BROTECH

EN

Technical Information **KORLOY**

Solid Tools Solution

Endmill

Drill

Reamer

Chamfer

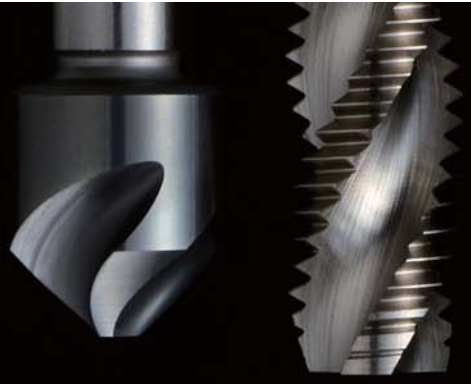
Thread

KORLOY

CONTENTS

PART 1

Endmill



PART 2

Drill

PART 3

Reamer / Chamfer / Thread

Endmill for HRSA Machining

Super Endmill

- Aerospace and generating industries
- Endmill for parts such as engines and turbines made into hard-to-cut materials.

See page 30.

Super Endmill

Optimal endmill for Ni Based super alloy HRSA : Inconel718, Hastelloy, waspalloy and etc.

For High Hardness

H-Star Endmill

- Ultra-fine substrate increases cutting edge strength of tools.
- The new coating layer applied provides hardness and a high temperature oxidation resistance of cutting edge in high speed machining
- Optimally designed cutting edge for high speed machining ensures stable machinability.

See page 34.

H-Star Endmill

Suitable for high speed machining of hardened workpieces ($H_RC50\sim63$).

The line-up of long neck, rib, taper neck, etc. is available for using in machining with various shapes.

U-Star Endmill

U-Star Endmill is suitable for machining medium hardness workpieces (HRC30~55) made of alloy steel, carbon steel, die steel, etc.

Full line-up available with various shapes like miniature type, taper neck, ball type, etc.

For mold & die

U-Star Endmill

- U-Star Endmill is available for a wide cutting range: roughing, medium cutting and finishing of molds and dies, and for various cutting methods of curved and inclined surfaces, special shapes, etc.
- High toughness substrate actualizes chipping resistance and hardness in machining.
- The new coating technology ensures oxidation resistance and high cutting edge strength.

See page 107.

For low hardness

G-Star Endmill

- Excellent Rake angle and Cutting edge considered the characteristics of workpiece.
- Improved chipping resistance and enhanced machinability by using high toughness materials.
- TiAlN coating for enhanced oxidation resistance and chipping resistance.

See page 180.

G-Star Endmill

Suitable for low hardness steel (HRC10~30); alloy steel, carbon steel, Pre-hardened, hardened steel etc.

General purpose suitable for rough machining, finishing and curved and sloped surfaces

Highly Efficient Roughing Endmill Series

R+ Endmill

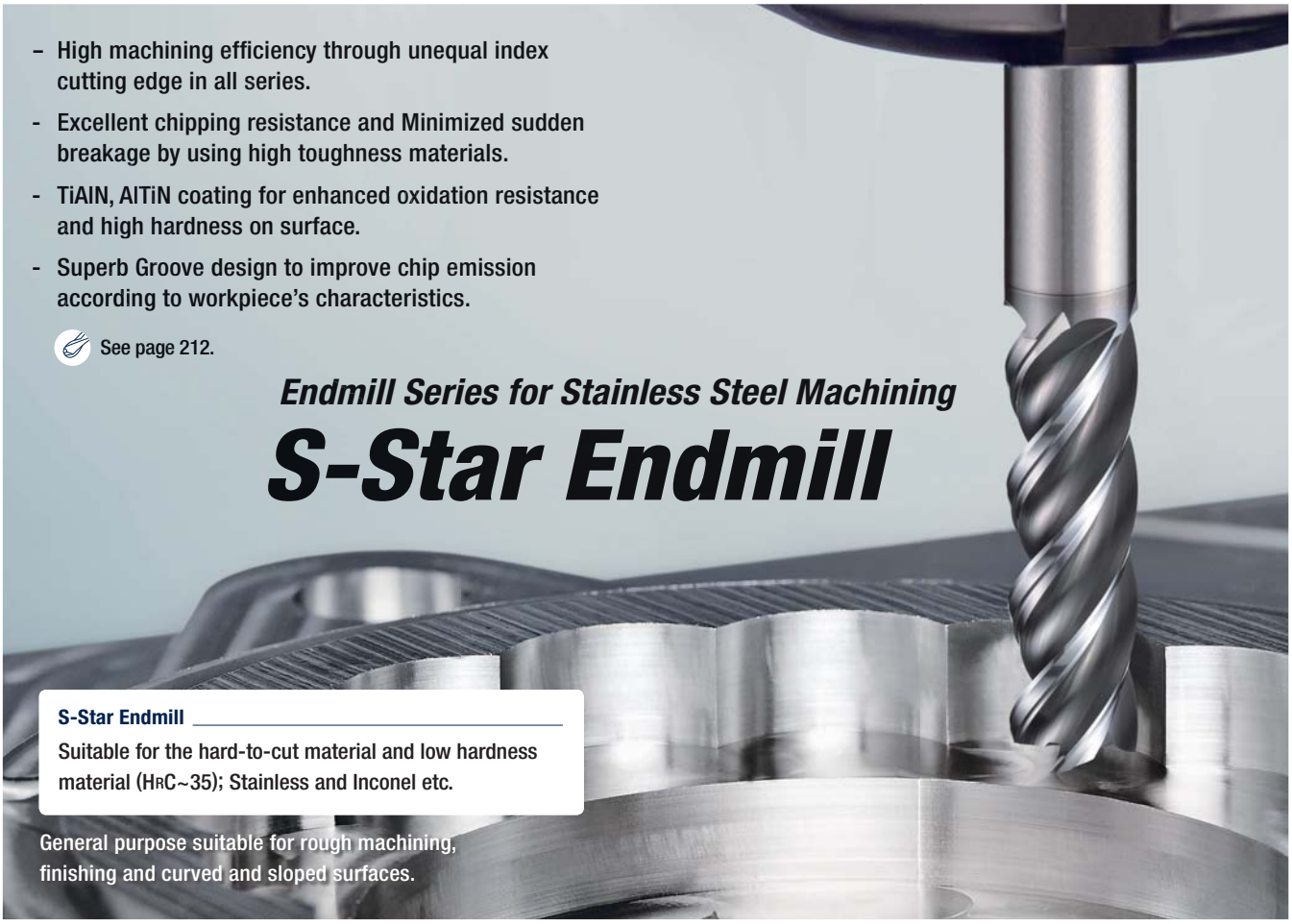
- Cost-saving cutting edge design for highly efficient roughing applications
- Reduced cutting load due to both differential pitch and unequal helix formation

See page 205.

R+ Endmill

Blade design ideal for roughing

High machining efficiency due to the special design for medium to rough cutting



- High machining efficiency through unequal index cutting edge in all series.
- Excellent chipping resistance and Minimized sudden breakage by using high toughness materials.
- TiAlN, AlTiN coating for enhanced oxidation resistance and high hardness on surface.
- Superb Groove design to improve chip emission according to workpiece's characteristics.

See page 212.

Endmill Series for Stainless Steel Machining

S-Star Endmill

S-Star Endmill

Suitable for the hard-to-cut material and low hardness material (H_RC~35); Stainless and Inconel etc.

General purpose suitable for rough machining, finishing and curved and sloped surfaces.

Endmill Series for Aluminum Machining

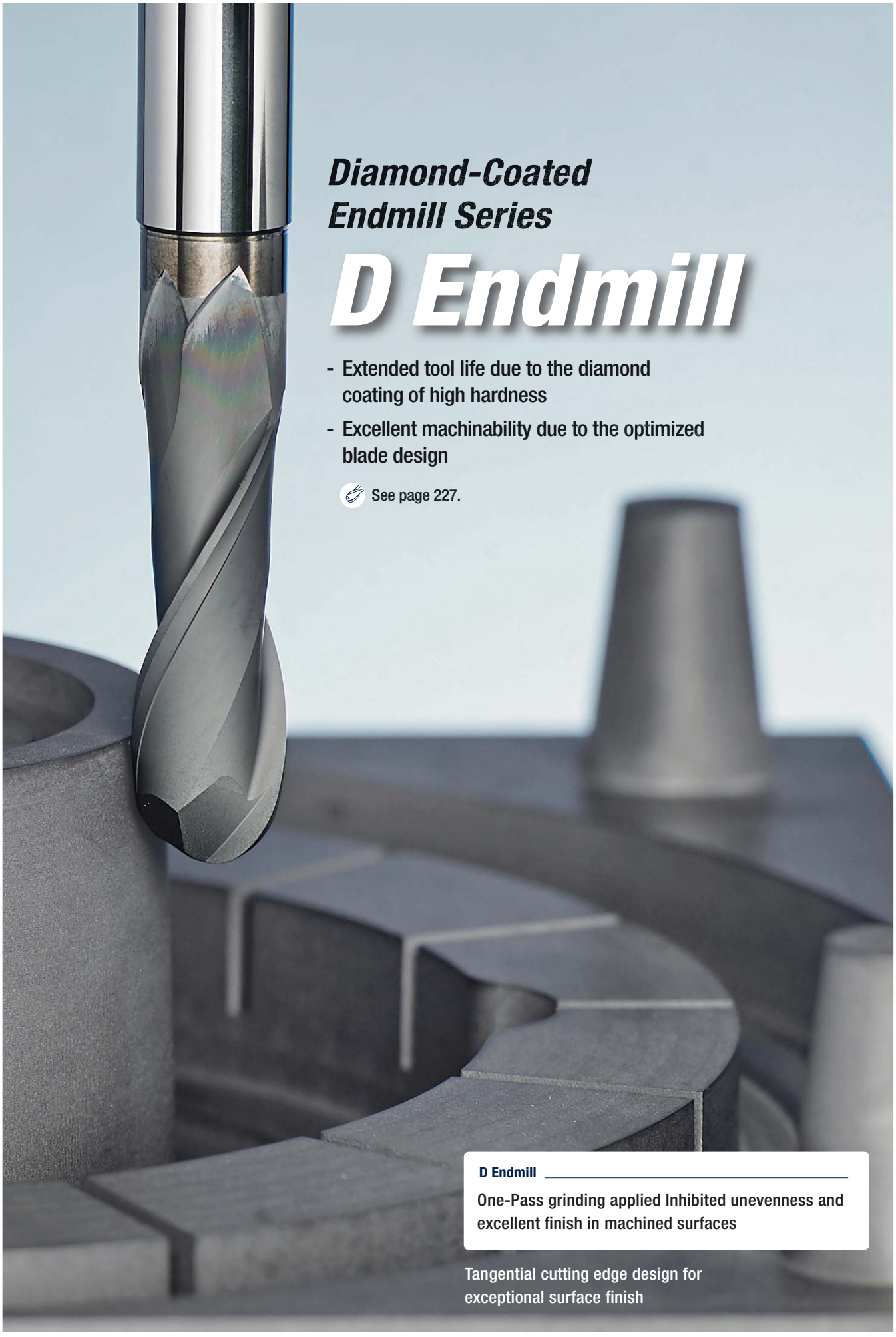
A-Star Endmill

- Sharp cutting edge considered the characteristics of workpiece
- High deposition resistance and enhanced chip emission through the surface of a mirror in the groove.
- Various specifications in the line such as Ball, single flute and roughing etc. for wide range in machining.

See page 215.

A-Star Endmill

Suitable for Aluminum, aluminum alloy and non-ferrous materials.



Diamond-Coated Endmill Series

D Endmill

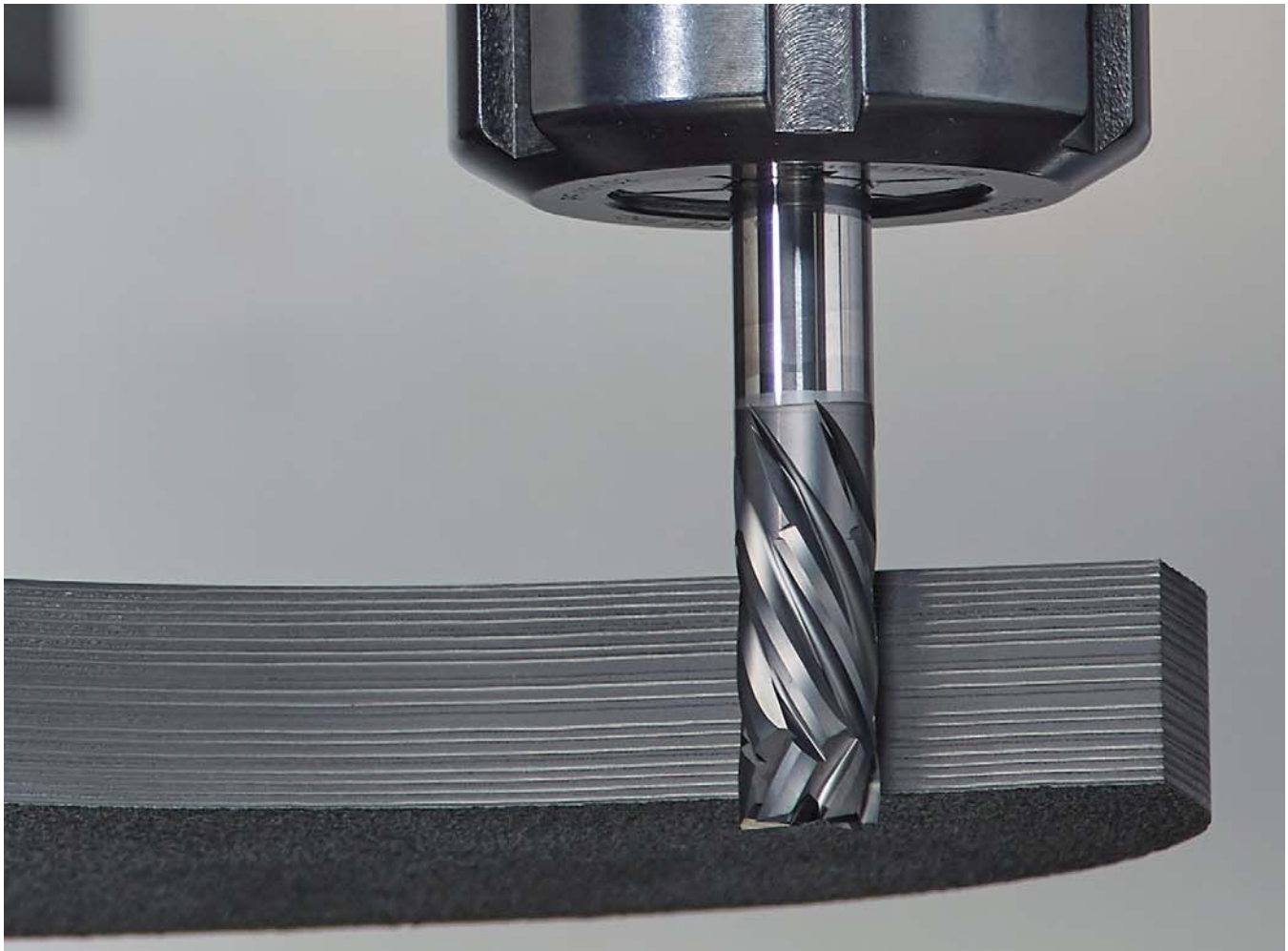
- Extended tool life due to the diamond coating of high hardness
- Excellent machinability due to the optimized blade design

See page 227.

D Endmill

One-Pass grinding applied Inhibited unevenness and excellent finish in machined surfaces

Tangential cutting edge design for exceptional surface finish



Router Endmill Series for Machining Composite Materials

Composite Router Endmill

- Blade design to inhibit delamination and burrs
- Boosted productivity due to highly efficient machining

See page 232.

Composite Router Endmill

Nano-crystalline diamond coating for excellent tool life

Router Endmill optimized for machining composite materials (CFRP, GFRP, etc.)

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T Endmill

Customized tools for various machine applications for dental prostheses

Optimized cutting performance by matching a proper grade with each type of dental prostheses

Endmill Series for Dental Prostheses Made of Zirconia, Titanium, Co-Cr, Wax, PMMA, etc.

T Endmill

- Inhibited unevenness and excellent finish in machined surfaces due to the optimized cutting edge design
- Specialized tool shape for each machine type

See page 237.

Multi-functional Endmill, Highly Efficient

M+ Endmill

- Endmill with various applications Drilling, ramping, slotting, side milling
- Enhanced surface roughness and reduced cutting load due to excellent tool rigidity
- Strengthened machinability due to Cr-based coating layer application

See page 240.

M+ Endmill

Multi-functional endmill for machining with various applications such as holemaking, milling etc.

Highly Efficient Hole Machining for Various Workpieces Including Automotive Components

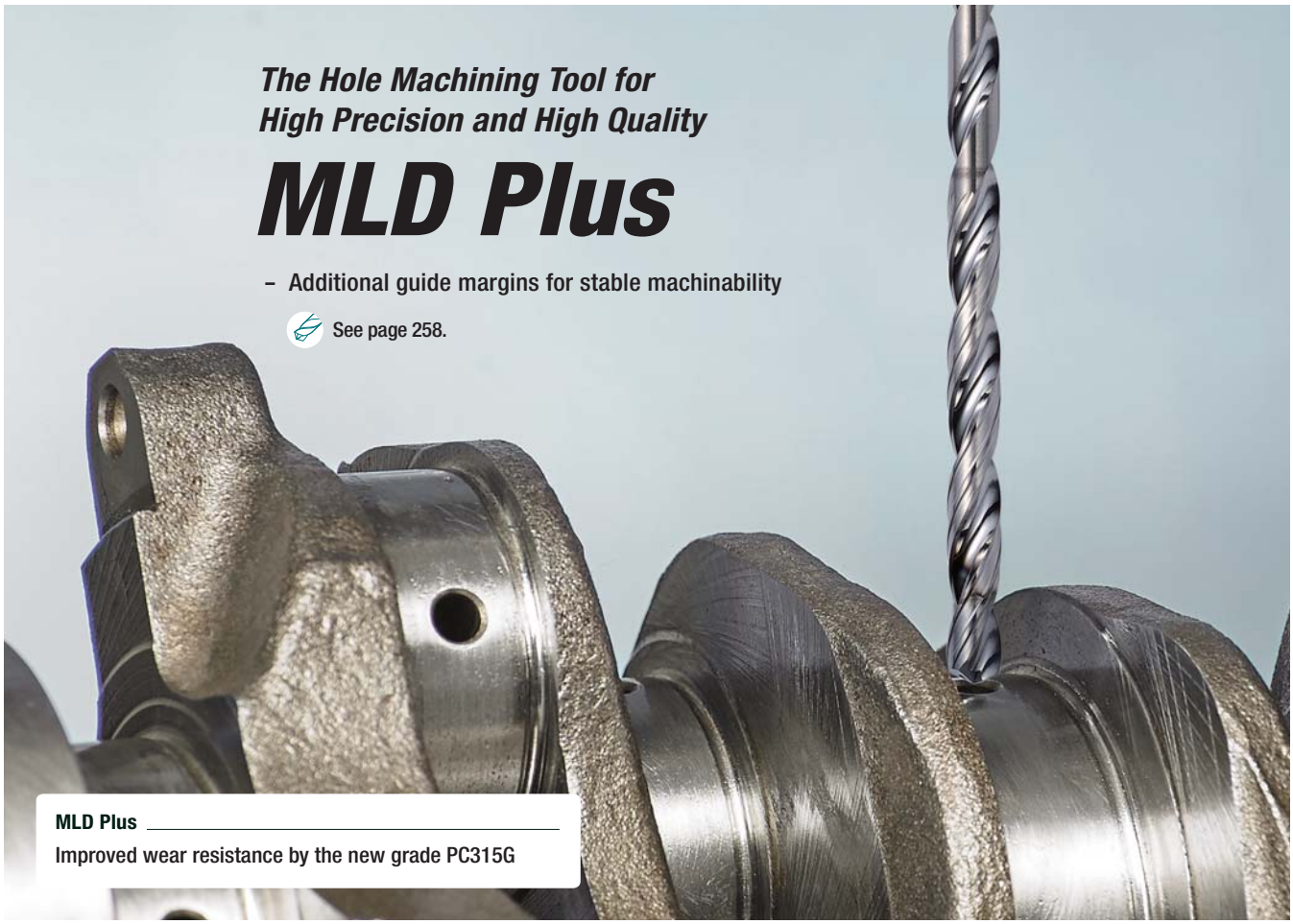
MSD Plus

- Highly efficient hole machining for various workpiece types such as automotive components
- Wider chip pockets for smooth chip evacuation

See page 246.

MSD Plus

Improved wear resistance by the new grade PC325U



The Hole Machining Tool for High Precision and High Quality

MLD Plus

- Additional guide margins for stable machinability

See page 258.

MLD Plus

Improved wear resistance by the new grade PC315G

For Hole Machining of Inconel and Titanium

MSD Plus-S

- Stable machinability with the optimized blade design and chip pockets
- Extended tool life due to excellent high temp resistance to chipping

See page 253.

T Endmill

Specialized for heat-resistant alloys used in aerospace, energy, power generation and automotive industries

Improved productivity and wear resistance due to stable machinability

The Hole Machining Tool Optimized for CFRP

MSD Plus CFRP

- Reduced burrs and excellent hole quality in CFRP machining by the high rake cutting edges

See page 261.

MSD Plus CFRP

Strong wear resistance by the new diamond-coated grade ND2100

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The Hole Machining Tool for Wide Applications Including Ramped, Curved and Flat Surfaces

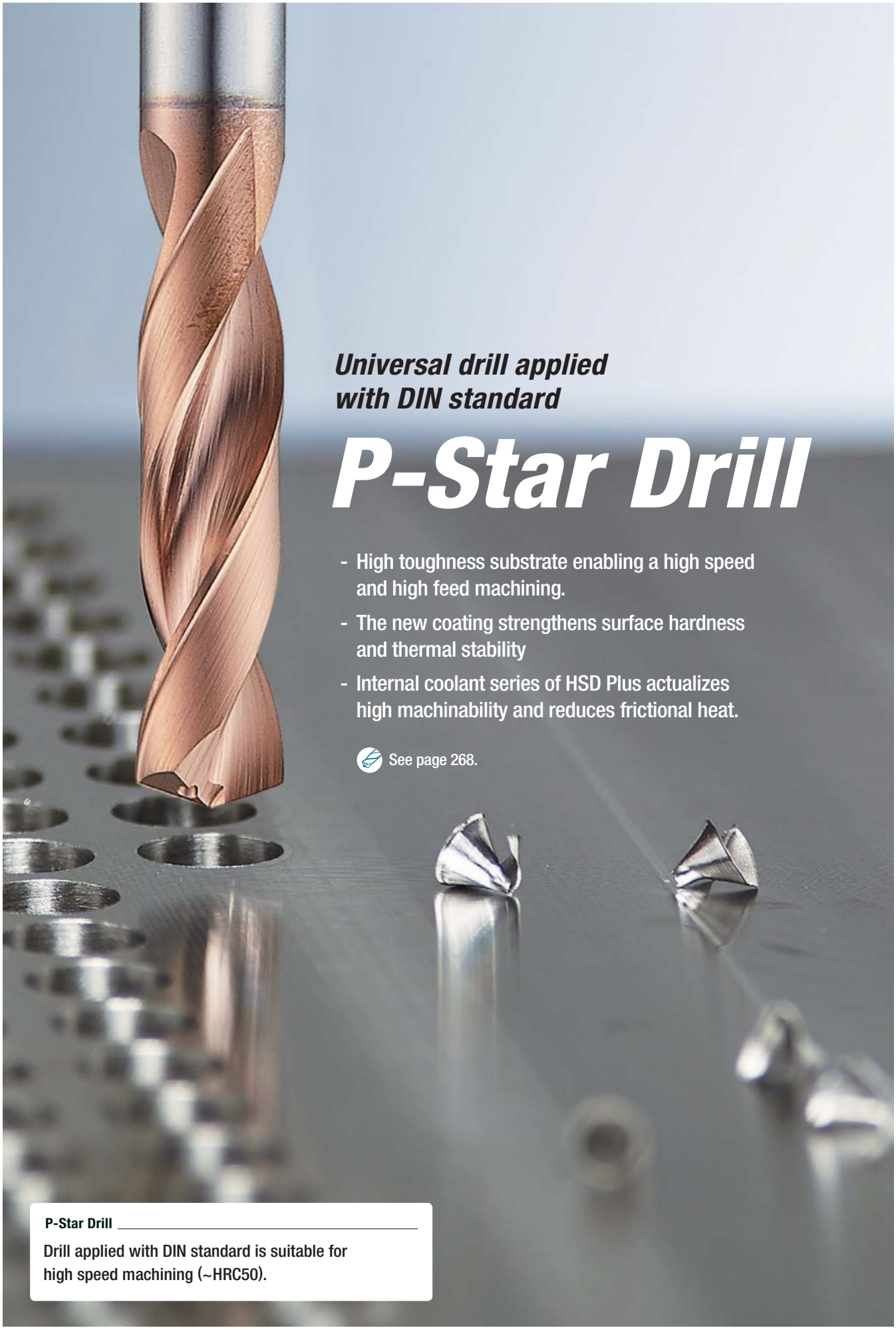
MSFD

- High-quality drilling availability in ramped surfaces by 180° point angle

See page 263.

MSFD

Improved resistance to chipping and welding, and reduced burrs by edge honing and chamfering



Universal drill applied with DIN standard

P-Star Drill

- High toughness substrate enabling a high speed and high feed machining.
- The new coating strengthens surface hardness and thermal stability
- Internal coolant series of HSD Plus actualizes high machinability and reduces frictional heat.

See page 268.

P-Star Drill

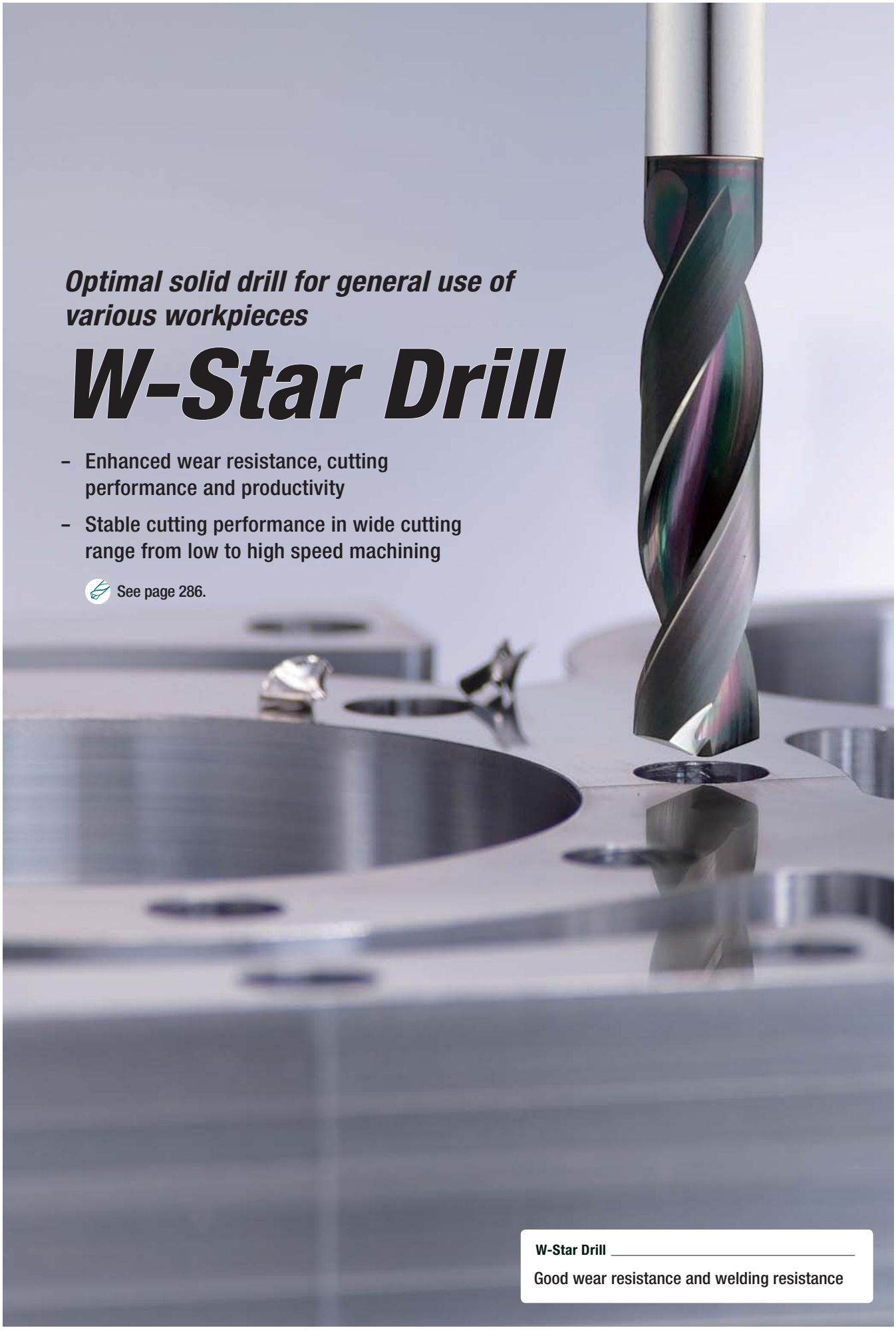
Drill applied with DIN standard is suitable for high speed machining (~HRC50).

Optimal solid drill for general use of various workpieces

W-Star Drill

- Enhanced wear resistance, cutting performance and productivity
- Stable cutting performance in wide cutting range from low to high speed machining

See page 286.



W-Star Drill

Good wear resistance and welding resistance

Carbide Solid Drill for Non-ferrous metals and Mild steel Machining

SSD-N

– Stable machining for high productivity

See page 295.

SSD-N

Available for various workpieces such as mild steel and non-ferrous metals

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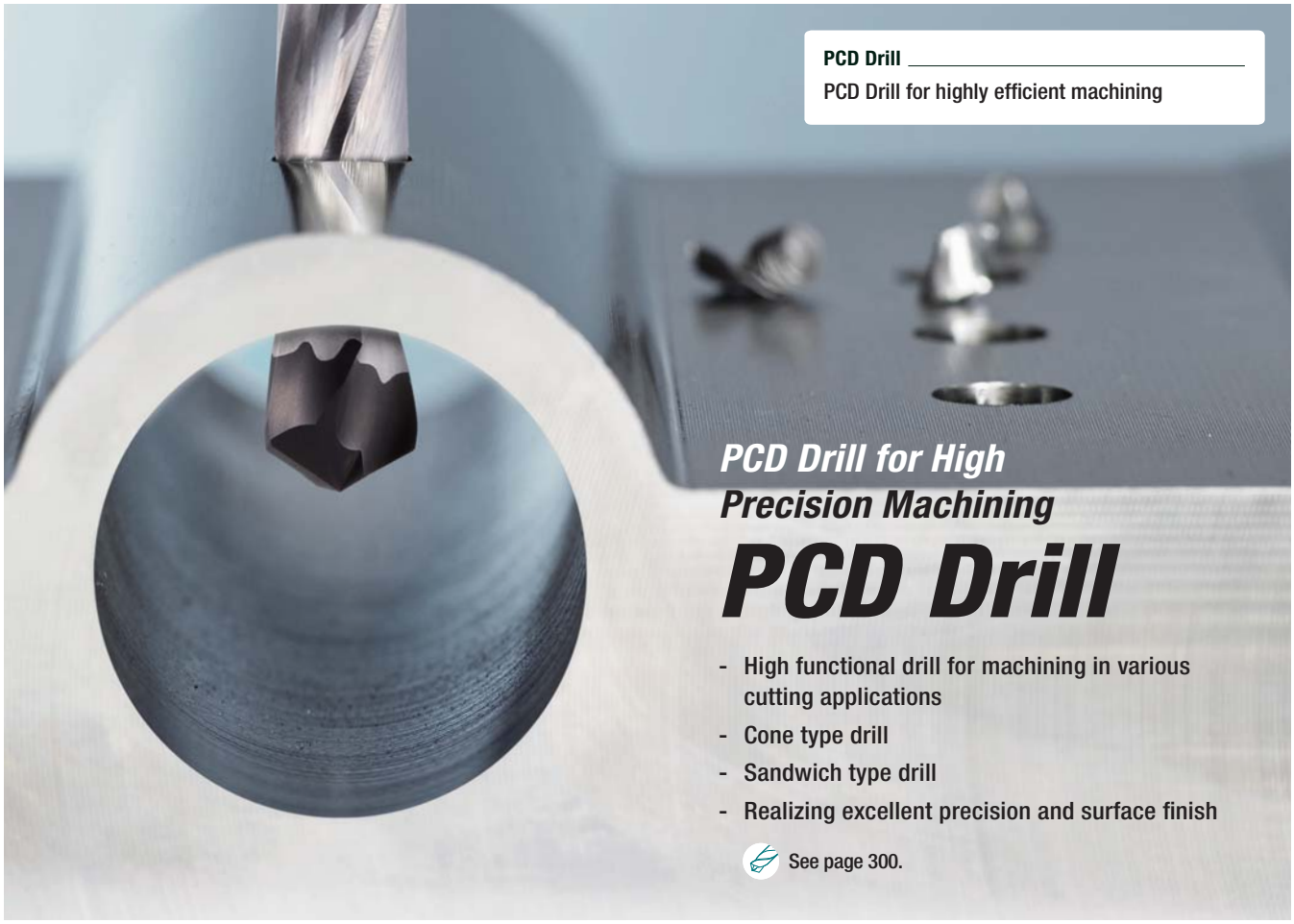


PCD Drill

PCD Drill for highly efficient machining

PCD Drill for High Precision Machining

PCD Drill

- High functional drill for machining in various cutting applications
- Cone type drill
- Sandwich type drill
- Realizing excellent precision and surface finish

See page 300.

Various counter sinks for high efficient machining

Counter Sink

- Unequal division and unequal lead applied for a high efficiency machining.
- Improved machinability actualizes high precision and stable machining.
- The new coating layer ensures stable machinability and extended tool life.

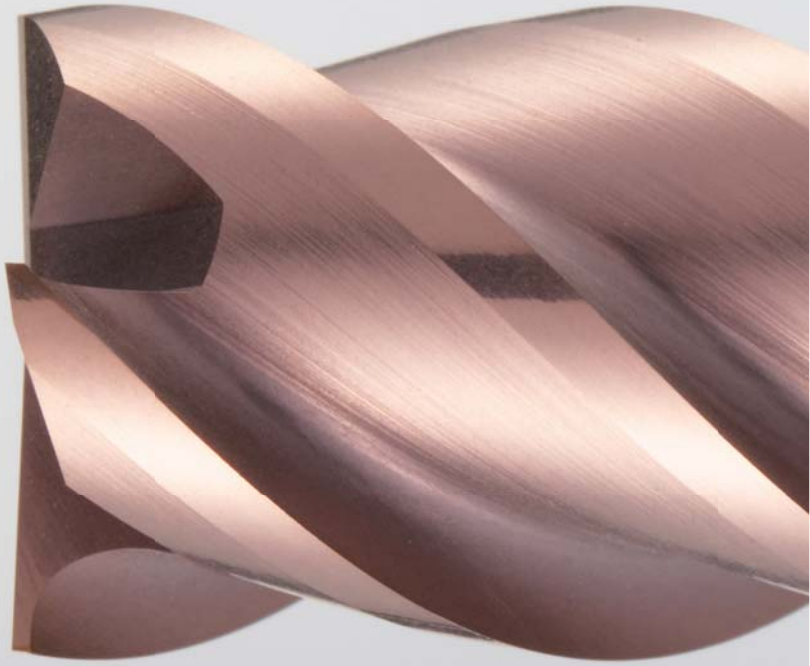
See page 318.

Counter Sink

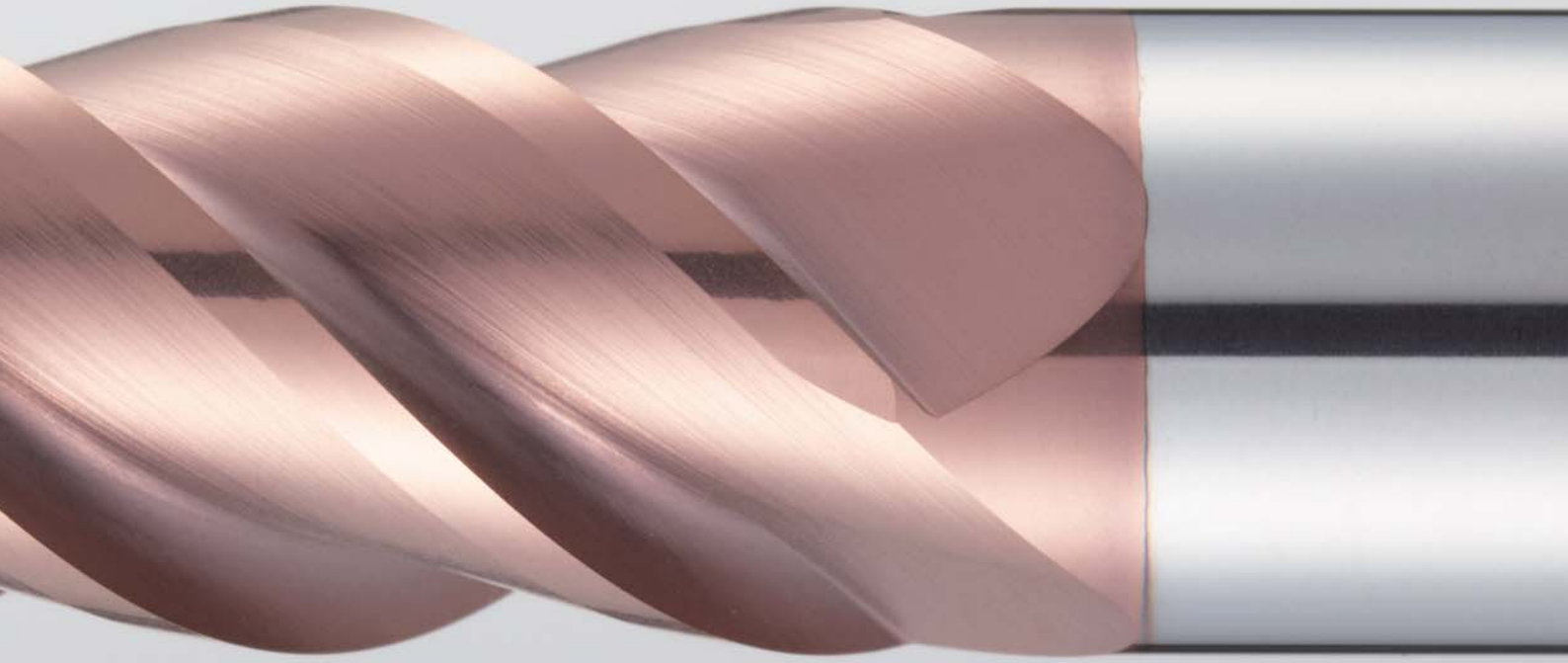
Carbide/HSS countersink with fast and stable performance

PART 1

Endmill



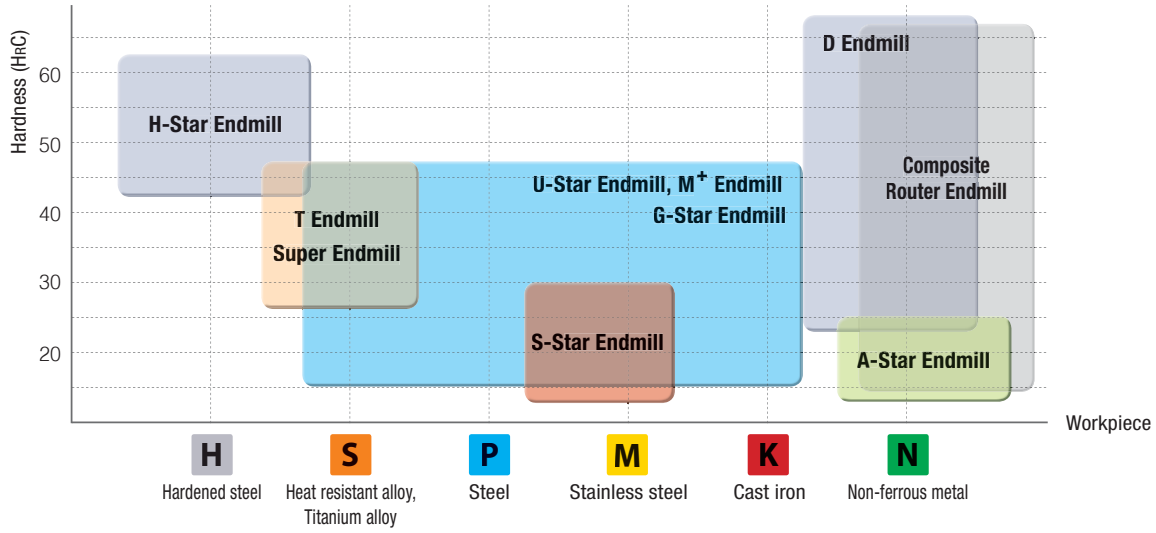
Product details



Technical information for Endmill

KORLOY Endmill

Application area



Tool selection guideline by functions

● 1st recommended ◑ 2nd recommended ○ Not recommended

Type	No. of tooth		Precise finishing	Finishing	Roughing	Slotting	Plunging	Copying	Trochoidal milling
Flat/ Radius	2 teeth	2	○	○	◑	●	●	○	○
	3 teeth	3	○	◑	◑	●	◑	○	○
	4 teeth	4	●	●	●	●	○	○	●
	6 teeth or over	6	●	●	○	○	○	○	●
Ball	2 teeth	2	○	○	○	●	○	●	○
	4 teeth	4	○	○	○	◑	○	●	○

- It is recommended to choose the shortest length tool in every application as possible.
- Stable machining actualizes long tool life and enhanced surface finish.

Line-up and features

Work-piece	Use	Product name	Type	No. of tooth	Diameter (tolerance)	Picture / No. of standard items	Features
H	High hardness (~HRC63)	H-Star Endmill	F B R	2~6	0.1~20	 3,007 Items	• Economical tools for high speed and high hardness machining • Available for various shapes of workpiece as long-neck
P K	hardness (~HRC55)	U-Star Endmill	F B R	2~6	0.1~25	 3,975 Items	• Economical tools for general machining with high performance • For various workpiece machining (carbon steel, alloy steel, cast iron, pre-hardened, etc.)
	General (~HRC30)	G-Star Endmill	F B R	2~4	1.0~20	 456 Items	• For general machining with high performance and high quality • For various workpiece machining (carbon steel, alloy steel, cast iron, pre-hardened, etc.)
M	Stainless steel	S-Star Endmill	F R	4	1.0~20	 72 Items	• Optimal performance in stainless machining • Enhanced oxidation resistance
S	HRSA	Super Endmill	F R	4	3.0~20	 162 Items	• Endmill for HRSA machining • Optimal for machining of Ni based HRSA such as Inconel, Hastelloy, Waspaloy, etc.
N	Non-ferrous metal, Aluminum	A-Star Endmill	F B R	2~3	1.0~20	 330 Items	• Effective chip evacuation in high feed machining with U-shape • Double relief angle (stronger cutting edge)
	Composite materials	Composite Router Endmill	F	2~8	4.0~12	 44 Items	• Router for composite material machining • High performance due to Nano-Crystalline dia-coating
	Graphite, Ceramics	D Endmill	F B	2~4	0.6~12	 151 Items	• Longer tool life due to high hardness dia-coating • Applying one-pass grinding and good surface finish
	Dental, metal, wax, Zirconia	T Endmill	B	2	0.6~3	 11 Items	• Endmill for machining materials for stooping teeth, Zirconia, Titanium, Co-Cr, Wax, PMMA, etc. • Applicable to dental milling machine and various materials for stooping teeth
For general machining with special function	Multi-functional	M+ Endmill	F D	4	3.0~20	 32 Items	• Multi-endmill for various machining (drilling, milling, etc.)
	Roughing	R+ Endmill	R	2~4	5.0~25	 204 Items	• Endmill with a shape minimizing cutting load for roughing

KORLOY Endmill

Type	Used	Shape	Designation	Figure	Coated	No. of flute	Size (Ø) Min	Size (Ø) Max	Workpiece P Steel	Workpiece M Stainless steel	Workpiece K Cast iron	Workpiece N Non-ferrous metal	Workpiece S Heat resistant alloy, Titanium alloy	Workpiece H Hardened steel	page
Super Endmill	HRSA	Flat	SFES		SL	4	3.0	20.0					◎		31
		Radius	SRES		SL	4	3.0	20.0					◎		32
H-Star Endmill	High speed, High hardness	Ball	ESB702		AℓTiN	2	0.1	12.0	◎		◎		○	◎	36
			ESB712		AℓTiN	2	1.0	12.0	◎		◎		○	◎	37
			ESB703		AℓTiN	3	2.0	12.0	◎		◎		○	◎	38
			ESB734		AℓTiN	4	2.0	10.0	◎		◎		○	◎	39
		Flat	ESE702		AℓTiN	2	0.1	20.0	◎		◎		○	◎	40
			ESE712		AℓTiN	2	1.0	6.0	◎		◎		○	◎	41
			ESE704		AℓTiN	4	1.0	20.0	◎		◎		○	◎	42
			ESE714		AℓTiN	4	1.0	12.0	◎		◎		○	◎	43
			ESE724(6)		AℓTiN	4/6	1.0	12.0	◎		◎		○	◎	44
			ESE744 New		AℓTiN	4	1.0	12.0	◎		◎		○	◎	45
			ESE716		AℓTiN	6	6.0	20.0	◎		◎		○	◎	46
		Radius	ESR702		AℓTiN	2	1.0	12.0	◎		◎		○	◎	47
			ESR732		AℓTiN	2	1.0	12.0	◎		◎		○	◎	50
			ESR704		AℓTiN	4	1.0	12.0	◎		◎		○	◎	51
			ESR714		AℓTiN	4	3.0	12.0	◎		◎		○	◎	53
			ESR724		AℓTiN	4	6.0	12.0	◎		◎		○	◎	54
			ESR734		AℓTiN	4	1.0	12.0	◎		◎		○	◎	55
			ESR706		AℓTiN	6	6.0	12.0	◎		◎		○	◎	56
			ESR736		AℓTiN	6	6.0	12.0	◎		◎		○	◎	57
		Rib ball	ESRB712		AℓTiN	2	0.1	12.0	◎		◎		○	◎	58
		Rib flat	ESRE712		AℓTiN	2	0.1	12.0	◎		◎		○	◎	62

◎: Excellent ○: Good

Type	Used	Shape	Designation	Figure	Coated	No. of flute	Size (Ø) Min	Size (Ø) Max	Workpiece P Steel	Workpiece M Stainless steel	Workpiece K Cast iron	Workpiece N Non-ferrous metal	Workpiece S Heat resistant alloy, Titanium alloy	Workpiece H Hardened steel	page
H-Star Endmill	High speed, High hardness	Rib flat	ESRE714 (New)		AlTiN	4	0.5	12.0	◎		◎		○	◎	65
		Rib radius	ESRR712 (New)		AlTiN	2	0.2	16.0	◎		◎		○	◎	68
			ESRR714 (New)		AlTiN	4	0.5	20.0	◎		◎		○	◎	74
		Flat	ESXE704		AlTiN	4	1.0	12.0	◎		◎		○	◎	81
			ESXE714		AlTiN	4	2.0	12.0	◎		◎		○	◎	82
		Radius	ESXR704		AlTiN	4	2.0	12.0	◎		◎		○	◎	83
		Rib ball	ESLNB		AlTiN	2	0.1	5.0	◎		◎		○	◎	84
			ESTNB20		AlTiN	2	0.2	10.0	◎		◎		○	◎	88
			ESTNB30		AlTiN	3	2.0	5.0	◎		◎		○	◎	92
		Rib flat	ESLNS20		AlTiN	2	0.1	5.0	◎		◎		○	◎	94
			ESLNS40		AlTiN	4	1.0	5.0	◎		◎		○	◎	98
		Rib radius	ESLNR		AlTiN	2	0.2	3.0	◎		◎		○	◎	100
			ESTNR		AlTiN	2	0.2	3.0	◎		◎		○	◎	104
		High feed	ESPM4		AlTiN	4	3.0	12.0	◎		◎		○	◎	106
U-Star Endmill	General	Ball	WHPB902		W	2	0.1	12.0	◎	○	◎		○		109
			WB502		W	2	0.1	25.0	◎	○	◎		○		110
			WB502-P		W	2	0.1	12.0	◎	○	◎		○		112
			WSB502		W	2	3.0	20.0	◎	○	◎		○		113
			WB503		W	3	1.0	12.0	◎	○	◎		○		114
			WB504		W	4	1.0	12.0	◎	○	◎		○		115
			WB532		W	2	3.0	12.0	◎	○	◎		○		116
			WB542		W	2	0.1	12.0	◎	○	◎		○		117
		Flat	WME502		W	2	0.1	25.0	◎	○	◎		○		123

◎: Excellent ○: Good

KORLOY Endmill

Type	Used	Shape	Designation	Figure	Coated	No. of flute	Size (Ø)		Workpiece						page
									P	M	K	N	S	H	
							Min	Max	Steel	Stainless steel	Cast iron	Non-ferrous metal	Heat resistant alloy, Titanium alloy	Hardened steel	
U-Star Endmill	General	Flat	WE502		W	2	0.1	20.0	◎	○	◎		○		124
			WE502-S3		W	2	0.1	3.0	◎	○	◎		○		126
			WE514		W	4	1.0	12.0	◎	○	◎		○		127
			WE522		W	2	1.0	25.0	◎	○	◎		○		129
			WE524		W	4	1.0	25.0	◎	○	◎		○		131
			WME504		W	4	0.8	25.0	◎	○	◎		○		133
			WXE504		W	4	1.0	20.0	◎	○	◎		○		134
			WE504H		W	4	1.0	20.0	◎	○	◎		○		135
			WE506		W	6	6.0	20.0	◎	○	◎		○		136
		Radius	WR502		W	2	0.2	20.0	◎	○	◎		○		137
			WR504		W	4	3.0	20.0	◎	○	◎		○		140
			WR506		W	6	6.0	20.0	◎	○	◎		○		141
			WR512		W	2	0.02	1.0	◎	○	◎		○		142
			WR514		W	4	6.0	12.0	◎	○	◎		○		146
			WXR504		W	4	1.0	20.0	◎	○	◎		○		149
		Radius	WXR514		W	4	1.0	20.0	◎	○	◎		○		151
		Rib radius	WR542		W	2	0.2	4.0	◎	○	◎		○		156
			WR544		W	4	1.0	4.0	◎	○	◎		○		161
		High feed	WSPM4		W	4	1.0	20.0	◎	○	◎		○		165
		Radius	WDR503		W	3	6.0	20.0	◎	○	◎		○		166
		Roughing	WF60		W	3~5	3.0	25.0	◎	○	◎		○		167
			WF61		W	3~5	3.0	25.0	◎	○	◎		○		168
		Taper ball	WTB502		W	2	0.3	2.0	◎	○	◎		○		169

◎: Excellent ○: Good

Type	Used	Shape	Designation	Figure	Coated	No. of flute	Size (Ø) Min	Size (Ø) Max	Workpiece P Steel	Workpiece M Stainless steel	Workpiece K Cast iron	Workpiece N Non-ferrous metal	Workpiece S Heat resistant alloy, Titanium alloy	Workpiece H Hardened steel	page
U-Star Endmill	General	Taper flat	WTE502		W	2	0.3	10.0	◎	○	◎		○		170
			WTE504		W	4	3.0	10.0	◎	○	◎		○		172
			WTE514		W	4	0.8	2.5	◎	○	◎		○		173
		Taper radius	WTR504		W	4	0.1	0.3	◎	○	◎		○		176
G-Star Endmill	General	Ball	DB312		AlTiN	2	1.0	20.0	◎	○	◎		○		182
			DB342		AlTiN	2	1.0	12.0	◎	○	◎		○		183
		Flat	TX202		AlTiN	2	1.0	20.0	◎	○	◎		○		184
			TX204		AlTiN	4	1.0	20.0	◎	○	◎		○		185
			TX222		AlTiN	2	3.0	20.0	◎	○	◎		○		186
			TX224		AlTiN	4	3.0	20.0	◎	○	◎		○		187
			TX302		AlTiN	2	1.0	20.0	◎	○	◎		○		188
			TX304		AlTiN	4	1.0	20.0	◎	○	◎		○		189
			TX304H		AlTiN	4	3.0	20.0	◎	○	◎		○		190
		Ball	TXB202		AlTiN	2	1.0	20.0	◎	○	◎		○		191
			TXB204		AlTiN	4	2.0	20.0	◎	○	◎		○		192
			TXB222		AlTiN	2	3.0	20.0	◎	○	◎		○		193
			TXB232		AlTiN	2	3.0	20.0	◎	○	◎		○		194
			TXB302		AlTiN	2	1.0	20.0	◎	○	◎		○		195
			TXB304		AlTiN	4	1.0	20.0	◎	○	◎		○		196
		Flat	ZE302P		AlTiN	2	1.0	20.0	◎	○	◎		○		197
		Flat	ZE304P		AlTiN	4	1.0	20.0	◎	○	◎		○		198
			ZE322		AlTiN	2	3.0	20.0	◎	○	◎		○		199
			ZE324		AlTiN	4	3.0	20.0	◎	○	◎		○		200

◎: Excellent ○: Good

KORLOY Endmill

Type	Used	Shape	Designation	Figure	Coated	No. of flute	Size (Ø) Min	Size (Ø) Max	Workpiece P Steel	Workpiece M Stainless steel	Workpiece K Cast iron	Workpiece N Non-ferrous metal	Workpiece S Heat resistant alloy, Titanium alloy	Workpiece H Hardened steel	page
G-Star Endmill	General	Radius	ZR304H		AℓTiN	4	3.0	12.0	◎	○	◎		○		201
			ZR322		AℓTiN	2	3.0	12.0	◎	○	◎		○		202
			ZR324		AℓTiN	4	3.0	12.0	◎	○	◎		○		203
			ZR324H		AℓTiN	4	6.0	12.0	◎	○	◎		○		204
R+ Endmill	Aluminum	Roughing	RPAE		Carbide, Non	3	6.0	25.0				◎			206
	General		RPE-FP-H		Carbide, TiAlN	4	5.0	20.0	◎	○	◎		○		206
			RPLE-FP-H		Carbide, TiAlN	4	5.0	20.0	◎	○	◎		○		207
			RPE-XG		Carbide, TiAlN	4	5.0	20.0	◎	○	◎		○		207
			RPE-FP-L		Carbide, TiAlN	4	5.0	20.0	◎	○	◎		○		208
			RPE-RG		Carbide, TiAlCrN	4	5.0	20.0	◎	○	◎		○		208
			RPE-RG		HSS, TiAlN	4	6.0	20.0	◎	○	◎		○		209
			RPE-FF		HSS, TiAlN	4	6.0	20.0	◎	○	◎		○		209
			RPE-FP		HSS, TiAlN	4	6.0	20.0	◎	○	◎		○		210
			RPE-RG		HSS, TiCN HSS, TiN	4	6.0	50.0	◎	○	◎		○		211
S-Star Endmill	STS	Flat	VXE504		AℓCrN	4	1.0	20.0	○	◎	○		◎		213
		Radius	VXR504		AℓCrN	4	1.0	20.0	○	◎	○		◎		214
A-Star Endmill	Aluminum	Ball	WAB312		Non	2	6.0	20.0	○			◎			217
		Flat	WAE301		Non	1	0.2	12.0	○			◎			218
			WAE302		Non	2	1.0	25.0	○			◎			219
			WAE30(2)3		Non	3	1.0	25.0	○			◎			220
		Radius	WAR302		Non	2	6.0	20.0	○			◎			222
			WAR303		Non	3	6.0	20.0	○			◎			223
			WAR502		Non	2	1.0	12.0	○			◎			224

◎: Excellent ○: Good

Type	Used	Shape	Designation	Figure	Coated	No. of flute	Size (Ø) Min	Size (Ø) Max	Workpiece P Steel	Workpiece M Stainless steel	Workpiece K Cast iron	Workpiece N Non-ferrous metal	Workpiece S Heat resistant alloy, Titanium alloy	Workpiece H Hardened steel	page
A-Star Endmill	Aluminum	Radius	WAR503		Non	3	4.0	20.0	○			◎			225
		Roughing	WAF303		Non	3	4.0	20.0	○			◎			226
D Endmill	Graphite, Ceramics	Flat	DFE		Diamond	2	1.0	12.0				◎			228
					Diamond	4	2.0	12.0				◎			229
		Ball	DBE		Diamond	2	0.6	12.0				◎			230
					Diamond	4	2.0	12.0				◎			231
Composite Router Endmill	Composite CFRP, GFRP	Flat	CCDR		Diamond	4	6.0	8.0				◎			233
					Diamond	6	10.0	12.0				◎			233
			CCR		Diamond	2	4.0	12.0				◎			234
			CCLR		Diamond	4	4.0	12.0				◎			235
			CCRR		Diamond	6	6.0	8.0				◎			236
					Diamond	8	10.0	12.0				◎			236
T Endmill	Dental, Zirconia	Ball	TZBE		Diamond	2	0.6	3.0				◎			237
	Dental, Metal	Ball	TTBE		Diamond	2	0.6	3.0					◎		237
	Dental, Wax		TWBE		-	2	0.6	3.0				◎			237
M+ Endmill	Multi	Flat	MPRE		TiAlCrN	4	3.0	20.0	◎	○	◎		○		240
PCD Endmill	Nonferrous, High speed	Flat	PDE		-	1	4.6	6.0				◎			241
					-	2	6.0	12.0				◎			241

◎: Excellent ○: Good

Endmill for Ni series HRSA machining (Inconel, Hasteloy, Waspaloy and etc.)

Super Endmill For HRSA

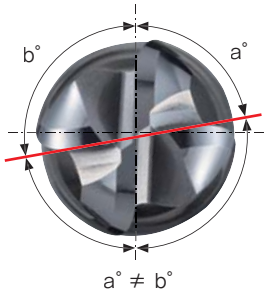
- Exclusive endmill for plane engines, generator and turbine parts.
- Optimal endmill for Ni series HRSA machining (Inconel, Hasteloy, Waspaloy and etc.)
  * **HRSA:** Heat resistant super alloy. Heating resisting alloy

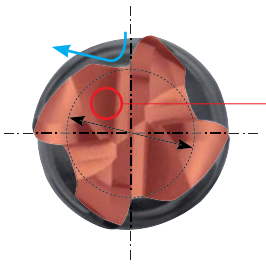
Code system

S	RE	S	4	120	-	080	-	R30
Super Endmill	Type	Workpiece	No. of flutes	Tool diameter		Flute length		R Corner R
	R: Radius Endmill	S: Super alloy T: Titanium/STS	4: 4 Flute	120: Ø12.0 mm		080: 80 mm		30: 30 mm

Features

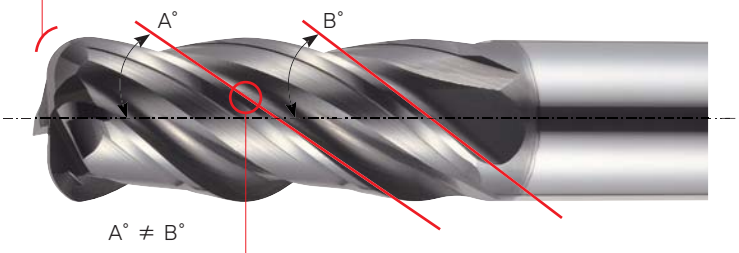
- Airplane and generator industries: Exclusive endmill for HRSA engine and turbine parts machining
- Irregular flute spacing and helix shape: Reducing chattering and improving stability in machining
- High rigidity core web design: Improving chip evacuation and stability in machining
- Sharp cutting edge: Reducing cutting load and work hardening
- Long tool life: New grade with high hardness and wear resistance substrate





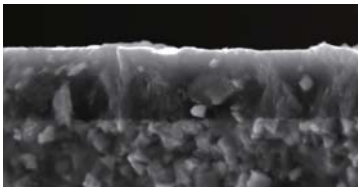
• **High rigidity core web design**
- Improved chip evacuation
- Increased machining stability

• **Sharp cutting edge**
- Applied corner radius gash and positive rake angle
- Reduced cutting load and work hardening



• **Irregular flute spacing helix angle**
- Reducing chattering
- Increasing machining stability

Features of grade



Super Lubricating Coating

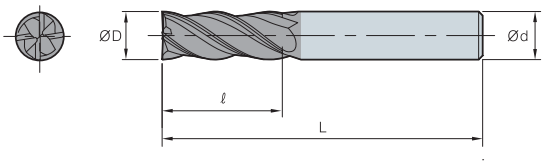
• **Super lubricating coating and special surface treatment technology**
- Improved welding and chipping resistance and machining stability

SFES4000 (Flat)

4 | 35°/38° HELIX | SL Coating | DATA p.380

• TOLERANCE

ØD		Ød
Ø1 ~ Ø6	0 ~ -0.015mm	h6
Ø6.1 ~ Ø20	0 ~ -0.02mm	



(mm)

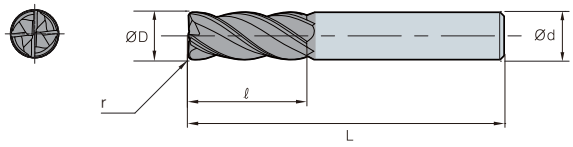
Designation	ØD	Ød	ℓ	L
SFES4030-050	3	6	8	50
SFES4040-050	4	6	10	50
SFES4050-060	5	6	15	60
SFES4060-060	6	6	15	60
SFES4080-070	8	8	20	70
SFES4100-075	10	10	25	75
SFES4120-080	12	12	30	80
SFES4140-100	14	14	35	90
SFES4160-100	16	16	42	100
SFES4200-100	20	20	48	100

Endmill Super Endmill For HRSA

SRES4000 (Radius)

• TOLERANCE

ØD		Ød
Ø1 ~ Ø6	0 ~ -0.015mm	h5
Ø6.1 ~ Ø20	0 ~ -0.02mm	



(mm)

Designation	ØD	Ød	ℓ	L	r
SRES4030-055-R02	3	6	8	55	0.2
SRES4030-055-R03	3	6	8	55	0.3
SRES4030-055-R05	3	6	8	55	0.5
SRES4040-055-R02	4	6	10	55	0.2
SRES4040-055-R03	4	6	10	55	0.3
SRES4040-055-R05	4	6	10	55	0.5
SRES4040-070-R02	4	6	10	70	0.2
SRES4040-070-R03	4	6	10	70	0.3
SRES4040-070-R05	4	6	10	70	0.5
SRES4050-055-R02	5	6	15	55	0.2
SRES4050-055-R03	5	6	15	55	0.3
SRES4050-055-R05	5	6	15	55	0.5
SRES4050-090-R02	5	6	15	90	0.2
SRES4050-090-R03	5	6	15	90	0.3
SRES4050-090-R05	5	6	15	90	0.5
SRES4060-060-R03	6	6	15	60	0.3
SRES4060-060-R05	6	6	15	60	0.5
SRES4060-060-R08	6	6	15	60	0.8
SRES4060-060-R10	6	6	15	60	1.0
SRES4060-060-R15	6	6	15	60	1.5
SRES4060-060-R20	6	6	15	60	2.0
SRES4060-090-R03	6	6	15	90	0.3
SRES4060-090-R05	6	6	15	90	0.5
SRES4060-090-R08	6	6	15	90	0.8
SRES4060-090-R10	6	6	15	90	1.0
SRES4060-090-R15	6	6	15	90	1.5
SRES4060-090-R20	6	6	15	90	2.0
SRES4080-070-R03	8	8	20	70	0.3
SRES4080-070-R05	8	8	20	70	0.5
SRES4080-070-R08	8	8	20	70	0.8
SRES4080-070-R10	8	8	20	70	1.0
SRES4080-070-R15	8	8	20	70	1.5
SRES4080-070-R20	8	8	20	70	2.0
SRES4080-070-R25	8	8	20	70	2.5
SRES4080-070-R30	8	8	20	70	3.0
SRES4080-100-R03	8	8	20	100	0.3

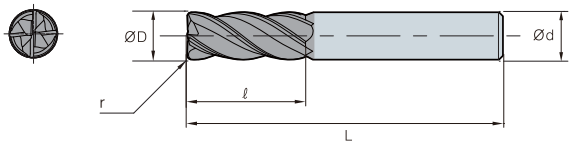
Designation	ØD	Ød	ℓ	L	r
SRES4080-100-R05	8	8	20	100	0.5
SRES4080-100-R08	8	8	20	100	0.8
SRES4080-100-R10	8	8	20	100	1.0
SRES4080-100-R15	8	8	20	100	1.5
SRES4080-100-R20	8	8	20	100	2.0
SRES4080-100-R25	8	8	20	100	2.5
SRES4080-100-R30	8	8	20	100	3.0
SRES4100-075-R03	10	10	25	75	0.3
SRES4100-075-R05	10	10	25	75	0.5
SRES4100-075-R08	10	10	25	75	0.8
SRES4100-075-R10	10	10	25	75	1.0
SRES4100-075-R15	10	10	25	75	1.5
SRES4100-075-R20	10	10	25	75	2.0
SRES4100-075-R25	10	10	25	75	2.5
SRES4100-075-R30	10	10	25	75	3.0
SRES4100-100-R03	10	10	25	100	0.3
SRES4100-100-R05	10	10	25	100	0.5
SRES4100-100-R08	10	10	25	100	0.8
SRES4100-100-R10	10	10	25	100	1.0
SRES4100-100-R15	10	10	25	100	1.5
SRES4100-100-R20	10	10	25	100	2.0
SRES4100-100-R25	10	10	25	100	2.5
SRES4100-100-R30	10	10	25	100	3.0
SRES4120-080-R05	12	12	30	80	0.5
SRES4120-080-R08	12	12	30	80	0.8
SRES4120-080-R10	12	12	30	80	1.0
SRES4120-080-R15	12	12	30	80	1.5
SRES4120-080-R20	12	12	30	80	2.0
SRES4120-080-R25	12	12	30	80	2.5
SRES4120-080-R30	12	12	30	80	3.0
SRES4120-080-R35	12	12	30	80	3.5
SRES4120-080-R40	12	12	30	80	4.0
SRES4120-110-R05	12	12	30	110	0.5
SRES4120-110-R08	12	12	30	110	0.8
SRES4120-110-R10	12	12	30	110	1.0
SRES4120-110-R15	12	12	30	110	1.5

SRES4000 (Radius)

4 | 35°/38° HELIX | R ±0.01 Corner R | SL Coating | DATA p.380

• TOLERANCE

ØD		Ød
Ø1 ~ Ø6	0 ~ -0.015mm	h5
Ø6.1 ~ Ø20	0 ~ -0.02mm	



Designation	ØD	Ød	ℓ	L	r
SRES4120-110-R20	12	12	30	110	2.0
SRES4120-110-R25	12	12	30	110	2.5
SRES4120-110-R30	12	12	30	110	3.0
SRES4120-110-R35	12	12	30	110	3.5
SRES4120-110-R40	12	12	30	110	4.0
SRES4140-090-R05	14	14	35	90	0.5
SRES4140-090-R08	14	14	35	90	0.8
SRES4140-090-R10	14	14	35	90	1.0
SRES4140-090-R15	14	14	35	90	1.5
SRES4140-090-R20	14	14	35	90	2.0
SRES4140-090-R30	14	14	35	90	3.0
SRES4140-150-R05	14	14	35	150	0.5
SRES4140-150-R08	14	14	35	150	0.8
SRES4140-150-R10	14	14	35	150	1.0
SRES4140-150-R15	14	14	35	150	1.5
SRES4140-150-R20	14	14	35	150	2.0
SRES4140-150-R30	14	14	35	150	3.0
SRES4160-100-R05	16	16	42	100	0.5
SRES4160-100-R08	16	16	42	100	0.8
SRES4160-100-R10	16	16	42	100	1.0
SRES4160-100-R15	16	16	42	100	1.5
SRES4160-100-R20	16	16	42	100	2.0
SRES4160-100-R25	16	16	42	100	2.5
SRES4160-100-R30	16	16	42	100	3.0
SRES4160-100-R35	16	16	42	100	3.5
SRES4160-100-R40	16	16	42	100	4.0
SRES4160-100-R50	16	16	42	100	5.0
SRES4160-100-R60	16	16	42	100	6.0
SRES4160-150-R05	16	16	42	150	0.5
SRES4160-150-R08	16	16	42	150	0.8
SRES4160-150-R10	16	16	42	150	1.0
SRES4160-150-R15	16	16	42	150	1.5
SRES4160-150-R20	16	16	42	150	2.0
SRES4160-150-R25	16	16	42	150	2.5
SRES4160-150-R30	16	16	42	150	3.0
SRES4160-150-R35	16	16	42	150	3.5

Designation	ØD	Ød	ℓ	L	r
SRES4160-150-R40	16	16	42	150	4.0
SRES4160-150-R50	16	16	42	150	5.0
SRES4160-150-R60	16	16	42	150	6.0
SRES4180-100-R05	18	20	45	100	0.5
SRES4180-100-R08	18	20	45	100	0.8
SRES4180-100-R10	18	20	45	100	1.0
SRES4180-100-R15	18	20	45	100	1.5
SRES4180-100-R20	18	20	45	100	2.0
SRES4180-100-R30	18	20	45	100	3.0
SRES4180-150-R05	18	20	45	150	0.5
SRES4180-150-R08	18	20	45	150	0.8
SRES4180-150-R10	18	20	45	150	1.0
SRES4180-150-R15	18	20	45	150	1.5
SRES4180-150-R20	18	20	45	150	2.0
SRES4180-150-R30	18	20	45	150	3.0
SRES4200-100-R05	20	20	48	100	0.5
SRES4200-100-R10	20	20	48	100	1.0
SRES4200-100-R15	20	20	48	100	1.5
SRES4200-100-R20	20	20	48	100	2.0
SRES4200-100-R25	20	20	48	100	2.5
SRES4200-100-R30	20	20	48	100	3.0
SRES4200-100-R35	20	20	48	100	3.5
SRES4200-100-R40	20	20	48	100	4.0
SRES4200-100-R50	20	20	48	100	5.0
SRES4200-100-R60	20	20	48	100	6.0
SRES4200-150-R05	20	20	48	150	0.5
SRES4200-150-R10	20	20	48	150	1.0
SRES4200-150-R15	20	20	48	150	1.5
SRES4200-150-R20	20	20	48	150	2.0
SRES4200-150-R25	20	20	48	150	2.5
SRES4200-150-R30	20	20	48	150	3.0
SRES4200-150-R35	20	20	48	150	3.5
SRES4200-150-R40	20	20	48	150	4.0
SRES4200-150-R50	20	20	48	150	5.0
SRES4200-150-R60	20	20	48	150	6.0

For high hardness

H-Star Endmill

- HRC50~63 Carbide endmill for high hardness steel
- Appropriate for precision machining by applying high precision tolerance on cutting diameter and radius

Features

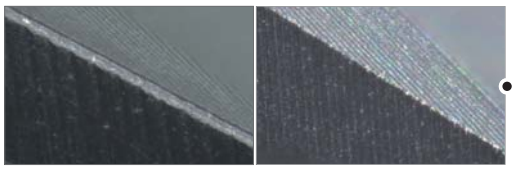
• Adopt a high hardness coating

- High-content Si ingredient
- Improved wear resistance
- Stability for frictional heat

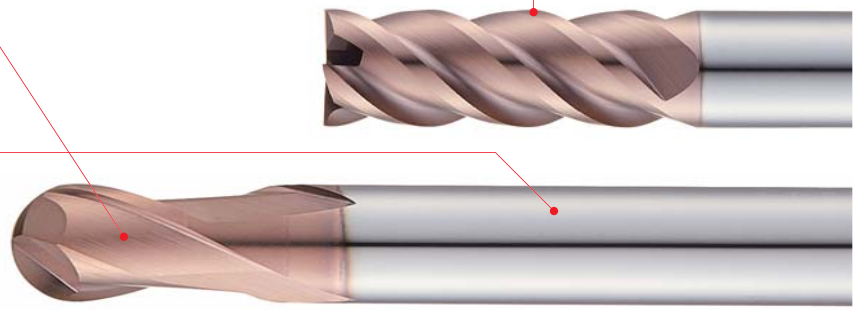
• Adopt a high hardness raw-material

- Formation by ultra-micro WC + Co. 9%
- Expansion of versatility by special toughness

• Treatment of toughness



- Improved chipping resistance
- Improved wear resistance, induce to stable work



Code system

ES	R	7	0	4	100	15	32	-	10

Type
H-Star Endmill

Appearance
B : Ball
E : Square
R : Radius
XE : Square (Unequal)
XR : Radius (Unequal)
PM : Power Mill
RB : Rib Ball
RE : Rib Square
RR : Rib Radius
LNB : Long Neck Ball
TNB : Taper Neck Ball
LNS : Long Neck Square
LNR : Long Neck Radius

Grade
7 : Grade

Length, Shank type
0 : Straight
1 : Neck
4 : Tapered Neck

No. of flutes
2 : 2 Flutes
3 : 3 Flutes
4 : 4 Flutes
6 : 6 Flutes

Cutting dia.
010 : Ø1.0
060 : Ø6.0
065 : Ø6.5
100 : Ø10.0

Corner R
05 : R0.5
15 : R1.5
20 : R2.0

Effective length
10 : 10 mm
12 : 12 mm
32 : 32 mm

Shank Dia.
06 : Ø6.0
10 : Ø10.0
12 : Ø12.0

EDP. NO	Appearance	Type	Range	Page
ESB702		2 Flutes neck type ball endmill	Ø0.1 ~ 12.0	36
ESB712		2 Flutes ball endmill	Ø1.0 ~ 12.0	37
ESB703		3 Flutes neck type ball endmill	Ø2.0 ~ 12.0	38
ESB734		4 Flutes 15° helix ball endmill	Ø2.0 ~ 10.0	39
ESE702		2 Flutes neck type flat endmill	Ø0.1 ~ 20.0	40
ESE712		2 Flutes flat endmill	Ø1.0 ~ 12.0	41
ESE704		4 Flutes neck type flat endmill	Ø1.0 ~ 20.0	42
ESE714		4 Flutes high helix flat endmill	Ø1.0 ~ 12.0	43
ESE724(6)		4&6 Flutes neck type flat endmill	Ø1.0 ~ 12.0	44
ESE744 New		4 Flutes high helix square endmill	Ø1.0 ~ 12.0	45
ESE716		6 Flutes high helix flat endmill	Ø6.0 ~ 20.0	46
ESR702		2 Flutes neck type radius endmill	Ø1.0 ~ 12.0	47 ~ 49
ESR732		2 Flutes long shank radius endmill	Ø1.0 ~ 12.0	50
ESR704		4 Flutes neck type radius endmill	Ø1.0 ~ 12.0	51 ~ 52
ESR714		4 Flutes radius endmill	Ø3.0 ~ 12.0	53
ESR724		4 Flutes neck type radius endmill	Ø6.0 ~ 12.0	54
ESR734		4 Flutes long shank radius endmill	Ø1.0 ~ 12.0	55
ESR706		6 Flutes neck type radius endmill	Ø6.0 ~ 12.0	56
ESR736		6 Flutes radius endmill	Ø6.0 ~ 12.0	57
ESRB712		2 Flutes rib ball endmill	Ø0.1 ~ 12.0	58 ~ 61
ESRE712		2 Flutes rib neck type flat endmill	Ø0.1 ~ 12.0	62 ~ 64
ESRE714 New		4 Flutes rib sqaure endmill	Ø0.5 ~ 12.0	65 ~ 67
ESRR712 New		2 Flutes rib radius endmill	Ø0.2 ~ 16.0	68 ~ 73
ESRR714 New		4 Flutes rib radius endmill	Ø0.5 ~ 20.0	74 ~ 80
ESXE704		4 Flutes neck type flat endmill	Ø1.0 ~ 12.0	81
ESXE714		4 Flutes flat endmill	Ø2.0 ~ 12.0	82
ESXR704		4 Flutes neck type radius endmill	Ø1.0 ~ 12.0	83
ESLNB		2 Flutes long neck type ball endmill	Ø0.1 ~ 5.0	84 ~ 87
ESTNB20		2 Flutes tapered neck type ball endmill	Ø0.2 ~ 10.0	88 ~ 91
ESTNB30		3 Flutes tapered neck type ball endmill	Ø2.0 ~ 5.0	92 ~ 93
ESLNS20		2 Flutes long neck type flat endmill	Ø0.1 ~ 5.0	94 ~ 97
ESLNS40		4 Flutes long neck type flat endmill	Ø1.0 ~ 5.0	98 ~ 99
ESLNR		2 Flutes long neck type radius endmill	Ø0.2 ~ 3.0	100 ~ 103
ESTNR		2 Flutes tapered neck type radius endmill	Ø0.2 ~ 3.0	104 ~ 105
ESPM4		4 Flutes neck type radius endmill	Ø3.0 ~ 12.0	106

H-Star Endmill

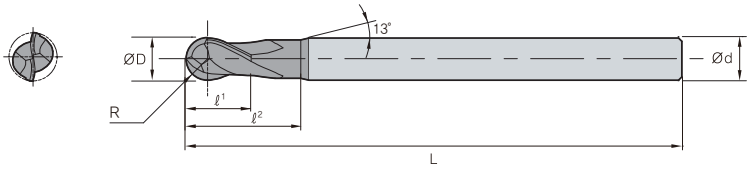
ESB702

2 Flutes neck type ball endmill

ULTRA FINE | 2 | 30° HELIX | R ±0.005 (R3 or Under) | R ±0.008 (Above R3) | AlTiN | DATA p.381

• TOLERANCE

ØD		Ød
~ Ø6	0 ~ -0.012mm	h5
Ø8 ~ Ø12	0 ~ -0.015mm	



(mm)

Designation	R	ØD	Ød	ℓ1	ℓ2	L
ESB702001	0.05	0.1	4	0.15	-	40
ESB702002	0.1	0.2	4	0.3	-	40
ESB702003	0.15	0.3	4	0.5	-	40
ESB702004	0.2	0.4	4	0.6	-	40
ESB702005	0.25	0.5	4	0.7	-	40
ESB702006	0.3	0.6	4	0.9	-	40
ESB702007	0.35	0.7	4	1.1	-	40
ESB702008	0.4	0.8	4	1.2	-	40
ESB702009	0.45	0.9	4	1.4	-	40
ESB702010	0.5	1	6	1.5	3	50
ESB702010S4	0.5	1	4	1.5	-	45
ESB702015	0.75	1.5	6	2	4	50
ESB702015S4	0.75	1.5	4	2	-	45
ESB702020	1	2	6	2.5	5	50
ESB702020S4	1	2	4	2.5	-	45
ESB702025	1.25	2.5	6	3	7	50
ESB702030	1.5	3	6	4	10	60
ESB702030S	1.5	3	6	4	10	50
ESB702030S4	1.5	3	4	4	-	45
ESB702031	1.5	3	6	4	10	70
ESB702040	2	4	6	5	10	60
ESB702040S	2	4	6	5	10	50
ESB702040S4	2	4	4	5	-	45
ESB702041	2	4	6	5	10	70
ESB702050	2.5	5	6	6	12	60
ESB702060	3	6	6	7	12	60
ESB702061	3	6	6	7	12	90
ESB702080	4	8	8	9	15	70
ESB702081	4	8	8	9	15	100
ESB702100	5	10	10	11	25	75
ESB702101	5	10	10	11	25	100
ESB702120	6	12	12	12	25	80
ESB702121	6	12	12	12	25	110

※ The above specifications are subject to change without prior notice for product quality improvement.

• Applicable Workpiece

Carbon steel ~ HB225	Alloy steel HB225~325	Pre-hardened steel HRC30~50	Hardened steel		Copper	Graphite	Cast iron ~FCD500	Aluminum	Stainless steel
			SKD61~HRC55	SKD11 HRC55~63					
		○	◎	◎	○				

◎: Excellent ○: Good

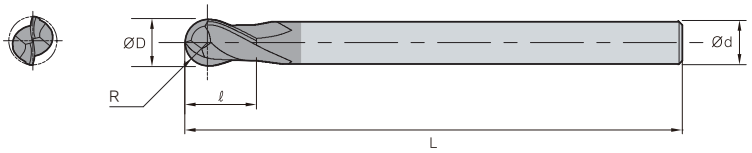
ESB712

2 Flutes ball endmill

ULTRA FINE | 2 | 30° HELIX | R ±0.005 (R3 or Under) | R ±0.008 (Above R3) | AlCrN | DATA p.382

• TOLERANCE

ØD		Ød
~ Ø6	0 ~ -0.012mm	h5
Ø8 ~ Ø12	0 ~ -0.015mm	



(mm)

Designation	R	ØD	Ød	ℓ	L
ESB712010	0.5	1	6	2.5	50
ESB712010S	0.5	1	6	1.5	40
ESB712010S4	0.5	1	4	2.5	50
ESB712012	0.6	1.2	6	3	50
ESB712015	0.75	1.5	6	4	50
ESB712015S	0.75	1.5	6	2.5	40
ESB712015S4	0.75	1.5	4	4	50
ESB712020	1	2	6	5	50
ESB712020S	1	2	6	3	40
ESB712020S4	1	2	4	5	50
ESB712025	1.25	2.5	6	7	60
ESB712030	1.5	3	6	8	60
ESB712030S	1.5	3	6	4.5	50
ESB712030S4	1.5	3	4	8	60
ESB712040	2	4	6	8	70
ESB712040S	2	4	6	6	50
ESB712050	2.5	5	6	10	80
ESB712050S	2.5	5	6	7.5	50
ESB712060	3	6	6	12	90
ESB712060S	3	6	6	9	50
ESB712080S	4	8	8	12	50
ESB712081	4	8	8	14	100
ESB712100	5	10	10	18	100
ESB712100S	5	10	10	15	60
ESB712120	6	12	12	22	110
ESB712120S	6	12	12	18	60

※ The above specifications are subject to change without prior notice for product quality improvement.

• Applicable Workpiece

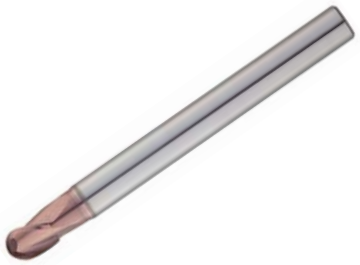
Carbon steel ~ HB225	Alloy steel HB225~325	Pre-hardened steel HRC30~50	Hardened steel		Copper	Graphite	Cast iron ~FCD500	Aluminum	Stainless steel
			SKD61~HRC55	SKD11 HRC55~63					
		○	◎	◎	○				

◎: Excellent ○: Good

H-Star Endmill

ESB703

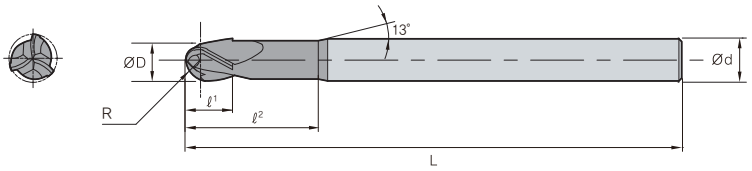
3 Flutes neck type ball endmill



ULTRA FINE | 3 | 30° HELIX | R ±0.005 (R3 or Under) | R ±0.008 (Above R3) | AlTiN | DATA p.381

• TOLERANCE

ØD		Ød
~ Ø6	0 ~ -0.012mm	h5
Ø8 ~ Ø12	0 ~ -0.015mm	



(mm)

Designation	R	ØD	Ød	ℓ1	ℓ2	L
ESB703020	1	2	6	2.5	5	50
ESB703025	1.25	2.5	6	3	7	50
ESB703030	1.5	3	6	4	10	60
ESB703030S	1.5	3	6	4	10	50
ESB703031	1.5	3	6	4	10	70
ESB703040	2	4	6	5	10	60
ESB703040S	2	4	6	5	10	50
ESB703041	2	4	6	5	10	70
ESB703050	2.5	5	6	6	12	60
ESB703060	3	6	6	7	12	60
ESB703061	3	6	6	7	12	90
ESB703080	4	8	8	9	15	70
ESB703081	4	8	8	9	15	100
ESB703100	5	10	10	11	25	75
ESB703101	5	10	10	11	25	100
ESB703120	6	12	12	12	25	80
ESB703121	6	12	12	12	25	110

※ The above specifications are subject to change without prior notice for product quality improvement.

• **Applicable Workpiece**

Carbon steel ~ HB225	Alloy steel HB225~325	Pre-hardened steel HRC30~50	Hardened steel		Copper	Graphite	Cast iron ~FCD500	Aluminum	Stainless steel
			SKD61~HRC55	SKD11 HRC55~63					
		○	◎	◎	○				

◎: Excellent ○: Good

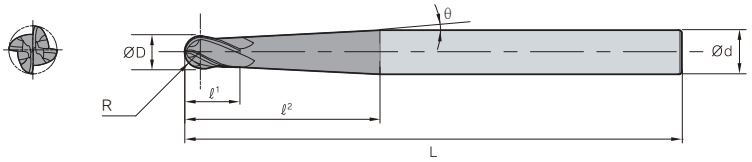
ESB734

4 Flutes 15° helix ball endmill

ULTRA FINE | 4 | 15° HELIX | R ±0.005 R3 or Under | R ±0.008 Above R3 | AlTiN | DATA p.382

• TOLERANCE

ØD		Ød
All sizes	0 ~ -0.012mm	h5



(mm)

Designation	R	ØD	Ød	ℓ1	ℓ2	θ	L
ESB734020-2.5	1	2	4	2	25	2.5	60
ESB734020-3.5	1	2	4	2	18	3.5	60
ESB734025-2.5	1.25	2.5	4	3	20	2.5	60
ESB734025-3.0	1.25	2.5	4	3	17	3	60
ESB734030-2.0	1.5	3	6	3	46	2	70
ESB734030-2.5	1.5	3	6	3	37	2.5	70
ESB734040-2.0	2	4	6	4	33	2	70
ESB734040-2.5	2	4	6	4	27	2.5	70
ESB734050-2.5	2.5	5	6	5	16	2.5	70
ESB734060-1.5	3	6	8	6	44	1.5	100
ESB734060-2.5	3	6	8	6	29	2.5	100
ESB734080-1.5	4	8	10	8	46	1.5	100
ESB734080-2.5	4	8	10	8	31	2.5	100
ESB734100-1.5	5	10	12	10	48	1.5	110
ESB734100-2.5	5	10	12	10	33	2.5	110

※ The above specifications are subject to change without prior notice for product quality improvement.

• Applicable Workpiece

Carbon steel ~ HB225	Alloy steel HB225~325	Pre-hardened steel HRC30~50	Hardened steel		Copper	Graphite	Cast iron ~FCD500	Aluminum	Stainless steel
			SKD61~HRC55	SKD11 HRC55~63					
		○	◎	◎	○				

◎: Excellent ○: Good

H-Star Endmill

ESE702

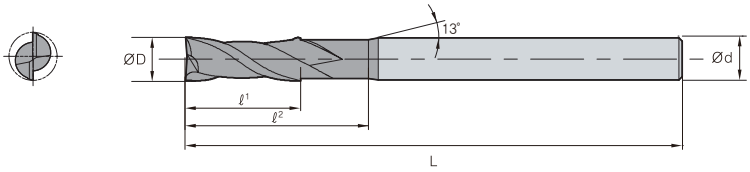
2 Flutes neck type flat endmill

ULTRA FINE | 2 | 30° HELIX | AlTiN | DATA

p.382, 383

• TOLERANCE

ØD		Ød
~ Ø6	0 ~ -0.012mm	h5
Ø8 ~ Ø20	0 ~ -0.015mm	



(mm)

Designation	ØD	Ød	ℓ1	ℓ2	L
ESE702001	0.1	4	0.2	-	40
ESE702002	0.2	4	0.4	-	40
ESE702003	0.3	4	0.5	-	40
ESE702004	0.4	4	0.7	-	40
ESE702005	0.5	4	1	-	40
ESE702006	0.6	4	1.2	-	40
ESE702007	0.7	4	1.4	-	40
ESE702008	0.8	4	1.6	-	40
ESE702009	0.9	4	2	-	40
ESE702010	1	6	1.5	-	40
ESE702010S4	1	4	1.5	-	40
ESE702015	1.5	6	2.2	-	40
ESE702020	2	6	3	6	40
ESE702020S4	2	4	3	6	40
ESE702025	2.5	6	4	6	40
ESE702030	3	6	4	7	45
ESE702035	3.5	6	6	9	45
ESE702040	4	6	6	9	45
ESE702045	4.5	6	6	10	45
ESE702050	5	6	6	11	50
ESE702060	6	6	7	14	50
ESE702080	8	8	9	18	60
ESE702100	10	10	12	25	75
ESE702120	12	12	15	30	75
ESE702160	16	16	18	38	90
ESE702200	20	20	24	45	100

※ The above specifications are subject to change without prior notice for product quality improvement.

• Applicable Workpiece

Carbon steel ~ HB225	Alloy steel HB225~325	Pre-hardened steel HRC30~50	Hardened steel		Copper	Graphite	Cast iron ~FCD500	Aluminum	Stainless steel
			SKD61~HRC55	SKD11 HRC55~63					
		○	◎	◎	○				

◎: Excellent ○: Good

ESE712

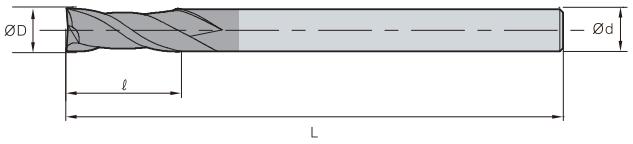
2 Flutes flat endmill

ULTRA FINE | 2 | 35° HELIX | AlTiN | DATA

p.384

• TOLERANCE

ØD		Ød
~ Ø6	0 ~ -0.012mm	h5
Ø8 ~ Ø12	0 ~ -0.015mm	



(mm)

Designation	ØD	Ød	ℓ	L
ESE712010	1	6	3	40
ESE712010-02	1	6	2	40
ESE712010-02S4	1	4	2	40
ESE712010-04	1	6	4	40
ESE712012	1.2	6	3	40
ESE712015	1.5	6	4	40
ESE712015S4	1.5	4	4	40
ESE712015-06	1.5	6	6	40
ESE712015-08	1.5	6	8	40
ESE712020	2	6	5	40
ESE712020S4	2	4	5	40
ESE712020-08	2	6	8	40
ESE712020-10	2	6	10	50
ESE712025	2.5	6	6	40
ESE712025S4	2.5	4	6	40
ESE712030	3	6	8	45
ESE712030S4	3	4	8	45
ESE712030-10	3	6	10	50

Designation	ØD	Ød	ℓ	L
ESE712030-12	3	6	12	50
ESE712035	3.5	6	10	45
ESE712040	4	6	10	45
ESE712040S4	4	4	10	45
ESE712040-12	4	6	12	50
ESE712040-16	4	6	16	60
ESE712045	4.5	6	11	45
ESE712050	5	6	13	50
ESE712055	5.5	6	13	50
ESE712060	6	6	13	50
ESE712060-15	6	6	15	60
ESE712065	6.5	8	16	60
ESE712070	7	8	18	60
ESE712080	8	8	19	60
ESE712100	10	10	22	70
ESE712100-25	10	10	25	70
ESE712120	12	12	26	75
ESE712120-30	12	12	30	75

※ The above specifications are subject to change without prior notice for product quality improvement.

• Applicable Workpiece

Carbon steel ~ HB225	Alloy steel HB225~325	Pre-hardened steel HRC30~50	Hardened steel		Copper	Graphite	Cast iron ~FCD500	Aluminum	Stainless steel
			SKD61~HRC55	SKD11 HRC55~63					
		○	◎	◎	○				

◎: Excellent ○: Good

H-Star Endmill

ESE704

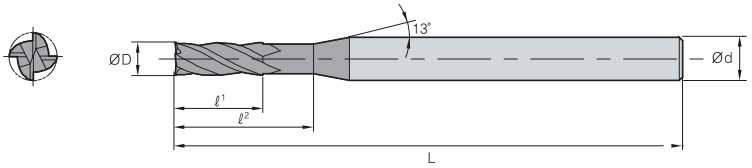
4 Flutes neck type flat endmill

ULTRA FINE | 4 | 30° HELIX | AlTiN | DATA

p.383

• TOLERANCE

ØD		Ød
~ Ø6	0 ~ -0.012mm	h5
Ø8 ~ Ø20	0 ~ -0.015mm	



(mm)

Designation	ØD	Ød	ℓ1	ℓ2	L
ESE704010	1	6	1.5	-	40
ESE704010S4	1	4	1.5	-	40
ESE704015	1.5	6	2.2	-	40
ESE704015S4	1.5	4	2.2	-	40
ESE704020	2	6	3	6	40
ESE704020S4	2	4	3	6	40
ESE704025	2.5	6	4	6	40
ESE704025S4	2.5	4	4	6	40
ESE704030	3	6	4	7	45
ESE704030S4	3	4	4	7	45
ESE704035	3.5	6	5	9	45
ESE704040	4	6	5	9	45
ESE704040S4	4	4	5	9	45
ESE704045	4.5	6	6	10	45
ESE704050	5	6	6	11	50
ESE704060	6	6	7	14	50
ESE704080	8	8	9	18	60
ESE704100	10	10	12	25	75
ESE704120	12	12	15	30	75
ESE704160	16	16	18	38	90
ESE704200	20	20	24	45	100

※ The above specifications are subject to change without prior notice for product quality improvement.

• Applicable Workpiece

Carbon steel ~ HB225	Alloy steel HB225~325	Pre-hardened steel HRC30~50	Hardened steel		Copper	Graphite	Cast iron ~FCD500	Aluminum	Stainless steel
			SKD61~HRC55	SKD11 HRC55~63					
		○	◎	◎	○				

◎: Excellent ○: Good

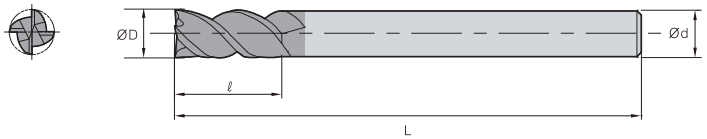
ESE714

4 Flutes high helix flat endmill

ULTRA FINE | 4 | 45° HELIX | AlTiN | DATA p.383

• TOLERANCE

ØD		Ød
~ Ø6	0 ~ -0.012mm	h5
Ø8 ~ Ø12	0 ~ -0.015mm	



(mm)

Designation	ØD	Ød	ℓ	L
ESE714010	1	6	2.5	40
ESE714010S4	1	4	2.5	40
ESE714012	1.2	6	3	40
ESE714015	1.5	6	4	40
ESE714015S4	1.5	4	4	40
ESE714020	2	6	5	40
ESE714020S4	2	4	5	40
ESE714025	2.5	6	6	40
ESE714025S4	2.5	4	6	40
ESE714030	3	6	8	45
ESE714030S4	3	4	8	45
ESE714035	3.5	6	9	45
ESE714040	4	6	10	45
ESE714040S4	4	4	10	45
ESE714050	5	6	13	50
ESE714060	6	6	13	50
ESE714060-15	6	6	15	60
ESE714060-15L	6	6	15	90
ESE714080	8	8	19	60
ESE714080L	8	8	19	100
ESE714100	10	10	22	70
ESE714100-25	10	10	25	70
ESE714100-25L	10	10	25	100
ESE714120	12	12	26	75
ESE714120-30	12	12	30	80
ESE714120-30L	12	12	30	100

※ The above specifications are subject to change without prior notice for product quality improvement.

• Applicable Workpiece

Carbon steel ~ HB225	Alloy steel HB225~325	Pre-hardened steel HRC30~50	Hardened steel		Copper	Graphite	Cast iron ~FCD500	Aluminum	Stainless steel
			SKD61~HRC55	SKD11 HRC55~63					
		○	◎	◎	○				

◎: Excellent ○: Good

H-Star Endmill

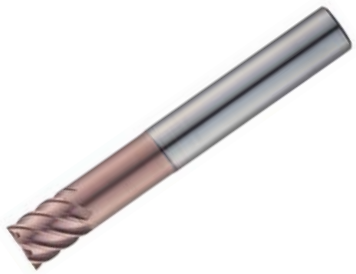
ESE724(6)

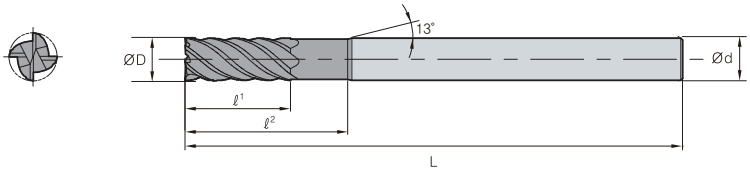
4&6 Flutes neck type flat endmill

ULTRA FINE | 4 | 6 | 45° HELIX Z=4 | 60° HELIX Z=6 | AlTiN | DATA p.385

• TOLERANCE

ØD		Ød
~ Ø6	0 ~ -0.012mm	h5
Ø8 ~ Ø12	0 ~ -0.015mm	





(mm)

Designation	ØD	Ød	ℓ1	ℓ2	L	Z
ESE724010	1	6	1.5	5	45	4
ESE724015	1.5	6	2.2	6	45	4
ESE724020	2	6	3	8	45	4
ESE724030	3	6	4	9	50	4
ESE724040	4	6	5	12	50	4
ESE724040S4L	4	4	5	12	75	4
ESE724050	5	6	6	15	50	4
ESE726060	6	6	7	20	60	6
ESE726080	8	8	9	25	70	6
ESE726100	10	10	12	32	75	6
ESE726120	12	12	15	38	80	6

※ The above specifications are subject to change without prior notice for product quality improvement.

• **Applicable Workpiece**

Carbon steel ~ HB225	Alloy steel HB225~325	Pre-hardened steel HRC30~50	Hardened steel		Copper	Graphite	Cast iron ~FCD500	Aluminum	Stainless steel
			SKD61~HRC55	SKD11 HRC55~63					
		○	◎	◎	○				

◎: Excellent ○: Good

ESE744

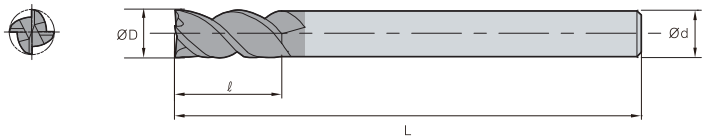
4 Flutes high helix square endmill

ULTRA FINE | 4 | 35° HELIX | AlTiN | DATA

p.383

• TOLERANCE

ØD		Ød
~ Ø6	0 ~ -0.012mm	h5
Ø8 ~ Ø12	0 ~ -0.015mm	



(mm)

Designation	ØD	Ød	ℓ	L
ESE744010S3	1	3	2.5	40
ESE744010S4	1	4	2.5	40
ESE744010	1	6	2.5	40
ESE744012S3	1.2	3	3	40
ESE744012S4	1.2	4	3	40
ESE744015S3	1.5	3	4	40
ESE744015S4	1.5	4	4	40
ESE744015	1.5	6	4	40
ESE744020S3	2	3	6	40
ESE744020S4	2	4	6	40
ESE744020	2	6	6	40
ESE744025S3	2.5	3	8	45
ESE744025S4	2.5	4	8	45
ESE744025	2.5	6	8	45
ESE744030S3	3	3	8	50
ESE744030S4	3	4	8	45
ESE744030	3	6	8	45
ESE744035	3.5	6	10	45
ESE744040S4	4	4	11	45
ESE744040	4	6	11	45
ESE744045	4.5	6	11	45
ESE744050	5	6	13	50
ESE744055	5.5	6	13	50
ESE744060	6	6	13	50
ESE744080	8	8	19	60
ESE744100	10	10	22	70
ESE744120	12	12	26	75

※ The above specifications are subject to change without prior notice for product quality improvement.

• Applicable Workpiece

Carbon steel ~ HB225	Alloy steel HB225~325	Pre-hardened steel HRC30~50	Hardened steel		Copper	Graphite	Cast iron ~FCD500	Aluminum	Stainless steel
			SKD61~HRC55	SKD11 HRC55~63					
		○	◎	◎	○				

H-Star Endmill

ESE716

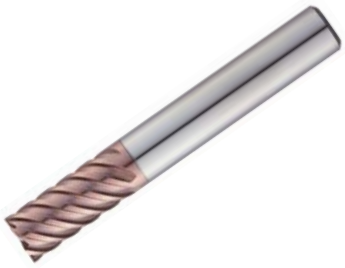
6 Flutes high helix flat endmill

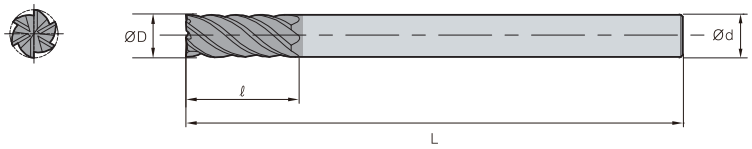
ULTRA FINE | 6 | 50° HELIX | AlTiN | DATA

p.385

• TOLERANCE

ØD		Ød
~ Ø6	0 ~ -0.012mm	h5
Ø8 ~ Ø20	0 ~ -0.015mm	





(mm)

Designation	ØD	Ød	ℓ	L
ESE716060	6	6	13	50
ESE716080	8	8	18	60
ESE716100	10	10	22	70
ESE716120	12	12	26	75
ESE716160	16	16	35	90
ESE716200	20	20	44	100

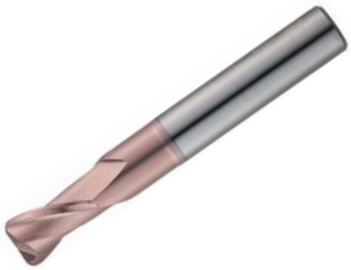
※ The above specifications are subject to change without prior notice for product quality improvement.

• **Applicable Workpiece**

Carbon steel ~ HB225	Alloy steel HB225~325	Pre-hardened steel HRC30~50	Hardened steel		Copper	Graphite	Cast iron ~FCD500	Aluminum	Stainless steel
			SKD61~HRC55	SKD11 HRC55~63					
		○	◎	◎	○				

◎: Excellent ○: Good

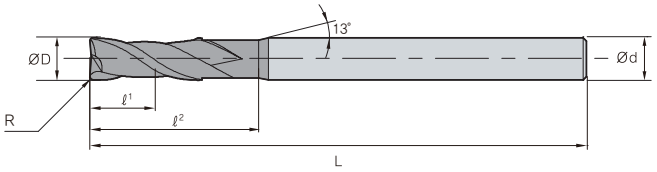
ESR702



ULTRA FINE | 2 | 30° HELIX | R ±0.01 (Ø6 or Under) | R ±0.015 (Above Ø6) | AlTiN | DATA p.386, 387

• TOLERANCE

ØD		Ød
~ Ø6	0 ~ -0.012mm	h5
Ø8 ~ Ø12	0 ~ -0.015mm	



(mm)

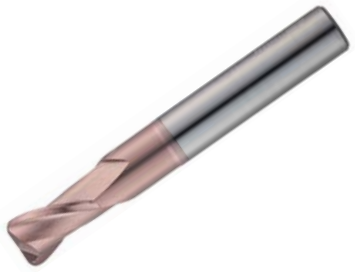
Designation	R	ØD	Ød	ℓ1	ℓ2	L
ESR70201000503S4	0.05	1	4	1.5	3	50
ESR70201000504S4	0.05	1	4	1.5	4	50
ESR70201000506S4	0.05	1	4	1.5	6	50
ESR70201000508S4	0.05	1	4	1.5	8	50
ESR70201000510S4	0.05	1	4	1.5	10	50
ESR7020100103S4	0.1	1	4	1.5	3	50
ESR7020100104	0.1	1	6	1.5	4	50
ESR7020100104S4	0.1	1	4	1.5	4	50
ESR7020100106	0.1	1	6	1.5	6	50
ESR7020100106S4	0.1	1	4	1.5	6	50
ESR7020100108S4	0.1	1	4	1.5	8	50
ESR7020100110S4	0.1	1	4	1.5	10	50
ESR7020100203S4	0.2	1	4	1.5	3	50
ESR7020100204	0.2	1	6	1.5	4	50
ESR7020100204S4	0.2	1	4	1.5	4	50
ESR7020100206	0.2	1	6	1.5	6	50
ESR7020100206S4	0.2	1	4	1.5	6	50
ESR7020100208S4	0.2	1	4	1.5	8	50
ESR7020100210	0.2	1	6	1.5	10	50
ESR7020100210S4	0.2	1	4	1.5	10	50
ESR7020100212	0.2	1	6	1.5	12	50
ESR7020100303S4	0.3	1	4	1.5	3	50
ESR7020100304S4	0.3	1	4	1.5	4	50
ESR7020100306S4	0.3	1	4	1.5	6	50
ESR7020100308S4	0.3	1	4	1.5	8	50
ESR7020100310S4	0.3	1	4	1.5	10	50
ESR7020120208	0.2	1.2	6	2	8	50
ESR7020120212	0.2	1.2	6	2	12	50
ESR70201500504S4	0.05	1.5	4	2.5	4	50
ESR70201500506S4	0.05	1.5	4	2.5	6	50
ESR70201500508S4	0.05	1.5	4	2.5	8	50
ESR70201500510S4	0.05	1.5	4	2.5	10	50
ESR70201500512S4	0.05	1.5	4	2.5	12	50
ESR7020150104S4	0.1	1.5	4	2.5	4	50
ESR7020150106S4	0.1	1.5	4	2.5	6	50
ESR7020150108S4	0.1	1.5	4	2.5	8	50

Designation	R	ØD	Ød	ℓ1	ℓ2	L
ESR7020150110S4	0.1	1.5	4	2.5	10	50
ESR7020150112S4	0.1	1.5	4	2.5	12	50
ESR7020150204	0.2	1.5	6	2.5	4	50
ESR7020150204S4	0.2	1.5	4	2.5	4	50
ESR7020150206	0.2	1.5	6	2.5	6	50
ESR7020150206S4	0.2	1.5	4	2.5	6	50
ESR7020150208	0.2	1.5	6	2.5	8	50
ESR7020150208S4	0.2	1.5	4	2.5	8	50
ESR7020150210	0.2	1.5	6	2.5	10	50
ESR7020150210S4	0.2	1.5	4	2.5	10	50
ESR7020150212S4	0.2	1.5	4	2.5	12	50
ESR7020150215	0.2	1.5	6	2.5	15	50
ESR7020150304S4	0.3	1.5	4	2.5	4	50
ESR7020150306S4	0.3	1.5	4	2.5	6	50
ESR7020150308S4	0.3	1.5	4	2.5	8	50
ESR7020150310S4	0.3	1.5	4	2.5	10	50
ESR7020150312S4	0.3	1.5	4	2.5	12	50
ESR7020150504S4	0.5	1.5	4	2.5	4	50
ESR7020150506S4	0.5	1.5	4	2.5	6	50
ESR7020150508S4	0.5	1.5	4	2.5	8	50
ESR7020150510S4	0.5	1.5	4	2.5	10	50
ESR7020150512S4	0.5	1.5	4	2.5	12	50
ESR7020200106S4	0.1	2	4	3	6	50
ESR7020200108	0.1	2	6	3	8	50
ESR7020200108S4	0.1	2	4	3	8	50
ESR7020200110S4	0.1	2	4	3	10	50
ESR7020200112	0.1	2	6	3	12	50
ESR7020200112S4	0.1	2	4	3	12	50
ESR7020200116S4	0.1	2	4	3	16	50
ESR7020200120S4	0.1	2	4	3	20	50
ESR7020200206	0.2	2	6	3	6	50
ESR7020200206S4	0.2	2	4	3	6	50
ESR7020200208S4	0.2	2	4	3	8	50
ESR7020200209	0.2	2	6	3	9	50
ESR7020200210S4	0.2	2	4	3	10	50
ESR7020200212S4	0.2	2	4	3	12	50

H-Star Endmill

ESR702

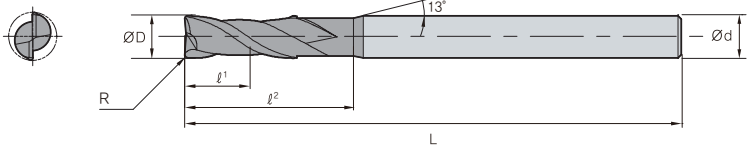
2 Flutes neck type radius endmill



ULTRA FINE | 2 | 30° HELIX | R ±0.01 Ø6 or Under | R ±0.015 Above Ø6 | AlTiN | DATA p.386, 387

• TOLERANCE

ØD		Ød
~ Ø6	0 ~ -0.012mm	h5
Ø8 ~ Ø12	0 ~ -0.015mm	



(mm)

Designation	R	ØD	Ød	ℓ1	ℓ2	L
ESR7020200216	0.2	2	6	3	16	50
ESR7020200216S4	0.2	2	4	3	16	50
ESR7020200220S4	0.2	2	4	3	20	50
ESR7020200306	0.3	2	6	3	6	50
ESR7020200306S4	0.3	2	4	3	6	50
ESR7020200308S4	0.3	2	4	3	8	50
ESR7020200310S4	0.3	2	4	3	10	50
ESR7020200312S4	0.3	2	4	3	12	50
ESR7020200316S4	0.3	2	4	3	16	50
ESR7020200320S4	0.3	2	4	3	20	50
ESR7020200506	0.5	2	6	3	6	50
ESR7020200506S4	0.5	2	4	3	6	50
ESR7020200508S4	0.5	2	4	3	8	50
ESR7020200509	0.5	2	6	3	9	50
ESR7020200510S4	0.5	2	4	3	10	50
ESR7020200512	0.5	2	6	3	12	50
ESR7020200512S4	0.5	2	4	3	12	50
ESR7020200516	0.5	2	6	3	16	50
ESR7020200516S4	0.5	2	4	3	16	50
ESR7020200520S4	0.5	2	4	3	20	50
ESR7020250208S4	0.2	2.5	4	3.5	8	50
ESR7020250210S4	0.2	2.5	4	3.5	10	50
ESR7020250212S4	0.2	2.5	4	3.5	12	50
ESR7020250216S4	0.2	2.5	4	3.5	16	50
ESR7020250308S4	0.3	2.5	4	3.5	8	50
ESR7020250310S4	0.3	2.5	4	3.5	10	50
ESR7020250312S4	0.3	2.5	4	3.5	12	50
ESR7020250316S4	0.3	2.5	4	3.5	16	50
ESR7020250508S4	0.5	2.5	4	3.5	8	50
ESR7020250510S4	0.5	2.5	4	3.5	10	50
ESR7020250512S4	0.5	2.5	4	3.5	12	50
ESR7020250516S4	0.5	2.5	4	3.5	16	50
ESR7020300108	0.1	3	6	4.5	8	55
ESR7020300110	0.1	3	6	4.5	10	55
ESR7020300112	0.1	3	6	4.5	12	55
ESR7020300116	0.1	3	6	4.5	16	55

Designation	R	ØD	Ød	ℓ1	ℓ2	L
ESR7020300120	0.1	3	6	4.5	20	60
ESR7020300208	0.2	3	6	4.5	8	55
ESR7020300209	0.2	3	6	4.5	9	55
ESR7020300210	0.2	3	6	4.5	10	55
ESR7020300212	0.2	3	6	4.5	12	55
ESR7020300216	0.2	3	6	4.5	16	55
ESR7020300220	0.2	3	6	4.5	20	60
ESR7020300308	0.3	3	6	4.5	8	55
ESR7020300309	0.3	3	6	4.5	9	55
ESR7020300310	0.3	3	6	4.5	10	55
ESR7020300312	0.3	3	6	4.5	12	55
ESR7020300314	0.3	3	6	4.5	14	55
ESR7020300316	0.3	3	6	4.5	16	55
ESR7020300320	0.3	3	6	4.5	20	60
ESR7020300508	0.5	3	6	4.5	8	55
ESR7020300509	0.5	3	6	4.5	9	55
ESR7020300510	0.5	3	6	4.5	10	55
ESR7020300512	0.5	3	6	4.5	12	55
ESR7020300516	0.5	3	6	4.5	16	55
ESR7020300520	0.5	3	6	4.5	20	60
ESR7020301008	1	3	6	4.5	8	55
ESR7020301010	1	3	6	4.5	10	55
ESR7020301012	1	3	6	4.5	12	55
ESR7020301016	1	3	6	4.5	16	55
ESR7020301020	1	3	6	4.5	20	60
ESR7020301025	1	3	6	4.5	25	60
ESR7020400110	0.1	4	6	6	10	55
ESR7020400112	0.1	4	6	6	12	55
ESR7020400116	0.1	4	6	6	16	55
ESR7020400120	0.1	4	6	6	20	60
ESR7020400125	0.1	4	6	6	25	60
ESR7020400210	0.2	4	6	6	10	55
ESR7020400212	0.2	4	6	6	12	55
ESR7020400216	0.2	4	6	6	16	55
ESR7020400220	0.2	4	6	6	20	60
ESR7020400225	0.2	4	6	6	25	60

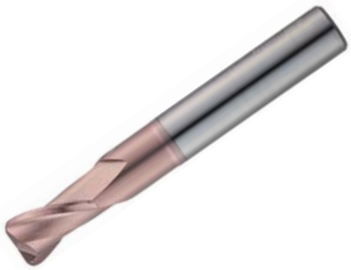
ESR702

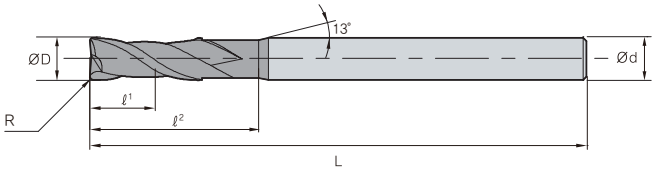
2 Flutes neck type radius endmill

ULTRA FINE | 2 | 30° HELIX | R ±0.01 (Ø6 or Under) | R ±0.015 (Above Ø6) | AlTiN | DATA p.386, 387

• TOLERANCE

ØD		Ød
~ Ø6	0 ~ -0.012mm	h5
Ø8 ~ Ø12	0 ~ -0.015mm	





(mm)

Designation	R	ØD	Ød	ℓ1	ℓ2	L
ESR7020400310	0.3	4	6	6	10	55
ESR7020400312	0.3	4	6	6	12	55
ESR7020400316	0.3	4	6	6	16	55
ESR7020400320	0.3	4	6	6	20	60
ESR7020400325	0.3	4	6	6	25	60
ESR7020400510	0.5	4	6	6	10	55
ESR7020400512	0.5	4	6	6	12	55
ESR7020400516	0.5	4	6	6	16	55
ESR7020400520	0.5	4	6	6	20	60
ESR7020400525	0.5	4	6	6	25	60
ESR7020400530	0.5	4	6	6	30	70
ESR7020401010	1	4	6	6	10	55
ESR7020401012	1	4	6	6	12	55
ESR7020401016	1	4	6	6	16	55
ESR7020401020	1	4	6	6	20	60
ESR7020401025	1	4	6	6	25	60
ESR7020401030	1	4	6	6	30	70
ESR7020500318	0.3	5	6	8	18	60
ESR7020600220	0.2	6	6	9	20	60
ESR7020600320	0.3	6	6	9	20	60

Designation	R	ØD	Ød	ℓ1	ℓ2	L
ESR7020600520	0.5	6	6	9	20	60
ESR7020601020	1	6	6	9	20	60
ESR7020601520	1.5	6	6	9	20	60
ESR7020602020	2	6	6	9	20	60
ESR7020800225	0.2	8	8	12	25	60
ESR7020800325	0.3	8	8	12	25	60
ESR7020800525	0.5	8	8	12	25	60
ESR7020801025	1	8	8	12	25	60
ESR7020801525	1.5	8	8	12	25	60
ESR7021000232	0.2	10	10	15	32	70
ESR7021000332	0.3	10	10	15	32	70
ESR7021000532	0.5	10	10	15	32	70
ESR7021001032	1	10	10	15	32	70
ESR7021001532	1.5	10	10	15	32	70
ESR7021002032	2	10	10	15	32	70
ESR7021200338	0.3	12	12	18	38	80
ESR7021200538	0.5	12	12	18	38	80
ESR7021201038	1	12	12	18	38	80
ESR7021201538	1.5	12	12	18	38	80
ESR7021202038	2	12	12	18	38	80

※ The above specifications are subject to change without prior notice for product quality improvement.

• Applicable Workpiece

Carbon steel ~ HB225	Alloy steel HB225~325	Pre-hardened steel HRC30~50	Hardened steel		Copper	Graphite	Cast iron ~FCD500	Aluminum	Stainless steel
			SKD61~HRC55	SKD11 HRC55~63					
		○	◎	◎	○				

◎: Excellent ○: Good

H-Star Endmill

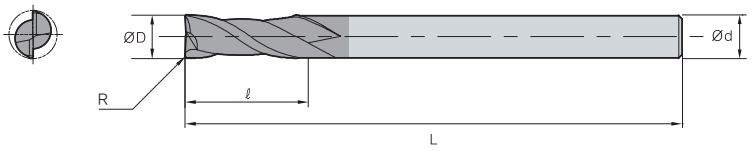
ESR732

2 Flutes long shank radius endmill

ULTRA FINE | 2 | 30° HELIX | R ±0.01 Ø6 or Under | R ±0.015 Above Ø6 | AlTiN | DATA p.387

• TOLERANCE

ØD		Ød
~ Ø6	0 ~ -0.012mm	h5
Ø8 ~ Ø12	0 ~ -0.015mm	



(mm)

Designation	R	ØD	Ød	ℓ	L
ESR73201001	0.1	1	6	2	50
ESR73201002	0.2	1	6	2	50
ESR73201003	0.3	1	6	2	50
ESR73201501	0.1	1.5	6	3	50
ESR73201502	0.2	1.5	6	3	50
ESR73201503	0.3	1.5	6	3	50
ESR73201505	0.5	1.5	6	3	50
ESR73202001	0.1	2	6	5	50
ESR73202002	0.2	2	6	5	50
ESR73202003	0.3	2	6	5	50
ESR73202005	0.5	2	6	5	50
ESR73202501	0.1	2.5	6	7	60
ESR73202502	0.2	2.5	6	7	60
ESR73202503	0.3	2.5	6	7	60
ESR73202505	0.5	2.5	6	7	60
ESR73203001	0.1	3	6	8	60
ESR73203002	0.2	3	6	8	60
ESR73203003	0.3	3	6	8	60
ESR73203005	0.5	3	6	8	60
ESR73204001	0.1	4	6	10	70
ESR73204002	0.2	4	6	10	70
ESR73204003	0.3	4	6	10	70
ESR73204005	0.5	4	6	10	70
ESR73204010	1	4	6	10	70
ESR73205001	0.1	5	6	13	80

Designation	R	ØD	Ød	ℓ	L
ESR73205002	0.2	5	6	13	80
ESR73205003	0.3	5	6	13	80
ESR73205005	0.5	5	6	13	80
ESR73205010	1	5	6	13	80
ESR73206001	0.1	6	6	15	90
ESR73206002	0.2	6	6	15	90
ESR73206003	0.3	6	6	15	90
ESR73206005	0.5	6	6	15	90
ESR73206010	1	6	6	15	90
ESR73208001	0.1	8	8	20	100
ESR73208002	0.2	8	8	20	100
ESR73208003	0.3	8	8	20	100
ESR73208005	0.5	8	8	20	100
ESR73208010	1	8	8	20	100
ESR73208020	2	8	8	20	100
ESR73210002	0.2	10	10	25	100
ESR73210003	0.3	10	10	25	100
ESR73210005	0.5	10	10	25	100
ESR73210010	1	10	10	25	100
ESR73210020	2	10	10	25	100
ESR73212002	0.2	12	12	30	110
ESR73212003	0.3	12	12	30	110
ESR73212005	0.5	12	12	30	110
ESR73212010	1	12	12	30	110
ESR73212020	2	12	12	30	110

※ The above specifications are subject to change without prior notice for product quality improvement.

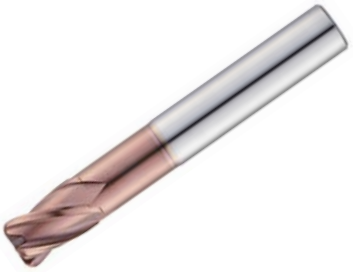
• Applicable Workpiece

Carbon steel ~ HB225	Alloy steel HB225~325	Pre-hardened steel HRC30~50	Hardened steel		Copper	Graphite	Cast iron ~FCD500	Aluminum	Stainless steel
			SKD61~HRC55	SKD11 HRC55~63					
		○	◎	◎	○				

◎: Excellent ○: Good

ESR704

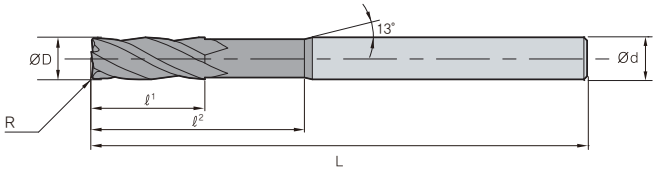
4 Flutes neck type radius endmill



ULTRA FINE | 4 | 30° HELIX | R ±0.01 Ø6 or Under | R ±0.015 Above Ø6 | AlTiN | DATA p.387

• TOLERANCE

ØD		Ød
~ Ø6	0 ~ -0.012mm	h5
Ø8 ~ Ø12	0 ~ -0.015mm	



(mm)

Designation	R	ØD	Ød	ℓ1	ℓ2	L
ESR7040100103S4	0.1	1	4	2	3	50
ESR7040100104S4	0.1	1	4	2	4	50
ESR7040100106S4	0.1	1	4	2	6	50
ESR7040100203S4	0.2	1	4	2	3	50
ESR7040100204S4	0.2	1	4	2	4	50
ESR7040100206S4	0.2	1	4	2	6	50
ESR7040100303S4	0.3	1	4	2	3	50
ESR7040100304S4	0.3	1	4	2	4	50
ESR7040100306S4	0.3	1	4	2	6	50
ESR7040150104S4	0.1	1.5	4	2.5	4	50
ESR7040150106S4	0.1	1.5	4	2.5	6	50
ESR7040150204S4	0.2	1.5	4	2.5	4	50
ESR7040150206S4	0.2	1.5	4	2.5	6	50
ESR7040150304S4	0.3	1.5	4	2.5	4	50
ESR7040150306S4	0.3	1.5	4	2.5	6	50
ESR7040200106S4	0.1	2	4	3	6	50
ESR7040200108S4	0.1	2	4	3	8	50
ESR7040200206S4	0.2	2	4	3	6	50
ESR7040200208	0.2	2	6	3	8	50
ESR7040200208S4	0.2	2	4	3	8	50
ESR7040200210	0.2	2	6	3	10	50
ESR7040200212	0.2	2	6	3	12	50
ESR7040200306S4	0.3	2	4	3	6	50
ESR7040200308S4	0.3	2	4	3	8	50
ESR7040200506S4	0.5	2	4	3	6	50
ESR7040200508S4	0.5	2	4	3	8	50
ESR7040250106S4	0.1	2.5	4	3.5	6	50
ESR7040300108	0.1	3	6	4	8	55
ESR7040300110	0.1	3	6	4	10	55
ESR7040300112	0.1	3	6	4	12	55
ESR7040300116	0.1	3	6	4	16	55
ESR7040300120	0.1	3	6	4	20	60
ESR7040300208	0.2	3	6	4	8	55
ESR7040300210	0.2	3	6	4	10	55
ESR7040300212	0.2	3	6	4	12	55
ESR7040300216	0.2	3	6	4	16	55

Designation	R	ØD	Ød	ℓ1	ℓ2	L
ESR7040300220	0.2	3	6	4	20	60
ESR7040300308	0.3	3	6	4	8	55
ESR7040300309	0.3	3	6	4	9	55
ESR7040300310	0.3	3	6	4	10	55
ESR7040300312	0.3	3	6	4	12	55
ESR7040300316	0.3	3	6	4	16	55
ESR7040300320	0.3	3	6	4	20	60
ESR7040300508	0.5	3	6	4	8	55
ESR7040300509	0.5	3	6	4	9	55
ESR7040300510	0.5	3	6	4	10	55
ESR7040300512	0.5	3	6	4	12	55
ESR7040300516	0.5	3	6	4	16	55
ESR7040300520	0.5	3	6	4	20	60
ESR7040301008	1	3	6	4	8	55
ESR7040301010	1	3	6	4	10	55
ESR7040301012	1	3	6	4	12	55
ESR7040301016	1	3	6	4	16	55
ESR7040301020	1	3	6	4	20	60
ESR7040400110	0.1	4	6	6	10	55
ESR7040400112	0.1	4	6	6	12	55
ESR7040400116	0.1	4	6	6	16	55
ESR7040400120	0.1	4	6	6	20	60
ESR7040400125	0.1	4	6	6	25	60
ESR7040400210	0.2	4	6	6	10	55
ESR7040400212	0.2	4	6	6	12	55
ESR7040400216	0.2	4	6	6	16	55
ESR7040400220	0.2	4	6	6	20	60
ESR7040400225	0.2	4	6	6	25	60
ESR7040400310	0.3	4	6	6	10	55
ESR7040400312	0.3	4	6	6	12	55
ESR7040400316	0.3	4	6	6	16	55
ESR7040400320	0.3	4	6	6	20	60
ESR7040400325	0.3	4	6	6	25	60
ESR7040400510	0.5	4	6	6	10	55
ESR7040400512	0.5	4	6	6	12	55
ESR7040400516	0.5	4	6	6	16	55

H-Star Endmill

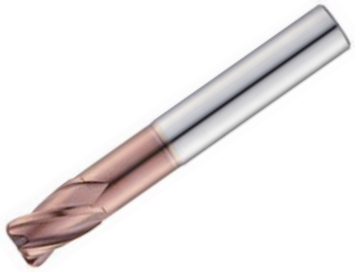
ESR704

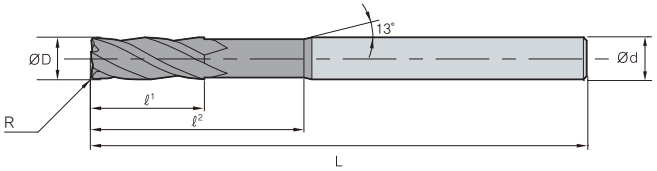
4 Flutes neck type radius endmill

ULTRA FINE | 4 | 30° HELIX | R ±0.01 Ø6 or Under | R ±0.015 Above Ø6 | AlTiN | DATA p.387

• TOLERANCE

ØD		Ød
~ Ø6	0 ~ -0.012mm	h5
Ø8 ~ Ø12	0 ~ -0.015mm	





(mm)

Designation	R	ØD	Ød	ℓ1	ℓ2	L
ESR7040400520	0.5	4	6	6	20	60
ESR7040400525	0.5	4	6	6	25	60
ESR7040401010	1	4	6	6	10	55
ESR7040401012	1	4	6	6	12	55
ESR7040401016	1	4	6	6	16	55
ESR7040401020	1	4	6	6	20	60
ESR7040401025	1	4	6	6	25	60
ESR7040600220	0.2	6	6	9	20	60
ESR7040600320	0.3	6	6	9	20	60
ESR7040600520	0.5	6	6	9	20	60
ESR7040601020	1	6	6	9	20	60
ESR7040601520	1.5	6	6	9	20	60
ESR7040602020	2	6	6	9	20	60
ESR7040800225	0.2	8	8	12	25	60
ESR7040800325	0.3	8	8	12	25	60

Designation	R	ØD	Ød	ℓ1	ℓ2	L
ESR7040800525	0.5	8	8	12	25	60
ESR7040801025	1	8	8	12	25	60
ESR7040801525	1.5	8	8	12	25	60
ESR7040802025	2	8	8	12	25	60
ESR7041000232	0.2	10	10	15	32	70
ESR7041000332	0.3	10	10	15	32	70
ESR7041000532	0.5	10	10	15	32	70
ESR7041001032	1	10	10	15	32	70
ESR7041001532	1.5	10	10	15	32	70
ESR7041002032	2	10	10	15	32	70
ESR7041200338	0.3	12	12	18	38	80
ESR7041200538	0.5	12	12	18	38	80
ESR7041201038	1	12	12	18	38	80
ESR7041201538	1.5	12	12	18	38	80
ESR7041202038	2	12	12	18	38	80

※ The above specifications are subject to change without prior notice for product quality improvement.

• **Applicable Workpiece**

Carbon steel ~ HB225	Alloy steel HB225~325	Pre-hardened steel HRC30~50	Hardened steel		Copper	Graphite	Cast iron ~FCD500	Aluminum	Stainless steel
			SKD61~HRC55	SKD11 HRC55~63					
		○	◎	◎	○				

◎: Excellent ○: Good

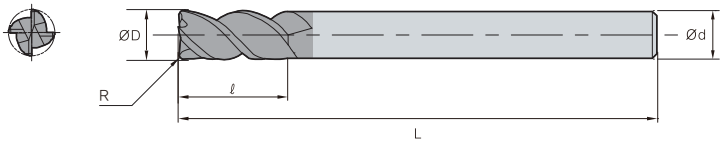
ESR714

4 Flutes radius endmill

ULTRA FINE | 4 | 45° HELIX | R ±0.01 Ø6 or Under | R ±0.015 Above Ø6 | AlCrN | DATA p.387

• TOLERANCE

ØD		Ød
~ Ø6	0 ~ -0.012mm	h5
Ø8 ~ Ø12	0 ~ -0.015mm	



(mm)

Designation	R	ØD	Ød	ℓ	L
ESR7140303	0.3	3	6	8	50
ESR7140305S4	0.5	3	4	8	50
ESR7140305	0.5	3	6	8	50
ESR7140403	0.3	4	6	11	50
ESR7140405	0.5	4	6	11	50
ESR7140405S4	0.5	4	4	11	50
ESR7140410	1	4	6	11	50
ESR7140603	0.3	6	6	15	60
ESR7140605	0.5	6	6	15	60
ESR7140610	1	6	6	15	60
ESR7140803	0.3	8	8	20	60
ESR7140805	0.5	8	8	20	60
ESR7140810	1	8	8	20	60
ESR7140815	1.5	8	8	20	60
ESR7140820	2	8	8	20	60
ESR7141003	0.3	10	10	25	70
ESR7141005	0.5	10	10	25	70
ESR7141010	1	10	10	25	70
ESR7141015	1.5	10	10	25	70
ESR7141020	2	10	10	25	70
ESR7141025	2.5	10	10	25	70
ESR7141030	3	10	10	25	70
ESR7141203	0.3	12	12	30	80
ESR7141205	0.5	12	12	30	80
ESR7141210	1	12	12	30	80
ESR7141215	1.5	12	12	30	80
ESR7141220	2	12	12	30	80
ESR7141225	2.5	12	12	30	80
ESR7141230	3	12	12	30	80

※ The above specifications are subject to change without prior notice for product quality improvement.

• Applicable Workpiece

Carbon steel ~ HB225	Alloy steel HB225~325	Pre-hardened steel HRC30~50	Hardened steel		Copper	Graphite	Cast iron ~FCD500	Aluminum	Stainless steel
			SKD61~HRC55	SKD11 HRC55~63					
		○	◎	◎	○				

◎: Excellent ○: Good

H-Star Endmill

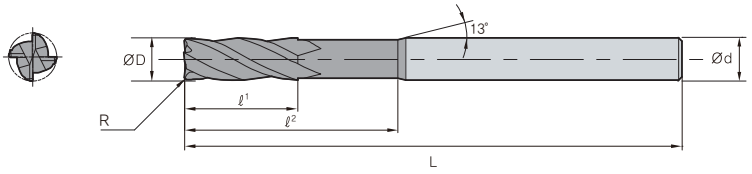
ESR724

4 Flutes neck type radius endmill

ULTRA FINE | 4 | 30° HELIX | R ±0.01 Ø6 or Under | R ±0.015 Above Ø6 | AlTiN | DATA p.387

• TOLERANCE

ØD		Ød
~ Ø6	0 ~ -0.012mm	h5
Ø8 ~ Ø12	0 ~ -0.015mm	



(mm)

Designation	R	ØD	Ød	ℓ1	ℓ2	L
ESR7240600520	0.5	6	6	9	20	90
ESR7240601020	1	6	6	9	20	90
ESR7240800525	0.5	8	8	12	25	100
ESR7240801025	1	8	8	12	25	100
ESR7241000532	0.5	10	10	15	32	100
ESR7241001032	1	10	10	15	32	100
ESR7241002032	2	10	10	15	32	100
ESR7241200538	0.5	12	12	18	38	110
ESR7241201038	1	12	12	18	38	110
ESR7241202038	2	12	12	18	38	110

※ The above specifications are subject to change without prior notice for product quality improvement.

• **Applicable Workpiece**

Carbon steel ~ HB225	Alloy steel HB225~325	Pre-hardened steel HRC30~50	Hardened steel		Copper	Graphite	Cast iron ~FCD500	Aluminum	Stainless steel
			SKD61~HRC55	SKD11 HRC55~63					
		○	◎	◎	○				

◎: Excellent ○: Good

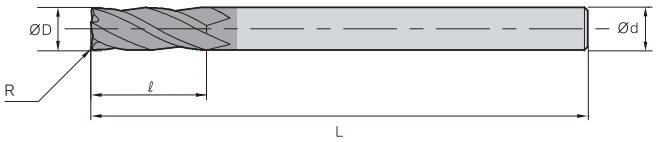
ESR734

4 Flutes long shank radius endmill

ULTRA FINE | 4 | 30° HELIX | R ±0.01 Ø6 or Under | R ±0.015 Above Ø6 | AlTiN | DATA p.387

• TOLERANCE

ØD		Ød
~ Ø6	0 ~ -0.012mm	h5
Ø8 ~ Ø12	0 ~ -0.015mm	



(mm)

Designation	R	ØD	Ød	ℓ	L
ESR73401001	0.1	1	6	2	50
ESR73401002	0.2	1	6	2	50
ESR73401003	0.3	1	6	2	50
ESR73401501	0.1	1.5	6	3	50
ESR73401502	0.2	1.5	6	3	50
ESR73401503	0.3	1.5	6	3	50
ESR73401505	0.5	1.5	6	3	50
ESR73402001	0.1	2	6	5	50
ESR73402002	0.2	2	6	5	50
ESR73402003	0.3	2	6	5	50
ESR73402005	0.5	2	6	5	50
ESR73402501	0.1	2.5	6	7	60
ESR73402502	0.2	2.5	6	7	60
ESR73402503	0.3	2.5	6	7	60
ESR73402505	0.5	2.5	6	7	60
ESR73403001	0.1	3	6	8	60
ESR73403002	0.2	3	6	8	60
ESR73403003	0.3	3	6	8	60
ESR73403005	0.5	3	6	8	60
ESR73404001	0.1	4	6	10	70
ESR73404002	0.2	4	6	10	70
ESR73404002S4	0.2	4	4	10	70
ESR73404003	0.3	4	6	10	70
ESR73404005	0.5	4	6	10	70
ESR73404005S4	0.5	4	4	10	70
ESR73404010	1	4	6	10	70
ESR73405001	0.1	5	6	13	80

Designation	R	ØD	Ød	ℓ	L
ESR73405002	0.2	5	6	13	80
ESR73405003	0.3	5	6	13	80
ESR73405005	0.5	5	6	13	80
ESR73405010	1	5	6	13	80
ESR73406001	0.1	6	6	15	90
ESR73406002	0.2	6	6	15	90
ESR73406003	0.3	6	6	15	90
ESR73406005	0.5	6	6	15	90
ESR73406010	1	6	6	15	90
ESR73408001	0.1	8	8	20	100
ESR73408002	0.2	8	8	20	100
ESR73408003	0.3	8	8	20	100
ESR73408005	0.5	8	8	20	100
ESR73408010	1	8	8	20	100
ESR73408020	2	8	8	20	100
ESR73410002	0.2	10	10	25	100
ESR73410003	0.3	10	10	25	100
ESR73410005	0.5	10	10	25	100
ESR73410010	1	10	10	25	100
ESR73410020	2	10	10	25	100
ESR73412002	0.2	12	12	30	110
ESR73412003	0.3	12	12	30	110
ESR73412005	0.5	12	12	30	110
ESR73412010	1	12	12	30	110
ESR73412010L	1	12	12	30	150
ESR73412020	2	12	12	30	110

※ The above specifications are subject to change without prior notice for product quality improvement.

• Applicable Workpiece

Carbon steel ~ HB225	Alloy steel HB225~325	Pre-hardened steel HRC30~50	Hardened steel		Copper	Graphite	Cast iron ~FCD500	Aluminum	Stainless steel
			SKD61~HRC55	SKD11 HRC55~63					
		○	◎	◎	○				

◎: Excellent ○: Good

H-Star Endmill

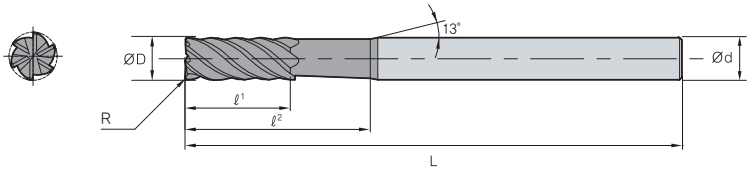
ESR706

6 Flutes neck type radius endmill

ULTRA FINE | 6 | 45° HELIX | R ±0.01 Ø6 or Under | R ±0.015 Above Ø6 | AlTiN | DATA p.388

• TOLERANCE

ØD		Ød
~ Ø6	0 ~ -0.012mm	h5
Ø8 ~ Ø12	0 ~ -0.015mm	



(mm)

Designation	R	ØD	Ød	ℓ1	ℓ2	L
ESR7060600314	0.3	6	6	6	14	50
ESR7060600514	0.5	6	6	6	14	50
ESR7060800524	0.5	8	8	8	24	60
ESR7060801024	1	8	8	8	24	60
ESR7061000530	0.5	10	10	10	30	70
ESR7061001030	1	10	10	10	30	70
ESR7061200530	0.5	12	12	12	30	75
ESR7061201030	1	12	12	12	30	75

※ The above specifications are subject to change without prior notice for product quality improvement.

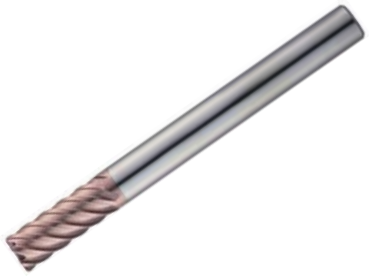
• **Applicable Workpiece**

Carbon steel ~ HB225	Alloy steel HB225~325	Pre-hardened steel HRC30~50	Hardened steel		Copper	Graphite	Cast iron ~FCD500	Aluminum	Stainless steel
			SKD61~HRC55	SKD11 HRC55~63					
		○	◎	◎	○				

◎: Excellent ○: Good

ESR736

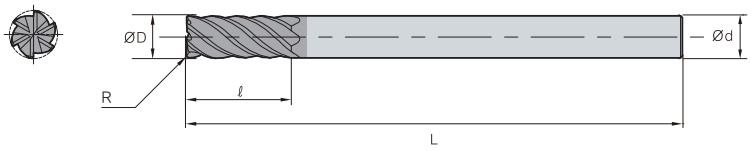
6 Flutes radius endmill



ULTRA FINE | 6 | 45° HELIX | R ±0.01 (Ø6 or Under) | R ±0.015 (Above Ø6) | AlCrN | DATA p.386

• TOLERANCE

ØD		Ød
~ Ø6	0 ~ -0.012mm	h5
Ø8 ~ Ø12	0 ~ -0.015mm	



(mm)

Designation	R	ØD	Ød	ℓ	L
ESR73606005	0.5	6	6	15	90
ESR73606010	1	6	6	15	90
ESR73608005	0.5	8	8	20	100
ESR73608010	1	8	8	20	100
ESR73610005	0.5	10	10	25	100
ESR73610010	1	10	10	25	100
ESR73612005	0.5	12	12	30	110
ESR73612010	1	12	12	30	110

※ The above specifications are subject to change without prior notice for product quality improvement.

• Applicable Workpiece

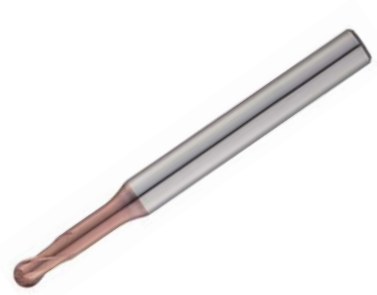
Carbon steel ~ HB225	Alloy steel HB225~325	Pre-hardened steel HRC30~50	Hardened steel		Copper	Graphite	Cast iron ~FCD500	Aluminum	Stainless steel
			SKD61~HRC55	SKD11 HRC55~63					
		○	◎	◎	○				

◎: Excellent ○: Good

H-Star Endmill

ESRB712

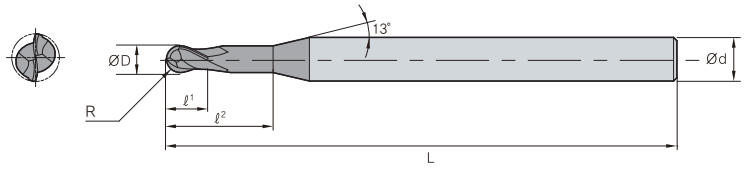
2 Flutes rib ball endmill



ULTRA FINE | 2 | 30° HELIX | R ±0.005 R3 or Under | R ±0.008 Above R3 | AlTiN | DATA p.389~393

• TOLERANCE

ØD		Ød
~ Ø6	0 ~ -0.012mm	h5
Ø8 ~ Ø12	0 ~ -0.015mm	



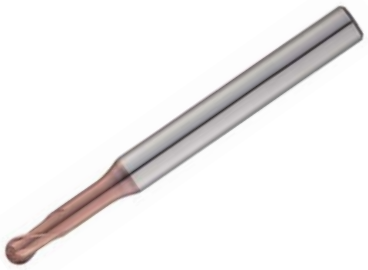
(mm)

Designation	R	ØD	Ød	ℓ1	ℓ2	L
ESRB712001002	0.05	0.1	4	0.1	0.2	40
ESRB712001003	0.05	0.1	4	0.1	0.3	40
ESRB712001005	0.05	0.1	4	0.1	0.5	40
ESRB71200101	0.05	0.1	4	0.1	1	40
ESRB712002005	0.1	0.2	4	0.2	0.5	40
ESRB712002015	0.1	0.2	4	0.2	1.5	40
ESRB71200201	0.1	0.2	4	0.2	1	40
ESRB71200202	0.1	0.2	4	0.2	2	40
ESRB71200203	0.1	0.2	4	0.2	3	40
ESRB712003015	0.15	0.3	4	0.3	1.5	40
ESRB71200301	0.15	0.3	4	0.3	1	40
ESRB712003025	0.15	0.3	4	0.3	2.5	40
ESRB71200302	0.15	0.3	4	0.3	2	40
ESRB71200303	0.15	0.3	4	0.3	3	40
ESRB71200304	0.15	0.3	4	0.3	4	40
ESRB71200305	0.15	0.3	4	0.3	5	40
ESRB712004015	0.2	0.4	4	0.4	1.5	40
ESRB71200401	0.2	0.4	4	0.4	1	40
ESRB712004025	0.2	0.4	4	0.4	2.5	40
ESRB71200402	0.2	0.4	4	0.4	2	40
ESRB71200403	0.2	0.4	4	0.4	3	40
ESRB71200404	0.2	0.4	4	0.4	4	40
ESRB71200405	0.2	0.4	4	0.4	5	40
ESRB71200406	0.2	0.4	4	0.4	6	40
ESRB71200408	0.2	0.4	4	0.4	8	40
ESRB71200410	0.2	0.4	4	0.4	10	40
ESRB712005015	0.25	0.5	4	0.5	1.5	45
ESRB71200501	0.25	0.5	4	0.5	1	45
ESRB71200501S6	0.25	0.5	6	0.5	1	45
ESRB712005025	0.25	0.5	4	0.5	2.5	45
ESRB71200502	0.25	0.5	4	0.5	2	45
ESRB71200502S6	0.25	0.5	6	0.5	2	45
ESRB71200503	0.25	0.5	4	0.5	3	45
ESRB71200504	0.25	0.5	4	0.5	4	45
ESRB71200504S6	0.25	0.5	6	0.5	4	45
ESRB71200505	0.25	0.5	4	0.5	5	45
ESRB71200506	0.25	0.5	4	0.5	6	45
ESRB71200508	0.25	0.5	4	0.5	8	45
ESRB71200510	0.25	0.5	4	0.5	10	45

Designation	R	ØD	Ød	ℓ1	ℓ2	L
ESRB71200512	0.25	0.5	4	0.5	12	45
ESRB71200514	0.25	0.5	4	0.5	14	45
ESRB71200516	0.25	0.5	4	0.5	16	45
ESRB71200601	0.3	0.6	4	0.6	1	45
ESRB71200601S6	0.3	0.6	6	0.6	1	45
ESRB71200602	0.3	0.6	4	0.6	2	45
ESRB71200602S6	0.3	0.6	6	0.6	2	45
ESRB71200603	0.3	0.6	4	0.6	3	45
ESRB71200603S6	0.3	0.6	6	0.6	3	45
ESRB71200604	0.3	0.6	4	0.6	4	45
ESRB71200604S6	0.3	0.6	6	0.6	4	45
ESRB71200605	0.3	0.6	4	0.6	5	45
ESRB71200605S6	0.3	0.6	6	0.6	5	45
ESRB71200606	0.3	0.6	4	0.6	6	45
ESRB71200606S6	0.3	0.6	6	0.6	6	45
ESRB71200608	0.3	0.6	4	0.6	8	45
ESRB71200608S6	0.3	0.6	6	0.6	8	45
ESRB71200610	0.3	0.6	4	0.6	10	45
ESRB71200610S6	0.3	0.6	6	0.6	10	45
ESRB71200612	0.3	0.6	4	0.6	12	45
ESRB71200612S6	0.3	0.6	6	0.6	12	45
ESRB71200614	0.3	0.6	4	0.6	14	45
ESRB71200614S6	0.3	0.6	6	0.6	14	45
ESRB71200616	0.3	0.6	4	0.6	16	45
ESRB71200616S6	0.3	0.6	6	0.6	16	50
ESRB71200702	0.35	0.7	4	0.7	2	45
ESRB71200704	0.35	0.7	4	0.7	4	45
ESRB71200706	0.35	0.7	4	0.7	6	45
ESRB71200708	0.35	0.7	4	0.7	8	45
ESRB71200710	0.35	0.7	4	0.7	10	45
ESRB71200712	0.35	0.7	4	0.7	12	45
ESRB71200801	0.4	0.8	4	0.8	1	45
ESRB71200801S6	0.4	0.8	6	0.8	1	45
ESRB71200802	0.4	0.8	4	0.8	2	45
ESRB71200802S6	0.4	0.8	6	0.8	2	45
ESRB71200803	0.4	0.8	4	0.8	3	45
ESRB71200803S6	0.4	0.8	6	0.8	3	45
ESRB71200804	0.4	0.8	4	0.8	4	45
ESRB71200804S6	0.4	0.8	6	0.8	4	45

ESRB712

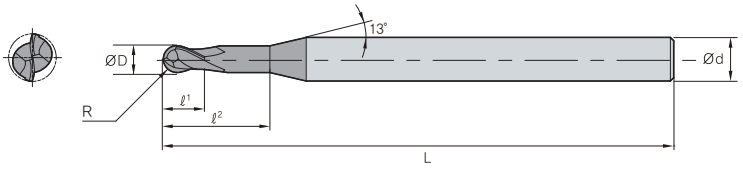
2 Flutes rib ball endmill



ULTRA FINE | 2 | 30° HELIX | R ±0.005 (R3 or Under) | R ±0.008 (Above R3) | AlCrN | DATA p.389~393

• TOLERANCE

ØD		Ød
~ Ø6	0 ~ -0.012mm	h5
Ø8 ~ Ø12	0 ~ -0.015mm	



(mm)

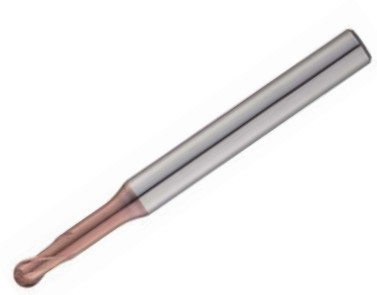
Designation	R	ØD	Ød	ℓ1	ℓ2	L
ESRB71200805	0.4	0.8	4	0.8	5	45
ESRB71200805S6	0.4	0.8	6	0.8	5	45
ESRB71200806	0.4	0.8	4	0.8	6	45
ESRB71200806S6	0.4	0.8	6	0.8	6	45
ESRB71200808	0.4	0.8	4	0.8	8	45
ESRB71200808S6	0.4	0.8	6	0.8	8	45
ESRB71200810	0.4	0.8	4	0.8	10	45
ESRB71200810S6	0.4	0.8	6	0.8	10	45
ESRB71200812	0.4	0.8	4	0.8	12	45
ESRB71200812S6	0.4	0.8	6	0.8	12	45
ESRB71200814	0.4	0.8	4	0.8	14	45
ESRB71200814S6	0.4	0.8	6	0.8	14	45
ESRB71200816	0.4	0.8	4	0.8	16	45
ESRB71200816S6	0.4	0.8	6	0.8	16	50
ESRB71200820	0.4	0.8	4	0.8	20	50
ESRB71200820S6	0.4	0.8	6	0.8	20	55
ESRB71200904	0.45	0.9	4	0.9	4	45
ESRB71200906	0.45	0.9	4	0.9	6	45
ESRB71200908	0.45	0.9	4	0.9	8	45
ESRB71200910	0.45	0.9	4	0.9	10	45
ESRB71201002	0.5	1	4	1	2	50
ESRB71201002S6	0.5	1	6	1	2	50
ESRB71201003	0.5	1	4	1	3	50
ESRB71201003S6	0.5	1	6	1	3	50
ESRB71201004	0.5	1	4	1	4	50
ESRB71201004S6	0.5	1	6	1	4	50
ESRB71201005	0.5	1	4	1	5	50
ESRB71201005S6	0.5	1	6	1	5	50
ESRB71201006	0.5	1	4	1	6	50
ESRB71201006S6	0.5	1	6	1	6	50
ESRB71201007	0.5	1	4	1	7	50
ESRB71201007S6	0.5	1	6	1	7	50
ESRB71201008	0.5	1	4	1	8	50
ESRB71201008S6	0.5	1	6	1	8	50
ESRB71201009	0.5	1	4	1	9	50
ESRB71201009S6	0.5	1	6	1	9	50
ESRB71201010	0.5	1	4	1	10	50
ESRB71201010S6	0.5	1	6	1	10	50
ESRB71201012	0.5	1	4	1	12	50

Designation	R	ØD	Ød	ℓ1	ℓ2	L
ESRB71201012S6	0.5	1	6	1	12	50
ESRB71201014	0.5	1	4	1	14	50
ESRB71201014S6	0.5	1	6	1	14	50
ESRB71201016	0.5	1	4	1	16	50
ESRB71201016S6	0.5	1	6	1	16	50
ESRB71201018	0.5	1	4	1	18	50
ESRB71201018S6	0.5	1	6	1	18	50
ESRB71201020	0.5	1	4	1	20	55
ESRB71201020S6	0.5	1	6	1	20	55
ESRB71201022	0.5	1	4	1	22	60
ESRB71201022S6	0.5	1	6	1	22	60
ESRB71201026	0.5	1	4	1	26	60
ESRB71201026S6	0.5	1	6	1	26	60
ESRB71201030	0.5	1	4	1	30	70
ESRB71201030S6	0.5	1	6	1	30	70
ESRB71201040	0.5	1	4	1	40	80
ESRB71201050	0.5	1	4	1	50	100
ESRB71201204	0.6	1.2	4	1.2	4	50
ESRB71201206	0.6	1.2	4	1.2	6	50
ESRB71201208	0.6	1.2	4	1.2	8	50
ESRB71201210	0.6	1.2	4	1.2	10	50
ESRB71201212	0.6	1.2	4	1.2	12	50
ESRB71201216	0.6	1.2	4	1.2	16	50
ESRB71201220	0.6	1.2	4	1.2	20	50
ESRB71201226	0.6	1.2	4	1.2	26	60
ESRB71201406	0.7	1.4	4	1.4	6	50
ESRB71201408	0.7	1.4	4	1.4	8	50
ESRB71201410	0.7	1.4	4	1.4	10	50
ESRB71201412	0.7	1.4	4	1.4	12	50
ESRB71201416	0.7	1.4	4	1.4	16	50
ESRB71201503	0.75	1.5	4	1.5	3	50
ESRB71201503S6	0.75	1.5	6	1.5	3	50
ESRB71201504	0.75	1.5	4	1.5	4	50
ESRB71201504S6	0.75	1.5	6	1.5	4	50
ESRB71201505	0.75	1.5	4	1.5	5	50
ESRB71201506	0.75	1.5	4	1.5	6	50
ESRB71201506S6	0.75	1.5	6	1.5	6	50
ESRB71201507	0.75	1.5	4	1.5	7	50
ESRB71201508	0.75	1.5	4	1.5	8	50

H-Star Endmill

ESRB712

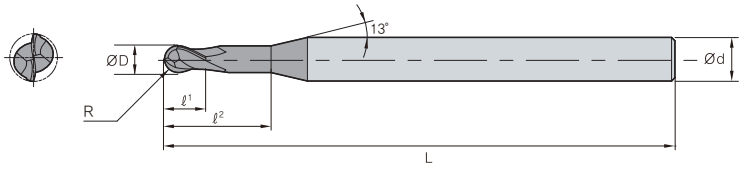
2 Flutes rib ball endmill



ULTRA FINE | 2 | 30° HELIX | R ±0.005 (R3 or Under) | R ±0.008 (Above R3) | AlTiN | DATA p.389~393

• TOLERANCE

ØD		Ød
~ Ø6	0 ~ -0.012mm	h5
Ø8 ~ Ø12	0 ~ -0.015mm	



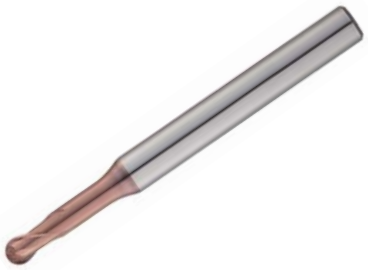
(mm)

Designation	R	ØD	Ød	ℓ1	ℓ2	L
ESRB71201508S6	0.75	1.5	6	1.5	8	50
ESRB71201510	0.75	1.5	4	1.5	10	50
ESRB71201510S6	0.75	1.5	6	1.5	10	50
ESRB71201512	0.75	1.5	4	1.5	12	50
ESRB71201512S6	0.75	1.5	6	1.5	12	50
ESRB71201514	0.75	1.5	4	1.5	14	50
ESRB71201514S6	0.75	1.5	6	1.5	14	50
ESRB71201516	0.75	1.5	4	1.5	16	50
ESRB71201516S6	0.75	1.5	6	1.5	16	50
ESRB71201518	0.75	1.5	4	1.5	18	50
ESRB71201518S6	0.75	1.5	6	1.5	18	50
ESRB71201520	0.75	1.5	4	1.5	20	55
ESRB71201520S6	0.75	1.5	6	1.5	20	55
ESRB71201522	0.75	1.5	4	1.5	22	60
ESRB71201522S6	0.75	1.5	6	1.5	22	60
ESRB71201526	0.75	1.5	4	1.5	26	60
ESRB71201526S6	0.75	1.5	6	1.5	26	60
ESRB71201530	0.75	1.5	4	1.5	30	70
ESRB71201530S6	0.75	1.5	6	1.5	30	70
ESRB71201535	0.75	1.5	4	1.5	35	70
ESRB71201535S6	0.75	1.5	6	1.5	35	70
ESRB71201540	0.75	1.5	4	1.5	40	80
ESRB71201540S6	0.75	1.5	6	1.5	40	80
ESRB71201604	0.8	1.6	4	1.6	4	50
ESRB71201606	0.8	1.6	4	1.6	6	50
ESRB71201608	0.8	1.6	4	1.6	8	50
ESRB71201610	0.8	1.6	4	1.6	10	50
ESRB71201612	0.8	1.6	4	1.6	12	50
ESRB71201616	0.8	1.6	4	1.6	16	50
ESRB71201620	0.8	1.6	4	1.6	20	50
ESRB71201804	0.9	1.8	4	1.8	4	50
ESRB71201806	0.9	1.8	4	1.8	6	50
ESRB71201808	0.9	1.8	4	1.8	8	50
ESRB71201810	0.9	1.8	4	1.8	10	50
ESRB71201812	0.9	1.8	4	1.8	12	50
ESRB71201816	0.9	1.8	4	1.8	16	50
ESRB71201820	0.9	1.8	4	1.8	20	50
ESRB71202004	1	2	4	2	4	50
ESRB71202004S6	1	2	6	2	4	50

Designation	R	ØD	Ød	ℓ1	ℓ2	L
ESRB71202006	1	2	4	2	6	50
ESRB71202006S6	1	2	6	2	6	50
ESRB71202008	1	2	4	2	8	50
ESRB71202008S6	1	2	6	2	8	50
ESRB71202010	1	2	4	2	10	50
ESRB71202010S6	1	2	6	2	10	50
ESRB71202012	1	2	4	2	12	50
ESRB71202012S6	1	2	6	2	12	50
ESRB71202014	1	2	4	2	14	50
ESRB71202014S6	1	2	6	2	14	50
ESRB71202016	1	2	4	2	16	50
ESRB71202016S6	1	2	6	2	16	50
ESRB71202018	1	2	4	2	18	55
ESRB71202018S6	1	2	6	2	18	55
ESRB71202020	1	2	4	2	20	55
ESRB71202020S6	1	2	6	2	20	55
ESRB71202022	1	2	4	2	22	60
ESRB71202022S6	1	2	6	2	22	60
ESRB71202026	1	2	4	2	26	60
ESRB71202026S6	1	2	6	2	26	60
ESRB71202030	1	2	4	2	30	70
ESRB71202030S6	1	2	6	2	30	70
ESRB71202035	1	2	4	2	35	70
ESRB71202035S6	1	2	6	2	35	70
ESRB71202040	1	2	4	2	40	80
ESRB71202040S6	1	2	6	2	40	80
ESRB71202045	1	2	4	2	45	90
ESRB71202045S6	1	2	6	2	45	90
ESRB71202050	1	2	4	2	50	100
ESRB71202050S6	1	2	6	2	50	100
ESRB71202060	1	2	4	2	60	110
ESRB71202508	1.25	2.5	4	2.5	8	50
ESRB71202510	1.25	2.5	4	2.5	10	50
ESRB71202512	1.25	2.5	4	2.5	12	50
ESRB71202516	1.25	2.5	4	2.5	16	50
ESRB71202520	1.25	2.5	4	2.5	20	50
ESRB71202522	1.25	2.5	4	2.5	22	60
ESRB71202526	1.25	2.5	4	2.5	26	60
ESRB71202530	1.25	2.5	4	2.5	30	70

ESRB712

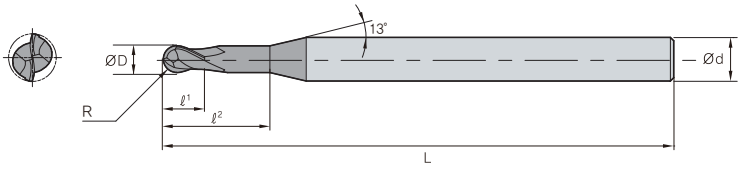
2 Flutes rib ball endmill



ULTRA FINE | 2 | 30° HELIX | R ±0.005 (R3 or Under) | R ±0.008 (Above R3) | AlCrN | DATA p.389~393

• TOLERANCE

ØD		Ød
~ Ø6	0 ~ -0.012mm	h5
Ø8 ~ Ø12	0 ~ -0.015mm	



(mm)

Designation	R	ØD	Ød	ℓ1	ℓ2	L
ESRB71202535	1.25	2.5	4	2.5	35	70
ESRB71202540	1.25	2.5	4	2.5	40	80
ESRB71202545	1.25	2.5	4	2.5	45	90
ESRB71202550	1.25	2.5	4	2.5	50	100
ESRB71203006	1.5	3	6	3	6	50
ESRB71203008	1.5	3	6	3	8	50
ESRB71203010	1.5	3	6	3	10	50
ESRB71203012	1.5	3	6	3	12	50
ESRB71203014	1.5	3	6	3	14	60
ESRB71203016	1.5	3	6	3	16	60
ESRB71203018	1.5	3	6	3	18	60
ESRB71203020	1.5	3	6	3	20	60
ESRB71203022	1.5	3	6	3	22	65
ESRB71203026	1.5	3	6	3	26	65
ESRB71203030	1.5	3	6	3	30	70
ESRB71203035	1.5	3	6	3	35	70
ESRB71203040	1.5	3	6	3	40	80
ESRB71203045	1.5	3	6	3	45	90
ESRB71203050	1.5	3	6	3	50	100
ESRB71203060	1.5	3	6	3	60	100
ESRB71203510	1.75	3.5	6	3	10	50
ESRB71203516	1.75	3.5	6	3	16	60
ESRB71203520	1.75	3.5	6	3	20	60
ESRB71203526	1.75	3.5	6	3	26	65
ESRB71203530	1.75	3.5	6	3	30	70
ESRB71204008	2	4	6	4	8	50
ESRB71204010	2	4	6	4	10	50
ESRB71204012	2	4	6	4	12	50
ESRB71204014	2	4	6	4	14	60
ESRB71204016	2	4	6	4	16	60
ESRB71204018	2	4	6	4	18	60
ESRB71204020	2	4	6	4	20	60
ESRB71204022	2	4	6	4	22	65
ESRB71204026	2	4	6	4	26	65

Designation	R	ØD	Ød	ℓ1	ℓ2	L
ESRB71204030	2	4	6	4	30	70
ESRB71204035	2	4	6	4	35	70
ESRB71204040	2	4	6	4	40	80
ESRB71204045	2	4	6	4	45	90
ESRB71204050	2	4	6	4	50	100
ESRB71204055	2	4	6	4	55	100
ESRB71204060	2	4	6	4	60	100
ESRB71205015	2.5	5	6	6	15	60
ESRB71205020	2.5	5	6	6	20	60
ESRB71205026	2.5	5	6	6	26	65
ESRB71205030	2.5	5	6	6	30	70
ESRB71205035	2.5	5	6	6	35	70
ESRB71205040	2.5	5	6	6	40	80
ESRB71205045	2.5	5	6	6	45	90
ESRB71205050	2.5	5	6	6	50	100
ESRB71205055	2.5	5	6	6	55	100
ESRB71205060	2.5	5	6	6	60	100
ESRB7120602090	3	6	6	12	20	90
ESRB71206020	3	6	6	8	20	60
ESRB7120603090	3	6	6	12	30	90
ESRB71206030	3	6	6	8	30	60
ESRB71208025100	4	8	8	14	25	100
ESRB71208025	4	8	8	10	25	70
ESRB71208035100	4	8	8	14	35	100
ESRB71208035	4	8	8	10	35	70
ESRB71210030100	5	10	10	18	30	100
ESRB71210030	5	10	10	12	30	75
ESRB71210040100	5	10	10	18	40	100
ESRB71210040	5	10	10	12	40	75
ESRB71212032110	6	12	12	22	32	110
ESRB71212032	6	12	12	14	32	80
ESRB71212045110	6	12	12	22	45	110
ESRB71212045	6	12	12	14	45	80

• Applicable Workpiece

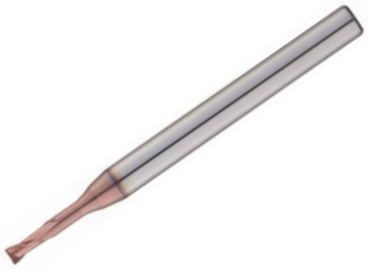
Carbon Steel ~ HB225	Alloy Steel HB225~325	Pre-hardened Steel HRC30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61~HRC55	SKD11 HRC55~63					
		○	◎	◎	○				

◎: Excellent ○: Good

H-Star Endmill

ESRE712

2 Flutes rib neck type flat endmill



ULTRA FINE | 2 | 30° HELIX | AlTiN | DATA

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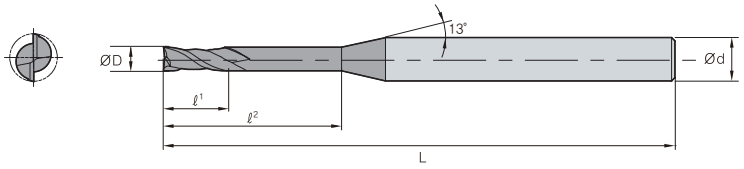
• TOLERANCE

ØD		Ød
~ Ø6	0 ~ -0.012mm	h5
Ø8 ~ Ø12	0 ~ -0.015mm	



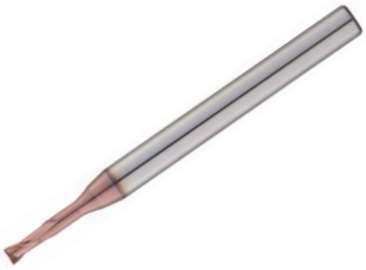
(mm)

Designation	ØD	Ød	ℓ1	ℓ2	L
ESRE712001003	0.1	4	0.15	0.3	40
ESRE712001005	0.1	4	0.15	0.5	40
ESRE71200101	0.1	4	0.15	1	40
ESRE712002005	0.2	4	0.3	0.5	40
ESRE712002015	0.2	4	0.3	1.5	40
ESRE71200201	0.2	4	0.3	1	40
ESRE71200202	0.2	4	0.3	2	40
ESRE712003015	0.3	4	0.5	1.5	40
ESRE71200301	0.3	4	0.5	1	40
ESRE712003025	0.3	4	0.5	2.5	40
ESRE71200302	0.3	4	0.5	2	40
ESRE71200303	0.3	4	0.5	3	40
ESRE71200304	0.3	4	0.5	4	40
ESRE71200305	0.4	4	0.5	5	40
ESRE712004015	0.4	4	0.6	1.5	40
ESRE71200401	0.4	4	0.6	1	40
ESRE712004025	0.4	4	0.6	2.5	40
ESRE71200402	0.4	4	0.6	2	40
ESRE71200403	0.4	4	0.6	3	40
ESRE71200404	0.4	4	0.6	4	40
ESRE71200405	0.4	4	0.6	5	40
ESRE71200406	0.4	4	0.6	6	40
ESRE71200408	0.4	4	0.6	8	40
ESRE71200410	0.5	4	0.6	10	40
ESRE712005015	0.5	4	0.7	1.5	45
ESRE71200501	0.5	4	0.7	1	45
ESRE712005025	0.5	4	0.7	2.5	45
ESRE71200502	0.5	4	0.7	2	45
ESRE71200503	0.5	4	0.7	3	45
ESRE71200504	0.5	4	0.7	4	45
ESRE71200505	0.5	4	0.7	5	45
ESRE71200506	0.5	4	0.7	6	45
ESRE71200508	0.5	4	0.7	8	45
ESRE71200510	0.5	4	0.7	10	45
ESRE71200512	0.5	4	0.7	12	45
ESRE71200514	0.5	4	0.7	14	45
ESRE71200516	0.5	4	0.7	16	45
ESRE71200602	0.6	4	0.9	2	45

Designation	ØD	Ød	ℓ1	ℓ2	L
ESRE71200603	0.6	4	0.9	3	45
ESRE71200604	0.6	4	0.9	4	45
ESRE71200605	0.6	4	0.9	5	45
ESRE71200606	0.6	4	0.9	6	45
ESRE71200608	0.6	4	0.9	8	45
ESRE71200610	0.6	4	0.9	10	45
ESRE71200612	0.6	4	0.9	12	45
ESRE71200614	0.6	4	0.9	14	45
ESRE71200616	0.6	4	0.9	16	45
ESRE71200702	0.7	4	1.2	2	45
ESRE71200704	0.7	4	1.2	4	45
ESRE71200706	0.7	4	1.2	6	45
ESRE71200708	0.7	4	1.2	8	45
ESRE71200710	0.7	4	1.2	10	45
ESRE71200712	0.7	4	1.2	12	45
ESRE71200802	0.8	4	1.2	2	45
ESRE71200803	0.8	4	1.2	3	45
ESRE71200804	0.8	4	1.2	4	45
ESRE71200805	0.8	4	1.2	5	45
ESRE71200806	0.8	4	1.2	6	45
ESRE71200808	0.8	4	1.2	8	45
ESRE71200810	0.8	4	1.2	10	45
ESRE71200812	0.8	4	1.2	12	45
ESRE71200814	0.8	4	1.2	14	45
ESRE71200816	0.8	4	1.2	16	45
ESRE71200820	0.8	4	1.2	20	50
ESRE71200906	0.9	4	1.3	6	45
ESRE71200908	0.9	4	1.3	8	45
ESRE71200910	0.9	4	1.3	10	45
ESRE71201002	1	4	1.5	2	50
ESRE71201003	1	4	1.5	3	50
ESRE71201004	1	4	1.5	4	50
ESRE71201005	1	4	1.5	5	50
ESRE71201006	1	4	1.5	6	50
ESRE71201007	1	4	1.5	7	50
ESRE71201008	1	4	1.5	8	50
ESRE71201010	1	4	1.5	10	50
ESRE71201012	1	4	1.5	12	50

ESRE712

2 Flutes rib neck type flat endmill



ULTRA FINE | 2 | 30° HELIX | AlTiN | DATA

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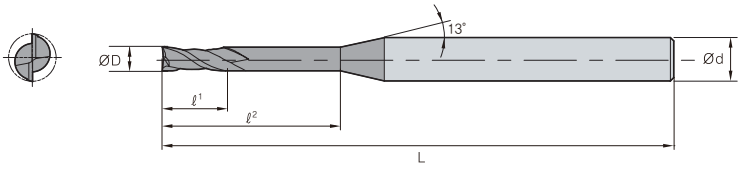
• TOLERANCE

ØD		Ød
~ Ø6	0 ~ -0.012mm	h5
Ø8 ~ Ø12	0 ~ -0.015mm	



(mm)

Designation	ØD	Ød	ℓ1	ℓ2	L
ESRE71201014	1	4	1.5	14	50
ESRE71201016	1	4	1.5	16	50
ESRE71201018	1	4	1.5	18	50
ESRE71201020	1	4	1.5	20	50
ESRE71201022	1	4	1.5	22	60
ESRE71201026	1	4	1.5	26	60
ESRE71201030	1	4	1.5	30	70
ESRE71201040	1	4	1.5	40	80
ESRE71201050	1	4	1.5	50	100
ESRE71201204	1.2	4	1.8	4	50
ESRE71201206	1.2	4	1.8	6	50
ESRE71201208	1.2	4	1.8	8	50
ESRE71201210	1.2	4	1.8	10	50
ESRE71201212	1.2	4	1.8	12	50
ESRE71201214	1.2	4	1.8	14	50
ESRE71201216	1.2	4	1.8	16	50
ESRE71201220	1.2	4	1.8	20	50
ESRE71201226	1.2	4	1.8	26	60
ESRE71201230	1.2	4	1.8	30	70
ESRE71201406	1.4	4	2.1	6	50
ESRE71201408	1.4	4	2.1	8	50
ESRE71201410	1.4	4	2.1	10	50
ESRE71201414	1.4	4	2.1	14	50
ESRE71201416	1.4	4	2.1	16	50
ESRE71201420	1.4	4	2.1	20	50
ESRE71201504	1.5	4	2.3	4	50
ESRE71201505	1.5	4	2.3	5	50
ESRE71201506	1.5	4	2.3	6	50
ESRE71201507	1.5	4	2.3	7	50
ESRE71201508	1.5	4	2.3	8	50
ESRE71201510	1.5	4	2.3	10	50
ESRE71201512	1.5	4	2.3	12	50
ESRE71201514	1.5	4	2.3	14	50
ESRE71201516	1.5	4	2.3	16	50
ESRE71201518	1.5	4	2.3	18	50
ESRE71201520	1.5	4	2.3	20	50
ESRE71201522	1.5	4	2.3	22	60
ESRE71201526	1.5	4	2.3	26	60

Designation	ØD	Ød	ℓ1	ℓ2	L
ESRE71201530	1.5	4	2.3	30	70
ESRE71201608	1.6	4	2.3	8	50
ESRE71201610	1.6	4	2.3	10	50
ESRE71201612	1.6	4	2.3	12	50
ESRE71201616	1.6	4	2.3	16	50
ESRE71201620	1.6	4	2.3	20	50
ESRE71201808	1.8	4	2.7	8	50
ESRE71201810	1.8	4	2.7	10	50
ESRE71201812	1.8	4	2.7	12	50
ESRE71201816	1.8	4	2.7	16	50
ESRE71201820	1.8	4	2.7	20	50
ESRE71202006	2	4	3	6	50
ESRE71202008	2	4	3	8	50
ESRE71202010	2	4	3	10	50
ESRE71202012	2	4	3	12	50
ESRE71202014	2	4	3	14	50
ESRE71202016	2	4	3	16	50
ESRE71202018	2	4	3	18	50
ESRE71202020	2	4	3	20	50
ESRE71202022	2	4	3	22	60
ESRE71202026	2	4	3	26	60
ESRE71202030	2	4	3	30	70
ESRE71202035	2	4	3	35	70
ESRE71202040	2	4	3	40	80
ESRE71202045	2	4	3	45	90
ESRE71202050	2	4	3	50	100
ESRE71202060	2	4	3	60	110
ESRE71202508	2.5	4	4	8	50
ESRE71202510	2.5	4	4	10	50
ESRE71202512	2.5	4	4	12	50
ESRE71202514	2.5	4	4	14	50
ESRE71202516	2.5	4	4	16	50
ESRE71202518	2.5	4	4	18	50
ESRE71202520	2.5	4	4	20	50
ESRE71202522	2.5	4	4	22	60
ESRE71202526	2.5	4	4	26	60
ESRE71202530	2.5	4	4	30	70
ESRE71202535	2.5	4	4	35	70

H-Star Endmill

ESRE712

2 Flutes rib neck type flat endmill

ULTRA FINE | 2 | 30° HELIX | AlTiN | DATA

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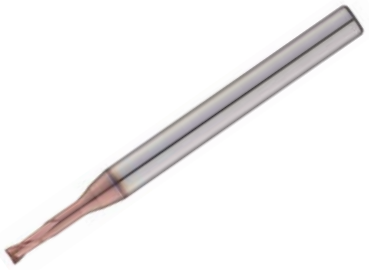
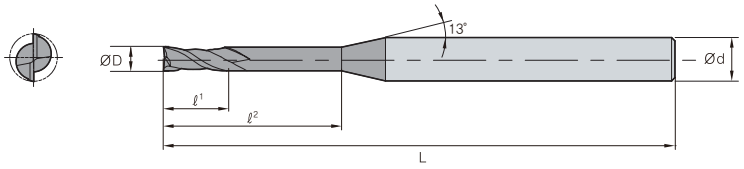
• TOLERANCE

ØD		Ød
~ Ø6	0 ~ -0.012mm	h5
Ø8 ~ Ø12	0 ~ -0.015mm	





(mm)

Designation	ØD	Ød	ℓ1	ℓ2	L
ESRE71202540	2.5	4	4	40	80
ESRE71202545	2.5	4	4	45	90
ESRE71202550	2.5	4	4	50	100
ESRE71203006	3	6	4.5	6	50
ESRE71203008	3	6	4.5	8	50
ESRE71203010	3	6	4.5	10	50
ESRE71203012	3	6	4.5	12	50
ESRE71203014	3	6	4.5	14	60
ESRE71203016	3	6	4.5	16	60
ESRE71203018	3	6	4.5	18	60
ESRE71203020	3	6	4.5	20	60
ESRE71203022	3	6	4.5	22	65
ESRE71203026	3	6	4.5	26	65
ESRE71203030	3	6	4.5	30	70
ESRE71203035	3	6	4.5	35	70
ESRE71203040	3	6	4.5	40	80
ESRE71203045	3	6	4.5	45	90
ESRE71203050	3	6	4.5	50	100
ESRE71203060	3	6	4.5	60	100
ESRE71204008	4	6	6	8	50
ESRE71204010	4	6	6	10	50
ESRE71204012	4	6	6	12	50
ESRE71204014	4	6	6	14	60
ESRE71204016	4	6	6	16	60
ESRE71204018	4	6	6	18	60
ESRE71204020	4	6	6	20	60
ESRE71204022	4	6	6	22	65
ESRE71204026	4	6	6	26	65

Designation	ØD	Ød	ℓ1	ℓ2	L
ESRE71204030	4	6	6	30	70
ESRE71204035	4	6	6	35	70
ESRE71204040	4	6	6	40	80
ESRE71204045	4	6	6	45	90
ESRE71204050	4	6	6	50	100
ESRE71204060	4	6	6	60	100
ESRE71205016	5	6	8	16	60
ESRE71205020	5	6	8	20	60
ESRE71205026	5	6	8	26	65
ESRE71205030	5	6	8	30	70
ESRE71205035	5	6	8	35	75
ESRE71205040	5	6	8	40	80
ESRE71205050	5	6	8	50	90
ESRE71205060	5	6	8	60	100
ESRE71206015	6	6	9	15	60
ESRE71206020	6	6	9	20	60
ESRE71206030	6	6	9	30	70
ESRE71206032	6	6	9	32	90
ESRE71208025	8	8	12	25	70
ESRE71208030	8	8	12	30	80
ESRE71208042	8	8	12	42	100
ESRE71210030	10	10	15	30	75
ESRE71210035	10	10	15	35	80
ESRE71210045	10	10	15	45	100
ESRE71212035	12	12	20	35	80
ESRE71212040	12	12	20	40	90
ESRE71212050	12	12	20	50	110

※ The above specifications are subject to change without prior notice for product quality improvement.

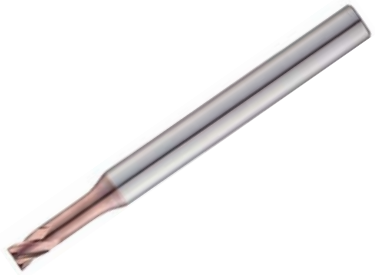
• **Applicable Workpiece**

Carbon steel ~ HB225	Alloy steel HB225~325	Pre-hardened steel HRC30~50	Hardened steel		Copper	Graphite	Cast iron ~FCD500	Aluminum	Stainless steel
			SKD61~HRC55	SKD11 HRC55~63					
		○	◎	◎	○				

◎: Excellent ○: Good

ESRE714

4 Flutes rib sqaure endmill



ULTRA FINE | 4 | 30° HELIX | AlTiN | DATA

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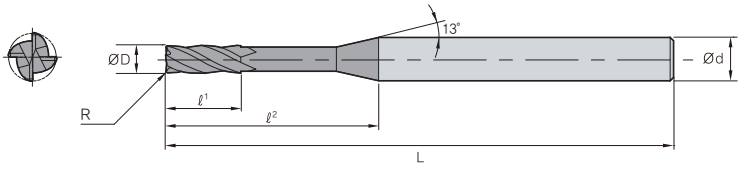
• TOLERANCE

ØD		Ød
~ Ø6	0 ~ -0.012mm	h5
Ø8 ~ Ø12	0 ~ -0.015mm	



(mm)

Designation	ØD	Ød	ℓ1	ℓ2	L
ESRE71400501	0.5	4	0.5	1	40
ESRE71400502	0.5	4	0.5	2	40
ESRE71400503	0.5	4	0.5	3	45
ESRE71400504	0.5	4	0.5	4	45
ESRE71400505	0.5	4	0.5	5	45
ESRE71400506	0.5	4	0.5	6	45
ESRE71400508	0.5	4	0.5	8	45
ESRE71400510	0.5	4	0.5	10	50
ESRE71400601	0.6	4	0.6	1	45
ESRE71400602	0.6	4	0.6	2	45
ESRE71400603	0.6	4	0.6	3	45
ESRE71400604	0.6	4	0.6	4	45
ESRE71400605	0.6	4	0.6	5	45
ESRE71400606	0.6	4	0.6	6	45
ESRE71400608	0.6	4	0.6	8	45
ESRE71400610	0.6	4	0.6	10	50
ESRE71400612	0.6	4	0.6	12	50
ESRE71400702	0.7	4	0.7	2	45
ESRE71400704	0.7	4	0.7	4	45
ESRE71400706	0.7	4	0.7	6	45
ESRE71400708	0.7	4	0.7	8	45
ESRE71400710	0.7	4	0.7	10	50
ESRE71400801	0.8	4	0.8	1	40
ESRE71400802	0.8	4	0.8	2	40
ESRE71400803	0.8	4	0.8	3	40
ESRE71400804	0.8	4	0.8	4	40
ESRE71400805	0.8	4	0.8	5	40
ESRE71400806	0.8	4	0.8	6	40
ESRE71400808	0.8	4	0.8	8	40
ESRE71400810	0.8	4	0.8	10	50
ESRE71400812	0.8	4	0.8	12	50
ESRE71400816	0.8	4	0.8	16	50
ESRE71401002	1	4	1	2	45
ESRE71401003	1	4	1	3	45
ESRE71401004	1	4	1	4	45
ESRE71401006	1	4	1	6	45

Designation	ØD	Ød	ℓ1	ℓ2	L
ESRE71401008	1	4	1	8	45
ESRE71401010	1	4	1	10	50
ESRE71401012	1	4	1	12	50
ESRE71401014	1	4	1	14	50
ESRE71401016	1	4	1	16	50
ESRE71401018	1	4	1	18	60
ESRE71401020	1	4	1	20	60
ESRE71401204	1.2	4	1.2	4	45
ESRE71401206	1.2	4	1.2	6	45
ESRE71401208	1.2	4	1.2	8	45
ESRE71401210	1.2	4	1.2	10	50
ESRE71401212	1.2	4	1.2	12	50
ESRE71401216	1.2	4	1.2	16	50
ESRE71401218	1.2	4	1.2	18	60
ESRE71401220	1.2	4	1.2	20	60
ESRE71401406	1.4	4	1.4	6	45
ESRE71401408	1.4	4	1.4	8	45
ESRE71401410	1.4	4	1.4	10	50
ESRE71401412	1.4	4	1.4	12	50
ESRE71401414	1.4	4	1.4	14	50
ESRE71401416	1.4	4	1.4	16	50
ESRE71401504	1.5	4	1.5	4	45
ESRE71401506	1.5	4	1.5	6	45
ESRE71401508	1.5	4	1.5	8	45
ESRE71401510	1.5	4	1.5	10	50
ESRE71401512	1.5	4	1.5	12	50
ESRE71401516	1.5	4	1.5	16	50
ESRE71401518	1.5	4	1.5	18	60
ESRE71401520	1.5	4	1.5	20	60
ESRE71401525	1.5	4	1.5	25	60
ESRE71401530	1.5	4	1.5	30	70
ESRE71401606	1.6	4	1.6	6	45
ESRE71401608	1.6	4	1.6	8	45
ESRE71401610	1.6	4	1.6	10	50
ESRE71401612	1.6	4	1.6	12	50
ESRE71401614	1.6	4	1.6	14	50

H-Star Endmill

ESRE714

4 Flutes rib sqaure endmill

ULTRA FINE | 4 | 30° HELIX | AlTiN | DATA

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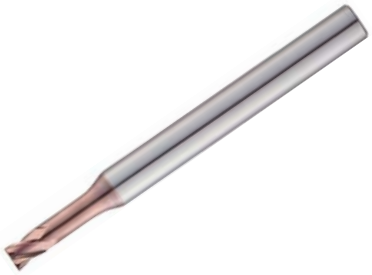
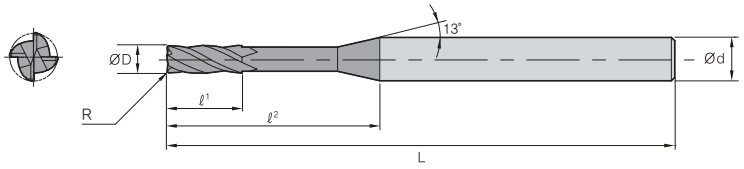
• TOLERANCE

ØD		Ød
~ Ø6	0 ~ -0.012mm	h5
Ø8 ~ Ø12	0 ~ -0.015mm	





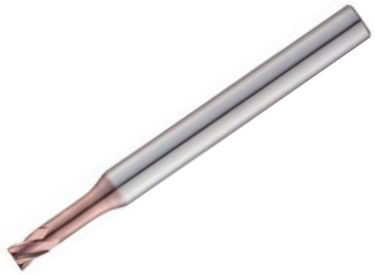
(mm)

Designation	ØD	Ød	ℓ1	ℓ2	L
ESRE71401616	1.6	4	1.6	16	50
ESRE71401618	1.6	4	1.6	18	60
ESRE71401620	1.6	4	1.6	20	60
ESRE71401625	1.6	4	1.6	25	70
ESRE71401806	1.8	4	1.8	6	45
ESRE71401808	1.8	4	1.8	8	45
ESRE71401810	1.8	4	1.8	10	50
ESRE71401812	1.8	4	1.8	12	50
ESRE71401816	1.8	4	1.8	16	50
ESRE71401820	1.8	4	1.8	20	60
ESRE71401825	1.8	4	1.8	25	70
ESRE71402004	2	4	2	4	45
ESRE71402006	2	4	2	6	45
ESRE71402008	2	4	2	8	45
ESRE71402010	2	4	2	10	50
ESRE71402012	2	4	2	12	50
ESRE71402014	2	4	2	14	50
ESRE71402016	2	4	2	16	50
ESRE71402018	2	4	2	18	50
ESRE71402020	2	4	2	20	50
ESRE71402022	2	4	2	22	60
ESRE71402025	2	4	2	25	60
ESRE71402030	2	4	2	30	70
ESRE71402510	2.5	4	2.5	10	50
ESRE71402512	2.5	4	2.5	12	50
ESRE71402516	2.5	4	2.5	16	50
ESRE71402520	2.5	4	2.5	20	50
ESRE71402525	2.5	4	2.5	25	60
ESRE71402530	2.5	4	2.5	30	70
ESRE71403006	3	6	3	6	45
ESRE71403008	3	6	3	8	45
ESRE71403010	3	6	3	10	50
ESRE71403012	3	6	3	12	50
ESRE71403016	3	6	3	16	55
ESRE71403020	3	6	3	20	60
ESRE71403025	3	6	3	25	65

Designation	ØD	Ød	ℓ1	ℓ2	L
ESRE71403030	3	6	3	30	70
ESRE71403035	3	6	3	35	75
ESRE71403040	3	6	3	40	80
ESRE71403045	3	6	3	45	90
ESRE71403050	3	6	3	50	100
ESRE71403060	3	6	3	60	110
ESRE71403512	3.5	6	3.5	12	50
ESRE71403516	3.5	6	3.5	16	55
ESRE71403520	3.5	6	3.5	20	60
ESRE71403525	3.5	6	3.5	25	65
ESRE71403530	3.5	6	3.5	30	70
ESRE71403535	3.5	6	3.5	35	75
ESRE71403540	3.5	6	3.5	40	80
ESRE71404006	4	6	4	6	50
ESRE71404008	4	6	4	8	50
ESRE71404010	4	6	4	10	50
ESRE71404012	4	6	4	12	50
ESRE71404016	4	6	4	16	55
ESRE71404020	4	6	4	20	60
ESRE71404025	4	6	4	25	65
ESRE71404030	4	6	4	30	70
ESRE71404040	4	6	4	40	80
ESRE71404045	4	6	4	45	90
ESRE71404050	4	6	4	50	100
ESRE71404060	4	6	4	60	110
ESRE71404512	4.5	6	4.5	12	50
ESRE71404516	4.5	6	4.5	16	55
ESRE71404520	4.5	6	4.5	20	60
ESRE71404525	4.5	6	4.5	25	65
ESRE71404530	4.5	6	4.5	30	70
ESRE71404540	4.5	6	4.5	40	80
ESRE71405016	5	6	5	16	60
ESRE71405020	5	6	5	20	60
ESRE71405025	5	6	5	25	65
ESRE71405030	5	6	5	30	70
ESRE71405040	5	6	5	40	80

ESRE714

4 Flutes rib sqaure endmill

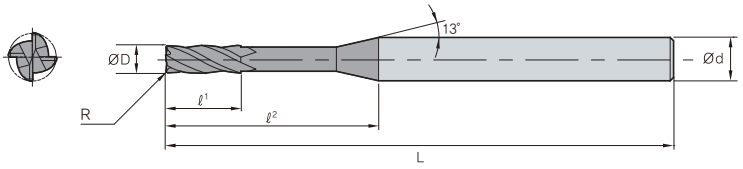


ULTRA FINE | 4 | 30° HELIX | AlTiN | DATA

p.399~402

• TOLERANCE

ØD		Ød
~ Ø6	0 ~ -0.012mm	h5
Ø8 ~ Ø12	0 ~ -0.015mm	



(mm)

Designation	ØD	Ød	ℓ1	ℓ2	L
ESRE71405050	5	6	5	50	100
ESRE71405060	5	6	5	60	110
ESRE71406020	6	6	6	20	60
ESRE71406030	6	6	6	30	75
ESRE71406040	6	6	6	40	80
ESRE71406050	6	6	6	50	90
ESRE71406060	6	6	6	60	100
ESRE71408025	8	8	12	25	65

Designation	ØD	Ød	ℓ1	ℓ2	L
ESRE71408040	8	8	12	40	100
ESRE71408050	8	8	12	50	110
ESRE71410030	10	10	15	30	70
ESRE71410050	10	10	15	50	100
ESRE71410060	10	10	15	60	120
ESRE71412040	12	12	18	40	80
ESRE71412060	12	12	18	60	110
ESRE71412070	12	12	18	70	130

※ The above specifications are subject to change without prior notice for product quality improvement.

• Applicable Workpiece

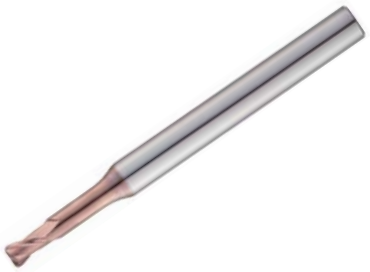
Carbon Steel ~ HB225	Alloy Steel HB225~325	Pre-hardened Steel HRC30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61~HRC55	SKD11 HRC55~63					
		○	◎	◎	○				

◎: Excellent ○: Good

H-Star Endmill

ESRR712

2 Flutes rib radius endmill

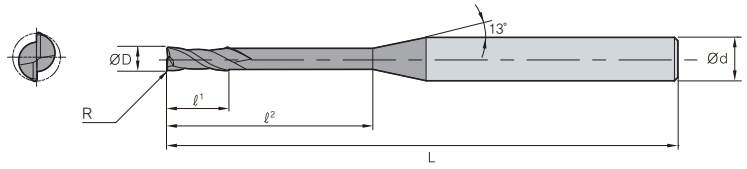


ULTRA FINE | 2 | 30° HELIX | AlTiN | DATA

p.403~412

• TOLERANCE

ØD		Ød
~ Ø6	0 ~ -0.012mm	h5
Ø8 ~ Ø16	0 ~ -0.015mm	



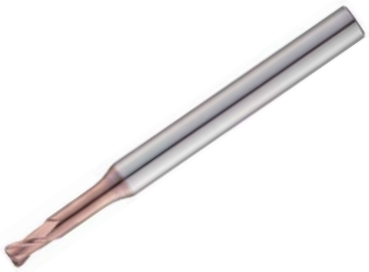
(mm)

Designation	R	ØD	Ød	ℓ1	ℓ2	L
ESRR712020002005	0.02	0.2	4	0.2	0.5	40
ESRR71202000201	0.02	0.2	4	0.2	1	40
ESRR712020002015	0.02	0.2	4	0.2	1.5	40
ESRR712020005005	0.05	0.2	4	0.2	0.5	40
ESRR71202000501	0.05	0.2	4	0.2	1	40
ESRR712020005015	0.05	0.2	4	0.2	1.5	40
ESRR71200300201	0.02	0.3	4	0.3	1	40
ESRR71200300202	0.02	0.3	4	0.3	2	40
ESRR71200300203	0.02	0.3	4	0.3	3	40
ESRR71200300501	0.05	0.3	4	0.3	1	40
ESRR71200300502	0.05	0.3	4	0.3	2	40
ESRR71200300503	0.05	0.3	4	0.3	3	40
ESRR71200400201	0.02	0.4	4	0.4	1	40
ESRR71200400202	0.02	0.4	4	0.4	2	40
ESRR71200400203	0.02	0.4	4	0.4	3	40
ESRR71200400204	0.02	0.4	4	0.4	4	40
ESRR71200400501	0.05	0.4	4	0.4	1	40
ESRR71200400502	0.05	0.4	4	0.4	2	40
ESRR71200400503	0.05	0.4	4	0.4	3	40
ESRR71200400504	0.05	0.4	4	0.4	4	40
ESRR71200401001	0.1	0.4	4	0.4	1	40
ESRR712004010015	0.1	0.4	4	0.4	1.5	40
ESRR71200401002	0.1	0.4	4	0.4	2	40
ESRR71200401003	0.1	0.4	4	0.4	3	40
ESRR71200401004	0.1	0.4	4	0.4	4	40
ESRR71200500201	0.02	0.5	4	0.5	1	45
ESRR712005002015	0.02	0.5	4	0.5	1.5	45
ESRR71200500202	0.02	0.5	4	0.5	2	45
ESRR712005002025	0.02	0.5	4	0.5	2.5	45
ESRR71200500203	0.02	0.5	4	0.5	3	45
ESRR71200500204	0.02	0.5	4	0.5	4	45
ESRR71200500205	0.02	0.5	4	0.5	5	45
ESRR71200500206	0.02	0.5	4	0.5	6	45
ESRR71200500208	0.02	0.5	4	0.5	8	45
ESRR71200500210	0.02	0.5	4	0.5	10	45
ESRR71200500501	0.05	0.5	4	0.5	1	45
ESRR712005005015	0.05	0.5	4	0.5	1.5	45
ESRR71200500502	0.05	0.5	4	0.5	2	45
ESRR712005005025	0.05	0.5	4	0.5	2.5	45

Designation	R	ØD	Ød	ℓ1	ℓ2	L
ESRR71200500503	0.05	0.5	4	0.5	3	45
ESRR71200500504	0.05	0.5	4	0.5	4	45
ESRR71200500505	0.05	0.5	4	0.5	5	45
ESRR71200500506	0.05	0.5	4	0.5	6	45
ESRR71200500508	0.05	0.5	4	0.5	8	45
ESRR71200500510	0.05	0.5	4	0.5	10	45
ESRR71200501001	0.1	0.5	4	0.5	1	45
ESRR712005010015	0.1	0.5	4	0.5	1.5	45
ESRR71200501002	0.1	0.5	4	0.5	2	45
ESRR712005010025	0.1	0.5	4	0.5	2.5	45
ESRR71200501003	0.1	0.5	4	0.5	3	45
ESRR71200501004	0.1	0.5	4	0.5	4	45
ESRR71200501005	0.1	0.5	4	0.5	5	45
ESRR71200501006	0.1	0.5	4	0.5	6	45
ESRR71200501008	0.1	0.5	4	0.5	8	45
ESRR71200501010	0.1	0.5	4	0.5	10	45
ESRR71200600202	0.02	0.6	4	0.6	2	45
ESRR71200600203	0.02	0.6	4	0.6	3	45
ESRR71200600204	0.02	0.6	4	0.6	4	45
ESRR71200600206	0.02	0.6	4	0.6	6	45
ESRR71200600208	0.02	0.6	4	0.6	8	45
ESRR71200600210	0.02	0.6	4	0.6	10	45
ESRR71200600212	0.02	0.6	4	0.6	12	50
ESRR71200600502	0.05	0.6	4	0.6	2	45
ESRR71200600503	0.05	0.6	4	0.6	3	45
ESRR71200600504	0.05	0.6	4	0.6	4	45
ESRR71200600506	0.05	0.6	4	0.6	6	45
ESRR71200600508	0.05	0.6	4	0.6	8	45
ESRR71200600510	0.05	0.6	4	0.6	10	45
ESRR71200600512	0.05	0.6	4	0.6	12	50
ESRR71200601002	0.1	0.6	4	0.6	2	45
ESRR71200601003	0.1	0.6	4	0.6	3	45
ESRR71200601004	0.1	0.6	4	0.6	4	45
ESRR71200601006	0.1	0.6	4	0.6	6	45
ESRR71200601008	0.1	0.6	4	0.6	8	45
ESRR71200601010	0.1	0.6	4	0.6	10	45
ESRR71200601012	0.1	0.6	4	0.6	12	50
ESRR71200701002	0.1	0.7	4	0.7	2	45
ESRR71200701004	0.1	0.7	4	0.7	4	45

ESRR712

2 Flutes rib radius endmill

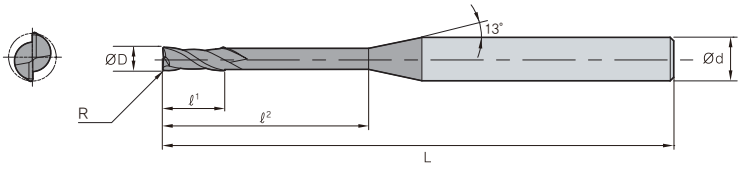


ULTRA FINE | 2 | 30° HELIX | AlTiN | DATA

p.403~412

• TOLERANCE

ØD		Ød
~ Ø6	0 ~ -0.012mm	h5
Ø8 ~ Ø16	0 ~ -0.015mm	



(mm)

Designation	R	ØD	Ød	ℓ1	ℓ2	L
ESRR71200701006	0.1	0.7	4	0.7	6	45
ESRR71200701008	0.1	0.7	4	0.7	8	45
ESRR71200701010	0.1	0.7	4	0.7	10	45
ESRR71200800202	0.02	0.8	4	0.8	2	45
ESRR71200800204	0.02	0.8	4	0.8	4	45
ESRR71200800206	0.02	0.8	4	0.8	6	45
ESRR71200800208	0.02	0.8	4	0.8	8	45
ESRR71200800210	0.02	0.8	4	0.8	10	45
ESRR71200800212	0.02	0.8	4	0.8	12	50
ESRR71200800502	0.05	0.8	4	0.8	2	45
ESRR71200800504	0.05	0.8	4	0.8	4	45
ESRR71200800506	0.05	0.8	4	0.8	6	45
ESRR71200800508	0.05	0.8	4	0.8	8	45
ESRR71200800510	0.05	0.8	4	0.8	10	45
ESRR71200800512	0.05	0.8	4	0.8	12	50
ESRR71200801002	0.1	0.8	4	0.8	2	45
ESRR71200801004	0.1	0.8	4	0.8	4	45
ESRR71200801006	0.1	0.8	4	0.8	6	45
ESRR71200801008	0.1	0.8	4	0.8	8	45
ESRR71200801010	0.1	0.8	4	0.8	10	45
ESRR71200801012	0.1	0.8	4	0.8	12	50
ESRR71200802002	0.2	0.8	4	0.8	2	45
ESRR71200802004	0.2	0.8	4	0.8	4	45
ESRR71200802006	0.2	0.8	4	0.8	6	45
ESRR71200802008	0.2	0.8	4	0.8	8	45
ESRR71200802010	0.2	0.8	4	0.8	10	45
ESRR71200802012	0.2	0.8	4	0.8	12	50
ESRR71201000204	0.02	1	4	1	4	45
ESRR71201000206	0.02	1	4	1	6	45
ESRR71201000208	0.02	1	4	1	8	45
ESRR71201000210	0.02	1	4	1	10	50
ESRR71201000212	0.02	1	4	1	12	50
ESRR71201000214	0.02	1	4	1	14	50
ESRR71201000216	0.02	1	4	1	16	50
ESRR71201000220	0.02	1	4	1	20	50
ESRR71201000504	0.05	1	4	1	4	45
ESRR71201000506	0.05	1	4	1	6	45
ESRR71201000508	0.05	1	4	1	8	45
ESRR71201000510	0.05	1	4	1	10	50

Designation	R	ØD	Ød	ℓ1	ℓ2	L
ESRR71201000512	0.05	1	4	1	12	50
ESRR71201000514	0.05	1	4	1	14	50
ESRR71201000516	0.05	1	4	1	16	50
ESRR71201000520	0.05	1	4	1	20	50
ESRR71201001004	0.1	1	4	1	4	45
ESRR71201001006	0.1	1	4	1	6	45
ESRR71201001008	0.1	1	4	1	8	45
ESRR71201001010	0.1	1	4	1	10	50
ESRR71201001012	0.1	1	4	1	12	50
ESRR71201001014	0.1	1	4	1	14	50
ESRR71201001016	0.1	1	4	1	16	50
ESRR71201001020	0.1	1	4	1	20	50
ESRR71201002004	0.2	1	4	1	4	45
ESRR71201002006	0.2	1	4	1	6	45
ESRR71201002008	0.2	1	4	1	8	45
ESRR71201002010	0.2	1	4	1	10	50
ESRR71201002012	0.2	1	4	1	12	50
ESRR71201002014	0.2	1	4	1	14	50
ESRR71201002016	0.2	1	4	1	16	50
ESRR71201002020	0.2	1	4	1	20	50
ESRR71201003004	0.3	1	4	1	4	45
ESRR71201003006	0.3	1	4	1	6	45
ESRR71201003008	0.3	1	4	1	8	45
ESRR71201003010	0.3	1	4	1	10	50
ESRR71201003012	0.3	1	4	1	12	50
ESRR71201003014	0.3	1	4	1	14	50
ESRR71201003016	0.3	1	4	1	16	50
ESRR71201003020	0.3	1	4	1	20	50
ESRR71201200204	0.02	1.2	4	1.2	4	45
ESRR71201200206	0.02	1.2	4	1.2	6	45
ESRR71201200208	0.02	1.2	4	1.2	8	45
ESRR71201200210	0.02	1.2	4	1.2	10	50
ESRR71201200212	0.02	1.2	4	1.2	12	50
ESRR71201200214	0.02	1.2	4	1.2	14	50
ESRR71201200216	0.02	1.2	4	1.2	16	50
ESRR71201200220	0.02	1.2	4	1.2	20	50
ESRR71201200504	0.05	1.2	4	1.2	4	45
ESRR71201200506	0.05	1.2	4	1.2	6	45
ESRR71201200508	0.05	1.2	4	1.2	8	45

H-Star Endmill

ESRR712

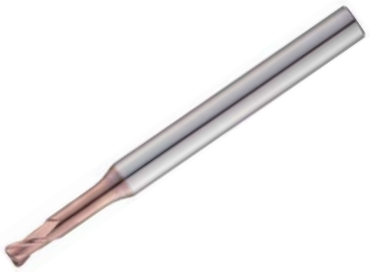
2 Flutes rib radius endmill

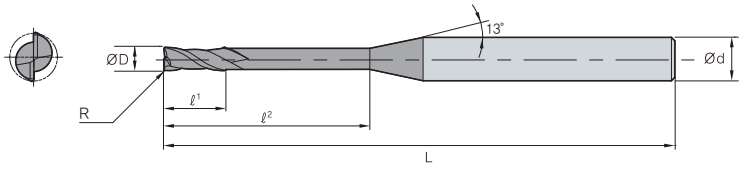
ULTRA FINE | 2 | 30° HELIX | AlTiN | DATA

p.403~412

• TOLERANCE

ØD		Ød
~ Ø6	0 ~ -0.012mm	h5
Ø8 ~ Ø16	0 ~ -0.015mm	





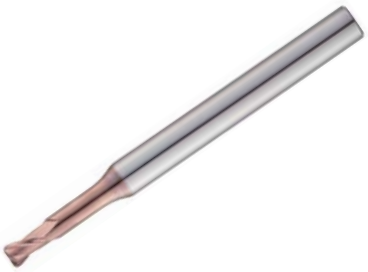
(mm)

Designation	R	ØD	Ød	ℓ1	ℓ2	L
ESRR71201200510	0.05	1.2	4	1.2	10	50
ESRR71201200512	0.05	1.2	4	1.2	12	50
ESRR71201200514	0.05	1.2	4	1.2	14	50
ESRR71201200516	0.05	1.2	4	1.2	16	50
ESRR71201200520	0.05	1.2	4	1.2	20	50
ESRR71201201004	0.1	1.2	4	1.2	4	45
ESRR71201201006	0.1	1.2	4	1.2	6	45
ESRR71201201008	0.1	1.2	4	1.2	8	45
ESRR71201201010	0.1	1.2	4	1.2	10	50
ESRR71201201012	0.1	1.2	4	1.2	12	50
ESRR71201201014	0.1	1.2	4	1.2	14	50
ESRR71201201016	0.1	1.2	4	1.2	16	50
ESRR71201201020	0.1	1.2	4	1.2	20	50
ESRR71201202004	0.2	1.2	4	1.2	4	45
ESRR71201202006	0.2	1.2	4	1.2	6	45
ESRR71201202008	0.2	1.2	4	1.2	8	45
ESRR71201202010	0.2	1.2	4	1.2	10	50
ESRR71201202012	0.2	1.2	4	1.2	12	50
ESRR71201202014	0.2	1.2	4	1.2	14	50
ESRR71201202016	0.2	1.2	4	1.2	16	50
ESRR71201202020	0.2	1.2	4	1.2	20	50
ESRR71201203004	0.3	1.2	4	1.2	4	45
ESRR71201203006	0.3	1.2	4	1.2	6	45
ESRR71201203008	0.3	1.2	4	1.2	8	45
ESRR71201203010	0.3	1.2	4	1.2	10	50
ESRR71201203012	0.3	1.2	4	1.2	12	50
ESRR71201203014	0.3	1.2	4	1.2	14	50
ESRR71201203016	0.3	1.2	4	1.2	16	50
ESRR71201203020	0.3	1.2	4	1.2	20	50
ESRR71201500204	0.02	1.5	4	1.5	4	45
ESRR71201500206	0.02	1.5	4	1.5	6	45
ESRR71201500208	0.02	1.5	4	1.5	8	45
ESRR71201500210	0.02	1.5	4	1.5	10	50
ESRR71201500212	0.02	1.5	4	1.5	12	50
ESRR71201500214	0.02	1.5	4	1.5	14	50
ESRR71201500216	0.02	1.5	4	1.5	16	50
ESRR71201500220	0.02	1.5	4	1.5	20	50
ESRR71201500504	0.05	1.5	4	1.5	4	45
ESRR71201500506	0.05	1.5	4	1.5	6	45

Designation	R	ØD	Ød	ℓ1	ℓ2	L
ESRR71201500508	0.05	1.5	4	1.5	8	45
ESRR71201500510	0.05	1.5	4	1.5	10	50
ESRR71201500512	0.05	1.5	4	1.5	12	50
ESRR71201500514	0.05	1.5	4	1.5	14	50
ESRR71201500516	0.05	1.5	4	1.5	16	50
ESRR71201500520	0.05	1.5	4	1.5	20	50
ESRR71201501004	0.1	1.5	4	1.5	4	45
ESRR71201501006	0.1	1.5	4	1.5	6	45
ESRR71201501008	0.1	1.5	4	1.5	8	45
ESRR71201501010	0.1	1.5	4	1.5	10	50
ESRR71201501012	0.1	1.5	4	1.5	12	50
ESRR71201501014	0.1	1.5	4	1.5	14	50
ESRR71201501016	0.1	1.5	4	1.5	16	50
ESRR71201501020	0.1	1.5	4	1.5	20	50
ESRR71201502004	0.2	1.5	4	1.5	4	45
ESRR71201502006	0.2	1.5	4	1.5	6	45
ESRR71201502008	0.2	1.5	4	1.5	8	45
ESRR71201502010	0.2	1.5	4	1.5	10	50
ESRR71201502012	0.2	1.5	4	1.5	12	50
ESRR71201502014	0.2	1.5	4	1.5	14	50
ESRR71201502016	0.2	1.5	4	1.5	16	50
ESRR71201502020	0.2	1.5	4	1.5	20	50
ESRR71201503004	0.3	1.5	4	1.5	4	45
ESRR71201503006	0.3	1.5	4	1.5	6	45
ESRR71201503008	0.3	1.5	4	1.5	8	45
ESRR71201503010	0.3	1.5	4	1.5	10	50
ESRR71201503012	0.3	1.5	4	1.5	12	50
ESRR71201503014	0.3	1.5	4	1.5	14	50
ESRR71201503016	0.3	1.5	4	1.5	16	50
ESRR71201503020	0.3	1.5	4	1.5	20	50
ESRR71201505004	0.5	1.5	4	1.5	4	45
ESRR71201505006	0.5	1.5	4	1.5	6	45
ESRR71201505008	0.5	1.5	4	1.5	8	45
ESRR71201505010	0.5	1.5	4	1.5	10	50
ESRR71201505012	0.5	1.5	4	1.5	12	50
ESRR71201505014	0.5	1.5	4	1.5	14	50
ESRR71201505016	0.5	1.5	4	1.5	16	50
ESRR71201505020	0.5	1.5	4	1.5	20	50
ESRR71202000206	0.02	2	4	2	6	45

ESRR712

2 Flutes rib radius endmill

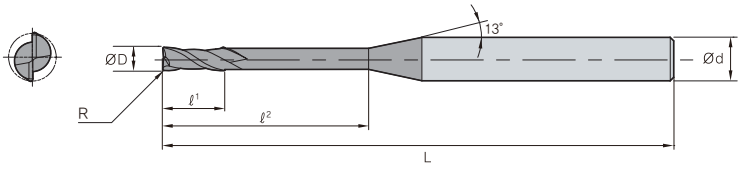


ULTRA FINE | 2 | 30° HELIX | AlTiN | DATA

p.403~412

• TOLERANCE

ØD		Ød
~ Ø6	0 ~ -0.012mm	h5
Ø8 ~ Ø16	0 ~ -0.015mm	



(mm)

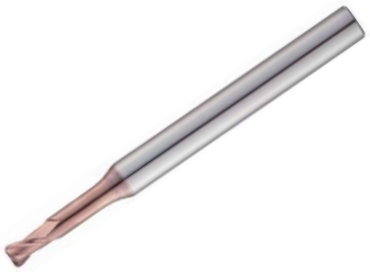
Designation	R	ØD	Ød	ℓ1	ℓ2	L
ESRR71202000208	0.02	2	4	2	8	45
ESRR71202000210	0.02	2	4	2	10	50
ESRR71202000212	0.02	2	4	2	12	50
ESRR71202000214	0.02	2	4	2	14	50
ESRR71202000216	0.02	2	4	2	16	50
ESRR71202000220	0.02	2	4	2	20	50
ESRR71202000225	0.02	2	4	2	25	60
ESRR71202000506	0.05	2	4	2	6	45
ESRR71202000508	0.05	2	4	2	8	45
ESRR71202000510	0.05	2	4	2	10	50
ESRR71202000512	0.05	2	4	2	12	50
ESRR71202000514	0.05	2	4	2	14	50
ESRR71202000516	0.05	2	4	2	16	50
ESRR71202000520	0.05	2	4	2	20	50
ESRR71202000525	0.05	2	4	2	25	60
ESRR71202001006	0.1	2	4	2	6	45
ESRR71202001008	0.1	2	4	2	8	45
ESRR71202001010	0.1	2	4	2	10	50
ESRR71202001012	0.1	2	4	2	12	50
ESRR71202001014	0.1	2	4	2	14	50
ESRR71202001016	0.1	2	4	2	16	50
ESRR71202001020	0.1	2	4	2	20	50
ESRR71202001025	0.1	2	4	2	25	60
ESRR71202001030	0.1	2	4	2	30	70
ESRR71202002006	0.2	2	4	2	6	45
ESRR71202002008	0.2	2	4	2	8	45
ESRR71202002010	0.2	2	4	2	10	50
ESRR71202002012	0.2	2	4	2	12	50
ESRR71202002014	0.2	2	4	2	14	50
ESRR71202002016	0.2	2	4	2	16	50
ESRR71202002020	0.2	2	4	2	20	50
ESRR71202002025	0.2	2	4	2	25	60
ESRR71202002030	0.2	2	4	2	30	70
ESRR71202003006	0.3	2	4	2	6	45
ESRR71202003008	0.3	2	4	2	8	45
ESRR71202003010	0.3	2	4	2	10	50
ESRR71202003012	0.3	2	4	2	12	50
ESRR71202003014	0.3	2	4	2	14	50
ESRR71202003016	0.3	2	4	2	16	50

Designation	R	ØD	Ød	ℓ1	ℓ2	L
ESRR71202003020	0.3	2	4	2	20	50
ESRR71202003025	0.3	2	4	2	25	60
ESRR71202003030	0.3	2	4	2	30	70
ESRR71202005006	0.5	2	4	2	6	45
ESRR71202005008	0.5	2	4	2	8	45
ESRR71202005010	0.5	2	4	2	10	50
ESRR71202005012	0.5	2	4	2	12	50
ESRR71202005014	0.5	2	4	2	14	50
ESRR71202005016	0.5	2	4	2	16	50
ESRR71202005020	0.5	2	4	2	20	50
ESRR71202005025	0.5	2	4	2	25	60
ESRR71202005030	0.5	2	4	2	30	70
ESRR71202501010	0.1	2.5	4	2.5	10	50
ESRR71202501016	0.1	2.5	4	2.5	16	50
ESRR71202501020	0.1	2.5	4	2.5	20	50
ESRR71202501025	0.1	2.5	4	2.5	25	60
ESRR71202501030	0.1	2.5	4	2.5	30	70
ESRR71202502010	0.2	2.5	4	2.5	10	50
ESRR71202502016	0.2	2.5	4	2.5	16	50
ESRR71202502020	0.2	2.5	4	2.5	20	50
ESRR71202503010	0.3	2.5	4	2.5	10	50
ESRR71202503016	0.3	2.5	4	2.5	16	50
ESRR71202503020	0.3	2.5	4	2.5	20	50
ESRR71202505010	0.5	2.5	4	2.5	10	50
ESRR71202505016	0.5	2.5	4	2.5	16	50
ESRR71202505020	0.5	2.5	4	2.5	20	50
ESRR71203001010	0.1	3	6	3	10	50
ESRR71203001012	0.1	3	6	3	12	50
ESRR71203001016	0.1	3	6	3	16	55
ESRR71203001020	0.1	3	6	3	20	60
ESRR71203001025	0.1	3	6	3	25	65
ESRR71203001030	0.1	3	6	3	30	70
ESRR71203001035	0.1	3	6	3	35	75
ESRR71203001040	0.1	3	6	3	40	80
ESRR71203002010	0.2	3	6	3	10	50
ESRR71203002012	0.2	3	6	3	12	50
ESRR71203002016	0.2	3	6	3	16	55
ESRR71203002020	0.2	3	6	3	20	60
ESRR71203002025	0.2	3	6	3	25	65

H-Star Endmill

ESRR712

2 Flutes rib radius endmill

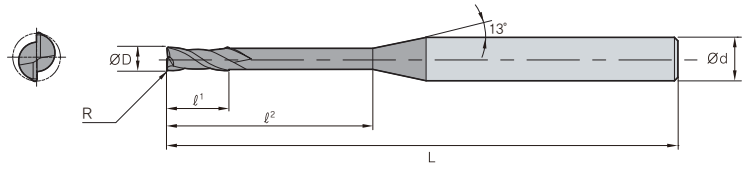


ULTRA FINE | 2 | 30° HELIX | AlTiN | DATA

p.403~412

• TOLERANCE

ØD		Ød
~ Ø6	0 ~ -0.012mm	h5
Ø8 ~ Ø16	0 ~ -0.015mm	



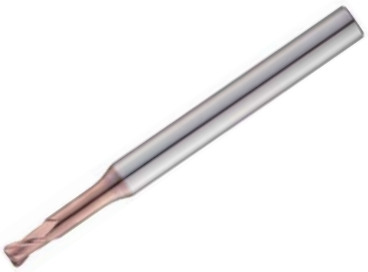
(mm)

Designation	R	ØD	Ød	ℓ1	ℓ2	L
ESRR71203002030	0.2	3	6	3	30	70
ESRR71203002035	0.2	3	6	3	35	75
ESRR71203002040	0.2	3	6	3	40	80
ESRR71203003010	0.3	3	6	3	10	50
ESRR71203003012	0.3	3	6	3	12	50
ESRR71203003016	0.3	3	6	3	16	55
ESRR71203003020	0.3	3	6	3	20	60
ESRR71203003025	0.3	3	6	3	25	65
ESRR71203003030	0.3	3	6	3	30	70
ESRR71203003035	0.3	3	6	3	35	75
ESRR71203003040	0.3	3	6	3	40	80
ESRR71203005010	0.5	3	6	3	10	50
ESRR71203005012	0.5	3	6	3	12	50
ESRR71203005016	0.5	3	6	3	16	55
ESRR71203005020	0.5	3	6	3	20	60
ESRR71203005025	0.5	3	6	3	25	65
ESRR71203005030	0.5	3	6	3	30	70
ESRR71203005035	0.5	3	6	3	35	75
ESRR71203005040	0.5	3	6	3	40	80
ESRR71203010010	1	3	6	3	10	50
ESRR71203010012	1	3	6	3	12	50
ESRR71203010016	1	3	6	3	16	55
ESRR71203010020	1	3	6	3	20	60
ESRR71203010025	1	3	6	3	25	65
ESRR71203010030	1	3	6	3	30	70
ESRR71203010035	1	3	6	3	35	75
ESRR71203010040	1	3	6	3	40	80
ESRR71204001012	0.1	4	6	4	12	50
ESRR71204001016	0.1	4	6	4	16	55
ESRR71204001020	0.1	4	6	4	20	60
ESRR71204001025	0.1	4	6	4	25	65
ESRR71204001030	0.1	4	6	4	30	70
ESRR71204001035	0.1	4	6	4	35	75
ESRR71204001040	0.1	4	6	4	40	80
ESRR71204002012	0.2	4	6	4	12	50
ESRR71204002016	0.2	4	6	4	16	55
ESRR71204002020	0.2	4	6	4	20	60
ESRR71204002025	0.2	4	6	4	25	65
ESRR71204002030	0.2	4	6	4	30	70

Designation	R	ØD	Ød	ℓ1	ℓ2	L
ESRR71204002035	0.2	4	6	4	35	75
ESRR71204002040	0.2	4	6	4	40	80
ESRR71204003012	0.3	4	6	4	12	50
ESRR71204003016	0.3	4	6	4	16	55
ESRR71204003020	0.3	4	6	4	20	60
ESRR71204003025	0.3	4	6	4	25	65
ESRR71204003030	0.3	4	6	4	30	70
ESRR71204003035	0.3	4	6	4	35	75
ESRR71204003040	0.3	4	6	4	40	80
ESRR71204005012	0.5	4	6	4	12	50
ESRR71204005016	0.5	4	6	4	16	55
ESRR71204005020	0.5	4	6	4	20	60
ESRR71204005025	0.5	4	6	4	25	65
ESRR71204005030	0.5	4	6	4	30	70
ESRR71204005035	0.5	4	6	4	35	75
ESRR71204005040	0.5	4	6	4	40	80
ESRR71204010012	1	4	6	4	12	50
ESRR71204010016	1	4	6	4	16	55
ESRR71204010020	1	4	6	4	20	60
ESRR71204010025	1	4	6	4	25	65
ESRR71204010030	1	4	6	4	30	70
ESRR71204010035	1	4	6	4	35	75
ESRR71204010040	1	4	6	4	40	80
ESRR71205002015	0.2	5	6	6	15	60
ESRR71205002025	0.2	5	6	6	25	70
ESRR71205002030	0.2	5	6	6	30	70
ESRR71205002040	0.2	5	6	6	40	80
ESRR71205005015	0.5	5	6	6	15	60
ESRR71205005025	0.5	5	6	6	25	70
ESRR71205005030	0.5	5	6	6	30	70
ESRR71205005040	0.5	5	6	6	40	80
ESRR71205010015	1	5	6	6	15	60
ESRR71205010025	1	5	6	6	25	70
ESRR71205010030	1	5	6	6	30	70
ESRR71205010040	1	5	6	6	40	80
ESRR71206001020	0.1	6	6	7	20	60
ESRR71206001040	0.1	6	6	7	40	80
ESRR71206002020	0.2	6	6	7	20	60
ESRR71206002040	0.2	6	6	7	40	80

ESRR712

2 Flutes rib radius endmill

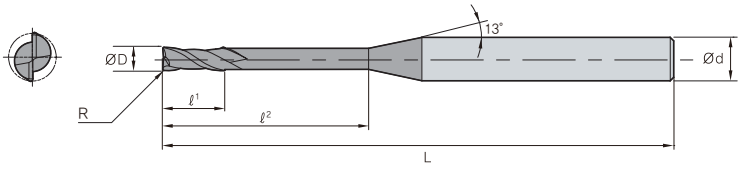


ULTRA FINE | 2 | 30° HELIX | AlTiN | DATA

p.403~412

• TOLERANCE

ØD		Ød
~ Ø6	0 ~ -0.012mm	h5
Ø8 ~ Ø16	0 ~ -0.015mm	



(mm)

Designation	R	ØD	Ød	ℓ1	ℓ2	L
ESRR71206003020	0.3	6	6	7	20	60
ESRR71206003040	0.3	6	6	7	40	80
ESRR71206005020	0.5	6	6	7	20	60
ESRR71206005040	0.5	6	6	7	40	80
ESRR71206010020	1	6	6	7	20	60
ESRR71206010040	1	6	6	7	40	80
ESRR71206015020	1.5	6	6	7	20	60
ESRR71206015040	1.5	6	6	7	40	80
ESRR71208002022	0.2	8	8	9	22	65
ESRR71208003022	0.3	8	8	9	22	65
ESRR71205005022	0.5	5	8	9	22	65
ESRR71208010022	1	8	8	9	22	65
ESRR71208015022	1.5	8	8	9	22	65
ESRR71210002024	0.2	10	10	11	24	70

Designation	R	ØD	Ød	ℓ1	ℓ2	L
ESRR71210003024	0.3	10	10	11	24	70
ESRR71210005024	0.5	10	10	11	24	70
ESRR71210010024	1	10	10	11	24	70
ESRR71210015024	1.5	10	10	11	24	70
ESRR71210020024	2	10	10	11	24	70
ESRR71212002026	0.2	12	12	13	26	80
ESRR71212003026	0.3	12	12	13	26	80
ESRR71212005026	0.5	12	12	13	26	80
ESRR71212010026	1	12	12	13	26	80
ESRR71212015026	1.5	12	12	13	26	80
ESRR71212020026	2	12	12	13	26	80
ESRR71212030026	3	12	12	13	26	80
ESRR71216005035	0.5	16	16	20	35	110
ESRR71216010035	1	16	16	20	35	110

※ The above specifications are subject to change without prior notice for product quality improvement.

