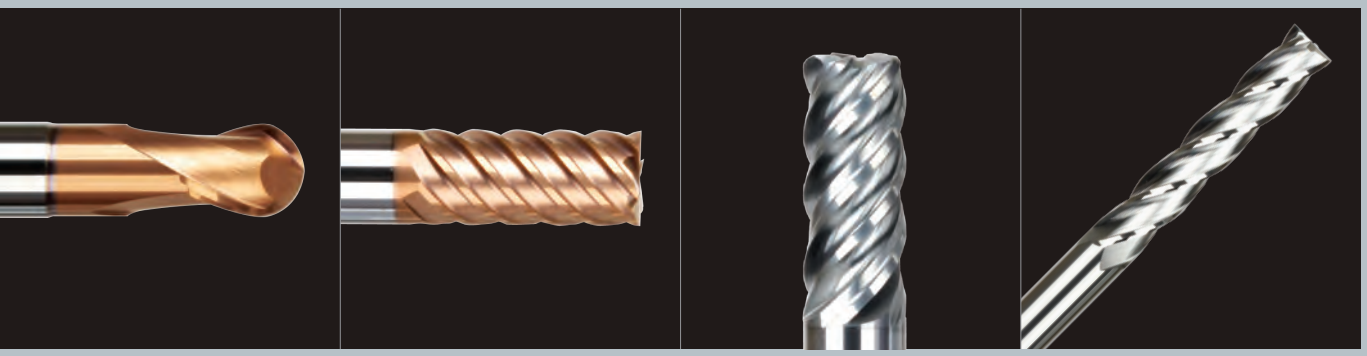
ENDMILL series

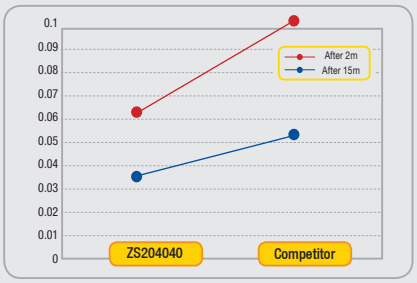


Zamus Star Series High Speed Cutting & High Hardened Steel(from HRc 50 to HRc 70)	34
Neo Classic X-STAR Series High performance & High efficiency (up to HRc45)	90
Zamus Classic Series High Speed Cutting & High Hardened Steel(from HRc 30 to HRc 55)	114
Zamus Thunder Series High Speed Cutting & High Hardened Steel(from HRc 25 to HRc 50)	180
Zamus Sus-Mate Series Stainless Steel, Titanium, Inconel and Steels up to HRc 45	206
Zamus Copper-Mate Series Copper, Copper Alloy and Non-ferrous Material	212
Zamus Gra-Mate Series Graphite and Non-ferrous	216
Zamus Al-Mate Series Aluminum and Non-ferrous	222
Standard End Mill Series General Purpose	233
Technical Data	248

Z-STAR New
Broken index geometry series

- Reducing cycle time for high feed rates!
- Capable of bottom machining operations during flat bottom machining!

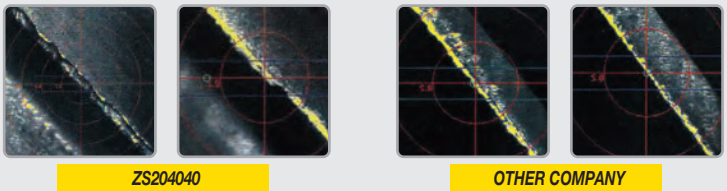
Test Report



***Cutting Condition**

- RPM : 12,000
- Feed : 710 mm/min
- Tool : ZS204040.
- Competitor : XX-XX 6F. Dia4.0
- Oil : Wet(Oil Mist)
- Workpiece : SKD11(HRc55)

Test Pictures

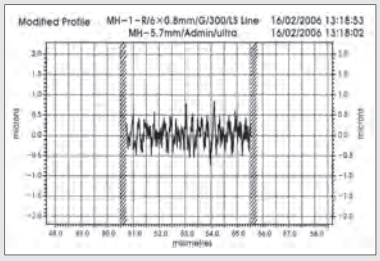


ZS204040 | OTHER COMPANY

After 2m | After 15m | After 2m | After 15m

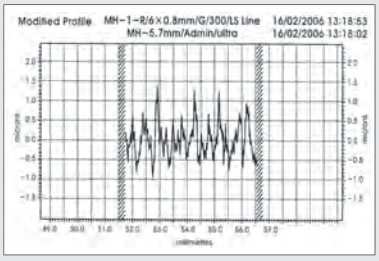
Workpiece surface

Taylor Hobson (ZS204040)



Ra	0.2216 µm	Rz1max	1.5608 µm	Rd(JIS)	0.8275 µm	Rmr	50.00 %	Cutoff(LS)	0.0025 mm		
Rq	0.2717 µm	Rz	0.5681 µm	RSz	0.8058 µm	RVo	0.0114 vl	Cutoffs	1		
Rt	1.6235 µm	Rd(DIN)	1.2626 µm	RSy	0.8816 µm	RPc	114.6 ls/cm	Name:MH	-2		
RSm	123.35 µm	Rz	1.2626 µm	Rdc	1.6235 µm	RHSC	48 peaks	bandwidth	0.00 µm		

Taylor Hobson (Other company VX-XX Competitor)



Ra	0.3407 µm	Rz1max	2.3343 µm	Rd(JIS)	0.7584 µm	Rmr	50.00 %	Cutoff(LS)	0.0025 mm		
Rq	0.4260 µm	Rz	0.7436 µm	RSz	0.5137 µm	RVo	0.0144 vl	Cutoffs	1		
Rt	2.3343 µm	Rd(DIN)	1.7828 µm	RSy	0.6691 µm	RPc	64.6 ls/cm	Name:MH	-1		
RSm	282.35 µm	Rz	1.7828 µm	Rdc	2.3343 µm	RHSC	21 peaks	bandwidth	0.00 µm		

5 Flutes broken index geometry

New

- Dramatically increased tool life expectancy and durability due to newly developed raw-materials.
- High precision, excellent surface and maximum tool life because of newly developed coating.

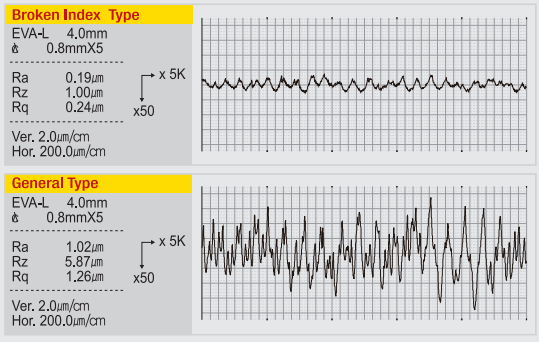
5 Flutes Broken index geometry Product Feature

- High precision and excellent surface roughness due to each 5F broken index geometry
- The unique design decrease chatter and resonance, can achieve slotting operation

Summary of advantages

Suitable for semi - roughing and finishing
Extremely high form accuracy
Vibration - free operation
Optimised flute geometry
High feed rates possible
Optimal surface quality
Increased tool life

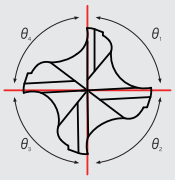
Workpiece surface



X-STAR
Broken index geometry series

- Reducing cycle time for high feed rates!
- Capable of bottom machining operations during flat bottom machining!

Broken index geometry Product Feature



- High precision and excellent surface roughness due to each 4F broken index geometry
- The unique patented design decrease chatter and resonance, can achieve a **Axial Depth 1XD** slotting operation.

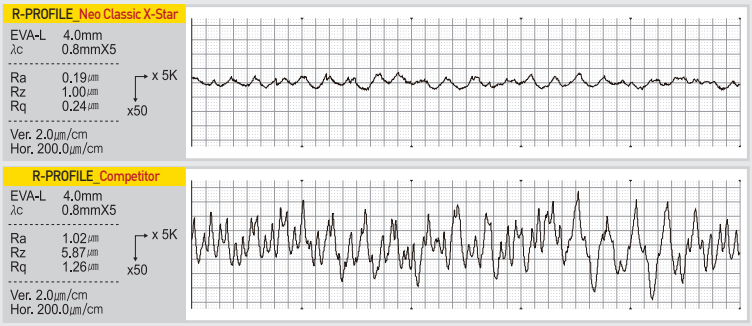
$\theta_1 \neq \theta_2 \neq \theta_3 \neq \theta_4$

Test Report

Cutting Condition

- RPM : 3,210
- Tool : XE504100(Ø10)
- Slotting : 1xD (Ad : 10mm, Rd : 10mm)
- Workpiece : SUS304

Workpiece surface



RIB PROCESSING

New

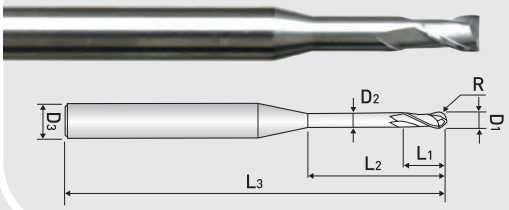
DB612 / ZE612 series

- Dramatically increased tool life expectancy and durability due to newly developed raw-materials.
- Economical and efficent compared to its price.
- High precision, excellent surface and maximum tool life because of newly developed coating.

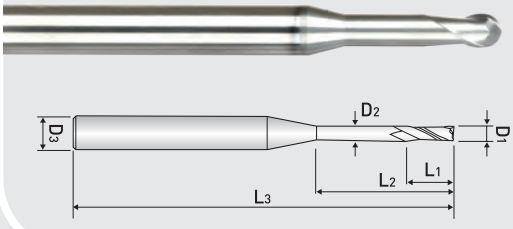
2 Flute, for RIB Processing

- Designed for hardened steel, alloy steel, die steel and other high hardened materials.
- Long neck design for deep machining processes near walls.

DB612 ....series



ZE612 ....series



TAP SERIES

New

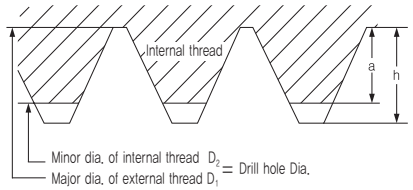
HSS and Carbide TAP series

- Straight Taps
- Spiral Taps
- Roll Taps
- Spiral Roll Taps
- Point Taps

Straight Tap, Spiral tap

Thread Size	Drill Size(mm)	mm	
		Min	Max
M3 X 0.5	2.50	2.459	2.599
M4 X 0.7	3.30	3.242	3.422
M5 X 0.8	4.20	4.134	4.334
M6 X 1.0	5.00	4.917	5.153
M8 X 1.25	6.80	6.647	6.912
M10 X 1.25	8.80	8.647	8.912
M10 X 1.5	8.50	8.376	8.676
M12 X 1.0	11.00	10.917	11.153
M12 X 1.25	10.80	10.647	10.912
M12 X 1.5	10.50	10.376	10.676
M12 X 1.75	10.30	10.106	10.441
M14 X 1.5	12.50	12.376	12.676
M14 X 2.0	12.00	11.835	12.21
M16 X 1.5	14.50	14.376	14.676
M16 X 2.0	14.00	13.835	14.21
M18 X 1.5	16.50	16.376	16.676
M18 X 2.5	15.50	15.294	15.744
M20 X 1.5	18.50	18.376	18.676
M20 X 2.5	17.50	17.294	17.744

Recommended Drill hole



a=1/2 X (D1−D2), h=Basic height of external thread
Percentage of thread engagement

Figure. Percentage of thread engagement : When external thread profile is equal to basic profile.

$$\text{Percentage of thread engagement} = \frac{\text{Basic major dia. of external thread} - \text{Drill hole dia.}}{2 \times \text{Basic height of thread engagement}}$$

$$\text{Drill hole Dia.} = d - 2 \times H \times \frac{\text{Percentage of thread engagement}}{100}$$

d : Major Dia. of external thread
H(Basic height of thread engagement) = 0.541266P
P : Pitch (mm)

* The recommended tap limit in compliance with JIS class 2 internal thread standard.

Roll tap

Thread Size	Drill Size(mm)	mm	
		Min	Max
M3 X 0.5	2.80	2.76	2.81
M4 X 0.7	3.70	3.65	3.7
M5 X 0.8	4.60	4.59	4.66
M6 X 1.0	5.50	5.48	5.57
M8 X 1.25	7.40	7.34	7.41
M10 X 1.25	9.40	9.34	9.41
M10 X 1.5	9.20	9.18	9.28
M12 X 1.0	11.50	11.48	11.57
M12 X 1.25	11.40	11.34	11.41
M12 X 1.5	11.20	11.18	11.28
M12 X 1.75	11.10	11.05	11.15

Recommended Drill hole

$$\text{DRILL diameter} = D - \frac{0.0068 \times P \times 65}{}$$

D:Nominal Diameter
P: 65% of the length's screw thread
65% of the length's screw thread

* The recommended tap limit is not included in JIS class standard and is just reference.

Corner rounding cutter CRC Series

New

- Designed for prehardened, hardened and stainless steels and cast iron up to HRc 52.
- By using the newly developed raw-material(0.2 um), it provides excellent performance during high speed cutting.

Cutting Tools Category Table

METRIC SIZE

Class	Feature	Type	Appearance	No. of Teeth	Item	App.	EDP. No.	Page
ZAMUS STAR	* Hardened Steels (~ HRc 70) * High Speed Cutting	SQUARE		2 FLUTE	LONG NECK	HSC	ZSLNS20	37
				4 FLUTE	LONG NECK	HSC	ZSLNS40	42
		BALL		2 FLUTE	LONG NECK	HSC	ZSLNB	44
		RADIUS		2 FLUTE	LONG NECK & BACK DRAFT TYPE	HSC	ZSLNR	48
		BALL		2 FLUTE	TAPER NECK & BACK DRAFT TYPE	HSC	ZSTNB20	52
				3 FLUTE	TAPER NECK & BACK DRAFT TYPE	HSC	ZSTNB30	56
		RADIUS		2 FLUTE	TAPER NECK & BACK DRAFT TYPE	HSC	ZSTNR	57
		SQUARE		4 FLUTE	LONG CUT LENGTH BROKEN INDEX	HSC	ZS124	59
		SQUARE & RADIUS		4 FLUTE	CORNER RADIUS BROKEN INDEX	HSC	ZS1(2)04	60
				4 FLUTE	CORNER RADIUS BROKEN INDEX	HSC	ZS204	61
	* High speed & High feed rates	RADIUS		4 FLUTE	STUB CUT LENGTH, with EXTENDED NECK	HSC	ZSPM4	63
	* Hardened Steels (~ HRc 70) * High Speed Cutting	BALL		2 FLUTE	STUB CUT LENGTH, BALL NOSE with EXTENDED NECK	HSC	DB702	64
				2 FLUTE	REGULAR LENGTH, BALL NOSE	HSC	DB712	65
				3 FLUTE	BALL NOSE for FINISHING MOLD & DIE	HSC	DB703	66
				4 FLUTE	TAPER NECK for FINISHING MOLD & DIE	HSC	DB734	67
		RADIUS		2 FLUTE	STUB CUT LENGTH, with EXTENDED NECK	HSC	ZE702	68
				4 FLUTE	STUB CUT LENGTH, with EXTENDED NECK	HSC	ZE704	69
				4&6 FLUTE	FINISHING for MOLD & DIE	HSC	ZE724(6)	70
				2 FLUTE	STUB CUT LENGTH, CORNER RADIUS with EXTENDED NECK	HSC	ZR702	71
				2 FLUTE	CORNER RADIUS with LONG SHANK	HSC	ZR732	76
				4 FLUTE	STUB CUT LENGTH, CORNER RADIUS with EXTENDED NECK	HSC	ZR704	78
				4 FLUTE	45° HELIX FINISHING MOLD & DIE	HSC	ZR714	81
				4 FLUTE	STUB CUT LENGTH, CORNER RADIUS with LONG SHANK	HSC	ZR724	82
				4 FLUTE	CORNER RADIUS with LONG SHANK	HSC	ZR734	83
				6 FLUTE	45° HELIX STUB CUT LENGTH, CORNER RADIUS with EXTENDED NECK	HSC	ZR706	85
				6 FLUTE	45°HELIX, LONG SHANK, CORNER RADIUS	HSC	ZR736	86
		SQUARE		2 FLUTE	35° HELIX REGULAR LENGTH	HSC	ZE712	87
				4 FLUTE	45° HELIX REGULAR LENGTH	HSC	ZE714	88
				6 FLUTE	50° HELIX REGULAR LENGTH	HSC	ZE716	89
NEO CLASSIC X-STAR	* High performance & High efficiency (~HRc45)	SQUARE		5 FLUTE	STUB CUT LENGTH		XE505A	93
				5 FLUTE	REGULAR CUT LENGTH		XE515A	94
		RADIUS		5 FLUTE	STUB CUT LENGTH CORNER RADIUS		XR505A	95
				5 FLUTE	REGULAR CUT LENGTH CORNER RADIUS		XR515A	96

	Carbon Steels (S45C,S55C...) ~ HB225	Alloy Steels (SCM,SK...) HB225~325	Prehardened Steels(NAK..) HRC30~50	Hardened Steels		Copper	Graphite	Cast Iron FCD400. 500~	Aluminum	Stainless Steels
				~HRc55 SKD61	HRc55~ SKD11					
	○	○	◎	◎	○					
	◎	◎	○			○				◎

ENDMILL SERIES
METRIC SIZE

Class	Feature	Type	Appearance	No. of Teeth	Item	App.	EDP. No.	Page
NEO CLASSIC X-STAR	* High performance & High efficiency (~HRc45)	SQUARE		5 FLUTE	REGULAR CUT LENGTH WITH EXTENDED NECK		XR525A	97
		CHAMFER		5 FLUTE	REGULAR CUT LENGTH WITH LONG EXTENDED NECK		XR535A	98
		SQUARE		5 FLUTE	REGULAR CUT LENGTH		XE505	99
				5 FLUTE	LONG CUT LENGTH		XE515	100
		RADIUS		5 FLUTE	REGULAR CUT LENGTH CORNER RADIUS		XR505	101
		BALL		4 FLUTE	REGULAR LENGTH, BALL NOSE		XXB504	102
		SQUARE		4 FLUTE	REGULAR LENGTH		XCE504	103
				4 FLUTE	REGULAR LENGTH		XCC504	104
				4 FLUTE	REGULAR LENGTH		XCR504	105
				3 FLUTE	REGULAR LENGTH		XCE503	106
				3 FLUTE	REGULAR LENGTH		XCC503	107
				3 FLUTE	REGULAR LENGTH		XCR503	108
				4 FLUTE	REGULAR LENGTH		XE504	109
		RADIUS		4 FLUTE	REGULAR LENGTH		XR504	110
		CHAMFER		4 FLUTE	STUB CUT LENGTH with EXTENDED NECK		XE514	111
				4 FLUTE	STUB CUT LENGTH with EXTENDED LONG NECK		XE524	112
		RADIUS		4 FLUTE	REGULAR LENGTH		XR514	113
ZAMUS CLASSIC	* Hardened Steels (~ HRc 55) * High Speed Cutting * General Speed Cutting	BALL		2 FLUTE	SHORT LENGTH, BALL NOSE	HSC	DB402	118
				2 FLUTE	15° HELIX STUB CUT LENGTH, BALL NOSE with EXTENDED NECK	HSC	DB412	119
				2 FLUTE	LONG LENGTH, BALL NOSE	HSC	DB512	120
				4 FLUTE	LONG LENGTH, BALL NOSE	HSC	DB514	121
				2 FLUTE	STUB CUT LENGTH, BALL NOSE with EXTENDED NECK	HSC	DB502	122
				2 FLUTE	EXTENDED NECK-LONG SHANK	HSC	DB522	123
				2 FLUTE	MMC-SPHERE TYPE	HSC	DB532	124
				4 FLUTE	MMC-SPHERE TYPE	HSC	DB534	125
		SQUARE		2 FLUTE	BALL NOSE with TAPER NECK	HSC	DB54(5)2	126
				2 FLUTE	REGULAR LENGTH	HSC	ZE502	127
				4 FLUTE	REGULAR LENGTH	HSC	ZE504	128
				3 FLUTE	REGULAR LENGTH	HSC	ZE503	129
				6 FLUTE	REGULAR & LONG LENGTH	HSC	ZE506	130
				2 FLUTE	MEDIUM LENGTH	HSC	ZM502	131
				4 FLUTE	MEDIUM LENGTH	HSC	ZM504	132
				2 FLUTE	MEDIUM CUT, LONG SHANK TYPE	HSC	ZM522	133

	Carbon Steels (S45C,S55C...) ~ HB225	Alloy Steels (SCM,SK...) HB225~325	Prehardened Steels(NAK..) HRC30~50	Hardened Steels		Copper	Graphite	Cast Iron FCD400. 500~	Aluminum	Stainless Steels
				~HRc55 SKD61	HRc55~ SKD11					
	◎	◎	○			○				◎
	○	○	◎	○				○		○

METRIC SIZE

Class	Feature	Type	Appearance	No. of Teeth	Item	App.	EDP. No.	Page
ZAMUS CLASSIC	* Hardened Steels (~ HRc 55) * High Speed Cutting * General Speed Cutting	SQUARE		4 FLUTE	MEDIUM CUT, LONG SHANK TYPE	HSC	ZM524	134
				2 FLUTE	LONG LENGTH	HSC	ZE522	135
				4 FLUTE	LONG LENGTH	HSC	ZE524	136
				4 FLUTE	EXTRA LONG LENGTH		ZE534	137
				2 FLUTE	35° HELIX REGULAR LENGTH	HSC	ZE512	138
				4 FLUTE	45° HELIX REGULAR LENGTH	HSC	ZE514	139
				6 FLUTE	50° HELIX REGULAR LENGTH	HSC	ZE516	140
		LONG NECK SQUARE		2 FLUTE	for RIB PROCESSING	HSC	ZE612	141
		LONG NECK BALL		2 FLUTE	for RIB PROCESSING	HSC	DB612	145
		RADIUS		2 FLUTE	STUB CUT LENGTH, CORNER RADIUS with EXTENDED NECK		ZR502	149
				4 FLUTE	STUB CUT LENGTH, CORNER RADIUS with EXTENDED NECK		ZR504	150
				2 FLUTE	REGULAR LENGTH, CORNER RADIUS		ZR512	151
				4 FLUTE	REGULAR LENGTH, CORNER RADIUS		ZR514	152
				2 FLUTE	LONG LENGTH, CORNER RADIUS		ZR522	153
				4 FLUTE	LONG LENGTH, CORNER RADIUS		ZR524	154
		BALL		MULTIPLE	TAPER BALL, RIB PROCESSING	HSC	TPRB4-050	155
				MULTIPLE	TAPER BALL, RIB PROCESSING	HSC	TPRB4-075	156
				MULTIPLE	TAPER BALL, RIB PROCESSING	HSC	TPRB4-100	157
				MULTIPLE	TAPER BALL, RIB PROCESSING	HSC	TPRB4-150	159
				MULTIPLE	TAPER BALL, RIB PROCESSING	HSC	TPRB4-200	161
		SQUARE		MULTIPLE	TAPER, RIB PROCESSING	HSC	TPRE4-050	163
				MULTIPLE	TAPER, RIB PROCESSING	HSC	TPRE4-075	165
				MULTIPLE	TAPER, RIB PROCESSING	HSC	TPRE4-100	167
				MULTIPLE	TAPER, RIB PROCESSING	HSC	TPRE4-150	169
				MULTIPLE	TAPER, RIB PROCESSING	HSC	TPRE4-200	171
				MULTIPLE	TAPER, RIB PROCESSING	HSC	TPRE4-300	173
		TAPER		3 FLUTE	TAPER END MILL		TE503	174
		TAPER BALL		3 FLUTE	TAPER BALL END MILL		TB503	175
				4 FLUTE	TAPER BALL END MILL		TB504	176
		ROUGHING		3~6 FLUTE	ROUGHING END MILL		ZF60	177
				3~5 FLUTE	ROUGHING END MILL - FINE PITCH		ZF61	178
				3 FLUTE	Z - AXIS ROUGHING END MILL		PK503	179

	Carbon Steels (S45C,S55C...) ~ HB225	Alloy Steels (SCM,SK...) HB225~325	Prehardened Steels(NAK..) HRC30~50	Hardened Steels		Copper	Graphite	Cast Iron FCD400. 500~	Aluminum	Stainless Steels
				~HRc55 SKD61	HRc55~ SKD11					
	○	○	◎	○				○		○

ENDMILL SERIES
METRIC SIZE

Class	Feature	Type	Appearance	No. of Teeth	Item	App.	EDP. No.	Page
ZAMUS THUNDER	* Hardened Steels (~ HRc 45) * High Speed Cutting * General Speed Cutting	BALL		2 FLUTE	LONG LENGTH, BALL NOSE		DB312	183
				2 FLUTE	BALL NOSE with TAPER NECK		DB342	184
		SQUARE		2 FLUTE	REGULAR LENGTH		ZE302	185
				4 FLUTE	REGULAR LENGTH		ZE304	186
				2 FLUTE	LONG LENGTH		ZE322	187
				4 FLUTE	LONG LENGTH		ZE324	188
		RADIUS		2 FLUTE	CORNER RADIUS LONG LENGTH		ZR322	189
				4 FLUTE	CORNER RADIUS LONG LENGTH		ZR324	190
				4 FLUTE	45° HELIX STUB CUT LENGTH, CORNER RADIUS, EXTENDED NECK		ZR304H	191
				4 FLUTE	45° HELIX STUB CUT LENGTH, CORNER RADIUS, LONG SHANK		ZR324H	192
	* Hardened Steels (~ HRc 45) * High Speed Cutting * General Speed Cutting * Economic Type	SQUARE		2 FLUTE	REGULAR LENGTH		TX302	193
				4 FLUTE	REGULAR LENGTH		TX304	194
				4 FLUTE	45° HELIX, REGULAR LENGTH		TX304H	195
		BALL		2 FLUTE	REGULAR LENGTH, BALL NOSE		TXB302	196
				4 FLUTE	REGULAR LENGTH, BALL NOSE		TXB304	197
		SQUARE		2 FLUTE	SHORT LENGTH		TX202	198
	* Hardened Steels (~ HRc 45) * High Speed Cutting * General Speed Cutting * Economic Type	SQUARE		2 FLUTE	LONG LENGTH		TX222	199
				4 FLUTE	SHORT LENGTH		TX204	200
				4 FLUTE	LONG LENGTH		TX224	201
		BALL		2 FLUTE	REGULAR LENGTH, BALL NOSE		TXB202	202
				2 FLUTE	LONG LENGTH, BALL NOSE		TXB222	203
				2 FLUTE	LONG REACH, BALL NOSE		TXB232	204
				4 FLUTE	REGULAR LENGTH, BALL NOSE		TXB204	205
ZAMUS SUS MATE	* Stainless Steels * Titanium * Inconell	BALL		2 FLUTE	BALL NOSE REGULAR & LONG LENGTH		DS502	208
		SQUARE		3 FLUTE	REGULAR LENGTH		SM503	209
				4 FLUTE	REGULAR LENGTH		SM504	210
		ROUGHING		4~6 FLUTE	ROUGHING END MILL		ZF62	211
ZAMUS COPPER-MATE	* Copper & non-ferrous material	BALL		2 FLUTE	STUB CUT with EXTENDED NECK		BC502	214
		RADIUS		2 FLUTE	STUB CUT with EXTENDED NECK		RC502	215
ZAMUS GRA-MATE	* Graphite & non-ferrous material	BALL		2 FLUTE	DIAMOND COATING BALL NOSE		G	218
		RADIUS		2 FLUTE	DIAMOND COATING END MILL		GE	221

	Carbon Steels (S45C,S55C...) ~ HB225	Alloy Steels (SCM,SK...) HB225~325	Prehardened Steels(NAK..) HRC30~50	Hardened Steels		Copper	Graphite	Cast Iron FCD400. 500~	Aluminum	Stainless Steels
				~HRc55 SKD61	HRc55~ SKD11					
	◎	◎	○							
	○	○	○			○				◎
	○	○				◎			○	
							◎		○	

ENDMILL SERIES
METRIC SIZE

Class	Feature	Type	Appearance	No. of Teeth	Item	App.	EDP. No.	Page
ZAMUS AL-MATE	* Aluminum & non-ferrous material	SQUARE		2 FLUTE	LONG LENGTH - for Aluminum		AE302	224
				3 FLUTE	LONG & EXTRA LONG LENGTH		AE30(2)3	225
				2 FLUTE	CORNER RADIUS		AR302	227
				3 FLUTE	CORNER RADIUS		AR303	228
		BALL		2 FLUTE	STUB CUT BALL NOSE		AB312	229
		RADIUS		2 FLUTE	CORNER RADIUS with D.L.C. COATED		AR502	230
				3 FLUTE	CORNER RADIUS with D.L.C. COATED		AR503	231
		ROUGHING		3 FLUTE	ROUGHING END MILL - for Aluminum		AF303	232
STANDARD END MILL	* General & Multi-purpose	SQUARE		2 FLUTE	REGULAR LENGTH		E302	235
				4 FLUTE	REGULAR LENGTH		E304	237
		BALL		2 FLUTE	BALL NOSE LONG LENGTH		B302	238
				2 FLUTE	BALL NOSE EXTRA LONG LENGTH		BL422	239
				4 FLUTE	BALL NOSE LONG LENGTH		B304	240
		SQUARE		2 FLUTE	LONG LENGTH		E322	241
				4 FLUTE	LONG LENGTH		E324	242
				2 FLUTE	REGULAR LENGTH - BRAZED TYPE		EB302	243
				4 FLUTE	REGULAR LENGTH - BRAZED TYPE		EB304	244
				2 FLUTE	LONG LENGTH - BRAZED TYPE		EB322	245
				4 FLUTE	LONG LENGTH - BRAZED TYPE		EB324	246
		BALL		2 FLUTE	BALL NOSE REGULAR LENGTH - BRAZED TYPE		BB302	247

	Carbon Steels (S45C,S55C...) ~ HB225	Alloy Steels (SCM,SK...) HB225~325	Prehardened Steels(NAK..) HRC30~50	Hardened Steels		Copper	Graphite	Cast Iron FCD400. 500~	Aluminum	Stainless Steels
				~HRc55 SKD61	HRc55~ SKD11					
						○			◎	
	○	○								

Zamus Star Series

Zamus Star Series

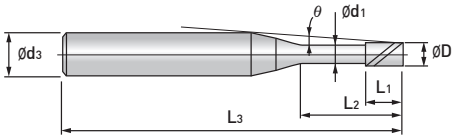
WIDIN

EDP. No.	APPEARANCE	FEATURE	STOCK	PAGE
ZSLNS20....-.. series		2 FLUTE, LONG NECK	•	37
ZSLNS40....-.. series		4 FLUTE, LONG NECK	•	42
ZSLNB....-..-. series		2 FLUTE, LONG NECK	•	44
ZSLNR....-..-. series		2 FLUTE, LONG NECK & BACK DRAFT TYPE	•	48
ZSTNB20..-..-. series		2 FLUTE, TAPER NECK & BACK DRAFT TYPE		52
ZSTNB30..-..-. series		3 FLUTE, TAPER NECK & BACK DRAFT TYPE		56
ZSTNR....-..-. series		2 FLUTE, TAPER NECK & BACK DRAFT TYPE		57
ZS124 ...series		4 FLUTE, LONG CUT LENGTH BROKEN INDEX	•	59
ZS1(2)04 ...series		4 FLUTE, CORNER RADIUS BROKEN INDEX	•	60
ZS204 .....series		4 FLUTE, CORNER RADIUS BROKEN INDEX	•	61
ZSPM4...-.. series		4 FLUTE, STUB CUT LENGTH, with EXTENDED NECK	•	63
DB702 ...series		2 FLUTE, STUB CUT LENGTH, BALL NOSE with EXTENDED NECK	•	64
DB712 ...series		2 FLUTE, REGULAR LENGTH, BALL NOSE	•	65
DB703 ...series		3 FLUTE, BALL NOSE for FINISHING MOLD & DIE	•	66
DB734 ...series		4 FLUTE,TAPER NECK for FINISHING MOLD & DIE	•	67

Zamus Star Series

WIDIN

EDP. No.	APPEARANCE	FEATURE	STOCK	PAGE
ZE702 ...series		2 FLUTE, STUB CUT LENGTH, with EXTENDED NECK	•	68
ZE704 ...series		4 FLUTE, STUB CUT LENGTH, with EXTENDED NECK	•	69
ZE724(6) ...series		4 & 6 FLUTE, FINISHING for MOLD & DIE	•	70
ZR702 .....series		2 FLUTE, STUB CUT LENGTH, CORNER RADIUS with EXTENDED NECK	•	71
ZR732 .....series		2 FLUTE, CORNER RADIUS with LONG SHANK	•	76
ZR704 .....series		4 FLUTE, STUB CUT LENGTH, CORNER RADIUS with EXTENDED NECK	•	78
ZR714....-..-. series		4 FLUTE, 45° HELIX FINISHING MOLD & DIE	•	81
ZR724 .....series		4 FLUTE, STUB CUT LENGTH, CORNER RADIUS with LONG SHANK	•	82
ZR734 .....series		4 FLUTE, CORNER RADIUS with LONG SHANK	•	83
ZR706 .....series		6 FLUTE, 45° HELIX STUB CUT LENGTH, CORNER RADIUS with EXTENDED NECK	•	85
ZR736 .....series		6 FLUTE, 45°HELIX, LONG SHANK, CORNER RADIUS	•	86
ZE712 ...series		2 FLUTE, 35° HELIX REGULAR LENGTH	•	87
ZE714 ...series		4 FLUTE, 45° HELIX REGULAR LENGTH	•	88
ZE716 ...series		6 FLUTE, 50° HELIX REGULAR LENGTH	•	89

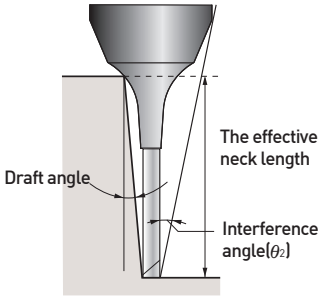


The effective neck length shown is not an exact value and to avoid contact with the workpiece, we recommend the user control the precise value of this length.

ZSLNS20....-.. series

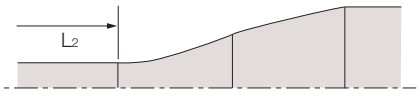
ULTRA FINE HELIX

EDP. No.	Dimension(mm)							Effective Neck Length					STOCK
	D	L_2	L_1	d_1	L_3	d_3	θ	0.5°	1°	1.5°	2°	3°	
ZSLNS2001-0.3	0.1	0.3	0.15	0.08	45	4	11.6	0.4	0.4	0.5	0.5	0.5	•
ZSLNS2001-0.5		0.5					11.4	0.6	0.7	0.7	0.7	0.8	•
ZSLNS2001-1		1					10.9	1.2	1.2	1.2	1.3	1.4	•
ZSLNS2002-0.5	0.2	0.5	0.3	0.17	50	4	11.3	1.2	1.3	1.5	1.7	2.0	•
ZSLNS2002-1		1					10.8	1.7	1.9	2.2	2.4	2.7	•
ZSLNS2002-1.5		1.5					10.3	2.3	2.5	2.8	3.0	3.4	•
ZSLNS2003-1	0.3	1	0.45	0.27	50	4	10.8	1.7	1.9	2.2	2.4	2.7	•
ZSLNS2003-1.5		1.5					10.3	2.3	2.5	2.8	3.0	3.4	•
ZSLNS2003-2		2					9.8	2.8	3.1	3.4	3.6	4.1	•
ZSLNS2003-2.5		2.5					9.4	3.4	3.7	4.0	4.3	4.7	•
ZSLNS2003-3		3					9.0	3.9	4.3	4.6	4.9	5.4	•
ZSLNS2004-1	0.4	1	0.6	0.37	50	4	10.7	1.7	1.9	2.2	2.4	2.7	•
ZSLNS2004-1.5		1.5					10.2	2.3	2.5	2.8	3.0	3.4	•
ZSLNS2004-2		2					9.7	2.8	3.1	3.4	3.6	4.1	•
ZSLNS2004-2.5		2.5					9.3	3.4	3.7	4.0	4.3	4.7	•
ZSLNS2004-3		3					8.9	3.9	4.3	4.6	4.9	5.4	•
ZSLNS2004-3.5		3.5					8.6	4.5	4.9	5.2	5.5	6.0	•
ZSLNS2004-4		4					8.2	5.0	5.4	5.8	6.1	6.6	•
ZSLNS2004-5		5					7.6	6.1	6.6	6.9	7.3	7.8	•
ZSLNS2004-6		6					7.1	7.2	7.7	8.1	8.4	9.0	•
ZSLNS2005-1	0.5	1	0.75	0.47	50	4	10.7	1.7	1.9	2.2	2.4	2.7	•
ZSLNS2005-1.5		1.5					10.2	2.3	2.5	2.8	3.0	3.4	•
ZSLNS2005-2		2					9.7	2.8	3.1	3.4	3.6	4.1	•
ZSLNS2005-2.5		2.5					9.3	3.4	3.7	4.0	4.3	4.7	•
ZSLNS2005-3		3					8.9	3.9	4.3	4.6	4.9	5.4	•
ZSLNS2005-4		4					8.1	5.0	5.4	5.8	6.1	6.6	•
ZSLNS2005-5		5					7.5	6.1	6.6	6.9	7.3	7.8	•
ZSLNS2005-6		6					7.0	7.2	7.7	8.1	8.4	9.0	•
ZSLNS2005-8		8					6.2	9.3	9.9	10.3	10.7	11.4	•
ZSLNS2006-2	0.6	2	0.9	0.57	50	4	9.6	2.8	3.1	3.4	3.6	4.1	•
ZSLNS2006-4		4					8.1	5.0	5.4	5.8	6.1	6.6	•
ZSLNS2006-6		6					6.9	7.2	7.7	8.1	8.4	9.0	•
ZSLNS2006-8		8					6.1	9.3	9.9	10.3	10.7	11.4	•
ZSLNS2006-10		10					5.4	11.5	12.1	12.6	13.0	13.7	•



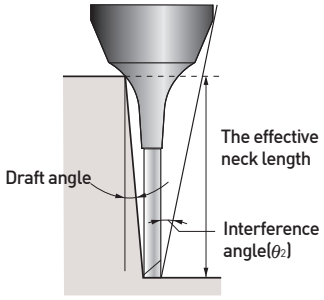
2 FLUTE, LONG NECK

- If the workpiece has draft angle, the interference length will be longer than the L_2.
- Please refer to the effective neck length for the various draft angles.
- In addition, the angle at which the tool will interfere with the workpiece is shown as the "interference angle θ_2", and should also be referred to.



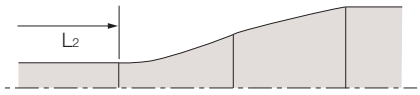
※The effective neck length shown is not an exact value and to avoid contact with the workpiece, we recommend the user control the precise value of this length.

EDP. No.	Dimension(mm)							Effective Neck Length					STOCK
	D	L_2	L_1	d_1	L_3	d_3	θ	0.5°	1°	1.5°	2°	3°	
ZSLNS2007-2	0.7	2	1.05	0.67	50	4	9.6	2.8	3.1	3.4	3.6	4.1	•
ZSLNS2007-4		4					8.0	5.0	5.4	5.8	6.1	6.6	•
ZSLNS2007-6		6					6.9	7.2	7.7	8.1	8.4	9.0	•
ZSLNS2007-8		8					6.0	9.3	9.9	10.3	10.7	11.4	•
ZSLNS2007-10		10					5.3	11.5	12.1	12.6	13.0	13.7	•
ZSLNS2008-4	0.8	4	1.2	0.77	50	4	7.9	5.0	5.4	5.8	6.1	6.6	•
ZSLNS2008-6		6					6.8	7.2	7.7	8.1	8.4	9.0	•
ZSLNS2008-8		8					5.9	9.3	9.9	10.3	10.7	11.4	•
ZSLNS2008-10		10					5.2	11.5	12.1	12.6	13.0	13.7	•
ZSLNS2008-12		12			55		4.7	13.6	14.2	14.8	15.2	16.0	•
ZSLNS2009-6	0.9	6	1.35	0.86	50	4	6.7	7.2	7.7	8.1	8.4	9.1	•
ZSLNS2009-8		8					5.8	9.4	9.9	10.4	10.7	11.4	•
ZSLNS2009-10		10					5.1	11.5	12.1	12.6	13.0	13.7	•
ZSLNS2009-12		12			55		4.6	13.6	14.3	14.8	15.2	16.0	•
ZSLNS2010-2	1	2	1.5	0.96	50	4	9.4	2.9	3.2	3.4	3.7	4.1	•
ZSLNS2010-4		4					7.7	5.1	5.5	5.8	6.1	6.6	•
ZSLNS2010-6		6					6.6	7.2	7.7	8.1	8.4	9.1	•
ZSLNS2010-8		8					5.7	9.4	9.9	10.4	10.7	11.4	•
ZSLNS2010-10		10					5.0	11.5	12.1	12.6	13.0	13.7	•
ZSLNS2010-12		12			55		4.5	13.6	14.3	14.8	15.2	16.0	•
ZSLNS2010-14		14					4.1	15.7	16.4	17.0	17.4	18.7	•
ZSLNS2010-16		16			60		3.8	17.8	18.6	19.1	19.6	21.3	•
ZSLNS2010-20		20					3.2	22.0	22.8	23.5	24.0	26.6	•
ZSLNS2012-6	1.2	6	1.8	1.15	50	4	6.3	7.3	7.7	8.1	8.5	9.1	•
ZSLNS2012-8		8					5.5	9.4	9.9	10.4	10.8	11.4	•
ZSLNS2012-10		10					4.8	11.5	12.1	12.6	13.0	13.7	•
ZSLNS2012-12		12			55		4.3	13.6	14.3	14.8	15.2	16.0	•
ZSLNS2012-16		16					3.6	17.8	18.6	19.2	19.7	21.3	•
ZSLNS2014-6	1.4	6	2.1	1.34	50	4	6.1	7.3	7.8	8.1	8.5	9.1	•
ZSLNS2014-8		8					5.3	9.4	10.0	10.4	10.8	11.5	•
ZSLNS2014-10		10					4.6	11.6	12.1	12.6	13.0	13.8	•
ZSLNS2014-12		12			55		4.1	13.7	14.3	14.8	15.3	16.1	•
ZSLNS2014-14		14					3.7	15.8	16.5	17.0	17.5	18.7	•
ZSLNS2014-16		16					3.4	17.9	18.6	19.2	19.7	21.4	•



2 FLUTE, LONG NECK

- If the workpiece has draft angle, the interference length will be longer than the L_2.
- Please refer to the effective neck length for the various draft angles.
- In addition, the angle at which the tool will interfere with the workpiece is shown as the "interference angle θ_2", and should also be referred to.



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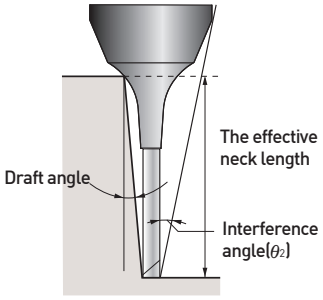
EDP. No.	Dimension(mm)							Effective Neck Length					STOCK
	D	L_2	L_1	d_1	L_3	d_3	θ	0.5°	1°	1.5°	2°	3°	
ZSLNS2015-4	1.5	4	2.25	1.44	50	4	7.2	5.2	5.5	5.9	6.2	6.7	•
ZSLNS2015-6		6					6.0	7.3	7.8	8.1	8.5	9.1	•
ZSLNS2015-8		8					5.1	9.4	10.0	10.4	10.8	11.5	•
ZSLNS2015-10		10					4.5	11.6	12.1	12.6	13.0	13.8	•
ZSLNS2015-12		12			55		4.0	13.7	14.3	14.8	15.3	16.1	•
ZSLNS2015-14		14					3.6	15.8	16.5	17.0	17.5	18.7	•
ZSLNS2015-16		16					3.3	17.9	18.6	19.2	19.7	-	•
ZSLNS2015-18		18			60		3.0	20.0	20.7	21.3	21.9	-	•
ZSLNS2015-20		20					2.8	22.0	22.9	23.5	24.1	-	•
ZSLNS2015-25		25			65		2.4	27.3	28.1	28.8	30.0	-	•
ZSLNS2016-6	1.6	6	2.4	1.54	50	4	5.9	7.3	7.8	8.1	8.5	9.1	•
ZSLNS2016-8		8					5.0	9.4	10.0	10.4	10.8	11.5	•
ZSLNS2016-10		10					4.4	11.6	12.1	12.6	13.0	13.8	•
ZSLNS2016-12		12			55		3.9	13.7	14.3	14.8	15.3	16.1	•
ZSLNS2016-14		14					3.5	15.8	16.5	17.0	17.5	18.7	•
ZSLNS2016-16		16					3.2	17.9	18.6	19.2	19.7	21.4	•
ZSLNS2016-18		18			60		2.9	20.0	20.7	21.3	21.9	-	•
ZSLNS2016-20		20					2.7	22.0	22.9	23.5	24.1	-	•
ZSLNS2018-6	1.8	6	2.7	1.73	50	4	5.6	7.4	7.8	8.2	8.5	9.1	•
ZSLNS2018-8		8					4.8	9.5	10.0	10.4	10.8	11.5	•
ZSLNS2018-10		10					4.2	11.6	12.2	12.6	13.0	13.8	•
ZSLNS2018-12		12			55		3.7	13.7	14.3	14.8	15.3	16.1	•
ZSLNS2018-14		14					3.3	15.8	16.5	17.0	17.5	18.8	•
ZSLNS2018-16		16					3.0	17.9	18.6	19.2	19.7	-	•
ZSLNS2018-18		18			60		2.7	20.0	20.7	21.3	21.9	-	•
ZSLNS2018-20		20					2.5	22.1	22.9	23.5	24.1	-	•
ZSLNS2020-4	2	4	3	1.92	50	4	6.5	5.3	5.6	5.9	6.2	6.7	•
ZSLNS2020-6		6					5.3	7.4	7.8	8.2	8.5	9.1	•
ZSLNS2020-8		8					4.5	9.5	10.0	10.4	10.8	11.5	•
ZSLNS2020-10		10					3.9	11.6	12.2	12.7	13.1	13.8	•
ZSLNS2020-12		12			55		3.4	13.7	14.3	14.9	15.3	16.1	•
ZSLNS2020-14		14					3.1	15.8	16.5	17.0	17.5	18.8	•

– No interference



2 FLUTE, LONG NECK

- If the workpiece has draft angle, the interference length will be longer than the L_2.
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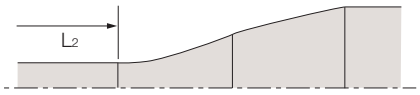

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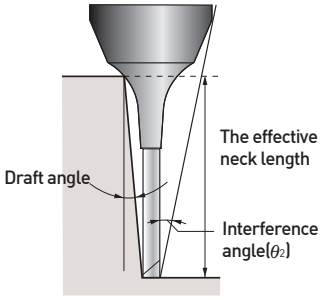
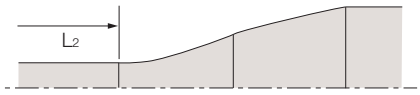
EDP. No.	Dimension(mm)							Effective Neck Length					STOCK
	D	L_2	L_1	d_1	L_3	d_3	θ	0.5°	1°	1.5°	2°	3°	
ZSLNS2020-16	2	16	3	1.92	55	4	2.8	17.9	18.6	19.2	19.7	-	•
ZSLNS2020-18		18			60		2.6	20.0	20.8	21.4	21.9	-	•
ZSLNS2020-20		20					2.4	22.1	22.9	23.5	24.1	-	•
ZSLNS2020-25		25			65		2.0	27.3	28.2	28.9	-	-	•
ZSLNS2020-30		30			70		1.7	32.5	33.4	34.4	-	-	•
ZSLNS2025-8	2.5	8	3.75	2.4	50	4	3.7	9.6	10.1	10.5	10.9	11.5	•
ZSLNS2025-10		10					3.1	11.7	12.2	12.7	13.1	13.8	•
ZSLNS2025-12		12			55		2.7	13.8	14.4	14.9	15.3	-	•
ZSLNS2025-14		14					2.4	15.9	16.5	17.1	17.5	-	•
ZSLNS2025-16		16					2.2	18.0	18.7	19.2	19.7	-	•
ZSLNS2025-18		18			60		2.0	20.1	20.8	21.4	-	-	•
ZSLNS2025-20		20					1.8	22.1	22.9	23.5	-	-	•
ZSLNS2025-25		25			65		1.5	27.3	28.2	-	-	-	•
ZSLNS2025-30		30			70		1.3	32.6	33.5	-	-	-	•
ZSLNS2030-8	3	8	4.5	2.88	55	6	5.6	9.6	10.1	10.5	10.9	11.5	•
ZSLNS2030-10		10					5.0	11.7	12.3	12.7	13.1	13.8	•
ZSLNS2030-12		12			60		4.5	13.8	14.4	14.9	15.4	16.3	•
ZSLNS2030-14		14					4.1	15.9	16.6	17.1	17.6	18.9	•
ZSLNS2030-16		16					3.7	18.0	18.7	19.3	19.8	21.6	•
ZSLNS2030-18		18					3.4	20.1	20.8	21.4	21.9	24.2	•
ZSLNS2030-20		20			65		3.2	22.2	23.0	23.6	24.2	26.9	•
ZSLNS2030-25		25			70		2.7	27.4	28.2	28.9	30.2	-	•
ZSLNS2030-30		30			75		2.4	32.6	33.5	34.5	36.2	-	•
ZSLNS2030-35		35			80		2.1	37.7	38.7	40.2	42.2	-	•
ZSLNS2030-40		40			90		1.9	42.9	43.9	45.9	-	-	•

– No interference



2 FLUTE, LONG NECK

- If the workpiece has draft angle, the interference length will be longer than the L_2.
- Please refer to the effective neck length for the various draft angles.
- In addition, the angle at which the tool will interfere with the workpiece is shown as the "interference angle θ_2", and should also be referred to.



※The effective neck length shown is not an exact value and to avoid contact with the workpiece, we recommend the user control the precise value of this length.

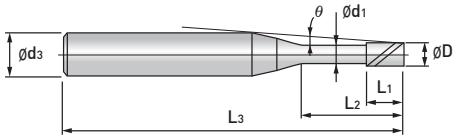
EDP. No.	Dimension(mm)							Effective Neck Length					STOCK
	D	L_2	L_1	d_1	L_3	d_3	θ	0.5°	1°	1.5°	2°	3°	
ZSLNS2040-12	4	12	6	3.85	60	6	3.4	13.9	14.5	15.0	15.4	16.3	•
ZSLNS2040-16		16					2.8	18.1	18.8	19.3	19.8	-	•
ZSLNS2040-20		20			70		2.3	22.3	23.0	23.6	24.3	-	•
ZSLNS2040-25		25					2.0	27.4	28.3	28.9	-	-	•
ZSLNS2040-30		30			80		1.7	32.6	33.5	34.6	-	-	•
ZSLNS2040-35		35					1.5	37.8	38.8	-	-	-	•
ZSLNS2040-40		40			90		1.3	42.9	44.0	-	-	-	•
ZSLNS2040-45		45					1.2	48.1	49.4	-	-	-	•
ZSLNS2040-50		50			100		1.1	53.2	54.8	-	-	-	•
ZSLNS2050-16	5	16	7.5	4.85	60	6	1.5	18.1	18.8	-	-	-	•
ZSLNS2050-20		20					1.3	22.3	23.0	-	-	-	•
ZSLNS2050-25		25			70		1.1	27.4	28.3	-	-	-	•
ZSLNS2050-30		30					0.9	32.6	-	-	-	-	•
ZSLNS2050-35		35			80		0.8	37.8	-	-	-	-	•
ZSLNS2050-40		40			90		0.7	42.9	-	-	-	-	•
ZSLNS2050-50		50			100		0.6	53.2	-	-	-	-	•

– No interference

■ Tolerance

Diameter	Mill Dia. (mm)	Shank Dia.
0.1 ~ 0.5	0 ~ -0.012	h5
0.6 ~ 4	0 ~ -0.015	

※Items can be changed for quality improvement without notice.



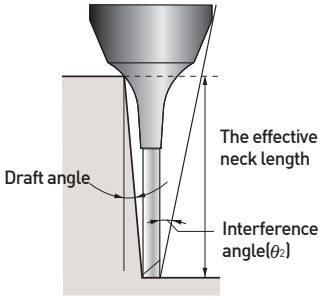
The effective neck length shown is not an exact value and to avoid contact with the workpiece, we recommend the user control the precise value of this length.

ZSLNS40....-.. series

ULTRA FINE HELIX

EDP. No.	Dimension(mm)							Effective Neck Length					STOCK
	D	L_2	L_1	d_1	L_3	d_3	θ	0.5°	1°	1.5°	2°	3°	
ZSLNS4010-4	1	4	1.5	0.96	50	4	7.7	5.1	5.5	5.8	6.1	6.6	•
ZSLNS4010-6		6					6.6	7.2	7.7	8.1	8.4	9.1	•
ZSLNS4010-8		8					5.7	9.4	9.9	10.4	10.7	11.4	•
ZSLNS4010-10		10					5.0	11.5	12.1	12.6	13.0	13.7	•
ZSLNS4015-4	1.5	4	2.25	1.44	50	4	7.2	5.2	5.5	5.9	6.2	6.7	•
ZSLNS4015-6		6					6.0	7.3	7.8	8.1	8.5	9.1	•
ZSLNS4015-8		8					5.1	9.4	10.0	10.4	10.8	11.5	•
ZSLNS4015-10		10					4.5	11.6	12.1	12.6	13.0	13.8	•
ZSLNS4015-12		12			55		4.0	13.7	14.3	14.8	15.3	16.1	•
ZSLNS4015-14		14					3.6	15.8	16.5	17.0	17.5	18.7	•
ZSLNS4015-16		16					3.3	17.9	18.6	19.2	19.7	-	•
ZSLNS4015-18		18			60		3.0	20.0	20.7	21.3	21.9	-	•
ZSLNS4015-20		20					2.8	22.0	22.9	23.5	24.1	-	•
ZSLNS4015-25		25			65		2.4	27.3	28.1	28.8	30.0	-	•
ZSLNS4020-4	2	4	3	1.92	50	4	6.5	5.3	5.6	5.9	6.2	6.7	•
ZSLNS4020-6		6					5.3	7.4	7.8	8.2	8.5	9.1	•
ZSLNS4020-8		8					4.5	9.5	10.0	10.4	10.8	11.5	•
ZSLNS4020-10		10					3.9	11.6	12.2	12.7	13.1	13.8	•
ZSLNS4020-12		12			55		3.4	13.7	14.3	14.9	15.3	16.1	•
ZSLNS4020-14		14					3.1	15.8	16.5	17.0	17.5	18.8	•
ZSLNS4020-16		16					2.8	17.9	18.6	19.2	19.7	-	•
ZSLNS4020-18		18			60		2.6	20.0	20.8	21.4	21.9	-	•
ZSLNS4020-20		20					2.4	22.1	22.9	23.5	24.1	-	•
ZSLNS4020-25		25			60		2.0	27.3	28.2	28.9	-	-	•
ZSLNS4020-30		30			70		1.7	32.5	33.4	34.4	-	-	•
ZSLNS4025-8	2.5	8	3.75	2.4	50	4	3.7	9.6	10.1	10.5	10.9	11.5	•
ZSLNS4025-10		10					3.1	11.7	12.2	12.7	13.1	13.8	•
ZSLNS4025-12		12			55		2.7	13.8	14.4	14.9	15.3	-	•
ZSLNS4025-14		14					2.4	15.9	16.5	17.1	17.5	-	•
ZSLNS4025-16		16					2.2	18.0	18.7	19.2	19.7	-	•
ZSLNS4025-18		18			60		2.0	20.1	20.8	21.4	-	-	•
ZSLNS4025-20		20					1.8	22.1	22.9	23.5	-	-	•
ZSLNS4025-25		25			65		1.5	27.3	28.2	-	-	-	•
ZSLNS4025-30		30			70		1.3	32.6	33.5	-	-	-	•

– No interference



4 FLUTE, LONG NECK

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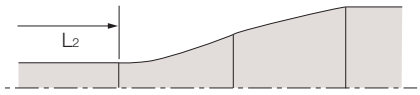

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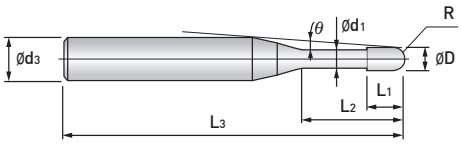
EDP. No.	Dimension(mm)							Effective Neck Length					STOCK
	D	L_2	L_1	d_1	L_3	d_3	θ	0.5°	1°	1.5°	2°	3°	
ZSLNS4030-8	3	8	4.5	2.88	55	6	5.6	9.6	10.1	10.5	10.9	11.5	•
ZSLNS4030-10		10					5.0	11.7	12.3	12.7	13.1	13.8	•
ZSLNS4030-12		12			60		4.5	13.8	14.4	14.9	15.4	16.3	•
ZSLNS4030-14		14					4.1	15.9	16.6	17.1	17.6	18.9	•
ZSLNS4030-16		16					3.7	18.0	18.7	19.3	19.8	21.6	•
ZSLNS4030-18		18					3.4	20.1	20.8	21.4	21.9	24.2	•
ZSLNS4030-20		20			65		3.2	22.2	23.0	23.6	24.2	26.9	•
ZSLNS4030-25		25			70		2.7	27.4	28.2	28.9	30.2	-	•
ZSLNS4030-30		30			75		2.4	32.6	33.5	34.5	36.2	-	•
ZSLNS4030-35		35			80		2.1	37.7	38.7	40.2	42.2	-	•
ZSLNS4030-40		40			90		1.9	42.9	43.9	45.9	-	-	•
ZSLNS4040-12	4	12	6	3.85	60	6	3.4	13.9	14.5	15.0	15.4	16.3	•
ZSLNS4040-16		16					2.8	18.1	18.8	19.3	19.8	-	•
ZSLNS4040-20		20			70		2.3	22.3	23.0	23.6	24.3	-	•
ZSLNS4040-25		25					2.0	27.4	28.3	28.9	-	-	•
ZSLNS4040-30		30			80		1.7	32.6	33.5	34.6	-	-	•
ZSLNS4040-35		35					1.5	37.8	38.8	-	-	-	•
ZSLNS4040-40		40			90		1.3	42.9	44.0	-	-	-	•
ZSLNS4040-45		45					1.2	48.1	49.4	-	-	-	•
ZSLNS4040-50		50			100		1.1	53.2	54.8	-	-	-	•
ZSLNS4050-16	5	16	7.5	4.85	60	6	1.5	18.1	18.8	-	-	-	•
ZSLNS4050-20		20					1.3	22.3	23.0	-	-	-	•
ZSLNS4050-25		25			70		1.1	27.4	28.3	-	-	-	•
ZSLNS4050-30		30					0.9	32.6	-	-	-	-	•
ZSLNS4050-35		35			80		0.8	37.8	-	-	-	-	•
ZSLNS4050-40		40			90		0.7	42.9	-	-	-	-	•
ZSLNS4050-50		50			100		0.6	53.2	-	-	-	-	•

– No interference

■ Tolerance

Diameter	Mill Dia. (mm)	Shank Dia.
0.1 ~ 0.5	0 ~ -0.012	h5
0.6 ~ 4	0 ~ -0.015	

※Items can be changed for quality improvement without notice.



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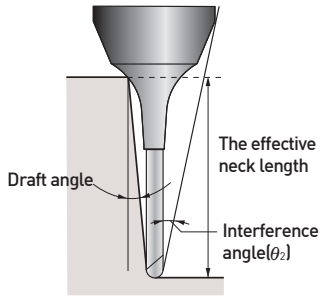
ZSLNB....-..-. series

ULTRA FINE HELIX

EDP. No.	Dimension(mm)								Effective Neck Length					STOCK
	R	D	L2	L1	d1	L3	d3	θ	0.5°	1°	1.5°	2°	3°	
ZSLNB2001-0.2	0.05	0.1	0.2	0.08	0.08	45	4	11.8	0.3	0.3	0.3	0.4	0.4	•
ZSLNB2001-0.3			0.3					11.7	0.4	0.4	0.5	0.5	0.5	•
ZSLNB2001-0.5			0.5					11.4	0.6	0.7	0.7	0.7	0.8	•
ZSLNB2002-0.5	0.1	0.2	0.5	0.15	0.17	50	4	11.5	1.2	1.3	1.5	1.6	2.0	•
ZSLNB2002-1			1					10.9	1.7	1.9	2.1	2.3	2.7	•
ZSLNB2002-1.5			1.5					10.4	2.3	2.5	2.8	3.0	3.4	•
ZSLNB2002-2			2					9.9	2.8	3.1	3.4	3.6	4.1	•
ZSLNB2002-2.5			2.5					9.5	3.4	3.7	4.0	4.2	4.7	•
ZSLNB2002-3.0			3					9.1	3.9	4.3	4.6	4.9	5.4	•
ZSLNB2003-1	0.15	0.3	1	0.25	0.27	50	4	10.9	1.7	1.9	2.1	2.3	2.7	•
ZSLNB2003-1.5			1.5					10.4	2.3	2.5	2.7	3.0	3.4	•
ZSLNB2003-2			2					9.9	2.8	3.1	3.4	3.6	4.0	•
ZSLNB2003-2.5			2.5					9.5	3.4	3.7	4.0	4.2	4.7	•
ZSLNB2003-3			3					9.1	3.9	4.3	4.6	4.8	5.3	•
ZSLNB2004-1	0.2	0.4	1	0.3	0.37	50	4	11.0	1.7	1.9	2.1	2.3	2.7	•
ZSLNB2004-1.5			1.5					10.4	2.3	2.5	2.7	2.9	3.4	•
ZSLNB2004-2			2					9.9	2.8	3.1	3.4	3.6	4.0	•
ZSLNB2004-2.5			2.5					9.5	3.4	3.7	4.0	4.2	4.7	•
ZSLNB2004-3			3					9.1	3.9	4.3	4.6	4.8	5.3	•
ZSLNB2004-3.5			3.5					8.7	4.5	4.8	5.2	5.4	6.0	•
ZSLNB2004-4			4					8.3	5.0	5.4	5.7	6.0	6.6	•
ZSLNB2004-4.5			4.5					8.0	5.6	6.0	6.3	6.6	7.2	•
ZSLNB2005-1	0.25	0.5	1	0.35	0.47	50	4	11.0	1.7	1.9	2.1	2.3	2.6	•
ZSLNB2005-2			2					9.9	2.8	3.1	3.3	3.6	4.0	•
ZSLNB2005-3			3					9.0	3.9	4.3	4.6	4.8	5.3	•
ZSLNB2005-4			4					8.3	5.0	5.4	5.7	6.0	6.6	•
ZSLNB2005-5			5					7.7	6.1	6.5	6.9	7.2	7.8	•
ZSLNB2005-6			6					7.1	7.2	7.6	8.0	8.4	9.0	•
ZSLNB2005-8			8					6.3	9.3	9.9	10.3	10.7	11.4	•



2 FLUTE, LONG NECK

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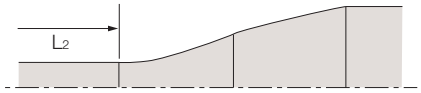

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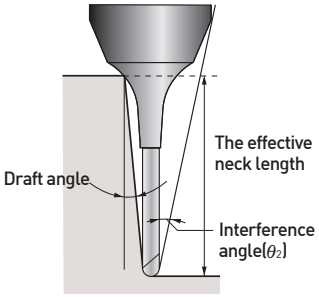
EDP. No.	Dimension(mm)								Effective Neck Length					STOCK
	R	D	L_2	L_1	d_1	L_3	d_3	θ	0.5°	1°	1.5°	2°	3°	
ZSLNB2006-1	0.3	0.6	1	0.4	0.57	50	4	11.0	1.7	1.9	2.1	2.3	2.6	•
ZSLNB2006-2			2					9.9	2.8	3.1	3.3	3.6	4.0	•
ZSLNB2006-3			3					9.0	3.9	4.3	4.5	4.8	5.3	•
ZSLNB2006-4			4					8.3	5.0	5.4	5.7	6.0	6.6	•
ZSLNB2006-5			5					7.6	6.1	6.5	6.9	7.2	7.8	•
ZSLNB2006-6			6					7.1	7.2	7.6	8.0	8.4	9.0	•
ZSLNB2006-7			7					6.6	8.3	8.8	9.2	9.5	10.2	•
ZSLNB2006-8			8					6.2	9.3	9.9	10.3	10.7	11.4	•
ZSLNB2006-9			9					5.8	10.4	10.9	11.4	11.8	12.5	•
ZSLNB2006-10			10					5.5	11.4	12.0	12.5	12.9	13.7	•
ZSLNB2006-12			12					5.0	13.6	14.2	14.7	15.2	16.0	•
ZSLNB2008-2	0.4	0.8	2	0.5	0.77	50	4	9.9	2.8	3.1	3.3	3.5	4.0	•
ZSLNB2008-4			4					8.2	5.0	5.4	5.7	6.0	6.5	•
ZSLNB2008-5			5					7.5	6.1	6.5	6.9	7.2	7.8	•
ZSLNB2008-6			6					7.0	7.2	7.6	8.0	8.4	9.0	•
ZSLNB2008-8			8					6.1	9.3	9.8	10.3	10.7	11.3	•
ZSLNB2008-10			10					5.4	11.4	12.0	12.5	12.9	13.7	•
ZSLNB2010-2	0.5	1	2	0.8	0.96	50	4	9.9	2.9	3.1	3.3	3.5	4.0	•
ZSLNB2010-3			3					8.9	4.0	4.3	4.5	4.8	5.3	•
ZSLNB2010-4			4					8.1	5.0	5.4	5.7	6.0	6.5	•
ZSLNB2010-5			5					7.4	6.1	6.5	6.9	7.2	7.8	•
ZSLNB2010-6			6					6.8	7.2	7.7	8.0	8.4	9.0	•
ZSLNB2010-7			7					6.3	8.3	8.8	9.2	9.5	10.2	•
ZSLNB2010-8			8					5.9	9.3	9.9	10.3	10.7	11.3	•
ZSLNB2010-9			9					5.5	10.4	11.0	11.4	11.8	12.5	•
ZSLNB2010-10			10					5.2	11.5	12.0	12.5	12.9	13.7	•
ZSLNB2010-12			12			55		4.6	13.6	14.2	14.7	15.2	15.9	•
ZSLNB2010-14			14					4.2	15.7	16.4	16.9	17.4	18.5	•
ZSLNB2010-16			16					3.8	17.8	18.5	19.1	19.6	21.2	•
ZSLNB2010-18			18			60		3.5	19.9	20.7	21.3	21.8	23.8	•
ZSLNB2010-20			20					3.3	22.0	22.8	23.4	24.0	26.5	•
ZSLNB2012-4	0.6	1.2	4	1.1	1.15	50	4	7.9	5.1	5.4	5.7	6.0	6.5	•
ZSLNB2012-6			6					6.6	7.2	7.7	8.0	8.4	9.0	•
ZSLNB2012-8			8					5.7	9.4	9.9	10.3	10.7	11.3	•
ZSLNB2012-10			10					5.0	11.5	12.1	12.5	12.9	13.7	•
ZSLNB2012-12			12			55		4.5	13.6	14.2	14.7	15.2	15.9	•



2 FLUTE, LONG NECK

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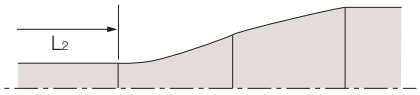
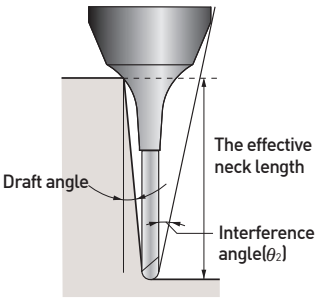
- Please refer to the effective neck length for the various draft angles.
- In addition, the angle at which the tool will interfere with the workpiece is shown as the "interference angle θ_2", and should also be referred to.



