

Technical Information **KORLOY**

SOLID TOOLS SOLUTION

Technical
information for

Endmill



Drill



Threading



Reamer



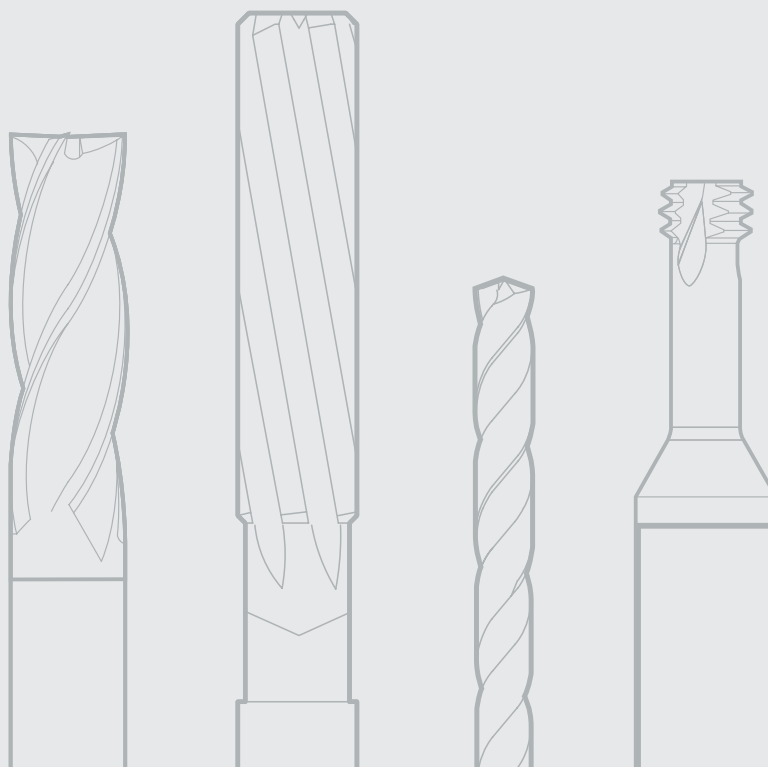
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Endmill



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Drill



Threading



Reamer





H Endmill

High speed endmills for machining high
hardness workpieces up to HRC70

Improved wear resistance and machinability /
Boosted productivity

High Speed Endmill Series
for High Hardness Machining

H Endmill

- Exceptional wear resistance due to the advanced coating technology
- Improved machinability due to the brand-new design
- Boosted productivity due to high speed capability in high precision machining

 See page 24.

Z Endmill

Universal endmills optimized for various workpiece materials of HRC50 or below (carbon steel, alloy steel, cast iron, pre-hardened steel, etc.)

Excellent cutting performance even at high temperature and high speeds due to the fine substrate and lubricative coating

Universal Endmill Series for High-Quality Machining

Z Endmill

- Improved machinability and tool life due to the advanced design and coating
- Long-term machining stability due to the optimized blade design and anti-chipping feature

 See page 28.

I⁺ Endmill

The highly tough substrate and wear-resistant coating

Improved tool life due to the coating with excellent resistance to chipping and wear

Universal Endmill Series for a Wide Range of Applications from Roughing to Finishing

I⁺ Endmill

- Applicable to workpiece materials up to HRC45
- Cost reduction due to excellent machinability and the reasonable price

 See page 34.



Economical Universal Endmill Series for High Efficiency

Z⁺ Endmill

- Improved tool life due to the most advanced substrate and coating
- Inhibited chipping and extended cutting time due to the optimized blade design

 See page 48.

Z⁺ Endmill

Roughing and finishing availability for
workpiece materials up to HRC45

Extended tool life / Increased productivity



R+ Endmill

Blade design ideal for roughing

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

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 66.

S+ Endmill

Optimum performance in stainless steel (also available in general steels, alloy steel and hardening steel)

Extended tool life due to the powerful cutting edges

Endmill Series for Stainless Steel Machining

S+ Endmill

- Special coating with stronger oxidation resistance
- Smooth chip evacuation due to the high rake angle and streamlined chip pockets
- Specially designed blade tips to inhibit work hardening

 See page 76.

A⁺ Endmill

The proprietary U-type flute design

Smooth chip evacuation at high feeds

Endmill Series for Aluminum Machining

A⁺ Endmill

- Double relief angle for improved edge rigidity and boosted productivity
- Sharp edges for both roughing and finishing

 See page 78.

Smooth Chip Flow and the Reliable Welding-Proof Feature

Solid Endmills for Aluminum

DLC coated

- Three to six times higher tool life with high hardness (Hv 3000~7000) compared to uncoated endmills
- Excellent surface finish due to lubrication resulting from the low friction coefficient ($\mu < 0.1$)

 See page 88.

Solid Endmills for Aluminum

Minimized cutting load and built-up edges for excellent surface finish

Available for aluminum, aluminum alloy, copper, and copper alloy



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 91.

Z⁺ Endmill

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

Tangential cutting edge design for exceptional surface finish



Superb Tool Life in Copper Electrodes Machining

C-Max

- Ideally suited for copper, brass, bronze and non-ferrous metals
- Standard ball, flat and radius types and an additional long neck type provided for a wide range of applications
- Long cutting time and excellent surface finish achieved when machining copper electrodes

 See page 97.

C-Max

Lubricative K-Silver coating with strong resistance to wear and chipping, supported by the substrate optimized for it

T Endmill

Customized tools for various machine applications for dental prostheses

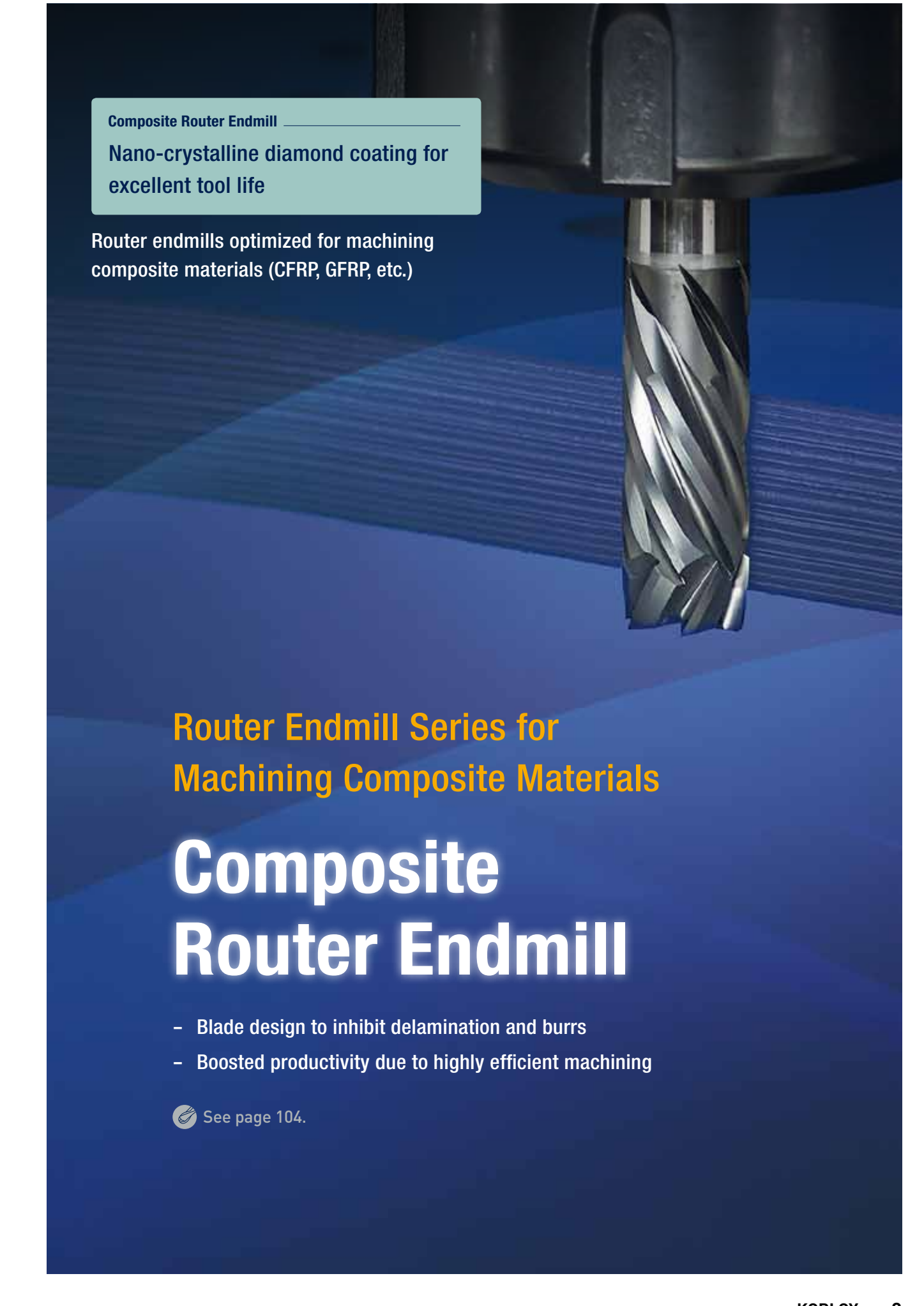
Optimized cutting performance by matching a proper grade with each type of dental prostheses

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 108.



Composite Router Endmill

Nano-crystalline diamond coating for
excellent tool life

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

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 104.

V Endmill

Maximally dampened tool vibrations and excellent surface finish for quality machining

Improved tool life due to the coating with excellent resistance to chipping and wear

**Boosted Productivity due to
Reduced Tool Vibrations**

V Endmill

Variable Endmill

- Improved productivity due to 30% higher cutting speed (vc) and feed rate (vf)

 See page 110.

F Endmill

Wide chip pockets for high efficiency and dispersed cutting forces for high feeds

**High Feed Machining for
High Efficiency**

F Endmill

Feed-up Endmill

 See page 112.



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
- Improved wear resistance due to the new grade PC325U

 See page 124.

The Hole Machining Tool for High Precision
and High Quality

MLD Plus

- Additional guide margins for stable machinability
- Improved wear resistance due to the new grade PC315G

 See page 135.

Uncoated Solid Drill Series for
High-Quality Machining

SSD Plus

- Exceptional chip control due to the brand-new design
- The upgraded geometry and improved surface finish of the product for high-quality machining
- Applicable to various workpiece materials such as mild steel and non-ferrous metals

 See page 151.



MSD Plus-S

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

**Improved productivity and wear resistance
due to stable machinability**

**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 130.



The Hole Machining Tool
Optimized for CFRP

MSD Plus CFRP

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

 See page 139.

MSD Plus CFRP

Strong wear resistance due to the new
diamond-coated grade ND2100



MSFD

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

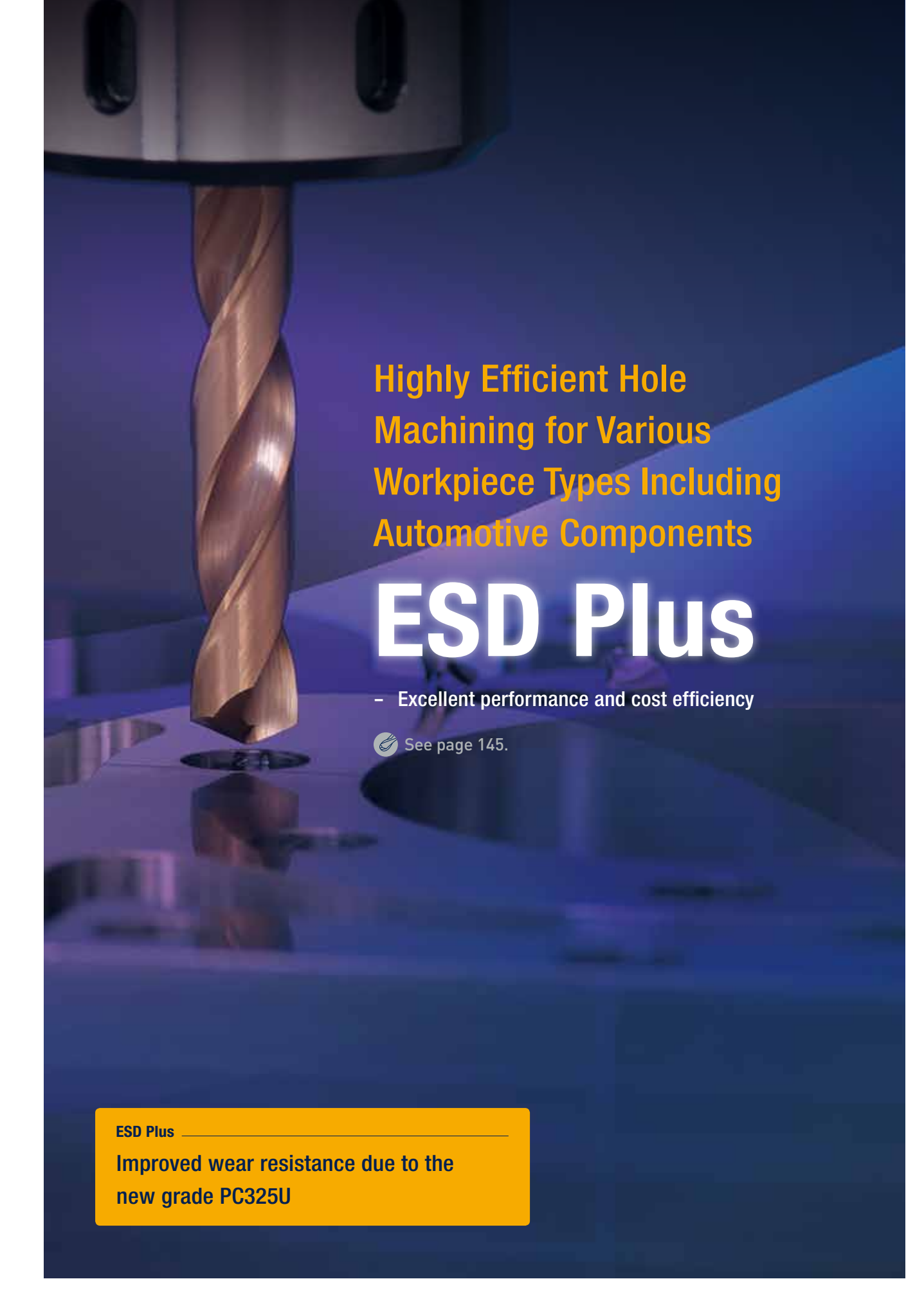
**The Hole Machining Tool
for Wide Applications
Including Ramped, Curved
and Flat Surfaces**

MSFD

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



See page 140.



Highly Efficient Hole
Machining for Various
Workpiece Types Including
Automotive Components

ESD Plus

- Excellent performance and cost efficiency



See page 145.

ESD Plus

Improved wear resistance due to the
new grade PC325U



Technical information for Endmill

Endmill

Product details / Recommended cutting conditions



Endmills index

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KORLOY Endmills

Type	Used	Shape	Designation	Figure	Coated	No. of flute	Size (∅)		Workpiece						page
							Min	Max	P	M	K	N	S	H	
									Steel	Stainless steel	Cast iron	Non-ferrous metal	Heat resistant alloy, Titanium alloy	Hardened steel	
H Endmill	High speed, High hardness	Ball	PBE		TiSiN	2	0.5	12	◎		◎		○	◎	24
		Radius	PRE		TiSiN	4	3	12	◎		◎		○	◎	25
Z Endmill	General	Flat	ZFE		AlCrN	2	1	16	◎	○	◎		○		28
					AlCrN	4	1	16	◎	○	◎		○		29
		Short flat	ZSFE		AlCrN	2	1	12	◎	○	◎		○		30
					AlCrN	4	1	12	◎	○	◎		○		30
		Ball	ZBE		AlCrN	2	1	12	◎	○	◎		○		31
		I ⁺ Endmill	General	Flat	IPFE		AlTiN	2	1	20	◎	○	◎		○
	AlTiN					4	1	20	◎	○	◎		○		36
Long flat	IPLFE				AlTiN	2	1	20	◎	○	◎		○		35
Long flat	IPLFE				AlTiN	4	1	20	◎	○	◎		○		37
Ball	IPBE				AlTiN	2	1	20	◎	○	◎		○		38
					AlTiN	4	1	20	◎	○	◎		○		40
Long ball	IPLBE				AlTiN	2	1	16	◎	○	◎		○		39
Radius	IPRE				AlTiN	2	1	12	◎	○	◎		○		41 42
Long radius	IPLRE				AlTiN	2	3	12	◎	○	◎		○		43

◎ : Excellent ○ : Good



Type	Used	Shape	Designation	Figure	Coated	No. of flute	Size (∅)		Workpiece						page
							Min	Max	P	M	K	N	S	H	
									Steel	Stainless steel	Cast Iron	Non-ferrous metal	Heat resistant alloy, Titanium alloy	Hardened steel	
I ⁺ Endmill	General	Radius	IPRE		AlTiN	4	2	12	◎	○	◎		○		44
		Long radius	IPLRE		AlTiN	4	3	12	◎	○	◎		○		45
Z ⁺ Endmill	General	Flat	ZPFE		AlCrSiN	2	1	20	◎	○	◎		○		48
		Short flat	ZPSFE		AlCrSiN	2	1	16	◎	○	◎		○		49
		Long flat	ZPLFE		AlCrSiN	2	2	20	◎	○	◎		○		50
		Long flute	ZPLFE		AlCrSiN	2	2	20	◎	○	◎		○		51
		Flat	ZPFE		AlCrSiN	4	1	20	◎	○	◎		○		52
		Short flat	ZPSFE		AlCrSiN	4	1	16	◎	○	◎		○		53
		Long flat	ZPLFE		AlCrSiN	4	2	20	◎	○	◎		○		54
		Long flute	ZPLFE		AlCrSiN	4	1	20	◎	○	◎		○		55
		Flat	ZPFE		AlCrSiN	3	2	25	◎	○	◎		○		56
					AlCrSiN	6	6	20	◎	○	◎		○		56
		Ball	ZPBE		AlCrSiN	2	0.8	20	◎	○	◎		○		57
		Long ball	ZPLBE		AlCrSiN	2	2	12	◎	○	◎		○		58
		Ball	ZPBE		AlCrSiN	4	2	20	◎	○	◎		○		59
		Radius	ZPRE		AlCrSiN	2	1	16	◎	○	◎		○		60

◎ : Excellent ○ : Good

KORLOY Endmills

Type	Used	Shape	Designation	Figure	Coated	No. of flute	Size (∅)		Workpiece						page
							Min	Max	P	M	K	N	S	H	
									Steel	Stainless steel	Cast iron	Non-ferrous metal	Heat resistant alloy	Titanium alloy	
Z ⁺ Endmill	General	Long radius	ZPLRE		AlCrSiN	2	6	16	◎	○	◎		○		61
		Radius	ZPRE		AlCrSiN	4	1.5	16	◎	○	◎		○		62
		Long radius	ZPLRE		AlCrSiN	4	6	16	◎	○	◎		○		63
R ⁺ Endmill	Aluminum	Roughing	RPAE		Carbide, Non	3	6	25				◎			66
	General		RPE-FP-H		Carbide, TiAlN	4	5	20	◎	○	◎		○		66
			RPLE-FP-H		Carbide, TiAlN	4	5	20	◎	○	◎		○		67
			RPE-XG		Carbide, TiAlN	4	5	20	◎	○	◎		○		67
			RPE-FP-L		Carbide, TiAlN	4	5	20	◎	○	◎		○		68
			RPE-RG		Carbide, TiAlCrN	4	5	20	◎	○	◎		○		68
			RPE-RG		HSS, TiAlN	4	6	20	◎	○	◎		○		69
			RPE-FF		HSS, TiAlN	4	6	20	◎	○	◎		○		69
			RPE-FP		HSS, TiAlN	4	6	20	◎	○	◎		○		70
			RPE-RG		HSS, TiCN HSS, TiN	4	6	50	◎	○	◎		○		71
S ⁺ Endmill	STS	Flat	SPFE		AlTiCrN	4	1	12	○	◎	○		◎		76
		Long flat	SPLFE		AlTiCrN	4	1	12	○	◎	○		◎		76

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Type	Used	Shape	Designation	Figure	Coated	No. of flute	Size (∅)		Workpiece						page
							Min	Max	P	M	K	N	S	H	
									Steel	Stainless steel	Cast iron	Non-ferrous metal	Heat resistant alloy	Titanium alloy	
A ⁺ Endmill	Aluminum	Flat	APFE		Non	2	2.5	20	○			◎			78
				Non	3	2.5	20	○			◎			78	
		Middle flat	APMFE		Non	2	3	20	○			◎			79
				Non	3	3	20	○			◎			79	
		Long flat	APLFE		Non	2	3	20	○			◎			80
				Non	3	3	20	○			◎			80	
		Ball	APBE		Non	2	1	12	○			◎			81
		Short flat	AFE		Non	3	1	20	○			◎			82
		Flat			Non	3	1	20	○			◎			83
		Long flat			Non	3	1	20	○			◎			84 85
		Roughing		APRE		Non	3	4	25	○			◎		
Solid Endmills for aluminum	Aluminum	Flat	SSEA		Non, Dlc	2	1	20	○			◎			88
					Non, Dlc	3	2	16	○			◎			88
		Ball	SSBEA		Non, Dlc	2	1	20	○			◎			89
D Endmill	Graphite, Ceramics	Flat	DFE		Diamond	2	1.0	12				◎			91
					Diamond	4	2	12				◎			92
		Ball	DBE		Diamond	2	0.6	12				◎			93 94
					Diamond	4	2	12				◎			95

◎ : Excellent ○ : Good

KORLOY Endmills

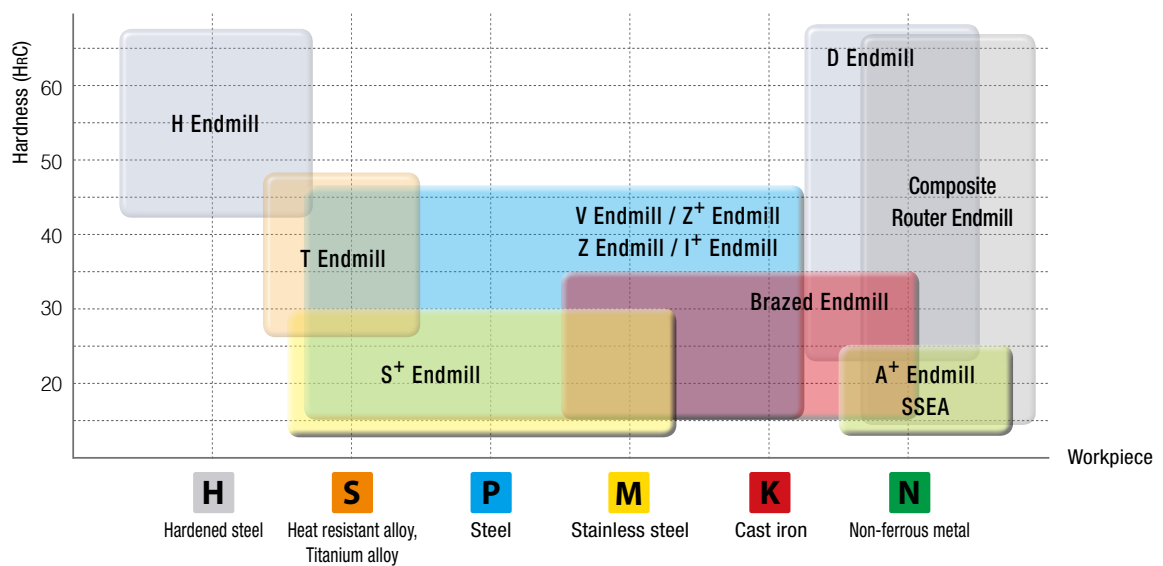
Type	Used	Shape	Designation	Figure	Coated	No. of flute	Size (Ø)		Workpiece						page
							Min	Max	P	M	K	N	S	H	
									Steel	Stainless steel	Cast iron	Non-ferrous metal	Heat resistant alloy, Titanium alloy	Hardened steel	
C-Max (Copper)	Copper, Copper alloy	Flat	CFE		CrN	2	1.0	12	○			◎			97
		Long neck flat	CFNE		CrN	2	0.5	4	○			◎			98
		Ball	CBE		CrN	2	1.0	12	○			◎			99
		Long neck ball	CBNE		CrN	2	0.5	4	○			◎			100
		Radius	CRE		CrN	2	2.0	12	○			◎			101
		Long neck radius	CRNE		CrN	2	1.0	4	○			◎			102
Composite Router Endmill	Composite CFRP, GFRP	Flat	CCDR		Diamond	4	6	8				◎			104
					Diamond	6	10	12				◎			104
			CCR		Diamond	2	4	12				◎			105
			CCLR		Diamond	4	4	12				◎			106
			CCRR		Diamond	6	6	8				◎			107
					Diamond	8	10	12				◎			107
T Endmill	Dental, Zirconia	Ball	TZBE		Diamond	2	0.6	3				◎			108
	Dental, Metal		TTBE		Diamond	2	0.6	3					◎		108
	Dental, Wax		TWBE		—	2	0.6	3				◎			108
V Endmill	General	Flat	VFE		TiAlN	4	2.5	16	◎	○	○		○	○	110
F Endmill	High feeds	High speed, High hardness	FME		TiAlN	4	6	12	○		○		◎	◎	112
		High speed, High hardness Long	FMLE		TiAlN	4	6	12	○		○		◎	◎	112

◎ : Excellent ○ : Good



Type	Used	Shape	Designation	Figure	Coated	No. of flute	Size (Ø)		Workpiece						page
							Min	Max	P	M	K	N	S	H	
									Steel	Stainless steel	Cast iron	Non-ferrous metal Heat resistant alloy, Titanium alloy		Hardened steel	
PCD Endmill	Nonferrous, High speed	Flat	PDE		-	1	4.6	6				◎			114
					-	2	6.0	12				◎			114
Brazed Endmill	Cast iron, Steel	Flat	ZSE		- (TiAlN)	2	14	50	○	○	◎		○		115
					- (TiAlN)	3	14	50	○	○	◎		○		116 117
					- (TiAlN)	4	14	50	○	○	◎		○		116
					- (TiAlN)	6	34	50	○	○	◎		○		116
	Aluminum, Copper		ZSEA		-	2	15	50				◎			117
	Cast iron, Steel	Long flat	ZSEL		- (TiAlN)	2	14	50	○	○	◎		○		118
					- (TiAlN)	4	16	40	○	○	◎		○		118
			ZSEXL		- (TiAlN)	2	20	25	○	○	◎		○		118
		Ball	ZSBE		- (TiAlN)	2	13	50	○	○	◎		○		119

Application area

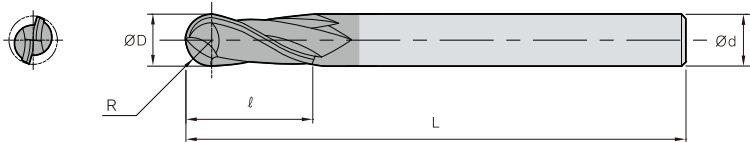


H Endmill

PBE2000 (Ball)



ØD	Tolerance
~ Ø5.9	0.00 ~ -0.015
Ø6.0 ~	0.00 ~ -0.025



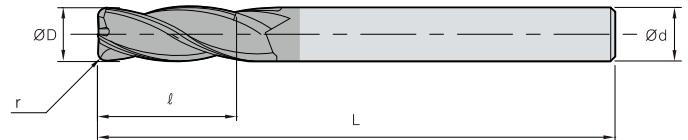
(mm)						
Designation		R	ØD	Ød	ℓ	L
PBE 	2005-040	0.25	0.5	6	1	40
	2010-050	0.5	1	6	2.5	50
	2012-050	0.6	1.2	6	3	50
	2015-050	0.75	1.5	6	4	50
	2020-050	1	2	6	5	50
	2025-060	1.25	2.5	6	7	60
	2030-060	1.5	3	6	8	60
	2040-070	2	4	6	8	70
	2050-080	2.5	5	6	10	80
	2060-090	3	6	6	12	90
	2080-100	4	8	8	14	100
	2100-100	5	10	10	18	100
	2120-110	6	12	12	22	110



PRE4000 (Radius)



ØD	Tolerance
~ Ø5.9	0.00 ~ -0.015
Ø6.0 ~	0.00 ~ -0.025



(mm)

Designation	ØD	Ød	ℓ	L	r
PRE					
4030-060-R01	3	6	8	60	0.1
4030-060-R02	3	6	8	60	0.2
4030-060-R03	3	6	8	60	0.3
4030-060-R05	3	6	8	60	0.5
4040-070-R01	4	6	10	70	0.1
4040-070-R02	4	6	10	70	0.2
4040-070-R03	4	6	10	70	0.3
4040-070-R05	4	6	10	70	0.5
4040-070-R10	4	6	10	70	1
4060-090-R02	6	6	15	90	0.2
4060-090-R03	6	6	15	90	0.3
4060-090-R05	6	6	15	90	0.5
4060-090-R10	6	6	15	90	1
4080-100-R02	8	8	20	100	0.2
4080-100-R03	8	8	20	100	0.3
4080-100-R05	8	8	20	100	0.5
4080-100-R10	8	8	20	100	1
4100-100-R03	10	10	25	100	0.3
4100-100-R05	10	10	25	100	0.5
4100-100-R10	10	10	25	100	1
4120-110-R03	12	12	30	110	0.3
4120-110-R05	12	12	30	110	0.5
4120-110-R10	12	12	30	110	1

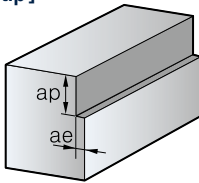
H Endmill

Recommended cutting conditions

PRE4000 Radius

Workpiece Conditions Diameter (Ø)	Pre-hardened steel (HrC35~45)		Hardened steel (HrC45~55)		High hardened steel (HrC55~70)	
	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)
3	17,300	1,250	11,500	840	7,500	256
4	13,200	1,300	8,800	880	5,600	268
5	12,500	1,500	8,300	1,000	5,100	296
6	10,350	1,400	6,900	950	4,200	280
8	7,800	1,350	5,200	900	3,200	264
10	6,150	1,260	4,100	840	2,550	248
12	5,250	1,260	3,500	840	2,100	240

[Application tip]



■ Shouldering depth (ap) and radial depth (ae)

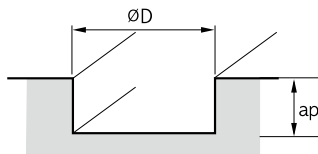
- $ap = 0.1D$
- $ae = 0.03D$

※ Workpiece should be clamped rigidly. In case of vibrations, reduce RPM and feed rate by the same ratio

PRE4000 Radius

Workpiece Conditions Diameter (Ø)	Pre-hardened steel (HrC35~45)		Hardened steel (HrC45~55)		High hardened steel (HrC55~70)	
	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)
3	17,300	544	11,500	336	7,500	128
4	13,200	560	8,800	352	5,600	136
5	12,500	644	8,300	400	5,100	144
6	10,350	616	6,900	384	4,200	144
8	7,800	576	5,200	356	3,200	132
10	6,150	544	4,100	332	2,550	124
12	5,250	544	3,500	332	2,100	124

[Application tip]



■ Slotting depth (ap)

- $ap = 0.05D$
- $ae = 1.0D$

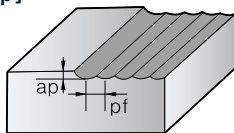
※ Workpiece should be clamped rigidly. In case of vibrations, reduce RPM and feed rate by the same ratio



PRE2000 Ball

Workpiece Conditions Diameter (Ø)	Pre-hardened steel (HRC35~45)		Hardened steel (HRC45~55)		High hardened Steel (HRC55~70)	
	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)
0.5	35,000	1,470	31,500	1,330	28,000	1,050
1	35,000	2,940	31,500	2,660	28,000	2,000
1.2	33,600	3,010	30,100	2,695	26,600	2,100
1.5	33,600	3,150	30,100	2,800	25,900	2,150
2	33,460	3,360	28,000	2,800	24,500	2,200
2.5	25,900	3,710	22,400	2,800	17,500	2,200
3	22,260	3,710	18,550	2,800	16,500	2,200
4	16,730	3,710	14,000	2,800	13,000	2,200
5	17,800	4,900	15,000	3,750	12,500	2,100
6	13,400	4,100	11,000	3,100	10,000	2,500
8	10,700	3,500	9,000	2,700	8,000	2,150
10	8,900	3,100	7,500	2,400	6,600	1,900
12	6,680	2,500	5,600	1,900	5,000	1,550

[Application tip]

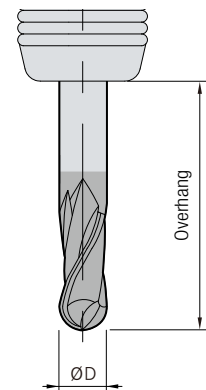


- $ap = 0.02D$
- $pf = 0.05D$

※ Workpiece should be clamped rigidly. In case of vibrations, reduce RPM and feed rate by the same ratio

Cutting condition by overhang

- Cutting conditions of the shank taper type in case of being clamped at neck
 - When the overhang is increased by 1D, decrease R.P.M and feed 10%
- In case of the straight type adjust conditions according to the overhang
 - Ex: When the overhang is 3D and is increased by 1D, decrease R.P.M and feed 10%



Notice

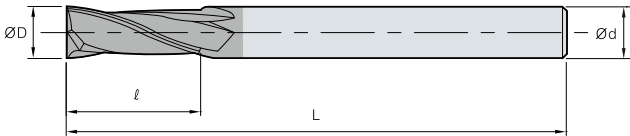
- Cutting conditions are up to the machine's condition and the shape of cutting
- Use cutting fluid that is proper to the workpiece and produces few temperature reactions

Z Endmill

ZFE2000 (Flat)



ØD	Tolerance
~ Ø5.9	0.00 ~ -0.015
Ø6.0 ~	0.00 ~ -0.025



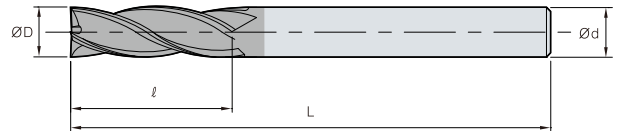
					(mm)
Designation		ØD	Ød	ℓ	L
ZFE 2	2010-050-S4	1	4	2.5	50
	2010-050-S6	1	6	2.5	50
	2012-050-S4	1.2	4	3	50
	2012-050-S6	1.2	6	3	50
	2015-050-S4	1.5	4	4	50
	2015-050-S6	1.5	6	4	50
	2020-050-S4	2	4	6	50
	2020-050-S6	2	6	6	50
	2025-050-S4	2.5	4	7.5	50
	2025-050-S6	2.5	6	7.5	50
	2030-050-S4	3	4	9	50
	2030-050-S6	3	6	9	50
	2035-050	3.5	6	10	50
	2040-050-S4	4	4	11	50
	2040-050-S6	4	6	11	50
	2045-050	4.5	6	14	50
	2050-060	5	6	15	60
	2055-060	5.5	6	15	60
	2060-060	6	6	15	60
	2065-060	6.5	8	18	60
	2070-060	7	8	20	60
	2075-060	7.5	8	20	60
	2080-070	8	8	20	70
	2085-070	8.5	10	22	70
	2090-070	9	10	22	70
	2095-070	9.5	10	24	70
	2100-075	10	10	25	75
	2120-080	12	12	30	80
	2140-100	14	14	35	100
	2160-100	16	16	40	100



ZFE4000 (Flat)



ØD	Tolerancez
~ Ø5.9	0.00 ~ -0.015
Ø6.0 ~	0.00 ~ -0.025



(mm)

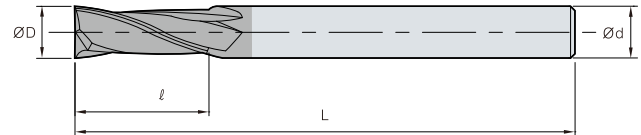
Designation		ØD	Ød	l	L
ZFE 4	4010-050-S4	1	4	2.5	50
	4010-050-S6	1	6	2.5	50
	4012-050-S4	1.2	4	3	50
	4012-050-S6	1.2	6	3	50
	4015-050-S4	1.5	4	4	50
	4015-050-S6	1.5	6	4	50
	4020-050-S4	2	4	6	50
	4020-050-S6	2	6	6	50
	4025-050-S4	2.5	4	7.5	50
	4025-050-S6	2.5	6	7.5	50
	4030-050-S4	3	4	9	50
	4030-050-S6	3	6	9	50
	4035-050	3.5	6	10	50
	4040-050-S4	4	4	11	50
	4040-050-S6	4	6	11	50
	4045-050	4.5	6	14	50
	4050-060	5	6	15	60
	4055-060	5.5	6	15	60
	4060-060	6	6	15	60
	4065-060	6.5	8	18	60
	4070-060	7	8	20	60
	4075-060	7.5	8	20	60
	4080-070	8	8	20	70
	4085-070	8.5	10	22	70
	4090-070	9	10	22	70
	4095-070	9.5	10	24	70
	4100-075	10	10	25	75
	4120-080	12	12	30	80
	4140-100	14	14	35	100
	4160-100	16	16	40	100

Z Endmill

ZSFE2000/4000 (Short flat)



ØD	Tolerance
~ Ø5.9	0.00 ~ -0.015
Ø6.0 ~	0.00 ~ -0.025



(mm)

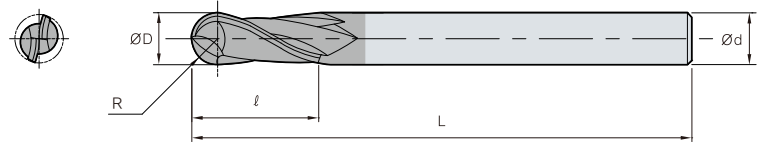
	Designation	ØD	Ød	ℓ	L
ZSFE 2	2010-040-S4	1	4	1.5	40
	2010-040-S6	1	6	1.5	40
	2012-040-S4	1.2	4	1.5	40
	2012-040-S6	1.2	6	1.5	40
	2015-040-S4	1.5	4	2.2	40
	2015-040-S6	1.5	6	2.2	40
	2020-040-S4	2	4	3	40
	2020-040-S6	2	6	3	40
	2025-040-S4	2.5	4	4	40
	2025-040-S6	2.5	6	4	40
	2030-045-S4	3	4	4.5	45
	2030-045-S6	3	6	4.5	45
	2040-045-S4	4	4	6	45
	2040-045-S6	4	6	6	45
	2060-050	6	6	9	50
	2080-060	8	8	12	60
ZSFE 4	2100-065	10	10	15	65
	2120-070	12	12	18	70
	4010-040-S4	1	4	1.5	40
	4010-040-S6	1	6	1.5	40
	4012-040-S4	1.2	4	1.5	40
	4012-040-S6	1.2	6	1.5	40
	4015-040-S4	1.5	4	2.2	40
	4015-040-S6	1.5	6	2.2	40
	4020-040-S4	2	4	3	40
	4020-040-S6	2	6	3	40
	4025-040-S4	2.5	4	4	40
	4025-040-S6	2.5	6	4	40
	4030-045-S4	3	4	4.5	45
	4030-045-S6	3	6	4.5	45
	4040-045-S4	4	4	6	45
	4040-045-S6	4	6	6	45
	4060-050	6	6	9	50
	4080-060	8	8	12	60
	4100-065	10	10	15	65
	4120-070	12	12	18	70



ZBE2000 (Ball)



ØD	Tolerance
~ Ø5.9	0.00 ~ -0.015
Ø6.0 ~	0.00 ~ -0.025



(mm)

Designation	R	ØD	Ød	ℓ	L
ZBE					
2010-050-S4	0.5	1	4	2.5	50
2010-050-S6	0.5	1	6	2.5	50
2012-050-S4	0.6	1.2	4	3	50
2012-050-S6	0.6	1.2	6	3	50
2015-050-S4	0.75	1.5	4	4	50
2015-050-S6	0.75	1.5	6	4	50
2020-050-S4	1	2	4	5	50
2020-050-S6	1	2	6	5	50
2025-060-S4	1.25	2.5	4	6	60
2025-060-S6	1.25	2.5	6	6	60
2030-060-S4	1.5	3	4	8	60
2030-060-S6	1.5	3	6	8	60
2035-070	1.75	3.5	6	8	70
2040-070-S4	2	4	4	8	70
2040-070-S6	2	4	6	8	70
2045-080	2.25	4.5	6	9	80
2050-080	2.5	5	6	10	80
2055-090	2.75	5.5	6	11	90
2060-090	3	6	6	12	90
2065-090	3.25	6.5	8	13	90
2070-090	3.5	7	8	14	90
2080-100	4	8	8	14	100
2085-100	4.25	8.5	10	16	100
2090-100	4.5	9	10	18	100
2100-100	5	10	10	18	100
2120-110	6	12	12	22	110

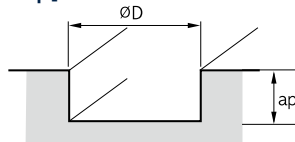
Z Endmill

Recommended cutting conditions

➤ ZFE2000/ZSFE2000 Flat

Workpiece Conditions Diameter (Ø)	Alloy steel & carbon steel / under H _R C30 (SCM, SNCM, SM45C etc)		Pre-hardened steel / H _R C30~45 (STD, KP4M, NAK etc)		Stainless steel (STS304, STS316 etc)	
	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	19,745	175	13,057	100	10,500	70
2	11,560	190	7,560	120	6,300	90
3	8,920	210	5,560	140	4,620	120
4	7,560	300	4,620	180	3,880	150
5	6,300	320	3,780	190	3,160	160
6	5,560	350	3,360	220	2,840	180
8	4,200	380	2,520	200	2,100	180
10	3,260	330	2,000	160	1,680	160
12	2,740	280	1,680	130	1,360	130
16	2,200	220	1,360	110	1,060	110

[Application tip]



■ Slotting depth (ap)

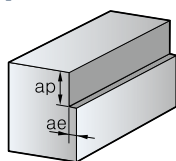
- $D \leq \varnothing 3$ ($ap = 0.2D$)
- $D > \varnothing 3$ ($ap = 0.5D$)

※ Workpiece should be clamped rigidly. In case of vibrations, reduce RPM and feed rate by the same ratio

➤ ZFE4000/ZSFE4000 Flat

Workpiece Conditions Diameter (Ø)	Alloy steel & carbon steel / under H _R C30 (SCM, SNCM, SM45C etc)		Pre-hardened steel / H _R C30~45 (STD, KP4M, NAK etc)		Stainless steel (STS304, STS316 etc)	
	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	11,560	280	7,560	170	6,300	140
3	8,920	320	5,560	200	4,620	170
4	7,560	570	4,620	350	3,880	280
5	6,300	600	3,780	360	3,160	300
6	5,560	660	3,360	410	2,840	330
8	4,200	710	2,520	380	2,100	350
10	3,260	610	2,000	300	1,680	300
12	2,740	520	1,680	250	1,360	240
16	2,200	410	1,360	200	1,100	200

[Application tip]



■ Slotting depth (ap)

- $ap = 1.0D$
- $ae = 0.05D$

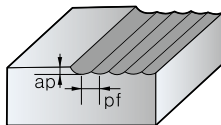
※ Workpiece should be clamped rigidly. In case of vibrations, reduce RPM and feed rate by the same ratio



➔ ZFE4000/ZSFE4000 Ball

Workpiece Conditions Diameter (Ø)	Alloy steel & carbon steel / under HRC30 (SCM, SNCM, SM45C etc)		Pre-hardened steel / HRC30~45 (STD, KP4M, NAK etc)	
	R.P.M n (min ⁻¹)	Feed vf (mm/min)	R.P.M n (min ⁻¹)	Feed vf (mm/min)
1	30,000	2,880	30,000	2,520
1.2	30,000	3,060	28,800	2,580
1.5	30,000	3,240	28,800	2,700
2	29,820	3,420	28,680	2,880
3	19,860	3,600	19,080	3,180
4	14,940	3,600	14,340	3,180
5	11,160	3,480	10,680	2,940
6	8,340	2,910	8,040	2,460
8	6,660	2,520	6,420	2,100
10	5,580	2,220	5,340	1,860
12	4,170	1,770	4,008	1,500

[Application tip]



- $ap = 0.03D$
- $pf = 0.05D$

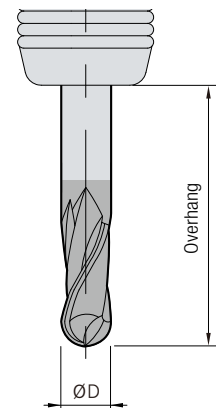
※ Workpiece should be clamped rigidly. In case of vibrations, reduce RPM and feed rate by the same ratio

➔ Cutting condition by overhang

- Cutting conditions of the shank taper type in case of being clamped at neck
 - When the overhang is increased by 1D, decrease R.P.M and feed 10%
- In case of the straight type adjust conditions according to the overhang
 - Ex: When the overhang is 3D and is increased by 1D, decrease R.P.M and feed 10%

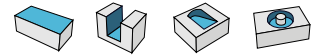
➔ Notice

- Cutting conditions are up to the machine's condition and the shape of cutting
- Use cutting fluid that is proper to the workpiece and produces few temperature reactions

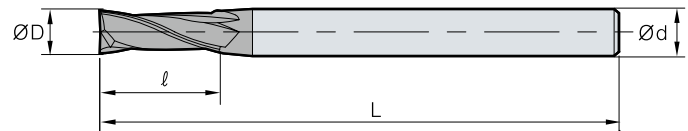


I⁺ Endmill

IPFE2000 (Flat)



ØD	Tolerance
Ø1~Ø12	0.00 ~ -0.02
Ø12.1~Ø20	0.00 ~ -0.03



(mm)

	Designation	ØD	Ød	ℓ	L
IPFE 2	2010-050-S3	1	3	3	50
	2010-050-S4	1	4	3	50
	2010-050	1	6	3	50
	2015-050-S3	1.5	3	4	50
	2015-050-S4	1.5	4	4	50
	2015-050	1.5	6	4	50
	2020-050-S3	2	3	6	50
	2020-050-S4	2	4	6	50
	2020-050	2	6	6	50
	2025-050-S3	2.5	3	8	50
	2025-050-S4	2.5	4	8	50
	2025-050	2.5	6	8	50
	2030-050-S3	3	3	8	50
	2030-050-S4	3	4	8	50
	2030-050	3	6	8	50
	2035-050-S4	3.5	4	10	50
	2035-050	3.5	6	10	50
	2040-050-S4	4	4	11	50
	2040-050	4	6	11	50
	2045-050	4.5	6	13	50
	2050-050	5	6	13	50
	2055-050	5.5	6	13	50
	2060-050	6	6	16	50
	2065-060	6.5	8	16	60
	2070-060	7	8	16	60
	2075-060	7.5	8	19	60
	2080-060	8	8	20	60
	2085-075	8.5	10	20	75
	2090-075	9	10	20	75
	2095-075	9.5	10	25	75
	2100-075	10	10	25	75
	2105-075	10.5	12	25	75
	2110-075	11	12	30	75
	2115-075	11.5	12	30	75
	2120-075	12	12	32	75
	2140-100	14	16	40	100
	2160-100	16	16	40	100
	2180-100	18	20	45	100
	2200-100	20	20	45	100



IPLFE2000 (Long flat)



ØD	Tolerance
Ø1~Ø12	0.00 ~ -0.02
Ø12.1~Ø20	0.00 ~ -0.03



Long shank type

(mm)

Designation		ØD	Ød	ℓ	L
IPLFE 2	2060-075	6	6	16	75
	2060-100	6	6	16	100
	2080-075	8	8	20	75
	2080-100	8	8	20	100
	2100-100	10	10	25	100
	2100-150	10	10	25	150
	2120-100	12	12	32	100
	2120-150	12	12	32	150

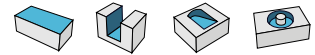
Long flute type

(mm)

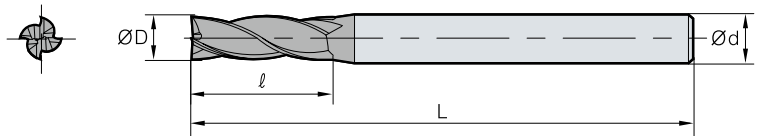
Designation		ØD	Ød	ℓ	L
IPLFE 2	2010-050-V7S4	1	4	7	50
	2015-050-V9S4	1.5	4	9	50
	2020-050-V12S4	2	4	12	50
	2025-050-V12S4	2.5	4	12	50
	2030-060-V15S6	3	6	15	60
	2035-060-V15S6	3.5	6	15	60
	2040-075-V20S6	4	6	20	75
	2045-075-V20S6	4.5	6	20	75
	2050-075-V25S6	5	6	25	75
	2055-075-V25S6	5.5	6	25	75
	2060-075-V30S6	6	6	30	75
	2070-100-V30S8	7	8	30	100
	2080-100-V40S8	8	8	40	100
	2090-100-V40S10	9	10	40	100
	2100-100-V40S10	10	10	40	100
	2110-100-V40S12	11	12	40	100
	2120-100-V50S12	12	12	50	100
	2140-150-V50S16	14	16	50	150
	2160-150-V60S16	16	16	60	150
	2200-200-V90S20	20	20	90	200