• Applicable Workpiece

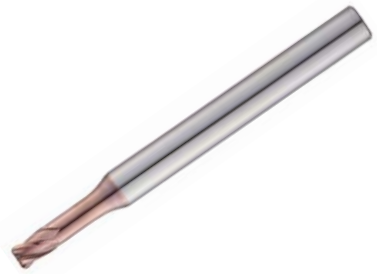
Carbon Steel ~ HB225	Alloy Steel HB225~325	Pre-hardened Steel HRC30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61~HRC55	SKD11 HRC55~63					
		○	◎	◎	○				

◎: Excellent ○: Good

H-Star Endmill

ESRR714

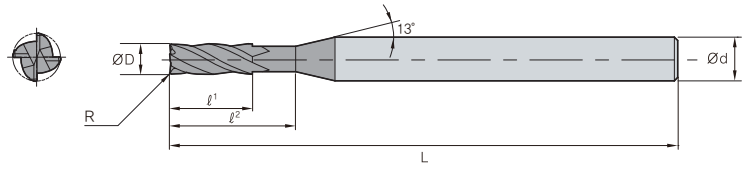
4 Flutes rib radius endmill



ULTRA FINE | 4 | 30° HELIX | R ±0.01 Ø6 or Under | R ±0.015 Above Ø6 | AlTiN | DATA p.413~424

• TOLERANCE

ØD		Ød
~ Ø6	0 ~ -0.012mm	h5
Ø8 ~ Ø20	0 ~ -0.015mm	



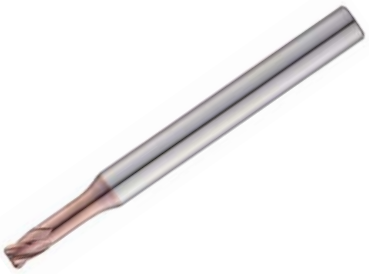
(mm)

Designation	R	ØD	Ød	ℓ1	ℓ2	L
ESRR71400500502	0.05	0.5	4	0.5	2	45
ESRR71400500504	0.05	0.5	4	0.5	4	45
ESRR71400500506	0.05	0.5	4	0.5	6	45
ESRR71400500508	0.05	0.5	4	0.5	8	45
ESRR71400501002	0.1	0.5	4	0.5	2	45
ESRR71400501004	0.1	0.5	4	0.5	4	45
ESRR71400501006	0.1	0.5	4	0.5	6	45
ESRR71400501008	0.1	0.5	4	0.5	8	45
ESRR71400600502	0.05	0.6	4	0.6	2	45
ESRR71400600504	0.05	0.6	4	0.6	4	45
ESRR71400600506	0.05	0.6	4	0.6	6	45
ESRR71400600508	0.05	0.6	4	0.6	8	45
ESRR71400601002	0.1	0.6	4	0.6	2	45
ESRR71400601004	0.1	0.6	4	0.6	4	45
ESRR71400601006	0.1	0.6	4	0.6	6	45
ESRR71400601008	0.1	0.6	4	0.6	8	45
ESRR71400700502	0.05	0.7	4	0.7	2	45
ESRR71400700504	0.05	0.7	4	0.7	4	45
ESRR71400700506	0.05	0.7	4	0.7	6	45
ESRR71400700508	0.05	0.7	4	0.7	8	45
ESRR71400701002	0.1	0.7	4	0.7	2	45
ESRR71400701004	0.1	0.7	4	0.7	4	45
ESRR71400701006	0.1	0.7	4	0.7	6	45
ESRR71400701008	0.1	0.7	4	0.7	8	45
ESRR71400800202	0.02	0.8	4	0.8	2	45
ESRR71400800204	0.02	0.8	4	0.8	4	45
ESRR71400800206	0.02	0.8	4	0.8	6	45
ESRR71400800208	0.02	0.8	4	0.8	8	45
ESRR71400800210	0.02	0.8	4	0.8	10	45
ESRR71400800212	0.02	0.8	4	0.8	12	50
ESRR71400800502	0.05	0.8	4	0.8	2	45
ESRR71400800504	0.05	0.8	4	0.8	4	45
ESRR71400800506	0.05	0.8	4	0.8	6	45
ESRR71400800508	0.05	0.8	4	0.8	8	45
ESRR71400800510	0.05	0.8	4	0.8	10	45
ESRR71400800512	0.05	0.8	4	0.8	12	50
ESRR71400801002	0.1	0.8	4	0.8	2	45
ESRR71400801004	0.1	0.8	4	0.8	4	45
ESRR71400801006	0.1	0.8	4	0.8	6	45

Designation	R	ØD	Ød	ℓ1	ℓ2	L
ESRR71400801008	0.1	0.8	4	0.8	8	45
ESRR71400801010	0.1	0.8	4	0.8	10	45
ESRR71400801012	0.1	0.8	4	0.8	12	50
ESRR71401000204	0.02	1	4	1	4	45
ESRR71401000206	0.02	1	4	1	6	45
ESRR71401000208	0.02	1	4	1	8	45
ESRR71401000210	0.02	1	4	1	10	50
ESRR71401000212	0.02	1	4	1	12	50
ESRR71401000214	0.02	1	4	1	14	50
ESRR71401000216	0.02	1	4	1	16	50
ESRR71401000220	0.02	1	4	1	20	50
ESRR71401000503	0.05	1	4	1	3	45
ESRR71401000504	0.05	1	4	1	4	45
ESRR71401000506	0.05	1	4	1	6	45
ESRR71401000508	0.05	1	4	1	8	45
ESRR71401000510	0.05	1	4	1	10	50
ESRR71401000512	0.05	1	4	1	12	50
ESRR71401000514	0.05	1	4	1	14	50
ESRR71401000516	0.05	1	4	1	16	50
ESRR71401000520	0.05	1	4	1	20	50
ESRR71401001003	0.1	1	4	1	3	45
ESRR71401001004	0.1	1	4	1	4	45
ESRR71401001006	0.1	1	4	1	6	45
ESRR71401001008	0.1	1	4	1	8	45
ESRR71401001010	0.1	1	4	1	10	50
ESRR71401001012	0.1	1	4	1	12	50
ESRR71401001014	0.1	1	4	1	14	50
ESRR71401001016	0.1	1	4	1	16	50
ESRR71401001020	0.1	1	4	1	20	50
ESRR71401002003	0.2	1	4	1	3	45
ESRR71401002004	0.2	1	4	1	4	45
ESRR71401002006	0.2	1	4	1	6	45
ESRR71401002008	0.2	1	4	1	8	45
ESRR71401002010	0.2	1	4	1	10	50
ESRR71401002012	0.2	1	4	1	12	50
ESRR71401002014	0.2	1	4	1	14	50
ESRR71401002016	0.2	1	4	1	16	50
ESRR71401002020	0.2	1	4	1	20	50
ESRR71401003003	0.3	1	4	1	3	45

ESRR714

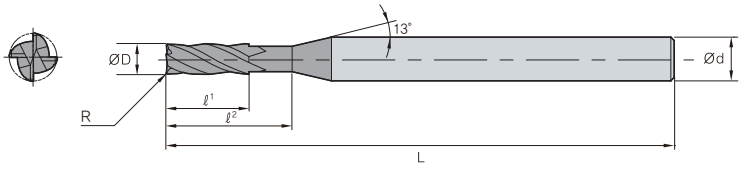
4 Flutes rib radius endmill



ULTRA FINE | 4 | 30° HELIX | R ±0.01 Ø6 or Under | R ±0.015 Above Ø6 | AlTiN | DATA p.413~424

• TOLERANCE

ØD		Ød
~ Ø6	0 ~ -0.012mm	h5
Ø8 ~ Ø20	0 ~ -0.015mm	



(mm)

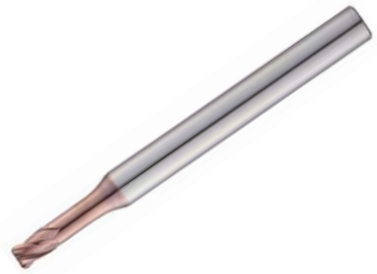
Designation	R	ØD	Ød	ℓ1	ℓ2	L
ESRR71401003004	0.3	1	4	1	4	45
ESRR71401003006	0.3	1	4	1	6	45
ESRR71401003008	0.3	1	4	1	8	45
ESRR71401003010	0.3	1	4	1	10	50
ESRR71401003012	0.3	1	4	1	12	50
ESRR71401003014	0.3	1	4	1	14	50
ESRR71401003016	0.3	1	4	1	16	50
ESRR71401003020	0.3	1	4	1	20	50
ESRR71401200204	0.02	1.2	4	1.2	4	45
ESRR71401200206	0.02	1.2	4	1.2	6	45
ESRR71401200208	0.02	1.2	4	1.2	8	45
ESRR71401200210	0.02	1.2	4	1.2	10	50
ESRR71401200212	0.02	1.2	4	1.2	12	50
ESRR71401200214	0.02	1.2	4	1.2	14	50
ESRR71401200216	0.02	1.2	4	1.2	16	50
ESRR71401200220	0.02	1.2	4	1.2	20	50
ESRR71401200503	0.05	1.2	4	1.2	3	45
ESRR71401200504	0.05	1.2	4	1.2	4	45
ESRR71401200506	0.05	1.2	4	1.2	6	45
ESRR71401200508	0.05	1.2	4	1.2	8	45
ESRR71401200510	0.05	1.2	4	1.2	10	50
ESRR71401200512	0.05	1.2	4	1.2	12	50
ESRR71401200514	0.05	1.2	4	1.2	14	50
ESRR71401200516	0.05	1.2	4	1.2	16	50
ESRR71401200520	0.05	1.2	4	1.2	20	50
ESRR71401201003	0.1	1.2	4	1.2	3	45
ESRR71401201004	0.1	1.2	4	1.2	4	45
ESRR71401201006	0.1	1.2	4	1.2	6	45
ESRR71401201008	0.1	1.2	4	1.2	8	45
ESRR71401201010	0.1	1.2	4	1.2	10	50
ESRR71401201012	0.1	1.2	4	1.2	12	50
ESRR71401201014	0.1	1.2	4	1.2	14	50
ESRR71401201016	0.1	1.2	4	1.2	16	50
ESRR71401201020	0.1	1.2	4	1.2	20	50
ESRR71401202003	0.2	1.2	4	1.2	3	45
ESRR71401202004	0.2	1.2	4	1.2	4	45
ESRR71401202006	0.2	1.2	4	1.2	6	45
ESRR71401202008	0.2	1.2	4	1.2	8	45
ESRR71401202010	0.2	1.2	4	1.2	10	50

Designation	R	ØD	Ød	ℓ1	ℓ2	L
ESRR71401202012	0.2	1.2	4	1.2	12	50
ESRR71401202014	0.2	1.2	4	1.2	14	50
ESRR71401202016	0.2	1.2	4	1.2	16	50
ESRR71401202020	0.2	1.2	4	1.2	20	50
ESRR71401203003	0.3	1.2	4	1.2	3	45
ESRR71401203004	0.3	1.2	4	1.2	4	45
ESRR71401203006	0.3	1.2	4	1.2	6	45
ESRR71401203008	0.3	1.2	4	1.2	8	45
ESRR71401203010	0.3	1.2	4	1.2	10	50
ESRR71401203012	0.3	1.2	4	1.2	12	50
ESRR71401203016	0.3	1.2	4	1.2	16	50
ESRR71401203020	0.3	1.2	4	1.2	20	50
ESRR71401500206	0.02	1.5	4	1.5	6	45
ESRR71401500208	0.02	1.5	4	1.5	8	45
ESRR71401500210	0.02	1.5	4	1.5	10	50
ESRR71401500212	0.02	1.5	4	1.5	12	50
ESRR71401500214	0.02	1.5	4	1.5	14	50
ESRR71401500216	0.02	1.5	4	1.5	16	50
ESRR71401500220	0.02	1.5	4	1.5	20	50
ESRR71401500222	0.02	1.5	4	1.5	22	60
ESRR71401500504	0.05	1.5	4	1.5	4	45
ESRR71401500506	0.05	1.5	4	1.5	6	45
ESRR71401500508	0.05	1.5	4	1.5	8	45
ESRR71401500510	0.05	1.5	4	1.5	10	50
ESRR71401500512	0.05	1.5	4	1.5	12	50
ESRR71401500514	0.05	1.5	4	1.5	14	50
ESRR71401500516	0.05	1.5	4	1.5	16	50
ESRR71401500520	0.05	1.5	4	1.5	20	50
ESRR71401500522	0.05	1.5	4	1.5	22	60
ESRR71401500526	0.05	1.5	4	1.5	26	60
ESRR71401501004	0.1	1.5	4	1.5	4	45
ESRR71401501006	0.1	1.5	4	1.5	6	45
ESRR71401501008	0.1	1.5	4	1.5	8	45
ESRR71401501010	0.1	1.5	4	1.5	10	50
ESRR71401501012	0.1	1.5	4	1.5	12	50
ESRR71401501014	0.1	1.5	4	1.5	14	50
ESRR71401501016	0.1	1.5	4	1.5	16	50
ESRR71401501020	0.1	1.5	4	1.5	20	50
ESRR71401501022	0.1	1.5	4	1.5	22	60

H-Star Endmill

ESRR714

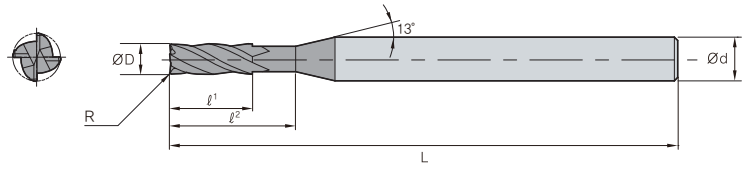
4 Flutes rib radius endmill



ULTRA FINE | 4 | 30° HELIX | R ±0.01 Ø6 or Under | R ±0.015 Above Ø6 | AlTiN | DATA p.413~424

• TOLERANCE

ØD		Ød
~ Ø6	0 ~ -0.012mm	h5
Ø8 ~ Ø20	0 ~ -0.015mm	



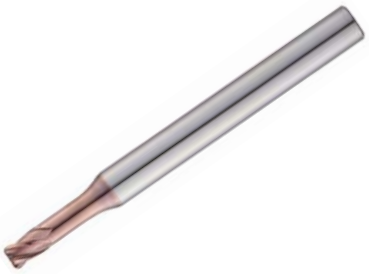
(mm)

Designation	R	ØD	Ød	ℓ1	ℓ2	L
ESRR71401501026	0.1	1.5	4	1.5	26	60
ESRR71401502004	0.2	1.5	4	1.5	4	45
ESRR71401502006	0.2	1.5	4	1.5	6	45
ESRR71401502008	0.2	1.5	4	1.5	8	45
ESRR71401502010	0.2	1.5	4	1.5	10	50
ESRR71401502012	0.2	1.5	4	1.5	12	50
ESRR71401502014	0.2	1.5	4	1.5	14	50
ESRR71401502016	0.2	1.5	4	1.5	16	50
ESRR71401502020	0.2	1.5	4	1.5	20	50
ESRR71401502022	0.2	1.5	4	1.5	22	60
ESRR71401502025	0.2	1.5	4	1.5	25	60
ESRR71401503004	0.3	1.5	4	1.5	4	45
ESRR71401503006	0.3	1.5	4	1.5	6	45
ESRR71401503008	0.3	1.5	4	1.5	8	45
ESRR71401503010	0.3	1.5	4	1.5	10	50
ESRR71401503012	0.3	1.5	4	1.5	12	50
ESRR71401503014	0.3	1.5	4	1.5	14	50
ESRR71401503016	0.3	1.5	4	1.5	16	50
ESRR71401503020	0.3	1.5	4	1.5	20	50
ESRR71401503022	0.3	1.5	4	1.5	22	60
ESRR71401503025	0.3	1.5	4	1.5	25	60
ESRR71401505004	0.5	1.5	4	1.5	4	45
ESRR71401505006	0.5	1.5	4	1.5	6	45
ESRR71401505008	0.5	1.5	4	1.5	8	45
ESRR71401505010	0.5	1.5	4	1.5	10	50
ESRR71401505012	0.5	1.5	4	1.5	12	50
ESRR71401505014	0.5	1.5	4	1.5	14	50
ESRR71401505016	0.5	1.5	4	1.5	16	50
ESRR71401505020	0.5	1.5	4	1.5	20	50
ESRR71401505022	0.5	1.5	4	1.5	22	60
ESRR71401505025	0.5	1.5	4	1.5	25	60
ESRR71402000206	0.02	2	4	2	6	45
ESRR71402000208	0.02	2	4	2	8	45
ESRR71402000210	0.02	2	4	2	10	50
ESRR71402000212	0.02	2	4	2	12	50
ESRR71402000214	0.02	2	4	2	14	50
ESRR71402000216	0.02	2	4	2	16	50
ESRR71402000220	0.02	2	4	2	20	50
ESRR71402000225	0.02	2	4	2	25	60

Designation	R	ØD	Ød	ℓ1	ℓ2	L
ESRR71402000230	0.02	2	4	2	30	70
ESRR71402000506	0.05	2	4	2	6	45
ESRR71402000508	0.05	2	4	2	8	45
ESRR71402000510	0.05	2	4	2	10	50
ESRR71402000512	0.05	2	4	2	12	50
ESRR71402000514	0.05	2	4	2	14	50
ESRR71402000516	0.05	2	4	2	16	50
ESRR71402000520	0.05	2	4	2	20	50
ESRR71402000525	0.05	2	4	2	25	60
ESRR71402000530	0.05	2	4	2	30	70
ESRR71402001006	0.1	2	4	2	6	45
ESRR71402001008	0.1	2	4	2	8	45
ESRR71402001010	0.1	2	4	2	10	50
ESRR71402001012	0.1	2	4	2	12	50
ESRR71402001014	0.1	2	4	2	14	50
ESRR71402001016	0.1	2	4	2	16	50
ESRR71402001020	0.1	2	4	2	20	50
ESRR71402001022	0.1	2	4	2	22	60
ESRR71402001025	0.1	2	4	2	25	60
ESRR71402001030	0.1	2	4	2	30	70
ESRR71402002006	0.2	2	4	2	6	45
ESRR71402002008	0.2	2	4	2	8	45
ESRR71402002010	0.2	2	4	2	10	50
ESRR71402002012	0.2	2	4	2	12	50
ESRR71402002014	0.2	2	4	2	14	50
ESRR71402002016	0.2	2	4	2	16	50
ESRR71402002020	0.2	2	4	2	20	50
ESRR71402002022	0.2	2	4	2	22	60
ESRR71402002025	0.2	2	4	2	25	60
ESRR71402002030	0.2	2	4	2	30	70
ESRR71402003006	0.3	2	4	2	6	45
ESRR71402003008	0.3	2	4	2	8	45
ESRR71402003010	0.3	2	4	2	10	50
ESRR71402003012	0.3	2	4	2	12	50
ESRR71402003014	0.3	2	4	2	14	50
ESRR71402003016	0.3	2	4	2	16	50
ESRR71402003020	0.3	2	4	2	20	50
ESRR71402003022	0.3	2	4	2	22	60
ESRR71402003025	0.3	2	4	2	25	60

ESRR714

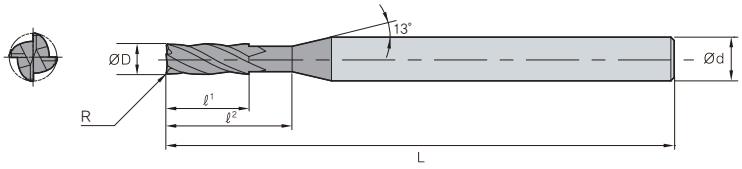
4 Flutes rib radius endmill



ULTRA FINE | 4 | 30° HELIX | R ±0.01 (Ø6 or Under) | R ±0.015 (Above Ø6) | AlTiN | DATA p.413~424

• TOLERANCE

ØD		Ød
~ Ø6	0 ~ -0.012mm	h5
Ø8 ~ Ø20	0 ~ -0.015mm	



(mm)

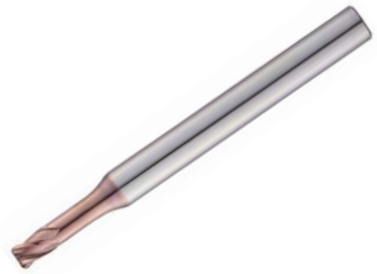
Designation	R	ØD	Ød	ℓ1	ℓ2	L
ESRR71402003030	0.3	2	4	2	30	70
ESRR71402005006	0.5	2	4	3	6	45
ESRR71402005008	0.5	2	4	2	8	45
ESRR71402005010	0.5	2	4	2	10	50
ESRR71402005012	0.5	2	4	2	12	50
ESRR71402005014	0.5	2	4	2	14	50
ESRR71402005016	0.5	2	4	2	16	50
ESRR71402005020	0.5	2	4	2	20	50
ESRR71402005022	0.5	2	4	2	22	60
ESRR71402005025	0.5	2	4	2	25	60
ESRR71402005030	0.5	2	4	2	30	70
ESRR71402501008	0.1	2.5	4	2.5	8	45
ESRR71402501010	0.1	2.5	4	2.5	10	50
ESRR71402501012	0.1	2.5	4	2.5	12	50
ESRR71402501014	0.1	2.5	4	2.5	14	50
ESRR71402501016	0.1	2.5	4	2.5	16	50
ESRR71402501020	0.1	2.5	4	2.5	20	50
ESRR71402501025	0.1	2.5	4	2.5	25	60
ESRR71402501030	0.1	2.5	4	2.5	30	70
ESRR71402502008	0.2	2.5	4	2.5	8	45
ESRR71402502010	0.2	2.5	4	2.5	10	50
ESRR71402502012	0.2	2.5	4	2.5	12	50
ESRR71402502014	0.2	2.5	4	2.5	14	50
ESRR71402502016	0.2	2.5	4	2.5	16	50
ESRR71402502020	0.2	2.5	4	2.5	20	50
ESRR71402502025	0.2	2.5	4	2.5	25	60
ESRR71402502030	0.2	2.5	4	2.5	30	70
ESRR71402503008	0.3	2.5	4	2.5	8	45
ESRR71402503010	0.3	2.5	4	2.5	10	50
ESRR71402503012	0.3	2.5	4	2.5	12	50
ESRR71402503014	0.3	2.5	4	2.5	14	50
ESRR71402503016	0.3	2.5	4	2.5	16	50
ESRR71402503020	0.3	2.5	4	2.5	20	50
ESRR71402503025	0.3	2.5	4	2.5	25	60
ESRR71402503030	0.3	2.5	4	2.5	30	70
ESRR71402505008	0.5	2.5	4	2.5	8	45
ESRR71402505010	0.5	2.5	4	2.5	10	50
ESRR71402505012	0.5	2.5	4	2.5	12	50
ESRR71402505014	0.5	2.5	4	2.5	14	50

Designation	R	ØD	Ød	ℓ1	ℓ2	L
ESRR71402505016	0.5	2.5	4	2.5	16	50
ESRR71402505020	0.5	2.5	4	2.5	20	50
ESRR71402505025	0.5	2.5	4	2.5	25	60
ESRR71402505030	0.5	2.5	4	2.5	30	70
ESRR71403001008	0.1	3	6	3	8	45
ESRR71403001010	0.1	3	6	3	10	50
ESRR71403001012	0.1	3	6	3	12	50
ESRR71403001014	0.1	3	6	3	14	50
ESRR71403001016	0.1	3	6	3	16	55
ESRR71403001020	0.1	3	6	3	20	60
ESRR71403001025	0.1	3	6	3	25	65
ESRR71403001030	0.1	3	6	3	30	70
ESRR71403001035	0.1	3	6	3	35	75
ESRR71403001040	0.1	3	6	3	40	80
ESRR71403001045	0.1	3	6	3	45	90
ESRR71403002008	0.2	3	6	3	8	45
ESRR71403002010	0.2	3	6	3	10	50
ESRR71403002012	0.2	3	6	3	12	50
ESRR71403002014	0.2	3	6	3	14	50
ESRR71403002016	0.2	3	6	3	16	55
ESRR71403002020	0.2	3	6	3	20	60
ESRR71403002025	0.2	3	6	3	25	65
ESRR71403002030	0.2	3	6	3	30	70
ESRR71403002035	0.2	3	6	3	35	75
ESRR71403002040	0.2	3	6	3	40	80
ESRR71403002045	0.2	3	6	3	45	90
ESRR71403003008	0.3	3	6	3	8	45
ESRR71403003010	0.3	3	6	3	10	50
ESRR71403003012	0.3	3	6	3	12	50
ESRR71403003014	0.3	3	6	3	14	50
ESRR71403003016	0.3	3	6	3	16	55
ESRR71403003020	0.3	3	6	3	20	60
ESRR71403003025	0.3	3	6	3	25	65
ESRR71403003030	0.3	3	6	3	30	70
ESRR71403003035	0.3	3	6	3	35	75
ESRR71403003040	0.3	3	6	3	40	80
ESRR71403003045	0.3	3	6	3	45	90
ESRR71403005008	0.5	3	6	3	8	45
ESRR71403005010	0.5	3	6	3	10	50

H-Star Endmill

ESRR714

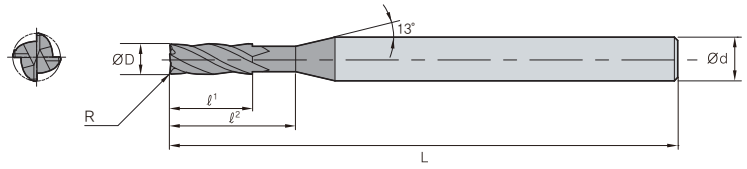
4 Flutes rib radius endmill



ULTRA FINE | 4 | 30° HELIX | R ±0.01 Ø6 or Under | R ±0.015 Above Ø6 | AlTiN | DATA p.413~424

• TOLERANCE

ØD		Ød
~ Ø6	0 ~ -0.012mm	h5
Ø8 ~ Ø20	0 ~ -0.015mm	



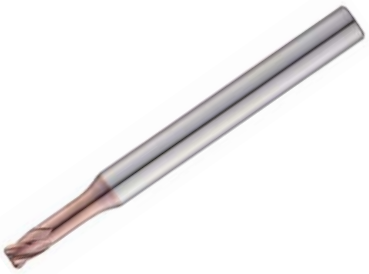
(mm)

Designation	R	ØD	Ød	ℓ1	ℓ2	L
ESRR71403005012	0.5	3	6	3	12	50
ESRR71403005014	0.5	3	6	3	14	50
ESRR71403005016	0.5	3	6	3	16	55
ESRR71403005020	0.5	3	6	3	20	60
ESRR71403005025	0.5	3	6	3	25	65
ESRR71403005030	0.5	3	6	3	30	70
ESRR71403005035	0.5	3	6	3	35	75
ESRR71403005040	0.5	3	6	3	40	80
ESRR71403005045	0.5	3	6	3	45	90
ESRR71403005050	0.5	3	6	3	50	100
ESRR71403010008	1	3	6	3	8	45
ESRR71403010010	1	3	6	3	10	50
ESRR71403010012	1	3	6	3	12	50
ESRR71403010014	1	3	6	3	14	50
ESRR71403010016	1	3	6	3	16	55
ESRR71403010020	1	3	6	3	20	60
ESRR71403010025	1	3	6	3	25	65
ESRR71403010030	1	3	6	3	30	70
ESRR71403010035	1	3	6	3	35	75
ESRR71403010040	1	3	6	3	40	80
ESRR71403010045	1	3	6	3	45	90
ESRR71403010050	1	3	6	3	50	100
ESRR71404001010	0.1	4	6	4	10	50
ESRR71404001012	0.1	4	6	4	12	50
ESRR71404001013	0.1	4	6	4	13	55
ESRR71404001016	0.1	4	6	4	16	55
ESRR71404001020	0.1	4	6	4	20	60
ESRR71404001025	0.1	4	6	4	25	65
ESRR71404001030	0.1	4	6	4	30	70
ESRR71404001035	0.1	4	6	4	35	75
ESRR71404001040	0.1	4	6	4	40	80
ESRR71404001045	0.1	4	6	4	45	90
ESRR71404001050	0.1	4	6	4	50	100
ESRR71404002010	0.2	4	6	4	10	50
ESRR71404002012	0.2	4	6	4	12	50
ESRR71404002013	0.2	4	6	4	13	55
ESRR71404002016	0.2	4	6	4	16	55
ESRR71404002020	0.2	4	6	4	20	60
ESRR71404002025	0.2	4	6	4	25	65

Designation	R	ØD	Ød	ℓ1	ℓ2	L
ESRR71404002030	0.2	4	6	4	30	70
ESRR71404002035	0.2	4	6	4	35	75
ESRR71404002040	0.2	4	6	4	40	80
ESRR71404002045	0.2	4	6	4	45	90
ESRR71404002050	0.2	4	6	4	50	100
ESRR71404003010	0.3	4	6	4	10	50
ESRR71404003012	0.3	4	6	4	12	50
ESRR71404003013	0.3	4	6	4	13	55
ESRR71404003016	0.3	4	6	4	16	55
ESRR71404003020	0.3	4	6	4	20	60
ESRR71404003025	0.3	4	6	4	25	65
ESRR71404003030	0.3	4	6	4	30	70
ESRR71404003035	0.3	4	6	4	35	75
ESRR71404003040	0.3	4	6	4	40	80
ESRR71404003045	0.3	4	6	4	45	90
ESRR71404003050	0.3	4	6	4	50	100
ESRR71404005010	0.5	4	6	4	10	50
ESRR71404005012	0.5	4	6	4	12	50
ESRR71404005013	0.5	4	6	4	13	55
ESRR71404005016	0.5	4	6	4	16	55
ESRR71404005020	0.5	4	6	4	20	60
ESRR71404005025	0.5	4	6	4	25	65
ESRR71404005030	0.5	4	6	4	30	70
ESRR71404005035	0.5	4	6	4	35	75
ESRR71404005040	0.5	4	6	4	40	80
ESRR71404005045	0.5	4	6	4	45	90
ESRR71404005050	0.5	4	6	4	50	100
ESRR71404005055	0.5	4	6	4	55	100
ESRR71404010010	1	4	6	4	10	50
ESRR71404010012	1	4	6	4	12	50
ESRR71404010013	1	4	6	4	13	55
ESRR71404010016	1	4	6	4	16	55
ESRR71404010020	1	4	6	4	20	60
ESRR71404010025	1	4	6	4	25	65
ESRR71404010030	1	4	6	4	30	70
ESRR71404010035	1	4	6	4	35	75
ESRR71404010040	1	4	6	4	40	80
ESRR71404010045	1	4	6	4	45	90
ESRR71404010050	1	4	6	4	50	100

ESRR714

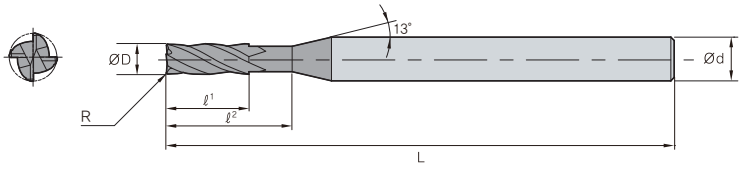
4 Flutes rib radius endmill



ULTRA FINE | 4 | 30° HELIX | R ±0.01 Ø6 or Under | R ±0.015 Above Ø6 | AlTiN | DATA p.413~424

• TOLERANCE

ØD		Ød
~ Ø6	0 ~ -0.012mm	h5
Ø8 ~ Ø20	0 ~ -0.015mm	



(mm)

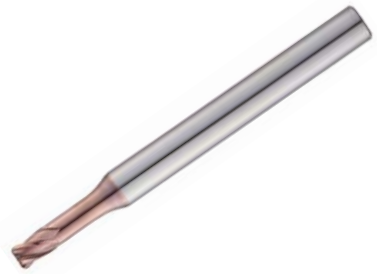
Designation	R	ØD	Ød	ℓ1	ℓ2	L
ESRR71404010055	1	4	6	4	55	100
ESRR71405001016	0.1	5	6	5	16	60
ESRR71405001030	0.1	5	6	5	30	70
ESRR71405001040	0.1	5	6	5	40	80
ESRR71405002016	0.2	5	6	5	16	60
ESRR71405002030	0.2	5	6	5	30	70
ESRR71405002040	0.2	5	6	5	40	80
ESRR71405003016	0.3	5	6	5	16	60
ESRR71405003030	0.3	5	6	5	30	70
ESRR71405003040	0.3	5	6	5	40	80
ESRR71405005016	0.5	5	6	5	16	60
ESRR71405005030	0.5	5	6	5	30	70
ESRR71405005040	0.5	5	6	5	40	80
ESRR71405005050	0.5	5	6	5	50	100
ESRR71405005060	0.5	5	6	5	60	110
ESRR71405010016	1	5	6	5	16	60
ESRR71405010030	1	5	6	5	30	70
ESRR71405010040	1	5	6	5	40	80
ESRR71405010050	1	5	6	5	50	100
ESRR71405010060	1	5	6	5	60	110
ESRR71405015015	1.5	5	6	5	15	60
ESRR71405020015	2	5	6	5	15	60
ESRR71406001020	0.1	6	6	7	20	60
ESRR71406001040	0.1	6	6	7	40	80
ESRR71406001050	0.1	6	6	7	50	100
ESRR71406002020	0.2	6	6	7	20	60
ESRR71406002040	0.2	6	6	7	40	80
ESRR71406002050	0.2	6	6	7	50	100
ESRR71406003020	0.3	6	6	7	20	60
ESRR71406003030	0.3	6	6	7	30	70
ESRR71406003040	0.3	6	6	7	40	80
ESRR71406003050	0.3	6	6	7	50	100
ESRR71406005020	0.5	6	6	7	20	60
ESRR71406005030	0.5	6	6	7	30	70
ESRR71406005040	0.5	6	6	7	40	80
ESRR71406005050	0.5	6	6	7	50	100
ESRR71406005060	0.5	6	6	7	60	110
ESRR71406010020	1	6	6	7	20	60
ESRR71406010030	1	6	6	7	30	70

Designation	R	ØD	Ød	ℓ1	ℓ2	L
ESRR71406010040	1	6	6	7	40	80
ESRR71406010050	1	6	6	7	50	100
ESRR71406010060	1	6	6	7	60	110
ESRR71406015020	1.5	6	6	7	20	60
ESRR71406015040	1.5	6	6	7	40	80
ESRR71406015050	1.5	6	6	7	50	100
ESRR71406020020	2	6	6	7	20	60
ESRR71406020030	2	6	6	7	30	70
ESRR71406020040	2	6	6	7	40	80
ESRR71406020050	2	6	6	7	50	100
ESRR71408001025	0.1	8	8	9	25	70
ESRR71408002022	0.2	8	8	9	22	65
ESRR71408002040	0.2	8	8	9	40	100
ESRR71408003022	0.3	8	8	9	22	65
ESRR71408003040	0.3	8	8	9	40	100
ESRR71408005022	0.5	8	8	9	22	65
ESRR71408005035	0.5	8	8	9	35	100
ESRR71408005040	0.5	8	8	9	40	100
ESRR71408005050	0.5	8	8	9	50	120
ESRR71408005060	0.5	8	8	9	60	120
ESRR71408010022	1	8	8	9	22	65
ESRR71408010035	1	8	8	9	35	100
ESRR71408010040	1	8	8	9	40	100
ESRR71408010050	1	8	8	9	50	120
ESRR71408010060	1	8	8	9	60	120
ESRR71408015022	1.5	8	8	9	22	65
ESRR71408015040	1.5	8	8	9	40	100
ESRR71408020022	2	8	8	9	22	65
ESRR71408020040	2	8	8	9	40	100
ESRR71408020050	2	8	8	9	50	120
ESRR71410001030	0.1	10	10	11	30	75
ESRR71410002024	0.2	10	10	11	24	70
ESRR71410002040	0.2	10	10	11	40	100
ESRR71410003024	0.3	10	10	11	24	70
ESRR71410003040	0.3	10	10	11	40	100
ESRR71410005024	0.5	10	10	11	24	70
ESRR71410005040	0.5	10	10	11	40	100
ESRR71410005050	0.5	10	10	11	50	120
ESRR71410005060	0.5	10	10	11	60	120

H-Star Endmill

ESRR714

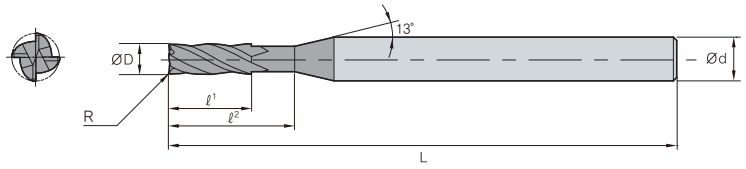
4 Flutes rib radius endmill



ULTRA FINE | 4 | 30° HELIX | R ±0.01 Ø6 or Under | R ±0.015 Above Ø6 | AlTiN | DATA p.413~424

• TOLERANCE

ØD		Ød
~ Ø6	0 ~ -0.012mm	h5
Ø8 ~ Ø20	0 ~ -0.015mm	



(mm)

Designation	R	ØD	Ød	ℓ1	ℓ2	L
ESRR71410010024	1	10	10	11	24	70
ESRR71410010040	1	10	10	11	40	100
ESRR71410010050	1	10	10	11	50	120
ESRR71410010060	1	10	10	11	60	120
ESRR71410015024	1.5	10	10	11	24	70
ESRR71410015040	1.5	10	10	11	40	100
ESRR71410020024	2	10	10	11	24	70
ESRR71410020040	2	10	10	11	40	100
ESRR71410020050	2	10	10	11	50	120
ESRR71410025024	2.5	10	10	11	24	70
ESRR71412002032	0.2	12	12	13	32	80
ESRR71412003026	0.3	12	12	13	26	80
ESRR71412003045	0.3	12	12	13	45	110
ESRR71412005026	0.5	12	12	13	26	80
ESRR71412005040	0.5	12	12	13	40	110
ESRR71412005060	0.5	12	12	13	60	130

Designation	R	ØD	Ød	ℓ1	ℓ2	L
ESRR71412010026	1	12	12	13	26	80
ESRR71412010040	1	12	12	13	40	110
ESRR71412010060	1	12	12	13	60	130
ESRR71412015026	1.5	12	12	13	26	80
ESRR71412020026	2	12	12	13	26	80
ESRR71412020040	2	12	12	13	40	110
ESRR71412030026	3	12	12	13	26	80
ESRR71416005035	0.5	16	16	20	35	100
ESRR71416005050	0.5	16	20	35	50	150
ESRR71416010035	1	16	16	20	35	100
ESRR71416010050	1	16	20	35	50	150
ESRR71420005040	0.5	20	20	25	40	100
ESRR71420005055	0.5	20	20	40	55	150
ESRR71420010040	1	20	20	25	40	100
ESRR71420010055	1	20	20	40	55	150

※ The above specifications are subject to change without prior notice for product quality improvement.

• **Applicable Workpiece**

Carbon steel ~ HB225	Alloy steel HB225~325	Pre-hardened steel HRC30~50	Hardened steel		Copper	Graphite	Cast iron ~FCD500	Aluminum	Stainless steel
			SKD61~HRC55	SKD11 HRC55~63					
		○	◎	◎	○				

◎: Excellent ○: Good

ESXE704

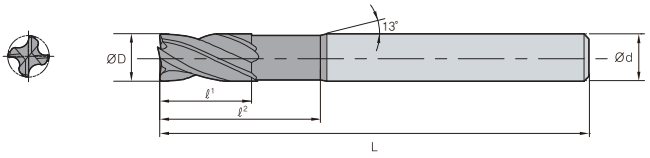
4 Flutes neck type flat endmill

ULTRA FINE | 4 | M HELIX | AlTiN | DATA

p.425

• TOLERANCE

ØD		Ød
All sizes	0 ~ -0.02mm	h5



(mm)

Designation	ØD	Ød	ℓ1	ℓ2	L
ESXE704010	1	4	1.5	4	45
ESXE704020	2	4	3	6	45
ESXE704030	3	6	4	7	45
ESXE704040	4	6	5	9	45
ESXE704060	6	6	7	14	50
ESXE704080	8	8	9	18	60
ESXE704100	10	10	12	25	75
ESXE704120	12	12	15	30	75

※ The above specifications are subject to change without prior notice for product quality improvement.

• Applicable Workpiece

Carbon steel ~ HB225	Alloy steel HB225~325	Pre-hardened steel HRC30~50	Hardened steel		Copper	Graphite	Cast iron ~FCD500	Aluminum	Stainless steel
			SKD61~HRC55	SKD11 HRC55~63					
		○	◎	◎	○				

◎: Excellent ○: Good

H-Star Endmill

ESXE714

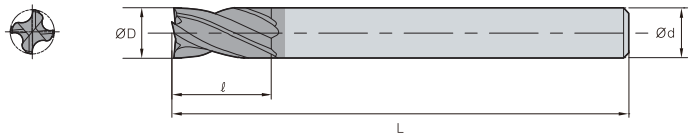
4 Flutes flat endmill

ULTRA FINE | 4 | M HELIX | AlTiN | DATA

p.425

• TOLERANCE

ØD		Ød
All sizes	0 ~ -0.02mm	h5



(mm)

Designation	ØD	Ød	ℓ	L
ESXE714020	2	4	5	45
ESXE714030	3	6	8	45
ESXE714040	4	6	10	45
ESXE714040S4	4	4	10	45
ESXE714060	6	6	16	50
ESXE714080	8	8	20	60
ESXE714100	10	10	25	75
ESXE714120	12	12	35	85

※ The above specifications are subject to change without prior notice for product quality improvement.

• **Applicable Workpiece**

Carbon steel ~ HB225	Alloy steel HB225~325	Pre-hardened steel HRC30~50	Hardened steel		Copper	Graphite	Cast iron ~FCD500	Aluminum	Stainless steel
			SKD61~HRC55	SKD11 HRC55~63					
		○	◎	◎	○				

◎: Excellent ○: Good

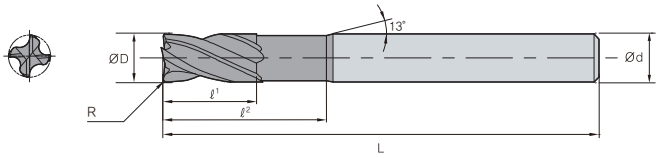
ESXR704

4 Flutes neck type radius endmill

ULTRA FINE | 4 | M HELIX | R ±0.01 Ø6 or Under | R ±0.015 Above Ø6 | AlTiN | DATA p.425

• TOLERANCE

ØD		Ød
All sizes	0 ~ -0.02mm	h5



(mm)

Designation	R	ØD	Ød	ℓ1	ℓ2	L
ESXR70401000504	0.05	1	4	1.5	4	45
ESXR70402000506	0.05	2	4	3	6	45
ESXR70402000507	0.05	2	4	2.5	7	50
ESXR7040200107	0.1	2	4	2.5	7	50
ESXR7040300107	0.1	3	6	4	7	45
ESXR7040300109	0.1	3	6	4	9	55
ESXR7040300209	0.2	3	6	4	9	55
ESXR7040300309	0.3	3	6	4	9	55
ESXR7040300312	0.3	3	6	4	12	55
ESXR7040300316	0.3	3	6	4	16	55
ESXR7040400109	0.1	4	6	5	9	45
ESXR7040400212	0.2	4	6	5	12	55
ESXR7040400212S4	0.2	4	4	5	12	55
ESXR7040400312	0.3	4	6	5	12	55
ESXR7040400316	0.3	4	6	5	16	55
ESXR7040400320	0.3	4	6	5	20	55
ESXR7040400512	0.5	4	6	5	12	55
ESXR7040400516	0.5	4	6	5	16	55
ESXR7040400516S4	0.5	4	4	5	16	55
ESXR7040400520	0.5	4	6	5	20	55
ESXR7040401012	1	4	6	5	12	55
ESXR7040500116	0.1	5	6	6	16	60
ESXR7040500216	0.2	5	6	6	16	60
ESXR7040500316	0.3	5	6	6	16	60
ESXR7040500516	0.5	5	6	6	16	60
ESXR7040501016	1	5	6	6	16	60
ESXR7040600120	0.1	6	6	7	20	60
ESXR7040600214	0.2	6	6	7	14	50

Designation	R	ØD	Ød	ℓ1	ℓ2	L
ESXR7040600220	0.2	6	6	7	20	60
ESXR7040600320	0.3	6	6	7	20	60
ESXR7040600520	0.5	6	6	7	20	60
ESXR7040601020	1	6	6	7	20	60
ESXR7040601520	1.5	6	6	7	20	60
ESXR7040800125	0.1	8	8	9	25	60
ESXR7040800218	0.2	8	8	9	18	60
ESXR7040800225	0.2	8	8	9	25	60
ESXR7040800325	0.3	8	8	9	25	60
ESXR7040800525	0.5	8	8	9	25	60
ESXR7040801025	1	8	8	9	25	60
ESXR7040801525	1.5	8	8	9	25	60
ESXR7040802025	2	8	8	9	25	60
ESXR7041000225	0.2	10	10	12	25	75
ESXR7041000232	0.2	10	10	11	32	75
ESXR7041000332	0.3	10	10	11	32	75
ESXR7041000532	0.5	10	10	11	32	75
ESXR7041001032	1	10	10	11	32	75
ESXR7041001532	1.5	10	10	11	32	75
ESXR7041002032	2	10	10	11	32	75
ESXR7041200238	0.2	12	12	12	38	75
ESXR7041200330	0.3	12	12	15	30	75
ESXR7041200338	0.3	12	12	12	38	75
ESXR7041200538	0.5	12	12	12	38	75
ESXR7041201038	1	12	12	12	38	75
ESXR7041201538	1.5	12	12	12	38	75
ESXR7041202038	2	12	12	12	38	75

※ The above specifications are subject to change without prior notice for product quality improvement.

• Applicable Workpiece

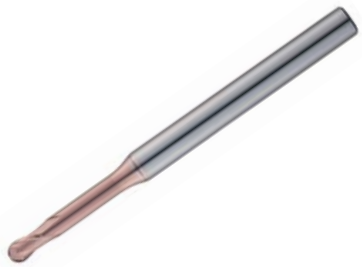
Carbon steel ~ HB225	Alloy steel HB225~325	Pre-hardened steel HRC30~50	Hardened steel		Copper	Graphite	Cast iron ~FCD500	Aluminum	Stainless steel
			SKD61~HRC55	SKD11 HRC55~63					
		○	◎	◎	○				

◎: Excellent ○: Good

H-Star Endmill

ESLNB

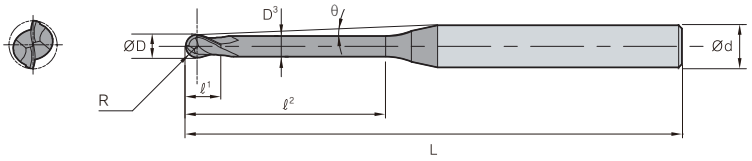
2 Flutes long neck type ball endmill



ULTRA FINE | 2 | 30° HELIX | R ±0.005 Above Ø6 | AlTiN | DATA p.425

• TOLERANCE

ØD		Ød
All sizes	0 ~ -0.012mm	h5

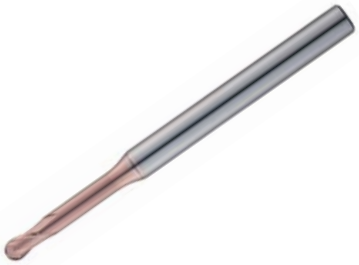


(mm)

Designation	Sizes(mm)								Effective length by inclination angle				
	R	ØD	Ød	ℓ¹	ℓ²	D³	θ	L	0.5°	1°	1.5°	2°	3°
ESLNB2001-0.2	0.05	0.1	4	0.08	0.2	0.08	11.8	45	0.3	0.3	0.3	0.4	0.4
ESLNB2001-0.3	0.05	0.1	4	0.08	0.3	0.08	11.7	45	0.4	0.4	0.5	0.5	0.5
ESLNB2001-0.5	0.05	0.1	4	0.08	0.5	0.08	11.4	45	0.6	0.7	0.7	0.7	0.8
ESLNB2002-0.5	0.1	0.2	4	0.15	0.5	0.17	11.5	50	1.2	1.3	1.5	1.6	2
ESLNB2002-1	0.1	0.2	4	0.15	1	0.17	10.9	50	1.7	1.9	2.1	2.3	2.7
ESLNB2002-1.5	0.1	0.2	4	0.15	1.5	0.17	10.4	50	2.3	2.5	2.8	3	3.4
ESLNB2002-2	0.1	0.2	4	0.15	2	0.17	9.9	50	2.8	3.1	3.4	3.6	4.1
ESLNB2002-2.5	0.1	0.2	4	0.15	2.5	0.17	9.5	50	3.4	3.7	4	4.2	4.7
ESLNB2002-3.0	0.1	0.2	4	0.15	3	0.17	9.1	50	3.9	4.3	4.6	4.9	5.4
ESLNB2003-1	0.15	0.3	4	0.25	1	0.27	10.9	50	1.7	1.9	2.1	2.3	2.7
ESLNB2003-1.5	0.15	0.3	4	0.25	1.5	0.27	10.4	50	2.3	2.5	2.7	3	3.4
ESLNB2003-2	0.15	0.3	4	0.25	2	0.27	9.9	50	2.8	3.1	3.4	3.6	4
ESLNB2003-2.5	0.15	0.3	4	0.25	2.5	0.27	9.5	50	3.4	3.7	4	4.2	4.7
ESLNB2003-3	0.15	0.3	4	0.25	3	0.27	9.1	50	3.9	4.3	4.6	4.8	5.3
ESLNB2004-1	0.2	0.4	4	0.3	1	0.37	11	50	1.7	1.9	2.1	2.3	2.7
ESLNB2004-1.5	0.2	0.4	4	0.3	1.5	0.37	10.4	50	2.3	2.5	2.7	2.9	3.4
ESLNB2004-2	0.2	0.4	4	0.3	2	0.37	9.9	50	2.8	3.1	3.4	3.6	4
ESLNB2004-2.5	0.2	0.4	4	0.3	2.5	0.37	9.5	50	3.4	3.7	4	4.2	4.7
ESLNB2004-3	0.2	0.4	4	0.3	3	0.37	9.1	50	3.9	4.3	4.6	4.8	5.3
ESLNB2004-3.5	0.2	0.4	4	0.3	3.5	0.37	8.7	50	4.5	4.8	5.2	5.4	6
ESLNB2004-4	0.2	0.4	4	0.3	4	0.37	8.3	50	5	5.4	5.7	6	6.6
ESLNB2004-4.5	0.2	0.4	4	0.3	4.5	0.37	8	50	5.6	6	6.3	6.6	7.2
ESLNB2005-1	0.25	0.5	4	0.35	1	0.47	11	50	1.7	1.9	2.1	2.3	2.6
ESLNB2005-2	0.25	0.5	4	0.35	2	0.47	9.9	50	2.8	3.1	3.3	3.6	4
ESLNB2005-3	0.25	0.5	4	0.35	3	0.47	9	50	3.9	4.3	4.6	4.8	5.3
ESLNB2005-4	0.25	0.5	4	0.35	4	0.47	8.3	50	5	5.4	5.7	6	6.6
ESLNB2005-5	0.25	0.5	4	0.35	5	0.47	7.7	50	6.1	6.5	6.9	7.2	7.8
ESLNB2005-6	0.25	0.5	4	0.35	6	0.47	7.1	50	7.2	7.6	8	8.4	9
ESLNB2005-8	0.25	0.5	4	0.35	8	0.47	6.3	50	9.3	9.9	10.3	10.7	11.4
ESLNB2006-1	0.3	0.6	4	0.4	1	0.57	11	50	1.7	1.9	2.1	2.3	2.6
ESLNB2006-2	0.3	0.6	4	0.4	2	0.57	9.9	50	2.8	3.1	3.3	3.6	4
ESLNB2006-3	0.3	0.6	4	0.4	3	0.57	9	50	3.9	4.3	4.5	4.8	5.3
ESLNB2006-4	0.3	0.6	4	0.4	4	0.57	8.3	50	5	5.4	5.7	6	6.6
ESLNB2006-5	0.3	0.6	4	0.4	5	0.57	7.6	50	6.1	6.5	6.9	7.2	7.8
ESLNB2006-6	0.3	0.6	4	0.4	6	0.57	7.1	50	7.2	7.6	8	8.4	9
ESLNB2006-7	0.3	0.6	4	0.4	7	0.57	6.6	50	8.3	8.8	9.2	9.5	10.2

ESLNB

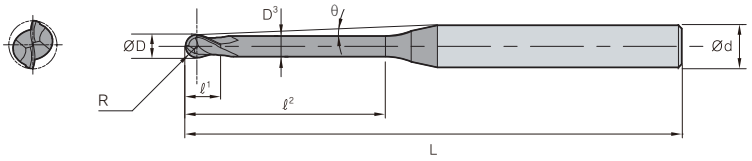
2 Flutes long neck type ball endmill



ULTRA FINE | 2 | 30° HELIX | R ±0.005 (Above Ø6) | AlTiN | DATA p.425

• TOLERANCE

ØD		Ød
All sizes	0 ~ -0.012mm	h5



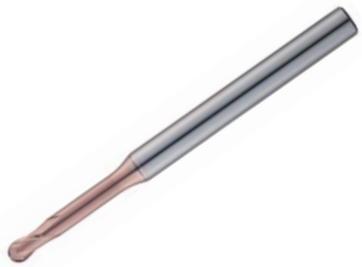
(mm)

Designation	Sizes(mm)								Effective length by inclination angle				
	R	ØD	Ød	ℓ¹	ℓ²	D³	θ	L	0.5°	1°	1.5°	2°	3°
ESLNB2006-8	0.3	0.6	4	0.4	8	0.57	6.2	50	9.3	9.9	10.3	10.7	11.4
ESLNB2006-9	0.3	0.6	4	0.4	9	0.57	5.8	50	10.4	10.9	11.4	11.8	12.5
ESLNB2006-10	0.3	0.6	4	0.4	10	0.57	5.5	50	11.4	12	12.5	12.9	13.7
ESLNB2006-12	0.3	0.6	4	0.4	12	0.57	5	50	13.6	14.2	14.7	15.2	16
ESLNB2008-2	0.4	0.8	4	0.5	2	0.77	9.9	50	2.8	3.1	3.3	3.5	4
ESLNB2008-4	0.4	0.8	4	0.5	4	0.77	8.2	50	5	5.4	5.7	6	6.5
ESLNB2008-5	0.4	0.8	4	0.5	5	0.77	7.5	50	6.1	6.5	6.9	7.2	7.8
ESLNB2008-6	0.4	0.8	4	0.5	6	0.77	7	50	7.2	7.6	8	8.4	9
ESLNB2008-8	0.4	0.8	4	0.5	8	0.77	6.1	50	9.3	9.8	10.3	10.7	11.3
ESLNB2008-10	0.4	0.8	4	0.5	10	0.77	5.4	50	11.4	12	12.5	12.9	13.7
ESLNB2010-2	0.5	1	4	0.8	2	0.96	9.9	50	2.9	3.1	3.3	3.5	4
ESLNB2010-3	0.5	1	4	0.8	3	0.96	8.9	50	4	4.3	4.5	4.8	5.3
ESLNB2010-4	0.5	1	4	0.8	4	0.96	8.1	50	5	5.4	5.7	6	6.5
ESLNB2010-5	0.5	1	4	0.8	5	0.96	7.4	50	6.1	6.5	6.9	7.2	7.8
ESLNB2010-6	0.5	1	4	0.8	6	0.96	6.8	50	7.2	7.7	8	8.4	9
ESLNB2010-7	0.5	1	4	0.8	7	0.96	6.3	50	8.3	8.8	9.2	9.5	10.2
ESLNB2010-8	0.5	1	4	0.8	8	0.96	5.9	50	9.3	9.9	10.3	10.7	11.3
ESLNB2010-9	0.5	1	4	0.8	9	0.96	5.5	50	10.4	11	11.4	11.8	12.5
ESLNB2010-10	0.5	1	4	0.8	10	0.96	5.2	50	11.5	12	12.5	12.9	13.7
ESLNB2010-12	0.5	1	4	0.8	12	0.96	4.6	55	13.6	14.2	14.7	15.2	15.9
ESLNB2010-14	0.5	1	4	0.8	14	0.96	4.2	55	15.7	16.4	16.9	17.4	18.5
ESLNB2010-16	0.5	1	4	0.8	16	0.96	3.8	55	17.8	18.5	19.1	19.6	21.2
ESLNB2010-18	0.5	1	4	0.8	18	0.96	3.5	60	19.9	20.7	21.3	21.8	23.8
ESLNB2010-20	0.5	1	4	0.8	20	0.96	3.3	60	22	22.8	23.4	24	26.5
ESLNB2012-4	0.6	1.2	4	1.1	4	1.15	7.9	50	5.1	5.4	5.7	6	6.5
ESLNB2012-6	0.6	1.2	4	1.1	6	1.15	6.6	50	7.2	7.7	8	8.4	9
ESLNB2012-8	0.6	1.2	4	1.1	8	1.15	5.7	50	9.4	9.9	10.3	10.7	11.3
ESLNB2012-10	0.6	1.2	4	1.1	10	1.15	5	50	11.5	12.1	12.5	12.9	13.7
ESLNB2012-12	0.6	1.2	4	1.1	12	1.15	4.5	55	13.6	14.2	14.7	15.2	15.9
ESLNB2014-8	0.7	1.4	4	1.3	8	1.34	5.5	50	9.4	9.9	10.3	10.7	11.3
ESLNB2014-12	0.7	1.4	4	1.3	12	1.34	4.3	55	13.6	14.2	14.7	15.2	15.9
ESLNB2014-16	0.7	1.4	4	1.3	16	1.34	3.5	55	17.8	18.5	19.1	19.6	21.2
ESLNB2015-4	0.75	1.5	4	1.35	4	1.44	7.7	50	5.1	5.4	5.7	6	6.5
ESLNB2015-6	0.75	1.5	4	1.35	6	1.44	6.4	50	7.3	7.7	8	8.4	9
ESLNB2015-8	0.75	1.5	4	1.35	8	1.44	5.4	50	9.4	9.9	10.3	10.7	11.3
ESLNB2015-10	0.75	1.5	4	1.35	10	1.44	4.7	50	11.5	12.1	12.5	12.9	13.7

H-Star Endmill

ESLNB

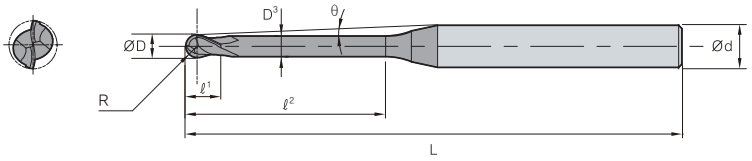
2 Flutes long neck type ball endmill



ULTRA FINE | 2 | 30° HELIX | R ±0.005 (Above Ø6) | AlTiN | DATA p.425

• TOLERANCE

ØD		Ød
All sizes	0 ~ -0.012mm	h5

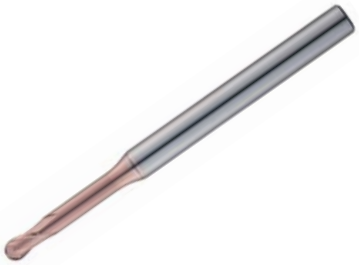


(mm)

Designation	Sizes(mm)								Effective length by inclination angle				
	R	ØD	Ød	ℓ¹	ℓ²	D³	θ	L	0.5°	1°	1.5°	2°	3°
ESLNB2015-12	0.75	1.5	4	1.35	12	1.44	4.2	55	13.6	14.2	14.7	15.2	15.9
ESLNB2015-14	0.75	1.5	4	1.35	14	1.44	3.8	55	15.7	16.4	16.9	17.4	18.5
ESLNB2015-16	0.75	1.5	4	1.35	16	1.44	3.4	55	17.8	18.5	19.1	19.6	21.1
ESLNB2015-20	0.75	1.5	4	1.35	20	1.44	2.9	60	22	22.8	23.4	24	-
ESLNB2016-8	0.8	1.6	4	1.4	8	1.54	5.3	50	9.4	9.9	10.3	10.7	11.3
ESLNB2016-10	0.8	1.6	4	1.4	10	1.54	4.6	55	11.5	12.1	12.5	12.9	13.7
ESLNB2016-12	0.8	1.6	4	1.4	12	1.54	4.1	55	13.6	14.2	14.7	15.2	15.9
ESLNB2016-16	0.8	1.6	4	1.4	16	1.54	3.3	55	17.8	18.5	19.1	19.6	21.1
ESLNB2016-20	0.8	1.6	4	1.4	20	1.54	2.8	60	22	22.8	23.4	24	-
ESLNB2018-8	0.9	1.8	4	1.6	8	1.73	5.1	50	9.4	9.9	10.3	10.7	11.3
ESLNB2018-12	0.9	1.8	4	1.6	12	1.73	3.9	55	13.7	14.3	14.7	15.2	15.9
ESLNB2018-16	0.9	1.8	4	1.6	16	1.73	3.1	55	17.9	18.6	19.1	19.6	21.1
ESLNB2018-20	0.9	1.8	4	1.6	20	1.73	2.6	60	22	22.8	23.4	24	-
ESLNB2020-3	1	2	4	1.7	3	1.92	8.3	50	4.1	4.4	4.6	4.8	5.2
ESLNB2020-4	1	2	4	3	4	1.92	7.3	50	5.2	5.5	5.8	6	6.5
ESLNB2020-6	1	2	4	3	6	1.92	5.8	50	7.3	7.7	8.1	8.4	9
ESLNB2020-8	1	2	4	3	8	1.92	4.9	50	9.5	9.9	10.3	10.7	11.3
ESLNB2020-10	1	2	4	3	10	1.92	4.2	50	11.6	12.1	12.6	12.9	13.6
ESLNB2020-12	1	2	4	3	12	1.92	3.7	55	13.7	14.3	14.8	15.2	15.9
ESLNB2020-14	1	2	4	3	14	1.92	3.2	55	15.8	16.4	16.9	17.4	18.5
ESLNB2020-16	1	2	4	3	16	1.92	2.9	55	17.9	18.6	19.1	19.6	-
ESLNB2020-18	1	2	4	3	18	1.92	2.7	60	20	20.7	21.3	21.8	-
ESLNB2020-20	1	2	4	3	20	1.92	2.4	60	22.1	22.8	23.4	24	-
ESLNB2020-22	1	2	4	3	22	1.92	2.3	60	24.1	24.9	25.6	26.3	-
ESLNB2020-25	1	2	4	3	25	1.92	2	65	27.3	28.1	28.8	-	-
ESLNB2020-30	1	2	4	3	30	1.92	1.7	70	32.4	33.4	34.2	-	-
ESLNB2020-35	1	2	4	3	35	1.92	1.5	75	37.6	38.6	-	-	-
ESLNB2020-40	1	2	4	3	40	1.92	1.4	80	42.8	43.8	-	-	-
ESLNB2025-10	1.25	2.5	4	4	10	2.4	3.4	50	11.6	12.1	12.6	13	13.6
ESLNB2025-16	1.25	2.5	4	4	16	2.4	2.3	55	17.9	18.6	19.1	19.6	-
ESLNB2025-20	1.25	2.5	4	4	20	2.4	1.9	60	22.1	22.8	23.5	-	-
ESLNB2030-8	1.5	3	6	4	8	2.88	6.2	55	9.6	10	10.4	10.7	11.3
ESLNB2030-10	1.5	3	6	4	10	2.88	5.5	55	11.7	12.2	12.6	13	13.6
ESLNB2030-13	1.5	3	6	4	13	2.88	4.6	60	14.8	15.4	15.9	16.3	17.1
ESLNB2030-16	1.5	3	6	4	16	2.88	4	60	18	18.6	19.1	19.6	21.1
ESLNB2030-18	1.5	3	6	4	18	2.88	3.6	60	20	20.7	21.3	21.8	23.7

ESLNB

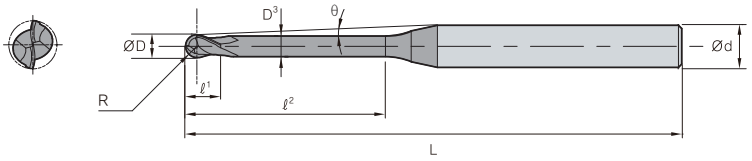
2 Flutes long neck type ball endmill



ULTRA FINE | 2 | 30° HELIX | R ±0.005 (Above Ø6) | AlCrN | DATA (p.425)

• TOLERANCE

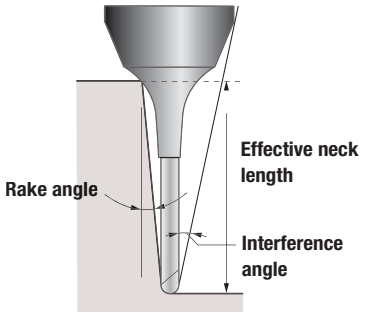
ØD		Ød
All sizes	0 ~ -0.012mm	h5

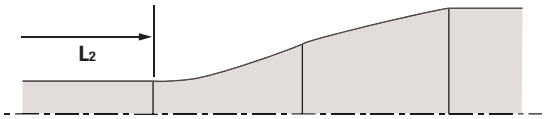


(mm)

Designation	Sizes(mm)								Effective length by inclination angle				
	R	ØD	Ød	ℓ¹	ℓ²	D³	θ	L	0.5°	1°	1.5°	2°	3°
ESLNB2030-20	1.5	3	6	4	20	2.88	3.4	65	22.1	22.9	23.5	24	26.4
ESLNB2030-25	1.5	3	6	4	25	2.88	2.8	70	27.3	28.2	28.8	29.9	-
ESLNB2030-30	1.5	3	6	4	30	2.88	2.2	75	37.7	38.7	40	41.9	-
ESLNB2030-35	1.5	3	6	4	35	2.88	4.5	80	11.6	12.1	12.5	12.9	13.5
ESLNB2040-10	2	4	6	5	10	3.9	3.6	55	14.7	15.3	15.8	16.2	17
ESLNB2040-13	2	4	6	5	13	3.9	3.1	60	17.9	18.5	19.1	19.5	20.9
ESLNB2040-16	2	4	6	5	16	3.9	2.5	60	22.1	22.8	23.4	23.9	-
ESLNB2040-20	2	4	6	5	20	3.9	2.1	65	27.3	28.1	28.8	29.8	-
ESLNB2040-25	2	4	6	5	25	3.9	1.8	70	32.4	33.4	34.2	-	-
ESLNB2040-30	2	4	6	5	30	3.9	1.6	75	37.6	38.6	39.9	-	-
ESLNB2040-35	2	4	6	5	35	3.9	1.4	80	42.8	43.8	-	-	-
ESLNB2040-40	2	4	6	5	40	3.9	1.2	80	47.9	49.1	-	-	-
ESLNB2040-45	2	4	6	5	45	3.9	1.1	90	53.1	54.5	-	-	-
ESLNB2040-50	2	4	6	5	50	3.9	1.4	100	22	22.8	-	-	-
ESLNB2050-20	2.5	5	6	6	20	4.9	1.2	65	27.2	28.1	-	-	-
ESLNB2050-25	2.5	5	6	6	25	4.9	1	70	32.4	-	-	-	-
ESLNB2050-30	2.5	5	6	6	30	4.9	0.8	75	42.8	-	-	-	-
ESLNB2050-35	2.5	5	6	6	35	4.9	0.7	80	42.8	-	-	-	-
ESLNB2050-40	2.5	5	6	6	40	4.9		90					

※ The above specifications are subject to change without prior notice for product quality improvement.





※ The marked effective neck length is the default value to prevent interference with the workpiece.
Proper control of the processing environment is required.

• Applicable Workpiece

Carbon steel ~ HB225	Alloy steel HB225~325	Pre-hardened steel HRC30~50	Hardened steel		Copper	Graphite	Cast iron ~FCD500	Aluminum	Stainless steel
			SKD61~HRC55	SKD11 HRC55~63					
		○	◎	◎	○				

◎: Excellent ○: Good

H-Star Endmill

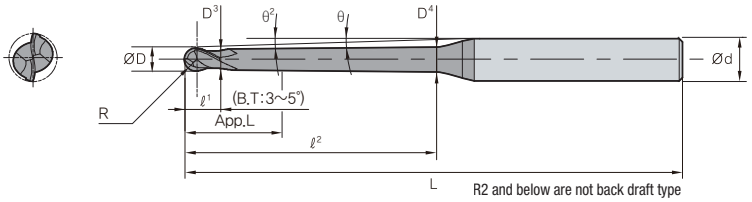
ESTNB20

2 Flutes tapered neck type ball endmill

ULTRA FINE | 2 | 30° HELIX | R ±0.01 Ø6 or Under | R ±0.015 Above Ø6 | AlTiN | DATA p.426~428

• TOLERANCE

ØD		Ød
~ Ø6	0 ~ -0.012mm	h5
Ø8 ~ Ø12	0 ~ -0.015mm	



(mm)

Designation	Sizes(mm)											Effective length by inclination angle				
	R	ØD	Ød	ℓ1	ℓ2	θ	D3	D4	App. L	θ2	L	0.5°	1°	1.5°	2°	3°
ESTNB2002-1-04	0.1	0.2	4	0.15	1	0.4	0.17	0.18	1.35	10.9	50	1.5	1.7	1.8	2	2.3
ESTNB2002-1.5-04	0.1	0.2	4	0.15	1.5	0.4	0.17	0.19	1.77	10.4	50	2	2.2	2.4	2.6	2.9
ESTNB2002-2-09	0.1	0.2	4	0.15	2	0.9	0.17	0.23	1.1	10.1	50	-	2.8	3.1	3.4	3.9
ESTNB2002-2.5-09	0.1	0.2	4	0.15	2.5	0.9	0.17	0.24	1.1	9.6	50	-	3.3	3.7	4	4.5
ESTNB2003-2-04	0.15	0.3	4	0.25	2	0.4	0.28	0.29	2.19	10	50	2.5	2.8	3	3.2	3.5
ESTNB2003-3-09	0.15	0.3	4	0.25	3	0.9	0.28	0.36	1.2	9.3	50	-	3.8	4.2	4.5	5.1
ESTNB2003-4-09	0.15	0.3	4	0.25	4	0.9	0.28	0.39	1.2	8.6	50	-	4.8	5.3	5.7	6.3
ESTNB2004-2-04	0.2	0.4	4	0.3	2	0.4	0.37	0.39	2.2	10	50	2.5	2.8	3	3.2	3.5
ESTNB2004-3-04	0.2	0.4	4	0.3	3	0.4	0.37	0.41	2.44	9.1	50	3.6	3.9	4.1	4.4	4.8
ESTNB2004-4-04	0.2	0.4	4	0.3	4	0.4	0.37	0.42	2.44	8.4	50	4.7	5.2	5.6	5.9	6.5
ESTNB2004-4-09	0.2	0.4	4	0.3	4	0.9	0.37	0.49	1.25	8.5	50	-	4.8	5.3	5.7	6.3
ESTNB2004-5-04	0.2	0.4	4	0.3	5	0.4	0.37	0.44	2.44	7.8	50	5.7	6.3	6.7	7.1	7.7
ESTNB2004-5-09	0.2	0.4	4	0.3	5	0.9	0.37	0.52	1.25	7.9	50	-	5.9	6.4	6.8	7.5
ESTNB2005-4-04	0.25	0.5	4	0.35	4	0.4	0.47	0.52	2.49	8.4	50	4.6	5	5.3	5.5	5.9
ESTNB2005-8-09	0.25	0.5	4	0.35	8	0.9	0.47	0.71	1.3	6.5	50	-	8.9	9.6	10.1	10.9
ESTNB2005-12-09	0.25	0.5	4	0.35	12	0.9	0.47	0.84	1.3	5.3	50	-	13	13.9	14.5	15.4
ESTNB20054-2-04	0.27	0.54	4	0.37	2	0.4	0.52	0.54	1.8	10	50	2.3	2.5	2.7	2.8	3
ESTNB20054-4-04	0.27	0.54	4	0.37	4	0.4	0.52	0.57	1.8	8.4	50	4.5	4.9	5.2	5.5	5.9
ESTNB20054-5-04	0.27	0.54	4	0.37	5	0.4	0.52	0.59	1.8	7.8	50	5.5	6	6.3	6.6	7.1
ESTNB20054-6-04	0.27	0.54	4	0.37	6	0.4	0.52	0.6	1.8	7.2	50	6.7	7.3	7.8	8.2	8.8
ESTNB20054-6.5-04	0.27	0.54	4	0.37	6.5	0.4	0.52	0.61	1.8	7	50	7.2	7.9	8.3	8.7	9.4
ESTNB20054-7-04	0.27	0.54	4	0.37	7	0.4	0.52	0.61	1.8	6.8	50	7.7	8.4	8.9	9.3	10
ESTNB2006-2-04	0.3	0.6	4	0.4	2	0.4	0.57	0.59	2.17	10	50	2.4	2.5	2.7	2.8	3
ESTNB2006-4-04	0.3	0.6	4	0.4	4	0.4	0.57	0.62	2.54	8.4	50	4.6	5	5.2	5.5	5.9
ESTNB2006-6-04	0.3	0.6	4	0.4	6	0.4	0.57	0.65	2.54	7.2	50	6.8	7.4	7.8	8.2	8.8
ESTNB2006-6-09	0.3	0.6	4	0.4	6	0.9	0.57	0.75	1.35	7.3	50	-	6.9	7.5	7.9	8.6
ESTNB2006-8-09	0.3	0.6	4	0.4	8	0.9	0.57	0.81	1.35	6.4	50	-	8.9	9.6	10.1	10.9
ESTNB2006-10-04	0.3	0.6	4	0.4	10	0.4	0.57	0.7	2.54	5.6	50	10.8	11.7	12.2	12.7	13.5
ESTNB2006-10-09	0.3	0.6	4	0.4	10	0.9	0.57	0.87	1.35	5.7	50	-	11	11.8	12.3	13.2
ESTNB2006-12-09	0.3	0.6	4	0.4	12	0.9	0.57	0.93	1.35	5.2	55	-	13	13.9	14.5	15.4
ESTNB2006-15-04	0.3	0.6	4	0.4	15	0.4	0.57	0.77	2.54	4.4	55	15.9	17	17.6	18.2	19.2
ESTNB2006-15-09	0.3	0.6	4	0.4	15	0.9	0.57	1.03	1.35	4.5	55	-	16.1	17.1	17.7	18.8
ESTNB2008-4-04	0.4	0.8	4	0.5	4	0.4	0.77	0.82	2.64	8.3	50	4.6	4.9	5.2	5.5	5.9
ESTNB2008-6-04	0.4	0.8	4	0.5	6	0.4	0.77	0.85	2.64	7.1	50	6.6	7.1	7.5	7.7	8.3
ESTNB2008-8-09	0.4	0.8	4	0.5	8	0.9	0.77	1.01	1.45	6.3	50	-	8.9	9.6	10.1	10.9
ESTNB2008-12-09	0.4	0.8	4	0.5	12	0.9	0.77	1.13	1.45	5	55	-	13	13.9	14.5	15.4

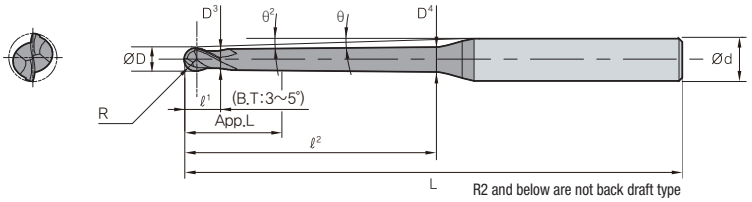
ESTNB20

2 Flutes tapered neck type ball endmill

ULTRA FINE | 2 | 30° HELIX | R ±0.01 (Ø6 or Under) | R ±0.015 (Above Ø6) | AlTiN | DATA p.426~428

• TOLERANCE

ØD		Ød
~ Ø6	0 ~ -0.012mm	h5
Ø8 ~ Ø12	0 ~ -0.015mm	



(mm)

Designation	Sizes(mm)											Effective length by inclination angle				
	R	ØD	Ød	ℓ1	ℓ2	θ	D3	D4	App. L	θ2	L	0.5°	1°	1.5°	2°	3°
ESTNB2008-16-09	0.4	0.8	4	0.5	16	0.9	0.77	1.26	1.45	4.2	55	-	17.1	18.1	18.8	19.9
ESTNB2009-4-04	0.45	0.9	4	0.6	4	0.4	0.86	0.91	3.46	8.2	50	4.5	4.7	4.9	5.1	5.4
ESTNB2009-8-04	0.45	0.9	4	0.6	8	0.4	0.86	0.96	3.46	6.1	55	8.7	9.3	9.7	10	10.6
ESTNB2009-12-04	0.45	0.9	4	0.6	12	0.4	0.86	1.02	3.46	4.8	55	12.9	13.8	14.4	14.9	15.7
ESTNB2009-16-04	0.45	0.9	4	0.6	16	0.4	0.86	1.08	3.46	4	60	17	18	18.7	19.3	20.5
ESTNB2009-18-04	0.45	0.9	4	0.6	18	0.4	0.86	1.1	3.46	3.7	65	19.1	20.1	20.9	21.5	23.1
ESTNB2009-20-04	0.45	0.9	4	0.6	20	0.4	0.86	1.13	3.46	3.4	65	21.1	22.2	23	23.6	25.6
ESTNB2009-22-04	0.45	0.9	4	0.6	22	0.4	0.86	1.16	3.46	3.2	65	23.1	24.3	25.1	25.8	28.2
ESTNB2009-24-04	0.45	0.9	4	0.6	24	0.4	0.86	1.19	3.46	3	70	25.2	26.4	27.2	27.9	-
ESTNB2010-6-04	0.5	1	6	0.8	6	0.4	0.94	1.01	5.09	8.3	50	6.8	7.2	7.5	7.8	8.3
ESTNB2010-8-04	0.5	1	6	0.8	8	0.4	0.94	1.04	5.09	7.5	55	8.8	9.3	9.7	10	10.6
ESTNB2010-10-04	0.5	1	6	0.8	10	0.4	0.94	1.07	5.09	6.8	55	11	11.7	12.3	12.7	13.5
ESTNB2010-10-09	0.5	1	6	0.8	10	0.9	0.94	1.23	2.7	6.9	55	-	11.2	11.9	12.4	13.2
ESTNB2010-15-09	0.5	1	6	0.8	15	0.9	0.94	1.39	2.7	5.7	60	-	16.2	17.1	17.8	18.8
ESTNB2010-20-04	0.5	1	6	0.8	20	0.4	0.94	1.21	5.09	4.7	65	21.2	22.3	23	23.6	25.7
ESTNB2010-20-09	0.5	1	6	0.8	20	0.4	0.94	1.54	2.7	4.8	65	-	21.3	22.4	23.1	24.6
ESTNB2010-25-09	0.5	1	6	0.8	25	0.4	0.94	1.7	2.7	4.2	70	-	26.4	27.6	28.4	30.8
ESTNB2010-30-04	0.5	1	6	0.8	30	0.4	0.94	1.35	5.09	3.6	75	31.3	32.7	33.6	34.8	38.5
ESTNB2010-30-09	0.5	1	6	0.8	30	0.9	0.94	1.86	2.7	3.7	75	-	31.4	32.8	33.7	36.9
ESTNB2010-35-09	0.5	1	6	0.8	35	0.9	0.94	2.02	2.7	3.3	80	-	36.5	38	39	43.1
ESTNB2010-40-09	0.5	1	6	0.8	40	0.9	0.94	2.17	2.7	3	85	-	41.6	43.2	44.4	-
ESTNB2010-50-09	0.5	1	6	0.8	50	0.9	0.94	2.49	2.7	2.5	95	-	51.7	53.5	55.5	-
ESTNB2010-60-09	0.5	1	6	0.8	60	0.9	0.94	2.8	2.7	2.2	105	-	61.8	63.8	66.6	-
ESTNB2010-70-09	0.5	1	6	0.8	70	0.9	0.94	3.11	2.7	1.9	115	-	71.9	74	-	-
ESTNB2015-8-04	0.75	1.5	6	1.35	8	0.4	1.42	1.51	7.07	7.3	55	8.9	9.4	9.7	10	10.6
ESTNB2015-10-04	0.75	1.5	6	1.35	10	0.4	1.42	1.54	7.07	6.6	55	10.9	11.5	11.9	12.2	12.9
ESTNB2015-12-04	0.75	1.5	6	1.35	12	0.4	1.42	1.57	7.07	6	55	13	13.6	14	14.4	15.4
ESTNB2015-15-09	0.75	1.5	6	1.35	15	0.9	1.42	1.85	3.89	5.4	60	-	16.4	17.2	17.8	18.8
ESTNB2015-20-09	0.75	1.5	6	1.35	20	0.9	1.42	2.01	3.89	4.5	65	-	21.4	22.4	23.2	24.7
ESTNB2015-30-09	0.75	1.5	6	1.35	30	0.9	1.42	2.32	3.89	3.4	75	-	31.5	32.9	33.7	37
ESTNB2018-4-04	0.9	1.8	6	1.6	4	0.4	1.73	1.76	4.38	9.2	50	4.6	4.8	4.9	5.1	5.4
ESTNB2018-8-04	0.9	1.8	6	1.6	8	0.4	1.73	1.82	6.61	7.1	50	8.6	9	9.2	9.4	10.2
ESTNB2018-12-04	0.9	1.8	6	1.6	12	0.4	1.73	1.88	6.61	5.8	55	12.9	13.5	14	14.4	15.4
ESTNB2018-16-04	0.9	1.8	6	1.6	16	0.4	1.73	1.93	6.61	4.9	60	17	17.7	18.3	18.7	20.5
ESTNB2018-20-04	0.9	1.8	6	1.6	20	0.4	1.73	1.99	6.61	4.3	65	21.2	22.3	23	23.6	25.6
ESTNB2018-24-04	0.9	1.8	6	1.6	24	0.4	1.73	2.04	6.61	3.8	65	25.3	26.5	27.3	27.9	30.8

H-Star Endmill

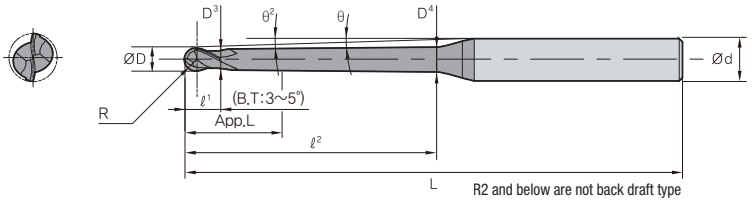
ESTNB20

2 Flutes tapered neck type ball endmill

ULTRA FINE | 2 | 30° HELIX | R ±0.01 Ø6 or Under | R ±0.015 Above Ø6 | AlTiN | DATA p.426~428

• TOLERANCE

ØD		Ød
~ Ø6	0 ~ -0.012mm	h5
Ø8 ~ Ø12	0 ~ -0.015mm	



(mm)

Designation	Sizes(mm)											Effective length by inclination angle				
	R	ØD	Ød	ℓ1	ℓ2	θ	D3	D4	App. L	θ2	L	0.5°	1°	1.5°	2°	3°
ESTNB2018-28-04	0.9	1.8	6	1.6	28	0.4	1.73	2.1	6.61	3.4	70	29.4	30.6	31.5	32.4	35.9
ESTNB2018-32-04	0.9	1.8	6	1.6	32	0.4	1.73	2.15	6.61	3	70	33.4	34.8	35.7	37.1	-
ESTNB2018-36-04	0.9	1.8	6	1.6	36	0.4	1.73	2.21	6.61	2.8	75	37.5	38.9	39.9	41.7	-
ESTNB2018-38-04	0.9	1.8	6	1.6	38	0.4	1.73	2.24	6.61	2.7	80	39.5	41	42	44	-
ESTNB2018-40-04	0.9	1.8	6	1.6	40	0.4	1.73	2.27	6.61	2.6	80	41.5	43.1	44.2	46.3	-
ESTNB2020-8-04	1	2	6	1.7	8	0.4	1.92	2.01	7.42	7	50	8.7	9	9.2	9.5	10.2
ESTNB2020-12-04	1	2	6	1.7	12	0.4	1.92	2.06	7.42	5.7	55	13	13.6	14	14.4	15.4
ESTNB2020-16-04	1	2	6	1.7	16	0.4	1.92	2.12	7.42	4.8	60	17	17.7	18.3	18.7	20.5
ESTNB2020-20-04	1	2	6	1.7	20	0.4	1.92	2.18	7.42	4.1	65	21.3	22.3	23	23.6	25.6
ESTNB2020-20-09	1	2	6	1.7	20	0.9	1.92	2.5	4.24	4.2	65	-	21.4	22.4	23.2	24.6
ESTNB2020-25-09	1	2	6	1.7	25	0.9	1.92	2.65	4.24	3.6	65	-	26.5	27.7	28.5	30.8
ESTNB2020-30-04	1	2	6	1.7	30	0.4	1.92	2.32	7.42	3.1	70	31.4	32.7	33.6	34.8	38.5
ESTNB2020-30-09	1	2	6	1.7	30	0.9	1.92	2.81	4.24	3.2	70	-	31.6	32.9	33.7	36.9
ESTNB2020-35-09	1	2	6	1.7	35	0.9	1.92	2.97	4.24	2.8	75	-	36.6	38	39	-
ESTNB2020-40-04	1	2	6	1.7	40	0.4	1.92	2.46	7.42	2.5	80	41.5	43.1	44.2	46.3	-
ESTNB2020-40-09	1	2	6	1.7	40	0.9	1.92	3.12	4.24	2.6	80	-	41.7	43.2	44.5	-
ESTNB2020-50-09	1	2	6	1.7	50	0.9	1.92	3.44	4.24	2.1	90	-	51.5	53.5	55.5	-
ESTNB2020-60-09	1	2	6	1.7	60	0.9	1.92	3.75	4.24	1.8	100	-	61.9	63.8	-	-
ESTNB2020-70-09	1	2	6	1.7	70	0.9	1.92	4.07	4.24	1.8	110	-	72	74.1	-	-
ESTNB2030-8-04	1.5	3	6	2.5	8	0.4	2.86	2.94	8.5	6.3	50	8.8	9.1	9.3	9.5	10.3
ESTNB2030-16-04	1.5	3	6	2.5	16	0.4	2.86	3.05	12.52	4.1	55	17.2	17.8	18.3	18.7	20.6
ESTNB2030-20-04	1.5	3	6	2.5	20	0.4	2.86	3.1	12.52	3.4	60	21.2	22	22.6	23.3	25.7
ESTNB2030-30-04	1.5	3	6	2.5	30	0.4	2.86	3.24	12.52	2.5	70	31.6	32.8	33.7	34.9	-
ESTNB2030-30-09	1.5	3	6	2.5	30	0.9	2.86	3.72	6.95	2.6	70	-	31.8	33	33.8	-
ESTNB2030-40-04	1.5	3	6	2.5	40	0.4	2.86	3.38	12.52	2	80	41.7	43.2	44.3	-	-
ESTNB2030-40-09	1.5	3	6	2.5	40	0.9	2.86	4.04	6.95	2	80	-	41.9	43.3	-	-
ESTNB2030-50-09	1.5	3	6	2.5	50	0.9	2.86	4.35	6.95	1.7	90	-	52	53.6	-	-
ESTNB2030-60-09	1.5	3	6	2.5	60	0.9	2.86	4.67	6.95	1.4	100	-	62.1	-	-	-
ESTNB2030-70-09	1.5	3	6	2.5	70	0.9	2.86	4.98	6.95	1.2	110	-	72.1	-	-	-
ESTNB2040-20-10	2	4	8	8	20	1	3.86	4.28	12.01	5	70	20.5	21.6	22.3	22.8	23.5
ESTNB2040-30-10	2	4	8	8	30	1	3.86	4.63	12.01	3.51	80	22	31.6	32.5	33.2	34.16
ESTNB2040-40-10	2	4	8	8	40	1	3.86	4.98	12.01	2.7	90	22	42	43.4	44.3	-
ESTNB2040-50-10	2	4	8	8	50	1	3.86	5.33	12.01	2.2	100	22	52	53.6	54.7	-
ESTNB2040-60-10	2	4	8	8	60	1	3.86	5.68	12.01	1.9	110	22	62	63.8	-	-
ESTNB2050-30-10	2.5	5	8	10	30	1	4.86	5.56	14.01	2.8	80	25.5	31.7	32.6	33.2	-
ESTNB2050-40-10	2.5	5	8	10	40	1	4.86	5.91	14.01	2.1	90	25.5	41.7	42.8	43.5	-

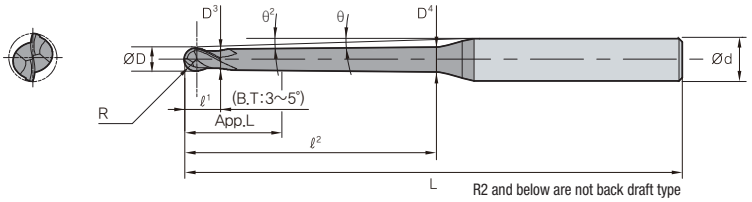
ESTNB20

2 Flutes tapered neck type ball endmill

ULTRA FINE | 2 | 30° HELIX | R ±0.01 (Ø6 or Under) | R ±0.015 (Above Ø6) | AlTiN | DATA p.426~428

• TOLERANCE

ØD		Ød
~ Ø6	0 ~ -0.012mm	h5
Ø8 ~ Ø12	0 ~ -0.015mm	



(mm)

Designation	Sizes(mm)											Effective length by inclination angle				
	R	ØD	Ød	ℓ1	ℓ2	θ	D3	D4	App. L	θ2	L	0.5°	1°	1.5°	2°	3°
ESTNB2050-60-10	2.5	5	8	10	60	1	4.86	6.61	14.01	1.5	110	25.5	62.1	-	-	-
ESTNB2060-30-10	3	6	8	12	30	1	5.86	6.49	16.01	1.9	80	29	31.8	32.6	-	-
ESTNB2060-40-10	3	6	8	12	40	1	5.86	6.84	16.01	1.5	90	29	41.8	-	-	-
ESTNB2060-50-10	3	6	8	12	50	1	5.86	7.19	16.01	1.2	100	29	51.8	-	-	-
ESTNB2060-60-10	3	6	10	12	60	1	5.86	7.54	16.01	1.9	110	29	62.2	63.9	-	-
ESTNB2060-70-10	3	6	10	12	70	1	5.86	7.89	16.01	1.7	120	29	72.2	74.1	-	-
ESTNB2060-80-10	3	6	10	12	80	1	5.86	8.23	16.01	1.5	130	29	82.2	-	-	-
ESTNB2080-50-10	4	8	10	14	50	1	7.86	9.12	18.01	1.2	110	32	51.9	-	-	-
ESTNB2080-60-10	4	8	10	14	60	1	7.86	9.47	18.01	1	120	32	-	-	-	-
ESTNB2080-70-10	4	8	10	14	70	1	7.86	9.82	18.01	0.9	130	32	-	-	-	-
ESTNB2080-80-10	4	8	12	14	80	1	7.86	10.16	18.01	1.5	140	32	82.3	-	-	-
ESTNB2100-60-10	5	10	12	18	60	1	9.86	11.33	22.01	1.1	130	39	62.1	-	-	-
ESTNB2100-75-10	5	10	12	18	75	1	9.86	11.85	22.01	0.9	140	39	-	-	-	-

※ The above specifications are subject to change without prior notice for product quality improvement.

• Applicable Workpiece

Carbon steel ~ HB225	Alloy steel HB225~325	Pre-hardened steel HRC30~50	Hardened steel		Copper	Graphite	Cast iron ~FCD500	Aluminum	Stainless steel
			SKD61~HRC55	SKD11 HRC55~63					
		○	◎	◎	○				

◎: Excellent ○: Good

H-Star Endmill

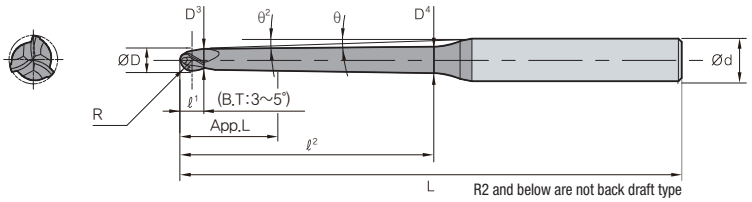
ESTNB30

3 Flutes tapered neck type ball endmill

ULTRA FINE | 3 | 30° HELIX | R ±0.005 (All sizes) | AlTiN | DATA p.429~432

• TOLERANCE

ØD		Ød
~ Ø6	0 ~ -0.012mm	h5
Ø8 ~ Ø12	0 ~ -0.015mm	

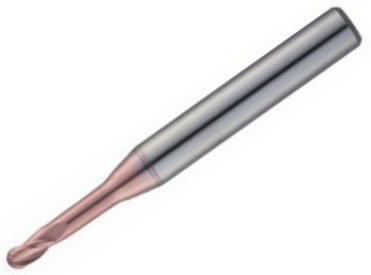


(mm)

Designation	Sizes(mm)											Effective length by inclination angle				
	R	ØD	Ød	ℓ1	ℓ2	θ	D3	D4	App. L	θ2	L	0.5°	1°	1.5°	2°	3°
ESTNB3020-8-04	1	2	6	1.7	8	0.4	1.92	2.01	7.42	7	50	8.7	9	9.2	9.5	10.2
ESTNB3020-12-04	1	2	6	1.7	12	0.4	1.92	2.06	7.42	5.7	55	13	13.6	14	14.4	15.4
ESTNB3020-16-04	1	2	6	1.7	16	0.4	1.92	2.12	7.42	4.8	60	17	17.7	18.3	18.7	20.5
ESTNB3020-20-04	1	2	6	1.7	20	0.4	1.92	2.18	7.42	4.1	65	21.3	22.3	23	23.6	25.6
ESTNB3020-20-09	1	2	6	1.7	20	0.9	1.92	2.5	4.24	4.2	65	-	21.4	22.4	23.2	24.6
ESTNB3020-25-09	1	2	6	1.7	25	0.9	1.92	2.65	4.24	3.6	65	-	26.5	27.7	28.5	30.8
ESTNB3020-30-04	1	2	6	1.7	30	0.4	1.92	2.32	7.42	3.1	70	31.4	32.7	33.6	34.8	38.5
ESTNB3020-30-09	1	2	6	1.7	30	0.9	1.92	2.81	4.24	3.2	70	-	31.6	32.9	33.7	36.9
ESTNB3020-35-09	1	2	6	1.7	35	0.9	1.92	2.97	4.24	2.8	75	-	36.6	38	39	-
ESTNB3020-40-04	1	2	6	1.7	40	0.4	1.92	2.46	7.42	2.5	80	41.5	43.1	44.2	46.3	-
ESTNB3020-40-09	1	2	6	1.7	40	0.9	1.92	3.12	4.24	2.6	80	-	41.7	43.2	44.5	-
ESTNB3020-50-09	1	2	6	1.7	50	0.9	1.92	3.44	4.24	2.1	90	-	51.8	53.5	55.5	-
ESTNB3020-60-09	1	2	6	1.7	60	0.9	1.92	3.75	4.24	1.8	100	-	61.9	63.8	-	-
ESTNB3020-70-09	1	2	6	1.7	70	0.9	1.92	4.07	4.24	1.6	110	-	72	74.1	-	-
ESTNB3030-8-04	1.5	3	6	2.5	8	0.4	2.86	2.94	8.5	6.3	50	8.8	9.1	9.3	9.5	10.3
ESTNB3030-16-04	1.5	3	6	2.5	16	0.4	2.86	3.05	12.52	4.1	55	17.2	17.8	18.3	18.7	20.6
ESTNB3030-20-04	1.5	3	6	2.5	20	0.4	2.86	3.1	12.52	3.4	60	21.2	22	22.6	23.3	25.7
ESTNB3030-30-04	1.5	3	6	2.5	30	0.4	2.86	3.24	12.52	2.5	70	31.6	32.8	33.7	34.9	-
ESTNB3030-30-09	1.5	3	6	2.5	30	0.9	2.86	3.72	6.95	2.6	70	-	31.8	33	33.8	-
ESTNB3030-40-04	1.5	3	6	2.5	40	0.4	2.86	3.38	12.52	2	80	41.7	43.2	44.3	-	-
ESTNB3030-40-09	1.5	3	6	2.5	40	0.9	2.86	4.04	6.95	2	80	-	41.9	43.3	-	-
ESTNB3030-50-09	1.5	3	6	2.5	50	0.9	2.86	4.35	6.95	1.7	90	-	52	53.6	-	-
ESTNB3030-60-09	1.5	3	6	2.5	60	0.9	2.86	4.67	6.95	1.4	100	-	62.1	-	-	-
ESTNB3030-70-09	1.5	3	6	2.5	70	0.9	2.86	4.98	6.95	1.2	110	-	72.1	-	-	-
ESTNB3040-20-10	2	4	8	8	20	1	3.86	4.28	12.01	5	70	20.5	21.6	22.3	22.8	23.5
ESTNB3040-30-10	2	4	8	8	30	1	3.86	4.63	12.01	3.6	80	22	31.6	32.5	33.2	34.1
ESTNB3040-40-10	2	4	8	8	40	1	3.86	4.98	12.01	2.7	90	22	42	43.4	44.3	-
ESTNB3040-50-10	2	4	8	8	50	1	3.86	5.33	12.01	2.2	100	22	52	53.6	54.7	-
ESTNB3040-60-10	2	4	8	8	60	1	3.86	5.68	12.01	1.9	110	22	62	63.8	-	-
ESTNB3050-30-10	2.5	5	8	10	30	1	4.86	5.56	14.01	2.8	80	25.5	31.7	32.6	33.2	-

ESTNB30

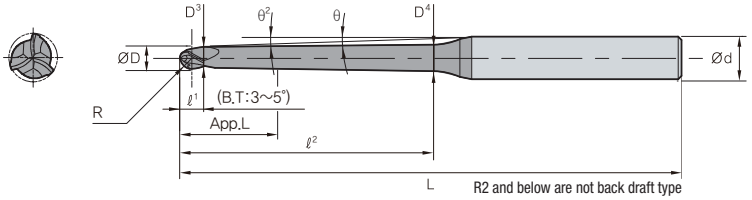
3 Flutes tapered neck type ball endmill



ULTRA FINE | 3 | 30° HELIX | R ±0.005 (All sizes) | AlTiN | DATA p.429~432

• TOLERANCE

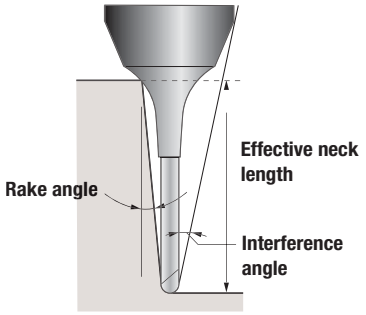
ØD		Ød
~ Ø6	0 ~ -0.012mm	h5
Ø8 ~ Ø12	0 ~ -0.015mm	

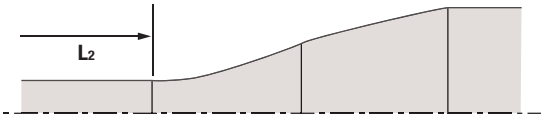


(mm)

Designation	Sizes(mm)											Effective length by inclination angle				
	R	ØD	Ød	ℓ1	ℓ2	θ	D3	D4	App. L	θ2	L	0.5°	1°	1.5°	2°	3°
ESTNB3050-40-10	2.5	5	8	10	40	1	4.86	5.91	14.01	2.1	90	25.5	41.7	42.8	43.5	-
ESTNB3050-60-10	2.5	5	8	10	60	1	4.86	6.61	12.52	1.5	110	25.5	62.1	-	-	-

※ The above specifications are subject to change without prior notice for product quality improvement.





※ The marked effective neck length is the default value to prevent interference with the workpiece.
Proper control of the processing environment is required.

• Applicable Workpiece

Carbon steel ~ HB225	Alloy steel HB225~325	Pre-hardened steel HRC30~50	Hardened steel		Copper	Graphite	Cast iron ~FCD500	Aluminum	Stainless steel
			SKD61~HRC55	SKD11 HRC55~63					
		○	◎	◎	○				

◎: Excellent ○: Good

H-Star Endmill

ESLNS20

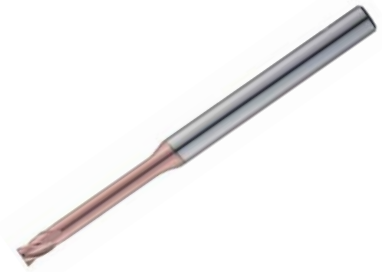
2 Flutes long neck type flat endmill

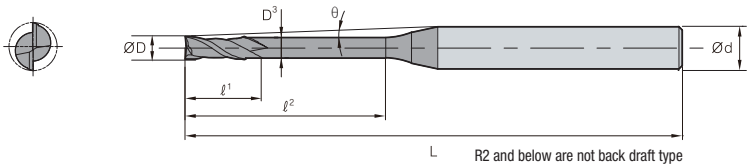
ULTRA FINE | 2 | 45° HELIX | AlTiN | DATA

p.433

• TOLERANCE

ØD		Ød
All sizes	0 ~ -0.012mm	h5





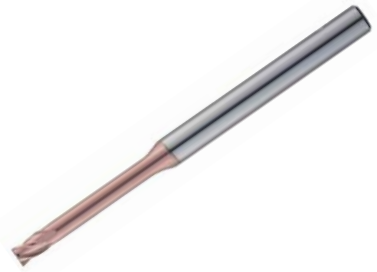
R2 and below are not back draft type

(mm)

Designation	Sizes(mm)							Effective length by inclination angle				
	ØD	Ød	ℓ1	ℓ2	D3	θ	L	0.5°	1°	1.5°	2°	3°
ESLNS2001-0.3	0.1	4	0.15	0.3	0.08	11.6	45	0.4	0.4	0.5	0.5	0.5
ESLNS2001-0.5	0.1	4	0.15	0.5	0.08	11.4	45	0.6	0.7	0.7	0.7	0.8
ESLNS2001-1	0.1	4	0.15	1	0.08	10.9	45	1.2	1.2	1.2	1.3	1.4
ESLNS2002-0.5	0.2	4	0.3	0.5	0.17	11.3	50	1.2	1.3	1.5	1.7	2
ESLNS2002-1	0.2	4	0.3	1	0.17	10.8	50	1.7	1.9	2.2	2.4	2.7
ESLNS2002-1.5	0.2	4	0.3	1.5	0.17	10.3	50	2.3	2.5	2.8	3	3.4
ESLNS2003-1	0.3	4	0.45	1	0.27	10.8	50	1.7	1.9	2.2	2.4	2.7
ESLNS2003-1.5	0.3	4	0.45	1.5	0.27	10.3	50	2.3	2.5	2.8	3	3.4
ESLNS2003-2	0.3	4	0.45	2	0.27	9.8	50	2.8	3.1	3.4	3.6	4.1
ESLNS2003-2.5	0.3	4	0.45	2.5	0.27	9.4	50	3.4	3.7	4	4.3	4.7
ESLNS2003-3	0.3	4	0.45	3	0.27	9	50	3.9	4.3	4.6	4.9	5.4
ESLNS2004-1	0.4	4	0.6	1	0.37	10.7	50	1.7	1.9	2.2	2.4	2.7
ESLNS2004-1.5	0.4	4	0.6	1.5	0.37	10.2	50	2.3	2.5	2.8	3	3.4
ESLNS2004-2	0.4	4	0.6	2	0.37	9.7	50	2.8	3.1	3.4	3.6	4.1
ESLNS2004-2.5	0.4	4	0.6	2.5	0.37	9.3	50	3.4	3.7	4	4.3	4.7
ESLNS2004-3	0.4	4	0.6	3	0.37	8.9	50	3.9	4.3	4.6	4.9	5.4
ESLNS2004-3.5	0.4	4	0.6	3.5	0.37	8.6	50	4.5	4.9	5.2	5.5	6
ESLNS2004-4	0.4	4	0.6	4	0.37	8.2	50	5	5.4	5.8	6.1	6.6
ESLNS2004-5	0.4	4	0.6	5	0.37	7.6	50	6.1	6.6	6.9	7.3	7.8
ESLNS2004-6	0.4	4	0.6	6	0.37	7.1	50	7.2	7.7	8.1	8.4	9
ESLNS2005-1	0.5	4	0.75	1	0.47	10.7	50	1.7	1.9	2.2	2.4	2.7
ESLNS2005-1.5	0.5	4	0.75	1.5	0.47	10.2	50	2.3	2.5	2.8	3	3.4
ESLNS2005-2	0.5	4	0.75	2	0.47	9.7	50	2.8	3.1	3.4	3.6	4.1
ESLNS2005-2.5	0.5	4	0.75	2.5	0.47	9.3	50	3.4	3.7	4	4.3	4.7
ESLNS2005-3	0.5	4	0.75	3	0.47	8.9	50	3.9	4.3	4.6	4.9	5.4
ESLNS2005-4	0.5	4	0.75	4	0.47	8.1	50	5	5.4	5.8	6.1	6.6
ESLNS2005-5	0.5	4	0.75	5	0.47	7.5	50	6.1	6.6	6.9	7.3	7.8
ESLNS2005-6	0.5	4	0.75	6	0.47	7	50	7.2	7.7	8.1	8.4	9
ESLNS2005-8	0.5	4	0.75	8	0.47	6.2	50	9.3	9.9	10.3	10.7	11.4
ESLNS2006-2	0.6	4	0.9	2	0.57	9.6	50	2.8	3.1	3.4	3.6	4.1
ESLNS2006-4	0.6	4	0.9	4	0.57	6.9	50	7.2	7.7	8.1	8.4	9
ESLNS2006-6	0.6	4	0.9	6	0.57	6.1	50	9.3	9.9	10.3	10.7	11.4
ESLNS2006-8	0.6	4	0.9	8	0.57	5.4	50	11.5	12.1	12.6	13	13.7
ESLNS2006-10	0.6	4	0.9	10	0.57	9.6	50	2.8	3.1	3.4	3.6	4.1
ESLNS2007-2	0.7	4	1.05	2	0.67	8	50	5	5.4	5.8	6.1	6.6
ESLNS2007-4	0.7	4	1.05	4	0.67	6.9	50	7.2	7.7	8.1	8.4	9
ESLNS2007-6	0.7	4	1.05	6	0.67	6	50	9.3	9.9	10.3	10.7	11.4
ESLNS2007-8	0.7	4	1.05	8	0.67	5.3	50	11.5	12.1	12.6	13	13.7
ESLNS2007-10	0.7	4	1.2	10	0.77	7.9	50	5	5.4	5.8	6.1	6.6
ESLNS2008-4	0.8	4	1.2	4	0.77	6.8	50	7.2	7.7	8.1	8.4	9

ESLNS20

2 Flutes long neck type flat endmill

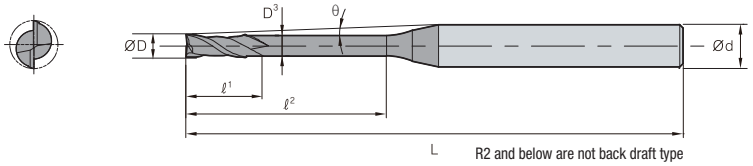


ULTRA FINE | 2 | 45° HELIX | AlTiN | DATA

p.433

• TOLERANCE

ØD		Ød
All sizes	0 ~ -0.012mm	h5



R2 and below are not back draft type

(mm)

Designation	Sizes(mm)							Effective length by inclination angle				
	ØD	Ød	ℓ¹	ℓ²	D³	θ	L	0.5°	1°	1.5°	2°	3°
ESLNS2008-6	0.8	4	1.2	6	0.77	5.9	50	9.3	9.9	10.3	10.7	11.4
ESLNS2008-8	0.8	4	1.2	8	0.77	5.2	50	11.5	12.1	12.6	13	13.7
ESLNS2008-10	0.8	4	1.2	10	0.77	4.7	55	13.6	14.2	14.8	15.2	16
ESLNS2008-12	0.8	4	1.2	12	0.77	6.7	55	7.2	7.7	8.1	8.4	9.1
ESLNS2009-6	0.9	4	1.35	6	0.86	5.8	50	9.4	9.9	10.4	10.7	11.4
ESLNS2009-8	0.9	4	1.35	8	0.86	5.1	50	11.5	12.1	12.6	13	13.7
ESLNS2009-10	0.9	4	1.35	10	0.86	4.6	55	13.6	14.3	14.8	15.2	16
ESLNS2009-12	0.9	4	1.35	12	0.86	9.4	55	2.9	3.2	3.4	3.7	4.1
ESLNS2010-2	1	4	1.5	2	0.96	7.7	50	5.1	5.5	5.8	6.1	6.6
ESLNS2010-4	1	4	1.5	4	0.96	6.6	50	7.2	7.7	8.1	8.4	9.1
ESLNS2010-6	1	4	1.5	6	0.96	5.7	50	9.4	9.9	10.4	10.7	11.4
ESLNS2010-8	1	4	1.5	8	0.96	5	50	11.5	12.1	12.6	13	13.7
ESLNS2010-10	1	4	1.5	10	0.96	4.5	55	13.6	14.3	14.8	15.2	16
ESLNS2010-12	1	4	1.5	12	0.96	4.1	55	15.7	16.4	17	17.4	18.7
ESLNS2010-14	1	4	1.5	14	0.96	3.8	60	17.8	18.6	19.1	19.6	21.3
ESLNS2010-16	1	4	1.5	16	0.96	3.2	60	22	22.8	23.5	24	26.6
ESLNS2010-20	1	4	1.5	20	0.96	6.3	60	7.3	7.7	8.1	8.5	9.1
ESLNS2012-6	1.2	4	1.8	6	1.15	5.5	50	9.4	9.9	10.4	10.8	11.4
ESLNS2012-8	1.2	4	1.8	8	1.15	4.8	50	11.5	12.1	12.6	13	13.7
ESLNS2012-10	1.2	4	1.8	10	1.15	11.5	50	12.1	12.6	13	13.7	16
ESLNS2012-12	1.2	4	1.8	12	1.15	4.3	55	13.6	14.3	14.8	15.2	16
ESLNS2012-16	1.2	4	1.8	16	1.15	3.6	55	17.8	18.6	19.2	19.7	21.3
ESLNS2014-6	1.4	4	2.1	6	1.34	6.1	50	7.3	7.8	8.1	8.5	9.1
ESLNS2014-8	1.4	4	2.1	8	1.34	5.3	50	9.4	10	10.4	10.8	11.5
ESLNS2014-10	1.4	4	2.1	10	1.34	4.6	50	11.6	12.1	12.6	13	13.8
ESLNS2014-12	1.4	4	2.1	12	1.34	4.1	55	13.7	14.3	14.8	15.3	16.1
ESLNS2014-14	1.4	4	2.1	14	1.34	3.7	55	15.8	16.5	17	17.5	18.7
ESLNS2014-16	1.4	4	2.1	16	1.34	3.4	55	17.9	18.6	19.2	19.7	21.4
ESLNS2015-4	1.5	4	2.25	4	1.44	7.2	50	5.2	5.5	5.9	6.2	6.7
ESLNS2015-6	1.5	4	2.25	6	1.44	6	50	7.3	7.8	8.1	8.5	9.1
ESLNS2015-8	1.5	4	2.25	8	1.44	5.1	50	9.4	10	10.4	10.8	11.5
ESLNS2015-10	1.5	4	2.25	10	1.44	4.5	50	11.6	12.1	12.6	13	13.8
ESLNS2015-12	1.5	4	2.25	12	1.44	4	55	13.7	14.3	14.8	15.3	16.1
ESLNS2015-14	1.5	4	2.25	14	1.44	3.6	55	15.8	16.5	17	17.5	18.7
ESLNS2015-16	1.5	4	2.25	16	1.44	3.3	55	17.9	18.6	19.2	19.7	-
ESLNS2015-18	1.5	4	2.25	18	1.44	3	60	20	20.7	21.3	21.9	-
ESLNS2015-20	1.5	4	2.25	20	1.44	2.8	60	22	22.9	23.5	24.1	-
ESLNS2015-25	1.5	4	2.25	25	1.44	2.4	65	27.3	28.1	28.8	30	-
ESLNS2016-6	1.6	4	2.4	6	1.54	5.9	50	7.3	7.8	8.1	8.5	9.1
ESLNS2016-8	1.6	4	2.4	8	1.54	5	50	9.4	10	10.4	10.8	11.5

H-Star Endmill

ESLNS20

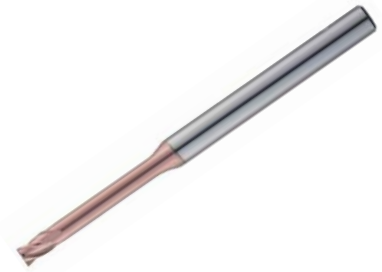
2 Flutes long neck type flat endmill

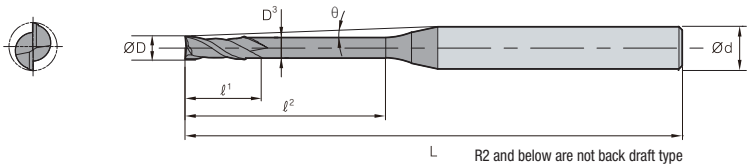
ULTRA FINE | 2 | 45° HELIX | AlTiN | DATA

p.433

• TOLERANCE

ØD		Ød
All sizes	0 ~ -0.012mm	h5





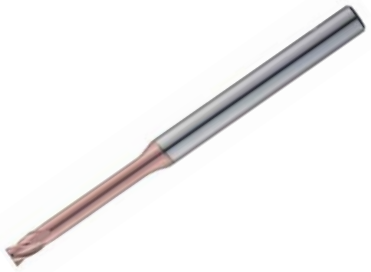
R2 and below are not back draft type

(mm)

Designation	Sizes(mm)							Effective length by inclination angle				
	ØD	Ød	ℓ1	ℓ2	D3	θ	L	0.5°	1°	1.5°	2°	3°
ESLNS2016-10	1.6	4	2.4	10	1.54	4.4	50	11.6	12.1	12.6	13	13.8
ESLNS2016-12	1.6	4	2.4	12	1.54	3.9	55	13.7	14.3	14.8	15.3	16.1
ESLNS2016-14	1.6	4	2.4	14	1.54	3.5	55	15.8	16.5	17	17.5	18.7
ESLNS2016-16	1.6	4	2.4	16	1.54	3.2	55	17.9	18.6	19.2	19.7	21.4
ESLNS2016-18	1.6	4	2.4	18	1.54	2.9	60	20	20.7	21.3	21.9	-
ESLNS2016-20	1.6	4	2.4	20	1.54	2.7	60	22	22.9	23.5	24.1	-
ESLNS2018-6	1.8	4	2.7	6	1.73	5.6	50	7.4	7.8	8.2	8.5	9.1
ESLNS2018-8	1.8	4	2.7	8	1.73	4.8	50	9.5	10	10.4	10.8	11.5
ESLNS2018-10	1.8	4	2.7	10	1.73	4.2	50	11.6	12.2	12.6	13	13.8
ESLNS2018-12	1.8	4	2.7	12	1.73	3.7	55	13.7	14.3	14.8	15.3	16.1
ESLNS2018-14	1.8	4	2.7	14	1.73	3.3	55	15.8	16.5	17	17.5	18.8
ESLNS2018-16	1.8	4	2.7	16	1.73	3	55	17.9	18.6	19.2	19.7	-
ESLNS2018-18	1.8	4	2.7	18	1.73	2.7	60	20	20.7	21.3	21.9	-
ESLNS2018-20	1.8	4	2.7	20	1.73	2.5	60	22.1	22.9	23.5	24.1	-
ESLNS2020-4	2	4	3	4	1.92	6.5	50	5.3	5.6	5.9	6.2	6.7
ESLNS2020-6	2	4	3	6	1.92	5.3	50	7.4	7.8	8.2	8.5	9.1
ESLNS2020-8	2	4	3	8	1.92	4.5	50	9.5	10	10.4	10.8	11.5
ESLNS2020-10	2	4	3	10	1.92	3.9	50	11.6	12.2	12.7	13.1	13.8
ESLNS2020-12	2	4	3	12	1.92	3.4	55	13.7	14.3	14.9	15.3	16.1
ESLNS2020-14	2	4	3	14	1.92	3.1	55	15.8	16.5	17	17.5	18.8
ESLNS2020-16	2	4	3	16	1.92	2.8	55	17.9	18.6	19.2	19.7	-
ESLNS2020-18	2	4	3	18	1.92	2.6	60	20	20.8	21.4	21.9	-
ESLNS2020-20	2	4	3	20	1.92	2.4	60	22.1	22.9	23.5	24.1	-
ESLNS2020-25	2	4	3	25	1.92	2	65	27.3	28.2	28.9	-	-
ESLNS2020-30	2	4	3	30	1.92	1.7	70	32.5	33.4	34.4	-	-
ESLNS2025-8	2.5	4	3.75	8	2.4	3.7	50	9.6	10.1	10.5	10.9	11.5
ESLNS2025-10	2.5	4	3.75	10	2.4	3.1	50	11.7	12.2	12.7	13.1	13.8
ESLNS2025-12	2.5	4	3.75	12	2.4	2.7	55	13.8	14.4	14.9	15.3	-
ESLNS2025-14	2.5	4	3.75	14	2.4	2.4	55	15.9	16.5	17.1	17.5	-
ESLNS2025-16	2.5	4	3.75	16	2.4	2.2	55	18	18.7	19.2	19.7	-
ESLNS2025-18	2.5	4	3.75	18	2.4	2	55	20.1	20.8	21.4	-	-
ESLNS2025-20	2.5	4	3.75	20	2.4	1.8	60	22.1	22.9	23.5	-	-
ESLNS2025-25	2.5	4	3.75	25	2.4	1.5	60	27.3	28.2	-	-	-
ESLNS2025-30	2.5	4	3.75	30	2.4	1.3	70	32.6	33.5	-	-	-
ESLNS2030-8	3	6	4.5	8	2.88	5.6	55	9.6	10.1	10.5	10.9	11.5
ESLNS2030-10	3	6	4.5	10	2.88	5	55	11.7	12.3	12.7	13.1	13.8
ESLNS2030-12	3	6	4.5	12	2.88	4.5	60	13.8	14.4	14.9	15.4	16.3
ESLNS2030-14	3	6	4.5	14	2.88	4.1	60	15.9	16.6	17.1	17.6	18.9
ESLNS2030-16	3	6	4.5	16	2.88	3.7	60	18	18.7	19.3	19.8	21.6
ESLNS2030-18	3	6	4.5	18	2.88	3.4	60	20.1	20.8	21.4	21.9	24.2

ESLNS20

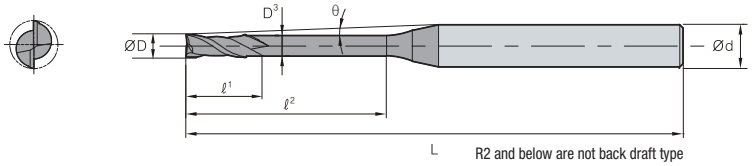
2 Flutes long neck type flat endmill



ULTRA FINE | 2 | 45° HELIX | AlTiN | DATA p.433

• TOLERANCE

ØD		Ød
All sizes	0 ~ -0.012mm	h5

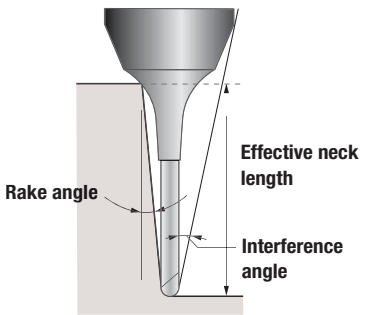


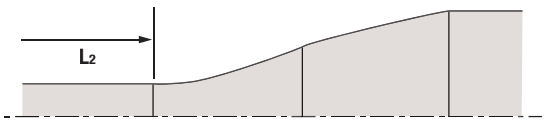
R2 and below are not back draft type

(mm)

Designation	Sizes(mm)							Effective length by inclination angle				
	ØD	Ød	ℓ¹	ℓ²	D³	θ	L	0.5°	1°	1.5°	2°	3°
ESLNS2030-20	3	6	4.5	20	2.88	3.2	65	22.2	23	23.6	24.2	26.9
ESLNS2030-25	3	6	4.5	25	2.88	2.7	70	27.4	28.2	28.9	30.2	-
ESLNS2030-30	3	6	4.5	30	2.88	2.4	75	32.6	33.5	34.5	36.2	-
ESLNS2030-35	3	6	4.5	35	2.88	2.1	80	37.7	38.7	40.2	42.2	-
ESLNS2030-40	3	6	4.5	40	2.88	1.9	90	42.9	43.9	45.9	-	-
ESLNS2040-12	4	6	6	12	3.85	3.4	60	13.9	14.5	15	15.4	16.3
ESLNS2040-16	4	6	6	16	3.85	2.8	60	18.1	18.8	19.3	19.8	-
ESLNS2040-20	4	6	6	20	3.85	2.3	70	22.3	23	23.6	24.3	-
ESLNS2040-25	4	6	6	25	3.85	2	70	27.4	28.3	28.9	-	-
ESLNS2040-30	4	6	6	30	3.85	1.7	80	32.6	33.5	34.6	-	-
ESLNS2040-35	4	6	6	35	3.85	1.5	80	37.8	38.8	-	-	-
ESLNS2040-40	4	6	6	40	3.85	1.3	90	42.9	44	-	-	-
ESLNS2040-45	4	6	6	45	3.85	1.2	90	48.1	49.4	-	-	-
ESLNS2040-50	4	6	6	50	3.85	1.1	100	53.2	54.8	-	-	-
ESLNS2050-16	5	6	7.5	16	4.85	1.5	60	18.1	18.8	-	-	-
ESLNS2050-20	5	6	7.5	20	4.85	1.3	60	22.3	23	-	-	-
ESLNS2050-25	5	6	7.5	25	4.85	1.1	70	27.4	28.3	-	-	-
ESLNS2050-30	5	6	7.5	30	4.85	0.9	70	32.6	-	-	-	-
ESLNS2050-35	5	6	7.5	35	4.85	0.8	80	37.8	-	-	-	-
ESLNS2050-40	5	6	7.5	40	4.85	0.7	90	42.9	-	-	-	-
ESLNS2050-50	5	6	7.5	50	4.85	0.6	100	53.2	-	-	-	-

※ The above specifications are subject to change without prior notice for product quality improvement.





※ The marked effective neck length is the default value to prevent interference with the workpiece.
Proper control of the processing environment is required.

• Applicable Workpiece

Carbon steel ~ HB225	Alloy steel HB225~325	Pre-hardened steel HRC30~50	Hardened steel		Copper	Graphite	Cast iron ~FCD500	Aluminum	Stainless steel
			SKD61~HRC55	SKD11 HRC55~63					
		○	◎	◎	○				

◎: Excellent ○: Good

H-Star Endmill

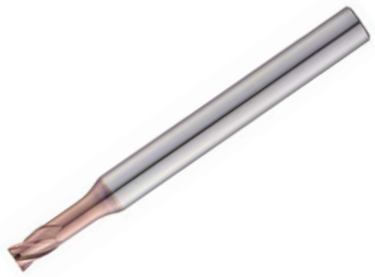
ESLNS40

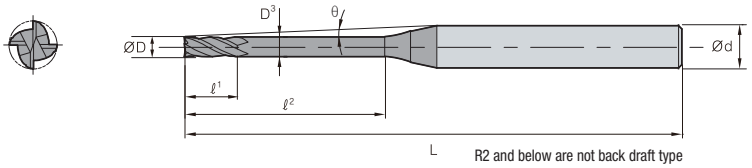
4 Flutes long neck type flat endmill

ULTRA FINE | 4 | 30° HELIX | AlTiN | DATA p.433

• TOLERANCE

ØD		Ød
All sizes	0 ~ -0.012mm	h5





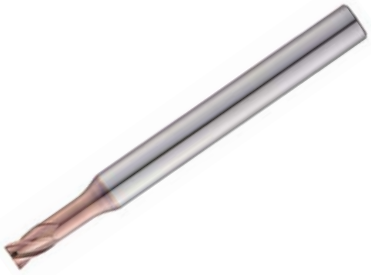
R2 and below are not back draft type

(mm)

Designation	Sizes(mm)							Effective length by inclination angle				
	ØD	Ød	ℓ1	ℓ2	D3	θ	L	0.5°	1°	1.5°	2°	3°
ESLNS4010-4	1	4	1.5	4	0.96	7.7	50	5.1	5.5	5.8	6.1	6.6
ESLNS4010-6	1	4	1.5	6	0.96	6.6	50	7.2	7.7	8.1	8.4	9.1
ESLNS4010-8	1	4	1.5	8	0.96	5.7	50	9.4	9.9	10.4	10.7	11.4
ESLNS4010-10	1	4	1.5	10	0.96	5	50	11.5	12.1	12.6	13	13.7
ESLNS4015-4	1.5	4	2.25	4	1.44	7.2	50	5.2	5.5	5.9	6.2	6.7
ESLNS4015-6	1.5	4	2.25	6	1.44	6	50	7.3	7.8	8.1	8.5	9.1
ESLNS4015-8	1.5	4	2.25	8	1.44	5.1	50	9.4	10	10.4	10.8	11.5
ESLNS4015-10	1.5	4	2.25	10	1.44	4.5	50	11.6	12.1	12.6	13	13.8
ESLNS4015-12	1.5	4	2.25	12	1.44	4	55	13.7	14.3	14.8	15.3	16.1
ESLNS4015-14	1.5	4	2.25	14	1.44	3.6	55	15.8	16.5	17	17.5	18.7
ESLNS4015-16	1.5	4	2.25	16	1.44	3.3	55	17.9	18.6	19.2	19.7	-
ESLNS4015-18	1.5	4	2.25	18	1.44	3	60	20	20.7	21.3	21.9	-
ESLNS4015-20	1.5	4	2.25	20	1.44	2.8	60	22	22.9	23.5	24.1	-
ESLNS4015-25	1.5	4	2.25	25	1.44	2.4	65	27.3	28.1	28.8	30	-
ESLNS4020-4	2	4	3	4	1.92	6.5	50	5.3	5.6	5.9	6.2	6.7
ESLNS4020-6	2	4	3	6	1.92	5.3	50	7.4	7.8	8.2	8.5	9.1
ESLNS4020-8	2	4	3	8	1.92	4.5	50	9.5	10	10.4	10.8	11.5
ESLNS4020-10	2	4	3	10	1.92	3.9	50	11.6	12.2	12.7	13.1	13.8
ESLNS4020-12	2	4	3	12	1.92	3.4	55	13.7	14.3	14.9	15.3	16.1
ESLNS4020-14	2	4	3	14	1.92	3.1	55	15.8	16.5	17	17.5	18.8
ESLNS4020-16	2	4	3	16	1.92	2.8	55	17.9	18.6	19.2	19.7	-
ESLNS4020-18	2	4	3	18	1.92	2.6	60	20	20.8	21.4	21.9	-
ESLNS4020-20	2	4	3	20	1.92	2.4	60	22.1	22.9	23.5	24.1	-
ESLNS4020-25	2	4	3	25	1.92	2	65	27.3	28.2	28.9	-	-
ESLNS4020-30	2	4	3	30	1.92	1.7	70	32.5	33.4	34.4	-	-
ESLNS4025-8	2.5	4	3.75	8	2.4	3.7	50	9.6	10.1	10.5	10.9	11.5
ESLNS4025-10	2.5	4	3.75	10	2.4	3.1	50	11.7	12.2	12.7	13.1	13.8
ESLNS4025-12	2.5	4	3.75	12	2.4	2.7	55	13.8	14.4	14.9	15.3	-
ESLNS4025-14	2.5	4	3.75	14	2.4	2.4	55	15.9	16.5	17.1	17.5	-
ESLNS4025-16	2.5	4	3.75	16	2.4	2.2	55	18	18.7	19.2	19.7	-
ESLNS4025-18	2.5	4	3.75	18	2.4	2	60	20.1	20.8	21.4	-	-
ESLNS4025-20	2.5	4	3.75	20	2.4	1.8	60	22.1	22.9	23.5	-	-
ESLNS4025-25	2.5	4	3.75	25	2.4	1.5	65	27.3	28.2	-	-	-
ESLNS4025-30	2.5	4	3.75	30	2.4	1.3	70	32.6	33.5	-	-	-
ESLNS4030-8	3	6	4.5	8	2.88	5.6	55	9.6	10.1	10.5	10.9	11.5
ESLNS4030-10	3	6	4.5	10	2.88	5	55	11.7	12.3	12.7	13.1	13.8

ESLNS40

4 Flutes long neck type flat endmill

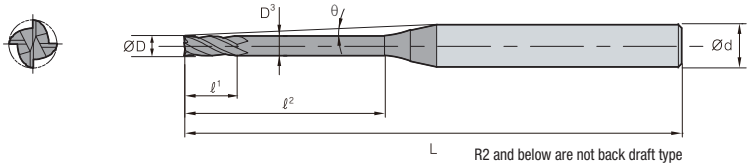


ULTRA FINE | 4 | 30° HELIX | AlTiN | DATA

p.433

• TOLERANCE

ØD		Ød
All sizes	0 ~ -0.012mm	h5



R2 and below are not back draft type

(mm)

Designation	Sizes(mm)							Effective length by inclination angle				
	ØD	Ød	ℓ¹	ℓ²	D³	θ	L	0.5°	1°	1.5°	2°	3°
ESLNS4030-12	3	6	4.5	12	2.88	4.5	60	13.8	14.4	14.9	15.4	16.3
ESLNS4030-14	3	6	4.5	14	2.88	4.1	60	15.9	16.6	17.1	17.6	18.9
ESLNS4030-16	3	6	4.5	16	2.88	3.7	60	18	18.7	19.3	19.8	21.6
ESLNS4030-18	3	6	4.5	18	2.88	3.4	60	20.1	20.8	21.4	21.9	24.2
ESLNS4030-20	3	6	4.5	20	2.88	3.2	65	22.2	23	23.6	24.2	26.9
ESLNS4030-25	3	6	4.5	25	2.88	2.7	70	27.4	28.2	28.9	30.2	-
ESLNS4030-30	3	6	4.5	30	2.88	2.4	75	32.6	33.5	34.5	36.2	-
ESLNS4030-35	3	6	4.5	35	2.88	2.1	80	37.7	38.7	40.2	42.2	-
ESLNS4030-40	3	6	4.5	40	2.88	1.9	90	42.9	43.9	45.9	-	-
ESLNS4040-12	4	6	6	12	3.85	3.4	60	13.9	14.5	15	15.4	16.3
ESLNS4040-16	4	6	6	16	3.85	2.8	60	18.1	18.8	19.3	19.8	-
ESLNS4040-20	4	6	6	20	3.85	2.3	70	22.3	23	23.6	24.3	-
ESLNS4040-25	4	6	6	25	3.85	2	70	27.4	28.3	28.9	-	-
ESLNS4040-30	4	6	6	30	3.85	1.7	80	32.6	33.5	34.6	-	-
ESLNS4040-35	4	6	6	35	3.85	1.5	80	37.8	38.8	-	-	-
ESLNS4040-40	4	6	6	40	3.85	1.3	90	42.9	44	-	-	-
ESLNS4040-45	4	6	6	45	3.85	1.2	90	48.1	49.4	-	-	-
ESLNS4040-50	4	6	6	50	3.85	1.1	100	53.2	54.8	-	-	-
ESLNS4050-16	5	6	7.5	16	4.85	1.5	60	18.1	18.8	-	-	-
ESLNS4050-20	5	6	7.5	20	4.85	1.3	60	22.3	23	-	-	-
ESLNS4050-25	5	6	7.5	25	4.85	1.1	70	27.4	28.3	-	-	-
ESLNS4050-30	5	6	7.5	30	4.85	0.9	70	32.6	-	-	-	-
ESLNS4050-35	5	6	7.5	35	4.85	0.8	80	37.8	-	-	-	-
ESLNS4050-40	5	6	7.5	40	4.85	0.7	90	42.9	-	-	-	-
ESLNS4050-50	5	6	7.5	50	4.85	0.6	100	53.2	-	-	-	-

※ The above specifications are subject to change without prior notice for product quality improvement.

• Applicable Workpiece

Carbon steel ~ HB225	Alloy steel HB225~325	Pre-hardened steel HRC30~50	Hardened steel		Copper	Graphite	Cast iron ~FCD500	Aluminum	Stainless steel
			SKD61~HRC55	SKD11 HRC55~63					
		○	◎	◎	○				

◎: Excellent ○: Good

H-Star Endmill

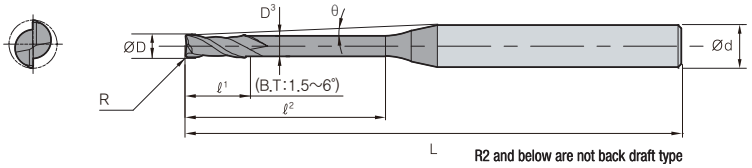
ESLNR

2 Flutes long neck type radius endmill

ULTRA FINE | 2 | 30° HELIX | R ±0.01 All sizes | AlTiN | DATA p.434~436

• TOLERANCE

ØD		Ød
All sizes	0 ~ -0.012mm	h5



R2 and below are not back draft type

(mm)

Designation	Sizes(mm)								Effective length by inclination angle				
	R	ØD	Ød	ℓ¹	ℓ²	D³	θ	L	0.5°	1°	1.5°	2°	3°
ESLNR2002-0.5-005	0.05	0.2	4	0.15	0.5	0.17	11.4	50	0.9	1	1	1.1	12
ESLNR2002-1-005	0.05	0.2	4	0.15	1	0.17	10.9	50	1.6	1.7	1.9	2	2.3
ESLNR2002-1.5-005	0.05	0.2	4	0.15	1.5	0.17	10.3	50	2.1	2.3	2.5	2.7	3
ESLNR2002-2-005	0.05	0.2	4	0.15	2	0.17	9.9	50	2.8	3.1	3.4	3.6	4.1
ESLNR2003-1-005	0.05	0.3	4	0.25	1	0.27	10.8	50	1.4	1.5	1.6	1.7	1.9
ESLNR2003-1.5-005	0.05	0.3	4	0.25	1.5	0.27	10.3	50	2.1	2.3	2.5	2.7	3
ESLNR2003-2.5-005	0.05	0.3	4	0.25	2.5	0.27	9.8	50	2.7	2.9	3.1	3.3	3.6
ESLNR2003-2-005	0.05	0.3	4	0.25	2	0.27	9.4	50	3.2	3.5	3.7	3.9	4.3
ESLNR2003-3-005	0.05	0.3	4	0.25	3	0.27	9	50	3.9	4.3	4.6	4.9	5.4
ESLNR2004-1-005	0.05	0.4	4	0.3	1	0.37	10.8	50	1.4	1.5	1.6	1.7	1.9
ESLNR2004-1.5-005	0.05	0.4	4	0.3	1.5	0.37	10.3	50	2	2.1	2.2	2.3	2.5
ESLNR2004-2-005	0.05	0.4	4	0.3	2	0.37	9.8	50	2.7	2.9	3.1	3.3	3.6
ESLNR2004-2.5-005	0.05	0.4	4	0.3	2.5	0.37	9.4	50	3.2	3.5	3.7	3.9	4.3
ESLNR2004-3-005	0.05	0.4	4	0.3	3	0.37	9	50	3.8	4	4.3	4.5	4.9
ESLNR2004-3.5-005	0.05	0.4	4	0.3	3.5	0.37	8.6	50	4.3	4.6	4.9	5.1	5.5
ESLNR2004-4-005	0.05	0.4	4	0.3	4	0.37	8.3	50	5	5.4	5.8	6.1	6.6
ESLNR2004-2-01	0.1	0.4	4	0.3	2	0.37	9.8	50	2.7	2.9	3.1	3.3	3.6
ESLNR2004-3-01	0.1	0.4	4	0.3	3	0.37	9	50	3.8	4	4.3	4.5	4.9
ESLNR2004-4-01	0.1	0.4	4	0.3	4	0.37	8.3	50	5	5.4	5.8	6.1	6.6
ESLNR2005-1-005	0.05	0.5	4	0.35	1	0.47	10.8	50	1.4	1.5	1.6	1.7	1.9
ESLNR2005-2-005	0.05	0.5	4	0.35	2	0.47	9.7	50	2.5	2.6	2.8	2.9	3.1
ESLNR2005-3-005	0.05	0.5	4	0.35	3	0.47	8.9	50	3.8	4	4.3	4.5	4.9
ESLNR2005-4-005	0.05	0.5	4	0.35	4	0.47	8.2	50	4.8	5.2	5.4	5.7	6.1
ESLNR2005-5-005	0.05	0.5	4	0.35	5	0.47	7.6	50	6.1	6.6	6.9	7.3	7.8
ESLNR2005-6-005	0.05	0.5	4	0.35	6	0.47	7	50	7.2	7.7	8.1	8.4	9
ESLNR2005-1-01	0.1	0.5	4	0.35	1	0.47	10.8	50	1.4	1.5	1.6	1.7	1.9
ESLNR2005-2-01	0.1	0.5	4	0.35	2	0.47	9.8	50	2.5	2.6	2.8	2.9	3.1
ESLNR2005-3-01	0.1	0.5	4	0.35	3	0.47	8.9	50	3.8	4	4.3	4.5	4.9
ESLNR2005-4-01	0.1	0.5	4	0.35	4	0.47	8.2	50	4.8	5.2	5.4	5.7	6.1
ESLNR2005-5-01	0.1	0.5	4	0.35	5	0.47	7.6	50	6.1	6.5	6.9	7.2	7.8
ESLNR2005-6-01	0.1	0.5	4	0.35	6	0.47	7.1	50	7.2	7.7	8.1	8.4	9
ESLNR2006-2-01	0.1	0.6	4	0.4	2	0.57	9.7	50	2.5	2.6	2.8	2.9	3.1
ESLNR2006-4-01	0.1	0.6	4	0.4	4	0.57	8.1	50	4.8	5.2	5.4	5.7	6.1
ESLNR2006-6-01	0.1	0.6	4	0.4	6	0.57	7	50	7.2	7.7	8.1	8.4	9

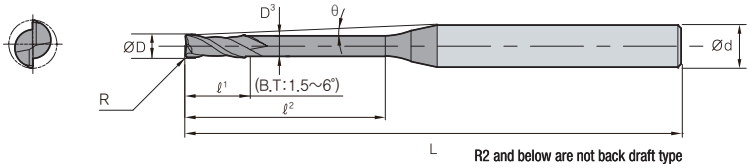
ESLNR

2 Flutes long neck type radius endmill

ULTRA FINE | 2 | 30° HELIX | R ±0.01 All sizes | AlTiN | DATA p.434~436

• TOLERANCE

ØD		Ød
All sizes	0 ~ -0.012mm	h5



R2 and below are not back draft type

(mm)

Designation	Sizes(mm)								Effective length by inclination angle				
	R	ØD	Ød	ℓ1	ℓ2	D3	θ	L	0.5°	1°	1.5°	2°	3°
ESLNR2006-8-01	0.1	0.6	4	0.4	8	0.57	6.1	50	9.3	9.9	10.3	10.7	11
ESLNR2006-10-01	0.1	0.6	4	0.4	10	0.57	5.5	50	11.5	12.1	12.5	13	13.7
ESLNR2008-4-01	0.1	0.8	4	0.5	4	4	8	50	4.8	5.2	5.4	5.7	6.1
ESLNR2008-6-01	0.1	0.8	4	0.5	6	6	6.8	50	7	7.4	7.7	7.9	8.4
ESLNR2008-8-01	0.1	0.8	4	0.5	8	8	5.9	50	9.3	9.9	10.3	10.7	11.4
ESLNR2008-12-01	0.1	0.8	4	0.5	12	12	4.7	50	13.6	14.2	14.7	15.2	16
ESLNR2008-4-02	0.2	0.8	4	0.5	4	4	8	50	4.8	5.1	5.4	5.6	6.1
ESLNR2008-6-02	0.2	0.8	4	0.5	6	6	6.9	50	7	7.3	7.7	7.9	8.4
ESLNR2010-4-01	0.1	1	4	0.8	4	0.94	7.7	50	4.7	4.9	5.1	5.2	5.5
ESLNR2010-6-01	0.1	1	4	0.8	6	0.94	6.6	50	7.1	7.4	7.7	8	8.5
ESLNR2010-8-01	0.1	1	4	0.8	8	0.94	5.7	50	9.2	9.6	9.9	10.2	10.8
ESLNR2010-10-01	0.1	1	4	0.8	10	0.94	5.1	50	11.6	12.1	12.6	13	13.7
ESLNR2010-12-01	0.1	1	4	0.8	12	0.94	4.5	55	13.7	14.3	14.8	15.3	16
ESLNR2010-16-01	0.1	1	4	0.8	16	0.94	3.8	60	17.9	18.6	19.2	19.7	21.3
ESLNR2010-20-01	0.1	1	4	0.8	20	0.94	3.2	60	22	22.8	23.5	24	26.7
ESLNR2010-4-02	0.2	1	4	0.8	4	0.94	7.8	50	4.7	4.9	5.1	5.2	5.5
ESLNR2010-6-02	0.2	1	4	0.8	6	0.94	6.6	50	7.1	7.4	7.7	8	8.5
ESLNR2010-8-02	0.2	1	4	0.8	8	0.94	5.8	50	9.2	9.6	9.9	10.2	10.8
ESLNR2010-10-02	0.2	1	4	0.8	10	0.94	5.1	50	11.6	12.1	12.6	13	13.7
ESLNR2010-12-02	0.2	1	4	0.8	12	0.94	4.6	55	13.7	14.3	14.8	15.2	16
ESLNR2010-16-02	0.2	1	4	0.8	16	0.94	3.8	60	17.9	18.6	19.2	19.7	21.3
ESLNR2010-20-02	0.2	1	4	0.8	20	0.94	3.2	60	22	22.8	23.5	24	26.6
ESLNR2010-6-03	0.3	1	4	0.8	6	0.94	6.7	50	7.1	7.4	7.7	8	8.4
ESLNR2010-10-03	0.3	1	4	0.8	10	0.94	5.1	50	11.5	12.1	12.6	13	13.7
ESLNR2010-16-03	0.3	1	4	0.8	16	0.94	3.8	60	17.9	18.6	19.1	19.6	21.3
ESLNR2010-20-03	0.3	1	4	0.8	20	0.94	3.2	60	22	22.8	23.5	24	26.6
ESLNR2015-4-01	0.1	1.5	4	1.35	4	1.42	7.2	50	4.8	4.9	5.1	5.3	5.5
ESLNR2015-8-01	0.1	1.5	4	1.35	8	1.42	5.2	50	9.2	9.6	10	10.3	10.8
ESLNR2015-12-01	0.1	1.5	4	1.35	12	1.42	4	55	13.4	13.9	14.3	14.7	16.1
ESLNR2015-15-01	0.1	1.5	4	1.35	15	1.42	3.5	55	16.9	17.6	18.1	18.6	20.1
ESLNR2015-20-01	0.1	1.5	4	1.35	20	1.42	2.8	60	22.1	22.9	23.5	24.1	-
ESLNR2015-4-02	0.2	1.5	4	1.35	4	1.42	7.3	50	4.7	4.9	5.1	5.3	5.5
ESLNR2015-8-02	0.2	1.5	4	1.35	8	1.42	5.2	50	9.2	9.6	10	10.3	10.8
ESLNR2015-12-02	0.2	1.5	4	1.35	12	1.42	4.1	55	13.4	13.9	14.3	14.7	16.1

H-Star Endmill

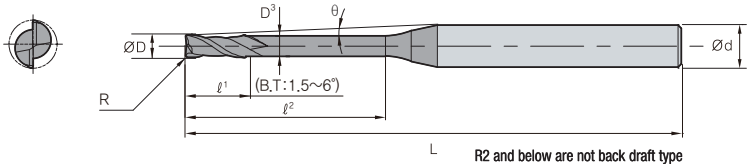
ESLNR

2 Flutes long neck type radius endmill

ULTRA FINE | 2 | 30° HELIX | R ±0.01 (All sizes) | AlTiN | DATA (p.434~436)

• TOLERANCE

ØD		Ød
All sizes	0 ~ -0.012mm	h5



R2 and below are not back draft type

(mm)

Designation	Sizes(mm)								Effective length by inclination angle				
	R	ØD	Ød	ℓ¹	ℓ²	D³	θ	L	0.5°	1°	1.5°	2°	3°
ESLNR2015-15-02	0.2	1.5	4	1.35	15	1.42	3.5	55	16.9	17.5	18.1	18.6	20
ESLNR2015-20-02	0.2	1.5	4	1.35	20	1.42	2.8	60	22.1	22.9	23.5	24.1	-
ESLNR2015-8-03	0.3	1.5	4	1.35	8	1.42	5.2	50	9.2	9.6	10	10.3	10.8
ESLNR2015-15-03	0.3	1.5	4	1.35	15	1.42	3.5	55	16.9	17.5	18.1	18.6	20
ESLNR2015-20-03	0.3	1.5	4	1.35	20	1.42	2.8	60	22.1	22.9	23.5	24	-
ESLNR2020-6-02	0.2	2	4	1.7	6	1.92	5.4	50	6.8	7.1	7.3	7.5	8.1
ESLNR2020-8-02	0.2	2	4	1.7	8	1.92	4.6	50	8.9	9.2	9.4	9.7	10.8
ESLNR2020-12-02	0.2	2	4	1.7	12	1.92	3.5	55	13.4	13.9	14.3	14.7	16.1
ESLNR2020-16-02	0.2	2	4	1.7	16	1.92	2.8	55	17.6	18.1	18.6	19.3	-
ESLNR2020-20-02	0.2	2	4	1.7	20	1.92	2.4	60	22.1	22.9	23.5	24.1	-
ESLNR2020-25-02	0.2	2	4	1.7	25	1.92	2	65	27.3	28.2	28.8	-	-
ESLNR2020-30-02	0.2	2	4	1.7	30	1.92	1.7	70	32.5	33.4	34.4	-	-
ESLNR2020-8-03	0.3	2	4	1.7	8	1.92	4.6	50	8.9	9.2	9.4	9.7	10.7
ESLNR2020-16-03	0.3	2	4	1.7	16	1.92	2.8	55	17.6	18.1	18.6	19.3	-
ESLNR2020-20-03	0.3	2	4	1.7	20	1.92	2.4	60	22.1	22.9	23.5	24	-
ESLNR2020-6-05	0.5	2	4	1.7	6	1.92	5.5	50	6.8	7.1	7.3	7.4	8
ESLNR2020-8-05	0.5	2	4	1.7	8	1.92	4.7	50	8.9	9.2	9.4	9.6	10.7
ESLNR2020-12-05	0.5	2	4	1.7	12	1.92	3.5	55	13.4	13.9	14.3	14.6	16
ESLNR2020-16-05	0.5	2	4	1.7	16	1.92	2.9	55	17.6	18.1	18.6	19.2	-
ESLNR2020-20-05	0.5	2	4	1.7	20	1.92	2.4	60	22.1	22.9	23.5	24	-
ESLNR2020-25-05	0.5	2	4	1.7	25	1.92	2	65	27.3	28.1	28.8	-	-
ESLNR2020-30-05	0.5	2	4	1.7	30	1.92	1.7	70	32.5	33.4	34.3	-	-
ESLNR2020-8-08	0.8	2	4	1.7	8	1.92	4.8	50	8.9	9.2	9.4	9.6	10.6
ESLNR2020-16-08	0.8	2	4	1.7	16	1.92	2.9	55	17.6	18.1	18.6	19.2	-
ESLNR2020-20-08	0.8	2	4	1.7	20	1.92	2.4	60	22.1	22.8	23.5	24	-
ESLNR2030-8-02	0.2	3	6	2.5	8	2.86	5.7	55	9	9.3	9.5	9.9	10.9
ESLNR2030-12-02	0.2	3	6	2.5	12	2.86	4.5	60	13.1	13.5	14	14.7	16.2
ESLNR2030-16-02	0.2	3	6	2.5	16	2.86	3.8	60	17.7	18.2	18.7	19.5	21.6
ESLNR2030-20-02	0.2	3	6	2.5	20	2.86	3.2	65	21.8	22.4	23.1	24.2	26.9
ESLNR2030-30-02	0.2	3	6	2.5	30	2.86	2.4	75	32.6	33.5	34.5	36.2	-
ESLNR2030-35-02	0.2	3	6	2.5	35	2.86	2.1	80	37.7	38.7	40.2	42.2	-
ESLNR2030-8-03	0.3	3	6	2.5	8	2.86	5.7	55	9	9.3	9.5	9.9	10.9
ESLNR2030-16-03	0.3	3	6	2.5	16	2.86	3.8	60	17.7	18.2	18.7	19.4	21.5
ESLNR2030-20-03	0.3	3	6	2.5	20	2.86	3.2	65	21.8	22.4	23.1	24.2	26.8

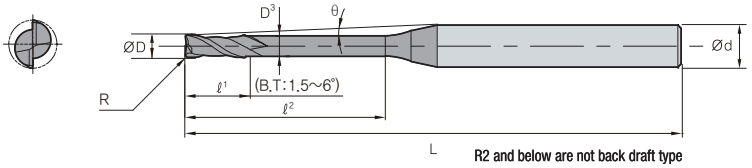
ESLNR

2 Flutes long neck type radius endmill

ULTRA FINE | 2 | 30° HELIX | R ±0.01 (All sizes) | AlTiN | DATA p.434~436

• TOLERANCE

ØD		Ød
All sizes	0 ~ -0.012mm	h5

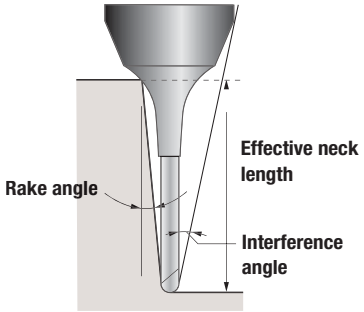


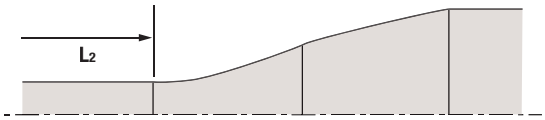
R2 and below are not back draft type

(mm)

Designation	Sizes(mm)								Effective length by inclination angle				
	R	ØD	Ød	ℓ1	ℓ2	D3	θ	L	0.5°	1°	1.5°	2°	3°
ESLNR2030-30-03	0.3	3	6	2.5	30	2.86	2.4	75	32.6	33.5	34.5	36.2	-
ESLNR2030-8-05	0.5	3	6	2.5	8	2.86	5.8	55	9	9.3	9.5	9.8	10.8
ESLNR2030-12-05	0.5	3	6	2.5	12	2.86	4.6	60	13.1	13.5	13.9	14.6	16.2
ESLNR2030-16-05	0.5	3	6	2.5	16	2.86	3.8	60	17.7	18.2	18.7	19.4	21.5
ESLNR2030-20-05	0.5	3	6	2.5	20	2.86	3.2	65	21.8	22.4	23.1	24.2	26.8
ESLNR2030-30-05	0.5	3	6	2.5	30	2.86	2.4	75	32.6	33.5	34.5	36.1	-
ESLNR2030-35-05	0.5	3	6	2.5	35	2.86	2.1	80	37.7	38.7	40.2	42.1	-

※ The above specifications are subject to change without prior notice for product quality improvement.





※ The marked effective neck length is the default value to prevent interference with the workpiece.
Proper control of the processing environment is required.

• Applicable Workpiece

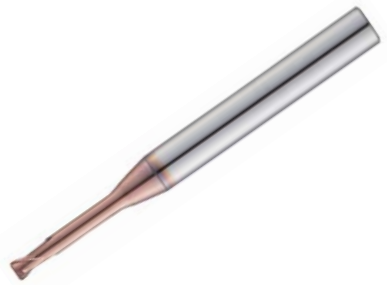
Carbon steel ~ HB225	Alloy steel HB225~325	Pre-hardened steel HRC30~50	Hardened steel		Copper	Graphite	Cast iron ~FCD500	Aluminum	Stainless steel
			SKD61~HRC55	SKD11 HRC55~63					
		○	◎	◎	○				

◎: Excellent ○: Good

H-Star Endmill

ESTNR

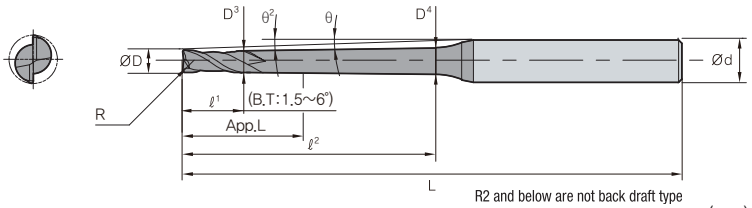
2 Flutes tapered neck type radius endmill



ULTRA FINE | 2 | 30° HELIX | R ±0.01 (All sizes) | AlTiN | DATA (p.437~438)

• TOLERANCE

ØD		Ød
All sizes	0 ~ -0.015mm	h5



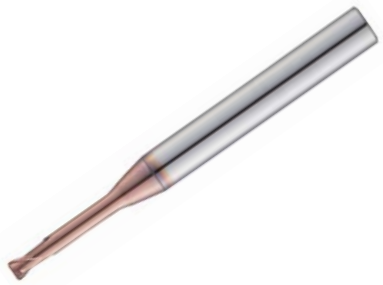
R2 and below are not back draft type

(mm)

Designation	Sizes(mm)											Effective length by inclination angle				
	R	ØD	Ød	ℓ1	ℓ2	θ	D3	D4	App. L	θ2	L	0.5°	1°	1.5°	2°	3°
ESTNR2002-2-09005	0.05	0.2	4	0.15	2	0.9	0.17	0.23	1.1	10	50	-	2.8	3.1	3.4	3.9
ESTNR2004-4-09005	0.05	0.4	4	0.3	4	0.9	0.37	0.49	1.25	8.4	50	-	4.9	5.3	5.7	6.3
ESTNR2004-5-09005	0.05	0.4	4	0.3	5	0.9	0.37	0.52	1.25	7.8	50	-	5.9	6.4	6.8	7.5
ESTNR2004-4-0901	0.1	0.4	4	0.3	4	0.9	0.37	0.49	1.25	8.5	50	-	4.9	5.3	5.7	6.3
ESTNR2004-5-0901	0.1	0.4	4	0.3	5	0.9	0.37	0.52	1.25	7.9	50	-	5.9	6.4	6.8	7.5
ESTNR2005-5-0901	0.1	0.5	4	0.35	5	0.9	0.47	0.62	1.3	7.8	50	-	5.9	6.4	6.8	7.5
ESTNR2005-8-0901	0.1	0.5	4	0.35	8	0.9	0.47	0.71	1.3	6.4	50	-	9	9.7	10.2	11
ESTNR2005-10-0901	0.1	0.5	4	0.35	10	0.9	0.47	0.77	1.3	5.8	55	-	11	11.8	12.4	13.2
ESTNR2006-12-0901	0.1	0.6	4	0.4	12	0.9	0.57	0.93	1.35	5.1	55	-	13	13.9	14.5	15.5
ESTNR2006-15-0901	0.1	0.6	4	0.4	15	0.9	0.57	13	1.35	4.5	55	-	16.1	17.1	17.8	18.8
ESTNR2008-6-0402	0.2	0.8	4	0.5	6	0.4	0.77	0.85	2.64	7	50	6.6	7.1	7.5	7.8	8.3
ESTNR2008-12-0902	0.2	0.8	4	0.5	12	0.9	0.77	1.13	1.45	5	55	-	13	13.9	14.5	15.5
ESTNR2010-8-0402	0.2	1	6	0.8	8	0.4	0.94	14	5.09	7.4	55	8.8	9.3	9.7	10.1	10.6
ESTNR2010-10-0902	0.2	1	6	0.8	10	0.9	0.94	1.23	5.09	6.8	55	-	11.2	11.9	12.4	13.3
ESTNR2010-15-0902	0.2	1	6	0.8	15	0.9	0.94	1.39	2.7	5.6	60	-	16.3	17.2	17.8	18.8
ESTNR2010-20-0902	0.2	1	6	0.8	20	0.9	0.94	1.54	2.7	4.8	65	-	21.3	22.4	23.2	24.7
ESTNR2010-25-0902	0.2	1	6	0.8	25	0.9	0.94	1.7	2.7	4.1	70	-	26.4	27.6	28.5	30.9
ESTNR2010-30-0902	0.2	1	6	0.8	30	0.9	0.94	1.86	2.7	3.7	75	-	31.5	32.8	33.7	37
ESTNR2010-35-0902	0.2	1	6	0.8	35	0.9	0.94	22	2.7	3.3	80	-	36.5	38	39	43.2
ESTNR2010-8-0403	0.3	1	6	0.8	8	0.4	0.94	14	2.7	7.4	55	8.8	9.3	9.7	10	10.6
ESTNR2010-15-0903	0.3	1	6	0.8	15	0.9	0.94	1.39	2.7	5.6	60	-	16.3	17.2	17.8	18.8
ESTNR2010-25-0903	0.3	1	6	0.8	25	0.9	0.94	1.7	2.7	4.2	70	-	26.4	27.6	28.5	30.8
ESTNR2010-30-0903	0.3	1	6	0.8	30	0.9	0.94	1.86	2.7	3.7	75	-	31.5	32.8	33.7	37
ESTNR2015-10-0402	0.2	1.5	6	1.35	10	0.4	1.42	1.54	7.07	6.4	55	11	11.5	11.9	12.3	13
ESTNR2015-15-0902	0.2	1.5	6	1.35	15	0.9	1.42	1.85	7.07	5.3	60	-	16.4	17.3	17.9	18.9
ESTNR2015-20-0902	0.2	1.5	6	1.35	20	0.9	1.42	21	3.89	4.5	65	-	21.5	22.5	23.2	24.9
ESTNR2015-25-0902	0.2	1.5	6	1.35	25	0.9	1.42	2.16	3.89	3.9	70	-	26.6	27.7	28.5	31
ESTNR2015-30-0902	0.2	1.5	6	1.35	30	0.9	1.42	2.32	3.89	3.4	75	-	31.6	32.9	33.8	37.1
ESTNR2015-10-0403	0.3	1.5	6	1.35	10	0.4	1.42	1.54	3.89	6.4	55	11	11.5	11.9	12.3	13
ESTNR2015-20-0903	0.3	1.5	6	1.35	20	0.9	1.42	21	3.89	4.5	65	-	21.5	22.5	23.2	24.8
ESTNR2015-25-0903	0.3	1.5	6	1.35	25	0.9	1.42	2.16	3.89	3.9	70	-	26.5	27.7	28.5	31
ESTNR2015-30-0903	0.3	1.5	6	1.35	30	0.9	1.42	2.32	3.89	3.4	75	-	31.6	32.9	33.8	37.1
ESTNR2020-30-0902	0.2	2	6	1.7	30	0.9	1.92	2.81	7.42	3.1	70	-	31.6	32.9	33.8	37.2
ESTNR2020-40-0902	0.2	2	6	1.7	40	0.9	1.92	3.12	7.42	2.5	80	-	41.8	43.3	44.6	-
ESTNR2020-50-0902	0.2	2	6	1.7	50	0.9	1.92	3.44	7.42	2.1	90	-	51.9	53.6	55.7	-
ESTNR2020-12-0403	0.3	2	6	1.7	12	0.4	1.92	2.06	7.42	5.5	55	13	13.6	14.1	14.5	15.6
ESTNR2020-20-0903	0.3	2	6	1.7	20	0.9	1.92	2.5	4.24	4.1	65	-	21.5	22.5	23.2	24.9
ESTNR2020-30-0903	0.3	2	6	1.7	30	0.9	1.92	2.81	4.24	3.1	70	-	31.6	32.9	33.8	37.1

ESTNR

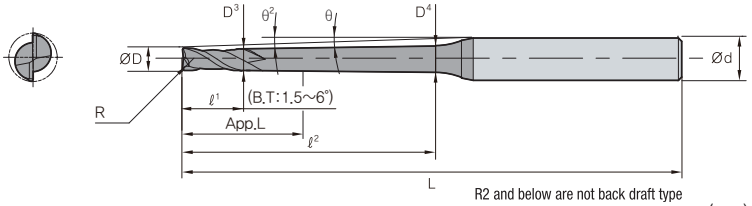
2 Flutes tapered neck type radius endmill



ULTRA FINE | 2 | 30° HELIX | R ±0.01 (All sizes) | AlTiN | DATA p.437~438

• TOLERANCE

ØD		Ød
All sizes	0 ~ -0.015mm	h5

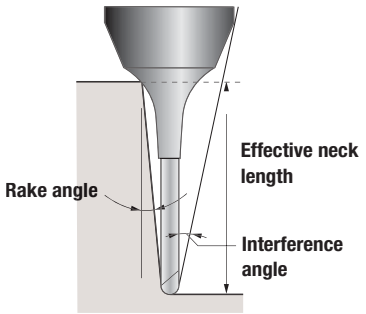


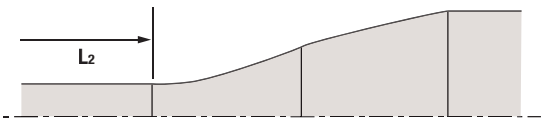
R2 and below are not back draft type

(mm)

Designation	Sizes(mm)											Effective length by inclination angle				
	R	ØD	Ød	ℓ1	ℓ2	θ	D3	D4	App. L	θ2	L	0.5°	1°	1.5°	2°	3°
ESTNR2020-40-0903	0.3	2	6	1.7	40	0.9	1.92	3.12	4.24	2.5	80	-	41.7	43.3	44.6	-
ESTNR2020-50-0903	0.3	2	6	1.7	50	0.9	1.92	3.44	4.24	2.1	90	-	51.8	53.6	55.7	-
ESTNR2020-8-0405	0.5	2	6	1.7	8	0.4	1.92	2.01	4.24	6.8	50	8.7	9	9.3	9.5	10.4
ESTNR2020-12-0405	0.5	2	6	1.7	12	0.4	1.92	2.06	4.24	5.6	55	13	13.6	14.1	14.4	15.5
ESTNR2020-16-0405	0.5	2	6	1.7	16	0.4	1.92	2.12	4.24	4.7	60	17	17.8	18.3	18.7	20.7
ESTNR2020-20-0905	0.5	2	6	1.7	20	0.9	1.92	2.5	4.24	4.2	65	-	21.5	22.5	23.2	24.8
ESTNR2020-25-0905	0.5	2	6	1.7	25	0.9	1.92	2.65	4.24	3.6	65	-	26.6	27.7	28.5	30.9
ESTNR2020-30-0905	0.5	2	6	1.7	30	0.9	1.92	2.81	4.24	3.1	70	-	31.6	32.9	33.8	37.1
ESTNR2020-40-0905	0.5	2	6	1.7	40	0.9	1.92	3.12	4.24	2.5	80	-	41.7	43.2	44.6	-
ESTNR2020-50-0905	0.5	2	6	1.7	50	0.9	1.92	3.44	4.24	2.1	90	-	51.8	53.6	55.6	-
ESTNR2030-40-0902	0.2	3	6	2.5	40	0.9	2.86	4.04	6.95	2	80	-	42	43.4	-	-
ESTNR2030-50-0902	0.2	3	6	2.5	50	0.9	2.86	4.35	6.95	1.6	90	-	52.1	53.7	-	-
ESTNR2030-60-0902	0.2	3	6	2.5	60	0.9	2.86	4.67	6.95	1.4	100	-	62.2	-	-	-
ESTNR2030-40-0903	0.3	3	6	2.5	40	0.9	2.86	4.04	6.95	2	80	-	42	43.4	-	-
ESTNR2030-50-0903	0.3	3	6	2.5	50	0.9	2.86	4.35	6.95	1.7	90	-	52.1	53.7	-	-
ESTNR2030-60-0903	0.3	3	6	2.5	60	0.9	2.86	4.67	6.95	1.4	100	-	62.2	-	-	-
ESTNR2030-40-0905	0.5	3	6	2.5	40	0.9	2.86	4.04	6.95	2	80	-	42	43.4	-	-
ESTNR2030-50-0905	0.5	3	6	2.5	50	0.9	2.86	4.35	6.95	1.7	90	-	52.1	53.7	-	-
ESTNR2030-60-0905	0.5	3	6	2.5	60	0.9	2.86	4.67	6.95	1.4	100	-	62.1	-	-	-

※ The above specifications are subject to change without prior notice for product quality improvement.





※ The marked effective neck length is the default value to prevent interference with the workpiece.
Proper control of the processing environment is required.

• Applicable Workpiece

Carbon steel ~ HB225	Alloy steel HB225~325	Pre-hardened steel HRC30~50	Hardened steel		Copper	Graphite	Cast iron ~FCD500	Aluminum	Stainless steel
			SKD61~HRC55	SKD11 HRC55~63					
		○	◎	◎	○				

◎: Excellent ○: Good

H-Star Endmill

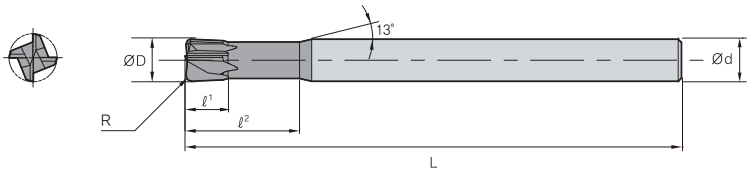
ESPM4

4 Flutes neck type radius endmill

ULTRA FINE | 4 | 0° HELIX | R ±0.015 All sizes | AlTiN | DATA p.439

• TOLERANCE

ØD		Ød
All sizes	0 ~ -0.02mm	h5



(mm)

Designation	R	ØD	Ød	ℓ1	ℓ2	L
ESPM4030-05	0.5	3	6	1.2	8	50
ESPM4040-05	0.5	4	6	1.5	10	50
ESPM4060-05	0.5	6	6	2.5	12	60
ESPM4060-10	1	6	6	2.5	12	60
ESPM4060-15	1.5	6	6	2.5	12	60
ESPM4060-15L	1.5	6	6	2.5	12	90
ESPM4080-10	1	8	8	3.5	16	60
ESPM4080-20	2	8	8	3.5	16	60
ESPM4080-20L	2	8	8	3.5	16	100
ESPM4100-10	1	10	10	4	20	70
ESPM4100-20	2	10	10	4	20	70
ESPM4100-20L	2	10	10	4	20	100
ESPM4120-20	2	12	12	5	25	80
ESPM4120-30	3	12	12	5	25	80
ESPM4120-30L	3	12	12	5	25	110

※ The above specifications are subject to change without prior notice for product quality improvement.

• **Applicable Workpiece**

Carbon steel ~ HB225	Alloy steel HB225~325	Pre-hardened steel HRC30~50	Hardened steel		Copper	Graphite	Cast iron ~FCD500	Aluminum	Stainless steel
			SKD61~HRC55	SKD11 HRC55~63					
		○	◎	◎	○				

◎: Excellent ○: Good

For mold & die

U-Star Endmill

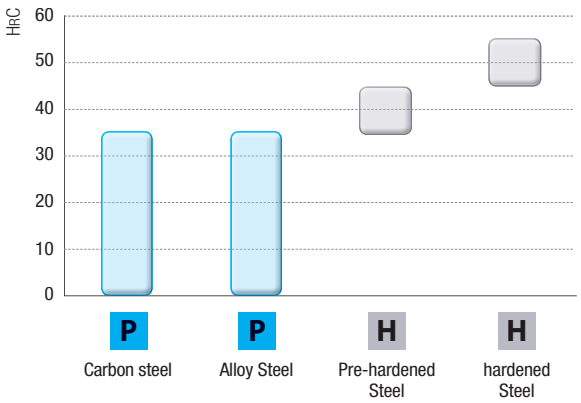
- Suitable for mid-high hardness steel (HRC30 ~ 55); Alloy steel, Carbon steel, Mold steel etc.
- Various shape and specification; Miniature type, Taper neck type, Sphere ball nose type etc.

Features

- Wide machining range for mold machining; Rough, Semi-finishing and finishing. Curved, Sloped surface and special shape.
- Improved chipping resistance and high hardness by using high toughness materials
- W coating for enhanced oxidation resistance and high hardness cutting edge

• R machining available on bottom surface by applying double radius shape on tool corner and end face.

[Applications]



Code system

W R 5 1 2 - 030 - 10 - 26

Type
W: U-Star Endmill
WHP: U-Star Endmill High Precision

Appearance
B: Ball type
SB: Straight Ball type
R: Radius type
DR: Double radius type
XR: Radius type (Unequal Division)
SPM: Speed Power Mill
ME: Miniature type
F: Roughing
TE: Tapered type
TB: Tapered Ball type
TR: Tapered Radius type
XE: Square type (Unequal Division)

Grade
5: Grade
9: High Precision Grade

Length, Shank type
0 : Straight
1 : Neck
4 : Tapered Neck

No. of flutes
2 : 2 Flutes
3 : 3 Flutes
4 : 4 Flutes
4H : 4 Flutes (Helix 45°)

Cutting dia.
0.03 ~ 25

Corner radius
0.05 ~ 2

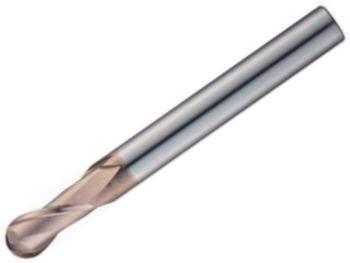
Effective length
0.2 ~ 100

U-Star Endmill

EDP. NO	Appearance	Type	Range	Page
WHPB902		2 Flutes ultra high precision ball nose endmill	Ø0.1 ~ 12.0	109
WB502		2 Flutes ball nose endmill	Ø0.1 ~ 25.0	110 ~ 111
WB502-P		2 Flutes high precision ball nose endmill	Ø0.1 ~ 12.0	112
WSB502		2 Flutes straight helix ball nose endmill	Ø3.0 ~ 20.0	113
WB503		3 Flutes ball nose endmill	Ø1.0 ~ 12.0	114
WB504		4 Flutes ball nose endmill	Ø1.0 ~ 12.0	115
WB532		2 Flutes sphere type ball nose endmill	Ø3.0 ~ 12.0	116
WB542		4 Flutes ball nose endmill	Ø0.1 ~ 12.0	117 ~ 122
WME502		2 Flutes miniature type flat endmill	Ø0.1 ~ 25.0	123
WE502		2 Flutes flat endmill	Ø0.1 ~ 20.0	124 ~ 125
WE502-S3		2 Flutes flat endmill	Ø0.1 ~ 3.0	126
WE514		4 Flutes neck type flat endmill	Ø1.0 ~ 12.0	127 ~ 128
WE522		2 Flutes long shank flat endmill	Ø1.0 ~ 25.0	129 ~ 130
WE524		4 Flutes long shank flat endmill	Ø1.0 ~ 25.0	131 ~ 132
WME504		4 Flutes variable helix flat endmill	Ø0.8 ~ 25.0	133
WXE504		4 Flutes variable helix flat endmill	Ø1.0 ~ 20.0	134
WE504H		4 Flutes 45° helix flat endmill	Ø1.0 ~ 20.0	135
WE506		6 Flutes 45° helix flat endmill	Ø6.0 ~ 20.0	136
WR502		2 Flutes radius endmill	Ø0.2 ~ 20.0	137 ~ 139
WR504		4 Flutes radius endmill	Ø3.0 ~ 20.0	140
WR506		6 Flutes 45° helix radius endmill	Ø6.0 ~ 20.0	141
WR512		2 Flutes neck type radius endmill	Ø0.2 ~ 20.0	142 ~ 147
WR514		4 Flutes neck type radius endmill	Ø6.0 ~ 12.0	148
WXR504		4 Flutes variable helix radius endmill	Ø1.0 ~ 20.0	149 ~ 150
WXR514		4 Flutes variable helix radius endmill	Ø1.0 ~ 20.0	151 ~ 155
WR542		2 Flutes tapered neck type radius endmill	Ø0.2 ~ 4.0	156 ~ 160
WR544		4 Flutes tapered neck type radius endmill	Ø1.0 ~ 4.0	161 ~ 164
WSPM4		4 Flutes 10° helix radius endmill	Ø1.0 ~ 20.0	165
WDR503		3 Flutes double corner radius endmill	Ø6.0 ~ 20.0	166
WF60		3~5 Flutes variable helix roughing endmill	Ø3.0 ~ 25.0	167
WF61		3~5 Flutes roughing endmill	Ø3.0 ~ 25.0	168
WTB502		2 Flutes tapered ball nose endmill	Ø0.3 ~ 2.0	169
WTE502		2 Flutes tapered flat endmill	Ø4.0 ~ 25.0	170 ~ 171
WTE504		4 Flutes tapered flat endmill	Ø6.0 ~ 25.0	172
WTE514		4 Flutes tapered flat endmill	Ø4.0 ~ 2.5	173 ~ 175
WTR504		4 Flutes tapered radius endmill	Ø0.8 ~ 2.5	176 ~ 179

WHPB902

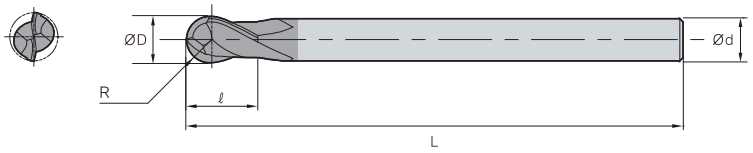
2 Flutes ultra high precision ball nose endmill



ULTRA FINE | 2 | 30° HELIX | R ±0.0015 (R1.5 or Under) | R ±0.0025 (Above R1.5 / R3 or Under) | R ±0.004 (Above R3) | W | DATA p.440

• TOLERANCE

ØD		Ød
Ø0.1 ~ Ø6	0 ~ -0.012mm	h6
Ø8 ~ Ø12	0 ~ -0.015mm	



(mm)

Designation	R	ØD	Ød	ℓ	L
WHPB902 001	0.05	0.1	4	0.2	40
WHPB902 0015	0.075	0.15	4	0.3	40
WHPB902 002	0.1	0.2	4	0.4	40
WHPB902 003	0.15	0.3	4	0.6	40
WHPB902 004	0.2	0.4	4	0.8	40
WHPB902 005	0.25	0.5	4	1	40
WHPB902 006	0.3	0.6	4	1.2	40
WHPB902 007	0.35	0.7	4	1.4	40
WHPB902 008	0.4	0.8	4	1.6	40
WHPB902 009	0.45	0.9	4	1.8	40
WHPB902 010	0.5	1	6	2.5	50
WHPB902 012	0.6	1.2	6	3	50
WHPB902 015	0.75	1.5	6	4	50
WHPB902 020	1	2	6	5	50
WHPB902 025	1.25	2.5	6	6	60
WHPB902 030	1.5	3	6	6	60
WHPB902 040	2	4	6	8	70
WHPB902 050	2.5	5	6	10	80
WHPB902 060	3	6	6	12	90
WHPB902 080	4	8	8	14	100
WHPB902 100	5	10	10	18	100
WHPB902 120	6	12	12	24	110

※ The above specifications are subject to change without prior notice for product quality improvement.

• Applicable Workpiece

Carbon steel ~ HB225	Alloy steel HB225~325	Pre-hardened steel HRC30~50	Hardened steel		Copper	Graphite	Cast iron ~FCD500	Aluminum	Stainless steel
			SKD61~HRC55	SKD11 HRC55~63					
○	○	◎	○				○		○

◎: Excellent ○: Good

U-Star Endmill

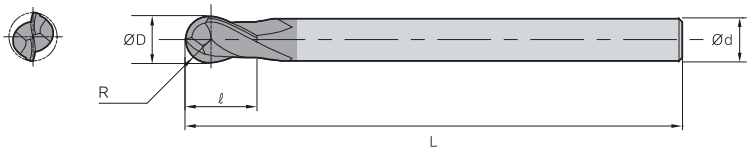
WB502

2 Flutes ball nose endmill

ULTRA FINE | 2 | 30° HELIX | R ±0.005 R3 or Under | R ±0.01 Above R3 | W | DATA p.441

• TOLERANCE

ØD		Ød
Ø1 ~ Ø6	0 ~ -0.012mm	h6
Ø6.5 ~ Ø25	0 ~ -0.015mm	



(mm)

Designation	R	ØD	Ød	ℓ	L
WB502 001S	0.05	0.1	4	0.1	40
WB502 001	0.05	0.1	4	0.2	40
WB502 001 S3	0.05	0.1	3	0.2	40
WB502 0015S	0.075	0.15	4	0.15	40
WB502 0015	0.075	0.15	4	0.3	40
WB502 0015 S3	0.075	0.15	3	0.3	40
WB502 002S	0.1	0.2	4	0.2	40
WB502 002	0.1	0.2	4	0.4	40
WB502 002 S3	0.1	0.2	3	0.4	40
WB502 003S	0.15	0.3	4	0.3	40
WB502 003	0.15	0.3	4	0.6	40
WB502 003 S3	0.15	0.3	3	0.6	40
WB502 004S	0.2	0.4	4	0.4	40
WB502 004	0.2	0.4	4	0.8	40
WB502 004 S3	0.2	0.4	3	0.8	40
WB502 005S	0.25	0.5	4	0.5	40
WB502 005	0.25	0.5	4	1	40
WB502 005 S3	0.25	0.5	3	1	40
WB502 006S	0.3	0.6	4	0.6	40
WB502 006	0.3	0.6	4	1.2	40
WB502 006 S3	0.3	0.6	3	1.2	40
WB502 007S	0.35	0.7	4	0.7	40
WB502 007	0.35	0.7	4	1.4	40
WB502 007 S3	0.35	0.7	3	1.4	40
WB502 008S	0.4	0.8	4	0.8	40
WB502 008	0.4	0.8	4	1.6	40
WB502 008 S3	0.4	0.8	3	1.6	40
WB502 009S	0.45	0.9	4	0.9	40
WB502 009	0.45	0.9	4	1.8	40
WB502 009 S3	0.45	0.9	3	1.8	40
WB502 010S	0.5	1	6	1.5	40
WB502 010 S3	0.5	1	3	2.5	50
WB502 010 S4	0.5	1	4	2.5	50
WB502 010	0.5	1	6	2.5	50
WB502 010 070	0.5	1	6	2.5	70
WB502 010 100	0.5	1	6	2.5	100
WB502 0120S	0.6	1.2	6	2	40

Designation	R	ØD	Ød	ℓ	L
WB502 012 S3	0.6	1.2	3	3	50
WB502 012 S4	0.6	1.2	4	3	50
WB502 012	0.6	1.2	6	3	50
WB502 012 070	0.6	1.2	6	3	70
WB502 012 100	0.6	1.2	6	3	100
WB502 015S	0.75	1.5	6	2.5	40
WB502 015 S3	0.75	1.5	3	4	50
WB502 015 S4	0.75	1.5	4	4	50
WB502 015	0.75	1.5	6	4	50
WB502 015 070	0.75	1.5	6	4	70
WB502 015 100	0.75	1.5	6	4	100
WB502 020S	1	2	6	3	40
WB502 020 S3	1	2	3	5	50
WB502 020 S4	1	2	4	5	50
WB502 020	1	2	6	5	50
WB502 020 080	1	2	6	5	80
WB502 020 100	1	2	6	5	100
WB502 025S	1.25	2.5	6	4	40
WB502 025 S3	1.25	2.5	3	6	60
WB502 025 S4	1.25	2.5	4	6	60
WB502 025	1.25	2.5	6	6	60
WB502 025 080	1.25	2.5	6	6	80
WB502 025 100	1.25	2.5	6	6	100
WB502 030S	1.5	3	6	4.5	40
WB502 030 S3	1.5	3	3	6	60
WB502 030 S4	1.5	3	4	6	60
WB502 030	1.5	3	6	6	60
WB502 030 080	1.5	3	6	6	80
WB502 030 100	1.5	3	6	6	100
WB502 035	1.75	3.5	6	8	70
WB502 040S	2	4	6	6	50
WB502 040 S4	2	4	4	8	70
WB502 040	2	4	6	8	70
WB502 040 100 S4	2	4	4	8	100
WB502 040 120 S4	2	4	4	8	120
WB502 040 100	2	4	6	8	100
WB502 040 120	2	4	6	8	120

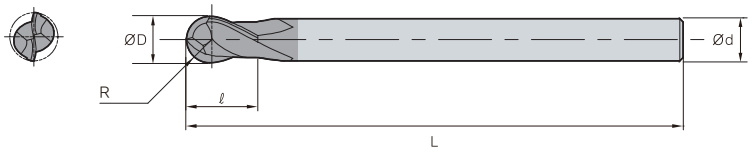
WB502

2 Flutes ball nose endmill

ULTRA FINE | 2 | 30° HELIX | R ±0.005 R3 or Under | R ±0.01 Above R3 | W | DATA p.441

• TOLERANCE

ØD		Ød
Ø1 ~ Ø6	0 ~ -0.012mm	h6
Ø6.5 ~ Ø25	0 ~ -0.015mm	



(mm)

Designation	R	ØD	Ød	ℓ	L
WB502 045	2.25	4.5	6	9	80
WB502 050S	2.5	5	6	7.5	60
WB502 050	2.5	5	6	10	80
WB502 050 S5	2.5	5	5	10	80
WB502 055	2.75	5.5	6	11	90
WB502 060S	3	6	6	9	50
WB502 060 060	3	6	6	9	60
WB502 060 080	3	6	6	9	80
WB502 060	3	6	6	12	90
WB502 060 110	3	6	6	12	110
WB502 060 130	3	6	6	12	130
WB502 060 150	3	6	6	12	150
WB502 065	3.25	6.5	8	13	90
WB502 070	3.5	7	8	14	90
WB502 080S	4	8	8	12	50
WB502 080 060	4	8	8	12	60
WB502 080 080	4	8	8	12	80
WB502 080 090	4	8	8	12	90
WB502 080	4	8	8	14	100
WB502 080 130	4	8	8	14	130
WB502 080 150	4	8	8	14	150
WB502 085	4.25	8.5	10	16	100
WB502 090	4.5	9	10	18	100
WB502 100S	5	10	10	15	50
WB502 100 060	5	10	10	15	60
WB502 100 080	5	10	10	15	80
WB502 100 090	5	10	10	15	90
WB502 100	5	10	10	18	100
WB502 100 130	5	10	10	18	130
WB502 100 150	5	10	10	18	150

Designation	R	ØD	Ød	ℓ	L
WB502 100 180	5	10	10	18	180
WB502 100 200	5	10	10	18	200
WB502 110	5.5	11	12	20	100
WB502 120S	6	12	12	18	60
WB502 120 080	6	12	12	18	80
WB502 120 090	6	12	12	18	90
WB502 120 100	6	12	12	18	100
WB502 120	6	12	12	24	110
WB502 120 130	6	12	12	24	130
WB502 120 150	6	12	12	24	150
WB502 120 180	6	12	12	24	180
WB502 120 200	6	12	12	24	200
WB502 130	6.5	13	12	24	100
WB502 140 S12	7	14	12	26	100
WB502 140	7	14	14	26	100
WB502 140 S16	7	14	16	26	100
WB502 150	7.5	15	16	28	140
WB502 160 100	8	16	16	24	100
WB502 160 130	8	16	16	24	130
WB502 160	8	16	16	30	150
WB502 160 180	8	16	16	30	180
WB502 160 200	8	16	16	30	200
WB502 180 S16	9	18	16	34	150
WB502 180	9	18	18	34	150
WB502 200 100	10	20	20	30	100
WB502 200 130	10	20	20	30	130
WB502 200	10	20	20	38	150
WB502 200 200	10	20	20	38	200
WB502 250 120	12.5	25	25	50	120
WB502 250	12.5	25	25	50	180

※ The above specifications are subject to change without prior notice for product quality improvement.

• Applicable Workpiece

Carbon steel ~ HB225	Alloy steel HB225~325	Pre-hardened steel HRC30~50	Hardened steel		Copper	Graphite	Cast iron ~FCD500	Aluminum	Stainless steel
			SKD61~HRC55	SKD11 HRC55~					
○	○	◎	○				○		○

◎: Excellent ○: Good

U-Star Endmill

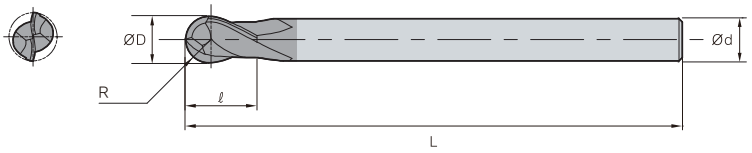
WB502-P

2 Flutes high precision ball nose endmill

ULTRA FINE | 2 | 30° HELIX | R ±0.002 (R3 or Under) | R ±0.003 (Above R3) | W | DATA p.441

• TOLERANCE

ØD		Ød
Ø0.1 ~ Ø6	0 ~ -0.012mm	h6
Ø8 ~ Ø12	0 ~ -0.015mm	



(mm)

Designation	R	ØD	Ød	ℓ	L
WB502 001P	0.05	0.1	4	0.2	40
WB502 0015P	0.075	0.15	4	0.3	40
WB502 002P	0.1	0.2	4	0.4	40
WB502 003P	0.15	0.3	4	0.6	40
WB502 004P	0.2	0.4	4	0.8	40
WB502 005P	0.25	0.5	4	1	40
WB502 006P	0.3	0.6	4	1.2	40
WB502 007P	0.35	0.7	4	1.4	40
WB502 008P	0.4	0.8	4	1.6	40
WB502 009P	0.45	0.9	4	1.8	40
WB502 010P	0.5	1	6	2.5	50
WB502 012P	0.6	1.2	6	3	50
WB502 015P	0.75	1.5	6	4	50
WB502 020P	1	2	6	5	50
WB502 025P	1.25	2.5	6	6	60
WB502 030P	1.5	3	6	6	60
WB502 040P	2	4	6	8	70
WB502 050P	2.5	5	6	10	80
WB502 060P	3	6	6	12	90
WB502 080P	4	8	8	14	100
WB502 100P	5	10	10	18	100
WB502 120P	6	12	12	24	110

※ The above specifications are subject to change without prior notice for product quality improvement.

• **Applicable Workpiece**

Carbon steel ~ HB225	Alloy steel HB225~325	Pre-hardened steel HRC30~50	Hardened steel		Copper	Graphite	Cast iron ~FCD500	Aluminum	Stainless steel
			SKD61~HRC55	SKD11 HRC55~					
○	○	◎	○				○		○

◎: Excellent ○: Good

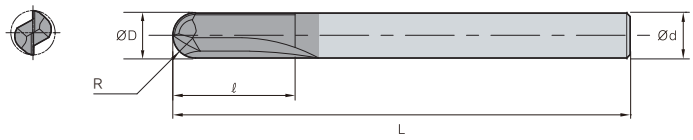
WSB502

2 Flutes straight helix ball nose endmill

ULTRA FINE | 2 | 0° HELIX | R ±0.005 (R3 or Under) | R ±0.01 (Above R3) | W | DATA p.442

• TOLERANCE

ØD		Ød
Ø3 ~ Ø6	0 ~ -0.012mm	h6
Ø8 ~ Ø20	0 ~ -0.015mm	



(mm)

Designation	R	ØD	Ød	ℓ	L
WSB502 030	1.5	3	6	10	70
WSB502 040	2	4	6	12	70
WSB502 050	2.5	5	6	18	90
WSB502 060	3	6	6	20	90
WSB502 080	4	8	8	25	100
WSB502 100	5	10	10	30	100
WSB502 120	6	12	12	32	110
WSB502 160	8	16	16	35	150
WSB502 200	10	20	20	40	150

※ The above specifications are subject to change without prior notice for product quality improvement.

• Applicable Workpiece

Carbon steel ~ HB225	Alloy steel HB225~325	Pre-hardened steel HRC30~50	Hardened steel		Copper	Graphite	Cast iron ~FCD500	Aluminum	Stainless steel
			SKD61~HRC55	SKD11 HRC55~					
○	○	◎	○				○		○

◎: Excellent ○: Good

U-Star Endmill

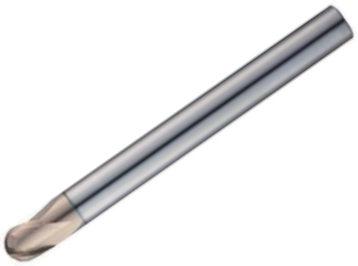
WB503

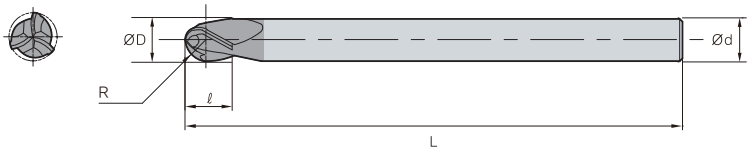
3 Flutes ball nose endmill

ULTRA FINE | 3 | 30° HELIX | R ±0.005 R3 or Under | R ±0.01 Above R3 | W | DATA p.442

• TOLERANCE

ØD		Ød
All sizes	0 ~ -0.02mm	h6





(mm)

Designation	R	ØD	Ød	ℓ	L
WB503 010	0.5	1	6	1	50
WB503 015	0.75	1.5	6	1.5	50
WB503 020	1	2	6	2	50
WB503 030	1.5	3	6	3	60
WB503 040	2	4	6	4	70
WB503 050	2.5	5	6	5	80
WB503 060	3	6	6	6	90
WB503 080	4	8	8	8	100
WB503 100	5	10	10	10	100
WB503 120	6	12	12	12	110

※ The above specifications are subject to change without prior notice for product quality improvement.

• **Applicable Workpiece**

Carbon steel ~ HB225	Alloy steel HB225~325	Pre-hardened steel HRC30~50	Hardened steel		Copper	Graphite	Cast iron ~FCD500	Aluminum	Stainless steel
			SKD61~HRC55	SKD11 HRC55~					
○	○	◎	○				○		○

◎: Excellent ○: Good

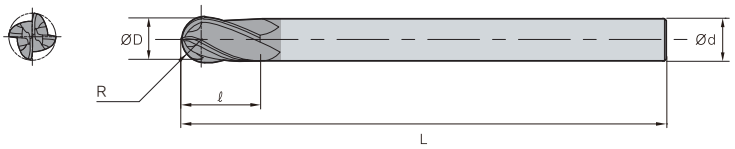
WB504

4 Flutes ball nose endmill

ULTRA FINE | 4 | 30° HELIX | R ±0.005 (R3 or Under) | R ±0.01 (Above R3) | W | DATA p.443

• TOLERANCE

ØD		Ød
All sizes	0 ~ -0.02mm	h6



(mm)

Designation	R	ØD	Ød	ℓ	L
WB504 010	0.5	1	6	1	50
WB504 015	0.75	1.5	6	1.5	50
WB504 020	1	2	6	2	50
WB504 030	1.5	3	6	3	60
WB504 040	2	4	6	4	70
WB504 050	2.5	5	6	5	80
WB504 060	3	6	6	6	90
WB504 080	4	8	8	8	100
WB504 100	5	10	10	10	100
WB504 120	6	12	12	12	110

※ The above specifications are subject to change without prior notice for product quality improvement.

• Applicable Workpiece

Carbon steel ~ HB225	Alloy steel HB225~325	Pre-hardened steel HRC30~50	Hardened steel		Copper	Graphite	Cast iron ~FCD500	Aluminum	Stainless steel
			SKD61~HRC55	SKD11 HRC55~					
○	○	◎	○				○		○

◎: Excellent ○: Good

U-Star Endmill

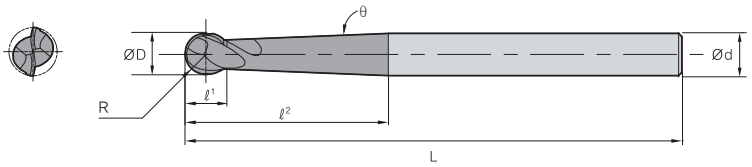
WB532

2 Flutes sphere type ball nose endmill

ULTRA FINE | 2 | 30° HELIX | R ±0.01 All sizes | AlTiN | DATA p.443

• TOLERANCE

ØD		Ød
All sizes	0 ~ -0.03mm	h6



(mm)

Designation	R	ØD	Ød	ℓ1	ℓ2	θ	L
WB532 030	1.5	3	6	2.3	16	1°30`	80
WB532 040	2	4	6	3.1	20	1°30`	80
WB532 050	2.5	5	6	3.9	25	1°30`	80
WB532 060	3	6	6	4.9	30	1°30`	100
WB532 080	4	8	8	6.3	35	1°30`	100
WB532 100	5	10	10	7.9	40	1°30`	100
WB532 120	6	12	12	9.5	50	1°30`	100

※ The above specifications are subject to change without prior notice for product quality improvement.