※The effective neck length shown is not an exact value and to avoid contact with the workpiece, we recommend the user control the precise value of this length.

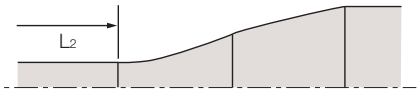
EDP. No.	Dimension(mm)								Effective Neck Length					STOCK
	R	D	L_2	L_1	d_1	L_3	d_3	θ	0.5°	1°	1.5°	2°	3°	
ZSLNB2014-8	0.7	1.4	8	1.3	1.34	50	4	5.5	9.4	9.9	10.3	10.7	11.3	•
ZSLNB2014-12			12			55		4.3	13.6	14.2	14.7	15.2	15.9	•
ZSLNB2014-16			16					3.5	17.8	18.5	19.1	19.6	21.2	•
ZSLNB2015-4	0.75	1.5	4	1.35	1.44	50	4	7.7	5.1	5.4	5.7	6.0	6.5	•
ZSLNB2015-6			6					6.4	7.3	7.7	8.0	8.4	9.0	•
ZSLNB2015-8			8					5.4	9.4	9.9	10.3	10.7	11.3	•
ZSLNB2015-10			10					4.7	11.5	12.1	12.5	12.9	13.7	•
ZSLNB2015-12			12			55		4.2	13.6	14.2	14.7	15.2	15.9	•
ZSLNB2015-14			14					3.8	15.7	16.4	16.9	17.4	18.5	•
ZSLNB2015-16			16					3.4	17.8	18.5	19.1	19.6	21.1	•
ZSLNB2015-20			20			60		2.9	22.0	22.8	23.4	24.0	-	•
ZSLNB2016-8	0.8	1.6	8	1.4	1.54	50	4	5.3	9.4	9.9	10.3	10.7	11.3	•
ZSLNB2016-10			10					4.6	11.5	12.1	12.5	12.9	13.7	•
ZSLNB2016-12			12			55		4.1	13.6	14.2	14.7	15.2	15.9	•
ZSLNB2016-16			16					3.3	17.8	18.5	19.1	19.6	21.1	•
ZSLNB2016-20			20			60		2.8	22.0	22.8	23.4	24.0	-	•
ZSLNB2018-8	0.9	1.8	8	1.6	1.73	50	4	5.1	9.4	9.9	10.3	10.7	11.3	•
ZSLNB2018-12			12			55		3.9	13.7	14.3	14.7	15.2	15.9	•
ZSLNB2018-16			16					3.1	17.9	18.6	19.1	19.6	21.1	•
ZSLNB2018-20			20			60		2.6	22.0	22.8	23.4	24.0	-	•
ZSLNB2020-3	1	2	3	1.7	1.92	50	4	8.3	4.1	4.4	4.6	4.8	5.2	•
ZSLNB2020-4			4	*3				7.3	5.2	5.5	5.8	6.0	6.5	•
ZSLNB2020-6			6					5.8	7.3	7.7	8.1	8.4	9.0	•
ZSLNB2020-8			8					4.9	9.5	9.9	10.3	10.7	11.3	•
ZSLNB2020-10			10					4.2	11.6	12.1	12.6	12.9	13.6	•
ZSLNB2020-12			12			55		3.7	13.7	14.3	14.8	15.2	15.9	•
ZSLNB2020-14			14					3.2	15.8	16.4	16.9	17.4	18.5	•
ZSLNB2020-16			16					2.9	17.9	18.6	19.1	19.6	-	•
ZSLNB2020-18			18			60		2.7	20.0	20.7	21.3	21.8	-	•
ZSLNB2020-20			20					2.4	22.1	22.8	23.4	24.0	-	•
ZSLNB2020-22			22					2.3	24.1	24.9	25.6	26.3	-	•
ZSLNB2020-25			25			65		2.0	27.3	28.1	28.8	-	-	•
ZSLNB2020-30			30			70		1.7	32.4	33.4	34.2	-	-	•

– No interference



2 FLUTE, LONG NECK

- If the workpiece has draft angle, the interference length will be longer than the L_2.
- Please refer to the effective neck length for the various draft angles.
- In addition, the angle at which the tool will interfere with the workpiece is shown as the "interference angle θ_2", and should also be referred to.



※The effective neck length shown is not an exact value and to avoid contact with the workpiece, we recommend the user control the precise value of this length.

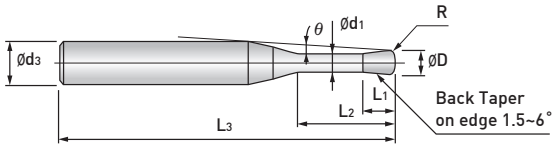
EDP. No.	Dimension(mm)								Effective Neck Length					STOCK
	R	D	L_2	L_1	d_1	L_3	d_3	θ	0.5°	1°	1.5°	2°	3°	
ZSLNB2020-35	1	2	35	*3	1.92	75	4	1.5	37.6	38.6	-	-	-	•
ZSLNB2020-40			40			80		1.4	42.8	43.8	-	-	-	•
ZSLNB2025-10	1.25	2.5	10	4	2.4	50	4	3.4	11.6	12.1	12.6	13	13.6	•
ZSLNB2025-16			16			55		2.3	17.9	18.6	19.1	19.6	-	•
ZSLNB2025-20			20			60		1.9	22.1	22.8	23.5	-	-	•
ZSLNB2030-8	1.5	3	8	*4	2.88	55	6	6.2	9.6	10.0	10.4	10.7	11.3	•
ZSLNB2030-10			10					5.5	11.7	12.2	12.6	13.0	13.6	•
ZSLNB2030-13			13			60		4.6	14.8	15.4	15.9	16.3	17.1	•
ZSLNB2030-16			16					4.0	18.0	18.6	19.1	19.6	21.1	•
ZSLNB2030-18			18					3.6	20.0	20.7	21.3	21.8	23.7	•
ZSLNB2030-20			20			65		3.4	22.1	22.9	23.5	24.0	26.4	•
ZSLNB2030-25			25			70		2.8	27.3	28.2	28.8	29.9	-	•
ZSLNB2030-30			30			75		2.5	32.5	33.4	34.3	35.9	-	•
ZSLNB2030-35			35			80		2.2	37.7	38.7	40.0	41.9	-	•
ZSLNB2040-10	2	4	10	*5	3.9	55	6	4.5	11.6	12.1	12.5	12.9	13.5	•
ZSLNB2040-13			13			60		3.6	14.7	15.3	15.8	16.2	17.0	•
ZSLNB2040-16			16					3.1	17.9	18.5	19.1	19.5	20.9	•
ZSLNB2040-20			20			65		2.5	22.1	22.8	23.4	23.9	-	•
ZSLNB2040-25			25			70		2.1	27.3	28.1	28.8	29.8	-	•
ZSLNB2040-30			30			75		1.8	32.4	33.4	34.2	-	-	•
ZSLNB2040-35			35			80		1.6	37.6	38.6	39.9	-	-	•
ZSLNB2040-40			40					1.4	42.8	43.8	-	-	-	•
ZSLNB2040-45			45			90		1.2	47.9	49.1	-	-	-	•
ZSLNB2040-50			50			100		1.1	53.1	54.5	-	-	-	•
ZSLNB2050-20	2.5	5	20	*6	4.9	65	6	1.4	22.0	22.8	-	-	-	•
ZSLNB2050-25			25			70		1.2	27.2	28.1	-	-	-	•
ZSLNB2050-30			30			75		1.0	32.4	-	-	-	-	•
ZSLNB2050-35			35			80		0.8	42.8	-	-	-	-	•
ZSLNB2050-40			40			90		0.7	42.8	-	-	-	-	•

– No interference

■ Tolerance

Radius (mm)	Shank Dia.
±0.005	h5

※Items can be changed for quality improvement without notice.

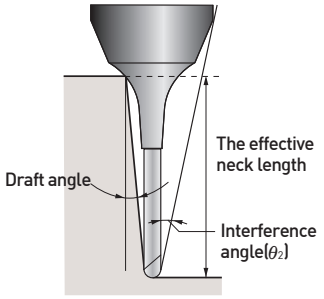


The effective neck length shown is not an exact value and to avoid contact with the workpiece, we recommend the user control the precise value of this length.

ZSLNR....-..-. series

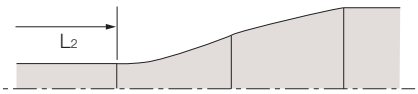
ULTRA FINE HELIX

EDP. No.	Dimension(mm)								Effective Neck Length					STOCK
	D	R	L_2	L_1	d_1	L_3	d_3	θ	0.5°	1°	1.5°	2°	3°	
ZSLNR2002-0.5-005	0.2	0.05	0.5	0.15	0.17	50	4	11.4	0.9	1.0	1.0	1.1	1.2	•
ZSLNR2002-1-005			1					10.9	1.6	1.7	1.9	2.0	2.3	•
ZSLNR2002-1.5-005			1.5					10.3	2.1	2.3	2.5	2.7	3.0	•
ZSLNR2002-2-005			2					9.9	2.8	3.1	3.4	3.6	4.1	•
ZSLNR2003-1-005	0.3	0.05	1	0.25	0.27	50	4	10.8	1.4	1.5	1.6	1.7	1.9	•
ZSLNR2003-1.5-005			1.5					10.3	2.1	2.3	2.5	2.7	3.0	•
ZSLNR2003-2-005			2					9.8	2.7	2.9	3.1	3.3	3.6	•
ZSLNR2003-2.5-005			2.5					9.4	3.2	3.5	3.7	3.9	4.3	•
ZSLNR2003-3-005			3					9.0	3.9	4.3	4.6	4.9	5.4	•
ZSLNR2004-1-005	0.4	0.05	1	0.3	0.37	50	4	10.8	1.4	1.5	1.6	1.7	1.9	•
ZSLNR2004-1.5-005			1.5					10.3	2.0	2.1	2.2	2.3	2.5	•
ZSLNR2004-2-005			2					9.8	2.7	2.9	3.1	3.3	3.6	•
ZSLNR2004-2.5-005			2.5					9.4	3.2	3.5	3.7	3.9	4.3	•
ZSLNR2004-3-005			3					9.0	3.8	4.0	4.3	4.5	4.9	•
ZSLNR2004-3.5-005			3.5					8.6	4.3	4.6	4.9	5.1	5.5	•
ZSLNR2004-4-005			4					8.3	5.0	5.4	5.8	6.1	6.6	•
ZSLNR2004-2-01		0.1	2					9.8	2.7	2.9	3.1	3.3	3.6	•
ZSLNR2004-3-01			3					9.0	3.8	4.0	4.3	4.5	4.9	•
ZSLNR2004-4-01			4					8.3	5.0	5.4	5.8	6.1	6.6	•
ZSLNR2005-1-005	0.5	0.05	1	0.35	0.47	50	4	10.8	1.4	1.5	1.6	1.7	1.9	•
ZSLNR2005-2-005			2					9.7	2.5	2.6	2.8	2.9	3.1	•
ZSLNR2005-3-005			3					8.9	3.8	4.0	4.3	4.5	4.9	•
ZSLNR2005-4-005			4					8.2	4.8	5.2	5.4	5.7	6.1	•
ZSLNR2005-5-005			5					7.6	6.1	6.6	6.9	7.3	7.8	•
ZSLNR2005-6-005			6					7.0	7.2	7.7	8.1	8.4	9.0	•
ZSLNR2005-1-01		0.1	1					10.8	1.4	1.5	1.6	1.7	1.9	•
ZSLNR2005-2-01			2					9.8	2.5	2.6	2.8	2.9	3.1	•
ZSLNR2005-3-01			3					8.9	3.8	4.0	4.3	4.5	4.9	•



2 FLUTE, LONG NECK BACK DRAFT TYPE

- If the workpiece has draft angle, the interference length will be longer than the L_2.
- Please refer to the effective neck length for the various draft angles.
- In addition, the angle at which the tool will interfere with the workpiece is shown as the "interference angle θ_2", and should also be referred to.



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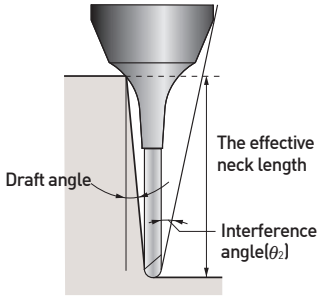
EDP. No.	Dimension(mm)								Effective Neck Length					STOCK
	D	R	L_2	L_1	d_1	L_3	d_3	θ	0.5°	1°	1.5°	2°	3°	
ZSLNR2005-4-01	0.5	0.1	4	0.35	0.47	50	4	8.2	4.8	5.2	5.4	5.7	6.1	•
ZSLNR2005-5-01			5					7.6	6.1	6.5	6.9	7.2	7.8	•
ZSLNR2005-6-01			6					7.1	7.2	7.7	8.1	8.4	9.0	•
ZSLNR2006-2-01	0.6	0.1	2	0.4	0.57	50	4	9.7	2.5	2.6	2.8	2.9	3.1	•
ZSLNR2006-4-01			4					8.1	4.8	5.2	5.4	5.7	6.1	•
ZSLNR2006-6-01			6					7.0	7.2	7.7	8.1	8.4	9.0	•
ZSLNR2006-8-01			8					6.1	9.3	9.9	10.3	10.7	11.4	•
ZSLNR2006-10-01			10					5.5	11.5	12.1	12.5	13.0	13.7	•
ZSLNR2008-4-01	0.8	0.1	4	0.5	0.77	50	4	8.0	4.8	5.2	5.4	5.7	6.1	•
ZSLNR2008-6-01			6					6.8	7.0	7.4	7.7	7.9	8.4	•
ZSLNR2008-8-01			8					5.9	9.3	9.9	10.3	10.7	11.4	•
ZSLNR2008-12-01			12			55		4.7	13.6	14.2	14.7	15.2	16.0	•
ZSLNR2008-4-02		0.2	4			50		8.0	4.8	5.1	5.4	5.6	6.1	•
ZSLNR2008-6-02			6					6.9	7.0	7.3	7.7	7.9	8.4	•
ZSLNR2010-4-01	1	0.1	4	0.8	0.94	50	4	7.7	4.7	4.9	5.1	5.2	5.5	•
ZSLNR2010-6-01			6					6.6	7.1	7.4	7.7	8.0	8.5	•
ZSLNR2010-8-01			8					5.7	9.2	9.6	9.9	10.2	10.8	•
ZSLNR2010-10-01			10					5.1	11.6	12.1	12.6	13.0	13.7	•
ZSLNR2010-12-01			12			55		4.5	13.7	14.3	14.8	15.3	16.0	•
ZSLNR2010-16-01			16			60		3.8	17.9	18.6	19.2	19.7	21.3	•
ZSLNR2010-20-01			20					3.2	22.0	22.8	23.5	24.0	26.7	•
ZSLNR2010-4-02		0.2	4			50		7.8	4.7	4.9	5.1	5.2	5.5	•
ZSLNR2010-6-02			6					6.6	7.1	7.4	7.7	8.0	8.5	•
ZSLNR2010-8-02			8					5.8	9.2	9.6	9.9	10.2	10.8	•
ZSLNR2010-10-02			10					5.1	11.6	12.1	12.6	13.0	13.7	•
ZSLNR2010-12-02			12			55		4.6	13.7	14.3	14.8	15.2	16.0	•
ZSLNR2010-16-02			16			60		3.8	17.9	18.6	19.2	19.7	21.3	•
ZSLNR2010-20-02			20					3.2	22.0	22.8	23.5	24.0	26.6	•



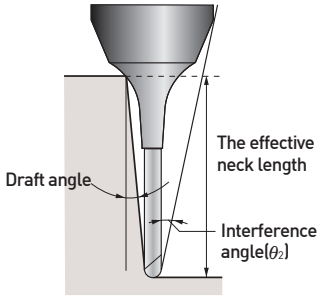
2 FLUTE, LONG NECK BACK DRAFT TYPE

- If the workpiece has draft angle, the interference length will be longer than the L_2.
- Please refer to the effective neck length for the various draft angles.
- In addition, the angle at which the tool will interfere with the workpiece is shown as the "interference angle θ_2", and should also be referred to.

※The effective neck length shown is not an exact value and to avoid contact with the workpiece, we recommend the user control the precise value of this length.

EDP. No.	Dimension(mm)								Effective Neck Length					STOCK
	D	R	L_2	L_1	d_1	L_3	d_3	θ	0.5°	1°	1.5°	2°	3°	
ZSLNR2010-6-03	1	0.3	6	0.8	0.94	50	4	6.7	7.1	7.4	7.7	8.0	8.4	•
ZSLNR2010-10-03			10					5.1	11.5	12.1	12.6	13.0	13.7	•
ZSLNR2010-16-03			16			60		3.8	17.9	18.6	19.1	19.6	21.3	•
ZSLNR2010-20-03			20					3.2	22.0	22.8	23.5	24.0	26.6	•
ZSLNR2015-4-01	1.5	0.1	4	1.35	1.42	50	4	7.2	4.8	4.9	5.1	5.3	5.5	•
ZSLNR2015-8-01			8					5.2	9.2	9.6	10.0	10.3	10.8	•
ZSLNR2015-12-01			12			55		4.0	13.4	13.9	14.3	14.7	16.1	•
ZSLNR2015-15-01			15					3.5	16.9	17.6	18.1	18.6	20.1	•
ZSLNR2015-20-01			20			60		2.8	22.1	22.9	23.5	24.1	-	•
ZSLNR2015-4-02		0.2	4			50		7.3	4.7	4.9	5.1	5.3	5.5	•
ZSLNR2015-8-02			8					5.2	9.2	9.6	10.0	10.3	10.8	•
ZSLNR2015-12-02			12			55		4.1	13.4	13.9	14.3	14.7	16.1	•
ZSLNR2015-15-02			15					3.5	16.9	17.5	18.1	18.6	20.0	•
ZSLNR2015-20-02			20			60		2.8	22.1	22.9	23.5	24.1	-	•
ZSLNR2015-8-03		0.3	8			50		5.2	9.2	9.6	10.0	10.3	10.8	•
ZSLNR2015-15-03			15			55		3.5	16.9	17.5	18.1	18.6	20.0	•
ZSLNR2015-20-03			20			60		2.8	22.1	22.9	23.5	24.0	-	•
ZSLNR2020-6-02	2	0.2	6	1.7	1.92	50	4	5.4	6.8	7.1	7.3	7.5	8.1	•
ZSLNR2020-8-02			8					4.6	8.9	9.2	9.4	9.7	10.8	•
ZSLNR2020-12-02			12			55		3.5	13.4	13.9	14.3	14.7	16.1	•
ZSLNR2020-16-02			16					2.8	17.6	18.1	18.6	19.3	-	•
ZSLNR2020-20-02			20			60		2.4	22.1	22.9	23.5	24.1	-	•
ZSLNR2020-25-02			25			65		2.0	27.3	28.2	28.8	-	-	•
ZSLNR2020-30-02			30			70		1.7	32.5	33.4	34.4	-	-	•
ZSLNR2020-8-03		0.3	8			50		4.6	8.9	9.2	9.4	9.7	10.7	•
ZSLNR2020-16-03			16			55		2.8	17.6	18.1	18.6	19.3	-	•
ZSLNR2020-20-03			20			60		2.4	22.1	22.9	23.5	24.0	-	•
ZSLNR2020-6-05		0.5	6			50		5.5	6.8	7.1	7.3	7.4	8.0	•
ZSLNR2020-8-05			8					4.7	8.9	9.2	9.4	9.6	10.7	•

– No interference



2 FLUTE, LONG NECK BACK DRAFT TYPE

- If the workpiece has draft angle, the interference length will be longer than the L_2.
- Please refer to the effective neck length for the various draft angles.
- In addition, the angle at which the tool will interfere with the workpiece is shown as the "interference angle θ_2", and should also be referred to.

※The effective neck length shown is not an exact value and to avoid contact with the workpiece, we recommend the user control the precise value of this length.

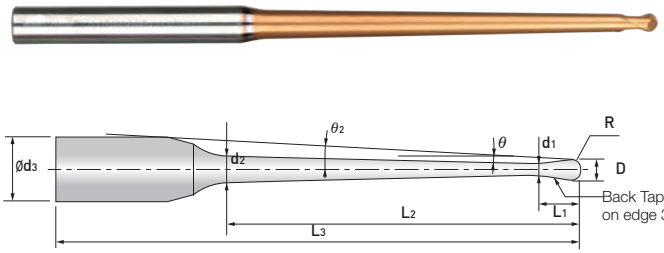
EDP. No.	Dimension(mm)								Effective Neck Length					STOCK
	D	R	L_2	L_1	d_1	L_3	d_3	θ	0.5°	1°	1.5°	2°	3°	
ZSLNR2020-12-05	2	0.5	12	1.7	1.92	55	4	3.5	13.4	13.9	14.3	14.6	16.0	•
ZSLNR2020-16-05			16					2.9	17.6	18.1	18.6	19.2	-	•
ZSLNR2020-20-05			20			60		2.4	22.1	22.9	23.5	24.0	-	•
ZSLNR2020-25-05			25			65		2.0	27.3	28.1	28.8	-	-	•
ZSLNR2020-30-05			30			70		1.7	32.5	33.4	34.3	-	-	•
ZSLNR2020-8-08		0.8	8			50		4.8	8.9	9.2	9.4	9.6	10.6	•
ZSLNR2020-16-08			16			55		2.9	17.6	18.1	18.6	19.2	-	•
ZSLNR2020-20-08			20			60		2.4	22.1	22.8	23.5	24.0	-	•
ZSLNR2030-8-02	3	0.2	8	2.5	2.86	55	6	5.7	9.0	9.3	9.5	9.9	10.9	•
ZSLNR2030-12-02			12			60		4.5	13.1	13.5	14.0	14.7	16.2	•
ZSLNR2030-16-02			16					3.8	17.7	18.2	18.7	19.5	21.6	•
ZSLNR2030-20-02			20			65		3.2	21.8	22.4	23.1	24.2	26.9	•
ZSLNR2030-30-02			30			75		2.4	32.6	33.5	34.5	36.2	-	•
ZSLNR2030-35-02			35			80		2.1	37.7	38.7	40.2	42.2	-	•
ZSLNR2030-8-03		0.3	8			55		5.7	9.0	9.3	9.5	9.9	10.9	•
ZSLNR2030-16-03			16			60		3.8	17.7	18.2	18.7	19.4	21.5	•
ZSLNR2030-20-03			20			65		3.2	21.8	22.4	23.1	24.2	26.8	•
ZSLNR2030-30-03			30			75		2.4	32.6	33.5	34.5	36.2	-	•
ZSLNR2030-8-05		0.5	8			55		5.8	9.0	9.3	9.5	9.8	10.8	•
ZSLNR2030-12-05			12			60		4.6	13.1	13.5	13.9	14.6	16.2	•
ZSLNR2030-16-05			16					3.8	17.7	18.2	18.7	19.4	21.5	•
ZSLNR2030-20-05			20			65		3.2	21.8	22.4	23.1	24.2	26.8	•
ZSLNR2030-30-05			30			75		2.4	32.6	33.5	34.5	36.1	-	•
ZSLNR2030-35-05			35			80		2.1	37.7	38.7	40.2	42.1	-	•

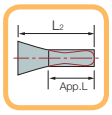
– No interference

■ Tolerance

Mill Dia. (mm)	Shank Dia.
0 ~ -0.015	h5

※Items can be changed for quality improvement without notice.





The effective neck length shown is not an exact value and to avoid contact with the workpiece, we recommend the user control the precise value of this length.

※R2 or higher is not applied to Back draft type.

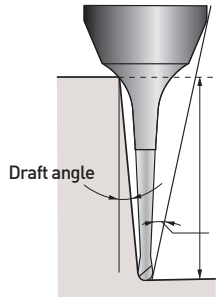
ZSTNB20..-..-. series

ULTRA FINE HELIX up to R3 over R3

EDP. No.	Dimension(mm)											Effective Neck Length					STOCK
	R	D	L_2	θ	L_1	d_1	d_2	L_3	d_3	App.L	θ_2	0.5°	1°	1.5°	2°	3°	
ZSTNB2002-1-04	0.1	0.2	1	0.4	0.15	0.17	0.18	50	4	1.35	10.9	1.5	1.7	1.8	2.0	2.3	
ZSTNB2002-1.5-04			1.5	0.4			0.19			1.77	10.4	2.0	2.2	2.4	2.6	2.9	
ZSTNB2002-2-09			2	0.9			0.23			1.10	10.1	x	2.8	3.1	3.4	3.9	
ZSTNB2002-2.5-09			2.5	0.9			0.24			1.10	9.6	x	3.3	3.7	4.0	4.5	
ZSTNB2003-2-04	0.15	0.3	2	0.4	0.25	0.28	0.29	50	4	2.19	10.0	2.5	2.8	3.0	3.2	3.5	
ZSTNB2003-3-09			3	0.9			0.36			1.20	9.3	x	3.8	4.2	4.5	5.1	
ZSTNB2003-4-09			4	0.9			0.39			1.20	8.6	x	4.8	5.3	5.7	6.3	
ZSTNB2004-2-04	0.2	0.4	2	0.4	0.3	0.37	0.39	50	4	2.20	10.0	2.5	2.8	3.0	3.2	3.5	
ZSTNB2004-3-04			3	0.4			0.41			2.44	9.1	3.6	3.9	4.1	4.4	4.8	
ZSTNB2004-4-04			4	0.4			0.42			2.44	8.4	4.7	5.2	5.6	5.9	6.5	
ZSTNB2004-4-09			4	0.9			0.49			1.25	8.5	x	4.8	5.3	5.7	6.3	
ZSTNB2004-5-04			5	0.4			0.44			2.44	7.8	5.7	6.3	6.7	7.1	7.7	
ZSTNB2004-5-09			5	0.9			0.52			1.25	7.9	x	5.9	6.4	6.8	7.5	
ZSTNB2005-4-04	0.25	0.5	4	0.4	0.35	0.47	0.52	50	4	2.49	8.4	4.6	5.0	5.3	5.5	5.9	
ZSTNB2005-8-09			8	0.9			0.71			1.30	6.5	x	8.9	9.6	10.1	10.9	
ZSTNB2005-12-09			12				0.84			1.30	5.3	x	13.0	13.9	14.5	15.4	
ZSTNB20054-2-04	0.27	0.54	2	0.4	0.37	0.52	0.54	50	4	1.80	10.0	2.3	2.5	2.7	2.8	3.0	
ZSTNB20054-4-04			4				0.57			1.80	8.4	4.5	4.9	5.2	5.5	5.9	
ZSTNB20054-5-04			5				0.59			1.80	7.8	5.5	6.0	6.3	6.6	7.1	
ZSTNB20054-6-04			6				0.60			1.80	7.2	6.7	7.3	7.8	8.2	8.8	
ZSTNB20054-6.5-04			6.5				0.61			1.80	7.0	7.2	7.9	8.3	8.7	9.4	
ZSTNB20054-7-04			7				0.61			1.80	6.8	7.7	8.4	8.9	9.3	10.0	
ZSTNB2006-2-04	0.3	0.6	2	0.4	0.4	0.57	0.59	50	4	2.17	10.0	2.4	2.5	2.7	2.8	3.0	
ZSTNB2006-4-04			4				0.62			2.54	8.4	4.6	5.0	5.2	5.5	5.9	
ZSTNB2006-6-04			6				0.65			2.54	7.2	6.8	7.4	7.8	8.2	8.8	
ZSTNB2006-6-09			6	0.9			0.75			1.35	7.3	x	6.9	7.5	7.9	8.6	
ZSTNB2006-8-09			8				0.81			1.35	6.4	x	8.9	9.6	10.1	10.9	
ZSTNB2006-10-04			10	0.4			0.70			2.54	5.6	10.8	11.7	12.2	12.7	13.5	
ZSTNB2006-10-09			10	0.9			0.87			1.35	5.7	x	11.0	11.8	12.3	13.2	
ZSTNB2006-12-09			12				0.93	55		1.35	5.2	x	13.0	13.9	14.5	15.4	
ZSTNB2006-15-04			15	0.4			0.77			2.54	4.4	15.9	17.0	17.6	18.2	19.2	
ZSTNB2006-15-09			15	0.9			1.03			1.35	4.5	x	16.1	17.1	17.7	18.8	

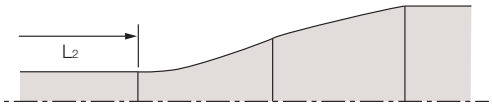
※ These tools are manufactured based on order received.

X No application
– No interference



2 FLUTE, TAPER NECK BACK DRAFT TYPE

- If the workpiece has draft angle, the interference length will be longer than the L_2.
- Please refer to the effective neck length for the various draft angles.
- In addition, the angle at which the tool will interfere with the workpiece is shown as the "interference angle θ_2", and should also be referred to.

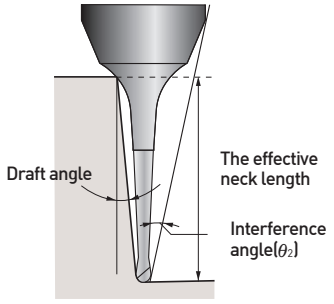


※The effective neck length shown is not an exact value and to avoid contact with the workpiece, we recommend the user control the precise value of this length.

EDP. No.	Dimension(mm)											Effective Neck Length					STOCK
	R	D	L_2	θ	L_1	d_1	d_2	L_3	d_3	App. L	θ_2	0.5°	1°	1.5°	2°	3°	
ZSTNB2008-4-04	0.4	0.8	4	0.4	0.5	0.77	0.82	50	4	2.64	8.3	4.6	4.9	5.2	5.5	5.9	
ZSTNB2008-6-04			6				0.85			2.64	7.1	6.6	7.1	7.5	7.7	8.3	
ZSTNB2008-8-09			8	0.9			1.01			1.45	6.3	x	8.9	9.6	10.1	10.9	
ZSTNB2008-12-09			12				1.13	55		1.45	5.0	x	13.0	13.9	14.5	15.4	
ZSTNB2008-16-09			16				1.26			1.45	4.2	x	17.1	18.1	18.8	19.9	
ZSTNB2009-4-04	0.45	0.9	4	0.4	0.6	0.86	0.91	50	4	3.46	8.2	4.5	4.7	4.9	5.1	5.4	
ZSTNB2009-8-04			8				0.96	55		3.46	6.1	8.7	9.3	9.7	10.0	10.6	
ZSTNB2009-12-04			12				1.02			3.46	4.8	12.9	13.8	14.4	14.9	15.7	
ZSTNB2009-16-04			16				1.08	60		3.46	4.0	17.0	18.0	18.7	19.3	20.5	
ZSTNB2009-18-04			18				1.10	65		3.46	3.7	19.1	20.1	20.9	21.5	23.1	
ZSTNB2009-20-04			20				1.13			3.46	3.4	21.1	22.2	23.0	23.6	25.6	
ZSTNB2009-22-04			22				1.16			3.46	3.2	23.1	24.3	25.1	25.8	28.2	
ZSTNB2009-24-04			24				1.19	70		3.46	3.0	25.2	26.4	27.2	27.9	-	
ZSTNB2010-6-04	0.5	1	6	0.4	0.8	0.94	1.01	50	6	5.09	8.3	6.8	7.2	7.5	7.8	8.3	
ZSTNB2010-8-04			8				1.04	55		5.09	7.5	8.8	9.3	9.7	10.0	10.6	
ZSTNB2010-10-04			10				1.07			5.09	6.8	11.0	11.7	12.3	12.7	13.5	
ZSTNB2010-10-09			10	0.9			1.23			2.70	6.9	x	11.2	11.9	12.4	13.2	
ZSTNB2010-15-09			15				1.39	60		2.70	5.7	x	16.2	17.1	17.8	18.8	
ZSTNB2010-20-04			20	0.4			1.21	65		5.09	4.7	21.2	22.3	23.0	23.6	25.7	
ZSTNB2010-20-09			20	0.9			1.54			2.70	4.8	x	21.3	22.4	23.1	24.6	
ZSTNB2010-25-09			25				1.70	70		2.70	4.2	x	26.4	27.6	28.4	30.8	
ZSTNB2010-30-04			30	0.4			1.35	75		5.09	3.6	31.3	32.7	33.6	34.8	38.5	
ZSTNB2010-30-09			30	0.9			1.86			2.70	3.7	x	31.4	32.8	33.7	36.9	
ZSTNB2010-35-09			35				2.02	80		2.70	3.3	x	36.5	38.0	39.0	43.1	
ZSTNB2010-40-09			40				2.17	85		2.70	3.0	x	41.6	43.2	44.4	-	
ZSTNB2010-50-09			50				2.49	95		2.70	2.5	x	51.7	53.5	55.5	-	
ZSTNB2010-60-09			60				2.80	105		2.70	2.2	x	61.8	63.8	66.6	-	
ZSTNB2010-70-09			70				3.11	115		2.70	1.9	x	71.9	74.0	-	-	
ZSTNB2015-8-04	0.75	1.5	8	0.4	1.35	1.42	1.51	55	6	7.07	7.3	8.9	9.4	9.7	10.0	10.6	
ZSTNB2015-10-04			10				1.54			7.07	6.6	10.9	11.5	11.9	12.2	12.9	

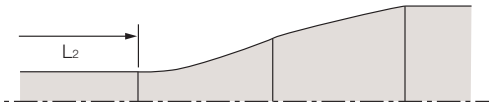
X No application
– No interference

※ These tools are manufactured based on order received.



2 FLUTE, TAPER NECK BACK DRAFT TYPE

- If the workpiece has draft angle, the interference length will be longer than the L_2.
- Please refer to the effective neck length for the various draft angles.
- In addition, the angle at which the tool will interfere with the workpiece is shown as the "interference angle θ_2", and should also be referred to.

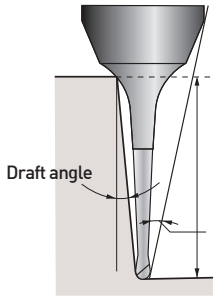


※The effective neck length shown is not an exact value and to avoid contact with the workpiece, we recommend the user control the precise value of this length.

EDP. No.	Dimension(mm)											Effective Neck Length					STOCK
	R	D	L_2	θ	L_1	d_1	d_2	L_3	d_3	App. L	θ_2	0.5°	1°	1.5°	2°	3°	
ZSTNB2015-12-04	0.75	1.5	12	0.4	1.35	1.42	1.57	55	6	7.07	6.0	13.0	13.6	14.0	14.4	15.4	
ZSTNB2015-15-09			15	0.9			1.85	60		3.89	5.4	x	16.4	17.2	17.8	18.8	
ZSTNB2015-20-09			20				2.01	65		3.89	4.5	x	21.4	22.4	23.2	24.7	
ZSTNB2015-30-09			30				2.32	75		3.89	3.4	x	31.5	32.9	33.7	37.0	
ZSTNB2018-4-04	0.9	1.8	4	0.4	1.6	1.73	1.76	50	6	4.38	9.2	4.6	4.8	4.9	5.1	5.4	
ZSTNB2018-8-04			8				1.82			6.61	7.1	8.6	9.0	9.2	9.4	10.2	
ZSTNB2018-12-04			12				1.88	55		6.61	5.8	12.9	13.5	14.0	14.4	15.4	
ZSTNB2018-16-04			16				1.93	60		6.61	4.9	17.0	17.7	18.3	18.7	20.5	
ZSTNB2018-20-04			20				1.99	65		6.61	4.3	21.2	22.3	23.0	23.6	25.6	
ZSTNB2018-24-04			24				2.04			6.61	3.8	25.3	26.5	27.3	27.9	30.8	
ZSTNB2018-28-04			28				2.10	70		6.61	3.4	29.4	30.6	31.5	32.4	35.9	
ZSTNB2018-32-04			32				2.15			6.61	3.0	33.4	34.8	35.7	37.1	-	
ZSTNB2018-36-04			36				2.21	75		6.61	2.8	37.5	38.9	39.9	41.7	-	
ZSTNB2018-38-04			38				2.24	80		6.61	2.7	39.5	41.0	42.0	44.0	-	
ZSTNB2018-40-04			40				2.27			6.61	2.6	41.5	43.1	44.2	46.3	-	
ZSTNB2020-8-04	1	2	8	0.4	1.7	1.92	2.01	50	6	7.42	7.0	8.7	9.0	9.2	9.5	10.2	
ZSTNB2020-12-04			12				2.06	55		7.42	5.7	13.0	13.6	14.0	14.4	15.4	
ZSTNB2020-16-04			16				2.12	60		7.42	4.8	17.0	17.7	18.3	18.7	20.5	
ZSTNB2020-20-04			20				2.18	65		7.42	4.1	21.3	22.3	23.0	23.6	25.6	
ZSTNB2020-20-09			20	0.9			2.50			4.24	4.2	x	21.4	22.4	23.2	24.6	
ZSTNB2020-25-09			25				2.65			4.24	3.6	x	26.5	27.7	28.5	30.8	
ZSTNB2020-30-04			30	0.4			2.32	70		7.42	3.1	31.4	32.7	33.6	34.8	38.5	
ZSTNB2020-30-09			30	0.9			2.81			4.24	3.2	x	31.6	32.9	33.7	36.9	
ZSTNB2020-35-09			35				2.97	75		4.24	2.8	x	36.6	38.0	39.0	-	
ZSTNB2020-40-04			40	0.4			2.46	80		7.42	2.5	41.5	43.1	44.2	46.3	-	
ZSTNB2020-40-09			40	0.9			3.12			4.24	2.6	x	41.7	43.2	44.5	-	
ZSTNB2020-50-09			50				3.44	90		4.24	2.1	x	51.8	53.5	55.5	-	
ZSTNB2020-60-09			60				3.75	100		4.24	1.8	x	61.9	63.8	-	-	
ZSTNB2020-70-09			70				4.07	110		4.24	1.6	x	72.0	74.1	-	-	
ZSTNB2030-8-04	1.5	3	8	0.4	2.5	2.86	2.94	50	6	8.50	6.3	8.8	9.1	9.3	9.5	10.3	
ZSTNB2030-16-04			16				3.05	55		12.52	4.1	17.2	17.8	18.3	18.7	20.6	

※ These tools are manufactured based on order received.

X No application
– No interference



2 FLUTE, TAPER NECK BACK DRAFT TYPE

- If the workpiece has draft angle, the interference length will be longer than the L_2.
- Please refer to the effective neck length for the various draft angles.
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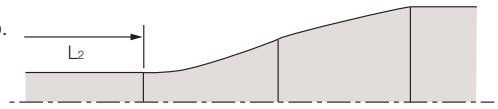

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EDP. No.	Dimension(mm)											Effective Neck Length					STOCK
	R	D	L_2	θ	L_1	d_1	d_2	L_3	d_3	App. L	θ_2	0.5°	1°	1.5°	2°	3°	
ZSTNB2030-20-04	1.5	3	20	0.4	2.5	2.86	3.10	60	6	12.52	3.4	21.2	22.0	22.6	23.3	25.7	
ZSTNB2030-30-04			30				3.24	70		12.52	2.5	31.6	32.8	33.7	34.9	-	
ZSTNB2030-30-09			30	0.9			3.72			6.95	2.6	x	31.8	33.0	33.8	-	
ZSTNB2030-40-04			40	0.4			3.38	80		12.52	2.0	41.7	43.2	44.3	-	-	
ZSTNB2030-40-09			40	0.9			4.04			6.95	2.0	x	41.9	43.3	-	-	
ZSTNB2030-50-09			50				4.35	90		6.95	1.7	x	52.0	53.6	-	-	
ZSTNB2030-60-09			60				4.67	100		6.95	1.4	x	62.1	-	-	-	
ZSTNB2030-70-09			70				4.98	110		6.95	1.2	x	72.1	-	-	-	
ZSTNB2040-20-10	2	4	20	1	8	3.86	4.28	70	8	12.01	5.0	20.5	21.6	22.3	22.8	23.5	
ZSTNB2040-30-10			30				4.63	80		12.01	3.51	22.0	31.6	32.5	33.2	34.16	
ZSTNB2040-40-10			40				4.98	90		12.01	2.7	22.0	42.0	43.4	44.3	-	
ZSTNB2040-50-10			50				5.33	100		12.01	2.2	22.0	52.0	53.6	54.7	-	
ZSTNB2040-60-10			60				5.68	110		12.01	1.9	22.0	62.0	63.8	-	-	
ZSTNB2050-30-10	2.5	5	30	1	10	4.86	5.56	80	8	14.01	2.8	25.5	31.7	32.6	33.2	-	
ZSTNB2050-40-10			40				5.91	90		14.01	2.1	25.5	41.7	42.8	43.5	-	
ZSTNB2050-60-10			60				6.61	110		14.01	1.5	25.5	62.1	-	-	-	
ZSTNB2060-30-10	3	6	30	1	12	5.86	6.49	80	8	16.01	1.9	29.0	31.8	32.6	-	-	
ZSTNB2060-40-10			40				6.84	90		16.01	1.5	29.0	41.8	-	-	-	
ZSTNB2060-50-10			50				7.19	100		16.01	1.2	29.0	51.8	-	-	-	
ZSTNB2060-60-10			60				7.54	110	10	16.01	1.9	29.0	62.2	63.9	-	-	
ZSTNB2060-70-10			70				7.89	120		16.01	1.7	29.0	72.2	74.1	-	-	
ZSTNB2060-80-10			80				8.23	130		16.01	1.5	29.0	82.2	-	-	-	
ZSTNB2080-50-10	4	8	50	1	14	7.86	9.12	110	10	18.01	1.2	32.0	51.9	-	-	-	
ZSTNB2080-60-10			60				9.47	120		18.01	1.0	32.0	-	-	-	-	
ZSTNB2080-70-10			70				9.82	130		18.01	0.9	32.0	-	-	-	-	
ZSTNB2080-80-10			80				10.16	140	12	18.01	1.5	32.0	82.3	-	-	-	
ZSTNB2100-60-10	5	10	60	1	18	9.86	11.33	130	12	22.01	1.1	39.0	62.1	-	-	-	
ZSTNB2100-75-10			75				11.85	140		22.01	0.9	39.0	-	-	-	-	

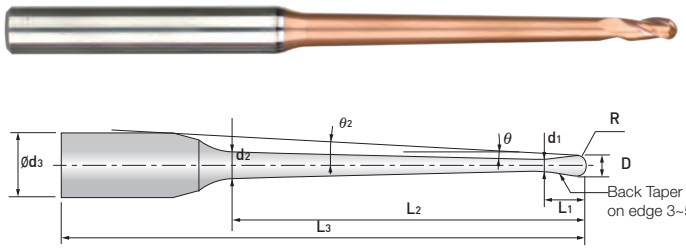
X No application
– No interference

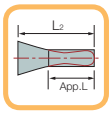
※ These tools are manufactured based on order received.

■ Tolerance

Diameter	Tolerance	Shank Dia.
up to 6	±0.005	h6
over 6	±0.01	

※Items can be changed for quality improvement without notice.





The effective neck length shown is not an exact value and to avoid contact with the workpiece, we recommend the user control the precise value of this length.

※R2 or higher is not applied to Back draft type.

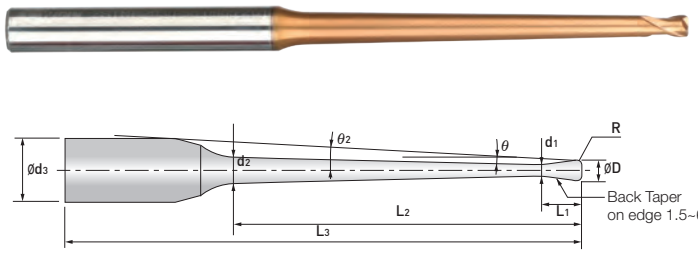
ZSTNB30..-..-.. series

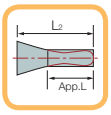
ULTRA FINE HELIX up to R3 over R3

EDP. No.	Dimension(mm)											Effective Neck Length					STOCK
	R	D	L2	θ	L1	d1	d2	L3	d3	App.L	θ2	0.5°	1°	1.5°	2°	3°	
ZSTNB3020-8-04	1	2	8	0.4	1.7	1.92	2.01	50	6	7.42	7.0	8.7	9.0	9.2	9.5	10.2	
ZSTNB3020-12-04			12				2.06	55		7.42	5.7	13.0	13.6	14.0	14.4	15.4	
ZSTNB3020-16-04			16				2.12	60		7.42	4.8	17.0	17.7	18.3	18.7	20.5	
ZSTNB3020-20-04			20				2.18	65		7.42	4.1	21.3	22.3	23.0	23.6	25.6	
ZSTNB3020-20-09			20	0.9			2.50			4.24	4.2	x	21.4	22.4	23.2	24.6	
ZSTNB3020-25-09			25				2.65			4.24	3.6	x	26.5	27.7	28.5	30.8	
ZSTNB3020-30-04			30	0.4			2.32	70		7.42	3.1	31.4	32.7	33.6	34.8	38.5	
ZSTNB3020-30-09			30	0.9			2.81			4.24	3.2	x	31.6	32.9	33.7	36.9	
ZSTNB3020-35-09			35				2.97	75		4.24	2.8	x	36.6	38.0	39.0	-	
ZSTNB3020-40-04			40	0.4			2.46	80		7.42	2.5	41.5	43.1	44.2	46.3	-	
ZSTNB3020-40-09			40	0.9			3.12	80		4.24	2.6	x	41.7	43.2	44.5	-	
ZSTNB3020-50-09			50				3.44	90		4.24	2.1	x	51.8	53.5	55.5	-	
ZSTNB3020-60-09			60				3.75	100		4.24	1.8	x	61.9	63.8	-	-	
ZSTNB3020-70-09			70				4.07	110		4.24	1.6	x	72.0	74.1	-	-	
ZSTNB3030-8-04	1.5	3	8	0.4	2.5	2.86	2.94	50	6	8.50	6.3	8.8	9.1	9.3	9.5	10.3	
ZSTNB3030-16-04			16				3.05	55		12.52	4.1	17.2	17.8	18.3	18.7	20.6	
ZSTNB3030-20-04			20				3.10	60		12.52	3.4	21.2	22.0	22.6	23.3	25.7	
ZSTNB3030-30-04			30				3.24	70		12.52	2.5	31.6	32.8	33.7	34.9	-	
ZSTNB3030-30-09			30	0.9			3.72			6.95	2.6	x	31.8	33.0	33.8	-	
ZSTNB3030-40-04			40	0.4			3.38	80		12.52	2.0	41.7	43.2	44.3	-	-	
ZSTNB3030-40-09			40	0.9			4.04			6.95	2.0	x	41.9	43.3	-	-	
ZSTNB3030-50-09			50				4.35	90		6.95	1.7	x	52.0	53.6	-	-	
ZSTNB3030-60-09			60				4.67	100		6.95	1.4	x	62.1	-	-	-	
ZSTNB3030-70-09			70				4.98	110		6.95	1.2	x	72.1	-	-	-	
ZSTNB3040-20-10	2	4	20	1	8	3.86	4.28	70	8	12.01	5.0	20.5	21.6	22.3	22.8	23.5	
ZSTNB3040-30-10			30				4.63	80		12.01	3.6	22.0	31.6	32.5	33.2	34.1	
ZSTNB3040-40-10			40				4.98	90		12.01	2.7	22.0	42.0	43.4	44.3	-	
ZSTNB3040-50-10			50				5.33	100		12.01	2.2	22.0	52.0	53.6	54.7	-	
ZSTNB3040-60-10			60				5.68	110		12.01	1.9	22.0	62.0	63.8	-	-	
ZSTNB3050-30-10	2.5	5	30	1	10	4.86	5.56	80	8	14.01	2.8	25.5	31.7	32.6	33.2	-	
ZSTNB3050-40-10			40				5.91	90		14.01	2.1	25.5	41.7	42.8	43.5	-	
ZSTNB3050-60-10			60				6.61	110		12.52	1.5	25.5	62.1	-	-	-	

X No application
– No interference

※ These tools are manufactured based on order received.





The effective neck length shown is not an exact value and to avoid contact with the workpiece, we recommend the user control the precise value of this length.

※R2 or higher is not applied to Back draft type.

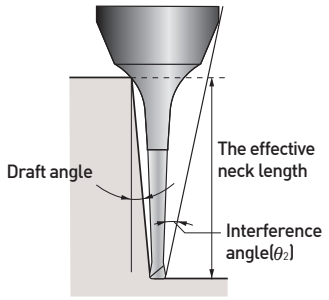
ZSTNR....-..-. series

ULTRA FINE HELIX

EDP. No.	Dimension(mm)											Effective Neck Length					STOCK
	R	D	L_2	θ	L_1	d_1	d_2	L_3	d_3	App. L	θ_2	0.5°	1°	1.5°	2°	3°	
ZSTNR2002-2-09005	0.2	0.05	2	0.9	0.15	0.17	0.23	50	4	1.10	10.0	x	2.8	3.1	3.4	3.9	
ZSTNR2004-4-09005	0.4	0.05	4	0.9	0.3	0.37	0.49	50	4	1.25	8.4	x	4.9	5.3	5.7	6.3	
ZSTNR2004-5-09005			5	0.9			0.52			1.25	7.8	x	5.9	6.4	6.8	7.5	
ZSTNR2004-4-0901		0.1	4	0.9			0.49			1.25	8.5	x	4.9	5.3	5.7	6.3	
ZSTNR2004-5-0901			5	0.9			0.52			1.25	7.9	x	5.9	6.4	6.8	7.5	
ZSTNR2005-5-0901	0.5	0.1	5	0.9	0.35	0.47	0.62	50	4	1.30	7.8	x	5.9	6.4	6.8	7.5	
ZSTNR2005-8-0901			8	0.9			0.71			1.30	6.4	x	9.0	9.7	10.2	11.0	
ZSTNR2005-10-0901			10	0.9			0.77	55		1.30	5.8	x	11.0	11.8	12.4	13.2	
ZSTNR2006-12-0901	0.6	0.1	12	0.9	0.4	0.57	0.93	55	4	1.35	5.1	x	13.0	13.9	14.5	15.5	
ZSTNR2006-15-0901			15	0.9			1.03			1.35	4.5	x	16.1	17.1	17.8	18.8	
ZSTNR2008-6-0402	0.8	0.2	6	0.4	0.5	0.77	0.85	50	4	2.64	7.0	6.6	7.1	7.5	7.8	8.3	
ZSTNR2008-12-0902			12	0.9			1.13	55		1.45	5.0	x	13.0	13.9	14.5	15.5	
ZSTNR2010-8-0402	1	0.2	8	0.4	0.8	0.94	1.04	55	6	5.09	7.4	8.8	9.3	9.7	10.1	10.6	
ZSTNR2010-10-0902			10	0.9			1.23			5.09	6.8	x	11.2	11.9	12.4	13.3	
ZSTNR2010-15-0902			15	0.9			1.39	60		2.70	5.6	x	16.3	17.2	17.8	18.8	
ZSTNR2010-20-0902			20	0.9			1.54	65		2.70	4.8	x	21.3	22.4	23.2	24.7	
ZSTNR2010-25-0902			25	0.9			1.70	70		2.70	4.1	x	26.4	27.6	28.5	30.9	
ZSTNR2010-30-0902			30	0.9			1.86	75		2.70	3.7	x	31.5	32.8	33.7	37.0	
ZSTNR2010-35-0902			35	0.9			2.02	80		2.70	3.3	x	36.5	38.0	39.0	43.2	
ZSTNR2010-8-0403		0.3	8	0.4			1.04	55		2.70	7.4	8.8	9.3	9.7	10.0	10.6	
ZSTNR2010-15-0903			15	0.9			1.39	60		2.70	5.6	x	16.3	17.2	17.8	18.8	
ZSTNR2010-25-0903			25	0.9			1.70	70		2.70	4.2	x	26.4	27.6	28.5	30.8	
ZSTNR2010-30-0903			30	0.9			1.86	75		2.70	3.7	x	31.5	32.8	33.7	37.0	
ZSTNR2015-10-0402	1.5	0.2	10	0.4	1.35	1.42	1.54	55	6	7.07	6.4	11.0	11.5	11.9	12.3	13.0	
ZSTNR2015-15-0902			15	0.9			1.85	60		7.07	5.3	x	16.4	17.3	17.9	18.9	
ZSTNR2015-20-0902			20	0.9			2.01	65		3.89	4.5	x	21.5	22.5	23.2	24.9	
ZSTNR2015-25-0902			25	0.9			2.16	70		3.89	3.9	x	26.6	27.7	28.5	31.0	
ZSTNR2015-30-0902			30	0.9			2.32	75		3.89	3.4	x	31.6	32.9	33.8	37.1	
ZSTNR2015-10-0403		0.3	10	0.4			1.54	55		3.89	6.4	11.0	11.5	11.9	12.3	13.0	

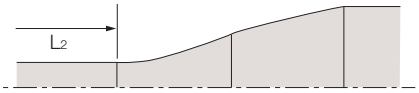
X No application
– No interference

※ These tools are manufactured based on order received.



2 FLUTE, TAPER NECK BACK DRAFT TYPE

- If the workpiece has draft angle, the interference length will be longer than the L_2.
- Please refer to the effective neck length for the various draft angles.
- In addition, the angle at which the tool will interfere with the workpiece is shown as the " interference angle θ_2", and should also be referred to.



※The effective neck length shown is not an exact value and to avoid contact with the workpiece, we recommend the user control the precise value of this length.

EDP. No.	Dimension(mm)											Effective Neck Length					STOCK
	R	D	L_2	θ	L_1	d_1	d_2	L_3	d_3	App. L	θ_2	0.5°	1°	1.5°	2°	3°	
ZSTNR2015-20-0903	1.5	0.3	20	0.9	1.35	1.42	2.01	65	6	3.89	4.5	x	21.5	22.5	23.2	24.8	
ZSTNR2015-25-0903			25				2.16	70			3.9	x	26.5	27.7	28.5	31.0	
ZSTNR2015-30-0903			30				2.32	75			3.4	x	31.6	32.9	33.8	37.1	
ZSTNR2020-30-0902	2	0.2	30	0.9	1.7	1.92	2.81	70	6	7.42	3.1	x	31.6	32.9	33.8	37.2	
ZSTNR2020-40-0902			40				3.12	80			2.5	x	41.8	43.3	44.6	-	
ZSTNR2020-50-0902			50				3.44	90			2.1	x	51.9	53.6	55.7	-	
ZSTNR2020-12-0403		0.3	12	0.4			2.06	55			5.5	13.0	13.6	14.1	14.5	15.6	
ZSTNR2020-20-0903			20	0.9			2.50	65		4.24	4.1	x	21.5	22.5	23.2	24.9	
ZSTNR2020-30-0903			30				2.81	70			3.1	x	31.6	32.9	33.8	37.1	
ZSTNR2020-40-0903			40				3.12	80			2.5	x	41.7	43.3	44.6	-	
ZSTNR2020-50-0903			50				3.44	90			2.1	x	51.8	53.6	55.7	-	
ZSTNR2020-8-0405		0.5	8	0.4			2.01	50			6.8	8.7	9.0	9.3	9.5	10.4	
ZSTNR2020-12-0405			12				2.06	55			5.6	13.0	13.6	14.1	14.4	15.5	
ZSTNR2020-16-0405			16				2.12	60			4.7	17.0	17.8	18.3	18.7	20.7	
ZSTNR2020-20-0905			20	0.9			2.50	65			4.2	x	21.5	22.5	23.2	24.8	
ZSTNR2020-25-0905			25				2.65	65			3.6	x	26.6	27.7	28.5	30.9	
ZSTNR2020-30-0905			30				2.81	70			3.1	x	31.6	32.9	33.8	37.1	
ZSTNR2020-40-0905			40				3.12	80			2.5	x	41.7	43.2	44.6	-	
ZSTNR2020-50-0905			50				3.44	90			2.1	x	51.8	53.6	55.6	-	
ZSTNR2030-40-0902	3	0.2	40	0.9	2.5	2.86	4.04	80	6	6.95	2.0	x	42.0	43.4	-	-	
ZSTNR2030-50-0902			50				4.35	90			1.6	x	52.1	53.7	-	-	
ZSTNR2030-60-0902			60				4.67	100			1.4	x	62.2	-	-	-	
ZSTNR2030-40-0903		0.3	40				4.04	80			2.0	x	42.0	43.4	-	-	
ZSTNR2030-50-0903			50				4.35	90			1.7	x	52.1	53.7	-	-	
ZSTNR2030-60-0903			60				4.67	100			1.4	x	62.2	-	-	-	
ZSTNR2030-40-0905		0.5	40				4.04	80			2.0	x	42.0	43.4	-	-	
ZSTNR2030-50-0905			50				4.35	90			1.7	x	52.1	53.7	-	-	
ZSTNR2030-60-0905			60				4.67	100			1.4	x	62.1	-	-	-	

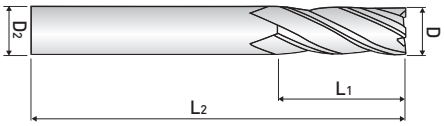
X No application
– No interference

※ These tools are manufactured based on order received.

■ Tolerance

Mill Dia. (mm)	Shank Dia.
0 ~ -0.015	h5

※Items can be changed for quality improvement without notice.



4 FLUTE, LONG CUT LENGTH BROKEN INDEX

- High precision and excellent surface due to each 4F unequal index geometry.
- Longer tool life over 50% as reducing chatter and resonance.

ZS124 ...series

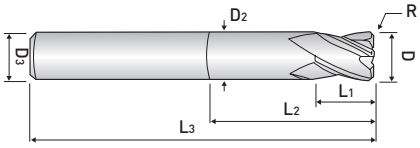
ULTRA FINE HELIX

EDP. No.	D	L_1	L_2	D_2	STOCK
ZS124 020	2	5	45	4	•
ZS124 030	3	8	45	6	•
ZS124 040	4	10	45	6	•
ZS124 060	6	16	50	6	•
ZS124 080	8	20	60	8	•
ZS124 100	10	25	75	10	•
ZS124 120	12	35	85	12	•

■ Tolerance

Mill Dia. (mm)	Shank Dia.
0 ~ -0.02	h6

※Items can be changed for quality improvement without notice.



4 FLUTE, CORNER RADIUS BROKEN INDEX

- The impacting debut of new type endmill for high hardened steels up to HRc70 and high speed machining up to 200m/min.
- High precision and excellent surface due to each 4F unequal index geometry.
- Longer tool life over 50% as reducing chatter and resonance.

ZS1(2)04 ...series

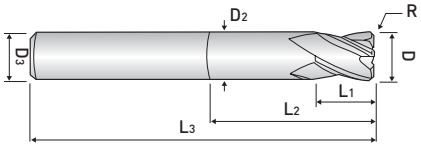
ULTRA FINE HELIX

EDP. No.	D	R	L_1	L_2	L_3	D_2	D_3	STOCK
ZS104010	1	-	1.5	4	45	0.9	4	•
ZS204010		0.05						•
ZS104020	2	-	3	6	45	1.9	4	•
ZS204020		0.05						•
ZS104030	3	-	4	7	45	2.9	6	•
ZS204030		0.1						•
ZS104040	4	-	5	9	45	3.8	6	•
ZS204040		0.1						•
ZS104060	6	-	7	14	50	5.8	6	•
ZS204060		0.2						•
ZS104080	8	-	9	18	60	7.8	8	•
ZS204080		0.2						•
ZS104100	10	-	12	25	75	9.7	10	•
ZS204100		0.2						•
ZS104120	12	-	15	30	75	11.7	12	•
ZS204120		0.3						•

■ Tolerance

Mill Dia. (mm)	Shank Dia.
0 ~ -0.02	h6

※Items can be changed for quality improvement without notice.



4 FLUTE, CORNER RADIUS BROKEN INDEX

- The impacting debut of new type endmill for high hardened steels up to HRc70 and high speed machining up to 200m/min.
- High precision and excellent surface due to each 4F unequal index geometry.
- Longer tool life over 50% as reducing chatter and resonance.

ZS204 .....series

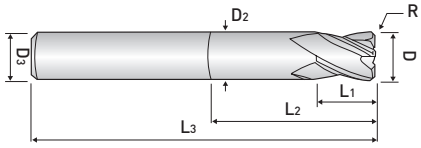
ULTRA FINE | 4 | HELIX | up to 6 | over 6

EDP. No.	D	R	L1	L2	L3	D2	D3	STOCK
ZS20402000507	2	0.05	2.5	7	50	1.9	4	•
ZS2040200107		0.1						•
ZS2040300109	3	0.1	4	9	55	2.9	6	•
ZS2040300209		0.2						•
ZS2040300309		0.3						•
ZS2040300312				12				•
ZS2040300316				16				•
ZS2040400212	4	0.2	5	12	55	3.8	6	•
ZS2040400312		0.3						•
ZS2040400316				16				•
ZS2040400320				20				•
ZS2040405012		0.5		12				•
ZS2040400516				16				•
ZS2040400520				20				•
ZS2040401012		1		12				•
ZS2040500116	5	0.1	6	16	60	4.8	6	•
ZS2040500216		0.2						•
ZS2040500316		0.3						•
ZS2040500516		0.5						•
ZS2040501016		1						•
ZS2040600120	6	0.1	7	20	60	5.8	6	•
ZS2040600220		0.2						•
ZS2040600320		0.3						•
ZS2040600520		0.5						•
ZS2040601020		1						•
ZS2040601520		1.5						•

■ Tolerance

Mill Dia. (mm)	Shank Dia.
0 ~ -0.02	h6

※Items can be changed for quality improvement without notice.



4 FLUTE, CORNER RADIUS BROKEN INDEX

- The impacting debut of new type endmill for high hardened steels up to HRc70 and high speed machining up to 200m/min.
- High precision and excellent surface due to each 4F unequal index geometry.
- Longer tool life over 50% as reducing chatter and resonance.

ZS204 .....series

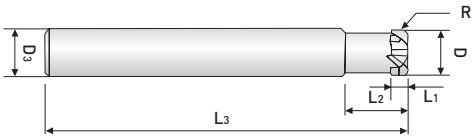
ULTRA FINE · HELIX · up to 6 · over 6

EDP. No.	D	R	L_1	L_2	L_3	D_2	D_3	STOCK
ZS2040800125	8	0.1	9	25	60	8	7.8	•
ZS2040800225		0.2						•
ZS2040800325		0.3						•
ZS2040800525		0.5						•
ZS2040801025		1						•
ZS2040801525		1.5						•
ZS2040802025		2						•
ZS2041000232	10	0.2	11	32	75	10	9.7	•
ZS2041000332		0.3						•
ZS2041000532		0.5						•
ZS2041001032		1						•
ZS2041001532		1.5						•
ZS2041002032		2						•
ZS2041200238	12	0.2	12	38	75	12	11.7	•
ZS2041200338		0.3						•
ZS2041200538		0.5						•
ZS2041201038		1						•
ZS2041201538		1.5						•
ZS2041202038		2						•

■ Tolerance

Mill Dia. (mm)	Shank Dia.
0 ~ -0.02	h6

※Items can be changed for quality improvement without notice.



4 FLUTE, STUB CUT LENGTH, with EXTENDED NECK

- Designed to machine high hardened material by using newly developed raw-material and new coating.
- Applying straight flute design on the tool to minimize the corner radius breakage.
- Applying back draft type on the tool to maximize the reducing chatter and preventing deflection.

ZSPM4...-.. series

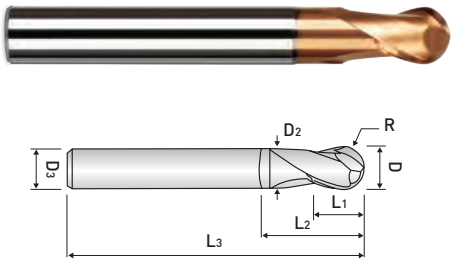
ULTRA FINE HELIX

EDP. No.	D	R	L_1	L_2	L_3	D_3	STOCK
ZSPM4030-05	3	0.5	1.2	8	50	6	•
ZSPM4040-05	4	0.5	1.5	10	50	6	•
ZSPM4060-05	6	0.5	2.5	12	60	6	•
ZSPM4060-10		1					•
ZSPM4060-15		1.5					•
ZSPM4060-15L					90		•
ZSPM4080-10	8	1	3.5	16	60	8	•
ZSPM4080-20		2					•
ZSPM4080-20L					100		•
ZSPM4100-10	10	1	4	20	70	10	•
ZSPM4100-20		2					•
ZSPM4100-20L					100		•
ZSPM4120-20	12	2	5	25	80	12	•
ZSPM4120-30		3					•
ZSPM4120-30L					110		•

■ Tolerance

Mill Dia. (mm)	Shank Dia.
0 ~ -0.02	h6

※Items can be changed for quality improvement without notice.



2 FLUTE, STUB CUT LENGTH, BALL NOSE with EXTENDED NECK

- Designed to machine high hardened materials up to HRc 70.
- Suitable for dry cutting & high speed cutting due to newly developed raw-material and new coating.
- Excellent workpiece finishes.

DB702 ...series

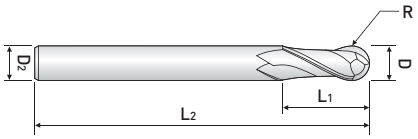
ULTRA FINE | HELIX | up to R3 | over R3

EDP. No.	D	R	L_1	L_2	L_3	D_2	D_3	STOCK
DB702001	0.1	0.05	0.15	-	40	-	4	•
DB702002	0.2	0.1	0.3	-	40	-	4	•
DB702003	0.3	0.15	0.5	-	40	-	4	•
DB702004	0.4	0.2	0.6	-	40	-	4	•
DB702005	0.5	0.25	0.7	-	40	-	4	•
DB702006	0.6	0.3	0.9	-	40	-	4	•
DB702007	0.7	0.35	1.1	-	40	-	4	•
DB702008	0.8	0.4	1.2	-	40	-	4	•
DB702009	0.9	0.45	1.4	-	40	-	4	•
DB702010S4	1	0.5	1.5	-	45	-	4	•
DB702010				3	50	0.95	6	•
DB702015S4		0.75	2	-	45	-	4	•
DB702015	1.5	0.75	2	4	50	1.45	6	•
DB702020S4	2	1	2.5	-	45	-	4	•
DB702020				5	50	1.9	6	•
DB702025	2.5	1.25	3	7	50	2.45	6	•
DB702030S4	3	1.5	4	-	45	-	4	•
DB702030S				10	50	2.9	6	•
DB702030					60			•
DB702031					70			•
DB702040S4	4	2	5	-	45	-	4	•
DB702040S				10	50	3.7	6	•
DB702040					60			•
DB702041					70			•
DB702050	5	2.5	6	12	60	4.7	6	•
DB702060	6	3	7	12	60	5.6	6	•
DB702061					90	5.9		•
DB702080	8	4	9	15	70	7.4	8	•
DB702081					100	7.9		•
DB702100	10	5	11	25	75	9.4	10	•
DB702101					100	9.9		•
DB702120	12	6	12	25	80	11.4	12	•
DB702121					110	11.9		•

■ Tolerance

Radius (mm)		Shank Dia.
up to R3	±0.005	h6
over R3	±0.01	

※Items can be changed for quality improvement without notice.



2 FLUTE, REGULAR LENGTH, BALL NOSE

- Designed to machine high hardened material up to HRc 70.
- Suitable for dry cutting & high speed cutting due to newly developed raw-material and new coating.
- Excellent workpiece finishes.