I⁺ Endmill

IPFE4000 (Flat)



ØD	Tolerance
Ø1~Ø12	0.00 ~ -0.02
Ø12.1~Ø20	0.00 ~ -0.03

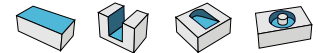


(mm)

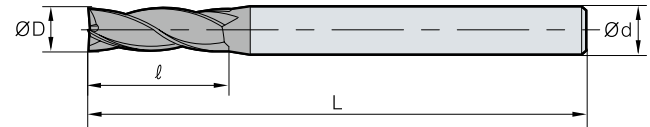
	Designation	ØD	Ød	ℓ	L
IPFE 4	4010-050-S3	1	3	3	50
	4010-050-S4	1	4	3	50
	4010-050	1	6	3	50
	4015-050-S3	1.5	3	4	50
	4015-050-S4	1.5	4	4	50
	4015-050	1.5	6	4	50
	4020-050-S3	2	3	6	50
	4020-050-S4	2	4	6	50
	4020-050	2	6	6	50
	4025-050-S3	2.5	3	8	50
	4025-050-S4	2.5	4	8	50
	4025-050	2.5	6	8	50
	4030-050-S3	3	3	8	50
	4030-050-S4	3	4	8	50
	4030-050	3	6	8	50
	4035-050-S4	3.5	4	10	50
	4035-050	3.5	6	10	50
	4040-050-S4	4	4	11	50
	4040-050	4	6	11	50
	4045-050	4.5	6	13	50
	4050-050	5	6	13	50
	4055-050	5.5	6	13	50
	4060-050	6	6	16	50
	4065-060	6.5	8	16	60
	4070-060	7	8	16	60
	4075-060	7.5	8	19	60
	4080-060	8	8	20	60
	4085-075	8.5	10	20	75
	4090-075	9	10	20	75
	4095-075	9.5	10	25	75
	4100-075	10	10	30	75
	4105-075	10.5	12	30	75
	4110-075	11	12	30	75
	4115-075	11.5	12	30	75
	4120-075	12	12	32	75
	4140-100	14	16	40	100
	4160-100	16	16	40	100
	4180-100	18	20	45	100
	4200-100	20	20	45	100



IPLFE4000 (Long flat)



ØD	Tolerance
Ø1~Ø12	0.00 ~ -0.02
Ø12.1~Ø20	0.00 ~ -0.03



Long shank type

(mm)

Designation		ØD	Ød	ℓ	L
 IPLFE	4060-075	6	6	16	75
	4060-100	6	6	16	100
	4080-075	8	8	20	75
	4080-100	8	8	20	100
	4100-100	10	10	30	100
	4100-150	10	10	30	150
	4120-100	12	12	32	100
	4120-150	12	12	32	150

Long flute type

(mm)

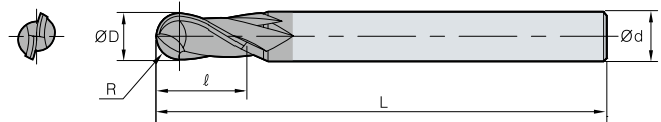
Designation		ØD	Ød	ℓ	L
IPLFE 4	4010-050-V6S4	1	4	6	50
	4015-050-V9S4	1.5	4	9	50
	4020-050-V12S4	2	4	12	50
	4025-050-V12S4	2.5	4	12	50
	4030-060-V15S6	3	6	15	60
	4035-060-V15S6	3.5	6	15	60
	4040-075-V20S6	4	6	20	75
	4045-075-V20S6	4.5	6	20	75
	4050-075-V25S6	5	6	25	75
	4055-075-V25S6	5.5	6	25	75
	4060-075-V30S6	6	6	30	75
	4070-100-V30S8	7	8	30	100
	4080-100-V40S8	8	8	40	100
	4090-100-V40S10	9	10	40	100
	4100-100-V40S10	10	10	40	100
	4110-100-V40S12	11	12	40	100
	4120-100-V50S12	12	12	50	100
	4140-150-V50S16	14	16	50	150
	4160-150-V60S16	16	16	60	150
	4200-200-V90S20	20	20	90	200

I⁺ Endmill

IPBE2000 (Ball)



ØD	Tolerance
Ø1~Ø12	0.00 ~ -0.02
Ø12.1~Ø20	0.00 ~ -0.03



(mm)

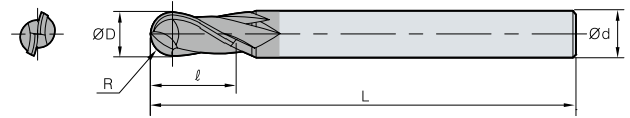
Designation		R	ØD	Ød	ℓ	L
IPBE 2	2010-050-S3	0.5	1	3	2	50
	2010-050-S4	0.5	1	4	2	50
	2010-050	0.5	1	6	2	50
	2015-050-S3	0.75	1.5	3	3	50
	2015-050-S4	0.75	1.5	4	3	50
	2015-050	0.75	1.5	6	3	50
	2020-050-S3	1	2	3	4	50
	2020-050-S4	1	2	4	4	50
	2020-050	1	2	6	4	50
	2025-050-S3	1.25	2.5	3	5	50
	2025-050-S4	1.25	2.5	4	5	50
	2025-050	1.25	2.5	6	5	50
	2030-050-S3	1.5	3	3	6	50
	2030-050-S4	1.5	3	4	6	50
	2030-050	1.5	3	6	6	50
	2035-050-S4	1.75	3.5	4	7	50
	2035-050	1.75	3.5	6	7	50
	2040-050-S4	2	4	4	8	50
	2040-050	2	4	6	8	50
	2045-050	2.25	4.5	6	9	50
	2050-050	2.5	5	6	10	50
	2060-050	3	6	6	12	50
	2070-060	3.5	7	8	14	60
	2080-060	4	8	8	16	60
	2090-075	4.5	9	10	18	75
	2100-075	5	10	10	20	75
	2120-075	6	12	12	24	75
	2140-100	7	14	16	28	100
	2160-100	8	16	16	32	100
	2180-100	9	18	20	36	100
	2200-100	10	20	20	40	100



IPLBE2000 (Long ball)



ØD	Tolerance
Ø1~Ø12	0.00 ~ -0.02
Ø12.1~Ø20	0.00 ~ -0.03



(mm)

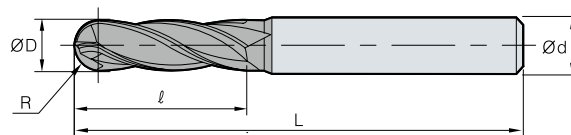
Designation		R	ØD	Ød	ℓ	L
IPLBE 2	2010-075	0.5	1	6	2	75
	2010-100	0.5	1	6	2	100
	2015-075	0.75	1.5	6	3	75
	2015-100	0.75	1.5	6	3	100
	2020-075	1	2	6	4	75
	2020-100	1	2	6	4	100
	2025-075	1.25	2.5	6	5	75
	2025-100	1.25	2.5	6	5	100
	2030-075	1.5	3	6	6	75
	2030-100	1.5	3	6	6	100
	2035-100	1.75	3.5	6	7	100
	2040-075	2	4	6	8	75
	2040-100	2	4	6	8	100
	2050-075	2.5	5	6	10	75
	2050-100	2.5	5	6	10	100
	2060-075	3	6	6	12	75
	2060-100	3	6	6	12	100
	2060-150	3	6	6	12	150
	2080-075	4	8	8	16	75
	2080-100	4	8	8	16	100
	2080-150	4	8	8	16	150
	2100-100	5	10	10	20	100
	2100-150	5	10	10	20	150
	2100-200	5	10	10	20	200
	2120-100	6	12	12	24	100
	2120-150	6	12	12	24	150
	2120-200	6	12	12	24	200
	2160-150	8	16	16	32	150
	2160-200	8	16	16	32	200

I⁺ Endmill

IPBE4000 (Ball)



ØD	Tolerance
Ø1~Ø12	0.00 ~ -0.02
Ø12.1~Ø20	0.00 ~ -0.03

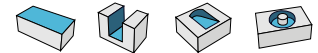


(mm)

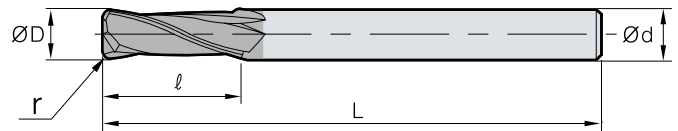
	Designation	R	ØD	Ød	ℓ	L
IPBE 	4010-050-S4	0.5	1	4	2	50
	4010-050	0.5	1	6	2	50
	4015-050-S4	0.75	1.5	4	3	50
	4015-050	0.75	1.5	6	3	50
	4020-050-S4	1	2	4	4	50
	4020-050	1	2	6	4	50
	4025-050-S4	1.25	2.5	4	5	50
	4025-050	1.25	2.5	6	5	50
	4030-050-S3	1.5	3	3	6	50
	4030-050-S4	1.5	3	4	6	50
	4030-050	1.5	3	6	6	50
	4035-050-S4	1.75	3.5	4	7	50
	4035-050	1.75	3.5	6	7	50
	4040-050-S4	2	4	4	8	50
	4040-050	2	4	6	8	50
	4045-050	2.25	4.5	6	9	50
	4050-050	2.5	5	6	10	50
	4060-050	3	6	6	12	50
	4070-060	3.5	7	8	14	60
	4080-060	4	8	8	16	60
	4090-075	4.5	9	10	18	75
	4100-075	5	10	10	20	75
	4120-075	6	12	12	24	75
	4140-100	7	14	16	28	100
	4160-100	8	16	16	32	100
	4180-100	9	18	20	36	100
	4200-100	10	20	20	40	100



IPRE2000 (Radius)



ØD	Tolerance
Ø1~Ø12	0.00 ~ -0.02

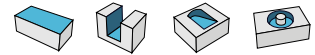


(mm)

Designation		ØD	Ød	ℓ	L	r
IPRE 2	2010-050-R01	1	4	3	50	0.1
	2010-050-R02	1	4	3	50	0.2
	2010-050-R03	1	4	3	50	0.3
	2015-050-R02	1.5	4	4	50	0.2
	2015-050-R03	1.5	4	4	50	0.3
	2020-050-R02	2	4	6	50	0.2
	2020-050-R03	2	4	6	50	0.3
	2020-050-R05	2	4	6	50	0.5
	2025-050-R02	2.5	4	8	50	0.2
	2030-050-R02-S3	3	3	8	50	0.2
	2030-050-R03-S3	3	3	8	50	0.3
	2030-050-R05-S3	3	3	8	50	0.5
	2030-050-R10-S3	3	3	8	50	1
	2030-050-R02	3	4	8	50	0.2
	2030-050-R03	3	4	8	50	0.3
	2030-050-R05	3	4	8	50	0.5
	2030-050-R10	3	4	8	50	1
	2040-050-R02	4	4	10	50	0.2
	2040-050-R03	4	4	10	50	0.3
	2040-050-R05	4	4	10	50	0.5
	2040-050-R10	4	4	10	50	1
	2040-050-R15	4	4	10	50	1.5
	2050-050-R02	5	6	13	50	0.2
	2050-050-R03	5	6	13	50	0.3
	2050-050-R05	5	6	13	50	0.5
	2050-050-R10	5	6	13	50	1
	2060-050-R02	6	6	15	50	0.2
	2060-050-R03	6	6	15	50	0.3
	2060-050-R05	6	6	15	50	0.5
	2060-050-R10	6	6	15	50	1
	2060-050-R15	6	6	15	50	1.5
	2060-050-R20	6	6	15	50	2

I⁺ Endmill

IPRE2000 (Radius)



ØD	Tolerance
Ø1~Ø12	0.00 ~ -0.02

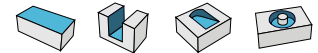


(mm)

Designation		ØD	Ød	l	L	r
IPRE	2080-060-R03	8	8	20	60	0.3
	2080-060-R05	8	8	20	60	0.5
	2080-060-R10	8	8	20	60	1
	2080-060-R15	8	8	20	60	1.5
	2080-060-R20	8	8	20	60	2
	2080-060-R25	8	8	20	60	2.5
	2080-060-R30	8	8	20	60	3
	2100-075-R03	10	10	25	75	0.3
	2100-075-R05	10	10	25	75	0.5
	2100-075-R10	10	10	25	75	1
	2100-075-R15	10	10	25	75	1.5
	2100-075-R20	10	10	25	75	2
	2100-075-R25	10	10	25	75	2.5
	2100-075-R30	10	10	25	75	3
	2120-075-R03	12	12	30	75	0.3
	2120-075-R05	12	12	30	75	0.5
	2120-075-R10	12	12	30	75	1
	2120-075-R15	12	12	30	75	1.5
	2120-075-R20	12	12	30	75	2
	2120-075-R25	12	12	30	75	2.5
	2120-075-R30	12	12	30	75	3



IPLRE2000 (Long radius)



ØD	Tolerance
Ø3~Ø12	0.00 ~ -0.02

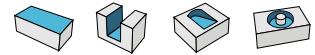


(mm)

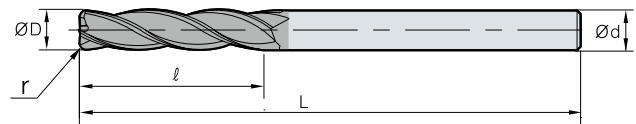
Designation		ØD	Ød	ℓ	L	r
IPLRE 	2030-075-R03	3	3	8	75	0.3
	2030-075-R05	3	3	8	75	0.5
	2030-075-R10	3	3	8	75	1
	2040-075-R03	4	4	10	75	0.3
	2040-075-R05	4	4	10	75	0.5
	2040-075-R10	4	4	10	75	1
	2040-075-R15	4	4	10	75	1.5
	2060-100-R03	6	6	15	100	0.3
	2060-100-R05	6	6	15	100	0.5
	2060-100-R10	6	6	15	100	1
	2060-100-R15	6	6	15	100	1.5
	2060-100-R20	6	6	15	100	2
	2080-100-R03	8	8	20	100	0.3
	2080-100-R05	8	8	20	100	0.5
	2080-100-R10	8	8	20	100	1
	2080-100-R15	8	8	20	100	1.5
	2080-100-R20	8	8	20	100	2
	2080-100-R25	8	8	20	100	2.5
	2080-100-R30	8	8	20	100	3
	2100-100-R03	10	10	25	100	0.3
	2100-100-R05	10	10	25	100	0.5
	2100-100-R10	10	10	25	100	1
	2100-100-R15	10	10	25	100	1.5
	2100-100-R20	10	10	25	100	2
	2100-100-R25	10	10	25	100	2.5
	2100-100-R30	10	10	25	100	3
	2120-100-R03	12	12	30	100	0.3
	2120-100-R05	12	12	30	100	0.5
	2120-100-R10	12	12	30	100	1
	2120-100-R15	12	12	30	100	1.5
	2120-100-R20	12	12	30	100	2
	2120-100-R25	12	12	30	100	2.5
	2120-100-R30	12	12	30	100	3

I⁺ Endmill

IPRE4000 (Radius)



ØD	Tolerance
Ø2~Ø12	0.00 ~ -0.02



(mm)

	Designation	ØD	Ød	ℓ	L	r
IPRE 4	4020-050-R02	2	4	6	50	0.2
	4020-050-R03	2	4	6	50	0.3
	4020-050-R05	2	4	6	50	0.5
	4025-050-R02	2.5	4	8	50	0.2
	4030-050-R02-S3	3	3	8	50	0.2
	4030-050-R03-S3	3	3	8	50	0.3
	4030-050-R05-S3	3	3	8	50	0.5
	4030-050-R10-S3	3	3	8	50	1
	4030-050-R02	3	4	8	50	0.2
	4030-050-R03	3	4	8	50	0.3
	4030-050-R05	3	4	8	50	0.5
	4030-050-R10	3	4	8	50	1
	4040-050-R02	4	4	10	50	0.2
	4040-050-R03	4	4	10	50	0.3
	4040-050-R05	4	4	10	50	0.5
	4040-050-R10	4	4	10	50	1
	4040-050-R15	4	4	10	50	1.5
	4050-050-R02	5	6	13	50	0.2
	4050-050-R03	5	6	13	50	0.3
	4050-050-R05	5	6	13	50	0.5
	4050-050-R10	5	6	13	50	1
	4060-050-R02	6	6	15	50	0.2
	4060-050-R03	6	6	15	50	0.3
	4060-050-R05	6	6	15	50	0.5
	4060-050-R10	6	6	15	50	1
	4060-050-R15	6	6	15	50	1.5
	4060-050-R20	6	6	15	50	2
	4080-060-R03	8	8	20	60	0.3
	4080-060-R05	8	8	20	60	0.5
	4080-060-R10	8	8	20	60	1
	4080-060-R15	8	8	20	60	1.5
	4080-060-R20	8	8	20	60	2
	4080-060-R25	8	8	20	60	2.5
	4080-060-R30	8	8	20	60	3
	4100-075-R03	10	10	25	75	0.3
	4100-075-R05	10	10	25	75	0.5
	4100-075-R10	10	10	25	75	1
	4100-075-R15	10	10	25	75	1.5
	4100-075-R20	10	10	25	75	2
	4100-075-R25	10	10	25	75	2.5
	4100-075-R30	10	10	25	75	3
	4120-075-R03	12	12	30	75	0.3
	4120-075-R05	12	12	30	75	0.5
	4120-075-R10	12	12	30	75	1
	4120-075-R15	12	12	30	75	1.5
	4120-075-R20	12	12	30	75	2
	4120-075-R25	12	12	30	75	2.5
	4120-075-R30	12	12	30	75	3

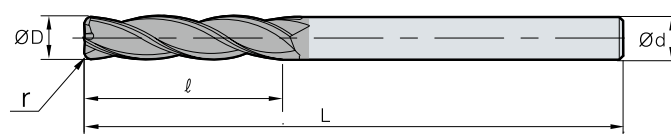


IPLRE4000 (Long radius)



ØD Tolerance

Ø3~Ø12 0.00 ~ -0.02



(mm)

Designation		ØD	Ød	ℓ	L	r
IPLRE 	4030-075-R03	3	3	8	75	0.3
	4030-075-R05	3	3	8	75	0.5
	4030-075-R10	3	3	8	75	1
	4040-075-R03	4	4	10	75	0.3
	4040-075-R05	4	4	10	75	0.5
	4040-075-R10	4	4	10	75	1
	4040-075-R15	4	4	10	75	1.5
	4060-100-R03	6	6	15	100	0.3
	4060-100-R05	6	6	15	100	0.5
	4060-100-R10	6	6	15	100	1
	4060-100-R15	6	6	15	100	1.5
	4060-100-R20	6	6	15	100	2
	4080-100-R03	8	8	20	100	0.3
	4080-100-R05	8	8	20	100	0.5
	4080-100-R10	8	8	20	100	1
	4080-100-R15	8	8	20	100	1.5
	4080-100-R20	8	8	20	100	2
	4080-100-R25	8	8	20	100	2.5
	4080-100-R30	8	8	20	100	3
	4100-100-R03	10	10	25	100	0.3
	4100-100-R05	10	10	25	100	0.5
	4100-100-R10	10	10	25	100	1
	4100-100-R15	10	10	25	100	1.5
	4100-100-R20	10	10	25	100	2
	4100-100-R25	10	10	25	100	2.5
	4100-100-R30	10	10	25	100	3
	4120-100-R03	12	12	30	100	0.3
	4120-100-R05	12	12	30	100	0.5
	4120-100-R10	12	12	30	100	1
	4120-100-R15	12	12	30	100	1.5
	4120-100-R20	12	12	30	100	2
	4120-100-R25	12	12	30	100	2.5
	4120-100-R30	12	12	30	100	3

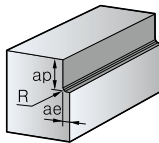
I⁺ Endmill

Recommended cutting conditions

IPFE2000 Flat

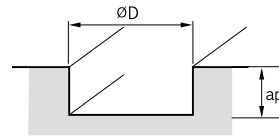
Diameter ($\varnothing$)	Carbon steel, Alloy steel-HrC30 (SM50C, SCM, GC250, Cast iron)			Alloy steel, High speed steel HrC30~45 (Pre-hardened steels, STD61, NAK)			Stainless steel (STS304, STS316)		
	R.P.M n (min ⁻¹)	Feed (mm/min)		R.P.M n (min ⁻¹)	Feed (mm/min)		R.P.M n (min ⁻¹)	Feed (mm/min)	
		Shouldering	Slotting		Shouldering	Slotting		Shouldering	Slotting
1.0	30,000	600	480	20,000	400	320	12,600	300	180
1.5	20,000	600	480	14,000	400	320	8,400	300	180
2.0	15,000	600	480	10,000	400	400	6,300	300	180
2.5	12,000	600	480	8,200	400	320	5,100	300	180
3.0	10,000	600	480	7,000	400	320	4,200	300	180
4.0	7,500	600	480	5,200	400	320	3,100	300	180
5.0	6,000	600	480	4,200	400	320	2,500	300	180
6.0	5,000	600	480	3,500	400	320	2,100	300	180
8.0	4,000	520	410	2,800	350	280	1,600	260	150
10.0	3,200	450	360	2,200	300	240	1,300	230	130
12.0	2,700	410	320	1,900	270	210	1,100	210	120
16.0	2,000	240	190	1,400	210	160	840	160	100
20.0	1,600	200	160	1,100	170	130	680	140	80

[Application tip]



■ Shouldering depth (ap) and radial depth (ae)

- ap : ≤ 1.5 (All dia.)
- ae : $\leq 0.1D$ ($D \leq \varnothing 3$)
 $\leq 0.2D$ ($D > \varnothing 3$)



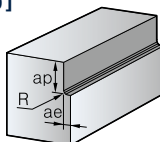
■ Slotting depth (ap)

- ap : $\leq 0.1D$ ($D \leq \varnothing 2$)
 $\leq 0.2D$ ($D > \varnothing 2$)

IPFE4000 Flat

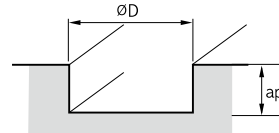
Diameter ($\varnothing$)	Carbon steel, Alloy steel-HrC30 (SM50C, SCM, GC250, Cast iron)			Alloy steel, High speed steel HrC30~45 (Pre-hardened steels, STD61, NAK)			Stainless steel (STS304, STS316)		
	R.P.M n (min ⁻¹)	Feed (mm/min)		R.P.M n (min ⁻¹)	Feed (mm/min)		R.P.M n (min ⁻¹)	Feed (mm/min)	
		Shouldering	Slotting		Shouldering	Slotting		Shouldering	Slotting
1.0	30,000	900	720	20,000	600	480	12,600	450	270
1.5	20,000	900	720	14,000	600	480	8,400	450	270
2.0	15,000	900	720	10,000	600	480	6,300	450	270
2.5	12,000	900	720	8,200	600	480	5,100	450	270
3.0	10,000	900	720	7,000	600	480	4,200	450	270
4.0	7,500	900	720	5,200	600	480	3,100	450	270
5.0	6,000	900	720	4,200	600	480	2,500	450	270
6.0	5,000	900	720	3,500	600	480	2,100	450	270
8.0	4,000	780	620	2,800	520	410	1,600	390	230
10.0	3,200	680	540	2,200	450	360	1,300	340	200
12.0	2,700	620	490	1,900	410	320	1,100	310	180
16.0	2,000	360	280	1,400	310	240	840	240	140
20.0	1,600	300	240	1,100	250	200	680	210	120

[Application tip]



■ Shouldering depth (ap) and radial depth (ae)

- ap : $\leq 1.5D$ (All dia.)
- ae : $\leq 0.1D$ ($D \leq \varnothing 3$)
 $\leq 0.2D$ ($D > \varnothing 3$)



■ Slotting depth (ap)

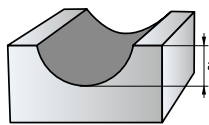
- ap : $\leq 0.1D$ ($D \leq \varnothing 2$)
 $\leq 0.2D$ ($D > \varnothing 2$)



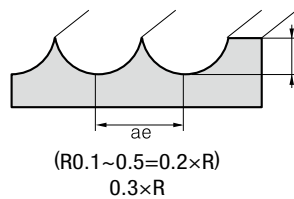
IPBE2000 Ball

Diameter ($\varnothing$)	Carbon steel (SM50C)		Alloy steel (SCM, STD, STS, KP4M, NAK)		Mold steel-HrC45 (STD61)		Non-ferrous metal (Aluminum)	
	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)
1.0	40,000	1,200	38,000	1,200	29,000	900	40,000	1,000
1.5	30,000	1,270	25,500	1,100	19,000	700	40,000	1,360
2.0	24,000	1,160	19,000	800	14,300	600	40,000	2,000
2.5	19,000	1,000	15,300	670	11,500	510	38,000	2,400
3.0	16,000	930	13,000	600	9,600	460	32,000	2,400
3.5	13,700	930	11,400	580	8,200	450	27,300	2,400
4.0	12,000	930	10,000	570	7,200	450	24,000	2,400
5.0	9,600	930	8,000	560	5,700	450	19,000	2,400
6.0	8,000	930	6,400	540	4,800	450	16,000	2,400
8.0	6,000	900	4,800	540	3,600	450	12,000	2,400
10.0	4,800	900	3,800	540	2,900	450	9,600	2,300
12.0	4,000	900	3,200	540	2,400	450	8,000	2,100
14.0	3,400	900	2,750	540	2,050	450	6,800	2,000
16.0	3,000	900	2,400	540	1,800	450	6,000	2,000
20.0	2,400	900	1,900	520	1,450	450	4,800	2,000

[Application tip]



- Slotting depth (ap)
- ap : $0.1 \times R$ (~45HrC)
 - $0.08 \times R$ (~50HrC)



- Shouldering depth (ap) and radial depth (ae)
- $\sim 0.16 \times R$ $R \leq 0.3$ (~45HrC)
 - $\sim 0.25 \times R$ $R \leq 3$ (~45HrC)
 - $\sim 0.17 \times R$ $R \leq 4$ (~45HrC)
 - $\sim 0.05 \times R$ (~50HrC)

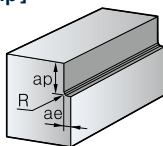
$$(R0.1 \sim 0.5 = 0.2 \times R)$$

$$0.3 \times R$$

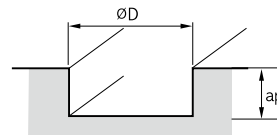
IPRE2000 Radius

Diameter ($\varnothing$)	Carbon steel, Alloy steel ~HrC30 (AISI 1049, Cast iron, SM50C, SCM)			Alloy steel, High speed steel HrC30~45 (Pre-hardened steels, STD61, NAK)			Stainless steel (STS304, STS316)		
	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
2.0	11,000	180	180	7,200	110	110	6,000	90	90
3.0	8,500	200	160	5,300	130	100	4,400	110	66
4.0	7,200	360	290	4,400	220	180	3,000	180	110
5.0	6,000	380	300	3,600	230	180	2,400	190	110
6.0	5,300	420	340	3,200	240	190	2,200	210	130
8.0	4,000	450	360	2,400	240	190	1,600	220	130
10.0	3,200	390	310	1,900	190	150	1,300	190	110
12.0	2,700	330	260	1,600	160	130	1,000	150	90

[Application tip]



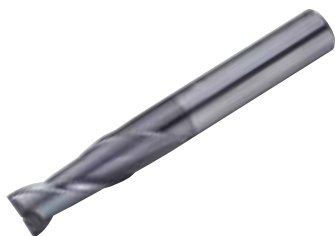
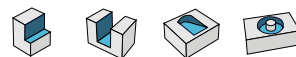
- Shouldering depth (ap) and radial depth (ae)
- ap : $\leq 1.5D$
 - ap : $\leq 0.1D$



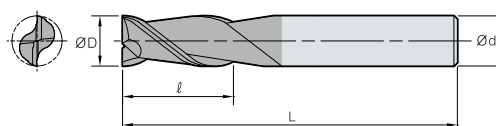
- Slotting depth (ap)
- ap : $\leq 0.3D$

Z⁺ Endmill

ZPFE2000 (Flat)



ØD	Tolerance
~ Ø11.9	0.00 ~ -0.02
Ø12 ~	0.00 ~ -0.03



(mm)

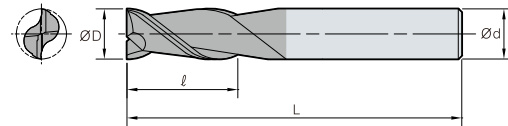
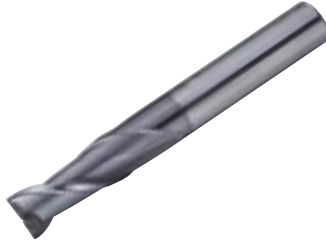
Designation		ØD	Ød	ℓ	L
ZPFE 2	2010-050-S4	1.0	4	3	50
	2015-050-S4	1.5	4	4	50
	2020-050-S4	2.0	4	6	50
	2025-050-V6S4	2.5	4	6	50
	2025-050-V8S4	2.5	4	8	50
	2030-050-S4	3.0	4	9	50
	2030-050	3.0	6	9	50
	2035-050-S4	3.5	4	9	50
	2035-050	3.5	6	9	50
	2040-050-S4	4.0	4	11	50
	2040-050	4.0	6	11	50
	2045-050	4.5	6	11	50
	2050-050	5.0	6	13	50
	2060-050	6.0	6	16	50
	2065-060	6.5	8	16	60
	2070-060	7.0	8	20	60
	2075-060	7.5	8	20	60
	2080-060	8.0	8	20	60
	2085-075	8.5	10	23	75
	2090-075	9.0	10	23	75
	2095-075	9.5	10	25	75
	2100-075	10.0	10	25	75
	2105-075	10.5	12	26	75
	2110-075	11.0	12	28	75
	2120-075	12.0	12	30	75
	2140-100	14.0	14	34	100
	2150-090	15.0	16	36	90
	2160-100	16.0	16	36	100
	2170-100	17.0	20	40	100
	2180-100	18.0	18	40	100
	2190-100	19.0	20	40	100
	2200-100	20.0	20	40	100



ZPSFE2000 (Short flat)



ØD	Tolerance
~ Ø11.9	0.00 ~ -0.02
Ø12 ~	0.00 ~ -0.03



(mm)

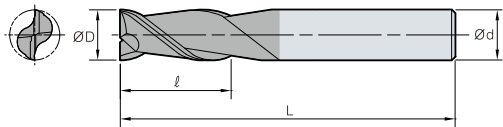
Designation	ØD	Ød	ℓ	L
ZPSFE				
2010-050-S4	1.0	4	2	50
2015-050-S4	1.5	4	2	50
2020-050-S4	2.0	4	3	50
2025-050-S4	2.5	4	4	50
2030-050-S4	3.0	4	5	50
2040-050-S4	4.0	4	6	50
2050-050	5.0	6	8	50
2060-050	6.0	6	9	50
2070-050	7.0	8	10	50
2080-050	8.0	8	12	50
2100-075	10.0	10	15	75
2120-075	12.0	12	18	75
2160-100	16.0	16	24	100

Z+ Endmill

ZPLFE2000 (Long flat)



ØD	Tolerance
~ Ø11.9	0.00 ~ - 0.02
Ø12 ~	0.00 ~ - 0.03



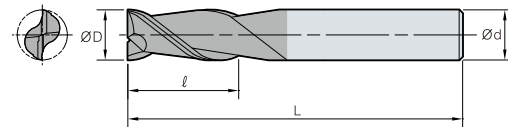
					(mm)
Designation		ØD	Ød	ℓ	L
ZPLFE 2	2020-075-S4	2.0	4	6	75
	2030-075-S4	3.0	4	9	75
	2030-075	3.0	6	12	75
	2040-075-S4	4.0	4	11	75
	2050-075	5.0	6	20	75
	2060-100	6.0	6	16	100
	2060-100-V20S6	6.0	6	20	100
	2080-075	8.0	8	20	75
	2080-100	8.0	8	25	100
	2100-100	10.0	10	30	100
	2120-100	12.0	12	35	100
	2160-150	16.0	16	36	150
	2200-150	20.0	20	45	150



ZPLFE2000 (Long flute)



ØD	Tolerance
~ Ø11.9	0.00 ~ - 0.02
Ø12 ~	0.00 ~ - 0.03

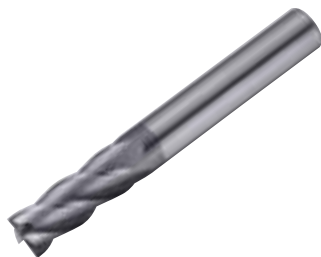
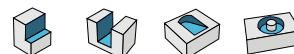


(mm)

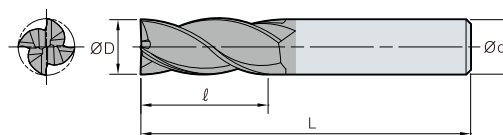
Designation		ØD	Ød	ℓ	L
ZPLFE 2	2020-075-V15S4	2.0	4	15	75
	2030-075-V25S4	3.0	4	25	75
	2040-075-V30S4	4.0	4	30	75
	2050-075-V30S6	5.0	6	30	75
	2060-075-V35S6	6.0	6	35	75
	2080-100-V40S8	8.0	8	40	100
	2100-100-V45S10	10.0	10	45	100
	2120-100-V50S12	12.0	12	50	100
	2140-100-V55S14	14.0	14	55	100
	2160-150-V50S16	16.0	16	50	150
	2160-150-V60S16	16.0	16	60	150
	2180-150-V65S18	18.0	18	65	150
	2200-150-V70S20	20.0	20	70	150

Z⁺ Endmill

ZPFE4000 (Flat)



ØD	Tolerance
~ Ø11.9	0.00 ~ -0.02
Ø12 ~	0.00 ~ -0.03



(mm)

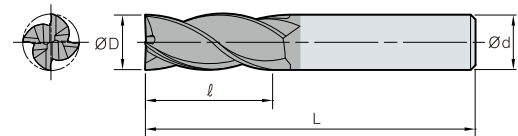
	Designation	ØD	Ød	ℓ	L
ZPFE 4	4010-050-S4	1.0	4	3	50
	4015-050-S4	1.5	4	5	50
	4015-050	1.5	6	5	50
	4020-050-S4	2.0	4	6	50
	4020-050	2.0	6	6	50
	4025-050-S4	2.5	4	8	50
	4025-050	2.5	6	8	50
	4030-050	3.0	6	6	50
	4030-050-S4	3.0	4	9	50
	4030-050-V9S6	3.0	6	9	50
	4035-050-S4	3.5	4	11	50
	4035-050	3.5	6	9	50
	4040-050-S4	4.0	4	11	50
	4040-050	4.0	6	11	50
	4045-050	4.5	6	11	50
	4050-050	5.0	6	8	50
	4050-050-V13S6	5.0	6	13	50
	4055-050	5.5	6	16	50
	4060-050	6.0	6	16	50
	4065-060	6.5	8	16	60
	4070-060	7.0	8	20	60
	4075-060	7.5	8	20	60
	4080-060	8.0	8	20	60
	4085-075	8.5	10	23	75
	4090-075	9.0	10	23	75
	4095-075	9.5	10	23	75
	4100-075	10.0	10	25	75
	4110-075	11.0	12	28	75
	4120-075	12.0	12	30	75
	4130-100	13.0	14	32	100
	4140-075	14.0	14	32	75
	4140-100	14.0	14	34	100
	4150-100	15.0	16	36	100
	4160-100	16.0	16	36	100
	4160-100-V40S16	16.0	16	40	100
	4160-100-V45S16	16.0	16	45	100
	4170-100-S18	17.0	18	38	100
	4180-100-S18	18.0	18	45	100
	4200-100-S20	20.0	20	45	100



ZPSFE4000 (Short flat)



ØD	Tolerance
~ Ø11.9	0.00 ~ - 0.02
Ø12 ~	0.00 ~ - 0.03



(mm)

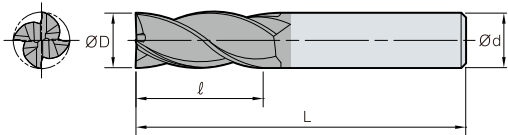
Designation		ØD	Ød	ℓ	L
ZPSFE 4	4010-050-S4	1.0	4	2	50
	4015-050-S4	1.5	4	2	50
	4020-050-S4	2.0	4	3	50
	4025-050-S4	2.5	4	4	50
	4030-050-S4	3.0	4	5	50
	4040-050-S4	4.0	4	6	50
	4050-050	5.0	6	8	50
	4060-050	6.0	6	9	50
	4070-050	7.0	8	10	50
	4080-050	8.0	8	12	50
	4100-075	10.0	10	15	75
	4120-075	12.0	12	18	75
	4160-100	16.0	16	24	100

Z⁺ Endmill

ZPLFE4000 (Long flat)



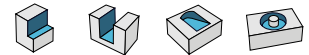
ØD	Tolerance
~ Ø11.9	0.00 ~ - 0.02
Ø12 ~	0.00 ~ - 0.03



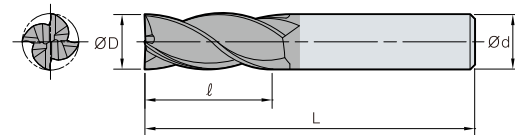
					(mm)
Designation		ØD	Ød	ℓ	L
ZPLFE 	4020-075-S4	2.0	4	10	75
	4030-075-S4	3.0	4	12	75
	4040-075-S4	4.0	4	11	75
	4040-050-V15S4	4.0	4	15	75
	4050-075	5.0	6	20	75
	4060-075	6.0	6	16	75
	4060-075-V20S6	6.0	6	20	75
	4080-075	8.0	8	20	75
	4080-100-S8	8.0	8	25	100
	4100-100	10.0	10	30	100
	4100-100-V35S10	10.0	10	35	100
	4120-100	12.0	12	35	100
	4160-150	16.0	16	36	150
	4200-150	20.0	20	45	150



ZPLFE4000 (Long flute)



ØD	Tolerance
~ Ø11.9	0.00 ~ - 0.02
Ø12 ~	0.00 ~ - 0.03

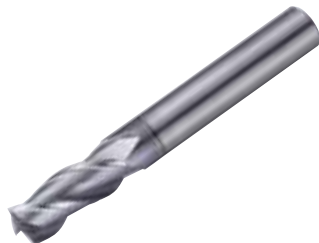
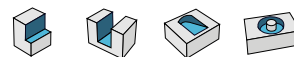


(mm)

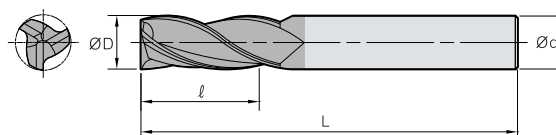
Designation	ØD	Ød	ℓ	L
ZPLFE				
 4010-050-V04S4	1.0	4	4	50
4020-050-V10S4	2.0	4	10	50
4030-060-V15S4	3.0	4	15	60
4030-060-V16S6	3.0	6	16	60
4040-060-V20S4	4.0	4	20	60
4040-075-V20S6	4.0	6	20	75
4040-075-V30S4	4.0	4	30	75
4050-075-V25S6	5.0	6	25	75
4050-075-V30S6	5.0	6	30	75
4060-075-V30S6	6.0	6	30	75
4060-075-V35S6	6.0	6	35	75
4080-100-V35S8	8.0	8	35	100
4080-100-V40S8	8.0	8	40	100
4100-100-V45S10	10.0	10	45	100
4100-100-V50S10	10.0	10	50	100
4120-100-V45S12	12.0	12	45	100
4120-100-V50S12	12.0	12	50	100
4140-100-V45S14	14.0	14	45	100
4160-150-V50S16	16.0	16	50	150
4160-150-V60S16	16.0	16	60	150
4160-150-V70S16	16.0	16	70	150
4180-150-V70S18	18.0	18	70	150
4200-150-V70S20	20.0	20	70	150

Z⁺ Endmill

ZPFE3000 (Flat)



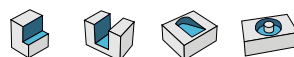
ØD	Tolerance
~ Ø11.9	0.00 ~ -0.02
Ø12 ~	0.00 ~ -0.03



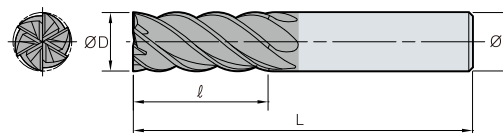
(mm)

Designation	ØD	Ød	ℓ	L
ZPFE				
 3020-050-S4	2.0	4	6	50
3030-050-S4	3.0	4	9	50
3040-050-S4	4.0	4	11	50
3050-050	5.0	6	13	50
3060-050	6.0	6	16	50
3065-060	6.5	8	16	60
3080-060	8.0	8	20	60
3095-075	9.5	10	24	75
3100-075	10.0	10	25	75
3120-075	12.0	12	30	75
3106-100	16.0	16	36	100
3180-100	18.0	18	40	100
3200-100	20.0	20	45	100
3250-100	25.0	25	50	100

ZPFE6000 (Flat)



ØD	Tolerance
~ Ø11.9	0.00 ~ -0.02
Ø12 ~	0.00 ~ -0.03



(mm)

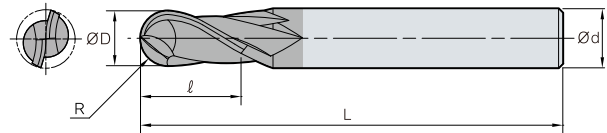
Designation	ØD	Ød	ℓ	L
ZPFE				
 6060-050	6.0	6	15	50
6080-060	8.0	8	20	60
6100-075	10.0	10	25	75
6120-075	12.0	12	30	75
6160-100	16.0	16	36	100
6200-100	20.0	20	45	100



ZPBE2000 (Ball)



ØD	Tolerance
~ Ø11.9	0.00 ~ -0.02
Ø12 ~	0.00 ~ -0.03



(mm)

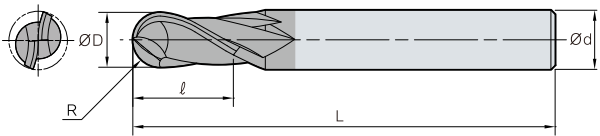
Designation		R	ØD	Ød	ℓ	L
ZPBE	2008-050-S4	0.4	0.8	4	1.6	50
	2009-050-S4	0.5	0.9	4	1.8	50
	2010-050-S4	0.5	1.0	4	2	50
	2015-050-S4	0.8	1.5	4	3	50
	2020-050-S4	1.0	2.0	4	4	50
	2020-050	1.0	2.0	6	4	50
	2025-050-S4	1.3	2.5	4	5	50
	2030-050-S4	1.5	3.0	4	6	50
	2030-050	1.5	3.0	6	6	50
	2040-050-S4	2.0	4.0	4	8	50
	2040-050	2.0	4.0	6	8	50
	2050-050	2.5	5.0	6	10	50
	2060-050	3.0	6.0	6	12	50
	2070-060	3.5	7.0	8	14	60
	2080-060	4.0	8.0	8	14	60
	2090-075	4.5	9.0	10	16	75
	2100-075	5.0	10.0	10	18	75
	2110-075	5.5	11.0	12	20	75
	2120-075	6.0	12.0	12	22	75
	2130-090	6.5	13.0	14	26	90
	2140-090	7.0	14.0	14	26	90
	2150-090	7.5	15.0	16	30	90
	2160-100	8.0	16.0	16	30	100
	2200-100	10.0	20.0	20	38	100

Z⁺ Endmill

ZPLBE2000 (Long ball)



ØD	Tolerance
~ Ø11.9	0.00 ~ - 0.02
Ø12 ~	0.00 ~ - 0.03



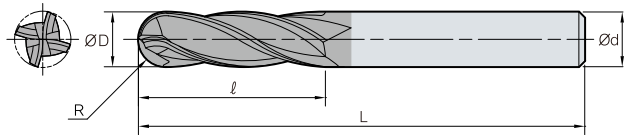
							(mm)
Designation		R	ØD	Ød	ℓ	L	
ZPLBE 	2020-075-S4	1.0	2.0	4	4	75	
	2030-075-S4	1.5	3.0	4	6	75	
	2030-075	1.5	3.0	6	6	75	
	2040-075-S4	2.0	4.0	4	8	75	
	2040-075	2.0	4.0	6	8	75	
	2050-075	2.5	5.0	6	10	75	
	2060-075	3.0	6.0	6	12	75	
	2080-100	4.0	8.0	8	14	100	
	2100-100	5.0	10.0	10	18	100	
	2120-100	6.0	12.0	12	20	100	



ZPBE4000 (Ball)



ØD	Tolerance
~ Ø11.9	0.00 ~ - 0.02
Ø12 ~	0.00 ~ - 0.03

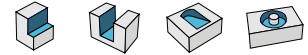


(mm)

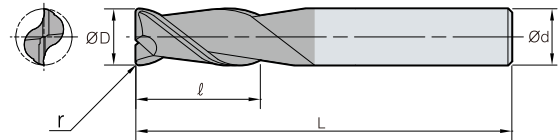
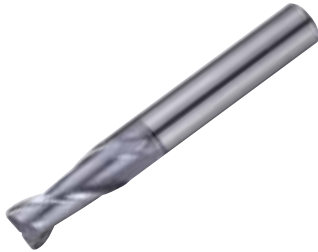
Designation	R	ØD	Ød	ℓ	L
ZPBE					
 4020-050-S4	1.0	2.0	4	4	50
4025-050-S4	1.3	2.5	4	5	50
4030-050-S4	1.5	3.0	4	6	50
4030-050	1.5	3.0	6	6	50
4040-050-S4	2.0	4.0	4	8	50
4040-050	2.0	4.0	6	8	50
4050-050	2.5	5.0	6	10	50
4060-050	3.0	6.0	6	12	50
4070-060	3.5	7.0	8	14	60
4080-060	4.0	8.0	8	14	60
4090-075	4.5	9.0	10	16	75
4100-075	5.0	10.0	10	18	75
4110-075	5.5	11.0	12	20	75
4120-075	6.0	12.0	12	22	75
4140-075	7.0	14.0	14	24	75
4160-100	8.0	16.0	16	30	100
4200-100	10.0	20.0	20	38	100

Z⁺ Endmill

ZPRE2000 (Radius)



ØD	Tolerance
~ Ø11.9	0.00 ~ -0.02
Ø12 ~	0.00 ~ -0.03



(mm)

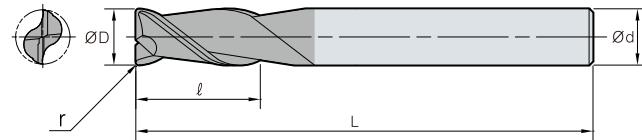
Designation		ØD	Ød	ℓ	L	r
ZPRE 2	2010-050-S4-R02	1.0	4	3	50	0.2
	2020-050-S4-R02	2.0	4	6	50	0.2
	2030-050-S4-R02	3.0	4	9	50	0.2
	2030-050-R02	3.0	6	9	50	0.2
	2030-050-S4-R03	3.0	4	9	50	0.3
	2030-050-R03	3.0	6	9	50	0.3
	2030-050-S4-R05	3.0	4	9	50	0.5
	2030-050-R05	3.0	6	9	50	0.5
	2040-050-S4-R02	4.0	4	11	50	0.2
	2040-050-R02	4.0	6	11	50	0.2
	2040-050-S4-R03	4.0	4	11	50	0.3
	2040-050-R03	4.0	6	11	50	0.3
	2040-050-S4-R05	4.0	4	11	50	0.5
	2040-050-R05	4.0	6	11	50	0.5
	2040-050-S4-R10	4.0	4	11	50	1.0
	2050-050-R02	5.0	6	13	50	0.2
	2050-050-R03	5.0	6	13	50	0.3
	2050-050-R05	5.0	6	13	50	0.5
	2050-050-R010	5.0	6	13	50	1.0
	2060-050-R05	6.0	6	16	50	0.5
	2060-050-R10	6.0	6	16	50	1.0
	2060-050-R15	6.0	6	16	50	1.5
	2060-050-R20	6.0	6	16	50	2.0
	2080-060-R03	8.0	8	20	60	0.3
	2080-060-R05	8.0	8	20	60	0.5
	2080-060-R10	8.0	8	20	60	1.0
	2080-060-R15	8.0	8	20	60	1.5
	2080-060-R20	8.0	8	20	60	2.0
	2100-075-R03	10.0	10	25	75	0.3
	2100-075-R06	10.0	10	25	75	0.6
	2100-075-R10	10.0	10	25	75	1.0
	2100-075-R15	10.0	10	25	75	1.5
	2100-075-R20	10.0	10	25	75	2.0
	2100-075-R30	10.0	10	25	75	3.0
	2120-075-R05	12.0	12	30	75	0.5
	2120-075-R10	12.0	12	30	75	1.0
	2120-075-R15	12.0	12	30	75	1.5
	2120-075-R20	12.0	12	30	75	2.0
	2120-075-R30	12.0	12	30	75	3.0
	2160-100-R10	16.0	16	36	100	1.0
	2160-100-R20	16.0	16	36	100	2.0
	2160-100-R30	16.0	16	36	100	3.0



