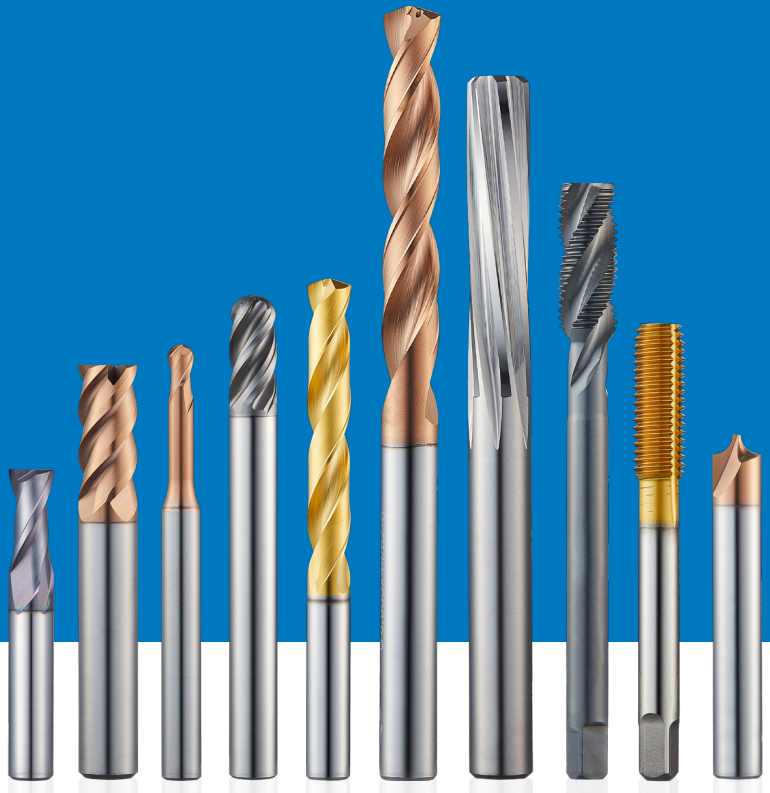
www.iwidin.com

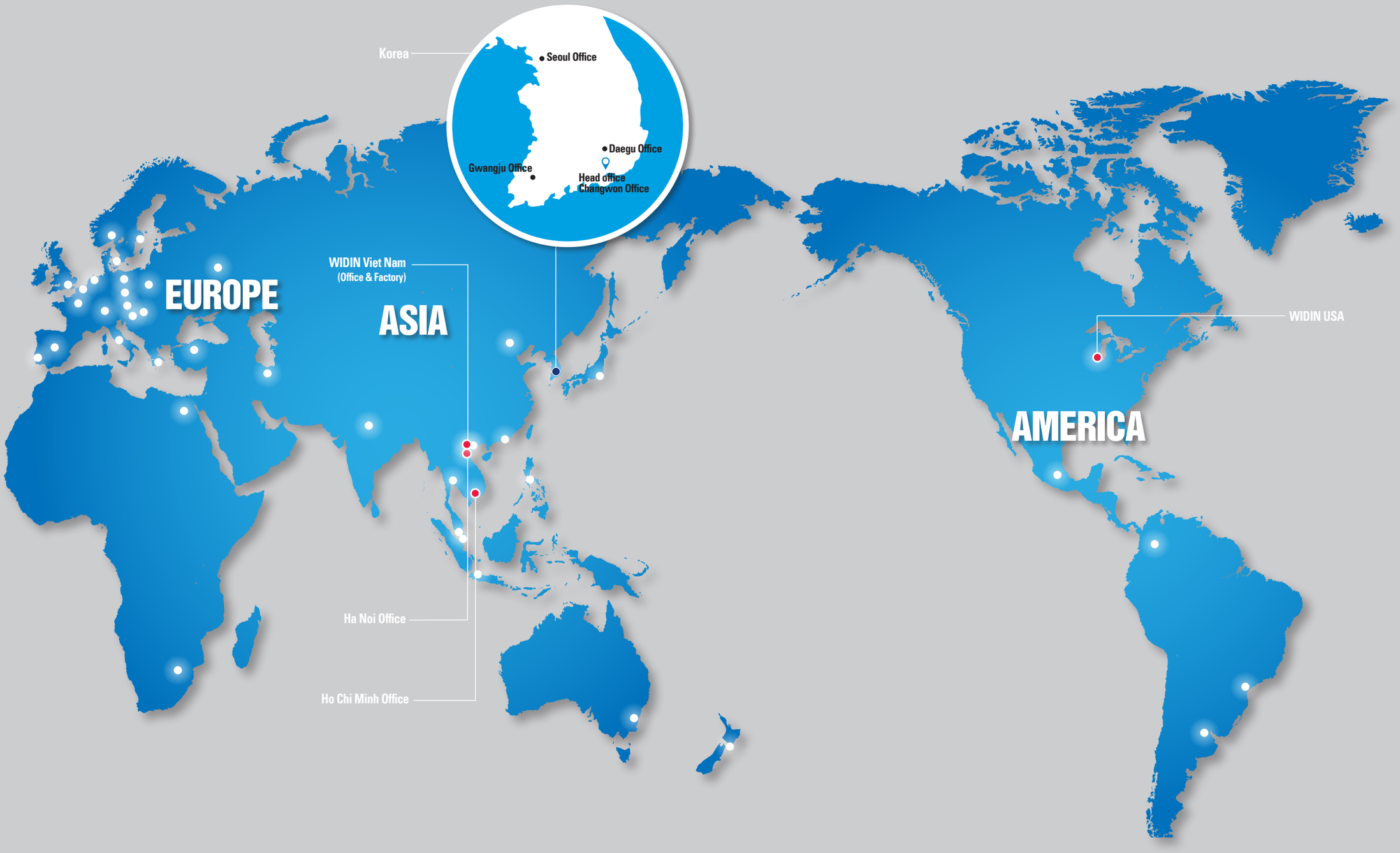
2020▶2021

WIDIN PRODUCTS



WIDIN
DING GROUP

GLOBAL NETWORK



GUIDE LINE TO ICONS

Cat.	ICON	TITLE	DESCRIPTION	Cat.	ICON	TITLE	DESCRIPTION
Tool Material	ULTRA FINE	ULTRA FINE	Ultra-fine grain	DIN standard	DIN 371-374 376	–	DIN371, 374, 376
	FINE GRAIN	FINE GRAIN	Fine grain		DIN 6537K	–	DIN6537K
	WC	WC	Carbide K10~K20 Material	Roughing shape	CHAMFERED	CHAMFERED PITCH	For finishing
	CARBIDE	CARBIDE	Carbide		FINE	FINE PITCH	For roughing
	HSSE	HSSE	HSSE		COARSE	Coarse Pitch Type	For roughing (Wide pitch)
Surface Treatment	AlTiN	AlTiN	Excellent wear resistance and heat resistance	No. of Flute	4	–	Indicates the number of flutes of the tool.
	TiAlN	TiAlN	Excellent oxidation resistance for high-speed processing	Helix Angle	45° HELIX	–	The helix angle of the end mill
	W	W	Excellent wear resistance and best for mold&die		M HELIX	–	the helix angle of end mill and the variable helix angle
	AlCrN	AlCrN	Excellent wear resistance and heat resistance		30° HELIX	–	The helix angle of the drill
	D.L.C	D.L.C	High surface hardness and excellent wear resistance	End face shape / Tolerance of Radius	R ±0.005	Ball shape / R tolerance	R tolerance of ball end mill
	Diamond	Diamond	Good wear resistance		R ±0.01	Corner R shape / R tolerance	Corner R tolerance of radius end mill
	CrN	CrN	Excellent wear resistance and welding resistance to copper and non-ferrous metals		C	Chamfer shape	Chamfered end face
	TiN	TiN	Excellent adhesion and wear resistance	Shape of cutting edge	SHARP EDGE	Sharp Edge	Sharped cutting edge
	TiCN	TiCN	Excellent adhesion, wear resistance, and heat resistance	Depth	▸3xD	–	This indicates the drilling depth * 3xD, 5xD, 8xD, 10xD, 20xD
	HOMO	Steam HOMO	Good coating to improve adhesion	Point angle	140°	–	Point angle on flute
	Uncoated	Non	Non coated	Cutting Condition	Data	–	Refers to the indicated page for the cutting conditions reference table

CONTENTS

NEW PRODUCTS

2020▶2021
WIDIN
PRODUCTS

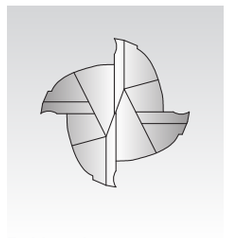
NEW PRODUCTS 00

* Upgrade version of ZE302, 304
* Reduced tool consumption by extending the blade length
* Increase tool life with coating upgrade

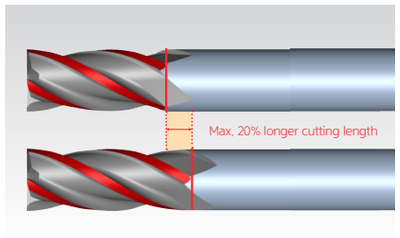
Thunder+

Features

· Optimal performance up to HRc 40 for general purpose machining
· Improved tool performance reliability with new coating
· Optimize flute shape to assure efficient chip evacuation and surface finish on workpiece



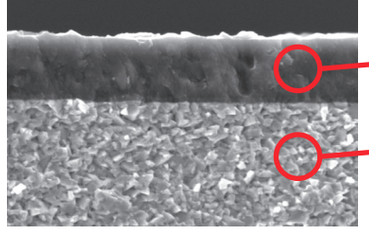
End face shape



Side cutting edge

Improvements

· Enhanced wear resistance and increased tool life with new coating

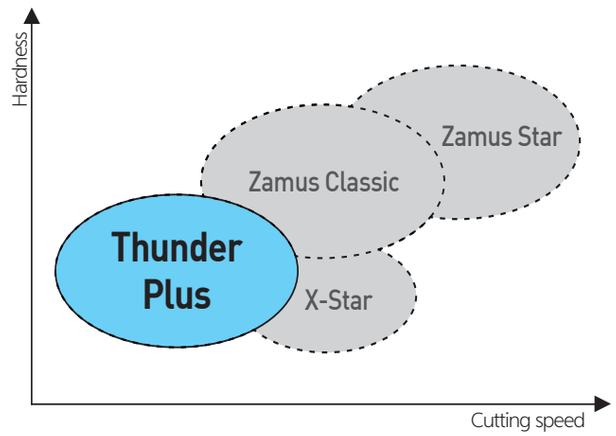


New surface treatment

TiAlN
Improved wear resistance and chipping resistance by applying thin film technology with excellent adhesion properties

Wear-resistant material applied
Secures stable workability by adopting a material suitable for general-purpose workpiece processing

Application

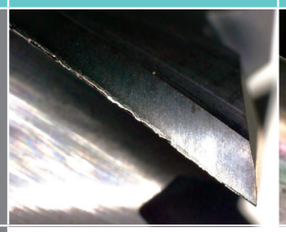
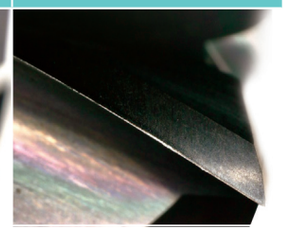


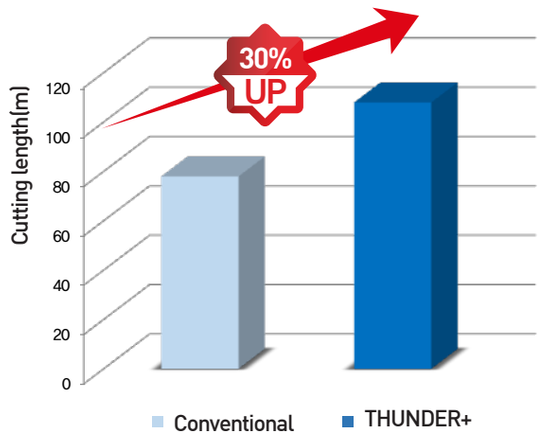
Thunder+

Cutting Condition

· TEST TOOL : Conventional / THUNDER+
· WORK PIECE : S45C (HB180)
· Cutting type : Side cutting
· Cutting condition : RPM 3,820 / Feed 917 / Ap 10.0, Ae 1.0

Case Study

Case study	Conventional	THUNDER+
Wear Appearance		
Chipping Appearance		



new
ENDMILL SERIES

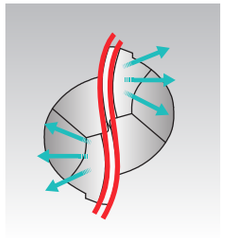
* Upgrade version of ZE302, 304
* Reduced tool consumption by extending the blade length
* Increase tool life with coating upgrade

Winner 7+

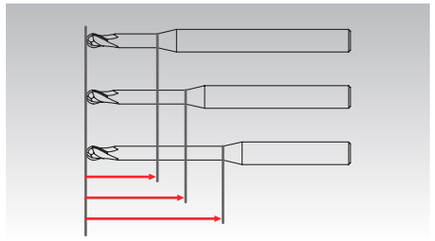
* Upgrade version of WE712, WB712, WINNER series.
* Various specifications
* Increase tool life with coating upgrade

Features

· Most optimal performance for high hardened workpieces below 60 HRc
· A wide selection of neck length for various work condition.
· Tighter tool tolerance for precision work



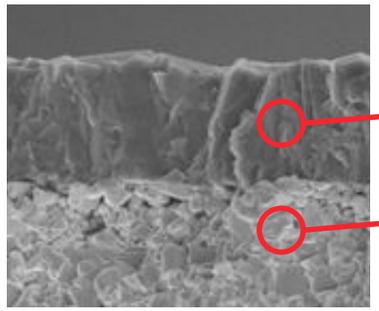
End face shape



Various neck length

Improvements

· Improved tool performance due to new Nano-coating which has improved toughness and heat resistance elements.
· High precision machining available due to tight tolerances in the shape of flute.

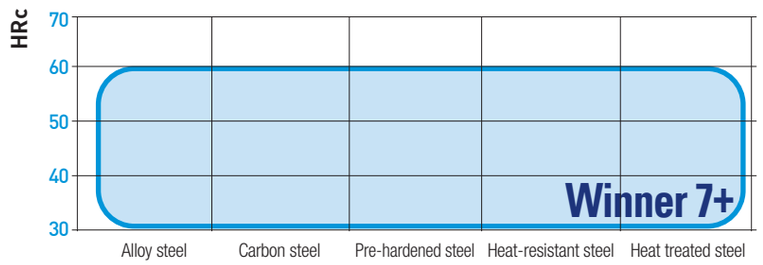


AlCrN
Improved wear resistance and chipping resistance by applying thin film technology with excellent adhesion.

Applying wear resistance substrate
Improved hardness and wear resistance by applying a stable base of fine grain

New surface treatment

Application

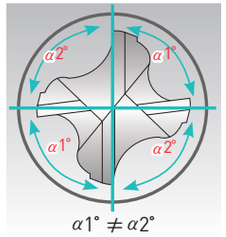


V-Star

* Upgrade version of SM504
* New corner radius specification
* Edge stabilization, coating upgrade improves tool life

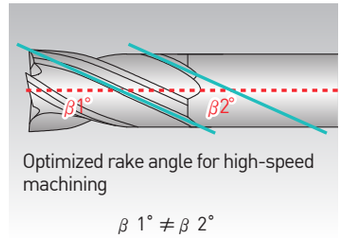
Features

· Stable high-speed milling by tool geometry - variable helix and optimized rake angle
· High quality workpiece surface finish due minimization of chatter
· Excellent chip emission with minimization of the attrition



$\alpha 1^\circ \neq \alpha 2^\circ$

End face shape



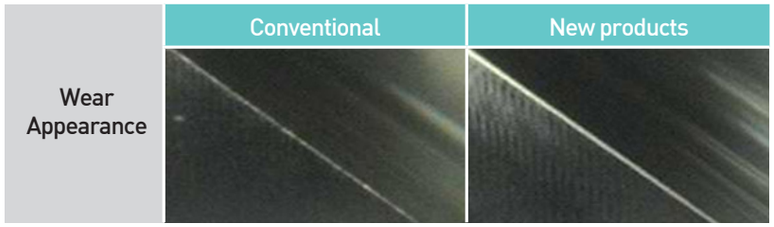
Optimized rake angle for high-speed machining

$\beta\ 1^\circ \neq \beta\ 2^\circ$

Side cutting edge

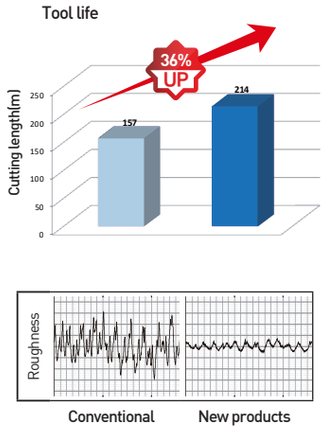
Improvements

· Minimized micro-chipping of the cutting edge at the beginning of processing with the newly applied surface treatment effect



Case Study

SUS304 / RPM 2,546 / Feed 611 / Ap 15.0, Ae 1.0



new
DRILL SERIES

* Upgrade version of PDS, PDM series.
* Chip pocket shape upgrade
* Increase tool life with coating upgrade

NEW PRODUCT NDPR/L

NEW DYNAMIC POWER DRILL (N-DOLPHIN DRILL)

NDP DRILL

· Provides practical and universal and stable machinability for a variety of workpieces by widening the choice of processing depth.

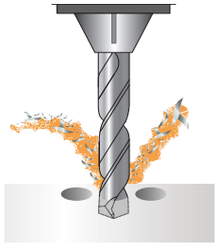
· It is a New Dynamic Power Drill (NDP) that has stable and excellent workability by improving the chip handling ability compared to the existing Power Drill.

Features 1

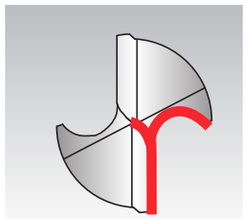
· Improvement of chip evacuation with wider chip pockets comparing to the conventional products

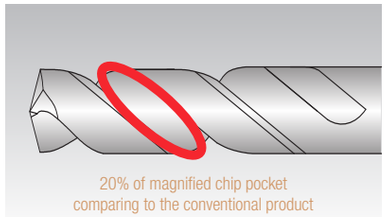
· Decrease of frictional resistance and heat with optimum margin and back taper

· Responding to various uses by securing products of various specifications



Improvement of chip curling by applying new γ -Flute concept





20% of magnified chip pocket comparing to the conventional product

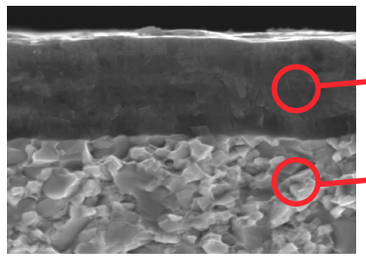
Improvement of minimum friction and chip emission with the optimum margin, back-taper and bigger chip pockets

Features 2

· Adopted nano multilayer thin film with improved wear resistance and chipping resistance and gold gloss color.

· Own surface treatment technique improves the surface roughness of the product, improving chip evacuation and improving lifespan.

Optimal material for general-purpose processing and application of new PVD coating



Adoption of high-hardness nano multilayer thin film technology with improved wear resistance, chipping resistance and lubricity

Secure processability by applying a material that combines optimum wear resistance and strength.

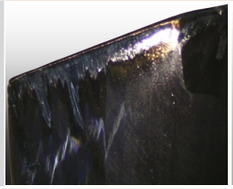
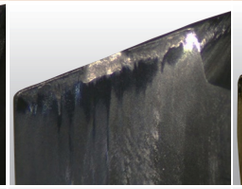
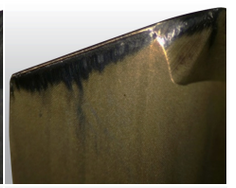
NDPR/L NEW PRODUCT

NEW DYNAMIC POWER DRILL (N-DOLPHIN DRILL)

Case Study

D6.0x36/66-6

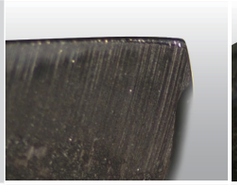
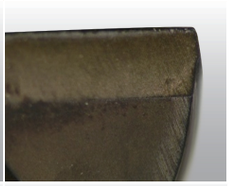
Case study

	Conventional	Competitor	NDPR060
Wear Appearance			
Tool Life	1,350	1,550	2,000

SM45C / Wet, External / Blind Hole / Vc:80m/min, f:0.14mm/rev / Ap:20mm

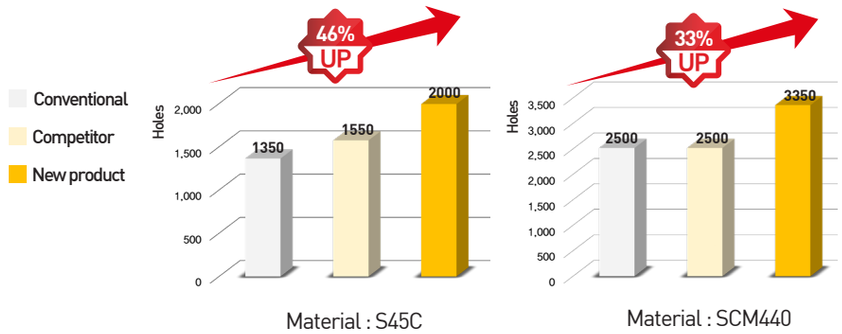
D6.0x36/66-6

Case study

	Conventional	Competitor	NDPR060
Wear Appearance			
Tool Life	2,500	2,500	3,350

SCM440 / Wet, External / Blind Hole / Vc:80m/min, f:0.14mm/rev / Ap:14.5mm

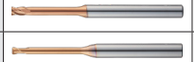
Case Study

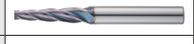


New DolPhin

It is a new brand name for all of Widin's rotating tools representing straight and dynamic image of cylindrical rotation pattern of tools when machining.

01 ENDMILL SERIES

Series	EDP. NO	Appearance	Flutes	Type				Length			Neck	Multi Helix	Page
				Ball	Square	Radius	Roughing	Short	Middle	Long			
1 Zamus Star	DB702		2F	o				o			o		30
	DB703		3F	o					o		o		31
	DB712		2F	o						o			32
	DB734		4F	o					o		o		33
	ZE702		2F		o				o		o		34
	ZE704		4F		o				o		o		35
	ZE712		2F		o				o				36
	ZE714		4F		o				o				37
	ZE716		6F		o				o				38
	ZE724(6)		4&6F		o				o		o		39
	ZR702		2F			o			o		o		40
	ZR704		4F			o			o		o		42
	ZR706		6F			o		o			o		44
	ZR714		4F			o			o				45
	ZR724		4F			o		o			o		46
	ZR732		2F			o			o		o		47
	ZR734		4F			o			o				48
	ZR736		6F			o			o				49
	WB712+ NEW		2F	o				o			o		50
	WE712+ NEW		2F		o			o			o		53
	ZS1(2)04		4F			o			o		o	o	56
	ZS124		4F		o					o		o	57
	ZS204		4F			o			o		o	o	58
	ZSLNB		2F	o				o			o		59
	ZSTNB20		2F	o				o			o		62
	ZSTNB30		3F	o				o			o		65
	ZSLNS20		2F		o			o			o		66
	ZSLNS40		4F		o			o			o		70
	ZSLNR		2F			o		o			o		72
	ZSTNR		2F			o		o			o		74
	ZSPM4		4F			o		o			o		76

Series	EDP. NO	Appearance	Flutes	Type				Length			Neck	Multi Helix	Page
				Ball	Square	Radius	Roughing	Short	Middle	Long			
2 Zamus Classic	DB402		2F	o				o					80
	DB412		2F	o					o		o		81
	DB502		2F	o					o		o		82
	DB512		2F	o					o				83
	DB514		4F	o					o				84
	DB522		2F	o					o		o		85
	DB532		2F	o					o		o		86
	DB534		4F	o					o		o		87
	DB54(5)2		2F	o					o		o		88
	PK503		3F				o		o		o		89
	TB503		3F	o					o				90
	TB504		4F	o					o				91
	TE503		3F		o				o				92
	TPRB4-050		4F	o				o	o	o			93
	TPRB4-075		4F	o				o	o	o			94
	TPRB4-100		4F	o				o	o	o			95
	TPRB4-150		4F	o				o	o	o			96
	TPRB4-200		4F	o				o	o	o			97
	TPRE4-050		4F		o			o	o	o			98
	TPRE4-075		4F		o			o	o	o			99
	TPRE4-100		4F		o			o	o	o			100
	TPRE4-150		4F		o			o	o	o			101
	TPRE4-200		4F		o			o	o	o			102
	TPRE4-300		4F		o			o	o	o			103
	ZE502		2F		o				o				104
	ZE503		3F		o				o				105
	ZE504		4F		o				o				106
	ZE506		6F		o				o	o			107
	ZE512		2F		o				o				108
	ZE514		4F		o				o				109
	ZE516		6F		o				o				110

01 ENDMILL SERIES

Series	EDP. NO	Appearance	Flutes	Type				Length			Neck	Multi Helix	Page
				Ball	Square	Radius	Roughing	Short	Middle	Long			
2 Zamus Classic	ZE522		2F		o					o			111
	ZE524		4F		o					o			112
	ZE534		4F		o					o			113
	ZF60		3~6F				o		o				114
	ZF61		3~5F				o		o				115
	ZM502		2F		o				o				116
	ZM504		4F		o				o				117
	ZM522		2F		o				o				118
	ZM524		4F		o				o				119
	ZR502		2F			o			o		o		120
	ZR504		4F			o			o		o		121
	ZR512		2F			o				o			122
	ZR514		4F			o				o			123
	ZR522		2F			o			o				124
	ZR524		4F			o			o				125
3 Zamus Thunder	DB312		2F	o					o				128
	DB342		2F	o					o		o		129
	TX202		2F		o				o				130
	TX204		4F		o				o				131
	TX222		2F		o			o					132
	TX224		4F		o			o					133
	TX302		2F		o					o			134
	TX304		4F		o					o			135
	TX304H		2F		o				o				136
	TXB202		4F		o				o				137
	TXB204		4F		o				o				138
	TXB222		2F	o									139
	TXB232		4F	o					o				140
	TXB302		2F	o						o			141
	TXB304		2F	o					o				142

Series	EDP. NO	Appearance	Flutes	Type				Length			Neck	Multi Helix	Page
				Ball	Square	Radius	Roughing	Short	Middle	Long			
3 Zamus Thunder	ZE302P new		2F		o				o				143
	ZE304P new		4F		o				o				144
	ZE322		2F		o					o			145
	ZE324		4F		o					o			146
	ZR304H		4F			o			o				147
	ZR322		2F			o			o				148
	ZR324		4F			o			o				149
	ZR324H		4F			o			o				150
4 Winner	WHPB902		2F	o					o				154
	WB502		2F	o				o	o				155
	WB502---P		2F	o					o				157
	WSB502		2F	o					o				158
	WB503		3F	o					o				159
	WB504		4F	o					o				160
	WB532		2F	o					o		o		161
	WB542		2F	o					o		o		162
	WME502		2F		o				o				166
	WE502		2F		o			o					167
	WE502---S3		2F		o				o				169
	WE514		4F		o			o			o		170
	WE522		2F		o					o			172
	WE524		4F		o					o			174
	WME504		4F		o				o			o	176
	WXE504		4F		o			o	o	o		o	177
	WE504H		4F		o				o				178
	WE506		6F		o				o	o			179
	WR502		2F			o		o	o				180
	WR504		4F			o			o				182
	WR506		6F			o			o				183

01 ENDMILL SERIES

Series	EDP. NO	Appearance	Flutes	Type				Length			Neck	Multi Helix	Page
				Ball	Square	Radius	Roughing	Short	Middle	Long			
4 Winner	WR512		2F			o			o		o		184
	WR514		4F			o		o	o				189
	WXR504		4F			o			o		o	o	190
	WXR514		4F			o			o		o	o	192
	WR542		2F			o			o		o		196
	WR544		4F			o		o			o		200
	WSPM4		4F			o			o				203
	WDR503		3F			o			o				204
	WF60		3~5F				o		o			o	205
	WF61		3~5F				o		o				206
	WTB502		2F	o					o				207
	WTE502		2F		o				o				208
	WTE504		4F		o					o			210
	WTE514		4F		o			o	o	o			211
	WTR504		4F			o		o	o	o			213
5 X-Star	XXB504		4F	o					o			o	218
	XCC503		3F		o				o			o	219
	XCC504		4F		o				o			o	220
	XCE503		3F		o				o			o	221
	XCE504		4F		o				o			o	222
	XCR503		3F			o			o			o	223
	XCR504		4F			o			o			o	224
	XE504		4F		o				o			o	225
	XE505		5F		o				o			o	226
	XE514		4 F		o			o			o	o	227
	XE515		5F		o				o			o	228
	XE524		4F		o			o			o	o	229
	XR504		4F			o			o			o	230
	XR505		5F			o			o			o	231
	XR514		4F			o			o			o	232

Series	EDP. NO	Appearance	Flutes	Type				Length			Neck	Multi Helix	Page
				Ball	Square	Radius	Roughing	Short	Middle	Long			
6 SUS-Wave	DS502		2F	o					o				236
	SM503		3F		o				o			o	237
	SM504		4F			o			o			o	238
	ZF62		4~6F				o		o		o		239
7 V-Star	VXE504 NEW		4F		o				o	o		o	241
	VXR504 NEW		4F			o			o			o	242
8 ALU-Wave	WAB312		2F	o				o			o		246
	WAE301		1F		o				o				247
	WAE302		2F		o				o				248
	WAE30(2)3		2F		o					o			249
	WAR302		2F			o			o				251
	WAR303		3F			o			o				252
	WAR502		2F			o			o				253
	WAR503		3F			o			o				254
	WAF303		3F				o		o				255
9 Standard	B302		2F	o						o			258
	B304		4F	o						o			259
	BL422		2F	o						o			260
	E302		2F		o				o				261
	E304		4F		o				o				262
	E322		2F		o					o			263
	EL422		2F		o					o			264
	E324		4F		o					o			265
	EB302---W		2F		o				o				266
	EB304---W		4F		o				o				267
	EB322---W		2F		o					o			268
	EB324---W		4F		o					o			269
	BB302---W		2F	o					o				270

01 ENDMILL SERIES

Series	EDP. NO	Appearance	Flutes	Type				Length			Neck	Multi Helix	Page
				Ball	Square	Radius	Roughing	Short	Middle	Long			
10 Copper-Mate	BC502		2F	o					o		o		274
	RC502		2F			o			o		o		275
11 GRA-Mate	G		2F	o					o		o		278
	WGB504		4F	o					o		o		279
	GE		2F		o				o		o		280
	WGE504		4F		o			o	o	o			281
	WGR502		2F			o			o		o		282
	WGR504		4F			o			o				283

02 DRILL SERIES

Series	EDP. NO	Appearance	Flutes	Shape		Length							Margin		Internal coolant	Cutting edge tolerance	Page
				Relief	Facet	3xD	4xD	5xD	6xD	8xD	10xD	20xD	Single	Double			
1 Power Drill	NDPR new		2F		o		o						o			h7	288
	NDPL new		2F		o				o				o			h7	290
	CTS---W		2F		o	o							o			h8	292
2 Power Max Drill	PF503		2F		o	o							o			h8	296
	PF505		2F		o			o					o			h8	299
	SF503		2F		o	o							o		o	h8	302
	SF505		2F		o			o					o		o	h8	305
	SF508 new		2F		o					o				o	o	h7	308
	SF510		2F		o						o			o	o	h8	310
	SF520		2F		o							o		o	o	h8	312
	HP503		2F		o	o								o		m7	313
	HPI503		2F		o	o								o	o	m7	315
	HPI505		2F		o			o						o	o	m7	317
	HPI508--N		2F		o					o				o	o	m7	320
	P503A(F)		2F	o		o							o			m7	322
	PI503A(F)		2F		o	o							o		o	m7	324
	PI505A(F)		2F		o			o					o		o	m7	326
3 Solid Spiral Drill	SSD		2F		o		o						o			h8	330
	SSDL		2F		o					o			o			h8	332
	SSTD		2F		o		o						o			h8	333
	APF		3F		o			o					o			0~ -0.012	335

03 TAP SERIES

Series		EDP. NO	Appearance	Type	Coating		Min~Max	Page
					Coating	Uncoated		
CARBIDE TAP	JIS	WPOM		Spiral tap		○	M3~M12	343
		WPCM		Spiral tap	TiCN		M3~M12	344
		WSOM		Straight tap		○	M3~M12	345
		WSCM		Straight tap	TiCN		M3~M12	346
		WROM		Roll tap		○	M3~M12	347
		WRCM		Roll tap	TiCN		M3~M12	348
		WFOM		Spiral Roll tap		○	M3~M6	349
		WFCM		Spiral Roll tap	TiCN		M3~M6	350
	DIN	WQOM		Spiral tap		○	M3~M24	351
		WQCM		Spiral tap	TiCN		M3~M24	352
		WGOM		Straight tap		○	M3~M24	353
		WGCM		Straight tap	TiCN		M3~M24	354
		WMOM		Roll tap		○	M3~M12	355
		WMCM		Roll tap	TiCN		M3~M12	356
HSSE TAP	JIS	VPOM		Spiral tap		○	M3~M24	357
		VPTM		Spiral tap	TiN		M3~M24	358
		VPCM		Spiral tap	TiCN		M3~M24	359
		VPHM		Spiral tap	HOMO		M3~M24	360
		VNOM		Point tap		○	M3~M24	361
		VNTM		Point tap	TiN		M3~M24	362
		VNCM		Point tap	TiCN		M3~M24	363
		VNHM		Point tap	HOMO		M3~M24	364
		VSOM		Straight tap		○	M3~M24	365
		VSTM		Straight tap	TiN		M3~M24	366
		VSCM		Straight tap	TiCN		M3~M24	367
		VSHM		Straight tap	HOMO		M3~M24	368
		VROM		Roll tap		○	M3~M12	369
		VRTM		Roll tap	TiN		M3~M12	370
		VRCM		Roll tap	TiCN		M3~M12	371
		VFOM		Spiral Roll tap		○	M3~M6	372
		VFTM		Spiral Roll tap	TiN		M3~M6	373
		VFCM		Spiral Roll tap	TiCN		M3~M6	374

Series		EDP. NO	Appearance	Type	Coating		Min~Max	Page
					Coating	Uncoated		
HSSE TAP	DIN	VQOM		Spiral tap		○	M3~M24	375
		VQTM		Spiral tap	TiN		M3~M24	376
		VQCM		Spiral tap	TiCN		M3~M24	377
		VQHM		Spiral tap	HOMO		M3~M24	378
		VDOM		Point tap		○	M3~M24	379
		VDTM		Point tap	TiN		M3~M24	380
		VDCM		Point tap	TiCN		M3~M24	381
		VDHM		Point tap	HOMO		M3~M24	382
		VGOM		Straight tap		○	M3~M24	383
		VGTM		Straight tap	TiN		M3~M24	384
		VGCM		Straight tap	TiCN		M3~M24	385
		VGHM		Straight tap	HOMO		M3~M24	386
		VMOM		Roll tap		○	M3~M12	387
		VMTM		Roll tap	TiN		M3~M12	388
		VMCM		Roll tap	TiCN		M3~M12	389
PIPE TAP		VSOPT		Straight tap		○	1/16-28~ 1-11	390
		VPOPT		Spiral tap		○	1/16-28~ 1-11	391
		VSONPT		Straight tap		○	1/16-28~1-11	392
		VPONPT		Spiral tap		○	1/16-27~1-11½	393
		VSOPS		Straight tap		○	1/8-28~ 1-11	394
		VPOPS		Spiral tap		○	1/8-28~ 1-11	395
		VSOPF		Straight tap		○	1/8-28~ 1-11	396
		VPOPF		Spiral tap		○	1/8-28~ 1-11	397

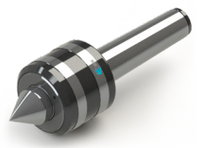
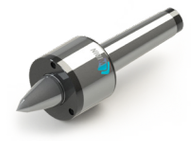
04 CENTERING TOOLS & REAMERS SERIES

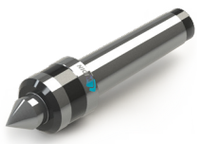
Series	Feature	EDP. NO	Appearance	Flutes	Type		Shape	Page
					Min	Max		
CENTERING TOOLS	For multi purpose	CDS		2F	1	5		402
		LDS		2F	3	20		403
		LDF---W		2F	3	12		404
		CES302		2F	3	20		405
		CEM---W		2F	10	20		406
		CRC		2F	2	20		407
		CFT---W		3~4F	6	12		408
		CCT		2F	3	12		409
		CCF		2F	2	12		410
REAMER	For general	SSR		4&6F	2	12	Straight	413
		SHR		4&6F	2	12	7˚Left Helix	414
		HRS---W		4&6F	1.98	12.05	7˚ Left Helix	415
		SBR		4&6F	3	20	60˚ Left Helix	416

05 CARBIDE RODS & BLANKS

Type	Appearance	Page
WU08		419
WF08		419
WF10		419
WF12		419
WK10		419

06 LIVE CENTER SERIES

Type	Appearance	Page
NC TYPE		422
NCB TYPE		422
NCC TYPE		422
NCBC TYPE		423
NCN TYPE		423
NCBN TYPE		423
NCCN TYPE		424
NCBCN TYPE		424
NCP TYPE		425
NCPB TYPE		425
NCPC TYPE		425
NCPBC TYPE		426
NCPN TYPE		426
NCPBN TYPE		426
NCPCN TYPE		427
NCPBCN TYPE		427
NK TYPE		428
NKB TYPE		428
NKC TYPE		428
NKBC TYPE		429
NKN TYPE		429
NKBN TYPE		429
NKCN TYPE		430
NKBCN TYPE		430
NKD TYPE		431
GR TYPE		431
SM TYPE		432
SMB TYPE		432
SMC TYPE		432
SMBC TYPE		433
SMN TYPE		433
SMBN TYPE		433
SMCN TYPE		434
SMBCN TYPE		434

Type	Appearance	Page
SMP TYPE		435
SMPB TYPE		435
SMPC TYPE		435
SMPBC TYPE		436
SMPN TYPE		436
SMPBN TYPE		436
SMPCN TYPE		437
SMPBCN TYPE		437
D50 TYPE		438
D50B TYPE		438
D50C TYPE		438
D50BC TYPE		439
HD TYPE		440
HDC TYPE		440
HDS TYPE		440
HDSC TYPE		441
HDSTH TYPE		441
PT-60 TYPE		442
PT-80 TYPE		442
LM-A TYPE		443
LM-C TYPE		443
LM-AN TYPE		444
LM-CN TYPE		444
LM-H TYPE		445
LM-HC TYPE		445
LM-HN TYPE		446
LM-HCN TYPE		446
LM-FN TYPE		447
LM-#80 TYPE		447

ENDMILL SERIES

2020▶2021
WIDIN
PRODUCTS

ENDMILL SERIES 01

EDP. NO	Appearance	Type	INCH & METRIC	Page
DB702		2 FLUTES NECK TYPE BALL NOSE ENDMILL	METRIC	30
DB703		3 FLUTES NECK TYPE BALL NOSE ENDMILL	METRIC	31
DB712		2 FLUTES BALL NOSE ENDMILL	METRIC	32
DB734		4 FLUTES 15° HELIX BALL NOSE ENDMILL	METRIC	33
ZE702		2 FLUTES NECK TYPE SQUARE ENDMILL	METRIC	34
ZE704		4 FLUTES NECK TYPE SQUARE ENDMILL	METRIC	35
ZE712		2 FLUTES SQUARE ENDMILL	METRIC	36
ZE714		4 FLUTES SQUARE ENDMILL	METRIC	37
ZE716		6 FLUTES SQUARE ENDMILL	METRIC	38
ZE724(6)		4&6 FLUTES NECK TYPE SQUARE ENDMILL	METRIC	39
ZR702		2 FLUTES NECK TYPE RADIUS ENDMILL	METRIC	40
ZR704		4 FLUTES NECK TYPE RADIUS ENDMILL	METRIC	42
ZR706		6 FLUTES NECK TYPE RADIUS ENDMILL	METRIC	44
ZR714		4 FLUTES RADIUS ENDMILL	METRIC	45
ZR724		4 FLUTES NECK TYPE RADIUS ENDMILL	METRIC	46
ZR732		2 FLUTES LONG SHANK RADIUS ENDMILL	METRIC	47
ZR734		4 FLUTES LONG SHANK RADIUS ENDMILL	METRIC	48
ZR736		6 FLUTES RADIUS ENDMILL	METRIC	49
WB712+ new		2 FLUTES RIB TYPE BALL NOSE ENDMILL	METRIC	50
WE712+ new		2 FLUTES RIB TYPE SQUARE ENDMILL	METRIC	53
ZS1(2)04		4 FLUTES NECK TYPE RADIUS ENDMILL	METRIC	56
ZS124		4 FLUTES SQUARE ENDMILL	METRIC	57
ZS204		4 FLUTES NECK TYPE RADIUS ENDMILL	METRIC	58
ZSLNB		2 FLUTES LONG NECK TYPE BALL NOSE ENDMILL	METRIC	59
ZSTNB20		2 FLUTES TAPERED NECK TYPE BALL NOSE ENDMILL	METRIC	62
ZSTNB30		3 FLUTES TAPERED NECK TYPE BALL NOSE ENDMILL	METRIC	65
ZSLNS20		2 FLUTES LONG NECK TYPE SQUARE ENDMILL	METRIC	66
ZSLNS40		4 FLUTES LONG NECK TYPE SQUARE ENDMILL	METRIC	70
ZSLNR		2 FLUTES LONG NECK TYPE RADIUS ENDMILL	METRIC	72
ZSTNR		2 FLUTES TAPERED NECK TYPE RADIUS ENDMILL	METRIC	74
ZSPM4		4 FLUTES NECK TYPE RADIUS ENDMILL	METRIC	76

Zamus Star Series

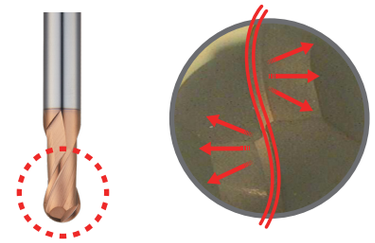
ZAMUS STAR

General Features

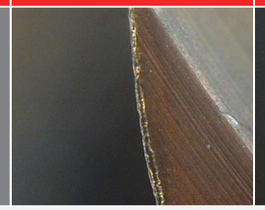
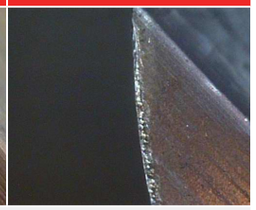
- Suitable for high-speed processing of high-hardness workpieces (recommended: HRc 50 ~ 70) such as heat treated steel, alloy steel, and carbon steel
- Suitable for various type of machining with diverse specifications such as long neck, rib, and tapered neck

Characteristics

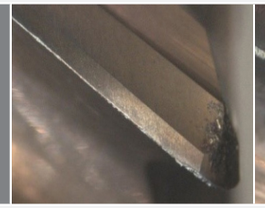
- Improved cutting edge strength of tools by using ultra-fine material
- Maintains hardness of the blade and has high temperature oxidation resistance and during high-speed processing by applying AlTiN coating
- Stable performance with designed cutting edge suitable for high-speed machining of high-hardness workpieces



* Stable tool life by distributing cutting load by applying S shape
* Improved machining precision with 0.005mm radius tolerance

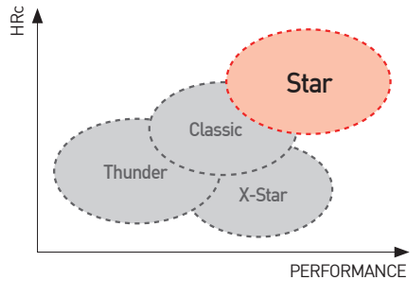
	WIDIN	COMPETITORS
BALL		

MATERIAL : SKD11 Heat treatment / RPM : 5,950 / FEED : 1,870 / ap : 0.25 / ae : 0.6
TEST TOOL : DB702120

CONER RADIUS		

MATERIAL : SKD11 Heat treatment / RPM : 5,500 / FEED : 1,100 / ap : 10 / ae : 0.5
TEST TOOL : ZS2041001032

Applications



EDP No. System

*If expressed as an integer, the decimal point is omitted.