DB712 ...series

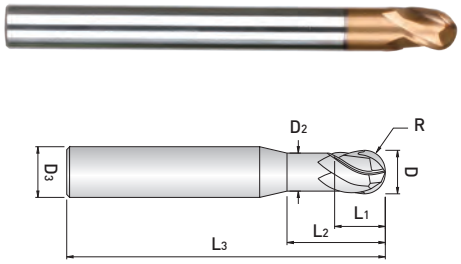
ULTRA FINE | HELIX | up to R3 | over R3

EDP. No.	Dia.	R	L_1	L_2	D_2	STOCK
DB712010S	1	0.5	1.5	40	6	•
DB712010S4			2.5	50	4	•
DB712010					6	•
DB712012	1.2	0.6	3	50	6	•
DB712015S	1.5	0.75	2.5	40	6	•
DB712015S4			4	50	4	•
DB712015					6	•
DB712020S	2	1	3	40	6	•
DB712020S4			5	50	4	•
DB712020					6	•
DB712025	2.5	1.25	7	60	6	•
DB712030S	3	1.5	4.5	50	6	•
DB712030S4			8	60	4	•
DB712030					6	•
DB712040S	4	2	6	50	6	•
DB712040			8	70		•
DB712050S	5	2.5	7.5	50	6	•
DB712050			10	80		•
DB712060S	6	3	9	50	6	•
DB712060			12	90		•
DB712080S	8	4	12	50	8	•
DB712081			14	100		•
DB712100S	10	5	15	60	10	•
DB712100			18	100		•
DB712120S	12	6	18	60	12	•
DB712120			22	110		•

■ Tolerance

Radius (mm)		Shank Dia.
up to R3	±0.005	h6
over R3	±0.01	

※Items can be changed for quality improvement without notice.



3FLUTE, BALL NOSE for finishing MOLD & DIE

- Designed to machine high hardened material up to HRc 70.
- Suitable for dry cutting & high speed cutting due to newly developed raw-material and new coating.
- Excellent workpiece finishes.

DB703 ...series

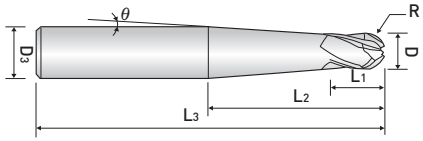
ULTRA FINE | HELIX | up to R3 | over R3

EDP. No.	D	R	L_1	L_2	L_3	D_2	D_3	STOCK
DB703020	2	1	2.5	5	50	1.9	6	•
DB703025	2.5	1.25	3	7	50	2.4	6	•
DB703030S	3	1.5	4	10	50	2.9	6	•
DB703030					60			•
DB703031					70			•
DB703040S	4	2	5	10	50	3.7	6	•
DB703040					60			•
DB703041					70			•
DB703050	5	2.5	6	12	60	4.7	6	•
DB703060	6	3	7	12	60	5.6	6	•
DB703061					90	5.9		•
DB703080	8	4	9	15	70	7.4	8	•
DB703081					100	7.9		•
DB703100	10	5	11	25	75	9.4	10	•
DB703101					100	9.9		•
DB703120	12	6	12	25	80	11.4	12	•
DB703121					110	11.9		•

■ Tolerance

Radius (mm)		Shank Dia.
up to R3	±0.005	h6
over R3	±0.01	

※Items can be changed for quality improvement without notice.



4FLUTE, TAPER NECK, FINISHING MOLD & DIE

- Designed to machine high hardened material up to HRc 70.
- Suitable for dry cutting & high speed cutting due to newly developed raw-material and new coating.
- Excellent workpiece finishes.

DB734 ...series

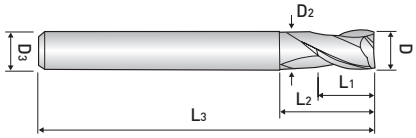
ULTRA FINE HELIX

EDP. No.	D	R	L1	L2	L3	θ	D3	STOCK
DB734020-2.5	2	1	2	25	60	2.5	4	•
DB734020-3.5				18		3.5		•
DB734025-2.5	2.5	1.25	3	20	60	2.5	4	•
DB734025-3.0				17		3		•
DB734030-2.0	3	1.5	3	46	70	2	6	•
DB734030-2.5				37		2.5		•
DB734040-2.0	4	2.0	4	33	70	2	6	•
DB734040-2.5				27		2.5		•
DB734050-2.5	5	2.5	5	16	70	2.5	6	•
DB734060-1.5	6	3.0	6	44	100	1.5	8	•
DB734060-2.5				29		2.5		•
DB734080-1.5	8	4.0	8	46	100	1.5	10	•
DB734080-2.5				31		2.5		•
DB734100-1.5	10	5.0	10	48	110	1.5	12	•
DB734100-2.5				33		2.5		•

■ Tolerance

Radius (mm)	Shank Dia.
±0.01	h6

※Items can be changed for quality improvement without notice.



2 FLUTE, STUB CUT LENGTH, with EXTENDED NECK

- Designed to machine high hardened materials up to HRc 70.
- Suitable for dry cutting & high speed cutting due to newly developed raw-material and new coating.

ZE702 ...series

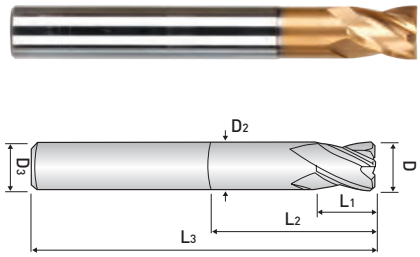
ULTRA FINE HELIX

EDP. No.	D	L_1	L_2	L_3	D_2	D_3	STOCK
ZE702001	0.1	0.2	-	40	-	4	•
ZE702002	0.2	0.4	-	40	-	4	•
ZE702003	0.3	0.5	-	40	-	4	•
ZE702004	0.4	0.7	-	40	-	4	•
ZE702005	0.5	1	-	40	-	4	•
ZE702006	0.6	1.2	-	40	-	4	•
ZE702007	0.7	1.4	-	40	-	4	•
ZE702008	0.8	1.6	-	40	-	4	•
ZE702009	0.9	2	-	40	-	4	•
ZE702010S4	1	1.5	-	40	-	4	•
ZE702010						6	•
ZE702015	1.5	2.2	-	40	-	6	•
ZE702020S4	2	3	6	40	1.9	4	•
ZE702020s						6	•
ZE702025	2.5	4	6	40	2.4	6	•
ZE702030	3	4	7	45	2.9	6	•
ZE702035	3.5	6	9	45	3.3	6	•
ZE702040	4	6	9	45	3.8	6	•
ZE702045	4.5	6	10	45	4.3	6	•
ZE702050	5	6	11	50	4.8	6	•
ZE702060	6	7	14	50	5.8	6	•
ZE702080	8	9	18	60	7.8	8	•
ZE702100	10	12	25	75	9.7	10	•
ZE702120	12	15	30	75	11.7	12	•
ZE702160	16	18	38	90	15.7	16	•
ZE702200	20	24	45	100	19.7	20	•

■ Tolerance

Mill Dia. (mm)		Shank Dia.
Diameter	Tolerance	
up to 6	0 ~ -0.012	h6
over 6	0 ~ -0.015	

※Items can be changed for quality improvement without notice.



4 FLUTE, STUB CUT LENGTH, with EXTENDED NECK

- Designed to machine high hardened materials up to HRc 70.
- Suitable for dry cutting & high speed cutting due to newly developed raw-material and new coating.

ZE704 ...series

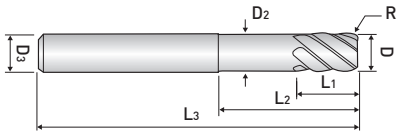
ULTRA FINE HELIX

EDP. No.	D	L_1	L_2	L_3	D_2	D_3	STOCK
ZE704010S4	1	1.5	-	40	-	4	•
ZE704010						6	•
ZE704015	1.5	2.2	-	40	-	6	•
ZE704020S4	2	3	6	40	1.9	4	•
ZE704020						6	•
ZE704025	2.5	4	6	40	2.4	6	•
ZE704030	3	4	7	45	2.9	6	•
ZE704035	3.5	5	9	45	3.3	6	•
ZE704040	4	5	9	45	3.8	6	•
ZE704045	4.5	6	10	45	4.3	6	•
ZE704050	5	6	11	50	4.8	6	•
ZE704060	6	7	14	50	5.8	6	•
ZE704080	8	9	18	60	7.8	8	•
ZE704100	10	12	25	75	9.7	10	•
ZE704120	12	15	30	75	11.7	12	•
ZE704160	16	18	38	90	15.7	16	•
ZE704200	20	24	45	100	19.7	20	•

■ Tolerance

Mill Dia. (mm)		Shank Dia.
Diameter	Tolerance	
up to 6	0 ~ -0.012	h6
over 6	0 ~ -0.015	

※Items can be changed for quality improvement without notice.



4 & 6 FLUTE, FINISHING for MOLD & DIE

- Designed to machine high hardened materials up to HRc 70.
- Suitable for dry cutting & high speed cutting due to newly developed raw-material and new coating.
- Corner radius(below 0.05) against chipping in high speed machining.

ZE724(6) ...series

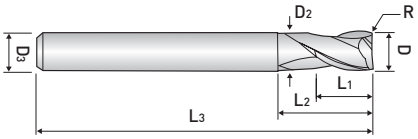
ULTRA FINE | ø1~ø5 | ø6~ø12 | 4 FLUTE | 6 FLUTE | R≤0.05

EDP. No.	D	R	L_1	L_2	L_3	D_2	D_3	Z	STOCK
ZE724010	1	-	1.5	5	45	0.95	6	4	•
ZE724015	1.5	-	2.2	6	45	1.45	6	4	•
ZE724020	2	0.05	3	8	45	1.9	6	4	•
ZE724030	3	0.05	4	9	50	2.9	6	4	•
ZE724040	4	0.05	5	12	50	3.8	6	4	•
ZE724050	5	0.05	6	15	50	4.8	6	4	•
ZE726060	6	0.05	7	20	60	5.8	6	6	•
ZE726080	8	0.05	9	25	70	7.8	8	6	•
ZE726100	10	0.05	12	32	75	9.7	10	6	•
ZE726120	12	0.05	15	38	80	11.7	12	6	•

■ Tolerance

Mill Dia. (mm)		Shank Dia.
Diameter	Tolerance	
up to 6	0 ~ -0.015	h6
over 6	0 ~ -0.02	

※Items can be changed for quality improvement without notice.



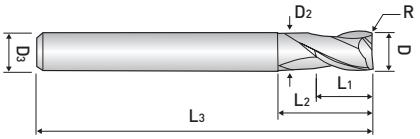
2 FLUTE, STUB CUT LENGTH, CORNER RADIUS with EXTENDED NECK

- Applied various corner "Radius" and effected length.
- Suitable for dry cutting & high speed cutting due to newly developed raw-material and new coating.

ZR702 .....series

ULTRA FINE | 4 FLUTE | up to 6 | over Φ6

EDP. No.	D	R	L1	L2	L3	D2	D3	STOCK
ZR702 010 005 03 S4	1	0.05	1.5	3	50	0.95	4	•
ZR702 010 005 04 S4				4				•
ZR702 010 005 06 S4				6				•
ZR702 010 005 08 S4				8				•
ZR702 010 005 10 S4				10				•
ZR702 010 01 03 S4		0.1		3				•
ZR702 010 01 04 S4				4				•
ZR702 010 01 06 S4				6				•
ZR702 010 01 08 S4				8				•
ZR702 010 01 10 S4				10				•
ZR702 010 02 03 S4		0.2		3				•
ZR702 010 02 04 S4				4				•
ZR702 010 02 06 S4				6				•
ZR702 010 02 08 S4				8				•
ZR702 010 02 10 S4				10				•
ZR702 010 03 03 S4		0.3		3				•
ZR702 010 03 04 S4				4				•
ZR702 010 03 06 S4				6				•
ZR702 010 03 08 S4				8				•
ZR702 010 03 10 S4				10				•
ZR702 010 01 04	1	0.1	1.5	4	50	0.95	6	•
ZR702 010 01 06				6				•
ZR702 010 02 04		0.2		4				•
ZR702 010 02 06				6				•
ZR702 010 02 10				10				•
ZR702 010 02 12				12				•
ZR702 012 02 08	1.2	0.2	2	8	50	1.15	6	•
ZR702 012 02 12				12				•
ZR702 015 005 04 S4	1.5	0.05	2.5	4	50	1.45	4	•
ZR702 015 005 06 S4				6				•
ZR702 015 005 08 S4				8				•
ZR702 015 005 10 S4				10				•
ZR702 015 005 12 S4				12				•
ZR702 015 01 04 S4		0.1		4				•
ZR702 015 01 06 S4				6				•
ZR702 015 01 08 S4				8				•
ZR702 015 01 10 S4				10				•
ZR702 015 01 12 S4				12				•

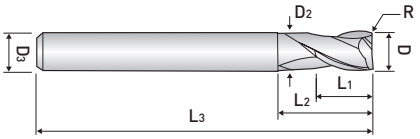


2 FLUTE, STUB CUT LENGTH, CORNER RADIUS with EXTENDED NECK

- Applied various corner "Radius" and effected length.
- Suitable for dry cutting & high speed cutting due to newly developed raw-material and new coating.

ZR702 .....series

EDP. No.	D	R	L1	L2	L3	D2	D3	STOCK
ZR702 015 02 04 S4	1.5	0.2	2.5	4	50	1.45	4	•
ZR702 015 02 06 S4				6				•
ZR702 015 02 08 S4				8				•
ZR702 015 02 10 S4				10				•
ZR702 015 02 12 S4				12				•
ZR702 015 03 04 S4		0.3		4				•
ZR702 015 03 06 S4				6				•
ZR702 015 03 08 S4				8				•
ZR702 015 03 10 S4				10				•
ZR702 015 03 12 S4				12				•
ZR702 015 05 04 S4		0.5		4				•
ZR702 015 05 06 S4				6				•
ZR702 015 05 08 S4				8				•
ZR702 015 05 10 S4				10				•
ZR702 015 05 12 S4				12				•
ZR702 015 02 04	1.5	0.2	2.5	4	50	1.45	6	•
ZR702 015 02 06				6				•
ZR702 015 02 08				8				•
ZR702 015 02 10				10				•
ZR702 015 02 15				15				•
ZR702 020 01 06 S4	2	0.1	3	6	50	1.9	4	•
ZR702 020 01 08 S4				8				•
ZR702 020 01 10 S4				10				•
ZR702 020 01 12 S4				12				•
ZR702 020 01 16 S4				16				•
ZR702 020 01 20 S4				20				•
ZR702 020 02 06 S4		0.2		6				•
ZR702 020 02 08 S4				8				•
ZR702 020 02 10 S4				10				•
ZR702 020 02 12 S4				12				•
ZR702 020 02 16 S4				16				•
ZR702 020 02 20 S4				20				•
ZR702 020 03 06 S4		0.3		6				•
ZR702 020 03 08 S4				8				•
ZR702 020 03 10 S4				10				•
ZR702 020 03 12 S4				12				•
ZR702 020 03 16 S4				16				•
ZR702 020 03 20 S4				2				•



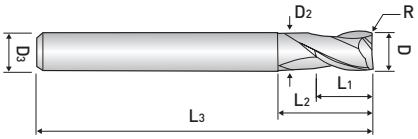
2 FLUTE, STUB CUT LENGTH, CORNER RADIUS with EXTENDED NECK

- Applied various corner "Radius" and effected length.
- Suitable for dry cutting & high speed cutting due to newly developed raw-material and new coating.

ZR702 .....series

ULTRA FINE | 4 FLUTE | up to 6 | over Φ6

EDP. No.	D	R	L1	L2	L3	D2	D3	STOCK
ZR702 020 05 06 S4	2	0.5	3	6	50	1.9	4	•
ZR702 020 05 08 S4				8				•
ZR702 020 05 10 S4				10				•
ZR702 020 05 12 S4				12				•
ZR702 020 05 16 S4				16				•
ZR702 020 05 20 S4				20				•
ZR702 020 01 08	2	0.1	3	8	50	1.9	6	•
ZR702 020 01 12				12				•
ZR702 020 02 06		0.2		6				•
ZR702 020 02 09				9				•
ZR702 020 02 16				16				•
ZR702 020 03 06		0.3		6				•
ZR702 020 05 06		0.5		6				•
ZR702 020 05 09				9				•
ZR702 020 05 12				12				•
ZR702 020 05 16				16				•
ZR702 025 02 08 S4	2.5	0.2	3.5	8	50	2.4	4	•
ZR702 025 02 10 S4				10				•
ZR702 025 02 12 S4				12				•
ZR702 025 02 16 S4				16				•
ZR702 025 03 08 S4		0.3		8				•
ZR702 025 03 10 S4				10				•
ZR702 025 03 12 S4				12				•
ZR702 025 03 16 S4				16				•
ZR702 025 05 08 S4		0.5		8				•
ZR702 025 05 10 S4				10				•
ZR702 025 05 12 S4				12				•
ZR702 025 05 16 S4				16				•
ZR702 030 01 08	3	0.1	*4.5	8	55	2.9	6	•
ZR702 030 01 10				10				•
ZR702 030 01 12				12				•
ZR702 030 01 16				16				•
ZR702 030 01 20				20	60			•
ZR702 030 02 08		0.2		8	55			•
ZR702 030 02 09				9				•
ZR702 030 02 10				10				•



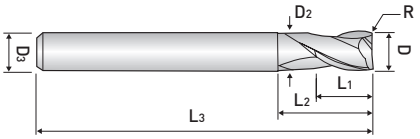
2 FLUTE, STUB CUT LENGTH, CORNER RADIUS with EXTENDED NECK

- Applied various corner "Radius" and effected length.
- Suitable for dry cutting & high speed cutting due to newly developed raw-material and new coating.

ZR702 .....series

ULTRA FINE | 4 FLUTE | up to 6 | over Φ6

EDP. No.	D	R	L1	L2	L3	D2	D3	STOCK
ZR702 030 02 12	3	0.2	4.5	12	55	2.9	6	•
ZR702 030 02 16				16				•
ZR702 030 02 20				20	60			•
ZR702 030 03 08	3	0.3	4.5	8	55	2.9	6	•
ZR702 030 03 09				9				•
ZR702 030 03 10				10				•
ZR702 030 03 12				12				•
ZR702 030 03 14				14				•
ZR702 030 03 16				16				•
ZR702 030 03 20				20	60			•
ZR702 030 05 08		0.5		8	55			•
ZR702 030 05 09				9				•
ZR702 030 05 10				10				•
ZR702 030 05 12				12				•
ZR702 030 05 16				16				•
ZR702 030 05 20				20	60			•
ZR702 030 10 08		1.0		8	55			•
ZR702 030 10 10				10				•
ZR702 030 10 12				12				•
ZR702 030 10 16				16				•
ZR702 030 10 20				20	60			•
ZR702 030 10 25				25				•
ZR702 040 01 10	4	1.0	6	10	55	3.8	6	•
ZR702 040 01 12				12				•
ZR702 040 01 16				16				•
ZR702 040 01 20				20	60			•
ZR702 040 01 25		0.2		25				•
ZR702 040 02 10				10	55			•
ZR702 040 02 12				12				•
ZR702 040 02 16				16				•
ZR702 040 02 20				20	60			•
ZR702 040 02 25		0.3		25				•
ZR702 040 03 10				10	55			•
ZR702 040 03 12				12				•
ZR702 040 03 16				16				•
ZR702 040 03 20				20	60			•
ZR702 040 03 25				25				•



2 FLUTE, STUB CUT LENGTH, CORNER RADIUS with EXTENDED NECK

- Applied various corner "Radius" and effected length.
- Suitable for dry cutting & high speed cutting due to newly developed raw-material and new coating.

ZR702 .....series

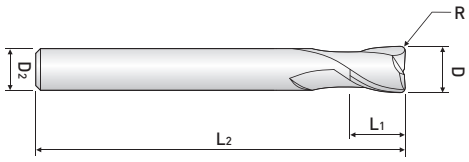
ULTRA FINE | 4 FLUTE | up to 6 | over Φ6

EDP. No.	D	R	L1	L2	L3	D2	D3	STOCK
ZR702 040 05 10	4	0.5	6	10	55	3.8	6	•
ZR702 040 05 12				12				•
ZR702 040 05 16				16				•
ZR702 040 05 20				20	60			•
ZR702 040 05 25				25				•
ZR702 040 05 30				30	70			•
ZR702 040 10 10		1.0		10	55			•
ZR702 040 10 12				12				•
ZR702 040 10 16				16				•
ZR702 040 10 20				20	60			•
ZR702 040 10 25				25				•
ZR702 040 10 30				30	70			•
ZR702 050 03 18	5	0.3	8	18	60	4.8	6	•
ZR702 060 02 20	6	0.2	9	20	60	5.8	6	•
ZR702 060 03 20		0.3						•
ZR702 060 05 20		0.5						•
ZR702 060 10 20		1.0						•
ZR702 060 15 20		1.5						•
ZR702 060 20 20		2.0						•
ZR702 080 02 25	8	0.2	12	25	60	7.8	8	•
ZR702 080 03 25		0.3						•
ZR702 080 05 25		0.5						•
ZR702 080 10 25		1.0						•
ZR702 080 15 25		1.5						•
ZR702 100 02 32	10	0.2	15	32	70	9.7	10	•
ZR702 100 03 32		0.3						•
ZR702 100 05 32		0.5						•
ZR702 100 10 32		1.0						•
ZR702 100 15 32		1.5						•
ZR702 100 20 32		2.0						•
ZR702 120 03 38	12	0.3	18	38	80	11.7	12	•
ZR702 120 05 38		0.5						•
ZR702 120 10 38		1.0						•
ZR702 120 15 38		1.5						•
ZR702 120 20 38		2.0						•

■ Tolerance

Mill Dia. (mm)		Shank Dia.
Diameter	Tolerance	
up to 6	0 ~ -0.012	h6
over 6	0 ~ -0.015	

※Items can be changed for quality improvement without notice.

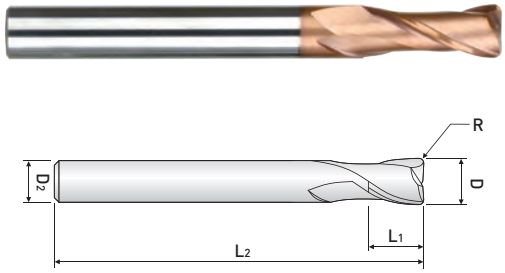


2 FLUTE, LONG SHANK, CORNER RADIUS

- Applied various corner "Radius" and effected length.
- Suitable for dry cutting & high speed cutting due to newly developed raw-material and new coating.

ZR732 .....series

EDP. No.	Dia.	R	L_1	L_2	D_2	STOCK
ZR732 010 01	1	0.1	2	50	6	•
ZR732 010 02		0.2				•
ZR732 010 03		0.3				•
ZR732 015 01	1.5	0.1	3	50	6	•
ZR732 015 02		0.2				•
ZR732 015 03		0.3				•
ZR732 015 05		0.5				•
ZR732 020 01	2	0.1	5	50	6	•
ZR732 020 02		0.2				•
ZR732 020 03		0.3				•
ZR732 020 05		0.5				•
ZR732 025 01	2.5	0.1	7	60	6	•
ZR732 025 02		0.2				•
ZR732 025 03		0.3				•
ZR732 025 05		0.5				•
ZR732 030 01	3	0.1	8	60	6	•
ZR732 030 02		0.2				•
ZR732 030 03		0.3				•
ZR732 030 05		0.5				•
ZR732 040 01	4	0.1	10	70	6	•
ZR732 040 02		0.2				•
ZR732 040 03		0.3				•
ZR732 040 05		0.5				•
ZR732 040 10		1.0				•



2 FLUTE, LONG SHANK, CORNER RADIUS

- Applied various corner "Radius" and effected length.
- Suitable for dry cutting & high speed cutting due to newly developed raw-material and new coating.

ZR732 .....series

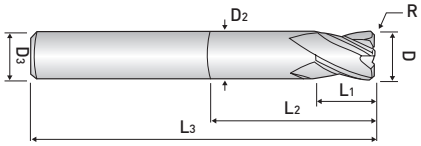
ULTRA FINE | 4 FLUTE | up to 6 | over Φ6

EDP. No.	Dia.	R	L_1	L_2	D_2	STOCK
ZR732 050 01	5	0.1	13	80	6	•
ZR732 050 02		0.2				•
ZR732 050 03		0.3				•
ZR732 050 05		0.5				•
ZR732 050 10		1.0				•
ZR732 060 01	6	0.1	15	90	6	•
ZR732 060 02		0.2				•
ZR732 060 03		0.3				•
ZR732 060 05		0.5				•
ZR732 060 10		1.0				•
ZR732 080 01	8	0.1	20	100	8	•
ZR732 080 02		0.2				•
ZR732 080 03		0.3				•
ZR732 080 05		0.5				•
ZR732 080 10		1.0				•
ZR732 080 20		2.0				•
ZR732 100 02	10	0.2	25	100	10	•
ZR732 100 03		0.3				•
ZR732 100 05		0.5				•
ZR732 100 10		1.0				•
ZR732 100 20		2.0				•
ZR732 120 02	12	0.2	30	110	12	•
ZR732 120 03		0.3				•
ZR732 120 05		0.5				•
ZR732 120 10		1.0				•
ZR732 120 20		2.0				•

■ Tolerance

Mill Dia. (mm)		Shank Dia.
Diameter	Tolerance	
up to 6	0 ~ -0.012	h6
over 6	0 ~ -0.015	

※Items can be changed for quality improvement without notice.



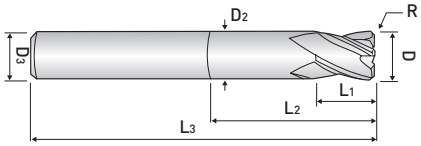
4 FLUTE, STUB CUT LENGTH, CORNER RADIUS with EXTENDED NECK

- Applied various corner "Radius" and effected length.
- Suitable for dry cutting & high speed cutting due to newly developed raw-material and new coating.

ZR704 .....series

ULTRA FINE | 4 FLUTE | up to Φ6 | over Φ6

EDP. No.	D	R	L1	L2	L3	D2	D3	STOCK
ZR704 010 01 03 S4	1	0.1	2	3	50	0.95	4	•
ZR704 010 01 04 S4				4				•
ZR704 010 01 06 S4				6				•
ZR704 010 02 03 S4		0.2		3				•
ZR704 010 02 04 S4				4				•
ZR704 010 02 06 S4				6				•
ZR704 010 03 03 S4		0.3		3				•
ZR704 010 03 04 S4				4				•
ZR704 010 03 06 S4				6				•
ZR704 015 01 04 S4	1.5	0.1	2.5	4	50	1.45	4	•
ZR704 015 01 06 S4				6				•
ZR704 015 02 04 S4		0.2		4				•
ZR704 015 02 06 S4				6				•
ZR704 015 03 04 S4		0.3		4				•
ZR704 015 03 06 S4				6				•
ZR704 020 01 06 S4	2	0.1	3	6	50	1.9	4	•
ZR704 020 01 08 S4				8				•
ZR704 020 02 06 S4		0.2		6				•
ZR704 020 02 08 S4				8				•
ZR704 020 03 06 S4		0.3		6				•
ZR704 020 03 08 S4				8				•
ZR704 020 05 06 S4		0.5		6				•
ZR704 020 05 08 S4				8				•
ZR704 020 02 08	2	0.2	3	8	50	1.9	6	•
ZR704 020 02 10				10				•
ZR704 020 02 12				12				•
ZR704 025 01 06 S4	2.5	0.1	3.5	6	50	2.4	4	•
ZR704 030 01 08	3	0.1	4	8	55	2.9	6	•
ZR704 030 01 10				10				•
ZR704 030 01 12				12				•
ZR704 030 01 16				16				•
ZR704 030 01 20				20	60			•
ZR704 030 02 08		0.2		8	55			•
ZR704 030 02 10				10				•
ZR704 030 02 12				12				•
ZR704 030 02 16				16				•
ZR704 030 02 20				20	60			•

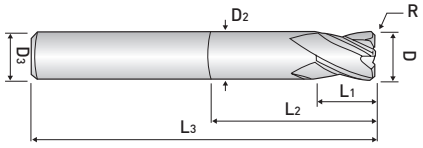


4 FLUTE, STUB CUT LENGTH, CORNER RADIUS with EXTENDED NECK

- Applied various corner "Radius" and effected length.
- Suitable for dry cutting & high speed cutting due to newly developed raw-material and new coating.

ZR704 .....series

EDP. No.	D	R	L1	L2	L3	D2	D3	STOCK
ZR704 030 03 08	3	0.3	4	8	55	2.9	6	•
ZR704 030 03 09				9				•
ZR704 030 03 10				10				•
ZR704 030 03 12				12				•
ZR704 030 03 16				16				•
ZR704 030 03 20				20	60			•
ZR704 030 05 08		0.5		8	55			•
ZR704 030 05 09				9				•
ZR704 030 05 10				10				•
ZR704 030 05 12				12				•
ZR704 030 05 16				16				•
ZR704 030 05 20				20	60			•
ZR704 030 10 08		1.0		8	55			•
ZR704 030 10 10				10				•
ZR704 030 10 12				12				•
ZR704 030 10 16				16				•
ZR704 030 10 20				20	60			•
ZR704 040 01 10	4	0.1	6	10	55	3.8	6	•
ZR704 040 01 12				12				•
ZR704 040 01 16				16				•
ZR704 040 01 20				20	60			•
ZR704 040 01 25				25				•
ZR704 040 02 10		0.2		10	55			•
ZR704 040 02 12				12				•
ZR704 040 02 16				16				•
ZR704 040 02 20				20	60			•
ZR704 040 02 25				25				•
ZR704 040 03 10		0.3		10	55			•
ZR704 040 03 12				12				•
ZR704 040 03 16				16				•
ZR704 040 03 20				20	60			•
ZR704 040 03 25				25				•
ZR704 040 05 10		0.5		10	55			•
ZR704 040 05 12				12				•
ZR704 040 05 16				16				•
ZR704 040 05 20				20	60			•
ZR704 040 05 25				25				•



4 FLUTE, STUB CUT LENGTH, CORNER RADIUS with EXTENDED NECK

- Applied various corner "Radius" and effected length.
- Suitable for dry cutting & high speed cutting due to newly developed raw-material and new coating.

ZR704 .....series

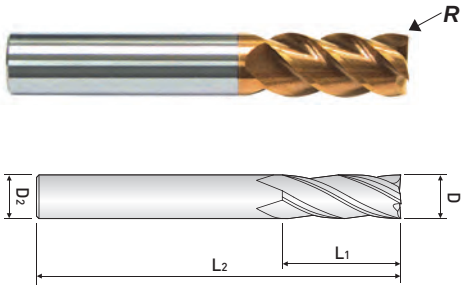
ULTRA FINE | 4 FLUTE | up to Φ6 | over Φ6

EDP. No.	D	R	L1	L2	L3	D2	D3	STOCK
ZR704 040 10 10	4	1.0	6	10	55	3.8	6	•
ZR704 040 10 12				12				•
ZR704 040 10 16				16				•
ZR704 040 10 20				20	60			•
ZR704 040 10 25				25				•
ZR704 060 02 20	6	0.2	9	20	60	5.8	6	•
ZR704 060 03 20		0.3						•
ZR704 060 05 20		0.5						•
ZR704 060 10 20		1.0						•
ZR704 060 15 20		1.5						•
ZR704 060 20 20		2.0						•
ZR704 080 02 25	8	0.2	12	25	60	7.8	8	•
ZR704 080 03 25		0.3						•
ZR704 080 05 25		0.5						•
ZR704 080 10 25		1.0						•
ZR704 080 15 25		1.5						•
ZR704 080 20 25		2.0						•
ZR704 100 02 32	10	0.2	15	32	70	9.7	10	•
ZR704 100 03 32		0.3						•
ZR704 100 05 32		0.5						•
ZR704 100 10 32		1.0						•
ZR704 100 15 32		1.5						•
ZR704 100 20 32		2.0						•
ZR704 120 03 38	12	0.3	18	38	80	11.7	12	•
ZR704 120 05 38		0.5						•
ZR704 120 10 38		1.0						•
ZR704 120 15 38		1.5						•
ZR704 120 20 38		2.0						•

■ Tolerance

Mill Dia. (mm)		Shank Dia.
Diameter	Tolerance	
up to 6	0 ~ -0.012	h6
over 6	0 ~ -0.015	

※Items can be changed for quality improvement without notice.



4FLUTE, 45° HELIX FINISHING MOLD & DIE

- Designed to machine high hardened material up to HRc 70.
- Suitable for dry cutting & high speed cutting due to newly developed raw-material and new coating.
- Possible to reduce machining cycle time by 2 x D finishing performance.

ZR714....-..-. series

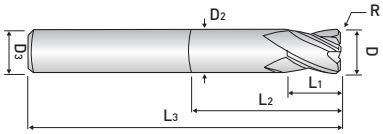
ULTRA FINE | 4 | 45° HELIX | R ±0.01 up to Φ6 | R ±0.015 over Φ6 | AlCrN HH

EDP. No.	Dia.	R	L_1	L_2	D_2	STOCK
ZR7140303	3	0.3	8	50	6	•
ZR7140305		0.5				•
ZR7140403	4	0.3	11	50	6	•
ZR7140405		0.5				•
ZR7140410		1.0				•
ZR7140603	6	0.3	15	60	6	•
ZR7140605		0.5				•
ZR7140610		1.0				•
ZR7140803	8	0.3	20	60	8	•
ZR7140805		0.5				•
ZR7140810		1.0				•
ZR7140815		1.5				•
ZR7140820		2.0				•
ZR7141003	10	0.3	25	70	10	•
ZR7141005		0.5				•
ZR7141010		1.0				•
ZR7141015		1.5				•
ZR7141020		2.0				•
ZR7141025		2.5				•
ZR7141030		3.0				•
ZR7141203	12	0.3	30	80	12	•
ZR7141205		0.5				•
ZR7141210		1.0				•
ZR7141215		1.5				•
ZR7141220		2.0				•
ZR7141225		2.5				•
ZR7141230		3.0				•

■ Tolerance

Mill Dia. (mm)		Shank Dia.
Diameter	Tolerance	
up to 6	0 ~ -0.012	h6
over 6	0 ~ -0.015	

※Items can be changed for quality improvement without notice.



4 FLUTE, STUB CUT LENGTH, CORNER RADIUS with LONG SHANK

- Applied various corner "Radius" and effected length.
- Suitable for dry cutting & high speed cutting due to newly developed raw-material and new coating.

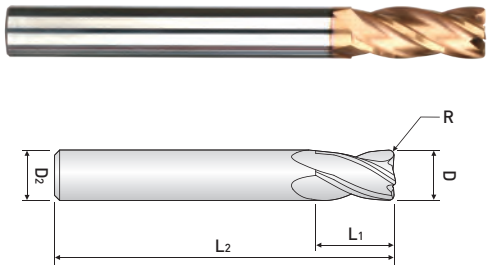
ZR724 .....series

EDP. No.	D	R	L_1	L_2	L_3	D_2	D_3	STOCK
ZR7240600520	6	0.5	9	20	90	5.8	6	•
ZR7240601020		1.0						•
ZR7240800525	8	0.5	12	25	100	7.7	8	•
ZR7240801025		1.0						•
ZR7241000532	10	0.5	15	32	100	9.7	10	•
ZR7241001032		1.0						•
ZR7241002032		2.0						•
ZR7241200538	12	0.5	18	38	110	11.7	12	•
ZR7241201038		1.0						•
ZR7241202038		2.0						•

■ Tolerance

Mill Dia. (mm)		Shank Dia.
Diameter	Tolerance	
up to 6	0 ~ -0.012	h6
over 6	0 ~ -0.015	

※Items can be changed for quality improvement without notice.



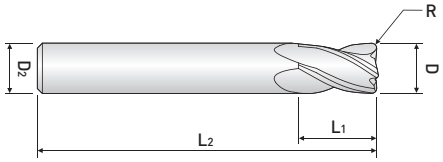
4 FLUTE, LONG SHANK, CORNER RADIUS

- Applied various corner "Radius" and effected length.
- Suitable for dry cutting & high speed cutting due to newly developed raw-material and new coating.

ZR734....-..-. series

ULTRA FINE | 4 | 30° HELIX | up to Φ6 | over Φ6 | AlCrN HH

EDP. No.	Dia.	R	L_1	L_2	D_2	STOCK
ZR734 010 01	1	0.1	2	50	6	•
ZR734 010 02		0.2				•
ZR734 010 03		0.3				•
ZR734 015 01	1.5	0.1	3	50	6	•
ZR734 015 02		0.2				•
ZR734 015 03		0.3				•
ZR734 015 05		0.5				•
ZR734 020 01	2	0.1	5	50	6	•
ZR734 020 02		0.2				•
ZR734 020 03		0.3				•
ZR734 020 05		0.5				•
ZR734 025 01	2.5	0.1	7	60	6	•
ZR734 025 02		0.2				•
ZR734 025 03		0.3				•
ZR734 025 05		0.5				•
ZR734 030 01	3	0.1	8	60	6	•
ZR734 030 02		0.2				•
ZR734 030 03		0.3				•
ZR734 030 05		0.5				•
ZR734 040 01	4	0.1	10	70	6	•
ZR734 040 02		0.2				•
ZR734 040 03		0.3				•
ZR734 040 05		0.5				•
ZR734 040 10		1.0				•



4 FLUTE, LONG SHANK, CORNER RADIUS

- Applied various corner "Radius" and effected length.
- Suitable for dry cutting & high speed cutting due to newly developed raw-material and new coating.

ZR734....-..-. series

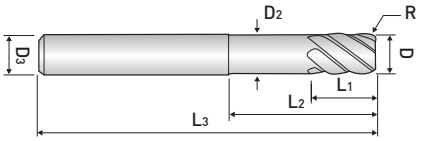
ULTRA FINE | HELIX | up to Φ6 | over Φ6

EDP. No.	Dia.	R	L_1	L_2	D_2	STOCK
ZR734 050 01	5	0.1	13	80	6	•
ZR734 050 02		0.2				•
ZR734 050 03		0.3				•
ZR734 050 05		0.5				•
ZR734 050 10		1.0				•
ZR734 060 01	6	0.1	15	90	6	•
ZR734 060 02		0.2				•
ZR734 060 03		0.3				•
ZR734 060 05		0.5				•
ZR734 060 10		1.0				•
ZR734 080 01	8	0.1	20	100	8	•
ZR734 080 02		0.2				•
ZR734 080 03		0.3				•
ZR734 080 05		0.5				•
ZR734 080 10		1.0				•
ZR734 080 20		2.0				•
ZR734 100 02	10	0.2	25	100	10	•
ZR734 100 03		0.3				•
ZR734 100 05		0.5				•
ZR734 100 10		1.0				•
ZR734 100 20		2.0				•
ZR734 120 02	12	0.2	30	110	12	•
ZR734 120 03		0.3				•
ZR734 120 05		0.5				•
ZR734 120 10		1.0				•
ZR734 120 20		2.0				•

■ Tolerance

Mill Dia. (mm)		Shank Dia.
Diameter	Tolerance	
up to 6	0 ~ -0.012	h6
over 6	0 ~ -0.015	

※Items can be changed for quality improvement without notice.



6 FLUTE, 45° HELIX STUB CUT LENGTH, CORNER RADIUS with EXTENDED NECK

- Applied various corner "Radius" and effected length.
- Suitable for dry cutting & high speed cutting due to newly developed raw-material and new coating.

ZR706 .....series

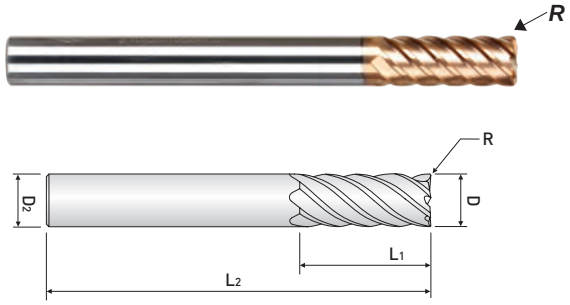
ULTRA FINE | HELIX | up to Φ6 | over Φ6

EDP. No.	D	R	L_1	L_2	L_3	D_2	D_3	STOCK
ZR7060600314	6	0.3	12	14	50	5.8	6	•
ZR7060600514		0.5						•
ZR7060800524	8	0.5	8	24	60	7.8	8	•
ZR7060801024		1.0						•
ZR7061000530	10	0.5	10	30	70	9.8	10	•
ZR7061001030		1.0						•
ZR7061200530	12	0.5	12	30	75	11.8	12	•
ZR7061201030		1.0						•

■ Tolerance

Mill Dia. (mm)	Shank Dia.
0 ~ -0.02	h6

※Items can be changed for quality improvement without notice.



6 FLUTE, 45°HELIX, LONG SHANK, CORNER RADIUS

- Applied various corner "Radius" and effected length.
- Suitable for dry cutting & high speed cutting due to newly developed raw-material and new coating.

ZR736 ...series

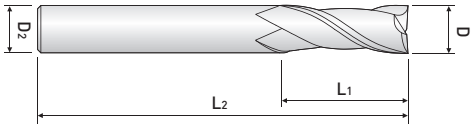
ULTRA FINE HELIX up to Φ6 over Φ6

EDP. No.	Dia.	R	L1	L2	D2	STOCK
ZR736 060 05	6	0.5	15	90	6	•
ZR736 060 10		1.0				•
ZR736 080 05	8	0.5	20	100	8	•
ZR736 080 10		1.0				•
ZR736 100 05	10	0.5	25	100	10	•
ZR736 100 10		1.0				•
ZR736 120 05	12	0.5	30	110	12	•
ZR736 120 10		1.0				•

■ Tolerance

Mill Dia. (mm)	Shank Dia.
0 ~ -0.02	h6

※Items can be changed for quality improvement without notice.



2 FLUTE, 35° HELIX REGULAR LENGTH

- Designed to machine high hardened materials up to HRc 70.
- Suitable for dry cutting & high speed cutting due to newly developed raw-material and new coating.

ZE712 ...series

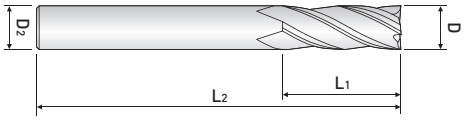
ULTRA FINE HELIX

EDP. No.	Dia.	L_1	L_2	D_2	STOCK
ZE712010-02	1.0	2	40	6	•
ZE712010		3			•
ZE712010-04		4			•
ZE712012	1.2	3	40	6	•
ZE712015	1.5	4	40	6	•
ZE712015-06		6			•
ZE712015-08		8			•
ZE712020	2.0	5	40	6	•
ZE712020-08		8			•
ZE712020-10		10	50		•
ZE712025	2.5	6	40	6	•
ZE712030	3.0	8	45	6	•
ZE712030-10		10	50		•
ZE712030-12		12			•
ZE712035	3.5	10	45	6	•
ZE712040	4.0	10	45	6	•
ZE712040-12		12	50		•
ZE712040-16		16	60		•
ZE712045	4.5	11	45	6	•
ZE712050	5.0	13	50	6	•
ZE712055	5.5	13	50	6	•
ZE712060	6.0	13	50	6	•
ZE712060-15		15	60		•
ZE712065	6.5	16	60	8	•
ZE712070	7.0	18	60	8	•
ZE712080	8.0	19	60	8	•
ZE712100	10.0	22	70	10	•
ZE712100-25		25			•
ZE712120	12.0	26	75	12	•
ZE712120-30		30	80		•

■ Tolerance

Mill Dia. (mm)	Shank Dia.
0 ~ -0.02	h6

※Items can be changed for quality improvement without notice.



4 FLUTE, 45° HELIX REGULAR LENGTH

- Designed to machine high hardened materials up to HRc 70.
- Suitable for dry cutting & high speed cutting due to newly developed raw-material and new coating.

ZE714 ...series

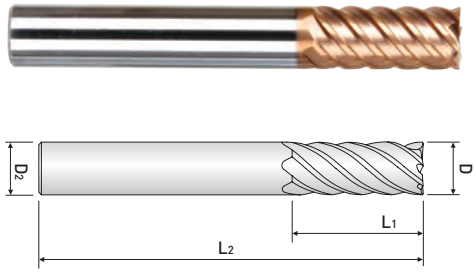
ULTRA FINE HELIX

EDP. No.	Dia.	L_1	L_2	D_2	STOCK
ZE714 010	1.0	2.5	40	6	•
ZE714 012	1.2	3	40	6	•
ZE714 015	1.5	4	40	6	•
ZE714020	2.0	5	40	6	•
ZE714025	2.5	6	40	6	•
ZE714030	3.0	8	45	6	•
ZE714 035	3.5	9	45	6	•
ZE714040	4.0	10	45	6	•
ZE714050	5.0	13	50	6	•
ZE714060	6.0	13	50	6	•
ZE714 060-15		15	60		•
ZE714080	8.0	19	60	8	•
ZE714100	10.0	22	70	10	•
ZE714 100-25		25			•
ZE714120	12.0	26	75	12	•
ZE714 120-30		30	80		•

■ Tolerance

Mill Dia. (mm)	Shank Dia.
0 ~ -0.02	h6

※Items can be changed for quality improvement without notice.



6 FLUTE, 50° HELIX REGULAR LENGTH

- Designed to machine high hardened materials up to HRc 70.
- Suitable for dry cutting & high speed cutting due to newly developed raw-material and new coating.

ZE716 ...series

ULTRA FINE HELIX

EDP. No.	Dia.	L_1	L_2	D_2	STOCK
ZE716060	6	13	50	6	•
ZE716080	8	18	60	8	•
ZE716100	10	22	70	10	•
ZE716120	12	26	75	12	•
ZE716160	16	35	90	16	•
ZE716200	20	44	100	20	•

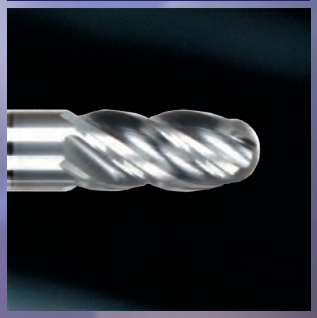
■ Tolerance

Mill Dia. (mm)	Shank Dia.
0 ~ -0.02	h6

※Items can be changed for quality improvement without notice.

Neo Classic X-STAR Series

ENDMILL SERIES



Neo Classic X-STAR Series

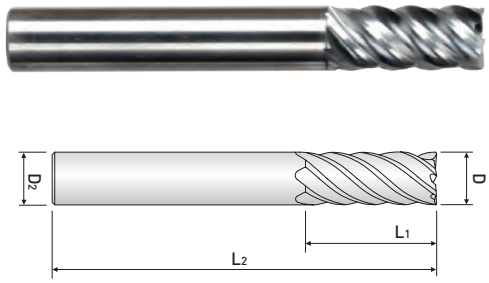
WIDIN

EDP. No.	APPEARANCE	FEATURE	STOCK	PAGE
XE505A ... series		5 FLUTES, STUB CUT LENGTH	•	93
XE515A ... series		5 FLUTES, REGULAR CUT LENGTH	•	94
XR505A ... series		5 FLUTES, STUB CUT LENGTH CORNER RADIUS	•	95
XR515A ... series		5 FLUTES, REGULAR CUT LENGTH CORNER RADIUS	•	96
XR525A ... series		5 FLUTES, REGULAR CUT LENGTH WITH EXTENDED NECK	•	97
XR535A ...series		5 FLUTES, REGULAR CUT LENGTH WITH LONG EXTENDED NECK	•	98
XE505 ... series		5 FLUTES, REGULAR CUT LENGTH	•	99
XE515 ... series		5 FLUTES, LONG CUT LENGTH	•	100
XR505 ... series		5 FLUTES, REGULAR CUT LENGTH CORNER RADIUS	•	101
XXB504 ...series		4 FLUTE, REGULAR LENGTH, BALL NOSE	•	102
XCE504 ...series		4 FLUTE, REGULAR LENGTH	•	103

Neo Classic X-STAR Series

WIDIN

EDP. No.	APPEARANCE	FEATURE	STOCK	PAGE
XCC504 ...series		4 FLUTE, REGULAR LENGTH	•	104
XCR504 ...series		4 FLUTE, REGULAR LENGTH	•	105
XCE503 ...series		3 FLUTE, REGULAR LENGTH	•	106
XCC503 ...series		3 FLUTE, REGULAR LENGTH	•	107
XCR503 ...series		3 FLUTE, REGULAR LENGTH	•	108
XE504 ...series		4 FLUTE, REGULAR LENGTH	•	109
XR504 ...series		4 FLUTE, REGULAR LENGTH	•	110
XE514 ...series		4 FLUTE, STUB CUT LENGTH with EXTENDED NECK	•	111
XE524 ...series		4 FLUTE, STUB CUT LENGTH with EXTENDED LONG NECK	•	112
XR514 ...series		4 FLUTE, REGULAR LENGTH	•	113



5 FLUTES, STUB CUT LENGTH

- Maintains Cutting Edge Strength & Sharpness for Improved Tool Life
- Strong Cutting Edges Allowing for Increased depths of cut at Elevated Cutting Speeds & Feeds
- Higher Feeds and Speeds for increased Productivity. Reduced Vibration Harmonics.

XE505A ... series

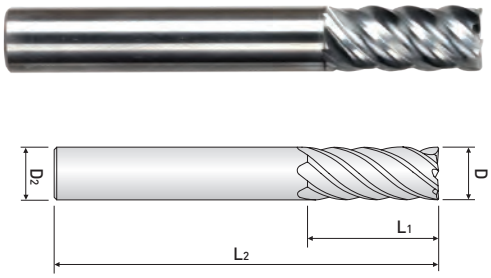
ULTRA FINE | HELIX | HELIX | HELIX

EDP. No.	D	L_1	L_2	D_2	STOCK
XE505 A 016	1/4	3/8	2	1/4	•
XE505 A 020	5/16	7/16	2	5/16	•
XE505 A 024	3/8	1/2	2	3/8	•
XE505 A 028	7/16	9/16	2-1/2	7/16	•
XE505 A 032	1/2	5/8	2-1/2	1/2	•
XE505 A 040	5/8	3/4	3	5/8	•
XE505 A 048	3/4	1	3	3/4	•
XE505 A 064	1	1	4	1	•

■ Tolerance

Mill Dia. (inch)		Shank Dia.
from 1/8 up to 1/4	0 ~ -.0012	-.0001 ~ -.0003
over 1/4 up to 3/8	0 ~ -.0016	
over 3/8 up to 1	0 ~ -.002	-.0001 ~ -.0004

※Items can be changed for quality improvement without notice.



5 FLUTES, REGULAR CUT LENGTH

- Maintains Cutting Edge Strength & Sharpness for Improved Tool Life
- Strong Cutting Edges Allowing for Increased depths of cut at Elevated Cutting Speeds & Feeds
- Higher Feeds and Speeds for increased Productivity. Reduced Vibration Harmonics.

XE515A ... series

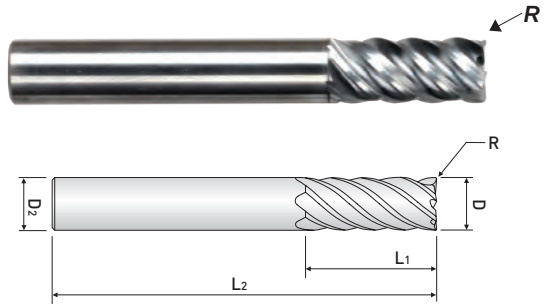
ULTRA FINE HELIX HELIX HELIX

EDP. No.	D	L_1	L_2	D_2	STOCK
XE515 A 016	1/4	5/8	2-1/2	1/4	•
XE515 A 018	9/32	5/8	2-1/2	5/16	•
XE515 A 020	5/16	13/16	2-1/2	5/16	•
XE515 A 022	11/32	13/16	2-1/2	3/8	•
XE515 A 024	3/8	7/8	2-1/2	3/8	•
XE515 A 026	13/32	7/8	2-3/4	7/16	•
XE515 A 028	7/16	1	2-3/4	7/16	•
XE515 A 030	15/32	1	3	1/2	•
XE515 A 032	1/2	1	3	1/2	•
XE515 A 036	9/16	1-1/8	3-1/2	9/16	•
XE515 A 040	5/8	1-1/4	3-1/2	5/8	•
XE515 A 048	3/4	1-1/2	4	3/4	•
XE515 A 064	1	1-1/2	4	1	•

■ Tolerance

Mill Dia. (inch)		Shank Dia.
from 1/8 up to 1/4	0 ~ -.0012	-.0001 ~ -.0003
over 1/4 up to 3/8	0 ~ -.0016	
over 3/8 up to 1	0 ~ -.002	-.0001 ~ -.0004

※Items can be changed for quality improvement without notice.



5 FLUTES, STUB CUT LENGTH CORNER RADIUS

- Maintains Cutting Edge Strength & Sharpness for Improved Tool Life
- Strong Cutting Edges Allowing for Increased depths of cut at Elevated Cutting Speeds & Feeds
- Higher Feeds and Speeds for increased Productivity. Reduced Vibration Harmonics.

XR505A ... series

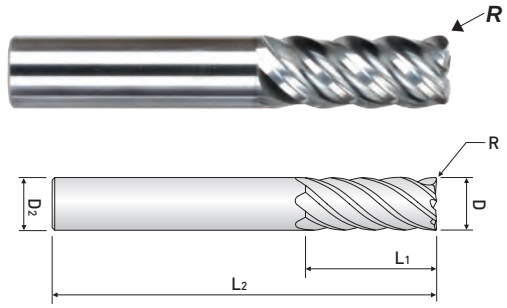
ULTRA FINE HELIX HELIX HELIX

EDP. No.	D	R	L_1	L_2	D_2	STOCK
XR505 A 016 015	1/4	.015	3/8	2	1/4	•
XR505 A 016 030		.030				•
XR505 A 020 015	5/16	.015	7/16	2	5/16	•
XR505 A 020 030		.030				•
XR505 A 024 015	3/8	.015	1/2	2	3/8	•
XR505 A 024 030		.030				•
XR505 A 028 015	7/16	.015	9/16	2-1/2	7/16	•
XR505 A 028 030		.030				•
XR505 A 032 015	1/2	.015	5/8	2-1/2	1/2	•
XR505 A 032 030		.030				•
XR505 A 040 015	5/8	.015	3/4	3	5/8	•
XR505 A 040 030		.030				•
XR505 A 040 045		.045				•
XR505 A 048 015	3/4	.015	1	3	3/4	•
XR505 A 048 030		.030				•
XR505 A 048 045		.045				•
XR505 A 064 015	1	.015	1-1/2	4	1	•
XR505 A 064 030		.030				•
XR505 A 064 045		.045				•
XR505 A 064 060		.060				•
XR505 A 064 090		.090				•
XR505 A 064 125		. 125				•

■ Tolerance

Mill Dia. (inch)		Shank Dia.
from 1/8 up to 1/4	0 ~ -.0012	-.0001 ~ -.0003
over 1/4 up to 3/8	0 ~ -.0016	
over 3/8 up to 1	0 ~ -.002	-.0001 ~ -.0004

※Items can be changed for quality improvement without notice.



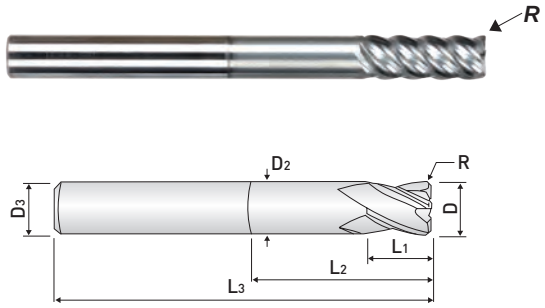
5 FLUTES, REGULAR CUT LENGTH CORNER RADIUS

- Maintains Cutting Edge Strength & Sharpness for Improved Tool Life
- Strong Cutting Edges Allowing for Increased depths of cut at Elevated Cutting Speeds & Feeds
- Higher Feeds and Speeds for increased Productivity. Reduced Vibration Harmonics.

XR515A ... series

ULTRA FINE · HELIX · HELIX · HELIX

EDP. No.	D	R	L_1	L_2	D_2	STOCK
XR515 A 016 015	1/4	.015	5/8	2-1/2	1/4	•
XR515 A 016 030		.030				•
XR515 A 018 015	9/32	.015	5/8	2-1/2	5/16	•
XR515 A 018 030		.030				•
XR515 A 020 015	5/16	.015	13/16	2-1/2	5/16	•
XR515 A 020 030		.030				•
XR515 A 022 015	11/32	.015	13/16	2-1/2	3/8	•
XR515 A 022 030		.030				•
XR515 A 024 015	3/8	.015	7/8	2-1/2	3/8	•
XR515 A 024 030		.030				•
XR515 A 026 015	13/32	.015	7/8	2-3/4	7/16	•
XR515 A 026 030		.030				•
XR515 A 028 015	7/16	.015	1	2-3/4	7/16	•
XR515 A 028 030		.030				•
XR515 A 030 015	15/32	.015	1	3	1/2	•
XR515 A 030 030		.030				•
XR515 A 032 015	1/2	.015	1	3	1/2	•
XR515 A 032 030		.030				•
XR515 A 032 045		.045				•
XR515 A 032 060		. 060				•
XR515 A 032 090		.090				•
XR515 A 032 125		.125				•
XR515 A 036 015	9/16	.015	1-1/8	3-1/2	9/16	•
XR515 A 036 030		.030				•
XR515 A 040 015	5/8	.015	1-1/4	3-1/2	5/8	•
XR515 A 040 030		.030				•
XR515 A 040 045		.045				•
XR515 A 040 060		.060				•
XR515 A 040 090		.090				•
XR515 A 040 125		.125				•
XR515 A 048 015	3/4	.015	1-1/2	4	3/4	•
XR515 A 048 030		.030				•
XR515 A 048 045		.045				•
XR515 A 048 060		.060				•
XR515 A 048 060		.090				•
XR515 A 048 125		.125				•



5 FLUTES, REGULAR CUT LENGTH WITH EXTENDED NECK

- Maintains Cutting Edge Strength & Sharpness for Improved Tool Life
- Strong Cutting Edges Allowing for Increased depths of cut at Elevated Cutting Speeds & Feeds
- Higher Feeds and Speeds for increased Productivity. Reduced Vibration Harmonics.

XR525A ... series

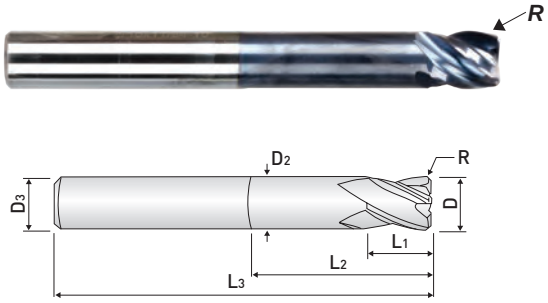
ULTRA FINE HELIX

EDP. No.	D	R	L_1	L_2	L_3	D_2	D_3	STOCK
XR525 A 016 015	1/4	.015	3 / 4	2-1/8	4	.242	1/4	•
XR525 A 016 030		.030						•
XR525 A 020 015	5/16	.015	1	2-1/8	4	.305	5/16	•
XR525 A 020 030		.030						•
XR525 A 024 015	3/8	.015	1	2-1/8	4	.367	3/8	•
XR525 A 024 030		.030						•
XR525 A 028 015	7/16	.015	-1/4	2-1/8	4	.430	7/16	•
XR525 A 028 030		.030						•
XR525 A 032 015	1/2	.015	1-1/4	2-1/8	4	.492	1/2	•
XR525 A 032 030		.030						•
XR525 A 032 015L		.015	1-3/8	3-1/8	5			•
XR525 A 032 030L		.030						•
XR525 A 040 015	5/8	.015	1-1/2	2-1/8	4	.617	5/8	•
XR525 A 040 030		.030						•
XR525 A 040 045		.045						•
XR525 A 040 015L		.015	1-3/4	3-1/8	5			•
XR525 A 040 030L		. 030						•
XR525 A 040 045L		.045						•
XR525 A 048 015	3/4	.015	1-7/8	3	5	.742	3/4	•
XR525 A 048 030		.030						•
XR525 A 048 045		.045						•
XR525 A 064 015	1	.015	2-1/4	3	5	.992	1	•
XR525 A 064 030		.030						•
XR525 A 064 045		.045						•

■ Tolerance

Mill Dia. (inch)		Shank Dia.
from 1/8 up to 1/4	0 ~ -.0012	-.0001 ~ -.0003
over 1/4 up to 3/8	0 ~ -.0016	
over 3/8 up to 1	0 ~ -.002	-.0001 ~ -.0004

※Items can be changed for quality improvement without notice.



5 FLUTES, REGULAR CUT LENGTH WITH LONG EXTENDED NECK

- Maintains Cutting Edge Strength & Sharpness for Improved Tool Life
- Strong Cutting Edges Allowing for Increased depths of cut at Elevated Cutting Speeds & Feeds
- Higher Feeds and Speeds for increased Productivity. Reduced Vibration Harmonics.

XR535A ...series

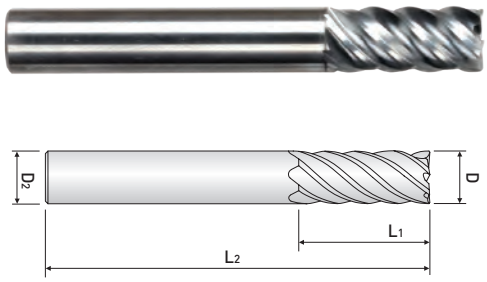
ULTRA FINE HELIX

EDP. No.	D	R	L_1	L_2	L_3	D_2	D_3	STOCK
XR535 A 024 015	3/8	.015	1-1/4	3-3/8	6	.367	3/8	•
XR535 A 024 030		.030						•
XR535 A 028 015	7/16	.015	1-1/2	3-3/8	6	.430	7/16	•
XR535 A 028 030		.030						•
XR535 A 032 015	1/2	.015	1-1/2	4-1/8	6	.492	1/2	•
XR535 A 032 030		.030						•
XR535 A 040 015	5/8	.015	2	4	6	.617	5/8	•
XR535 A 040 030		.030						•
XR535 A 040 045		.045						•
XR535 A 048 015	3/4	.015	2-1/4	4	6	.742	3/4	•
XR535 A 048 030		.030						•
XR535 A 048 045		.045						•
XR535 A 064 015	1	.015	3	4	6	.992	1	•
XR535 A 064 030		.030						•
XR535 A 064 045		.045						•

■ Tolerance

Mill Dia. (inch)		Shank Dia.
from 1/8 up to 1/4	0 ~ -.0012	-.0001 ~ -.0003
over 1/4 up to 3/8	0 ~ -.0016	
over 3/8 up to 1	0 ~ -.002	-.0001 ~ -.0004

※Items can be changed for quality improvement without notice.



5 FLUTES, REGULAR CUT LENGTH

- Maintains Cutting Edge Strength & Sharpness for Improved Tool Life
- Strong Cutting Edges Allowing for Increased depths of cut at Elevated Cutting Speeds & Feeds
- Higher Feeds and Speeds for increased Productivity. Reduced Vibration Harmonics.

XE505 ... series

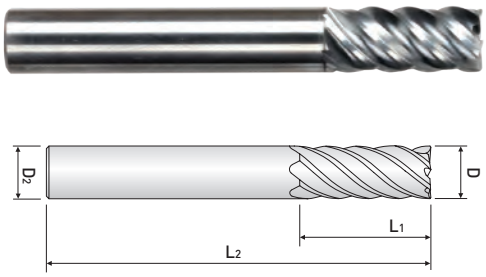
ULTRA FINE | HELIX | HELIX | HELIX

EDP. No.	D	L_1	L_2	D_2	STOCK
XE505 060	6	13	57	6	•
XE505 080	8	19	63	8	•
XE505 100	10	22	72	10	•
XE505 120	12	26	83	12	•
XE505 140	14	26	83	14	•
XE505 160	16	32	92	16	•
XE505 180	18	32	92	18	•
XE505 200	20	38	104	20	•
XE505 250	25	38	104	25	•

■ Tolerance

Mill Dia. (mm)		Shank Dia.
Diameter	Tolerance	h6
up to 8	0 ~ -0.04	
over 8	0 ~ -0.05	

※Items can be changed for quality improvement without notice.



5 FLUTES, LONG CUT LENGTH

- Maintains Cutting Edge Strength & Sharpness for Improved Tool Life
- Strong Cutting Edges Allowing for Increased depths of cut at Elevated Cutting Speeds & Feeds
- Higher Feeds and Speeds for increased Productivity. Reduced Vibration Harmonics.

XE515 ... series

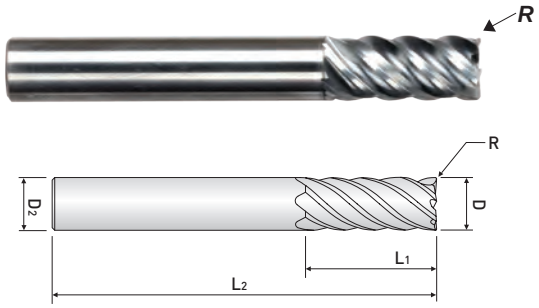
ULTRA FINE HELIX

EDP. No.	D	L_1	L_2	D_2	STOCK
XE515 060	6	25	75	6	•
XE515 080	8	30	75	8	•
XE515 100	10	45	100	10	•
XE515 120	12	75	150	12	•
XE515 160	16	75	150	16	•
XE515 200	20	75	150	20	•

■ Tolerance

Mill Dia. (mm)		Shank Dia.
Diameter	Tolerance	h6
up to 8	0 ~ -0.04	
over 8	0 ~ -0.05	

※Items can be changed for quality improvement without notice.



5 FLUTES, REGULAR CUT LENGTH CORNER RADIUS

- Maintains Cutting Edge Strength & Sharpness for Improved Tool Life
- Strong Cutting Edges Allowing for Increased depths of cut at Elevated Cutting Speeds & Feeds
- Higher Feeds and Speeds for increased Productivity. Reduced Vibration Harmonics.

XR505 ... series

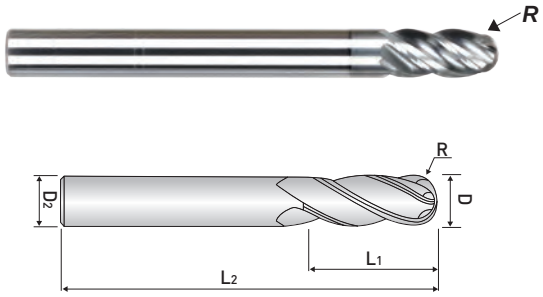
ULTRA FINE · HELIX · HELIX · HELIX

EDP. No.	D	R	L_1	L_2	D_2	STOCK
XR505 06 050	6	0.5	13	57	6	•
XR505 08 050	8	0.5	19	63	8	•
XR505 10 050	10	0.5	22	72	10	•
XR505 12 075	12	0.75	26	83	12	•
XR505 14 075	14	0.75	26	83	14	•
XR505 14 075 S16				92	16	•
XR505 16 100	16	1.0	32	92	16	•
XR505 18 100	18	1.0	32	92	18	•
XR505 18 100 S20				104	20	•
XR505 20 100	20	1.0	38	104	20	•
XR505 25 100	25	1.0	38	104	25	•

■ Tolerance

Mill Dia. (mm)		Shank Dia.
Diameter	Tolerance	
up to 8	0 ~ -0.04	h6
over 8	0 ~ -0.05	

※Items can be changed for quality improvement without notice.



4 FLUTE, REGULAR LENGTH, BALL NOSE

- High precision and excellent surface due to each 4F broken index geometry
- The unique patented design decrease chatter and resonance.
- Strengthened cutting edge geometry designed for excellent performance on high-temp alloys, high tensile stainless steel, inconel and titanium.

XXB504 ...series

ULTRA FINE HELIX HELIX

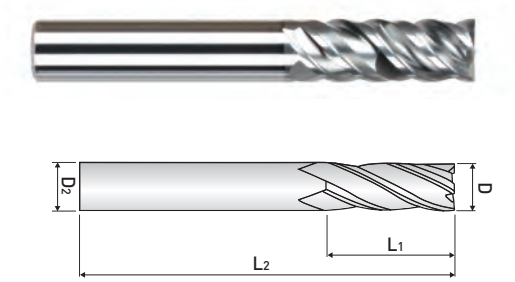
EDP. No.	D	R	L_1	L_2	D_2	STOCK
XXB504040	4	2	8	70	4	•
XXB504060	6	3	12	90	6	•
XXB504080	8	4	15	100	8	•
XXB504100	10	5	20	100	10	•
XXB504120	12	6	25	110	12	•

※ Flat shank is available upon request
ex) XXB504100F : Flat shank

■ Tolerance

Mill Dia. (mm)	Shank Dia.
0 ~ -0.02	h6

※Items can be changed for quality improvement without notice.