• **Applicable Workpiece**

Carbon steel ~ HB225	Alloy steel HB225~325	Pre-hardened steel HRC30~50	Hardened steel		Copper	Graphite	Cast iron ~FCD500	Aluminum	Stainless steel
			SKD61~HRC55	SKD11 HRC55~					
○	○	◎	○				○		○

◎: Excellent ○: Good

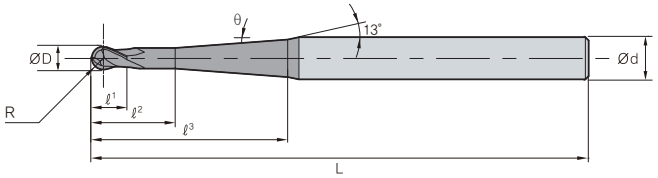
WB542

4 Flutes ball nose endmill

ULTRA FINE | 2 | 30° HELIX | R ±0.005 (R3 or Under) | R ±0.01 (Above R3) | W | DATA p.444

• TOLERANCE

ØD		Ød
Ø0.1 ~ Ø6	0 ~ -0.012mm	h6
Ø8 ~ Ø12	0 ~ -0.015mm	



(mm)

Designation	R	ØD	Ød	ℓ1	ℓ2	ℓ3	θ	L
WB542 001 05 005	0.05	0.1	4	0.1	-	0.5	30`	40
WB542 001 05 01	0.05	0.1	4	0.1	-	1	30`	40
WB542 001 10 005	0.05	0.1	4	0.1	-	0.5	1°	40
WB542 001 10 01	0.05	0.1	4	0.1	-	1	1°	40
WB542 001 15 005	0.05	0.1	4	0.1	-	0.5	1°30`	40
WB542 001 15 01	0.05	0.1	4	0.1	-	1	1°30`	40
WB542 001 20 005	0.05	0.1	4	0.1	-	0.5	2°	40
WB542 001 20 01	0.05	0.1	4	0.1	-	1	2°	40
WB542 001 30 005	0.05	0.1	4	0.1	-	0.5	3°	40
WB542 001 30 01	0.05	0.1	4	0.1	-	1	3°	40
WB542 002 05 01	0.1	0.2	4	0.2	0.4	1	30`	40
WB542 002 05 02	0.1	0.2	4	0.2	0.4	2	30`	40
WB542 002 05 03	0.1	0.2	4	0.2	0.4	3	30`	40
WB542 002 10 01	0.1	0.2	4	0.2	0.4	1	1°	40
WB542 002 10 02	0.1	0.2	4	0.2	0.4	2	1°	40
WB542 002 10 03	0.1	0.2	4	0.2	0.4	3	1°	40
WB542 002 15 01	0.1	0.2	4	0.2	0.4	1	1°30`	40
WB542 002 15 02	0.1	0.2	4	0.2	0.4	2	1°30`	40
WB542 002 15 03	0.1	0.2	4	0.2	0.4	3	1°30`	40
WB542 002 20 01	0.1	0.2	4	0.2	0.4	1	2°	40
WB542 002 20 02	0.1	0.2	4	0.2	0.4	2	2°	40
WB542 002 20 03	0.1	0.2	4	0.2	0.4	3	2°	40
WB542 002 30 01	0.1	0.2	4	0.2	0.4	1	3°	40
WB542 002 30 02	0.1	0.2	4	0.2	0.4	2	3°	40
WB542 002 30 03	0.1	0.2	4	0.2	0.4	3	3°	40
WB542 002 50 02	0.1	0.2	4	0.2	0.4	2	5°	40
WB542 002 50 03	0.1	0.2	4	0.2	0.4	3	5°	40
WB542 003 05 02	0.15	0.3	4	0.3	0.6	2	30`	40
WB542 003 05 03	0.15	0.3	4	0.3	0.6	3	30`	40
WB542 003 05 04	0.15	0.3	4	0.3	0.6	4	30`	40
WB542 003 05 05	0.15	0.3	4	0.3	0.6	5	30`	40
WB542 003 10 02	0.15	0.3	4	0.3	0.6	2	1°	40
WB542 003 10 03	0.15	0.3	4	0.3	0.6	3	1°	40
WB542 003 10 04	0.15	0.3	4	0.3	0.6	4	1°	40
WB542 003 10 05	0.15	0.3	4	0.3	0.6	5	1°	40
WB542 003 15 02	0.15	0.3	4	0.3	0.6	2	1°30'	40

Designation	R	ØD	Ød	ℓ1	ℓ2	ℓ3	θ	L
WB542 003 15 03	0.15	0.3	4	0.3	0.6	3	1°30'	40
WB542 003 15 04	0.15	0.3	4	0.3	0.6	4	1°30'	40
WB542 003 15 05	0.15	0.3	4	0.3	0.6	5	1°30'	40
WB542 003 20 02	0.15	0.3	4	0.3	0.6	2	2°	40
WB542 003 20 03	0.15	0.3	4	0.3	0.6	3	2°	40
WB542 003 20 04	0.15	0.3	4	0.3	0.6	4	2°	40
WB542 003 20 05	0.15	0.3	4	0.3	0.6	5	2°	40
WB542 003 30 02	0.15	0.3	4	0.3	0.6	2	3°	40
WB542 003 30 03	0.15	0.3	4	0.3	0.6	3	3°	40
WB542 003 30 04	0.15	0.3	4	0.3	0.6	4	3°	40
WB542 003 30 05	0.15	0.3	4	0.3	0.6	5	3°	40
WB542 003 50 05	0.15	0.3	4	0.3	0.6	5	5°	40
WB542 004 05 02	0.2	0.4	4	0.4	0.8	2	30`	50
WB542 004 05 03	0.2	0.4	4	0.4	0.8	3	30`	50
WB542 004 05 04	0.2	0.4	4	0.4	0.8	4	30`	50
WB542 004 05 05	0.2	0.4	4	0.4	0.8	5	30`	50
WB542 004 05 06	0.2	0.4	4	0.4	0.8	6	30`	50
WB542 004 10 02	0.2	0.4	4	0.4	0.8	2	1°	50
WB542 004 10 03	0.2	0.4	4	0.4	0.8	3	1°	50
WB542 004 10 04	0.2	0.4	4	0.4	0.8	4	1°	50
WB542 004 10 05	0.2	0.4	4	0.4	0.8	5	1°	50
WB542 004 10 06	0.2	0.4	4	0.4	0.8	6	1°	50
WB542 004 15 02	0.2	0.4	4	0.4	0.8	2	1°30`	50
WB542 004 15 03	0.2	0.4	4	0.4	0.8	3	1°30`	50
WB542 004 15 04	0.2	0.4	4	0.4	0.8	4	1°30`	50
WB542 004 15 05	0.2	0.4	4	0.4	0.8	5	1°30`	50
WB542 004 15 06	0.2	0.4	4	0.4	0.8	6	1°30`	50
WB542 004 20 02	0.2	0.4	4	0.4	0.8	2	2°	50
WB542 004 20 03	0.2	0.4	4	0.4	0.8	3	2°	50
WB542 004 20 04	0.2	0.4	4	0.4	0.8	4	2°	50
WB542 004 20 05	0.2	0.4	4	0.4	0.8	5	2°	50
WB542 004 20 06	0.2	0.4	4	0.4	0.8	6	2°	50
WB542 004 30 02	0.2	0.4	4	0.4	0.8	2	3°	50
WB542 004 30 03	0.2	0.4	4	0.4	0.8	3	3°	50
WB542 004 30 04	0.2	0.4	4	0.4	0.8	4	3°	50
WB542 004 30 05	0.2	0.4	4	0.4	0.8	5	3°	50

U-Star Endmill

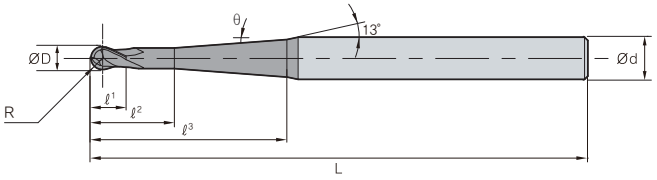
WB542

4 Flutes ball nose endmill

ULTRA FINE | 2 | 30° HELIX | R ±0.005 (R3 or Under) | R ±0.01 (Above R3) | W | DATA p.444

• TOLERANCE

ØD		Ød
Ø0.1 ~ Ø6	0 ~ -0.012mm	h6
Ø8 ~ Ø12	0 ~ -0.015mm	



(mm)

Designation	R	ØD	Ød	ℓ1	ℓ2	ℓ3	θ	L
WB542 004 30 06	0.2	0.4	4	0.4	0.8	6	3°	50
WB542 004 50 04	0.2	0.4	4	0.4	0.8	4	5°	50
WB542 004 50 06	0.2	0.4	4	0.4	0.8	6	5°	50
WB542 005 05 04	0.25	0.5	4	0.5	1	4	30`	50
WB542 005 05 06	0.25	0.5	4	0.5	1	6	30`	50
WB542 005 05 08	0.25	0.5	4	0.5	1	8	30`	50
WB542 005 05 10	0.25	0.5	4	0.5	1	10	30`	50
WB542 005 10 04	0.25	0.5	4	0.5	1	4	1°	50
WB542 005 10 06	0.25	0.5	4	0.5	1	6	1°	50
WB542 005 10 08	0.25	0.5	4	0.5	1	8	1°	50
WB542 005 10 10	0.25	0.5	4	0.5	1	10	1°	50
WB542 005 15 04	0.25	0.5	4	0.5	1	4	1°30`	50
WB542 005 15 06	0.25	0.5	4	0.5	1	6	1°30`	50
WB542 005 15 08	0.25	0.5	4	0.5	1	8	1°30`	50
WB542 005 15 10	0.25	0.5	4	0.5	1	10	1°30`	50
WB542 005 20 04	0.25	0.5	4	0.5	1	4	2°	50
WB542 005 20 06	0.25	0.5	4	0.5	1	6	2°	50
WB542 005 20 08	0.25	0.5	4	0.5	1	8	2°	50
WB542 005 20 10	0.25	0.5	4	0.5	1	10	2°	50
WB542 005 30 04	0.25	0.5	4	0.5	1	4	3°	50
WB542 005 30 06	0.25	0.5	4	0.5	1	6	3°	50
WB542 005 30 08	0.25	0.5	4	0.5	1	8	3°	50
WB542 005 30 10	0.25	0.5	4	0.5	1	10	3°	50
WB542 006 05 04	0.3	0.6	4	0.6	1.2	4	30`	50
WB542 006 05 06	0.3	0.6	4	0.6	1.2	6	30`	50
WB542 006 05 08	0.3	0.6	4	0.6	1.2	8	30`	50
WB542 006 05 10	0.3	0.6	4	0.6	1.2	10	30`	50
WB542 006 05 12	0.3	0.6	4	0.6	1.2	12	30`	50
WB542 006 10 04	0.3	0.6	4	0.6	1.2	4	1°	50
WB542 006 10 06	0.3	0.6	4	0.6	1.2	6	1°	50
WB542 006 10 08	0.3	0.6	4	0.6	1.2	8	1°	50
WB542 006 10 10	0.3	0.6	4	0.6	1.2	10	1°	50
WB542 006 10 12	0.3	0.6	4	0.6	1.2	12	1°	50
WB542 006 15 04	0.3	0.6	4	0.6	1.2	4	1°30`	50
WB542 006 15 06	0.3	0.6	4	0.6	1.2	6	1°30`	50
WB542 006 15 08	0.3	0.6	4	0.6	1.2	8	1°30`	50

Designation	R	ØD	Ød	ℓ1	ℓ2	ℓ3	θ	L
WB542 006 15 10	0.3	0.6	4	0.6	1.2	10	1°30`	50
WB542 006 15 12	0.3	0.6	4	0.6	1.2	12	1°30`	50
WB542 006 20 04	0.3	0.6	4	0.6	1.2	4	2°	50
WB542 006 20 06	0.3	0.6	4	0.6	1.2	6	2°	50
WB542 006 20 08	0.3	0.6	4	0.6	1.2	8	2°	50
WB542 006 20 10	0.3	0.6	4	0.6	1.2	10	2°	50
WB542 006 20 12	0.3	0.6	4	0.6	1.2	12	2°	50
WB542 006 30 04	0.3	0.6	4	0.6	1.2	4	3°	50
WB542 006 30 06	0.3	0.6	4	0.6	1.2	6	3°	50
WB542 006 30 08	0.3	0.6	4	0.6	1.2	8	3°	50
WB542 006 30 10	0.3	0.6	4	0.6	1.2	10	3°	50
WB542 006 30 12	0.3	0.6	4	0.6	1.2	12	3°	50
WB542 008 05 04	0.4	0.8	4	0.8	1.6	4	30`	50
WB542 008 05 06	0.4	0.8	4	0.8	1.6	6	30`	50
WB542 008 05 08	0.4	0.8	4	0.8	1.6	8	30`	50
WB542 008 05 10	0.4	0.8	4	0.8	1.6	10	30`	50
WB542 008 05 12	0.4	0.8	4	0.8	1.6	12	30`	50
WB542 008 05 16	0.4	0.8	4	0.8	1.6	16	30`	50
WB542 008 10 04	0.4	0.8	4	0.8	1.6	4	1°	50
WB542 008 10 06	0.4	0.8	4	0.8	1.6	6	1°	50
WB542 008 10 08	0.4	0.8	4	0.8	1.6	8	1°	50
WB542 008 10 10	0.4	0.8	4	0.8	1.6	10	1°	50
WB542 008 10 12	0.4	0.8	4	0.8	1.6	12	1°	50
WB542 008 10 16	0.4	0.8	4	0.8	1.6	16	1°	50
WB542 008 15 04	0.4	0.8	4	0.8	1.6	4	1°30`	50
WB542 008 15 06	0.4	0.8	4	0.8	1.6	6	1°30`	50
WB542 008 15 08	0.4	0.8	4	0.8	1.6	8	1°30`	50
WB542 008 15 10	0.4	0.8	4	0.8	1.6	10	1°30`	50
WB542 008 15 12	0.4	0.8	4	0.8	1.6	12	1°30`	50
WB542 008 15 16	0.4	0.8	4	0.8	1.6	16	1°30`	50
WB542 008 20 04	0.4	0.8	4	0.8	1.6	4	2°	50
WB542 008 20 06	0.4	0.8	4	0.8	1.6	6	2°	50
WB542 008 20 08	0.4	0.8	4	0.8	1.6	8	2°	50
WB542 008 20 10	0.4	0.8	4	0.8	1.6	10	2°	50
WB542 008 20 12	0.4	0.8	4	0.8	1.6	12	2°	50
WB542 008 20 16	0.4	0.8	4	0.8	1.6	16	2°	50

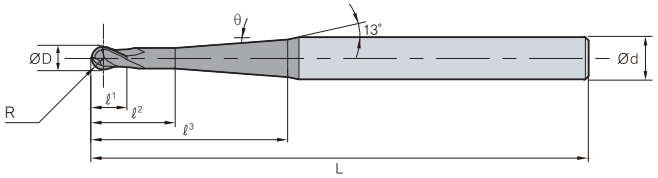
WB542

4 Flutes ball nose endmill

ULTRA FINE | 2 | 30° HELIX | R ±0.005 (R3 or Under) | R ±0.01 (Above R3) | W | DATA p.444

• TOLERANCE

ØD		Ød
Ø0.1 ~ Ø6	0 ~ -0.012mm	h6
Ø8 ~ Ø12	0 ~ -0.015mm	



(mm)

Designation	R	ØD	Ød	ℓ1	ℓ2	ℓ3	θ	L
WB542 008 30 04	0.4	0.8	4	0.8	1.6	4	3°	50
WB542 008 30 06	0.4	0.8	4	0.8	1.6	6	3°	50
WB542 008 30 08	0.4	0.8	4	0.8	1.6	8	3°	50
WB542 008 30 10	0.4	0.8	4	0.8	1.6	10	3°	50
WB542 008 30 12	0.4	0.8	4	0.8	1.6	12	3°	50
WB542 008 30 16	0.4	0.8	4	0.8	1.6	16	3°	50
WB542 010 05 06	0.5	1	4	1	2.5	6	30`	50
WB542 010 05 08	0.5	1	4	1	2.5	8	30`	50
WB542 010 05 10	0.5	1	4	1	2.5	10	30`	50
WB542 010 05 12	0.5	1	4	1	2.5	12	30`	50
WB542 010 05 16	0.5	1	4	1	2.5	16	30`	50
WB542 010 05 20	0.5	1	4	1	2.5	20	30`	50
WB542 010 05 25	0.5	1	4	1	2.5	25	30`	60
WB542 010 05 30	0.5	1	4	1	2.5	30	30`	70
WB542 010 05 40	0.5	1	4	1	2.5	40	30`	80
WB542 010 05 50	0.5	1	4	1	2.5	50	30`	90
WB542 010 10 06	0.5	1	4	1	2.5	6	1°	50
WB542 010 10 08	0.5	1	4	1	2.5	8	1°	50
WB542 010 10 10	0.5	1	4	1	2.5	10	1°	50
WB542 010 10 12	0.5	1	4	1	2.5	12	1°	50
WB542 010 10 16	0.5	1	4	1	2.5	16	1°	50
WB542 010 10 20	0.5	1	4	1	2.5	20	1°	50
WB542 010 10 25	0.5	1	4	1	2.5	25	1°	60
WB542 010 10 30	0.5	1	4	1	2.5	30	1°	70
WB542 010 10 40	0.5	1	4	1	2.5	40	1°	80
WB542 010 10 50	0.5	1	4	1	2.5	50	1°	90
WB542 010 15 06	0.5	1	4	1	2.5	6	1°30`	50
WB542 010 15 08	0.5	1	4	1	2.5	8	1°30`	50
WB542 010 15 10	0.5	1	4	1	2.5	10	1°30`	50
WB542 010 15 12	0.5	1	4	1	2.5	12	1°30`	50
WB542 010 15 16	0.5	1	4	1	2.5	16	1°30`	50
WB542 010 15 20	0.5	1	4	1	2.5	20	1°30`	50
WB542 010 15 25	0.5	1	4	1	2.5	25	1°30`	60
WB542 010 15 30	0.5	1	4	1	2.5	30	1°30`	70
WB542 010 15 40	0.5	1	4	1	2.5	40	1°30`	80
WB542 010 15 50	0.5	1	4	1	2.5	50	1°30`	90

Designation	R	ØD	Ød	ℓ1	ℓ2	ℓ3	θ	L
WB542 010 20 06	0.5	1	4	1	2.5	6	2°	50
WB542 010 20 08	0.5	1	4	1	2.5	8	2°	50
WB542 010 20 10	0.5	1	4	1	2.5	10	2°	50
WB542 010 20 12	0.5	1	4	1	2.5	12	2°	50
WB542 010 20 16	0.5	1	4	1	2.5	16	2°	50
WB542 010 20 20	0.5	1	4	1	2.5	20	2°	50
WB542 010 20 25	0.5	1	4	1	2.5	25	2°	60
WB542 010 20 30	0.5	1	4	1	2.5	30	2°	70
WB542 010 20 40	0.5	1	4	1	2.5	40	2°	80
WB542 010 20 50	0.5	1	6	1	2.5	50	2°	90
WB542 010 30 06	0.5	1	4	1	2.5	6	3°	50
WB542 010 30 08	0.5	1	4	1	2.5	8	3°	50
WB542 010 30 10	0.5	1	4	1	2.5	10	3°	50
WB542 010 30 12	0.5	1	4	1	2.5	12	3°	50
WB542 010 30 16	0.5	1	4	1	2.5	16	3°	50
WB542 010 30 20	0.5	1	4	1	2.5	20	3°	50
WB542 010 30 25	0.5	1	4	1	2.5	25	3°	60
WB542 010 30 30	0.5	1	6	1	2.5	30	3°	70
WB542 010 30 40	0.5	1	6	1	2.5	40	3°	80
WB542 010 30 50	0.5	1	6	1	2.5	50	3°	90
WB542 010 50 30	0.5	1	6	1	2.5	30	5°	70
WB542 012 05 08	0.6	1.2	4	1.2	3	8	30`	50
WB542 012 05 12	0.6	1.2	4	1.2	3	12	30`	50
WB542 012 05 16	0.6	1.2	4	1.2	3	16	30`	50
WB542 012 05 20	0.6	1.2	4	1.2	3	20	30`	50
WB542 012 05 25	0.6	1.2	4	1.2	3	25	30`	60
WB542 012 05 30	0.6	1.2	4	1.2	3	30	30`	70
WB542 012 10 08	0.6	1.2	4	1.2	3	8	1°	50
WB542 012 10 12	0.6	1.2	4	1.2	3	12	1°	50
WB542 012 10 16	0.6	1.2	4	1.2	3	16	1°	50
WB542 012 10 20	0.6	1.2	4	1.2	3	20	1°	50
WB542 012 10 25	0.6	1.2	4	1.2	3	25	1°	60
WB542 012 10 30	0.6	1.2	4	1.2	3	30	1°	70
WB542 012 15 08	0.6	1.2	4	1.2	3	8	1°30`	50
WB542 012 15 12	0.6	1.2	4	1.2	3	12	1°30`	50
WB542 012 15 16	0.6	1.2	4	1.2	3	16	1°30`	50

U-Star Endmill

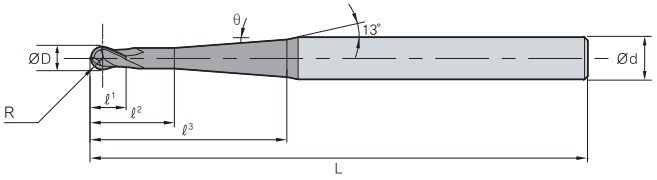
WB542

4 Flutes ball nose endmill

ULTRA FINE | 2 | 30° HELIX | R ±0.005 R3 or Under | R ±0.01 Above R3 | W | DATA p.444

• TOLERANCE

ØD		Ød
Ø0.1 ~ Ø6	0 ~ -0.012mm	h6
Ø8 ~ Ø12	0 ~ -0.015mm	



(mm)

Designation	R	ØD	Ød	ℓ1	ℓ2	ℓ3	θ	L
WB542 012 15 20	0.6	1.2	4	1.2	3	20	1°30`	50
WB542 012 15 25	0.6	1.2	4	1.2	3	25	1°30`	60
WB542 012 15 30	0.6	1.2	4	1.2	3	30	1°30`	70
WB542 012 20 08	0.6	1.2	4	1.2	3	8	2°	50
WB542 012 20 12	0.6	1.2	4	1.2	3	12	2°	50
WB542 012 20 16	0.6	1.2	4	1.2	3	16	2°	50
WB542 012 20 20	0.6	1.2	4	1.2	3	20	2°	50
WB542 012 20 25	0.6	1.2	4	1.2	3	25	2°	60
WB542 012 20 30	0.6	1.2	4	1.2	3	30	2°	70
WB542 012 30 08	0.6	1.2	4	1.2	3	8	3°	50
WB542 012 30 12	0.6	1.2	4	1.2	3	12	3°	50
WB542 012 30 16	0.6	1.2	4	1.2	3	16	3°	50
WB542 012 30 20	0.6	1.2	4	1.2	3	20	3°	50
WB542 012 30 25	0.6	1.2	4	1.2	3	25	3°	60
WB542 012 30 30	0.6	1.2	6	1.2	3	30	3°	70
WB542 015 05 08	0.75	1.5	4	1.5	4	8	30`	50
WB542 015 05 10	0.75	1.5	4	1.5	4	10	30`	50
WB542 015 05 12	0.75	1.5	4	1.5	4	12	30`	50
WB542 015 05 16	0.75	1.5	4	1.5	4	16	30`	50
WB542 015 05 20	0.75	1.5	4	1.5	4	20	30`	50
WB542 015 05 25	0.75	1.5	4	1.5	4	25	30`	60
WB542 015 05 30	0.75	1.5	4	1.5	4	30	30`	70
WB542 015 05 40	0.75	1.5	4	1.5	4	40	30`	80
WB542 015 05 50	0.75	1.5	4	1.5	4	50	30`	90
WB542 015 10 08	0.75	1.5	4	1.5	4	8	1°	50
WB542 015 10 10	0.75	1.5	4	1.5	4	10	1°	50
WB542 015 10 12	0.75	1.5	4	1.5	4	12	1°	50
WB542 015 10 16	0.75	1.5	4	1.5	4	16	1°	50
WB542 015 10 20	0.75	1.5	4	1.5	4	20	1°	50
WB542 015 10 25	0.75	1.5	4	1.5	4	25	1°	60
WB542 015 10 30	0.75	1.5	4	1.5	4	30	1°	70
WB542 015 10 40	0.75	1.5	4	1.5	4	40	1°	80
WB542 015 10 50	0.75	1.5	4	1.5	4	50	1°	90
WB542 015 15 08	0.75	1.5	4	1.5	4	8	1°30`	50
WB542 015 15 10	0.75	1.5	4	1.5	4	10	1°30`	50
WB542 015 15 12	0.75	1.5	4	1.5	4	12	1°30`	50

Designation	R	ØD	Ød	ℓ1	ℓ2	ℓ3	θ	L
WB542 015 15 16	0.75	1.5	4	1.5	4	16	1°30`	50
WB542 015 15 20	0.75	1.5	4	1.5	4	20	1°30`	50
WB542 015 15 25	0.75	1.5	4	1.5	4	25	1°30`	60
WB542 015 15 30	0.75	1.5	4	1.5	4	30	1°30`	70
WB542 015 15 40	0.75	1.5	4	1.5	4	40	1°30`	80
WB542 015 15 50	0.75	1.5	4	1.5	4	50	1°30`	90
WB542 015 20 08	0.75	1.5	4	1.5	4	8	2°	50
WB542 015 20 10	0.75	1.5	4	1.5	4	10	2°	50
WB542 015 20 12	0.75	1.5	4	1.5	4	12	2°	50
WB542 015 20 16	0.75	1.5	4	1.5	4	16	2°	50
WB542 015 20 20	0.75	1.5	4	1.5	4	20	2°	50
WB542 015 20 25	0.75	1.5	4	1.5	4	25	2°	60
WB542 015 20 30	0.75	1.5	4	1.5	4	30	2°	70
WB542 015 20 40	0.75	1.5	4	1.5	4	40	2°	80
WB542 015 20 50	0.75	1.5	6	1.5	4	50	2°	90
WB542 015 30 20	0.75	1.5	6	1.5	4	20	3°	50
WB542 015 30 30	0.75	1.5	6	1.5	4	30	3°	70
WB542 015 30 40	0.75	1.5	6	1.5	4	40	3°	80
WB542 015 30 50	0.75	1.5	8	1.5	4	50	3°	90
WB542 015 50 30	0.75	1.5	8	1.5	4	30	5°	70
WB542 020 05 10	1	2	4	2	5	10	30`	50
WB542 020 05 12	1	2	4	2	5	12	30`	50
WB542 020 05 16	1	2	4	2	5	16	30`	50
WB542 020 05 20	1	2	4	2	5	20	30`	50
WB542 020 05 25	1	2	4	2	5	25	30`	60
WB542 020 05 30	1	2	4	2	5	30	30`	70
WB542 020 05 40	1	2	4	2	5	40	30`	80
WB542 020 05 50	1	2	6	2	5	50	30`	100
WB542 020 05 60	1	2	6	2	5	60	30`	100
WB542 020 05 80	1	2	6	2	5	80	30`	140
WB542 020 10 10	1	2	4	2	5	10	1°	50
WB542 020 10 12	1	2	4	2	5	12	1°	50
WB542 020 10 16	1	2	4	2	5	16	1°	50
WB542 020 10 20	1	2	4	2	5	20	1°	50
WB542 020 10 25	1	2	4	2	5	25	1°	60
WB542 020 10 30	1	2	4	2	5	30	1°	70

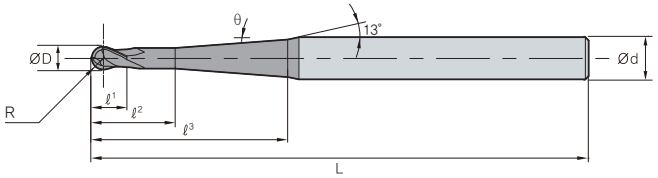
WB542

4 Flutes ball nose endmill

ULTRA FINE | 2 | 30° HELIX | R ±0.005 R3 or Under | R ±0.01 Above R3 | W | DATA p.444

• TOLERANCE

ØD		Ød
Ø0.1 ~ Ø6	0 ~ -0.012mm	h6
Ø8 ~ Ø12	0 ~ -0.015mm	



(mm)

Designation	R	ØD	Ød	ℓ1	ℓ2	ℓ3	θ	L
WB542 020 10 40	1	2	6	2	5	40	1°	80
WB542 020 10 50	1	2	6	2	5	50	1°	100
WB542 020 10 60	1	2	6	2	5	60	1°	100
WB542 020 10 80	1	2	6	2	5	80	1°	140
WB542 020 15 10	1	2	4	2	5	10	1°30`	50
WB542 020 15 12	1	2	4	2	5	12	1°30`	50
WB542 020 15 16	1	2	4	2	5	16	1°30`	50
WB542 020 15 20	1	2	4	2	5	20	1°30`	50
WB542 020 15 25	1	2	4	2	5	25	1°30`	60
WB542 020 15 30	1	2	6	2	5	30	1°30`	70
WB542 020 15 40	1	2	6	2	5	40	1°30`	80
WB542 020 15 50	1	2	6	2	5	50	1°30`	100
WB542 020 15 60	1	2	6	2	5	60	1°30`	100
WB542 020 15 80	1	2	6	2	5	80	1°30`	140
WB542 020 20 10	1	2	4	2	5	10	2°	50
WB542 020 20 12	1	2	4	2	5	12	2°	50
WB542 020 20 16	1	2	4	2	5	16	2°	50
WB542 020 20 20	1	2	4	2	5	20	2°	55
WB542 020 20 25	1	2	4	2	5	25	2°	60
WB542 020 20 30	1	2	4	2	5	30	2°	70
WB542 020 20 40	1	2	6	2	5	40	2°	80
WB542 020 20 50	1	2	6	2	5	50	2°	90
WB542 020 20 60	1	2	6	2	5	60	2°	100
WB542 020 20 80	1	2	8	2	5	80	2°	140
WB542 020 30 30	1	2	6	2	5	30	3°	70
WB542 020 30 40	1	2	6	2	5	40	3°	80
WB542 020 30 50	1	2	8	2	5	50	3°	90
WB542 020 30 60	1	2	8	2	5	60	3°	100
WB542 020 30 80	1	2	10	2	5	80	3°	140
WB542 020 50 30	1	2	8	2	5	30	5°	70
WB542 020 50 40	1	2	10	2	5	40	5°	90
WB542 030 05 16	1.5	3	6	4.5	6	16	30`	60
WB542 030 05 20	1.5	3	6	4.5	6	20	30`	65
WB542 030 05 30	1.5	3	6	4.5	6	30	30`	70
WB542 030 05 40	1.5	3	6	4.5	6	40	30`	80
WB542 030 05 50	1.5	3	6	4.5	6	50	30`	90

Designation	R	ØD	Ød	ℓ1	ℓ2	ℓ3	θ	L
WB542 030 05 60	1.5	3	6	4.5	6	60	30`	100
WB542 030 10 16	1.5	3	6	4.5	6	16	1°	60
WB542 030 10 20	1.5	3	6	4.5	6	20	1°	65
WB542 030 10 30	1.5	3	6	4.5	6	30	1°	70
WB542 030 10 40	1.5	3	6	4.5	6	40	1°	80
WB542 030 10 50	1.5	3	6	4.5	6	50	1°	90
WB542 030 10 60	1.5	3	6	4.5	6	60	1°	100
WB542 030 10 70	1.5	3	6	4.5	6	70	1°	120
WB542 030 15 16	1.5	3	6	4.5	6	16	1°30`	60
WB542 030 15 20	1.5	3	6	4.5	6	20	1°30`	65
WB542 030 15 30	1.5	3	6	4.5	6	30	1°30`	70
WB542 030 15 40	1.5	3	6	4.5	6	40	1°30`	80
WB542 030 15 50	1.5	3	6	4.5	6	50	1°30`	90
WB542 030 15 60	1.5	3	6	4.5	6	60	1°30`	100
WB542 030 20 16	1.5	3	6	4.5	6	16	2°	60
WB542 030 20 20	1.5	3	6	4.5	6	20	2°	65
WB542 030 20 30	1.5	3	6	4.5	6	30	2°	70
WB542 030 20 40	1.5	3	6	4.5	6	40	2°	80
WB542 030 20 50	1.5	3	8	4.5	6	50	2°	90
WB542 030 30 30	1.5	3	6	4.5	6	30	3°	70
WB542 030 30 40	1.5	3	8	4.5	6	40	3°	90
WB542 030 50 30	1.5	3	8	4.5	6	30	5°	70
WB542 030 50 40	1.5	3	10	4.5	6	40	5°	90
WB542 040 05 40	2	4	6	6	8	40	30`	90
WB542 040 05 50	2	4	6	6	8	50	30`	100
WB542 040 05 60	2	4	6	6	8	60	30`	110
WB542 040 05 70	2	4	6	6	8	70	30`	120
WB542 040 10 40	2	4	6	6	8	40	1°	90
WB542 040 10 50	2	4	6	6	8	50	1°	100
WB542 040 10 60	2	4	8	6	8	60	1°	110
WB542 040 10 70	2	4	8	6	8	70	1°	120
WB542 040 15 40	2	4	6	6	8	40	1°30`	90
WB542 040 15 50	2	4	8	6	8	50	1°30`	100
WB542 040 15 60	2	4	8	6	8	60	1°30`	110
WB542 040 15 70	2	4	8	6	8	70	1°30`	120
WB542 040 30 50	2	4	10	6	8	50	3°	100

U-Star Endmill

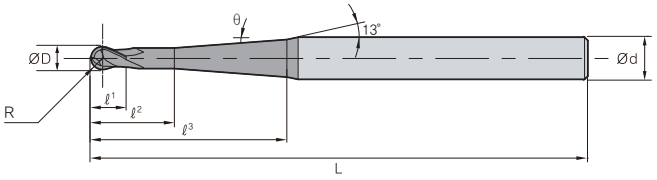
WB542

4 Flutes ball nose endmill

ULTRA FINE | 2 | 30° HELIX | R ±0.005 (R3 or Under) | R ±0.01 (Above R3) | W | DATA p.444

• TOLERANCE

ØD		Ød
Ø0.1 ~ Ø6	0 ~ -0.012mm	h6
Ø8 ~ Ø12	0 ~ -0.015mm	



(mm)

Designation	R	ØD	Ød	ℓ1	ℓ2	ℓ3	θ	L
WB542 040 50 50	2	4	12	6	8	50	5°	100
WB542 050 10 60	2.5	5	8	10	13	60	1°	120
WB542 050 15 60	2.5	5	8	10	13	60	1°30`	120
WB542 050 30 40	2.5	5	8	10	13	40	3°	120
WB542 060 10 60	3	6	8	12	15	60	1°	120
WB542 060 10 90	3	6	10	12	15	90	1°	150
WB542 060 15 60	3	6	10	12	15	60	1°30`	120
WB542 060 15 90	3	6	10	12	15	90	1°30`	150
WB542 060 20 60	3	6	10	12	15	60	2°	120
WB542 060 20 90	3	6	12	12	15	90	2°	150
WB542 060 30 60	3	6	12	12	15	60	3°	120
WB542 060 30 90	3	6	14	12	15	90	3°	150
WB542 080 10 70	4	8	10	14	18	70	1°	130
WB542 080 10 100	4	8	12	14	18	100	1°	150
WB542 080 15 70	4	8	12	14	18	70	1°30`	130
WB542 080 15 100	4	8	14	14	18	100	1°30`	150
WB542 080 20 70	4	8	12	14	18	70	2°	130
WB542 080 20 100	4	8	14	14	18	100	2°	150
WB542 080 30 70	4	8	14	14	18	70	3°	130
WB542 080 30 100	4	8	18	14	18	100	3°	150
WB542 100 10 70	5	10	12	18	22	70	1°	130
WB542 100 10 80	5	10	14	18	22	80	1°	150
WB542 100 10 100	5	10	14	18	22	100	1°	200
WB542 100 15 70	5	10	14	18	22	70	1°30`	130

Designation	R	ØD	Ød	ℓ1	ℓ2	ℓ3	θ	L
WB542 100 15 80	5	10	14	18	22	80	1°30`	150
WB542 100 15 100	5	10	16	18	22	100	1°30`	200
WB542 100 20 70	5	10	14	18	22	70	2°	130
WB542 100 20 80	5	10	16	18	22	80	2°	150
WB542 100 20 100	5	10	16	18	22	100	2°	200
WB542 100 30 70	5	10	16	18	22	70	3°	130
WB542 100 30 80	5	10	18	18	22	80	3°	150
WB542 100 30 100	5	10	20	18	22	100	3°	200
WB542 120 10 60	6	12	14	22	25	60	1°	130
WB542 120 10 80	6	12	14	22	25	80	1°	150
WB542 120 10 90	6	12	16	22	25	90	1°	180
WB542 120 10 100	6	12	16	22	25	100	1°	200
WB542 120 15 60	6	12	14	22	25	60	1°30`	130
WB542 120 15 80	6	12	16	22	25	80	1°30`	150
WB542 120 15 90	6	12	16	22	25	90	1°30`	180
WB542 120 15 100	6	12	16	22	25	100	1°30`	200
WB542 120 20 60	6	12	16	22	25	60	2°	130
WB542 120 20 80	6	12	16	22	25	80	2°	150
WB542 120 20 90	6	12	18	22	25	90	2°	180
WB542 120 20 100	6	12	18	22	25	100	2°	200
WB542 120 30 60	6	12	16	22	25	60	3°	130
WB542 120 30 80	6	12	18	22	25	80	3°	150
WB542 120 30 90	6	12	20	22	25	90	3°	180
WB542 120 30 100	6	12	20	22	25	100	3°	200

※ The above specifications are subject to change without prior notice for product quality improvement.

• Applicable Workpiece

Carbon steel ~ HB225	Alloy steel HB225~325	Pre-hardened steel HRC30~50	Hardened steel		Copper	Graphite	Cast iron ~FCD500	Aluminum	Stainless steel
			SKD61~HRC55	SKD11 HRC55~					
○	○	◎	○				○		○

◎: Excellent ○: Good

WME502

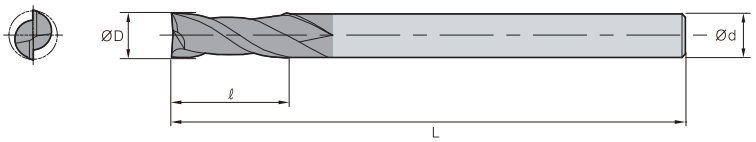
2 Flutes miniature type flat endmill

ULTRA FINE | 2 | 30° HELIX | W | DATA

p.444

• TOLERANCE

ØD		Ød
Ø0.1 ~ Ø6	0 ~ -0.012mm	h6
Ø6.5 ~ Ø25	0 ~ -0.015mm	



(mm)

Designation	ØD	Ød	ℓ	L
WME502 001	0.1	4	0.2	40
WME502 0015	0.15	4	0.3	40
WME502 002	0.2	4	0.4	40
WME502 0025	0.25	4	0.5	40
WME502 003	0.3	4	0.6	40
WME502 0035	0.35	4	0.7	40
WME502 004	0.4	4	0.8	40
WME502 0045	0.45	4	0.9	40
WME502 005	0.5	4	1	40
WME502 0055	0.55	4	1.1	40
WME502 006	0.6	4	1.2	40
WME502 0065	0.65	4	1.3	40
WME502 007	0.7	4	1.4	40
WME502 0075	0.75	4	1.5	40
WME502 008	0.8	4	1.6	40
WME502 0085	0.85	4	1.7	40
WME502 009	0.9	4	1.8	40
WME502 0095	0.95	4	2	40
WME502 010	1	6	2.5	50
WME502 012	1.2	6	3	50
WME502 015	1.5	6	4	50
WME502 020	2	6	6	50
WME502 025	2.5	6	7	50
WME502 030	3	6	8	50
WME502 035	3.5	6	10	50
WME502 040	4	6	10	50
WME502 045	4.5	6	14	50
WME502 050	5	6	15	60
WME502 055	5.5	6	15	60

Designation	ØD	Ød	ℓ	L
WME502 060	6	6	15	60
WME502 065	6.5	8	18	60
WME502 070	7	8	20	60
WME502 075	7.5	8	20	60
WME502 080	8	8	20	70
WME502 085	8.5	10	22	70
WME502 090	9	10	22	70
WME502 095	9.5	10	24	70
WME502 100	10	10	25	75
WME502 105	10.5	12	26	75
WME502 110	11	12	30	75
WME502 115	11.5	12	30	80
WME502 120	12	12	30	80
WME502 130	13	12	35	100
WME502 140 S12	14	12	35	100
WME502 140	14	14	35	100
WME502 140 S16	14	16	35	100
WME502 150	15	16	38	100
WME502 160	16	16	40	100
WME502 170	17	16	42	100
WME502 180 S16	18	16	45	100
WME502 180	18	18	45	100
WME502 190	19	20	45	100
WME502 200	20	20	45	100
WME502 210	21	20	45	100
WME502 220	22	20	45	100
WME502 230	23	25	50	120
WME502 240	24	25	50	120
WME502 250	25	25	50	120

※ The above specifications are subject to change without prior notice for product quality improvement.

• Applicable Workpiece

Carbon steel ~ HB225	Alloy steel HB225~325	Pre-hardened steel HRC30~50	Hardened steel		Copper	Graphite	Cast iron ~FCD500	Aluminum	Stainless steel
			SKD61~HRC55	SKD11 HRC55~					
○	○	◎	○				○		○

◎: Excellent ○: Good

U-Star Endmill

WE502

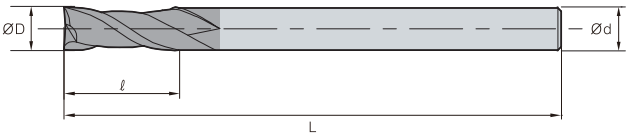
2 Flutes flat endmill

ULTRA FINE | 2 | 30° HELIX | W | DATA

p.444

• TOLERANCE

ØD		Ød
All sizes	0 ~ -0.012mm	h6



(mm)

Designation	ØD	Ød	ℓ	L
WE502 001 001	0.1	4	0.1	40
WE502 001	0.1	4	0.2	40
WE502 001 003	0.1	4	0.3	40
WE502 002 002	0.2	4	0.2	40
WE502 002	0.2	4	0.4	40
WE502 002 006	0.2	4	0.6	40
WE502 003 003	0.3	4	0.3	40
WE502 003	0.3	4	0.6	40
WE502 003 009	0.3	4	0.9	40
WE502 004	0.4	4	0.6	40
WE502 004 004	0.4	4	0.8	40
WE502 004 012	0.4	4	1.2	40
WE502 005 005	0.5	4	0.5	40
WE502 005	0.5	4	1	40
WE502 005 015	0.5	4	1.5	40
WE502 006 006	0.6	4	0.6	40
WE502 006	0.6	4	1.2	40
WE502 006 018	0.6	4	1.8	40
WE502 007 007	0.7	4	0.7	40
WE502 007	0.7	4	1.4	40
WE502 007 021	0.7	4	2.1	40
WE502 008 008	0.8	4	0.8	40
WE502 008	0.8	4	1.6	40
WE502 008 024	0.8	4	2.4	40
WE502 009 009	0.9	4	0.9	40
WE502 009	0.9	4	1.8	40
WE502 009 027	1.9	4	2.7	40
WE502 010 01	1	6	1	40
WE502 010 02	1	6	2	40
WE502 010	1	6	2.5	50
WE502 010 S4	1	4	2.5	50
WE502 010 03	1	6	3	50
WE502 010 04	1	6	4	50
WE502 010 06	1	6	6	50
WE502 011 S4	1.1	4	3	50
WE502 012 02	1.2	6	2	40
WE502 012	1.2	6	3	50
WE502 012 S4	1.2	4	3	50

Designation	ØD	Ød	ℓ	L
WE502 012 04	1.2	6	4	50
WE502 012 06	1.2	6	6	50
WE502 013 S4	1.3	4	3	50
WE502 014 S4	1.4	4	4	50
WE502 015 015	1.5	6	1.5	40
WE502 015 03	1.5	6	3	40
WE502 015	1.5	6	4	50
WE502 015 S4	1.5	4	4	50
WE502 015 06	1.5	6	6	50
WE502 015 08	1.5	6	8	50
WE502 015 10	1.5	6	10	50
WE502 016 S4	1.6	4	4	50
WE502 017 S4	1.7	4	4	50
WE502 018 S4	1.8	4	5	50
WE502 019 S4	1.9	4	5	50
WE502 020 02	2	6	2	40
WE502 020 04	2	6	4	40
WE502 020	2	6	6	50
WE502 020 S4	2	4	6	50
WE502 020 08	2	6	8	50
WE502 020 10	2	6	10	50
WE502 020 12	2	6	12	50
WE502 021 S4	2.1	4	6	50
WE502 022 S4	2.2	4	6	50
WE502 023 S4	2.3	4	6	50
WE502 024 S4	2.4	4	6	50
WE502 025 025	2.5	6	2.5	40
WE502 025 05	2.5	6	5	40
WE502 025	2.5	6	7	50
WE502 025 S4	2.5	4	8	50
WE502 025 10	2.5	6	10	50
WE502 025 12	2.5	6	12	50
WE502 026 S4	2.6	4	8	50
WE502 027 S4	2.7	4	8	50
WE502 028 S4	2.8	4	8	50
WE502 029 S4	2.9	4	8	50
WE502 030 03	3	6	3	40
WE502 030 06	3	6	6	40

WE502

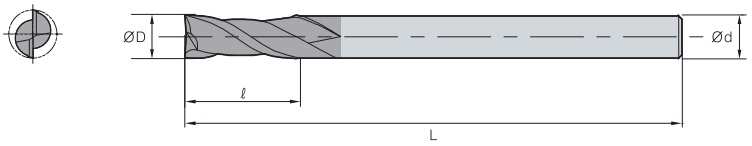
2 Flutes flat endmill

ULTRA FINE | 2 | 30° HELIX | W | DATA

p.444

• TOLERANCE

ØD		Ød
All sizes	0 ~ -0.012mm	h6



(mm)

Designation	ØD	Ød	ℓ	L
WE502 030	3	6	8	50
WE502 030 S4	3	4	8	50
WE502 030 10	3	6	10	50
WE502 030 12	3	6	12	50
WE502 030 14	3	6	14	50
WE502 035 S4	3.5	4	10	50
WE502 040 04	4	6	4	40
WE502 040 08	4	6	8	40
WE502 040	4	6	10	50
WE502 040 S4	4	4	10	50
WE502 040 080 S4	4	4	10	80
WE502 040 12	4	6	12	50
WE502 040 14	4	6	14	50
WE502 040 16	4	6	16	50
WE502 050 05	5	6	5	50
WE502 050 10	5	6	10	50
WE502 050	5	6	15	60
WE502 050 20	5	6	20	60
WE502 050 25	5	6	25	60
WE502 060 06	6	6	6	50
WE502 060 12	6	6	12	50

Designation	ØD	Ød	ℓ	L
WE502 060	6	6	15	60
WE502 060 20	6	6	20	60
WE502 060 25	6	6	25	60
WE502 080 16	8	8	16	60
WE502 080	8	8	20	70
WE502 080 25	8	8	25	70
WE502 080 30	8	8	30	70
WE502 100 22	10	10	22	65
WE502 100	10	10	25	75
WE502 100 30	10	10	30	75
WE502 100 35	10	10	35	75
WE502 120 26	12	12	26	70
WE502 120	12	12	30	80
WE502 120 35	12	12	35	80
WE502 120 40	12	12	40	80
WE502 140	14	16	35	100
WE502 160	16	16	32	100
WE502 16 040	16	16	40	100
WE502 180	18	20	45	100
WE502 200	20	20	45	100

※ The above specifications are subject to change without prior notice for product quality improvement.

• Applicable Workpiece

Carbon steel ~ HB225	Alloy steel HB225~325	Pre-hardened steel HRC30~50	Hardened steel		Copper	Graphite	Cast iron ~FCD500	Aluminum	Stainless steel
			SKD61~HRC55	SKD11 HRC55~					
○	○	◎	○				○		○

◎: Excellent ○: Good

U-Star Endmill

WE502-S3

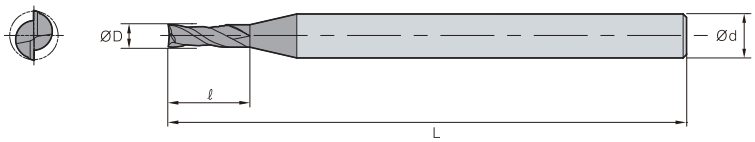
2 Flutes flat endmill

ULTRA FINE | 2 | 30° HELIX | W | DATA

p.444

• TOLERANCE

ØD		Ød
All sizes	0 ~ -0.012mm	h6



(mm)

Designation	ØD	Ød	ℓ	L
WE502 001 S3	0.1	3	0.2	40
WE502 002 S3	0.2	3	0.4	40
WE502 003 S3	0.3	3	0.6	40
WE502 004 S3	0.4	3	0.8	40
WE502 005 S3	0.5	3	1	40
WE502 006 S3	0.6	3	1.2	40
WE502 007 S3	0.7	3	1.4	40
WE502 008 S3	0.8	3	1.6	40
WE502 009 S3	0.9	3	1.8	40
WE502 010 S3	1	3	2.5	50
WE502 012 S3	1.2	3	3	50
WE502 015 S3	1.5	3	4	50
WE502 020 S3	2	3	6	50
WE502 025 S3	2.5	3	7	50
WE502 030 S3	3	3	8	50

※ The above specifications are subject to change without prior notice for product quality improvement.

• **Applicable Workpiece**

Carbon steel ~ HB225	Alloy steel HB225~325	Pre-hardened steel HRC30~50	Hardened steel		Copper	Graphite	Cast iron ~FCD500	Aluminum	Stainless steel
			SKD61~HRC55	SKD11 HRC55~					
○	○	◎	○				○		○

◎: Excellent ○: Good

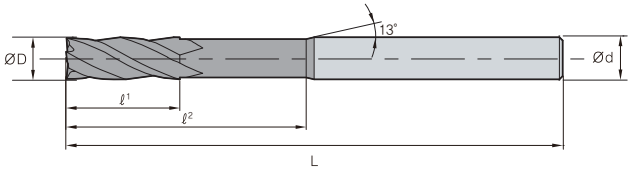
WE514

4 Flutes neck type flat endmill

ULTRA FINE | 4 | 30° HELIX | W | DATA p.445

• TOLERANCE

ØD		Ød
All sizes	0 ~ -0.03mm	h6



(mm)

Designation	ØD	Ød	ℓ1	ℓ2	L
WE514 010 02	1	4	1.5	2	50
WE514 010 03	1	4	1.5	3	50
WE514 010 04	1	4	1.5	4	50
WE514 010 05	1	4	1.5	5	50
WE514 010 06	1	4	1.5	6	50
WE514 010 07	1	4	1.5	7	50
WE514 010 08	1	4	1.5	8	50
WE514 010 10	1	4	1.5	10	50
WE514 010 12	1	4	1.5	12	50
WE514 010 14	1	4	1.5	14	50
WE514 010 16	1	4	1.5	16	50
WE514 010 18	1	4	1.5	18	50
WE514 010 20	1	4	1.5	20	50
WE514 010 22	1	4	1.5	22	60
WE514 010 26	1	4	1.5	26	60
WE514 010 30	1	4	1.5	30	70
WE514 010 40	1	4	1.5	40	80
WE514 010 50	1	4	1.5	50	100
WE514 012 04	1.2	4	1.8	4	50
WE514 012 06	1.2	4	1.8	6	50
WE514 012 08	1.2	4	1.8	8	50
WE514 012 10	1.2	4	1.8	10	50
WE514 012 12	1.2	4	1.8	12	50
WE514 012 14	1.2	4	1.8	14	50
WE514 012 16	1.2	4	1.8	16	50
WE514 012 20	1.2	4	1.8	20	50
WE514 012 26	1.2	4	1.8	26	60
WE514 012 30	1.2	4	1.8	30	70
WE514 015 04	1.5	4	2.3	4	50
WE514 015 05	1.5	4	2.3	5	50
WE514 015 06	1.5	4	2.3	6	50
WE514 015 07	1.5	4	2.3	7	50
WE514 015 08	1.5	4	2.3	8	50
WE514 015 10	1.5	4	2.3	10	50
WE514 015 12	1.5	4	2.3	12	50
WE514 015 14	1.5	4	2.3	14	50

Designation	ØD	Ød	ℓ1	ℓ2	L
WE514 015 16	1.5	4	2.3	16	50
WE514 015 18	1.5	4	2.3	18	50
WE514 015 20	1.5	4	2.3	20	50
WE514 015 22	1.5	4	2.3	22	60
WE514 015 26	1.5	4	2.3	26	60
WE514 015 30	1.5	4	2.3	30	70
WE514 020 06	2	4	3	6	50
WE514 020 08	2	4	3	8	50
WE514 020 10	2	4	3	10	50
WE514 020 12	2	4	3	12	50
WE514 020 14	2	4	3	14	50
WE514 020 16	2	4	3	16	50
WE514 020 18	2	4	3	18	50
WE514 020 20	2	4	3	20	50
WE514 020 22	2	4	3	22	60
WE514 020 26	2	4	3	26	60
WE514 020 30	2	4	3	30	70
WE514 020 35	2	4	3	35	70
WE514 020 40	2	4	3	40	80
WE514 020 45	2	4	3	45	90
WE514 020 50	2	4	3	50	100
WE514 020 60	2	4	3	60	110
WE514 025 08	2.5	4	4	8	50
WE514 025 10	2.5	4	4	10	50
WE514 025 12	2.5	4	4	12	50
WE514 025 14	2.5	4	4	14	50
WE514 025 16	2.5	4	4	16	50
WE514 025 18	2.5	4	4	18	50
WE514 025 20	2.5	4	4	20	50
WE514 025 22	2.5	4	4	22	60
WE514 025 26	2.5	4	4	26	60
WE514 025 30	2.5	4	4	30	70
WE514 025 35	2.5	4	4	35	70
WE514 025 40	2.5	4	4	40	80
WE514 025 45	2.5	4	4	45	90
WE514 025 50	2.5	4	4	50	100

U-Star Endmill

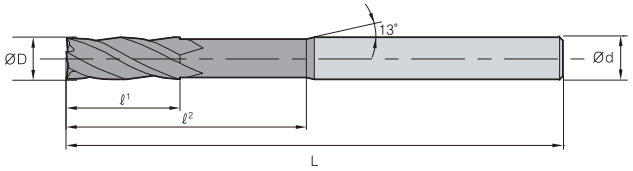
WE514

4 Flutes neck type flat endmill

ULTRA FINE | 4 | 30° HELIX | W | DATA p.445

• TOLERANCE

ØD		Ød
All sizes	0 ~ -0.03mm	h6



(mm)

Designation	ØD	Ød	ℓ1	ℓ2	L
WE514 030 06	3	6	4.5	6	50
WE514 030 08	3	6	4.5	8	50
WE514 030 10	3	6	4.5	10	50
WE514 030 12	3	6	4.5	12	50
WE514 030 14	3	6	4.5	14	60
WE514 030 16	3	6	4.5	16	60
WE514 030 18	3	6	4.5	18	60
WE514 030 20	3	6	4.5	20	60
WE514 030 22	3	6	4.5	22	65
WE514 030 26	3	6	4.5	26	65
WE514 030 30	3	6	4.5	30	70
WE514 030 35	3	6	4.5	35	70
WE514 030 40	3	6	4.5	40	80
WE514 030 45	3	6	4.5	45	90
WE514 030 50	3	6	4.5	50	100
WE514 030 60	3	6	4.5	60	100
WE514 040 08	4	6	4.5	8	50
WE514 040 10	4	6	4.5	10	50
WE514 040 12	4	6	4.5	12	50
WE514 040 14	4	6	4.5	14	60
WE514 040 16	4	6	4.5	16	60
WE514 040 18	4	6	4.5	18	60
WE514 040 20	4	6	4.5	20	60
WE514 040 22	4	6	4.5	22	65
WE514 040 26	4	6	4.5	26	65
WE514 040 30	4	6	4.5	30	70

Designation	ØD	Ød	ℓ1	ℓ2	L
WE514 040 35	4	6	4.5	35	70
WE514 040 40	4	6	4.5	40	80
WE514 040 45	4	6	4.5	45	90
WE514 040 50	4	6	4.5	50	100
WE514 040 60	4	6	4.5	60	100
WE514 050 16	5	6	8	16	60
WE514 050 20	5	6	8	20	60
WE514 050 26	5	6	8	26	65
WE514 050 30	5	6	8	30	70
WE514 050 35	5	6	8	35	75
WE514 050 40	5	6	8	40	80
WE514 050 50	5	6	8	50	90
WE514 050 60	5	6	8	60	100
WE514 060 15	6	6	9	15	60
WE514 060 20	6	6	9	20	60
WE514 060 30	6	6	9	30	70
WE514 060 32	6	6	9	32	90
WE514 080 25	8	8	12	25	70
WE514 080 30	8	8	12	30	80
WE514 080 42	8	8	12	42	100
WE514 100 30	10	10	15	30	75
WE514 100 35	10	10	15	35	80
WE514 100 45	10	10	15	45	100
WE514 120 35	12	12	20	35	80
WE514 120 40	12	12	20	40	90
WE514 120 50	12	12	20	50	110

※ The above specifications are subject to change without prior notice for product quality improvement.

• Applicable Workpiece

Carbon steel ~ HB225	Alloy steel HB225~325	Pre-hardened steel HRC30~50	Hardened steel		Copper	Graphite	Cast iron ~FCD500	Aluminum	Stainless steel
			SKD61~HRC55	SKD11 HRC55~					
○	○	◎	○				○		○

◎: Excellent ○: Good

WE522

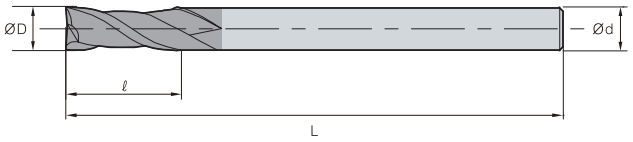
2 Flutes long shank flat endmill

ULTRA FINE | 2 | 30° HELIX | W | DATA

p.445

• TOLERANCE

ØD		Ød
All sizes	0 ~ -0.03mm	h6



(mm)

Designation	ØD	Ød	ℓ	L
WE522 010 03	1	6	3	60
WE522 010 04	1	6	4	60
WE522 010 05	1	6	5	60
WE522 010 06	1	6	6	60
WE522 010 07	1	6	7	60
WE522 010 08	1	6	8	60
WE522 010 10	1	6	10	60
WE522 010 12	1	6	12	60
WE522 012 04	1.2	6	4	60
WE522 012 06	1.2	6	6	60
WE522 012 08	1.2	6	8	60
WE522 012 10	1.2	6	10	60
WE522 012 12	1.2	6	12	60
WE522 015 06	1.5	6	6	60
WE522 015 08	1.5	6	8	60
WE522 015 10	1.5	6	10	60
WE522 015 12	1.5	6	12	60
WE522 015 14	1.5	6	14	60
WE522 015 16	1.5	6	16	60
WE522 020 08	2	6	8	60
WE522 020 10	2	6	10	60
WE522 020 12	2	6	12	60
WE522 020 14	2	6	14	60
WE522 020 16	2	6	16	60
WE522 025 10	2.5	6	10	60
WE522 025 12	2.5	6	12	60
WE522 025 16	2.5	6	16	60
WE522 025 20	2.5	6	20	60
WE522 025 26	2.5	6	26	60
WE522 030 16 S3	3	3	16	100
WE522 030 10	3	6	10	70
WE522 030 12	3	6	12	70
WE522 030 14	3	6	14	70
WE522 030 16	3	6	16	70
WE522 030 20	3	6	20	70
WE522 030 26	3	6	26	70
WE522 030 30	3	6	30	70
WE522 040 20 S4	4	4	20	100

Designation	ØD	Ød	ℓ	L
WE522 040 12	4	6	12	70
WE522 040 16	4	6	16	70
WE522 040 20	4	6	20	70
WE522 040 26	4	6	26	70
WE522 040 30	4	6	30	70
WE522 050 20	5	6	20	70
WE522 050 25	5	6	25	70
WE522 050 25 100	5	6	25	100
WE522 050 30	5	6	30	80
WE522 050 35	5	6	35	90
WE522 050 40	5	6	40	100
WE522 060 15	6	6	15	60
WE522 060 15 080	6	6	15	80
WE522 060 20	6	6	20	70
WE522 060 20 090	6	6	20	90
WE522 060 25	6	6	25	75
WE522 060 30	6	6	30	80
WE522 060 30 100	6	6	30	100
WE522 060 30 150	6	6	30	150
WE522 060 35	6	6	35	90
WE522 060 40	6	6	40	90
WE522 060 40 120	6	6	40	120
WE522 060 45	6	6	45	150
WE522 080 25	8	8	25	80
WE522 080 30	8	8	30	80
WE522 080 30 100	8	8	30	100
WE522 080 35	8	8	35	90
WE522 080 40	8	8	40	90
WE522 080 40 120	8	8	40	120
WE522 080 40 150	8	8	40	150
WE522 080 45	8	8	45	100
WE522 080 50	8	8	50	100
WE522 080 50 150	8	8	50	150
WE522 100 30	10	10	30	80
WE522 100 30 100	10	10	30	100
WE522 100 35	10	10	35	90
WE522 100 40	10	10	40	90
WE522 100 40 120	10	10	40	120

U-Star Endmill

WE522

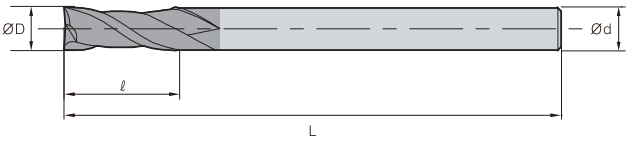
2 Flutes long shank flat endmill

ULTRA FINE | 2 | 30° HELIX | W | DATA

p.445

• TOLERANCE

ØD		Ød
All sizes	0 ~ -0.03mm	h6



(mm)

Designation	ØD	Ød	ℓ	L
WE522 100 45	10	10	45	100
WE522 100 50	10	10	50	100
WE522 100 50 150	10	10	50	150
WE522 100 50 200	10	10	50	200
WE522 100 55	10	10	55	150
WE522 100 60	10	10	60	110
WE522 100 60 200	10	10	60	200
WE522 120 35	12	12	35	90
WE522 120 40	12	12	40	100
WE522 120 40 120	12	12	40	120
WE522 120 45	12	12	45	130
WE522 120 50	12	12	50	100
WE522 120 50 150	12	12	50	150
WE522 120 55	12	12	55	110
WE522 120 60	12	12	60	110
WE522 120 60 150	12	12	60	150
WE522 120 60 200	12	12	60	200
WE522 120 65	12	12	65	150
WE522 120 70	12	12	70	120
WE522 120 70 200	12	12	70	200
WE522 140 50	14	16	50	110
WE522 140 60	14	16	60	150
WE522 160 40	16	16	40	150
WE522 160 50	16	16	50	110
WE522 160 50 150	16	16	50	150
WE522 160 60	16	16	60	120

Designation	ØD	Ød	ℓ	L
WE522 160 70	16	16	70	130
WE522 160 70 150	16	16	70	150
WE522 160 70 200	16	16	70	200
WE522 160 80	16	16	80	150
WE522 160 90	16	16	90	150
WE522 160 110	16	16	110	200
WE522 160 120	16	16	120	250
WE522 180 50	18	20	50	120
WE522 180 70	18	20	70	130
WE522 180 100	18	20	100	200
WE522 200 50	20	20	50	110
WE522 200 50 150	20	20	50	150
WE522 200 60	20	20	60	130
WE522 200 70	20	20	70	130
WE522 200 80	20	20	80	150
WE522 200 90	20	20	90	150
WE522 200 90 200	20	20	90	200
WE522 200 110	20	20	110	200
WE522 200 120	20	20	120	250
WE522 220 75	22	20	75	150
WE522 220 110	22	20	110	200
WE522 250 70	25	25	70	150
WE522 250 90	25	25	90	150
WE522 250 110	25	25	110	200
WE522 250 120	25	25	120	250

※ The above specifications are subject to change without prior notice for product quality improvement.

• Applicable Workpiece

Carbon steel ~ HB225	Alloy steel HB225~325	Pre-hardened steel HRC30~50	Hardened steel		Copper	Graphite	Cast iron ~FCD500	Aluminum	Stainless steel
			SKD61~HRC55	SKD11 HRC55~					
○	○	◎	○				○		○

◎: Excellent ○: Good

WE524

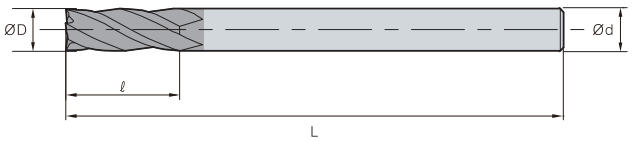
4 Flutes long shank flat endmill

ULTRA FINE | 4 | 30° HELIX | W | DATA

p.446

• TOLERANCE

ØD		Ød
All sizes	0 ~ -0.03mm	h6



(mm)

Designation	ØD	Ød	ℓ	L
WE524 010 03	1	6	3	60
WE524 010 04	1	6	4	60
WE524 010 05	1	6	5	60
WE524 010 06	1	6	6	60
WE524 010 07	1	6	7	60
WE524 010 08	1	6	8	60
WE524 010 10	1	6	10	60
WE524 010 12	1	6	12	60
WE524 012 04	1.2	6	4	60
WE524 012 06	1.2	6	6	60
WE524 012 08	1.2	6	8	60
WE524 012 10	1.2	6	10	60
WE524 012 12	1.2	6	12	60
WE524 015 06	1.5	6	6	60
WE524 015 08	1.5	6	8	60
WE524 015 10	1.5	6	10	60
WE524 015 12	1.5	6	12	60
WE524 015 14	1.5	6	14	60
WE524 015 16	1.5	6	16	60
WE524 015 20	1.5	6	20	60
WE524 015 26	1.5	6	26	60
WE524 020 08	2	6	8	60
WE524 020 10	2	6	10	60
WE524 020 12	2	6	12	60
WE524 020 14	2	6	14	60
WE524 020 16	2	6	16	60
WE524 025 10	2.5	6	10	60
WE524 025 12	2.5	6	12	60
WE524 025 16	2.5	6	16	60
WE524 025 20	2.5	6	20	60
WE524 025 26	2.5	6	26	60
WE524 030 16 S3	3	3	16	100
WE524 030 10	3	6	10	70
WE524 030 12	3	6	12	70
WE524 030 14	3	6	14	70
WE524 030 16	3	6	16	70
WE524 030 20	3	6	20	70
WE524 030 26	3	6	26	70

Designation	ØD	Ød	ℓ	L
WE524 030 30	3	6	30	70
WE524 030 35	3	6	35	90
WE524 040 20 S4	4	4	20	100
WE524 040 12	4	6	12	70
WE524 040 16	4	6	16	70
WE524 040 20	4	6	20	70
WE524 040 26	4	6	26	70
WE524 040 30	4	6	30	70
WE524 050 20	5	6	20	70
WE524 050 25	5	6	25	70
WE524 050 25 100	5	6	25	100
WE524 050 30	5	6	30	80
WE524 050 35	5	6	35	90
WE524 050 40	5	6	40	100
WE524 060 15	6	6	15	60
WE524 060 15 080	6	6	15	80
WE524 060 20	6	6	20	70
WE524 060 20 090	6	6	20	90
WE524 060 25	6	6	25	75
WE524 060 30	6	6	30	80
WE524 060 30 100	6	6	30	100
WE524 060 30 150	6	6	30	150
WE524 060 35	6	6	35	90
WE524 060 40	6	6	40	90
WE524 060 40 120	6	6	40	120
WE524 060 45	6	6	45	150
WE524 080 25	8	8	25	80
WE524 080 30	8	8	30	80
WE524 080 30 100	8	8	30	100
WE524 080 35	8	8	35	90
WE524 080 40	8	8	40	90
WE524 080 40 120	8	8	40	120
WE524 080 40 150	8	8	40	150
WE524 080 45	8	8	45	100
WE524 080 50	8	8	50	100
WE524 080 50 150	8	8	50	150
WE524 100 30	10	10	30	80
WE524 100 30 100	10	10	30	100

U-Star Endmill

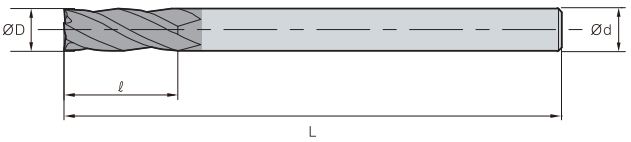
WE524

4 Flutes long shank flat endmill

ULTRA FINE | 4 | 30° HELIX | W | DATA p.446

• TOLERANCE

ØD		Ød
All sizes	0 ~ -0.03mm	h6



(mm)

Designation	ØD	Ød	ℓ	L
WE524 100 35	10	10	35	90
WE524 100 40	10	10	40	90
WE524 100 40 120	10	10	40	120
WE524 100 45	10	10	45	100
WE524 100 50	10	10	50	100
WE524 100 50 150	10	10	50	150
WE524 100 50 200	10	10	50	200
WE524 100 55	10	10	55	150
WE524 100 60	10	10	60	110
WE524 100 60 200	10	10	60	200
WE524 120 35	12	12	35	90
WE524 120 40	12	12	40	100
WE524 120 40 120	12	12	40	120
WE524 120 45	12	12	45	130
WE524 120 50	12	12	50	100
WE524 120 50 150	12	12	50	150
WE524 120 55	12	12	55	110
WE524 120 60	12	12	60	110
WE524 120 60 150	12	12	60	150
WE524 120 60 200	12	12	60	200
WE524 120 65	12	12	65	150
WE524 120 70	12	12	70	120
WE524 120 70 200	12	12	70	200
WE524 140 50	14	16	50	110
WE524 140 60	14	16	60	150
WE524 160 40	16	16	40	150
WE524 160 50	16	16	50	110

Designation	ØD	Ød	ℓ	L
WE524 160 50 150	16	16	50	150
WE524 160 60	16	16	60	120
WE524 160 70	16	16	70	130
WE524 160 70 150	16	16	70	150
WE524 160 70 200	16	16	70	200
WE524 160 80	16	16	80	150
WE524 160 90	16	16	90	150
WE524 160 110	16	16	110	200
WE524 160 120	16	16	120	250
WE524 180 50	18	20	50	120
WE524 180 70	18	20	70	130
WE524 180 100	18	20	100	200
WE524 200 50	20	20	50	110
WE524 200 50 150	20	20	50	150
WE524 200 60	20	20	60	130
WE524 200 70	20	20	70	130
WE524 200 80	20	20	80	150
WE524 200 90	20	20	90	150
WE524 200 90 200	20	20	90	200
WE524 200 110	20	20	110	200
WE524 200 120	20	20	120	250
WE524 220 75	22	20	75	150
WE524 220 110	22	20	110	200
WE524 250 70	25	25	70	150
WE524 250 90	25	25	90	150
WE524 250 110	25	25	110	200
WE524 250 120	25	25	120	250

※ The above specifications are subject to change without prior notice for product quality improvement.

• Applicable Workpiece

Carbon steel ~ HB225	Alloy steel HB225~325	Pre-hardened steel HRC30~50	Hardened steel		Copper	Graphite	Cast iron ~FCD500	Aluminum	Stainless steel
			SKD61~HRC55	SKD11 HRC55~					
○	○	◎	○				○		○

◎: Excellent ○: Good

WME504

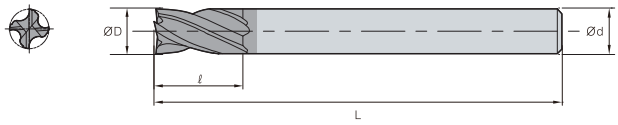
4 Flutes variable helix flat endmill

ULTRA FINE | 4 | 29° HELIX | 31° HELIX | W | DATA

p.446

• TOLERANCE

ØD		Ød
All sizes	0 ~ -0.03mm	h6



(mm)

Designation	ØD	Ød	ℓ	L
WME504 008	0.8	4	1.6	40
WME504 009	0.9	4	1.8	40
WME504 010	1	6	2.5	50
WME504 012	1.2	6	3	50
WME504 015	1.5	6	4	50
WME504 020	2	6	6	50
WME504 025	2.5	6	7	50
WME504 030	3	6	8	50
WME504 035	3.5	6	10	50
WME504 040	4	6	10	50
WME504 045	4.5	6	14	50
WME504 050	5	6	15	60
WME504 055	5.5	6	15	60
WME504 060	6	6	15	60
WME504 065	6.5	8	18	60
WME504 070	7	8	20	60
WME504 075	7.5	8	20	60
WME504 080	8	8	20	70
WME504 085	8.5	10	22	70
WME504 090	9	10	22	70
WME504 095	9.5	10	24	70

Designation	ØD	Ød	ℓ	L
WME504 100	10	10	25	75
WME504 105	10.5	12	26	75
WME504 110	11	12	30	75
WME504 115	11.5	12	30	80
WME504 120	12	12	30	80
WME504 130	13	12	35	100
WME504 140 S12	14	12	35	100
WME504 140 S14	14	14	35	100
WME504 140	14	16	35	100
WME504 150	15	16	38	100
WME504 160	16	16	40	100
WME504 170	17	16	42	100
WME504 180 S16	18	16	45	100
WME504 180	18	18	45	100
WME504 190	19	20	45	100
WME504 200	20	20	45	100
WME504 210	21	20	45	100
WME504 220	22	20	45	100
WME504 230	23	25	50	120
WME504 240	24	25	50	120
WME504 250	25	25	50	120

※ The above specifications are subject to change without prior notice for product quality improvement.

• Applicable Workpiece

Carbon steel ~ HB225	Alloy steel HB225~325	Pre-hardened steel HRC30~50	Hardened steel		Copper	Graphite	Cast iron ~FCD500	Aluminum	Stainless steel
			SKD61~HRC55	SKD11 HRC55~					
○	○	◎	○				○		○

◎: Excellent ○: Good

U-Star Endmill

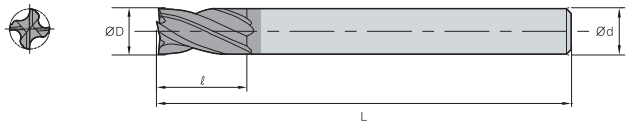
WXE504

4 Flutes variable helix flat endmill

p.446

• TOLERANCE

ØD		Ød
All sizes	0 ~ -0.03mm	h6



(mm)

Designation	ØD	Ød	ℓ	L
WXE504 010 01	1	6	1	40
WXE504 010 02	1	6	2	40
WXE504 010	1	6	2.5	50
WXE504 010 03	1	6	3	50
WXE504 010 04	1	6	4	50
WXE504 010 06	1	6	6	50
WXE504 012 02	1.2	6	2	40
WXE504 012	1.2	6	3	50
WXE504 012 04	1.2	6	4	50
WXE504 012 06	1.2	6	6	50
WXE504 015 015	1.5	6	1.5	40
WXE504 015 03	1.5	6	3	40
WXE504 015	1.5	6	4	50
WXE504 015 06	1.5	6	6	50
WXE504 015 08	1.5	6	8	50
WXE504 015 10	1.5	6	10	50
WXE504 020 02	2	6	2	40
WXE504 020 04	2	6	4	40
WXE504 020	2	6	6	50
WXE504 020 08	2	6	8	50
WXE504 020 10	2	6	10	50
WXE504 020 12	2	6	12	50
WXE504 025 025	2.5	6	2.5	40
WXE504 025 05	2.5	6	5	40
WXE504 025	2.5	6	7	50
WXE504 025 10	2.5	6	10	50
WXE504 025 12	2.5	6	12	50
WXE504 030 03	3	6	3	40
WXE504 030 06	3	6	6	40
WXE504 030	3	6	8	50
WXE504 030 10	3	6	10	50
WXE504 030 12	3	6	12	50
WXE504 030 14	3	6	14	50

Designation	ØD	Ød	ℓ	L
WXE504 040 04	4	6	4	40
WXE504 040 08	4	6	8	40
WXE504 040	4	6	10	50
WXE504 040 12	4	6	12	50
WXE504 040 14	4	6	14	50
WXE504 040 16	4	6	16	50
WXE504 050 05	5	6	5	50
WXE504 050 10	5	6	10	50
WXE504 050	5	6	15	60
WXE504 050 20	5	6	20	60
WXE504 050 25	5	6	25	60
WXE504 060 06	6	6	6	50
WXE504 060 12	6	6	12	50
WXE504 060	6	6	15	60
WXE504 060 20	6	6	20	60
WXE504 060 25	6	6	25	60
WXE504 080 16	8	8	16	60
WXE504 080	8	8	20	70
WXE504 080 25	8	8	25	70
WXE504 080 30	8	8	30	70
WXE504 100 22	10	10	22	65
WXE504 100	10	10	25	75
WXE504 100 30	10	10	30	75
WXE504 100 35	10	10	35	75
WXE504 120 26	12	12	26	70
WXE504 120	12	12	30	80
WXE504 120 35	12	12	35	80
WXE504 120 40	12	12	40	80
WXE504 140	14	16	35	100
WXE504 160 32	16	16	32	100
WXE504 160	16	16	40	100
WXE504 180	18	20	45	100
WXE504 200	20	20	45	100

※ The above specifications are subject to change without prior notice for product quality improvement.

• Applicable Workpiece

Carbon steel ~ HB225	Alloy steel HB225~325	Pre-hardened steel HRC30~50	Hardened steel		Copper	Graphite	Cast iron ~FCD500	Aluminum	Stainless steel
			SKD61~HRC55	SKD11 HRC55~					
○	○	◎	○				○		○

◎: Excellent ○: Good

WE504H

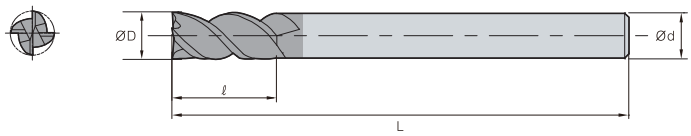
4 Flutes 45° helix flat endmill

ULTRA FINE | 4 | 45° HELIX | W | DATA

p.447

• TOLERANCE

ØD		Ød
All sizes	0 ~ -0.03mm	h6



(mm)

Designation	ØD	Ød	ℓ	L
WE504H 010	1	6	2.5	50
WE504H 010 04	1	6	4	60
WE504H 010 06	1	6	6	60
WE504H 015	1.5	6	4	50
WE504H 015 06	1.5	6	6	60
WE504H 015 08	1.5	6	8	60
WE504H 020	2	6	6	50
WE504H 020 08	2	6	8	60
WE504H 020 10	2	6	10	60
WE504H 030	3	6	8	50
WE504H 030 10	3	6	10	70
WE504H 030 12	3	6	12	70
WE504H 030 16	3	6	16	70
WE504H 040	4	6	10	50
WE504H 040 12	4	6	12	70
WE504H 040 16	4	6	16	70
WE504H 040 20	4	6	20	70
WE504H 050	5	6	15	50
WE504H 050 30	5	6	30	80
WE504H 060	6	6	15	60
WE504H 060 20	6	6	20	70

Designation	ØD	Ød	ℓ	L
WE504H 060 30	6	6	30	80
WE504H 080	8	8	20	70
WE504H 080 30	8	8	30	80
WE504H 080 35	8	8	35	90
WE504H 080 40	8	8	40	90
WE504H 100	10	10	25	75
WE504H 100 30	10	10	30	80
WE504H 100 40	10	10	40	90
WE504H 100 50	10	10	50	100
WE504H 120	12	12	30	80
WE504H 120 40	12	12	40	90
WE504H 120 50	12	12	50	100
WE504H 120 60	12	12	60	110
WE504H 160	16	16	40	100
WE504H 160 50	16	16	50	110
WE504H 160 60	16	16	60	120
WE504H 160 110	16	16	110	200
WE504H 200	20	20	45	100
WE504H 200 60	20	20	60	120
WE504H 200 70	20	20	70	130
WE504H 200 110	20	20	110	200

※ The above specifications are subject to change without prior notice for product quality improvement.

• Applicable Workpiece

Carbon steel ~ HB225	Alloy steel HB225~325	Pre-hardened steel HRC30~50	Hardened steel		Copper	Graphite	Cast iron ~FCD500	Aluminum	Stainless steel
			SKD61~HRC55	SKD11 HRC55~					
○	○	◎	○				○		○

◎: Excellent ○: Good

U-Star Endmill

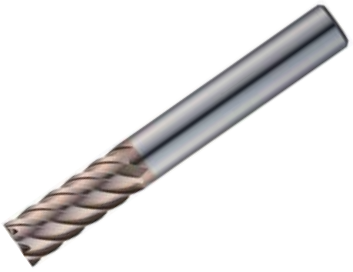
WE506

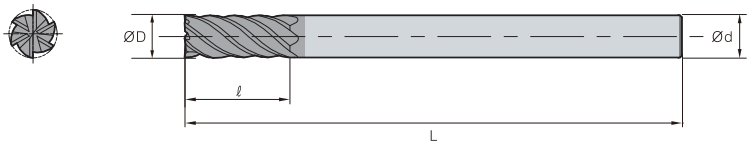
6 Flutes 45° helix flat endmill

ULTRA FINE | 6 | 45° HELIX | W | DATA p.448

• TOLERANCE

ØD		Ød
All sizes	0 ~ -0.03mm	h6





(mm)

Designation	ØD	Ød	ℓ	L
WE506 060	6	6	15	60
WE506 060 20	6	6	20	70
WE506 060 30	6	6	30	80
WE506 060 30 110	6	6	30	110
WE506 080	8	8	20	70
WE506 080 30	8	8	30	80
WE506 080 35	8	8	35	90
WE506 080 40	8	8	40	90
WE506 080 40 130	8	8	40	130
WE506 100	10	10	25	75
WE506 100 30	10	10	30	80
WE506 100 40	10	10	40	90
WE506 100 50	10	10	50	100
WE506 100 50 150	10	10	50	150
WE506 120	12	12	30	80
WE506 120 40	12	12	40	90
WE506 120 50	12	12	50	100
WE506 120 60	12	12	60	110
WE506 120 60 150	12	12	60	150
WE506 160	16	16	40	100
WE506 160 50	16	16	50	110
WE506 160 60	16	16	60	120
WE506 160 90	16	16	90	150
WE506 160 110	16	16	110	200
WE506 160 110 250	16	16	110	250
WE506 200	20	20	45	100
WE506 200 60	20	20	60	120
WE506 200 70	20	20	70	130
WE506 200 110	20	20	110	200
WE506 200 110 250	20	20	110	250
WE506 200 110 300	20	20	110	300

※ The above specifications are subject to change without prior notice for product quality improvement.

• Applicable Workpiece

Carbon steel ~ HB225	Alloy steel HB225~325	Pre-hardened steel HRC30~50	Hardened steel		Copper	Graphite	Cast iron ~FCD500	Aluminum	Stainless steel
			SKD61~HRC55	SKD11 HRC55~					
○	○	◎	○				○		○

◎: Excellent ○: Good

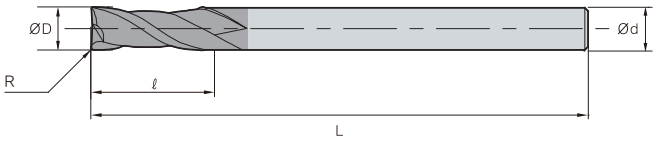
WR502

2 Flutes radius endmill

ULTRA FINE | 2 | 30° HELIX | R ±0.005 Ø6 or Under | R ±0.01 Above Ø6 | W | DATA p.449

• TOLERANCE

ØD		Ød
Ø0.2 ~ Ø6	0 ~ -0.012mm	h6
Ø7 ~ Ø20	0 ~ -0.015mm	



(mm)

Designation	R	ØD	Ød	ℓ	L
WR502 002 002	0.02	0.2	4	0.4	40
WR502 002 005	0.05	0.2	4	0.4	40
WR502 003 002	0.02	0.3	4	0.6	40
WR502 003 005	0.05	0.3	4	0.6	40
WR502 004 005	0.05	0.4	4	0.8	40
WR502 004 01	0.1	0.4	4	0.8	40
WR502 005 005	0.05	0.5	4	1	40
WR502 005 01	0.1	0.5	4	1	40
WR502 006 005	0.05	0.6	4	1.2	40
WR502 006 01	0.1	0.6	4	1.2	40
WR502 006 02	0.2	0.6	4	1.2	40
WR502 007 005	0.05	0.7	4	1.4	40
WR502 007 01	0.1	0.7	4	1.4	40
WR502 007 02	0.2	0.7	4	1.4	40
WR502 008 005	0.05	0.8	4	1.6	40
WR502 008 01	0.1	0.8	4	1.6	40
WR502 008 02	0.2	0.8	4	1.6	40
WR502 009 005	0.05	0.9	4	1.8	40
WR502 009 01	0.1	0.9	4	1.8	40
WR502 010 005	0.05	1	6	2.5	50
WR502 010 01	0.1	1	6	2.5	50
WR502 010 02	0.2	1	6	2.5	50
WR502 010 03	0.3	1	6	2.5	50
WR502 012 005	0.05	1.2	6	3	50
WR502 012 01	0.1	1.2	6	3	50
WR502 012 02	0.2	1.2	6	3	50
WR502 012 03	0.3	1.2	6	3	50
WR502 015 005	0.05	1.5	6	4	50
WR502 015 01	0.1	1.5	6	4	50
WR502 015 02	0.2	1.5	6	4	50
WR502 015 03	0.3	1.5	6	4	50
WR502 015 05	0.5	1.5	6	4	50
WR502 020 01	0.1	2	6	6	50
WR502 020 02	0.2	2	6	6	50
WR502 020 03	0.3	2	6	6	50
WR502 020 05	0.5	2	6	6	50

Designation	R	ØD	Ød	ℓ	L
WR502 025 01	0.1	2.5	6	7	60
WR502 025 02	0.2	2.5	6	7	60
WR502 025 03	0.3	2.5	6	7	60
WR502 025 05	0.5	2.5	6	7	60
WR502 030 01	0.1	3	6	8	60
WR502 030 02	0.2	3	6	8	60
WR502 030 03	0.3	3	6	8	60
WR502 030 05	0.5	3	6	8	60
WR502 030 10	1	3	6	8	60
WR502 035 01	0.1	3.5	6	10	70
WR502 035 02	0.2	3.5	6	10	70
WR502 035 03	0.3	3.5	6	10	70
WR502 035 05	0.5	3.5	6	10	70
WR502 040 01 S4	0.1	4	4	10	70
WR502 040 02 S4	0.2	4	4	10	70
WR502 040 03 S4	0.3	4	4	10	70
WR502 040 05 S4	0.5	4	4	10	70
WR502 040 10 S4	1	4	4	10	70
WR502 040 01 100 S4	0.1	4	4	10	100
WR502 040 02 100 S4	0.2	4	4	10	100
WR502 040 03 100 S4	0.3	4	4	10	100
WR502 040 05 100 S4	0.5	4	4	10	100
WR502 040 10 100 S4	1	4	4	10	100
WR502 040 01	0.1	4	6	10	100
WR502 040 02	0.2	4	6	10	100
WR502 040 03	0.3	4	6	10	100
WR502 040 05	0.5	4	6	10	100
WR502 040 10	1	4	6	10	100
WR502 045 01	0.1	4.5	6	11	80
WR502 045 02	0.2	4.5	6	11	80
WR502 045 03	0.3	4.5	6	11	80
WR502 045 05	0.5	4.5	6	11	80
WR502 050 01	0.1	5	6	13	90
WR502 050 02	0.2	5	6	13	90
WR502 050 03	0.3	5	6	13	90
WR502 050 05	0.5	5	6	13	90

U-Star Endmill

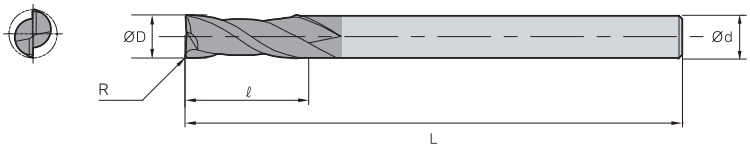
WR502

2 Flutes radius endmill

ULTRA FINE | 2 | 30° HELIX | R ±0.005 Ø6 or Under | R ±0.01 Above Ø6 | W | DATA p.449

• TOLERANCE

ØD		Ød
Ø0.2 ~ Ø6	0 ~ -0.012mm	h6
Ø7 ~ Ø20	0 ~ -0.015mm	



(mm)

Designation	R	ØD	Ød	ℓ	L
WR502 050 10	1	5	6	13	90
WR502 055 01	0.1	5.5	6	13	90
WR502 055 02	0.2	5.5	6	13	90
WR502 055 03	0.3	5.5	6	13	90
WR502 055 05	0.5	5.5	6	13	90
WR502 055 10	1	5.5	6	13	90
WR502 060 03 60	0.3	6	6	15	60
WR502 060 05 60	0.5	6	6	15	60
WR502 060 10 60	1	6	6	15	60
WR502 060 01	0.1	6	6	15	90
WR502 060 02	0.2	6	6	15	90
WR502 060 03	0.3	6	6	15	90
WR502 060 05	0.5	6	6	15	90
WR502 060 10	1	6	6	15	90
WR502 060 15	1.5	6	6	15	90
WR502 060 20	2	6	6	15	90
WR502 060 05 110	0.5	6	6	15	110
WR502 060 10 110	1	6	6	15	110
WR502 060 05 130	0.5	6	6	15	130
WR502 060 10 130	1	6	6	15	130
WR502 070 01	0.1	7	8	16	90
WR502 070 02	0.2	7	8	16	90
WR502 070 03	0.3	7	8	16	90
WR502 070 05	0.5	7	8	16	90
WR502 070 10	1	7	8	16	90
WR502 070 20	2	7	8	16	90
WR502 080 03 70	0.3	8	8	20	70
WR502 080 05 70	0.5	8	8	20	70
WR502 080 10 70	1	8	8	20	70
WR502 080 01	0.1	8	8	20	100
WR502 080 02	0.2	8	8	20	100
WR502 080 03	0.3	8	8	20	100
WR502 080 05	0.5	8	8	20	100
WR502 080 10	1	8	8	20	100
WR502 080 15	1.5	8	8	20	100
WR502 080 20	2	8	8	20	100

Designation	R	ØD	Ød	ℓ	L
WR502 080 25	2.5	8	8	20	100
WR502 080 30	3	8	8	20	100
WR502 080 05 120	0.5	8	8	20	120
WR502 080 10 120	1	8	8	20	120
WR502 080 05 150	0.5	8	8	20	150
WR502 080 10 150	1	8	8	20	150
WR502 100 03 75	0.3	10	10	25	75
WR502 100 05 75	0.5	10	10	25	75
WR502 100 10 75	1	10	10	25	75
WR502 100 01	0.1	10	10	25	100
WR502 100 02	0.2	10	10	25	100
WR502 100 03	0.3	10	10	25	100
WR502 100 05	0.5	10	10	25	100
WR502 100 10	1	10	10	25	100
WR502 100 15	1.5	10	10	25	100
WR502 100 20	2	10	10	25	100
WR502 100 25	2.5	10	10	25	100
WR502 100 30	3	10	10	25	100
WR502 100 40	4	10	10	25	100
WR502 100 05 130	0.5	10	10	25	130
WR502 100 10 130	1	10	10	25	130
WR502 100 05 150	0.5	10	10	25	150
WR502 100 10 150	1	10	10	25	150
WR502 110 02	0.2	11	12	25	110
WR502 110 03	0.3	11	12	25	110
WR502 110 05	0.5	11	12	25	110
WR502 110 10	1	11	12	25	110
WR502 110 20	2	11	12	25	110
WR502 120 03 80	0.3	12	12	30	80
WR502 120 05 80	0.5	12	12	30	80
WR502 120 10 80	1	12	12	30	80
WR502 120 01	0.1	12	12	30	110
WR502 120 02	0.2	12	12	30	110
WR502 120 03	0.3	12	12	30	110
WR502 120 05	0.5	12	12	30	110
WR502 120 10	1	12	12	30	110

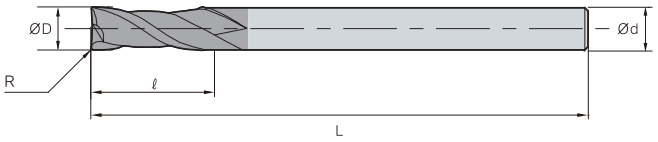
WR502

2 Flutes radius endmill

ULTRA FINE | 2 | 30° HELIX | R ±0.005 (Ø6 or Under) | R ±0.01 (Above Ø6) | W | DATA p.449

• TOLERANCE

ØD		Ød
Ø0.2 ~ Ø6	0 ~ -0.012mm	h6
Ø7 ~ Ø20	0 ~ -0.015mm	



(mm)

Designation	R	ØD	Ød	ℓ	L
WR502 120 15	1.5	12	12	30	110
WR502 120 20	2	12	12	30	110
WR502 120 25	2.5	12	12	30	110
WR502 120 30	3	12	12	30	110
WR502 120 40	4	12	12	30	110
WR502 120 50	5	12	12	30	110
WR502 120 05 130	0.5	12	12	30	130
WR502 120 10 130	1	12	12	30	130
WR502 120 05 150	0.5	12	12	30	150
WR502 120 10 150	1	12	12	30	150
WR502 140 05	0.5	14	16	30	150

Designation	R	ØD	Ød	ℓ	L
WR502 140 10	1	14	16	30	150
WR502 140 20	2	14	16	30	150
WR502 160 05	0.5	16	16	32	150
WR502 160 10	1	16	16	32	150
WR502 160 15	1.5	16	16	32	150
WR502 160 20	2	16	16	32	150
WR502 200 05	0.5	20	20	38	150
WR502 200 10	1	20	20	38	150
WR502 200 15	1.5	20	20	38	150
WR502 200 20	2	20	20	38	150

※ The above specifications are subject to change without prior notice for product quality improvement.

• Applicable Workpiece

Carbon steel ~ HB225	Alloy steel HB225~325	Pre-hardened steel HRC30~50	Hardened steel		Copper	Graphite	Cast iron ~FCD500	Aluminum	Stainless steel
			SKD61~HRC55	SKD11 HRC55~					
○	○	◎	○				○		○

◎: Excellent ○: Good

U-Star Endmill

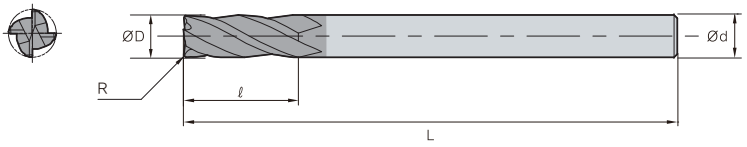
WR504

4 Flutes radius endmill

ULTRA FINE | 4 | 38° HELIX | R ±0.02 ALL SIZES | W | DATA p.449

• TOLERANCE

ØD		Ød
All sizes	0 ~ -0.03mm	h6



(mm)

Designation	R	ØD	Ød	ℓ	L
WR504 030 02	0.2	3	6	8	60
WR504 030 03	0.3	3	6	8	60
WR504 030 05	0.5	3	6	8	60
WR504 040 02	0.2	4	6	10	70
WR504 040 03	0.3	4	6	10	70
WR504 040 05	0.5	4	6	10	70
WR504 040 10	1	4	6	10	70
WR504 050 03 060	0.3	5	6	13	60
WR504 050 05 060	0.5	5	6	13	60
WR504 050 03	0.3	5	6	13	90
WR504 050 05	0.5	5	6	13	90
WR504 060 03 060	0.3	6	6	15	60
WR504 060 05 060	0.5	6	6	15	60
WR504 060 10 060	1	6	6	15	60
WR504 060 03	0.3	6	6	15	90
WR504 060 05	0.5	6	6	15	90
WR504 060 10	1	6	6	15	90
WR504 080 03 070	0.3	8	8	20	70
WR504 080 05 070	0.5	8	8	20	70
WR504 080 10 070	1	8	8	20	70
WR504 080 03	0.3	8	8	20	100
WR504 080 05	0.5	8	8	20	100
WR504 080 10	1	8	8	20	100
WR504 100 03 075	0.3	10	10	25	75
WR504 100 05 075	0.5	10	10	25	75
WR504 100 10 075	1	10	10	25	75

Designation	R	ØD	Ød	ℓ	L
WR504 100 03	0.3	10	10	25	100
WR504 100 05	0.5	10	10	25	100
WR504 100 10	1	10	10	25	100
WR504 120 03 080	0.3	12	12	30	80
WR504 120 05 080	0.5	12	12	30	80
WR504 120 10 080	1	12	12	30	80
WR504 120 03	0.3	12	12	30	110
WR504 120 05	0.5	12	12	30	110
WR504 120 10	1	12	12	30	110
WR504 160 05 100	0.5	16	16	32	100
WR504 160 10 100	1	16	16	32	100
WR504 160 15 100	1.5	16	16	32	100
WR504 160 20 100	2	16	16	32	100
WR504 160 05	0.5	16	16	32	150
WR504 160 10	1	16	16	32	150
WR504 160 15	1.5	16	16	32	150
WR504 160 20	2	16	16	32	150
WR504 200 05 100	0.5	20	20	38	100
WR504 200 10 100	1	20	20	38	100
WR504 200 15 100	1.5	20	20	38	100
WR504 200 20 100	2	20	20	38	100
WR504 200 05	0.5	20	20	38	150
WR504 200 10	1	20	20	38	150
WR504 200 15	1.5	20	20	38	150
WR504 200 20	2	20	20	38	150

※ The above specifications are subject to change without prior notice for product quality improvement.

• **Applicable Workpiece**

Carbon steel ~ HB225	Alloy steel HB225~325	Pre-hardened steel HRC30~50	Hardened steel		Copper	Graphite	Cast iron ~FCD500	Aluminum	Stainless steel
			SKD61~HRC55	SKD11 HRC55~					
○	○	◎	○				○		○

◎: Excellent ○: Good

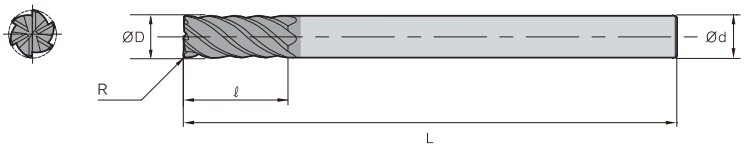
WR506

6 Flutes 45° helix radius endmill

ULTRA FINE | 6 | 45° HELIX | R ±0.015 All sizes | W | DATA p.450

• TOLERANCE

ØD		Ød
All sizes	0 ~ -0.03mm	h6



(mm)

Designation	R	ØD	Ød	ℓ	L
WR506 060 03	0.3	6	6	15	90
WR506 060 05	0.5	6	6	15	90
WR506 060 10	1	6	6	15	90
WR506 080 03	0.3	8	8	20	100
WR506 080 05	0.5	8	8	20	100
WR506 080 10	1	8	8	20	100
WR506 100 03	0.3	10	10	25	100
WR506 100 05	0.5	10	10	25	100
WR506 100 10	1	10	10	25	100
WR506 120 03	0.3	12	12	30	110
WR506 120 05	0.5	12	12	30	110
WR506 120 10	1	12	12	30	110
WR506 160 05	0.5	16	16	32	150
WR506 160 10	1	16	16	32	150
WR506 160 15	1.5	16	16	32	150
WR506 160 20	2	16	16	32	150
WR506 200 05	0.5	20	20	38	150
WR506 200 10	1	20	20	38	150
WR506 200 15	1.5	20	20	38	150
WR506 200 20	2	20	20	38	150

※ The above specifications are subject to change without prior notice for product quality improvement.

• Applicable Workpiece

Carbon steel ~ HB225	Alloy steel HB225~325	Pre-hardened steel HRC30~50	Hardened steel		Copper	Graphite	Cast iron ~FCD500	Aluminum	Stainless steel
			SKD61~HRC55	SKD11 HRC55~					
○	○	◎	○				○		○

◎: Excellent ○: Good

U-Star Endmill

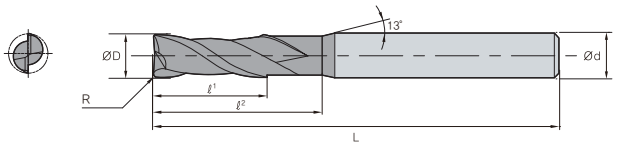
WR512

2 Flutes neck type radius endmill

ULTRA FINE | 2 | 30° HELIX | R ±0.01 Ø6 or Under | R ±0.015 Above Ø6 | W | DATA p.449

• TOLERANCE

ØD		Ød
Ø0.2 ~ Ø6	0 ~ -0.012mm	h6
Ø8 ~ Ø12	0 ~ -0.015mm	



(mm)

Designation	R	ØD	Ød	ℓ1	ℓ2	L
WR512 002 002 005	0.02	0.2	4	0.3	0.5	40
WR512 002 002 01	0.02	0.2	4	0.3	1	40
WR512 002 002 015	0.02	0.2	4	0.3	1.5	40
WR512 002 002 02	0.02	0.2	4	0.3	2	40
WR512 002 005 005	0.05	0.2	4	0.3	0.5	40
WR512 002 005 01	0.05	0.2	4	0.3	1	40
WR512 002 005 015	0.05	0.2	4	0.3	1.5	40
WR512 002 005 02	0.05	0.2	4	0.3	2	40
WR512 003 002 01	0.02	0.3	4	0.5	1	40
WR512 003 002 02	0.02	0.3	4	0.5	2	40
WR512 003 002 03	0.02	0.3	4	0.5	3	40
WR512 003 005 01	0.05	0.3	4	0.5	1	40
WR512 003 005 02	0.05	0.3	4	0.5	2	40
WR512 003 005 03	0.05	0.3	4	0.5	3	40
WR512 004 005 01	0.05	0.4	4	0.6	1	40
WR512 004 005 015	0.05	0.4	4	0.6	1.5	40
WR512 004 005 02	0.05	0.4	4	0.6	2	40
WR512 004 005 025	0.05	0.4	4	0.6	2.5	40
WR512 004 005 03	0.05	0.4	4	0.6	3	40
WR512 004 005 04	0.05	0.4	4	0.6	4	40
WR512 004 01 01	0.1	0.4	4	0.6	1	40
WR512 004 01 015	0.1	0.4	4	0.6	1.5	40
WR512 004 01 02	0.1	0.4	4	0.6	2	40
WR512 004 01 025	0.1	0.4	4	0.6	2.5	40
WR512 004 01 03	0.1	0.4	4	0.6	3	40
WR512 004 01 04	0.1	0.4	4	0.6	4	40
WR512 005 005 01	0.05	0.5	4	0.7	1	45
WR512 005 005 015	0.05	0.5	4	0.7	1.5	45
WR512 005 005 02	0.05	0.5	4	0.7	2	45
WR512 005 005 025	0.05	0.5	4	0.7	2.5	45
WR512 005 005 03	0.05	0.5	4	0.7	3	45
WR512 005 005 04	0.05	0.5	4	0.7	4	45
WR512 005 005 05	0.05	0.5	4	0.7	5	45
WR512 005 005 06	0.05	0.5	4	0.7	6	45
WR512 005 01 01	0.1	0.5	4	0.7	1	45
WR512 005 01 015	0.1	0.5	4	0.7	1.5	45
WR512 005 01 02	0.1	0.5	4	0.7	2	45
WR512 005 01 025	0.1	0.5	4	0.7	2.5	45

Designation	R	ØD	Ød	ℓ1	ℓ2	L
WR512 005 01 03	0.1	0.5	4	0.7	3	45
WR512 005 01 04	0.1	0.5	4	0.7	4	45
WR512 005 01 05	0.1	0.5	4	0.7	5	45
WR512 005 01 06	0.1	0.5	4	0.7	6	45
WR512 006 005 02	0.05	0.6	4	0.9	2	45
WR512 006 005 03	0.05	0.6	4	0.9	3	45
WR512 006 005 04	0.05	0.6	4	0.9	4	45
WR512 006 005 06	0.05	0.6	4	0.9	6	45
WR512 006 005 08	0.05	0.6	4	0.9	8	45
WR512 006 005 10	0.05	0.6	4	0.9	10	45
WR512 006 01 02	0.1	0.6	4	0.9	2	45
WR512 006 01 03	0.1	0.6	4	0.9	3	45
WR512 006 01 04	0.1	0.6	4	0.9	4	45
WR512 006 01 06	0.1	0.6	4	0.9	6	45
WR512 006 01 08	0.1	0.6	4	0.9	8	45
WR512 006 01 10	0.1	0.6	4	0.9	10	45
WR512 006 02 02	0.2	0.6	4	0.9	2	45
WR512 006 02 03	0.2	0.6	4	0.9	3	45
WR512 006 02 04	0.2	0.6	4	0.9	4	45
WR512 006 02 06	0.2	0.6	4	0.9	6	45
WR512 006 02 08	0.2	0.6	4	0.9	8	45
WR512 006 02 10	0.2	0.6	4	0.9	10	45
WR512 007 005 02	0.05	0.7	4	1.2	2	45
WR512 007 005 04	0.05	0.7	4	1.2	4	45
WR512 007 005 06	0.05	0.7	4	1.2	6	45
WR512 007 005 08	0.05	0.7	4	1.2	8	45
WR512 007 005 10	0.05	0.7	4	1.2	10	45
WR512 007 01 02	0.1	0.7	4	1.2	2	45
WR512 007 01 04	0.1	0.7	4	1.2	4	45
WR512 007 01 06	0.1	0.7	4	1.2	6	45
WR512 007 01 08	0.1	0.7	4	1.2	8	45
WR512 007 01 10	0.1	0.7	4	1.2	10	45
WR512 007 02 02	0.2	0.7	4	1.2	2	45
WR512 007 02 04	0.2	0.7	4	1.2	4	45
WR512 007 02 06	0.2	0.7	4	1.2	6	45
WR512 007 02 08	0.2	0.7	4	1.2	8	45
WR512 007 02 10	0.2	0.7	4	1.2	10	45
WR512 008 005 02	0.05	0.8	4	1.2	2	45

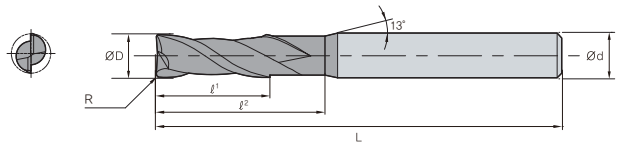
WR512

2 Flutes neck type radius endmill

ULTRA FINE | 2 | 30° HELIX | R ±0.01 Ø6 or Under | R ±0.015 Above Ø6 | W | DATA p.449

• TOLERANCE

ØD		Ød
Ø0.2 ~ Ø6	0 ~ -0.012mm	h6
Ø8 ~ Ø12	0 ~ -0.015mm	



(mm)

Designation	R	ØD	Ød	ℓ1	ℓ2	L
WR512 008 005 03	0.05	0.8	4	1.2	3	45
WR512 008 005 04	0.05	0.8	4	1.2	4	45
WR512 008 005 06	0.05	0.8	4	1.2	6	45
WR512 008 005 08	0.05	0.8	4	1.2	8	45
WR512 008 005 10	0.05	0.8	4	1.2	10	45
WR512 008 01 02	0.1	0.8	4	1.2	2	45
WR512 008 01 03	0.1	0.8	4	1.2	3	45
WR512 008 01 04	0.1	0.8	4	1.2	4	45
WR512 008 01 06	0.1	0.8	4	1.2	6	45
WR512 008 01 08	0.1	0.8	4	1.2	8	45
WR512 008 01 10	0.1	0.8	4	1.2	10	45
WR512 008 02 02	0.2	0.8	4	1.2	2	45
WR512 008 02 03	0.2	0.8	4	1.2	3	45
WR512 008 02 04	0.2	0.8	4	1.2	4	45
WR512 008 02 06	0.2	0.8	4	1.2	6	45
WR512 008 02 08	0.2	0.8	4	1.2	8	45
WR512 008 02 10	0.2	0.8	4	1.2	10	45
WR512 010 005 03	0.05	1	4	1.5	3	50
WR512 010 005 04	0.05	1	4	1.5	4	50
WR512 010 005 06	0.05	1	4	1.5	6	50
WR512 010 005 08	0.05	1	4	1.5	8	50
WR512 010 005 10	0.05	1	4	1.5	10	50
WR512 010 005 12	0.05	1	4	1.5	12	50
WR512 010 005 14	0.05	1	4	1.5	14	50
WR512 010 005 16	0.05	1	4	1.5	16	50
WR512 010 005 20	0.05	1	4	1.5	20	50
WR512 010 01 03	0.1	1	4	1.5	3	50
WR512 010 01 04	0.1	1	4	1.5	4	50
WR512 010 01 06	0.1	1	4	1.5	6	50
WR512 010 01 08	0.1	1	4	1.5	8	50
WR512 010 01 10	0.1	1	4	1.5	10	50
WR512 010 01 12	0.1	1	4	1.5	12	50
WR512 010 01 14	0.1	1	4	1.5	14	50
WR512 010 01 16	0.1	1	4	1.5	16	50
WR512 010 01 20	0.1	1	4	1.5	20	50
WR512 010 02 03	0.2	1	4	1.5	3	50
WR512 010 02 04	0.2	1	4	1.5	4	50
WR512 010 02 06	0.2	1	4	1.5	6	50
WR512 010 02 08	0.2	1	4	1.5	8	50
WR512 010 02 10	0.2	1	4	1.5	10	50
WR512 010 02 12	0.2	1	4	1.5	12	50
WR512 010 02 14	0.2	1	4	1.5	14	50
WR512 010 02 16	0.2	1	4	1.5	16	50
WR512 010 02 20	0.2	1	4	1.5	20	50
WR512 010 03 03	0.3	1	4	1.5	3	50
WR512 010 03 04	0.3	1	4	1.5	4	50
WR512 010 03 06	0.3	1	4	1.5	6	50
WR512 010 03 08	0.3	1	4	1.5	8	50
WR512 010 03 10	0.3	1	4	1.5	10	50
WR512 010 03 12	0.3	1	4	1.5	12	50
WR512 010 03 14	0.3	1	4	1.5	14	50
WR512 010 03 16	0.3	1	4	1.5	16	50
WR512 010 03 20	0.3	1	4	1.5	20	50
WR512 012 005 03	0.05	1.2	4	1.8	3	50
WR512 012 005 04	0.05	1.2	4	1.8	4	50
WR512 012 005 06	0.05	1.2	4	1.8	6	50
WR512 012 005 08	0.05	1.2	4	1.8	8	50
WR512 012 005 10	0.05	1.2	4	1.8	10	50
WR512 012 005 12	0.05	1.2	4	1.8	12	50
WR512 012 005 16	0.05	1.2	4	1.8	16	50
WR512 012 005 20	0.05	1.2	4	1.8	20	50
WR512 012 01 03	0.1	1.2	4	1.8	3	50
WR512 012 01 04	0.1	1.2	4	1.8	4	50
WR512 012 01 06	0.1	1.2	4	1.8	6	50
WR512 012 01 08	0.1	1.2	4	1.8	8	50
WR512 012 01 10	0.1	1.2	4	1.8	10	50
WR512 012 01 12	0.1	1.2	4	1.8	12	50
WR512 012 01 16	0.1	1.2	4	1.8	16	50
WR512 012 01 20	0.1	1.2	4	1.8	20	50
WR512 012 02 03	0.2	1.2	4	1.8	3	50
WR512 012 02 04	0.2	1.2	4	1.8	4	50
WR512 012 02 06	0.2	1.2	4	1.8	6	50
WR512 012 02 08	0.2	1.2	4	1.8	8	50
WR512 012 02 10	0.2	1.2	4	1.8	10	50
WR512 012 02 12	0.2	1.2	4	1.8	12	50
WR512 012 02 16	0.2	1.2	4	1.8	16	50

U-Star Endmill

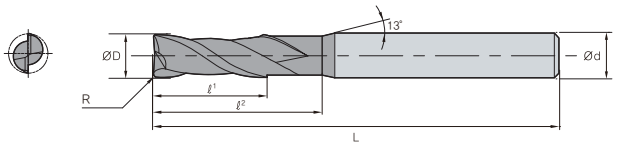
WR512

2 Flutes neck type radius endmill

ULTRA FINE | 2 | 30° HELIX | R ±0.01 Ø6 or Under | R ±0.015 Above Ø6 | W | DATA p.449

• TOLERANCE

ØD		Ød
Ø0.2 ~ Ø6	0 ~ -0.012mm	h6
Ø8 ~ Ø12	0 ~ -0.015mm	



(mm)

Designation	R	ØD	Ød	ℓ1	ℓ2	L
WR512 012 02 20	0.2	1.2	4	1.8	20	50
WR512 012 03 03	0.3	1.2	4	1.8	3	50
WR512 012 03 04	0.3	1.2	4	1.8	4	50
WR512 012 03 06	0.3	1.2	4	1.8	6	50
WR512 012 03 08	0.3	1.2	4	1.8	8	50
WR512 012 03 10	0.3	1.2	4	1.8	10	50
WR512 012 03 12	0.3	1.2	4	1.8	12	50
WR512 012 03 16	0.3	1.2	4	1.8	16	50
WR512 012 03 20	0.3	1.2	4	1.8	20	50
WR512 015 005 04	0.05	1.5	4	2.3	4	50
WR512 015 005 06	0.05	1.5	4	2.3	6	50
WR512 015 005 08	0.05	1.5	4	2.3	8	50
WR512 015 005 10	0.05	1.5	4	2.3	10	50
WR512 015 005 12	0.05	1.5	4	2.3	12	50
WR512 015 005 14	0.05	1.5	4	2.3	14	50
WR512 015 005 16	0.05	1.5	4	2.3	16	50
WR512 015 005 20	0.05	1.5	4	2.3	20	50
WR512 015 005 22	0.05	1.5	4	2.3	22	60
WR512 015 005 26	0.05	1.5	4	2.3	26	60
WR512 015 01 04	0.1	1.5	4	2.3	4	50
WR512 015 01 06	0.1	1.5	4	2.3	6	50
WR512 015 01 08	0.1	1.5	4	2.3	8	50
WR512 015 01 10	0.1	1.5	4	2.3	10	50
WR512 015 01 12	0.1	1.5	4	2.3	12	50
WR512 015 01 14	0.1	1.5	4	2.3	14	50
WR512 015 01 16	0.1	1.5	4	2.3	16	50
WR512 015 01 20	0.1	1.5	4	2.3	20	50
WR512 015 01 22	0.1	1.5	4	2.3	22	60
WR512 015 01 26	0.1	1.5	4	2.3	26	60
WR512 015 02 04	0.2	1.5	4	2.3	4	50
WR512 015 02 06	0.2	1.5	4	2.3	6	50
WR512 015 02 08	0.2	1.5	4	2.3	8	50
WR512 015 02 10	0.2	1.5	4	2.3	10	50
WR512 015 02 12	0.2	1.5	4	2.3	12	50
WR512 015 02 14	0.2	1.5	4	2.3	14	50
WR512 015 02 16	0.2	1.5	4	2.3	16	50
WR512 015 02 20	0.2	1.5	4	2.3	20	50
WR512 015 02 22	0.2	1.5	4	2.3	22	60

Designation	R	ØD	Ød	ℓ1	ℓ2	L
WR512 015 02 26	0.2	1.5	4	2.3	26	60
WR512 015 03 04	0.3	1.5	4	2.3	4	50
WR512 015 03 06	0.3	1.5	4	2.3	6	50
WR512 015 03 08	0.3	1.5	4	2.3	8	50
WR512 015 03 10	0.3	1.5	4	2.3	10	50
WR512 015 03 12	0.3	1.5	4	2.3	12	50
WR512 015 03 14	0.3	1.5	4	2.3	14	50
WR512 015 03 16	0.3	1.5	4	2.3	16	50
WR512 015 03 20	0.3	1.5	4	2.3	20	50
WR512 015 03 22	0.3	1.5	4	2.3	22	60
WR512 015 03 26	0.3	1.5	4	2.3	26	60
WR512 015 05 04	0.5	1.5	4	2.3	4	50
WR512 015 05 06	0.5	1.5	4	2.3	6	50
WR512 015 05 08	0.5	1.5	4	2.3	8	50
WR512 015 05 10	0.5	1.5	4	2.3	10	50
WR512 015 05 12	0.5	1.5	4	2.3	12	50
WR512 015 05 14	0.5	1.5	4	2.3	14	50
WR512 015 05 16	0.5	1.5	4	2.3	16	50
WR512 015 05 20	0.5	1.5	4	2.3	20	50
WR512 015 05 22	0.5	1.5	4	2.3	22	60
WR512 015 05 26	0.5	1.5	4	2.3	26	60
WR512 020 01 06	0.1	2	4	3	6	50
WR512 020 01 08	0.1	2	4	3	8	50
WR512 020 01 10	0.1	2	4	3	10	50
WR512 020 01 12	0.1	2	4	3	12	50
WR512 020 01 14	0.1	2	4	3	14	50
WR512 020 01 16	0.1	2	4	3	16	50
WR512 020 01 20	0.1	2	4	3	20	50
WR512 020 01 22	0.1	2	4	3	22	60
WR512 020 01 26	0.1	2	4	3	26	60
WR512 020 01 30	0.1	2	4	3	30	70
WR512 020 02 06	0.2	2	4	3	6	50
WR512 020 02 08	0.2	2	4	3	8	50
WR512 020 02 10	0.2	2	4	3	10	50
WR512 020 02 12	0.2	2	4	3	12	50
WR512 020 02 14	0.2	2	4	3	14	50
WR512 020 02 16	0.2	2	4	3	16	50
WR512 020 02 20	0.2	2	4	3	20	50

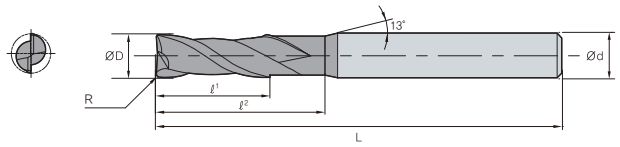
WR512

2 Flutes neck type radius endmill

ULTRA FINE | 2 | 30° HELIX | R ±0.01 Ø6 or Under | R ±0.015 Above Ø6 | W | DATA p.449

• TOLERANCE

ØD		Ød
Ø0.2 ~ Ø6	0 ~ -0.012mm	h6
Ø8 ~ Ø12	0 ~ -0.015mm	



(mm)

Designation	R	ØD	Ød	ℓ1	ℓ2	L
WR512 020 02 22	0.2	2	4	3	22	60
WR512 020 02 26	0.2	2	4	3	26	60
WR512 020 02 30	0.2	2	4	3	30	70
WR512 020 03 06	0.3	2	4	3	6	50
WR512 020 03 08	0.3	2	4	3	8	50
WR512 020 03 10	0.3	2	4	3	10	50
WR512 020 03 12	0.3	2	4	3	12	50
WR512 020 03 14	0.3	2	4	3	14	50
WR512 020 03 16	0.3	2	4	3	16	50
WR512 020 03 20	0.3	2	4	3	20	50
WR512 020 03 22	0.3	2	4	3	22	60
WR512 020 03 26	0.3	2	4	3	26	60
WR512 020 03 30	0.3	2	4	3	30	70
WR512 020 05 06	0.5	2	4	3	6	50
WR512 020 05 08	0.5	2	4	3	8	50
WR512 020 05 10	0.5	2	4	3	10	50
WR512 020 05 12	0.5	2	4	3	12	50
WR512 020 05 14	0.5	2	4	3	14	50
WR512 020 05 16	0.5	2	4	3	16	50
WR512 020 05 20	0.5	2	4	3	20	50
WR512 020 05 22	0.5	2	4	3	22	60
WR512 020 05 26	0.5	2	4	3	26	60
WR512 020 05 30	0.5	2	4	3	30	70
WR512 025 01 08	0.1	2.5	4	4	8	50
WR512 025 01 10	0.1	2.5	4	4	10	50
WR512 025 01 12	0.1	2.5	4	4	12	50
WR512 025 01 14	0.1	2.5	4	4	14	50
WR512 025 01 16	0.1	2.5	4	4	16	50
WR512 025 01 20	0.1	2.5	4	4	20	50
WR512 025 01 26	0.1	2.5	4	4	26	60
WR512 025 01 30	0.1	2.5	4	4	30	70
WR512 025 02 08	0.2	2.5	4	4	8	50
WR512 025 02 10	0.2	2.5	4	4	10	50
WR512 025 02 12	0.2	2.5	4	4	12	50
WR512 025 02 14	0.2	2.5	4	4	14	50
WR512 025 02 16	0.2	2.5	4	4	16	50
WR512 025 02 20	0.2	2.5	4	4	20	50
WR512 025 02 26	0.2	2.5	4	4	26	60

Designation	R	ØD	Ød	ℓ1	ℓ2	L
WR512 025 02 30	0.2	2.5	4	4	30	70
WR512 025 03 08	0.3	2.5	4	4	8	50
WR512 025 03 10	0.3	2.5	4	4	10	50
WR512 025 03 12	0.3	2.5	4	4	12	50
WR512 025 03 14	0.3	2.5	4	4	14	50
WR512 025 03 16	0.3	2.5	4	4	16	50
WR512 025 03 20	0.3	2.5	4	4	20	50
WR512 025 03 26	0.3	2.5	4	4	26	60
WR512 025 03 30	0.3	2.5	4	4	30	70
WR512 025 05 08	0.5	2.5	4	4	8	50
WR512 025 05 10	0.5	2.5	4	4	10	50
WR512 025 05 12	0.5	2.5	4	4	12	50
WR512 025 05 14	0.5	2.5	4	4	14	50
WR512 025 05 16	0.5	2.5	4	4	16	50
WR512 025 05 20	0.5	2.5	4	4	20	50
WR512 025 05 26	0.5	2.5	4	4	26	60
WR512 025 05 30	0.5	2.5	4	4	30	70
WR512 030 01 08	0.1	3	6	4.5	8	50
WR512 030 01 10	0.1	3	6	4.5	10	50
WR512 030 01 12	0.1	3	6	4.5	12	50
WR512 030 01 14	0.1	3	6	4.5	14	60
WR512 030 01 16	0.1	3	6	4.5	16	60
WR512 030 01 20	0.1	3	6	4.5	20	60
WR512 030 01 26	0.1	3	6	4.5	26	65
WR512 030 01 30	0.1	3	6	4.5	30	70
WR512 030 01 35	0.1	3	6	4.5	35	70
WR512 030 01 40	0.1	3	6	4.5	40	80
WR512 030 02 08	0.2	3	6	4.5	8	50
WR512 030 02 10	0.2	3	6	4.5	10	50
WR512 030 02 12	0.2	3	6	4.5	12	50
WR512 030 02 14	0.2	3	6	4.5	14	60
WR512 030 02 16	0.2	3	6	4.5	16	60
WR512 030 02 20	0.2	3	6	4.5	20	60
WR512 030 02 26	0.2	3	6	4.5	26	65
WR512 030 02 30	0.2	3	6	4.5	30	70
WR512 030 02 35	0.2	3	6	4.5	35	70
WR512 030 02 40	0.2	3	6	4.5	40	80
WR512 030 03 08	0.3	3	6	4.5	8	50

U-Star Endmill

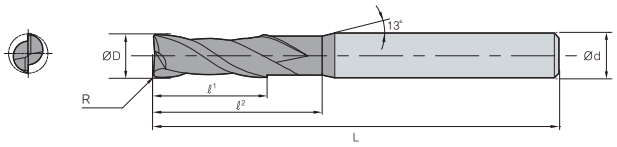
WR512

2 Flutes neck type radius endmill

ULTRA FINE | 2 | 30° HELIX | R ±0.01 Ø6 or Under | R ±0.015 Above Ø6 | W | DATA p.449

• TOLERANCE

ØD		Ød
Ø0.2 ~ Ø6	0 ~ -0.012mm	h6
Ø8 ~ Ø12	0 ~ -0.015mm	



(mm)

Designation	R	ØD	Ød	ℓ1	ℓ2	L
WR512 030 03 10	0.3	3	6	4.5	10	50
WR512 030 03 12	0.3	3	6	4.5	12	50
WR512 030 03 14	0.3	3	6	4.5	14	60
WR512 030 03 16	0.3	3	6	4.5	16	60
WR512 030 03 20	0.3	3	6	4.5	20	60
WR512 030 03 26	0.3	3	6	4.5	26	65
WR512 030 03 30	0.3	3	6	4.5	30	70
WR512 030 03 35	0.3	3	6	4.5	35	70
WR512 030 03 40	0.3	3	6	4.5	40	80
WR512 030 05 08	0.5	3	6	4.5	8	50
WR512 030 05 10	0.5	3	6	4.5	10	50
WR512 030 05 12	0.5	3	6	4.5	12	50
WR512 030 05 14	0.5	3	6	4.5	14	60
WR512 030 05 16	0.5	3	6	4.5	16	60
WR512 030 05 20	0.5	3	6	4.5	20	60
WR512 030 05 26	0.5	3	6	4.5	26	65
WR512 030 05 30	0.5	3	6	4.5	30	70
WR512 030 05 35	0.5	3	6	4.5	35	70
WR512 030 05 40	0.5	3	6	4.5	40	80
WR512 030 10 08	1	3	6	4.5	8	50
WR512 030 10 10	1	3	6	4.5	10	50
WR512 030 10 12	1	3	6	4.5	12	50
WR512 030 10 14	1	3	6	4.5	14	60
WR512 030 10 16	1	3	6	4.5	16	60
WR512 030 10 20	1	3	6	4.5	20	60
WR512 030 10 26	1	3	6	4.5	26	65
WR512 030 10 30	1	3	6	4.5	30	70
WR512 030 10 35	1	3	6	4.5	35	70
WR512 030 10 40	1	3	6	4.5	40	80
WR512 040 01 10	0.1	4	6	6	10	50
WR512 040 01 12	0.1	4	6	6	12	50
WR512 040 01 14	0.1	4	6	6	14	60
WR512 040 01 16	0.1	4	6	6	16	60
WR512 040 01 20	0.1	4	6	6	20	60
WR512 040 01 26	0.1	4	6	6	26	65
WR512 040 01 30	0.1	4	6	6	30	65
WR512 040 01 35	0.1	4	6	6	35	70
WR512 040 01 40	0.1	4	6	6	40	80

Designation	R	ØD	Ød	ℓ1	ℓ2	L
WR512 040 01 45	0.1	4	6	6	45	90
WR512 040 01 50	0.1	4	6	6	50	100
WR512 040 02 10	0.2	4	6	6	10	50
WR512 040 02 12	0.2	4	6	6	12	50
WR512 040 02 14	0.2	4	6	6	14	60
WR512 040 02 16	0.2	4	6	6	16	60
WR512 040 02 20	0.2	4	6	6	20	60
WR512 040 02 26	0.2	4	6	6	26	65
WR512 040 02 30	0.2	4	6	6	30	65
WR512 040 02 35	0.2	4	6	6	35	70
WR512 040 02 40	0.2	4	6	6	40	80
WR512 040 02 45	0.2	4	6	6	45	90
WR512 040 02 50	0.2	4	6	6	50	100
WR512 040 03 10	0.3	4	6	6	10	50
WR512 040 03 12	0.3	4	6	6	12	50
WR512 040 03 14	0.3	4	6	6	14	60
WR512 040 03 16	0.3	4	6	6	16	60
WR512 040 03 20	0.3	4	6	6	20	60
WR512 040 03 26	0.3	4	6	6	26	65
WR512 040 03 30	0.3	4	6	6	30	65
WR512 040 03 35	0.3	4	6	6	35	70
WR512 040 03 40	0.3	4	6	6	40	80
WR512 040 03 45	0.3	4	6	6	45	90
WR512 040 03 50	0.3	4	6	6	50	100
WR512 040 05 10	0.5	4	6	6	10	50
WR512 040 05 12	0.5	4	6	6	12	50
WR512 040 05 14	0.5	4	6	6	14	60
WR512 040 05 16	0.5	4	6	6	16	60
WR512 040 05 20	0.5	4	6	6	20	60
WR512 040 05 26	0.5	4	6	6	26	65
WR512 040 05 30	0.5	4	6	6	30	65
WR512 040 05 35	0.5	4	6	6	35	70
WR512 040 05 40	0.5	4	6	6	40	80
WR512 040 05 45	0.5	4	6	6	45	90
WR512 040 05 50	0.5	4	6	6	50	100
WR512 040 10 10	1	4	6	6	10	50
WR512 040 10 12	1	4	6	6	12	50
WR512 040 10 14	1	4	6	6	14	60

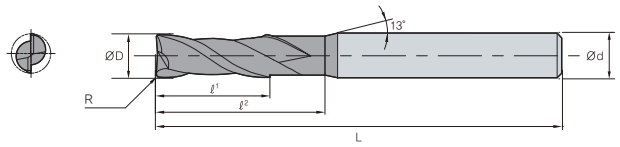
WR512

2 Flutes neck type radius endmill

ULTRA FINE | 2 | 30° HELIX | R ±0.01 Ø6 or Under | R ±0.015 Above Ø6 | W | DATA p.449

• TOLERANCE

ØD		Ød
Ø0.2 ~ Ø6	0 ~ -0.012mm	h6
Ø8 ~ Ø12	0 ~ -0.015mm	



(mm)

Designation	R	ØD	Ød	ℓ1	ℓ2	L
WR512 040 10 16	1	4	6	6	16	60
WR512 040 10 20	1	4	6	6	20	60
WR512 040 10 26	1	4	6	6	26	65
WR512 040 10 30	1	4	6	6	30	65
WR512 040 10 35	1	4	6	6	35	70
WR512 040 10 40	1	4	6	6	40	80
WR512 040 10 45	1	4	6	6	45	90
WR512 040 10 50	1	4	6	6	50	100
WR512 050 01	0.1	5	6	8	15	60
WR512 050 02	0.2	5	6	8	15	60
WR512 050 03	0.3	5	6	8	15	60
WR512 050 05	0.5	5	6	8	15	60
WR512 050 10	1	5	6	8	15	60
WR512 050 15	1.5	5	6	8	15	60
WR512 050 20	2	5	6	8	15	60
WR512 060 01	0.1	6	6	9	20	60
WR512 060 02	0.2	6	6	9	20	60
WR512 060 03	0.3	6	6	9	20	60
WR512 060 05	0.5	6	6	9	20	60
WR512 060 10	1	6	6	9	20	60
WR512 060 15	1.5	6	6	9	20	60
WR512 060 20	2	6	6	9	20	60
WR512 060 03 90	0.3	6	6	15	30	90
WR512 060 05 90	0.5	6	6	15	30	90
WR512 060 10 90	1	6	6	15	30	90
WR512 080 01	0.1	8	8	12	25	70
WR512 080 02	0.2	8	8	12	25	70
WR512 080 03	0.3	8	8	12	25	70
WR512 080 05	0.5	8	8	12	25	70
WR512 080 10	1	8	8	12	25	70
WR512 080 15	1.5	8	8	12	25	70

Designation	R	ØD	Ød	ℓ1	ℓ2	L
WR512 080 20	2	8	8	12	25	70
WR512 080 03 100	0.3	8	8	20	35	100
WR512 080 05 100	0.5	8	8	20	35	100
WR512 080 10 100	1	8	8	20	35	100
WR512 100 01	0.1	10	10	15	30	75
WR512 100 02	0.2	10	10	15	30	75
WR512 100 03	0.3	10	10	15	30	75
WR512 100 05	0.5	10	10	15	30	75
WR512 100 10	1	10	10	15	30	75
WR512 100 15	1.5	10	10	15	30	75
WR512 100 20	2	10	10	15	30	75
WR512 100 03 100	0.3	10	10	25	40	100
WR512 100 05 100	0.5	10	10	25	40	100
WR512 100 10 100	1	10	10	25	40	100
WR512 120 02	0.2	12	12	18	32	80
WR512 120 03	0.3	12	12	18	32	80
WR512 120 05	0.5	12	12	18	32	80
WR512 120 10	1	12	12	18	32	80
WR512 120 15	1.5	12	12	18	32	80
WR512 120 20	2	12	12	18	32	80
WR512 120 03 110	0.3	12	12	30	45	110
WR512 120 05 110	0.5	12	12	30	45	110
WR512 120 10 110	1	12	12	30	45	110
WR512 160 05	0.5	16	16	20	35	100
WR512 160 10	1	16	16	20	35	100
WR512 160 05 150	0.5	16	16	35	50	150
WR512 160 10 150	1	16	16	35	50	150
WR512 200 05	0.5	20	20	25	40	100
WR512 200 10	1	20	20	25	40	100
WR512 200 05 150	0.5	20	20	40	55	150
WR512 200 10 150	1	20	20	40	55	150

※ The above specifications are subject to change without prior notice for product quality improvement.

• Applicable Workpiece

Carbon steel ~ HB225	Alloy steel HB225~325	Pre-hardened steel HRC30~50	Hardened steel		Copper	Graphite	Cast iron ~FCD500	Aluminum	Stainless steel
			SKD61~HRC55	SKD11 HRC55~					
○	○	◎	○				○		○

◎: Excellent ○: Good

U-Star Endmill

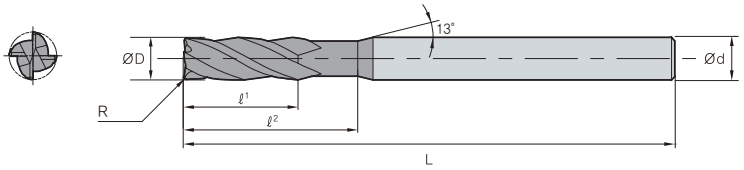
WR514

4 Flutes neck type radius endmill

ULTRA FINE | 4 | 38° HELIX | R ±0.02 All sizes | W | DATA p.450

• TOLERANCE

ØD		Ød
All sizes	0 ~ -0.03mm	h6



(mm)

Designation	R	ØD	Ød	ℓ1	ℓ2	L
WR514 060 05	0.5	6	6	10	30	90
WR514 060 10	1	6	6	10	30	90
WR514 080 05	0.5	8	8	12	35	100
WR514 080 10	1	8	8	12	35	100
WR514 100 05	0.5	10	10	15	40	100
WR514 100 10	1	10	10	15	40	100
WR514 120 05	0.5	12	12	20	45	110
WR514 120 10	1	12	12	20	45	110

※ The above specifications are subject to change without prior notice for product quality improvement.

• **Applicable Workpiece**

Carbon steel ~ HB225	Alloy steel HB225~325	Pre-hardened steel HRC30~50	Hardened steel		Copper	Graphite	Cast iron ~FCD500	Aluminum	Stainless steel
			SKD61~HRC55	SKD11 HRC55~					
○	○	◎	○				○		○

◎: Excellent ○: Good

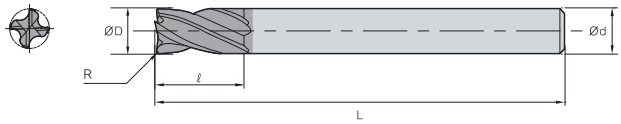
WXR504

4 Flutes variable helix radius endmill

ULTRA FINE | 4 | 29° HELIX | 31° HELIX | R ±0.02 All sizes | W | DATA p.451

• TOLERANCE

ØD		Ød
All sizes	0 ~ -0.03mm	h6



(mm)

Designation	R	ØD	Ød	ℓ	L
WXR504 010 005	0.05	1	6	2.5	50
WXR504 010 01	0.1	1	6	2.5	50
WXR504 010 02	0.2	1	6	2.5	50
WXR504 010 03	0.3	1	6	2.5	50
WXR504 012 005	0.05	1.2	6	3	50
WXR504 012 01	0.1	1.2	6	3	50
WXR504 012 02	0.2	1.2	6	3	50
WXR504 012 03	0.3	1.2	6	3	50
WXR504 015 005	0.05	1.5	6	4	50
WXR504 015 01	0.1	1.5	6	4	50
WXR504 015 02	0.2	1.5	6	4	50
WXR504 015 03	0.3	1.5	6	4	50
WXR504 015 05	0.5	1.5	6	4	50
WXR504 020 01	0.1	2	6	6	50
WXR504 020 02	0.2	2	6	6	50
WXR504 020 03	0.3	2	6	6	50
WXR504 020 05	0.5	2	6	6	50
WXR504 025 01	0.1	2.5	6	7	60
WXR504 025 02	0.2	2.5	6	7	60
WXR504 025 03	0.3	2.5	6	7	60
WXR504 025 05	0.5	2.5	6	7	60
WXR504 030 01	0.1	3	6	8	60
WXR504 030 02	0.2	3	6	8	60
WXR504 030 03	0.3	3	6	8	60
WXR504 030 05	0.5	3	6	8	60
WXR504 030 10	1	3	6	8	60
WXR504 035 01	0.1	3.5	6	10	70
WXR504 035 02	0.2	3.5	6	10	70
WXR504 035 03	0.3	3.5	6	10	70
WXR504 035 05	0.5	3.5	6	10	70
WXR504 040 01 S4	0.1	4	4	10	70
WXR504 040 02 S4	0.2	4	4	10	70
WXR504 040 03 S4	0.3	4	4	10	70
WXR504 040 05 S4	0.5	4	4	10	70
WXR504 040 10 S4	1	4	4	10	70
WXR504 040 01 100 S4	0.1	4	4	10	100
WXR504 040 02 100 S4	0.2	4	4	10	100
WXR504 040 03 100 S4	0.3	4	4	10	100
WXR504 040 05 100 S4	0.5	4	4	10	100

Designation	R	ØD	Ød	ℓ	L
WXR504 040 10 100 S4	1	4	4	10	100
WXR504 040 01	0.1	4	6	10	70
WXR504 040 02	0.2	4	6	10	70
WXR504 040 03	0.3	4	6	10	70
WXR504 040 05	0.5	4	6	10	70
WXR504 040 10	1	4	6	10	70
WXR504 045 01	0.1	4.5	6	11	80
WXR504 045 02	0.2	4.5	6	11	80
WXR504 045 03	0.3	4.5	6	11	80
WXR504 045 05	0.5	4.5	6	11	80
WXR504 050 01	0.1	5	6	13	90
WXR504 050 02	0.2	5	6	13	90
WXR504 050 03	0.3	5	6	13	90
WXR504 050 05	0.5	5	6	13	90
WXR504 050 10	1	5	6	13	90
WXR504 055 01	0.1	5.5	6	13	90
WXR504 055 02	0.2	5.5	6	13	90
WXR504 055 03	0.3	5.5	6	13	90
WXR504 055 05	0.5	5.5	6	13	90
WXR504 055 10	1	5.5	6	13	90
WXR504 060 01 060	0.1	6	6	15	60
WXR504 060 02 060	0.2	6	6	15	60
WXR504 060 01	0.1	6	6	15	90
WXR504 060 02	0.2	6	6	15	90
WXR504 060 03	0.3	6	6	15	90
WXR504 060 05	0.5	6	6	15	90
WXR504 060 10	1	6	6	15	90
WXR504 060 15	1.5	6	6	15	90
WXR504 060 20	2	6	6	15	90
WXR504 060 05 110	0.5	6	6	15	110
WXR504 060 10 110	1	6	6	15	110
WXR504 060 05 130	0.5	6	6	15	130
WXR504 060 10 130	1	6	6	15	130
WXR504 070 01	0.1	7	8	16	90
WXR504 070 02	0.2	7	8	16	90
WXR504 070 03	0.3	7	8	16	90
WXR504 070 05	0.5	7	8	16	90
WXR504 070 10	1	7	8	16	90
WXR504 070 20	2	7	8	16	90

U-Star Endmill

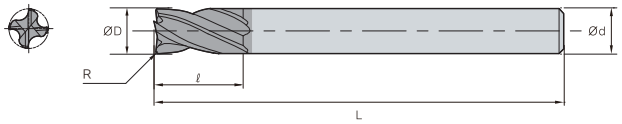
WXR504

4 Flutes neck type radius endmill

ULTRA FINE | 4 | 29° HELIX | 31° HELIX | R ±0.02 (All sizes) | W | DATA (p.451)

• TOLERANCE

ØD		Ød
All sizes	0 ~ -0.03mm	h6



(mm)

Designation	R	ØD	Ød	ℓ	L
WXR504 080 03 070	0.3	8	8	20	70
WXR504 080 05 070	0.5	8	8	20	70
WXR504 080 10 070	1	8	8	20	70
WXR504 080 01	0.1	8	8	20	100
WXR504 080 02	0.2	8	8	20	100
WXR504 080 03	0.3	8	8	20	100
WXR504 080 05	0.5	8	8	20	100
WXR504 080 10	1	8	8	20	100
WXR504 080 15	1.5	8	8	20	100
WXR504 080 20	2	8	8	20	100
WXR504 080 25	2.5	8	8	20	100
WXR504 080 30	3	8	8	20	100
WXR504 080 05 120	0.5	8	8	20	120
WXR504 080 10 120	1	8	8	20	120
WXR504 080 05 150	0.5	8	8	20	150
WXR504 080 10 150	1	8	8	20	150
WXR504 100 03 075	0.3	10	10	25	75
WXR504 100 05 075	0.5	10	10	25	75
WXR504 100 10 075	1	10	10	25	75
WXR504 100 01	0.1	10	10	25	100
WXR504 100 02	0.2	10	10	25	100
WXR504 100 03	0.3	10	10	25	100
WXR504 100 05	0.5	10	10	25	100
WXR504 100 10	1	10	10	25	100
WXR504 100 15	1.5	10	10	25	100
WXR504 100 20	2	10	10	25	100
WXR504 100 25	2.5	10	10	25	100
WXR504 100 30	3	10	10	25	100
WXR504 100 40	4	10	10	25	100
WXR504 100 05 130	0.5	10	10	22	130
WXR504 100 10 130	1	10	10	22	130
WXR504 100 05 150	0.5	10	10	22	150
WXR504 100 10 150	1	10	10	22	150
WXR504 110 02	0.2	11	12	25	110

Designation	R	ØD	Ød	ℓ	L
WXR504 110 03	0.3	11	12	25	110
WXR504 110 05	0.5	11	12	25	110
WXR504 110 10	1	11	12	25	110
WXR504 110 20	2	11	12	25	110
WXR504 120 03 080	0.3	12	12	30	80
WXR504 120 05 080	0.5	12	12	30	80
WXR504 120 10 080	1	12	12	30	80
WXR504 120 01	0.1	12	12	30	110
WXR504 120 02	0.2	12	12	30	110
WXR504 120 03	0.3	12	12	30	110
WXR504 120 05	0.5	12	12	30	110
WXR504 120 10	1	12	12	30	110
WXR504 120 15	1.5	12	12	30	110
WXR504 120 20	2	12	12	30	110
WXR504 120 25	2.5	12	12	30	110
WXR504 120 30	3	12	12	30	110
WXR504 120 40	4	12	12	30	110
WXR504 120 50	5	12	12	30	110
WXR504 120 05 130	0.5	12	12	30	130
WXR504 120 10 130	1	12	12	30	130
WXR504 120 05 150	0.5	12	12	30	150
WXR504 120 10 150	1	12	12	30	150
WXR504 140 05	0.5	14	16	35	150
WXR504 140 10	1	14	16	35	150
WXR504 140 20	2	14	16	35	150
WXR504 160 05	0.5	16	16	32	150
WXR504 160 10	1	16	16	32	150
WXR504 160 15	1.5	16	16	32	150
WXR504 160 20	2	16	16	32	150
WXR504 200 05	0.5	20	20	38	150
WXR504 200 10	1	20	20	38	150
WXR504 200 15	1.5	20	20	38	150
WXR504 200 20	2	20	20	38	150

※ The above specifications are subject to change without prior notice for product quality improvement.

• Applicable Workpiece

Carbon steel ~ HB225	Alloy steel HB225~325	Pre-hardened steel HRC30~50	Hardened steel		Copper	Graphite	Cast iron ~FCD500	Aluminum	Stainless steel
			SKD61~HRC55	SKD11 HRC55~					
○	○	◎	○				○		○

◎: Excellent ○: Good

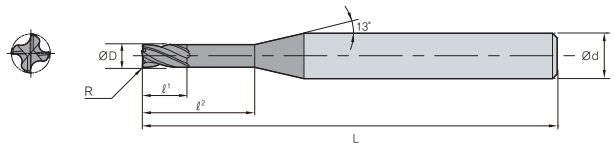
WXR514

4 Flutes variable helix radius endmill

ULTRA FINE | 4 | 29° HELIX | 31° HELIX | R ±0.02 All sizes | W | DATA p.451

• TOLERANCE

ØD		Ød
All sizes	0 ~ -0.03mm	h6



(mm)

Designation	R	ØD	Ød	ℓ1	ℓ2	L
WXR514 010 005 03	0.05	1	4	1.5	3	50
WXR514 010 005 04	0.05	1	4	1.5	4	50
WXR514 010 005 06	0.05	1	4	1.5	6	50
WXR514 010 005 08	0.05	1	4	1.5	8	50
WXR514 010 005 10	0.05	1	4	1.5	10	50
WXR514 010 005 12	0.05	1	4	1.5	12	50
WXR514 010 005 14	0.05	1	4	1.5	14	50
WXR514 010 005 16	0.05	1	4	1.5	16	50
WXR514 010 005 20	0.05	1	4	1.5	20	50
WXR514 010 01 03	0.1	1	4	1.5	3	50
WXR514 010 01 04	0.1	1	4	1.5	4	50
WXR514 010 01 06	0.1	1	4	1.5	6	50
WXR514 010 01 08	0.1	1	4	1.5	8	50
WXR514 010 01 10	0.1	1	4	1.5	10	50
WXR514 010 01 12	0.1	1	4	1.5	12	50
WXR514 010 01 14	0.1	1	4	1.5	14	50
WXR514 010 01 16	0.1	1	4	1.5	16	50
WXR514 010 01 20	0.1	1	4	1.5	20	50
WXR514 010 02 03	0.2	1	4	1.5	3	50
WXR514 010 02 04	0.2	1	4	1.5	4	50
WXR514 010 02 06	0.2	1	4	1.5	6	50
WXR514 010 02 08	0.2	1	4	1.5	8	50
WXR514 010 02 10	0.2	1	4	1.5	10	50
WXR514 010 02 12	0.2	1	4	1.5	12	50
WXR514 010 02 14	0.2	1	4	1.5	14	50
WXR514 010 02 16	0.2	1	4	1.5	16	50
WXR514 010 02 20	0.2	1	4	1.5	20	50
WXR514 010 03 03	0.3	1	4	1.5	3	50
WXR514 010 03 04	0.3	1	4	1.5	4	50
WXR514 010 03 06	0.3	1	4	1.5	6	50
WXR514 010 03 08	0.3	1	4	1.5	8	50
WXR514 010 03 10	0.3	1	4	1.5	10	50
WXR514 010 03 12	0.3	1	4	1.5	12	50
WXR514 010 03 14	0.3	1	4	1.5	14	50
WXR514 010 03 16	0.3	1	4	1.5	16	50
WXR514 010 03 20	0.3	1	4	1.5	20	50

Designation	R	ØD	Ød	ℓ1	ℓ2	L
WXR514 012 005 03	0.05	1.2	4	1.8	3	50
WXR514 012 005 04	0.05	1.2	4	1.8	4	50
WXR514 012 005 06	0.05	1.2	4	1.8	6	50
WXR514 012 005 08	0.05	1.2	4	1.8	8	50
WXR514 012 005 10	0.05	1.2	4	1.8	10	50
WXR514 012 005 12	0.05	1.2	4	1.8	12	50
WXR514 012 005 16	0.05	1.2	4	1.8	16	50
WXR514 012 005 20	0.05	1.2	4	1.8	20	50
WXR514 012 01 03	0.1	1.2	4	1.8	3	50
WXR514 012 01 04	0.1	1.2	4	1.8	4	50
WXR514 012 01 06	0.1	1.2	4	1.8	6	50
WXR514 012 01 08	0.1	1.2	4	1.8	8	50
WXR514 012 01 10	0.1	1.2	4	1.8	10	50
WXR514 012 01 12	0.1	1.2	4	1.8	12	50
WXR514 012 01 16	0.1	1.2	4	1.8	16	50
WXR514 012 01 20	0.1	1.2	4	1.8	20	50
WXR514 012 02 03	0.2	1.2	4	1.8	3	50
WXR514 012 02 04	0.2	1.2	4	1.8	4	50
WXR514 012 02 06	0.2	1.2	4	1.8	6	50
WXR514 012 02 08	0.2	1.2	4	1.8	8	50
WXR514 012 02 10	0.2	1.2	4	1.8	10	50
WXR514 012 02 12	0.2	1.2	4	1.8	12	50
WXR514 012 02 16	0.2	1.2	4	1.8	16	50
WXR514 012 02 20	0.2	1.2	4	1.8	20	50
WXR514 012 03 03	0.3	1.2	4	1.8	3	50
WXR514 012 03 04	0.3	1.2	4	1.8	4	50
WXR514 012 03 06	0.3	1.2	4	1.8	6	50
WXR514 012 03 08	0.3	1.2	4	1.8	8	50
WXR514 012 03 10	0.3	1.2	4	1.8	10	50
WXR514 012 03 12	0.3	1.2	4	1.8	12	50
WXR514 012 03 16	0.3	1.2	4	1.8	16	50
WXR514 012 03 20	0.3	1.2	4	1.8	20	50
WXR514 015 005 04	0.05	1.5	4	2.3	4	50
WXR514 015 005 06	0.05	1.5	4	2.3	6	50
WXR514 015 005 08	0.05	1.5	4	2.3	8	50
WXR514 015 005 10	0.05	1.5	4	2.3	10	50

U-Star Endmill

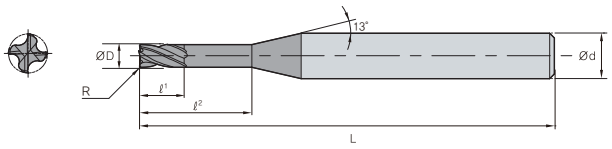
WXR514

4 Flutes variable helix radius endmill

ULTRA FINE | 4 | 29° HELIX | 31° HELIX | R ±0.02 (All sizes) | W | DATA (p.451)

• TOLERANCE

ØD		Ød
All sizes	0 ~ -0.03mm	h6



(mm)

Designation	R	ØD	Ød	ℓ1	ℓ2	L
WXR514 015 005 12	0.05	1.5	4	2.3	12	50
WXR514 015 005 14	0.05	1.5	4	2.3	14	50
WXR514 015 005 16	0.05	1.5	4	2.3	16	50
WXR514 015 005 20	0.05	1.5	4	2.3	20	50
WXR514 015 005 22	0.05	1.5	4	2.3	22	60
WXR514 015 005 26	0.05	1.5	4	2.3	26	60
WXR514 015 01 04	0.1	1.5	4	2.3	4	50
WXR514 015 01 06	0.1	1.5	4	2.3	6	50
WXR514 015 01 08	0.1	1.5	4	2.3	8	50
WXR514 015 01 10	0.1	1.5	4	2.3	10	50
WXR514 015 01 12	0.1	1.5	4	2.3	12	50
WXR514 015 01 14	0.1	1.5	4	2.3	14	50
WXR514 015 01 16	0.1	1.5	4	2.3	16	50
WXR514 015 01 20	0.1	1.5	4	2.3	20	50
WXR514 015 01 22	0.1	1.5	4	2.3	22	60
WXR514 015 01 26	0.1	1.5	4	2.3	26	60
WXR514 015 02 04	0.2	1.5	4	2.3	4	50
WXR514 015 02 06	0.2	1.5	4	2.3	6	50
WXR514 015 02 08	0.2	1.5	4	2.3	8	50
WXR514 015 02 10	0.2	1.5	4	2.3	10	50
WXR514 015 02 12	0.2	1.5	4	2.3	12	50
WXR514 015 02 14	0.2	1.5	4	2.3	14	50
WXR514 015 02 16	0.2	1.5	4	2.3	16	50
WXR514 015 02 20	0.2	1.5	4	2.3	20	50
WXR514 015 02 22	0.2	1.5	4	2.3	22	60
WXR514 015 02 26	0.2	1.5	4	2.3	26	60
WXR514 015 03 04	0.3	1.5	4	2.3	4	50
WXR514 015 03 06	0.3	1.5	4	2.3	6	50
WXR514 015 03 08	0.3	1.5	4	2.3	8	50
WXR514 015 03 10	0.3	1.5	4	2.3	10	50
WXR514 015 03 12	0.3	1.5	4	2.3	12	50
WXR514 015 03 14	0.3	1.5	4	2.3	14	50
WXR514 015 03 16	0.3	1.5	4	2.3	16	50
WXR514 015 03 20	0.3	1.5	4	2.3	20	50
WXR514 015 03 22	0.3	1.5	4	2.3	22	60
WXR514 015 03 26	0.3	1.5	4	2.3	26	60

Designation	R	ØD	Ød	ℓ1	ℓ2	L
WXR514 015 05 04	0.5	1.5	4	2.3	4	50
WXR514 015 05 06	0.5	1.5	4	2.3	6	50
WXR514 015 05 08	0.5	1.5	4	2.3	8	50
WXR514 015 05 10	0.5	1.5	4	2.3	10	50
WXR514 015 05 12	0.5	1.5	4	2.3	12	50
WXR514 015 05 14	0.5	1.5	4	2.3	14	50
WXR514 015 05 16	0.5	1.5	4	2.3	16	50
WXR514 015 05 20	0.5	1.5	4	2.3	20	50
WXR514 015 05 22	0.5	1.5	4	2.3	22	60
WXR514 015 05 26	0.5	1.5	4	2.3	26	60
WXR514 020 01 06	0.1	2	4	3	6	50
WXR514 020 01 08	0.1	2	4	3	8	50
WXR514 020 01 10	0.1	2	4	3	10	50
WXR514 020 01 12	0.1	2	4	3	12	50
WXR514 020 01 14	0.1	2	4	3	14	50
WXR514 020 01 16	0.1	2	4	3	16	50
WXR514 020 01 20	0.1	2	4	3	20	50
WXR514 020 01 22	0.1	2	4	3	22	60
WXR514 020 01 26	0.1	2	4	3	26	60
WXR514 020 01 30	0.1	2	4	3	30	70
WXR514 020 02 06	0.2	2	4	3	6	50
WXR514 020 02 08	0.2	2	4	3	8	50
WXR514 020 02 10	0.2	2	4	3	10	50
WXR514 020 02 12	0.2	2	4	3	12	50
WXR514 020 02 14	0.2	2	4	3	14	50
WXR514 020 02 16	0.2	2	4	3	16	50
WXR514 020 02 20	0.2	2	4	3	20	50
WXR514 020 02 22	0.2	2	4	3	22	60
WXR514 020 02 26	0.2	2	4	3	26	60
WXR514 020 02 30	0.2	2	4	3	30	70
WXR514 020 03 06	0.3	2	4	3	6	70
WXR514 020 03 08	0.3	2	4	3	8	70
WXR514 020 03 10	0.3	2	4	3	10	70
WXR514 020 03 12	0.3	2	4	3	12	50
WXR514 020 03 14	0.3	2	4	3	14	50
WXR514 020 03 16	0.3	2	4	3	16	50

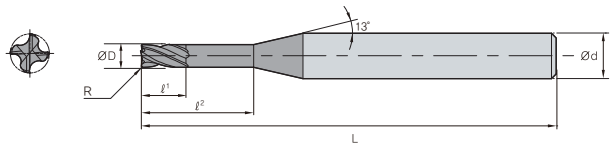
WXR514

4 Flutes variable helix radius endmill

ULTRA FINE | 4 | 29° HELIX | 31° HELIX | R ±0.02 All sizes | W | DATA p.451

• TOLERANCE

ØD		Ød
All sizes	0 ~ -0.03mm	h6



(mm)

Designation	R	ØD	Ød	ℓ1	ℓ2	L
WXR514 020 03 20	0.3	2	4	3	20	50
WXR514 020 03 22	0.3	2	4	3	22	60
WXR514 020 03 26	0.3	2	4	3	26	60
WXR514 020 03 30	0.3	2	4	3	30	70
WXR514 020 05 06	0.5	2	4	3	6	50
WXR514 020 05 08	0.5	2	4	3	8	50
WXR514 020 05 10	0.5	2	4	3	10	50
WXR514 020 05 12	0.5	2	4	3	12	50
WXR514 020 05 14	0.5	2	4	3	14	50
WXR514 020 05 16	0.5	2	4	3	16	50
WXR514 020 05 20	0.5	2	4	3	20	50
WXR514 020 05 22	0.5	2	4	3	22	60
WXR514 020 05 26	0.5	2	4	3	26	60
WXR514 020 05 30	0.5	2	4	3	30	70
WXR514 025 01 08	0.1	2.5	4	4	8	50
WXR514 025 01 10	0.1	2.5	4	4	10	50
WXR514 025 01 12	0.1	2.5	4	4	12	50
WXR514 025 01 14	0.1	2.5	4	4	14	50
WXR514 025 01 16	0.1	2.5	4	4	16	50
WXR514 025 01 20	0.1	2.5	4	4	20	50
WXR514 025 01 26	0.1	2.5	4	4	26	60
WXR514 025 01 30	0.1	2.5	4	4	30	70
WXR514 025 02 08	0.2	2.5	4	4	8	50
WXR514 025 02 10	0.2	2.5	4	4	10	50
WXR514 025 02 12	0.2	2.5	4	4	12	50
WXR514 025 02 14	0.2	2.5	4	4	14	50
WXR514 025 02 16	0.2	2.5	4	4	16	50
WXR514 025 02 20	0.2	2.5	4	4	20	50
WXR514 025 02 26	0.2	2.5	4	4	26	60
WXR514 025 02 30	0.2	2.5	4	4	30	70
WXR514 025 03 08	0.3	2.5	4	4	8	50
WXR514 025 03 10	0.3	2.5	4	4	10	50
WXR514 025 03 12	0.3	2.5	4	4	12	50
WXR514 025 03 14	0.3	2.5	4	4	14	50
WXR514 025 03 16	0.3	2.5	4	4	16	50
WXR514 025 03 20	0.3	2.5	4	4	20	50

Designation	R	ØD	Ød	ℓ1	ℓ2	L
WXR514 025 03 26	0.3	2.5	4	4	26	60
WXR514 025 03 30	0.3	2.5	4	4	30	70
WXR514 025 05 08	0.5	2.5	4	4	8	50
WXR514 025 05 10	0.5	2.5	4	4	10	50
WXR514 025 05 12	0.5	2.5	4	4	12	50
WXR514 025 05 14	0.5	2.5	4	4	14	50
WXR514 025 05 16	0.5	2.5	4	4	16	50
WXR514 025 05 20	0.5	2.5	4	4	20	50
WXR514 025 05 26	0.5	2.5	4	4	26	60
WXR514 025 05 30	0.5	2.5	4	4	30	70
WXR514 030 01 08	0.1	3	6	4.5	8	50
WXR514 030 01 10	0.1	3	6	4.5	10	50
WXR514 030 01 12	0.1	3	6	4.5	12	50
WXR514 030 01 14	0.1	3	6	4.5	14	60
WXR514 030 01 16	0.1	3	6	4.5	16	60
WXR514 030 01 20	0.1	3	6	4.5	20	60
WXR514 030 01 26	0.1	3	6	4.5	26	65
WXR514 030 01 30	0.1	3	6	4.5	30	70
WXR514 030 01 35	0.1	3	6	4.5	35	70
WXR514 030 01 40	0.1	3	6	4.5	40	80
WXR514 030 02 08	0.2	3	6	4.5	8	50
WXR514 030 02 10	0.2	3	6	4.5	10	50
WXR514 030 02 12	0.2	3	6	4.5	12	50
WXR514 030 02 14	0.2	3	6	4.5	14	60
WXR514 030 02 16	0.2	3	6	4.5	16	60
WXR514 030 02 20	0.2	3	6	4.5	20	60
WXR514 030 02 26	0.2	3	6	4.5	26	65
WXR514 030 02 30	0.2	3	6	4.5	30	70
WXR514 030 02 35	0.2	3	6	4.5	35	70
WXR514 030 02 40	0.2	3	6	4.5	40	80
WXR514 030 03 08	0.3	3	6	4.5	8	50
WXR514 030 03 10	0.3	3	6	4.5	10	50
WXR514 030 03 12	0.3	3	6	4.5	12	50
WXR514 030 03 14	0.3	3	6	4.5	14	60
WXR514 030 03 16	0.3	3	6	4.5	16	60
WXR514 030 03 20	0.3	3	6	4.5	20	60

U-Star Endmill

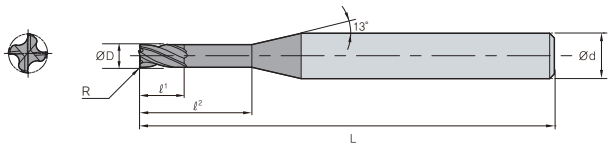
WXR514

4 Flutes variable helix radius endmill

ULTRA FINE | 4 | 29° HELIX | 31° HELIX | R ±0.02 (All sizes) | W | DATA (p.451)

• TOLERANCE

ØD		Ød
All sizes	0 ~ -0.03mm	h6



(mm)

Designation	R	ØD	Ød	ℓ1	ℓ2	L
WXR514 030 03 26	0.3	3	6	4.5	26	65
WXR514 030 03 30	0.3	3	6	4.5	30	70
WXR514 030 03 35	0.3	3	6	4.5	35	70
WXR514 030 03 40	0.3	3	6	4.5	40	80
WXR514 030 05 08	0.5	3	6	4.5	8	50
WXR514 030 05 10	0.5	3	6	4.5	10	50
WXR514 030 05 12	0.5	3	6	4.5	12	50
WXR514 030 05 14	0.5	3	6	4.5	14	60
WXR514 030 05 16	0.5	3	6	4.5	16	60
WXR514 030 05 20	0.5	3	6	4.5	20	60
WXR514 030 05 26	0.5	3	6	4.5	26	65
WXR514 030 05 30	0.5	3	6	4.5	30	70
WXR514 030 05 35	0.5	3	6	4.5	35	70
WXR514 030 05 40	0.5	3	6	4.5	40	80
WXR514 030 10 08	1	3	6	4.5	8	50
WXR514 030 10 10	1	3	6	4.5	10	50
WXR514 030 10 12	1	3	6	4.5	12	50
WXR514 030 10 14	1	3	6	4.5	14	60
WXR514 030 10 16	1	3	6	4.5	16	60
WXR514 030 10 20	1	3	6	4.5	20	60
WXR514 030 10 26	1	3	6	4.5	26	65
WXR514 030 10 30	1	3	6	4.5	30	70
WXR514 030 10 35	1	3	6	4.5	35	70
WXR514 030 10 40	1	3	6	4.5	40	80
WXR514 040 01 10	0.1	4	6	6	10	50
WXR514 040 01 12	0.1	4	6	6	12	50
WXR514 040 01 14	0.1	4	6	6	14	60
WXR514 040 01 16	0.1	4	6	6	16	60
WXR514 040 01 20	0.1	4	6	6	20	60
WXR514 040 01 26	0.1	4	6	6	26	65
WXR514 040 01 30	0.1	4	6	6	30	70
WXR514 040 01 35	0.1	4	6	6	35	70
WXR514 040 01 40	0.1	4	6	6	40	80
WXR514 040 01 45	0.1	4	6	6	45	90
WXR514 040 01 50	0.1	4	6	6	50	100
WXR514 040 02 10	0.2	4	6	6	10	50

Designation	R	ØD	Ød	ℓ1	ℓ2	L
WXR514 040 02 12	0.2	4	6	6	12	50
WXR514 040 02 14	0.2	4	6	6	14	60
WXR514 040 02 16	0.2	4	6	6	16	60
WXR514 040 02 20	0.2	4	6	6	20	60
WXR514 040 02 26	0.2	4	6	6	26	65
WXR514 040 02 30	0.2	4	6	6	30	70
WXR514 040 02 35	0.2	4	6	6	35	70
WXR514 040 02 40	0.2	4	6	6	40	80
WXR514 040 02 45	0.2	4	6	6	45	90
WXR514 040 02 50	0.2	4	6	6	50	100
WXR514 040 03 10	0.3	4	6	6	10	50
WXR514 040 03 12	0.3	4	6	6	12	50
WXR514 040 03 14	0.3	4	6	6	14	60
WXR514 040 03 16	0.3	4	6	6	16	60
WXR514 040 03 20	0.3	4	6	6	20	60
WXR514 040 03 26	0.3	4	6	6	26	65
WXR514 040 03 30	0.3	4	6	6	30	70
WXR514 040 03 35	0.3	4	6	6	35	70
WXR514 040 03 40	0.3	4	6	6	40	80
WXR514 040 03 45	0.3	4	6	6	45	90
WXR514 040 03 50	0.3	4	6	6	50	100
WXR514 040 05 10	0.5	4	6	6	10	50
WXR514 040 05 12	0.5	4	6	6	12	50
WXR514 040 05 14	0.5	4	6	6	14	60
WXR514 040 05 16	0.5	4	6	6	16	60
WXR514 040 05 20	0.5	4	6	6	20	60
WXR514 040 05 26	0.5	4	6	6	26	65
WXR514 040 05 30	0.5	4	6	6	30	70
WXR514 040 05 35	0.5	4	6	6	35	70
WXR514 040 05 40	0.5	4	6	6	40	80
WXR514 040 05 45	0.5	4	6	6	45	90
WXR514 040 05 50	0.5	4	6	6	50	100
WXR514 040 10 10	1	4	6	6	10	50
WXR514 040 10 12	1	4	6	6	12	50
WXR514 040 10 14	1	4	6	6	14	60
WXR514 040 10 16	1	4	6	6	16	60

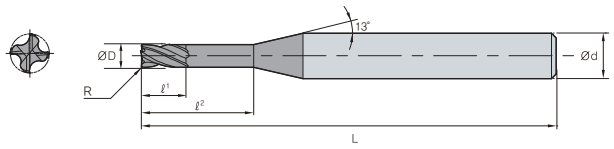
WXR514

4 Flutes variable helix radius endmill

ULTRA FINE | 4 | 29° HELIX | 31° HELIX | R ±0.02 All sizes | W | DATA p.451

• TOLERANCE

ØD		Ød
All sizes	0 ~ -0.03mm	h6



(mm)

Designation	R	ØD	Ød	ℓ1	ℓ2	L
WXR514 040 10 20	1	4	6	6	20	60
WXR514 040 10 26	1	4	6	6	26	65
WXR514 040 10 30	1	4	6	6	30	70
WXR514 040 10 35	1	4	6	6	35	70
WXR514 040 10 40	1	4	6	6	40	80
WXR514 040 10 45	1	4	6	6	45	90
WXR514 040 10 50	1	4	6	6	50	100
WXR514 050 01	0.1	5	6	8	15	60
WXR514 050 02	0.2	5	6	8	15	60
WXR514 050 03	0.3	5	6	8	15	60
WXR514 050 05	0.5	5	6	8	15	60
WXR514 050 10	10	5	6	8	15	60
WXR514 050 15	1.5	5	6	8	15	60
WXR514 050 20	20	5	6	8	15	60
WXR514 060 01	0.1	6	6	9	20	60
WXR514 060 02	0.2	6	6	9	20	60
WXR514 060 03	0.3	6	6	9	20	60
WXR514 060 05	0.5	6	6	9	20	60
WXR514 060 10	1	6	6	9	20	60
WXR514 060 15	1.5	6	6	9	20	60
WXR514 060 20	2	6	6	9	20	60
WXR514 060 03 090	0.3	6	6	15	30	90
WXR514 060 05 090	0.5	6	6	15	30	90
WXR514 060 10 090	1	6	6	15	30	90
WXR514 080 01	0.1	8	8	12	25	70
WXR514 080 02	0.2	8	8	12	25	70
WXR514 080 03	0.3	8	8	12	25	70
WXR514 080 05	0.5	8	8	12	25	70
WXR514 080 10	1	8	8	12	25	70
WXR514 080 15	1.5	8	8	12	25	70
WXR514 080 20	2	8	8	12	25	70

Designation	R	ØD	Ød	ℓ1	ℓ2	L
WXR514 080 03 100	0.3	8	8	20	35	100
WXR514 080 05 100	0.5	8	8	20	35	100
WXR514 080 10 100	1	8	8	20	35	100
WXR514 100 01	0.1	10	10	15	30	75
WXR514 100 02	0.2	10	10	15	30	75
WXR514 100 03	0.3	10	10	15	30	75
WXR514 100 05	0.5	10	10	15	30	75
WXR514 100 10	1	10	10	15	30	75
WXR514 100 15	1.5	10	10	15	30	75
WXR514 100 20	2	10	10	15	30	75
WXR514 100 03 100	0.3	10	10	25	40	100
WXR514 100 05 100	0.5	10	10	25	40	100
WXR514 100 10 100	1	10	10	25	40	100
WXR514 120 02	0.2	12	12	18	32	80
WXR514 120 03	0.3	12	12	18	32	80
WXR514 120 05	0.5	12	12	18	32	80
WXR514 120 10	1	12	12	18	32	80
WXR514 120 15	1.5	12	12	18	32	80
WXR514 120 20	2	12	12	18	32	80
WXR514 120 03 110	0.3	12	12	30	45	110
WXR514 120 05 110	0.5	12	12	30	45	110
WXR514 120 10 110	1	12	12	30	45	110
WXR514 160 05	0.5	16	16	20	35	100
WXR514 160 10	1	16	16	20	35	100
WXR514 160 05 150	0.5	16	20	35	50	150
WXR514 160 10 150	1	16	20	35	50	150
WXR514 200 05	0.5	20	20	25	40	100
WXR514 200 10	1	20	20	25	40	100
WXR514 200 05 150	0.5	20	20	40	55	150
WXR514 200 10 150	1	20	20	40	55	150

※ The above specifications are subject to change without prior notice for product quality improvement.

• Applicable Workpiece

Carbon steel ~ HB225	Alloy steel HB225~325	Pre-hardened steel HRC30~50	Hardened steel		Copper	Graphite	Cast iron ~FCD500	Aluminum	Stainless steel
			SKD61~HRC55	SKD11 HRC55~					
○	○	◎	○				○		○

◎: Excellent ○: Good

U-Star Endmill

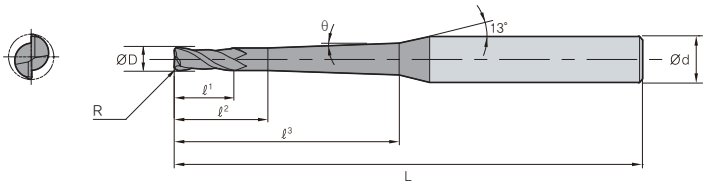
WR542

2 Flutes tapered neck type radius endmill

ULTRA FINE | 2 | 30° HELIX | R ±0.01 (All sizes) | W | DATA (p.450)

• TOLERANCE

ØD		Ød
All sizes	0 ~ -0.012mm	h6



(mm)

Designation	R	ØD	Ød	ℓ1	ℓ2	ℓ3	θ	L
WR542 002 005 01 01	0.05	0.2	4	0.3	0.4	1	1°	40
WR542 002 005 01 02	0.05	0.2	4	0.3	0.4	2	1°	40
WR542 002 005 01 03	0.05	0.2	4	0.3	0.4	3	1°	40
WR542 002 005 02 01	0.05	0.2	4	0.3	0.4	1	2°	40
WR542 002 005 02 02	0.05	0.2	4	0.3	0.4	2	2°	40
WR542 002 005 02 03	0.05	0.2	4	0.3	0.4	3	2°	40
WR542 003 005 01 02	0.05	0.3	4	0.5	0.6	2	1°	40
WR542 003 005 01 03	0.05	0.3	4	0.5	0.6	3	1°	40
WR542 003 005 01 04	0.05	0.3	4	0.5	0.6	4	1°	40
WR542 003 005 01 05	0.05	0.3	4	0.5	0.6	5	1°	40
WR542 003 005 02 02	0.05	0.3	4	0.5	0.6	2	2°	40
WR542 003 005 02 03	0.05	0.3	4	0.5	0.6	3	2°	40
WR542 003 005 02 04	0.05	0.3	4	0.5	0.6	4	2°	40
WR542 003 005 02 05	0.05	0.3	4	0.5	0.6	5	2°	40
WR542 004 005 01 02	0.05	0.4	4	0.6	0.8	2	1°	50
WR542 004 005 01 03	0.05	0.4	4	0.6	0.8	3	1°	50
WR542 004 005 01 04	0.05	0.4	4	0.6	0.8	4	1°	50
WR542 004 005 01 05	0.05	0.4	4	0.6	0.8	5	1°	50
WR542 004 005 01 06	0.05	0.4	4	0.6	0.8	6	1°	50
WR542 004 005 02 02	0.05	0.4	4	0.6	0.8	2	2°	50
WR542 004 005 02 03	0.05	0.4	4	0.6	0.8	3	2°	50
WR542 004 005 02 04	0.05	0.4	4	0.6	0.8	4	2°	50
WR542 004 005 02 05	0.05	0.4	4	0.6	0.8	5	2°	50
WR542 004 005 02 06	0.05	0.4	4	0.6	0.8	6	2°	50
WR542 004 01 01 02	0.1	0.4	4	0.6	0.8	2	1°	50
WR542 004 01 01 03	0.1	0.4	4	0.6	0.8	3	1°	50
WR542 004 01 01 04	0.1	0.4	4	0.6	0.8	4	1°	50
WR542 004 01 01 05	0.1	0.4	4	0.6	0.8	5	1°	50
WR542 004 01 01 06	0.1	0.4	4	0.6	0.8	6	1°	50
WR542 004 01 02 02	0.1	0.4	4	0.6	0.8	2	2°	50
WR542 004 01 02 03	0.1	0.4	4	0.6	0.8	3	2°	50
WR542 004 01 02 04	0.1	0.4	4	0.6	0.8	4	2°	50
WR542 004 01 02 05	0.1	0.4	4	0.6	0.8	5	2°	50
WR542 004 01 02 06	0.1	0.4	4	0.6	0.8	6	2°	50
WR542 005 005 01 04	0.05	0.5	4	0.7	1	4	1°	50
WR542 005 005 01 06	0.05	0.5	4	0.7	1	6	1°	50
WR542 005 005 01 08	0.05	0.5	4	0.7	1	8	1°	50

Designation	R	ØD	Ød	ℓ1	ℓ2	ℓ3	θ	L
WR542 005 005 01 10	0.05	0.5	4	0.7	1	10	1°	50
WR542 005 005 02 04	0.05	0.5	4	0.7	1	4	2°	50
WR542 005 005 02 06	0.05	0.5	4	0.7	1	6	2°	50
WR542 005 005 02 08	0.05	0.5	4	0.7	1	8	2°	50
WR542 005 005 02 10	0.05	0.5	4	0.7	1	10	2°	50
WR542 005 01 01 04	0.1	0.5	4	0.7	1	4	1°	50
WR542 005 01 01 06	0.1	0.5	4	0.7	1	6	1°	50
WR542 005 01 01 08	0.1	0.5	4	0.7	1	8	1°	50
WR542 005 01 01 10	0.1	0.5	4	0.7	1	10	1°	50
WR542 005 01 02 04	0.1	0.5	4	0.7	1	4	2°	50
WR542 005 01 02 06	0.1	0.5	4	0.7	1	6	2°	50
WR542 005 01 02 08	0.1	0.5	4	0.7	1	8	2°	50
WR542 005 01 02 10	0.1	0.5	4	0.7	1	10	2°	50
WR542 006 01 01 04	0.1	0.6	4	0.9	1.2	4	1°	50
WR542 006 01 01 06	0.1	0.6	4	0.9	1.2	6	1°	50
WR542 006 01 01 08	0.1	0.6	4	0.9	1.2	8	1°	50
WR542 006 01 01 10	0.1	0.6	4	0.9	1.2	10	1°	50
WR542 006 01 01 12	0.1	0.6	4	0.9	1.2	12	1°	50
WR542 006 01 02 04	0.1	0.6	4	0.9	1.2	4	2°	50
WR542 006 01 02 06	0.1	0.6	4	0.9	1.2	6	2°	50
WR542 006 01 02 08	0.1	0.6	4	0.9	1.2	8	2°	50
WR542 006 01 02 10	0.1	0.6	4	0.9	1.2	10	2°	50
WR542 006 01 02 12	0.1	0.6	4	0.9	1.2	12	2°	50
WR542 006 02 01 04	0.2	0.6	4	0.9	1.2	4	1°	50
WR542 006 02 01 06	0.2	0.6	4	0.9	1.2	6	1°	50
WR542 006 02 01 08	0.2	0.6	4	0.9	1.2	8	1°	50
WR542 006 02 01 10	0.2	0.6	4	0.9	1.2	10	1°	50
WR542 006 02 01 12	0.2	0.6	4	0.9	1.2	12	1°	50
WR542 006 02 02 04	0.2	0.6	4	0.9	1.2	4	2°	50
WR542 006 02 02 06	0.2	0.6	4	0.9	1.2	6	2°	50
WR542 006 02 02 08	0.2	0.6	4	0.9	1.2	8	2°	50
WR542 006 02 02 10	0.2	0.6	4	0.9	1.2	10	2°	50
WR542 006 02 02 12	0.2	0.6	4	0.9	1.2	12	2°	50
WR542 008 01 01 04	0.1	0.8	4	1.2	1.6	4	1°	50
WR542 008 01 01 06	0.1	0.8	4	1.2	1.6	6	1°	50
WR542 008 01 01 08	0.1	0.8	4	1.2	1.6	8	1°	50
WR542 008 01 01 10	0.1	0.8	4	1.2	1.6	10	1°	50

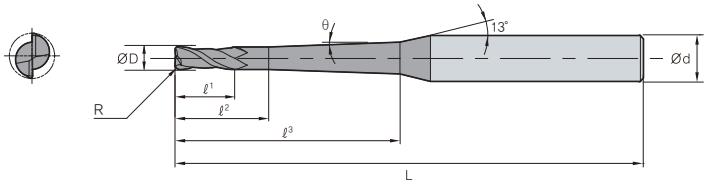
WR542

2 Flutes tapered neck type radius endmill

ULTRA FINE | 2 | 30° HELIX | R ±0.01 (All sizes) | W | DATA p.450

• TOLERANCE

ØD		Ød
All sizes	0 ~ -0.012mm	h6



(mm)

Designation	R	ØD	Ød	ℓ1	ℓ2	ℓ3	θ	L
WR542 008 01 01 12	0.1	0.8	4	1.2	1.6	12	1°	50
WR542 008 01 01 16	0.1	0.8	4	1.2	1.6	16	1°	50
WR542 008 01 02 04	0.1	0.8	4	1.2	1.6	4	2°	50
WR542 008 01 02 06	0.1	0.8	4	1.2	1.6	6	2°	50
WR542 008 01 02 08	0.1	0.8	4	1.2	1.6	8	2°	50
WR542 008 01 02 10	0.1	0.8	4	1.2	1.6	10	2°	50
WR542 008 01 02 12	0.1	0.8	4	1.2	1.6	12	2°	50
WR542 008 01 02 16	0.1	0.8	4	1.2	1.6	16	2°	50
WR542 008 02 01 04	0.2	0.8	4	1.2	1.6	4	1°	50
WR542 008 02 01 06	0.2	0.8	4	1.2	1.6	6	1°	50
WR542 008 02 01 08	0.2	0.8	4	1.2	1.6	8	1°	50
WR542 008 02 01 10	0.2	0.8	4	1.2	1.6	10	1°	50
WR542 008 02 01 12	0.2	0.8	4	1.2	1.6	12	1°	50
WR542 008 02 01 16	0.2	0.8	4	1.2	1.6	16	1°	50
WR542 008 02 02 04	0.2	0.8	4	1.2	1.6	4	2°	50
WR542 008 02 02 06	0.2	0.8	4	1.2	1.6	6	2°	50
WR542 008 02 02 08	0.2	0.8	4	1.2	1.6	8	2°	50
WR542 008 02 02 10	0.2	0.8	4	1.2	1.6	10	2°	50
WR542 008 02 02 12	0.2	0.8	4	1.2	1.6	12	2°	50
WR542 008 02 02 16	0.2	0.8	4	1.2	1.6	16	2°	50
WR542 010 01 01 06	0.1	1	4	1.5	2.5	6	1°	50
WR542 010 01 01 08	0.1	1	4	1.5	2.5	8	1°	50
WR542 010 01 01 10	0.1	1	4	1.5	2.5	10	1°	50
WR542 010 01 01 12	0.1	1	4	1.5	2.5	12	1°	50
WR542 010 01 01 16	0.1	1	4	1.5	2.5	16	1°	50
WR542 010 01 01 20	0.1	1	4	1.5	2.5	20	1°	50
WR542 010 01 01 25	0.1	1	4	1.5	2.5	25	1°	60
WR542 010 01 01 30	0.1	1	4	1.5	2.5	30	1°	70
WR542 010 01 01 40	0.1	1	4	1.5	2.5	40	1°	80
WR542 010 01 01 50	0.1	1	6	1.5	2.5	50	1°	90
WR542 010 01 02 06	0.1	1	4	1.5	2.5	6	2°	50
WR542 010 01 02 08	0.1	1	4	1.5	2.5	8	2°	50
WR542 010 01 02 10	0.1	1	4	1.5	2.5	10	2°	50
WR542 010 01 02 12	0.1	1	4	1.5	2.5	12	2°	50
WR542 010 01 02 16	0.1	1	4	1.5	2.5	16	2°	50
WR542 010 01 02 20	0.1	1	4	1.5	2.5	20	2°	50
WR542 010 01 02 25	0.1	1	4	1.5	2.5	25	2°	60

Designation	R	ØD	Ød	ℓ1	ℓ2	ℓ3	θ	L
WR542 010 01 02 30	0.1	1	4	1.5	2.5	30	2°	70
WR542 010 01 02 40	0.1	1	4	1.5	2.5	40	2°	80
WR542 010 01 02 50	0.1	1	6	1.5	2.5	50	2°	90
WR542 010 02 01 06	0.2	1	4	1.5	2.5	6	1°	50
WR542 010 02 01 08	0.2	1	4	1.5	2.5	8	1°	50
WR542 010 02 01 10	0.2	1	4	1.5	2.5	10	1°	50
WR542 010 02 01 12	0.2	1	4	1.5	2.5	12	1°	50
WR542 010 02 01 16	0.2	1	4	1.5	2.5	16	1°	50
WR542 010 02 01 20	0.2	1	4	1.5	2.5	20	1°	50
WR542 010 02 01 25	0.2	1	4	1.5	2.5	25	1°	60
WR542 010 02 01 30	0.2	1	4	1.5	2.5	30	1°	70
WR542 010 02 01 40	0.2	1	4	1.5	2.5	40	1°	80
WR542 010 02 01 50	0.2	1	6	1.5	2.5	50	1°	90
WR542 010 02 02 06	0.2	1	4	1.5	2.5	6	2°	50
WR542 010 02 02 08	0.2	1	4	1.5	2.5	8	2°	50
WR542 010 02 02 10	0.2	1	4	1.5	2.5	10	2°	50
WR542 010 02 02 12	0.2	1	4	1.5	2.5	12	2°	50
WR542 010 02 02 16	0.2	1	4	1.5	2.5	16	2°	50
WR542 010 02 02 20	0.2	1	4	1.5	2.5	20	2°	50
WR542 010 02 02 25	0.2	1	4	1.5	2.5	25	2°	60
WR542 010 02 02 30	0.2	1	4	1.5	2.5	30	2°	70
WR542 010 02 02 40	0.2	1	4	1.5	2.5	40	2°	80
WR542 010 02 02 50	0.2	1	6	1.5	2.5	50	2°	90
WR542 012 01 01 08	0.1	1.2	4	1.8	3	8	1°	50
WR542 012 01 01 12	0.1	1.2	4	1.8	3	12	1°	50
WR542 012 01 01 16	0.1	1.2	4	1.8	3	16	1°	50
WR542 012 01 01 20	0.1	1.2	4	1.8	3	20	1°	50
WR542 012 01 01 25	0.1	1.2	4	1.8	3	25	1°	60
WR542 012 01 01 30	0.1	1.2	4	1.8	3	30	1°	70
WR542 012 01 02 08	0.1	1.2	4	1.8	3	8	2°	50
WR542 012 01 02 12	0.1	1.2	4	1.8	3	12	2°	50
WR542 012 01 02 16	0.1	1.2	4	1.8	3	16	2°	50
WR542 012 01 02 20	0.1	1.2	4	1.8	3	20	2°	50
WR542 012 01 02 25	0.1	1.2	4	1.8	3	25	2°	60
WR542 012 01 02 30	0.1	1.2	4	1.8	3	30	2°	70
WR542 012 02 01 08	0.2	1.2	4	1.8	3	8	1°	50
WR542 012 02 01 12	0.2	1.2	4	1.8	3	12	1°	50

U-Star Endmill

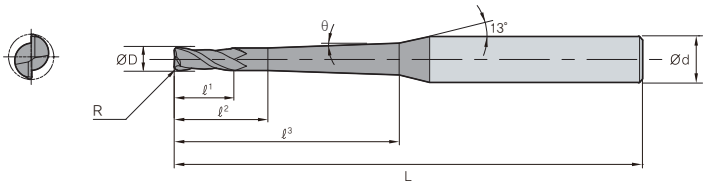
WR542

2 Flutes tapered neck type radius endmill

ULTRA FINE | 2 | 30° HELIX | R ±0.01 (All sizes) | W | DATA (p.450)

• TOLERANCE

ØD		Ød
All sizes	0 ~ -0.012mm	h6



(mm)

Designation	R	ØD	Ød	ℓ1	ℓ2	ℓ3	θ	L
WR542 012 02 01 16	0.2	1.2	4	1.8	3	16	1°	50
WR542 012 02 01 20	0.2	1.2	4	1.8	3	20	1°	50
WR542 012 02 01 25	0.2	1.2	4	1.8	3	25	1°	60
WR542 012 02 01 30	0.2	1.2	4	1.8	3	30	1°	70
WR542 012 02 02 08	0.2	1.2	4	1.8	3	8	2°	50
WR542 012 02 02 12	0.2	1.2	4	1.8	3	12	2°	50
WR542 012 02 02 16	0.2	1.2	4	1.8	3	16	2°	50
WR542 012 02 02 20	0.2	1.2	4	1.8	3	20	2°	50
WR542 012 02 02 25	0.2	1.2	4	1.8	3	25	2°	60
WR542 012 02 02 30	0.2	1.2	4	1.8	3	30	2°	70
WR542 015 01 01 08	0.1	1.5	4	2.3	3	8	1°	50
WR542 015 01 01 10	0.1	1.5	4	2.3	3	10	1°	50
WR542 015 01 01 12	0.1	1.5	4	2.3	3	12	1°	50
WR542 015 01 01 16	0.1	1.5	4	2.3	3	16	1°	50
WR542 015 01 01 20	0.1	1.5	4	2.3	3	20	1°	50
WR542 015 01 01 25	0.1	1.5	4	2.3	3	25	1°	60
WR542 015 01 01 30	0.1	1.5	4	2.3	3	30	1°	70
WR542 015 01 01 40	0.1	1.5	4	2.3	3	40	1°	80
WR542 015 01 01 50	0.1	1.5	4	2.3	3	50	1°	90
WR542 015 01 02 08	0.1	1.5	4	2.3	3	8	2°	50
WR542 015 01 02 10	0.1	1.5	4	2.3	3	10	2°	50
WR542 015 01 02 12	0.1	1.5	4	2.3	3	12	2°	50
WR542 015 01 02 16	0.1	1.5	4	2.3	3	16	2°	50
WR542 015 01 02 20	0.1	1.5	4	2.3	3	20	2°	50
WR542 015 01 02 25	0.1	1.5	4	2.3	3	25	2°	60
WR542 015 01 02 30	0.1	1.5	4	2.3	3	30	2°	70
WR542 015 01 02 40	0.1	1.5	6	2.3	3	40	2°	80
WR542 015 01 02 50	0.1	1.5	6	2.3	3	50	2°	90
WR542 015 02 01 08	0.2	1.5	4	2.3	3	8	1°	50
WR542 015 02 01 10	0.2	1.5	4	2.3	3	10	1°	50
WR542 015 02 01 12	0.2	1.5	4	2.3	3	12	1°	50
WR542 015 02 01 16	0.2	1.5	4	2.3	3	16	1°	50
WR542 015 02 01 20	0.2	1.5	4	2.3	3	20	1°	50
WR542 015 02 01 25	0.2	1.5	4	2.3	3	25	1°	60
WR542 015 02 01 30	0.2	1.5	4	2.3	3	30	1°	70
WR542 015 02 01 40	0.2	1.5	4	2.3	3	40	1°	80
WR542 015 02 01 50	0.2	1.5	4	2.3	3	50	1°	90

Designation	R	ØD	Ød	ℓ1	ℓ2	ℓ3	θ	L
WR542 015 02 02 08	0.2	1.5	4	2.3	3	8	2°	50
WR542 015 02 02 10	0.2	1.5	4	2.3	3	10	2°	50
WR542 015 02 02 12	0.2	1.5	4	2.3	3	12	2°	50
WR542 015 02 02 16	0.2	1.5	4	2.3	3	16	2°	50
WR542 015 02 02 20	0.2	1.5	4	2.3	3	20	2°	50
WR542 015 02 02 25	0.2	1.5	4	2.3	3	25	2°	60
WR542 015 02 02 30	0.2	1.5	4	2.3	3	30	2°	70
WR542 015 02 02 40	0.2	1.5	6	2.3	3	40	2°	80
WR542 015 02 02 50	0.2	1.5	6	2.3	3	50	2°	90
WR542 015 03 01 08	0.3	1.5	4	2.3	3	8	1°	50
WR542 015 03 01 10	0.3	1.5	4	2.3	3	10	1°	50
WR542 015 03 01 12	0.3	1.5	4	2.3	3	12	1°	50
WR542 015 03 01 16	0.3	1.5	4	2.3	3	16	1°	50
WR542 015 03 01 20	0.3	1.5	4	2.3	3	20	1°	50
WR542 015 03 01 25	0.3	1.5	4	2.3	3	25	1°	60
WR542 015 03 01 30	0.3	1.5	4	2.3	3	30	1°	70
WR542 015 03 01 40	0.3	1.5	4	2.3	3	40	1°	80
WR542 015 03 01 50	0.3	1.5	4	2.3	3	50	1°	90
WR542 015 03 02 08	0.3	1.5	4	2.3	3	8	2°	50
WR542 015 03 02 10	0.3	1.5	4	2.3	3	10	2°	50
WR542 015 03 02 12	0.3	1.5	4	2.3	3	12	2°	50
WR542 015 03 02 16	0.3	1.5	4	2.3	3	16	2°	50
WR542 015 03 02 20	0.3	1.5	4	2.3	3	20	2°	50
WR542 015 03 02 25	0.3	1.5	4	2.3	3	25	2°	60
WR542 015 03 02 30	0.3	1.5	4	2.3	3	30	2°	70
WR542 015 03 02 40	0.3	1.5	6	2.3	3	40	2°	80
WR542 015 03 02 50	0.3	1.5	6	2.3	3	50	2°	90
WR542 020 01 01 10	0.1	2	4	2	5	10	1°	50
WR542 020 01 01 12	0.1	2	4	2	5	12	1°	50
WR542 020 01 01 16	0.1	2	4	2	5	16	1°	50
WR542 020 01 01 20	0.1	2	4	2	5	20	1°	50
WR542 020 01 01 25	0.1	2	4	2	5	25	1°	60
WR542 020 01 01 30	0.1	2	4	2	5	30	1°	70
WR542 020 01 01 40	0.1	2	6	2	5	40	1°	80
WR542 020 01 01 50	0.1	2	6	2	5	50	1°	100
WR542 020 01 01 60	0.1	2	6	2	5	60	1°	100
WR542 020 01 01 80	0.1	2	6	2	5	80	1°	140

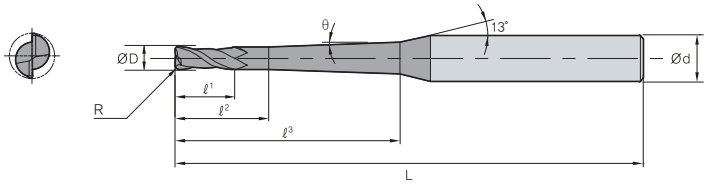
WR542

2 Flutes tapered neck type radius endmill

ULTRA FINE | 2 | 30° HELIX | R ±0.01 All sizes | W | DATA p.450

• TOLERANCE

ØD		Ød
All sizes	0 ~ -0.012mm	h6



(mm)

Designation	R	ØD	Ød	ℓ1	ℓ2	ℓ3	θ	L
WR542 020 01 02 10	0.1	2	4	2	5	10	2°	50
WR542 020 01 02 12	0.1	2	4	2	5	12	2°	50
WR542 020 01 02 16	0.1	2	4	2	5	16	2°	50
WR542 020 01 02 20	0.1	2	4	2	5	20	2°	50
WR542 020 01 02 25	0.1	2	4	2	5	25	2°	60
WR542 020 01 02 30	0.1	2	4	2	5	30	2°	70
WR542 020 01 02 40	0.1	2	6	2	5	40	2°	80
WR542 020 01 02 50	0.1	2	6	2	5	50	2°	100
WR542 020 01 02 60	0.1	2	6	2	5	60	2°	100
WR542 020 01 02 80	0.1	2	8	2	5	80	2°	140
WR542 020 02 01 10	0.2	2	4	2	5	10	1°	50
WR542 020 02 01 12	0.2	2	4	2	5	12	1°	50
WR542 020 02 01 16	0.2	2	4	2	5	16	1°	50
WR542 020 02 01 20	0.2	2	4	2	5	20	1°	50
WR542 020 02 01 25	0.2	2	4	2	5	25	1°	60
WR542 020 02 01 30	0.2	2	4	2	5	30	1°	70
WR542 020 02 01 40	0.2	2	6	2	5	40	1°	80
WR542 020 02 01 50	0.2	2	6	2	5	50	1°	100
WR542 020 02 01 60	0.2	2	6	2	5	60	1°	100
WR542 020 02 01 80	0.2	2	6	2	5	80	1°	140
WR542 020 02 02 10	0.2	2	4	2	5	10	2°	50
WR542 020 02 02 12	0.2	2	4	2	5	12	2°	50
WR542 020 02 02 16	0.2	2	4	2	5	16	2°	50
WR542 020 02 02 20	0.2	2	4	2	5	20	2°	50
WR542 020 02 02 25	0.2	2	4	2	5	25	2°	60
WR542 020 02 02 30	0.2	2	4	2	5	30	2°	70
WR542 020 02 02 40	0.2	2	6	2	5	40	2°	80
WR542 020 02 02 50	0.2	2	6	2	5	50	2°	100
WR542 020 02 02 60	0.2	2	6	2	5	60	2°	100
WR542 020 02 02 80	0.2	2	8	2	5	80	2°	140
WR542 020 03 01 10	0.3	2	4	2	5	10	1°	50
WR542 020 03 01 12	0.3	2	4	2	5	12	1°	50
WR542 020 03 01 16	0.3	2	4	2	5	16	1°	50
WR542 020 03 01 20	0.3	2	4	2	5	20	1°	50
WR542 020 03 01 25	0.3	2	4	2	5	25	1°	60
WR542 020 03 01 30	0.3	2	4	2	5	30	1°	70
WR542 020 03 01 40	0.3	2	6	2	5	40	1°	80

Designation	R	ØD	Ød	ℓ1	ℓ2	ℓ3	θ	L
WR542 020 03 01 50	0.3	2	6	2	5	50	1°	100
WR542 020 03 01 60	0.3	2	6	2	5	60	1°	100
WR542 020 03 01 80	0.3	2	6	2	5	80	1°	140
WR542 020 03 02 10	0.3	2	4	2	5	10	2°	50
WR542 020 03 02 12	0.3	2	4	2	5	12	2°	50
WR542 020 03 02 16	0.3	2	4	2	5	16	2°	50
WR542 020 03 02 20	0.3	2	4	2	5	20	2°	50
WR542 020 03 02 25	0.3	2	4	2	5	25	2°	60
WR542 020 03 02 30	0.3	2	4	2	5	30	2°	70
WR542 020 03 02 40	0.3	2	6	2	5	40	2°	80
WR542 020 03 02 50	0.3	2	6	2	5	50	2°	100
WR542 020 03 02 60	0.3	2	6	2	5	60	2°	100
WR542 020 03 02 80	0.3	2	8	2	5	80	2°	140
WR542 020 05 01 10	0.5	2	4	2	5	10	1°	50
WR542 020 05 01 12	0.5	2	4	2	5	12	1°	50
WR542 020 05 01 16	0.5	2	4	2	5	16	1°	50
WR542 020 05 01 20	0.5	2	4	2	5	20	1°	50
WR542 020 05 01 25	0.5	2	4	2	5	25	1°	60
WR542 020 05 01 30	0.5	2	4	2	5	30	1°	70
WR542 020 05 01 40	0.5	2	6	2	5	40	1°	80
WR542 020 05 01 50	0.5	2	6	2	5	50	1°	100
WR542 020 05 01 60	0.5	2	6	2	5	60	1°	100
WR542 020 05 01 80	0.5	2	6	2	5	80	1°	140
WR542 020 05 02 10	0.5	2	4	2	5	10	2°	50
WR542 020 05 02 12	0.5	2	4	2	5	12	2°	50
WR542 020 05 02 16	0.5	2	4	2	5	16	2°	50
WR542 020 05 02 20	0.5	2	4	2	5	20	2°	50
WR542 020 05 02 25	0.5	2	4	2	5	25	2°	60
WR542 020 05 02 30	0.5	2	4	2	5	30	2°	70
WR542 020 05 02 40	0.5	2	6	2	5	40	2°	80
WR542 020 05 02 50	0.5	2	6	2	5	50	2°	100
WR542 020 05 02 60	0.5	2	6	2	5	60	2°	100
WR542 020 05 02 80	0.5	2	8	2	5	80	2°	140
WR542 030 02 01 16	0.2	3	6	4.5	6	16	1°	60
WR542 030 02 01 20	0.2	3	6	4.5	6	20	1°	65
WR542 030 02 01 30	0.2	3	6	4.5	6	30	1°	70
WR542 030 02 01 40	0.2	3	6	4.5	6	40	1°	80

U-Star Endmill

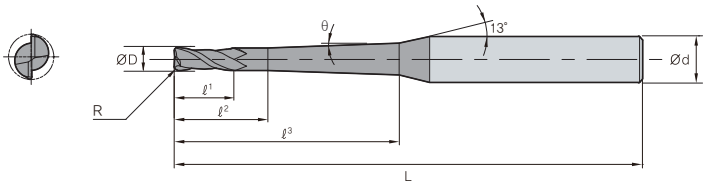
WR542

2 Flutes tapered neck type radius endmill

ULTRA FINE | 2 | 30° HELIX | R ±0.01 (All sizes) | W | DATA (p.450)

• TOLERANCE

ØD		Ød
All sizes	0 ~ -0.012mm	h6



(mm)

Designation	R	ØD	Ød	ℓ1	ℓ2	ℓ3	θ	L
WR542 030 02 01 50	0.2	3	6	4.5	6	50	1°	90
WR542 030 02 01 60	0.2	3	6	4.5	6	60	1°	100
WR542 030 02 02 16	0.2	3	6	4.5	6	16	2°	60
WR542 030 02 02 20	0.2	3	6	4.5	6	20	2°	65
WR542 030 02 02 30	0.2	3	6	4.5	6	30	2°	70
WR542 030 02 02 40	0.2	3	6	4.5	6	40	2°	80
WR542 030 02 02 50	0.2	3	8	4.5	6	50	2°	90
WR542 030 02 02 60	0.2	3	8	4.5	6	60	2°	100
WR542 030 02 02 70	0.2	3	8	4.5	6	70	2°	120
WR542 030 03 01 16	0.3	3	6	4.5	6	16	1°	60
WR542 030 03 01 20	0.3	3	6	4.5	6	20	1°	65
WR542 030 03 01 30	0.3	3	6	4.5	6	30	1°	70
WR542 030 03 01 40	0.3	3	6	4.5	6	40	1°	80
WR542 030 03 01 50	0.3	3	6	4.5	6	50	1°	90
WR542 030 03 01 60	0.3	3	6	4.5	6	60	1°	100
WR542 030 03 02 16	0.3	3	6	4.5	6	16	2°	60
WR542 030 03 02 20	0.3	3	6	4.5	6	20	2°	65
WR542 030 03 02 30	0.3	3	6	4.5	6	30	2°	70
WR542 030 03 02 40	0.3	3	6	4.5	6	40	2°	80
WR542 030 03 02 50	0.3	3	8	4.5	6	50	2°	90
WR542 030 03 02 60	0.3	3	8	4.5	6	60	2°	100
WR542 030 03 02 70	0.3	3	8	4.5	6	70	2°	120
WR542 030 05 01 16	0.5	3	6	4.5	6	16	1°	60
WR542 030 05 01 20	0.5	3	6	4.5	6	20	1°	65
WR542 030 05 01 30	0.5	3	6	4.5	6	30	1°	70
WR542 030 05 01 40	0.5	3	6	4.5	6	40	1°	80
WR542 030 05 01 50	0.5	3	6	4.5	6	50	1°	90
WR542 030 05 01 60	0.5	3	6	4.5	6	60	1°	100
WR542 030 05 02 16	0.5	3	6	4.5	6	16	2°	60
WR542 030 05 02 20	0.5	3	6	4.5	6	20	2°	65
WR542 030 05 02 30	0.5	3	6	4.5	6	30	2°	70
WR542 030 05 02 40	0.5	3	6	4.5	6	40	2°	80
WR542 030 05 02 50	0.5	3	8	4.5	6	50	2°	90
WR542 030 05 02 60	0.5	3	8	4.5	6	60	2°	100
WR542 030 05 02 70	0.5	3	8	4.5	6	70	2°	120
WR542 040 02 01 40	0.2	4	6	6	8	40	1°	90
WR542 040 02 01 50	0.2	4	6	6	8	50	1°	100
WR542 040 02 01 60	0.2	4	6	6	8	60	1°	110
WR542 040 02 01 70	0.2	4	8	6	8	70	1°	120
WR542 040 02 02 40	0.2	4	8	6	8	40	2°	90
WR542 040 02 02 50	0.2	4	8	6	8	50	2°	100
WR542 040 02 02 60	0.2	4	8	6	8	60	2°	110
WR542 040 02 02 70	0.2	4	10	6	8	70	2°	120
WR542 040 03 01 40	0.3	4	6	6	8	40	1°	90
WR542 040 03 01 50	0.3	4	6	6	8	50	1°	100
WR542 040 03 01 60	0.3	4	6	6	8	60	1°	110
WR542 040 03 01 70	0.3	4	8	6	8	70	1°	120
WR542 040 03 02 40	0.3	4	8	6	8	40	2°	90
WR542 040 03 02 50	0.3	4	8	6	8	50	2°	100
WR542 040 03 02 60	0.3	4	8	6	8	60	2°	110
WR542 040 03 02 70	0.3	4	10	6	8	70	2°	120
WR542 040 05 01 40	0.5	4	6	6	8	40	1°	90
WR542 040 05 01 50	0.5	4	6	6	8	50	1°	100
WR542 040 05 01 60	0.5	4	6	6	8	60	1°	110
WR542 040 05 01 70	0.5	4	8	6	8	70	1°	120
WR542 040 05 02 40	0.5	4	8	6	8	40	2°	90
WR542 040 05 02 50	0.5	4	8	6	8	50	2°	100
WR542 040 05 02 60	0.5	4	8	6	8	60	2°	110
WR542 040 05 02 70	0.5	4	10	6	8	70	2°	120

※ The above specifications are subject to change without prior notice for product quality improvement.