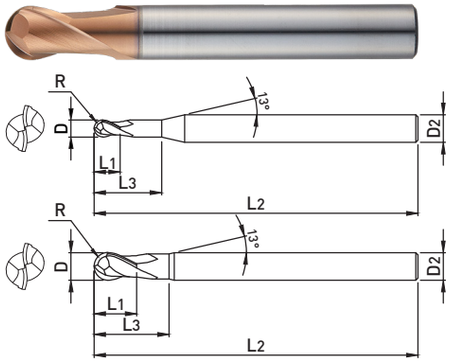
TYPE	APPEARANCE	GRADE	LENGTH, SHANK TYPE	FLUTE	CUTTING DIA.	CORNER R	EFFECTIVE LENGTH	SHANK DIA.
Z : Zamus Endmill	A : Inch Size	7 : Grade	0 - Neck	2 : 2 Flutes	0.05	0.05	For more information, Refer to the detail pages.	4
D : Dynamic	B : Ball type		1 - Straight Type, NECK	3 : 3 Flutes	~	~		~
ZS : Zamus Star	E : Square type		2 - Long Neck	4 : 4 Flutes	20	3		20
W : WINNER 7 PLUS	R : Radius type		3 - Long Shank	6 : 6 Flutes				
	LNS : Long Neck Square type							
	LNB : Long Neck Ball type							
	LNR : Long Neck Radius type							
	PM : Power Mill							

Z	R	7	0	4	020	03	06	S04
Zamus Endmill	Radius type	Grade	Neck	4 Flutes	Ø2	R0.3	Effective length 6	SHANK DIA. Ø4

Ex) 4FLUTES CUTTING DIA. Ø2 CORNER R 0.3 70 GRADE CORNER RADIUS NECK TYPE ZAMUS ENDMILL

DB702

2 FLUTES NECK TYPE BALL NOSE ENDMILL



- High-precision R tolerance applied to the cutting edge provides high-quality machining shape
- High strength of cutting edge by applying optimized rake angle

ULTRA FINE | 2 | 30° HELIX | R ±0.005 R3 OR UNDER | R ±0.01 ABOVE R3 | AlTiN | DATA p.453

■ **TOLERANCE**

D		SHANK DIA.
ALL SIZES	0 ~ -0.02mm	h5

EDP No.	D	R	L_1	L_3	L_2	D_2
DB702 001	0.1	0.05	0.15	-	40	4
DB702 002	0.2	0.1	0.3	-	40	4
DB702 003	0.3	0.15	0.5	-	40	4
DB702 004	0.4	0.2	0.6	-	40	4
DB702 005	0.5	0.25	0.7	-	40	4
DB702 006	0.6	0.3	0.9	-	40	4
DB702 007	0.7	0.35	1.1	-	40	4
DB702 008	0.8	0.4	1.2	-	40	4
DB702 009	0.9	0.45	1.4	-	40	4
DB702 010 S4	1	0.5	1.5	-	45	4
DB702 010	1	0.5	1.5	3	50	6
DB702 015 S4	1.5	0.75	2	-	45	4
DB702 015	1.5	0.75	2	4	50	6
DB702 020 S4	2	1	2.5	-	45	4
DB702 020	2	1	2.5	5	50	6
DB702 025	2.5	1.25	3	7	50	6
DB702 030S4	3	1.5	4	-	45	4
DB702 030S	3	1.5	4	10	50	6
DB702 030	3	1.5	4	10	60	6
DB702 031	3	1.5	4	10	70	6
DB702 040 S4	4	2	5	-	45	4
DB702 040 S	4	2	5	10	50	6
DB702 040	4	2	5	10	60	6
DB702 041	4	2	5	10	70	6
DB702 050	5	2.5	6	12	60	6
DB702 060	6	3	7	12	60	6
DB702 061	6	3	7	12	90	6
DB702 080	8	4	9	15	70	8
DB702 081	8	4	9	15	100	8
DB702 100	10	5	11	25	75	10
DB702 101	10	5	11	25	100	10
DB702 120	12	6	12	25	80	12
DB702 121	12	6	12	25	110	12

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

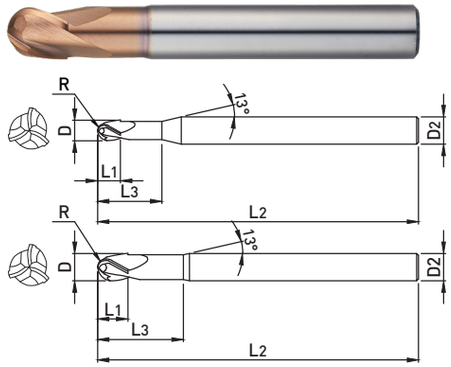
■ **Applicable Working Material**

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
	O	O	◎	◎	O				

○ : GOOD ◎ : EXCELLENT

DB703

3 FLUTES NECK TYPE BALL NOSE ENDMILL



- High-precision R tolerance applied to the cutting edge provides high-quality machining shape
- Excellent workpiece finishes by applying center match type 3 flutes in high speed processing

ULTRA FINE | 3 | 30° HELIX | R ±0.005 R3 OR UNDER | R ±0.01 ABOVE R3 | AlTiN | DATA p.453

■ **TOLERANCE**

D		SHANK DIA.
ALL SIZES	0 ~ -0.015mm	h5

EDP No	D	R	L_1	L_3	L_2	D_2
DB703 020	2	1	2.5	5	50	6
DB703 025	2.5	1.25	3	7	50	6
DB703 030 S	3	1.5	4	10	50	6
DB703 030	3	1.5	4	10	60	6
DB703 031	3	1.5	4	10	70	6
DB703 040 S	4	2	5	10	50	6
DB703 040	4	2	5	10	60	6
DB703 041	4	2	5	10	70	6
DB703 050	5	2.5	6	12	60	6
DB703 060	6	3	7	12	60	6
DB703 061	6	3	7	12	90	6
DB703 080	8	4	9	15	70	8
DB703 081	8	4	9	15	100	8
DB703 100	10	5	11	25	75	10
DB703 101	10	5	11	25	100	10
DB703 120	12	6	12	25	80	12
DB703 121	12	6	12	25	110	12

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

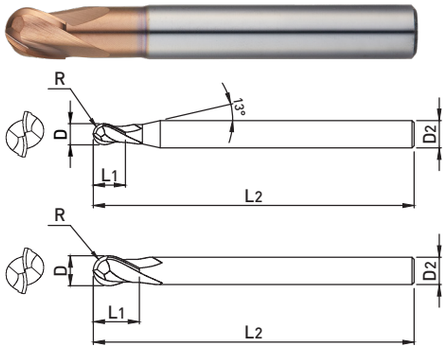
■ **Applicable Working Material**

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
	O	O	◎	◎	O				

○ : GOOD ◎ : EXCELLENT

DB712

2 FLUTES BALL NOSE ENDMILL



- High-precision R tolerance applied to the cutting edge provides high-quality machining shape
- High strength of cutting edge by applying optimized rake angle

ULTRA FINE | 2 | 30° HELIX | R ±0.005 R3 OR UNDER | R ±0.01 ABOVE R3 | AlTiN | DATA p.453

■ TOLERANCE

D		SHANK DIA.
ALL SIZES	0 ~ -0.02mm	h5

EDP No	D	R	L_1	L_2	D_2
DB712 010 S	1	0.5	1.5	40	6
DB712 010 S4	1	0.5	2.5	50	4
DB712 010	1	0.5	2.5	50	6
DB712 012	1.2	0.6	3	50	6
DB712 015 S	1.5	0.75	2.5	40	6
DB712 015 S4	1.5	0.75	4	50	4
DB712 015	1.5	0.75	4	50	6
DB712 020 S	2	1	3	40	6
DB712 020 S4	2	1	5	50	4
DB712 020	2	1	5	50	6
DB712 025	2.5	1.25	7	60	6
DB712 030 S	3	1.5	4.5	50	6
DB712 030 S4	3	1.5	8	60	4
DB712 030	3	1.5	8	60	6
DB712 040 S	4	2	6	50	6
DB712 040	4	2	8	70	6
DB712 050 S	5	2.5	7.5	50	6
DB712 050	5	2.5	10	80	6
DB712 060 S	6	3	9	50	6
DB712 060	6	3	12	90	6
DB712 080 S	8	4	12	50	8
DB712 081	8	4	14	100	8
DB712 100 S	10	5	15	60	10
DB712 100	10	5	18	100	10
DB712 120 S	12	6	18	60	12
DB712 120	12	6	22	110	12

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

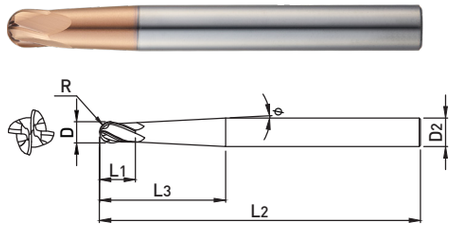
■ Applicable Working Material

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
	○	○	◎	◎	○				

○ : GOOD ◎ : EXCELLENT

DB734

4 FLUTES 15° HELIX BALL NOSE ENDMILL



- Excellent hardness with tapered effective length
- Improved tool life by minimizing chattering

ULTRA FINE | 4 | 15° HELIX | R ±0.01 ALL SIZES | AlTiN | DATA p.454

■ TOLERANCE

D		SHANK DIA.
ALL SIZES	0 ~ -0.015mm	h5

EDP No	D	R	L_1	L_3	L_2	θ	D_2
DB734 020-2.5	2	1	2	25	60	2.5	4
DB734 020-3.5	2	1	2	18	60	3.5	4
DB734 025-2.5	2.5	1.25	3	20	60	2.5	4
DB734 025-3.0	2.5	1.25	3	17	60	3	4
DB734 030-2.0	3	1.5	3	46	70	2	6
DB734 030-2.5	3	1.5	3	37	70	2.5	6
DB734 040-2.0	4	2	4	33	70	2	6
DB734 040-2.5	4	2	4	27	70	2.5	6
DB734 050-2.5	5	2.5	5	16	70	2.5	6
DB734 060-1.5	6	3	6	44	100	1.5	8
DB734 060-2.5	6	3	6	29	100	2.5	8
DB734 080-1.5	8	4	8	46	100	1.5	10
DB734 080-2.5	8	4	8	31	100	2.5	10
DB734 100-1.5	10	5	10	48	110	1.5	12
DB734 100-2.5	10	5	10	33	110	2.5	12

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

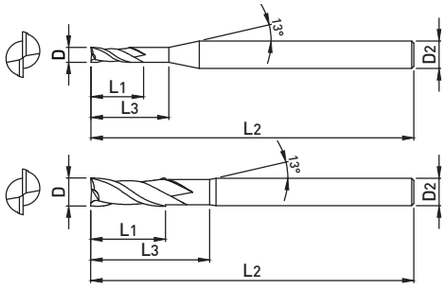
■ Applicable Working Material

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
	○	○	◎	◎	○				

○ : GOOD ◎ : EXCELLENT

ZE702

2 FLUTES SQUARE ENDMILL



- The stiffness of the cutting edge is supplemented by applying the rake angle
- Improved chipping resistance and wear resistance with high hardness cutting edge

ULTRA FINE | 2 | 30° HELIX | AlTiN | DATA p.455

■ TOLERANCE

D		SHANK DIA.
~ D6	0 ~ -0.012mm	h5
D8 ~ 20	0 ~ -0.015mm	

EDP No	D	L_1	L_3	L_2	D_2
ZE702 001	0.1	0.2	-	40	4
ZE702 002	0.2	0.4	-	40	4
ZE702 003	0.3	0.5	-	40	4
ZE702 004	0.4	0.7	-	40	4
ZE702 005	0.5	1	-	40	4
ZE702 006	0.6	1.2	-	40	4
ZE702 007	0.7	1.4	-	40	4
ZE702 008	0.8	1.6	-	40	4
ZE702 009	0.9	2	-	40	4
ZE702 010 S4	1	1.5	-	40	4
ZE702 010	1	1.5	-	40	6
ZE702 015	1.5	2.2	-	40	6
ZE702 020 S4	2	3	6	40	4
ZE702 020	2	3	6	40	6
ZE702 025	2.5	4	6	40	6
ZE702 030	3	4	7	45	6
ZE702 035	3.5	6	9	45	6
ZE702 040	4	6	9	45	6
ZE702 045	4.5	6	10	45	6
ZE702 050	5	6	11	50	6
ZE702 060	6	7	14	50	6
ZE702 080	8	9	18	60	8
ZE702 100	10	12	25	75	10
ZE702 120	12	15	30	75	12
ZE702 160	16	18	38	90	16
ZE702 200	20	24	45	100	20

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

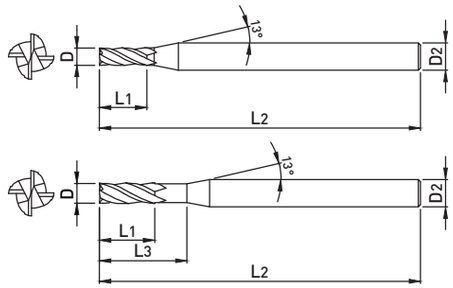
■ Applicable Working Material

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
	○	○	◎	◎	○				

○ : GOOD ◎ : EXCELLENT

ZE704

4 FLUTES NECK TYPE SQUARE ENDMILL



- The stiffness of the cutting edge is supplemented by applying the rake angle
- Improved chipping resistance and wear resistance with high hardness cutting edge

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

■ TOLERANCE

D		SHANK DIA.
~ D6	0 ~ -0.012mm	h5
D8 ~ 20	0 ~ -0.015mm	

EDP No	D	L_1	L_3	L_2	D_2
ZE704 010 S4	1	1.5	-	40	4
ZE704 010	1	1.5	-	40	6
ZE704 015	1.5	2.2	-	40	6
ZE704 020 S4	2	3	6	40	4
ZE704 020	2	3	6	40	6
ZE704 025	2.5	4	6	40	6
ZE704 030	3	4	7	45	6
ZE704 035	3.5	5	9	45	6
ZE704 040	4	5	9	45	6
ZE704 045	4.5	6	10	45	6
ZE704 050	5	6	11	50	6
ZE704 060	6	7	14	50	6
ZE704 080	8	9	18	60	8
ZE704 100	10	12	25	75	10
ZE704 120	12	15	30	75	12
ZE704 160	16	18	38	90	16
ZE704 200	20	24	45	100	20

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

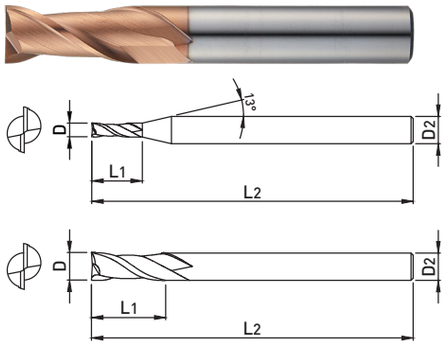
■ Applicable Working Material

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
	○	○	◎	◎	○				

○ : GOOD ◎ : EXCELLENT

ZE712

2 FLUTES SQUARE ENDMILL



- The stiffness of the cutting edge is supplemented by applying the rake angle
- Improved chipping resistance and wear resistance with high hardness cutting edge

ULTRA FINE | 2 | 35° HELIX | AlTiN | DATA p.455

■ **TOLERANCE**

D		SHANK DIA.
ALL SIZES	0 ~ -0.02mm	h5

EDP No	D	L_1	L_2	D_2
ZE712 010-02	1	2	40	6
ZE712 010	1	3	40	6
ZE712 010-04	1	4	40	6
ZE712 012	1.2	3	40	6
ZE712 015	1.5	4	40	6
ZE712 015-06	1.5	6	40	6
ZE712 015-08	1.5	8	40	6
ZE712 020	2	5	40	6
ZE712 020-08	2	8	40	6
ZE712 020-10	2	10	50	6
ZE712 025	2.5	6	40	6
ZE712 030	3	8	45	6
ZE712 030-10	3	10	50	6
ZE712 030-12	3	12	50	6
ZE712 035	3.5	10	45	6
ZE712 040	4	10	45	6
ZE712 040-12	4	12	50	6
ZE712 040-16	4	16	60	6
ZE712 045	4.5	11	45	6
ZE712 050	5	13	50	6
ZE712 055	5.5	13	50	6
ZE712 060	6	13	50	6
ZE712 060-15	6	15	60	6
ZE712 065	6.5	16	60	8
ZE712 070	7	18	60	8
ZE712 080	8	19	60	8
ZE712 100	10	22	70	10

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

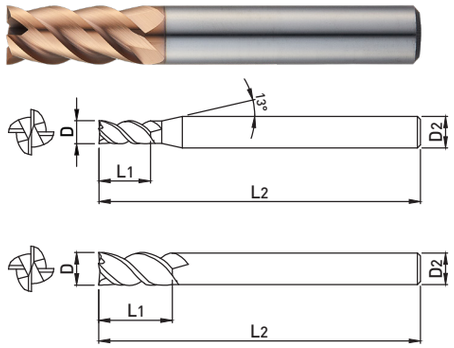
■ **Applicable Working Material**

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
	○	○	◎	◎	○				

○ : GOOD ◎ : EXCELLENT

ZE714

4 FLUTES SQUARE ENDMILL



- The stiffness of the cutting edge is supplemented by applying the rake angle
- Improved chipping resistance and wear resistance with high hardness cutting edge
- Improved workability by applying 45° helix angle

ULTRA FINE | 4 | 45° HELIX | AlTiN | DATA p.456

■ **TOLERANCE**

D		SHANK DIA.
ALL SIZES	0 ~ -0.02mm	h5

EDP No	D	L_1	L_2	D_2
ZE714 010	1	2.5	40	6
ZE714 012	1.2	3	40	6
ZE714 015	1.5	4	40	6
ZE714 020	2	5	40	6
ZE714 025	2.5	6	40	6
ZE714 030	3	8	45	6
ZE714 035	3.5	9	45	6
ZE714 040	4	10	45	6
ZE714 050	5	13	50	6
ZE714 060	6	13	50	6
ZE714 060-15	6	15	60	6
ZE714 080	8	19	60	8
ZE714 100	10	22	70	10
ZE714 100-25	10	25	70	10
ZE714 120	12	26	75	12
ZE714 120-30	12	30	80	12

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

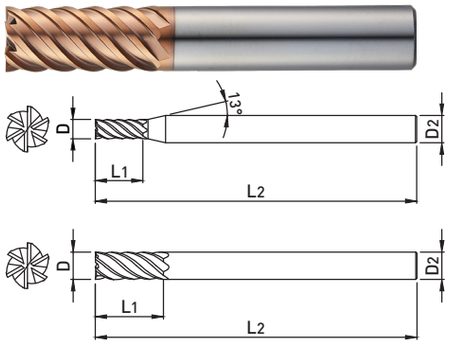
■ **Applicable Working Material**

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
	○	○	◎	◎	○				

○ : GOOD ◎ : EXCELLENT

ZE716

6 FLUTES SQUARE ENDMILL



- The stiffness of the cutting edge is supplemented by applying the rake angle
- Improved chipping resistance and wear resistance with high hardness cutting edge
- Improved workability by applying 50° helix angle

ULTRA FINE | 6 | 50° HELIX | AlTiN | DATA p.456

■ **TOLERANCE**

D		SHANK DIA.
ALL SIZES	0 ~ -0.02mm	h5

EDP No	D	L_1	L_2	D_2
ZE716 060	6	13	50	6
ZE716 080	8	18	60	8
ZE716 100	10	22	70	10
ZE716 120	12	26	75	12
ZE716 160	16	35	90	16
ZE716 200	20	44	100	20

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

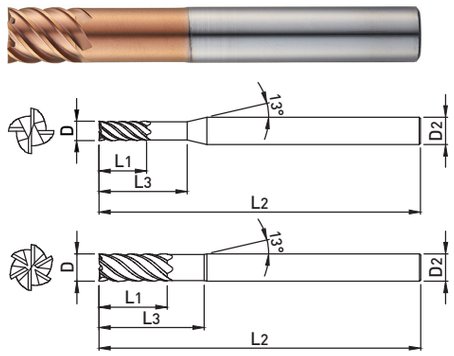
■ **Applicable Working Material**

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
	○	○	◎	◎	○				

○ : GOOD ◎ : EXCELLENT

ZE724(6)

4&6 FLUTES NECK TYPE SQUARE ENDMILL



- Improved cutting performance during high-speed machining by reinforcing the stiffness of the cutting edge
- Suitable for semi-finishing, finishing by applying high helix angle
- Minimize interference in machining by applying various effective length

ULTRA FINE | 4 | 6 | 45° HELIX Z=4 | 60° HELIX Z=6 | AlTiN | DATA p.456

■ **TOLERANCE**

D		SHANK DIA.
~ D6	0 ~ -0.015mm	h5
D8 ~ 12	0 ~ -0.002mm	

EDP No	D	L_1	L_3	L_2	D_2	Z
ZE724 010	1	1.5	5	45	6	4
ZE724 015	1.5	2.2	6	45	6	4
ZE724 020	2	3	8	45	6	4
ZE724 030	3	4	9	50	6	4
ZE724 040	4	5	12	50	6	4
ZE724 050	5	6	15	50	6	4
ZE726 060	6	7	20	60	6	6
ZE726 080	8	9	25	70	8	6
ZE726 100	10	12	32	75	10	6
ZE726 120	12	15	38	80	12	6

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

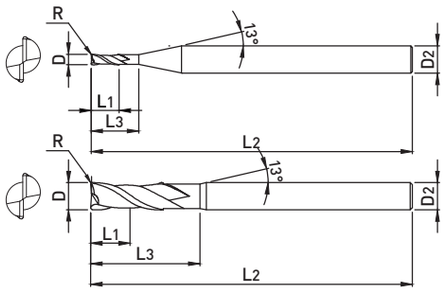
■ **Applicable Working Material**

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
	○	○	◎	◎	○				

○ : GOOD ◎ : EXCELLENT

ZR702

2 FLUTES NECK TYPE RADIUS ENDMILL



- Excellent machinability with cutting edge considered the characteristics of high hardness workpiece
- Extend customer choice with various corner R size and effective length

ULTRA FINE | 2 | 30° HELIX | AlTiN | R ±0.01 | R ±0.015 | DATA

Φ6 OR UNDER ABOVE Φ6

p.457

▪ **TOLERANCE**

D		SHANK DIA.
~ D6	0 ~ -0.012mm	h5
D8 ~ 12	0 ~ -0.015mm	

EDP No	D	R	L_1	L_3	L_2	D_2
ZR702 010 005 03 S4	1	0.05	1.5	3	50	4
ZR702 010 005 04 S4	1	0.05	1.5	4	50	4
ZR702 010 005 06 S4	1	0.05	1.5	6	50	4
ZR702 010 005 08 S4	1	0.05	1.5	8	50	4
ZR702 010 005 10 S4	1	0.05	1.5	10	50	4
ZR702 010 01 03 S4	1	0.1	1.5	3	50	4
ZR702 010 01 04 S4	1	0.1	1.5	4	50	4
ZR702 010 01 06 S4	1	0.1	1.5	6	50	4
ZR702 010 01 08 S4	1	0.1	1.5	8	50	4
ZR702 010 01 10 S4	1	0.1	1.5	10	50	4
ZR702 010 02 03 S4	1	0.2	1.5	3	50	4
ZR702 010 02 04 S4	1	0.2	1.5	4	50	4
ZR702 010 02 06 S4	1	0.2	1.5	6	50	4
ZR702 010 02 08 S4	1	0.2	1.5	8	50	4
ZR702 010 02 10 S4	1	0.2	1.5	10	50	4
ZR702 010 03 03 S4	1	0.3	1.5	3	50	4
ZR702 010 03 04 S4	1	0.3	1.5	4	50	4
ZR702 010 03 06 S4	1	0.3	1.5	6	50	4
ZR702 010 03 08 S4	1	0.3	1.5	8	50	4
ZR702 010 03 10 S4	1	0.3	1.5	10	50	4
ZR702 010 01 04	1	0.1	1.5	4	50	6
ZR702 010 01 06	1	0.1	1.5	6	50	6
ZR702 010 02 04	1	0.2	1.5	4	50	6
ZR702 010 02 06	1	0.2	1.5	6	50	6
ZR702 010 02 10	1	0.2	1.5	10	50	6
ZR702 010 02 12	1	0.2	1.5	12	50	6
ZR702 012 02 08	1.2	0.2	2	8	50	6
ZR702 012 02 12	1.2	0.2	2	12	50	6
ZR702 015 005 04 S4	1.5	0.05	2.5	4	50	4
ZR702 015 005 06 S4	1.5	0.05	2.5	6	50	4
ZR702 015 005 08 S4	1.5	0.05	2.5	8	50	4
ZR702 015 005 10 S4	1.5	0.05	2.5	10	50	4
ZR702 015 005 12 S4	1.5	0.05	2.5	12	50	4
ZR702 015 01 04 S4	1.5	0.1	2.5	4	50	4
ZR702 015 01 06 S4	1.5	0.1	2.5	6	50	4
ZR702 015 01 08 S4	1.5	0.1	2.5	8	50	4
ZR702 015 01 10 S4	1.5	0.1	2.5	10	50	4
ZR702 015 01 12 S4	1.5	0.1	2.5	12	50	4

EDP No	D	R	L_1	L_3	L_2	D_2
ZR702 015 01 12 S4	1.5	0.1	2.5	12	50	4
ZR702 015 02 04 S4	1.5	0.2	2.5	4	50	4
ZR702 015 02 06 S4	1.5	0.2	2.5	6	50	4
ZR702 015 02 08 S4	1.5	0.2	2.5	8	50	4
ZR702 015 02 10 S4	1.5	0.2	2.5	10	50	4
ZR702 015 02 12 S4	1.5	0.2	2.5	12	50	4
ZR702 015 03 04 S4	1.5	0.3	2.5	4	50	4
ZR702 015 03 06 S4	1.5	0.3	2.5	6	50	4
ZR702 015 03 08 S4	1.5	0.3	2.5	8	50	4
ZR702 015 03 10 S4	1.5	0.3	2.5	10	50	4
ZR702 015 03 12 S4	1.5	0.3	2.5	12	50	4
ZR702 015 05 04 S4	1.5	0.5	2.5	4	50	4
ZR702 015 05 06 S4	1.5	0.5	2.5	6	50	4
ZR702 015 05 08 S4	1.5	0.5	2.5	8	50	4
ZR702 015 05 10 S4	1.5	0.5	2.5	10	50	4
ZR702 015 05 12 S4	1.5	0.5	2.5	12	50	4
ZR702 015 02 04	1.5	0.2	2.5	4	50	6
ZR702 015 02 06	1.5	0.2	2.5	6	50	6
ZR702 015 02 08	1.5	0.2	2.5	8	50	6
ZR702 015 02 10	1.5	0.2	2.5	10	50	6
ZR702 015 02 15	1.5	0.2	2.5	15	50	6
ZR702 020 01 06 S4	2	0.1	3	6	50	4
ZR702 020 01 08 S4	2	0.1	3	8	50	4
ZR702 020 01 12 S4	2	0.1	3	12	50	4
ZR702 020 01 16 S4	2	0.1	3	16	50	4
ZR702 020 01 20 S4	2	0.1	3	20	50	4
ZR702 020 02 06 S4	2	0.2	3	6	50	4
ZR702 020 02 08 S4	2	0.2	3	8	50	4
ZR702 020 02 10 S4	2	0.2	3	10	50	4
ZR702 020 02 12 S4	2	0.2	3	12	50	4
ZR702 020 02 16 S4	2	0.2	3	16	50	4
ZR702 020 02 20 S4	2	0.2	3	20	50	4
ZR702 020 03 06 S4	2	0.3	3	6	50	4
ZR702 020 03 08 S4	2	0.3	3	8	50	4
ZR702 020 03 10 S4	2	0.3	3	10	50	4
ZR702 020 03 12 S4	2	0.3	3	12	50	4
ZR702 020 03 16 S4	2	0.3	3	16	50	4
ZR702 020 03 20 S4	2	0.3	3	20	50	4

EDP No	D	R	L_1	L_3	L_2	D_2
ZR702 020 05 06 S4	2	0.5	3	6	50	4
ZR702 020 05 08 S4	2	0.5	3	8	50	4
ZR702 020 05 10 S4	2	0.5	3	10	50	4
ZR702 020 05 12 S4	2	0.5	3	12	50	4
ZR702 020 05 16 S4	2	0.5	3	16	50	4
ZR702 020 05 20 S4	2	0.5	3	20	50	4
ZR702 020 01 08	2	0.1	3	8	50	6
ZR702 020 01 12	2	0.1	3	12	50	6
ZR702 020 02 06	2	0.2	3	6	50	6
ZR702 020 02 09	2	0.2	3	9	50	6
ZR702 020 02 16	2	0.2	3	16	50	6
ZR702 020 03 06	2	0.3	3	6	50	6
ZR702 020 05 06	2	0.5	3	6	50	6
ZR702 020 05 09	2	0.5	3	9	50	6
ZR702 020 05 12	2	0.5	3	12	50	6
ZR702 020 05 16	2	0.5	3	16	50	6
ZR702 025 02 08 S4	2.5	0.2	3.5	8	50	4
ZR702 025 02 10 S4	2.5	0.2	3.5	10	50	4
ZR702 025 02 12 S4	2.5	0.2	3.5	12	50	4
ZR702 025 02 16 S4	2.5	0.2	3.5	16	50	4
ZR702 025 03 08 S4	2.5	0.3	3.5	8	50	4
ZR702 025 03 10 S4	2.5	0.3	3.5	10	50	4
ZR702 025 03 12 S4	2.5	0.3	3.5	12	50	4
ZR702 025 03 16 S4	2.5	0.3	3.5	16	50	4
ZR702 025 05 08 S4	2.5	0.5	3.5	8	50	4
ZR702 025 05 10 S4	2.5	0.5	3.5	10	50	4
ZR702 025 05 12 S4	2.5	0.5	3.5	12	50	4
ZR702 025 05 16 S4	2.5	0.5	3.5	16	50	4
ZR702 030 01 08	3	0.1	4.5	8	55	6
ZR702 030 01 10	3	0.1	4.5	10	55	6
ZR702 030 01 12	3	0.1	4.5	12	55	6
ZR702 030 01 16	3	0.1	4.5	16	55	6
ZR702 030 01 20	3	0.1	4.5	20	60	6
ZR702 030 02 08	3	0.2	4.5	8	55	6
ZR702 030 02 09	3	0.2	4.5	9	55	6
ZR702 030 02 10	3	0.2	4.5	10	55	6
ZR702 030 02 12	3	0.2	4.5	12	55	6
ZR702 030 02 16	3	0.2	4.5	16	55	6
ZR702 030 02 20	3	0.2	4.5	20	60	6
ZR702 030 03 08	3	0.3	4.5	8	55	6
ZR702 030 03 09	3	0.3	4.5	9	55	6
ZR702 030 03 10	3	0.3	4.5	10	55	6
ZR702 030 03 12	3	0.3	4.5	12	55	6
ZR702 030 03 14	3	0.3	4.5	14	55	6
ZR702 030 03 16	3	0.3	4.5	16	55	6
ZR702 030 03 20	3	0.3	4.5	20	60	6
ZR702 030 05 08	3	0.5	4.5	8	55	6
ZR702 030 05 09	3	0.5	4.5	9	55	6
ZR702 030 05 10	3	0.5	4.5	10	55	6
ZR702 030 05 12	3	0.5	4.5	12	55	6
ZR702 030 05 16	3	0.5	4.5	16	55	6
ZR702 030 05 20	3	0.5	4.5	20	60	6
ZR702 030 10 08	3	1	4.5	8	55	6
ZR702 030 10 10	3	1	4.5	10	55	6

EDP No	D	R	L_1	L_3	L_2	D_2
ZR702 030 10 12	3	1	4.5	12	55	6
ZR702 030 10 16	3	1	4.5	16	55	6
ZR702 030 10 20	3	1	4.5	20	55	6
ZR702 030 10 25	3	1	4.5	25	60	6
ZR702 040 01 10	4	0.1	6	10	55	6
ZR702 040 01 12	4	0.1	6	12	55	6
ZR702 040 01 16	4	0.1	6	16	55	6
ZR702 040 01 20	4	0.1	6	20	60	6
ZR702 040 01 25	4	0.1	6	25	60	6
ZR702 040 02 10	4	0.2	6	10	55	6
ZR702 040 02 12	4	0.2	6	12	55	6
ZR702 040 02 16	4	0.2	6	16	55	6
ZR702 040 02 20	4	0.2	6	20	60	6
ZR702 040 02 25	4	0.2	6	25	60	6
ZR702 040 03 10	4	0.3	6	10	55	6
ZR702 040 03 12	4	0.3	6	12	55	6
ZR702 040 03 16	4	0.3	6	16	55	6
ZR702 040 03 20	4	0.3	6	20	60	6
ZR702 040 03 25	4	0.3	6	25	60	6
ZR702 040 05 10	4	0.5	6	10	55	6
ZR702 040 05 12	4	0.5	6	12	55	6
ZR702 040 05 16	4	0.5	6	16	55	6
ZR702 040 05 20	4	0.5	6	20	60	6
ZR702 040 05 25	4	0.5	6	25	60	6
ZR702 040 05 30	4	0.5	6	30	70	6
ZR702 040 10 10	4	1	6	10	55	6
ZR702 040 10 12	4	1	6	12	55	6
ZR702 040 10 16	4	1	6	16	55	6
ZR702 040 10 20	4	1	6	20	60	6
ZR702 040 10 25	4	1	6	25	60	6
ZR702 040 10 30	4	1	6	30	70	6
ZR702 050 03 18	5	0.3	8	18	60	6
ZR702 060 02 20	6	0.2	9	20	60	6
ZR702 060 03 20	6	0.3	9	20	60	6
ZR702 060 05 20	6	0.5	9	20	60	6
ZR702 060 10 20	6	1	9	20	60	6
ZR702 060 15 20	6	1.5	9	20	60	6
ZR702 060 20 20	6	2	9	20	60	6
ZR702 080 02 25	8	0.2	12	25	60	8
ZR702 080 03 25	8	0.3	12	25	60	8
ZR702 080 05 25	8	0.5	12	25	60	8
ZR702 080 10 25	8	1	12	25	60	8
ZR702 080 15 25	8	1.5	12	25	60	8
ZR702 100 02 32	10	0.2	15	32	70	10
ZR702 100 03 32	10	0.3	15	32	70	10
ZR702 100 05 32	10	0.5	15	32	70	10
ZR702 100 10 32	10	1	15	32	70	10
ZR702 100 15 32	10	1.5	15	32	70	10
ZR702 100 20 32	10	2	15	32	70	10
ZR702 120 03 38	12	0.3	18	38	80	12
ZR702 120 05 38	12	0.5	18	38	80	12
ZR702 120 10 38	12	1	18	38	80	12
ZR702 120 15 38	12	1.5	18	38	80	12
ZR702 120 20 38	12	2	18	38	80	12

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

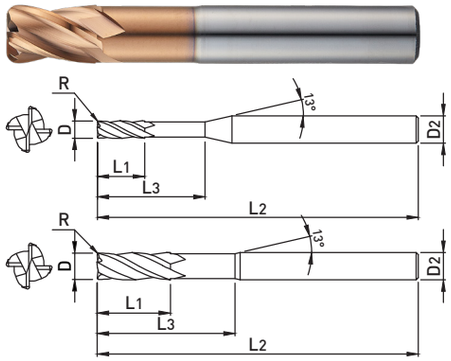
■ **Applicable Working Material**

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
	○	○	◎	◎	○				

○ : GOOD ◎ : EXCELLENT

ZR704

4 FLUTES NECK TYPE RADIUS ENDMILL



- Excellent machinability with cutting edge considered the characteristics of high hardness workpiece
- Extend customer choice with various corner R size and effective length

ULTRA FINE | 4 | 30° HELIX | AlTiN | R ±0.01 | R ±0.015 | DATA

Φ6 OR UNDER ABOVE Φ6 p.458

■ **TOLERANCE**

D		SHANK DIA.
~ D6	0 ~ -0.012mm	h5
D8 ~ 12	0 ~ -0.015mm	

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

EDP No	D	R	L1	L3	L2	D2
ZR704 030 03 09	3	0.3	4	9	55	6
ZR704 030 03 10	3	0.3	4	10	55	6
ZR704 030 03 12	3	0.3	4	12	55	6
ZR704 030 03 16	3	0.3	4	16	55	6
ZR704 030 03 20	3	0.3	4	20	60	6
ZR704 030 05 08	3	0.5	4	8	55	6
ZR704 030 05 09	3	0.5	4	9	55	6
ZR704 030 05 10	3	0.5	4	10	55	6
ZR704 030 05 12	3	0.5	4	12	55	6
ZR704 030 05 16	3	0.5	4	16	55	6
ZR704 030 05 20	3	0.5	4	20	60	6
ZR704 030 10 08	3	1	4	8	55	6
ZR704 030 10 10	3	1	4	10	55	6
ZR704 030 10 12	3	1	4	12	55	6
ZR704 030 10 16	3	1	4	16	55	6
ZR704 030 10 20	3	1	4	20	60	6
ZR704 040 01 10	4	0.1	6	10	55	6
ZR704 040 01 12	4	0.1	6	12	55	6
ZR704 040 01 16	4	0.1	6	16	55	6
ZR704 040 01 20	4	0.1	6	20	60	6
ZR704 040 01 25	4	0.1	6	25	60	6
ZR704 040 02 10	4	0.2	6	10	55	6
ZR704 040 02 12	4	0.2	6	12	55	6
ZR704 040 02 16	4	0.2	6	16	55	6
ZR704 040 02 20	4	0.2	6	20	60	6
ZR704 040 02 25	4	0.2	6	25	60	6
ZR704 040 03 10	4	0.3	6	10	55	6
ZR704 040 03 12	4	0.3	6	12	55	6
ZR704 040 03 16	4	0.3	6	16	55	6
ZR704 040 03 20	4	0.3	6	20	60	6
ZR704 040 03 25	4	0.3	6	25	55	6
ZR704 040 05 10	4	0.5	6	10	55	6
ZR704 040 05 12	4	0.5	6	12	55	6
ZR704 040 05 16	4	0.5	6	16	60	6
ZR704 040 05 20	4	0.5	6	20	60	6
ZR704 040 05 25	4	0.5	6	25	60	6
ZR704 040 10 10	4	1	6	10	55	6
ZR704 040 10 12	4	1	6	12	55	6

EDP No	D	R	L1	L3	L2	D2
ZR704 040 10 16	4	1	6	16	55	6
ZR704 040 10 20	4	1	6	20	60	6
ZR704 040 10 25	4	1	6	25	60	6
ZR704 060 02 20	6	0.2	9	20	60	6
ZR704 060 03 20	6	0.3	9	20	60	6
ZR704 060 05 20	6	0.5	9	20	60	6
ZR704 060 10 20	6	1	9	20	60	6
ZR704 060 15 20	6	1.5	9	20	60	6
ZR704 060 20 20	6	2	9	20	60	6
ZR704 080 02 25	8	0.2	12	25	60	8
ZR704 080 03 25	8	0.3	12	25	60	8
ZR704 080 05 25	8	0.5	12	25	60	8
ZR704 080 10 25	8	1	12	25	60	8
ZR704 080 15 25	8	1.5	12	25	60	8
ZR704 080 20 25	8	2	12	25	60	8
ZR704 100 02 32	10	0.2	15	32	70	10
ZR704 100 03 32	10	0.3	15	32	70	10
ZR704 100 05 32	10	0.5	15	32	70	10
ZR704 100 10 32	10	1	15	32	70	10
ZR704 100 15 32	10	1.5	15	32	70	10
ZR704 100 20 32	10	2	15	32	70	10
ZR704 120 03 38	12	0.3	18	38	80	12
ZR704 120 05 38	12	0.5	18	38	80	12
ZR704 120 10 38	12	1	18	38	80	12
ZR704 120 15 38	12	1.5	18	38	80	12
ZR704 120 20 38	12	2	18	38	80	12

EDP No	D	R	L1	L3	L2	D2

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

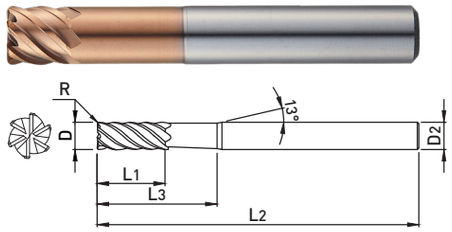
■ **Applicable Working Material**

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
	○	○	◎	◎	○				

○ : GOOD ◎ : EXCELLENT

ZR706

6 FLUTES NECK TYPE RADIUS ENDMILL



- Excellent machinability with cutting edge considered the characteristics of high hardness workpiece
- Extend customer choice with various corner R size and effective length

ULTRA FINE | 6 | 45° HELIX | R ±0.01 | R ±0.015 | AlTiN | DATA

Φ6 OR UNDER ABOVE Φ6

p.456

■ TOLERANCE

D		SHANK DIA.
ALL SIZES	0 ~ -0.02mm	h5

EDP No	D	R	L_1	L_3	L_2	D_2
ZR706 060 03 14	6	0.3	6	14	50	6
ZR706 060 05 14	6	0.5	6	14	50	6
ZR706 080 05 24	8	0.5	8	24	60	8
ZR706 080 10 24	8	1	8	24	60	8
ZR706 100 05 30	10	0.5	10	30	70	10
ZR706 100 10 30	10	1	10	30	70	10
ZR706 120 05 30	12	0.5	12	30	75	12
ZR706 120 10 30	12	1	12	30	75	12

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

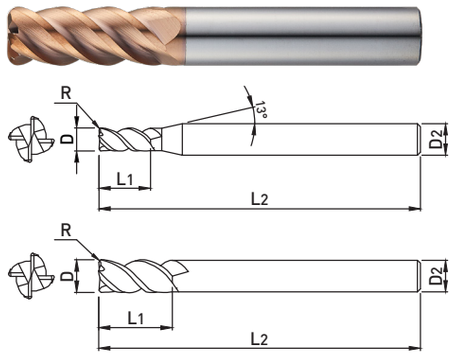
■ Applicable Working Material

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
	○	○	◎	◎	○				

○ : GOOD ◎ : EXCELLENT

ZR714

4 FLUTES RADIUS ENDMILL



- Excellent machinability with cutting edge considered the characteristics of high hardness workpiece
- Cutting performance suitable for high speed and feed machining with 45° Helix

ULTRA FINE | 4 | 45° HELIX | AlTiN | R ±0.01 | R ±0.015 | DATA

Φ6 OR UNDER ABOVE Φ6

p.458

■ TOLERANCE

D		SHANK DIA.
~ D6	0 ~ -0.012mm	h5
D8 ~ 12	0 ~ -0.015mm	

EDP No	D	R	L_1	L_2	D_2
ZR714 0303	3	0.3	8	50	6
ZR714 0305	3	0.5	8	50	6
ZR714 0403	4	0.3	11	50	6
ZR714 0405	4	0.5	11	50	6
ZR714 0410	4	1	11	50	6
ZR714 0603	6	0.3	15	60	6
ZR714 0605	6	0.5	15	60	6
ZR714 0610	6	1	15	60	6
ZR714 0803	8	0.3	20	60	8
ZR714 0805	8	0.5	20	60	8
ZR714 0810	8	1	20	60	8
ZR714 0815	8	1.5	20	60	8
ZR714 0820	8	2	20	60	8
ZR714 1003	10	0.3	25	70	10
ZR714 1005	10	0.5	25	60	10
ZR714 1010	10	1	25	60	10
ZR714 1015	10	1.5	25	60	10
ZR714 1020	10	2	25	60	10
ZR714 1025	10	2.5	25	60	10
ZR714 1030	10	3	25	60	10
ZR714 1203	12	0.3	30	80	12
ZR714 1205	12	0.5	30	80	12
ZR714 1210	12	1	30	80	12
ZR714 1215	12	1.5	30	80	12
ZR714 1220	12	2	30	80	12
ZR714 1225	12	2.5	30	80	12
ZR714 1230	12	3	30	80	12