4 FLUTE, REGULAR LENGTH

- High precision and excellent surface due to each 4F broken index geometry
- The unique patented design decrease chatter and resonance, can achieve an Axial Depth 1XD
- Reinforced bending moment because of double core geometry

XCE504 ...series

ULTRA FINE | 4 | 46° HELIX | 48° HELIX | TiAlN SH

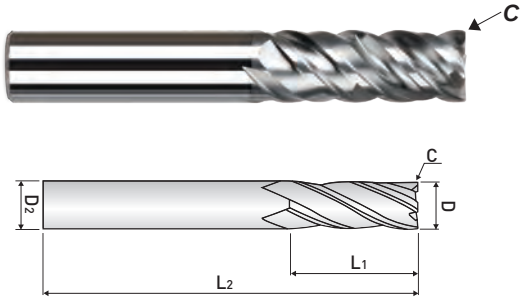
EDP. No.	D	L_1	L_2	D_2	STOCK
XCE504060	6	15	50	6	•
XCE504080	8	20	60	8	•
XCE504100	10	25	70	10	•
XCE504120	12	30	75	12	•
XCE504160	16	40	90	16	•
XCE504200	20	45	100	20	•
XCE504250	25	50	120	25	•

※ Flat shank is available upon request
ex) XCE504100F : Flat shank

■ Tolerance

Mill Dia. (mm)	Shank Dia.
0 ~ -0.02	h6

※Items can be changed for quality improvement without notice.



4 FLUTE, REGULAR LENGTH

- High precision and excellent surface due to each 4F broken index geometry
- The unique patented design decrease chatter and resonance, can achieve an Axial Depth 1XD
- Reinforced bending moment because of double core geometry

* corner chamfer type

XCC504 ...series

ULTRA FINE HELIX HELIX

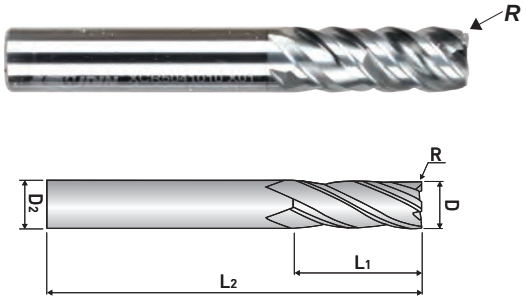
EDP. No.	D	C	L_1	L_2	D_2	STOCK
XCC504060	6	0.075	15	50	6	•
XCC504080	8	0.1	20	60	8	•
XCC504100	10	0.125	25	70	10	•
XCC504120	12	0.15	30	75	12	•
XCC504160	16	0.2	40	90	16	•
XCC504200	20	0.3	45	100	20	•
XCC504250	25	0.3	50	120	25	•

※ Flat shank is available upon request
ex) XCC504100F : Flat shank

■ Tolerance

Mill Dia. (mm)	Shank Dia.
0 ~ -0.02	h6

※Items can be changed for quality improvement without notice.



4 FLUTE, REGULAR LENGTH

- High precision and excellent surface due to each 4F broken index geometry
- The unique patented design decrease chatter and resonance, can achieve an Axial Depth 1XD
- Reinforced bending moment because of double core geometry

XCR504 ...series

ULTRA FINE HELIX HELIX

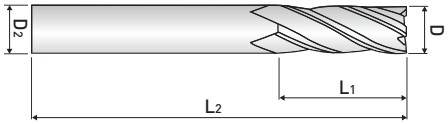
EDP. No.	D	R	L_1	L_2	D_2	STOCK
XCR5040602	6	0.2	15	50	6	•
XCR5040605		0.5				•
XCR5040610		1				•
XCR5040805	8	0.5	20	60	8	•
XCR5040810		1				•
XCR5041005	10	0.5	25	70	10	•
XCR5041010		1				•
XCR5041205	12	0.5	30	75	12	•
XCR5041210		1				•
XCR5041605	16	0.5	40	90	16	•
XCR5041610		1				•
XCR5042005	20	0.5	45	100	20	•
XCR5042010		1				•
XCR5042505	25	0.5	50	120	25	•
XCR5042510		1				•

※ Flat shank is available upon request
ex) XCR5041010F : Flat shank

■ Tolerance

Mill Dia. (mm)	Shank Dia.
0 ~ -0.02	h6

※Items can be changed for quality improvement without notice.



3 FLUTE, REGULAR LENGTH

- High precision and excellent surface due to each 4F broken index geometry
- The unique patented design decrease chatter and resonance, can achieve an Axial Depth 1XD
- Reinforced bending moment because of double core geometry

XCE503 ...series

ULTRA FINE HELIX

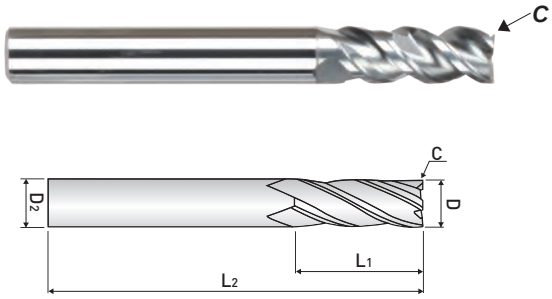
EDP. No.	D	L_1	L_2	D_2	STOCK
XCE503020	2	6	50	6	•
XCE503025	2.5	8	50	6	•
XCE503030	3	10	50	6	•
XCE503035	3.5	10	50	6	•
XCE503040	4	12	50	6	•
XCE503045	4.5	14	50	6	•
XCE503050	5	15	50	6	•
XCE503055	5.5	15	50	6	•
XCE503060	6	15	50	6	•
XCE503080	8	20	60	8	•
XCE503100	10	25	70	10	•
XCE503120	12	30	75	12	•
XCE503160	16	40	90	16	•
XCE503200	20	45	100	20	•
XCE503250	25	50	120	25	•

※ Flat shank is available upon request
ex) XCE503100F : Flat shank

■ Tolerance

Mill Dia. (mm)	Shank Dia.
0 ~ -0.02	h6

※Items can be changed for quality improvement without notice.



3 FLUTE, REGULAR LENGTH

- High precision and excellent surface due to each 4F broken index geometry
- The unique patented design decrease chatter and resonance, can achieve an Axial Depth 1XD
- Reinforced bending moment because of double core geometry

* corner chamfer type

XCC503 ...series

ULTRA FINE HELIX

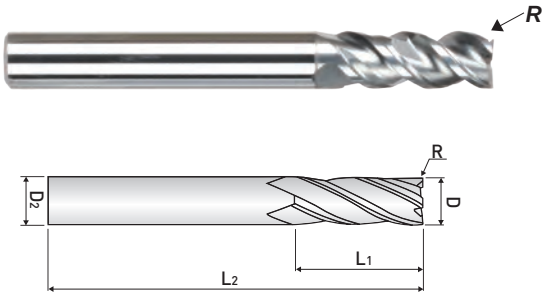
EDP. No.	D	C	L_1	L_2	D_2	STOCK
XCC503020	2	0.025	6	50	6	•
XCC503025	2.5	0.025	8	50	6	•
XCC503030	3	0.035	10	50	6	•
XCC503035	3.5	0.035	10	50	6	•
XCC503040	4	0.045	12	50	6	•
XCC503045	4.5	0.045	14	50	6	•
XCC503050	5	0.055	15	50	6	•
XCC503055	5.5	0.055	15	50	6	•
XCC503060	6	0.075	15	50	6	•
XCC503080	8	0.1	20	60	8	•
XCC503100	10	0.125	25	70	10	•
XCC503120	12	0.150	30	75	12	•
XCC503160	16	0.200	40	90	16	•
XCC503200	20	0.250	45	100	20	•
XCC503250	25	0.300	50	120	25	•

※ Flat shank is available upon request
ex) XCC503100F : Flat shank

■ Tolerance

Mill Dia. (mm)	Shank Dia.
0 ~ -0.02	h6

※Items can be changed for quality improvement without notice.



3 FLUTE, REGULAR LENGTH

- High precision and excellent surface due to each 4F broken index geometry
- The unique patented design decrease chatter and resonance, can achieve an Axial Depth 1XD
- Reinforced bending moment because of double core geometry

XCR503 ...series

ULTRA FINE HELIX

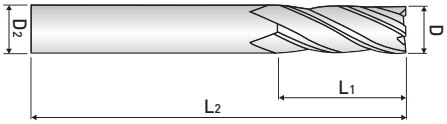
EDP. No.	D	R	L_1	L_2	D_2	STOCK
XCR5030502	5	0.2	15	50	6	•
XCR5030602	6	0.2	15	50	6	•
XCR5030605		0.5				•
XCR5030610		1				•
XCR5030805	8	0.5	20	60	8	•
XCR5030810		1				•
XCR5031005	10	0.5	25	70	10	•
XCR5031010		1				•
XCR5031205	12	0.5	30	75	12	•
XCR5031210		1				•
XCR5031605	16	0.5	40	90	16	•
XCR5031610		1				•
XCR5032005	20	0.5	45	100	20	•
XCR5032010		1				•
XCR5032505	25	0.5	50	120	25	•
XCR5032510		1				•

※ Flat shank is available upon request
ex) XCR5031010F : Flat shank

■ Tolerance

Mill Dia. (mm)	Shank Dia.
0 ~ -0.02	h6

※Items can be changed for quality improvement without notice.



4 FLUTE, REGULAR LENGTH

- High precision and excellent surface due to each 4F broken index geometry
- The unique patented design decrease chatter and resonance, can achieve an Axial Depth 1XD
- Sharp cutting edge geometry designed for excellent performance on mild mold steel and stainless steel

XE504 ...series

ULTRA FINE HELIX HELIX

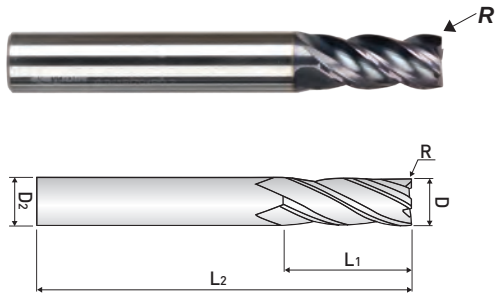
EDP. No.	D	L_1	L_2	D_2	STOCK
XE504010	1	2.5	45	4	•
XE504020	2	5	45	4	•
XE504030	3	8	50	6	•
XE504040	4	11	50	6	•
XE504050	5	13	50	6	•
XE504060	6	13	50	6	•
XE504070	7	16	60	8	•
XE504080	8	19	60	8	•
XE504090	9	19	70	10	•
XE504100	10	22	70	10	•
XE504110	11	22	75	12	•
XE504120	12	26	75	12	•
XE504130	13	26	80	12	•
XE504140	14	26	80	14	•
XE504160	16	32	90	16	•
XE504180	18	32	100	18	•
XE504200	20	38	100	20	•
XE504250	25	45	120	25	•

※ Flat shank is available upon request
ex) XE504100F : Flat shank

■ Tolerance

Mill Dia. (mm)		Shank Dia.
Diameter	Tolerance	
up to 12	0 ~ -0.02	h6
over 12	0 ~ -0.03	

※Items can be changed for quality improvement without notice.



4 FLUTE, REGULAR LENGTH

- High precision and excellent surface due to each 4F broken index geometry
- The unique patented design decrease chatter and resonance, can achieve an Axial Depth 1XD
- Sharp cutting edge geometry designed for excellent per formance on mild mold steel and stainless steel

XR504 ...series

ULTRA FINE HELIX HELIX

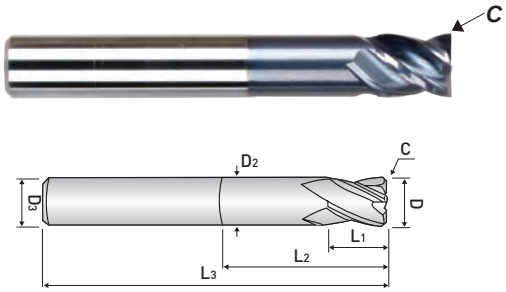
EDP. No.	D	R	L_1	L_2	D_2	STOCK
XR504020	2	0.1	5	45	4	•
XR504030	3	0.1	8	50	6	•
XR504040	4	0.2	11	50	6	•
XR504050	5	0.2	13	50	6	•
XR504060	6	0.2	13	50	6	•
XR504070	7	0.2	16	60	8	•
XR504080	8	0.2	19	60	8	•
XR504090	9	0.2	19	70	10	•
XR504100	10	0.3	22	70	10	•
XR504110	11	0.3	22	75	12	•
XR504120	12	0.3	26	75	12	•
XR504130	13	0.3	26	80	12	•
XR504140	14	0.3	26	80	14	•
XR504160	16	0.3	32	90	16	•
XR504180	18	0.3	32	100	18	•
XR504200	20	0.3	38	100	20	•
XR504250	25	0.3	45	120	25	•

※ Flat shank is available upon request
ex) XR504100F : Flat shank

■ Tolerance

Mill Dia. (mm)		Shank Dia.
Diameter	Tolerance	
up to 12	0 ~ -0.02	h6
over 12	0 ~ -0.03	

※Items can be changed for quality improvement without notice.



4 FLUTE, STUB CUT LENGTH with EXTENDED NECK

- High precision and excellent surface due to each 4F broken index geometry
- The unique patented design decrease chatter and resonance, can achieve an Axial Depth 1XD
- Sharp cutting edge geometry designed for excellent performance on mild mold steel and stainless steel

* corner chamfer type

XE514 ...series

ULTRA FINE HELIX HELIX

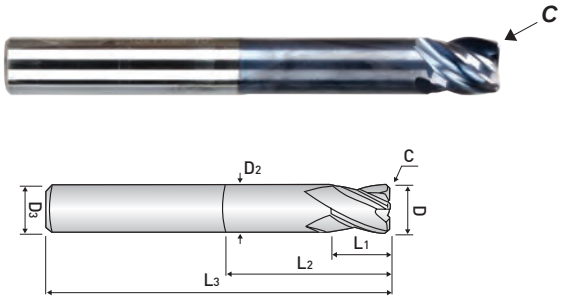
EDP. No.	D	L_1	L_2	L_3	D_2	D_3	STOCK
XE514010	1	2	10	45	0.8	4	•
XE514020	2	3	12	45	1.8	4	•
XE514030	3	4	14	50	2.8	6	•
XE514040	4	5	16	50	3.8	6	•
XE514050	5	6	18	50	4.8	6	•
XE514060	6	7	20	50	5.8	6	•
XE514080	8	9	26	60	7.8	8	•
XE514100	10	11	31	70	9.8	10	•
XE514120	12	13	37	75	11.8	12	•
XE514160	16	17	43	90	15.8	16	•
XE514200	20	21	53	100	19.8	20	•

※ Flat shank is available upon request
ex) XE514100F : Flat shank

■ Tolerance

Mill Dia. (mm)		Shank Dia.
Diameter	Tolerance	
up to 12	0 ~ -0.02	h6
over 12	0 ~ -0.03	

※Items can be changed for quality improvement without notice.



4 FLUTE, STUB CUT LENGTH with EXTENDED LONG NECK

- High precision and excellent surface due to each 4F broken index geometry
- The unique patented design decrease chatter and resonance, can achieve an Axial Depth 1XD
- Sharp cutting edge geometry designed for excellent performance on mild mold steel and stainless steel

* corner chamfer type

XE524 ...series

ULTRA FINE HELIX

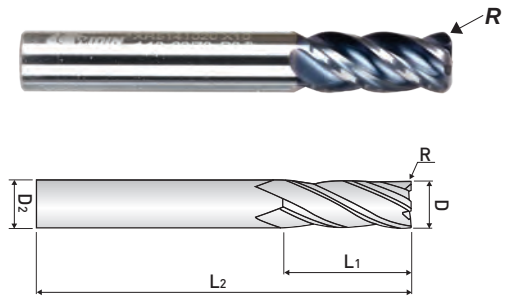
EDP. No.	D	L_1	L_2	L_3	D_2	D_3	STOCK
XE524060	6	7	33	70	5.8	6	•
XE524080	8	9	43	80	7.8	8	•
XE524100	10	11	43	84	9.8	10	•
XE524120	12	13	51	97	11.8	12	•
XE524160	16	17	66	115	15.8	16	•

※ Flat shank is available upon request
ex) XE524100F : Flat shank

■ Tolerance

Mill Dia. (mm)		Shank Dia.
Diameter	Tolerance	
up to 12	0 ~ -0.02	h6
over 12	0 ~ -0.03	

※Items can be changed for quality improvement without notice.



4 FLUTE, REGULAR LENGTH

- High precision and excellent surface due to each 4F broken index geometry
- The unique patented design decrease chatter and resonance, can achieve an Axial Depth 1XD
- Applied various corner radius.
- Sharp cutting edge geometry designed for excellent performance on mild mold steel and stainless steel

XR514 ...series

ULTRA FINE · 4 · 38° HELIX · 40° HELIX · R ±0.02 · AlCrN H

EDP. No.	D	R	L1	L2	D2	STOCK
XR5140201	2	0.1	5	45	4	•
XR5140202		0.2				•
XR5140302	3	0.2	8	50	6	•
XR5140303		0.3				•
XR5140305		0.5				•
XR5140403	4	0.3	10	50	6	•
XR5140405		0.5				•
XR5140410		1.0				•
XR5140505	5	0.5	13	50	6	•
XR5140510		1.0				•
XR5140605	6	0.5	13	50	6	•
XR5140610		1.0				•
XR5140615		1.5				•
XR5140805	8	0.5	19	60	8	•
XR5140810		1.0				•
XR5140815		1.5				•
XR5140820		2.0				•
XR5141005	10	0.5	22	70	10	•
XR5141010		1.0				•
XR5141015		1.5				•
XR5141020		2.0				•
XR5141205	12	0.5	26	75	12	•
XR5141210		1.0				•
XR5141215		1.5				•
XR5141220		2.0				•
XR5141230		3.0				•
XR5141615	16	1.5	32	90	16	•
XR5141620		2.0				•
XR5141630		3.0				•
XR5142030	20	3.0	38	100	20	•
XR5142040		4.0				•
XR5142050		5.0				•

※ Flat shank is available upon request ex) XR514100F : Flat shank

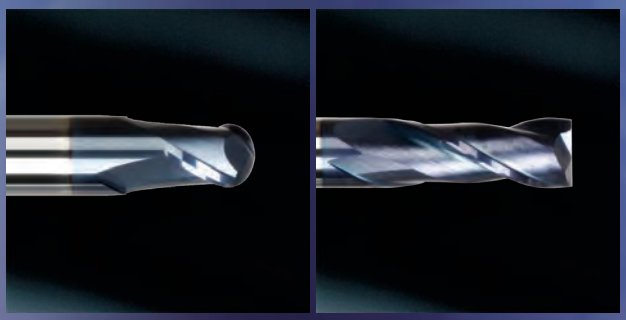
■ Tolerance

Mill Dia. (mm)		Shank Dia.
Diameter	Tolerance	
up to 12	0 ~ -0.02	h6
over 12	0 ~ -0.03	

※Items can be changed for quality improvement without notice.

Zamus Classic Series

ENDMILL SERIES



Zamus Classic Series

WIDIN

EDP. No.	APPEARANCE	FEATURE	STOCK	PAGE
DB402 ...series		2 FLUTE, SHORT LENGTH, BALL NOSE	•	118
DB412 ...series		2 FLUTE, 15° HELIX STUB CUT LENGTH, BALL NOSE with EXTENDED NECK	•	119
DB512 ...series		2 FLUTE, LONG LENGTH, BALL NOSE	•	120
DB514 ...series		4 FLUTE, LONG LENGTH, BALL NOSE	•	121
DB502 ...series		2 FLUTE, STUB CUT LENGTH, BALL NOSE with EXTENDED NECK	•	122
DB522 ...series		2 FLUTE, EXTENDED NECK-LONG SHANK	•	123
DB532 ...series		2 FLUTE, MMC-SPHERE TYPE	•	124
DB534 ...series		4 FLUTE, MMC-SPHERE TYPE	•	125
DB54(5)2 ...series		2 FLUTE, BALL NOSE with TAPER NECK	•	126
ZE502 ...series		2 FLUTE, REGULAR LENGTH	•	127
ZE504 ...series		4 FLUTE, REGULAR LENGTH	•	128
ZE503 ...series		3 FLUTE, REGULAR LENGTH	•	129
ZE506 ...series		6 FLUTE, REGULAR & LONG LENGTH	•	130
ZM502 ...series		2 FLUTE, MEDIUM LENGTH	•	131
ZM504 ...series		4 FLUTE, MEDIUM LENGTH	•	132
ZM522 ...series		2 FLUTE, MEDIUM CUT, LONG SHANK TYPE	•	133
ZM524 ...series		4 FLUTE, MEDIUM CUT, LONG SHANK TYPE	•	134

Zamus Classic Series

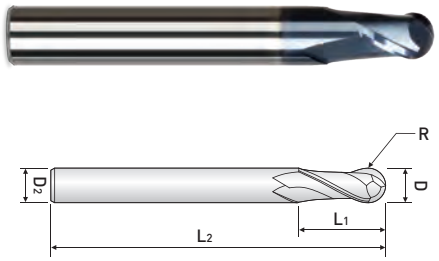
WIDIN

EDP. No.	APPEARANCE	FEATURE	STOCK	PAGE
ZE522 ...series		2 FLUTE, LONG LENGTH	•	135
ZE524 ...series		4 FLUTE, LONG LENGTH	•	136
ZE534 ...series		4 FLUTE, EXTRA LONG LENGTH	•	137
ZE512 ...series		2 FLUTE 35° HELIX REGULAR LENGTH	•	138
ZE514 ...series		4 FLUTE 45° HELIX REGULAR LENGTH	•	139
ZE516 ...series		6 FLUTE 50° HELIX REGULAR LENGTH	•	140
ZE612 ...series		2 FLUTE, for RIB PROCESSING	•	141
DB612 ...series		2 FLUTE, for RIB PROCESSING	•	145
ZR502 ...series		2 FLUTE, STUB CUT LENGTH, CORNER RADIUS with EXTENDED NECK	•	149
ZR504 ...series		4 FLUTE, STUB CUT LENGTH, CORNER RADIUS with EXTENDED NECK	•	150
ZR512 ...series		2 FLUTE, REGULAR LENGTH, CORNER RADIUS	•	151
ZR514 ...series		4 FLUTE, REGULAR LENGTH, CORNER RADIUS	•	152
ZR522 ...series		2 FLUTE, LONG LENGTH, CORNER RADIUS	•	153
ZR524 ...series		4 FLUTE, LONG LENGTH, CORNER RADIUS	•	154
TPRB4 ...-..-050 series		MULTIPLE FLUTES - TAPER BALL ENDMILLS for RIB PROCESSING		155
TPRB4 ...-..-075 series		MULTIPLE FLUTES - TAPER BALL ENDMILLS for RIB PROCESSING		156

Zamus Classic Series

WIDIN

EDP. No.	APPEARANCE	FEATURE	STOCK	PAGE
TPRB4 ...-..-100 series		MULTIPLE FLUTES - TAPER BALL ENDMILLS for RIB PROCESSING		157
TPRB4 ...-..-150 series		MULTIPLE FLUTES - TAPER BALL ENDMILLS for RIB PROCESSING		159
TPRB4 ...-..-200 series		MULTIPLE FLUTES - TAPER BALL ENDMILLS for RIB PROCESSING		161
TPRE4 ...-..-050 series		MULTIPLE FLUTES - TAPER ENDMILLS for RIB PROCESSINGH		163
TPRE4 ...-..-075 series		MULTIPLE FLUTES - TAPER ENDMILLS for RIB PROCESSING		165
TPRE4 ...-..-100 series		MULTIPLE FLUTES - TAPER ENDMILLS for RIB PROCESSING		167
TPRE4 ...-..-150 series		MULTIPLE FLUTES - TAPER ENDMILLS for RIB PROCESSING		169
TPRE4 ...-..-200 series		MULTIPLE FLUTES - TAPER ENDMILLS for RIB PROCESSING		171
TPRE4 ...-..-300 series		MULTIPLE FLUTES - TAPER ENDMILLS for RIB PROCESSING		173
TE503 .....series		3 FLUTE, TAPER END MILL		174
TB503 ...series		3 FLUTE, TAPER BALL END MILL		175
TB504 ...series		4 FLUTE, TAPER BALL END MILL		176
ZF60 ....series		ROUGHING END MILL	•	177
ZF61 ...series		ROUGHING END MILL - FINE PITCH	•	178
PK503 ...series		Z - AXIS ROUGHING END MILL	•	179



2 FLUTE, SHORT LENGTH, BALL NOSE

- Designed to machine tool steel, alloy steel, mold steel and other high hardened materials.
- Suitable for copy milling.

DB402 ...series

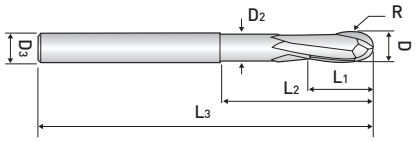
ULTRA FINE HELIX

EDP. No.	Dia.	R	L_1	L_2	D_2	STOCK
DB402010	1	0.5	3	38	4	•
DB402012	1.2	0.6	3	38	4	•
DB402015	1.5	0.75	3	42	4	•
DB402020	2	1	3	42	6	•
DB402025	2.5	1.25	3	42	6	•
DB402030	3	1.5	4	50	6	•
DB402035	3.5	1.75	4	50	6	•
DB402040	4	2	5	50	6	•
DB402045	4.5	2.25	5	50	6	•
DB402050	5	2.5	6	50	6	•
DB402055	5.5	2.75	6	50	6	•
DB402060	6	3	7	50	6	•
DB402070	7	3.5	8	60	8	•
DB402080	8	4	9	60	8	•
DB402090	9	4.5	10	70	10	•
DB402100	10	5	11	70	10	•
DB402120	12	6	12	75	12	•
DB402140	14	7	14	80	14	•
DB402160	16	8	16	82	16	•
DB402200	20	10	20	100	20	•

■ Tolerance

Mill Dia. (mm)	Shank Dia.
0 ~ -0.02	h6

※Items can be changed for quality improvement without notice.



2 FLUTE, 15˚ HELIX STUB CUT LENGTH, BALL NOSE with EXTENDED NECK

- Designed for high hardened materials up to HRc 62.
- Suitable for high speed machining.

DB412 ...series

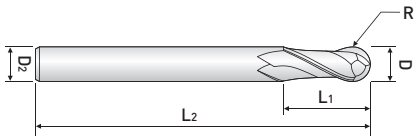
ULTRA FINE HELIX

EDP. No.	D	R	L_1	L_2	L_3	D_2	D_3	STOCK
DB412010	1	0.5	1	3	50	0.95	4	•
DB412015	1.5	0.75	2	5	50	1.4	4	•
DB412020	2	1	3	6	50	1.9	6	•
DB412030S	3	1.5	4	8	50	2.9	4	•
DB412030							6	•
DB412030L					75			•
DB412040S	4	2	5	10	50	3.9	4	•
DB412040							6	•
DB412040L					75			•
DB412050	5	2.5	5	10	50	4.9	6	•
DB412060S	6	3	6	12	50	5.9	6	•
DB412060					75			•
DB412060L				16	100			•
DB412080	8	4	8	16	60	7.9	8	•
DB412080L				25	100			•
DB412100	10	5	10	20	70	9.9	10	•
DB412100L				30	100			•

■ Tolerance

Mill Dia. (mm)	Shank Dia.
0 ~ -0.03	h6

※Items can be changed for quality improvement without notice.



2 FLUTE, LONG LENGTH, BALL NOSE

- Designed to machine tool steel, alloy steel, mold steel and other high hardened materials.
- Suitable for copy milling.

DB512 ...series

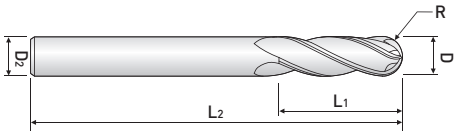
ULTRA FINE HELIX

EDP. No.	Dia.	R	L_1	L_2	D_2	STOCK
DB512010	1	0.5	3	50	4	•
DB512010					6	•
DB512015	1.5	0.75	4	50	6	•
DB512020	2	1	5	60	4	•
DB512020					6	•
DB512025	2.5	1.25	6	60	6	•
DB512030	3	1.5	8	70	4	•
DB512030					6	•
DB512035	3.5	1.75	8	70	6	•
DB512040	4	2	8	70	4	•
DB512040					6	•
DB512045	4.5	2.25	10	70	6	•
DB512050	5	2.5	12	80	6	•
DB512055	5.5	2.75	12	80	6	•
DB512060	6	3	12	90	6	•
DB512065	6.5	3.25	12	90	8	•
DB512070	7	3.5	15	90	8	•
DB512080	8	4	15	100	8	•
DB512090	9	4.5	20	100	10	•
DB512100	10	5	20	100	10	•
DB512101			25	150		•
DB512110	11	5.5	25	110	12	•
DB512120	12	6	25	110	12	•
DB512121			30	150		•
DB512122			35	200		•
DB512130	13	6.5	30	110	14	•
DB512140	14	7	30	110	14	•
DB512150	15	7.5	35	140	16	•
DB512160	16	8	35	140	16	•
DB512161			40	200		•
DB512162			45	250		•
DB512180	18	9	40	150	18	•
DB512200	20	10	40	160	20	•
DB512201			45	200		•
DB512202			50	250		•
DB512250	25	12.5	50	180	25	•

■ Tolerance

Mill Dia. (mm)	Shank Dia.
0 ~ -0.02	h6

※Items can be changed for quality improvement without notice.



4 FLUTE, LONG LENGTH, BALL NOSE

- Designed to machine tool steel, alloy steel, mold steel and other high hardened materials.
- Suitable for copy milling.

DB514 ...series

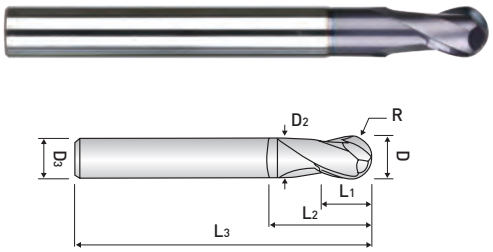
ULTRA FINE HELIX

EDP. No.	Dia.	R	L_1	L_2	D_2	STOCK
DB514030	3	1.5	8	70	6	•
DB514040	4	2	8	70	6	•
DB514050	5	2.5	10	80	6	•
DB514060	6	3	12	90	6	•
DB514070	7	3.5	15	90	8	•
DB514080	8	4	15	100	8	•
DB514090	9	4.5	20	100	10	•
DB514100	10	5	20	100	10	•
DB514110	11	5.5	25	110	12	•
DB514120	12	6	25	110	12	•
DB514130	13	6.5	30	110	14	•
DB514140	14	7	30	110	14	•
DB514150	15	7.5	35	140	16	•
DB514160	16	8	35	140	16	•
DB514180	18	9	40	150	18	•
DB514200	20	10	40	160	20	•
DB514250	25	12.5	50	180	25	•

■ Tolerance

Mill Dia. (mm)	Shank Dia.
0 ~ -0.02	h6

※Items can be changed for quality improvement without notice.



2 FLUTE, STUB CUT LENGTH, BALL NOSE with EXTENDED NECK

- Designed to machine tool steel, alloy steel, mold steel and other high hardened materials.
- Suitable for copy milling.
- Designed to high strength.

DB502 ...series

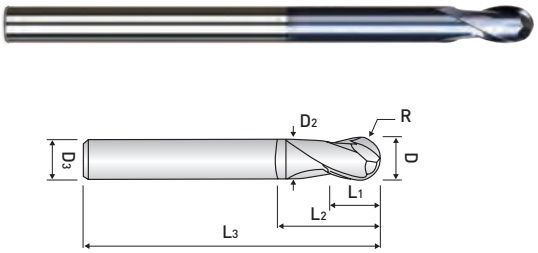
ULTRA FINE HELIX

EDP. No.	D	R	L_1	L_2	L_3	D_2	D_3	STOCK
DB502010	1	0.5	1	3	50	0.95	6	•
DB502015	1.5	0.75	1.5	4	50	1.45	6	•
DB502020	2	1	2	6	60	1.9	6	•
DB502030	3	1.5	4	9	70	2.85	6	•
DB502040	4	2	5	12	70	3.85	6	•
DB502050	5	2.5	6	15	80	4.7	6	•
DB502060	6	3	7	18	90	5.7	6	•
DB502080	8	4	10	24	90	7.7	8	•
DB502100	10	5	12	30	100	9.5	10	•
DB502120	12	6	14	36	110	11.5	12	•

■ Tolerance

Mill Dia. (mm)	Shank Dia.
0 ~ -0.02	h6

※Items can be changed for quality improvement without notice.



2 FLUTE, EXTENDED NECK-LONG SHANK

- Designed to machine tool steel, alloy steel, mold steel and other high hardened materials.
- Suitable for copy milling.
- Suitable for deep copy milling with long neck type.

DB522 ...series

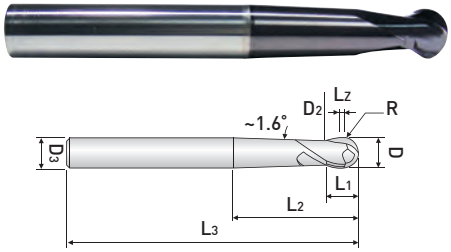
ULTRA FINE HELIX

EDP. No.	D	R	L_1	L_2	L_3	D_2	D_3	STOCK
DB522030	3	1.5	4	35	100	2.9	6	•
DB522040	4	2	6	35	100	3.9	6	•
DB522050	5	2.5	7	40	115	4.9	6	•
DB522060	6	3	8	45	115	5.9	6	•
DB522061							8	•
DB522070	7	3.5	10	45	125	6.9	8	•
DB522080	8	4	12	55	125	7.9	8	•
DB522081							10	•
DB522090	9	4.5	15	65	140	8.9	10	•
DB522100	10	5	15	65	140	9.9	10	•
DB522120	12	6	18	75	150	11.9	12	•
DB522140	14	7	23	75	155	13.9	14	•
DB522160	16	8	30	75	155	15.9	16	•

■ Tolerance

Mill Dia. (mm)	Shank Dia.
0 ~ -0.02	h6

※Items can be changed for quality improvement without notice.



2 FLUTE, MMC-SPHERE TYPE

- For copy milling & steep sloped machining in mold & die.
- AlTiN coated for high wear resistance.

DB532 ...series

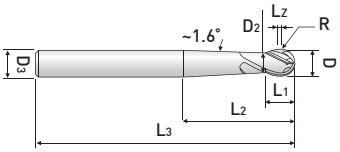
ULTRA FINE HELIX

EDP. No.	D	R	L1	L2	L3	D2	D3	Lz	STOCK
DB532030	3	1.5	4	30	80	2.5	6	1.5	•
DB532031			2.3					-	
DB532040	4	2	5	30	80	3.3	6	1.5	•
DB532041			3.1					-	
DB532050	5	2.5	6	43	80	4.1	6	2	•
DB532051			3.9	38				-	
DB532060	6	3	7	30	100	4.7	6	2	•
DB532061			4.9	28				-	
DB532080	8	4	9	36	100	6.5	8	3	•
DB532081			6.3	33				-	
DB532100	10	5	11	43	100	8.2	10	3	•
DB532101			7.9	40				-	
DB532120	12	6	13	52	100	9.8	12	3	•
DB532121			9.5	49				-	
DB532160	16	8	15	61	150	13.4	16	3	•
DB532161			12.4	59				-	

■ Tolerance

Mill Dia. (mm)	Shank Dia.
0 ~ -0.02	h6

※Items can be changed for quality improvement without notice.



4 FLUTE, MMC-SPHERE TYPE

- For copy milling & Steep sloped machining in Mold & Die.
- AlTiN coated for high wear resistance.

DB534 ...series

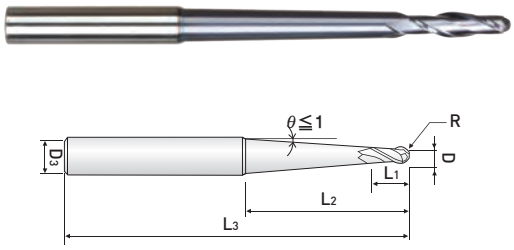
ULTRA FINE HELIX

EDP. No.	D	R	L1	L2	L3	D2	D3	Lz	STOCK
DB534050	5	2.5	6	43	80	4.1	6	2	•
DB534051			3.9	38				-	
DB534060	6	3	7	30	100	4.7	6	2	•
DB534061			4.9	28				-	
DB534080	8	4	9	36	100	6.5	8	3	•
DB534081			6.3	33				-	
DB534100	10	5	11	43	100	8.2	10	3	•
DB534101			7.9	40				-	
DB534120	12	6	13	52	100	9.8	12	3	•
DB534121			9.5	49				-	
DB534160	16	8	15	61	150	13.4	16	3	•
DB534161			12.4	59				-	

■ Tolerance

Mill Dia. (mm)	Shank Dia.
0 ~ -0.02	h6

※Items can be changed for quality improvement without notice.



2 FLUTE, BALL NOSE with TAPER NECK

- Designed to machine tool steel, alloy steel, mold steel and other high hardened materials.
- Suitable for copy milling.
- Suitable for deep copy milling with taper long neck type.

DB54(5)2 ...series

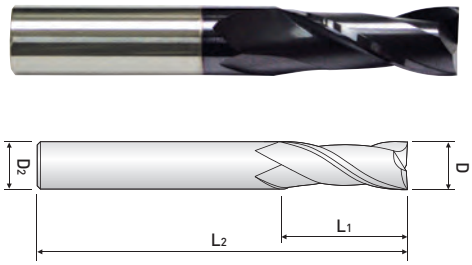
ULTRA FINE HELIX

EDP. No.	D	R	L_1	L_2	L_3	D_3	STOCK
DB542020	2	1.0	3	63	110	6	•
DB552020			5	85	155		•
DB542030	3	1.5	5	65	110	6	•
DB552030			7	87	155		•
DB542040	4	2.0	7	67	110	6	•
DB552040			10	90	155	8	•
DB542050	5	2.5	10	70	110	6	•
DB552050			15	95	155	8	•
DB542060	6	3.0	18	78	155	10	•
DB552060			20	110	200		•
DB542080	8	4.0	30	100	155	12	•
DB552080				120	200		•
DB542100	10	5.0	40	100	155	12	•
DB552100				120	200		•
DB542120	12	6.0	50	110	155	16	•
DB552120				130	200		•

■ Tolerance

Mill Dia. (mm)	Shank Dia.
0 ~ -0.02	h6

※Items can be changed for quality improvement without notice.



2 FLUTE, REGULAR LENGTH

- Designed to machine tool steel, alloy steel, mold steel and other high hardened materials.
- Superior workpiece finishes.

ZE502 ...series

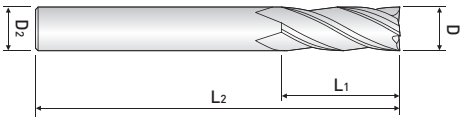
ULTRA FINE HELIX

EDP. No.	Dia.	L_1	L_2	D_2	STOCK
ZE502010	1	3	42	4	•
ZE502010				6	•
ZE502015	1.5	4	42	6	•
ZE502020	2	6	42	4	•
ZE502020				6	•
ZE502025	2.5	8	42	6	•
ZE502030	3	10	50	4	•
ZE502030				6	•
ZE502035	3.5	10	50	6	•
ZE502040	4	12	50	4	•
ZE502040				6	•
ZE502045	4.5	14	50	6	•
ZE502050	5	15	50	6	•
ZE502055	5.5	15	50	6	•
ZE502060	6	15	50	6	•
ZE502065	6.5	18	60	8	•
ZE502070	7	20	60	8	•
ZE502075	7.5	20	60	8	•
ZE502080	8	20	60	8	•
ZE502085	8.5	23	70	10	•
ZE502090	9	25	70	10	•
ZE502095	9.5	25	70	10	•
ZE502100	10	25	70	10	•
ZE502105	10.5	28	75	12	•
ZE502110	11	30	75	12	•
ZE502115	11.5	30	75	12	•
ZE502120	12	30	75	12	•
ZE502125S12	12.5	30	80	12	•
ZE502130S12	13	30	80	12	•
ZE502130		35	85	14	•
ZE502130S16			90	16	•
ZE502140	14	35	85	14	•
ZE502140S16			90	16	•
ZE502150	15	40	90	16	•
ZE502160	16	40	90	16	•
ZE502170	17	40	100	16	•
ZE502180	18	45	100	18	•
ZE502190	19	45	100	20	•
ZE502200	20	45	100	20	•
ZE502220	22	45	100	20	•
ZE502240	24	50	120	25	•
ZE502250	25	50	120	25	•

■ Tolerance

Mill Dia. (mm)	Shank Dia.
0 ~ -0.02	h6

※Items can be changed for quality improvement without notice.



4 FLUTE, REGULAR LENGTH

- Designed to machine tool steel, alloy steel, mold steel and other high hardened materials.
- Superior workpiece finishes.

ZE504 ...series

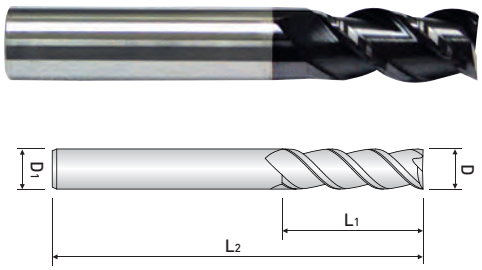
ULTRA FINE HELIX

EDP. No.	Dia.	L_1	L_2	D_2	STOCK
ZE504010	1	2.5	42	6	•
ZE504015	1.5	4	42	6	•
ZE504020	2	6	42	4	•
ZE504020				6	•
ZE504025	2.5	8	42	6	•
ZE504030	3	10	50	4	•
ZE504030				6	•
ZE504035	3.5	10	50	6	•
ZE504040	4	12	50	4	•
ZE504040				6	•
ZE504045	4.5	14	50	6	•
ZE504050	5	15	50	6	•
ZE504055	5.5	15	50	6	•
ZE504060	6	15	50	6	•
ZE504065	6.5	18	60	8	•
ZE504070	7	20	60	8	•
ZE504075	7.5	20	60	8	•
ZE504080	8	20	60	8	•
ZE504085	8.5	23	70	10	•
ZE504090	9	25	70	10	•
ZE504095	9.5	25	70	10	•
ZE504100	10	25	70	10	•
ZE504105	10.5	28	75	12	•
ZE504110	11	30	75	12	•
ZE504115	11.5	30	75	12	•
ZE504120	12	30	75	12	•
ZE504125S12	12.5	30	80	12	•
ZE504130S12	13	30	80	12	•
ZE504130		35	85	14	•
ZE504130S16			90	16	•
ZE504140	14	35	85	14	•
ZE504140S16			90	16	•
ZE504150	15	40	90	16	•
ZE504160	16	40	90	16	•
ZE504170	17	40	100	16	•
ZE504180	18	45	100	18	•
ZE504190	19	45	100	20	•
ZE504200	20	45	100	20	•
ZE504220	22	45	100	20	•
ZE504240	24	50	120	25	•
ZE504250	25	50	120	25	•

■ Tolerance

Mill Dia. (mm)	Shank Dia.
0 ~ -0.02	h6

※Items can be changed for quality improvement without notice.



3 FLUTE, REGULAR LENGTH

- Designed to machine tool steel, alloy steel, mold steel and other high hardened materials.
- Superior workpiece finishes.

ZE503 ...series

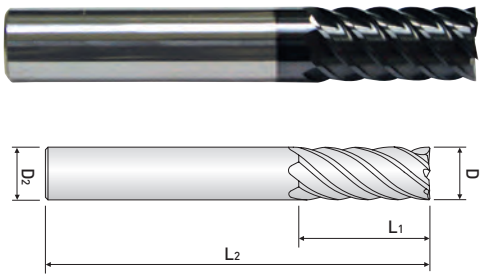
ULTRA FINE HELIX

EDP. No.	Dia.	L_1	L_2	D_2	STOCK
ZE503060	6	15	50	6	•
ZE503070	7	18	60	8	•
ZE503080	8				•
ZE503090	9	22	70	10	•
ZE503100	10				•
ZE503110	11	26	75	12	•
ZE503120	12				•
ZE503130	13	32	85	14	•
ZE503140	14				•
ZE503150	15	35	90	16	•
ZE503160	16				•
ZE503180	18	40	100	18	•
ZE503200	20	40	100	20	•
ZE503250	25	50	120	25	•
ZE503320	32	70	150	32	•

■ Tolerance

Mill Dia. (mm)	Shank Dia.
0 ~ -0.03	h6

※Items can be changed for quality improvement without notice.



6 FLUTE, REGULAR & LONG LENGTH

- Designed for highly hardened materials up to HRc 55.
- Suitable for high speed & finishing machining.

ZE506 ...series

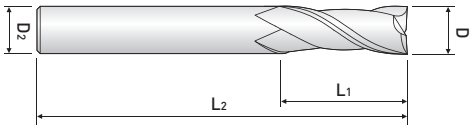
ULTRA FINE HELIX

EDP. No.	Dia.	L_1	L_2	D_2	STOCK
ZE506060	6	15	50	6	•
ZE506061		26	70		•
ZE506070	7	18	60	8	•
ZE506080	8	18	60	8	•
ZE506081		36	90		•
ZE506090	9	22	70	10	•
ZE506100	10	22	70	10	•
ZE506101		46	100		•
ZE506110	11	26	75	12	•
ZE506120	12	26	75	12	•
ZE506121		56	110		•
ZE506130	13	32	85	14	•
ZE506140	14	32	85	14	•
ZE506150	15	35	90	16	•
ZE506160	16	35	90	16	•
ZE506161		66	130		•
ZE506180	18	44	100	18	•
ZE506200	20	44	100	20	•
ZE506201		76	150		•
ZE506250	25	50	120	25	•
ZE506251		92	180		•
ZE506320	32	70	150	32	•

■ Tolerance

Mill Dia. (mm)	Shank Dia.
0 ~ -0.03	h6

※Items can be changed for quality improvement without notice.



2 FLUTE, MEDIUM LENGTH

- Designed to machine tool steel, alloy steel, mold steel and other high hardened materials.
- Superior workpiece finishes.

ZM502 ...series

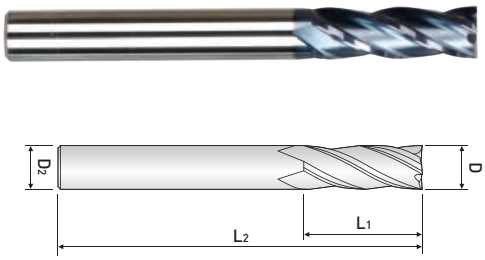
ULTRA FINE HELIX

EDP. No.	Dia.	L_1	L_2	D_2	STOCK
ZM502020	2	8	40	4	•
ZM502030	3	12	50	6	•
ZM502040	4	15	50	6	•
ZM502050	5	20	60	6	•
ZM502060	6	20	60	6	•
ZM502080	8	25	70	8	•
ZM502100	10	30	90	10	•
ZM502120	12	30	90	12	•
ZM502140	14	40	110	16	•
ZM502160	16	50	110	16	•
ZM502180	18	50	110	20	•
ZM502200	20	55	110	20	•
ZM502250	25	75	140	25	•

■ Tolerance

Mill Dia. (mm)	Shank Dia.
0 ~ -0.03	h6

※Items can be changed for quality improvement without notice.



4 FLUTE, MEDIUM LENGTH

- Designed to machine tool steel, alloy steel, mold steel and other high hardened materials.
- Superior workpiece finishes.

ZM504 ...series

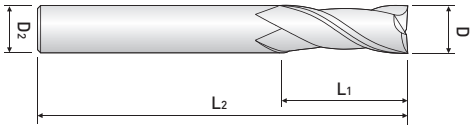
ULTRA FINE HELIX

EDP. No.	Dia.	L_1	L_2	D_2	STOCK
ZM504020	2	8	40	4	•
ZM504030	3	12	50	6	•
ZM504040	4	15	50	6	•
ZM504050	5	20	60	6	•
ZM504060	6	20	60	6	•
ZM504080	8	25	70	8	•
ZM504100	10	30	90	10	•
ZM504120	12	30	90	12	•
ZM504140	14	40	110	16	•
ZM504160	16	50	110	16	•
ZM504180	18	50	110	20	•
ZM504200	20	55	110	20	•
ZM504250	25	75	140	25	•

■ Tolerance

Mill Dia. (mm)	Shank Dia.
0 ~ -0.03	h6

※Items can be changed for quality improvement without notice.



2 FLUTE, MEDIUM CUT LONG SHANK TYPE

- Designed to machine tool steel, alloy steel, mold steel and other high hardened materials.
- Superior workpiece finishes.

ZM522 ...series

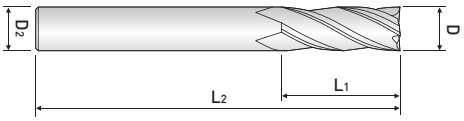
ULTRA FINE HELIX

EDP. No.	Dia.	L_1	L_2	D_2	STOCK
ZM522030	3	10	70	6	•
ZM522040	4	12	70	6	•
ZM522050	5	15	80	6	•
ZM522060	6	15	80	6	•
ZM522080	8	20	100	8	•
ZM522100	10	25	100	10	•
ZM522120	12	30	110	12	•
ZM522160	16	40	125	16	•
ZM522200	20	45	150	20	•

■ Tolerance

Mill Dia. (mm)	Shank Dia.
0 ~ -0.03	h6

※Items can be changed for quality improvement without notice.



4 FLUTE, MEDIUM CUT LONG SHANK TYPE

- Designed to machine tool steel, alloy steel, mold steel and other high hardened materials.
- Superior workpiece finishes.

ZM524 ...series

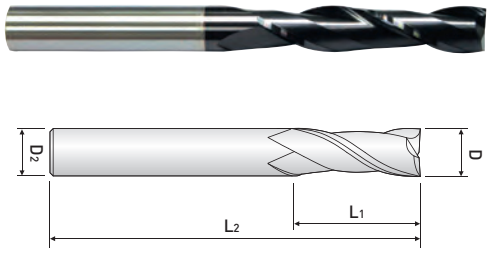
ULTRA FINE HELIX

EDP. No.	Dia.	L_1	L_2	D_2	STOCK
ZM524030	3	10	70	6	•
ZM524040	4	12	70	6	•
ZM524050	5	15	80	6	•
ZM524060	6	15	80	6	•
ZM524080	8	20	100	8	•
ZM524100	10	25	100	10	•
ZM524120	12	30	110	12	•
ZM524160	16	40	125	16	•
ZM524200	20	45	150	20	•

■ Tolerance

Mill Dia. (mm)	Shank Dia.
0 ~ -0.03	h6

※Items can be changed for quality improvement without notice.



2 FLUTE, LONG LENGTH

- Designed to machine tool steel, alloy steel, mold steel and other high hardened materials.
- Superior workpiece finishes.

ZE522 ...series

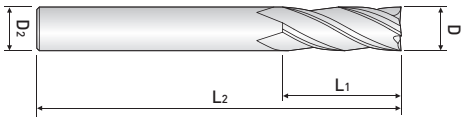
ULTRA FINE HELIX

EDP. No.	Dia.	L_1	L_2	D_2	STOCK
ZE522030	3	25	75	6	•
ZE522040	4	25	75	6	•
ZE522050	5	30	80	6	•
ZE522060	6	30	80	6	•
ZE522070	7	35	85	8	•
ZE522080	8	35	85	8	•
ZE522090	9	45	100	10	•
ZE522100	10	45	100	10	•
ZE522101		60	155		•
ZE522110	11	50	110	12	•
ZE522120	12	55	120	12	•
ZE522121		65	155		•
ZE522140	14	60	120	14	•
ZE522160	16	60	120	16	•
ZE522161		75	165		•
ZE522180	18	60	120	18	•
ZE522200	20	60	120	20	•
ZE522201		75	165		•

■ Tolerance

Mill Dia. (mm)	Shank Dia.
0 ~ -0.03	h6

※Items can be changed for quality improvement without notice.



4 FLUTE, LONG LENGTH

- Designed to machine tool steel, alloy steel, mold steel and other high hardened materials.
- Superior workpiece finishes.

ZE524 ...series

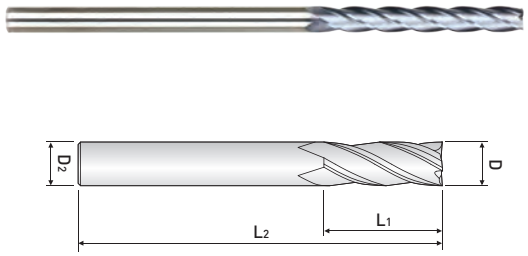
ULTRA FINE HELIX

EDP. No.	Dia.	L_1	L_2	D_2	STOCK
ZE524030	3	25	75	6	•
ZE524040	4	25	75	6	•
ZE524050	5	30	80	6	•
ZE524060	6	30	80	6	•
ZE524070	7	35	85	8	•
ZE524080	8	35	85	8	•
ZE524090	9	45	100	10	•
ZE524100	10	45	100	10	•
ZE524110	11	50	110	12	•
ZE524120	12	55	120	12	•
ZE524140	14	60	120	14	•
ZE524160	16	60	120	16	•
ZE524180	18	60	120	18	•
ZE524200	20	60	120	20	•

■ Tolerance

Mill Dia. (mm)	Shank Dia.
0 ~ -0.03	h6

※Items can be changed for quality improvement without notice.



4 FLUTE, EXTRA LONG LENGTH

- Designed to machine tool steel, alloy steel, mold steel and other high hardened materials.
- Superior workpiece finishes.

ZE534 ...series

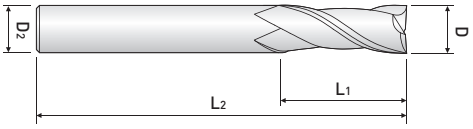
ULTRA FINE HELIX

EDP. No.	Dia.	L_1	L_2	D_2	STOCK
ZE534040	4	30	130	6	•
ZE534050	5	35	130	6	•
ZE534060	6	40	130	6	•
ZE534061		50	155		•
ZE534081	8	60	155	8	•
ZE534082		80	200		•
ZE534101	10	60	155	10	•
ZE534102		80	200		•
ZE534121	12	60	155	12	•
ZE534122		80	200		•
ZE534161	16	80	155	16	•
ZE534162		100	200		•
ZE534163		120	250		•
ZE534201	20	80	165	20	•
ZE534202		100	200		•
ZE534203		130	250		•
ZE534252	25	100	200	25	•
ZE534253		150	250		•

■ Tolerance

Mill Dia. (mm)	Shank Dia.
0 ~ -0.03	h6

※Items can be changed for quality improvement without notice.



2 FLUTE, 35˚ HELIX REGULAR LENGTH

- Designed for high hardened materials up to HRc 62.
- Suitable for high speed machining.

ZE512 ...series

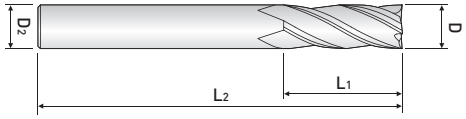
ULTRA FINE HELIX

EDP. No.	Dia.	L_1	L_2	D_2	STOCK
ZE512010	1	3	40	6	•
ZE512015	1.5	4	40	6	•
ZE512020	2	5	40	6	•
ZE512025	2.5	6	40	6	•
ZE512030	3	8	45	6	•
ZE512035	3.5	10	45	6	•
ZE512040	4	10	45	6	•
ZE512045	4.5	11	45	6	•
ZE512050	5	13	50	6	•
ZE512055	5.5	13	50	6	•
ZE512060	6	13	50	6	•
ZE512065	6.5	16	60	8	•
ZE512070	7	18	60	8	•
ZE512080	8	19	60	8	•
ZE512100	10	22	70	10	•
ZE512120	12	26	75	12	•

■ Tolerance

Mill Dia. (mm)	Shank Dia.
0 ~ -0.02	h6

※Items can be changed for quality improvement without notice.



4 FLUTE, 45˚ HELIX REGULAR LENGTH

- Designed for high hardened materials up to HRc 62.
- Suitable for high speed machining.

ZE514 ...series

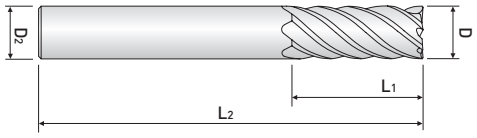
ULTRA FINE HELIX

EDP. No.	Dia.	L_1	L_2	D_2	STOCK
ZE514020	2	5	40	6	•
ZE514025	2.5	6	40	6	•
ZE514030	3	8	45	6	•
ZE514040	4	10	45	6	•
ZE514050	5	13	50	6	•
ZE514060	6	13	50	6	•
ZE514080	8	19	60	8	•
ZE514100	10	22	70	10	•
ZE514120	12	26	75	12	•

■ Tolerance

Mill Dia. (mm)	Shank Dia.
0 ~ -0.02	h6

※Items can be changed for quality improvement without notice.



6 FLUTE, 50° HELIX REGULAR LENGTH

- Designed for high hardened materials up to HRc 62.
- Suitable for high speed machining.

ZE516 ...series

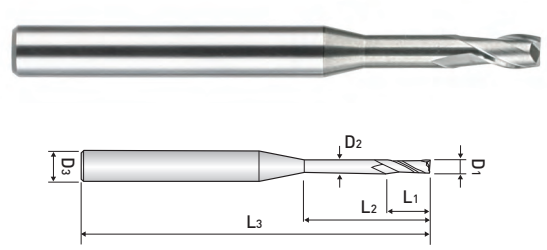
ULTRA FINE HELIX

EDP. No.	Dia.	L_1	L_2	D_2	STOCK
ZE516060	6	13	50	6	•
ZE516080	8	18	60	8	•
ZE516100	10	22	70	10	•
ZE516120	12	26	75	12	•
ZE516160	16	35	90	16	•
ZE516200	20	44	100	20	•

■ Tolerance

Mill Dia. (mm)	Shank Dia.
0 ~ -0.02	h6

※Items can be changed for quality improvement without notice.



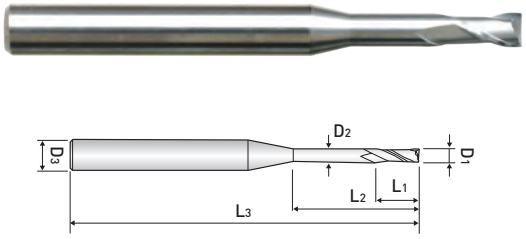
2 FLUTE, for RIB PROCESSING

- Designed for machine tool steel, alloy steel, mold steel and other high hardened materials.
- Long neck design for deep machining near walls.

ZE612 ...series

ULTRA FINE HELIX

EDP. No.	D1	L1	L2	L3	D2	D3	STOCK
ZE6120402	0.4	0.6	2	45	0.37	4	•
ZE6120403			3				•
ZE6120404			4				•
ZE6120405			5				•
ZE6120406			6				•
ZE6120408			8				•
ZE6120502	0.5	0.7	2	45	0.45	4	•
ZE6120503			3				•
ZE6120504			4				•
ZE6120505			5				•
ZE6120506			6				•
ZE6120508			8				•
ZE6120510			10				•
ZE6120602	0.6	0.9	2	45	0.55	4	•
ZE6120603			3				•
ZE6120604			4				•
ZE6120605			5				•
ZE6120606			6				•
ZE6120608			8				•
ZE6120610			10				•
ZE6120612			12				•
ZE6120702	0.7	1	2	45	0.65	4	•
ZE6120704			4				•
ZE6120706			6				•
ZE6120708			8				•
ZE6120710			10				•
ZE6120802	0.8	1.2	2	45	0.75	4	•
ZE6120804			4				•
ZE6120806			6				•
ZE6120808			8				•
ZE6120810			10				•
ZE6120812			12				•
ZE6120906	0.9	1.4	6	45	0.85	4	•
ZE6120908			8				•
ZE6120910			10				•
ZE6121003	1	1.5	3	45	0.95	4	



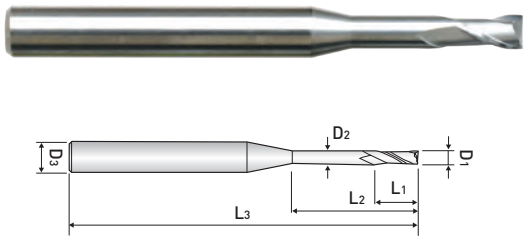
2 FLUTE, for RIB PROCESSING

- Designed for machine tool steel, alloy steel, mold steel and other high hardened materials.
- Long neck design for deep machining near walls.

ZE612 ...series

ULTRA FINE HELIX

EDP. No.	D1	L1	L2	L3	D2	D3	STOCK
ZE6121004	1	1.5	4	45	0.95	4	•
ZE6121005			5				•
ZE6121006			6				•
ZE6121008			8				•
ZE6121010			10				•
ZE6121012			12				•
ZE6121014			14				•
ZE6121016			16	50			•
ZE6121018			18				•
ZE6121020			20				•
ZE6121025			25	60			•
ZE6121206	1.2	1.8	6	45	1.15	4	•
ZE6121208			8				•
ZE6121210			10				•
ZE6121212			12				•
ZE6121216			16	50			•
ZE6121220			20				•
ZE6121225			25	60			•
ZE6121406	1.4	2.1	6	45	1.35	4	•
ZE6121408			8				•
ZE6121410			10				•
ZE6121412			12				•
ZE6121414			14	50			•
ZE6121416			16				•
ZE6121420			20				•
ZE6121506	1.5	2.3	6	45	1.45	4	•
ZE6121508			8				•
ZE6121510			10				•
ZE6121512			12				•
ZE6121514			14				•
ZE6121516			16	50			•
ZE6121518			18	55			•
ZE6121520			20				•
ZE6121525			25	60			•
ZE6121606	1.6	2.5	6	45	1.55	4	•
ZE6121608			8				•



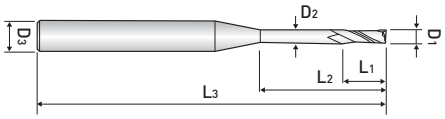
2 FLUTE, for RIB PROCESSING

- Designed for machine tool steel, alloy steel, mold steel and other high hardened materials.
- Long neck design for deep machining near walls.

ZE612 ...series

ULTRA FINE HELIX

EDP. No.	D1	L1	L2	L3	D2	D3	STOCK
ZE6121610	1.6	2.5	10	45	1.55	4	•
ZE6121612			12				•
ZE6121614			14	50			•
ZE6121616			16				•
ZE6121618			18	55			•
ZE6121620			20				•
ZE6121806	1.8	2.8	6	45	1.75	4	•
ZE6121808			8				•
ZE6121810			10				•
ZE6121812			12				•
ZE6121814			14	50			•
ZE6121816			16				•
ZE6121818			18	55			•
ZE6121820			20				•
ZE6122006	2	3	6	45	1.95	4	•
ZE6122008			8				•
ZE6122010			10				•
ZE6122012			12				•
ZE6122014			14	50			•
ZE6122016			16				•
ZE6122018			18	55			•
ZE6122020			20				•
ZE6122022			22	60			•
ZE6122025			25				•
ZE6122030			30	70			•
ZE6122035			35				•
ZE6122040			40	80			•
ZE6122508	2.5	3.7	8	45	2.45	4	•
ZE6122510			10				•
ZE6122512			12				•
ZE6122514			14	50			•
ZE6122516			16				•
ZE6122518			18	55			•
ZE6122520			20				•
ZE6122525			25	60			•
ZE6122530			30	70			•



2 FLUTE, for RIB PROCESSING

- Designed for machine tool steel, alloy steel, mold steel and other high hardened materials.
- Long neck design for deep machining near walls.

ZE612 ...series

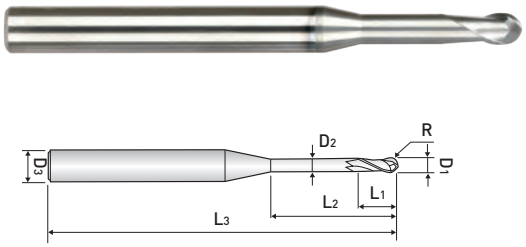
ULTRA FINE HELIX

EDP. No.	D1	L1	L2	L3	D2	D3	STOCK
ZE6122535	2.5	3.7	35	70	2.45	4	•
ZE6122540			40	80			•
ZE6123008	3	4.5	8	45	2.85	6	•
ZE6123010			10				•
ZE6123012			12				•
ZE6123014			14	50			•
ZE6123016			16				•
ZE6123018			18	55			•
ZE6123020			20				•
ZE6123025			25	60			•
ZE6123030			30	70			•
ZE6123035			35	80			•
ZE6123040			40	90			•
ZE6123045			45				•
ZE6123050			50	100			•
ZE6124010	4	6	10	50	3.85	6	•
ZE6124012			12				•
ZE6124016			16	60			•
ZE6124020			20				•
ZE6124025			25	70			•
ZE6124030			30				•
ZE6124035			35	80			•
ZE6124040			40	90			•
ZE6124045			45				•
ZE6124050			50	100			•
ZE6125016	5	7.5	16	60	4.85	6	•
ZE6125020			20				•
ZE6125025			25	70			•
ZE6125030			30				•
ZE6125035			35	80			•
ZE6125040			40	90			•
ZE6125050			50	100			•

■ Tolerance

Mill Dia. (mm)	Shank Dia.
0 ~ -0.02	h6

※Items can be changed for quality improvement without notice.



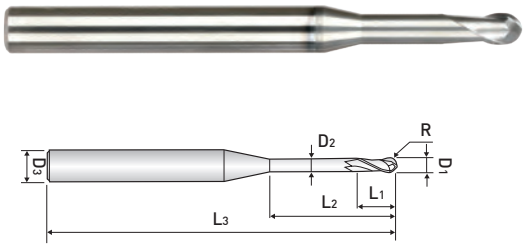
2 FLUTE, for RIB PROCESSING

- Designed for machine tool steel, alloy steel, mold steel and other high hardened materials.
- Long neck design for deep machining near walls.

DB612 ...series

ULTRA FINE HELIX

EDP. No.	D1	R	L1	L2	L3	D2	D3	STOCK
DB6120502	0.5	0.25	0.5	2	45	0.45	4	•
DB6120503				3				•
DB6120504				4				•
DB6120505				5				•
DB6120506				6				•
DB6120508				8				•
DB6120510				10				•
DB6120602	0.6	0.3	0.6	2	45	0.55	4	•
DB6120603				3				•
DB6120604				4				•
DB6120605				5				•
DB6120606				6				•
DB6120608				8				•
DB6120610				10				•
DB6120612				12				•
DB6120702	0.7	0.35	0.7	2	45	0.65	4	•
DB6120704				4				•
DB6120708				8				•
DB6120802	0.8	0.4	0.8	2	45	0.75	4	•
DB6120804				4				•
DB6120805				5				•
DB6120806				6				•
DB6120807				7				•
DB6120808				8				•
DB6120810				10				•
DB6120812				12				•
DB6120816				16	50			•
DB6121003	1	0.5	1	3	45	0.95	4	•
DB6121004				4				•
DB6121005				5				•
DB6121006				6				•
DB6121007				7				•
DB6121008				8				•
DB6121009				9				•
DB6121010				10				•
DB6121012				12				•



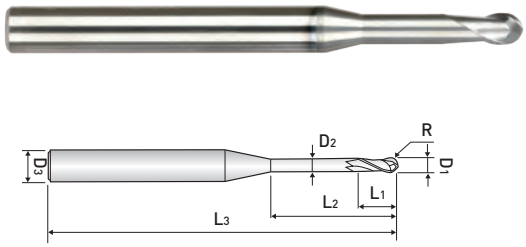
2 FLUTE, for RIB PROCESSING

- Designed for machine tool steel, alloy steel, mold steel and other high hardened materials.
- Long neck design for deep machining near walls.