• Applicable Workpiece

Carbon steel ~ HB225	Alloy steel HB225~325	Pre-hardened steel HRC30~50	Hardened steel		Copper	Graphite	Cast iron ~FCD500	Aluminum	Stainless steel
			SKD61~HRC55	SKD11 HRC55~					
○	○	◎	○				○		○

◎: Excellent ○: Good

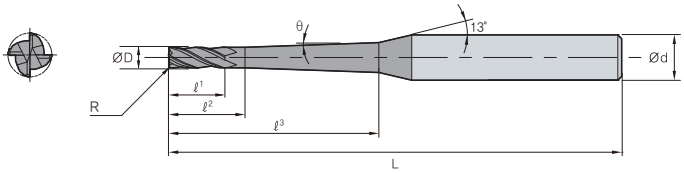
WR544

4 Flutes tapered neck type radius endmill

ULTRA FINE | 4 | 30° HELIX | R ±0.01 All sizes | W | DATA p.451

• TOLERANCE

ØD		Ød
All sizes	0 ~ -0.012mm	h6



(mm)

Designation	R	ØD	Ød	ℓ1	ℓ2	ℓ3	θ	L
WR544 010 01 01 06	0.1	1	4	1.5	2.5	6	1°	50
WR544 010 01 01 08	0.1	1	4	1.5	2.5	8	1°	50
WR544 010 01 01 10	0.1	1	4	1.5	2.5	10	1°	50
WR544 010 01 01 12	0.1	1	4	1.5	2.5	12	1°	50
WR544 010 01 01 16	0.1	1	4	1.5	2.5	16	1°	50
WR544 010 01 01 20	0.1	1	4	1.5	2.5	20	1°	50
WR544 010 01 01 25	0.1	1	4	1.5	2.5	25	1°	60
WR544 010 01 01 30	0.1	1	4	1.5	2.5	30	1°	70
WR544 010 01 01 40	0.1	1	4	1.5	2.5	40	1°	80
WR544 010 01 01 50	0.1	1	4	1.5	2.5	50	1°	90
WR544 010 01 02 06	0.1	1	4	1.5	2.5	6	2°	50
WR544 010 01 02 08	0.1	1	4	1.5	2.5	8	2°	50
WR544 010 01 02 10	0.1	1	4	1.5	2.5	10	2°	50
WR544 010 01 02 12	0.1	1	4	1.5	2.5	12	2°	50
WR544 010 01 02 16	0.1	1	4	1.5	2.5	16	2°	50
WR544 010 01 02 20	0.1	1	4	1.5	2.5	20	2°	50
WR544 010 01 02 25	0.1	1	4	1.5	2.5	25	2°	60
WR544 010 01 02 30	0.1	1	4	1.5	2.5	30	2°	70
WR544 010 01 02 40	0.1	1	4	1.5	2.5	40	2°	80
WR544 010 01 02 50	0.1	1	6	1.5	2.5	50	2°	90
WR544 010 02 01 06	0.2	1	4	1.5	2.5	6	1°	50
WR544 010 02 01 08	0.2	1	4	1.5	2.5	8	1°	50
WR544 010 02 01 10	0.2	1	4	1.5	2.5	10	1°	50
WR544 010 02 01 12	0.2	1	4	1.5	2.5	12	1°	50
WR544 010 02 01 16	0.2	1	4	1.5	2.5	16	1°	50
WR544 010 02 01 20	0.2	1	4	1.5	2.5	20	1°	50
WR544 010 02 01 25	0.2	1	4	1.5	2.5	25	1°	60
WR544 010 02 01 30	0.2	1	4	1.5	2.5	30	1°	70
WR544 010 02 01 40	0.2	1	4	1.5	2.5	40	1°	80
WR544 010 02 01 50	0.2	1	4	1.5	2.5	50	1°	90
WR544 010 02 02 06	0.2	1	4	1.5	2.5	6	2°	50
WR544 010 02 02 08	0.2	1	4	1.5	2.5	8	2°	50
WR544 010 02 02 10	0.2	1	4	1.5	2.5	10	2°	50
WR544 010 02 02 12	0.2	1	4	1.5	2.5	12	2°	50
WR544 010 02 02 16	0.2	1	4	1.5	2.5	16	2°	50
WR544 010 02 02 20	0.2	1	4	1.5	2.5	20	2°	50
WR544 010 02 02 25	0.2	1	4	1.5	2.5	25	2°	60

Designation	R	ØD	Ød	ℓ1	ℓ2	ℓ3	θ	L
WR544 010 02 02 30	0.2	1	4	1.5	2.5	30	2°	70
WR544 010 02 02 40	0.2	1	4	1.5	2.5	40	2°	80
WR544 010 02 02 50	0.2	1	6	1.5	2.5	50	2°	90
WR544 012 01 01 08	0.1	1.2	4	1.8	3	8	1°	50
WR544 012 01 01 12	0.1	1.2	4	1.8	3	12	1°	50
WR544 012 01 01 16	0.1	1.2	4	1.8	3	16	1°	50
WR544 012 01 01 20	0.1	1.2	4	1.8	3	20	1°	50
WR544 012 01 01 25	0.1	1.2	4	1.8	3	25	1°	60
WR544 012 01 01 30	0.1	1.2	4	1.8	3	30	1°	70
WR544 012 01 02 08	0.1	1.2	4	1.8	3	8	2°	50
WR544 012 01 02 12	0.1	1.2	4	1.8	3	12	2°	50
WR544 012 01 02 16	0.1	1.2	4	1.8	3	16	2°	50
WR544 012 01 02 20	0.1	1.2	4	1.8	3	20	2°	50
WR544 012 01 02 25	0.1	1.2	4	1.8	3	25	2°	60
WR544 012 01 02 30	0.1	1.2	4	1.8	3	30	2°	70
WR544 012 02 01 08	0.2	1.2	4	1.8	3	8	1°	50
WR544 012 02 01 12	0.2	1.2	4	1.8	3	12	1°	50
WR544 012 02 01 16	0.2	1.2	4	1.8	3	16	1°	50
WR544 012 02 01 20	0.2	1.2	4	1.8	3	20	1°	50
WR544 012 02 01 25	0.2	1.2	4	1.8	3	25	1°	60
WR544 012 02 01 30	0.2	1.2	4	1.8	3	30	1°	70
WR544 012 02 02 08	0.2	1.2	4	1.8	3	8	2°	50
WR544 012 02 02 12	0.2	1.2	4	1.8	3	12	2°	50
WR544 012 02 02 16	0.2	1.2	4	1.8	3	16	2°	50
WR544 012 02 02 20	0.2	1.2	4	1.8	3	20	2°	50
WR544 012 02 02 25	0.2	1.2	4	1.8	3	25	2°	60
WR544 012 02 02 30	0.2	1.2	4	1.8	3	30	2°	70
WR544 015 01 01 08	0.1	1.5	4	2.3	3	8	1°	50
WR544 015 01 01 10	0.1	1.5	4	2.3	3	10	1°	50
WR544 015 01 01 12	0.1	1.5	4	2.3	3	12	1°	50
WR544 015 01 01 16	0.1	1.5	4	2.3	3	16	1°	50
WR544 015 01 01 20	0.1	1.5	4	2.3	3	20	1°	50
WR544 015 01 01 25	0.1	1.5	4	2.3	3	25	1°	60
WR544 015 01 01 30	0.1	1.5	4	2.3	3	30	1°	70
WR544 015 01 01 40	0.1	1.5	4	2.3	3	40	1°	80
WR544 015 01 01 50	0.1	1.5	4	2.3	3	50	1°	90
WR544 015 01 02 08	0.1	1.5	4	2.3	3	8	2°	50

U-Star Endmill

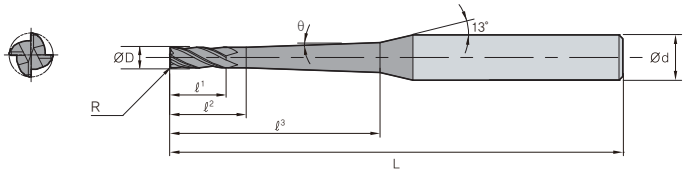
WR544

4 Flutes tapered neck type radius endmill

ULTRA FINE | 4 | 30° HELIX | R ±0.01 All sizes | W | DATA p.451

• TOLERANCE

ØD		Ød
All sizes	0 ~ -0.012mm	h6



(mm)

Designation	R	ØD	Ød	ℓ1	ℓ2	ℓ3	θ	L
WR544 015 01 02 10	0.1	1.5	4	2.3	3	10	2°	50
WR544 015 01 02 12	0.1	1.5	4	2.3	3	12	2°	50
WR544 015 01 02 16	0.1	1.5	4	2.3	3	16	2°	50
WR544 015 01 02 20	0.1	1.5	4	2.3	3	20	2°	50
WR544 015 01 02 25	0.1	1.5	4	2.3	3	25	2°	60
WR544 015 01 02 30	0.1	1.5	4	2.3	3	30	2°	70
WR544 015 01 02 40	0.1	1.5	6	2.3	3	40	2°	80
WR544 015 01 02 50	0.1	1.5	6	2.3	3	50	2°	90
WR544 015 02 01 08	0.2	1.5	4	2.3	3	8	1°	50
WR544 015 02 01 10	0.2	1.5	4	2.3	3	10	1°	50
WR544 015 02 01 12	0.2	1.5	4	2.3	3	12	1°	50
WR544 015 02 01 16	0.2	1.5	4	2.3	3	16	1°	50
WR544 015 02 01 20	0.2	1.5	4	2.3	3	20	1°	50
WR544 015 02 01 25	0.2	1.5	4	2.3	3	25	1°	60
WR544 015 02 01 30	0.2	1.5	4	2.3	3	30	1°	70
WR544 015 02 01 40	0.2	1.5	4	2.3	3	40	1°	80
WR544 015 02 01 50	0.2	1.5	4	2.3	3	50	1°	90
WR544 015 02 02 08	0.2	1.5	4	2.3	3	8	2°	50
WR544 015 02 02 10	0.2	1.5	4	2.3	3	10	2°	50
WR544 015 02 02 12	0.2	1.5	4	2.3	3	12	2°	50
WR544 015 02 02 16	0.2	1.5	4	2.3	3	16	2°	50
WR544 015 02 02 20	0.2	1.5	4	2.3	3	20	2°	50
WR544 015 02 02 25	0.2	1.5	4	2.3	3	25	2°	60
WR544 015 02 02 30	0.2	1.5	4	2.3	3	30	2°	70
WR544 015 02 02 40	0.2	1.5	6	2.3	3	40	2°	80
WR544 015 02 02 50	0.2	1.5	6	2.3	3	50	2°	90
WR544 015 03 01 08	0.3	1.5	4	2.3	3	8	1°	50
WR544 015 03 01 10	0.3	1.5	4	2.3	3	10	1°	50
WR544 015 03 01 12	0.3	1.5	4	2.3	3	12	1°	50
WR544 015 03 01 16	0.3	1.5	4	2.3	3	16	1°	50
WR544 015 03 01 20	0.3	1.5	4	2.3	3	20	1°	50
WR544 015 03 01 25	0.3	1.5	4	2.3	3	25	1°	60
WR544 015 03 01 30	0.3	1.5	4	2.3	3	30	1°	70
WR544 015 03 01 40	0.3	1.5	4	2.3	3	40	1°	80
WR544 015 03 01 50	0.3	1.5	4	2.3	3	50	1°	90
WR544 015 03 02 08	0.3	1.5	4	2.3	3	8	2°	50
WR544 015 03 02 10	0.3	1.5	4	2.3	3	10	2°	50
WR544 015 03 02 12	0.3	1.5	4	2.3	3	12	2°	50
WR544 015 03 02 16	0.3	1.5	4	2.3	3	16	2°	50
WR544 015 03 02 20	0.3	1.5	4	2.3	3	20	2°	50
WR544 015 03 02 25	0.3	1.5	4	2.3	3	25	2°	60
WR544 015 03 02 30	0.3	1.5	4	2.3	3	30	2°	70
WR544 015 03 02 40	0.3	1.5	6	2.3	3	40	2°	80
WR544 015 03 02 50	0.3	1.5	6	2.3	3	50	2°	90
WR544 020 01 01 10	0.1	2	4	2	5	10	1°	50
WR544 020 01 01 12	0.1	2	4	2	5	12	1°	50
WR544 020 01 01 16	0.1	2	4	2	5	16	1°	50
WR544 020 01 01 20	0.1	2	4	2	5	20	1°	50
WR544 020 01 01 25	0.1	2	4	2	5	25	1°	60
WR544 020 01 01 30	0.1	2	4	2	5	30	1°	70
WR544 020 01 01 40	0.1	2	6	2	5	40	1°	80
WR544 020 01 01 50	0.1	2	6	2	5	50	1°	100
WR544 020 01 01 60	0.1	2	6	2	5	60	1°	100
WR544 020 01 01 80	0.1	2	6	2	5	80	1°	140
WR544 020 01 02 10	0.1	2	4	2	5	10	2°	50
WR544 020 01 02 12	0.1	2	4	2	5	12	2°	50
WR544 020 01 02 16	0.1	2	4	2	5	16	2°	50
WR544 020 01 02 20	0.1	2	4	2	5	20	2°	50
WR544 020 01 02 25	0.1	2	4	2	5	25	2°	60
WR544 020 01 02 30	0.1	2	4	2	5	30	2°	70
WR544 020 01 02 40	0.1	2	6	2	5	40	2°	80
WR544 020 01 02 50	0.1	2	6	2	5	50	2°	100
WR544 020 01 02 60	0.1	2	6	2	5	60	2°	100
WR544 020 01 02 80	0.1	2	8	2	5	80	2°	140
WR544 020 02 01 10	0.2	2	4	2	5	10	1°	50
WR544 020 02 01 12	0.2	2	4	2	5	12	1°	50
WR544 020 02 01 16	0.2	2	4	2	5	16	1°	50
WR544 020 02 01 20	0.2	2	4	2	5	20	1°	50
WR544 020 02 01 25	0.2	2	4	2	5	25	1°	60
WR544 020 02 01 30	0.2	2	4	2	5	30	1°	70
WR544 020 02 01 40	0.2	2	6	2	5	40	1°	80
WR544 020 02 01 50	0.2	2	6	2	5	50	1°	100
WR544 020 02 01 60	0.2	2	6	2	5	60	1°	100
WR544 020 02 01 80	0.2	2	6	2	5	80	1°	140

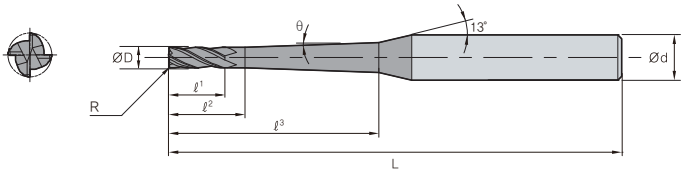
WR544

4 Flutes tapered neck type radius endmill

ULTRA FINE | 4 | 30° HELIX | R ±0.01 All sizes | W | DATA p.451

• TOLERANCE

ØD		Ød
All sizes	0 ~ -0.012mm	h6



(mm)

Designation	R	ØD	Ød	ℓ1	ℓ2	ℓ3	θ	L
WR544 020 02 02 10	0.2	2	4	2	5	10	2°	50
WR544 020 02 02 12	0.2	2	4	2	5	12	2°	50
WR544 020 02 02 16	0.2	2	4	2	5	16	2°	50
WR544 020 02 02 20	0.2	2	4	2	5	20	2°	50
WR544 020 02 02 25	0.2	2	4	2	5	25	2°	60
WR544 020 02 02 30	0.2	2	4	2	5	30	2°	70
WR544 020 02 02 40	0.2	2	6	2	5	40	2°	80
WR544 020 02 02 50	0.2	2	6	2	5	50	2°	100
WR544 020 02 02 60	0.2	2	6	2	5	60	2°	100
WR544 020 02 02 80	0.2	2	8	2	5	80	2°	140
WR544 020 03 01 10	0.3	2	4	2	5	10	1°	50
WR544 020 03 01 12	0.3	2	4	2	5	12	1°	50
WR544 020 03 01 16	0.3	2	4	2	5	16	1°	50
WR544 020 03 01 20	0.3	2	4	2	5	20	1°	50
WR544 020 03 01 25	0.3	2	4	2	5	25	1°	60
WR544 020 03 01 30	0.3	2	4	2	5	30	1°	70
WR544 020 03 01 40	0.3	2	6	2	5	40	1°	80
WR544 020 03 01 50	0.3	2	6	2	5	50	1°	100
WR544 020 03 01 60	0.3	2	6	2	5	60	1°	100
WR544 020 03 01 80	0.3	2	6	2	5	80	1°	140
WR544 020 03 02 10	0.3	2	4	2	5	10	2°	50
WR544 020 03 02 12	0.3	2	4	2	5	12	2°	50
WR544 020 03 02 16	0.3	2	4	2	5	16	2°	50
WR544 020 03 02 20	0.3	2	4	2	5	20	2°	50
WR544 020 03 02 25	0.3	2	4	2	5	25	2°	60
WR544 020 03 02 30	0.3	2	4	2	5	30	2°	70
WR544 020 03 02 40	0.3	2	6	2	5	40	2°	80
WR544 020 03 02 50	0.3	2	6	2	5	50	2°	100
WR544 020 03 02 60	0.3	2	6	2	5	60	2°	100
WR544 020 03 02 80	0.3	2	8	2	5	80	2°	140
WR544 020 05 01 10	0.5	2	4	2	5	10	1°	50
WR544 020 05 01 12	0.5	2	4	2	5	12	1°	50
WR544 020 05 01 16	0.5	2	4	2	5	16	1°	50
WR544 020 05 01 20	0.5	2	4	2	5	20	1°	50
WR544 020 05 01 25	0.5	2	4	2	5	25	1°	60
WR544 020 05 01 30	0.5	2	4	2	5	30	1°	70
WR544 020 05 01 40	0.5	2	6	2	5	40	1°	80

Designation	R	ØD	Ød	ℓ1	ℓ2	ℓ3	θ	L
WR544 020 05 01 50	0.5	2	6	2	5	50	1°	100
WR544 020 05 01 60	0.5	2	6	2	5	60	1°	100
WR544 020 05 01 80	0.5	2	6	2	5	80	2°	140
WR544 020 05 02 10	0.5	2	4	2	5	10	2°	50
WR544 020 05 02 12	0.5	2	4	2	5	12	2°	50
WR544 020 05 02 16	0.5	2	4	2	5	16	2°	50
WR544 020 05 02 20	0.5	2	4	2	5	20	2°	50
WR544 020 05 02 25	0.5	2	4	2	5	25	2°	60
WR544 020 05 02 30	0.5	2	4	2	5	30	2°	70
WR544 020 05 02 40	0.5	2	6	2	5	40	2°	80
WR544 020 05 02 50	0.5	2	6	2	5	50	2°	100
WR544 020 05 02 60	0.5	2	6	2	5	60	2°	100
WR544 020 05 02 80	0.5	2	8	2	5	80	2°	140
WR544 030 02 01 16	0.2	3	6	4.5	6	16	1°	60
WR544 030 02 01 20	0.2	3	6	4.5	6	20	1°	65
WR544 030 02 01 30	0.2	3	6	4.5	6	30	1°	70
WR544 030 02 01 40	0.2	3	6	4.5	6	40	1°	80
WR544 030 02 01 50	0.2	3	6	4.5	6	50	1°	90
WR544 030 02 01 60	0.2	3	6	4.5	6	60	1°	100
WR544 030 02 02 16	0.2	3	6	4.5	6	16	2°	60
WR544 030 02 02 20	0.2	3	6	4.5	6	20	2°	65
WR544 030 02 02 30	0.2	3	6	4.5	6	30	2°	70
WR544 030 02 02 40	0.2	3	6	4.5	6	40	2°	80
WR544 030 02 02 50	0.2	3	8	4.5	6	50	2°	90
WR544 030 02 02 60	0.2	3	8	4.5	6	60	2°	100
WR544 030 02 02 70	0.2	3	8	4.5	6	70	2°	120
WR544 030 03 01 16	0.3	3	6	4.5	6	16	1°	60
WR544 030 03 01 20	0.3	3	6	4.5	6	20	1°	65
WR544 030 03 01 30	0.3	3	6	4.5	6	30	1°	70
WR544 030 03 01 40	0.3	3	6	4.5	6	40	1°	80
WR544 030 03 01 50	0.3	3	6	4.5	6	50	1°	90
WR544 030 03 01 60	0.3	3	6	4.5	6	60	1°	100
WR544 030 03 02 16	0.3	3	6	4.5	6	16	2°	60
WR544 030 03 02 20	0.3	3	6	4.5	6	20	2°	65
WR544 030 03 02 30	0.3	3	6	4.5	6	30	2°	70
WR544 030 03 02 40	0.3	3	6	4.5	6	40	2°	80
WR544 030 03 02 50	0.3	3	8	4.5	6	50	2°	90

U-Star Endmill

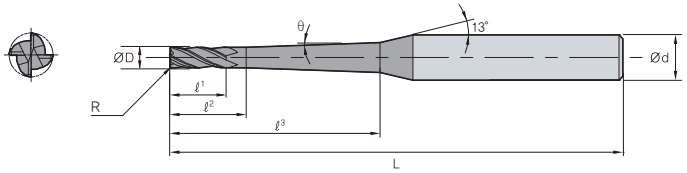
WR544

4 Flutes tapered neck type radius endmill

ULTRA FINE | 4 | 30° HELIX | R ±0.01 All sizes | W | DATA p.451

• TOLERANCE

ØD		Ød
All sizes	0 ~ -0.012mm	h6



(mm)

Designation	R	ØD	Ød	ℓ1	ℓ2	ℓ3	θ	L
WR544 030 03 02 60	0.3	3	8	4.5	6	60	2°	100
WR544 030 03 02 70	0.3	3	8	4.5	6	70	2°	120
WR544 030 05 01 16	0.5	3	6	4.5	6	16	1°	60
WR544 030 05 01 20	0.5	3	6	4.5	6	20	1°	65
WR544 030 05 01 30	0.5	3	6	4.5	6	30	1°	70
WR544 030 05 01 40	0.5	3	6	4.5	6	40	1°	80
WR544 030 05 01 50	0.5	3	6	4.5	6	50	1°	90
WR544 030 05 01 60	0.5	3	6	4.5	6	60	1°	100
WR544 030 05 02 16	0.5	3	6	4.5	6	16	2°	60
WR544 030 05 02 20	0.5	3	6	4.5	6	20	2°	65
WR544 030 05 02 30	0.5	3	6	4.5	6	30	2°	70
WR544 030 05 02 40	0.5	3	6	4.5	6	40	2°	80
WR544 030 05 02 50	0.5	3	8	4.5	6	50	2°	90
WR544 030 05 02 60	0.5	3	8	4.5	6	60	2°	100
WR544 030 05 02 70	0.5	3	8	4.5	6	70	2°	120
WR544 040 02 01 40	0.2	4	6	6	8	40	1°	90
WR544 040 02 01 50	0.2	4	6	6	8	50	1°	100
WR544 040 02 01 60	0.2	4	6	6	8	60	1°	110
WR544 040 02 01 70	0.2	4	8	6	8	70	1°	120
WR544 040 02 02 40	0.2	4	8	6	8	40	2°	90

Designation	R	ØD	Ød	ℓ1	ℓ2	ℓ3	θ	L
WR544 040 02 02 50	0.2	4	8	6	8	50	2°	100
WR544 040 02 02 60	0.2	4	8	6	8	60	2°	110
WR544 040 02 02 70	0.2	4	10	6	8	70	2°	120
WR544 040 03 01 40	0.3	4	6	6	8	40	1°	90
WR544 040 03 01 50	0.3	4	6	6	8	50	1°	100
WR544 040 03 01 60	0.3	4	6	6	8	60	1°	110
WR544 040 03 01 70	0.3	4	8	6	8	70	1°	120
WR544 040 03 02 40	0.3	4	8	6	8	40	2°	90
WR544 040 03 02 50	0.3	4	8	6	8	50	2°	100
WR544 040 03 02 60	0.3	4	8	6	8	60	2°	110
WR544 040 03 02 70	0.3	4	10	6	8	70	2°	120
WR544 040 05 01 40	0.5	4	6	6	8	40	1°	90
WR544 040 05 01 50	0.5	4	6	6	8	50	1°	100
WR544 040 05 01 60	0.5	4	6	6	8	60	1°	110
WR544 040 05 01 70	0.5	4	8	6	8	70	1°	120
WR544 040 05 02 40	0.5	4	8	6	8	40	2°	90
WR544 040 05 02 50	0.5	4	8	6	8	50	2°	100
WR544 040 05 02 60	0.5	4	8	6	8	60	2°	110
WR544 040 05 02 70	0.5	4	10	6	8	70	2°	120

※ The above specifications are subject to change without prior notice for product quality improvement.

• Applicable Workpiece

Carbon steel ~ HB225	Alloy steel HB225~325	Pre-hardened steel HRC30~50	Hardened steel		Copper	Graphite	Cast iron ~FCD500	Aluminum	Stainless steel
			SKD61~HRC55	SKD11 HRC55~					
○	○	◎	○				○		○

◎: Excellent ○: Good

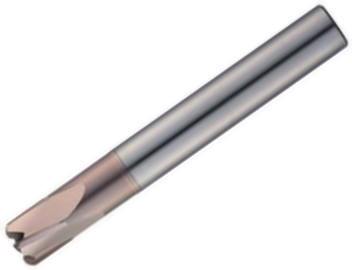
WSPM4

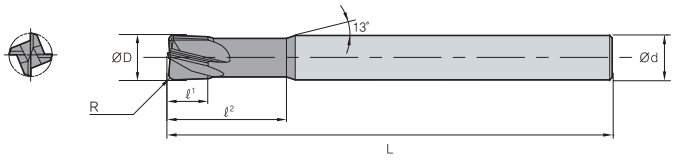
4 Flutes 10° helix radius endmill

ULTRA FINE | 4 | 10° HELIX | R ±0.02 (All sizes) | W | DATA p.452

• TOLERANCE

ØD		Ød
All sizes	0 ~ -0.03mm	h6





(mm)

Designation	R	ØD	Ød	ℓ1	ℓ2	L
WSPM4010-01	0.1	1	6	1	2.5	50
WSPM4010-02	0.2	1	6	1	2.5	50
WSPM4010-03	0.3	1	6	1	2.5	50
WSPM4015-02	0.2	1.5	6	1.5	4	50
WSPM4015-03	0.3	1.5	6	1.5	4	50
WSPM4015-05	0.5	1.5	6	1.5	4	50
WSPM4020-02	0.2	2	6	2	6	50
WSPM4020-03	0.3	2	6	2	6	50
WSPM4020-05	0.5	2	6	2	6	50
WSPM4030-02	0.2	3	6	3	8	50
WSPM4030-03	0.3	3	6	3	8	50
WSPM4030-05	0.5	3	6	3	8	50
WSPM4040-02	0.2	4	6	4	10	50
WSPM4040-03	0.3	4	6	4	10	50
WSPM4040-05	0.5	4	6	4	10	50
WSPM4040-10	1	4	6	4	10	50
WSPM4060-02	0.2	6	6	6	15	60
WSPM4060-03	0.3	6	6	6	15	60
WSPM4060-05	0.5	6	6	6	15	60
WSPM4060-10	1	6	6	6	15	60
WSPM4060-20	2	6	6	6	15	60
WSPM4060-02L	0.2	6	6	6	15	90
WSPM4060-03L	0.3	6	6	6	15	90
WSPM4060-05L	0.5	6	6	6	15	90
WSPM4060-10L	1	6	6	6	15	90
WSPM4060-20L	2	6	6	6	15	90
WSPM4080-02	0.2	8	8	8	20	70
WSPM4080-03	0.3	8	8	8	20	70
WSPM4080-05	0.5	8	8	8	20	70
WSPM4080-10	1	8	8	8	20	70
WSPM4080-20	2	8	8	8	20	70
WSPM4080-02L	0.2	8	8	8	20	100
WSPM4080-03L	0.3	8	8	8	20	100
WSPM4080-05L	0.5	8	8	8	20	100
WSPM4080-10L	1	8	8	8	20	100
WSPM4080-20L	2	8	8	8	20	100

Designation	R	ØD	Ød	ℓ1	ℓ2	L
WSPM4100-02	0.2	10	10	10	25	75
WSPM4100-03	0.3	10	10	10	25	75
WSPM4100-05	0.5	10	10	10	25	75
WSPM4100-10	1	10	10	10	25	75
WSPM4100-15	1.5	10	10	10	25	75
WSPM4100-20	2	10	10	10	25	75
WSPM4100-02L	0.2	10	10	10	25	100
WSPM4100-03L	0.3	10	10	10	25	100
WSPM4100-05L	0.5	10	10	10	25	100
WSPM4100-10L	1	10	10	10	25	100
WSPM4100-15L	1.5	10	10	10	25	100
WSPM4100-20L	2	10	10	10	25	100
WSPM4120-03	0.3	12	12	12	30	80
WSPM4120-05	0.5	12	12	12	30	80
WSPM4120-10	1	12	12	12	30	80
WSPM4120-15	1.5	12	12	12	30	80
WSPM4120-20	2	12	12	12	30	80
WSPM4120-30	3	12	12	12	30	80
WSPM4120-03L	0.3	12	12	12	30	110
WSPM4120-05L	0.5	12	12	12	30	110
WSPM4120-10L	1	12	12	12	30	110
WSPM4120-15L	1.5	12	12	12	30	110
WSPM4120-20L	2	12	12	12	30	110
WSPM4120-30L	3	12	12	12	30	110
WSPM4160-05	0.5	16	16	16	35	100
WSPM4160-10	1	16	16	16	35	100
WSPM4160-20	2	16	16	16	35	100
WSPM4160-05L	0.5	16	16	16	35	150
WSPM4160-10L	1	16	16	16	35	150
WSPM4160-20L	2	16	16	16	35	150
WSPM4200-05	0.5	20	20	20	40	100
WSPM4200-10	1	20	20	20	40	100
WSPM4200-20	2	20	20	20	40	100
WSPM4200-05L	0.5	20	20	20	40	150
WSPM4200-10L	1	20	20	20	40	150
WSPM4200-20L	2	20	20	20	40	150

※ The above specifications are subject to change without prior notice for product quality improvement.

• Applicable Workpiece

Carbon steel ~ HB225	Alloy steel HB225~325	Pre-hardened steel HRC30~50	Hardened steel		Copper	Graphite	Cast iron ~FCD500	Aluminum	Stainless steel
			SKD61~HRC55	SKD11 HRC55~					
○	○	◎	○				○		○

◎: Excellent ○: Good

U-Star Endmill

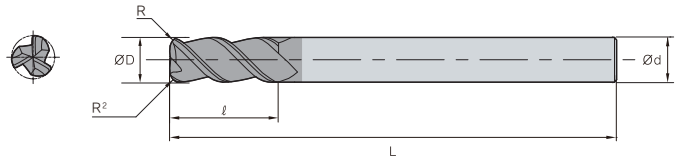
WDR503

3 Flutes double corner radius endmill

ULTRA FINE | 3 | 45° HELIX | R ±0.01 All sizes | W | DATA p.453

• TOLERANCE

ØD		Ød
All sizes	0 ~ -0.02mm	h6



(mm)

Designation	R	ØD	Ød	R²	ℓ	L
WDR503 060 05	0.5	6	6	6	10	90
WDR503 060 10	1	6	6	6	10	90
WDR503 060 20	2	6	6	6	10	90
WDR503 080 05	0.5	8	8	8	16	100
WDR503 080 10	1	8	8	8	16	100
WDR503 080 20	2	8	8	8	16	100
WDR503 100 05	0.5	10	10	10	20	100
WDR503 100 10	1	10	10	10	20	100
WDR503 100 20	2	10	10	10	20	100
WDR503 120 05	0.5	12	12	12	24	110
WDR503 120 10	1	12	12	12	24	110
WDR503 120 20	2	12	12	12	24	110
WDR503 160 05	0.5	16	16	16	32	150
WDR503 160 10	1	16	16	16	32	150
WDR503 200 05	0.5	20	20	20	40	150
WDR503 200 10	1	20	20	20	40	150

※ The above specifications are subject to change without prior notice for product quality improvement.

• **Applicable Workpiece**

Carbon steel ~ HB225	Alloy steel HB225~325	Pre-hardened steel HRC30~50	Hardened steel		Copper	Graphite	Cast iron ~FCD500	Aluminum	Stainless steel
			SKD61~HRC55	SKD11 HRC55~					
○	○	◎	○				○		○

◎: Excellent ○: Good

WF60

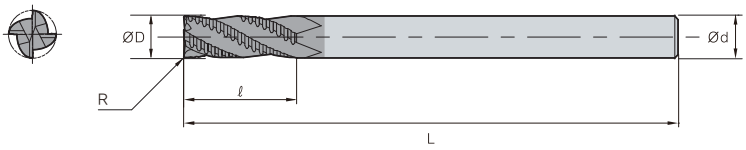
3~5 Flutes variable helix roughing endmill

ULTRA FINE | 3-5 | 29° HELIX | 31° HELIX | CHAMFERED | W | DATA

p.454

• TOLERANCE

ØD		Ød
All sizes	0 ~ -0.05mm	h6



(mm)

Designation	R	ØD	Ød	ℓ	L	z
WF603 030	0.2	3	6	8	50	3
WF603 040	0.2	4	6	10	50	3
WF604 050	0.2	5	6	13	50	4
WF604 060	0.2	6	6	10	50	4
WF604 060 15	0.2	6	6	15	60	4
WF604 070	0.2	7	8	18	70	4
WF604 080	0.2	8	8	12	60	4
WF604 080 20	0.2	8	8	20	70	4
WF604 090	0.3	9	10	22	75	4
WF604 100	0.3	10	10	15	65	4
WF604 100 25	0.3	10	10	25	75	4
WF604 110	0.3	11	12	27	80	4
WF604 120	0.3	12	12	20	70	4
WF604 120 30	0.3	12	12	30	80	4
WF605 130	0.5	13	12	35	100	5
WF605 140	0.5	14	14	35	100	5
WF605 140 S16	0.5	14	16	35	100	5
WF605 160	1	16	16	25	80	5
WF605 160 40	1	16	16	40	100	5
WF605 180	1	18	18	40	100	5
WF605 180 S20	1	18	20	40	100	5
WF605 200	1	20	20	25	80	5
WF605 200 45	1	20	20	45	100	5
WF605 250	1	25	25	45	100	5

※ The above specifications are subject to change without prior notice for product quality improvement.

• Applicable Workpiece

Carbon steel ~ HB225	Alloy steel HB225~325	Pre-hardened steel HRC30~50	Hardened steel		Copper	Graphite	Cast iron ~FCD500	Aluminum	Stainless steel
			SKD61~HRC55	SKD11 HRC55~					
○	○	◎	○				○		○

◎: Excellent ○: Good

U-Star Endmill

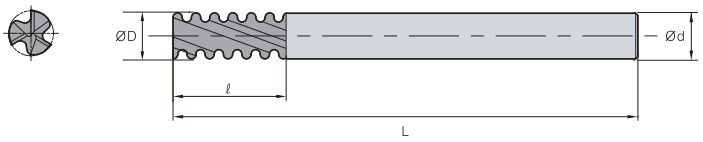
WF61

3~5 Flutes roughing endmill

ULTRA FINE | 3~5 | 20° HELIX | FINE | W | DATA p.454

• TOLERANCE

ØD		Ød
~ Ø3	0 ~ -0.04mm	h6
Ø4 ~ Ø6	0 ~ -0.048mm	
Ø7 ~ Ø10	0 ~ -0.058mm	
Ø12 ~ Ø18	0 ~ -0.07mm	
Ø20 ~	0 ~ -0.084mm	



(mm)

Designation	ØD	Ød	ℓ	L	z
WF613 030	3	6	8	50	3
WF613 040	4	6	10	50	3
WF613 050	5	6	13	50	3
WF613 060	6	6	15	60	3
WF613 060 20	6	6	20	60	3
WF613 070	7	8	18	70	3
WF613 080	8	8	20	70	3
WF613 080 25	8	8	25	70	3
WF614 090	9	10	22	75	4
WF614 100	10	10	25	75	4
WF614 100 30	10	10	30	75	4
WF614 110	11	12	27	80	4
WF614 120	12	12	30	80	4
WF614 120 35	12	12	35	80	4
WF614 130	13	12	35	100	4
WF614 140	14	16	35	100	4
WF614 160	16	16	40	100	4
WF614 180	18	18	40	100	4
WF614 200	20	20	50	100	4
WF615 250	25	25	50	100	5

※ The above specifications are subject to change without prior notice for product quality improvement.

• Applicable Workpiece

Carbon steel ~ HB225	Alloy steel HB225~325	Pre-hardened steel HRC30~50	Hardened steel		Copper	Graphite	Cast iron ~FCD500	Aluminum	Stainless steel
			SKD61~HRC55	SKD11 HRC55~					
○	○	◎	○				○		○

◎: Excellent ○: Good

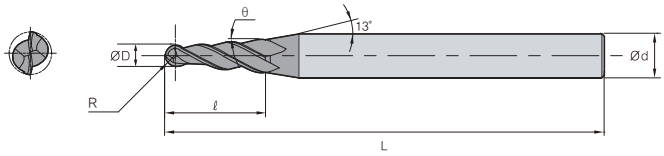
WTB502

2 Flutes tapered ball nose endmill

ULTRA FINE | 2 | 30° HELIX | R ±0.01 All sizes | W | DATA p.455

• TOLERANCE

ØD		Ød
All sizes	0 ~ -0.03mm	h6



(mm)

Designation	R	ØD	Ød	ℓ	θ	L
WTB502 003 005	0.15	0.3	4	1.2	30`	40
WTB502 003 01	0.15	0.3	4	1.2	1°	40
WTB502 003 015	0.15	0.3	4	1.2	1°30`	40
WTB502 003 02	0.15	0.3	4	1.2	2°	40
WTB502 003 03	0.15	0.3	4	1.2	3°	40
WTB502 003 05	0.15	0.3	4	1.2	5°	40
WTB502 003 07	0.15	0.3	4	1.5	7°	40
WTB502 003 10	0.15	0.3	4	1.5	10°	40
WTB502 004 005	0.2	0.4	4	1.6	30`	40
WTB502 004 01	0.2	0.4	4	1.6	1°	40
WTB502 004 015	0.2	0.4	4	1.6	1°30`	40
WTB502 004 02	0.2	0.4	4	1.6	2°	40
WTB502 004 03	0.2	0.4	4	1.6	3°	40
WTB502 004 05	0.2	0.4	4	1.6	5°	40
WTB502 004 07	0.2	0.4	4	2	7°	40
WTB502 004 10	0.2	0.4	4	2	10°	40
WTB502 005 005	0.25	0.5	4	2	30`	45
WTB502 005 01	0.25	0.5	4	2	1°	45
WTB502 005 015	0.25	0.5	4	2	1°30`	45
WTB502 005 02	0.25	0.5	4	2	2°	45
WTB502 005 03	0.25	0.5	4	2	3°	45
WTB502 005 05	0.25	0.5	4	2	5°	45
WTB502 005 07	0.25	0.5	4	2.5	7°	45
WTB502 005 10	0.25	0.5	4	2.5	10°	45
WTB502 006 005	0.3	0.6	4	2	30`	45
WTB502 006 01	0.3	0.6	4	2	1°	45
WTB502 006 015	0.3	0.6	4	2	1°30`	45
WTB502 006 02	0.3	0.6	4	2	2°	45
WTB502 006 03	0.3	0.6	4	2	3°	45
WTB502 006 05	0.3	0.6	4	2	5°	45
WTB502 006 07	0.3	0.6	4	2.5	7°	45
WTB502 006 10	0.3	0.6	4	2.5	10°	45
WTB502 007 005	0.35	0.7	4	2.5	30`	45
WTB502 007 01	0.35	0.7	4	2.5	1°	45
WTB502 007 015	0.35	0.7	4	2.5	1°30`	45
WTB502 007 02	0.35	0.7	4	2.5	2°	45

Designation	R	ØD	Ød	ℓ	θ	L
WTB502 007 03	0.35	0.7	4	2.5	3°	45
WTB502 007 05	0.35	0.7	4	2.5	5°	45
WTB502 007 07	0.35	0.7	4	3	7°	45
WTB502 007 10	0.35	0.7	4	3	10°	45
WTB502 008 005	0.4	0.8	4	3.2	30`	45
WTB502 008 01	0.4	0.8	4	3.2	1°	45
WTB502 008 015	0.4	0.8	4	3.2	1°30`	45
WTB502 008 02	0.4	0.8	4	3.2	2°	45
WTB502 008 03	0.4	0.8	4	3.2	3°	45
WTB502 008 05	0.4	0.8	4	3.2	5°	45
WTB502 008 07	0.4	0.8	4	3.2	7°	45
WTB502 008 10	0.4	0.8	4	3.2	10°	45
WTB502 010 005	0.5	1	4	4	30`	50
WTB502 010 01	0.5	1	4	4	1°	50
WTB502 010 015	0.5	1	4	4	1°30`	50
WTB502 010 02	0.5	1	4	4	2°	50
WTB502 010 03	0.5	1	4	4	3°	50
WTB502 010 05	0.5	1	4	4	5°	50
WTB502 010 07	0.5	1	4	4	7°	50
WTB502 010 10	0.5	1	4	4	10°	50
WTB502 015 005	0.75	1.5	4	6	30`	50
WTB502 015 01	0.75	1.5	4	6	1°	50
WTB502 015 015	0.75	1.5	4	6	1°30`	50
WTB502 015 02	0.75	1.5	4	7	2°	50
WTB502 015 03	0.75	1.5	4	8	3°	50
WTB502 015 05	0.75	1.5	4	10	5°	50
WTB502 015 07	0.75	1.5	4	10	7°	50
WTB502 015 10	0.75	1.5	6	10	10°	50
WTB502 020 005	1	2	4	6	30`	50
WTB502 020 01	1	2	4	6	1°	50
WTB502 020 015	1	2	4	6	1°30`	50
WTB502 020 02	1	2	4	10	2°	50
WTB502 020 03	1	2	4	10	3°	50
WTB502 020 05	1	2	4	10	5°	50
WTB502 020 07	1	2	6	10	7°	50
WTB502 020 10	1	2	6	11	10°	50

※ The above specifications are subject to change without prior notice for product quality improvement.

• Applicable Workpiece

Carbon steel ~ HB225	Alloy steel HB225~325	Pre-hardened steel HRC30~50	Hardened steel		Copper	Graphite	Cast iron ~FCD500	Aluminum	Stainless steel
			SKD61~HRC55	SKD11 HRC55~					
○	○	◎	○				○		○

◎: Excellent ○: Good

U-Star Endmill

WTE502

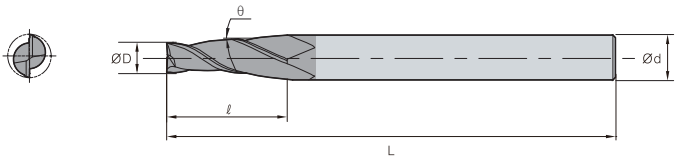
2 Flutes tapered flat endmill

ULTRA FINE | 2 | 30° HELIX | W | DATA

p.455

• TOLERANCE

ØD		Ød
All sizes	0 ~ -0.03mm	h6



(mm)

Designation	ØD	Ød	ℓ	θ	L
WTE502 003 005	0.3	4	1.2	30`	40
WTE502 003 01	0.3	4	1.2	1°	40
WTE502 003 015	0.3	4	1.2	1°30`	40
WTE502 003 02	0.3	4	1.2	2°	40
WTE502 003 03	0.3	4	1.5	3°	40
WTE502 003 05	0.3	4	1.5	5°	40
WTE502 003 07	0.3	4	1.5	7°	40
WTE502 003 10	0.3	4	1.5	10°	40
WTE502 004 005	0.4	4	1.6	30`	40
WTE502 004 01	0.4	4	1.6	1°	40
WTE502 004 015	0.4	4	1.6	1°30`	40
WTE502 004 02	0.4	4	1.6	2°	40
WTE502 004 03	0.4	4	1.6	3°	40
WTE502 004 05	0.4	4	2	5°	40
WTE502 004 07	0.4	4	2	7°	40
WTE502 004 10	0.4	4	2	10°	40
WTE502 005 005	0.5	4	2	30`	45
WTE502 005 01	0.5	4	2	1°	45
WTE502 005 015	0.5	4	2	1°30`	45
WTE502 005 02	0.5	4	2	2°	45
WTE502 005 03	0.5	4	2	3°	45
WTE502 005 05	0.5	4	2.5	5°	45
WTE502 005 07	0.5	4	2.5	7°	45
WTE502 005 10	0.5	4	2.5	10°	45
WTE502 006 005	0.6	4	2.4	30`	45
WTE502 006 01	0.6	4	2.4	1°	45
WTE502 006 015	0.6	4	2.4	1°30`	45
WTE502 006 02	0.6	4	2.4	2°	45
WTE502 006 03	0.6	4	2.4	3°	45
WTE502 006 05	0.6	4	3	5°	45
WTE502 006 07	0.6	4	3	7°	45
WTE502 006 10	0.6	4	3	10°	45
WTE502 007 005	0.7	4	2.8	30`	45
WTE502 007 01	0.7	4	2.8	1°	45
WTE502 007 015	0.7	4	2.8	1°30`	45
WTE502 007 02	0.7	4	2.8	2°	45
WTE502 007 03	0.7	4	2.8	3°	45

Designation	ØD	Ød	ℓ	θ	L
WTE502 007 05	0.7	4	3.5	5°	45
WTE502 007 07	0.7	4	3.5	7°	45
WTE502 007 10	0.7	4	3.5	10°	45
WTE502 008 005	0.8	4	3.2	30`	45
WTE502 008 01	0.8	4	3.2	1°	45
WTE502 008 015	0.8	4	3.2	1°30`	45
WTE502 008 02	0.8	4	3.2	2°	45
WTE502 008 03	0.8	4	3.2	3°	45
WTE502 008 05	0.8	4	4	5°	45
WTE502 008 07	0.8	4	4	7°	45
WTE502 008 10	0.8	4	4	10°	45
WTE502 010 005	1	4	4	30`	50
WTE502 010 01	1	4	4	1°	50
WTE502 010 015	1	4	4	1°30`	50
WTE502 010 02	1	4	6	2°	50
WTE502 010 03	1	4	6	3°	50
WTE502 010 05	1	4	8	5°	50
WTE502 010 07	1	4	8	7°	50
WTE502 010 10	1	4	8	10°	50
WTE502 015 005	1.5	4	6	30`	50
WTE502 015 01	1.5	4	6	1°	50
WTE502 015 015	1.5	4	6	1°30`	50
WTE502 015 02	1.5	4	8	2°	50
WTE502 015 03	1.5	4	8	3°	50
WTE502 015 05	1.5	4	10	5°	50
WTE502 015 07	1.5	4	10	7°	50
WTE502 015 10	1.5	6	10	10°	50
WTE502 020 005	2	4	8	30`	50
WTE502 020 01	2	4	8	1°	50
WTE502 020 015	2	4	8	1°30`	50
WTE502 020 02	2	4	10	2°	50
WTE502 020 03	2	4	10	3°	50
WTE502 020 05	2	6	12	5°	50
WTE502 020 07	2	6	12	7°	50
WTE502 020 10	2	8	12	10°	50
WTE502 025 005	2.5	6	10	30`	50
WTE502 025 01	2.5	6	10	1°	50

WTE502

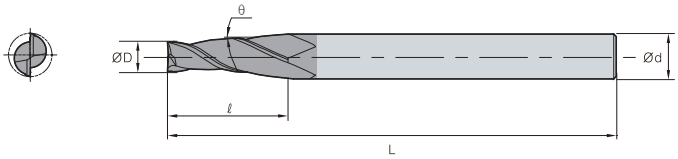
2 Flutes tapered flat endmill

ULTRA FINE | 2 | 30° HELIX | W | DATA

p.455

• TOLERANCE

ØD		Ød
All sizes	0 ~ -0.03mm	h6



(mm)

Designation	ØD	Ød	ℓ	θ	L
WTE502 025 015	2.5	6	10	1°30`	50
WTE502 025 02	2.5	6	12	2°	50
WTE502 025 03	2.5	6	12	3°	50
WTE502 025 05	2.5	6	14	5°	50
WTE502 025 07	2.5	6	14	7°	50
WTE502 025 10	2.5	8	14	10°	50
WTE502 030 005	3	6	12	30`	50
WTE502 030 01	3	6	12	1°	50
WTE502 030 015	3	6	12	1°30`	50
WTE502 030 02	3	6	14	2°	50
WTE502 030 03	3	6	14	3°	50
WTE502 030 05	3	6	16	5°	50
WTE502 030 07	3	8	16	7°	50
WTE502 030 10	3	10	16	10°	50
WTE502 040 005	4	6	16	30`	60
WTE502 040 01	4	6	16	1°	60
WTE502 040 015	4	6	16	1°30`	60
WTE502 040 02	4	6	16	2°	60
WTE502 040 03	4	6	19	3°	60
WTE502 040 05	4	8	22	5°	65
WTE502 040 07	4	8	16	7°	65
WTE502 040 10	4	10	17	10°	65
WTE502 060 005	6	8	20	30`	65
WTE502 060 01	6	8	20	1°	65
WTE502 060 015	6	8	20	1°30`	65
WTE502 060 02	6	8	20	2°	65
WTE502 060 03	6	8	19	3°	65

Designation	ØD	Ød	ℓ	θ	L
WTE502 060 05	6	10	22	5°	75
WTE502 060 07	6	12	24	7°	75
WTE502 060 10	6	12	17	10°	75
WTE502 070 005	7	8	28	30`	70
WTE502 070 01	7	8	28	1°	70
WTE502 070 015	7	10	28	1°30`	70
WTE502 070 02	7	10	28	2°	80
WTE502 070 03	7	10	28	3°	80
WTE502 070 05	7	12	28	5°	80
WTE502 080 005	8	10	35	30`	90
WTE502 080 01	8	10	35	1°	90
WTE502 080 015	8	10	35	1°30`	90
WTE502 080 02	8	10	28	2°	90
WTE502 080 03	8	12	38	3°	90
WTE502 080 05	8	16	45	5°	100
WTE502 080 07	8	16	32	7°	90
WTE502 080 10	8	20	34	10°	100
WTE502 080 10 S25	8	25	48	10°	150
WTE502 100 00 5	10	12	40	30`	90
WTE502 100 01	10	12	40	1°	90
WTE502 100 015	10	12	38	1°30`	90
WTE502 100 02	10	16	40	2°	75
WTE502 100 03	10	16	40	3°	100
WTE502 100 05	10	16	34	5°	100
WTE502 100 07	10	20	40	7°	90
WTE502 100 10	10	25	42	10°	100

※ The above specifications are subject to change without prior notice for product quality improvement.

• Applicable Workpiece

Carbon steel ~ HB225	Alloy steel HB225~325	Pre-hardened steel HRC30~50	Hardened steel		Copper	Graphite	Cast iron ~FCD500	Aluminum	Stainless steel
			SKD61~HRC55	SKD11 HRC55~					
○	○	◎	○				○		○

◎: Excellent ○: Good

U-Star Endmill

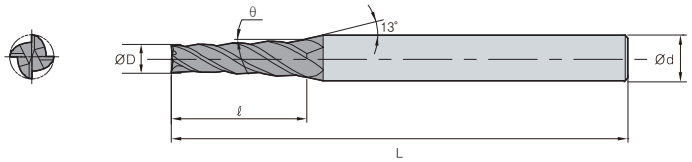
WTE504

4 Flutes tapered flat endmill

ULTRA FINE | 4 | 30° HELIX | W | DATA p.456

• TOLERANCE

ØD		Ød
All sizes	0 ~ -0.03mm	h6



(mm)

Designation	ØD	Ød	ℓ	θ	L
WTE504 030 005	3	6	12	30`	50
WTE504 030 01	3	6	12	1°	50
WTE504 030 015	3	6	12	1°30`	50
WTE504 030 02	3	6	14	2°	50
WTE504 030 03	3	6	14	3°	50
WTE504 030 05	3	6	16	5°	50
WTE504 030 07	3	8	16	7°	50
WTE504 030 10	3	10	16	10°	50
WTE504 040 005	4	6	16	30`	60
WTE504 040 01	4	6	16	1°	60
WTE504 040 015	4	6	16	1°30`	60
WTE504 040 02	4	6	16	2°	60
WTE504 040 03	4	6	19	3°	60
WTE504 040 05	4	8	22	5°	65
WTE504 040 07	4	8	16	7°	65
WTE504 040 10	4	10	17	10°	65
WTE504 060 005	6	8	20	30`	65
WTE504 060 01	6	8	20	1°	65
WTE504 060 015	6	8	20	1°30`	65
WTE504 060 02	6	8	20	2°	65
WTE504 060 03	6	8	19	3°	65
WTE504 060 05	6	10	22	5°	75
WTE504 060 07	6	12	24	7°	75

Designation	ØD	Ød	ℓ	θ	L
WTE504 060 10	6	12	17	10°	75
WTE504 070 005	7	8	28	30`	70
WTE504 070 01	7	8	28	1°	70
WTE504 070 015	7	10	28	1°30`	70
WTE504 070 02	7	10	28	2°	80
WTE504 070 03	7	10	28	3°	80
WTE504 070 05	7	12	28	5°	80
WTE504 080 005	8	10	35	30`	90
WTE504 080 01	8	10	35	1°	90
WTE504 080 015	8	10	35	1°30`	90
WTE504 080 02	8	10	28	2°	90
WTE504 080 03	8	12	38	3°	90
WTE504 080 05	8	16	45	5°	100
WTE504 080 07	8	16	32	7°	90
WTE504 080 10	8	20	34	10°	100
WTE504 100 005	10	12	40	30`	90
WTE504 100 01	10	12	40	1°	90
WTE504 100 015	10	12	38	1°30`	90
WTE504 100 02	10	16	40	2°	90
WTE504 100 03	10	16	40	3°	100
WTE504 100 05	10	16	34	5°	100
WTE504 100 07	10	20	40	7°	90
WTE504 100 10	10	25	42	10°	100

※ The above specifications are subject to change without prior notice for product quality improvement.

• Applicable Workpiece

Carbon steel ~ HB225	Alloy steel HB225~325	Pre-hardened steel HRC30~50	Hardened steel		Copper	Graphite	Cast iron ~FCD500	Aluminum	Stainless steel
			SKD61~HRC55	SKD11 HRC55~					
○	○	◎	○				○		○

◎: Excellent ○: Good

WTE514

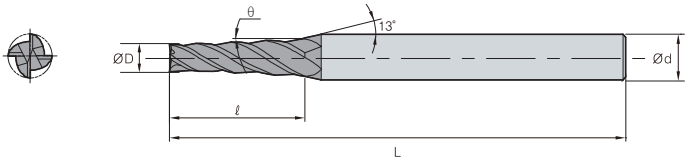
4 Flutes tapered flat endmill

ULTRA FINE | 4 | 30° HELIX | W | DATA

p.456

• TOLERANCE

ØD		Ød
All sizes	0 ~ -0.03mm	h6



(mm)

Designation	ØD	Ød	ℓ	θ	L
WTE514 008 005 04	0.8	4	4	30`	45
WTE514 008 005 06	0.8	4	6	30`	45
WTE514 008 005 08	0.8	4	8	30`	45
WTE514 008 005 10	0.8	4	10	30`	45
WTE514 008 005 12	0.8	4	12	30`	45
WTE514 008 010 04	0.8	4	4	1°	45
WTE514 008 010 06	0.8	4	6	1°	45
WTE514 008 010 08	0.8	4	8	1°	45
WTE514 008 010 10	0.8	4	10	1°	45
WTE514 008 010 12	0.8	4	12	1°	45
WTE514 008 015 04	0.8	4	4	1°30`	45
WTE514 008 015 06	0.8	4	6	1°30`	45
WTE514 008 015 08	0.8	4	8	1°30`	45
WTE514 008 015 10	0.8	4	10	1°30`	45
WTE514 008 015 12	0.8	4	12	1°30`	45
WTE514 008 020 04	0.8	4	4	2°	45
WTE514 008 020 06	0.8	4	6	2°	45
WTE514 008 020 08	0.8	4	8	2°	45
WTE514 008 020 10	0.8	4	10	2°	45
WTE514 008 020 12	0.8	4	12	2°	45
WTE514 010 005 04	1	4	4	30`	50
WTE514 010 005 06	1	4	6	30`	50
WTE514 010 005 08	1	4	8	30`	50
WTE514 010 005 10	1	4	10	30`	50
WTE514 010 005 12	1	4	12	30`	50
WTE514 010 005 16	1	4	16	30`	50
WTE514 010 010 04	1	4	4	1°	50
WTE514 010 010 06	1	4	6	1°	50
WTE514 010 010 08	1	4	8	1°	50
WTE514 010 010 10	1	4	10	1°	50
WTE514 010 010 12	1	4	12	1°	50
WTE514 010 010 16	1	4	16	1°	50
WTE514 010 015 04	1	4	4	1°30`	50
WTE514 010 015 06	1	4	6	1°30`	50
WTE514 010 015 08	1	4	8	1°30`	50
WTE514 010 015 10	1	4	10	1°30`	50

Designation	ØD	Ød	ℓ	θ	L
WTE514 010 015 12	1	4	12	1°30`	50
WTE514 010 015 16	1	4	16	1°30`	50
WTE514 010 020 04	1	4	4	2°	50
WTE514 010 020 06	1	4	6	2°	50
WTE514 010 020 08	1	4	8	2°	50
WTE514 010 020 10	1	4	10	2°	50
WTE514 010 020 12	1	4	12	2°	50
WTE514 010 020 16	1	4	16	2°	50
WTE514 010 030 04	1	4	4	3°	50
WTE514 010 030 06	1	4	6	3°	50
WTE514 010 030 08	1	4	8	3°	50
WTE514 010 030 10	1	4	10	3°	50
WTE514 010 030 12	1	4	12	3°	50
WTE514 010 030 16	1	4	16	3°	50
WTE514 012 005 06	1.2	4	6	30`	50
WTE514 012 005 08	1.2	4	8	30`	50
WTE514 012 005 10	1.2	4	10	30`	50
WTE514 012 005 12	1.2	4	12	30`	50
WTE514 012 005 16	1.2	4	16	30`	50
WTE514 012 010 06	1.2	4	6	1°	50
WTE514 012 010 08	1.2	4	8	1°	50
WTE514 012 010 10	1.2	4	10	1°	50
WTE514 012 010 12	1.2	4	12	1°	50
WTE514 012 010 16	1.2	4	16	1°	50
WTE514 012 015 06	1.2	4	6	1°30`	50
WTE514 012 015 08	1.2	4	8	1°30`	50
WTE514 012 015 10	1.2	4	10	1°30`	50
WTE514 012 015 12	1.2	4	12	1°30`	50
WTE514 012 015 16	1.2	4	16	1°30`	50
WTE514 012 020 06	1.2	4	6	2°	50
WTE514 012 020 08	1.2	4	8	2°	50
WTE514 012 020 10	1.2	4	10	2°	50
WTE514 012 020 12	1.2	4	12	2°	50
WTE514 012 020 16	1.2	4	16	2°	50
WTE514 012 030 06	1.2	4	6	3°	50
WTE514 012 030 08	1.2	4	8	3°	50

U-Star Endmill

WTE514

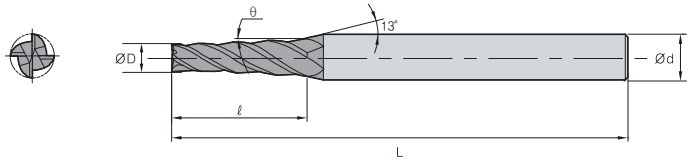
4 Flutes tapered flat endmill

ULTRA FINE | 4 | 30° HELIX | W | DATA

p.456

• TOLERANCE

ØD		Ød
All sizes	0 ~ -0.03mm	h6



(mm)

Designation	ØD	Ød	ℓ	θ	L
WTE514 012 030 10	1.2	4	10	3°	50
WTE514 012 030 12	1.2	4	12	3°	50
WTE514 012 030 16	1.2	4	16	3°	50
WTE514 015 005 06	1.5	4	6	30`	50
WTE514 015 005 08	1.5	4	8	30`	50
WTE514 015 005 10	1.5	4	10	30`	50
WTE514 015 005 12	1.5	4	12	30`	50
WTE514 015 005 16	1.5	4	16	30`	50
WTE514 015 005 20	1.5	4	20	30`	60
WTE514 015 010 06	1.5	4	6	1°	50
WTE514 015 010 08	1.5	4	8	1°	50
WTE514 015 010 10	1.5	4	10	1°	50
WTE514 015 010 12	1.5	4	12	1°	50
WTE514 015 010 16	1.5	4	16	1°	50
WTE514 015 010 20	1.5	4	20	1°	60
WTE514 015 015 06	1.5	4	6	1°30`	50
WTE514 015 015 08	1.5	4	8	1°30`	50
WTE514 015 015 10	1.5	4	10	1°30`	50
WTE514 015 015 12	1.5	4	12	1°30`	50
WTE514 015 015 16	1.5	4	16	1°30`	50
WTE514 015 015 20	1.5	4	20	1°30`	60
WTE514 015 020 06	1.5	4	6	2°	50
WTE514 015 020 08	1.5	4	8	2°	50
WTE514 015 020 10	1.5	4	10	2°	50
WTE514 015 020 12	1.5	4	12	2°	50
WTE514 015 020 16	1.5	4	16	2°	50
WTE514 015 020 20	1.5	4	20	2°	60
WTE514 015 030 06	1.5	4	6	3°	50
WTE514 015 030 08	1.5	4	8	3°	50
WTE514 015 030 10	1.5	4	10	3°	50
WTE514 015 030 12	1.5	4	12	3°	50
WTE514 015 030 16	1.5	4	16	3°	50
WTE514 015 030 20	1.5	4	20	3°	60
WTE514 020 005 08	2	4	8	30`	50
WTE514 020 005 10	2	4	10	30`	50
WTE514 020 005 12	2	4	12	30`	50

Designation	ØD	Ød	ℓ	θ	L
WTE514 020 005 16	2	4	16	30`	50
WTE514 020 005 20	2	4	20	30`	60
WTE514 020 005 25	2	4	25	30`	60
WTE514 020 010 08	2	4	8	1°	50
WTE514 020 010 10	2	4	10	1°	50
WTE514 020 010 12	2	4	12	1°	50
WTE514 020 010 16	2	4	16	1°	50
WTE514 020 010 20	2	4	20	1°	60
WTE514 020 010 25	2	4	25	1°	60
WTE514 020 015 08	2	4	8	1°30`	50
WTE514 020 015 10	2	4	10	1°30`	50
WTE514 020 015 12	2	4	12	1°30`	50
WTE514 020 015 16	2	4	16	1°30`	50
WTE514 020 015 20	2	4	20	1°30`	60
WTE514 020 015 25	2	4	25	1°30`	60
WTE514 020 020 08	2	4	8	2°	50
WTE514 020 020 10	2	4	10	2°	50
WTE514 020 020 12	2	4	12	2°	50
WTE514 020 020 16	2	4	16	2°	50
WTE514 020 020 20	2	4	20	2°	60
WTE514 020 020 25	2	4	25	2°	60
WTE514 020 030 08	2	4	8	3°	50
WTE514 020 030 10	2	4	10	3°	50
WTE514 020 030 12	2	4	12	3°	50
WTE514 020 030 16	2	4	16	3°	50
WTE514 020 030 20	2	6	20	3°	60
WTE514 020 030 25	2	6	25	3°	60
WTE514 025 005 10	2.5	4	10	30`	50
WTE514 025 005 12	2.5	4	12	30`	50
WTE514 025 005 16	2.5	4	16	30`	50
WTE514 025 005 20	2.5	4	20	30`	60
WTE514 025 005 25	2.5	4	25	30`	60
WTE514 025 005 30	2.5	4	30	30`	60
WTE514 025 010 10	2.5	4	10	1°	50
WTE514 025 010 12	2.5	4	12	1°	50
WTE514 025 010 16	2.5	4	16	1°	50

WTE514

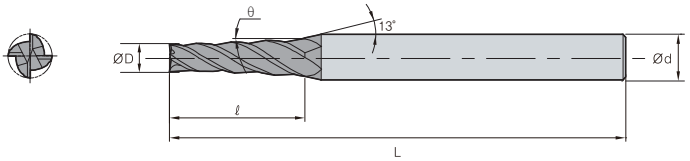
4 Flutes tapered flat endmill

ULTRA FINE | 4 | 30° HELIX | W | DATA

p.456

• TOLERANCE

ØD		Ød
All sizes	0 ~ -0.03mm	h6



(mm)

Designation	ØD	Ød	ℓ	θ	L
WTE514 025 010 20	2.5	4	20	1°	60
WTE514 025 010 25	2.5	4	25	1°	60
WTE514 025 010 30	2.5	4	30	1°	60
WTE514 025 015 10	2.5	4	10	1°30`	50
WTE514 025 015 12	2.5	4	12	1°30`	50
WTE514 025 015 16	2.5	4	16	1°30`	50
WTE514 025 015 20	2.5	4	20	1°30`	60
WTE514 025 015 25	2.5	4	25	1°30`	60
WTE514 025 015 30	2.5	6	30	1°30`	60
WTE514 025 020 10	2.5	4	10	2°	50
WTE514 025 020 12	2.5	4	12	2°	50

Designation	ØD	Ød	ℓ	θ	L
WTE514 025 020 16	2.5	4	16	2°	50
WTE514 025 020 20	2.5	4	20	2°	60
WTE514 025 020 25	2.5	6	25	2°	60
WTE514 025 020 30	2.5	6	30	2°	60
WTE514 025 030 10	2.5	4	10	3°	50
WTE514 025 030 12	2.5	4	12	3°	50
WTE514 025 030 16	2.5	6	16	3°	50
WTE514 025 030 20	2.5	6	20	3°	60
WTE514 025 030 25	2.5	6	25	3°	60
WTE514 025 030 30	2.5	6	30	3°	60

※ The above specifications are subject to change without prior notice for product quality improvement.

• Applicable Workpiece

Carbon steel ~ HB225	Alloy steel HB225~325	Pre-hardened steel HRC30~50	Hardened steel		Copper	Graphite	Cast iron ~FCD500	Aluminum	Stainless steel
			SKD61~HRC55	SKD11 HRC55~					
○	○	◎	○				○		○

◎: Excellent ○: Good

U-Star Endmill

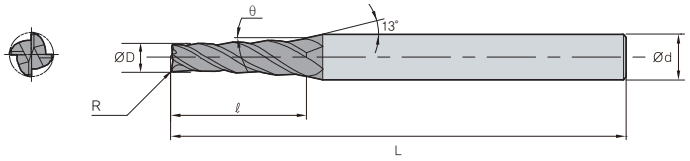
WTR504

4 Flutes tapered radius endmill

ULTRA FINE | 4 | 30° HELIX | R ±0.01 All sizes | W | DATA p.456

• TOLERANCE

ØD		Ød
All sizes	0 ~ -0.03mm	h6



(mm)

Designation	R	ØD	Ød	ℓ	θ	L
WTR504 008 01 01 04	0.1	0.8	4	4	1°	45
WTR504 008 01 01 06	0.1	0.8	4	6	1°	45
WTR504 008 01 01 08	0.1	0.8	4	8	1°	45
WTR504 008 01 015 04	0.1	0.8	4	4	1°30`	45
WTR504 008 01 015 06	0.1	0.8	4	6	1°30`	45
WTR504 008 01 015 08	0.1	0.8	4	8	1°30`	45
WTR504 008 02 01 04	0.1	0.8	4	4	1°	45
WTR504 008 02 01 06	0.1	0.8	4	6	1°	45
WTR504 008 02 01 08	0.1	0.8	4	8	1°	45
WTR504 008 02 015 04	0.1	0.8	4	4	1°30`	45
WTR504 008 02 015 06	0.1	0.8	4	6	1°30`	45
WTR504 008 02 015 08	0.1	0.8	4	8	1°30`	45
WTR504 010 01 01 04	0.1	1	4	4	1°	50
WTR504 010 01 01 06	0.1	1	4	6	1°	50
WTR504 010 01 01 08	0.1	1	4	8	1°	50
WTR504 010 01 01 10	0.1	1	4	10	1°	50
WTR504 010 01 01 12	0.1	1	4	12	1°	50
WTR504 010 01 015 04	0.1	1	4	4	1°30`	50
WTR504 010 01 015 06	0.1	1	4	6	1°30`	50
WTR504 010 01 015 08	0.1	1	4	8	1°30`	50
WTR504 010 01 015 10	0.1	1	4	10	1°30`	50
WTR504 010 01 015 12	0.1	1	4	12	1°30`	50
WTR504 010 01 02 04	0.1	1	4	4	2°	50
WTR504 010 01 02 06	0.1	1	4	6	2°	50
WTR504 010 01 02 08	0.1	1	4	8	2°	50
WTR504 010 01 02 10	0.1	1	4	10	2°	50
WTR504 010 01 02 12	0.1	1	4	12	2°	50
WTR504 010 01 03 04	0.1	1	4	4	3°	50
WTR504 010 01 03 06	0.1	1	4	6	3°	50
WTR504 010 01 03 08	0.1	1	4	8	3°	50
WTR504 010 01 03 10	0.1	1	4	10	3°	50
WTR504 010 01 03 12	0.1	1	4	12	3°	50
WTR504 010 02 01 04	0.2	1	4	4	1°	50
WTR504 010 02 01 06	0.2	1	4	6	1°	50
WTR504 010 02 01 08	0.2	1	4	8	1°	50
WTR504 010 02 01 10	0.2	1	4	10	1°	50
WTR504 010 02 01 12	0.2	1	4	12	1°	50
WTR504 010 02 015 04	0.2	1	4	4	1°30`	50
WTR504 010 02 015 06	0.2	1	4	6	1°30`	50
WTR504 010 02 015 08	0.2	1	4	8	1°30`	50
WTR504 010 02 015 10	0.2	1	4	10	1°30`	50
WTR504 010 02 015 12	0.2	1	4	12	1°30`	50
WTR504 010 02 02 04	0.2	1	4	4	2°	50
WTR504 010 02 02 06	0.2	1	4	6	2°	50
WTR504 010 02 02 08	0.2	1	4	8	2°	50
WTR504 010 02 02 10	0.2	1	4	10	2°	50
WTR504 010 02 02 12	0.2	1	4	12	2°	50
WTR504 010 02 03 04	0.2	1	4	4	3°	50
WTR504 010 02 03 06	0.2	1	4	6	3°	50
WTR504 010 02 03 08	0.2	1	4	8	3°	50
WTR504 010 02 03 10	0.2	1	4	10	3°	50
WTR504 010 02 03 12	0.2	1	4	12	3°	50
WTR504 010 03 01 04	0.3	1	4	4	1°	50
WTR504 010 03 01 06	0.3	1	4	6	1°	50
WTR504 010 03 01 08	0.3	1	4	8	1°	50
WTR504 010 03 01 10	0.3	1	4	10	1°	50
WTR504 010 03 01 12	0.3	1	4	12	1°	50
WTR504 010 03 015 04	0.3	1	4	4	1°30`	50
WTR504 010 03 015 06	0.3	1	4	6	1°30`	50
WTR504 010 03 015 08	0.3	1	4	8	1°30`	50
WTR504 010 03 015 10	0.3	1	4	10	1°30`	50
WTR504 010 03 015 12	0.3	1	4	12	1°30`	50
WTR504 010 03 02 04	0.3	1	4	4	2°	50
WTR504 010 03 02 06	0.3	1	4	6	2°	50
WTR504 010 03 02 08	0.3	1	4	8	2°	50
WTR504 010 03 02 10	0.3	1	4	10	2°	50
WTR504 010 03 02 12	0.3	1	4	12	2°	50
WTR504 010 03 03 04	0.3	1	4	4	3°	50
WTR504 010 03 03 06	0.3	1	4	6	3°	50
WTR504 010 03 03 08	0.3	1	4	8	3°	50
WTR504 010 03 03 10	0.3	1	4	10	3°	50
WTR504 010 03 03 12	0.3	1	4	12	3°	50
WTR504 012 01 01 06	0.1	1.2	4	6	1°	50
WTR504 012 01 01 08	0.1	1.2	4	8	1°	50

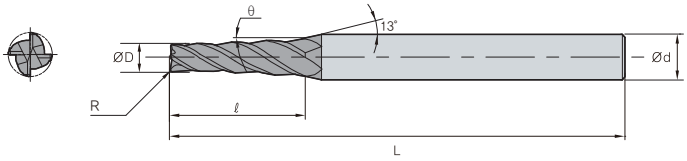
WTR504

4 Flutes tapered radius endmill

ULTRA FINE | 4 | 30° HELIX | R ±0.01 All sizes | W | DATA p.456

• TOLERANCE

ØD		Ød
All sizes	0 ~ -0.03mm	h6



(mm)

Designation	R	ØD	Ød	ℓ	θ	L
WTR504 012 01 01 10	0.1	1.2	4	10	1°	50
WTR504 012 01 01 12	0.1	1.2	4	12	1°	50
WTR504 012 01 02 06	0.1	1.2	4	6	2°	50
WTR504 012 01 02 08	0.1	1.2	4	8	2°	50
WTR504 012 01 02 10	0.1	1.2	4	10	2°	50
WTR504 012 01 02 12	0.1	1.2	4	12	2°	50
WTR504 012 01 03 06	0.1	1.2	4	6	3°	50
WTR504 012 01 03 08	0.1	1.2	4	8	3°	50
WTR504 012 01 03 10	0.1	1.2	4	10	3°	50
WTR504 012 01 03 12	0.1	1.2	4	12	3°	50
WTR504 012 02 01 06	0.2	1.2	4	6	1°	50
WTR504 012 02 01 08	0.2	1.2	4	8	1°	50
WTR504 012 02 01 10	0.2	1.2	4	10	1°	50
WTR504 012 02 01 12	0.2	1.2	4	12	1°	50
WTR504 012 02 02 06	0.2	1.2	4	6	2°	50
WTR504 012 02 02 08	0.2	1.2	4	8	2°	50
WTR504 012 02 02 10	0.2	1.2	4	10	2°	50
WTR504 012 02 02 12	0.2	1.2	4	12	2°	50
WTR504 012 02 03 06	0.2	1.2	4	6	3°	50
WTR504 012 02 03 08	0.2	1.2	4	8	3°	50
WTR504 012 02 03 10	0.2	1.2	4	10	3°	50
WTR504 012 02 03 12	0.2	1.2	4	12	3°	50
WTR504 012 03 01 06	0.3	1.2	4	6	1°	50
WTR504 012 03 01 08	0.3	1.2	4	8	1°	50
WTR504 012 03 01 10	0.3	1.2	4	10	1°	50
WTR504 012 03 01 12	0.3	1.2	4	12	1°	50
WTR504 012 03 02 06	0.3	1.2	4	6	2°	50
WTR504 012 03 02 08	0.3	1.2	4	8	2°	50
WTR504 012 03 02 10	0.3	1.2	4	10	2°	50
WTR504 012 03 02 12	0.3	1.2	4	12	2°	50
WTR504 012 03 03 06	0.3	1.2	4	6	3°	50
WTR504 012 03 03 08	0.3	1.2	4	8	3°	50
WTR504 012 03 03 10	0.3	1.2	4	10	3°	50
WTR504 012 03 03 12	0.3	1.2	4	12	3°	50
WTR504 015 01 01 06	0.1	1.5	4	6	1°	50
WTR504 015 01 01 08	0.1	1.5	4	8	1°	50
WTR504 015 01 01 10	0.1	1.5	4	10	1°	50

Designation	R	ØD	Ød	ℓ	θ	L
WTR504 015 01 01 12	0.1	1.5	4	12	1°	50
WTR504 015 01 01 16	0.1	1.5	4	16	1°	50
WTR504 015 01 01 20	0.1	1.5	4	20	1°	60
WTR504 015 01 02 06	0.1	1.5	4	6	2°	50
WTR504 015 01 02 08	0.1	1.5	4	8	2°	50
WTR504 015 01 02 10	0.1	1.5	4	10	2°	50
WTR504 015 01 02 12	0.1	1.5	4	12	2°	50
WTR504 015 01 02 16	0.1	1.5	4	16	2°	50
WTR504 015 01 02 20	0.1	1.5	4	20	2°	60
WTR504 015 01 03 06	0.1	1.5	4	6	3°	50
WTR504 015 01 03 08	0.1	1.5	4	8	3°	50
WTR504 015 01 03 10	0.1	1.5	4	10	3°	50
WTR504 015 01 03 12	0.1	1.5	4	12	3°	50
WTR504 015 01 03 16	0.1	1.5	4	16	3°	50
WTR504 015 01 03 20	0.1	1.5	4	20	3°	60
WTR504 015 02 01 06	0.2	1.5	4	6	1°	50
WTR504 015 02 01 08	0.2	1.5	4	8	1°	50
WTR504 015 02 01 10	0.2	1.5	4	10	1°	50
WTR504 015 02 01 12	0.2	1.5	4	12	1°	50
WTR504 015 02 01 16	0.2	1.5	4	16	1°	50
WTR504 015 02 01 20	0.2	1.5	4	20	1°	60
WTR504 015 02 02 06	0.2	1.5	4	6	2°	50
WTR504 015 02 02 08	0.2	1.5	4	8	2°	50
WTR504 015 02 02 10	0.2	1.5	4	10	2°	50
WTR504 015 02 02 12	0.2	1.5	4	12	2°	50
WTR504 015 02 02 16	0.2	1.5	4	16	2°	50
WTR504 015 02 02 20	0.2	1.5	4	20	2°	60
WTR504 015 02 03 06	0.2	1.5	4	6	3°	50
WTR504 015 02 03 08	0.2	1.5	4	8	3°	50
WTR504 015 02 03 10	0.2	1.5	4	10	3°	50
WTR504 015 02 03 12	0.2	1.5	4	12	3°	50
WTR504 015 02 03 16	0.2	1.5	4	16	3°	50
WTR504 015 02 03 20	0.2	1.5	4	20	3°	60
WTR504 015 03 01 06	0.3	1.5	4	6	1°	50
WTR504 015 03 01 08	0.3	1.5	4	8	1°	50
WTR504 015 03 01 10	0.3	1.5	4	10	1°	50
WTR504 015 03 01 12	0.3	1.5	4	12	1°1	50

U-Star Endmill

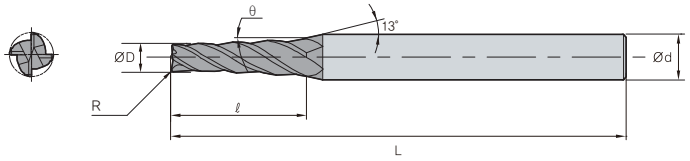
WTR504

4 Flutes tapered radius endmill

ULTRA FINE | 4 | 30° HELIX | R ±0.01 (All sizes) | W | DATA (p.456)

• TOLERANCE

ØD		Ød
All sizes	0 ~ -0.03mm	h6



(mm)

Designation	R	ØD	Ød	ℓ	θ	L
WTR504 015 03 01 16	0.3	1.5	4	16	1°1	50
WTR504 015 03 01 20	0.3	1.5	4	20	1°1	60
WTR504 015 03 02 06	0.3	1.5	4	6	2°	50
WTR504 015 03 02 08	0.3	1.5	4	8	2°	50
WTR504 015 03 02 10	0.3	1.5	4	10	2°	50
WTR504 015 03 02 12	0.3	1.5	4	12	2°	50
WTR504 015 03 02 16	0.3	1.5	4	16	2°	50
WTR504 015 03 02 20	0.3	1.5	4	20	2°	60
WTR504 015 03 03 06	0.3	1.5	4	6	3°	50
WTR504 015 03 03 08	0.3	1.5	4	8	3°	50
WTR504 015 03 03 10	0.3	1.5	4	10	3°	50
WTR504 015 03 03 12	0.3	1.5	4	12	3°	50
WTR504 015 03 03 16	0.3	1.5	4	16	3°	50
WTR504 015 03 03 20	0.3	1.5	4	20	3°	60
WTR504 020 01 01 08	0.1	2	4	8	1°	50
WTR504 020 01 01 10	0.1	2	4	10	1°	50
WTR504 020 01 01 12	0.1	2	4	12	1°	50
WTR504 020 01 01 16	0.1	2	4	16	1°	50
WTR504 020 01 01 20	0.1	2	4	20	1°	60
WTR504 020 01 01 25	0.1	2	4	25	1°	60
WTR504 020 01 02 08	0.1	2	4	8	2°	50
WTR504 020 01 02 10	0.1	2	4	10	2°	50
WTR504 020 01 02 12	0.1	2	4	12	2°	50
WTR504 020 01 02 16	0.1	2	4	16	2°	50
WTR504 020 01 02 20	0.1	2	4	20	2°	60
WTR504 020 01 02 25	0.1	2	4	25	2°	60
WTR504 020 01 03 08	0.1	2	4	8	3°	50
WTR504 020 01 03 10	0.1	2	4	10	3°	50
WTR504 020 01 03 12	0.1	2	4	12	3°	50
WTR504 020 01 03 16	0.1	2	4	16	3°	50
WTR504 020 01 03 20	0.1	2	6	20	3°	60
WTR504 020 01 03 25	0.1	2	6	25	3°	60
WTR504 020 02 01 08	0.2	2	4	8	1°	50
WTR504 020 02 01 10	0.2	2	4	10	1°	50
WTR504 020 02 01 12	0.2	2	4	12	1°	50
WTR504 020 02 01 16	0.2	2	4	16	1°	50
WTR504 020 02 01 20	0.2	2	4	20	1°	60

Designation	R	ØD	Ød	ℓ	θ	L
WTR504 020 02 01 25	0.2	2	4	25	1°	60
WTR504 020 02 02 08	0.2	2	4	8	2°	50
WTR504 020 02 02 10	0.2	2	4	10	2°	50
WTR504 020 02 02 12	0.2	2	4	12	2°	50
WTR504 020 02 02 16	0.2	2	4	16	2°	50
WTR504 020 02 02 20	0.2	2	4	20	2°	60
WTR504 020 02 02 25	0.2	2	4	25	2°	60
WTR504 020 02 03 08	0.2	2	4	8	3°	50
WTR504 020 02 03 10	0.2	2	4	10	3°	50
WTR504 020 02 03 12	0.2	2	4	12	3°	50
WTR504 020 02 03 16	0.2	2	4	16	3°	50
WTR504 020 02 03 20	0.2	2	6	20	3°	60
WTR504 020 02 03 25	0.2	2	6	25	3°	60
WTR504 020 03 01 08	0.3	2	4	8	1°	50
WTR504 020 03 01 10	0.3	2	4	10	1°	50
WTR504 020 03 01 12	0.3	2	4	12	1°	50
WTR504 020 03 01 16	0.3	2	4	16	1°	50
WTR504 020 03 01 20	0.3	2	4	20	1°	60
WTR504 020 03 01 25	0.3	2	4	25	1°	60
WTR504 020 03 02 08	0.3	2	4	8	2°	50
WTR504 020 03 02 10	0.3	2	4	10	2°	50
WTR504 020 03 02 12	0.3	2	4	12	2°	50
WTR504 020 03 02 16	0.3	2	4	16	2°	50
WTR504 020 03 02 20	0.3	2	4	20	2°	60
WTR504 020 03 02 25	0.3	2	4	25	2°	60
WTR504 020 03 03 08	0.3	2	4	8	3°	50
WTR504 020 03 03 10	0.3	2	4	10	3°	50
WTR504 020 03 03 12	0.3	2	4	12	3°	50
WTR504 020 03 03 16	0.3	2	4	16	3°	50
WTR504 020 03 03 20	0.3	2	6	20	3°	60
WTR504 020 03 03 25	0.3	2	6	25	3°	60
WTR504 025 01 01 10	0.1	2.5	4	10	1°	50
WTR504 025 01 01 12	0.1	2.5	4	12	1°	50
WTR504 025 01 01 16	0.1	2.5	4	16	1°	50
WTR504 025 01 01 20	0.1	2.5	4	20	1°	60
WTR504 025 01 01 25	0.1	2.5	4	25	1°	60
WTR504 025 01 01 30	0.1	2.5	4	30	1°	60

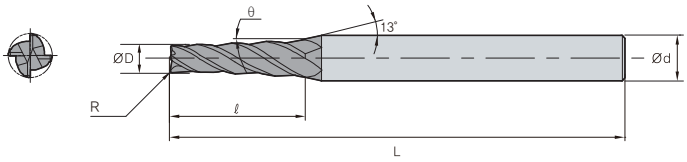
WTR504

4 Flutes tapered radius endmill

ULTRA FINE | 4 | 30° HELIX | R ±0.01 (All sizes) | W | DATA p.456

• TOLERANCE

ØD		Ød
All sizes	0 ~ -0.03mm	h6



(mm)

Designation	R	ØD	Ød	ℓ	θ	L
WTR504 025 01 02 10	0.1	2.5	4	10	2°	50
WTR504 025 01 02 12	0.1	2.5	4	12	2°	50
WTR504 025 01 02 16	0.1	2.5	4	16	2°	50
WTR504 025 01 02 20	0.1	2.5	4	20	2°	60
WTR504 025 01 02 25	0.1	2.5	6	25	2°	60
WTR504 025 01 02 30	0.1	2.5	6	30	2°	60
WTR504 025 01 03 10	0.1	2.5	4	10	3°	50
WTR504 025 01 03 12	0.1	2.5	4	12	3°	50
WTR504 025 01 03 16	0.1	2.5	6	16	3°	50
WTR504 025 01 03 20	0.1	2.5	6	20	3°	60
WTR504 025 01 03 25	0.1	2.5	6	25	3°	60
WTR504 025 01 03 30	0.1	2.5	6	30	3°	60
WTR504 025 02 01 10	0.2	2.5	4	10	1°	50
WTR504 025 02 01 12	0.2	2.5	4	12	1°	50
WTR504 025 02 01 16	0.2	2.5	4	16	1°	50
WTR504 025 02 01 20	0.2	2.5	4	20	1°	60
WTR504 025 02 01 25	0.2	2.5	4	25	1°	60
WTR504 025 02 01 30	0.2	2.5	4	30	1°	60
WTR504 025 02 02 10	0.2	2.5	4	10	2°	50
WTR504 025 02 02 12	0.2	2.5	4	12	2°	50
WTR504 025 02 02 16	0.2	2.5	4	16	2°	50
WTR504 025 02 02 20	0.2	2.5	4	20	2°	60
WTR504 025 02 02 25	0.2	2.5	6	25	2°	60
WTR504 025 02 02 30	0.2	2.5	6	30	2°	60

Designation	R	ØD	Ød	ℓ	θ	L
WTR504 025 02 03 10	0.2	2.5	4	10	3°	50
WTR504 025 02 03 12	0.2	2.5	4	12	3°	50
WTR504 025 02 03 16	0.2	2.5	6	16	3°	50
WTR504 025 02 03 20	0.2	2.5	6	20	3°	60
WTR504 025 02 03 25	0.2	2.5	6	25	3°	60
WTR504 025 02 03 30	0.2	2.5	6	30	3°	60
WTR504 025 03 01 10	0.3	2.5	4	10	1°	50
WTR504 025 03 01 12	0.3	2.5	4	12	1°	50
WTR504 025 03 01 16	0.3	2.5	4	16	1°	50
WTR504 025 03 01 20	0.3	2.5	4	20	1°	60
WTR504 025 03 01 25	0.3	2.5	4	25	1°	60
WTR504 025 03 01 30	0.3	2.5	4	30	1°	60
WTR504 025 03 02 10	0.3	2.5	4	10	2°	50
WTR504 025 03 02 12	0.3	2.5	4	12	2°	50
WTR504 025 03 02 16	0.3	2.5	4	16	2°	50
WTR504 025 03 02 20	0.3	2.5	4	20	2°	60
WTR504 025 03 02 25	0.3	2.5	6	25	2°	60
WTR504 025 03 02 30	0.3	2.5	6	30	2°	60
WTR504 025 03 03 10	0.3	2.5	4	10	3°	50
WTR504 025 03 03 12	0.3	2.5	4	12	3°	50
WTR504 025 03 03 16	0.3	2.5	6	16	3°	50
WTR504 025 03 03 20	0.3	2.5	6	20	3°	60
WTR504 025 03 03 25	0.3	2.5	6	25	3°	60
WTR504 025 03 03 30	0.3	2.5	6	30	3°	60

※ The above specifications are subject to change without prior notice for product quality improvement.

• Applicable Workpiece

Carbon steel ~ HB225	Alloy steel HB225~325	Pre-hardened steel HRC30~50	Hardened steel		Copper	Graphite	Cast iron ~FCD500	Aluminum	Stainless steel
			SKD61~HRC55	SKD11 HRC55~					
○	○	◎	○				○		○

◎: Excellent ○: Good

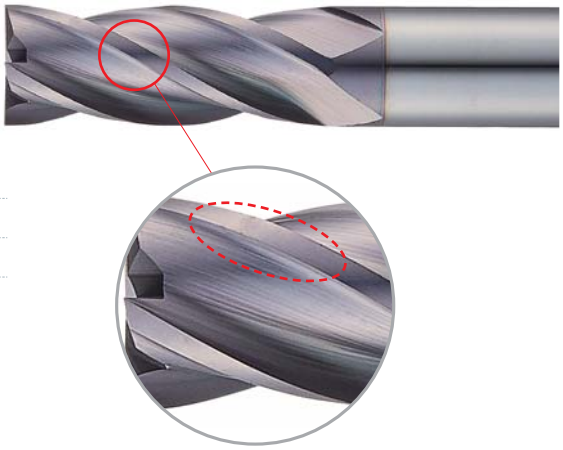
For low hardness

G-Star Endmill

- Suitable for low hardness steel (HRC10 ~ 30); Alloy steel, Carbon steel, Pre-harden, Hardened steel etc.
- General purpose suitable for rough machining, Finishing and curved and sloped surfaces

Features

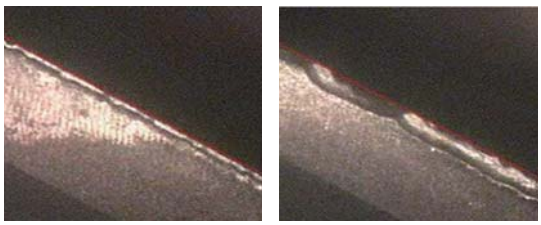
- Excellent Rake angle and Cutting edge considered the characteristics of workpiece.
- Improved chipping resistance and enhanced machinability by using high toughness materials
- TiAlN coating for enhanced oxidation resistance and chipping resistance



- Excellent workpiece finishes by 45°high helix angle

Performance evaluation

Workpiece	STC3
Cutting conditions	n (rpm) = 4,515, Feed = 845, ap = 10, ae = 0.4
Tools	ZE304100P



KORLOY | Competitor

Code system

Z	R	3	2	4H	08	-	10	-	S4

Type
D: Dynamic
Z: G-Star Endmill
T: Thunder

Appearance
B: Ball
E: Square
R: Radius
X: Square
S: Square
XB: Ball

Grade
3: Grade
2: Grade

Length, Shank type
0: Straight
1: Standard
2: Long Cutting Length
3: Long Shank
4: Tapered Neck

No. of flutes
2: 2 Flutes
4: 4 Flutes
4H: 4 Flutes (Helix 45°)

Cutting dia.
1 ~ 20

Corner R
0.2 ~ 3

Shank dia.
4 ~ 20

EDP. NO	Appearance	Type	Range	Page
DB312		2 Flutes ball nose endmill	Ø1.0 ~ 20.0	182
DB342		2 Flutes tapered neck type ball nose endmill	Ø1.0 ~ 12.0	183
TX202		2 Flutes short shank flat endmill	Ø1.0 ~ 20.0	184
TX204		4 Flutes short shank flat endmill	Ø1.0 ~ 20.0	185
TX222		2 Flutes long flat endmill	Ø3.0 ~ 20.0	186
TX224		4 Flutes long flat endmill	Ø3.0 ~ 20.0	187
TX302		2 Flutes flat endmill	Ø1.0 ~ 20.0	188
TX304		4 Flutes flat endmill	Ø1.0 ~ 20.0	189
TX304H		4 Flutes 45° helix flat endmill	Ø3.0 ~ 20.0	190
TXB202		2 Flutes short shank ball nose endmill	Ø1.0 ~ 20.0	191
TXB204		4 Flutes short shank ball nose endmill	Ø2.0 ~ 20.0	192
TXB222		2 Flutes long ball nose endmill	Ø3.0 ~ 20.0	193
TXB232		2 Flutes long shank ball nose endmill	Ø3.0 ~ 20.0	194
TXB302		2 Flutes ball nose endmill	Ø1.0 ~ 20.0	195
TXB304		4 Flutes ball nose endmill	Ø1.0 ~ 20.0	196
ZE302P		2 Flutes flat endmill	Ø1.0 ~ 20.0	197
ZE304P		4 Flutes flat endmill	Ø1.0 ~ 20.0	198
ZE322		2 Flutes extra long flat endmill	Ø3.0 ~ 20.0	199
ZE324		4 Flutes extra long flat endmill	Ø3.0 ~ 20.0	200
ZR304H		4 Flutes 45° helix radius endmill	Ø3.0 ~ 12.0	201
ZR322		2 Flutes long shank radius endmill	Ø3.0 ~ 12.0	202
ZR324		4 Flutes long shank radius endmill	Ø3.0 ~ 12.0	203
ZR324H		4 Flutes 45° helix radius endmill	Ø6.0 ~ 12.0	204

G-Star Endmill

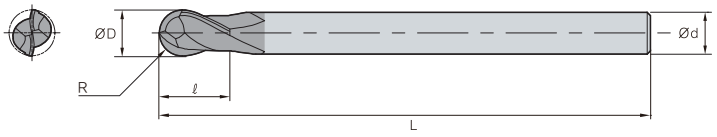
DB312

2 Flutes ball nose endmill

FINE GRAIN | 2 | 30° HELIX | R ±0.01 All sizes | TiAlN | DATA p.457

• TOLERANCE

ØD		Ød
All sizes	0 ~ -0.02mm	h6.5



(mm)

Designation	R	ØD	Ød	ℓ	L
DB312 010 S4	0.5	1	4	2.5	50
DB312 010	0.5	1	6	2.5	50
DB312 012	0.6	1.2	6	3	50
DB312 015	0.75	1.5	6	4	50
DB312 020 S4	1	2	4	5	50
DB312 020	1	2	6	5	50
DB312 025	1.25	2.5	6	6	60
DB312 030 S3	1.5	3	3	8	60
DB312 030 S4	1.5	3	4	8	60
DB312 030	1.5	3	6	8	60
DB312 035	1.75	3.5	6	8	70
DB312 040 S4	2	4	4	8	70
DB312 040	2	4	6	8	70
DB312 045	2.25	4.5	6	8	70
DB312 050	2.5	5	6	10	80

Designation	R	ØD	Ød	ℓ	L
DB312 055	2.75	5.5	6	10	80
DB312 060S	3	6	6	12	60
DB312 060	3	6	6	12	90
DB312 065	3.25	6.5	8	12	90
DB312 070	3.5	7	8	14	90
DB312 080S	4	8	8	14	60
DB312 080	4	8	8	14	100
DB312 090	4.5	9	10	18	100
DB312 100S	5	10	10	18	60
DB312 100	5	10	10	18	100
DB312 120	6	12	12	22	110
DB312 140	7	14	14	26	110
DB312 160	8	16	16	30	140
DB312 180	9	18	18	34	140
DB312 200	10	20	20	38	160

※ The above specifications are subject to change without prior notice for product quality improvement.

• **Applicable Workpiece**

Carbon steel ~ HB225	Alloy steel HB225~325	Pre-hardened steel HRC30~50	Hardened steel		Copper	Graphite	Cast iron ~FCD500	Aluminum	Stainless steel
			SKD61~HRC55	SKD11 HRC55~					
◎	◎	○							

◎: Excellent ○: Good

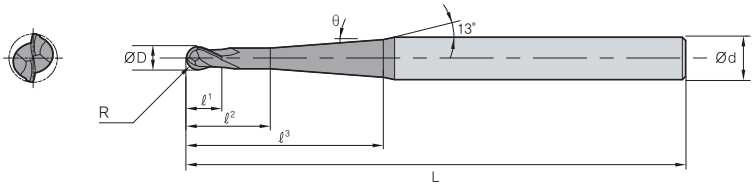
DB342

2 Flutes tapered neck type ball nose endmill

FINE GRAIN | 2 | 30° HELIX | R ±0.01 All sizes | TiAlN | DATA p.457

• TOLERANCE

ØD		Ød
All sizes	0 ~ -0.02mm	h6



(mm)

Designation	R	ØD	Ød	ℓ1	ℓ2	ℓ3	θ	L
DB342 01015	0.5	1	6	2	4	23	1°30′	60
DB342 01050	0.5	1	6	2	4	23	5°	60
DB342 01030	0.5	1	6	2	4	42	3°	80
DB342 02015	1	2	6	4	6	23	1°30′	60
DB342 02050	1	2	6	4	6	23	5°	60
DB342 02030	1	2	6	4	6	41	3°	80
DB342 03030	1.5	3	6	6	8	32	3°	70
DB342 03015	1.5	3	6	6	8	52	1°30′	90
DB342 04030	2	4	6	8	10	28	3°	70
DB342 04015	2	4	6	8	10	49	1°30′	90
DB342 05030	2.5	5	8	10	12	41	3°	90
DB342 05015	2.5	5	8	10	12	61	1°30′	110
DB342 06030	3	6	8	12	15	34	3°	90
DB342 06015	3	6	8	12	15	53	1°30′	110
DB342 08030	4	8	10	14	17	36	3°	100
DB342 08015	4	8	10	14	17	55	1°30′	120
DB342 10030	5	10	12	18	21	40	3°	110
DB342 10015	5	10	12	18	21	59	1°30′	130
DB342 12030	6	12	16	22	25	63	3°	140
DB342 12015	6	12	16	22	25	83	1°30′	160

※ The above specifications are subject to change without prior notice for product quality improvement.

• Applicable Workpiece

Carbon steel ~ HB225	Alloy steel HB225~325	Pre-hardened steel HRC30~50	Hardened steel		Copper	Graphite	Cast iron ~FCD500	Aluminum	Stainless steel
			SKD61~HRC55	SKD11 HRC55~					
◎	◎	○							

◎: Excellent ○: Good

G-Star Endmill

TX202

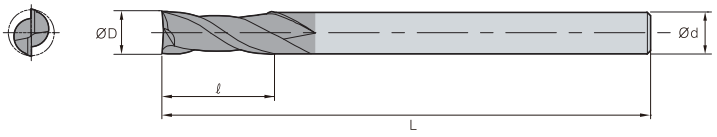
2 Flutes short shank flat endmill

FINE GRAIN | 2 | 30° HELIX | TiAlN | DATA

p.458

• TOLERANCE

ØD		Ød
Ø1 ~ Ø3	-0.014 ~ -0.028mm	h6
Ø4 ~ Ø6	-0.02 ~ -0.038mm	
Ø7 ~ Ø10	-0.025 ~ -0.047mm	
Ø12 ~ Ø18	-0.032 ~ -0.059mm	
Ø20 ~	-0.04 ~ -0.073mm	



(mm)

Designation	ØD	Ød	ℓ	L
TX202 010	1	3	3	39
TX202 015	1.5	3	5	39
TX202 020	2	3	7	39
TX202 025	2.5	3	8	39
TX202 030	3	3	10	39
TX202 040	4	4	14	51
TX202 050	5	5	16	51
TX202 060	6	6	19	64
TX202 080	8	8	21	64
TX202 100	10	10	25	70
TX202 120	12	12	25	76
TX202 160	16	16	32	89
TX202 200	20	20	38	102

※ The above specifications are subject to change without prior notice for product quality improvement.

• Applicable Workpiece

Carbon steel ~ HB225	Alloy steel HB225~325	Pre-hardened steel HRC30~50	Hardened steel		Copper	Graphite	Cast iron ~FCD500	Aluminum	Stainless steel
			SKD61~HRC55	SKD11 HRC55~					
◎	◎	○							

◎: Excellent ○: Good

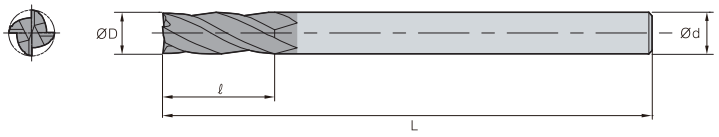
TX204

4 Flutes short shank flat endmill

FINE GRAIN | 4 | 30° HELIX | TiAlN | DATA p.459

• TOLERANCE

ØD		Ød
Ø1 ~ Ø3	-0.014 ~ -0.028mm	h6
Ø4 ~ Ø6	-0.02 ~ -0.038mm	
Ø7 ~ Ø10	-0.025 ~ -0.047mm	
Ø12 ~ Ø18	-0.032 ~ -0.059mm	
Ø20 ~	-0.04 ~ -0.073mm	



(mm)

Designation	ØD	Ød	ℓ	L
TX204 010	1	3	3	39
TX204 015	1.5	3	5	39
TX204 020	2	3	7	39
TX204 025	2.5	3	8	39
TX204 030	3	3	10	39
TX204 040	4	4	14	51
TX204 050	5	5	16	51
TX204 060	6	6	19	64
TX204 080	8	8	21	64
TX204 100	10	10	25	70
TX204 120	12	12	25	76
TX204 160	16	16	32	89
TX204 200	20	20	38	102

※ The above specifications are subject to change without prior notice for product quality improvement.

• Applicable Workpiece

Carbon steel ~ HB225	Alloy steel HB225~325	Pre-hardened steel HRC30~50	Hardened steel		Copper	Graphite	Cast iron ~FCD500	Aluminum	Stainless steel
			SKD61~HRC55	SKD11 HRC55~					
◎	◎	○							

◎: Excellent ○: Good

G-Star Endmill

TX222

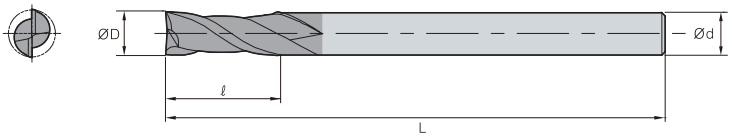
2 Flutes long flat endmill

FINE GRAIN | 2 | 30° HELIX | TiAlN | DATA

p.458

• TOLERANCE

ØD		Ød
Ø1 ~ Ø3	-0.014 ~ -0.028mm	h6
Ø4 ~ Ø6	-0.02 ~ -0.038mm	
Ø7 ~ Ø10	-0.025 ~ -0.047mm	
Ø12 ~ Ø18	-0.032 ~ -0.059mm	
Ø20 ~	-0.04 ~ -0.073mm	



(mm)

Designation	ØD	Ød	ℓ	L
TX222 030	3	3	20	60
TX222 040	4	4	20	60
TX222 050	5	5	25	75
TX222 060	6	6	30	75
TX222 080	8	8	30	75
TX222 100	10	10	40	100
TX222 120	12	12	45	100
TX222 140	14	14	45	100
TX222 160	16	16	45	100
TX222 180	18	18	45	100
TX222 200	20	20	45	100

※ The above specifications are subject to change without prior notice for product quality improvement.

• Applicable Workpiece

Carbon steel ~ HB225	Alloy steel HB225~325	Pre-hardened steel HRC30~50	Hardened steel		Copper	Graphite	Cast iron ~FCD500	Aluminum	Stainless steel
			SKD61~HRC55	SKD11 HRC55~					
◎	◎	○							

◎: Excellent ○: Good

TX224

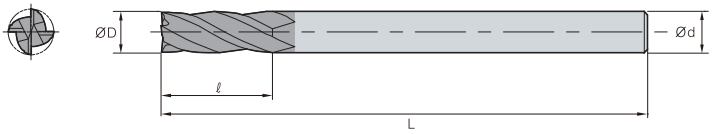
4 Flutes long flat endmill

FINE GRAIN | 4 | 30° HELIX | TiAlN | DATA

p.459

• TOLERANCE

ØD		Ød
Ø1 ~ Ø3	-0.014 ~ -0.028mm	h6
Ø4 ~ Ø6	-0.02 ~ -0.038mm	
Ø7 ~ Ø10	-0.025 ~ -0.047mm	
Ø12 ~ Ø18	-0.032 ~ -0.059mm	
Ø20 ~	-0.04 ~ -0.073mm	



(mm)

Designation	ØD	Ød	ℓ	L
TX224 030	3	3	20	60
TX224 040	4	4	20	60
TX224 050	5	5	25	75
TX224 060	6	6	30	75
TX224 080	8	8	30	75
TX224 081	8	8	30	100
TX224 100	10	10	40	100
TX224 120	12	12	45	100
TX224 140	14	14	45	100
TX224 160	16	16	45	100
TX224 180	18	18	45	100
TX224 200	20	20	45	100

※ The above specifications are subject to change without prior notice for product quality improvement.

• Applicable Workpiece

Carbon steel ~ HB225	Alloy steel HB225~325	Pre-hardened steel HRC30~50	Hardened steel		Copper	Graphite	Cast iron ~FCD500	Aluminum	Stainless steel
			SKD61~HRC55	SKD11 HRC55~					
◎	◎	○							

◎: Excellent ○: Good

G-Star Endmill

TX302

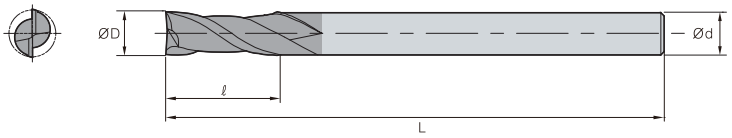
2 Flutes flat endmill

FINE GRAIN | 2 | 30° HELIX | TiAlN | DATA

p.458

• TOLERANCE

ØD		Ød
Ø1 ~ Ø3	-0.014 ~ -0.028mm	h6
Ø4 ~ Ø6	-0.02 ~ -0.038mm	
Ø7 ~ Ø10	-0.025 ~ -0.047mm	
Ø12 ~ Ø18	-0.032 ~ -0.059mm	
Ø20 ~	-0.04 ~ -0.073mm	



(mm)

Designation	ØD	Ød	ℓ	L
TX302 010	1	4	3	50
TX302 015	1.5	4	4	50
TX302 020	2	4	6	50
TX302 025	2.5	4	8	50
TX302 030	3	4	9	50
TX302 040	4	4	11	50
TX302 050	5	6	13	50
TX302 060	6	6	16	50
TX302 070	7	8	16	60
TX302 080	8	8	19	60
TX302 090	9	10	19	60
TX302 100	10	10	25	75
TX302 120	12	12	30	75
TX302 140	14	14	32	75
TX302 160	16	16	32	100
TX302 180	18	18	32	100
TX302 200	20	20	38	100

※ The above specifications are subject to change without prior notice for product quality improvement.

• Applicable Workpiece

Carbon steel ~ HB225	Alloy steel HB225~325	Pre-hardened steel HRC30~50	Hardened steel		Copper	Graphite	Cast iron ~FCD500	Aluminum	Stainless steel
			SKD61~HRC55	SKD11 HRC55~					
◎	◎	○							

◎: Excellent ○: Good

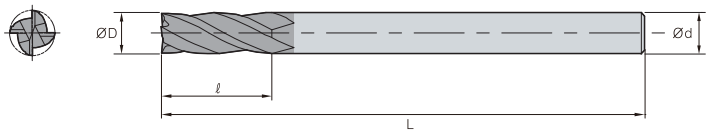
TX304

4 Flutes flat endmill

FINE GRAIN | 4 | 30° HELIX | TiAlN | DATA p.459

• TOLERANCE

ØD		Ød
Ø1 ~ Ø3	-0.014 ~ -0.028mm	h6
Ø4 ~ Ø6	-0.02 ~ -0.038mm	
Ø7 ~ Ø10	-0.025 ~ -0.047mm	
Ø12 ~ Ø18	-0.032 ~ -0.059mm	
Ø20 ~	-0.04 ~ -0.073mm	



(mm)

Designation	ØD	Ød	ℓ	L
TX304 010	1	4	3	50
TX304 015	1.5	4	4	50
TX304 020	2	4	6	50
TX304 025	2.5	4	8	50
TX304 030	3	4	9	50
TX304 040	4	4	11	50
TX304 050	5	6	13	50
TX304 060	6	6	16	50
TX304 070	7	8	16	60
TX304 080	8	8	19	60
TX304 090	9	10	19	60
TX304 100	10	10	25	75
TX304 120	12	12	30	75
TX304 140	14	14	32	75
TX304 160	16	16	32	100
TX304 180	18	18	32	100
TX304 200	20	20	38	100

※ The above specifications are subject to change without prior notice for product quality improvement.

• Applicable Workpiece

Carbon steel ~ HB225	Alloy steel HB225~325	Pre-hardened steel HRC30~50	Hardened steel		Copper	Graphite	Cast iron ~FCD500	Aluminum	Stainless steel
			SKD61~HRC55	SKD11 HRC55~					
◎	◎	○							

◎: Excellent ○: Good

G-Star Endmill

TX304H

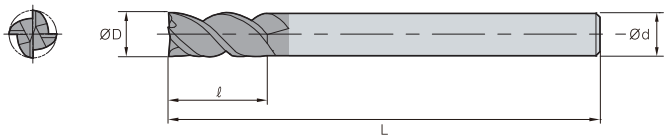
4 Flutes 45° helix flat endmill

FINE GRAIN | 4 | 45° HELIX | TiAlN | DATA

p.460

• TOLERANCE

ØD		Ød
Ø1 ~ Ø3	-0.014 ~ -0.028mm	h6
Ø4 ~ Ø6	-0.02 ~ -0.038mm	
Ø7 ~ Ø10	-0.025 ~ -0.047mm	
Ø12 ~ Ø18	-0.032 ~ -0.059mm	
Ø20 ~	-0.04 ~ -0.073mm	



(mm)

Designation	ØD	Ød	ℓ	L
TX304H 030	3	6	8	50
TX304H 030 S3	3	3	8	50
TX304H 030 S4	3	4	8	50
TX304H 040	4	6	11	50
TX304H 040 S4	4	4	11	50
TX304H 050	5	6	13	50
TX304H 060	6	6	13	50
TX304H 080	8	8	19	60
TX304H 100	10	10	22	70
TX304H 120	12	12	26	75
TX304H 130	13	12	26	80
TX304H 140	14	14	26	80
TX304H 160	16	16	32	90
TX304H 180	18	18	32	100
TX304H 200	20	20	38	100

※ The above specifications are subject to change without prior notice for product quality improvement.

• **Applicable Workpiece**

Carbon steel ~ HB225	Alloy steel HB225~325	Pre-hardened steel HRC30~50	Hardened steel		Copper	Graphite	Cast iron ~FCD500	Aluminum	Stainless steel
			SKD61~HRC55	SKD11 HRC55~					
◎	◎	○							

◎: Excellent ○: Good

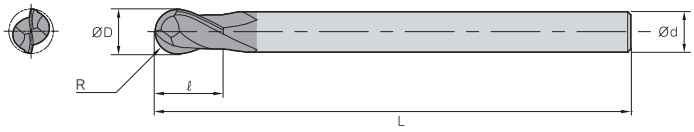
TXB202

2 Flutes short shank ball nose endmill

FINE GRAIN | 2 | 30° HELIX | R ±0.02 All sizes | TiAlN | DATA p.460

• TOLERANCE

ØD		Ød
All sizes	0 ~ -0.04mm	h6



(mm)

Designation	R	ØD	Ød	ℓ	L
TXB202 010	0.5	1	3	3	39
TXB202 015	0.75	1.5	3	5	39
TXB202 020	1	2	3	7	39
TXB202 025	1.25	2.5	3	8	39
TXB202 030	1.5	3	3	10	39
TXB202 040	2	4	4	14	51
TXB202 050	2.5	5	5	16	51
TXB202 060	3	6	6	19	64
TXB202 080	4	8	8	21	64
TXB202 100	5	10	10	25	70
TXB202 120	6	12	12	25	76
TXB202 160	8	16	16	32	89
TXB202 200	10	20	20	38	100

※ The above specifications are subject to change without prior notice for product quality improvement.

• Applicable Workpiece

Carbon steel ~ HB225	Alloy steel HB225~325	Pre-hardened steel HRC30~50	Hardened steel		Copper	Graphite	Cast iron ~FCD500	Aluminum	Stainless steel
			SKD61~HRC55	SKD11 HRC55~					
◎	◎	○							

◎: Excellent ○: Good

G-Star Endmill

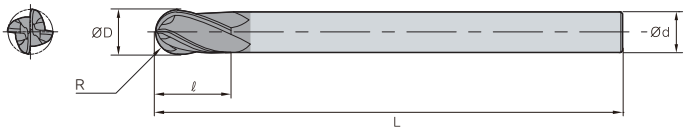
TXB204

4 Flutes short shank ball nose endmill

FINE GRAIN | 4 | 30° HELIX | R ±0.01 All sizes | TiAlN | DATA p.461

• TOLERANCE

ØD		Ød
All sizes	0 ~ -0.04mm	h6



(mm)

Designation	R	ØD	Ød	ℓ	L
TXB204 020	1	2	3	7	39
TXB204 030	1.5	3	3	10	39
TXB204 040	2	4	4	14	51
TXB204 050	2.5	5	5	16	51
TXB204 060	3	6	6	19	64
TXB204 080	4	8	8	21	64
TXB204 100	5	10	10	25	70
TXB204 120	6	12	12	25	76
TXB204 160	8	16	16	32	89
TXB204 200	10	20	20	38	100

※ The above specifications are subject to change without prior notice for product quality improvement.

• **Applicable Workpiece**

Carbon steel ~ HB225	Alloy steel HB225~325	Pre-hardened steel HRC30~50	Hardened steel		Copper	Graphite	Cast iron ~FCD500	Aluminum	Stainless steel
			SKD61~HRC55	SKD11 HRC55~					
◎	◎	○							

◎: Excellent ○: Good

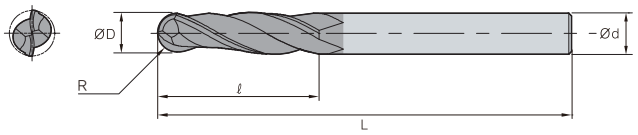
TXB222

2 Flutes long ball nose endmill

FINE GRAIN | 2 | 30° HELIX | R ±0.02 All sizes | TiAlN | DATA p.460

• TOLERANCE

ØD		Ød
All sizes	0 ~ -0.04mm	h6



(mm)

Designation	R	ØD	Ød	ℓ	L
TXB222 030	1.5	3	3	20	60
TXB222 040	2	4	4	20	60
TXB222 050	2.5	5	5	25	75
TXB222 060	3	6	6	30	75
TXB222 080	4	8	8	30	100
TXB222 100	5	10	10	40	100
TXB222 120	6	12	12	45	100
TXB222 140	7	14	14	45	100
TXB222 160	8	16	16	45	100
TXB222 180	9	18	18	45	100
TXB222 200	10	20	20	45	100

※ The above specifications are subject to change without prior notice for product quality improvement.

• Applicable Workpiece

Carbon steel ~ HB225	Alloy steel HB225~325	Pre-hardened steel HRC30~50	Hardened steel		Copper	Graphite	Cast iron ~FCD500	Aluminum	Stainless steel
			SKD61~HRC55	SKD11 HRC55~					
◎	◎	○							

◎: Excellent ○: Good

G-Star Endmill

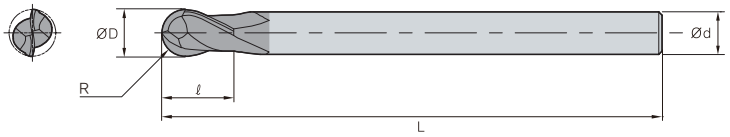
TXB232

2 Flutes long shank ball nose endmill

FINE GRAIN | 2 | 30° HELIX | R ±0.02 All sizes | TiAlN | DATA p.460

• TOLERANCE

ØD		Ød
All sizes	0 ~ -0.04mm	h6



(mm)

Designation	R	ØD	Ød	ℓ	L
TXB232 030	1.5	3	3	5	75
TXB232 040	2	4	4	8	75
TXB232 050	2.5	5	5	9	75
TXB232 060	3	6	6	10	100
TXB232 060-75	3	6	6	10	75
TXB232 080	4	8	8	12	100
TXB232 080-75	4	8	8	12	75
TXB232 100	5	10	10	14	100
TXB232 100L	5	10	10	14	150
TXB232 120	6	12	12	16	100
TXB232 120L	6	12	12	16	150
TXB232 140	7	14	14	18	100
TXB232 160	8	16	16	22	150
TXB232 200	10	20	20	26	150

※ The above specifications are subject to change without prior notice for product quality improvement.

• **Applicable Workpiece**

Carbon steel ~ HB225	Alloy steel HB225~325	Pre-hardened steel HRC30~50	Hardened steel		Copper	Graphite	Cast iron ~FCD500	Aluminum	Stainless steel
			SKD61~HRC55	SKD11 HRC55~					
◎	◎	○							

◎: Excellent ○: Good

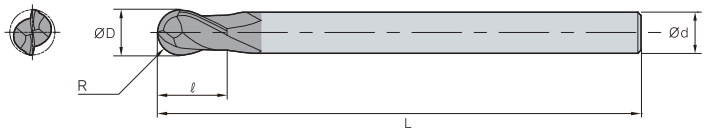
TXB302

2 Flutes ball nose endmill

FINE GRAIN | 2 | 30° HELIX | R ±0.02 All sizes | TiAlN | DATA p.460

• TOLERANCE

ØD		Ød
All sizes	0 ~ -0.04mm	h6



(mm)

Designation	R	ØD	Ød	ℓ	L
TXB302 010	0.5	1	4	2	50
TXB302 015	0.75	1.5	4	3	50
TXB302 020	1	2	4	4	50
TXB302 025	1.25	2.5	4	6	50
TXB302 030	1.5	3	4	6	50
TXB302 040	2	4	4	8	50
TXB302 050	2.5	5	6	10	50
TXB302 060	3	6	6	12	50
TXB302 080	4	8	8	14	60
TXB302 100	5	10	10	18	75
TXB302 120	6	12	12	22	75
TXB302 140	7	14	14	32	75
TXB302 160	8	16	16	32	100
TXB302 180	9	18	18	32	100
TXB302 200	10	20	20	38	100

※ The above specifications are subject to change without prior notice for product quality improvement.

• Applicable Workpiece

Carbon steel ~ HB225	Alloy steel HB225~325	Pre-hardened steel HRC30~50	Hardened steel		Copper	Graphite	Cast iron ~FCD500	Aluminum	Stainless steel
			SKD61~HRC55	SKD11 HRC55~					
◎	◎	○							

◎: Excellent ○: Good

G-Star Endmill

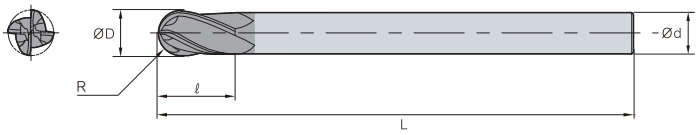
TXB304

4 Flutes ball nose endmill

FINE GRAIN | 4 | 30° HELIX | R ±0.02 All sizes | TiAlN | DATA p.461

• TOLERANCE

ØD		Ød
All sizes	0 ~ -0.04mm	h6



(mm)

Designation	R	ØD	Ød	ℓ	L
TXB304 010	0.5	1	4	2	50
TXB304 015	0.75	1.5	4	3	50
TXB304 020	1	2	4	4	50
TXB304 030	1.5	3	4	6	50
TXB304 040	2	4	4	8	50
TXB304 050	2.5	5	6	10	50
TXB304 060	3	6	6	12	50
TXB304 080	4	8	8	14	60
TXB304 100	5	10	10	18	75
TXB304 120	6	12	12	22	75
TXB304 140	7	14	14	32	75
TXB304 160	8	16	16	32	100
TXB304 180	9	18	18	32	100
TXB304 200	10	20	20	38	100

※ The above specifications are subject to change without prior notice for product quality improvement.

• **Applicable Workpiece**

Carbon steel ~ HB225	Alloy steel HB225~325	Pre-hardened steel HRC30~50	Hardened steel		Copper	Graphite	Cast iron ~FCD500	Aluminum	Stainless steel
			SKD61~HRC55	SKD11 HRC55~					
◎	◎	○							

◎: Excellent ○: Good

ZE302P

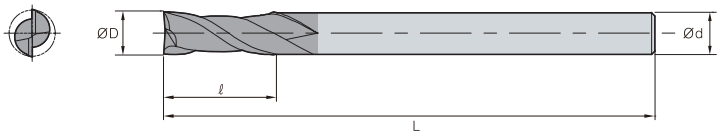
2 Flutes flat endmill

FINE GRAIN | 2 | 30° HELIX | TiAlN | DATA

p.462

• TOLERANCE

ØD		Ød
All sizes	0 ~ -0.02mm	h6



(mm)

Designation	ØD	Ød	ℓ	L
ZE302 010P	1	6	2.5	50
ZE302 015P	1.5	6	4	50
ZE302 020P	2	6	6	50
ZE302 025P	2.5	6	8	50
ZE302 030P	3	6	10	50
ZE302 035P	3.5	6	10	50
ZE302 040P	4	6	12	50
ZE302 045P	4.5	6	14	50
ZE302 050P	5	6	15	60
ZE302 055P	5.5	6	15	60
ZE302 060P	6	6	15	60
ZE302 065P	6.5	8	18	60
ZE302 070P	7	8	20	65
ZE302 075P	7.5	8	20	65
ZE302 080P	8	8	20	65
ZE302 085P	8.5	10	22	70
ZE302 090P	9	10	22	70
ZE302 095P	9.5	10	24	70
ZE302 100P	10	10	25	70
ZE302 105P	10.5	12	26	80
ZE302 110P	11	12	30	80
ZE302 115P	11.5	12	30	80
ZE302 120P	12	12	30	80
ZE302 130P	13	12	35	90
ZE302 140P	14	14	35	100
ZE302 150P	15	16	40	100
ZE302 160P	16	16	40	100
ZE302 180P	18	18	45	100
ZE302 200P	20	20	45	100

※ The above specifications are subject to change without prior notice for product quality improvement.

• Applicable Workpiece

Carbon steel ~ HB225	Alloy steel HB225~325	Pre-hardened steel HRC30~50	Hardened steel		Copper	Graphite	Cast iron ~FCD500	Aluminum	Stainless steel
			SKD61~HRC55	SKD11 HRC55~					
◎	◎	○							

◎: Excellent ○: Good

G-Star Endmill

ZE304P

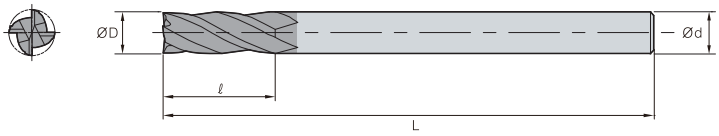
4 Flutes flat endmill

FINE GRAIN | 4 | 30° HELIX | TiAlN | DATA

p.463

• TOLERANCE

ØD		Ød
All sizes	0 ~ -0.02mm	h6



(mm)

Designation	ØD	Ød	ℓ	L
ZE304 010P	1	6	2.5	50
ZE304 015P	1.5	6	4	50
ZE304 020P	2	6	6	50
ZE304 025P	2.5	6	8	50
ZE304 030P	3	6	10	50
ZE304 035P	3.5	6	10	50
ZE304 040P	4	6	12	50
ZE304 045P	4.5	6	14	50
ZE304 050P	5	6	15	60
ZE304 055P	5.5	6	15	60
ZE304 060P	6	6	15	60
ZE304 065P	6.5	8	18	60
ZE304 070P	7	8	20	65
ZE304 075P	7.5	8	20	65
ZE304 080P	8	8	20	65
ZE304 085P	8.5	10	22	70
ZE304 090P	9	10	22	70
ZE304 095P	9.5	10	24	70
ZE304 100P	10	10	25	70
ZE304 105P	10.5	12	26	80
ZE304 110P	11	12	30	80
ZE304 115P	11.5	12	30	80
ZE304 120P	12	12	30	80
ZE304 130P	13	12	35	90
ZE304 140P	14	14	35	100
ZE304 150P	15	16	40	100
ZE304 160P	16	16	40	100
ZE304 180P	18	18	45	100
ZE304 200P	20	20	45	100

※ The above specifications are subject to change without prior notice for product quality improvement.

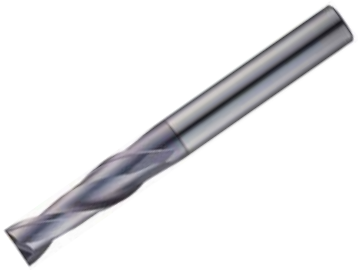
• Applicable Workpiece

Carbon steel ~ HB225	Alloy steel HB225~325	Pre-hardened steel HRC30~50	Hardened steel		Copper	Graphite	Cast iron ~FCD500	Aluminum	Stainless steel
			SKD61~HRC55	SKD11 HRC55~					
◎	◎	○							

◎: Excellent ○: Good

ZE322

2 Flutes extra long flat endmill

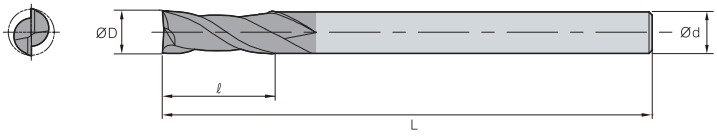


FINE GRAIN | 2 | 30° HELIX | TiAlN | DATA

p.462

• TOLERANCE

ØD		Ød
All sizes	0 ~ -0.03mm	h6



(mm)

Designation	ØD	Ød	ℓ	L
ZE322 030	3	6	15	60
ZE322 031	3	6	20	70
ZE322 030S	3	3	20	100
ZE322 040	4	6	15	60
ZE322 041	4	6	20	70
ZE322 040S	4	4	20	100
ZE322 050	5	6	20	60
ZE322 051	5	6	20	80
ZE322 052	5	6	25	100
ZE322 060	6	6	20	80
ZE322 061	6	6	30	100
ZE322 062	6	6	40	150
ZE322 080	8	8	30	90
ZE322 081	8	8	35	100
ZE322 082	8	8	40	150
ZE322 100	10	10	30	90

Designation	ØD	Ød	ℓ	L
ZE322 101	10	10	35	100
ZE322 102	10	10	45	150
ZE322 103	10	10	55	180
ZE322 120	12	12	30	90
ZE322 121	12	12	40	110
ZE322 122	12	12	50	150
ZE322 123	12	12	60	200
ZE322 140	14	14	40	120
ZE322 141	14	14	60	150
ZE322 160	16	16	50	140
ZE322 161	16	16	70	160
ZE322 162	16	16	80	200
ZE322 180	18	18	50	140
ZE322 200	20	20	60	150
ZE322 201	20	20	100	200
ZE322 202	20	20	130	250

※ The above specifications are subject to change without prior notice for product quality improvement.

• Applicable Workpiece

Carbon steel ~ HB225	Alloy steel HB225~325	Pre-hardened steel HRC30~50	Hardened steel		Copper	Graphite	Cast iron ~FCD500	Aluminum	Stainless steel
			SKD61~HRC55	SKD11 HRC55~					
◎	◎	○							

◎: Excellent ○: Good

G-Star Endmill

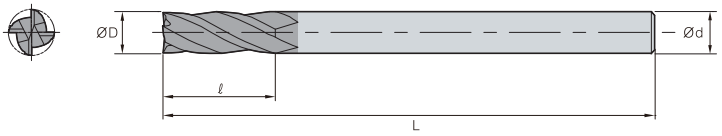
ZE324

4 Flutes extra long flat endmill

FINE GRAIN | 4 | 30° HELIX | TiAlN | DATA p.463

• TOLERANCE

ØD		Ød
All sizes	0 ~ -0.03mm	h6



(mm)

Designation	ØD	Ød	ℓ	L
ZE324 030	3	6	15	60
ZE324 031	3	6	20	70
ZE324 030S	3	3	20	100
ZE324 040	4	6	15	60
ZE324 041	4	6	20	70
ZE324 040S	4	4	20	100
ZE324 050	5	6	20	60
ZE324 051	5	6	20	80
ZE324 052	5	6	25	100
ZE324 060	6	6	20	80
ZE324 061	6	6	30	100
ZE324 062	6	6	40	150
ZE324 080	8	8	30	90
ZE324 081	8	8	35	100
ZE324 082	8	8	40	150
ZE324 100	10	10	30	90

Designation	ØD	Ød	ℓ	L
ZE324 101	10	10	35	100
ZE324 102	10	10	45	150
ZE324 103	10	10	55	180
ZE324 120	12	12	30	90
ZE324 121	12	12	40	110
ZE324 122	12	12	50	150
ZE324 123	12	12	60	200
ZE324 140	14	14	40	120
ZE324 141	14	14	60	150
ZE324 160	16	16	50	140
ZE324 161	16	16	70	160
ZE324 162	16	16	80	200
ZE324 180	18	18	50	140
ZE324 200	20	20	60	150
ZE324201	20	20	100	200
ZE324202	20	20	130	250

※ The above specifications are subject to change without prior notice for product quality improvement.

• Applicable Workpiece

Carbon steel ~ HB225	Alloy steel HB225~325	Pre-hardened steel HRC30~50	Hardened steel		Copper	Graphite	Cast iron ~FCD500	Aluminum	Stainless steel
			SKD61~HRC55	SKD11 HRC55~					
◎	◎	○							

◎: Excellent ○: Good

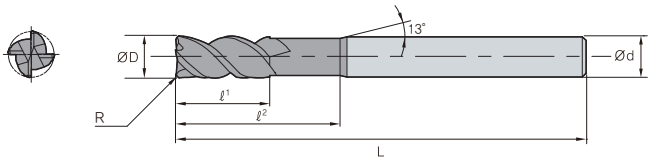
ZR304H

4 Flutes 45° helix radius endmill

FINE GRAIN | 4 | 45° HELIX | R ±0.02 All sizes | TiAlN | DATA p.461

• TOLERANCE

ØD		Ød
All sizes	0 ~ -0.03mm	h6



(mm)

Designation	R	ØD	Ød	ℓ1	ℓ2	L
ZR304H 0303	0.3	3	6	4	12	55
ZR304H 0302S3	0.2	3	3	4	12	55
ZR304H 0303S4	0.3	3	4	4	12	55
ZR304H 0305	0.5	3	6	4	12	55
ZR304H 0305S3	0.5	3	3	4	12	55
ZR304H 0305S4	0.5	3	4	4	12	55
ZR304H 0402S4	0.2	4	4	5	16	55
ZR304H 0403	0.3	4	6	5	16	55
ZR304H 0403S4	0.3	4	4	5	16	55
ZR304H 0405	0.5	4	6	5	16	55
ZR304H 0405S4	0.5	4	4	5	16	55
ZR304H 0605	0.5	6	6	7	20	60
ZR304H 0610	1	6	6	7	20	60
ZR304H 0805	0.5	8	8	10	25	65
ZR304H 0810	1	8	8	10	25	65
ZR304H 1005	0.5	10	10	12	30	70
ZR304H 1010	1	10	10	12	30	70
ZR304H 1015	1.5	10	10	12	30	70
ZR304H 1020	2	10	10	12	30	70
ZR304H 1205	0.5	12	12	15	30	80
ZR304H 1210	1	12	12	15	30	80
ZR304H 1215	1.5	12	12	15	30	80
ZR304H 1220	2	12	12	15	30	80

※ The above specifications are subject to change without prior notice for product quality improvement.

• Applicable Workpiece

Carbon steel ~ HB225	Alloy steel HB225~325	Pre-hardened steel HRC30~50	Hardened steel		Copper	Graphite	Cast iron ~FCD500	Aluminum	Stainless steel
			SKD61~HRC55	SKD11 HRC55~					
◎	◎	○							

◎: Excellent ○: Good

G-Star Endmill

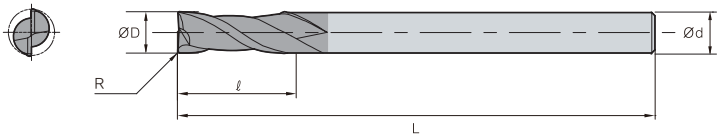
ZR322

2 Flutes long shank radius endmill

FINE GRAIN | 2 | 30° HELIX | R ±0.02 All sizes | TiAlN | DATA p.464

• TOLERANCE

ØD		Ød
All sizes	0 ~ -0.03mm	h6



(mm)

Designation	R	ØD	Ød	ℓ	L
ZR322 0302S4	0.2	3	4	8	60
ZR322 0302	0.2	3	6	8	60
ZR322 0303	0.3	3	6	8	60
ZR322 0305S4	0.5	3	4	8	60
ZR322 0305	0.5	3	6	8	60
ZR322 0402S4	0.2	4	4	11	70
ZR322 0402	0.2	4	6	11	70
ZR322 0403	0.3	4	6	11	70
ZR322 0405S4	0.5	4	4	11	70
ZR322 0405	0.5	4	6	11	70
ZR322 0410S4	1	4	4	11	70
ZR322 0410	1	4	6	11	70
ZR322 0502	0.2	5	6	13	80
ZR322 0503	0.3	5	6	13	80
ZR322 0505	0.5	5	6	13	80
ZR322 0510	1	5	6	13	80
ZR322 0602	0.2	6	6	13	90
ZR322 0603	0.3	6	6	13	90
ZR322 0605	0.5	6	6	13	90

Designation	R	ØD	Ød	ℓ	L
ZR322 0610	1	6	6	13	90
ZR322 0803	0.3	8	8	19	100
ZR322 0805	0.5	8	8	19	100
ZR322 0810	1	8	8	19	100
ZR322 0815	1.5	8	8	19	100
ZR322 0820	2	8	8	19	100
ZR322 1003	0.3	10	10	22	100
ZR322 1005	0.5	10	10	22	100
ZR322 1010	1	10	10	22	100
ZR322 1015	1.5	10	10	22	100
ZR322 1020	2	10	10	22	100
ZR322 1025	2.5	10	10	22	100
ZR322 1205	0.5	12	12	26	110
ZR322 1210	1	12	12	26	110
ZR322 1215	1.5	12	12	26	110
ZR322 1220	2	12	12	26	110
ZR322 1225	2.5	12	12	26	110
ZR322 1230	3	12	12	26	110

※ The above specifications are subject to change without prior notice for product quality improvement.

• **Applicable Workpiece**

Carbon steel ~ HB225	Alloy steel HB225~325	Pre-hardened steel HRC30~50	Hardened steel		Copper	Graphite	Cast iron ~FCD500	Aluminum	Stainless steel
			SKD61~HRC55	SKD11 HRC55~					
◎	◎	○							

◎: Excellent ○: Good

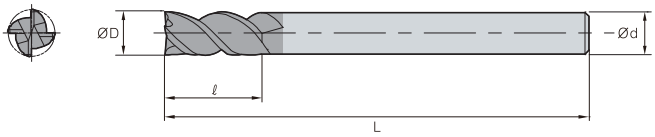
ZR324

4 Flutes long shank radius endmill

FINE GRAIN | 4 | 30° HELIX | R ±0.02 (All sizes) | TiAlN | DATA p.464

• TOLERANCE

ØD		Ød
All sizes	0 ~ -0.03mm	h6



(mm)

Designation	R	ØD	Ød	ℓ	L
ZR324 0302S4	0.2	3	4	8	60
ZR324 0302	0.2	3	6	8	60
ZR324 0303	0.3	3	6	8	60
ZR324 0305S4	0.5	3	4	8	60
ZR324 0305	0.5	3	6	8	60
ZR324 0402S4	0.2	4	4	11	70
ZR324 0402	0.2	4	6	11	70
ZR324 0403	0.3	4	6	11	70
ZR324 0405S4	0.5	4	4	11	70
ZR324 0405	0.5	4	6	11	70
ZR324 0410S4	1	4	4	11	70
ZR324 0410	1	4	6	11	70
ZR324 0502	0.2	5	6	13	80
ZR324 0503	0.3	5	6	13	80
ZR324 0505	0.5	5	6	13	80
ZR324 0510	1	5	6	13	80
ZR324 0602	0.2	6	6	13	90
ZR324 0603	0.3	6	6	13	90
ZR324 0605	0.5	6	6	13	90

Designation	R	ØD	Ød	ℓ	L
ZR324 0610	1	6	6	13	90
ZR324 0803	0.3	8	8	19	100
ZR324 0805	0.5	8	8	19	100
ZR324 0810	1	8	8	19	100
ZR324 0815	1.5	8	8	19	100
ZR324 0820	2	8	8	19	100
ZR324 1003	0.3	10	10	22	100
ZR324 1005	0.5	10	10	22	100
ZR324 1010	1	10	10	22	100
ZR324 1015	1.5	10	10	22	100
ZR324 1020	2	10	10	22	100
ZR324 1025	2.5	10	10	22	100
ZR324 1205	0.5	12	12	26	110
ZR324 1210	1	12	12	26	110
ZR324 1215	1.5	12	12	26	110
ZR324 1220	2	12	12	26	110
ZR324 1225	2.5	12	12	26	110
ZR324 1230	3	12	12	26	110

※ The above specifications are subject to change without prior notice for product quality improvement.

• Applicable Workpiece

Carbon steel ~ HB225	Alloy steel HB225~325	Pre-hardened steel HRC30~50	Hardened steel		Copper	Graphite	Cast iron ~FCD500	Aluminum	Stainless steel
			SKD61~HRC55	SKD11 HRC55~					
◎	◎	○							

◎: Excellent ○: Good

G-Star Endmill

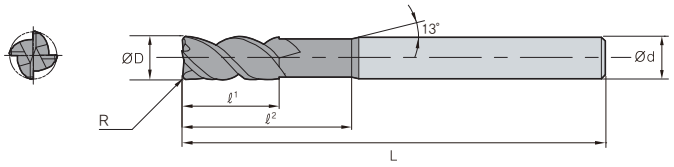
ZR324H

4 Flutes 45° helix radius endmill

FINE GRAIN | 4 | 45° HELIX | R ±0.02 All sizes | TiAlN | DATA p.461

• TOLERANCE

ØD		Ød
All sizes	0 ~ -0.03mm	h6



(mm)

Designation	R	ØD	Ød	ℓ1	ℓ2	L
ZR324H 0605	0.5	6	6	9	20	90
ZR324H 0610	1	6	6	9	20	90
ZR324H 0805	0.5	8	8	12	25	100
ZR324H 0810	1	8	8	12	25	100
ZR324H 1005	0.5	10	10	15	32	100
ZR324H 1010	1	10	10	15	32	100
ZR324H 1015	1.5	10	10	15	32	100
ZR324H 1020	2	10	10	15	32	100
ZR324H 1205	0.5	12	12	18	38	110
ZR324H 1210	1	12	12	18	38	110
ZR324H 1215	1.5	12	12	18	38	110
ZR324H 1220	2	12	12	18	38	110

※ The above specifications are subject to change without prior notice for product quality improvement.

• **Applicable Workpiece**

Carbon steel ~ HB225	Alloy steel HB225~325	Pre-hardened steel HRC30~50	Hardened steel		Copper	Graphite	Cast iron ~FCD500	Aluminum	Stainless steel
			SKD61~HRC55	SKD11 HRC55~					
◎	◎	○							

◎: Excellent ○: Good

High efficient roughing endmill

R+ Endmill

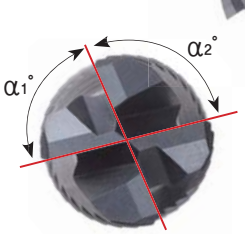
- Cost-effective cutting-edge design for rough machining
- Specifically designed corners as irregular flute spacing and lead angle

Features

- Excellent machining efficiency - Special design for medium to rough cutting
- Longer cutting life - Extended tool cost thanks to newly applied grades
- Higher cutting performance - Blade design ideal for roughing

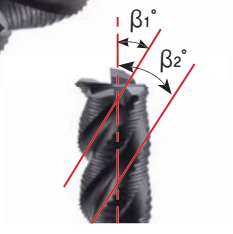
• **Lower cutting**
- Ideal for medium to rough cutting
- Special edge design

• **Soft cutting**
- Serrated cutting edges
- 3 Combo R



$(\alpha_1^\circ \neq \alpha_2^\circ)$

• Irregular flute spacing to prevent chattering



$(\beta_1^\circ \neq \beta_2^\circ)$

• Irregular lead angles to disperse cutting force

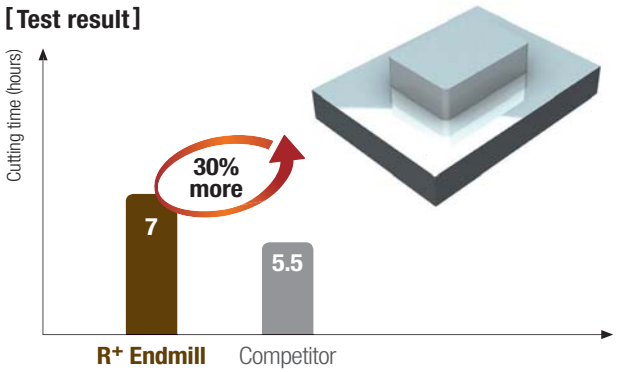
Grade system

Carbide roughing		HSS roughing	
FN30T	Carbide, uncoated	HN30T	HSS PM, uncoated
PC10T	Carbide, TiCN coated	HN20T	HSS, uncoated
PC20T	Carbide, TiN coated	HC10T	HSS, TiCN coated
PC30T	Carbide, TiAlN coated	HC20T	HSS, TiN coated
PC40T	Carbide, TiAlCrN coated	HC30T	HSS PM, TiAlN coated

Application examples

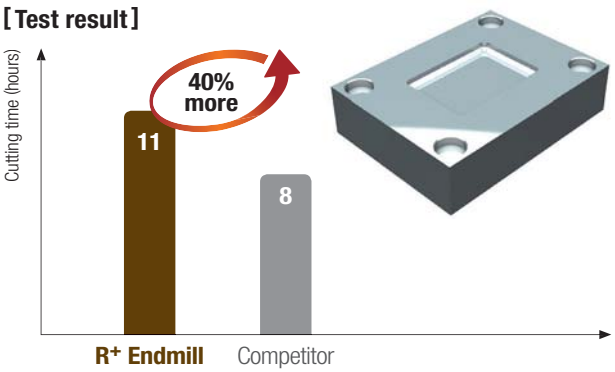
Workpiece	Mold
Cutting conditions	vc (m/min) = 57, fz (mm/t) = 0.03
	ap (mm) = 8, dry
Tools	RPE4080-075-FF

[Test result]



Workpiece	Mold
Cutting conditions	vc (m/min) = 68, fz (mm/t) = 0.06
	ap (mm) = 8, dry
Tools	RPE4080-063-FP-H

[Test result]



R+ Endmill

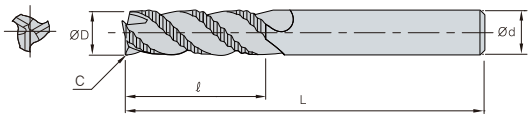
RPAE

Wave roughing endmill for Al

3 | 45° HELIX | Substrate FN30T | DATA p.465

• TOLERANCE

ØD		Ød
Ø6 ~ Ø25	0 ~ -0.05mm	h6



• Carbide

(mm)

Designation	ØD	Ød	ℓ	L	C
RPAE 3060-063	6	6	18	63	0.3
RPAE 3070-063	7	8	23	63	0.3
RPAE 3080-063	8	8	23	63	0.3
RPAE 3090-080	9	10	30	80	0.3
RPAE 3100-080	10	10	30	80	0.3
RPAE 3110-080	11	12	32	80	0.5
RPAE 3120-080	12	12	32	80	0.5
RPAE 3140-080	14	14	32	80	0.5
RPAE 3160-105	16	16	48	105	0.5
RPAE 3180-105	18	18	48	105	0.5
RPAE 3200-105	20	20	50	105	0.5
RPAE 3250-105	25	25	50	105	0.5

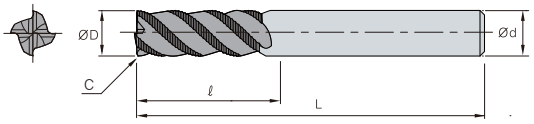
RPE-FP-H

Fine pitch standard type roughing endmill

4 | 40°/42° HELIX | Substrate PC30T | DATA p.465

• TOLERANCE

ØD		Ød
Ø5 ~ Ø20	0 ~ -0.05mm	h6



• Carbide, High helix angle, irregular flute spacing and lead

(mm)

Designation	ØD	Ød	ℓ	L	C
RPE 4050-057-FP-H	5	6	13	57	0.3
RPE 4060-057-FP-H	6	6	13	57	0.5
RPE 4080-063-FP-H	8	8	19	63	0.5
RPE 4100-072-FP-H	10	10	22	72	0.5
RPE 4120-082-FP-H	12	12	26	82	0.5
RPE 4140-082-FP-H	14	16	26	82	0.6
RPE 4160-092-FP-H	16	16	32	92	0.6
RPE 4180-092-FP-H	18	20	32	92	0.6
RPE 4200-0104-FP-H	20	20	38	104	0.6

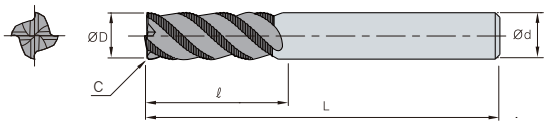
RPLE-FP-H

Fine pitch long type roughing endmill

4 | 40°/42° HELIX | Substrate PC30T | DATA p.465

• TOLERANCE

ØD		Ød
Ø5 ~ Ø20	0 ~ -0.05mm	h6



• Carbide, High helix angle, irregular flute spacing and lead

(mm)

Designation	ØD	Ød	ℓ	L	C
RPLE 4050-063-FP-H	5	6	19	63	0.3
RPLE 4060-063-FP-H	6	8	19	63	0.5
RPLE 4080-072-FP-H	8	8	28	72	0.5
RPLE 4100-082-FP-H	10	10	34	82	0.5
RPLE 4120-097-FP-H	12	12	40	97	0.5
RPLE 4140-097-FP-H	14	16	40	97	0.6
RPLE 4160-108-FP-H	16	16	48	108	0.6
RPLE 4180-108-FP-H	18	20	48	108	0.6
RPLE 4200-122-FP-H	20	20	56	122	0.6

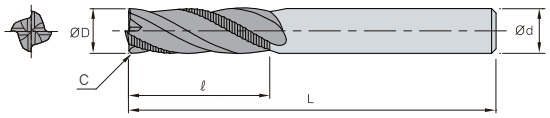
RPE-XG

Endmill for finishing and roughing

4 | 30° HELIX | Substrate PC30T | DATA p.466

• TOLERANCE

ØD		Ød
Ø6 ~ Ø20	0 ~ -0.05mm	h6



• Carbide

(mm)

Designation	ØD	Ød	ℓ	L	C
RPE 4060-052-XG	6	6	14	52	0.25
RPE 4070-063-XG	7	8	18	63	0.3
RPE 4080-063-XG	8	8	18	63	0.3
RPE 4090-080-XG	9	10	22	80	0.3
RPE 4100-080-XG	10	10	22	80	0.3
RPE 4110-080-XG	11	12	26	80	0.4
RPE 4120-080-XG	12	12	26	80	0.4
RPE 4140-080-XG	14	14	30	80	0.4
RPE 4160-105-XG	16	16	34	105	0.6
RPE 4180-105-XG	18	18	38	105	0.6
RPE 4200-105-XG	20	20	42	105	0.6

R+ Endmill

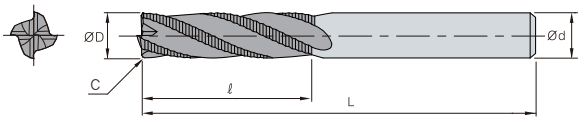
RPE-FP-L

Roughing endmill for fine pitches

4 | 18°/23° HELIX | Substrate PC30T | DATA p.466

• TOLERANCE

ØD		Ød
Ø5 ~ Ø20	0 ~ -0.05mm	h6



• Carbide, irregular flute spacing and lead

(mm)

Designation	ØD	Ød	ℓ	L	C
RPE 4050-060-FP-L	5	6	13	60	0.3
RPE 4060-080-FP-L	6	8	13	80	0.5
RPE 4080-080-FP-L	8	8	19	80	0.5
RPE 4100-080-FP-L	10	10	22	80	0.5
RPE 4120-080-FP-L	12	12	26	80	0.5
RPE 4140-085-FP-L	14	16	26	85	0.6
RPE 4160-100-FP-L	16	16	32	100	0.6
RPE 4180-100-FP-L	18	20	32	100	0.6
RPE 4200-105-FP-L	20	20	38	105	0.6

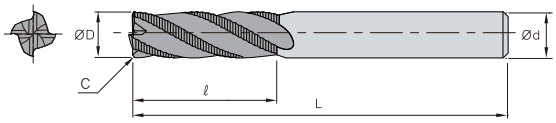
RPE-RG

Standard roughing endmill

4 | 30° HELIX | Substrate PC40T | DATA p.467

• TOLERANCE

ØD		Ød
Ø5 ~ Ø20	0 ~ -0.05mm	h6



• Carbide

(mm)

Designation	ØD	Ød	ℓ	L	C
RPE 4050-050-RG	5	6	13	50	0.3
RPE 4060-050-RG	6	6	16	50	0.3
RPE 4080-060-RG	8	8	20	60	0.3
RPE 4100-075-RG	10	10	25	75	0.3
RPE 4120-080-RG	12	12	30	80	0.4
RPE 4140-100-RG	14	16	35	100	0.6
RPE 4160-100-RG	16	16	40	100	0.6
RPE 4180-110-RG	18	20	40	110	0.6
RPE 4200-110-RG	20	20	45	110	0.6

RPE-RG

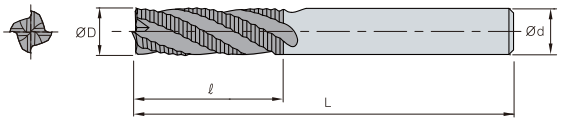
4F Roughing endmill

4 | 30° HELIX | HSS PM | Substrate HN30T HC30T | DATA

p.467

• TOLERANCE

ØD		Ød
Ø6 ~ Ø20	±0.1mm	h6



• HSS PM

(mm)

Designation	ØD	Ød	ℓ	L
RPE 4060-060-RG	6	6	20	60
RPE 4070-070-RG	7	10	20	70
RPE 4080-075-RG	8	10	25	75
RPE 4090-075-RG	9	10	30	75
RPE 4100-085-RG	10	10	35	85
RPE 4120-100-RG	12	12	40	100
RPE 4140-100-RG	14	16	40	100
RPE 4160-110-RG	16	16	50	110
RPE 4180-110-RG	18	20	50	110
RPE 4200-125-RG	20	20	60	125

RPE-FF

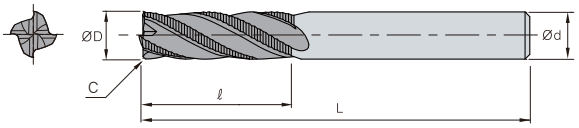
Roughing endmill for fine pitches

4 | 25°/30° HELIX | HSS PM | Substrate HC30T | DATA

p.467

• TOLERANCE

ØD		Ød
Ø6 ~ Ø20	±0.1mm	h6



• HSS PM, Irregular flute spacing

(mm)

Designation	ØD	Ød	ℓ	L	C
RPE 4060-060-FF	6	6	20	60	0.5
RPE 4070-070-FF	7	10	20	70	0.5
RPE 4080-075-FF	8	10	25	75	0.5
RPE 4090-075-FF	9	10	30	75	0.5
RPE 4100-085-FF	10	10	35	85	0.5
RPE 4120-100-FF	12	12	40	100	0.6
RPE 4140-100-FF	14	12	40	100	0.6
RPE 4160-110-FF	16	16	50	110	0.6
RPE 4180-110-FF	18	16	50	110	0.6
RPE 4200-125-FF	20	20	60	125	0.6

R+ Endmill

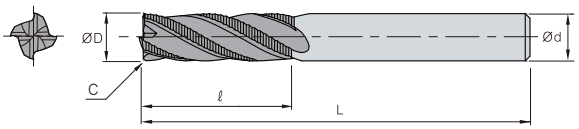
RPE-FP

Roughing endmill for fine pitches

4 | 25°/30° HELIX | HSS PM | Substrate HC30T | DATA p.467

• TOLERANCE

ØD		Ød
Ø6 ~ Ø12	0 ~ -0.05mm	h6
Ø12.1 ~ Ø20	0 ~ -0.1mm	



• HSS PM, irregular flute spacing and lead

(mm)

Designation	ØD	Ød	ℓ	L	C
RPE 4060-080-FP	6	6	13	80	0.5
RPE 4070-080-FP	7	10	16	80	0.5
RPE 4080-085-FP	8	10	19	85	0.5
RPE 4090-095-FP	9	10	19	95	0.5
RPE 4100-100-FP	10	10	22	100	0.5
RPE 4120-110-FP	12	12	26	110	0.6
RPE 4140-110-FP	14	12	26	110	0.6
RPE 4160-125-FP	16	16	32	125	0.6
RPE 4180-125-FP	18	16	32	125	0.6
RPE 4200-140-FP	20	20	38	140	0.6

RPE-RG

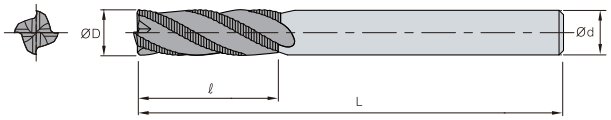
Roughing endmill

4 | 30° HELIX | HSS Co 8% | Substrate HN20T HC20T HC10T | DATA

p.468

• TOLERANCE

ØD		Ød
Ø6 ~ Ø50	±0.1mm	h6



• HSS

(mm)

Designation	ØD	Ød	ℓ	L
RPE 4060-060-RG	6	6	15	60
RPE 4070-065-RG	7	8	20	65
RPE 4080-065-RG	8	8	20	65
RPE 4090-075-RG	9	10	25	75
RPE 4100-075-RG	10	10	25	75
RPE 4110-080-RG	11	12	30	80
RPE 4120-080-RG	12	12	30	80
RPE 4130-090-RG	13	12	35	90
RPE 4140-090-RG	14	12	35	90
RPE 4150-095-RG	15	12	40	95
RPE 4160-095-RG	16	16	40	95
RPE 4170-095-RG	17	16	40	95
RPE 4180-105-RG	18	16	40	105
RPE 4190-110-RG	19	16	45	110
RPE 4200-110-RG	20	20	45	110
RPE 4210-110-RG	21	20	45	110
RPE 4220-110-RG	22	20	45	110
RPE 4230-110-RG	23	20	45	110
RPE 4240-120-RG	24	25	50	120
RPE 4250-120-RG	25	25	50	120
RPE 4260-120-RG	26	25	50	120
RPE 4270-125-RG	27	25	55	125
RPE 4280-125-RG	28	25	55	125
RPE 4300-125-RG	30	25	55	125
RPE 4320-145-RG	32	32	60	145
RPE 4340-145-RG	34	32	60	145
RPE 4350-145-RG	35	32	60	145
RPE 4360-145-RG	36	32	60	145
RPE 4380-150-RG	38	32	65	150
RPE 4400-150-RG	40	32	65	150
RPE 4420-155-RG	42	42	65	155
RPE 4440-155-RG	44	42	65	155
RPE 4450-160-RG	45	42	70	160
RPE 4460-160-RG	46	42	70	160
RPE 4500-160-RG	50	42	70	160

Endmill series for stainless steel machining

S-Star Endmill

- Strong cutting edge ensures long tool life
- Special coating with high oxidation resistance
- High rake angle and curvilinear chip pocket allow chip evacuation
- Special cutting edge prevents hardening of tools
- Optimal machinability in stainless steel machining
- Available for steel, alloy steel and hardening steel machining
- Available for multiple operations (Shouldering, slotting and ramping etc.)

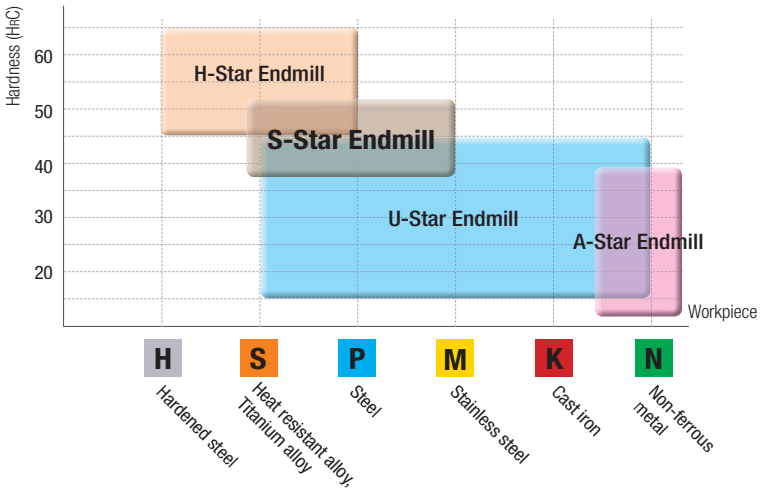
Stainless steel machining

- Low thermal conductivity of stainless steel alloy causes conducting heat to the tool and fracture and chipping
- Stainless steel alloy has high cutting resistance, and it easily causes wear on tools
- High temperature in stainless steel alloy machining lowers cutting conditions and decrease the quality of surface roughness

Trouble shooting for stainless steel

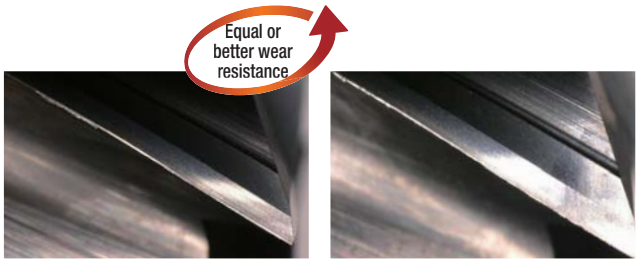
- Get low cutting conditions
- Get deeper ap than the work hardened layer and use tools with sharp cutting edge
- Use coolant

Application area



Performance evaluation (Wear resistance)

Workpiece	X5CrNiMo17-12-2
Cutting conditions	vc (m/min) = 50, fz (mm/t) = 0.06,
	ap (mm) = 10, ae (mm) = 1, wet (70 bar)
Tools	VXE504 080



S-Star Endmill | Competitor

EDP. NO	Appearance	Type	Range	Page
VXE504		4 Flutes variable helix flat endmill	Ø1.0 ~ 20.0	213
VXR504		4 Flutes variable helix radius endmill	Ø1.0 ~ 20.0	214

VXE504

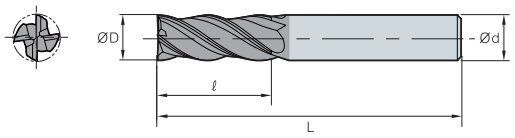
4 Flutes variable helix flat endmill

ULTRA FINE | 4 | 37° HELIX | 39° HELIX | AlCrN | DATA

p.469

• TOLERANCE

ØD		Ød
All sizes	0 ~ -0.03mm	h6



(mm)

Designation	ØD	Ød	ℓ	L
VXE504 010	1	6	2.5	50
VXE504 012	1.2	6	3	50
VXE504 015	1.5	6	4	50
VXE504 020	2	6	6	50
VXE504 025	2.5	6	7	50
VXE504 030	3	6	8	55
VXE504 030 10	3	6	10	60
VXE504 035	3.5	6	10	55
VXE504 040	4	6	10	55
VXE504 040 12	4	6	12	60
VXE504 045	4.5	6	12	55
VXE504 050	5	6	15	55
VXE504 055	5.5	6	15	60
VXE504 060	6	6	15	60
VXE504 060 20	6	6	20	65
VXE504 065	6.5	8	15	60
VXE504 070	7	8	20	80
VXE504 080	8	8	20	70
VXE504 080 25	8	8	25	70
VXE504 080 30	8	8	30	80
VXE504 085	8.5	10	20	70
VXE504 090	9	10	25	80
VXE504 100	10	10	25	75
VXE504 100 35	10	10	35	85
VXE504 120	12	12	30	80
VXE504 120 40	12	12	40	90
VXE504 140	14	16	35	90
VXE504 160	16	16	42	100
VXE504 180	18	16	45	100
VXE504 200	20	20	48	100

※ The above specifications are subject to change without prior notice for product quality improvement.

• Applicable Workpiece

Carbon steel ~ HB225	Alloy steel HB225~325	Pre-hardened steel HRC30~50	Hardened steel		Copper	Graphite	Cast iron ~FCD500	Aluminum	Stainless steel
			SKD61~HRC55	SKD11 HRC55~					
○	○	○			○				◎

○: GOOD ◎: EXCELLENT

S-Star Endmill

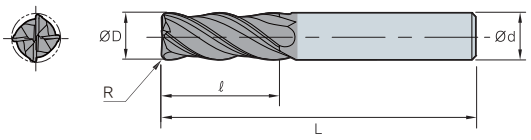
VXR504

4 Flutes variable helix radius endmill

ULTRA FINE | 4 | R ±0.01 (All sizes) | 37° HELIX | 39° HELIX | AlCrN | DATA p.469

• TOLERANCE

ØD		Ød
All sizes	0 ~ -0.03mm	h6



(mm)

Designation	R	ØD	Ød	ℓ	L
VXR504 010	0.1	1	6	2.5	50
VXR504 010 02	0.2	1	6	2.5	50
VXR504 012	0.1	1.2	6	3	50
VXR504 015	0.1	1.5	6	4	50
VXR504 015 02	0.2	1.5	6	4	50
VXR504 020	0.1	2	6	6	50
VXR504 020 02	0.2	2	6	6	50
VXR504 025	0.2	2.5	6	7	50
VXR504 030	0.2	3	6	8	55
VXR504 030 03	0.3	3	6	8	55
VXR504 030 05	0.5	3	6	8	55
VXR504 040	0.2	4	6	10	55
VXR504 040 03	0.3	4	6	10	55
VXR504 040 05	0.5	4	6	10	55
VXR504 050	0.2	5	6	15	55
VXR504 050 03	0.3	5	6	15	55
VXR504 050 05	0.5	5	6	15	55
VXR504 060	0.3	6	6	15	60
VXR504 060 05	0.5	6	6	15	60
VXR504 060 10	1	6	6	15	60
VXR504 080	0.3	8	8	20	70

Designation	R	ØD	Ød	ℓ	L
VXR504 080 05	0.5	8	8	20	70
VXR504 080 10	1	8	8	20	70
VXR504 100	0.3	10	10	25	75
VXR504 100 05	0.5	10	10	25	75
VXR504 100 10	1	10	10	25	75
VXR504 100 15	1.5	10	10	25	75
VXR504 100 20	2	10	10	25	75
VXR504 100 30	3	10	10	25	75
VXR504 120	0.5	12	12	30	80
VXR504 120 10	1	12	12	30	80
VXR504 120 15	1.5	12	12	30	80
VXR504 120 20	2	12	12	30	80
VXR504 120 30	3	12	12	30	80
VXR504 120 40	4	12	12	30	80
VXR504 140	0.5	14	16	35	90
VXR504 140 10	1	14	16	35	90
VXR504 160	0.5	16	16	42	100
VXR504 160 10	1	16	16	42	100
VXR504 180	0.5	18	16	45	100
VXR504 200	0.5	20	20	48	100
VXR504 200 10	1	20	20	48	100

※ The above specifications are subject to change without prior notice for product quality improvement.

• Applicable Workpiece

Carbon steel ~ HB225	Alloy steel HB225~325	Pre-hardened steel HRC30~50	Hardened steel		Copper	Graphite	Cast iron ~FCD500	Aluminum	Stainless steel
			SKD61~HRC55	SKD11 HRC55~					
○	○	○			○				◎

○: GOOD ◎: EXCELLENT

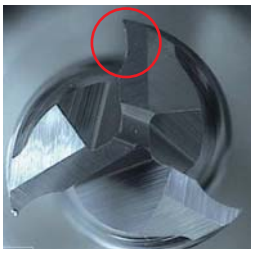
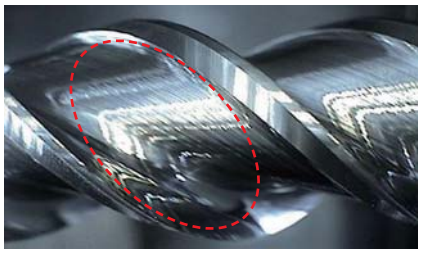
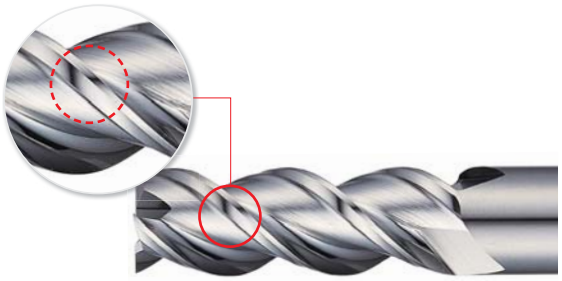
Endmill series for aluminum machining

A-Star Endmill

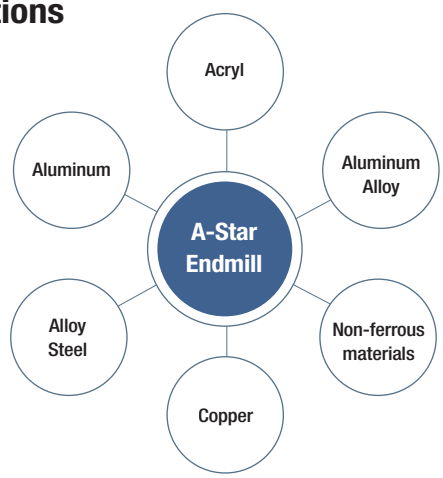
- Suitable for Aluminum, aluminum alloy and non-ferrous materials.
- Various specifications in the line such as Ball, single flute and roughing etc. for wide range in machining.

Features

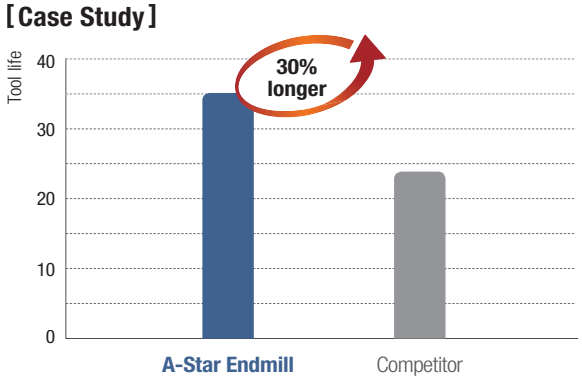
- Sharp cutting edge considered the characteristics of workpiece
- High deposition resistance and enhanced chip emission through the surface of a mirror in the groove.

Applications



[Case Study]



Code system

WA	R	3	0	3	-	14	-	10
Type	Appearance	Grade	Length, Shank type	No. of flutes		Cutting dia.		Corner radius
A-Star Endmill	B: Ball E: Square R: Radius F: Roughing	3: NON Coating 5: D.L.C Coating	0: Stub Length 1: Regula Length 2: Long Length	1: 1 Flutes 2: 2 Flutes 3: 3 Flutes		0.2 ~ 25		0.05 ~ 5

A-Star Endmill

EDP. NO	Appearance	Type	Range	Page
WAB312		2 Flutes ball nose endmill	Ø6.0 ~ 20.0	217
WAE301		1 Flutes flat endmill	Ø0.2 ~ 12.0	218
WAE302		2 Flutes flat endmill	Ø1.0 ~ 25.0	219
WAE30(2)3		3 Flutes flat endmill	Ø1.0 ~ 25.0	220 ~ 221
WAR302		2 Flutes radius endmill	Ø6.0 ~ 20.0	222
WAR303		3 Flutes radius endmill	Ø6.0 ~ 20.0	223
WAR502		2 Flutes radius endmill	Ø1.0 ~ 12.0	224
WAR503		3 Flutes radius endmill	Ø4.0 ~ 20.0	225
WAF303		3 Flutes roughing endmill	Ø6.0 ~ 20.0	226

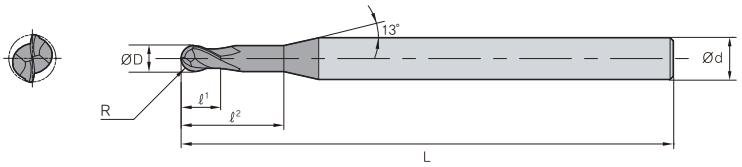
WAB312

2 Flutes ball nose endmill

FINE GRAIN | 2 | 50° HELIX | R ±0.02 (All sizes) | Un-coated | DATA p.470

• TOLERANCE

ØD		Ød
All sizes	±0.02mm	h6



(mm)

Designation	R	ØD	Ød	ℓ1	ℓ2	L
WAB312 060	3	6	6	5.5	25	55
WAB312 061	3	6	6	5.5	40	90
WAB312 080	4	8	8	7	30	65
WAB312 081	4	8	8	7	50	100
WAB312 100	5	10	10	8.5	35	75
WAB312 101	5	10	10	10	50	100
WAB312 102	5	10	10	10	60	150
WAB312 120	6	12	12	10.5	40	75
WAB312 121	6	12	12	12	50	110
WAB312 122	6	12	12	12	60	150
WAB312 160	8	16	16	14	50	90
WAB312 161	8	16	16	16	70	150
WAB312 162	8	16	16	16	90	200
WAB312 200	10	20	20	17	50	100

※ The above specifications are subject to change without prior notice for product quality improvement.

• Applicable Workpiece

Carbon steel ~ HB225	Alloy steel HB225~325	Pre-hardened steel HRC30~50	Hardened steel		Copper	Graphite	Cast iron ~FCD500	Aluminum	Stainless steel
			SKD61~HRC55	SKD11 HRC55~					
					○			◎	

○ : GOOD ◎ : EXCELLENT

A-Star Endmill

WAE301

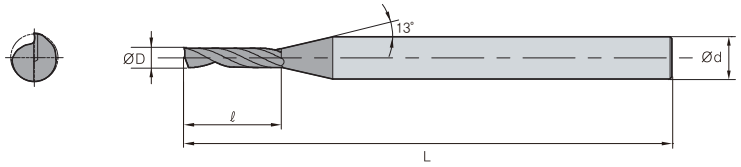
1 Flutes flat endmill

FINE GRAIN | 1 | 30° HELIX | Un-coated | DATA

p.470

• TOLERANCE

ØD		Ød
Ø0.2 ~ Ø5	0 ~ -0.02mm	h5
Ø6 ~ Ø12	0 ~ -0.03mm	



(mm)

Designation	ØD	Ød	ℓ	L
WAE301 002	0.2	4	0.3	40
WAE301 003	0.3	4	0.9	40
WAE301 004	0.4	4	1.2	40
WAE301 005	0.5	4	1.5	40
WAE301 006	0.6	4	1.8	40
WAE301 007	0.7	4	2.1	40
WAE301 008	0.8	4	2.4	40
WAE301 009	0.9	4	2.7	40
WAE301 010	1	6	3	45
WAE301 010-4.5	1	6	4.5	45
WAE301 010-6	1	6	6	50
WAE301 012	1.2	6	3	45
WAE301 012-5	1.2	6	5	45
WAE301 012-6	1.2	6	6	50
WAE301 015	1.5	6	4	45
WAE301 015-6	1.5	6	6	50
WAE301 015-8	1.5	6	8	50
WAE301 020	2	6	6	50
WAE301 020-8	2	6	8	50
WAE301 020-10	2	6	10	50
WAE301 025	2.5	6	7	50

Designation	ØD	Ød	ℓ	L
WAE301 025-8	2.5	6	8	50
WAE301 025-10	2.5	6	10	50
WAE301 025-12	2.5	6	12	50
WAE301 030	3	6	8	50
WAE301 030-12	3	6	12	50
WAE301 030-15	3	6	15	50
WAE301 040	4	6	10	50
WAE301 040-15	4	6	15	50
WAE301 040-20	4	6	20	60
WAE301 050	5	6	13	60
WAE301 050-20	5	6	20	60
WAE301 050-25	5	6	25	60
WAE301 060	6	6	15	60
WAE301 060-20	6	6	20	60
WAE301 060-25	6	6	25	60
WAE301 080	8	8	20	70
WAE301 080-25	8	8	25	75
WAE301 100	10	10	22	75
WAE301 100-30	10	10	30	80
WAE301 120	12	12	26	75
WAE301 120-35	12	12	35	90

※ The above specifications are subject to change without prior notice for product quality improvement.

• Applicable Workpiece

Carbon steel ~ HB225	Alloy steel HB225~325	Pre-hardened steel HRC30~50	Hardened steel		Copper	Graphite	Cast iron ~FCD500	Aluminum	Stainless steel
			SKD61~HRC55	SKD11 HRC55~					
					○			◎	

○ : GOOD ◎ : EXCELLENT

WAE302

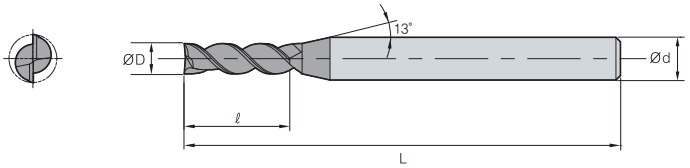
2 Flutes flat endmill

FINE GRAIN | 2 | 45° HELIX | SHARP EDGE | Un-coated | DATA

p.471

• TOLERANCE

ØD		Ød
All sizes	0 ~ -0.02mm	h6



(mm)

Designation	ØD	Ød	ℓ	L
WAE302 010	1	4	3	50
WAE302 010-6	1	6	6	60
WAE302 012	1.2	6	4	50
WAE302 015	1.5	6	6	50
WAE302 015-8	1.5	6	8	60
WAE302 020 S4	2	4	6	50
WAE302 020	2	6	6	50
WAE302 020-10	2	6	10	60
WAE302 025	2.5	6	12	55
WAE302 030	3	6	12	55
WAE302 030-15	3	6	15	65
WAE302 035	3.5	6	14	57
WAE302 040	4	6	14	55
WAE302 040-16	4	6	16	65
WAE302 050	5	6	17	55
WAE302 050-22	5	6	22	60
WAE302 060	6	6	17	60
WAE302 060-22	6	6	22	60
WAE302 070	7	8	20	63

Designation	ØD	Ød	ℓ	L
WAE302 080	8	8	23	70
WAE302 080-31	8	8	31	80
WAE302 090	9	10	25	72
WAE302 100	10	10	28	75
WAE302 100-36	10	10	36	90
WAE302 110	11	12	30	80
WAE302 120	12	12	33	80
WAE302 120-41	12	12	41	95
WAE302 122	12	12	45	100
WAE302 130	13	14	35	85
WAE302 140	14	14	38	90
WAE302 150	15	16	40	90
WAE302 160	16	16	45	100
WAE302 160-53	16	16	53	110
WAE302 180	18	18	49	100
WAE302 200	20	20	50	100
WAE302 200-55	20	20	55	110
WAE302 250	25	25	50	120

※ The above specifications are subject to change without prior notice for product quality improvement.

• Applicable Workpiece

Carbon steel ~ HB225	Alloy steel HB225~325	Pre-hardened steel HRC30~50	Hardened steel		Copper	Graphite	Cast iron ~FCD500	Aluminum	Stainless steel
			SKD61~HRC55	SKD11 HRC55~					
					○			◎	

○ : GOOD ◎ : EXCELLENT

A-Star Endmill

WAE30(2)3

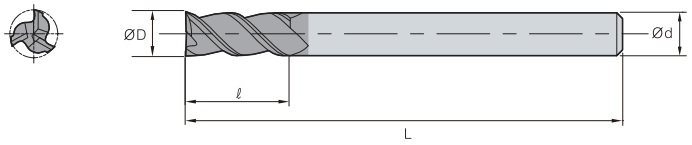
3 Flutes flat endmill

FINE GRAIN | 3 | 45° HELIX | SHARP EDGE | Un-coated | DATA

p.472

• TOLERANCE

ØD		Ød
All sizes	0 ~ -0.02mm	h6



(mm)

Designation	ØD	Ød	ℓ	L
WAE303 010-02	1	6	2	40
WAE303 010-025	1	6	2.5	40
WAE303 010	1	6	3	50
WAE303 010-04	1	6	4	60
WAE303 010-06	1	6	6	60
WAE303 012	1.2	6	4	50
WAE303 015-03	1.5	6	3	40
WAE303 015	1.5	6	5	50
WAE303 015-06	1.5	6	6	60
WAE303 015-08	1.5	6	8	60
WAE303 015-10	1.5	6	10	60
WAE303 020-03	2	6	3	40
WAE303 020	2	6	6	50
WAE303 020-08	2	6	8	60
WAE303 020-10	2	6	10	60
WAE303 020-12	2	6	12	60
WAE303 025	2.5	6	8	40
WAE303 025-10	2.5	6	10	55
WAE303 025-12	2.5	6	12	60
WAE303 030-04	3	6	4	45
WAE303 030-08	3	6	8	45
WAE303 030	3	6	12	55
WAE303 031	3	6	15	65
WAE323 030	3	6	20	70
WAE323 031	3	6	25	75
WAE323 032	3	6	30	80
WAE303 035	3.5	6	12	55
WAE303 040-05	4	6	5	45
WAE303 040-08	4	6	8	45
WAE303 040-11	4	6	11	45
WAE303 040	4	6	14	55
WAE303 040-16	4	6	16	65
WAE303 041	4	6	20	70
WAE323 040	4	6	26	75
WAE323 041	4	6	30	80
WAE303 045	4.5	6	15	55
WAE303 050-06	5	6	6	45

Designation	ØD	Ød	ℓ	L
WAE303 050	5	6	17	55
WAE303 051	5	6	22	60
WAE303 052	5	6	26	70
WAE323 050	5	6	31	75
WAE323 051	5	6	36	80
WAE323 052	5	6	41	85
WAE323 053	5	6	46	90
WAE303 055	5.5	6	17	55
WAE303 060-07	6	6	7	50
WAE303 060-13	6	6	13	50
WAE303 060	6	6	17	60
WAE303 061	6	6	22	60
WAE303 062	6	6	26	70
WAE303 063	6	6	31	75
WAE323 060	6	6	36	80
WAE323 061	6	6	43	90
WAE323 062	6	6	51	100
WAE303 070	7	8	23	65
WAE303 080-10	8	8	10	60
WAE303 080-20	8	8	20	60
WAE303 080	8	8	23	70
WAE303 080-29	8	8	29	80
WAE303 081	8	8	31	80
WAE303 082	8	8	36	85
WAE323 080	8	8	41	90
WAE323 081	8	8	46	95
WAE323 082	8	8	51	100
WAE323 083	8	8	56	105
WAE323 084	8	8	66	110
WAE303 090	9	10	28	70
WAE303 100-12	10	10	12	65
WAE303 100-23	10	10	23	65
WAE303 100	10	10	28	75
WAE303 100-33	10	10	33	90
WAE303 101	10	10	36	90
WAE303 100-41	10	10	41	90
WAE303 102	10	10	46	100

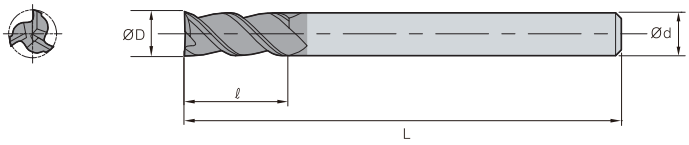
WAE30(2)3

3 Flutes flat endmill

FINE GRAIN | 3 | 45° HELIX | SHARP EDGE | Un-coated | DATA p.472

• TOLERANCE

ØD		Ød
All sizes	0 ~ -0.02mm	h6



(mm)

Designation	ØD	Ød	ℓ	L
WAE303 103	10	10	51	100
WAE323 100	10	10	56	110
WAE323 100-61	10	10	61	110
WAE323 101	10	10	66	120
WAE303 110	11	12	30	80
WAE303 120-14	12	12	14	70
WAE303 120-27	12	12	27	70
WAE303 120	12	12	33	80
WAE303 121	12	12	41	95
WAE303 122	12	12	46	100
WAE303 122-51	12	12	51	100
WAE303 123	12	12	56	110
WAE303 124-61	12	12	61	110
WAE323 120	12	12	66	120
WAE323 120-71	12	12	71	120
WAE323 121	12	12	76	135
WAE303 130	13	14	35	85
WAE303 140	14	14	38	90
WAE303 150	15	16	40	90
WAE303 160-19	16	16	19	90
WAE303 160-33	16	16	33	90
WAE303 160	16	16	45	100

Designation	ØD	Ød	ℓ	L
WAE303 160-53	16	16	53	105
WAE303 161	16	16	56	110
WAE303 162	16	16	66	130
WAE303 163	16	16	76	150
WAE323 160	16	16	86	160
WAE323 161	16	16	96	180
WAE323 162	16	16	106	190
WAE323 163	16	16	116	200
WAE303 180	18	18	49	100
WAE303 200-23	20	20	23	90
WAE303 200-39	20	20	39	90
WAE303 200	20	20	50	100
WAE303 201	20	20	60	110
WAE303 202	20	20	70	130
WAE303 203	20	20	76	150
WAE323 200	20	20	86	160
WAE323 201	20	20	96	180
WAE323 202	20	20	106	190
WAE323 203	20	20	116	200
WAE323 204	20	20	126	220
WAE303 250	25	25	50	120

※ The above specifications are subject to change without prior notice for product quality improvement.

• Applicable Workpiece

Carbon steel ~ HB225	Alloy steel HB225~325	Pre-hardened steel HRC30~50	Hardened steel		Copper	Graphite	Cast iron ~FCD500	Aluminum	Stainless steel
			SKD61~HRC55	SKD11 HRC55~					
					○			◎	

○ : GOOD ◎ : EXCELLENT

A-Star Endmill

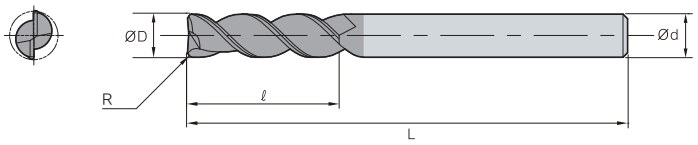
WAR302

2 Flutes radius endmill

FINE GRAIN | 2 | 45° HELIX | R ±0.015 (All sizes) | Un-coated | DATA (p.473)

• TOLERANCE

ØD		Ød
All sizes	0 ~ -0.02mm	h6



(mm)

Designation	R	ØD	Ød	ℓ	L
WAR302 06 05	0.5	6	6	15	50
WAR302 06 10	1	6	6	15	50
WAR302 06 15	1.5	6	6	15	50
WAR302 06 20	2	6	6	15	50
WAR302 08 05	0.5	8	8	20	60
WAR302 08 10	1	8	8	20	60
WAR302 08 15	1.5	8	8	20	60
WAR302 08 20	2	8	8	20	60
WAR302 08 30	3	8	8	20	60
WAR302 10 05	0.5	10	10	25	70
WAR302 10 10	1	10	10	25	70
WAR302 10 15	1.5	10	10	25	70
WAR302 10 20	2	10	10	25	70
WAR302 10 30	3	10	10	25	70
WAR302 10 40	4	10	10	25	70
WAR302 12 10	1	12	12	30	75
WAR302 12 20	2	12	12	30	75

Designation	R	ØD	Ød	ℓ	L
WAR302 12 30	3	12	12	30	75
WAR302 12 40	4	12	12	30	75
WAR302 14 10	1	14	14	35	80
WAR302 14 20	2	14	14	35	80
WAR302 14 30	3	14	14	35	80
WAR302 14 40	4	14	14	35	80
WAR302 14 50	5	14	14	35	80
WAR302 16 10	1	16	16	40	90
WAR302 16 20	2	16	16	40	90
WAR302 16 30	3	16	16	40	90
WAR302 16 40	4	16	16	40	90
WAR302 16 50	5	16	16	40	90
WAR302 20 10	1	20	20	45	100
WAR302 20 20	2	20	20	45	100
WAR302 20 30	3	20	20	45	100
WAR302 20 40	4	20	20	45	100
WAR302 20 50	5	20	20	45	100

※ The above specifications are subject to change without prior notice for product quality improvement.

• Applicable Workpiece

Carbon steel ~ HB225	Alloy steel HB225~325	Pre-hardened steel HRC30~50	Hardened steel		Copper	Graphite	Cast iron ~FCD500	Aluminum	Stainless steel
			SKD61~HRC55	SKD11 HRC55~					
					○			◎	

○ : GOOD ◎ : EXCELLENT

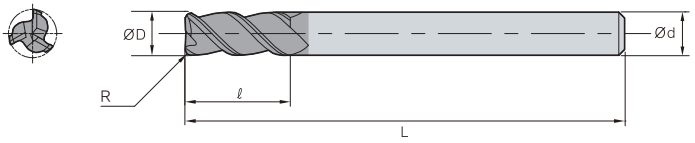
WAR303

3 Flutes radius endmill

FINE GRAIN | 3 | 45° HELIX | R ±0.015 (All sizes) | Un-coated | DATA p.473

• TOLERANCE

ØD		Ød
All sizes	0 ~ -0.02mm	h6



(mm)

Designation	R	ØD	Ød	ℓ	L
WAR303 06 05	0.5	6	6	15	50
WAR303 06 10	1	6	6	15	50
WAR303 06 15	1.5	6	6	15	50
WAR303 06 20	2	6	6	15	50
WAR303 08 05	0.5	8	8	20	60
WAR303 08 10	1	8	8	20	60
WAR303 08 15	1.5	8	8	20	60
WAR303 08 20	2	8	8	20	60
WAR303 10 05	0.5	10	10	25	70
WAR303 10 10	1	10	10	25	70
WAR303 10 15	1.5	10	10	25	70
WAR303 10 20	2	10	10	25	70
WAR303 10 30	3	10	10	25	70
WAR303 10 40	4	10	10	25	70
WAR303 12 10	1	12	12	30	75
WAR303 12 20	2	12	12	30	75
WAR303 12 30	3	12	12	30	75

Designation	R	ØD	Ød	ℓ	L
WAR303 12 40	4	12	12	30	75
WAR303 14 10	1	14	14	35	80
WAR303 14 20	2	14	14	35	80
WAR303 14 30	3	14	14	35	80
WAR303 14 40	4	14	14	35	80
WAR303 14 50	5	14	14	35	80
WAR303 16 10	1	16	16	40	90
WAR303 16 20	2	16	16	40	90
WAR303 16 30	3	16	16	40	90
WAR303 16 40	4	16	16	40	90
WAR303 16 50	5	16	16	40	90
WAR303 20 10	1	20	20	45	100
WAR303 20 20	2	20	20	45	100
WAR303 20 30	3	20	20	45	100
WAR303 20 40	4	20	20	45	100
WAR303 20 50	5	20	20	45	100

※ The above specifications are subject to change without prior notice for product quality improvement.

• Applicable Workpiece

Carbon steel ~ HB225	Alloy steel HB225~325	Pre-hardened steel HRC30~50	Hardened steel		Copper	Graphite	Cast iron ~FCD500	Aluminum	Stainless steel
			SKD61~HRC55	SKD11 HRC55~					
					○			◎	

○ : GOOD ◎ : EXCELLENT

A-Star Endmill

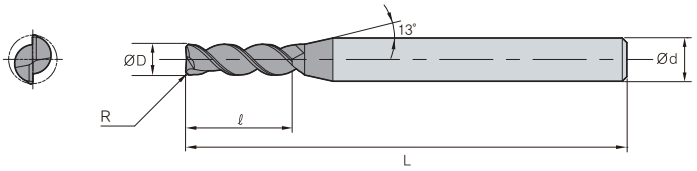
WAR502

2 Flutes radius endmill

FINE GRAIN | 2 | 45° HELIX | R ±0.015 (All sizes) | D.L.C | DATA p.474

• TOLERANCE

ØD		Ød
All sizes	0 ~ -0.02mm	h6



(mm)

Designation	R	ØD	Ød	ℓ	L
WAR502 010	0.05	1	6	3	40
WAR502 015	0.05	1.5	6	5	40
WAR502 020	0.1	2	6	6	40
WAR502 021	0.1	2	6	12	50
WAR502 030	0.1	3	6	10	50
WAR502 031	0.1	3	6	20	60
WAR502 040	0.1	4	6	12	50
WAR502 041	0.1	4	6	20	60
WAR502 050	0.1	5	6	15	57
WAR502 060	0.1	6	6	15	57
WAR502 061	0.1	6	6	22	65
WAR502 070	0.1	7	8	20	63
WAR502 080	0.1	8	8	20	63
WAR502 081	0.1	8	8	28	70
WAR502 090	0.1	9	10	25	72
WAR502 100	0.2	10	10	28	72
WAR502 101	0.2	10	10	32	80
WAR502 110	0.2	11	12	30	80
WAR502 120	0.2	12	12	32	80
WAR502 121	0.2	12	12	40	100

※ The above specifications are subject to change without prior notice for product quality improvement.

• Applicable Workpiece

Carbon steel ~ HB225	Alloy steel HB225~325	Pre-hardened steel HRC30~50	Hardened steel		Copper	Graphite	Cast iron ~FCD500	Aluminum	Stainless steel
			SKD61~HRC55	SKD11 HRC55~					
					○			◎	

○ : GOOD ◎ : EXCELLENT

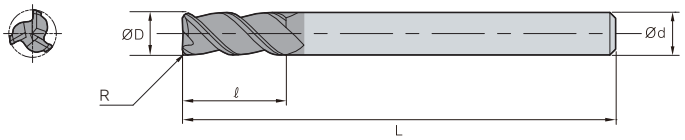
WAR503

3 Flutes radius endmill

FINE GRAIN | 3 | 45° HELIX | R ±0.015 (All sizes) | D.L.C | DATA (p.475~476)

• TOLERANCE

ØD		Ød
All sizes	0 ~ -0.02mm	h6



(mm)

Designation	R	ØD	Ød	ℓ	L
WAR503 040	0.5	4	6	14	57
WAR503 041	1	4	6	25	62
WAR503 060	0.5	6	6	16	57
WAR503 061	1	6	6	25	62
WAR503 080	0.5	8	8	22	63
WAR503 081	1	8	8	35	80
WAR503 100	0.5	10	10	28	72
WAR503 101	1	10	10	45	100
WAR503 120	0.5	12	12	32	80
WAR503 121	1	12	12	45	100
WAR503 160	0.5	16	16	45	90
WAR503 161	1	16	16	65	125
WAR503 200	0.5	20	20	50	100
WAR503 201	1	20	20	70	130

※ The above specifications are subject to change without prior notice for product quality improvement.

• Applicable Workpiece

Carbon steel ~ HB225	Alloy steel HB225~325	Pre-hardened steel HRC30~50	Hardened steel		Copper	Graphite	Cast iron ~FCD500	Aluminum	Stainless steel
			SKD61~HRC55	SKD11 HRC55~					
					○			◎	

○ : GOOD ◎ : EXCELLENT

A-Star Endmill

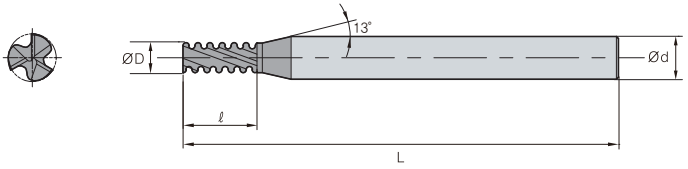
WAF303

3 Flutes roughing endmill

FINE GRAIN | 3 | 38° HELIX | COARSE (Conventional Pitch) | DIN 6535HA | DIN 6535HB | Un-coated | DATA p.477

• TOLERANCE

ØD		Ød
Ø4 ~ Ø6	0 ~ -0.048mm	h6
Ø7 ~ Ø10	0 ~ -0.058mm	
Ø12 ~ Ø18	0 ~ -0.07mm	
Ø20 ~	0 ~ -0.084mm	



(mm)

Designation	ØD	Ød	ℓ	L
WAF303 040	4	6	10	55
WAF303 050	5	6	15	55
WAF303 060	6	6	16	60
WAF303 061	6	6	25	80
WAF303 070	7	8	16	63
WAF303 080	8	8	20	65
WAF303 081	8	8	30	90
WAF303 090	9	10	19	72
WAF303 100	10	10	25	75
WAF303 101	10	10	40	100
WAF303 120	12	12	30	80
WAF303 121	12	12	50	110
WAF303 140	14	14	35	90
WAF303 160	16	16	42	100
WAF303 161	16	16	52	150
WAF303 162	16	16	65	125
WAF303 180	18	18	32	92
WAF303 200	20	20	38	104
WAF303 201	20	20	55	160

※ Flat shank is available upon request
ex) WAF303100F: Flat shank

※ The above specifications are subject to change without prior notice for product quality improvement.