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

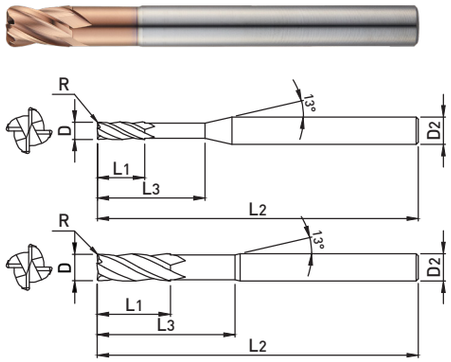
■ Applicable Working Material

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
	○	○	◎	◎	○				

○ : GOOD ◎ : EXCELLENT

ZR724

4 FLUTES NECK TYPE RADIUS ENDMILL



- Excellent machinability with cutting edge considered the characteristics of high hardness workpiece
- Suitable for deep groove machining with long shank type
- Minimizes interference with workpieces by applying neck type

ULTRA FINE | 4 | 30° HELIX | R ±0.01 | R ±0.015 | AlTiN | DATA

Φ6 OR UNDER ABOVE Φ6

p.458

■ TOLERANCE

D		SHANK DIA.
~ D6	0 ~ -0.012mm	h5
D8 ~ 12	0 ~ -0.015mm	

EDP No	D	R	L_1	L_3	L_2	D_2
ZR724 060 05 20	6	0.5	9	20	90	6
ZR724 060 10 20	6	1	9	20	90	6
ZR724 080 05 25	8	0.5	12	25	100	8
ZR724 080 10 25	8	1	12	25	100	8
ZR724 100 05 32	10	0.5	15	32	100	10
ZR724 100 10 32	10	1	15	32	100	10
ZR724 100 20 32	10	2	15	32	100	10
ZR724 120 05 38	12	0.5	18	38	110	12
ZR724 120 10 38	12	1	18	38	110	12
ZR724 120 20 38	12	2	18	38	110	12

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

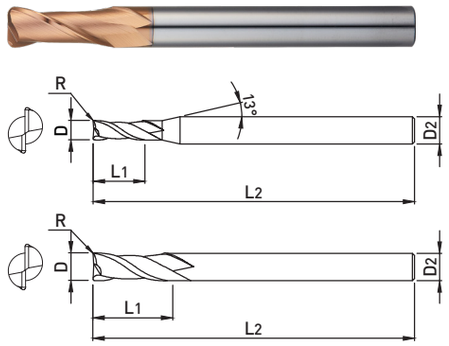
■ Applicable Working Material

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
	○	○	◎	◎	○				

○ : GOOD ◎ : EXCELLENT

ZR732

2 FLUTES LONG SHANK RADIUS ENDMILL



- High strength R shape by cutting edge design considering the characteristics of high hardness workpiece
- Suitable for deep groove machining with long shank type

ULTRA FINE | 2 | 30° HELIX | R ±0.01 | R ±0.015 | AlTiN | DATA

Φ6 OR UNDER ABOVE Φ6

p.457

■ TOLERANCE

D		SHANK DIA.
~ D6	0 ~ -0.012mm	h5
D8 ~ 12	0 ~ -0.015mm	

EDP No	D	R	L_1	L_2	D_2
ZR732 010 01	1	0.1	2	50	6
ZR732 010 02	1	0.2	2	50	6
ZR732 010 03	1	0.3	2	50	6
ZR732 015 01	1.5	0.1	3	50	6
ZR732 015 02	1.5	0.2	3	50	6
ZR732 015 03	1.5	0.3	3	50	6
ZR732 015 05	1.5	0.5	3	50	6
ZR732 020 01	2	0.1	5	50	6
ZR732 020 02	2	0.2	5	50	6
ZR732 020 03	2	0.3	5	50	6
ZR732 020 05	2	0.5	5	50	6
ZR732 025 01	2.5	0.1	7	60	6
ZR732 025 02	2.5	0.2	7	60	6
ZR732 025 03	2.5	0.3	7	60	6
ZR732 025 05	2.5	0.5	7	60	6
ZR732 030 01	3	0.1	8	60	6
ZR732 030 02	3	0.2	8	60	6
ZR732 030 03	3	0.3	8	60	6
ZR732 030 05	3	0.5	8	60	6
ZR732 040 01	4	0.1	10	70	6
ZR732 040 02	4	0.2	10	70	6
ZR732 040 03	4	0.3	10	70	6
ZR732 040 05	4	0.5	10	70	6
ZR732 040 10	4	1	10	70	6
ZR732 050 01	5	0.1	13	80	6
ZR732 050 02	5	0.2	13	80	6
ZR732 050 03	5	0.3	13	80	6
ZR732 050 05	5	0.5	13	80	6
ZR732 050 10	5	1	13	80	6
ZR732 060 01	6	0.1	15	90	6
ZR732 060 02	6	0.2	15	90	6
ZR732 060 03	6	0.3	15	90	6
ZR732 060 05	6	0.5	15	90	6
ZR732 060 10	6	1	15	90	6
ZR732 080 01	8	0.1	20	100	8
ZR732 080 02	8	0.2	20	100	8
ZR732 080 03	8	0.3	20	100	8
ZR732 080 05	8	0.5	20	100	8
ZR732 080 10	8	1	20	100	8
ZR732 080 20	8	2	20	100	8
ZR732 100 02	10	0.2	25	100	10
ZR732 100 03	10	0.3	25	100	10
ZR732 100 05	10	0.5	25	100	10
ZR732 100 10	10	1	25	100	10
ZR732 100 20	10	2	25	100	10
ZR732 120 02	12	0.2	30	110	12
ZR732 120 03	12	0.3	30	110	12
ZR732 120 05	12	0.5	30	110	12
ZR732 120 10	12	1	30	110	12
ZR732 120 20	12	2	30	110	12

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

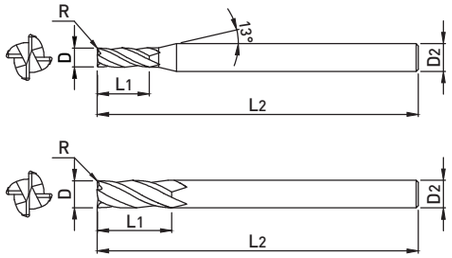
■ Applicable Working Material

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
	○	○	◎	◎	○				

○ : GOOD ◎ : EXCELLENT

ZR734

4 FLUTES LONG SHANK RADIUS ENDMILL



- High strength R shape by cutting edge design considering the characteristics of high hardness workpiece
- Suitable for deep groove machining with long shank type

ULTRA FINE | 4 | 30° HELIX | R ±0.01 | R ±0.015 | AlTiN | DATA

Φ6 OR UNDER ABOVE Φ6

p.458

■ TOLERANCE

D		SHANK DIA.
~ D6	0 ~ -0.012mm	h5
D8 ~ 12	0 ~ -0.015mm	

EDP No	D	R	L1	L2	D2
ZR734 010 01	1	0.1	2	50	6
ZR734 010 02	1	0.2	2	50	6
ZR734 010 03	1	0.3	2	50	6
ZR734 015 01	1.5	0.1	3	50	6
ZR734 015 02	1.5	0.2	3	50	6
ZR734 015 03	1.5	0.3	3	50	6
ZR734 015 05	1.5	0.5	3	50	6
ZR734 020 01	2	0.1	5	50	6
ZR734 020 02	2	0.2	5	50	6
ZR734 020 03	2	0.3	5	50	6
ZR734 020 05	2	0.5	5	50	6
ZR734 025 01	2.5	0.1	7	60	6
ZR734 025 02	2.5	0.2	7	60	6
ZR734 025 03	2.5	0.3	7	60	6
ZR734 025 05	2.5	0.5	7	60	6
ZR734 030 01	3	0.1	8	60	6
ZR734 030 02	3	0.2	8	60	6
ZR734 030 03	3	0.3	8	60	6
ZR734 030 05	3	0.5	8	60	6
ZR734 040 01	4	0.1	10	70	6
ZR734 040 02	4	0.2	10	70	6
ZR734 040 03	4	0.3	10	70	6
ZR734 040 05	4	0.5	10	70	6
ZR734 040 10	4	1	10	70	6
ZR734 050 01	5	0.1	13	80	6
ZR734 050 02	5	0.2	13	80	6
ZR734 050 03	5	0.3	13	80	6
ZR734 050 05	5	0.5	13	80	6
ZR734 050 10	5	1	13	80	6
ZR734 060 01	6	0.1	15	90	6
ZR734 060 02	6	0.2	15	90	6
ZR734 060 03	6	0.3	15	90	6
ZR734 060 05	6	0.5	15	90	6
ZR734 060 10	6	1	15	90	6
ZR734 080 01	8	0.1	20	100	8
ZR734 080 02	8	0.2	20	100	8
ZR734 080 03	8	0.3	20	100	8
ZR734 080 05	8	0.5	20	100	8
ZR734 080 10	8	1	20	100	8
ZR734 080 20	8	2	20	100	8
ZR734 100 02	10	0.2	25	100	10
ZR734 100 03	10	0.3	25	100	10
ZR734 100 05	10	0.5	25	100	10
ZR734 100 10	10	1	25	100	10
ZR734 100 20	10	2	25	100	10
ZR734 120 02	12	0.2	30	110	12
ZR734 120 03	12	0.3	30	110	12
ZR734 120 05	12	0.5	30	110	12
ZR734 120 10	12	1	30	110	12
ZR734 120 20	12	2	30	110	12

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

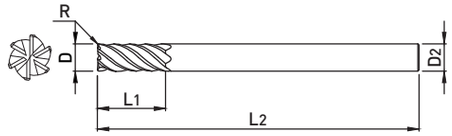
■ Applicable Working Material

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
	○	○	◎	◎	○				

○ : GOOD ◎ : EXCELLENT

ZR736

6 FLUTES RADIUS ENDMILL



- High strength R shape by cutting edge design considering the characteristics of high hardness workpiece
- Suitable for deep groove machining with long shank type

ULTRA FINE | 6 | 45° HELIX | R ±0.01 | R ±0.015 | AlTiN | DATA

Φ6 OR UNDER ABOVE Φ6

p.456

■ TOLERANCE

D		SHANK DIA.
ALL SIZES	0 ~ -0.02mm	h5

EDP No	D	R	L1	L2	D2
ZR736 060 05	6	0.5	15	90	6
ZR736 060 10	6	1	15	90	6
ZR736 080 05	8	0.5	20	100	8
ZR736 080 10	8	1	20	100	8
ZR736 100 05	10	0.5	25	100	10
ZR736 100 10	10	1	25	100	10
ZR736 120 05	12	0.5	30	110	12
ZR736 120 10	12	1	30	110	12

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

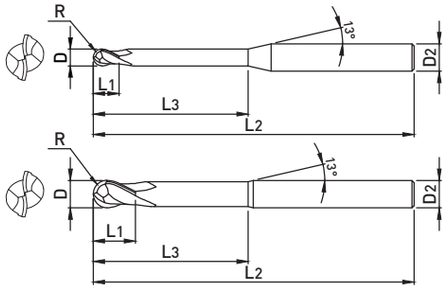
■ Applicable Working Material

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
	○	○	◎	◎	○				

○ : GOOD ◎ : EXCELLENT

WB712+

2 FLUTES RIB TYPE BALL NOSE ENDMILL New



- Minimize tool breakage and improve stability by reinforcing neck stiffness
- Extend customer choice with various neck type, suitable for deep groove machining

ULTRA FINE | 2 | 30° HELIX | R ±0.005 R3 OR MORE | R ±0.01 ABOVE R3 | AlTiN | DATA p.459~462

▪ **TOLERANCE**

D		SHANK DIA.
~ D6	0 ~ -0.012mm	h5
D8 ~ 12	0 ~ -0.015mm	

EDP No	D	R	L1	L3	L2	D2
WB712 001 002P	0.1	0.05	0.1	0.2	40	4
WB712 001 003P	0.1	0.05	0.1	0.3	40	4
WB712 001 005P	0.1	0.05	0.1	0.2	40	4
WB712 001 01P	0.1	0.05	0.1	1	40	4
WB712 002 005P	0.2	0.1	0.2	0.5	40	4
WB712 002 015P	0.2	0.1	0.2	1.5	40	4
WB712 002 01P	0.2	0.1	0.2	1	40	4
WB712 002 02P	0.2	0.1	0.2	2	40	4
WB712 002 03P	0.2	0.1	0.2	3	40	4
WB712 003 015P	0.3	0.15	0.3	1.5	40	4
WB712 003 01P	0.3	0.15	0.3	1	40	4
WB712 003 025P	0.3	0.15	0.3	2.5	40	4
WB712 003 02P	0.3	0.15	0.3	2	40	4
WB712 003 03P	0.3	0.15	0.3	3	40	4
WB712 003 04P	0.3	0.15	0.3	4	40	4
WB712 003 05P	0.3	0.15	0.3	5	40	4
WB712 004 015P	0.4	0.2	0.4	1.5	40	4
WB712 004 01P	0.4	0.2	0.4	1	40	4
WB712 004 025P	0.4	0.2	0.4	2.5	40	4
WB712 004 02P	0.4	0.2	0.4	2	40	4
WB712 004 03P	0.4	0.2	0.4	3	40	4
WB712 004 04P	0.4	0.2	0.4	4	40	4
WB712 004 05P	0.4	0.2	0.4	5	40	4
WB712 004 06P	0.4	0.2	0.4	6	40	4
WB712 004 08P	0.4	0.2	0.4	8	40	4
WB712 004 10P	0.4	0.2	0.4	10	40	4
WB712 005 015P	0.5	0.25	0.5	1.5	45	4
WB712 005 01P	0.5	0.25	0.5	1	45	4
WB712 005 01 S6P	0.5	0.25	0.5	1	45	6
WB712 005 025P	0.5	0.25	0.5	2.5	45	4
WB712 005 02P	0.5	0.25	0.5	2	45	4
WB712 005 02 S6P	0.5	0.25	0.5	2	45	6
WB712 005 03P	0.5	0.25	0.5	3	45	4
WB712 005 04P	0.5	0.25	0.5	4	45	4
WB712 005 04 S6P	0.5	0.25	0.5	4	45	6
WB712 005 05P	0.5	0.25	0.5	5	45	4

EDP No	D	R	L1	L3	L2	D2
WB712 005 06P	0.5	0.25	0.5	6	45	4
WB712 005 08P	0.5	0.25	0.5	8	45	4
WB712 005 10P	0.5	0.25	0.5	10	45	4
WB712 005 12P	0.5	0.25	0.5	12	45	4
WB712 005 14P	0.5	0.25	0.5	14	45	4
WB712 005 16P	0.5	0.25	0.5	16	45	4
WB712 006 01P	0.6	0.3	0.6	1	45	4
WB712 006 01 S6P	0.6	0.3	0.6	1	45	6
WB712 006 02P	0.6	0.3	0.6	2	45	4
WB712 006 02 S6P	0.6	0.3	0.6	2	45	6
WB712 006 03P	0.6	0.3	0.6	3	45	4
WB712 006 03 S6P	0.6	0.3	0.6	3	45	6
WB712 006 04P	0.6	0.3	0.6	4	45	4
WB712 006 04 S6P	0.6	0.3	0.6	4	45	6
WB712 006 05P	0.6	0.3	0.6	5	45	4
WB712 006 05 S6P	0.6	0.3	0.6	5	45	6
WB712 006 06P	0.6	0.3	0.6	6	45	4
WB712 006 06 S6P	0.6	0.3	0.6	6	45	6
WB712 006 08P	0.6	0.3	0.6	8	45	4
WB712 006 08 S6P	0.6	0.3	0.6	8	45	6
WB712 006 10P	0.6	0.3	0.6	10	45	4
WB712 006 10 S6P	0.6	0.3	0.6	10	45	6
WB712 006 12P	0.6	0.3	0.6	12	45	4
WB712 006 12 S6P	0.6	0.3	0.6	12	45	6
WB712 006 14P	0.6	0.3	0.6	14	45	4
WB712 006 14 S6P	0.6	0.3	0.6	14	45	6
WB712 006 16P	0.6	0.3	0.6	16	45	4
WB712 006 16 S6P	0.6	0.3	0.6	16	50	6
WB712 007 02P	0.7	0.35	0.7	8	45	4
WB712 007 04P	0.7	0.35	0.7	4	45	4
WB712 007 06P	0.7	0.35	0.7	6	45	4
WB712 007 08P	0.7	0.35	0.7	8	45	4
WB712 007 10P	0.7	0.35	0.7	10	45	4
WB712 007 12P	0.7	0.35	0.7	12	45	4
WB712 008 01P	0.8	0.4	0.8	1	45	4
WB712 008 01 S6P	0.8	0.4	0.8	1	45	6

EDP No	D	R	L1	L3	L2	D2
WB712 008 02P	0.8	0.4	0.8	2	45	4
WB712 008 02 S6P	0.8	0.4	0.8	2	45	6
WB712 008 03P	0.8	0.4	0.8	3	45	4
WB712 008 03 S6P	0.8	0.4	0.8	3	45	6
WB712 008 04P	0.8	0.4	0.8	4	45	4
WB712 008 04 S6P	0.8	0.4	0.8	4	45	6
WB712 008 05P	0.8	0.4	0.8	5	45	4
WB712 008 05 S6P	0.8	0.4	0.8	5	45	6
WB712 008 06P	0.8	0.4	0.8	6	45	4
WB712 008 06 S6P	0.8	0.4	0.8	6	45	6
WB712 008 08P	0.8	0.4	0.8	8	45	4
WB712 008 08 S6P	0.8	0.4	0.8	8	45	6
WB712 008 10P	0.8	0.4	0.8	10	45	4
WB712 008 10 S6P	0.8	0.4	0.8	10	45	6
WB712 008 12P	0.8	0.4	0.8	12	45	4
WB712 008 12 S6P	0.8	0.4	0.8	12	45	6
WB712 008 14P	0.8	0.4	0.8	14	45	4
WB712 008 14 S6P	0.8	0.4	0.8	14	45	6
WB712 008 16P	0.8	0.4	0.8	16	45	4
WB712 008 16 S6P	0.8	0.4	0.8	16	50	6
WB712 008 20P	0.8	0.4	0.8	20	50	4
WB712 008 20 S6P	0.8	0.4	0.8	20	55	6
WB712 009 04P	0.9	0.45	0.9	4	45	4
WB712 009 06P	0.9	0.45	0.9	6	45	4
WB712 009 08P	0.9	0.45	0.9	8	45	4
WB712 009 10P	0.9	0.45	0.9	10	45	4
WB712 010 02P	1	0.5	1	2	50	4
WB712 010 02 S6P	1	0.5	1	2	50	6
WB712 010 03P	1	0.5	1	3	50	4
WB712 010 03 S6P	1	0.5	1	3	50	6
WB712 010 04P	1	0.5	1	4	50	4
WB712 010 04 S6P	1	0.5	1	4	50	6
WB712 010 05P	1	0.5	1	5	50	4
WB712 010 05 S6P	1	0.5	1	5	50	6
WB712 010 06P	1	0.5	1	6	50	4
WB712 010 06 S6P	1	0.5	1	6	50	6
WB712 010 07P	1	0.5	1	7	50	4
WB712 010 07 S6P	1	0.5	1	7	50	6
WB712 010 08P	1	0.5	1	8	50	4
WB712 010 08 S6P	1	0.5	1	8	50	6
WB712 010 09P	1	0.5	1	9	50	4
WB712 010 09 S6P	1	0.5	1	9	50	6
WB712 010 10P	1	0.5	1	10	50	4
WB712 010 10 S6P	1	0.5	1	10	50	6
WB712 010 12P	1	0.5	1	12	50	4
WB712 010 12 S6P	1	0.5	1	12	50	6
WB712 010 14P	1	0.5	1	14	50	4
WB712 010 14 S6P	1	0.5	1	14	50	6
WB712 010 16P	1	0.5	1	16	50	4
WB712 010 16 S6P	1	0.5	1	16	50	6
WB712 010 18P	1	0.5	1	18	50	4
WB712 010 18 S6P	1	0.5	1	18	50	6
WB712 010 20P	1	0.5	1	20	55	4
WB712 010 20 S6P	1	0.5	1	20	55	6
WB712 010 22P	1	0.5	1	22	60	4
WB712 010 22 S6P	1	0.5	1	22	60	6
WB712 010 26P	1	0.5	1	26	60	4
WB712 010 26 S6P	1	0.5	1	26	60	6

EDP No	D	R	L1	L3	L2	D2
WB712 010 30P	1	0.5	1	30	70	4
WB712 010 30 S6P	1	0.5	1	30	70	6
WB712 010 40P	1	0.5	1	40	80	4
WB712 010 50P	1	0.5	1	50	100	4
WB712 012 04P	1.2	0.6	1.2	4	50	4
WB712 012 06P	1.2	0.6	1.2	6	50	4
WB712 012 08P	1.2	0.6	1.2	8	50	4
WB712 012 10P	1.2	0.6	1.2	10	50	4
WB712 012 12P	1.2	0.6	1.2	12	50	4
WB712 012 16P	1.2	0.6	1.2	16	50	4
WB712 012 20P	1.2	0.6	1.2	20	50	4
WB712 012 26P	1.2	0.6	1.2	26	60	4
WB712 014 06P	1.4	0.7	1.4	6	50	4
WB712 014 08P	1.4	0.7	1.4	8	50	4
WB712 014 10P	1.4	0.7	1.4	10	50	4
WB712 014 12P	1.4	0.7	1.4	12	50	4
WB712 014 16P	1.4	0.7	1.4	16	50	4
WB712 015 03P	1.5	0.75	1.5	3	50	4
WB712 015 03 S6P	1.5	0.75	1.5	3	50	6
WB712 015 04P	1.5	0.75	1.5	4	50	4
WB712 015 04 S6P	1.5	0.75	1.5	4	50	6
WB712 015 05P	1.5	0.75	1.5	5	50	4
WB712 015 06P	1.5	0.75	1.5	6	50	4
WB712 015 06 S6P	1.5	0.75	1.5	6	50	6
WB712 015 07P	1.5	0.75	1.5	7	50	4
WB712 015 08P	1.5	0.75	1.5	8	50	4
WB712 015 08 S6P	1.5	0.75	1.5	8	50	6
WB712 015 10P	1.5	0.75	1.5	10	50	4
WB712 015 10 S6P	1.5	0.75	1.5	10	50	6
WB712 015 12P	1.5	0.75	1.5	12	50	4
WB712 015 12 S6P	1.5	0.75	1.5	12	50	6
WB712 015 14P	1.5	0.75	1.5	14	50	4
WB712 015 14 S6P	1.5	0.75	1.5	14	50	6
WB712 015 16P	1.5	0.75	1.5	16	50	4
WB712 015 16 S6P	1.5	0.75	1.5	16	50	6
WB712 015 18P	1.5	0.75	1.5	18	50	4
WB712 015 18 S6P	1.5	0.75	1.5	18	50	6
WB712 015 20P	1.5	0.75	1.5	20	55	4
WB712 015 20 S6P	1.5	0.75	1.5	20	55	6
WB712 015 22P	1.5	0.75	1.5	22	60	4
WB712 015 22 S6P	1.5	0.75	1.5	22	60	6
WB712 015 26P	1.5	0.75	1.5	26	60	4
WB712 015 26 S6P	1.5	0.75	1.5	26	60	6
WB712 015 30P	1.5	0.75	1.5	30	70	4
WB712 015 30 S6P	1.5	0.75	1.5	30	70	6
WB712 015 35P	1.5	0.75	1.5	35	70	4
WB712 015 35 S6P	1.5	0.75	1.5	35	70	6
WB712 015 40P	1.5	0.75	1.5	40	80	4
WB712 015 40 S6P	1.5	0.75	1.5	40	80	6
WB712 016 04P	1.6	0.8	1.6	4	50	4
WB712 016 06P	1.6	0.8	1.6	6	50	4
WB712 016 08P	1.6	0.8	1.6	8	50	4
WB712 016 10P	1.6	0.8	1.6	10	50	4
WB712 016 12P	1.6	0.8	1.6	12	50	4
WB712 016 16P	1.6	0.8	1.6	16	50	4
WB712 016 20P	1.6	0.8	1.6	20	50	4
WB712 018 04P	1.8	0.9	1.8	4	50	4
WB712 018 06P	1.8	0.9	1.8	6	50	4

WB712+

2 FLUTES RIB TYPE BALL NOSE ENDMILL New

EDP No	D	R	L_1	L_3	L_2	D_2
WB712 018 08P	1.8	0.9	1.8	8	50	4
WB712 018 10P	1.8	0.9	1.8	10	50	4
WB712 018 12P	1.8	0.9	1.8	12	50	4
WB712 018 16P	1.8	0.9	1.8	16	50	4
WB712 018 20P	1.8	0.9	1.8	20	50	4
WB712 020 04P	2	1	2	4	50	4
WB712 020 04 S6P	2	1	2	4	50	6
WB712 020 06P	2	1	2	6	50	4
WB712 020 06 S6P	2	1	2	6	50	6
WB712 020 08P	2	1	2	8	50	4
WB712 020 08 S6P	2	1	2	8	50	6
WB712 020 10P	2	1	2	10	50	4
WB712 020 10 S6P	2	1	2	10	50	6
WB712 020 12P	2	1	2	12	50	4
WB712 020 12 S6P	2	1	2	12	50	6
WB712 020 14P	2	1	2	14	50	4
WB712 020 14 S6P	2	1	2	14	50	6
WB712 020 16P	2	1	2	16	50	4
WB712 020 16 S6P	2	1	2	16	50	6
WB712 020 18P	2	1	2	18	55	4
WB712 020 18 S6P	2	1	2	18	55	6
WB712 020 20P	2	1	2	20	55	4
WB712 020 20 S6P	2	1	2	20	55	6
WB712 020 22P	2	1	2	22	60	4
WB712 020 22 S6P	2	1	2	22	60	6
WB712 020 26P	2	1	2	26	60	4
WB712 020 26 S6P	2	1	2	26	60	6
WB712 020 30P	2	1	2	30	70	4
WB712 020 30 S6P	2	1	2	30	70	6
WB712 020 35P	2	1	2	35	70	4
WB712 020 35 S6P	2	1	2	35	70	6
WB712 020 40P	2	1	2	40	80	4
WB712 020 40 S6P	2	1	2	40	80	6
WB712 020 45P	2	1	2	45	90	4
WB712 020 45 S6P	2	1	2	45	90	4
WB712 020 50P	2	1	2	50	100	4
WB712 020 50 S6P	2	1	2	50	100	6
WB712 020 60P	2	1	2	60	110	4
WB712 025 08P	2.5	1.25	2.5	8	50	4
WB712 025 10P	2.5	1.25	2.5	10	50	4
WB712 025 12P	2.5	1.25	2.5	12	50	4
WB712 025 16P	2.5	1.25	2.5	16	50	4
WB712 025 20P	2.5	1.25	2.5	20	50	4
WB712 025 22P	2.5	1.25	2.5	22	60	4
WB712 025 26P	2.5	1.25	2.5	26	60	4
WB712 025 30P	2.5	1.25	2.5	30	70	4
WB712 025 35P	2.5	1.25	2.5	35	70	4
WB712 025 40P	2.5	1.25	2.5	40	80	4
WB712 025 45P	2.5	1.25	2.5	45	90	4
WB712 025 50P	2.5	1.25	2.5	50	100	4
WB712 030 06P	3	1.5	3	6	50	6
WB712 030 08P	3	1.5	3	8	50	6
WB712 030 10P	3	1.5	3	10	50	6
WB712 030 12P	3	1.5	3	12	50	6
WB712 030 14P	3	1.5	3	14	60	6
WB712 030 16P	3	1.5	3	16	60	6
WB712 030 18P	3	1.5	3	18	60	6

EDP No	D	R	L_1	L_3	L_2	D_2
WB712 030 20P	3	1.5	3	20	60	6
WB712 030 22P	3	1.5	3	22	60	6
WB712 030 26P	3	1.5	3	26	65	6
WB712 030 30P	3	1.5	3	30	70	6
WB712 030 35P	3	1.5	3	35	70	6
WB712 030 40P	3	1.5	3	40	80	6
WB712 030 45P	3	1.5	3	45	90	6
WB712 030 50P	3	1.5	3	50	100	6
WB712 030 60P	3	1.5	3	60	100	6
WB712 035 10P	3.5	1.75	3	10	50	6
WB712 035 16P	3.5	1.75	3	16	60	6
WB712 035 20P	3.5	1.75	3	20	60	6
WB712 035 26P	3.5	1.75	3	26	65	6
WB712 035 30P	3.5	1.75	3	30	70	6
WB712 040 08P	4	2	4	8	50	6
WB712 040 10P	4	2	4	10	50	6
WB712 040 12P	4	2	4	12	50	6
WB712 040 14P	4	2	4	14	60	6
WB712 040 16P	4	2	4	16	60	6
WB712 040 18P	4	2	4	18	60	6
WB712 040 20P	4	2	4	20	60	6
WB712 040 22P	4	2	4	22	65	6
WB712 040 26P	4	2	4	26	65	6
WB712 040 30P	4	2	4	30	70	6
WB712 040 35P	4	2	4	35	70	6
WB712 040 40P	4	2	4	40	80	6
WB712 040 45P	4	2	4	45	90	6
WB712 040 50P	4	2	4	50	100	6
WB712 040 55P	4	2	4	55	100	6
WB712 040 60P	4	2	4	60	100	6
WB712 050 15P	5	2.5	6	15	60	6
WB712 050 20P	5	2.5	6	20	60	6
WB712 050 26P	5	2.5	6	26	65	6
WB712 050 30P	5	2.5	6	30	70	6
WB712 050 35P	5	2.5	6	35	70	6
WB712 050 40P	5	2.5	6	40	80	6
WB712 050 45P	5	2.5	6	45	90	6
WB712 050 50P	5	2.5	6	50	100	6
WB712 050 55P	5	2.5	6	55	100	6
WB712 050 60P	5	2.5	6	60	100	6
WB712 060 20 90P	6	3	12	20	90	6
WB712 060 20P	6	3	8	20	60	6
WB712 060 30 90P	6	3	12	30	90	6
WB712 060 30P	6	3	8	30	60	6
WB712 080 25 100P	8	4	14	25	100	8
WB712 080 25P	8	4	10	25	70	8
WB712 080 35 100P	8	4	14	35	100	8
WB712 080 35P	8	4	10	35	70	8
WB712 100 30 100P	10	5	18	30	100	10
WB712 100 30P	10	5	12	30	75	10
WB712 100 40 100P	10	5	18	40	100	10
WB712 100 40P	10	5	12	40	75	10
WB712 120 32 110P	12	6	22	32	110	12
WB712 120 32P	12	6	14	32	80	12
WB712 120 45 110P	12	6	22	45	110	12
WB712 120 45P	12	6	14	45	80	12

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

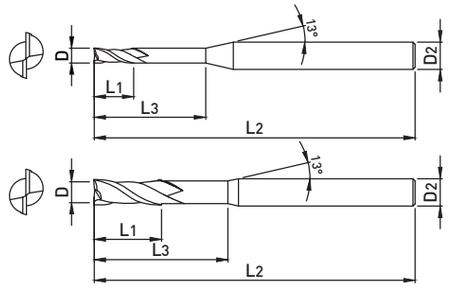
■ **Applicable Working Material**

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○	◎	◎	◎					

○ : GOOD ◎ : EXCELLENT

WE712+

New 2 FLUTES RIB TYPE SQUARE ENDMILL



- Minimize tool breakage and improve stability by reinforcing neck stiffness
- Extend customer choice with various neck type, suitable for deep groove machining

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

p.463~466

■ **TOLERANCE**

D		SHANK DIA.
~ D6	0 ~ -0.012mm	h5
D8 ~ 12	0 ~ -0.015mm	

EDP No	D	L_1	L_3	L_2	D_2
WE712 001 003P	0.1	0.15	0.3	40	4
WE712 001 005P	0.1	0.15	0.5	40	4
WE712 001 01P	0.1	0.15	1	40	4
WE712 002 005P	0.2	0.3	0.5	40	4
WE712 002 01P	0.2	0.3	1	40	4
WE712 002 015P	0.2	0.3	1.5	40	4
WE712 002 02P	0.2	0.3	2	40	4
WE712 003 01P	0.3	0.5	1	40	4
WE712 003 015P	0.3	0.5	1.5	40	4
WE712 003 02P	0.3	0.5	2	40	4
WE712 003 025P	0.3	0.5	2.5	40	4
WE712 003 03P	0.3	0.5	3	40	4
WE712 003 04P	0.3	0.5	4	40	4
WE712 003 05P	0.3	0.5	5	40	4
WE712 004 01P	0.4	0.6	1	40	4
WE712 004 015P	0.4	0.6	1.5	40	4
WE712 004 02P	0.4	0.6	2	40	4
WE712 004 025P	0.4	0.6	2.5	40	4
WE712 004 03P	0.4	0.6	3	40	4
WE712 004 04P	0.4	0.6	4	40	4
WE712 004 05P	0.4	0.6	5	40	4
WE712 004 06P	0.4	0.6	6	40	4
WE712 004 08P	0.4	0.6	8	40	4
WE712 004 10P	0.4	0.6	10	40	4
WE712 005 01P	0.5	0.7	1	45	4
WE712 005 015P	0.5	0.7	1.5	45	4
WE712 005 02P	0.5	0.7	2	45	4
WE712 005 025P	0.5	0.7	2.5	45	4
WE712 005 03P	0.5	0.7	3	45	4
WE712 005 04P	0.5	0.7	4	45	4
WE712 005 05P	0.5	0.7	5	45	4
WE712 005 06P	0.5	0.7	6	45	4
WE712 005 08P	0.5	0.7	8	45	4
WE712 005 10P	0.5	0.7	10	45	4
WE712 005 12P	0.5	0.7	12	45	4
WE712 005 14P	0.5	0.7	14	45	4

EDP No	D	L_1	L_3	L_2	D_2
WE712 005 16P	0.5	0.7	16	45	4
WE712 006 02P	0.6	0.9	2	45	4
WE712 006 03P	0.6	0.9	3	45	4
WE712 006 04P	0.6	0.9	4	45	4
WE712 006 05P	0.6	0.9	5	45	4
WE712 006 06P	0.6	0.9	6	45	4
WE712 006 08P	0.6	0.9	8	45	4
WE712 006 10P	0.6	0.9	10	45	4
WE712 006 12P	0.6	0.9	12	45	4
WE712 006 14P	0.6	0.9	14	45	4
WE712 006 16P	0.6	0.9	16	45	4
WE712 007 02P	0.7	1.2	2	45	4
WE712 007 04P	0.7	1.2	4	45	4
WE712 007 06P	0.7	1.2	6	45	4
WE712 007 08P	0.7	1.2	8	45	4
WE712 007 10P	0.7	1.2	10	45	4
WE712 007 12P	0.7	1.2	12	45	4
WE712 008 02P	0.8	1.2	2	45	4
WE712 008 03P	0.8	1.2	3	45	4
WE712 008 04P	0.8	1.2	4	45	4
WE712 008 05P	0.8	1.2	5	45	4
WE712 008 06P	0.8	1.2	6	45	4
WE712 008 08P	0.8	1.2	8	45	4
WE712 008 10P	0.8	1.2	10	45	4
WE712 008 12P	0.8	1.2	12	45	4
WE712 008 14P	0.8	1.2	14	45	4
WE712 008 16P	0.8	1.2	16	45	4
WE712 008 20P	0.8	1.2	20	50	4
WE712 009 06P	0.9	1.3	6	45	4
WE712 009 08P	0.9	1.3	8	45	4
WE712 009 10P	0.9	1.3	10	45	4
WE712 010 02P	1	1.5	2	50	4
WE712 010 03P	1	1.5	3	50	4
WE712 010 4P	1	1.5	4	50	4
WE712 010 05P	1	1.5	5	50	4
WE712 010 06P	1	1.5	6	50	4

WE712+

2 FLUTES RIB TYPE SQUARE ENDMILL New

EDP No	D	L_1	L_3	L_2	D_2
WE712 010 07P	1	1.5	7	50	4
WE712 010 08P	1	1.5	8	50	4
WE712 010 10P	1	1.5	10	50	4
WE712 010 12P	1	1.5	12	50	4
WE712 010 14P	1	1.5	14	50	4
WE712 010 16P	1	1.5	16	50	4
WE712 010 18P	1	1.5	18	50	4
WE712 010 20P	1	1.5	20	50	4
WE712 010 22P	1	1.5	22	60	4
WE712 010 26P	1	1.5	26	60	4
WE712 010 30P	1	1.5	30	70	4
WE712 010 40P	1	1.5	40	80	4
WE712 010 50P	1	1.5	50	100	4
WE712 012 04P	1.2	1.8	4	50	4
WE712 012 06P	1.2	1.8	6	50	4
WE712 012 08P	1.2	1.8	8	50	4
WE712 012 10P	1.2	1.8	10	50	4
WE712 012 12P	1.2	1.8	12	50	4
WE712 012 14P	1.2	1.8	14	50	4
WE712 012 16P	1.2	1.8	16	50	4
WE712 012 20P	1.2	1.8	20	50	4
WE712 012 26P	1.2	1.8	26	60	4
WE712 012 30P	1.2	1.8	30	70	4
WE712 014 06P	1.4	2.1	6	50	4
WE712 014 08P	1.4	2.1	8	50	4
WE712 014 10P	1.4	2.1	10	50	4
WE712 014 14P	1.4	2.1	14	50	4
WE712 014 16P	1.4	2.1	16	50	4
WE712 014 20P	1.4	2.1	20	50	4
WE712 015 04P	1.5	2.3	4	50	4
WE712 015 05P	1.5	2.3	5	50	4
WE712 015 06P	1.5	2.3	6	50	4
WE712 015 07P	1.5	2.3	7	50	4
WE712 015 08P	1.5	2.3	8	50	4
WE712 015 10P	1.5	2.3	10	50	4
WE712 015 12P	1.5	2.3	12	50	4
WE712 015 14P	1.5	2.3	14	50	4
WE712 015 16P	1.5	2.3	16	50	4
WE712 015 18P	1.5	2.3	18	50	4
WE712 015 20P	1.5	2.3	20	50	4
WE712 015 22P	1.5	2.3	22	60	4
WE712 015 26P	1.5	2.3	26	60	4
WE712 015 30P	1.5	2.3	30	70	4
WE712 016 08P	1.6	2.3	8	50	4
WE712 016 10P	1.6	2.3	10	50	4
WE712 016 12P	1.6	2.3	12	50	4
WE712 016 16P	1.6	2.3	16	50	4
WE712 016 20P	1.6	2.3	20	50	4
WE712 018 08P	1.8	2.7	8	50	4
WE712 018 10P	1.8	2.7	10	50	4
WE712 018 12P	1.8	2.7	12	50	4
WE712 018 16P	1.8	2.7	16	50	4
WE712 018 20P	1.8	2.7	20	50	4
WE712 020 06P	2	3	6	50	4
WE712 020 08P	2	3	8	50	4
WE712 020 10P	2	3	10	50	4

EDP No	D	L_1	L_3	L_2	D_2
WE712 020 12P	2	3	12	50	4
WE712 020 14P	2	3	14	50	4
WE712 020 16P	2	3	16	50	4
WE712 020 18P	2	3	18	50	4
WE712 020 20P	2	3	20	50	4
WE712 020 22P	2	3	22	60	4
WE712 020 26P	2	3	26	60	4
WE712 020 30P	2	3	30	70	4
WE712 020 35P	2	3	35	70	4
WE712 020 40P	2	3	40	80	4
WE712 020 45P	2	3	45	90	4
WE712 020 50P	2	3	50	100	4
WE712 020 60P	2	3	60	110	4
WE712 025 08P	2.5	4	8	50	4
WE712 025 10P	2.5	4	10	50	4
WE712 025 12P	2.5	4	12	50	4
WE712 025 14P	2.5	4	14	50	4
WE712 025 16P	2.5	4	16	50	4
WE712 025 18P	2.5	4	18	50	4
WE712 025 20P	2.5	4	20	50	4
WE712 025 22P	2.5	4	22	60	4
WE712 025 26P	2.5	4	26	60	4
WE712 025 30P	2.5	4	30	70	4
WE712 025 35P	2.5	4	35	70	4
WE712 025 40P	2.5	4	40	80	4
WE712 025 45P	2.5	4	45	90	4
WE712 025 50P	2.5	4	50	100	4
WE712 030 06P	3	4.5	6	50	6
WE712 030 08P	3	4.5	8	50	6
WE712 030 10P	3	4.5	10	50	6
WE712 030 12P	3	4.5	12	50	6
WE712 030 14P	3	4.5	14	60	6
WE712 030 16P	3	4.5	16	60	6
WE712 030 18P	3	4.5	18	60	6
WE712 030 20P	3	4.5	20	60	6
WE712 030 22P	3	4.5	22	65	6
WE712 030 26P	3	4.5	26	65	6
WE712 030 30P	3	4.5	30	70	6
WE712 030 35P	3	4.5	35	70	6
WE712 030 40P	3	4.5	40	80	6
WE712 030 45P	3	4.5	45	90	6
WE712 030 50P	3	4.5	50	100	6
WE712 030 60P	3	4.5	60	100	6
WE712 040 08P	4	6	8	50	6
WE712 040 10P	4	6	10	50	6
WE712 040 12P	4	6	12	50	6
WE712 040 14P	4	6	14	60	6
WE712 040 16P	4	6	16	60	6
WE712 040 18P	4	6	18	60	6
WE712 040 20P	4	6	20	60	6
WE712 040 22P	4	6	22	65	6
WE712 040 26P	4	6	26	65	6
WE712 040 30P	4	6	30	70	6
WE712 040 35P	4	6	35	70	6
WE712 040 40P	4	6	40	80	6
WE712 040 45P	4	6	45	90	6

EDP No	D	L_1	L_3	L_2	D_2
WE712 040 50P	4	6	50	100	6
WE712 040 60P	4	6	60	100	6
WE712 050 16P	5	8	16	60	6
WE712 050 20P	5	8	20	60	6
WE712 050 26P	5	8	26	65	6
WE712 050 30P	5	8	30	70	6
WE712 050 35P	5	8	35	75	6
WE712 050 40P	5	8	40	80	6
WE712 050 50P	5	8	50	90	6
WE712 050 60P	5	8	60	100	6
WE712 060 15P	6	9	15	60	6
WE712 060 20P	6	9	20	60	6
WE712 060 30P	6	9	30	70	6
WE712 060 32P	6	9	32	90	6
WE712 080 25P	8	12	25	70	8
WE712 080 30P	8	12	30	80	8
WE712 080 42P	8	12	42	100	8
WE712 100 30P	10	15	30	75	10
WE712 100 35P	10	15	35	80	10
WE712 100 45P	10	15	45	100	10
WE712 120 35P	12	20	35	80	12
WE712 120 40P	12	20	40	90	12
WE712 120 50P	12	20	50	110	12

EDP No	D	L_1	L_3	L_2	D_2

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

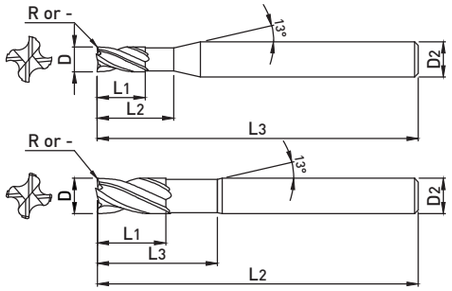
■ Applicable Working Material

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○	◎	◎	◎					

○ : GOOD ◎ : EXCELLENT

ZS1(2)04

4 FLUTES NECK TYPE RADIUS ENDMILL



- Excellent surface roughness while high-speed machining by adopting individual cutting edge
- Improved tool life by reduced chattering
- Applying R form to reduce cutting edge chipping