DB612 ...series

ULTRA FINE HELIX

EDP. No.	D1	R	L1	L2	L3	D2	D3	STOCK
DB6121014	1	0.5	1	14	50	0.95	4	•
DB6121016				16				•
DB6121018				18				•
DB6121020				20	55			•
DB6121022				22	60			•
DB6121025				25				•
DB6121204	1.2	0.6	1.2	4	45	1.15	4	•
DB6121206				6				•
DB6121208				8				•
DB6121210				10				•
DB6121212				12				•
DB6121216				16	50			•
DB6121220				20	55			•
DB6121224				24	60			•
DB6121406	1.4	0.7	1.4	6	45	1.35	4	•
DB6121408				8				•
DB6121412				12				•
DB6121416				16	50			•
DB6121503	1.5	0.75	1.5	3	45	1.45	4	•
DB6121504				4				•
DB6121506				6				•
DB6121508				8				•
DB6121510				10				•
DB6121512				12				•
DB6121514				14	50			•
DB6121516				16				•
DB6121518				18				•
DB6121520				20	55			•
DB6121522				22	60			•
DB6121525				25				•
DB6121530				30	70			•
DB6121535				35				•
DB6121606	1.6	0.8	1.6	6	45	1.55	4	•
DB6121608				8				•
DB6121610				10				•
DB6121612				12				•



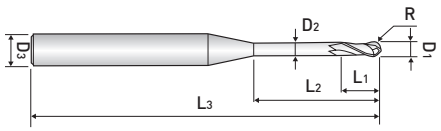
2 FLUTE, for RIB PROCESSING

- Designed for machine tool steel, alloy steel, mold steel and other high hardened materials.
- Long neck design for deep machining near walls.

DB612 ...series

ULTRA FINE HELIX

EDP. No.	D1	R	L1	L2	L3	D2	D3	STOCK
DB6121616	1.6	0.8	1.6	16	50	1.55	4	•
DB6121620				20	55			•
DB6121806	1.8	0.9	1.8	6	45	1.75	4	•
DB6121808				8				•
DB6121812				12				•
DB6121816				16	50			•
DB6121820				20	55			•
DB6122004	2	1	2	4	45	1.95	4	•
DB6122006				6				•
DB6122008				8				•
DB6122010				10				•
DB6122012				12				•
DB6122014				14	50			•
DB6122016				16				•
DB6122018				18	55			•
DB6122020				20				•
DB6122022				22	60			•
DB6122025				25	65			•
DB6122030				30	70			•
DB6122035				35				•
DB6122040				40	80			•
DB6122045				45				•
DB6122508	2.5	1.25	2.5	8	50	2.4	4	•
DB6122510				10				•
DB6122516				16				•
DB6122520				20	60			•
DB6122525				25				•
DB6122530				30	70			•
DB6122535				35				•
DB6123006	3	1.5	3	6	50	2.85	6	•
DB6123008				8				•
DB6123010				10				•
DB6123012				12				•
DB6123014				14	55			•
DB6123016				16				•
DB6123018				18	60			•



2 FLUTE, for RIB PROCESSING

- Designed for machine tool steel, alloy steel, mold steel and other high hardened materials.
- Long neck design for deep machining near walls.

DB612 ...series

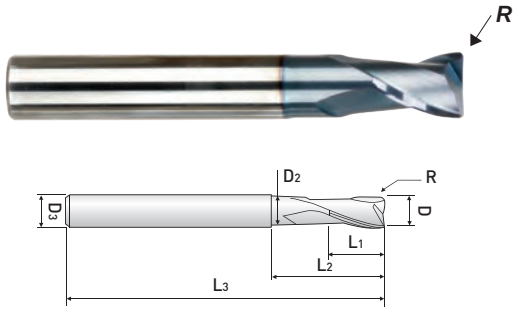
ULTRA FINE HELIX

EDP. No.	D1	R	L1	L2	L3	D2	D3	STOCK
DB6123020	3	1.5	3	20	60	2.85	6	•
DB6123025				25	65			•
DB6123030				30	70			•
DB6123035				35	80			•
DB6123040				40				•
DB6123045				45	90			•
DB6123050				50	100			•
DB6123060				60				•
DB6124008	4	2	4	8	60	3.85	6	•
DB6124010				10				•
DB6124012				12				•
DB6124016				16				•
DB6124020				20	65			•
DB6124025				25	70			•
DB6124030				30	80			•
DB6124035				35				•
DB6124040				40	90			•
DB6124045				45				•
DB6124050				50	100			•
DB6124060				60				•
DB6125015	5	2.5	5	15	60	4.85	6	•
DB6125020				20				•
DB6125025				25	70			•
DB6125030				30	80			•
DB6125035				35				•
DB6125040				40	90			•
DB6125045				45				•
DB6125050				50	100			•
DB6125060				60				•

■ Tolerance

Mill Dia. (mm)	Shank Dia.
0 ~ -0.02	h6

※Items can be changed for quality improvement without notice.



2 FLUTE, STUB CUT LENGTH, CORNER RADIUS with EXTENDED NECK

- Designed to machine tool steel, alloy steel, mold steel and other high hardened materials.
- Superior workpiece finishes.
- Increased feed rate.

ZR502 ...series

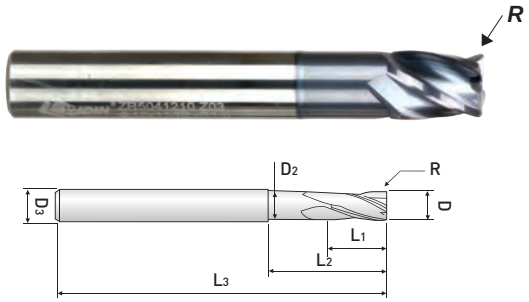
ULTRA FINE HELIX

EDP. No.	D	R	L_1	L_2	L_3	D_2	D_3	STOCK
ZR5020405	4	0.5	6	10	55	3.7	6	•
ZR5020410		1						•
ZR5020605	6	0.5	8	15	55	5.7	6	•
ZR5020610		1						•
ZR5020805	8	0.5	10	20	65	7.7	8	•
ZR5020810		1						•
ZR5020815		1.5						•
ZR5020820		2						•
ZR5021005	10	0.5	12	28	80	9.5	10	•
ZR5021010		1						•
ZR5021015		1.5						•
ZR5021020		2						•
ZR5021205	12	0.5	15	30	82	11.5	12	•
ZR5021210		1						•
ZR5021215		1.5						•
ZR5021220		2						•

■ Tolerance

Mill Dia. (mm)	Shank Dia.
0 ~ -0.02	h6

※Items can be changed for quality improvement without notice.



4 FLUTE, STUB CUT LENGTH, CORNER RADIUS with EXTENDED NECK

- Designed to machine tool steel, alloy steel, mold steel and other high hardened materials.
- Superior workpiece finishes.
- Increased feed rate.

ZR504 ...series

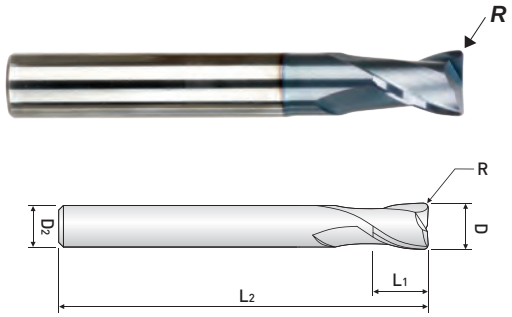
ULTRA FINE HELIX

EDP. No.	D	R	L_1	L_2	L_3	D_2	D_3	STOCK
ZR5040405	4	0.5	6	10	55	3.7	6	•
ZR5040410		1						•
ZR5040605	6	0.5	8	15	55	5.7	6	•
ZR5040610		1						•
ZR5040805	8	0.5	10	20	65	7.7	8	•
ZR5040810		1						•
ZR5040815		1.5						•
ZR5040820		2						•
ZR5041005	10	0.5	12	28	80	9.5	10	•
ZR5041010		1						•
ZR5041015		1.5						•
ZR5041020		2						•
ZR5041205	12	0.5	15	30	82	11.5	12	•
ZR5041210		1						•
ZR5041215		1.5						•
ZR5041220		2						•

■ Tolerance

Mill Dia. (mm)	Shank Dia.
0 ~ -0.02	h6

※Items can be changed for quality improvement without notice.



2 FLUTE, REGULAR LENGTH, CORNER RADIUS

- Designed to machine tool steel, alloy steel, mold steel and other high hardened materials.
- Superior workpiece finishes.
- Increased feed rate.

ZR512 ...series

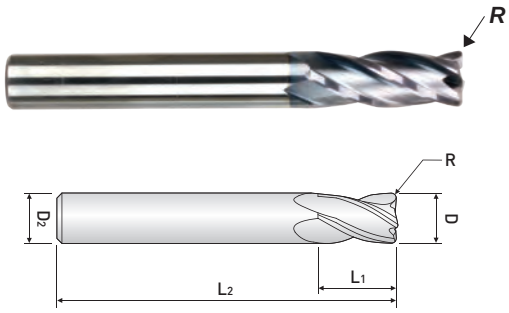
ULTRA FINE HELIX

EDP. No.	Dia.	R	L_1	L_2	D_2	STOCK
ZR5120605	6	0.5	15	55	6	•
ZR5120610		1				•
ZR5120805	8	0.5	20	65	8	•
ZR5120810		1				•
ZR5120815		1.5				•
ZR5120820		2				•
ZR5121005	10	0.5	25	80	10	•
ZR5121010		1				•
ZR5121015		1.5				•
ZR5121020		2				•
ZR5121025		2.5				•
ZR5121030		3				•
ZR5121205	12	0.5	30	82	12	•
ZR5121210		1				•
ZR5121215		1.5				•
ZR5121220		2				•
ZR5121225		2.5				•
ZR5121230		3				•
ZR5121605	16	0.5	40	100	16	•
ZR5121610		1				•
ZR5121615		1.5				•
ZR5121620		2				•
ZR5121630		3				•
ZR5122005	20	0.5	45	110	20	•
ZR5122010		1				•
ZR5122015		1.5				•
ZR5122020		2				•
ZR5122030		3				•

■ Tolerance

Mill Dia. (mm)	Shank Dia.
0 ~ -0.03	h6

※Items can be changed for quality improvement without notice.



4 FLUTE, REGULAR LENGTH, CORNER RADIUS

- Designed to machine tool steel, alloy steel, mold steel and other high hardened materials.
- Superior workpiece finishes.
- Increased feed rate.

ZR514 ...series

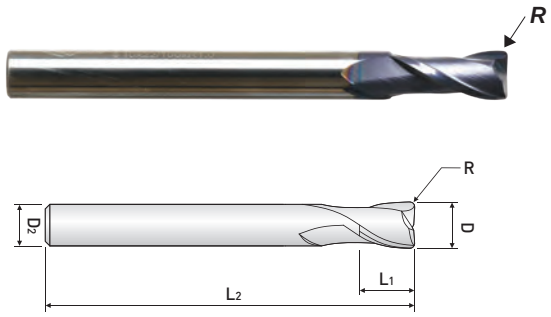
ULTRA FINE HELIX

EDP. No.	Dia.	R	L_1	L_2	D_2	STOCK
ZR5140605	6	0.5	15	55	6	•
ZR5140610		1				•
ZR5140805	8	0.5	20	65	8	•
ZR5140810		1				•
ZR5140815		1.5				•
ZR5140820		2				•
ZR5141005	10	0.5	25	80	10	•
ZR5141010		1				•
ZR5141015		1.5				•
ZR5141020		2				•
ZR5141025		2.5				•
ZR5141030		3				•
ZR5141205	12	0.5	30	82	12	•
ZR5141210		1				•
ZR5141215		1.5				•
ZR5141220		2				•
ZR5141225		2.5				•
ZR5141230		3				•
ZR5141605	16	0.5	40	100	16	•
ZR5141610		1				•
ZR5141615		1.5				•
ZR5141620		2				•
ZR5141630		3				•
ZR5142005	20	0.5	45	110	20	•
ZR5142010		1				•
ZR5142015		1.5				•
ZR5142020		2				•
ZR5142030		3				•

■ Tolerance

Mill Dia. (mm)	Shank Dia.
0 ~ -0.03	h6

※Items can be changed for quality improvement without notice.



2 FLUTE, LONG LENGTH, CORNER RADIUS

- Designed to machine tool steel, alloy steel, mold steel and other high hardened materials.
- Superior workpiece finishes.
- Increased feed rate.

ZR522 ...series

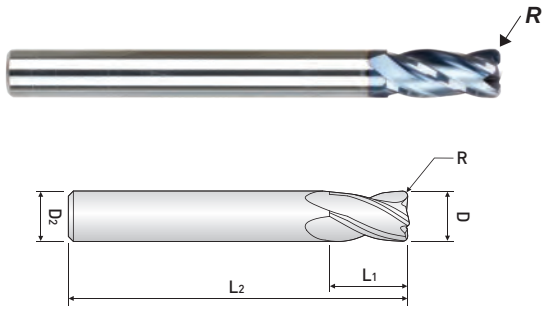
ULTRA FINE HELIX

EDP. No.	Dia.	R	L_1	L_2	D_2	STOCK
ZR5220302S4	3	0.2	8	60	4	•
ZR5220302					6	•
ZR5220305S4		0.5			4	•
ZR5220305					6	•
ZR5220402S4	4	0.2	11	70	4	•
ZR5220402	4	0.2	11	70	6	•
ZR5220405S4		0.5			4	•
ZR5220405		0.5			6	•
ZR5220410		1			6	•
ZR5220502	5	0.2	13	80	6	•
ZR5220505		0.5				•
ZR5220510		1				•
ZR5220602	6	0.2	13	90	6	•
ZR5220605		0.5				•
ZR5220610		1				•
ZR5220805	8	0.5	19	100	8	•
ZR5220810		1				•
ZR5220815		1.5				•
ZR5220820		2				•
ZR5221005	10	0.5	22	100	10	•
ZR5221010		1				•
ZR5221015		1.5				•
ZR5221020		2				•
ZR5221025		2.5				•
ZR5221205	12	0.5	26	110	12	•
ZR5221210		1				•
ZR5221215		1.5				•
ZR5221220		2				•
ZR5221225		2.5				•
ZR5221230		3				•

■ Tolerance

Mill Dia. (mm)	Shank Dia.
0 ~ -0.02	h6

※Items can be changed for quality improvement without notice.



4 FLUTE, LONG LENGTH, CORNER RADIUS

- Designed to machine tool steel, alloy steel, mold steel and other high hardened materials.
- Superior workpiece finishes.
- Increased feed rate.

ZR524 ...series

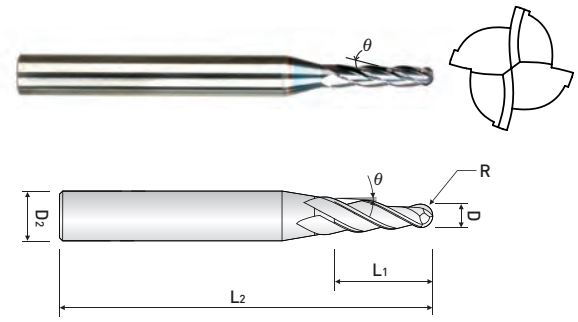
ULTRA FINE HELIX

EDP. No.	Dia.	R	L_1	L_2	D_2	STOCK
ZR5240302S4	3	0.2	8	60	4	•
ZR5240302					6	•
ZR5240305S4		0.5			4	•
ZR5240305					6	•
ZR5240402S4	4	0.2	11	70	4	•
ZR5240402					6	•
ZR5240405S4		0.5			4	•
ZR5240405					6	•
ZR5240410S4		1			4	•
ZR5240410					6	•
ZR5240502	5	0.2	13	80	6	•
ZR5240505		0.5				•
ZR5240510		1				•
ZR5240602	6	0.2	13	90	6	•
ZR5240605		0.5				•
ZR5240610		1				•
ZR5240805	8	0.5	19	100	8	•
ZR5240810		1				•
ZR5240815		1.5				•
ZR5240820		2				•
ZR5241005	10	0.5	22	100	10	•
ZR5241010		1				•
ZR5241015		1.5				•
ZR5241020		2				•
ZR5241025		2.5				•
ZR5241205	12	0.5	26	110	12	•
ZR5241210		1				•
ZR5241215		1.5				•
ZR5241220		2				•
ZR5241225		2.5				•
ZR5241230		3				•

■ Tolerance

Mill Dia. (mm)	Shank Dia.
0 ~ -0.02	h6

※Items can be changed for quality improvement without notice.



MULTIPLE FLUTES – TAPER BALL ENDMILLS for RIB PROCESSING

- Applying high hardened taper angle on the tool leads to highly efficient Rib processing
- Suitable to do machining performance on the inclined workpiece for electricity and electronic precise mold

■Taper Tolerance : ±10′

TPRB4...-..-050 series

ULTRA FINE HELIX

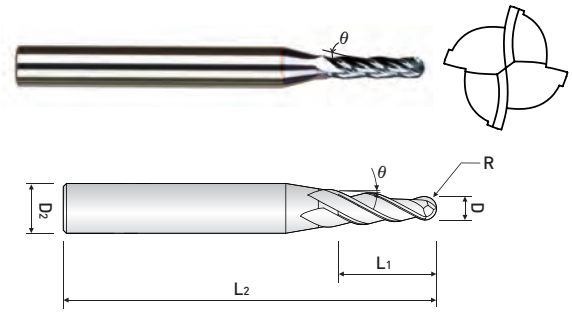
EDP. No.	R	θ	L1	L2	D2	STOCK
TPRB4006-04-050	0.3	30′	4	40	4	
TPRB4006-06-050			6			
TPRB4008-06-050	0.4	30′	6	45	4	
TPRB4008-08-050			8			
TPRB4008-10-050			10			
TPRB4010-06-050	0.5	30′	6	45	4	
TPRB4010-08-050			8			
TPRB4010-10-050			10			
TPRB4010-12-050			12			
TPRB4010-16-050			16	50		
TPRB4012-06-050	0.6	30′	6	45	4	
TPRB4012-08-050			8			
TPRB4012-10-050			10			
TPRB4012-12-050			12			
TPRB4012-16-050			16	50		
TPRB4015-08-050	0.75	30′	8	45	4	
TPRB4015-10-050			10			
TPRB4015-12-050			12			
TPRB4015-16-050			16	50		
TPRB4015-20-050			20	55		
TPRB4016-08-050	0.8	30′	8	45	4	
TPRB4016-10-050			10			
TPRB4016-12-050			12			
TPRB4016-16-050			16	50		
TPRB4016-20-050			20	55		
TPRB4018-08-050	0.9	30′	8	45	4	
TPRB4018-10-050			10			
TPRB4018-12-050			12			
TPRB4018-16-050			16	50		
TPRB4018-20-050			20	55		
TPRB4020-10-050	1.0	30′	10	45	4	
TPRB4020-12-050			12			
TPRB4020-16-050			16	50		
TPRB4020-20-050			20	55		
TPRB4020-25-050			25			
TPRB4025-10-050	1.25	30′	10	45	4	
TPRB4025-12-050			12			
TPRB4025-16-050			16	50		
TPRB4025-20-050			20	55		
TPRB4025-25-050			25			

※ These tools are manufactured based on order received.

■ Tolerance

Radius (mm)	Shank Dia.
±0.01	h6

※Items can be changed for quality improvement without notice.



MULTIPLE FLUTES – TAPER BALL ENDMILLS for RIB PROCESSING

- Applying high hardened taper angle on the tool leads to highly efficient Rib processing
- Suitable to do machining performance on the inclined workpiece for electricity and electronic precise mold

■Taper Tolerance : ±10′

TPRB4...-..-075 series

ULTRA FINE HELIX

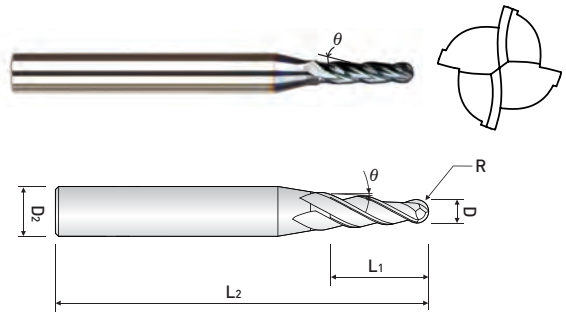
EDP. No.	R	θ	L₁	L₂	D₂	STOCK
TPRB4006-04-075	0.3	45′	4	40	4	
TPRB4006-06-075			6			
TPRB4008-06-075	0.4	45′	6	45	4	
TPRB4008-08-075			8			
TPRB4008-10-075			10			
TPRB4010-08-075	0.5	45′	8	45	4	
TPRB4010-10-075			10			
TPRB4010-12-075			12			
TPRB4012-08-075	0.6	45′	8	45	4	
TPRB4012-10-075			10			
TPRB4012-12-075			12			
TPRB4012-16-075			16	50		
TPRB4015-08-075	0.75	45′	8	45	4	
TPRB4015-10-075			10			
TPRB4015-12-075			12			
TPRB4015-16-075			16	50		
TPRB4015-20-075			20	55		
TPRB4016-08-075	0.8	45′	8	45	4	
TPRB4016-10-075			10			
TPRB4016-12-075			12			
TPRB4016-16-075			16	50		
TPRB4016-20-075			20	55		
TPRB4018-08-075	0.9	45′	8	45	4	
TPRB4018-10-075			10			
TPRB4018-12-075			12			
TPRB4018-16-075			16	50		
TPRB4018-20-075			20	55		
TPRB4020-10-075	1.0	45′	10	45	4	
TPRB4020-12-075			12			
TPRB4020-16-075			16	50		
TPRB4020-20-075			20	55		
TPRB4020-25-075			25			
TPRB4025-10-075	1.25	45′	10	45	4	
TPRB4025-12-075			12			
TPRB4025-16-075			16	50		
TPRB4025-20-075			20	55		
TPRB4025-25-075			25			

※ These tools are manufactured based on order received.

■ Tolerance

Radius (mm)	Shank Dia.
±0.01	h6

※Items can be changed for quality improvement without notice.



MULTIPLE FLUTES – TAPER BALL ENDMILLS for RIB PROCESSING

- Applying high hardened taper angle on the tool leads to highly efficient Rib processing
- Suitable to do machining performance on the inclined workpiece for electricity and electronic precise mold

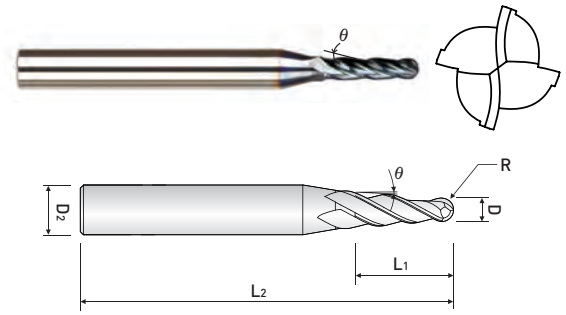
■Taper Tolerance : ±10′

TPRB4...-..-100 series

ULTRA FINE HELIX

EDP. No.	R	θ	L1	L2	D2	STOCK
TPRB4006-04-100	0.3	1°00′	4	40	4	
TPRB4006-06-100			6			
TPRB4008-06-100	0.4	1°00′	6	45	4	
TPRB4008-08-100			8			
TPRB4008-10-100			10			
TPRB4010-06-100	0.5	1°00′	6	45	4	
TPRB4010-08-100			8			
TPRB4010-10-100			10			
TPRB4010-12-100			12			
TPRB4010-16-100			16	50		
TPRB4012-06-100	0.6	1°00′	6	45	4	
TPRB4012-08-100			8			
TPRB4012-10-100			10			
TPRB4012-12-100			12			
TPRB4012-16-100			16	50		
TPRB4015-08-100	0.75	1°00′	8	45	4	
TPRB4015-10-100			10			
TPRB4015-12-100			12			
TPRB4015-16-100			16	50		
TPRB4015-20-100			20	55		
TPRB4016-08-100	0.8	1°00′	8	45	4	
TPRB4016-10-100			10			
TPRB4016-12-100			12			
TPRB4016-16-100			16	50		
TPRB4016-20-100			20	55		
TPRB4018-08-100	0.9	1°00′	8	45	4	
TPRB4018-10-100			10			
TPRB4018-12-100			12			
TPRB4018-16-100			16	50		
TPRB4018-20-100			20	55		

※ These tools are manufactured based on order received.



MULTIPLE FLUTES – TAPER BALL ENDMILLS for RIB PROCESSING

- Applying high hardened taper angle on the tool leads to highly efficient Rib processing
- Suitable to do machining performance on the inclined workpiece for electricity and electronic precise mold

■Taper Tolerance : ±10′

TPRB4...-..-100 series

ULTRA FINE HELIX

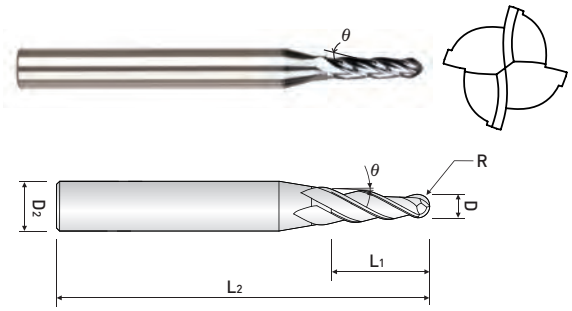
EDP. No.	R	θ	L1	L2	D2	STOCK
TPRB4020-10-100	1.0	1°00′	10	45	4	
TPRB4020-12-100			12			
TPRB4020-16-100			16	50		
TPRB4020-20-100			20	55		
TPRB4020-25-100			25			
TPRB4025-10-100	1.25	1°00′	10	45	4	
TPRB4025-12-100			12			
TPRB4025-16-100			16	50		
TPRB4025-20-100			20	55		
TPRB4025-25-100			25			

※ These tools are manufactured based on order received.

■ Tolerance

Radius (mm)	Shank Dia.
±0.01	h6

※Items can be changed for quality improvement without notice.



MULTIPLE FLUTES – TAPER BALL ENDMILLS for RIB PROCESSING

- Applying high hardened taper angle on the tool leads to highly efficient Rib processing
- Suitable to do machining performance on the inclined workpiece for electricity and electronic precise mold

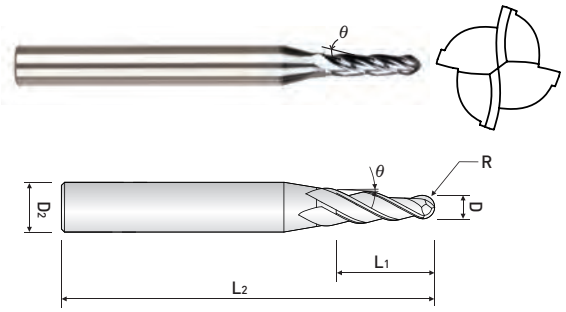
■Taper Tolerance : ±10′

TPRB4...-..-150 series

ULTRA FINE HELIX

EDP. No.	R	θ	L1	L2	D2	STOCK
TPRB4006-04-150	0.3	1°30′	4	40	4	
TPRB4006-06-150			6			
TPRB4008-06-150	0.4	1°30′	6	45	4	
TPRB4008-08-150			8			
TPRB4008-10-150			10			
TPRB4010-06-150	0.5	1°30′	6	45	4	
TPRB4010-08-150			8			
TPRB4010-10-150			10			
TPRB4010-12-150			12			
TPRB4010-16-150			16	50		
TPRB4012-06-150	0.6	1°30′	6	45	4	
TPRB4012-08-150			8			
TPRB4012-10-150			10			
TPRB4012-12-150			12			
TPRB4012-16-150			16	50		
TPRB4015-08-150	0.75	1°30′	8	45	4	
TPRB4015-10-150			10			
TPRB4015-12-150			12			
TPRB4015-16-150			16	50		
TPRB4015-20-150			20	55		
TPRB4016-08-150	0.8	1°30′	8	45	4	
TPRB4016-10-150			10			
TPRB4016-12-150			12			
TPRB4016-16-150			16	50		
TPRB4016-20-150			20	55		
TPRB4018-08-150	0.9	1°30′	8	45	4	
TPRB4018-10-150			10			
TPRB4018-12-150			12			
TPRB4018-16-150			16	50		
TPRB4018-20-150			20	55		

※ These tools are manufactured based on order received.



MULTIPLE FLUTES – TAPER BALL ENDMILLS for RIB PROCESSING

- Applying high hardened taper angle on the tool leads to highly efficient Rib processing
- Suitable to do machining performance on the inclined workpiece for electricity and electronic precise mold

■Taper Tolerance : ±10′

TPRB4...-..-150 series

ULTRA FINE HELIX

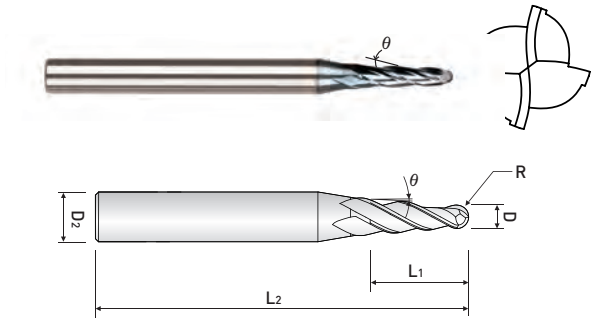
EDP. No.	R	θ	L1	L2	D2	STOCK
TPRB4020-10-150	1.0	1°30′	10	45	4	
TPRB4020-12-150			12			
TPRB4020-16-150			16	50		
TPRB4020-20-150			20	55		
TPRB4020-25-150			25			
TPRB4020-30-150			30	60		
TPRB4025-10-150	1.25	1°30′	10	45	4	
TPRB4025-12-150			12			
TPRB4025-16-150			16	50		
TPRB4025-20-150			20	55		
TPRB4025-25-150			25			
TPRB4025-30-150			30	60	6	

※ These tools are manufactured based on order received.

■ Tolerance

Radius (mm)	Shank Dia.
±0.01	h6

※Items can be changed for quality improvement without notice.



MULTIPLE FLUTES – TAPER BALL ENDMILLS for RIB PROCESSING

- Applying high hardened taper angle on the tool leads to highly efficient Rib processing
- Suitable to do machining performance on the inclined workpiece for electricity and electronic precise mold

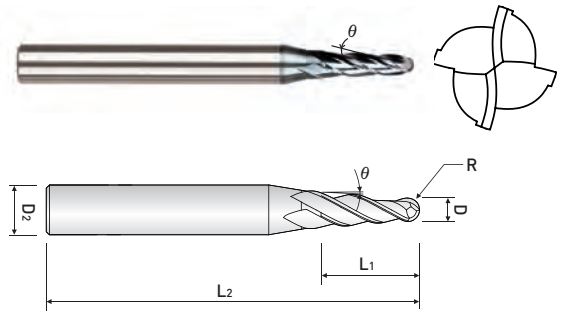
■Taper Tolerance : ±10′

TPRB4...-..-200 series

ULTRA FINE HELIX

EDP. No.	R	θ	L1	L2	D2	STOCK
TPRB4006-04-200	0.3	2°00′	4	40	4	
TPRB4006-06-200			6			
TPRB4008-06-200	0.4	2°00′	6	45	4	
TPRB4008-08-200			8			
TPRB4008-10-200			10			
TPRB4010-06-200	0.5	2°00′	6	45	4	
TPRB4010-08-200			8			
TPRB4010-10-200			10			
TPRB4010-12-200			12			
TPRB4010-16-200			16	50		
TPRB4012-06-200	0.6	2°00′	6	45	4	
TPRB4012-08-200			8			
TPRB4012-10-200			10			
TPRB4012-12-200			12			
TPRB4012-16-200			16	50		
TPRB4015-08-200	0.75	2°00′	8	45	4	
TPRB4015-10-200			10			
TPRB4015-12-200			12			
TPRB4015-16-200			16	50		
TPRB4015-20-200			20	55		
TPRB4016-08-200	0.8	2°00′	8	45	4	
TPRB4016-10-200			10			
TPRB4016-12-200			12			
TPRB4016-16-200			16	50		
TPRB4016-20-200			20	55		
TPRB4018-08-200	0.9	2°00′	8	45	4	
TPRB4018-10-200			10			
TPRB4018-12-200			12			
TPRB4018-16-200			16	50		
TPRB4018-20-200			20	55		

※ These tools are manufactured based on order received.



MULTIPLE FLUTES – TAPER BALL ENDMILLS for RIB PROCESSING

- Applying high hardened taper angle on the tool leads to highly efficient Rib processing
- Suitable to do machining performance on the inclined workpiece for electricity and electronic precise mold

■Taper Tolerance : ±10′

TPRB4...-..-200 series

ULTRA FINE HELIX

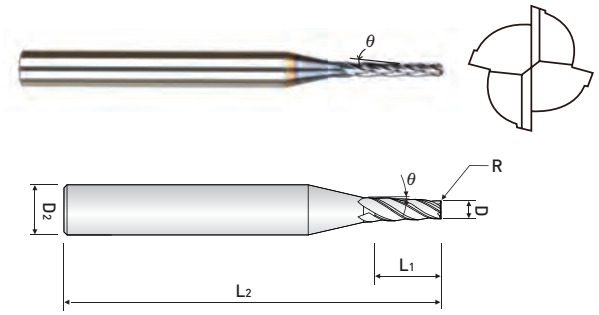
EDP. No.	R	θ	L1	L2	D2	STOCK
TPRB4020-10-200	1.0	2°00′	10	45	4	
TPRB4020-12-200			12			
TPRB4020-16-200			16	50		
TPRB4020-20-200			20	55		
TPRB4020-25-200			25			
TPRB4020-30-200			30	60	6	
TPRB4025-10-200	1.25	2°00′	10	45	4	
TPRB4025-12-200			12			
TPRB4025-16-200			16	50		
TPRB4025-20-200			20	55		
TPRB4025-25-200			25			
TPRB4025-30-200			30	60	6	

※ These tools are manufactured based on order received.

■ Tolerance

Radius (mm)	Shank Dia.
±0.01	h6

※Items can be changed for quality improvement without notice.



MULTIPLE FLUTES - TAPER ENDMILLS for RIB PROCESSING

- Rigid taper end mill for highly productive rib processing.
- Can also be used for side milling operation.

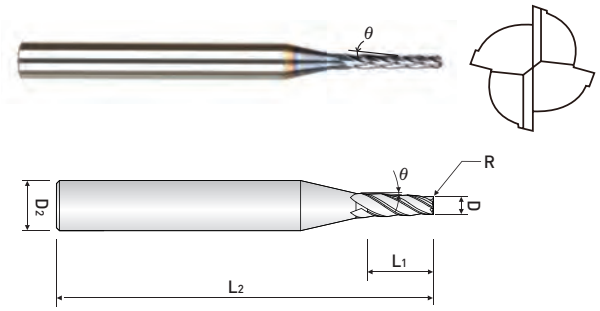
■Taper Tolerance : ±10′

TPRE4...-...-050 series

ULTRA FINE HELIX

EDP. No.	Dia.	θ	L1	L2	D2	STOCK
TPRE4004-02-050	0.4	30′	2	40	4	
TPRE4004-03-050			3			
TPRE4004-04-050			4			
TPRE4005-02-050	0.5	30′	2	40	4	
TPRE4005-04-050			4			
TPRE4005-06-050			6			
TPRE4006-04-050	0.6	30′	4	40	4	
TPRE4006-06-050			6			
TPRE4007-06-050	0.7	30′	6	40	4	
TPRE4007-08-050			8			
TPRE4008-06-050	0.8	30′	6	45	4	
TPRE4008-08-050			8			
TPRE4008-10-050			10			
TPRE4009-06-050	0.9	30′	6	45	4	
TPRE4009-08-050			8			
TPRE4009-10-050			10			
TPRE4010-06-050	1.0	30′	6	45	4	
TPRE4010-08-050			8			
TPRE4010-10-050			10			
TPRE4010-12-050			12			
TPRE4010-16-050			16	50		
TPRE4012-06-050	1.2	30′	6	45	4	
TPRE4012-08-050			8			
TPRE4012-10-050			10			
TPRE4012-12-050			12			
TPRE4012-16-050			16	50		
TPRE4014-08-050	1.4	30′	8	45	4	
TPRE4014-12-050			12			
TPRE4014-16-050			16	50		

※ These tools are manufactured based on order received.



MULTIPLE FLUTES - TAPER ENDMILLS for RIB PROCESSING

- Rigid taper end mill for highly productive rib processing.
- Can also be used for side milling operation.

■Taper Tolerance : ±10′

TPRE4...-...-050 series

ULTRA FINE HELIX

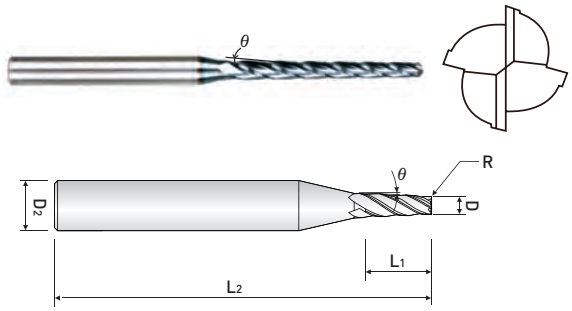
EDP. No.	Dia.	θ	L1	L2	D2	STOCK
TPRE4015-08-050	1.5	30′	8	45	4	
TPRE4015-10-050			10			
TPRE4015-12-050			12			
TPRE4015-16-050			16	50		
TPRE4015-20-050			20	55		
TPRE4016-08-050	1.6	30′	8	45	4	
TPRE4016-10-050			10			
TPRE4016-12-050			12			
TPRE4016-16-050			16	50		
TPRE4016-20-050			20	55		
TPRE4018-08-050	1.8	30′	8	45	4	
TPRE4018-10-050			10			
TPRE4018-12-050			12			
TPRE4018-16-050			16	50		
TPRE4018-20-050			20	55		
TPRE4020-10-050	2.0	30′	10	45	4	
TPRE4020-12-050			12			
TPRE4020-16-050			16	50		
TPRE4020-20-050			20	55		
TPRE4020-25-050			25			
TPRB4025-10-150	2.5	30′	10	45	4	
TPRB4025-12-150			12			
TPRB4025-16-150			16	50		
TPRB4025-20-150			20	55		
TPRB4025-25-150			25			
TPRB4025-30-150			30	60		

※ These tools are manufactured based on order received.

■ Tolerance

Mill Dia. (mm)	Shank Dia.
0 ~ -0.03	h6

※Items can be changed for quality improvement without notice.



MULTIPLE FLUTES - TAPER ENDMILLS for RIB PROCESSING

- Rigid taper end mill for highly productive rib processing.
- Can also be used for side milling operation.

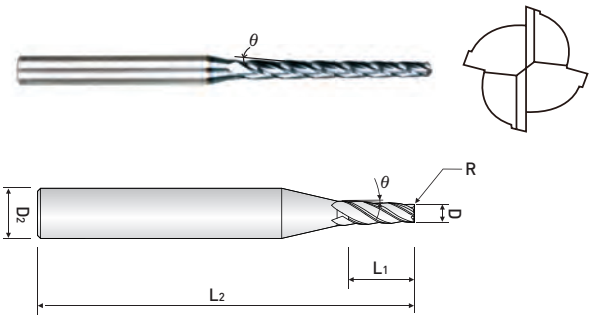
■Taper Tolerance : ±10′

TPRE4...-...-075 series

ULTRA FINE HELIX

EDP. No.	Dia.	θ	L1	L2	D2	STOCK
TPRE4004-02-075	0.4	45′	2	40	4	
TPRE4004-03-075			3			
TPRE4004-04-075			4			
TPRE4005-04-075	0.5	45′	4	40	4	
TPRE4005-06-075			6			
TPRE4006-04-075	0.6	45′	4	40	4	
TPRE4006-06-075			6			
TPRE4007-06-075	0.7	45′	6	40	4	
TPRE4007-08-075			8			
TPRE4008-06-075	0.8	45′	6	45	4	
TPRE4008-08-075			8			
TPRE4008-10-075			10			
TPRE4009-06-075	0.9	45′	6	45	4	
TPRE4009-08-075			8			
TPRE4009-10-075			10			
TPRE4010-08-075	1.0	45′	8	45	4	
TPRE4010-10-075			10			
TPRE4010-12-075			12			
TPRE4012-08-075	1.2	45′	8	45	4	
TPRE4012-10-075			10			
TPRE4012-12-075			12			
TPRE4012-16-075			16	50		
TPRE4015-08-075	1.5	45′	8	45	4	
TPRE4015-10-075			10			
TPRE4015-12-075			12			
TPRE4015-16-075			16	50		
TPRE4015-20-075			20	55		

※ These tools are manufactured based on order received.



MULTIPLE FLUTES - TAPER ENDMILLS for RIB PROCESSING

- Rigid taper end mill for highly productive rib processing.
- Can also be used for side milling operation.

■Taper Tolerance : ±10′

TPRE4...-...-075 series

ULTRA FINE HELIX

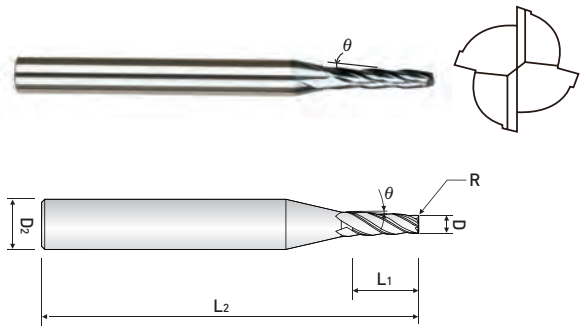
EDP. No.	Dia.	θ	L1	L2	D2	STOCK
TPRE4016-08-075	1.6	45′	8	45	4	
TPRE4016-10-075			10			
TPRE4016-12-075			12			
TPRE4016-16-075			16	50		
TPRE4016-20-075			20	55		
TPRE4018-08-075	1.8	45′	8	45	4	
TPRE4018-10-075			10			
TPRE4018-12-075			12			
TPRE4018-16-075			16	50		
TPRE4018-20-075			20	55		
TPRE4020-10-075	2.0	45′	10	45	4	
TPRE4020-12-075			12			
TPRE4020-16-075			16	50		
TPRE4020-20-075			20	55		
TPRE4020-25-075			25			
TPRE4025-10-075	2.5	45′	10	45	4	
TPRE4025-12-075			12			
TPRE4025-16-075			16	50		
TPRE4025-20-075			20	55		
TPRE4025-25-075			25			
TPRE4025-30-075			30	60		
TPRE4030-25-075	3.0	45′	25	55	4	
TPRE4030-40-075			40	80	6	

※ These tools are manufactured based on order received.

■ Tolerance

Mill Dia. (mm)	Shank Dia.
0 ~ -0.03	h6

※Items can be changed for quality improvement without notice.



MULTIPLE FLUTES - TAPER ENDMILLS for RIB PROCESSING

- Rigid taper end mill for highly productive rib processing.
- Can also be used for side milling operation.

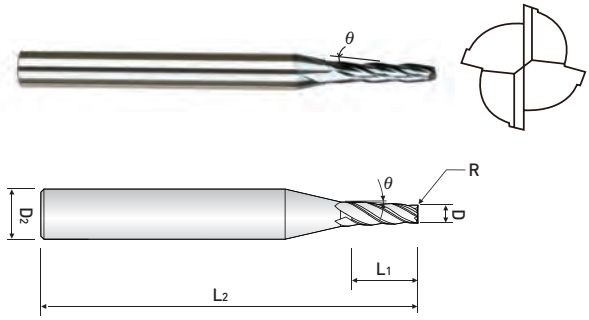
■Taper Tolerance : ±10′

TPRE4...-...-100 series

ULTRA FINE HELIX

EDP. No.	Dia.	θ	L1	L2	D2	STOCK
TPRE4004-02-100	0.4	1°00′	2	40	4	
TPRE4004-03-100			3			
TPRE4004-04-100			4			
TPRE4005-02-100	0.5	1°00′	2	40	4	
TPRE4005-04-100			4			
TPRE4005-06-100			6			
TPRE4006-04-100	0.6	1°00′	4	40	4	
TPRE4006-06-100			6			
TPRE4007-06-100	0.7	1°00′	6	40	4	
TPRE4007-08-100			8			
TPRE4008-06-100	0.8	1°00′	6	45	4	
TPRE4008-08-100			8			
TPRE4008-10-100			10			
TPRE4009-06-100	0.9	1°00′	6	45	4	
TPRE4009-08-100			8			
TPRE4009-10-100			10			
TPRE4010-06-100	1.0	1°00′	6	45	4	
TPRE4010-08-100			8			
TPRE4010-10-100			10			
TPRE4010-12-100			12			
TPRE4010-16-100			16	50		
TPRE4012-06-100	1.2	1°00′	6	45	4	
TPRE4012-08-100			8			
TPRE4012-10-100			10			
TPRE4012-12-100			12			
TPRE4012-16-100			16	50		
TPRE4014-08-100	1.4	1°00′	8	45	4	
TPRE4014-12-100			12			
TPRE4014-16-100			16	50		

※ These tools are manufactured based on order received.



MULTIPLE FLUTES - TAPER ENDMILLS for RIB PROCESSING

- Rigid taper end mill for highly productive rib processing.
- Can also be used for side milling operation.

■Taper Tolerance : ±10′

TPRE4...-...-100 series

ULTRA FINE HELIX

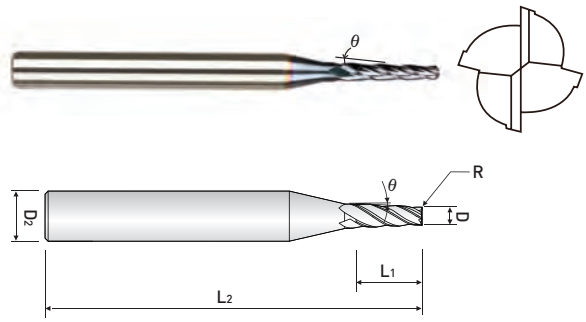
EDP. No.	Dia.	θ	L1	L2	D2	STOCK
TPRE4015-08-100	1.5	1°00′	8	45	4	
TPRE4015-10-100			10			
TPRE4015-12-100			12			
TPRE4015-16-100			16	50		
TPRE4015-20-100			20	55		
TPRE4016-08-100	1.6	1°00′	8	45	4	
TPRE4016-10-100			10			
TPRE4016-12-100			12			
TPRE4016-16-100			16	50		
TPRE4016-20-100			20	55		
TPRE4018-08-100	1.8	1°00′	8	45	4	
TPRE4018-10-100			10			
TPRE4018-12-100			12			
TPRE4018-16-100			16	50		
TPRE4018-20-100			20	55		
TPRE4020-10-100	2.0	1°00′	10	45	4	
TPRE4020-12-100			12			
TPRE4020-16-100			16	50		
TPRE4020-20-100			20	55		
TPRE4020-25-100			25			
TPRE4025-10-100	2.5	1°00′	10	45	4	
TPRE4025-12-100			12			
TPRE4025-16-100			16	50		
TPRE4025-20-100			20	55		
TPRE4025-25-100			25			
TPRE4025-30-100			30	60		
TPRE4030-25-075	3.0	1°00′	25	55	4	
TPRE4030-40-075			40	80	6	

※ These tools are manufactured based on order received.

■ Tolerance

Mill Dia. (mm)	Shank Dia.
0 ~ -0.03	h6

※Items can be changed for quality improvement without notice.



MULTIPLE FLUTES - TAPER ENDMILLS for RIB PROCESSING

- Rigid taper end mill for highly productive rib processing.
- Can also be used for side milling operation.

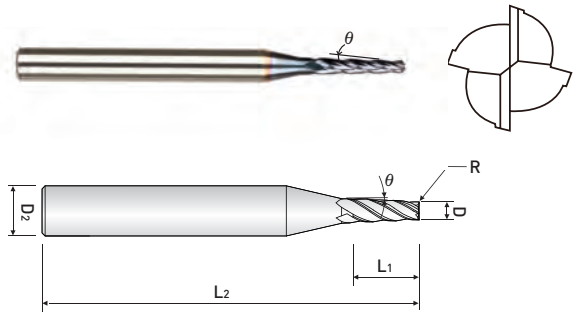
■Taper Tolerance : ±10′

TPRE4...-...-150 series

ULTRA FINE HELIX

EDP. No.	Dia.	θ	L1	L2	D2	STOCK
TPRE4004-02-150	0.4	1°30′	2	40	4	
TPRE4004-03-150			3			
TPRE4004-04-150			4			
TPRE4005-04-150	0.5	1°30′	4	40	4	
TPRE4005-06-150			6			
TPRE4006-04-150	0.6	1°30′	4	40	4	
TPRE4006-06-150			6			
TPRE4007-06-150	0.7	1°30′	6	40	4	
TPRE4007-08-150			8			
TPRE4008-06-150	0.8	1°30′	6	45	4	
TPRE4008-08-150			8			
TPRE4008-10-150			10			
TPRE4009-06-150	0.9	1°30′	6	45	4	
TPRE4009-08-150			8			
TPRE4009-10-150			10			
TPRE4010-06-150	1.0	1°30′	6	45	4	
TPRE4010-08-150			8			
TPRE4010-10-150			10			
TPRE4010-12-150			12			
TPRE4010-16-150			16	50		
TPRE4012-06-150	1.2	1°30′	6	45	4	
TPRE4012-08-150			8			
TPRE4012-10-150			10			
TPRE4012-12-150			12			
TPRE4012-16-150			16	50		
TPRE4014-08-150	1.4	1°30′	8	45	4	
TPRE4014-12-150			12			
TPRE4014-16-150			16	50		

※ These tools are manufactured based on order received.



MULTIPLE FLUTES - TAPER ENDMILLS for RIB PROCESSING

- Rigid taper end mill for highly productive rib processing.
- Can also be used for side milling operation.

■Taper Tolerance : ±10′

TPRE4...-...-150 series

ULTRA FINE HELIX

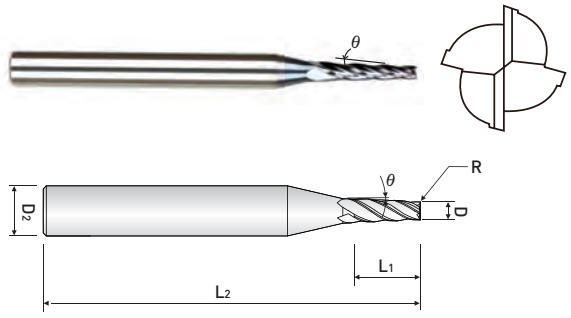
EDP. No.	Dia.	θ	L1	L2	D2	STOCK
TPRE4015-08-150	1.5	1°30′	8	45	4	
TPRE4015-10-150			10			
TPRE4015-12-150			12			
TPRE4015-16-150			16	50		
TPRE4015-20-150			20	55		
TPRE4016-08-150	1.6	1°30′	8	45	4	
TPRE4016-10-150			10			
TPRE4016-12-150			12			
TPRE4016-16-150			16	50		
TPRE4016-20-150			20	55		
TPRE4018-08-150	1.8	1°30′	8	45	4	
TPRE4018-10-150			10			
TPRE4018-12-150			12			
TPRE4018-16-150			16	50		
TPRE4018-20-150			20	55		
TPRE4020-10-150	2.0	1°30′	10	45	4	
TPRE4020-12-150			12			
TPRE4020-16-150			16	50		
TPRE4020-20-150			20	55		
TPRE4020-25-150			25			
TPRE4025-10-150	2.5	1°30′	10	45	4	
TPRE4025-12-150			12			
TPRE4025-16-150			16	50		
TPRE4025-20-150			20	55		
TPRE4025-25-150			25			
TPRE4025-30-150			30	65	6	
TPRE4030-25-150	3.0	1°30′	25	60	6	
TPRE4030-40-150			40	80		

※ These tools are manufactured based on order received.

■ Tolerance

Mill Dia. (mm)	Shank Dia.
0 ~ -0.03	h6

※Items can be changed for quality improvement without notice.



MULTIPLE FLUTES - TAPER ENDMILLS for RIB PROCESSING

- Rigid taper end mill for highly productive rib processing.
- Can also be used for side milling operation.

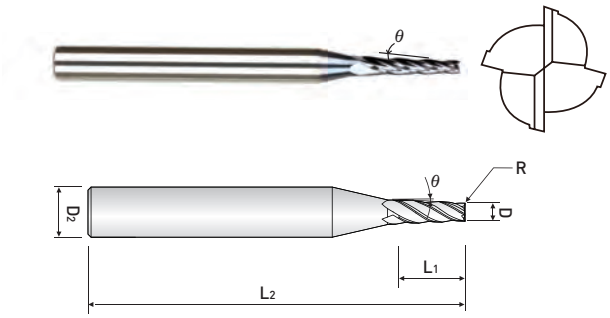
■Taper Tolerance : ±10′

TPRE4...-...-200 series

ULTRA FINE HELIX

EDP. No.	Dia.	θ	L1	L2	D2	STOCK
TPRE4004-02-200	0.4	2°00′	2	40	4	
TPRE4004-03-200			3			
TPRE4004-04-200			4			
TPRE4005-04-200	0.5	2°00′	4	40	4	
TPRE4005-06-200			6			
TPRE4006-04-200	0.6	2°00′	4	40	4	
TPRE4006-06-200			6			
TPRE4007-06-200	0.7	2°00′	6	40	4	
TPRE4007-08-200			8			
TPRE4008-06-200	0.8	2°00′	6	45	4	
TPRE4008-08-200			8			
TPRE4008-10-200			10			
TPRE4009-06-200	0.9	2°00′	6	45	4	
TPRE4009-08-200			8			
TPRE4009-10-200			10			
TPRE4010-06-200	1.0	2°00′	6	45	4	
TPRE4010-08-200			8			
TPRE4010-10-200			10			
TPRE4010-12-200			12			
TPRE4010-16-200			16	50		
TPRE4012-06-200	1.2	2°00′	6	45	4	
TPRE4012-08-200			8			
TPRE4012-10-200			10			
TPRE4012-12-200			12			
TPRE4012-16-200			16	50		
TPRE4014-08-200	1.4	2°00′	8	45	4	
TPRE4014-12-200			12			
TPRE4014-16-200			16	50		

※ These tools are manufactured based on order received.



MULTIPLE FLUTES - TAPER ENDMILLS for RIB PROCESSING

- Rigid taper end mill for highly productive rib processing.
- Can also be used for side milling operation.

■Taper Tolerance : ±10′

TPRE4...-...-200 series

ULTRA FINE HELIX

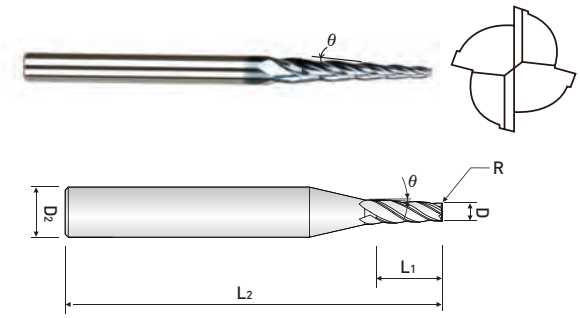
EDP. No.	Dia.	θ	L1	L2	D2	STOCK
TPRE4015-08-200	1.5	2°00′	8	45	4	
TPRE4015-10-200			10			
TPRE4015-12-200			12			
TPRE4015-16-200			16	50		
TPRE4015-20-200			20	55		
TPRE4016-08-200	1.6	2°00′	8	45	4	
TPRE4016-10-200			10			
TPRE4016-12-200			12			
TPRE4016-16-200			16	50		
TPRE4016-20-200			20	55		
TPRE4018-08-200	1.8	2°00′	8	45	4	
TPRE4018-10-200			10			
TPRE4018-12-200			12			
TPRE4018-16-200			16	50		
TPRE4018-20-200			20	55		
TPRE4020-10-200	2.0	2°00′	10	45	4	
TPRE4020-12-200			12			
TPRE4020-16-200			16	50		
TPRE4020-20-200			20	55		
TPRE4020-25-200			25			
TPRE4025-10-200	2.5	2°00′	10	45	4	
TPRE4025-12-200			12			
TPRE4025-16-200			16	50		
TPRE4025-20-200			20	55		
TPRE4025-25-200			25	60	6	
TPRE4025-30-200			30	65		
TPRE4030-25-200	3.0	2°00′	25	60	6	
TPRE4030-40-200			40	80		

※ These tools are manufactured based on order received.

■ Tolerance

Mill Dia. (mm)	Shank Dia.
0 ~ -0.03	h6

※Items can be changed for quality improvement without notice.



MULTIPLE FLUTES - TAPER ENDMILLS for RIB PROCESSING

- Rigid taper end mill for highly productive rib processing.
- Can also be used for side milling operation.

■Taper Tolerance : ±10′

TPRE4...-...-300 series

ULTRA FINE HELIX

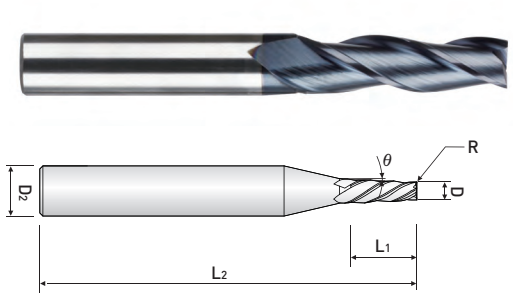
EDP. No.	Dia.	θ	L1	L2	D2	STOCK
TPRE4005-04-300	0.5	3°00′	4	40	4	
TPRE4006-04-300	0.6	3°00′	4	40	4	
TPRE4007-06-300	0.7	3°00′	6	40	4	
TPRE4008-06-300	0.8	3°00′	6	45	4	
TPRE4008-10-300			10			
TPRE4009-08-300	0.9	3°00′	8	45	4	
TPRE4010-08-300	1.0	3°00′	8	45	4	
TPRE4010-12-300			12			
TPRE4012-10-300	1.2	3°00′	10	45	4	
TPRE4012-16-300			16	50		
TPRE4015-12-300	1.5	3°00′	12	45	4	
TPRE4015-20-300			20	55		
TPRE4016-12-300	1.6	3°00′	12	45	4	
TPRE4016-20-300			20	55		
TPRE4018-12-300	1.8	3°00′	12	45	4	
TPRE4018-20-300			20	55		
TPRE4020-16-300	2.0	3°00′	16	50	4	
TPRE4020-25-300			25	60	6	
TPRE4025-20-300	2.5	3°00′	20	60	6	
TPRE4025-30-300			30	65		
TPRE4030-25-300	3.0	2°00′	25	60	6	
TPRE4030-40-300			40	80	8	

※ These tools are manufactured based on order received.

■ Tolerance

Mill Dia. (mm)	Shank Dia.
0 ~ -0.03	h6

※Items can be changed for quality improvement without notice.



3 FLUTE, TAPER END MILL

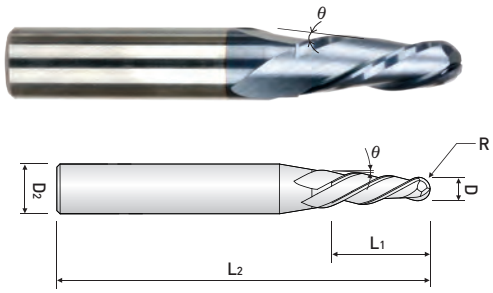
- Designed to machine tool steel, alloy steel, mold steel and other high hardened materials.
- AlTiN coated for high wear resistance.

TE503 .....series

ULTRA FINE HELIX

EDP. No.	Dia.	θ°	L1	N.D	L2	D2	STOCK
TE50303106	3	1	10	3.4	50	6	
TE50303206		2		3.7			
TE50303306		3		4			
TE50303506		5		4.8			
TE50304106	4	1	15	4.5	50	6	
TE50304206		2		5			
TE50304306		3		5.6			
TE50304508		5		6.6		8	
TE50305106	5	1	20 (17.1)	5.7	60	6	
TE50305208		2		6.4		8	
TE50305308		3		7.1			
TE50305508		5		8.5			
TE50306108	6	1	20	6.7	60	8	
TE50306208		2		7.4			
TE50306308		3		8.1			
TE50306510		5		9.5	70	10	
TE50308110	8	1	25 (22.8)	8.9	70	10	
TE50308210		2		9.8			
TE50308312		3		10.6	75	12	
TE50308512		5		12.4			
TE50310112	10	1	35	11.2	90	12	
TE50310212		2	28	12.4			
TE50310314		3	35	13.7		14	
TE50310516		5		16.1		16	

※ These tools are manufactured based on order received.



3 FLUTE, TAPER BALL END MILL

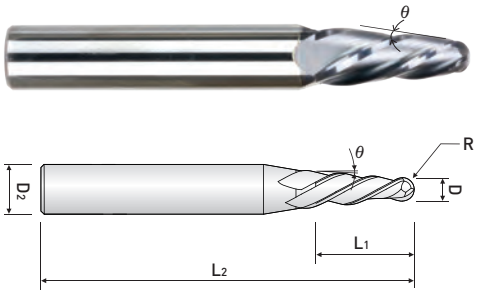
- Designed to machine tool steel, alloy steel, mold steel and other high hardened materials.
- AlTiN coated for high wear resistance.

TB503 ...series

ULTRA FINE HELIX

EDP. No.	Dia.	R	θ	L1	L2	D2	STOCK
TB50315306	3	1.5	3°	12	60	6	
TB50320306	4	2		15	60	6	
TB50325308	5	2.5		18	60	8	
TB50330310	6	3		22	70	10	
TB50340312	8	4		26	75	12	
TB50350312	10	5		19	75	12	
TB50360316	12	6		36	90	16	
TB50315506	3	1.5	5°	12	60	6	
TB50320508	4	2		15	60	8	
TB50325510	5	2.5		18	70	10	
TB50330510	6	3		22	70	10	
TB50340512	8	4		26	75	12	
TB50350516	10	5		30	90	16	
TB50360520	12	6		36	100	20	
TB50315706	3	1.5	7°	12	60	6	
TB50320708	4	2		15	60	8	
TB50325710	5	2.5		18	70	10	
TB50330712	6	3		22	75	12	
TB50340716	8	4		26	90	16	
TB50350716	10	5		30	90	16	
TB50360720	12	6		36	100	20	

※ These tools are manufactured based on order received.



4 FLUTE, TAPER BALL END MILL

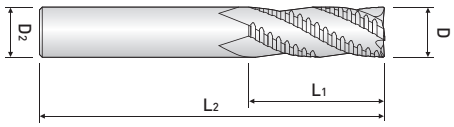
- Designed to machine tool steel, alloy steel, mold steel and other high hardened materials.
- AlTiN coated for high wear resistance.

TB504 ...series

ULTRA FINE HELIX

EDP. No.	Dia.	R	θ°	L1	L2	D2	STOCK
TB50425308	5	2.5	3°	18	60	8	
TB50430310	6	3		22	70	10	
TB50440312	8	4		26	75	12	
TB50450312	10	5		19	75	12	
TB50460316	12	6		36	90	16	
TB50425510	5	2.5	5°	18	70	10	
TB50430510	6	3		22	70	10	
TB50440512	8	4		26	75	12	
TB50450516	10	5		30	90	16	
TB50460520	12	6		36	100	20	
TB50425710	5	2.5	7°	18	70	10	
TB50430712	6	3		22	75	12	
TB50440716	8	4		26	90	16	
TB50450716	10	5		30	90	16	
TB50460720	12	6		36	100	20	

※ These tools are manufactured based on order received.



3~6 FLUTE, ROUGHING & FINISHING END MILL

- Designed to machine tool steel, alloy steel, mold steel and other high hardened materials.
- AlTiN coated for high wear resistance.
- Rough & finish type.

ZF60 ....series

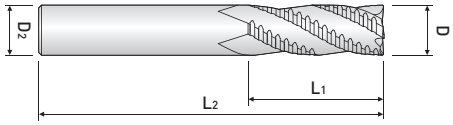
ULTRA FINE HELIX

EDP. No.	Dia.	L_1	L_2	D_2	STOCK
ZF603040	4	10	50	6	•
ZF603050	5	13	50	6	•
ZF603060	6	15	50	6	•
ZF603070	7	18	60	8	•
ZF603080	8	18	60	8	•
ZF604090	9	22	70	10	•
ZF604100	10	22	70	10	•
ZF604110	11	26	75	12	•
ZF604120	12	26	75	12	•
ZF604130	13	32	85	14	•
ZF604140	14	32	85	14	•
ZF604150	15	35	90	16	•
ZF604160	16	35	90	16	•
ZF604180	18	44	100	18	•
ZF604200	20	44	100	20	•
ZF605250	25	50	120	25	•
ZF606320	32	70	150	32	•

■ Tolerance

㎛=1/1000㎜

Tolerance \ Dia.	from 1 to 3	over 3 to 6	over 6 to 10	over 10 to 18	over 18 to 30
Cutting Edge(h10)	0 -40	0 -48	0 -58	0 -70	0 -84
Shank(h6)	0 -6	0 -8	0 -9	0 -11	0 -13



3~5 FLUTE, ROUGHING END MILL - FINE Pitch DIN6527L / DIN6535-HA, DIN6535-HB

- Designed for machine tool steel, alloy steel, mold steel and other highly hardened materials.
- High velocity milling of hardened steels.
- For dry and wet milling.
- Fast chip ejection.

ZF61 ....series

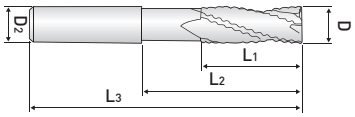
ULTRA FINE HELIX Conventional Pitch

EDP. No.		Dia.	L_1	L_2	D_2	STOCK
PLAIN SHANK	FLAT SHANK					
ZF613040	ZF613040F	4	10	50	6	•
ZF613050	ZF613050F	5	13	50	6	•
ZF613060	ZF613060F	6	16	57	6	•
ZF613070	ZF613070F	7	16	63	8	•
ZF613080	ZF613080F	8	16	63	8	•
ZF614090	ZF614090F	9	19	72	10	•
ZF614100	ZF614100F	10	22	72	10	•
ZF614120	ZF614120F	12	26	83	12	•
ZF614140	ZF614140F	14	32	83	14	•
ZF614160	ZF614160F	16	35	92	16	•
ZF614180	ZF614180F	18	40	100	18	•
ZF614200	ZF614200F	20	44	104	20	•
ZF615250	ZF615250F	25	50	120	25	•

■ Tolerance

㎛=1/1000㎜

Tolerance \ Dia.	from 1 to 3	over 3 to 6	over 6 to 10	over 10 to 18	over 18 to 30
Cutting Edge(h10)	0 -40	0 -48	0 -58	0 -70	0 -84
Shank(h6)	0 -6	0 -8	0 -9	0 -11	0 -13



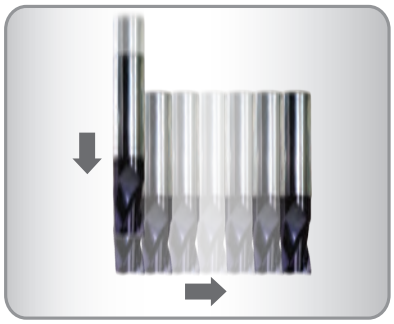
3 FLUTE, Z - AXIS ROUGHING END MILL

- Reducing cycle time by 1 pass operating from Z-axis to slotting.
- Preventing the working interruption as Neck type.