• Applicable Workpiece

Carbon steel ~ HB225	Alloy steel HB225~325	Pre-hardened steel HRC30~50	Hardened steel		Copper	Graphite	Cast iron ~FCD500	Aluminum	Stainless steel
			SKD61~HRC55	SKD11 HRC55~					
					○			◎	

○ : GOOD ◎ : EXCELLENT

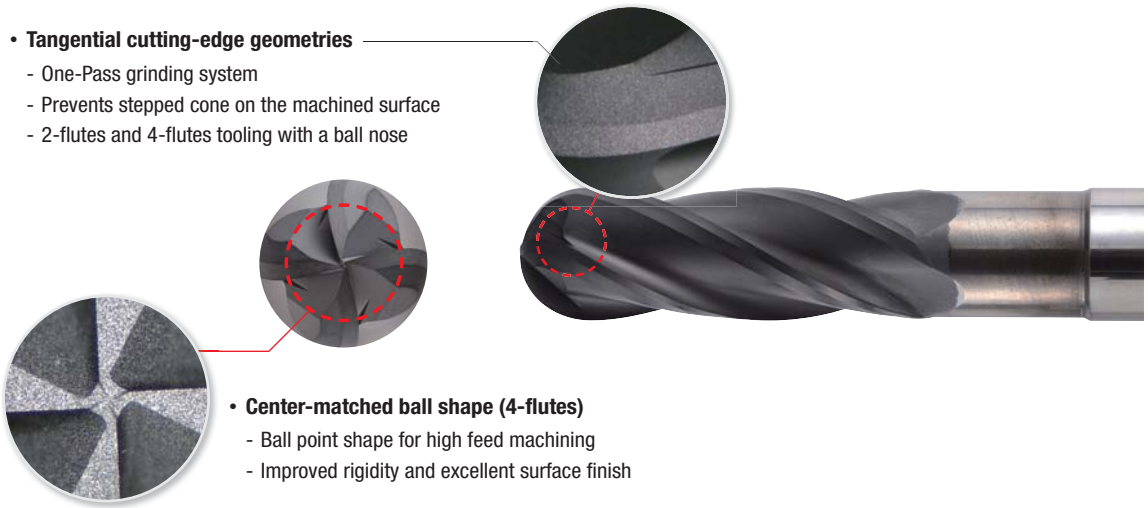
Diamond coated endmill

D Endmill

- Tangential cutting-edge geometries for excellent surface finish
- Excellent wear resistance due to high hardness and high purity diamond coating
- Advanced surface finish and cutting performance thanks to sharp edges and tangential tool geometries

Features

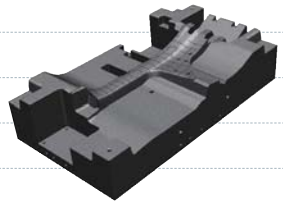
- **Tangential cutting-edge geometries**
  - One-Pass grinding system
  - Prevents stepped cone on the machined surface
  - 2-flutes and 4-flutes tooling with a ball nose

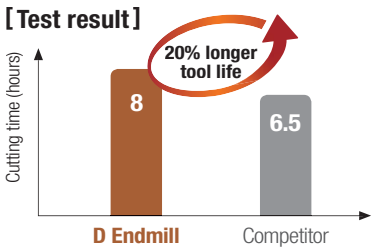


- **Center-matched ball shape (4-flutes)**
  - Ball point shape for high feed machining
  - Improved rigidity and excellent surface finish

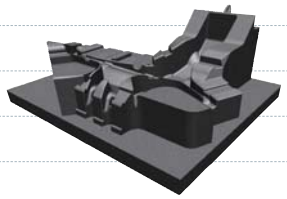
Application examples

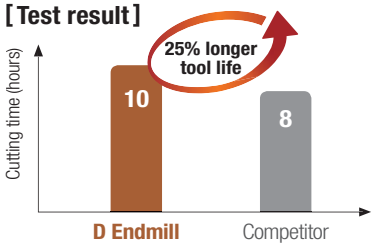
Workpiece	Graphite mold
Cutting conditions	vc (m/min) = 100, fz (mm/t) = 0.11
	ap (mm) = 0.26, dry
Tools	DBE4060-110-N250S06



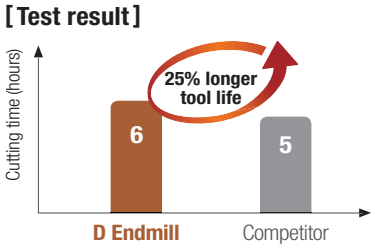


Workpiece	Graphite mold
Cutting conditions	vc (m/min) = 180, fz (mm/t) = 0.1
	ap (mm) = 0.2, dry
Tools	DBE2060-110-N250S06





Workpiece	Graphite mold
Cutting conditions	vc (m/min) = 300, fz (mm/t) = 0.1
	ap (mm) = 0.15, dry
Tools	DBE2060-080-N250S06



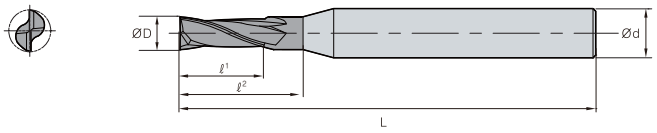
D Endmill

DFE2000 (Flat)

2 | 30° HELIX | Substrate ND3000 | DATA p.478

• TOLERANCE

ØD		Ød
~ Ø5.9	0 ~ -0.02mm	h6
Ø6.0 ~	0 ~ -0.03mm	



(mm)

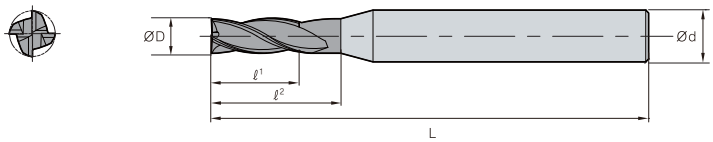
Designation	ØD	Ød	ℓ1	ℓ2	L
DFE 2010-045-N050S04	1	4	3	5	45
DFE 2010-060-N050S04	1	4	3	5	60
DFE 2010-060-N100S04	1	4	3	10	60
DFE 2010-060-N150S04	1	4	3	15	60
DFE 2010-060-N200S04	1	4	3	20	60
DFE 2010-060-N250S04	1	4	3	25	60
DFE 2015-060-N050S04	1.5	4	4	5	60
DFE 2015-060-N100S04	1.5	4	4	10	60
DFE 2015-060-N150S04	1.5	4	4	15	60
DFE 2015-060-N200S04	1.5	4	4	20	60
DFE 2015-060-N250S04	1.5	4	4	25	60
DFE 2020-045-N080S04	2	4	6	8	45
DFE 2020-080-N080S04	2	4	6	8	80
DFE 2020-080-N100S04	2	4	6	10	80
DFE 2020-080-N150S04	2	4	6	15	80
DFE 2020-080-N200S04	2	4	6	20	80
DFE 2020-080-N250S04	2	4	6	25	80
DFE 2020-080-N300S04	2	4	6	30	80
DFE 2020-080-N400S04	2	4	6	40	80
DFE 2030-050-N100S06	3	6	9	10	50
DFE 2030-080-N100S04	3	4	9	10	80
DFE 2030-080-N200S04	3	4	9	20	80
DFE 2030-080-N250S04	3	4	9	25	80
DFE 2030-080-N300S04	3	4	9	30	80
DFE 2030-080-N400S04	3	4	9	40	80
DFE 2040-050-N160S06	4	6	12	16	50
DFE 2040-080-N160S04	4	4	12	16	80
DFE 2050-060-N200S06	5	6	15	20	60
DFE 2050-110-N200S06	5	6	15	20	110
DFE 2060-060-N180S06	6	6	18	-	60
DFE 2060-110-N250S06	6	6	18	25	110
DFE 2060-150-N250S06	6	6	18	25	150
DFE 2080-070-N250S08	8	8	25	-	70
DFE 2080-150-N400S08	8	8	25	40	150
DFE 2100-080-N300S10	10	10	30	-	80
DFE 2100-150-N500S10	10	10	30	50	150
DFE 2120-080-N350S12	12	12	35	-	80
DFE 2120-150-N600S12	12	12	35	60	150

DFE4000 (Flat)

4 | 30° HELIX | Substrate ND3000 | DATA p.478

• TOLERANCE

ØD		Ød
~ Ø5.9	0 ~ -0.02mm	h6
Ø6.0 ~	0 ~ -0.03mm	



(mm)

Designation	ØD	Ød	ℓ1	ℓ2	L
DFE 4020-045-N060S04	2	4	6	8	45
DFE 4020-060-N100S04	2	4	10	12	60
DFE 4030-050-N100S06	3	6	10	12	50
DFE 4030-060-N150S04	3	4	15	18	60
DFE 4040-050-N150S06	4	6	15	18	50
DFE 4040-080-N200S04	4	4	20	-	80
DFE 4060-060-N180S06	6	6	18	-	60
DFE 4060-110-N300S06	6	6	30	-	110
DFE 4060-150-N300S06	6	6	30	-	150
DFE 4080-070-N250S08	8	8	25	-	70
DFE 4080-110-N400S08	8	8	40	-	110
DFE 4080-150-N400S08	8	8	40	-	150
DFE 4100-080-N250S10	10	10	25	-	80
DFE 4100-110-N400S10	10	10	40	-	110
DFE 4100-150-N500S10	10	10	50	-	150
DFE 4120-080-N300S12	12	12	30	-	80
DFE 4120-110-N400S12	12	12	40	-	110
DFE 4120-150-N500S12	12	12	50	-	150

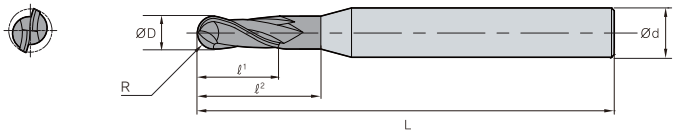
D Endmill

DBE2000 (Ball)

2 | 30° HELIX | Substrate ND3000 | DATA p.478

• TOLERANCE

ØD		Ød
~ Ø5.9	0 ~ -0.02mm	h6
Ø6.0 ~	0 ~ -0.03mm	



(mm)

Designation	R	ØD	Ød	ℓ1	ℓ2	L
DBE 2006-045-N020S04	0.3	0.6	4	2	2	45
DBE 2006-045-N050S04	0.3	0.6	4	2	5	45
DBE 2006-045-N080S04	0.3	0.6	4	2	8	45
DBE 2006-045-N100S04	0.3	0.6	4	2	10	45
DBE 2008-045-N030S04	0.4	0.8	4	2.5	3	45
DBE 2008-045-N050S04	0.4	0.8	4	2.5	5	45
DBE 2008-045-N100S04	0.4	0.8	4	2.5	10	45
DBE 2010-060-N030S04	0.5	1	4	3	3	60
DBE 2010-060-N050S04	0.5	1	4	3	5	60
DBE 2010-060-N080S04	0.5	1	4	3	8	60
DBE 2010-060-N100S04	0.5	1	4	3	10	60
DBE 2010-060-N120S04	0.5	1	4	3	12	60
DBE 2010-060-N150S04	0.5	1	4	3	15	60
DBE 2010-060-N200S04	0.5	1	4	3	20	60
DBE 2010-080-N250S04	0.5	1	4	3	25	80
DBE 2010-080-N300S04	0.5	1	4	3	30	80
DBE 2010-080-N350S04	0.5	1	4	3	35	80
DBE 2010-080-N400S04	0.5	1	4	3	40	80
DBE 2015-060-N050S04	0.75	1.5	4	4	5	60
DBE 2015-080-N100S04	0.75	1.5	4	4	10	80
DBE 2015-080-N150S04	0.75	1.5	4	4	15	80
DBE 2015-080-N200S04	0.75	1.5	4	4	20	80
DBE 2015-080-N250S04	0.75	1.5	4	4	25	80
DBE 2015-080-N300S04	0.75	1.5	4	4	30	80
DBE 2015-080-N350S04	0.75	1.5	4	4	35	80
DBE 2015-080-N400S04	0.75	1.5	4	4	40	80
DBE 2020-060-N080S04	1	2	4	6	8	60
DBE 2020-080-N100S04	1	2	4	6	10	80
DBE 2020-080-N150S04	1	2	4	6	15	80
DBE 2020-080-N200S04	1	2	4	6	20	80
DBE 2020-080-N250S04	1	2	4	6	25	80
DBE 2020-080-N300S04	1	2	4	6	30	80
DBE 2020-080-N350S04	1	2	4	6	35	80

Designation	R	ØD	Ød	ℓ1	ℓ2	L
DBE 2020-100-N400S04	1	2	4	6	40	100
DBE 2020-100-N450S04	1	2	4	6	45	100
DBE 2020-100-N500S04	1	2	4	6	50	100
DBE 2030-060-N100S04	1.5	3	4	9	10	60
DBE 2030-100-N150S04	1.5	3	4	9	15	100
DBE 2030-100-N200S04	1.5	3	4	9	20	100
DBE 2030-100-N250S04	1.5	3	4	9	25	100
DBE 2030-100-N300S04	1.5	3	4	9	30	100
DBE 2030-100-N350S04	1.5	3	4	9	35	100
DBE 2030-100-N400S04	1.5	3	4	9	40	100
DBE 2030-100-N500S04	1.5	3	4	9	50	100
DBE 2040-060-N160S04	2	4	4	12	16	60
DBE 2040-080-N160S04	2	4	4	12	16	80
DBE 2040-080-N300S04	2	4	4	12	30	80
DBE 2040-100-N160S04	2	4	4	12	16	100
DBE 2040-100-N400S04	2	4	4	12	40	100
DBE 2040-130-N160S04	2	4	4	12	16	130
DBE 2040-130-N400S04	2	4	4	12	40	130
DBE 2050-110-N200S06	2.5	5	6	15	20	110
DBE 2060-080-N250S06	3	6	6	20	25	80
DBE 2060-110-N250S06	3	6	6	20	25	110
DBE 2060-150-N300S06	3	6	6	20	30	150
DBE 2080-080-N300S08	4	8	8	25	30	80
DBE 2080-110-N300S08	4	8	8	25	30	110
DBE 2080-150-N500S08	4	8	8	25	50	150
DBE 2080-200-N400S08	4	8	8	25	40	200
DBE 2100-080-N400S10	5	10	10	30	40	80
DBE 2100-110-N400S10	5	10	10	30	40	110
DBE 2100-150-N600S10	5	10	10	30	60	150
DBE 2100-200-N500S10	5	10	10	30	50	200
DBE 2120-110-N500S12	6	12	12	35	50	110
DBE 2120-150-N500S12	6	12	12	35	50	150
DBE 2120-200-N600S12	6	12	12	35	60	200

DBE4000 (Ball)

4 | 30° HELIX | Substrate ND3000 | DATA

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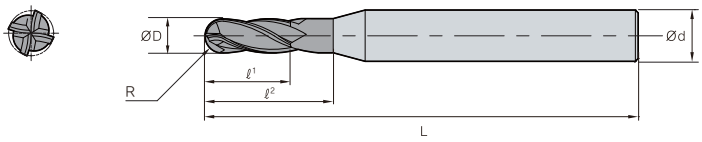
• TOLERANCE

ØD		Ød
~ Ø5.9	0 ~ -0.02mm	h6
Ø6.0 ~	0 ~ -0.03mm	



(mm)

Designation	R	ØD	Ød	ℓ1	ℓ2	L
DBE 4020-060-N080S04	1	2	4	6	8	60
DBE 4020-080-N100S04	1	2	4	6	10	80
DBE 4020-080-N200S04	1	2	4	6	20	80
DBE 4020-080-N300S04	1	2	4	6	30	80
DBE 4020-080-N400S04	1	2	4	6	40	80
DBE 4030-060-N100S04	1.5	3	4	9	10	60
DBE 4030-100-N150S04	1.5	3	4	9	15	100
DBE 4030-100-N200S04	1.5	3	4	9	20	100
DBE 4030-100-N300S04	1.5	3	4	9	30	100
DBE 4030-100-N400S04	1.5	3	4	9	40	100
DBE 4030-100-N500S04	1.5	3	4	9	50	100
DBE 4040-060-N160S04	2	4	4	12	16	60
DBE 4040-080-N160S04	2	4	4	12	16	80
DBE 4040-100-N160S04	2	4	4	12	16	100
DBE 4040-130-N160S04	2	4	4	12	16	130
DBE 4060-080-N250S06	3	6	6	20	25	80
DBE 4060-110-N250S06	3	6	6	20	25	110
DBE 4060-150-N300S06	3	6	6	20	30	150
DBE 4080-080-N300S08	4	8	8	25	30	80
DBE 4080-110-N300S08	4	8	8	25	30	110
DBE 4080-150-N350S08	4	8	8	25	35	150
DBE 4080-200-N400S08	4	8	8	25	40	200
DBE 4100-080-N350S10	5	10	10	30	35	80
DBE 4100-110-N350S10	5	10	10	30	35	110
DBE 4100-150-N400S10	5	10	10	30	40	150
DBE 4100-200-N500S10	5	10	10	30	50	200
DBE 4120-110-N500S12	6	12	12	35	50	110
DBE 4120-150-N500S12	6	12	12	35	50	150
DBE 4120-200-N600S12	6	12	12	35	60	200

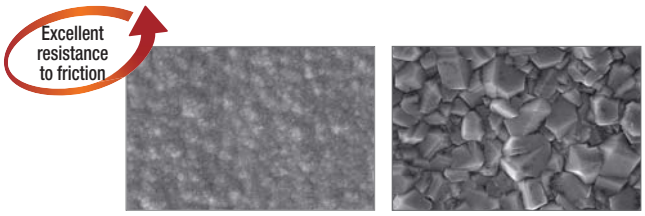
Router endmill for machining composite materials

Composite Router Endmill

- Router endmills optimized for machining composite materials (CFRP/GFRP)
- Excellent tool life thanks to nano-crystal diamond coating
- Blade design for reducing flaking and burrs
- Improved productivity through high efficiency machining

Features

- Diamond-coated grade ND2110 for machining composite materials
- High hardness diamond coating (over Hv 8,000)
- Nano-diamond coating with excellent resistance to friction and welding
- Improved resistance to flaking thanks by applying the specialized grade for diamond coating



CCDR (Dual Helix Router Endmill)

- Dual helix design to inhibit flaking on upper and lower faces of workpieces
- Endmill for finishing, profiling, and grooving

CCHR (High-performance Router Endmill)

- Multi flute nick shaped for high efficient machining
- Endmill for shape contouring, grooving, roughing

CCR (Router Endmill)

- Down cut design for low vibrations and cutting force
- Endmill for roughing, profiling, and grooving

CCLR (Low Helix Router Endmill)

- Fewer burrs thanks to the low axial cutting force
- Endmill for finishing, profiling, and blind groove making

CCRR (Reverse Helix Router Endmill)

- Reverse helix design to inhibit a drift in the workpiece's course
- Endmill for finishing, profiling, and through groove making

CCDR4000/6000 (Flat)

4 | 6 | 30°/-30° HELIX | Substrate ND2100

• TOLERANCE

ØD		Ød
Ø6 ~ Ø12	0 ~ -0.03mm	h5

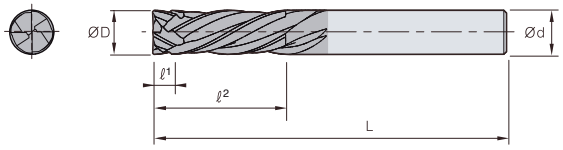


Fig. 1

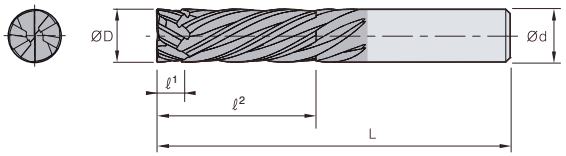


Fig. 2

(mm)

Designation	ØD	Ød	ℓ1	ℓ2	L	Fig.
CCDR 4060-065	6	6	3	18	65	1
CCDR 4080-075	8	8	4	24	75	1
CCDR 6100-085	10	10	5	30	85	2
CCDR 6120-100	12	12	6	36	100	2

4 | 6 | 30°/-30° HELIX | Substrate ND2100

• TOLERANCE

ØD		Ød
Ø0.25 ~ Ø0.5	0 ~ -0.0012 (inch)	h5

(inch)

Designation	ØD	Ød	ℓ1	ℓ2	L	Fig.
CCDR 402500	1/4 0.250	0.25	0.125	0.75	2.5	1
CCDR 402500L	1/4 0.250	0.25	0.125	1.5	4	1
CCDR 603750	3/8 0.375	0.375	0.125	1	3.25	2
CCDR 603750L	3/8 0.375	0.375	0.125	1.5	4	2
CCDR 605000	1/2 0.500	0.5	0.125	1	3.25	2
CCDR 605000L	1/2 0.500	0.5	0.125	1.5	4	2

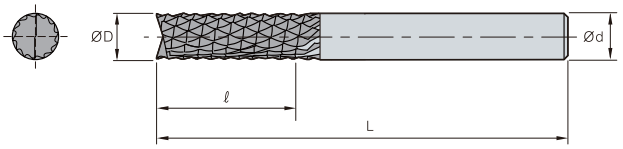
Endmill Composite Router Endmill

CCR2000 (Flat)

2 | -27° HELIX | Substrate ND2100

• TOLERANCE

ØD		Ød
Ø4 ~ Ø12	-0.02 ~ -0.08mm	h5



(mm)

Designation	ØD	Ød	ℓ	L
CCR 2040-050	4	4	12	50
CCR 2050-050	5	5	15	50
CCR 2060-065	6	6	18	65
CCR 2080-075	8	8	24	75
CCR 2100-085	10	10	30	85
CCR 2120-100	12	12	36	100

2 | -27° HELIX | Substrate ND2100

• TOLERANCE

ØD		Ød
Ø0.25 ~ Ø0.5	-0.0008 ~ -0.0032 (inch)	h5

(inch)

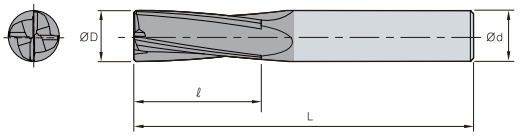
Designation	ØD	Ød	ℓ	L
CCR 202500	1/4 0.250	0.25	0.75	2.5
CCR 202500L	1/4 0.250	0.25	1.5	4
CCR 203750	3/8 0.375	0.375	1	3.25
CCR 203750L	3/8 0.375	0.375	1.5	4
CCR 205000	1/2 0.500	0.5	1	3.25
CCR 205000L	1/2 0.500	0.5	1.5	4

CCLR4000 (Flat)

4 | 15° HELIX | Substrate ND2100

• TOLERANCE

ØD		Ød
Ø4 ~ Ø12	0 ~ -0.03mm	h5



(mm)

Designation	ØD	Ød	ℓ	L
CCLR 4040-050	4	4	12	50
CCLR 4050-050	5	5	15	50
CCLR 4060-065	6	6	18	65
CCLR 4080-075	8	8	24	75
CCLR 4100-085	10	10	30	85
CCLR 4120-100	12	12	36	100

4 | 15° HELIX | Substrate ND2100

• TOLERANCE

ØD		Ød
Ø0.25 ~ Ø0.5	0 ~ -0.0012 (inch)	h5

(inch)

Designation	ØD	Ød	ℓ	L
CCLR 402500	1/4 0.250	0.25	0.75	2.5
CCLR 402500L	1/4 0.250	0.25	1.5	4
CCLR 403750	3/8 0.375	0.375	1	3.25
CCLR 403750L	3/8 0.375	0.375	1.5	4
CCLR 405000	1/2 0.500	0.5	1	3.25
CCLR 405000L	1/2 0.500	0.5	1.5	4

Endmill Composite Router Endmill

CCRR6000/8000 (Flat)

4 | 6 | -25° HELIX | Substrate ND2100

• TOLERANCE

ØD		Ød
Ø6 ~ Ø12	0 ~ -0.03mm	h5

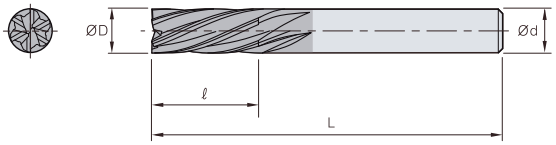


Fig. 1

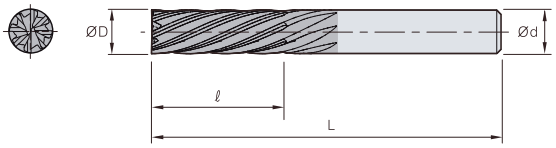


Fig. 2

(mm)

Designation	ØD	Ød	ℓ	L	Fig.
CCRR 6060-065	6	6	18	65	1
CCRR 6080-075	8	8	24	75	1
CCRR 8100-085	10	10	30	85	2
CCRR 8120-100	12	12	36	100	2

4 | 6 | -25° HELIX | Substrate ND2100

• TOLERANCE

ØD		Ød
Ø0.25 ~ Ø0.5	0 ~ -0.0012 (inch)	h5

(inch)

Designation	ØD	Ød	ℓ	L	Fig.
CCRR 602500	1/4 0.250	0.25	0.75	2.5	1
CCRR 602500L	1/4 0.250	0.25	1.5	4	1
CCRR 803750	3/8 0.375	0.375	1	3.25	2
CCRR 803750L	3/8 0.375	0.375	1.5	4	2
CCRR 805000	1/2 0.500	0.5	1	3.25	2
CCRR 805000L	1/2 0.500	0.5	1.5	4	2

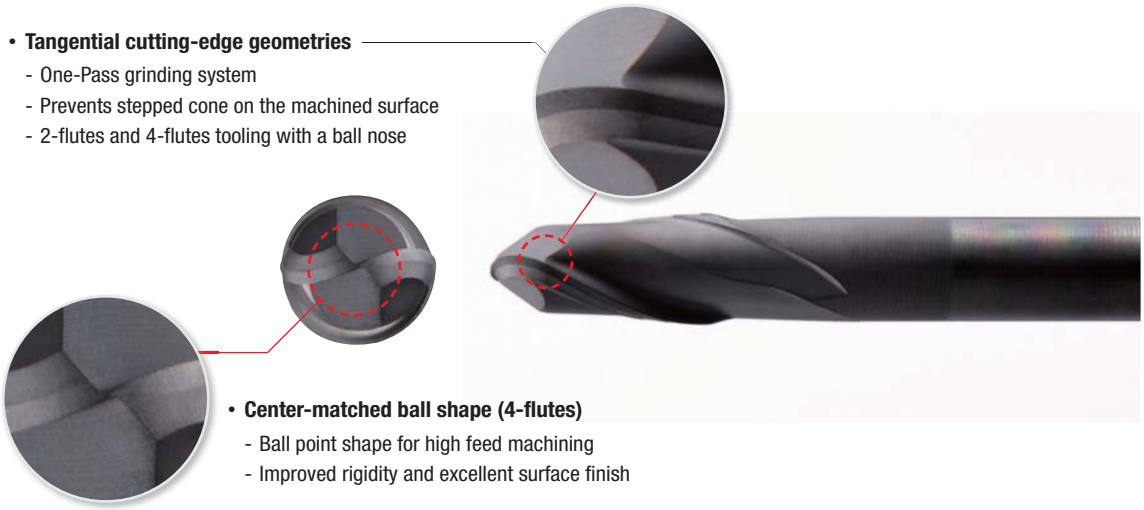
Endmill for machining dental prostheses

T Endmill

- For machining dental prostheses made of zirconia, titanium, Co-Cr, wax, PMMA, etc
- Optimized cutting performance by matching a proper grade with each type of materials
- Inhibited unevenness and excellent finish in machined surfaces due to the optimized cutting-edge design
- Specialized tool shape for each machine type

Features

- A dedicated tool for each machine - Meets marketplace demands
- A specialized grade for each workpiece - Provides optimized performance for various materials of implants
- Optimized cutting-edge design - Enables excellent machinability



- **Tangential cutting-edge geometries**
  - One-Pass grinding system
  - Prevents stepped cone on the machined surface
  - 2-flutes and 4-flutes tooling with a ball nose

- **Center-matched ball shape (4-flutes)**
  - Ball point shape for high feed machining
  - Improved rigidity and excellent surface finish

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Code system

T	Z	BE	2	030	-	050	-	N100	S04	(Z-MATCH)
T Endmill	Workpiece	Type	No. of flutes	Drill dia.		Overall length		Neck length	Shank dia.	Machine Maker

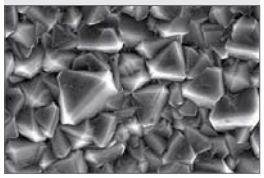
- **Workpiece**: Z : Zirconia; T : Ti/Co-Cr; W : Wax/PMMA
- **Type**: BE : Ball Endmill; FE : Flat Endmill; RE : Radius Endmill
- **No. of flutes**: 2 : 2 Flute
- **Drill dia.**: 030 : 3 mm
- **Overall length**: 050 : 50 mm
- **Neck length**: N100 : 10 mm
- **Shank dia.**: S04 : 4 mm

D Endmill

Grade solution for zirconia

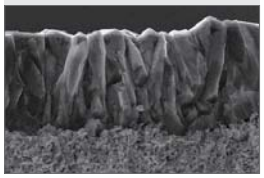
- **Development of ND3000 (Diamond-coated grade)**
  - High hardness diamond coating that is excellent in machining graphite and ceramic
  - Optimized for high speed and medium duty cutting thanks to its excellent grip to coated layers

Surface of ND3000



High hardness diamond coating (Hv 10,000) provides excellent wear resistance

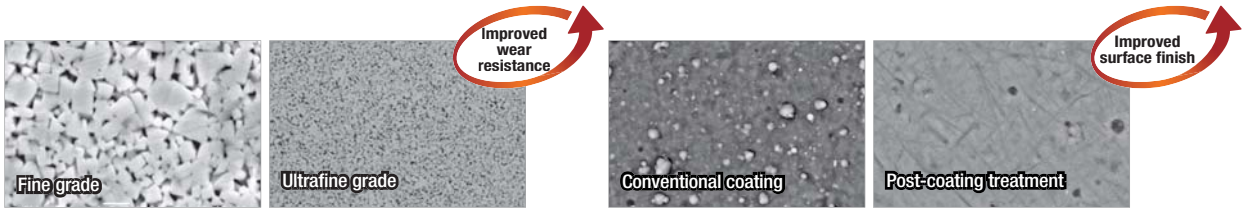
Cross section of coated layers



Specialized grade for Zirconia provides excellent adhesion

Grade solution for titanium

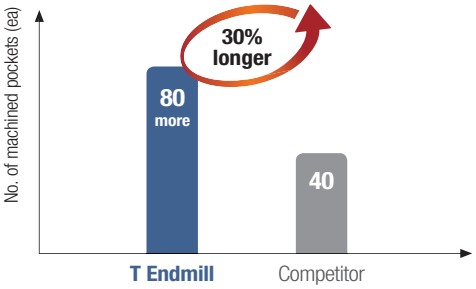
- **Development of PC2510 (Coated grade for high hardened steel)**
  - Post-coating treatment was applied to improve surface finish
  - A grade optimized for interrupted machining of high hardness steels and wet treatment accompanying high thermal shock. Its ultrafine substrate features high toughness which allows stable performance

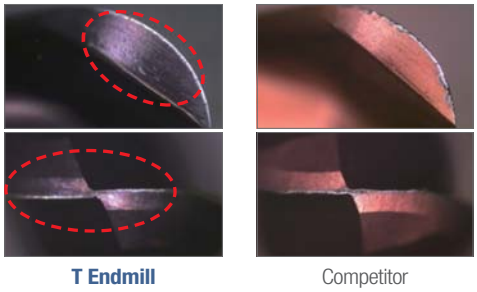


Performance evaluation

Workpiece	Co-Cr
Cutting conditions	vc (m/min) = 150, fz (mm/t) = 0.08
	ap (mm) = 0.13, ae (mm) = 0.7, wet
Tools	TTBE2030-050

[Test result]



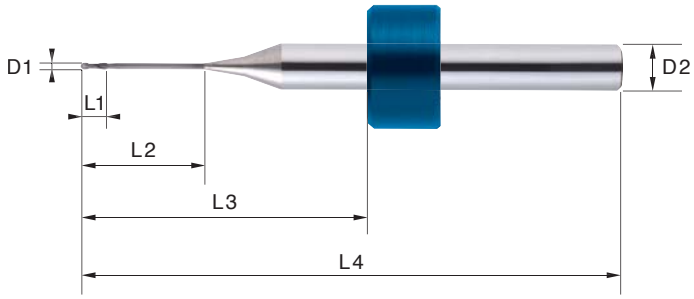


T Endmill Competitor

Excellent resistance to toughness and wear thanks to the new grade PC2510

Special T Endmill order form

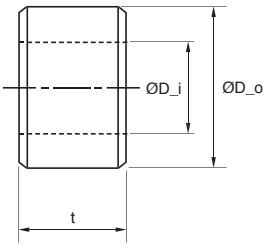
• Stop rings and other tool resources can be made to order



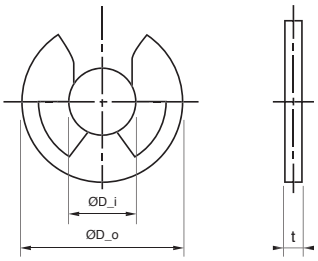
[Data Sheet]

Type of machine	
Workpiece	
Dental material	
Cutting diameter (D1)	
Shank diameter (D2)	
Cutting length (L1)	
Neck length (L2)	
Stop ring position (L3)	
Overall length (L4)	
Stop ring shape	

[Stop ring specification]



< Plastic ring >



< E type ring >

(mm)

Type	Stop ring			Shank diameter		
	ØD_o	ØD_i	t	Ø3	Ø4	Ø6
Plastic ring	Ø7.55	Ø3	4.45	●		
	Ø7.7	Ø4	5.0		●	
	Ø10.5	Ø6	6.5			●
E type ring	Ø6.0	Ø2.5	0.4	●		

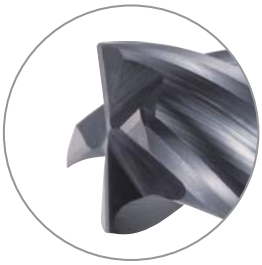
※ Stop ring can be made to order when specified sizes are send to an adjacent KORLOY sales office

Multi-functional Endmill, Highly Efficient

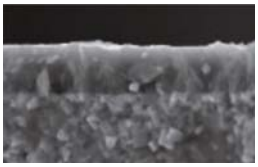
M+ Endmill

- Endmill with various applications Drilling, ramping, slotting, side milling
- Enhanced surface roughness and reduced cutting load due to excellent tool rigidity
- Strengthened machinability due to Cr-based coating layer application

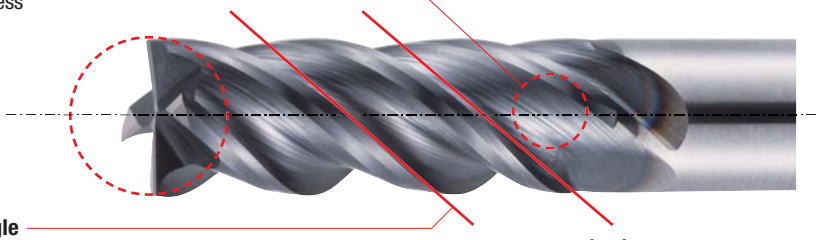
Features



- **Unique Cutting Edge**
  - For performing Multi functions Edge
  - Perform drill/endmill functions
  - High rigidity edge design
  - Champers to prevent chipping
  - Reducing cutting resistance and improving surface roughness



- **Optimal coating application**
  - Excellent wear resistance
  - Excellent thermal shock stability and high temperature hardness
  - Improve utilization and productivity



- **Variable Lead & Helix Angle**
  - Suppress Chatter & Vibration
  - Improve machining stability

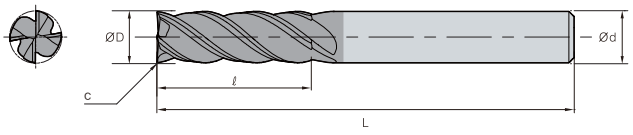
Helix Angle 38˚/41˚

MPRE4000-B

4 | 30°/41° HELIX | Substrate PC40T | DATA p.480~481

- TOLERANCE

ØD		Ød
Ø3 ~ Ø20	0 ~ -0.03mm	h6



(mm)

Designation	ØD	Ød	ℓ	L	C
MPRE 4030-054	3	6	5	54	-
MPRE 4040-054	4	6	11	54	0.04
MPRE 4050-054	5	6	13	54	0.05
MPRE 4060-054	6	6	13	54	0.06
MPRE 4080-065(-B)	8	8	19	65	0.08
MPRE 4100-075(-B)	10	10	22	75	0.1
MPRE 4120-082(-B)	12	12	26	82	0.12
MPRE 4140-082(-B)	14	14	26	82	0.12
MPRE 4160-100(-B)	16	16	32	100	0.16
MPRE 4200-105(-B)	20	20	38	105	0.2

※ -B : Weldon type is applicable for more than Ø8

Longer tool life and good surface finishes

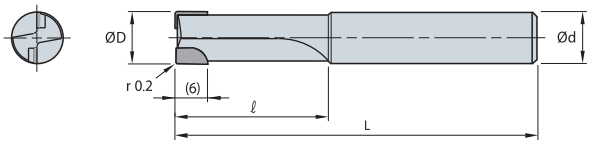
PCD Endmill

- Longer tool life and good surface roughness
- Reducing burrs at non-ferrous metals machining
- **1000 type**: Ultra finishing for non-ferrous metals
- **2000 type**: Optimal for aluminum alloy, carbon steel, graphite and reinforced Plastic machining

PDE1000/2000 (Flat)

1 | 2 | 0° HELIX | PCD | Substrate DP200 | DATA

p.481



(mm)

Designation	ØD	Ød	ℓ	L
PDE 1040	4	6	15	45
PDE 1050	5	6	15	50
PDE 1060	6	6	20	60
PDE 2060	6	8	20	60
PDE 2070	7	8	20	60
PDE 2080	8	8	20	60
PDE 2090	9	10	25	70
PDE 2100	10	10	25	70
PDE 2120	12	12	25	75

Special endmill order form

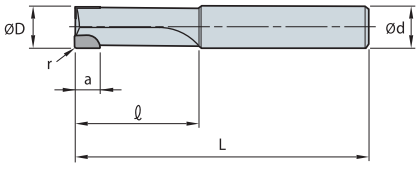


Fig. 1

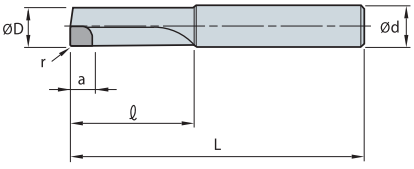
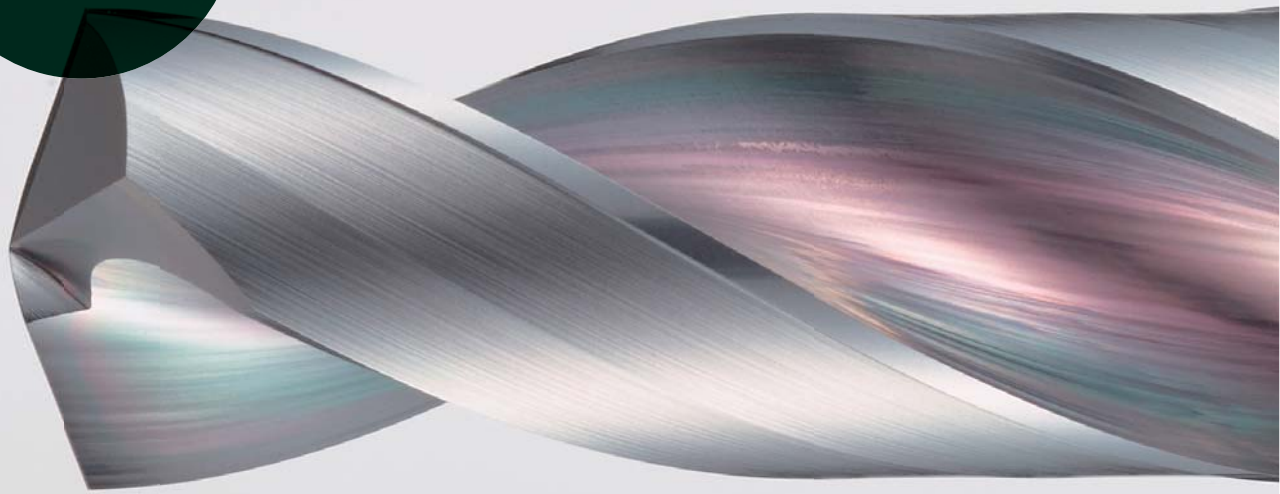


Fig. 2

Designation	Fig.	No. of flute	Dimension (mm)					
			ØD	Ød	r	a	ℓ	L
PDES								

※ Depending on customer requests, we can make special Endmill

PART 2



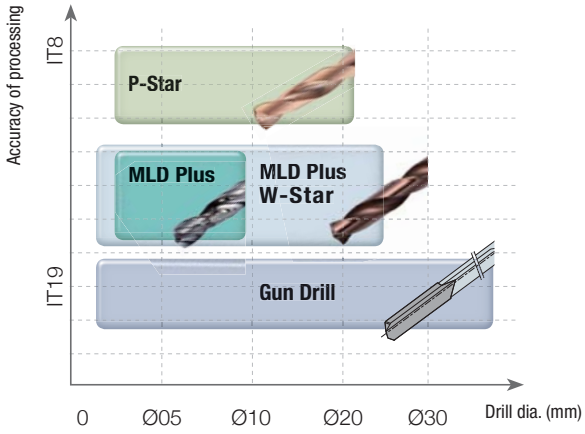
Drill

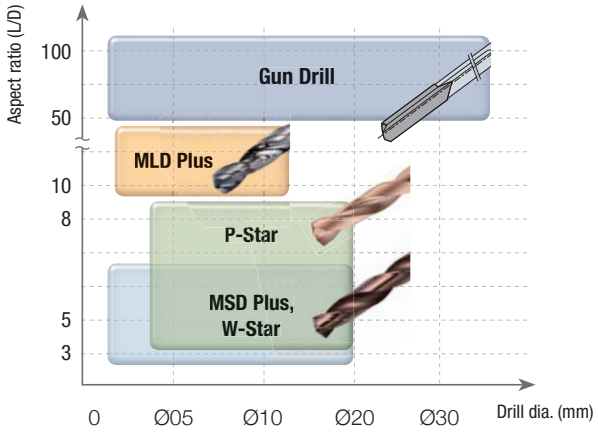
Product details

Technical information for Drill

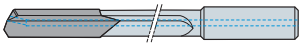
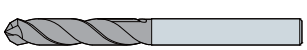
Solid Drill

Application area





Solid drill Line-up and features

Work-piece	Use	Product name	Coolant	Drill dia. (tolerance)	Aspect ratio (L/D)	Geometries	Features
P M K	Medium hardness	P-Star	Central/ peripheral	Ø3.0~20.0 (h7)	3D~8D		• The optimal international standard for high speed machining with ~ HRC50
P M K	General	MSD Plus	Central/ peripheral	Ø1.0~20.0 (h7)	3D~7D		• High efficiency machining for various workpiece machining such as automobile components
P M K	General	MLD Plus (Long drill)	Central	Ø3.0~10.0 (h7)	10D~25D		• For deep drilling with high efficiency and high quality
P M K	General	W-Star	Peripheral	Ø1.0~20.0 (h7)	5D~7D		• High efficient and economic endmill
P M K	General	MSFD	Central/ peripheral	Ø2.5~12.0 (h7)	2D~3D		• Flat drill for various types of drilling such as helical machining, curved surface machining, flat surface machining, etc.
P M K	General	Gun Drill	–	Ø3.0~33.0 (h7)	50D ~ 100D		• High efficient drilling of deep hole (50D~100D) • Availability of special types
S	HRSA	MSD Plus-S	Central	Ø3.0~16.0 (h7)	3D~5D		• For HRSA machining • For hard-to-cut material machining of aerospace, energy, power generation, automobile, etc.
N	CFRP	MSD Plus CFRP	Peripheral	Ø3.0~12.7 (m7)	5D		• Machining for CFRP workpiece
N	Non-ferrous metal, Aluminum	SSD-N	Peripheral	Ø1.0~13.0 (h7)	–		• Non-coated drill for non-ferrous steel and mild steel
N	Non-ferrous metal, Aluminum	PCD Drill	Peripheral	Ø2.0~12.0 (h7)	–		• High precision and surface finish • Cone/Sandwich type

Type	Designation		Shape	Drills dia.	Aspect ratio	Page
Solid Drills	Mach Solid Drill Plus	MSDP		Ø1.0 ~ Ø2.4	3D ~ 7D	247
		MSDPH		Ø2.5 ~ Ø20.0	3D ~ 7D	248
	Mach Solid Drill Plus-S	MSDPH-S		Ø3.0 ~ Ø16.0	3D ~ 5D	254
	Mach Long Drill Plus	MLD		Ø3.0 ~ Ø10.0	10D ~ 25D	259
	Mach Solid Drill Plus CFRP	MSDP-C		Ø3.0 ~ Ø12.7	5D	262
	Mach Solid Flat Drill	MSFD		Ø2.5 ~ Ø16.0	2D	264
		MSFDH		Ø2.5 ~ Ø16.0	3D	266
	P-Star Drill	HP503		Ø3.0 ~ Ø16.0	3D	270
		HPI503		Ø3.0 ~ Ø20.0	3D	272
		HPI505		Ø3.0 ~ Ø20.0	5D	275
		HPI508-N		Ø3.0 ~ Ø20.0	8D	278
		P503A(F)		Ø3.0 ~ Ø20.0	3D	280
		PI503A(F)		Ø3.0 ~ Ø20.0	3D	282
		PI505A(F)		Ø4.0 ~ Ø20.0	5D	284
	W-Star Drill	NDPG503		Ø1.0 ~ Ø13.0	3D	287
		NDPG504		Ø1.0 ~ Ø20.0	4D	289
		NDPG507		Ø3.0 ~ Ø20.0	7D	292
	Carbide Drill	SSD-N		Ø1.0 ~ Ø13.0	-	296
	Burnishing Drill	BDS		Ø4.0 ~ Ø16.0	5D ~ 7D	298
		BDT		Ø4.2 ~ Ø10.3	2D ~ 4D	298
	Top solid Drill	TSDM		Ø8.0 ~ Ø25.0	5D ~ 8D	299
	PCD Drill	PDD		Ø5.0 ~ Ø12.0	5D	300
		CPD		Ø2.0 ~ Ø8.0	3D ~ 5D	301
		CPDL		Ø2.0 ~ Ø8.0	12D ~ 45D	301
		SPD		Ø4.0 ~ Ø16.0	4D ~ 5D	302
	Gun Drill	KGDS		Ø3.0 ~ Ø33.0	50D ~ 100D	304
		KGDT		Ø6.0 ~ Ø26.5	50D ~ 100D	305

Highly efficient hole making for various workpieces including components

MSD Plus

Mach Solid Drill Plus

Code system

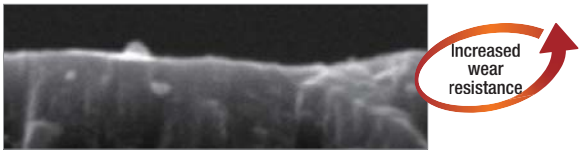
Special type

MSDP(H) 040 - 5 P - 100L - 5S

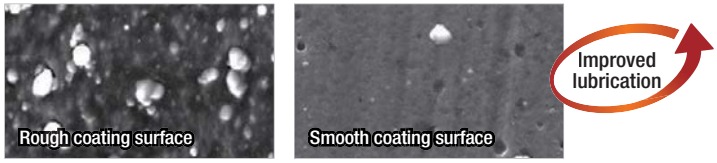
- **Oil hole**
  - None: MSDP
  - With oil hole: MSDPH
- **Drill dia.(ØD)**
  - 040: Ø4.0
  - (One decimal place marked)
- **Standard type**
  - Aspect ratio (L/D)
  - 3D, 5D, 7D
- **Special type**
  - Flute length
  - 100: 100 mm
- **Machining area**
  - P: Carbon steel, alloy steel
  - M: Stainless steel
  - K: Cast iron
  - N: Aluminum, copper alloy
- **Overall length**
  - 100L: 100 mm
- **Shank dia.**
  - 5S: Ø5

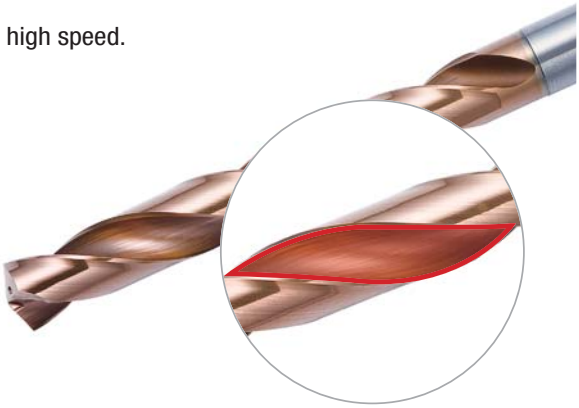
Features

- **New grade (PC325U)**
  - Lubricative coating layer improves welding resistance at middle to high speed.
  - Increase wear resistance in machining carbon steel



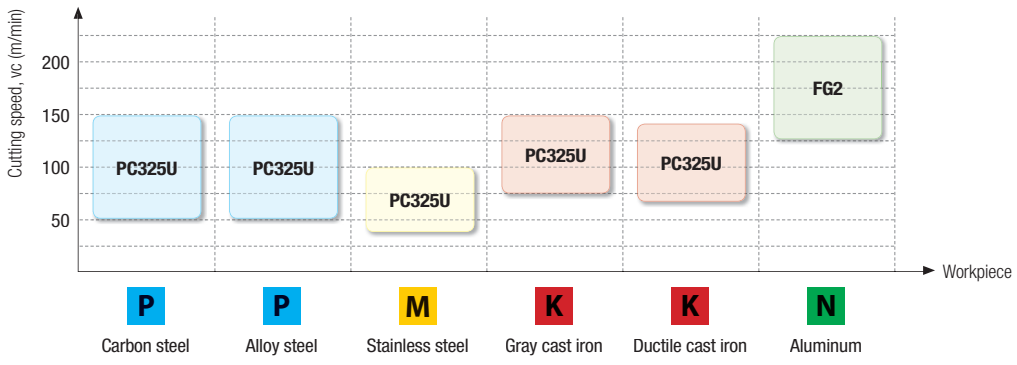
- **Surface of coating layer**
  - Increased welding resistance and lower cutting load
  - Reduced frictional resistance at cutting edges and on the flute



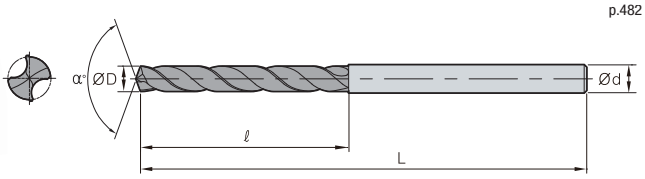


- **Flute shape**
  - Improved chip evacuation thanks to wider chip pocket

Application area



MSDP - □ (P/M/K/N)



DATA
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• TOLERANCE

Terminology	P	M	K	N
Grade	PC325U			FG2
Tolerance (drill Dia.)	h7			
Tolerance (shank Dia.)	h6			
Point angle	140°			135°
Twist angle	30°			
Thinning	X type			
Coolant	External			

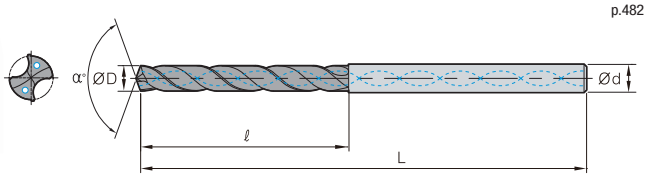
P Steel M Stainless steel K Cast iron N Non-ferrous metal

Designation	ØD	Ød	3P,M,K,N		5P,M,K,N	
			ℓ	L	ℓ	L
MSDP 010 - □ P,M,K,N	1	3	6	45	12	66
MSDP 011 - □ P,M,K,N	1.1	3	7	45	12	66
MSDP 012 - □ P,M,K,N	1.2	3	8	45	12	66
MSDP 013 - □ P,M,K,N	1.3	3	8	45	12	66
MSDP 014 - □ P,M,K,N	1.4	3	9	45	12	66
MSDP 015 - □ P,M,K,N	1.5	3	9	45	12	66
MSDP 016 - □ P,M,K,N	1.6	3	10	45	15	66
MSDP 017 - □ P,M,K,N	1.7	3	10	45	15	66
MSDP 018 - □ P,M,K,N	1.8	3	11	45	15	66
MSDP 019 - □ P,M,K,N	1.9	3	11	45	15	66
MSDP 020 - □ P,M,K,N	2	3	14	53	20	66
MSDP 021 - □ P,M,K,N	2.1	3	14	53	20	66
MSDP 022 - □ P,M,K,N	2.2	3	14	53	20	66
MSDP 023 - □ P,M,K,N	2.3	3	14	53	20	66
MSDP 024 - □ P,M,K,N	2.4	3	14	53	20	66

Drill

MSD Plus

MSDP(H) - □(P/M/K/N)



DATA
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• TOLERANCE

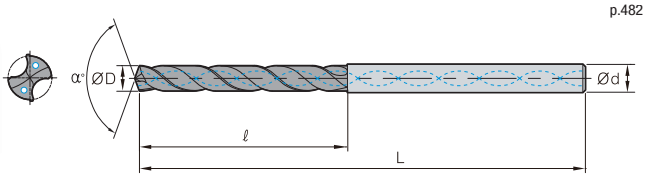
Terminology	P	M	K	N
Grade	PC325U			FG2
Tolerance (drill Dia.)	h7			
Tolerance (shank Dia.)	h6			
Point angle	140°			135°
Twist angle	30°			
Thinning	X type			
Coolant	Through/External			

P Steel M Stainless steel K Cast iron N Non-ferrous metal

(mm)

Designation	ØD	Ød	3P,M,K,N		5P,M,K,N		7P,M,K,N	
			ℓ	L	ℓ	L	ℓ	L
MSDP(H) 025 - □P,M,K,N	2.5	3	14	53	20	66	30	70
MSDP(H) 026 - □P,M,K,N	2.6	3	17	53	20	66	30	70
MSDP(H) 027 - □P,M,K,N	2.7	3	17	53	20	66	30	70
MSDP(H) 028 - □P,M,K,N	2.8	3	17	53	20	66	30	70
MSDP(H) 029 - □P,M,K,N	2.9	3	17	53	20	66	30	70
MSDP(H) 030 - □P,M,K,N	3	3	17	53	20	66	30	70
MSDP(H) 031 - □P,M,K,N	3.1	4	20	58	28	74	30	70
MSDP(H) 032 - □P,M,K,N	3.2	4	20	58	28	74	30	70
MSDP(H) 033 - □P,M,K,N	3.3	4	20	58	28	74	30	70
MSDP(H) 034 - □P,M,K,N	3.4	4	20	58	28	74	37.5	75
MSDP(H) 035 - □P,M,K,N	3.5	4	20	58	28	74	37.5	75
MSDP(H) 036 - □P,M,K,N	3.6	4	22	58	32	74	37.5	75
MSDP(H) 037 - □P,M,K,N	3.7	4	22	58	32	74	37.5	75
MSDP(H) 038 - □P,M,K,N	3.8	4	22	58	32	74	37.5	75
MSDP(H) 039 - □P,M,K,N	3.9	4	22	58	32	74	37.5	75
MSDP(H) 040 - □P,M,K,N	4	4	22	58	32	74	37.5	75
MSDP(H) 041 - □P,M,K,N	4.1	5	24	62	36	82	37.5	75
MSDP(H) 042 - □P,M,K,N	4.2	5	24	62	36	82	37.5	75
MSDP(H) 043 - □P,M,K,N	4.3	5	24	62	36	82	45	85
MSDP(H) 044 - □P,M,K,N	4.4	5	24	62	36	82	45	85
MSDP(H) 045 - □P,M,K,N	4.5	5	24	62	36	82	45	85
MSDP(H) 046 - □P,M,K,N	4.6	5	26	62	38	82	45	85
MSDP(H) 047 - □P,M,K,N	4.7	5	26	62	38	82	45	85
MSDP(H) 048 - □P,M,K,N	4.8	5	26	62	38	82	50	90
MSDP(H) 049 - □P,M,K,N	4.9	5	26	62	38	82	50	90
MSDP(H) 050 - □P,M,K,N	5	5	26	62	38	82	50	90
MSDP(H) 051 - □P,M,K,N	5.1	6	28	66	44	82	50	90
MSDP(H) 052 - □P,M,K,N	5.2	6	28	66	44	82	50	90
MSDP(H) 053 - □P,M,K,N	5.3	6	28	66	44	82	50	90
MSDP(H) 054 - □P,M,K,N	5.4	6	28	66	44	82	50	90
MSDP(H) 055 - □P,M,K,N	5.5	6	28	66	44	82	57	97
MSDP(H) 056 - □P,M,K,N	5.6	6	28	66	44	82	57	97
MSDP(H) 057 - □P,M,K,N	5.7	6	28	66	44	82	57	97
MSDP(H) 058 - □P,M,K,N	5.8	6	28	66	44	82	57	97
MSDP(H) 059 - □P,M,K,N	5.9	6	28	66	44	82	57	97
MSDP(H) 060 - □P,M,K,N	6	6	28	66	44	82	57	97
MSDP(H) 061 - □P,M,K,N	6.1	7	34	74	50	91	66	106

MSDP(H) - □(P/M/K/N)



DATA
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• TOLERANCE

Terminology	P	M	K	N
Grade	PC325U			FG2
Tolerance (drill Dia.)	h7			
Tolerance (shank Dia.)	h6			
Point angle	140°			135°
Twist angle	30°			
Thinning	X type			
Coolant	Through/External			

P Steel M Stainless steel K Cast iron N Non-ferrous metal

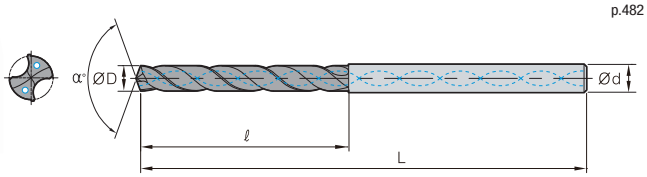
(mm)

Designation	ØD	Ød	3P,M,K,N		5P,M,K,N		7P,M,K,N	
			ℓ	L	ℓ	L	ℓ	L
MSDP(H) 062 - □P,M,K,N	6.2	7	34	74	50	91	66	106
MSDP(H) 063 - □P,M,K,N	6.3	7	34	74	50	91	66	106
MSDP(H) 064 - □P,M,K,N	6.4	7	34	74	50	91	66	106
MSDP(H) 065 - □P,M,K,N	6.5	7	34	74	50	91	66	106
MSDP(H) 066 - □P,M,K,N	6.6	7	34	74	50	91	66	106
MSDP(H) 067 - □P,M,K,N	6.7	7	34	74	50	91	66	106
MSDP(H) 068 - □P,M,K,N	6.8	7	34	74	50	91	66	106
MSDP(H) 069 - □P,M,K,N	6.9	7	34	74	50	91	76	116
MSDP(H) 070 - □P,M,K,N	7	7	34	74	50	91	76	116
MSDP(H) 071 - □P,M,K,N	7.1	8	41	79	53	91	76	116
MSDP(H) 072 - □P,M,K,N	7.2	8	41	79	53	91	76	116
MSDP(H) 073 - □P,M,K,N	7.3	8	41	79	53	91	76	116
MSDP(H) 074 - □P,M,K,N	7.4	8	41	79	53	91	76	116
MSDP(H) 075 - □P,M,K,N	7.5	8	41	79	53	91	76	116
MSDP(H) 076 - □P,M,K,N	7.6	8	41	79	53	91	76	116
MSDP(H) 077 - □P,M,K,N	7.7	8	41	79	53	91	76	116
MSDP(H) 078 - □P,M,K,N	7.8	8	41	79	53	91	76	116
MSDP(H) 079 - □P,M,K,N	7.9	8	41	79	53	91	76	116
MSDP(H) 080 - □P,M,K,N	8	8	43	84	58	98	87	131
MSDP(H) 081 - □P,M,K,N	8.1	9	43	84	58	98	87	131
MSDP(H) 082 - □P,M,K,N	8.2	9	43	84	58	98	87	131
MSDP(H) 083 - □P,M,K,N	8.3	9	43	84	58	98	87	131
MSDP(H) 084 - □P,M,K,N	8.4	9	43	84	58	98	87	131
MSDP(H) 085 - □P,M,K,N	8.5	9	43	84	58	98	87	131
MSDP(H) 086 - □P,M,K,N	8.6	9	43	84	58	98	87	131
MSDP(H) 087 - □P,M,K,N	8.7	9	43	84	58	98	87	131
MSDP(H) 088 - □P,M,K,N	8.8	9	43	84	58	98	87	131
MSDP(H) 089 - □P,M,K,N	8.9	9	43	84	58	98	87	131
MSDP(H) 090 - □P,M,K,N	9	9	43	84	58	98	87	131
MSDP(H) 091 - □P,M,K,N	9.1	10	47	89	61	105	95	139
MSDP(H) 092 - □P,M,K,N	9.2	10	47	89	61	105	95	139
MSDP(H) 093 - □P,M,K,N	9.3	10	47	89	61	105	95	139
MSDP(H) 094 - □P,M,K,N	9.4	10	47	89	61	105	95	139
MSDP(H) 095 - □P,M,K,N	9.5	10	47	89	61	105	95	139
MSDP(H) 096 - □P,M,K,N	9.6	10	47	89	61	105	95	139
MSDP(H) 097 - □P,M,K,N	9.7	10	47	89	61	105	95	139
MSDP(H) 098 - □P,M,K,N	9.8	10	47	89	61	105	95	139

Drill

MSD Plus

MSDP(H) - □(P/M/K/N)



DATA
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• TOLERANCE

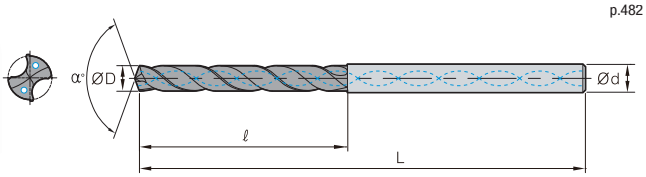
Terminology	P	M	K	N
Grade	PC325U			FG2
Tolerance (drill Dia.)	h7			
Tolerance (shank Dia.)	h6			
Point angle	140°			135°
Twist angle	30°			
Thinning	X type			
Coolant	Through/External			

P Steel M Stainless steel K Cast iron N Non-ferrous metal

(mm)

Designation	ØD	Ød	3P,M,K,N		5P,M,K,N		7P,M,K,N	
			ℓ	L	ℓ	L	ℓ	L
MSDP(H) 099 - □P,M,K,N	9.9	10	47	89	61	105	95	139
MSDP(H) 100 - □P,M,K,N	10	10	47	89	61	105	95	139
MSDP(H) 101 - □P,M,K,N	10.1	11	55	95	68	114	106	155
MSDP(H) 102 - □P,M,K,N	10.2	11	55	95	68	114	106	155
MSDP(H) 103 - □P,M,K,N	10.3	11	55	95	68	114	106	155
MSDP(H) 104 - □P,M,K,N	10.4	11	55	95	68	114	106	155
MSDP(H) 105 - □P,M,K,N	10.5	11	55	95	68	114	106	155
MSDP(H) 106 - □P,M,K,N	10.6	11	55	95	68	114	106	155
MSDP(H) 107 - □P,M,K,N	10.7	11	55	95	68	114	106	155
MSDP(H) 108 - □P,M,K,N	10.8	11	55	95	68	114	106	155
MSDP(H) 109 - □P,M,K,N	10.9	11	55	95	68	114	106	155
MSDP(H) 110 - □P,M,K,N	11	11	55	95	68	114	106	155
MSDP(H) 111 - □P,M,K,N	11.1	12	55	102	71	120	114	163
MSDP(H) 112 - □P,M,K,N	11.2	12	55	102	71	120	114	163
MSDP(H) 113 - □P,M,K,N	11.3	12	55	102	71	120	114	163
MSDP(H) 114 - □P,M,K,N	11.4	12	55	102	71	120	114	163
MSDP(H) 115 - □P,M,K,N	11.5	12	55	102	71	120	114	163
MSDP(H) 116 - □P,M,K,N	11.6	12	55	102	71	120	114	163
MSDP(H) 117 - □P,M,K,N	11.7	12	55	102	71	120	114	163
MSDP(H) 118 - □P,M,K,N	11.8	12	55	102	71	120	114	163
MSDP(H) 119 - □P,M,K,N	11.9	12	55	102	71	120	114	163
MSDP(H) 120 - □P,M,K,N	12	12	55	102	71	120	114	163
MSDP(H) 121 - □P,M,K,N	12.1	13	60	107	77	124	133	182
MSDP(H) 122 - □P,M,K,N	12.2	13	60	107	77	124	133	182
MSDP(H) 123 - □P,M,K,N	12.3	13	60	107	77	124	133	182
MSDP(H) 124 - □P,M,K,N	12.4	13	60	107	77	124	133	182
MSDP(H) 125 - □P,M,K,N	12.5	13	60	107	77	124	133	182
MSDP(H) 126 - □P,M,K,N	12.6	13	60	107	77	124	133	182
MSDP(H) 127 - □P,M,K,N	12.7	13	60	107	77	124	133	182
MSDP(H) 128 - □P,M,K,N	12.8	13	60	107	77	124	133	182
MSDP(H) 129 - □P,M,K,N	12.9	13	60	107	77	124	133	182
MSDP(H) 130 - □P,M,K,N	13	13	60	107	77	124	133	182
MSDP(H) 131 - □P,M,K,N	13.1	14	62	107	80	133	133	182
MSDP(H) 132 - □P,M,K,N	13.2	14	62	107	80	133	133	182
MSDP(H) 133 - □P,M,K,N	13.3	14	62	107	80	133	133	182
MSDP(H) 134 - □P,M,K,N	13.4	14	62	107	80	133	133	182
MSDP(H) 135 - □P,M,K,N	13.5	14	62	107	80	133	133	182

MSDP(H) - □(P/M/K/N)



DATA
p.482

• TOLERANCE

Terminology	P	M	K	N
Grade	PC325U			FG2
Tolerance (drill Dia.)	h7			
Tolerance (shank Dia.)	h6			
Point angle	140°			135°
Twist angle	30°			
Thinning	X type			
Coolant	Through/External			

P Steel M Stainless steel K Cast iron N Non-ferrous metal

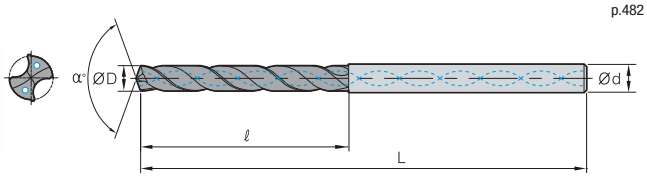
(mm)

Designation	ØD	Ød	3P,M,K,N		5P,M,K,N		7P,M,K,N	
			ℓ	L	ℓ	L	ℓ	L
MSDP(H) 136 - □P,M,K,N	13.6	14	62	107	80	133	133	182
MSDP(H) 137 - □P,M,K,N	13.7	14	62	107	80	133	133	182
MSDP(H) 138 - □P,M,K,N	13.8	14	62	107	80	133	133	182
MSDP(H) 139 - □P,M,K,N	13.9	14	62	107	80	133	133	182
MSDP(H) 140 - □P,M,K,N	14	14	62	107	80	133	133	182
MSDP(H) 141 - □P,M,K,N	14.1	15	65	115	85	143	152	204
MSDP(H) 142 - □P,M,K,N	14.2	15	65	115	85	143	152	204
MSDP(H) 143 - □P,M,K,N	14.3	15	65	115	85	143	152	204
MSDP(H) 144 - □P,M,K,N	14.4	15	65	115	85	143	152	204
MSDP(H) 145 - □P,M,K,N	14.5	15	65	115	85	143	152	204
MSDP(H) 146 - □P,M,K,N	14.6	15	65	115	85	143	152	204
MSDP(H) 147 - □P,M,K,N	14.7	15	65	115	85	143	152	204
MSDP(H) 148 - □P,M,K,N	14.8	15	65	115	85	143	152	204
MSDP(H) 149 - □P,M,K,N	14.9	15	65	115	85	143	152	204
MSDP(H) 150 - □P,M,K,N	15	15	65	115	85	143	152	204
MSDP(H) 151 - □P,M,K,N	15.1	16	68	115	88	143	152	204
MSDP(H) 152 - □P,M,K,N	15.2	16	68	115	88	143	152	204
MSDP(H) 153 - □P,M,K,N	15.3	16	68	115	88	143	152	204
MSDP(H) 154 - □P,M,K,N	15.4	16	68	115	88	143	152	204
MSDP(H) 155 - □P,M,K,N	15.5	16	68	115	88	143	152	204
MSDP(H) 156 - □P,M,K,N	15.6	16	68	115	88	143	152	204
MSDP(H) 157 - □P,M,K,N	15.7	16	68	115	88	143	152	204
MSDP(H) 158 - □P,M,K,N	15.8	16	68	115	88	143	152	204
MSDP(H) 159 - □P,M,K,N	15.9	16	68	115	88	143	152	204
MSDP(H) 160 - □P,M,K,N	16	16	68	115	88	143	152	204
MSDP(H) 161 - □P,M,K,N	16.1	17	73	123	93	153	171	223
MSDP(H) 162 - □P,M,K,N	16.2	17	73	123	93	153	171	223
MSDP(H) 163 - □P,M,K,N	16.3	17	73	123	93	153	171	223
MSDP(H) 164 - □P,M,K,N	16.4	17	73	123	93	153	171	223
MSDP(H) 165 - □P,M,K,N	16.5	17	73	123	93	153	171	223
MSDP(H) 166 - □P,M,K,N	16.6	17	73	123	93	153	171	223
MSDP(H) 167 - □P,M,K,N	16.7	17	73	123	93	153	171	223
MSDP(H) 168 - □P,M,K,N	16.8	17	73	123	93	153	171	223
MSDP(H) 169 - □P,M,K,N	16.9	17	73	123	93	153	171	223
MSDP(H) 170 - □P,M,K,N	17	17	73	123	93	153	171	223
MSDP(H) 171 - □P,M,K,N	17.1	18	73	123	98	153	171	223
MSDP(H) 172 - □P,M,K,N	17.2	18	73	123	98	153	171	223

Drill

MSD Plus

MSDP(H) - □(P/M/K/N)



DATA
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• TOLERANCE

Terminology	P	M	K	N
Grade	PC325U			FG2
Tolerance (drill Dia.)	h7			
Tolerance (shank Dia.)	h6			
Point angle	140°			135°
Twist angle	30°			
Thinning	X type			
Coolant	Through/External			

P Steel M Stainless steel K Cast iron N Non-ferrous metal

(mm)

Designation	ØD	Ød	3P,M,K,N		5P,M,K,N		7P,M,K,N	
			ℓ	L	ℓ	L	ℓ	L
MSDP(H) 173 - □P,M,K,N	17.3	18	73	123	98	153	171	223
MSDP(H) 174 - □P,M,K,N	17.4	18	73	123	98	153	171	223
MSDP(H) 175 - □P,M,K,N	17.5	18	73	123	98	153	171	223
MSDP(H) 176 - □P,M,K,N	17.6	18	73	123	98	153	171	223
MSDP(H) 177 - □P,M,K,N	17.7	18	73	123	98	153	171	223
MSDP(H) 178 - □P,M,K,N	17.8	18	73	123	98	153	171	223
MSDP(H) 179 - □P,M,K,N	17.9	18	73	123	98	153	171	223
MSDP(H) 180 - □P,M,K,N	18	18	73	123	98	153	171	223
MSDP(H) 181 - □P,M,K,N	18.1	19	79	131	103	153	190	244
MSDP(H) 182 - □P,M,K,N	18.2	19	79	131	103	153	190	244
MSDP(H) 183 - □P,M,K,N	18.3	19	79	131	103	153	190	244
MSDP(H) 184 - □P,M,K,N	18.4	19	79	131	103	153	190	244
MSDP(H) 185 - □P,M,K,N	18.5	19	79	131	103	153	190	244
MSDP(H) 186 - □P,M,K,N	18.6	19	79	131	103	153	190	244
MSDP(H) 187 - □P,M,K,N	18.7	19	79	131	103	153	190	244
MSDP(H) 188 - □P,M,K,N	18.8	19	79	131	103	153	190	244
MSDP(H) 189 - □P,M,K,N	18.9	19	79	131	103	153	190	244
MSDP(H) 190 - □P,M,K,N	19	19	79	131	103	153	190	244
MSDP(H) 191 - □P,M,K,N	19.1	20	79	131	107	153	190	244
MSDP(H) 192 - □P,M,K,N	19.2	20	79	131	107	153	190	244
MSDP(H) 193 - □P,M,K,N	19.3	20	79	131	107	153	190	244
MSDP(H) 194 - □P,M,K,N	19.4	20	79	131	107	153	190	244
MSDP(H) 195 - □P,M,K,N	19.5	20	79	131	107	153	190	244
MSDP(H) 196 - □P,M,K,N	19.6	20	79	131	107	153	190	244
MSDP(H) 197 - □P,M,K,N	19.7	20	79	131	107	153	190	244
MSDP(H) 198 - □P,M,K,N	19.8	20	79	131	107	153	190	244
MSDP(H) 199 - □P,M,K,N	19.9	20	79	131	107	153	190	244
MSDP(H) 200 - □P,M,K,N	20	20	79	131	107	153	190	244

Specialized for heat-resistant alloys used in the aerospace, energy, power generation and automotive industries

MSD Plus-S

Mach Solid Drill Plus-S

- Improved Productivity and Excellent Machinability - Ensuring machinability with optimized blade design and chip pockets
- Stronger Resistance to Wear - Extended tool life due to excellent high temp resistance to chipping

Code system

Special type

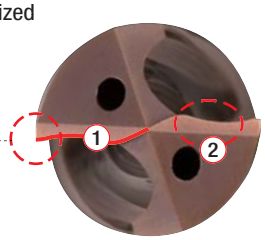
MSDP(H) 060 - 5 S - 100L - 5S

- **Oil hole**: None: MSDP; With oil hole: MSDPH
- **Drill dia.(ØD)**: 060: Ø6.0
- **Standard type**: Aspect ratio (L/D) 3D, 5D
- **Special type**: Flute length 50: 50 mm
- **Machining area**: S: HRSA
- **Overall length**: 100L: 100 mm
- **Shank dia.**: 5S: Ø5

Features

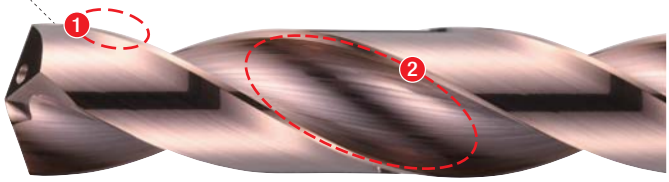
- Notch-controlled blade design and specially treated cutting edges prevent chipping and breakage

① Cutting edges designed for low cutting resistance
② Tip relief angle and shape optimized for heat evacuation

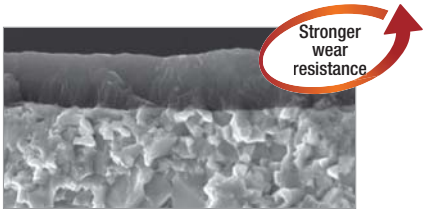


- Optimized margin and back-tapered design

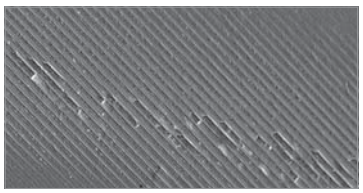
❶ Reduced friction resistance and cutting temperature
❷ Wider chip pockets improve chip evacuation



- Improved resistance to heat and oxidation thanks to the newly applied grade, PC325T
- Reduced friction resistance and improved chip evacuation due to excellent surface finish
- Exceptional wear resistance when machining heat-resistant alloys at high temperatures



PC325T

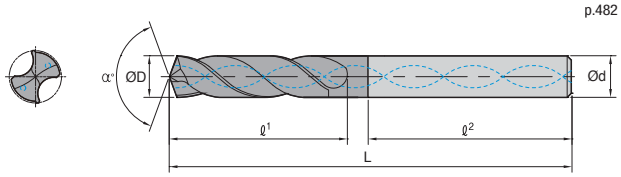


Smooth coating surface

Drill

MSD Plus-S

MSDPH-S



DATA
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• TOLERANCE

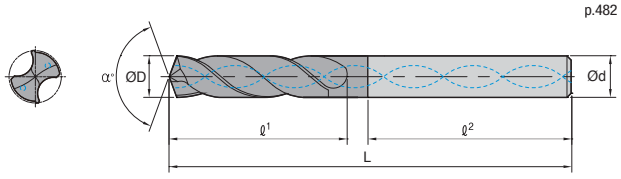
Terminology	S
Grade	PC325T
Tolerance (drill Dia.)	h7
Tolerance (shank Dia.)	h6
Point angle	140°
Twist angle	30°
Thinning	X type
Coolant	Through
International standard	DIN 6537
Shank type	DIN 6535 HA

S Heat resistant alloy, Titanium alloy

(mm)

Designation	ØD		Ød	3S		5S		ℓ2
	mm	inch		ℓ1	L	ℓ1	L	
MSDPH 030 - □S	3.00	-	6	20	62	28	66	36
MSDPH 031 - □S	3.10	-	6	20	62	28	66	36
MSDPH 0318 - □S	3.18	1/8	6	20	62	28	66	36
MSDPH 032 - □S	3.20	-	6	20	62	28	66	36
MSDPH 033 - □S	3.30	-	6	20	62	28	66	36
MSDPH 034 - □S	3.40	-	6	20	62	28	66	36
MSDPH 035 - □S	3.50	-	6	20	62	28	66	36
MSDPH 0357 - □S	3.57	9/64	6	20	62	28	66	36
MSDPH 036 - □S	3.60	-	6	20	62	28	66	36
MSDPH 037 - □S	3.70	-	6	20	62	28	66	36
MSDPH 038 - □S	3.80	-	6	24	66	36	74	36
MSDPH 039 - □S	3.90	-	6	24	66	36	74	36
MSDPH 0397 - □S	3.97	5/32	6	24	66	36	74	36
MSDPH 040 - □S	4.00	-	6	24	66	36	74	36
MSDPH 041 - □S	4.10	-	6	24	66	36	74	36
MSDPH 042 - □S	4.20	-	6	24	66	36	74	36
MSDPH 043 - □S	4.30	-	6	24	66	36	74	36
MSDPH 0437 - □S	4.37	11/64	6	24	66	36	74	36
MSDPH 044 - □S	4.40	-	6	24	66	36	74	36
MSDPH 045 - □S	4.50	-	6	24	66	36	74	36
MSDPH 046 - □S	4.60	-	6	24	66	36	74	36
MSDPH 047 - □S	4.70	-	6	24	66	36	74	36
MSDPH 0476 - □S	4.76	3/16	6	28	66	44	82	36
MSDPH 048 - □S	4.80	-	6	28	66	44	82	36
MSDPH 049 - □S	4.90	-	6	28	66	44	82	36
MSDPH 050 - □S	5.00	-	6	28	66	44	82	36
MSDPH 051 - □S	5.10	-	6	28	66	44	82	36
MSDPH 0516 - □S	5.16	13/64	6	28	66	44	82	36
MSDPH 052 - □S	5.20	-	6	28	66	44	82	36
MSDPH 053 - □S	5.30	-	6	28	66	44	82	36
MSDPH 054 - □S	5.40	-	6	28	66	44	82	36
MSDPH 055 - □S	5.50	-	6	28	66	44	82	36
MSDPH 0556 - □S	5.56	7/32	6	28	66	44	82	36
MSDPH 056 - □S	5.60	-	6	28	66	44	82	36
MSDPH 057 - □S	5.70	-	6	28	66	44	82	36
MSDPH 058 - □S	5.80	-	6	28	66	44	82	36
MSDPH 059 - □S	5.90	-	6	28	66	44	82	36
MSDPH 0595 - □S	5.95	15/64	6	28	66	44	82	36
MSDPH 060 - □S	6.00	-	6	28	66	44	82	36

MSDPH-S



DATA
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• TOLERANCE

Terminology	S
Grade	PC325T
Tolerance (drill Dia.)	h7
Tolerance (shank Dia.)	h6
Point angle	140°
Twist angle	30°
Thinning	X type
Coolant	Through
International standard	DIN 6537
Shank type	DIN 6535 HA

S Heat resistant alloy, Titanium alloy

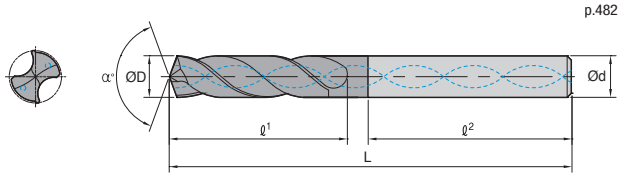
(mm)

Designation	ØD		Ød	3S		5S		ℓ2
	mm	inch		ℓ1	L	ℓ1	L	
MSDPH 061 - □S	6.10	-	8	34	79	53	91	36
MSDPH 062 - □S	6.20	-	8	34	79	53	91	36
MSDPH 063 - □S	6.30	-	8	34	79	53	91	36
MSDPH 0635 - □S	6.35	1/4	8	34	79	53	91	36
MSDPH 064 - □S	6.40	-	8	34	79	53	91	36
MSDPH 065 - □S	6.50	-	8	34	79	53	91	36
MSDPH 066 - □S	6.60	-	8	34	79	53	91	36
MSDPH 067 - □S	6.70	-	8	34	79	53	91	36
MSDPH 0675 - □S	6.75	17/64	8	34	79	53	91	36
MSDPH 068 - □S	6.80	-	8	34	79	53	91	36
MSDPH 069 - □S	6.90	-	8	34	79	53	91	36
MSDPH 070 - □S	7.00	-	8	34	79	53	91	36
MSDPH 071 - □S	7.10	-	8	41	79	53	91	36
MSDPH 0714 - □S	7.14	9/32	8	41	79	53	91	36
MSDPH 072 - □S	7.20	-	8	41	79	53	91	36
MSDPH 073 - □S	7.30	-	8	41	79	53	91	36
MSDPH 074 - □S	7.40	-	8	41	79	53	91	36
MSDPH 075 - □S	7.50	-	8	41	79	53	91	36
MSDPH 0754 - □S	7.54	19/64	8	41	79	53	91	36
MSDPH 076 - □S	7.60	-	8	41	79	53	91	36
MSDPH 077 - □S	7.70	-	8	41	79	53	91	36
MSDPH 078 - □S	7.80	-	8	41	79	53	91	36
MSDPH 079 - □S	7.90	-	8	41	79	53	91	36
MSDPH 0794 - □S	7.94	5/16	8	41	79	53	91	36
MSDPH 080 - □S	8.00	-	8	41	79	53	91	36
MSDPH 081 - □S	8.10	-	10	47	89	61	103	40
MSDPH 082 - □S	8.20	-	10	47	89	61	103	40
MSDPH 083 - □S	8.30	-	10	47	89	61	103	40
MSDPH 0833 - □S	8.33	21/64	10	47	89	61	103	40
MSDPH 084 - □S	8.40	-	10	47	89	61	103	40
MSDPH 085 - □S	8.50	-	10	47	89	61	103	40
MSDPH 086 - □S	8.60	-	10	47	89	61	103	40
MSDPH 087 - □S	8.70	-	10	47	89	61	103	40
MSDPH 0873 - □S	8.73	11/32	10	47	89	61	103	40
MSDPH 088 - □S	8.80	-	10	47	89	61	103	40
MSDPH 089 - □S	8.90	-	10	47	89	61	103	40
MSDPH 090 - □S	9.00	-	10	47	89	61	103	40
MSDPH 091 - □S	9.10	-	10	47	89	61	103	40
MSDPH 0913 - □S	9.13	23/64	10	47	89	61	103	40

Drill

MSD Plus-S

MSDPH-S



DATA
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• TOLERANCE

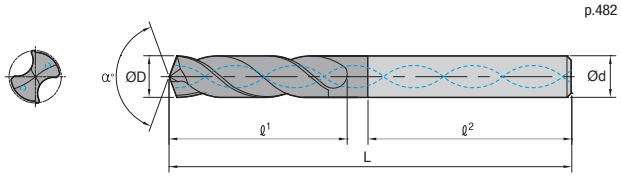
Terminology	S
Grade	PC325T
Tolerance (drill Dia.)	h7
Tolerance (shank Dia.)	h6
Point angle	140°
Twist angle	30°
Thinning	X type
Coolant	Through
International standard	DIN 6537
Shank type	DIN 6535 HA

S Heat resistant alloy, Titanium alloy

(mm)

Designation	ØD		Ød	3S		5S		ℓ2
	mm	inch		ℓ1	L	ℓ1	L	
MSDPH 092 - □S	9.20	-	10	47	89	61	103	40
MSDPH 093 - □S	9.30	-	10	47	89	61	103	40
MSDPH 094 - □S	9.40	-	10	47	89	61	103	40
MSDPH 095 - □S	9.50	-	10	47	89	61	103	40
MSDPH 0953 - □S	9.53	3/8	10	47	89	61	103	40
MSDPH 096 - □S	9.60	-	10	47	89	61	103	40
MSDPH 097 - □S	9.70	-	10	47	89	61	103	40
MSDPH 098 - □S	9.80	-	10	47	89	61	103	40
MSDPH 099 - □S	9.90	-	10	47	89	61	103	40
MSDPH 0992 - □S	9.92	25/64	10	47	89	61	103	40
MSDPH 100 - □S	10.00	-	10	47	89	61	103	40
MSDPH 101 - □S	10.10	-	12	55	102	71	118	45
MSDPH 102 - □S	10.20	-	12	55	102	71	118	45
MSDPH 103 - □S	10.30	-	12	55	102	71	118	45
MSDPH 1032 - □S	10.32	13/32	12	55	102	71	118	45
MSDPH 104 - □S	10.40	-	12	55	102	71	118	45
MSDPH 105 - □S	10.50	-	12	55	102	71	118	45
MSDPH 106 - □S	10.60	-	12	55	102	71	118	45
MSDPH 107 - □S	10.70	-	12	55	102	71	118	45
MSDPH 1072 - □S	10.72	27/64	12	55	102	71	118	45
MSDPH 108 - □S	10.80	-	12	55	102	71	118	45
MSDPH 109 - □S	10.90	-	12	55	102	71	118	45
MSDPH 110 - □S	11.00	-	12	55	102	71	118	45
MSDPH 111 - □S	11.10	-	12	55	102	71	118	45
MSDPH 1111 - □S	11.11	7/16	12	55	102	71	118	45
MSDPH 112 - □S	11.20	-	12	55	102	71	118	45
MSDPH 113 - □S	11.30	-	12	55	102	71	118	45
MSDPH 114 - □S	11.40	-	12	55	102	71	118	45
MSDPH 115 - □S	11.50	-	12	55	102	71	118	45
MSDPH 1151 - □S	11.51	29/64	12	55	102	71	118	45
MSDPH 116 - □S	11.60	-	12	55	102	71	118	45
MSDPH 117 - □S	11.70	-	12	55	102	71	118	45
MSDPH 118 - □S	11.80	-	12	55	102	71	118	45
MSDPH 119 - □S	11.90	-	12	55	102	71	118	45
MSDPH 1191 - □S	11.91	15/32	12	55	102	71	118	45
MSDPH 120 - □S	12.00	-	12	55	102	71	118	45
MSDPH 121 - □S	12.10	-	14	60	107	77	124	45
MSDPH 122 - □S	12.20	-	14	60	107	77	124	45
MSDPH 123 - □S	12.30	31/64	14	60	107	77	124	45
MSDPH 124 - □S	12.40	-	14	60	107	77	124	45

MSDPH-S



DATA
p.482

• TOLERANCE

Terminology	S
Grade	PC325T
Tolerance (drill Dia.)	h7
Tolerance (shank Dia.)	h6
Point angle	140°
Twist angle	30°
Thinning	X type
Coolant	Through
International standard	DIN 6537
Shank type	DIN 6535 HA

S Heat resistant alloy, Titanium alloy

(mm)

Designation	ØD		Ød	3S		5S		ℓ2
	mm	inch		ℓ1	L	ℓ1	L	
MSDPH 125 - □S	12.50	-	14	60	107	77	124	45
MSDPH 126 - □S	12.60	-	14	60	107	77	124	45
MSDPH 127 - □S	12.70	1/2	14	60	107	77	124	45
MSDPH 128 - □S	12.80	-	14	60	107	77	124	45
MSDPH 129 - □S	12.90	-	14	60	107	77	124	45
MSDPH 130 - □S	13.00	-	14	60	107	77	124	45
MSDPH 131 - □S	13.10	-	14	60	107	77	124	45
MSDPH 132 - □S	13.20	-	14	60	107	77	124	45
MSDPH 133 - □S	13.30	-	14	60	107	77	124	45
MSDPH 134 - □S	13.40	-	14	60	107	77	124	45
MSDPH 1349 - □S	13.49	17/32	14	60	107	77	124	45
MSDPH 135 - □S	13.50	-	14	60	107	77	124	45
MSDPH 136 - □S	13.60	-	14	60	107	77	124	45
MSDPH 137 - □S	13.70	-	14	60	107	77	124	45
MSDPH 138 - □S	13.80	-	14	60	107	77	124	45
MSDPH 139 - □S	13.90	-	14	60	107	77	124	45
MSDPH 140 - □S	14.00	-	14	60	107	77	124	45
MSDPH 141 - □S	14.10	-	16	65	115	83	133	48
MSDPH 142 - □S	14.20	-	16	65	115	83	133	48
MSDPH 1429 - □S	14.29	9/16	16	65	115	83	133	48
MSDPH 143 - □S	14.30	-	16	65	115	83	133	48
MSDPH 144 - □S	14.40	-	16	65	115	83	133	48
MSDPH 145 - □S	14.50	-	16	65	115	83	133	48
MSDPH 146 - □S	14.60	-	16	65	115	83	133	48
MSDPH 147 - □S	14.70	-	16	65	115	83	133	48
MSDPH 148 - □S	14.80	-	16	65	115	83	133	48
MSDPH 149 - □S	14.90	-	16	65	115	83	133	48
MSDPH 150 - □S	15.00	-	16	65	115	83	133	48
MSDPH 151 - □S	15.10	-	16	65	115	83	133	48
MSDPH 152 - □S	15.20	-	16	65	115	83	133	48
MSDPH 153 - □S	15.30	-	16	65	115	83	133	48
MSDPH 154 - □S	15.40	-	16	65	115	83	133	48
MSDPH 155 - □S	15.50	-	16	65	115	83	133	48
MSDPH 156 - □S	15.60	-	16	65	115	83	133	48
MSDPH 157 - □S	15.70	-	16	65	115	83	133	48
MSDPH 158 - □S	15.80	-	16	65	115	83	133	48
MSDPH 1587 - □S	15.87	5/8	16	65	115	83	133	48
MSDPH 159 - □S	15.90	-	16	65	115	83	133	48
MSDPH 160 - □S	16.00	-	16	65	115	83	133	48

High precision results when machining deep holes

MLD Plus

Mach Long Solid Drill Plus

Code system

Special type

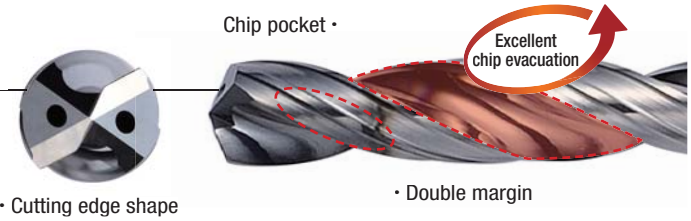
MLD 0600N - 10 P - 100L - 10S

- **MLD** — Mach Long Solid Drill Plus (MLD Plus)
- **0600N** — Drill dia. (ØD)
  - 0600: Ø6.00 (Two decimal place marked)
- **10** — Standard type
  - Aspect ratio (L/D)
  - 10D, 15D, 20D, 25D
- **P** — Machining area
  - P: Carbon steel, alloy steel
  - K: Cast iron
  - N: Aluminum, copper alloy
- **100L** — Overall length
  - 100L: 100 mm
- **10S** — Shank dia.
  - 10S: Ø10

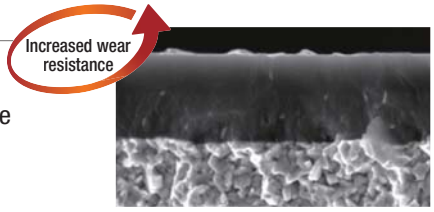
Special type
- Flute length
- 100: 100 mm

Features

- **Cutting edge and flute shape**
  - Straight cutting edge provides better rigidity
  - Excellent chip evacuation due to wider chip pocket and improved flute surface roughness
  - Double margin secures machining stability



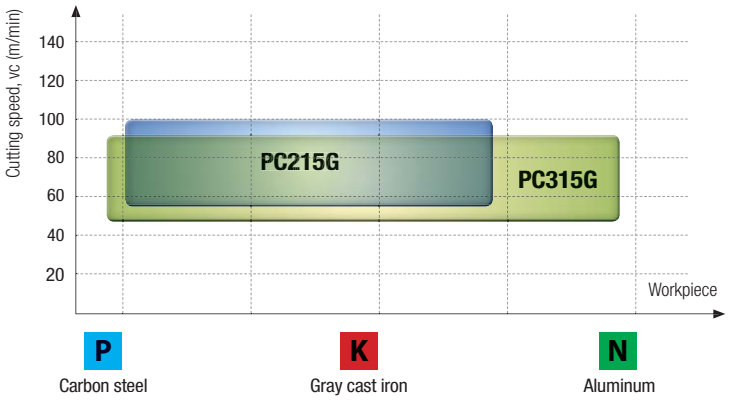
- **New grade (PC315G)**
  - Ultra-fine substrate and new coating applied
  - Lubricative coating layer improves chip evacuation with lower frictional resistance
  - Longer tool life due to higher wear resistance



PC315G

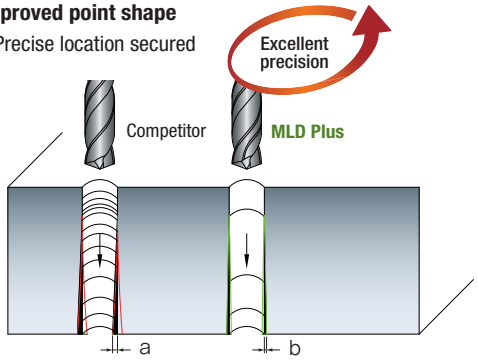
Application area

- **PC215G** - Excellent performance when machining cast iron and alloy steel at high speed
- **PC315G** - Universal grade excellent when machining carbon steel, cast iron, etc. at middle to low cutting speed



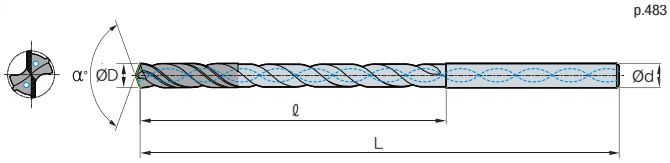
[Degree of machining precision]

- **Improved machining precision**
  - Bent holes reduced, Inside hole surface roughness improved
  - Hole size uniformity increased
- **Improved point shape**
  - Precise location secured



Reduced bent holes compared to competitors (a > b)

MLD - □□(P/K/N)



DATA
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• TOLERANCE

Terminology	P	K	N
Grade	PC215G PC315G		FG2
Tolerance (drill Dia.)	h7		
Tolerance (shank Dia.)	h6		
Point angle	135°		
Twist angle	30°		
Thinning	X type		
Coolant	Through		

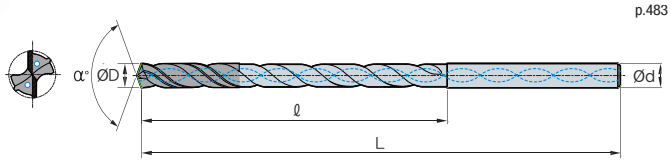
P Steel K Cast iron N Non-ferrous metal

Designation	ØD	Ød	10 P,M,K		15 P,M,K		20 P,M,K		25 P,M,K	
			ℓ	L	ℓ	L	ℓ	L	ℓ	L
MLD 0300N - □□P,K,N	3.0	3	40	90	55	105	70	120	-	-
MLD 0310N - □□P,K,N	3.1	4	45	100	60	125	80	140	-	-
MLD 0320N - □□P,K,N	3.2	4	45	100	60	125	80	140	-	-
MLD 0330N - □□P,K,N	3.3	4	45	100	60	125	80	140	-	-
MLD 0340N - □□P,K,N	3.4	4	50	100	65	125	85	140	-	-
MLD 0350N - □□P,K,N	3.5	4	50	100	65	125	85	140	-	-
MLD 0360N - □□P,K,N	3.6	4	50	100	65	125	85	140	-	-
MLD 0370N - □□P,K,N	3.7	4	50	100	65	125	85	140	-	-
MLD 0380N - □□P,K,N	3.8	4	50	100	75	125	90	140	-	-
MLD 0390N - □□P,K,N	3.9	4	50	100	75	125	90	140	-	-
MLD 0400N - □□P,K,N	4.0	4	50	100	75	125	90	140	115	165
MLD 0410N - □□P,K,N	4.1	5	55	115	75	140	100	165	120	190
MLD 0420N - □□P,K,N	4.2	5	55	115	75	140	100	165	120	190
MLD 0430N - □□P,K,N	4.3	5	60	115	85	140	110	165	135	190
MLD 0440N - □□P,K,N	4.4	5	60	115	85	140	110	165	135	190
MLD 0450N - □□P,K,N	4.5	5	60	115	85	140	110	165	135	190
MLD 0460N - □□P,K,N	4.6	5	60	115	85	140	110	165	135	190
MLD 0470N - □□P,K,N	4.7	5	60	115	85	140	110	165	135	190
MLD 0480N - □□P,K,N	4.8	5	65	115	90	140	115	165	140	190
MLD 0490N - □□P,K,N	4.9	5	65	115	90	140	115	165	140	190
MLD 0500N - □□P,K,N	5	5	65	115	90	140	115	165	140	190
MLD 0510N - □□P,K,N	5.1	6	70	128	95	160	120	190	150	220
MLD 0520N - □□P,K,N	5.2	6	70	128	95	160	120	190	150	220
MLD 0530N - □□P,K,N	5.3	6	70	128	95	160	120	190	150	220
MLD 0540N - □□P,K,N	5.4	6	78	128	110	160	140	190	170	220
MLD 0550N - □□P,K,N	5.5	6	78	128	110	160	140	190	170	220
MLD 0560N - □□P,K,N	5.6	6	78	128	110	160	140	190	170	220
MLD 0570N - □□P,K,N	5.7	6	78	128	110	160	140	190	170	220
MLD 0580N - □□P,K,N	5.8	6	78	128	110	160	140	190	170	220
MLD 0590N - □□P,K,N	5.9	6	78	128	110	160	140	190	170	220
MLD 0600N - □□P,K,N	6	6	78	128	110	160	140	190	170	220
MLD 0610N - □□P,K,N	6.1	7	87	140	120	175	155	210	190	250
MLD 0620N - □□P,K,N	6.2	7	87	140	120	175	155	210	190	250
MLD 0630N - □□P,K,N	6.3	7	87	140	120	175	155	210	190	250
MLD 0640N - □□P,K,N	6.4	7	87	140	120	175	155	210	190	250
MLD 0650N - □□P,K,N	6.5	7	87	140	120	175	155	210	190	250

Drill

MSD Plus

MLD - □□(P/K/N)



DATA
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• TOLERANCE

Terminology	P	K	N
Grade	PC215G PC315G		FG2
Tolerance (drill Dia.)	h7		
Tolerance (shank Dia.)	h6		
Point angle	135°		
Twist angle	30°		
Thinning	X type		
Coolant	Through		

P Steel K Cast iron N Non-ferrous metal

(mm)

Designation	ØD	Ød	10 P,M,K		15 P,M,K		20 P,M,K		25 P,M,K	
			ℓ	L	ℓ	L	ℓ	L	ℓ	L
MLD 0660N - □□P,K,N	6.6	7	87	140	120	175	155	210	190	250
MLD 0670N - □□P,K,N	6.7	7	87	140	120	175	155	210	190	250
MLD 0680N - □□P,K,N	6.8	7	90	140	125	175	160	210	200	250
MLD 0690N - □□P,K,N	6.9	7	90	140	125	175	160	210	200	250
MLD 0700N - □□P,K,N	7	7	90	140	125	175	160	210	200	250
MLD 0710N - □□P,K,N	7.1	8	100	155	135	195	170	230	-	-
MLD 0720N - □□P,K,N	7.2	8	100	155	135	195	170	230	-	-
MLD 0730N - □□P,K,N	7.3	8	100	155	135	195	170	230	-	-
MLD 0740N - □□P,K,N	7.4	8	100	155	135	195	170	230	-	-
MLD 0750N - □□P,K,N	7.5	8	100	155	135	195	170	230	-	-
MLD 0760N - □□P,K,N	7.6	8	105	155	145	195	180	230	-	-
MLD 0770N - □□P,K,N	7.7	8	105	155	145	195	180	230	-	-
MLD 0780N - □□P,K,N	7.8	8	105	155	145	195	180	230	-	-
MLD 0790N - □□P,K,N	7.9	8	105	155	145	195	180	230	-	-
MLD 0800N - □□P,K,N	8	8	105	155	145	195	180	230	-	-
MLD 0810N - □□P,K,N	8.1	9	110	165	155	210	195	260	-	-
MLD 0820N - □□P,K,N	8.2	9	110	165	155	210	195	260	-	-
MLD 0830N - □□P,K,N	8.3	9	110	165	155	210	195	260	-	-
MLD 0840N - □□P,K,N	8.4	9	110	165	155	210	195	260	-	-
MLD 0850N - □□P,K,N	8.5	9	110	165	155	210	195	260	-	-
MLD 0860N - □□P,K,N	8.6	9	115	165	160	210	210	260	-	-
MLD 0870N - □□P,K,N	8.7	9	115	165	160	210	210	260	-	-
MLD 0880N - □□P,K,N	8.8	9	115	165	160	210	210	260	-	-
MLD 0890N - □□P,K,N	8.9	9	115	165	160	210	210	260	-	-
MLD 0900N - □□P,K,N	9	9	115	165	160	210	210	260	-	-
MLD 0910N - □□P,K,N	9.1	10	125	190	170	240	-	-	-	-
MLD 0920N - □□P,K,N	9.2	10	125	190	170	240	-	-	-	-
MLD 0930N - □□P,K,N	9.3	10	125	190	170	240	-	-	-	-
MLD 0940N - □□P,K,N	9.4	10	125	190	170	240	-	-	-	-
MLD 0950N - □□P,K,N	9.5	10	125	190	170	240	-	-	-	-
MLD 0960N - □□P,K,N	9.6	10	130	190	180	240	-	-	-	-
MLD 0970N - □□P,K,N	9.7	10	130	190	180	240	-	-	-	-
MLD 0980N - □□P,K,N	9.8	10	130	190	180	240	-	-	-	-
MLD 0990N - □□P,K,N	9.9	10	130	190	180	240	-	-	-	-
MLD 1000N - □□P,K,N	10	10	130	190	180	240	-	-	-	-

Optimized tool for hole making of CFRP

MSD Plus CFRP

Mach Solid Drill Plus CFRP

- KORLOY's new diamond coated grade ND2110 offers excellent wear resistance
- The optimal cutting edge reduces burrs.

Code system

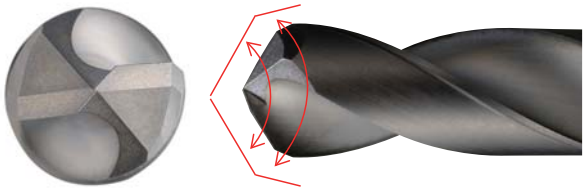
Special type

MSDP 060 - 5 C - 100L - 6S

- **MSDP** — Mach Solid Drill Plus
- **060** — Drill dia. (ØD): 060: Ø6.0 (One decimal place marked)
- **5** — Standard type: Aspect ratio (L/D); Special type: Flute length 100: 100 mm
- **C** — Machining area: C: CFRP
- **100L** — Overall length: 100L: 100 mm
- **6S** — Shank dia.: 6S: Ø6

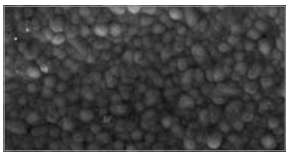
Features

- The cutting edge with a 2 step shape reduces the cutting load
- The optimal point angle of cutting edge reduces burrs
- Higher hardness of cutting edge increases wear resistance

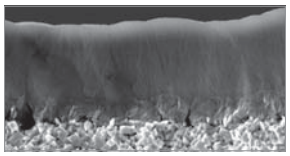


ND2110

- Diamond coating specialized in CFRP machining
- Diamond-coated substrate optimized for CFRP cutting



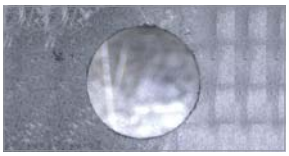
High hardness diamond coating maintains well-cut shapes



Diamond coating's strong grip to the substrate

- Inhibited burr creation by keeping cutting edges in good shape

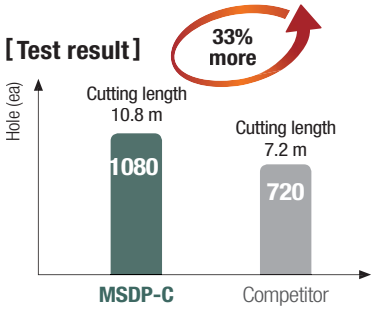
Less wear and flaking on the rake surface



Fewer burrs on workpieces

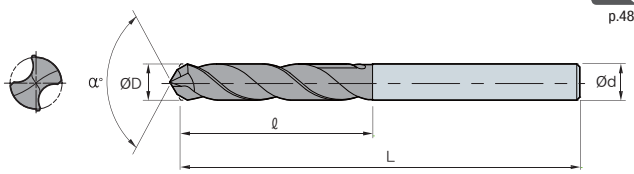
Application examples

Workpiece	CFRP (Wing Tail)
Cutting conditions	vc (m/min) = 100, fz (mm/t) = 0.05
	ap (mm) = 10, Air
Tools	MSDP060-5C (ND2110)



Drill MSD Plus CFRP

MSDP-5C



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• TOLERANCE

Terminology	C
Grade	ND2100
Tolerance (drill Dia.)	m7
Tolerance (shank Dia.)	h6
Point angle	118°
Twist angle	30°
Thinning	X type
Coolant	External

C CFRP

(mm)

Designation	ØD	Ød	5C	
			ℓ	L
MSDP 030-5C	3.00	6	28	66
MSDP 040-5C	4.00	6	36	74
MSDP 0476-5C	4.76	6	44	82
MSDP 050-5C	5.00	6	44	82
MSDP 060-5C	6.00	6	44	82
MSDP 0635-5C	6.35	8	53	91
MSDP 070-5C	7.00	8	53	91
MSDP 0794-5C	7.94	8	53	91
MSDP 080-5C	8.00	8	53	91
MSDP 090-5C	9.00	10	61	103
MSDP 0952-5C	9.52	10	61	103
MSDP 100-5C	10.00	10	61	103
MSDP 110-5C	11.00	12	71	118
MSDP 1111-5C	11.11	12	71	118
MSDP 120-5C	12.00	12	71	118
MSDP 127-5C	12.70	14	71	124

The best tool for ramped, curved or flat workpieces

MSFD

Mach Solid Flat Drill

- High quality hole making capability with 180°-point angle
- Improved anti chipping and welding resistance by edge honing and chamfering
  Minimized creation of burrs compared to general drills

Code system

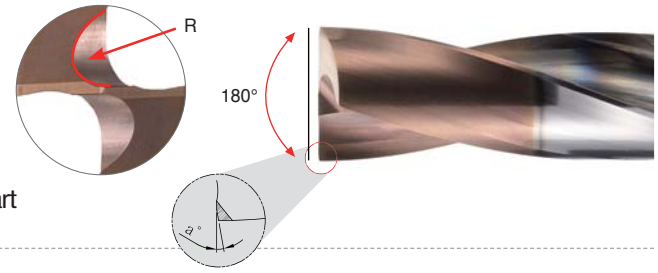
Special type

MSFD(H) 060 - 2 P - 100L - 6S

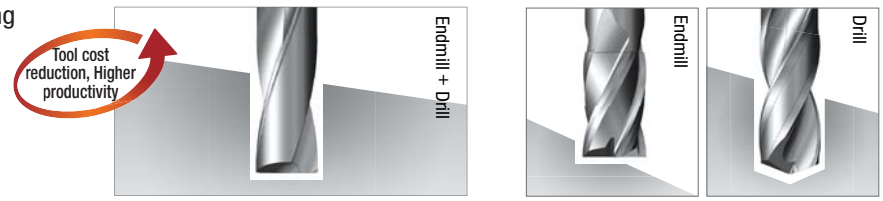
- **Oil hole**: None: MSFD; With oil holes: MSFDH
- **Drill dia. (ØD)**: 060: Ø6.0 (One decimal place marked)
- **Standard type**: Aspect ratio (L/D) 2D, 3D
- **Special type**: Flute length 100: 100 mm
- **Machining area**: P: General - Carbon steel, alloy steel
- **Overall length**: 100L: 100 mm
- **Shank dia.**: 6S: Ø6

Features

- Excellent straightness with its 180° - point angle when drilling on ramped surface
- Stronger resistance to chipping through corner chamfering
- Widened chip pockets by the use of 'R' shape on the thinning part



- Multi-functional capability - end milling and drilling using a single MSFD



MSFD

Conventional tools used and their application

Performance evaluation

Workpiece	SM48C
Cutting conditions	vc (m/min) = 80, fz (mm/min) = 0.10
Cutting length	7.2 m (600 holes)
Tools	MSFD060-2P (PC325U)

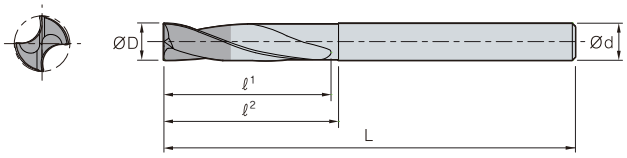
MSFD
Prolongs tool life

Competitor

Drill

MSFD

MSFD-2P



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• TOLERANCE

Terminology	P
Grade	PC325U
Tolerance (drill Dia.)	H7
Tolerance (shank Dia.)	h6
Point angle	180°
Twist angle	20°
Thinning	R type
Coolant	External

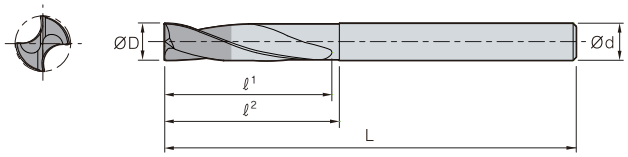
P Steel

(mm)

Designation	ØD	Ød	2P		
			ℓ1	ℓ2	L
MSFD 025-2P	2.5	4	10.5	11.5	50
MSFD 026-2P	2.6	4	10.9	11.9	50
MSFD 027-2P	2.7	4	11.3	12.3	50
MSFD 028-2P	2.8	4	11.8	12.8	50
MSFD 029-2P	2.9	4	12.2	13.2	50
MSFD 030-2P	3.0	6	12.6	13.6	50
MSFD 031-2P	3.1	6	13.0	14.0	50
MSFD 032-2P	3.2	6	13.4	14.4	50
MSFD 033-2P	3.3	6	13.9	14.9	50
MSFD 034-2P	3.4	6	14.3	15.3	50
MSFD 035-2P	3.5	6	14.7	15.7	50
MSFD 036-2P	3.6	6	15.1	16.1	50
MSFD 037-2P	3.7	6	15.5	16.5	50
MSFD 038-2P	3.8	6	16.0	17.0	50
MSFD 039-2P	3.9	6	16.4	17.4	50
MSFD 040-2P	4.0	6	16.8	17.8	50
MSFD 041-2P	4.1	6	17.2	18.2	60
MSFD 042-2P	4.2	6	17.6	18.6	60
MSFD 043-2P	4.3	6	18.1	19.1	60
MSFD 044-2P	4.4	6	18.5	19.5	60
MSFD 045-2P	4.5	6	18.9	19.9	60
MSFD 046-2P	4.6	6	19.3	20.3	60
MSFD 047-2P	4.7	6	19.7	20.7	60
MSFD 048-2P	4.8	6	20.2	21.2	60
MSFD 049-2P	4.9	6	20.6	21.6	60
MSFD 050-2P	5.0	6	21.0	22.0	60
MSFD 051-2P	5.1	6	21.4	22.4	60
MSFD 052-2P	5.2	6	21.8	22.8	60
MSFD 053-2P	5.3	6	22.3	23.3	60
MSFD 054-2P	5.4	6	22.7	23.7	60
MSFD 055-2P	5.5	6	23.1	24.1	60
MSFD 056-2P	5.6	6	23.5	24.5	60
MSFD 057-2P	5.7	6	23.9	24.9	60
MSFD 058-2P	5.8	6	24.4	25.4	60
MSFD 059-2P	5.9	6	24.8	25.8	60
MSFD 060-2P	6.0	6	25.2	26.2	60
MSFD 061-2P	6.1	8	25.6	26.6	70

Designation	ØD	Ød	2P		
			ℓ1	ℓ2	L
MSFD 062-2P	6.2	8	26.0	27.0	70
MSFD 063-2P	6.3	8	26.5	27.5	70
MSFD 064-2P	6.4	8	26.9	27.9	70
MSFD 065-2P	6.5	8	27.3	28.3	70
MSFD 066-2P	6.6	8	27.7	28.7	70
MSFD 067-2P	6.7	8	28.1	29.1	70
MSFD 068-2P	6.8	8	28.6	29.6	70
MSFD 069-2P	6.9	8	29.0	30.0	70
MSFD 070-2P	7.0	8	29.4	30.4	70
MSFD 071-2P	7.1	8	29.8	30.8	70
MSFD 072-2P	7.2	8	30.2	31.2	70
MSFD 073-2P	7.3	8	30.7	31.7	70
MSFD 074-2P	7.4	8	31.1	32.1	70
MSFD 075-2P	7.5	8	31.5	32.5	70
MSFD 076-2P	7.6	8	31.9	32.9	70
MSFD 077-2P	7.7	8	32.3	33.3	70
MSFD 078-2P	7.8	8	32.8	33.8	70
MSFD 079-2P	7.9	8	33.2	34.2	70
MSFD 080-2P	8.0	8	33.6	34.6	70
MSFD 081-2P	8.1	10	34.0	35.0	80
MSFD 082-2P	8.2	10	34.4	35.4	80
MSFD 083-2P	8.3	10	34.9	35.9	80
MSFD 084-2P	8.4	10	35.3	36.3	80
MSFD 085-2P	8.5	10	35.7	36.7	80
MSFD 086-2P	8.6	10	36.1	37.1	80
MSFD 087-2P	8.7	10	36.5	37.5	80
MSFD 088-2P	8.8	10	37.0	38.0	80
MSFD 089-2P	8.9	10	37.4	38.4	80
MSFD 090-2P	9.0	10	37.8	38.8	80
MSFD 091-2P	9.1	10	38.2	39.2	80
MSFD 092-2P	9.2	10	38.6	39.6	80
MSFD 093-2P	9.3	10	39.1	40.1	80
MSFD 094-2P	9.4	10	39.5	40.5	80
MSFD 095-2P	9.5	10	39.9	40.9	80
MSFD 096-2P	9.6	10	40.3	41.3	80
MSFD 097-2P	9.7	10	40.7	41.7	80
MSFD 098-2P	9.8	10	41.2	42.2	80

MSFD-2P



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• TOLERANCE

Terminology	P
Grade	PC325U
Tolerance (drill Dia.)	H7
Tolerance (shank Dia.)	h6
Point angle	180°
Twist angle	20°
Thinning	R type
Coolant	External

P Steel

(mm)

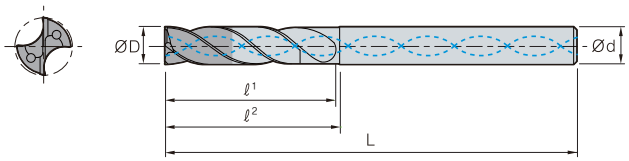
Designation	ØD	Ød	2P		
			ℓ1	ℓ2	L
MSFD 099-2P	9.9	10	41.6	42.6	80
MSFD 100-2P	10.0	10	42.0	43.0	80
MSFD 101-2P	10.1	12	42.4	43.4	90
MSFD 102-2P	10.2	12	42.8	43.8	90
MSFD 103-2P	10.3	12	43.3	44.3	90
MSFD 104-2P	10.4	12	43.7	44.7	90
MSFD 105-2P	10.5	12	44.1	45.1	90
MSFD 106-2P	10.6	12	44.5	45.5	90
MSFD 107-2P	10.7	12	44.9	45.9	90
MSFD 108-2P	10.8	12	45.4	46.4	90
MSFD 109-2P	10.9	12	45.8	46.8	90
MSFD 110-2P	11.0	12	46.2	47.2	90
MSFD 111-2P	11.1	12	46.6	47.6	90
MSFD 112-2P	11.2	12	47.0	48.0	90
MSFD 113-2P	11.3	12	47.5	48.5	90
MSFD 114-2P	11.4	12	47.9	48.9	90
MSFD 115-2P	11.5	12	48.3	49.3	90
MSFD 116-2P	11.6	12	48.7	49.7	90
MSFD 117-2P	11.7	12	49.1	50.1	90
MSFD 118-2P	11.8	12	49.6	50.6	90
MSFD 119-2P	11.9	12	50.0	51.0	90
MSFD 120-2P	12.0	12	50.4	51.4	90
MSFD 121-2P	12.1	14	50.8	51.8	100
MSFD 122-2P	12.2	14	51.2	52.2	100
MSFD 123-2P	12.3	14	51.7	52.7	100
MSFD 124-2P	12.4	14	52.1	53.1	100
MSFD 125-2P	12.5	14	52.5	53.5	100
MSFD 126-2P	12.6	14	52.9	53.9	100
MSFD 127-2P	12.7	14	53.3	54.3	100
MSFD 128-2P	12.8	14	53.8	54.8	100
MSFD 129-2P	12.9	14	54.2	55.2	100

Designation	ØD	Ød	2P		
			ℓ1	ℓ2	L
MSFD 130-2P	13.0	14	54.6	55.6	100
MSFD 131-2P	13.1	14	55.0	56.0	100
MSFD 132-2P	13.2	14	55.4	56.4	100
MSFD 133-2P	13.3	14	55.9	56.9	100
MSFD 134-2P	13.4	14	56.3	57.3	100
MSFD 135-2P	13.5	14	56.7	57.7	110
MSFD 136-2P	13.6	14	57.1	58.1	110
MSFD 137-2P	13.7	14	57.5	58.5	110
MSFD 138-2P	13.8	14	58.0	59.0	110
MSFD 139-2P	13.9	14	58.4	59.4	110
MSFD 140-2P	14.0	14	58.8	59.8	110
MSFD 141-2P	14.1	16	59.2	60.2	110
MSFD 142-2P	14.2	16	59.6	60.6	110
MSFD 143-2P	14.3	16	60.1	61.1	110
MSFD 144-2P	14.4	16	60.5	61.5	110
MSFD 145-2P	14.5	16	60.9	61.9	110
MSFD 146-2P	14.6	16	61.3	62.3	110
MSFD 147-2P	14.7	16	61.7	62.7	110
MSFD 148-2P	14.8	16	62.2	63.2	110
MSFD 149-2P	14.9	16	62.6	63.6	110
MSFD 150-2P	15.0	16	63.0	64.0	110
MSFD 151-2P	15.1	16	65.0	66.0	115
MSFD 152-2P	15.2	16	65.0	66.0	115
MSFD 153-2P	15.3	16	65.1	66.1	115
MSFD 154-2P	15.4	16	65.1	66.1	115
MSFD 155-2P	15.5	16	65.1	66.1	115
MSFD 156-2P	15.6	16	67.1	68.1	115
MSFD 157-2P	15.7	16	67.1	68.1	115
MSFD 158-2P	15.8	16	67.2	68.2	115
MSFD 159-2P	15.9	16	67.2	68.2	115
MSFD 160-2P	16.0	16	67.2	68.2	115

Drill

MSFD

MSFDH-3P



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• TOLERANCE

Terminology	P
Grade	PC325U
Tolerance (drill Dia.)	H7
Tolerance (shank Dia.)	h6
Point angle	180°
Twist angle	30°
Thinning	R type
Coolant	Through

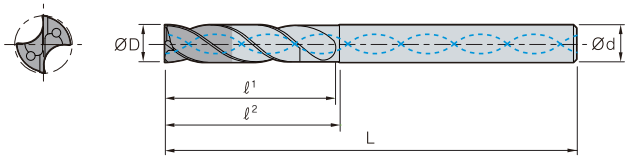
P Steel

(mm)

Designation	ØD	Ød	3P		
			ℓ1	ℓ2	L
MSFDH 025-3P	2.5	3	17	18	58
MSFDH 026-3P	2.6	3	17	18	58
MSFDH 027-3P	2.7	3	17	18	58
MSFDH 028-3P	2.8	3	17	18	58
MSFDH 029-3P	2.9	3	17	18	58
MSFDH 030-3P	3.0	6	20	21	62
MSFDH 031-3P	3.1	6	20	21	62
MSFDH 032-3P	3.2	6	20	21	62
MSFDH 033-3P	3.3	6	20	21	62
MSFDH 034-3P	3.4	6	20	21	62
MSFDH 035-3P	3.5	6	20	21	62
MSFDH 036-3P	3.6	6	20	21	62
MSFDH 037-3P	3.7	6	20	21	62
MSFDH 038-3P	3.8	6	24	25	66
MSFDH 039-3P	3.9	6	24	25	66
MSFDH 040-3P	4.0	6	24	25	66
MSFDH 041-3P	4.1	6	24	25	66
MSFDH 042-3P	4.2	6	24	25	66
MSFDH 043-3P	4.3	6	24	25	66
MSFDH 044-3P	4.4	6	24	25	66
MSFDH 045-3P	4.5	6	24	25	66
MSFDH 046-3P	4.6	6	24	25	66
MSFDH 047-3P	4.7	6	24	25	66
MSFDH 048-3P	4.8	6	28	29	66
MSFDH 049-3P	4.9	6	28	29	66
MSFDH 050-3P	5.0	6	28	29	66
MSFDH 051-3P	5.1	6	28	29	66
MSFDH 052-3P	5.2	6	28	29	66
MSFDH 053-3P	5.3	6	28	29	66
MSFDH 054-3P	5.4	6	28	29	66
MSFDH 055-3P	5.5	6	28	29	66
MSFDH 056-3P	5.6	6	28	29	66
MSFDH 057-3P	5.7	6	28	29	66
MSFDH 058-3P	5.8	6	28	29	66
MSFDH 059-3P	5.9	6	28	29	66
MSFDH 060-3P	6.0	6	28	29	66
MSFDH 061-3P	6.1	8	34	35	79

Designation	ØD	Ød	3P		
			ℓ1	ℓ2	L
MSFDH 062-3P	6.2	8	34	35	79
MSFDH 063-3P	6.3	8	34	35	79
MSFDH 064-3P	6.4	8	34	35	79
MSFDH 065-3P	6.5	8	34	35	79
MSFDH 066-3P	6.6	8	34	35	79
MSFDH 067-3P	6.7	8	34	35	79
MSFDH 068-3P	6.8	8	34	35	79
MSFDH 069-3P	6.9	8	34	35	79
MSFDH 070-3P	7.0	8	34	35	79
MSFDH 071-3P	7.1	8	41	42	79
MSFDH 072-3P	7.2	8	41	42	79
MSFDH 073-3P	7.3	8	41	42	79
MSFDH 074-3P	7.4	8	41	42	79
MSFDH 075-3P	7.5	8	41	42	79
MSFDH 076-3P	7.6	8	41	42	79
MSFDH 077-3P	7.7	8	41	42	79
MSFDH 078-3P	7.8	8	41	42	79
MSFDH 079-3P	7.9	8	41	42	79
MSFDH 080-3P	8.0	8	41	42	79
MSFDH 081-3P	8.1	10	47	48	89
MSFDH 082-3P	8.2	10	47	48	89
MSFDH 083-3P	8.3	10	47	48	89
MSFDH 084-3P	8.4	10	47	48	89
MSFDH 085-3P	8.5	10	47	48	89
MSFDH 086-3P	8.6	10	47	48	89
MSFDH 087-3P	8.7	10	47	48	89
MSFDH 088-3P	8.8	10	47	48	89
MSFDH 089-3P	8.9	10	47	48	89
MSFDH 090-3P	9.0	10	47	48	89
MSFDH 091-3P	9.1	10	47	48	89
MSFDH 092-3P	9.2	10	47	48	89
MSFDH 093-3P	9.3	10	47	48	89
MSFDH 094-3P	9.4	10	47	48	89
MSFDH 095-3P	9.5	10	47	48	89
MSFDH 096-3P	9.6	10	47	48	89
MSFDH 097-3P	9.7	10	47	48	89
MSFDH 098-3P	9.8	10	47	48	89

MSFDH-3P



DATA
p.483

• TOLERANCE

Terminology	P
Grade	PC325U
Tolerance (drill Dia.)	H7
Tolerance (shank Dia.)	h6
Point angle	180°
Twist angle	30°
Thinning	R type
Coolant	Through

P Steel

(mm)

Designation	ØD	Ød	3P		
			ℓ1	ℓ2	L
MSFDH 099-3P	9.9	10	47	48	89
MSFDH 100-3P	10.0	10	47	48	89
MSFDH 101-3P	10.1	12	55	56	102
MSFDH 102-3P	10.2	12	55	56	102
MSFDH 103-3P	10.3	12	55	56	102
MSFDH 104-3P	10.4	12	55	56	102
MSFDH 105-3P	10.5	12	55	56	102
MSFDH 106-3P	10.6	12	55	56	102
MSFDH 107-3P	10.7	12	55	56	102
MSFDH 108-3P	10.8	12	55	56	102
MSFDH 109-3P	10.9	12	55	56	102
MSFDH 110-3P	11.0	12	55	56	102
MSFDH 111-3P	11.1	12	55	56	102
MSFDH 112-3P	11.2	12	55	56	102
MSFDH 113-3P	11.3	12	55	56	102
MSFDH 114-3P	11.4	12	55	56	102
MSFDH 115-3P	11.5	12	55	56	102
MSFDH 116-3P	11.6	12	55	56	102
MSFDH 117-3P	11.7	12	55	56	102
MSFDH 118-3P	11.8	12	55	56	102
MSFDH 119-3P	11.9	12	55	56	102
MSFDH 120-3P	12.0	12	55	56	102
MSFDH 121-3P	12.1	14	60	61	107
MSFDH 122-3P	12.2	14	60	61	107
MSFDH 123-3P	12.3	14	60	61	107
MSFDH 124-3P	12.4	14	60	61	107
MSFDH 125-3P	12.5	14	60	61	107
MSFDH 126-3P	12.6	14	60	61	107
MSFDH 127-3P	12.7	14	60	61	107
MSFDH 128-3P	12.8	14	60	61	107
MSFDH 129-3P	12.9	14	60	61	107

Designation	ØD	Ød	3P		
			ℓ1	ℓ2	L
MSFDH 130-3P	13.0	14	60	61	107
MSFDH 131-3P	13.1	14	60	61	107
MSFDH 132-3P	13.2	14	60	61	107
MSFDH 133-3P	13.3	14	60	61	107
MSFDH 134-3P	13.4	14	60	61	107
MSFDH 135-3P	13.5	14	60	61	107
MSFDH 136-3P	13.6	14	60	61	107
MSFDH 137-3P	13.7	14	60	61	107
MSFDH 138-3P	13.8	14	60	61	107
MSFDH 139-3P	13.9	14	60	61	107
MSFDH 140-3P	14.0	14	60	61	107
MSFDH 141-3P	14.1	16	65	66	115
MSFDH 142-3P	14.2	16	65	66	115
MSFDH 143-3P	14.3	16	65	66	115
MSFDH 144-3P	14.4	16	65	66	115
MSFDH 145-3P	14.5	16	65	66	115
MSFDH 146-3P	14.6	16	65	66	115
MSFDH 147-3P	14.7	16	65	66	115
MSFDH 148-3P	14.8	16	65	66	115
MSFDH 149-3P	14.9	16	65	66	115
MSFDH 150-3P	15.0	16	65	66	115
MSFDH 151-3P	15.1	16	65	66	115
MSFDH 152-3P	15.2	16	65	66	115
MSFDH 153-3P	15.3	16	65	66	115
MSFDH 154-3P	15.4	16	65	66	115
MSFDH 155-3P	15.5	16	65	66	115
MSFDH 156-3P	15.6	16	65	66	115
MSFDH 157-3P	15.7	16	65	66	115
MSFDH 158-3P	15.8	16	65	66	115
MSFDH 159-3P	15.9	16	65	66	115
MSFDH 160-3P	16.0	16	65	66	115

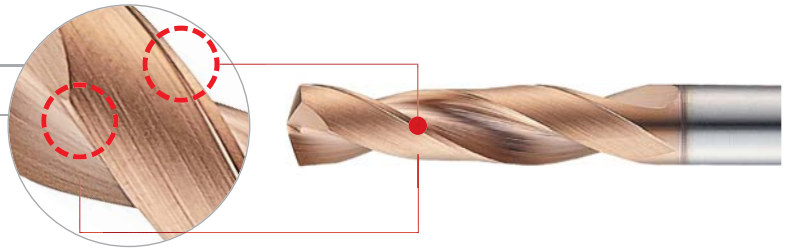
General use Drill with DIN standard

P-Star Drill

DIN standardized drill suitable for (~HRC50) high speed machining

- Applicable for high speed and high feed machining with high toughness substrate
- Enhanced surface hardness and heat resistance with new coating implementation
- Internal coolant types are also available with improved machinability and reduced friction heat

Features

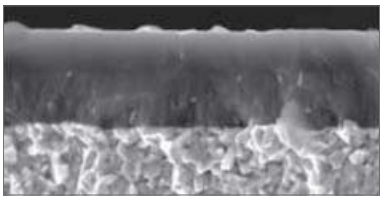


Features of drill

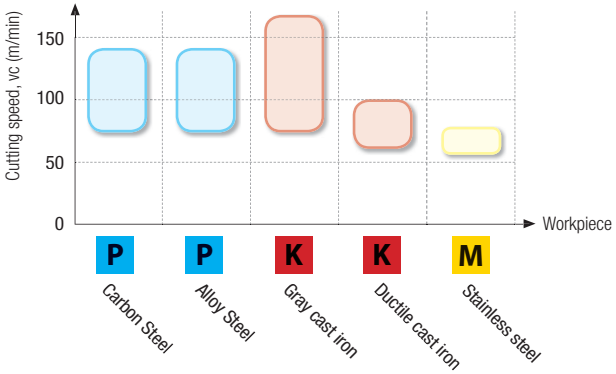
- Excellent straightness with its 180° - point angle when drilling on ramped surface
- Stronger resistance to chipping through corner chamfering
- Widened chip pockets by the use of 'R' shape on the thinning part

Features of substrate/grade

- Enhanced surface hardness and heat resistance with TiAlN coating implementation
- Excellent chipping resistance in high speed and high feed machining with high toughness substrate
- Applicable for various workpieces such as alloy steel, cast iron, stainless steel and pre-hardened steel
- Recommended for (~HRC50) high speed cutting



Application area



Code system

P	I	5	05	A	-	040
P-Star Drill	Appearance	Grade	Drilling depth	Shank type		Cutting dia.
P: P-Star Drill S: Spiral Coolant HP: High Precision	F: Facet Point I: Internal Coolant	5: Grade	03: 3×D 05: 5×D 08: 8×D 10: 10×D 20: 20×D	A: Plane F: DIN 6535 HE		3 ~ 20

EDP. NO.		Flutes	Feature		Length					Internal Coolant	Margin Type	Tolerance D	Diameter range (Ø)	
INCH : ◆ METRIC : ◇			Relief	Facet	3×D	5×D	8×D	10×D	20×D				Min.	Max.
HP503	◆ ◇	2		○	○						Double	m7	3	16
HPI503	◇	2		○	○					○	Double	m7	3	20
HPI505	◆ ◇	2		○		○				○	Double	m7	3	20
HPI508-N	◆ ◇	2		○			○			○	Double	m7	3	20
P503A(F)	◇	2	○		○						Single	m7	3	20
PI503A(F	◇	2		○	○					○	Single	m7	3	20
PI505A(F)	◇	2		○		○				○	Single	m7	4	20

EDP. NO	Appearance	Type	Drills dia.	Page
HP503		Double margin drill - 3×D	Ø3.0 ~ Ø16.0	270
HPI503		Double margin internal coolant drill - 3×D	Ø3.0 ~ Ø20.0	272
HPI505		Double margin internal coolant drill - 5×D	Ø3.0 ~ Ø20.0	275
HPI508-N		Double margin internal coolant drill - 8×D	Ø3.0 ~ Ø20.0	278
P503A(F)		Din 6537k type drill	Ø3.0 ~ Ø20.0	280
PI503A(F)		Din 6537K type internal coolant drill	Ø3.0 ~ Ø20.0	282
PI505A(F)		Din 6537K type internal coolant drill	Ø4.0 ~ Ø20.0	284

P-Star Drill

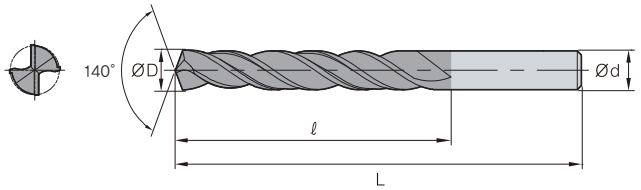
HP503

Double margin drill - 3×D

DIN 6537K | ULTRA FINE | 30° HELIX | TiAlN | 3×D | 140° | DATA p.484

• TOLERANCE

ØD		Ød
Ø3	+0.012 ~ +0.002mm	h6
Ø3.1 ~ Ø6	+0.016 ~ +0.004mm	
Ø6.1 ~ Ø10	+0.021 ~ +0.006mm	
Ø10.1 ~ Ø16	+0.025 ~ +0.007mm	



(mm)

Designation	ØD		Ød	ℓ	L
	mm	inch			
HP503 030	3	0.1181	6	20	62
HP503 031	3.1	0.1220	6	20	62
HP503 032	3.2	0.1260	6	20	62
HP503 033	3.3	0.1299	6	20	62
HP503 034	3.4	0.1339	6	20	62
HP503 035	3.5	0.1378	6	20	62
HP503 036	3.6	0.1417	6	20	62
HP503 037	3.7	0.1457	6	20	62
HP503 038	3.8	0.1496	6	24	66
HP503 039	3.9	0.1535	6	24	66
HP503 040	4	0.1575	6	24	66
HP503 041	4.1	0.1614	6	24	66
HP503 042	4.2	0.1654	6	24	66
HP503 043	4.3	0.1693	6	24	66
HP503 044	4.4	0.1732	6	24	66
HP503 045	4.5	0.1772	6	24	66
HP503 046	4.6	0.1811	6	24	66
HP503 047	4.7	0.1850	6	24	66
HP503 048	4.8	0.1890	6	28	66
HP503 049	4.9	0.1929	6	28	66
HP503 050	5	0.1969	6	28	66
HP503 051	5.1	0.2008	6	28	66
HP503 052	5.2	0.2047	6	28	66
HP503 053	5.3	0.2087	6	28	66
HP503 054	5.4	0.2126	6	28	66
HP503 055	5.5	0.2165	6	28	66
HP503 056	5.6	0.2205	6	28	66
HP503 057	5.7	0.2244	6	28	66
HP503 058	5.8	0.2283	6	28	66
HP503 059	5.9	0.2322	6	28	66
HP503 060	6	0.2362	6	28	66
HP503 061	6.1	0.2402	8	34	79
HP503 062	6.2	0.2441	8	34	79
HP503 063	6.3	0.2480	8	34	79
HP503 064	6.4	0.2520	8	34	79
HP503 065	6.5	0.2559	8	34	79
HP503 066	6.6	0.2598	8	34	79

Designation	ØD		Ød	ℓ	L
	mm	inch			
HP503 067	6.7	0.2638	8	34	79
HP503 068	6.8	0.2677	8	34	79
HP503 069	6.9	0.2717	8	34	79
HP503 070	7	0.2756	8	34	79
HP503 071	7.1	0.2795	8	41	79
HP503 072	7.2	0.2835	8	41	79
HP503 073	7.3	0.2874	8	41	79
HP503 074	7.4	0.2913	8	41	79
HP503 075	7.5	0.2953	8	41	79
HP503 076	7.6	0.2992	8	41	79
HP503 077	7.7	0.3031	8	41	79
HP503 078	7.8	0.3071	8	41	79
HP503 079	7.9	0.3110	8	41	79
HP503 080	8	0.3150	8	41	79
HP503 081	8.1	0.3189	10	47	89
HP503 082	8.2	0.3228	10	47	89
HP503 083	8.3	0.3268	10	47	89
HP503 084	8.4	0.3307	10	47	89
HP503 085	8.5	0.3346	10	47	89
HP503 086	8.6	0.3386	10	47	89
HP503 087	8.7	0.3425	10	47	89
HP503 088	8.8	0.3465	10	47	89
HP503 089	8.9	0.3504	10	47	89
HP503 090	9	0.3543	10	47	89
HP503 091	9.1	0.3583	10	47	89
HP503 092	9.2	0.3622	10	47	89
HP503 093	9.3	0.3661	10	47	89
HP503 094	9.4	0.3701	10	47	89
HP503 095	9.5	0.3740	10	47	89
HP503 096	9.6	0.3780	10	47	89
HP503 097	9.7	0.3819	10	47	89
HP503 098	9.8	0.3858	10	47	89
HP503 099	9.9	0.3898	10	47	89
HP503 100	10	0.3937	10	47	89
HP503 101	10.1	0.3976	12	55	102
HP503 102	10.2	0.4016	12	55	102
HP503 103	10.3	0.4055	12	55	102

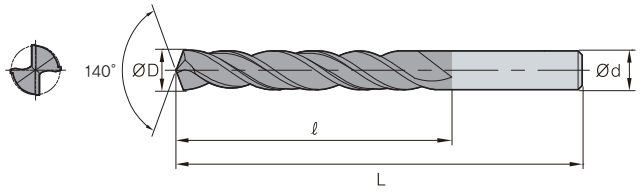
HP503

Double margin drill - 3×D

DIN 6537K | ULTRA FINE | 30° HELIX | TiAlN | ▸3×D | 140° | DATA p.484

• TOLERANCE

ØD		Ød
Ø3	+0.012 ~ +0.002mm	h6
Ø3.1 ~ Ø6	+0.016 ~ +0.004mm	
Ø6.1 ~ Ø10	+0.021 ~ +0.006mm	
Ø10.1 ~ Ø16	+0.025 ~ +0.007mm	



(mm)

Designation	ØD		Ød	ℓ	L
	mm	inch			
HP503 104	10.4	0.4094	12	55	102
HP503 105	10.5	0.4134	12	55	102
HP503 106	10.6	0.4173	12	55	102
HP503 107	10.7	0.4213	12	55	102
HP503 108	10.8	0.4252	12	55	102
HP503 109	10.9	0.4291	12	55	102
HP503 110	11	0.4331	12	55	102
HP503 111	11.1	0.4370	12	55	102
HP503 112	11.2	0.4409	12	55	102
HP503 113	11.3	0.4449	12	55	102
HP503 114	11.4	0.4488	12	55	102
HP503 115	11.5	0.4528	12	55	102
HP503 116	11.6	0.4567	12	55	102
HP503 117	11.7	0.4606	12	55	102
HP503 118	11.8	0.4646	12	55	102
HP503 119	11.9	0.4685	12	55	102
HP503 120	12	0.4724	12	55	102
HP503 121	12.1	0.4764	14	60	107
HP503 122	12.2	0.4803	14	60	107
HP503 123	12.3	0.4843	14	60	107
HP503 124	12.4	0.4882	14	60	107

Designation	ØD		Ød	ℓ	L
	mm	inch			
HP503 125	12.5	0.4921	14	60	107
HP503 126	12.6	0.4961	14	60	107
HP503 127	12.7	0.5000	14	60	107
HP503 128	12.8	0.5039	14	60	107
HP503 129	12.9	0.5079	14	60	107
HP503 130	13	0.5118	14	60	107
HP503 131	13.1	0.5157	14	60	107
HP503 132	13.2	0.5157	14	60	107
HP503 133	13.3	0.5236	14	60	107
HP503 135	13.5	0.5315	14	60	107
HP503 137	13.7	0.5394	14	60	107
HP503 140	14	0.5512	14	60	107
HP503 142	14.2	0.5591	16	65	115
HP503 143	14.3	0.5630	16	65	115
HP503 145	14.5	0.5709	16	65	115
HP503 146	14.6	0.5787	16	65	115
HP503 148	14.8	0.5827	16	65	115
HP503 150	15	0.5906	16	65	115
HP503 155	15.5	0.6102	16	65	115
HP503 157	15.7	0.6181	16	65	115
HP503 160	16	0.6299	16	65	115

※ The above specifications are subject to change without prior notice for product quality improvement.

• Applicable Workpiece

Carbon steel ~ HB225	Alloy Steel HB225~325	Pre-hardened steel HRC30~50	Hardened steel		Copper	Graphite	Cast iron ~FCD500	Aluminum	Stainless steel
			SKD61~HRC55	SKD11 HRC55~					
○	◎	◎	○	○			◎		○

◎: Excellent ○: Good

Drill

P-Star Drill

HPI503

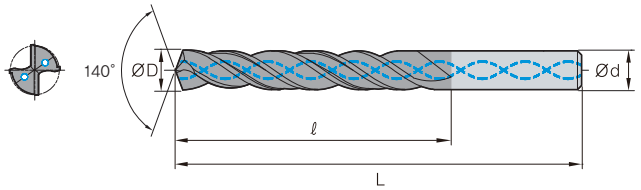
Double margin internal coolant drill - 3×D

DIN 6537K | ULTRA FINE | 30° HELIX | TiAlN | 3×D | 140° | DATA

p.484

• TOLERANCE

ØD		Ød
Ø3	+0.012 ~ +0.002mm	h6
Ø3.1 ~ Ø6	+0.016 ~ +0.004mm	
Ø6.1 ~ Ø10	+0.021 ~ +0.006mm	
Ø10.1 ~ Ø18	+0.025 ~ +0.007mm	
Ø18.1 ~	+0.029 ~ +0.008mm	



(mm)

Designation	ØD			Ød	ℓ	L
	mm	fraction	inch			
HPI503 030	3	-	0.1181	6	20	62
HPI503 031	3.1	-	0.1120	6	20	62
HPI503 03175	3.175	1/8	0.1250	6	20	62
HPI503 032	3.2	-	0.1260	6	20	62
HPI503 03264	3.264	-	0.1285	6	20	62
HPI503 033	3.3	-	0.1299	6	20	62
HPI503 034	3.4	-	0.1339	6	20	62
HPI503 035	3.5	-	0.1378	6	20	62
HPI503 03572	3.572	9/64	0.1406	6	20	62
HPI503 036	3.6	-	0.1417	6	20	62
HPI503 037	3.7	-	0.1457	6	20	62
HPI503 038	3.8	-	0.1496	6	24	66
HPI503 039	3.9	-	0.1535	6	24	66
HPI503 0397	3.97	5/32	0.1563	6	24	66
HPI503 040	4	-	0.1575	6	24	66
HPI503 04039	4.039	-	0.1590	6	24	66
HPI503 041	4.1	-	0.1614	6	24	66
HPI503 042	4.2	-	0.1654	6	24	66
HPI503 043	4.3	-	0.1693	6	24	66
HPI503 04366	4.366	-	0.1719	6	24	66
HPI503 044	4.4	-	0.1732	6	24	66
HPI503 045	4.5	-	0.1772	6	24	66
HPI503 046	4.6	-	0.1811	6	24	66
HPI503 047	4.7	-	0.1850	6	24	66
HPI503 04763	4.763	3/16	0.1875	6	28	66
HPI503 048	4.8	-	0.1890	6	28	66
HPI503 049	4.9	-	0.1929	6	28	66
HPI503 050	5	-	0.1969	6	28	66
HPI503 051	5.1	-	0.2008	6	28	66
HPI503 05159	5.159	13/64	0.2031	6	28	66
HPI503 052	5.2	-	0.2047	6	28	66
HPI503 053	5.3	-	0.2087	6	28	66
HPI503 054	5.4	-	0.2126	6	28	66
HPI503 055	5.5	-	0.2165	6	28	66
HPI503 05558	5.558	7/32	0.2188	6	28	66

Designation	ØD			Ød	ℓ	L
	mm	fraction	inch			
HPI503 056	5.6	-	0.2205	6	28	66
HPI503 057	5.7	-	0.2244	6	28	66
HPI503 058	5.8	-	0.2283	6	28	66
HPI503 059	5.9	-	0.2323	6	28	66
HPI503 05953	5.953	15/64	0.2344	6	28	66
HPI503 060	6	-	0.2362	6	28	66
HPI503 061	6.1	-	0.2402	8	34	79
HPI503 062	6.2	-	0.2441	8	34	79
HPI503 063	6.3	-	0.2480	8	34	79
HPI503 0635	6.35	1/4	0.2500	8	34	79
HPI503 064	6.4	-	0.2520	8	34	79
HPI503 065	6.5	-	0.2559	8	34	79
HPI503 066	6.6	-	0.2598	8	34	79
HPI503 067	6.7	-	0.2638	8	34	79
HPI503 06747	6.747	17/64	0.2656	8	34	79
HPI503 068	6.8	-	0.2677	8	34	79
HPI503 069	6.9	-	0.2717	8	34	79
HPI503 070	7	-	0.2756	8	34	79
HPI503 071	7.1	-	0.2795	8	41	79
HPI503 07145	7.145	9/32	0.2813	8	41	79
HPI503 072	7.2	-	0.2835	8	41	79
HPI503 073	7.3	-	0.2874	8	41	79
HPI503 074	7.4	-	0.2913	8	41	79
HPI503 075	7.5	-	0.2953	8	41	79
HPI503 07541	7.541	19/64	0.2969	8	41	79
HPI503 076	7.6	-	0.2992	8	41	79
HPI503 077	7.7	-	0.3031	8	41	79
HPI503 078	7.8	-	0.0371	8	41	79
HPI503 079	7.9	-	0.3110	8	41	79
HPI503 07938	7.938	5/16	0.3125	8	41	79
HPI503 080	8	-	0.3150	8	41	79
HPI503 081	8.1	-	0.3189	10	47	89
HPI503 082	8.2	-	0.3228	10	47	89
HPI503 083	8.3	-	0.3268	10	47	89
HPI503 08334	8.334	21/64	0.3281	10	47	89

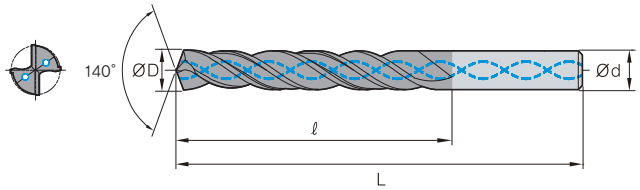
HPI503

Double margin internal coolant drill - 3×D

DIN 6537K | ULTRA FINE | 30° HELIX | TiAlN | 3×D | 140° | DATA p.484

• TOLERANCE

ØD		Ød
Ø3	+0.012 ~ +0.002mm	h6
Ø3.1 ~ Ø6	+0.016 ~ +0.004mm	
Ø6.1 ~ Ø10	+0.021 ~ +0.006mm	
Ø10.1 ~ Ø18	+0.025 ~ +0.007mm	
Ø18.1 ~	+0.029 ~ +0.008mm	



(mm)

Designation	ØD			Ød	ℓ	L
	mm	fraction	inch			
HPI503 0834	8.34	-	0.3283	10	47	89
HPI503 084	8.4	-	0.3307	10	47	89
HPI503 085	8.5	-	0.3346	10	47	89
HPI503 086	8.6	-	0.3386	10	47	89
HPI503 087	8.7	-	0.3425	10	47	89
HPI503 08733	8.733	11/32	0.3438	10	47	89
HPI503 088	8.8	-	0.3465	10	47	89
HPI503 089	8.9	-	0.6504	10	47	89
HPI503 090	9	-	0.3543	10	47	89
HPI503 091	9.1	-	0.3583	10	47	89
HPI503 09129	9.129	23/64	0.3594	10	47	89
HPI503 092	9.2	-	0.3622	10	47	89
HPI503 093	9.3	-	0.3661	10	47	89
HPI503 094	9.4	-	0.3680	10	47	89
HPI503 095	9.5	-	0.3740	10	47	89
HPI503 09525	9.525	3/8	0.3750	10	47	89
HPI503 096	9.6	-	0.3780	10	47	89
HPI503 097	9.7	-	0.3819	10	47	89
HPI503 098	9.8	-	0.3858	10	47	89
HPI503 099	9.9	-	0.3898	10	47	89
HPI503 09921	9.9921	25/64	0.3906	10	47	89
HPI503 100	10	-	0.3937	10	47	89
HPI503 101	10.1	-	0.3976	12	55	105
HPI503 102	10.2	-	0.4016	12	55	105
HPI503 103	10.3	-	0.4055	12	55	105
HPI503 1032	10.32	13/32	0.4063	12	55	105
HPI503 104	10.4	-	0.4094	12	55	105
HPI503 105	10.5	-	0.4134	12	55	105
HPI503 106	10.6	-	0.4173	12	55	105
HPI503 107	10.7	-	0.4213	12	55	105
HPI503 10716	10.716	27/64	0.4219	12	55	105
HPI503 108	10.8	-	0.4252	12	55	105
HPI503 109	10.9	-	0.4291	12	55	105
HPI503 110	11	-	0.4331	12	55	105
HPI503 111	11.1	-	0.4370	12	55	105

Designation	ØD			Ød	ℓ	L
	mm	fraction	inch			
HPI503 11113	11.113	7/16	0.4375	12	55	105
HPI503 112	11.2	-	0.4409	12	55	105
HPI503 113	11.3	-	0.4449	12	55	105
HPI503 114	11.4	-	0.4488	12	55	105
HPI503 115	11.5	-	0.4528	12	55	105
HPI503 11509	11.509	29/64	0.4531	12	55	105
HPI503 116	11.6	-	0.4567	12	55	105
HPI503 117	11.7	-	0.4606	12	55	105
HPI503 118	11.8	-	0.4646	12	55	105
HPI503 119	11.9	-	0.4685	12	55	105
HPI503 11908	11.908	15/32	0.4688	12	55	105
HPI503 120	12	-	0.4724	12	55	105
HPI503 121	12.1	-	0.4764	14	60	107
HPI503 122	12.2	-	0.4803	14	60	107
HPI503 123	12.3	-	0.4843	14	60	107
HPI503 12304	12.304	31/64	0.4844	14	60	107
HPI503 124	12.4	-	0.4882	14	60	107
HPI503 125	12.5	-	0.4921	14	60	107
HPI503 126	12.6	-	0.4961	14	60	107
HPI503 127	12.7	1/2	0.5000	14	60	107
HPI503 128	12.8	-	0.5039	14	60	107
HPI503 129	12.9	-	0.5079	14	60	107
HPI503 130	13	-	0.5118	14	60	107
HPI503 132	13.2	-	0.5197	14	60	107
HPI503 133	13.3	-	0.5236	14	60	107
HPI503 13494	13.494	17/32	0.5313	14	60	107
HPI503 135	13.5	-	0.5315	14	60	107
HPI503 137	13.7	-	0.5394	14	60	107
HPI503 13891	13.891	35/64	0.5469	14	60	107
HPI503 140	14	-	0.5512	14	60	107
HPI503 141	14.1	-	0.5551	16	65	115
HPI503 142	14.2	-	0.5591	16	65	115
HPI503 14288	14.288	9/16	0.5625	16	65	115
HPI503 145	14.5	-	0.5709	16	65	115
HPI503 146	14.6	-	0.5746	16	65	115

P-Star Drill

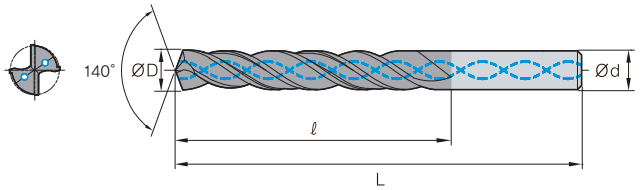
HPI503

Double margin internal coolant drill - 3×D

DIN 6537K | ULTRA FINE | 30° HELIX | TiAlN | 3×D | 140° | DATA p.484

• TOLERANCE

ØD		Ød
Ø3	+0.012 ~ +0.002mm	h6
Ø3.1 ~ Ø6	+0.016 ~ +0.004mm	
Ø6.1 ~ Ø10	+0.021 ~ +0.006mm	
Ø10.1 ~ Ø18	+0.025 ~ +0.007mm	
Ø18.1 ~	+0.029 ~ +0.008mm	



(mm)

Designation	ØD			Ød	ℓ	L
	mm	fraction	inch			
HPI503 147	14.7	-	0.5787	16	65	115
HPI503 150	15	-	0.5906	16	65	115
HPI503 15081	15.081	19/32	0.5937	16	65	115
HPI503 155	15.5	-	0.6102	16	65	115
HPI503 157	15.7	-	0.6181	16	65	115
HPI503 158	15.8	-	0.6220	16	65	115
HPI503 15875	15.875	5/8	0.6250	16	65	115
HPI503 160	16	-	0.6299	16	65	115
HPI503 162	16.2	-	0.6378	18	73	123
HPI503 163	16.3	-	0.6417	18	73	123
HPI503 165	16.5	-	0.6496	18	73	123
HPI503 167	16.7	-	0.6575	18	73	123

Designation	ØD			Ød	ℓ	L
	mm	fraction	inch			
HPI503 168	16.8	-	0.6614	18	73	123
HPI503 170	17	-	0.6693	18	73	123
HPI503 171	17.1	-	0.6732	18	73	123
HPI503 17463	17.463	11/16	0.6875	18	73	123
HPI503 175	17.5	-	0.6890	18	73	123
HPI503 180	18	-	0.7087	18	73	123
HPI503 185	18.5	-	0.7883	20	79	131
HPI503 190	19	-	0.7480	20	79	131
HPI503 1905	19.05	3/4	0.7500	20	79	131
HPI503 197	19.7	-	0.7756	20	79	131
HPI503 200	20	-	0.7874	20	79	131

※ The above specifications are subject to change without prior notice for product quality improvement.

• Applicable Workpiece

Carbon steel ~ HB225	Alloy steel HB225~325	Pre-hardened steel HRC30~50	Hardened steel		Copper	Graphite	Cast iron ~FCD500	Aluminum	Stainless steel
			SKD61~HRC55	SKD11 HRC55~					
○	◎	◎	○	○			◎		○

◎: Excellent ○: Good

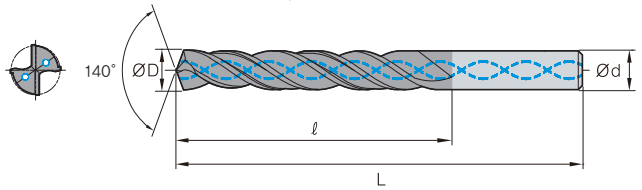
HPI505

Double margin internal coolant drill - 5×D

DIN 6537K | ULTRA FINE | 30° HELIX | TiAlN | 5×D | 140° | DATA p.484

• TOLERANCE

ØD		Ød
Ø3	+0.012 ~ +0.002mm	h6
Ø3.1 ~ Ø6	+0.016 ~ +0.004mm	
Ø6.1 ~ Ø10	+0.021 ~ +0.006mm	
Ø10.1 ~ Ø18	+0.025 ~ +0.007mm	
Ø18.1 ~	+0.029 ~ +0.008mm	



(mm)

Designation	ØD			Ød	ℓ	L
	mm	fraction	inch			
HPI505 030	3	-	0.1181	6	30	66
HPI505 031	3.1	-	0.1120	6	30	66
HPI505 03175	3.175	-	0.1250	6	30	66
HPI505 032	3.2	-	0.1260	6	30	66
HPI505 03264	3.264	1/8	0.1285	6	30	66
HPI505 033	3.3	-	0.1299	6	30	66
HPI505 034	3.4	-	0.1339	6	30	66
HPI505 035	3.5	-	0.1378	6	30	66
HPI505 03572	3.572	9/64	0.1406	6	30	66
HPI505 036	3.6	-	0.1417	6	30	66
HPI505 037	3.7	-	0.1457	6	30	66
HPI505 038	3.8	-	0.1496	6	36	74
HPI505 039	3.9	-	0.1535	6	36	74
HPI505 0397	3.97	5/32	0.1563	6	36	74
HPI505 040	4	-	0.1575	6	36	74
HPI505 04039	4.039	-	0.1590	6	36	74
HPI505 041	4.1	-	0.1614	6	36	74
HPI505 042	4.2	-	0.1654	6	36	74
HPI505 043	4.3	-	0.1693	6	36	74
HPI505 04366	4.366	-	0.1719	6	36	74
HPI505 044	4.4	-	0.1732	6	36	74
HPI505 045	4.5	-	0.1772	6	36	74
HPI505 0458	4.58	-	0.1803	6	36	74
HPI505 046	4.6	-	0.1811	6	36	74
HPI505 04623	4.623	-	0.1820	6	36	74
HPI505 047	4.7	-	0.1850	6	36	74
HPI505 04763	4.763	3/16	0.1875	6	44	82
HPI505 048	4.8	-	0.1890	6	44	82
HPI505 049	4.9	-	0.1929	6	44	82
HPI505 050	5	-	0.1969	6	44	82
HPI505 051	5.1	-	0.2008	6	44	82
HPI505 05159	5.159	13/64	0.2031	6	44	82
HPI505 052	5.2	-	0.2047	6	44	82
HPI505 053	5.3	-	0.2087	6	44	82
HPI505 054	5.4	-	0.2126	6	44	82
HPI505 0541	5.41	-	0.2130	6	44	82
HPI505 055	5.5	-	0.2165	6	44	82

Designation	ØD			Ød	ℓ	L
	mm	fraction	inch			
HPI505 05558	5.558	7/32	0.2188	6	44	82
HPI505 056	5.6	-	0.2205	6	44	82
HPI505 057	5.7	-	0.2244	6	44	82
HPI505 058	5.8	-	0.2283	6	44	82
HPI505 059	5.9	-	0.2323	6	44	82
HPI505 05953	5.953	15/64	0.2344	6	44	82
HPI505 060	6	-	0.2362	6	44	82
HPI505 061	6.1	-	0.2402	8	53	91
HPI505 062	6.2	-	0.2441	8	53	91
HPI505 063	6.3	-	0.2480	8	53	91
HPI505 0635	6.35	1/4	0.2500	8	53	91
HPI505 064	6.4	-	0.2520	8	53	91
HPI505 065	6.5	-	0.2559	8	53	91
HPI505 06528	6.528	-	0.2570	8	53	91
HPI505 066	6.6	-	0.2598	8	53	91
HPI505 067	6.7	-	0.2638	8	53	91
HPI505 06747	6.747	17/64	0.2656	8	53	91
HPI505 068	6.8	-	0.2677	8	53	91
HPI505 069	6.9	-	0.2717	8	53	91
HPI505 06909	6.909	-	0.2720	8	53	91
HPI505 070	7	-	0.2756	8	53	91
HPI505 071	7.1	-	0.2795	8	53	91
HPI505 07145	7.145	9/32	0.2813	8	53	91
HPI505 072	7.2	-	0.2835	8	53	91
HPI505 073	7.3	-	0.2874	8	53	91
HPI505 074	7.4	-	0.2913	8	53	91
HPI505 075	7.5	-	0.2953	8	53	91
HPI505 07541	7.541	19/64	0.2969	8	53	91
HPI505 076	7.6	-	0.2992	8	53	91
HPI505 077	7.7	-	0.3031	8	53	91
HPI505 078	7.8	-	0.3071	8	53	91
HPI505 079	7.9	-	0.3110	8	53	91
HPI505 07938	7.938	5/16	0.3125	8	53	91
HPI505 080	8	-	0.3150	8	53	91
HPI505 081	8.1	-	0.3189	10	61	103
HPI505 082	8.2	-	0.3228	10	61	103
HPI505 083	8.3	-	0.3268	10	61	103

P-Star Drill

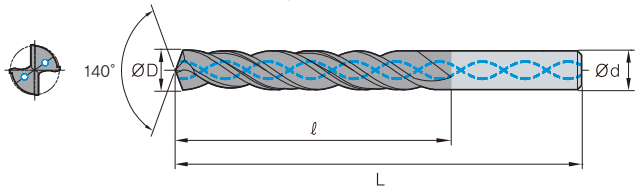
HPI505

Double margin internal coolant drill - 5×D

DIN 6537K | ULTRA FINE | 30° HELIX | TiAlN | 5×D | 140° | DATA p.484

• TOLERANCE

ØD		Ød
Ø3	+0.012 ~ +0.002mm	h6
Ø3.1 ~ Ø6	+0.016 ~ +0.004mm	
Ø6.1 ~ Ø10	+0.021 ~ +0.006mm	
Ø10.1 ~ Ø18	+0.025 ~ +0.007mm	
Ø18.1 ~	+0.029 ~ +0.008mm	



(mm)

Designation	ØD			Ød	ℓ	L
	mm	fraction	inch			
HPI505 08334	8.334	21/64	0.3281	10	61	103
HPI505 084	8.4	-	0.3307	10	61	103
HPI505 08433	8.433	-	0.3320	10	61	103
HPI505 085	8.5	-	0.3346	10	61	103
HPI505 086	8.6	-	0.3386	10	61	103
HPI505 087	8.7	-	0.3425	10	61	103
HPI505 08733	8.733	11/32	0.3438	10	61	103
HPI505 088	8.8	-	0.3465	10	61	103
HPI505 089	8.9	-	0.3504	10	61	103
HPI505 090	9	-	0.3543	10	61	103
HPI505 091	9.1	-	0.3583	10	61	103
HPI505 09129	9.129	23/64	0.3594	10	61	103
HPI505 092	9.2	-	0.3622	10	61	103
HPI505 093	9.3	-	0.3661	10	61	103
HPI505 09347	9.347	-	0.3680	10	61	103
HPI505 094	9.4	-	0.3701	10	61	103
HPI505 095	9.5	-	0.3740	10	61	103
HPI505 09525	9.525	3/8	0.3750	10	61	103
HPI505 096	9.6	-	0.3780	10	61	103
HPI505 097	9.7	-	0.3819	10	61	103
HPI505 09703	9.703	-	0.3820	10	61	103
HPI505 09746	9.746	-	0.3837	10	61	103
HPI505 098	9.8	-	0.3858	10	61	103
HPI505 099	9.9	-	0.3898	10	61	103
HPI505 09921	9.921	25/64	0.3906	10	61	103
HPI505 100	10	-	0.3937	10	61	103
HPI505 101	10.1	-	0.3976	12	71	118
HPI505 102	10.2	-	0.4016	12	71	118
HPI505 103	10.3	-	0.4055	12	71	118
HPI505 1032	10.32	13/32	0.4063	12	71	118
HPI505 104	10.4	-	0.4074	12	71	118
HPI505 105	10.5	-	0.4134	12	71	118
HPI505 106	10.6	-	0.4173	12	71	118
HPI505 107	10.7	-	0.4213	12	71	118
HPI505 10716	10.716	27/64	0.4219	12	71	118
HPI505 108	10.8	-	0.4252	12	71	118
HPI505 109	10.9	-	0.4291	12	71	118

Designation	ØD			Ød	ℓ	L
	mm	fraction	inch			
HPI505 110	11	-	0.4331	12	71	118
HPI505 111	11.1	-	0.4370	12	71	118
HPI505 11113	11.113	7/16	0.4375	12	71	118
HPI505 112	11.2	-	0.4409	12	71	118
HPI505 113	11.3	-	0.4449	12	71	118
HPI505 114	11.4	-	0.4488	12	71	118
HPI505 115	11.5	-	0.4528	12	71	118
HPI505 11509	11.509	29/64	0.4531	12	71	118
HPI505 116	11.6	-	0.4567	12	71	118
HPI505 117	11.7	-	0.4606	12	71	118
HPI505 118	11.8	-	0.4646	12	71	118
HPI505 119	11.9	-	0.4685	12	71	118
HPI505 11908	11.908	15/32	0.4688	12	71	118
HPI505 120	12	-	0.4724	12	71	118
HPI505 121	12.1	-	0.4764	14	77	124
HPI505 122	12.2	-	0.4803	14	77	124
HPI505 123	12.3	-	0.4843	14	77	124
HPI505 12304	12.304	31/64	0.4844	14	77	124
HPI505 124	12.4	-	0.4882	14	77	124
HPI505 125	12.5	-	0.4921	14	77	124
HPI505 126	12.6	-	0.4961	14	77	124
HPI505 127	12.7	1/2	0.5000	14	77	124
HPI505 128	12.8	-	0.5039	14	77	124
HPI505 129	12.9	-	0.5079	14	77	124
HPI505 12903	12.903	-	0.5080	14	77	124
HPI505 130	13	-	0.5118	14	77	124
HPI505 13096	13.096	33/64	0.5156	14	77	124
HPI505 131	13.1	-	0.5157	14	77	124
HPI505 132	13.2	-	0.5197	14	77	124
HPI505 133	13.3	-	0.5236	14	77	124
HPI505 134	13.4	-	0.5276	14	77	124
HPI505 13494	13.494	17/32	0.5313	14	77	124
HPI505 135	13.5	-	0.5315	14	77	124
HPI505 137	13.7	-	0.5394	14	77	124
HPI505 138	13.8	-	0.5433	14	77	124
HPI505 13891	13.981	35/64	0.5504	14	77	124
HPI505 140	14	-	0.5512	14	77	124

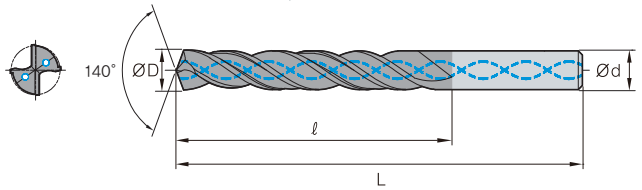
HPI505

Double margin internal coolant drill - 5×D

DIN 6537K | ULTRA FINE | 30° HELIX | TiAlN | 5×D | 140° | DATA p.484

• TOLERANCE

ØD		Ød
Ø3	+0.012 ~ +0.002mm	h6
Ø3.1 ~ Ø6	+0.016 ~ +0.004mm	
Ø6.1 ~ Ø10	+0.021 ~ +0.006mm	
Ø10.1 ~ Ø18	+0.025 ~ +0.007mm	
Ø18.1 ~	+0.029 ~ +0.008mm	



(mm)

Designation	ØD			Ød	ℓ	L
	mm	fraction	inch			
HPI505 141	14.1	-	0.5551	16	83	133
HPI505 142	14.2	-	0.5591	16	83	133
HPI505 14288	14.288	9/16	0.5625	16	83	133
HPI505 145	14.5	-	0.5709	16	83	133
HPI505 146	14.6	-	0.5748	16	83	133
HPI505 147	14.7	-	0.5787	16	83	133
HPI505 148	14.8	-	0.5827	16	83	133
HPI505 149	14.9	-	0.5866	16	83	133
HPI505 150	15	-	0.5906	16	83	133
HPI505 15081	15.081	19/32	0.5937	16	83	133
HPI505 151	15.1	-	0.5945	16	83	133
HPI505 152	15.2	-	0.5984	16	83	133
HPI505 155	15.5	-	0.6102	16	83	133
HPI505 156	15.6	-	0.6142	16	83	133
HPI505 157	15.7	-	0.6181	16	83	133
HPI505 158	15.8	-	0.6220	16	83	133
HPI505 15875	15.875	5/8	0.6250	16	83	133
HPI505 159	15.9	-	0.6260	16	83	133
HPI505 160	16	-	0.6299	16	83	133
HPI505 16078	16.078	-	0.6330	18	93	143
HPI505 162	16.2	-	0.6378	18	93	143
HPI505 164	16.4	-	0.6457	18	93	143
HPI505 165	16.5	-	0.6496	18	93	143
HPI505 166	16.6	-	0.6535	18	93	143
HPI505 16667	16.667	21/32	0.6562	18	93	143
HPI505 167	16.7	-	0.6575	18	93	143

Designation	ØD			Ød	ℓ	L
	mm	fraction	inch			
HPI505 170	17	-	0.6693	18	93	143
HPI505 171	17.1	-	0.6732	18	93	143
HPI505 172	17.2	-	0.6772	18	93	143
HPI505 173	17.3	-	0.6811	18	93	143
HPI505 17463	17.463	11/16	0.6875	18	93	143
HPI505 175	17.5	-	0.6890	18	93	143
HPI505 176	17.6	-	0.6929	18	93	143
HPI505 177	17.7	-	0.6969	18	93	143
HPI505 178	17.8	-	0.7008	18	93	143
HPI505 179	17.9	-	0.7047	18	93	143
HPI505 180	18	-	0.7087	18	93	143
HPI505 184	18.4	-	0.7244	20	101	153
HPI505 185	18.5	-	0.7283	20	101	153
HPI505 186	18.6	-	0.7323	20	101	153
HPI505 188	18.8	-	0.7402	20	101	153
HPI505 189	18.9	-	0.7441	20	101	153
HPI505 190	19	-	0.7480	20	101	153
HPI505 1905	19.05	3/4	0.7500	20	101	153
HPI505 192	19.2	-	0.7559	20	101	153
HPI505 19253	19.253	-	0.7580	20	101	153
HPI505 19446	19.446	49/64	0.7656	20	101	153
HPI505 195	19.5	-	0.7677	20	101	153
HPI505 197	19.7	-	0.7756	20	101	153
HPI505 19844	19.844	25/32	0.7813	20	101	153
HPI505 200	20	-	0.7874	20	101	153

※ The above specifications are subject to change without prior notice for product quality improvement.

• Applicable Workpiece

Carbon steel ~ HB225	Alloy steel HB225~325	Pre-hardened steel HRC30~50	Hardened steel		Copper	Graphite	Cast iron ~FCD500	Aluminum	Stainless steel
			SKD61~HRC55	SKD11 HRC55~					
○	◎	◎	○	○			◎		○

◎: Excellent ○: Good

P-Star Drill

HPI508-N

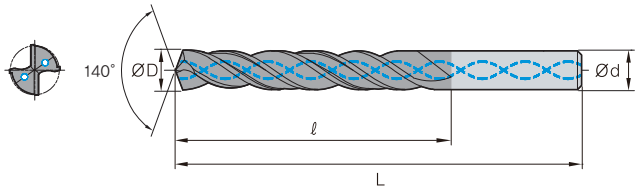
Double margin internal coolant drill - 8×D

ULTRA FINE | 30° HELIX | TiAlN | 8×D | 140° | DATA

p.484

• TOLERANCE

ØD		Ød
Ø3	+0.012 ~ +0.002mm	h6
Ø3.1 ~ Ø6	+0.016 ~ +0.004mm	
Ø6.1 ~ Ø10	+0.021 ~ +0.006mm	
Ø10.1 ~ Ø18	+0.025 ~ +0.007mm	
Ø18.1 ~	+0.029 ~ +0.008mm	



(mm)

Designation	ØD			Ød	ℓ	L
	mm	fraction	inch			
HPI508 030N	3	-	0.1181	6	43	80
HPI508 031N	3.1	-	0.1220	6	43	80
HPI508 03175N	3.175	1/8	0.1250	6	43	80
HPI508 032N	3.2	-	0.1260	6	43	80
HPI508 03264N	3.264	-	0.1285	6	43	80
HPI508 033N	3.3	-	0.1299	6	43	80
HPI508 034N	3.4	-	0.1339	6	43	80
HPI508 035N	3.5	-	0.1378	6	43	80
HPI508 03572N	3.572	9/64	0.1406	6	43	80
HPI508 036N	3.6	-	0.1417	6	43	80
HPI508 037N	3.7	-	0.1457	6	43	80
HPI508 038N	3.8	-	0.1496	6	49	87
HPI508 039N	3.9	-	0.1535	6	49	87
HPI508 0397N	3.97	5/32	0.1563	6	49	87
HPI508 040N	4	-	0.1575	6	49	87
HPI508 04039N	4.039	-	0.1590	6	49	87
HPI508 041N	4.1	-	0.1614	6	49	87
HPI508 042N	4.2	-	0.1654	6	49	87
HPI508 043N	4.3	-	0.1693	6	49	87
HPI508 04366N	4.366	-	0.1719	6	49	87
HPI508 044N	4.4	-	0.1732	6	49	87
HPI508 045N	4.5	-	0.1772	6	49	87
HPI508 046N	4.6	-	0.1811	6	49	87
HPI508 047N	4.7	-	0.1850	6	49	87
HPI508 04763N	4.763	3/16	0.1875	6	56	94
HPI508 048N	4.8	-	0.1890	6	56	94
HPI508 049N	4.9	-	0.1929	6	56	94
HPI508 050N	5	-	0.1969	6	56	94
HPI508 051N	5.1	-	0.2008	6	56	94
HPI508 05159N	5.159	13/64	0.2031	6	56	94
HPI508 052N	5.2	-	0.2047	6	56	94
HPI508 053N	5.3	-	0.2087	6	56	94
HPI508 054N	5.4	-	0.2126	6	56	94
HPI508 055N	5.5	-	0.2165	6	56	94
HPI508 05558N	5.558	7/32	0.2188	6	56	94
HPI508 056N	5.6	-	0.2205	6	56	94
HPI508 057N	5.7	-	0.2244	6	56	94
HPI508 058N	5.8	-	0.2283	6	56	94
HPI508 059N	5.9	-	0.2323	6	56	94

Designation	ØD			Ød	ℓ	L
	mm	fraction	inch			
HPI508 05953N	5.953	15/64	0.2344	6	56	94
HPI508 060N	6	-	0.2362	6	65	94
HPI508 061N	6.1	-	0.2402	8	67	105
HPI508 062N	6.2	-	0.2441	8	67	105
HPI508 063N	6.3	-	0.2480	8	67	105
HPI508 0635N	6.35	1/4	0.2500	8	67	105
HPI508 064N	6.4	-	0.2520	8	67	105
HPI508 065N	6.5	-	0.2559	8	67	105
HPI508 066N	6.6	-	0.2598	8	67	105
HPI508 067N	6.7	-	0.2638	8	67	105
HPI508 06747N	6.747	17/64	0.2656	8	67	105
HPI508 068N	6.8	-	0.2677	8	67	105
HPI508 069N	6.9	-	0.2717	8	67	105
HPI508 070N	7	-	0.2756	8	76	116
HPI508 071N	7.1	-	0.2795	8	76	116
HPI508 07145N	7.145	9/32	0.2813	8	76	116
HPI508 072N	7.2	-	0.2835	8	76	116
HPI508 073N	7.3	-	0.2874	8	76	116
HPI508 074N	7.4	-	0.2913	8	76	116
HPI508 075N	7.5	-	0.2953	8	76	116
HPI508 07541N	7.541	19/64	0.2969	8	76	116
HPI508 076N	7.6	-	0.2992	8	76	116
HPI508 077N	7.7	-	0.3031	8	76	116
HPI508 078N	7.8	-	0.3071	8	76	116
HPI508 079N	7.9	-	0.3110	8	76	116
HPI508 07938N	7.938	5/16	0.3125	8	76	116
HPI508 080N	8	-	0.3150	8	76	116
HPI508 081N	8.1	-	0.3189	10	87	131
HPI508 082N	8.2	-	0.3228	10	87	131
HPI508 083N	8.3	-	0.3268	10	87	131
HPI508 08334N	8.334	21/64	0.3281	10	87	131
HPI508 084N	8.4	-	0.3307	10	87	131
HPI508 085N	8.5	-	0.3346	10	87	131
HPI508 086N	8.6	-	0.3386	10	87	131
HPI508 087N	8.7	-	0.3425	10	87	131
HPI508 08733N	8.733	11/32	0.3438	10	87	131
HPI508 088N	8.8	-	0.3465	10	87	131
HPI508 089N	8.9	-	0.3504	10	87	131
HPI508 090N	9	-	0.3543	10	87	131

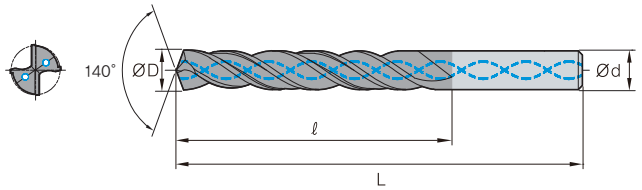
HPI508-N

Double margin internal coolant drill - 8×D

ULTRA FINE | 30° HELIX | TiAlN | 8×D | 140° | DATA p.484

• TOLERANCE

ØD		Ød
Ø3	+0.012 ~ +0.002mm	h6
Ø3.1 ~ Ø6	+0.016 ~ +0.004mm	
Ø6.1 ~ Ø10	+0.021 ~ +0.006mm	
Ø10.1 ~ Ø18	+0.025 ~ +0.007mm	
Ø18.1 ~	+0.029 ~ +0.008mm	



(mm)

Designation	ØD			Ød	ℓ	L
	mm	fraction	inch			
HPI508 091N	9.1	-	0.3583	10	95	139
HPI508 09129N	9.129	23/64	0.3594	10	95	139
HPI508 092N	9.2	-	0.3622	10	95	139
HPI508 093N	9.3	-	0.3661	10	95	139
HPI508 094N	9.4	-	0.3701	10	95	139
HPI508 095N	9.5	-	0.3740	10	95	139
HPI508 09525N	9.525	3/8	0.3750	10	95	139
HPI508 096N	9.6	-	0.3780	10	95	139
HPI508 097N	9.7	-	0.3819	10	95	139
HPI508 098N	9.8	-	0.3858	10	95	139
HPI508 099N	9.9	-	0.3898	10	95	139
HPI508 09921N	9.921	25/64	0.3906	10	95	139
HPI508 100N	10	-	0.3937	10	95	139
HPI508 101N	10.1	-	0.3976	12	106	155
HPI508 102N	10.2	-	0.4016	12	106	155
HPI508 103N	10.3	-	0.4055	12	106	155
HPI508 1032N	10.32	13/32	0.4063	12	106	155
HPI508 104N	10.4	-	0.4094	12	106	155
HPI508 105N	10.5	-	0.4134	12	106	155
HPI508 107N	10.7	-	0.4213	12	106	155
HPI508 10716N	10.716	27/64	0.4219	12	106	155
HPI508 108N	10.8	-	0.4252	12	106	155
HPI508 109N	10.9	-	0.4291	12	106	155
HPI508 110N	11	-	0.4331	12	106	155
HPI508 111N	11.1	-	0.4370	12	114	163
HPI508 11113N	11.113	7/16	0.4375	12	114	163
HPI508 112N	11.2	-	0.4409	12	114	163
HPI508 113N	11.3	-	0.4449	12	114	163
HPI508 114N	11.4	-	0.4488	12	114	163
HPI508 115N	11.5	-	0.4528	12	114	163
HPI508 11509N	11.509	29/64	0.4531	12	114	163
HPI508 116N	11.6	-	0.4567	12	114	163
HPI508 117N	11.7	-	0.4606	12	114	163
HPI508 118N	11.8	-	0.4646	12	114	163

Designation	ØD			Ød	ℓ	L
	mm	fraction	inch			
HPI508 119N	11.9	-	0.4685	12	114	163
HPI508 11908N	11.908	15/32	0.4688	12	114	163
HPI508 120N	12	-	0.4724	12	114	163
HPI508 12304N	12.304	31/64	0.4844	14	133	182
HPI508 125N	12.5	-	0.4921	14	133	182
HPI508 127N	12.7	1/2	0.5000	14	133	182
HPI508 128N	12.8	-	0.5039	14	133	182
HPI508 130N	13	-	0.5118	14	133	182
HPI508 13494N	13.494	-	0.5313	14	133	182
HPI508 135N	13.5	-	0.5315	14	133	182
HPI508 140N	14	-	0.5512	14	133	182
HPI508 14288N	14.288	9/16	0.5625	16	152	204
HPI508 145N	14.5	-	0.5709	16	152	204
HPI508 150N	15	-	0.5906	16	152	204
HPI508 151N	15.1	-	0.5945	16	152	204
HPI508 152N	15.2	-	0.5984	16	152	204
HPI508 153N	15.3	-	0.6024	16	152	204
HPI508 155N	15.5	-	0.6102	16	152	204
HPI508 158N	15.8	-	0.6220	16	152	204
HPI508 15875N	15.875	5/8	0.6250	16	152	204
HPI508 160N	16	-	0.6299	16	152	204
HPI508 16078N	16.078	-	0.6330	18	171	223
HPI508 162N	16.2	-	0.6378	18	171	223
HPI508 165N	16.5	-	0.6496	18	171	223
HPI508 170N	17	-	0.6693	18	171	223
HPI508 17463N	17.463	11/16	0.6875	18	171	223
HPI508 175N	17.5	-	0.6890	18	171	223
HPI508 180N	18	-	0.7087	18	171	223
HPI508 185N	18.5	-	0.7283	20	191	244
HPI508 190N	19	-	0.7480	20	191	244
HPI508 1905N	19.05	3/4	0.7500	20	191	244
HPI508 19253N	19.253	-	0.7580	20	191	244
HPI508 198N	19.8	-	0.7795	20	191	244
HPI508 200N	20	-	0.7874	20	191	244

※ The above specifications are subject to change without prior notice for product quality improvement.

• Applicable Workpiece

Carbon steel ~ HB225	Alloy steel HB225~325	Pre-hardened steel HRC30~50	Hardened steel		Copper	Graphite	Cast iron ~FCD500	Aluminum	Stainless steel
			SKD61~HRC55	SKD11 HRC55~					
○	◎	◎	○	○			◎		○

◎: Excellent ○: Good

P-Star Drill

P503A(F)

Din 6537K type drill

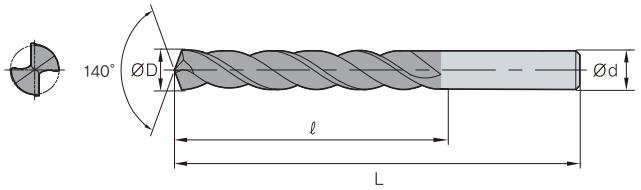
DIN 6537K | ULTRA FINE | 30° HELIX | TiAlN | ▸3×D | 140° | DATA

p.485

• TOLERANCE

D	Ød
Ø3	+0.012 ~ +0.002mm
Ø3.1 ~ Ø6	+0.016 ~ +0.004mm
Ø6.1 ~ Ø10	+0.021 ~ +0.006mm
Ø10.1 ~ Ø18	+0.025 ~ +0.007mm
Ø18.1 ~	+0.029 ~ +0.008mm

h6



(mm)

Designation	Designation (Weldon shank)	ØD	Ød	ℓ	L
P503A 030	P503F 030	3	6	20	62
P503A 031	P503F 031	3.1	6	20	62
P503A 032	P503F 032	3.2	6	20	62
P503A 033	P503F 033	3.3	6	20	62
P503A 034	P503F 034	3.4	6	20	62
P503A 035	P503F 035	3.5	6	20	62
P503A 036	P503F 036	3.6	6	20	62
P503A 037	P503F 037	3.7	6	20	62
P503A 038	P503F 038	3.8	6	24	66
P503A 039	P503F 039	3.9	6	24	66
P503A 040	P503F 040	4	6	24	66
P503A 041	P503F 041	4.1	6	24	66
P503A 042	P503F 042	4.2	6	24	66
P503A 043	P503F 043	4.3	6	24	66
P503A 044	P503F 044	4.4	6	24	66
P503A 045	P503F 045	4.5	6	24	66
P503A 046	P503F 046	4.6	6	24	66
P503A 047	P503F 047	4.7	6	24	66
P503A 048	P503F 048	4.8	6	28	66
P503A 049	P503F 049	4.9	6	28	66
P503A 050	P503F 050	5	6	28	66
P503A 051	P503F 051	5.1	6	28	66
P503A 052	P503F 052	5.2	6	28	66
P503A 053	P503F 053	5.3	6	28	66
P503A 054	P503F 054	5.4	6	28	66
P503A 055	P503F 055	5.5	6	28	66
P503A 056	P503F 056	5.6	6	28	66
P503A 057	P503F 057	5.7	6	28	66
P503A 058	P503F 058	5.8	6	28	66
P503A 059	P503F 059	5.9	6	28	66
P503A 060	P503F 060	6	6	28	66
P503A 061	P503F 061	6.1	8	34	79
P503A 062	P503F 062	6.2	8	34	79
P503A 063	P503F 063	6.3	8	34	79
P503A 064	P503F 064	6.4	8	34	79
P503A 065	P503F 065	6.5	8	34	79
P503A 066	P503F 066	6.6	8	34	79
P503A 067	P503F 067	6.7	8	34	79
P503A 068	P503F 068	6.8	8	34	79
P503A 069	P503F 069	6.9	8	34	79
P503A 070	P503F 070	7	8	34	79

Designation	Designation (Weldon shank)	ØD	Ød	ℓ	L
P503A 071	P503F 071	7.1	8	41	79
P503A 072	P503F 072	7.2	8	41	79
P503A 073	P503F 073	7.3	8	41	79
P503A 074	P503F 074	7.4	8	41	79
P503A 075	P503F 075	7.5	8	41	79
P503A 076	P503F 076	7.6	8	41	79
P503A 077	P503F 077	7.7	8	41	79
P503A 078	P503F 078	7.8	8	41	79
P503A 079	P503F 079	7.9	8	41	79
P503A 080	P503F 080	8	8	41	79
P503A 081	P503F 081	8.1	10	47	89
P503A 082	P503F 082	8.2	10	47	89
P503A 083	P503F 083	8.3	10	47	89
P503A 084	P503F 084	8.4	10	47	89
P503A 085	P503F 085	8.5	10	47	89
P503A 086	P503F 086	8.6	10	47	89
P503A 087	P503F 087	8.7	10	47	89
P503A 088	P503F 088	8.8	10	47	89
P503A 089	P503F 089	8.9	10	47	89
P503A 090	P503F 090	9	10	47	89
P503A 091	P503F 091	9.1	10	47	89
P503A 092	P503F 092	9.2	10	47	89
P503A 093	P503F 093	9.3	10	47	89
P503A 094	P503F 094	9.4	10	47	89
P503A 095	P503F 095	9.5	10	47	89
P503A 096	P503F 096	9.6	10	47	89
P503A 097	P503F 097	9.7	10	47	89
P503A 098	P503F 098	9.8	10	47	89
P503A 099	P503F 099	9.9	10	47	89
P503A 100	P503F 100	10	10	47	89
P503A 101	P503F 101	10.1	12	55	102
P503A 102	P503F 102	10.2	12	55	102
P503A 103	P503F 103	10.3	12	55	102
P503A 104	P503F 104	10.4	12	55	102
P503A 105	P503F 105	10.5	12	55	102
P503A 106	P503F 106	10.6	12	55	102
P503A 107	P503F 107	10.7	12	55	102
P503A 108	P503F 108	10.8	12	55	102
P503A 109	P503F 109	10.9	12	55	102
P503A 110	P503F 110	11	12	55	102
P503A 111	P503F 111	11.1	12	55	102

P503A(F)

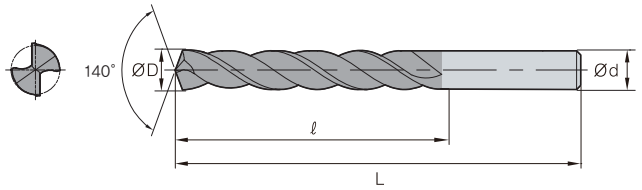
Din 6537K type drill

DIN 6537K | ULTRA FINE | 30° HELIX | TiAlN | ▸3×D | 140° | DATA

p.485

• TOLERANCE

ØD		Ød
Ø3	+0.012 ~ +0.002mm	h6
Ø3.1 ~ Ø6	+0.016 ~ +0.004mm	
Ø6.1 ~ Ø10	+0.021 ~ +0.006mm	
Ø10.1 ~ Ø18	+0.025 ~ +0.007mm	
Ø18.1 ~	+0.029 ~ +0.008mm	



(mm)

Designation	Designation (Weldon shank)	ØD	Ød	ℓ	L
P503A 112	P503F 112	11.2	12	55	102
P503A 113	P503F 113	11.3	12	55	102
P503A 114	P503F 114	11.4	12	55	102
P503A 115	P503F 115	11.5	12	55	102
P503A 116	P503F 116	11.6	12	55	102
P503A 117	P503F 117	11.7	12	55	102
P503A 118	P503F 118	11.8	12	55	102
P503A 119	P503F 119	11.9	12	55	102
P503A 120	P503F 120	12	12	55	102
P503A 121	P503F 121	12.1	14	60	107
P503A 122	P503F 122	12.2	14	60	107
P503A 123	P503F 123	12.3	14	60	107
P503A 124	P503F 124	12.4	14	60	107
P503A 125	P503F 125	12.5	14	60	107
P503A 126	P503F 126	12.6	14	60	107
P503A 127	P503F 127	12.7	14	60	107
P503A 128	P503F 128	12.8	14	60	107
P503A 129	P503F 129	12.9	14	60	107
P503A 130	P503F 130	13	14	60	107
P503A 131	P503F 131	13.1	14	60	107
P503A 132	P503F 132	13.2	14	60	107
P503A 133	P503F 133	13.3	14	60	107
P503A 134	P503F 134	13.4	14	60	107
P503A 135	P503F 135	13.5	14	60	107
P503A 136	P503F 136	13.6	14	60	107
P503A 137	P503F 137	13.7	14	60	107
P503A 138	P503F 138	13.8	14	60	107
P503A 139	P503F 139	13.9	14	60	107
P503A 140	P503F 140	14	14	60	107
P503A 141	P503F 141	14.1	16	65	115
P503A 142	P503F 142	14.2	16	65	115
P503A 143	P503F 143	14.3	16	65	115
P503A 144	P503F 144	14.4	16	65	115
P503A 145	P503F 145	14.5	16	65	115
P503A 146	P503F 146	14.6	16	65	115
P503A 147	P503F 147	14.7	16	65	115
P503A 148	P503F 148	14.8	16	65	115
P503A 149	P503F 149	14.9	16	65	115
P503A 150	P503F 150	15	16	65	115
P503A 151	P503F 151	15.1	16	65	115
P503A 152	P503F 152	15.2	16	65	115
P503A 153	P503F 153	15.3	16	65	115
P503A 154	P503F 154	15.4	16	65	115
P503A 155	P503F 155	15.5	16	65	115
P503A 156	P503F 156	15.6	16	65	115
P503A 157	P503F 157	15.7	16	65	115
P503A 158	P503F 158	15.8	16	65	115
P503A 159	P503F 159	15.9	16	65	115
P503A 160	P503F 160	16	16	65	115
P503A 161	P503F 161	16.1	18	73	123
P503A 163	P503F 163	16.3	18	73	123
P503A 165	P503F 165	16.5	18	73	123
P503A 170	P503F 170	17	18	73	123
P503A 171	P503F 171	17.1	18	73	123
P503A 172	P503F 172	17.2	18	73	123
P503A 175	P503F 175	17.5	18	73	123
P503A 177	P503F 177	17.7	18	73	123
P503A 178	P503F 178	17.8	18	73	123
P503A 180	P503F 180	18	18	73	123
P503A 181	P503F 181	18.1	20	79	131
P503A 182	P503F 182	18.2	20	79	131
P503A 185	P503F 185	18.5	20	79	131
P503A 190	P503F 190	19	20	79	131
P503A 191	P503F 191	19.1	20	79	131
P503A 195	P503F 195	19.5	20	79	131
P503A 197	P503F 197	19.7	20	79	131
P503A 200	P503F 200	20	20	79	131

※ The above specifications are subject to change without prior notice for product quality improvement.

• Applicable Workpiece

Carbon steel ~ HB225	Alloy steel HB225~325	Pre-hardened steel HRC30~50	Hardened steel		Copper	Graphite	Cast iron ~FCD500	Aluminum	Stainless steel
			SKD61~HRC55	SKD11 HRC55~					
○	◎	◎	○	○			◎		◎

◎: Excellent ○: Good

P-Star Drill

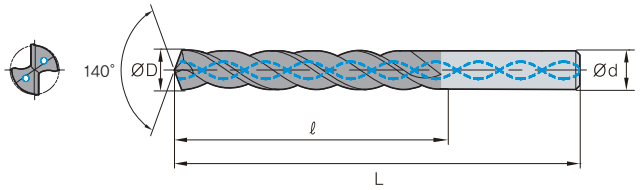
PI503A(F)

Din 6537K type internal coolant drill

DIN 6537K | ULTRA FINE | 30° HELIX | TiAlN | ▸3×D | 140° | DATA p.485

• TOLERANCE

ØD		Ød
Ø3	+0.012 ~ +0.002mm	h6
Ø3.1 ~ Ø6	+0.016 ~ +0.004mm	
Ø6.1 ~ Ø10	+0.021 ~ +0.006mm	
Ø10.1 ~ Ø18	+0.025 ~ +0.007mm	
Ø18.1 ~	+0.029 ~ +0.008mm	



(mm)

Designation	Designation (Weldon shank)	ØD	Ød	ℓ	L
PI503A 030	PI503F 030	3	6	20	62
PI503A 031	PI503F 031	3.1	6	20	62
PI503A 032	PI503F 032	3.2	6	20	62
PI503A 033	PI503F 033	3.3	6	20	62
PI503A 034	PI503F 034	3.4	6	20	62
PI503A 035	PI503F 035	3.5	6	20	62
PI503A 036	PI503F 036	3.6	6	20	62
PI503A 037	PI503F 037	3.7	6	20	62
PI503A 038	PI503F 038	3.8	6	24	66
PI503A 039	PI503F 039	3.9	6	24	66
PI503A 040	PI503F 040	4	6	24	66
PI503A 041	PI503F 041	4.1	6	24	66
PI503A 042	PI503F 042	4.2	6	24	66
PI503A 043	PI503F 043	4.3	6	24	66
PI503A 044	PI503F 044	4.4	6	24	66
PI503A 045	PI503F 045	4.5	6	24	66
PI503A 046	PI503F 046	4.6	6	24	66
PI503A 047	PI503F 047	4.7	6	24	66
PI503A 048	PI503F 048	4.8	6	28	66
PI503A 049	PI503F 049	4.9	6	28	66
PI503A 050	PI503F 050	5	6	28	66
PI503A 051	PI503F 051	5.1	6	28	66
PI503A 052	PI503F 052	5.2	6	28	66
PI503A 053	PI503F 053	5.3	6	28	66
PI503A 054	PI503F 054	5.4	6	28	66
PI503A 055	PI503F 055	5.5	6	28	66
PI503A 056	PI503F 056	5.6	6	28	66
PI503A 057	PI503F 057	5.7	6	28	66
PI503A 058	PI503F 058	5.8	6	28	66
PI503A 059	PI503F 059	5.9	6	28	66
PI503A 060	PI503F 060	6	6	28	66
PI503A 061	PI503F 061	6.1	8	34	79
PI503A 062	PI503F 062	6.2	8	34	79
PI503A 063	PI503F 063	6.3	8	34	79
PI503A 064	PI503F 064	6.4	8	34	79
PI503A 065	PI503F 065	6.5	8	34	79
PI503A066	PI503F 066	6.6	8	34	79
PI503A067	PI503F 067	6.7	8	34	79
PI503A068	PI503F 068	6.8	8	34	79
PI503A069	PI503F 069	6.9	8	34	79
PI503A070	PI503F 070	7	8	34	79

Designation	Designation (Weldon shank)	ØD	Ød	ℓ	L
PI503A071	PI503F 071	7.1	8	41	79
PI503A072	PI503F 072	7.2	8	41	79
PI503A073	PI503F 073	7.3	8	41	79
PI503A074	PI503F 074	7.4	8	41	79
PI503A075	PI503F 075	7.5	8	41	79
PI503A076	PI503F 076	7.6	8	41	79
PI503A077	PI503F 077	7.7	8	41	79
PI503A078	PI503F 078	7.8	8	41	79
PI503A079	PI503F 079	7.9	8	41	79
PI503A080	PI503F 080	8	8	41	79
PI503A081	PI503F 081	8.1	10	47	89
PI503A082	PI503F 082	8.2	10	47	89
PI503A083	PI503F 083	8.3	10	47	89
PI503A084	PI503F 084	8.4	10	47	89
PI503A085	PI503F 085	8.5	10	47	89
PI503A086	PI503F 086	8.6	10	47	89
PI503A087	PI503F 087	8.7	10	47	89
PI503A088	PI503F 088	8.8	10	47	89
PI503A089	PI503F 089	8.9	10	47	89
PI503A090	PI503F 090	9	10	47	89
PI503A091	PI503F 091	9.1	10	47	89
PI503A092	PI503F 092	9.2	10	47	89
PI503A093	PI503F 093	9.3	10	47	89
PI503A094	PI503F 094	9.4	10	47	89
PI503A095	PI503F 095	9.5	10	47	89
PI503A096	PI503F 096	9.6	10	47	89
PI503A097	PI503F 097	9.7	10	47	89
PI503A098	PI503F 098	9.8	10	47	89
PI503A099	PI503F 099	9.9	10	47	89
PI503A100	PI503F 100	10	10	47	89
PI503A101	PI503F 101	10.1	12	55	102
PI503A 102	PI503F 102	10.2	12	55	102
PI503A 103	PI503F 103	10.3	12	55	102
PI503A 104	PI503F 104	10.4	12	55	102
PI503A 105	PI503F 105	10.5	12	55	102
PI503A 106	PI503F 106	10.6	12	55	102
PI503A 107	PI503F 107	10.7	12	55	102
PI503A 108	PI503F 108	10.8	12	55	102
PI503A 109	PI503F 109	10.9	12	55	102
PI503A 110	PI503F 110	11	12	55	102
PI503A 111	PI503F 111	11.1	12	55	102

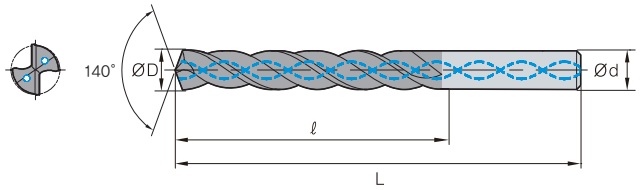
PI503A(F)

Din 6537K type internal coolant drill

DIN 6537K | ULTRA FINE | 30° HELIX | TiAlN | ▸3×D | 140° | DATA p.485

• TOLERANCE

ØD		Ød
Ø3	+0.012 ~ +0.002mm	h6
Ø3.1 ~ Ø6	+0.016 ~ +0.004mm	
Ø6.1 ~ Ø10	+0.021 ~ +0.006mm	
Ø10.1 ~ Ø18	+0.025 ~ +0.007mm	
Ø18.1 ~	+0.029 ~ +0.008mm	



(mm)

Designation	Designation (Weldon shank)	ØD	Ød	ℓ	L
PI503A 112	PI503F 112	11.2	12	55	102
PI503A 113	PI503F 113	11.3	12	55	102
PI503A 114	PI503F 114	11.4	12	55	102
PI503A 115	PI503F 115	11.5	12	55	102
PI503A 116	PI503F 116	11.6	12	55	102
PI503A 117	PI503F 117	11.7	12	55	102
PI503A 118	PI503F 118	11.8	12	55	102
PI503A 119	PI503F 119	11.9	12	55	102
PI503A 120	PI503F 120	12	12	55	102
PI503A 121	PI503F 121	12.1	14	60	107
PI503A 122	PI503F 122	12.2	14	60	107
PI503A 123	PI503F 123	12.3	14	60	107
PI503A 124	PI503F 124	12.4	14	60	107
PI503A 125	PI503F 125	12.5	14	60	107
PI503A 126	PI503F 126	12.6	14	60	107
PI503A 127	PI503F 127	12.7	14	60	107
PI503A 128	PI503F 128	12.8	14	60	107
PI503A 129	PI503F 129	12.9	14	60	107
PI503A 130	PI503F 130	13	14	60	107
PI503A 131	PI503F 131	13.1	14	60	107
PI503A 132	PI503F 132	13.2	14	60	107
PI503A 133	PI503F 133	13.3	14	60	107
PI503A 134	PI503F 134	13.4	14	60	107
PI503A 135	PI503F 135	13.5	14	60	107
PI503A 136	PI503F 136	13.6	14	60	107
PI503A 137	PI503F 137	13.7	14	60	107
PI503A 138	PI503F 138	13.8	14	60	107
PI503A 139	PI503F 139	13.9	14	60	107
PI503A 140	PI503F 140	14	14	60	107
PI503A 141	PI503F 141	14.1	16	65	115
PI503A 142	PI503F 142	14.2	16	65	115
PI503A 143	PI503F 143	14.3	16	65	115
PI503A 144	PI503F 144	14.4	16	65	115
PI503A 145	PI503F 145	14.5	16	65	115

Designation	Designation (Weldon shank)	ØD	Ød	ℓ	L
PI503A 146	PI503F 146	14.6	16	65	115
PI503A 147	PI503F 147	14.7	16	65	115
PI503A 148	PI503F 148	14.8	16	65	115
PI503A 149	PI503F 149	14.9	16	65	115
PI503A 150	PI503F 150	15	16	65	115
PI503A 151	PI503F 151	15.1	16	65	115
PI503A 152	PI503F 152	15.2	16	65	115
PI503A 153	PI503F 153	15.3	16	65	115
PI503A 154	PI503F 154	15.4	16	65	115
PI503A 155	PI503F 155	15.5	16	65	115
PI503A 156	PI503F 156	15.6	16	65	115
PI503A 157	PI503F 157	15.7	16	65	115
PI503A 158	PI503F 158	15.8	16	65	115
PI503A 159	PI503F 159	15.9	16	65	115
PI503A 160	PI503F 160	16	16	65	115
PI503A 161	PI503F 161	16.1	18	73	123
PI503A 163	PI503F 163	16.3	18	73	123
PI503A 165	PI503F 165	16.5	18	73	123
PI503A 170	PI503F 170	17	18	73	123
PI503A 171	PI503F 171	17.1	18	73	123
PI503A 172	PI503F 172	17.2	18	73	123
PI503A 175	PI503F 175	17.5	18	73	123
PI503A 177	PI503F 177	17.7	18	73	123
PI503A 178	PI503F 178	17.8	18	73	123
PI503A 180	PI503F 180	18	18	73	123
PI503A 181	PI503F 181	18.1	20	79	131
PI503A 182	PI503F 182	18.2	20	79	131
PI503A 185	PI503F 185	18.5	20	79	131
PI503A 190	PI503F 190	19	20	79	131
PI503A 191	PI503F 191	19.1	20	79	131
PI503A 195	PI503F 195	19.5	20	79	131
PI503A 197	PI503F 197	19.7	20	79	131
PI503A 200	PI503F 200	20	20	79	131

※ The above specifications are subject to change without prior notice for product quality improvement.

• Applicable Workpiece

Carbon steel ~ HB225	Alloy steel HB225~325	Pre-hardened steel HRC30~50	Hardened steel		Copper	Graphite	Cast iron ~FCD500	Aluminum	Stainless steel
			SKD61~HRC55	SKD11 HRC55~					
○	◎	◎	○	○			◎		◎

◎: Excellent ○: Good

Drill

P-Star Drill

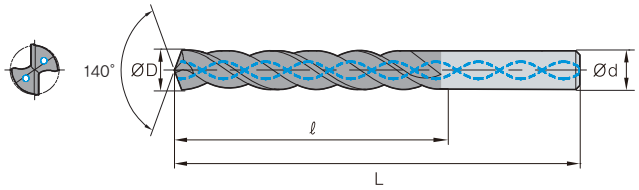
PI505A(F)

Din 6537K type internal coolant drill

DIN 6537K | ULTRA FINE | 30° HELIX | TiAlN | ▸5×D | 140° | DATA p.485

• TOLERANCE

ØD		Ød
Ø4 ~ Ø6	+0.016 ~ +0.004mm	h6
Ø6.1 ~ Ø10	+0.021 ~ +0.006mm	
Ø10.1 ~ Ø18	+0.025 ~ +0.007mm	
Ø18.1 ~	+0.029 ~ +0.008mm	



(mm)

Designation	Designation (Weldon shank)	ØD	Ød	ℓ	L
PI505A 040	PI505F 040	4	6	36	74
PI505A 041	PI505F 041	4.1	6	36	74
PI505A 042	PI505F 042	4.2	6	36	74
PI505A 043	PI505F 043	4.3	6	36	74
PI505A 044	PI505F 044	4.4	6	36	74
PI505A 045	PI505F 045	4.5	6	36	74
PI505A 046	PI505F 046	4.6	6	36	74
PI505A 047	PI505F 047	4.7	6	36	74
PI505A 048	PI505F 048	4.8	6	44	82
PI505A 049	PI505F 049	4.9	6	44	82
PI505A 050	PI505F 050	5	6	44	82
PI505A 051	PI505F 051	5.1	6	44	82
PI505A 052	PI505F 052	5.2	6	44	82
PI505A 053	PI505F 053	5.3	6	44	82
PI505A 054	PI505F 054	5.4	6	44	82
PI505A 055	PI505F 055	5.5	6	44	82
PI505A 056	PI505F 056	5.6	6	44	82
PI505A 057	PI505F 057	5.7	6	44	82
PI505A 058	PI505F 058	5.8	6	44	82
PI505A 059	PI505F 059	5.9	6	44	82
PI505A 060	PI505F 060	6	6	44	82
PI505A 061	PI505F 061	6.1	8	53	91
PI505A 062	PI505F 062	6.2	8	53	91
PI505A 063	PI505F 063	6.3	8	53	91
PI505A 064	PI505F 064	6.4	8	53	91
PI505A 065	PI505F 065	6.5	8	53	91
PI505A 066	PI505F 066	6.6	8	53	91
PI505A 067	PI505F 067	6.7	8	53	91
PI505A 068	PI505F 068	6.8	8	53	91
PI505A 069	PI505F 069	6.9	8	53	91
PI505A 070	PI505F 070	7	8	53	91
PI505A 071	PI505F 071	7.1	8	53	91
PI505A 072	PI505F 072	7.2	8	53	91
PI505A 073	PI505F 073	7.3	8	53	91
PI505A 074	PI505F 074	7.4	8	53	91
PI505A 075	PI505F 075	7.5	8	53	91
PI505A 076	PI505F 076	7.6	8	53	91
PI505A 077	PI505F 077	7.7	8	53	91

Designation	Designation (Weldon shank)	ØD	Ød	ℓ	L
PI505A 078	PI505F 078	7.8	8	53	91
PI505A 079	PI505F 079	7.9	8	53	91
PI505A 080	PI505F 080	8	8	53	91
PI505A 081	PI505F 081	8.1	10	61	103
PI505A 082	PI505F 082	8.2	10	61	103
PI505A 083	PI505F 083	8.3	10	61	103
PI505A 084	PI505F 084	8.4	10	61	103
PI505A 085	PI505F 085	8.5	10	61	103
PI505A 086	PI505F 086	8.6	10	61	103
PI505A 087	PI505F 087	8.7	10	61	103
PI505A 088	PI505F 088	8.8	10	61	103
PI505A 089	PI505F 089	8.9	10	61	103
PI505A 090	PI505F 090	9	10	61	103
PI505A 091	PI505F 091	9.1	10	61	103
PI505A 092	PI505F 092	9.2	10	61	103
PI505A 093	PI505F 093	9.3	10	61	103
PI505A 094	PI505F 094	9.4	10	61	103
PI505A 095	PI505F 095	9.5	10	61	103
PI505A 096	PI505F 096	9.6	10	61	103
PI505A 097	PI505F 097	9.7	10	61	103
PI505A 098	PI505F 098	9.8	10	61	103
PI505A 099	PI505F 099	9.9	10	61	103
PI505A 100	PI505F 100	10	10	61	103
PI505A 101	PI505F 101	10.1	12	71	118
PI505A 102	PI505F 102	10.2	12	71	118
PI505A 103	PI505F 103	10.3	12	71	118
PI505A 104	PI505F 104	10.4	12	71	118
PI505A 105	PI505F 105	10.5	12	71	118
PI505A 106	PI505F 106	10.6	12	71	118
PI505A 107	PI505F 107	10.7	12	71	118
PI505A 108	PI505F 108	10.8	12	71	118
PI505A 109	PI505F 109	10.9	12	71	118
PI505A 110	PI505F 110	11	12	71	118
PI505A 111	PI505F 111	11.1	12	71	118
PI505A 112	PI505F 112	11.2	12	71	118
PI505A 113	PI505F 113	11.3	12	71	118
PI505A 114	PI505F 114	11.4	12	71	118
PI505A 115	PI505F 115	11.5	12	71	118

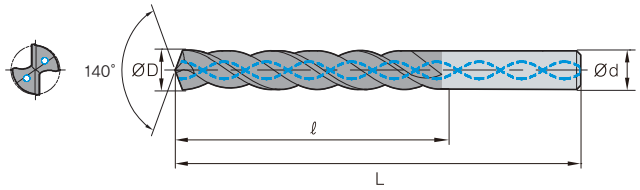
PI505A(F)

Din 6537K type internal coolant drill

DIN 6537K | ULTRA FINE | 30° HELIX | TiAlN | ▸5×D | 140° | DATA p.485

• TOLERANCE

ØD		Ød
Ø4 ~ Ø6	+0.016 ~ +0.004mm	h6
Ø6.1 ~ Ø10	+0.021 ~ +0.006mm	
Ø10.1 ~ Ø18	+0.025 ~ +0.007mm	
Ø18.1 ~	+0.029 ~ +0.008mm	



(mm)

Designation	Designation (Weldon shank)	ØD	Ød	ℓ	L
PI505A 116	PI505F 116	11.6	12	71	118
PI505A 117	PI505F 117	11.7	12	71	118
PI505A 118	PI505F 118	11.8	12	71	118
PI505A 119	PI505F 119	11.9	12	71	118
PI505A 120	PI505F 120	12	12	71	118
PI505A 121	PI505F 121	12.1	14	77	124
PI505A 122	PI505F 122	12.2	14	77	124
PI505A 123	PI505F 123	12.3	14	77	124
PI505A 124	PI505F 124	12.4	14	77	124
PI505A 125	PI505F 125	12.5	14	77	124
PI505A 126	PI505F 126	12.6	14	77	124
PI505A 127	PI505F 127	12.7	14	77	124
PI505A 128	PI505F 128	12.8	14	77	124
PI505A 129	PI505F 129	12.9	14	77	124
PI505A 130	PI505F 130	13	14	77	124
PI505A 131	PI505F 131	13.1	14	77	124
PI505A 132	PI505F 132	13.2	14	77	124
PI505A 133	PI505F 133	13.3	14	77	124
PI505A 134	PI505F 134	13.4	14	77	124
PI505A 135	PI505F 135	13.5	14	77	124
PI505A 136	PI505F 136	13.6	14	77	124
PI505A 137	PI505F 137	13.7	14	77	124
PI505A 138	PI505F 138	13.8	14	77	124
PI505A 139	PI505F 139	13.9	14	77	124
PI505A 140	PI505F 140	14	14	77	124
PI505A 141	PI505F 141	14.1	16	83	133
PI505A 142	PI505F 142	14.2	16	83	133
PI505A 143	PI505F 143	14.3	16	83	133
PI505A 144	PI505F 144	14.4	16	83	133
PI505A 145	PI505F 145	14.5	16	83	133
PI505A 146	PI505F 146	14.6	16	83	133
PI505A 147	PI505F 147	14.7	16	83	133

Designation	Designation (Weldon shank)	ØD	Ød	ℓ	L
PI505A 148	PI505F 148	14.8	16	83	133
PI505A 149	PI505F 149	14.9	16	83	133
PI505A 150	PI505F 150	15	16	83	133
PI505A 151	PI505F 151	15.1	16	83	133
PI505A 152	PI505F 152	15.2	16	83	133
PI505A 153	PI505F 153	15.3	16	83	133
PI505A 154	PI505F 154	15.4	16	83	133
PI505A 155	PI505F 155	15.5	16	83	133
PI505A 156	PI505F 156	15.6	16	83	133
PI505A 157	PI505F 157	15.7	16	83	133
PI505A 158	PI505F 158	15.8	16	83	133
PI505A 159	PI505F 159	15.9	16	83	133
PI505A 160	PI505F 160	16	16	83	133
PI505A 161	PI505F 161	16.1	18	93	143
PI505A 163	PI505F 163	16.3	18	93	143
PI505A 165	PI505F 165	16.5	18	93	143
PI505A 170	PI505F 170	17	18	93	143
PI505A 171	PI505F 171	17.1	18	93	143
PI505A 172	PI505F 172	17.2	18	93	143
PI505A 175	PI505F 175	17.5	18	93	143
PI505A 177	PI505F 177	17.7	18	93	143
PI505A 178	PI505F 178	17.8	18	93	143
PI505A 180	PI505F 180	18	18	93	143
PI505A 181	PI505F 181	18.1	20	101	153
PI505A 182	PI505F 182	18.2	20	101	153
PI505A 185	PI505F 185	18.5	20	101	153
PI505A 190	PI505F 190	19	20	101	153
PI505A 191	PI505F 191	19.1	20	101	153
PI505A 195	PI505F 195	19.5	20	101	153
PI505A 197	PI505F 197	19.7	20	101	153
PI505A 200	PI505F 200	20	20	101	153

• Applicable Workpiece

Carbon steel ~ HB225	Alloy steel HB225~325	Pre-hardened steel HRC30~50	Hardened steel		Copper	Graphite	Cast iron ~FCD500	Aluminum	Stainless steel
			SKD61~HRC55	SKD11 HRC55~					
○	◎	◎	○	○			◎		◎

◎: Excellent ○: Good

Economical carbide coated solid drill

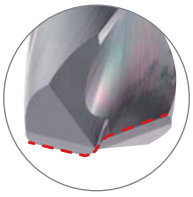
W-Star Drill

- Better cutting performance with an improved thinning shape which lessens cutting load
- High rigidity and good chip evacuation from the optimal designed flute
- Excellent cutting performance in stainless machining

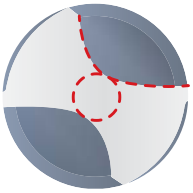
Code system

NDP	G	5	04	-	100
W-Star Drill	Appearance	Grade	Length		Diameter
	G: General	5: Grade	03: 3D 04: 4D 07: 7D		010: Ø1.0 060: Ø6.0 065: Ø6.5 100: Ø10.0

Features

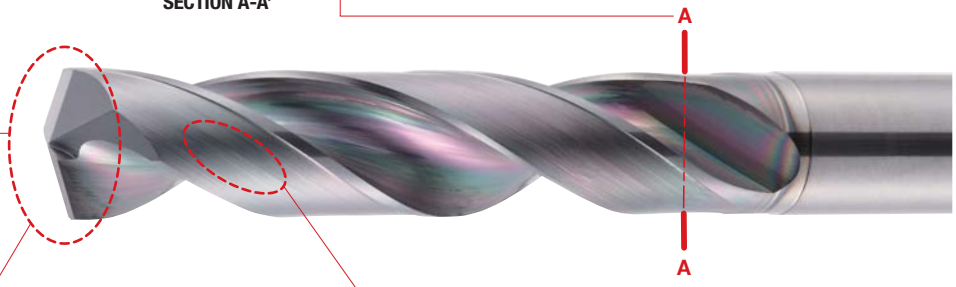


- **XR Thinning shape**
  - Reduced cutting load on the cutting edge with a streamlined thinning
  - Improved chip breaking

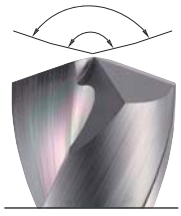


SECTION A-A'

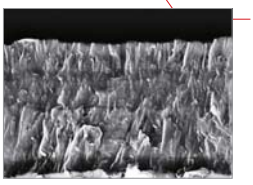
- **Optimal flute**
  - Good chip evacuation due to applying the larger chip pocket



Multi Point angle



- **Multi Point angle**
  - Separated cutting load by optimal point angle
  - Streamlined 1st point angle



- **New AlCrN coating**
  - Improved chip evacuation with enhanced flute lubrication
  - Enhanced wear resistance and oxidation resistance by multi-layer coating

EDP. NO	Appearance	Type	Drills dia.	Page
NDPG503		General purpose drill	Ø1.0 ~ Ø13.0	215
NDPG504		General purpose drill	Ø1.0 ~ Ø20.0	217
NDPG507		General purpose drill	Ø3.0 ~ Ø20.0	220

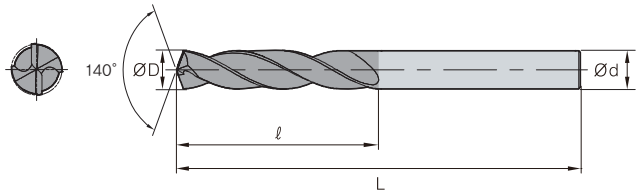
NDPG503

General purpose drill

ULTRA FINE | 30° HELIX | AlTiN | ▸3×D | 140° | DATA p.486

• TOLERANCE

ØD		Ød
Ø1 ~ Ø3	0 ~ -0.010mm	h6
Ø3.1 ~ Ø6	0 ~ -0.012mm	
Ø6.1 ~ Ø10	0 ~ -0.015mm	
Ø10.1 ~ Ø13	0 ~ -0.018mm	



(mm)

Designation	Description (mm)				TAP	
	ØD	Ød	ℓ	L	Size	Limit
NDPG503010	1	3	5	38	-	-
NDPG503011	1.1	3	6	42	-	-
NDPG503012	1.2	3	6	42	-	-
NDPG503013	1.3	3	6	42	-	-
NDPG503014	1.4	3	7	42	-	-
NDPG503015	1.5	3	7	42	-	-
NDPG503016	1.6	3	8	42	-	-
NDPG503017	1.7	3	8	42	-	-
NDPG503018	1.8	3	9	42	-	-
NDPG503019	1.9	3	9	42	-	-
NDPG503020	2	3	10	50	-	-
NDPG503021	2.1	3	10	50	-	-
NDPG503022	2.2	3	11	50	-	-
NDPG503023	2.3	3	11	50	-	-
NDPG503024	2.4	3	12	50	-	-
NDPG503025	2.5	3	12	50	M3x0.5	WH1~4
NDPG503026	2.6	3	12	50	M3x0.5	WH5~6
NDPG503027	2.7	3	14	50	-	-
NDPG503028	2.8	3	14	50	-	-
NDPG503029	2.9	3	14	50	-	-
NDPG503030	3	3	14	55	-	-
NDPG503031	3.1	4	16	55	-	-
NDPG50303175	3.175	4	16	55	-	-
NDPG503032	3.2	4	16	55	-	-
NDPG50303264	3.264	4	16	55	-	-
NDPG503033	3.3	4	16	55	M4x0.7	WH1~4
NDPG503034	3.4	4	16	55	M4x0.7	WH5~6
NDPG503035	3.5	4	16	55	-	-
NDPG50303572	3.572	4	18	55	-	-
NDPG503036	3.6	4	18	55	-	-
NDPG503037	3.7	4	18	55	-	-
NDPG503038	3.8	4	20	55	-	-
NDPG503039	3.9	4	20	55	-	-
NDPG503040	4	4	20	55	-	-
NDPG50304039	4.039	5	20	55	-	-
NDPG503041	4.1	5	20	55	-	-
NDPG503042	4.2	5	20	62	M5x0.8	WH1~4
NDPG503043	4.3	5	22	62	M5x0.8	WH5~6

Designation	Description (mm)				TAP	
	ØD	Ød	ℓ	L	Size	Limit
NDPG503044	4.4	5	22	62	-	-
NDPG503045	4.5	5	22	62	-	-
NDPG503046	4.6	5	22	62	-	-
NDPG503047	4.7	5	22	62	-	-
NDPG50304763	4.763	5	24	62	-	-
NDPG503048	4.8	5	24	62	-	-
NDPG503049	4.9	5	24	62	-	-
NDPG503050	5	5	24	62	M6x1.0	WH1~4
NDPG503051	5.1	6	24	62	M6x1.0	WH5~6
NDPG50305159	5.159	6	28	66	-	-
NDPG503052	5.2	6	28	66	-	-
NDPG503053	5.3	6	28	66	-	-
NDPG503054	5.4	6	28	66	-	-
NDPG503055	5.5	6	28	66	-	-
NDPG50305556	5.556	6	28	66	-	-
NDPG503056	5.6	6	28	66	-	-
NDPG503057	5.7	6	28	66	-	-
NDPG503058	5.8	6	28	66	-	-
NDPG503059	5.9	6	28	66	-	-
NDPG50305953	5.953	6	28	66	-	-
NDPG503060	6	6	28	66	-	-
NDPG503061	6.1	7	30	66	-	-
NDPG503062	6.2	7	34	74	-	-
NDPG503063	6.3	7	34	74	-	-
NDPG5030635	6.35	7	34	74	-	-
NDPG503064	6.4	7	34	74	-	-
NDPG503065	6.5	7	34	74	-	-
NDPG503066	6.6	7	34	74	-	-
NDPG503067	6.7	7	37	74	-	-
NDPG50306747	6.747	7	37	74	-	-
NDPG503068	6.8	7	37	74	M8x1.25	WH1~4
NDPG503069	6.9	7	37	74	M8x1.25	WH5~6
NDPG503070	7	7	37	74	M8x1.0	WH1~4
NDPG503071	7.1	8	37	74	M8x1.0	WH5~6
NDPG50307144	7.144	8	40	79	-	-
NDPG503072	7.2	8	40	79	-	-
NDPG503073	7.3	8	40	79	-	-
NDPG503074	7.4	8	40	79	-	-

W-Star Drill

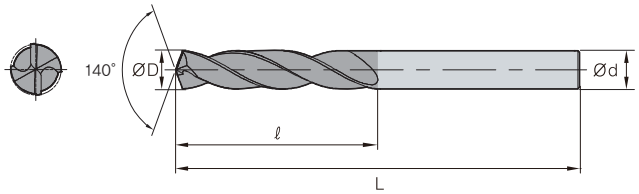
NDPG503

General purpose drill

ULTRA FINE | 30° HELIX | AlTiN | 3×D | 140° | DATA p.486

• TOLERANCE

ØD		Ød
Ø1 ~ Ø3	0 ~ -0.010mm	h6
Ø3.1 ~ Ø6	0 ~ -0.012mm	
Ø6.1 ~ Ø10	0 ~ -0.015mm	
Ø10.1 ~ Ø13	0 ~ -0.018mm	



(mm)

Designation	Description (mm)				TAP	
	ØD	Ød	ℓ	L	Size	Limit
NDPG503075	7.5	8	40	79	-	-
NDPG50307541	7.541	8	40	79	-	-
NDPG503076	7.6	8	40	79	-	-
NDPG503077	7.7	8	40	79	-	-
NDPG503078	7.8	8	40	79	-	-
NDPG503079	7.9	8	40	79	-	-
NDPG50307938	7.938	8	40	79	-	-
NDPG503080	8	8	40	79	-	-
NDPG503081	8.1	9	40	79	-	-
NDPG503082	8.2	9	43	84	-	-
NDPG503083	8.3	9	43	84	-	-
NDPG503084	8.4	9	43	84	-	-
NDPG503085	8.5	9	43	84	M10x1.5	WH1~4
NDPG503086	8.6	9	43	84	M10x1.5	WH5~6
NDPG503087	8.7	9	43	84	-	-
NDPG50308731	8.731	9	43	84	-	-
NDPG503088	8.8	9	43	84	M10x1.25	WH1~4
NDPG503089	8.9	9	43	84	M10x1.25	WH5~6
NDPG503090	9	9	43	84	M10x1.0	WH1~4
NDPG503091	9.1	10	43	84	M10x1.0	WH5~6
NDPG503092	9.2	10	47	89	-	-
NDPG503093	9.3	10	47	89	-	-
NDPG503094	9.4	10	47	89	-	-
NDPG503095	9.5	10	47	89	-	-
NDPG50309525	9.525	10	47	89	-	-
NDPG503096	9.6	10	47	89	-	-
NDPG503097	9.7	10	47	89	-	-
NDPG503098	9.8	10	47	89	-	-
NDPG503099	9.9	10	47	89	-	-
NDPG503100	10	10	47	89	-	-
NDPG503101	10.1	11	47	89	-	-
NDPG503102	10.2	11	51	95	-	-

Designation	Description (mm)				TAP	
	ØD	Ød	ℓ	L	Size	Limit
NDPG503103	10.3	11	51	95	M12x1.75	WH1~2
NDPG50310319	10.319	11	51	95	M12x1.75	WH3~4
NDPG503104	10.4	11	51	95	M12x1.75	WH5~6
NDPG503105	10.5	11	51	95	M12x1.5	WH1~4
NDPG503106	10.6	11	51	95	M12x1.5	WH5~6
NDPG503107	10.7	11	51	95	-	-
NDPG50310716	10.716	11	51	95	-	-
NDPG503108	10.8	11	51	95	M12x1.25	WH1~4
NDPG503109	10.9	11	51	95	M12x1.25	WH5~6
NDPG503110	11	11	51	95	M12x1.0	WH1~4
NDPG503111	11.1	12	51	95	M12x1.0	WH5~6
NDPG50311113	11.113	12	54	102	-	-
NDPG503112	11.2	12	54	102	-	-
NDPG503113	11.3	12	54	102	-	-
NDPG503114	11.4	12	54	102	-	-
NDPG503115	11.5	12	54	102	-	-
NDPG503116	11.6	12	54	102	-	-
NDPG503117	11.7	12	54	102	-	-
NDPG503118	11.8	12	54	102	-	-
NDPG503119	11.9	12	54	102	-	-
NDPG503120	12	12	54	102	M14x2	WH1~4
NDPG503121	12.1	13	54	102	M14x2	WH5~6
NDPG503122	12.2	13	57	102	-	-
NDPG503123	12.3	13	57	102	-	-
NDPG503124	12.4	13	57	102	-	-
NDPG503125	12.5	13	57	102	M14x1.5	WH1~4
NDPG503126	12.6	13	57	102	M14x1.5	WH5~6
NDPG503127	12.7	13	57	102	-	-
NDPG503128	12.8	13	57	102	-	-
NDPG503129	12.9	13	57	102	-	-
NDPG503130	13	13	57	102	-	-

• **Applicable Workpiece**

Carbon steel ~ HB225	Alloy steel HB225~325	Pre-hardened steel HRC30~50	Hardened steel		Cast iron	Stainless steels	Nonferrous steels & Aluminum
			SKD61~HRC55	SKD11 HRC55~			
◎	◎	○			○	◎	

◎: Excellent ○: Good

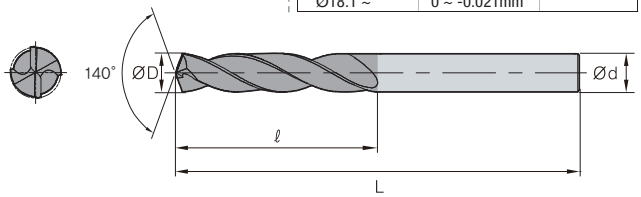
NDPG504

General purpose drill

ULTRA FINE | 30° HELIX | AlTiN | 4×D | 140° | DATA p.486

• TOLERANCE

ØD		Ød
Ø1 ~ Ø3	0 ~ -0.010mm	h6
Ø3.1 ~ Ø6	0 ~ -0.012mm	
Ø6.1 ~ Ø10	0 ~ -0.015mm	
Ø10.1 ~ Ø18	0 ~ -0.018mm	
Ø18.1 ~	0 ~ -0.021mm	



(mm)

Designation	Description (mm)				TAP	
	ØD	Ød	ℓ	L	Size	Limit
NDPG504010	1	3	8	38	-	-
NDPG504011	1.1	3	9	42	-	-
NDPG504012	1.2	3	10	42	-	-
NDPG504013	1.3	3	10	42	-	-
NDPG504014	1.4	3	11	42	-	-
NDPG504015	1.5	3	11	42	-	-
NDPG504016	1.6	3	12	42	-	-
NDPG504017	1.7	3	12	42	-	-
NDPG504018	1.8	3	13	42	-	-
NDPG504019	1.9	3	13	42	-	-
NDPG504020	2	3	18	50	-	-
NDPG504021	2.1	3	18	50	-	-
NDPG504022	2.2	3	18	50	-	-
NDPG504023	2.3	3	18	50	-	-
NDPG504024	2.4	3	18	50	-	-
NDPG504025	2.5	3	18	50	M3x0.5	WH1~4
NDPG504026	2.6	3	18	50	M3x0.5	WH5~6
NDPG504027	2.7	3	18	50	-	-
NDPG504028	2.8	3	18	50	-	-
NDPG504029	2.9	3	18	50	-	-
NDPG504030	3	3	20	55	-	-
NDPG504031	3.1	4	20	55	-	-
NDPG50403175	3.175	4	20	55	-	-
NDPG504032	3.2	4	20	55	-	-
NDPG50403264	3.264	4	20	55	-	-
NDPG504033	3.3	4	20	55	M3x0.7	WH1~4
NDPG504034	3.4	4	20	55	M4x0.7	WH 5~6
NDPG504035	3.5	4	20	55	-	-
NDPG50403572	3.572	4	25	55	-	-
NDPG504036	3.6	4	25	55	-	-
NDPG504037	3.7	4	25	55	-	-
NDPG504038	3.8	4	25	55	-	-
NDPG504039	3.9	4	25	55	-	-
NDPG504040	4	4	25	55	-	-
NDPG50404039	4.039	5	25	55	-	-
NDPG504041	4.1	5	25	55	-	-
NDPG504042	4.2	5	33	63	-	-

Designation	Description (mm)				TAP	
	ØD	Ød	ℓ	L	Size	Limit
NDPG504043	4.3	5	33	63	M5x0.8	WH1~4
NDPG504044	4.4	5	33	63	M5x0.8	WH5~6
NDPG504045	4.5	5	33	63	-	-
NDPG504046	4.6	5	33	63	-	-
NDPG504047	4.7	5	33	63	-	-
NDPG50404763	4.763	5	33	63	-	-
NDPG504048	4.8	5	33	63	-	-
NDPG504049	4.9	5	33	63	-	-
NDPG504050	5	5	33	63	M6x1.0	WH1~4
NDPG504051	5.1	6	33	63	M6x1.0	WH5~6
NDPG50405159	5.159	6	36	66	-	-
NDPG504052	5.2	6	36	66	-	-
NDPG504053	5.3	6	36	66	-	-
NDPG504054	5.4	6	36	66	-	-
NDPG504055	5.5	6	36	66	-	-
NDPG50405556	5.556	6	36	66	-	-
NDPG504056	5.6	6	36	66	-	-
NDPG504057	5.7	6	36	66	-	-
NDPG504058	5.8	6	36	66	-	-
NDPG504059	5.9	6	36	66	-	-
NDPG50405953	5.953	6	36	66	-	-
NDPG504060	6	6	36	66	-	-
NDPG504061	6.1	7	36	66	-	-
NDPG504062	6.2	7	42	75	-	-
NDPG504063	6.3	7	42	75	-	-
NDPG5040635	6.35	7	42	75	-	-
NDPG504064	6.4	7	42	75	-	-
NDPG504065	6.5	7	42	75	-	-
NDPG504066	6.6	7	42	75	-	-
NDPG504067	6.7	7	42	75	-	-
NDPG50406747	6.747	7	42	75	-	-
NDPG504068	6.8	7	42	75	M8x1.25	WH1~4
NDPG504069	6.9	7	42	75	M8x1.25	WH5~6
NDPG504070	7	7	42	75	M8x1.0	WH1~4
NDPG504071	7.1	8	42	75	M8x1.0	WH5~6
NDPG50407144	7.144	8	46	80	-	-
NDPG504072	7.2	8	46	80	-	-

Drill

W-Star Drill

NDPG504

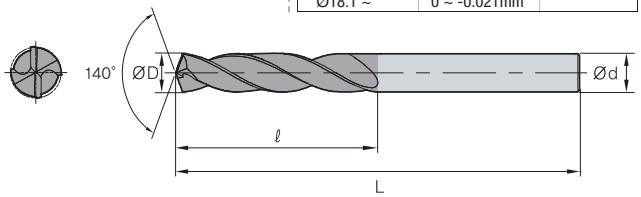
General purpose drill

ULTRA FINE | 30° HELIX | AlTiN | ▸4×D | 140° | DATA

p.486

• TOLERANCE

ØD		Ød
Ø1 ~ Ø3	0 ~ -0.010mm	h6
Ø3.1 ~ Ø6	0 ~ -0.012mm	
Ø6.1 ~ Ø10	0 ~ -0.015mm	
Ø10.1 ~ Ø18	0 ~ -0.018mm	
Ø18.1 ~	0 ~ -0.021mm	



(mm)

Designation	Description (mm)				TAP	
	ØD	Ød	ℓ	L	Size	Limit
NDPG504073	7.3	8	46	80	-	-
NDPG504074	7.4	8	46	80	-	-
NDPG504075	7.5	8	46	80	-	-
NDPG50407541	7.541	8	46	80	-	-
NDPG504076	7.6	8	46	80	-	-
NDPG504077	7.7	8	46	80	-	-
NDPG504078	7.8	8	46	80	-	-
NDPG504079	7.9	8	46	80	-	-
NDPG50407938	7.938	8	46	80	-	-
NDPG504080	8	8	46	80	-	-
NDPG504081	8.1	9	46	80	-	-
NDPG504082	8.2	9	50	85	-	-
NDPG504083	8.3	9	50	85	-	-
NDPG504084	8.4	9	50	85	-	-
NDPG504085	8.5	9	50	85	M10x1.5	WH1~4
NDPG504086	8.6	9	50	85	M10x1.5	WH5~6
NDPG504087	8.7	9	50	85	-	-
NDPG50408731	8.731	9	50	85	-	-
NDPG504088	8.8	9	50	85	M10x1.25	WH1~4
NDPG504089	8.9	9	50	85	M10x1.25	WH5~6
NDPG504090	9	9	50	85	M10x1.0	WH1~4
NDPG504091	9.1	10	50	85	M10x1.0	WH5~6
NDPG504092	9.2	10	55	90	-	-
NDPG504093	9.3	10	55	90	-	-
NDPG504094	9.4	10	55	90	-	-
NDPG504095	9.5	10	55	90	-	-
NDPG50409525	9.525	10	55	90	-	-
NDPG504096	9.6	10	55	90	-	-
NDPG504097	9.7	10	55	90	-	-
NDPG504098	9.8	10	55	90	-	-
NDPG504099	9.9	10	55	90	-	-
NDPG504100	10	10	55	90	-	-
NDPG504101	10.1	11	55	90	-	-
NDPG504102	10.2	11	57	95	-	-
NDPG504103	10.3	11	57	95	M12x1.75	WH1~2
NDPG50410319	10.319	11	57	95	M12x1.75	WH3~4
NDPG504104	10.4	11	57	95	M12x1.75	WH5~6

Designation	Description (mm)				TAP	
	ØD	Ød	ℓ	L	Size	Limit
NDPG504105	10.5	11	57	95	M12x1.5	WH1~4
NDPG504106	10.6	11	57	95	M12x1.5	WH5~6
NDPG504107	10.7	11	57	95	-	-
NDPG50410716	10.716	11	57	95	-	-
NDPG504108	10.8	11	57	95	M12x1.25	WH1~4
NDPG504109	10.9	11	57	95	M12x1.25	WH5~6
NDPG504110	11	11	57	95	M12x1.0	WH1~4
NDPG504111	11.1	12	57	95	M12x1.0	WH5~6
NDPG50411113	11.113	12	63	102	-	-
NDPG504112	11.2	12	63	102	-	-
NDPG504113	11.3	12	63	102	-	-
NDPG504114	11.4	12	63	102	-	-
NDPG504115	11.5	12	63	102	-	-
NDPG504116	11.6	12	63	102	-	-
NDPG504117	11.7	12	63	102	-	-
NDPG504118	11.8	12	63	102	-	-
NDPG504119	11.9	12	63	102	-	-
NDPG504120	12	12	63	102	M14x2.0	WH1~4
NDPG504121	12.1	13	63	102	M14x2.0	WH5~6
NDPG504122	12.2	13	63	102	-	-
NDPG504123	12.3	13	63	102	-	-
NDPG504124	12.4	13	63	102	-	-
NDPG504125	12.5	13	63	102	M14x1.5	WH1~4
NDPG504126	12.6	13	63	102	M14x1.5	WH5~6
NDPG504127	12.7	13	63	102	-	-
NDPG504128	12.8	13	63	102	-	-
NDPG504129	12.9	13	63	102	-	-
NDPG504130	13	13	63	102	-	-
NDPG504131	13.1	14	63	102	-	-
NDPG504132	13.2	14	65	107	-	-
NDPG504133	13.3	14	65	107	-	-
NDPG504134	13.4	14	65	107	-	-
NDPG50413494	13.494	14	65	107	-	-
NDPG504135	13.5	14	65	107	-	-
NDPG504136	13.6	14	65	107	-	-
NDPG504137	13.7	14	65	107	-	-
NDPG504138	13.8	14	65	107	-	-

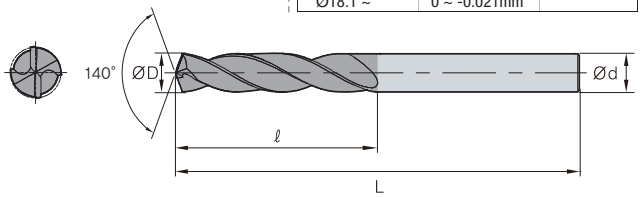
NDPG504

General purpose drill

ULTRA FINE | 30° HELIX | AlTiN | ▸4×D | 140° | DATA p.486

• TOLERANCE

ØD		Ød
Ø1 ~ Ø3	0 ~ -0.010mm	h6
Ø3.1 ~ Ø6	0 ~ -0.012mm	
Ø6.1 ~ Ø10	0 ~ -0.015mm	
Ø10.1 ~ Ø18	0 ~ -0.018mm	
Ø18.1 ~	0 ~ -0.021mm	



(mm)

Designation	Description (mm)				TAP	
	ØD	Ød	ℓ	L	Size	Limit
NDPG504139	13.9	14	65	107	-	-
NDPG504140	14	14	65	107	M16x2.0	WH1~4
NDPG504141	14.1	15	65	107	M16x2.0	WH5~6
NDPG504142	14.2	15	67	111	-	-
NDPG504143	14.3	15	67	111	-	-
NDPG504144	14.4	15	67	111	-	-
NDPG504145	14.5	15	67	111	M16x1.5	WH1~4
NDPG504146	14.6	15	67	111	M16x1.5	WH5~6
NDPG504147	14.7	15	67	111	-	-
NDPG504148	14.8	15	67	111	-	-
NDPG504149	14.9	15	67	111	-	-
NDPG504150	15	15	67	111	-	-
NDPG504151	15.1	16	67	111	-	-
NDPG504152	15.2	16	69	115	-	-
NDPG504154	15.4	16	69	115	-	-
NDPG504155	15.5	16	69	115	M18x2.5	WH1~4
NDPG504156	15.6	16	69	115	M18x2.5	WH5~6
NDPG504157	15.7	16	69	115	-	-
NDPG504158	15.8	16	69	115	-	-
NDPG50415875	15.875	16	69	115	-	-

Designation	Description (mm)				TAP	
	ØD	Ød	ℓ	L	Size	Limit
NDPG504160	16	16	69	115	-	-
NDPG504161	16.1	17	69	115	-	-
NDPG504163	16.3	17	71	119	-	-
NDPG504165	16.5	17	71	119	M18x1.5	WH1~6
NDPG50416669	16.669	17	71	119	-	-
NDPG504170	17	17	71	119	-	-
NDPG504171	17.1	18	71	119	-	-
NDPG504172	17.2	18	74	123	-	-
NDPG504175	17.5	18	74	123	M20x2.5	WH1~6
NDPG504177	17.7	18	74	123	-	-
NDPG504178	17.8	18	74	123	-	-
NDPG504180	18	18	74	123	-	-
NDPG504181	18.1	19	74	123	-	-
NDPG504182	18.2	19	76	127	-	-
NDPG504185	18.5	19	76	127	M20x1.5	WH1~6
NDPG504190	19	19	76	127	-	-
NDPG504191	19.1	20	76	127	-	-
NDPG504195	19.5	20	80	131	M22x2.5	WH1~6
NDPG504197	19.7	20	80	131	-	-
NDPG504200	20	20	80	131	-	-