(※ Not recommended for machining requiring R shape)

ULTRA FINE | 4 | M HELIX | R ±0.01 ABOVE R6 | R ±0.015 R6 OR UNDER | AlTiN | DATA p.467

■ TOLERANCE

D		SHANK DIA.
ALL SIZES	0 ~ -0.02mm	h5

EDP No	D	R	L_1	L_3	L_2	D_2
ZS104 010	1	-	1.5	4	45	4
ZS204 010	1	0.05	1.5	4	45	4
ZS104 020	2	-	3	6	45	4
ZS204 020	2	0.05	3	6	45	4
ZS104 030	3	-	4	7	45	6
ZS204 030	3	0.1	4	7	45	6
ZS104 040	4	-	5	9	45	6
ZS204 040	4	0.1	5	9	45	6
ZS104 060	6	-	7	14	50	6
ZS204 060	6	0.2	7	14	50	6
ZS104 080	8	-	9	18	60	8
ZS204 080	8	0.2	9	18	60	8
ZS104 100	10	-	12	25	75	10
ZS204 100	10	0.2	12	25	75	10
ZS104 120	12	-	15	30	75	12
ZS204 120	12	0.3	15	30	75	12

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

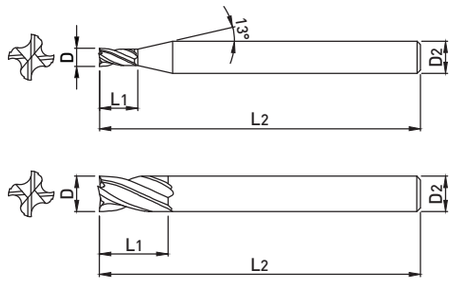
■ Applicable Working Material

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
	O	O	◎	◎	O				

○ : GOOD ◎ : EXCELLENT

ZS124

4 FLUTES SQUARE ENDMILL



- Excellent surface roughness while high-speed machining by adopting individual cutting edge
- Improved tool life by reduced chattering

ULTRA FINE | 4 | M HELIX | AlTiN | DATA p.467

■ TOLERANCE

D		SHANK DIA.
ALL SIZES	0 ~ -0.02mm	h5

EDP No	D	L_1	L_2	D_2
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

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

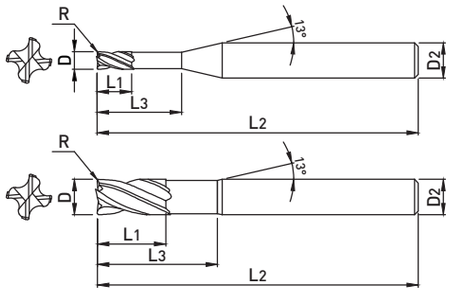
■ Applicable Working Material

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
	O	O	◎	◎	O				

○ : GOOD ◎ : EXCELLENT

ZS204

4 FLUTES NECK TYPE RADIUS ENDMILL



- Excellent surface roughness while high-speed machining by adopting individual cutting edge
- Improved tool life by reduced chattering

ULTRA FINE | 4 | M HELIX | R ±0.015 | R ±0.01 | AlTiN | DATA

ϕ6 OR UNDER ABOVE ϕ6

p.467

■ TOLERANCE

D		SHANK DIA.
ALL SIZES	0 ~ -0.02mm	h5

EDP No	D	R	L1	L3	L2	D2
ZS204 020 005 07	2	0.05	2.5	7	50	4
ZS204 020 01 07	2	0.1	2.5	7	50	4
ZS204 030 01 09	3	0.1	4	9	55	6
ZS204 030 02 09	3	0.2	4	9	55	6
ZS204 030 03 09	3	0.3	4	9	55	6
ZS204 030 03 12	3	0.3	4	12	55	6
ZS204 030 03 16	3	0.3	4	16	55	6
ZS204 040 02 12	4	0.2	5	12	55	6
ZS204 040 03 12	4	0.3	5	12	55	6
ZS204 040 03 16	4	0.3	5	16	55	6
ZS204 040 03 20	4	0.3	5	20	55	6
ZS204 040 05 12	4	0.5	5	12	55	6
ZS204 040 05 16	4	0.5	5	16	55	6
ZS204 040 05 20	4	0.5	5	20	55	6
ZS204 040 10 12	4	1	5	12	55	6
ZS204 050 01 16	5	0.1	6	16	60	6
ZS204 050 02 16	5	0.2	6	16	60	6
ZS204 050 03 16	5	0.3	6	16	60	6
ZS204 050 05 16	5	0.5	6	16	60	6
ZS204 050 10 16	5	1	6	16	60	6
ZS204 060 01 20	6	0.1	7	20	60	6
ZS204 060 02 20	6	0.2	7	20	60	6
ZS204 060 03 20	6	0.3	7	20	60	6
ZS204 060 05 20	6	0.5	7	20	60	6
ZS204 060 10 20	6	1	7	20	60	6
ZS204 060 15 20	6	1.5	7	20	60	6
ZS204 080 01 25	8	0.1	9	25	60	8
ZS204 080 02 25	8	0.2	9	25	60	8
ZS204 080 03 25	8	0.3	9	25	60	8
ZS204 080 05 25	8	0.5	9	25	60	8

EDP No	D	R	L1	L3	L2	D2
ZS204 080 10 25	8	1	9	25	60	8
ZS204 080 15 25	8	1.5	9	25	60	8
ZS204 080 20 25	8	2	9	25	60	8
ZS204 100 02 32	10	0.2	11	32	75	10
ZS204 100 03 32	10	0.3	11	32	75	10
ZS204 100 05 32	10	0.5	11	32	75	10
ZS204 100 10 32	10	1	11	32	75	10
ZS204 100 15 32	10	1.5	11	32	75	10
ZS204 100 20 32	10	2	11	32	75	10
ZS204 120 02 38	12	0.2	12	38	75	12
ZS204 120 03 38	12	0.3	12	38	75	12
ZS204 120 05 38	12	0.5	12	38	75	12
ZS204 120 10 38	12	1	12	38	75	12
ZS204 120 15 38	12	1.5	12	38	75	12
ZS204 120 20 38	12	2	12	38	75	12

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

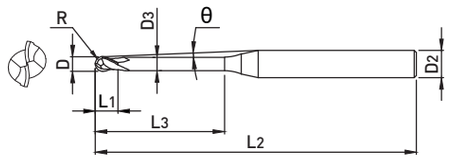
■ Applicable Working Material

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
	○	○	◎	◎	○				

○ : GOOD ◎ : EXCELLENT

ZSLNB

2 FLUTES LONG NECK TYPE BALL NOSE ENDMILL



- Suitable for deep grooves and sloped surfaces with a various neck
- Applicable to various machining by applying effective neck length following rake angle

ULTRA FINE | 2 | 30° HELIX | R ±0.005 | AlTiN | DATA

ALL SIZES

p.467

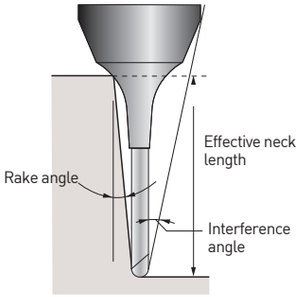
■ TOLERANCE

D		SHANK DIA.
ALL SIZES	0 ~ -0.015mm	h5

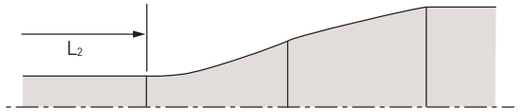
EDP No	SIZES(mm)								Effective length by inclination angle				
	D	R	L1	L3	D3	L2	D2	θ	0.5°	1°	1.5°	2°	3°
ZSLNB 2001-0.2	0.1	0.05	0.08	0.2	0.08	45	4	11.8	0.3	0.3	0.3	0.4	0.4
ZSLNB 2001-0.3	0.1	0.05	0.08	0.3	0.08	45	4	11.7	0.4	0.4	0.5	0.5	0.5
ZSLNB 2001-0.5	0.1	0.05	0.08	0.5	0.08	45	4	11.4	0.6	0.7	0.7	0.7	0.8
ZSLNB 2002-0.5	0.2	0.1	0.15	0.5	0.17	50	4	11.5	1.2	1.3	1.5	1.6	2.0
ZSLNB 2002-1	0.2	0.1	0.15	1	0.17	50	4	10.9	1.7	1.9	2.1	2.3	2.7
ZSLNB 2002-1.5	0.2	0.1	0.15	1.5	0.17	50	4	10.4	2.3	2.5	2.8	3.0	3.4
ZSLNB 2002-2	0.2	0.1	0.15	2	0.17	50	4	9.9	2.8	3.1	3.4	3.6	4.1
ZSLNB 2002-2.5	0.2	0.1	0.15	2.5	0.17	50	4	9.5	3.4	3.7	4	4.2	4.7
ZSLNB 2002-3.0	0.2	0.1	0.15	3	0.17	50	4	9.1	3.9	4.3	4.6	4.9	5.4
ZSLNB 2003-1	0.3	0.15	0.25	1	0.27	50	4	10.9	1.7	1.9	2.1	2.3	2.7
ZSLNB 2003-1.5	0.3	0.15	0.25	1.5	0.27	50	4	10.4	2.3	2.5	2.7	3	3.4
ZSLNB 2003-2	0.3	0.15	0.25	2	0.27	50	4	9.9	2.8	3.1	3.4	3.6	4.0
ZSLNB 2003-2.5	0.3	0.15	0.25	2.5	0.27	50	4	9.5	3.4	3.7	4	4.2	4.7
ZSLNB 2003-3	0.3	0.15	0.25	3	0.27	50	4	9.1	3.9	4.3	4.6	4.8	5.3
ZSLNB 2004-1	0.4	0.2	0.3	1	0.37	50	4	11	1.7	1.9	2.1	2.3	2.7
ZSLNB 2004-1.5	0.4	0.2	0.3	1.5	0.37	50	4	10.4	2.3	2.5	2.7	2.9	3.4
ZSLNB 2004-2	0.4	0.2	0.3	2	0.37	50	4	9.9	2.8	3.1	3.4	3.6	4
ZSLNB 2004-2.5	0.4	0.2	0.3	2.5	0.37	50	4	9.5	3.4	3.7	4	4.2	4.7
ZSLNB 2004-3	0.4	0.2	0.3	3	0.37	50	4	9.1	3.9	4.3	4.6	4.8	5.3
ZSLNB 2004-3.5	0.4	0.2	0.3	3.5	0.37	50	4	8.7	4.5	4.8	5.2	5.4	6
ZSLNB 2004-4	0.4	0.2	0.3	4	0.37	50	4	8.3	5.0	5.4	5.7	6	6.6
ZSLNB 2004-4.5	0.4	0.2	0.3	4.5	0.37	50	4	8	5.6	6	6.3	6.6	7.2
ZSLNB 2005-1	0.5	0.25	0.35	1	0.47	50	4	11	1.7	1.9	2.1	2.3	2.6
ZSLNB 2005-2	0.5	0.25	0.35	2	0.47	50	4	9.9	2.8	3.1	3.3	3.6	4
ZSLNB 2005-3	0.5	0.25	0.35	3	0.47	50	4	9	3.9	4.3	4.6	4.8	5.3
ZSLNB 2005-4	0.5	0.25	0.35	4	0.47	50	4	8.3	5	5.4	5.7	6	6.6
ZSLNB 2005-5	0.5	0.25	0.35	5	0.47	50	4	7.7	6.1	6.5	6.9	7.2	7.8
ZSLNB 2005-6	0.5	0.25	0.35	6	0.47	50	4	7.1	7.2	7.6	8	8.4	9
ZSLNB 2005-8	0.5	0.25	0.35	8	0.47	50	4	6.3	9.3	9.9	10.3	10.7	11.4
ZSLNB 2006-1	0.6	0.3	0.4	1	0.57	50	4	11	1.7	1.9	2.1	2.3	2.6
ZSLNB 2006-2	0.6	0.3	0.4	2	0.57	50	4	9.9	2.8	3.1	3.3	3.6	4
ZSLNB 2006-3	0.6	0.3	0.4	3	0.57	50	4	9	3.9	4.3	4.5	4.8	5.3
ZSLNB 2006-4	0.6	0.3	0.4	4	0.57	50	4	8.3	5	5.4	5.7	6	6.6
ZSLNB 2006-5	0.6	0.3	0.4	5	0.57	50	4	7.6	6.1	6.5	6.9	7.2	7.8
ZSLNB 2006-6	0.6	0.3	0.4	6	0.57	50	4	7.1	7.2	7.6	8	8.4	9

ZSLNB

2 FLUTES LONG NECK TYPE BALL NOSE ENDMILL



- For inclined workpieces, the cutting length is longer than the neck length (L_2).
- Refer to Effective Neck Length according to various inclination angles when selecting a tool
- Interference between tool and workpiece may occur, check the interference angle (θ)



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

ULTRA FINE | 2 | 30° HELIX | R ±0.005 ALL SIZES | AlTiN | DATA p.467

■ **TOLERANCE**

D		SHANK DIA.
ALL SIZES	0 ~ -0.015mm	h5

EDP No	SIZES(mm)								Effective length by inclination angle				
	D	R	L_1	L_3	D_3	L_2	D_2	θ	0.5°	1°	1.5°	2°	3°
ZSLNB 2006-7	0.6	0 .3	0.4	7	0.57	50	4	6.6	8.3	8.8	9.2	9.5	10.2
ZSLNB 2006-8	0.6	0.3	0.4	8	0.57	50	4	6.2	9.3	9.9	10.3	10.7	11.4
ZSLNB 2006-9	0.6	0.3	0.4	9	0.57	50	4	5.8	10.4	10.9	11.4	11.8	12.5
ZSLNB 2006-10	0.6	0.3	0.4	10	0.57	50	4	5.5	11.4	12	12.5	12.9	13.7
ZSLNB 2006-12	0.6	0.3	0.4	12	0.57	50	4	5	13.6	14.2	14.7	15.2	16
ZSLNB 2008-2	0.8	0.4	0.5	2	0.77	50	4	9.9	2.8	3.1	3.3	3.5	4
ZSLNB 2008-4	0.8	0.4	0.5	4	0.77	50	4	8.2	5	5.4	5.7	6	6.5
ZSLNB 2008-5	0.8	0.4	0.5	5	0.77	50	4	7.5	6.1	6.5	6.9	7.2	7.8
ZSLNB 2008-6	0.8	0.4	0.5	6	0.77	50	4	7	7.2	7.6	8	8.4	9
ZSLNB 2008-8	0.8	0.4	0.5	8	0.77	50	4	6.1	9.3	9.8	10.3	10.7	11.3
ZSLNB 2008-10	0.8	0.4	0.5	10	0.77	50	4	5.4	11.4	12	12.5	12.9	13.7
ZSLNB 2010-2	1	0.5	0.8	2	0.96	50	4	9.9	2.9	3.1	3.3	3.5	4
ZSLNB 2010-3	1	0.5	0.8	3	0.96	50	4	8.9	4	4.3	4.5	4.8	5.3
ZSLNB 2010-4	1	0.5	0.8	4	0.96	50	4	8.1	5	5.4	5.7	6	6.5
ZSLNB 2010-5	1	0.5	0.8	5	0.96	50	4	7.4	6.1	6.5	6.9	7.2	7.8
ZSLNB 2010-6	1	0.5	0.8	6	0.96	50	4	6.8	7.2	7.7	8	8.4	9
ZSLNB 2010-7	1	0.5	0.8	7	0.96	50	4	6.3	8.3	8.8	9.2	9.5	10.2
ZSLNB 2010-8	1	0.5	0.8	8	0.96	50	4	5.9	9.3	9.9	10.3	10.7	11.3
ZSLNB 2010-9	1	0.5	0.8	9	0.96	50	4	5.5	10.4	11	11.4	11.8	12.5
ZSLNB 2010-10	1	0.5	0.8	10	0.96	50	4	5.2	11.5	12	12.5	12.9	13.7
ZSLNB 2010-12	1	0.5	0.8	12	0.96	55	4	4.6	13.6	14.2	14.7	15.2	15.9
ZSLNB 2010-14	1	0.5	0.8	14	0.96	55	4	4.2	15.7	16.4	16.9	17.4	18.5
ZSLNB 2010-16	1	0.5	0.8	16	0.96	55	4	3.8	17.8	18.5	19.1	19.6	21.2
ZSLNB 2010-18	1	0.5	0.8	18	0.96	60	4	3.5	19.9	20.7	21.3	21.8	23.8
ZSLNB 2010-20	1	0.5	0.8	20	0.96	60	4	3.3	22	22.8	23.4	24	26.5
ZSLNB 2012-4	1.2	0.6	1.1	4	1.15	50	4	7.9	5.1	5.4	5.7	6	6.5
ZSLNB 2012-6	1.2	0.6	1.1	6	1.15	50	4	6.6	7.2	7.7	8	8.4	9
ZSLNB 2012-8	1.2	0.6	1.1	8	1.15	50	4	5.7	9.4	9.9	10.3	10.7	11.3
ZSLNB 2012-10	1.2	0.6	1.1	10	1.15	50	4	5	11.5	12.1	12.5	12.9	13.7
ZSLNB 2012-12	1.2	0.6	1.1	12	1.15	55	4	4.5	13.6	14.2	14.7	15.2	15.9
ZSLNB 2014-8	1.4	0.7	1.3	8	1.34	50	4	5.5	9.4	9.9	10.3	10.7	11.3
ZSLNB 2014-12	1.4	0.7	1.3	12	1.34	55	4	4.3	13.6	14.2	14.7	15.2	15.9
ZSLNB 2014-16	1.4	0.7	1.3	16	1.34	55	4	3.5	17.8	18.5	19.1	19.6	21.2
ZSLNB 2015-4	1.5	0.75	1.35	4	1.44	50	4	7.7	5.1	5.4	5.7	6	6.5
ZSLNB 2015-6	1.5	0.75	1.35	6	1.44	50	4	6.4	7.3	7.7	8	8.4	9

EDP No	SIZES(mm)								Effective length by inclination angle				
	D	R	L_1	L_3	D_3	L_2	D_2	θ	0.5°	1°	1.5°	2°	3°
ZSLNB 2015-8	1.5	0.75	1.35	8	1.44	50	4	5.4	9.4	9.9	10.3	10.7	11.3
ZSLNB 2015-10	1.5	0.75	1.35	10	1.44	50	4	4.7	11.5	12.1	12.5	12.9	13.7
ZSLNB 2015-12	1.5	0.75	1.35	12	1.44	55	4	4.2	13.6	14.2	14.7	15.2	15.9
ZSLNB 2015-14	1.5	0.75	1.35	14	1.44	55	4	3.8	15.7	16.4	16.9	17.4	18.5
ZSLNB 2015-16	1.5	0.75	1.35	16	1.44	55	4	3.4	17.8	18.5	19.1	19.6	21.1
ZSLNB 2015-20	1.5	0.75	1.35	20	1.44	60	4	2.9	22	22.8	23.4	24	-
ZSLNB 2016-8	1.6	0.8	1.4	8	1.54	50	4	5.3	9.4	9.9	10.3	10.7	11.3
ZSLNB 2016-10	1.6	0.8	1.4	10	1.54	50	4	4.6	11.5	12.1	12.5	12.9	13.7
ZSLNB 2016-12	1.6	0.8	1.4	12	1.54	55	4	4.1	13.6	14.2	14.7	15.2	15.9
ZSLNB 2016-16	1.6	0.8	1.4	16	1.54	55	4	3.3	17.8	18.5	19.1	19.6	21.1
ZSLNB 2016-20	1.6	0.8	1.4	20	1.54	60	4	2.8	22	22.8	23.4	24	-
ZSLNB 2018-8	1.8	0.9	1.6	8	1.73	50	4	5.1	9.4	9.9	10.3	10.7	11.3
ZSLNB 2018-12	1.8	0.9	1.6	12	1.73	55	4	3.9	13.7	14.3	14.7	15.2	15.9
ZSLNB 2018-16	1.8	0.9	1.6	16	1.73	55	4	3.1	17.9	18.6	19.1	19.6	21.1
ZSLNB 2018-20	1.8	0.9	1.6	20	1.73	60	4	2.6	22	22.8	23.4	24	-
ZSLNB 2020-3	2	1	1.7	3	1.92	50	4	8.3	4.1	4.4	4.6	4.8	5.2
ZSLNB 2020-4	2	1	3	4	1.92	50	4	7.3	5.2	5.5	5.8	6	6.5
ZSLNB 2020-6	2	1	3	6	1.92	50	4	5.8	7.3	7.7	8.1	8.4	9
ZSLNB 2020-8	2	1	3	8	1.92	50	4	4.9	9.5	9.9	10.3	10.7	11.3
ZSLNB 2020-10	2	1	3	10	1.92	50	4	4.2	11.6	12.1	12.6	12.9	13.6
ZSLNB 2020-12	2	1	3	12	1.92	55	4	3.7	13.7	14.3	14.8	15.2	15.9
ZSLNB 2020-14	2	1	3	14	1.92	55	4	3.2	15.8	16.4	16.9	17.4	18.5
ZSLNB 2020-16	2	1	3	16	1.92	55	4	2.9	17.9	18.6	19.1	19.6	-
ZSLNB 2020-18	2	1	3	18	1.92	60	4	2.7	20	20.7	21.3	21.8	-
ZSLNB 2020-20	2	1	3	20	1.92	60	4	2.4	22.1	22.8	23.4	24	-
ZSLNB 2020-22	2	1	3	22	1.92	60	4	2.3	24.1	24.9	25.6	26.3	-
ZSLNB 2020-25	2	1	3	25	1.92	65	4	2	27.3	28.1	28.8	-	-
ZSLNB 2020-30	2	1	3	30	1.92	70	4	1.7	32.4	33.4	34.2	-	-
ZSLNB 2020-35	2	1	3	35	1.92	75	4	1.5	37.6	38.6	-	-	-
ZSLNB 2020-40	2	1	3	40	1.92	80	4	1.4	42.8	43.8	-	-	-
ZSLNB 2025-10	2.5	1.25	4	10	2.4	50	4	3.4	11.6	12.1	12.6	13	13.6
ZSLNB 2025-16	2.5	1.25	4	16	2.4	55	4	2.3	17.9	18.6	19.1	19.6	-
ZSLNB 2025-20	2.5	1.25	4	20	2.4	60	4	1.9	22.1	22.8	23.5	-	-
ZSLNB 2030-8	3	1.5	4	8	2.88	55	6	6.2	9.6	10	10.4	10.7	11.3
ZSLNB 2030-10	3	1.5	4	10	2.88	55	6	5.5	11.7	12.2	12.6	13	13.6
ZSLNB 2030-13	3	1.5	4	13	2.88	60	6	4.6	14.8	15.4	15.9	16.3	17.1
ZSLNB 2030-16	3	1.5	4	16	2.88	60	6	4	18	18.6	19.1	19.6	21.1
ZSLNB 2030-18	3	1.5	4	18	2.88	60	6	3.6	20	20.7	21.3	21.8	23.7
ZSLNB 2030-20	3	1.5	4	20	2.88	65	6	3.4	22.1	22.9	23.5	24	26.4
ZSLNB 2030-25	3	1.5	4	25	2.88	70	6	2.8	27.3	28.2	28.8	29.9	-
ZSLNB 2030-30	3	1.5	4	30	2.88	75	6	2.5	32.5	33.4	34.3	35.9	-
ZSLNB 2030-35	3	1.5	4	35	2.88	80	6	2.2	37.7	38.7	40	41.9	-
ZSLNB 2040-10	4	2	5	10	3.9	55	6	4.5	11.6	12.1	12.5	12.9	13.5
ZSLNB 2040-13	4	2	5	13	3.9	60	6	3.6	14.7	15.3	15.8	16.2	17
ZSLNB 2040-16	4	2	5	16	3.9	60	6	3.1	17.9	18.5	19.1	19.5	20.9
ZSLNB 2040-20	4	2	5	20	3.9	65	6	2.5	22.1	22.8	23.4	23.9	-
ZSLNB 2040-25	4	2	5	25	3.9	70	6	2.1	27.3	28.1	28.8	29.8	-
ZSLNB 2040-30	4	2	5	30	3.9	75	6	1.8	32.4	33.4	34.2	-	-
ZSLNB 2040-35	4	2	5	35	3.9	80	6	1.6	37.6	38.6	39.9	-	-
ZSLNB 2040-40	4	2	5	40	3.9	80	6	1.4	42.8	43.8	-	-	-
ZSLNB 2040-45	4	2	5	45	3.9	90	6	1.2	47.9	49.1	-	-	-
ZSLNB 2040-50	4	2	5	50	3.9	100	6	1.1	53.1	54.5	-	-	-
ZSLNB 2050-20	5	2.5	6	20	4.9	65	6	1.4	22	22.8	-	-	-
ZSLNB 2050-25	5	2.5	6	25	4.9	70	6	1.2	27.2	28.1	-	-	-
ZSLNB 2050-30	5	2.5	6	30	4.9	75	6	1	32.4	-	-	-	-
ZSLNB 2050-35	5	2.5	6	35	4.9	80	6	0.8	42.8	-	-	-	-
ZSLNB 2050-40	5	2.5	6	40	4.9	90	6	0.7	42.8	-	-	-	-

– No interference

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

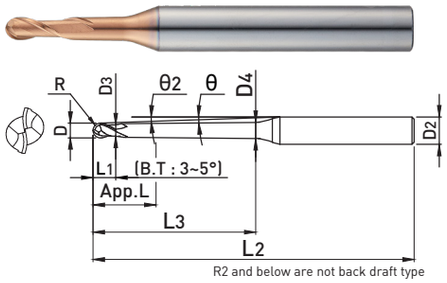
■ **Applicable Working Material**

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
	○	○	◎	◎	○				

○ : GOOD ◎ : EXCELLENT

ZSTNB20

2 FLUTES TAPERED NECK TYPE BALL NOSE ENDMILL



R2 and below are not back draft type

- Suitable for deep grooves and sloped surfaces with various neck specifications
- Reduced tool vibration and minimized chattering with taper type neck
- Applicable to various machining by applying effective neck length following rake angle

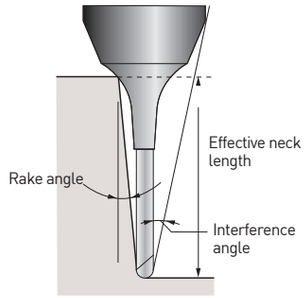
ULTRA FINE | 2 | 30° HELIX | R ±0.005 R6 OR UNDER | R ±0.01 ABOVE R6 | ALTiN | DATA p.468~471

▪ **TOLERANCE**

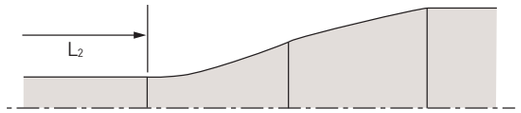
D		SHANK DIA.
ALL SIZES	0 ~ -0.015mm	h5

EDP No	SIZES(mm)											Effective length by inclination angle				
	D	R	L_1	L_3	θ	D_3	D_4	L_2	D_2	App. L	θ_2	0.5°	1°	1.5°	2°	3°
ZSTNB 2002-1-04	0.2	0.1	0.15	1	0.4	0.17	0.18	50	4	1.35	10.9	1.5	1.7	1.8	2	2.3
ZSTNB 2002-1.5-04	0.2	0.1	0.15	1.5	0.4	0.17	0.19	50	4	1.77	10.4	2	2.2	2.4	2.6	2.9
ZSTNB 2002-2-09	0.2	0.1	0.15	2	0.9	0.17	0.23	50	4	1.10	10.1	x	2.8	3.1	3.4	3.9
ZSTNB 2002-2.5-09	0.2	0.1	0.15	2.5	0.9	0.17	0.24	50	4	1.10	9.6	x	3.3	3.7	4	4.5
ZSTNB 2003-2-04	0.3	0.15	0.25	2	0.4	0.28	0.29	50	4	2.19	10	2.5	2.8	3	3.2	3.5
ZSTNB 2003-3-09	0.3	0.15	0.25	3	0.9	0.28	0.36	50	4	1.20	9.3	x	3.8	4.2	4.5	5.1
ZSTNB 2003-4-09	0.3	0.15	0.25	4	0.9	0.28	0.39	50	4	1.20	8.6	x	4.8	5.3	5.7	6.3
ZSTNB 2004-2-04	0.4	0.2	0.3	2	0.4	0.37	0.39	50	4	2.20	10	2.5	2.8	3	3.2	3.5
ZSTNB 2004-3-04	0.4	0.2	0.3	3	0.4	0.37	0.41	50	4	2.44	9.1	3.6	3.9	4.1	4.4	4.8
ZSTNB 2004-4-04	0.4	0.2	0.3	4	0.4	0.37	0.42	50	4	2.44	8.4	4.7	5.2	5.6	5.9	6.5
ZSTNB 2004-4-09	0.4	0.2	0.3	4	0.9	0.37	0.49	50	4	1.25	8.5	x	4.8	5.3	5.7	6.3
ZSTNB 2004-5-04	0.4	0.2	0.3	5	0.4	0.37	0.44	50	4	2.44	7.8	5.7	6.3	6.7	7.1	7.7
ZSTNB 2004-5-09	0.4	0.2	0.3	5	0.9	0.37	0.52	50	4	1.25	7.9	x	5.9	6.4	6.8	7.5
ZSTNB 2005-4-04	0.5	0.25	0.35	4	0.4	0.47	0.52	50	4	2.49	8.4	4.6	5	5.3	5.5	5.9
ZSTNB 2005-8-09	0.5	0.25	0.35	8	0.9	0.47	0.71	50	4	1.30	6.5	x	8.9	9.6	10.1	10.9
ZSTNB 2005-12-09	0.5	0.25	0.35	12	0.9	0.47	0.84	50	4	1.30	5.3	x	13	13.9	14.5	15.4
ZSTNB 2005-42-04	0.54	0.27	0.37	2	0.4	0.52	0.54	50	4	1.80	10	2.3	2.5	2.7	2.8	3
ZSTNB 2005-44-04	0.54	0.27	0.37	4	0.4	0.52	0.57	50	4	1.80	8.4	4.5	4.9	5.2	5.5	5.9
ZSTNB 2005-45-04	0.54	0.27	0.37	5	0.4	0.52	0.59	50	4	1.80	7.8	5.5	6	6.3	6.6	7.1
ZSTNB 2005-46-04	0.54	0.27	0.37	6	0.4	0.52	0.60	50	4	1.80	7.2	6.7	7.3	7.8	8.2	8.8
ZSTNB 2005-46.5-04	0.54	0.27	0.37	6.5	0.4	0.52	0.61	50	4	1.80	7	7.2	7.9	8.3	8.7	9.4
ZSTNB 2005-47-04	0.54	0.27	0.37	7	0.4	0.52	0.61	50	4	1.80	6.8	7.7	8.4	8.9	9.3	10
ZSTNB 2006-2-04	0.6	0.3	0.4	2	0.4	0.57	0.59	50	4	2.17	10	2.4	2.5	2.7	2.8	3
ZSTNB 2006-4-04	0.6	0.3	0.4	4	0.4	0.57	0.62	50	4	2.54	8.4	4.6	5	5.2	5.5	5.9
ZSTNB 2006-6-04	0.6	0.3	0.4	6	0.4	0.57	0.65	50	4	2.54	7.2	6.8	7.4	7.8	8.2	8.8
ZSTNB 2006-6-09	0.6	0.3	0.4	6	0.9	0.57	0.75	50	4	1.35	7.3	x	6.9	7.5	7.9	8.6
ZSTNB 2006-8-09	0.6	0.3	0.4	8	0.9	0.57	0.81	50	4	1.35	6.4	x	8.9	9.6	10.1	10.9
ZSTNB 2006-10-04	0.6	0.3	0.4	10	0.4	0.57	0.70	50	4	2.54	5.6	10.8	11.7	12.2	12.7	13.5
ZSTNB 2006-10-09	0.6	0.3	0.4	10	0.9	0.57	0.87	50	4	1.35	5.7	x	11	11.8	12.3	13.2
ZSTNB 2006-12-09	0.6	0.3	0.4	12	0.9	0.57	0.93	50	4	1.35	5.2	x	13	13.9	14.5	15.4
ZSTNB 2006-15-04	0.6	0.3	0.4	15	0.4	0.57	0.77	50	4	2.54	4.4	15.9	17	17.6	18.2	19.2
ZSTNB 2006-15-09	0.6	0.3	0.4	15	0.9	0.57	1.03	50	4	1.35	4.5	x	16.1	17.1	17.7	18.8
ZSTNB 2008-4-04	0.8	0.4	0.5	4	0.4	0.77	0.82	50	4	2.64	8.3	4.6	4.9	5.2	5.5	5.9
ZSTNB 2008-6-04	0.8	0.4	0.5	6	0.4	0.77	0.85	50	4	2.64	7.1	6.6	7.1	7.5	7.7	8.3
ZSTNB 2008-8-09	0.8	0.4	0.5	8	0.9	0.77	1.01	50	4	1.45	6.3	x	8.9	9.6	10.1	10.9
ZSTNB 2008-12-09	0.8	0.4	0.5	12	0.9	0.77	1.13	55	4	1.45	5	x	13	13.9	14.5	15.4

2 FLUTES TAPERED NECK TYPE BALL NOSE ENDMILL ZSTNB20



- For inclined workpieces, the cutting length is longer than the neck length (L_2).
- Refer to Effective Neck Length according to various inclination angles when selecting a tool
- Interference between tool and workpiece may occur, check the interference angle (θ)



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

ULTRA FINE | 2 | 30° HELIX | R ±0.005 R6 OR UNDER | R ±0.01 ABOVE R6 | ALTiN | DATA p.468~471

▪ **TOLERANCE**

D		SHANK DIA.
ALL SIZES	0 ~ -0.015mm	h5

EDP No	SIZES(mm)											Effective length by inclination angle				
	D	R	L_1	L_3	θ	D_3	D_4	L_2	D_2	App. L	θ_2	0.5°	1°	1.5°	2°	3°
ZSTNB 2008-16-09	0.8	0.4	0.5	16	0.9	0.77	1.26	55	4	1.45	4.2	x	17.1	18.1	18.8	19.9
ZSTNB 2009-4-04	0.9	0.45	0.6	4	0.4	0.86	0.91	50	4	3.46	8.2	4.5	4.7	4.9	5.1	5.4
ZSTNB 2009-8-04	0.9	0.45	0.6	8	0.4	0.86	0.96	55	4	3.46	6.1	8.7	9.3	9.7	10	10.6
ZSTNB 2009-12-04	0.9	0.45	0.6	12	0.4	0.86	1.02	55	4	3.46	4.8	12.9	13.8	14.4	14.9	15.7
ZSTNB 2009-16-04	0.9	0.45	0.6	16	0.4	0.86	1.08	60	4	3.46	4	17	18	18.7	19.3	20.5
ZSTNB 2009-18-04	0.9	0.45	0.6	18	0.4	0.86	1.10	65	4	3.46	3.7	19.1	20.1	20.9	21.5	23.1
ZSTNB 2009-20-04	0.9	0.45	0.6	20	0.4	0.86	1.13	65	4	3.46	3.4	21.1	22.2	23	23.6	25.6
ZSTNB 2009-22-04	0.9	0.45	0.6	22	0.4	0.86	1.16	65	4	3.46	3.2	23.1	24.3	25.1	25.8	28.2
ZSTNB 2009-24-04	0.9	0.45	0.6	24	0.4	0.86	1.19	70	4	3.46	3	25.2	26.4	27.2	27.9	-
ZSTNB 2010-6-04	1	0.5	0.8	6	0.4	0.94	1.01	50	6	5.09	8.3	6.8	7.2	7.5	7.8	8.3
ZSTNB 2010-8-04	1	0.5	0.8	8	0.4	0.94	1.04	55	6	5.09	7.5	8.8	9.3	9.7	10	10.6
ZSTNB 2010-10-04	1	0.5	0.8	10	0.4	0.94	1.07	55	6	5.09	6.8	11	11.7	12.3	12.7	13.5
ZSTNB 2010-10-09	1	0.5	0.8	10	0.9	0.94	1.23	55	6	2.70	6.9	x	11.2	11.9	12.4	13.2
ZSTNB 2010-15-09	1	0.5	0.8	15	0.9	0.94	1.39	60	6	2.70	5.7	x	16.2	17.1	17.8	18.8
ZSTNB 2010-20-04	1	0.5	0.8	20	0.4	0.94	1.21	55	6	5.09	4.7	21.2	22.3	23	23.6	25.7
ZSTNB 2010-20-09	1	0.5	0.8	20	0.4	0.94	1.54	55	6	2.70	4.8	x	21.3	22.4	23.1	24.6
ZSTNB 2010-25-09	1	0.5	0.8	25	0.4	0.94	1.70	70	6	2.70	4.2	x	26.4	27.6	28.4	30.8
ZSTNB 2010-30-04	1	0.5	0.8	30	0.4	0.94	1.35	75	6	5.09	3.6	31.3	32.7	33.6	34.8	38.5
ZSTNB 2010-30-09	1	0.5	0.8	30	0.9	0.94	1.86	75	6	2.70	3.7	x	31.4	32.8	33.7	36.9
ZSTNB 2010-35-09	1	0.5	0.8	35	0.9	0.94	2.02	80	6	2.70	3.3	x	36.5	38	39	43.1
ZSTNB 2010-40-09	1	0.5	0.8	40	0.9	0.94	2.17	85	6	2.70	3	x	41.6	43.2	44.4	-
ZSTNB 2010-50-09	1	0.5	0.8	50	0.9	0.94	2.49	95	6	2.70	2.5	x	51.7	53.5	55.5	-
ZSTNB 2010-60-09	1	0.5	0.8	60	0.9	0.94	2.80	105	6	2.70	2.2	x	61.8	63.8	66.6	-
ZSTNB 2010-70-09	1	0.5	0.8	70	0.9	0.94	3.11	115	6	2.70	1.9	x	71.9	74	-	-
ZSTNB 2015-8-04	1.5	0.75	1.35	8	0.4	1.42	1.51	55	6	7.07	7.3	8.9	9.4	9.7	10	10.6
ZSTNB 2015-10-04	1.5	0.75	1.35	10	0.4	1.42	1.54	55	6	7.07	6.6	10.9	11.5	11.9	12.2	12.9
ZSTNB 2015-12-04	1.5	0.75	1.35	12	0.4	1.42	1.57	55	6	7.07	6	13	13.6	14	14.4	15.4
ZSTNB 2015-15-09	1.5	0.75	1.35	15	0.9	1.42	1.85	60	6	3.89	5.4	x	16.4	17.2	17.8	18.8
ZSTNB 2015-20-09	1.5	0.75	1.35	20	0.9	1.42	2.01	65	6	3.89	4.5	x	21.4	22.4	23.2	24.7
ZSTNB 2015-30-09	1.5	0.75	1.35	30	0.9	1.42	2.32	75	6	3.89	3.4	x	31.5	32.9	33.7	37
ZSTNB 2018-4-04	1.8	0.9	1.6	4	0.4	1.73	1.76	50	6	4.38	9.2	4.6	4.8	4.9	5.1	5.4
ZSTNB 2018-8-04	1.8	0.9	1.6	8	0.4	1.73	1.82	50	6	6.61	7.1	8.6	9	9.2	9.4	10.2
ZSTNB 2018-12-04	1.8	0.9	1.6	12	0.4	1.73	1.88	55	6	6.61	5.8	12.9	13.5	14	14.4	15.4
ZSTNB 2018-16-04	1.8	0.9	1.6	16	0.4	1.73	1.93	60	6	6.61	4.9	17	17.7	18.3	18.7	20.5
ZSTNB 2018-20-04	1.8	0.9	1.6	20	0.4	1.73	1.99	65	6	6.61	4.3	21.2	22.3	23	23.6	25.6
ZSTNB 2018-24-04	1.8	0.9	1.6	24	0.4	1.73	2.04	65	6	6.61	3.8	25.3	26.5	27.3	27.9	30.8

ZSTNB20

2 FLUTES TAPERED NECK TYPE BALL NOSE ENDMILL

EDP No	SIZES(mm)											Effective length by inclination angle				
	D	R	L_1	L_3	θ	D_3	D_4	L_2	D_2	App. L	$θ_2$	0.5°	1°	1.5°	2°	3°
ZSTNB 2018-28-04	1.8	0.9	1.6	28	0.4	1.73	2.10	70	6	6.61	3.4	29.4	30.6	31.5	32.4	35.9
ZSTNB 2018-32-04	1.8	0.9	1.6	32	0.4	1.73	2.15	70	6	6.61	3	33.4	34.8	35.7	37.1	-
ZSTNB 2018-36-04	1.8	0.9	1.6	36	0.4	1.73	2.21	75	6	6.61	2.8	37.5	38.9	39.9	41.7	-
ZSTNB 2018-38-04	1.8	0.9	1.6	38	0.4	1.73	2.24	80	6	6.61	2.7	39.5	41	42.0	44	-
ZSTNB 2018-40-04	1.8	0.9	1.6	40	0.4	1.73	2.27	80	6	6.61	2.6	41.5	43.1	44.2	46.3	-
ZSTNB 2020-8-04	2	1	1.7	8	0.4	1.92	2.01	50	6	7.42	7	8.7	9	9.2	9.5	10.2
ZSTNB 2020-12-04	2	1	1.7	12	0.4	1.73	2.06	55	6	7.42	5.7	13.0	13.6	14.0	14.4	15.4
ZSTNB 2020-16-04	2	1	1.7	16	0.4	1.73	2.12	60	6	7.42	4.8	17.0	17.7	18.3	18.7	20.5
ZSTNB 2020-20-04	2	1	1.7	20	0.4	1.73	2.18	65	6	7.42	4.1	21.3	22.3	23.0	23.6	25.6
ZSTNB 2020-20-09	2	1	1.7	20	0.9	1.73	2.50	65	6	4.24	4.2	x	21.4	22.4	23.2	24.6
ZSTNB 2020-25-09	2	1	1.7	25	0.9	1.73	2.65	65	6	4.24	3.6	x	26.5	27.7	28.5	30.8
ZSTNB 2020-30-04	2	1	1.7	30	0.4	1.73	2.32	70	6	7.42	3.1	31.4	32.7	33.6	34.8	38.5
ZSTNB 2020-30-09	2	1	1.7	30	0.9	1.73	2.81	70	6	4.24	3.2	x	31.6	32.9	33.7	36.9
ZSTNB 2030-8-04	3	1.5	2.5	8	0.4	2.86	2.94	50	6	8.50	6.3	8.8	9.1	9.3	9.5	10.3
ZSTNB 2030-16-04	3	1.5	2.5	16	0.4	2.86	3.05	55	6	12.52	4.1	17.2	17.8	18.3	18.7	20.6
ZSTNB 2030-20-04	3	1.5	2.5	20	0.4	2.86	3.10	60	6	12.52	3.4	21.2	22	22.6	23.3	25.7
ZSTNB 2030-30-04	3	1.5	2.5	30	0.4	2.86	3.24	70	6	12.52	2.5	31.6	32.8	33.7	34.9	-
ZSTNB 2030-30-09	3	1.5	2.5	30	0.9	2.86	3.72	70	6	6.95	2.6	x	31.8	33.0	33.8	-
ZSTNB 2030-40-04	3	1.5	2.5	40	0.4	2.86	3.38	80	6	12.52	2	41.7	43.2	44.3	-	-
ZSTNB 2030-40-09	3	1.5	2.5	40	0.9	2.86	4.04	80	6	6.95	2	x	41.9	43.3	-	-
ZSTNB 2030-50-09	3	1.5	2.5	50	0.9	2.86	4.35	90	6	6.95	1.7	x	52	53.6	-	-
ZSTNB 2030-60-09	3	1.5	2.5	60	0.9	2.86	4.67	100	6	6.95	1.4	x	62.1	-	-	-
ZSTNB 2030-70-09	3	1.5	2.5	70	0.9	2.86	4.98	110	6	6.95	1.2	x	72.1	-	-	-
ZSTNB 2040-20-10	4	2	8	20	1	3.86	4.28	70	8	12.01	5	20.5	21.6	22.3	22.8	23.5
ZSTNB 2040-30-10	4	2	8	30	1	3.86	4.63	80	8	12.01	3.51	22	31.6	32.5	33.2	34.16
ZSTNB 2040-40-10	4	2	8	40	1	3.86	4.98	90	8	12.01	2.7	22	42	43.4	44.3	-
ZSTNB 2040-50-10	4	2	8	50	1	3.86	5.33	100	8	12.01	2.2	22	52	53.6	54.7	-
ZSTNB 2040-60-10	4	2	8	60	1	3.86	5.68	110	8	12.01	1.9	22	62	63.8	-	-
ZSTNB 2050-30-10	5	2.5	10	30	1	4.86	5.56	80	8	14.01	2.8	25.5	31.7	32.6	33.2	-
ZSTNB 2050-40-10	5	2.5	10	40	1	3.86	5.91	90	8	14.01	2.1	25.5	41.7	42.8	43.5	-
ZSTNB 2050-60-10	5	2.5	10	60	1	3.86	6.61	110	8	14.01	1.5	25.5	62.1	-	-	-
ZSTNB 2060-30-10	6	3	12	30	1	5.86	6.49	80	8	16.01	1.9	29	31.8	32.6	-	-
ZSTNB 2060-40-10	6	3	12	40	1	5.86	6.84	90	8	16.01	1.5	29	41.8	-	-	-
ZSTNB 2060-50-10	6	3	12	50	1	5.86	7.19	100	8	16.01	1.2	29	51.8	-	-	-
ZSTNB 2060-60-10	6	3	12	60	1	5.86	7.54	110	10	16.01	1.9	29	62.2	63.9	-	-
ZSTNB 2060-70-10	6	3	12	70	1	5.86	7.89	120	10	16.01	1.7	29	72.2	74.1	-	-
ZSTNB 2060-80-10	6	3	12	80	1	5.86	8.23	130	10	16.01	1.5	29	82.2	-	-	-
ZSTNB 2080-50-10	8	4	14	50	1	7.86	9.12	110	10	18.01	1.2	32	51.9	-	-	-
ZSTNB 2080-60-10	8	4	14	60	1	7.86	9.47	120	10	18.01	1	32	-	-	-	-
ZSTNB 2080-70-10	8	4	14	70	1	7.86	9.82	130	10	18.01	0.9	32	-	-	-	-
ZSTNB 2080-80-10	8	4	14	80	1	7.86	10.16	140	12	18.01	1.5	32	82.3	-	-	-
ZSTNB 2100-60-10	10	5	18	60	1	9.86	11.33	130	12	22.01	1.1	39	62.1	-	-	-
ZSTNB 2100-75-10	10	5	18	75	1	9.86	11.85	140	12	22.01	0.9	39	-	-	-	-