PK503 ...series

ULTRA FINE HELIX Conventional Pitch

EDP. No.	D	L_1	L_2	L_3	D_2	Z	STOCK
PK503060	6	9	15	57	6	3	•
PK503080	8	12	20	63	8		•
PK503100	10	15	25	72	10		•
PK503120	12	18	30	83	12		•
PK503140	14	21	35	83	14		•
PK503160	16	24	40	92	16		•
PK503200	20	30	50	104	20		•



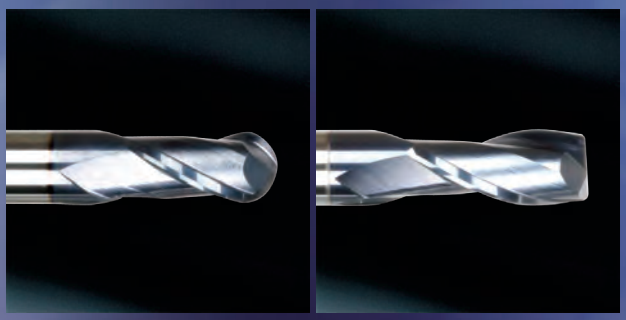
■ Tolerance

μm=1/1000mm

Tolerance \ Dia.	from 1 to 3	over 3 to 6	over 6 to 10	over 10 to 18	over 18 to 30
Cutting Edge(d11)	-20 -85	-30 -105	-40 -150	-50 -180	-65 -225
Shank(h6)	0 -6	0 -8	0 -9	0 -11	0 -13

Zamus Thunder Series

ENDMILL SERIES



Zamus Thunder Series

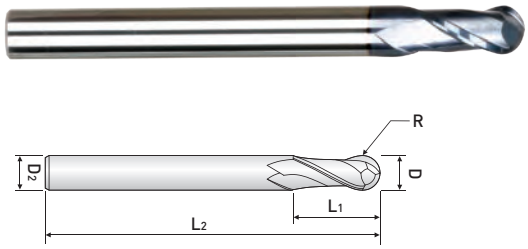
WIDIN

EDP. No.	APPEARANCE	FEATURE	STOCK	PAGE
DB312 ...series		2 FLUTE, LONG LENGTH, BALL NOSE	•	183
DB342 ...series		2 FLUTE, BALL NOSE with TAPER NECK	•	184
ZE302 ...series		2 FLUTE, REGULAR LENGTH	•	185
ZE304 ...series		4 FLUTE, REGULAR LENGTH	•	186
ZE322 ...series		2 FLUTE, LONG LENGTH	•	187
ZE324 ...series		4 FLUTE, LONG LENGTH	•	188
ZR322 ....series		2 FLUTE, CORNER RADIUS LONG LENGTH	•	189
ZR324 ....series		4 FLUTE, CORNER RADIUS LONG LENGTH	•	190
ZR304H ...series		4 FLUTE, 45° HELIX STUB CUT LENGTH, CORNER RADIUS with EXTENDED NECK		191
ZR324H ...series		4 FLUTE, 45° HELIX STUB CUT LENGTH, CORNER RADIUS with LONG SHANK		192
TX302...series		2 FLUTE, REGULAR LENGTH	•	193
TX304...series		4 FLUTE, REGULAR LENGTH	•	194

Zamus Thunder Series

WIDIN

EDP. No.	APPEARANCE	FEATURE	STOCK	PAGE
TX304H...series		4 FLUTE, 45° HELIX, REGULAR LENGTH		195
TXB302...series		2 FLUTE, REGULAR LENGTH, BALL NOSE	•	196
TXB304...series		4 FLUTE, REGULAR LENGTH, BALL NOSE	•	197
TX202...series		2 FLUTE, SHORT LENGTH	•	198
TX222...series		2 FLUTE, LONG LENGTH	•	199
TX204...series		4 FLUTE, SHORT LENGTH	•	200
TX224...series		4 FLUTE, LONG LENGTH	•	201
TXB202...series		2 FLUTE, REGULAR LENGTH, BALL NOSE	•	202
TXB222...series		2 FLUTE, LONG LENGTH, BALL NOSE	•	203
TXB232...series		2 FLUTE, LONG REACH, BALL NOSE	•	204
TXB204...series		4 FLUTE, REGULAR LENGTH, BALL NOSE	•	205



2 FLUTE, LONG LENGTH, BALL NOSE

- Designed to machine tool steel, alloy steel, mold steel and other high hardened materials.
- Suitable for copy milling.

DB312 ...series

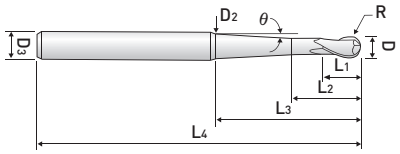
MG FINE GRAIN | 2 | 30° HELIX | R ±0.01 | TiAlN

EDP. No.	Dia.	R	L_1	L_2	D_2	STOCK
DB312010S4	1	0.5	2.5	50	4	•
DB312010					6	•
DB312012	1.2	0.6	3	50	6	•
DB312015	1.5	0.75	4	50	6	•
DB312020S4	2	1	5	50	4	•
DB312020					6	•
DB312025	2.5	1.25	6	60	6	•
DB312030S3	3	1.5	8	60	3	•
DB312030S4					4	•
DB312030					6	•
DB312035	3.5	1.75	8	70	6	•
DB312040S4	4	2	8	70	4	•
DB312040					6	•
DB312045	4.5	2.25	8	70	6	•
DB312050	5	2.5	10	80	6	•
DB312055	5.5	2.75	10	80	6	•
DB312060S	6	3	12	60	6	•
DB312060				90		•
DB312065	6.5	3.25	12	90	8	•
DB312070	7	3.5	14	90	8	•
DB312080S	8	4	14	60	8	•
DB312080				100		•
DB312090	9	4.5	18	100	10	•
DB312100S	10	5	18	60	10	•
DB312100				100		•
DB312120	12	6	22	110	12	•
DB312140	14	7	26	110	14	•
DB312160	16	8	30	140	16	•
DB312180	18	9	34	140	18	•
DB312200	20	10	38	160	20	•

■ Tolerance

Mill Dia. (mm)	Shank Dia.
0 ~ -0.02	h6

※Items can be changed for quality improvement without notice.



2 FLUTE, BALL NOSE with TAPER NECK

- Suitable for deep slotting machining performance as long size shape with taper neck.

DB342 .....series

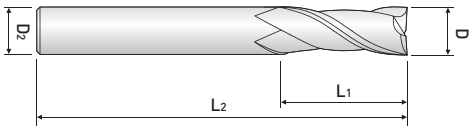
FINE GRAIN HELIX

EDP. No.	D	R	L1	L2	L3	L4	D2	D3	θ	STOCK
DB34201015	1	0.5	2	4	23	60	2	6	1°30´	•
DB34201050							4.3		5°	•
DB34201030					42	80	5		3°	•
DB34202015	2	1	4	6	23	60	2.9	6	1°30´	•
DB34202050							5		5°	•
DB34202030					41	80	5.7		3°	•
DB34203030	3	1.5	6	8	32	70	5.6	6	3°	•
DB34203015					52	90	5.3		1°30´	•
DB34204030	4	2	8	10	28	70	6	6	3°	•
DB34204015					49	90			1°30´	•
DB34205030	5	2.5	10	12	41	90	8	8	3°	•
DB34205015					61	110	7.6		1°30´	•
DB34206030	6	3	12	15	34	90	8	8	3°	•
DB34206015					53	110			1°30´	•
DB34208030	8	4	14	17	36	100	10	10	3°	•
DB34208015					55	120			1°30´	•
DB34210030	10	5	18	21	40	110	12	12	3°	•
DB34210015					59	130			1°30´	•
DB34212030	12	6	22	25	63	140	16	16	3°	•
DB34212015					83	160	15		1°30´	•

■ Tolerance

Mill Dia. (mm)	Shank Dia.
0 ~ -0.02	h6

※Items can be changed for quality improvement without notice.



2 FLUTE, REGULAR LENGTH

- Designed to machine tool steel, alloy steel, mold steel and other high hardened materials.

ZE302 ...series

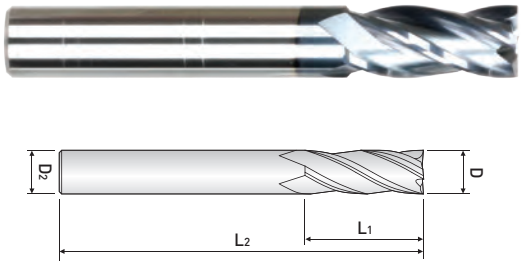
FINE GRAIN HELIX

EDP. No.	Dia.	L_1	L_2	D_2	STOCK
ZE302010	1	2.5	40	6	•
ZE302015	1.5	4	40	6	•
ZE302020	2	6	40	6	•
ZE302025	2.5	8	40	6	•
ZE302030	3	8	45	6	•
ZE302035	3.5	10	45	6	•
ZE302040	4	11	45	6	•
ZE302045	4.5	11	45	6	•
ZE302050	5	13	50	6	•
ZE302055	5.5	13	50	6	•
ZE302060	6	13	50	6	•
ZE302065	6.5	16	60	8	•
ZE302070	7	16	60	8	•
ZE302075	7.5	16	60	8	•
ZE302080	8	19	60	8	•
ZE302085	8.5	19	70	10	•
ZE302090	9	19	70	10	•
ZE302095	9.5	19	70	10	•
ZE302100	10	22	70	10	•
ZE302105	10.5	22	75	12	•
ZE302110	11	22	75	12	•
ZE302115	11.5	22	75	12	•
ZE302120	12	26	75	12	•
ZE302130	13	26	80	12	•
ZE302140	14	26	80	14	•
ZE302150	15	32	90	16	•
ZE302160	16	32	90	16	•
ZE302180	18	32	100	18	•
ZE302200	20	38	100	20	•

■ Tolerance

Mill Dia. (mm)	Shank Dia.
0 ~ -0.02	h6

※Items can be changed for quality improvement without notice.



4 FLUTE, REGULAR LENGTH

- Designed to machine tool steel, alloy steel, mold steel and other high hardened materials.

ZE304 ...series

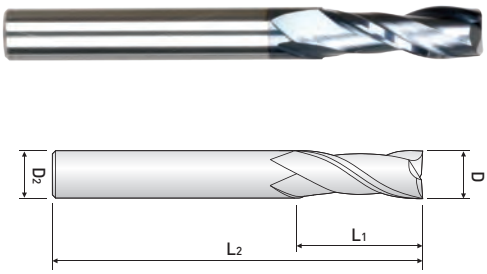
FINE GRAIN HELIX

EDP. No.	Dia.	L_1	L_2	D_2	STOCK
ZE304020	2	6	40	6	•
ZE304025	2.5	8	40	6	•
ZE304030	3	8	45	6	•
ZE304035	3.5	10	45	6	•
ZE304040	4	11	45	6	•
ZE304045	4.5	11	45	6	•
ZE304050	5	13	50	6	•
ZE304055	5.5	13	50	6	•
ZE304060	6	13	50	6	•
ZE304065	6.5	16	60	8	•
ZE304070	7	16	60	8	•
ZE304075	7.5	16	60	8	•
ZE304080	8	19	60	8	•
ZE304085	8.5	19	70	10	•
ZE304090	9	19	70	10	•
ZE304095	9.5	19	70	10	•
ZE304100	10	22	70	10	•
ZE304105	10.5	22	75	12	•
ZE304110	11	22	75	12	•
ZE304115	11.5	22	75	12	•
ZE304120	12	26	75	12	•
ZE304130	13	26	80	12	•
ZE304140	14	26	80	14	•
ZE304150	15	32	90	16	•
ZE304160	16	32	90	16	•
ZE304180	18	32	100	18	•
ZE304200	20	38	100	20	•

■ Tolerance

Mill Dia. (mm)	Shank Dia.
0 ~ -0.02	h6

※Items can be changed for quality improvement without notice.



2 FLUTE, LONG & EXTRA LONG LENGTH

- Designed to machine tool steel, alloy steel, mold steel and other high hardened materials.

ZE322 ...series

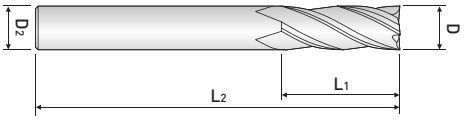
FINE GRAIN HELIX

EDP. No.	Dia.	L_1	L_2	D_2	STOCK
ZE322030	3	15	60	6	•
ZE322031		20	70		•
ZE322030S			100	3	•
ZE322040	4	15	60	6	•
ZE322041		20	70		•
ZE322040S			100	4	•
ZE322050	5	20	60	6	•
ZE322051			80		•
ZE322052		25	100		•
ZE322060	6	20	80	6	•
ZE322061		30	100		•
ZE322062		40	150		•
ZE322080	8	30	90	8	•
ZE322081		35	100		•
ZE322082		40	150		•
ZE322100	10	30	90	10	•
ZE322101		35	100		•
ZE322102		45	150		•
ZE322103		55	180		•
ZE322120	12	30	90	12	•
ZE322121		40	110		•
ZE322122		50	150		•
ZE322123		60	200		•
ZE322140	14	40	120	14	•
ZE322141		60	150		•
ZE322160	16	50	140	16	•
ZE322161		70	160		•
ZE322162		80	200		•
ZE322180	18	50	140	18	•
ZE322200	20	60	150	20	•
ZE322201		100	200		•
ZE322202		130	250		•

■ Tolerance

Mill Dia. (mm)	Shank Dia.
0 ~ -0.03	h6

※Items can be changed for quality improvement without notice.



4 FLUTE, LONG & EXTRA LONG LENGTH

- Designed to machine tool steel, alloy steel, mold steel and other high hardened materials.

ZE324 ...series

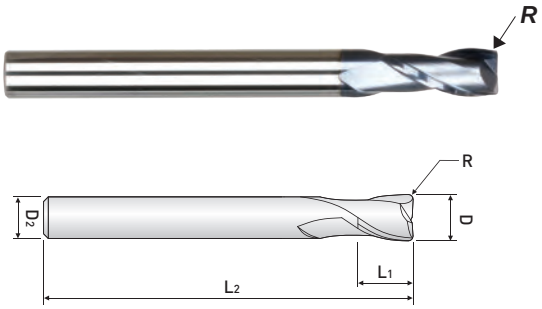
FINE GRAIN HELIX

EDP. No.	Dia.	L_1	L_2	D_2	STOCK
ZE324030	3	15	60	6	•
ZE324031		20	70		
ZE324030S			100	3	
ZE324040	4	15	60	6	•
ZE324041		20	70		
ZE324040S			100	4	
ZE324050	5	20	60	6	•
ZE324051			80		
ZE324052		25	100		
ZE324060	6	20	80	6	•
ZE324061		30	100		
ZE324062		40	150		
ZE324080	8	30	90	8	•
ZE324081		35	100		
ZE324082		40	150		
ZE324100	10	30	90	10	•
ZE324101		35	100		
ZE324102		45	150		
ZE324103		55	180		
ZE324120	12	30	90	12	•
ZE324121		40	110		
ZE324122		50	150		
ZE324123		60	200		
ZE324140	14	40	120	14	•
ZE324141		60	150		
ZE324160	16	50	140	16	•
ZE324161		70	160		
ZE324162		80	200		
ZE324180	18	50	140	18	•
ZE324200	20	60	150	20	•
ZE324201		100	200		
ZE324202		130	250		

■ Tolerance

Mill Dia. (mm)	Shank Dia.
0 ~ -0.03	h6

※Items can be changed for quality improvement without notice.



2 FLUTE, CORNER RADIUS LONG LENGTH

- Designed to machine tool steel, alloy steel mold steel and other high hardened materials.
- TiALN coated for high wear resistance.

ZR322 ....series

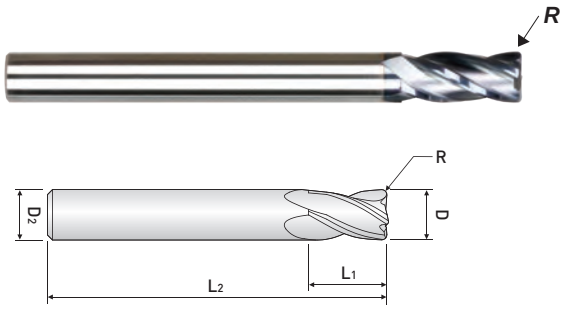
FINE GRAIN HELIX

EDP. No.	Dia.	R	L_1	L_2	D_2	STOCK
ZR3220302	3	0.2	8	60	4	•
ZR3220302					6	
ZR3220303		0.3			6	
ZR3220305		0.5			4	
ZR3220305					6	
ZR3220402	4	0.2	11	70	4	•
ZR3220402					6	
ZR3220403		0.3			6	
ZR3220405		0.5			4	
ZR3220405					6	
ZR3220410		1.0			4	
ZR3220410					6	
ZR3220502	5	0.2	13	80	6	•
ZR3220503		0.3				
ZR3220505		0.5				
ZR3220510		1.0				
ZR3220602	6	0.2	13	90	6	•
ZR3220603		0.3				
ZR3220605		0.5				
ZR3220610		1.0				
ZR3220803	8	0.3	19	100	8	•
ZR3220805		0.5				
ZR3220810		1.0				
ZR3220815		1.5				
ZR3220820		2.0				
ZR3221003	10	0.3	22	100	10	•
ZR3221005		0.5				
ZR3221010		1.0				
ZR3221015		1.5				
ZR3221020		2.0				
ZR3221025		2.5				
ZR3221205	12	0.5	26	110	12	•
ZR3221210		1.0				
ZR3221215		1.5				
ZR3221220		2.0				
ZR3221225		2.5				
ZR3221230		3.0				

■ Tolerance

Mill Dia. (mm)	Shank Dia.
0 ~ -0.03	h6

※Items can be changed for quality improvement without notice.



4 FLUTE, CORNER RADIUS LONG LENGTH

- Designed to machine tool steel, alloy steel mold steel and other high hardened materials.
- TiALN coated for high wear resistance.

ZR324 ....series

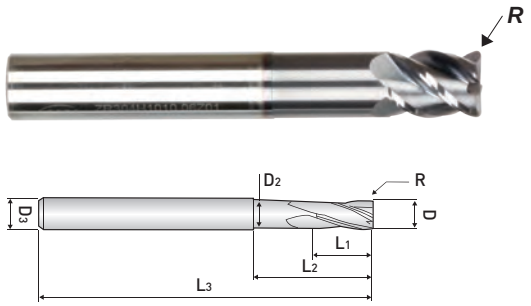
FINE GRAIN HELIX

EDP. No.	Dia.	R	L_1	L_2	D_2	STOCK
ZR3240302	3	0.2	8	60	4	•
ZR3240302					6	
ZR3240303		0.3			6	
ZR3240305		0.5			4	
ZR3240305					6	
ZR3240402	4	0.2	11	70	4	•
ZR3240402					6	
ZR3240403		0.3			6	
ZR3240405		0.5			4	
ZR3240405					6	
ZR3240410		1.0			4	
ZR3240410					6	
ZR3240502	5	0.2	13	80	6	•
ZR3240503		0.3				
ZR3240505		0.5				
ZR3240510		1.0				
ZR3240602	6	0.2	13	90	6	•
ZR3240603		0.3				
ZR3240605		0.5				
ZR3240610		1.0				
ZR3240803	8	0.3	19	100	8	•
ZR3240805		0.5				
ZR3240810		1.0				
ZR3240815		1.5				
ZR3240820		2.0				
ZR3241003	10	0.3	22	100	10	•
ZR3241005		0.5				
ZR3241010		1.0				
ZR3241015		1.5				
ZR3241020		2.0				
ZR3241025		2.5				
ZR3241205	12	0.5	26	110	12	•
ZR3241210		1.0				
ZR3241215		1.5				
ZR3241220		2.0				
ZR3241225		2.5				
ZR3241230		3.0				

■ Tolerance

Mill Dia. (mm)	Shank Dia.
0 ~ -0.03	h6

※Items can be changed for quality improvement without notice.



4 FLUTE, 45° HELIX STUB CUT LENGTH, CORNER RADIUS with EXTENDED NECK

- Designed for high hardened materials up to HRc 45.
- Suitable for high speed machining.

ZR304H ...series

FINE GRAIN HELIX

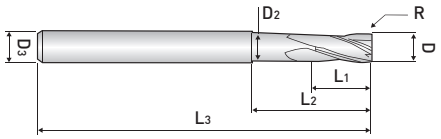
EDP. No.	D	R	L1	L2	L3	D2	D3	STOCK
ZR304H0303	3	0.3	4	12	55	2.8	6	
ZR304H0305		0.5						
ZR304H0403	4	0.3	5	16	55	3.8	6	
ZR304H0405		0.5						
ZR304H0605	6	0.5	7	20	60	5.8	6	
ZR304H0610		1.0						
ZR304H0805	8	0.5	10	25	65	7.8	8	
ZR304H0810		1.0						
ZR304H1005	10	0.5	12	30	70	9.8	10	
ZR304H1010		1.0						
ZR304H1015		1.5						
ZR304H1020		2.0						
ZR304H1205	12	0.5	15	30	80	11.8	12	
ZR304H1210		1.0						
ZR304H1215		1.5						
ZR304H1220		2.0						

※ These tools are manufactured based on order received.

■ Tolerance

Mill Dia. (mm)	Shank Dia.
0 ~ -0.03	h6

※Items can be changed for quality improvement without notice.



4 FLUTE, 45° HELIX STUB CUT LENGTH, CORNER RADIUS LONG SHANK

- Designed for high hardened materials up to HRc 45.
- Suitable for high speed machining.

ZR324H ...series

FINE GRAIN HELIX

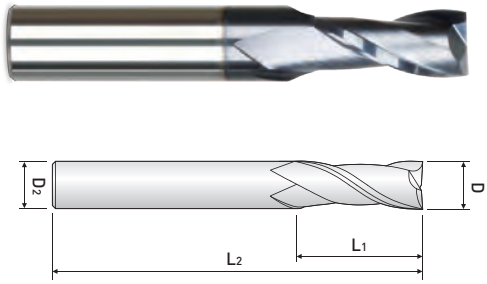
EDP. No.	D	R	L_1	L_2	L_3	D_2	D_3	STOCK
ZR324H0605	6	0.5	9	20	90	5.8	6	
ZR324H0610		1.0						
ZR324H0805	8	0.5	12	25	100	7.8	8	
ZR324H0810		1.0						
ZR324H1005	10	0.5	15	32	100	9.8	10	
ZR324H1010		1.0						
ZR324H1015		1.5						
ZR324H1020		2.0						
ZR324H1205	12	0.5	18	38	110	11.8	12	
ZR324H1210		1.0						
ZR324H1215		1.5						
ZR324H1220		2.0						

※ These tools are manufactured based on order received.

■ Tolerance

Mill Dia. (mm)	Shank Dia.
0 ~ -0.03	h6

※Items can be changed for quality improvement without notice.



2 FLUTE, REGULAR LENGTH

- Designed to machine tool steel, alloy steel, mold steel and other high hardened materials.
- Excellent high-performance Endmills.

TX302...series

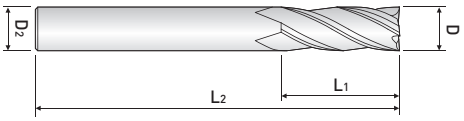
FINE GRAIN HELIX

EDP. No.	Dia.	L_1	L_2	D_2	STOCK
TX302010	1	3	50	4	•
TX302015	1.5	4	50	4	•
TX302020	2	6	50	4	•
TX302025	2.5	8	50	4	•
TX302030	3	9	50	4	•
TX302040	4	11	50	4	•
TX302050	5	13	50	6	•
TX302060	6	16	50	6	•
TX302070	7	16	60	8	•
TX302080	8	19	60	8	•
TX302090	9	19	60	10	•
TX302100	10	25	75	10	•
TX302120	12	30	75	12	•
TX302140	14	32	75	14	•
TX302160	16	32	100	16	•
TX302180	18	32	100	18	•
TX302200	20	38	100	20	•

■ Tolerance

㎛=1/1000㎜

Tolerance \ Dia.	from 1 to 3	over 3 to 6	over 6 to 10	over 10 to 18	over 18 to 30
Cutting Edge(d11)	-14 -28	-20 -38	-25 -47	-32 -59	-40 -73
Shank(h6)	0 -6	0 -8	0 -9	0 -11	0 -13



4 FLUTE, REGULAR LENGTH

- Designed to machine tool steel, alloy steel, mold steel and other high hardened materials.
- Excellent high-performance Endmills.

TX304...series

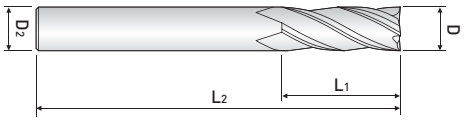
FINE GRAIN HELIX

EDP. No.	Dia.	L_1	L_2	D_2	STOCK
TX304010	1	3	50	4	•
TX304015	1.5	4	50	4	•
TX304020	2	6	50	4	•
TX304025	2.5	8	50	4	•
TX304030	3	9	50	4	•
TX304040	4	11	50	4	•
TX304050	5	13	50	6	•
TX304060	6	16	50	6	•
TX304070	7	16	60	8	•
TX304080	8	19	60	8	•
TX304090	9	19	60	10	•
TX304100	10	25	75	10	•
TX304120	12	30	75	12	•
TX304140	14	32	75	14	•
TX304160	16	32	100	16	•
TX304180	18	32	100	18	•
TX304200	20	38	100	20	•

■ Tolerance

㎛=1/1000㎜

Tolerance \ Dia.	from 1 to 3	over 3 to 6	over 6 to 10	over 10 to 18	over 18 to 30
Cutting Edge(d11)	-14 -28	-20 -38	-25 -47	-32 -59	-40 -73
Shank(h6)	0 -6	0 -8	0 -9	0 -11	0 -13



4 FLUTE, 45° HELIX, REGULAR LENGTH

- Designed to machine tool steel, alloy steel, mold steel and other high hardened materials.
- Excellent high-performance Endmills.

TX304H ...series

FINE GRAIN HELIX

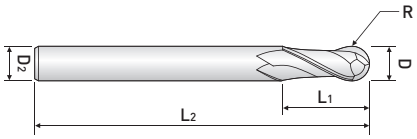
EDP. No.	Dia.	L_1	L_2	D_2	STOCK
TX304H030	3	8	50	6	
TX304H040	4	11	50	6	
TX304H050	5	13	50	6	
TX304H060	6	13	50	6	
TX304H080	8	19	60	8	
TX304H100	10	22	70	10	
TX304H120	12	26	75	12	
TX304H130	13	26	80	12	
TX304H140	14	26	80	14	
TX304H160	16	32	90	16	
TX304H180	18	32	100	18	
TX304H200	20	38	100	20	

※ These tools are manufactured based on order received.

■ Tolerance

㎛=1/1000㎜

Tolerance \ Dia.	from 1 to 3	over 3 to 6	over 6 to 10	over 10 to 18	over 18 to 30
Cutting Edge(d11)	-14 -28	-20 -38	-25 -47	-32 -59	-40 -73
Shank(h6)	0 -6	0 -8	0 -9	0 -11	0 -13



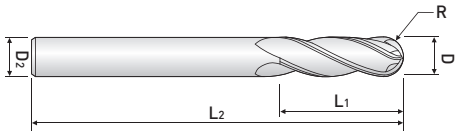
2FLUTE, REGULAR LENGTH, BALL NOSE

- Designed to machine tool steel, alloy, mold steel and other high hardened material.
- Suitable to profile processing.

TXB302...series

FINE GRAIN HELIX

EDP. No.	Dia.	R	L_1	L_2	D_2	STOCK
TXB302010	1	0.5	2	50	4	•
TXB302015	1.5	0.75	3	50	4	•
TXB302020	2	1	4	50	4	•
TXB302025	2.5	1.25	6	50	4	•
TXB302030	3	1.5	6	50	4	•
TXB302040	4	2	8	50	4	•
TXB302050	5	2.5	10	50	6	•
TXB302060	6	3	12	50	6	•
TXB302080	8	4	14	60	8	•
TXB302100	10	5	18	75	10	•
TXB302120	12	6	22	75	12	•
TXB302140	14	7	32	75	14	•
TXB302160	16	8	32	100	16	•
TXB302180	18	9	32	100	18	•
TXB302200	20	10	38	100	20	•



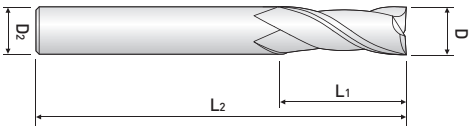
4 FLUTE, REGULAR LENGTH, BALL NOSE

- Designed to machine tool steel, alloy steel, mold steel and other high hardened materials.
- Excellent workpiece finishes.

TXB304...series

FINE GRAIN HELIX

EDP. No.	Dia.	R	L_1	L_2	D_2	STOCK
TXB304010	1	0.5	2	50	4	•
TXB304015	1.5	0.75	3	50	4	•
TXB304020	2	1	4	50	4	•
TXB304030	3	1.5	6	50	4	•
TXB304040	4	2	8	50	4	•
TXB304050	5	2.5	10	50	6	•
TXB304060	6	3	12	50	6	•
TXB304080	8	4	14	60	8	•
TXB304100	10	5	18	75	10	•
TXB304120	12	6	22	75	12	•
TXB304140	14	7	32	75	14	•
TXB304160	16	8	32	100	16	•
TXB304180	18	9	32	100	18	•
TXB304200	20	10	38	100	20	•



2 FLUTE, SHORT LENGTH

- Designed to machine tool steel, alloy steel, mold steel and other high hardened materials.
- Excellent workpiece finishes.

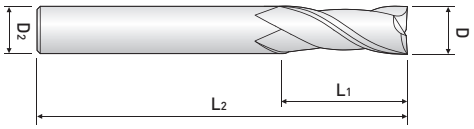
TX202...series

EDP. No.	Dia.	L_1	L_2	D_2	STOCK
TX202010	1	3	39	3	•
TX202015	1.5	5	39	3	•
TX202020	2	7	39	3	•
TX202025	2.5	8	39	3	•
TX202030	3	10	39	3	•
TX202040	4	14	51	4	•
TX202050	5	16	51	5	•
TX202060	6	19	64	6	•
TX202080	8	21	64	8	•
TX202100	10	25	70	10	•
TX202120	12	25	76	12	•
TX202160	16	32	89	16	•
TX202200	20	38	102	20	•

■ Tolerance

㎛=1/1000㎜

Tolerance \ Dia.	from 1 to 3	over 3 to 6	over 6 to 10	over 10 to 18	over 18 to 30
Cutting Edge(d11)	-14 -28	-20 -38	-25 -47	-32 -59	-40 -73
Shank(h6)	0 -6	0 -8	0 -9	0 -11	0 -13



2 FLUTE, LONG LENGTH

- Designed to machine tool steel, alloy steel, mold steel and other high hardened materials.
- Excellent workpiece finishes.

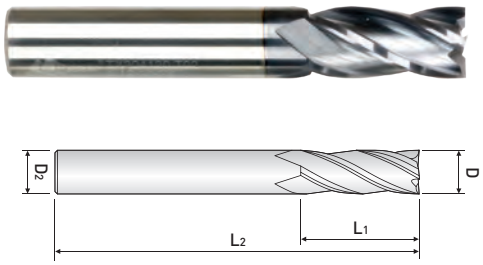
TX222...series

EDP. No.	Dia.	L_1	L_2	D_2	STOCK
TX222030	3	20	60	3	•
TX222040	4	20	60	4	•
TX222050	5	25	75	5	•
TX222060	6	30	75	6	•
TX222080	8	30	75	8	•
TX222100	10	40	100	10	•
TX222120	12	45	100	12	•
TX222140	14	45	100	14	•
TX222160	16	45	100	16	•
TX222180	18	45	100	18	•
TX222200	20	45	100	20	•

■ Tolerance

㎛=1/1000㎜

Tolerance \ Dia.	from 1 to 3	over 3 to 6	over 6 to 10	over 10 to 18	over 18 to 30
Cutting Edge(d11)	-14 -28	-20 -38	-25 -47	-32 -59	-40 -73
Shank(h6)	0 -6	0 -8	0 -9	0 -11	0 -13



4 FLUTE, SHORT LENGTH

- Designed to machine tool steel, alloy steel, mold steel and other high hardened materials.
- Excellent workpiece finishes.

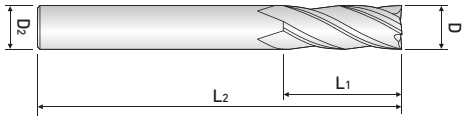
TX204...series

EDP. No.	Dia.	L_1	L_2	D_2	STOCK
TX204010	1	3	39	3	•
TX204015	1.5	5	39	3	•
TX204020	2	7	39	3	•
TX204025	2.5	8	39	3	•
TX204030	3	10	39	3	•
TX204040	4	14	51	4	•
TX204050	5	16	51	5	•
TX204060	6	19	64	6	•
TX204080	8	21	64	8	•
TX204100	10	25	70	10	•
TX204120	12	25	76	12	•
TX204160	16	32	89	16	•
TX204200	20	38	102	20	•

■ Tolerance

㎛=1/1000㎜

Tolerance \ Dia.	from 1 to 3	over 3 to 6	over 6 to 10	over 10 to 18	over 18 to 30
Cutting Edge(d11)	-14 -28	-20 -38	-25 -47	-32 -59	-40 -73
Shank(h6)	0 -6	0 -8	0 -9	0 -11	0 -13



4 FLUTE, LONG LENGTH

- Designed to machine tool steel, alloy steel, mold steel and other high hardened materials.
- Excellent workpiece finishes.

TX224...series

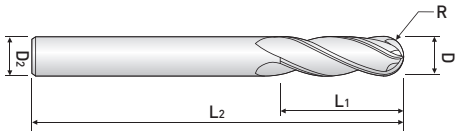
FINE GRAIN HELIX

EDP. No.	Dia.	L_1	L_2	D_2	STOCK
TX224030	3	20	60	3	•
TX224040	4	20	60	4	•
TX224050	5	25	75	5	•
TX224060	6	30	75	6	•
TX224080	8	30	75	8	•
TX224100	10	40	100	10	•
TX224120	12	45	100	12	•
TX224140	14	45	100	14	•
TX224160	16	45	100	16	•
TX224180	18	45	100	18	•
TX224200	20	45	100	20	•

■ Tolerance

㎛=1/1000㎜

Tolerance \ Dia.	from 1 to 3	over 3 to 6	over 6 to 10	over 10 to 18	over 18 to 30
Cutting Edge(d11)	-14 -28	-20 -38	-25 -47	-32 -59	-40 -73
Shank(h6)	0 -6	0 -8	0 -9	0 -11	0 -13



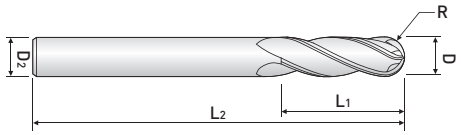
2 FLUTE, REGULAR LENGTH, BALL NOSE

- Designed to machine tool steel, alloy steel, mold steel and other high hardened materials.
- For copy-milling machines.

TXB202...series

FINE GRAIN HELIX

EDP. No.	Dia.	R	L_1	L_2	D_2	STOCK
TXB202010	1	0.5	3	39	3	•
TXB202015	1.5	0.75	5	39	3	•
TXB202020	2	1	7	39	3	•
TXB202025	2.5	1.25	8	39	3	•
TXB202030	3	1.5	10	39	3	•
TXB202040	4	2	14	51	4	•
TXB202050	5	2.5	16	51	5	•
TXB202060	6	3	19	64	6	•
TXB202080	8	4	21	64	8	•
TXB202100	10	5	25	70	10	•
TXB202120	12	6	25	76	12	•
TXB202160	16	8	32	89	16	•
TXB202200	20	10	38	100	20	•



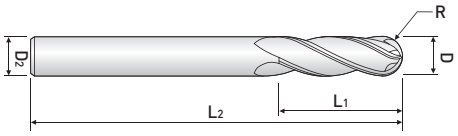
2 FLUTE, LONG LENGTH, BALL NOSE

- Designed to machine tool steel, alloy steel, mold steel and other high hardened materials.
- Excellent workpiece finishes.

TXB222...series

FINE GRAIN HELIX

EDP. No.	Dia.	R	L_1	L_2	D_2	STOCK
TXB222030	3	1.5	20	60	3	•
TXB222040	4	2	20	60	4	•
TXB222050	5	2.5	25	75	5	•
TXB222060	6	3	30	75	6	•
TXB222080	8	4	30	100	8	•
TXB222100	10	5	40	100	10	•
TXB222120	12	6	45	100	12	•
TXB222140	14	7	45	100	14	•
TXB222160	16	8	45	100	16	•
TXB222180	18	9	45	100	18	•
TXB222200	20	10	45	100	20	•



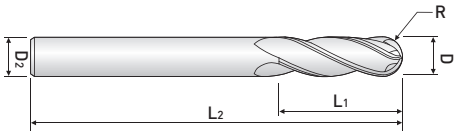
2 FLUTE, LONG REACH, BALL NOSE

- Designed to machine tool steel, alloy steel, mold steel and other high hardened materials.
- For copy-milling machines.

TXB232...series

FINE GRAIN HELIX

EDP. No.	Dia.	R	L_1	L_2	D_2	STOCK
TXB232030	3	1.5	5	75	3	•
TXB232040	4	2	8	75	4	•
TXB232050	5	2.5	9	75	5	•
TXB232060	6	3	10	100	6	•
TXB232080	8	4	12	100	8	•
TXB232100	10	5	14	100	10	•
TXB232120	12	6	16	100	12	•
TXB232140	14	7	18	100	14	•
TXB232160	16	8	22	150	16	•
TXB232200	20	10	26	150	20	•



4 FLUTE, REGULAR LENGTH, BALL NOSE

- Designed to machine tool steel, alloy steel, mold steel and other high hardened materials.
- Excellent workpiece finishes.

TXB204...series

FINE GRAIN HELIX

EDP. No.	Dia.	R	L_1	L_2	D_2	STOCK
TXB204020	2	1	7	39	3	•
TXB204030	3	1.5	10	39	3	•
TXB204040	4	2	14	51	4	•
TXB204050	5	2.5	16	51	5	•
TXB204060	6	3	19	64	6	•
TXB204080	8	4	21	64	8	•
TXB204100	10	5	25	70	10	•
TXB204120	12	6	25	76	12	•
TXB204160	16	8	32	89	16	•
TXB204200	20	10	38	100	20	•

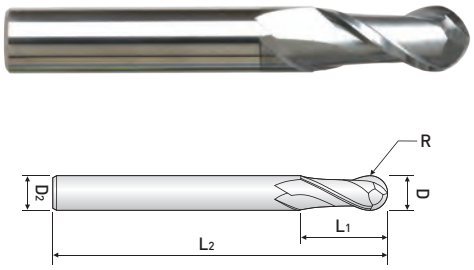
Zamus Sus-Mate Series

ENDMILL SERIES

Zamus Sus-Mate Series

WIDIN

EDP. No.	APPEARANCE	FEATURE	STOCK	PAGE
DS502 ...series		2 FLUTE, BALL NOSE REGULAR & LONG LENGTH	•	208
SM503 ...series		3 FLUTE, REGULAR LENGTH	•	209
SM504 ...series		4 FLUTE, REGULAR LENGTH	•	210
ZF62 ...series		4~6FLUTE, ROUGHING END MILL DIN6527 / DIN6535-HA, DIN6535-HB	•	211



2 FLUTE, BALL NOSE REGULAR & LONG LENGTH

- Suitable for Stainless steel, Titanium, Inconel.

DS502 ...series

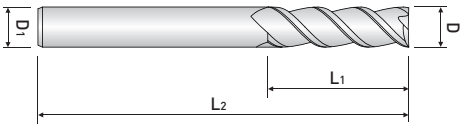
ULTRA FINE HELIX

EDP. No.	Dia.	R	L_1	L_2	D_2	STOCK
DS502010	1	0.5	3	50	6	•
DS502020	2	1	6	50	6	•
DS502030	3	1.5	8	50	6	•
DS502031				70		•
DS502040	4	2	10	50	6	•
DS502041				70		•
DS502050	5	2.5	13	50	6	•
DS502051				80		•
DS502060	6	3	13	50	6	•
DS502061				90		•
DS502080	8	4	19	60	8	•
DS502081				100		•
DS502100	10	5	22	70	10	•
DS502101				100		•
DS502120	12	6	26	75	12	•
DS502121				110		•

■ Tolerance

Radius (mm)	Shank Dia.
±0.01	h6

※Items can be changed for quality improvement without notice.



3 FLUTE, REGULAR LENGTH

- Suitable for Stainless steel, Titanium, Inconel.

SM503 ...series

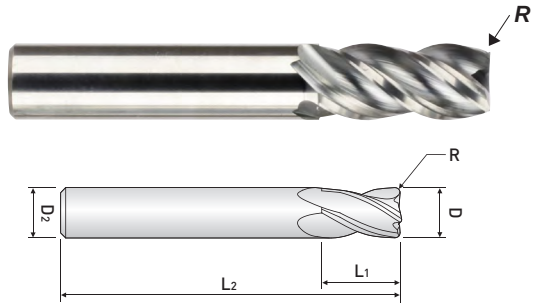
ULTRA FINE HELIX

EDP. No.	Dia.	L_1	L_2	D_2	STOCK
SM503020	2	6	45	6	•
SM503030	3	8	45	6	•
SM503040	4	10	50	6	•
SM503050	5	13	50	6	•
SM503060	6	13	50	6	•
SM503080	8	19	60	8	•
SM503100	10	22	70	10	•
SM503120	12	26	75	12	•
SM503140	14	30	82	14	•
SM503160	16	40	100	16	•
SM503180	18	40	100	18	•
SM503200	20	40	100	20	•

■ Tolerance

Mill Dia. (mm)	Shank Dia.
±0.01	h6

※Items can be changed for quality improvement without notice.



4 FLUTE, REGULAR LENGTH

- Suitable for Stainless steel, Titanium, Inconel.
- Broken Index Type.

SM504 ...series

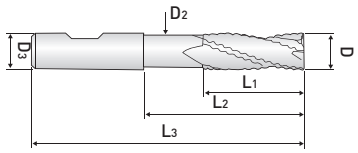
ULTRA FINE HELIX

EDP. No.	D	R	L_1	L_2	D_2	STOCK
SM504020	2	0.1	6	45	6	•
SM504030	3	0.1	10	45	6	•
SM504040	4	0.2	12	50	6	•
SM504050	5	0.2	13	50	6	•
SM504060	6	0.2	13	50	6	•
SM504070	7	0.2	16	60	8	•
SM504080	8	0.2	16	60	8	•
SM504090	9	0.2	19	70	10	•
SM504100	10	0.3	22	70	10	•
SM504120	12	0.3	26	75	12	•
SM504140	14	0.3	26	82	14	•
SM504160	16	0.3	32	90	16	•
SM504180	18	0.3	32	100	18	•
SM504200	20	0.3	38	100	20	•

■ Tolerance

Mill Dia. (mm)		Shank Dia.
Diameter	Tolerance	
	0 ~ -0.02	h6
	0 ~ -0.03	

※Items can be changed for quality improvement without notice.



4~6 FLUTE, ROUGHING END MILL DIN6527 / DIN6535-HA, DIN6535-HB

- Designed to machine tool steel, alloy steel, stainless steel and other low hardness materials.
- Fast chip ejection.

ZF62 ....series

ULTRA FINE HELIX Conventional Pitch

EDP. No.		D	L1	L2	D2	L3	D3	Z	STOCK
PLAIN SHANK	FLAT SHANK								
ZF624060	ZF624060F	6	7	-	-	54	6	4	•
ZF624061	ZF624061F		16	-	-	57			•
ZF624062	ZF624062F			20	5.5				•
ZF624080	ZF624080F	8	9	-	-	58	8	4	•
ZF624081	ZF624081F		16	-	-	63			•
ZF624082	ZF624082F			26	7.5				•
ZF624100	ZF624100F	10	14	-	-	66	10	4	•
ZF624101	ZF624101F		22	-	-	72			•
ZF624102	ZF624102F			31	9.5				•
ZF624120	ZF624120F	12	16	-	-	73	12	4	•
ZF624121	ZF624121F		26	-	-	83			•
ZF624122	ZF624122F			37	11.5				•
ZF625160	ZF625160F	16	22	-	-	82	16	5	•
ZF625161	ZF625161F		32	-	-	92			•
ZF625162	ZF625162F			51	15.5	100			•
ZF626200	ZF626200F	20	26	-	-	92	20	6	•
ZF626201	ZF626201F		38	-	-	104			•
ZF626202	ZF626202F			59	19.2	110			•

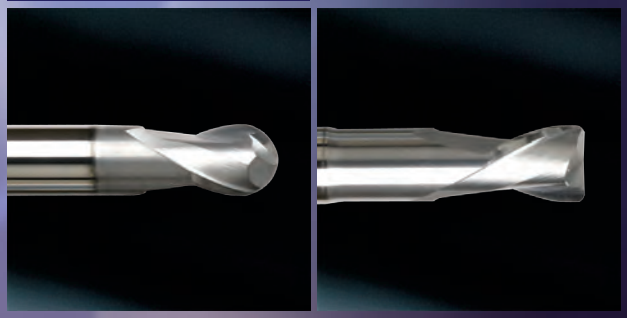
■ Tolerance

㎛=1/1000㎜

Tolerance \ Dia.	ø1~ø3	ø3~ø6	ø6~ø10	ø10~ø18	ø18~ø30
Cutting Edge(h10)	0 -40	0 -48	0 -58	0 -70	0 -84
Shank(h6)	0 -6	0 -8	0 -9	0 -11	0 -13

Zamus Copper-Mate Series

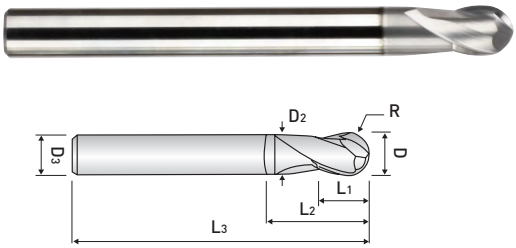
ENDMILL SERIES



Zamus Copper-Mate Series

WIDIN

EDP. No.	APPEARANCE	FEATURE	STOCK	PAGE
BC502 .....series		2 FLUTE, STUB CUT LENGTH, BALL NOSE with EXTENDED NECK	•	214
RC502.....series		2 FLUTE, STUB CUT LENGTH, CORNER RADIUS with EXTENDED NECK	•	215



2 FLUTE, STUB CUT LENGTH, BALL NOSE with EXTENDED NECK

- Suitable for copper & non-ferrous material.

BC502 ...series

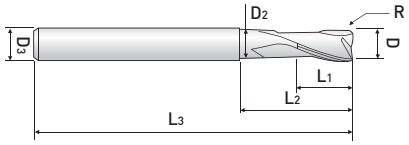
ULTRA FINE HELIX

EDP. No.	D	R	L_1	L_2	L_3	D_2	D_3	STOCK
BC502010	1	0.5	1.5	3	50	0.95	6	•
BC502015	1.5	0.75	2	4	50	1.45	6	•
BC502020	2	1	2.5	5	50	1.95	6	•
BC502025	2.5	1.25	3	7	50	2.45	6	•
BC502030	3	1.5	4	10	60	2.9	6	•
BC502040	4	2	5	10	60	3.9	6	•
BC502050	5	2.5	6	12	60	4.9	6	•
BC502060	6	3	7	12	60	5.9	6	•
BC502061					90			
BC502080	8	4	9	15	70	7.9	8	•
BC502081				16	100			
BC502100	10	5	11	25	75	9.9	10	•
BC502101					100			
BC502120	12	6	12	25	80	11.9	12	•
BC502121					110			

■ Tolerance

Radius (mm)	Shank Dia.
±0.01	h6

※Items can be changed for quality improvement without notice.



2 FLUTE, STUB CUT LENGTH, CORNER RADIUS with EXTENDED NECK

- Suitable for copper & non-ferrous material.

RC502 .....series

ULTRA FINE | HELIX | up to Φ6 | over 6

EDP. No.	D	R	L_1	L_2	L_3	D_2	D_3	STOCK
RC5020200509	2	0.5	3	9	55	1.8	6	•
RC5020300509	3	0.5	4	9	55	2.8	6	•
RC5020300516				16				
RC5020300520				20				
RC5020400512	4	0.5	5	12	55	3.7	6	•
RC5020400516				16				
RC5020400520				20				
RC5020600520	6	0.5	7	20	60	5.5	6	•
RC5020601020		1						
RC5020800525	8	0.5	9	25	60	7.4	8	•
RC5020801025		1						
RC5021000532	10	0.5	11	32	70	9.2	10	•
RC5021001032		1						
RC5021200538	12	0.5	12	38	80	11	12	•
RC5021201038		1						

■ Tolerance

Mill Dia. (mm)		Shank Dia.
Diameter	Tolerance	
up to 6	0 ~ -0.012	h6
over 6	0 ~ -0.015	

※Items can be changed for quality improvement without notice.

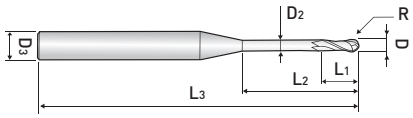
Zamus Gra-Mate Series

ENDMILL SERIES

Zamus Gra-Mate Series

WIDIN

EDP. No.	APPEARANCE	FEATURE	STOCK	PAGE
G .....series		2 FLUTE, DIAMOND COATING BALL NOSE	•	218
GE .....series		2 FLUTE, DIAMOND COATING END MILL	•	221



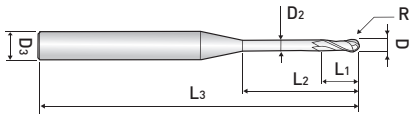
2 FLUTE, DIAMOND COATING BALL NOSE

- High performance on **graphite**, wrought aluminum, bakelite, plastics, wood, brass etc.

G .....series

HELIX DIAMOND

EDP. No.	D	R	L_1	L_2	L_3	D_2	D_3	STOCK
G00501003	0.5	0.25	1	3	50	0.45	4	•
G00501006				6				•
G00501010				10				•
G00601203	0.6	0.3	1.2	3	50	0.55	4	•
G00601206				6				•
G00601208				8				•
G00601210				10				•
G00601212				12				•
G0080164	0.8	0.4	1.6	4	50	0.75	4	•
G0080166				6				•
G0080168				8				•
G0100306	1	0.5	3	6	60	0.95	4	•
G0100308				8				•
G0100310				10				•
G0100312				12				•
G0100314				14				•
G0100316				16				•
G0100318				18				•
G0100320				20				•
G0120410	1.2	0.6	4	10	70	1.15	4	•
G0150510	1.5	0.75	5	10	60	1.45	4	•
G0150512				12				•
G0150516				16				•
G0150520				20				•
G0150525				25	70			•
G0150530				30				•



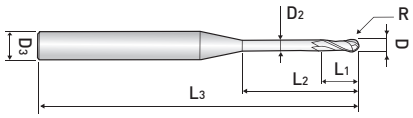
2 FLUTE, DIAMOND COATING BALL NOSE

- High performance on **graphite**, wrought aluminum, bakelite, plastics, wood, brass etc.

G .....series

HELIX DIAMOND

EDP. No.	D	R	L_1	L_2	L_3	D_2	D_3	STOCK
G0200812	2	1	8	12	60	1.95	4	•
G0200816				16				•
G0200820				20				•
G0200825				25	70			•
G0200830				30				•
G0200835				35	80			•
G0200840				40				•
G0201020			10	20	80			•
G0201020L					100			•
G0251020	2.5	1.25	10	20	80	2.43	4	•
G0301216	3	1.5	12	16	60	2.9	6	•
G0301220				20	70			•
G0301225				25				•
G0301230				30	80			•
G0301235				35				•
G0301240				40	90			•
G0301245				45				•
G0301525			15	25	80		4	•
G04015S	4	2	15	-	50	-	4	•
G04015M				-	80	-		•
G04015L				-	120	-		•
G0401520				20	60	3.9	6	•
G0401525				25	70			•
G0401530				30	80			•
G0401535				35				•
G0401540				40	90			•
G0401545				45				•
G0401550				50	100			•
G0402030			20	30	80		4	•



2 FLUTE, DIAMOND COATING BALL NOSE

- High performance on **graphite**, wrought aluminum, bakelite, plastics, wood, brass etc.

G .....series

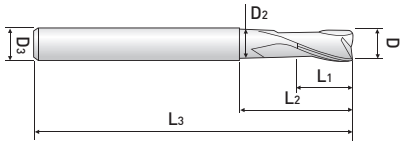
HELIX DIAMOND

EDP. No.	D	R	L_1	L_2	L_3	D_2	D_3	STOCK
G0503050	5	2.5	30	50	100	4.8	6	•
G0503050L					150			•
G06020S	6	3	20	-	70	-	6	•
G06020M				-	100	-		•
G06020L				-	150	-		•
G0603050			30	50	100	5.8		•
G0603050L					150			•
G08025S	8	4	25	-	70	-	8	•
G08025M				-	110	-		•
G08025L				-	160	-		•
G0804060			40	60	110	7.8		•
G0804060L					200			•
G10030S	10	5	30	-	80	-	10	•
G10030M				-	120	-		•
G10030L				-	170	-		•
G1005070			50	70	120	9.7		•
G1005070L					200			•
G12035S	12	6	35	-	80	-	12	•
G12035M				-	130	-		•
G12035L				-	180	-		•
G1205575			55	75	130	11.7		•
G1205575L					200			•

■ Tolerance

Mill Dia. (mm)	Shank Dia.
0 ~ -0.03	h6

※Items can be changed for quality improvement without notice.



2 FLUTE, DIAMOND COATING END MILL

- High performance on **graphite**, wrought aluminum, bakelite, plastics, wood, brass etc.

GE .....series

WC · HELIX 30° · DIAMOND

EDP. No.	D	L_1	L_2	L_3	D_2	D_3	STOCK
GE00501006	0.5	1	6	50	0.45	4	•
GE00601206	0.6	1.2	6	50	0.55	4	•
GE00601210			10				•
GE00701506	0.7	1.5	6	50	0.65	4	•
GE00802006	0.8	2	6	50	0.75	4	•
GE0100308	1	3	8	60	0.95	4	•
GE0100310			10				•
GE0100312			12				•
GE0150412	1.5	4	12	60	1.45	4	•
GE0200612	2	6	12	60	1.95	4	•
GE0200612S6						6	•
GE0250812	2.5	8	12	60	2.43	4	•
GE0301012	3	10	12	60	2.9	4	•
GE0301016			16				•
GE0301012S6			12			6	•
GE0301016S6			16				•
GE04012S	4	12	-	60	-	6	•
GE0401216			16		3.9		•
GE0401220			20				•
GE0501520	5	15	20	60	4.8	6	•
GE06020S	6	20	-	60	-	6	•
GE0602030			30	80	5.8		•
GE0603050		30	50	150			•
GE08025S	8	25	-	70	-	8	•
GE0802540			40	100	7.8		•
GE0804070		40	70	150			•
GE10030S	10	30	-	80	-	10	•
GE1003050			50	100	9.7		•
GE1004580		45	80	160			•
GE12030S	12	30	-	80	-	12	•
GE1203050			50	110	11.7		•
GE1205080		50	80	160			•

■ Tolerance

Mill Dia. (mm)	Shank Dia.
0 ~ -0.03	h6

※Items can be changed for quality improvement without notice.

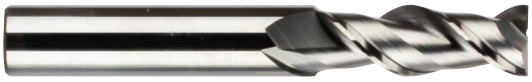
Zamus Al-Mate Series

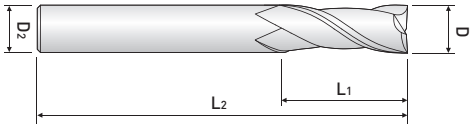
ENDMILL SERIES

Zamus Al-Mate Series

WIDIN

EDP. No.	APPEARANCE	FEATURE	STOCK	PAGE
AE302 ...series		2 FLUTE, LONG LENGTH - for Aluminum	•	224
AE30(2)3 ...series		3 FLUTE, LONG & EXTRA LONG LENGTH - for Aluminum	•	225
AR302 ...series		2 FLUTE, CORNER RADIUS	•	227
AR303 ...series		3 FLUTE, CORNER RADIUS	•	228
AB312 ...series		2 FLUTE, STUB CUT BALL NOSE - for Aluminum	•	229
AR502 ...series		2 FLUTE, CORNER RADIUS with D.L.C. COATED	•	230
AR503 ...series		3 FLUTE, CORNER RADIUS with D.L.C. COATED	•	231
AF303 ...series		ROUGHING END MILL - for Aluminum	•	232





2 FLUTE, LONG LENGTH - for Aluminum

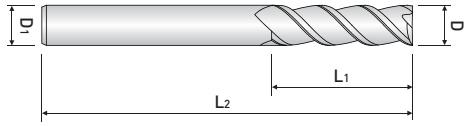
AE302 ...series

EDP. No.	Dia.	L_1	L_2	D_2	STOCK
AE302010	1	3	40	4	•
AE302015	1.5	6	57	6	•
AE302020S4	2	6	40	4	•
AE302020	2	6	57	6	•
AE302025	2.5	10	57	6	•
AE302030	3	12	57	6	•
AE302035	3.5	12	57	6	•
AE302040	4	14	57	6	•
AE302050	5	16	57	6	•
AE302060	6	16	57	6	•
AE302070	7	20	63	8	•
AE302080	8	22	63	8	•
AE302090	9	25	72	10	•
AE302100	10	28	72	10	•
AE302110	11	30	80	12	•
AE302120	12	32	80	12	•
AE302130	13	35	85	14	•
AE302140	14	35	85	14	•
AE302150	15	40	90	16	•
AE302160	16	45	90	16	•
AE302180	18	45	100	18	•
AE302200	20	50	100	20	•
AE302250	25	50	120	25	•

■ Tolerance

Mill Dia. (mm)	Shank Dia.
0 ~ -0.02	h6

※Items can be changed for quality improvement without notice.

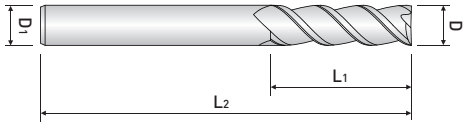


3 FLUTE, LONG & EXTRA LONG LENGTH
- for Aluminum

AE30(2)3 ...series

FINE GRAIN · HELIX · SHARP EDGE

EDP. No.	Dia.	L_1	L_2	D_2	STOCK
AE303010	1	3	40	6	•
AE303015	1.5	4	40	6	•
AE303020	2	6	50	6	•
AE303025	2.5	8	50	6	•
AE303030	3	12	57	6	•
AE303031		15			•
AE323030		20	62		•
AE323031		25			•
AE303040	4	14	57	6	•
AE303041		20			•
AE323040		25	62		•
AE323041		30	70		•
AE303050	5	16	57	6	•
AE303051		20			•
AE303052		25	62		•
AE323050		30	70		•
AE323051		35			•
AE303060	6	16	57	6	•
AE303061		20			•
AE303062		25	62		•
AE303063		30	70		•
AE323060		35	80		•
AE323061		42	90		•
AE303070	7	20	63	8	•
AE303080	8	22	63	8	•
AE303081		30	70		•
AE303082		35	80		•
AE323080		40	100		•
AE323081		45			•
AE303090	9	25	72	10	•



3 FLUTE, LONG & EXTRA LONG LENGTH
- for Aluminum

AE30(2)3 ...series

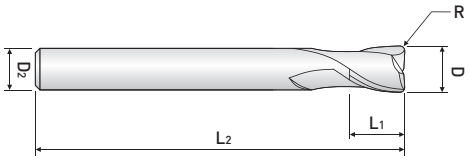
FINE GRAIN HELIX SHARP EDGE

EDP. No.	Dia.	L_1	L_2	D_2	STOCK
AE303100	10	28	72	10	•
AE303101		35	80		•
AE303102		45	100		•
AE323100		55	110		•
AE323101		65	120		•
AE303110	11	30	80	12	•
AE303120	12	32	80	12	•
AE303121		40	90		•
AE303122		45	100		•
AE303123		55	110		•
AE323120		65	120		•
AE323121		75	125		•
AE303130	13	35	85	14	•
AE303140	14	35	85	14	•
AE303150	15	40	90	16	•
AE303160	16	45	90	16	•
AE303161		55	110		•
AE303162		65	125		•
AE303163		75	130		•
AE323160		85	150		•
AE303180	18	45	100	18	•
AE303200	20	50	100	20	•
AE303201		60	110		•
AE303202		70	130		•
AE323200		80	150		•
AE323201		90	160		•
AE323202		100	160		•
AE303250	25	50	120	25	•

■ Tolerance

Mill Dia. (mm)	Shank Dia.
0 ~ -0.02	h6

※Items can be changed for quality improvement without notice.



2FLUTE, REGULAR LENGTH,
CORNER RADIUS - for Aluminum

AR302 ...series

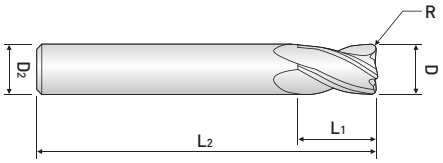
FINE GRAIN HELIX

EDP. No.	Dia.	R	L_1	L_2	D_2	STOCK
AR3020605	6	0.5	15	50	6	•
AR3020610		1				•
AR3020615		1.5				•
AR3020805	8	0.5	20	60	8	•
AR3020810		1				•
AR3020815		1.5				•
AR3020820		2				•
AR3021005	10	0.5	25	70	10	•
AR3021010		1				•
AR3021015		1.5				•
AR3021020		2				•
AR3021030		3				•
AR3021040		4				•
AR3021210	12	1	30	75	12	•
AR3021220		2				•
AR3021230		3				•
AR3021240		4				•
AR3021410	14	1	35	80	14	•
AR3021420		2				•
AR3021430		3				•
AR3021440		4				•
AR3021450		5				•
AR3021610	16	1	40	90	16	•
AR3021620		2				•
AR3021630		3				•
AR3021640		4				•
AR3021650		5				•
AR3022010	20	1	45	100	20	•
AR3022020		2				•
AR3022030		3				•
AR3022040		4				•
AR3022050		5				•

■ Tolerance

Mill Dia. (mm)	Shank Dia.
0 ~ -0.02	h6

※Items can be changed for quality improvement without notice.



3FLUTE, REGULAR LENGTH, CORNER RADIUS - for Aluminum

AR303 ...series

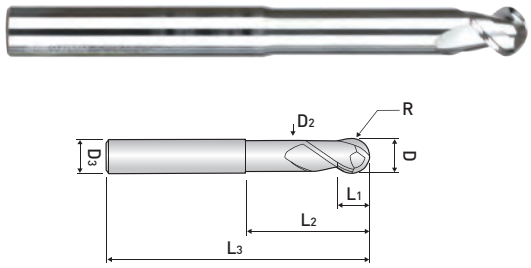
ULTRA FINE HELIX

EDP. No.	R	L1	L2	D2	STOCK
AR3030605	0.5	15	50	6	•
AR3030610	1				•
AR3030615	1.5				•
AR3030805	0.5	20	60		•
AR3030810	1				•
AR3030815	1.5				•
AR3030820	2				•
AR3031005	0.5	25	70	10	•
AR3031010	1				•
AR3031015	1.5				•
AR3031020	2				•
AR3031030	3				•
AR3031040	4				•
AR3031210	1	30	75	12	•
AR3031220	2				•
AR3031230	3				•
AR3031240	4				•
AR3031410	1	35	80	14	•
AR3031420	2				•
AR3031430	3				•
AR3031440	4				•
AR3031450	5				•
AR3031610	1	40	90	16	•
AR3031620	2				•
AR3031630	3				•
AR3031640	4				•
AR3031650	5				•
AR3032010	1	45	100	20	•
AR3032020	2				•
AR3032030	3				•
AR3032040	4				•
AR3032050	5				•

■ Tolerance

Mill Dia. (mm)	Shank Dia.
0 ~ -0.02	h6

※Items can be changed for quality improvement without notice.



2 FLUTE, STUB CUT BALL NOSE - for Aluminum

- Excellent cutting quality on **aluminum** & copper.

AB312 ...series

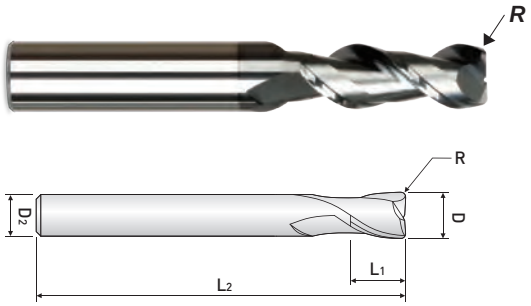
ULTRA FINE HELIX

EDP. No.	D	R	L1	L2	L3	D2	D3	STOCK
AB312060	6	3	5.5	25	55	5.4	6	•
AB312061				40	90			•
AB312080	8	4	7	30	65	7.2	8	•
AB312081				50	100			•
AB312100	10	5	8.5	35	75	9	10	•
AB312101			10	50	100			•
AB312102				60	150			•
AB312120	12	6	10.5	40	75	11	12	•
AB312121			12	50	110			•
AB312122				60	150			•
AB312160	16	8	14	50	90	14.5	16	•
AB312161			16	70	150			•
AB312162				90	200			•
AB312200	20	10	17	50	100	18	20	•

■ Tolerance

Mill Dia. (mm)	Shank Dia.
±0.02	h6

※Items can be changed for quality improvement without notice.



2 FLUTE, CORNER RADIUS, LONG LENGTH, D.L.C. COATING

- Suitable for aluminium, aluminium alloy, copper & non-ferrous material.
- Corner radius against chipping in high speed machining.

AR502 ...series

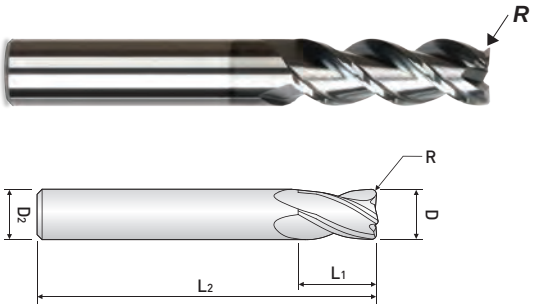
FINE GRAIN HELIX D.L.C.

EDP. No.	Dia.	R	L_1	L_2	D_2	STOCK
AR502010	1	0.05	3	40	6	•
AR502015	1.5	0.05	5	40	6	•
AR502020	2	0.1	6	40	6	•
AR502021			12	50		•
AR502030	3	0.1	10	50	6	•
AR502031			20	60		•
AR502040	4	0.1	12	50	6	•
AR502041			20	60		•
AR502050	5	0.1	15	57	6	•
AR502060	6	0.1	15	57	6	•
AR502061			22	65		•
AR502070	7	0.1	20	63	8	•
AR502080	8	0.1	20	63	8	•
AR502081			28	70		•
AR502090	9	0.1	25	72	10	•
AR502100	10	0.2	28	72	10	•
AR502101			32	80		•
AR502110	11	0.2	30	80	12	•
AR502120	12	0.2	32	80	12	•
AR502121			40	100		•

■ Tolerance

Mill Dia. (mm)	Shank Dia.
0 ~ -0.02	h6

※Items can be changed for quality improvement without notice.



3 FLUTE, CORNER RADIUS, LONG LENGTH, D.L.C. COATING

- Suitable for aluminium, aluminium alloy, copper & non-ferrous material.
- Corner radius against chipping in high speed machining.

AR503 ...series

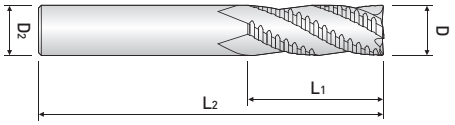
FINE GRAIN HELIX D.L.C.

EDP. No.	Dia.	R	L_1	L_2	D_2	STOCK
AR503040	4	0.5	14	57	6	•
AR503041		1	25	62		•
AR503060	6	0.5	16	57	6	•
AR503061		1	25	62		•
AR503080	8	0.5	22	63	8	•
AR503081		1	35	80		•
AR503100	10	0.5	28	72	10	•
AR503101		1	45	100		•
AR503120	12	0.5	32	80	12	•
AR503121		1	45	100		•
AR503160	16	0.5	45	90	16	•
AR503161		1	65	125		•
AR503200	20	0.5	50	100	20	•
AR503201		1	70	130		•

■ Tolerance

Mill Dia. (mm)	Shank Dia.
0 ~ -0.02	h6

※Items can be changed for quality improvement without notice.