• Applicable Workpiece

Carbon steel ~ HB225	Alloy steel HB225~325	Pre-hardened steel HRC30~50	Hardened steel		Cast iron	Stainless steels	Nonferrous steels & Aluminum
			SKD61~HRC55	SKD11 HRC55~			
◎	◎	○			○	◎	

◎: Excellent ○: Good

W-Star Drill

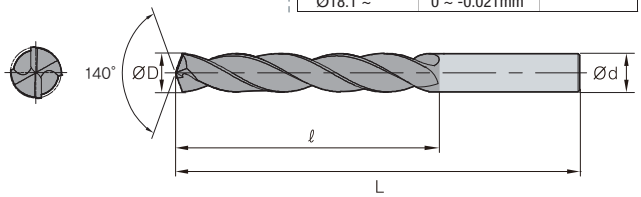
NDPG507

General purpose drill

ULTRA FINE | 30° HELIX | AlTiN | ▸7×D | 140° | DATA p.486

• TOLERANCE

ØD		Ød
Ø3	0 ~ -0.010mm	h6
Ø3.1 ~ Ø6	0 ~ -0.012mm	
Ø6.1 ~ Ø10	0 ~ -0.015mm	
Ø10.1 ~ Ø18	0 ~ -0.018mm	
Ø18.1 ~	0 ~ -0.021mm	



(mm)

Designation	Description (mm)				TAP	
	ØD	Ød	ℓ	L	Size	Limit
NDPG507030	3	3	45	80	-	-
NDPG507031	3.1	4	45	80	-	-
NDPG50703175	3.175	4	45	80	-	-
NDPG507032	3.2	4	45	80	-	-
NDPG50703264	3.264	4	45	80	-	-
NDPG507033	3.3	4	45	80	M4x0.7	WH1~4
NDPG507034	3.4	4	45	80	M4x0.7	WH5~6
NDPG507035	3.5	4	45	80	-	-
NDPG50703572	3.572	4	45	80	-	-
NDPG507036	3.6	4	45	80	-	-
NDPG507037	3.7	4	45	80	-	-
NDPG507038	3.8	4	45	80	-	-
NDPG507039	3.9	4	45	80	-	-
NDPG507040	4	4	45	80	-	-
NDPG507041	4.1	5	45	80	-	-
NDPG507042	4.2	5	45	80	M5x0.8	WH1~4
NDPG507043	4.3	5	45	80	M5x0.8	WH5~6
NDPG507044	4.4	5	45	80	-	-
NDPG507045	4.5	5	45	80	-	-
NDPG507046	4.6	5	45	80	-	-
NDPG507047	4.7	5	45	80	-	-
NDPG50704763	4.763	5	45	80	-	-
NDPG507048	4.8	5	45	80	-	-
NDPG507049	4.9	5	45	80	-	-
NDPG507050	5	5	45	80	M6x1.0	WH1~4
NDPG507051	5.1	6	45	80	M6x1.0	WH5~6
NDPG50705159	5.159	6	50	83	-	-
NDPG507052	5.2	6	50	83	-	-
NDPG507053	5.3	6	50	83	-	-
NDPG507054	5.4	6	50	83	-	-
NDPG507055	5.5	6	50	83	-	-
NDPG50705556	5.556	6	50	83	-	-
NDPG507056	5.6	6	50	83	-	-
NDPG507057	5.7	6	50	83	-	-
NDPG507058	5.8	6	50	83	-	-

Designation	Description (mm)				TAP	
	ØD	Ød	ℓ	L	Size	Limit
NDPG507059	5.9	6	50	83	-	-
NDPG507060	6	6	50	83	-	-
NDPG507061	6.1	7	50	83	-	-
NDPG507062	6.2	7	53	85	-	-
NDPG507063	6.3	7	53	85	-	-
NDPG5070635	6.35	7	53	85	-	-
NDPG507064	6.4	7	53	85	-	-
NDPG507065	6.5	7	53	85	-	-
NDPG507066	6.6	7	53	85	-	-
NDPG507067	6.7	7	53	85	-	-
NDPG50706747	6.747	7	53	85	-	-
NDPG507068	6.8	7	53	85	M8x1.25	WH1~4
NDPG507069	6.9	7	53	85	M8x1.25	WH5~6
NDPG507070	7	7	53	85	M8x1.0	WH1~4
NDPG507071	7.1	8	53	85	M8x1.0	WH5~6
NDPG50707144	7.144	8	58	90	-	-
NDPG507072	7.2	8	58	90	-	-
NDPG507073	7.3	8	58	90	-	-
NDPG507074	7.4	8	58	90	-	-
NDPG507075	7.5	8	58	90	-	-
NDPG507076	7.6	8	58	90	-	-
NDPG507077	7.7	8	58	90	-	-
NDPG507078	7.8	8	58	90	-	-
NDPG507079	7.9	8	58	90	-	-
NDPG50707938	7.938	8	58	90	-	-
NDPG507080	8	8	58	90	-	-
NDPG507081	8.1	9	58	90	-	-
NDPG507082	8.2	9	64	98	-	-
NDPG507083	8.3	9	64	98	-	-
NDPG507084	8.4	9	64	98	-	-
NDPG507085	8.5	9	64	98	M10x1.5	WH1~4
NDPG507086	8.6	9	64	98	M10x1.5	WH5~6
NDPG507087	8.7	9	64	98	-	-
NDPG50708731	8.731	9	64	98	-	-
NDPG507088	8.8	9	64	98	M10x1.25	WH1~4

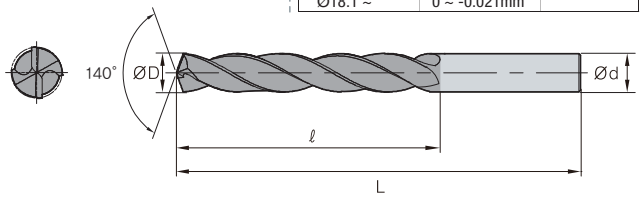
NDPG507

General purpose drill

ULTRA FINE | 30° HELIX | AlTiN | 7×D | 140° | DATA p.486

• TOLERANCE

ØD		Ød
Ø3	0 ~ -0.010mm	h6
Ø3.1 ~ Ø6	0 ~ -0.012mm	
Ø6.1 ~ Ø10	0 ~ -0.015mm	
Ø10.1 ~ Ø18	0 ~ -0.018mm	
Ø18.1 ~	0 ~ -0.021mm	



(mm)

Designation	Description (mm)				TAP	
	ØD	Ød	ℓ	L	Size	Limit
NDPG507089	8.9	9	64	98	M10x1.25	WH5~6
NDPG507090	9	9	64	98	M10x1.0	WH1~4
NDPG507091	9.1	10	64	98	M10x1.0	WH5~6
NDPG507092	9.2	10	68	105	-	-
NDPG507093	9.3	10	68	105	-	-
NDPG507094	9.4	10	68	105	-	-
NDPG507095	9.5	10	68	105	-	-
NDPG50709525	9.525	10	68	105	-	-
NDPG507096	9.6	10	68	105	-	-
NDPG507097	9.7	10	68	105	-	-
NDPG507098	9.8	10	68	105	-	-
NDPG507099	9.9	10	68	105	-	-
NDPG507100	10	10	68	105	-	-
NDPG507101	10.1	11	68	105	-	-
NDPG507102	10.2	11	73	110	-	-
NDPG507103	10.3	11	73	110	M12x1.75	WH1~2
NDPG50710319	10.319	11	73	110	M12x1.75	WH3~4
NDPG507104	10.4	11	73	110	M12x1.75	WH5~6
NDPG507105	10.5	11	73	110	M12x1.5	WH1~4
NDPG507106	10.6	11	73	110	M12x1.5	WH5~6
NDPG507107	10.7	11	73	110	-	-
NDPG50710716	10.716	11	73	110	-	-
NDPG507108	10.8	11	73	110	M12x1.25	WH1~4
NDPG507109	10.9	11	73	110	M12x1.25	WH5~6
NDPG507110	11	11	73	110	M12x1.0	WH1~4
NDPG507111	11.1	12	73	110	M12x1.0	WH5~6
NDPG50711113	11.113	12	80	120	-	-
NDPG507112	11.2	12	80	120	-	-
NDPG507113	11.3	12	80	120	-	-
NDPG507114	11.4	12	80	120	-	-
NDPG507115	11.5	12	80	120	-	-
NDPG507116	11.6	12	80	120	-	-
NDPG507117	11.7	12	80	120	-	-
NDPG507118	11.8	12	80	120	-	-
NDPG507119	11.9	12	80	120	-	-

Designation	Description (mm)				TAP	
	ØD	Ød	ℓ	L	Size	Limit
NDPG507120	12	12	80	120	M14x2.0	WH1~4
NDPG507121	12.1	13	80	120	M14x2.0	WH5~6
NDPG507122	12.2	13	90	137	-	-
NDPG507123	12.3	13	90	137	-	-
NDPG507124	12.4	13	90	137	-	-
NDPG507125	12.5	13	90	137	M14x1.5	WH1~4
NDPG507126	12.6	13	90	137	M14x1.5	WH5~6
NDPG507127	12.7	13	90	137	-	-
NDPG507128	12.8	13	90	137	-	-
NDPG507129	12.9	13	90	137	-	-
NDPG507130	13	13	90	137	-	-
NDPG507131	13.1	14	90	137	-	-
NDPG507133	13.3	14	96	147	-	-
NDPG507134	13.4	14	96	147	-	-
NDPG50713494	13.494	14	96	147	-	-
NDPG507135	13.5	14	96	147	-	-
NDPG507136	13.6	14	96	147	-	-
NDPG507137	13.7	14	96	147	-	-
NDPG507138	13.8	14	96	147	-	-
NDPG50713891	13.891	14	96	147	-	-
NDPG507139	13.9	14	96	147	-	-
NDPG507140	14	14	96	147	M16x2.0	WH1~4
NDPG507141	14.1	15	96	147	M16x2.0	WH5~6
NDPG507142	14.2	15	100	153	-	-
NDPG50714288	14.288	15	100	153	-	-
NDPG507143	14.3	15	100	153	-	-
NDPG507145	14.5	15	100	153	M16x1.5	WH1~4
NDPG507146	14.6	15	100	153	M16x1.5	WH5~6
NDPG507147	14.7	15	100	153	-	-
NDPG507148	14.8	15	100	153	-	-
NDPG507149	14.9	15	100	153	-	-
NDPG507150	15	15	100	153	-	-
NDPG507151	15.1	16	100	153	-	-
NDPG507154	15.4	16	112	160	-	-
NDPG507155	15.5	16	112	160	M18x2.5	WH1~4

W-Star Drill

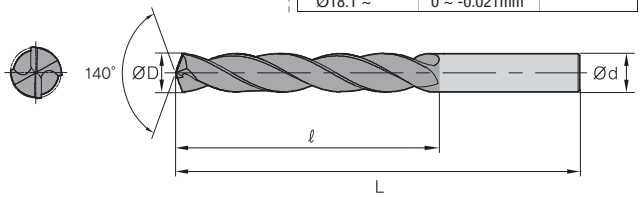
NDPG507

General purpose drill

ULTRA FINE | 30° HELIX | AlTiN | 7×D | 140° | DATA p.486

• TOLERANCE

ØD		Ød
Ø3	0 ~ -0.010mm	h6
Ø3.1 ~ Ø6	0 ~ -0.012mm	
Ø6.1 ~ Ø10	0 ~ -0.015mm	
Ø10.1 ~ Ø18	0 ~ -0.018mm	
Ø18.1 ~	0 ~ -0.021mm	



(mm)

Designation	Description (mm)				TAP	
	ØD	Ød	ℓ	L	Size	Limit
NDPG507156	15.6	16	112	160	M18x2.5	WH5~6
NDPG507157	15.7	16	112	160	-	-
NDPG507158	15.8	16	112	160	-	-
NDPG50715875	15.875	16	112	160	-	-
NDPG507160	16	16	112	160	-	-
NDPG507161	16.1	17	112	160	-	-
NDPG507163	16.3	17	112	160	-	-
NDPG507165	16.5	17	112	160	M18x1.5	WH1~6
NDPG50716669	16.669	17	112	160	-	-
NDPG507170	17	17	112	160	-	-
NDPG507171	17.1	18	112	160	-	-
NDPG507172	17.2	18	112	160	-	-

Designation	Description (mm)				TAP	
	ØD	Ød	ℓ	L	Size	Limit
NDPG50717463	17.463	18	112	160	-	-
NDPG507175	17.5	18	112	160	M20x2.5	WH1~6
NDPG507177	17.7	18	112	160	-	-
NDPG507178	17.8	18	112	160	-	-
NDPG507180	18	18	112	160	-	-
NDPG507182	18.2	19	112	160	-	-
NDPG507185	18.5	19	112	160	M20x1.5	WH1~6
NDPG507190	19	19	112	160	-	-
NDPG507195	19.5	20	112	160	M22x2.5	WH1~6
NDPG507197	19.7	20	112	160	-	-
NDPG507200	20	20	112	160	-	-

• **Applicable Workpiece**

Carbon steel ~ HB225	Alloy steel HB225~325	Pre-hardened steel HRC30~50	Hardened steel		Cast iron	Stainless steels	Nonferrous steels & Aluminum
			SKD61~HRC55	SKD11 HRC55~			
◎	◎	○			○	◎	

◎: Excellent ○: Good

Carbide Solid Drill for Non-ferrous metals and Mild steel Machining

SSD-N

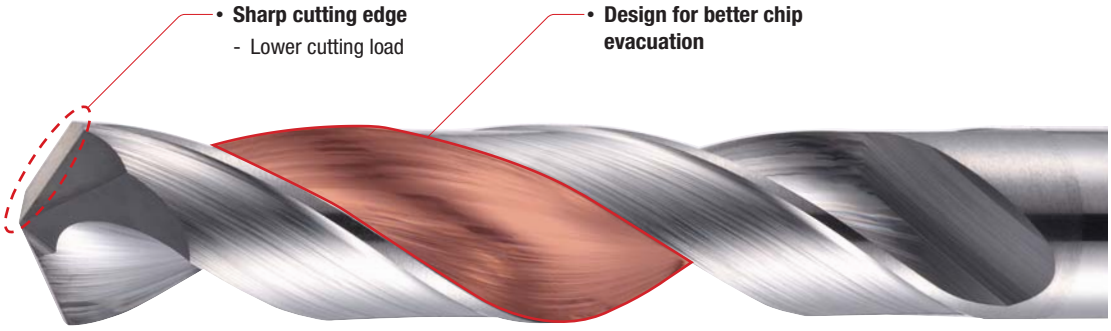
- Stable drilling for high productivity
- Available for various workpieces such as mild steel and non-ferrous metals

Code system

Special type

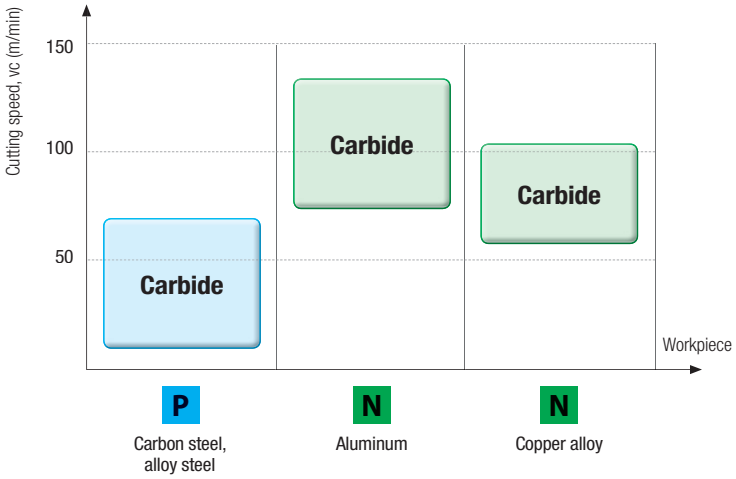
SSD	010	-	N	-	10	-	60L	-	6S
Solid Spiral Drill	Drill dia. (ØD) 010: Ø1.0		Nonferrous		Flute length 10: 10 mm		Overall length 60L: 60 mm		Shank dia. 6S: Ø6.0

Features



• **X-shaped fore-end**
- High precision

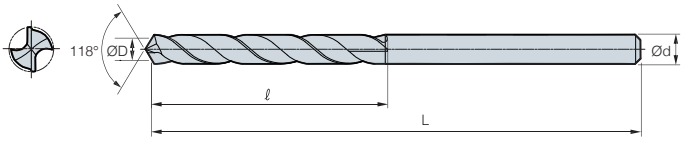
Application range



Drill

SSD-N

SSD-N



DATA
p.486

• TOLERANCE

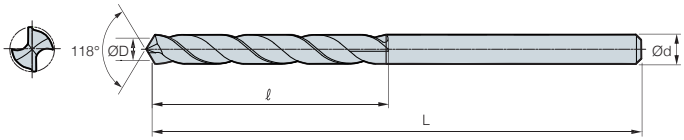
Coating	×
Tolerance (drill Dia.)	h8
Tolerance (shank Dia.)	h7
Point angle	118°
Twist angle	30°
Thinning	X type
Coolant	External

(mm)

Designation	ØD	Ød	ℓ	L
SSD 010-N	1.0	1.0	10	38
SSD 011-N	1.1	1.1	10	38
SSD 012-N	1.2	1.2	10	38
SSD 013-N	1.3	1.3	13	38
SSD 014-N	1.4	1.4	13	38
SSD 015-N	1.5	1.5	13	38
SSD 016-N	1.6	1.6	13	38
SSD 017-N	1.7	1.7	13	38
SSD 018-N	1.8	1.8	13	38
SSD 019-N	1.9	1.9	13	38
SSD 020-N	2.0	2.0	16	45
SSD 021-N	2.1	2.1	16	45
SSD 022-N	2.2	2.2	16	45
SSD 023-N	2.3	2.3	16	45
SSD 024-N	2.4	2.4	18	50
SSD 025-N	2.5	2.5	20	50
SSD 026-N	2.6	2.6	20	50
SSD 027-N	2.7	2.7	22	50
SSD 028-N	2.8	2.8	22	50
SSD 029-N	2.9	2.9	22	50
SSD 030-N	3.0	3.0	22	50
SSD 031-N	3.1	3.1	25	50
SSD 032-N	3.2	3.2	25	50
SSD 033-N	3.3	3.3	25	50
SSD 034-N	3.4	3.4	25	50
SSD 035-N	3.5	3.5	25	50
SSD 036-N	3.6	3.6	28	55
SSD 037-N	3.7	3.7	28	55
SSD 038-N	3.8	3.8	28	55
SSD 039-N	3.9	3.9	28	55
SSD 040-N	4.0	4.0	28	55
SSD 041-N	4.1	4.1	30	60
SSD 042-N	4.2	4.2	30	60
SSD 043-N	4.3	4.3	30	60
SSD 044-N	4.4	4.4	30	60
SSD 045-N	4.5	4.5	30	60
SSD 046-N	4.6	4.6	33	65

Designation	ØD	Ød	ℓ	L
SSD 047-N	4.7	4.7	33	65
SSD 048-N	4.8	4.8	35	65
SSD 049-N	4.9	4.9	35	65
SSD 050-N	5.0	5.0	35	65
SSD 051-N	5.1	5.1	35	65
SSD 052-N	5.2	5.2	35	65
SSD 053-N	5.3	5.3	35	65
SSD 054-N	5.4	5.4	35	65
SSD 055-N	5.5	5.5	35	65
SSD 056-N	5.6	5.6	38	75
SSD 057-N	5.7	5.7	38	75
SSD 058-N	5.8	5.8	38	75
SSD 059-N	5.9	5.9	38	75
SSD 060-N	6.0	6.0	38	75
SSD 061-N	6.1	6.1	38	75
SSD 062-N	6.2	6.2	38	75
SSD 063-N	6.3	6.3	38	75
SSD 064-N	6.4	6.4	38	75
SSD 065-N	6.5	6.5	38	75
SSD 066-N	6.6	6.6	45	80
SSD 067-N	6.7	6.7	45	80
SSD 068-N	6.8	6.8	45	80
SSD 069-N	6.9	6.9	45	80
SSD 070-N	7.0	7.0	45	80
SSD 071-N	7.1	7.1	45	80
SSD 072-N	7.2	7.2	45	80
SSD 073-N	7.3	7.3	45	80
SSD 074-N	7.4	7.4	45	80
SSD 075-N	7.5	7.5	45	80
SSD 076-N	7.6	7.6	50	85
SSD 077-N	7.7	7.7	50	85
SSD 078-N	7.8	7.8	50	85
SSD 079-N	7.9	7.9	50	85
SSD 080-N	8.0	8.0	50	85
SSD 081-N	8.1	8.1	50	85
SSD 082-N	8.2	8.2	50	85
SSD 083-N	8.3	8.3	50	85

SSD-N



DATA
p.486

• TOLERANCE

Coating	×
Tolerance (drill Dia.)	h8
Tolerance (shank Dia.)	h7
Point angle	118°
Twist angle	30°
Thinning	X type
Coolant	External

(mm)

Designation	ØD	Ød	ℓ	L
SSD 084-N	8.4	8.4	50	85
SSD 085-N	8.5	8.5	50	85
SSD 086-N	8.6	8.6	50	95
SSD 087-N	8.7	8.7	50	95
SSD 088-N	8.8	8.8	50	95
SSD 089-N	8.9	8.9	50	95
SSD 090-N	9.0	9.0	50	95
SSD 091-N	9.1	9.1	50	95
SSD 092-N	9.2	9.2	50	95
SSD 093-N	9.3	9.3	50	95
SSD 094-N	9.4	9.4	50	95
SSD 095-N	9.5	9.5	50	95
SSD 096-N	9.6	9.6	50	95
SSD 097-N	9.7	9.7	50	95
SSD 098-N	9.8	9.8	50	95
SSD 099-N	9.9	9.9	55	100
SSD 100-N	10.0	10.0	55	100
SSD 101-N	10.1	10.1	55	115
SSD 102-N	10.2	10.2	55	115

Designation	ØD	Ød	ℓ	L
SSD 103-N	10.3	10.3	55	115
SSD 104-N	10.4	10.4	55	115
SSD 105-N	10.5	10.5	55	115
SSD 106-N	10.6	10.6	60	115
SSD 107-N	10.7	10.7	60	115
SSD 108-N	10.8	10.8	60	115
SSD 109-N	10.9	10.9	60	115
SSD 110-N	11.0	11.0	60	115
SSD 111-N	11.1	11.1	65	120
SSD 112-N	11.2	11.2	65	120
SSD 113-N	11.3	11.3	65	120
SSD 115-N	11.5	11.5	65	120
SSD 118-N	11.8	11.8	65	120
SSD 119-N	11.9	11.9	65	120
SSD 120-N	12.0	12.0	65	120
SSD 124-N	12.4	12.4	70	125
SSD 125-N	12.5	12.5	70	125
SSD 130-N	13.0	13.0	75	130

Burnishing Drill

BDS

DATA p.487

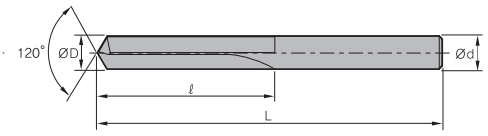


Fig 1

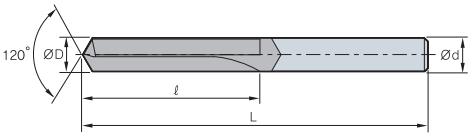


Fig 2

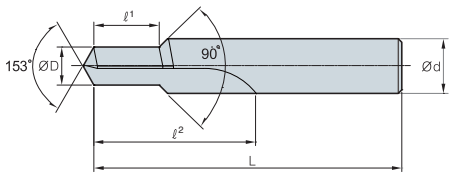
(mm)

Designation	ØD	Ød	ℓ	L	Fig.
BDS 040S	4.0	4	35	80	1
BDS 050S	5.0	5	40	85	1
BDS 060S	6.0	6	50	95	1
BDS 070S	7.0	7	55	100	1
BDS 080S	8.0	8	65	110	1
BDS 090S	9.0	9	70	120	1
BDS 100S	10.0	10	80	130	1
BDS 110S	11.0	11	90	140	1
BDS 120B	12.0	12	95	150	2
BDS 130B	13.0	16	105	160	2
BDS 140B	14.0	16	110	170	2
BDS 150B	15.0	16	120	185	2
BDS 160B	16.0	16	125	190	2

BDT (Step)

For tapping a foundation hole

DATA p.487

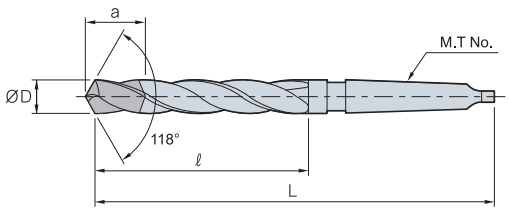


(mm)

Designation	ØD	Ød	ℓ1	ℓ2	L	Tap
BDT M05080 - ℓ1	4.2	6	35	9~15	90	M5XP0.8
BDT M06100 - ℓ1	5.0	7	40	11~18	95	M6XP1.0
BDT M08125 - ℓ1	6.8	10	50	15~24	105	M8XP1.25
BDT M10125 - ℓ1	8.8	12	55	17~30	110	M10XP1.25
BDT M10150 - ℓ1	8.5	12	55	17~30	110	M10XP1.5
BDT M12125 - ℓ1	10.8	14	60	19~36	120	M12XP1.25
BDT M12150 - ℓ1	10.5	14	60	19~36	120	M12XP1.5
BDT M12175 - ℓ1	10.3	14	60	19~36	120	M12XP1.75

Top Solid Drill

TSDM



DATA
p.487

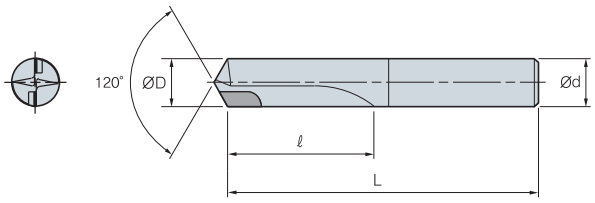
Designation	ØD	ℓ	L	a	M.T No
TSDM 080~085	8.0~8.5	85	168	25	1
TSDM 086~090	8.6~9.0	88	172	25	1
TSDM 091~095	9.1~9.5	92	175	26	1
TSDM 096~100	9.6~10.0	95	178	26	1
TSDM 101~105	10.1~10.5	98	182	26	1
TSDM 106~110	10.6~11.0	102	185	26	1
TSDM 111~115	11.1~11.5	105	188	26	1
TSDM 116~120	11.6~12.0	108	192	26	1
TSDM 121~125	12.1~12.5	112	195	26	1
TSDM 126~130	12.6~13.0	115	198	26	2
TSDM 131~135	13.1~13.5	118	202	27	2
TSDM 136~140	13.6~14.0	122	205	27	2
TSDM 141~145	14.1~14.5	122	222	27	2
TSDM 146~150	14.6~15.0	125	225	27	2
TSDM 151~155	15.1~15.5	125	228	27	2
TSDM 156~160	15.6~16.0	130	230	27	2
TSDM 161~165	16.1~16.5	132	232	27	2
TSDM 166~170	16.6~17.0	135	234	27	2
TSDM 171~180	17.1~18.0	140	240	27	2
TSDM 181~190	18.1~19.0	145	245	27	2
TSDM 191~200	19.1~20.0	150	250	30	2
TSDM 201~210	20.1~21.0	155	255	30	2
TSDM 211~220	21.1~22.0	160	260	30	2
TSDM 221~230	22.1~23.0	165	265	30	2
TSDM 231~250	23.1~25.0	165	285	34	3

PCD Drill

PDD

Brazing type

DATA
p.488



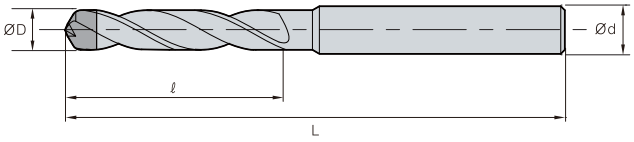
(mm)

Designation	ØD	Ød	ℓ	L
PDD 0500	5.0	5.0	30	80
PDD 0550	5.5	5.5	30	80
PDD 0600	6.0	6.0	30	80
PDD 0650	6.5	6.5	40	95
PDD 0700	7.0	7.0	40	95
PDD 0750	7.5	7.5	45	100
PDD 0800	8.0	8.0	45	100
PDD 0850	8.5	8.5	50	110
PDD 0900	9.0	9.0	50	110
PDD 0950	9.5	9.5	55	115
PDD 1000	10.0	10.0	55	115
PDD 1050	10.5	10.5	60	120
PDD 1100	11.0	11.0	60	120
PDD 1150	11.5	11.5	65	125
PDD 1200	12.0	12.0	65	125

CPD (Standard)

Cone type

DATA
p.488

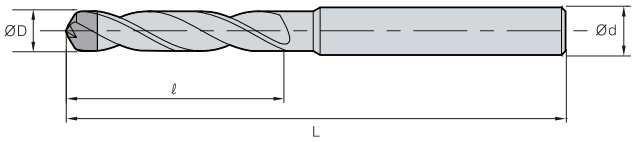


Designation	ØD	Ød	ℓ	L
CPD 020~030	2.0~3.0	4	10	43
CPD 031~035	3.1~3.5	4	15	43
CPD 036~040	3.6~4.0	4	15	43
CPD 041~050	4.1~5.0	6	20	53
CPD 051~060	5.1~6.0	6	25	63
CPD 061~070	6.1~7.0	8	30	79
CPD 071~080	7.1~8.0	8	35	79

CPDL (Long)

Cone type

DATA
p.488



Designation	ØD	Ød	ℓ	L
CPDL 020~030	2.0~3.0	4	90	160
CPDL 031~035	3.1~3.5	4	90	160
CPDL 036~040	3.6~4.0	4	90	160
CPDL 041~050	4.1~5.0	6	90	160
CPDL 051~060	5.1~6.0	6	90	160
CPDL 061~070	6.1~7.0	8	90	160
CPDL 071~080	7.1~8.0	8	90	160

Notice

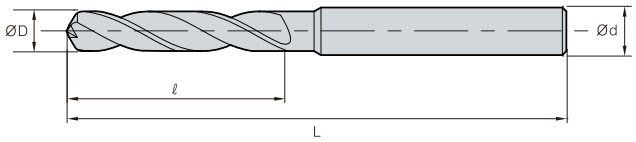
- High functional drill for machining in various cutting range : Cone type drill(CPD)
- Realizing excellent accuracy and surface finish
- High precision premium PCD drill

PCD Drill

SPD (Standard)

Sandwich type

DATA
p.488



(mm)

Designation	ØD	Ød	ℓ	L
SPD 040	4.0	4	20	43
SPD 045	4.5	6	20	53
SPD 050	5.0	6	25	63
SPD 055	5.5	6	25	63
SPD 060	6.0	6	25	63
SPD 065	6.5	8	30	79
SPD 070	7.0	8	35	79
SPD 075	7.5	8	35	79
SPD 080	8.0	8	35	79
SPD 085	8.5	10	60	110
SPD 090	9.0	10	60	110
SPD 095	9.5	10	60	110
SPD 100	10.0	10	60	110
SPD 105	10.5	10	60	110
SPD 110	11.0	12	70	110
SPD 115	11.5	12	70	110
SPD 120	12.0	12	80	150
SPD 125	12.5	12	80	150
SPD 130	13.0	14	80	150
SPD 135	13.5	14	80	150
SPD 140	14.0	14	80	150
SPD 145	14.5	14	80	150
SPD 150	15.0	16	80	150
SPD 160	16.0	16	80	150

Notice

- High functional drill for machining in various cutting range : Sandwich type drill(SPD)
- Realizing excellent accuracy and surface finish
- High precision premium PCD drill

Stable performance and hole quality with our unique cutting edge and guide pad available regrinding

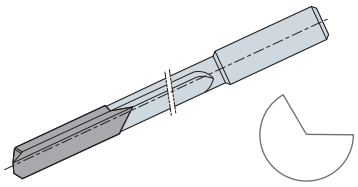
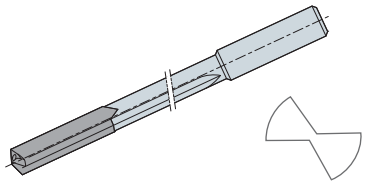
Gun Drill

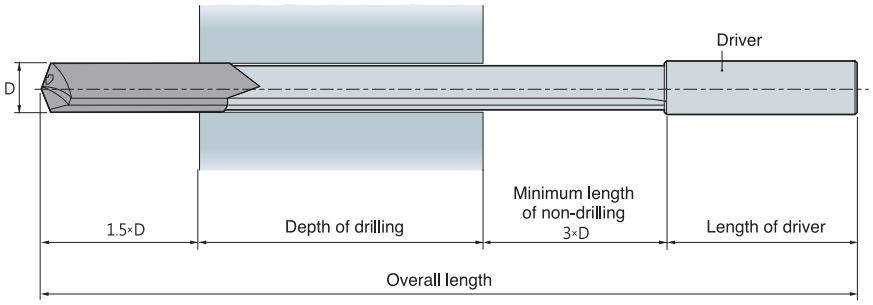
- High efficiency in deep hole machining
- High accuracy (Hole tolerance: IT9, surface finish: Ra0.1~3.0S)
- Stable Quality due to unique cutting edge and guide pad available regrinding
- Used drill can be recycled by exchanging the carbide part
- Depending on request, the drills can change geometry of cutting edge and drive specification
- For ordering, please check length of drill

Code system

KGD	S	-	12.05	-	1500	/	D30
KORLOY Gun Drill	Lib type S : Single T : Twin		Drill dia. (ØD) Ø12.05		Length of drill 1500 mm		Drive no. D30

Features

	Single lip type	Twin lip type
Shape		
Drill Dia.	Ø3.0 ~ Ø33.0	Ø8.0 ~ Ø24.0
Depth of drilling	≥ 2,000 mm	≥ 1,000 mm
Tolerance	IT9	IT10
Surface finish	Ra 0.1~3.0 μm	Ra 1.0~4.0 μm
Application	For all kinds of workpiece machining	• Workpieces with good chip evacuation • Machining of at higher feed than single lip type's



- Refer to the code system and the above drawing when ordering
- Refer to the page 112 for the size of a driver
- The overall length can be chosen by order

Gun Drill

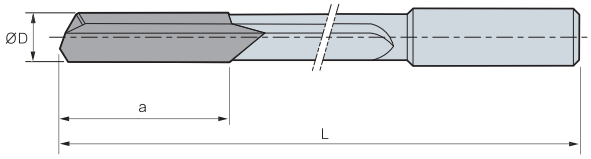
KGDS

Single lip type

DATA p.488

• TOLERANCE

Designation description	
○.○○	Diameter
□□□□	Length
D□□	Driver code no.



(mm)

Designation	ØD	a
KGDS ○.○○ – □□□□/**D**□□	3.00~3.49	19
KGDS ○.○○ – □□□□/**D**□□	3.50~3.99	19
KGDS ○.○○ – □□□□/**D**□□	4.00~4.49	23
KGDS ○.○○ – □□□□/**D**□□	4.50~4.99	23
KGDS ○.○○ – □□□□/**D**□□	5.00~5.49	24
KGDS ○.○○ – □□□□/**D**□□	5.50~5.99	26
KGDS ○.○○ – □□□□/**D**□□	6.00~6.49	27
KGDS ○.○○ – □□□□/**D**□□	6.50~6.99	28
KGDS ○.○○ – □□□□/**D**□□	7.00~7.49	29
KGDS ○.○○ – □□□□/**D**□□	7.50~7.99	30
KGDS ○.○○ – □□□□/**D**□□	8.00~8.49	31
KGDS ○.○○ – □□□□/**D**□□	8.50~8.99	31
KGDS ○.○○ – □□□□/**D**□□	9.00~8.49	31
KGDS ○.○○ – □□□□/**D**□□	9.50~9.99	31
KGDS ○.○○ – □□□□/**D**□□	10.00~10.49	31
KGDS ○.○○ – □□□□/**D**□□	10.50~10.99	32
KGDS ○.○○ – □□□□/**D**□□	11.00~11.49	35
KGDS ○.○○ – □□□□/**D**□□	11.50~11.99	35
KGDS ○.○○ – □□□□/**D**□□	12.00~12.49	38
KGDS ○.○○ – □□□□/**D**□□	12.50~12.99	38

Designation	ØD	a
KGDS ○.○○ – □□□□/**D**□□	13.00~13.99	38
KGDS ○.○○ – □□□□/**D**□□	14.00~14.99	38
KGDS ○.○○ – □□□□/**D**□□	15.00~15.99	39
KGDS ○.○○ – □□□□/**D**□□	16.00~16.99	39
KGDS ○.○○ – □□□□/**D**□□	17.00~17.99	40
KGDS ○.○○ – □□□□/**D**□□	18.00~18.99	41
KGDS ○.○○ – □□□□/**D**□□	19.00~19.99	41
KGDS ○.○○ – □□□□/**D**□□	20.00~20.99	44
KGDS ○.○○ – □□□□/**D**□□	21.00~21.99	46
KGDS ○.○○ – □□□□/**D**□□	22.00~22.99	49
KGDS ○.○○ – □□□□/**D**□□	23.00~23.99	51
KGDS ○.○○ – □□□□/**D**□□	24.00~24.99	52
KGDS ○.○○ – □□□□/**D**□□	25.00~25.99	54
KGDS ○.○○ – □□□□/**D**□□	26.00~26.99	54
KGDS ○.○○ – □□□□/**D**□□	27.00~27.99	54
KGDS ○.○○ – □□□□/**D**□□	28.00~28.99	54
KGDS ○.○○ – □□□□/**D**□□	29.00~29.99	56
KGDS ○.○○ – □□□□/**D**□□	30.00~30.99	59
KGDS ○.○○ – □□□□/**D**□□	31.00~31.99	61
KGDS ○.○○ – □□□□/**D**□□	32.00~32.99	61

※ When ordering, please mark the overall length(L) and driver number(or drawing)

Available overall length

Designation	Drill dia.	Overall length				
		250mm	500mm	1000mm	1500mm	2000mm
KGDS	3.00 ~ 3.49	○	○	○		
	3.50 ~ 32.99	○	○	○	○	○
KGDT	8.00 ~ 23.99	○	○	○		

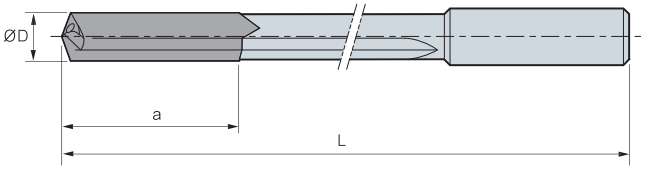
KGDT

Twin lip type

DATA p.488

• TOLERANCE

Designation description	
○.○○	Diameter
□□□□	Length
D□□	Driver code no.

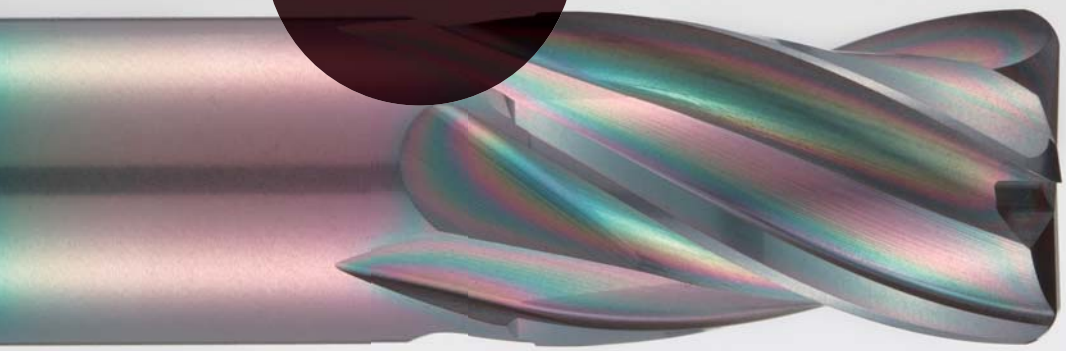


(mm)

Designation	ØD	a
KGDT ○.○○ – □□□□ / **D**□□	8.00~8.49	38
KGDT ○.○○ – □□□□ / **D**□□	8.50~8.99	38
KGDT ○.○○ – □□□□ / **D**□□	9.00~8.49	40
KGDT ○.○○ – □□□□ / **D**□□	9.50~9.99	40
KGDT ○.○○ – □□□□ / **D**□□	10.00~10.49	40
KGDT ○.○○ – □□□□ / **D**□□	10.50~10.99	40
KGDT ○.○○ – □□□□ / **D**□□	11.00~11.49	45
KGDT ○.○○ – □□□□ / **D**□□	11.50~11.99	45
KGDT ○.○○ – □□□□ / **D**□□	12.00~12.49	45
KGDT ○.○○ – □□□□ / **D**□□	12.50~12.99	48
KGDT ○.○○ – □□□□ / **D**□□	13.00~13.99	48
KGDT ○.○○ – □□□□ / **D**□□	14.00~14.99	48
KGDT ○.○○ – □□□□ / **D**□□	15.00~15.99	48
KGDT ○.○○ – □□□□ / **D**□□	16.00~16.99	50
KGDT ○.○○ – □□□□ / **D**□□	17.00~17.99	50
KGDT ○.○○ – □□□□ / **D**□□	18.00~18.99	50
KGDT ○.○○ – □□□□ / **D**□□	19.00~19.99	50
KGDT ○.○○ – □□□□ / **D**□□	20.00~20.99	55
KGDT ○.○○ – □□□□ / **D**□□	21.00~21.99	55
KGDT ○.○○ – □□□□ / **D**□□	22.00~22.99	55
KGDT ○.○○ – □□□□ / **D**□□	23.00~23.99	60

※ When ordering, please mark the overall length(L) and driver number(or drawing)

PART 3



- Reamer
- Chamfer
- Thread

Product details

Technical information for Reamer / Chamfer / Thread

Reamer

Chamfer

Thread

Reamer / Chamfer / Thread

Reamer / Chamfer

Type	Designation		Shape	Drills dia.	Aspect ratio	Page
Reamer	Chucking / Machine Reamer	SCRS		Ø5.0 ~ Ø20.0	2D ~ 3D	310
		SCRH		Ø5.0 ~ Ø20.0	2D ~ 3D	310
		TCRS		Ø7.0 ~ Ø30.0	2D ~ 3D	311
		TMRS		Ø7.0 ~ Ø30.0	3D ~ 5D	311
	PCD Reamer	PDR		Ø5.0 ~ Ø20.0	3D ~ 5D	312
	Cermet Reamer	KCR		Ø6.0 ~ Ø30.0	3D ~ 7D	313
	Broach Reamer	HBRE		Ø3.0 ~ Ø25.0	3D ~ 7D	314
Chamfer	Chamfer Tool	CET		Ø3.0 ~ Ø16.0	-	315
		CCT		Ø3.0 ~ Ø12.0	-	316
	Counter Sink	CSPC		Ø6.0 ~ Ø20.0	-	318
		CSNC		Ø10.0 ~ Ø30.0	-	318
		CSNC		Ø10.0 ~ Ø30.0	-	319
		CSHC		Ø10.0 ~ Ø30.0	-	319
		CSPH		Ø6.3 ~ Ø25.0	-	320
		CSNH		Ø10.0 ~ Ø50.0	-	320
		CSNH		Ø10.0 ~ Ø50.0	-	321
		CSHH		Ø10.0 ~ Ø50.0	-	321

Thread

Type		Designation		Shape	Surface treatment		Size range	Page
					Coating	Uncoated		
HSSE TAP	JIS	Spiral Tap	VPOM		-	○	M3 ~ M24	346
			VPTM		TiN	-	M3 ~ M24	347
			VPCM		TiCN	-	M3 ~ M24	348
			VPHM		HOMO	-	M3 ~ M24	349
		Spiral Point Tap	VNOM		-	○	M3 ~ M24	350
			VNTM		TiN	-	M3 ~ M24	351

Type		Designation		Shape	Surface treatment		Size range	Page
					Coating	Uncoated		
HSSE TAP	JIS	Spiral Point Tap	VNCM		TiCN	-	M3~M24	352
			VNHM		HOMO	-	M3~M24	353
		Straight Flute Tap	VSOM		-	○	M3~M24	354
			VSTM		TiN	-	M3~M24	355
			VSCM		TiCN	-	M3~M24	356
			VSHM		HOMO	-	M3~M24	357
		Roll Tap	VROM		-	○	M3~M12	358
			VRTM		TiN	-	M3~M12	359
			VRCM		TiCN	-	M3~M12	360
		Spiral Roll Tap	VFOM		-	○	M3~M6	361
			VFTM		TiN	-	M3~M6	362
			VFCM		TiCN	-	M3~M6	363
	DIN	Spiral Flute Tap	VQOM		-	○	M3~M24	364
			VQTM		TiN	-	M3~M24	365
			VQCM		TiCN	-	M3~M24	366
			VQHM		HOMO	-	M3~M24	367
		Spiral Point Tap	VDOM		-	○	M3~M24	368
			VDTM		TiN	-	M3~M24	369
			VDCM		TiCN	-	M3~M24	370
			VDHM		HOMO	-	M3~M24	371
		Straight Flute Tap	VGOM		-	○	M3~M24	372
			VGTM		TiN	-	M3~M24	373
			VGCM		TiCN	-	M3~M24	374
			VGHM		HOMO	-	M3~M24	375
		Roll Tap	VMOM		-	○	M3~M12	376
			VMTM		TiN	-	M3~M12	377
			VMCM		TiCN	-	M3~M12	378

Chucking / Machine Reamer

SCRS

Chucking reamer

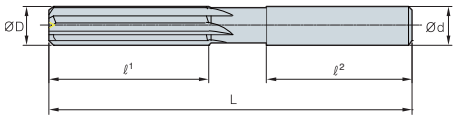


Fig. 1

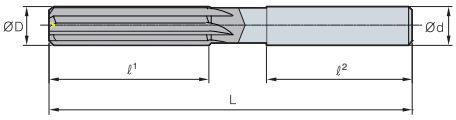


Fig. 2

(mm)

Designation	No. of flute	ØD	Ød	ℓ1	ℓ2	L	Fig.
SCRS 050S	4	5.0	6	20	40	100	1
SCRS 060S	4	6.0	6	20	40	115	1
SCRS 070S	4	7.0	8	20	40	125	1
SCRS 080S	4	8.0	8	20	40	135	1
SCRS 090S	4	9.0	10	20	45	140	1
SCRS 100B	4	10.0	10	25	50	145	2
SCRS 110B	4	11.0	12	25	50	150	2
SCRS 120B	4	12.0	12	25	50	160	2
SCRS 130B	4	13.0	16	25	50	165	2
SCRS 140B	6	14.0	16	25	50	170	2
SCRS 150B	6	15.0	16	30	50	180	2
SCRS 160B	6	16.0	16	30	50	190	2
SCRS 180B	6	18.0	20	30	55	210	2
SCRS 200B	6	20.0	20	40	60	230	2

SCRH

Chucking reamer

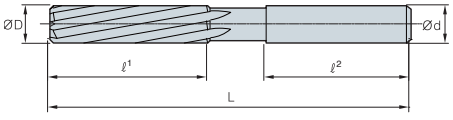


Fig. 1

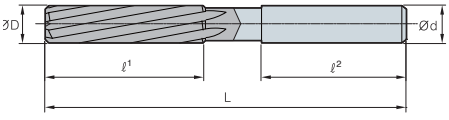
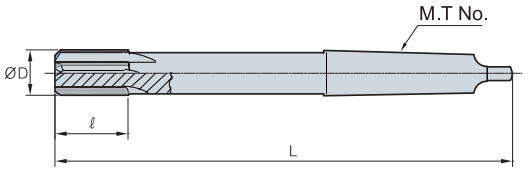


Fig. 2

Designation	No. of flute	ØD	Ød	ℓ1	ℓ2	L	Fig.
SCRH 050S	4	5.0	6	20	40	100	1
SCRH 060S	4	6.0	6	20	40	115	1
SCRH 070S	4	7.0	8	20	40	125	1
SCRH 080S	4	8.0	8	20	40	135	1
SCRH 090S	4	9.0	10	20	45	140	1
SCRH 100B	4	10.0	10	25	50	145	2
SCRH 110B	4	11.0	12	25	50	150	2
SCRH 120B	4	12.0	12	25	50	160	2
SCRH 130B	4	13.0	16	25	50	165	2
SCRH 140B	6	14.0	16	25	50	170	2
SCRH 150B	6	15.0	16	30	50	180	2
SCRH 160B	6	16.0	16	30	50	190	2
SCRH 180B	6	18.0	20	30	55	210	2
SCRH 200B	6	20.0	20	40	60	230	2

TCRS

Chucking reamer

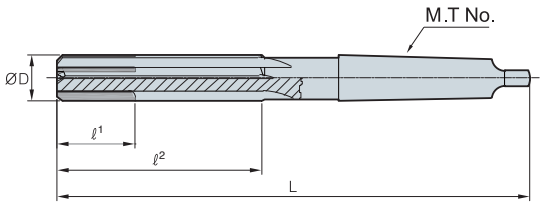


(mm)

Designation	No. of flute	ØD	ℓ	L	M.T No.
TCRS 070	4	7.0	20	150	1
TCRS 080	4	8.0	20	150	1
TCRS 090	4	9.0	20	160	1
TCRS 100	4	10.0	25	160	1
TCRS 110	4	11.0	25	170	1
TCRS 120	4	12.0	25	170	1
TCRS 130	4	13.0	25	180	1
TCRS 140	6	14.0	25	190	1
TCRS 150	6	15.0	30	200	2
TCRS 160	6	16.0	30	200	2
TCRS 180	6	18.0	30	220	2
TCRS 200	6	20.0	40	230	2
TCRS 250	6	25.0	40	260	3
TCRS 280	8	28.0	40	270	3
TCRS 300	8	30.0	50	290	3

TMRS

Machine reamer

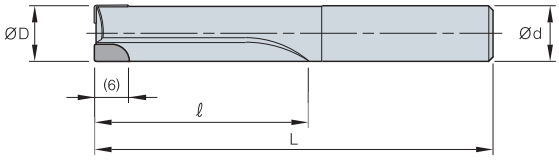


Designation	No. of flute	ØD	ℓ1	ℓ2	L	M.T No.
TMRS 070	4	7.0	60	60	150	1
TMRS 080	4	8.0	70	70	150	1
TMRS 090	4	9.0	70	70	160	1
TMRS 100	4	10.0	75	75	170	1
TMRS 110	4	11.0	75	75	170	1
TMRS 120	4	12.0	80	40	180	1
TMRS 130	4	13.0	85	40	190	1
TMRS 140	6	14.0	90	45	210	1
TMRS 150	6	15.0	90	45	215	2
TMRS 160	6	16.0	100	50	220	2
TMRS 180	6	18.0	105	50	225	2
TMRS 200	6	20.0	120	50	240	2
TMRS 250	6	25.0	130	50	270	3
TMRS 280	8	28.0	140	50	280	3
TMRS 300	8	30.0	150	50	290	3

PCD Reamer

PDR

DATA
p.489



(mm)

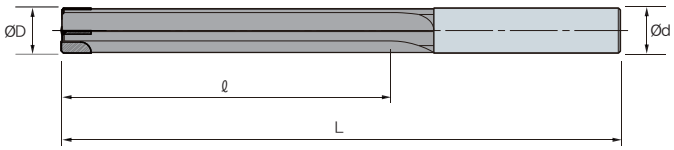
Designation	No. of flute	ØD	Ød	ℓ	L
PDR 2050	2	5.0	6	30	65
PDR 2060	2	6.0	6	40	75
PDR 2070	2	7.0	8	40	75
PDR 2080	2	8.0	8	40	75
PDR 2090	2	9.0	10	40	85
PDR 2100	2	10.0	10	40	85
PDR 2120	2	12.0	12	50	95
PDR 2140	2	14.0	16	50	95
PDR 2150	2	15.0	16	50	100
PDR 4160	4	16.0	16	50	100
PDR 4180	4	18.0	20	60	110
PDR 4200	4	20.0	20	60	110

Cermet Reamer

KCR

Standard type

DATA
p.489

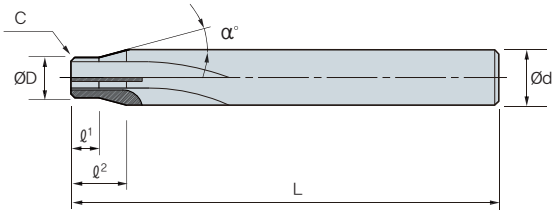


(mm)

Designation	No. of flute	ØD	Ød	ℓ	L
KCR 060~079-25-70L	2	6.0~7.9	8	25	70
KCR 080~099-035-90L	2	8.0~9.9	10	35	90
KCR 100~119-050-100L	4	10.0~11.9	12	50	100
KCR 120~159-060-110L	4	12.0~15.9	12	60	110
KCR 160~199-060-110L	4	16.0~19.9	16	60	110
KCR 200~259-060-110L	4	20.0~25.9	20	60	110
KCR 260~300-070-130L	4	26.0~30.0	25	70	130

※ Customizing tools are available
(Maximum overhang length should be less than 150mm.)

Special type

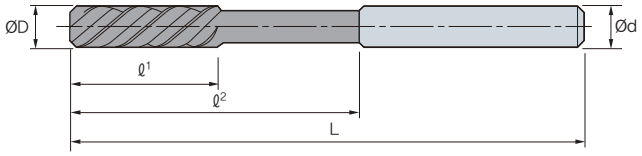


(mm)

Designation	No. of flute	ØD	Ød	ℓ1	ℓ2	L	α°
KCR□□□~□□□-□□□L	2~4	8.0~25.9	12~30	7~18	2~15	70	10°~ 60°

Broach Reamer

HBRE

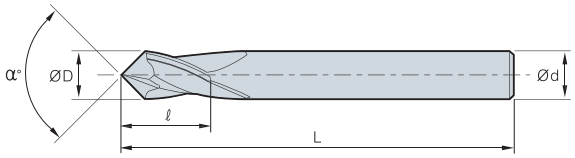


(mm)

Designation	No. of flute	ØD	Ød	ℓ1	ℓ2	L	Type
HBRE 030	3	3.0	3	20	40	70	Solid
HBRE 040	3	4.0	4	25	40	70	Solid
HBRE 060	4	6.0	6	30	50	80	Solid
HBRE 080	4	8.0	8	30	60	100	Solid
HBRE 100	4	10.0	10	30	60	100	Solid
HBRE 120	4	12.0	12	40	70	120	Top Solid
HBRE 160	6	16.0	16	40	80	130	Top Solid
HBRE 200	6	20.0	20	50	90	150	Top Solid
HBRE 250	6	25.0	25	50	90	150	Top Solid

Chamfer Tool

CET



(mm)

Designation	ØD	Ød	ℓ	L	α°
CET060 030	3.0	3	5.5	50	60°
CET060 040	4.0	4	7	50	
CET060 060	6.0	6	10	60	
CET060 080	8.0	8	13	70	
CET060 100	10.0	10	16	70	
CET060 120	12.0	12	18	80	
CET060 160	16.0	16	24	100	
CET090 030	3.0	3	5.5	50	90°
CET090 040	4.0	4	7	50	
CET090 060	6.0	6	10	60	
CET090 080	8.0	8	13	70	
CET090 100	10.0	10	16	70	
CET090 120	12.0	12	18	80	
CET090 160	16.0	16	24	100	
CET120 030	3.0	3	5.5	50	120°
CET120 040	4.0	4	7	50	
CET120 060	6.0	6	10	60	
CET120 080	8.0	8	13	70	
CET120 100	10.0	10	16	70	
CET120 120	12.0	12	18	80	
CET120 160	16.0	16	24	100	

Chamfer Tool

CCT

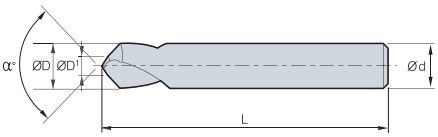


Fig 1

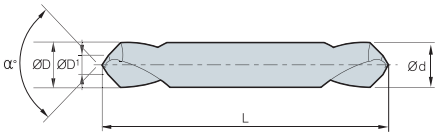


Fig 2

(mm)

Designation	ØD = Ød	ØD¹	L	α°	Fig.
CCT060 030	3.0	1.0	40	60°	1
CCT060 040	4.0	1.5	40		
CCT060 060	6.0	2.0	50		
CCT060 080	8.0	2.5	60		
CCT060 100	10.0	3.0	70		
CCT060 120	12.0	4.0	80		
CCT060 160	16.0	5.0	100		
CCT060T 030	3.0	1.0	40		2
CCT060T 040	4.0	1.5	40		
CCT060T 060	6.0	2.0	50		
CCT060T 080	8.0	2.5	60		
CCT060T 100	10.0	3.0	70		
CCT060T 120	12.0	4.0	80		
CCT060T 160	16.0	5.0	100		
CCT060T 030L	3.0	1.0	100		
CCT060T 040L	4.0	1.5	100		
CCT060T 060L	6.0	2.0	100		
CCT060T 080L	8.0	2.5	120		
CCT060T 100L	10.0	3.0	120		
CCT060T 120L	12.0	4.0	150		
CCT090 030	3.0	1.0	40	90°	1
CCT090 040	4.0	1.5	40		
CCT090 060	6.0	2.0	50		
CCT090 080	8.0	2.5	60		
CCT090 100	10.0	3.0	70		
CCT090 120	12.0	4.0	80		
CCT090 160	16.0	5.0	100		
CCT090T 030	3.0	1.0	40		2
CCT090T 040	4.0	1.5	40		
CCT090T 060	6.0	2.0	50		
CCT090T 080	8.0	2.5	60		
CCT090T 100	10.0	3.0	70		
CCT090T 120	12.0	4.0	80		
CCT090T 160	16.0	5.0	100		
CCT090T 030L	3.0	1.0	100		
CCT090T 040L	4.0	1.5	100		
CCT090T 060L	6.0	2.0	100		
CCT090T 080L	8.0	2.5	120		
CCT090T 100L	10.0	3.0	120		
CCT090T 120L	12.0	4.0	150		
CCT120 030	3.0	1.0	40	120°	1
CCT120 040	4.0	1.5	40		
CCT120 060	6.0	2.0	50		
CCT120 080	8.0	2.5	60		

CCT

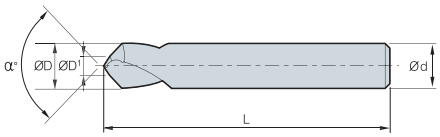


Fig 1

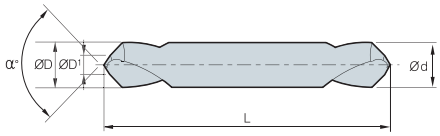
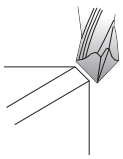
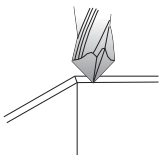
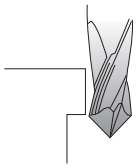
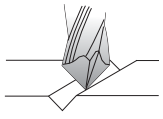
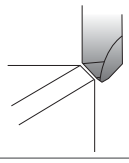
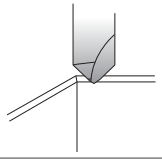
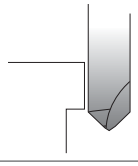
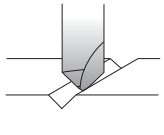


Fig 2

(mm)

Designation	ØD = Ød	ØD¹	L	α°	Fig.
CCT120 100	10.0	3.0	70	120°	1
CCT120 120	12.0	4.0	80		
CCT120 160	16.0	5.0	100		
CCT120T 030	3.0	1.0	40	120°	2
CCT120T 040	4.0	1.5	40		
CCT120T 060	6.0	2.0	50		
CCT120T 080	8.0	2.5	60		
CCT120T 100	10.0	3.0	70		
CCT120T 120	12.0	4.0	80		
CCT120T 160	16.0	5.0	100		
CCT120T 030L	3.0	1.0	100		
CCT120T 040L	4.0	1.5	100		
CCT120T 060L	6.0	2.0	100		
CCT120T 080L	8.0	2.5	120		
CCT120T 100L	10.0	3.0	120		
CCT120T 120L	12.0	4.0	150		

CET/CCT Application example

	Centering	Hole Chamfering	Chamfering (External)	Chamfering (Internal)	Side milling	Slot milling
Application (CET)						
60°	×	●	●	● ~ ▲	●	×
90°	▲	●	●	●	●	● ~ ▲
120°	●	●	●	●	●	●
Application (CCT)						
60°	●	●	● ~ ▲	▲ ~ ×	×	×
90°	●	●	● ~ ▲	▲ ~ ×	×	×
120°	●	●	●	●	×	●

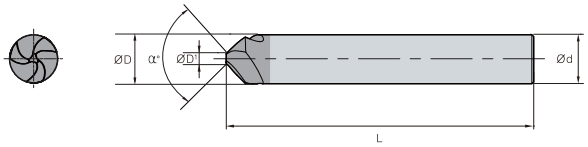
Counter Sink

CSPC 3000

3 | Unequal Division /Lead | Substrate PC40T | DATA p.490

• TOLERANCE

ØD		Ød
All sizes	±0.5mm	h6



(mm)

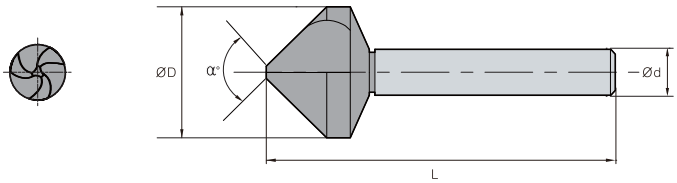
Designation	ØD	Ød	ØD1	L	α°
CSPC 3060-050	6.0	6	1.5	50	90°
CSPC 3080-060	8.0	8	2	60	90°
CSPC 3100-070	10.0	10	2.5	70	90°
CSPC 3120-075	12.0	12	2.8	75	90°
CSPC 3160-080	16.0	16	3.2	80	90°
CSPC 3200-090	20.0	20	3.5	90	90°

CSNC 3000

3 | Straight Type | Substrate PC20T | DATA p.490

• TOLERANCE

ØD		Ød
All sizes	±1.0mm	h9



(mm)

Designation	ØD	Ød	Range of dia	L	α°
CSNC 3100-047	10.0	6	2.0~9.0	47	90°
CSNC 3150-053	15.0	8	3.0~14.0	53	90°
CSNC 3200-057	20.0	10	4.0~19.0	57	90°
CSNC 3250-067	25.0	12	5.0~24.0	67	90°
CSNC 3300-075	30.0	12	6.0~29.0	75	90°

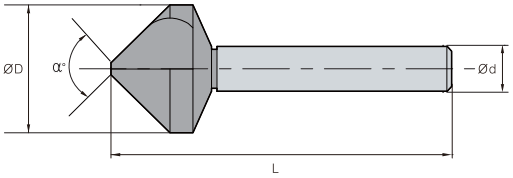
※ Order made available

CSNC 1000

1 | Straight Type | Substrate PC20T | DATA p.490

• TOLERANCE

ØD		Ød
All sizes	±1.0mm	h9



(mm)

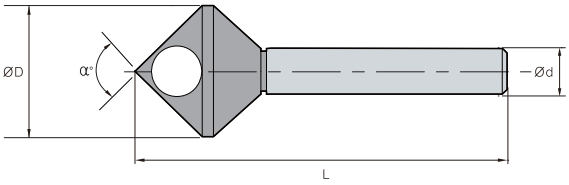
Designation	ØD	Ød	Range of dia	L	α°
CSNC 1100-048	10.0	6	2.0~9.0	48	90°
CSNC 1150-054	15.0	8	2.0~14.0	54	90°
CSNC 1200-059	20.0	10	2.0~19.0	59	90°
CSNC 1250-069	25.0	12	3.0~24.0	69	90°
CSNC 1300-077	30.0	12	4.0~29.0	77	90°

CSHC 1000

1 | Hole Type | Substrate PC20T | DATA p.490

• TOLERANCE

ØD		Ød
All sizes	±1.0mm	h9



(mm)

Designation	ØD	Ød	Range of dia	L	α°
CSHC 1100-045	10.0	6	4.0~8.0	45	90°
CSHC 1150-055	15.0	8	5.0~12.0	55	90°
CSHC 1200-070	20.0	10	8.0~15.0	70	90°
CSHC 1250-075	25.0	12	10.0~20.0	75	90°
CSHC 1300-085	30.0	12	12.0~25.0	85	90°

※ Order made available

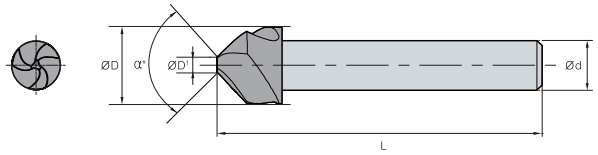
Chamfer Counter Sink

CSPH3000

3 | Unequal Division /Lead | Substrate HC40T | DATA p.490

• TOLERANCE

ØD		Ød
All sizes	±0.5mm	h8



(mm)

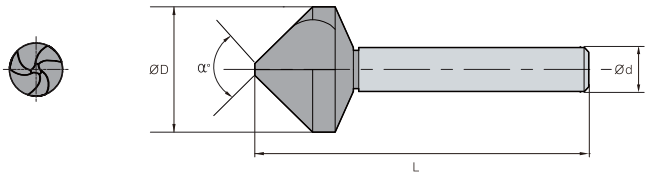
Designation	ØD	Ød	ØD1	L	α°
CSPH 3060-045	6.3	5	1.5	45	90°
CSPH 3080-050	8.3	6	2.0	50	90°
CSPH 3100-050	10.4	6	2.5	50	90°
CSPH 3120-056	12.4	8	2.8	56	90°
CSPH 3160-060	16.5	10	3.2	60	90°
CSPH 3200-063	20.5	10	3.5	63	90°
CSPH 3250-068	25.0	10	3.8	68	90°

CSNH 3000

3 | Straight Type | Substrate HC10T HC20T | DATA p.491

• TOLERANCE

ØD		Ød
All sizes	±1.0mm	h9
	±1°	



Designation	ØD	Ød	Range of dia	L	α°
CSNH 3100-050	10	6	3~9	50	90°
CSNH 3150-055	15	8	3~14	55	90°
CSNH 3200-060	20	10	4~19	60	90°
CSNH 3250-068	25	12	5~24	68	90°
CSNH 3300-079	30	12	6~29	79	90°
CSNH 3350-085	35	12	7~34	85	90°
CSNH 3400-090	40	12	8~39	90	90°
CSNH 3450-095	45	16	9~44	95	90°
CSNH 3500-100	50	16	12~49	100	90°

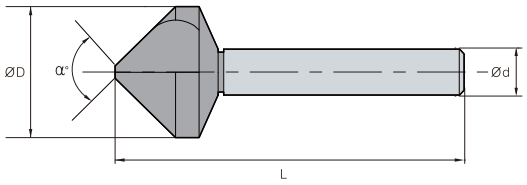
CSNH 1000

1 | Straight Type | Substrate HC10T HC20T | DATA

p.491

• TOLERANCE

ØD		Ød
All sizes	±1.0mm	h9



(mm)

Designation	ØD	Ød	Range of dia	L	α°
CSNH 1100-070	10	6	2~9	50	90°
CSNH 1150-075	15	8	2~14	55	90°
CSNH 1200-090	20	10	2~19	60	90°
CSNH 1250-080	25	12	2~24	70	90°
CSNH 1300-090	30	12	6~29	75	90°
CSNH 1350-080	35	12	7~34	80	90°
CSNH 1400-085	40	12	8~39	85	90°
CSNH 1450-087	45	12	9~44	87	90°
CSNH 1500-090	50	12	12~49	90	90°

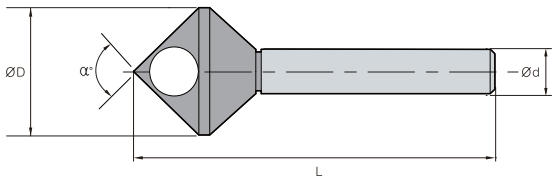
CSHH 1000

1 | Hole Type | Substrate HC10T HC20T | DATA

p.491

• TOLERANCE

ØD		Ød
All sizes	±1.0mm	h9

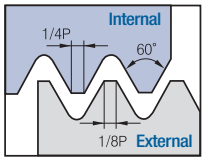


Designation	ØD	Ød	Range of dia	L	α°
CSHH 1100-070	10	6	3~9	50	90°
CSHH 1150-075	15	8	5~12	60	90°
CSHH 1200-090	20	10	8~15	65	90°
CSHH 1250-080	25	12	10~20	74	90°
CSHH 1300-090	30	12	12~25	85	90°
CSHH 1350-095	35	16	14~30	95	90°
CSHH 1400-105	40	16	16~35	105	90°
CSHH 1450-120	45	16	18~40	120	90°
CSHH 1500-130	50	16	20~45	130	90°

Thread Mill

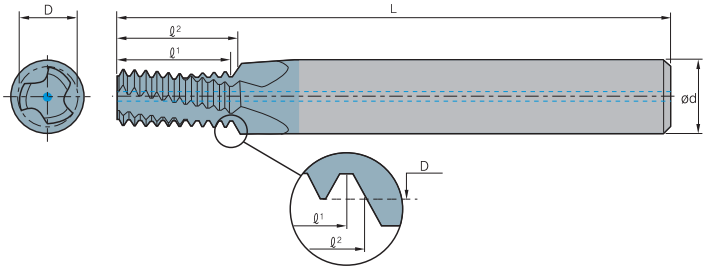
ISO Metric

Helical flutes with thru-hole coolant



Internal

Defined by: R262 (DIN 13)
Tolerance class : 6H



(ℓ² ≤ 1.5 × Thread Diameter)

Thread		Pitch	Designation		PC9070M	Dimensions (mm)					No.of flute	Tooth	*Bore dia.
M Coarse	M Fine	(mm)		Internal		Ød	D	L	ℓ¹	ℓ²	z	zt	mm
M3×0.5	M3.5~M16×0.5	0.50	STMHC	04024L04-I0.50ISO		4	2.40	45	4.5	4.7	3	9	2.5
M4×0.7	-	0.70		04031L06-I0.70ISO		4	3.15	45	6.3	6.6	3	9	3.3
M5×0.8	-	0.80		04039L07-I0.80ISO		4	3.90	45	7.2	7.6	3	9	4.2
M6×1.0	M8~M40×1.0	1.00		06048L09-I1.00ISO	●	6	4.80	57	9.0	9.5	3	9	5.0
M8×1.25	-	1.25		08065L13-I1.25ISO		8	6.50	61	12.5	13.1	3	10	6.8
M10×1.5	M12~M48×1.5	1.50		10082L15-I1.50ISO		10	8.20	73	15.0	15.7	3	10	8.5
M12×1.75	-	1.75		10099L18-I1.75ISO		10	9.90	73	17.5	18.4	4	10	10.2
M14×2.0	M17~M80×2.0	2.00		12116L21-I2.00ISO		12	11.60	73	20.0	21.0	4	10	12.0
M16×2.0	M17~M80×2.0	2.00		14136L25-I2.00ISO		14	13.60	92	24.0	25.0	4	12	14.0

(ℓ² ≤ 2 × Thread Diameter)

Thread		Pitch	Designation		PC9070M	Dimensions (mm)					No.of flute	Tooth	*Bore dia.
M Coarse	M Fine	(mm)		Internal		Ød	D	L	ℓ¹	ℓ²	z	zt	mm
M3×0.5	M3.5~M16×0.5	0.50	STMHC	04024L06-I0.50ISO		4	2.40	45	6.0	6.2	3	12	2.5
-	M4×0.5	0.50		04032L08-I0.50ISO		4	3.20	45	8.0	8.2	3	16	3.5
-	M5×0.5	0.50		06042L10-I0.50ISO		6	4.20	57	10.0	10.2	3	20	4.5
M4×0.7	-	0.70		04031L08-I0.70ISO		4	3.15	45	8.4	8.7	3	12	3.3
-	M6×0.75	0.75		06050L12-I0.75ISO		6	5.00	57	12.0	12.4	3	16	5.3
M5×0.8	-	0.80		04039L10-I0.80ISO		4	3.90	45	10.4	10.8	3	13	4.2
M6×1.0	M8~M40×1.0	1.00		06048L12-I1.00ISO	●	6	4.80	57	12.0	12.5	3	12	5.0
-	M8×1.0	1.00		08067L16-I1.00ISO		8	6.70	61	16.0	16.5	3	16	7.0
-	M10×1.0	1.00		10087L20-I1.00ISO		10	8.70	73	20.0	20.5	3	20	9.0
-	M12×1.0	1.00		12107L24-I1.00ISO	●	12	10.70	73	24.0	24.5	4	24	11.0
M8×1.25	-	1.25		08065L16-I1.25ISO	●	8	6.50	61	16.2	16.9	3	13	6.8
-	M10×1.25	1.25		10085L20-I1.25ISO	●	10	8.50	73	20.0	20.6	3	16	8.8
M10×1.5	M12~M48×1.5	1.50		10082L20-I1.50ISO	●	10	8.20	73	19.5	20.2	3	13	8.5
-	M12×1.5	1.50		10099L24-I1.50ISO	●	10	9.90	73	24.0	24.7	4	16	10.5
-	M14×1.5	1.50		12119L29-I1.50ISO		12	11.90	80	28.5	29.2	4	19	12.5
-	M16×1.5	1.50		14139L32-I1.50ISO	●	14	13.90	92	31.5	32.2	4	21	14.5
M12×1.75	-	1.75		10099L25-I1.75ISO		10	9.90	73	24.5	25.4	4	14	10.2
M14×2.0	M17~M80×2.0	2.00		12116L29-I2.00ISO		12	11.60	80	28.0	29.0	4	14	12.0
M16×2.0	M17~M80×2.0	2.00		14136L33-I2.00ISO		14	13.60	92	32.0	33.0	4	16	14.0
M18×2.5	-	2.50		16148L36-I2.50ISO		16	14.80	92	35.0	36.2	4	14	15.5
M 20×2.5	-	2.50		18171L41-I2.50ISO		18	17.10	102	40.0	41.2	4	16	17.5
M 24×3.0	-	3.00		20199L49-I3.00ISO		20	19.90	102	48.0	49.5	4	16	21.0

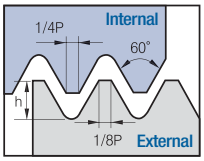
* Bore Diameter applies to smallest thread Dia

* Maximum thread length = $\ell^2 - \frac{\text{Pitch}}{4}$

● : Stock item

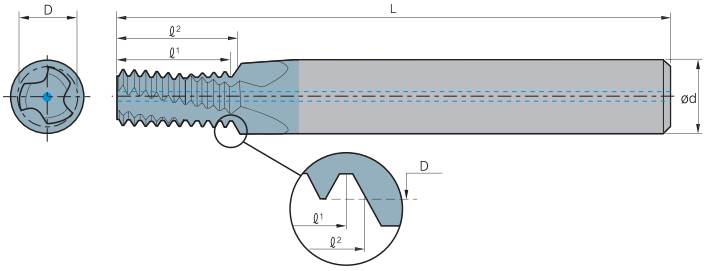
American UN (UNC,UNF,UNEF)

Helical flutes with thru-hole coolant



Internal

Defined by: ANSI B1.1.74
Tolerance class : 2B



(ℓ2≤1.5×Thread Diameter)

Thread			Pitch	Designation		PC9070M	Dimensions (mm)					No.of flute	Tooth	*Bore dia.
UNC	UNF	UNEF	(tpi)		Internal		Ød	D	L	ℓ1	ℓ2	z	zt	mm
No.10~24	5/16″,3/8″×24	9/16″~11/16″×24	24	STMHC	04035L07-I24UNC		4	3.58	45	7.4	7.9	3	7	3.8
No.10~24	5/16″,3/8″×24	9/16″~11/16″×24	24		06041L08-I24UNC		6	4.15	57	8.5	9.0	3	8	4.5
1/4″×20	7/16″,1/2″×20	3/4″~1″×20	20		06048L09-I20UNC		6	4.88	57	8.9	9.5	3	7	5.2
5/16″×18	9/16″,5/8″×18	11/16″~1 11/16″×18	18		08061L11-I18UNC		8	6.15	61	11.3	12.0	3	8	6.5
3/8″×16	3/4″×16	-	16		08076L15-I16UNC		8	7.65	61	14.3	15.1	3	9	8.0
7/16″×14	7/8″×14	-	14		10090L17-I14UNC		10	9.00	73	16.3	17.2	3	9	9.3
1/2″×13	-	-	13		12104L20-I13UNC		12	10.35	73	19.5	20.5	4	10	10.8
9/16″×12	1″~1 1/2″×12	-	12		12118L22-I12UNC		12	11.80	73	21.2	22.2	4	10	12.3

(ℓ2≤2×Thread Diameter)

Thread			Pitch	Designation		PC9070M	Dimensions (mm)					No.of flute	Tooth	*Bore dia.
UNC	UNF	UNEF	(tpi)		Internal		Ød	D	L	ℓ1	ℓ2	z	zt	mm
-	No.10~32	No. 12~3/8″×32	32	STMHC	04038L09-I32UNF		4	3.80	45	9.5	9.9	3	12	4.0
-	-	No. 12~3/8″×32	32		06044L11-I32UNEF		6	4.40	57	11.1	11.5	3	14	4.7
-	No.12, 1/4″×28	7/16″; 1/2″×28	28		06043L11-I28UNF		6	4.30	57	10.9	11.3	3	12	4.6
-	1/4″×28	7/16″; 1/2″×28	28		06052L13-I28UNF		6	5.15	57	12.7	13.1	3	14	5.5
-	-	7/16″; 1/2″×28	28		10099L22-I28UNEF		10	9.90	73	21.8	22.2	3	24	10.2
No.10~24	5/16″, 3/8″×24	9/16″~11/16″×24	24		04035L10-I24UNC		4	3.58	45	9.5	10.0	3	9	3.8
No.12~24	5/16″, 3/8″×24	9/16″~11/16″×24	24		06041L11-I24UNC		6	4.15	57	10.6	11.1	3	10	4.5
-	5/16″, 3/8″×24	9/16″~11/16″×24	24		08066L16-I24UNF		8	6.68	61	15.9	16.4	3	15	6.8
-	3/8″×24	9/16″~11/16″×24	24		10082L19-I24UNF		10	8.20	73	19.0	19.6	3	18	8.5
-	-	9/16″~11/16″×24	24		14129L29-I24UNEF		14	12.90	92	28.6	29.1	4	27	13.2
1/4″×20	7/16″, 1/2″×20	3/4″~1″×20	20		06048L13-I20UNC		6	4.88	57	12.7	13.3	3	10	5.2
-	7/16″, 1/2″×20	3/4″~1″×20	20		10096L22-I20UNF		10	9.60	73	21.6	22.2	3	17	9.8
-	1/2″×20	3/4″~1″×20	20		12111L26-I20UNF		12	11.10	80	25.4	26.0	3	20	11.5
-	-	3/4″~1″×20	20		18174L38-I20UNEF		18	17.40	102	38.1	38.7	4	30	17.8
5/16″×18	9/16″, 5/8″×18	11/16″~1 11/16″×18	18		08061L16-I18UNC		8	6.15	61	15.5	16.2	3	11	6.5
-	9/16″, 5/8″×18	11/16″~1 11/16″×18	18		14125L28-I18UNF		14	12.50	92	28.2	28.9	4	20	12.8
-	5/8″×18	11/16″~1 11/16″×18	18		16141L31-I18UNF		16	14.10	92	31.0	31.7	4	22	14.5
3/8″×16	3/4″×16	-	16		08076L19-I16UNC		8	7.65	61	19.0	19.8	3	12	8.0
-	3/4″×16	-	16		18170L38-I16UNF		18	17.00	102	38.1	38.8	4	24	17.5
7/16″×14	7/8″×14	-	14		10090L22-I14UNC		10	9.00	73	21.8	22.7	3	12	9.3
-	7/8″×14	-	14		20199L44-I14UNF		20	19.90	102	43.5	44.4	4	24	20.5
1/2″×13	-	-	13		12104L26-I13UNC		12	10.35	80	25.4	26.4	4	13	10.8
9/16″×12	1″~1 1/2″×12	-	12		12118L28-I12UNC		12	11.80	80	27.5	28.6	4	13	12.3
-	1″~1 1/2″×12	-	12		20199L51-I12UNF		20	19.90	102	50.8	51.9	4	24	23.5
5/8″×11	-	-	11		14131L33-I11UNC		14	13.10	92	32.3	33.5	4	14	13.5
3/4″×10	-	-	10		16159L39-I10UNC		16	15.90	92	38.1	39.4	4	15	16.5
7/8″×9	-	-	9		20190L46-I9UNC		20	19.00	102	45.2	46.6	4	16	19.5
1″×8	-	-	8		20199L52-I8UNC		20	19.90	102	50.8	52.4	4	16	22.0

* Bore Diameter applies to smallest thread Dia

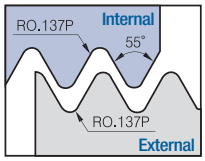
* Maximum thread length = $\ell^2 - \frac{\text{Pitch}}{4}$

● : Stock item

Thread Mill

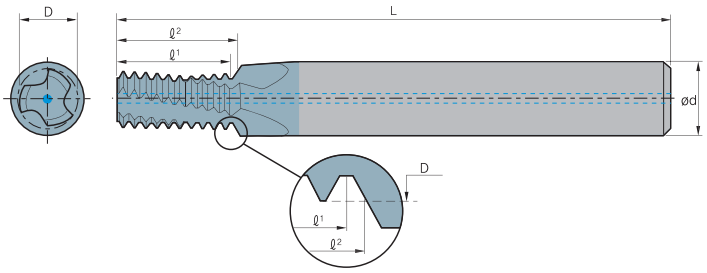
Whitworth (BSW,BSF)

Helical flutes with thru-hole coolant



External / Internal

Defined by: B.S.84 : 1956,
DIN 259, ISO228/1 : 1982
Tolerance class : Medium class A



(ℓ2 ≤ 2 × Thread Diameter)

Thread		Pitch	Designation		PC9070M	Dimensions (mm)					No.of flute	Tooth	*Bore dia.
BSW	BSF	(tpi)		Internal		Ød	D	L	ℓ1	ℓ2	z	zt	mm
-	1/4″×26	26	STMHC	06050L13-EI26BSF		6	5.00	57	12.7	13.2	3	13	5.3
-	5/16″×22	22		08063L16-EI22BSF		8	6.35	61	16.2	16.7	3	14	6.7
1/4″×20	3/8″×20	20		06044L13-EI20BSW		6	4.45	57	12.7	13.3	3	10	5.0
-	3/8″×20	20		08076L19-EI20BSF		8	7.65	61	19.0	19.7	3	15	8.2
5/16″×18	7/16″×18	18		06058L16-EI18BSW		6	5.85	57	15.5	16.2	3	11	6.5
-	7/16″×18	18		10092L23-EI18BSF		10	9.20	73	22.6	23.3	3	16	9.7
3/8″×16	1/2″, 9/16″×16	16		08072L19-EI16BSW		8	7.20	61	19.0	19.8	3	12	7.9
-	1/2″, 9/16″×16	16		12105L26-EI16BSF		12	10.50	80	25.4	26.2	4	16	11.1
-	9/16″×16	16		14122L29-EI16BSF		14	12.15	92	28.6	29.4	4	18	12.6
7/16″×14	5/8″, 11/16″×14	14		10085L22-EI14BSW		10	8.50	73	21.8	22.7	3	12	9.2
-	5/8″, 11/16″×14	14		14134L31-EI14BSF		14	13.40	92	30.8	31.7	4	17	14.0
-	11/16″×14	14		16150L35-EI14BSF		16	15.00	92	34.5	35.4	4	19	15.6
1/2″×12	3/4″×12	12		10096L26-EI12BSW		10	9.65	73	25.4	26.5	3	12	10.5
9/16″×12	3/4″×12	12		12113L28-EI12BSW		12	11.25	80	27.5	28.6	4	13	12.1
-	3/4″×12	12		18162L39-EI12BSF		18	16.20	102	38.1	39.2	4	18	16.8
5/8″×11	7/8″×11	11		14126L33-EI11BSW		14	12.60	92	32.3	33.5	4	14	13.4
11/16″×11	-	11		16142L35-EI11BSW		16	14.20	92	34.6	35.8	4	15	15.0

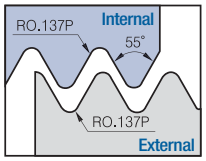
* Bore Diameter applies to smallest thread Dia

* Maximum thread length = $\ell^2 - \frac{\text{Pitch}}{4}$

● : Stock item

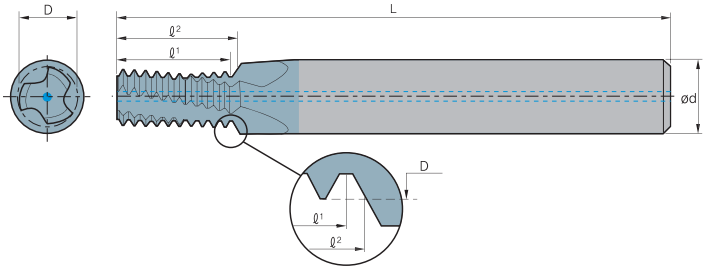
BSP(G) New

Helical flutes with thru-hole coolant



External / Internal

Defined by: B.S.2779:1956
Tolerance class : Medium class



(ℓ2 ≤ 1.5 × Thread Diameter)

Thread Standard	Pitch (tpi)	Designation Internal		PC9070M	Dimensions (mm) Ød	D	L	ℓ1	ℓ2	No.of flute z	Tooth zt	*Bore dia. mm
1/16″, 1/8″x28	28	STMHC	08064L12-EI28BSPTM		8	6.4	61	11.8	12.2	3	13	6.7
1/8″x28	28		10082L15-EI28BSPTM		10	8.2	73	14.5	15.0	3	16	8.7
1/4″, 3/8″x19	19		12110L20-EI19BSPTM		12	11.0	80	20.1	20.7	4	15	11.8
3/8″x19	19		16145L26-EI19BSPTM		16	15.2	92	25.4	26.1	4	19	15.2
1″-4″x11	11		20199L42-EI11BSPTM		20	30.7	102	41.6	42.7	4	18	30.7

(ℓ2 ≤ 2 × Thread Diameter)

Thread Standard	Pitch (tpi)	Designation Internal		PC9070M	Dimensions (mm) Ød	D	L	ℓ1	ℓ2	No.of flute z	Tooth zt	*Bore dia. mm
1/16″, 1/8″x28	28	STMHC	08064L15-EI28BSPTM		8	6.4	61	11.8	15.9	3	13	6.7
1/8″x28	28		10082L19-EI28BSPTM		10	8.2	73	14.5	19.5	3	16	8.7
1/4″, 3/8″x19	19		12110L27-EI19BSPTM		12	11.0	80	20.1	27.4	4	15	11.8
3/8″x19	19		16145L34-EI19BSPTM		16	15.2	92	33.4	34.1	4	25	15.2
1/2″-7/8″x14	14		18179L42-EI14BSPTM		18	19.0	102	41.7	42.6	4	23	19.0

* Bore Diameter applies to smallest thread Dia

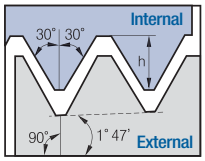
* Maximum thread length = $\ell^2 - \frac{\text{Pitch}}{4}$

● : Stock item

Thread Mill

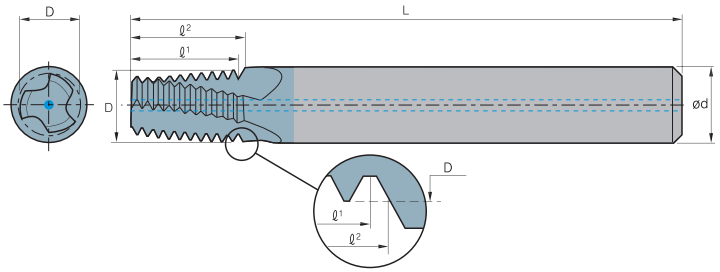
NPT

Helical flutes with thru-hole coolant



External / Internal

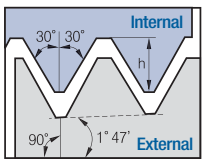
Defined by: USAS B2.1:1968
Tolerance class : Standard NPT



Thread Standard	Pitch (tpi)	Designation External / Internal		PC9070M	Dimensions (mm) Ød	D	L	ℓ1	ℓ2	No.of flute z	Tooth zt	*Bore dia. mm
1/16″×27	27.0	STMHC	06059L09-EI27NPT		6	5.90	57	9.4	9.9	3	10	6.3
1/8″×27	27.0		08076L09-EI27NPT		8	7.65	61	9.4	9.9	3	10	8.5
1/4″×18	18.0		10099L14-EI18NPT	●	10	9.90	73	14.1	14.8	3	10	11.1
3/8″×18	18.0		12111L14-EI18NPT		12	11.15	73	14.1	14.8	4	10	14.5
1/2″, 3/4″×14	14.0		16142L19-EI14NPT		16	14.25	92	18.1	19.0	4	10	17.7, 23.0
1″, 1 1/14, 1 1/2″, 2″×11.5	11.5		20196L23-EI11.5NPT		20	19.60	102	22.1	23.2	4	10	29.0, 37.7, 44.0, 56.0
2 1/2″×8 ; 3″×8	8.0		20196L33-EI8NPT		20	19.60	102	31.7	33.3	4	10	66.5, 82.1

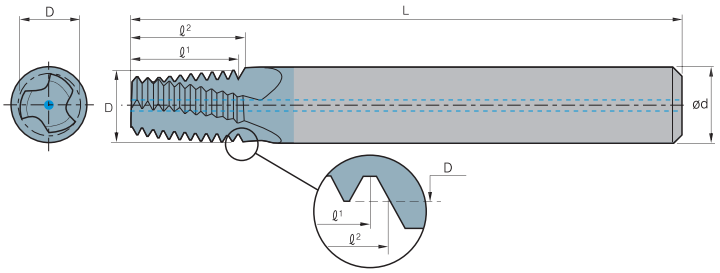
NPTF

Helical flutes with thru-hole coolant



External / Internal

Defined by: ANSI 1.20.3-1976
Tolerance class : Standard NPTF



Thread Standard	Pitch (tpi)	Designation External / Internal		PC9070M	Dimensions (mm) Ød	D	L	ℓ1	ℓ2	No.of flute z	Tooth zt	*Bore dia. mm
1/16″×27	27.0	STMHC	06059L09-EI27NPTF	●	6	5.90	57	9.4	9.9	3	10	6.3
1/8″×27	27.0		08076L09-EI27NPTF		8	7.65	61	9.4	9.9	3	10	8.5
1/4″×18	18.0		10099L14-EI18NPTF		10	9.90	73	14.1	14.8	3	10	11.1
3/8″×18	18.0		12111L14-EI18NPTF		12	11.15	73	14.1	14.8	4	10	14.5
1/2″, 3/4″×14	14.0		16142L19-EI14NPTF		16	14.25	92	18.1	19.0	4	10	17.7, 23.4
1″, 1 1/14, 1 1/2″, 2″×11.5	11.5		20196L23-EI11.5NPTF		20	19.60	102	22.1	23.2	4	10	29.0, 37.7, 43.7, 55.6
2 1/2″×8 ; 3″×8	8.0		20196L33-EI8NPTF		20	19.60	102	31.7	33.3	4	10	66.3, 82.1

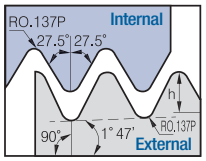
* Bore Diameter applies to smallest thread Dia

* Maximum thread length = $\ell^2 - \frac{\text{Pitch}}{4}$

● : Stock item

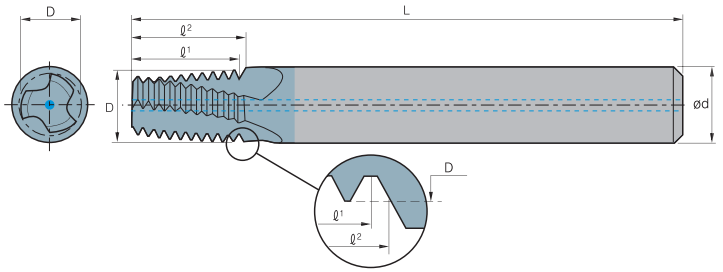
BSPT

Helical flutes with thru-hole coolant



External / Internal

Defined by: B.S.21:1985
Tolerance class : Standard BSPT

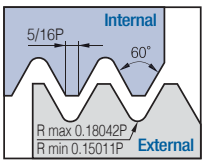


Thread Standard	Pitch (tpi)	Designation External / Internal		PC9070M	Dimensions (mm) Ød	D	L	ℓ1	ℓ2	No.of flute z	Tooth zt	*Bore dia. mm
1/16″×28	28	STMHC	06059L10-EI28BSPT		6	5.90	57	10.0	10.2	3	11	6.7
1/8″×28	28		08076L10-EI28BSPT		8	7.65	61	10.0	10.2	3	11	8.7
1/4″×19	19		10099L15-EI19BSPT		10	9.90	73	14.7	15.4	3	11	11.8
3/8″×19	19		12111L15-EI19BSPT		12	11.15	73	14.7	15.4	4	11	15.2
1/2″, 3/4″×14	14		16142L22-EI14BSPT		16	14.25	92	21.8	22.7	4	12	19.0
1″, 1 1/2″, 2″, 2 1/2″×11	11		20196L28-EI11BSPT		20	19.60	102	27.7	28.9	4	12	30.7

UNJ

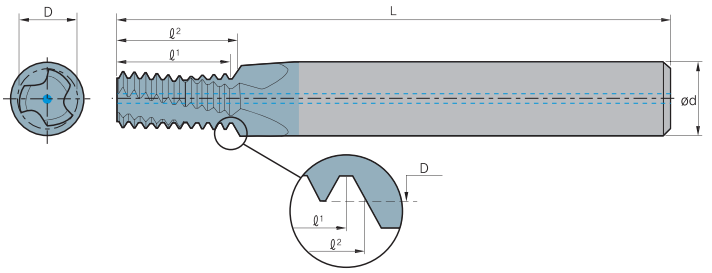
New

Helical flutes with thru-hole coolant



Internal

Defined by: MIL-S-8879C
Tolerance class : 3B



Thread UNJC	UNJF	UNFEF/UNJ	Pitch (tpi)	Designation Internal		PC9070M	Dimensions (mm) Ød	D	L	ℓ1	ℓ2	No.of flute z	Tooth zt	*Bore dia. mm
0.138″(#6)	0.190″(#10)	0.216(#12)/0.4375(7/16″)	32	STMHC	04027L07-I32UNJTM		4	2.7	45	7.1	7.5	3	9	2.80
-	0.250″(1/4″)	0.4375″(7/16″)/0.5625″(9/16″)	28		06054L13-I28UNJTM		6	5.4	57	12.7	13.1	3	14	5.60
0.190″(#10)	0.3125″(5/16″)	0.5625″(9/16″)/-	24		04037L09-I24UNJTM		4	3.7	45	9.5	10.0	3	9	4.00
-	0.3125″(5/16″)	0.5625″(9/16″)/-	24		08067L15-I24UNJTM		8	6.7	61	15.9	16.4	3	15	7.00
0.250″(1/4″)	0.4375″(7/16″)	0.750″(3/4″)/0.3125″(5/16″)	20		06050L12-I20UNJTM		6	5.0	57	12.7	13.3	3	10	5.30
-	0.4375″(7/16″)	0.750″(3/4″)/0.5625″(9/16″)	20		10096L21-I20UNJTM		10	9.6	73	21.6	22.2	4	17	10.00
0.3125″(5/16″)	0.5625″(9/16″)	1.0625″(1 1/16″)/-	18		08064L15-I18UNJTM		8	6.4	61	15.5	16.2	3	11	6.75
0.375″(3/8″)	0.750″(3/4″)	-/0.4375″(7/16″)	16		08077L19-I16UNJTM		8	7.7	61	19.1	19.8	3	12	8.10
0.4375″(7/16″)	0.875″(7/8″)	-	14		10092L21-I14UNJTM		10	9.2	73	21.8	22.7	4	12	9.50
0.500″(1/2″)	-	-	13		10099L25-I13UNJTM		10	9.9	73	25.4	26.4	4	13	11.00

* Bore Diameter applies to smallest thread Dia

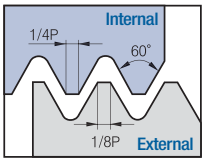
* Maximum thread length = $\ell^2 - \frac{\text{Pitch}}{4}$

● : Stock item

Thread Mill

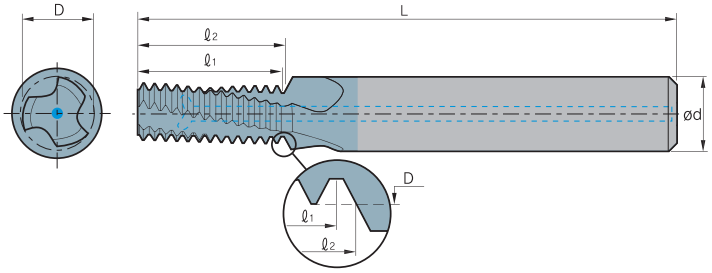
ISO Metric

Helical flutes with radial cooling



Internal

Defined by: R262 (DIN 13)
Tolerance class: 6H

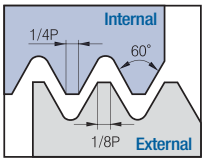


(ℓ ≤ 2 × Thread Diameter)

Thread		Pitch (mm)	Designation		PC9070M	Dimensions (mm)					No.of flute	Tooth	*Bore dia.
M Coarse	M Fine			Internal		Ød	D	L	ℓ1	ℓ2	z	zt	mm
M6×1.0	M8~M40×1.0	1.0	STMHCR	06048L12-I1.00ISO		6	4.8	57	12.0	12.5	3	12	5.0
	M10×1.0	1.0		10087L20-I1.00ISO		10	8.7	73	20.0	20.5	3	20	9.0
	M12×1.0	1.0		12107L24-I1.00ISO		12	10.7	73	24.0	24.5	4	24	11.0
M8×1.25		1.25		08065L16-I1.25ISO		8	6.5	64	16.3	16.9	3	13	6.8
M10×1.5	M12~M48×1.5	1.5		10082L20-I1.50ISO		10	8.2	73	19.5	20.3	3	13	8.5
	M12×1.5	1.5		10099L24-I1.50ISO		10	9.9	73	24.0	24.8	4	16	10.5
	M14×1.5	1.5		12119L29-I1.50ISO		12	11.9	84	28.5	29.3	4	19	12.5
	M16×1.5	1.5		14139L32-I1.50ISO		14	13.9	84	31.5	32.3	4	21	14.5
M12×1.75		1.75		10099L25-I1.75ISO		10	9.9	73	24.5	25.4	4	14	10.2

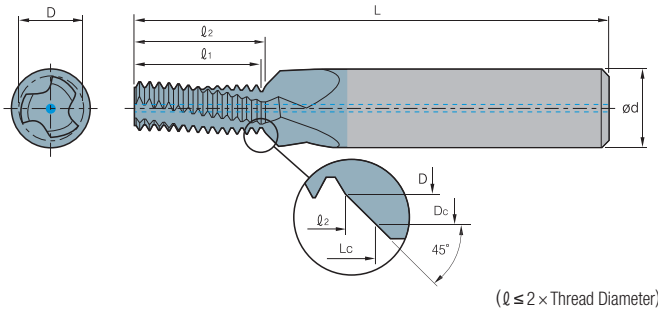
ISO Metric

Helical flutes with thru-hole coolant-thru & Chamfer



Internal

Defined by: R262 (DIN 13)
Tolerance class: 6H



(ℓ ≤ 2 × Thread Diameter)

Thread		Pitch (mm)	Designation		PC9070M	Dimensions (mm)							No.of flute	Tooth	*Bore dia.
M Coarse	M Fine			Internal		Ød	D	Dc	L	ℓ1	ℓ2	Lc	z	zt	mm
M6×1.0	M8~M40×1.0	1.0	STMHCC	08048L12-I1.00ISO		8	4.8	6.3	61	12.0	12.5	13.3	3	12	5.0
	M10×1.0	1.0		12087L20-I1.00ISO		12	8.7	10.3	73	20.0	20.5	21.3	3	20	9.0
	M12×1.0	1.0		14107L24-I1.00ISO		14	10.7	12.3	80	24.0	24.5	25.3	4	24	11.0
M8×1.25		1.25		10065L16-I1.25ISO		10	6.5	8.3	73	16.3	16.9	17.8	3	13	6.8
M10×1.5	M12~M48×1.5	1.5		12082L20-I1.50ISO		12	8.2	10.3	80	19.5	20.3	21.3	3	13	8.5
	M12×1.5	1.5		14099L24-I1.50ISO		14	9.9	12.3	80	24.0	24.8	26.0	4	16	10.5
	M14×1.5	1.5		16119L29-I1.50ISO		16	11.9	14.3	92	28.5	29.3	30.5	4	19	12.5
	M16×1.5	1.5		18139L32-I1.50ISO		18	13.9	16.3	92	31.5	32.3	33.5	4	21	14.5
M12×1.75		1.75		14099L25-I1.75ISO		14	9.9	12.3	80	24.5	25.4	26.6	4	14	10.2

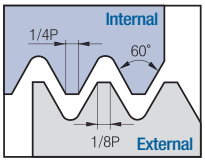
* Bore Diameter applies to smallest thread Dia

* Maximum thread length = $\ell^2 - \frac{\text{Pitch}}{4}$

● : Stock item

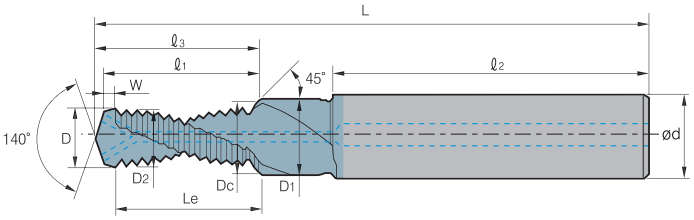
ISO Metric

Drill, Chamfer & Thread with thru-hole coolant



Internal

Defined by: R262 (DIN 13)
Tolerance class: 6H



Thread ISO 2D M Coarse	Pitch (mm)	Designation	Internal	PC9070M	Dimensions (mm) L	ℓ3	ℓ1	ℓ2	W	Le	D	Ød	D1	Dc	D2	No.of flute z	Tooth zt
M6×1.0	1.0	STMHCD	IM6×1.0ISO-2D		62.0	14.5	13.7	36	1.0	12.7	5.0	8	6.6	6.3	4.85	2	11
M8×1.25	1.25		IM8×1.25ISO-2D		74.0	18.2	17.1	40	1.3	15.8	6.8	10	9.0	8.3	6.45	2	11
M10×1.5	1.5		IM10×1.5ISO-2D		79.0	23.4	22.1	45	1.5	20.6	8.5	12	11.0	10.3	8.08	2	12
M12×1.75	1.75		IM12×1.75ISO-2D		89.0	27.1	25.5	45	1.5	24.0	10.3	14	13.5	12.3	9.74	2	12

Thread ISO 2.5D M Coarse	Pitch (mm)	Designation	Internal	PC9070M	Dimensions (mm) L	ℓ3	ℓ1	ℓ2	W	Le	D	Ød	D1	Dc	D2	No.of flute z	Tooth zt
M6×1.0	1.0	STMHCD	IM6×1.0ISO-2.5D		62.0	16.5	15.7	36	1.0	14.7	5.0	8	6.6	6.3	4.85	2	13
M8×1.25	1.25		IM8×1.25ISO-2.5D		74.0	23.2	22.1	40	1.3	20.8	6.8	10	9.0	8.3	6.45	2	15
M10×1.5	1.5		IM10×1.5ISO-2.5D		79.0	27.9	26.6	45	1.5	25.1	8.5	12	11.0	10.3	8.08	2	15

* Bore Diameter applies to smallest thread Dia

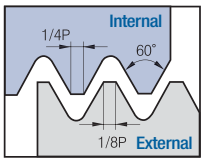
* Maximum thread length = $\ell^2 - \frac{\text{Pitch}}{4}$

● : Stock item

Thread Mill

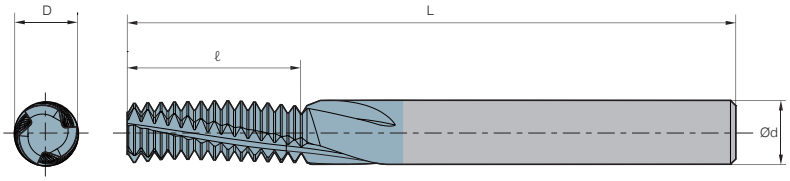
ISO Metric New

Helical flutes



External / Internal

Defined by: R262 (DIN 13)
Tolerance class : 6g/6H



(ℓ ≤ 2 × Thread Diameter)

Thread		Pitch	Designation		PC9070M	Dimensions (mm)				No.of flute	Tooth
M Coarse	M Fine	(mm)		External		Ød	D	L	ℓ	z	zt
M3x0.5	-	0.50	STMH	04039L06-E0.5ISOTM		4	3.9	45	6	3	12
M4.5x0.7	-	0.75		04039L09-E0.75ISOTM		4	3.9	45	9	3	12
M6x1.0	-	1.00		04039L12-E1.0ISOTM		4	3.9	45	12	3	12
M8x1.25	-	1.25		06059L16-E1.25ISOTM		6	5.9	57	16.25	3	13
M10x1.5	-	1.50		08079L21-E1.5ISOTM	●	8	7.9	63	21	3	14
M14x2.0	-	2.00		10099L28-E2.0ISOTM		10	9.9	73	28	4	14

(ℓ ≤ 2 × Thread Diameter)

Thread		Pitch	Designation		PC9070M	Dimensions (mm)				No.of flute	Tooth	*Bore dia.
M Coarse	M Fine	(mm)		Internal		Ød	D	L	ℓ	z	zt	mm
M3x0.5	M3.5-M16x0.5	0.50	STMH	04022L06-I0.5ISOTM		4	2.2	45	6.0	3	12	2.5
-	M4x0.5	0.50		04030L08-I0.5ISOTM		4	3.0	45	8.0	3	16	3.5
-	M3x0.5	0.50		04039L10-I0.5ISOTM		4	3.9	45	6.0	3	12	4.5
M4x0.7	-	0.70		04028L08-I0.7ISOTM		4	2.8	45	8.4	3	12	3.3
-	M6x0.75	0.75		04039L12-I0.75ISOTM		4	3.9	45	9.0	3	12	5.3
M5x0.8	-	0.80		04035L10-I0.8ISOTM		4	3.5	45	10.4	3	13	4.2
M6x1.0	M8-M40x1.0	1.00		04039L12-I1.0ISOTM		4	3.9	45	12.0	3	12	5.0
-	M8x1.0	1.00		06059L16-I1.0ISOTM		6	5.9	57	16.0	3	16	7.0
-	M10x1.0	1.00		08079L20-I1.0ISOTM	●	8	7.9	63	20.0	3	20	9.0
-	M12x1.0	1.00		10099L24-I1.0ISOTM	●	10	3.9	45	12.0	3	12	11.0
M8x1.25	-	1.25		06058L16-I1.25ISOTM		6	5.8	57	16.25	3	13	6.8
-	M10x1.25	1.25		08077L20-I1.25ISOTM	●	6	5.9	57	16.25	3	13	8.8
M10x1.5	M12-M48x1.5	1.50		08077L21-I1.5ISOTM	●	8	7.7	63	21.0	3	14	8.5
-	M12x1.5	1.50		10094L24-I1.5ISOTM	●	8	7.9	63	21.0	3	14	10.5
-	M14x1.5	1.50		12112L28-I1.5ISOTM	●	10	9.4	73	24.0	4	16	12.5
-	M16x1.5	1.50		12119L33-I1.5ISOTM	●	12	11.2	83	28.5	4	19	14.5
M12x1.75	-	1.75		10087L24-I1.75ISOTM	●	10	8.7	73	24.5	4	14	10.2
M14x2.0	M17-M80x2.0	2.00		10099L28-I2.0ISOTM	●	10	9.9	73	28.0	4	14	12.0
M16x2.0	M17-M80x2.0	2.00		12119L32-I2.0ISOTM	●	10	9.9	73	28.0	4	14	14.0
M18-M22x2.5	-	2.50		16139L40-I2.5ISOTM		16	13.9	92	40.0	5	16	15.5
M24x3.0	-	3.00		16159L42-I3.0ISOTM		16	15.9	92	42.0	4	14	21.0

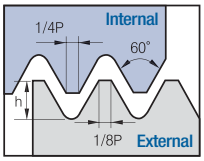
* Bore Diameter applies to smallest thread Dia

● : Stock item

American UN (UNC,UNF,UNEF)

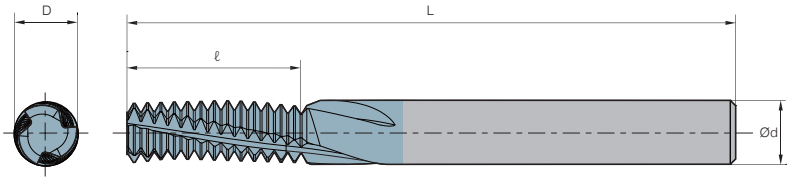
New

Helical flutes



External / Internal

Defined by: ANSI B1.1.74
Tolerance class : 2A/2B



(ℓ ≤ 2 × Thread Diameter)

Thread		Pitch	Designation		PC9070M	Dimensions (mm)				No.of flute	Tooth
UNC	UNF	(tpi)		External		Ød	D	L	ℓ	z	zt
No.8-32	-	32	STMH	04039L09-E32UNCTM		4	3.9	45	8.7	3	11
-	No.12-28	28		04039L12-E28UNFTM		4	3.9	45	11.8	3	13
No.12-24	-	24		04039L12-E24UNCTM		4	3.9	45	11.6	3	11
1/4″x20	-	20		04039L13-E20UNCTM		4	3.9	45	12.7	3	10
5/16″x18	-	18		06059L17-E18UNCTM		6	5.9	57	16.9	3	12
3/8″x16	-	16		08079L19-E16UNCTM		8	7.9	63	19.1	3	12
9/16″x12	-	12		12119L30-E12UNCTM		12	11.9	83	29.6	4	14

(ℓ ≤ 2 × Thread Diameter)

Thread			Pitch	Designation		PC9070M	Dimensions (mm)				No.of flute	Tooth	*Bore dia.
UNC	UNF	UNEF	(tpi)		Internal		Ød	D	L	ℓ	z	zt	mm
-	No.8-36		36	STMH	04030L09-I36UNFTM		4	3.0	45	8.5	3	12	3.5
-	No.10-32	No.12-3/8″x32	32		04033L11-I32UNFTM		4	3.3	45	11.1	3	14	4.0
-	No.12-28,1/4″x28	7/16″,1/2″x28	28		04038L12-I28UNFTM		4	3.8	45	11.8	3	13	4.6
-	1/4″x28	7/16″,1/2″x28	28		06046L13-I28UNFTM		6	4.6	57	12.7	3	14	5.5
-	-	7/16″,1/2″x28	28		10092L23-I28UNEFTM		10	9.2	73	22.7	4	25	10.2
No.10-24	5/16″,3/8″x24	9/16″-11/16″x24	24		04029L11-I24UNCTM		4	2.9	45	10.6	3	10	3.8
No.12-24	5/16″,3/8″x24	9/16″-11/16″x24	24		04035L12-I24UNCTM		4	3.5	45	11.6	3	11	4.5
5/16″,	3/8″x24	9/16″-11/16″x24	24		06057L16-I24UNFTM		6	5.7	57	15.9	3	15	6.8
-	3/8″x24	9/16″-11/16″x24	24		08074L19-I24UNFTM		8	7.4	63	19.1	3	18	8.5
-	-	9/16″-11/16″x24	24		12119L29-I24UNEFTM		12	11.9	83	28.6	4	27	13.2
1/4″x20	7/16″,1/2″x20	3/4″-1″x20	20		04039L13-I20UNCTM		4	3.9	45	12.7	3	10	5.2
7/16″,	1/2″x20	3/4″-1″x20	20		10085L23-I20UNFTM		10	8.5	73	22.9	4	18	9.8
-	1/2″x20	3/4″-1″x20	20		10099L26-I20UNFTM		10	9.9	73	25.4	4	20	11.5
-	-	3/4″-1″x20	20		16159L38-I20UNEFTM		16	15.9	92	38.1	5	30	17.8
5/16″x18	9/16″,5/8″x18	11/16″-1 11/16″x18	18		06052L17-I18UNCTM		6	5.2	57	16.9	3	12	6.5
9/16″,	5/8″x18	11/16″-1 11/16″x18	18		12113L30-I18UNFTM		12	11.3	83	29.6	4	21	12.8
5/8″x18	11/16″-1	11/16″x18	18		12119L33-I18UNFTM		12	11.9	83	32.5	4	23	14.5
3/8″x16	3/4″x16	-	16		08067L19-I16UNCTM		8	6.7	63	19.1	3	12	8.0
-	3/4″x16	-	16		16159L38-I16UNFTM		16	15.9	92	38.1	4	24	17.5
7/16″x14	7/8″x14	-	14		08076L24-I14UNCTM		8	7.6	63	23.6	4	13	9.3
-	7/8″x14	-	14		20187L44-I14UNFTM		20	18.7	104	43.5	4	24	20.5
1/2″x13	-	-	13		10089L26-I13UNCTM		10	8.9	73	25.4	4	13	10.8
9/16″x12	1″-1 1/2″x12	-	12		12103L30-I12UNCTM		12	10.3	83	29.6	4	14	12.3
-	1″-1 1/2″x12	-	12		20199L51-I12UNFTM		20	19.9	104	50.8	5	24	23.5
5/8″x11	-	-	11		12110L32-I11UNCTM		12	11.0	83	32.3	4	14	13.5
3/4″x10	-	-	10		16135L38-I10UNCTM		16	13.5	92	38.1	5	15	16.5
7/8″x9	-	-	9		16152L45-I9UNCTM		16	15.2	92	45.2	4	16	19.5
1″x8	-	-	8		20170L51-I8UNCTM		20	17.0	104	50.8	4	16	22.0

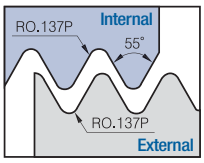
* Bore Diameter applies to smallest thread Dia

● : Stock item

Thread Mill

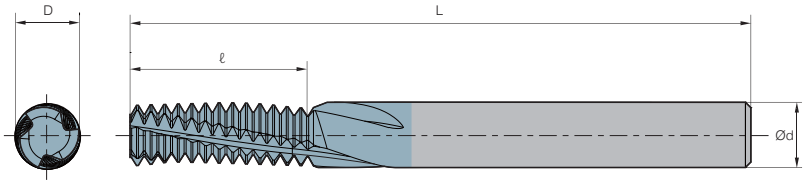
BSP New

Helical flutes



External / Internal

Defined by: B.S.2779 : 1956
Tolerance class : Medium class

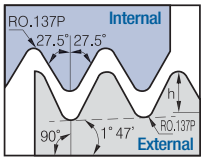


(ℓ ≤ 2 × Thread Diameter)

Thread Standard	Pitch (tpi)	Designation External / Internal		PC9070M	Dimensions (mm) Ød	D	L	ℓ	No.of flute z	Tooth zt	*Bore dia. mm
1/16″x28,1/8″x28	28	STMH	06058L16-EI28BSPTM		6	5.8	57	16.3	3	18	6.7
1/8″x28	28		08077L20-EI28BSPTM		8	7.7	63	20.0	3	22	8.7
1/4″x19, 3/8″x19	19		10099L27-EI19BSPTM		10	9.9	73	26.7	4	20	11.8
3/8″x19	19		16134L33-EI19BSPTM		16	13.4	92	33.4	4	25	15.2
1/2″, 3/4″x14	14		16157L44-EI14BSPTM		16	15.7	92	43.5	5	24	19.0
1″, 1 1/2″, 2″, 2 1/2″x11	11		20199L42-EI11BSPTM		20	19.9	104	41.6	5	18	30.7

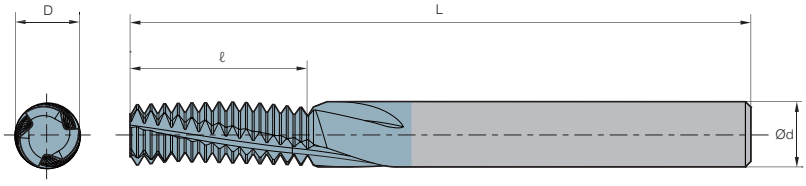
BSPT New

Helical flutes



External / Internal

Defined by: B.S.21 : 1985
Tolerance class : Standard BSPT



Thread Standard	Pitch (tpi)	Designation External / Internal		PC9070M	Dimensions (mm) Ød	D	L	ℓ	No.of flute z	Tooth zt	*Bore dia. mm
1/16″x28	28	STMH	06058L16-EI28BSPT-TM		6	5.8	57	16.3	3	18	6.7
1/8″x28	28		08077L20-EI28BSPT-TM		8	7.7	63	20.0	3	22	8.7
1/4″x19	19		10099L27-EI19BSPT-TM		10	9.9	73	26.7	4	20	11.8
3/8″x19	19		16134L33-EI19BSPT-TM		16	13.4	92	33.4	4	25	15.2
1/2″, 3/4″x14	14		16157L44-EI14BSPT-TM		16	15.7	92	43.5	5	24	19.0
1″, 1 1/2″, 2″, 2 1/2″x11	11		20199L42-EI11BSPT-TM		20	19.9	104	41.6	5	18	30.7

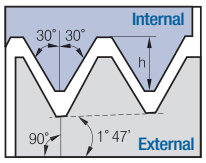
* Bore Diameter applies to smallest thread Dia

● : Stock item

NPT

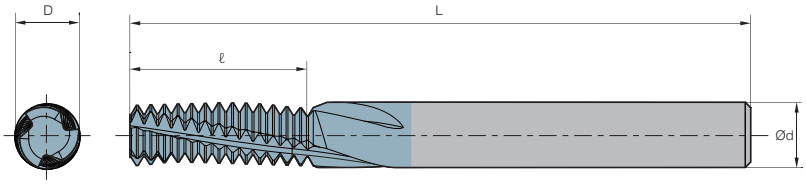
New

Helical flutes



External / Internal

Defined by: USAS B2.1 : 1968
Tolerance class : Standard NPT

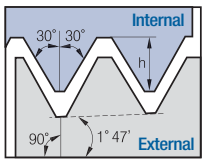


Thread Standard	Pitch (tpi)	Designation External / Internal		PC9070M	Dimensions (mm) Ød	D	L	ℓ	No.of flute z	Tooth zt	*Bore dia. mm
1/16"x27	27.0	STMH	06053L09-EI27NPT-TM		6	5.3	57	9.4	3	10	6.3
1/8"x27	27.0		08075L09-EI27NPT-TM		8	7.5	63	9.4	4	10	8.5
1/4"x18	18.0		10094L14-EI18NPT-TM		10	9.4	73	14.1	4	10	11.1
3/8"x18	18.0		12119L14-EI18NPT-TM		12	11.9	83	14.1	4	10	14.5
1/2", 3/4"x14	14.0		16155L25-EI14NPT-TM		16	15.5	92	25.4	5	14	17.7, 23.0
1"-2"x11.5	11.5		20199L33-EI11.5NPT-TM		20	19.9	104	33.1	5	15	29.0-56.0
2 1/2", 3"x8	8.0		20199L38-EI8NPT-TM		20	19.9	104	38.1	4	12	66.0

NPTF

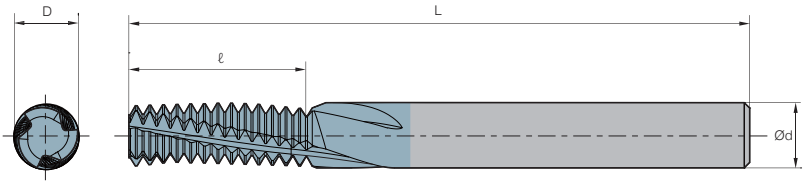
New

Helical flutes



External / Internal

Defined by: ANSI 1.20.3-1976
Tolerance class : Standard NPTF



Thread Standard	Pitch (tpi)	Designation External / Internal		PC9070M	Dimensions (mm) Ød	D	L	ℓ	No.of flute z	Tooth zt	*Bore dia. mm
1/16"x27	27.0	STMH	06053L09-EI27NPTFTM		6	5.3	57	9.4	3	10	6.3
1/8"x27	27.0		08075L09-EI27NPTFTM		8	7.5	63	9.4	4	10	8.4
1/4"x18	18.0		10094L14-EI18NPTFTM		10	9.4	73	14.1	4	10	11.1
3/8"x18	18.0		12119L14-EI18NPTFTM		12	11.9	83	14.1	4	10	14.7
1/2", 3/4"x14	14.0		16155L25-EI14NPTFTM		16	15.5	92	25.4	5	14	17.9, 23.4
1"-2"x11.5	11.5		20199L33-EI11.5NPTFTM		20	19.9	104	33.1	5	15	29.4-56.2
2 1/2", 3"x8	8.0		20199L38-EI8NPTFTM		20	19.9	104	38.1	4	12	67.0

* Bore Diameter applies to smallest thread Dia

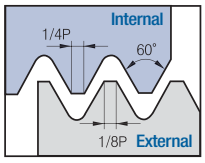
● : Stock item

Thread Mill

ISO Metric

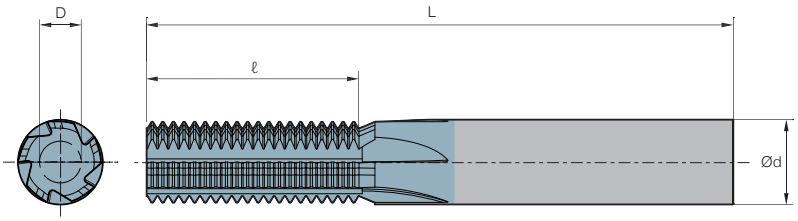
New

Straight flutes



External / Internal

Defined by: R262 (DIN 13)
Tolerance class : 6g/6H



Thread Standard	Pitch (mm)	Designation External		PC9060M	Dimensions (mm) Ød	D	L	ℓ	No.of flute z	Tooth zt	*Bore dia. mm
M3	0.50	STMS	06059-E0.5ISOTM		6	5.9	57	15	3	30	0.31
M4.5	0.75		08079-E0.75ISOTM3		8	7.9	63	19.5	3	26	0.46
M4.5	0.75		08079-E0.75ISOTM5		8	7.9	63	19.5	5	26	0.46
M6	1.00		10099-E1.0ISOTM		10	9.9	72	24	5	24	0.61
M10	1.50		12119-E1.5ISOTM		12	11.9	83	30	5	20	0.92
M14	2.00		12119-E2.0ISOTM		12	11.9	83	30	5	15	1.23
M24	3.00		16159-E3.0ISOTM		16	15.9	92	36	5	12	1.84
M36	4.00		16159-E4.0ISOTM		16	15.9	92	40	5	10	2.45
M64	6.00		20199-E6.0ISOTM		20	19.9	104	36	5	6	3.68

Thread Standard	Pitch (mm)	Designation Internal		PC9060M	Dimensions (mm) Ød	D	L	ℓ	No.of flute z	Tooth zt	*Bore dia. mm
M4.5	0.75	STMS	04030-I0.75ISOTM		4	3	42	6.75	3	9	0.43
M8	0.75		06059-I0.75ISOTM		6	5.9	57	15.0	3	20	0.43
M5	0.80		04036-I0.8ISOTM		4	3.6	42	8.0	3	10	0.46
M6	1.00		06040-I1.0ISOTM		6	4	57	9.0	3	9	0.58
M12	1.00		08079-I1.0ISOTM3		8	7.9	63	20.0	3, 5	20	0.58
M12	1.00		08079-I1.0ISOTM5		8	7.9	63	20.0	3, 5	20	0.58
M8	1.25		06050-I1.25ISOTM		6	5	57	12.5	3	10	0.72
M10	1.50		06059-I1.5ISOTM		6	5.9	57	15.0	3	10	0.87
M14	1.50		10099-I1.5ISOTM		10	9.9	72	24.0	5	16	0.87
M18	1.50		12119-I1.5ISOTM		12	11.9	83	30.0	5	20	0.87
M12	1.75		08079-I1.75ISOTM3		8	7.9	63	19.25	3, 5	11	1.01
M12	1.75		08079-I1.75ISOTM5		8	7.9	63	19.25	3, 5	11	1.01
M16	2.00		10099-I2.0ISOTM		10	9.9	72	24.0	5	12	1.15
M18	2.00		12119-I2.0ISOTM		12	11.9	83	30.0	5	15	1.15
M20	2.50		12119-I2.5ISOTM		12	11.9	83	30.0	5	12	1.44
M24	3.00		16159-I3.0ISOTM		16	15.9	92	36.0	5	12	1.73
M30	3.50		16159-I3.5ISOTM		16	15.9	92	38.5	5	11	2.02
M36	4.00		16159-I4.0ISOTM		16	15.9	92	40.0	5	10	2.31
M48	5.00		20199-I5.0ISOTM		20	19.9	104	40.0	5	8	2.89
M64	6.00		20199-I6.0ISOTM		20	19.9	104	36.0	5	6	3.46

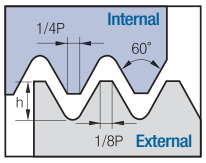
* Bore Diameter applies to smallest thread Dia

● : Stock item

BSP

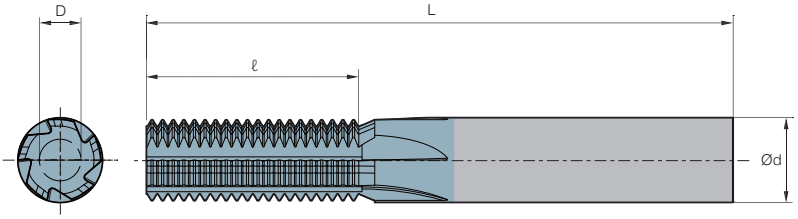
New

Straight flutes



External / Internal

Defined by: B.S.2779:1956
Tolerance class : Medium class

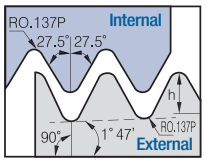


Thread Standard	Pitch (tpi)	Designation	External	PC9060M	Dimensions (mm) Ød	D	L	ℓ	No.of flute z	Tooth zt	*Bore dia. mm
1/16″	28	STMS	06059-EI28BSPTM		6	5.9	57	14.51	3	16	0.58
1/4″	19		08079-EI19BSPTM3		8	7.9	63	18.72	3	14	0.86
1/4″	19		08079-EI19BSPTM5		8	7.9	63	18.72	5	14	0.86
1/2″	14		12119-EI14BSPTM		12	11.9	83	29.03	5	16	1.16
1″	11		16159-EI11BSPTM		16	15.9	92	34.64	5	15	1.48

BSPT

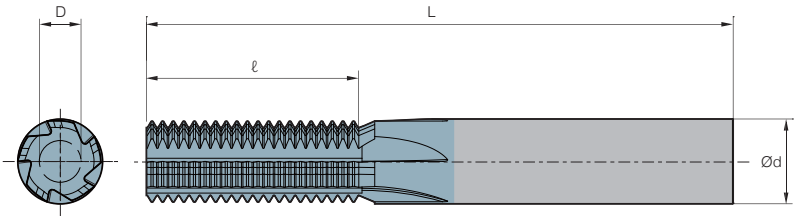
New

Straight flutes



External / Internal

Defined by: B.S.21 : 1985
Tolerance class : Standard BSPT



Thread Standard	Pitch (tpi)	Designation	External	PC9060M	Dimensions (mm) Ød	D	L	ℓ	No.of flute z	Tooth zt	*Bore dia. mm
1/16″	28	STMS	06059-EI28BSPT-TM		6	5.9	57	9.98	3	11	0.58
1/4″	19		08079-EI19BSPT-TM3		8	7.9	63	14.71	3	11	0.86
1/4″	19		08079-EI19BSPT-TM5		8	7.9	63	14.71	5	11	0.86
1/2″	14		12119-EI14BSPT-TM		12	11.9	83	19.96	5	11	1.16
1″	11		16159-EI11BSPT-TM		16	15.9	92	39.25	5	17	1.48

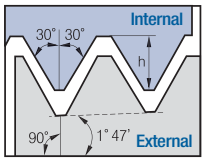
* Bore Diameter applies to smallest thread Dia

● : Stock item

Thread Mill

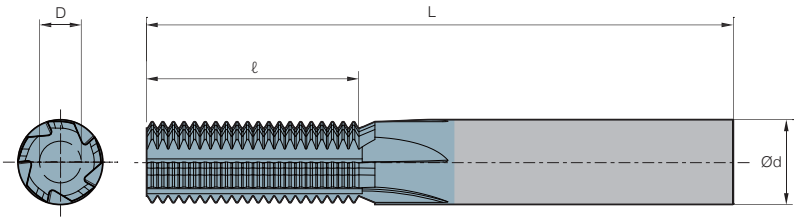
NPT New

Straight flutes



External / Internal

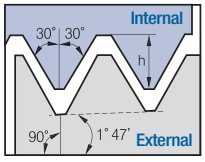
Defined by: USAS B2.1:1968
Tolerance class : Standard NPT



Thread Standard	Pitch (tpi)	Designation External / Internal		PC9060M	Dimensions (mm) Ød	D	L	ℓ	No.of flute z	Tooth zt	*Bore dia. mm
1/16″	27.0	STMS	06059-EI27NPT-TM		6	5.9	57	9.41	3.0	10	0.66
1/4″	18.0		08079-EI18NPT-TM3		8	7.9	63	14.11	3, 5	10	1.01
1/4″	18.0		08079-EI18NPT-TM5		8	7.9	63	14.11	3, 5	10	1.01
1/2″	14.0		12119-EI14NPT-TM		12	11.9	83	19.96	5.0	11	1.33
1″	11.5		16159-EI11.5NPT-TM		16	15.9	92	26.50	5.0	12	1.64
2 1/2″	8.0		16159-EI8NPT-TM		16	15.9	92	38.10	5.0	12	2.42

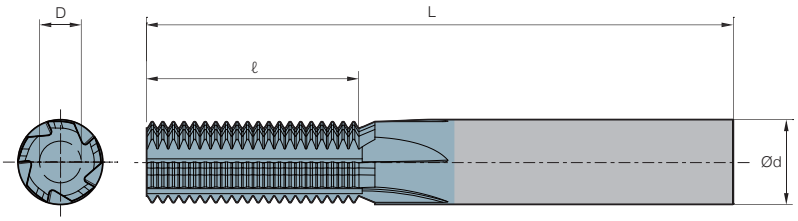
NPTF New

Straight flutes



External / Internal

Defined by: ANSI 1.20.3-1976
Tolerance class : Standard NPTF



Thread Standard	Pitch (tpi)	Designation External / Internal		PC9060M	Dimensions (mm) Ød	D	L	ℓ	No.of flute z	Tooth zt	*Bore dia. mm
1/16″	27.0	STMS	06059-EI27NPTF-TM		6	5.9	57	9.41	3	10	0.64
1/4″	18.0		08079-EI18NPTF-TM		8	7.9	63	14.11	3, 5	10	1.00
1/2″	14.0		12119-EI14NPTF-TM		12	11.9	83	19.96	5	11	1.35
1″	11.5		16159-EI11.5NPTF-TM		16	15.9	92	26.50	5	12	1.63
2 1/2″	8.0		16159-EI8NPTF-TM		16	15.9	92	38.10	5	12	2.38

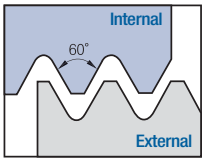
* Bore Diameter applies to smallest thread Dia

● : Stock item

ISO Metric

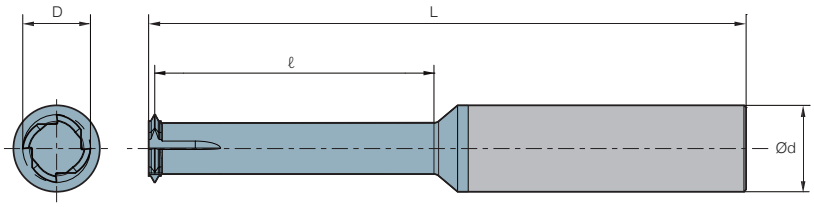
New

Deep threading / Long-type tool



Internal

Defined by: R262 (DIN 13)
Tolerance class : 6H



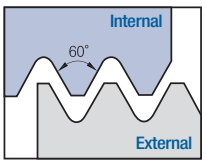
(ℓ' ≤ 3 × Thread Diameter)

Thread Standard	Pitch (tpi)	Designation Internal		PC9070M	Dimensions (mm) Ød	D	L	ℓ	No.of flute z	Tooth zt	*Bore dia. mm
M6x1	1.00	STMD1T	08041-I1.0ISOTM		8	4.1	63	19	3	1	5.0
M8x1.25	1.25		10058-I1.25ISOTM		10	5.8	73	26	3	1	6.8
M10x1.5	1.50		10077-I1.50ISOTM		10	7.7	73	32	3	1	8.5
M12x1.5	1.50		12094-I1.50ISOTM		12	9.4	83	38	4	1	10.5
M12x1.75	1.75		12087-I1.75ISOTM		12	8.7	83	38	4	1	10.2
M14x2	2.00		16102-I2.0ISOTM		16	10.2	92	44	4	1	12.0
M16x2	2.00		16122-I2.0ISOTM		16	12.2	100	50	4	1	14.0
M18x2.5	2.50		16129-I2.5ISOTM		16	12.9	108	57	5	1	15.5
M20x2.5	2.50		16148-I2.5ISOTM		16	14.8	114	63	5	1	17.5

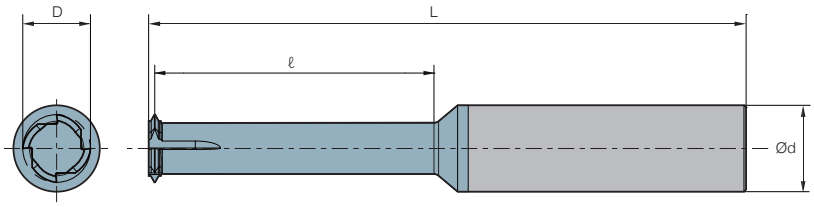
TP60

New

Deep threading / Long-type tool



Internal



Thread M Coarse	Thread M Fine	Min. Thread UN, UNF, UNEF	Pitch (mm)	Pitch (tpi)	Designation Internal		PC9070M	Dimensions (mm) Ød	D	L	ℓ	No.of flute z	Tooth zt
M5x0.8	M5x0.5, M5X0.75	No.10-56UNS, No.10-48UNS, No.10-40UNS, No.10-36UNS, No.10-32UNF	0.5 ~0.8	32 ~56	STMD1T	04390L160-ITA60TM		4	3.90	45	16	4	1
M6x1.0	M6x0.5, M6X0.75	No.12-56UNS, No.12-48UNS, 1/4 -40UNS, 1/4 -36UNS, 1/4 -32UNEF, 1/4 -28UNF, 1/4 -27UNS, 1/4 -24UNS	0.5 ~1.0	24 ~56		06485L200-ITB60TM		6	4.85	51	20	5	1
M8x1.25	M7x0.5, M7x0.75, M7.5x1.0	5/16 -48UNS, 5/16 -40UNS, 5/16 -36UNS, 5/16 -32UNEF, 5/16 -28UN, 5/16 -27UNS, 5/16 -24UNS, 5/16 -20UN	0.5 ~1.25	20 ~48		06590L250-ITF60TM		6	5.90	64	25	5	1
	M10.5x0.5, M11x0.75, M11x1.0	7/16 -32UN, 7/16 -28UNEF, 7/16 -27UNS, 7/16 -24UNS	0.5 ~1.0	24 ~56		10990L350-ITB60TM		10	9.90	73	35	6	1
M10x1.5	M10x1.0, M10X1.25	3/8 -24UNF, 3/8 -20UN, 7/16 -18UNS, 7/16 -16UN	1.0 ~1.50	16 ~24		08790L320-ITC60TM		8	7.90	63	32	6	1
M12x1.75	M12x1.0, M12X1.25, M12x1.5	1/2 -24UNS, 1/2 -20UNS, 1/2 -18UNS, 1/2 -16UNS, 1/2 -14UNS	1.0 ~1.75	14 ~24		10990L380-ITD60TM		10	9.90	73	38	6	1
-	M13.5x1.0, M14x1.25, M14x1.5	9/16 -24UNEF	1.0 ~1.75	14 ~24		12119L450-ITD60TM		12	11.90	83	45	6	1

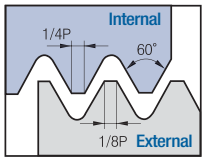
* Bore Diameter applies to smallest thread Dia

● : Stock item

Thread Mill

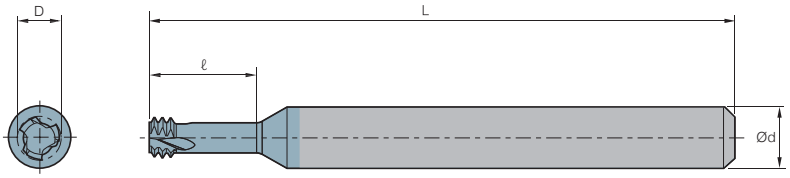
ISO Metric

Deep threading



Internal

Defined by: R262 (DIN 13)
Tolerance class : 6H



(ℓ ≤ 2 × Thread Diameter)

Thread		Pitch (mm)	Designation		PC9070M	Dimensions (mm)				No.of flute	Tooth	*Bore dia.
M Coarse	M Fine			Internal		Ød	D	L	ℓ	z	zt	mm
M1.6x0.35	-	0.35	STMD3T	03012L034-I0.35ISO		3	1.20	30	3.4	3	3	1.25
M2x0.4	-	0.40		06015L042-I0.40ISO		6	1.55	57	4.2	3	3	1.60
M2.2x0.45	-	0.45		06016L046-I0.45ISO		6	1.65	57	4.6	3	3	1.75
M2.5x0.45	-	0.45		06019L052-I0.45ISO		6	1.95	57	5.2	3	3	2.05
M3x0.5	M3.5-M16x0.5	0.50		06024L062-I0.50ISO		6	2.40	57	6.2	3	3	2.50
M3.5x0.6	-	0.60		06027L073-I0.60ISO		6	2.75	57	7.3	3	3	2.90
M4x0.7	-	0.70		06031L083-I0.70ISO		6	3.15	57	8.3	3	3	3.30
M5x0.8	-	0.80		06040L104-I0.80ISO		6	4.05	57	10.4	3	3	4.20
M6x1.0	M8-M40x1.0	1.00		06048L125-I1.00ISO		6	4.80	57	12.5	3	3	5.00
M8x1.25	-	1.25		08065L166-I1.25ISO		8	6.50	63	16.6	3	3	6.80
M10x1.5	M12-M48x1.50	1.50		10082L208-I1.50ISO		10	8.20	73	20.8	3	3	8.50
M12x1.75	-	1.75		10099L250-I1.75ISO		10	9.90	73	25.0	3	3	10.30
M16x2.0	-	2.00		12119L330-I2.00ISO		12	11.90	83	33.0	3	3	14.00
M20x2.5	-	2.50		16159L413-I2.50ISO		16	15.90	92	41.3	3	3	17.50

(ℓ ≤ 3 × Thread Diameter)

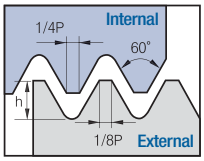
Thread		Pitch (mm)	Designation		PC9070M	Dimensions (mm)				No.of flute	Tooth	*Bore dia.
M Coarse	M Fine			Internal		Ød	D	L	ℓ	z	zt	mm
M1.6X0.35	-	0.35	STMD3T	03012L050-I0.35ISO		3	1.20	30	5.0	3	3	1.25
M2x0.4	-	0.40		03015L062-I0.40IS0		3	1.55	30	6.2	3	3	1.60
M2X0.4	-	0.40		06015L062-I0.40ISO		6	1.55	57	6.2	3	3	1.60
M2.5x0.45	-	0.45		03019L077-I0.45ISO		3	1.95	30	7.7	3	3	2.05
M2.5x0.45	-	0.45		06019L077-I0.45ISO		6	1.95	57	7.7	3	3	2.05
M3X0.5	M3.5-M16x0.5	0.50		03024L092-I0.50ISO		3	2.40	30	9.2	3	3	2.50
M3x0.5	M3.5-M16x0.5	0.50		06024L092-I0.50ISO		6	2.40	57	9.2	3	3	2.50
M4x0.7	-	0.70		06031L123-I0.70ISO		6	3.15	57	12.3	3	3	3.30
M5x0.8	-	0.80		06040L154-I0.80ISO		6	4.05	57	15.4	3	3	4.20
M6x1.0	M8-M40x1.0	1.00		06048L185-I1.00ISO		6	4.80	57	18.5	3	3	5.00
M8x1.25	-	1.25		08065L246-I1.25ISO		8	6.50	63	24.6	3	3	6.80

* Bore Diameter applies to smallest thread Dia

● : Stock item

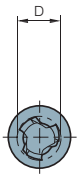
American UN (UNC,UNF)

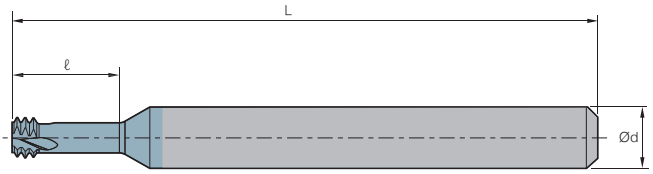
Deep threading



External / Internal

Defined by: ANSI B1.1.74
Tolerance class : 2B





(ℓ ≤ 2 × Thread Diameter)

Thread		Pitch	Designation		PC9070M	Dimensions (mm)				No.of flute	Tooth	*Bore dia.
UNC	UNF	(tpi)	External / Internal			Ød	D	L	ℓ	z	zt	mm
-	No.1-72	72	STMD3T	06014L039-I72UN		6	1.45	57	3.9	3	3	1.6
No.1-64	No.2-64	64		06014L042-I64UN		6	1.40	57	4.2	3	3	1.5
No.2-56	No.3-56	56		06016L050-I56UN		6	1.65	57	5.0	3	3	1.8
No.3-48	No.4-48	48		06019L060-I48UN		6	1.90	57	6.0	3	3	2.1
No.4,No.5-40	No.6-40	40		06021L060-I40UN		6	2.10	57	6.0	3	3	2.3
No.5-40	No.6-40	40		06024L072-I40UN		6	2.45	57	7.2	3	3	2.6
-	No.8-36	36		06033L087-I36UN		6	3.30	57	8.7	3	3	3.5
No.6,No.8-32	No.10-32	32		06025L074-I32UN		6	2.55	57	7.4	3	3	2.8
No.8-32	No.10-32	32		06032L100-I32UN		6	3.20	57	10.0	3	3	3.5
-	No.10-32	32		06038L103-I32UN		6	3.80	57	10.3	3	3	4.0
-	1/4˝x28	28		06052L132-I28UN		6	5.25	57	13.2	3	3	5.5
No.10-24	5/16˝x24	24		06035L102-I24UN		6	3.58	57	10.2	3	3	3.9
-	5/16˝x24	24		08066L165-I24UN		8	6.68	63	16.5	3	3	6.9
1/4˝x20	7/16˝x20	20		06048L134-I20UN		6	4.88	57	13.4	3	3	5.2
-	7/16˝x20	20		10095L230-I20UN		10	9.55	73	23.0	3	3	9.9
5/16˝x18	-	18		08061L169-I18UN		8	6.15	63	16.9	3	3	6.6
3/8˝x16	-	16		08067L191-I16UN		8	6.70	63	19.1	3	3	8.0
7/16˝x14	-	14		10090L233-I14UN		10	9.00	73	23.3	3	3	9.4

(ℓ ≤ 3 × Thread Diameter)

Thread		Pitch	Designation		PC9070M	Dimensions (mm)				No.of flute	Tooth	*Bore dia.
M Coarse	M Fine	(tpi)	External / Internal			Ød	D	L	ℓ	z	zt	mm
-	No.1-72	72	STMD3T	03014L057-I72UN		3	1.45	30	5.75	3	3	1.6
-	No.1-72	72		06014L057-I72UN		6	1.45	57	5.75	3	3	1.6
No.2-56	No.3-56	56		03016L070-I56UN		3	1.65	30	7.00	3	3	1.8
No.4, No.5-40	No.6-40	40		03021L090-I40UN		3	2.10	30	9.00	3	3	2.3
No.4, No.5-40	No.6-40	40		06021L090-I40UN		6	2.10	57	9.00	3	3	2.3
No.5-40	No.6-40	40		06024L100-I40UN		6	2.45	57	10.00	3	3	2.6
No.6, No.8-32	No.10-32	32		03025L110-I32UN		3	2.55	30	11.00	3	3	2.8
No.6, No.8-32	No.10-32	32		06025L110-I32UN		6	2.55	57	11.00	3	3	2.8
No.8-32	No.10-32	32		06032L130-I32UN		6	3.20	57	13.00	3	3	3.4
-	No.10-32	32		06038L150-I32UN		6	3.80	57	15.10	3	3	4.0
-	1/4˝x28	28		06052L196-I28UN		6	5.25	57	19.60	3	3	5.5
-	5/16˝x24	24		08066L245-I24UN		8	6.68	63	24.50	3	3	6.9
1/4˝x20	7/16˝x20	20		06048L198-I20UN		6	4.88	57	19.80	3	3	5.1
5/16˝x18	-	18		08061L239-I18UN		8	6.15	63	24.00	3	3	6.6

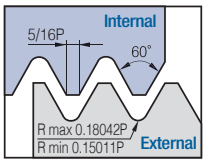
* Bore Diameter applies to smallest thread Dia

● : Stock item

Thread Mill

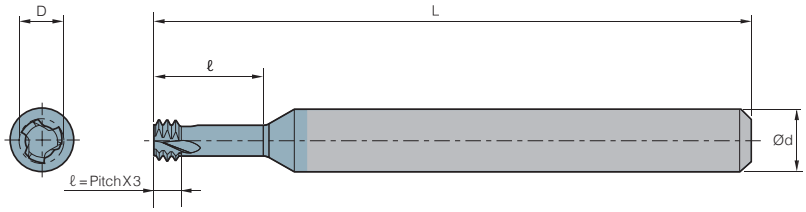
UNJ New

Deep threading



Internal

Defined by: MIL-S-8879C
Tolerance class : 3B

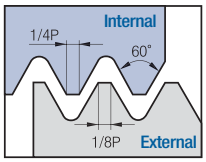


(ℓ ≤ 3 × Thread Diameter)

Thread		Pitch	Designation		PC9070M	Dimensions (mm)				No.of flute	Tooth	*Bore dia.
UNJC	UNJF	(tpi)		Internal		Ød	D	L	ℓ	z	zt	mm
0.138″(#6)	0.190″(#10)	32	STMD3T	06027L110-I32UNJTM		6	2.7	57	11.0	3	3	2.80
-	0.250″(1/4″)	28		06054L195-I28UNJTM		6	5.4	57	19.5	3	3	5.60
0.190″(#10)	-	24		06037L149-I24UNJTM		6	3.7	57	14.9	3	3	4.00
-	0.3125″(5/16″)	24		08067L241-I24UNJTM		8	6.7	63	24.1	3	3	7.00
0.250″(1/4″)	-	20		06050L195-I20UNJTM		6	5	57	19.5	3	3	5.30
-	0.4375″(7/16″)	20		10096L335-I20UNJTM		10	9.6	73	33.5	3	3	10.00
0.3125″(5/16″)	0.5625″(9/16″)	18		08064L241-I18UNJTM		8	6.4	63	24.1	3	3	6.75
0.375″(3/8″)	0.750″(3/4″)	16		08077L290-I16UNJTM		8	7.7	63	29.0	3	3	8.10
0.4375″(7/16″)	0.875″(7/8″)	14		10092L335-I14UNJTM		10	9.2	73	33.5	3	3	9.50
0.500″(1/2″)	-	13		10099L385-I13UNJTM		10	9.9	73	38.5	3	3	11.00

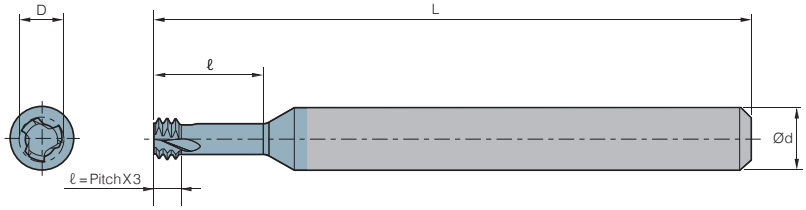
MJ New

Deep threading



Internal

Defined by: ISO 5855
Tolerance class : 4h/6h-4H/5H



(ℓ ≤ 3 × Thread Diameter)

Thread	Pitch	Designation		PC9070M	Dimensions (mm)				No.of flute	Tooth	*Bore dia.
Standard	(mm)		Internal		Ød	D	L	ℓ	z	zt	mm
MJ3x0.5	0.50	STMD3T	06024L092-I0.5MJTM		6	2.40	57	9.2	3	3	2.60
MJ3.5x0.6	0.60		06028L110-I0.6MJTM		6	2.85	57	11.0	3	3	3.00
MJ4x0.7	0.70		06031L123-I0.7MJTM		6	3.15	57	12.3	3	3	3.40
MJ5x0.8	0.80		06040L154-I0.8MJTM		6	4.05	57	15.4	3	3	4.30
MJ6x1.0	1.00		06048L185-I1.0MJTM		6	4.80	57	18.5	3	3	5.10
MJ8x1.25	1.25		08065L246-I1.25MJTM		8	6.50	63	24.6	3	3	6.90
MJ10x1.5	1.50		10082L308-I1.50MJTM		10	8.20	73	30.8	3	3	8.70
MJ12x1.75	1.75		10099L370-I1.75MJTM		10	9.90	73	37.0	3	3	10.40
MJ14x2	2.00		12119L425-I2.0MJTM		12	11.90	83	42.5	3	3	12.25

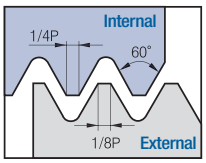
* Bore Diameter applies to smallest thread Dia

● : Stock item

ISO Metric

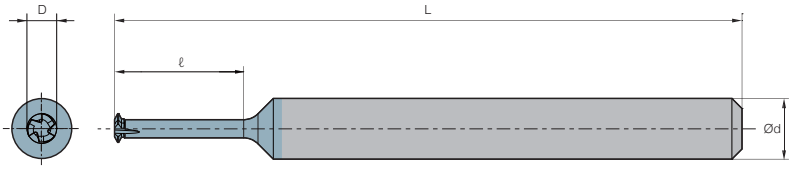
New

Deep threading for dental



Internal

Defined by: R262 (DIN 13)
Tolerance class : 6H



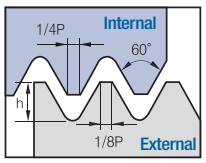
(ℓ ≤ 3 × Thread Diameter)

Thread		Pitch	Designation		PC9070M	Dimensions (mm)				No.of flute	Tooth	*Bore dia.
M Coarse	M Fine	(mm)		Internal		Ød	D	L	ℓ	z	zt	mm
M1.0x0.25	M1.4x0.25	0.25	STMD1T	03007L031-I0.25ISO-TM		3	0.70	31	3.1	3	1	0.75
M1.2x0.25	M1.4x0.25	0.25		03009L038-I0.25ISO-TM		3	0.90	31	3.8	3	1	0.95
M1.4x0.3	-	0.30		03011L044-I0.30ISO-TM		3	1.05	31	4.4	3	1	1.15
M1.6x0.35	-	0.35		03012L050-I0.35ISO-TM		3	1.20	31	5.0	3	1	1.30
M1.8x0.35	M2.0x0.35	0.35		03014L056-I0.35ISO-TM		3	1.40	31	5.6	3	1	1.50
M2.0x0.4	-	0.40		03015L062-I0.40ISO-TM		3	1.50	31	6.2	3	1	1.65
M2.5x0.45	-	0.45		03019L077-I0.45ISO-TM		3	1.95	31	7.7	3	1	2.10

American UNF

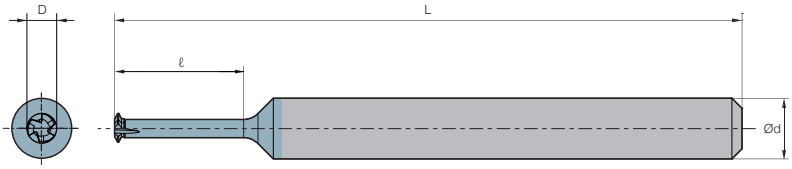
New

Deep threading for dental



Internal

Defined by: ANSI B1.1.74
Tolerance class : 2B



(ℓ ≤ 3 × Thread Diameter)

Thread	Pitch	Designation		PC9070M	Dimensions (mm)				No.of flute	Tooth	*Bore dia.
UNF	(tpi)		Internal		Ød	D	L	ℓ	z	zt	mm
0-80	80	STMD1T	03011L046-I80UN-TM		3	1.15	31	4.6	3	1	1.3
1-72	72		03014L065-I72UN-TM		3	1.45	31	6.5	3	1	1.6

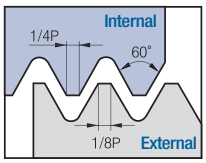
* Bore Diameter applies to smallest thread Dia

● : Stock item

Thread Mill

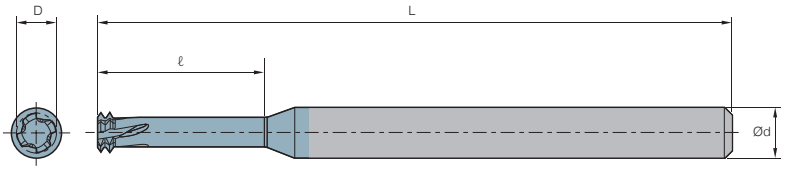
ISO Metric

Deep threading for hard materials



Internal

Defined by: R262 (DIN 13)
Tolerance class : 6H

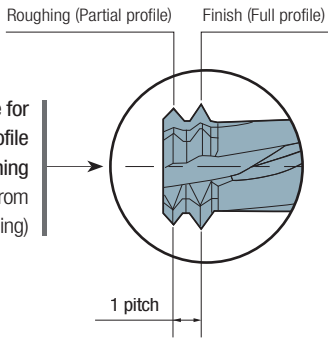


(ℓ ≤ 2 × Thread Diameter)

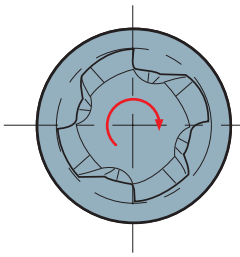
Thread		Pitch	Designation		PC9070M	Dimensions (mm)				No.of flute	Tooth	*Bore dia.
M Coarse	M Fine	(mm)		Internal		Ød	D	L	ℓ	z	zt	mm
M2x0.4	-	0.40	STMD2L	06015L042-I0.4ISO-TM		6	1.55	76	4.60	4	2	1.60
M2.2x0.45	-	0.45		06016L046-I0.45ISO-TM		6	1.65	76	5.05	4	2	1.80
M2.5x0.45	-	0.45		06019L052-I0.45ISO-TM		6	1.95	76	5.65	4	2	2.05
M3x0.5	M3.5-M16x0.5	0.50		06024L062-I0.5ISO-TM		6	2.40	76	6.75	4	2	2.55
M3.5x0.6	-	0.60		06027L073-I0.6ISO-TM		6	2.75	76	7.90	4	2	2.95
M4x0.7	-	0.70		06031L083-I0.7ISO-TM		6	3.15	76	9.05	4	2	3.35
M5x0.8	-	0.80		06040L104-I0.8ISO-TM		6	4.05	76	11.20	4	2	4.30
M6x1.0	M8-M40x1.0	1.00		06048L125-I1.0ISO-TM		6	4.80	76	13.50	5	2	5.10
M8x1.25	-	1.25		08065L166-I1.25ISO-TM		8	6.50	80	17.85	5	2	6.80
M10x1.5	M12-M48x1.50	1.50		08079L208-I1.50ISO-TM		8	7.90	80	22.30	6	2	8.60
M12x1.75	-	1.75		10099L250-I1.75ISO-TM		10	9.90	101	26.75	6	2	10.40

(ℓ ≤ 3 × Thread Diameter)

Thread		Pitch	Designation		PC9070M	Dimensions (mm)				No.of flute	Tooth	*Bore dia.
M Coarse	M Fine	(mm)		Internal		Ød	D	L	ℓ	z	zt	mm
M2x0.4	-	0.40	STMD2L	06015L062-I0.4ISO-TM		6	1.55	76	6.60	4	2	1.60
M2.5x0.45	-	0.45		06019L077-I0.45ISO-TM		6	1.95	76	8.15	4	2	2.05
M3x0.5	M3.5-M16x0.5	0.50		06024L092-I0.5ISO-TM		6	2.40	76	9.75	4	2	2.55
M4x0.7	-	0.70		06031L123-I0.7ISO-TM		6	3.15	76	13.05	4	2	3.35
M5x0.8	-	0.80		06040L154-I0.8ISO-TM		6	4.05	76	16.20	4	2	4.30
M6x1.0	M8-M40x1.0	1.00		06048L185-I1.0ISO-TM		6	4.80	76	19.50	5	2	5.10
M8x1.25	-	1.25		08065L246-I1.25ISO-TM		8	6.50	80	25.85	5	2	6.80



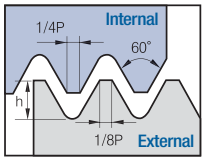
Two cutting teeth: Partial profile for leading tooth followed by full profile for finishing
The work direction should be from the top to the bottom (Climb Milling)



Deep threading for hard materials tools are left handed.
For CNC use M04 code.

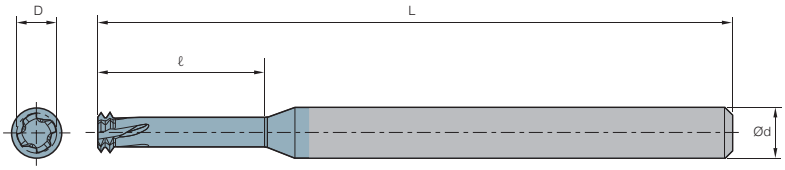
American UN (UNC,UNF)

Deep threading for hard materials



Internal

Defined by: ANSI B1.1.74
Tolerance class : 2B



(ℓ ≤ 2 × Thread Diameter)

Thread		Pitch	Designation		PC9070M	Dimensions (mm)				No.of flute	Tooth	*Bore dia.
UNC	UNF	(tpi)		Internal		Ød	D	L	ℓ	z	zt	mm
No.2-56	No.3-56	56	STMD2L	06016L050-I56UN-TM		6	1.65	76	5.45	4	2	1.80
No.3-48	No.4-48	48		06019L060-I48UN-TM		6	1.90	76	6.53	4	2	2.10
No.4-40, No.5-40	No.6-40	40		06021L060-I40UN-TM		6	2.10	76	6.64	4	2	2.35
No.5-40	No.6-40	40		06024L072-I40UN-TM		6	2.45	76	7.84	4	2	2.65
-	No.8-36	36		06033L087-I36UN-TM		6	3.30	76	9.41	4	2	3.55
No.6-32, No.8-32	No.10-32	32		06025L074-I32UN-TM		6	2.55	76	8.20	4	2	2.85
No.8-32	No.10-32	32		06032L100-I32UN-TM		6	3.20	76	10.79	4	2	3.50
-	No.10-32	32		06037L100-I32UN-TM		6	3.70	76	10.80	4	2	4.17
-	1/4˝x28	28		06052L132-I28UN-TM		6	5.25	76	14.11	5	2	5.55
No.10-24	5/16˝x24	24		06035L102-I24UN-TM		6	3.58	76	11.26	4	2	3.90
-	5/16˝x24	24		08066L165-I24UN-TM		8	6.68	80	17.56	5	2	7.00
1/4˝-20	7/16˝x20	20		06048L134-I20UN-TM		6	4.88	76	14.67	5	2	5.20
-	7/16˝x20	20		10095L230-I20UN-TM		10	9.55	101	24.27	6	2	9.90
5/16˝x18	-	18		08061L160-I18UN-TM		8	6.15	80	18.17	4	2	6.50
3/8˝x16	-	16		08076L197-I16UN-TM		8	7.65	80	21.29	5	2	8.00
7/16˝x14	-	14		10090L233-I14UN-TM		10	9.00	101	25.11	6	2	9.50
1/2˝x13	-	13		10099L256-I13UN-TM		10	9.90	101	27.55	6	2	10.90

(ℓ ≤ 3 × Thread Diameter)

Thread		Pitch	Designation		PC9070M	Dimensions (mm)				No.of flute	Tooth	*Bore dia.
UNC	UNF	(tpi)		Internal		Ød	D	L	ℓ	z	zt	mm
No.4-40, No.5-40	No.6-40	40	STMD2L	06021L090-I40UN-TM		6	2.10	76	9.64	4	2	2.35
No.5-40	No.6-40	40		06024L100-I40UN-TM		6	2.45	76	10.64	4	2	2.65
No.6-32, No.8-32	No.10-32	32		06025L110-I32UN-TM		6	2.55	76	11.79	4	2	2.85
No.8-32	No.10-32	32		06032L130-I32UN-TM		6	3.20	76	13.79	4	2	3.50
-	1/4˝x28	28		06052L196-I28UN-TM		6	5.25	76	20.51	5	2	5.55
-	5/16˝x24	24		08066L245-I24UN-TM		8	6.68	80	25.56	5	2	7.00
1/4˝x20	7/16˝x20	20		06048L198-I20UN-TM		6	4.88	76	21.07	5	2	5.20
5/16˝x18	-	18		08061L240-I18UN-TM		8	6.15	80	26.17	4	2	6.50
7/16˝x14	-	14		10090L335-I14UN-TM		10	9.00	101	35.31	6	2	9.50

* Bore Diameter applies to smallest thread Dia

● : Stock item

High performance carbide tap and HSS tap

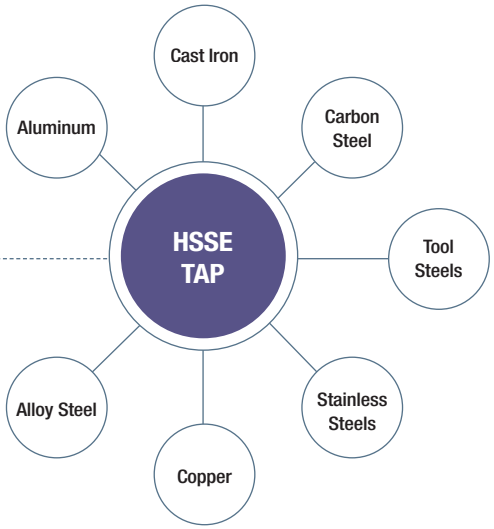
TAP

- Suitable for Alloy Steels, Carbon steels, Brass, Aluminum alloy steels
- Extend customer choice with variety of size and type

Features

- Improvement of wear resistance and chipping resistance by applied to high toughness material
- High processability and Minimized chip deposition by applied to TiN,TiCN coating
- Response to a wide range of processing conditions by adopting the stepwise accuracy method of WH or GH

Applications



Code system

V	R	0	M	06	100	V	-	S

Raw material
V : HSSE

Appearance
S (JIS) : Straight
G (DIN) : Straight
P (JIS) : Spiral
Q (DIN) : Spiral
N (JIS) : Point
D (DIN) : Point
R (JIS) : Roll
F (JIS) : Spiral Roll
M (DIN) : Roll

Surface treatment
O : NON
T : TiN
C : TiCN
H : HOMO

Thread
M : Meter Thread
PT : Pipe Tapered
NPT : National Pipe Tapered
PS : Pipe Straight
PF : Pipe Fastening

Size
M3 ~ M24

Pitch
0.5 ~ 3.0

Chamfer length
1.5
2.0
2.5
4.0
5.0

Oil Groove
S : 1 Groove
M : 4 Groove

HSS TAP

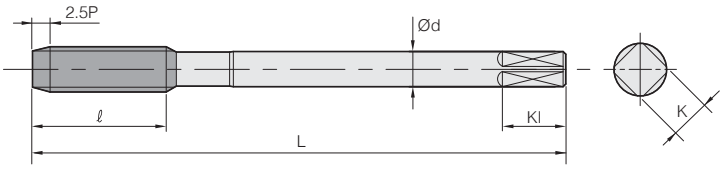
EDP. NO	Appearance	Type		Surface treatment		Size range	Page
				Coating	Uncoated		
VPOM		JIS	Spiral Tap	-	○	M3~M24	346
VPTM			Spiral Tap	TiN	-	M3~M24	347
VPCM			Spiral Tap	TiCN	-	M3~M24	348
VPHM			Spiral Tap	HOMO	-	M3~M24	349
VNOM			Spira Point Tap	-	○	M3~M24	350
VNTM			Spira Point Tap	TiN	-	M3~M24	351
VNCM			Spira Point Tap	TiCN	-	M3~M24	352
VNHM			Spira Point Tap	HOMO	-	M3~M24	353
VSOM			Straight Flute Tap	-	○	M3~M24	354
VSTM			Straight Flute Tap	TiN	-	M3~M24	355
VSCM			Straight Flute Tap	TiCN	-	M3~M24	356
VSHM			Straight Flute Tap	HOMO	-	M3~M24	357
VROM			Roll Tap	-	○	M3~M12	358
VRTM			Roll Tap	TiN	-	M3~M12	359
VRCM			Roll Tap	TiCN	-	M3~M12	360
VFOM			Spiral Roll Tap	-	○	M3~M6	361
VFTM			Spiral Roll Tap	TiN	-	M3~M6	362
VFCM			Spiral Roll Tap	TiCN	-	M3~M6	363
VQOM		DIN	Spiral Flute Tap	-	○	M3~M24	364
VQTM			Spiral Flute Tap	TiN	-	M3~M24	365
VQCM			Spiral Flute Tap	TiCN	-	M3~M24	366
VQHM			Spiral Flute Tap	HOMO	-	M3~M24	367
VDOM			Spiral Point Tap	-	○	M3~M24	368
VDTM			Spiral Point Tap	TiN	-	M3~M24	369
VDCM			Spiral Point Tap	TiCN	-	M3~M24	370
VDHM			Spiral Point Tap	HOMO	-	M3~M24	371
VGOM			Straight Flute Tap	-	○	M3~M24	372
VGTM			Straight Flute Tap	TiN	-	M3~M24	373
VGCM			Straight Flute Tap	TiCN	-	M3~M24	374
VGHM			Straight Flute Tap	HOMO	-	M3~M24	375
VMOM			Roll Tap	-	○	M3~M12	376
VMTM			Roll Tap	TiN	-	M3~M12	377
VMCM			Roll Tap	TiCN	-	M3~M12	378

Thread **TAP**

VPOM

JIS spiral flute taps

HSSE | 35° HELIX | Un-coated



Designation 2.5P	Thread size	Limits	L	ℓ	d	K	KI	Z
VPOM0305025	M3 × 0.5	WH2	46	11	4	3.2	6	3
VPOM0407025	M4 × 0.7	WH2	52	13	5	4	7	3
VPOM04507525	M4.5 × 0.75	WH2	55	13	5	4	7	3
VPOM0508025	M5 × 0.8	WH2	60	16	5.5	4.5	7	3
VPOM0610025	M6 × 1.0	WH2	62	19	6	4.5	7	3
VPOM0812525	M8 × 1.25	WH2	70	22	6.2	5	8	3
VPOM1012525	M10 × 1.25	WH2	75	24	7	5.5	8	3
VPOM1015025	M10 × 1.5	WH2	75	24	7	5.5	8	3
VPOM1210025	M12 × 1.0	WH2	82	29	8.5	6.5	9	3
VPOM1212525	M12 × 1.25	WH2	82	29	8.5	6.5	9	3
VPOM1215025	M12 × 1.5	WH2	82	29	8.5	6.5	9	3
VPOM1217525	M12 × 1.75	WH2	82	29	8.5	6.5	9	3
VPOM1415025	M14 × 1.5	WH2	88	30	10.5	8	11	3
VPOM1420025	M14 × 2.0	WH2	88	30	10.5	8	11	3
VPOM1615025	M16 × 1.5	WH2	95	32	12.5	10	13	3
VPOM1620025	M16 × 2.0	WH2	95	32	12.5	10	13	3
VPOM1815025	M18 × 1.5	WH2	100	37	14	11	14	4
VPOM1825025	M18 × 2.5	WH3	100	37	14	11	14	4
VPOM2015025	M20 × 1.5	WH3	105	37	15	12	15	4
VPOM2025025	M20 × 2.5	WH3	105	37	15	12	15	4
VPOM2215025	M22 × 1.5	WH3	115	38	17	13	16	4
VPOM2225025	M22 × 2.5	WH3	115	38	17	13	16	4
VPOM2415025	M24 × 1.5	WH3	120	45	19	15	18	4
VPOM2420025	M24 × 2.0	WH3	120	45	19	15	18	4
VPOM2430025	M24 × 3.0	WH4	120	45	19	15	18	4

• Applicable Workpiece

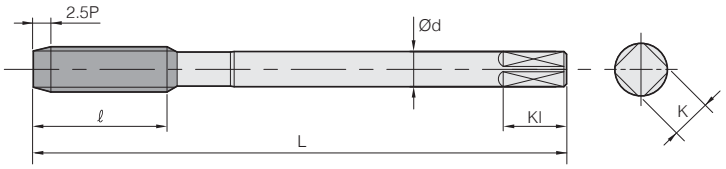
Low carbon steels	Medium carbon steels	High carbon steels	Alloy steel	Hardened steels			Stainless steels	Tool steels	Cast steels	Cast iron	High strength steels	Copper	Brass	Casting brass	Bronze	Aluminum rolled material	Aluminum alloy castings	Magnesium alloy castings	Zinc alloy castings	Titanium alloys	Nickel alloy	Thermoset-ting plastic	Thermo-plastic
C ~0.25%	C0.25% ~0.45%	C 0.45%~	SCM	25~45 HrC	45~55 HrC	50~60 HrC	SUS	SKD	SC	FC	FCD	Cu	Bs	BsC	PB	AL	AC, ADC	MC	ZDC				
	◎		◎								○	○	○	○	○	○	○	○	○				○

◎: Excellent ○: Good

VPTM

JIS spiral flute taps

HSSE | 35° HELIX | TiN



Designation 2.5P	Thread size	Limits	L	ℓ	d	K	Kl	Z
VPTM0305025	M3 × 0.5	WH2	46	11	4	3.2	6	3
VPTM0407025	M4 × 0.7	WH2	52	13	5	4	7	3
VPTM04507525	M4.5 × 0.75	WH2	55	13	5	4	7	3
VPTM0508025	M5 × 0.8	WH2	60	16	5.5	4.5	7	3
VPTM0610025	M6 × 1.0	WH2	62	19	6	4.5	7	3
VPTM0812525	M8 × 1.25	WH2	70	22	6.2	5	8	3
VPTM1012525	M10 × 1.25	WH2	75	24	7	5.5	8	3
VPTM1015025	M10 × 1.5	WH2	75	24	7	5.5	8	3
VPTM1210025	M12 × 1.0	WH2	82	29	8.5	6.5	9	3
VPTM1212525	M12 × 1.25	WH2	82	29	8.5	6.5	9	3
VPTM1215025	M12 × 1.5	WH2	82	29	8.5	6.5	9	3
VPTM1217525	M12 × 1.75	WH2	82	29	8.5	6.5	9	3
VPTM1415025	M14 × 1.5	WH2	88	30	10.5	8	11	3
VPTM1420025	M14 × 2.0	WH2	88	30	10.5	8	11	3
VPTM1615025	M16 × 1.5	WH2	95	32	12.5	10	13	3
VPTM1620025	M16 × 2.0	WH2	95	32	12.5	10	13	3
VPTM1815025	M18 × 1.5	WH2	100	37	14	11	14	4
VPTM1825025	M18 × 2.5	WH3	100	37	14	11	14	4
VPTM2015025	M20 × 1.5	WH3	105	37	15	12	15	4
VPTM2025025	M20 × 2.5	WH3	105	37	15	12	15	4
VPTM2215025	M22 × 1.5	WH3	115	38	17	13	16	4
VPTM2225025	M22 × 2.5	WH3	115	38	17	13	16	4
VPTM2415025	M24 × 1.5	WH3	120	45	19	15	18	4
VPTM2420025	M24 × 2.0	WH3	120	45	19	15	18	4
VPTM2430025	M24 × 3.0	WH4	120	45	19	15	18	4

• Applicable Workpiece

Low carbon steels	Medium carbon steels	High carbon steels	Alloy steel	Hardened steels			Stainless steels	Tool steels	Cast steels	Cast iron	High strength steels	Copper	Brass	Casting brass	Bronze	Aluminum rolled material	Aluminum alloy castings	Magnesium alloy castings	Zinc alloy castings	Titanium alloys	Nickel alloy	Thermosetting plastic	Thermoplastic
C ~0.25%	C0.25% ~0.45%	C 0.45%~	SCM	25~45 HrC	45~55 HrC	50~60 HrC	SUS	SKD	SC	FC	FCD	Cu	Bs	BsC	PB	AL	AC, ADC	MC	ZDC				
	◎		◎								○	○	○	○	○	○	○	○	○				○

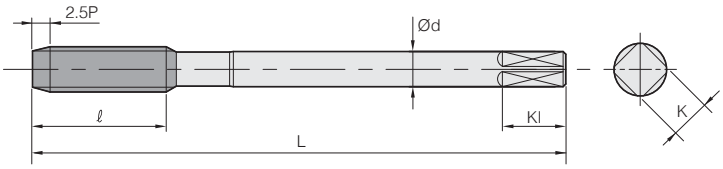
◎: Excellent ○: Good

Thread **TAP**

VPCM

JIS spiral flute taps

HSSE | 35° HELIX | TiCN



Designation 2.5P	Thread size	Limits	L	ℓ	d	K	KI	Z
VPCM0305025	M3 × 0.5	WH2	46	11	4	3.2	6	3
VPCM0407025	M4 × 0.7	WH2	52	13	5	4	7	3
VPCM04507525	M4.5 × 0.75	WH2	55	13	5	4	7	3
VPCM0508025	M5 × 0.8	WH2	60	16	5.5	4.5	7	3
VPCM0610025	M6 × 1.0	WH2	62	19	6	4.5	7	3
VPCM0812525	M8 × 1.25	WH2	70	22	6.2	5	8	3
VPCM1012525	M10 × 1.25	WH2	75	24	7	5.5	8	3
VPCM1015025	M10 × 1.5	WH2	75	24	7	5.5	8	3
VPCM1210025	M12 × 1.0	WH2	82	29	8.5	6.5	9	3
VPCM1212525	M12 × 1.25	WH2	82	29	8.5	6.5	9	3
VPCM1215025	M12 × 1.5	WH2	82	29	8.5	6.5	9	3
VPCM1217525	M12 × 1.75	WH2	82	29	8.5	6.5	9	3
VPCM1415025	M14 × 1.5	WH2	88	30	10.5	8	11	3
VPCM1420025	M14 × 2.0	WH2	88	30	10.5	8	11	3
VPCM1615025	M16 × 1.5	WH2	95	32	12.5	10	13	3
VPCM1620025	M16 × 2.0	WH2	95	32	12.5	10	13	3
VPCM1815025	M18 × 1.5	WH2	100	37	14	11	14	4
VPCM1825025	M18 × 2.5	WH3	100	37	14	11	14	4
VPCM2015025	M20 × 1.5	WH3	105	37	15	12	15	4
VPCM2025025	M20 × 2.5	WH3	105	37	15	12	15	4
VPCM2215025	M22 × 1.5	WH3	115	38	17	13	16	4
VPCM2225025	M22 × 2.5	WH3	115	38	17	13	16	4
VPCM2415025	M24 × 1.5	WH3	120	45	19	15	18	4
VPCM2420025	M24 × 2.0	WH3	120	45	19	15	18	4
VPCM2430025	M24 × 3.0	WH4	120	45	19	15	18	4

• Applicable Workpiece

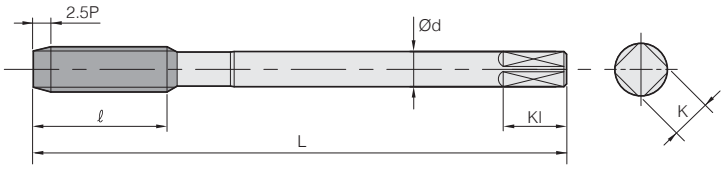
Low carbon steels	Medium carbon steels	High carbon steels	Alloy steel	Hardened steels			Stainless steels	Tool steels	Cast steels	Cast iron	High strength steels	Copper	Brass	Casting brass	Bronze	Aluminum rolled material	Aluminum alloy castings	Magnesium alloy castings	Zinc alloy castings	Titanium alloys	Nickel alloy	Thermoset-ting plastic	Thermo-plastic
C ~0.25%	C0.25% ~0.45%	C 0.45%~	SCM	25~45 HrC	45~55 HrC	50~60 HrC	SUS	SKD	SC	FC	FCD	Cu	Bs	BsC	PB	AL	AC, ADC	MC	ZDC				
	◎		◎								○	○	○	○	○	○	○	○	○				○

◎: Excellent ○: Good

VPHM

JIS spiral flute taps

HSSE | 35° HELIX | HOMO



Designation 2.5P	Thread size	Limits	L	ℓ	d	K	Kl	Z
VPHM0305025	M3 × 0.5	WH2	46	11	4	3.2	6	3
VPHM0407025	M4 × 0.7	WH2	52	13	5	4	7	3
VPHM04507525	M4.5 × 0.75	WH2	55	13	5	4	7	3
VPHM0508025	M5 × 0.8	WH2	60	16	5.5	4.5	7	3
VPHM0610025	M6 × 1.0	WH2	62	19	6	4.5	7	3
VPHM0812525	M8 × 1.25	WH2	70	22	6.2	5	8	3
VPHM1012525	M10 × 1.25	WH2	75	24	7	5.5	8	3
VPHM1015025	M10 × 1.5	WH2	75	24	7	5.5	8	3
VPHM1210025	M12 × 1.0	WH2	82	29	8.5	6.5	9	3
VPHM1212525	M12 × 1.25	WH2	82	29	8.5	6.5	9	3
VPHM1215025	M12 × 1.5	WH2	82	29	8.5	6.5	9	3
VPHM1217525	M12 × 1.75	WH2	82	29	8.5	6.5	9	3
VPHM1415025	M14 × 1.5	WH2	88	30	10.5	8	11	3
VPHM1420025	M14 × 2.0	WH2	88	30	10.5	8	11	3
VPHM1615025	M16 × 1.5	WH2	95	32	12.5	10	13	3
VPHM1620025	M16 × 2.0	WH2	95	32	12.5	10	13	3
VPHM1815025	M18 × 1.5	WH2	100	37	14	11	14	4
VPHM1825025	M18 × 2.5	WH3	100	37	14	11	14	4
VPHM2015025	M20 × 1.5	WH3	105	37	15	12	15	4
VPHM2025025	M20 × 2.5	WH3	105	37	15	12	15	4
VPHM2215025	M22 × 1.5	WH3	115	38	17	13	16	4
VPHM2225025	M22 × 2.5	WH3	115	38	17	13	16	4
VPHM2415025	M24 × 1.5	WH3	120	45	19	15	18	4
VPHM2420025	M24 × 2.0	WH3	120	45	19	15	18	4
VPHM2430025	M24 × 3.0	WH4	120	45	19	15	18	4

• Applicable Workpiece

Low carbon steels	Medium carbon steels	High carbon steels	Alloy steel	Hardened steels			Stainless steels	Tool steels	Cast steels	Cast iron	High strength steels	Copper	Brass	Casting brass	Bronze	Aluminum rolled material	Aluminum alloy castings	Magnesium alloy castings	Zinc alloy castings	Titanium alloys	Nickel alloy	Thermosetting plastic	Thermoplastic
C ~0.25%	C0.25% ~0.45%	C 0.45%~	SCM	25~45 HrC	45~55 HrC	50~60 HrC	SUS	SKD	SC	FC	FCD	Cu	Bs	BsC	PB	AL	AC, ADC	MC	ZDC				
	◎		◎								○	○	○	○	○	○	○	○	○				○

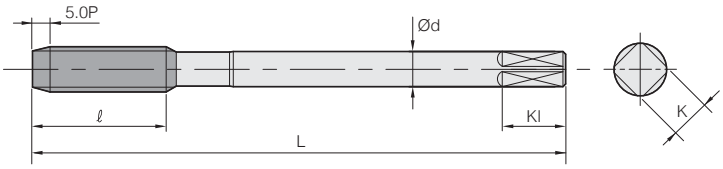
◎: Excellent ○: Good

Thread **TAP**

VNOM

JIS spiral point taps

HSSE | Un-coated



Designation 5P	Thread size	Limits	L	ℓ	d	K	KI	Z
VNOM0305050	M3 × 0.5	WH2	46	11	4	3.2	6	3
VNOM0407050	M4 × 0.7	WH2	52	13	5	4	7	3
VNOM0508050	M5 × 0.8	WH2	60	16	5.5	4.5	7	3
VNOM0610050	M6 × 1.0	WH2	62	19	6	4.5	7	3
VNOM0812550	M8 × 1.25	WH3	70	22	6.2	5	8	3
VNOM1012550	M10 × 1.25	WH3	75	24	7	5.5	8	3
VNOM1015050	M10 × 1.5	WH3	75	24	7	5.5	8	3
VNOM1210050	M12 × 1.0	WH3	82	29	8.5	6.5	9	3
VNOM1212550	M12 × 1.25	WH3	82	29	8.5	6.5	9	3
VNOM1215050	M12 × 1.5	WH3	82	29	8.5	6.5	9	3
VNOM1217550	M12 × 1.75	WH4	82	29	8.5	6.5	9	3
VNOM1415050	M14 × 1.5	WH3	88	30	10.5	8	11	3
VNOM1420050	M14 × 2.0	WH4	88	30	10.5	8	11	3
VNOM1615050	M16 × 1.5	WH3	95	32	12.5	10	13	3
VNOM1620050	M16 × 2.0	WH4	95	32	12.5	10	13	3
VNOM1815050	M18 × 1.5	WH4	100	37	14	11	14	3
VNOM1825050	M18 × 2.5	WH4	100	37	14	11	14	3
VNOM2015050	M20 × 1.5	WH4	105	37	15	12	15	3
VNOM2025050	M20 × 2.5	WH4	105	37	15	12	15	3
VNOM2215050	M22 × 1.5	WH4	115	38	17	13	16	3
VNOM2225050	M22 × 2.5	WH4	115	38	17	13	16	3
VNOM2415050	M24 × 1.5	WH4	120	45	19	15	18	3
VNOM2420050	M24 × 2.0	WH4	120	45	19	15	18	3
VNOM2430050	M24 × 3.0	WH4	120	45	19	15	18	3

• Applicable Workpiece

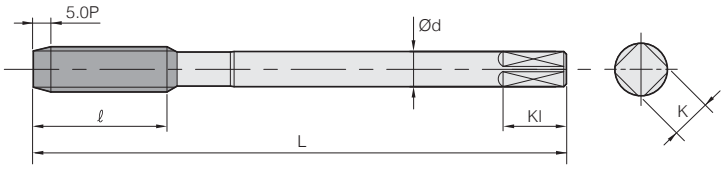
Low carbon steels	Medium carbon steels	High carbon steels	Alloy steel	Hardened steels			Stainless steels	Tool steels	Cast steels	Cast iron	High strength steels	Copper	Brass	Casting brass	Bronze	Aluminum rolled material	Aluminum alloy castings	Magnesium alloy castings	Zinc alloy castings	Titanium alloys	Nickel alloy	Thermoset-ting plastic	Thermo-plastic
C ~0.25%	C0.25% ~0.45%	C 0.45%~	SCM	25~45 HrC	45~55 HrC	50~60 HrC	SUS	SKD	SC	FC	FCD	Cu	Bs	BsC	PB	AL	AC, ADC	MC	ZDC				
	○	○	◎							○	○	○	○	○	○	◎	○	○	○				○

◎: Excellent ○: Good

VNTM

JIS flute point taps

HSSE TiN



Designation 5P	Thread size	Limits	L	ℓ	d	K	Kl	Z
VNTM0305050	M3 × 0.5	WH2	46	11	4	3.2	6	3
VNTM0407050	M4 × 0.7	WH2	52	13	5	4	7	3
VNTM0508050	M5 × 0.8	WH2	60	16	5.5	4.5	7	3
VNTM0610050	M6 × 1.0	WH2	62	19	6	4.5	7	3
VNTM0812550	M8 × 1.25	WH3	70	22	6.2	5	8	3
VNTM1012550	M10 × 1.25	WH3	75	24	7	5.5	8	3
VNTM1015050	M10 × 1.5	WH3	75	24	7	5.5	8	3
VNTM1210050	M12 × 1.0	WH3	82	29	8.5	6.5	9	3
VNTM1212550	M12 × 1.25	WH3	82	29	8.5	6.5	9	3
VNTM1215050	M12 × 1.5	WH3	82	29	8.5	6.5	9	3
VNTM1217550	M12 × 1.75	WH4	82	29	8.5	6.5	9	3
VNTM1415050	M14 × 1.5	WH3	88	30	10.5	8	11	3
VNTM1420050	M14 × 2.0	WH4	88	30	10.5	8	11	3
VNTM1615050	M16 × 1.5	WH3	95	32	12.5	10	13	3
VNTM1620050	M16 × 2.0	WH4	95	32	12.5	10	13	3
VNTM1815050	M18 × 1.5	WH4	100	37	14	11	14	3
VNTM1825050	M18 × 2.5	WH4	100	37	14	11	14	3
VNTM2015050	M20 × 1.5	WH4	105	37	15	12	15	3
VNTM2025050	M20 × 2.5	WH4	105	37	15	12	15	3
VNTM2215050	M22 × 1.5	WH4	115	38	17	13	16	3
VNTM2225050	M22 × 2.5	WH4	115	38	17	13	16	3
VNTM2415050	M24 × 1.5	WH4	120	45	19	15	18	3
VNTM2420050	M24 × 2.0	WH4	120	45	19	15	18	3
VNTM2430050	M24 × 3.0	WH4	120	45	19	15	18	3

• Applicable Workpiece

Low carbon steels	Medium carbon steels	High carbon steels	Alloy steel	Hardened steels			Stainless steels	Tool steels	Cast steels	Cast iron	High strength steels	Copper	Brass	Casting brass	Bronze	Aluminum rolled material	Aluminum alloy castings	Magnesium alloy castings	Zinc alloy castings	Titanium alloys	Nickel alloy	Thermosetting plastic	Thermoplastic
C ~0.25%	C0.25% ~0.45%	C 0.45%~	SCM	25~45 HrC	45~55 HrC	50~60 HrC	SUS	SKD	SC	FC	FCD	Cu	Bs	BsC	PB	AL	AC, ADC	MC	ZDC				
○	○	○	○				◎	○	○	○	○	○	○	○	○	○	○	○	○	○	○		○

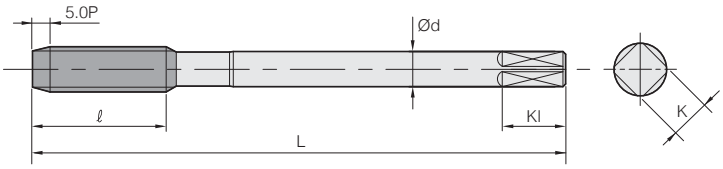
◎: Excellent ○: Good

Thread **TAP**

VNCM

JIS flute point taps

HSSE TiCN



Designation 5P	Thread size	Limits	L	ℓ	d	K	KI	Z
VNCM0305050	M3 × 0.5	WH2	46	11	4	3.2	6	3
VNCM0407050	M4 × 0.7	WH2	52	13	5	4	7	3
VNCM0508050	M5 × 0.8	WH2	60	16	5.5	4.5	7	3
VNCM0610050	M6 × 1.0	WH2	62	19	6	4.5	7	3
VNCM0812550	M8 × 1.25	WH3	70	22	6.2	5	8	3
VNCM1012550	M10 × 1.25	WH3	75	24	7	5.5	8	3
VNCM1015050	M10 × 1.5	WH3	75	24	7	5.5	8	3
VNCM1210050	M12 × 1.0	WH3	82	29	8.5	6.5	9	3
VNCM1212550	M12 × 1.25	WH3	82	29	8.5	6.5	9	3
VNCM1215050	M12 × 1.5	WH3	82	29	8.5	6.5	9	3
VNCM1217550	M12 × 1.75	WH4	82	29	8.5	6.5	9	3
VNCM1415050	M14 × 1.5	WH3	88	30	10.5	8	11	3
VNCM1420050	M14 × 2.0	WH4	88	30	10.5	8	11	3
VNCM1615050	M16 × 1.5	WH3	95	32	12.5	10	13	3
VNCM1620050	M16 × 2.0	WH4	95	32	12.5	10	13	3
VNCM1815050	M18 × 1.5	WH4	100	37	14	11	14	3
VNCM1825050	M18 × 2.5	WH4	100	37	14	11	14	3
VNCM2015050	M20 × 1.5	WH4	105	37	15	12	15	3
VNCM2025050	M20 × 2.5	WH4	105	37	15	12	15	3
VNCM2215050	M22 × 1.5	WH4	115	38	17	13	16	3
VNCM2225050	M22 × 2.5	WH4	115	38	17	13	16	3
VNCM2415050	M24 × 1.5	WH4	120	45	19	15	18	3
VNCM2420050	M24 × 2.0	WH4	120	45	19	15	18	3
VNCM2430050	M24 × 3.0	WH4	120	45	19	15	18	3

• Applicable Workpiece

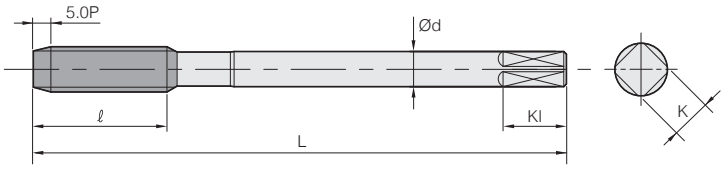
Low carbon steels	Medium carbon steels	High carbon steels	Alloy steel	Hardened steels			Stainless steels	Tool steels	Cast steels	Cast iron	High strength steels	Copper	Brass	Casting brass	Bronze	Aluminum rolled material	Aluminum alloy castings	Magnesium alloy castings	Zinc alloy castings	Titanium alloys	Nickel alloy	Thermosetting plastic	Thermoplastic
C ~0.25%	C0.25% ~0.45%	C 0.45%~	SCM	25~45 HrC	45~55 HrC	50~60 HrC	SUS	SKD	SC	FC	FCD	Cu	Bs	BsC	PB	AL	AC, ADC	MC	ZDC				
◎	◎	◎	○				○	○	○	○	○	○	○	○	○	○	○	○	○				○

◎: Excellent ○: Good

VNHM

JIS flute point taps

HSSE HOMO



Designation 5P	Thread size	Limits	L	ℓ	d	K	Kl	Z
VNHM0305050	M3 × 0.5	WH2	46	11	4	3.2	6	3
VNHM0407050	M4 × 0.7	WH2	52	13	5	4	7	3
VNHM0508050	M5 × 0.8	WH2	60	16	5.5	4.5	7	3
VNHM0610050	M6 × 1.0	WH2	62	19	6	4.5	7	3
VNHM0812550	M8 × 1.25	WH3	70	22	6.2	5	8	3
VNHM1012550	M10 × 1.25	WH3	75	24	7	5.5	8	3
VNHM1015050	M10 × 1.5	WH3	75	24	7	5.5	8	3
VNHM1210050	M12 × 1.0	WH3	82	29	8.5	6.5	9	3
VNHM1212550	M12 × 1.25	WH3	82	29	8.5	6.5	9	3
VNHM1215050	M12 × 1.5	WH3	82	29	8.5	6.5	9	3
VNHM1217550	M12 × 1.75	WH4	82	29	8.5	6.5	9	3
VNHM1415050	M14 × 1.5	WH3	88	30	10.5	8	11	3
VNHM1420050	M14 × 2.0	WH4	88	30	10.5	8	11	3
VNHM1615050	M16 × 1.5	WH3	95	32	12.5	10	13	3
VNHM1620050	M16 × 2.0	WH4	95	32	12.5	10	13	3
VNHM1815050	M18 × 1.5	WH4	100	37	14	11	14	3
VNHM1825050	M18 × 2.5	WH4	100	37	14	11	14	3
VNHM2015050	M20 × 1.5	WH4	105	37	15	12	15	3
VNHM2025050	M20 × 2.5	WH4	105	37	15	12	15	3
VNHM2215050	M22 × 1.5	WH4	115	38	17	13	16	3
VNHM2225050	M22 × 2.5	WH4	115	38	17	13	16	3
VNHM2415050	M24 × 1.5	WH4	120	45	19	15	18	3
VNHM2420050	M24 × 2.0	WH4	120	45	19	15	18	3
VNHM2430050	M24 × 3.0	WH4	120	45	19	15	18	3

• Applicable Workpiece

Low carbon steels	Medium carbon steels	High carbon steels	Alloy steel	Hardened steels			Stainless steels	Tool steels	Cast steels	Cast iron	High strength steels	Copper	Brass	Casting brass	Bronze	Aluminum rolled material	Aluminum alloy castings	Magnesium alloy castings	Zinc alloy castings	Titanium alloys	Nickel alloy	Thermosetting plastic	Thermoplastic
C ~0.25%	C0.25% ~0.45%	C 0.45%~	SCM	25~45 HrC	45~55 HrC	50~60 HrC	SUS	SKD	SC	FC	FCD	Cu	Bs	BsC	PB	AL	AC, ADC	MC	ZDC				
◎	◎		○						○														○

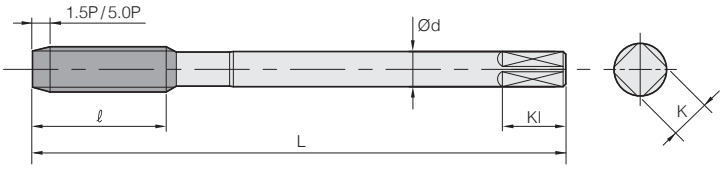
◎: Excellent ○: Good

Thread **TAP**

VSOM

JIS straight flute taps

HSSE | Un-coated



Designation		Thread size	Limits	L	ℓ	d	K	KI	Z
1.5P	5P								
VSOM0305015	VSOM0305050	M3 × 0.5	WH2	46	11	4	3.2	6	3
VSOM0407015	VSOM0407050	M4 × 0.7	WH2	52	13	5	4	7	3
VSOM0508015	VSOM0508050	M5 × 0.8	WH2	60	16	5.5	4.5	7	3
VSOM0610015	VSOM0610050	M6 × 1.0	WH2	62	19	6	4.5	7	3
VSOM0812515	VSOM0812550	M8 × 1.25	WH2	70	22	6.2	5	8	4
VSOM1012515	VSOM1012550	M10 × 1.25	WH2	75	24	7	5.5	8	4
VSOM1015015	VSOM1015050	M10 × 1.5	WH3	75	24	7	5.5	8	4
VSOM1210015	VSOM1210050	M12 × 1.0	WH2	82	29	8.5	6.5	9	4
VSOM1212515	VSOM1212550	M12 × 1.25	WH2	82	29	8.5	6.5	9	4
VSOM1215015	VSOM1215050	M12 × 1.5	WH3	82	29	8.5	6.5	9	4
VSOM1217515	VSOM1217550	M12 × 1.75	WH3	82	29	8.5	6.5	9	4
VSOM1415015	VSOM1415050	M14 × 1.5	WH3	88	30	10.5	8	11	4
VSOM1420015	VSOM1420050	M14 × 2.0	WH3	88	30	10.5	8	11	4
VSOM1615015	VSOM1615050	M16 × 1.5	WH3	95	32	12.5	10	13	4
VSOM1620015	VSOM1620050	M16 × 2.0	WH3	95	32	12.5	10	13	4
VSOM1815015	VSOM1815050	M18 × 1.5	WH3	100	37	14	11	14	4
VSOM1825015	VSOM1825050	M18 × 2.5	WH3	100	37	14	11	14	4
VSOM2015015	VSOM2015050	M20 × 1.5	WH3	105	37	15	12	15	4
VSOM2025015	VSOM2025050	M20 × 2.5	WH3	105	37	15	12	15	4
VSOM2215015	VSOM2215050	M22 × 1.5	WH3	115	38	17	13	16	4
VSOM2225015	VSOM2225050	M22 × 2.5	WH3	115	38	17	13	16	4
VSOM2415015	VSOM2415050	M24 × 1.5	WH3	120	45	19	15	18	4
VSOM2420015	VSOM2420050	M24 × 2.0	WH3	120	45	19	15	18	4
VSOM2430015	VSOM2430050	M24 × 3.0	WH3	120	45	19	15	18	4

1.5P Tap is removed external center as bottoming type

• Applicable Workpiece

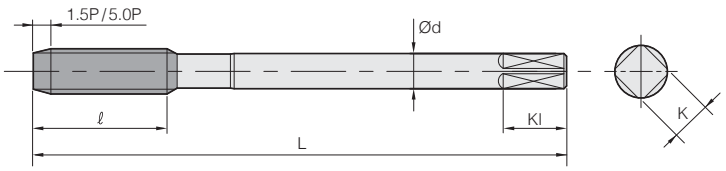
Low carbon steels	Medium carbon steels	High carbon steels	Alloy steel	Hardened steels			Stainless steels	Tool steels	Cast steels	Cast iron	High strength steels	Copper	Brass	Casting brass	Bronze	Aluminum rolled material	Aluminum alloy castings	Magnesium alloy castings	Zinc alloy castings	Titanium alloys	Nickel alloy	Thermoset-ting plastic	Thermo-plastic
C ~0.25%	C0.25% ~0.45%	C 0.45%~	SCM	25~45 HrC	45~55 HrC	50~60 HrC	SUS	SKD	SC	FC	FCD	Cu	Bs	BsC	PB	AL	AC, ADC	MC	ZDC				
○	○	○	○	○									○	○	○		○	○	○				

◎: Excellent ○: Good

VSTM

JIS straight flute taps

HSSE TiN



Designation		Thread size	Limits	L	ℓ	d	K	KI	Z
1.5P	5P								
VSTM0305015	VSTM0305050	M3 × 0.5	WH2	46	11	4	3.2	6	3
VSTM0407015	VSTM0407050	M4 × 0.7	WH2	52	13	5	4	7	3
VSTM0508015	VSTM0508050	M5 × 0.8	WH2	60	16	5.5	4.5	7	3
VSTM0610015	VSTM0610050	M6 × 1.0	WH2	62	19	6	4.5	7	3
VSTM0812515	VSTM0812550	M8 × 1.25	WH2	70	22	6.2	5	8	4
VSTM1012515	VSTM1012550	M10 × 1.25	WH2	75	24	7	5.5	8	4
VSTM1015015	VSTM1015050	M10 × 1.5	WH3	75	24	7	5.5	8	4
VSTM1210015	VSTM1210050	M12 × 1.0	WH2	82	29	8.5	6.5	9	4
VSTM1212515	VSTM1212550	M12 × 1.25	WH2	82	29	8.5	6.5	9	4
VSTM1215015	VSTM1215050	M12 × 1.5	WH3	82	29	8.5	6.5	9	4
VSTM1217515	VSTM1217550	M12 × 1.75	WH3	82	29	8.5	6.5	9	4
VSTM1415015	VSTM1415050	M14 × 1.5	WH3	88	30	10.5	8	11	4
VSTM1420015	VSTM1420050	M14 × 2.0	WH3	88	30	10.5	8	11	4
VSTM1615015	VSTM1615050	M16 × 1.5	WH3	95	32	12.5	10	13	4
VSTM1620015	VSTM1620050	M16 × 2.0	WH3	95	32	12.5	10	13	4
VSTM1815015	VSTM1815050	M18 × 1.5	WH3	100	37	14	11	14	4
VSTM1825015	VSTM1825050	M18 × 2.5	WH3	100	37	14	11	14	4
VSTM2015015	VSTM2015050	M20 × 1.5	WH3	105	37	15	12	15	4
VSTM2025015	VSTM2025050	M20 × 2.5	WH3	105	37	15	12	15	4
VSTM2215015	VSTM2215050	M22 × 1.5	WH3	115	38	17	13	16	4
VSTM2225015	VSTM2225050	M22 × 2.5	WH3	115	38	17	13	16	4
VSTM2415015	VSTM2415050	M24 × 1.5	WH3	120	45	19	15	18	4
VSTM2420015	VSTM2420050	M24 × 2.0	WH3	120	45	19	15	18	4
VSTM2430015	VSTM2430050	M24 × 3.0	WH3	120	45	19	15	18	4

1.5P Tap is removed external center as bottoming type

• Applicable Workpiece

Low carbon steels	Medium carbon steels	High carbon steels	Alloy steel	Hardened steels			Stainless steels	Tool steels	Cast steels	Cast iron	High strength steels	Copper	Brass	Casting brass	Bronze	Aluminum rolled material	Aluminum alloy castings	Magnesium alloy castings	Zinc alloy castings	Titanium alloys	Nickel alloy	Thermosetting plastic	Thermoplastic
C ~0.25%	C0.25% ~0.45%	C 0.45%~	SCM	25~45 HrC	45~55 HrC	50~60 HrC	SUS	SKD	SC	FC	FCD	Cu	Bs	BsC	PB	AL	AC, ADC	MC	ZDC				
○	○	○	○	○									○	○	○		○	○	○				

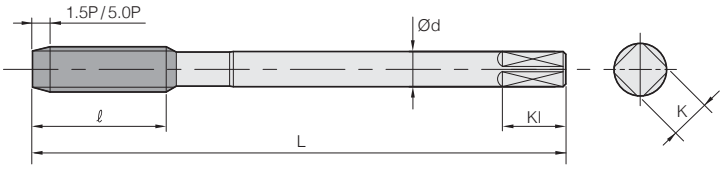
◎: Excellent ○: Good

Thread **TAP**

VSCM

JIS straight flute taps

HSSE TiCN



Designation		Thread size	Limits	L	ℓ	d	K	KI	Z
1.5P	5P								
VSCM0305015	VSCM0305050	M3 × 0.5	WH2	46	11	4	3.2	6	3
VSCM0407015	VSCM0407050	M4 × 0.7	WH2	52	13	5	4	7	3
VSCM0508015	VSCM0508050	M5 × 0.8	WH2	60	16	5.5	4.5	7	3
VSCM0610015	VSCM0610050	M6 × 1.0	WH2	62	19	6	4.5	7	3
VSCM0812515	VSCM0812550	M8 × 1.25	WH2	70	22	6.2	5	8	4
VSCM1012515	VSCM1012550	M10 × 1.25	WH2	75	24	7	5.5	8	4
VSCM1015015	VSCM1015050	M10 × 1.5	WH3	75	24	7	5.5	8	4
VSCM1210015	VSCM1210050	M12 × 1.0	WH2	82	29	8.5	6.5	9	4
VSCM1212515	VSCM1212550	M12 × 1.25	WH2	82	29	8.5	6.5	9	4
VSCM1215015	VSCM1215050	M12 × 1.5	WH3	82	29	8.5	6.5	9	4
VSCM1217515	VSCM1217550	M12 × 1.75	WH3	82	29	8.5	6.5	9	4
VSCM1415015	VSCM1415050	M14 × 1.5	WH3	88	30	10.5	8	11	4
VSCM1420015	VSCM1420050	M14 × 2.0	WH3	88	30	10.5	8	11	4
VSCM1615015	VSCM1615050	M16 × 1.5	WH3	95	32	12.5	10	13	4
VSCM1620015	VSCM1620050	M16 × 2.0	WH3	95	32	12.5	10	13	4
VSCM1815015	VSCM1815050	M18 × 1.5	WH3	100	37	14	11	14	4
VSCM1825015	VSCM1825050	M18 × 2.5	WH3	100	37	14	11	14	4
VSCM2015015	VSCM2015050	M20 × 1.5	WH3	105	37	15	12	15	4
VSCM2025015	VSCM2025050	M20 × 2.5	WH3	105	37	15	12	15	4
VSCM2215015	VSCM2215050	M22 × 1.5	WH3	115	38	17	13	16	4
VSCM2225015	VSCM2225050	M22 × 2.5	WH3	115	38	17	13	16	4
VSCM2415015	VSCM2415050	M24 × 1.5	WH3	120	45	19	15	18	4
VSCM2420015	VSCM2420050	M24 × 2.0	WH3	120	45	19	15	18	4
VSCM2430015	VSCM2430050	M24 × 3.0	WH3	120	45	19	15	18	4

1.5P Tap is removed external center as bottoming type

• Applicable Workpiece

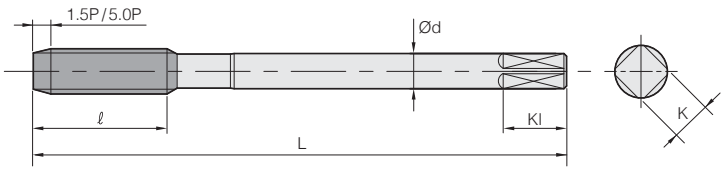
Low carbon steels	Medium carbon steels	High carbon steels	Alloy steel	Hardened steels			Stainless steels	Tool steels	Cast steels	Cast iron	High strength steels	Copper	Brass	Casting brass	Bronze	Aluminum rolled material	Aluminum alloy castings	Magnesium alloy castings	Zinc alloy castings	Titanium alloys	Nickel alloy	Thermoset-ting plastic	Thermo-plastic
C ~0.25%	C0.25% ~0.45%	C 0.45%~	SCM	25~45 HrC	45~55 HrC	50~60 HrC	SUS	SKD	SC	FC	FCD	Cu	Bs	BsC	PB	AL	AC, ADC	MC	ZDC				
○	○	○	○	○									○	○	○		○	○	○				

◎: Excellent ○: Good

VSHM

JIS straight flute taps

HSSE HOMO



Designation		Thread size	Limits	L	ℓ	d	K	KI	Z
1.5P	5P								
VSHM0305015	VSHM0305050	M3 × 0.5	WH2	46	11	4	3.2	6	3
VSHM0407015	VSHM0407050	M4 × 0.7	WH2	52	13	5	4	7	3
VSHM0508015	VSHM0508050	M5 × 0.8	WH2	60	16	5.5	4.5	7	3
VSHM0610015	VSHM0610050	M6 × 1.0	WH2	62	19	6	4.5	7	3
VSHM0812515	VSHM0812550	M8 × 1.25	WH2	70	22	6.2	5	8	4
VSHM1012515	VSHM1012550	M10 × 1.25	WH2	75	24	7	5.5	8	4
VSHM1015015	VSHM1015050	M10 × 1.5	WH3	75	24	7	5.5	8	4
VSHM1210015	VSHM1210050	M12 × 1.0	WH2	82	29	8.5	6.5	9	4
VSHM1212515	VSHM1212550	M12 × 1.25	WH2	82	29	8.5	6.5	9	4
VSHM1215015	VSHM1215050	M12 × 1.5	WH3	82	29	8.5	6.5	9	4
VSHM1217515	VSHM1217550	M12 × 1.75	WH3	82	29	8.5	6.5	9	4
VSHM1415015	VSHM1415050	M14 × 1.5	WH3	88	30	10.5	8	11	4
VSHM1420015	VSHM1420050	M14 × 2.0	WH3	88	30	10.5	8	11	4
VSHM1615015	VSHM1615050	M16 × 1.5	WH3	95	32	12.5	10	13	4
VSHM1620015	VSHM1620050	M16 × 2.0	WH3	95	32	12.5	10	13	4
VSHM1815015	VSHM1815050	M18 × 1.5	WH3	100	37	14	11	14	4
VSHM1825015	VSHM1825050	M18 × 2.5	WH3	100	37	14	11	14	4
VSHM2015015	VSHM2015050	M20 × 1.5	WH3	105	37	15	12	15	4
VSHM2025015	VSHM2025050	M20 × 2.5	WH3	105	37	15	12	15	4
VSHM2215015	VSHM2215050	M22 × 1.5	WH3	115	38	17	13	16	4
VSHM2225015	VSHM2225050	M22 × 2.5	WH3	115	38	17	13	16	4
VSHM2415015	VSHM2415050	M24 × 1.5	WH3	120	45	19	15	18	4
VSHM2420015	VSHM2420050	M24 × 2.0	WH3	120	45	19	15	18	4
VSHM2430015	VSHM2430050	M24 × 3.0	WH3	120	45	19	15	18	4

1.5P Tap is removed external center as bottoming type

• Applicable Workpiece

Low carbon steels	Medium carbon steels	High carbon steels	Alloy steel	Hardened steels			Stainless steels	Tool steels	Cast steels	Cast iron	High strength steels	Copper	Brass	Casting brass	Bronze	Aluminum rolled material	Aluminum alloy castings	Magnesium alloy castings	Zinc alloy castings	Titanium alloys	Nickel alloy	Thermosetting plastic	Thermoplastic
C ~0.25%	C0.25% ~0.45%	C 0.45%~	SCM	25~45 HrC	45~55 HrC	50~60 HrC	SUS	SKD	SC	FC	FCD	Cu	Bs	BsC	PB	AL	AC, ADC	MC	ZDC				
○	○	○	○	○									○	○	○		○	○	○				