X No application
– No interference

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

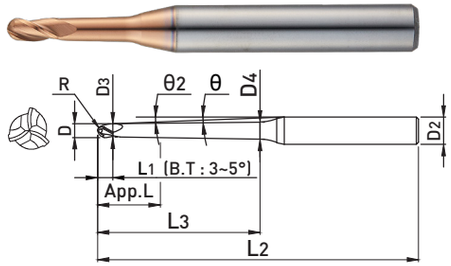
■ **Applicable Working Material**

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
	○	○	◎	◎	○				

○ : GOOD ◎ : EXCELLENT

ZSTNB30

3 FLUTES TAPERED NECK TYPE BALL NOSE ENDMILL



- Suitable for deep grooves and sloped surfaces with various neck specifications
- Reduced tool vibration and minimized chattering with taper type neck
- Applicable to various machining by applying effective neck length following rake angle

ULTRA FINE | 3 | 30° HELIX | R ±0.005 ALL SIZES | AlTiN | DATA p.468~471

■ **TOLERANCE**

D		SHANK DIA.
ALL SIZES	0 ~ -0.015mm	h5

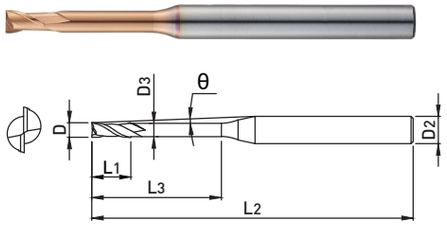
EDP No	SIZES(mm)											Effective length by inclination angle				
	D	R	L_1	L_3	θ	D_3	D_4	L_2	D_2	App. L	$θ_2$	0.5°	1°	1.5°	2°	3°
ZSTNB 3020-8-04	2	1	1.7	8	0.4	1.92	2.01	50	6	7.42	7	8.7	9	9.2	9.5	10.2
ZSTNB 3020-12-04	2	1	1.7	12	0.4	1.92	2.06	55	6	7.42	5.7	13	13.6	14	14.4	15.4
ZSTNB 3020-16-04	2	1	1.7	16	0.4	1.92	2.12	60	6	7.42	4.8	17	17.7	18.3	18.7	20.5
ZSTNB 3020-20-04	2	1	1.7	20	0.4	1.92	2.18	65	6	7.42	4.1	21.3	22.3	23	23.6	25.6
ZSTNB 3020-20-09	2	1	1.7	20	0.9	1.92	2.50	65	6	4.24	4.2	x	21.4	22.4	23.2	24.6
ZSTNB 3020-25-09	2	1	1.7	25	0.9	1.92	2.65	65	6	4.24	3.6	x	26.5	27.7	28.5	30.8
ZSTNB 3020-30-04	2	1	1.7	30	0.4	1.92	2.32	70	6	7.42	3.1	31.4	32.7	33.6	34.8	38.5
ZSTNB 3020-30-09	2	1	1.7	30	0.9	1.92	2.81	70	6	4.24	3.2	x	31.6	32.9	33.7	36.9
ZSTNB 3020-35-09	2	1	1.7	35	0.9	1.92	2.97	75	6	4.24	2.8	x	36.6	38	39	-
ZSTNB 3020-40-04	2	1	1.7	40	0.4	1.92	2.46	80	6	7.42	2.5	41.5	43.1	44.2	46.3	-
ZSTNB 3020-40-09	2	1	1.7	40	0.9	1.92	3.12	80	6	4.24	2.6	x	41.7	43.2	44.5	-
ZSTNB 3020-50-09	2	1	1.7	50	0.9	1.92	3.44	90	6	4.24	2.1	x	51.8	53.5	55.5	-
ZSTNB 3020-60-09	2	1	1.7	60	0.9	1.92	3.75	100	6	4.24	1.8	x	61.9	63.8	-	-
ZSTNB 3020-70-09	2	1	1.7	70	0.9	1.92	4.07	110	6	4.24	1.6	x	72	74.1	-	-
ZSTNB 3030-8-04	3	1.5	2.5	8	0.4	2.86	2.94	50	6	8.50	6.3	8.8	9.1	9.3	9.5	10.3
ZSTNB 3030-16-04	3	1.5	2.5	16	0.4	2.86	3.05	55	6	12.52	4.1	17.2	17.8	18.3	18.7	20.6
ZSTNB 3030-20-04	3	1.5	2.5	20	0.4	2.86	3.10	60	6	12.52	3.4	21.2	22	22.6	23.3	25.7
ZSTNB 3030-30-04	3	1.5	2.5	30	0.4	2.86	3.24	70	6	12.52	2.5	31.6	32.8	33.7	34.9	-
ZSTNB 3030-30-09	3	1.5	2.5	30	0.9	2.86	3.72	70	6	6.95	2.6	x	31.8	33	33.8	-
ZSTNB 3030-40-04	3	1.5	2.5	40	0.4	2.86	3.38	80	6	12.52	2.0	41.7	43.2	44.3	-	-
ZSTNB 3030-40-09	3	1.5	2.5	40	0.9	2.86	4.04	80	6	6.95	2	x	41.9	43.3	-	-
ZSTNB 3030-50-09	3	1.5	2.5	50	0.9	2.86	4.35	90	6	6.95	1.7	x	52	53.6	-	-
ZSTNB 3030-60-09	3	1.5	2.5	60	0.9	2.86	4.67	100	6	6.95	1.4	x	62.1	-	-	-
ZSTNB 3030-70-09	3	1.5	2.5	70	0.9	2.86	4.98	110	6	6.95	1.2	x	72.1	-	-	-
ZSTNB 3040-20-10	4	2	8	20	1	3.86	4.28	70	8	12.01	5	20.5	21.6	22.3	22.8	23.5
ZSTNB 3040-30-10	4	2	8	30	1	3.86	4.63	80	8	12.01	3.6	22	31.6	32.5	33.2	34.1
ZSTNB 3040-40-10	4	2	8	40	1	3.86	4.98	90	8	12.01	2.7	22	42	43.4	44.3	-
ZSTNB 3040-50-10	4	2	8	50	1	3.86	5.33	100	8	12.01	2.2	22	52	53.6	54.7	-
ZSTNB 3040-60-10	4	2	8	60	1	3.86	5.68	110	8	12.01	1.9	22	62	63.8	-	-
ZSTNB 3050-30-10	5	2.5	10	30	1	4.86	5.56	80	8	14.01	2.8	25.5	31.7	32.6	33.2	-
ZSTNB 3050-40-10	5	2.5	10	40	1	4.86	5.91	90	8	14.01	2.1	25.5	41.7	42.8	43.5	-
ZSTNB 3050-60-10	5	2.5	10	60	1	4.86	6.61	110	8	12.52	1.5	25.5	62.1	-	-	-

X No application
– No interference

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

ZSLNS20

2 FLUTES LONG NECK TYPE SQUARE ENDMILL



- Suitable for deep grooves and sloped surfaces with various neck specifications
- Applicable to various machining by applying effective neck length following rake angle

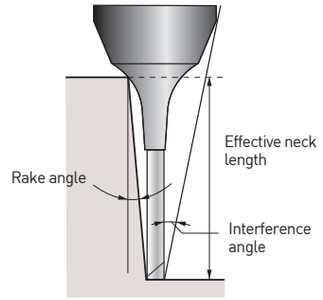
ULTRA FINE | 2 | 30° HELIX | AlTiN | DATA

p.472

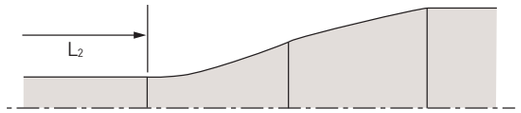
■ TOLERANCE

D		SHANK DIA.
ALL SIZES	0 ~ -0.015mm	h5

EDP No	SIZES(mm)							Effective length by inclination angle				
	D	L_1	L_3	D_3	L_2	D_2	θ	0.5°	1°	1.5°	2°	3°
ZSLNS 2001-0.3	0.1	0.15	0.3	0.08	45	4	11.6	0.4	0.4	0.5	0.5	0.5
ZSLNS 2001-0.5	0.1	0.15	0.5	0.08	45	4	11.4	0.6	0.7	0.7	0.7	0.8
ZSLNS 2001-1	0.1	0.15	1	0.08	45	4	10.9	1.2	1.2	1.2	1.3	1.4
ZSLNS 2002-0.5	0.2	0.3	0.5	0.17	50	4	11.3	1.2	1.3	1.5	1.7	2
ZSLNS 2002-1	0.2	0.3	1	0.17	50	4	10.8	1.7	1.9	2.2	2.4	2.7
ZSLNS 2002-1.5	0.2	0.3	1.5	0.17	50	4	10.3	2.3	2.5	2.8	3	3.4
ZSLNS 2003-1	0.3	0.45	1	0.27	50	4	10.8	1.7	1.9	2.2	2.4	2.7
ZSLNS 2003-1.5	0.3	0.3	1.5	0.27	50	4	10.3	2.3	2.5	2.8	3	3.4
ZSLNS 2003-2	0.3	0.3	2	0.27	50	4	9.8	2.8	3.1	3.4	3.6	4.1
ZSLNS 2003-2.5	0.3	0.3	2.5	0.27	50	4	9.4	3.4	3.7	4	4.3	4.7
ZSLNS 2003-3	0.3	0.3	3	0.27	50	4	9	3.9	4.3	4.6	4.9	5.4
ZSLNS 2004-1	0.4	0.6	1	0.37	50	4	10.7	1.7	1.9	2.2	2.4	2.7
ZSLNS 2004-1.5	0.4	0.6	1.5	0.37	50	4	10.2	2.3	2.5	2.8	3	3.4
ZSLNS 2004-2	0.4	0.6	2	0.37	50	4	9.7	2.8	3.1	3.4	3.6	4.1
ZSLNS 2004-2.5	0.4	0.6	2.5	0.37	50	4	9.3	3.4	3.7	4	4.3	4.7
ZSLNS 2004-3	0.4	0.6	3	0.37	50	4	8.9	3.9	4.3	4.6	4.9	5.4
ZSLNS 2004-3.5	0.4	0.6	3.5	0.37	50	4	8.6	4.5	4.9	5.2	5.5	6
ZSLNS 2004-4	0.4	0.6	4	0.37	50	4	8.2	5	5.4	5.8	6.1	6.6
ZSLNS 2004-5	0.4	0.6	5	0.37	50	4	7.6	6.1	6.6	6.9	7.3	7.8
ZSLNS 2004-6	0.4	0.6	6	0.37	50	4	7.1	7.2	7.7	8.1	8.4	9
ZSLNS 2005-1	0.5	0.75	1	0.47	50	4	10.7	1.7	1.9	2.2	2.4	2.7
ZSLNS 2005-1.5	0.5	0.75	1.5	0.47	50	4	10.2	2.3	2.5	2.8	3	3.4
ZSLNS 2005-2	0.5	0.75	2	0.47	50	4	9.7	2.8	3.1	3.4	3.6	4.1
ZSLNS 2005-2.5	0.5	0.75	2.5	0.47	50	4	9.3	3.4	3.7	4	4.3	4.7
ZSLNS 2005-3	0.5	0.75	3	0.47	50	4	8.9	3.9	4.3	4.6	4.9	5.4
ZSLNS 2005-4	0.5	0.75	4	0.47	50	4	8.1	5	5.4	5.8	6.1	6.6
ZSLNS 2005-5	0.5	0.75	5	0.47	50	4	7.5	6.1	6.6	6.9	7.3	7.8
ZSLNS 2005-6	0.5	0.75	6	0.47	50	4	7	7.2	7.7	8.1	8.4	9
ZSLNS 2005-8	0.5	0.75	8	0.47	50	4	6.2	9.3	9.9	10.3	10.7	11.4
ZSLNS 2006-2	0.6	0.9	2	0.57	50	4	9.6	2.8	3.1	3.4	3.6	4.1
ZSLNS 2006-4	0.6	0.9	4	0.57	50	4	8.1	5	5.4	5.8	6.1	6.6
ZSLNS 2006-6	0.6	0.9	6	0.57	50	4	6.9	7.2	7.7	8.1	8.4	9
ZSLNS 2006-8	0.6	0.9	8	0.57	50	4	6.1	9.3	9.9	10.3	10.7	11.4
ZSLNS 2006-10	0.6	0.9	10	0.57	50	4	5.4	11.5	12.1	12.6	13	13.7
ZSLNS 2007-2	0.7	1.05	2	0.67	50	4	9.6	2.8	3.1	3.4	3.6	4.1
ZSLNS 2007-4	0.7	1.05	4	0.67	50	4	8	5	5.4	5.8	6.1	6.6



- For inclined workpieces, the cutting length is longer than the neck length (L_2).
- Refer to Effective Neck Length according to various inclination angles when selecting a tool
- Interference between tool and workpiece may occur, check the interference angle (θ)



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

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

p.472

■ TOLERANCE

D		SHANK DIA.
ALL SIZES	0 ~ -0.015mm	h5

EDP No	SIZES(mm)							Effective length by inclination angle				
	D	L_1	L_3	D_3	L_2	D_2	θ	0.5°	1°	1.5°	2°	3°
ZSLNS 2007-6	0.7	15	6	0.67	50	4	6.9	7.2	7.7	8.1	8.4	9
ZSLNS 2007-8	0.7	15	8	0.67	50	4	6	9.3	9.9	10.3	10.7	11.4
ZSLNS 2007-10	0.7	15	10	0.67	50	4	5.3	11.5	12.1	12.6	13	13.7
ZSLNS 2008-4	0.8	1.2	4	0.77	50	4	7.9	5	5.4	5.8	6.1	6.6
ZSLNS 2008-6	0.8	1.2	6	0.77	50	4	6.8	7.2	7.7	8.1	8.4	9
ZSLNS 2008-8	0.8	1.2	8	0.77	50	4	5.9	9.3	9.9	10.3	10.7	11.4
ZSLNS 2008-10	0.8	1.2	10	0.77	50	4	5.2	11.5	12.1	12.6	13	13.7
ZSLNS 2008-12	0.8	1.2	12	0.77	55	4	4.7	13.6	14.2	14.8	15.2	16
ZSLNS 2009-6	0.9	1.35	6	0.86	50	4	6.7	7.2	7.7	8.1	8.4	9.1
ZSLNS 2009-8	0.9	1.35	8	0.77	50	4	5.8	9.4	9.9	10.4	10.7	11.4
ZSLNS 2009-10	0.9	1.35	10	0.77	50	4	5.1	11.5	12.1	12.6	13	13.7
ZSLNS 2009-12	0.9	1.35	12	0.77	55	4	4.6	13.6	14.3	14.8	15.2	16
ZSLNS 2010-2	1	1.5	2	0.96	50	4	9.4	2.9	3.2	3.4	3.7	4.1
ZSLNS 2010-4	1	1.5	4	0.96	50	4	7.7	5.1	5.5	5.8	6.1	6.6
ZSLNS 2010-6	1	1.5	6	0.96	50	4	6.6	7.2	7.7	8.1	8.4	9.1
ZSLNS 2010-8	1	1.5	8	0.96	50	4	5.7	9.4	9.9	10.4	10.7	11.4
ZSLNS 2010-10	1	1.5	10	0.96	50	4	5	11.5	12.1	12.6	13	13.7
ZSLNS 2010-12	1	1.5	12	0.96	55	4	4.5	13.6	14.3	14.8	15.2	16
ZSLNS 2010-14	1	1.5	14	0.96	55	4	4.1	15.7	16.4	17	17.4	18.7
ZSLNS 2010-16	1	1.5	16	0.96	60	4	3.8	17.8	18.6	19.1	19.6	21.3
ZSLNS 2010-20	1	1.5	20	0.96	55	4	3.2	22	22.8	23.5	24	26.6
ZSLNS 2012-6	1.2	1.8	6	1.15	50	4	6.3	7.3	7.7	8.1	8.5	9.1
ZSLNS 2012-8	1.2	1.8	8	1.15	50	4	5.5	9.4	9.9	10.4	10.8	11.4
ZSLNS 2012-10	1.2	1.8	10	1.15	50	4	4.8	11.5	12.1	12.6	13	13.7
ZSLNS 2012-12	1.2	1.8	12	1.15	55	4	4.3	13.6	14.3	14.8	15.2	16
ZSLNS 2012-16	1.2	1.8	16	1.15	55	4	3.6	17.8	18.6	19.2	19.7	21.3
ZSLNS 2014-6	1.4	2.1	6	1.34	50	4	6.1	7.3	7.8	8.1	8.5	9.1
ZSLNS 2014-8	1.4	2.1	8	1.34	50	4	5.3	9.4	10	10.4	10.8	11.5
ZSLNS 2014-10	1.4	2.1	10	1.34	50	4	4.6	11.6	12.1	12.6	13	13.8
ZSLNS 2014-12	1.4	2.1	12	1.34	55	4	4.1	13.7	14.3	14.8	15.3	16.1
ZSLNS 2014-14	1.4	2.1	14	1.34	55	4	3.7	15.8	16.5	17	17.5	18.7
ZSLNS 2014-16	1.4	2.1	16	1.34	55	4	3.4	17.9	18.6	19.2	19.7	21.4
ZSLNS 2015-4	1.5	2.25	4	1.44	50	4	7.2	5.2	5.5	5.9	6.2	6.7
ZSLNS 2015-6	1.5	2.25	6	1.44	50	4	6	7.3	7.8	8.1	8.5	9.1
ZSLNS 2015-8	1.5	2.25	8	1.44	50	4	5.1	9.4	10	10.4	10.8	11.5
ZSLNS 20 5-10	1.5	2.25	10	1.44	50	4	4.5	11.6	12.1	12.6	13	13.8

ZSLNS20

2 FLUTES LONG NECK TYPE SQUARE ENDMILL

EDP No	SIZES(mm)							Effective length by inclination angle				
	D	L_1	L_3	D_3	L_2	D_2	θ	0.5°	1°	1.5°	2°	3°
ZSLNS 2015-12	1.5	2.25	12	1.44	55	4	4	13.7	14.3	14.8	15.3	16.1
ZSLNS 2015-14	1.5	2.25	14	1.44	55	4	3.6	15.8	16.5	17	17.5	18.7
ZSLNS 2015-16	1.5	2.25	16	1.44	55	4	3.3	17.9	18.6	19.2	19.7	-
ZSLNS 2015-18	1.5	2.25	18	1.44	60	4	3	20	20.7	21.3	21.9	-
ZSLNS 2015-20	1.5	2.25	20	1.44	55	4	2.8	22	22.9	23.5	24.1	-
ZSLNS 2015-25	1.5	2.25	25	1.44	65	4	2.4	27.3	28.1	28.8	30	-
ZSLNS 2016-6	1.6	2.4	6	1.54	50	4	5.9	7.3	7.8	8.1	8.5	9.1
ZSLNS 2016-8	1.6	2.4	8	1.54	55	4	5	9.4	10	10.4	10.8	11.5
ZSLNS 2016-10	1.6	2.4	10	1.54	55	4	4.4	11.6	12.1	12.6	13	13.8
ZSLNS 2016-12	1.6	2.4	12	1.54	55	4	3.9	13.7	14.3	14.8	15.3	16.1
ZSLNS 2016-14	1.6	2.4	14	1.54	55	4	3.5	15.8	16.5	17	17.5	18.7
ZSLNS 2016-16	1.6	2.4	16	1.54	55	4	3.2	17.9	18.6	19.2	19.7	21.4
ZSLNS 2016-18	1.6	2.4	18	1.54	60	4	2.9	20	20.7	21.3	21.9	-
ZSLNS 2016-20	1.6	2.4	20	1.54	60	4	2.7	22	22.9	23.5	24.1	-
ZSLNS 2018-6	1.8	2.7	6	1.73	50	4	5.6	7.4	7.8	8.2	8.5	9.1
ZSLNS 2018-8	1.8	2.7	8	1.73	50	4	4.8	9.5	10	10.4	10.8	11.5
ZSLNS 2018-10	1.8	2.7	10	1.73	50	4	4.2	11.6	12.2	12.6	13	13.8
ZSLNS 2018-12	1.8	2.7	12	1.73	55	4	3.7	13.7	14.3	14.8	15.3	16.1
ZSLNS 2018-14	1.8	2.7	14	1.73	55	4	3.3	15.8	16.5	17	17.5	18.8
ZSLNS 2018-16	1.8	2.7	16	1.73	55	4	3	17.9	18.6	19.2	19.7	-
ZSLNS 2018-18	1.8	2.7	18	1.73	60	4	2.7	20	20.7	21.3	21.9	-
ZSLNS 2018-20	1.8	2.7	20	1.73	60	4	2.5	22.1	22.9	23.5	24.1	-
ZSLNS 2020-4	2	3	4	1.92	50	4	6.5	5.3	5.6	5.9	6.2	6.7
ZSLNS 2020-6	2	3	6	1.92	50	4	5.3	7.4	7.8	8.2	8.5	9.1
ZSLNS 2020-8	2	3	8	1.92	50	4	4.5	9.5	10	10.4	10.8	11.5
ZSLNS 2020-10	2	3	10	1.92	50	4	3.9	11.6	12.2	12.7	13.1	13.8
ZSLNS 2020-12	2	3	12	1.92	55	4	3.4	13.7	14.3	14.9	15.3	16.1
ZSLNS 2020-14	2	3	14	1.92	55	4	3.1	15.8	16.5	17	17.5	18.8
ZSLNS 2020-16	2	3	16	1.92	55	4	2.8	17.9	18.6	19.2	19.7	-
ZSLNS 2020-18	2	3	18	1.92	60	4	2.6	20	20.8	21.4	21.9	-
ZSLNS 2020-20	2	3	20	1.92	60	4	2.4	22.1	22.9	23.5	24.1	-
ZSLNS 2020-25	2	3	25	1.92	65	4	2	27.3	28.2	28.9	-	-
ZSLNS 2020-30	2	3	30	1.92	70	4	1.7	32.5	33.4	34.4	-	-
ZSLNS 2025-8	2.5	3.75	8	2.4	50	4	3.7	9.6	10.1	10.5	10.9	11.5
ZSLNS 2025-10	2.5	3.75	10	2.4	50	4	3.1	11.7	12.2	12.7	13.1	13.8
ZSLNS 2025-12	2.5	3.75	12	2.4	55	4	2.7	13.8	14.4	14.9	15.3	-
ZSLNS 2025-14	2.5	3.75	14	2.4	55	4	2.4	15.9	16.5	17.1	17.5	-
ZSLNS 2025-16	2.5	3.75	16	2.4	55	4	2.2	18	18.7	19.2	19.7	-
ZSLNS 2025-18	2.5	3.75	18	2.4	60	4	2	20.1	20.8	21.4	-	-
ZSLNS 2025-20	2.5	3.75	20	2.4	60	4	1.8	22.1	22.9	23.5	-	-
ZSLNS 2025-25	2.5	3.75	25	2.4	65	4	1.5	27.3	28.2	-	-	-
ZSLNS 2025-30	2.5	3.75	30	2.4	70	4	1.3	32.6	33.5	-	-	-
ZSLNS 2030-8	3	4.5	8	2.88	55	6	5.6	9.6	10.1	10.5	10.9	11.5
ZSLNS 2030-10	3	4.5	10	2.88	55	6	5	11.7	12.3	12.7	13.1	13.8
ZSLNS 2030-12	3	4.5	12	2.88	60	6	4.5	13.8	14.4	14.9	15.4	16.3
ZSLNS 2030-14	3	4.5	14	2.88	55	6	4.1	15.9	16.6	17.1	17.6	18.9
ZSLNS 2030-16	3	4.5	16	2.88	55	6	3.7	18	18.7	19.3	19.8	21.6
ZSLNS 2030-18	3	4.5	18	2.88	55	6	3.4	20.1	20.8	21.4	21.9	24.2
ZSLNS 2030-20	3	4.5	20	2.88	65	6	3.2	22.2	23	23.6	24.2	26.9
ZSLNS 2030-25	3	4.5	25	2.88	70	6	2.7	27.4	28.2	28.9	30.2	-
ZSLNS 2030-30	3	4.5	30	2.88	75	6	2.4	32.6	33.5	34.5	36.2	-
ZSLNS 2030-35	3	4.5	35	2.88	80	6	2.1	37.7	38.7	40.2	42.2	-
ZSLNS 2030-40	3	4.5	40	2.88	90	6	1.9	42.9	43.9	45.9	-	-
ZSLNS 2040-12	4	6	12	3.85	60	6	3.4	13.9	14.5	15	15.4	16.3

EDP No	SIZES(mm)							Effective length by inclination angle				
	D	L_1	L_3	D_3	L_2	D_2	θ	0.5°	1°	1.5°	2°	3°
ZSLNS 2040-16	4	6	16	3.85	60	6	2.8	18.1	18.8	19.3	19.8	-
ZSLNS 2040-20	4	6	20	3.85	70	6	2.3	22.3	23	23.6	24.3	-
ZSLNS 2040-25	4	6	25	3.85	60	6	2	27.4	28.3	28.9	-	-
ZSLNS 2040-30	4	6	30	3.85	80	6	1.7	32.6	33.5	34.6	-	-
ZSLNS 2040-35	4	6	35	3.85	60	6	1.5	37.8	38.8	-	-	-
ZSLNS 2040-40	4	6	40	3.85	90	6	1.3	42.9	44	-	-	-
ZSLNS 2040-45	4	6	45	3.85	90	6	1.2	48.1	49.4	-	-	-
ZSLNS 2040-50	4	6	50	3.85	100	6	1.1	53.2	54.8	-	-	-
ZSLNS 2050-16	5	7.5	16	4.85	60	6	1.5	18.1	18.8	-	-	-
ZSLNS 2050-20	5	7.5	20	4.85	60	6	1.3	22.3	23	-	-	-
ZSLNS 2050-25	5	7.5	25	4.85	70	6	1.1	27.4	28.3	-	-	-
ZSLNS 2050-30	5	7.5	30	4.85	70	6	0.9	32.6	-	-	-	-
ZSLNS 2050-35	5	7.5	35	4.85	80	6	0.8	37.8	-	-	-	-
ZSLNS 2050-40	5	7.5	40	4.85	90	6	0.7	42.9	-	-	-	-
ZSLNS 2050-50	5	7.5	50	4.85	100	6	0.6	53.2	-	-	-	-

– No interference

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

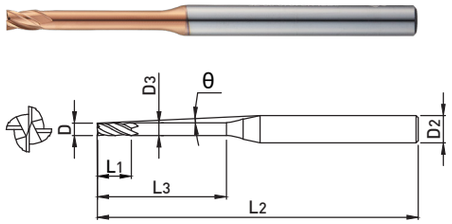
■ **Applicable Working Material**

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
	○	○	◎	◎	○				

○ : GOOD ◎ : EXCELLENT

ZSLNS40

4 FLUTES LONG NECK TYPE SQUARE ENDMILL



- Suitable for deep grooves and sloped surfaces with various neck specifications
- Applicable to various machining by applying effective neck length following rake angle
- Excellent workpiece finishes in semi-finishing and finishing by 4 flutes cutting

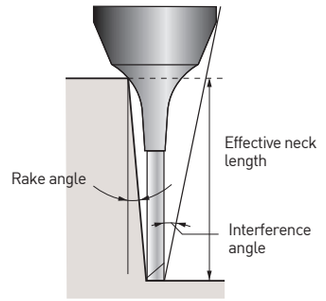
ULTRA FINE | 4 | 30° HELIX | AlTiN | DATA

p.472

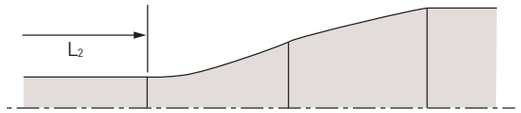
■ TOLERANCE

D		SHANK DIA.
ALL SIZES	0 ~ -0.015mm	h5

EDP No	SIZES(mm)							Effective length by inclination angle				
	D	L_1	L_3	D_3	L_2	D_2	θ	0.5°	1°	1.5°	2°	3°
ZSLNS 4010-4	1	1.5	4	0.96	50	4	7.7	5.1	5.5	5.8	6.1	6.6
ZSLNS 4010-6	1	1.5	6	0.96	50	4	6.6	7.2	7.7	8.1	8.4	9.1
ZSLNS 4010-8	1	1.5	8	0.96	50	4	5.7	9.4	9.9	10.4	10.7	11.4
ZSLNS 4010-10	1	1.5	10	0.96	50	4	5	11.5	12.1	12.6	13	13.7
ZSLNS 4015-4	1.5	2.25	4	1.44	50	4	7.2	5.2	5.5	5.9	6.2	6.7
ZSLNS 4015-6	1.5	2.25	6	1.44	50	4	6	7.3	7.8	8.1	8.5	9.1
ZSLNS 4015-8	1.5	2.25	8	1.44	50	4	5.1	9.4	10	10.4	10.8	11.5
ZSLNS 4015-10	1.5	2.25	10	1.44	50	4	4.5	11.6	12.1	12.6	13	13.8
ZSLNS 4015-12	1.5	2.25	12	1.44	55	4	4	13.7	14.3	14.8	15.3	16.1
ZSLNS 4015-14	1.5	2.25	14	1.44	50	4	3.6	15.8	16.5	17	17.5	18.7
ZSLNS 4015-16	1.5	2.25	16	1.44	50	4	3.3	17.9	18.6	19.2	19.7	-
ZSLNS 4015-18	1.5	2.25	18	1.44	60	4	3	20	20.7	21.3	21.9	-
ZSLNS 4015-20	1.5	2.25	20	1.44	60	4	2.8	22	22.9	23.5	24.1	-
ZSLNS 4015-25	1.5	2.25	25	1.44	65	4	2.4	27.3	28.1	28.8	30	-
ZSLNS 4020-4	2	3	4	1.92	50	4	6.5	5.3	5.6	5.9	6.2	6.7
ZSLNS 4020-6	2	3	6	1.92	50	4	5.3	7.4	7.8	8.2	8.5	9.1
ZSLNS 4020-8	2	3	8	1.92	50	4	4.5	9.5	10	10.4	10.8	11.5
ZSLNS 4020-10	2	3	10	1.92	50	4	3.9	11.6	12.2	12.7	13.1	13.8
ZSLNS 4020-12	2	3	12	1.92	55	4	3.4	13.7	14.3	14.9	15.3	16.1
ZSLNS 4020-14	2	3	14	1.92	55	4	3.1	15.8	16.5	17	17.5	18.8
ZSLNS 4020-16	2	3	16	1.92	55	4	2.8	17.9	18.6	19.2	19.7	-
ZSLNS 4020-18	2	3	18	1.92	60	4	2.6	20	20.8	21.4	21.9	-
ZSLNS 4020-20	2	3	20	1.92	55	4	2.4	22.1	22.9	23.5	24.1	-
ZSLNS 4020-25	2	3	25	1.92	65	4	2	27.3	28.2	28.9	-	-
ZSLNS 4020-30	2	3	30	1.92	70	4	1.7	32.5	33.4	34.4	-	-
ZSLNS 4025-8	2.5	3.75	8	2.4	50	4	3.7	9.6	10.1	10.5	10.9	11.5
ZSLNS 4025-10	2.5	3.75	10	2.4	50	4	3.1	11.7	12.2	12.7	13.1	13.8
ZSLNS 4025-12	2.5	3.75	12	2.4	55	4	2.7	13.8	14.4	14.9	15.3	-
ZSLNS 4025-14	2.5	3.75	14	2.4	55	4	2.4	15.9	16.5	17.1	17.5	-
ZSLNS 4025-16	2.5	3.75	16	2.4	55	4	2.2	18	18.7	19.2	19.7	-
ZSLNS 4025-18	2.5	3.75	18	2.4	60	4	2	20.1	20.8	21.4	-	-
ZSLNS 4025-20	2.5	3.75	20	2.4	60	4	1.8	22.1	22.9	23.5	-	-
ZSLNS 4025-25	2.5	3.75	25	2.4	65	4	1.5	27.3	28.2	-	-	-
ZSLNS 4025-30	2.5	3.75	30	2.4	70	4	1.3	32.6	33.5	-	-	-
ZSLNS 4030-8	3	4.5	8	2.88	55	6	5.6	9.6	10.1	10.5	10.9	11.5
ZSLNS 4030-10	3	4.5	10	2.88	55	6	5	11.7	12.3	12.7	13.1	13.8



- For inclined workpieces, the cutting length is longer than the neck length (L_2).
- Refer to Effective Neck Length according to various inclination angles when selecting a tool
- Interference between tool and workpiece may occur, check the interference angle (θ)



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

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

p.472

■ TOLERANCE

D		SHANK DIA.
ALL SIZES	0 ~ -0.015mm	h5

EDP No	SIZES(mm)							Effective length by inclination angle				
	D	L_1	L_3	D_3	L_2	D_2	θ	0.5°	1°	1.5°	2°	3°
ZSLNS 4030-12	3	4.5	12	2.88	60	6	4.5	13.8	14.4	14.9	15.4	16.3
ZSLNS 4030-14	3	4.5	14	2.88	60	6	4.1	15.9	16.6	17.1	17.6	18.9
ZSLNS 4030-16	3	4.5	16	2.88	60	6	3.7	18	18.7	19.3	19.8	21.6
ZSLNS 4030-18	3	4.5	18	2.88	60	6	3.4	20.1	20.8	21.4	21.9	24.2
ZSLNS 4030-20	3	4.5	20	2.88	65	6	3.2	22.2	23	23.6	24.2	26.9
ZSLNS 4030-25	3	4.5	25	2.88	70	6	2.7	27.4	28.2	28.9	30.2	-
ZSLNS 4030-30	3	4.5	30	2.88	75	6	2.4	32.6	33.5	34.5	36.2	-
ZSLNS 4030-35	3	4.5	35	2.88	80	6	2.1	37.7	38.7	40.2	42.2	-
ZSLNS 4030-40	3	4.5	40	2.88	90	6	1.9	42.9	43.9	45.9	-	-
ZSLNS 4040-12	4	6	12	3.85	60	6	3.4	13.9	14.5	15	15.4	16.3
ZSLNS 4040-16	4	6	16	3.85	60	6	2.8	18.1	18.8	19.3	19.8	-
ZSLNS 4040-20	4	6	20	3.85	70	6	2.3	22.3	23	23.6	24.3	-
ZSLNS 4040-25	4	6	25	3.85	70	6	2	27.4	28.3	28.9	-	-
ZSLNS 4040-30	4	6	30	3.85	80	6	1.7	32.6	33.5	34.6	-	-
ZSLNS 4040-35	4	6	35	3.85	80	6	1.5	37.8	38.8	-	-	-
ZSLNS 4040-40	4	6	40	3.85	90	6	1.3	42.9	44	-	-	-
ZSLNS 4040-45	4	6	45	3.85	90	6	1.2	48.1	49.4	-	-	-
ZSLNS 4040-50	4	6	50	3.85	100	6	1.1	53.2	54.8	-	-	-
ZSLNS 4050-16	5	7.5	16	4.85	60	6	1.5	18.1	18.8	-	-	-
ZSLNS 4050-20	5	7.5	20	4.85	60	6	1.3	22.3	23	-	-	-
ZSLNS 4050-25	5	7.5	25	4.85	70	6	1.1	27.4	28.3	-	-	-
ZSLNS 4050-30	5	7.5	30	4.85	60	6	0.9	32.6	-	-	-	-
ZSLNS 4050-35	5	7.5	35	4.85	80	6	0.8	37.8	-	-	-	-
ZSLNS 4050-40	5	7.5	40	4.85	90	6	0.7	42.9	-	-	-	-
ZSLNS 4050-50	5	7.5	50	4.85	100	6	0.6	53.2	-	-	-	-

– No interference

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

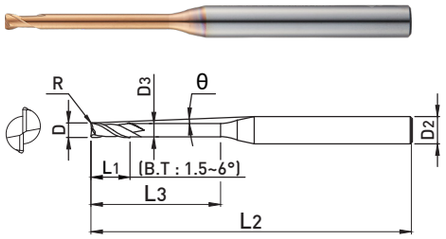
■ Applicable Working Material

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
	○	○	◎	◎	○				

○ : GOOD ◎ : EXCELLENT

ZSLNR

2 FLUTES LONG NECK TYPE RADIUS ENDMILL



- Suitable for deep grooves and sloped surfaces with various neck specifications
- Applicable to various machining by applying effective neck length following rake angle
- Offer precise R machining by reinforcing chipping resistance in the corner R part

ULTRA FINE | 2 | 30° HELIX | R ±0.01 (ALL SIZES) | AlTiN | DATA p.473~475

■ TOLERANCE

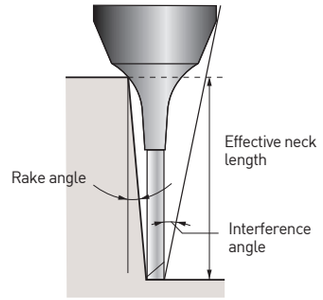
D		SHANK DIA.
ALL SIZES	0 ~ -0.015mm	h5

EDP No	SIZES(mm)								Effective length by inclination angle				
	D	R	L_1	L_3	D_3	L_2	D_2	θ	0.5°	1°	1.5°	2°	3°
ZSLNR 2010-6-03	1	0.3	0.8	6	0.94	50	4	6.7	7.1	7.4	7.7	8	8.4
ZSLNR 2010-10-03	1	0.3	0.8	10	0.94	50	4	5.1	11.5	12.1	12.6	13	13.7
ZSLNR 2010-16-03	1	0.3	0.8	16	0.94	60	4	3.8	17.9	18.6	19.1	19.6	21.3
ZSLNR 2010-20-03	1	0.3	0.8	20	0.94	60	4	3.2	22	22.8	23.5	24	26.6
ZSLNR 2015-4-01	1.5	0.1	1.35	4	1.42	50	4	7.2	4.8	4.9	5.1	5.3	5.5
ZSLNR 2015-8-01	1.5	0.1	1.35	8	1.42	50	4	5.2	9.2	9.6	10	10.3	10.8
ZSLNR 2015-12-01	1.5	0.1	1.35	12	1.42	55	4	4	13.4	13.9	14.3	14.7	16.1
ZSLNR 2015-15-01	1.5	0.1	1.35	15	1.42	55	4	3.5	16.9	17.6	18.1	18.6	20.1
ZSLNR 2015-20-01	1.5	0.1	1.35	20	1.42	60	4	2.8	22.1	22.9	23.5	24.1	-
ZSLNR 2015-4-02	1.5	0.2	1.35	4	1.42	50	4	7.3	4.7	4.9	5.1	5.3	5.5
ZSLNR 2015-8-02	1.5	0.2	1.35	8	1.42	50	4	5.2	9.2	9.6	10	10.3	10.8
ZSLNR 2015-12-02	1.5	0.2	1.35	12	1.42	55	4	4.1	13.4	13.9	14.3	14.7	16.1
ZSLNR 2015-15-02	1.5	0.2	1.35	15	1.42	55	4	3.5	16.9	17.5	18.1	18.6	20
ZSLNR 2015-20-02	1.5	0.2	1.35	20	1.42	60	4	2.8	22.1	22.9	23.5	24.1	-
ZSLNR 2015-8-03	1.5	0.3	1.35	8	1.42	50	4	5.2	9.2	9.6	10	10.3	10.8
ZSLNR 2015-15-03	1.5	0.3	1.35	15	1.42	55	4	3.5	16.9	17.5	18.1	18.6	20
ZSLNR 2015-20-03	1.5	0.3	1.35	20	1.42	60	4	2.8	22.1	22.9	23.5	24	-
ZSLNR 2020-6-02	2	0.2	1.7	6	1.92	50	4	5.4	6.8	7.1	7.3	7.5	8.1
ZSLNR 2020-8-02	2	0.2	1.7	8	1.92	50	4	4.6	8.9	9.2	9.4	9.7	10.8
ZSLNR 2020-12-02	2	0.2	1.7	12	1.92	55	4	3.5	13.4	13.9	14.3	14.7	16.1
ZSLNR 2020-16-02	2	0.2	1.7	16	1.92	55	4	2.8	17.6	18.1	18.6	19.3	-
ZSLNR 2020-20-02	2	0.2	1.7	20	1.92	60	4	2.4	22.1	22.9	23.5	24.1	-
ZSLNR 2020-25-02	2	0.2	1.7	25	1.92	65	4	2	27.3	28.2	28.8	-	-
ZSLNR 2020-30-02	2	0.2	1.7	30	1.92	70	4	1.7	32.5	33.4	34.4	-	-
ZSLNR 2020-8-03	2	0.3	1.7	8	1.92	50	4	4.6	8.9	9.2	9.4	9.7	10.7
ZSLNR 2020-16-03	2	0.3	1.7	16	1.92	55	4	2.8	17.6	18.1	18.6	19.3	-
ZSLNR 2020-20-03	2	0.3	1.7	20	1.92	60	4	2.4	22.1	22.9	23.5	24	-
ZSLNR 2020-6-05	2	0.5	1.7	6	1.92	50	4	5.5	6.8	7.1	7.3	7.4	8
ZSLNR 2020-8-05	2	0.5	1.7	8	1.92	50	4	4.7	8.9	9.2	9.4	9.6	10.7
ZSLNR 2020-12-05	2	0.5	1.7	12	1.92	55	4	3.5	13.4	13.9	14.3	14.6	16
ZSLNR 2020-16-05	2	0.5	1.7	16	1.92	55	4	2.9	17.6	18.1	18.6	19.2	-
ZSLNR 2020-20-05	2	0.5	1.7	20	1.92	60	4	2.4	22.1	22.9	23.5	24	-
ZSLNR 2020-25-05	2	0.5	1.7	25	1.92	65	4	2	27.3	28.1	28.8	-	-
ZSLNR 2020-30-05	2	0.5	1.7	30	1.92	70	4	1.7	32.5	33.4	34.3	-	-
ZSLNR 2020-8-08	2	0.8	1.7	8	1.92	50	4	4.8	8.9	9.2	9.4	9.6	10.6
ZSLNR 2020-16-08	2	0.8	1.7	16	1.92	55	4	2.9	17.6	18.1	18.6	19.2	-