ROUGHING END MILL - for Aluminum
DIN6527L / DIN6535-HA, DIN6535-HB

AF303 ...series

FINE GRAIN · HELIX · Conventional Pitch

EDP. No.		Dia.	L_1	L_2	D_2	STOCK
PLAIN SHANK	FLAT SHANK					
AF303060	AF303060F	6	16	57	6	•
AF303070	AF303070F	7	16	63	8	•
AF303080	AF303080F	8	16	63	8	•
AF303090	AF303090F	9	19	72	10	•
AF303100	AF303100F	10	22	72	10	•
AF303120	AF303120F	12	26	83	12	•
AF303140	AF303140F	14	26	83	14	•
AF303160	AF303160F	16	32	92	16	•
AF303180	AF303180F	18	32	92	18	•
AF303200	AF303200F	20	38	104	20	•

■ Tolerance

㎛=1/1000㎜

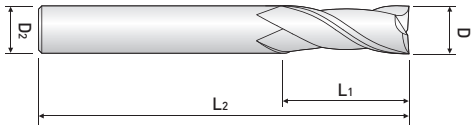
Tolerance \ Dia.	from 1 to 3	over 3 to 6	over 6 to 10	over 10 to 18	over 18 to 30
Cutting Edge(h10)	0 -40	0 -48	0 -58	0 -70	0 -84
Shank(h6)	0 -6	0 -8	0 -9	0 -11	0 -13

Standard End Mill Series

Standard End Mill Series

WIDIN

EDP. No.	APPEARANCE	FEATURE	STOCK	PAGE
E302 ...series		2 FLUTE, REGULAR LENGTH	•	235
E304 ...series		4 FLUTE, REGULAR LENGTH	•	237
B302 ...series		2 FLUTE, BALL NOSE LONG LENGTH	•	238
BL422 ...series		2 FLUTE, BALL NOSE EXTRA LONG LENGTH	•	239
B304 ...series		4 FLUTE, BALL NOSE LONG LENGTH	•	240
E322 ...series		2 FLUTE, LONG LENGTH	•	241
E324 ...series		4 FLUTE, LONG LENGTH	•	242
EB302 ...series		2 FLUTE, REGULAR LENGTH - BRAZED TYPE	•	243
EB304 ...series		4 FLUTE, REGULAR LENGTH - BRAZED TYPE	•	244
EB322 ...series		2 FLUTE, LONG LENGTH - BRAZED TYPE	•	245
EB324 ...series		4 FLUTE, LONG LENGTH - BRAZED TYPE	•	246
BB302 ...series		2 FLUTE, BALL NOSE REGULAR LENGTH - BRAZED TYPE	•	247

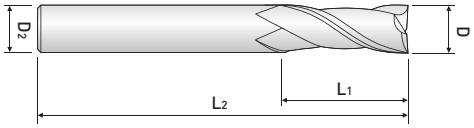


2 FLUTE, REGULAR LENGTH

E302 ...series

FINE GRAIN HELIX

EDP. No.	Dia.	L_1	L_2	D_2	STOCK
E302010S4	1	3	42	4	•
E302010				6	•
E302015S4	1.5	4	42	4	•
E302015				6	•
E302020S4	2	6	42	4	•
E302020				6	•
E302025S4	2.5	8	42	4	•
E302025				6	•
E302030	3	10	50	6	•
E302035	3.5	10	50	6	•
E302040	4	12	50	6	•
E302045	4.5	14	50	6	•
E302050	5	15	50	6	•
E302055	5.5	15	50	6	•
E302060	6	15	50	6	•
E302065	6.5	18	60	8	•
E302070	7	20	60	8	•
E302075	7.5	20	60	8	•
E302080	8	20	60	8	•
E302085	8.5	23	70	10	•
E302090	9	25	70	10	•
E302095	9.5	25	70	10	•
E302100	10	25	70	10	•
E302105	10.5	28	75	12	•
E302110	11	30	75	12	•



2 FLUTE, REGULAR LENGTH

E302 ...series

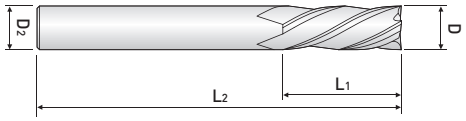
FINE GRAIN

EDP. No.	Dia.	L_1	L_2	D_2	STOCK
E302115	11.5	30	75	12	•
E302120	12	30	75	12	•
E302130	13	35	85	14	•
E302130S16			90	16	•
E302140	14	35	85	14	•
E302140S16			90	16	•
E302150	15	40	90	16	•
E302160	16	40	90	16	•
E302180	18	45	100	18	•
E302200	20	45	100	20	•
E302250	25	50	120	25	•

■ Tolerance

㎛=1/1000㎜

Tolerance \ Dia.	from 1 to 3	over 3 to 6	over 6 to 10	over 10 to 18	over 18 to 30
Cutting Edge(h10)	0 -40	0 -48	0 -58	0 -70	0 -84
Shank(h6)	0 -6	0 -8	0 -9	0 -11	0 -13



4 FLUTE, REGULAR LENGTH

E304 ...series

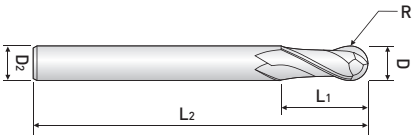
FINE GRAIN HELIX

EDP. No.	Dia.	L_1	L_2	D_2	STOCK
E304020S4	2	6	42	4	•
E304020				6	•
E304025	2.5	8	42	6	•
E304030	3	10	50	6	•
E304035	3.5	10	50	6	•
E304040	4	12	50	6	•
E304045	4.5	14	50	6	•
E304050	5	15	50	6	•
E304055	5.5	15	50	6	•
E304060	6	15	50	6	•
E304065	6.5	18	60	8	•
E304070	7	20	60	8	•
E304075	7.5	20	60	8	•
E304080	8	20	60	8	•
E304085	8.5	23	70	10	•
E304090	9	25	70	10	•
E304095	9.5	25	70	10	•
E304100	10	25	70	10	•
E304105	10.5	28	75	12	•
E304110	11	30	75	12	•
E304115	11.5	30	75	12	•
E304120	12	30	75	12	•
E304130	13	35	85	14	•
E304130S16			90	16	•
E304140	14	35	85	14	•
E304140S16			90	16	•
E304150	15	40	90	16	•
E304160	16	40	90	16	•
E304180	18	45	100	18	•
E304200	20	45	100	20	•
E304250	25	50	120	25	•

■ Tolerance

㎛=1/1000㎜

Tolerance \ Dia.	from 1 to 3	over 3 to 6	over 6 to 10	over 10 to 18	over 18 to 30
Cutting Edge(h10)	0 -40	0 -48	0 -58	0 -70	0 -84
Shank(h6)	0 -6	0 -8	0 -9	0 -11	0 -13



2 FLUTE, BALL NOSE LONG LENGTH

B302 ...series

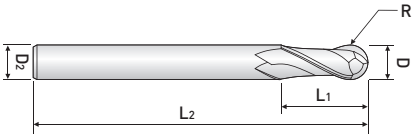
FINE GRAIN HELIX

EDP. No.	Dia.	R	L_1	L_2	D_2	STOCK
B302010	1	0.5	3	50	6	•
B302015	1.5	0.75	4	50	6	•
B302020	2	1	6	60	6	•
B302025	2.5	1.25	6	60	6	•
B302030	3	1.5	8	70	6	•
B302035	3.5	1.75	8	70	6	•
B302040	4	2	8	70	6	•
B302045	4.5	2.25	10	70	6	•
B302050	5	2.5	12	80	6	•
B302055	5.5	2.75	12	80	6	•
B302060	6	3	12	90	6	•
B302065	6.5	3.25	12	90	8	•
B302070	7	3.5	20	90	8	•
B302080	8	4	20	100	8	•
B302090	9	4.5	25	100	10	•
B302100	10	5	25	100	10	•
B302110	11	5.5	30	110	12	•
B302120	12	6	30	110	12	•
B302130	13	6.5	35	120	14	•
B302140	14	7	35	120	14	•
B302150	15	7.5	40	140	16	•
B302160	16	8	40	140	16	•
B302180	18	9	45	150	18	•
B302200	20	10	45	160	20	•
B302250	25	12.5	50	180	25	•

■ Tolerance

㎛=1/1000㎜

Tolerance \ Dia.	from 1 to 3	over 3 to 6	over 6 to 10	over 10 to 18	over 18 to 30
Cutting Edge(h10)	0 -40	0 -48	0 -58	0 -70	0 -84
Shank(h6)	0 -6	0 -8	0 -9	0 -11	0 -13



2 FLUTE, BALL NOSE EXTRA LONG LENGTH

BL422 ...series

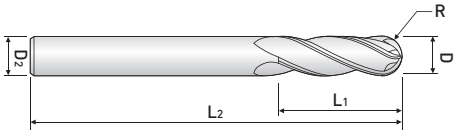
FINE GRAIN HELIX

EDP. No.	Dia.	R	L_1	L_2	D_2	STOCK
BL422030	3	1.5	30	75	3	•
BL422040	4	2	30	75	4	•
BL422050	5	2.5	40	100	5	•
BL422060	6	3	50	150	6	•
BL422080	8	4	50	150	8	•
BL422100	10	5	60	150	10	•
BL422120	12	6	75	150	12	•
BL422140	14	7	75	150	14	•
BL422160	16	8	75	150	16	•
BL422180	18	9	75	150	18	•
BL422200	20	10	75	150	20	•

■ Tolerance

㎛=1/1000㎜

Tolerance \ Dia.	from 1 to 3	over 3 to 6	over 6 to 10	over 10 to 18	over 18 to 30
Cutting Edge(h10)	0 -40	0 -48	0 -58	0 -70	0 -84
Shank(h6)	0 -6	0 -8	0 -9	0 -11	0 -13



4 FLUTE, BALL NOSE LONG LENGTH

B304 ...series

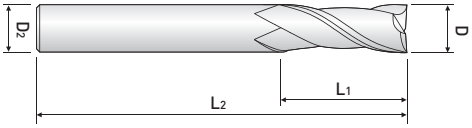
FINE GRAIN HELIX

EDP. No.	Dia.	R	L_1	L_2	D_2	STOCK
B304030	3	1.5	8	70	6	•
B304040	4	2	8	70	6	•
B304050	5	2.5	12	80	6	•
B304060	6	3	12	90	6	•
B304070	7	3.5	20	90	8	•
B304080	8	4	20	100	8	•
B304090	9	4.5	25	100	10	•
B304100	10	5	25	100	10	•
B304110	11	5.5	30	110	12	•
B304120	12	6	30	110	12	•
B304130	13	6.5	35	120	14	•
B304140	14	7	35	120	14	•
B304150	15	7.5	40	140	16	•
B304160	16	8	40	140	16	•
B304180	18	9	45	150	18	•
B304200	20	10	45	160	20	•
B304250	25	12.5	50	180	25	•

■ Tolerance

㎛=1/1000㎜

Tolerance \ Dia.	from 1 to 3	over 3 to 6	over 6 to 10	over 10 to 18	over 18 to 30
Cutting Edge(h10)	0 -40	0 -48	0 -58	0 -70	0 -84
Shank(h6)	0 -6	0 -8	0 -9	0 -11	0 -13



2 FLUTE, LONG LENGTH

E322 ...series

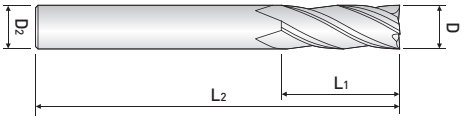
FINE GRAIN HELIX

EDP. No.	Dia.	L_1	L_2	D_2	STOCK
E322030	3	25	75	6	•
E322040	4	25	75	6	•
E322050	5	30	85	6	•
E322060	6	30	85	6	•
E322070	7	35	85	8	•
E322080	8	35	85	8	•
E322090	9	45	100	10	•
E322100	10	45	100	10	•
E322101		60	155		•
E322120	12	55	120	12	•
E322121		65	155		•
E322140	14	60	120	14	•
E322160	16	60	120	16	•
E322161		75	165		•
E322180	18	60	120	18	•
E322200	20	60	120	20	•
E322201		75	165		•

■ Tolerance

㎛=1/1000㎜

Tolerance \ Dia.	from 1 to 3	over 3 to 6	over 6 to 10	over 10 to 18	over 18 to 30
Cutting Edge(h10)	0 -40	0 -48	0 -58	0 -70	0 -84
Shank(h6)	0 -6	0 -8	0 -9	0 -11	0 -13



4 FLUTE, LONG LENGTH

E324 ...series

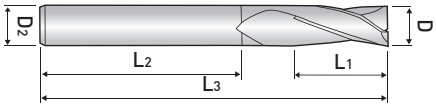
FINE GRAIN HELIX

EDP. No.	D	L_1	L_2	D_2	STOCK
E324030	3	25	75	6	•
E324040	4	25	75	6	•
E324050	5	30	85	6	•
E324060	6	30	85	6	•
E324070	7	35	85	8	•
E324080	8	35	85	8	•
E324090	9	45	100	10	•
E324100	10	45	100	10	•
E324101		60	155		•
E324120	12	55	120	12	•
E324121		65	155		•
E324140	14	60	120	14	•
E324160	16	60	120	16	•
E324161		75	165		•
E324180	18	60	120	18	•
E324200	20	60	120	20	•
E324201		75	165		•

■ Tolerance

㎛=1/1000㎜

Tolerance \ Dia.	from 1 to 3	over 3 to 6	over 6 to 10	over 10 to 18	over 18 to 30
Cutting Edge(h10)	0 -40	0 -48	0 -58	0 -70	0 -84
Shank(h6)	0 -6	0 -8	0 -9	0 -11	0 -13



2 FLUTE, REGULAR LENGTH - BRAZED TYPE

EB302 ...series

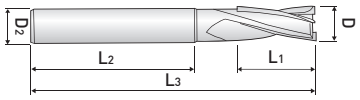
FINE GRAIN HELIX

EDP. No.	D	L_1	L_2	L_3	D_2	STOCK
EB302140	14	28	60	98	16	•
EB302150	15	28	60	98	16	•
EB302160	16	28	60	98	16	•
EB302170	17	32	70	115	20	•
EB302180	18	32	70	115	20	•
EB302190	19	32	70	115	20	•
EB302200	20	32	70	115	20	•
EB302210	21	32	70	115	20	•
EB302220	22	32	70	115	20	•
EB302230	23	40	85	140	25	•
EB302240	24	40	85	140	25	•
EB302250	25	40	85	140	25	•
EB302260	26	40	85	140	25	•
EB302270	27	40	85	140	25	•
EB302280	28	40	85	140	25	•
EB302290	29	50	85	150	32	•
EB302300	30	50	85	150	32	•
EB302310	31	50	85	150	32	•
EB302320	32	50	85	150	32	•
EB302350	35	50	85	150	32	•
EB302360	36	50	85	150	32	•
EB302380	38	55	85	155	32	•
EB302400	40	55	85	155	32	•
EB302420	42	55	85	155	32	•
EB302450	45	63	85	160	32	•
EB302500	50	63	85	160	32	•

■ Tolerance

Mill Dia. (mm)	Shank Dia.
0 ~ -0.05	h7

※Items can be changed for quality improvement without notice.



4 FLUTE, REGULAR LENGTH - BRAZED TYPE

EB304 ...series

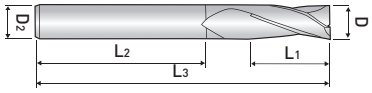
MG FINE GRAIN · 4 · 30° HELIX

EDP. No.	D	L_1	L_2	L_3	D_2	STOCK
EB304140	14	28	60	98	16	•
EB304150	15	28	60	98	16	•
EB304160	16	28	60	98	16	•
EB304170	17	32	70	115	20	•
EB304180	18	32	70	115	20	•
EB304190	19	32	70	115	20	•
EB304200	20	32	70	115	20	•
EB304210	21	32	70	115	20	•
EB304220	22	32	70	115	20	•
EB304230	23	40	85	140	25	•
EB304240	24	40	85	140	25	•
EB304250	25	40	85	140	25	•
EB304260	26	40	85	140	25	•
EB304270	27	40	85	140	25	•
EB304280	28	40	85	140	25	•
EB304290	29	50	85	150	32	•
EB304300	30	50	85	150	32	•
EB304310	31	50	85	150	32	•
EB304320	32	50	85	150	32	•
EB304350	35	50	85	150	32	•
EB304360	36	50	85	150	32	•
EB304380	38	55	85	155	32	•
EB304400	40	55	85	155	32	•
EB304420	42	55	85	155	32	•
EB304450	45	63	85	160	32	•
EB304500	50	63	85	160	32	•

■ Tolerance

Mill Dia. (mm)	Shank Dia.
0 ~ -0.05	h7

※Items can be changed for quality improvement without notice.



2 FLUTE, LONG LENGTH - BRAZED TYPE

EB322 ...series

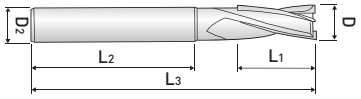
FINE GRAIN HELIX

EDP. No.	D	L_1	L_2	L_3	D_2	STOCK
EB322140	14	50	60	130	16	•
EB322150	15	50	60	130	16	•
EB322160	16	50	60	130	16	•
EB322180	18	60	60	140	20	•
EB322200	20	60	60	140	20	•
EB322220	22	60	60	140	20	•
EB322240	24	70	60	150	25	•
EB322250	25	70	60	150	25	•
EB322260	26	70	60	150	25	•
EB322280	28	70	60	150	25	•
EB322300	30	80	70	180	32	•
EB322320	32	90	70	190	32	•
EB322350	35	100	70	200	32	•
EB322380	38	100	70	220	32	•
EB322400	40	100	70	220	32	•
EB322450	45	120	80	230	32	•

■ Tolerance

Mill Dia. (mm)	Shank Dia.
0 ~ -0.05	h7

※Items can be changed for quality improvement without notice.



4 FLUTE, LONG LENGTH - BRAZED TYPE

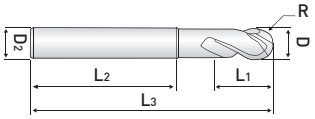
EB324 ...series

EDP. No.	D	L_1	L_2	L_3	D_2	STOCK
EB324140	14	50	60	130	16	•
EB324150	15	50	60	130	16	•
EB324160	16	50	60	130	16	•
EB324180	18	60	60	140	20	•
EB324200	20	60	60	140	20	•
EB324220	22	60	60	140	20	•
EB324240	24	70	60	150	25	•
EB324250	25	70	60	150	25	•
EB324260	26	70	60	150	25	•
EB324280	28	70	60	150	25	•
EB324300	30	80	70	180	32	•
EB324320	32	90	70	190	32	•
EB324350	35	100	70	200	32	•
EB324380	38	100	70	220	32	•
EB324400	40	100	70	220	32	•
EB324450	45	120	80	230	32	•
EB324500	50	140	80	240	32	•

■ Tolerance

Mill Dia. (mm)	Shank Dia.
0 ~ -0.05	h7

※Items can be changed for quality improvement without notice.



2 FLUTE, BALL NOSE REGULAR LENGTH - BRAZED TYPE

BB302 ...series

FINE GRAIN HELIX

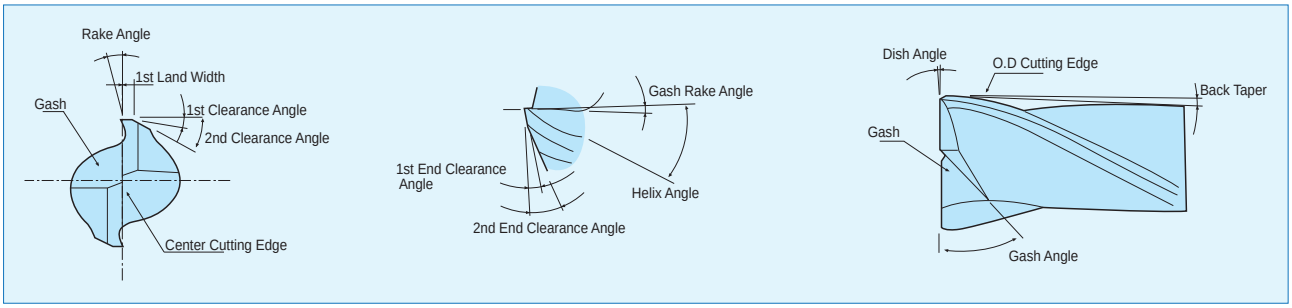
EDP. No.	D	R	L_1	L_2	L_3	D_2	STOCK
BB302150	15	7.5	28	55	100	16	•
BB302160	16	8	28	55	100	16	•
BB302180	18	9	29	55	110	20	•
BB302200	20	10	29	55	110	20	•
BB302220	22	11	36	60	110	25	•
BB302240	24	12	37	60	110	25	•
BB302250	25	12.5	38	60	120	25	•
BB302280	28	14	40	65	120	32	•
BB302300	30	15	46	65	130	32	•
BB302320	32	16	47	65	140	32	•

■ Tolerance

Mill Dia. (mm)	Shank Dia.
0 ~ -0.05	h7

※Items can be changed for quality improvement without notice.

Nomenclature of End Mill



Application range of Grade

WORKPIECE	GRADE
Carbon Steel, Alloy Steel, Tool Steel, Metal Mold Steel	* Micro Grain Carbide * P30
Cast Iron, Ductile	* Micro Grain Carbide * K10~K20
Heat Treatment Steel(HRc 40-60)	* Ultrafinest Carbide
Aluminium, Nonferrous Meterial	* Micro Grain Carbide * K10

Formula of End Milling

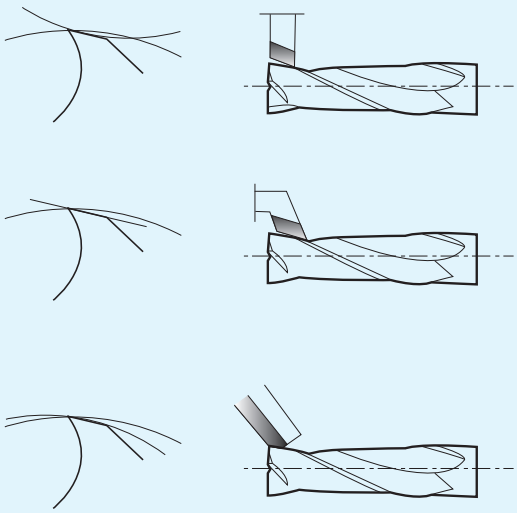
1) Cutting Speed $V = \frac{\pi \times D \times N}{1000}$ (m/min)	V : Cutting Speed (m/min) D : Diameter of End Mill (mm) N : End Mill revolution (RPM)
2) Feed per tooth $fz = \frac{F}{Z \times N}$ (mm/tooth)	fz : Feed per tooth (mm/tooth) Z : No. of teeth N : End Mill revolution (RPM)
3) Table Feed rate $F = fz \times Z \times N$	F : Feed rate (mm/min) fz : Feed per tooth (mm/tooth) Z : No. of teeth N : End Mill revolution (RPM)
4) Cutting Time $Tc = \frac{L}{F}$	Tc: Cutting Time (min) F : Table feed rate (mm/ min) L : Length of cut (workpiece Length+Diameter of Endmill+α)

For Regrinding

1. Regrinding range

APPLICATION RANGE	CUTTER Dia.	AMOUNT OF FLANK WEAR
Finish Machining	~ ø10 ø 11 ~ ø30 ø 31 ~ ø50	0.05 ~ 0.1 0.1 ~ 0.25 0.2 ~ 0.35
Rough Machining	~ ø10 ø 11 ~ ø30 ø 31 ~ ø50	0.08 ~ 0.15 0.15 ~ 0.35 0.3 ~ 0.45

2. Regrinding Method of Relief

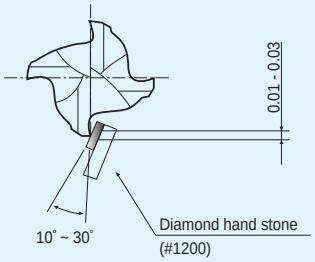


(1) Concave method
- In case when precise outer diameter dimension is required.
- In case of aluminium machining.

(2) Flat method
- Excellent machinability
  - Applicable to ball end mill and taper end mill.
- Secondary clearance angle work is required.
  - When Diameter is large.

(3) Eccentric method
- Excellent toughness and surface roughness.
- Secondary clearance angle work is not required.

3. Honing



1) Recommend honing for machining mold metal and high hardness workpiece.
   -The amount of honing shall be less than that of feed per blade.

2) When using end mill without honing, machine for 10 to 30 seconds at feed rate of less than 0.01 mm/blade and then machine at normal feed rate.

3) Honing is not required for machining aluminium and non-ferrous metal.

Trouble Shooting for Endmilling

Problems	Cause	Cutting Speed	Feed Rate	Depth of Cut	Coolant	Up & Down Cut	Relief Angle	Lead Angle	Cutting Length	Numbers of Teeth	Honing	Chip Pocket	Toughness	Hardness	Mechanical Rigidity	Mechanical Chattering	Workpiece Setting	Overhang
Cutting edge breakage	Excessive wear on periphery	• Improper cutting conditions	▼	▲		◉								▲				
	Chipping	• Improper cutting conditions • Generation of built-up edge • Improper tool grade		▼			▼	▼			◉		▲			▼	▲	▼
	Breakage while cutting	• Improper cutting conditions • Excessive cutting load • Excessive overhang		▼	▼				▼			▲			▲		▲	▼
Poor surface finish		• Generation of built-up edge	▲	▲		◉		▲			◉							
		• generation of chattering	▼			○	▼		▼						▲	◉	▲	▼
		• Surface Squarence		▼	▼		▲		▲	▼								▼
Oversize or undersize		• Improper cutting conditions • Improper choice of endmill type	▲	▼			▼			▼	▲				▲	▼		▼
Poor chip control		• Excessive cutting rate • Improper chip Pocket • Improper cutting conditions		▼	▼					▼		▲						

▲ : Increase ▼ : Decrease ○ : Application ◉ : Proper application

ZSTNB series

Work					Carbon Steels, Alloy Steels (180~250HB)		Pre-harden Steels (35~45HRC)		Hardened Steels (45~55HRC)		Hardened Steels (55~65HRC)	
Ratio to standard depth of cut					Depth of Cut X 100%		Depth of Cut X 80%		Depth of Cut X 65%		Depth of Cut X 60%	
R (mm)	Mill Dia (mm)	Neck Length (mm)	Neck Angle (°)	Depth of Cut (mm)	n (min^{-1})	Vf (mm/min)	n (min^{-1})	Vf (mm/min)	n (min^{-1})	Vf (mm/min)	n (min^{-1})	Vf (mm/min)
0.1	0.2	1	0.4	0.017	40,000	800	28,000	504	26,000	416	26,000	364
		1.5	0.4	0.009	40,000	800	28,000	504	26,000	416	26,000	364
		2	0.9	0.007	32,000	461	22,400	323	20,800	266	20,800	233
		2.5	0.9	0.004	26,000	333	18,200	204	16,900	189	16,900	162
0.15	0.3	2	0.4	0.025	40,000	1,200	28,000	756	26,000	624	26,000	546
		3	0.9	0.013	32,000	691	22,400	484	20,800	399	20,800	349
		4	0.9	0.010	26,000	499	18,200	306	16,900	284	16,900	243
0.2	0.4	2	0.4	0.035	40,000	1,600	28,000	1,008	26,000	832	26,000	728
		3	0.4	0.020	40,000	1,600	28,000	1,008	26,000	832	26,000	728
		4	0.4	0.007	32,000	922	22,400	645	20,800	532	20,800	466
		4	0.9	0.009	32,000	922	22,400	645	20,800	532	20,800	466
		5	0.4	0.006	26,000	666	18,200	408	16,900	379	16,900	324
		5	0.9	0.007	26,000	666	18,200	408	16,900	379	16,900	324
0.25	0.5	4	0.4	0.040	40,000	2,000	28,000	1,260	26,000	1,040	26,000	910
		8	0.9	0.010	26,000	728	18,200	446	16,900	414	16,900	355
		12	0.9	0.005	22,400	627	15,680	384	14,560	357	14,560	306
0.27	0.54	2	0.4	0.050	40,000	2,160	28,000	1,361	26,000	1,123	26,000	983
		4	0.4	0.037	40,000	2,160	28,000	1,361	26,000	1,123	26,000	983
		5	0.4	0.031	40,000	1,512	28,000	1,176	26,000	1,040	26,000	832
		6	0.4	0.025	26,000	1,244	18,200	871	16,900	676	16,900	629
		6.5	0.4	0.020	26,000	1,011	18,200	619	16,900	575	16,900	493
		7	0.4	0.015	26,000	899	18,200	585	16,900	543	16,900	465
0.3	0.6	2	0.4	0.055	40,000	2,400	28,000	1,512	26,000	1,248	26,000	1,092
		4	0.4	0.035	40,000	2,400	28,000	1,512	26,000	1,248	26,000	1,092
		6	0.4	0.018	32,000	1,382	22,400	968	20,800	799	20,800	699
		6	0.9	0.020	32,000	1,382	22,400	968	20,800	799	20,800	699
		8	0.9	0.020	26,000	998	18,200	612	16,900	568	16,900	487
		10	0.4	0.013	26,000	874	18,200	535	16,900	497	16,900	426
		10	0.9	0.015	26,000	874	18,200	535	16,900	497	16,900	426
		12	0.9	0.010	26,000	874	18,200	535	16,900	497	16,900	426
		15	0.4	0.005	22,400	753	15,680	461	14,560	367	14,560	367
		15	0.9	0.006	22,400	753	15,680	461	14,560	367	14,560	367

ZSTNB series

Work					Carbon Steels, Alloy Steels (180~250HB)		Pre-harden Steels (35~45HRC)		Hardened Steels (45~55HRC)		Hardened Steels (55~65HRC)	
Ratio to standard depth of cut					Depth of Cut X 100%		Depth of Cut X 80%		Depth of Cut X 65%		Depth of Cut X 60%	
R (mm)	Mill Dia (mm)	Neck Length (mm)	Neck Angle (°)	Depth of Cut (mm)	n (min^{-1})	Vf (mm/min)	n (min^{-1})	Vf (mm/min)	n (min^{-1})	Vf (mm/min)	n (min^{-1})	Vf (mm/min)
0.4	0.8	4	0.4	0.062	32,000	2,560	22,400	1,613	20,800	1,331	20,800	1,165
		6	0.4	0.045	32,000	2,560	22,400	1,613	20,800	1,331	20,800	1,165
		8	0.9	0.026	25,600	1,475	17,920	1,032	16,640	852	16,640	745
		12	0.9	0.020	20,800	1,065	14,560	699	13,520	606	13,520	519
		16	0.9	0.018	20,800	932	14,560	612	13,520	530	13,520	454
0.45	0.9	4	0.4	0.063	28,300	2,547	19,810	1,605	18,395	1,324	18,395	1,159
		8	0.4	0.050	28,300	2,547	19,810	1,605	18,395	1,324	18,395	1,159
		12	0.4	0.037	18,400	1,325	12,880	811	11,960	753	11,960	646
		16	0.4	0.024	18,400	1,325	12,880	811	11,960	753	11,960	646
		18	0.4	0.018	18,400	1,325	12,880	811	11,960	753	11,960	646
		20	0.4	0.015	15,850	1,141	11,095	699	10,303	649	10,303	556
		22	0.4	0.012	15,850	1,141	11,095	699	10,303	649	10,303	556
		24	0.4	0.009	14,150	1,019	9,905	624	9,198	579	9,198	497
0.5	1	6	0.4	0.055	25,600	2,560	17,920	1,613	16,640	1,331	16,640	1,165
		8	0.4	0.055	25,600	2,560	17,920	1,613	16,640	1,331	16,640	1,165
		10	0.4	0.032	20,800	1,872	14,560	1,310	13,520	1,082	13,520	946
		10	0.9	0.035	20,800	1,872	14,560	1,310	13,520	1,082	13,520	946
		15	0.9	0.028	16,640	1,331	11,648	874	10,816	757	10,816	649
		20	0.4	0.018	16,640	1,331	11,648	874	10,816	757	10,816	649
		20	0.9	0.020	16,640	1,331	11,648	874	10,816	757	10,816	649
		25	0.9	0.017	14,560	1,165	10,192	764	9,464	662	9,464	568
		30	0.4	0.015	12,480	874	8,736	568	8,112	487	8,112	406
		30	0.9	0.017	12,480	874	8,736	568	8,112	487	8,112	406
		35	0.9	0.010	10,400	728	7,280	473	6,760	406	6,760	338
		40	0.9	0.009	10,000	700	7,000	455	6,500	390	6,500	325
		50	0.9	0.007	9,500	665	6,650	432	6,175	371	6,175	309
		60	0.9	0.005	9,000	630	6,300	410	5,850	351	5,850	293
		70	0.9	0.003	8,500	595	5,950	387	5,525	332	5,525	276
0.75	1.5	8	0.4	0.070	16,960	2,544	11,872	1,603	11,024	1,323	11,024	1,158
		10	0.4	0.070	16,960	2,544	11,872	1,603	11,024	1,323	11,024	1,158
		12	0.4	0.070	16,960	2,544	11,872	1,603	11,024	1,323	11,024	1,158
		15	0.9	0.045	13,568	1,832	9,498	1,282	8,819	1,058	8,819	926
		20	0.9	0.040	11,024	1,323	7,717	810	7,166	752	7,166	645
		30	0.9	0.028	11,024	1,323	7,717	810	7,166	752	7,166	645

ZSTNB series

Work					Carbon Steels, Alloy Steels (180~250HB)		Pre-harden Steels (35~45HRC)		Hardened Steels (45~55HRC)		Hardened Steels (55~65HRC)	
Ratio to standard depth of cut					Depth of Cut X 100%		Depth of Cut X 80%		Depth of Cut X 65%		Depth of Cut X 60%	
R (mm)	Mill Dia (mm)	Neck Length (mm)	Neck Angle (°)	Depth of Cut (mm)	n (min^{-1})	Vf (mm/min)	n (min^{-1})	Vf (mm/min)	n (min^{-1})	Vf (mm/min)	n (min^{-1})	Vf (mm/min)
0.9	1.8	4	0.4	0.120	14,200	2,556	9,940	1,610	9,230	1,329	9,230	1,163
		8	0.4	0.100	14,200	2,556	9,940	1,610	9,230	1,329	9,230	1,163
		12	0.4	0.080	14,200	2,556	9,940	1,610	9,230	1,329	9,230	1,163
		16	0.4	0.071	14,200	2,556	9,940	1,610	9,230	1,329	9,230	1,163
		20	0.4	0.062	9,230	1,329	6,461	814	6,000	756	6,000	648
		24	0.4	0.053	9,230	1,329	6,461	814	6,000	756	6,000	648
		28	0.4	0.044	9,230	1,329	6,461	814	6,000	756	6,000	648
		32	0.4	0.036	9,230	1,329	6,461	814	6,000	756	6,000	648
		36	0.4	0.028	9,230	1,329	6,461	814	6,000	756	6,000	648
		38	0.4	0.020	8,000	1,152	5,600	706	5,200	655	5,200	562
		40	0.4	0.015	8,000	1,152	5,600	706	5,200	655	5,200	562
1	2	8	0.4	0.150	15,200	3,040	10,640	1,915	9,880	1,581	9,880	1,383
		12	0.4	0.090	15,200	3,040	10,640	1,915	9,880	1,581	9,880	1,383
		16	0.4	0.090	15,200	3,040	10,640	1,915	9,880	1,581	9,880	1,383
		20	0.4	0.060	12,160	2,189	8,512	1,532	7,904	1,265	7,904	1,107
		20	0.9	0.070	12,160	2,189	8,512	1,532	7,904	1,265	7,904	1,107
		25	0.9	0.070	9,880	1,581	6,916	968	6,442	899	6,422	771
		30	0.4	0.040	9,880	1,581	6,916	968	6,442	899	6,422	771
		30	0.9	0.045	9,880	1,581	6,916	968	6,442	899	6,422	771
		35	0.9	0.045	9,880	1,581	6,916	968	6,442	899	6,422	771
		40	0.4	0.030	9,880	1,581	6,916	968	6,442	899	6,422	771
		40	0.9	0.035	9,880	1,581	6,916	968	6,442	899	6,422	771
		50	0.9	0.170	8,512	1,192	5,958	775	5,533	664	5,533	553
		60	0.9	0.009	7,235	1,013	5,065	658	4,703	564	4,703	470
		70	0.9	0.005	6,150	861	4,305	560	3,997	480	3,997	400
1.5	3	8	0.4	0.320	12,720	3,816	8,904	2,404	8,268	1,984	8,268	1,736
		16	0.4	0.220	12,720	3,816	8,904	2,404	8,268	1,984	8,268	1,736
		20	0.4	0.150	12,720	3,434	8,904	2,137	8,268	1,736	8,268	1,488
		30	0.4	0.080	10,176	2,748	7,123	1,496	6,614	1,389	6,614	1,191
		30	0.9	0.090	10,176	2,748	7,123	1,496	6,614	1,389	6,614	1,191
		40	0.4	0.060	8,268	1,984	5,788	1,215	5,374	1,129	5,374	967
		40	0.9	0.070	8,268	1,984	5,788	1,215	5,374	1,129	5,374	967
		50	0.9	0.050	8,268	1,984	5,788	1,215	5,374	1,129	5,374	967
		60	0.9	0.030	7,123	1,710	4,986	1,047	4,630	972	4,630	833
		70	0.9	0.020	6,233	1,496	4,363	916	4,051	851	4,051	729

ZSTNB series

Work					Carbon Steels, Alloy Steels (180~250HB)		Pre-harden Steels (35~45HRC)		Hardened Steels (45~55HRC)		Hardened Steels (55~65HRC)	
Ratio to standard depth of cut					Depth of Cut X 100%		Depth of Cut X 80%		Depth of Cut X 65%		Depth of Cut X 60%	
R (mm)	Mill Dia (mm)	Neck Length (mm)	Neck Angle (°)	Depth of Cut (mm)	n (min^{-1})	Vf (mm/min)	n (min^{-1})	Vf (mm/min)	n (min^{-1})	Vf (mm/min)	n (min^{-1})	Vf (mm/min)
2	4	20	1	0.32	11,900	2,860	9,000	2,050	7,800	1,680	7,800	1,590
		30	1	0.23	11,900	2,570	9,000	1,850	7,800	1,520	7,800	1,430
		40	1	0.14	9,500	1,940	7,200	1,400	6,200	1,140	6,200	1,080
		50	1	0.11	7,800	1,590	5,800	1,120	5,000	920	5,000	870
		60	1	0.07	7,800	1,590	5,800	1,120	5,000	920	5,000	870
2.5	5	30	1	0.34	9,500	2,140	7,200	1,540	6,200	1,260	6,200	1,190
		40	1	0.25	9,500	2,140	7,200	1,540	6,200	1,260	6,200	1,190
		60	1	0.15	6,200	1,320	4,700	950	4,000	770	4,000	720
3	6	30	1	0.45	8,000	2,000	6,000	1,430	5,200	1,170	5,200	1,110
		40	1	0.40	8,000	1,800	6,000	1,280	5,200	1,050	5,200	990
		50	1	0.32	8,000	1,800	6,000	1,280	5,200	1,050	5,200	990
		60	1	0.22	6,400	1,360	4,800	970	4,100	780	4,100	740
		70	1	0.18	5,200	1,110	3,900	790	3,400	650	3,400	610
		80	1	0.14	5,200	1,110	3,900	790	3,400	650	3,400	610
4	8	50	1	0.50	6,000	1,460	4,500	1,040	3,900	850	3,900	810
		60	1	0.43	6,000	1,460	4,500	1,040	3,900	850	3,900	810
		70	1	0.33	6,000	1,460	4,500	1,040	3,900	850	3,900	810
		80	1	0.25	4,800	1,100	3,600	780	3,100	640	3,100	600
5	10	60	1	0.70	4,800	1,300	3,600	920	3,100	750	3,100	710
		75	1	0.50	4,800	1,300	3,600	920	3,100	750	3,100	710

- Please adjust the cutting depth index according to the cutting depth factors of above table.
- For Rib or Slotting machining process which are not easy for chip ejection, please reduce the cutting depth by 20~30% from the above cutting condition.
  ex) ZSTNB2040-20-10, HRC 55, Rib processing
  Cutting depth : 0.32(standard cutting depth) X 0.65 X 0.8 = 0.17mm
- In actual machining, the condition should be adjusted according to the machining shape, purpose and the machine type.
- If RPM of the machine is low, the feed rate should be low in the same ratio as RPM.

ZSTNR series

Work				Carbon Steels, Alloy Steels (180~250HB)		Pre-harden Steels (35~45HRC)		Hardened Steels (45~55HRC)		Hardened Steels (55~65HRC)	
Ratio to standard depth of cut				Depth of Cut X 100%		Depth of Cut X 80%		Depth of Cut X 65%		Depth of Cut X 60%	
Mill Dia (mm)	R (mm)	Neck Length (mm)	Depth of Cut (mm)	n (min^{-1})	Vf (mm/min)	n (min^{-1})	Vf (mm/min)	n (min^{-1})	Vf (mm/min)	n (min^{-1})	Vf (mm/min)
0.2	0.05	2	0.007	39,660	887	33,660	754	29,700	591	27,720	483
0.4	0.05	4	0.009	30,096	899	25,582	764	22,572	599	21,067	489
		5	0.007	26,752	710	22,739	528	20,064	466	18,726	373
	0.1	4	0.009	31,680	946	26,928	804	23,760	631	22,176	515
		5	0.007	28,160	747	23,936	556	21,120	490	19,712	392
0.5	0.1	5	0.013	30,413	1,090	25,851	753	22,810	562	21,289	453
		8	0.008	24,330	678	20,681	468	18,248	350	17,031	282
		10	0.007	18,248	509	15,511	351	13,686	262	12,773	211
0.6	0.1	12	0.010	20,377	791	17,320	546	15,282	408	14,264	329
		15	0.006	16,727	649	14,218	448	12,545	335	11,709	270
0.8	0.2	6	0.045	31,680	1,084	26,928	921	23,760	723	22,176	590
		12	0.020	28,160	943	23,936	695	21,120	613	19,712	490
1	0.2	8	0.040	28,512	1,463	24,235	1,244	21,384	976	19,958	797
		10	0.035	28,512	1,596	24,235	1,357	21,384	1,064	19,958	869
		15	0.028	25,344	1,261	21,542	938	19,008	828	17,741	662
		20	0.020	19,008	828	16,157	653	14,256	532	13,306	414
		25	0.017	15,840	690	13,464	544	11,880	443	11,088	345
		30	0.017	15,840	690	13,464	544	11,880	443	11,088	345
		35	0.010	15,840	690	13,464	544	11,880	443	11,088	345
	0.3	8	0.040	28,512	1,463	24,235	1,244	21,384	976	19,958	797
		15	0.028	25,344	1,261	21,542	938	19,008	828	17,741	662
		25	0.017	15,840	690	13,464	544	11,880	443	11,088	345
		30	0.017	15,840	690	13,464	544	11,880	443	11,088	345
1.5	0.2	10	0.050	21,683	1,079	18,431	803	16,262	708	15,178	567
		15	0.045	19,712	981	16,755	730	14,784	644	13,798	515
		20	0.042	17,347	863	14,745	642	13,010	567	12,143	453
		25	0.032	14,784	644	12,566	508	11,088	414	10,349	322
		30	0.028	12,320	536	10,472	423	9,240	345	8,624	268
	0.3	10	0.050	21,683	1,079	18,431	803	16,262	708	15,178	567
		20	0.042	17,347	863	14,745	642	13,010	567	12,143	453
		25	0.032	14,784	644	12,566	508	11,088	414	10,349	322
		30	0.028	12,320	536	10,472	423	9,240	345	8,624	268

ZSTNR series

Work				Carbon Steels, Alloy Steels (180~250HB)		Pre-harden Steels (35~45HRC)		Hardened Steels (45~55HRC)		Hardened Steels (55~65HRC)	
Ratio to standard depth of cut				Depth of Cut X 100%		Depth of Cut X 80%		Depth of Cut X 65%		Depth of Cut X 60%	
Mill Dia (mm)	R (mm)	Neck Length (mm)	Depth of Cut (mm)	n (min^{-1})	Vf (mm/min)	n (min^{-1})	Vf (mm/min)	n (min^{-1})	Vf (mm/min)	n (min^{-1})	Vf (mm/min)
2	0.2	30	0.045	13,440	1,254	11,424	933	10,080	823	9,408	658
		40	0.035	10,080	823	8,568	650	7,560	529	7,056	412
		50	0.017	8,400	686	7,140	541	6,300	441	5,880	343
	0.3	12	0.088	22,680	1,814	19,278	1,427	17,010	1,191	15,876	1,048
		20	0.054	18,144	1,452	15,422	1,141	13,608	953	12,701	838
		30	0.045	13,440	1,393	11,424	1,036	10,080	914	9,408	732
		40	0.035	10,080	914	8,568	722	7,560	588	7,056	457
		50	0.017	8,400	762	7,140	601	6,300	490	5,880	381
	0.5	8	0.170	22,680	1,814	19,278	1,427	17,010	1,191	15,876	1,048
		12	0.088	22,680	1,814	19,278	1,427	17,010	1,191	15,876	1,048
		16	0.088	19,278	1,542	16,386	1,213	14,459	1,012	13,495	891
		20	0.054	18,114	1,452	15,422	1,141	13,608	953	12,701	838
		25	0.054	15,876	1,270	13,495	999	11,907	833	11,113	733
		30	0.045	13,440	1,393	11,424	1,036	10,080	914	9,408	732
		40	0.035	10,080	914	8,568	722	7,560	588	7,056	457
		50	0.017	8,400	762	7,140	601	6,300	490	5,880	381
3	0.2	40	0.070	10,240	956	8,704	711	7,680	627	7,168	502
		50	0.050	7,680	627	6,528	495	5,760	403	5,376	314
		60	0.030	6,400	523	5,440	412	4,800	336	4,480	261
	0.3	40	0.070	10,240	1,062	8,704	790	7,680	697	7,168	557
		50	0.050	7,680	697	6,528	550	5,760	448	5,376	348
		60	0.030	6,400	581	5,440	458	4,800	373	4,480	290
	0.5	40	0.070	10,240	1,062	8,704	790	7,680	697	7,168	557
		50	0.050	7,680	697	6,528	550	5,760	448	5,376	348
		60	0.030	6,400	581	5,440	458	4,800	373	4,480	290

- Please adjust the cutting depth index according to the cutting depth factors of above table.
- In actual machining, the condition should be adjusted according to the machining shape, purpose and machine type.
- If RPM of the machine is low, the feed rate should be low in the same ratio as RPM.

ZSLNR series

Work				Carbon Steels, Alloy Steels (180~250HB)		Pre-harden Steels (35~45HRC)		Hardened Steels (45~55HRC)		Hardened Steels (55~65HRC)	
Ratio to standard depth of cut				Depth of Cut X 100%		Depth of Cut X 80%		Depth of Cut X 65%		Depth of Cut X 60%	
Mill Dia (mm)	R (mm)	Neck Length (mm)	Depth of Cut (mm)	n (min^{-1})	Vf (mm/min)	n (min^{-1})	Vf (mm/min)	n (min^{-1})	Vf (mm/min)	n (min^{-1})	Vf (mm/min)
0.2	0.05	0.5	0.020	50,000	258	50,000	205	50,000	180	50,000	160
		1	0.014	50,000	258	50,000	205	50,000	180	50,000	160
		1.5	0.008	50,000	240	45,900	202	45,900	170	45,900	153
		2	0.008	42,000	202	36,700	176	36,700	162	36,700	147
0.3	0.05	1	0.021	50,000	585	50,000	456	50,000	336	50,000	320
		1.5	0.016	50,000	585	45,000	456	45,000	336	45,000	320
		2	0.012	45,000	530	45,000	420	45,000	300	45,000	290
		2.5	0.010	40,000	471	40,000	373	40,000	267	40,000	258
		3	0.008	35,000	412	35,000	326	30,000	200	30,000	194
0.4	0.05	1	0.025	50,000	580	50,000	461	40,000	320	36,000	270
		1.5	0.020	50,000	580	50,000	461	40,000	320	36,000	270
		2	0.016	45,000	520	45,000	410	36,000	290	34,000	240
		2.5	0.015	40,500	480	40,500	370	33,400	270	30,600	220
		3	0.014	40,000	410	40,000	330	32,800	240	25,600	200
		3.5	0.012	36,000	380	36,000	300	29,400	200	22,920	180
		4	0.008	30,000	320	30,000	250	21,600	160	19,200	150
	0.1	2	0.028	45,000	520	45,000	410	36,000	290	34,000	240
		3	0.016	40,000	410	40,000	330	32,800	240	25,600	200
		4	0.010	30,000	320	30,000	250	21,600	160	19,200	150
0.5	0.05	1	0.030	50,000	898	40,000	464	30,000	378	28,000	315
		2	0.023	50,000	898	40,000	464	30,000	378	28,000	315
		3	0.017	45,000	810	36,000	414	27,000	315	24,500	261
		4	0.017	40,000	820	32,000	378	24,000	279	20,000	234
		5	0.011	28,800	540	19,400	280	18,000	250	15,000	200
		6	0.008	28,800	480	19,400	260	18,000	250	15,000	200
	0.1	1	0.035	50,000	898	40,000	464	30,000	378	28,000	315
		2	0.030	50,000	898	40,000	464	30,000	378	28,000	315
		3	0.020	45,000	810	36,000	414	27,000	315	24,500	261
		4	0.020	40,000	720	32,000	378	24,000	279	20,000	234
		5	0.013	28,800	540	19,400	280	18,000	250	15,000	200
		6	0.013	28,800	480	19,400	260	18,000	250	15,000	200
0.6	0.1	2	0.035	50,000	1,159	37,830	600	28,200	390	23,000	320
		4	0.024	40,000	830	27,800	440	23,600	280	21,000	230
		6	0.015	24,000	490	18,000	300	17,800	240	15,000	210
		8	0.013	24,000	466	18,000	285	17,800	228	15,000	200
		10	0.009	24,000	451	18,000	276	17,800	221	15,000	193

ZSTNR series

Work				Carbon Steels, Alloy Steels (180~250HB)		Pre-harden Steels (35~45HRC)		Hardened Steels (45~55HRC)		Hardened Steels (55~65HRC)	
Ratio to standard depth of cut				Depth of Cut X 100%		Depth of Cut X 80%		Depth of Cut X 65%		Depth of Cut X 60%	
Mill Dia (mm)	R (mm)	Neck Length (mm)	Depth of Cut (mm)	n (min^{-1})	Vf (mm/min)	n (min^{-1})	Vf (mm/min)	n (min^{-1})	Vf (mm/min)	n (min^{-1})	Vf (mm/min)
0.8	0.1	4	0.032	48,000	1,102	28,000	518	20,000	320	20,000	288
		6	0.019	38,700	800	25,000	461	18,000	288	18,000	256
		8	0.015	29,025	600	20,000	369	16,200	259	16,200	230
		12	0.012	29,025	570	20,000	350	16,200	246	16,200	219
	0.2	4	0.056	48,000	1,102	28,000	518	20,000	320	20,000	288
		6	0.032	38,700	800	25,000	461	18,000	288	18,000	256
1	0.1	4	0.038	32,400	1,359	27,540	1,039	24,300	815	22,680	666
		6	0.024	26,244	990	22,307	842	19,683	660	18,371	539
		8	0.024	23,328	880	19,829	748	17,496	587	16,330	479
		10	0.015	20,412	770	17,350	655	15,309	514	14,288	419
		12	0.015	18,144	609	15,422	453	13,608	399	12,701	320
		16	0.009	18,144	533	15,422	420	13,608	342	12,701	266
		20	0.006	13,608	399	11,567	315	10,206	257	9,526	200
	0.2	4	0.070	32,400	1,359	27,540	1,039	24,300	815	22,680	666
		6	0.040	26,244	990	22,307	842	19,683	660	18,371	539
		8	0.040	23,328	880	19,829	748	17,496	587	16,330	479
		10	0.025	20,412	770	17,350	655	15,309	514	14,288	419
		12	0.025	18,144	609	15,422	453	13,608	399	12,701	320
		16	0.015	18,144	533	15,422	420	13,608	342	12,701	266
		20	0.010	13,608	399	11,567	315	10,206	257	9,526	200
	0.3	6	0.040	26,244	990	22,307	842	19,683	660	18,371	539
		10	0.025	20,412	770	17,350	655	15,309	514	14,288	419
		16	0.015	18,144	533	15,422	420	13,608	342	12,701	266
		20	0.010	13,608	399	11,567	315	10,206	257	9,526	200
1.5	0.1	4	0.042	24,930	1,130	20,956	868	18,711	678	17,364	556
		8	0.036	22,680	1,027	19,278	873	17,010	685	15,876	559
		12	0.036	18,144	822	15,422	698	13,608	548	12,701	447
		15	0.023	14,112	568	11,995	423	10,584	373	9,878	298
		20	0.018	14,112	568	11,995	423	10,584	373	9,878	298
	0.2	4	0.070	24,930	1,130	20,956	868	18,711	678	17,364	556
		8	0.060	22,680	1,027	19,278	873	17,010	685	15,876	559
		12	0.060	18,144	822	15,422	698	13,608	548	12,701	447
		15	0.038	14,112	568	11,995	423	10,584	373	9,878	298
		20	0.030	14,112	568	11,995	423	10,584	373	9,878	298
	0.3	8	0.060	22,680	1,027	19,278	873	17,010	685	15,876	559
		15	0.038	14,112	568	11,995	423	10,584	373	9,878	298
		20	0.030	14,112	568	11,995	423	10,584	373	9,878	298

ZSTNR series

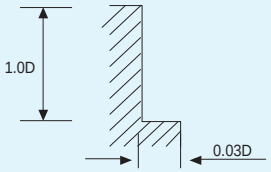
Work				Carbon Steels, Alloy Steels (180~250HB)		Pre-harden Steels (35~45HRC)		Hardened Steels (45~55HRC)		Hardened Steels (55~65HRC)	
Ratio to standard depth of cut				Depth of Cut X 100%		Depth of Cut X 80%		Depth of Cut X 65%		Depth of Cut X 60%	
Mill Dia (mm)	R (mm)	Neck Length (mm)	Depth of Cut (mm)	n (min^{-1})	Vf (mm/min)	n (min^{-1})	Vf (mm/min)	n (min^{-1})	Vf (mm/min)	n (min^{-1})	Vf (mm/min)
2	0.2	6	0.080	20,790	1,635	17,672	1,389	15,593	981	14,553	801
		8	0.070	18,900	1,486	16,065	1,263	14,175	892	13,230	728
		12	0.040	15,309	1,083	13,013	921	11,482	722	10,716	590
		16	0.040	13,608	963	11,567	818	10,206	642	9,526	524
		20	0.035	11,907	843	10,121	716	8,930	562	8,335	459
		25	0.025	11,907	843	10,121	716	8,930	562	8,335	459
		30	0.017	11,312	800	9,615	680	8,484	534	7,918	436
	0.3	8	0.090	18,900	1,651	16,065	1,403	14,175	991	13,230	809
		16	0.060	13,608	1,070	11,567	909	10,206	713	9,526	583
		20	0.037	11,907	936	10,121	796	8,930	624	8,335	510
	0.5	6	0.017	20,709	1,635	17,672	1,389	15,593	981	14,553	801
		8	0.014	18,900	1,651	16,065	1,403	14,175	991	13,230	809
		12	0.080	15,309	1,204	13,013	1,023	11,482	802	10,716	655
		16	0.080	13,608	1,070	11,567	909	10,206	713	9,526	583
		20	0.050	11,907	936	10,121	796	8,930	624	8,335	510
		25	0.050	11,907	936	10,121	796	8,930	624	8,335	510
		30	0.030	11,312	889	9,615	756	8,484	593	7,918	484
	0.8	8	0.200	18,900	1,651	16,065	1,403	14,175	991	13,230	809
		16	0.100	13,608	1,070	11,567	909	10,206	713	9,526	583
		20	0.060	11,907	936	10,121	796	8,930	624	8,335	510
3	0.2	8	0.090	14,400	1,415	12,240	1,203	10,800	849	10,080	693
		12	0.070	14,400	1,415	12,240	1,203	10,800	849	10,080	693
		16	0.050	14,400	1,415	12,240	1,203	10,800	849	10,080	693
		20	0.050	11,664	1,146	9,914	974	8,748	764	8,165	624
		30	0.040	9,072	1,146	7,711	974	6,804	764	6,350	624
		35	0.035	9,072	1,146	7,711	974	6,804	764	6,350	624
	0.3	8	0.130	14,400	1,572	12,240	1,337	10,800	943	10,080	771
		16	0.075	14,400	1,572	12,240	1,337	10,800	943	10,080	771
		20	0.075	11,664	1,274	9,914	1,083	8,748	849	8,165	693
		30	0.060	9,072	1,274	7,711	1,083	6,804	849	6,350	693
	0.5	8	0.180	14,400	1,572	12,240	1,337	10,800	943	10,080	771
		12	0.130	14,400	1,572	12,240	1,337	10,800	943	10,080	771
		16	0.100	14,400	1,572	12,240	1,337	10,800	943	10,080	771
		20	0.100	11,664	1,274	9,914	1,083	8,748	849	8,165	693
		30	0.080	9,072	1,274	7,711	1,083	6,804	849	6,350	693
		35	0.065	9,072	1,274	7,711	1,083	6,804	849	6,350	693

- Please adjust the cutting depth index according to the cutting depth factors of above table.
- In actual machining, the condition should be adjusted according to the machining shape, purpose and machine type.
- If RPM of the machine is low, the feed rate should be low in the same ratio as RPM.

ZS1(2)04, ZS204 series ▶ Side Cutting

MATERIAL	HARDENED STEELS		HARDENED STEELS		HARDENED STEELS		HARDENED STEELS		HARDENED STEELS	
HARDNESS	HRc 40~HRc 50		HRc 50~HRc 55		HRc 55~HRc 60		HRc 60~HRc 65		HRc 65~HRc 70	
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
4	17200	1690	11440	1140	9360	700	7280	430	6170	310
6	13450	1820	8970	1230	6890	720	5460	450	4810	330
8	9100	1750	6760	1170	5200	670	4160	420	3640	310
10	8000	1630	5330	1090	4160	620	3320	400	2860	280
12	6830	1630	4550	1010	3450	580	2730	370	2420	260

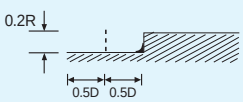
RPM = rev. / min.
FEED = mm / min.

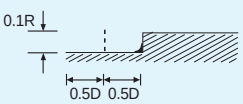


ZSPM4...-.. series

MATERIAL	HARDENED STEELS									
HARDNESS	~HRc40		HRc 40 ~ HRc 50		HRc 50 ~ HRc 55		HRc 55 ~ HRc 60		HRc 60 ~ HRc 65	
D X R(mm)	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
3 X R0.5	9550	6500	6900	4150	4550	2750	2850	1150	1900	610
4 X R0.5	7950	7000	5750	4600	4000	3200	2550	1350	1750	700
6 X R0.5	5800	7650	4100	4900	2900	3500	1850	1850	1350	795
6 X R1.0	5800	7650	4100	4900	2900	3500	1850	1850	1350	795
8 X R1.0	4350	7650	3050	4900	2200	3500	1400	1850	995	795
8 X R2.0	4350	7650	3050	4900	2200	3500	1400	1850	995	795
10 X R1.0	3500	7650	2450	4900	1750	3500	1100	1850	795	795
10 X R2.0	3500	7650	2450	4900	1750	3500	1100	1850	795	795
12 X R2.0	2900	7650	2050	4900	1450	3500	925	1850	665	795
12 X R3.0	2900	7650	2050	4900	1450	3500	925	1850	665	795

RPM = rev. / min.
FEED = mm / min.

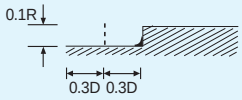


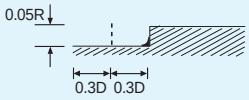


ZSPM4...-.. series ▶High Speed Cutting

MATERIAL	HARDENED STEELS									
HARDNESS	~HRc40		HRc 40 ~ HRc 50		HRc 50 ~ HRc 55		HRc 55 ~ HRc 60		HRc 60 ~ HRc 65	
D X R(mm)	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
3 X R0.5	22000	16000	17000	10000	12500	8000	9500	4600	6900	2500
4 X R0.5	17000	17500	13000	12000	11000	9200	8000	5500	5600	2900
6 X R0.5	13500	18500	10500	13800	9000	11000	6400	6400	4500	3600
6 X R1.0	13500	18500	10500	13800	9000	11000	6400	6400	4500	3600
8 X R1.0	10000	18500	8000	14000	6800	11000	4800	6700	3400	4100
8 X R2.0	10000	18500	8000	14000	6800	11000	4800	6700	3400	4100
10 X R1.0	8000	18500	6400	14000	5400	11000	3800	6800	2700	3800
10 X R2.0	8000	18500	6400	14000	5400	11000	3800	6800	2700	3800
12 X R2.0	6600	18500	5300	14000	4500	11000	3200	7000	2250	3600
12 X R3.0	6600	18500	5300	14000	4500	11000	3200	7000	2250	3600

RPM = rev. / min.
FEED = mm / min.

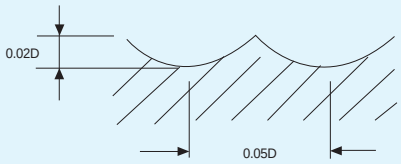




DB702, DB712 series

MATERIAL	HARDENED STEELS HEAT RESISTANT STEELS		HARDENED STEELS		HARDENED STEELS		HARDENED STEELS		HARDENED STEELS		HARDENED STEELS	
HARDNESS	HRc 30~ HRc 40		HRc 40~ HRc 50		HRc 50~ HRc 55		HRc 55~ HRc 60		HRc 60~ HRc 65		HRc 65~ HRc 70	
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
0.2	50000	1200	50000	1050	45000	960	40000	770	35000	674	31500	570
0.3	50000	1500	50000	1350	45000	1200	40000	965	35000	840	31500	700
0.4	50000	1900	50000	1700	45000	1500	40000	1200	35000	1050	31500	890
0.5	50000	2400	50000	2100	45000	1900	40000	1500	35000	1300	31500	1100
0.6	50000	2900	50000	2500	45000	2200	40000	1800	35000	1600	31500	1400
0.8	50000	3900	50000	3300	45000	3000	40000	2400	35000	2100	31500	1800
1	50000	4800	50000	4200	45000	3800	40000	3000	35000	2600	35000	2300
1.5	50000	5400	48000	4500	43000	4000	37000	3100	33000	2700	29700	2300
2	49700	5700	47800	4800	40000	4000	35000	3150	32000	2800	28500	2300
3	33100	6000	31800	5300	26500	4000	23500	3150	21000	2800	19000	2300
4	24900	6000	23900	5300	20000	4000	17500	3150	16000	2800	14500	2300
5	18600	5800	17800	4900	15000	3750	13500	3050	11500	2550	10500	2100
6	13900	4850	13400	4100	11000	3100	10000	2500	8800	2150	8000	1750
8	11100	4200	10700	3500	9000	2700	8000	2150	7000	1850	6500	1550
10	9300	3700	8900	3100	7500	2400	6600	1900	5800	1650	5300	1380
12	6950	2950	6680	2500	5600	1900	5000	1550	4400	1250	4000	1050

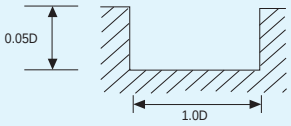
RPM = rev. / min.
FEED = mm / min.

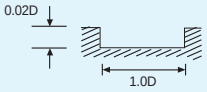


ZE702, ZE712 series ▶Slotting

MATERIAL	HARDENED STEELS HEAT RESISTANT STEELS		HARDENED STEELS		HARDENED STEELS		HARDENED STEELS		HARDENED STEELS		HARDENED STEELS	
HARDNESS	HRc 30~ HRc 40		HRc 40~ HRc 50		HRc 50~ HRc 55		HRc 55~ HRc 60		HRc 60~ HRc 65		HRc 65~ HRc 70	
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
0.2	50000	130	45000	115	40000	95	33000	60	33000	45	26400	30
0.3	50000	190	45000	140	40000	115	33000	70	25000	50	20000	35
0.4	50000	235	45000	180	40000	140	33000	90	25000	55	20000	40
0.5	50000	370	45000	280	40000	220	33000	140	25000	85	20000	60
0.6	50000	470	45000	360	40000	285	30000	160	25000	105	20000	75
0.8	50000	600	40000	440	30000	295	25000	185	19000	110	15200	80
0.9	49000	655	39000	520	27800	330	22700	205	17500	125	14000	90
1	48000	750	38000	570	25500	360	20500	215	16000	135	12500	85
2	33300	850	26000	680	17500	420	14500	260	11000	160	9500	115
3	21800	850	17300	680	11500	420	9500	260	7500	160	6400	115
4	16700	880	13200	700	8800	440	7200	270	5600	170	4750	118
5	15700	1000	12500	805	8300	500	6400	285	5100	180	4450	132
6	13100	950	10350	770	6900	480	5300	280	4200	180	3700	130
8	9880	930	7800	720	5200	445	4000	255	3200	165	2800	120
10	7800	850	6150	680	4100	415	3200	240	2550	155	2200	112
12	6650	850	5250	680	3500	415	2650	240	2100	155	1860	112
16	4900	730	3900	580	2600	365	2000	210	1600	135	1400	95
20	3900	660	3100	525	2050	335	1600	195	1300	125	1100	85

RPM = rev. / min.
FEED = mm / min.

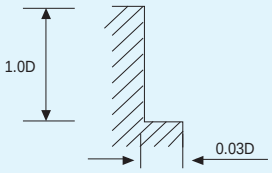




ZE702, ZE712 series ▶Side Cutting

MATERIAL	HARDENED STEELS HEAT RESISTANT STEELS		HARDENED STEELS		HARDENED STEELS		HARDENED STEELS		HARDENED STEELS		HARDENED STEELS	
HARDNESS	HRc 30~ HRc 40		HRc 40~ HRc 50		HRc 50~ HRc 55		HRc 55~ HRc 60		HRc 60~ HRc 65		HRc 65~ HRc 70	
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
1	48000	1050	38000	820	25500	510	20500	310	16000	190	12500	125
2	33300	1200	26000	970	17500	600	14500	370	11000	230	9500	165
3	21800	1200	17300	970	11500	600	9500	370	7500	230	6400	165
4	16700	1250	13200	1000	8800	625	7200	385	5600	240	4750	170
5	15700	1450	12500	1150	8300	710	6400	410	5100	260	4450	190
6	13100	1350	10350	1100	6900	690	5300	400	4200	255	3700	185
8	9880	1320	7800	1030	5200	635	4000	365	3200	235	2800	170
10	7800	1200	6150	970	4100	590	3200	340	2550	220	2200	160
12	6650	1200	5250	970	3500	590	2650	340	2100	220	1860	160
16	4900	1050	3900	840	2600	520	2000	300	1600	190	1400	140
20	3900	950	3100	750	2050	475	1600	275	1300	175	1100	125

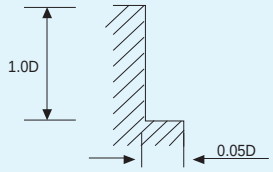
RPM = rev. / min.
FEED = mm / min.