ZPLRE2000 (Long radius)



ØD	Tolerance
~ Ø11.9	0.00 ~ -0.02
Ø12 ~	0.00 ~ -0.03

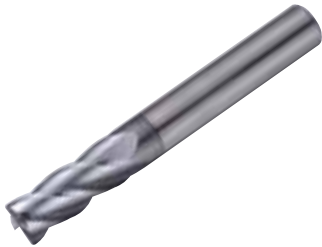
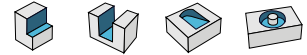


(mm)

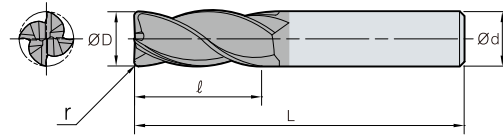
Designation		ØD	Ød	ℓ	L	r
ZPLRE 2	2060-075-R05	6.0	6	16	75	0.5
	2060-075-R10	6.0	6	16	75	1.0
	2060-075-R15	6.0	6	16	75	1.5
	2080-100-R05	8.0	8	20	100	0.5
	2080-100-R10	8.0	8	20	100	1.0
	2080-100-R15	8.0	8	20	100	1.5
	2100-100-R05	10.0	10	25	100	0.5
	2100-100-R10	10.0	10	25	100	1.0
	2100-100-R15	10.0	10	25	100	1.5
	2100-100-R20	10.0	10	25	100	2.0
	2120-100-R05	12.0	12	30	100	0.5
	2120-100-R10	12.0	12	30	100	1.0
	2120-100-R15	12.0	12	30	100	1.5
	2120-100-R20	12.0	12	30	100	2.0
	2160-150-R05	16.0	16	36	150	0.5
	2160-150-R10	16.0	16	36	150	1.0
	2160-150-R15	16.0	16	36	150	1.5
	2160-150-R20	16.0	16	36	150	2.0

Z⁺ Endmill

ZPRE4000 (Radius)



ØD	Tolerance
~ Ø11.9	0.00 ~ -0.02
Ø12 ~	0.00 ~ -0.03

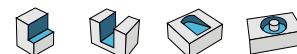


(mm)

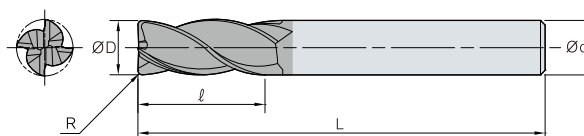
Designation		ØD	Ød	ℓ	L	r
ZPRE 4	4015-050-S4-R02	1.5	4	5	50	0.2
	4020-050-S4-R02	2.0	4	6	50	0.2
	4030-050-S4-R02	3.0	4	9	50	0.2
	4030-050-S4-R03	3.0	4	9	50	0.3
	4030-050-S4-R05	3.0	4	9	50	0.5
	4040-050-S4-R02	4.0	4	11	50	0.2
	4040-050-S4-R03	4.0	4	11	50	0.3
	4040-050-S4-R05	4.0	4	11	50	0.5
	4040-050-S4-R10	4.0	4	11	50	1.0
	4045-050-R10	4.5	6	12	50	1.0
	4050-050-R02	5.0	6	13	50	0.2
	4050-050-R05	5.0	6	13	50	0.5
	4050-050-R10	5.0	6	13	50	1.0
	4050-050-R15	5.0	6	13	50	1.5
	4060-050-R05	6.0	6	16	50	0.5
	4060-050-R10	6.0	6	16	50	1.0
	4060-050-R15	6.0	6	16	50	1.5
	4080-060-R03	8.0	8	20	60	0.3
	4080-060-R05	8.0	8	20	60	0.5
	4080-060-R10	8.0	8	20	60	1.0
	4080-060-R15	8.0	8	20	60	1.5
	4080-060-R20	8.0	8	20	60	2.0
	4100-075-R03	10.0	10	25	75	0.3
	4100-075-R05	10.0	10	25	75	0.5
	4100-075-R10	10.0	10	25	75	1.0
	4100-075-R15	10.0	10	25	75	1.5
	4100-075-R20	10.0	10	25	75	2.0
	4100-075-R25	10.0	10	25	75	2.5
	4100-075-R30	10.0	10	25	75	3.0
	4120-075-R05	12.0	12	30	75	0.5
	4120-075-R10	12.0	12	30	75	1.0
	4120-075-R15	12.0	12	30	75	1.5
	4120-075-R20	12.0	12	30	75	2.0
	4120-075-R25	12.0	12	30	75	2.5
	4120-075-R30	12.0	12	30	75	3.0
	4160-100-R05	16.0	16	36	100	0.5
	4160-100-R10	16.0	16	36	100	1.0
	4160-100-R20	16.0	16	36	100	2.0
	4160-100-R30	16.0	16	36	100	3.0



ZPLRE4000 (Long radius)



ØD	Tolerance
~ Ø11.9	0.00 ~ - 0.02
Ø12 ~	0.00 ~ - 0.03



(mm)

Designation		ØD	Ød	ℓ	L	r
ZPLRE 4	4060-075-R05	6.0	6	16	75	0.5
	4060-075-R10	6.0	6	16	75	1.0
	4060-075-R15	6.0	6	16	75	1.5
	4080-100-R05	8.0	8	20	100	0.5
	4080-100-R10	8.0	8	20	100	1.0
	4080-100-R15	8.0	8	20	100	1.5
	4080-100-R20	8.0	8	20	100	2.0
	4100-100-R05	10.0	10	25	100	0.5
	4100-100-R10	10.0	10	25	100	1.0
	4100-100-R15	10.0	10	25	100	1.5
	4100-100-R20	10.0	10	25	100	2.0
	4120-100-R05	12.0	12	30	100	0.5
	4120-100-R10	12.0	12	30	100	1.0
	4120-100-R15	12.0	12	30	100	1.5
	4120-100-R20	12.0	12	30	100	2.0
	4120-100-R30	12.0	12	30	100	3.0
	4160-150-R05	16.0	16	36	150	0.5
	4160-150-R10	16.0	16	36	150	1.0
	4160-150-R15	16.0	16	36	150	1.5
	4160-150-R20	16.0	16	36	150	2.0
	4160-150-R30	16.0	16	36	150	3.0

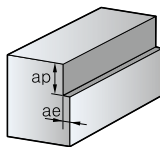
Z⁺ Endmill

Recommended cutting conditions

ZPFE2000/ZPSFE2000 Flat

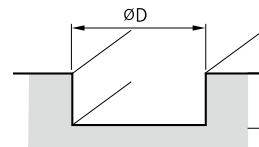
Workpiece Conditions Diameter (Ø)	Alloy steel and Carbon steel / under H _A C30 (SCM, SNCM, SM45C etc)		Pre-hardened steel / H _A C30~47 (STD, KP4M, NAK etc)		Stainless steel (STS304, STS316 etc)	
	R.P.M n (min ⁻¹)	Feed vf (mm/min)	R.P.M n (min ⁻¹)	Feed vf (mm/min)	R.P.M n (min ⁻¹)	Feed vf (mm/min)
1	19,745	175	13,057	100	10,500	70
2	11,560	190	7,560	120	6,300	90
3	8,920	210	5,560	140	4,620	120
4	7,560	300	4,620	180	3,880	150
5	6,300	320	3,780	190	3,160	160
6	5,560	350	3,360	220	2,840	180
8	4,200	380	2,520	200	2,100	180
10	3,260	330	2,000	160	1,680	160
12	2,740	280	1,680	130	1,360	130
16	2,200	220	1,360	110	1,060	110

[Application tip]



■ Shouldering depth (ap)

- $D \leq \varnothing 2.5$ ($ap = 1.3D$, $ae = 0.05D$)
- $D > \varnothing 2.5$ ($ap = 1.5D$, $ae = 0.1D$)



■ Slotting depth (ap)

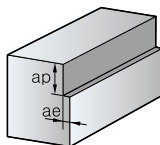
- $D \leq \varnothing 2.5$ ($ap = 0.3D$)
- $D > \varnothing 2.5$ ($ap = 0.5D$)

※ Workpiece should be clamped rigidly. In case of vibrations, reduce RPM and feed rate by the same ratio

ZPFE4000/ZPSFE4000 Flat

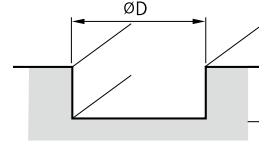
Workpiece Conditions Diameter (Ø)	Alloy steel and Carbon steel / under H _A C30 (SCM, SNCM, SM45C etc)		Pre-hardened steel / H _A C30~47 (STD, KP4M, NAK etc)		Stainless steel (STS304, STS316 etc)	
	R.P.M n (min ⁻¹)	Feed vf (mm/min)	R.P.M n (min ⁻¹)	Feed vf (mm/min)	R.P.M n (min ⁻¹)	Feed vf (mm/min)
2	11,560	280	7,560	170	6,300	140
3	8,920	320	5,560	200	4,620	170
4	7,560	570	4,620	350	3,880	280
5	6,300	600	3,780	360	3,160	300
6	5,560	660	3,360	410	2,840	330
8	4,200	710	2,520	380	2,100	350
10	3,260	610	2,000	300	1,680	300
12	2,740	520	1,680	250	1,360	240
16	2,200	410	1,360	200	1,100	200

[Application tip]



■ Shouldering depth (ap)

- $D \leq \varnothing 2.5$ ($ap = 1.3D$, $ae = 0.05D$)
- $D > \varnothing 2.5$ ($ap = 1.5D$, $ae = 0.1D$)



■ Slotting depth (ap)

- $D \leq \varnothing 2.5$ ($ap = 0.3D$)
- $D > \varnothing 2.5$ ($ap = 0.5D$)

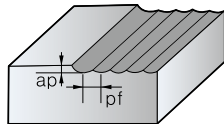
※ Workpiece should be clamped rigidly. In case of vibrations, reduce RPM and feed rate by the same ratio



➡ ZPBE2000 Ball

Workpiece Conditions Diameter (Ø)	Alloy steel and Carbon steel / under H _{RC} 30 (SCM, SNCM, SM45C etc)		Pre-hardened steel / H _{RC} 30~47 (STD, KP4M, CENA, NAK etc)	
	R.P.M n (min ⁻¹)	Feed vf (mm/min)	R.P.M n (min ⁻¹)	Feed vf (mm/min)
1	30,000	2,880	30,000	2,520
1.2	30,000	3,060	28,800	2,580
1.5	30,000	3,240	28,800	2,700
2	29,820	3,420	28,680	2,880
3	19,860	3,600	19,080	3,180
4	14,940	3,600	14,340	3,180
5	11,160	3,480	10,680	2,940
6	8,340	2,910	8,040	2,460
8	6,660	2,520	6,420	2,100
10	5,580	2,220	5,340	1,860
12	4,170	1,770	4,008	1,500

[Application tip]



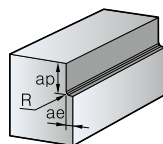
- $ap = 0.03D$
- $pf = 0.05D$

※ Workpiece should be clamped rigidly. In case of vibrations, reduce RPM and feed rate by the same ratio

➡ ZPRE2000 Radius

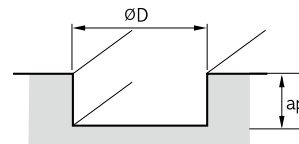
Workpiece Conditions Diameter (Ø)	Alloy steel and Carbon steel / under H _{RC} 30 (SCM, SNCM, SM45C etc)		Pre-hardened steel / H _{RC} 30~47 (STD, KP4M, NAK etc)		Stainless steel (STS304, STS316 etc)	
	R.P.M n (min ⁻¹)	Feed vf (mm/min)	R.P.M n (min ⁻¹)	Feed vf (mm/min)	R.P.M n (min ⁻¹)	Feed vf (mm/min)
6	5,300	420	3,200	240	2,400	180
8	4,000	450	2,700	210	2,040	150
10	3,200	390	2,400	180	1,600	120
12	2,700	330	2,040	150	1,300	100
14	2,400	270	1,600	120	1,000	70
16	2,040	200	1,300	100	1,300	60

[Application tip]



■ Shouldering depth (ap)

- $ap \leq 1.5D$
- $ae \leq 0.1D$



■ Slotting depth (ap)

- $ap \leq 0.3D$

※ Workpiece should be clamped rigidly. In case of vibrations, reduce RPM and feed rate by the same ratio

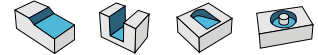
➡ Notice

- Please adjust the recommended cutting conditions properly, according to the condition of your machines, the target shapes, and your purpose for machining
- Workpiece should be clamped rigidly. In case of vibrations, reduce RPM and feed rate by the same ratio
- In case of overhang over 3D, reduce RPM and feed rate

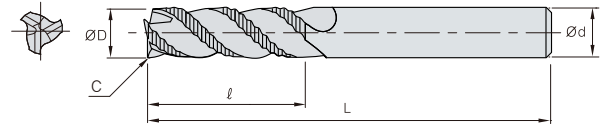
R⁺ Endmill

RPAE (Roughing Endmill for Wave Form of AI)

• Carbide Endmill



ØD	Tolerance
Ø6 ~ Ø10	0.00 ~ -0.058
Ø10 ~ Ø18	0.00 ~ -0.070
Ø18 ~ Ø25	0.00 ~ -0.084

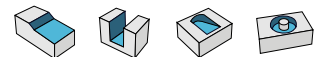


(mm)

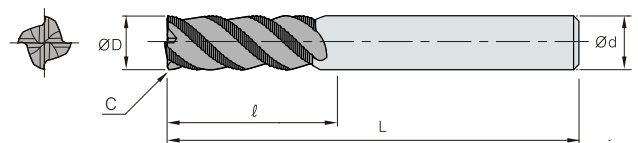
Designation	ØD	Ød	ℓ	L	C
RPAE					
 3060-063	6.0	6	18	63	0.3
3070-063	7.0	8	23	63	0.3
3080-063	8.0	8	23	63	0.3
3090-080	9.0	10	30	80	0.3
3100-080	10.0	10	30	80	0.3
3110-080	11.0	12	32	80	0.5
3120-080	12.0	12	32	80	0.5
3140-080	14.0	14	32	80	0.5
3160-105	16.0	16	48	105	0.5
3180-105	18.0	18	48	105	0.5
3200-105	20.0	20	50	105	0.5
3250-105	25.0	25	50	105	0.5

RPE-FP-H (Standard Roughing Endmill for Fine Pitches)

• High-helix carbide Endmill with irregular flute spacing and lead



ØD	Tolerance
Ø5 ~ Ø20	0.00 ~ -0.05



(mm)

Designation	ØD	Ød	ℓ	L	C
RPE					
 4050-057-FP-H	5.0	6	13	57	0.3
4060-057-FP-H	6.0	6	13	57	0.5
4080-063-FP-H	8.0	8	19	63	0.5
4100-072-FP-H	10.0	10	22	72	0.5
4120-082-FP-H	12.0	12	26	82	0.5
4140-082-FP-H	14.0	16	26	82	0.6
4160-092-FP-H	16.0	16	32	92	0.6
4180-092-FP-H	18.0	20	32	92	0.6
4200-0104-FP-H	20.0	20	38	104	0.6

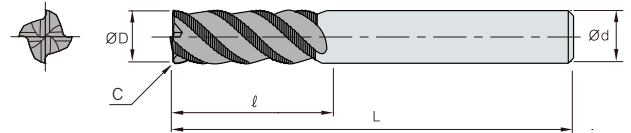


RPLE-FP-H (Long Type Roughing Endmill for Fine Pitches)

- High-helix carbide Endmill with irregular flute spacing and lead



ØD	Tolerance
Ø5 ~ Ø20	0.00 ~ -0.05



(mm)

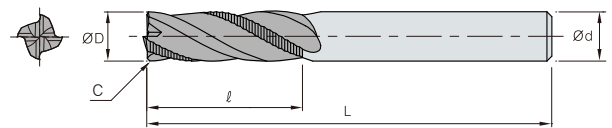
Designation	ØD	Ød	ℓ	L	C
RPLE					
4050-063-FP-H	5.0	6	19	63	0.3
4060-063-FP-H	6.0	8	19	63	0.5
4080-072-FP-H	8.0	8	28	72	0.5
4100-082-FP-H	10.0	10	34	82	0.5
4120-097-FP-H	12.0	12	40	97	0.5
4140-097-FP-H	14.0	16	40	97	0.6
4160-108-F P-H	16.0	16	48	108	0.6
4180-108-FP-H	18.0	20	48	108	0.6
4200-122-FP-H	20.0	20	56	122	0.6

RPE-XG (Roughing Endmill with Finishing Capability)

- Carbide Endmill



ØD	Tolerance
Ø6 ~ Ø10	0.00 ~ -0.058
Ø10 ~ Ø18	0.00 ~ -0.070
Ø18 ~ Ø20	0.00 ~ -0.084



(mm)

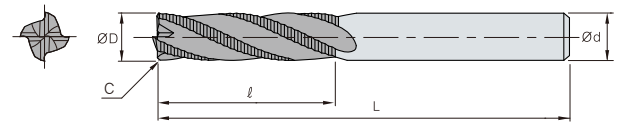
Designation	ØD	Ød	ℓ	L	C
RPE					
4060-052-XG	6.0	6	14	52	0.25
4070-063-XG	7.0	8	18	63	0.3
4080-063-XG	8.0	8	18	63	0.3
4090-080-XG	9.0	10	22	80	0.3
4100-080-XG	10.0	10	22	80	0.3
4110-080-XG	11.0	12	26	80	0.4
4120-080-XG	12.0	12	26	80	0.4
4140-080-XG	14.0	14	30	80	0.4
4160-105-XG	16.0	16	34	105	0.6
4180-105-XG	18.0	18	38	105	0.6
4200-105-XG	20.0	20	42	105	0.6

R⁺ Endmill**RPE-FP-L (Roughing Endmill for Fine Pitches)**

- High-helix carbide Endmill with irregular flute spacing and lead



ØD	Tolerance
Ø5 ~ Ø20	0.00 ~ -0.05



(mm)

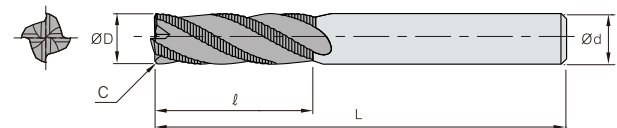
Designation	ØD	Ød	l	L	C
RPE 4050-060-FP-L	5.0	6	13	60	0.3
4060-080-FP-L	6.0	8	13	80	0.5
4080-080-FP-L	8.0	8	19	80	0.5
4100-080-FP-L	10.0	10	22	80	0.5
4120-080-FP-L	12.0	12	26	80	0.5
4140-085-FP-L	14.0	16	26	85	0.6
4160-100-FP-L	16.0	16	32	100	0.6
4180-100-FP-L	18.0	20	32	100	0.6
4200-105-FP-L	20.0	20	38	105	0.6

RPE-RG (Standard Roughing Endmill)

- Carbide Endmill



ØD	Tolerance
Ø5 ~ Ø20	0.00 ~ -0.05



(mm)

Designation	ØD	Ød	l	L	C
RPE 4050-050-RG	5.0	6	13	50	0.3
4060-050-RG	6.0	6	16	50	0.3
4080-060-RG	8.0	8	20	60	0.3
4100-075-RG	10.0	10	25	75	0.3
4120-080-RG	12.0	12	30	80	0.4
4140-100-RG	14.0	16	35	100	0.6
4160-100-RG	16.0	16	40	100	0.6
4180-110-RG	18.0	20	40	110	0.6
4200-110-RG	20.0	20	45	110	0.6

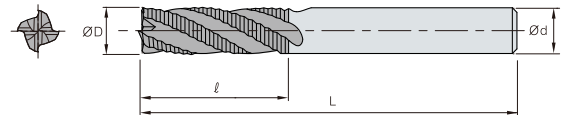


RPE-RG (4F Roughing Endmill)

• HSS PM Endmill



ØD	Tolerance
Ø6 ~ Ø10	±0.075
Ø10 ~ Ø18	±0.090
Ø18 ~ Ø20	±0.105



(mm)

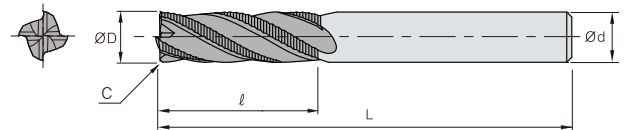
Designation	ØD	Ød	ℓ	L
RPE 4060-060-RG	6.0	6	20	60
4070-070-RG	7.0	10	20	70
4080-075-RG	8.0	10	25	75
4090-075-RG	9.0	10	30	75
4100-085-RG	10.0	10	35	85
4120-100-RG	12.0	12	40	100
4140-100-RG	14.0	16	40	100
4160-110-RG	16.0	16	50	110
4180-110-RG	18.0	20	50	110
4200-125-RG	20.0	20	60	125

RPE-FF (Roughing Endmill for Fine Pitches)

• HSS PM Endmill with irregular flute spacing



ØD	Tolerance
Ø6 ~ Ø10	±0.075
Ø10 ~ Ø18	±0.090
Ø18 ~ Ø20	±0.105

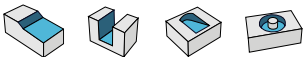


(mm)

Designation	ØD	Ød	ℓ	L	C
RPE 4060-060-FF	6.0	6	20	60	0.5
4070-070-FF	7.0	10	20	70	0.5
4080-075-FF	8.0	10	25	75	0.5
4090-075-FF	9.0	10	30	75	0.5
4100-085-FF	10.0	10	35	85	0.5
4120-100-FF	12.0	12	40	100	0.6
4140-100-FF	14.0	12	40	100	0.6
4160-110-FF	16.0	16	50	110	0.6
4180-110-FF	18.0	16	50	110	0.6
4200-125-FF	20.0	20	60	125	0.6

R+ Endmill

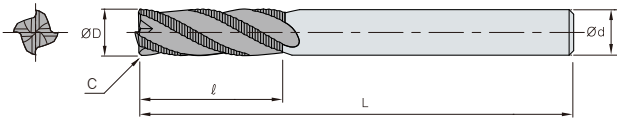
RPE-FP (Roughing Endmill for Fine Pitches)



• HSS PM Endmill with irregular flute spacing and lead



ØD	Tolerance
Ø6 ~ Ø10	±0.075
Ø10 ~ Ø18	±0.090
Ø18 ~ Ø20	±0.105



(mm)						
Designation		ØD	Ød	l	L	C
RPE 4	4060-080-FP	6.0	6	13	80	0.5
	4070-080-FP	7.0	10	16	80	0.5
	4080-085-FP	8.0	10	19	85	0.5
	4090-095-FP	9.0	10	19	95	0.5
	4100-100-FP	10.0	10	22	100	0.5
	4120-110-FP	12.0	12	26	110	0.6
	4140-110-FP	14.0	12	26	110	0.6
	4160-125-FP	16.0	16	32	125	0.6
	4180-125-FP	18.0	16	32	125	0.6
	4200-140-FP	20.0	20	38	140	0.6

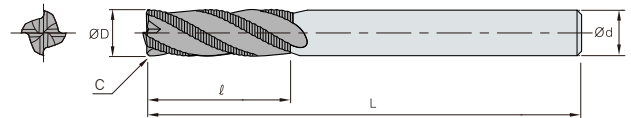


RPE-RG (Roughing Endmill)

• HSS Endmill



ØD	Tolerance
Ø6 ~ Ø10	±0.075
Ø10 ~ Ø18	±0.090
Ø18 ~ Ø20	±0.105



(mm)

Designation	ØD	Ød	ℓ	L
RPE				
4060-060-RG	6.0	6	15	60
4070-065-RG	7.0	8	20	65
4080-065-RG	8.0	8	20	65
4090-075-RG	9.0	10	25	75
4100-075-RG	10.0	10	25	75
4110-080-RG	11.0	12	30	80
4120-080-RG	12.0	12	30	80
4130-090-RG	13.0	12	35	90
4140-090-RG	14.0	12	35	90
4150-095-RG	15.0	12	40	95
4160-095-RG	16.0	16	40	95
4170-095-RG	17.0	16	40	95
4180-105-RG	18.0	16	40	105
4190-110-RG	19.0	16	45	110
4200-110-RG	20.0	20	45	110
4210-110-RG	21.0	20	45	110
4220-110-RG	22.0	20	45	110
4230-110-RG	23.0	20	45	110
4240-120-RG	24.0	25	50	120
4250-120-RG	25.0	25	50	120
4260-120-RG	26.0	25	50	120
4270-125-RG	27.0	25	55	125
4280-125-RG	28.0	25	55	125
4300-125-RG	30.0	25	55	125
4320-145-RG	32.0	32	60	145
4340-145-RG	34.0	32	60	145
4350-145-RG	35.0	32	60	145
4360-145-RG	36.0	32	60	145
4380-150-RG	38.0	32	65	150
4400-150-RG	40.0	32	65	150
4420-155-RG	42.0	42	65	155
4440-155-RG	44.0	42	65	155
4450-160-RG	45.0	42	70	160
4460-160-RG	46.0	42	70	160
4500-160-RG	50.0	42	70	160

R⁺ Endmill

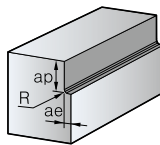
Recommended cutting conditions

RPAE

* For Carbide

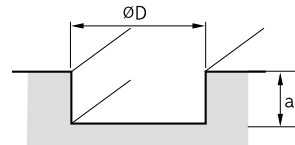
구 분 Workpiece Conditions Diameter (Ø)	Shouldering				Slotting			
	Aluminum alloy (A7075)		Aluminum alloy (cast) (AC4B)		Aluminum alloy (A7075)		Aluminum alloy (cast) (AC4B)	
	R.P.M n (min ⁻¹)	Feed vf (mm/min)	R.P.M n (min ⁻¹)	Feed vf (mm/min)	R.P.M n (min ⁻¹)	Feed vf (mm/min)	R.P.M n (min ⁻¹)	Feed vf (mm/min)
6	13,500	6,000	10,800	4,800	10,500	3,800	8,400	3,100
8	10,500	4,700	8,400	3,800	8,000	3,000	6,400	2,400
10	8,500	3,800	6,800	3,100	6,500	2,500	5,200	2,000
12	6,800	3,050	5,500	2,500	5,250	2,000	4,200	1,600
14	5,800	2,600	4,700	2,100	4,500	1,700	3,600	1,400
16	5,200	2,350	4,200	1,900	4,000	1,500	3,200	1,200
18	4,700	2,100	3,800	1,700	3,550	1,300	2,900	1,100
20	4,200	1,900	3,400	1,600	3,200	1,200	2,600	1,000
25	3,400	1,500	2,800	1,200	2,550	1,000	2,100	800

[Application tip]



■ Shouldering depth (ap)

- ap : ≤ 1.5D
- ae : ≤ 0.5D



■ Slotting depth (ap)

- ap : ≤ 1.5D

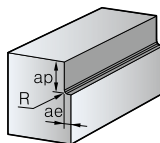
※ Workpiece should be clamped rigidly. In case of vibrations, reduce RPM and feed rate by the same ratio

RP (L)E-FP-H

* For Carbide

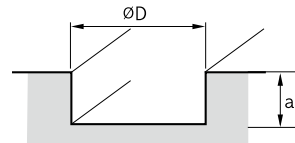
구 분 Workpiece Conditions Diameter (Ø)	Alloy steel, Carbon steel (≤HrC25)		Alloy steel, Carbon steel, Pre-hardened steel (HrC25~HrC40)		Alloy steel, Carbon steel (≤HrC25)		Alloy steel, Carbon steel, Pre-hardened steel (HrC25~HrC40)	
	R.P.M n (min ⁻¹)	Feed vf (mm/min)	R.P.M n (min ⁻¹)	Feed vf (mm/min)	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)	R.P.M n (min ⁻¹)	Feed vf (mm/min)	R.P.M n (min ⁻¹)	Feed vf (mm/min)
6	12,000	1,550	10,600	1,100	15,800	2,570	14,300	1,850
8	9,000	1,650	8,100	1,180	11,900	2,700	10,700	1,950
10	7,200	1,650	6,400	1,180	9,500	2,700	8,500	1,950
12	6,000	1,540	5,400	1,140	8,000	2,570	7,100	1,850
14	5,200	1,540	4,750	1,095	7,000	2,510	6,250	1,800
16	4,500	1,540	4,100	1,050	6,000	2,450	5,400	1,750
18	4,400	1,435	3,650	975	5,400	2,295	4,850	1,625
20	3,600	1,330	3,200	900	4,800	2,140	4,300	1,500
25	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

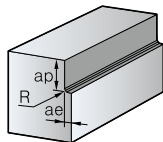


RPE-XG

*For Carbide

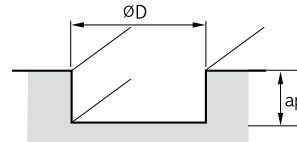
Workpiece Conditions Diameter (Ø)	Alloy steel, Carbon steel (≤HRC25)		Alloy steel, Carbon steel, Pre-hardened steel (HRC25~HRC40)		Alloy steel, Carbon steel (≤HRC25)		Alloy steel, Carbon steel, Pre-hardened steel (HRC25~HRC40)	
	R.P.M n (min ⁻¹)	Feed vf (mm/min)	R.P.M n (min ⁻¹)	Feed vf (mm/min)	R.P.M n (min ⁻¹)	Feed vf (mm/min)	R.P.M n (min ⁻¹)	Feed vf (mm/min)
6	12,000	1,090	10,600	770	15,800	1,800	14,300	1,300
8	9,000	1,160	8,100	830	11,900	1,890	10,700	1,370
10	7,200	1,160	6,400	830	9,500	1,890	8,500	1,370
12	6,000	1,080	5,400	800	8,000	1,800	7,100	1,300
14	5,200	1,080	4,750	770	7,000	1,760	6,250	1,260
16	4,500	1,080	4,100	740	6,000	1,720	5,400	1,230
18	4,400	1,000	3,650	680	5,400	1,610	4,850	1,140
20	3,600	930	3,200	630	4,800	1,500	4,300	1,050
25	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)

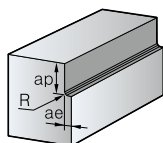
※ Workpiece should be clamped rigidly. In case of vibrations, reduce RPM and feed rate by the same ratio

RPE-FP-L

*For Carbide

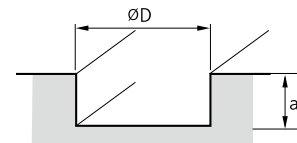
Workpiece Conditions Diameter (Ø)	Alloy steel, Carbon steel (≤HRC35)		Pre-hardened steel (HRC35~HRC45)		High hardened steel (HRC45~HRC55)	
	R.P.M n (min ⁻¹)	Feed vf (mm/min)	R.P.M n (min ⁻¹)	Feed vf (mm/min)	R.P.M n (min ⁻¹)	Feed vf (mm/min)
6	12,400	840	8,400	570	3,400	260
8	9,200	840	6,300	570	2,400	240
10	7,600	840	5,100	570	2,000	290
12	6,000	840	4,200	570	1,680	260
14	5,200	840	3,600	570	1,400	200
16	4,800	760	3,300	510	1,200	160
18	4,400	720	2,700	420	1,100	150
20	3,600	560	2,400	360	1,000	150
25	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

R⁺ Endmill

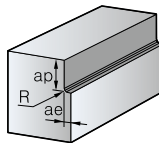
Recommended cutting conditions

RPE-RG

* For Carbide

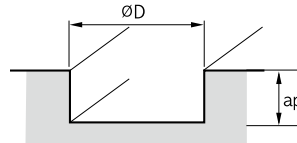
Workpiece Conditions Diameter (Ø)	Alloy steel, Carbon steel (≤HRC25)		Alloy steel, Carbon steel, Pre-hardened steel (HRC25~HRC40)		Alloy steel, Carbon steel (≤HRC25)		Alloy steel, Carbon steel, Pre-hardened steel (HRC25~HRC40)	
	R.P.M n (min ⁻¹)	Feed vf (mm/min)	R.P.M n (min ⁻¹)	Feed vf (mm/min)	R.P.M n (min ⁻¹)	Feed vf (mm/min)	R.P.M n (min ⁻¹)	Feed vf (mm/min)
6	12,000	1,240	10,600	800	15,800	2,060	14,300	1,480
8	9,000	1,320	8,100	940	11,900	2,160	10,700	1,560
10	7,200	1,320	6,400	940	9,500	2,160	8,500	1,560
12	6,000	1,230	5,400	910	8,000	2,060	7,100	1,480
14	5,200	1,230	4,750	880	7,000	2,010	6,250	1,440
16	4,500	1,230	4,100	840	6,000	1,960	5,400	1,400
18	4,400	1,150	3,650	780	5,400	1,840	4,850	1,300
20	3,600	1,060	3,200	720	4,800	1,710	4,300	1,200
25	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)

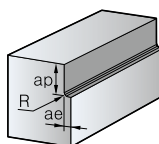
※ Workpiece should be clamped rigidly. In case of vibrations, reduce RPM and feed rate by the same ratio

RPE-RG

* For HSS Co

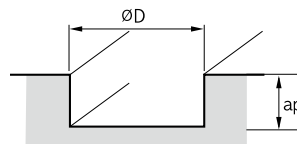
Workpiece Conditions Diameter (Ø)	Alloy steel, Carbon steel, Tool steel		Alloy steel, Carbon steel, Tool steel (≤HRC20)		Alloy steel, Carbon steel, Tool steel (HRC20~HRC30)		Alloy steel, Carbon steel, Tool steel (HRC30~HRC40)	
	R.P.M n (min ⁻¹)	Feed vf (mm/min)	R.P.M n (min ⁻¹)	Feed vf (mm/min)	R.P.M n (min ⁻¹)	Feed vf (mm/min)	R.P.M n (min ⁻¹)	Feed vf (mm/min)
6	1,800	80	1,600	60	1,200	55	800	30
8	1,400	105	1,100	75	900	65	560	45
10	1,100	150	900	120	800	110	450	60
12	900	180	800	140	630	110	400	70
14	800	180	700	140	560	110	350	70
16	700	180	560	140	450	110	280	70
18	630	180	500	140	400	110	250	70
20	560	180	450	140	400	110	220	70
22	500	220	450	170	350	140	220	70
25	450	220	400	170	310	140	180	85
28	400	210	350	160	280	130	160	85
30	350	210	310	160	250	130	160	85
32	350	210	280	160	220	130	140	85
36	310	210	250	160	200	130	120	85
40	280	200	220	150	180	120	110	80
50	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

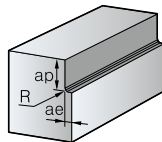


➡ RPE-FF, FP, RG

* For HSS PM

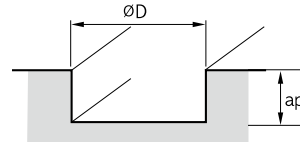
Workpiece Conditions Diameter (Ø)	Alloy steel, Carbon steel, Tool steel		Alloy steel, Carbon steel, Tool steel (≤HRC20)		Alloy steel, Carbon steel, Tool steel (HRC20~HRC30)		Alloy steel, Carbon steel, Tool steel (HRC30~HRC40)	
	R.P.M n (min ⁻¹)	Feed vf (mm/min)	R.P.M n (min ⁻¹)	Feed vf (mm/min)	R.P.M n (min ⁻¹)	Feed vf (mm/min)	R.P.M n (min ⁻¹)	Feed vf (mm/min)
6	2,700	200	2,100	155	1,500	100	1,250	90
8	2,300	250	1,800	200	1,300	140	1,000	110
10	1,800	360	1,400	275	1,000	170	850	140
12	1,500	360	1,150	290	850	200	700	155
14	1,300	360	1,000	290	720	200	600	155
16	1,150	360	900	290	625	200	520	155
18	1,000	360	850	290	580	200	470	155
20	920	370	720	290	500	200	420	155
22	850	370	620	290	450	200	380	155
25	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

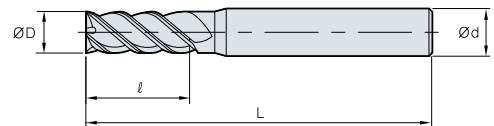
※ Workpiece should be clamped rigidly. In case of vibrations, reduce RPM and feed rate by the same ratio

S⁺ Endmill

SPFE4000 (Flat)



ØD	Tolerance
Ø1~Ø12	0.00 ~ -0.02



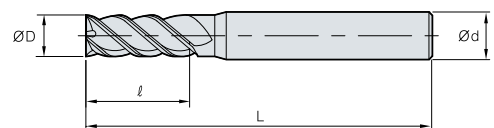
(mm)

	Designation	ØD	Ød	ℓ	L
SPFE 	4010-050	1.0	4	3	50
	4015-050	1.5	4	4	50
	4020-050	2.0	4	6	50
	4025-050	2.5	4	8	50
	4030-050	3.0	4	9	50
	4030-050-S6	3.0	6	9	50
	4040-050	4.0	4	11	50
	4040-050-S6	4.0	6	11	50
	4050-050	5.0	6	13	50
	4060-050	6.0	6	16	50
	4080-060	8.0	8	20	60
	4100-075	10.0	10	30	75
	4120-075	12.0	12	32	75

SPLFE4000 (Long flat)



ØD	Tolerance
Ø1~Ø12	0.00 ~ -0.02



(mm)

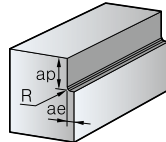
	Designation	ØD	Ød	ℓ	L
SPLFE 	4010-050	1.0	4	4	50
	4015-050	1.5	4	6	50
	4020-050	2.0	4	8	50
	4025-050	2.5	4	10	50
	4030-050-S6	3.0	6	12	50
	4040-050-S6	4.0	6	16	50
	4050-060	5.0	6	20	60
	4060-060	6.0	6	24	60
	4080-075	8.0	8	35	75
	4100-100	10.0	10	45	100
	4120-100	12.0	12	45	100



Recommended cutting conditions

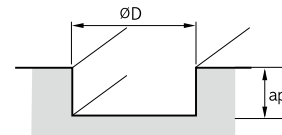
Workpiece Conditions Diameter (Ø)	Stainless steel STS		Titanium alloy /Inconel		Normal steel (SS, SM) (Under HRC 25)		Alloy steel (SCM) (HRC 25~35)		Hardened steel (STD) (HRC 40~50)	
	R.P.M n (min ⁻¹)	Feed vf (mm/min)	R.P.M n (min ⁻¹)	Feed vf (mm/min)	R.P.M n (min ⁻¹)	Feed vf (mm/min)	R.P.M n (min ⁻¹)	Feed vf (mm/min)	R.P.M n (min ⁻¹)	Feed vf (mm/min)
2	5,500	240	2,600	90	9,000	540	6,000	3,200	4,000	240
4	4,000	260	2,000	90	6,600	600	4,500	340	3,000	280
6	3,000	360	1,200	90	4,800	720	3,000	360	2,500	280
8	2,000	390	1,000	100	3,600	750	2,200	460	2,000	300
10	1,700	410	800	120	2,800	750	1,800	460	1,500	300
12	1,500	380	700	100	2,400	710	1,500	410	1,200	280
14	1,200	320	600	95	2,200	660	1,300	370	1,000	270
16	1,000	270	500	90	1,800	490	1,100	320	800	230
20	750	250	400	85	900	270	900	270	600	200

[Application tip]



■ Shouldering depth (ap) and radial depth (ae)

- Normal steel, Alloy steel, Stainless steel: $ae = 0.1D$, $ap = 1.5D$
- Titanium alloy, Inconel, Hardened steel: $ae = 0.05D$, $ap = 1.5D$



■ Slotting depth (ap)

- Normal steel, Alloy steel: $ap = 1.0D$
- Stainless steel: $ap = 0.3D$
- Titanium alloy, Inconel, Hardened steel: $ap = 0.2D$

➡ Stainless steel machining

- Low thermal conductivity of stainless steel alloy causes conducting heat to the tool and fracture and chipping
- Stainless steel alloy machining gets produces 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⁺ Endmill

APFE2000/3000 (Flat)



ØD	Tolerance
Ø1~Ø12	0.00 ~ -0.02
Ø12.1~Ø20	0.00 ~ -0.03

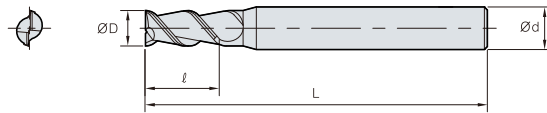


Fig. 1

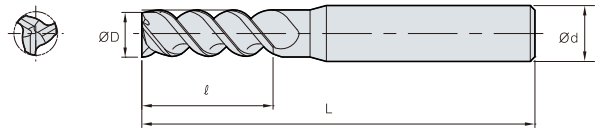


Fig. 2

(mm)

Designation		ØD	Ød	ℓ	L	Fig.
APFE 2	2010-050-S6	1	6	3	50	1
	2015-050-S6	1.5	6	4	50	1
	2020-050-S4	2	4	6	50	1
	2025-050	2.2	6	8	50	1
	2030-050	3.0	6	9	50	1
	2040-050	4.0	6	12	50	1
	2050-050	5.0	6	15	50	1
	2060-050	6.0	6	18	50	1
	2080-060	8.0	8	20	60	1
	2100-075	10.0	10	30	75	1
	2120-075	12.0	12	32	75	1
	2160-100	16.0	16	45	100	1
	2200-100	20.0	20	45	100	1
APFE 3	3010-050-S4	1	4	3	50	2
	3015-050-S4	1.5	4	4	50	2
	3020-050-S4	2	4	6	50	2
	3025-050	2.5	6	8	50	2
	3030-050	3.0	6	9	50	2
	3040-050	4.0	6	12	50	2
	3050-050	5.0	6	15	50	2
	3060-050	6.0	6	18	50	2
	3080-060	8.0	8	20	60	2
	3100-075	10.0	10	30	75	2
	3120-075	12.0	12	32	75	2
	3160-100	16.0	16	45	100	2
	3200-100	20.0	20	45	100	2



APMFE2000/3000 (Middle flat)



ØD	Tolerance
Ø1~Ø12	0.00 ~ -0.02
Ø12.1~Ø20	0.00 ~ -0.03

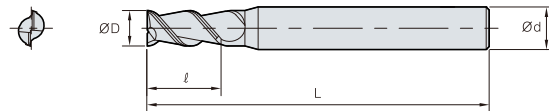


Fig. 1

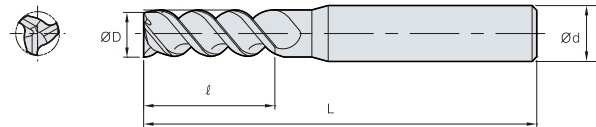


Fig. 2

(mm)

Designation		ØD	Ød	ℓ	L	Fig.
APMFE	2030-060	3.0	6	11	60	1
	2040-060	4.0	6	14	60	1
	2050-060	5.0	6	17	60	1
	2060-065	6.0	6	22	65	1
	2080-065	8.0	8	25	65	1
	2100-080	10.0	10	37	80	1
	2120-080	12.0	12	40	80	1
	2160-110	16.0	16	55	110	1
	2200-125	20.0	20	60	125	1
APLFE	3030-060	3.0	6	11	60	2
	3040-060	4.0	6	14	60	2
	3050-060	5.0	6	17	60	2
	3060-075	6.0	6	22	65	2
	3080-075	8.0	8	25	65	2
	3100-100	10.0	10	37	80	2
	3120-100	12.0	12	40	80	2
	3160-150	16.0	16	55	110	2
	3200-150	20.0	20	60	125	2

A⁺ Endmill

APLFE2000/3000 (Long flat)



ØD	Tolerance
Ø1~Ø12	0.00 ~ -0.02
Ø12.1~Ø20	0.00 ~ -0.03

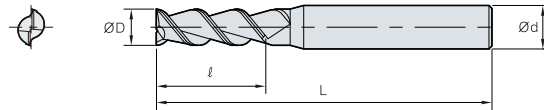


Fig. 1

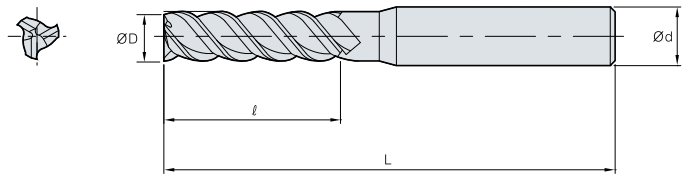


Fig. 2

(mm)

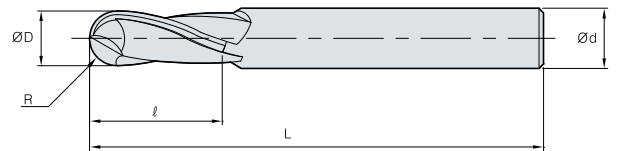
Designation		ØD	Ød	ℓ	L	그림
APLFE 2	2030-060	3.0	6	12	60	1
	2040-060	4.0	6	16	60	1
	2050-060	5.0	6	20	60	1
	2060-075	6.0	6	25	75	1
	2080-075	8.0	8	32	75	1
	2100-100	10.0	10	45	100	1
	2120-100	12.0	12	45	100	1
	2160-150	16.0	16	65	150	1
	2200-150	20.0	20	75	150	1
APLFE 3	3030-060	3.0	6	12	60	2
	3040-060	4.0	6	16	60	2
	3050-060	5.0	6	20	60	2
	3060-075	6.0	6	25	75	2
	3080-075	8.0	8	32	75	2
	3100-100	10.0	10	45	100	2
	3120-100	12.0	12	45	100	2
	3160-150	16.0	16	65	150	2
	3200-150	20.0	20	75	150	2



APBE2000 (Ball)



ØD	Tolerance
Ø1~Ø12	0.00 ~ -0.02



(mm)

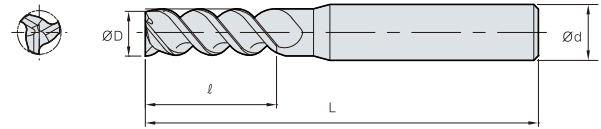
Designation		ØD	Ød	l	L
APBE	2010-050	1.0	4	2	50
	2015-050	1.5	4	3	50
	2020-050	2.0	4	4	50
	2025-050	2.5	4	5	50
	2030-050	3.0	4	6	50
	2035-050	3.5	4	7	50
	2040-050	4.0	4	8	50
	2045-050	4.5	6	9	50
	2050-050	5.0	6	10	50
	2055-050	5.5	6	11	50
	2060-050	6.0	6	12	50
	2080-060	8.0	8	16	60
	2100-075	10.0	10	20	75
	2120-075	12.0	12	24	75

A⁺ Endmill

AFE3000 (Short flat)



ØD	Tolerance
Ø1~Ø12	0.00 ~ -0.02
Ø12.1~Ø20	0.00 ~ -0.03



(mm)

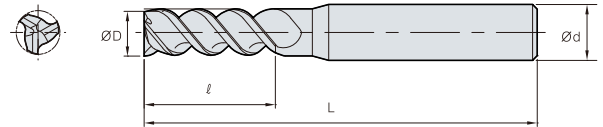
	Designation	ØD	Ød	ℓ	L
AFE 	3010-040-V2S6	1	6	2	40
	3010-040-V2.5S6	1	6	2.5	40
	3015-040-V3S6	1.5	6	3	40
	3020-040-V3S6	2	6	3	40
	3030-045-V4S6	3	6	4	45
	3030-045-V8S6	3	6	8	45
	3040-045-V5S6	4	6	5	45
	3040-045-V8S6	4	6	8	45
	3040-045-V11S6	4	6	11	45
	3050-045-V6S6	5	6	6	45
	3060-050-V7S6	6	6	7	50
	3060-050-V13S6	6	6	13	50
	3080-060-V9S8	8	8	9	60
	3080-060-V19S8	8	8	19	60
	3100-065-V11S10	10	10	11	65
	3100-065-V22S10	10	10	22	65
	3120-070-V13S12	12	12	13	70
	3120-070-V26S12	12	12	26	70
	3160-090-V18S16	16	16	18	90
	3160-090-V32S16	16	16	32	90
	3200-090-V22S20	20	20	22	90
	3200-090-V38S20	20	20	38	90