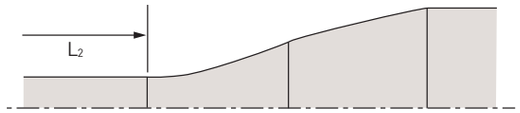
2 FLUTES LONG NECK TYPE RADIUS ENDMILL

ZSLNR

STAR



- For inclined workpieces, the cutting length is longer than the neck length (L_2).
- Refer to Effective Neck Length according to various inclination angles when selecting a tool
- Interference between tool and workpiece may occur, check the interference angle (θ)



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

ULTRA FINE | 2 | 30° HELIX | R ±0.01 (ALL SIZES) | AlTiN | DATA p.473~475

■ TOLERANCE

D		SHANK DIA.
ALL SIZES	0 ~ -0.015mm	h5

EDP No	SIZES(mm)								Effective length by inclination angle				
	D	R	L_1	L_3	D_3	L_2	D_2	θ	0.5°	1°	1.5°	2°	3°
ZSLNR 2020-20-08	2	0.8	1.7	20	1.92	60	4	2.4	22.1	22.8	23.5	24	-
ZSLNR 2030-8-02	3	0.2	2.5	8	2.86	55	6	5.7	9	9.3	9.5	9.9	10.9
ZSLNR 2030-12-02	3	0.2	2.5	12	2.86	60	6	4.5	13.1	13.5	14	14.7	16.2
ZSLNR 2030-16-02	3	0.2	2.5	16	2.86	60	6	3.8	17.7	18.2	18.7	19.5	21.6
ZSLNR 2030-20-02	3	0.2	2.5	20	2.86	65	6	3.2	21.8	22.4	23.1	24.2	26.9
ZSLNR 2030-30-02	3	0.2	2.5	30	2.86	75	6	2.4	32.6	33.5	34.5	36.2	-
ZSLNR 2030-35-02	3	0.2	2.5	35	2.86	80	6	2.1	37.7	38.7	40.2	42.2	-
ZSLNR 2030-8-03	3	0.3	2.5	8	2.86	55	6	5.7	9	9.3	9.5	9.9	10.9
ZSLNR 2030-16-03	3	0.3	2.5	16	2.86	60	6	3.8	17.7	18.2	18.7	19.4	21.5
ZSLNR 2030-20-03	3	0.3	2.5	20	2.86	65	6	3.2	21.8	22.4	23.1	24.2	26.8
ZSLNR 2030-30-03	3	0.3	2.5	30	2.86	75	6	2.4	32.6	33.5	34.5	36.2	-
ZSLNR 2030-8-05	3	0.5	2.5	8	2.86	55	6	5.8	9	9.3	9.5	9.8	10.8
ZSLNR 2030-12-05	3	0.5	2.5	12	2.86	60	6	4.6	13.1	13.5	13.9	14.6	16.2
ZSLNR 2030-16-05	3	0.5	2.5	16	2.86	60	6	3.8	17.7	18.2	18.7	19.4	21.5
ZSLNR 2030-20-05	3	0.5	2.5	20	2.86	65	6	3.2	21.8	22.4	23.1	24.2	26.8
ZSLNR 2030-30-05	3	0.5	2.5	30	2.86	75	6	2.4	32.6	33.5	34.5	36.1	-
ZSLNR 2030-35-05	3	0.5	2.5	35	2.86	80	6	2.1	37.7	38.7	40.2	42.1	-

– No interference

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

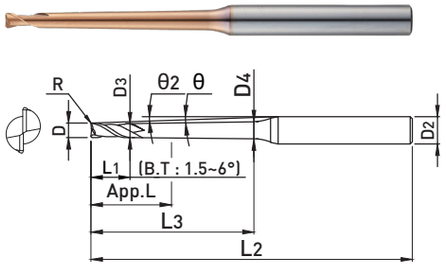
■ Applicable Working Material

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
	○	○	◎	◎	○				

○ : GOOD ◎ : EXCELLENT

ZSTNR

2 FLUTES TAPERED NECK TYPE RADIUS ENDMILL



- Suitable for deep grooves and sloped surfaces with various neck specifications
- Reduced tool vibration and minimized chattering with taper type neck
- Applicable to various machining by applying effective neck length following rake angle
- Offer precise R machining by reinforcing chipping resistance in the corner R part

ULTRA FINE | 2 | 30° HELIX | R ±0.01 ALL SIZES | AlTiN | DATA p.476~477

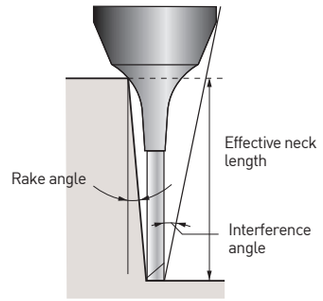
■ TOLERANCE

D		SHANK DIA.
ALL SIZES	0 ~ -0.015mm	h5

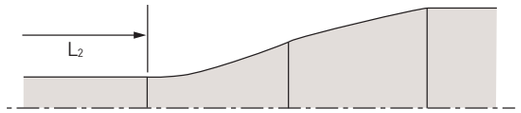
EDP No	SIZES(mm)											Effective length by inclination angle				
	D	R	L1	L3	θ	D3	D4	L2	D2	App. L	θ2	0.5°	1°	1.5°	2°	3°
ZSTNR 2002-2-09005	0.2	0.5	0.15	2	0.9	0.17	0.23	50	4	1.10	10	x	2.8	3.1	3.4	3.9
ZSTNR 2004-4-09005	0.4	0.5	0.3	4	0.9	0.37	0.49	50	4	1.25	8.4	x	4.9	5.3	5.7	6.3
ZSTNR 2004-5-09005	0.4	0.5	0.3	5	0.9	0.37	0.52	50	4	1.25	7.8	x	5.9	6.4	6.8	7.5
ZSTNR 2004-4-0901	0.4	0.1	0.3	4	0.9	0.37	0.49	50	4	1.25	8.5	x	4.9	5.3	5.7	6.3
ZSTNR 2004-5-0901	0.4	0.1	0.3	5	0.9	0.37	0.52	50	4	1.25	7.9	x	5.9	6.4	6.8	7.5
ZSTNR 2005-5-0901	0.5	0.1	0.35	5	0.9	0.47	0.62	50	4	1.30	7.8	x	5.9	6.4	6.8	7.5
ZSTNR 2005-8-0901	0.5	0.1	0.35	8	0.9	0.47	0.71	50	4	1.30	6.4	x	9	9.7	10.2	11
ZSTNR 2005-10-0901	0.5	0.1	0.35	10	0.9	0.47	0.77	55	4	1.30	5.8	x	11	11.8	12.4	13.2
ZSTNR 2006-12-0901	0.6	0.1	0.4	12	0.9	0.57	0.93	55	4	1.35	5.1	x	13	13.9	14.5	15.5
ZSTNR 2006-15-0901	0.6	0.1	0.4	15	0.9	0.57	13	55	4	1.35	4.5	x	16.1	17.1	17.8	18.8
ZSTNR 2008-6-0402	0.8	0.2	0.5	6	0.4	0.77	0.85	50	4	2.64	7	6.6	7.1	7.5	7.8	8.3
ZSTNR 2008-12-0902	0.8	0.2	0.5	12	0.9	0.77	1.13	55	4	1.45	5	x	13	13.9	14.5	15.5
ZSTNR 2010-8-0402	1	0.2	0.8	8	0.4	0.94	14	55	4	5.09	7.4	8.8	9.3	9.7	10.1	10.6
ZSTNR 2010-10-0902	1	0.2	0.8	10	0.9	0.94	1.23	55	4	5.09	6.8	x	11.2	11.9	12.4	13.3
ZSTNR 2010-15-0902	1	0.2	0.8	15	0.9	0.94	1.39	60	4	2.70	5.6	x	16.3	17.2	17.8	18.8
ZSTNR 2010-20-0902	1	0.2	0.8	20	0.9	0.94	1.54	65	4	2.70	4.8	x	21.3	22.4	23.2	24.7
ZSTNR 2010-25-0902	1	0.2	0.8	25	0.9	0.94	1.70	70	4	2.70	4.1	x	26.4	27.6	28.5	30.9
ZSTNR 2010-30-0902	1	0.2	0.8	30	0.9	0.94	1.86	75	4	2.70	3.7	x	31.5	32.8	33.7	37
ZSTNR 2010-35-0902	1	0.2	0.8	35	0.9	0.94	22	80	4	2.70	3.3	x	36.5	38	39	43.2
ZSTNR 2010-8-0403	1	0.3	0.8	8	0.4	0.94	14	55	4	2.70	7.4	8.8	9.3	9.7	10	10.6
ZSTNR 2010-15-0903	1	0.3	0.8	15	0.9	0.94	1.39	60	4	2.70	5.6	x	16.3	17.2	17.8	18.8
ZSTNR 2010-25-0903	1	0.3	0.8	25	0.9	0.94	1.70	70	4	2.70	4.2	x	26.4	27.6	28.5	30.8
ZSTNR 2010-30-0903	1	0.3	0.8	30	0.9	0.94	1.86	75	4	2.70	3.7	x	31.5	32.8	33.7	37
ZSTNR 2015-10-0402	1.5	0.2	1.35	10	0.4	1.42	1.54	55	6	7.07	6.4	11	11.5	11.9	12.3	13
ZSTNR 2015-15-0902	1.5	0.2	1.35	15	0.9	1.42	1.85	60	6	7.07	5.3	x	16.4	17.3	17.9	18.9
ZSTNR 2015-20-0902	1.5	0.2	1.35	20	0.9	1.42	21	65	6	3.89	4.5	x	21.5	22.5	23.2	24.9
ZSTNR 2015-25-0902	1.5	0.2	1.35	25	0.9	1.42	2.16	70	6	3.89	3.9	x	26.6	27.7	28.5	31
ZSTNR 2015-30-0902	1.5	0.2	1.35	30	0.9	1.42	2.32	75	6	3.89	3.4	x	31.6	32.9	33.8	37.1
ZSTNR 2015-10-0403	1.5	0.3	1.35	10	0.4	1.42	1.54	55	6	3.89	6.4	11	11.5	11.9	12.3	13
ZSTNR 2015-20-0903	1.5	0.3	1.35	20	0.9	1.42	21	65	6	3.89	4.5	x	21.5	22.5	23.2	24.8
ZSTNR 2015-25-0903	1.5	0.3	1.35	25	0.9	1.42	2.16	70	6	3.89	3.9	x	26.5	27.7	28.5	31
ZSTNR 2015-30-0903	1.5	0.3	1.35	30	0.9	1.42	2.32	75	6	3.89	3.4	x	31.6	32.9	33.8	37.1
ZSTNR 2020-30-0902	2	0.2	1.7	30	0.9	1.92	2.81	70	6	7.42	3.1	x	31.6	32.9	33.8	37.2
ZSTNR 2020-40-0902	2	0.2	1.7	40	0.9	1.92	3.12	80	6	7.42	2.5	x	41.8	43.3	44.6	-

ZSTNR

2 FLUTES TAPERED NECK TYPE RADIUS ENDMILL



- For inclined workpieces, the cutting length is longer than the neck length (L_2).
- Refer to Effective Neck Length according to various inclination angles when selecting a tool
- Interference between tool and workpiece may occur, check the interference angle (θ)



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

ULTRA FINE | 2 | 30° HELIX | R ±0.01 ALL SIZES | AlTiN | DATA p.476~477

■ TOLERANCE

D		SHANK DIA.
ALL SIZES	0 ~ -0.015mm	h5

EDP No	SIZES(mm)											Effective length by inclination angle				
	D	R	L1	L3	θ	D3	D4	L2	D2	App. L	θ2	0.5°	1°	1.5°	2°	3°
ZSTNR 2020-50-0902	2	0.2	1.7	50	0.9	1.92	3.44	90	6	7.42	2.1	x	51.9	53.6	55.7	-
ZSTNR 2020-12-0403	2	0.3	1.7	12	0.4	1.92	2.06	55	6	7.42	5.5	13	13.6	14.1	14.5	15.6
ZSTNR 2020-20-0903	2	0.3	1.7	20	0.9	1.92	2.50	65	6	4.24	4.1	x	21.5	22.5	23.2	24.9
ZSTNR 2020-30-0903	2	0.3	1.7	30	0.9	1.92	2.81	70	6	4.24	3.1	x	31.6	32.9	33.8	37.1
ZSTNR 2020-40-0903	2	0.3	1.7	40	0.9	1.92	3.12	80	6	4.24	2.5	x	41.7	43.3	44.6	-
ZSTNR 2020-50-0903	2	0.3	1.7	50	0.9	1.92	3.44	90	6	4.24	2.1	x	51.8	53.6	55.7	-
ZSTNR 2020-8-0405	2	0.5	1.7	8	0.4	1.92	2.01	50	6	4.24	6.8	8.7	9	9.3	9.5	10.4
ZSTNR 2020-12-0405	2	0.5	1.7	12	0.4	1.92	2.06	55	6	4.24	5.6	13	13.6	14.1	14.4	15.5
ZSTNR 2020-16-0405	2	0.5	1.7	16	0.4	1.92	2.12	60	6	4.24	4.7	17	17.8	18.3	18.7	20.7
ZSTNR 2020-20-0905	2	0.5	1.7	20	0.9	1.92	2.50	65	6	4.24	4.2	x	21.5	22.5	23.2	24.8
ZSTNR 2020-25-0905	2	0.5	1.7	25	0.9	1.92	2.65	65	6	4.24	3.6	x	26.6	27.7	28.5	30.9
ZSTNR 2020-30-0905	2	0.5	1.7	30	0.9	1.92	2.81	70	6	4.24	3.1	x	31.6	32.9	33.8	37.1
ZSTNR 2020-40-0905	2	0.5	1.7	40	0.9	1.92	3.12	80	6	4.24	2.5	x	41.7	43.2	44.6	-
ZSTNR 2020-50-0905	2	0.5	1.7	50	0.9	1.92	3.44	90	6	4.24	2.1	x	51.8	53.6	55.6	-
ZSTNR 2030-40-0902	3	0.2	2.5	40	0.9	2.86	4.04	80	6	6.95	2	x	42	43.4	-	-
ZSTNR 2030-50-0902	3	0.2	2.5	50	0.9	2.86	4.35	90	6	6.95	1.6	x	52.1	53.7	-	-
ZSTNR 2030-60-0902	3	0.2	2.5	60	0.9	2.86	4.67	100	6	6.95	1.4	x	62.2	-	-	-
ZSTNR 2030-40-0903	3	0.3	2.5	40	0.9	2.86	4.04	80	6	6.95	2	x	42	43.4	-	-
ZSTNR 2030-50-0903	3	0.3	2.5	50	0.9	2.86	4.35	90	6	6.95	1.7	x	52.1	53.7	-	-
ZSTNR 2030-60-0903	3	0.3	2.5	60	0.9	2.86	4.67	100	6	6.95	1.4	x	62.2	-	-	-
ZSTNR 2030-40-0905	3	0.5	2.5	40	0.9	2.86	4.04	80	6	6.95	2	x	42	43.4	-	-
ZSTNR 2030-50-0905	3	0.5	2.5	50	0.9	2.86	4.35	90	6	6.95	1.7	x	52.1	53.7	-	-
ZSTNR 2030-60-0905	3	0.5	2.5	60	0.9	2.86	4.67	100	6	6.95	1.4	x	62.1	-	-	-

X No application
– No interference

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

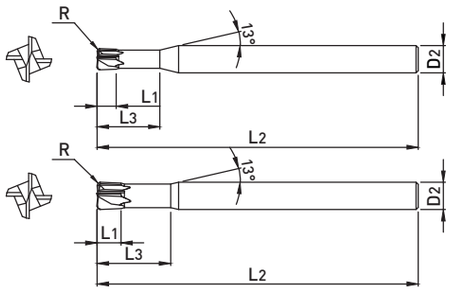
■ Applicable Working Material

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
	○	○	◎	◎	○				

○ : GOOD ◎ : EXCELLENT

ZSPM4

4 FLUTES NECK TYPE RADIUS ENDMILL



- Straight flute type increases rigidity to minimize corner damage
- Minimizes chattering and moving by applying Back Draft Type on the cutting edge

ULTRA FINE | 4 | 0° HELIX | R ±0.015 ALL SIZES | AlTiN | DATA p.478

■ **TOLERANCE**

D		SHANK DIA.
ALL SIZES	0 ~ -0.02mm	h5

EDP No	D	R	L_1	L_3	L_2	D_2
ZSPM4 030-05	3	0.5	1.2	8	50	6
ZSPM4 040-05	4	0.5	1.5	10	50	6
ZSPM4 060-05	6	0.5	2.5	12	60	6
ZSPM4 060-10	6	1	2.5	12	60	6
ZSPM4 060-15	6	1.5	2.5	12	60	6
ZSPM4 060-15L	6	1.5	2.5	12	90	6
ZSPM4 080-10	8	1	3.5	16	60	8
ZSPM4 080-20	8	2	3.5	16	60	8
ZSPM4 080-20L	8	2	3.5	16	100	8
ZSPM4 100-10	10	1	4	20	70	10
ZSPM4 100-20	10	2	4	20	70	10
ZSPM4 100-20L	10	2	4	20	100	10
ZSPM4 120-20	12	2	5	25	80	12
ZSPM4 120-30	12	3	5	25	80	12
ZSPM4 120-30L	12	3	5	25	110	12

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

■ **Applicable Working Material**

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
	○	○	◎	◎	○				

○ : GOOD ◎ : EXCELLENT

MEMO

EDP. NO	Appearance	Type	INCH & METRIC	Page
DB402		2 FLUTES BALL NOSE ENDMILL	METRIC	80
DB412		2 FLUTES 15° HELIX BALL NOSE ENDMILL	METRIC	81
DB502		2 FLUTES NECK TYPE BALL NOSE ENDMILL	METRIC	82
DB512		2 FLUTES BALL NOSE ENDMILL	METRIC	83
DB514		4 FLUTES BALL NOSE ENDMILL	METRIC	84
DB522		2 FLUTES NECK TYPE BALL NOSE ENDMILL	METRIC	85
DB532		2 FLUTES MMC SPHERE TYPE BALL NOSE ENDMILL	METRIC	86
DB534		4 FLUTES MMC SPHERE TYPE BALL NOSE ENDMILL	METRIC	87
DB54(5)2		2 FLUTES TAPERED NECK TYPE BALL NOSE ENDMILL	METRIC	88
PK503		3 FLUTES ROUGHING ENDMILL	METRIC	89
TB503		3 FLUTES TAPERED NECK TYPE BALL NOSE ENDMILL	METRIC	90
TB504		4 FLUTES TAPERED NECK TYPE BALL NOSE ENDMILL	METRIC	91
TE503		3 FLUTES TAPERED NECK TYPE SQUARE ENDMILL	METRIC	92
TPRB4-050		4 FLUTES TAPERED BALL NOSE ENDMILL	METRIC	93
TPRB4-075		4 FLUTES TAPERED BALL NOSE ENDMILL	METRIC	94
TPRB4-100		4 FLUTES TAPERED BALL NOSE ENDMILL	METRIC	95
TPRB4-150		4 FLUTES TAPERED BALL NOSE ENDMILL	METRIC	96
TPRB4-200		4 FLUTES TAPERED BALL NOSE ENDMILL	METRIC	97
TPRE4-050		4 FLUTES TAPERED SQUARE ENDMILL	METRIC	98
TPRE4-075		4 FLUTES TAPERED SQUARE ENDMILL	METRIC	99
TPRE4-100		4 FLUTES TAPERED SQUARE ENDMILL	METRIC	100
TPRE4-150		4 FLUTES TAPERED SQUARE ENDMILL	METRIC	101
TPRE4-200		4 FLUTES TAPERED SQUARE ENDMILL	METRIC	102
TPRE4-300		4 FLUTES TAPERED SQUARE ENDMILL	METRIC	103
ZE502		2 FLUTES SQUARE ENDMILL	METRIC	104
ZE503		3 FLUTES SQUARE ENDMILL	METRIC	105
ZE504		4 FLUTES SQUARE ENDMILL	METRIC	106
ZE506		6 FLUTES SQUARE ENDMILL	METRIC	107
ZE512		2 FLUTES 35° HELIX SQUARE ENDMILL	METRIC	108
ZE514		4 FLUTES 45° HELIX SQUARE ENDMILL	METRIC	109
ZE516		6 FLUTES 50° HELIX SQUARE ENDMILL	METRIC	110
ZE522		2 FLUTES LONG SHANK SQUARE ENDMILL	METRIC	111
ZE524		4 FLUTES LONG SHANK SQUARE ENDMILL	METRIC	112
ZE534		4 FLUTES EXTRA LONG SQUARE ENDMILL	METRIC	113
ZF60		3~6 FLUTES FINISHING ROUGHING ENDMILL	METRIC	114
ZF61		3~5 FLUTES FINE PITCH ROUGHING ENDMILL	METRIC	115
ZM502		2 FLUTES SQUARE ENDMILL	METRIC	116
ZM504		4 FLUTES SQUARE ENDMILL	METRIC	117
ZM522		2 FLUTES LONG SHANK SQUARE ENDMILL	METRIC	118
ZM524		4 FLUTES LONG SHANK SQUARE ENDMILL	METRIC	119
ZR502		2 FLUTES NECK TYPE RADIUS ENDMILL	METRIC	120
ZR504		4 FLUTES NECK TYPE RADIUS ENDMILL	METRIC	121
ZR512		2 FLUTES RADIUS ENDMILL	METRIC	122
ZR514		4 FLUTES RADIUS ENDMILL	METRIC	123
ZR522		2 FLUTES LONG SHANK RADIUS ENDMILL	METRIC	124
ZR524		4 FLUTES LONG SHANK RADIUS ENDMILL	METRIC	125

Zamus Classic Series

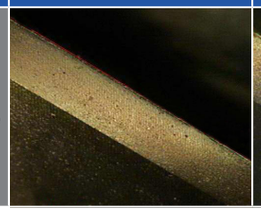
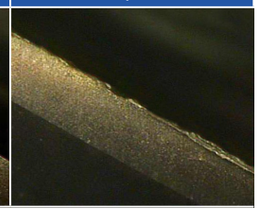
ZAMUS CLASSIC

General Features

- Suitable for processing medium hardened materials (recommended: HRc 30 ~ 50) such as medium carbon steel and alloy steel, pre-hardened steel, and mold steel
- Various series that can cope with a wide range of machining environments such as roughing, medium/finishing, and inclined surface machining

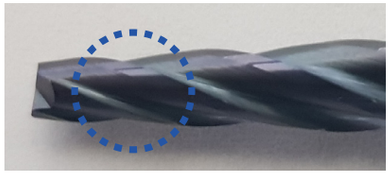
Characteristics

- High versatility due to design of cutting edge suitable for various workpiece materials
- Excellent chipping resistance and Minimized sudden breakage by using high toughness materials
- AlTiN coating secures stable oxidation resistance and surface hardness of the cutting edge

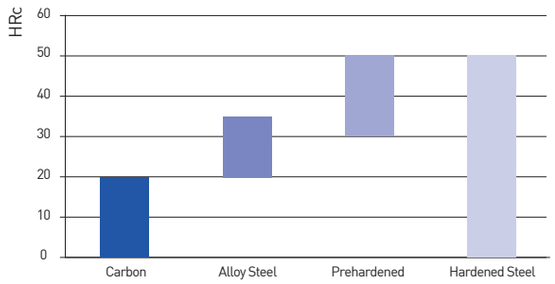
	WIDIN	Competitor
Wear Appearance		

TPRE Series

- High stiffness taper enables high-efficiency rib processing
- High-precision taper machining of molds for IT



Applications



EDP No. System

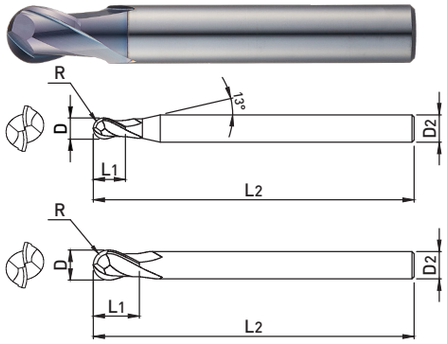
*If expressed as an integer, the decimal point is omitted.

TYPE	APPEARANCE	GRADE	LENGTH, SHANK TYPE	FLUTE	CUTTING DIA.	CORNER R	SHANK DIA.
D : Dynamic M : Miniature Z : Zamus Endmill F : Inch Size T : Tapered PK : Plunge Roughing TREB604 : Tapered Rib(Ball) TPRE604 : Tapered Rib(Square)	A : Inch Size D : Dinamic Ball Z : Square B : Ball Type E : Square M : Medium Cutting Length R : Radius F: Roughing	4 : Grade 5 : Grade	0 : Straight 1 : Neck 2 : Long Cutting Length, Long Shank 3 : Extra Long Cutting Length	2 : 2 Flutes 3 : 3 Flutes 4 : 4 Flutes 6 : 6 Flutes 8 : 8 Flutes	0.4 ~ 32	0.2 ~ 3	4 ~ 32
Z	R	5	2	4	05	02	
Zamus Endmill	Radius type	Grade	Long shank	4 Flutes	Ø5	R0.2	

Ex) 4FLUTES CUTTING DIA. Ø5 CORNER R0.2 50 GRADE CORNER RADIUS LONG SHANK TYPE ZAMUS ENDMILL

DB402

2 FLUTES BALL NOSE ENDMILL



- Suitable for various curvature and copy machining
- Expanding the customer's choice by configuring various specifications from Ø1 to Ø20

ULTRA FINE | 2 | 30° HELIX | R ±0.01 ALL SIZES | AlTiN | DATA p.479

■ TOLERANCE

D		SHANK DIA.
ALL SIZES	0 ~ -0.02mm	h6

EDP No	D	R	L_1	L_2	D_2
DB402 010	1	0.5	3	38	4
DB402 012	1.2	0.6	3	38	4
DB402 015	1.5	0.75	3	42	4
DB402 020	2	1	3	42	6
DB402 025	2.5	1.25	3	42	6
DB402 030	3	1.5	4	50	6
DB402 035	3.5	1.75	4	50	6
DB402 040	4	2	5	50	6
DB402 045	4.5	2.25	5	50	6
DB402 050	5	2.5	6	50	6
DB402 055	5.5	2.75	6	50	6
DB402 060	6	3	7	50	6
DB402 070	7	3.5	8	60	8
DB402 080	8	4	9	60	8
DB402 090	9	4.5	10	70	10
DB402 100	10	5	11	70	10
DB402 120	12	6	12	75	12
DB402 140	14	7	14	80	14
DB402 160	16	8	16	82	16
DB402 200	20	10	20	100	20

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

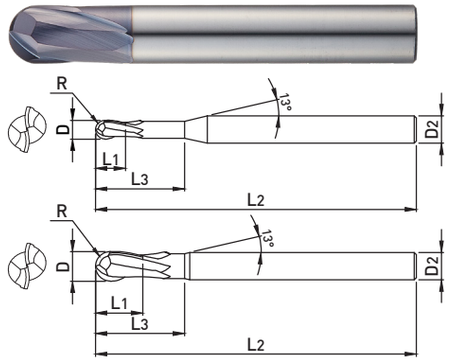
■ Applicable Working Material

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○	◎	○				○		○

○ : GOOD ◎ : EXCELLENT

DB412

2 FLUTES 15° HELIX BALL NOSE ENDMILL



- Improved chip evacuation by applying 15° helix angle
- Minimize interference in machining by applying the neck shape

ULTRA FINE | 2 | 15° HELIX | R ±0.01 ALL SIZES | AlTiN | DATA p.479

■ TOLERANCE

D		SHANK DIA.
ALL SIZES	0 ~ -0.03mm	h6

EDP No	D	R	L_1	L_3	L_2	D_2
DB412 010	1	0.5	1	3	50	4
DB412 015	1.5	0.75	2	5	50	4
DB412 020	2	1	3	6	50	6
DB412 030S	3	1.5	4	8	50	4
DB412 030	3	1.5	4	8	50	6
DB412 030L	3	1.5	4	8	75	6
DB412 040S	4	2	5	10	50	4
DB412 040	4	2	5	10	50	6
DB412 040L	4	2	5	10	75	6
DB412 050	5	2.5	5	10	50	6
DB412 060S	6	3	6	12	50	6
DB412 060	6	3	6	12	75	6
DB412 060L	6	3	6	16	100	6
DB412 080	8	4	8	16	60	8
DB412 080L	8	4	8	25	100	8
DB412 100	10	5	10	20	70	10
DB412 100L	10	5	5	30	100	10

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

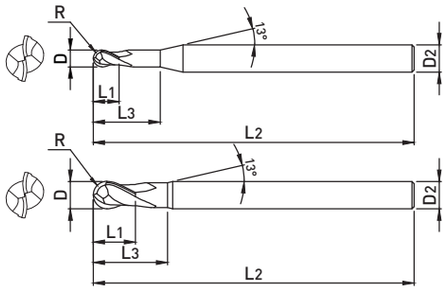
■ Applicable Working Material

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○	◎	○				○		○

○ : GOOD ◎ : EXCELLENT

DB502

2 FLUTES NECK TYPE BALL NOSE ENDMILL



- Suitable for various curvature and copy machining
- Minimize interference in machining by applying the neck shape

ULTRA FINE | 2 | 30° HELIX | R ±0.01 | AlTiN | DATA

ALL SIZES

p.479

■ TOLERANCE

D		SHANK DIA.
ALL SIZES	0 ~ -0.02mm	h6

EDP No	D	R	L_1	L_3	L_2	D_2
DB502 010	1	0.5	1	3	50	6
DB502 015	1.5	0.75	1.5	4	50	6
DB502 020	2	1	2	6	60	6
DB502 030	3	1.5	4	9	70	6
DB502 040	4	2	5	12	70	6
DB502 050	5	2.5	6	15	80	6
DB502 060	6	3	7	18	90	6
DB502 080	8	4	10	24	90	8
DB502 100	10	5	12	30	100	10
DB502 120	12	6	14	36	110	12

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

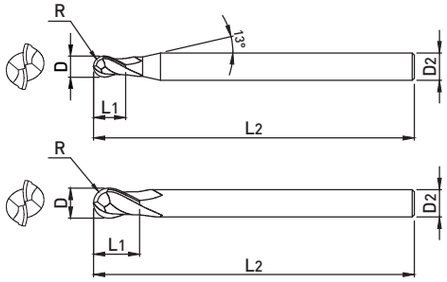
■ Applicable Working Material

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○	◎	○				○		○

○ : GOOD ◎ : EXCELLENT

2 FLUTES BALL NOSE ENDMILL

DB512



- Suitable for various curvature and copy machining
- Expanding the customer's choice by configuring various specifications from Ø1 to Ø25

ULTRA FINE | 2 | 30° HELIX | R ±0.01 | AlTiN | DATA

ALL SIZES

p.479

■ TOLERANCE

D		SHANK DIA.
ALL SIZES	0 ~ -0.02mm	h6

EDP No	D	R	L_1	L_2	D_2
DB512 010S4	1	0.5	3	50	4
DB512 010	1	0.5	3	50	6
DB512 015	1.5	0.75	4	50	6
DB512 020S4	2	1	5	60	4
DB512 020	2	1	5	60	6
DB512 025	2.5	1.25	6	60	6
DB512 030S4	3	1.5	8	70	4
DB512 030	3	1.5	8	70	6
DB512 035	3.5	1.75	8	70	6
DB512 040S4	4	2	8	70	4
DB512 040	4	2	8	70	6
DB512 045	4.5	2.25	10	70	6
DB512 050	5	2.5	12	80	6
DB512 055	5.5	2.75	12	80	6
DB512 060	6	3	12	90	6
DB512 065	6.5	3.25	12	90	8
DB512 070	7	3.5	15	90	8
DB512 080	8	4	15	100	8
DB512 090	9	4.5	20	100	10
DB512 100	10	5	20	100	10
DB512 101	10	5	25	150	10
DB512 110	11	5.5	25	110	12
DB512 120	12	6	25	110	12
DB512 121	12	6	30	150	12
DB512 122	12	6	35	200	12
DB512 130	13	6.5	30	110	14
DB512 140	14	7	30	110	14
DB512 150	15	7.5	35	140	16
DB512 160	16	8	35	140	16
DB512 161	16	8	40	200	16
DB512 162	16	8	45	250	16
DB512 180	18	9	40	150	18
DB512 200	20	10	40	160	20
DB512 201	20	10	45	200	20
DB512 202	20	10	50	250	20
DB512 250	25	12.5	50	180	25

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

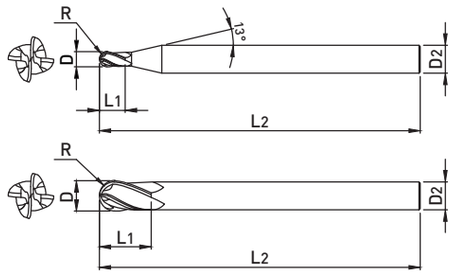
■ Applicable Working Material

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○	◎	○				○		○

○ : GOOD ◎ : EXCELLENT

DB514

4 FLUTES BALL NOSE ENDMILL



- Suitable for various curvature and copy machining
- Suitable for semi-finishing and finishing by 4 flutes cutting

ULTRA FINE | 4 | 30° HELIX | R ±0.01 ALL SIZES | AlTiN | DATA p.480

■ TOLERANCE

D		SHANK DIA.
ALL SIZES	0 ~ -0.02mm	h6

EDP No	D	R	L_1	L_2	D_2
DB514 030	3	1.5	8	70	6
DB514 040	4	2	8	70	6
DB514 050	5	2.5	10	80	6
DB514 060	6	3	12	90	6
DB514 070	7	3.5	15	90	8
DB514 080	8	4	15	100	8
DB514 090	9	4.5	20	100	10
DB514 100	10	5	20	100	10
DB514 110	11	5.5	25	110	12
DB514 120	12	6	25	110	12
DB514 130	13	6.5	30	110	14
DB514 140	14	7	30	110	14
DB514 150	15	7.5	35	140	16
DB514 160	16	8	35	140	16
DB514 180	18	9	40	150	18
DB514 200	20	10	40	160	20
DB514 250	25	12.5	50	180	25

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

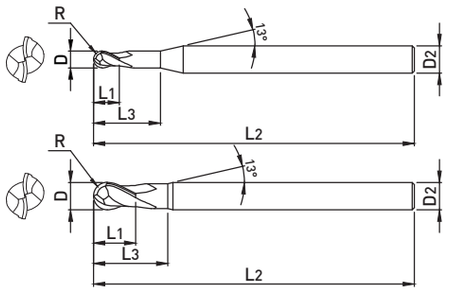
■ Applicable Working Material

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○	◎	○				○		○

○ : GOOD ◎ : EXCELLENT

DB522

2 FLUTES NECK TYPE BALL NOSE ENDMILL



- Suitable for various curvature and copy machining
- Suitable for deep groove machining with long neck, shank type

ULTRA FINE | 2 | 30° HELIX | R ±0.01 ALL SIZES | AlTiN | DATA p.480

■ TOLERANCE

D		SHANK DIA.
ALL SIZES	0 ~ -0.02mm	h6

EDP No	D	R	L_1	L_3	L_2	D_2
DB522 030	3	1.5	4	35	100	6
DB522 040	4	2	6	35	100	6
DB522 050	5	2.5	7	40	115	6
DB522 060	6	3	8	45	115	6
DB522 061	6	3	8	45	115	8
DB522 070	7	3.5	10	45	125	8
DB522 080	8	4	12	55	125	8
DB522 081	8	4	12	55	125	10
DB522 090	9	4.5	15	65	140	10
DB522 100	10	5	15	65	140	10
DB522 120	12	6	18	75	150	12
DB522 140	14	7	23	75	155	14
DB522 160	16	8	30	75	155	16

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

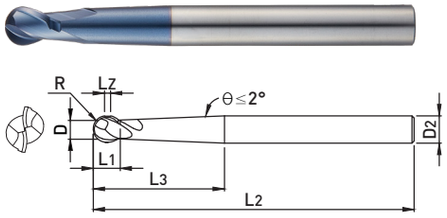
■ Applicable Working Material

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○	◎	○				○		○

○ : GOOD ◎ : EXCELLENT

DB532

2 FLUTES MMC SPHERE TYPE BALL NOSE ENDMILL



- A rounded cutting edge enable to machining a various sloped surface
- Reduced tool vibration and minimized chattering with taper type on effective cutting part

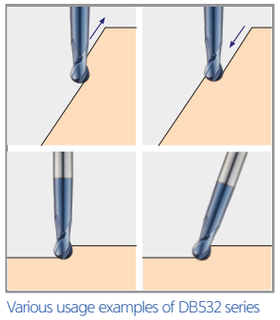
ULTRA FINE | 2 | 30° HELIX | R ±0.01 ALL SIZES | AlTiN | DATA p.481

■ TOLERANCE

D		SHANK DIA.
ALL SIZES	0 ~ -0.02mm	h6

EDP No	D	R	L_1	L_3	L_2	D_2	L_z
DB532 030	3	1.5	4	30	80	6	1.5
DB532 031	3	1.5	2.3	30	80	6	-
DB532 040	4	2	5	30	80	6	1.5
DB532 041	4	2	3.1	30	80	6	-
DB532 050	5	2.5	6	43	80	6	2
DB532 051	5	2.5	3.9	38	80	6	-
DB532 060	6	3	7	30	100	6	2
DB532 061	6	3	4.9	28	100	6	-
DB532 080	8	4	9	36	100	8	3
DB532 081	8	4	6.3	33	100	8	-
DB532 100	10	5	11	43	100	10	3
DB532 101	10	5	7.9	40	100	10	-
DB532 120	12	6	13	52	100	12	3
DB532 121	12	6	9.5	49	100	12	-
DB532 160	16	8	15	61	150	16	3
DB532 161	16	8	12.4	59	150	16	-

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



Various usage examples of DB532 series

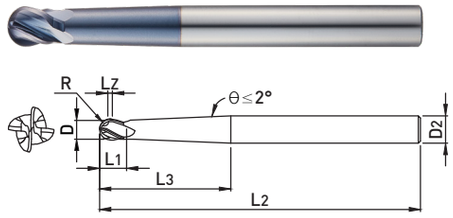
■ Applicable Working Material

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○	◎	○				○		○

○ : GOOD ◎ : EXCELLENT

DB534

4 FLUTES MMC SPHERE TYPE BALL NOSE ENDMILL



- A rounded cutting edge enable to machining a various sloped surface
- Reduced tool vibration and minimized chattering with taper type on effective cutting part

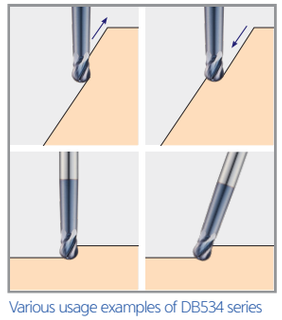
ULTRA FINE | 4 | 30° HELIX | R ±0.01 ALL SIZES | AlTiN | DATA p.482

■ TOLERANCE

D		SHANK DIA.
ALL SIZES	0 ~ -0.02mm	h6

EDP No	D	R	L_1	L_3	L_2	D_2	L_z
DB534 050	5	2.5	6	43	80	6	2
DB534 051	5	2.5	3.9	38	80	6	-
DB534 060	6	3	7	30	100	6	2
DB534 061	6	3	4.9	28	100	6	-
DB534 080	8	4	9	36	100	8	3
DB534 081	8	4	6.3	33	100	8	-
DB534 100	10	5	11	43	100	10	3
DB534 101	10	5	7.9	40	100	10	-
DB534 120	12	6	13	52	100	12	3
DB534 121	12	6	9.5	49	100	12	-
DB534 160	16	8	15	61	150	16	3
DB534 161	16	8	12.4	59	150	16	-

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



Various usage examples of DB534 series

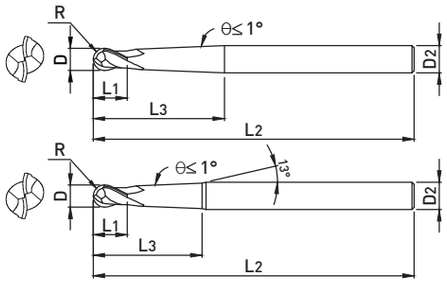
■ Applicable Working Material

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○	◎	○				○		○

○ : GOOD ◎ : EXCELLENT

DB54(5)2

2 FLUTES TAPERED NECK TYPE BALL NOSE ENDMILL



- Reduced tool vibration and minimized chattering with taper type on effective cutting part
- Suitable for deep groove and sloped surface processing through various specifications for long type

ULTRA FINE | 2 | 30° HELIX | R ±0.01 ALL SIZES | AlTiN | DATA p.480

■ TOLERANCE

D		SHANK DIA.
ALL SIZES	0 ~ -0.02mm	h6

EDP No	D	R	L_1	L_3	L_2	D_2
DB542 020	2	1	3	63	110	6
DB552 020	2	1	5	85	155	6
DB542 030	3	1.5	5	65	110	6
DB552 030	3	1.5	7	87	155	6
DB542 040	4	2	7	67	110	6
DB552 040	4	2	10	90	155	8
DB542 050	5	2.5	10	70	110	6
DB552 050	5	2.5	15	95	155	8
DB542 060	6	3	18	78	155	10
DB552 060	6	3	20	110	200	10
DB542 080	8	4	30	100	155	12
DB552 080	8	4	30	120	200	12
DB542 100	10	5	40	100	155	12
DB552 100	10	5	40	120	200	12
DB542 120	12	6	50	110	155	16
DB552 120	12	6	50	130	200	16

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

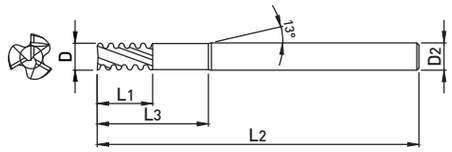
■ Applicable Working Material

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○	◎	○				○		○

○ : GOOD ◎ : EXCELLENT

PK503

3 FLUTES ROUGHING ENDMILL



- Improvement of production efficiency through continuous machining from Z-axis vertical feed to grooving
- Minimized interference by applying the neck

ULTRA FINE | 3 | 20° HELIX | AlTiN | FINE | DATA p.484

■ TOLERANCE

D		SHANK DIA.
~ D6	-0.03 ~ -0.105mm	h6
D8 ~ 10	-0.04 ~ -0.15mm	
D12 ~ 16	-0.05 ~ -0.18mm	
D20 ~	-0.065 ~ -0.225mm	

EDP No	D	L_1	L_3	L_2	D_2
PK503 060	6	9	15	57	6
PK503 080	8	12	20	63	8
PK503 100	10	15	25	72	10
PK503 120	12	18	30	83	12
PK503 140	14	21	35	83	14
PK503 160	16	24	40	92	16
PK503 200	20	30	50	104	20