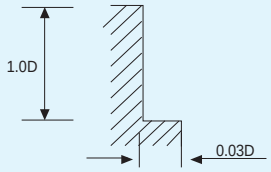


ZE704, ZE714, ZE724 series ▶Side Cutting

MATERIAL	HARDENED STEELS HEAT RESISTANT STEELS		HARDENED STEELS		HARDENED STEELS		HARDENED STEELS		HARDENED STEELS		HARDENED STEELS	
HARDNESS	HRc 30~ HRc 40		HRc 40~ HRc 50		HRc 50~ HRc 55		HRc 55~ HRc 60		HRc 60~ HRc 65		HRc 65~ HRc 70	
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
1	48000	1480	38000	1050	25500	710	20500	430	16000	270	12500	175
2	33300	1750	26000	1250	17500	840	14500	520	11000	320	9500	230
3	21800	1750	17300	1250	11500	840	9500	520	7500	320	6400	230
4	16700	1800	13200	1300	8800	880	7200	540	5600	335	4750	240
5	15700	2000	12500	1500	8300	1000	6400	580	5100	370	4450	270
6	13100	1950	10350	1400	6900	950	5300	560	4200	350	3700	260
8	9880	1880	7800	1350	5200	900	4000	520	3200	330	2800	240
10	7800	1750	6150	1260	4100	840	3200	480	2550	310	2200	220
12	6650	1750	5250	1260	3500	840	2650	480	2100	300	1860	220
16	4900	1500	3900	1100	2600	730	2000	420	1600	270	1400	200
20	3900	1300	3100	970	2050	650	1600	380	1300	250	1100	180

RPM = rev. / min.
FEED = mm / min.

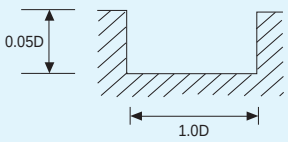


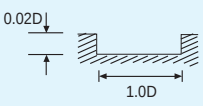


ZR702, ZR732 series ▶Slotting

MATERIAL	HARDENED STEELS HEAT RESISTANT STEELS		HARDENED STEELS		HARDENED STEELS		HARDENED STEELS		HARDENED STEELS		HARDENED STEELS	
HARDNESS	HRc 30~ HRc 40		HRc 40~ HRc 50		HRc 50~ HRc 55		HRc 55~ HRc 60		HRc 60~ HRc 65		HRc 65~ HRc 70	
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
2	33300	680	26000	544	17500	336	14500	208	11000	128	9500	92
3	21800	680	17300	544	11500	336	9500	208	7500	128	6400	92
4	16700	704	13200	560	8800	352	7200	216	5600	136	4750	94
5	15700	800	12500	644	8300	400	6400	228	5100	144	4450	106
6	13100	760	10350	616	6900	384	5300	224	4200	144	3700	104
8	9880	744	7800	576	5200	356	4000	204	3200	132	2800	96
10	7800	680	6150	544	4100	332	3200	192	2550	124	2200	90
12	6650	680	5250	544	3500	332	2650	192	2100	124	1860	90
16	4900	584	3900	464	2600	292	2000	168	1600	108	1400	78
20	3900	528	3100	420	2050	268	1600	168	1300	100	1100	70

RPM = rev. / min.
FEED = mm / min.

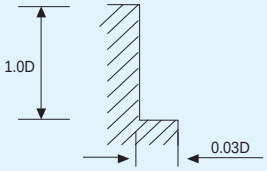




ZR702, ZR732 series ▶Side Cutting

MATERIAL	HARDENED STEELS HEAT RESISTANT STEELS		HARDENED STEELS		HARDENED STEELS		HARDENED STEELS		HARDENED STEELS		HARDENED STEELS	
HARDNESS	HRc 30~ HRc 40		HRc 40~ HRc 50		HRc 50~ HRc 55		HRc 55~ HRc 60		HRc 60~ HRc 65		HRc 65~ HRc 70	
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
2	33300	960	26000	776	17500	480	14500	296	11000	184	9500	132
3	21800	960	17300	776	11500	480	9500	296	7500	184	6400	132
4	16700	1000	13200	800	8800	500	7200	308	5600	192	4750	136
5	15700	1160	12500	920	8300	568	6400	328	5100	208	4450	152
6	13100	1080	10350	880	6900	552	5300	320	4200	204	3700	148
8	9880	1056	7800	824	5200	508	4000	292	3200	188	2800	136
10	7800	960	6150	776	4100	472	3200	272	2550	176	2200	128
12	6650	960	5250	776	3500	472	2650	272	2100	176	1860	128
16	4900	840	3900	672	2600	416	2000	240	1600	152	1400	112
20	3900	760	3100	600	2050	380	1600	220	1300	140	1100	100

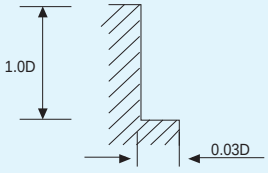
RPM = rev. / min.
FEED = mm / min.



ZR704, ZR714, ZR724, ZR734 series

MATERIAL	HARDENED STEELS HEAT RESISTANT STEELS		HARDENED STEELS		HARDENED STEELS		HARDENED STEELS		HARDENED STEELS		HARDENED STEELS	
HARDNESS	HRc 30~ HRc 40		HRc 40~ HRc 50		HRc 50~ HRc 55		HRc 55~ HRc 60		HRc 60~ HRc 65		HRc 65~ HRc 70	
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
3	21800	1400	17300	1000	11500	672	9500	416	7500	256	6400	184
4	16700	1440	13200	1040	8800	704	7200	432	5600	268	4750	192
5	15700	1600	12500	1200	8300	800	6400	464	5100	296	4450	216
6	13100	1560	10350	1120	6900	760	5300	448	4200	280	3700	208
8	9880	1504	7800	1080	5200	720	4000	416	3200	264	2800	192
10	7800	1400	6150	1008	4100	672	3200	384	2550	248	2200	176
12	6650	1400	5250	1008	3500	672	2650	384	2100	240	1860	176
16	4900	1200	3900	880	2600	584	2000	336	1600	216	1400	160
20	3900	1040	3100	776	2050	520	1600	304	1300	200	1100	144

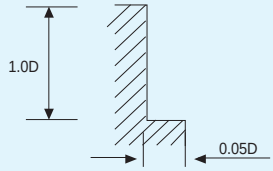
RPM = rev. / min.
FEED = mm / min.

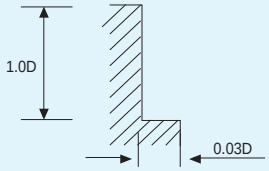


ZR706, ZR736, ZE716, ZE726 series

MATERIAL	HARDENED STEELS HEAT RESISTANT STEELS		HARDENED STEELS		HARDENED STEELS		HARDENED STEELS		HARDENED STEELS		HARDENED STEELS	
HARDNESS	HRc 30~ HRc 40		HRc 40~ HRc 50		HRc 50~ HRc 55		HRc 55~ HRc 60		HRc 60~ HRc 65		HRc 65~ HRc 70	
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
6	24800	5350	23500	4900	16000	4900	13500	3300	10500	2100	8000	1450
8	20000	5500	19000	5000	12000	4600	10000	3100	8000	2000	6000	1400
10	16000	4900	15500	4500	9500	4100	8000	2900	6400	1800	4800	1300
12	13000	4500	12500	4100	8000	3800	6600	2500	5300	1600	4000	1150
16	10000	4000	9700	3700	6000	3400	5000	2300	4000	1250	3000	870
20	8000	3350	7800	3400	4800	3200	4000	2100	3200	1020	2400	690

RPM = rev. / min.
FEED = mm / min.

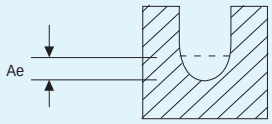




ZSLNB series

MATERIAL	ALLOY STEELS HEAT RESISTANT STEELS			HARDENED STEELS			HARDENED STEELS			COPPER		
HARDNESS	HRc 30~ HRc 45			HRc 45~ HRc 55			HRc 55~ HRc 65					
DIAMETER(mm)	RPM	FEED	Ae(mm)	RPM	FEED	Ae(mm)	RPM	FEED	Ae(mm)	RPM	FEED	Ae(mm)
0.5	34100~49500	600~870	0.007~0.028	31900~35200	490~540	0.005~0.023	31900~35200	440~480	0.005~0.021	49000~50000	1100~1400	0.010~0.042
0.6	28600~40700	590~850	0.007~0.034	26400~29700	480~540	0.006~0.028	26400~29700	400~480	0.006~0.025	42000~50000	1100~1700	0.011~0.050
0.8	22000~30800	640~890	0.016~0.064	19800~22000	490~550	0.013~0.052	19800~22000	440~500	0.012~0.048	31000~50000	1100~2250	0.024~0.096
1.0	17600~24200	600~850	0.008~0.080	15400~17600	470~540	0.007~0.065	15400~17600	440~500	0.006~0.060	24000~49500	1100~2200	0.012~0.120
1.2	14300~18700	590~780	0.024~0.032	12000~14000	480~540	0.020~0.026	12000~14000	420~480	0.018~0.024	28500~38500	1480~1950	0.036~0.048
1.5	11000~14300	580~760	0.031~0.048	10000~11500	480~540	0.025~0.039	10000~11500	420~480	0.023~0.036	17000~28500	1100~1950	0.046~0.072
2.0	8500~11000	590~800	0.024~0.160	7900~8800	470~530	0.020~0.130	7900~8800	440~480	0.018~0.120	12600~24000	1100~2150	0.036~0.240
3.0	5700~8200	730~1000	0.064~0.24	5300~5800	590~650	0.052~0.195	5300~5800	550~620	0.048~0.120	11900~17000	1850~2700	0.096~0.360
4.0	4300~6200	680~990	0.080~0.320	3950~4400	550~620	0.065~0.260	3850~4400	530~570	0.060~0.240	6600~12500	1260~2500	0.120~0.480

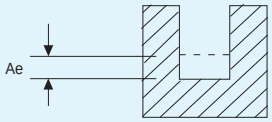
RPM = rev. / min.
FEED = mm / min.



ZSLNS20, ZSLNS40 series

MATERIAL	ALLOY STEELS HEAT RESISTANT STEELS			HARDENED STEELS			HARDENED STEELS			COPPER		
HARDNESS	HRc 30~ HRc 45			HRc 45~ HRc 55			HRc 55~ HRc 65					
DIAMETER(mm)	RPM	FEED	Ae(mm)	RPM	FEED	Ae(mm)	RPM	FEED	Ae(mm)	RPM	FEED	Ae(mm)
0.4	34100~50000	350~590	0.005~0.028	30500~35200	295~340	0.003~0.020	18300~24600	120~200	0.002~0.012	48000~50000	790~920	0.008~0.048
0.5	25650~33000	370~470	0.006~0.035	23750~26000	285~315	0.004~0.025	14200~18000	115~130	0.003~0.015	44000~50000	800~1150	0.010~0.060
0.6	20900~35200	330~560	0.007~0.030	19900~22000	260~290	0.005~0.021	11900~15500	100~120	0.003~0.013	37500~50000	770~1250	0.011~0.051
0.8	16150~26400	360~590	0.009~0.040	15200~16700	280~310	0.006~0.028	9000~11700	110~125	0.004~0.017	28500~47000	770~1300	0.015~0.068
1.0	12300~18700	350~540	0.011~0.028	10500~11500	250~280	0.008~0.020	6300~8050	100~115	0.005~0.012	22500~34000	810~1300	0.018~0.048
1.2	10450~17600	350~590	0.025~0.070	9100~10000	250~280	0.015~0.042	5400~7000	100~115	0.009~0.026	22500~31500	950~1350	0.036~0.101
1.5	9100~17600	430~830	0.017~0.077	7000~8000	250~280	0.012~0.055	4300~5500	100~115	0.007~0.033	14500~25000	770~1320	0.028~0.132
2.0	6350~10550	340~570	0.021~0.140	6100~6700	270~300	0.015~0.100	3600~4700	100~120	0.009~0.060	11500~18500	770~1250	0.036~0.240
3.0	4300~7050	550~900	0.056~0.210	3990~4600	445~515	0.040~0.150	2400~3200	105~310	0.024~0.090	9000~13000	1400~2110	0.096~0.360
4.0	3200~5300	400~675	0.074~0.280	3000~3400	335~380	0.053~0.200	1800~2400	75~230	0.032~0.120	6750~9750	1050~1575	0.128~0.480

RPM = rev. / min.
FEED = mm / min.

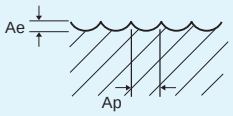


DB412 series

MATERIAL	HARDENED STEELS		HARDENED STEELS		HARDENED STEELS		HARDENED STEELS	
HARDNESS	HRc45 ~ HRc50		HRc50 ~ HRc55		HRc55 ~ HRc60		HRc60 ~ HRc70	
STRENGTH	1500 ~ 1750N/mm²		1750 ~ 2000N/mm²		2000 ~ 2080N/mm²		2080N/mm²	
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
1	20000	460	20000	400	20000	350	20000	240
1.5	16300	640	16100	580	16000	570	14200	360
2	14500	800	14200	740	13850	760	11300	465
2.5	13400	950	13000	890	12600	920	9600	560
3	12700	1100	12300	1050	11800	1000	8400	660
4	10600	1100	10300	1050	9800	1000	6650	650
5	9400	1100	9050	1050	8600	950	5600	680
6	8600	1150	8250	1100	7850	950	4850	700
8	7000	1050	6700	1000	6350	950	3800	650
10	6050	1000	5800	960	5450	900	3200	620
12	5450	1000	5200	960	4900	900	2750	610

RPM=rev. / min.
FEED=mm / min.

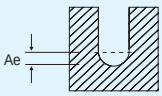
Ae: D1~D4=0.05XD
D5~D8=0.025mm
D10~D20=0.30mm
Ap: D1~D20=0.1 X D



DB612 series ▶Rib Processing

MATERIAL	NON-ALLOYED STEELS ALLOY STEELS · CAST IRON			ALLOY STEELS HEAT RESISTANT STEELS			HARDENED STEELS		
HARDNESS	~ HRc30			HRc30 ~ HRc45			HRc45 ~ HRc55		
STRENGTH	~ 1000N/mm²			1000 ~ 1500N/mm²			1500 ~ 2000N/mm²		
DIAMETER(mm)	RPM	FEED	Ae(mm)	RPM	FEED	Ae(mm)	RPM	FEED	Ae(mm)
0.5	33000~42000	200~540	0.023~0.045	24000~30000	100~300	0.023~0.045	15000~19000	100~2000	0.005~0.009
0.6	33000~42000	250~700	0.027~0.054	24000~30000	120~385	0.027~0.054	15000~19000	120~250	0.005~0.011
0.8	33000~42000	250~700	0.036~0.072	24000~30000	120~385	0.036~0.072	15000~19000	120~250	0.007~0.014
1.0	30000~38000	275~770	0.045~0.090	22000~27000	140~430	0.045~0.090	13500~17500	140~280	0.009~0.018
1.2	25000~32000	275~860	0.055~0.100	18000~23000	140~430	0.055~0.100	11500~14500	140~280	0.010~0.022
1.4	22000~27000	275~860	0.062~0.125	16000~19000	140~430	0.062~0.125	10000~12500	140~280	0.012~0.025
1.5	20000~25000	275~860	0.070~0.135	14500~18500	140~430	0.070~0.135	9500~11500	140~280	0.014~0.028
1.6	19000~25000	275~860	0.075~0.145	14000~17500	140~430	0.075~0.145	9000~11000	140~280	0.015~0.030
1.8	18000~23000	275~860	0.080~0.160	12500~16000	140~430	0.080~0.160	8000~10000	140~280	0.016~0.032
2	16000~20000	275~860	0.090~0.180	11500~14500	140~430	0.090~0.180	7500~9000	140~280	0.018~0.035
3	11000~14000	275~860	0.135~0.270	7500~9500	140~430	0.135~0.270	5000~6000	140~280	0.028~0.055
4	9000~12000	275~860	0.180~0.360	6100~8200	140~430	0.180~0.360	4000~5000	140~280	0.035~0.070

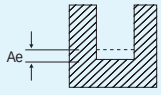
RPM=rev. / min.
FEED=mm / min.



ZE612 series ▶Rib Processing

MATERIAL	NON-ALLOYED STEELS ALLOY STEELS · CAST IRON			ALLOY STEELS HEAT RESISTANT STEELS			HARDENED STEELS		
HARDNESS	~ HRc30			HRc30 ~ HRc45			HRc45 ~ HRc55		
STRENGTH	~ 1000N/mm²			1000 ~ 1500N/mm²			1500 ~ 2000N/mm²		
DIAMETER(mm)	RPM	FEED	Ae(mm)	RPM	FEED	Ae(mm)	RPM	FEED	Ae(mm)
0.4	33000~42000	220~490	0.007~0.018	24000~30000	100~375	0.007~0.018	15000~18000	35~100	0.004~0.008
0.5	33000~42000	220~190	0.009~0.022	24000~30000	100~375	0.009~0.022	15000~18000	35~100	0.004~0.009
0.6	33000~42000	275~630	0.011~0.026	24000~30000	120~485	0.011~0.026	15000~18000	45~120	0.005~0.011
0.7	33000~42000	275~630	0.012~0.031	24000~30000	120~485	0.012~0.031	15000~18000	45~120	0.006~0.013
0.8	28500~37000	310~700	0.014~0.035	20500~26000	130~530	0.014~0.035	13000~15500	50~140	0.007~0.015
0.9	26000~33000	310~800	0.030~0.060	19000~24000	180~600	0.030~0.060	11500~13500	60~145	0.008~0.016
1.0	24000~30000	310~900	0.045~0.090	16500~21000	210~660	0.045~0.090	10500~13500	75~145	0.009~0.018
1.2	19500~24000	310~990	0.055~0.100	14000~17000	210~660	0.055~0.100	9000~11000	75~145	0.010~0.022
1.4	17000~21000	310~990	0.062~0.125	12000~15000	210~660	0.062~0.125	7500~9500	75~145	0.012~0.025
1.5	15500~20000	310~990	0.070~0.135	11000~14500	210~660	0.070~0.135	7000~8500	75~145	0.014~0.028
1.6	15000~19000	310~990	0.075~0.145	11000~13500	210~660	0.075~0.145	6500~8500	75~145	0.015~0.030
1.8	14000~18000	310~990	0.080~0.160	10000~12000	210~660	0.080~0.160	6000~7500	75~145	0.016~0.032
2.0	12500~15500	310~990	0.090~0.180	9000~11000	210~660	0.090~0.180	5500~7000	75~145	0.018~0.035
2.5	10000~13000	310~990	0.112~0.235	7000~9000	210~660	0.112~0.235	4500~5500	75~145	0.022~0.045
3.0	8500~10500	310~990	0.135~0.270	6000~7500	210~660	0.135~0.270	3500~4500	75~145	0.028~0.055
4.0	6500~8000	310~990	0.180~0.360	4500~5500	210~660	0.180~0.360	2700~3500	75~145	0.036~0.072

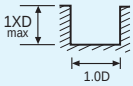
RPM=rev. / min.
FEED=mm / min.

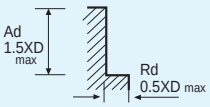


X-STAR series

WORKPIECE	LOW CARBON STEELS		LOW CARBON STEELS		MED ALLOY STEELS		MOLD&DIE STEELS		CAST IRON-GRAY		CAST IRON-GRAY	
HARDNESS	~HB175		~HB275		~HB275		~HB275		~HB200		~HB300	
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
3	16500	335	13585	276	11320	230	5820	118	15360	300	7765	158
4	12340	326	10190	326	8520	340	4380	175	11550	462	5810	232
5	9895	502	8150	413	6790	345	3490	177	9215	468	4655	236
6	8250	586	6795	483	5660	403	2910	207	7680	546	3880	276
8	6185	754	5095	620	4245	517	2185	266	5760	702	2910	354
10	4950	955	4075	786	3395	656	1745	337	4610	889	2330	449
12	4125	963	3395	793	2830	661	1455	340	3840	897	1940	453
14	3535	890	2910	733	2425	592	1250	314	3290	829	1665	419
16	3095	817	2545	672	2125	561	1090	288	2880	761	1455	384
18	2750	809	2265	667	1885	556	970	285	2560	754	1295	381
20	2475	804	2040	662	1700	552	875	283	2305	749	1165	378
25	1975	631	1630	521	1360	435	700	230	1850	600	930	300

RPM = rev. / min.
FEED = mm / min.



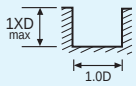


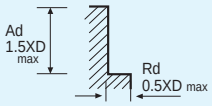
- Use a rigid and precise machines and holders.
- Use a suitable cutting oil.

X-STAR series

WORKPIECE	CAST IRONMALLEABLE		STAINLESS 300 SERIES		STAINLESS 400 SERIES		STAINLESS PH SERIES		TITANIUM ALLOYS		HIGH TEMP ALLOYS	
HARDNESS	~HB300		~HB275		~HB185		~HB325		~HB295		~HB300	
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
3	4850	95	9705	175	13585	250	8085	125	9705	225	2590	50
4	3660	146	7245	290	10190	407	6050	242	7245	290	1910	76
5	2910	147	5820	300	8150	430	4850	250	5820	355	1550	75
6	2425	173	4850	355	6795	560	4045	300	4850	405	1295	75
8	1820	221	3640	405	5095	635	3030	355	3640	455	970	100
10	1455	280	2910	405	4075	635	2425	355	2910	455	775	100
12	1215	283	2425	405	3395	635	2020	355	2425	455	645	100
14	1040	262	2080	405	2910	635	1735	355	2080	455	555	100
16	910	240	1820	405	2545	635	1515	355	1820	455	485	100
18	810	238	1615	380	2265	560	1350	300	1615	405	430	100
20	730	236	1455	380	2040	560	1215	300	1455	405	390	100
25	585	187	1160	370	1630	560	970	300	1160	405	305	73

RPM = rev. / min.
FEED = mm / min.



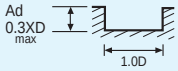


- Use a rigid and precise machines and holders.
- Use a suitable cutting oil.

X-STAR series ▶Slotting

WORKPIECE	HARDENED STEELS	
HARDNESS	HRc30~45	
DIAMETER(mm)	RPM	FEED
3	6900	552
4	5175	414
5	4140	331
6	3450	414
8	2588	414
10	2070	414
12	1725	414
14	1479	414
16	1294	414
18	1150	368
20	1035	414
25	828	397

RPM = rev. / min.
FEED = mm / min.

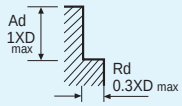


- Use a rigid and precise machines and holders.
- Use a suitable cutting oil.

X-STAR series ▶Side Cutting

WORKPIECE	HARDENED STEELS	
HARDNESS	HRc30~45	
DIAMETER(mm)	RPM	FEED
3	8493	679
4	6369	510
5	5096	611
6	4246	849
8	3185	764
10	2548	713
12	2123	764
14	1820	728
16	1592	701
18	1415	679
20	1274	662
25	1019	611

RPM = rev. / min.
FEED = mm / min.

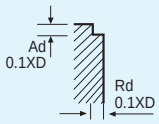


- Use a rigid and precise machines and holders.
- Use a suitable cutting oil.

X-STAR series ▶High Speed Cutting

WORKPIECE	HARDENED STEELS	
HARDNESS	HRc30~45	
DIAMETER(mm)	RPM	FEED
3	18047	2166
4	13535	1624
5	10828	1732
6	9023	2166
8	6768	1895
10	5414	1732
12	4512	1985
14	3867	1856
16	3384	1895
18	3008	1805
20	2707	1841
25	2166	1646

RPM = rev. / min.
FEED = mm / min.



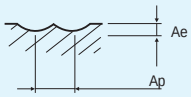
- Use a rigid and precise machines and holders.
- Use a suitable cutting oil.

DB312, DB402, DB502, DB512, DB522 series ▶General Cutting

MATERIAL	NON-ALLOYED STEELS ALLOY STEELS · CAST IRON		ALLOY STEELS HEAT RESISTANT STEELS		HARDENED STEELS	
HARDNESS	~ HRc30		HRc30 ~ HRc40		HRc40 ~ HRc55	
STRENGTH	~ 1000N/mm²		1000 ~ 1250N//mm²		1500N/mm²	
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED
1	16500	290	13300	230	6100	105
1.5	16500	405	12700	310	5590	140
2	15100	865	11200	565	4900	175
2.5	15100	865	11200	565	4900	175
3	13800	780	10500	530	4750	175
4	11000	850	8800	610	4410	205
5	9600	945	7600	665	3860	205
6	8900	1150	7200	955	3340	220
8	7500	1500	6050	1060	2590	255
10	6700	1750	5300	1170	2140	260
12	6150	2000	4900	1280	1840	280
16	5000	1950	3900	1220	1420	280
20	4350	1900	3400	1200	1170	290

RPM = rev. / min.
FEED = mm / min.

Ae : D1~D6=0.2mm
D8~D20=0.3mm
Ap : 0.2XD



Ae : D1~D6=0.2mm
D8~D20=0.3mm
Ap : 0.1XD

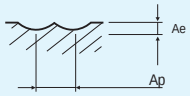
• Please reduce cutting speed around 20~30% from the above tablef or DB522 series.

DB312, DB402, DB502, DB512, DB522 series ▶High Speed Cutting

MATERIAL	NON-ALLOYED STEELS · ALLOY STEELS · CAST IRONN		ALLOY STEELS HEAT RESISTANT STEELS	
HARDNESS	~ HRc45		HRc30 ~ HRc40	
STRENGTH	~ 1500N/mm²		1500 ~ 2000N/mm²	
DIAMETER(mm)	RPM	FEED	RPM	FEED
1	26000	1500	26000	920
1.5	24000	1600	24000	990
2	22000	1700	22000	1080
2.5	22000	2000	20000	1130
3	22000	2300	17800	1200
4	22000	3350	14300	1300
5	22000	4150	12600	1380
6	22000	4600	11000	1440
8	17500	4600	8800	1440
10	14700	4450	7350	1380
12	12800	4450	6400	1330
16	10000	4000	5000	1150
20	8350	3650	4150	1060

RPM = rev. / min.
FEED = mm / min.

Ae : D1~D6=0.2mm
D8~D20=0.3mm
Ap : 0.2XD



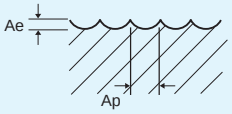
• Please reduce cutting speed around 20~30% from the above tablef or DB522 series.

DB514 series ▶General Cutting

MATERIAL	N0N-ALLOYED STEELS ALLOY STEELS · CAST IRON		ALLOY STEELS HEAT RESISTANT STEELS		HARDENED STEELS	
HARDNESS	~ HRc30		HRc30 ~ HRc40		HRc45 ~ HRc65	
STRENGTH	~ 1000N/mm²		1000 ~ 1250N//mm²		1500N/mm²	
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED
3	13100	1020	10000	690	4520	220
4	10500	1110	8400	800	4200	270
5	9140	1230	7300	870	3680	270
6	7780	1260	6300	950	3160	280
8	5260	1430	4420	990	2100	280
10	4620	1530	3780	1070	1780	280
12	3780	1350	2940	990	1360	280
16	2740	1380	2320	980	1160	280
20	2100	1260	1900	950	840	280

RPM = rev. / min.
FEED = mm / min.

Ae: D1~D6=0.2mm
D8~D20=0.3mm
Ap: 0.2 X D



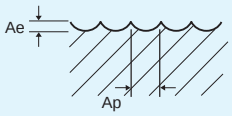
Ae: D1~D6=0.2mm
D8~D20=0.3mm
Ap: 0.1 X D

DB514 series ▶High Speed Cutting

MATERIAL	NON-ALLOYED STEELS ALLOY STEELS · CAST IRON		HARDENED STEELS	
HARDNESS	~ HRc45		HRc45 ~ HRc65	
STRENGTH	~ 1500N/mm²		~ 1500N/mm²	
DIAMETER(mm)	RPM	FEED	RPM	FEED
3	21000	1500	17000	780
4	21000	2210	13660	870
5	21000	2700	12000	900
6	21000	3470	10500	940
8	15760	4260	7880	1110
10	13660	4580	6300	1260
12	10500	3950	5260	1260
16	8200	3950	3780	1060
20	6300	3780	2940	790

RPM = rev. / min.
FEED = mm / min.

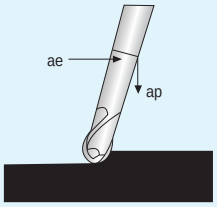
Ae: D1~D6=0.2mm
D8~D20=0.3mm
Ap: 0.05 X D



DB532 series ▶General Cutting

MATERIAL	NON-ALLOYED STEELS ALLOY STEELS · CAST IRON		ALLOY STEELS HEAT RESISTANT STEELS		HARDENED STEELS	
HARDNESS	~ HRc30		HRc30 ~ HRc40		HRc45 ~ HRc65	
STRENGTH	~ 1000N/mm²		1000 ~ 1250N//mm²		1500N/mm²	
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED
3	35000	2800	33000	2600	12000	900
4	26000	2300	25000	2200	9000	800
5	21000	2100	20000	2000	7000	700
6	17000	1900	16000	1800	6000	650
8	13000	1700	12000	1600	4500	550
10	10500	1450	10000	1400	3500	500
12	9000	1400	8000	1300	3000	450
16	6000	1200	5500	1100	2000	400

RPM = rev. / min.
FEED = mm / min.

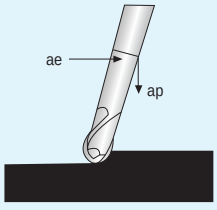


ae = 0.05 x d1
ap = 0.02 x d1

DB532 series ▶High Speed Cutting

MATERIAL	NON-ALLOYED STEELS ALLOY STEELS · CAST IRON		ALLOY STEELS HEAT RESISTANT STEELS		HARDENED STEELS	
HARDNESS	~ HRc30		HRc30 ~ HRc40		HRc45 ~ HRc65	
STRENGTH	~ 1000N/mm²		1000 ~ 1250N//mm²		1500N/mm²	
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED
3	47000	3700	44000	3500	17000	1400
4	35000	3200	33000	3000	13000	1200
5	28000	2800	27000	2600	10000	1100
6	23000	2600	22000	2400	8000	950
8	18000	2300	17000	2100	6000	850
10	14000	2000	13000	1900	5000	750
12	12000	1800	11000	1800	4000	700
16	9000	1600	8000	1500	3300	600

RPM = rev. / min.
FEED = mm / min.

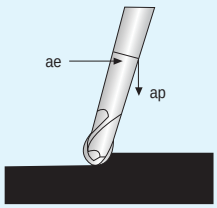


ae = 0.05 x d1
ap = 0.02 x d1

DB534 series ▶General Cutting

MATERIAL	NON-ALLOYED STEELS ALLOY STEELS · CAST IRON		ALLOY STEELS HEAT RESISTANT STEELS		HARDENED STEELS	
HARDNESS	~ HRc30		HRc30 ~ HRc40		HRc45 ~ HRc65	
STRENGTH	~ 1000N/mm²		1000 ~ 1250N//mm²		1500N/mm²	
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED
5	21000	4000	20000	4000	7000	1400
6	17000	4000	16000	3500	6000	1300
8	13000	3500	12000	3000	4500	1100
10	10500	3000	10000	2500	3500	1000
12	9000	2800	8000	2500	3000	950
16	6000	2800	5500	2200	2000	800

RPM = rev. / min.
FEED = mm / min.

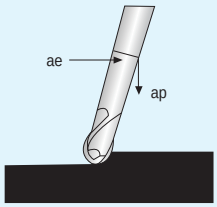


ae = 0.05 x d1
ap = 0.02 x d1

DB534 series ▶High Speed Cutting

MATERIAL	NON-ALLOYED STEELS ALLOY STEELS · CAST IRON		ALLOY STEELS HEAT RESISTANT STEELS		HARDENED STEELS	
HARDNESS	~ HRc30		HRc30 ~ HRc40		HRc45 ~ HRc65	
STRENGTH	~ 1000N/mm²		1000 ~ 1250N//mm²		1500N/mm²	
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED
5	28000	5600	27000	5300	11000	2100
6	23000	5100	22000	4900	9000	1900
8	18000	4600	17000	4300	7000	1700
10	14000	3900	13000	3700	5000	1400
12	12000	3700	11000	3500	4500	1300
16	9000	3100	8000	3000	3300	1100

RPM = rev. / min.
FEED = mm / min.

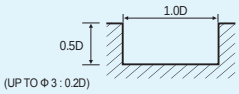


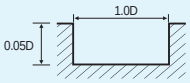
ae = 0.05 x d1
ap = 0.02 x d1

ZE302, ZE322, ZE402, ZE502, ZE522 series ▶General Cutting

MATERIAL	ALLOY STEELS·HEAT RESISTANT STEELS		HARDENED STEELS		STAINLESS STEELS	
HARDNESS	HRc30 ~ HRc40		HRc40 ~ HRc50			
STRENGTH	1000 ~ 1250N/mm²		1250 ~ 1750N//mm²			
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED
2	9700	220	6350	135	5300	105
3	7500	240	4670	160	3880	135
4	6350	345	3880	205	3250	175
5	5300	370	3170	220	2650	185
6	4670	405	2830	255	2380	205
8	3530	435	2120	230	1760	205
10	2730	380	1680	185	1420	185
12	2310	320	1420	150	1140	150
16	1850	255	1140	125	890	125
20	1420	195	890	90	705	90
25	1150	150	705	80	580	70

RPM = rev. / min.
FEED = mm / min.



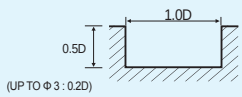


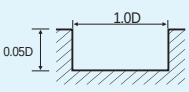
• Please reduce cutting speed around 20~30% from the above tablef or ZE522, ZE322 series.

ZE302, ZE322, ZE402, ZE502, ZE522 series ▶High Speed Cutting

MATERIAL	ALLOY STEELS·HEAT RESISTANT STEELS		HARDENED STEELS				STAINLESS STEELS	
HARDNESS	HRc30 ~ HRc40		HRc40 ~ HRc50		HRc40 ~ HRc55			
STRENGTH	1000 ~ 1250N//mm²		1250 ~ 1750N/mm²		1750 ~ 2000N/mm²			
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
2	18000	665	11800	415	8700	175	9800	345
3	11000	655	6800	435	5600	185	6200	370
4	10300	725	6300	430	4300	185	5300	370
5	9350	715	5570	420	3700	185	4620	355
6	8200	750	4930	470	3250	185	4100	390
8	6300	770	3780	410	2470	185	3120	355
10	4830	750	2940	360	2000	160	2470	310
12	4100	750	2520	345	1680	160	2100	300
16	3260	715	2000	355	1890	150	1940	290
20	2520	665	1580	310	1680	150	1630	275
25	2000	635	1260	340	1570	150	1420	290

RPM = rev. / min.
FEED = mm / min.

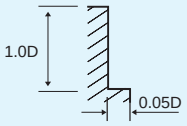




ZE503 series ▶Side Cutting

MATERIAL	NON-ALLOY STEELS ALLOY STEELS·CAST IRON		ALLOY STEELS HEAT RESISTANT STEELS		STAINLESS STEELS		HARDENED STEELS		HARDENED STEELS	
HARDNESS	~ HRc30		HRc30 ~ HRc45				HRc45 ~ HRc55		HRc55 ~ HRc65	
STRENGTH	~ 1000N/mm²		1000 ~ 1500N/mm²				1500 ~ 2000N/mm²		2000N/mm²~	
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
6	5560	500	3360	310	2840	250	2000	60	1100	45
8	4200	530	2520	290	2100	265	1680	80	840	45
10	3260	460	2000	230	1680	230	1360	70	680	35
12	2740	390	1680	190	1360	180	1160	60	560	35
16	2200	310	1360	150	1060	150	900	45	440	20
18	1940	280	1210	135	950	130	790	35	380	20
20	1680	240	1060	120	840	115	680	30	320	20

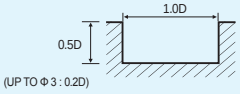
RPM = rev. / min.
FEED = mm / min.

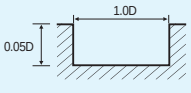


ZE503 series ▶Slotting

MATERIAL	NON-ALLOY STEELS ALLOY STEELS·CAST IRON		ALLOY STEELS HEAT RESISTANT STEELS		STAINLESS STEELS		HARDENED STEELS		HARDENED STEELS	
HARDNESS	~ HRc30		HRc30 ~ HRc45				HRc45 ~ HRc55		HRc55 ~ HRc65	
STRENGTH	~ 1000N/mm²		1000 ~ 1500N/mm²				1500 ~ 2000N/mm²		2000N/mm²~	
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
6	5560	310	3360	200	2840	160	2000	50	1100	35
8	4200	340	2520	180	2100	160	1680	65	840	35
10	3260	300	2000	140	1680	145	1360	55	680	30
12	2740	250	1680	120	1360	120	1160	50	560	30
16	2200	200	1360	100	1060	100	900	35	440	20
18	1940	175	1210	85	950	85	790	30	380	20
20	1680	150	1060	70	840	70	680	25	320	20

RPM = rev. / min.
FEED = mm / min.

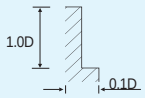


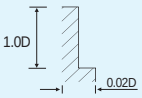


ZE304, ZE324, ZE404, ZE504, ZE524 series ▶General Cutting

MATERIAL	NON-ALLOY STEELS ALLOY STEELS · CAST IRON		HARDENED STEELS				STAINLESS STEELS	
HARDNESS	~HRc30		HRc30 ~ HRc45		HRc45 ~ HRc55			
STRENGTH	~1000N/mm²		1000 ~ 1500N/mm²		1500 ~ 2000N/mm²			
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
2	12100	320	7900	195	2700	47	6600	160
3	9400	370	5840	230	2000	58	4850	195
4	7900	655	4850	405	1500	58	4070	320
5	6600	690	3970	415	1300	58	3320	345
6	5830	760	3530	470	1150	58	2980	380
8	4410	815	2650	435	880	58	2200	405
10	3420	700	2100	345	720	46	1760	345
12	2880	600	1760	290	590	46	1430	275
16	2310	470	1430	230	460	29	1150	230
20	1760	370	1110	185	340	29	880	175
25	1430	290	880	150	270	23	715	140

RPM = rev. / min.
FEED = mm / min.



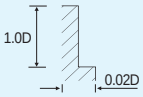


• Please reduce cutting speed around 20~30% from the above tablef or ZE524 & ZE324 series.

ZE304, ZE324, ZE404, ZE504, ZE524 series ▶High Speed Cutting

MATERIAL	NON-ALLOY STEELS ALLOY STEELS · CAST IRON		HARDENED STEELS				STAINLESS STEELS	
HARDNESS	~HRc30		HRc30 ~ HRc45		HRc45 ~ HRc55			
STRENGTH	~1000N/mm²		1000 ~ 1500N/mm²		1500 ~ 2000N/mm²			
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
2	31400	1230	23500	520	12600	275	21600	465
3	19300	1210	13600	735	8900	390	13500	660
4	18100	1330	12600	865	7090	465	11800	775
5	16400	1310	11100	1010	6040	530	10300	910
6	14400	1380	9900	1100	5300	580	9100	990
8	11000	1430	7600	1090	3990	575	6900	980
10	8500	1380	5880	1110	3150	580	5420	1000
12	7200	1380	5040	1090	2620	575	4600	985
16	5700	1320	3990	1010	2000	535	3590	910
20	4400	1270	3150	930	1580	490	2840	840
25	3500	1170	2520	755	1260	390	2270	680

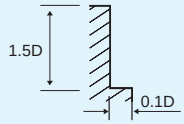
RPM = rev. / min.
FEED = mm / min.

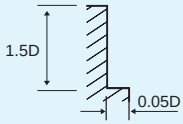


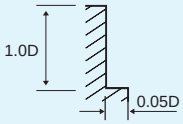
ZE506, ZE516 series ▶General Speed Cutting

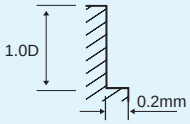
MATERIAL	NON-ALLOY STEELS ALLOY STEELS · CAST IRON		ALLOY STEELS HEAT RESISTANT STEELS		HARDENED STEELS		HARDENED STEELS	
HARDNESS	~ HRc30		HRc30 ~ HRc50		HRc50 ~ HRc60		HRc60 ~ HRc65	
STRENGTH	~ 1000N/mm²		1000 ~ 1750N/mm²		1750 ~ 2080N/mm²		2080N/mm²	
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
6	5560	2000	3880	1370	1580	210	1100	130
8	4200	2000	2940	1370	1160	210	840	130
10	3360	2000	2320	1370	1000	210	680	130
12	2840	1680	2000	1160	840	180	560	110
16	2100	1260	1480	880	640	130	420	70
20	1680	1010	1160	690	500	110	320	60
25	1500	900	1100	600	430	90	260	50

RPM = rev. / min.
FEED = mm / min.





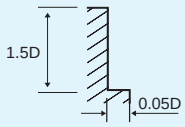


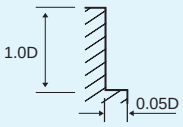


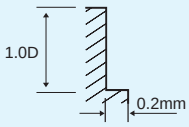
ZE506, ZE516 series ▶High Speed Cutting

MATERIAL	HEAT RESISTANT STEELS HARDENED STEELS		HARDENED STEELS		HARDENED STEELS	
HARDNESS	~ HRc50		HRc50 ~ HRc60		HRc60 ~ HRc65	
STRENGTH	1750N/mm²		1750~2080N/mm²		2080N/mm²~	
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED
6	16800	6090	8400	3050	4200	1470
8	12600	6090	6300	3050	3160	1470
10	9980	5990	5040	3050	2520	1470
12	8400	5040	4200	2520	2100	1260
16	6300	3780	3160	1890	1580	950
20	5040	3050	2520	1470	1260	760
25	4500	2750	2200	1300	1120	670

RPM = rev. / min.
FEED = mm / min.





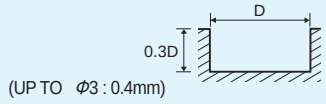


• Please reduce cutting speed around 20~30% from the above tablef or Extra long series.

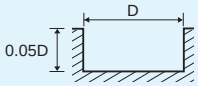
ZM502, ZM522 series

MATERIAL	NON-ALLOYED STEELS ALLOY STEELS · CAST IRON		ALLOY STEELS HEAT RESISTANT STEELS		HARDENED STEELS	
HARDNESS	~ HRc30		HRc30 ~ HRc45		HRc45 ~ HRc55	
STRENGTH	~ 1000N/mm²		1000~ 1500N///mm²		1500 ~ 2000N//mm²	
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED
2	6300	60	5040	50	3150	25
3	4410	70	3570	60	2200	30
4	3570	85	2840	70	1790	35
5	3050	105	2420	85	1580	40
6	2630	125	2100	105	1370	50
8	2000	135	1580	105	1050	50
10	1680	135	1370	105	840	50
12	1370	105	1160	95	700	40
16	1160	95	890	75	560	35
20	840	70	680	50	420	25

RPM=rev. / min.
FEED=mm / min.



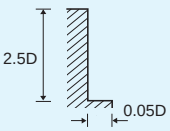
(UP TO Φ3 : 0.4mm)

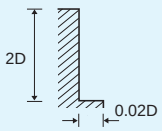


ZM504, ZM524 series

MATERIAL	NON-ALLOY STEELS ALLOY STEELS · CAST IRON		ALLOY STEELS HEAT RESISTANT STEELS		HARDENED STEELS		HARDENED STEELS	
HARDNESS	~ HRc30		HRc30 ~ HRc45		HRc45 ~ HRc55		HRc55 ~ HRc65	
STRENGTH	~ 1000N/mm²		1000 ~ 1500N//mm²		1500 ~ 2000N/mm²		2000N/mm²	
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
2	6300	100	5040	80	3150	45		
3	4410	115	3570	100	2200	55	1890	30
4	3570	140	2840	115	1790	60	1470	35
5	3050	180	2420	140	1580	70	1260	40
6	2630	215	2100	180	1370	90	1160	50
8	2000	230	1580	180	1050	90	840	50
10	1680	230	1370	180	840	90	670	50
12	1370	180	1160	160	700	70	560	40
16	1160	160	890	125	560	60	440	35
20	840	115	680	90	420	45	340	25

RPM=rev. / min.
FEED=mm / min.

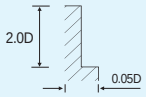


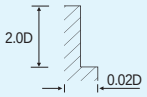


ZR322, ZR502, ZR512, ZR522 series ▶Side Cutting

MATERIAL	NON-ALLOYED STEELS ALLOY STEELS · CAST IRON		ALLOY STEELS HEAT RESISTANT STEELS		HARDENED STEELS	
HARDNESS	~ HRc30		HRc30 ~ HRc45		HRc45 ~ HRc55	
STRENGTH	~ 1000N/mm²		1000~ 1500N///mm²		1500 ~ 2000N//mm²	
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED
3	6950	195	4500	150	3300	100
4	5600	240	3600	170	2700	105
5	4800	250	3050	210	2350	125
6	4150	250	2650	210	2050	125
8	3150	265	2000	210	1600	125
10	2150	265	1700	210	1250	125
12	1800	210	1500	185	1050	105
16	1800	185	1100	140	840	90
20	1300	130	860	105	625	65

RPM=rev. / min.
FEED=mm / min.

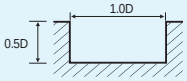




ZR322, ZR502, ZR512, ZR522 series ▶Slotting

MATERIAL	NON-ALLOYED STEELS ALLOY STEELS · CAST IRON		ALLOY STEELS HEAT RESISTANT STEELS		HARDENED STEELS	
HARDNESS	~ HRc30		HRc30 ~ HRc45		HRc45 ~ HRc55	
STRENGTH	~ 1000N/mm²		1000~ 1500N///mm²		1500 ~ 2000N//mm²	
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED
3	6950	160	4500	80	3300	55
4	5600	195	3600	100	2700	60
5	4800	240	3050	115	2350	75
6	4150	290	2650	145	2050	90
8	3150	210	2000	145	1600	90
10	2150	250	1700	140	1250	90
12	1800	200	1500	135	1050	75
16	1800	215	1100	100	840	60
20	1300	160	860	70	625	45

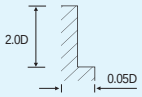
RPM=rev. / min.
FEED=mm / min.

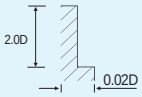


ZR324, ZR504, ZR514, ZR524 series

MATERIAL	NON-ALLOYED STEELS ALLOY STEELS · CAST IRON		ALLOY STEELS HEAT RESISTANT STEELS		HARDENED STEELS	
HARDNESS	~ HRc30		HRc30 ~ HRc45		HRc45 ~ HRc55	
STRENGTH	~ 1000N/mm²		1000~ 1500N///mm²		1500 ~ 2000N//mm²	
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED
3	6950	195	4500	150	3300	100
4	5600	240	3600	170	2700	105
5	4800	250	3050	210	2350	125
6	4150	250	2650	210	2050	125
8	3150	265	2000	210	1600	125
10	2150	265	1700	210	1250	125
12	1800	210	1500	185	1050	105
16	1880	185	1100	140	840	90
20	1300	130	860	105	625	65

RPM=rev. / min.
FEED=mm / min.

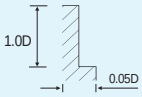




ZR304H, ZR324H series

MATERIAL	NON-ALLOYED STEELS ALLOY STEELS · CAST IRON		ALLOY STEELS HEAT RESISTANT STEELS		HARDENED STEELS	
HARDNESS	~ HRc30		HRc30 ~ HRc45		HRc45 ~ HRc55	
STRENGTH	~ 1000N/mm²		1000~ 1500N///mm²		1500 ~ 2000N//mm²	
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED
6	7000	910	4200	560	3000	140
8	5300	980	3200	530	2500	190
10	4100	840	2500	410	2050	165
12	3500	730	2100	340	1700	140

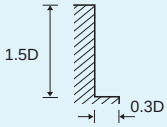
RPM=rev. / min.
FEED=mm / min.

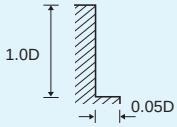


ZF60, ZF61 series

MATERIAL	NON-ALLOY STEELS ALLOY STEELS·CAST IRON		ALLOY STEELS HEAT RESISTANT STEELS		STAINLESS STEELS		HARDENED STEELS		HARDENED STEELS	
HARDNESS	~ HRc30		HRc30 ~ HRc38		HRc38 ~ HRc45		HRc45 ~ HRc55		HRc55 ~ HRc65	
STRENGTH	~ 1000N/mm²		1000 ~ 1200N/mm²		1200 ~ 1400N/mm²		1400 ~ 2000N/mm²		2000N/mm²~	
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
6	15600	2320	12400	840	8400	570	3400	260	2400	190
8	11600	2320	9200	840	6300	570	2400	240	1800	180
10	9200	2320	7600	840	5100	570	2000	290	1300	190
12	8000	2400	6000	800	4200	570	1680	260	1200	190
14	6800	2400	5200	840	3600	570	1400	200	900	130
16	6000	2400	4800	760	3300	510	1200	160	800	110
18	5200	2320	4400	720	2700	420	1100	150	700	100
20	4800	2160	3600	560	2400	360	1000	150	660	100
25	4300	2150	3200	620	2160	410	900	160	600	100

RPM=rev. / min.
FEED=mm / min.

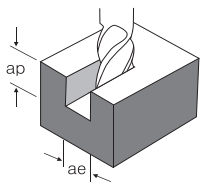


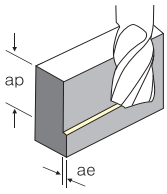


PK503 series

MATERIAL		Alloy Steels·High Carbon Steels				Prehardened Steels·Tool steels HRC30 ~ 40			
(V)m/min		130 ~ 150				100 ~ 120			
Diameter (mm)		(r.p.m.)	fz			(r.p.m.)	fz		
			Slot	Side Cutting	Slot		Slot	Side Cutting	Slot
6		7,400	0.030	0.045	0.018	5,800	0.025	0.030	0.012
8		5,600	0.035	0.062	0.025	4,400	0.030	0.045	0.018
10		4.600	0.045	0.075	0.030	3,500	0.040	0.048	0.019
12		3,700	0.050	0.087	0.035	3,000	0.045	0.052	0.020
14		3,200	0.055	0.090	0.036	2,500	0.053	0.056	0.022
16		2,800	0.055	0.090	0.036	2,200	0.060	0.060	0.024
20		2,200	0.080	0.095	0.038	1,800	0.066	0.066	0.026
	ap		1.0D	1.0D	0.5D		1.0D	1.0D	0.5D
	ae		1.0D	0.5D	1.0D		1.0D	0.3D	1.0D

MATERIAL		SUS304·316·Prehardened Steels HRC40 ~ 45				Titanium Alloy			
(V)m/min		50 ~ 70				30 ~ 50			
Diameter (mm)		(r.p.m.)	fz			(r.p.m.)	fz		
			Slot	Side Cutting	Slot		Slot	Side Cutting	Slot
6		3,200	0.020	0.030	0.012	2,100	0.017	0.020	0.008
8		2,400	0.030	0.040	0.016	1,600	0.025	0.025	0.010
10		1,900	0.040	0.055	0.022	1,300	0.035	0.040	0.016
12		1,600	0.045	0.065	0.026	1,100	0.040	0.050	0.020
14		1,360	0.048	0.070	0.028	900	0.043	0.053	0.021
16		1,200	0.050	0.075	0.030	800	0.045	0.055	0.022
20		1,000	0.052	0.083	0.033	600	0.050	0.057	0.023
	ap		0.5D	1.0D	0.5D		0.5D	1.0D	0.5D
	ae		1.0D	0.5D	1.0D		1.0D	0.3D	1.0D

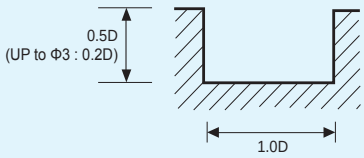


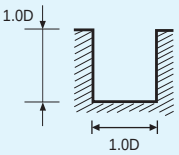


TX202, 222, 302 ...series

MATERIAL	NON - ALLOYED STEELS ALLOY STEELS TOOLS STEELS		ALLOY STEELS HEAT RESISANT STEELS		STAINLESS STEELS		CAST IRON		ALUMINUM ALLOYS		COPPER, BRASS NON-FERROUS METALS	
HARDNESS	~ HRc 30		HRc 30 ~ HRc 45									
STRENGTH	~ 1000N/mm^2		1000 ~ 1500N/mm^2									
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
1	14300	105	8500	65	7150	50	18700	205	44000	330	24700	200
1.5	9350	150	5550	85	5600	80	12100	205	27500	385	20300	300
2	7850	160	5150	100	4300	80	9350	220	22000	460	16500	340
3	6100	180	3800	120	3150	100	6050	220	15400	460	11000	340
4	5150	255	3150	155	2650	130	4600	220	11000	460	8800	340
5	4300	270	2550	160	2150	135	3650	220	9150	460	6800	340
6	3800	300	2300	190	1950	155	2950	255	7600	485	5700	375
8	2850	325	1700	170	1450	155	2200	275	5700	485	4400	375
10	2200	280	1350	135	1150	135	1850	285	4600	485	3400	375
12	1850	240	1150	110	950	110	1450	295	3750	485	2850	375
14	1700	215	1050	100	850	100	1300	310	3300	485	2400	375
16	1500	185	950	95	700	95	1100	320	2850	485	2200	375
20	1150	145	700	70	550	70	900	340	2200	485	1700	375

RPM = rev. / min.
FEED = mm / min.



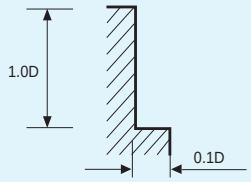


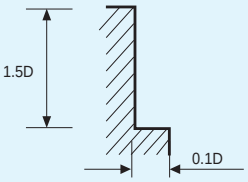
※ The FEED for long & extra long types, should be reduced by around 50%

TX204, 224, 304 ...series

MATERIAL	NON - ALLOYED STEELS ALLOY STEELS TOOLS STEELS		ALLOY STEELS HEAT RESISANT STEELS		STAINLESS STEELS		CAST IRON		ALUMINUM ALLOYS		COPPER, BRASS NON-FERROUS METALS	
HARDNESS	~ HRc 30		HRc 30 ~ HRc 45									
STRENGTH	~ 1000N/mm²		1000 ~ 1500N/mm²									
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
1	17600	150	10250	85	8650	75	18700	620	44000	1050	24700	605
1.5	11800	215	7050	115	7050	120	12100	620	27500	1160	20300	910
2	9850	240	6450	145	5350	120	9350	640	22000	1320	16500	1035
3	7600	270	4750	170	3950	145	6050	640	15400	1320	11000	1035
4	6450	485	3950	300	3300	240	4600	640	11000	1320	8800	1035
5	5350	510	3200	305	2700	255	3650	640	9150	1320	6800	1035
6	4750	560	2850	350	2400	280	2950	770	7600	1430	5700	1100
8	3550	605	2150	325	1800	300	2200	815	5700	1430	4400	1100
10	2750	520	1700	255	1450	255	1850	860	4600	1430	3400	1100
12	2350	440	1450	215	1150	205	1450	900	3750	1430	2850	1100
14	2100	395	1300	195	1050	190	1300	945	3300	1430	2400	1100
16	1850	350	1150	170	950	170	1100	970	2850	1430	2200	1100
20	1450	270	900	135	700	130	900	1035	2200	1430	1700	1100

RPM = rev. / min.
FEED = mm / min.





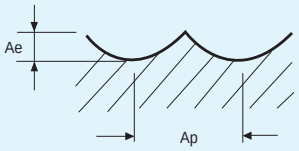
※ The FEED for long & extra long types, should be reduced by around 50%

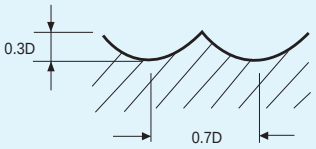
TXB202, 222, 232, 302 ...series

MATERIAL	CARBON STEELS ALLOY STEELS TOOLS STEELS		CARBON STEELS ALLOY STEELS TOOLS STEELS		HARDENED STEELS		CAST IRON		ALUMINUM ALLOYS	
HARDNESS	~ HRc 30		HRc 30 ~ HRc 45		HRc 45 ~ HRc 50					
STRENGTH	~ 1000N/mm²		1000 ~ 1500N/mm²		1500N/mm²					
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
2	12350	640	9150	415	4000	125	10500	220	30800	395
3	11400	575	8550	390	3800	125	7050	230	20500	395
4	8950	630	7150	450	3600	150	5150	285	15400	395
5	7800	700	6200	490	3100	150	4150	330	12100	470
6	7250	870	5900	705	2700	160	3400	360	10300	470
8	6100	1090	4900	785	2050	190	2500	460	7900	540
10	5450	1330	4350	870	1750	190	2050	460	6150	540
12	4990	1500	3950	950	1500	210	1750	460	5150	630
14	4530	1495	3600	925	1300	210	1400	460	4300	630
16	4085	1470	3200	905	1150	210	1300	460	3850	540
18	3800	1425	3000	890	1050	210	1100	460	3400	540
20	3550	1425	2800	885	950	210	1050	420	2950	540

RPM = rev. / min.
FEED = mm / min.

Ae : D1~D6=0.2mm
D8~D20=0.3mm
Ap : 0.2D



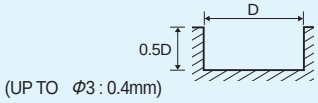


※ The FEED for long & extra long types, should be reduced by around 50%

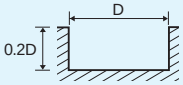
SM503 series ▶Slotting

MATERIAL	CARBON STEELS · ALLOY STEELS · TOOLS STEELS						CAST IRON		STAINLESS STEEL		COPPER ALLOYS		TITANIUM ALLOYS		INCONEL	
HARDNESS	~HRc2040		HRc20 ~ HRc30		HRc30 ~ HRc45											
STRENGTH	1000N/mm²		800 ~ 1000N/mm²		1500 ~ 1500N/mm²											
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
3	10080	950	7750	740	5550	395	6700	520	5550	320	8300	360	5550	395	2200	100
4	7550	1400	5850	1100	4200	595	5050	550	4200	320	6200	400	4200	595	1650	105
6	5050	1650	3850	1250	2800	700	3350	660	2800	370	4100	440	2800	700	1150	130
8	3750	1700	2950	1330	2100	710	2500	665	2100	375	3100	500	2100	710	850	120
10	3050	1650	2300	1250	1650	655	2000	630	1650	355	2500	530	1650	665	650	120
12	2500	1500	2000	1200	1350	605	1650	570	1350	320	2000	550	1350	605	555	110

RPM=rev. / min.
FEED=mm / min.



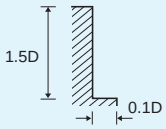
(UP TO Φ3 : 0.4mm)

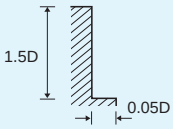


SM503 series ▶Side Cutting

MATERIAL	CARBON STEELS · ALLOY STEELS · TOOLS STEELS						CAST IRON		STAINLESS STEEL		COPPER ALLOYS		TITANIUM ALLOYS		INCONEL	
HARDNESS	~HRc20		HRc20 ~ HRc30		HRc30 ~ HRc45											
STRENGTH	1000N/mm²		800 ~ 1000N/mm²		1500 ~ 1500N/mm²											
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
3	10080	1080	7750	850	5550	450	6700	605	5550	365	8300	390	5550	450	2200	110
4	7550	1630	5850	1260	4200	680	5050	630	4200	365	6200	440	4200	680	1650	125
6	5050	1910	3850	1470	2800	810	3350	755	2800	430	4100	490	2800	810	1150	150
8	3750	1950	2950	1500	2100	810	2500	770	2100	430	3100	550	2100	810	850	140
10	3050	1890	2300	1400	1650	775	2000	720	1650	415	2500	570	1650	775	650	140
12	2500	1700	2000	1340	1350	700	1650	665	1350	365	2000	620	1350	700	555	125

RPM=rev. / min.
FEED=mm / min.

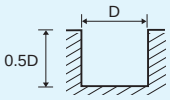




SM504 series

MATERIAL	ALLOY STEELS · CAST IRON		STAINLESS STEELS 300 SERIES TITANIUM		STAINLESS STEELS 400 SERIES	
HARDNESS	~HB 230					
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED
3	13500	275	6690	105	9350	145
4	10100	370	5050	135	7000	185
5	8090	410	4050	165	5600	230
6	6750	480	3350	190	4700	265
8	5050	620	2500	250	3500	340
10	4050	780	2050	320	2800	430
12	3370	750	1680	310	2350	435
14	2890	670	1400	280	2000	405
16	2500	630	1250	265	1750	370
18	2250	630	1100	260	1550	365
20	2000	620	1000	260	1400	365

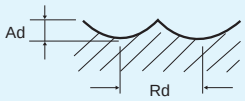
RPM=rev. / min.
FEED=mm / min.



BC502 series

MATERIAL		UNALLOYED COPPER			
R	DIAMETER(mm)	RPM	FEED	Rd	Ad
0.5	1	41000	1660	0.040	0.063
0.75	1.5	27000	1830	0.068	0.087
1	2	20000	1780	0.089	0.112
1.25	2.5	16000	1840	0.115	0.090
1.5	3	13000	2220	0.171	0.168
2	4	10000	2080	0.208	0.200
2.5	5	8300	1990	0.240	0.200
3	6	6900	1940	0.281	0.250
4	8	5720	1000	0.175	0.400
5	10	4550	700	0.154	0.500
6	12	3770	600	0.159	0.600

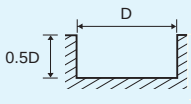
RPM=rev. / min.
FEED=mm / min.

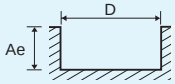


ZF62 series ▶Slotting

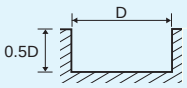
MATERIAL	NON - ALLOYED STEELS ALLOY STEELS · CAST IRON		ALLOY STEELS HEAT RESISTANT STEELS		STAINLESS STEELS		INCONEL	
HARDNESS	~ HRc30		HRc30 ~ HRc45					
STRENGTH	~ 1000N/mm²		1000 ~ 1500N//mm²					
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
6	16380	2680	13020	970	8820	670	3000	285
8	12180	2680	9660	970	6615	670	2250	270
10	9660	2680	7980	970	5355	660	1625	285
12	8400	2770	6300	925	4410	660	1500	285
16	6300	2770	5040	880	3465	590	1000	165
20	5040	2495	3780	650	2520	415	825	150

RPM=rev. / min.
FEED=mm / min.





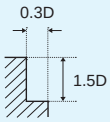
Ae : Φ4 ~ Φ10 = 0.25 x D
Φ12 ~ Φ16 = 0.15 x D
Φ18 ~ Φ20 = 0.10 x D

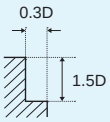


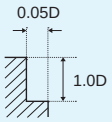
ZF62 series ▶Side Cutting

MATERIAL	NON - ALLOYED STEELS ALLOY STEELS · CAST IRON		ALLOY STEELS HEAT RESISTANT STEELS		STAINLESS STEELS		INCONEL	
HARDNESS	~ HRc30		HRc30 ~ HRc45					
STRENGTH	~ 1000N/mm²		1000 ~ 1500N//mm²					
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
6	16380	2680	13020	970	8820	670	3000	285
8	12180	2680	9660	970	6615	670	2250	270
10	9660	2680	7980	970	5355	660	1625	285
12	8400	2770	6300	925	4410	660	1500	285
16	6300	2770	5040	880	3465	590	1000	165
20	5040	2495	3780	650	2520	415	825	150

RPM=rev. / min.
FEED=mm / min.



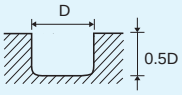


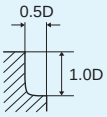


RC502 series

MATERIAL	UNALLOYED COPPER			
DIAMETER(mm)	RPM	FEED	RPM	FEED
3	44500	2350	50000	3700
4	33400	2100	50000	4700
6	22300	2100	33400	4900
8	16700	2100	25000	4700
10	13370	2100	20000	4800
12	11100	2100	16700	4700

RPM=rev. / min.
FEED=mm / min.

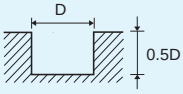




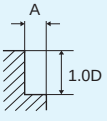
AE302 series

MATERIAL	ALLOY STEELS · CAST IRON		ALUMINIUM	
HARDNESS	~HB 230			
DIAMETER(mm)	RPM	FEED	RPM	FEED
1.0	16870	505	16870	845
1.5	13150	525	13150	790
2.0	11300	565	11300	790
2.5	10565	635	10565	845
3.0	10000	700	10000	900
4.0	10000	900	10000	1100
5.0	10000	1000	10000	1300
6.0	10000	1200	10000	1500
7.0	8850	1240	8850	1505
8.0	8000	1400	8000	1800
9.0	8000	1550	8000	1680
10.0	8000	1700	8000	2100
12.0	8000	2100	8000	2600
14.0	6000	1800	6000	2200
16.0	6000	1900	6000	2400
18.0	4000	1400	4000	1800
20.0	4000	1600	4000	1900

RPM=rev. / min.
FEED=mm / min.



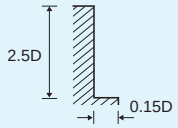
A : Φ3 ~ Φ10 = 0.25 x D
Φ12 ~ Φ20 = 0.5 x D



AE303, AE323 series ▶Side Cutting

MATERIAL	ALUMINIUM · NONFERROUS METALS	
DIAMETER(mm)	RPM	FEED
3	7000	455
4	7000	546
5	7000	651
6	7000	756
8	5600	861
10	5600	1050
12	5600	882
14	4200	1106
16	4200	1211
18	2800	910
20	2800	956

RPM=rev. / min.
FEED=mm / min.

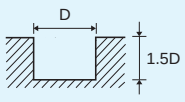


• Please reduce cutting speed around 20~30% from the above tablef or AE323 series.

AE303, AE323 series ▶Slotting

MATERIAL	ALUMINIUM · NONFERROUS METALS	
DIAMETER(mm)	RPM	FEED
3	7000	350
4	7000	441
5	7000	504
6	7000	606
8	5600	700
10	5600	854
12	5600	1050
14	4200	903
16	4200	945
18	2800	700
20	2800	805

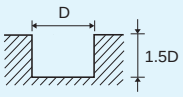
RPM=rev. / min.
FEED=mm / min.

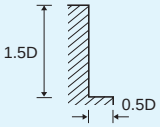


AF303 series ▶Slotting

MATERIAL	ALUMINIUM · NONFERROUS METALS			
DIAMETER(mm)	RPM	FEED	RPM	FEED
6	10500	800	13500	1050
8	8000	700	10500	900
10	6500	750	8500	950
12	5250	800	6800	1050
16	4000	800	5200	1050
20	3200	800	4200	1050

RPM=rev. / min.
FEED=mm / min.

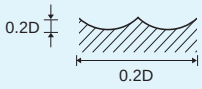




G series

MATERIAL	GRAPHITE	
DIAMETER(mm)	RPM	FEED
R0.5	16000	480
R0.75	16000	640
R1	16000	800
R1.5	16000	1450
R2	16000	2100
R3	15000	2950
R4	13000	3000
R5	11500	3050
R6	10500	3150
R8	8555	2960

RPM=rev. / min.
FEED=mm / min.



EB302, EB322, BB302 series

Work Material	SM50C,SCM,GC (~HRc30)		STD61,STD11 (HRc30~HRc45)		STD61 (HRc45~HRc55)	
DIAMETER (mm)	RPM (mm^{-1})	FEED (mm/rev)	RPM (mm^{-1})	FEED (mm/rev)	RPM (mm^{-1})	FEED (mm/rev)
20	1600	152	950	88	560	44
25	1300	136	750	72	450	36
30	1100	120	650	64	370	32
40	800	96	500	56	280	24
50	650	88	400	48	220	20

EB304, EB324 series

Work Material	SM50C,SCM,GC (~HRc30)		STD61,STD11 (HRc30~HRc45)		STD61 (HRc45~HRc55)	
DIAMETER (mm)	RPM (mm^{-1})	FEED (mm/rev)	RPM (mm^{-1})	FEED (mm/rev)	RPM (mm^{-1})	FEED (mm/rev)
20	1600	230	950	133	560	66
25	1300	205	750	109	450	54
30	1100	180	650	96	370	48
40	800	145	500	85	280	36
50	650	135	400	72	220	30