AFE3000 (Flat)



ØD	Tolerance
Ø1~Ø12	0.00 ~ -0.02
Ø12.1~Ø20	0.00 ~ -0.03



(mm)

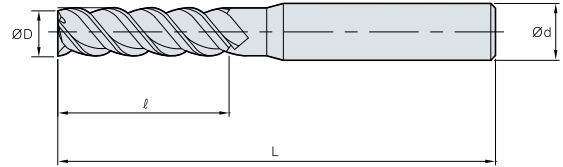
Designation		ØD	Ød	ℓ	L
AFE 	3010-050-V3S6	1	6	3	50
	3015-050-V5S6	1.5	6	5	50
	3020-050-V6S6	2	6	6	50
	3030-055-V11S6	3	6	11	55
	3040-055-V13S6	4	6	13	55
	3050-055-V17S6	5	6	17	55
	3060-060-V17S6	6	6	17	60
	3080-070-V22S8	8	8	22	70
	3100-075-V27S10	10	10	27	75
	3120-080-V32S12	13	12	32	80
	3160-100-V42S16	16	16	42	100
	3200-100-V48S20	20	20	48	100

A⁺ Endmill

AFE3000 (Long flat)



ØD	Tolerance
Ø1~Ø12	0.00 ~ -0.02
Ø12.1~Ø20	0.00 ~ -0.03



(mm)

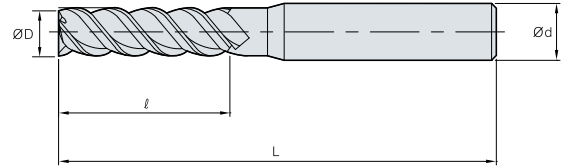
	Designation	ØD	Ød	ℓ	L
AFE 	3010-060-V4S6	1	6	4	60
	3010-060-V6S6	1	6	6	60
	3015-060-V6S6	1.5	6	6	60
	3015-060-V8S6	1.5	6	8	60
	3015-060-V10S6	1.5	6	10	60
	3020-060-V8S6	2	6	8	60
	3020-060-V10S6	2	6	10	60
	3020-060-V12S6	2	6	12	60
	3030-065-V15S6	3	6	15	65
	3030-070-V20S6	3	6	20	70
	3030-075-V25S6	3	6	25	75
	3030-080-V30S6	3	6	30	80
	3040-065-V16S6	4	6	16	65
	3040-070-V20S6	4	6	20	70
	3040-075-V26S6	4	6	26	75
	3040-080-V30S6	4	6	30	80
	3060-060-V22S6	6	6	22	60
	3060-070-V25S6	6	6	25	70
	3060-075-V30S6	6	6	30	75
	3060-080-V35S6	6	6	35	80
	3060-090-V42S6	6	6	42	90
	3060-100-V50S6	6	6	50	100
	3080-080-V28S8	8	8	28	80
	3080-080-V30S8	8	8	30	80
	3080-085-V35S8	8	8	35	85
	3080-090-V40S8	8	8	40	90
	3080-095-V45S8	8	8	45	95
	3080-100-V50S8	8	8	50	100
	3080-105-V55S8	8	8	55	105
	3080-110-V65S8	8	8	65	110



AFE3000 (Long flat)



ØD	Tolerance
Ø1~Ø12	0.00 ~ -0.02
Ø12.1~Ø20	0.00 ~ -0.03



(mm)

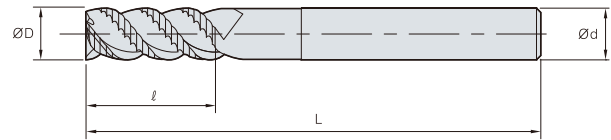
	Designation	ØD	Ød	ℓ	L
AFE 	3100-090-V32S10	10	10	32	90
	3100-090-V35S10	10	10	35	90
	3100-090-V40S10	10	10	40	90
	3100-100-V45S10	10	10	45	100
	3100-100-V50S10	10	10	50	100
	3100-110-V55S10	10	10	55	110
	3100-110-V60S10	10	10	60	110
	3100-120-V65S10	10	10	65	120
	3120-095-V40S12	12	12	40	95
	3120-100-V45S12	12	12	45	100
	3120-100-V50S12	12	12	50	100
	3120-110-V55S12	12	12	55	110
	3120-110-V60S12	12	12	60	110
	3120-120-V65S12	12	12	65	120
	3120-120-V70S12	12	12	70	120
	3120-135-V75S12	12	12	75	135
	3160-105-V52S16	16	16	52	105
	3160-110-V55S16	16	16	55	110
	3160-130-V65S16	16	16	65	130
	3160-150-V75S16	16	16	75	150
	3160-160-V85S16	16	16	85	160
	3160-180-V95S16	16	16	95	180
	3160-190-V105S16	16	16	105	190
	3160-200-V115S16	16	16	115	200
	3200-110-V55S20	20	20	55	110
	3200-130-V65S20	20	20	65	130
	3200-150-V75S20	20	20	75	150
	3200-160-V85S20	20	20	85	160
	3200-180-V95S20	20	20	95	180
	3200-190-V105S20	20	20	105	190
	3200-200-V115S20	20	20	115	200
	3200-220-V125S20	20	20	125	220

A⁺ Endmill

APRE3000 (Roughing)



ØD	Tolerance
Ø4~Ø8	0.00 ~ -0.07
Ø8.1~Ø25	0.00 ~ -0.1

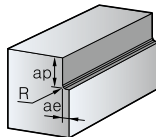


(mm)

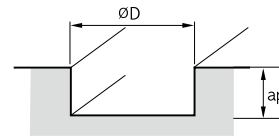
Designation		ØD	Ød	ℓ	L
APRE 	3040-050	4.0	6	8	50
	3050-050	5.0	6	13	50
	3060-050	6.0	6	15	50
	3065-060	6.5	8	16	60
	3070-060	7.0	8	16	60
	3075-060	7.5	8	20	60
	3080-060	8.0	8	20	60
	3085-075	8.5	10	20	75
	3090-075	9.0	10	20	75
	3095-075	9.5	10	22	75
	3100-075	10.0	10	25	75
	3110-075	11.0	12	30	75
	3120-075	12.0	12	30	75
	3130-075	13.0	14	30	75
	3140-075	14.0	16	32	75
	3150-075	15.0	16	32	75
	3160-100	16.0	16	35	100
	3170-100	17.0	20	35	100
	3180-100	18.0	20	35	100
	3200-100	20.0	20	45	100
	3250-105	25.0	25	50	105

**A⁺ Endmill****Recommended cutting conditions****APFE/AFE**

Type	Shouldering				Slotting			
Workpiece	Aluminum alloy (A7075)		Aluminum alloy (cast) (AC4B)		Aluminum alloy (A7075)		Aluminum alloy (cast) (AC4B)	
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)	R.P.M n (min ⁻¹)	Feed vf (mm/min)
1	40,000	480	40,000	368	40,000	368	40,000	280
2	40,000	880	38,000	680	38,000	680	32,000	440
3	32,000	1,120	25,000	760	25,000	760	21,000	480
4	24,000	1,200	19,000	800	19,000	800	13,000	520
5	19,000	1,280	15,000	880	15,000	800	13,000	560
6	16,000	1,520	13,000	960	13,000	880	11,000	600
8	12,000	1,520	9,500	960	9,500	960	8,000	640
10	9,500	1,520	7,600	960	7,600	960	6,400	640
12	8,000	1,520	6,400	960	6,400	960	5,300	640
16	6,000	1,520	4,800	960	4,800	800	4,000	576
20	4,800	1,200	3,800	800	3,800	776	3,200	528

[Application tip]**■ Shouldering depth (ap) and radial depth (ae)**

- $ap \leq 2.0D$
- $ae \leq 0.2D$ ($D > \phi 3$)
 $\leq 0.5D$ ($D \geq \phi 3$)

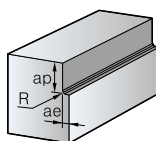
**■ Slotting depth (ap)**

- $ap \leq D$ (max: 12mm)

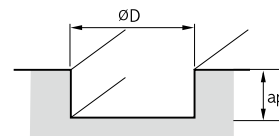
※ Workpiece should be clamped rigidly In case of vibrations, reduce R.P.M and feed rate by the same ratio

APRE

Type	Shouldering				Slotting			
Workpiece	Aluminum alloy (A7075)		Aluminum alloy (cast) (AC4B)		Aluminum alloy (A7075)		Aluminum alloy (cast) (AC4B)	
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)	R.P.M n (min ⁻¹)	Feed vf (mm/min)
4	20,000	8,000	16,000	6,400	15,000	5,000	12,000	4,000
5	16,000	6,500	12,800	5,200	12,000	4,000	9,600	3,200
6	13,500	6,000	10,800	4,800	10,500	3,800	8,400	3,100
8	10,500	4,700	8,400	3,800	8,000	3,000	6,400	2,400
10	8,500	3,800	6,800	3,100	6,500	2,500	5,200	2,000
12	6,800	3,050	5,500	2,500	5,250	2,000	4,200	1,600
14	5,800	2,600	4,700	2,100	4,500	1,700	3,600	1,400
16	5,200	2,350	4,200	1,900	4,000	1,500	3,200	1,200
18	4,700	2,100	3,800	1,700	3,550	1,300	2,900	1,100
20	4,200	1,900	3,400	1,600	3,200	1,200	2,600	1,000
25	3,400	1,500	2,800	1,200	2,550	1,000	2,100	800

[Application tip]**■ Shouldering depth (ap) and radial depth (ae)**

- $ap \leq 1.5D$
- $ae \leq 0.5D$

**■ Slotting depth (ap)**

- $ap \leq 1.5D$

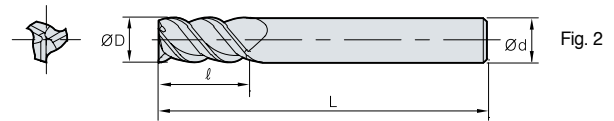
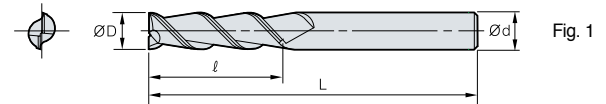
※ Workpiece should be clamped rigidly In case of vibrations, reduce R.P.M and feed rate by the same ratio

Solid Endmills for Aluminum

SSEA2000/3000 (Flat)



ØD	Tolerance
Ø1 ~ Ø6	-0.010 ~ -0.030
Ø7 ~ Ø10	-0.015 ~ -0.040
Ø11 ~ Ø20	-0.020 ~ -0.050



(mm)

	Designation	ØD	Ød	ℓ	L	Fig.
SSEA 2	2010	1	6	3	40	1
	2015	1.5	6	4	40	1
	2020	2	6	6	40	1
	2025	2.5	6	7	40	1
	2030	3	6	10	45	1
	2035	3.5	6	10	45	1
	2040	4	6	12	45	1
	2050	5	6	15	50	1
	2060	6	6	15	50	1
	2070	7	8	20	60	1
	2080	8	8	20	60	1
	2090	9	10	20	70	1
	2100	10	10	25	70	1
	2110	11	12	25	75	1
	2120	12	12	30	75	1
	2130	13	16	30	90	1
	2140	14	16	35	90	1
	2150	15	16	40	90	1
	2160	16	16	40	90	1
	2180	18	18	45	100	1
	2200	20	20	45	100	1
SSEA 3	3020	2	6	6	40	2
	3030	3	6	10	45	2
	3035	3.5	6	10	45	2
	3040	4	6	12	45	2
	3050	5	6	15	50	2
	3060	6	6	15	50	2
	3070	7	8	20	60	2
	3080	8	8	20	60	2
	3090	9	10	20	70	2
	3100	10	10	25	70	2
	3110	11	12	25	75	2
	3120	12	12	30	75	2
	3130	13	16	30	90	2
	3140	14	16	35	90	2
	3150	15	16	40	90	2
	3160	16	16	40	90	2

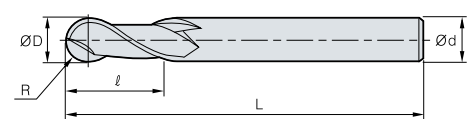
Special endmills order: SSEA③③③③I-L Ex.1) 3 flutes, diameter: 6.3,I: 17, L: 60 SSEA3063 17-60L Ex.2) 3 flutes, diameter: 6.3,standard type SSEA3063



SSBEA2000 (Ball)



ØD	Tolerance
All	0 ~ - 0.03



(mm)

Designation		R	ØD	Ød	ℓ	L
SSBEA 2	2010	0.5	1	6	3	70
	2015	0.75	1.5	6	4	70
	2020	1	2	6	6	70
	2025	1.25	2.5	6	8	70
	2030	1.5	3	6	10	70
	2035	1.75	3.5	6	10	70
	2040	2	4	6	12	70
	2045	2.25	4.5	6	15	80
	2050	2.5	5	6	15	80
	2055	2.75	5.5	6	15	80
	2060	3	6	6	15	80
	2065	3.25	6.5	8	20	90
	2070	3.5	7	8	20	90
	2075	3.75	7.5	8	20	90
	2080	4	8	8	20	90
	2085	4.25	8.5	10	25	100
	2090	4.5	9	10	25	100
	2100	5	10	10	25	100
	2110	5.5	11	12	30	110
	2120	6	12	12	30	110
	2130	6.5	13	16	35	120
	2140	7	14	16	35	120
	2150	7.5	15	16	40	120
	2160	8	16	16	40	120
	2170	8.5	17	20	40	130
	2180	9	18	20	45	130
	2190	9.5	19	20	45	130
	2200	10	20	20	45	130

Special endmills order: SSBEA2000000 I-L

Ex.1) 2 flutes, diameter: 6.3, L: 17, L: 60 SSBEA3063 17-60L

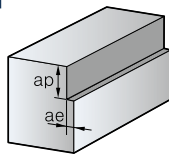
Ex.2) 2 flutes, diameter: 6.3, standard type SSBEA3063

Recommended cutting conditions

SSEA2000

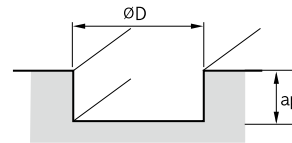
구 분 Workpiece Conditions Diameter (Ø)	Shouldering				Slotting			
	Aluminum alloy (A7075)		Aluminum alloy (cast) (AC4B)		Aluminum alloy (A7075)		Aluminum alloy (cast) (AC4B)	
	R.P.M n (min ⁻¹)	Feed vf (mm/min)	R.P.M n (min ⁻¹)	Feed vf (mm/min)	R.P.M n (min ⁻¹)	Feed vf (mm/min)	R.P.M n (min ⁻¹)	Feed vf (mm/min)
1	40,000	480	40,000	368	40,000	368	40,000	280
2	40,000	880	38,000	680	38,000	680	32,000	440
3	32,000	1,120	25,000	760	25,000	760	21,000	480
4	24,000	1,200	19,000	800	19,000	800	13,000	520
5	19,000	1,280	15,000	880	15,000	800	13,000	560
6	16,000	1,520	13,000	960	13,000	880	11,000	600
8	12,000	1,520	9,500	960	9,500	960	8,000	640
10	9,500	1,520	7,600	960	7,600	960	6,400	640
12	8,000	1,520	6,400	960	6,400	960	5,300	640
16	6,000	1,520	4,800	960	4,800	800	4,000	576
20	4,800	1,200	3,800	800	3,800	776	3,200	528

[Application tip]



■ Shouldering depth (ap) and radial depth (ae)

- ap : $\leq 2.0D$
- ae : $\leq 0.2D$ ($D < \phi 3$)
: $\leq 0.5D$ ($D \geq \phi 3$)



■ Slotting depth (ap)

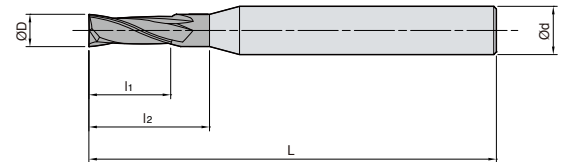
- ap : $\leq D$ (max:12mm)

※ Workpiece should be clamped rigidly In case of vibrations, reduce R.P.M and feed rate by the same ratio



D Endmill

DFE2000 (Flat)



(mm)

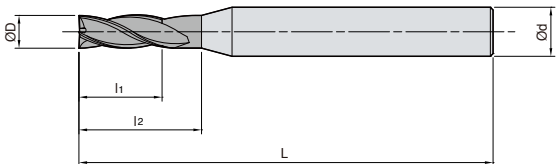
	Designation	ØD	Ød	l ₁	l ₂	L
DFE	2010-045-N050S04	1	4	3	5	45
	2010-060-N050S04	1	4	3	5	60
	2010-060-N100S04	1	4	3	10	60
	2010-060-N150S04	1	4	3	15	60
	2010-060-N200S04	1	4	3	20	60
	2010-060-N250S04	1	4	3	25	60
	2015-060-N050S04	1.5	4	4	5	60
	2015-060-N100S04	1.5	4	4	10	60
	2015-060-N150S04	1.5	4	4	15	60
	2015-060-N200S04	1.5	4	4	20	60
	2015-060-N250S04	1.5	4	4	25	60
	2020-045-N080S04	2	4	6	8	45
	2020-080-N080S04	2	4	6	8	80
	2020-080-N100S04	2	4	6	10	80
	2020-080-N150S04	2	4	6	15	80
	2020-080-N200S04	2	4	6	20	80
	2020-080-N250S04	2	4	6	25	80
	2020-080-N300S04	2	4	6	30	80
	2020-080-N400S04	2	4	6	40	80
	2030-050-N100S06	3	6	9	10	50
	2030-080-N100S04	3	4	9	10	80
	2030-080-N200S04	3	4	9	20	80
	2030-080-N250S04	3	4	9	25	80
	2030-080-N300S04	3	4	9	30	80
	2030-080-N400S04	3	4	9	40	80
	2040-050-N160S06	4	6	12	16	50
	2040-080-N160S04	4	4	12	16	80
	2050-060-N200S06	5	6	15	20	60
	2050-110-N200S06	5	6	15	20	110
	2060-060-N180S06	6	6	18	-	60
	2060-110-N250S06	6	6	18	25	110
	2060-150-N250S06	6	6	18	25	150
	2080-070-N250S08	8	8	25	-	70
	2080-150-N400S08	8	8	25	40	150
	2100-080-N300S10	10	10	30	-	80
	2100-150-N500S10	10	10	30	50	150
	2120-080-N350S12	12	12	35	-	80
	2120-150-N600S12	12	12	35	60	150

D Endmill

DFE4000 (Flat)



ØD	Tolerance
~Ø5.9	0.00 ~ -0.02
Ø6.0~	0.00 ~ -0.03



(mm)

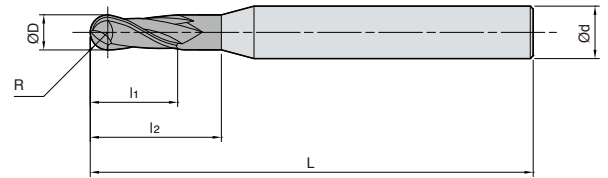
Designation		ØD	Ød	l ₁	l ₂	L
DFE	4020-045-N060S04	2	4	6	8	45
	4020-060-N100S04	2	4	10	12	60
	4030-050-N100S06	3	6	10	12	50
	4030-060-N150S04	3	4	15	18	60
	4040-050-N150S06	4	6	15	18	50
	4040-080-N200S04	4	4	20	-	80
	4060-060-N180S06	6	6	18	-	60
	4060-110-N300S06	6	6	30	-	110
	4060-150-N300S06	6	6	30	-	150
	4080-070-N250S08	8	8	25	-	70
	4080-110-N400S08	8	8	40	-	110
	4080-150-N400S08	8	8	40	-	150
	4100-080-N250S10	10	10	25	-	80
	4100-110-N400S10	10	10	40	-	110
	4100-150-N500S10	10	10	50	-	150
	4120-080-N300S12	12	12	30	-	80
	4120-110-N400S12	12	12	40	-	110
	4120-150-N500S12	12	12	50	-	150



DBE2000 (Ball)



ØD	Tolerance
~Ø5.9	0.00 ~ -0.02
Ø6.0~	0.00 ~ -0.03



(mm)

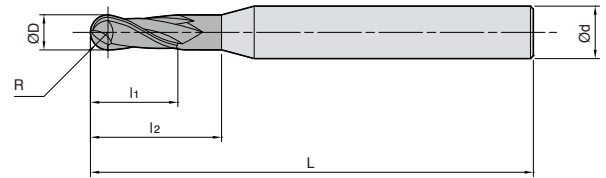
Designation	R	ØD	Ød	l ₁	l ₂	L
DBE 2	2006-045-N020S04	0.3	0.6	4	2	45
	2006-045-N050S04	0.3	0.6	4	2	45
	2006-045-N080S04	0.3	0.6	4	2	45
	2006-045-N100S04	0.3	0.6	4	2	45
	2008-045-N030S04	0.4	0.8	4	2.5	45
	2008-045-N050S04	0.4	0.8	4	2.5	45
	2008-045-N100S04	0.4	0.8	4	2.5	45
	2010-060-N030S04	0.5	1	4	3	60
	2010-060-N050S04	0.5	1	4	3	60
	2010-060-N080S04	0.5	1	4	3	60
	2010-060-N100S04	0.5	1	4	3	60
	2010-060-N120S04	0.5	1	4	3	60
	2010-060-N150S04	0.5	1	4	3	60
	2010-060-N200S04	0.5	1	4	3	60
	2010-080-N250S04	0.5	1	4	3	80
	2010-080-N300S04	0.5	1	4	3	80
	2010-080-N350S04	0.5	1	4	3	80
	2010-080-N400S04	0.5	1	4	3	80
	2015-060-N050S04	0.75	1.5	4	4	60
	2015-080-N100S04	0.75	1.5	4	4	80
	2015-080-N150S04	0.75	1.5	4	4	80
	2015-080-N200S04	0.75	1.5	4	4	80
	2015-080-N250S04	0.75	1.5	4	4	80
	2015-080-N300S04	0.75	1.5	4	4	80
	2015-080-N350S04	0.75	1.5	4	4	80
	2015-080-N400S04	0.75	1.5	4	4	80
	2020-060-N080S04	1	2	4	6	60
	2020-080-N100S04	1	2	4	6	80
	2020-080-N150S04	1	2	4	6	80
	2020-080-N200S04	1	2	4	6	80
	2020-080-N250S04	1	2	4	6	80
	2020-080-N300S04	1	2	4	6	80
	2020-080-N350S04	1	2	4	6	80
	2020-100-N400S04	1	2	4	6	100
	2020-100-N450S04	1	2	4	6	100
	2020-100-N500S04	1	2	4	6	100

D Endmill

DBE2000 (Ball)



ØD	Tolerance
~Ø5.9	0.00 ~ -0.02
Ø6.0~	0.00 ~ -0.03



(mm)

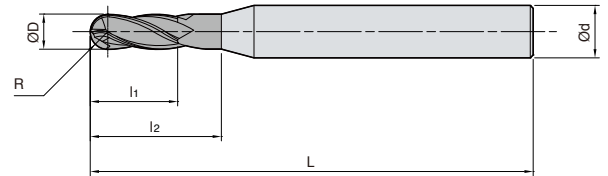
	Designation	R	ØD	Ød	l ₁	l ₂	L
DBE 2	2030-060-N100S04	1.5	3	4	9	10	60
	2030-100-N150S04	1.5	3	4	9	15	100
	2030-100-N200S04	1.5	3	4	9	20	100
	2030-100-N250S04	1.5	3	4	9	25	100
	2030-100-N300S04	1.5	3	4	9	30	100
	2030-100-N350S04	1.5	3	4	9	35	100
	2030-100-N400S04	1.5	3	4	9	40	100
	2030-100-N500S04	1.5	3	4	9	50	100
	2040-060-N160S04	2	4	4	12	16	60
	2040-080-N160S04	2	4	4	12	16	80
	2040-080-N300S04	2	4	4	12	30	80
	2040-100-N160S04	2	4	4	12	16	100
	2040-100-N400S04	2	4	4	12	40	100
	2040-130-N160S04	2	4	4	12	16	130
	2040-130-N400S04	2	4	4	12	40	130
	2050-110-N200S06	2.5	5	6	15	20	110
	2060-080-N250S06	3	6	6	20	25	80
	2060-110-N250S06	3	6	6	20	25	110
	2060-150-N300S06	3	6	6	20	30	150
	2080-080-N300S08	4	8	8	25	30	80
	2080-110-N300S08	4	8	8	25	30	110
	2080-150-N500S08	4	8	8	25	50	150
	2080-200-N400S08	4	8	8	25	40	200
	2100-080-N400S10	5	10	10	30	40	80
	2100-110-N400S10	5	10	10	30	40	110
	2100-150-N600S10	5	10	10	30	60	150
	2100-200-N500S10	5	10	10	30	50	200
	2120-110-N500S12	6	12	12	35	50	110
	2120-150-N500S12	6	12	12	35	50	150
	2120-200-N600S12	6	12	12	35	60	200



DBE4000 (Ball)



ØD	Tolerance
~Ø5.9	0.00 ~ -0.02
Ø6.0~	0.00 ~ -0.03



(mm)

Designation	R	ØD	Ød	l ₁	l ₂	L
DBE						
4020-060-N080S04	1	2	4	6	8	60
4020-080-N100S04	1	2	4	6	10	80
4020-080-N200S04	1	2	4	6	20	80
4020-080-N300S04	1	2	4	6	30	80
4020-080-N400S04	1	2	4	6	40	80
4030-060-N100S04	1.5	3	4	9	10	60
4030-100-N150S04	1.5	3	4	9	15	100
4030-100-N200S04	1.5	3	4	9	20	100
4030-100-N300S04	1.5	3	4	9	30	100
4030-100-N400S04	1.5	3	4	9	40	100
4030-100-N500S04	1.5	3	4	9	50	100
4040-060-N160S04	2	4	4	12	16	60
4040-080-N160S04	2	4	4	12	16	80
4040-100-N160S04	2	4	4	12	16	100
4040-130-N160S04	2	4	4	12	16	130
4060-080-N250S06	3	6	6	20	25	80
4060-110-N250S06	3	6	6	20	25	110
4060-150-N300S06	3	6	6	20	30	150
4080-080-N300S08	4	8	8	25	30	80
4080-110-N300S08	4	8	8	25	30	110
4080-150-N350S08	4	8	8	25	35	150
4080-200-N400S08	4	8	8	25	40	200
4100-080-N350S10	5	10	10	30	35	80
4100-110-N350S10	5	10	10	30	35	110
4100-150-N400S10	5	10	10	30	40	150
4100-200-N500S10	5	10	10	30	50	200
4120-110-N500S12	6	12	12	35	50	110
4120-150-N500S12	6	12	12	35	50	150
4120-200-N600S12	6	12	12	35	60	200

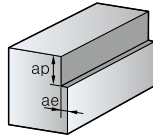
D Endmill

Recommended cutting conditions

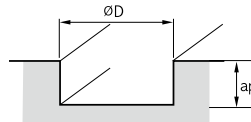
Flat type

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	40,000	500	40,000	700	-	-
2	25,000	570	25,000	800	25,000	1,600
3	20,000	570	20,000	800	20,000	1,600
4	18,000	680	18,000	950	18,000	1,900
5	14,000	960	14,000	1,200	14,000	2,400
6	11,000	1,000	11,000	1,400	11,000	2,800
8	8,000	930	8,000	1,300	8,000	2,600
10	6,500	860	6,500	1,200	6,500	2,400
12	5,500	860	5,500	1,200	5,500	2,400

[Application tip]



- $D \leq \varnothing 2.5$, $ap = 1.5D$, $ae = 0.05D$
- $D > \varnothing 2.5$, $ap = 1.5D$, $ae = 0.1D$



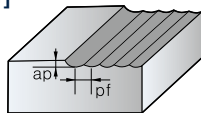
- $D \leq \varnothing 2.5$, $ap = 0.3D$
- $D > \varnothing 2.5$, $ap = 0.5D$

※ Workpiece should be clamped rigidly In case of vibrations, reduce R.P.M 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	16,000	400	-	-
2	16,000	800	16,000	1,200
3	16,000	1,450	16,000	2,000
4	16,000	2,100	16,000	3,100
5	15,500	2,550	15,000	3,800
6	15,000	2,950	15,000	4,400
8	13,000	3,000	13,000	4,500
10	11,500	3,000	12,000	4,600
12	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 R.P.M 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

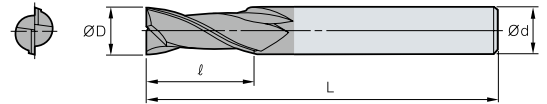


C-Max (Copper)

CFE2000 (Flat)



ØD	Tolerance
Ø0.5~Ø6	0.00 ~ 0.01
Ø8~Ø12	0.00 ~ 0.02



(mm)

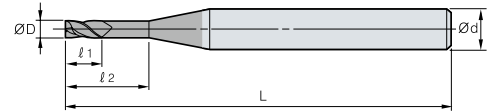
Designation		ØD	Ød	ℓ	L
CFE	2010-040	1	4	2.5	40
	2015-040	1.5	4	4	40
	2020-045	2	4	5	45
	2030-045	3	6	8	45
	2040-050	4	6	11	50
	2050-060	5	6	13	60
	2060-060	6	6	13	60
	2080-060	8	8	19	60
	2100-070	10	10	22	70
	2120-075	12	12	26	75

C-Max (Copper)

CFNE2000 (Long neck flat)



ØD	Tolerance
Ø0.5~Ø6	0.00 ~ 0.01
Ø8~Ø12	0.00 ~ 0.02



(mm)

Designation		ØD	Ød	l ₁	l ₂	L
CFNE	2005-045-N2	0.5	4	0.8	2	45
	2005-045-N4	0.5	4	0.8	4	45
	2005-045-N6	0.5	4	0.8	6	45
	2005-050-N8	0.5	4	0.8	8	50
	2010-045-N4	1	4	1.5	4	45
	2010-045-N6	1	4	1.5	6	45
	2010-050-N8	1	4	1.5	8	50
	2010-050-N10	1	4	1.5	10	50
	2015-045-N6	1.5	4	2.3	6	45
	2015-050-N8	1.5	4	2.3	8	50
	2015-050-N10	1.5	4	2.3	10	50
	2015-050-N12	1.5	4	2.3	12	50
	2020-045-N6	2	4	3	6	45
	2020-050-N8	2	4	3	8	50
	2020-050-N10	2	4	3	10	50
	2020-055-N12	2	4	3	12	50
	2030-050-N10	3	4	4.5	10	50
	2030-050-N12	3	4	4.5	12	50
	2030-060-N14	3	4	4.5	14	60
	2030-060-N16	3	4	4.5	16	60
	2040-050-N12	4	6	6	12	50
	2040-050-N16	4	6	6	16	50
	2040-060-N20	4	6	6	20	60



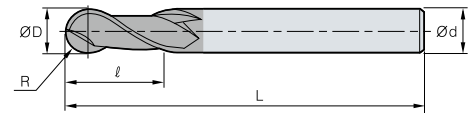
CBE2000 (Ball)



CrN



ØD	Tolerance	R 공차
Ø0.5~Ø6	0.00 ~ 0.01	±0.005
Ø8~Ø12	0.00 ~ 0.02	±0.005



(mm)

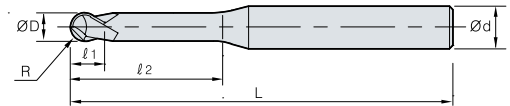
Designation		R	ØD	Ød	ℓ	L
CBE	2010-050	0.5	1	4	2.5	50
	2015-050	0.75	1.5	4	4	50
	2020-050	1	2	4	5	50
	2030-060	1.2	3	6	8	60
	2040-070	2	4	6	8	70
	2050-080	2.5	5	6	10	80
	2060-080	3	6	6	12	80
	2080-090	4	8	8	14	90
	2100-100	5	10	10	18	100
	2120-110	6	12	12	22	110

C-Max (Copper)

CBNE2000 (Long neck ball)



ØD	Tolerance
Ø0.5~Ø6	0.00 ~ 0.01
Ø8~Ø12	0.00 ~ 0.02



(mm)

Designation		R	ØD	Ød	ℓ ₁	ℓ ₂	L
CBNE 2	2005-045-N2	0.25	0.5	4	0.5	2	45
	2005-045-N4	0.25	0.5	4	0.5	4	45
	2005-045-N6	0.25	0.5	4	0.5	6	45
	2005-050-N8	0.25	0.5	4	0.5	8	50
	2010-045-N4	0.5	1	4	1	4	45
	2010-045-N6	0.5	1	4	1	6	45
	2010-050-N8	0.5	1	4	1	8	50
	2010-050-N10	0.5	1	4	1	10	50
	2015-050-N8	0.75	1.5	4	1.5	8	50
	2015-050-N10	0.75	1.5	4	1.5	10	50
	2015-050-N12	0.75	1.5	4	1.5	12	50
	2015-055-N14	0.75	1.5	4	1.5	14	55
	2020-050-N8	1	2	4	2	8	50
	2020-050-N10	1	2	4	2	10	50
	2020-050-N12	1	2	4	2	12	50
	2020-055-N14	1	2	4	2	14	55
	2030-050-N10	1.5	3	4	3	10	50
	2030-050-N12	1.5	3	4	3	12	50
	2030-055-N14	1.5	3	4	3	14	55
	2030-055-N16	1.5	3	4	3	16	60
	2040-060-N16	2	4	6	4	16	60
	2040-060-N20	2	4	6	4	20	60
	2040-070-N25	2	4	6	4	25	70
	2040-070-N30	2	4	6	4	30	70



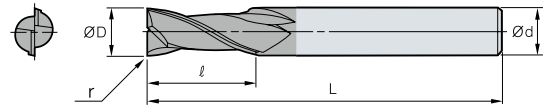
CRE2000 (Radius)



CrN



ØD	Tolerance	R 공차
Ø0.5~Ø6	0.00 ~ 0.01	±0.005
Ø8~Ø12	0.00 ~ 0.02	±0.005



(mm)

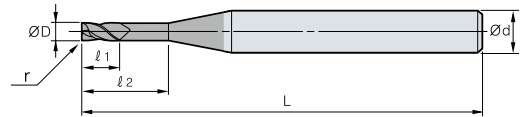
Designation		r	ØD	Ød	ℓ	L
CRE 2	2020-045-R05	0.5	2	4	5	45
	2030-045-R05	0.5	3	6	8	45
	2040-050-R05	0.5	4	6	11	50
	2050-060-R05	0.5	5	6	13	60
	2060-060-R05	0.5	6	6	13	60
	2080-060-R10	1	8	8	19	60
	2100-070-R10	1	10	10	22	70
	2120-075-R10	1	12	12	26	75

C-Max (Copper)

CRNE2000 (Long neck radius)



ØD	Tolerance	R 공차
Ø0.5~Ø6	0.00 ~ 0.01	±0.005
Ø8~Ø12	0.00 ~ 0.02	±0.005



(mm)

Designation		r	ØD	Ød	ℓ ₁	ℓ ₂	L
CRNE 2	2010-045-R02N4	0.2	1	4	1.5	4	45
	2010-045-R02N6	0.2	1	4	1.5	6	45
	2010-050-R02N8	0.2	1	4	1.5	8	50
	2010-050-R02N10	0.2	1	4	1.5	10	50
	2015-045-R02N6	0.2	1.5	4	2.3	6	45
	2015-050-R02N8	0.2	1.5	4	2.3	8	50
	2015-050-R02N10	0.2	1.5	4	2.3	10	50
	2015-050-R02N12	0.2	1.5	4	2.3	12	50
	2020-045-R05N6	0.5	2	4	3	6	45
	2020-050-R05N8	0.5	2	4	3	8	50
	2020-050-R05N10	0.5	2	4	3	10	50
	2020-055-R05N12	0.5	2	4	3	12	50
	2030-050-R05N10	0.5	3	4	4.5	10	50
	2030-050-R05N12	0.5	3	4	4.5	12	50
	2030-060-R05N14	0.5	3	4	4.5	14	60
	2030-060-R05N16	0.5	3	4	4.5	16	60
	2040-050-R05N12	0.5	4	6	6	12	50
	2040-050-R05N16	0.5	4	6	6	16	50
	2040-060-R05N20	0.5	4	6	6	20	60

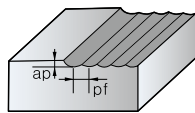


C-Max (Copper)

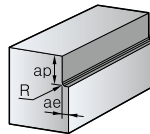
Recommended cutting conditions

Tool	CBE/CBNE		CFE/CFNE		CRE/CRNE	
Workpiece Conditions Diameter (Ø)	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)
0.5	40,000	2,600	40,000	1,800	-	-
1	40,000	2,800	40,000	2,000	40,000	2,000
1.5	40,000	3,200	40,000	2,400	30,000	2,400
2	40,000	3,600	30,000	1,800	30,000	1,800
3	40,000	4,000	23,000	1,380	20,000	1,380
4	32,000	3,200	15,000	900	15,000	900
5	25,000	2,500	12,000	750	12,000	750
6	21,000	2,100	10,000	600	10,000	600
8	16,000	1,600	8,000	480	8,000	480
10	13,000	1,300	6,400	384	6,400	384
12	9,000	900	5,400	324	5,400	324

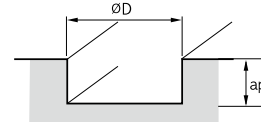
[Application tip]



- $ap = 0.1D$
- $pf = 0.2D$



- $ap = 1.5D$
- $ae = 0.1D$



- $ap \leq 1.5D$

※ Workpiece should be clamped rigidly In case of vibrations, reduce R.P.M and feed rate by the same ratio

Composite Router Endmill

CCDR4000/6000 (Flat)

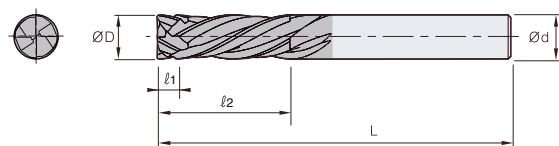


Fig. 1

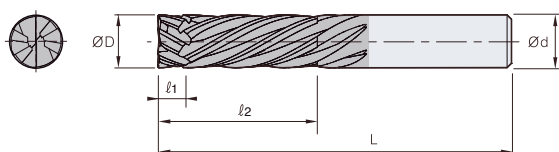


Fig. 2



ØD	Tolerance
Ø6~12	0.00 ~ -0.03 (mm)

(mm)

Designation		ØD	Ød	ℓ ₁	ℓ ₂	L	Fig.
	4060-065	6	6	3	18	65	1
	4080-075	8	8	4	24	75	1
	6100-085	10	10	5	30	85	2
	6120-100	12	12	6	36	100	2



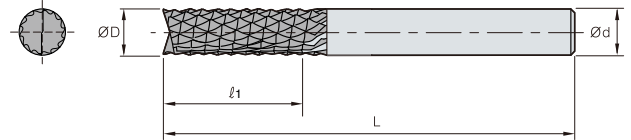
ØD	Tolerance
Ø0.250 ~ 0.500	0.0000 ~ -0.0012 (inch)

(inch)

Designation		ØD	Ød	ℓ ₁	ℓ ₂	L	Fig.
	402500	1/4 0.250	0.250	0.125	0.750	2.500	1
	402500L	1/4 0.250	0.250	0.125	1.500	4.000	1
	603750	3/8 0.375	0.375	0.125	1.000	3.250	2
	603750L	3/8 0.375	0.375	0.125	1.500	4.000	2
	605000	1/2 0.500	0.500	0.125	1.000	3.250	2
	605000L	1/2 0.500	0.500	0.125	1.500	4.000	2



CCR2000 (Flat)



ØD	Tolerance
Ø4 ~ 12	-0.02 ~ -0.08 (mm)

(mm)

Designation		ØD	Ød	ℓ ₁	L
CCR 2	2040-050	4	4	12	50
	2050-050	5	5	15	50
	2060-065	6	6	18	65
	2080-075	8	8	24	75
	2100-085	10	10	30	85
	2120-100	12	12	36	100



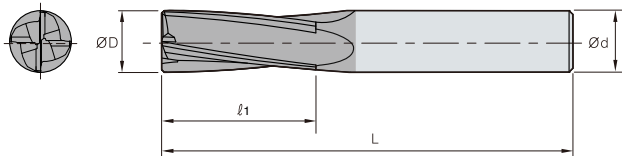
ØD	Tolerance
Ø0.250 ~ 0.500	-0.0008 ~ -0.0032 (inch)

(inch)

Designation		ØD	Ød	ℓ ₁	L
CCR 2	202500	1/4 0.250	0.250	0.750	2.500
	202500L	1/4 0.250	0.250	1.500	4.000
	203750	3/8 0.375	0.375	1.000	3.250
	203750L	3/8 0.375	0.375	1.500	4.000
	205000	1/2 0.500	0.500	1.000	3.250
	205000L	1/2 0.500	0.500	1.500	4.000

Composite Router Endmill

CCLR4000 (Flat)



ØD	Tolerance
Ø4 ~ 12	0.00 ~ -0.03 (mm)

(mm)

Designation		ØD	Ød	ℓ1	L
CCLR	4040-050	4	4	12	50
	4050-050	5	5	15	50
	4060-065	6	6	18	65
	4080-075	8	8	24	75
	4100-085	10	10	30	85
	4120-100	12	12	36	100



ØD	Tolerance
Ø0.250 ~ 0.500	0.0000 ~ -0.0012 (inch)

(inch)

Designation		ØD	Ød	ℓ1	L
CCLR	402500	1/4 0.250	0.250	0.750	2.500
	402500L	1/4 0.250	0.250	1.500	4.000
	403750	3/8 0.375	0.375	1.000	3.250
	403750L	3/8 0.375	0.375	1.500	4.000
	405000	1/2 0.500	0.500	1.000	3.250
	405000L	1/2 0.500	0.500	1.500	4.000



CCRR6000/8000 (Flat)

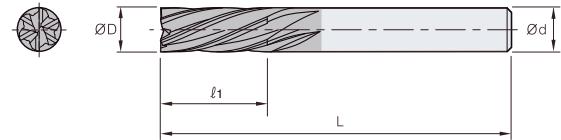


Fig. 1

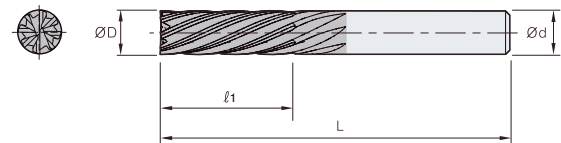


Fig. 2



ØD	Tolerance
Ø6~12	0.00 ~ -0.03 (mm)

(mm)

	Designation	ØD	Ød	ℓ ₁	L	Fig.
	CCRR 6060-065	6	6	18	65	1
	6080-075	8	8	24	75	1
	CCRR 8100-085	10	10	30	85	2
	8120-100	12	12	36	100	2



ØD	Tolerance
Ø0.250 ~0.500	0.0000 ~ -0.0012 (inch)

(inch)

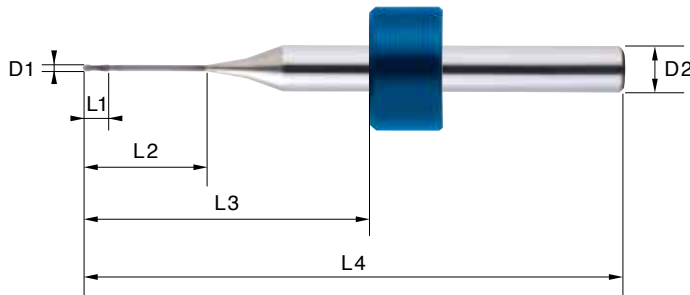
	Designation	ØD	Ød	ℓ ₁	L	Fig.
	CCRR 602500	1/4 0.250	0.250	0.750	2.500	1
	602500L	1/4 0.250	0.250	1.500	4.000	1
	CCRR 803750	3/8 0.375	0.375	1.000	3.250	2
	803750L	3/8 0.375	0.375	1.500	4.000	2
	805000	1/2 0.500	0.500	1.000	3.250	2
	805000L	1/2 0.500	0.500	1.500	4.000	2

T Endmill

T	Z	BE	2	030 - 050 - N100	S04 (Z-MATCH)
T Endmill	Type BE : Ball Endmill FE : Flat Endmill RE : Radius Endmill	Drill dia. 030 : 3mm	Neck length N100 : 10mm	Machine Maker	
Workpiece Z : Zirconia T : Ti/Co-Cr W : Wax/PMMA	No. of flutes 2 : 2Flute	Overall length 050 : 50mm	Shank dia. S04 : 4mm		

Special T Endmill order form

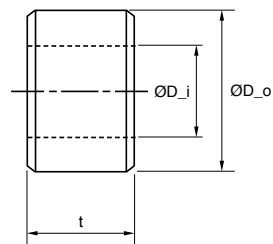
- Stop rings and other tool resources can be made to order



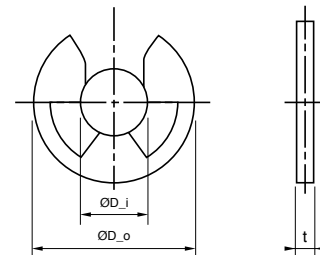
[Data Sheet]

Type of machine	
Workpiece	
Dental material	
Cutting diameter (D1)	
Shank diameter (D2)	
Cutting length (L1)	
Neck length (L2)	
Stop ring position	
Overall length (L4)	
Stop ring shape	

[Stop ring specification]



< Plastic ring >



< E type ring >

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	●		

(mm)

※ Stop ring can be made to order when specified sizes are send to an adjacent KORLOY sales office

T Endmill



Recommended cutting conditions

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

V Endmill

VFE4000 (Flat)



ØD	Tolerance
Ø2.5~Ø9	0.00 ~ -0.02
Ø10~Ø16	0.00 ~ -0.03

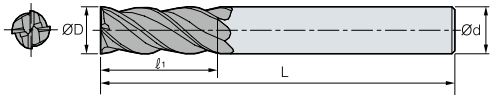


Fig. 1

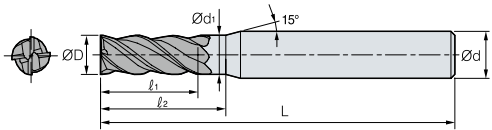


Fig. 2

(mm)								
Designation		ØD	Ød	d ₁	ℓ ₁	ℓ ₂	L	Fig.
 VFE	4025-045	2.5	6.0	2.48	6.0	8.0	45	2
	4030-050	3.0	6.0	2.98	7.0	9.5	50	2
	4035-050	3.5	6.0	3.48	8.0	11.0	50	2
	4040-050	4.0	6.0	3.98	9.0	12.0	50	2
	4050-050	5.0	6.0	4.98	12.0	16.0	50	2
	4060-050	6.0	6.0	-	14.0	-	50	1
	4070-060	7.0	8.0	6.97	16.0	21.0	60	2
	4080-060	8.0	8.0	-	19.0	-	60	1
	4090-070	9.0	10.0	8.97	20.0	27.0	70	2
	4100-075	10.0	10.0	-	23.0	-	75	1
	4120-080	12.0	12.0	-	27.0	-	80	1
	4140-085	14.0	14.0	-	31.0	-	85	1
	4160-090	16.0	16.0	-	36.0	-	90	1



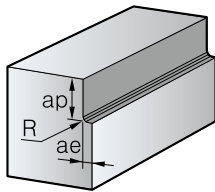
V Endmill

Recommended cutting conditions

Shouldering

Diameter ($\varnothing D$)	Alloy & Carbon steel, HRC25 or less (SM, SCM)				Mold steel, HRC35~45 (STS, KP4M)			
	R.P.M (min ⁻¹)	Feed (mm/min)	ap (mm)	ae (mm)	R.P.M (min ⁻¹)	Feed (mm/min)	ap (mm)	ae (mm)
2.5	15,915	1,241	3.8	0.7	12,732	891	0.3	0.3
3.0	13,263	1,241	4.5	0.8	10,610	891	0.3	0.3
3.5	11,368	1,241	5.3	0.9	9,095	891	0.4	0.4
4.0	9,947	1,241	6.0	1.1	7,958	891	0.4	0.4
5.0	7,958	1,241	7.5	1.4	6,366	891	0.5	0.5
6.0	6,631	1,241	9.0	1.6	5,305	891	0.6	0.6
7.0	5,684	1,241	10.5	1.9	4,547	891	0.7	0.7
8.0	4,974	1,194	12.0	2.2	3,979	891	0.8	0.8
9.0	4,421	1,194	13.5	2.4	3,537	891	0.9	0.9
10.0	3,979	1,194	15.0	2.7	3,183	891	1.0	1.0
12.0	3,316	1,194	18.0	3.2	2,653	891	1.2	1.2
14.0	2,842	1,194	21.0	3.8	2,274	891	1.4	1.4
16.0	2,487	1,194	24.0	4.3	1,989	891	1.6	1.6