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

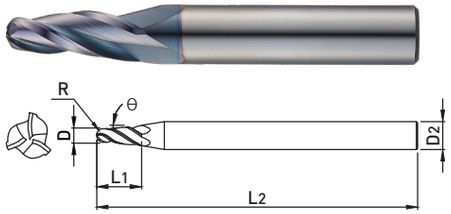
■ Applicable Working Material

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○	◎	○				○		○

○ : GOOD ◎ : EXCELLENT

TB503

3 FLUTES TAPERED NECK TYPE BALL NOSE ENDMILL



- Suitable for machining sloped surface with various taper angle

ULTRA FINE | 3 | 30° HELIX | AlTiN | R ±0.02 ALL SIZES | DATA p.485

■ **TOLERANCE**

D		SHANK DIA.
ALL SIZES	±0.05mm	h6

EDP No	D	R	θ	L_1	L_2	D_2
TB503 15 306	3	1.5	3°	12	60	6
TB503 20 306	4	2	3°	15	60	6
TB503 25 308	5	2.5	3°	18	60	8
TB503 30 310	6	3	3°	22	70	10
TB503 40 312	8	4	3°	26	75	12
TB503 50 312	10	5	3°	19	75	12
TB503 60 316	12	6	3°	36	90	16
TB503 15 506	3	1.5	5°	12	60	6
TB503 20 508	4	2	5°	15	60	8
TB503 25 510	5	2.5	5°	18	70	10
TB503 30 510	6	3	5°	22	70	10
TB503 40 512	8	4	5°	26	75	12
TB503 50 516	10	5	5°	30	90	16
TB503 60 520	12	6	5°	36	100	20
TB503 15 706	3	1.5	7°	12	60	6
TB503 20 708	4	2	7°	15	60	8
TB503 25 710	5	2.5	7°	18	70	10
TB503 30 712	6	3	7°	22	75	12
TB503 40 716	8	4	7°	26	90	16
TB503 50 716	10	5	7°	29	90	16
TB503 60 720	12	6	7°	36	100	20

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

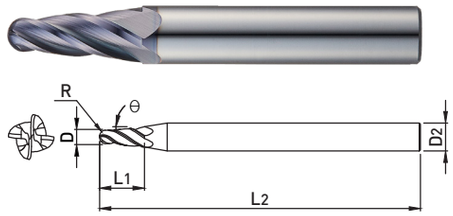
■ **Applicable Working Material**

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○	◎	○				○		○

○ : GOOD ◎ : EXCELLENT

TB504

4 FLUTES TAPERED NECK TYPE BALL NOSE ENDMILL



- Suitable for machining sloped surface with various taper angle
- Excellent surface roughness due to multi-cutting with 4 flutes

ULTRA FINE | 4 | 30° HELIX | AlTiN | R ±0.02 ALL SIZES | DATA p.485

■ **TOLERANCE**

D		SHANK DIA.
ALL SIZES	±0.05mm	h6

EDP No	D	R	θ	L_1	L_2	D_2
TB504 25 308	5	2.5	3°	18	60	8
TB504 30 310	6	3	3°	22	70	10
TB504 40 312	8	4	3°	26	75	12
TB504 50 312	10	5	3°	19	75	12
TB504 60 316	12	6	3°	36	90	16
TB504 25 510	5	2.5	5°	18	70	10
TB504 30 510	6	3	5°	22	70	10
TB504 40 512	8	4	5°	26	75	12
TB504 50 516	10	5	5°	30	90	16
TB504 60 520	12	6	5°	36	100	20
TB504 25 710	5	2.5	7°	18	70	10
TB504 30 712	6	3	7°	22	75	12
TB504 40 716	8	4	7°	26	90	16
TB504 50 716	10	5	7°	29	90	16
TB504 60 720	12	6	7°	36	100	20

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

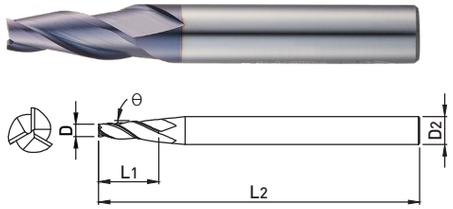
■ **Applicable Working Material**

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○	◎	○				○		○

○ : GOOD ◎ : EXCELLENT

TE503

3 FLUTES TAPERED NECK TYPE SQUARE ENDMILL



- Suitable for machining sloped surface with various taper angle

ULTRA FINE | 3 | 30° HELIX | AlTiN | DATA

p.485

■ TOLERANCE

D		SHANK DIA.
ALL SIZES	±0.02mm	h6

EDP No	D	θ	L_1	L_2	D_2
TE503 03 106	3	1°	10	50	6
TE503 03 206	3	2°	10	50	6
TE503 03 306	3	3°	10	50	6
TE503 03 506	3	5°	10	50	6
TE503 04 106	4	1°	15	50	6
TE503 04 206	4	2°	15	50	6
TE503 04 306	4	3°	15	50	6
TE503 04 508	4	5°	15	50	8
TE503 05 106	5	1°	17.1	60	6
TE503 05 208	5	2°	17.1	60	8
TE503 05 308	5	3°	17.1	60	8
TE503 05 508	5	5°	17.1	60	8
TE503 06 108	6	1°	20	60	8
TE503 06 208	6	2°	20	60	8
TE503 06 308	6	3°	20	60	8
TE503 06 510	6	5°	20	70	10
TE503 08 110	8	1°	22.8	70	10
TE503 08 210	8	2°	22.8	70	10
TE503 08 312	8	3°	22.8	75	12
TE503 08 512	8	5°	22.8	75	12
TE503 10 112	10	1°	35	90	12
TE503 10 212	10	2°	28	90	12
TE503 10 314	10	3°	34.3	90	14
TE503 10 516	10	5°	34.3	90	16

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

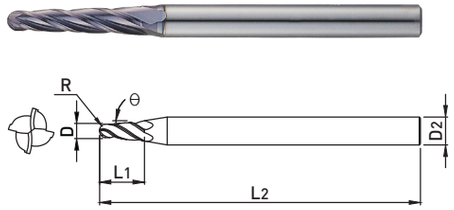
■ Applicable Working Material

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○	◎	○				○		○

○ : GOOD ◎ : EXCELLENT

TPRB4-050

4 FLUTES TAPERED BALL NOSE ENDMILL



- Suitable for machining sloped surface with 0.5 taper angle
- Reinforced hardness and improved work efficiency by applying tapered rib shape

ULTRA FINE | 4 | 25° HELIX | R ±0.01 | AlTiN | DATA

p.486

■ TOLERANCE

D		SHANK DIA.
ALL SIZES	0 ~ -0.05mm	h6

EDP No	D	R	θ	L_1	L_2	D_2
TPRB4 006-04-050	0.6	0.3	30′	4	40	4
TPRB4 006-06-050	0.6	0.3	30′	6	40	4
TPRB4 008-06-050	0.8	0.4	30′	6	45	4
TPRB4 008-08-050	0.8	0.4	30′	8	45	4
TPRB4 008-10-050	0.8	0.4	30′	10	45	4
TPRB4 010-06-050	1	0.5	30′	6	45	4
TPRB4 010-08-050	1	0.5	30′	8	45	4
TPRB4 010-10-050	1	0.5	30′	10	45	4
TPRB4 010-12-050	1	0.5	30′	12	45	4
TPRB4 010-16-050	1	0.5	30′	16	50	4
TPRB4 012-06-050	1.2	0.6	30′	6	45	4
TPRB4 012-08-050	1.2	0.6	30′	8	45	4
TPRB4 012-10-050	1.2	0.6	30′	10	45	4
TPRB4 012-12-050	1.2	0.6	30′	12	45	4
TPRB4 012-16-050	1.2	0.6	30′	16	50	4
TPRB4 015-08-050	1.5	0.75	30′	8	45	4
TPRB4 015-10-050	1.5	0.75	30′	10	45	4
TPRB4 015-12-050	1.5	0.75	30′	12	45	4
TPRB4 015-16-050	1.5	0.75	30′	16	50	4
TPRB4 015-20-050	1.5	0.75	30′	20	55	4
TPRB4 016-08-050	1.6	0.8	30′	8	45	4
TPRB4 016-10-050	1.6	0.8	30′	10	45	4
TPRB4 016-12-050	1.6	0.8	30′	12	45	4
TPRB4 016-16-050	1.6	0.8	30′	16	50	4
TPRB4 016-20-050	1.6	0.8	30′	20	55	4
TPRB4 018-08-050	1.8	0.9	30′	8	45	4
TPRB4 018-10-050	1.8	0.9	30′	10	45	4
TPRB4 018-12-050	1.8	0.9	30′	12	45	4
TPRB4 018-16-050	1.8	0.9	30′	16	50	4
TPRB4 018-20-050	1.8	0.9	30′	20	55	4

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

EDP No	D	R	θ	L_1	L_2	D_2
TPRB4 020-10-050	2	1.0	30′	10	45	4
TPRB4 020-12-050	2	1.0	30′	12	45	4
TPRB4 020-16-050	2	1.0	30′	16	50	4
TPRB4 020-20-050	2	1.0	30′	20	55	4
TPRB4 020-25-050	2	1.0	30′	25	55	4
TPRB4 025-10-050	2.5	1.25	30′	10	45	4
TPRB4 025-12-050	2.5	1.25	30′	12	45	4
TPRB4 025-16-050	2.5	1.25	30′	16	50	4
TPRB4 025-20-050	2.5	1.25	30′	20	55	4
TPRB4 025-25-050	2.5	1.25	30′	25	55	4

※ The above products are produced upon customer's order.

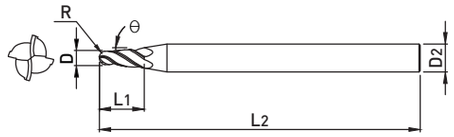
■ Applicable Working Material

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○	◎	○				○		○

○ : GOOD ◎ : EXCELLENT

TPRB4-075

4 FLUTES TAPERED BALL NOSE ENDMILL



- Suitable for machining sloped surface with 0.75 taper angle
- Reinforced hardness and improved work efficiency by applying tapered rib shape

ULTRA FINE | 4 | 25° HELIX | R ±0.01 ALL SIZES | AlTiN | DATA p.486

■ TOLERANCE

D		SHANK DIA.
ALL SIZES	0 ~ -0.05mm	h6

EDP No	D	R	θ	L_1	L_2	D_2
TPRB4 006-04-075	0.6	0.3	45′	4	40	4
TPRB4 006-06-075	0.6	0.3	45′	6	40	4
TPRB4 008-06-075	0.8	0.4	45′	6	45	4
TPRB4 008-08-075	0.8	0.4	45′	8	45	4
TPRB4 008-10-075	0.8	0.4	45′	10	45	4
TPRB4 010-08-075	1	0.5	45′	8	45	4
TPRB4 010-10-075	1	0.5	45′	10	45	4
TPRB4 010-12-075	1	0.5	45′	12	45	4
TPRB4 012-08-075	1.2	0.6	45′	8	45	4
TPRB4 012-10-075	1.2	0.6	45′	10	45	4
TPRB4 012-12-075	1.2	0.6	45′	12	45	4
TPRB4 012-16-075	1.2	0.6	45′	16	50	4
TPRB4 015-08-075	1.5	0.75	45′	8	45	4
TPRB4 015-10-075	1.5	0.75	45′	10	45	4
TPRB4 015-12-075	1.5	0.75	45′	12	45	4
TPRB4 015-16-075	1.5	0.75	45′	16	50	4
TPRB4 015-20-075	1.5	0.75	45′	20	55	4
TPRB4 016-08-075	1.6	0.8	45′	8	45	4
TPRB4 016-10-075	1.6	0.8	45′	10	45	4
TPRB4 016-12-075	1.6	0.8	45′	12	45	4
TPRB4 016-16-075	1.6	0.8	45′	16	50	4
TPRB4 016-20-075	1.6	0.8	45′	20	55	4
TPRB4 018-08-075	1.8	0.9	45′	8	45	4
TPRB4 018-10-075	1.8	0.9	45′	10	45	4
TPRB4 018-12-075	1.8	0.9	45′	12	45	4
TPRB4 018-16-075	1.8	0.9	45′	16	50	4
TPRB4 018-20-075	1.8	0.9	45′	20	55	4
TPRB4 020-10-075	2	1	45′	10	45	4
TPRB4 020-12-075	2	1	45′	12	45	4
TPRB4 020-16-075	2	1	45′	16	50	4

EDP No	D	R	θ	L_1	L_2	D_2
TPRB4 020-20-075	2	1	45′	20	55	4
TPRB4 020-25-075	2	1	45′	25	55	4
TPRB4 025-10-075	2.5	1.25	45′	10	45	4
TPRB4 025-12-075	2.5	1.25	45′	12	45	4
TPRB4 025-16-075	2.5	1.25	45′	16	50	4
TPRB4 025-20-075	2.5	1.25	45′	20	55	4
TPRB4 025-25-075	2.5	1.25	45′	25	55	4

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

※ The above products are produced upon customer's order.

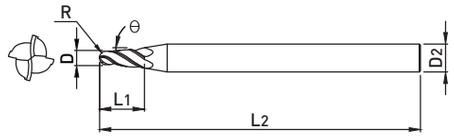
■ Applicable Working Material

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○	◎	○				○		○

○ : GOOD ◎ : EXCELLENT

TPRB4-100

4 FLUTES TAPERED BALL NOSE ENDMILL



- Suitable for machining sloped surface with 1.0 taper angle
- Reinforced hardness and improved work efficiency by applying tapered rib shape

ULTRA FINE | 4 | 25° HELIX | R ±0.01 ALL SIZES | AlTiN | DATA p.486

■ TOLERANCE

D		SHANK DIA.
ALL SIZES	0 ~ -0.05mm	h6

EDP No	D	R	θ	L_1	L_2	D_2
TPRB4 006-04-100	0.6	0.3	1°00′	4	40	4
TPRB4 006-06-100	0.6	0.3	1°00′	6	40	4
TPRB4 008-06-100	0.6	0.4	1°00′	6	45	4
TPRB4 008-08-100	0.8	0.4	1°00′	8	45	4
TPRB4 008-10-100	0.8	0.4	1°00′	10	45	4
TPRB4 010-06-100	1	0.5	1°00′	6	45	4
TPRB4 010-08-100	1	0.5	1°00′	8	45	4
TPRB4 010-10-100	1	0.5	1°00′	10	45	4
TPRB4 010-12-100	1	0.5	1°00′	12	45	4
TPRB4 010-16-100	1	0.5	1°00′	16	50	4
TPRB4 012-06-100	1.2	0.6	1°00′	6	45	4
TPRB4 012-08-100	1.2	0.6	1°00′	8	45	4
TPRB4 012-10-100	1.2	0.6	1°00′	10	45	4
TPRB4 012-12-100	1.2	0.6	1°00′	12	45	4
TPRB4 012-16-100	1.2	0.6	1°00′	16	50	4
TPRB4 015-08-100	1.5	0.75	1°00′	8	45	4
TPRB4 015-10-100	1.5	0.75	1°00′	10	45	4
TPRB4 015-12-100	1.5	0.75	1°00′	12	45	4
TPRB4 015-16-100	1.5	0.75	1°00′	16	50	4
TPRB4 015-20-100	1.5	0.75	1°00′	20	55	4
TPRB4 016-08-100	1.6	0.8	1°00′	8	45	4
TPRB4 016-10-100	1.6	0.8	1°00′	10	45	4
TPRB4 016-12-100	1.6	0.8	1°00′	12	45	4
TPRB4 016-16-100	1.6	0.8	1°00′	16	50	4
TPRB4 016-20-100	1.6	0.8	1°00′	20	55	4
TPRB4 018-08-100	1.8	0.9	1°00′	8	45	4
TPRB4 018-10-100	1.8	0.9	1°00′	10	45	4
TPRB4 018-12-100	1.8	0.9	1°00′	12	45	4
TPRB4 018-16-100	1.8	0.9	1°00′	16	50	4
TPRB4 018-20-100	1.8	0.9	1°00′	20	55	4

EDP No	D	R	θ	L_1	L_2	D_2
TPRB4 020-10-100	2	1	1°00′	10	45	4
TPRB4 020-12-100	2	1	1°00′	12	45	4
TPRB4 020-16-100	2	1	1°00′	16	50	4
TPRB4 020-20-100	2	1	1°00′	20	55	4
TPRB4 020-25-100	2	1	1°00′	25	55	4
TPRB4 025-10-100	2.5	1.25	1°00′	10	45	4
TPRB4 025-12-100	2.5	1.25	1°00′	12	45	4
TPRB4 025-16-100	2.5	1.25	1°00′	16	50	4
TPRB4 025-20-100	2.5	1.25	1°00′	20	55	4
TPRB4 025-25-100	2.5	1.25	1°00′	25	55	4

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

※ The above products are produced upon customer's order.

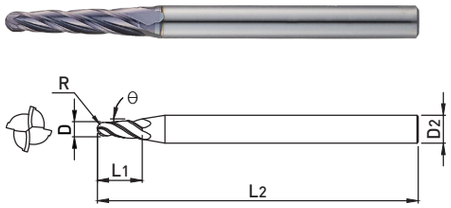
■ Applicable Working Material

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○	◎	○				○		○

○ : GOOD ◎ : EXCELLENT

TPRB4-150

4 FLUTES TAPERED BALL NOSE ENDMILL



- Suitable for machining sloped surface with 1.5 taper angle
- Reinforced hardness and improved work efficiency by applying tapered rib shape

ULTRA FINE | 4 | 25° HELIX | R ±0.01 | AlTiN | DATA

ALL SIZES

p.486

■ TOLERANCE

D		SHANK DIA.
ALL SIZES	0 ~ -0.05mm	h6

EDP No	D	R	θ	L_1	L_2	D_2
TPRB4 006-04-150	0.6	0.3	1°30′	4	40	4
TPRB4 006-06-150	0.6	0.3	1°30′	6	40	4
TPRB4 008-06-150	0.8	0.4	1°30′	6	45	4
TPRB4 008-08-150	0.8	0.4	1°30′	8	45	4
TPRB4 008-10-150	0.8	0.4	1°30′	10	45	4
TPRB4 010-06-150	1	0.5	1°30′	6	45	4
TPRB4 010-08-150	1	0.5	1°30′	8	45	4
TPRB4 010-10-150	1	0.5	1°30′	10	45	4
TPRB4 010-12-150	1	0.5	1°30′	12	45	4
TPRB4 010-16-150	1	0.5	1°30′	16	50	4
TPRB4 012-06-150	1.2	0.6	1°30′	6	45	4
TPRB4 012-08-150	1.2	0.6	1°30′	8	45	4
TPRB4 012-10-150	1.2	0.6	1°30′	10	45	4
TPRB4 012-12-150	1.2	0.6	1°30′	12	45	4
TPRB4 012-16-150	1.2	0.6	1°30′	16	50	4
TPRB4 015-08-150	1.5	0.75	1°30′	8	45	4
TPRB4 015-10-150	1.5	0.75	1°30′	10	45	4
TPRB4 015-12-150	1.5	0.75	1°30′	12	45	4
TPRB4 015-16-150	1.5	0.75	1°30′	16	50	4
TPRB4 015-20-150	1.5	0.75	1°30′	20	55	4
TPRB4 016-08-150	1.6	0.8	1°30′	8	45	4
TPRB4 016-10-150	1.6	0.8	1°30′	10	45	4
TPRB4 016-12-150	1.6	0.8	1°30′	12	45	4
TPRB4 016-16-150	1.6	0.8	1°30′	16	50	4
TPRB4 016-20-150	1.6	0.8	1°30′	20	55	4
TPRB4 018-08-150	1.8	0.9	1°30′	8	45	4
TPRB4 018-10-150	1.8	0.9	1°30′	10	45	4
TPRB4 018-12-150	1.8	0.9	1°30′	12	45	4
TPRB4 018-16-150	1.8	0.9	1°30′	16	50	4
TPRB4 018-20-150	1.8	0.9	1°30′	20	55	4

EDP No	D	R	θ	L_1	L_2	D_2
TPRB4 020-10-150	2	1	1°30′	10	45	4
TPRB4 020-12-150	2	1	1°30′	12	45	4
TPRB4 020-16-150	2	1	1°30′	16	50	4
TPRB4 020-20-150	2	1	1°30′	20	55	4
TPRB4 020-25-150	2	1	1°30′	25	55	4
TPRB4 020-30-150	2	1	1°30′	30	60	4
TPRB4 025-10-150	2.5	1.25	1°30′	10	45	4
TPRB4 025-12-150	2.5	1.25	1°30′	12	45	4
TPRB4 025-16-150	2.5	1.25	1°30′	16	50	4
TPRB4 025-20-150	2.5	1.25	1°30′	20	55	4
TPRB4 025-25-150	2.5	1.25	1°30′	25	55	4
TPRB4 025-30-150	2.5	1.25	1°30′	30	60	6

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

※ The above products are produced upon customer's order.

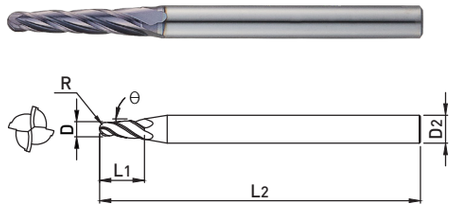
■ Applicable Working Material

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○	◎	○				○		○

○ : GOOD ◎ : EXCELLENT

TPRB4-200

4 FLUTES TAPERED BALL NOSE ENDMILL



- Suitable for machining sloped surface with 2.0 taper angle
- Reinforced hardness and improved work efficiency by applying tapered rib shape

ULTRA FINE | 4 | 25° HELIX | R ±0.01 | AlTiN | DATA

ALL SIZES

p.486

■ TOLERANCE

D		SHANK DIA.
ALL SIZES	0 ~ -0.05mm	h6

EDP No	D	R	θ	L_1	L_2	D_2
TPRB4 006-04-200	0.6	0.3	2°00′	4	40	4
TPRB4 006-06-200	0.6	0.3	2°00′	6	40	4
TPRB4 008-06-200	0.8	0.4	2°00′	6	45	4
TPRB4 008-08-200	0.8	0.4	2°00′	8	45	4
TPRB4 008-10-200	0.8	0.4	2°00′	10	45	4
TPRB4 010-06-200	1	0.5	2°00′	6	45	4
TPRB4 010-08-200	1	0.5	2°00′	8	45	4
TPRB4 010-10-200	1	0.5	2°00′	10	45	4
TPRB4 010-12-200	1	0.5	2°00′	12	45	4
TPRB4 010-16-200	1	0.5	2°00′	16	50	4
TPRB4 012-06-200	1.2	0.6	2°00′	6	45	4
TPRB4 012-08-200	1.2	0.6	2°00′	8	45	4
TPRB4 012-10-200	1.2	0.6	2°00′	10	45	4
TPRB4 012-12-200	1.2	0.6	2°00′	12	45	4
TPRB4 012-16-200	1.2	0.6	2°00′	16	50	4
TPRB4 015-08-200	1.5	0.75	2°00′	8	45	4
TPRB4 015-10-200	1.5	0.75	2°00′	10	45	4
TPRB4 015-12-200	1.5	0.75	2°00′	12	45	4
TPRB4 015-16-200	1.5	0.75	2°00′	16	50	4
TPRB4 015-20-200	1.5	0.75	2°00′	20	55	4
TPRB4 016-08-200	1.6	0.8	2°00′	8	45	4
TPRB4 016-10-200	1.6	0.8	2°00′	10	45	4
TPRB4 016-12-200	1.6	0.8	2°00′	12	45	4
TPRB4 016-16-200	1.6	0.8	2°00′	16	50	4
TPRB4 016-20-200	1.6	0.8	2°00′	20	55	4
TPRB4 018-08-200	1.8	0.9	2°00′	8	45	4
TPRB4 018-10-200	1.8	0.9	2°00′	10	45	4
TPRB4 018-12-200	1.8	0.9	2°00′	12	45	4
TPRB4 018-16-200	1.8	0.9	2°00′	16	50	4
TPRB4 018-20-200	1.8	0.9	2°00′	20	55	4

EDP No	D	R	θ	L_1	L_2	D_2
TPRB4 020-10-200	2	1	2°00′	10	45	4
TPRB4 020-12-200	2	1	2°00′	12	45	4
TPRB4 020-16-200	2	1	2°00′	16	50	4
TPRB4 020-20-200	2	1	2°00′	20	55	4
TPRB4 020-25-200	2	1	2°00′	25	55	4
TPRB4 020-30-200	2	1	2°00′	30	60	6
TPRB4 025-10-200	2.5	1.25	2°00′	10	45	4
TPRB4 025-12-200	2.5	1.25	2°00′	12	45	4
TPRB4 025-16-200	2.5	1.25	2°00′	16	50	4
TPRB4 025-20-200	2.5	1.25	2°00′	20	55	4
TPRB4 025-25-200	2.5	1.25	2°00′	25	55	4
TPRB4 025-30-200	2.5	1.25	2°00′	30	60	6

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

※ The above products are produced upon customer's order.

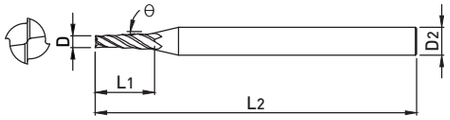
■ Applicable Working Material

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○	◎	○				○		○

○ : GOOD ◎ : EXCELLENT

TPRE4-050

4 FLUTES TAPERED SQUARE ENDMILL



- Suitable for machining sloped surface with 0.5 taper angle
- Reinforced hardness and improved work efficiency by applying tapered rib shape

ULTRA FINE | 4 | 25° HELIX | AlTiN | DATA

p.486

■ **TOLERANCE**

D		SHANK DIA.
ALL SIZES	0 ~ -0.05mm	h6

EDP No	D	θ	L_1	L_2	D_2
TPRE4 004-02-050	0.4	30′	2	40	4
TPRE4 004-03-050	0.4	30′	3	40	4
TPRE4 004-04-050	0.4	30′	4	40	4
TPRE4 005-02-050	0.5	30′	2	40	4
TPRE4 005-04-050	0.5	30′	4	40	4
TPRE4 005-06-050	0.5	30′	6	40	4
TPRE4 006-04-050	0.6	30′	4	40	4
TPRE4 006-06-050	0.6	30′	6	40	4
TPRE4 007-06-050	0.7	30′	6	40	4
TPRE4 007-08-050	0.7	30′	8	40	4
TPRE4 008-06-050	0.8	30′	6	45	4
TPRE4 008-08-050	0.8	30′	8	45	4
TPRE4 008-10-050	0.8	30′	10	45	4
TPRE4 009-06-050	0.9	30′	6	45	4
TPRE4 009-08-050	0.9	30′	8	45	4
TPRE4 009-10-050	0.9	30′	10	45	4
TPRE4 010-06-050	1	30′	6	45	4
TPRE4 010-08-050	1	30′	8	45	4
TPRE4 010-10-050	1	30′	10	45	4
TPRE4 010-12-050	1	30′	12	45	4
TPRE4 010-16-050	1	30′	16	50	4
TPRE4 012-06-050	1.2	30′	6	45	4
TPRE4 012-08-050	1.2	30′	8	45	4
TPRE4 012-10-050	1.2	30′	10	45	4
TPRE4 012-12-050	1.2	30′	12	45	4
TPRE4 012-16-050	1.2	30′	16	50	4
TPRE4 014-08-050	1.4	30′	8	45	4
TPRE4 014-12-050	1.4	30′	12	45	4
TPRE4 014-16-050	1.4	30′	16	50	4
TPRE4 015-08-050	1.5	30′	8	45	4

EDP No	D	θ	L_1	L_2	D_2
TPRE4 015-10-050	1.5	30′	10	45	4
TPRE4 015-12-050	1.5	30′	12	45	4
TPRE4 015-16-050	1.5	30′	16	50	4
TPRE4 015-20-050	1.5	30′	20	55	4
TPRE4 016-08-050	1.6	30′	8	45	4
TPRE4 016-10-050	1.6	30′	10	45	4
TPRE4 016-12-050	1.6	30′	12	45	4
TPRE4 016-16-050	1.6	30′	16	50	4
TPRE4 016-20-050	1.6	30′	20	55	4
TPRE4 018-08-050	1.8	30′	8	45	4
TPRE4 018-10-050	1.8	30′	10	45	4
TPRE4 018-12-050	1.8	30′	12	45	4
TPRE4 018-16-050	1.8	30′	16	50	4
TPRE4 018-20-050	1.8	30′	20	55	4
TPRE4 020-10-050	2	30′	10	45	4
TPRE4 020-12-050	2	30′	12	45	4
TPRE4 020-16-050	2	30′	16	50	4
TPRE4 020-20-050	2	30′	20	55	4
TPRE4 020-25-050	2	30′	25	55	4
TPRE4 025-10-050	2.5	30′	10	45	4
TPRE4 025-12-050	2.5	30′	12	45	4
TPRE4 025-16-050	2.5	30′	16	50	4
TPRE4 025-20-050	2.5	30′	20	55	4
TPRE4 025-25-050	2.5	30′	25	55	4
TPRE4 025-30-050	2.5	30′	30	60	4

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

※ The above products are produced upon customer's order.

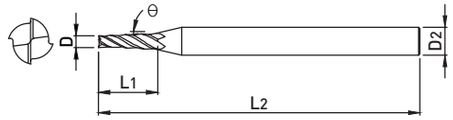
■ **Applicable Working Material**

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○	◎	○				○		○

○ : GOOD ◎ : EXCELLENT

TPRE4-075

4 FLUTES TAPERED SQUARE ENDMILL



- Suitable for machining sloped surface with 0.75 taper angle
- Reinforced hardness and improved work efficiency by applying tapered rib shape

ULTRA FINE | 4 | 25° HELIX | AlTiN | DATA

p.486

■ **TOLERANCE**

D		SHANK DIA.
ALL SIZES	0 ~ -0.03mm	h6

EDP No	D	θ	L_1	L_2	D_2
TPRE4 004-02-075	0.4	45′	2	40	4
TPRE4 004-03-075	0.4	45′	3	40	4
TPRE4 004-04-075	0.4	45′	4	40	4
TPRE4 005-04-075	0.5	45′	4	40	4
TPRE4 005-06-075	0.5	45′	6	40	4
TPRE4 006-04-075	0.6	45′	4	40	4
TPRE4 006-06-075	0.6	45′	6	40	4
TPRE4 007-06-075	0.7	45′	6	40	4
TPRE4 007-08-075	0.7	45′	8	40	4
TPRE4 008-06-075	0.8	45′	6	45	4
TPRE4 008-08-075	0.8	45′	8	45	4
TPRE4 008-10-075	0.8	45′	10	45	4
TPRE4 009-06-075	0.9	45′	6	45	4
TPRE4 009-08-075	0.9	45′	8	45	4
TPRE4 009-10-075	0.9	45′	10	45	4
TPRE4 010-08-075	1	45′	8	45	4
TPRE4 010-10-075	1	45′	10	45	4
TPRE4 010-12-075	1	45′	12	45	4
TPRE4 012-08-075	1.2	45′	8	45	4
TPRE4 012-10-075	1.2	45′	10	45	4
TPRE4 012-12-075	1.2	45′	12	45	4
TPRE4 012-16-075	1.2	45′	16	50	4
TPRE4 015-08-075	1.5	45′	8	45	4
TPRE4 015-10-075	1.5	45′	10	45	4
TPRE4 015-12-075	1.5	45′	12	45	4
TPRE4 015-16-075	1.5	45′	16	50	4
TPRE4 015-20-075	1.5	45′	20	55	4
TPRE4 016-08-075	1.6	45′	8	45	4
TPRE4 016-10-075	1.6	45′	10	45	4
TPRE4 016-12-075	1.6	45′	12	45	4

EDP No	D	θ	L_1	L_2	D_2
TPRE4 016-16-075	1.6	45′	16	50	4
TPRE4 016-20-075	1.6	45′	20	55	4
TPRE4 018-08-075	1.8	45′	8	45	4
TPRE4 018-10-075	1.8	45′	10	45	4
TPRE4 018-12-075	1.8	45′	12	45	4
TPRE4 018-16-075	1.8	45′	16	50	4
TPRE4 018-20-075	1.8	45′	20	55	4
TPRE4 020-10-075	2	45′	10	45	4
TPRE4 020-12-075	2	45′	12	45	4
TPRE4 020-16-075	2	45′	16	50	4
TPRE4 020-20-075	2	45′	20	55	4
TPRE4 020-25-075	2	45′	25	55	4
TPRE4 025-10-075	2.5	45′	10	45	4
TPRE4 025-12-075	2.5	45′	12	45	4
TPRE4 025-16-075	2.5	45′	16	50	4
TPRE4 025-20-075	2.5	45′	20	55	4
TPRE4 025-25-075	2.5	45′	25	55	4
TPRE4 025-30-075	2.5	45′	30	60	4
TPRE4 030-25-075	3	45′	25	55	4
TPRE4 030-40-075	3	45′	40	80	6

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

※ The above products are produced upon customer's order.

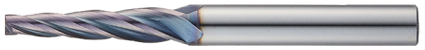
■ **Applicable Working Material**

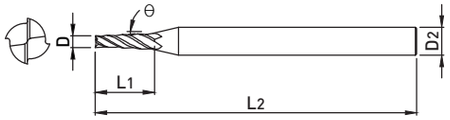
Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○	◎	○				○		○

○ : GOOD ◎ : EXCELLENT

TPRE4-100

4 FLUTES TAPERED SQUARE ENDMILL





- Suitable for machining sloped surface with 1.0 taper angle
- Reinforced hardness and improved work efficiency by applying tapered rib shape

ULTRA FINE | 4 | 25° HELIX | AlTiN | DATA

p.486

■ **TOLERANCE**

D		SHANK DIA.
ALL SIZES	0 ~ -0.03mm	h6

EDP No	D	θ	L_1	L_2	D_2
TPRE4 004-02-100	0.4	1°00′	2	40	4
TPRE4 004-03-100	0.4	1°00′	3	40	4
TPRE4 004-04-100	0.4	1°00′	4	40	4
TPRE4 005-02-100	0.5	1°00′	2	40	4
TPRE4 005-04-100	0.5	1°00′	4	40	4
TPRE4 005-06-100	0.5	1°00′	6	40	4
TPRE4 006-04-100	0.6	1°00′	4	40	4
TPRE4 006-06-100	0.6	1°00′	6	40	4
TPRE4 007-06-100	0.7	1°00′	6	40	4
TPRE4 007-08-100	0.7	1°00′	8	40	4
TPRE4 008-06-100	0.8	1°00′	6	45	4
TPRE4 008-08-100	0.8	1°00′	8	45	4
TPRE4 008-10-100	0.8	1°00′	10	45	4
TPRE4 009-06-100	0.9	1°00′	6	45	4
TPRE4 009-08-100	0.9	1°00′	8	45	4
TPRE4 009-10-100	0.9	1°00′	10	45	4
TPRE4 010-06-100	1	1°00′	6	45	4
TPRE4 010-08-100	1	1°00′	8	45	4
TPRE4 010-10-100	1	1°00′	10	45	4
TPRE4 010-12-100	1	1°00′	12	45	4
TPRE4 010-16-100	1	1°00′	16	50	4
TPRE4 012-06-100	1.2	1°00′	6	45	4
TPRE4 012-08-100	1.2	1°00′	8	45	4
TPRE4 012-10-100	1.2	1°00′	10	45	4
TPRE4 012-12-100	1.2	1°00′	12	45	4
TPRE4 012-16-100	1.2	1°00′	16	50	4
TPRE4 014-08-100	1.4	1°00′	8	45	4
TPRE4 014-12-100	1.4	1°00′	12	45	4
TPRE4 014-16-100	1.4	1°00′	16	50	4
TPRE4 015-08-100	1.5	1°00′	8	45	4
TPRE4 015-10-100	1.5	1°00′	10	45	4
TPRE4 015-12-100	1.5	1°00′	12	45	4
TPRE4 015-16-100	1.5	1°00′	16	50	4
TPRE4 015-20-100	1.5	1°00′	20	55	4
TPRE4 016-08-100	1.6	1°00′	8	45	4
TPRE4 016-10-100	1.6	1°00′	10	45	4
TPRE4 016-12-100	1.6	1°00′	12	45	4
TPRE4 016-16-100	1.6	1°00′	16	50	4
TPRE4 016-20-100	1.6	1°00′	20	55	4
TPRE4 018-08-100	1.8	1°00′	8	45	4
TPRE4 018-10-100	1.8	1°00′	10	45	4
TPRE4 018-12-100	1.8	1°00′	12	45	4
TPRE4 018-16-100	1.8	1°00′	16	50	4
TPRE4 018-20-100	1.8	1°00′	20	55	4
TPRE4 020-10-100	2	1°00′	10	45	4
TPRE4 020-12-100	2	1°00′	12	45	4
TPRE4 020-16-100	2	1°00′	16	50	4
TPRE4 020-20-100	2	1°00′	20	55	4
TPRE4 020-25-100	2	1°00′	25	55	4
TPRE4 025-10-100	2.5	1°00′	10	45	4
TPRE4 025-12-100	2.5	1°00′	12	45	4
TPRE4 025-16-100	2.5	1°00′	16	50	4
TPRE4 025-20-100	2.5	1°00′	20	55	4
TPRE4 025-25-100	2.5	1°00′	25	55	4
TPRE4 025-30-100	2.5	1°00′	30	60	4
TPRE4 030-25-100	3	1°00′	25	55	4
TPRE4 030-40-100	3	1°00′	40	80	6

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

※ The above products are produced upon customer's order.

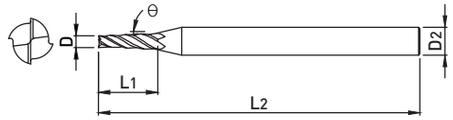
■ **Applicable Working Material**

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○	◎	○				○		○

○ : GOOD ◎ : EXCELLENT

TPRE4-150

4 FLUTES TAPERED SQUARE ENDMILL



- Suitable for machining sloped surface with 1.5 taper angle
- Reinforced hardness and improved work efficiency by applying tapered rib shape

ULTRA FINE | 4 | 25° HELIX | AlTiN | DATA

p.486

■ **TOLERANCE**

D		SHANK DIA.
ALL SIZES	0 ~ -0.03mm	h6

EDP No	D	θ	L_1	L_2	D_2
TPRE4 004-02-150	0.4	1°30′	2	40	4
TPRE4 004-03-150	0.4	1°30′	3	40	4
TPRE4 004-04-150	0.4	1°30′	4	40	4
TPRE4 005-04-150	0.5	1°30′	4	40	4
TPRE4 005-06-150	0.5	1°30′	6	40	4
TPRE4 006-04-150	0.6	1°30′	4	40	4
TPRE4 006-06-150	0.6	1°30′	6	40	4
TPRE4 007-06-150	0.7	1°30′	6	40	4
TPRE4 007-08-150	0.7	1°30′	8	40	4
TPRE4 008-06-150	0.8	1°30′	6	45	4
TPRE4 008-08-150	0.8	1°30′	8	45	4
TPRE4 008-10-150	0.8	1°30′	10	45	4
TPRE4 009-06-150	0.9	1°30′	6	45	4
TPRE4 009-08-150	0.9	1°30′	8	45	4
TPRE4 009-10-150	0.9	1°30′	10	45	4
TPRE4 010-06-150	1	1°30′	6	45	4
TPRE4 010-08-150	1	1°30′	8	45	4
TPRE4 010-10-150	1	1°30′	10	45	4
TPRE4 010-12-150	1	1°30′	12	45	4
TPRE4 010-16-150	1	1°30′	16	50	4
TPRE4 012-06-150	1.2	1°30′	6	45	4
TPRE4 012-08-150	1.2	1°30′	8	45	4
TPRE4 012-10-150	1.2	1°30′	10	45	4
TPRE4 012-12-150	1.2	1°30′	12	45	4
TPRE4 012-16-150	1.2	1°30′	16	50	4
TPRE4 014-08-150	1.4	1°30′	8	45	4
TPRE4 014-12-150	1.4	1°30′	12	45	4
TPRE4 014-16-150	1.4	1°30′	16	50	4
TPRE4 015-08-150	1.5	1°30′	8	45	4
TPRE4 015-10-150	1.5	1°30′	10	45	4
TPRE4 015-12-150	1.5	1°30′	12	45	4
TPRE4 015-16-150	1.5	1°30′	16	50	4
TPRE4 015-20-150	1.5	1°30′	20	55	4
TPRE4 016-08-150	1.6	1°30′	8	45	4
TPRE4 016-10-150	1.6	1°30′	10	45	4
TPRE4 016-12-150	1.6	1°30′	12	45	4
TPRE4 016-16-150	1.6	1°30′	16	50	4
TPRE4 016-20-150	1.6	1°30′	20	55	4
TPRE4 018-08-150	1.8	1°30′	8	45	4
TPRE4 018-10-150	1.8	1°30′	10	45	4
TPRE4 018-12-150	1.8	1°30′	12	45	4
TPRE4 018-16-150	1.8	1°30′	16	50	4
TPRE4 018-20-150	1.8	1°30′	20	55	4
TPRE4 020-10-150	2	1°30′	10	45	4
TPRE4 020-12-150	2	1°30′	12	45	4
TPRE4 020-16-150	2	1°30′	16	50	4
TPRE4 020-20-150	2	1°30′	20	55	4
TPRE4 020-25-150	2	1°30′	25	55	4
TPRE4 025-10-150	2.5	1°30′	10	45	4
TPRE4 025-12-150	2.5	1°30′	12	45	4
TPRE4 025-16-150	2.5	1°30′	16	50	4
TPRE4 025-20-150	2.5	1°30′	20	55	4
TPRE4 025-25-150	2.5	1°30′	25	55	4
TPRE4 025-30-150	2.5	1°30′	30	65	6
TPRE4 030-25-150	3	1°30′	25	60	6
TPRE4 030-40-150	3	1°30′	40	80	6

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

※ The above products are produced upon customer's order.

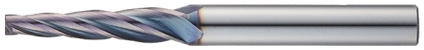
■ **Applicable Working Material**

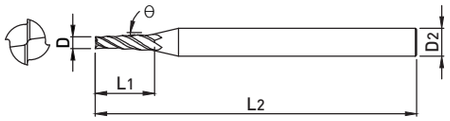
Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○	◎	○				○		○

○ : GOOD ◎ : EXCELLENT

TPRE4-200

4 FLUTES TAPERED SQUARE ENDMILL





- Suitable for machining sloped surface with 2.0 taper angle
- Reinforced hardness and improved work efficiency by applying tapered rib shape

ULTRA FINE | 4 | 25° HELIX | AlTiN | DATA

p.486

■ TOLERANCE

D		SHANK DIA.
ALL SIZES	0 ~ -0.03mm	h6

EDP No	D	θ	L_1	L_2	D_2
TPRE4 004-02-200	0.4	2°00'	2	40	4
TPRE4 004-03-200	0.4	2°00'	3	40	4
TPRE4 004-04-200	0.4	2°00'	4	40	4
TPRE4 005-04-200	0.5	2°00'	4	40	4
TPRE4 005-06-200	0.5	2°00'	6	40	4
TPRE4 006-04-200	0.6	2°00'	4	40	4
TPRE4 006-06-200	0.6	2°00'	6	40	4
TPRE4 007-06-200	0.7	2°00'	6	40	4
TPRE4 007-08-200	0.7	2°00'	8	40	4
TPRE4 008-06-200	0.8	2°00'	6	45	4
TPRE4 008-08-200	0.8	2°00'	8	45	4
TPRE4 008-10-200	0.8	2°00'	10	45	4
TPRE4 009-06-200	0.9	2°00'	6	45	4
TPRE4 009-08-200	0.9	2°00'	8	45	4
TPRE4 009-10-200	0.9	2°00'	10	45	4
TPRE4 010-06-200	1	2°00'	6	45	4
TPRE4 010-08-200	1	2°00'	8	45	4
TPRE4 010-10-200	1	2°00'	10	45	4
TPRE4 010-12-200	1	2°00'	12	45	4
TPRE4 010-16-200	1	2°00'	16	50	4
TPRE4 012-06-200	1.2	2°00'	6	45	4
TPRE4 012-08-200	1.2	2°00'	8	45	4
TPRE4 012-10-200	1.2	2°00'	10	45	4
TPRE4 012-12-200	1.2	2°00'	12	45	4
TPRE4 012-16-200	1.2	2°00'	16	50	4
TPRE4 014-08-200	1.4	2°00'	8	45	4
TPRE4 014-12-200	1.4	2°00'	12	45	4
TPRE4 014-16-200	1.4	2°00'	16	50	4
TPRE4 015-08-200	1.5	2°00'	8	45	4
TPRE4 015-10-200	1.5	2°00'	10	45	4

EDP No	D	θ	L_1	L_2	D_2
TPRE4 015-12-200	1.5	2°00'	12	45	4
TPRE4 015-16-200	1.5	2°00'	16	50	4
TPRE4 015-20-200	1.5	2°00'	20	55	4
TPRE4 016-08-200	1.6	2°00'	8	45	4
TPRE4 016-10-200	1.6	2°00'	10	45	4
TPRE4 016-12-200	1.6	2°00'	12	45	4
TPRE4 016-16-200	1.6	2°00'	16	50	4
TPRE4 016-20-200	1.6	2°00'	20	55	4
TPRE4 018-08-200	1.8	2°00'	8	45	4
TPRE4 018-10-200	1.8	2°00'	10	45	4
TPRE4 018-12-200	1.8	2°00'	12	45	4
TPRE4 018-16-200	1.8	2°00'	16	50	4
TPRE4 018-20-200	1.8	2°00'	20	55	4
TPRE4 020-10-200	2	2°00'	10	45	4
TPRE4 020-12-200	2	2°00'	12	45	4
TPRE4 020-16-200	2	2°00'	16	50	4
TPRE4 020-20-200	2	2°00'	20	55	4
TPRE4 020-25-200	2	2°00'	25	55	4
TPRE4 025-10-200	2.5	2°00'	10	45	4
TPRE4 025-12-200	2.5	2°00'	12	45	4
TPRE4 025-16-200	2.5	2°00'	16	50	4
TPRE4 025-20-200	2.5	2°00'	20	55	4
TPRE4 025-25-200	2.5	2°00'	25	60	6
TPRE4 025-30-200	2.5	2°00'	30	65	6
TPRE4 030-25-200	3	2°00'	25	60	6
TPRE4 030-40-200	3	2°00'	40	80	6

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

※ The above products are produced upon customer's order.