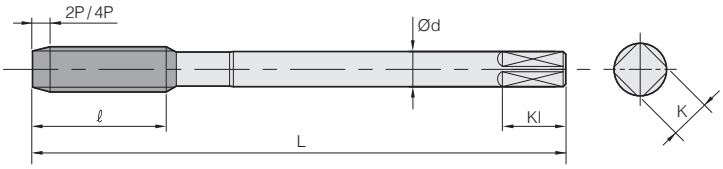
◎: Excellent ○: Good

Thread **TAP**

VROM

JIS roll taps

HSSE | Un-coated



Designation		Thread size	Limits	L	ℓ	d	K	Kl	Oil groove
2P	4P								
VROM0305020S	-	M3 × 0.5	GH5	46	11	4	3.2	6	S
VROM0305020M	VROM0305040M	M3 × 0.5	GH5	46	11	4	3.2	6	M
VROM0407020S	-	M4 × 0.7	GH6	52	13	5	4	7	S
VROM0407020M	VROM0407040M	M4 × 0.7	GH6	52	13	5	4	7	M
VROM0508020S	-	M5 × 0.8	GH6	60	16	5.5	4.5	7	S
VROM0508020M	VROM0508040M	M5 × 0.8	GH6	60	16	5.5	4.5	7	M
VROM0610020S	-	M6 × 1.0	GH7	62	19	6	4.5	7	S
VROM0610020M	VROM0610040M	M6 × 1.0	GH7	62	19	6	4.5	7	M
VROM0812520S	-	M8 × 1.25	GH7	70	22	6.2	5	8	S
VROM0812520M	VROM0812540M	M8 × 1.25	GH7	70	22	6.2	5	8	M
VROM1012520S	-	M10 × 1.25	GH7	75	24	7	5.5	8	S
VROM1012520M	VROM1012540M	M10 × 1.25	GH7	75	24	7	5.5	8	M
VROM1015020S	-	M10 × 1.5	GH7	75	24	7	5.5	8	S
VROM1015020M	VROM1015040M	M10 × 1.5	GH7	75	24	7	5.5	8	M
VROM1210020S	-	M12 × 1.0	GH7	82	29	8.5	6.5	9	S
VROM1210020M	VROM1210040M	M12 × 1.0	GH7	82	29	8.5	6.5	9	M
VROM1212520S	-	M12 × 1.25	GH7	82	29	8.5	6.5	9	S
VROM1212520M	VROM1212540M	M12 × 1.25	GH7	82	29	8.5	6.5	9	M
VROM1215020S	-	M12 × 1.5	GH7	82	29	8.5	6.5	9	S
VROM1215020M	VROM1215040M	M12 × 1.5	GH7	82	29	8.5	6.5	9	M
VROM1217520S	-	M12 × 1.75	GH8	82	29	8.5	6.5	9	S
VROM1217520M	VROM1217540M	M12 × 1.75	GH8	82	29	8.5	6.5	9	M

2.0P Tap is removed external center as bottoming type

Oil groove S: 1 oil groove
Oil groove M: 4 oil groove

• Applicable Workpiece

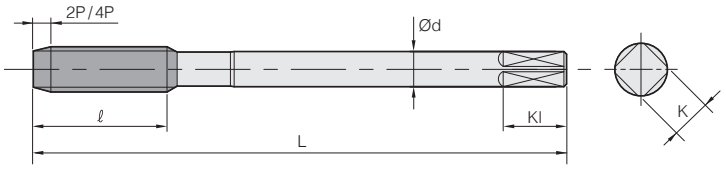
Low carbon steels	Medium carbon steels	High carbon steels	Alloy steel	Hardened steels			Stainless steels	Tool steels	Cast steels	Cast iron	High strength steels	Copper	Brass	Casting brass	Bronze	Aluminum rolled material	Aluminum alloy castings	Magnesium alloy castings	Zinc alloy castings	Titanium alloys	Nickel alloy	Thermosetting plastic	Thermoplastic
C ~0.25%	C0.25% ~0.45%	C 0.45%~	SCM	25~45 HrC	45~55 HrC	50~60 HrC	SUS	SKD	SC	FC	FCD	Cu	Bs	BsC	PB	AL	AC, ADC	MC	ZDC				
												◎	◎	◎		◎	◎		◎				

◎: Excellent ○: Good

VRTM

JIS roll taps

HSSE TiN



Designation		Thread size	Limits	L	ℓ	d	K	Kl	Oil groove
2P	4P								
VRTM0305020S	-	M3 × 0.5	GH5	46	11	4	3.2	6	S
VRTM0305020M	VRTM0305040M	M3 × 0.5	GH6	46	11	4	3.2	6	M
VRTM0407020S	-	M4 × 0.7	GH6	52	13	5	4	7	S
VRTM0407020M	VRTM0407040M	M4 × 0.7	GH6	52	13	5	4	7	M
VRTM0508020S	-	M5 × 0.8	GH6	60	16	5.5	4.5	7	S
VRTM0508020M	VRTM0508040M	M5 × 0.8	GH6	60	16	5.5	4.5	7	M
VRTM0610020S	-	M6 × 1.0	GH7	62	19	6	4.5	7	S
VRTM0610020M	VRTM0610040M	M6 × 1.0	GH7	62	19	6	4.5	7	M
VRTM0812520S	-	M8 × 1.25	GH7	70	22	6.2	5	8	S
VRTM0812520M	VRTM0812540M	M8 × 1.25	GH7	70	22	6.2	5	8	M
VRTM1012520S	-	M10 × 1.25	GH7	75	24	7	5.5	8	S
VRTM1012520M	VRTM1012540M	M10 × 1.25	GH7	75	24	7	5.5	8	M
VRTM1015020S	-	M10 × 1.5	GH7	75	24	7	5.5	8	S
VRTM1015020M	VRTM1015040M	M10 × 1.5	GH7	75	24	7	5.5	8	M
VRTM1210020S	-	M12 × 1.0	GH7	82	29	8.5	6.5	9	S
VRTM1210020M	VRTM1210040M	M12 × 1.0	GH7	82	29	8.5	6.5	9	M
VRTM1212520S	-	M12 × 1.25	GH7	82	29	8.5	6.5	9	S
VRTM1212520M	VRTM1212540M	M12 × 1.25	GH7	82	29	8.5	6.5	9	M
VRTM1215020S	-	M12 × 1.5	GH7	82	29	8.5	6.5	9	S
VRTM1215020M	VRTM1215040M	M12 × 1.5	GH7	82	29	8.5	6.5	9	M
VRTM1217520S	-	M12 × 1.75	GH8	82	29	8.5	6.5	9	S
VRTM1217520M	VRTM1217540M	M12 × 1.75	GH8	82	29	8.5	6.5	9	M

2.0P Tap is removed external center as bottoming type

Oil groove S: 1 oil groove
Oil groove M: 4 oil groove

• Applicable Workpiece

Low carbon steels	Medium carbon steels	High carbon steels	Alloy steel	Hardened steels			Stainless steels	Tool steels	Cast steels	Cast iron	High strength steels	Copper	Brass	Casting brass	Bronze	Aluminum rolled material	Aluminum alloy castings	Magnesium alloy castings	Zinc alloy castings	Titanium alloys	Nickel alloy	Thermosetting plastic	Thermoplastic
C ~0.25%	C0.25% ~0.45%	C 0.45%~	SCM	25~45 HrC	45~55 HrC	50~60 HrC	SUS	SKD	SC	FC	FCD	Cu	Bs	BsC	PB	AL	AC, ADC	MC	ZDC				
												◎	◎	◎		◎	◎		◎				

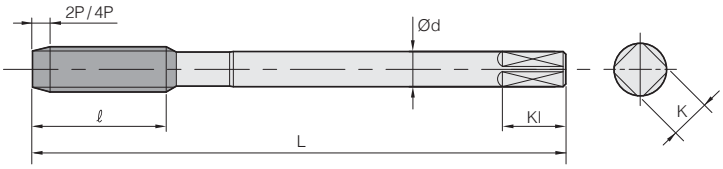
◎: Excellent ○: Good

Thread **TAP**

VRCM

JIS roll taps

HSSE TiCN



Designation		Thread size	Limits	L	ℓ	d	K	KI	Oil groove
2P	4P								
VRCM0305020S	-	M3 × 0.5	GH5	46	11	4	3.2	6	S
VRCM0305020M	VRCM0305040M	M3 × 0.5	GH5	46	11	4	3.2	6	M
VRCM0407020S	-	M4 × 0.7	GH6	52	13	5	4	7	S
VRCM0407020M	VRCM0407040M	M4 × 0.7	GH6	52	13	5	4	7	M
VRCM0508020S	-	M5 × 0.8	GH6	60	16	5.5	4.5	7	S
VRCM0508020M	VRCM0508040M	M5 × 0.8	GH6	60	16	5.5	4.5	7	M
VRCM0610020S	-	M6 × 1.0	GH7	62	19	6	4.5	7	S
VRCM0610020M	VRCM0610040M	M6 × 1.0	GH7	62	19	6	4.5	7	M
VRCM0812520S	-	M8 × 1.25	GH7	70	22	6.2	5	8	S
VRCM0812520M	VRCM0812540M	M8 × 1.25	GH7	70	22	6.2	5	8	M
VRCM1012520S	-	M10 × 1.25	GH7	75	24	7	5.5	8	S
VRCM1012520M	VRCM1012540M	M10 × 1.25	GH7	75	24	7	5.5	8	M
VRCM1015020S	-	M10 × 1.50	GH7	75	24	7	5.5	8	S
VRCM1015020M	VRCM1015040M	M10 × 1.50	GH7	75	24	7	5.5	8	M
VRCM1210020S	-	M12 × 1.0	GH7	82	29	8.5	6.5	9	S
VRCM1210020M	VRCM1210040M	M12 × 1.0	GH7	82	29	8.5	6.5	9	M
VRCM1212520S	-	M12 × 1.25	GH7	82	29	8.5	6.5	9	S
VRCM1212520M	VRCM1212540M	M12 × 1.25	GH7	82	29	8.5	6.5	9	M
VRCM1215020S	-	M12 × 1.5	GH7	82	29	8.5	6.5	9	S
VRCM1215020M	VRCM1215040M	M12 × 1.5	GH7	82	29	8.5	6.5	9	M
VRCM1217520S	-	M12 × 1.75	GH8	82	29	8.5	6.5	9	S
VRCM1217520M	VRCM1217540M	M12 × 1.75	GH8	82	29	8.5	6.5	9	M

2.0P Tap is removed external center as bottoming type

Oil groove S: 1 oil groove
Oil groove M: 4 oil groove

• Applicable Workpiece

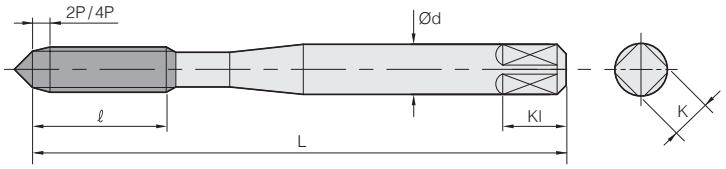
Low carbon steels	Medium carbon steels	High carbon steels	Alloy steel	Hardened steels			Stainless steels	Tool steels	Cast steels	Cast iron	High strength steels	Copper	Brass	Casting brass	Bronze	Aluminum rolled material	Aluminum alloy castings	Magnesium alloy castings	Zinc alloy castings	Titanium alloys	Nickel alloy	Thermosetting plastic	Thermoplastic
C ~0.25%	C0.25% ~0.45%	C 0.45%~	SCM	25~45 HrC	45~55 HrC	50~60 HrC	SUS	SKD	SC	FC	FCD	Cu	Bs	BsC	PB	AL	AC, ADC	MC	ZDC				
												◎	◎	◎		◎	◎		◎				

◎: Excellent ○: Good

VFOM

JIS roll taps

HSSE | Un-coated



Designation		Thread size	Limits	L	ℓ	d	K	Kl
2P	4P							
VFOM0305020	VFOM0305040	M3 × 0.5	GH6	46	18	4	3.2	6
VFOM03506020	VFOM03506040	M3.5 × 0.6	GH6	46	18	4	3.2	6
VFOM0407020	VFOM0407040	M4 × 0.7	GH7	52	20	5	4	7
VFOM0508020	VFOM0508040	M5 × 0.8	GH7	60	22	5.5	4.5	7
VFOM0610020	VFOM0610040	M6 × 1.0	GH7	62	24	6	4.5	7

2.0P Tap is removed external center as bottoming type

• Applicable Workpiece

Low carbon steels	Medium carbon steels	High carbon steels	Alloy steel	Hardened steels			Stainless steels	Tool steels	Cast steels	Cast iron	High strength steels	Copper	Brass	Casting brass	Bronze	Aluminum rolled material	Aluminum alloy castings	Magnesium alloy castings	Zinc alloy castings	Titanium alloys	Nickel alloy	Thermosetting plastic	Thermoplastic
C ~0.25%	C0.25% ~0.45%	C 0.45%~	SCM	25~45 HrC	45~55 HrC	50~60 HrC	SUS	SKD	SC	FC	FCD	Cu	Bs	BsC	PB	AL	AC, ADC	MC	ZDC				
												○	○	○		○	○		○				

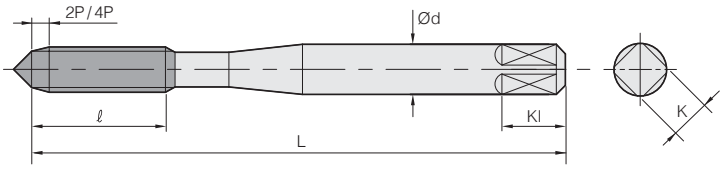
◎: Excellent ○: Good

Thread **TAP**

VFTM

JIS spiral roll taps

HSSE TiN



Designation		Thread size	Limits	L	ℓ	d	K	KI
2P	4P							
VFTM0305020	VFTM0305040	M3 × 0.5	GH6	46	18	4	3.2	6
VFTM03506020	VFTM03506040	M3.5 × 0.6	GH6	46	18	4	3.2	6
VFTM0407020	VFTM0407040	M4 × 0.7	GH7	52	20	5	4	7
VFTM0508020	VFTM0508040	M5 × 0.8	GH7	60	22	5.5	4.5	7
VFTM0610020	VFTM0610040	M6 × 1.0	GH7	62	24	6	4.5	7

2.0P Tap is removed external center as bottoming type

• Applicable Workpiece

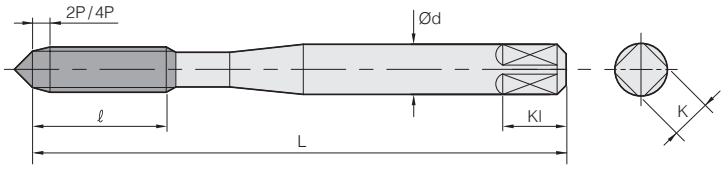
Low carbon steels	Medium carbon steels	High carbon steels	Alloy steel	Hardened steels			Stainless steels	Tool steels	Cast steels	Cast iron	High strength steels	Copper	Brass	Casting brass	Bronze	Aluminum rolled material	Aluminum alloy castings	Magnesium alloy castings	Zinc alloy castings	Titanium alloys	Nickel alloy	Thermosetting plastic	Thermoplastic
C ~0.25%	C0.25% ~0.45%	C 0.45%~	SCM	25~45 HrC	45~55 HrC	50~60 HrC	SUS	SKD	SC	FC	FCD	Cu	Bs	BsC	PB	AL	AC, ADC	MC	ZDC				
												○	○	○		○	○		○				

◎: Excellent ○: Good

VFCM

JIS spiral roll taps

HSSE TiCN



Designation		Thread size	Limits	L	ℓ	d	K	Kl
2P	4P							
VFCM0305020	VFCM0305040	M3 × 0.5	GH6	46	18	4	3.2	6
VFCM03506020	VFCM03506040	M3.5 × 0.6	GH6	46	18	4	3.2	6
VFCM0407020	VFCM0407040	M4 × 0.7	GH7	52	20	5	4	7
VFCM0508020	VFCM0508040	M5 × 0.8	GH7	60	22	5.5	4.5	7
VFCM0610020	VFCM0610040	M6 × 1.0	GH7	62	24	6	4.5	7

2.0P Tap is removed external center as bottoming type

• Applicable Workpiece

Low carbon steels	Medium carbon steels	High carbon steels	Alloy steel	Hardened steels			Stainless steels	Tool steels	Cast steels	Cast iron	High strength steels	Copper	Brass	Casting brass	Bronze	Aluminum rolled material	Aluminum alloy castings	Magnesium alloy castings	Zinc alloy castings	Titanium alloys	Nickel alloy	Thermosetting plastic	Thermoplastic
C ~0.25%	C0.25% ~0.45%	C 0.45%~	SCM	25~45 HrC	45~55 HrC	50~60 HrC	SUS	SKD	SC	FC	FCD	Cu	Bs	BsC	PB	AL	AC, ADC	MC	ZDC				
◎	◎	○	○				◎					◎	◎	◎		◎	◎		◎				

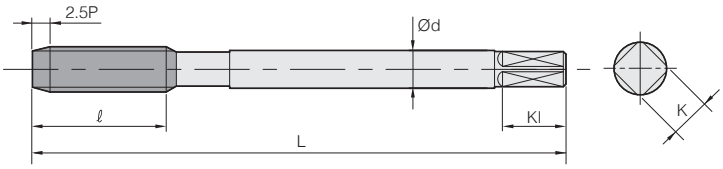
◎: Excellent ○: Good

Thread **TAP**

VQOM

DIN spiral flute taps

DIN 371-376 374 | HSSE | 35° HELIX | Un-coated



Designation 2.5P	Thread size	Limits	L	ℓ	d	K	KI	Z	Din type
VQOM0305025	M3 × 0.5	6H	56	11	3.5	2.7	6	3	371
VQOM0407025	M4 × 0.7	6H	63	13	4.5	3.4	6	3	371
VQOM0508025	M5 × 0.8	6H	70	15	6	4.9	8	3	371
VQOM0610025	M6 × 1.0	6H	80	17	6	4.9	8	3	371
VQOM0810025	M8 × 1.0	6H	90	17	6	4.9	8	3	374
VQOM0812525	M8 × 1.25	6H	90	20	8	6.2	9	3	371
VQOM1010025	M10 × 1.0	6H	90	18	7	5.5	8	3	374
VQOM1012525	M10 × 1.25	6H	100	22	7	5.5	8	3	374
VQOM1015025	M10 × 1.5	6H	100	22	10	8	11	3	371
VQOM1210025	M12 × 1.0	6H	100	18	9	7	10	3	374
VQOM1212525	M12 × 1.25	6H	100	22	9	7	10	3	374
VQOM1215025	M12 × 1.5	6H	100	22	9	7	10	3	374
VQOM1217525	M12 × 1.75	6H	110	24	9	7	10	3	376
VQOM1415025	M14 × 1.5	6H	100	22	11	9	12	3	374
VQOM1420025	M14 × 2.0	6H	110	26	11	9	12	3	376
VQOM1615025	M16 × 1.5	6H	100	22	12	9	12	3	374
VQOM1620025	M16 × 2.0	6H	110	27	12	9	12	3	376
VQOM1815025	M18 × 1.5	6H	110	25	14	11	14	4	374
VQOM1825025	M18 × 2.5	6H	125	30	14	11	14	4	376
VQOM2015025	M20 × 1.5	6H	125	25	16	12	15	4	374
VQOM2025025	M20 × 2.5	6H	140	32	16	12	15	4	376
VQOM2215025	M22 × 1.5	6H	125	25	18	14.5	17	4	374
VQOM2225025	M22 × 2.5	6H	140	32	18	14.5	17	4	376
VQOM2415025	M24 × 1.5	6H	140	27	18	14.5	17	4	374
VQOM2420025	M24 × 2.0	6H	140	27	18	14.5	17	4	374
VQOM2430025	M24 × 3.0	6H	160	34	18	14.5	17	4	376

• Applicable Workpiece

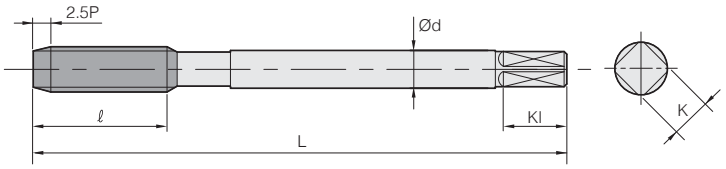
Low carbon steels	Medium carbon steels	High carbon steels	Alloy steel	Hardened steels			Stainless steels	Tool steels	Cast steels	Cast iron	High strength steels	Copper	Brass	Casting brass	Bronze	Aluminum rolled material	Aluminum alloy castings	Magnesium alloy castings	Zinc alloy castings	Titanium alloys	Nickel alloy	Thermosetting plastic	Thermoplastic
C ~0.25%	C0.25% ~0.45%	C 0.45%~	SCM	25~45 HrC	45~55 HrC	50~60 HrC	SUS	SKD	SC	FC	FCD	Cu	Bs	BsC	PB	AL	AC, ADC	MC	ZDC				
	◎		◎								○	○	○	○	○	○	○	○	○				○

◎: Excellent ○: Good

VQTM

DIN spiral flute taps

DIN 371-376 374 | HSSE | 35° HELIX | TiN



Designation 2.5P	Thread size	Limits	L	ℓ	d	K	KI	Z	Din type
VQTM0305025	M3 × 0.5	6H	56	11	3.5	2.7	6	3	371
VQTM0407025	M4 × 0.7	6H	63	13	4.5	3.4	6	3	371
VQTM0508025	M5 × 0.8	6H	70	15	6	4.9	8	3	371
VQTM0610025	M6 × 1.0	6H	80	17	6	4.9	8	3	371
VQTM0810025	M8 × 1.0	6H	90	17	6	4.9	8	3	374
VQTM0812525	M8 × 1.25	6H	90	20	8	6.2	9	3	371
VQTM1010025	M10 × 1.0	6H	90	18	7	5.5	8	3	374
VQTM1012525	M10 × 1.25	6H	100	22	7	5.5	8	3	374
VQTM1015025	M10 × 1.5	6H	100	22	10	8	11	3	371
VQTM1210025	M12 × 1.0	6H	100	18	9	7	10	3	374
VQTM1212525	M12 × 1.25	6H	100	22	9	7	10	3	374
VQTM1215025	M12 × 1.5	6H	100	22	9	7	10	3	374
VQTM1217525	M12 × 1.75	6H	110	24	9	7	10	3	376
VQTM1415025	M14 × 1.5	6H	100	22	11	9	12	3	374
VQTM1420025	M14 × 2.0	6H	110	26	11	9	12	3	376
VQTM1615025	M16 × 1.5	6H	100	22	12	9	12	3	374
VQTM1620025	M16 × 2.0	6H	110	27	12	9	12	3	376
VQTM1815025	M18 × 1.5	6H	110	25	14	11	14	4	374
VQTM1825025	M18 × 2.5	6H	125	30	14	11	14	4	376
VQTM2015025	M20 × 1.5	6H	125	25	16	12	15	4	374
VQTM2025025	M20 × 2.5	6H	140	32	16	12	15	4	376
VQTM2215025	M22 × 1.5	6H	125	25	18	14.5	17	4	374
VQTM2225025	M22 × 2.5	6H	140	32	18	14.5	17	4	376
VQTM2415025	M24 × 1.5	6H	140	27	18	14.5	17	4	374
VQTM2420025	M24 × 2.0	6H	140	27	18	14.5	17	4	374
VQTM2430025	M24 × 3.0	6H	160	34	18	14.5	17	4	376

• Applicable Workpiece

Low carbon steels	Medium carbon steels	High carbon steels	Alloy steel	Hardened steels			Stainless steels	Tool steels	Cast steels	Cast iron	High strength steels	Copper	Brass	Casting brass	Bronze	Aluminum rolled material	Aluminum alloy castings	Magnesium alloy castings	Zinc alloy castings	Titanium alloys	Nickel alloy	Thermosetting plastic	Thermoplastic
C ~0.25%	C0.25% ~0.45%	C 0.45%~	SCM	25~45 HrC	45~55 HrC	50~60 HrC	SUS	SKD	SC	FC	FCD	Cu	Bs	BsC	PB	AL	AC, ADC	MC	ZDC				
	◎		◎								○	○	○	○	○	○	○	○	○				○

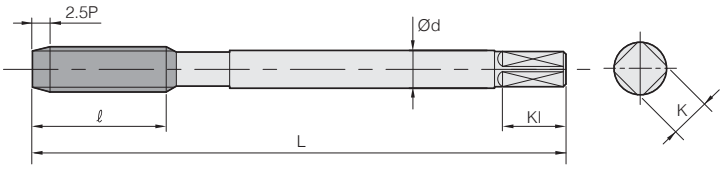
◎: Excellent ○: Good

Thread **TAP**

VQCM

DIN spiral flute taps

DIN 371-376 374 | HSSE | 35° HELIX | TiCN



Designation 2.5P	Thread size	Limits	L	ℓ	d	K	KI	Z	Din type
VQCM0305025	M3 × 0.5	6H	56	11	3.5	2.7	6	3	371
VQCM0407025	M4 × 0.7	6H	63	13	4.5	3.4	6	3	371
VQCM0508025	M5 × 0.8	6H	70	15	6	4.9	8	3	371
VQCM0610025	M6 × 1.0	6H	80	17	6	4.9	8	3	371
VQCM0810025	M8 × 1.0	6H	90	17	6	4.9	8	3	374
VQCM0812525	M8 × 1.25	6H	90	20	8	6.2	9	3	371
VQCM1010025	M10 × 1.0	6H	90	18	7	5.5	8	3	374
VQCM1012525	M10 × 1.25	6H	100	22	7	5.5	8	3	374
VQCM1015025	M10 × 1.5	6H	100	22	10	8	11	3	371
VQCM1210025	M12 × 1.0	6H	100	18	9	7	10	3	374
VQCM1212525	M12 × 1.25	6H	100	22	9	7	10	3	374
VQCM1215025	M12 × 1.5	6H	100	22	9	7	10	3	374
VQCM1217525	M12 × 1.75	6H	110	24	9	7	10	3	376
VQCM1415025	M14 × 1.5	6H	100	22	11	9	12	3	374
VQCM1420025	M14 × 2.0	6H	110	26	11	9	12	3	376
VQCM1615025	M16 × 1.5	6H	100	22	12	9	12	3	374
VQCM1620025	M16 × 2.0	6H	110	27	12	9	12	3	376
VQCM1815025	M18 × 1.5	6H	110	25	14	11	14	4	374
VQCM1825025	M18 × 2.5	6H	125	30	14	11	14	4	376
VQCM2015025	M20 × 1.5	6H	125	25	16	12	15	4	374
VQCM2025025	M20 × 2.5	6H	140	32	16	12	15	4	376
VQCM2215025	M22 × 1.5	6H	125	25	18	14.5	17	4	374
VQCM2225025	M22 × 2.5	6H	140	32	18	14.5	17	4	376
VQCM2415025	M24 × 1.5	6H	140	27	18	14.5	17	4	374
VQCM2420025	M24 × 2.0	6H	140	27	18	14.5	17	4	374
VQCM2430025	M24 × 3.0	6H	160	34	18	14.5	17	4	376

• Applicable Workpiece

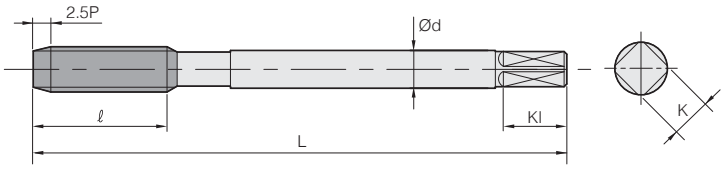
Low carbon steels	Medium carbon steels	High carbon steels	Alloy steel	Hardened steels			Stainless steels	Tool steels	Cast steels	Cast iron	High strength steels	Copper	Brass	Casting brass	Bronze	Aluminum rolled material	Aluminum alloy castings	Magnesium alloy castings	Zinc alloy castings	Titanium alloys	Nickel alloy	Thermosetting plastic	Thermoplastic
C ~0.25%	C0.25% ~0.45%	C 0.45%~	SCM	25~45 HrC	45~55 HrC	50~60 HrC	SUS	SKD	SC	FC	FCD	Cu	Bs	BsC	PB	AL	AC, ADC	MC	ZDC				
	◎		◎								○	○	○	○	○	○	○	○	○				○

◎: Excellent ○: Good

VQHM

DIN spiral flute taps

DIN 371-376 374 | HSSE | 35° HELIX | HOMO



Designation 2.5P	Thread size	Limits	L	ℓ	d	K	KI	Z	Din type
VQHM0305025	M3 × 0.5	6H	56	11	3.5	2.7	6	3	371
VQHM0407025	M4 × 0.7	6H	63	13	4.5	3.4	6	3	371
VQHM0508025	M5 × 0.8	6H	70	15	6	4.9	8	3	371
VQHM0610025	M6 × 1.0	6H	80	17	6	4.9	8	3	371
VQHM0810025	M8 × 1.0	6H	90	17	6	4.9	8	3	374
VQHM0812525	M8 × 1.25	6H	90	20	8	6.2	9	3	371
VQHM1010025	M10 × 1.0	6H	90	18	7	5.5	8	3	374
VQHM1012525	M10 × 1.25	6H	100	22	7	5.5	8	3	374
VQHM1015025	M10 × 1.5	6H	100	22	10	8	11	3	371
VQHM1210025	M12 × 1.0	6H	100	18	9	7	10	3	374
VQHM1212525	M12 × 1.25	6H	100	22	9	7	10	3	374
VQHM1215025	M12 × 1.5	6H	100	22	9	7	10	3	374
VQHM1217525	M12 × 1.75	6H	110	24	9	7	10	3	376
VQHM1415025	M14 × 1.5	6H	100	22	11	9	12	3	374
VQHM1420025	M14 × 2.0	6H	110	26	11	9	12	3	376
VQHM1615025	M16 × 1.5	6H	100	22	12	9	12	3	374
VQHM1620025	M16 × 2.0	6H	110	27	12	9	12	3	376
VQHM1815025	M18 × 1.5	6H	110	25	14	11	14	4	374
VQHM1825025	M18 × 2.5	6H	125	30	14	11	14	4	376
VQHM2015025	M20 × 1.5	6H	125	25	16	12	15	4	374
VQHM2025025	M20 × 2.5	6H	140	32	16	12	15	4	376
VQHM2215025	M22 × 1.5	6H	125	25	18	14.5	17	4	374
VQHM2225025	M22 × 2.5	6H	140	32	18	14.5	17	4	376
VQHM2415025	M24 × 1.5	6H	140	27	18	14.5	17	4	374
VQHM2420025	M24 × 2.0	6H	140	27	18	14.5	17	4	374
VQHM2430025	M24 × 3.0	6H	160	34	18	14.5	17	4	376

• Applicable Workpiece

Low carbon steels	Medium carbon steels	High carbon steels	Alloy steel	Hardened steels			Stainless steels	Tool steels	Cast steels	Cast iron	High strength steels	Copper	Brass	Casting brass	Bronze	Aluminum rolled material	Aluminum alloy castings	Magnesium alloy castings	Zinc alloy castings	Titanium alloys	Nickel alloy	Thermosetting plastic	Thermoplastic
C ~0.25%	C0.25% ~0.45%	C 0.45%~	SCM	25~45 HrC	45~55 HrC	50~60 HrC	SUS	SKD	SC	FC	FCD	Cu	Bs	BsC	PB	AL	AC, ADC	MC	ZDC				
	◎		◎								○	○	○	○	○	○	○	○	○				○

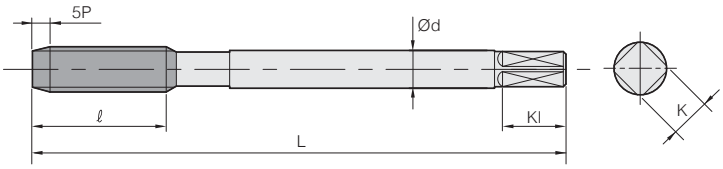
◎: Excellent ○: Good

Thread **TAP**

VDOM

DIN point flute taps

DIN 371-376 374 | HSSE | Un-coated



Designation 5P	Thread size	Limits	L	ℓ	d	K	KI	Z	Din type
VDOM0305050	M3 × 0.5	6H	56	11	3.5	2.7	6	3	371
VDOM0407050	M4 × 0.7	6H	63	13	4.5	3.4	6	3	371
VDOM0508050	M5 × 0.8	6H	70	15	6	4.9	8	3	371
VDOM0610050	M6 × 1.0	6H	80	17	6	4.9	8	3	371
VDOM0810050	M8 × 1.0	6H	90	17	6	4.9	8	3	374
VDOM0812550	M8 × 1.25	6H	90	20	8	6.2	9	3	371
VDOM1010050	M10 × 1.0	6H	90	18	7	5.5	8	3	374
VDOM1012550	M10 × 1.25	6H	100	22	7	5.5	8	3	374
VDOM1015050	M10 × 1.5	6H	100	22	10	8	11	3	371
VDOM1210050	M12 × 1.0	6H	100	18	9	7	10	3	374
VDOM1212550	M12 × 1.25	6H	100	22	9	7	10	3	374
VDOM1215050	M12 × 1.5	6H	100	22	9	7	10	3	374
VDOM1217550	M12 × 1.75	6H	110	24	9	7	10	3	376
VDOM1415050	M14 × 1.5	6H	100	22	11	9	12	3	374
VDOM1420050	M14 × 2.0	6H	110	26	11	9	12	3	376
VDOM1615050	M16 × 1.5	6H	100	22	12	9	12	3	374
VDOM1620050	M16 × 2.0	6H	110	27	12	9	12	3	376
VDOM1815050	M18 × 1.5	6H	110	25	14	11	14	3	374
VDOM1825050	M18 × 2.5	6H	125	30	14	11	14	3	376
VDOM2015050	M20 × 1.5	6H	125	25	16	12	15	3	374
VDOM2025050	M20 × 2.5	6H	140	32	16	12	15	3	376
VDOM2215050	M22 × 1.5	6H	125	25	18	14.5	17	3	374
VDOM2225050	M22 × 2.5	6H	140	32	18	14.5	17	3	376
VDOM2415050	M24 × 1.5	6H	140	27	18	14.5	17	3	374
VDOM2420050	M24 × 2.0	6H	140	27	18	14.5	17	3	374
VDOM2430050	M24 × 3.0	6H	160	34	18	14.5	17	3	376

• Applicable Workpiece

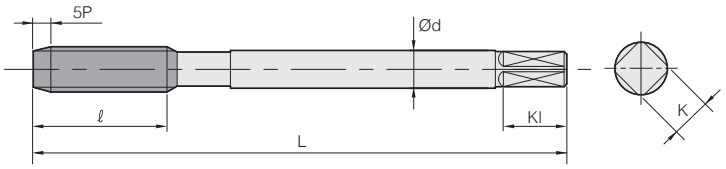
Low carbon steels	Medium carbon steels	High carbon steels	Alloy steel	Hardened steels			Stainless steels	Tool steels	Cast steels	Cast iron	High strength steels	Copper	Brass	Casting brass	Bronze	Aluminum rolled material	Aluminum alloy castings	Magnesium alloy castings	Zinc alloy castings	Titanium alloys	Nickel alloy	Thermoset-ting plastic	Thermo-plastic
C ~0.25%	C0.25% ~0.45%	C 0.45%~	SCM	25~45 HrC	45~55 HrC	50~60 HrC	SUS	SKD	SC	FC	FCD	Cu	Bs	BsC	PB	AL	AC, ADC	MC	ZDC				
	○	○	◎							○	○	○	○	○	○	◎	○	○	○				○

◎: Excellent ○: Good

VDTM

DIN point flute tap

DIN 371-376 374 | HSSE | TiN



Designation 5P	Thread size	Limits	L	ℓ	d	K	Kl	Z	Din type
VDTM0305050	M3 × 0.5	6H	56	11	3.5	2.7	6	3	371
VDTM0407050	M4 × 0.7	6H	63	13	4.5	3.4	6	3	371
VDTM0508050	M5 × 0.8	6H	70	15	6	4.9	8	3	371
VDTM0610050	M6 × 1.0	6H	80	17	6	4.9	8	3	371
VDTM0810050	M8 × 1.0	6H	90	17	6	4.9	8	3	374
VDTM0812550	M8 × 1.25	6H	90	20	8	6.2	9	3	371
VDTM1010050	M10 × 1.0	6H	90	18	7	5.5	8	3	374
VDTM1012550	M10 × 1.25	6H	100	22	7	5.5	8	3	374
VDTM1015050	M10 × 1.5	6H	100	22	10	8	11	3	371
VDTM1210050	M12 × 1.0	6H	100	18	9	7	10	3	374
VDTM1212550	M12 × 1.25	6H	100	22	9	7	10	3	374
VDTM1215050	M12 × 1.5	6H	100	22	9	7	10	3	374
VDTM1217550	M12 × 1.75	6H	110	24	9	7	10	3	376
VDTM1415050	M14 × 1.5	6H	100	22	11	9	12	3	374
VDTM1420050	M14 × 2.0	6H	110	26	11	9	12	3	376
VDTM1615050	M16 × 1.5	6H	100	22	12	9	12	3	374
VDTM1620050	M16 × 2.0	6H	110	27	12	9	12	3	376
VDTM1815050	M18 × 1.5	6H	110	25	14	11	14	3	374
VDTM1825050	M18 × 2.5	6H	125	30	14	11	14	3	376
VDTM2015050	M20 × 1.5	6H	125	25	16	12	15	3	374
VDTM2025050	M20 × 2.5	6H	140	32	16	12	15	3	376
VDTM2215050	M22 × 1.5	6H	125	25	18	14.5	17	3	374
VDTM2225050	M22 × 2.5	6H	140	32	18	14.5	17	3	376
VDTM2415050	M24 × 1.5	6H	140	27	18	14.5	17	3	374
VDTM2420050	M24 × 2.0	6H	140	27	18	14.5	17	3	374
VDTM2430050	M24 × 3.0	6H	160	34	18	14.5	17	3	376

• Applicable Workpiece

Low carbon steels	Medium carbon steels	High carbon steels	Alloy steel	Hardened steels			Stainless steels	Tool steels	Cast steels	Cast iron	High strength steels	Copper	Brass	Casting brass	Bronze	Aluminum rolled material	Aluminum alloy castings	Magnesium alloy castings	Zinc alloy castings	Titanium alloys	Nickel alloy	Thermosetting plastic	Thermoplastic
C ~0.25%	C0.25% ~0.45%	C 0.45%~	SCM	25~45 HrC	45~55 HrC	50~60 HrC	SUS	SKD	SC	FC	FCD	Cu	Bs	BsC	PB	AL	AC, ADC	MC	ZDC				
	○	○	◎							○	○	○	○	○	○	◎	○	○	○				○

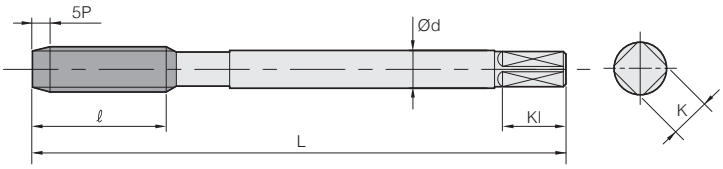
◎: Excellent ○: Good

Thread **TAP**

VDCM

DIN point flute taps

DIN 371-376 374 | HSSE | TiCN



Designation 5P	Thread size	Limits	L	ℓ	d	K	KI	Z	Din type
VDCM0305050	M3 × 0.5	6H	56	11	3.5	2.7	6	3	371
VDCM0407050	M4 × 0.7	6H	63	13	4.5	3.4	6	3	371
VDCM0508050	M5 × 0.8	6H	70	15	6	4.9	8	3	371
VDCM0610050	M6 × 1.0	6H	80	17	6	4.9	8	3	371
VDCM0810050	M8 × 1.0	6H	90	17	6	4.9	8	3	374
VDCM0812550	M8 × 1.25	6H	90	20	8	6.2	9	3	371
VDCM1010050	M10 × 1.0	6H	90	18	7	5.5	8	3	374
VDCM1012550	M10 × 1.25	6H	100	22	7	5.5	8	3	374
VDCM1015050	M10 × 1.5	6H	100	22	10	8	11	3	371
VDCM1210050	M12 × 1.0	6H	100	18	9	7	10	3	374
VDCM1212550	M12 × 1.25	6H	100	22	9	7	10	3	374
VDCM1215050	M12 × 1.5	6H	100	22	9	7	10	3	374
VDCM1217550	M12 × 1.75	6H	110	24	9	7	10	3	376
VDCM1415050	M14 × 1.5	6H	100	22	11	9	12	3	374
VDCM1420050	M14 × 2.0	6H	110	26	11	9	12	3	376
VDCM1615050	M16 × 1.5	6H	100	22	12	9	12	3	374
VDCM1620050	M16 × 2.0	6H	110	27	12	9	12	3	376
VDCM1815050	M18 × 1.5	6H	110	25	14	11	14	3	374
VDCM1825050	M18 × 2.5	6H	125	30	14	11	14	3	376
VDCM2015050	M20 × 1.5	6H	125	25	16	12	15	3	374
VDCM2025050	M20 × 2.5	6H	140	32	16	12	15	3	376
VDCM2215050	M22 × 1.5	6H	125	25	18	14.5	17	3	374
VDCM2225050	M22 × 2.5	6H	140	32	18	14.5	17	3	376
VDCM2415050	M24 × 1.5	6H	140	27	18	14.5	17	3	374
VDCM2420050	M24 × 2.0	6H	140	27	18	14.5	17	3	374
VDCM2430050	M24 × 3.0	6H	160	34	18	14.5	17	3	376

• Applicable Workpiece

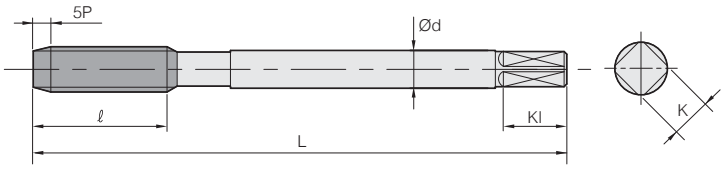
Low carbon steels	Medium carbon steels	High carbon steels	Alloy steel	Hardened steels			Stainless steels	Tool steels	Cast steels	Cast iron	High strength steels	Copper	Brass	Casting brass	Bronze	Aluminum rolled material	Aluminum alloy castings	Magnesium alloy castings	Zinc alloy castings	Titanium alloys	Nickel alloy	Thermoset-ting plastic	Thermo-plastic
C ~0.25%	C0.25% ~0.45%	C 0.45%~	SCM	25~45 HrC	45~55 HrC	50~60 HrC	SUS	SKD	SC	FC	FCD	Cu	Bs	BsC	PB	AL	AC, ADC	MC	ZDC				
	○	○	◎							○	○	○	○	○	○	◎	○	○	○				○

◎: Excellent ○: Good

VDHM

DIN point flute taps

DIN 371-376 374 | HSSE | HOMO



Designation 5P	Thread size	Limits	L	ℓ	d	K	Kl	Z	Din type
VDHM0305050	M3 × 0.5	6H	56	11	3.5	2.7	6	3	371
VDHM0407050	M4 × 0.7	6H	63	13	4.5	3.4	6	3	371
VDHM0508050	M5 × 0.8	6H	70	15	6	4.9	8	3	371
VDHM0610050	M6 × 1.0	6H	80	17	6	4.9	8	3	371
VDHM0810050	M8 × 1.0	6H	90	17	6	4.9	8	3	374
VDHM0812550	M8 × 1.25	6H	90	20	8	6.2	9	3	371
VDHM1010050	M10 × 1.0	6H	90	18	7	5.5	8	3	374
VDHM1012550	M10 × 1.25	6H	100	22	7	5.5	8	3	374
VDHM1015050	M10 × 1.5	6H	100	22	10	8	11	3	371
VDHM1210050	M12 × 1.0	6H	100	18	9	7	10	3	374
VDHM1212550	M12 × 1.25	6H	100	22	9	7	10	3	374
VDHM1215050	M12 × 1.5	6H	100	22	9	7	10	3	374
VDHM1217550	M12 × 1.75	6H	110	24	9	7	10	3	376
VDHM1415050	M14 × 1.5	6H	100	22	11	9	12	3	374
VDHM1420050	M14 × 2.0	6H	110	26	11	9	12	3	376
VDHM1615050	M16 × 1.5	6H	100	22	12	9	12	3	374
VDHM1620050	M16 × 2.0	6H	110	27	12	9	12	3	376
VDHM1815050	M18 × 1.5	6H	110	25	14	11	14	3	374
VDHM1825050	M18 × 2.5	6H	125	30	14	11	14	3	376
VDHM2015050	M20 × 1.5	6H	125	25	16	12	15	3	374
VDHM2025050	M20 × 2.5	6H	140	32	16	12	15	3	376
VDHM2215050	M22 × 1.5	6H	125	25	18	14.5	17	3	374
VDHM2225050	M22 × 2.5	6H	140	32	18	14.5	17	3	376
VDHM2415050	M24 × 1.5	6H	140	27	18	14.5	17	3	374
VDHM2420050	M24 × 2.0	6H	140	27	18	14.5	17	3	374
VDHM2430050	M24 × 3.0	6H	160	34	18	14.5	17	3	376

• Applicable Workpiece

Low carbon steels	Medium carbon steels	High carbon steels	Alloy steel	Hardened steels			Stainless steels	Tool steels	Cast steels	Cast iron	High strength steels	Copper	Brass	Casting brass	Bronze	Aluminum rolled material	Aluminum alloy castings	Magnesium alloy castings	Zinc alloy castings	Titanium alloys	Nickel alloy	Thermosetting plastic	Thermoplastic
C ~0.25%	C0.25% ~0.45%	C 0.45%~	SCM	25~45 HrC	45~55 HrC	50~60 HrC	SUS	SKD	SC	FC	FCD	Cu	Bs	BsC	PB	AL	AC, ADC	MC	ZDC				
	○	○	◎							○	○	○	○	○	○	◎	○	○	○				○

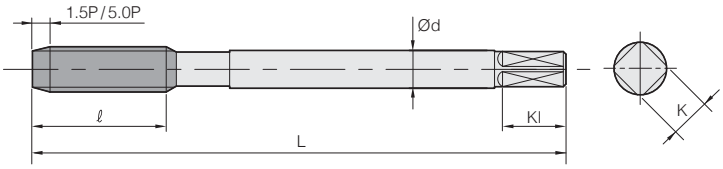
◎: Excellent ○: Good

Thread **TAP**

VGOM

DIN straight flute taps

DIN 371-376 374 | HSSE | Un-coated



Designation		Thread size	Limits	L	ℓ	d	K	KI	Z	Din type
1.5P	5P									
VGOM0305015	VGOM0305050	M3 × 0.5	6H	56	11	3.5	2.7	6	3	371
VGOM0407015	VGOM0407050	M4 × 0.7	6H	63	13	4.5	3.4	6	3	371
VGOM0508015	VGOM0508050	M5 × 0.8	6H	70	15	6	4.9	8	3	371
VGOM0610015	VGOM0610050	M6 × 1.0	6H	80	17	6	4.9	8	3	371
VGOM0810015	VGOM0810050	M8 × 1.0	6H	90	17	6	4.9	8	4	374
VGOM0812515	VGOM0812550	M8 × 1.25	6H	90	20	8	6.2	9	4	371
VGOM1010015	VGOM1010050	M10 × 1.0	6H	90	18	7	5.5	8	4	374
VGOM1012515	VGOM1012550	M10 × 1.25	6H	100	22	7	5.5	8	4	374
VGOM1015015	VGOM1015050	M10 × 1.5	6H	100	22	10	8	11	4	371
VGOM1210015	VGOM1210050	M12 × 1.0	6H	100	18	9	7	10	4	374
VGOM1212515	VGOM1212550	M12 × 1.25	6H	100	22	9	7	10	4	374
VGOM1215015	VGOM1215050	M12 × 1.5	6H	100	22	9	7	10	4	374
VGOM1217515	VGOM1217550	M12 × 1.75	6H	110	24	9	7	10	4	376
VGOM1415015	VGOM1415050	M14 × 1.5	6H	100	22	11	9	12	4	374
VGOM1420015	VGOM1420050	M14 × 2.0	6H	110	26	11	9	12	4	376
VGOM1615015	VGOM1615050	M16 × 1.5	6H	100	22	12	9	12	4	374
VGOM1620015	VGOM1620050	M16 × 2.0	6H	110	27	12	9	12	4	376
VGOM1815015	VGOM1815050	M18 × 1.5	6H	110	25	14	11	14	4	374
VGOM1825015	VGOM1825050	M18 × 2.5	6H	125	30	14	11	14	4	376
VGOM2015015	VGOM2015050	M20 × 1.5	6H	125	25	16	12	15	4	374
VGOM2025015	VGOM2025050	M20 × 2.5	6H	140	32	16	12	15	4	376
VGOM2215015	VGOM2215050	M22 × 1.5	6H	125	25	18	14.5	17	4	374
VGOM2225015	VGOM2225050	M22 × 2.5	6H	140	32	18	14.5	17	4	376
VGOM2415015	VGOM2415050	M24 × 1.5	6H	140	27	18	14.5	17	4	374
VGOM2420015	VGOM2420050	M24 × 2.0	6H	140	27	18	14.5	17	4	374
VGOM2430015	VGOM2430050	M24 × 3.0	6H	160	34	18	14.5	17	4	376

1.5P Tap is removed external center as bottoming type

• Applicable Workpiece

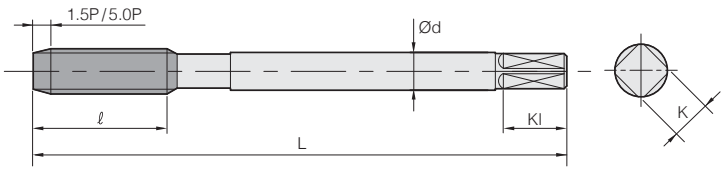
Low carbon steels	Medium carbon steels	High carbon steels	Alloy steel	Hardened steels			Stainless steels	Tool steels	Cast steels	Cast iron	High strength steels	Copper	Brass	Casting brass	Bronze	Aluminum rolled material	Aluminum alloy castings	Magnesium alloy castings	Zinc alloy castings	Titanium alloys	Nickel alloy	Thermoset-ting plastic	Thermo-plastic
C ~0.25%	C0.25% ~0.45%	C 0.45%~	SCM	25~45 HrC	45~55 HrC	50~60 HrC	SUS	SKD	SC	FC	FCD	Cu	Bs	BsC	PB	AL	AC, ADC	MC	ZDC				
○	○	○	○	○									○	○	○		○	○	○				

◎: Excellent ○: Good

VGTM

DIN straight flute taps

DIN 371-376 374 | HSSE | TiN



Designation		Thread size	Limits	L	ℓ	d	K	KI	Z	Din type
1.5P	5P									
VGTM0305015	VGTM0305050	M3 × 0.5	6H	56	11	3.5	2.7	6	3	371
VGTM0407015	VGTM0407050	M4 × 0.7	6H	63	13	4.5	3.4	6	3	371
VGTM0508015	VGTM0508050	M5 × 0.8	6H	70	15	6	4.9	8	3	371
VGTM0610015	VGTM0610050	M6 × 1.0	6H	80	17	6	4.9	8	3	371
VGTM0810015	VGTM0810050	M8 × 1.0	6H	90	17	6	4.9	8	4	374
VGTM0812515	VGTM0812550	M8 × 1.25	6H	90	20	8	6.2	9	4	371
VGTM1010015	VGTM1010050	M10 × 1.0	6H	90	18	7	5.5	8	4	374
VGTM1012515	VGTM1012550	M10 × 1.25	6H	100	22	7	5.5	8	4	374
VGTM1015015	VGTM1015050	M10 × 1.5	6H	100	22	10	8	11	4	371
VGTM1210015	VGTM1210050	M12 × 1.0	6H	100	18	9	7	10	4	374
VGTM1212515	VGTM1212550	M12 × 1.25	6H	100	22	9	7	10	4	374
VGTM1215015	VGTM1215050	M12 × 1.5	6H	100	22	9	7	10	4	374
VGTM1217515	VGTM1217550	M12 × 1.75	6H	110	24	9	7	10	4	376
VGTM1415015	VGTM1415050	M14 × 1.5	6H	100	22	11	9	12	4	374
VGTM1420015	VGTM1420050	M14 × 2.0	6H	110	26	11	9	12	4	376
VGTM1615015	VGTM1615050	M16 × 1.5	6H	100	22	12	9	12	4	374
VGTM1620015	VGTM1620050	M16 × 2.0	6H	110	27	12	9	12	4	376
VGTM1815015	VGTM1815050	M18 × 1.5	6H	110	25	14	11	14	4	374
VGTM1825015	VGTM1825050	M18 × 2.5	6H	125	30	14	11	14	4	376
VGTM2015015	VGTM2015050	M20 × 1.5	6H	125	25	16	12	15	4	374
VGTM2025015	VGTM2025050	M20 × 2.5	6H	140	32	16	12	15	4	376
VGTM2215015	VGTM2215050	M22 × 1.5	6H	125	25	18	14.5	17	4	374
VGTM2225015	VGTM2225050	M22 × 2.5	6H	140	32	18	14.5	17	4	376
VGTM2415015	VGTM2415050	M24 × 1.5	6H	140	27	18	14.5	17	4	374
VGTM2420015	VGTM2420050	M24 × 2.0	6H	140	27	18	14.5	17	4	374
VGTM2430015	VGTM2430050	M24 × 3.0	6H	160	34	18	14.5	17	4	376

1.5P Tap is removed external center as bottoming type

• Applicable Workpiece

Low carbon steels	Medium carbon steels	High carbon steels	Alloy steel	Hardened steels			Stainless steels	Tool steels	Cast steels	Cast iron	High strength steels	Copper	Brass	Casting brass	Bronze	Aluminum rolled material	Aluminum alloy castings	Magnesium alloy castings	Zinc alloy castings	Titanium alloys	Nickel alloy	Thermosetting plastic	Thermoplastic
C ~0.25%	C0.25% ~0.45%	C 0.45%~	SCM	25~45 HrC	45~55 HrC	50~60 HrC	SUS	SKD	SC	FC	FCD	Cu	Bs	BsC	PB	AL	AC, ADC	MC	ZDC				
○	○	○	○	○									○	○	○		○	○	○				

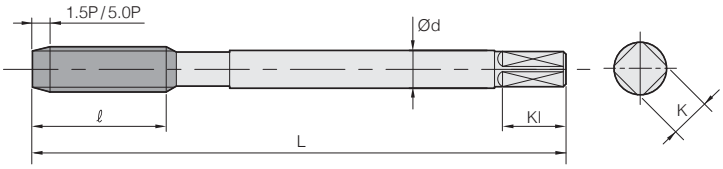
◎: Excellent ○: Good

Thread **TAP**

VGCM

DIN straight flute taps

DIN 371-376 374 | HSSE | TiCN



Designation		Thread size	Limits	L	ℓ	d	K	KI	Z	Din type
1.5P	5P									
VGCM0305015	VGCM0305050	M3 × 0.5	6H	56	11	3.5	2.7	6	3	371
VGCM0407015	VGCM0407050	M4 × 0.7	6H	63	13	4.5	3.4	6	3	371
VGCM0508015	VGCM0508050	M5 × 0.8	6H	70	15	6	4.9	8	3	371
VGCM0610015	VGCM0610050	M6 × 1.0	6H	80	17	6	4.9	8	3	371
VGCM0810015	VGCM0810050	M8 × 1.0	6H	90	17	6	4.9	8	4	374
VGCM0812515	VGCM0812550	M8 × 1.25	6H	90	20	8	6.2	9	4	371
VGCM1010015	VGCM1010050	M10 × 1.0	6H	90	18	7	5.5	8	4	374
VGCM1012515	VGCM1012550	M10 × 1.25	6H	100	22	7	5.5	8	4	374
VGCM1015015	VGCM1015050	M10 × 1.5	6H	100	22	10	8	11	4	371
VGCM1210015	VGCM1210050	M12 × 1.0	6H	100	18	9	7	10	4	374
VGCM1212515	VGCM1212550	M12 × 1.25	6H	100	22	9	7	10	4	374
VGCM1215015	VGCM1215050	M12 × 1.5	6H	100	22	9	7	10	4	374
VGCM1217515	VGCM1217550	M12 × 1.75	6H	110	24	9	7	10	4	376
VGCM1415015	VGCM1415050	M14 × 1.5	6H	100	22	11	9	12	4	374
VGCM1420015	VGCM1420050	M14 × 2.0	6H	110	26	11	9	12	4	376
VGCM1615015	VGCM1615050	M16 × 1.5	6H	100	22	12	9	12	4	374
VGCM1620015	VGCM1620050	M16 × 2.0	6H	110	27	12	9	12	4	376
VGCM1815015	VGCM1815050	M18 × 1.5	6H	110	25	14	11	14	4	374
VGCM1825015	VGCM1825050	M18 × 2.5	6H	125	30	14	11	14	4	376
VGCM2015015	VGCM2015050	M20 × 1.5	6H	125	25	16	12	15	4	374
VGCM2025015	VGCM2025050	M20 × 2.5	6H	140	32	16	12	15	4	376
VGCM2215015	VGCM2215050	M22 × 1.5	6H	125	25	18	14.5	17	4	374
VGCM2225015	VGCM2225050	M22 × 2.5	6H	140	32	18	14.5	17	4	376
VGCM2415015	VGCM2415050	M24 × 1.5	6H	140	27	18	14.5	17	4	374
VGCM2420015	VGCM2420050	M24 × 2.0	6H	140	27	18	14.5	17	4	374
VGCM2430015	VGCM2430050	M24 × 3.0	6H	160	34	18	14.5	17	4	376

1.5P Tap is removed external center as bottoming type

• Applicable Workpiece

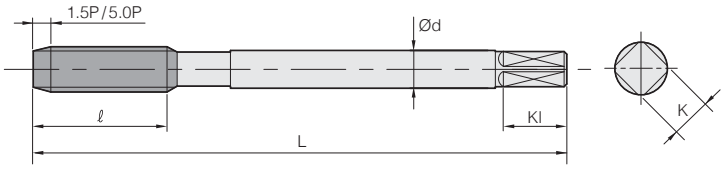
Low carbon steels	Medium carbon steels	High carbon steels	Alloy steel	Hardened steels			Stainless steels	Tool steels	Cast steels	Cast iron	High strength steels	Copper	Brass	Casting brass	Bronze	Aluminum rolled material	Aluminum alloy castings	Magnesium alloy castings	Zinc alloy castings	Titanium alloys	Nickel alloy	Thermoset-ting plastic	Thermo-plastic
C ~0.25%	C0.25% ~0.45%	C 0.45%~	SCM	25~45 HrC	45~55 HrC	50~60 HrC	SUS	SKD	SC	FC	FCD	Cu	Bs	BsC	PB	AL	AC, ADC	MC	ZDC				
○	○	○	○	○									○	○	○		○	○	○				

◎: Excellent ○: Good

VGHM

DIN straight flute taps

DIN 371-376 374 | HSSE | HOMO



Designation		Thread size	Limits	L	ℓ	d	K	Kl	Z	Din type
1.5P	5P									
VGHM0305015	VGHM0305050	M3 × 0.5	6H	56	11	3.5	2.7	6	3	371
VGHM0407015	VGHM0407050	M4 × 0.7	6H	63	13	4.5	3.4	6	3	371
VGHM0508015	VGHM0508050	M5 × 0.8	6H	70	15	6	4.9	8	3	371
VGHM0610015	VGHM0610050	M6 × 1.0	6H	80	17	6	4.9	8	3	371
VGHM0810015	VGHM0810050	M8 × 1.0	6H	90	17	6	4.9	8	4	374
VGHM0812515	VGHM0812550	M8 × 1.25	6H	90	20	8	6.2	9	4	371
VGHM1010015	VGHM1010050	M10 × 1.0	6H	90	18	7	5.5	8	4	374
VGHM1012515	VGHM1012550	M10 × 1.25	6H	100	22	7	5.5	8	4	374
VGHM1015015	VGHM1015050	M10 × 1.5	6H	100	22	10	8	11	4	371
VGHM1210015	VGHM1210050	M12 × 1.0	6H	100	18	9	7	10	4	374
VGHM1212515	VGHM1212550	M12 × 1.25	6H	100	22	9	7	10	4	374
VGHM1215015	VGHM1215050	M12 × 1.5	6H	100	22	9	7	10	4	374
VGHM1217515	VGHM1217550	M12 × 1.75	6H	110	24	9	7	10	4	376
VGHM1415015	VGHM1415050	M14 × 1.5	6H	100	22	11	9	12	4	374
VGHM1420015	VGHM1420050	M14 × 2.0	6H	110	26	11	9	12	4	376
VGHM1615015	VGHM1615050	M16 × 1.5	6H	100	22	12	9	12	4	374
VGHM1620015	VGHM1620050	M16 × 2.0	6H	110	27	12	9	12	4	376
VGHM1815015	VGHM1815050	M18 × 1.5	6H	110	25	14	11	14	4	374
VGHM1825015	VGHM1825050	M18 × 2.5	6H	125	30	14	11	14	4	376
VGHM2015015	VGHM2015050	M20 × 1.5	6H	125	25	16	12	15	4	374
VGHM2025015	VGHM2025050	M20 × 2.5	6H	140	32	16	12	15	4	376
VGHM2215015	VGHM2215050	M22 × 1.5	6H	125	25	18	14.5	17	4	374
VGHM2225015	VGHM2225050	M22 × 2.5	6H	140	32	18	14.5	17	4	376
VGHM2415015	VGHM2415050	M24 × 1.5	6H	140	27	18	14.5	17	4	374
VGHM2420015	VGHM2420050	M24 × 2.0	6H	140	27	18	14.5	17	4	374
VGHM2430015	VGHM2430050	M24 × 3.0	6H	160	34	18	14.5	17	4	376

1.5P Tap is removed external center as bottoming type

• Applicable Workpiece

Low carbon steels	Medium carbon steels	High carbon steels	Alloy steel	Hardened steels			Stainless steels	Tool steels	Cast steels	Cast iron	High strength steels	Copper	Brass	Casting brass	Bronze	Aluminum rolled material	Aluminum alloy castings	Magnesium alloy castings	Zinc alloy castings	Titanium alloys	Nickel alloy	Thermosetting plastic	Thermoplastic
C ~0.25%	C0.25% ~0.45%	C 0.45%~	SCM	25~45 HrC	45~55 HrC	50~60 HrC	SUS	SKD	SC	FC	FCD	Cu	Bs	BsC	PB	AL	AC, ADC	MC	ZDC				
○	○	○	○	○									○	○	○		○	○	○				

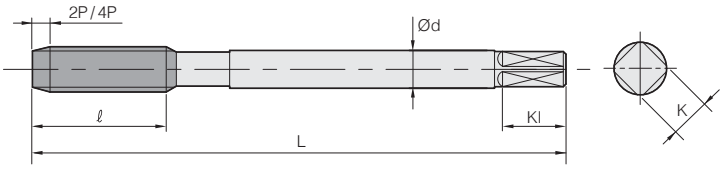
◎: Excellent ○: Good

Thread **TAP**

VMOM

DIN roll taps

DIN 371-376 374 | HSSE | Un-coated



Designation		Thread size	Limits	L	ℓ	d	K	KI	Oil groove
2P	4P								
VMOM0305020S	-	M3 × 0.5	6HX	56	11	3.5	2.7	6	S
VMOM0305020M	VMOM0305040M	M3 × 0.5	6HX	56	11	3.5	2.7	6	M
VMOM0407020S	-	M4 × 0.7	6HX	63	13	4.5	3.4	6	S
VMOM0407020M	VMOM0407040M	M4 × 0.7	6HX	63	13	4.5	3.4	6	M
VMOM0508020S	-	M5 × 0.8	6HX	70	15	6	4.9	8	S
VMOM0508020M	VMOM0508040M	M5 × 0.8	6HX	70	15	6	4.9	8	M
VMOM0610020S	-	M6 × 1.0	6HX	80	17	6	4.9	8	S
VMOM0610020M	VMOM0610040M	M6 × 1.0	6HX	80	17	6	4.9	8	M
VMOM0810020S	-	M8 × 1.0	6HX	90	17	6	4.9	8	S
VMOM0810020M	VMOM0810040M	M8 × 1.0	6HX	90	17	6	4.9	8	M
VMOM0812520S	-	M8 × 1.25	6HX	90	20	8	6.2	9	S
VMOM0812520M	VMOM0812540M	M8 × 1.25	6HX	90	20	8	6.2	9	M
VMOM1010020S	-	M10 × 1.0	6HX	90	18	7	5.5	8	S
VMOM1010020M	VMOM1010040M	M10 × 1.0	6HX	90	18	7	5.5	8	M
VMOM1012520S	-	M10 × 1.25	6HX	100	22	7	5.5	8	S
VMOM1012520M	VMOM1012540M	M10 × 1.25	6HX	100	22	7	5.5	8	M
VMOM1015020S	-	M10 × 1.5	6HX	100	22	10	8	11	S
VMOM1015020M	VMOM1015040M	M10 × 1.5	6HX	100	22	10	8	11	M
VMOM1210020S	-	M12 × 1.0	6HX	100	18	9	7	10	S
-	VMOM1210040M	M12 × 1.0	6HX	100	18	9	7	10	M
VMOM1212520S	-	M12 × 1.25	6HX	100	22	9	7	10	S
VMOM1212520M	VMOM1212540M	M12 × 1.25	6HX	100	22	9	7	10	M
VMOM1215020S	-	M12 × 1.5	6HX	100	22	9	7	10	S
VMOM1215020M	VMOM1215040M	M12 × 1.5	6HX	100	22	9	7	10	M
VMOM1217520S	-	M12 × 1.75	6HX	110	24	9	7	10	S
VMOM1217520M	VMOM1217540M	M12 × 1.75	6HX	100	24	9	7	10	M

2.0P Tap is removed external center as bottoming type

Oil groove S: 1 oil groove
Oil groove M: 4 oil groove

• Applicable Workpiece

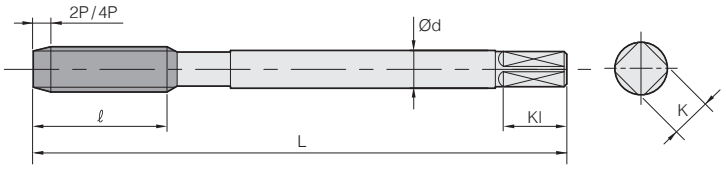
Low carbon steels	Medium carbon steels	High carbon steels	Alloy steel	Hardened steels			Stainless steels	Tool steels	Cast steels	Cast iron	High strength steels	Copper	Brass	Casting brass	Bronze	Aluminum rolled material	Aluminum alloy castings	Magnesium alloy castings	Zinc alloy castings	Titanium alloys	Nickel alloy	Thermosetting plastic	Thermoplastic
C ~0.25%	C0.25% ~0.45%	C 0.45%~	SCM	25~45 HrC	45~55 HrC	50~60 HrC	SUS	SKD	SC	FC	FCD	Cu	Bs	BsC	PB	AL	AC, ADC	MC	ZDC				
												◎	◎	◎		◎	◎		◎				

◎: Excellent ○: Good

VMTM

DIN roll taps

DIN 371-376 374 | HSSE | TiN



Designation		Thread size	Limits	L	ℓ	d	K	KI	Oil groove
2P	4P								
VMTM0305020S	-	M3 × 0.5	6HX	56	11	3.5	2.7	6	S
VMTM0305020M	VMTM0305040M	M3 × 0.5	6HX	56	11	3.5	2.7	6	M
VMTM0407020S	-	M4 × 0.7	6HX	63	13	4.5	3.4	6	S
VMTM0407020M	VMTM0407040M	M4 × 0.7	6HX	63	13	4.5	3.4	6	M
VMTM0508020S	-	M5 × 0.8	6HX	70	15	6	4.9	8	S
VMTM0508020M	VMTM0508040M	M5 × 0.8	6HX	70	15	6	4.9	8	M
VMTM0610020S	-	M6 × 1.0	6HX	80	17	6	4.9	8	S
VMTM0610020M	VMTM0610040M	M6 × 1.0	6HX	80	17	6	4.9	8	M
VMTM0810020S	-	M8 × 1.0	6HX	90	17	8	6.2	9	S
VMTM0810020M	VMTM0810040M	M8 × 1.0	6HX	90	17	8	6.2	9	M
VMTM0812520S	-	M8 × 1.25	6HX	90	20	8	6.2	9	S
VMTM0812520M	VMTM0812540M	M8 × 1.25	6HX	90	20	8	6.2	9	M
VMTM1010020S	-	M10 × 1.0	6HX	90	18	10	8	11	S
VMTM1010020M	VMTM1010040M	M10 × 1.0	6HX	90	18	10	8	11	M
VMTM1012520S	-	M10 × 1.25	6HX	100	22	10	8	11	S
VMTM1012520M	VMTM1012540M	M10 × 1.25	6HX	100	22	10	8	11	M
VMTM1015020S	-	M10 × 1.5	6HX	100	22	10	8	11	S
VMTM1015020M	VMTM1015040M	M10 × 1.5	6HX	100	22	10	8	11	M
VMTM1210020S	-	M12 × 1.0	6HX	100	18	9	7	10	S
-	VMTM1210040M	M12 × 1.0	6HX	100	18	9	7	10	M
VMTM1212520S	-	M12 × 1.25	6HX	100	22	9	7	10	S
VMTM1212520M	VMTM1212540M	M12 × 1.25	6HX	100	22	9	7	10	M
VMTM1215020S	-	M12 × 1.5	6HX	100	22	9	7	10	S
VMTM1215020M	VMTM1215040M	M12 × 1.5	6HX	100	22	9	7	10	M
VMTM1217520S	-	M12 × 1.75	6HX	110	24	9	7	10	S
VMTM1217520M	VMTM1217540M	M12 × 1.75	6HX	110	24	9	7	10	M

2.0P Tap is removed external center as bottoming type

Oil groove S: 1 oil groove
Oil groove M: 4 oil groove

• Applicable Workpiece

Low carbon steels	Medium carbon steels	High carbon steels	Alloy steel	Hardened steels			Stainless steels	Tool steels	Cast steels	Cast iron	High strength steels	Copper	Brass	Casting brass	Bronze	Aluminum rolled material	Aluminum alloy castings	Magnesium alloy castings	Zinc alloy castings	Titanium alloys	Nickel alloy	Thermosetting plastic	Thermoplastic
C ~0.25%	C0.25% ~0.45%	C 0.45%~	SCM	25~45 HrC	45~55 HrC	50~60 HrC	SUS	SKD	SC	FC	FCD	Cu	Bs	BsC	PB	AL	AC, ADC	MC	ZDC				
												◎	◎	◎		◎	◎		◎				

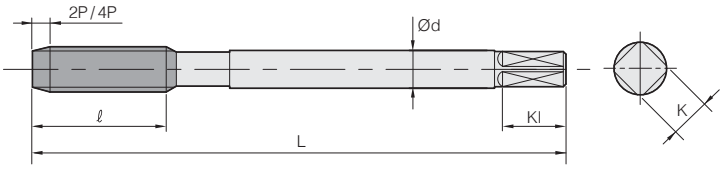
◎: Excellent ○: Good

Thread **TAP**

VMCM

DIN roll taps

DIN 371-376 374 | HSSE | TiCN



Designation		Thread size	Limits	L	ℓ	d	K	KI	Oil groove
2P	4P								
VMCM0305020S	-	M3 × 0.5	6HX	56	11	3.5	2.7	6	S
VMCM0305020M	VMCM0305040M	M3 × 0.5	6HX	56	11	3.5	2.7	6	M
VMCM0407020S	-	M4 × 0.7	6HX	63	13	4.5	3.4	6	S
VMCM0407020M	VMCM0407040M	M4 × 0.7	6HX	63	13	4.5	3.4	6	M
VMCM0508020S	-	M5 × 0.8	6HX	70	15	6	4.9	8	S
VMCM0508020M	VMCM0508040M	M5 × 0.8	6HX	70	15	6	4.9	8	M
VMCM0610020S	-	M6 × 1.0	6HX	80	17	6	4.9	8	S
VMCM0610020M	VMCM0610040M	M6 × 1.0	6HX	80	17	6	4.9	8	M
VMCM0810020S	-	M8 × 1.0	6HX	90	17	8	6.2	9	S
VMCM0810020M	VMCM0810040M	M8 × 1.0	6HX	90	17	8	6.2	9	M
VMCM0812520S	-	M8 × 1.25	6HX	90	20	8	6.2	9	S
VMCM0812520M	VMCM0812540M	M8 × 1.25	6HX	90	20	8	6.2	9	M
VMCM1010020S	-	M10 × 1.0	6HX	90	18	10	8	11	S
VMCM1010020M	VMCM1010040M	M10 × 1.0	6HX	90	18	10	8	11	M
VMCM1012520S	-	M10 × 1.25	6HX	100	22	10	8	11	S
VMCM1012520M	VMCM1012540M	M10 × 1.25	6HX	100	22	10	8	11	M
VMCM1015020S	-	M10 × 1.5	6HX	100	22	10	8	11	S
VMCM1015020M	VMCM1015040M	M10 × 1.5	6HX	100	22	10	8	11	M
VMCM1210020S	-	M12 × 1.0	6HX	100	18	9	7	10	S
-	VMCM1210040M	M12 × 1.0	6HX	100	18	9	7	10	M
VMCM1212520S	-	M12 × 1.25	6HX	100	22	9	7	10	S
VMCM1212520M	VMCM1212540M	M12 × 1.25	6HX	100	22	9	7	10	M
VMCM1215020S	-	M12 × 1.5	6HX	100	22	9	7	10	S
VMCM1215020M	VMCM1215040M	M12 × 1.5	6HX	100	22	9	7	10	M
VMCM1217520S	-	M12 × 1.75	6HX	110	24	9	7	10	S
VMCM1217520M	VMCM1217540M	M12 × 1.75	6HX	110	24	9	7	10	M

2.0P Tap is removed external center as bottoming type

Oil groove S: 1 oil groove
Oil groove M: 4 oil groove

• Applicable Workpiece

Low carbon steels	Medium carbon steels	High carbon steels	Alloy steel	Hardened steels			Stainless steels	Tool steels	Cast steels	Cast iron	High strength steels	Copper	Brass	Casting brass	Bronze	Aluminum rolled material	Aluminum alloy castings	Magnesium alloy castings	Zinc alloy castings	Titanium alloys	Nickel alloy	Thermoset-ting plastic	Thermo-plastic
C ~0.25%	C0.25% ~0.45%	C 0.45%~	SCM	25~45 HrC	45~55 HrC	50~60 HrC	SUS	SKD	SC	FC	FCD	Cu	Bs	BsC	PB	AL	AC, ADC	MC	ZDC				
												◎	◎	◎		◎	◎		◎				

◎: Excellent ○: Good

Recommended Cutting Conditions


Endmill


Drill


Reamer


Chamfer

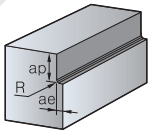

Thread

Super Endmill For HRSA

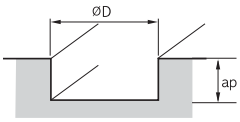
SFES4000 (Flat), SRES4000 (Radius)

Workpiece / Conditions / Diameter (Ø)	Ni based heat resistant super alloy (Inconel718, 625)			
	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
3	3,800	220	2,500	125
4	3,000	240	1,900	135
5	2,450	245	1,500	145
6	2,100	250	1,250	145
8	1,600	225	945	155
10	1,250	215	760	145
12	1,050	210	630	145
16	765	210	475	110
20	635	200	380	110

Application tip



■ **Shouldering depth**
- ap: ≤ 1.5D
- ae: ≤ 0.05D



■ **Slotting depth**
- ap: ≤ 0.2D

※ Notice

- Please adjust the recommended cutting conditions properly, according to the condition of your machines, the target shapes, and your purpose for machining.
- Please set the machine with high rigidity and check the workpiece clamping.
- Please select proper coolant for workpiece materials and check the pressure and amount of coolant enough for machining.
- In case of chattering, reduce RPM and feed rate by the same ratio.

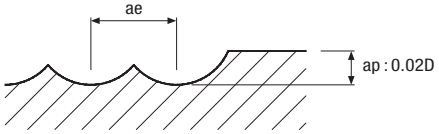
H-Star Endmill

ESB702, ESB712 series

Workpiece	Hardened steels Heat resistant alloy		Hardened steels									
Conditions	HRC30~40		HRC40~50		HRC50~55		HRC55~60		HRC60~65		HRC65~70	
Diameter(Ø)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
~0.2	50,000	1,200	50,000	1,050	45,000	960	40,000	770	35,000	674	31,500	570
0.3	50,000	1,500	50,000	1,350	45,000	1,200	40,000	765	35,000	840	31,500	700
0.4	50,000	1,900	50,000	1,700	45,000	1,500	40,000	1,200	35,000	1,050	31,500	1,100
0.5	50,000	2,400	50,000	2,100	45,000	1,900	40,000	1,500	35,000	1,300	31,500	1,100
0.6	50,000	2,900	50,000	2,500	45,000	2,200	40,000	1,800	35,000	1,600	31,500	1,400
0.8	50,000	3,900	50,000	3,300	45,000	3,000	40,000	2,400	35,000	1,600	31,500	1,800
1	50,000	4,800	50,000	4,200	45,000	3,800	40,000	3,000	35,000	2,600	35,000	2,300
1.5	50,000	5,400	48,000	4,500	43,000	4,000	23,000	3,100	33,000	2,700	29,700	2,300
2	49,700	5,700	47,800	4,800	40,000	4,000	35,000	3,150	32,000	2,800	28,500	2,300
3	33,100	6,000	31,800	5,300	26,500	4,000	23,500	3,150	21,000	28,00	19,000	2,300
4	24,900	6,000	23,900	5,300	20,000	4,000	17,500	3,150	16,000	2,800	14,500	2,300
5	18.6	5,800	17,800	4,900	15,000	3,750	13,500	3,050	11,500	2,550	10,500	2,100
6	13,900	4,850	13,400	4,100	11,000	3,100	10,000	2,500	8,800	2,150	8,000	1,750
8	11,100	4,200	10,700	3,500	9,000	2,700	8,000	2,150	7,000	1,850	6,500	1,550
10	9,300	3,700	8,900	3,100	7,500	2,400	6,600	1,900	5,800	1,650	5,300	1,380
12	6,950	2,950	6,680	2,500	5,600	1,900	5,000	1,550	4,400	1,250	4,000	1,050

Application tip

*ae : D1 ~ D4 = 0.05 × D
D5 ~ D8 = 0.025mm
D10 ~ D20 = 0.30mm

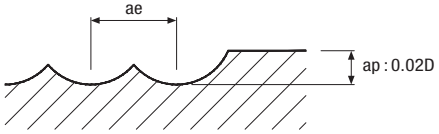


ESB703 series

Workpiece	Hardened steels											
Conditions	HRC30~40		HRC40~50		HRC50~55		HRC55~60		HRC60~65		HRC65~70	
D × R(mm)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
2	57,000	7,100	55,000	6,000	46,000	5,000	40,300	3,900	36,800	3,500	32,800	2,900
2.5	57,000	7,100	55,000	6,000	46,000	5,000	40,300	3,900	36,800	3,500	32,800	2,900
3	38,000	7,500	36,600	6,600	30,500	5,000	27,000	3,900	24,200	3,500	21,900	2,900
4	28,500	7,500	27,500	6,600	23,000	5,000	20,100	3,900	18,400	3,500	16,700	2,900
5	21,500	7,300	20,500	6,100	17,300	4,700	15,500	3,800	13,200	3,200	12,100	2,600
6	16,000	6,100	15,400	5,100	12,700	3,900	11,500	3,100	10,100	2,700	9,200	2,200
8	12,700	5,300	12,300	4,400	10,400	3,400	9,200	2,700	8,100	2,300	7,500	1,900
10	10,700	4,600	10,200	3,900	8,600	3,000	7,600	2,400	6,700	2,100	6,100	1,700
12	8,000	3,700	7,700	3,100	6,400	2,400	5,800	1,900	5,100	1,600	4,600	1,300

Application tip

*ae : D1 ~ D4 = 0.05 × D
D5 ~ D8 = 0.025mm
D10 ~ D20 = 0.30mm



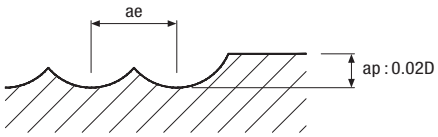
H-Star Endmill

ESB734 series

Workpiece	Hardened steels											
Conditions	HRC30~40		HRC40~50		HRC50~55		HRC55~60		HRC60~65		HRC65~70	
Diameter(Ø)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
2	62,100	8,600	59,800	7,200	50,000	6,000	43,800	4,700	40,000	4,200	35,600	3,500
2.5	62,100	8,600	59,800	7,200	50,000	6,000	43,800	4,700	40,000	4,200	35,600	3,500
3	41,400	9,000	39,800	8,000	33,100	6,000	29,400	4,700	26,300	4,200	23,800	3,500
4	31,100	9,000	29,900	8,000	25,000	6,000	21,900	4,700	20,000	4,200	18,100	3,500
5	23,300	8,700	22,300	7,400	18,800	5,600	16,900	4,600	14,400	3,800	13,100	3,200
6	17,400	7,300	16,800	6,200	13,800	4,700	12,500	3,800	11,000	3,200	10,000	2,600
8	13,900	6,300	13,400	5,300	11,300	4,100	10,000	3,200	8,800	2,800	8,100	2,300
10	11,600	5,600	11,100	4,700	9,400	3,600	8,300	2,900	7,300	2,500	6,600	2,100

Application tip

*ae : D1 ~ D4 = 0.05 × D
D5 ~ D8 = 0.025mm
D10 ~ D20 = 0.30mm

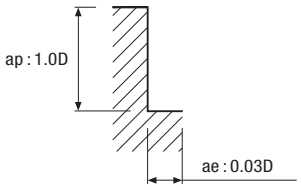


ESE702 series

Side cutting

Workpiece	Hardened steel Heat resistant alloy		Hardened steels									
Conditions	HRC30~40		HRC40~50		HRC50~55		HRC55~60		HRC60~65		HRC65~70	
Diameter(Ø)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
1	48,000	1,050	38,000	820	25,500	510	20,500	310	16,000	190	12,500	125
2	33,300	1,200	26,000	970	17,500	600	14,500	370	11,000	230	9,500	165
3	21,800	1,200	17,300	970	11,500	600	9,500	370	7,500	230	6,400	165
4	16,700	1,250	13,200	1,000	8,800	625	7,200	385	5,600	240	4,750	170
5	15,700	1,450	12,500	1,150	8,300	710	6,400	410	5,100	260	4,450	190
6	13,100	1,350	10,350	1,100	6,900	690	5,300	400	4,200	255	3,700	185
8	9,880	1,320	7,800	1,030	5,200	635	4,000	365	3,200	235	2,800	170
10	7,800	1,200	6,150	970	4,100	590	3,200	340	2,550	220	2,200	160
12	6,650	1,200	5,250	970	3,500	590	2,650	340	2,100	220	1,860	160
16	4,900	1,050	3,900	840	2,600	520	2,000	300	1,600	190	1,400	140
20	3,900	950	3,100	750	2,050	475	1,600	275	1,300	175	1,100	125

Application tip

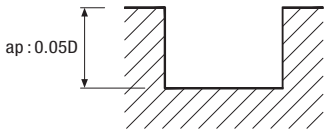


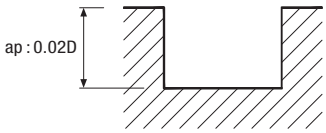
ESE702 series

Slotting

Workpiece	Hardened steel Heat resistant alloy		Hardened steels									
Conditions	HRC30~40		HRC40~50		HRC50~55		HRC55~60		HRC60~65		HRC65~70	
Diameter(Ø)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
~0.2	50,000	130	45,000	115	40,000	95	33,000	60	33,000	45	26,400	30
0.3	50,000	190	45,000	140	40,000	115	33,000	70	25,000	50	20,000	35
0.4	50,000	235	45,000	180	40,000	140	33,000	90	25,000	55	20,000	40
0.5	50,000	370	45,000	280	40,000	220	33,000	140	25,000	85	20,000	60
0.6	50,000	470	45,000	360	40,000	285	33,000	160	25,000	105	20,000	75
0.8	50,000	600	40,000	440	30,000	295	25,000	185	19,000	110	15,200	80
0.9	49,000	655	39,000	520	27,800	330	22,700	205	17,500	125	14,000	90
1	48,000	750	38,000	570	25,500	360	20,500	215	16,000	135	12,500	85
2	33,300	850	26,000	680	17,500	420	14,500	260	11,000	160	9,500	115
3	21,800	850	17,300	680	11,500	420	9,500	260	7,500	160	6,400	115
4	16,700	880	13,200	700	8,800	440	7,200	270	5,600	170	4,750	118
5	15,700	1,000	12,500	805	8,300	500	6,400	285	5,100	180	4,450	132
6	13,100	950	10,350	770	6,900	480	5,300	280	4,200	180	3,700	130
8	9,880	930	7,800	720	5,200	445	4,000	255	3,200	165	2,800	120
10	7,800	850	6,150	680	4,100	415	3,200	240	2,550	155	2,200	122
12	6,650	850	5,250	680	3,500	415	2,650	240	2,100	155	1,860	112
16	4,900	730	3,900	580	2,600	365	2,000	210	1,600	135	1,400	95
20	3,900	660	3,100	525	2,050	335	1,600	195	1,300	125	1,100	85

Application tip



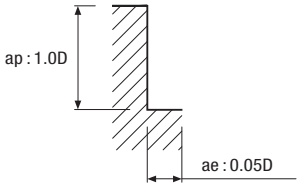


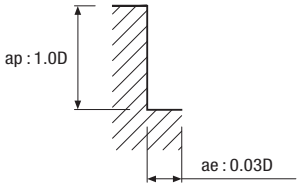
ESE704, ESE714, ESE744 series

Side cutting

Workpiece	Hardened steel Heat resistant alloy		Hardened steels									
Conditions	HRC30~40		HRC40~50		HRC50~55		HRC55~60		HRC60~65		HRC65~70	
Diameter(Ø)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
1	48,000	1,480	38,000	1,050	25,500	710	20,500	430	16,000	270	12,500	175
2	33,300	1,750	26,000	1,250	17,500	840	14,500	520	11,000	320	9,500	230
3	21,800	1,750	17,300	1,250	11,500	840	9,500	520	7,500	320	6,400	230
4	16,700	1,800	13,200	1,300	8,800	880	7,200	540	5,600	335	4,750	240
5	15,700	2,000	12,500	1,500	8,300	1,000	6,400	580	5,100	370	4,450	270
6	13,100	1,950	10,350	1,400	6,900	950	5,300	560	4,200	350	3,700	260
8	9,880	1,880	7,800	1,350	5,200	900	4,000	520	3,200	330	2,800	240
10	7,800	1,750	6,150	1,260	4,100	840	3,200	480	2,550	310	2,200	220
12	6,650	1,750	5,250	1,260	3,500	840	2,650	480	2,100	300	1,860	220
16	4,900	1,500	3,900	1,100	2,600	730	2,000	420	1,600	270	1,400	200
20	3,900	1,300	3,100	970	2,050	650	1,600	380	1,300	250	1,100	180

Application tip





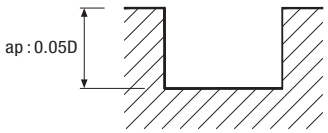
H-Star Endmill

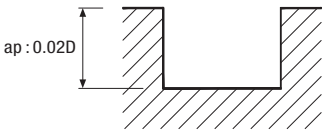
ESE712 series

Slotting

Workpiece	Hardened steel Heat resistant alloy		Hardened steels									
Conditions	HRC30~40		HRC40~50		HRC50~55		HRC55~60		HRC60~65		HRC65~70	
Diameter(Ø)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
0.2	50,000	130	45,000	115	40,000	95	33,000	60	33,000	45	26,400	30
0.3	50,000	190	45,000	140	40,000	115	33,000	70	25,000	50	20,000	35
0.4	50,000	235	45,000	180	40,000	140	33,000	90	25,000	55	20,000	40
0.5	50,000	370	45,000	280	40,000	220	33,000	140	25,000	85	20,000	60
0.6	50,000	470	45,000	360	40,000	285	30,000	160	25,000	105	20,000	75
0.8	50,000	600	40,000	440	30,000	295	25,000	185	19,000	110	15,200	80
0.9	49,000	655	39,000	520	27,800	330	22,700	205	17,500	125	14,000	90
1	48,000	750	38,000	570	25,500	360	20,500	215	16,000	135	12,500	85
2	33,300	850	26,000	680	17,500	420	14,500	260	11,000	160	9,500	115
3	21,800	850	17,300	680	11,500	420	9,500	260	7,500	160	6,400	115
4	16,700	880	13,200	700	8,800	440	7,200	270	5,600	170	4,750	118
5	15,700	1,000	12,500	805	8,300	500	6,400	285	5,100	180	4,450	132
6	13,100	950	10,350	770	6,900	480	5,300	280	4,200	180	3,700	130
8	9,880	930	7,800	720	5,200	445	4,000	255	3,200	165	2,800	120
10	7,800	850	6,150	680	4,100	415	3,200	240	2,550	155	2,200	112
12	6,650	850	5,250	680	3,500	415	2,650	240	2,100	155	1,860	112
16	4,900	730	3,900	580	2,600	365	2,000	210	1,600	135	1,400	95
20	3,900	660	3,100	525	2,050	335	1,600	195	1,300	125	1,100	85

Application tip



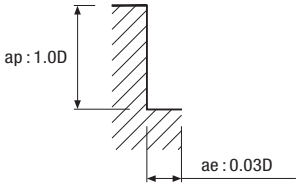


ESE712 series

Side cutting

Workpiece	Hardened steels Heat resistant alloy		Hardened steels									
Conditions	HRC30~40		HRC40~50		HRC50~55		HRC55~60		HRC60~65		HRC65~70	
Diameter(Ø)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
1	48,000	1,050	38,000	820	25,500	510	20,500	310	16,000	190	12,500	125
2	33,300	1,200	26,000	970	17,500	600	14,500	370	11,000	230	9,500	165
3	21,800	1,200	17,300	970	11,500	600	9,500	370	7,500	230	6,400	165
4	16,700	1,250	13,200	1,000	8,800	625	7,200	385	5,600	240	4,750	170
5	15,700	1,450	12,500	1,150	8,300	710	6,400	410	5,100	260	4,450	190
6	13,100	1,350	10,350	1,100	6,900	690	5,300	400	4,200	255	3,700	185
8	9,880	1,320	7,800	1,030	5,200	635	4,000	365	3,200	235	2,800	170
10	7,800	1,200	6,150	970	4,100	590	3,200	340	2,550	220	2,200	160
12	6,650	1,200	5,250	970	3,500	590	2,650	340	2,100	220	1,860	160
16	4,900	1,050	3,900	840	2,600	520	2,000	300	1,600	190	1,400	140
20	3,900	950	3,100	750	2,050	475	1,600	275	1,300	175	1,100	125

Application tip

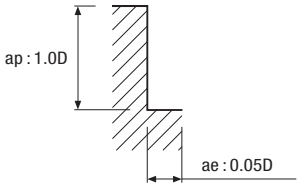


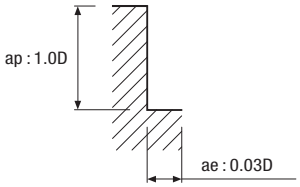
ESE716 series

Side cutting

Workpiece	Hardened steels Heat resistant alloy		Hardened steels									
Conditions	HRC30~40		HRC40~50		HRC50~55		HRC55~60		HRC60~65		HRC65~70	
Diameter(Ø)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
6	24,800	5,350	23,500	4,900	16,000	4,900	13,500	3,300	10,500	2,100	8,000	1,450
8	20,000	5,500	19,000	5,000	12,000	4,600	10,000	3,100	8,000	2,000	6,000	1,400
10	16,000	4,900	15,500	4,500	9,500	4,100	8,000	2,900	6,400	1,800	4,800	1,300
12	13,000	4,500	12,500	4,100	8,000	3,800	6,600	2,500	5,300	1,600	4,000	1,150
16	10,000	4,000	9,700	3,700	6,000	3,400	5,000	2,300	4,000	1,250	3,000	870
20	8,000	3,350	7,800	3,400	4,800	3,200	4,000	2,100	3,200	1,020	2,400	690

Application tip



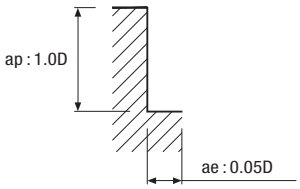


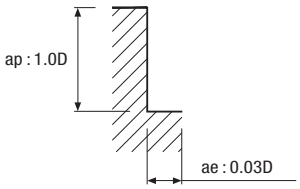
ESE724 series

Side cutting

Workpiece	Hardened steels Heat resistant alloy		Hardened steels									
Conditions	HRC30~40		HRC40~50		HRC50~55		HRC55~60		HRC60~65		HRC65~70	
Diameter(Ø)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
1	48,000	1,480	38,000	1,050	25,500	710	20,500	430	16,000	270	12,500	175
2	33,300	1,750	26,000	1,250	17,500	840	14,500	520	11,000	320	9,500	230
3	21,800	1,750	17,300	1,250	11,500	840	9,500	520	7,500	320	6,400	230
4	16,700	1,800	13,200	1,300	8,800	880	7,200	540	5,600	335	4,750	240
5	15,700	2,000	12,500	1,500	8,300	1,000	6,400	580	5,100	370	4,450	270
6	13,100	1,950	10,350	1,400	6,900	950	5,300	560	4,200	350	3,700	260
8	9,880	1,880	7,800	1,350	5,200	900	4,000	520	3,200	330	2,800	240
10	7,800	1,750	6,150	1,260	4,100	840	3,200	480	2,550	310	2,200	220
12	6,650	1,750	5,250	1,260	3,500	840	2,650	480	2,100	300	1,860	220
16	4,900	1,500	3,900	1,100	2,600	730	2,000	420	1,600	270	1,400	200
20	3,900	1,300	3,100	970	2,050	650	1,600	380	1,300	250	1,100	180

Application tip



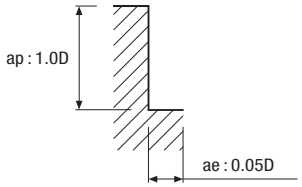


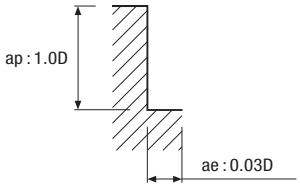
H-Star Endmill

ESE726, ESR736 series

Workpiece	Hardened steels Heat resistant alloy		Hardened steels									
Conditions	HRC30~40		HRC40~50		HRC50~55		HRC55~60		HRC60~65		HRC65~70	
Diameter(Ø)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
6	24,800	5,350	23,500	4,900	16,000	4,900	13,500	3,300	10,500	2,100	8,000	1,450
8	20,000	5,500	19,000	5,000	12,000	4,600	10,000	3,100	8,000	2,000	6,000	1,400
10	16,000	4,900	15,500	4,500	9,500	4,100	8,000	2,900	6,400	1,800	4,800	1,300
12	13,000	4,500	12,500	4,100	8,000	3,800	6,600	2,500	5,300	1,600	4,000	1,150
16	10,000	4,000	9,700	3,700	6,000	3,400	5,000	2,300	4,000	1,250	3,000	870
20	8,000	3,350	7,800	3,400	4,800	3,200	4,000	2,100	3,200	1,020	2,400	690

Application tip



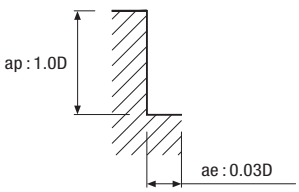


ESR702 series

Side cutting

Workpiece	Hardened steels Heat resistant alloy		Hardened steels									
Conditions	HRC30~40		HRC40~50		HRC50~55		HRC55~60		HRC60~65		HRC65~70	
Diameter(Ø)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
2	33,300	960	26,000	776	17,500	480	14,500	296	11,000	184	9,500	132
3	21,800	960	17,300	776	11,500	480	9,500	296	7,500	184	6,400	132
4	16,700	1,000	13,200	800	8,800	500	7,200	308	5,600	192	4,750	136
5	15,700	1,160	12,500	920	8,300	568	6,400	328	5,100	208	4,450	152
6	13,100	1,080	10,350	880	6,900	552	5,300	320	4,200	204	3,700	148
8	9,880	1,056	7,800	824	5,200	508	4,000	292	3,200	188	2,800	136
10	7,800	960	6,150	776	4,100	472	3,200	272	2,550	176	2,200	128
12	6,650	960	5,250	776	3,500	472	2,650	272	2,100	176	1,860	128
16	4,900	840	3,900	672	2,600	416	2,000	240	1,600	152	1,400	112
20	3,900	760	3,100	600	2,050	380	1,600	220	1,300	140	1,100	100

Application tip

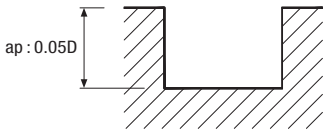


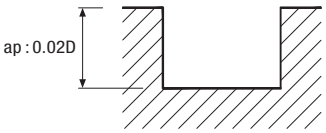
ESR702, ESR732 series

Slotting

Workpiece	Hardened steels Heat resistant alloy		Hardened steels									
Conditions	HRC30~40		HRC40~50		HRC50~55		HRC55~60		HRC60~65		HRC65~70	
Diameter(Ø)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
2	33,300	680	26,000	544	17,500	336	14,500	208	11,000	128	9,500	92
3	21,800	680	17,300	544	11,500	336	9,500	208	7,500	128	6,400	92
4	16,700	704	13,200	560	8,800	352	7,200	216	5,600	136	4,750	94
5	15,700	800	12,500	644	8,300	400	6,400	228	5,100	144	4,450	106
6	13,100	760	10,350	616	6,900	384	5,300	224	4,200	144	3,700	104
8	9,880	744	7,800	576	5,200	356	4,000	204	3,200	132	2,800	96
10	7,800	680	6,150	544	4,100	332	3,200	192	2,550	124	2,200	90
12	6,650	680	5,250	544	3,500	332	2,650	192	2,100	124	1,860	90
16	4,900	584	3,900	464	2,600	292	2,000	168	1,600	108	1,400	78
20	3,900	528	3,100	420	2,050	268	1,600	168	1,300	100	1,100	70

Application tip



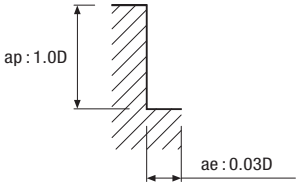


ESR724, ESR714, ESR734, ESR704 series

Side cutting

Workpiece	Hardened steels Heat resistant alloy		Hardened steels									
Conditions	HRC30~40		HRC40~50		HRC50~55		HRC55~60		HRC60~65		HRC65~70	
Diameter(Ø)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
3	21,800	1,400	17,300	1,000	11,500	672	9,500	416	7,500	256	6,400	184
4	16,700	1,440	13,200	1,040	8,800	704	7,200	432	5,600	268	4,750	192
5	15,700	1,600	12,500	1,200	8,300	800	6,400	464	5,100	296	4,450	216
6	13,100	1,560	10,350	1,120	6,900	760	5,300	448	4,200	280	3,700	208
8	9,880	1,504	7,800	1,080	5,200	720	4,000	416	3,200	264	2,800	192
10	7,800	1,400	6,150	1,008	4,100	672	3,200	384	2,550	248	2,200	176
12	6,650	1,400	5,250	1,008	3,500	672	2,650	384	2,100	240	1,860	176
16	4,900	1,200	3,900	880	2,600	584	2,000	336	1,600	216	1,400	160
20	3,900	1,040	3,100	776	2,050	520	1,600	304	1,300	200	1,100	144

Application tip

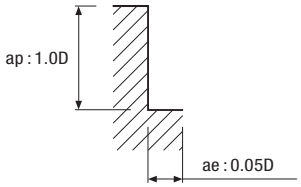


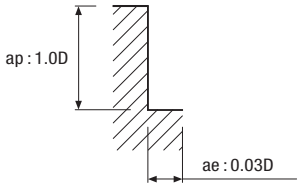
H-Star Endmill

ESR706 series

Workpiece	Hardened steels Heat resistant alloy		Hardened steels									
Conditions	HRC30~40		HRC40~50		HRC50~55		HRC55~60		HRC60~65		HRC65~70	
Diameter(Ø)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
6	24,800	5,350	23,500	4,900	16,000	4,900	13,500	3,300	10,500	2,100	8,000	1,450
8	20,000	5,500	19,000	5,000	12,000	4,600	10,000	3,100	8,000	2,000	6,000	1,400
10	16,000	4,900	15,500	4,500	9,500	4,100	8,000	2,900	6,400	1,800	4,800	1,300
12	13,000	4,500	12,500	4,100	8,000	3,800	6,600	2,500	5,300	1,600	4,000	1,150
16	10,000	4,000	9,700	3,700	6,000	3,400	5,000	2,300	4,000	1,250	3,000	870
20	8,000	3,350	7,800	3,400	4,800	3,200	4,000	2,100	3,200	1,020	2,400	690

Application tip





ESRB712

Workpiece		Alloy steels, Carbon steels (SCM, SNCM, S45C)			Pre-hardened steels (NAK, CENA, KP4)			Hardened steels (SKD, SKT, STAVAX)		
Strength		~HRC35			HRC35~45			HRC45~55		
Conditions		~1100N/mm²			1100~1500N/mm²			1500~2000N/mm²		
Diameter(Ø)	Effective Length	R.P.M n (min⁻¹)	Feed vf (mm/min)	ap (mm)	R.P.M n (min⁻¹)	Feed vf (mm/min)	ap (mm)	R.P.M n (min⁻¹)	Feed vf (mm/min)	ap (mm)
0.1	**0.3**	50,000	240	0.009	50,000	215	0.007	50,000	190	0.005
0.1	**0.5**	50,000	240	0.006	50,000	215	0.005	50,000	190	0.004
0.1	**1**	45,000	195	0.002	45,000	175	0.002	45,000	155	0.001
0.2	**0.5**	50,000	335	0.018	50,000	310	0.014	43,200	260	0.010
0.2	**1**	50,000	335	0.013	50,000	310	0.010	43,200	260	0.007
0.2	**1.5**	45,000	270	0.007	45,000	250	0.006	38,880	210	0.004
0.2	**2**	45,000	270	0.005	45,000	250	0.004	38,880	210	0.003
0.2	3	45,000	270	0.003	45,000	250	0.003	38,880	210	0.002
0.3	1	50,000	475	0.019	50,000	430	0.015	42,800	365	0.011
0.3	1.5	50,000	475	0.019	50,000	430	0.015	42,800	365	0.011
0.3	2	45,000	385	0.011	45,000	350	0.008	38,520	295	0.006
0.3	2.5	45,000	385	0.007	45,000	350	0.005	38,520	295	0.004
0.3	3	45,000	385	0.007	45,000	350	0.005	38,520	295	0.004
0.3	4	40,000	305	0.004	40,000	275	0.003	34,240	235	0.002
0.3	5	30,000	200	0.003	30,000	180	0.002	25,680	155	0.002
0.4	1	41,000	490	0.036	38,800	425	0.028	34,200	340	0.020
0.4	1.5	41,000	490	0.025	38,800	425	0.020	34,200	340	0.014
0.4	2	41,000	490	0.025	38,800	425	0.020	34,200	340	0.014
0.4	2.5	36,900	395	0.014	34,920	345	0.011	30,780	275	0.008
0.4	3	36,900	395	0.014	34,920	345	0.011	30,780	275	0.008
0.4	4	36,900	395	0.009	34,920	345	0.007	30,780	275	0.005
0.4	5	32,800	315	0.009	31,040	270	0.007	27,360	220	0.005
0.4	6	32,800	315	0.005	31,040	270	0.004	27,360	220	0.003
0.4	8	24,600	205	0.004	23,280	180	0.003	20,520	145	0.002
0.4	10	12,300	90	0.004	11,640	75	0.003	10,260	60	0.002
0.5	1	34,200	685	0.045	32,300	580	0.035	28,500	515	0.025
0.5	1.5	34,200	685	0.045	32,300	580	0.035	28,500	515	0.025
0.5	2	34,200	685	0.032	32,300	580	0.025	28,500	515	0.018
0.5	2.5	34,200	685	0.032	32,300	580	0.025	28,500	515	0.018
0.5	3	30,780	555	0.018	29,070	470	0.014	25,650	415	0.010
0.5	4	30,780	555	0.018	29,070	470	0.014	25,650	415	0.010
0.5	5	30,780	555	0.011	29,070	470	0.009	25,650	415	0.006
0.5	6	27,360	440	0.011	25,840	370	0.009	22,800	330	0.006
0.5	8	20,520	290	0.007	19,380	245	0.005	17,100	215	0.004
0.5	10	20,520	290	0.005	19,380	245	0.004	17,100	215	0.003
0.5	12	10,260	125	0.005	9,690	105	0.004	8,550	95	0.003
0.5	14	10,260	125	0.005	9,690	105	0.004	8,550	95	0.003
0.5	16	3,420	35	0.005	3,230	30	0.004	2,850	25	0.003
0.6	1	34,200	1,025	0.038	32,300	840	0.029	28,500	685	0.021
0.6	2	34,200	1,025	0.038	32,300	840	0.029	28,500	685	0.021
0.6	3	34,200	1,025	0.038	32,300	840	0.029	28,500	685	0.021
0.6	4	30,780	830	0.022	29,070	680	0.017	25,650	555	0.012
0.6	5	30,780	830	0.014	29,070	680	0.011	25,650	555	0.008
0.6	6	30,780	830	0.014	29,070	680	0.011	25,650	555	0.008

H-Star Endmill

ESRB712

Workpiece		Alloy steels, Carbon steels (SCM, SNCM, S45C)			Pre-hardened steels (NAK, CENA, KP4)			Hardened steels (SKD, SKT, STAVAX)		
Strength		~HRC35			HRC35~45			HRC45~55		
Conditions		~1100N/mm²			1100~1500N/mm²			1500~2000N/mm²		
Diameter(Ø)	Effective Length	R.P.M n (min⁻¹)	Feed vf (mm/min)	ap (mm)	R.P.M n (min⁻¹)	Feed vf (mm/min)	ap (mm)	R.P.M n (min⁻¹)	Feed vf (mm/min)	ap (mm)
0.6	8	27,360	655	0.008	25,840	540	0.006	22,800	440	0.005
0.6	10	20,520	430	0.005	19,380	355	0.004	17,100	290	0.003
0.6	12	20,520	430	0.005	19,380	355	0.004	17,100	290	0.003
0.6	14	10,260	185	0.005	9,690	150	0.004	8,550	125	0.003
0.6	16	10,260	185	0.005	9,690	150	0.004	8,550	125	0.003
0.7	2	34,200	1,130	0.063	32,300	930	0.049	28,500	765	0.035
0.7	4	30,780	915	0.025	29,070	755	0.020	25,650	620	0.014
0.7	6	30,780	915	0.016	29,070	755	0.012	25,650	620	0.009
0.7	8	27,360	725	0.016	25,840	595	0.012	22,800	490	0.009
0.7	10	27,360	725	0.009	25,840	595	0.007	22,800	490	0.005
0.7	12	20,520	475	0.006	19,380	390	0.005	17,100	320	0.004
0.8	2	34,200	1,230	0.072	32,300	1,035	0.056	28,500	855	0.040
0.8	3	34,200	1,230	0.050	32,300	1,035	0.039	28,500	855	0.028
0.8	4	34,200	1,230	0.050	32,300	1,035	0.039	28,500	855	0.028
0.8	5	30,780	995	0.029	29,070	840	0.022	25,650	695	0.016
0.8	6	30,780	995	0.029	29,070	840	0.022	25,650	695	0.016
0.8	8	30,780	995	0.018	29,070	840	0.014	25,650	695	0.010
0.8	10	27,360	785	0.018	25,840	660	0.014	22,800	545	0.010
0.8	12	27,360	785	0.011	25,840	660	0.008	22,800	545	0.006
0.8	14	20,520	515	0.007	19,380	435	0.006	17,100	360	0.004
0.8	16	20,520	515	0.007	19,380	435	0.006	17,100	360	0.004
0.8	20	10,260	220	0.007	9,690	185	0.006	8,550	155	0.004
0.9	4	29,250	1,120	0.032	27,630	935	0.025	24,390	775	0.018
0.9	6	29,250	1,120	0.032	27,630	935	0.025	24,390	775	0.018
0.9	8	29,250	1,120	0.020	27,630	935	0.016	24,390	775	0.011
0.9	10	26,000	885	0.020	24,560	740	0.016	21,680	610	0.011
1.0	2	30,800	1,540	0.090	29,100	1,310	0.070	25,700	1,075	0.050
1.0	3	30,800	1,540	0.090	29,100	1,310	0.070	25,700	1,075	0.050
1.0	4	30,800	1,540	0.063	29,100	1,310	0.049	25,700	1,075	0.035
1.0	5	30,800	1,540	0.063	29,100	1,310	0.049	25,700	1,075	0.035
1.0	6	27,720	1,245	0.036	26,190	1,060	0.028	23,130	870	0.020
1.0	7	27,720	1,245	0.036	26,190	1,060	0.028	23,130	870	0.020
1.0	8	27,720	1,245	0.036	26,190	1,060	0.028	23,130	870	0.020
1.0	10	27,720	1,245	0.023	26,190	1,060	0.018	23,130	870	0.013
1.0	12	24,640	985	0.023	23,280	840	0.018	20,560	690	0.013
1.0	14	24,640	985	0.014	23,280	840	0.011	20,560	690	0.008
1.0	16	18,480	645	0.014	17,460	550	0.011	15,420	450	0.008
1.0	18	18,480	645	0.009	17,460	550	0.007	15,420	450	0.005
1.0	20	18,480	645	0.009	17,460	550	0.007	15,420	450	0.005
1.0	22	9,240	275	0.009	8,730	235	0.007	7,710	195	0.005
1.0	26	9,240	275	0.009	8,730	235	0.007	7,710	195	0.005
1.0	30	9,240	275	0.009	8,730	235	0.007	7,710	195	0.005
1.0	40	3,080	75	0.009	2,910	65	0.007	2,570	55	0.005
1.0	50	3,080	75	0.006	2,910	65	0.005	2,570	55	0.003

ESRB712

Workpiece		Alloy steels, Carbon steels (SCM, SNCM, S45C)			Pre-hardened steels (NAK, CENA, KP4)			Hardened steels (SKD, SKT, STAVAX)		
Strength		~HRC35			HRC35~45			HRC45~55		
Conditions		~1100N/mm²			1100~1500N/mm²			1500~2000N/mm²		
Diameter(Ø)	Effective Length	R.P.M n (min⁻¹)	Feed vf (mm/min)	ap (mm)	R.P.M n (min⁻¹)	Feed vf (mm/min)	ap (mm)	R.P.M n (min⁻¹)	Feed vf (mm/min)	ap (mm)
1.2	4	26,300	1,375	0.076	24,800	1,150	0.059	21,900	950	0.042
1.2	6	26,300	1,375	0.076	24,800	1,150	0.059	21,900	950	0.042
1.2	8	23,670	1,115	0.043	22,320	930	0.034	19,710	770	0.024
1.2	10	23,670	1,115	0.027	22,320	930	0.021	19,710	770	0.015
1.2	12	23,670	1,115	0.027	22,320	930	0.021	19,710	770	0.015
1.2	16	21,040	880	0.016	19,840	735	0.013	17,520	610	0.009
1.2	20	15,780	580	0.011	14,880	485	0.008	13,140	400	0.006
1.2	26	7,890	245	0.011	7,440	205	0.008	6,570	170	0.006
1.4	6	21,500	1,295	0.088	20,300	1,100	0.069	18,000	935	0.049
1.4	8	19,350	1,050	0.050	18,270	890	0.039	16,200	755	0.028
1.4	10	19,350	1,050	0.050	18,270	890	0.039	16,200	755	0.028
1.4	16	17,200	830	0.032	16,240	705	0.025	14,400	600	0.018
1.5	4	23,900	1,580	0.135	22,600	1,355	0.105	20,000	1,075	0.075
1.5	5	23,900	1,580	0.095	22,600	1,355	0.074	20,000	1,075	0.053
1.5	6	23,900	1,580	0.095	22,600	1,355	0.074	20,000	1,075	0.053
1.5	7	23,900	1,580	0.095	22,600	1,355	0.074	20,000	1,075	0.053
1.5	8	21,510	1,280	0.054	20,340	1,100	0.042	18,000	870	0.030
1.5	10	21,510	1,280	0.054	20,340	1,100	0.042	18,000	870	0.030
1.5	12	21,510	1,280	0.054	20,340	1,100	0.042	18,000	870	0.030
1.5	14	21,510	1,280	0.034	20,340	1,100	0.026	18,000	870	0.019
1.5	16	19,120	1,010	0.034	18,080	865	0.026	16,000	690	0.019
1.5	18	19,120	1,010	0.034	18,080	865	0.026	16,000	690	0.019
1.5	20	19,120	1,010	0.020	18,080	865	0.016	16,000	690	0.011
1.5	22	19,120	1,010	0.020	18,080	865	0.016	16,000	690	0.011
1.5	26	14,340	665	0.014	13,560	570	0.011	12,000	450	0.008
1.5	30	14,340	665	0.014	13,560	570	0.011	12,000	450	0.008
1.5	35	7,170	285	0.010	6,780	245	0.008	6,000	195	0.005
1.5	40	7,170	285	0.010	6,780	245	0.008	6,000	195	0.005
1.6	4	22,200	1,555	0.101	21,000	1,300	0.078	18,500	1,110	0.056
1.6	6	22,200	1,555	0.101	21,000	1,300	0.078	18,500	1,110	0.056
1.6	8	22,200	1,555	0.101	21,000	1,300	0.078	18,500	1,110	0.056
1.6	10	19,980	1,260	0.058	18,900	1,055	0.045	16,650	900	0.032
1.6	12	19,980	1,260	0.058	18,900	1,055	0.045	16,650	900	0.032
1.6	16	19,980	1,260	0.036	18,900	1,055	0.028	16,650	900	0.020
1.6	20	17,760	995	0.036	16,800	830	0.028	14,800	710	0.020
1.8	4	22,200	1,780	0.113	21,000	1,470	0.088	18,500	1,225	0.063
1.8	6	22,200	1,780	0.113	21,000	1,470	0.088	18,500	1,225	0.063
1.8	8	22,200	1,780	0.113	21,000	1,470	0.088	18,500	1,225	0.063
1.8	10	19,980	1,440	0.065	18,900	1,190	0.050	16,650	990	0.036
1.8	12	19,980	1,440	0.065	18,900	1,190	0.050	16,650	990	0.036
1.8	16	19,980	1,440	0.041	18,900	1,190	0.032	16,650	990	0.023
1.8	20	17,760	1,140	0.041	16,800	940	0.032	14,800	785	0.023
2.0	6	18,000	1,795	0.180	17,000	1,525	0.140	15,000	1,285	0.100
2.0	8	18,000	1,795	0.126	17,000	1,525	0.098	15,000	1,285	0.070

H-Star Endmill

ESRB712

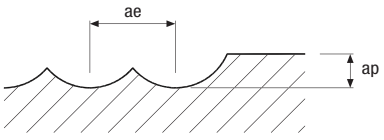
Workpiece		Alloy steels, Carbon steels (SCM, SNCM, S45C)			Pre-hardened steels (NAK, CENA, KP4)			Hardened steels (SKD, SKT, STAVAX)		
Strength		~HRC35			HRC35~45			HRC45~55		
Conditions		~1100N/mm²			1100~1500N/mm²			1500~2000N/mm²		
Diameter(Ø)	Effective Length	R.P.M n (min⁻¹)	Feed vf (mm/min)	ap (mm)	R.P.M n (min⁻¹)	Feed vf (mm/min)	ap (mm)	R.P.M n (min⁻¹)	Feed vf (mm/min)	ap (mm)
2.0	10	18,000	1,795	0.126	17,000	1,525	0.098	15,000	1,285	0.070
2.0	12	16,200	1,455	0.072	15,300	1,235	0.056	13,500	1,040	0.040
2.0	14	16,200	1,455	0.072	15,300	1,235	0.056	13,500	1,040	0.040
2.0	16	16,200	1,455	0.072	15,300	1,235	0.056	13,500	1,040	0.040
2.0	18	16,200	1,455	0.045	15,300	1,235	0.035	13,500	1,040	0.025
2.0	20	16,200	1,455	0.045	15,300	1,235	0.035	13,500	1,040	0.025
2.0	22	14,400	1,150	0.045	13,600	975	0.035	12,000	820	0.025
2.0	26	14,400	1,150	0.045	13,600	975	0.035	12,000	820	0.025
2.0	30	14,400	1,150	0.027	13,600	975	0.021	12,000	820	0.015
2.0	35	10,800	755	0.018	10,200	640	0.014	9,000	540	0.010
2.0	40	10,800	755	0.018	10,200	640	0.014	9,000	540	0.010
2.0	45	5,400	325	0.018	5,100	275	0.014	4,500	230	0.010
2.0	50	5,400	325	0.018	5,100	275	0.014	4,500	230	0.010
2.0	60	5,400	325	0.018	5,100	275	0.014	4,500	230	0.010
2.5	8	15,800	1,925	0.158	14,900	1,605	0.123	13,200	1,305	0.088
2.5	10	15,800	1,925	0.158	14,900	1,605	0.123	13,200	1,305	0.088
2.5	12	15,800	1,925	0.158	14,900	1,605	0.123	13,200	1,305	0.088
2.5	16	14,220	1,560	0.090	13,410	1,300	0.070	11,880	1,055	0.050
2.5	20	14,220	1,560	0.090	13,410	1,300	0.070	11,880	1,055	0.050
2.5	22	14,220	1,560	0.056	13,410	1,300	0.044	11,880	1,055	0.031
2.5	26	12,640	1,230	0.056	11,920	1,025	0.044	10,560	835	0.031
2.5	30	12,640	1,230	0.056	11,920	1,025	0.044	10,560	835	0.031
2.5	35	12,640	1,230	0.034	11,920	1,025	0.026	10,560	835	0.019
2.5	40	9,480	810	0.034	8,940	675	0.026	7,920	550	0.019
2.5	45	9,480	810	0.023	8,940	675	0.018	7,920	550	0.013
2.5	50	9,480	810	0.023	8,940	675	0.018	7,920	550	0.013
3.0	6	13,700	2,050	0.270	12,900	1,730	0.210	11,400	1,435	0.150
3.0	8	13,700	2,050	0.270	12,900	1,730	0.210	11,400	1,435	0.150
3.0	10	13,700	2,050	0.189	12,900	1,730	0.147	11,400	1,435	0.105
3.0	12	13,700	2,050	0.189	12,900	1,730	0.147	11,400	1,435	0.105
3.0	14	13,700	2,050	0.189	12,900	1,730	0.147	11,400	1,435	0.105
3.0	16	12,330	1,660	0.108	11,610	1,400	0.084	10,260	1,160	0.06
3.0	18	12,330	1,660	0.108	11,610	1,400	0.084	10,260	1,160	0.06
3.0	20	12,330	1,660	0.108	11,610	1,400	0.084	10,260	1,160	0.06
3.0	22	12,330	1,660	0.108	11,610	1,400	0.084	10,260	1,160	0.06
3.0	26	12,330	1,660	0.068	11,610	1,400	0.053	10,260	1,160	0.038
3.0	30	12,330	1,660	0.068	11,610	1,400	0.053	10,260	1,160	0.038
3.0	35	10,960	1,310	0.068	10,320	1,105	0.053	9,120	920	0.038
3.0	40	10,960	1,310	0.041	10,320	1,105	0.032	9,120	920	0.023
3.0	45	10,960	1,310	0.041	10,320	1,105	0.032	9,120	920	0.023
3.0	50	8,220	860	0.027	7,740	725	0.021	6,840	605	0.015
3.0	60	8,220	860	0.027	7,740	725	0.021	6,840	605	0.015
4.0	8	9,800	1,965	0.360	9,300	1,670	0.280	8,200	1,395	0.200
4.0	10	9,800	1,965	0.360	9,300	1,670	0.280	8,200	1,395	0.200

ESRB712

Workpiece		Alloy steels, Carbon steels (SCM, SNCM, S45C)			Pre-hardened steels (NAK, CENA, KP4)			Hardened steels (SKD, SKT, STAVAX)		
Strength		~HRC35			HRC35~45			HRC45~55		
Conditions		~1100N/mm²			1100~1500N/mm²			1500~2000N/mm²		
Diameter(Ø)	Effective Length	R.P.M n (min⁻¹)	Feed vf (mm/min)	ap (mm)	R.P.M n (min⁻¹)	Feed vf (mm/min)	ap (mm)	R.P.M n (min⁻¹)	Feed vf (mm/min)	ap (mm)
4.0	12	9,800	1,965	0.360	9,300	1,670	0.280	8,200	1,395	0.200
4.0	14	9,800	1,965	0.252	9,300	1,670	0.196	8,200	1,395	0.140
4.0	16	9,800	1,965	0.252	9,300	1,670	0.196	8,200	1,395	0.140
4.0	18	9,800	1,965	0.252	9,300	1,670	0.196	8,200	1,395	0.140
4.0	20	9,800	1,965	0.252	9,300	1,670	0.196	8,200	1,395	0.140
4.0	22	8,820	1,590	0.144	8,370	1,355	0.112	7,380	1,130	0.080
4.0	26	8,820	1,590	0.144	8,370	1,355	0.112	7,380	1,130	0.080
4.0	30	8,820	1,590	0.144	8,370	1,355	0.112	7,380	1,130	0.080
4.0	35	8,820	1,590	0.090	8,370	1,355	0.070	7,380	1,130	0.050
4.0	40	8,820	1,590	0.090	8,370	1,355	0.070	7,380	1,130	0.050
4.0	45	7,840	1,260	0.090	7,440	1,070	0.070	6,560	895	0.050
4.0	50	7,840	1,260	0.090	7,440	1,070	0.070	6,560	895	0.050
4.0	60	7,840	1,260	0.054	7,440	1,070	0.042	6,560	895	0.030
5.0	15	7,700	1,845	0.315	7,300	1,455	0.245	6,400	1,285	0.175
5.0	20	7,700	1,845	0.315	7,300	1,455	0.245	6,400	1,285	0.175
5.0	26	6,930	1,495	0.180	6,570	1,180	0.140	5,760	1,040	0.100
5.0	30	6,930	1,495	0.180	6,570	1,180	0.140	5,760	1,040	0.100
5.0	35	6,930	1,495	0.180	6,570	1,180	0.140	5,760	1,040	0.100
5.0	40	6,930	1,495	0.180	6,570	1,180	0.140	5,760	1,040	0.100
5.0	50	6,930	1,495	0.113	6,570	1,180	0.088	5,760	1,040	0.063
5.0	60	6,160	1,180	0.113	5,840	930	0.088	5,120	820	0.063
6.0	20	6,500	1,900	0.378	6,200	1,600	0.294	5,500	1,330	0.210
6.0	30	6,500	1,900	0.378	6,200	1,600	0.294	5,500	1,330	0.210
8.0	25	4,850	1,800	0.504	4,600	1,500	0.392	4,000	1,280	0.280
8.0	30	4,850	1,800	0.504	4,600	1,500	0.392	4,000	1,280	0.280
10.0	30	3,850	1,650	0.900	3,680	1,400	0.700	3,200	1,200	0.500
10.0	40	3,850	1,650	0.630	3,680	1,400	0.490	3,200	1,200	0.350
12.0	32	3,200	1,520	1.080	3,050	1,300	0.840	2,650	1,100	0.600
12.0	45	3,200	1,520	0.756	3,050	1,300	0.588	2,650	1,100	0.420

Application tip

*ae : D1 ~ D4 = 0.05 × D
D5 ~ D8 = 0.025mm
D10 ~ D20 = 0.30mm



H-Star Endmill

ESRE712

Side cutting

Workpiece		Alloy steels, Carbon steels (SCM, SNCM, S45C)			Pre-hardened steels (NAK, CENA, KP4)			Hardened steels (SKD, SKT, STAVAX)		
Strength		~HRC35			HRC35~45			HRC45~55		
Conditions		~1100N/mm²			1100~1500N/mm²			1500~2000N/mm²		
Diameter(Ø)	Effective Length	R.P.M n (min⁻¹)	Feed vf (mm/min)	ap (mm)	R.P.M n (min⁻¹)	Feed vf (mm/min)	ap (mm)	R.P.M n (min⁻¹)	Feed vf (mm/min)	ap (mm)
0.1	0.3	50,000	315	0.009	46,200	230	0.007	40,600	170	0.005
0.1	0.5	50,000	315	0.006	46,200	230	0.005	40,600	170	0.004
0.1	1	45,000	255	0.002	41,580	185	0.002	36,540	140	0.001
0.2	0.5	38,500	380	0.018	36,300	270	0.014	32,100	200	0.010
0.2	1	38,500	380	0.013	36,300	270	0.010	32,100	200	0.007
0.2	1.5	34,650	310	0.007	32,670	220	0.006	28,890	160	0.004
0.2	2	34,650	310	0.005	32,670	220	0.004	28,890	160	0.003
0.3	1	34,200	390	0.019	32,300	270	0.015	28,500	230	0.011
0.3	1.5	34,200	390	0.019	32,300	270	0.015	25,800	230	0.011
0.3	2	30,780	315	0.011	29,070	220	0.008	25,650	185	0.006
0.3	2.5	30,780	315	0.007	29,070	220	0.005	25,650	185	0.004
0.3	3	30,780	315	0.007	29,070	220	0.005	25,650	185	0.004
0.3	4	27,360	250	0.004	25,840	175	0.003	22,800	145	0.002
0.3	5	20,520	165	0.003	19,380	115	0.002	17,100	95	0.002
0.4	1	27,400	540	0.036	25,800	380	0.028	22,800	280	0.020
0.4	1.5	27,400	540	0.025	25,800	380	0.020	22,800	280	0.014
0.4	2	27,400	540	0.025	25,800	380	0.020	22,800	280	0.014
0.4	2.5	24,660	435	0.014	23,220	310	0.011	20,520	225	0.008
0.4	3	24,660	435	0.014	23,220	310	0.011	20,520	225	0.008
0.4	4	24,660	435	0.009	23,220	310	0.007	20,520	225	0.005
0.4	5	21,920	345	0.009	20,640	245	0.007	18,240	180	0.005
0.4	6	21,920	345	0.005	20,640	245	0.004	18,240	180	0.003
0.4	8	16,440	225	0.004	15,480	160	0.003	13,680	120	0.002
0.4	10	8,220	95	0.004	7,740	70	0.003	6,840	50	0.002
0.5	1	27,400	540	0.045	25,800	425	0.035	22,800	285	0.025
0.5	1.5	27,400	540	0.045	25,800	425	0.035	22,800	285	0.025
0.5	2	27,400	540	0.032	25,800	425	0.025	22,800	285	0.018
0.5	2.5	27,400	540	0.032	25,800	425	0.025	22,800	285	0.018
0.5	3	24,660	435	0.018	23,220	345	0.014	20,520	230	0.010
0.5	4	24,660	435	0.018	23,220	345	0.014	20,520	230	0.010
0.5	5	24,660	435	0.011	23,220	345	0.009	20,520	230	0.006
0.5	6	21,920	345	0.011	20,640	270	0.009	18,240	180	0.006
0.5	8	16,440	225	0.007	15,480	180	0.005	13,680	120	0.004
0.5	10	16,440	225	0.005	15,480	180	0.004	13,680	120	0.003
0.5	12	8,220	95	0.005	7,740	75	0.004	6,840	50	0.003
0.5	14	8,220	95	0.005	7,740	75	0.004	6,840	50	0.003
0.5	16	2,740	25	0.005	2,580	20	0.004	2,280	15	0.003
0.6	2	27,400	775	0.038	25,800	545	0.029	22,800	405	0.021
0.6	3	27,400	775	0.038	25,800	545	0.029	22,800	405	0.021
0.6	4	24,660	630	0.022	23,220	440	0.017	20,520	330	0.012
0.6	5	24,660	630	0.014	23,220	440	0.011	20,520	330	0.008
0.6	6	24,660	630	0.014	23,220	440	0.011	20,520	330	0.008
0.6	8	21,920	495	0.008	20,640	350	0.006	18,240	260	0.005
0.6	10	16,440	325	0.005	15,480	230	0.004	13,680	170	0.003

ESRE712

Side cutting

Workpiece		Alloy steels, Carbon steels (SCM, SNCM, S45C)			Pre-hardened steels (NAK, CENA, KP4)			Hardened steels (SKD, SKT, STAVAX)		
Strength		~HRC35			HRC35~45			HRC45~55		
Conditions		~1100N/mm²			1100~1500N/mm²			1500~2000N/mm²		
Diameter(Ø)	Effective Length	R.P.M n (min⁻¹)	Feed vf (mm/min)	ap (mm)	R.P.M n (min⁻¹)	Feed vf (mm/min)	ap (mm)	R.P.M n (min⁻¹)	Feed vf (mm/min)	ap (mm)
0.6	12	16,440	325	0.005	15,480	230	0.004	13,680	170	0.003
0.6	14	8,220	140	0.005	7,740	100	0.004	6,840	75	0.003
0.6	16	8,220	140	0.005	7,740	100	0.004	6,840	75	0.003
0.7	2	27,400	775	0.063	25,800	545	0.049	22,800	405	0.035
0.7	4	24,660	630	0.025	23,220	440	0.020	20,520	330	0.014
0.7	6	24,660	630	0.016	23,220	440	0.012	20,520	330	0.009
0.7	8	21,920	495	0.016	20,640	350	0.012	18,240	260	0.009
0.7	10	21,920	495	0.009	20,640	350	0.007	18,240	260	0.005
0.7	12	16,440	325	0.009	15,480	230	0.005	13,680	170	0.004
0.8	2	27,400	775	0.072	25,800	605	0.056	22,800	450	0.040
0.8	3	27,400	775	0.050	25,800	605	0.039	22,800	450	0.028
0.8	4	27,400	775	0.050	25,800	605	0.039	22,800	450	0.028
0.8	5	24,660	630	0.029	23,220	490	0.022	20,520	365	0.016
0.8	6	24,660	630	0.029	23,220	490	0.022	20,520	365	0.016
0.8	8	24,660	630	0.018	23,220	490	0.014	20,520	365	0.010
0.8	10	21,920	495	0.018	20,640	385	0.014	18,240	290	0.010
0.8	12	21,920	495	0.011	20,640	385	0.008	18,240	290	0.006
0.8	14	16,440	325	0.007	15,480	255	0.006	13,680	190	0.004
0.8	16	16,440	325	0.007	15,480	255	0.006	13,680	190	0.004
0.8	20	8,220	140	0.007	7,740	110	0.006	6,840	80	0.004
0.9	6	22,140	575	0.032	20,970	440	0.025	18,450	330	0.018
0.9	8	22,140	575	0.020	20,970	440	0.016	18,450	330	0.011
0.9	10	19,680	455	0.020	18,640	350	0.016	16,400	260	0.011
1.0	2	24,600	1,045	0.090	23,300	890	0.070	20,500	665	0.050
1.0	3	24,600	1,045	0.090	23,300	890	0.070	20,500	665	0.050
1.0	4	24,600	1,045	0.063	23,300	890	0.049	20,500	665	0.035
1.0	5	24,600	1,045	0.063	23,300	890	0.049	20,500	665	0.035
1.0	6	22,140	845	0.036	20,970	720	0.028	18,450	540	0.020
1.0	7	22,140	845	0.036	20,970	720	0.028	18,450	540	0.020
1.0	8	22,140	845	0.036	20,970	720	0.028	18,450	540	0.020
1.0	10	22,140	845	0.023	20,970	720	0.018	18,450	540	0.013
1.0	12	19,680	670	0.023	18,640	570	0.018	16,400	425	0.013
1.0	14	19,680	670	0.014	18,640	570	0.011	16,400	425	0.008
1.0	16	14,760	440	0.014	13,980	375	0.011	12,300	280	0.008
1.0	18	14,760	440	0.009	13,980	375	0.007	12,300	280	0.005
1.0	20	14,760	440	0.009	13,980	375	0.007	12,300	280	0.005
1.0	22	7,380	190	0.009	6,990	160	0.007	6,150	120	0.005
1.0	26	7,380	190	0.009	6,990	160	0.007	6,150	120	0.005
1.0	30	7,380	190	0.009	6,990	160	0.007	6,150	120	0.005
1.0	40	2,460	50	0.009	2,330	45	0.007	2,050	35	0.005
1.0	50	2,460	50	0.006	2,330	45	0.005	2,050	35	0.003
1.2	4	21,900	930	0.076	20,700	720	0.059	18,200	485	0.042
1.2	6	21,900	930	0.076	20,700	720	0.059	18,200	485	0.042
1.2	8	19,710	755	0.043	18,630	585	0.034	16,380	395	0.024

H-Star Endmill

ESRE712

Side cutting

Workpiece		Alloy steels, Carbon steels (SCM, SNCM, S45C)			Pre-hardened steels (NAK, CENA, KP4)			Hardened steels (SKD, SKT, STAVAX)		
Strength		~HRC35			HRC35~45			HRC45~55		
Conditions		~1100N/mm²			1100~1500N/mm²			1500~2000N/mm²		
Diameter(Ø)	Effective Length	R.P.M n (min⁻¹)	Feed vf (mm/min)	ap (mm)	R.P.M n (min⁻¹)	Feed vf (mm/min)	ap (mm)	R.P.M n (min⁻¹)	Feed vf (mm/min)	ap (mm)
1.2	10	19,710	755	0.027	18,630	585	0.021	16,380	395	0.015
1.2	12	19,710	755	0.027	18,630	585	0.021	16,380	395	0.015
1.2	14	17,520	595	0.027	16,560	460	0.021	14,560	310	0.015
1.2	16	17,520	595	0.016	16,560	460	0.013	14,560	310	0.009
1.2	20	13,140	390	0.011	12,420	300	0.008	10,920	205	0.006
1.2	26	6,570	165	0.011	6,210	130	0.008	5,460	85	0.006
1.2	30	6,570	165	0.011	6,210	130	0.008	5,460	85	0.006
1.4	6	19,200	815	0.088	18,100	570	0.069	16,000	425	0.049
1.4	8	17,280	660	0.050	16,290	460	0.039	14,400	345	0.028
1.4	10	17,280	660	0.050	16,290	460	0.039	14,400	345	0.028
1.4	14	17,280	660	0.032	16,290	460	0.025	14,400	345	0.018
1.4	16	15,360	520	0.032	14,480	365	0.025	12,800	270	0.018
1.4	20	15,360	520	0.019	14,480	365	0.015	12,800	270	0.011
1.5	4	19,200	905	0.135	18,100	635	0.105	16,000	475	0.075
1.5	5	19,200	905	0.095	18,100	635	0.074	16,000	475	0.053
1.5	6	19,200	905	0.095	18,100	635	0.074	16,000	475	0.053
1.5	7	19,200	905	0.095	18,100	635	0.074	16,000	475	0.053
1.5	8	17,280	735	0.054	16,290	515	0.042	14,400	385	0.030
1.5	10	17,280	735	0.054	16,290	515	0.042	14,400	385	0.030
1.5	12	17,280	735	0.054	16,290	515	0.042	14,400	385	0.030
1.5	14	17,280	735	0.034	16,290	515	0.026	14,400	385	0.019
1.5	16	15,360	580	0.034	14,480	405	0.026	12,800	305	0.019
1.5	18	15,360	580	0.034	14,480	405	0.026	12,800	305	0.019
1.5	20	15,360	580	0.020	14,480	405	0.016	12,800	305	0.011
1.5	22	15,360	580	0.020	14,480	405	0.016	12,800	305	0.011
1.5	26	11,520	380	0.014	10,860	265	0.011	9,600	200	0.008
1.5	30	11,520	380	0.014	10,860	265	0.011	9,600	200	0.008
1.6	8	17,800	840	0.101	16,800	655	0.078	14,800	490	0.056
1.6	10	16,020	680	0.058	15,120	530	0.045	13,320	395	0.032
1.6	12	16,020	680	0.058	15,120	530	0.045	13,320	395	0.032
1.6	16	16,020	680	0.036	15,120	530	0.028	13,320	395	0.020
1.6	20	14,240	540	0.036	13,440	420	0.028	11,840	315	0.020
1.8	8	17,800	840	0.113	16,800	655	0.088	14,800	490	0.063
1.8	10	16,020	680	0.065	15,120	530	0.050	13,320	395	0.036
1.8	12	16,020	680	0.065	15,120	530	0.050	13,320	395	0.036
1.8	16	16,020	680	0.041	15,120	530	0.032	13,320	395	0.023
1.8	20	14,240	540	0.041	13,440	420	0.032	11,840	315	0.023
2.0	6	14,400	820	0.180	13,600	620	0.140	12,000	475	0.100
2.0	8	14,400	820	0.126	13,600	620	0.098	12,000	475	0.070
2.0	10	14,400	820	0.126	13,600	620	0.098	12,000	475	0.070
2.0	12	12,960	665	0.072	12,240	500	0.056	10,800	385	0.040
2.0	14	12,960	665	0.072	12,240	500	0.056	10,800	385	0.040
2.0	16	12,960	665	0.072	12,240	500	0.056	10,800	385	0.040
2.0	18	12,960	665	0.045	12,240	500	0.035	10,800	385	0.025

ESRE712

Side cutting

Workpiece		Alloy steels, Carbon steels (SCM, SNCM, S45C)			Pre-hardened steels (NAK, CENA, KP4)			Hardened steels (SKD, SKT, STAVAX)		
Strength		~HRC35			HRC35~45			HRC45~55		
Conditions		~1100N/mm²			1100~1500N/mm²			1500~2000N/mm²		
Diameter(Ø)	Effective Length	R.P.M n (min⁻¹)	Feed vf (mm/min)	ap (mm)	R.P.M n (min⁻¹)	Feed vf (mm/min)	ap (mm)	R.P.M n (min⁻¹)	Feed vf (mm/min)	ap (mm)
2.0	20	12,960	665	0.045	12,240	500	0.035	10,800	385	0.025
2.0	22	11,520	525	0.045	10,880	395	0.035	9,600	305	0.025
2.0	26	11,520	525	0.045	10,880	395	0.035	9,600	305	0.025
2.0	30	11,520	525	0.027	10,880	395	0.021	9,600	305	0.015
2.0	35	8,640	345	0.018	8,160	260	0.014	7,200	200	0.010
2.0	40	8,640	345	0.018	8,160	260	0.014	7,200	200	0.010
2.0	45	4,320	150	0.018	4,080	110	0.014	3,600	85	0.010
2.0	50	4,320	150	0.018	4,080	110	0.014	3,600	85	0.010
2.0	60	4,320	150	0.018	4,080	110	0.014	3,600	85	0.010
2.5	8	12,300	970	0.158	11,600	680	0.123	10,300	510	0.088
2.5	10	12,300	970	0.158	11,600	680	0.123	10,300	510	0.088
2.5	12	12,300	970	0.158	11,600	680	0.123	10,300	510	0.088
2.5	14	11,070	785	0.090	10,440	550	0.070	9,270	415	0.050
2.5	16	11,070	785	0.090	10,440	550	0.070	9,270	415	0.050
2.5	18	11,070	785	0.090	10,440	550	0.070	9,270	415	0.050
2.5	20	11,070	785	0.090	10,440	550	0.070	9,270	415	0.050
2.5	22	11,070	785	0.056	10,440	550	0.044	9,270	415	0.031
2.5	26	9,840	620	0.056	9,280	435	0.044	8,240	325	0.031
2.5	30	9,840	620	0.056	9,280	435	0.044	8,240	325	0.031
2.5	35	9,840	620	0.034	9,280	435	0.026	8,240	325	0.019
2.5	40	7,380	405	0.034	6,960	285	0.026	6,180	215	0.019
2.5	45	7,380	405	0.023	6,960	285	0.018	6,180	215	0.013
2.5	50	7,380	405	0.023	6,960	285	0.018	6,180	215	0.013
3.0	6	10,900	860	0.270	10,300	605	0.210	6,600	450	0.150
3.0	8	10,900	860	0.270	10,300	605	0.210	6,600	450	0.150
3.0	10	10,900	860	0.189	10,300	605	0.147	6,600	450	0.105
3.0	12	10,900	860	0.189	10,300	605	0.147	6,600	450	0.105
3.0	14	10,900	860	0.189	10,300	605	0.147	6,600	450	0.105
3.0	16	9,810	695	0.108	9,270	490	0.084	5,940	365	0.060
3.0	18	9,810	695	0.108	9,270	490	0.084	5,940	365	0.060
3.0	20	9,810	695	0.108	9,270	490	0.084	5,940	365	0.060
3.0	22	9,810	695	0.108	9,270	490	0.084	5,940	365	0.060
3.0	26	9,810	695	0.068	9,270	490	0.053	5,940	365	0.038
3.0	30	9,810	695	0.068	9,270	490	0.053	5,940	365	0.038
3.0	35	8,720	550	0.068	8,240	385	0.053	5,280	290	0.038
3.0	40	8,720	550	0.041	8,240	385	0.032	5,280	290	0.023
3.0	45	8,720	550	0.041	8,240	385	0.032	5,280	290	0.023
3.0	50	6,540	360	0.027	6,180	255	0.021	3,960	190	0.015
3.0	60	6,540	360	0.027	6,180	255	0.021	3,960	190	0.015
4.0	8	8,000	1,300	0.360	7,600	1,160	0.280	6,700	770	0.200
4.0	10	8,000	1,300	0.360	7,600	1,160	0.280	6,700	770	0.200
4.0	12	8,000	1,300	0.360	7,600	1,160	0.280	6,700	770	0.200
4.0	14	8,000	1,300	0.252	7,600	1,160	0.196	6,700	770	0.140
4.0	16	8,000	1,300	0.252	7,600	1,160	0.196	6,700	770	0.140

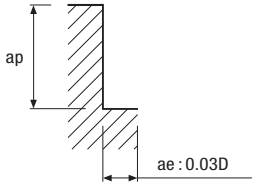
H-Star Endmill

ESRE712

Side cutting

Workpiece		Alloy steels, Carbon steels (SCM, SNCM, S45C)			Pre-hardened steels (NAK, CENA, KP4)			Hardened steels (SKD, SKT, STAVAX)		
Strength		~HRC35			HRC35~45			HRC45~55		
Conditions		~1100N/mm²			1100~1500N/mm²			1500~2000N/mm²		
Diameter(Ø)	Effective Length	R.P.M n (min⁻¹)	Feed vf (mm/min)	ap (mm)	R.P.M n (min⁻¹)	Feed vf (mm/min)	ap (mm)	R.P.M n (min⁻¹)	Feed vf (mm/min)	ap (mm)
4.0	18	8,000	1,300	0.252	7,600	1,160	0.196	6,700	770	0.140
4.0	20	8,000	1,300	0.252	7,600	1,160	0.196	6,700	770	0.140
4.0	22	7,200	1,055	0.144	6,840	940	0.112	6,030	625	0.080
4.0	26	7,200	1,055	0.144	6,840	940	0.112	6,030	625	0.080
4.0	30	7,200	1,055	0.144	6,840	940	0.112	6,030	625	0.080
4.0	35	7,200	1,055	0.090	6,840	940	0.070	6,030	625	0.050
4.0	40	7,200	1,055	0.090	6,840	940	0.070	6,030	625	0.050
4.0	45	6,400	830	0.090	6,080	740	0.070	5,360	495	0.050
4.0	50	6,400	830	0.090	6,080	740	0.070	5,360	495	0.050
4.0	60	6,400	830	0.054	6,080	740	0.042	5,360	495	0.030
5.0	16	6,400	1,155	0.315	6,100	900	0.245	5,400	605	0.175
5.0	20	6,400	1,155	0.315	6,100	900	0.245	5,400	605	0.175
5.0	26	5,760	935	0.180	5,490	730	0.140	4,860	490	0.100
5.0	30	5,760	935	0.180	5,490	730	0.140	4,860	490	0.100
5.0	35	5,760	935	0.180	5,490	730	0.140	4,860	490	0.100
5.0	40	5,760	935	0.180	5,490	730	0.140	4,860	490	0.100
5.0	50	5,760	935	0.113	5,490	730	0.088	4,860	490	0.063
5.0	60	5,120	740	0.113	4,880	575	0.088	4,320	385	0.063
6.0	15	5,300	1,055	0.540	5,000	820	0.420	4,400	550	0.300
6.0	20	5,300	1,055	0.378	5,000	820	0.294	4,400	550	0.210
6.0	30	5,300	1,055	0.378	5,000	820	0.294	4,400	550	0.210
6.0	32	4,770	855	0.216	4,500	665	0.168	3,960	445	0.120
8.0	25	4,000	950	0.504	3,800	750	0.392	3,300	500	0.280
8.0	30	4,000	950	0.504	3,800	750	0.392	3,300	500	0.280
8.0	42	3,600	770	0.288	3,400	605	0.224	2,950	405	0.160
10.0	30	3,200	900	0.900	3,050	680	0.700	2,630	400	0.500
10.0	35	3,200	900	0.630	3,050	680	0.490	2,630	400	0.350
10.0	45	3,200	900	0.630	3,050	680	0.490	2,630	400	0.350
12.0	35	2,650	800	1.080	2,520	600	0.840	2,180	350	0.600
12.0	40	2,650	800	0.756	2,520	600	0.588	2,180	350	0.420
12.0	50	2,650	800	0.756	2,520	600	0.588	2,180	350	0.420

Application tip



ESRE714

Workpiece		Alloy steels, Carbon steels (SCM, SNCM, S45C)			Pre-hardened steels (NAK, CENA, KP4)			Hardened steels (SKD, SKT, STAVAX)		
Strength		~HRC35			HRC35~45			HRC45~55		
Conditions		~1100N/mm²			1100~1500N/mm²			1500~2000N/mm²		
Diameter(Ø)	Effective Length	R.P.M n (min⁻¹)	Feed vf (mm/min)	ap (mm)	R.P.M n (min⁻¹)	Feed vf (mm/min)	ap (mm)	R.P.M n (min⁻¹)	Feed vf (mm/min)	ap (mm)
0.5	1	27,400	756	0.045	25,800	595	0.035	22,800	399	0.025
0.5	2	27,400	756	0.032	25,800	595	0.025	22,800	399	0.018
0.5	3	24,660	609	0.018	23,220	483	0.014	20,520	322	0.01
0.5	4	24,660	609	0.018	23,220	483	0.014	20,520	322	0.01
0.5	5	24,660	609	0.011	23,220	483	0.009	20,520	322	0.006
0.5	6	21,920	483	0.011	20,640	378	0.009	18,240	252	0.006
0.5	8	16,440	315	0.007	15,480	252	0.005	13,680	168	0.004
0.5	10	16,440	315	0.005	15,480	252	0.004	13,680	168	0.003
0.6	1	27,400	1085	0.038	25,800	763	0.029	22,800	567	0.021
0.6	2	27,400	1085	0.038	25,800	763	0.029	22,800	567	0.021
0.6	3	27,400	1085	0.038	25,800	763	0.029	22,800	567	0.021
0.6	4	24,660	882	0.022	23,220	616	0.017	20,520	462	0.012
0.6	5	24,660	882	0.014	23,220	616	0.011	20,520	462	0.008
0.6	6	24,660	882	0.014	23,220	616	0.011	20,520	462	0.008
0.6	8	21,920	693	0.008	20,640	490	0.006	18,240	364	0.005
0.6	10	16,440	455	0.005	15,480	322	0.004	13,680	238	0.003
0.6	12	16,440	455	0.005	15,480	322	0.004	13,680	238	0.003
0.7	2	27,400	1085	0.063	25,800	763	0.049	22,800	567	0.035
0.7	4	24,660	882	0.025	23,220	616	0.02	20,520	462	0.014
0.7	6	24,660	693	0.016	23,220	616	0.012	20,520	462	0.009
0.7	8	21,920	693	0.016	20,640	490	0.012	18,240	364	0.009
0.7	10	21,920		0.009	20,640	490	0.007	18,240	364	0.005
0.8	1	27,400	1085	0.072	25,800	847	0.056	22,800	630	0.04
0.8	2	27,400	1085	0.072	25,800	847	0.056	22,800	630	0.04
0.8	3	27,400	1085	0.05	25,800	847	0.039	22,800	630	0.028
0.8	4	27,400	1085	0.05	25,800	847	0.039	22,800	630	0.028
0.8	5	24,660	882	0.029	23,220	686	0.022	20,520	511	0.016
0.8	6	24,660	882	0.029	23,220	686	0.022	20,520	511	0.016
0.8	8	24,660	882	0.018	23,220	686	0.014	20,520	511	0.01
0.8	10	21,920	693	0.018	20,640	539	0.014	18,240	406	0.01
0.8	12	21,920	693	0.011	20,640	539	0.008	18,240	406	0.006
0.8	16	16,440	455	0.007	15,480	357	0.006	13,680	266	0.004
1	2	24,600	1463	0.09	23,300	1246	0.07	20,500	931	0.05
1	3	24,600	1463	0.09	23,300	1246	0.07	20,500	931	0.05
1	4	24,600	1463	0.063	23,300	1246	0.049	20,500	931	0.035
1	6	22,140	1183	0.036	20,970	1008	0.028	18,450	756	0.02
1	8	22,140	1183	0.036	20,970	1008	0.028	18,450	756	0.02
1	10	22,140	1183	0.023	20,970	1008	0.018	18,450	756	0.013
1	12	19,680	938	0.023	18,640	798	0.018	16,400	595	0.013
1	14	19,680	938	0.014	18,640	798	0.011	16,400	595	0.008
1	16	14,760	616	0.014	13,980	525	0.011	12,300	392	0.008
1	18	14,760	616	0.009	13,980	525	0.007	12,300	392	0.005
1	20	14,760	616	0.009	13,980	525	0.007	12,300	392	0.005
1.2	4	21,900	1,302	0.076	20,700	1008	0.059	18,200	679	0.042
1.2	6	21,900	1,302	0.076	20,700	1008	0.059	18,200	679	0.042
1.2	8	19,710	1,057	0.043	18,630	819	0.034	16,380	553	0.024
1.2	10	19,710	1,057	0.027	18,630	819	0.021	16,380	553	0.015
1.2	12	19,710	1057	0.027	18,630	819	0.021	16,380	553	0.015

H-Star Endmill

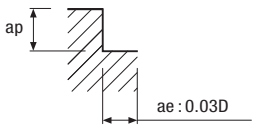
ESRE714

Workpiece		Alloy steels, Carbon steels (SCM, SNCM, S45C)			Pre-hardened steels (NAK, CENA, KP4)			Hardened steels (SKD, SKT, STAVAX)		
Strength		~HRC35			HRC35~45			HRC45~55		
Conditions		~1100N/mm²			1100~1500N/mm²			1500~2000N/mm²		
Diameter(Ø)	Effective Length	R.P.M n (min⁻¹)	Feed vf (mm/min)	ap (mm)	R.P.M n (min⁻¹)	Feed vf (mm/min)	ap (mm)	R.P.M n (min⁻¹)	Feed vf (mm/min)	ap (mm)
1.2	16	17,520	833	0.016	16,560	644	0.013	14,560	434	0.009
1.2	18	17,520	833	0.016	16,560	644	0.013	14,560	434	0.009
1.2	20	13,140	546	0.011	12,420	420	0.008	10,920	287	0.006
1.4	6	19,200	1141	0.088	18,100	798	0.069	16,000	595	0.049
1.4	8	17,280	924	0.05	16,290	644	0.039	14,400	483	0.028
1.4	10	17,280	924	0.05	16,290	644	0.039	14,400	483	0.028
1.4	12	17,280	924	0.05	16,290	644	0.039	14,400	483	0.028
1.4	14	17,280	924	0.032	16,290	644	0.025	14,400	483	0.018
1.4	16	15,360	728	0.032	14,480	511	0.025	12,800	378	0.018
1.5	4	19,200	1267	0.135	18,100	889	0.105	16,000	665	0.075
1.5	6	19,200	1267	0.095	18,100	889	0.074	16,000	665	0.053
1.5	8	17,280	1029	0.054	16,290	721	0.042	14,400	539	0.03
1.5	10	17,280	1029	0.054	16,290	721	0.042	14,400	539	0.03
1.5	12	17,280	1029	0.054	16,290	721	0.042	14,400	539	0.03
1.5	16	15,360	812	0.034	14,480	567	0.026	12,800	427	0.019
1.5	18	15,360	812	0.034	14,480	567	0.026	12,800	427	0.019
1.5	20	15,360	812	0.02	14,480	567	0.016	12,800	427	0.011
1.5	25	11,520	532	0.014	10,860	371	0.011	9,600	280	0.008
1.5	30	11,520	532	0.014	10,860	371	0.011	9,600	280	0.008
1.6	6	17,800	1176	0.101	16,800	917	0.078	14,800	686	0.056
1.6	8	17,800	1176	0.101	16,800	917	0.078	14,800	686	0.056
1.6	10	16,020	952	0.058	15,120	742	0.045	13,320	553	0.032
1.6	12	16,020	952	0.058	15,120	742	0.045	13,320	553	0.032
1.6	14	16,020	952	0.058	15,120	742	0.045	13,320	553	0.032
1.6	16	16,020	952	0.036	15,120	752	0.028	13,320	553	0.02
1.6	18	16,020	952	0.036	15,120	752	0.028	13,320	553	0.02
1.6	20	14,240	756	0.036	13,440	588	0.028	11,840	441	0.02
1.6	25	14,240	756	0.036	13,440	588	0.028	11,840	441	0.02
1.8	6	17,800	1176	0.113	16,800	917	0.088	14,800	686	0.063
1.8	8	17,800	1176	0.113	16,800	917	0.088	14,800	686	0.063
1.8	10	16,020	952	0.065	15,120	742	0.05	13,320	553	0.036
1.8	12	16,020	952	0.065	15,120	742	0.05	13,320	553	0.036
1.8	16	16,020	952	0.041	15,120	742	0.032	13,320	553	0.023
1.8	20	14,240	756	0.041	13,440	588	0.032	11,840	441	0.023
1.8	25	14,240	756	0.041	13,440	588	0.032	11,840	441	0.023
2	4	14,400	1148	0.18	13,600	868	0.14	12,000	665	0.1
2	6	14,400	1148	0.18	13,600	868	0.14	12,000	665	0.1
2	8	14,400	1148	0.126	13,600	868	0.098	12,000	665	0.07
2	10	14,400	1148	0.126	13,600	868	0.098	12,000	665	0.07
2	12	12,960	931	0.072	12,240	700	0.056	10,800	539	0.04
2	14	12,960	931	0.072	12,240	700	0.056	10,800	539	0.04
2	16	12,960	931	0.072	12,240	700	0.056	10,800	539	0.04
2	18	12,960	931	0.045	12,240	700	0.035	10,800	539	0.025
2	20	12,960	931	0.045	12,240	700	0.035	10,800	539	0.025
2	22	11,520	735	0.045	10,880	553	0.035	9,600	427	0.025
2	25	11,520	735	0.045	10,880	553	0.035	9,600	427	0.025
2	30	11,520	735	0.027	10,880	553	0.021	9,600	427	0.015
2.5	10	12,300	1358	0.158	11,600	952	0.123	10,300	714	0.088

ESRE714

Workpiece		Alloy steels, Carbon steels (SCM, SNCM, S45C)			Pre-hardened steels (NAK, CENA, KP4)			Hardened steels (SKD, SKT, STAVAX)		
Strength		~HRC35			HRC35~45			HRC45~55		
Conditions		~1100N/mm²			1100~1500N/mm²			1500~2000N/mm²		
Diameter(Ø)	Effective Length	R.P.M n (min⁻¹)	Feed vf (mm/min)	ap (mm)	R.P.M n (min⁻¹)	Feed vf (mm/min)	ap (mm)	R.P.M n (min⁻¹)	Feed vf (mm/min)	ap (mm)
2.5	12	12,300	1358	0.158	11,600	952	0.123	10,300	714	0.088
2.5	16	11,070	1099	0.09	10,440	770	0.07	9,270	581	0.05
2.5	20	11,070	1099	0.09	10,440	770	0.07	9,270	581	0.05
2.5	25	9,840	868	0.056	9,280	609	0.044	8,240	455	0.031
2.5	30	9,840	868	0.056	9,280	609	0.044	8,240	455	0.031
3	6	10,900	1204	0.27	10,300	847	0.21	6,600	630	0.15
3	8	10,900	1204	0.27	10,300	847	0.21	6,600	630	0.15
3	10	10,900	1204	0.189	10,300	847	0.147	6,600	630	0.105
3	12	10,900	1204	0.189	10,300	847	0.147	6,600	630	0.105
3	16	9,810	973	0.108	9,270	686	0.084	5,940	511	0.06
3	20	9,810	973	0.108	9,270	686	0.084	5,940	511	0.06
3	25	9,810	973	0.068	9,270	686	0.053	5,940	511	0.038
3	30	9,810	973	0.068	9,270	686	0.053	5,940	511	0.038
3	35	8,720	770	0.068	8,240	539	0.053	5,280	406	0.038
3	40	8,720	770	0.041	8,240	539	0.032	5,280	406	0.023
3	45	8,720	770	0.041	8,240	539	0.032	5,280	406	0.023
3	50	6,540	504	0.027	6,180	357	0.021	3,960	266	0.015
3	60	6,540	504	0.027	6,180	357	0.021	3,960	266	0.015
3.5	12	9,310	1430	0.236	8,800	1008	0.183	5,640	750	0.131
3.5	16	8,380	1158	0.135	7,920	816	0.105	5,070	608	0.075
3.5	20	8,380	1158	0.135	7,920	816	0.105	5,070	608	0.047
3.5	25	8,380	1158	0.085	7,920	816	0.066	5,070	608	0.047
3.5	30	8,380	1158	0.085	7,920	816	0.066	5,070	608	0.047
3.5	35	7,450	916	0.085	7,040	641	0.066	4,510	483	0.047
3.5	40	7,450	916	0.051	7,040	641	0.04	4,510	483	0.028
4	6	8,000	1820	0.36	7,600	1624	0.28	6,700	1078	0.2
4	8	8,000	1820	0.36	7,600	1624	0.28	6,700	1078	0.2
4	10	8,000	1820	0.36	7,600	1624	0.28	6,700	1078	0.2
4	12	8,000	1820	0.36	7,600	1624	0.28	6,700	1078	0.2
4	16	8,000	1820	0.252	7,600	1624	0.196	6,700	1078	0.14
4	20	8,000	1820	0.252	7,600	1624	0.196	6,700	1078	0.14
4	25	7,200	1477	0.144	6,840	1316	0.112	6,030	875	0.08
4	30	7,200	1477	0.144	6,840	1316	0.112	6,030	875	0.08
4	40	7,200	1477	0.09	6,840	1316	0.07	6,030	875	0.05
4	45	6,400	1162	0.09	6,080	1036	0.07	5,360	693	0.05
4	50	6,400	1162	0.09	6,080	1036	0.07	5,360	693	0.05
4	60	6,400	1162	0.054	6,080	1036	0.042	5,360	693	0.03
4.5	12	6,830	2166	0.45	6,490	1933	0.35	5,720	1283	0.25
4.5	16	6,830	2166	0.315	6,490	1933	0.245	5,720	1283	0.175
4.5	20	6,830	2166	0.315	6,490	1933	0.245	5,720	1283	0.175
4.5	25	6,150	1758	0.18	5,840	1566	0.14	5,150	1041	0.1
4.5	30	6,150	1758	0.18	5,840	1566	0.14	5,150	1041	0.1

Application tip

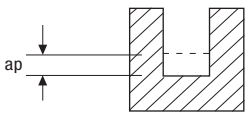


H-Star Endmill

ESRE714

Workpiece		Alloy steels, Carbon steels (SCM, SNCM, S45C)			Pre-hardened steels (NAK, CENA, KP4)			Hardened steels (SKD, SKT, STAVAX)		
Strength		~HRC35			HRC35~45			HRC45~55		
Conditions		~1100N/mm²			1100~1500N/mm²			1500~2000N/mm²		
Diameter(Ø)	Effective Length	R.P.M n (min⁻¹)	Feed vf (mm/min)	ap (mm)	R.P.M n (min⁻¹)	Feed vf (mm/min)	ap (mm)	R.P.M n (min⁻¹)	Feed vf (mm/min)	ap (mm)
4.5	40	6,150	1758	0.112	5,840	1566	0.087	5,150	1041	0.062
5	16	6,400	1617	0.315	6,100	1260	0.245	5,400	847	0.175
5	20	6,400	1617	0.315	6,100	1260	0.245	5,400	847	0.175
5	25	5,760	1309	0.18	5,490	1022	0.14	4,860	686	0.1
5	30	5,760	1309	0.18	5,490	1022	0.14	4,860	686	0.1
5	40	5,760	1309	0.18	5,490	1022	0.14	4,860	686	0.1
5	50	5,760	1309	0.113	5,490	1022	0.088	4,860	686	0.063
5	60	5,120	1036	0.113	4,880	805	0.088	4,320	539	0.063
6	20	5,300	1477	0.378	5,000	1148	0.294	4,400	770	0.21
6	30	5,300	1,477	0.378	5,000	1,148	0.294	4,400	770	0.21
6	40	4,770	1,197	0.216	4,500	931	0.168	3,960	623	0.12
6	50	4,770	1,197	0.216	4,500	931	0.168	3,960	623	0.12
6	60	4,370	958	0.141	4,171	931	0.11	3,690	623	0.078
8	25	4,000	1,330	0.504	3,800	1,050	0.392	3,300	700	0.28
8	40	3,600	1,078	0.288	3,400	847	0.224	2,950	567	0.16
8	50	3,600	1,078	0.288	3,400	847	0.224	2,950	567	0.16
10	30	3,200	1,260	0.9	3,050	952	0.7	2,630	560	0.5
10	50	3,200	1,260	0.63	3,050	952	0.49	2,630	560	0.35
10	60	3,200	1,260	0.63	3,050	952	0.49	2,630	560	0.35
12	40	2,650	1,120	0.756	2,520	840	0.588	2,180	490	0.42
12	60	2,360	896	0.472	2,250	672	0.367	1,940	392	0.262
12	70	2,360	896	0.472	2,250	672	0.367	1,940	392	0.262

Application tip



ESRR712 series

Workpiece				Carbon steels, Alloy steels 180~250HB		Pre-hardened steels HRC35~45		Hardened steels HRC45~55		High-hardened steels HRC55~65	
Ratio to standard depth of cut				Depth of Cut × 100%		Depth of Cut × 80%		Depth of Cut × 65%		Depth of Cut × 60%	
Diameter (Ø)	Corner R (mm)	Neck length (mm)	Depth of Cut (mm)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
0.2	0.02	0.5	0.016	50,000	258	50,000	205	50,000	180	50,000	160
		1	0.011	50,000	258	50,000	205	50,000	180	50,000	160
		1.5	0.007	42,000	202	36,700	176	36,700	162	36,700	147
	0.05	0.5	0.02	50,000	258	50,000	205	50,000	180	50,000	160
		1	0.014	50,000	258	50,000	205	50,000	180	50,000	160
		1.5	0.008	50,000	240	45,900	202	45,900	170	45,900	153
0.3	0.02	1	0.016	50,000	585	50,000	456	50,000	336	50,000	320
		2	0.011	45,000	530	45,000	420	45,000	300	45,000	290
		3	0.007	35,000	412	35,000	326	30,000	200	30,000	194
	0.05	1	0.021	50,000	585	50,000	456	50,000	336	50,000	320
		2	0.012	45,000	530	45,000	420	45,000	300	45,000	290
		3	0.008	35,000	412	35,000	326	30,000	200	30,000	194
0.4	0.02	1	0.016	50,000	580	50,000	461	40,000	320	36,000	270
		2	0.013	45,000	520	45,000	410	36,000	290	34,000	240
		3	0.01	40,000	410	40,000	330	32,800	240	25,600	200
		4	0.007	30,000	320	30,000	250	21,600	160	19,200	150
	0.05	1	0.025	50,000	580	50,000	461	40,000	320	36,000	270
		2	0.016	45,000	520	45,000	410	36,000	290	34,000	240
		3	0.014	40,000	410	40,000	330	32,800	240	25,600	200
		4	0.008	30,000	320	30,000	250	21,600	160	19,200	150
	0.1	1	0.033	50,000	580	50,000	461	40,000	320	36,000	270
		1.5	0.03	50,000	580	50,000	461	40,000	320	36,000	270
		2	0.028	45,000	520	45,000	410	36,000	290	34,000	240
		3	0.016	40,000	410	40,000	330	32,800	240	25,600	200
		4	0.01	30,000	320	30,000	250	21,600	160	19,200	150
0.5	0.02	1	0.016	50,000	898	40,000	464	30,000	378	28,000	315
		1.5	0.014	50,000	898	40,000	464	30,000	378	28,000	315
		2	0.013	50,000	898	40,000	464	30,000	378	28,000	315
		2.5	0.011	45,000	810	36,000	414	27,000	315	24,500	261
		3	0.01	45,000	810	36,000	414	27,000	315	24,500	261
		4	0.008	40,000	720	32,000	378	24,000	279	20,000	234
		5	0.007	40,000	720	32,000	378	24,000	279	20,000	234
		6	0.006	28,800	480	19,400	260	18,000	250	15,000	200
		8	0.005	28,800	480	19,400	260	18,000	250	15,000	200
		10	0.004	28,800	480	19,400	260	18,000	250	15,000	200
	0.05	1	0.03	50,000	898	40,000	464	30,000	378	28,000	315
		1.5	0.026	50,000	898	40,000	464	30,000	378	28,000	315
		2	0.023	50,000	898	40,000	464	30,000	378	28,000	315
		2.5	0.02	45,000	810	36,000	414	27,000	315	24,500	261
		3	0.017	45,000	810	36,000	414	27,000	315	24,500	261
		4	0.017	40,000	720	32,000	378	24,000	279	20,000	234
		5	0.011	28,800	540	19,400	280	18,000	250	15,000	200
		6	0.008	28,800	480	19,400	260	18,000	250	15,000	200
		8	0.007	28,800	480	19,400	260	18,000	250	15,000	200
		10	0.006	28,800	480	19,400	260	18,000	250	15,000	200

H-Star Endmill

ESRR712 series

Workpiece				Carbon steels, Alloy steels 180~250HB		Pre-hardened steels HRC35~45		Hardened steels HRC45~55		High-hardened steels HRC55~65	
Ratio to standard depth of cut				Depth of Cut × 100%		Depth of Cut × 80%		Depth of Cut × 65%		Depth of Cut × 60%	
Diameter (Ø)	Corner R (mm)	Neck length (mm)	Depth of Cut (mm)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
0.5	0.1	1	0.035	50,000	898	40,000	464	30,000	378	28,000	315
		1.5	0.032	50,000	898	40,000	464	30,000	378	28,000	315
		2	0.03	50,000	898	40,000	464	30,000	378	28,000	315
		2.5	0.025	45,000	810	36,000	414	27,000	315	24,500	261
		3	0.02	45,000	810	36,000	414	27,000	315	24,500	261
		4	0.02	40,000	720	32,000	378	24,000	279	20,000	234
		5	0.013	28,800	540	19,400	280	18,000	250	15,000	200
		6	0.013	28,800	480	19,400	260	18,000	250	15,000	200
		8	0.01	28,800	480	19,400	260	18,000	250	15,000	200
		10	0.08	28,800	480	19,400	260	18,000	250	15,000	200
0.6	0.02	2	0.016	50,000	1,159	37,830	600	28,200	390	23,000	320
		3	0.014	40,000	830	27,800	440	23,600	280	21,000	230
		4	0.013	40,000	830	27,800	440	23,600	280	21,000	230
		6	0.01	24,000	490	18,000	300	17,800	240	15,000	210
		8	0.008	24,000	466	18,000	285	17,800	228	15,000	200
		10	0.007	24,000	451	18,000	276	17,800	221	15,000	193
		12	0.006	24,000	451	18,000	276	17,800	221	15,000	193
	0.05	2	0.028	50,000	1,159	37,830	600	28,200	390	23,000	320
		3	0.023	40,000	830	27,800	440	23,600	280	21,000	230
		4	0.019	40,000	830	27,800	440	23,600	280	21,000	230
		6	0.012	24,000	490	18,000	300	17,800	240	15,000	210
		8	0.01	24,000	466	18,000	285	17,800	228	15,000	200
		10	0.007	24,000	451	18,000	276	17,800	221	15,000	193
		12	0.006	24,000	451	18,000	276	17,800	221	15,000	193
	0.1	2	0.035	50,000	1,159	37,830	600	28,200	390	23,000	320
		3	0.03	40,000	830	27,800	440	23,600	280	21,000	230
		4	0.024	40,000	830	27,800	440	23,600	280	21,000	230
		6	0.015	24,000	490	18,000	300	17,800	240	15,000	210
		8	0.013	24,000	466	18,000	285	17,800	228	15,000	200
		10	0.009	24,000	451	18,000	276	17,800	221	15,000	193
		12	0.007	24,000	451	18,000	276	17,800	221	15,000	193
0.7	0.1	2	0.042	49,200	1,054	34,190	558	29,030	355	25,830	292
		4	0.029	40,000	830	27,800	440	23,600	280	21,000	230
		6	0.018	24,000	490	18,000	300	17,800	240	15,000	210
		8	0.015	24,000	490	18,000	300	17,800	240	15,000	210
		10	0.012	24,000	490	18,000	300	17,800	240	15,000	210
0.8	0.02	2	0.016	48,000	1,378	28,000	647	20,000	400	20,000	360
		4	0.016	48,000	1,102	28,000	518	20,000	320	20,000	288
		6	0.013	38,700	800	25,000	461	18,000	288	18,000	256
		8	0.011	29,025	600	20,000	369	16,200	259	16,200	230
		10	0.01	29,025	570	20,000	350	16,200	246	16,200	219
		12	0.09	29,025	570	20,000	350	16,200	246	16,200	219
	0.05	2	0.038	48,000	1,378	28,000	647	20,000	400	20,000	360
		4	0.026	48,000	1,102	28,000	518	20,000	320	20,000	288

ESRR712 series

Workpiece				Carbon steels, Alloy steels 180~250HB		Pre-hardened steels HRC35~45		Hardened steels HRC45~55		High-hardened steels HRC55~65	
Ratio to standard depth of cut				Depth of Cut × 100%		Depth of Cut × 80%		Depth of Cut × 65%		Depth of Cut × 60%	
Diameter (Ø)	Corner R (mm)	Neck length (mm)	Depth of Cut (mm)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
0.8	0.05	6	0.015	38,700	800	25,000	461	18,000	288	18,000	256
		8	0.012	29,025	600	20,000	369	16,200	259	16,200	230
		10	0.011	29,025	570	20,000	350	16,200	246	16,200	219
		12	0.01	29,025	570	20,000	350	16,200	246	16,200	219
	0.1	2	0.047	48,000	1,378	28,000	647	20,000	400	20,000	360
		4	0.032	48,000	1,102	28,000	518	20,000	320	20,000	288
		6	0.019	38,700	800	25,000	461	18,000	288	18,000	256
		8	0.015	29,025	600	20,000	369	16,200	259	16,200	230
		10	0.013	29,025	570	20,000	350	16,200	246	16,200	219
		12	0.012	29,025	570	20,000	350	16,200	246	16,200	219
	0.2	2	0.081	48,000	1,378	28,000	647	20,000	400	20,000	360
		4	0.056	48,000	1,102	28,000	518	20,000	320	20,000	288
		6	0.032	38,700	800	25,000	461	18,000	288	18,000	256
		8	0.018	29,025	600	20,000	369	16,200	259	16,200	230
		10	0.016	29,025	570	20,000	350	16,200	246	16,200	219
		12	0.015	29,025	570	20,000	350	16,200	246	16,200	219
1	0.02	4	0.013	32,400	1,359	27,540	1,039	24,300	815	22,680	666
		6	0.01	26,244	990	22,307	842	19,683	660	18,371	539
		8	0.008	23,328	880	19,829	748	17,496	587	16,330	479
		10	0.006	20,412	770	17,350	655	15,309	514	14,288	419
		12	0.005	18,144	609	15,422	453	13,608	399	12,701	320
		14	0.004	18,144	533	15,422	420	13,608	342	12,701	266
		16	0.004	18,144	533	15,422	420	13,608	342	12,701	266
		20	0.003	13,608	399	11,567	315	10,206	257	9,526	200
	0.05	4	0.027	32,400	1,359	28,917	1,128	24,300	815	22,680	666
		6	0.017	26,244	990	24,538	928	19,683	660	18,371	539
		8	0.016	23,328	880	19,829	748	17,496	587	16,330	479
		10	0.011	20,412	770	17,350	655	15,309	514	14,288	419
		12	0.01	18,144	609	15,422	453	13,608	399	12,701	320
		14	0.008	18,144	533	15,422	420	13,608	342	12,701	266
		16	0.006	18,144	533	15,422	420	13,608	342	12,701	266
		20	0.004	13,608	399	11,567	315	10,206	257	9,526	200
	0.1	4	0.038	32,400	1,359	27,540	1,039	24,300	815	22,680	666
		6	0.024	26,244	990	22,307	842	19,683	660	18,371	539
		8	0.024	23,328	880	19,829	748	17,496	587	16,330	479
		10	0.015	20,412	770	17,350	655	15,309	514	14,288	419
		12	0.015	18,144	609	15,422	453	13,608	399	12,701	320
		14	0.012	18,144	533	15,422	420	13,608	342	12,701	266
		16	0.009	18,144	533	15,422	420	13,608	342	12,701	266
		20	0.006	13,608	399	11,567	315	10,206	257	9,526	200
	0.2	4	0.07	32,400	1,359	27,540	1,039	24,300	815	22,680	666
		6	0.04	26,244	990	22,307	842	19,683	660	18,371	539
		8	0.04	23,328	880	19,829	748	17,496	587	16,330	479
		10	0.025	20,412	770	17,350	655	15,309	514	14,288	419

H-Star Endmill

ESRR712 series

Workpiece				Carbon steels, Alloy steels 180~250HB		Pre-hardened steels HRC35~45		Hardened steels HRC45~55		High-hardened steels HRC55~65	
Ratio to standard depth of cut				Depth of Cut × 100%		Depth of Cut × 80%		Depth of Cut × 65%		Depth of Cut × 60%	
Diameter (Ø)	Corner R (mm)	Neck length (mm)	Depth of Cut (mm)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
1	0.2	12	0.025	18,144	609	15,422	453	13,608	399	12,701	320
		14	0.02	18,144	533	15,422	420	13,608	342	12,701	266
		16	0.015	18,144	533	15,422	420	13,608	342	12,701	266
		20	0.01	13,608	399	11,567	315	10,206	257	9,526	200
	0.3	4	0.07	32,400	1,359	27,540	1,039	24,300	815	22,680	666
		6	0.04	26,244	990	22,307	842	19,683	660	18,371	539
		8	0.04	23,328	880	19,829	748	17,496	587	16,330	479
		10	0.025	20,412	770	17,350	655	15,309	514	14,288	419
		12	0.025	18,144	609	15,422	453	13,608	399	12,701	320
		14	0.02	18,144	533	15,422	420	13,608	342	12,701	266
		16	0.015	18,144	533	15,422	420	13,608	342	12,701	266
		20	0.01	13,608	399	11,567	315	10,206	257	9,526	200
1.2	0.02	4	0.013	28,868	1,154	24,538	928	21,651	727	20,208	594
		6	0.01	28,868	1,154	24,538	928	21,651	727	20,208	594
		8	0.008	24,640	962	20,944	791	18,480	620	17,248	506
		10	0.006	20,412	770	17,350	655	15,309	514	14,288	419
		12	0.005	19,278	652	16,386	554	14,458	428	13,494	342
		14	0.004	18,144	533	15,422	453	13,608	342	12,701	266
		16	0.004	18,144	533	15,422	453	13,608	342	12,701	266
		20	0.003	13,608	399	11,567	315	10,206	257	9,526	200
	0.05	4	0.027	28,868	1,154	24,538	928	21,651	727	20,208	594
		6	0.017	28,868	1,154	24,538	928	21,651	727	20,208	594
		8	0.016	24,640	962	20,944	791	18,480	620	17,248	506
		10	0.011	20,412	770	17,350	655	15,309	514	14,288	419
		12	0.01	19,278	652	16,386	554	14,458	428	13,494	342
		14	0.008	18,144	533	15,422	453	13,608	342	12,701	266
		16	0.006	18,144	533	15,422	453	13,608	342	12,701	266
		20	0.004	13,608	399	11,567	315	10,206	257	9,526	200
	0.1	4	0.03	28,868	1,154	24,538	928	21,651	727	20,208	594
		6	0.03	28,868	1,154	24,538	928	21,651	727	20,208	594
		8	0.022	24,640	962	20,944	791	18,480	620	17,248	506
		10	0.015	20,412	770	17,350	655	15,309	514	14,288	419
		12	0.012	19,278	652	16,386	554	14,458	428	13,494	342
		14	0.01	18,144	533	15,422	453	13,608	342	12,701	266
		16	0.01	18,144	533	15,422	453	13,608	342	12,701	266
		20	0.006	13,608	399	11,567	315	10,206	257	9,526	200
	0.2	4	0.05	28,868	1,154	24,538	928	21,651	727	20,208	594
		6	0.05	28,868	1,154	24,538	928	21,651	727	20,208	594
		8	0.037	24,640	962	20,944	791	18,480	620	17,248	506
		10	0.025	20,412	770	17,350	655	15,309	514	14,288	419
		12	0.02	19,278	651	16,386	554	14,458	428	13,494	342
		14	0.016	18,144	533	15,422	453	13,608	342	12,701	266
		16	0.016	18,144	533	15,422	453	13,608	342	12,701	266
		20	0.01	13,608	399	11,567	315	10,206	257	9,526	200

ESRR712 series

Workpiece				Carbon steels, Alloy steels 180~250HB		Pre-hardened steels HRC35~45		Hardened steels HRC45~55		High-hardened steels HRC55~65	
Ratio to standard depth of cut				Depth of Cut × 100%		Depth of Cut × 80%		Depth of Cut × 65%		Depth of Cut × 60%	
Diameter (Ø)	Corner R (mm)	Neck length (mm)	Depth of Cut (mm)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
1.2	0.3	4	0.05	28,868	1,154	24,538	928	21,651	727	20,208	594
		6	0.05	28,868	1,154	24,538	928	21,651	727	20,208	594
		8	0.037	24,640	962	20,944	791	18,480	620	17,248	506
		10	0.025	20,412	770	17,350	655	15,309	514	14,288	419
		12	0.02	19,278	651	16,386	554	14,458	428	13,494	342
		14	0.016	18,144	533	15,422	453	13,608	342	12,701	266
		16	0.016	18,144	533	15,422	453	13,608	342	12,701	266
		20	0.01	13,608	399	11,567	315	10,206	257	9,526	200
1.5	0.02	4	0.013	24,930	1,130	20,956	947	18,711	752	17,364	611
		6	0.01	23,779	1,074	20,382	921	17,834	716	16,560	582
		8	0.008	22,680	1,027	19,278	873	17,010	685	15,876	559
		10	0.006	20,412	924	17,350	785	15,309	616	14,288	503
		12	0.005	18,144	822	15,422	698	13,608	548	12,701	447
		14	0.004	14,112	568	11,995	423	10,584	373	9,878	298
		16	0.004	14,112	568	11,995	423	10,584	373	9,878	298
		20	0.003	14,112	568	11,995	423	10,584	373	9,878	298
	0.05	4	0.027	24,930	1,130	20,956	947	18,711	752	17,364	611
		6	0.017	23,779	1,074	20,382	921	17,834	716	16,560	582
		8	0.016	22,680	1,027	19,278	873	17,010	685	15,876	559
		10	0.011	20,412	924	17,350	785	15,309	616	14,288	503
		12	0.01	18,144	822	15,422	698	13,608	548	12,701	447
		14	0.008	14,112	568	11,995	423	10,584	373	9,878	298
		16	0.006	14,112	568	11,995	423	10,584	373	9,878	298
		20	0.004	14,112	568	11,995	423	10,584	373	9,878	298
	0.1	4	0.042	24,930	1,130	20,956	947	18,711	752	17,364	611
		6	0.04	23,779	1,074	20,382	921	17,834	716	16,560	582
		8	0.036	22,680	1,027	19,278	873	17,010	685	15,876	559
		10	0.036	20,412	924	17,350	785	15,309	616	14,288	503
		12	0.036	18,144	822	15,422	698	13,608	548	12,701	447
		14	0.023	14,112	568	11,995	423	10,584	373	9,878	298
		16	0.023	14,112	568	11,995	423	10,584	373	9,878	298
		20	0.018	14,112	568	11,995	423	10,584	373	9,878	298
	0.2	4	0.07	24,930	1,130	20,956	868	18,711	678	17,364	556
		6	0.065	23,779	1,074	20,382	921	17,834	716	16,560	582
		8	0.06	22,680	1,027	19,278	873	17,010	685	15,876	559
		10	0.06	20,412	924	17,350	785	15,309	616	14,288	503
		12	0.06	18,144	822	15,422	698	13,608	548	12,701	447
		14	0.038	14,112	568	11,995	423	10,584	373	9,878	298
		16	0.038	14,112	568	11,995	423	10,584	373	9,878	298
		20	0.03	14,112	568	11,995	423	10,584	373	9,878	298
	0.3	4	0.07	24,930	1,130	20,956	868	18,711	678	17,364	556
		6	0.065	23,779	1,074	20,382	921	17,834	716	16,560	582
		8	0.06	22,680	1,027	19,278	873	17,010	685	15,876	559
		10	0.06	20,412	924	17,350	785	15,309	616	14,288	503

H-Star Endmill

ESRR712 series

Workpiece				Carbon steels, Alloy steels 180~250HB		Pre-hardened steels HRC35~45		Hardened steels HRC45~55		High-hardened steels HRC55~65	
Ratio to standard depth of cut				Depth of Cut × 100%		Depth of Cut × 80%		Depth of Cut × 65%		Depth of Cut × 60%	
Diameter (Ø)	Corner R (mm)	Neck length (mm)	Depth of Cut (mm)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
1.5	0.3	12	0.06	18,144	822	15,422	698	13,608	548	12,701	447
		14	0.038	14,112	568	11,995	423	10,584	373	9,878	298
		16	0.038	14,112	568	11,995	423	10,584	373	9,878	298
		20	0.03	14,112	568	11,995	423	10,584	373	9,878	298
	0.5	4	0.085	24,930	1,130	20,956	868	18,711	678	17,364	556
		6	0.08	23,779	1,074	20,382	921	17,834	716	16,560	582
		8	0.07	22,680	1,027	19,278	873	17,010	685	15,876	559
		10	0.067	20,412	924	17,350	785	15,309	616	14,288	503
		12	0.065	18,144	822	15,422	698	13,608	548	12,701	447
		14	0.045	14,112	568	11,995	423	10,584	373	9,878	298
		16	0.045	14,112	568	11,995	423	10,584	373	9,878	298
		20	0.035	14,112	568	11,995	423	10,584	373	9,878	298
	0.02	6	0.013	20,790	1,635	17,672	1,389	15,593	981	14,553	801
		8	0.01	18,900	1,486	16,065	1,263	14,175	892	13,230	728
		10	0.008	17104	1284	14539	1092	12828	807	11973	659
		12	0.006	15,309	1,083	13,013	921	11,482	722	10,716	590
		14	0.005	14,458	1023	12,290	869	10,844	682	10,121	557
		16	0.004	13,608	963	11,567	818	10,206	642	9,526	524
		20	0.004	11,907	843	10,121	716	8,930	562	8,335	459
		25	0.003	11,907	757	10,121	643	8,930	505	8,335	411
	0.05	6	0.027	20,790	1,635	17,672	1,389	15,593	981	14,553	801
		8	0.017	18,900	1,486	16,065	1,263	14,175	892	13,230	728
		10	0.016	17104	1284	14539	1092	12828	807	11973	659
		12	0.011	15,309	1,083	13,013	921	11,482	722	10,716	590
		14	0.01	14,458	1023	12,290	869	10,844	682	10,121	557
		16	0.008	13,608	963	11,567	818	10,206	642	9,526	524
		20	0.006	11,907	843	10,121	716	8,930	562	8,335	459
		25	0.004	11,907	757	10,121	643	8,930	505	8,335	411
	0.1	6	0.07	20,790	1,635	17,672	1,389	15,593	981	14,553	801
		8	0.055	18,900	1,486	16,065	1,263	14,175	892	13,230	728
		10	0.042	17104	1284	14539	1092	12828	807	11973	659
		12	0.03	15,309	1,083	13,013	921	11,482	722	10,716	590
		14	0.03	14,458	1023	12,290	869	10,844	682	10,121	557
		16	0.03	13,608	963	11,567	818	10,206	642	9,526	524
		20	0.025	11,907	843	10,121	716	8,930	562	8,335	459
		25	0.015	11,907	757	10,121	643	8,930	505	8,335	411
		30	0.01	11,312	719	9,615	611	8,484	480	7,918	391
	0.2	6	0.08	20,790	1,635	17,672	1,389	15,593	981	14,553	801
		8	0.07	18,900	1,486	16,065	1,263	14,175	892	13,230	728
		10	0.055	17,104	1,284	14,539	1,092	12,828	807	11,973	659
		12	0.04	15,309	1,083	13,013	921	11,482	722	10,716	590
		14	0.04	14,458	1,023	12,290	869	10,844	682	10,121	557
		16	0.04	13,608	963	11,567	818	10,206	642	9,526	524
		20	0.035	11,907	843	10,121	716	8,930	562	8,335	459

ESRR712 series

Workpiece				Carbon steels, Alloy steels 180~250HB		Pre-hardened steels HRC35~45		Hardened steels HRC45~55		High-hardened steels HRC55~65	
Ratio to standard depth of cut				Depth of Cut × 100%		Depth of Cut × 80%		Depth of Cut × 65%		Depth of Cut × 60%	
Diameter (Ø)	Corner R (mm)	Neck length (mm)	Depth of Cut (mm)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
2	0.2	25	0.025	11,907	757	10,121	643	8,930	505	8,335	411
		30	0.017	11,312	719	9,615	611	8,484	480	7,918	391
	0.3	6	0.11	20,790	1,635	17,672	1,389	15,593	981	14,553	801
		8	0.09	18,900	1,486	16,065	1,263	14,175	892	13,230	728
		10	0.075	17,104	1,284	14,539	1,092	12,828	807	11,973	659
		12	0.06	15,309	1,083	13,013	921	11,482	722	10,716	590
		14	0.06	14,458	1023	12,290	869	10,844	682	10,121	557
		16	0.06	13,608	963	11,567	818	10,206	642	9,526	524
		20	0.037	11,907	843	10,121	716	8,930	562	8,335	459
		25	0.03	11,907	757	10,121	643	8,930	505	8,335	411
		30	0.021	11,312	719	9,615	611	8,484	480	7,918	391
	0.5	6	0.17	20,790	1,635	17,672	1,389	15,593	981	14,553	801
		8	0.14	18,900	1,486	16,065	1,263	14,175	892	13,230	728
		10	0.11	17,104	1284	14,539	1143	12,828	807	11,973	659
		12	0.08	15,309	1,083	13,013	1,023	11,482	722	10,716	590
		14	0.08	14,458	1023	12,290	920	1,084	682	10,121	557
		16	0.08	13,608	963	11,567	818	10,206	642	9,526	524
		20	0.05	11,907	843	10,121	716	8,930	562	8,335	459
		25	0.05	11,907	757	10,121	643	8,930	505	8,335	411
		30	0.03	11,312	719	9,615	611	8,484	480	7,918	391
2.5	0.1	10	0.055	18,900	1,486	16,065	1,263	14,175	892	13,230	728
		16	0.042	16,254	1224	13,816	1040	12,190	767	11,378	626
		20	0.03	13,608	963	11,567	818	10,206	642	9,526	524
		25	0.022	12,757	860	10,844	730	9,568	573	8,930	467
		30	0.015	11,907	757	10,121	643	8,930	505	8,335	411
	0.2	10	0.07	18,900	1,486	16,065	1,263	14,175	892	13,230	728
		16	0.055	16,254	1,224	1,386	1040	12,190	767	11,378	626
		20	0.04	13,608	963	11,567	818	10,206	642	9,526	524
	0.3	10	0.09	18,900	1,486	16,065	1,263	14,175	892	13,230	728
		16	0.075	16,254	1,224	1,386	1040	12,190	767	11,378	626
		20	0.06	13,608	963	11,567	818	10,206	642	9,526	524
	0.5	10	0.14	18,900	1,486	16,065	1,263	14,175	892	13,230	728
		16	0.11	16,254	1,224	1,386	1040	12,190	767	11,378	626
		20	0.08	13,608	963	11,567	818	10,206	642	9,526	524
3	0.1	10	0.06	14,400	1,415	12,240	1,203	10,800	849	10,080	693
		12	0.05	14,400	1,415	12,240	1,203	10,800	849	10,080	693
		16	0.035	14,400	1,415	12,240	1,203	10,800	849	10,080	693
		20	0.035	11,664	1,146	9,914	974	8,748	687	8,165	561
		25	0.031	10,368	973	8,812	827	7,776	583	7,257	477
		30	0.027	9,072	801	7,711	681	6,804	480	6,350	393
		35	0.02	9,072	801	7,711	681	6,804	480	6,350	393
		40	0.015	9,072	801	7,711	681	6,804	480	6,350	393
	0.2	10	0.08	14,400	1,415	12,240	1,203	10,800	849	10,080	693
		12	0.07	14,400	1,415	12,240	1,203	10,800	849	10,080	693

H-Star Endmill

ESRR712 series

Workpiece				Carbon steels, Alloy steels 180~250HB		Pre-hardened steels HRC35~45		Hardened steels HRC45~55		High-hardened steels HRC55~65	
Ratio to standard depth of cut				Depth of Cut × 100%		Depth of Cut × 80%		Depth of Cut × 65%		Depth of Cut × 60%	
Diameter (Ø)	Corner R (mm)	Neck length (mm)	Depth of Cut (mm)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
3	0.2	16	0.05	14,400	1,415	12,240	1,203	10,800	849	10,080	693
		20	0.05	11,664	1,146	9,914	974	8,748	687	8,165	561
		25	0.045	10,368	973	8,812	827	7,776	583	7,257	477
		30	0.04	9,072	801	7,711	681	6,804	480	6,350	393
		35	0.035	9,072	801	7,711	681	6,804	480	6,350	393
		40	0.03	9,072	801	7,711	681	6,804	480	6,350	393
	0.3	10	0.115	14,400	1,415	12,240	1,203	10,800	849	10,080	693
		12	0.1	14,400	1,415	12,240	1,203	10,800	849	10,080	693
		16	0.075	14,400	1,415	12,240	1,203	10,800	849	10,080	693
		20	0.075	11,664	1,146	9,914	974	8,748	687	8,165	561
		25	0.067	10,368	973	8,812	827	7,776	583	7,257	477
		30	0.06	9,072	801	7,711	681	6,804	480	6,350	393
		35	0.05	9,072	801	7,711	681	6,804	480	6,350	393
		40	0.04	9,072	801	7,711	681	6,804	480	6,350	393
	0.5	10	0.155	14,400	1,415	12,240	1,203	10,800	849	10,080	693
		12	0.13	14,400	1,415	12,240	1,203	10,800	849	10,080	693
		16	0.1	14,400	1,415	12,240	1,203	10,800	849	10,080	693
		20	0.1	11,664	1,146	9,914	974	8,748	687	8,165	561
		25	0.09	10,368	973	8,812	827	7,776	583	7,257	477
		30	0.08	9,072	801	7,711	681	6,804	480	6,350	393
		35	0.065	9,072	801	7,711	681	6,804	480	6,350	393
		40	0.05	9,072	801	7,711	681	6,804	480	6,350	393
	1	10	0.175	14,400	1,415	12,240	1,203	10,800	849	10,080	693
		12	0.15	14,400	1,415	12,240	1,203	10,800	849	10,080	693
		16	0.12	14,400	1,415	12,240	1,203	10,800	849	10,080	693
		20	0.11	11,664	1,146	9,914	974	8,748	687	8,165	561
		25	0.1	10,368	973	8,812	827	7,776	583	7,257	477
		30	0.09	9,072	801	7,711	681	6,804	480	6,350	393
		35	0.075	9,072	801	7,711	681	6,804	480	6,350	393
		40	0.06	9,072	801	7,711	681	6,804	480	6,350	393
4	0.1	12	0.065	11,213	1,950	9,531	1,658	8,410	1,170	7,849	956
		16	0.06	10,255	1,783	8,697	1,512	7,599	1,057	6,684	814
		20	0.055	10,255	1,783	8,697	1,512	7,599	1,057	6,684	814
		25	0.05	10,255	1,783	7,782	1293	6,545	872	5,904	687
		30	0.045	10,255	1,783	6,867	1,075	5,491	688	5,124	561
		35	0.04	10,255	1,783	6,867	1,075	5,491	688	5,124	561
		40	0.035	10,255	1,783	6,867	1,075	5,491	688	5,124	561
	0.2	12	0.14	11,213	1,950	9,531	1,658	8,410	1,170	7,849	956
		16	0.13	10,255	1,783	8,697	1,512	7,599	1,057	6,684	814
		20	0.11	10,255	1,783	8,697	1,512	7,599	1,057	6,684	814
		25	0.105	10,255	1,783	7,782	1293	6,545	872	5,904	687
		30	0.1	10,255	1,783	6,867	1,075	5,491	688	5,124	561
		35	0.08	10,255	1,783	6,867	1,075	5,491	688	5,124	561
		40	0.07	9,247	1,429	6,225	901	5,217	602	4,621	459

ESRR712 series

Workpiece				Carbon steels, Alloy steels 180~250HB		Pre-hardened steels HRC35~45		Hardened steels HRC45~55		High-hardened steels HRC55~65	
Ratio to standard depth of cut				Depth of Cut × 100%		Depth of Cut × 80%		Depth of Cut × 65%		Depth of Cut × 60%	
Diameter (Ø)	Corner R (mm)	Neck length (mm)	Depth of Cut (mm)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
4	0.3	12	0.22	11,213	1,950	9,531	1,658	8,410	1,170	7,849	956
		16	0.2	10,255	1,783	8,697	1,512	7,599	1,057	6,684	814
		20	0.18	10,255	1,783	8,697	1,512	7,599	1,057	6,684	814
		25	0.17	10,255	1,783	7,782	1293	6,545	872	5,904	687
		30	0.16	10,255	1,783	6,867	1,075	5,491	688	5,124	561
		35	0.14	10,255	1,783	6,867	1,075	5,491	688	5,124	561
		40	0.13	9,247	1,429	6,225	901	5,217	602	4,621	459
	0.5	12	0.35	11,213	1,950	9,531	1,658	8,410	1,170	7,849	956
		16	0.25	10,255	1,783	8,697	1,512	7,599	1,057	6,684	814
		20	0.2	10,255	1,783	8,697	1,512	7,599	1,057	6,684	814
		25	0.175	10,255	1,783	7,782	1293	6,545	872	5,904	687
		30	0.15	10,255	1,783	6,867	1,075	5,491	688	5,124	5
		35	0.1	10,255	1,783	6,867	1,075	5,491	688	5,124	561
		40	0.075	9,247	1,429	6,225	901	5,217	602	4,621	459
	1	12	0.4	11,213	1,950	9,531	1,658	8,410	1,170	7,849	956
		16	0.29	10,255	1,783	8,697	1,512	7,599	1,057	6,684	814
		20	0.23	10,255	1,783	8,697	1,512	7,599	1,057	6,684	814
		25	0.2	10,255	1,783	7,782	1293	6,545	872	5,904	687
		30	0.17	10,255	1,783	6,867	1,075	5,491	688	5,124	561
		35	0.12	10,255	1,783	6,867	1,075	5,491	688	5,124	561
		40	0.09	9,247	1,429	6,225	901	5,217	602	4,621	459
5	0.2	15	0.16	9,154	1,990	7,781	1,692	6,866	1,194	6,408	975
		25	0.152	8,513	1813	7,236	1541	6,385	1088	5,959	888
		30	0.145	7,872	1637	6,691	1391	5,904	982	5,510	802
		40	0.13	6,590	1,284	5,602	1,091	4,943	770	4,613	629
	0.5	15	0.35	9,154	1,990	7,781	1,692	6,866	1,194	6,408	975
		25	0.296	8,513	1813	7,236	1541	6,385	1088	5,959	888
		30	0.24	7,872	1637	6,691	1391	5,904	982	5,510	802
		40	0.135	6,590	1,284	5,602	1,091	4,943	770	4,613	629
	1	15	0.4	9,154	1,990	7,781	1,692	6,866	1,194	6,408	975
		25	0.337	8,513	1813	7,236	1541	6,385	1088	5,959	888
		30	0.275	7,872	1637	6,691	1391	5,904	982	5,510	802
		40	0.15	6,590	1,284	5,602	1,091	4,943	770	4,613	629
6	0.1	20	0.065	7,630	1,991	6,486	1,692	5,722	1,194	5,342	975
		40	0.05	6,486	1,523	5,513	1,294	4,865	914	4,540	746
	0.2	20	0.14	7,630	1,991	6,486	1,692	5,722	1,194	5,342	975
		40	0.11	6,486	1,523	5,513	1,294	4,865	914	4,540	746
	0.3	20	0.22	7,630	1,991	6,486	1,692	5,722	1,194	5,342	975
		40	0.18	6,486	1,523	5,513	1,294	4,865	914	4,540	746
	0.5	20	0.35	7,630	1,991	6,486	1,692	5,722	1,194	5,342	975
		40	0.24	6,486	1,523	5,513	1,294	4,865	914	4,540	746
	1	20	0.4	7,630	1,991	6,486	1,692	5,722	1,194	5,342	975
		40	0.28	6,486	1,523	5,513	1,294	4,865	914	4,540	746
	1.5	20	0.45	7,630	1,991	6,486	1,692	5,722	1,194	5,342	975
		40	0.3	6,486	1,523	5,513	1,294	4,865	914	4,540	746

H-Star Endmill

ESRR712 series

Workpiece				Carbon steels, Alloy steels 180~250HB		Pre-hardened steels HRC35~45		Hardened steels HRC45~55		High-hardened steels HRC55~65	
Ratio to standard depth of cut				Depth of Cut × 100%		Depth of Cut × 80%		Depth of Cut × 65%		Depth of Cut × 60%	
Diameter (Ø)	Corner R (mm)	Neck length (mm)	Depth of Cut (mm)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
8	0.2	22	0.35	5,730	1900	4,524	1483	3,016	914	2,320	584
	0.3	22	0.5	5,730	1900	4,524	1483	3,016	914	2,320	584
	0.5	22	0.6	5,730	1900	4,524	1483	3,016	914	2,320	584
	1	22	0.7	5,730	1900	4,524	1483	3,016	914	2,320	584
	1.5	22	0.8	5,730	1900	4,524	1483	3,016	914	2,320	584
10	0.2	24	0.4	4,524	1728	3,567	1396	2,378	849	1,856	544
	0.3	24	0.5	4,524	1728	3,567	1396	2,378	849	1,856	544
	0.5	24	0.6	4,524	1728	3,567	1396	2,378	849	1,856	544
	1	24	0.7	4,524	1728	3,567	1396	2,378	849	1,856	544
	1.5	24	0.8	4,524	1728	3,567	1396	2,378	849	1,856	544
	2	24	0.9	4,524	1728	3,567	1396	2,378	849	1,856	544
12	0.2	26	0.5	3,857	1728	3,045	1396	2,030	849	1,537	544
	0.3	26	0.6	3,857	1728	3,045	1396	2,030	849	1,537	544
	0.5	26	0.7	3,857	1728	3,045	1396	2,030	849	1,537	544
	1	26	0.8	3,857	1728	3,045	1396	2,030	849	1,537	544
	1.5	26	0.9	3,857	1728	3,045	1396	2,030	849	1,537	544
	2	26	1	3,857	1728	3,045	1396	2,030	849	1,537	544
	3	26	1	3,857	1728	3,045	1396	2,030	849	1,537	544
16	0.5	35	2	2,842	1,512	2,262	1209	1,508	748	1,160	480
	1	35	2	2,842	453	2,262	362	1,508	224	1,160	480

- Please adjust the cutting depth index according to the cutting depth factors of above table.
- In actual machining, the condition should be adjusted according to the machining shape, purpose and machine type.
- If RPM of the machine is low, the feed rate should be low in the same ratio as RPM.