[Application tip]



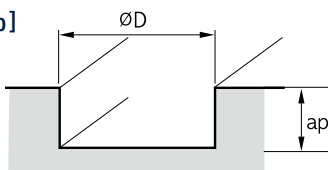
※ Cutting condition by overhang

1. Standard overhang: Follow cutting condition above
2. Long overhang: When the overhang is increased by 10mm, decrease feed 5% & ae 5%

Slotting

Diameter ($\varnothing D$)	Alloy & Carbon steel, HRC25 or less (SM, SCM)			Mold steel, HRC35~45 (STS, KP4M)		
	R.P.M (min ⁻¹)	Feed (mm/min)	ap (mm)	R.P.M (min ⁻¹)	Feed (mm/min)	ap (mm)
2.5	15,915	1,035	2.8	12,732	700	2.5
3.0	13,263	1,035	3.3	10,610	700	3.0
3.5	11,268	1,035	3.9	9,095	700	3.5
4.0	9,947	1,035	4.4	7,958	700	4.0
5.0	7,958	1,035	5.5	6,366	700	5.0
6.0	6,631	1,035	6.6	5,305	700	6.0
7.0	5,687	1,035	7.7	4,549	700	7.0
8.0	4,974	1,035	8.8	3,979	700	8.0
9.0	4,421	1,035	9.9	3,537	700	9.0
10.0	3,979	1,035	11.0	3,183	700	10.0
12.0	3,316	1,035	13.2	2,653	700	12.0
14.0	2,842	1,035	15.4	2,274	700	14.0
16.0	2,487	1,035	17.6	1,989	700	16.0

[Application tip]

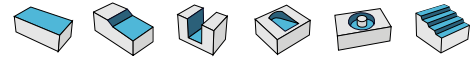
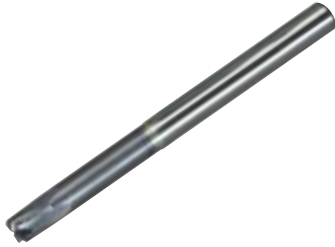


※ Cutting condition by overhang

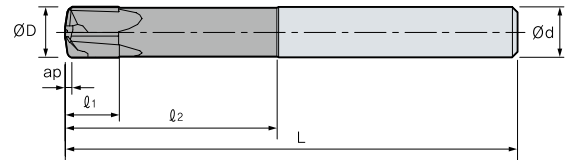
1. Standard overhang: Follow cutting condition above
2. Long overhang: When the overhang is increased by 10mm, decrease feed 5% & ae 5%

F Endmill

FME4000 (Standard)



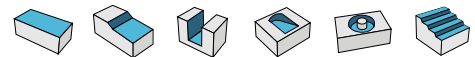
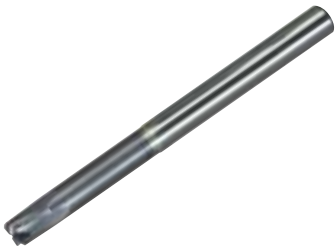
ØD	Tolerance
Ø6-Ø12	- 0.01 ~ - 0.03



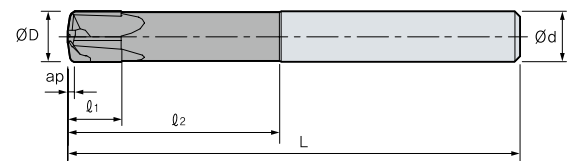
(mm)

	Designation	R	ØD	Ød	l ₁	l ₂	L	Max. ap (mm)	CAM-Radius
	4060-050-R05	0.5	6	6	4.5	18	50	0.35	0.7
	4080-060-R05	0.5	8	8	6	24	60	0.45	0.8
	4100-070-R10	1.0	10	10	7.5	30	70	0.65	1.3
	4120-075-R12	1.2	12	12	9	36	75	0.78	1.6

FMLE4000 (Long)



ØD	Tolerance
Ø6-Ø12	- 0.01 ~ - 0.03



(mm)

	Designation	R	ØD	Ød	l ₁	l ₂	L	Max. ap (mm)	CAM-Radius
	4060-090-R05	0.5	6	6	4.5	30	90	0.35	0.7
	4080-090-R05	0.5	8	8	6	40	90	0.45	0.8
	4100-100-R10	1.0	10	10	7.5	50	100	0.65	1.3
	4120-110-R12	1.2	12	12	9	60	110	0.78	1.6

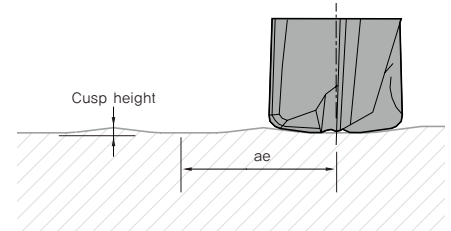
F Endmill



Recommended cutting conditions

➡ Cusp height by radial depth of cut

Diameter (Ø)	Radial depth ae (mm)					
	0.1XD	0.2XD	0.3XD	0.4XD	0.5XD	0.6XD
6	0	0	0	0.02	0.06	0.11
8	0	0	0	0.04	0.10	0.15
10	0	0	0.01	0.07	0.14	0.21
12	0	0	0.01	0.08	0.17	0.25



➡ Medium cut

Diameter (Ø)	Mold steel Hrc35~45 (HPM1, KP4M)				Mold steel Hrc45~55 (NAK55, NAK80, STAVAX)				Heat treated Hrc55 (SKD11, STD61)			
	R.P.M n (min ⁻¹)	Feed vf (mm/min)	ap (mm)	ae (mm)	R.P.M n (min ⁻¹)	Feed vf (mm/min)	ap (mm)	ae (mm)	R.P.M n (min ⁻¹)	Feed vf (mm/min)	ap (mm)	ae (mm)
6	11,600	11,200	0.24	1.6	9,000	7,570	0.21	1.6	5,800	3,500	0.18	1.6
8	8,700		0.32	2.2	6,700		0.28	2.2	4,300		0.24	2.2
10	7,000		0.40	2.7	5,400		0.35	2.7	3,500		0.30	2.7
12	5,800		0.48	3.3	4,500		0.42	3.3	2,900		0.36	3.3

➡ Roughing cut

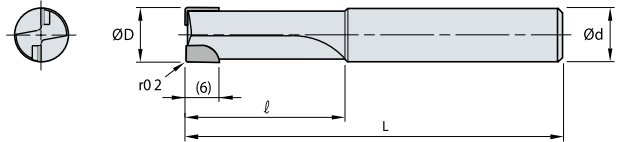
Diameter (Ø)	Mold steel Hrc35~45 (HPM1, KP4M)				Mold steel Hrc45~55 (NAK55, NAK80, STAVAX)				Heat treated Hrc55 (SKD11, STD61)			
	R.P.M n (min ⁻¹)	Feed vf (mm/min)	ap (mm)	ae (mm)	R.P.M n (min ⁻¹)	Feed vf (mm/min)	ap (mm)	ae (mm)	R.P.M n (min ⁻¹)	Feed vf (mm/min)	ap (mm)	ae (mm)
6	8,488	9,167	0.27	3.0	6,366	6,112	0.24	3.0	4,244	2,546	0.21	3.0
8	6,366		0.36	4.0	4,775		0.32	4.0	3,183		0.28	4.0
10	5,093		0.45	5.0	3,820		0.40	5.0	2,546		0.35	5.0
12	4,244		0.54	6.0	3,183		0.48	6.0	2,122		0.42	6.0

※ Cutting condition by overhang

1. Standard overhang: Follow cutting conditions above
2. Long type: Apply 80% feed & 80% ae
3. Long overhang: When the overhang is increased by 10mm, decrease feed 5% & ae 5%

PCD Endmill

PDE1000/2000 (Flat)



(mm)

Designation		ØD	Ød	ℓ	L
PDE 1	1040	4	6	15	45
	1050	5	6	15	50
	1060	6	6	20	60
PDE 2	2060	6	8	20	60
	2070	7	8	20	60
	2080	8	8	20	60
	2090	9	10	25	70
	2100	10	10	25	70
	2120	12	12	25	75

Special endmill order form

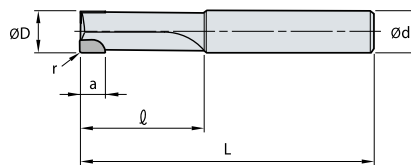


Fig. 1

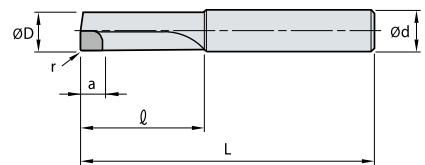


Fig. 2

Designation	Fig.	No. of Flute	Dimension (mm)					
			ØD	Ød	r	a	ℓ	L
PDES								

※ Depending on customer requests, we can make special Endmill

Recommended cutting conditions

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

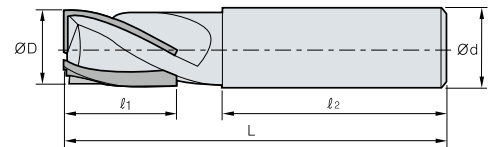
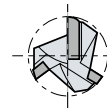


Brazed Endmill

ZSE200/300 (Flat)



ØD	Tolerance
All	0.00 ~ - 0.05



(mm)

	Designation	ØD	Ød	ℓ ₁	ℓ ₂	L
ZSE 2	214	14	16	28	57	95
	215	15	16	28	57	95
	216(Q)	16	16	28	55	95
	217	17	20	30	70	115
	218	18	20	30	70	115
	219	19	20	30	70	115
	220(Q)	20	20	30	70	115
	221	21	20	35	65	115
	222	22	20	35	65	115
	223	23	25	35	75	125
	224	24	25	35	75	125
	225	25	25	35	75	125
	226(Q)	26	25	35	75	125
	227	27	25	35	75	125
	228	28	25	35	75	125
	229	29	32	40	95	150
	230(Q)	30	32	40	95	150
	231	31	32	40	95	150
	232	32	32	45	90	150
	233	33	32	45	90	150
	234	34	32	50	85	150
	235	35	32	50	85	150
	236	36	32	50	85	150
	237	37	32	55	80	150
	238	38	32	55	80	150
	238S	38	42	55	80	150
	240(Q)	40	32	60	75	150
	240S	40	42	60	75	150
	242	42	32	60	75	150
ZSE 3	244	44	32	65	80	160
	245	45	32	65	80	160
	245S	45	42	65	80	160
	247	47	32	65	80	160
	248	48	32	65	80	160
	248S	48	42	65	80	160
	250	50	32	65	80	160
	250S	50	42	65	80	160
	314	14	16	28	57	95
	315	15	16	28	57	95
	316	16	16	28	55	95
	317	17	20	30	70	115
	318	18	20	30	70	115
	319	19	20	30	70	115
	320	20	20	30	70	115
	322	22	20	35	65	115
	325	25	25	35	75	125
	326	26	25	35	75	125
	328	28	25	35	75	125
	330	30	32	40	95	150
	331	31	32	40	95	150

Special Endmills order: ZSE○○○○○I-L

Ex.1) 2 flutes, diameter: 6.3, I: 10, L: 60 ZSBE206310-60L

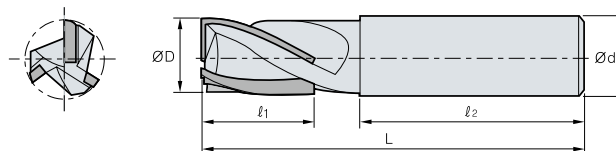
Ex.2) 2 flutes, diameter: 6.3, standard type ZSE2063

Brazed Endmill

ZSE300/400/600 (Flat)



ØD	Tolerance
All	0.00 ~ - 0.05



(mm)

	Designation	ØD	Ød	l ₁	l ₂	L
ZSE 3	332	32	32	45	90	150
	333	33	32	45	90	150
	334	34	32	50	85	150
	335	35	32	50	85	150
	338	38	32	55	80	150
	338S	38	42	55	80	150
	340	40	32	60	75	150
	340S	40	42	60	75	150
	342	42	32	60	75	150
	345	45	32	65	80	160
	345S	45	42	65	80	160
	350	50	32	65	80	160
	350S	50	42	65	80	160
ZSE 4	414	14	16	28	57	95
	415	15	16	28	57	95
	416 (Q)	16	16	28	55	95
	417	17	20	30	70	115
	418	18	20	30	70	115
	419	19	20	30	70	115
	420 (Q)	20	20	30	70	115
	421	21	20	35	65	115
	422	22	20	35	65	115
	423	23	25	35	75	125
	424	24	25	35	75	125
	425 (Q)	25	25	35	75	125
	426	26	25	35	75	125
	427	27	25	35	75	125
	428	28	25	35	75	125
	429	29	32	40	95	150
	430	30	32	40	95	150
	432 (Q)	32	32	45	90	150
	435	35	32	50	80	150
	438	38	32	55	85	150
	438S	38	42	55	85	150
	440 (Q)	40	32	60	75	150
	440S	40	42	60	75	150
	445	45	32	65	80	160
	445S	45	42	65	80	160
	450	50	32	65	80	160
	450S	50	42	65	80	160
ZSE 6	634	34	32	50	85	150
	635	35	32	50	85	150
	638	38	32	55	80	150
	638S	38	42	55	80	150
	640	40	32	60	75	150
	640S	40	42	60	75	150
	645	45	32	65	80	160
	645S	45	42	65	80	160
	650	50	32	65	80	160
	650S	50	42	65	80	160

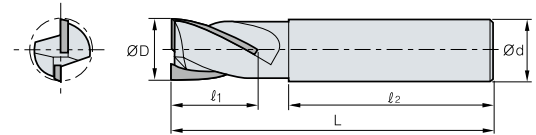
Special Endmills order: ZSE○○○○○I-L



ZSEA200 (Flat)



ØD	Tolerance
All	0.00 ~ - 0.05



(mm)

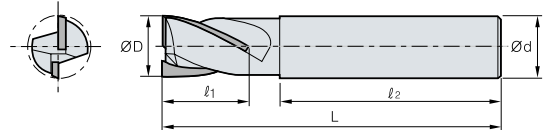
Designation		ØD	Ød	ℓ ₁	ℓ ₂	L
ZSEA 2	215	15	16	28	57	95
	216	16	16	28	55	95
	218	18	20	30	70	115
	219	19	20	30	70	115
	220	20	20	30	70	115
	221	21	20	35	65	115
	222	22	20	35	65	115
	223	23	25	35	75	125
	224	24	25	35	75	125
	225	25	25	35	75	125
	228	28	25	35	75	125
	230	30	32	40	95	150
	232	32	32	45	90	150
	238	38	32	55	80	150
	240	40	32	60	75	150
	250	50	32	65	80	160

Brazed Endmill

ZSEL200/400, ZSEXL200 (Long flat)



ØD	Tolerance
All	0.00 ~ - 0.05



(mm)

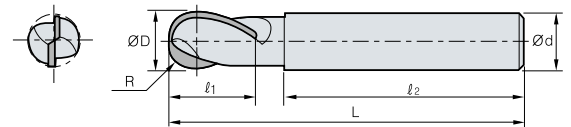
	Designation	ØD	Ød	l ₁	l ₂	L
ZSEL 2	214	14	16	50	55	120
	216	16	16	50	55	120
	218	18	20	60	65	140
	220	20	20	60	65	140
	222	22	20	60	65	140
	225	25	25	70	65	150
	230	30	32	80	85	180
	232	32	32	90	85	190
	235	35	32	100	85	200
	240	40	42	100	105	220
	245	45	42	120	95	230
	250	50	42	120	95	230
ZSEL 4	416	16	16	50	55	120
	420	20	20	60	65	140
	425	25	25	70	65	150
	430	30	32	80	85	180
	435	35	32	100	85	200
	440	40	42	100	105	220
ZSEXL 2	220	20	20	120	65	200
	222	22	20	120	65	200
	225	25	25	140	65	220



ZSBE200 (Ball)



ØD	Tolerance
All	0.00 ~ - 0.05



(mm)

Designation	R	ØD	Ød	l ₁	l ₂	L
ZSBE						
2 213	6.5	13	16	30	60	100
214	7	14	16	30	65	100
215	7.5	15	16	35	55	100
216Q	8	16	16	35	55	100
217	8.5	17	20	35	65	110
218	9	18	20	35	65	110
219	9.5	19	20	35	65	110
220Q	10	20	20	35	65	110
221	10.5	21	20	35	65	110
222	11	22	20	35	65	110
223	11.5	23	25	40	65	120
224	12	24	25	40	70	120
225	12.5	25	25	40	70	120
230	15	30	32	40	70	130
231	15.5	31	32	40	80	130
232	16	32	32	50	75	140
233	16.5	33	32	50	75	140
234	17	34	32	50	85	150
235	17.5	35	32	50	85	150
235S	17.5	35	42	50	85	150
236	18	36	32	50	85	150
236S	18	36	42	50	85	150
237	18.5	37	32	50	95	160
237S	18.5	37	42	50	95	160
238	19	38	32	50	95	160
238S	19	38	42	50	95	160
239	19.5	39	32	50	95	160
239S	19.5	39	42	50	95	160
240	20	40	32	50	95	160
240S	20	40	42	50	95	160
245	22.5	45	32	50	105	170
245S	22.5	45	42	50	105	170
250	25	50	32	50	105	170
250S	25	50	42	50	105	170

- ZSBE200 Special Endmills order: ZSBE2 I-L
Ex 1) 2 flutes diameter: 6 3 I: 10 L: 60 ZSBE 206310-60L Ex.2) 2 flutes, diameter: 6.3, standard type ZSBE2063
- ZSEA200 Special Endmills order : ZSEA2 I-L
Ex.1) 2 flutes, diameter: 16.3, I: 28, L: 95 ZSEA2163 28-95L Ex.2) 2 flutes, diameter: 17.0, standard type ZSEA2170
- ZSEL200/400, ZSEXL200 Special Endmills orde r: ZSEL I-L

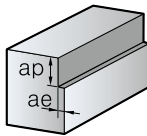
Brazed Endmill

Recommended cutting conditions

➤ ZSE200 Flat

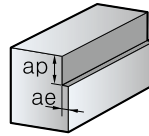
Workpiece Conditions Diameter (Ø)	SM50C,SCM,GC (~HRC30)		STD61,STD11 (HRC30~45)		STD61 (HRC45~55)	
	R.P.M n (min ⁻¹)	Feed vf (mm/min)	R.P.M n (min ⁻¹)	Feed vf (mm/min)	R.P.M n (min ⁻¹)	Feed vf (mm/min)
20	1,600	152	950	88	560	44
25	1,300	136	750	72	450	36
30	1,100	120	650	64	370	32
40	800	96	500	56	280	24
50	650	88	400	48	220	20

[Application tip]



■ Side milling (under HRC45)

- ap : $\leq 1.5D$
- ae : $\leq 0.1D$



■ Side milling (over HRC45)

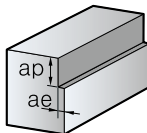
- ap : $\leq 1D$ (Max : 1mm)

- ※ Above table based on side milling, when it enters to ae direction, you should apply reduced cutting condition
- ※ When it enters to ae direction, for finishing you should increase revolution speed and feed in the table

➤ ZSE400 Flat

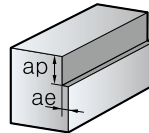
Workpiece Conditions Diameter (Ø)	SM50C,SCM,GC (~HRC30)		STD61,STD11 (HRC30~45)		STD61 (HRC45~55)	
	R.P.M n (min ⁻¹)	Feed vf (mm/min)	R.P.M n (min ⁻¹)	Feed vf (mm/min)	R.P.M n (min ⁻¹)	Feed vf (mm/min)
20	1,600	230	950	133	560	66
25	1,300	205	750	109	450	54
30	1,100	180	650	96	370	48
40	800	145	500	85	280	36
50	650	135	400	72	220	30

[Application tip]



■ Side milling (under HRC45)

- ap : $\leq 1.5D$
- ae : $\leq 0.1D$



■ Side milling (over HRC45)

- ap : $\leq 1D$ (Max : 1mm)

- ※ Above table based on side milling, when it enters to ae direction, you should apply reduced cutting condition
- ※ When it enters to ae direction, for finishing you should increase revolution speed and feed in the table

Drill

Product details / Recommended cutting conditions

Drill / Threading / Reamer index 122



Drill

MSD Plus	124	Vulcan Drill	153
MSD Plus-S	130	Burnishing Drill	156
MLD Plus	135	Top Solid Drill	158
MSD Plus CFRP	139	PCD Drill	159
MSFD	140	Gun Drill	160
ESD Plus	145	Champer Tool	163
SSD Plus	151		



Threading

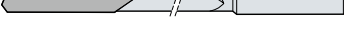
Thread Mill	166	TAP	176
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Reamer

Chuckling / Machine Reamer	187	Cermet Reamer	190
PCD Reamer	189	Broach Reamer	191

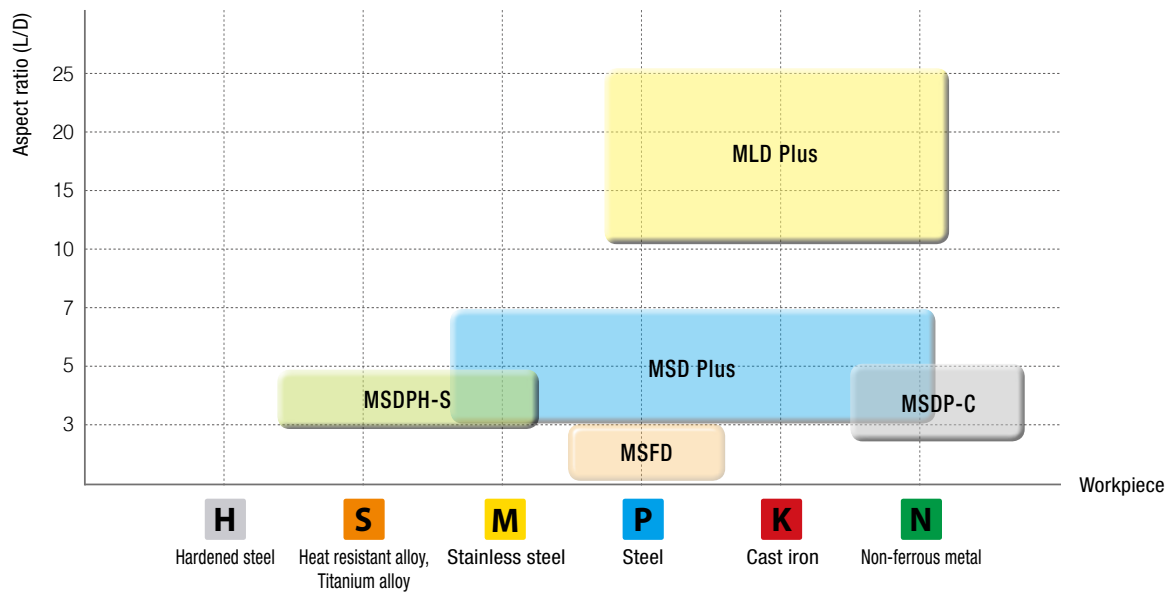
KORLOY Drill / Reamer

Type	Designation		Shape	Drills dia.	Aspect ratio	Page
Solid Drills	Mach Solid Drill Plus	MSDP		Ø1.0~Ø20.0	3D~7D	124~128
		MSDPH		Ø2.5~Ø20.0	3D~7D	125~128
	Mach Solid Drill Plus-S	MSDPH-S		Ø3.0~Ø16.0	3D~5D	130~133
	Mach Long Drill Plus	MLD□□□□N		Ø3.0~Ø10.0	10D~25D	135~138
	Mach Solid Drill Plus CFRP	MSDP-C		Ø3.0~Ø12.7	5D	139
	Mach Solid Flat Drill	MSFD		Ø2.5~Ø12.0	2D	140, 141
		MSFDH		Ø2.5~Ø12.0	3D	142~143
	ECO Solid Drill Plus	ESDP-P		Ø1.0~Ø20.0	3D~5D	145~149
	Carbide Drill Plus	SSDP		Ø1.0~Ø15.0	-	151, 152
	Vulcan Drill	VZD		Ø12.6~Ø40.5	-	153, 154
	Burnishing Drill	BDS		Ø4.0~Ø16.0	5D~7D	156
		BDT		Ø4.2~Ø10.3	2D~4D	156
	Top solid Drill	TSDM		Ø8.0~Ø25.0	5D~8D	158
	PCD Drill	PDD		Ø5.0~Ø12.0	5D	159
	Gun Drill	KGDS		Ø2.0~Ø33.0	50D~100D	160
		KGDT		Ø6.0~Ø26.5	50D~100D	161



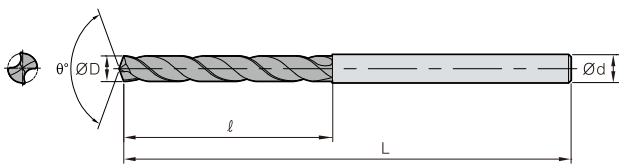
Type	Designation		Shape	Drills dia.	Aspect ratio	Page
Reamer	Chuckling / Machine Reamer	SCRS	 Available Insert : RI	Ø5.0~Ø20.0	2D~3D	187
		SCRH		Ø5.0~Ø20.0	2D~3D	187
		TCRS		Ø7.0~Ø30.0	2D~3D	188
		TMRS		Ø7.0~Ø30.0	3D~5D	188
	PCD Reamer	PDR		Ø5.0~Ø20.0	3D~5D	189
	Cermet Reamer	KCR		Ø6.0~Ø30.0	3D~7D	190
	Broach Reamer	HBRE		Ø3.0~Ø25.0	3D~7D	191

Application area



MSD Plus

MSDP-□ (P/M/K/N)



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

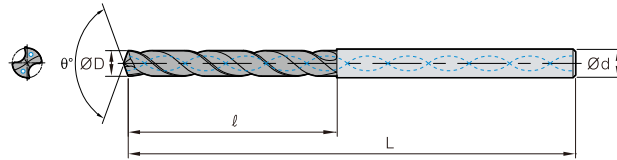
Non-ferrous metal

P Steel M Stainless steel K Cast iron N Non-ferrous metal

(mm)							
Designation		ØD	Ød	3P,M,K,N		5P,M,K,N	
				ℓ	L	ℓ	L
MSDP	010 - □ P,M,K,N	1.0	3.0	6	45	12	66
	011 - □ P,M,K,N	1.1	3.0	7	45	12	66
	012 - □ P,M,K,N	1.2	3.0	8	45	12	66
	013 - □ P,M,K,N	1.3	3.0	8	45	12	66
	014 - □ P,M,K,N	1.4	3.0	9	45	12	66
	015 - □ P,M,K,N	1.5	3.0	9	45	12	66
	016 - □ P,M,K,N	1.6	3.0	10	45	15	66
	017 - □ P,M,K,N	1.7	3.0	10	45	15	66
	018 - □ P,M,K,N	1.8	3.0	11	45	15	66
	019 - □ P,M,K,N	1.9	3.0	11	45	15	66
	020 - □ P,M,K,N	2.0	3.0	14	53	20	66
	021 - □ P,M,K,N	2.1	3.0	14	53	20	66
	022 - □ P,M,K,N	2.2	3.0	14	53	20	66
	023 - □ P,M,K,N	2.3	3.0	14	53	20	66
	024 - □ P,M,K,N	2.4	3.0	14	53	20	66



MSDP (H)-□ (P/M/K/N)



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			

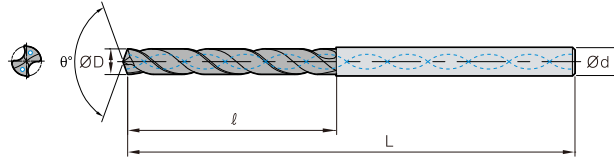
P Steel
 M Stainless steel
 K Cast iron
 N Non-ferrous metal

(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	3.0	14	53	20	66	30	70
	026 - □ P,M,K,N	2.6	3.0	17	53	20	66	30	70
	027 - □ P,M,K,N	2.7	3.0	17	53	20	66	30	70
	028 - □ P,M,K,N	2.8	3.0	17	53	20	66	30	70
	029 - □ P,M,K,N	2.9	3.0	17	53	20	66	30	70
	030 - □ P,M,K,N	3.0	3.0	17	53	20	66	30	70
	031 - □ P,M,K,N	3.1	4.0	20	58	28	74	30	70
	032 - □ P,M,K,N	3.2	4.0	20	58	28	74	30	70
	033 - □ P,M,K,N	3.3	4.0	20	58	28	74	30	70
	034 - □ P,M,K,N	3.4	4.0	20	58	28	74	37.5	75
	035 - □ P,M,K,N	3.5	4.0	20	58	28	74	37.5	75
	036 - □ P,M,K,N	3.6	4.0	22	58	32	74	37.5	75
	037 - □ P,M,K,N	3.7	4.0	22	58	32	74	37.5	75
	038 - □ P,M,K,N	3.8	4.0	22	58	32	74	37.5	75
	039 - □ P,M,K,N	3.9	4.0	22	58	32	74	37.5	75
	040 - □ P,M,K,N	4.0	4.0	22	58	32	74	37.5	75
	041 - □ P,M,K,N	4.1	5.0	24	62	36	82	37.5	75
	042 - □ P,M,K,N	4.2	5.0	24	62	36	82	37.5	75
	043 - □ P,M,K,N	4.3	5.0	24	62	36	82	45	85
	044 - □ P,M,K,N	4.4	5.0	24	62	36	82	45	85
	045 - □ P,M,K,N	4.5	5.0	24	62	36	82	45	85
	046 - □ P,M,K,N	4.6	5.0	26	62	38	82	45	85
	047 - □ P,M,K,N	4.7	5.0	26	62	38	82	45	85
	048 - □ P,M,K,N	4.8	5.0	26	62	38	82	50	90
	049 - □ P,M,K,N	4.9	5.0	26	62	38	82	50	90
	050 - □ P,M,K,N	5.0	5.0	26	62	38	82	50	90
	051 - □ P,M,K,N	5.1	6.0	28	66	44	82	50	90
	052 - □ P,M,K,N	5.2	6.0	28	66	44	82	50	90
	053 - □ P,M,K,N	5.3	6.0	28	66	44	82	50	90
	054 - □ P,M,K,N	5.4	6.0	28	66	44	82	50	90
	055 - □ P,M,K,N	5.5	6.0	28	66	44	82	57	97
	056 - □ P,M,K,N	5.6	6.0	28	66	44	82	57	97
	057 - □ P,M,K,N	5.7	6.0	28	66	44	82	57	97
	058 - □ P,M,K,N	5.8	6.0	28	66	44	82	57	97
	059 - □ P,M,K,N	5.9	6.0	28	66	44	82	57	97
	060 - □ P,M,K,N	6.0	6.0	28	66	44	82	57	97
	061 - □ P,M,K,N	6.1	7.0	34	74	50	91	66	106
	062 - □ P,M,K,N	6.2	7.0	34	74	50	91	66	106
	063 - □ P,M,K,N	6.3	7.0	34	74	50	91	66	106
	064 - □ P,M,K,N	6.4	7.0	34	74	50	91	66	106
	065 - □ P,M,K,N	6.5	7.0	34	74	50	91	66	106
	066 - □ P,M,K,N	6.6	7.0	34	74	50	91	66	106
	067 - □ P,M,K,N	6.7	7.0	34	74	50	91	66	106
	068 - □ P,M,K,N	6.8	7.0	34	74	50	91	66	106
	069 - □ P,M,K,N	6.9	7.0	34	74	50	91	76	116
	070 - □ P,M,K,N	7.0	7.0	34	74	50	91	76	116
	071 - □ P,M,K,N	7.1	8.0	41	79	53	91	76	116
	072 - □ P,M,K,N	7.2	8.0	41	79	53	91	76	116

MSD Plus

MSDP (H)-□ (P/M/K/N)



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			

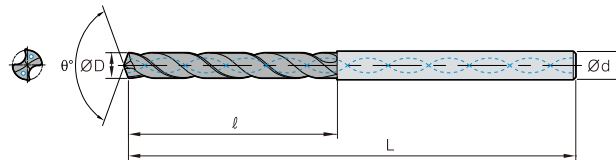
P Steel
 M Stainless steel
 K Cast iron
 N Non-ferrous metal

(mm)

Designation		ØD	Ød	3P,M,K,N		5P,M,K,N		7P,M,K,N	
				ℓ	L	ℓ	L	ℓ	L
MSDP (H)	073 - □ P,M,K,N	7.3	8.0	41	79	53	91	76	116
	074 - □ P,M,K,N	7.4	8.0	41	79	53	91	76	116
	075 - □ P,M,K,N	7.5	8.0	41	79	53	91	76	116
	076 - □ P,M,K,N	7.6	8.0	41	79	53	91	76	116
	077 - □ P,M,K,N	7.7	8.0	41	79	53	91	76	116
	078 - □ P,M,K,N	7.8	8.0	41	79	53	91	76	116
	079 - □ P,M,K,N	7.9	8.0	41	79	53	91	76	116
	080 - □ P,M,K,N	8.0	8.0	43	84	58	98	87	131
	081 - □ P,M,K,N	8.1	9.0	43	84	58	98	87	131
	082 - □ P,M,K,N	8.2	9.0	43	84	58	98	87	131
	083 - □ P,M,K,N	8.3	9.0	43	84	58	98	87	131
	084 - □ P,M,K,N	8.4	9.0	43	84	58	98	87	131
	085 - □ P,M,K,N	8.5	9.0	43	84	58	98	87	131
	086 - □ P,M,K,N	8.6	9.0	43	84	58	98	87	131
	087 - □ P,M,K,N	8.7	9.0	43	84	58	98	87	131
	088 - □ P,M,K,N	8.8	9.0	43	84	58	98	87	131
	089 - □ P,M,K,N	8.9	9.0	43	84	58	98	87	131
	090 - □ P,M,K,N	9.0	9.0	43	84	58	98	87	131
	091 - □ P,M,K,N	9.1	10.0	47	89	61	105	95	139
	092 - □ P,M,K,N	9.2	10.0	47	89	61	105	95	139
	093 - □ P,M,K,N	9.3	10.0	47	89	61	105	95	139
	094 - □ P,M,K,N	9.4	10.0	47	89	61	105	95	139
	095 - □ P,M,K,N	9.5	10.0	47	89	61	105	95	139
	096 - □ P,M,K,N	9.6	10.0	47	89	61	105	95	139
	097 - □ P,M,K,N	9.7	10.0	47	89	61	105	95	139
	098 - □ P,M,K,N	9.8	10.0	47	89	61	105	95	139
	099 - □ P,M,K,N	9.9	10.0	47	89	61	105	95	139
	100 - □ P,M,K,N	10.0	10.0	47	89	61	105	95	139
	101 - □ P,M,K,N	10.1	11.0	55	95	68	114	106	155
	102 - □ P,M,K,N	10.2	11.0	55	95	68	114	106	155
	103 - □ P,M,K,N	10.3	11.0	55	95	68	114	106	155
	104 - □ P,M,K,N	10.4	11.0	55	95	68	114	106	155
	105 - □ P,M,K,N	10.5	11.0	55	95	68	114	106	155
	106 - □ P,M,K,N	10.6	11.0	55	95	68	114	106	155
	107 - □ P,M,K,N	10.7	11.0	55	95	68	114	106	155
	108 - □ P,M,K,N	10.8	11.0	55	95	68	114	106	155
	109 - □ P,M,K,N	10.9	11.0	55	95	68	114	106	155
	110 - □ P,M,K,N	11.0	11.0	55	95	68	114	106	155
	111 - □ P,M,K,N	11.1	12.0	55	102	71	120	114	163
	112 - □ P,M,K,N	11.2	12.0	55	102	71	120	114	163
	113 - □ P,M,K,N	11.3	12.0	55	102	71	120	114	163
	114 - □ P,M,K,N	11.4	12.0	55	102	71	120	114	163
	115 - □ P,M,K,N	11.5	12.0	55	102	71	120	114	163
	116 - □ P,M,K,N	11.6	12.0	55	102	71	120	114	163
	117 - □ P,M,K,N	11.7	12.0	55	102	71	120	114	163
	118 - □ P,M,K,N	11.8	12.0	55	102	71	120	114	163
	119 - □ P,M,K,N	11.9	12.0	55	102	71	120	114	163
	120 - □ P,M,K,N	12.0	12.0	55	102	71	120	114	163



MSDP (H)-□ (P/M/K/N)



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			

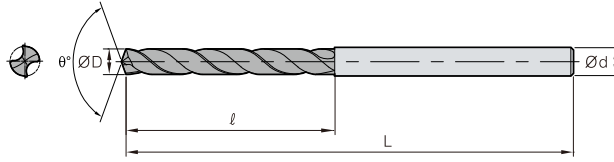
Steel Stainless steel Cast iron Non-ferrous metal

(mm)

Designation		ØD	Ød	3P,M,K,N		5P,M,K,N		7P,M,K,N	
				ℓ	L	ℓ	L	ℓ	L
MSDP (H)	121 - □ P,M,K,N	12.1	13.0	60	107	77	124	133	182
	122 - □ P,M,K,N	12.2	13.0	60	107	77	124	133	182
	123 - □ P,M,K,N	12.3	13.0	60	107	77	124	133	182
	124 - □ P,M,K,N	12.4	13.0	60	107	77	124	133	182
	125 - □ P,M,K,N	12.5	13.0	60	107	77	124	133	182
	126 - □ P,M,K,N	12.6	13.0	60	107	77	124	133	182
	127 - □ P,M,K,N	12.7	13.0	60	107	77	124	133	182
	128 - □ P,M,K,N	12.8	13.0	60	107	77	124	133	182
	129 - □ P,M,K,N	12.9	13.0	60	107	77	124	133	182
	130 - □ P,M,K,N	13.0	13.0	60	107	77	124	133	182
	131 - □ P,M,K,N	13.1	14.0	62	107	80	133	133	182
	132 - □ P,M,K,N	13.2	14.0	62	107	80	133	133	182
	133 - □ P,M,K,N	13.3	14.0	62	107	80	133	133	182
	134 - □ P,M,K,N	13.4	14.0	62	107	80	133	133	182
	135 - □ P,M,K,N	13.5	14.0	62	107	80	133	133	182
	136 - □ P,M,K,N	13.6	14.0	62	107	80	133	133	182
	137 - □ P,M,K,N	13.7	14.0	62	107	80	133	133	182
	138 - □ P,M,K,N	13.8	14.0	62	107	80	133	133	182
	139 - □ P,M,K,N	13.9	14.0	62	107	80	133	133	182
	140 - □ P,M,K,N	14.0	14.0	62	107	80	133	133	182
	141 - □ P,M,K,N	14.1	15.0	65	115	85	143	152	204
	142 - □ P,M,K,N	14.2	15.0	65	115	85	143	152	204
	143 - □ P,M,K,N	14.3	15.0	65	115	85	143	152	204
	144 - □ P,M,K,N	14.4	15.0	65	115	85	143	152	204
	145 - □ P,M,K,N	14.5	15.0	65	115	85	143	152	204
	146 - □ P,M,K,N	14.6	15.0	65	115	85	143	152	204
	147 - □ P,M,K,N	14.7	15.0	65	115	85	143	152	204
	148 - □ P,M,K,N	14.8	15.0	65	115	85	143	152	204
	149 - □ P,M,K,N	14.9	15.0	65	115	85	143	152	204
	150 - □ P,M,K,N	15.0	15.0	65	115	85	143	152	204
	151 - □ P,M,K,N	15.1	16.0	68	115	88	143	152	204
	152 - □ P,M,K,N	15.2	16.0	68	115	88	143	152	204
	153 - □ P,M,K,N	15.3	16.0	68	115	88	143	152	204
	154 - □ P,M,K,N	15.4	16.0	68	115	88	143	152	204
	155 - □ P,M,K,N	15.5	16.0	68	115	88	143	152	204
	156 - □ P,M,K,N	15.6	16.0	68	115	88	143	152	204
	157 - □ P,M,K,N	15.7	16.0	68	115	88	143	152	204
	158 - □ P,M,K,N	15.8	16.0	68	115	88	143	152	204
	159 - □ P,M,K,N	15.9	16.0	68	115	88	143	152	204
	160 - □ P,M,K,N	16.0	16.0	68	115	88	143	152	204
	161 - □ P,M,K,N	16.1	17.0	73	123	93	153	171	223
	162 - □ P,M,K,N	16.2	17.0	73	123	93	153	171	223
	163 - □ P,M,K,N	16.3	17.0	73	123	93	153	171	223
	164 - □ P,M,K,N	16.4	17.0	73	123	93	153	171	223
	165 - □ P,M,K,N	16.5	17.0	73	123	93	153	171	223
	166 - □ P,M,K,N	16.6	17.0	73	123	93	153	171	223
	167 - □ P,M,K,N	16.7	17.0	73	123	93	153	171	223
	168 - □ P,M,K,N	16.8	17.0	73	123	93	153	171	223

MSD Plus

MSDP (H)-□ (P/M/K/N)



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
169 - □ P,M,K,N	16.9	17.0	73	123	93	153	171	223
170 - □ P,M,K,N	17.0	17.0	73	123	93	153	171	223
171 - □ P,M,K,N	17.1	18.0	73	123	98	153	171	223
172 - □ P,M,K,N	17.2	18.0	73	123	98	153	171	223
173 - □ P,M,K,N	17.3	18.0	73	123	98	153	171	223
174 - □ P,M,K,N	17.4	18.0	73	123	98	153	171	223
175 - □ P,M,K,N	17.5	18.0	73	123	98	153	171	223
176 - □ P,M,K,N	17.6	18.0	73	123	98	153	171	223
177 - □ P,M,K,N	17.7	18.0	73	123	98	153	171	223
178 - □ P,M,K,N	17.8	18.0	73	123	98	153	171	223
179 - □ P,M,K,N	17.9	18.0	73	123	98	153	171	223
180 - □ P,M,K,N	18.0	18.0	73	123	98	153	171	223
181 - □ P,M,K,N	18.1	19.0	79	131	103	153	190	244
182 - □ P,M,K,N	18.2	19.0	79	131	103	153	190	244
183 - □ P,M,K,N	18.3	19.0	79	131	103	153	190	244
184 - □ P,M,K,N	18.4	19.0	79	131	103	153	190	244
185 - □ P,M,K,N	18.5	19.0	79	131	103	153	190	244
186 - □ P,M,K,N	18.6	19.0	79	131	103	153	190	244
187 - □ P,M,K,N	18.7	19.0	79	131	103	153	190	244
188 - □ P,M,K,N	18.8	19.0	79	131	103	153	190	244
189 - □ P,M,K,N	18.9	19.0	79	131	103	153	190	244
190 - □ P,M,K,N	19.0	19.0	79	131	103	153	190	244
191 - □ P,M,K,N	19.1	20.0	79	131	107	153	190	244
192 - □ P,M,K,N	19.2	20.0	79	131	107	153	190	244
193 - □ P,M,K,N	19.3	20.0	79	131	107	153	190	244
194 - □ P,M,K,N	19.4	20.0	79	131	107	153	190	244
195 - □ P,M,K,N	19.5	20.0	79	131	107	153	190	244
196 - □ P,M,K,N	19.6	20.0	79	131	107	153	190	244
197 - □ P,M,K,N	19.7	20.0	79	131	107	153	190	244
198 - □ P,M,K,N	19.8	20.0	79	131	107	153	190	244
199 - □ P,M,K,N	19.9	20.0	79	131	107	153	190	244
200 - □ P,M,K,N	20.0	20.0	79	131	107	153	190	244

MSD Plus



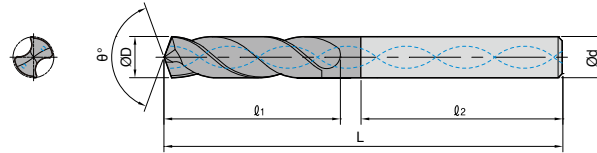
Recommended cutting conditions

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

MSDPH-S

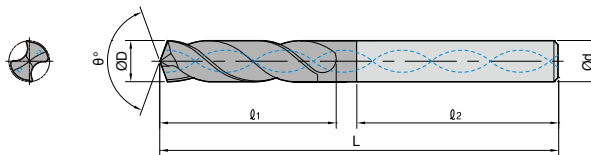


Terminology	S
Grade	PC325T
Tolerance (drill Dia.)	h7
Tolerance (shank Dia.)	h6
Point angle	140°
Twist angle	30°
Thinning	X Type
Coolant	Through
International standard	DIN 6537
Shank type	DIN 6535 HA

Designation		ØD		Ød	3S		5S		ℓ2
		mm	inch		ℓ1	L	ℓ1	L	
MSDPH	030-□S	3.0		6	20	62	28	66	36
	031-□S	3.1		6	20	62	28	66	36
	0318-□S	3.18	1/8	6	20	62	28	66	36
	032-□S	3.2		6	20	62	28	66	36
	033-□S	3.3		6	20	62	28	66	36
	034-□S	3.4		6	20	62	28	66	36
	035-□S	3.5		6	20	62	28	66	36
	0357-□S	3.57	9/64	6	20	62	28	66	36
	036-□S	3.6		6	20	62	28	66	36
	037-□S	3.7		6	20	62	28	66	36
	038-□S	3.8		6	24	66	36	74	36
	039-□S	3.9		6	24	66	36	74	36
	0397-□S	3.97	5/32	6	24	66	36	74	36
	040-□S	4.0		6	24	66	36	74	36
	041-□S	4.1		6	24	66	36	74	36
	042-□S	4.2		6	24	66	36	74	36
	043-□S	4.3		6	24	66	36	74	36
	0437-□S	4.37	11/64	6	24	66	36	74	36
	044-□S	4.4		6	24	66	36	74	36
	045-□S	4.5		6	24	66	36	74	36
	046-□S	4.6		6	24	66	36	74	36
	047-□S	4.7		6	24	66	36	74	36
	0476-□S	4.76	3/16	6	28	66	44	82	36
	048-□S	4.8		6	28	66	44	82	36
	049-□S	4.9		6	28	66	44	82	36
	050-□S	5.0		6	28	66	44	82	36
	051-□S	5.1		6	28	66	44	82	36
	0516-□S	5.16	13/64	6	28	66	44	82	36
	052-□S	5.2		6	28	66	44	82	36
	053-□S	5.3		6	28	66	44	82	36
	054-□S	5.4		6	28	66	44	82	36
	055-□S	5.5		6	28	66	44	82	36
	0556-□S	5.56	7/32	6	28	66	44	82	36
	056-□S	5.6		6	28	66	44	82	36
	057-□S	5.7		6	28	66	44	82	36
	058-□S	5.8		6	28	66	44	82	36
	059-□S	5.9		6	28	66	44	82	36
	0595-□S	5.95	15/64	6	28	66	44	82	36
	060-□S	6.0		6	28	66	44	82	36



MSDPH-S

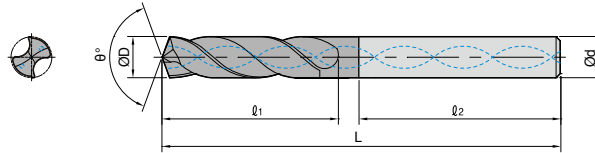


Terminology	S
Grade	PC325T
Tolerance (drill Dia.)	h7
Tolerance (shank Dia.)	h6
Point angle	140°
Twist angle	30°
Thinning	X Type
Coolant	Through
International standard	DIN 6537
Shank type	DIN 6535 HA