ESRR714 series

Workpiece				Carbon steels, Alloy steels 180~250HB		Pre-hardened steels HRC35~45		Hardened steels HRC45~55		High-hardened steels HRC55~65	
Ratio to standard depth of cut				Depth of Cut × 100%		Depth of Cut × 80%		Depth of Cut × 65%		Depth of Cut × 60%	
Diameter (Ø)	Corner R (mm)	Neck length (mm)	Depth of Cut (mm)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
0.5	0.05	2	0.023	50,000	1257	40,000	649	30,000	529	28,000	441
		4	0.017	40,000	1008	32,000	529	24,000	390	20,000	327
		6	0.008	28,800	672	19,400	364	18,000	350	15,000	280
		8	0.007	28,800	672	19,400	364	18,000	350	15,000	280
	0.1	2	0.03	50,000	1257	40,000	649	30,000	529	28,000	441
		4	0.02	40,000	1008	32,000	529	24,000	390	20,000	327
		6	0.013	28,800	672	19,400	364	18,000	350	15,000	280
		8	0.01	28,800	672	19,400	364	18,000	350	15,000	280
0.6	0.05	2	0.028	50,000	1622	37,830	840	28,200	546	23,000	448
		4	0.019	40,000	1,162	27,800	616	23,600	392	21,000	322
		6	0.012	24,000	686	18,000	420	17,800	336	15,000	294
		8	0.01	24,000	652	18,000	399	17,800	319	15,000	280
	0.1	2	0.035	50,000	1622	37,830	840	28,200	546	23,000	448
		4	0.024	40,000	1,162	27,800	616	23,600	392	21,000	322
		6	0.015	24,000	686	18,000	420	17,800	336	15,000	294
		8	0.013	24,000	652	18,000	399	17,800	319	15,000	280
0.7	0.05	2	0.028	49,200	1,475	34,190	781	29,030	497	25,830	408
		4	0.019	40,000	1,162	27,800	616	23,600	392	21,000	322
		6	0.012	24,000	686	18,000	420	17,800	336	15,000	294
		8	0.01	24,000	686	18,000	420	17,800	336	15,000	294
	0.1	2	0.042	49,200	1,475	34,190	781	29,030	497	25,830	408
		4	0.029	40,000	1,162	27,800	616	23,600	392	21,000	322
		6	0.018	24,000	686	18,000	420	17,800	336	15,000	294
		8	0.015	24,000	686	18,000	420	17,800	336	15,000	294
0.8	0.02	2	0.016	48,000	1929	28,000	905	20,000	560	360	504
		4	0.016	48,000	1,542	28,000	725	20,000	448	288	403
		6	0.013	38,700	1,120	25,000	645	18,000	403	256	358
		8	0.011	29,025	840	20,000	516	16,200	362	230	322
		10	0.01	29,025	798	20,000	490	16,200	344	219	306
		12	0.09	29,025	798	20,000	490	16,200	344	219	306
	0.05	2	0.038	48,000	1929	28,000	905	20,000	560	360	504
		4	0.026	48,000	1,542	28,000	725	20,000	448	288	403
		6	0.015	38,700	1,120	25,000	645	18,000	403	256	358
		8	0.012	29,025	840	20,000	516	16,200	362	230	322
		10	0.011	29,025	798	20,000	490	16,200	344	219	306
		12	0.01	29,025	798	20,000	490	16,200	344	219	306
	0.1	2	0.047	48,000	1929	28,000	905	20,000	560	360	504
		4	0.032	48,000	1,542	28,000	725	20,000	448	288	403
		6	0.019	38,700	1,120	25,000	645	18,000	403	256	358
		8	0.015	29,025	840	20,000	516	16,200	362	230	322
		10	0.013	29,025	798	20,000	490	16,200	344	219	306
		12	0.012	29,025	798	20,000	490	16,200	344	219	306
1	0.02	4	0.013	32,400	1902	27,540	1454	24,300	1141	22,680	932
		6	0.01	26,244	1386	22,307	1178	19,683	924	18,371	754

H-Star Endmill

ESRR714 series

Workpiece				Carbon steels, Alloy steels 180~250HB		Pre-hardened steels HRC35~45		Hardened steels HRC45~55		High-hardened steels HRC55~65	
Ratio to standard depth of cut				Depth of Cut × 100%		Depth of Cut × 80%		Depth of Cut × 65%		Depth of Cut × 60%	
Diameter (Ø)	Corner R (mm)	Neck length (mm)	Depth of Cut (mm)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
1	0.02	8	0.008	23,328	1232	19,829	1047	17,496	821	16,330	670
		10	0.006	20,412	1,078	17,350	917	15,309	719	14,288	586
		12	0.005	18,144	852	15,422	634	13,608	558	12,701	448
		14	0.004	18,144	746	15,422	588	13,608	478	12,701	372
		16	0.004	18,144	746	15,422	588	13,608	478	12,701	372
		20	0.003	13,608	558	11,567	441	10,206	359	9,526	280
	0.05	3	0.027	32,400	1902	27,540	1454	24,300	1141	22,680	932
		4	0.027	32,400	1902	27,540	1454	24,300	1141	22,680	932
		6	0.017	26,244	1386	22,307	1178	19,683	924	18,371	754
		8	0.016	23,328	1232	19,829	1047	17,496	821	16,330	670
		10	0.011	20,412	1,078	17,350	917	15,309	719	14,288	586
		12	0.01	18,144	852	15,422	634	13,608	558	12,701	448
		14	0.008	18,144	746	15,422	588	13,608	478	12,701	372
		16	0.006	18,144	746	15,422	588	13,608	478	12,701	372
		20	0.004	13,608	558	11,567	441	10,206	359	9,526	280
	0.1	3	0.038	32,400	1902	27,540	1454	24,300	1141	22,680	932
		4	0.038	32,400	1902	27,540	1454	24,300	1141	22,680	932
		6	0.024	26,244	1386	22,307	1178	19,683	924	18,371	754
		8	0.024	23,328	1232	19,829	1047	17,496	821	16,330	670
		10	0.015	20,412	1,078	17,350	917	15,309	719	14,288	586
		12	0.015	18,144	852	15,422	634	13,608	558	12,701	448
		14	0.012	18,144	746	15,422	588	13,608	478	12,701	372
		16	0.009	18,144	746	15,422	588	13,608	478	12,701	372
		20	0.006	13,608	558	11,567	441	10,206	359	9,526	280
	0.2	3	0.07	32,400	1902	27,540	1454	24,300	1141	22,680	932
		4	0.07	32,400	1902	27,540	1454	24,300	1141	22,680	932
		6	0.04	26,244	1386	22,307	1178	19,683	924	18,371	754
		8	0.04	23,328	1232	19,829	1047	17,496	821	16,330	670
		10	0.025	20,412	1,078	17,350	917	15,309	719	14,288	586
		12	0.025	18,144	852	15,422	634	13,608	558	12,701	448
		14	0.02	18,144	746	15,422	588	13,608	478	12,701	372
		16	0.015	18,144	746	15,422	588	13,608	478	12,701	372
		20	0.01	13,608	558	11,567	441	10,206	359	9,526	280
	0.3	3	0.07	32,400	1902	27,540	1454	24,300	1141	22,680	932
		4	0.07	32,400	1902	27,540	1454	24,300	1141	22,680	932
		6	0.04	26,244	1386	22,307	1178	19,683	924	18,371	754
		8	0.04	23,328	1232	19,829	1047	17,496	821	16,330	670
		10	0.025	20,412	1,078	17,350	917	15,309	719	14,288	586
		12	0.025	18,144	852	15,422	634	13,608	558	12,701	448
		14	0.02	18,144	746	15,422	588	13,608	478	12,701	372
		16	0.015	18,144	746	15,422	588	13,608	478	12,701	372
		20	0.01	13,608	558	11,567	441	10,206	359	9,526	280
1.2	0.02	4	0.013	28,868	1,615	24,538	1,299	21,651	1017	20,208	831
		6	0.01	28,868	1,615	24,538	1,299	21,651	1,017	20,208	831

ESRR714 series

Workpiece				Carbon steels, Alloy steels 180~250HB		Pre-hardened steels HRC35~45		Hardened steels HRC45~55		High-hardened steels HRC55~65	
Ratio to standard depth of cut				Depth of Cut × 100%		Depth of Cut × 80%		Depth of Cut × 65%		Depth of Cut × 60%	
Diameter (Ø)	Corner R (mm)	Neck length (mm)	Depth of Cut (mm)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
1.2	0.02	8	0.008	24,640	1,346	20,944	1,107	18,480	868	17,248	708
		10	0.006	20,412	1,078	17,350	917	15,309	719	14,288	586
		12	0.005	19,278	912	16,386	775	14,458	599	13,494	478
		14	0.004	18,144	746	15,422	634	13,608	478	12,701	372
		16	0.004	18,144	746	15,422	634	13,608	478	12,701	372
		20	0.003	13,608	558	11,567	441	10,206	359	9,526	280
	0.05	3	0.027	28,868	1,615	24,538	1,299	21,651	1017	20,208	831
		4	0.027	28,868	1,615	24,538	1,299	21,651	1017	20,208	831
		6	0.017	28,868	1,615	24,538	1,299	21,651	1,017	20,208	831
		8	0.016	24,640	1,346	20,944	1,107	18,480	868	17,248	708
		10	0.011	20,412	1,078	17,350	917	15,309	719	14,288	586
		12	0.01	19,278	912	16,386	775	14,458	599	13,494	478
		14	0.008	18,144	746	15,422	634	13,608	478	12,701	372
		16	0.006	18,144	746	15,422	634	13,608	478	12,701	372
		20	0.004	13,608	558	11,567	441	10,206	359	9,526	280
	0.1	3	0.03	28,868	1,615	24,538	1,299	21,651	1017	20,208	831
		4	0.03	28,868	1,615	24,538	1,299	21,651	1017	20,208	831
		6	0.03	28,868	1,615	24,538	1,299	21,651	1,017	20,208	831
		8	0.022	24,640	1,346	20,944	1,107	18,480	868	17,248	708
		10	0.015	20,412	1,078	17,350	917	15,309	719	14,288	586
		12	0.012	19,278	912	16,386	775	14,458	599	13,494	478
		14	0.01	18,144	746	15,422	634	13,608	478	12,701	372
		16	0.01	18,144	746	15,422	634	13,608	478	12,701	372
		20	0.006	13,608	558	11,567	441	10,206	359	9,526	280
	0.2	3	0.05	28,868	1,615	24,538	1,299	21,651	1017	20,208	831
		4	0.05	28,868	1,615	24,538	1,299	21,651	1017	20,208	831
		6	0.05	28,868	1,615	24,538	1,299	21,651	1,017	20,208	831
		8	0.037	24,640	1,346	20,944	1,107	18,480	868	17,248	708
		10	0.025	20,412	1,078	17,350	917	15,309	719	14,288	586
		12	0.02	19,278	912	16,386	775	14,458	599	13,494	478
		14	0.016	18,144	746	15,422	634	13,608	478	12,701	372
		16	0.016	18,144	746	15,422	634	13,608	478	12,701	372
		20	0.01	13,608	558	11,567	441	10,206	359	9,526	280
	0.3	3	0.05	28,868	1,615	24,538	1,299	21,651	1017	20,208	831
		4	0.05	28,868	1,615	24,538	1,299	21,651	1017	20,208	831
		6	0.05	28,868	1,615	24,538	1,299	21,651	1,017	20,208	831
		8	0.037	24,640	1,346	20,944	1,107	18,480	868	17,248	708
		10	0.025	20,412	1,078	17,350	917	15,309	719	14,288	586
		12	0.02	19,278	912	16,386	775	14,458	599	13,494	478
		16	0.016	18,144	746	15,422	634	13,608	478	12,701	372
		20	0.01	13,608	558	11,567	441	10,206	359	9,526	280
1.5	0.02	6	0.01	23,779	1,503	20,382	1,325	17,834	1,052	16,560	855
		8	0.008	22,680	1,437	19,278	1,289	17,010	1,002	15,876	814
		10	0.006	20,412	1,293	17,350	1,222	15,309	959	14,288	782

H-Star Endmill

ESRR714 series

Workpiece				Carbon steels, Alloy steels 180~250HB		Pre-hardened steels HRC35~45		Hardened steels HRC45~55		High-hardened steels HRC55~65	
Ratio to standard depth of cut				Depth of Cut × 100%		Depth of Cut × 80%		Depth of Cut × 65%		Depth of Cut × 60%	
Diameter (Ø)	Corner R (mm)	Neck length (mm)	Depth of Cut (mm)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
1.5	0.02	12	0.005	18,144	1,150	15,422	1,099	13,608	862	12,701	704
		14	0.004	14,112	795	11,995	977	10,584	767	9,878	625
		16	0.004	14,112	795	11,995	592	10,584	522	9,878	417
		20	0.003	14,112	795	11,995	592	10,584	522	9,878	417
		22	0.003	14,112	795	11,995	592	10,584	522	9,878	417
	0.05	4	0.027	24,930	1,582	20,956	1325	18,711	1052	17,364	855
		6	0.017	23,779	1,503	20,382	1,325	17,834	1,052	16,560	855
		8	0.016	22,680	1,437	19,278	1,289	17,010	1,002	15,876	814
		10	0.011	20,412	1,293	17,350	1,222	15,309	959	14,288	782
		12	0.01	18,144	1,150	15,422	1,099	13,608	862	12,701	704
		14	0.008	14,112	795	11,995	977	10,584	767	9,878	625
		16	0.006	14,112	795	11,995	592	10,584	522	9,878	417
		20	0.004	14,112	795	11,995	592	10,584	522	9,878	417
		22	0.004	14,112	795	11,995	592	10,584	522	9,878	417
		26	0.003	14,112	795	11,995	592	10,584	522	9,878	417
	0.1	4	0.042	24,930	1,582	20,956	1325	18,711	1052	17,364	855
		6	0.04	23,779	1,503	20,382	1,325	17,834	1,052	16,560	855
		8	0.036	22,680	1,437	19,278	1,289	17,010	1,002	15,876	814
		10	0.036	20,412	1,293	17,350	1,222	15,309	959	14,288	782
		12	0.036	18,144	1,150	15,422	1,099	13,608	862	12,701	704
		14	0.023	14,112	795	11,995	977	10,584	767	9,878	625
		16	0.023	14,112	795	11,995	592	10,584	522	9,878	417
		20	0.018	14,112	795	11,995	592	10,584	522	9,878	417
		22	0.015	14,112	795	11,995	592	10,584	522	9,878	417
		26	0.01	14,112	795	11,995	592	10,584	522	9,878	417
	0.2	4	0.07	24,930	1,582	20,956	1325	18,711	1052	17,364	855
		6	0.065	23,779	1,503	20,382	1,325	17,834	1,052	16,560	855
		8	0.06	22,680	1,437	19,278	1,289	17,010	1,002	15,876	814
		10	0.06	20,412	1,293	17,350	1,222	15,309	959	14,288	782
		12	0.06	18,144	1,150	15,422	1,099	13,608	862	12,701	704
		14	0.038	14,112	795	11,995	977	10,584	767	9,878	625
		16	0.038	14,112	795	11,995	592	10,584	522	9,878	417
		20	0.03	14,112	795	11,995	592	10,584	522	9,878	417
		22	0.025	14,112	795	11,995	592	10,584	522	9,878	417
		25	0.02	14,112	795	11,995	592	10,584	522	9,878	417
	0.3	4	0.07	24,930	1,582	20,956	1325	18,711	1052	17,364	855
		6	0.065	23,779	1,503	20,382	1,325	17,834	1,052	16,560	855
		8	0.06	22,680	1,437	19,278	1,289	17,010	1,002	15,876	814
		10	0.06	20,412	1,293	17,350	1,222	15,309	959	14,288	782
		12	0.06	18,144	1,150	15,422	1,099	13,608	862	12,701	704
		14	0.038	14,112	795	11,995	977	10,584	767	9,878	625
		16	0.038	14,112	795	11,995	592	10,584	522	9,878	417
		20	0.03	14,112	795	11,995	592	10,584	522	9,878	417
		22	0.025	14,112	795	11,995	592	10,584	522	9,878	417
		25	0.02	14,112	795	11,995	592	10,584	522	9,878	417

ESRR714 series

Workpiece				Carbon steels, Alloy steels 180~250HB		Pre-hardened steels HRC35~45		Hardened steels HRC45~55		High-hardened steels HRC55~65	
Ratio to standard depth of cut				Depth of Cut × 100%		Depth of Cut × 80%		Depth of Cut × 65%		Depth of Cut × 60%	
Diameter (Ø)	Corner R (mm)	Neck length (mm)	Depth of Cut (mm)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
1.5	0.5	4	0.085	24,930	1,582	20,956	1325	18,711	1052	17,364	855
		6	0.08	23,779	1,503	20,382	1,325	17,834	1,052	16,560	855
		8	0.07	22,680	1,437	19,278	1,289	17,010	1,002	15,876	814
		10	0.067	20,412	1,293	17,350	1,222	15,309	959	14,288	782
		12	0.065	18,144	1,150	15,422	1,099	13,608	862	12,701	704
		14	0.045	14,112	795	11,995	977	10,584	767	9,878	625
		16	0.045	14,112	795	11,995	592	10,584	522	9,878	417
		20	0.035	14,112	795	11,995	592	10,584	522	9,878	417
		22	0.03	14,112	795	11,995	592	10,584	522	9,878	417
		25	0.025	14,112	795	11,995	592	10,584	522	9,878	417
2	0.02	6	0.013	20,790	2289	17,672	1944	15,593	1373	14,553	1121
		8	0.01	18,900	2080	16,065	1768	14,175	1248	13,230	1019
		10	0.008	17104	1797	14539	1528	12828	1129	11973	922
		12	0.006	15,309	1516	13,013	1289	11,482	1010	10,716	826
		14	0.005	14,458	1432	12,290	1216	10,844	954	10,121	779
		16	0.004	13,608	1,348	11,567	1145	10,206	898	9,526	733
		20	0.004	11,907	1180	10,121	1002	8,930	786	8,335	642
		25	0.003	11,907	1059	10,121	900	8,930	707	8,335	575
		30	0.003	11,312	1006	9,615	855	8,484	672	7,918	547
	0.05	6	0.027	20,790	2289	17,672	1944	15,593	1373	14,553	1121
		8	0.017	18,900	2080	16,065	1768	14,175	1248	13,230	1019
		10	0.016	17104	1797	14539	1528	12828	1129	11973	922
		12	0.011	15,309	1516	13,013	1289	11,482	1010	10,716	826
		14	0.01	14,458	1432	12,290	1216	10,844	954	10,121	779
		16	0.008	13,608	1,348	11,567	1145	10,206	898	9,526	733
		20	0.006	11,907	1180	10,121	1002	8,930	786	8,335	642
		25	0.004	11,907	1059	10,121	900	8,930	707	8,335	575
		30	0.003	11,312	1006	9,615	855	8,484	672	7,918	547
	0.1	6	0.07	20,790	2289	17,672	1944	15,593	1373	14,553	1121
		8	0.055	18,900	2080	16,065	1768	14,175	1248	13,230	1019
		10	0.042	17104	1797	14539	1528	12828	1129	11973	922
		12	0.03	15,309	1516	13,013	1289	11,482	1010	10,716	826
		14	0.03	14,458	1432	12,290	1216	10,844	954	10,121	779
		16	0.03	13,608	1,348	11,567	1145	10,206	898	9,526	733
		20	0.025	11,907	1180	10,121	1002	8,930	786	8,335	642
		22	0.02	11,907	1059	10,121	900	8,930	707	8,335	575
		25	0.015	11,907	1059	10,121	900	8,930	707	8,335	575
		30	0.01	11,312	1006	9,615	855	8,484	672	7,918	547
	0.2	6	0.08	20,790	2289	17,672	1944	15,593	1373	14,553	1121
		8	0.07	18,900	2080	16,065	1768	14,175	1248	13,230	1019
		10	0.055	17104	1797	14539	1528	12828	1129	11973	922
		12	0.04	15,309	1516	13,013	1289	11,482	1010	10,716	826
		14	0.04	14,458	1432	12,290	1216	10,844	954	10,121	779
		16	0.04	13,608	1,348	11,567	1145	10,206	898	9,526	733

H-Star Endmill

ESRR714 series

Workpiece				Carbon steels, Alloy steels 180~250HB		Pre-hardened steels HRC35~45		Hardened steels HRC45~55		High-hardened steels HRC55~65	
Ratio to standard depth of cut				Depth of Cut × 100%		Depth of Cut × 80%		Depth of Cut × 65%		Depth of Cut × 60%	
Diameter (Ø)	Corner R (mm)	Neck length (mm)	Depth of Cut (mm)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
2	0.2	20	0.035	11,907	1180	10,121	1002	8,930	786	8,335	642
		22	0.03	11,907	1059	10,121	900	8,930	707	8,335	575
		25	0.025	11,907	1059	10,121	900	8,930	707	8,335	575
		30	0.017	11,312	1006	9,615	855	8,484	672	7,918	547
	0.3	6	0.11	20,790	2289	17,672	1944	15,593	1373	14,553	1121
		8	0.09	18,900	2080	16,065	1768	14,175	1248	13,230	1019
		10	0.075	17104	1797	14539	1528	12828	1129	11973	922
		12	0.06	15,309	1516	13,013	1289	11,482	1010	10,716	826
		14	0.06	14,458	1432	12,290	1216	10,844	954	10,121	779
		16	0.06	13,608	1,348	11,567	1145	10,206	898	9,526	733
		20	0.037	11,907	1180	10,121	1002	8,930	786	8,335	642
		22	0.033	11,907	1059	10,121	900	8,930	707	8,335	575
		25	0.03	11,907	1059	10,121	900	8,930	707	8,335	575
		30	0.021	11,312	1006	9,615	855	8,484	672	7,918	547
	0.5	6	0.17	20,790	2289	17,672	1944	15,593	1373	14,553	1121
		8	0.14	18,900	2080	16,065	1768	14,175	1248	13,230	1019
		10	0.11	17104	1797	14539	1528	12828	1129	11973	922
		12	0.08	15,309	1516	13,013	1289	11,482	1010	10,716	826
		14	0.08	14,458	1432	12,290	1216	10,844	954	10,121	779
		16	0.08	13,608	1,348	11,567	1145	10,206	898	9,526	733
		20	0.05	11,907	1180	10,121	1002	8,930	786	8,335	642
		22	0.05	11,907	1059	10,121	900	8,930	707	8,335	575
		25	0.05	11,907	1059	10,121	900	8,930	707	8,335	575
		30	0.03	11,312	1006	9,615	855	8,484	672	7,918	547
2.5	0.1	8	0.06	18,900	2,080	16,065	1,768	14,175	1248	13,230	1019
		10	0.055	18,900	2,080	16,065	1,768	14,175	1248	13,230	1019
		12	0.051	18,018	1,958	15,315	1664	13,513	1190	12,613	1019
		14	0.046	17,136	1835	14,566	1560	12,852	1132	11,995	971
		16	0.042	16,254	1,713	13,816	1,456	12,190	1,073	11,378	876
		20	0.03	13,608	1,348	11,567	1,145	10,206	898	9,526	733
		25	0.022	12,757	1204	10,844	1022	9,568	802	8,930	653
		30	0.015	11,907	1,059	10,121	900	8,930	707	8,335	575
	0.2	8	0.08	18,900	2,080	16,065	1,768	14,175	1248	13,230	1019
		10	0.07	18,900	2,080	16,065	1,768	14,175	1248	13,230	1019
		12	0.06	18,018	1,958	15,315	1664	13,513	1190	12,613	1019
		14	0.05	17,136	1835	14,566	1560	12,852	1132	11,995	971
		16	0.055	16,254	1,713	13,816	1,456	12,190	1,073	11,378	876
		20	0.04	13,608	1,348	11,567	1,145	10,206	898	9,526	733
		25	0.03	12,757	1204	10,844	1022	9,568	802	8,930	653
		30	0.02	11,907	1,059	10,121	900	8,930	707	8,335	575
	0.3	8	0.1	18,900	2,080	16,065	1,768	14,175	1248	13,230	1019
		10	0.09	18,900	2,080	16,065	1,768	14,175	1248	13,230	1019
		12	0.085	18,018	1,958	15,315	1664	13,513	1190	12,613	1019
		14	0.08	17,136	1835	14,566	1560	12,852	1132	11,995	971

ESRR714 series

Workpiece				Carbon steels, Alloy steels 180~250HB		Pre-hardened steels HRC35~45		Hardened steels HRC45~55		High-hardened steels HRC55~65	
Ratio to standard depth of cut				Depth of Cut × 100%		Depth of Cut × 80%		Depth of Cut × 65%		Depth of Cut × 60%	
Diameter (Ø)	Corner R (mm)	Neck length (mm)	Depth of Cut (mm)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
2.5	0.3	16	0.075	16,254	1,713	13,816	1,456	12,190	1,073	11,378	876
		20	0.06	13,608	1,348	11,567	1,145	10,206	898	9,526	733
		25	0.065	12,757	1204	10,844	1022	9,568	802	8,930	653
		30	0.06	11,907	1,059	10,121	900	8,930	707	8,335	575
	0.5	8	0.15	18,900	2,080	16,065	1,768	14,175	1248	13,230	1019
		10	0.14	18,900	2,080	16,065	1,768	14,175	1248	13,230	1019
		12	0.13	18,018	1,958	15,315	1664	13,513	1190	12,613	1019
		14	0.12	17,136	1835	14,566	1560	12,852	1132	11,995	971
		16	0.11	16,254	1,713	13,816	1,456	12,190	1,073	11,378	876
		20	0.08	13,608	1,348	11,567	1,145	10,206	898	9,526	733
		25	0.07	12,757	1204	10,844	1022	9,568	802	8,930	653
		30	0.05	11,907	1,059	10,121	900	8,930	707	8,335	575
3	0.1	8	0.07	14,400	1,981	12,240	1,684	10,800	1188	10,080	970
		10	0.06	14400	1,981	12240	1,684	10800	1188	10080	970
		12	0.05	14,400	1,981	12,240	1,684	10,800	1188	10,080	970
		14	0.047	14,400	1,981	12,240	1,684	10,800	1188	10,080	970
		16	0.035	14,400	1,981	12,240	1,684	10,800	1188	10,080	970
		20	0.035	11,664	1,604	9,914	1,363	8,748	961	8,165	785
		25	0.031	10368	1,362	8812.5	1,158	7776	816	7257.5	667
		30	0.027	9,072	1,121	7,711	953	6,804	672	6,350	550
		35	0.02	9,072	1,121	7,711	953	6,804	672	6,350	550
		40	0.015	8,164	897	6,939	762	6,123	537	5,715	440
		45	0.01	7,258	672	6,169	572	5,443	403	5,080	330
	0.2	8	0.09	14,400	1,981	12,240	1,684	10,800	1188	10,080	970
		10	0.08	14400	1,981	12240	1,684	10800	1188	10080	970
		12	0.07	14,400	1,981	12,240	1,684	10,800	1188	10,080	970
		14	0.06	14,400	1,981	12,240	1,684	10,800	1188	10,080	970
		16	0.05	14,400	1,981	12,240	1,684	10,800	1188	10,080	970
		20	0.05	11,664	1,604	9,914	1,363	8,748	961	8,165	785
		25	0.045	10368	1,362	8812.5	1,158	7776	816	7257.5	667
		30	0.04	9,072	1,121	7,711	953	6,804	672	6,350	550
		35	0.035	9,072	1,121	7,711	953	6,804	672	6,350	550
		40	0.03	8,164	897	6,939	762	6,123	537	5,715	440
		45	0.025	7,258	672	6,169	572	5,443	403	5,080	330
	0.3	8	0.13	14,400	1,981	12,240	1,684	10,800	1188	10,080	970
		10	0.115	14400	1,981	12240	1,684	10800	1188	10080	970
		12	0.1	14,400	1,981	12,240	1,684	10,800	1188	10,080	970
		14	0.085	14,400	1,981	12,240	1,684	10,800	1188	10,080	970
		16	0.075	14,400	1,981	12,240	1,684	10,800	1188	10,080	970
		20	0.075	11,664	1,604	9,914	1,363	8,748	961	8,165	785
		25	0.0675	10368	1,362	8812.5	1,158	7776	816	7257.5	667
		30	0.06	9,072	1,121	7,711	953	6,804	672	6,350	550
		35	0.05	9,072	1,121	7,711	953	6,804	672	6,350	550
		40	0.04	8,164	897	6,939	762	6,123	537	5,715	440
		45	0.03	7,258	672	6,169	572	5,443	403	5,080	330

H-Star Endmill

ESRR714 series

Workpiece				Carbon steels, Alloy steels 180~250HB		Pre-hardened steels HRC35~45		Hardened steels HRC45~55		High-hardened steels HRC55~65	
Ratio to standard depth of cut				Depth of Cut × 100%		Depth of Cut × 80%		Depth of Cut × 65%		Depth of Cut × 60%	
Diameter (Ø)	Corner R (mm)	Neck length (mm)	Depth of Cut (mm)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
3	0.5	8	0.18	14,400	1,981	12,240	1,684	10,800	1188	10,080	970
		10	0.155	14400	1,981	12240	1,684	10800	1188	10080	970
		12	0.13	14,400	1,981	12,240	1,684	10,800	1188	10,080	970
		14	0.12	14,400	1,981	12,240	1,684	10,800	1188	10,080	970
		16	0.1	14,400	1,981	12,240	1,684	10,800	1188	10,080	970
		20	0.1	11,664	1,604	9,914	1,363	8,748	961	8,165	785
		25	0.09	10368	1,362	8812.5	1,158	7776	816	7257.5	667
		30	0.08	9,072	1,121	7,711	953	6,804	672	6,350	550
		35	0.065	9,072	1,121	7,711	953	6,804	672	6,350	550
		40	0.05	8,164	897	6,939	762	6,123	537	5,715	440
		45	0.04	7,258	672	6,169	572	5,443	403	5,080	330
		50	0.03	6,532	538	5,552	457	4,899	322	4,572	264
	1	8	0.2	14,400	1,981	12,240	1,684	10,800	1188	10,080	970
		10	0.175	14400	1,981	12240	1,684	10800	1188	10080	970
		12	0.15	14,400	1,981	12,240	1,684	10,800	1188	10,080	970
		14	0.13	14,400	1,981	12,240	1,684	10,800	1188	10,080	970
		16	0.12	14,400	1,981	12,240	1,684	10,800	1188	10,080	970
		20	0.11	11,664	1,604	9,914	1,363	8,748	961	8,165	785
		25	0.1	10368	1,362	8812.5	1,158	7776	816	7257.5	667
		30	0.09	9,072	1,121	7,711	953	6,804	672	6,350	550
		35	0.075	9,072	1,121	7,711	953	6,804	672	6,350	550
		40	0.06	8,164	897	6,939	762	6,123	537	5,715	440
		45	0.045	7,258	672	6,169	572	5,443	403	5,080	330
		50	0.03	6,532	538	5,552	457	4,899	322	4,572	264
4	0.1	10	0.072	11,213	2,730	9,531	2,321	8,410	1,638	7,849	1338
		12	0.065	11,213	2,730	9,531	2,321	8,410	1638	7,849	1338
		13	0.062	10,734	2,613	9,114	2,219	8,004	1558	7,266	1239
		16	0.06	10,255	2,496	8,697	2116	7,599	1479	6,684	1139
		20	0.055	10,255	2496	8,697	2,116	7,599	1479	6,884	1139
		25	0.05	10,255	2,496	7,782	1,810	6,545	1,221	5,904	962
		30	0.045	10,255	2,496	6,867	1,505	5,491	963	5,124	785
		35	0.04	10,255	2,496	6,867	1505	5,491	963	5,124	785
		40	0.035	9,247	2,000	6,225	1,262	5,217	842	4,621	643
		45	0.03	8,240	1,505	5,584	1,019	4,944	722	4,119	501
		50	0.02	7,398	1,200	4,980	757	4,174	505	3,697	385
	0.2	10	0.15	11,213	2,730	9,531	2,321	8,410	1,638	7,849	1338
		12	0.14	11,213	2,730	9,531	2,321	8,410	1638	7,849	1338
		13	0.135	10,734	2,613	9,114	2,219	8,004	1558	7,266	1239
		16	0.13	10,255	2,496	8,697	2116	7,599	1479	6,684	1139
		20	0.11	10,255	2496	8,697	2,116	7,599	1479	6,884	1139
		25	0.105	10,255	2,496	7,782	1,810	6,545	1,221	5,904	962
		30	0.1	10,255	2,496	6,867	1,505	5,491	963	5,124	785
		35	0.08	10,255	2,496	6,867	1505	5,491	963	5,124	785
		40	0.07	9,247	2,000	6,225	1,262	5,217	842	4,621	643

ESRR714 series

Workpiece				Carbon steels, Alloy steels 180~250HB		Pre-hardened steels HRC35~45		Hardened steels HRC45~55		High-hardened steels HRC55~65	
Ratio to standard depth of cut				Depth of Cut × 100%		Depth of Cut × 80%		Depth of Cut × 65%		Depth of Cut × 60%	
Diameter (Ø)	Corner R (mm)	Neck length (mm)	Depth of Cut (mm)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
4	0.2	45	0.06	8,240	1,505	5,584	1,019	4,944	722	4,119	501
		50	0.05	7,398	1,200	4,980	757	4,174	505	3,697	385
	0.3	10	0.23	11,213	2,730	9,531	2,321	8,410	1,638	7,849	1338
		12	0.22	11,213	2,730	9,531	2,321	8,410	1638	7,849	1338
		13	0.21	10,734	2,613	9,114	2,219	8,004	1558	7,266	1239
		16	0.2	10,255	2,496	8,697	2116	7,599	1479	6,684	1139
		20	0.18	10,255	2496	8,697	2,116	7,599	1479	6,884	1139
		25	0.17	10,255	2,496	7,782	1,810	6,545	1,221	5,904	962
		30	0.16	10,255	2,496	6,867	1,505	5,491	963	5,124	785
		35	0.14	10,255	2,496	6,867	1505	5,491	963	5,124	785
		40	0.13	9,247	2,000	6,225	1,262	5,217	842	4,621	643
		45	0.12	8,240	1,505	5,584	1,019	4,944	722	4,119	501
		50	0.11	7,398	1,200	4,980	757	4,174	505	3,697	385
	0.5	10	0.4	11,213	2,730	9,531	2,321	8,410	1,638	7,849	1338
		12	0.35	11,213	2,730	9,531	2,321	8,410	1638	7,849	1338
		13	0.3	10,734	2,613	9,114	2,219	8,004	1558	7,266	1239
		16	0.25	10,255	2,496	8,697	2116	7,599	1479	6,684	1139
		20	0.2	10,255	2496	8,697	2,116	7,599	1479	6,884	1139
		25	0.175	10,255	2,496	7,782	1,810	6,545	1,221	5,904	962
		30	0.15	10,255	2,496	6,867	1,505	5,491	963	5,124	785
		35	0.1	10,255	2,496	6,867	1505	5,491	963	5,124	785
		40	0.075	9,247	2,000	6,225	1,262	5,217	842	4,621	643
		45	0.05	8,240	1,505	5,584	1,019	4,944	722	4,119	501
		50	0.04	7,398	1,200	4,980	757	4,174	505	3,697	385
		55	0.03	6,592	9903	4,467	611	3,955	433	3,295	300
	1	10	0.5	11,213	2,730	9,531	2,321	8,410	1,638	7,849	1338
		12	0.4	11,213	2,730	9,531	2,321	8,410	1638	7,849	1338
		13	0.35	10,734	2,613	9,114	2,219	8,004	1558	7,266	1239
		16	0.29	10,255	2,496	8,697	2116	7,599	1479	6,684	1139
		20	0.23	10,255	2496	8,697	2,116	7,599	1479	6,884	1139
		25	0.2	10,255	2,496	7,782	1,810	6,545	1,221	5,904	962
		30	0.17	10,255	2,496	6,867	1,505	5,491	963	5,124	785
		35	0.12	10,255	2,496	6,867	1505	5,491	963	5,124	785
		40	0.09	9,247	2,000	6,225	1,262	5,217	842	4,621	643
		45	0.06	8,240	1,505	5,584	1,019	4,944	722	4,119	501
		50	0.05	7,398	1,200	4,980	757	4,174	505	3,697	385
		55	0.04	6,592	9903	4,467	611	3,955	433	3,295	300
5	0.1	16	0.08	9,154	2786	7,781	2368	6,866	1671	6,408	1365
		30	0.07	7,872	2291	6,691	1948	5,904	1374	5,510	1122
		40	0.06	6,590	1797	5,602	1527	4,943	1078	4,613	880
	0.2	16	0.16	9,154	2786	7,781	2368	6,866	1671	6,408	1365
		30	0.145	7,872	2291	6,691	1948	5,904	1374	5,510	1122
		40	0.13	6,590	1797	5,602	1527	4,943	1078	4,613	880

H-Star Endmill

ESRR714 series

Workpiece				Carbon steels, Alloy steels 180~250HB		Pre-hardened steels HRC35~45		Hardened steels HRC45~55		High-hardened steels HRC55~65	
Ratio to standard depth of cut				Depth of Cut × 100%		Depth of Cut × 80%		Depth of Cut × 65%		Depth of Cut × 60%	
Diameter (Ø)	Corner R (mm)	Neck length (mm)	Depth of Cut (mm)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
5	0.3	16	0.24	9,154	2786	7,781	2368	6,866	1671	6,408	1365
		30	0.22	7,872	2291	6,691	1948	5,904	1374	5,510	1122
		40	0.2	6,590	1797	5,602	1527	4,943	1078	4,613	880
	0.5	16	0.35	9,154	2786	7,781	2368	6,866	1671	6,408	1365
		30	0.296	7,872	2291	6,691	1948	5,904	1374	5,510	1122
		40	0.135	6,590	1797	5,602	1527	4,943	1078	4,613	880
		50	0.12	5,272	1078	4,482	916	3,954	646	3,690	528
		60	0.1	4,218	647	3,585	549	3,164	388	2,952	317
	1	16	0.4	9,154	2786	7,781	2368	6,866	1671	6,408	1365
		30	0.275	7,872	2291	6,691	1948	5,904	1374	5,510	1122
		40	0.15	6,590	1797	5,602	1527	4,943	1078	4,613	880
		50	0.13	5,272	1078	4,482	916	3,954	646	3,690	528
		60	0.11	4,218	647	3,585	549	3,164	388	2,952	317
	1.5	15	0.45	9,154	2786	7,781	2368	6,866	1671	6,408	1365
	2	15	0.5	9,154	2786	7,781	2368	6,866	1671	6,408	1365
6	0.1	20	0.065	7,630	2787	6,486	2368	5,722	1671	5,432	1365
		40	0.05	6,486	2132	5,513	1811	4,865	1279	4,540	1044
		50	0.04	5,491	1,470	4,668	1,248	4,118	872	3,844	711
	0.2	20	0.14	7,630	2787	6,486	2368	5,722	1671	5,432	1365
		40	0.11	6,486	2132	5,513	1811	4,865	1279	4,540	1044
		50	0.08	5,491	1,470	4,668	1,248	4,118	872	3,844	711
	0.3	20	0.22	7,630	2787	6,486	2368	5,722	1671	5,432	1365
		30	0.2	7,630	2787	6,486	2368	5,722	1671	5,432	1365
		40	0.18	6,486	2132	5,513	1811	4,865	1279	4,540	1044
		50	0.14	5,491	1,470	4,668	1,248	4,118	872	3,844	711
	0.5	20	0.35	7,630	2787	6,486	2368	5,722	1671	5,432	1365
		30	0.29	7,630	2787	6,486	2368	5,722	1671	5,432	1365
		40	0.24	6,486	2132	5,513	1811	4,865	1279	4,540	1044
		50	0.165	5,491	1,470	4,668	1,248	4,118	872	3,844	711
		60	0.1	5,491	1,470	4,668	1,248	4,118	872	3,844	711
	1	20	0.4	7,630	2787	6,486	2368	5,722	1671	5,432	1365
		30	0.35	7,630	2787	6,486	2368	5,722	1671	5,432	1365
		40	0.28	6,486	2132	5,513	1811	4,865	1279	4,540	1044
		50	0.2	5,491	1,470	4,668	1,248	4,118	872	3,844	711
		60	0.15	5,491	1,470	4,668	1,248	4,118	872	3,844	711
	1.5	20	0.45	7,630	2787	6,486	2368	5,722	1671	5,432	1365
		40	0.4	6,486	2132	5,513	1811	4,865	1279	4,540	1044
		50	0.3	5,491	1,470	4,668	1,248	4,118	872	3,844	711
	2	20	0.5	7,630	2787	6,486	2368	5,722	1671	5,432	1365
		30	0.4	7,630	2787	6,486	2368	5,722	1671	5,432	1365
		40	0.3	6,486	2132	5,513	1811	4,865	1279	4,540	1044
		50	0.2	5,491	1,470	4,668	1,248	4,118	872	3,844	711

ESRR714 series

Workpiece				Carbon steels, Alloy steels 180~250HB		Pre-hardened steels HRC35~45		Hardened steels HRC45~55		High-hardened steels HRC55~65	
Ratio to standard depth of cut				Depth of Cut × 100%		Depth of Cut × 80%		Depth of Cut × 65%		Depth of Cut × 60%	
Diameter (Ø)	Corner R (mm)	Neck length (mm)	Depth of Cut (mm)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
8	0.1	25	0.35	5,730	2660	4,524	2076	3,016	1279	2,320	817
	0.2	22	0.5	5,730	2660	4,524	2076	3,016	1279	2,320	817
		40	0.25	5,730	2660	4,524	2076	3,016	1279	2,320	817
	0.3	22	0.6	5,730	2660	4,524	2076	3,016	1279	2,320	817
		40	0.3	5,730	2660	4,524	2076	3,016	1279	2,320	817
	0.5	22	0.7	5,730	2660	4,524	2076	3,016	1279	2,320	817
		35	0.5	5,730	2660	4,524	2076	3,016	1279	2,320	817
		40	0.35	5,730	2660	4,524	2076	3,016	1279	2,320	817
		50	0.3	4,584	1596	3,619	1245	2,413	767	1,856	490
		60	0.25	4,584	1596	3,619	1245	2,413	767	1,856	490
	1	22	0.8	5,730	2660	4,524	2076	3,016	1279	2,320	817
		35	0.6	5,730	2660	4,524	2076	3,016	1279	2,320	817
		40	0.4	5,730	2660	4,524	2076	3,016	1279	2,320	817
		50	0.4	4,584	1596	3,619	1245	2,413	767	1,856	490
		60	0.3	4,584	1596	3,619	1245	2,413	767	1,856	490
	1.2	22	0.9	5,730	2660	4,524	2076	3,016	1279	2,320	817
		40	0.45	5,730	2660	4,524	2076	3,016	1279	2,320	817
	2	22	1	5,730	2660	4,524	2076	3,016	1279	2,320	817
		40	0.5	5,730	2660	4,524	2076	3,016	1279	2,320	817
		50	0.4	4,584	1596	3,619	1245	2,413	767	1,856	490
10	0.1	30	0.4	4,524	2419	3,567	1954	2,378	1188	1,856	761
	0.2	24	0.5	4,524	2419	3,567	1954	2,378	1188	1,856	761
		40	0.25	4,524	2419	3,567	1954	2,378	1188	1,856	761
	0.3	24	0.6	4,524	2419	3,567	1954	2,378	1188	1,856	761
		40	0.3	4,524	2419	3,567	1954	2,378	1188	1,856	761
	0.5	24	0.7	4,524	2419	3,567	1954	2,378	1188	1,856	761
		40	0.4	4,524	2419	3,567	1954	2,378	1188	1,856	761
		50	0.3	3,619	1451	2,854	1172	1,902	713	1,485	456
		60	0.2	3,619	1451	2,854	1172	1,902	713	1,485	456
	1	24	0.8	4,524	2419	3,567	1954	2,378	1188	1,856	761
		40	0.5	4,524	2419	3,567	1954	2,378	1188	1,856	761
		50	0.4	3,619	1451	2,854	1172	1,902	713	1,485	456
		60	0.3	3,619	1451	2,854	1172	1,902	713	1,485	456
	1.5	24	0.9	4,524	2419	3,567	1954	2,378	1188	1,856	761
		40	0.55	4,524	2419	3,567	1954	2,378	1188	1,856	761
	2	24	1	4,524	2419	3,567	1954	2,378	1188	1,856	761
		40	0.5	3,619	1451	2,854	1172	1,902	713	1,485	456
		50	0.4	2,895	870	2,283	703	1,522	427	1,188	274
	2.5	24	1.1	4,524	2419	3,567	1954	2,378	1188	1,856	761
12	0.2	32	0.5	3,857	2419	3,045	1954	2,030	1188	1,537	761
	0.3	26	0.6	3,857	2419	3,045	1954	2,030	1188	1,537	761
		45	0.3	3,857	2419	3,045	1954	2,030	1188	1,537	761
	0.5	26	0.7	3,857	2419	3,045	1954	2,030	1188	1,537	761
		40	0.4	3,857	2419	3,045	1954	2,030	1188	1,537	761

H-Star Endmill

ESRR714 series

Workpiece				Carbon steels, Alloy steels 180~250HB		Pre-hardened steels HRC35~45		Hardened steels HRC45~55		High-hardened steels HRC55~65	
Ratio to standard depth of cut				Depth of Cut × 100%		Depth of Cut × 80%		Depth of Cut × 65%		Depth of Cut × 60%	
Diameter (Ø)	Corner R (mm)	Neck length (mm)	Depth of Cut (mm)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
12	0.5	60	0.3	3,086	1451	2,436	1172	1,624	713	1,230	456
	1	26	0.8	3,857	2419	3,045	1954	2,030	1188	1,537	761
		40	0.5	3,857	2419	3,045	1954	2,030	1188	1,537	761
		60	0.3	3,086	1451	2,436	1172	1,624	713	1,230	456
	1.5	26	0.9	3,857	2419	3,045	1954	2,030	1188	1,537	761
	2	26	1	3,857	2419	3,045	1954	2,030	1188	1,537	761
		40	0.5	3,857	2419	3,045	1954	2,030	1188	1,537	761
	3	26	1	3,857	2419	3,045	1954	2,030	1188	1,537	761
16	0.5	35	2	2,842	2116	2,262	1692	1,508	1047	1,160	672
		50	1	2,842	2116	2,262	1692	1,508	1047	1,160	672
	1	35	2	2,842	2116	2,262	1692	1,508	1047	1,160	672
		50	1	2,842	2116	2,262	1692	1,508	1047	1,160	672
20	0.5	40	2	2,262	1915	1,798	1512	1,189	957	928	616
		55	1	2,262	1915	1,798	1512	1,189	957	928	616
	1	40	2	2,262	1915	1,798	1512	1,189	957	928	616
		55	1	2,262	1915	1,798	1512	1,189	957	928	616

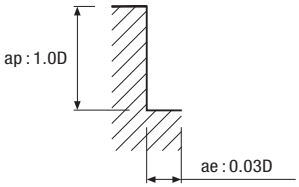
- Please adjust the cutting depth index according to the cutting depth factors of above table.
- In actual machining, the condition should be adjusted according to the machining shape, purpose and machine type.
- If RPM of the machine is low, the feed rate should be low in the same ratio as RPM.

ESXR704, ESXE704, ESXE714 series

Side cutting

Workpiece / Conditions / Diameter (Ø)	Hardened steels Heat resistant alloy HRC40~50		Hardened steels HRC50~55		Hardened steels HRC55~60		Hardened steels HRC60~65		Hardened steels HRC65~70	
	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
4	17,200	1,690	11,440	1,140	9,360	700	7,280	430	6,170	310
6	13,450	1,820	8,970	1,230	6,890	720	5,460	450	4,810	330
8	9,100	1,750	6,760	1,170	5,200	670	4,160	420	3,640	310
10	8,000	1,630	5,330	1,090	4,160	620	3,320	400	2,860	280
12	6,830	1,630	4,550	1,010	3,450	580	2,730	370	2,420	260

Application tip

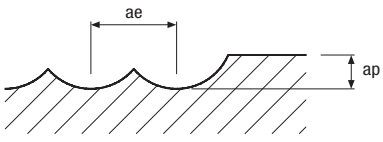


ESLNB series

Workpiece / Conditions / Diameter (Ø)	Alloy steels, Heat resistant steels HRC30~45			Hardened steels HRC45~55			Hardened steels HRC55~65			Copper, Copper alloy		
	R.P.M n (min⁻¹)	Feed vf (mm/min)	ae (mm)	R.P.M n (min⁻¹)	Feed vf (mm/min)	ae (mm)	R.P.M n (min⁻¹)	Feed vf (mm/min)	ae (mm)	R.P.M n (min⁻¹)	Feed vf (mm/min)	ae (mm)
0.5	34,100~49,500	600~870	0.007~0.028	31,900~35,200	490~540	0.005~0.023	31,900~35,200	440~480	0.005~0.021	49,000~50,000	1,100~1,400	0.010~0.042
0.6	28,600~40,700	590~850	0.007~0.034	26,400~29,700	480~540	0.006~0.028	26,400~29,700	400~480	0.006~0.025	42,000~50,000	1,100~1,700	0.011~0.050
0.8	22,000~30,800	640~890	0.016~0.064	19,800~22,000	490~550	0.013~0.052	19,800~22,000	440~500	0.012~0.048	31,000~50,000	1,100~2,250	0.024~0.096
1.0	17,600~24,200	600~850	0.008~0.080	15,400~17,600	470~540	0.007~0.065	15,400~17,600	440~500	0.006~0.060	24,000~49,500	1,100~2,200	0.012~0.120
1.2	14,300~18,700	590~780	0.024~0.032	12,000~14,000	480~540	0.020~0.026	12,000~14,000	420~480	0.018~0.024	28,500~38,500	1,480~1,950	0.036~0.048
1.5	11,000~14,300	580~760	0.031~0.048	10,000~11,500	480~540	0.025~0.039	10,000~11,500	420~480	0.023~0.036	17,000~28,500	1,100~1,950	0.046~0.072
2.0	8,500~11,000	590~800	0.024~0.160	7,900~8,800	470~530	0.020~0.130	7,900~8,800	440~480	0.018~0.120	12,600~24,000	1,100~2,150	0.036~0.240
3.0	5,700~8,200	730~1,000	0.064~0.24	5,300~5,800	590~650	0.052~0.195	5,300~5,800	550~620	0.048~0.120	11,900~17,000	1,850~2,700	0.096~0.360
4.0	4,300~6,200	680~990	0.080~0.320	3,950~4,400	550~620	0.065~0.260	3,850~4,400	530~570	0.060~0.240	6,600~12,500	1,260~2,500	0.120~0.480

Application tip

*ae : D1 ~ D4 = 0.05 × D
D5 ~ D8 = 0.025mm
D10 ~ D20 = 0.30mm



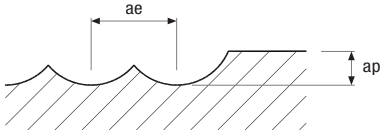
H-Star Endmill

ESTNB20 series

Workpiece					Carbon steels, Alloy steels 180~250HB		Pre-hardened steels HRC35~45		Hardened steels HRC45~55		High-hardened steels HRC55~65	
Ratio to standard depth of cut					Depth of Cut × 100%		Depth of Cut × 80%		Depth of Cut × 65%		Depth of Cut × 60%	
R (mm)	Diameter (Ø)	Neck length (mm)	Neck Angle (°)	Depth of Cut (mm)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
0.4	0.8	4	0.4	0.062	32,000	2,560	22,400	1,613	20,800	1,331	20,800	1,165
		6	0.4	0.045	32,000	2,560	22,400	1,613	20,800	1,331	20,800	1,165
		8	0.9	0.026	25,600	1,475	17,920	1,032	16,640	852	16,640	745
		12	0.9	0.020	20,800	1,065	14,560	699	13,520	606	13,520	519
		16	0.9	0.018	20,800	932	14,560	612	13,520	530	13,520	454
0.45	0.9	4	0.4	0.063	28,300	2,547	19,810	1,605	18,395	1,324	18,395	1,159
		8	0.4	0.050	28,300	2,547	19,810	1,605	18,395	1,324	18,395	1,159
		12	0.4	0.037	18,400	1,325	12,880	811	11,960	753	11,960	646
		16	0.4	0.024	18,400	1,325	12,880	811	11,960	753	11,960	646
		18	0.4	0.018	18,400	1,325	12,880	811	11,960	753	11,960	646
		20	0.4	0.015	15,850	1,141	11,095	699	10,303	649	10,303	556
		22	0.4	0.012	15,850	1,141	11,095	699	10,303	649	10,303	556
		24	0.4	0.009	14,150	1,019	9,905	624	9,198	579	9,198	497
0.5	1	6	0.4	0.055	25,600	2,560	17,920	1,613	16,640	1,331	16,640	1,165
		8	0.4	0.055	25,600	2,560	17,920	1,613	16,640	1,331	16,640	1,165
		10	0.4	0.032	20,800	1,872	14,560	1,310	13,520	1,082	13,520	946
		10	0.9	0.035	20,800	1,872	14,560	1,310	13,520	1,082	13,520	946
		15	0.9	0.028	16,640	1,331	11,648	874	10,816	757	10,816	649
		20	0.4	0.018	16,640	1,331	11,648	874	10,816	757	10,816	649
		20	0.9	0.020	16,640	1,331	11,648	874	10,816	757	10,816	649
		25	0.9	0.017	14,560	1,165	10,192	764	9,464	662	9,464	568
		30	0.4	0.015	12,480	874	8,736	568	8,112	487	8,112	406
		30	0.9	0.017	12,480	874	8,736	568	8,112	487	8,112	406
		35	0.9	0.010	10,400	728	7,280	473	6,760	406	6,760	338
		40	0.9	0.009	10,000	700	7,000	455	6,500	390	6,500	325
		50	0.9	0.007	9,500	665	6,650	432	6,175	371	6,175	309
		60	0.9	0.005	9,000	630	6,300	410	5,850	351	5,850	293
		70	0.9	0.003	8,500	595	5,950	387	5,525	332	5,525	276
0.75	1.5	8	0.4	0.070	16,960	2,544	11,872	1,603	11,024	1,323	11,024	1,158
		10	0.4	0.070	16,960	2,544	11,872	1,603	11,024	1,323	11,024	1,158
		12	0.4	0.070	16,960	2,544	11,872	1,603	11,024	1,323	11,024	1,158
		15	0.9	0.045	13,568	1,832	9,498	1,282	8,819	1,058	8,819	926
		20	0.9	0.040	11,024	1,323	7,717	810	7,166	752	7,166	645
		30	0.9	0.028	11,024	1,323	7,717	810	7,166	752	7,166	645

Application tip

*ae : D1 ~ D4 = 0.05 × D
D5 ~ D8 = 0.025mm
D10 ~ D20 = 0.30mm



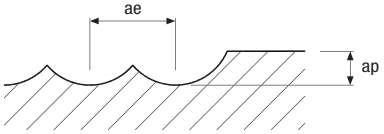
- Please adjust the cutting depth index according to the cutting depth factors of above table.
- For Rib or Slotting machining process which are not easy for chip ejection, please reduce the cutting depth by 20~30% from the above cutting condition.
  ex) ESTNB2040-20-10, HRC 55, Rib processing
  ex) Cutting depth: 0.32(standard cutting depth) × 0.65 × 0.8 = 0.17mm
- In actual machining, the condition should be adjusted according to the machining shape, purpose and the machine type.
- If RPM of the machine is low, the feed rate should be low in the same ratio as RPM.

ESTNB20 series

Workpiece					Carbon steels, Alloy steels 180~250HB		Pre-hardened steels HRC35~45		Hardened steels HRC45~55		High-hardened steels HRC55~65	
Ratio to standard depth of cut					Depth of Cut × 100%		Depth of Cut × 80%		Depth of Cut × 65%		Depth of Cut × 60%	
R (mm)	Diameter (Ø)	Neck length (mm)	Neck Angle (°)	Depth of Cut (mm)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
0.9	1.8	4	0.4	0.120	14,200	2,556	9,940	1,610	9,230	1,329	9,230	1,163
		8	0.4	0.100	14,200	2,556	9,940	1,610	9,230	1,329	9,230	1,163
		12	0.4	0.080	14,200	2,556	9,940	1,610	9,230	1,329	9,230	1,163
		16	0.4	0.071	14,200	2,556	9,940	1,610	9,230	1,329	9,230	1,163
		20	0.4	0.062	9,230	1,329	6,461	814	6,000	756	6,000	648
		24	0.4	0.053	9,230	1,329	6,461	814	6,000	756	6,000	648
		28	0.4	0.044	9,230	1,329	6,461	814	6,000	756	6,000	648
		32	0.4	0.036	9,230	1,329	6,461	814	6,000	756	6,000	648
		36	0.4	0.028	9,230	1,329	6,461	814	6,000	756	6,000	648
		38	0.4	0.020	8,000	1,152	5,600	706	5,200	655	5,200	562
		40	0.4	0.015	8,000	1,152	5,600	706	5,200	655	5,200	562
1	2	8	0.4	0.150	15,200	3,040	10,640	1,915	9,880	1,581	9,880	1,383
		12	0.4	0.090	15,200	3,040	10,640	1,915	9,880	1,581	9,880	1,383
		16	0.4	0.090	15,200	3,040	10,640	1,915	9,880	1,581	9,880	1,383
		20	0.4	0.060	12,160	2,189	8,512	1,532	7,904	1,265	7,904	1,107
		20	0.9	0.070	12,160	2,189	8,512	1,532	7,904	1,265	7,904	1,107
		25	0.9	0.070	9,880	1,581	6,916	968	6,442	899	6,422	771
		30	0.4	0.040	9,880	1,581	6,916	968	6,442	899	6,422	771
		30	0.9	0.045	9,880	1,581	6,916	968	6,442	899	6,422	771
		35	0.9	0.045	9,880	1,581	6,916	968	6,442	899	6,422	771
		40	0.4	0.030	9,880	1,581	6,916	968	6,442	899	6,422	771
		40	0.9	0.035	9,880	1,581	6,916	968	6,442	899	6,422	771
		50	0.9	0.170	8,512	1,192	5,958	775	5,533	664	5,533	553
		60	0.9	0.009	7,235	1,013	5,065	658	4,703	564	4,703	470
		70	0.9	0.005	6,150	861	4,305	560	3,997	480	3,997	400
1.5	3	8	0.4	0.320	12,720	3,816	8,904	2,404	8,268	1,984	8,268	1,736
		16	0.4	0.220	12,720	3,816	8,904	2,404	8,268	1,984	8,268	1,736
		20	0.4	0.150	12,720	3,434	8,904	2,137	8,268	1,736	8,268	1,488
		30	0.4	0.080	10,176	2,748	7,123	1,496	6,614	1,389	6,614	1,191
		30	0.9	0.090	10,176	2,748	7,123	1,496	6,614	1,389	6,614	1,191
		40	0.4	0.060	8,268	1,984	5,788	1,215	5,374	1,129	5,374	967
		40	0.9	0.070	8,268	1,984	5,788	1,215	5,374	1,129	5,374	967
		50	0.9	0.050	8,268	1,984	5,788	1,215	5,374	1,129	5,374	967
		60	0.9	0.030	7,123	1,710	4,986	1,047	4,630	972	4,630	833
		70	0.9	0.020	6,233	1,496	4,363	916	4,051	851	4,051	729

Application tip

*ae : D1 ~ D4 = 0.05 × D
D5 ~ D8 = 0.025mm
D10 ~ D20 = 0.30mm



- Please adjust the cutting depth index according to the cutting depth factors of above table.
- For Rib or Slotting machining process which are not easy for chip ejection, please reduce the cutting depth by 20~30% from the above cutting condition.
  ex) ESTNB2040-20-10, HRC 55, Rib processing
  ex) Cutting depth: 0.32(standard cutting depth) × 0.65 × 0.8 = 0.17mm
- In actual machining, the condition should be adjusted according to the machining shape, purpose and the machine type.
- If RPM of the machine is low, the feed rate should be low in the same ratio as RPM.

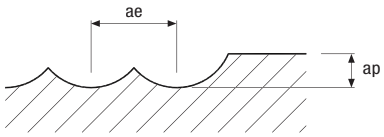
H-Star Endmill

ESTNB20 series

Workpiece					Carbon steels, Alloy steels 180~250HB		Pre-hardened steels HRC35~45		Hardened steels HRC45~55		High-hardened steels HRC55~65	
Ratio to standard depth of cut					Depth of Cut × 100%		Depth of Cut × 80%		Depth of Cut × 65%		Depth of Cut × 60%	
R (mm)	Diameter (Ø)	Neck length (mm)	Neck Angle (°)	Depth of Cut (mm)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
2	4	20	1	0.32	11,900	2,860	9,000	2,050	7,800	1,680	7,800	1,590
		30	1	0.23	11,900	2,570	9,000	1,850	7,800	1,520	7,800	1,430
		40	1	0.14	9,500	1,940	7,200	1,400	6,200	1,140	6,200	1,080
		50	1	0.11	7,800	1,590	5,800	1,120	5,000	920	5,000	870
		60	1	0.07	7,800	1,590	5,800	1,120	5,000	920	5,000	870
2.5	5	30	1	0.34	9,500	2,140	7,200	1,540	6,200	1,260	6,200	1,190
		40	1	0.25	9,500	2,140	7,200	1,540	6,200	1,260	6,200	1,190
		60	1	0.15	6,200	1,320	4,700	950	4,000	770	4,000	720
3	6	30	1	0.45	8,000	2,000	6,000	1,430	5,200	1,170	5,200	1,110
		40	1	0.40	8,000	1,800	6,000	1,280	5,200	1,050	5,200	990
		50	1	0.32	8,000	1,800	6,000	1,280	5,200	1,050	5,200	990
		60	1	0.22	6,400	1,360	4,800	970	4,100	780	4,100	740
		70	1	0.18	5,200	1,110	3,900	790	3,400	650	3,400	610
		80	1	0.14	5,200	1,110	3,900	790	3,400	650	3,400	610
4	8	50	1	0.50	6,000	1,460	4,500	1,040	3,900	850	3,900	810
		60	1	0.43	6,000	1,460	4,500	1,040	3,900	850	3,900	810
		70	1	0.33	6,000	1,460	4,500	1,040	3,900	850	3,900	810
		80	1	0.25	4,800	1,100	3,600	780	3,100	640	3,100	600
5	10	60	1	0.70	4,800	1,300	3,600	920	3,100	750	3,100	710
		75	1	0.50	4,800	1,300	3,600	920	3,100	750	3,100	710

Application tip

*ae : D1 ~ D4 = 0.05 × D
D5 ~ D8 = 0.025mm
D10 ~ D20 = 0.30mm



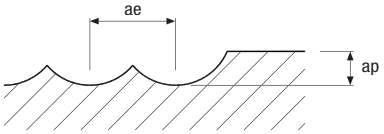
- Please adjust the cutting depth index according to the cutting depth factors of above table.
- For Rib or Slotting machining process which are not easy for chip ejection, please reduce the cutting depth by 20~30% from the above cutting condition.
  ex) ESTNB2040-20-10, HRC 55, Rib processing
  ex) Cutting depth: 0.32(standard cutting depth) × 0.65 × 0.8 = 0.17mm
- In actual machining, the condition should be adjusted according to the machining shape, purpose and the machine type.
- If RPM of the machine is low, the feed rate should be low in the same ratio as RPM.

ESTNB30 series

Workpiece					Carbon steels, Alloy steels 180~250HB		Pre-hardened steels HRC35~45		Hardened steels HRC45~55		High-hardened steels HRC55~65	
Ratio to standard depth of cut					Depth of Cut × 100%		Depth of Cut × 80%		Depth of Cut × 65%		Depth of Cut × 60%	
R (mm)	Diameter (Ø)	Neck length (mm)	Neck Angle (°)	Depth of Cut (mm)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
0.1	0.2	1	0.4	0.017	40,000	800	28,000	504	26,000	416	26,000	364
		1.5	0.4	0.009	40,000	800	28,000	504	26,000	416	26,000	364
		2	0.9	0.007	32,000	461	22,400	323	20,800	266	20,800	233
		2.5	0.9	0.004	26,000	333	18,200	204	16,900	189	16,900	162
0.15	0.3	2	0.4	0.025	40,000	1,200	28,000	756	26,000	624	26,000	546
		3	0.9	0.013	32,000	691	22,400	484	20,800	399	20,800	349
		4	0.9	0.010	26,000	499	18,200	306	16,900	284	16,900	243
0.2	0.4	2	0.4	0.035	40,000	1,600	28,000	1,008	26,000	832	26,000	728
		3	0.4	0.020	40,000	1,600	28,000	1,008	26,000	832	26,000	728
		4	0.4	0.007	32,000	922	22,400	645	20,800	532	20,800	466
		4	0.9	0.009	32,000	922	22,400	645	20,800	532	20,800	466
		5	0.4	0.006	26,000	666	18,200	408	16,900	379	16,900	324
		5	0.9	0.007	26,000	666	18,200	408	16,900	379	16,900	324
0.25	0.5	4	0.4	0.040	40,000	2,000	28,000	1,260	26,000	1,040	26,000	910
		8	0.9	0.010	26,000	728	18,200	446	16,900	414	16,900	355
		12	0.9	0.005	22,400	627	15,680	384	14,560	357	14,560	306
0.27	0.54	2	0.4	0.050	40,000	2,160	28,000	1,361	26,000	1,123	26,000	983
		4	0.4	0.037	40,000	2,160	28,000	1,361	26,000	1,123	26,000	983
		5	0.4	0.031	40,000	1,512	28,000	1,176	26,000	1,040	26,000	832
		6	0.4	0.025	26,000	1,244	18,200	871	16,900	676	16,900	629
		6.5	0.4	0.020	26,000	1,011	18,200	619	16,900	575	16,900	493
		7	0.4	0.015	26,000	899	18,200	585	16,900	543	16,900	465
0.3	0.6	2	0.4	0.055	40,000	2,400	28,000	1,512	26,000	1,248	26,000	1,092
		4	0.4	0.035	40,000	2,400	28,000	1,512	26,000	1,248	26,000	1,092
		6	0.4	0.018	32,000	1,382	22,400	968	20,800	799	20,800	699
		6	0.9	0.020	32,000	1,382	22,400	968	20,800	799	20,800	699
		8	0.9	0.020	26,000	998	18,200	612	16,900	568	16,900	487
		10	0.4	0.013	26,000	874	18,200	535	16,900	497	16,900	426
		10	0.9	0.015	26,000	874	18,200	535	16,900	497	16,900	426
		12	0.9	0.010	26,000	874	18,200	535	16,900	497	16,900	426
		15	0.4	0.005	22,400	753	15,680	461	14,560	367	14,560	367
		15	0.9	0.006	22,400	753	15,680	461	14,560	367	14,560	367

Application tip

*ae : D1 ~ D4 = 0.05 × D
D5 ~ D8 = 0.025mm
D10 ~ D20 = 0.30mm



- Please adjust the cutting depth index according to the cutting depth factors of above table.
- For Rib or Slotting machining process which are not easy for chip ejection, please reduce the cutting depth by 20~30% from the above cutting condition.
  ex) ESTNB3040-20-10, HRC 55, Rib processing
  ex) Cutting depth: 0.32(standard cutting depth) × 0.65 × 0.8 = 0.17mm
- In actual machining, the condition should be adjusted according to the machining shape, purpose and the machine type.
- If RPM of the machine is low, the feed rate should be low in the same ratio as RPM.

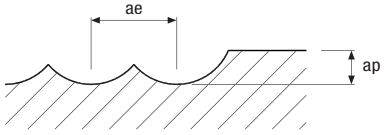
H-Star Endmill

ESTNB30 series

Workpiece					Carbon steels, Alloy steels 180~250HB		Pre-hardened steels HRC35~45		Hardened steels HRC45~55		High-hardened steels HRC55~65	
Ratio to standard depth of cut					Depth of Cut × 100%		Depth of Cut × 80%		Depth of Cut × 65%		Depth of Cut × 60%	
R (mm)	Diameter (Ø)	Neck length (mm)	Neck Angle (°)	Depth of Cut (mm)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
0.4	0.8	4	0.4	0.062	32,000	2,560	22,400	1,613	20,800	1,331	20,800	1,165
		6	0.4	0.045	32,000	2,560	22,400	1,613	20,800	1,331	20,800	1,165
		8	0.9	0.026	25,600	1,475	17,920	1,032	16,640	852	16,640	745
		12	0.9	0.020	20,800	1,065	14,560	699	13,520	606	13,520	519
		16	0.9	0.018	20,800	932	14,560	612	13,520	530	13,520	454
0.45	0.9	4	0.4	0.063	28,300	2,547	19,810	1,605	18,395	1,324	18,395	1,159
		8	0.4	0.050	28,300	2,547	19,810	1,605	18,395	1,324	18,395	1,159
		12	0.4	0.037	18,400	1,325	12,880	811	11,960	753	11,960	646
		16	0.4	0.024	18,400	1,325	12,880	811	11,960	753	11,960	646
		18	0.4	0.018	18,400	1,325	12,880	811	11,960	753	11,960	646
		20	0.4	0.015	15,850	1,141	11,095	699	10,303	649	10,303	556
		22	0.4	0.012	15,850	1,141	11,095	699	10,303	649	10,303	556
		24	0.4	0.009	14,150	1,019	9,905	624	9,198	579	9,198	497
0.5	1	6	0.4	0.055	25,600	2,560	17,920	1,613	16,640	1,331	16,640	1,165
		8	0.4	0.055	25,600	2,560	17,920	1,613	16,640	1,331	16,640	1,165
		10	0.4	0.032	20,800	1,872	14,560	1,310	13,520	1,082	13,520	946
		10	0.9	0.035	20,800	1,872	14,560	1,310	13,520	1,082	13,520	946
		15	0.9	0.028	16,640	1,331	11,648	874	10,816	757	10,816	649
		20	0.4	0.018	16,640	1,331	11,648	874	10,816	757	10,816	649
		20	0.9	0.020	16,640	1,331	11,648	874	10,816	757	10,816	649
		25	0.9	0.017	14,560	1,165	10,192	764	9,464	662	9,464	568
		30	0.4	0.015	12,480	874	8,736	568	8,112	487	8,112	406
		30	0.9	0.017	12,480	874	8,736	568	8,112	487	8,112	406
		35	0.9	0.010	10,400	728	7,280	473	6,760	406	6,760	338
		40	0.9	0.009	10,000	700	7,000	455	6,500	390	6,500	325
		50	0.9	0.007	9,500	665	6,650	432	6,175	371	6,175	309
		60	0.9	0.005	9,000	630	6,300	410	5,850	351	5,850	293
		70	0.9	0.003	8,500	595	5,950	387	5,525	332	5,525	276
0.75	1.5	8	0.4	0.070	16,960	2,544	11,872	1,603	11,024	1,323	11,024	1,158
		10	0.4	0.070	16,960	2,544	11,872	1,603	11,024	1,323	11,024	1,158
		12	0.4	0.070	16,960	2,544	11,872	1,603	11,024	1,323	11,024	1,158
		15	0.9	0.045	13,568	1,832	9,498	1,282	8,819	1,058	8,819	926
		20	0.9	0.040	11,024	1,323	7,717	810	7,166	752	7,166	645
		30	0.9	0.028	11,024	1,323	7,717	810	7,166	752	7,166	645

Application tip

*ae : D1 ~ D4 = 0.05 × D
D5 ~ D8 = 0.025mm
D10 ~ D20 = 0.30mm



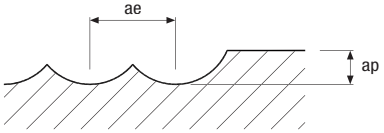
- Please adjust the cutting depth index according to the cutting depth factors of above table.
- For Rib or Slotting machining process which are not easy for chip ejection, please reduce the cutting depth by 20~30% from the above cutting condition.
  ex) ESTNB3040-20-10, HRC 55, Rib processing
  ex) Cutting depth: 0.32(standard cutting depth) × 0.65 × 0.8 = 0.17mm
- In actual machining, the condition should be adjusted according to the machining shape, purpose and the machine type.
- If RPM of the machine is low, the feed rate should be low in the same ratio as RPM.

ESTNB30 series

Workpiece					Carbon steels, Alloy steels 180~250HB		Pre-hardened steels HRC35~45		Hardened steels HRC45~55		High-hardened steels HRC55~65	
Ratio to standard depth of cut					Depth of Cut × 100%		Depth of Cut × 80%		Depth of Cut × 65%		Depth of Cut × 60%	
R (mm)	Diameter (Ø)	Neck length (mm)	Neck Angle (°)	Depth of Cut (mm)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
0.9	1.8	4	0.4	0.120	14,200	2,556	9,940	1,610	9,230	1,329	9,230	1,163
		8	0.4	0.100	14,200	2,556	9,940	1,610	9,230	1,329	9,230	1,163
		12	0.4	0.080	14,200	2,556	9,940	1,610	9,230	1,329	9,230	1,163
		16	0.4	0.071	14,200	2,556	9,940	1,610	9,230	1,329	9,230	1,163
		20	0.4	0.062	9,230	1,329	6,461	814	6,000	756	6,000	648
		24	0.4	0.053	9,230	1,329	6,461	814	6,000	756	6,000	648
		28	0.4	0.044	9,230	1,329	6,461	814	6,000	756	6,000	648
		32	0.4	0.036	9,230	1,329	6,461	814	6,000	756	6,000	648
		36	0.4	0.028	9,230	1,329	6,461	814	6,000	756	6,000	648
		38	0.4	0.020	8,000	1,152	5,600	706	5,200	655	5,200	562
		40	0.4	0.015	8,000	1,152	5,600	706	5,200	655	5,200	562
1	2	8	0.4	0.150	15,200	3,040	10,640	1,915	9,880	1,581	9,880	1,383
		12	0.4	0.090	15,200	3,040	10,640	1,915	9,880	1,581	9,880	1,383
		16	0.4	0.090	15,200	3,040	10,640	1,915	9,880	1,581	9,880	1,383
		20	0.4	0.060	12,160	2,189	8,512	1,532	7,904	1,265	7,904	1,107
		20	0.9	0.070	12,160	2,189	8,512	1,532	7,904	1,265	7,904	1,107
		25	0.9	0.070	9,880	1,581	6,916	968	6,442	899	6,422	771
		30	0.4	0.040	9,880	1,581	6,916	968	6,442	899	6,422	771
		30	0.9	0.045	9,880	1,581	6,916	968	6,442	899	6,422	771
		35	0.9	0.045	9,880	1,581	6,916	968	6,442	899	6,422	771
		40	0.4	0.030	9,880	1,581	6,916	968	6,442	899	6,422	771
		40	0.9	0.035	9,880	1,581	6,916	968	6,442	899	6,422	771
		50	0.9	0.170	8,512	1,192	5,958	775	5,533	664	5,533	553
		60	0.9	0.009	7,235	1,013	5,065	658	4,703	564	4,703	470
		70	0.9	0.005	6,150	861	4,305	560	3,997	480	3,997	400
1.5	3	8	0.4	0.320	12,720	3,816	8,904	2,404	8,268	1,984	8,268	1,736
		16	0.4	0.220	12,720	3,816	8,904	2,404	8,268	1,984	8,268	1,736
		20	0.4	0.150	12,720	3,434	8,904	2,137	8,268	1,736	8,268	1,488
		30	0.4	0.080	10,176	2,748	7,123	1,496	6,614	1,389	6,614	1,191
		30	0.9	0.090	10,176	2,748	7,123	1,496	6,614	1,389	6,614	1,191
		40	0.4	0.060	8,268	1,984	5,788	1,215	5,374	1,129	5,374	967
		40	0.9	0.070	8,268	1,984	5,788	1,215	5,374	1,129	5,374	967
		50	0.9	0.050	8,268	1,984	5,788	1,215	5,374	1,129	5,374	967
		60	0.9	0.030	7,123	1,710	4,986	1,047	4,630	972	4,630	833
		70	0.9	0.020	6,233	1,496	4,363	916	4,051	851	4,051	729

Application tip

*ae : D1 ~ D4 = 0.05 × D
D5 ~ D8 = 0.025mm
D10 ~ D20 = 0.30mm



- Please adjust the cutting depth index according to the cutting depth factors of above table.
- For Rib or Slotting machining process which are not easy for chip ejection, please reduce the cutting depth by 20~30% from the above cutting condition.
  ex) ESTNB3040-20-10, HRC 55, Rib processing
  ex) Cutting depth: 0.32(standard cutting depth) × 0.65 × 0.8 = 0.17mm
- In actual machining, the condition should be adjusted according to the machining shape, purpose and the machine type.
- If RPM of the machine is low, the feed rate should be low in the same ratio as RPM.

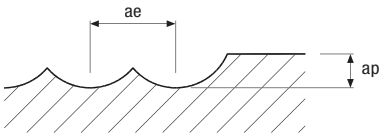
H-Star Endmill

ESTNB30 series

Workpiece					Carbon steels, Alloy steels 180~250HB		Pre-hardened steels HRC35~45		Hardened steels HRC45~55		High-hardened steels HRC55~65	
Ratio to standard depth of cut					Depth of Cut × 100%		Depth of Cut × 80%		Depth of Cut × 65%		Depth of Cut × 60%	
R (mm)	Diameter (Ø)	Neck length (mm)	Neck Angle (°)	Depth of Cut (mm)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
2	4	20	1	0.32	11,900	2,860	9,000	2,050	7,800	1,680	7,800	1,590
		30	1	0.23	11,900	2,570	9,000	1,850	7,800	1,520	7,800	1,430
		40	1	0.14	9,500	1,940	7,200	1,400	6,200	1,140	6,200	1,080
		50	1	0.11	7,800	1,590	5,800	1,120	5,000	920	5,000	870
		60	1	0.07	7,800	1,590	5,800	1,120	5,000	920	5,000	870
2.5	5	30	1	0.34	9,500	2,140	7,200	1,540	6,200	1,260	6,200	1,190
		40	1	0.25	9,500	2,140	7,200	1,540	6,200	1,260	6,200	1,190
		60	1	0.15	6,200	1,320	4,700	950	4,000	770	4,000	720
3	6	30	1	0.45	8,000	2,000	6,000	1,430	5,200	1,170	5,200	1,110
		40	1	0.40	8,000	1,800	6,000	1,280	5,200	1,050	5,200	990
		50	1	0.32	8,000	1,800	6,000	1,280	5,200	1,050	5,200	990
		60	1	0.22	6,400	1,360	4,800	970	4,100	780	4,100	740
		70	1	0.18	5,200	1,110	3,900	790	3,400	650	3,400	610
		80	1	0.14	5,200	1,110	3,900	790	3,400	650	3,400	610
4	8	50	1	0.50	6,000	1,460	4,500	1,040	3,900	850	3,900	810
		60	1	0.43	6,000	1,460	4,500	1,040	3,900	850	3,900	810
		70	1	0.33	6,000	1,460	4,500	1,040	3,900	850	3,900	810
		80	1	0.25	4,800	1,100	3,600	780	3,100	640	3,100	600
5	10	60	1	0.70	4,800	1,300	3,600	920	3,100	750	3,100	710
		75	1	0.50	4,800	1,300	3,600	920	3,100	750	3,100	710

Application tip

*ae : D1 ~ D4 = 0.05 × D
D5 ~ D8 = 0.025mm
D10 ~ D20 = 0.30mm

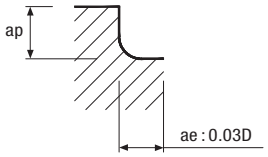


- Please adjust the cutting depth index according to the cutting depth factors of above table.
- For Rib or Slotting machining process which are not easy for chip ejection, please reduce the cutting depth by 20~30% from the above cutting condition.
  ex) ESTNB2040-20-10, HRC 55, Rib processing
  ex) Cutting depth: 0.32(standard cutting depth) × 0.65 × 0.8 = 0.17mm
- In actual machining, the condition should be adjusted according to the machining shape, purpose and the machine type.
- If RPM of the machine is low, the feed rate should be low in the same ratio as RPM.

ESLNS20, ESLNS40 series

Workpiece / Conditions / Diameter(Ø)	Alloy steels, Heat resistant steels HRC30~45			Hardened steels HRC45~55			High-hardened steels HRC55~65			Copper, Copper alloy		
	R.P.M n (min⁻¹)	Feed vf (mm/min)	ae (mm)	R.P.M n (min⁻¹)	Feed vf (mm/min)	ae (mm)	R.P.M n (min⁻¹)	Feed vf (mm/min)	ae (mm)	R.P.M n (min⁻¹)	Feed vf (mm/min)	ae (mm)
0.4	34,100~50,000	350~590	0.005~0.028	30,500~35,200	295~340	0.003~0.020	18,300~24,600	120~200	0.002~0.012	48,000~50,000	790~920	0.008~0.048
0.5	25,650~33,000	370~470	0.006~0.035	23,750~26,000	285~315	0.004~0.025	14,200~18,000	115~130	0.003~0.015	44,000~50,000	800~1,150	0.010~0.060
0.6	20,900~35,200	330~560	0.007~0.030	19,900~22,000	260~290	0.005~0.021	11,900~15,500	100~120	0.003~0.013	37,500~50,000	770~1,250	0.011~0.051
0.8	16,150~26,400	360~590	0.009~0.040	15,200~16,700	280~310	0.006~0.028	9,000~11,700	110~125	0.004~0.017	28,500~47,000	770~1,300	0.015~0.068
1.0	12,300~18,700	350~540	0.011~0.028	10,500~11,500	250~280	0.008~0.020	6,300~8,050	100~115	0.005~0.012	22,500~34,000	810~1,300	0.018~0.048
1.2	10,450~17,600	350~590	0.025~0.070	9,100~10,000	250~280	0.015~0.042	5,400~7,000	100~115	0.009~0.026	22,500~31,500	950~1,350	0.036~0.101
1.5	9,100~17,600	430~830	0.017~0.077	7,000~8,000	250~280	0.012~0.055	4,300~5,500	100~115	0.007~0.033	14,500~25,000	770~1,320	0.028~0.132
2.0	6,350~10,550	340~570	0.021~0.140	6,100~6,700	270~300	0.015~0.100	3,600~4,700	100~120	0.009~0.060	11,500~18,500	770~1,250	0.036~0.240
3.0	4,300~7,050	550~900	0.056~0.210	3,990~4,600	445~515	0.040~0.150	2,400~3,200	105~310	0.024~0.090	9,000~13,000	1,400~2,110	0.096~0.360
4.0	3,200~5,300	400~675	0.074~0.280	3,000~3,400	335~380	0.053~0.200	1,800~2,400	75~230	0.032~0.120	6,750~9,750	1,050~1,575	0.128~0.480

Application tip

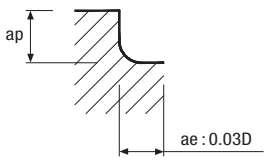


H-Star Endmill

ESLNR series

Workpiece				Carbon steels, Alloy steels 180~250HB		Pre-hardened steels HRC35~45		Hardened steels HRC45~55		High-hardened steels HRC55~65	
Ratio to standard depth of cut				Depth of Cut × 100%		Depth of Cut × 80%		Depth of Cut × 65%		Depth of Cut × 60%	
Diameter (Ø)	Corner R (mm)	Neck length (mm)	Depth of Cut (mm)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
0.2	0.05	0.5	0.020	50,000	258	50,000	205	50,000	180	50,000	160
		1	0.014	50,000	258	50,000	205	50,000	180	50,000	160
		1.5	0.008	50,000	240	45,900	202	45,900	170	45,900	153
		2	0.008	42,000	202	36,700	176	36,700	162	36,700	147
0.3	0.05	1	0.021	50,000	585	50,000	456	50,000	336	50,000	320
		1.5	0.016	50,000	585	45,000	456	45,000	336	45,000	320
		2	0.012	45,000	530	45,000	420	45,000	300	45,000	290
		2.5	0.010	40,000	471	40,000	373	40,000	267	40,000	258
		3	0.008	35,000	412	35,000	326	30,000	200	30,000	194
0.4	0.05	1	0.025	50,000	580	50,000	461	40,000	320	36,000	270
		1.5	0.020	50,000	580	50,000	461	40,000	320	36,000	270
		2	0.016	45,000	520	45,000	410	36,000	290	34,000	240
		2.5	0.015	40,500	480	40,500	370	33,400	270	30,600	220
		3	0.014	40,000	410	40,000	330	32,800	240	25,600	200
		3.5	0.012	36,000	380	36,000	300	29,400	200	22,920	180
		4	0.008	30,000	320	30,000	250	21,600	160	19,200	150
	0.1	2	0.028	45,000	520	45,000	410	36,000	290	34,000	240
		3	0.016	40,000	410	40,000	330	32,800	240	25,600	200
		4	0.010	30,000	320	30,000	250	21,600	160	19,200	150
0.5	0.05	1	0.030	50,000	898	40,000	464	30,000	378	28,000	315
		2	0.023	50,000	898	40,000	464	30,000	378	28,000	315
		3	0.017	45,000	810	36,000	414	27,000	315	24,500	261
		4	0.017	40,000	820	32,000	378	24,000	279	20,000	234
		5	0.011	28,800	540	19,400	280	18,000	250	15,000	200
		6	0.008	28,800	480	19,400	260	18,000	250	15,000	200
	0.1	1	0.035	50,000	898	40,000	464	30,000	378	28,000	315
		2	0.030	50,000	898	40,000	464	30,000	378	28,000	315
		3	0.020	45,000	810	36,000	414	27,000	315	24,500	261
		4	0.020	40,000	720	32,000	378	24,000	279	20,000	234
		5	0.013	28,800	540	19,400	280	18,000	250	15,000	200
		6	0.013	28,800	480	19,400	260	18,000	250	15,000	200
0.6	0.1	2	0.035	50,000	1,159	37,830	600	28,200	390	23,000	320
		4	0.024	40,000	830	27,800	440	23,600	280	21,000	230
		6	0.015	24,000	490	18,000	300	17,800	240	15,000	210
		8	0.013	24,000	466	18,000	285	17,800	228	15,000	200
		10	0.009	24,000	451	18,000	276	17,800	221	15,000	193

Application tip

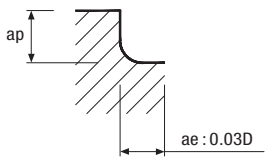


- Please adjust the cutting depth index according to the cutting depth factors of above table.
- In actual machining, the condition should be adjusted according to the machining shape, purpose and machine type.
- If RPM of the machine is low, the feed rate should be low in the same ratio as RPM.

ESLNR series

Workpiece				Carbon steels, Alloy steels 180~250HB		Pre-hardened steels HRC35~45		Hardened steels HRC45~55		High-hardened steels HRC55~65	
Ratio to standard depth of cut				Depth of Cut × 100%		Depth of Cut × 80%		Depth of Cut × 65%		Depth of Cut × 60%	
Diameter (Ø)	Corner R (mm)	Neck length (mm)	Depth of Cut (mm)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
2	0.2	6	0.08	20,790	1,635	17,672	1,389	15,593	981	14,553	801
		8	0.07	18,900	1,486	16,065	1,263	14,175	892	13,230	728
		12	0.04	15,309	1,083	13,013	921	11,482	722	10,716	590
		16	0.04	13,608	963	11,567	818	10,206	642	9,526	524
		20	0.035	11,907	843	10,121	716	8,930	562	8,335	459
		25	0.025	11,907	843	10,121	716	8,930	562	8,335	459
		30	0.017	11,312	800	9,615	680	8,484	534	7,918	436
	0.3	8	0.09	18,900	1,651	16,065	1,403	14,175	991	13,230	809
		16	0.06	13,608	1,070	11,567	909	10,206	713	9,526	583
		20	0.037	11,907	936	10,121	796	8,930	624	8,335	510
	0.5	6	0.017	20,709	1,635	17,672	1,389	15,593	981	14,553	801
		8	0.014	18,900	1,651	16,065	1,403	14,175	991	13,230	809
		12	0.08	15,309	1,204	13,013	1,023	11,482	802	10,716	655
		16	0.08	13,608	1,070	11,567	909	10,206	713	9,526	583
		20	0.05	11,907	936	10,121	796	8,930	624	8,335	510
		25	0.05	11,907	936	10,121	796	8,930	624	8,335	510
		30	0.03	11,312	889	9,615	756	8,484	593	7,918	484
	0.8	8	0.2	18,900	1,651	16,065	1,403	14,175	991	13,230	809
		16	0.1	13,608	1,070	11,567	909	10,206	713	9,526	583
		20	0.06	11,907	936	10,121	796	8,930	624	8,335	510
3	0.2	8	0.09	14,400	1,415	12,240	1,203	10,800	849	10,080	693
		12	0.07	14,400	1,415	12,240	1,203	10,800	849	10,080	693
		16	0.05	14,400	1,415	12,240	1,203	10,800	849	10,080	693
		20	0.05	11,664	1,146	9,914	974	8,748	764	8,165	624
		30	0.04	9,072	1,146	7,711	974	6,804	764	6,350	624
		35	0.035	9,072	1,146	7,711	974	6,804	764	6,350	624
	0.3	8	0.13	14,400	1,572	12,240	1,337	10,800	943	10,080	771
		16	0.075	14,400	1,572	12,240	1,337	10,800	943	10,080	771
		20	0.075	11,664	1,274	9,914	1,083	8,748	849	8,165	693
		30	0.06	9,072	1,274	7,711	1,083	6,804	849	6,350	693
	0.5	8	0.18	14,400	1,572	12,240	1,337	10,800	943	10,080	771
		12	0.13	14,400	1,572	12,240	1,337	10,800	943	10,080	771
		16	0.1	14,400	1,572	12,240	1,337	10,800	943	10,080	771
		20	0.1	11,664	1,274	9,914	1,083	8,748	849	8,165	693
		30	0.08	9,072	1,274	7,711	1,083	6,804	849	6,350	693
		35	0.065	9,072	1,274	7,711	1,083	6,804	849	6,350	693

Application tip



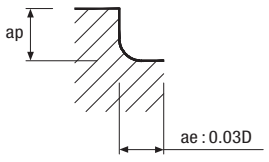
- Please adjust the cutting depth index according to the cutting depth factors of above table.
- In actual machining, the condition should be adjusted according to the machining shape, purpose and machine type.
- If RPM of the machine is low, the feed rate should be low in the same ratio as RPM.

H-Star Endmill

ESLNR series

Workpiece				Carbon steels, Alloy steels 180~250HB		Pre-hardened steels HRC35~45		Hardened steels HRC45~55		High-hardened steels HRC55~65	
Ratio to standard depth of cut				Depth of Cut × 100%		Depth of Cut × 80%		Depth of Cut × 65%		Depth of Cut × 60%	
Diameter (Ø)	Corner R (mm)	Neck length (mm)	Depth of Cut (mm)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
0.8	0.1	4	0.032	48,000	1,102	28,000	518	20,000	320	20,000	288
		6	0.019	38,700	800	25,000	461	18,000	288	18,000	256
		8	0.015	29,025	600	20,000	369	16,200	259	16,200	230
		12	0.012	29,025	570	20,000	350	16,200	246	16,200	219
	0.2	4	0.056	48,000	1,102	28,000	518	20,000	320	20,000	288
		6	0.032	38,700	800	25,000	461	18,000	288	18,000	256
1	0.1	4	0.038	32,400	1,359	27,540	1,039	24,300	815	22,680	666
		6	0.024	26,244	990	22,307	842	19,683	660	18,371	539
		8	0.024	23,328	880	19,829	748	17,496	587	16,330	479
		10	0.015	20,412	770	17,350	655	15,309	514	14,288	419
		12	0.015	18,144	609	15,422	453	13,608	399	12,701	320
		16	0.009	18,144	533	15,422	420	13,608	342	12,701	266
		20	0.006	13,608	399	11,567	315	10,206	257	9,526	200
	0.2	4	0.07	32,400	1,359	27,540	1,039	24,300	815	22,680	666
		6	0.040	26,244	990	22,307	842	19,683	660	18,371	539
		8	0.040	23,328	880	19,829	748	17,496	587	16,330	479
		10	0.025	20,412	770	17,350	655	15,309	514	14,288	419
		12	0.025	18,144	609	15,422	453	13,608	399	12,701	320
		16	0.015	18,144	533	15,422	420	13,608	342	12,701	266
		20	0.010	13,608	399	11,567	315	10,206	257	9,526	200
	0.3	6	0.040	26,244	990	22,307	842	19,683	660	18,371	539
		10	0.025	20,412	770	17,350	655	15,309	514	14,288	419
		16	0.015	18,144	533	15,422	420	13,608	342	12,701	266
		20	0.010	13,608	399	11,567	315	10,206	257	9,526	200
1.5	0.1	4	0.042	24,930	1,130	20,956	868	18,711	678	17,364	556
		8	0.036	22,680	1,027	19,278	873	17,010	685	15,876	559
		12	0.036	18,144	822	15,422	698	13,608	548	12,701	447
		15	0.023	14,112	568	11,995	423	10,584	373	9,878	298
		20	0.018	14,112	568	11,995	423	10,584	373	9,878	298
	0.2	4	0.070	24,930	1,130	20,956	868	18,711	678	17,364	556
		8	0.060	22,680	1,027	19,278	873	17,010	685	15,876	559
		12	0.060	18,144	822	15,422	698	13,608	548	12,701	447
		15	0.038	14,112	568	11,995	423	10,584	373	9,878	298
		20	0.030	14,112	568	11,995	423	10,584	373	9,878	298
	0.3	8	0.060	22,680	1,027	19,278	873	17,010	685	15,876	559
		15	0.038	14,112	568	11,995	423	10,584	373	9,878	298
		20	0.030	14,112	568	11,995	423	10,584	373	9,878	298

Application tip

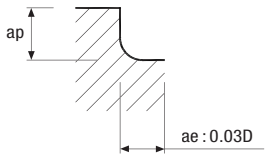


- Please adjust the cutting depth index according to the cutting depth factors of above table.
- In actual machining, the condition should be adjusted according to the machining shape, purpose and machine type.
- If RPM of the machine is low, the feed rate should be low in the same ratio as RPM.

ESTNR series

Workpiece				Carbon steels, Alloy steels 180~250HB		Pre-hardened steels HRC35~45		Hardened steels HRC45~55		High-hardened steels HRC55~65	
Ratio to standard depth of cut				Depth of Cut × 100%		Depth of Cut × 80%		Depth of Cut × 65%		Depth of Cut × 60%	
Diameter (Ø)	Corner R (mm)	Neck length (mm)	Depth of Cut (mm)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
0.2	0.05	2	0.007	39,660	887	33,660	754	29,700	591	27,720	483
0.4	0.05	4	0.009	30,096	899	25,582	764	22,572	599	21,067	489
		5	0.007	26,752	710	22,739	528	20,064	466	18,726	373
	0.1	4	0.009	31,680	946	26,928	804	23,760	631	22,176	515
		5	0.007	28,160	747	23,936	556	21,120	490	19,712	392
0.5	0.1	5	0.013	30,413	1,090	25,851	753	22,810	562	21,289	453
		8	0.008	24,330	678	20,681	468	18,248	350	17,031	282
		10	0.007	18,248	509	15,511	351	13,686	262	12,773	211
0.6	0.1	12	0.01	20,377	791	17,320	546	15,282	408	14,264	329
		15	0.006	16,727	649	14,218	448	12,545	335	11,709	270
0.8	0.2	6	0.045	31,680	1,084	26,928	921	23,760	723	22,176	590
		12	0.02	28,160	943	23,936	695	21,120	613	19,712	490
1	0.2	8	0.04	28,512	1,463	24,235	1,244	21,384	976	19,958	797
		10	0.035	28,512	1,596	24,235	1,357	21,384	1,064	19,958	869
		15	0.028	25,344	1,261	21,542	938	19,008	828	17,741	662
		20	0.02	19,008	828	16,157	653	14,256	532	13,306	414
		25	0.017	15,840	690	13,464	544	11,880	443	11,088	345
		30	0.017	15,840	690	13,464	544	11,880	443	11,088	345
		35	0.01	15,840	690	13,464	544	11,880	443	11,088	345
	0.3	8	0.04	28,512	1,463	24,235	1,244	21,384	976	19,958	797
		15	0.028	25,344	1,261	21,542	938	19,008	828	17,741	662
		25	0.017	15,840	690	13,464	544	11,880	443	11,088	345
		30	0.017	15,840	690	13,464	544	11,880	443	11,088	345
1.5	0.2	10	0.05	21,683	1,079	18,431	803	16,262	708	15,178	567
		15	0.045	19,712	981	16,755	730	14,784	644	13,798	515
		20	0.042	17,347	863	14,745	642	13,010	567	12,143	453
		25	0.032	14,784	644	12,566	508	11,088	414	10,349	322
		30	0.028	12,320	536	10,472	423	9,240	345	8,624	268
	0.3	10	0.05	21,683	1,079	18,431	803	16,262	708	15,178	567
		20	0.042	17,347	863	14,745	642	13,010	567	12,143	453
		25	0.032	14,784	644	12,566	508	11,088	414	10,349	322
		30	0.028	12,320	536	10,472	423	9,240	345	8,624	268

Application tip



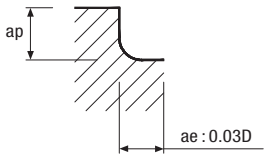
- Please adjust the cutting depth index according to the cutting depth factors of above table.
- In actual machining, the condition should be adjusted according to the machining shape, purpose and machine type.
- If RPM of the machine is low, the feed rate should be low in the same ratio as RPM.

H-Star Endmill

ESTNR series

Workpiece				Carbon steels, Alloy steels 180~250HB		Pre-hardened steels HRC35~45		Hardened steels HRC45~55		High-hardened steels HRC55~65	
Ratio to standard depth of cut				Depth of Cut × 100%		Depth of Cut × 80%		Depth of Cut × 65%		Depth of Cut × 60%	
Diameter (Ø)	Corner R (mm)	Neck length (mm)	Depth of Cut (mm)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
2	0.2	30	0.045	13,440	1,254	11,424	933	10,080	823	9,408	658
		40	0.035	10,080	823	8,568	650	7,560	529	7,056	412
		50	0.017	8,400	686	7,140	541	6,300	441	5,880	343
	0.3	12	0.088	22,680	1,814	19,278	1,427	17,010	1,191	15,876	1,048
		20	0.054	18,144	1,452	15,422	1,141	13,608	953	12,701	838
		30	0.045	13,440	1,393	11,424	1,036	10,080	914	9,408	732
		40	0.035	10,080	914	8,568	722	7,560	588	7,056	457
		50	0.017	8,400	762	7,140	601	6,300	490	5,880	381
	0.5	8	0.170	22,680	1,814	19,278	1,427	17,010	1,191	15,876	1,048
		12	0.088	22,680	1,814	19,278	1,427	17,010	1,191	15,876	1,048
		16	0.088	19,278	1,542	16,386	1,213	14,459	1,012	13,495	891
		20	0.054	18,114	1,452	15,422	1,141	13,608	953	12,701	838
		25	0.054	15,876	1,270	13,495	999	11,907	833	11,113	733
		30	0.045	13,440	1,393	11,424	1,036	10,080	914	9,408	732
		40	0.035	10,080	914	8,568	722	7,560	588	7,056	457
		50	0.017	8,400	762	7,140	601	6,300	490	5,880	381
3	0.2	40	0.070	10,240	956	8,704	711	7,680	627	7,168	502
		50	0.050	7,680	627	6,528	495	5,760	403	5,376	314
		60	0.030	6,400	523	5,440	412	4,800	336	4,480	261
	0.3	40	0.070	10,240	1,062	8,704	790	7,680	697	7,168	557
		50	0.050	7,680	697	6,528	550	5,760	448	5,376	348
		60	0.030	6,400	581	5,440	458	4,800	373	4,480	290
	0.5	40	0.070	10,240	1,062	8,704	790	7,680	697	7,168	557
		50	0.050	7,680	697	6,528	550	5,760	448	5,376	348
		60	0.030	6,400	581	5,440	458	4,800	373	4,480	290

Application tip



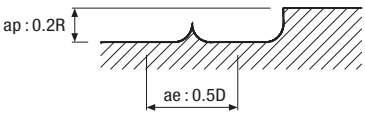
- Please adjust the cutting depth index according to the cutting depth factors of above table.
- In actual machining, the condition should be adjusted according to the machining shape, purpose and machine type.
- If RPM of the machine is low, the feed rate should be low in the same ratio as RPM.

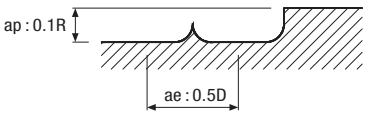
ESPM4 series

Side cutting

Workpiece	Hardened steels Heat resistant alloy		Hardened steels							
Conditions	~HRC40		HRC40~50		HRC50~55		HRC55~60		HRC60~65	
Diameter (Ø) × R (mm)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
3 × R0.5	9,550	6,500	6,900	4,150	4,550	2,750	2,850	1,150	1,900	610
4 × R0.5	7,950	7,000	5,750	4,600	4,000	3,200	2,550	1,350	1,750	700
6 × R0.5	5,800	7,650	4,100	4,900	2,900	3,500	1,850	1,850	1,350	795
6 × R1.0	5,800	7,650	4,100	4,900	2,900	3,500	1,850	1,850	1,350	795
8 × R1.0	4,350	7,650	3,050	4,900	2,200	3,500	1,400	1,850	995	795
8 × R2.0	4,350	7,650	3,050	4,900	2,200	3,500	1,400	1,850	995	795
10 × R1.0	3,500	7,650	2,450	4,900	1,750	3,500	1,100	1,850	795	795
10 × R2.0	3,500	7,650	2,450	4,900	1,750	3,500	1,100	1,850	795	795
12 × R2.0	2,900	7,650	2,050	4,900	1,450	3,500	925	1,850	665	795
12 × R3.0	2,900	7,650	2,050	4,900	1,450	3,500	925	1,850	665	795

Application tip



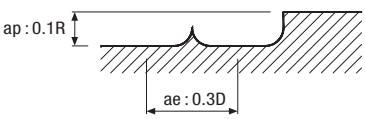


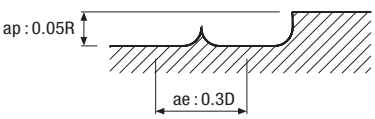
ESPM4 series

High Speed Cutting

Workpiece	Hardened steels Heat resistant alloy		Hardened steels							
Conditions	~HRC40		HRC40~50		HRC50~55		HRC55~60		HRC60~65	
Diameter (Ø) × R (mm)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
3 × R0.5	22,000	16,000	17,000	10,000	12,500	8,000	9,500	4,600	6,900	2,500
4 × R0.5	17,000	17,500	13,000	12,000	11,000	9,200	8,000	5,500	5,600	2,900
6 × R0.5	13,500	18,500	10,500	13,800	9,000	11,000	6,400	6,400	4,500	3,600
6 × R1.0	13,500	18,500	10,500	13,800	9,000	11,000	6,400	6,400	4,500	3,600
8 × R1.0	10,000	18,500	8,000	14,000	6,800	11,000	4,800	6,700	3,400	4,100
8 × R2.0	10,000	18,500	8,000	14,000	6,800	11,000	4,800	6,700	3,400	4,100
10 × R1.0	8,000	18,500	6,400	14,000	5,400	11,000	3,800	6,800	2,700	3,800
10 × R2.0	8,000	18,500	6,400	14,000	5,400	11,000	3,800	6,800	2,700	3,800
12 × R2.0	6,600	18,500	5,300	14,000	4,500	11,000	3,200	7,000	2,250	3,600
12 × R3.0	6,600	18,500	5,300	14,000	4,500	11,000	3,200	7,000	2,250	3,600

Application tip



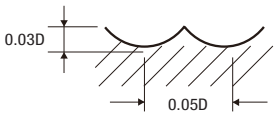


U-Star Endmill

WHPB902

Workpiece	Alloy steels, Carbon steels		Pre-hardened steels		Hardened steels	
Strength	~HRC35		HRC35~45		HRC45~55	
Conditions	~1100N/mm²		1100 ~ 1500N/mm²		1500 ~ 2000N/mm²	
Diameter(Ø)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
0.1	40,000	550	40,000	500	33,000	400
0.2	30,000	720	30,000	630	27,000	575
0.3	30,000	900	30,000	810	27,000	720
0.4	30,000	1,140	30,000	1,020	27,000	900
0.5	30,000	1,440	30,000	1,260	27,000	1,140
0.6	30,000	1,740	30,000	1,500	27,000	1,320
0.8	30,000	2,340	30,000	1,980	27,000	1,800
1	30,000	2,880	30,000	2520	27,000	2,280
1.2	30,000	3,060	28,800	2,580	25,800	2,310
1.5	30,000	3,240	28,800	2,700	25,800	2,400
2	29,820	3,420	28,680	2,880	24,000	2,400
3	19,860	3,600	19,080	3,180	15,900	2,400
4	14,940	3,600	14,340	3,180	12,000	2,400
5	11,160	3,480	10,680	2,940	9,000	2,250
6	8,340	2,910	8,040	2,460	6,600	1,860
8	6,660	2,520	6,420	2,100	5,400	1,620
10	5,580	2,220	5,340	1,860	4,500	1,440
12	4,170	1,770	4,008	1,500	3,360	1,440
16	3,340	1,590	3,210	1,320	2,700	1,020
20	2,670	1,410	2,580	1,170	2,160	900
25	2,130	1,150	2,060	950	1,730	730

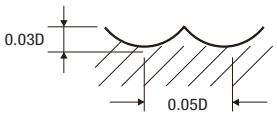
Application tip



WHPB902, WB502, WB502...P

Workpiece	Alloy steels, Carbon steels (SCM, SNCM, S45C)		Pre-hardened steels (NAK, CENA, KP4)		Hardened steels (SKD, SKT, STAVAX)	
Strength	~HRC35		HRC35~45		HRC45~55	
Conditions	~1100N/mm²		1100~1500N/mm²		1500~2000N/mm²	
Diameter(Ø)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
0.1	40,000	550	40,000	500	33,000	400
0.2	30,000	720	30,000	630	27,000	575
0.3	30,000	900	30,000	810	27,000	720
0.4	30,000	1,140	30,000	1,020	27,000	900
0.5	30,000	1,440	30,000	1,260	27,000	1,140
0.6	30,000	1,740	30,000	1,500	27,000	1,320
0.8	30,000	2,340	30,000	1,980	27,000	1,800
1	30,000	2,880	30,000	2,520	27,000	2,280
1.2	30,000	3,060	28,800	2,580	25,800	2,310
1.5	30,000	3,240	28,800	2,700	25,800	2,400
2	29,820	3,420	28,680	2,880	24,000	2,400
3	19,860	3,600	19,080	3,180	15,900	2,400
4	14,940	3,600	14,340	3,180	12,000	2,400
5	11,160	3,480	10,680	2,940	9,000	2,250
6	8,340	2,910	8,040	2,460	6,600	1,860
8	6,660	2,520	6,420	2,100	5,400	1,620
10	5,580	2,220	5,340	1,860	4,500	1,440
12	4,170	1,770	4,008	1,500	3,360	1,140
16	3,340	1,590	3,210	1,320	2,700	1,020
20	2,670	1,410	2,580	1,170	2,160	900
25	2,130	1,150	2,060	950	1,730	730

Application tip

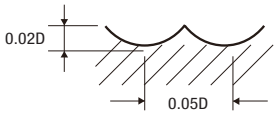


U-Star Endmill

WSB502

Workpiece	Alloy steels, Carbon steels (SCM, SNCM, S45C)		Pre-hardened steels (NAK, CENA, KP4)		Hardened steels (SKD, SKT, STAVAX)	
Strength	~HRC35		HRC35~45		HRC45~55	
Conditions	~1100N/mm²		1100 ~ 1500N/mm²		1500 ~ 2000N/mm²	
Diameter(Ø)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
3	13,500	1,700	13,200	1,620	12,500	860
4	10,600	1,700	10,300	1,620	9,800	860
5	9,400	1,650	9,050	1,570	8,600	860
6	8,600	1,750	8,250	1,670	7,850	865
8	7,000	1,550	6,700	1,460	6,350	890
10	6,050	1,450	5,800	1,360	5,450	870
12	5,450	1,420	5,200	1,330	4,900	785
16	4,300	1,200	4,000	1,100	3,700	650
20	3,600	1,050	3,200	900	3,000	550

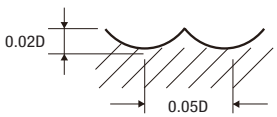
Application tip



WB503

Workpiece	Alloy steels, Carbon steels (SCM, SNCM, S45C)		Pre-hardened steels (NAK, CENA, KP4)		Hardened steels (SKD, SKT, STAVAX)	
Strength	~HRC35		HRC35~45		HRC45~55	
Conditions	~1100N/mm²		1100 ~ 1500N/mm²		1500 ~ 2000N/mm²	
Diameter(Ø)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
1	50,000	4,150	44,000	3,000	33,000	2100
1.5	40,000	5,100	35,000	3,660	36,400	2600
2	33,000	5,890	29,000	4,150	21,700	3000
3	25,000	6,930	22,000	4,880	16,500	3490
4	21,670	6,930	18,120	4,880	13,400	3490
5	18,000	6,520	15,100	4,880	11,160	3320
6	16,200	7,710	13,680	5,590	10,980	4050
8	12,150	6,610	10,170	4,720	8,280	3580
10	9,720	5,870	8,190	4,130	6,620	3100
12	8,150	5,490	4,130	3,830	5,520	2870

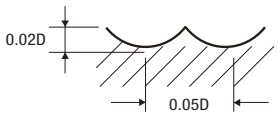
Application tip



WB504

Workpiece	Alloy steels, Carbon steels (SCM, SNCM, S45C)		Pre-hardened steels (NAK, CENA, KP4)		Hardened steels (SKD, SKT, STAVAX)	
Strength	~HRC35		HRC35~45		HRC45~55	
Conditions	~1100N/mm²		1100~1500N/mm²		1500~2000N/mm²	
Diameter(Ø)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
1	48,000	3,300	35,000	2,350	32,000	2,200
1.5	38,400	4,100	28,000	2,900	25,600	2,700
2	31,680	4,600	23,100	3,300	21,000	3,100
3	24,000	5,430	17,500	3,880	16,000	3,650
4	20,130	5,430	14,880	3,880	14,220	3,650
5	16,780	5,430	12,400	3,690	11,670	3,470
6	15,200	6,220	12,200	4,500	11,100	3,830
8	11,300	5,250	9,200	3,980	8,320	3,350
10	9,100	4,590	7,350	3,450	6,660	2,870
12	7,590	4,260	6,130	3,190	5,530	2,400

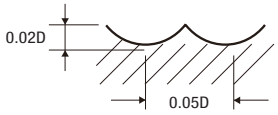
Application tip



WB532

Workpiece	Alloy steels, Carbon steels (SCM, SNCM, S45C)		Pre-hardened steels (NAK, CENA, KP4)		Hardened steels (SKD, SKT, STAVAX)	
Strength	~HRC35		HRC35~45		HRC45~55	
Conditions	~1100N/mm²		1100~1500N/mm²		1500~2000N/mm²	
Diameter(Ø)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
3	35,000	2,800	33,000	2,600	12,000	900
4	26,000	2,300	25,000	2,200	9,000	800
5	21,000	2,100	20,000	2,000	7,000	700
6	17,000	1,900	16,000	1,800	6,000	650
8	13,000	1,700	12,000	1,600	4,500	550
10	10,500	1,450	10,000	1,400	3,500	500
12	9,000	1,400	8,000	1,300	3,000	450

Application tip



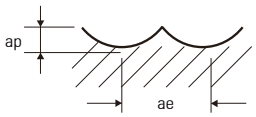
U-Star Endmill

WB542 series

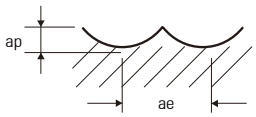
General Cutting

Workpiece	Alloy steels, Carbon steels (SCM, SNCM, S45C)		Pre-hardened steels (NAK, CENA, KP4)		Hardened steels (SKD, SKT, STAVAX)	
Strength	~HRC35		HRC35~45		HRC45~55	
Conditions	~1100N/mm²		1100 ~ 1500N/mm²		1500 ~ 2000N/mm²	
Diameter(Ø)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
0.1	16,500	80	25,500	185	25,500	160
0.2	16,500	90	25,500	220	25,500	200
0.3	15,300	112	24,000	260	24,000	220
0.4	15,300	112	24,000	260	24,000	220
0.5	13,300	128	20,800	300	20,800	250
0.6	11,200	144	17,600	330	17,600	280
0.8	11,200	144	17,600	330	17,600	280
1.0	10,180	160	16,000	370	16,000	320
1.5	9,500	220	13,000	500	12,800	400
2.0	9,250	260	11,500	640	11,300	590
3.0	8,000	370	10,200	880	9,800	850
4.0	6,720	420	8,500	880	8,200	850
5.0	5,840	460	7,500	880	7,200	850
6.0	5,500	660	6,900	920	6,500	880
8.0	4,600	740	5,600	840	5,300	800
10.0	4,070	820	4,850	800	4,650	770
12.0	3,700	890	4,350	800	4,150	770

Application tip



ap: D1~D6 = 0.2mm
D8~D12 = 0.3mm
ae: 0.2 × D

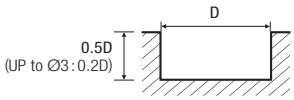


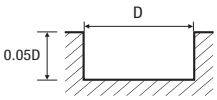
ap: D1~D4 = 0.05 × D
D5~D8 = 0.25mm
D10~D12 = 0.3mm
ae: 0.1 × D

WME502, WE502-S3, WE502 series

Workpiece	Alloy steels, Carbon steels (SCM, SNCM, S45C)		Pre-hardened steels (NAK, CENA, KP4)		Stainless steels (SUS)		Hardened steels (SKD, SKT, STAVAX)	
Strength	~HRC35		HRC35~45				HRC45~55	
Conditions	~1100N/mm²		1100 ~ 1500N/mm²				1500 ~ 2000N/mm²	
Diameter(Ø)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
2.0	11,560	190	7,560	120	6,300	90	5,040	35
3.0	8,920	210	5,560	140	4,620	120	3,360	40
4.0	7,560	300	4,620	180	3,880	150	2,940	40
5.0	6,300	320	3,780	190	3,160	160	2,320	50
6.0	5,560	350	3,360	220	2,840	180	2,000	55
8.0	4,200	380	2,520	200	2,100	180	1,680	75
10.0	3,260	330	2,000	160	1,680	160	1,360	60
12.0	2,740	280	1,680	130	1,360	130	1,160	55
16.0	2,200	220	1,360	110	1,060	110	900	40
20.0	1,680	170	1,060	80	840	80	680	30
25.0	1,360	130	840	70	680	60	540	20

Application tip

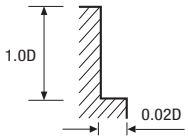




WE514 series

Workpiece	Alloy steels, Carbon steels (SCM, SNCM, S45C)		Pre-hardened steels (NAK, CENA, KP4)		Stainless steels (SUS)		Hardened steels (SKD, SKT, STAVAX)	
Strength	~HRC35		HRC35~45				HRC45~55	
Conditions	~1100N/mm²		1100~1500N/mm²				1500~2000N/mm²	
Diameter(Ø)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
1.0	22,000	310	13,500	180	10,750	140	8,500	50
1.5	17,000	320	10,700	190	8,500	150	6,500	50
2.0	13,900	330	9,070	200	7,560	165	6,000	60
2.5	12,000	350	7,600	220	6,000	180	4,500	60
3.0	10,700	380	6,670	240	5,110	200	4,030	70
4.0	9,070	680	5,540	420	4,650	330	3,530	70
5.0	7,560	720	4,530	430	3,800	360	2,780	85
6.0	6,670	790	4,030	490	3,400	390	2,400	95
8.0	5,040	850	3,020	450	2,520	420	2,010	130
10.0	3,910	730	2,400	360	2,010	360	1,630	105
12.0	3,300	620	2,010	300	1,630	280	1,400	95

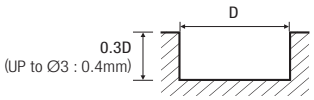
Application tip

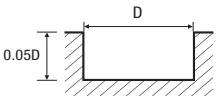


WE522 series

Workpiece	Alloy steels, Carbon steels (SCM, SNCM, S45C)		Pre-hardened steels (NAK, CENA, KP4)		Hardened steels (SKD, SKT, STAVAX)	
Strength	~HRC35		HRC35~45		HRC45~55	
Conditions	~1100N/mm²		1100~1500N/mm²		1500~2000N/mm²	
Diameter(Ø)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
2.0	6,300	60	5,040	50	3,150	25
3.0	4,410	70	3,570	60	2,200	30
4.0	3,570	85	2,840	70	1,790	35
5.0	3,050	105	2,420	85	1,580	40
6.0	2,630	125	2,100	105	1,370	50
8.0	2,000	135	1,580	105	1,050	50
10.0	1,680	135	1,370	105	840	50
12.0	1,370	105	1,160	95	700	40
16.0	1,160	95	890	75	560	35
20.0	840	70	680	50	420	25

Application tip



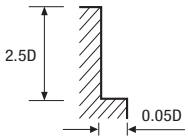


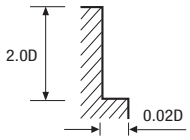
U-Star Endmill

WE524 series

Workpiece	Alloy steels, Carbon steels (SCM, SNCM, S45C)		Pre-hardened steels (NAK, CENA, KP4)		Hardened steels (SKD, SKT, STAVAX)	
Strength	~HRC35		HRC35~45		HRC45~55	
Conditions	~1100N/mm²		1100 ~ 1500N/mm²		1500 ~ 2000N/mm²	
Diameter(Ø)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
2.0	6,300	100	5,040	80	3,150	45
3.0	4,410	115	3,570	100	2,200	55
4.0	3,570	140	2,840	115	1,790	60
5.0	3,050	180	2,420	140	1,580	70
6.0	2,630	215	2,100	180	1,370	90
8.0	2,000	230	1,580	180	1,050	90
10.0	1,680	230	1,370	180	840	90
12.0	1,370	180	1,160	160	700	70
16.0	1,160	160	890	125	560	60
20.0	840	115	680	90	420	45

Application tip

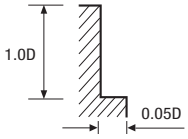




WME504, WXE504 series

Workpiece	Alloy steels, Carbon steels (SCM, SNCM, S45C)		Pre-hardened steels (NAK, CENA, KP4)		Stainless steels (SUS)		Hardened steels (SKD, SKT, STAVAX)	
Strength	~HRC35		HRC35~45				HRC45~55	
Conditions	~1100N/mm²		1100 ~ 1500N/mm²				1500 ~ 2000N/mm²	
Diameter(Ø)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
2.0	11,560	280	7,560	170	6,300	140	5,040	50
3.0	8,920	320	5,560	200	4,620	170	3,360	60
4.0	7,560	570	4,620	350	3,880	280	2,940	60
5.0	6,300	600	3,780	360	3,160	300	2,320	70
6.0	5,560	660	3,360	410	2,840	330	2,000	80
8.0	4,200	710	2,520	380	2,100	350	1,680	110
10.0	3,260	610	2,000	300	1,680	300	1,360	90
12.0	2,740	520	1,680	250	1,360	240	1,160	80
16.0	2,200	410	1,360	200	1,100	300	900	60
20.0	1,680	320	1,060	160	840	150	680	40
25.0	1,360	250	840	130	680	120	540	30

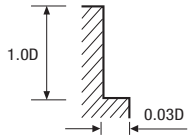
Application tip



WE504H series

Workpiece	Alloy steels, Carbon steels (SCM, SNCM, S45C)		Pre-hardened steels (NAK, CENA, KP4)		Hardened steels (SKD, SKT, STAVAX)	
Strength	~HRC35		HRC35~45		HRC45~55	
Conditions	~1100N/mm²		1100~1500N/mm²		1500~2000N/mm²	
Diameter(Ø)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
1	45,000	750	37,000	560	23,000	300
2	23,500	800	18,000	540	12,000	360
3	15,750	810	12,600	580	8,280	380
4	12,150	830	9,540	600	6,345	400
6	9,450	900	7,470	640	4,950	440
8	7,110	860	5,625	620	3,780	410
10	5,580	800	4,410	570	2,925	380
12	4,770	800	3,780	570	2,520	380
16	3,600	810	2,900	570	2,000	400
20	3,000	810	2,300	570	1,600	400

Application tip



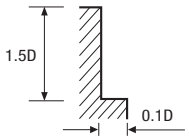
U-Star Endmill

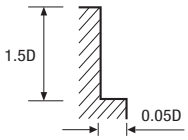
WE506 series

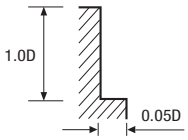
General Cutting

Workpiece	Alloy steels, Carbon steels (SCM, SNCM, S45C)		Pre-hardened steels (NAK, CENA, KP4)		Hardened steels (SKD, SKT, STAVAX)	
Strength	~HRC35		HRC35~45		HRC45~55	
Conditions	~1100N/mm²		1100 ~ 1500N/mm²		1500 ~ 2000N/mm²	
Diameter(Ø)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
6.0	5,560	2,000	3,880	1,370	1,580	210
8.0	4,200	2,000	2,940	1,370	1,160	210
10.0	3,360	2,000	2,320	1,370	1,000	210
12.0	2,840	1,680	2,000	1,160	840	180
16.0	2,100	1,260	1,480	880	640	130
20.0	1,680	1,010	1,160	690	500	110
25.0	1,500	90	1,100	600	430	90

Application tip





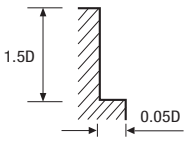


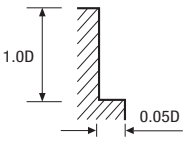
WE506 series

High Speed Cutting

Workpiece	Pre-hardened steels (NAK, CENA, KP4)		Hardened steels (SKD, SKT, STAVAX)	
Strength	HRC35~45		HRC45~55	
Conditions	1100 ~ 1500N/mm²		1500 ~ 2000N/mm²	
Diameter(Ø)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
6.0	16,800	6,090	8,400	3,050
8.0	12,600	6,090	6,300	3,050
10.0	9,980	5,990	5,040	3,050
12.0	8,400	5,040	4,200	2,520
16.0	6,300	3,780	3,160	1,890
20.0	5,040	3,050	2,520	1,470
25.0	4,500	2,700	2,200	1,300

Application tip

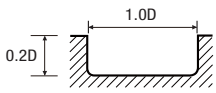


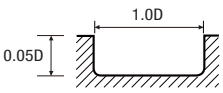


WR502 series

Workpiece	Alloy steels, Carbon steels (SCM, SNCM, S45C)		Pre-hardened steels (NAK, CENA, KP4)		Hardened steels (SKD, SKT, STAVAX)	
Strength	~HRC35		HRC35~45		HRC45~55	
Conditions	~1100N/mm²		1100~1500N/mm²		1500~2000N/mm²	
Diameter(Ø)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
0.2	44,000	145	28,800	60	17,600	40
0.3	41,000	170	27,000	70	16,500	45
0.4	41,000	170	27,000	70	16,500	45
0.5	36,000	190	23,400	80	14,300	50
0.6	30,000	210	19,800	90	12,100	55
0.8	30,000	210	19,800	90	12,100	55
1.0	27,600	240	18,000	100	11,000	60
1.5	22,000	250	13,500	110	8,500	60
2.0	18,000	260	11,560	120	7,200	70
2.5	15,000	270	9,500	130	6,100	70
3.0	13,240	280	8,560	140	5,280	70
4.0	10,720	340	6,820	170	4,300	80
5.0	9,160	420	5,800	200	3,800	100
6.0	7,900	500	5,040	250	3,280	120
8.0	6,000	540	3,800	250	2,520	120
10.0	5,040	540	3,280	250	2,020	120
12.0	4,120	420	2,780	230	1,680	100
16.0	3,100	360	2,100	170	1,280	80
20.0	2,520	280	1,640	120	1,000	60

Application tip

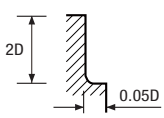


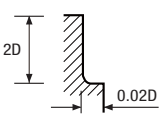


WR504, WR512 series

Workpiece	Alloy steels, Carbon steels (SCM, SNCM, S45C)		Pre-hardened steels (NAK, CENA, KP4)		Hardened steels (SKD, SKT, STAVAX)	
Strength	~HRC35		HRC35~45		HRC45~55	
Conditions	~1100N/mm²		1100~1500N/mm²		1500~2000N/mm²	
Diameter(Ø)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
3.0	4,410	115	3,570	100	2,200	55
4.0	3,570	140	2,840	115	1,790	60
5.0	3,050	180	2,420	140	1,580	70
6.0	2,630	215	2,100	180	1,370	85
8.0	2,000	230	1,580	180	1,050	85
10.0	1,680	230	1,370	180	840	85
12.0	1,370	180	1,160	160	700	70
16.0	1,160	160	890	125	560	60
20.0	840	115	680	90	420	45

Application tip



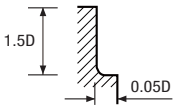


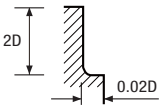
U-Star Endmill

WR506 series

Workpiece	Alloy steels, Carbon steels (SCM, SNCM, S45C)		Pre-hardened steels (NAK, CENA, KP4)		Hardened steels (SKD, SKT, STAVAX)	
Strength	~HRC35		HRC35~45		HRC45~55	
Conditions	~1100N/mm²		1100 ~ 1500N/mm²		1500 ~ 2000N/mm²	
Diameter(Ø)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
6.0	14,880	3,210	14,100	2,940	9,600	2,940
8.0	12,000	3,300	11,400	3,000	7,200	2,760
10.0	9,600	2,940	9,300	2,700	5,700	2,460
12.0	7,800	2,700	7,500	2,460	4,800	2,280
16.0	6,000	2,400	5,820	2,220	3,600	2,040
20.0	4,800	2,010	4,680	2,040	2,880	1,920

Application tip

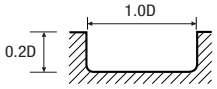


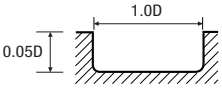


WR514, WR542 series

Workpiece	Alloy steels, Carbon steels (SCM, SNCM, S45C)		Pre-hardened steels (NAK, CENA, KP4)		Hardened steels (SKD, SKT, STAVAX)	
Strength	~HRC35		HRC35~45		HRC45~55	
Conditions	~1100N/mm²		1100 ~ 1500N/mm²		1500 ~ 2000N/mm²	
Diameter(Ø)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
0.2	50,000	170	34,500	75	21,150	45
0.3	50,000	200	32,000	85	20,000	50
0.4	50,000	200	32,000	85	20,000	50
0.5	43,000	220	28,000	95	17,100	60
0.6	36,400	250	24,000	110	14,500	65
0.8	36,400	250	24,000	110	14,500	65
1.0	33,100	280	21,600	120	13,200	70
1.5	26,400	300	16,200	130	10,200	70
2.0	21,600	310	13,800	140	8,640	80
2.5	18,000	320	11,400	150	7,320	80
3.0	15,900	330	10,300	160	6,300	80
4.0	12,800	400	8,200	200	5,150	95
5.0	11,000	500	7,000	240	4,560	120
6.0	9,500	600	6,000	300	3,930	140
8.0	7,200	640	4,550	300	3,020	140
10.0	6,000	640	4,000	300	2,420	140
12.0	5,000	500	3,340	270	2,000	120
16.0	3,720	450	2,520	210	1,540	95
20.0	3,000	330	1,950	140	1,200	70

Application tip

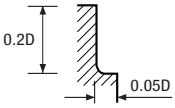


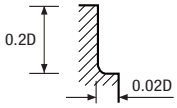


WXR504 series

Workpiece	Alloy steels, Carbon steels (SCM, SNCM, S45C)		Pre-hardened steels (NAK, CENA, KP4)		Hardened steels (SKD, SKT, STAVAX)	
Strength	~HRC35		HRC35~45		HRC45~55	
Conditions	~1100N/mm²		1100~1500N/mm²		1500~2000N/mm²	
Diameter(Ø)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
1.0	27,600	300	18,000	220	11,000	120
1.5	22,000	310	13,500	230	8,500	120
2.0	18,000	320	11,560	240	7,200	130
2.5	15,000	330	9,500	250	6,100	130
3.0	13,240	340	8,560	260	5,280	130
4.0	10,720	420	6,820	300	4,300	140
5.0	9,160	430	5,800	360	3,800	170
6.0	7,900	430	5,040	360	3,280	170
8.0	6,000	460	3,800	360	2,520	170
10.0	5,040	460	3,280	360	2,020	170
12.0	4,120	360	2,780	320	1,680	140
16.0	3,100	280	2,100	230	1,280	115
20.0	2,520	230	1,640	180	1,000	90

Application tip

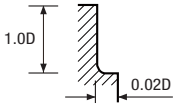




WXR514, WR544 series

Workpiece	Alloy steels, Carbon steels (SCM, SNCM, S45C)		Pre-hardened steels (NAK, CENA, KP4)		Hardened steels (SKD, SKT, STAVAX)	
Strength	~HRC35		HRC35~45		HRC45~55	
Conditions	~1100N/mm²		1100~1500N/mm²		1500~2000N/mm²	
Diameter(Ø)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
1.0	33,100	360	21,600	260	13,200	140
1.5	26,400	370	16,200	270	10,200	140
2.0	21,600	380	13,800	280	8,640	150
2.5	18,000	390	11,400	300	7,320	150
3.0	15,900	400	10,300	310	6,300	150
4.0	12,800	500	8,200	360	5,150	160
5.0	11,000	510	7,000	430	4,560	200
6.0	9,500	510	6,000	430	3,930	200
8.0	7,200	550	4,550	430	3,020	200
10.0	6,000	550	4,000	430	2,420	200
12.0	5,000	430	3,340	380	2,000	160
16.0	3,720	330	2,520	280	1,540	135
20.0	3,000	270	1,950	210	1,200	100

Application tip

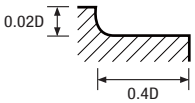


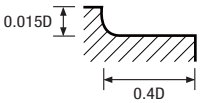
U-Star Endmill

WSPM4 series

Workpiece	Alloy steels, Carbon steels (SCM, SNCM, S45C)		Pre-hardened steels (NAK, CENA, KP4)		Hardened steels (SKD, SKT, STAVAX)	
Strength	~HRC35		HRC35~45		HRC45~55	
Conditions	~1100N/mm²		1100 ~ 1500N/mm²		1500 ~ 2000N/mm²	
Diameter(Ø)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
1.0	49000	7650	40000	6500	35000	5750
1.5	37000	8550	30000	7200	27000	6400
2.0	29700	9000	24300	7560	21600	6750
3.0	19800	9900	16200	8100	14400	7650
4.0	15300	10800	12600	8550	10800	7920
6.0	9900	11700	8100	9900	7200	8640
8.0	7380	11700	6300	9900	5400	8640
10.0	5850	10800	4950	9000	4320	8550
12.0	4950	10800	4140	9000	3690	8100
16.0	3690	9000	3060	7920	2700	7020
20.0	2970	7200	2430	6300	2160	5670

Application tip



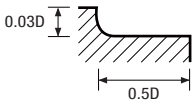


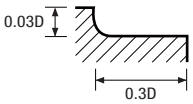
WDR503 series

General Cutting

Workpiece	Alloy steels, Carbon steels (SCM, SNCM, S45C)		Pre-hardened steels (NAK, CENA, KP4)		Hardened steels (SKD, SKT, STAVAX)	
Strength	~HRC35		HRC35~45		HRC45~55	
Conditions	~1100N/mm²		1100~1500N/mm²		1500~2000N/mm²	
Diameter(Ø)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
6.0	5,100	3,500	5,500	3,750	3,850	2,700
8.0	3,800	3,400	4,150	3,700	2,850	2,550
10.0	3,800	3,750	3,600	3,500	2,700	2,700
12.0	3,200	4,200	3,250	4,250	2,250	2,300
16.0	2,400	3,100	2,250	2,900	1,700	1,750
20.0	1,900	2,500	1,800	2,350	1,350	1,400

Application tip



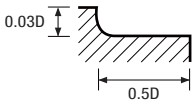


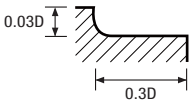
WDR503 series

High Speed Cutting

Workpiece	Alloy steels, Carbon steels (SCM, SNCM, S45C)		Pre-hardened steels (NAK, CENA, KP4)		Hardened steels (SKD, SKT, STAVAX)	
Strength	~HRC35		HRC35~45		HRC45~55	
Conditions	~1100N/mm²		1100~1500N/mm²		1500~2000N/mm²	
Diameter(Ø)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
6.0	8,300	5,700	7,650	5,250	6,400	4,550
8.0	6,200	5,550	5,750	5,100	5,250	4,700
10.0	5,750	5,650	5,000	4,900	4,200	4,250
12.0	4,800	6,300	4,150	5,450	3,500	3,650
16.0	3,600	4,700	3,100	4,050	2,650	2,700
20.0	2,900	3,750	2,500	3,250	2,100	2,150

Application tip



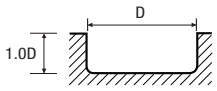


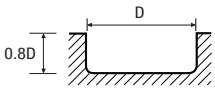
U-Star Endmill

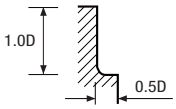
WF60 series

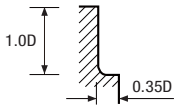
Workpiece	Alloy steels Carbon steels (SCM, S45C, S50C)		Alloy steels Carbon steels Pre-hardened steels (SCM, SKD, NAK, KP4)		Alloy steels Carbon steels (SCM, S45C, S50C)		Alloy steels Carbon steels Pre-hardened steels (SCM, SKD, NAK, KP4)	
Conditions	~HRC25		HRC25~40		~HRC25		HRC25~40	
Diameter(Ø)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
6.0	12,000	1,550	10,600	1,100	15,800	2,570	14,300	1,850
8.0	9,000	1,650	8,100	1,180	11,900	2,700	10,700	1,950
10.0	7,200	1,650	6,400	1,180	9,500	2,700	8,500	1,950
12.0	6,000	1,540	5,400	1,140	8,000	2,570	7,100	1,850
16.0	4,500	1,500	4,100	1,050	6,000	2,450	5,400	1,750
20.0	3,600	1,330	3,200	900	4,800	2,140	4,300	1,500

Application tip





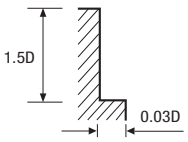


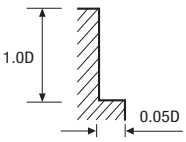


WF61 series

Workpiece	Alloy steels, Carbon steels (SCM, SNCM, S45C)		Pre-hardened steels (NAK, CENA, KP4)		Hardened steels (SKD, SKT, STAVAX)	
Strength	~HRC35		HRC35~45		HRC45~55	
Conditions	~1100N/mm²		1100~1500N/mm²		1500~2000N/mm²	
Diameter(Ø)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
6.0	12,400	840	8,400	570	3,400	260
8.0	9,200	840	6,300	570	2,400	240
10.0	7,600	840	5,100	570	2,000	290
12.0	6,000	800	4,200	570	1,680	260
14.0	5,200	840	3,600	570	1,400	200
16.0	4,800	760	3,300	510	1,200	160
18.0	4,400	720	2,700	420	1,100	150
20.0	3,600	560	2,400	360	1,000	150
25.0	3,200	620	2,160	410	900	160

Application tip

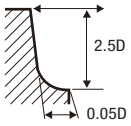




WTB502 series

Workpiece	Alloy steels, Carbon steels (SCM, SNCM, S45C)		Pre-hardened steels (NAK, CENA, KP4)	
Strength	~ HRC35		HRC35~45	
Conditions	~ 1100N/mm²		1100 ~ 1500N/mm²	
Diameter(Ø)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
0.4	36,000	144	27,900	113
0.6	25,200	144	18,900	113
0.8	18,000	144	13,950	108
1.0	14,850	149	11,250	113
2.0	7,560	153	5,670	113
3.0	3,969	108	3,213	90
4.0	3,213	126	2,556	104

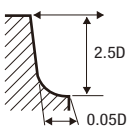
Application tip



WTE502 series

Workpiece	Alloy steels, Carbon steels (SCM, SNCM, S45C)		Pre-hardened steels (NAK, CENA, KP4)	
Strength	~ HRC35		HRC35~45	
Conditions	~ 1100N/mm²		1100 ~ 1500N/mm²	
Diameter(Ø)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
0.3	45,000	135	35,000	105
0.4	36,000	144	27,900	113
0.6	25,200	144	18,900	113
0.8	18,000	144	13,950	108
1.0	14,850	149	11,250	113
2.0	7,560	153	5,670	113
3.0	3,969	108	3,213	90
4.0	3,213	126	2,556	104
6.0	2,367	189	1,890	153
8.0	1,800	225	1,422	162
10.0	1,440	225	1,170	167

Application tip

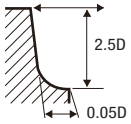


U-Star Endmill

WTE504, WTE514 series

Workpiece	Alloy steels, Carbon steels (SCM, SNCM, S45C)		Pre-hardened steels (NAK, CENA, KP4)	
Strength	~ HRC35		HRC35~45	
Conditions	~ 1100N/mm²		1100 ~ 1500N/mm²	
Diameter(Ø)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
3.0	3,969	216	3,213	180
4.0	3,213	252	2,556	207
6.0	2,367	378	1,890	306
8.0	1,800	450	1,422	324
10.0	1,440	450	1,170	333

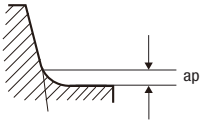
Application tip



WTR504 series

Workpiece	Alloy steels, Carbon steels (SCM, SNCM, S45C)			Pre-hardened steels (NAK, CENA, KP4)			Hardened steels (SKD, SKT, STAVAX)		
Strength	~HRC35			HRC35~45			HRC45~55		
Conditions	~1100N/mm²			1100 ~ 1500N/mm²			1500 ~ 2000N/mm²		
Diameter(Ø)	R.P.M n (min⁻¹)	Feed vf (mm/min)	Ap (mm)	R.P.M n (min⁻¹)	Feed vf (mm/min)	Ap (mm)	R.P.M n (min⁻¹)	Feed vf (mm/min)	Ap (mm)
0.4	40,000	630	0.008 ~ 0.016	32,000	450	0.008 ~ 0.012	22,000	270	0.004 ~ 0.008
0.6	30,000	630	0.012 ~ 0.024	23,000	450	0.012 ~ 0.018	15,000	270	0.006 ~ 0.012
0.8	22,500	630	0.016 ~ 0.032	17,000	450	0.016 ~ 0.024	11,500	270	0.008 ~ 0.016
1.0	18,000	630	0.020 ~ 0.040	13,500	450	0.020 ~ 0.030	9,000	270	0.010 ~ 0.020
1.2	14,400	630	0.025 ~ 0.050	11,700	450	0.025 ~ 0.040	7,200	270	0.012 ~ 0.025
1.5	11,700	630	0.030 ~ 0.060	9,000	450	0.030 ~ 0.050	5,850	270	0.015 ~ 0.030
2.0	9,000	630	0.040 ~ 0.080	7,200	450	0.040 ~ 0.060	4,500	270	0.020 ~ 0.040

Application tip



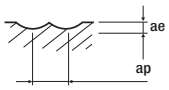
G-Star Endmill

DB312, DB342, DB402, DB502, DB512, DB522, DB54(5)2

General Cutting

Workpiece	NON-alloyed steels alloy steels · Cast iron		Alloy steels, Heat resistant steels		Hardened steels	
Strength	~HRC30		HRC30~40		HRC40~55	
Conditions	~1100N/mm²		1000~1250N/mm²		1500N/mm²	
Diameter(Ø)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
1.0	16,500	290	13,300	230	6,100	105
1.5	16,500	405	12,700	310	5,590	140
2.0	15,100	865	11,200	565	4,900	175
2.5	15,100	865	11,200	565	4,900	175
3.0	13,800	780	10,500	530	4,750	175
4.0	11,000	850	8,800	610	4,410	205
5.0	9,600	945	7,600	665	3,860	205
6.0	8,900	1,150	7,200	955	3,340	220
8.0	7,500	1,500	6,050	1,060	2,590	255
10.0	6,700	1,750	5,300	1,170	2,140	260
12.0	6,150	2,000	4,900	1,280	1,840	280
16.0	5,000	1,950	3,900	1,220	1,420	280
20.0	4,350	1,900	3,400	1,200	1,170	290

Application tip



ae: D1~D6 = 0.2mm
D8~D20 = 0.3mm
ap: 0.2×D

ae: D1~D6 = 0.2mm
D8~D20 = 0.25mm
ap: 0.1×D

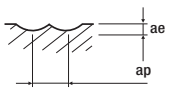
※ Please reduce cutting speed around 20~30% from the above table or DB522 series.

DB312, DB342, DB402, DB502, DB512, DB522, DB54(5)2

High Speed Cutting

Workpiece	NON-alloyed steels alloy steels · Cast iron		Alloy steels, Heat resistant steels	
Strength	~HRC45		HRC30~40	
Conditions	~1500N/mm²		1500~2000N/mm²	
Diameter(Ø)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
1.0	26,000	1,500	26,000	920
1.5	24,000	1,600	24,000	990
2.0	22,000	1,700	22,000	1,080
2.5	22,000	2,000	20,000	1,130
3.0	22,000	2,300	17,800	1,200
4.0	22,000	3,350	14,300	1,300
5.0	22,000	4,150	12,600	1,380
6.0	22,000	4,600	11,000	1,440
8.0	17,500	4,600	8,800	1,440
10.0	14,700	4,450	7,350	1,380
12.0	12,800	4,450	6,400	1,330
16.0	10,000	4,000	5,000	1,150
20.0	8,350	3,650	4,150	1,060

Application tip



ae: D1~D6 = 0.2mm
D8~D20 = 0.3mm
ap: 0.2×D

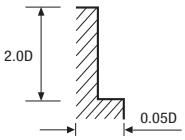
※ Please reduce cutting speed around 20~30% from the above table or DB522 series.

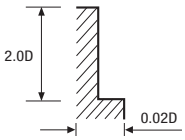
G-Star Endmill

ZR324, ZR504, ZR514, ZR524

Workpiece	Non-Alloyed steels Alloy steels · Cast iron		Alloy steels, Heat resistant steels		hardened steels	
Strength	~HRC30		HRC30~45		HRC45~55	
Conditions	~1000N/mm²		1000~1500N/mm²		1500~2000N/mm²	
Diameter(Ø)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
3	6,950	195	4,500	150	3,300	100
4	5,600	240	3,600	170	2,700	105
5	4,800	250	3,050	210	2,350	125
6	4,150	250	2,650	210	2,050	125
8	3,150	265	2,000	210	1,600	125
10	2,150	265	1,700	210	1,250	125
12	1,800	210	1,500	185	1,050	105
16	1,880	185	1,100	140	840	90
20	1,300	130	860	105	625	65

Application tip

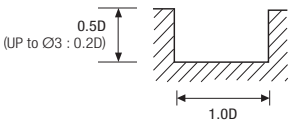


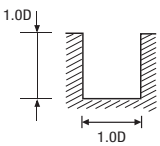


TX202, TX222, TX302

Workpiece	Non-Alloy steels, alloy steels, Cast iron		Alloy steels, Heat resistant steels		Stainless steels		Cast iron		Aluminum alloys		Copper, Brass nonferrous metals	
Strength	~HRC30		HRC30~45		-		-		-		-	
Conditions	~1000N/mm²		1000~1500N/mm²		-		-		-		-	
Diameter(Ø)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
1.0	14,300	105	8,500	65	7,150	50	18,700	205	44,000	330	24,700	200
1.5	9,350	150	5,550	85	5,600	80	12,100	205	27,500	385	20,300	300
2.0	7,850	160	5,150	100	4,300	80	9,350	220	22,000	460	16,500	340
3.0	6,100	180	3,800	120	3,150	100	6,050	220	15,400	460	11,000	340
4.0	5,150	255	3,150	155	2,650	130	4,600	220	11,000	460	8,800	340
5.0	4,300	270	2,550	160	2,150	135	3,650	220	9,150	460	6,800	340
6.0	3,800	300	2,300	190	1,950	155	2,950	255	7,600	485	5,700	375
8.0	2,850	325	1,700	170	1,450	155	2,200	275	5,700	485	4,400	375
10.0	2,200	280	1,350	135	1,150	135	1,850	285	4,600	485	3,400	375
12.0	1,850	240	1,150	110	950	110	1,450	295	3,750	485	2,850	375
14.0	1,700	215	1,050	100	850	100	1,300	310	3,300	485	2,400	375
16.0	1,500	185	950	95	700	95	1,100	320	2,850	485	2,200	375
20.0	1,150	145	700	70	550	70	900	340	2,200	485	1,700	375

Application tip



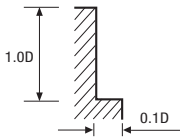


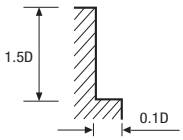
※ The Feed for long & extra long types, should be reduced by around 30~40%.

TX204, TX224, TX304

Workpiece	Non-Alloy steels, alloy steels, Cast iron		Alloy steels, Heat resistant steels		Stainless steels		Cast iron		Aluminum alloys		Copper, Brass nonferrous metals	
Strength	~HRC30		HRC30~45		-		-		-		-	
Conditions	~1000N/mm²		1000~1500N/mm²		-		-		-		-	
Diameter(Ø)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
1.0	17,600	150	10,250	85	8,650	75	18,700	620	44,000	1,050	24,700	605
1.5	11,800	215	7,050	115	7,050	120	12,100	620	27500	1,160	20,300	910
2.0	9,850	240	6,450	145	5,350	120	9,350	640	22000	1,320	16,500	1,035
3.0	7,600	270	4,750	170	3,950	145	6,050	640	15400	1,320	11,000	1,035
4.0	6,450	485	3,950	300	3,300	240	4,600	640	11000	1,320	8,800	1,035
5.0	5,350	510	3,200	305	2,700	255	3,650	640	9150	1,320	6,800	1,035
6.0	4,750	560	2,850	350	2,400	280	2,950	770	7600	1,430	5,700	1,100
8.0	3,550	605	2,150	325	1,800	300	2,200	815	5700	1,430	4,400	1,100
10.0	2,750	520	1,700	255	1,450	255	1,850	860	4600	1,430	3,400	1,100
12.0	2,350	440	1,450	215	1,150	205	1,450	900	3750	1,430	2,850	1,100
14.0	2,100	395	1,300	195	1,050	190	1,300	945	3300	1,430	2,400	1,100
16.0	1,850	350	1,150	170	950	170	1,100	970	2850	1,430	2,200	1,100
20.0	1,450	270	900	135	700	130	900	1,035	2200	1,430	1,700	1,100

Application tip





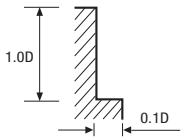
※ The Feed for long & extra long types, should be reduced by around 30~40%.

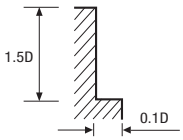
G-Star Endmill

TX304H

Workpiece	Non-Alloy steels, alloy steels, Cast iron		Alloy steels, Heat resistant steels		Stainless steels		Cast iron		Aluminum alloys		Copper, Brass nonferrous metals	
Strength	≤ HRC30		HRC30~45		-		-		-		-	
Conditions	~1000N/mm²		1000~1500N/mm²		-		-		-		-	
Diameter(Ø)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
1.0	17,600	150	10,250	85	8,650	75	18,700	620	44,000	1,050	24,700	605
1.5	11,800	215	7,050	115	7,050	120	12,100	620	27,500	1,160	20,300	910
2.0	9,850	240	6,450	145	5,350	120	9,350	640	22,000	1,320	16,500	1,035
3.0	7,600	270	4,750	170	3,950	145	6,050	640	15,400	1,320	11,000	1,035
4.0	6,450	485	3,950	300	3,300	240	4,600	640	11,000	1,320	8,800	1,035
5.0	5,350	510	3,200	305	2,700	255	3,650	640	9,150	1,320	6,800	1,035
6.0	4,750	560	2,850	350	2,400	280	2,950	770	7,600	1,430	5,700	1,100
8.0	3,550	605	2,150	325	1,800	300	2,200	815	5,700	1,430	4,400	1,100
10.0	2,750	520	1,700	255	1,450	255	1,850	860	4,600	1,430	3,400	1,100
12.0	2,350	440	1,450	215	1,150	205	1,450	900	3,750	1,430	2,850	1,100
14.0	2,100	395	1,300	195	1,080	190	1,300	945	3,300	1,430	2,400	1,100
16.0	1,850	350	1,150	170	950	170	1,100	970	2,850	1,430	2,200	1,100
20.0	1,450	270	900	135	700	130	900	1,035	2,200	1,430	1,700	1,100

Application tip



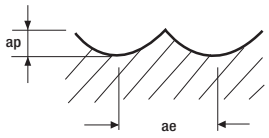


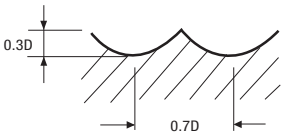
TXB202, TXB222, TXB232, TXB302

Workpiece	Carbon steels, Alloy steels, Tool steels				Hardened steels		Cast iron		Aluminum alloys	
Strength	≤ HRC30		HRC30~45		HRC45~50		-		-	
Conditions	~1000N/mm²		1000~1500N/mm²		1500N/mm²		-		-	
Diameter(Ø)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
2.0	12,350	640	9,150	415	4,000	125	10,500	220	30,800	395
3.0	11,400	575	8,550	390	3,800	125	7,050	230	20,500	395
4.0	8,950	630	7,150	450	3,600	150	5,150	285	15,400	395
5.0	7,800	700	6,200	490	3,100	150	4,150	330	12,100	470
6.0	7,250	870	5,900	705	2,700	160	3,400	360	10,300	470
8.0	6,100	1,090	4,900	785	2,050	190	2,500	460	7,900	540
10.0	5,450	1,330	4,350	870	1,750	190	2,050	460	6,150	540
12.0	4,990	1,500	3,950	950	1,500	210	1,750	460	5,150	630
14.0	4,530	1,495	3,600	925	1,300	210	1,400	460	4,300	630
16.0	4,085	1,470	3,200	905	1,150	210	1,300	460	3,850	540
18.0	3,800	1,425	3,000	890	1,050	210	1,100	460	3,400	540
20.0	3,550	1,425	2,800	885	950	210	1,050	420	2,950	540

Application tip

ae: D1~D6 = 0.2mm
D8~D20 = 0.3mm
ap: 0.2





※ The Feed for long & extra long types, should be reduced by around 30~40%.

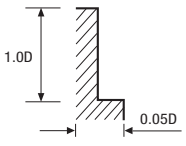
TXB304, TXB204 series

Workpiece	Alloy steels, Tool steels				Hardened steels		Cast iron		Aluminum alloys	
Strength	≤ HRC30		HRC30~45		HRC45~50		-		-	
Conditions	~1000N/mm²		1000~1500N/mm²		1500N/mm²		-		-	
Diameter(Ø)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
2	15,400	1,000	11,400	600	5,000	200	13,100	300	38,500	600
3	14,300	900	10,700	600	4,800	200	8,800	300	25,600	600
4	11,200	900	8,900	700	4,500	200	6,400	400	19,300	600
5	9,800	1,100	7,800	700	3,900	200	5,200	500	15,100	700
6	9,100	1,300	7,400	1,100	3,400	200	4,300	500	12,900	700
8	7,600	1,600	6,100	1,200	2,600	300	3,100	700	9,900	800
10	6,800	2,000	5,400	1,300	2,200	300	2,600	700	7,700	800
12	6,200	2,300	4,900	1,400	1,900	300	2,200	700	6,400	900
14	5,700	2,200	4,500	1,400	1,600	300	1,800	700	5,400	900
16	5,100	2,200	4,000	1,400	1,400	300	1,600	700	4,800	800
18	4,800	2,100	3,800	1,300	1,300	300	1,400	700	4,300	800
20	4,400	2,100	3,500	1,300	1,200	300	1,300	600	3,700	800

ZR304H, ZR324H

Workpiece	Non-Alloyed steels Alloy steels · Cast iron		Alloy steels, Heat resistant steels		hardened steels	
Strength	~HRC30		HRC30~45		HRC30~45	
Conditions	~1000N/mm²		1000~1500N/mm²		1500~2000N/mm²	
Diameter(Ø)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
6	7,000	910	4,200	560	3,000	140
8	5,300	980	3,200	530	2,500	190
10	4,100	840	2,500	410	2,050	165
12	3,500	730	2,100	340	1,700	140

Application tip



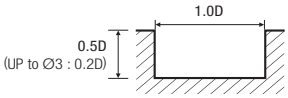
G-Star Endmill

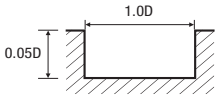
ZE302, ZE322, ZE402, ZE502, ZE522, ZE512

General Cutting

Workpiece	Alloy steels, Heat resistant steels		Hardened steels		Stainless steels	
Strength	HRC30~40		HRC40~50		-	
Conditions	1000~1250N/mm²		1250~1750N/mm²		-	
Diameter(Ø)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
2	9,700	220	6,350	135	5,300	105
3	7,500	240	4,670	160	3,880	135
4	6,350	345	3,880	205	3,250	175
5	5,300	370	3,170	220	2,650	185
6	4,670	405	2,830	255	2,380	205
8	3,530	435	2,120	230	1,760	205
10	2,730	380	1,680	185	1,420	185
12	2,310	320	1,420	150	1,140	150
16	1,850	255	1,140	125	890	125
20	1,420	195	890	90	705	90
25	1,150	150	705	80	580	70

Application tip





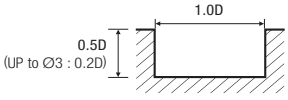
※ Please reduce cutting speed around 20~30% from the above table or ZE522, ZE322 series.

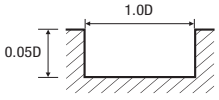
ZE302, ZE322, ZE402, ZE502, ZE522, ZE512

High Speed Cutting

Workpiece	Alloy steels, Heat resistant steels		Hardened steels				stainless steels	
Strength	HRC30~40		HRC40~50		HRC40~55		-	
Conditions	1000~1250N/mm²		1250~1750N/mm²		1750~2000N/mm²		-	
Diameter(Ø)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
2	18,000	665	11,800	415	8,700	175	9,800	345
3	11,000	655	6,800	435	5,600	185	6,200	370
4	10,300	725	6,300	430	4,300	185	5,300	370
5	9,350	715	5,570	420	3,700	185	4,620	355
6	8,200	750	4,930	470	3,250	185	4,100	390
8	6,300	770	3,780	410	2,470	185	3,120	355
10	4,830	750	2,940	360	2,000	160	2,470	310
12	4,100	750	2,520	345	1,680	160	2,100	300
16	3,260	715	2,000	355	1,890	150	1,940	290
20	2,520	665	1,580	310	1,680	150	1,630	275
25	2,000	635	1,260	340	1,570	150	1,420	290

Application tip



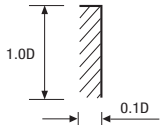


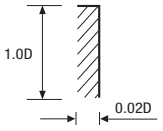
ZE304, ZE324, ZE404, ZE504, ZE524, ZE534, ZE514, ACE4

General Cutting

Workpiece	Non-Alloyed steels Alloy steels · Cast iron		Hardened steels				Stainless steels	
Strength	~HRC30		HRC30~45		HRC45~55		-	
Conditions	~1000N/mm²		1000~1500N/mm²		1500~2000N/mm²		-	
Diameter(Ø)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
2	12,100	320	7,900	195	2,700	47	6,600	160
3	9,400	370	5,840	230	2,000	58	4,850	195
4	7,900	655	4,850	405	1,500	58	4,070	320
5	6,600	690	3,970	415	1,300	58	3,320	345
6	5,830	760	3,530	470	1,150	58	2,980	380
8	4,410	815	2,650	435	880	58	2,200	405
10	3,420	700	2,100	345	720	46	1,760	345
12	2,880	600	1,760	290	590	46	1,430	275
16	2,310	470	1,430	230	460	29	1,150	230
20	1,760	370	1,110	185	340	29	880	175
25	1,430	290	880	150	270	23	715	140

Application tip





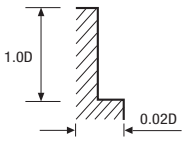
※ Please reduce cutting speed around 20~30% from the above table or ZE524 & ZE324 series.

ZE304, ZE324, ZE404, ZE504, ZE524, ZE534, ZE514, ACE4

High Speed Cutting

Workpiece	Non-Alloyed steels Alloy steels · Cast iron		Hardened steels				Stainless steels	
Strength	~HRC30		HRC30~45		HRC45~55		-	
Conditions	~1000N/mm²		1000~1500N/mm²		1500~2000N/mm²		-	
Diameter(Ø)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
2	31,400	1,230	23,500	520	12,600	275	21,600	465
3	19,300	1,210	13,600	735	8,900	390	13,500	660
4	18,100	1,330	12,600	865	7,090	465	11,800	775
5	16,400	1,310	11,100	1,010	6,040	530	10,300	910
6	14,400	1,380	9,900	1,100	5,300	580	9,100	990
8	11,000	1,430	7,600	1,090	3,990	575	6,900	980
10	8,500	1,380	5,880	1,110	3,150	580	5,420	1,000
12	7,200	1,380	5,040	1,090	2,620	575	4,600	985
16	5,700	1,320	3,990	1,010	2,000	535	3,590	910
20	4,400	1,270	3,150	930	1,580	490	2,840	840
25	3,500	1,170	2,520	755	1,260	390	2,270	680

Application tip



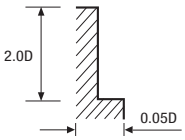
G-Star Endmill

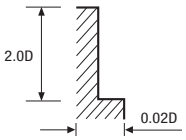
ZR322, ZR502, ZR512, ZR522

Side cutting

Workpiece	Non-Alloyed steels Alloy steels · Cast iron		Alloy steels, Heat resistant steels		hardened steels	
Strength	~HRC30		HRC30~45		HRC45~55	
Conditions	~1000N/mm²		1000~1500N/mm²		1500~2000N/mm²	
Diameter(Ø)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
3	6,950	195	4,500	150	3,300	100
4	5,600	240	3,600	170	2,700	105
5	4,800	250	3,050	210	2,350	125
6	4,150	250	2,650	210	2,050	125
8	3,150	265	2,000	210	1,600	125
10	2,150	265	1,700	210	1,250	125
12	1,800	210	1,500	185	1,050	105
16	1,800	185	1,100	140	840	90
20	1,300	130	860	105	625	65

Application tip



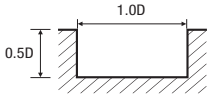


ZR322, ZR502, ZR512, ZR522

Slotting

Workpiece	Non-Alloyed steels Alloy steels · Cast iron		Alloy steels, Heat resistant steels		hardened steels	
Strength	~HRC30		HRC30~45		HRC45~55	
Conditions	~1000N/mm²		1000~1500N/mm²		1500~2000N/mm²	
Diameter(Ø)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
3	6,950	160	4,500	80	3,300	55
4	5,600	195	3,600	100	2,700	60
5	4,800	240	3,050	115	2,350	75
6	4,150	290	2,650	145	2,050	90
8	3,150	210	2,000	145	1,600	90
10	2,150	250	1,700	140	1,250	90
12	1,800	200	1,500	135	1,050	75
16	1,800	215	1,100	100	840	60
20	1,300	160	860	70	625	45

Application tip



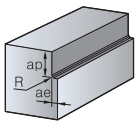
R+ Endmill

RPAE

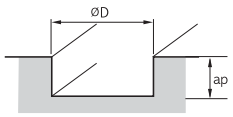
*For Carbide

Workpiece / Conditions / Diameter(Ø)	Aluminum, Non-ferrous metal		Aluminum, Non-ferrous metal	
	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
6.0	13,000	1,125	13,000	1,400
8.0	10,400	1,300	10,400	1,600
10.0	10,400	1,585	10,400	2,000
12.0	10,400	1,950	10,400	1,650
14.0	7,800	1,675	7,800	2,050
16.0	7,800	1,755	7,800	2,250
18.0	5,200	1,300	5,200	1,700
20.0	5,200	1,495	5,200	1,800
25.0	5,000	1,495	5,000	1,800

Application tip



■ **Shouldering depth(ap)**
- ap : ≤ 1.5D
- ae : ≤ 0.15D



■ **Slotting depth(ap)**
- ap : ≤ 0.2D

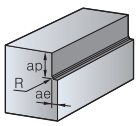
※ Workpiece should be clamped rigidly. In case of vibrations, reduce RPM and feed rate by the same ratio

RP(L)E-FP-H

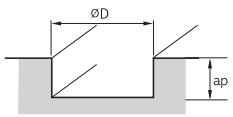
*For Carbide

Workpiece / Conditions / Diameter(Ø)	Alloy steels, Carbon steels ≤HRC25		Alloy steels, Carbon steels, Pre-hardened steels HRC25~40		Alloy steels, Carbon steels ≤HRC25		Alloy steels, Carbon steels, Pre-hardened steels HRC25~40	
	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
6.0	12,000	1,550	10,600	1,100	15,800	2,570	14,300	1,850
8.0	9,000	1,650	8,100	1,180	11,900	2,700	10,700	1,950
10.0	7,200	1,650	6,400	1,180	9,500	2,700	8,500	1,950
12.0	6,000	1,540	5,400	1,140	8,000	2,570	7,100	1,850
14.0	5,200	1,540	4,750	1,095	7,000	2,510	6,250	1,800
16.0	4,500	1,540	4,100	1,050	6,000	2,450	5,400	1,750
18.0	4,400	1,435	3,650	975	5,400	2,295	4,850	1,625
20.0	3,600	1,330	3,200	900	4,800	2,140	4,300	1,500
25.0	3,200	1,200	2,800	850	4,400	2,000	3,800	1,400

Application tip



■ **Shouldering depth(ap)**
- ap : ≤ 1.0D
- ae : ≤ 0.5D (≤HRC25)
  ≤ 0.35D (HRC25~40)



■ **Slotting depth(ap)**
- ap : ≤ 1.0D (≤HRC25)
  ≤ 0.8D (HRC25~40)

※ Workpiece should be clamped rigidly. In case of vibrations, reduce RPM and feed rate by the same ratio

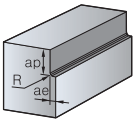
R+ Endmill

RPE-XG

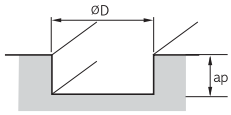
*For Carbide

Workpiece / Conditions / Diameter(Ø)	Alloy steels, Carbon steels ≤HRC25		Alloy steels, Carbon steels, Pre-hardened steels HRC25~40		Alloy steels, Carbon steels ≤HRC25		Alloy steels, Carbon steels, Pre-hardened steels HRC25~40	
	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
6.0	12,000	1,090	10,600	770	15,800	1,800	14,300	1,300
8.0	9,000	1,160	8,100	830	11,900	1,890	10,700	1,370
10.0	7,200	1,160	6,400	830	9,500	1,890	8,500	1,370
12.0	6,000	1,080	5,400	800	8,000	1,800	7,100	1,300
14.0	5,200	1,080	4,750	770	7,000	1,760	6,250	1,260
16.0	4,500	1,080	4,100	740	6,000	1,720	5,400	1,230
18.0	4,400	1,000	3,650	680	5,400	1,610	4,850	1,140
20.0	3,600	930	3,200	630	4,800	1,500	4,300	1,050
25.0	3,200	840	2,800	600	4,400	1,400	3,800	980

Application tip



■ **Shouldering depth(ap)**
- ap : ≤ 1.0D
- ae : ≤ 0.5D (≤HRC25)
  ≤ 0.35D (HRC25~40)



■ **Slotting depth(ap)**
- ap : ≤ 1.0D (≤HRC25)
  ≤ 0.8D (HRC25~40)

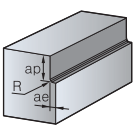
※ Workpiece should be clamped rigidly. In case of vibrations, reduce RPM and feed rate by the same ratio

RPE-FP-L

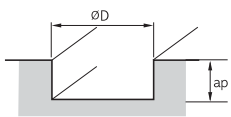
*For Carbide

Workpiece / Conditions / Diameter(Ø)	Alloy steel, Carbon steels ≤HRC35		Pre-hardened steels HRC35~45		High hardened steels HRC45~55	
	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
6.0	12,400	840	8,400	570	3,400	260
8.0	9,200	840	6,300	570	2,400	240
10.0	7,600	840	5,100	570	2,000	290
12.0	6,000	840	4,200	570	1,680	260
14.0	5,200	840	3,600	570	1,400	200
16.0	4,800	760	3,300	510	1,200	160
18.0	4,400	720	2,700	420	1,100	150
20.0	3,600	560	2,400	360	1,000	150
25.0	3,200	620	2,160	410	900	160

Application tip



■ **Shouldering depth(ap)**
- ap : ≤ 1.0D
- ae : ≤ 0.3D (≤HRC45)
  ≤ 0.05D (HRC45~55)



■ **Slotting depth(ap)**
- ap : ≤ 0.3D (≤HRC45)
  ≤ 0.05D (HRC45~55)

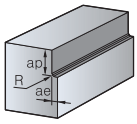
※ Workpiece should be clamped rigidly. In case of vibrations, reduce RPM and feed rate by the same ratio

RPE-RG

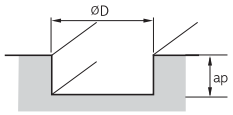
*For Carbide

Workpiece / Conditions / Diameter(Ø)	Alloy steels, Carbon steels ≤HRC25		Alloy steels, Carbon steels, Pre-hardened steels HRC25~40		Alloy steels, Carbon steels ≤HRC25		Alloy steels, Carbon steels, Pre-hardened steels HRC25~40	
	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
6.0	12,000	1,240	10,600	800	15,800	2,060	14,300	1,480
8.0	9,000	1,320	8,100	940	11,900	2,160	10,700	1,560
10.0	7,200	1,320	6,400	940	9,500	2,160	8,500	1,560
12.0	6,000	1,230	5,400	910	8,000	2,060	7,100	1,480
14.0	5,200	1,230	4,750	880	7,000	2,010	6,250	1,440
16.0	4,500	1,230	4,100	840	6,000	1,960	5,400	1,400
18.0	4,400	1,150	3,650	780	5,400	1,840	4,850	1,300
20.0	3,600	1,060	3,200	720	4,800	1,710	4,300	1,200
25.0	3,200	960	2,800	680	4,400	1,600	3,800	1,120

Application tip



■ **Shouldering depth(ap)**
- ap : ≤ 1.0D
- ae : ≤ 0.5D (≤HRC25)
  ≤ 0.35D (HRC25~40)



■ **Slotting depth(ap)**
- ap : ≤ 1.0D (≤HRC25)
  ≤ 0.8D (HRC25~40)

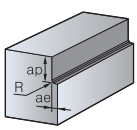
※ Workpiece should be clamped rigidly. In case of vibrations, reduce RPM and feed rate by the same ratio

RPE-FF, FP, RG

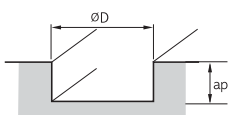
*For HSS PM

Workpiece / Conditions / Diameter(Ø)	Alloy steels, Carbon steels, Tool steels		Alloy steels, Carbon steels, Tool steels ≤HRC20		Alloy steels, Carbon steels, Tool steels HRC20~30		Alloy steels, Carbon steels, Tool steels HRC30~40	
	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
6.0	2,700	200	2,100	155	1,500	100	1,250	90
8.0	2,300	250	1,800	200	1,300	140	1,000	110
10.0	1,800	360	1,400	275	1,000	170	850	140
12.0	1,500	360	1,150	290	850	200	700	155
14.0	1,300	360	1,000	290	720	200	600	155
16.0	1,150	360	900	290	625	200	520	155
18.0	1,000	360	850	290	580	200	470	155
20.0	920	370	720	290	500	200	420	155
22.0	850	370	620	290	450	200	380	155
25.0	750	360	570	275	400	190	340	155

Application tip



■ **Shouldering depth(ap)**
- ap : ≤ 1.5D (All dia.)
- ae : ≤ 0.5D (All dia.)



■ **Slotting depth(ap)**
- ap : ≤ 0.15D

※ Workpiece should be clamped rigidly. In case of vibrations, reduce RPM and feed rate by the same ratio

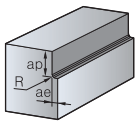
R+ Endmill

RPE-RG

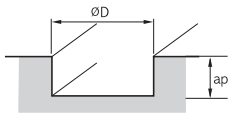
* For HSS Co

Workpiece / Conditions / Diameter(Ø)	Alloy steels, Carbon steels, Tool steels		Alloy steels, Carbon steels, Tool steels ≤HRC20		Alloy steels, Carbon steels, Tool steels HRC20~30		Alloy steels, Carbon steels, Tool steels HRC30~40	
	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
6.0	1,800	80	1,600	60	1,200	55	800	30
8.0	1,400	105	1,100	75	900	65	560	45
10.0	1,100	150	900	120	800	110	450	60
12.0	900	180	800	140	630	110	400	70
14.0	800	180	700	140	560	110	350	70
16.0	700	180	560	140	450	110	280	70
18.0	630	180	500	140	400	110	250	70
20.0	560	180	450	140	400	110	220	70
22.0	500	220	450	170	350	140	220	70
25.0	450	220	400	170	310	140	180	85
28.0	400	210	350	160	280	130	160	85
30.0	350	210	310	160	250	130	160	85
32.0	350	210	280	160	220	130	140	85
36.0	310	210	250	160	200	130	120	85
40.0	280	200	220	150	180	120	110	80
50.0	220	200	180	170	160	140	90	80

Application tip



■ **Shouldering depth(ap)**
- ap : ≤ 1.5D
- ae : ≤ 0.1D



■ **Slotting depth(ap)**
- ap : ≤ 0.15D

※ Workpiece should be clamped rigidly. In case of vibrations, reduce RPM and feed rate by the same ratio

S-Star Endmill

VXE504, VXR504

Slotting

Workpiece	Alloy steels, Cast iron		Stainless steels 300 series		Stainless steels 400 series		Titanium		inconel	
Conditions	~HB230		-		-		-		-	
Diameter(Ø)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
1.0	40,500	300	20,000	250	28,000	160	28,000	225	9330	60
1.5	27,000	300	13,000	180	18,500	160	18,500	185	6135	50
2.0	20,300	300	10,000	150	14,000	160	14,000	165	4685	45
2.5	16,200	300	8,000	120	11,000	165	11,000	155	3700	40
3.0	13,500	275	6,690	105	9,350	145	9,350	135	3135	35
4.0	10,100	370	5,050	135	7,000	185	7,000	195	2340	50
5.0	8,090	410	4,050	165	5,600	230	5,600	360	1875	60
6.0	6,750	480	3,350	190	4,700	265	4,700	415	1570	70
8.0	5,050	620	2,500	250	3,500	340	3,500	545	1170	95
10.0	4,050	780	2,050	320	2,800	430	2,800	695	945	120
12.0	3,370	750	1,680	310	2,350	435	2,350	685	780	115
14.0	2,890	670	1,400	280	2,000	405	2,000	820	715	150
16.0	2,500	630	1,250	265	1,750	370	1,750	950	600	180
18.0	2,250	630	1,100	260	1,550	365	1,550	1,245	515	250
20.0	2,000	620	1,000	260	1,400	365	1,400	1,875	480	390

Application tip

Stainless steel machining

- Low thermal conductivity of stainless steel alloy can cause conducted heat resulting fracture and chipping into the tool
- Stainless steel alloy machining can cause high wear and high cutting resistance
- High temperature in stainless steel alloy machining lowers cutting conditions and decrease the quality of surface roughness

Trouble shooting for stainless steel

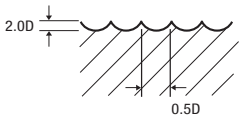
- Getting low cutting conditions
- Getting deeper ap than the work hardened layer and use tools with sharp cutting edge
- Use coolant

A-Star Endmill

WAB312

Workpiece / Conditions / Diameter(Ø)	Aluminium alloy		Copper alloy	
	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
6.0	18,000	1,750	5,500	440
8.0	14,000	2,000	4,200	500
10.0	14,000	2,350	4,200	580
12.0	14,000	3,000	4,200	750
16.0	11,000	2,700	3,300	670
20.0	8,000	2,200	2,200	600

Application tip

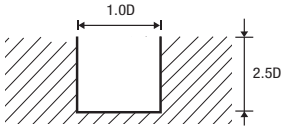


WAE301

Slotting, General Cutting

Workpiece / Conditions / Diameter(Ø)	Acrylic		Alloy steels	
	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
1.0	32,000	2,000	23,000	1,300
2.0	32,000	2,200	23,000	1,500
3.0	25,000	2,400	18,000	1,700
4.0	20,000	2,400	15,000	1,800
5.0	15,000	2,200	12,000	1,800
6.0	13,500	2,300	10,000	1,800
8.0	10,000	2,400	7,800	1,900
10.0	8,000	2,400	6,000	2,000
12.0	7,000	2,200	5,000	1,900

Application tip

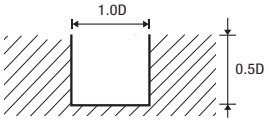


WAE302

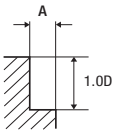
Slotting, Side cutting

Workpiece / Conditions / Diameter(Ø)	Alloy steels, Cast iron ~HB230		Aluminium -	
	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
1.0	16,870	505	16,870	845
1.5	13,150	525	13,150	790
2.0	11,300	565	11,300	790
2.5	10,565	635	10,565	845
3.0	10,000	700	10,000	900
4.0	10,000	900	10,000	1,100
5.0	10,000	1,000	10,000	1,300
6.0	10,000	1,200	10,000	1,500
7.0	8,850	1,240	8,850	1,505
8.0	8,000	1,400	8,000	1,800
9.0	8,000	1,550	8,000	1,680
10.0	8,000	1,700	8,000	2,100
12.0	8,000	2,100	8,000	2,600
14.0	6,000	1,800	6,000	2,200
16.0	6,000	1,900	6,000	2,400
18.0	4,000	1,400	4,000	1,800
20.0	4,000	1,600	4,000	1,900

Application tip



A : Ø3~Ø10 = 0.25 × D
Ø12~Ø20 = 0.5 × D



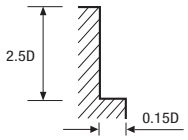
A-Star Endmill

WAE30(2)3, WAR303

Side cutting , General Cutting

Workpiece / Conditions / Diameter(Ø)	Aluminium, Nonferrous metals	
	R.P.M n (min⁻¹)	Feed vf (mm/min)
3	7,000	455
4	7,000	546
5	7,000	651
6	7,000	756
8	5,600	861
10	5,600	1,050
12	5,600	882
14	4,200	1106
16	4,200	1,211
18	2,800	910
20	2,800	956

Application tip



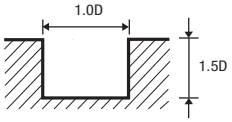
※ Please reduce cutting speed around 20~30% from the above table or AE323 series.

WAE30(2)3, WAR303

Slotting, General Cutting

Workpiece / Conditions / Diameter(Ø)	Aluminium, Nonferrous metals	
	R.P.M n (min⁻¹)	Feed vf (mm/min)
3	7,000	350
4	7,000	441
5	7,000	504
6	7,000	606
8	5,600	700
10	5,600	854
12	5,600	1,050
14	4,200	903
16	4,200	945
18	2,800	700
20	2,800	805

Application tip



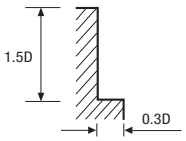
※ Please reduce cutting speed around 20~30% from the above table or AE323 series.

WAR302

Side cutting, General Cutting

Workpiece / Conditions / Diameter(Ø)	Aluminium alloy (<Si 4%)		Aluminium alloy (<Si 8%)		Aluminium alloy (Die casting)		Aluminium alloy (Cu)	
	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
4	24,000	4,800	19,900	3,980	16,000	3,200	12,000	2,400
6	16,000	3,840	13,200	3,160	10,600	2,544	8,000	1,920
8	12,000	3,600	9,900	2,970	8,000	2,400	6,000	1,800
10	9,500	3,420	8,000	2,880	6,300	2,260	4,800	1,720
12	8,000	3,200	6,600	2,640	5,300	2,120	4,000	1,600
14	6,800	2,990	5,600	2,460	4,500	1,980	3,400	1,490
16	6,000	3,000	5,000	2,500	4,000	2,000	3,000	1,500
18	5,300	2,600	4,400	2,200	3,500	1,750	2,600	1,300
20	4,800	2,400	4,000	2,000	3,200	1,600	2,400	1,200

Application tip

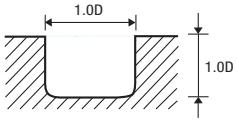


WAR302

Slotting, General Cutting

Workpiece / Conditions / Diameter(Ø)	Aluminium alloy (<Si 4%)		Aluminium alloy (<Si 8%)		Aluminium alloy (Die casting)		Aluminium alloy (Cu)	
	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
4	24,000	3,840	19,900	2,980	16,000	2,240	12,000	1,440
6	16,000	3,072	13,200	2,370	10,600	1,780	8,000	1,150
8	12,000	2,880	9,900	2,230	8,000	1,680	6,000	1,080
10	9,500	2,730	8,000	2,160	6,300	1,580	4,800	1,030
12	8,000	2,560	6,600	1,980	5,300	1,480	4,000	960
14	6,800	2,390	5,600	1,845	4,500	1,380	3,400	890
16	6,000	2,400	5,000	1,870	4,000	1,400	3,000	900
18	5,300	2,080	4,400	1,650	3,500	1,220	2,600	780
20	4,800	1,920	4,000	1,500	3,200	1,260	2,400	720

Application tip



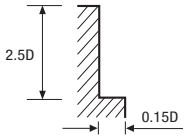
A-Star Endmill

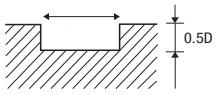
WAR502

Side cutting, Slotting, General cutting

Workpiece / Conditions / Diameter(Ø)	Aluminium alloy (A7075)		Aluminum alloy casting (Si13%)		Magnesium alloy · Copper alloys	
	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
1.0	32,000	220	32,000	220	23,000	220
1.2	32,000	230	32,000	230	19,000	220
1.4	32,000	260	32,000	260	16,500	220
1.5	32,000	280	32,000	280	15,500	220
1.6	32,000	320	32,000	320	14,500	220
1.8	32,000	360	32,000	360	13,000	220
2.0	32,000	420	32,000	420	11,500	220
2.5	25,000	600	25,000	600	9,500	250
3.0	21,000	700	21,000	700	7,950	250
4.0	15,500	725	15,500	725	5,950	280
5.0	12,500	760	12,500	760	4,750	295
6.0	10,500	830	10,500	830	3,950	310
8.0	7,950	890	7,950	890	2,950	300
10.0	6,350	995	6,350	995	2,350	365
12.0	5,300	1,050	5,300	1,050	1,950	390

Application tip



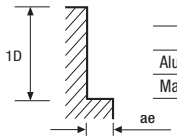


WAR502

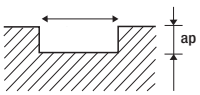
Side cutting, Slotting, High speed cutting

Workpiece / Conditions / Diameter(Ø)	Aluminium alloy (A7075)		Aluminum alloy casting (Si13%)		Magnesium alloy · Copper alloys	
	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
1.0	50,000	1,000	50,000	950	42,000	700
1.2	50,000	1,200	50,000	1,150	36,000	700
1.4	50,000	1,400	50,000	1,250	31,000	700
1.5	50,000	1,600	48,000	1,250	29,500	700
1.6	50,000	1,700	45,000	1,250	28,000	700
1.8	50,000	1,850	41,000	1,250	26,500	750
2.0	50,000	2,000	38,000	1,250	24,000	750
2.5	48,000	2,100	31,000	1,250	20,000	750
3.0	40,000	2,100	26,000	1,250	17,000	750
4.0	33,000	2,250	20,000	1,350	14,000	800
5.0	31,000	2,800	19,200	1,650	12,500	950
6.0	26,000	2,800	15,900	1,700	10,500	1,000
8.0	19,500	2,900	12,000	1,800	7,900	1,000
10.0	15,500	3,200	9,600	1,900	6,350	1,100
12.0	13,000	3,200	8,000	1,900	5,300	1,100

Application tip



	ae
Aluminium alloy, Aluminum alloy casting	0.15D
Magnesium alloy, Copper alloys	0.1D



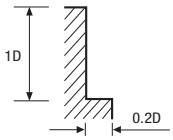
	ap
Aluminium alloy, Aluminum alloy casting	0.15D
Magnesium alloy, Copper alloys	0.1D

WAR503

Side cutting , General Cutting

Workpiece / Conditions / Diameter(Ø)	Aluminium alloy (A7075)		Aluminum alloy casting (Si13%)		Magnesium alloy · Copper alloys	
	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
3	21,000	1,100	21,000	1,100	7,950	325
4	15,500	1,250	15,500	1,250	5,950	365
5	12,500	1,300	12,500	1,275	4,750	385
6	10,500	1,400	10,500	1,400	3,950	400
8	7,950	1,500	7,950	1,500	2,950	460
10	6,350	1,700	6,350	1,700	2,350	475
12	5,300	1,750	5,300	1,750	1,950	510
16	3,950	1,750	3,950	1,750	1,450	510
20	3,150	1,750	3,150	1,750	1,150	510

Application tip

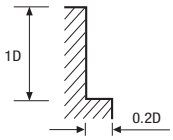


WAR503

Side cutting , High speed cutting

Workpiece / Conditions / Diameter(Ø)	Aluminium alloy (A7075)		Aluminum alloy casting (Si13%)		Magnesium alloy · Copper alloys	
	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
3	40,000	2,100	24,000	1,250	17,000	625
4	32,000	2,250	19,200	1,550	14,300	800
5	32,000	3,250	19,200	1,950	12,700	925
6	26,500	3,500	15,900	2,150	10,600	960
8	20,000	3,750	12,000	2,250	8,000	1,130
10	16,000	4,300	9,600	2,580	6,350	1,150
12	13,300	4,400	8,000	2,650	5,300	1,250
16	10,000	4,400	6,000	2,650	4,000	1,250
20	8,000	4,400	4,800	2,650	3,200	1,250

Application tip



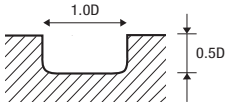
A-Star Endmill

WAR503

Slotting, General Cutting

Workpiece / Conditions / Diameter(Ø)	Aluminium alloy (A7075)		Aluminum alloy casting (Si13%)		Magnesium alloy · Copper alloys	
	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
3	21,000	770	2,100	770	7,950	325
4	15,500	810	15,500	810	5,950	375
5	12,500	860	12,500	860	4,750	385
6	10,500	950	10,500	950	3,950	400
8	8,000	1,000	8,000	1,000	2,950	460
10	6,350	1,150	6,350	1,150	2,350	475
12	5,300	1,200	5,300	1,200	1,950	510
16	3,950	1,200	3,950	1,200	1,450	510
20	3,150	1,200	3,150	1,200	1,150	510

Application tip

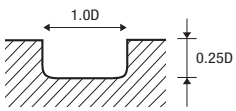


WAR503

Slotting, High speed cutting

Workpiece / Conditions / Diameter(Ø)	Aluminium alloy (A7075)		Aluminum alloy casting (Si13%)	
	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
3	40,000	1,450	24,000	880
4	32,000	1,700	19,200	1,000
5	32,000	2,200	19,200	1,350
6	26,500	2,400	15,900	1,450
8	20,000	2,500	12,000	1,500
10	16,000	2,800	9,600	1,700
12	13,300	2,950	8,000	1,800
16	10,000	3,000	6,000	1,800
20	8,000	3,000	4,800	1,800

Application tip

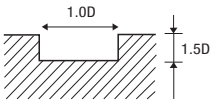


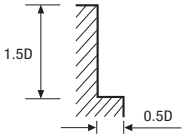
WAF303

Slotting

Workpiece / Conditions / Diameter (Ø)	aluminium, nonferrous metals			
	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
6	10,500	800	13,500	1,050
8	8,000	700	10,500	900
10	6,500	750	8,500	950
12	5,250	800	6,800	1,050
16	4,000	800	5,200	1,050
20	3,200	800	4,200	1,050

Application tip



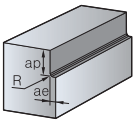


D Endmill

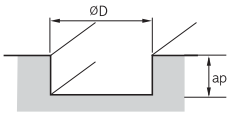
Flat type

Tool	DFE2000 (Slotting)		DFE2000 (Shouldering)		DFE4000 (Shouldering)	
Workpiece	Graphite					
Conditions / Diameter(Ø)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
1.0	40,000	500	40,000	700	-	-
2.0	25,000	570	25,000	800	25,000	1,600
3.0	20,000	570	20,000	800	20,000	1,600
4.0	18,000	680	18,000	950	18,000	1,900
5.0	14,000	960	14,000	1,200	14,000	2,400
6.0	11,000	1,000	11,000	1,400	11,000	2,800
8.0	8,000	930	8,000	1,300	8,000	2,600
10.0	6,500	860	6,500	1,200	6,500	2,400
12.0	5,500	860	5,500	1,200	5,500	2,400

Application tip



- D ≤ ∅2.5, ap = 1.5D, ae = 0.05D
- D > ∅2.5, ap = 1.5D, ae = 0.1D



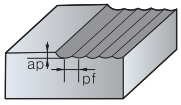
- D ≤ ∅2.5, ap = 0.3D
- D > ∅2.5, ap = 0.5D

※ Workpiece should be clamped rigidly. In case of vibrations, reduce RPM and feed rate by the same ratio

Ball type

Tool	DBE2000		DBE4000	
Workpiece	Graphite			
Conditions / Diameter(Ø)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
1.0	16,000	400	-	-
2.0	16,000	800	16,000	1,200
3.0	16,000	1,450	16,000	2,000
4.0	16,000	2,100	16,000	3,100
5.0	15,500	2,550	15,000	3,800
6.0	15,000	2,950	15,000	4,400
8.0	13,000	3,000	13,000	4,500
10.0	11,500	3,000	12,000	4,600
12.0	10,700	3,200	10,000	4,700

Application tip



- ap = 0.2D
- pf = 0.2D

※ Workpiece should be clamped rigidly. In case of vibrations, reduce RPM and feed rate by the same ratio

Notice

- Cutting conditions are up to the machine's condition and the shape of cutting
- Workpiece should be clamped rigidly. In case of vibrations, reduce RPM and feed rate by the same ratio
- When the overhang is longer than 3D, reduce RPM and feed rate

T Endmill

Titanium/Co-Cr

Diameter (Ø)	Application	ap (mm)	ae (mm)	R.P.M n (min⁻¹)	Feed vf (mm/min)
3.0	Roughing	0.12	0.7	10,500	1,150
2.5	Medium	0.08	0.53	11,500	850
2.0	Medium	0.08	0.42	14,500	850
1.5	Finishing	0.04	0.32	19,000	850
1.0	Finishing	0.02	0.07	28,500	850
0.6	Finishing	0.02	0.07	28,500	850

Zirconia

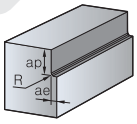
Diameter (Ø)	Application	ap (mm)	ae (mm)	R.P.M n (min⁻¹)	Feed vf (mm/min)
3.0	Roughing	0.5	1.5	23,500	1,600
2.5	Medium	0.3	1.25	28,000	1,200
2.0	Finishing	0.3	1.0	35,000	1,200
1.0	Finishing	0.1	0.2	38,500	1,050
0.6	Finishing	0.1	0.2	63,500	630

M+ Endmill

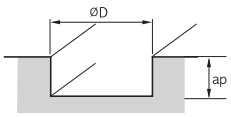
Shouldering & Slotting

Workpiece / Conditions / Diameter(Ø)	Carbon steels, Alloy steels (AISI1049, Cast iron, S50C, SCM) under HRC30			Alloy steels, High Tool Steels (Pre-hardened steels, STD61, NAK) HRC30~45			Austenitic stainless Steels (AISI304, AISI31G, SUS304, SUS316)			Hardened Steels (SKD61, SKD11, NAK, STAVAX) HRC45~50		
	R.P.M n (min⁻¹)	Feed (mm/min)		R.P.M n (min⁻¹)	Feed (mm/min)		R.P.M n (min⁻¹)	Feed (mm/min)		R.P.M n (min⁻¹)	Feed (mm/min)	
		Shouldering	Slotting		Shouldering	Slotting		Shouldering	Slotting		Shouldering	Slotting
3.0	9,500	500	350	6,400	130	100	5,800	110	66	2,100	55	44
4.0	7,200	580	410	4,800	220	180	4,400	180	110	1,600	67	54
5.0	6,000	600	420	3,600	230	180	3,500	190	110	1,300	70	56
6.0	4,800	720	500	3,200	240	190	2,900	210	130	1,100	75	60
8.0	3,600	720	500	2,400	240	190	2,200	220	130	800	65	50
10.0	2,900	730	510	1,900	190	150	1,800	190	110	600	65	50
12.0	2,400	650	460	1,600	160	130	1,500	150	90	500	65	50
16.0	1,800	610	430	1,200	240	190	1,100	220	130	400	65	50
20.0	1,400	560	390	1,000	190	150	900	190	110	300	65	50

Application tip



■ **Shouldering depth(ap) and radial depth(ae)**
- ap : ≤ 1.5D
- ae : ≤ 0.1D



■ **Slotting depth(ap)**
- ap : ≤ 0.05D (D ≤ Ø2)
  ≤ 0.1D (D > Ø2)

Ramping, Helix

Workpiece / Ramping Max. angle / Conditions / Diameter(Ø)	Carbon steels, Alloy steels (AISI1049, Cast iron, S50C, SCM) under HRC30		Alloy steels, High Tool Steels (Pre-hardened steels, STD61, NAK) HRC30~45		Austenitic stainless Steels (AISI304, AISI31G, SUS304, SUS316)		Hardened Steels (SKD61, SKD11, NAK, STAVAX) HRC45~50	
Ramping Max. angle	30°		20°		5°		5°	
	R.P.M n (min⁻¹)	Feed(mm/min) Slotting	R.P.M n (min⁻¹)	Feed(mm/min) Slotting	R.P.M n (min⁻¹)	Feed(mm/min) Slotting	R.P.M n (min⁻¹)	Feed(mm/min) Slotting
3.0	9,500	315	6,400	90	5,800	60	2,100	40
4.0	7,200	369	4,800	160	4,400	100	1,600	50
5.0	6,000	378	3,600	160	3,500	100	1,300	50
6.0	4,800	450	3,200	170	2,900	120	1,100	55
8.0	3,600	450	2,400	170	2,200	120	800	45
10.0	2,900	459	1,900	140	1,800	100	600	45
12.0	2,400	414	1,600	120	1,500	80	500	45
16.0	1,800	387	1,200	170	1,100	120	400	45
20.0	1,400	351	1,000	140	900	100	300	45

Drilling

Workpiece / Conditions / Diameter(Ø)	Carbon steels, Alloy steels (AISI1049, Cast iron, S50C, SCM) under HRC30		Alloy steels, High Tool Steels (Pre-hardened steels, STD61, NAK) HRC30~45		Cast iron (Grey cast iron, Graphite cast iron)	
	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)	R.P.M n (min⁻¹)	Feed vf (mm/min)
3.0	9,500	280	6,400	80	5,700	320
4.0	7,200	330	4,800	140	4,320	240
5.0	6,000	340	3,600	140	3,600	200
6.0	4,800	400	3,200	150	2,880	160
8.0	3,600	400	2,400	150	2,160	120
10.0	2,900	410	1,900	120	1,740	100
12.0	2,400	370	1,600	100	1,440	80
16.0	1,800	340	1,200	150	1,080	60
20.0	1,400	310	1,000	120	840	50

PCD Endmill

Workpiece	vc (m/min)	n (min⁻¹)	fz (mm/t)
Aluminum Alloy, Copper	30~300	2,000~12,000	0.02~0.07
Reinforced Plastic	35~300	2,800~16,000	0.04~0.12
Carbon steel, Graphite	10~100	5,300~16,000	0.04~0.2

MSD Plus

Workpiece				Grade	vc (m/min)	Depth of cut = 10D~25D Feed rate (mm/rev) per drill dia. (mm)				
ISO		Workpiece	HB			Ø1.0~Ø4.0	Ø4.1~Ø8.0	Ø8.1~Ø12.0	Ø12.1~Ø16.0	Ø16.1~Ø20.0
P	Carbon steel	Low carbon steel	80~120	PC325U	90 (80~150)	0.10~0.15	0.16~0.24	0.20~0.30	0.25~0.36	0.30~0.40
		High carbon steel	Over 250	PC325U	50 (40~80)	0.08~0.20	0.08~0.20	0.10~0.25	0.15~0.25	0.15~0.30
	Alloy steel	Low alloy steel	140~260	PC325U	90 (80~150)	0.10~0.15	0.16~0.24	0.20~0.30	0.25~0.36	0.30~0.40
		Hardened low alloy steel	200~400	PC325U	60 (50~100)	0.10~0.15	0.16~0.24	0.20~0.30	0.25~0.36	0.30~0.40
		High alloy steel	50~260	PC325U	50 (40~80)	0.08~0.20	0.08~0.20	0.10~0.25	0.15~0.25	0.15~0.30
		Hardened high alloy steel	over 250	PC325U	50 (40~80)	0.08~0.20	0.08~0.20	0.10~0.25	0.15~0.25	0.15~0.30
M	Stainless steel	Austenite series	135~275	PC325U	45 (25~80)	0.05~0.20	0.05~0.20	0.10~0.25	0.10~0.25	0.15~0.30
		Ferrite series Martensite series	135~275	PC325U	50 (30~80)	0.05~0.20	0.05~0.20	0.10~0.25	0.10~0.25	0.15~0.30
K	Cast iron	Gray cast iron	150~230	PC325U	100 (80~150)	0.10~0.15	0.16~0.24	0.20~0.30	0.25~0.36	0.30~0.40
		Ductile cast iron	160~260	PC325U	90 (70~140)	0.10~0.15	0.16~0.24	0.20~0.30	0.25~0.36	0.30~0.40
N	Aluminum	Aluminum alloy	30~150	FG2	150 (125~220)	0.24~0.38	0.38~0.53	0.53~0.75	0.61~0.85	0.68~0.98
	Copper alloy	Copper alloy	150~160	FG2	150 (125~220)	0.10~0.15	0.16~0.24	0.20~0.30	0.25~0.36	0.30~0.40

- Cutting conditions above are for the case of less than 5D depth of cut and through coolant system applied
- In case of external coolant system, reduce the above feed values by 20%

MSD Plus-S

Workpiece			HB	Grade	vc (m/min)	Depth of cut = 3D~5D Feed rate (mm/rev) per drill dia. (mm)			
ISO		Workpiece				Ø2.5~Ø5.0	Ø5.1~Ø8.0	Ø8.1~Ø12.0	Ø12.1~Ø16.0
S	Heat resistant alloy	Fe-base	25~35	PC325T	25~30	0.055~0.07	0.07~0.10	0.08~0.13	0.10~0.15
		Ni or Co base	35~45	PC325T	20~25	0.045~0.06	0.06~0.09	0.07~0.12	0.09~0.14
	Titanium	Pure titanium	10~15	PC325T	40~50	0.07~0.11	0.09~0.14	0.12~0.18	0.16~0.23
		α and β alloys	35~45	PC325T	30~40	0.05~0.09	0.07~0.12	0.10~0.16	0.14~0.21

- Cutting conditions above are for the case of less than 5D depth of cut and through coolant system applied.

MLD Plus

Workpiece				Grade	vc (m/min)	Depth of cut = 10D~25D		
						Feed rate (mm/rev) per drill dia. (mm)		
ISO		Workpiece	HB	Recommended		Ø3.0~Ø5.0	Ø5.1~Ø8.0	Ø8.1~Ø10.0
P	Carbon steel	Low carbon steel	80~120	PC315G	80 (60~90)	0.10~0.15	0.15~0.20	0.20~0.25
		High carbon steel	180~280	PC315G	70 (60~80)	0.10~0.15	0.15~0.20	0.20~0.25
	Alloy steel	Low alloy steel	140~260	PC215G	80 (60~90)	0.10~0.15	0.12~0.17	0.15~0.20
		Low carbon steel	50-260	PC215G	70 (60~80)	0.08~0.15	0.10~0.15	0.15~0.20
K	Cast iron	Gray cast iron	150-230	PC215G	80 (60~100)	0.10~0.20	0.15~0.20	0.15~0.20
		Ductile cast iron	160-260	PC215G	70 (60~80)	0.10~0.20	0.15~0.20	0.15~0.20
N	Aluminum	Aluminum alloy	30-150	FG2	120 (100~150)	0.12~0.17	0.15~0.20	0.20~0.25
	Copper lloy	Copper alloy	150-160	FG2	120 (100~150)	0.12~0.17	0.15~0.20	0.20~0.25

MSD Plus CFRP

Workpiece	Grade	vc (m/min)	Depth of cut = 5D		
			Feed rate (mm/rev) per drill dia. (mm)		
			Ø2.5~Ø4.0	Ø4.1~Ø8.0	Ø8.1~Ø12.0
CFRP	ND2100	100 (100~150)	0.03 ~ 0.07	0.03 ~ 0.07	0.03 ~ 0.07

MSFD

Workpiece				Grade	Cutting speed, vc (m/min)	Feed (Depth of cut = 2D~3D)		
						Feed rate (mm/rev) per drill dia. (mm)		
ISO		Workpiece	HB	Recommended		Ø2.5~Ø4.0	Ø4.1~Ø8.0	Ø8.1~Ø12.0
P	Carbon steel	Low carbon steel	80~120	PC325U	75 (60~90)	0.03~0.10	0.05~0.15	0.10~0.20
		High carbon steel	180~280	PC325U	75 (60~80)	0.03~0.10	0.05~0.15	0.10~0.20
	Alloy steel	Low alloy steel	140~260	PC325U	65 (50~80)	0.03~0.10	0.05~0.15	0.10~0.20
		High alloy steel	50~260	PC325U	65 (50~80)	0.03~0.10	0.05~0.15	0.10~0.20

P-Star Drill

HPI503, 505, 508, HP503

Workpiece / Solidity / Conditions / Diameter(Ø)	Non-Alloyed steel		Alloy steels		Gray cast iron		Gray cast iron	
	< 700N/mm²		< 1000N/mm²		< HB240, GG25		< HB300, GG40	
	R.P.M n (min⁻¹)	Feed fn (mm/rev)	R.P.M n (min⁻¹)	Feed fn (mm/rev)	R.P.M n (min⁻¹)	Feed fn (mm/rev)	R.P.M n (min⁻¹)	Feed fn (mm/rev)
1	16,250	0.05	14,800	0.05	26,600	0.05	17,300	0.05
2	16,250	0.07	14,800	0.07	26,600	0.07	17,300	0.07
3	16,000	0.16	14,500	0.16	26,000	0.16	17,000	0.16
4	12,000	0.17	11,000	0.17	20,000	0.17	13,000	0.17
5	9,550	0.18	8,600	0.18	16,000	0.18	10,000	0.18
6	8,000	0.2	7,200	0.2	13,000	0.2	8,500	0.2
7	6,800	0.22	6,100	0.22	11,500	0.22	7,300	0.22
8	6,000	0.24	5,400	0.24	9,900	0.24	6,400	0.24
9	5,300	0.27	4,800	0.27	8,800	0.27	5,700	0.27
10	4,800	0.3	4,300	0.3	8,000	0.3	5,100	0.3
12	4,000	0.33	3,600	0.33	6,600	0.33	4,250	0.33
14	3,400	0.36	3,050	0.36	5,700	0.36	3,650	0.36
16	3,000	0.39	2,700	0.39	5,000	0.39	3,200	0.39
18	2,650	0.42	2,400	0.42	4,400	0.42	2,850	0.42
20	2,400	0.45	2,150	0.45	4,000	0.45	2,550	0.45

※ Apply to the feed rate for each product as follows.
HPI503(3×D): Feed 100%
HPI505(5×D): Feed 90%
HPI508(8×D): Feed 70~80%

PF50, P50, HP50 Series

Workpiece / V / Conditions / Diameter (Ø)	Carbon steels (C<0.3%) Alloy steels/SS400 SCM~710N/mm²		Carbon steels (C≥0.3%) Alloy steels/S50C SCM~1.060N/mm²		SUJ2· SUS440		SKD61 HRC34~43		HRC43~48		SKD11 HRC48~53		Cast iron FC 250~350		Ductile FC 400~500	
Conditions	80~125m/min		80~125m/min		63~80m/min		40~63m/min		32~45m/min		25~36m/min		80~125m/min		63~90m/min	
	R.P.M n (min⁻¹)	Feed fn (mm/rev)	R.P.M n (min⁻¹)	Feed fn (mm/rev)	R.P.M n (min⁻¹)	Feed fn (mm/rev)	R.P.M n (min⁻¹)	Feed fn (mm/rev)	R.P.M n (min⁻¹)	Feed fn (mm/rev)	R.P.M n (min⁻¹)	Feed fn (mm/rev)	R.P.M n (min⁻¹)	Feed fn (mm/rev)	R.P.M n (min⁻¹)	Feed fn (mm/rev)
2	12,000	0.06~0.08	12,000	0.06~0.08	11,000	0.06~0.08	8,000	0.06~0.08	6,000	0.05~0.07	4,500	0.03~0.06	15,000	0.06~0.08	11,000	0.06~0.08
3	9,600	0.09~0.12	9,600	0.09~0.12	7,500	0.09~0.12	5,300	0.09~0.12	4,000	0.07~0.11	3,200	0.05~0.09	10,000	0.09~0.12	7,600	0.09~0.12
4	8,000	0.10~0.15	8,000	0.10~0.15	5,650	0.10~0.15	4,000	0.10~0.15	3,000	0.08~0.13	2,600	0.06~0.10	8,000	0.10~0.15	6,000	0.10~0.15
5	6,400	0.12~0.18	6,400	0.12~0.18	4,550	0.12~0.18	3,300	0.12~0.18	2,400	0.10~0.15	2,000	0.8~0.12	6,400	0.12~0.18	4,800	0.12~0.18
6	5,300	0.14~0.20	5,300	0.14~0.20	3,800	0.14~0.20	2,750	0.14~0.20	2,000	0.12~0.18	1,700	0.09~0.15	5,300	0.14~0.20	4,000	0.14~0.20
8	4,000	0.16~0.24	4,000	0.16~0.24	2,850	0.16~0.24	2,100	0.16~0.24	1,500	0.14~0.22	1,300	0.12~0.20	4,000	0.16~0.24	3,000	0.16~0.24
10	3,200	0.18~0.27	3,200	0.18~0.27	2,250	0.18~0.27	1,700	0.18~0.27	1,200	0.15~0.25	1,000	0.13~0.23	3,200	0.18~0.27	2,400	0.18~0.27
12	2,650	0.20~0.30	2,650	0.20~0.30	1,900	0.20~0.30	1,400	0.20~0.30	1,000	0.17~0.26	850	0.14~0.24	2,700	0.20~0.30	2,000	0.20~0.30
14	2,300	0.22~0.35	2,300	0.22~0.35	1,600	0.22~0.35	1,200	0.22~0.35	860	0.18~0.30	730	0.15~0.26	2,300	0.22~0.35	1,700	0.22~0.35
16	2,000	0.25~0.36	2,000	0.25~0.36	1,400	0.25~0.36	1,050	0.25~0.36	760	0.20~0.32	640	0.16~0.26	2,000	0.25~0.36	1,500	0.25~0.36
18	1,800	0.28~0.38	1,800	0.28~0.38	1,250	0.28~0.38	920	0.28~0.38	670	0.23~0.33	570	0.18~0.28	1,800	0.28~0.38	1,350	0.28~0.38
20	1,600	0.30~0.40	1,600	0.30~0.40	1,150	0.30~0.40	850	0.30~0.40	600	0.25~0.35	500	0.20~0.30	1,600	0.30~0.40	1,200	0.30~0.40

SF503, SF505, SF508, PI503, PI505 Series

Workpiece / V / Conditions / Diameter (Ø)	Carbon steels (C<0.3%) Alloy steels/SS400 SCM~710N/mm²		Carbon steels (C≥0.3%) Alloy steels/S50C SCM~1.060N/mm²		SUJ2· SUS440		SKD61 HRC34~43		HRC43~48		SKD11 HRC48~53		Cast iron FC 250~350		Ductile FC 400~500	
Conditions	80~125m/min		80~125m/min		63~80m/min		40~63m/min		32~45m/min		25~36m/min		80~125m/min		63~90m/min	
	R.P.M n (min⁻¹)	Feed fn (mm/rev)	R.P.M n (min⁻¹)	Feed fn (mm/rev)	R.P.M n (min⁻¹)	Feed fn (mm/rev)	R.P.M n (min⁻¹)	Feed fn (mm/rev)	R.P.M n (min⁻¹)	Feed fn (mm/rev)	R.P.M n (min⁻¹)	Feed fn (mm/rev)	R.P.M n (min⁻¹)	Feed fn (mm/rev)	R.P.M n (min⁻¹)	Feed fn (mm/rev)
3	13,000	0.09~0.12	12,000	0.09~0.12	7,600	0.09~0.12	6,400	0.09~0.12	5,300	0.07~0.11	3,800	0.05~0.09	12,000	0.09~0.12	8,500	0.09~0.12
4	10,000	0.1~0.15	9,500	0.1~0.15	5,700	0.1~0.15	4,800	0.1~0.15	4,000	0.08~0.13	2,950	0.06~0.1	9,000	0.1~0.15	6,350	0.1~0.15
5	8,000	0.12~0.18	7,600	0.12~0.18	4,600	0.12~0.18	3,800	0.12~0.18	3,200	0.1~0.15	2,300	0.08~0.12	7,600	0.12~0.18	5,100	0.12~0.18
6	6,600	0.14~0.20	6,400	0.14~0.20	3,800	0.14~0.20	3,200	0.14~0.20	2,650	0.12~0.18	1,900	0.09~0.15	6,400	0.14~0.20	4,250	0.14~0.20
8	5,000	0.16~0.24	4,800	0.16~0.24	2,900	0.16~0.24	2,400	0.16~0.24	2,000	0.14~0.22	1,450	0.12~0.2	4,800	0.16~0.24	3,200	0.16~0.24
10	4,000	0.18~0.27	3,800	0.18~0.27	2,300	0.18~0.27	1,900	0.18~0.27	1,600	0.15~0.25	1,150	0.13~0.23	3,800	0.18~0.27	2,550	0.18~0.27
12	3,300	0.20~0.30	3,200	0.20~0.30	1,900	0.20~0.30	1,600	0.20~0.30	1,300	0.17~0.26	950	0.14~0.24	3,200	0.20~0.30	2,100	0.20~0.30
14	2,800	0.22~0.35	2,700	0.22~0.35	1,600	0.22~0.35	1,350	0.22~0.35	1,150	0.18~0.3	800	0.15~0.26	2,700	0.22~0.35	1,800	0.22~0.35
16	2,500	0.25~0.36	2,400	0.25~0.36	1,400	0.25~0.36	1,200	0.25~0.36	1,000	0.2~0.32	700	0.16~0.26	2,400	0.25~0.36	1,600	0.25~0.36
18	2,200	0.28~0.38	2,100	0.28~0.38	1,300	0.28~0.38	1,100	0.28~0.38	900	0.23~0.33	650	0.18~0.28	2,100	0.28~0.38	1,400	0.28~0.38
20	2,000	0.30~0.40	1,900	0.30~0.40	1,150	0.30~0.40	1,000	0.30~0.40	800	0.25~0.35	600	0.2~0.3	1,900	0.30~0.40	1,250	0.30~0.40

- SF503(3×D): fn 100%
- SF505(5×D): fn 90%
- SF508(8×D): fn 70~80%

W-Star Drill

NDPG Series

Workpiece / V / Conditions / Mill Dia (mm)	Carbon steels (C<0.3%) Alloy steels/SS400 SCM~710N/mm²		Carbon steels (C>0.3%) Alloy steels/S50C SCM~1.060N/mm²		Grey cast iron < HB240		Grey cast iron < HB350		Stainless steels	
	80~120m/min		80~120m/min		120~200m/min		80~130m/min		40~45m/min	
	R.P.M n (min⁻¹)	Feed fn (mm/rev)	R.P.M n (min⁻¹)	Feed fn (mm/rev)	R.P.M n (min⁻¹)	Feed fn (mm/rev)	R.P.M n (min⁻¹)	Feed fn (mm/rev)	R.P.M n (min⁻¹)	Feed fn (mm/rev)
1	13,000	0.04	13,000	0.04	21,300	0.04	14,200	0.04	7,160	0.03
2	13,000	0.06	13,000	0.06	21,300	0.06	14,200	0.06	7,160	0.04
3	13,000	0.13	13,000	0.13	21,000	0.13	14,000	0.13	4,780	0.07
4	9,500	0.14	9,500	0.14	16,000	0.14	10,500	0.14	3,600	0.08
5	7,600	0.15	7,600	0.15	13,000	0.15	8,300	0.15	2,850	0.09
6	6,400	0.17	6,400	0.17	11,000	0.17	6,900	0.17	2,400	0.1
8	4,800	0.21	4,800	0.21	8,000	0.21	5,200	0.21	1,800	0.12
10	3,800	0.25	3,800	0.25	6,400	0.25	4,150	0.25	1,450	0.15
12	3,200	0.27	3,200	0.27	5,300	0.27	3,450	0.27	1,200	0.17
14	2,750	0.29	2,750	0.29	4,550	0.29	3,000	0.29	1,000	0.19
16	2,400	0.31	2,400	0.31	4,000	0.31	2,600	0.31	900	0.21
18	2,100	0.33	2,100	0.33	3,550	0.33	2,300	0.33	800	0.23
20	1,900	0.35	1,900	0.35	3,200	0.35	2,100	0.35	700	0.25

※ NDPG507: Use 85% to the above condition

SSD-N

SSD-N

Workpiece / Conditions / Diameter (Ø)	Tool steels, Alloy steels		Aluminium, Aluminium alloy		Brass, Bronze		Epoxy, Resin	
	R.P.M n (min⁻¹)	Feed fn (mm/rev)	R.P.M n (min⁻¹)	Feed fn (mm/rev)	R.P.M n (min⁻¹)	Feed fn (mm/rev)	R.P.M n (min⁻¹)	Feed fn (mm/rev)
3	4,000~7,000	0.02	10,000~12,000	0.03	7,000~10,000	0.02	9,000~12,000	0.08
5	2,400~4,200	0.03	6,000~8,000	0.05	4,200~6,000	0.04	5,400~7,200	0.08
8	1,500~2,600	0.05	3,700~5,000	0.08	2,600~3,700	0.08	3,400~4,500	0.09
12	1,000~1,700	0.06	2,500~3,200	0.12	1,700~2,500	0.12	2,200~3,000	0.11

Workpiece				Grade	vc (m/min)	Feed rate (mm/rev) per drill dia. (mm)			
ISO		Workpiece	HB			Ø2.5~Ø4.0	Ø4.1~Ø8.0	Ø8.1~Ø12.0	Ø12.1~Ø15.0
P	Carbon steel	Low carbon steel	80~120	Carbide	35 (20~65)	0.02~0.06	0.04~0.08	0.06~0.12	0.10~0.16
N	Aluminum	Aluminum alloy	30-150		100 (94~120)	0.03~0.06	0.05~0.08	0.08~0.12	0.12~0.18
	Copper alloy	Copper alloy	150-160		80 (65~95)	0.03~0.06	0.05~0.08	0.08~0.12	0.12~0.18

Burnishing Drill

Workpiece	Cutting speed vc (m/min)	Feed rate (mm/rev) per drill dia. (mm)				
		Ø2.0~3.0	Ø3.5~5.0	Ø5.5~8.0	Ø8.5~12.0	Ø12.5~18.0
Aluminum alloy, Copper alloy	30~60	0.02~0.05	0.03~0.10	0.04~0.15	0.05~0.20	0.05~0.30
Aluminum alloy for die castings	50~80	0.02~0.05	0.03~0.10	0.04~0.15	0.05~0.20	0.05~0.30
Cast iron (GC) Ductile cast	25~60	0.01~0.04	0.02~0.08	0.05~0.12	0.05~0.20	0.05~0.30
Iron (GCD)	20~50	0.01~0.03	0.02~0.05	0.03~0.08	0.04~0.12	0.05~0.15

Top Solid Drill

Diameter	Cutting condition	Ductile cast iron	Gray cast iron	Soft steel
Ø8.0~Ø10.0	vc (m/min)	30 (20~35)	40 (20~60)	100 (50~150)
	fn (mm/rev)	0.30 (0.20~0.40)	0.30 (0.20~0.40)	0.15 (0.10~0.20)
Ø10.1~Ø15.0	vc (m/min)	50 (30~70)	60 (30~80)	130 (70~200)
	fn (mm/rev)	0.35 (0.30~0.40)	0.35 (0.30~0.40)	0.15 (0.10~0.20)
Ø15.1~Ø25.0	vc (m/min)	60 (50~60)	75 (50~100)	150 (100~250)
	fn (mm/rev)	0.35 (0.30~0.45)	0.40 (0.30~0.50)	0.15 (0.10~0.20)

PCD Drill

Workpiece	vc (m/min)	fn (mm/rev)
CFRP	50~250	0.075 (0.05~0.25)
Aluminum alloy		0.050 (0.03~0.20)
Counter sink section		0.040 (0.02~0.15)

Gun Drill

Workpiece	Hardness (HB)	Cutting speed vc (m/min)	Feed rate (mm/rev) per drill dia. (mm)					
			~Ø4	~Ø6	~Ø10	~Ø14	~Ø24	Ø25~
Carbon steel Alloy steel	~150	100~150	0.005~0.015	0.010~0.025	0.015~0.035	0.020~0.050	0.030~0.070	0.040~0.080
	150~250	80~120	0.005~0.010	0.010~0.020	0.015~0.030	0.020~0.040	0.030~0.060	0.030~0.060
	250~350	50~100	0.005~0.010	0.005~0.010	0.010~0.020	0.015~0.030	0.020~0.040	0.020~0.040
	350~	~30	-	0.005~0.010	0.005~0.010	0.010~0.020	0.020~0.035	0.020~0.035
Stainless steel	~250	50~80	0.005~0.015	0.010~0.020	0.010~0.020	0.010~0.030	0.020~0.035	0.020~0.040
	250~350	40~50	-	0.005~0.015	0.010~0.015	0.010~0.020	0.010~0.020	0.010~0.020
Cast iron	~220	80~100	0.010~0.0120	0.020~0.040	0.030~0.050	0.040~0.080	0.080~0.120	0.100~0.150
	220~	40~80	0.005~0.010	0.005~0.015	0.010~0.020	0.015~0.030	0.020~0.050	0.025~0.070
Aluminum alloy	-	180~250	0.010~0.020	0.020~0.040	0.030~0.060	0.040~0.080	0.100~0.180	0.150~0.200
Light alloy	-	120~200	0.005~0.010	0.010~0.020	0.020~0.025	0.020~0.030	0.030~0.040	0.040~0.060

PCD Reamer

For high speed and high precision machining

Workpiece	vc (m/min)	fn (mm/rev)
Aluminum alloy	50 ~ 250	0.05~0.20

Cermet Reamer

Workpiece	Hardness	fz (mm/t)	vc (m/min)
Carbon steel	Under HRC30	0.1~0.4	50~80
High carbon steel, Alloy steel	HRC30 ~ 40	0.1~0.4	80~120
	HRC40 ~ 50	0.1~0.4	50~80
Alloy steel	More than HRC50	0.05~0.2	30~60

Counter Sink

CSPC

Diameter (Ø)	Alloy steels & carbon steels under HRC30		Pre-hardened steels HRC30~45		Stainless Steels HRC30~50		Hardened steels HRC45~55		Aluminum alloy	
	R.P.M n (min⁻¹)	Feed (mm/min)	R.P.M n (min⁻¹)	Feed (mm/min)	R.P.M n (min⁻¹)	Feed (mm/min)	R.P.M n (min⁻¹)	Feed (mm/min)	R.P.M n (min⁻¹)	Feed (mm/min)
6.0	3,030	1,550	1,820	600	1,520	500	1,350	240	7,580	3,870
8.0	2,300	1,520	1,370	580	1,150	480	1,015	270	5,750	3,800
10.0	1,840	1,490	1,100	590	920	500	810	270	4,590	3,720
12.0	1,540	1,480	930	610	780	510	690	270	3,850	3,700
16.0	1,150	1,310	690	520	570	460	505	260	2,890	3,470

CSNC/CSHC

1F(Hole) Type

Diameter (Ø)	Alloy steels & carbon steels under HRC30		Pre-hardened steels HRC30~45		Stainless Steels		Aluminum alloy	
	vc (m/min)	Feed (mm/min)	vc (m/min)	Feed (mm/min)	vc (m/min)	Feed (mm/min)	vc (m/min)	Feed (mm/min)
~ 10.0	42~72	121	28~48	120	15~17	50	50~110	350
10.0 ~ 20.0		110		70		25		230
20.0 ~ 30.0		75		50		20		200

CSNC

3F Type

Diameter (Ø)	Alloy steels & carbon steels under HRC30		Pre-hardened steels HRC30~45		Stainless Steels		Aluminum alloy	
	vc (m/min)	Feed (mm/min)	vc (m/min)	Feed (mm/min)	vc (m/min)	Feed (mm/min)	vc (m/min)	Feed (mm/min)
~ 10.0	30~60	170	20~40	100	10~12	30	40~100	350
10.0 ~ 20.0		85		60		16		230
20.0 ~ 30.0		60		40		10		200

CSPH

Diameter (Ø)	Alloy steels & carbon steels under HRC30		Pre-hardened steels HRC30~45		Stainless Steels HRC30~50		Hardened steels HRC45~55		Aluminum alloy	
	R.P.M n (min⁻¹)	Feed (mm/min)	R.P.M n (min⁻¹)	Feed (mm/min)	R.P.M n (min⁻¹)	Feed (mm/min)	R.P.M n (min⁻¹)	Feed (mm/min)	R.P.M n (min⁻¹)	Feed (mm/min)
6.3	1,328	230	1,970	350	905	160	807	140	5,760	1,040
8.3	995	230	1,490	360	690	160	610	140	4,370	1,050
10.4	792	230	1,190	360	550	160	487	130	3,485	940
12.4	665	230	1,000	360	460	150	407	130	2,920	960
16.5	500	230	750	360	345	160	307	140	2,200	990
20.5	402	230	600	360	276	160	247	140	1,770	1,010

CSNH/CSHH

1F(Hole) Type

Diameter (ø)	Alloy steels & carbon steels under HRC30		Pre-hardened steels HRC30~45		Stainless Steels		Aluminum alloy	
	vc (m/min)	Feed (mm/min)	vc (m/min)	Feed (mm/min)	vc (m/min)	Feed (mm/min)	vc (m/min)	Feed (mm/min)
~ 10.0	20-30	110	16-20	55	50-60	255	50-100	450
10.0 ~ 20.0		55		35		180		350
20.0 ~ 30.0		35		55		150		300

CSNH

3F Type

Diameter (ø)	Alloy steels & carbon steels under HRC30		Pre-hardened steels HRC30~45		Stainless Steels		Aluminum alloy		Plastic	
	vc (m/min)	Feed (mm/min)	vc (m/min)	Feed (mm/min)	vc (m/min)	Feed (mm/min)	vc (m/min)	Feed (mm/min)	vc (m/min)	Feed (mm/min)
~ 10.0	10~15	60	8~12	35	4~6	30	50~60	255	35~70	400
10.0 ~ 20.0		30		25		16		180		300
20.0 ~ 30.0		20		15		10		150		250

⚠ For the safe metalcutting

- Use safety supplies such as protective gloves to prevent possible injury while touching the edge of tools.
- Use safety glasess or safety cover to hedge possible dangers. Inappropriate usage or excessive cutting condition may lead tool's breakage or even the fragment's scattering.
- Clamp the workpiece tightly enough to prevent its movement while its machining.
- Properly manage the tool change phase because the inordinately used tool can be easily broken under the excessive cutting load or severe wear, and it may threat the operator's safety.
- Use safety cover because chips evacuated during cutting are hot and sharp and may cause burns and cuts. To remove chips safely, stop machining, put on protective gloves, and use a hook or other tools.
- Prepare for fire prevention measures as the use of the non-water soluble cutting oil may cause fire.
- Use safety cover and other safety supplies because the spare parts or the inserts can be pulled out due to centrifugal force while high speed machining.

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