Designation		ØD		Ød	3S		5S		L2
		mm	inch		L1	L	L1	L	
MSDPH	061-□S	6.1		8	34	79	53	91	36
	062-□S	6.2		8	34	79	53	91	36
	063-□S	6.3		8	34	79	53	91	36
	0635-□S	6.35	1/4	8	34	79	53	91	36
	064-□S	6.4		8	34	79	53	91	36
	065-□S	6.5		8	34	79	53	91	36
	066-□S	6.6		8	34	79	53	91	36
	067-□S	6.7		8	34	79	53	91	36
	0675-□S	6.75	17/64	8	34	79	53	91	36
	068-□S	6.8		8	34	79	53	91	36
	069-□S	6.9		8	34	79	53	91	36
	070-□S	7.0		8	34	79	53	91	36
	071-□S	7.1		8	41	79	53	91	36
	0714-□S	7.14	9/32	8	41	79	53	91	36
	072-□S	7.2		8	41	79	53	91	36
	073-□S	7.3		8	41	79	53	91	36
	074-□S	7.4		8	41	79	53	91	36
	075-□S	7.5		8	41	79	53	91	36
	0754-□S	7.54	19/64	8	41	79	53	91	36
	076-□S	7.6		8	41	79	53	91	36
	077-□S	7.7		8	41	79	53	91	36
	078-□S	7.8		8	41	79	53	91	36
	079-□S	7.9		8	41	79	53	91	36
	0794-□S	7.94	5/16	8	41	79	53	91	36
	080-□S	8.0		8	41	79	53	91	36
	081-□S	8.1		10	47	89	61	103	40
	082-□S	8.2		10	47	89	61	103	40
	083-□S	8.3		10	47	89	61	103	40
	0833-□S	8.33	21/64	10	47	89	61	103	40
	084-□S	8.4		10	47	89	61	103	40
	085-□S	8.5		10	47	89	61	103	40
	086-□S	8.6		10	47	89	61	103	40
	087-□S	8.7		10	47	89	61	103	40
	0873-□S	8.73	11/32	10	47	89	61	103	40
	088-□S	8.8		10	47	89	61	103	40
	089-□S	8.9		10	47	89	61	103	40
	090-□S	9.0		10	47	89	61	103	40
	091-□S	9.1		10	47	89	61	103	40
	0913-□S	9.13	23/64	10	47	89	61	103	40

MSD Plus-S

MSDPH-S

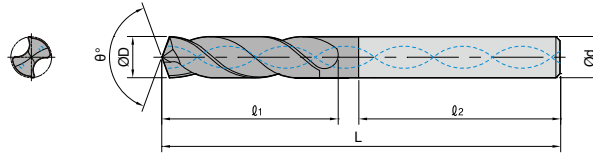


Terminology	S
Grade	PC325T
Tolerance (drill Dia.)	h7
Tolerance (shank Dia.)	h6
Point angle	140°
Twist angle	30°
Thinning	X Type
Coolant	Through
International standard	DIN 6537
Shank type	DIN 6535 HA

Designation		ØD		Ød	3S		5S		ℓ2
		mm	inch		ℓ1	L	ℓ1	L	
MSDPH	092-□S	9.2		10	47	89	61	103	40
	093-□S	9.3		10	47	89	61	103	40
	094-□S	9.4		10	47	89	61	103	40
	095-□S	9.5		10	47	89	61	103	40
	0953-□S	9.53	3/8	10	47	89	61	103	40
	096-□S	9.6		10	47	89	61	103	40
	097-□S	9.7		10	47	89	61	103	40
	098-□S	9.8		10	47	89	61	103	40
	099-□S	9.9		10	47	89	61	103	40
	0992-□S	9.92	25/64	10	47	89	61	103	40
	100-□S	10.0		10	47	89	61	103	40
	101-□S	10.1		12	55	102	71	118	45
	102-□S	10.2		12	55	102	71	118	45
	103-□S	10.3		12	55	102	71	118	45
	1032-□S	10.32	13/32	12	55	102	71	118	45
	104-□S	10.4		12	55	102	71	118	45
	105-□S	10.5		12	55	102	71	118	45
	106-□S	10.6		12	55	102	71	118	45
	107-□S	10.7		12	55	102	71	118	45
	1072-□S	10.72	27/64	12	55	102	71	118	45
	108-□S	10.8		12	55	102	71	118	45
	109-□S	10.9		12	55	102	71	118	45
	110-□S	11.0		12	55	102	71	118	45
	111-□S	11.1		12	55	102	71	118	45
	1111-□S	11.11	7/16	12	55	102	71	118	45
	112-□S	11.2		12	55	102	71	118	45
	113-□S	11.3		12	55	102	71	118	45
	114-□S	11.4		12	55	102	71	118	45
	115-□S	11.5		12	55	102	71	118	45
	1151-□S	11.51	29/64	12	55	102	71	118	45
	116-□S	11.6		12	55	102	71	118	45
	117-□S	11.7		12	55	102	71	118	45
	118-□S	11.8		12	55	102	71	118	45
	119-□S	11.9		12	55	102	71	118	45
	1191-□S	11.91	15/32	12	55	102	71	118	45
	120-□S	12.0		12	55	102	71	118	45
	121-□S	12.1		14	60	107	77	124	45
	122-□S	12.2		14	60	107	77	124	45
	123-□S	12.3	31/64	14	60	107	77	124	45
	124-□S	12.4		14	60	107	77	124	45



MSDPH-S



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

Designation		ØD		Ød	3S		5S		L2
		mm	inch		L1	L	L1	L	
MSDPH	125-□S	12.5		14	60	107	77	124	45
	126-□S	12.6		14	60	107	77	124	45
	127-□S	12.7	1/2	14	60	107	77	124	45
	128-□S	12.8		14	60	107	77	124	45
	129-□S	12.9		14	60	107	77	124	45
	130-□S	13.0		14	60	107	77	124	45
	131-□S	13.1		14	60	107	77	124	45
	132-□S	13.2		14	60	107	77	124	45
	133-□S	13.3		14	60	107	77	124	45
	134-□S	13.4		14	60	107	77	124	45
	1349-□S	13.49	17/32	14	60	107	77	124	45
	135-□S	13.5		14	60	107	77	124	45
	136-□S	13.6		14	60	107	77	124	45
	137-□S	13.7		14	60	107	77	124	45
	138-□S	13.8		14	60	107	77	124	45
	139-□S	13.9		14	60	107	77	124	45
	140-□S	14.0		14	60	107	77	124	45
	141-□S	14.1		16	65	115	83	133	48
	142-□S	14.2		16	65	115	83	133	48
	1429-□S	14.29	9/16	16	65	115	83	133	48
	143-□S	14.3		16	65	115	83	133	48
	144-□S	14.4		16	65	115	83	133	48
	145-□S	14.5		16	65	115	83	133	48
	146-□S	14.6		16	65	115	83	133	48
	147-□S	14.7		16	65	115	83	133	48
	148-□S	14.8		16	65	115	83	133	48
	149-□S	14.9		16	65	115	83	133	48
	150-□S	15.0		16	65	115	83	133	48
	151-□S	15.1		16	65	115	83	133	48
	152-□S	15.2		16	65	115	83	133	48
	153-□S	15.3		16	65	115	83	133	48
	154-□S	15.4		16	65	115	83	133	48
	155-□S	15.5		16	65	115	83	133	48
	156-□S	15.6		16	65	115	83	133	48
	157-□S	15.7		16	65	115	83	133	48
	158-□S	15.8		16	65	115	83	133	48
	1587-□S	15.87	5/8	16	65	115	83	133	48
	159-□S	15.9		16	65	115	83	133	48
	160-□S	16.0		16	65	115	83	133	48

MSD Plus-S

Recommended cutting conditions

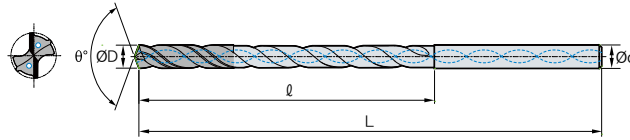
Workpiece		HB	Grade	vc (m/min)	Depth of cut = 3D~5D				
					Feed rate (mm/rev) per drill dia. (mm)				
ISO	Workpiece				Ø2.5~Ø5.0	Ø5.1~Ø8.0	Ø8.1~Ø12.0	Ø12.1~Ø16.0	
S	Heat resistant alloy	Fe-base	25~35	PC325T	25~30	0.055~0.07	0.07~0.10	0.08~0.13	0.10~0.15
		Ni or Co base	35~45	PC325T	20~25	0.045~0.06	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

MLD-□□ (P/K/N)



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		

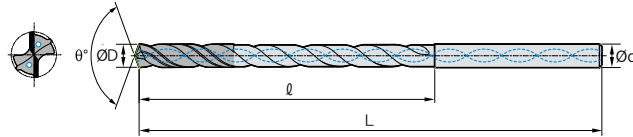
Steel Cast iron Non-ferrous metal

(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	0300N-□□P,K,N	3.0	3.0	40	90	55	105	70	120	-	-
	0310N-□□P,K,N	3.1	4.0	45	100	60	125	80	140	-	-
	0320N-□□P,K,N	3.2	4.0	45	100	60	125	80	140	-	-
	0330N-□□P,K,N	3.3	4.0	45	100	60	125	80	140	-	-
	0340N-□□P,K,N	3.4	4.0	50	100	65	125	85	140	-	-
	0350N-□□P,K,N	3.5	4.0	50	100	65	125	85	140	-	-
	0360N-□□P,K,N	3.6	4.0	50	100	65	125	85	140	-	-
	0370N-□□P,K,N	3.7	4.0	50	100	65	125	85	140	-	-
	0380N-□□P,K,N	3.8	4.0	50	100	75	125	90	140	-	-
	0390N-□□P,K,N	3.9	4.0	50	100	75	125	90	140	-	-
	0400N-□□P,K,N	4.0	4.0	50	100	75	125	90	140	115	165
	0410N-□□P,K,N	4.1	5.0	55	115	75	140	100	165	120	190
	0420N-□□P,K,N	4.2	5.0	55	115	75	140	100	165	120	190
	0430N-□□P,K,N	4.3	5.0	60	115	85	140	110	165	135	190
	0440N-□□P,K,N	4.4	5.0	60	115	85	140	110	165	135	190
	0450N-□□P,K,N	4.5	5.0	60	115	85	140	110	165	135	190
	0460N-□□P,K,N	4.6	5.0	60	115	85	140	110	165	135	190
	0470N-□□P,K,N	4.7	5.0	60	115	85	140	110	165	135	190
	0480N-□□P,K,N	4.8	5.0	65	115	90	140	115	165	140	190
	0490N-□□P,K,N	4.9	5.0	65	115	90	140	115	165	140	190

MLD Plus

MLD- □□ (P/K/N)



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		

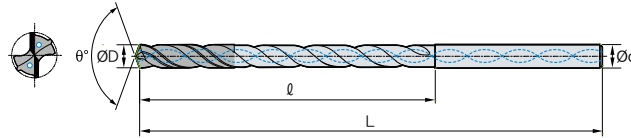
■ Steel
 ■ Cast iron
 ■ Non-ferrous metal

(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	0500N-□□P,K,N	5.0	5.0	65	115	90	140	115	165	140	190
	0510N-□□P,K,N	5.1	6.0	70	128	95	160	120	190	150	220
	0520N-□□P,K,N	5.2	6.0	70	128	95	160	120	190	150	220
	0530N-□□P,K,N	5.3	6.0	70	128	95	160	120	190	150	220
	0540N-□□P,K,N	5.4	6.0	78	128	110	160	140	190	170	220
	0550N-□□P,K,N	5.5	6.0	78	128	110	160	140	190	170	220
	0560N-□□P,K,N	5.6	6.0	78	128	110	160	140	190	170	220
	0570N-□□P,K,N	5.7	6.0	78	128	110	160	140	190	170	220
	0580N-□□P,K,N	5.8	6.0	78	128	110	160	140	190	170	220
	0590N-□□P,K,N	5.9	6.0	78	128	110	160	140	190	170	220
	0600N-□□P,K,N	6.0	6.0	78	128	110	160	140	190	170	220
	0610N-□□P,K,N	6.1	7.0	87	140	120	175	155	210	190	250
	0620N-□□P,K,N	6.2	7.0	87	140	120	175	155	210	190	250
	0630N-□□P,K,N	6.3	7.0	87	140	120	175	155	210	190	250
	0640N-□□P,K,N	6.4	7.0	87	140	120	175	155	210	190	250
	0650N-□□P,K,N	6.5	7.0	87	140	120	175	155	210	190	250
	0660N-□□P,K,N	6.6	7.0	87	140	120	175	155	210	190	250
	0670N-□□P,K,N	6.7	7.0	87	140	120	175	155	210	190	250
	0680N-□□P,K,N	6.8	7.0	90	140	125	175	160	210	200	250
	0690N-□□P,K,N	6.9	7.0	90	140	125	175	160	210	200	250



MLD-□□ (P/K/N)



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		

Steel Cast iron 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	0700N-□□P,K,N	7.0	7.0	90	140	125	175	160	210	200	250
	0710N-□□P,K,N	7.1	8.0	100	155	135	195	170	230	-	-
	0720N-□□P,K,N	7.2	8.0	100	155	135	195	170	230	-	-
	0730N-□□P,K,N	7.3	8.0	100	155	135	195	170	230	-	-
	0740N-□□P,K,N	7.4	8.0	100	155	135	195	170	230	-	-
	0750N-□□P,K,N	7.5	8.0	100	155	135	195	170	230	-	-
	0760N-□□P,K,N	7.6	8.0	105	155	145	195	180	230	-	-
	0770N-□□P,K,N	7.7	8.0	105	155	145	195	180	230	-	-
	0780N-□□P,K,N	7.8	8.0	105	155	145	195	180	230	-	-
	0790N-□□P,K,N	7.9	8.0	105	155	145	195	180	230	-	-
	0800N-□□P,K,N	8.0	8.0	105	155	145	195	180	230	-	-
	0810N-□□P,K,N	8.1	9.0	110	165	155	210	195	260	-	-
	0820N-□□P,K,N	8.2	9.0	110	165	155	210	195	260	-	-
	0830N-□□P,K,N	8.3	9.0	110	165	155	210	195	260	-	-
	0840N-□□P,K,N	8.4	9.0	110	165	155	210	195	260	-	-
	0850N-□□P,K,N	8.5	9.0	110	165	155	210	195	260	-	-
	0860N-□□P,K,N	8.6	9.0	115	165	160	210	210	260	-	-
	0870N-□□P,K,N	8.7	9.0	115	165	160	210	210	260	-	-
	0880N-□□P,K,N	8.8	9.0	115	165	160	210	210	260	-	-
	0890N-□□P,K,N	8.9	9.0	115	165	160	210	210	260	-	-
	0900N-□□P,K,N	9.0	9.0	115	165	160	210	210	260	-	-
	0910N-□□P,K,N	9.1	10.0	125	190	170	240	-	-	-	-
	0920N-□□P,K,N	9.2	10.0	125	190	170	240	-	-	-	-
	0930N-□□P,K,N	9.3	10.0	125	190	170	240	-	-	-	-
	0940N-□□P,K,N	9.4	10.0	125	190	170	240	-	-	-	-
	0950N-□□P,K,N	9.5	10.0	125	190	170	240	-	-	-	-
	0960N-□□P,K,N	9.6	10.0	130	190	180	240	-	-	-	-
	0970N-□□P,K,N	9.7	10.0	130	190	180	240	-	-	-	-
	0980N-□□P,K,N	9.8	10.0	130	190	180	240	-	-	-	-
	0990N-□□P,K,N	9.9	10.0	130	190	180	240	-	-	-	-
	1000N-□□P,K,N	10.0	10.0	130	190	180	240	-	-	-	-

MLD Plus

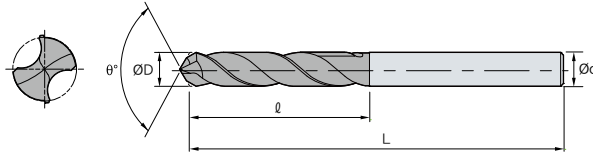
Recommended cutting conditions

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 Iloy	Copper alloy	150-160	FG2	120 (100~150)	0.12~0.17	0.15~0.20	0.20~0.25



MSD Plus CFRP

MSDP-5C



Terminology	C
Grade	ND2100
Tolerance (drill Dia.)	m7
Tolerance (shank Dia.)	h6
Point angle	118°
Twist angle	30°
Thinning	X type
Coolant	External

CFRP

(mm)

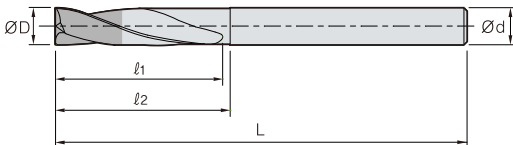
Designation	ØD	Ød	5C	
			ℓ	L
MSDP 030-5C	3	6	28	66
040-5C	4	6	36	74
0476-5C	4.76	6	44	82
050-5C	5	6	44	82
060-5C	6	6	44	82
0635-5C	6.35	8	53	91
070-5C	7	8	53	91
0794-5C	7.94	8	53	91
080-5C	8	8	53	91
090-5C	9	10	61	103
0952-5C	9.52	10	61	103
100-5C	10	10	61	103
110-5C	11	12	71	118
1111-5C	11.11	12	71	118
120-5C	12	12	71	118
127-5C	12.7	14	71	124

Recommended cutting conditions

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

MSFD-2P



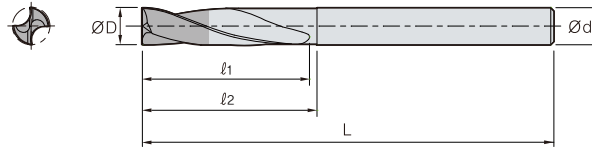
Terminology	P
Grade	PC325U
Tolerance (drill Dia.)	H7
Tolerance (shank Dia.)	h6
Point angle	180°
Twist angle	20°
Thinning	R type
Coolant	External

Steel

(mm)						
Designation		ØD	Ød	2P		
				l ₁	l ₂	L
MSFD	025-2P	2.5	4.0	10.5	11.5	50
	026-2P	2.6	4.0	10.9	11.9	50
	027-2P	2.7	4.0	11.3	12.3	50
	028-2P	2.8	4.0	11.8	12.8	50
	029-2P	2.9	4.0	12.2	13.2	50
	030-2P	3.0	6.0	12.6	13.6	50
	031-2P	3.1	6.0	13.0	14.0	50
	032-2P	3.2	6.0	13.4	14.4	50
	033-2P	3.3	6.0	13.9	14.9	50
	034-2P	3.4	6.0	14.3	15.3	50
	035-2P	3.5	6.0	14.7	15.7	50
	036-2P	3.6	6.0	15.1	16.1	50
	037-2P	3.7	6.0	15.5	16.5	50
	038-2P	3.8	6.0	16.0	17.0	50
	039-2P	3.9	6.0	16.4	17.4	50
	040-2P	4.0	6.0	16.8	17.8	50
	041-2P	4.1	6.0	17.2	18.2	60
	042-2P	4.2	6.0	17.6	18.6	60
	043-2P	4.3	6.0	18.1	19.1	60
	044-2P	4.4	6.0	18.5	19.5	60
	045-2P	4.5	6.0	18.9	19.9	60
	046-2P	4.6	6.0	19.3	20.3	60
	047-2P	4.7	6.0	19.7	20.7	60
	048-2P	4.8	6.0	20.2	21.2	60
	049-2P	4.9	6.0	20.6	21.6	60
	050-2P	5.0	6.0	21.0	22.0	60
	051-2P	5.1	6.0	21.4	22.4	60
	052-2P	5.2	6.0	21.8	22.8	60
	053-2P	5.3	6.0	22.3	23.3	60
	054-2P	5.4	6.0	22.7	23.7	60
	055-2P	5.5	6.0	23.1	24.1	60
	056-2P	5.6	6.0	23.5	24.5	60
	057-2P	5.7	6.0	23.9	24.9	60
	058-2P	5.8	6.0	24.4	25.4	60
	059-2P	5.9	6.0	24.8	25.8	60
	060-2P	6.0	6.0	25.2	26.2	60
	061-2P	6.1	8.0	25.6	26.6	70
	062-2P	6.2	8.0	26.0	27.0	70
	063-2P	6.3	8.0	26.5	27.5	70
	064-2P	6.4	8.0	26.9	27.9	70
	065-2P	6.5	8.0	27.3	28.3	70
	066-2P	6.6	8.0	27.7	28.7	70
	067-2P	6.7	8.0	28.1	29.1	70
	068-2P	6.8	8.0	28.6	29.6	70
	069-2P	6.9	8.0	29.0	30.0	70



MSFD-2P



Terminology	P
Grade	PC325U
Tolerance (drill Dia.)	H7
Tolerance (shank Dia.)	h6
Point angle	180°
Twist angle	20°
Thinning	R type
Coolant	External

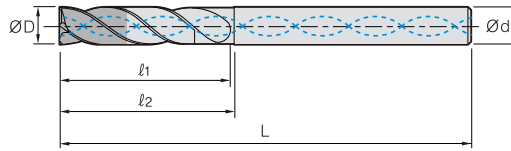
Steel

(mm)

Designation	ØD	Ød	2P		
			l1	l2	L
MSFD 070-2P	7.0	8.0	29.4	30.4	70
071-2P	7.1	8.0	29.8	30.8	70
072-2P	7.2	8.0	30.2	31.2	70
073-2P	7.3	8.0	30.7	31.7	70
074-2P	7.4	8.0	31.1	32.1	70
075-2P	7.5	8.0	31.5	32.5	70
076-2P	7.6	8.0	31.9	32.9	70
077-2P	7.7	8.0	32.3	33.3	70
078-2P	7.8	8.0	32.8	33.8	70
079-2P	7.9	8.0	33.2	34.2	70
080-2P	8.0	8.0	33.6	34.6	70
081-2P	8.1	10.0	34.0	35.0	80
082-2P	8.2	10.0	34.4	35.4	80
083-2P	8.3	10.0	34.9	35.9	80
084-2P	8.4	10.0	35.3	36.3	80
085-2P	8.5	10.0	35.7	36.7	80
086-2P	8.6	10.0	36.1	37.1	80
087-2P	8.7	10.0	36.5	37.5	80
088-2P	8.8	10.0	37.0	38.0	80
089-2P	8.9	10.0	37.4	38.4	80
090-2P	9.0	10.0	37.8	38.8	80
091-2P	9.1	10.0	38.2	39.2	80
092-2P	9.2	10.0	38.6	39.6	80
093-2P	9.3	10.0	39.1	40.1	80
094-2P	9.4	10.0	39.5	40.5	80
095-2P	9.5	10.0	39.9	40.9	80
096-2P	9.6	10.0	40.3	41.3	80
097-2P	9.7	10.0	40.7	41.7	80
098-2P	9.8	10.0	41.2	42.2	80
099-2P	9.9	10.0	41.6	42.6	80
100-2P	10.0	10.0	42.0	43	80
101-2P	10.1	12.0	42.4	43.4	90
102-2P	10.2	12.0	42.8	43.8	90
103-2P	10.3	12.0	43.3	44.3	90
104-2P	10.4	12.0	43.7	44.7	90
105-2P	10.5	12.0	44.1	45.1	90
106-2P	10.6	12.0	44.5	45.5	90
107-2P	10.7	12.0	44.9	45.9	90
108-2P	10.8	12.0	45.4	46.4	90
109-2P	10.9	12.0	45.8	46.8	90
110-2P	11.0	12.0	46.2	47.2	90
111-2P	11.1	12.0	46.6	47.6	90
112-2P	11.2	12.0	47.0	48.0	90
113-2P	11.3	12.0	47.5	48.5	90
114-2P	11.4	12.0	47.9	48.9	90
115-2P	11.5	12.0	48.3	49.3	90
116-2P	11.6	12.0	48.7	49.7	90
117-2P	11.7	12.0	49.1	50.1	90
118-2P	11.8	12.0	49.6	50.6	90
119-2P	11.9	12.0	50.0	51.0	90
120-2P	12.0	12.0	50.4	51.4	90

MSFD

MSFDH-3P



Terminology	P
Grade	PC325U
Tolerance (drill Dia.)	H7
Tolerance (shank Dia.)	h6
Point angle	180°
Twist angle	30°
Thinning	R type
Coolant	Through

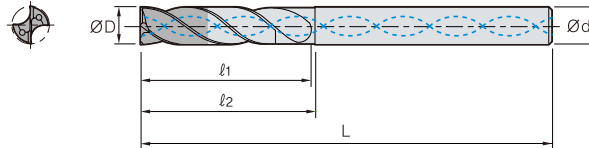
P Steel

(mm)

MSFDH	Designation	ØD	Ød	3P		
				l ₁	l ₂	L
	025-3P	2.5	3.0	17	18	58
	026-3P	2.6	3.0	17	18	58
	027-3P	2.7	3.0	17	18	58
	028-3P	2.8	3.0	17	18	58
	029-3P	2.9	3.0	17	18	58
	030-3P	3.0	6.0	20	21	62
	031-3P	3.1	6.0	20	21	62
	032-3P	3.2	6.0	20	21	62
	033-3P	3.3	6.0	20	21	62
	034-3P	3.4	6.0	20	21	62
	035-3P	3.5	6.0	20	21	62
	036-3P	3.6	6.0	20	21	62
	037-3P	3.7	6.0	20	21	62
	038-3P	3.8	6.0	24	25	66
	039-3P	3.9	6.0	24	25	66
	040-3P	4.0	6.0	24	25	66
	041-3P	4.1	6.0	24	25	66
	042-3P	4.2	6.0	24	25	66
	043-3P	4.3	6.0	24	25	66
	044-3P	4.4	6.0	24	25	66
	045-3P	4.5	6.0	24	25	66
	046-3P	4.6	6.0	24	25	66
	047-3P	4.7	6.0	24	25	66
	048-3P	4.8	6.0	28	29	66
	049-3P	4.9	6.0	28	29	66
	050-3P	5.0	6.0	28	29	66
	051-3P	5.1	6.0	28	29	66
	052-3P	5.2	6.0	28	29	66
	053-3P	5.3	6.0	28	29	66
	054-3P	5.4	6.0	28	29	66
	055-3P	5.5	6.0	28	29	66
	056-3P	5.6	6.0	28	29	66
	057-3P	5.7	6.0	28	29	66
	058-3P	5.8	6.0	28	29	66
	059-3P	5.9	6.0	28	29	66
	060-3P	6.0	6.0	28	29	66
	061-3P	6.1	8.0	34	35	79
	062-3P	6.2	8.0	34	35	79
	063-3P	6.3	8.0	34	35	79
	064-3P	6.4	8.0	34	35	79
	065-3P	6.5	8.0	34	35	79
	066-3P	6.6	8.0	34	35	79
	067-3P	6.7	8.0	34	35	79
	068-3P	6.8	8.0	34	35	79
	069-3P	6.9	8.0	34	35	79
	070-3P	7.0	8.0	34	35	79
	071-3P	7.1	8.0	41	42	79
	072-3P	7.2	8.0	41	42	79



MSFDH-3P



Terminology	P
Grade	PC325U
Tolerance (drill Dia.)	H7
Tolerance (shank Dia.)	h6
Point angle	180°
Twist angle	30°
Thinning	R type
Coolant	Through

Steel

(mm)

Designation		ØD	Ød	3P		
				Ø1	Ø2	L
MSFDH	073-3P	7.3	8.0	41	42	79
	074-3P	7.4	8.0	41	42	79
	075-3P	7.5	8.0	41	42	79
	076-3P	7.6	8.0	41	42	79
	077-3P	7.7	8.0	41	42	79
	078-3P	7.8	8.0	41	42	79
	079-3P	7.9	8.0	41	42	79
	080-3P	8.0	8.0	41	42	79
	081-3P	8.1	10.0	47	48	89
	082-3P	8.2	10.0	47	48	89
	083-3P	8.3	10.0	47	48	89
	084-3P	8.4	10.0	47	48	89
	085-3P	8.5	10.0	47	48	89
	086-3P	8.6	10.0	47	48	89
	087-3P	8.7	10.0	47	48	89
	088-3P	8.8	10.0	47	48	89
	089-3P	8.9	10.0	47	48	89
	090-3P	9.0	10.0	47	48	89
	091-3P	9.1	10.0	47	48	89
	092-3P	9.2	10.0	47	48	89
	093-3P	9.3	10.0	47	48	89
	094-3P	9.4	10.0	47	48	89
	095-3P	9.5	10.0	47	48	89
	096-3P	9.6	10.0	47	48	89
	097-3P	9.7	10.0	47	48	89
	098-3P	9.8	10.0	47	48	89
	099-3P	9.9	10.0	47	48	89
	100-3P	10.0	10.0	47	48	89
	101-3P	10.1	12.0	55	56	102
	102-3P	10.2	12.0	55	56	102
	103-3P	10.3	12.0	55	56	102
	104-3P	10.4	12.0	55	56	102
	105-3P	10.5	12.0	55	56	102
	106-3P	10.6	12.0	55	56	102
	107-3P	10.7	12.0	55	56	102
	108-3P	10.8	12.0	55	56	102
	109-3P	10.9	12.0	55	56	102
	110-3P	11.0	12.0	55	56	102
	111-3P	11.1	12.0	55	56	102
	112-3P	11.2	12.0	55	56	102
	113-3P	11.3	12.0	55	56	102
	114-3P	11.4	12.0	55	56	102
	115-3P	11.5	12.0	55	56	102
	116-3P	11.6	12.0	55	56	102
	117-3P	11.7	12.0	55	56	102
	118-3P	11.8	12.0	55	56	102
	119-3P	11.9	12.0	55	56	102
	120-3P	12.0	12.0	55	56	102

MSFD

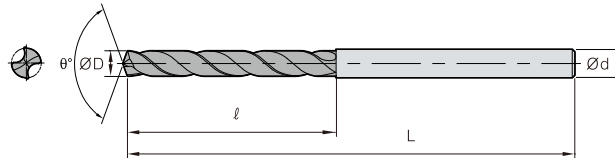
Recommended cutting conditions

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



ESD Plus

ESDP-□P



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

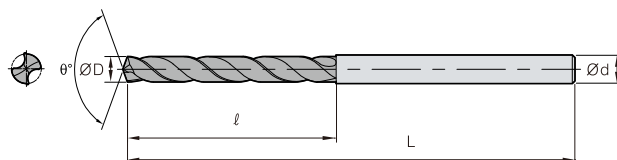
(mm)

Designation		ØD	Ød	P,M,K,N		P,M,K,N	
				l	L	l	L
ESDP	010-□P	1.0	3	5	45	8	45
	011-□P	1.1	3	6	45	9	45
	012-□P	1.2	3	6	45	10	45
	013-□P	1.3	3	7	45	10	45
	014-□P	1.4	3	7	45	11	45
	015-□P	1.5	3	7	45	11	45
	016-□P	1.6	3	8	45	12	45
	017-□P	1.7	3	8	45	12	45
	018-□P	1.8	3	9	45	13	45
	019-□P	1.9	3	9	45	14	45
	020-□P	2.0	3	10	50	18	50
	021-□P	2.1	3	10	50	18	50
	022-□P	2.2	3	12	50	18	50
	023-□P	2.3	3	12	50	18	50
	024-□P	2.4	3	12	50	18	50

※ Order made items available

ESD Plus

ESDP-□P



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			

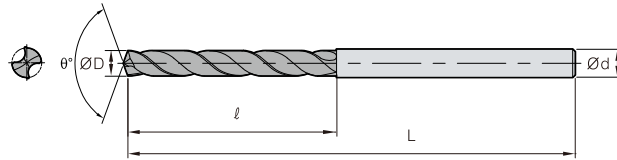
P Steel
 M Stainless steel
 K Cast iron
 N Non-ferrous metal

(mm)

Designation		ØD	Ød	3P		5P	
				ℓ	L	ℓ	L
ESDP	025-□P	2.5	3	12	50	18	50
	026-□P	2.6	3	12	50	18	50
	027-□P	2.7	3	15	50	18	50
	028-□P	2.8	3	15	50	18	50
	029-□P	2.9	3	15	50	18	50
	030-□P	3.0	3	16	55	20	55
	031-□P	3.1	4	16	55	20	55
	032-□P	3.2	4	16	55	20	55
	033-□P	3.3	4	16	55	20	55
	034-□P	3.4	4	16	55	20	55
	035-□P	3.5	4	16	55	20	55
	036-□P	3.6	4	18	55	25	55
	037-□P	3.7	4	18	55	25	55
	038-□P	3.8	4	20	55	25	55
	039-□P	3.9	4	20	55	25	55
	040-□P	4.0	4	20	55	25	55
	041-□P	4.1	5	20	55	25	55
	042-□P	4.2	5	20	63	33	63
	043-□P	4.3	5	23	63	33	63
	044-□P	4.4	5	23	63	33	63
	045-□P	4.5	5	23	63	33	63
	046-□P	4.6	5	23	63	33	63
	047-□P	4.7	5	23	63	33	63
	048-□P	4.8	5	25	63	33	63
	049-□P	4.9	5	25	63	33	63
	050-□P	5.0	5	25	63	33	63
	051-□P	5.1	6	25	63	33	63
	052-□P	5.2	6	28	66	36	66
	053-□P	5.3	6	28	66	36	66
	054-□P	5.4	6	28	66	36	66
	055-□P	5.5	6	28	66	36	66
	056-□P	5.6	6	28	66	36	66
	057-□P	5.7	6	28	66	36	66
	058-□P	5.8	6	28	66	36	66
	059-□P	5.9	6	28	66	36	66
	060-□P	6.0	6	30	66	36	66
	061-□P	6.1	7	30	66	36	66
	062-□P	6.2	7	32	75	42	75
	063-□P	6.3	7	32	75	42	75
	064-□P	6.4	7	32	75	42	75
	065-□P	6.5	7	32	75	42	75
	066-□P	6.6	7	32	75	42	75
	067-□P	6.7	7	32	75	42	75
	068-□P	6.8	7	32	75	42	75
	069-□P	6.9	7	32	75	42	75
	070-□P	7.0	7	32	75	42	75
	071-□P	7.1	8	32	75	42	75
	072-□P	7.2	8	36	80	46	80



ESDP-□P



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				

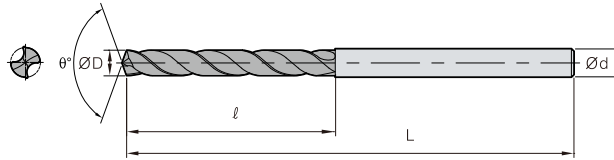
P Steel
 M Stainless steel
 K Cast iron
 N Non-ferrous metal

(mm)

Designation		ØD	Ød	3P		5P	
				ℓ	L	ℓ	L
ESDP	073-□P	7.3	8	36	80	46	80
	074-□P	7.4	8	36	80	46	80
	075-□P	7.5	8	36	80	46	80
	076-□P	7.6	8	36	80	46	80
	077-□P	7.7	8	36	80	46	80
	078-□P	7.8	8	36	80	46	80
	079-□P	7.9	8	36	80	46	80
	080-□P	8.0	8	36	80	46	80
	081-□P	8.1	9	36	80	46	80
	082-□P	8.2	9	38	85	50	85
	083-□P	8.3	9	38	85	50	85
	084-□P	8.4	9	38	85	50	85
	085-□P	8.5	9	38	85	50	85
	086-□P	8.6	9	40	85	50	85
	087-□P	8.7	9	40	85	50	85
	088-□P	8.8	9	40	85	50	85
	089-□P	8.9	9	40	85	50	85
	090-□P	9.0	9	40	85	50	85
	091-□P	9.1	10	42	85	50	85
	092-□P	9.2	10	42	90	55	90
	093-□P	9.3	10	42	90	55	90
	094-□P	9.4	10	42	90	55	90
	095-□P	9.5	10	42	90	55	90
	096-□P	9.6	10	45	90	55	90
	097-□P	9.7	10	45	90	55	90
	098-□P	9.8	10	45	90	55	90
	099-□P	9.9	10	45	90	55	90
	100-□P	10.0	10	45	90	55	90
	101-□P	10.1	11	-	-	55	90
	102-□P	10.2	11	-	-	57	95
	103-□P	10.3	11	-	-	57	95
	104-□P	10.4	11	-	-	57	95
	105-□P	10.5	11	-	-	57	95
	106-□P	10.6	11	-	-	57	95
	107-□P	10.7	11	-	-	57	95
	108-□P	10.8	11	-	-	57	95
	109-□P	10.9	11	-	-	57	95
	110-□P	11.0	11	-	-	57	95
	111-□P	11.1	12	-	-	57	95
	112-□P	11.2	12	-	-	63	102
	113-□P	11.3	12	-	-	63	102
	114-□P	11.4	12	-	-	63	102
	115-□P	11.5	12	-	-	63	102
	116-□P	11.6	12	-	-	63	102
	117-□P	11.7	12	-	-	63	102
	118-□P	11.8	12	-	-	63	102
	119-□P	11.9	12	-	-	63	102
	120-□P	12.0	12	-	-	63	102

ESD Plus

ESDP-□P



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			

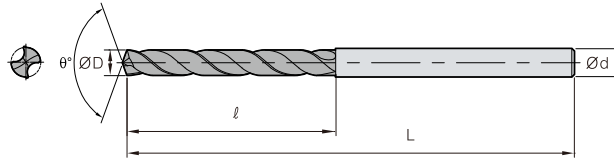
P Steel
 M Stainless steel
 K Cast iron
 N Non-ferrous metal

(mm)

Designation		ØD	Ød	3P		5P	
				ℓ	L	ℓ	L
ESDP	121-□P	12.1	13	55	102	63	102
	122-□P	12.2	13	55	102	63	102
	123-□P	12.3	13	55	102	63	102
	124-□P	12.4	13	55	102	63	102
	125-□P	12.5	13	55	102	63	102
	126-□P	12.6	13	55	102	63	102
	127-□P	12.7	13	55	102	63	102
	128-□P	12.8	13	55	102	63	102
	129-□P	12.9	13	55	102	63	102
	130-□P	13.0	13	55	102	63	102
	131-□P	13.1	14	55	102	63	102
	132-□P	13.2	14	58	107	65	107
	133-□P	13.3	14	58	107	65	107
	134-□P	13.4	14	58	107	65	107
	135-□P	13.5	14	58	107	65	107
	136-□P	13.6	14	58	107	65	107
	137-□P	13.7	14	58	107	65	107
	138-□P	13.8	14	58	107	65	107
	139-□P	13.9	14	58	107	65	107
	140-□P	14.0	14	58	107	65	107
	141-□P	14.1	15	58	107	65	107
	142-□P	14.2	15	60	115	68	115
	143-□P	14.3	15	60	115	68	115
	144-□P	14.4	15	60	115	68	115
	145-□P	14.5	15	60	115	68	115
	146-□P	14.6	15	60	115	68	115
	147-□P	14.7	15	60	115	68	115
	148-□P	14.8	15	60	115	68	115
	149-□P	14.9	15	60	115	68	115
	150-□P	15.0	15	60	115	68	115
	151-□P	15.1	16	60	115	68	115
	152-□P	15.2	16	65	120	70	120
	153-□P	15.3	16	65	120	70	120
	154-□P	15.4	16	65	120	70	120
	155-□P	15.5	16	65	120	70	120
	156-□P	15.6	16	65	120	70	120
	157-□P	15.7	16	65	120	70	120
	158-□P	15.8	16	65	120	70	120
	159-□P	15.9	16	65	120	70	120
	160-□P	16.0	16	65	120	70	120
	161-□P	16.1	17	65	120	70	120
	162-□P	16.2	17	65	120	70	120
	163-□P	16.3	17	65	120	70	120
	164-□P	16.4	17	65	120	70	120
	165-□P	16.5	17	68	125	72	125
	166-□P	16.6	17	68	125	72	125
	167-□P	16.7	17	68	125	72	125
	168-□P	16.8	17	68	125	72	125



ESDP-□P



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

(mm)

Designation	ØD	Ød	3P		5P	
			ℓ	L	ℓ	L
ESDP						
169-□P	16.9	17	68	125	72	125
170-□P	17.0	17	68	125	72	125
171-□P	17.1	18	68	125	72	125
172-□P	17.2	18	68	125	72	125
173-□P	17.3	18	68	125	72	125
174-□P	17.4	18	68	125	72	125
175-□P	17.5	18	70	130	75	130
176-□P	17.6	18	70	130	75	130
177-□P	17.7	18	70	130	75	130
178-□P	17.8	18	70	130	75	130
179-□P	17.9	18	70	130	75	130
180-□P	18.0	18	70	130	75	130
181-□P	18.1	19	72	130	75	130
182-□P	18.2	19	72	130	75	130
183-□P	18.3	19	72	130	75	130
184-□P	18.4	19	72	130	75	130
185-□P	18.5	19	79	130	78	130
186-□P	18.6	19	79	130	78	130
187-□P	18.7	19	79	130	78	130
188-□P	18.8	19	79	130	78	130
189-□P	18.9	19	79	130	78	130
190-□P	19.0	19	79	130	78	130
191-□P	19.1	20	79	130	78	130
192-□P	19.2	20	79	130	78	130
193-□P	19.3	20	79	130	78	130
194-□P	19.4	20	79	130	78	130
195-□P	19.5	20	79	135	82	135
196-□P	19.6	20	79	135	82	135
197-□P	19.7	20	79	135	82	135
198-□P	19.8	20	79	135	82	135
199-□P	19.9	20	79	135	82	135
200-□P	20.0	20	79	135	82	135

ESD Plus

Recommended cutting conditions

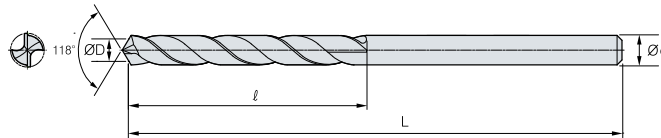
Workpiece				Grade	vc (m/min)	fn (mm/rev)				
ISO	Workpiece	HB	Recommended			Feed rate (mm/rev) per drill dia. (mm)				
						Ø2.5~4.0	Ø4.1~8.0	Ø8.1~12.0	Ø12.1~16.0	Ø16.1~20.0
P	Carbon steel	Low carbon steel	80~120	PC325U	72 (64~120)	0.08~0.12	0.13~0.19	0.16~0.24	0.20~0.29	0.24~0.32
		High carbon steel	over 250	PC325U	40 (32~64)	0.06~0.16	0.06~0.16	0.08~0.20	0.12~0.20	0.12~0.24
	Alloy steel	Low alloy steel	140~260	PC325U	72 (64~120)	0.08~0.12	0.13~0.19	0.16~0.24	0.20~0.29	0.24~0.32
		Hardened low alloy steel	200~400	PC325U	48 (40~80)	0.08~0.12	0.13~0.19	0.16~0.24	0.20~0.29	0.24~0.32
		High alloy steel	50~260	PC325U	40 (32~64)	0.06~0.16	0.06~0.16	0.08~0.20	0.12~0.20	0.12~0.24
		Hardened high alloy steel	over 250	PC325U	40 (32~64)	0.06~0.16	0.06~0.16	0.08~0.20	0.12~0.20	0.12~0.24
M	Stainless steel	Austenite series	135~275	PC325U	36 (20~64)	0.04~0.16	0.04~0.16	0.08~0.20	0.08~0.20	0.12~0.24
		Ferrite series Martensite series	135~275	PC325U	40 (24~64)	0.04~0.16	0.04~0.16	0.08~0.20	0.08~0.20	0.12~0.24
K	Cast iron	Gray cast iron	150~230	PC325U	80 (64~120)	0.08~0.12	0.13~0.19	0.16~0.24	0.20~0.29	0.24~0.32
		Ductile cast iron	160~260	PC325U	72 (56~112)	0.08~0.12	0.13~0.19	0.16~0.24	0.20~0.29	0.24~0.32
N	Aluminum	Aluminum alloy	30~150	FG2	120 (100~176)	0.19~0.30	0.30~0.42	0.42~0.60	0.49~0.68	0.54~0.78
	Copper alloy	Copper alloy	150~160	FG2	120 (100~176)	0.08~0.12	0.13~0.19	0.16~0.24	0.20~0.29	0.24~0.32

• Cutting conditions above are for the case of less than 5D depth of cut and External coolant system applied



SSD Plus

SSDP



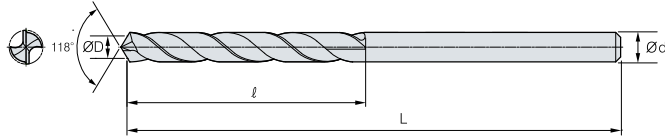
Coating	x
Tolerance (drill Dia.)	h7
Tolerance (shank Dia.)	h7
Point angle	118°
Twist angle	30°
Thinning	X type
Coolant	External

(mm)

Designation	ØD = Ød	ℓ	L	Designation	ØD = Ød	ℓ	L
SSDP 010	1.0	10	32	SSDP 048	4.8	38	65
011	1.1	10	32	049	4.9	38	65
012	1.2	10	32	050	5.0	38	65
013	1.3	10	32	051	5.1	38	65
014	1.4	10	32	052	5.2	38	65
015	1.5	13	35	053	5.3	38	65
016	1.6	13	35	054	5.4	38	65
017	1.7	13	35	055	5.5	38	65
018	1.8	13	35	056	5.6	40	75
019	1.9	13	35	057	5.7	40	75
020	2.0	18	40	058	5.8	40	75
021	2.1	18	40	059	5.9	40	75
022	2.2	18	40	060	6.0	40	75
023	2.3	18	40	061	6.1	40	75
024	2.4	18	40	062	6.2	40	75
025	2.5	22	45	063	6.3	40	75
026	2.6	22	45	064	6.4	40	75
027	2.7	22	45	065	6.5	40	75
028	2.8	22	45	066	6.6	46	80
029	2.9	22	45	067	6.7	46	80
030	3.0	25	50	068	6.8	46	80
031	3.1	25	50	069	6.9	46	80
032	3.2	25	50	070	7.0	46	80
033	3.3	28	50	071	7.1	46	80
034	3.4	28	50	072	7.2	46	80
035	3.5	28	50	073	7.3	46	80
036	3.6	30	55	074	7.4	46	80
037	3.7	30	55	075	7.5	46	80
038	3.8	30	55	076	7.6	50	85
039	3.9	30	55	077	7.7	50	85
040	4.0	30	55	078	7.8	50	85
041	4.1	34	60	079	7.9	50	85
042	4.2	34	60	080	8.0	50	85
043	4.3	34	60	081	8.1	50	85
044	4.4	34	60	082	8.2	50	85
045	4.5	34	60	083	8.3	50	85
046	4.6	38	65	084	8.4	50	85
047	4.7	38	65	085	8.5	50	85

SSD Plus

SSDP



Coating	x
Tolerance (drill Dia.)	h7
Tolerance (shank Dia.)	h6
Point angle	118°
Twist angle	30°
Thinning	X type
Coolant	External

(mm)							
SSDP				SSDP			
Designation	ØD = Ød	ℓ	L	Designation	ØD = Ød	ℓ	L
086	8.6	50	95	097	9.7	50	100
087	8.7	50	95	098	9.8	50	100
088	8.8	50	95	099	9.9	50	100
089	8.9	50	95	100	10.0	50	100
090	9.0	50	95	105	10.5	60	115
091	9.1	50	95	110	11.0	60	115
092	9.2	50	95	115	11.5	65	120
093	9.3	50	95	120	12.0	65	120
094	9.4	50	95	125	12.5	65	125
095	9.5	50	95	130	13.0	65	125
096	9.6	50	100	150	15.0	70	130

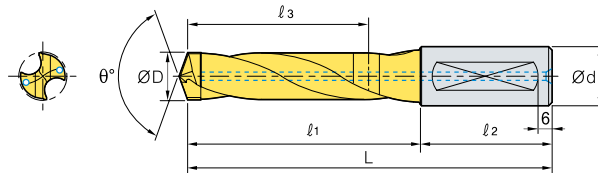
Recommended cutting conditions

Workpiece				Grade	vc (m/min)	Depth of cut = 10D~25D 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 Iloy	Copper alloy	150-160		80 (65~95)	0.03~0.06	0.05~0.08	0.08~0.12	0.12~0.18



Vulcan Drill

Vulcan Drill (VZD)-MA, MBA



Type	MA	MBA
Grade	PC230F	
Tolerance (drill Dia.)	h7	
Tolerance (shank Dia.)	h7	
Point angle	140°	150°
Twist angle	25°	20°
Thinning	X type	
Coolant	Through	

(mm)

Designation	ØD	Ød	L	l ₁	l ₂	l ₃
VZD						
126~135MA, MBA	12.6~13.5	16	110	62	48	44
136~145MA, MBA	13.6~14.5	16	115	67	48	48
146~155MA, MBA	14.6~15.5	20	125	75	50	55
156~165MA, MBA	15.6~16.5	20	130	80	50	59
166~175MA, MBA	16.6~17.5	20	135	85	50	63
176~185MA, MBA	17.6~18.5	20	140	90	50	66
186~195MA, MBA	18.6~19.5	25	155	99	56	74
196~205MA, MBA	19.6~20.5	25	155	99	56	73
206~215MA, MBA	20.6~21.5	25	155	99	56	72
216~225MA, MBA	21.6~22.5	25	160	104	56	76
226~235MA, MBA	22.6~23.5	25	160	104	56	74
236~245MA, MBA	23.6~24.5	32	170	110	60	79
246~255MA, MBA	24.6~25.5	32	170	110	60	78
256~265MA, MBA	25.6~26.5	32	175	115	60	82
266~275MA, MBA	26.6~27.5	32	175	115	60	80
276~285MA, MBA	27.6~28.5	32	180	120	60	84
286~295MA, MBA	28.6~29.5	32	185	125	60	88
296~305MA, MBA	29.6~30.5	32	185	125	60	87
306~315MA, MBA	30.6~31.5	40	205	135	70	95
316~325MA, MBA	31.6~32.5	40	210	140	70	98
326~335MA, MBA	32.6~33.5	40	215	145	70	101
336~345MA, MBA	33.6~34.5	40	220	150	70	104
346~355MA, MBA	34.6~35.5	40	225	155	70	107
356~365MA, MBA	35.6~36.5	40	225	155	70	110
366~375MA, MBA	36.6~37.5	40	230	160	70	113
376~385MA, MBA	37.6~38.5	40	235	165	70	116
386~395MA, MBA	38.6~39.5	40	240	170	70	119
396~405MA, MBA	39.6~40.5	40	245	175	70	122

※ VZD□□□MA: For General steel, Ductile cast iron

MBA: For Mild steel, Low carbon steel

※ Order made items: VZD□□□M□ × Flute length - Total length L

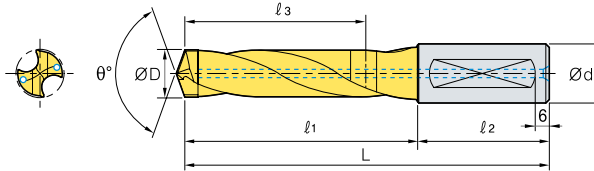
Ex.1) MA Type, Machined diameter: Ø18.6 mm, Flute length: 110 mm, Total length: 200 mm → VZD186MA × 110-200L

Ex.2) MA Type, Machined diameter: Ø18.63, Flute length: 110 mm, Total length: 200 mm → VZD1863MA × 110-200L

Ex.3) MA Type, Machined diameter: Ø18.6, Standard → VZD186MA

Vulcan Drill

Vulcan Drill (VZD)-LA, LBA



Type	LA	LBA
Grade	PC230F	
Tolerance (drill Dia.)	h7	
Tolerance (shank Dia.)	h7	
Point angle	140°	150°
Twist angle	25°	20°
Thinning	X type	
Coolant	Through	

(mm)

Designation	ØD	Ød	L	l ₁	l ₂	l ₃
VZD	126~135LA, LBA	12.6~13.5	16	140	92	48
	136~145LA, LBA	13.6~14.5	16	145	97	48
	146~155LA, LBA	14.6~15.5	20	155	105	50
	156~165LA, LBA	15.6~16.5	20	165	115	50
	166~175LA, LBA	16.6~17.5	20	170	120	50
	176~185LA, LBA	17.6~18.5	20	175	125	50
	186~195LA, LBA	18.6~19.5	25	190	134	56
	196~205LA, LBA	19.6~20.5	25	195	139	56
	206~215LA, LBA	20.6~21.5	25	195	139	56
	216~225LA, LBA	21.6~22.5	25	200	144	56
	226~235LA, LBA	22.6~23.5	25	210	154	56
	236~245LA, LBA	23.6~24.5	32	220	160	60
	246~255LA, LBA	24.6~25.5	32	225	165	60
	256~265LA, LBA	25.6~26.5	32	230	170	60
	266~275LA, LBA	26.6~27.5	32	235	175	60
	276~285LA, LBA	27.6~28.5	32	240	180	60
	286~295LA, LBA	28.6~29.5	32	245	185	60
	296~305LA, LBA	29.6~30.5	32	255	195	60
	306~315LA, LBA	30.6~31.5	40	275	205	70
	316~325LA, LBA	31.6~32.5	40	280	210	70
	326~335LA, LBA	32.6~33.5	40	280	215	70
	336~345LA, LBA	33.6~34.5	40	290	220	70
	346~355LA, LBA	34.6~35.5	40	295	225	70
	356~365LA, LBA	35.6~36.5	40	300	230	70
	366~375LA, LBA	36.6~37.5	40	305	235	70
	376~385LA, LBA	37.6~38.5	40	315	245	70
	386~395LA, LBA	38.6~39.5	40	320	250	70
	396~405LA, LBA	39.6~40.5	40	325	255	70

※ VZD□□□LA: For General steel, Ductile cast iron

LBA: For Mild steel, Low carbon steel

※ Order made items: VZD□□□M□ × Flute length - Total length L

Ex.1) LA Type, Machined diameter: Ø18.6 mm, Flute length: 110 mm, Total length: 200 mm → VZD186LA × 110-200L

Ex.2) LA Type, Machined diameter: Ø18.63, Flute length: 110 mm, Total length: 200 mm → VZD1863LA × 110-200L

Ex.3) LA Type, Machined diameter: Ø18.6, Standard → VZD186LA



Vulcan Drill

Recommended cutting conditions

Form	Workpiece	Hardness	~Ø15		~Ø20		~Ø40	
			vc (m/min)	fn (mm/rev)	vc (m/min)	fn (mm/rev)	vc (m/min)	fn (mm/rev)
MA LA	Mild steel, General steel, Alloy steel	Under HB250	40~90 (65)	0.15~0.30 (0.20)	40~90 (65)	0.20~0.40 (0.30)	40~90 (70)	0.20~0.45 (0.35)
	General steel, Alloy steel	Under HB320	40~90 (60)	0.10~0.25 (0.20)	40~90 (60)	0.15~0.35 (0.25)	40~90 (65)	0.20~0.40 (0.30)
	Mold steel	HB250	40~70 (50)	0.10~0.25 (0.20)	40~70 (50)	0.15~0.30 (0.25)	40~70 (50)	0.20~0.35 (0.30)
	Stainless steel	HB250	30~50 (45)	0.10~0.20 (0.15)	30~50 (45)	0.15~0.25 (0.20)	30~50 (45)	0.20~0.30 (0.25)
	Ductile cast iron	-	50~100 (70)	0.20~0.35 (0.30)	50~100 (70)	0.20~0.40 (0.35)	50~100 (70)	0.25~0.50 (0.40)
MBA LBA	Mild steel, General steel, Alloy steel	Under HB250	40~90 (75)	0.20~0.40 (0.30)	40~90 (75)	0.20~0.40 (0.30)	40~90 (80)	0.20~0.45 (0.35)
	General steel, Alloy steel	Under HB320	35~80 (55)	0.15~0.30 (0.25)	35~80 (55)	0.15~0.30 (0.25)	40~80 (60)	0.15~0.40 (0.30)

Burnishing Drill

Burnishing Drill-BDS

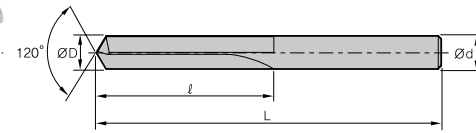


Fig 1

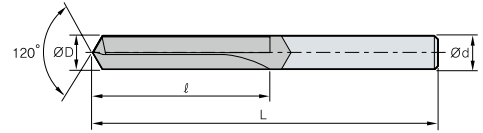


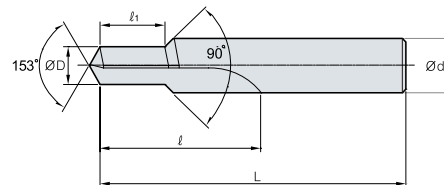
Fig 2

(mm)

Designation		ØD	Ød	ℓ	L	Fig.
BDS	040S	4.0	4.0	35	80	1
	050S	5.0	5.0	40	85	1
	060S	6.0	6.0	50	95	1
	070S	7.0	7.0	55	100	1
	080S	8.0	8.0	65	110	1
	090S	9.0	9.0	70	120	1
	100S	10.0	10.0	80	130	1
	110S	11.0	11.0	90	140	1
	120B	12.0	12.0	95	150	2
	130B	13.0	16.0	105	160	2
	140B	14.0	16.0	110	170	2
	150B	15.0	16.0	120	185	2
	160B	16.0	16.0	125	190	2

Step Burnishing Drill-BDT

For tapping a foundation hole



(mm)

Designation		ØD	Ød	ℓ	ℓ ₁	L	Tap
BDT	M05080-ℓ 1	4.2	6.0	35	9~15	90	M5XP0.8
	M06100-ℓ 1	5.0	7.0	40	11~18	95	M6XP1.0
	M08125-ℓ 1	6.8	10.0	50	15~24	105	M8XP1.25
	M10125-ℓ 1	8.8	12.0	55	17~30	110	M10XP1.25
	M10150-ℓ 1	8.5	12.0	55	17~30	110	M10XP1.5
	M12125-ℓ 1	10.8	14.0	60	19~36	120	M12XP1.25
	M12150-ℓ 1	10.5	14.0	60	19~36	120	M12XP1.5
	M12175-ℓ 1	10.3	14.0	60	19~36	120	M12XP1.75



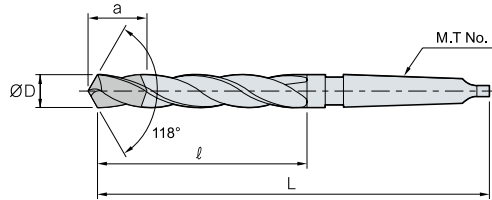
Burnishing Drill

Recommended cutting conditions

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	Ø12.5~ 18
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

Top Solid Drill-TSDM



(mm)

	Designation	ØD	L	l	a	M.T No
TSDM	080~085	8.0~8.5	168	85	25	1
	086~090	8.6~9.0	172	88	25	1
	091~095	9.1~9.5	175	92	26	1
	096~100	9.6~10.0	178	95	26	1
	101~105	10.1~10.5	182	98	26	1
	106~110	10.6~11.0	185	102	26	1
	111~115	11.1~11.5	188	105	26	1
	116~120	11.6~12.0	192	108	26	1
	121~125	12.1~12.5	195	112	26	1
	126~130	12.6~13.0	198	115	26	2
	131~135	13.1~13.5	202	118	27	2
	136~140	13.6~14.0	205	122	27	2
	141~145	14.1~14.5	222	122	27	2
	146~150	14.6~15.0	225	125	27	2
	151~155	15.1~15.5	228	125	27	2
	156~160	15.6~16.0	230	130	27	2
	161~165	16.1~16.5	232	132	27	2
	166~170	16.6~17.0	234	135	27	2
	171~180	17.1~18.0	240	140	27	2
	181~190	18.1~19.0	245	145	27	2
	191~200	19.1~20.0	250	150	30	2
	201~210	20.1~21.0	255	155	30	2
	211~220	21.1~22.0	260	160	30	2
	221~230	22.1~23.0	265	165	30	2
	231~250	23.1~25.0	285	165	34	3

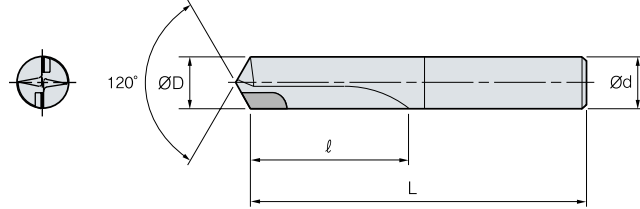
Recommended cutting conditions

Diameter	Cutting condition	Ductile cast iron	Gray cast iron	Soft steel
Ø8~Ø10	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	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	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

PDD



(mm)

Designation		ØD	Ød	ℓ	L
PDD	0500	5.0	5.0	30	80
	0550	5.5	5.5	30	80
	0600	6.0	6.0	30	80
	0650	6.5	6.5	40	95
	0700	7.0	7.0	40	95
	0750	7.5	7.5	45	100
	0800	8.0	8.0	45	100
	0850	8.5	8.5	50	110
	0900	9.0	9.0	50	110
	0950	9.5	9.5	55	115
	1000	10.0	10.0	55	115
	1050	10.5	10.5	60	120
	1100	11.0	11.0	60	120
	1150	11.5	11.5	65	125
	1200	12.0	12.0	65	125

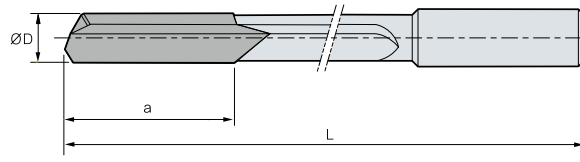
Recommended cutting conditions

Workpiece	vc (m/min)	fn (mm/rev)
Aluminum alloy	50 ~ 250	0.05 ~ 0.20
		0.10 ~ 0.40

Gun Drill

Gun Drill-KGDS

Single lip type



Designation description	
0.00	Diameter
0000	Length
D00	Driver code no.

(mm)

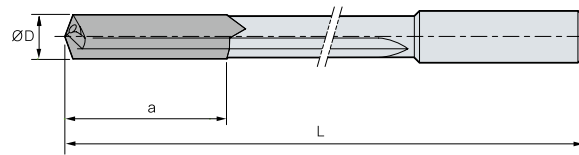
	Designation	ØD	a
KGDS	0.00-0000 / D00	2.00~2.49	18
	0.00-0000 / D00	2.50~2.99	18
	0.00-0000 / D00	3.00~3.49	19
	0.00-0000 / D00	3.50~3.99	19
	0.00-0000 / D00	4.00~4.49	23
	0.00-0000 / D00	4.50~4.99	23
	0.00-0000 / D00	5.00~5.49	24
	0.00-0000 / D00	5.50~5.99	26
	0.00-0000 / D00	6.00~6.49	27
	0.00-0000 / D00	6.50~6.99	28
	0.00-0000 / D00	7.00~7.49	29
	0.00-0000 / D00	7.50~7.99	30
	0.00-0000 / D00	8.00~8.49	31
	0.00-0000 / D00	8.50~8.99	31
	0.00-0000 / D00	9.00~8.49	31
	0.00-0000 / D00	9.50~9.99	31
	0.00-0000 / D00	10.00~10.49	31
	0.00-0000 / D00	10.50~10.99	32
	0.00-0000 / D00	11.00~11.49	35
	0.00-0000 / D00	11.50~11.99	35
	0.00-0000 / D00	12.00~12.49	38
	0.00-0000 / D00	12.50~12.99	38
	0.00-0000 / D00	13.00~13.99	38
	0.00-0000 / D00	14.00~14.99	38
	0.00-0000 / D00	15.00~15.99	39
	0.00-0000 / D00	16.00~16.99	39
	0.00-0000 / D00	17.00~17.99	40
	0.00-0000 / D00	18.00~18.99	41
	0.00-0000 / D00	19.00~19.99	41
	0.00-0000 / D00	20.00~20.99	44
	0.00-0000 / D00	21.00~21.99	46
	0.00-0000 / D00	22.00~22.99	49
	0.00-0000 / D00	23.00~23.99	51
	0.00-0000 / D00	24.00~24.99	52
	0.00-0000 / D00	25.00~25.99	54
	0.00-0000 / D00	26.00~26.99	54
	0.00-0000 / D00	27.00~27.99	54
	0.00-0000 / D00	28.00~28.99	54
	0.00-0000 / D00	29.00~29.99	56
	0.00-0000 / D00	30.00~30.99	59
	0.00-0000 / D00	31.00~31.99	61
	0.00-0000 / D00	32.00~32.99	61

※ When ordering, please mark the overall length and driver number (or drawing)



Gun Drill-KGDT

➤ Twin lip type



Designation description	
0.00	Diameter
0000	Length
D00	Driver code no.

(mm)

Designation		ØD	a
KGDT	0.00-0000 / D00	6.00~6.49	35
	0.00-0000 / D00	6.50~6.99	35
	0.00-0000 / D00	7.00~7.49	38
	0.00-0000 / D00	7.50~7.99	38
	0.00-0000 / D00	8.00~8.49	38
	0.00-0000 / D00	8.50~8.99	38
	0.00-0000 / D00	9.00~8.49	40
	0.00-0000 / D00	9.50~9.99	40
	0.00-0000 / D00	10.00~10.49	40
	0.00-0000 / D00	10.50~10.99	40
	0.00-0000 / D00	11.00~11.49	45
	0.00-0000 / D00	11.50~11.99	45
	0.00-0000 / D00	12.00~12.49	45
	0.00-0000 / D00	12.50~12.99	48
	0.00-0000 / D00	13.00~13.99	48
	0.00-0000 / D00	14.00~14.99	48
	0.00-0000 / D00	15.00~15.99	48
	0.00-0000 / D00	16.00~16.99	50
	0.00-0000 / D00	17.00~17.99	50
	0.00-0000 / D00	18.00~18.99	50
	0.00-0000 / D00	19.00~19.99	50
	0.00-0000 / D00	20.00~20.99	55
	0.00-0000 / D00	21.00~21.99	55
	0.00-0000 / D00	22.00~22.99	55
	0.00-0000 / D00	23.00~23.99	60
	0.00-0000 / D00	24.00~24.99	60
	0.00-0000 / D00	25.00~25.99	65
	0.00-0000 / D00	26.00~26.50	65

※ When ordering, please mark the overall length and driver number (or drawing)

Available overall length

Designation	Drill Dia.	Overall length				
		250mm	500mm	1000mm	1500mm	2000mm
KGDS	2.00 ~ 2.99	○	○			
	3.00 ~ 3.49	○	○	○		
	3.50 ~ 32.99	○	○	○	○	○
KGDT	6.00 ~ 26.50	○	○	○		

Gun Drill

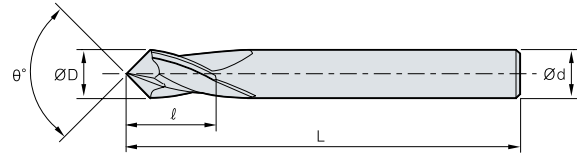
Recommended cutting conditions

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



Champer Tool (CET/CCT)

Champer Tool-CET



(mm)

Designation		ØD	Ød	ℓ	L	θ°
CET060 -	030	3	3	5.5	50	60°
	040	4	4	7	50	
	060	6	6	10	60	
	080	8	8	13	70	
	100	10	10	16	70	
	120	12	12	18	80	
	160	16	16	24	100	
CET090 -	030	3	3	5.5	50	90°
	040	4	4	7	50	
	060	6	6	10	60	
	080	8	8	13	70	
	100	10	10	16	70	
	120	12	12	18	80	
	160	16	16	24	100	
CET120 -	030	3	3	5.5	50	120°
	040	4	4	7	50	
	060	6	6	10	60	
	080	8	8	13	70	
	100	10	10	16	70	
	120	12	12	18	80	
	160	16	16	24	100	

Champer Tool

Champer Tool- CCT

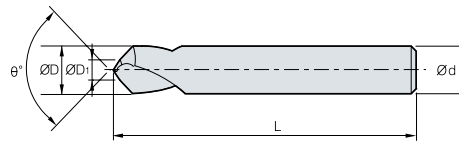
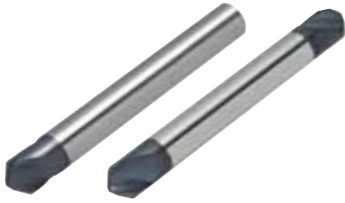


Fig 1

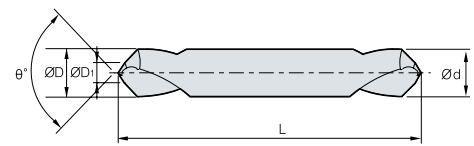


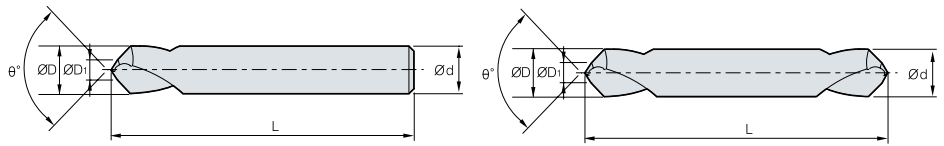
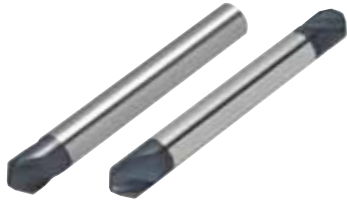
Fig 2

(mm)

Designation	ØD = Ød	ØD1	L	θ°	Fig.
CCT060 -	030	1.0	40	60°	1
	040	1.5	40		
	060	2.0	50		
	080	2.5	60		
	100	3.0	70		
	120	4.0	80		
	160	5.0	100		
CCT060T -	030	1.0	40		2
	040	1.5	40		
	060	2.0	50		
	080	2.5	60		
	100	3.0	70		
	120	4.0	80		
	160	5.0	100		
CCT060T -	030L	1.0	100		
	040L	1.5	100		
	060L	2.0	100		
	080L	2.5	120		
	100L	3.0	120		
	120L	4.0	150		
CCT090 -	030	1.0	40	90°	1
	040	1.5	40		
	060	2.0	50		
	080	2.5	60		
	100	3.0	70		
	120	4.0	80		
	160	5.0	100		
CCT090T -	030	1.0	40		2
	040	1.5	40		
	060	2.0	50		
	080	2.5	60		
	100	3.0	70		
	120	4.0	80		
	160	5.0	100		
CCT090T -	030L	1.0	100		
	040L	1.5	100		
	060L	2.0	100		
	080L	2.5	120		
	100L	3.0	120		
	120L	4.0	150		
CCT120 -	030	1.0	40	120°	1
	040	1.5	40		
	060	2.0	50		
	080	2.5	60		
	100	3.0	70		
	120	4.0	80		
	160	5.0	100		



Champer Tool- CCT



(mm)

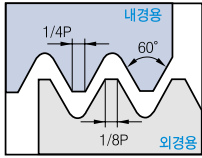
Designation	ØD = Ød	ØD1	L	θ°	Fig.
CCT120T - 030	3	1.0	40	120°	2
040	4	1.5	40		
060	6	2.0	50		
080	8	2.5	60		
100	10	3.0	70		
120	12	4.0	80		
160	16	5.0	100		
CCT120T - 030L	3	1.0	100		
040L	4	1.5	100		
060L	6	2.0	100		
080L	8	2.5	120		
100L	10	3.0	120		
120L	12	4.0	150		

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°	•	•	•	•	×	•

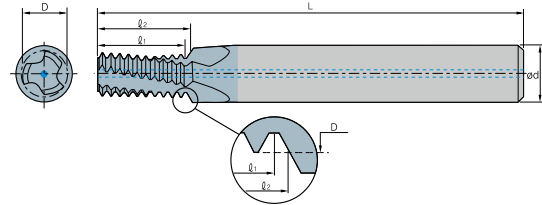
Thread Mill

ISO Metric



Internal

Defined by : R262 (DIN 13)
Tolerance class : 6H



($l_2 \leq 1.5 \times \text{Thread Diameter}$)

Thread		Pitch (mm)	Designation	Dimensions (mm)					No. of flute	Tooth	*Bore dia.	
M Coarse	M Fine			Internal	Ød	D	L	ℓ ₁				ℓ ₂
M3×0.5	M3.5~M16×0.5	0.5	STMHC	04024L04-I0.50ISO	4	2.40	45	4.5	4.7	3	9	2.5
M4×0.7		0.7		04031L06-I0.70ISO	4	3.15	45	6.3	6.6	3	9	3.3
M5×0.8		0.8		04039L07-I0.80ISO	4	3.90	45	7.2	7.6	3	9	4.2
M6×1.0	M8~M40×1.0	1.0		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	1.5		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	2.0		12116L21-I2.00ISO	12	11.60	73	20.0	21.0	4	10	12.0
M16×2.0	M17~M80×2.0	2.0		14136L25-I2.00ISO	14	13.60	92	24.0	25.0	4	12	14.0

($l_2 \leq 2 \times \text{Thread Diameter}$)

Thread		Pitch (mm)	Designation	Dimensions (mm)					No.of flute	Tooth	*Bore dia.	
M Coarse	M Fine			Internal	Ød	D	L	ℓ ₁				ℓ ₂
M3×0.5	M3.5~M16×0.5	0.5	STMHC	04024L06-I0.50ISO	4	2.40	45	6.0	6.2	3	12	2.5
	M4×0.5	0.5		04032L08-I0.50ISO	4	3.20	45	8.0	8.2	3	16	3.5
	M5×0.5	0.5		06042L10-I0.50ISO	6	4.20	57	10.0	10.2	3	20	4.5
M4×0.7		0.7		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		0.8		04039L10-I0.80ISO	4	3.90	45	10.4	10.8	3	13	4.2
M6×1.0	M8~M40×1.0	1.0		06048L12-I1.00ISO	6	4.80	57	12.0	12.5	3	12	5.0
	M8×1.0	1.0		08067L16-I1.00ISO	8	6.70	61	16.0	16.5	3	16	7.0
	M10×1.0	1.0		10087L20-I1.00ISO	10	8.70	73	20.0	20.5	3	20	9.0
	M12×1.0	1.0		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	1.5		10082L20-I1.50ISO	10	8.20	73	19.5	20.2	3	13	8.5
	M12×1.5	1.5		10099L24-I1.50ISO	10	9.90	73	24.0	24.7	4	16	10.5
	M14×1.5	1.5		12119L29-I1.50ISO	12	11.90	80	28.5	29.2	4	19	12.5
	M16×1.5	1.5		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	2.0		12116L29-I2.00ISO	12	11.60	80	28.0	29.0	4	14	12.0
M16×2.0	M17~M80×2.0	2.0		14136L33-I2.00ISO	14	13.60	92	32.0	33.0	4	16	14.0
M18×2.5		2.5		16148L36-I2.50ISO	16	14.80	92	35.0	36.2	4	14	15.5
M 20×2.5		2.5		18171L41-I2.50ISO	18	17.10	102	40.0	41.2	4	16	17.5
M 24×3.0		3.0		20199L49-I3.00ISO	20	19.90	102	48.0	49.5	4	16	21.0

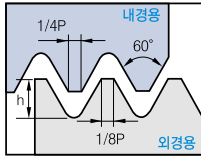
* Bore Diameter applies to smallest thread Dia

Maximum thread length = $l_2 - \frac{\text{Pitch}}{4}$

● : Stock item

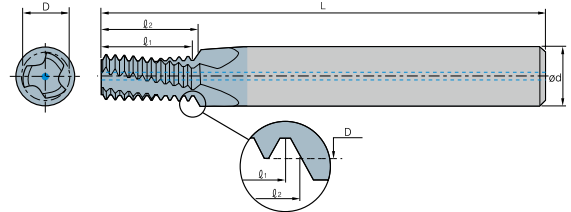


American UN (UNC,UNF,UNEF)



Internal

Defined by : ANSI B1.1.74
Tolerance class : 2B



($L_2 \leq 1.5 \times \text{Thread Diameter}$)

Thread			Pitch (tpi)	Designation	Dimensions (mm)					No. of flute	Tooth	*Bore dia.	
UNC	UNF	UNEF			Internal	Ød	D	L	ℓ ₁	ℓ ₂	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

($L_2 \leq 2 \times \text{Thread Diameter}$)

Thread			Pitch (tpi)	Designation	Dimensions (mm)					No. of flute	Tooth	*Bore dia. mm	
UNC	UNF	UNEF			Internal	Ød	D	L	ℓ ₁				ℓ ₂
	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	

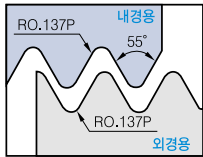
* Bore Diameter applies to smallest thread Dia

Maximum thread length = $L_2 - \frac{\text{Pitch}}{4}$

● : Stock item

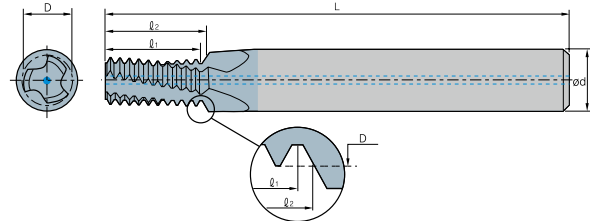
Thread Mill

Whitworth (BSW,BSF)



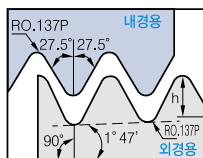
External / Internal

Defined by : B.S.84 : 1956,
DIN 259, ISO228/1 : 1982
Tolerance class : Medium class A

($q_2 \leq 2 \times \text{Thread Diameter}$)

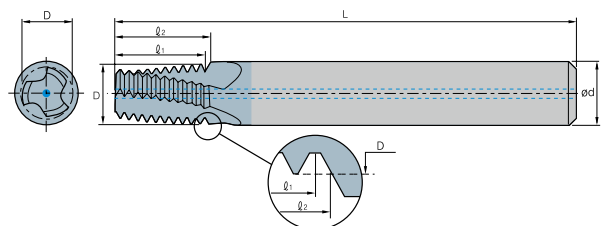
Thread		Pitch (tpi)	Designation	Dimensions (mm)					No.of flute	Tooth	*Bore dia.	
BSW	BSF			External/Internal	Ød	D	L	ℓ ₁				ℓ ₂
	1/4"×26	26	STMHC	06050L13-EI26BSF	6	5.00	57	12.7	13.2	3	13	5.3
	5/16"×22	22		08063L16-EI22BSF	8	6.35	61	16.2	16.7	3	14	6.7
1/4"×20	3/8"×20	20		06044L13-EI20BSW	6	4.45	57	12.7	13.3	3	10	5.0
	3/8"×20	20		08076L19-EI20BSF	8	7.65	61	19.0	197	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

BSPT



External / Internal

Defined by : B.S.21 : 1985
Tolerance class : Standard BSPT



Thread	Pitch (tpi)	Designation	Dimensions (mm)					No.of flute	Tooth	*Bore dia.	
Standard			Internal	Ød	D	L	ℓ ₁				ℓ ₂
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

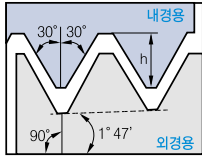
* Bore Diameter applies to smallest thread Dia

Maximum thread length = $q_2 - \frac{\text{Pitch}}{4}$

● : Stock item

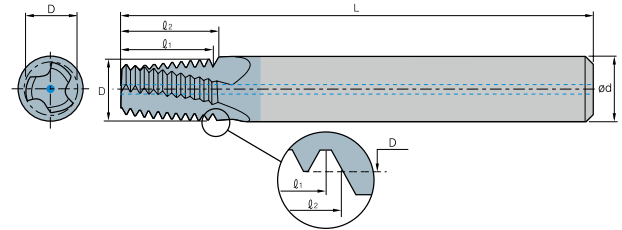


NPT



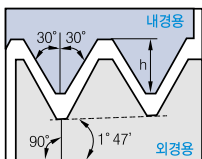
External / Internal

Defined by : USAS B2.1 : 1968
Tolerance class : Standard NPT



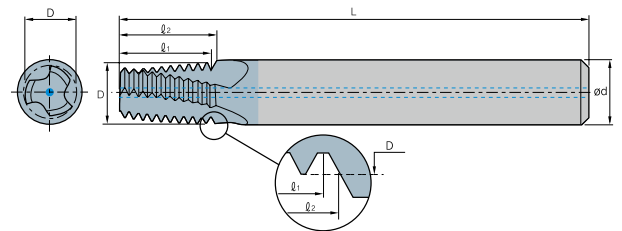
Thread Standard	Pitch (tpi)	Designation		Dimensions (mm)					No. of flute	Tooth	*Bore dia.
		Internal		Ød	D	L	ℓ ₁	ℓ ₂	z	zt	mm
1/16"×27	27	STMHC	06059L09-EI27NPT	6	5.90	57	9.4	9.9	3	10	6.3
1/8"×27	27		08076L09-EI27NPT	8	7.65	61	9.4	9.9	3	10	8.5
1/4"×18	18		10099L14-EI18NPT	10	9.90	73	14.1	14.8	3	10	11.1
3/8"×18	18		12111L14-EI18NPT	12	11.15	73	14.1	14.8	4	10	14.5
1/2", 3/4"×14	14		16142L19-EI14NPT	16	14.25	92	18.1	19.0	4	10	17.7, 23.0
1", 1 1/4, 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		20196L33-EI8NPT	20	19.60	102	31.7	33.3	4	10	66.5, 82.1

NPTF



External / Internal

Defined by : ANSI 1.20.3-1976
Tolerance class : Standard NPTF



Thread	Pitch	Designation	Dimensions (mm)					No. of flute	Tooth	*Bore dia.	
Standard	(tpi)	Internal	Ød	D	L	ℓ ₁	ℓ ₂	z	zt	mm	
1/16"×27	27	STMHC	06059L09-EI27NPTF	6	5.90	57	9.4	9.9	3	10	6.3
1/8"×27	27		08076L09-EI27NPTF	8	7.65	61	9.4	9.9	3	10	8.5
1/4"×18	18		10099L14-EI18NPTF	10	9.90	73	14.1	14.8	3	10	11.1
3/8"×18	18		12111L14-EI18NPTF	12	11.15	73	14.1	14.8	4	10	14.5
1/2", 3/4"×14	14		16142L19-EI14NPTF	16	14.25	92	18.1	19.0	4	10	17.7, 23.4
1", 1 1/4, 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		20196L33-EI8NPTF	20	19.60	102	31.7	33.3	4	10	66.3, 82.1

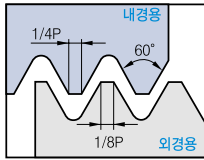
* Bore Diameter applies to smallest thread Dia

Maximum thread length = $l_2 - \frac{\text{Pitch}}{4}$

● : Stock item

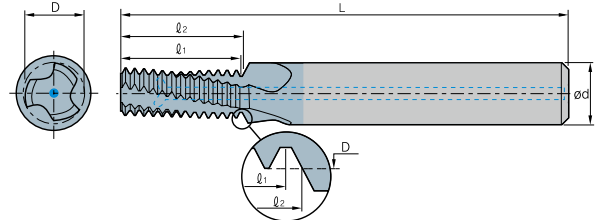
Thread Mill

ISO Metric



Internal

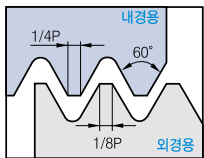
Defined by : R262 (DIN 13)
Tolerance class : 6H



($L_2 \leq 2 \times \text{Thread Diameter}$)

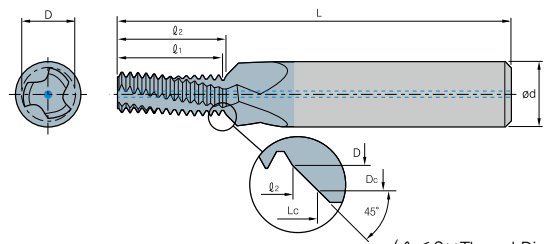
Thread		Pitch (tpi)	Designation		Dimensions (mm)					No. of flute z	Tooth zt	*Bore dia. mm
M Coarse	M Fine		Internal		Ød	D	L	L_1	L_2			
M6×1.0	M8~M40×1.0	1.0	STMHCR	06048L12-I1.00ISO	6	4.8	57	12.0	12.5	3	12	5.0
	M10×1.0	1.0		10087L20-I1.00ISO	10	8.7	73	20.0	20.5	3	20	9.0
	M12×1.0	1.0		12107L24-I1.00ISO	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



Internal

Defined by : R262 (DIN 13)
Tolerance class : 6H



($L_2 \leq 2 \times \text{Thread Diameter}$)

Thread		Pitch (tpi)	Designation	Dimensions (mm)								No. of flute	Tooth	*Bore dia.
M Coarse	M Fine			Internal	Ød	D	L	ℓ ₁	ℓ ₂	z	zt			
M6×1.0	M8~M40×1.0	1.0	STMHCC	08048L12-11.00ISO	8	4.8	6.3	61	12.0	12.5	13.3	3	12	5.0
	M10×1.0	1.0		12087L20-11.00ISO	12	8.7	10.3	73	20.0	20.5	21.3	3	20	9.0
	M12×1.0	1.0		14107L24-11.00ISO	14	10.7	12.3	80	24.0	24.5	25.3	4	24	11.0
M8×1.25		1.25		10065L16-11.25ISO	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		12082L20-11.50ISO	12	8.2	10.3	80	19.5	20.3	21.3	3	13	8.5
	M12×1.5	1.5		14099L24-11.50ISO	14	9.9	12.3	80	24.0	24.8	26.0	4	16	10.5
	M14×1.5	1.5		16119L29-11.50ISO	16	11.9	14.3	92	28.5	29.3	30.5	4	19	12.5
	M16×1.5	1.5		18139L32-11.50ISO	18	13.9	16.3	92	31.5	32.3	33.5	4	21	14.5
M12×1.75		1.75		14099L25-11.75ISO	14	9.9	12.3	80	24.5	25.4	26.6	4	14	10.2

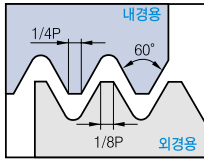
* Bore Diameter applies to smallest thread Dia

Maximum thread length = $L_2 - \frac{\text{Pitch}}{4}$

● : Stock item

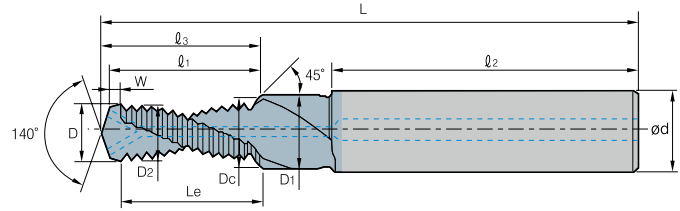


ISO Metric



Internal

Defined by : R262 (DIN 13)
Tolerance class : 6H



Thread	Pitch (mm)	Designation		Dimensions (mm)										No. of flute	Tooth	
ISO 2D M Coarse	Internal			L	ℓ ₃	ℓ ₁	ℓ ₂	W	Le	D	Ød	D ₁	D _c	D ₂	z	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

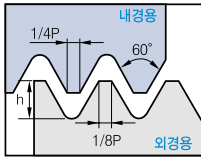
Thread	Pitch	Designation		Dimensions (mm)											No. of flute	Tooth
ISO 2.5D M Coarse	(mm)			Internal	L	ℓ ₃	ℓ ₁	ℓ ₂	W	Le	D	Ød	D ₁	D _c	D ₂	z
M6×1.0	1.0	STMHCD-	IM6×1.0ISO-2.5D	62.0	16.5	15.7	36	1.0	14.7	5.0	8	6.6	6.3	4.85	2	13
M8×1.25	1.25		IM8×1.25ISO-2.5D	74.0	23.2	22.1	40	1.3	20.8	6.8	10	9.0	8.3	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

Maximum thread length = $l_2 - \frac{\text{Pitch}}{4}$

● : Stock item

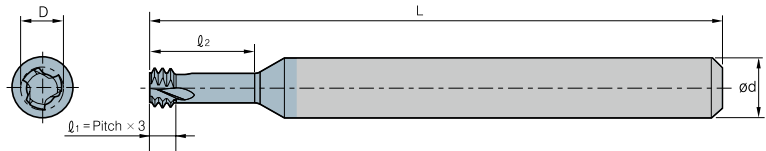
Thread Mill

ISO Metric



Internal

Defined by : R262 (DIN 13)
Tolerance class : 6H

($l_2 \leq 2 \times \text{Thread Diameter}$)

Thread		Pitch (mm)	Designation		Dimensions (mm)				No. of flute z	Tooth zt	*Bore dia. mm
M Coarse	M Fine		Internal		Ød	D	L	l ₂			
M1.6×0.35		0.35	STMD3T	03012L034-I0.35ISO	3	1.20	30	3.4	3	3	1.25
M2×0.4		0.4		06015L042-I0.4ISO	6	1.55	57	4.2	3	3	1.6
M2.2×0.45		0.45		06016L046-I0.45ISO	6	1.65	57	4.6	3	3	1.75
M2.5×0.45		0.45		06019L052-I0.45ISO	6	1.95	57	5.2	3	3	2.05
M3×0.5	M3.5~M16×0.5	0.5		06024L062-I0.5ISO	6	2.40	57	6.2	3	3	2.5
M3.5×0.6		0.6		06027L073-I0.6ISO	6	2.75	57	7.3	3	3	2.9
M4×0.7		0.7		06031L083-I0.7ISO	6	3.15	57	8.3	3	3	3.3
M5×0.8		0.8		06040L104-I0.8ISO	6	4.05	57	10.4	3	3	4.2
M6×1.0	M8~M40×1.0	1.0		06048L125-I1.0ISO	6	4.80	57	12.5	3	3	5.0
M8×1.25		1.25		08065L166-I1.25ISO	8	6.50	63	16.6	3	3	6.8
M10×1.5	M12~M48×1.50	1.5		10082L208-I1.50ISO	10	8.20	73	20.8	3	3	8.5
M12×1.75		1.75		10099L250-I1.75ISO	10	9.90	73	25.0	3	3	10.3

3d ($l_2 \leq 3 \times \text{Thread Diameter}$)

Thread		Pitch (mm)	Designation		Dimensions (mm)				No. of flute z	Tooth zt	*Bore dia. mm
M Coarse	M Fine		Internal		Ød	D	L	l ₂			
M1.6×0.35		0.35	STMD3T	03012L050-I0.35ISO	3	1.20	30	5.0	3	3	1.25
M2×0.4		0.4		06015L062-I0.4ISO	6	1.55	57	6.2	3	3	1.6
M2.5×0.45		0.45		06019L077-I0.45ISO	6	1.95	57	7.0	3	3	2.05
M3×0.5	M3.5~M16×0.5	0.5		06024L092-I0.5ISO	6	2.40	57	9.2	3	3	2.5
M4×0.7		0.7		06031L123-I0.7ISO	6	3.15	57	12.3	3	3	3.3
M5×0.8		0.8		06040L154-I0.8ISO	6	4.05	57	15.4	3	3	4.2
M6×1.0	M8~M40×1.0	1.0		06048L185-I1.0ISO	6	4.80	57	18.5	3	3	5.0
M8×1.25		1.25		08065L246-I1.25ISO	8	6.50	63	24.6	3	3	6.8

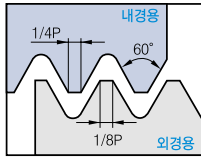
* Bore Diameter applies to smallest thread Dia

Maximum thread length = $l_2 - \frac{\text{Pitch}}{4}$

● : Stock item



American UN



Internal

Defined by : ANSI B1.1.74
Tolerance class : 2B



($L_2 \leq 2 \times \text{Thread Diameter}$)

Thread		Pitch (tpi)	Designation	Dimensions (mm)				No.of flute z	Tooth zt	*Bore dia. mm	
UNC	UNF			Ød	D	L	ℓ ₂				
	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
	1/4"×28	28		06052L132-I28UN	6	5.25	57	13.2	3	3	5.5
No.10~24	5/16"×24	24		06035L102-I24UN	6	3.58	57	10.2	3	3	3.9
	5/16"×24	24		08066L165-I24UN	8	6.68	63	16.5	3	3	6.9
1/4"×20	7/16"×20	20		06048L134-I20UN	6	4.88	57	13.4	3	3	5.2
	7/16"×20	20		010095L230-I20UN	10	9.55	73	23.0	3	3	9.9
3/8"×16		16		08067L191-I16UN	8	6.70	63	19.1	3	3	8.0
7/16"×14		14		10090L233-I14UN	10	9.00	73	23.3	3	3	9.4

($L_2 \leq 3 \times \text{Thread Diameter}$)

Thread		Pitch (tpi)	Designation	Dimensions (mm)				No.of flute z	Tooth zt	*Bore dia. mm	
UNC	UNF			Internal	Ød	D	L				ℓ ₂
	No.1~72	72	STMD3T	06014L057-I72UN	6	1.45	57	5.75	3	3	1.6
No.4, No.5~40	No.6~40	40		06021L090-I40UN	6	2.10	57	9.0	3	3	2.3
No.5~40	No.6~40	40		06024L100-I40UN	6	2.45	57	10.0	3	3	2.6
No.6, No.8~32	No.10~32	32		06025L110-I32UN	6	2.55	57	11.0	3	3	2.8
No.8~32	No.10~32	32		06032L130-I32UN	6	3.20	57	13.0	3	3	3.4
	1/4" 28	28		06052L196-I28UN	6	5.25	57	19.6	3	3	5.5
	5/16"x24	24		08066L245-I24UN	8	6.68	63	24.5	3	3	6.9
1/4"x20	7/16"x20	20		06048L198-I20UN	6	4.88	57	19.8	3	3	5.1

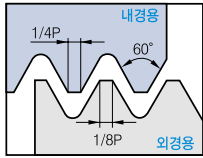
* Bore Diameter applies to smallest thread Dia

Maximum thread length = $L_2 - \frac{\text{Pitch}}{4}$

● : Stock item

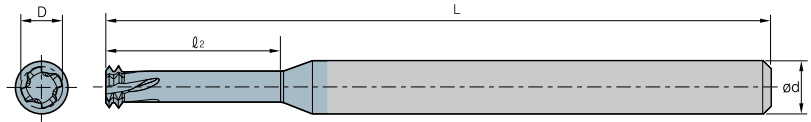
Thread Mill

ISO Metric



Internal

Defined by : R262 (DIN 13)
Tolerance class : 6H

($l_2 \leq 2 \times \text{Thread Diameter}$)

Thread		Pitch (mm)	Designation	Dimensions (mm)				No.of flute	Tooth	*Bore dia.	
M Coarse	M Fine			Internal	Ød	D	L				ℓ ₂
M2×0.4		0.4	STMD2L	06015L042-I0.4ISO	6	1.55	76	4.60	4	2	1.6
M2.2×0.45		0.45		06016L046-I0.45ISO	6	1.65	76	5.05	4	2	1.8
M2.5×0.45		0.45		06019L052-I0.45ISO	6	1.95	76	5.65	4	2	2.05
M3×0.5	M3.5~M16×0.5	0.5		06024L062-I0.5ISO	6	2.40	76	6.75	4	2	2.55
M3.5×0.6		0.6		06027L073-I0.6ISO	6	2.75	76	7.90	4	2	2.95
M4×0.7		0.7		06031L083-I0.7ISO	6	3.15	76	9.05	4	2	3.35
M5×0.8		0.8		06040L104-I0.8ISO	6	4.05	76	11.20	4	2	4.3
M6×1.0	M8~M40×1.0	1.0		06048L125-I1.0ISO	6	4.80	76	13.50	4	2	5.1
M8×1.25		1.25		08065L166-I1.25ISO	8	6.50	80	17.85	4	2	6.8
M10×1.5	M12~M48×1.50	1.5		08079L208-I1.50ISO	8	7.90	80	22.30	4	2	8.6
M12×1.75		1.75		10099L250-I1.75ISO	10	9.90	101	26.75	4	2	10.4

($l_2 \leq 3 \times \text{Thread Diameter}$)

Thread		Pitch (mm)	Designation	Dimensions (mm)				No.of flute	Tooth	*Bore dia.	
M Coarse	M Fine			Internal	Ød	D	L				ℓ ₂
M2×0.4		0.4	STMD2L	06015L062-I0.4ISO	6	1.55	76	6.60	4	2	1.6
M2.2×0.45		0.45		06019L077-I0.45ISO	6	1.95	76	8.15	4	2	2.05
M3×0.5	M3.5~M16×0.5	0.5		06024L092-I0.5ISO	6	2.40	76	9.75	4	2	2.55
M4×0.7		0.7		06031L123-I0.7ISO	6	3.15	76	13.05	4	2	3.35
M5×0.8		0.8		06040L154-I0.8ISO	6	4.05	76	16.20	4	2	4.3
M6×1.0	M8~M40×1.0	1.0		06048L185-I1.0ISO	6	4.80	76	19.50	4	2	5.1
M8×1.25		1.25		08065L246-I1.25ISO	8	6.50	80	25.85	4	2	6.8

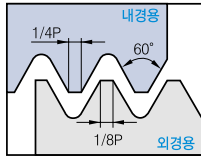
* Bore Diameter applies to smallest thread Dia

Maximum thread length = $l_2 - \frac{\text{Pitch}}{4}$

● : Stock item

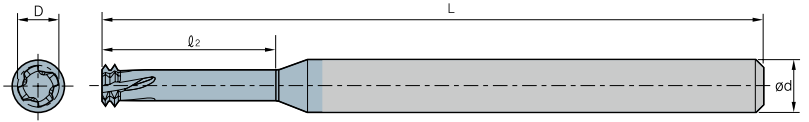


American UN



Internal

Defined by : ANSI B1.1.74
Tolerance class : 2B



($L_2 \leq 2 \times \text{Thread Diameter}$)

Thread		Pitch (tpi)	Designation	Dimensions (mm)				No.of flute z	Tooth zt	*Bore dia. mm	
UNC	UNF			Internal	Ød	D	L				ℓ ₂
No.2~56	No.3~56	56	STMD2L	06016L050-I56UN	6	1.65	76	5.45	4	2	1.80
No.3~48	No.4~48	48		06019L060-I48UN	6	1.90	76	6.53	4	2	2.10
No.4~40 ; No.5~40	No.6~40	40		06021L060-I40UN	6	2.10	76	6.64	4	2	2.35
No.5~40	No.6~40	40		06024L072-I40UN	6	2.45	76	7.84	4	2	2.65
	No.8~36	36		06033L087-I36UN	6	3.30	76	9.41	4	2	3.55
No.6~32 ; No.8~32	No.10~32	32		06025L074-I32UN	6	2.55	76	8.20	4	2	2.85
No.8~32	No.10~32	32		06032L100-I32UN	6	3.20	76	10.79	4	2	3.50
	1/4"x28	28		06052L132-I28UN	6	5.25	76	14.11	4	2	5.55
No.10~24	5/16"x24	24		06035L102-I24UN	6	3.58	76	11.26	4	2	3.90
	5/16"x24	24		08066L165-I24UN	8	6.68	76	17.56	4	2	7.00
1/4"x20	7/16"x20	20		06048L134-I20UN	6	4.88	76	14.67	4	2	5.20
	7/16"x20	20		10095L230-I20UN	10	9.55	101	24.27	4	2	9.90
3/8"x16		16		08076L197-I16UN	8	7.65	80	21.29	4	2	8.00
7/16"x14		14		10090L233-I14UN	10	9.00	101	25.11	4	2	9.50
1/2"x13		13		10099L256-I13UN	10	9.90	101	27.55	4	2	10.90

($L_2 \leq 3 \times \text{Thread Diameter}$)

Thread		Pitch (tpi)	Designation	Dimensions (mm)				No.of flute z	Tooth zt	*Bore dia. mm	
UNC	UNF			Internal	Ød	D	L				ℓ ₂
No.4~40, No.5~40	No.6~40	40	STMD2L	06021L090-I40UN	6	2.10	76	9.64	4	2	2.35
No.5~40	No.6~40	40		06024L100-I40UN	6	2.45	76	10.64	4	2	2.65
No.6~32, No.8~32	No.10~32	32		06025L110-I32UN	6	2.55	76	11.79	4	2	2.85
No.8~32	No.10~32	32		06032L130-I32UN	6	3.20	76	13.79	4	2	3.50
	1/4"×28	28		06052L196-I28UN	6	5.25	76	20.51	4	2	5.55
	5/16"×24	24		08066L245-I24UN	8	6.68	80	25.56	4	2	7.00
1/4"~20	7/16"×20	20		06048L198-I20UN	6	4.88	76	21.07	4	2	5.20
7/16"×14		14		10090L335-I14UN	10	9.00	101	35.31	4	2	9.50

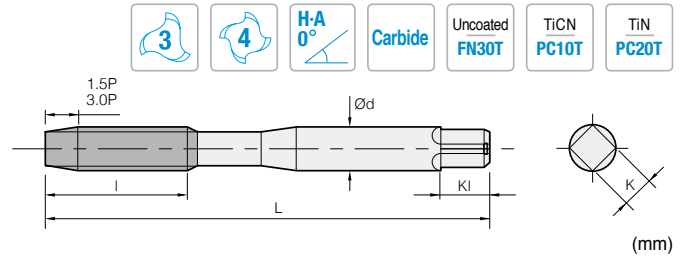
* Bore Diameter applies to smallest thread Dia

Maximum thread length = $L_2 - \frac{\text{Pitch}}{4}$

● : Stock item

TAP

ST Straight Tap



Flutes	Designation		Thread size	L	I	d	K	KI	Limits
	1.5P	3P							
3	M3X0.5-ST15	M3X0.5-ST30	M3X0.5	46	11	4.0	3.2	6	KH3
	M4X0.7-ST15	M4X0.7-ST30	M4X0.7	52	13	5.0	4.0	7	KH3
	M5X0.8-ST15	M5X0.8-ST30	M5X0.8	60	16	5.5	4.5	7	KH3
	M6X1.0-ST15	M6X1.0-ST30	M6X1.0	62	19	6.0	4.5	7	KH3
4	M8X1.0-ST15	M8X1.0-ST30	M8X1.0	70	22	6.2	5.0	8	KH3
	M8X1.25-ST15	M8X1.25-ST30	M8X1.25	70	22	6.2	5.0	8	KH4
	M10X1.0-ST15	M10X1.0-ST30	M10X1.0	75	24	7.0	5.5	8	KH3
	M10X1.25-ST15	M10X1.25-ST30	M10X1.25	75	24	7.0	5.5	8	KH4
	M10X1.5-ST15	M10X1.5-ST30	M10X1.5	75	24	7.0	5.5	8	KH4
	M12X1.0-ST15	M12X1.0-ST30	M12X1.0	82	29	8.5	6.5	9	KH3
	M12X1.25-ST15	M12X1.25-ST30	M12X1.25	82	29	8.5	6.5	9	KH4
	M12X1.5-ST15	M12X1.5-ST30	M12X1.5	82	29	8.5	6.5	9	KH4
	M12X1.75-ST15	M12X1.75-ST30	M12X1.75	82	29	8.5	6.5	9	KH5

※ Ideal for mass tapping operations of general cast iron, ductile cast iron, brass-cast, thermosetting plastics, etc

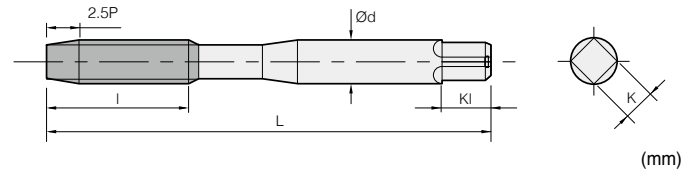
※ Wear resistance highly improved by the use of TiCN, TiN coating for high efficiency tapping operations

Applicable workpiece range

Division	Carbon steel			Alloy steel	Quenched and tempered steel			Stainless steel	Tool steel	Cast steel	Cast iron	Ductile cast iron	Copper	Brass	Brass-cast	Bronze	Rolled aluminum	Aluminum-cast, alloyed	Magnesium-cast, alloyed	Zinc-cast, alloyed	Titanium alloy		Thermo-setting plastics	Thermo-plastics
	C ~0.25%	C 0.25%~0.45%	C 0.45%~		25~45 HRC	45~55 HRC	50~60 HRC														Ti	Ni		
FN30T											◎	○		○	○	◎		○	○	○			◎	
PC10T											◎	○		○	○	◎		○	○	○			◎	
PC20T											◎	○		○	○	◎		○	○	○			◎	



SP Spiral Tap



(mm)

Flutes	Designation 2.5P	Thread size	L	I	d	K	KI	Limits
	M3X0.5-SP25	M3X0.5	46	11	4.0	3.2	6	KH3
	M4X0.7-SP25	M4X0.7	52	13	5.0	4.0	7	KH3
	M5X0.8-SP25	M5X0.8	60	16	5.5	4.5	7	KH3
	M6X1.0-SP25	M6X1.0	62	19	6.0	4.5	7	KH3
	M8X1.0-SP25	M8X1.0	70	22	6.2	5.0	8	KH3
	M8X1.25-SP25	M8X1.25	70	22	6.2	5.0	8	KH4
	M10X1.0-SP25	M10X1.0	75	24	7.0	5.5	8	KH3
	M10X1.25-SP25	M10X1.25	75	24	7.0	5.5	8	KH4
	M10X1.5-SP25	M10X1.5	75	24	7.0	5.5	8	KH4
	M12X1.0-SP25	M12X1.0	82	29	8.5	6.5	9	KH3
	M12X1.25-SP25	M12X1.25	82	29	8.5	6.5	9	KH4
	M12X1.5-SP25	M12X1.5	82	29	8.5	6.5	9	KH4
	M12X1.75-SP25	M12X1.75	82	29	8.5	6.5	9	KH5

※ Ideal for making blind holes in quantity on general cast iron, ductile cast iron, brass-cast, thermosetting plastics, etc

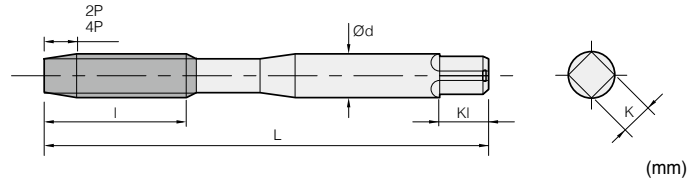
※ Wear resistance highly improved by the use of TiCN coating for high efficiency tapping operations

Applicable workpiece range

Division	Carbon steel			Alloy steel	Quenched and tempered steel			Stainless steel	Tool steel	Cast steel	Cast iron	Ductile cast iron	Copper	Brass	Brass-cast	Bronze	Rolled aluminum	Aluminum-cast, alloyed	Magnesium-cast, alloyed	Zinc-cast, alloyed	Titanium alloy		Thermosetting plastics	Thermoplastics
	C ~0.25%	C 0.25% ~0.45%	C 0.45%~		25~45 HRC	45~55 HRC	50~60 HRC														Ti	Ni		
FN30T											○	◎	◎	◎	◎	○	○	○	○	○				◎
PC10T											○	◎	◎	◎	◎	○	○	◎	◎	◎			○	◎

TAP

RT Roll Tap



Carbide

Uncoated
FN30TTiCN
PC10T

Flutes	Designation		Thread size	L	I	d	K	KI	Limits
	2P	4P							
1	M3X0.5-RT20 (S)	-	M3X0.5	46	11	4.0	3.2	6	GH5
4	M3X0.5-RT20 (M)	M3X0.5-RT40 (M)	M3X0.5	46	11	4.0	3.2	6	GH5
1	M4X0.7-RT20 (S)	-	M4X0.7	52	13	5.0	4.0	7	GH6
4	M4X0.7-RT20 (M)	M4X0.7-RT40 (M)	M4X0.7	52	13	5.0	4.0	7	GH6
1	M5X0.8-RT20 (S)	-	M5X0.8	60	16	5.5	4.5	7	GH6
4	M5X0.8-RT20 (M)	M5X0.8-RT40 (M)	M5X0.8	60	16	5.5	4.5	7	GH6
1	M6X1.0-RT20 (S)	-	M6X1.0	62	19	6.0	4.5	7	GH7
4	M6X1.0-RT20 (M)	M6X1.0-RT40 (M)	M6X1.0	62	19	6.0	4.5	7	GH7
1	M8X1.25-RT20 (S)	-	M8X1.25	70	22	6.2	5.0	8	GH7
4	M8X1.25-RT20 (M)	M8X1.25-RT40 (M)	M8X1.25	70	22	6.2	5.0	8	GH7
1	M10X1.25-RT20 (S)	-	M10X1.25	75	24	7.0	5.5	8	GH7
4	M10X1.25-RT20 (M)	M10X1.25-RT40 (M)	M10X1.25	75	24	7.0	5.5	8	GH7
1	M12X1.0-RT20 (S)	-	M12X1.0	82	29	8.5	6.5	9	GH7
4	M12X1.0-RT20 (M)	M12X1.0-RT40 (M)	M12X1.0	82	29	8.5	6.5	9	GH7
1	M12X1.25-RT20 (S)	-	M12X1.25	82	29	8.5	6.5	9	GH7
4	M12X1.25-RT20 (M)	M12X1.25-RT40 (M)	M12X1.25	82	29	8.5	6.5	9	GH7
1	M12X1.5-RT20 (S)	-	M12X1.5	82	29	8.5	6.5	9	GH7
4	M12X1.5-RT20 (M)	M12X1.5-RT40 (M)	M12X1.5	82	29	8.5	6.5	9	GH7
1	M12X1.75-RT20 (S)	-	M12X1.75	82	29	8.5	6.5	9	GH8
4	M12X1.75-RT20 (M)	M12X1.75-RT40 (M)	M12X1.75	82	29	8.5	6.5	9	GH8

※ For general use on both steels and non-ferrous metal

※ Wear resistance highly improved by the use of TiCN coating for high efficiency tapping operations

※ Ideal for making both through holes and blind holes on non-ferrous metals

Applicable workpiece range

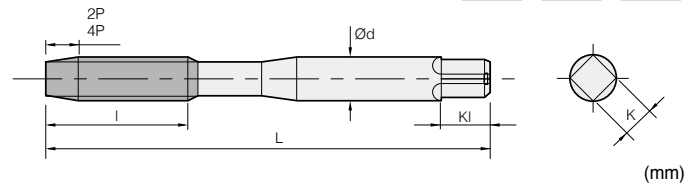
Division	Carbon steel			Alloy steel	Quenched and tempered steel			Stainless steel	Tool steel	Cast steel	Cast iron	Ductile cast iron	Copper	Brass	Brass-cast	Bronze	Rolled aluminum	Aluminum-cast, alloyed	Magnesium-cast, alloyed	Zinc-cast, alloyed	Titanium alloy		Thermo-setting plastics	Thermo-plastics
	C ~0.25%	C0.25% ~0.45%	C 0.45%~	SCM	25~45 HrC	45~55 HrC	50~60 HrC	SUS	SKD	SC	GC	GCD	Cu	Bs	BsC	PB	Al	AC ADC	MC	ZDC	Ti	Ni	-	-
FN30T													◎	◎	◎		◎	◎		◎				
PC10T	◎	◎	○	○				◎					◎	◎	◎		◎	◎		◎				



SR Spiral Roll Tap



Carbide

Uncoated
FN30TTiCN
PC10T

Designation		Thread size	L	I	d	K	KI	Limits
2P	4P							
M3X0.5-SR20	M3X0.5-SR40	M3X0.5	46	18	4.0	3.2	6	GH6
M3.5X0.6-SR20	M3.5X0.6-SR40	M3.5X0.6	46	18	4.0	3.2	6	GH6
M4X0.7-SR20	M4X0.7-SR40	M4X0.7	52	20	5.0	4.0	7	GH7
M5X0.8-SR20	M5X0.8-SR40	M5X0.8	60	22	5.5	4.5	7	GH7
M6X1.0-SR20	M6X1.0-SR40	M6X1.0	62	24	6.0	4.5	7	GH7

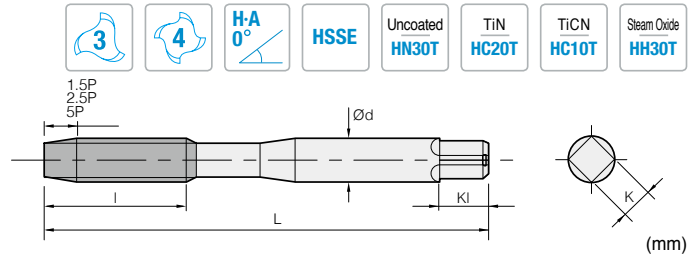
- ※ For general use for tapping aluminum, magnesium and zinc as well as non-ferrous metal
- ※ Ideal for tapping steel, non-ferrous materials and stainless steel
- ※ Wear resistance highly improved by the use of TiCN coating for high efficiency tapping operations

Applicable workpiece range

Division	Carbon steel			Alloy steel	Quenched and tempered steel			Stainless steel	Tool steel	Cast steel	Cast iron	Ductile cast iron	Copper	Brass	Brass-cast	Bronze	Rolled aluminum	Aluminum-cast, alloyed	Magnesium-cast, alloyed	Zinc-cast, alloyed	Titanium alloy		Thermosetting plastics	Thermoplastics
	C ~0.25%	C0.25% ~0.45%	C 0.45%~		25~45 HrC	45~55 HrC	50~60 HrC														Ti	Ni		
FN30T													○	○	○		○	○		○				
PC10T	○	○	○	○				○					○	○	○		○	○		○				

TAP

ST Straight Tap



Flutes	Designation			Thread size	L	I	d	K	KI	Limits
	1.5P	2.5P	5P							
3	M3X0.5-ST15	M3X0.5-ST25	M3X0.5-ST50	M3X0.5	46	11	4.0	3.2	6	KH2
	M4X0.7-ST15	M4X0.7-ST25	M4X0.7-ST50	M4X0.7	52	13	5.0	4.0	7	KH2
	M5X0.8-ST15	M5X0.8-ST25	M5X0.8-ST50	M5X0.8	60	16	5.5	4.5	7	KH2
	M6X1.0-ST15	M6X1.0-ST25	M6X1.0-ST50	M6X1.0	62	19	6.0	4.5	7	KH2
4	M8X1.25-ST15	M8X1.25-ST25	M8X1.25-ST50	M8X1.25	70	22	6.2	5.0	8	KH2
	M10X1.25-ST15	M10X1.25-ST25	M10X1.25-ST50	M10X1.25	75	24	7.0	5.5	8	KH2
	M10X1.5-ST15	M10X1.5-ST25	M10X1.5-ST50	M10X1.5	75	24	7.0	5.5	8	KH3
	M12X1.0-ST15	M12X1.0-ST25	M12X1.0-ST50	M12X1.0	82	29	8.5	6.5	9	KH2
	M12X1.25-ST15	M12X1.25-ST25	M12X1.25-ST50	M12X1.25	82	29	8.5	6.5	9	KH2
	M12X1.5-ST15	M12X1.5-ST25	M12X1.5-ST50	M12X1.5	82	29	8.5	6.5	9	KH3
	M12X1.75-ST15	M12X1.75-ST25	M12X1.75-ST50	M12X1.75	82	29	8.5	6.5	9	KH3
	M14X1.5-ST15	M14X1.5-ST25	M14X1.5-ST50	M14X1.5	88	30	10.5	8.0	11	KH3
	M14X2.0-ST15	M14X2.0-ST25	M14X2.0-ST50	M14X2.0	88	30	10.5	8.0	11	KH3
	M16X1.5-ST15	M16X1.5-ST25	M16X1.5-ST50	M16X1.5	95	32	12.5	10.0	13	KH3
	M16X2.0-ST15	M16X2.0-ST25	M16X2.0-ST50	M16X2.0	95	32	12.5	10.0	13	KH3
	M18X1.5-ST15	M18X1.5-ST25	M18X1.5-ST50	M18X1.5	100	37	14.0	11.0	14	KH3
	M18X2.5-ST15	M18X2.5-ST25	M18X2.5-ST50	M18X2.5	100	37	14.0	11.0	14	KH3
	M20X1.5-ST15	M20X1.5-ST25	M20X1.5-ST50	M20X1.5	105	37	15.0	12.0	15	KH3
	M20X2.5-ST15	M20X2.5-ST25	M20X2.5-ST50	M20X2.5	105	37	15.0	12.0	15	KH3

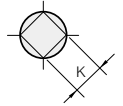
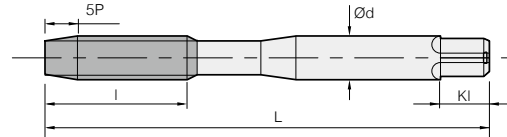
- ※ Ideal for making both through holes and blind holes on carbon steel, alloy steel and non-ferrous metal
- ※ Wear resistance highly improved by the use of TiN, TiCN, Steam oxide coating for high efficiency tapping operations
- ※ Built-up edges are prevented thanks to a reduced coefficient of friction gained by using porous cutting fluid of Fe₃O₄
- ※ Ideal for tapping stainless steel, cast steel, carbon steel for machine structures, etc

Applicable workpiece range

Division	Carbon steel			Alloy steel	Quenched and tempered steel			Stainless steel	Tool steel	Cast steel	Cast iron	Ductile cast iron	Copper	Brass	Brass-cast	Bronze	Rolled aluminum	Aluminum-cast, alloyed	Magnesium-cast, alloyed	Zinc-cast, alloyed	Titanium alloy		Thermosetting plastics	Thermoplastics
	C ~0.25%	C0.25% ~0.45%	C 0.45%~		25~45 HrC	45~55 HrC	50~60 HrC														Ti	Ni		
HN30T		○										○		○	○	○	○	○	○	○				
HC20T	○	○	○	○	○									○	○	○	○	○	○	○				
HC10T	○	○	○	○	○									○	○	○	○	○	○	○				
HH30T	◎	◎	◎	◎	◎	◎	◎	○	○	○	○	○												



PT Point Tap



(mm)

Flutes	Designation 5P	Thread size	L	I	d	K	KI	Limits
	M3X0.5-PT50	M3X0.5	46	11	4.0	3.2	6	KH2
	M4X0.7-PT50	M4X0.7	52	13	5.0	4.0	7	KH2
	M5X0.8-PT50	M5X0.8	60	16	5.5	4.5	7	KH2
	M6X1.0-PT50	M6X1.0	62	19	6.0	4.5	7	KH2
	M8X1.25-PT50	M8X1.25	70	22	6.2	5.0	8	KH3
	M10X1.25-PT50	M10X1.25	75	24	7.0	5.5	8	KH3
	M10X1.5-PT50	M10X1.5	75	24	7.0	5.5	8	KH3
	M12X1.0-PT50	M12X1.0	82	29	8.5	6.5	9	KH3
	M12X1.25-PT50	M12X1.25	82	29	8.5	6.5	9	KH3
	M12X1.5-PT50	M12X1.5	82	29	8.5	6.5	9	KH3
	M12X1.75-PT50	M12X1.75	82	29	8.5	6.5	9	KH4
	M14X1.5-PT50	M14X1.5	88	30	10.5	8.0	11	KH3
	M14X2.0-PT50	M14X2.0	88	30	10.5	8.0	11	KH4
	M16X1.5-PT50	M16X1.5	95	32	12.5	10.0	13	KH3
	M16X2.0-PT50	M16X2.0	95	32	12.5	10.0	13	KH4
	M18X1.5-PT50	M18X1.5	100	37	14.0	11.0	14	KH4
	M18X2.5-PT50	M18X2.5	100	37	14.0	11.0	14	KH4
	M20X1.5-PT50	M20X1.5	105	37	15.0	12.0	15	KH4
	M20X2.5-PT50	M20X2.5	105	37	15.0	12.0	15	KH4

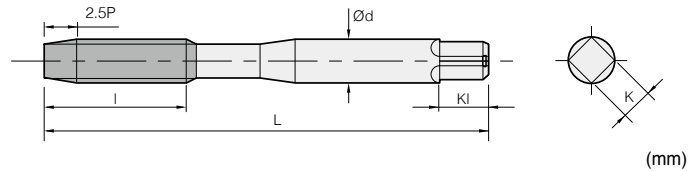
- ※ Ideal for making through holes on carbon steel, alloy steel and non-ferrous metal
- ※ Wear resistance highly improved by the use of TiN, TiCN, Steam oxide coating for high efficiency tapping operations
- ※ Built-up edges are prevented thanks to a reduced coefficient of friction gained by using porous cutting fluid of Fe3O4
- ※ Ideal for tapping stainless steel, cast steel, carbon steel for machine structures, etc

Applicable workpiece range

Division	Carbon steel			Alloy steel	Quenched and tempered steel			Stainless steel	Tool steel	Cast steel	Cast iron	Ductile cast iron	Copper	Brass	Brass-cast	Bronze	Rolled aluminum	Aluminum-cast, alloyed	Magnesium-cast, alloyed	Zinc-cast, alloyed	Titanium alloy		Thermo-setting plastics	Thermo-plastics
	C ~0.25%	C 0.25%~0.45%	C 0.45%~		25~45 HRC	45~55 HRC	50~60 HRC														Ti	Ni		
HN30T		○	○	◎							○	○	○	○	○	○	◎	○	○	○				○
HC20T	○	○	○	○				◎	○	○	○	○	○	○	○	○	○	○	○	○	○	○		○
HC10T	◎	◎	◎	○				○	○	○	○	○	○	○	○	○	○	○	○	○	○	○		○
HH30T	◎	◎	◎	◎	◎	◎	◎	○	○	○	○	○												

TAP

SP Spiral Tap



Flutes	Designation 2.5P	Thread size	L	I	d	K	KI	Limits
3	M3X0.5-SP25	M3X0.5	46	11	4.0	3.2	6	KH2
	M4X0.7-SP25	M4X0.7	52	13	5.0	4.0	7	KH2
	M5X0.8-SP25	M5X0.8	60	16	5.5	4.5	7	KH2
	M6X1.0-SP25	M6X1.0	62	19	6.0	4.5	7	KH2
	M8X1.25-SP25	M8X1.25	70	22	6.2	5.0	8	KH2
	M10X1.25-SP25	M10X1.25	75	24	7.0	5.5	8	KH2
	M10X1.5-SP25	M10X1.5	75	24	7.0	5.5	8	KH2
	M12X1.0-SP25	M12X1.0	82	29	8.5	6.5	9	KH2
	M12X1.25-SP25	M12X1.25	82	29	8.5	6.5	9	KH2
	M12X1.5-SP25	M12X1.5	82	29	8.5	6.5	9	KH2
	M12X1.75-SP25	M12X1.75	82	29	8.5	6.5	9	KH2
	M14X1.5-SP25	M14X1.5	88	30	10.5	8.0	11	KH2
	M14X2.0-SP25	M14X2.0	88	30	10.5	8.0	11	KH2
	M16X1.5-SP25	M16X1.5	95	32	12.5	10.0	13	KH2
	M16X2.0-SP25	M16X2.0	95	32	12.5	10.0	13	KH2
4	M18X1.5-SP25	M18X1.5	100	37	14.0	11.0	14	KH2
	M18X2.5-SP25	M18X2.5	100	37	14.0	11.0	14	KH3
	M20X1.5-SP25	M20X1.5	105	37	15.0	12.0	15	KH3
	M20X2.5-SP25	M20X2.5	105	37	15.0	12.0	15	KH3

※ Ideal for making blind holes. Its flutes provide excellent chip evacuation in tapping carbon steel, alloy steel and non-ferrous materials

※ Wear resistance highly improved by the use of TiN, TiCN, Steam oxide coating for high efficiency tapping operations

※ Built-up edges are prevented thanks to a reduced coefficient of friction gained by using porous cutting fluid of Fe₃O₄

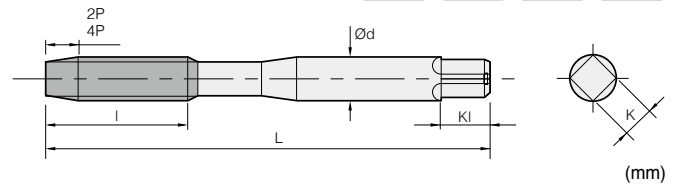
※ Ideal for tapping stainless steel, cast steel, carbon steel for machine structures, etc

Applicable workpiece range

Division	Carbon steel			Alloy steel	Quenched and tempered steel			Stainless steel	Tool steel	Cast steel	Cast iron	Ductile cast iron	Copper	Brass	Brass-cast	Bronze	Rolled aluminum	Aluminum-cast, alloyed	Magnesium-cast, alloyed	Zinc-cast, alloyed	Titanium alloy		Thermo-setting plastics	Thermo-plastics
	C ~0.25%	C 0.25%~0.45%	C 0.45%~	SCM	25~45 HRC	45~55 HRC	50~60 HRC	SUS	SKD	SC	GC	GCD	Cu	Bs	BsC	PB	Al	AC ADC	MC	ZDC	Ti	Ni	-	-
HN30T		○		◎								○	○	○	○	○	○	○	○	○				○
HC20T	○	○	○	○				○	○	○		○	○	○	○	○	○	○	○	○	○			○
HC10T	○	◎	◎	○				○	○	○		○	○	○	○	○	○	◎	○	○	○	○		○
HH30T	◎	◎	◎	◎	◎	◎	◎	○	○	○	○	○												



RT Roll Tap



Flutes	Designation		Thread size	L	I	d	K	KI	Limits
	2P	4P							
1	M3X0.5-RT20 (S)	-	M3X0.5	46	11	4.0	3.2	6	GH5
4	M3X0.5-RT20 (M)	M3X0.5-RT40 (M)	M3X0.5	46	11	4.0	3.2	6	GH5
1	M4X0.7-RT20 (S)	-	M4X0.7	52	13	5.0	4.0	7	GH6
4	M4X0.7-RT20 (M)	M4X0.7-RT40 (M)	M4X0.7	52	13	5.0	4.0	7	GH6
1	M5X0.8-RT20 (S)	-	M5X0.8	60	16	5.5	4.5	7	GH6
4	M5X0.8-RT20 (M)	M5X0.8-RT40 (M)	M5X0.8	60	16	5.5	4.5	7	GH6
1	M6X1.0-RT20 (S)	-	M6X1.0	62	19	6.0	4.5	7	GH7
4	M6X1.0-RT20 (M)	M6X1.0-RT40 (M)	M6X1.0	62	19	6.0	4.5	7	GH7
1	M8X1.25-RT20 (S)	-	M8X1.25	70	22	6.2	5.0	8	GH7
4	M8X1.25-RT20 (M)	M8X1.25-RT40 (M)	M8X1.25	70	22	6.2	5.0	8	GH7
1	M10X1.25-RT20 (S)	-	M10X1.25	75	24	7.0	5.5	8	GH7
4	M10X1.25-RT20 (M)	M10X1.25-RT40 (M)	M10X1.25	75	24	7.0	5.5	8	GH7
1	M10X1.5-RT20 (S)	-	M10X1.5	75	24	7.0	5.5	8	GH7
4	M10X1.5-RT20 (M)	M10X1.5-RT40 (M)	M10X1.5	75	24	7.0	5.5	8	GH7
1	M12X1.0-RT20 (S)	-	M12X1.0	82	29	8.5	6.5	9	GH7
4	M12X1.0-RT20 (M)	M12X1.0-RT40 (M)	M12X1.0	82	29	8.5	6.5	9	GH7
1	M12X1.25-RT20 (S)	-	M12X1.25	82	29	8.5	6.5	9	GH7
4	M12X1.25-RT20 (M)	M12X1.25-RT40 (M)	M12X1.25	82	29	8.5	6.5	9	GH7
1	M12X1.5-RT20 (S)	-	M12X1.5	82	29	8.5	6.5	9	GH7
4	M12X1.5-RT20 (M)	M12X1.5-RT40 (M)	M12X1.5	82	29	8.5	6.5	9	GH7
1	M12X1.75-RT20 (S)	-	M12X1.75	82	29	8.5	6.5	9	GH8
4	M12X1.75-RT20 (M)	M12X1.75-RT40 (M)	M12X1.75	82	29	8.5	6.5	9	GH8

※ For general use for both steels and non-ferrous metal

※ Wear resistance highly improved by the use of TiN, TiCN coating for high efficiency tapping operations

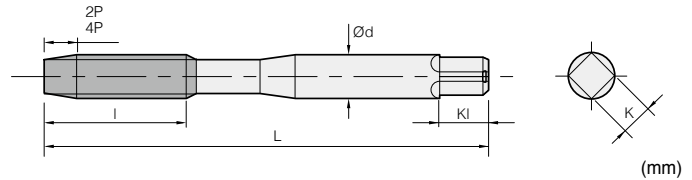
※ Ideal for tapping non-ferrous alloys such as aluminum, zinc, copper, etc

Applicable workpiece range

Division	Carbon steel			Alloy steel	Quenched and tempered steel			Stainless steel	Tool steel	Cast steel	Cast iron	Ductile cast iron	Copper	Brass	Brass-cast	Bronze	Rolled aluminum	Aluminum-cast, alloyed	Magnesium-cast, alloyed	Zinc-cast, alloyed	Titanium alloy		Thermo-setting plastics	Thermo-plastics
	C ~0.25%	C 0.25%~0.45%	C 0.45%~		25~45 HRC	45~55 HRC	50~60 HRC														Ti	Ni		
HN30T													○	○	○	○	○		◎					
HC20T	○	○	○	○				◎	○	○		○	○	○	○									
HC10T	◎	◎	○	○				◎					◎	◎	◎		◎	◎		◎				

TAP

SR Spiral Roll Tap



Designation		Thread size	L	I	d	K	KI	Limits
2P	4P							
M3X0.5-SR20	M3X0.5-SR40	M3X0.5	46	18	4.0	3.2	6	GH6
M3.5X0.6-SR20	M3.5X0.6-SR40	M3.5X0.6	48	18	4.0	3.2	6	GH6
M4X0.7-SR20	M4X0.7-SR40	M4X0.7	52	20	5.0	4.0	7	GH7
M5X0.8-SR20	M5X0.8-SR40	M5X0.8	60	22	5.5	4.5	7	GH7
M6X1.0-SR20	M6X1.0-SR40	M6X1.0	62	24	6.0	4.5	7	GH7

- ※ For general use for tapping aluminum, magnesium and zinc as well as non-ferrous metal
- ※ Wear resistance highly improved by the use of TiN, TiCN coating for high efficiency tapping operations
- ※ Ideal for tapping steel, non-ferrous materials and stainless steel

Applicable workpiece range

Division	Carbon steel			Alloy steel	Quenched and tempered steel			Stainless steel	Tool steel	Cast steel	Cast iron	Ductile cast iron	Copper	Brass	Brass-cast	Bronze	Rolled aluminum	Aluminum-cast, alloyed	Magnesium-cast, alloyed	Zinc-cast, alloyed	Titanium alloy		Thermo-setting plastics	Thermo-plastics
	C ~0.25%	C0.25% ~0.45%	C 0.45%~		25~45 HrC	45~55 HrC	50~60 HrC														Ti	Ni		
HN30T													○	○	○	○	○		◎					
HC20T	○	○	○	○				◎	○	○		○	○	○	○									
HC10T	◎	◎	○	○				◎					◎	◎	◎		◎	◎		◎				

TAP



Line-up

Carbide tap

Tap type	Picture	Features	Grade	Size
ST		- For through holes and mass production - For cast iron, medium carbon steel and non-ferrous metal	FN30T	M3~M12
			PC10T	M3~M12
			PC20T	M3~M12
SP		- For blind holes - Better chip evacuation through flutes	FN30T	M3~M12
			PC10T	M3~M12
RT		- For non-ferrous metal - For through holes and blind holes	FN30T	M3~M12
			PC10T	M3~M12
SR		For non-ferrous metal, Al and magnesium	FN30T	M3~M6
			PC10T	M3~M6

HSS tap

Tap type	Picture	Features	Grade	Size
ST		- For through holes and mass production - For cast iron, medium carbon steel and non-ferrous metal	HN30T	M3~M20
			HC20T	M3~M20
			HC10T	M3~M20
			HH30T	M3~M20
PT		- For through holes and mass production - Similar shape to the straight type but specialized with easier chip evacuation	HN30T	M3~M20
			HC20T	M3~M20
			HC10T	M3~M20
			HH30T	M3~M20
SP		- For blind holes - Chip evacuation through flutes	HN30T	M3~M20
			HC20T	M3~M20
			HC10T	M3~M20
			HH30T	M3~M24
RT		- For non-ferrous metal - For through holes and blind holes	HN30T	M3~M12
			HC20T	M3~M12
			HC10T	M3~M12
SR		For non-ferrous metal, Al and magnesium	HN30T	M3~M6
			HC20T	M3~M6
			HC10T	M3~M6

Recommended drill diameter [On 2nd class thread basis]

Straight tap & Spiral tap

Thread size	Drill diameter		
	Min	Recommended	Max
M3X0.5	2.459	2.5	2.599
M4X0.7	3.242	3.3	3.422
M5X0.8	4.134	4.2	4.334
M6X1.0	4.917	5.0	5.153
M8X1.25	6.647	6.8	6.912
M10X1.25	8.647	8.8	8.912
M10X1.5	8.376	8.5	8.676
M12X1.0	10.917	11.0	11.153
M12X1.25	10.647	10.8	10.912
M12X1.5	10.376	10.5	10.676

Thread size	Drill diameter		
	Min	Recommended	Max
M12X1.75	10.106	10.3	10.441
M14X1.5	12.376	12.5	12.676
M14X2.0	11.835	12.0	12.21
M16X1.5	14.376	14.5	14.676
M16X2.0	13.835	14.0	14.21
M18X1.5	16.376	16.5	16.676
M18X2.5	15.294	15.5	15.744
M20X1.5	18.376	18.5	18.676
M20X2.5	17.294	17.5	17.744
-	-	-	-

TAP

 Roll tap

Thread size	Drill diameter		
	Min	Recommended	Max
M3X0.5	2.76	2.8	2.81
M4X0.7	3.65	3.7	3.7
M5X0.8	4.59	4.6	4.66
M6X1.0	5.48	5.5	5.57
M8X1.25	7.34	7.4	7.41
M10X1.25	9.34	9.4	9.41

Thread size	Drill diameter		
	Min	Recommended	Max
M10X1.5	9.18	9.2	9.28
M12X1.0	11.48	11.5	11.57
M12X1.25	11.34	11.4	11.41
M12X1.5	11.18	11.2	11.28
M12X1.75	11.05	11.1	11.15
-	-	-	-

Recommended cutting speeds and cutting fluid

- For machining cold/hot forging steel and sintered ferrous alloy in high feed, high depth of cut and highly interrupted conditions
- Excellent resistance to chipping, fracture and thermal cracks
- Improved surface finish due to optimized cutting edges

ISO	Division		Cutting speed, vc (m/min)					Cutting fluid			
			Straight tap	Spiral tap	Point tap	Carbide tap	Roll tap	Insoluble	Water soluble emulsion	Semi dry	Dry
P	Low carbon steel	≥ 0.25 %C	8~13	8~13	15~25	-	8~13	◎	○	△	△
	Medium carbon steel	≥ 0.25~0.45 %C	7~12	7~12	10~15	-	7~10	◎	○	△	△
	High carbon steel	≥ 0.45 %C	6~9	6~9	8~13	-	5~8	◎	○	△	△
	Alloy steel	SCM	7~12	7~12	10~15	-	5~8	◎	△	△	△
	Quenched and tempered steel	25~45HrC	3~5	3~5	4~6	-	-	◎	△	-	-
	Tool steel	SKD	6~9	6~9	7~10	-	-	◎	-	-	-
	Cast steel	SCM	6~11	6~11	10~15	-	-	◎	○	-	-
M	Stainless steel	SUS	4~7	5~8	8~13	-	5~10	◎	○	-	-
	Precipitation hardened stainless steel	SUS630 SUS631	3~5	3~5	4~6	-	-	◎	-	-	-
K	Cast iron	GC	10~15	-	-	10~20	-	◎	○	○	○
	Ductile cast iron	GCD	7~12	7~12	10~20	10~20	-	◎	○	○	-
N	Copper	Cu	6~9	6~11	7~12	10~20	7~12	○	○	-	-
	Brass, brass-cast	Bs Bsc	10~15	10~20	15~25	15~25	7~12	○	○	○	○
	Bronze, bronze-cast	PB PBC	6~11	6~11	10~20	10~20	7~12	○	○	-	-
	Rolled aluminum	Al	10~20	10~20	15~25	-	10~20	◎	○	△	-
	Aluminum-cast, alloyed	AC ACD	10~15	10~15	15~20	10~20	10~25	◎	○	△	-
	Magnesium-cast, alloyed	MC	7~12	7~12	10~15	10~20	-	◎	○	○	-
	Zinc-cast, alloyed	ZDC	1~12	7~12	10~15	10~20	7~12	◎	○	△	-
	Thermosetting plastics	Bakelite phenol epoxy	10~20	-	-	15~25	-	-	○	○	○
	Thermoplastics	Nylon vinyl chloride	10~20	10~15	10~20	10~20	-	-	○	○	○



Chucking / Machine Reamer

Chucking Reamer-SCRS

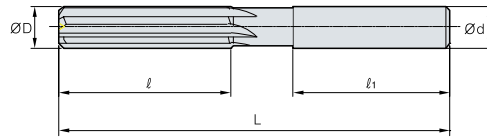


Fig. 1

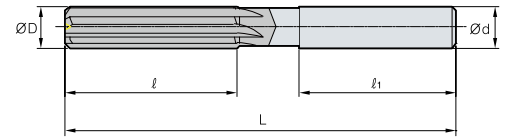


Fig. 2

(mm)

	Designation	No. of flute	ØD	Ød	ℓ	ℓ₁	L	Fig.
SCRS	050S	4	5.0	6.0	20	40	100	1
	060S	4	6.0	6.0	20	40	115	1
	070S	4	7.0	8.0	20	40	125	1
	080S	4	8.0	8.0	20	40	135	1
	090S	4	9.0	10.0	20	45	140	1
	100B	4	10.0	10.0	25	50	145	2
	110B	4	11.0	12.0	25	50	150	2
	120B	4	12.0	12.0	25	50	160	2
	130B	4	13.0	16.0	25	50	165	2
	140B	6	14.0	16.0	25	50	170	2
	150B	6	15.0	16.0	30	50	180	2
	160B	6	16.0	16.0	30	50	190	2
	180B	6	18.0	20.0	30	55	210	2
	200B	6	20.0	20.0	40	60	230	2

Chucking Reamer-SCRH

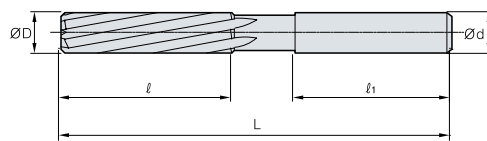


Fig. 1

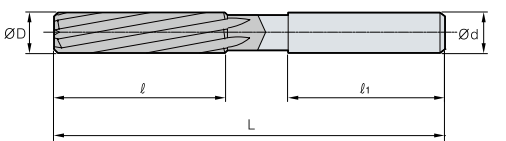


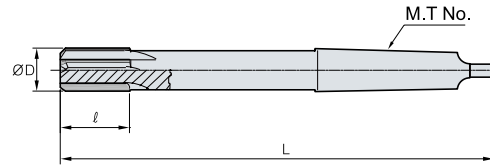
Fig. 2

(mm)

	Designation	No. of flute	ØD	Ød	ℓ	ℓ₁	L	Fig.
SCRS	050S	4	5.0	6.0	20	40	100	1
	060S	4	6.0	6.0	20	40	115	1
	070S	4	7.0	8.0	20	40	125	1
	080S	4	8.0	8.0	20	40	135	1
	090S	4	9.0	10.0	20	45	140	1
	100B	4	10.0	10.0	25	50	145	2
	110B	4	11.0	12.0	25	50	150	2
	120B	4	12.0	12.0	25	50	160	2
	130B	4	13.0	16.0	25	50	165	2
	140B	6	14.0	16.0	25	50	170	2
	150B	6	15.0	16.0	30	50	180	2
	160B	6	16.0	16.0	30	50	190	2
	180B	6	18.0	20.0	30	55	210	2
	200B	6	20.0	20.0	40	60	230	2

Chucking / Machine Reamer

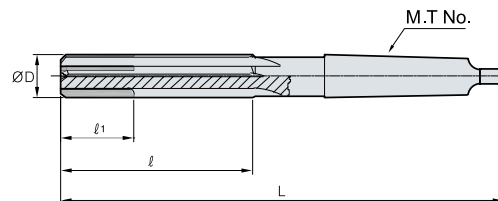
Chucking Reamer-TCRS



(mm)

	Designation	No. of flute	ØD	ℓ	L	M.T No.
TCRS	070	4	7.0	20	150	1
	080	4	8.0	20	150	1
	090	4	9.0	20	160	1
	100	4	10.0	25	160	1
	110	4	11.0	25	170	1
	120	4	12.0	25	170	1
	130	4	13.0	25	180	1
	140	6	14.0	25	190	1
	150	6	15.0	30	200	2
	160	6	16.0	30	200	2
	180	6	18.0	30	220	2
	200	6	20.0	40	230	2
	250	6	25.0	40	260	3
	280	8	28.0	40	270	3
	300	8	30.0	50	290	3

Chucking Reamer-TMRS



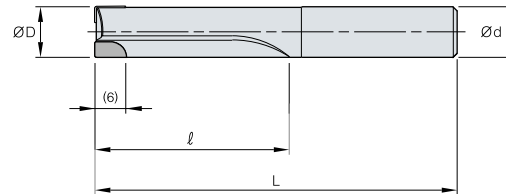
(mm)

	Designation	No. of flute	ØD	ℓ	ℓ₁	L	M.T No.
TMRS	070	4	7.0	60	60	150	1
	080	4	8.0	70	70	150	1
	090	4	9.0	70	70	160	1
	100	4	10.0	75	75	170	1
	110	4	11.0	75	75	170	1
	120	4	12.0	80	40	180	1
	130	4	13.0	85	40	190	1
	140	6	14.0	90	45	210	1
	150	6	15.0	90	45	215	2
	160	6	16.0	100	50	220	2
	180	6	18.0	105	50	225	2
	200	6	20.0	120	50	240	2
	250	6	25.0	130	50	270	3
	280	8	28.0	140	50	280	3
	300	8	30.0	150	50	290	3



PCD Reamer

PCD Reamer-PDR



(mm)

	Designation	No. of flute	ØD	Ød	ℓ	L
PDR	2050	2	5.0	6.0	30	65
	2060	2	6.0	6.0	40	75
	2070	2	7.0	8.0	40	75
	2080	2	8.0	8.0	40	75
	2090	2	9.0	10.0	40	85
	2100	2	10.0	10.0	40	85
	2120	2	12.0	12.0	50	95
	2140	2	14.0	16.0	50	95
	2150	2	15.0	16.0	50	100
	4160	4	16.0	16.0	50	100
	4180	4	18.0	20.0	60	110
	4200	4	20.0	20.0	60	110

Recommended cutting conditions

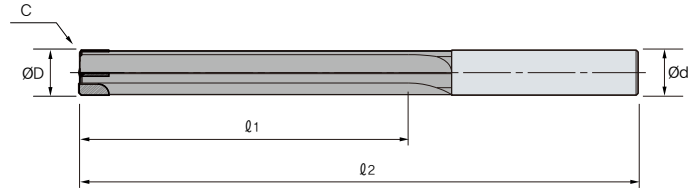
➡ For high speed and high precision machining

Workpiece	vc (m/min)	fn (mm/rev)
Aluminum alloy	50 ~ 250	0.05~0.20

Cermet Reamer

Cermet Reamer-KCR

Standard type

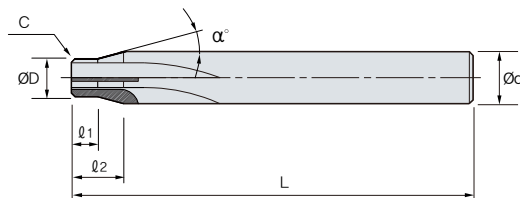


(mm)

	Designation	No. of flute	ØD	Ød	l ₁	L
KCR	060~079-25-70L	2	6.0~7.9	8	25	70
	080~099-035-90L	2	8.0~9.9	10	35	90
	100~119-050-100L	4	10.0~11.9	12	50	100
	120~159-060-110L	4	12.0~15.9	12	60	110
	160~199-060-110L	4	16.0~19.9	16	60	110
	200~259-060-110L	4	20.0~25.9	20	60	110
	260~300-070-130L	4	26.0~30	25	70	130

• The length of flute and overhang length of reamer are available for quotation • The maximum overhang length is 150mm

Special type



(mm)

	Designation	No. of flute	ØD	Ød	l ₁	l ₂	L	α°
KCR	□□□~□□□-□□□L	2~4	8.0~25.9	12~30	7~18	2~15	70	10°~60°

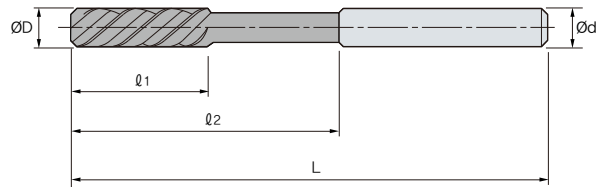
Recommended cutting conditions

Workpiece	Hardness	fz (mm/t)	vc (m/min)
Carbon steel	Under 30HRC	0.1~0.4	50~80
High carbon steel, Alloy steel	30~40HRC	0.1~0.4	80~120
	40~50HRC	0.1~0.4	50~80
Alloy steel	More than 50HRC	0.05~0.2	30~60



Broach Reamer

Broach Reamer-HBRE



(mm)

Designation	No. of flute	ØD	Ød	l ₁	l ₂	L	Type
HBRE	030	3.0	3.0	20	40	70	Solid
	040	4.0	4.0	25	40	70	Solid
	060	6.0	6.0	30	50	80	Solid
	080	8.0	8.0	30	60	100	Solid
	100	10.0	10.0	30	60	100	Solid
	120	12.0	12.0	40	70	120	Top Solid
	160	16.0	16.0	40	80	130	Top Solid
	200	20.0	20.0	50	90	150	Top Solid
	250	25.0	25.0	50	90	150	Top Solid

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