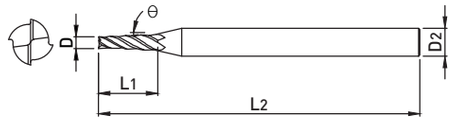
■ Applicable Working Material

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○	◎	○				○		○

○ : GOOD ◎ : EXCELLENT

TPRE4-300

4 FLUTES TAPERED SQUARE ENDMILL



- Suitable for machining sloped surface with 3.0 taper angle
- Reinforced hardness and improved work efficiency by applying tapered rib shape

ULTRA FINE | 4 | 25° HELIX | AlTiN | DATA

p.486

■ TOLERANCE

D		SHANK DIA.
ALL SIZES	0 ~ -0.03mm	h6

EDP No	D	θ	L_1	L_2	D_2
TPRE4 005-04-300	0.5	3°00'	4	40	4
TPRE4 006-04-300	0.6	3°00'	4	40	4
TPRE4 007-06-300	0.7	3°00'	6	40	4
TPRE4 008-06-300	0.8	3°00'	6	45	4
TPRE4 008-10-300	0.8	3°00'	10	45	4
TPRE4 009-08-300	0.9	3°00'	8	45	4
TPRE4 010-08-300	1	3°00'	8	45	4
TPRE4 010-12-300	1	3°00'	12	45	4
TPRE4 012-10-300	1.2	3°00'	10	45	4
TPRE4 012-16-300	1.2	3°00'	16	50	4
TPRE4 015-12-300	1.5	3°00'	12	45	4
TPRE4 015-20-300	1.5	3°00'	20	55	4
TPRE4 016-12-300	1.6	3°00'	12	45	4
TPRE4 016-20-300	1.6	3°00'	20	55	4
TPRE4 018-12-300	1.8	3°00'	12	45	4
TPRE4 018-20-300	1.8	3°00'	20	55	4
TPRE4 020-16-300	2	3°00'	16	50	4
TPRE4 020-25-300	2	3°00'	25	60	6
TPRE4 025-20-300	2.5	3°00'	20	60	6
TPRE4 025-30-300	2.5	3°00'	30	65	6
TPRE4 030-25-300	3	3°00'	25	60	6
TPRE4 030-40-300	3	3°00'	40	80	8

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

※ The above products are produced upon customer's order.

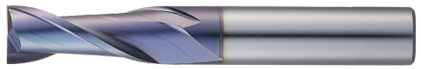
■ Applicable Working Material

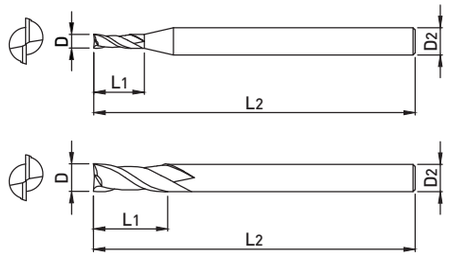
Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○	◎	○				○		○

○ : GOOD ◎ : EXCELLENT

ZE502

2 FLUTES SQUARE ENDMILL





- Suitable for mid/high hardness machining, Superior chip evacuation and multi-purpose
- Extend customer choice with a wide range of specifications from Ø0.1 to Ø25

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

p.487

■ TOLERANCE

D		SHANK DIA.
ALL SIZES	0 ~ -0.02mm	h6

EDP No	D	L_1	L_2	D_2
ZE502 010S4	1	3	42	4
ZE502 010	1	3	42	6
ZE502 015	1.5	4	42	6
ZE502 020S4	2	6	42	4
ZE502 020	2	6	42	6
ZE502 025	2.5	8	42	6
ZE502 030S4	3	10	50	4
ZE502 030	3	10	50	6
ZE502 035	3.5	10	50	6
ZE502 040S4	4	12	50	4
ZE502 040	4	12	50	6
ZE502 045	4.5	14	50	6
ZE502 050	5	15	50	6
ZE502 055	5.5	15	50	6
ZE502 060	6	15	50	6
ZE502 065	6.5	18	60	8
ZE502 070	7	20	60	8
ZE502 075	7.5	20	60	8
ZE502 080	8	20	60	8
ZE502 085	8.5	23	70	10
ZE502 090	9	25	70	10
ZE502 095	9.5	25	70	10
ZE502 100	10	25	70	10
ZE502 105	10.5	28	75	12
ZE502 110	11	30	75	12
ZE502 115	11.5	30	75	12
ZE502 120	12	30	75	12
ZE502 125S12	12.5	30	80	12
ZE502 130S12	13	30	80	12
ZE502 130	13	35	85	14

EDP No	D	L_1	L_2	D_2
ZE502 130S16	13	35	90	16
ZE502 140	14	35	85	14
ZE502 140S16	14	35	90	16
ZE502 150	15	40	90	16
ZE502 160	16	40	90	16
ZE502 170	17	40	100	16
ZE502 180	18	45	100	18
ZE502 190	19	45	100	20
ZE502 200	20	45	100	20
ZE502 220	22	45	100	20
ZE502 240	24	50	120	25
ZE502 250	25	50	120	25

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

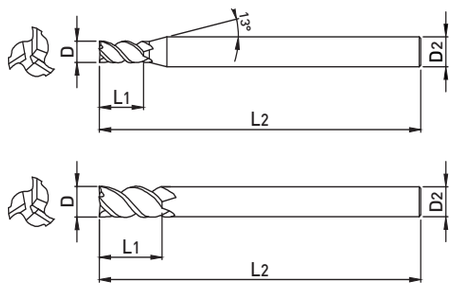
■ Applicable Working Material

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○	◎	○				○		○

○ : GOOD ◎ : EXCELLENT

ZE503

3 FLUTES SQUARE ENDMILL



- Suitable for mid/high hardness machining, Superior chip evacuation and multi-purpose
- Excellent workpiece finishes in semi-finishing and finishing

ULTRA FINE | 3 | 45° HELIX | AlTiN | DATA

p.488

■ TOLERANCE

D		SHANK DIA.
ALL SIZES	0 ~ -0.03mm	h6

EDP No	D	L_1	L_2	D_2
ZE503 060	6	15	50	6
ZE503 070	7	18	60	8
ZE503 080	8	18	60	8
ZE503 090	9	22	70	10
ZE503 100	10	22	70	10
ZE503 110	11	26	75	12
ZE503 120	12	26	75	12
ZE503 130	13	32	85	14
ZE503 140	14	32	85	14
ZE503 150	15	35	90	16
ZE503 160	16	35	90	16
ZE503 180	18	40	100	18
ZE503 200	20	40	100	20
ZE503 250	25	50	120	25
ZE503 320	32	70	150	32

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

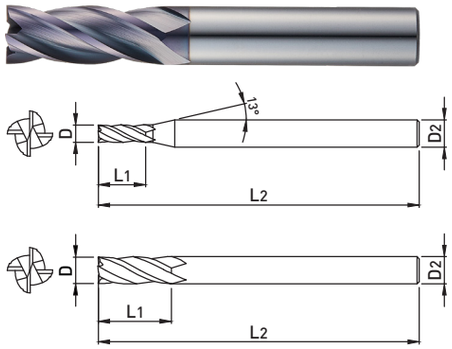
■ Applicable Working Material

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○	◎	○				○		○

○ : GOOD ◎ : EXCELLENT

ZE504

4 FLUTES SQUARE ENDMILL



- Suitable for mid/high hardness machining, Superior chip evacuation and multi-purpose
- Extend customer choice with a wide range of specifications from Ø0.1 to Ø25

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

p.489

■ TOLERANCE

D		SHANK DIA.
ALL SIZES	0 ~ -0.02mm	h6

EDP No	D	L_1	L_2	D_2
ZE504 010	1	2.5	42	6
ZE504 015	1.5	4	42	6
ZE504 020S4	2	6	42	4
ZE504 020	2	6	42	6
ZE504 025	2.5	8	42	6
ZE504 030S4	3	10	50	4
ZE504 030	3	10	50	6
ZE504 035	3.5	10	50	6
ZE504 040S4	4	12	50	4
ZE504 040	4	12	50	6
ZE504 045	4.5	14	50	6
ZE504 050	5	15	50	6
ZE504 055	5.5	15	50	6
ZE504 060	6	15	50	6
ZE504 065	6.5	18	60	8
ZE504 070	7	20	60	8
ZE504 075	7.5	20	60	8
ZE504 080	8	20	60	8
ZE504 085	8.5	23	70	10
ZE504 090	9	25	70	10
ZE504 095	9.5	25	70	10
ZE504 100	10	25	70	10
ZE504 105	10.5	28	75	12
ZE504 110	11	30	75	12
ZE504 115	11.5	30	75	12
ZE504 120	12	30	75	12
ZE504 125S12	12.5	30	80	12
ZE504 130S12	13	30	80	12
ZE504 130	13	35	85	14
ZE504 130S16	13	35	90	16
ZE504 140	14	35	85	14
ZE504 140S16	14	35	90	16
ZE504 150	15	40	90	16
ZE504 160	16	40	90	16
ZE504 170	17	40	100	16
ZE504 180	18	45	100	18
ZE504 190	19	45	100	20
ZE504 200	20	45	100	20
ZE504 220	22	45	100	20
ZE504 240	24	50	120	25
ZE504 250	25	50	120	25

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

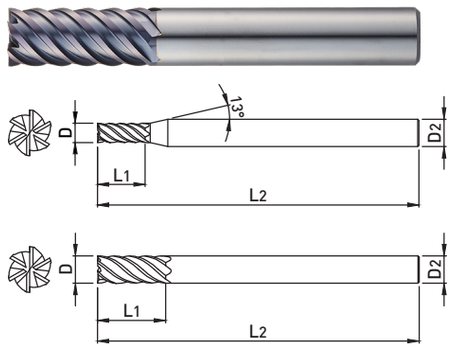
■ Applicable Working Material

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○	◎	○				○		○

○ : GOOD ◎ : EXCELLENT

ZE506

6 FLUTES SQUARE ENDMILL



- Excellent for finishing by 6 flutes cutting
- Excellent processability for finishing with 50° Helix angle

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

p.490

■ TOLERANCE

D		SHANK DIA.
ALL SIZES	0 ~ -0.03mm	h6

EDP No	D	L_1	L_2	D_2
ZE506 060	6	15	50	6
ZE506 061	6	26	70	6
ZE506 070	7	18	60	8
ZE506 080	8	18	60	8
ZE506 081	8	36	90	8
ZE506 090	9	22	70	10
ZE506 100	10	22	70	10
ZE506 101	10	46	100	10
ZE506 110	11	26	75	12
ZE506 120	12	26	75	12
ZE506 121	12	56	110	12
ZE506 130	13	32	85	14
ZE506 140	14	32	85	14
ZE506 150	15	35	90	16
ZE506 160	16	35	90	16
ZE506 161	16	66	130	16
ZE506 180	18	44	100	18
ZE506 200	20	44	100	20
ZE506 201	20	76	150	20
ZE506 250	25	50	120	25
ZE506 251	25	92	180	25
ZE506 320	32	70	150	32

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

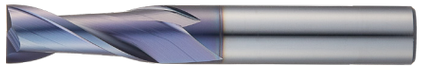
■ Applicable Working Material

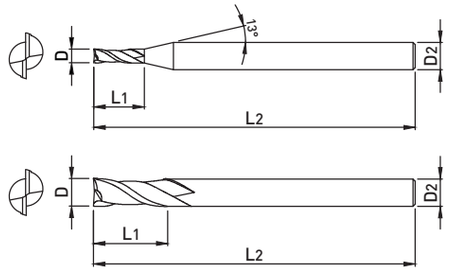
Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○	◎	○				○		○

○ : GOOD ◎ : EXCELLENT

ZE512

2 FLUTES 35° HELIX SQUARE ENDMILL





- Reduced cutting load with 35° Helix angle
- Superior chip evacuation and multi-purpose

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

p.487

■ **TOLERANCE**

D		SHANK DIA.
ALL SIZES	0 ~ -0.02mm	h6

EDP No	D	L_1	L_2	D_2
ZE512 010	1	3	40	6
ZE512 015	1.5	4	40	6
ZE512 020	2	5	40	6
ZE512 025	2.5	6	40	6
ZE512 030	3	8	45	6
ZE512 035	3.5	10	45	6
ZE512 040	4	10	45	6
ZE512 045	4.5	11	45	6
ZE512 050	5	13	50	6
ZE512 055	5.5	13	50	6
ZE512 060	6	13	50	6
ZE512 065	6.5	16	60	8
ZE512 070	7	18	60	8
ZE512 080	8	19	60	8
ZE512 100	10	22	70	10
ZE512 120	12	26	75	12

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

상기 제품은 고객의 주문 시 생산합니다.

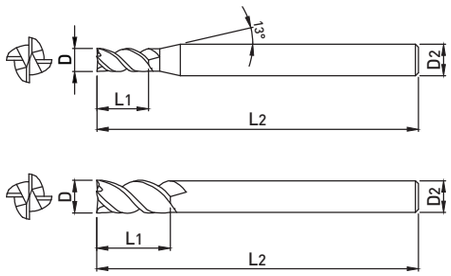
■ **Applicable Working Material**

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○	◎	○				○		○

○ : GOOD ◎ : EXCELLENT

ZE514

4 FLUTES 45° HELIX SQUARE ENDMILL



- Suitable from roughing to finishing and Excellent machining surface
- Excellent processability for semi-finishing and finishing with 45° Helix angle

ULTRA FINE | 4 | 45° HELIX | AlTiN | DATA

p.489

■ **TOLERANCE**

D		SHANK DIA.
ALL SIZES	0 ~ -0.02mm	h6

EDP No	D	L_1	L_2	D_2
ZE514 020	2	5	40	6
ZE514 025	2.5	6	40	6
ZE514 030	3	8	45	6
ZE514 040	4	10	45	6
ZE514 050	5	13	50	6
ZE514 060	6	13	50	6
ZE514 080	8	19	60	8
ZE514 100	10	22	70	10
ZE514 120	12	26	75	12

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

상기 제품은 고객의 주문 시 생산합니다.

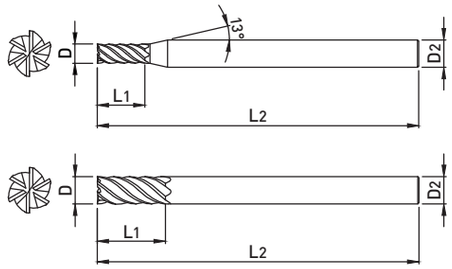
■ **Applicable Working Material**

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○	◎	○				○		○

○ : GOOD ◎ : EXCELLENT

ZE516

6 FLUTES SQUARE ENDMILL



- Excellent for finishing by 6 flutes cutting and Excellent machining surface
- Excellent processability for finishing with 50° Helix angle

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

p.490

■ TOLERANCE

D		SHANK DIA.
ALL SIZES	0 ~ -0.02mm	h6

EDP No	D	L_1	L_2	D_2
ZE516 060	6	13	50	6
ZE516 080	8	18	60	8
ZE516 100	10	22	70	10
ZE516 120	12	26	75	12
ZE516 160	16	35	90	16
ZE516 200	20	44	100	20

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

상기 제품은 고객의 주문 시 생산합니다.

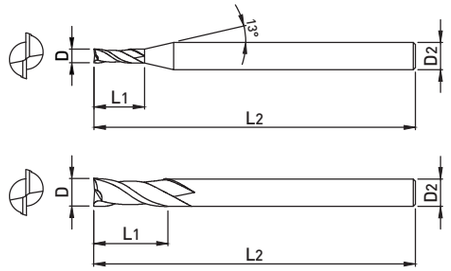
■ Applicable Working Material

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○	◎	○				○		○

○ : GOOD ◎ : EXCELLENT

ZE522

2 FLUTES LONG SHANK SQUARE ENDMILL



- Suitable for mid/high hardness machining, Superior chip evacuation and multi-purpose
- Improved machining efficiency in side machining by adopting long-cutting length

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

p.487

■ TOLERANCE

D		SHANK DIA.
ALL SIZES	0 ~ -0.03mm	h6

EDP No	D	L_1	L_2	D_2
ZE522 030	3	25	75	6
ZE522 040	4	25	75	6
ZE522 050	5	30	80	6
ZE522 060	6	30	80	6
ZE522 070	7	35	85	8
ZE522 080	8	35	85	8
ZE522 090	9	45	100	10
ZE522 100	10	45	100	10
ZE522 101	10	60	155	10
ZE522 110	11	50	110	12
ZE522 120	12	55	120	12
ZE522 121	12	65	155	12
ZE522 140	14	60	120	14
ZE522 160	16	60	120	16
ZE522 161	16	75	165	16
ZE522 180	18	60	120	18
ZE522 200	20	60	120	20
ZE522 201	20	75	165	20

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

상기 제품은 고객의 주문 시 생산합니다.

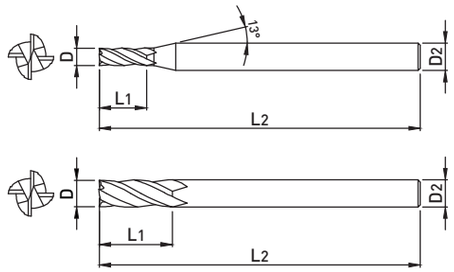
■ Applicable Working Material

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○	◎	○				○		○

○ : GOOD ◎ : EXCELLENT

ZE524

4 FLUTES LONG SHANK SQUARE ENDMILL



- Suitable for mid/high hardness machining, Superior chip evacuation and multi-purpose
- Improved machining efficiency in side machining by adopting long-cutting length

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

p.489

■ TOLERANCE

D		SHANK DIA.
ALL SIZES	0 ~ -0.03mm	h6

EDP No	D	L_1	L_2	D_2
ZE524 030	3	25	75	6
ZE524 040	4	25	75	6
ZE524 050	5	30	80	6
ZE524 060	6	30	80	6
ZE524 070	7	35	85	8
ZE524 080	8	35	85	8
ZE524 090	9	45	100	10
ZE524 100	10	45	100	10
ZE524 110	11	50	110	12
ZE524 120	12	55	120	12
ZE524 140	14	60	120	14
ZE524 160	16	60	120	16
ZE524 180	18	60	120	18
ZE524 200	20	60	120	20

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

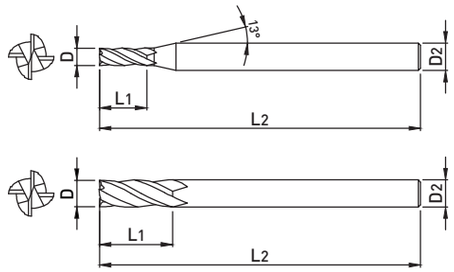
■ Applicable Working Material

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○	◎	○				○		○

○ : GOOD ◎ : EXCELLENT

ZE534

4 FLUTES EXTRA LONG SQUARE ENDMILL



- Suitable for mid/high hardness machining, Superior chip evacuation and multi-purpose
- Improved machining efficiency in side machining by adopting long-cutting length

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

p.489

■ TOLERANCE

D		SHANK DIA.
ALL SIZES	0 ~ -0.03mm	h6

EDP No	D	L_1	L_2	D_2
ZE534 040	4	30	130	6
ZE534 050	5	35	130	6
ZE534 060	6	40	130	6
ZE534 061	6	50	155	6
ZE534 081	8	60	155	8
ZE534 082	8	80	200	8
ZE534 101	10	60	155	10
ZE534 102	10	80	200	10
ZE534 121	12	60	155	12
ZE534 122	12	80	200	12
ZE534 161	16	80	155	16
ZE534 162	16	100	200	16
ZE534 163	16	120	250	16
ZE534 201	20	80	165	20
ZE534 202	20	100	200	20
ZE534 203	20	130	250	20
ZE534 252	25	100	200	25
ZE534 253	25	150	250	25

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

Reducing cutting speed by 30~40% is recommended.

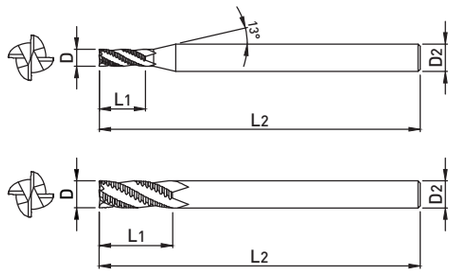
■ Applicable Working Material

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○	◎	○				○		○

○ : GOOD ◎ : EXCELLENT

ZF60

3~6 FLUTES FINISHING ROUGHING ENDMILL



- Applying chamfer type on end face to reduce cutting edge chipping, enhance flute edge hardness
- Increased tool life with hardened cutting edge design.

ULTRA FINE | 3~6 | 30° HELIX | CHAMFERED | AlTiN | DATA

p.491

■ TOLERANCE

D		SHANK DIA.
D4 ~ 6	0 ~ -0.048mm	h6
D7 ~ 10	0 ~ -0.058mm	
D11 ~ 18	0 ~ -0.07mm	
D20 ~	0 ~ -0.084mm	

EDP No	D	L_1	L_2	D_2
ZF603 040	4	10	50	6
ZF603 050	5	13	50	6
ZF603 060	6	15	50	6
ZF603 070	7	18	60	8
ZF603 080	8	18	60	8
ZF604 090	9	22	70	10
ZF604 100	10	22	70	10
ZF604 110	11	26	75	12
ZF604 120	12	26	75	12
ZF604 130	13	32	85	14
ZF604 140	14	32	85	14
ZF604 150	15	35	90	16
ZF604 160	16	35	90	16
ZF604 180	18	44	100	18
ZF604 200	20	44	100	20
ZF605 250	25	50	120	25
ZF606 320	32	70	150	32

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

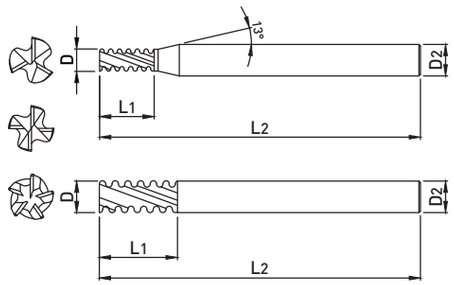
■ Applicable Working Material

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○	◎	○				○		○

○ : GOOD ◎ : EXCELLENT

ZF61

3~5 FLUTES FINE PITCH ROUGHING ENDMILL



- Applying chamfer type on end face to reduce cutting edge chipping, enhance flute edge hardness
- Strengthen the hardness of flute with 20 helix angle

ULTRA FINE | 3~5 | 20° HELIX | DIN 6535HA | DIN 6535HB | FINE | AlTiN | DATA

p.491

■ TOLERANCE

D		SHANK DIA.
D4 ~ 6	0 ~ -0.048mm	h6
D7 ~ 10	0 ~ -0.058mm	
D11 ~ 18	0 ~ -0.07mm	
D20 ~	0 ~ -0.084mm	

EDP No PLAIN SHANK	EDP No FLAT SHANK	D	L_1	L_2	D_2
ZF613 040	ZF613 040F	4	10	50	6
ZF613 050	ZF613 050F	5	13	50	6
ZF613 060	ZF613 060F	6	16	57	6
ZF613 070	ZF613 070F	7	16	63	8
ZF613 080	ZF613 080F	8	16	63	8
ZF614 090	ZF614 090F	9	19	72	10
ZF614 100	ZF614 100F	10	22	72	10
ZF614 120	ZF614 120F	12	26	83	12
ZF614 140	ZF614 140F	14	32	83	14
ZF614 160	ZF614 160F	16	35	92	16
ZF614 180	ZF614 180F	18	40	100	18
ZF614 200	ZF614 200F	20	44	104	20
ZF615 250	ZF615 250F	25	50	120	25

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

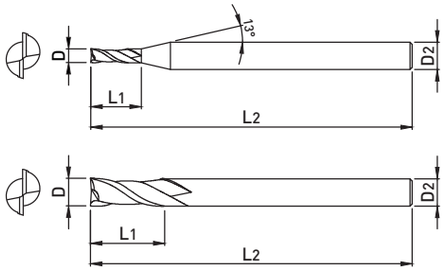
■ Applicable Working Material

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○	◎	○				○		○

○ : GOOD ◎ : EXCELLENT

ZM502

2 FLUTES SQUARE ENDMILL



- Suitable for mid/high hardness machining, Superior chip evacuation and multi-purpose
- Extend customer choice with a wide range of specifications from Ø2 to Ø25

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

p.491

■ **TOLERANCE**

D		SHANK DIA.
ALL SIZES	0 ~ -0.03mm	h6

EDP No	D	L_1	L_2	D_2
ZM502 020	2	8	40	4
ZM502 030	3	12	50	6
ZM502 040	4	15	50	6
ZM502 050	5	20	60	6
ZM502 060	6	20	60	6
ZM502 080	8	25	70	8
ZM502 100	10	30	90	10
ZM502 120	12	30	90	12
ZM502 140	14	40	110	16
ZM502 160	16	50	110	16
ZM502 180	18	50	110	20
ZM502 200	20	55	110	20
ZM502 250	25	75	140	25

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

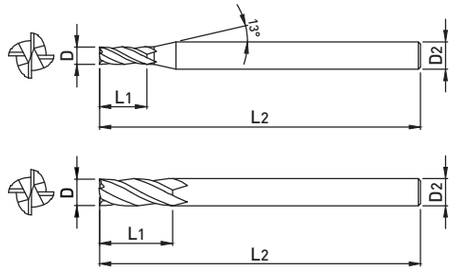
■ **Applicable Working Material**

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○	◎	○				○		○

○ : GOOD ◎ : EXCELLENT

ZM504

4 FLUTES SQUARE ENDMILL



- Suitable for mid/high hardness machining, Superior chip evacuation and multi-purpose
- Extend customer choice with a wide range of specifications from Ø2 to Ø25

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

p.492

■ **TOLERANCE**

D		SHANK DIA.
ALL SIZES	0 ~ -0.03mm	h6

EDP No	D	L_1	L_2	D_2
ZM504 020	2	8	40	4
ZM504 030	3	12	50	6
ZM504 040	4	15	50	6
ZM504 050	5	20	60	6
ZM504 060	6	20	60	6
ZM504 080	8	25	70	8
ZM504 100	10	30	90	10
ZM504 120	12	30	90	12
ZM504 140	14	40	110	16
ZM504 160	16	50	110	16
ZM504 180	18	50	110	20
ZM504 200	20	55	110	20
ZM504 250	25	75	140	25

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

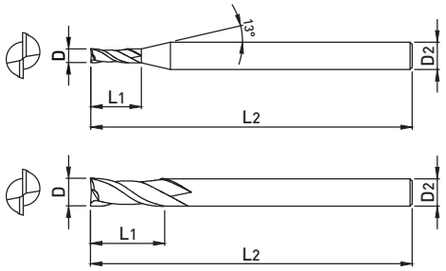
■ **Applicable Working Material**

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○	◎	○				○		○

○ : GOOD ◎ : EXCELLENT

ZM522

2 FLUTES LONG SHANK SQUARE ENDMILL



- Suitable for mid/high hardness machining, Superior chip evacuation and multi-purpose
- Suitable for deep machining with long shank type

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

p.491

■ TOLERANCE

D		SHANK DIA.
ALL SIZES	0 ~ -0.03mm	h6

EDP No	D	L_1	L_2	D_2
ZM522 030	3	10	70	6
ZM522 040	4	12	70	6
ZM522 050	5	15	80	6
ZM522 060	6	15	80	6
ZM522 080	8	20	100	8
ZM522 100	10	25	100	10
ZM522 120	12	30	110	12
ZM522 160	16	40	125	16
ZM522 200	20	45	150	20

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

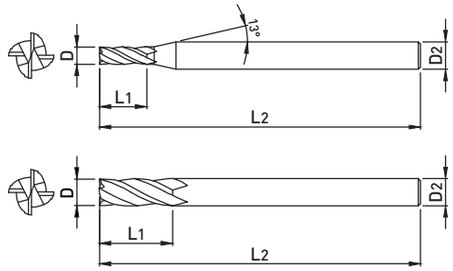
■ Applicable Working Material

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○	◎	○				○		○

○ : GOOD ◎ : EXCELLENT

ZM524

4 FLUTES LONG SHANK SQUARE ENDMILL



- Suitable for mid/high hardness machining, Superior chip evacuation and multi-purpose
- Suitable for deep machining with long shank type

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

p.492

■ TOLERANCE

D		SHANK DIA.
ALL SIZES	0 ~ -0.03mm	h6

EDP No	D	L_1	L_2	D_2
ZM524 030	3	10	70	6
ZM524 040	4	12	70	6
ZM524 050	5	15	80	6
ZM524 060	6	15	80	6
ZM524 080	8	20	100	8
ZM524 100	10	25	100	10
ZM524 120	12	30	110	12
ZM524 160	16	40	125	16
ZM524 200	20	45	150	20

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

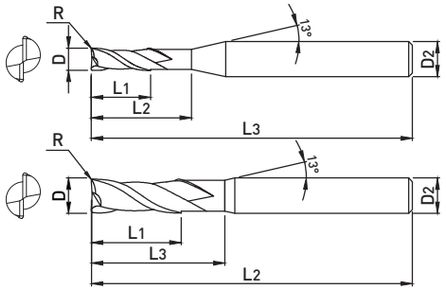
■ Applicable Working Material

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○	◎	○				○		○

○ : GOOD ◎ : EXCELLENT

ZR502

2 FLUTES NECK TYPE RADIUS ENDMILL



- Suitable for mid/high hardness machining, Superior chip evacuation and multi-purpose
- Increased processability, chipping resistance with hardened cutting edge design.

ULTRA FINE | 2 | 30° HELIX | R ±0.02 ALL SIZES | AlTiN | DATA p.493

■ TOLERANCE

D		SHANK DIA.
ALL SIZES	0 ~ -0.02mm	h6

EDP No	D	R	L_1	L_3	L_2	D_2
ZR502 0405	4	0.5	6	10	55	6
ZR502 0410	4	1	6	10	55	6
ZR502 0605	6	0.5	8	15	55	6
ZR502 0610	6	1	8	15	55	6
ZR502 0805	8	0.5	10	20	65	8
ZR502 0810	8	1	10	20	65	8
ZR502 0815	8	1.5	10	20	65	8
ZR502 0820	8	2	10	20	65	8
ZR502 1005	10	0.5	12	28	80	10
ZR502 1010	10	1	12	28	80	10
ZR502 1015	10	1.5	12	28	80	10
ZR502 1020	10	2	12	28	80	10
ZR502 1205	12	0.5	15	30	82	12
ZR502 1210	12	1	15	30	82	12
ZR502 1215	12	1.5	15	30	82	12
ZR502 1220	12	2	15	30	82	12

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

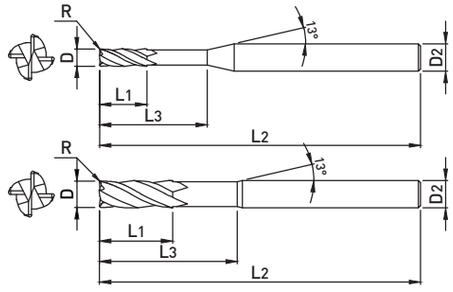
■ Applicable Working Material

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○	◎	○				○		○

○ : GOOD ◎ : EXCELLENT

ZR504

4 FLUTES NECK TYPE RADIUS ENDMILL



- Suitable for mid/high hardness machining, Superior chip evacuation and multi-purpose
- Increased processability, chipping resistance with hardened cutting edge design.

ULTRA FINE | 4 | 30° HELIX | R ±0.02 ALL SIZES | AlTiN | DATA p.494

■ TOLERANCE

D		SHANK DIA.
ALL SIZES	0 ~ -0.02mm	h6

EDP No	D	R	L_1	L_3	L_2	D_2
ZR504 0405	4	0.5	6	10	55	6
ZR504 0410	4	1	6	10	55	6
ZR504 0605	6	0.5	8	15	55	6
ZR504 0610	6	1	8	15	55	6
ZR504 0805	8	0.5	10	20	65	8
ZR504 0810	8	1	10	20	65	8
ZR504 0815	8	1.5	10	20	65	8
ZR504 0820	8	2	10	20	65	8
ZR504 1005	10	0.5	12	28	80	10
ZR504 1010	10	1	12	28	80	10
ZR504 1015	10	1.5	12	28	80	10
ZR504 1020	10	2	12	28	80	10
ZR504 1205	12	0.5	15	30	82	12
ZR504 1210	12	1	15	30	82	12
ZR504 1215	12	1.5	15	30	82	12
ZR504 1220	12	2	15	30	82	12

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

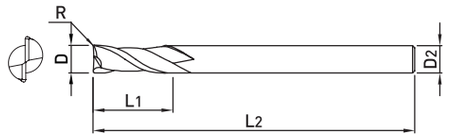
■ Applicable Working Material

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○	◎	○				○		○

○ : GOOD ◎ : EXCELLENT

ZR512

2 FLUTES RADIUS ENDMILL



- High hardened corner R from proper design considered the characteristics of workpiece.
- Excellent machining surface with increased chipping and wear resistance in high speed and feed machining.

ULTRA FINE | 2 | 30° HELIX | R ±0.02 | AlTiN | DATA

ALL SIZES

p.493

■ TOLERANCE

D		SHANK DIA.
ALL SIZES	0 ~ -0.03mm	h6

EDP No	D	R	L_1	L_2	D_2
ZR512 0605	6	0.5	15	55	6
ZR512 0610	6	1	15	55	6
ZR512 0805	8	0.5	20	65	8
ZR512 0810	8	1	20	65	8
ZR512 0815	8	1.5	20	65	8
ZR512 0820	8	2	20	65	8
ZR512 1005	10	0.5	25	80	10
ZR512 1010	10	1	25	80	10
ZR512 1015	10	1.5	25	80	10
ZR512 1020	10	2	25	80	10
ZR512 1025	10	2.5	25	80	10
ZR512 1030	10	3	25	80	10
ZR512 1205	12	0.5	30	82	12
ZR512 1210	12	1	30	82	12
ZR512 1215	12	1.5	30	82	12
ZR512 1220	12	2	30	82	12
ZR512 1225	12	2.5	30	82	12
ZR512 1230	12	3	30	82	12
ZR512 1605	16	0.5	40	100	16
ZR512 1610	16	1	40	100	16
ZR512 1615	16	1.5	40	100	16
ZR512 1620	16	2	40	100	16
ZR512 1630	16	3	40	100	16
ZR512 2005	20	0.5	45	110	20
ZR512 2010	20	1	45	110	20
ZR512 2015	20	1.5	45	110	20
ZR512 2020	20	2	45	110	20
ZR512 2030	20	3	45	110	20

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

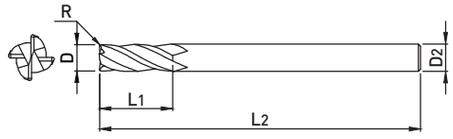
■ Applicable Working Material

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○	◎	○				○		○

○ : GOOD ◎ : EXCELLENT

ZR514

4 FLUTES RADIUS ENDMILL



- High hardened corner R from proper design considered the characteristics of workpiece.
- Excellent machining surface with increased chipping and wear resistance in high speed and feed machining.

ULTRA FINE | 4 | 30° HELIX | R ±0.02 | AlTiN | DATA

ALL SIZES

p.494

■ TOLERANCE

D		SHANK DIA.
ALL SIZES	0 ~ -0.03mm	h6

EDP No	D	R	L_1	L_2	D_2
ZR514 0605	6	0.5	15	55	6
ZR514 0610	6	1	15	55	6
ZR514 0805	8	0.5	20	65	8
ZR514 0810	8	1	20	65	8
ZR514 0815	8	1.5	20	65	8
ZR514 0820	8	2	20	65	8
ZR514 1005	10	0.5	25	80	10
ZR514 1010	10	1	25	80	10
ZR514 1015	10	1.5	25	80	10
ZR514 1020	10	2	25	80	10
ZR514 1025	10	2.5	25	80	10
ZR514 1030	10	3	25	80	10
ZR514 1205	12	0.5	30	82	12
ZR514 1210	12	1	30	82	12
ZR514 1215	12	1.5	30	82	12
ZR514 1220	12	2	30	82	12
ZR514 1225	12	2.5	30	82	12
ZR514 1230	12	3	30	82	12
ZR514 1605	16	0.5	40	100	16
ZR514 1610	16	1	40	100	16
ZR514 1615	16	1.5	40	100	16
ZR514 1620	16	2	40	100	16
ZR514 1630	16	3	40	100	16
ZR514 2005	20	0.5	45	110	20
ZR514 2010	20	1	45	110	20
ZR514 2015	20	1.5	45	110	20
ZR514 2020	20	2	45	110	20
ZR514 2030	20	3	45	110	20

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

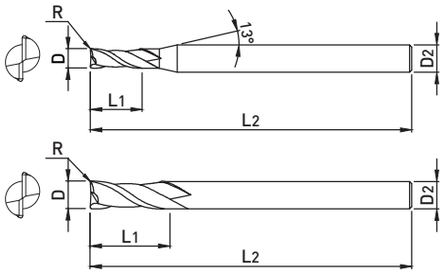
■ Applicable Working Material

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○	◎	○				○		○

○ : GOOD ◎ : EXCELLENT

ZR522

2 FLUTES LONG SHANK RADIUS ENDMILL



- High hardened corner R from proper design considered the characteristics of workpiece.
- Excellent machining surface with increased chipping and wear resistance in high speed and feed machining.
- Suitable for deep groove machining with long shank type

ULTRA FINE | 2 | 30° HELIX | R ±0.02 | AlTiN | DATA

ALL SIZES

p.493

■ TOLERANCE

D		SHANK DIA.
ALL SIZES	0 ~ -0.02mm	h6

EDP No	D	R	L_1	L_2	D_2
ZR522 0302S4	3	0.2	8	60	4
ZR522 0302	3	0.2	8	60	6
ZR522 0305S4	3	0.5	8	60	4
ZR522 0305	3	0.5	8	60	6
ZR522 0402S4	4	0.2	11	70	4
ZR522 0402	4	0.2	11	70	6
ZR522 0405S4	4	0.5	11	70	4
ZR522 0405	4	0.5	11	70	6
ZR522 0410S4	4	1	11	70	4
ZR522 0410	4	1	11	70	6
ZR522 0502	5	0.2	13	80	6
ZR522 0505	5	0.5	13	80	6
ZR522 0510	5	1	13	80	6
ZR522 0602	6	0.2	13	90	6
ZR522 0605	6	0.5	13	90	6
ZR522 0610	6	1	13	90	6
ZR522 0805	8	0.5	19	100	8
ZR522 0810	8	1	19	100	8
ZR522 0815	8	1.5	19	100	8
ZR522 0820	8	2	19	100	8
ZR522 1005	10	0.5	22	100	10
ZR522 1010	10	1	22	100	10
ZR522 1015	10	1.5	22	100	10
ZR522 1020	10	2	22	100	10
ZR522 1025	10	2.5	22	100	10
ZR522 1205	12	0.5	26	110	12
ZR522 1210	12	1	26	110	12
ZR522 1215	12	1.5	26	110	12

EDP No	D	R	L_1	L_2	D_2
ZR522 1220	12	2	26	110	12
ZR522 1225	12	2.5	26	110	12
ZR522 1230	12	3	26	110	12

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

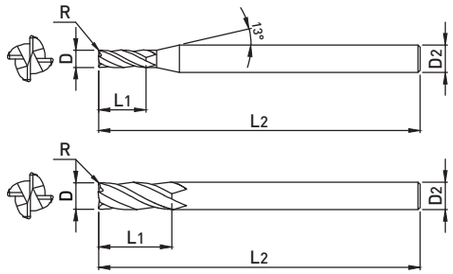
■ Applicable Working Material

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○	◎	○				○		○

○ : GOOD ◎ : EXCELLENT

ZR524

4 FLUTES LONG SHANK RADIUS ENDMILL



- High hardened corner R from proper design considered the characteristics of workpiece.
- Excellent machining surface with increased chipping and wear resistance in high speed and feed machining.
- Suitable for deep groove machining with long shank type

ULTRA FINE | 4 | 30° HELIX | R ±0.02 | AlTiN | DATA

ALL SIZES

p.494

■ TOLERANCE

D		SHANK DIA.
ALL SIZES	0 ~ -0.02mm	h6

EDP No	D	R	L_1	L_2	D_2
ZR524 0302S4	3	0.2	8	60	4
ZR524 0302	3	0.2	8	60	6
ZR524 0305S4	3	0.5	8	60	4
ZR524 0305	3	0.5	8	60	6
ZR524 0402S4	4	0.2	11	70	4
ZR524 0402	4	0.2	11	70	6
ZR524 0405S4	4	0.5	11	70	4
ZR524 0405	4	0.5	11	70	6
ZR524 0410S4	4	1	11	70	4
ZR524 0410	4	1	11	70	6
ZR524 0502	5	0.2	13	80	6
ZR524 0505	5	0.5	13	80	6
ZR524 0510	5	1	13	80	6
ZR524 0602	6	0.2	13	90	6
ZR524 0605	6	0.5	13	90	6
ZR524 0610	6	1	13	90	6
ZR524 0805	8	0.5	19	100	8
ZR524 0810	8	1	19	100	8
ZR524 0815	8	1.5	19	100	8
ZR524 0820	8	2	19	100	8
ZR524 1005	10	0.5	22	100	10
ZR524 1010	10	1	22	100	10
ZR524 1015	10	1.5	22	100	10
ZR524 1020	10	2	22	100	10
ZR524 1025	10	2.5	22	100	10
ZR524 1205	12	0.5	26	110	12
ZR524 1210	12	1	26	110	12
ZR524 1215	12	1.5	26	110	12

EDP No	D	R	L_1	L_2	D_2
ZR5241220	12	2	26	110	12
ZR5241225	12	2.5	26	110	12
ZR5241230	12	3	26	110	12

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

■ Applicable Working Material

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○	◎	○				○		○

○ : GOOD ◎ : EXCELLENT

EDP. NO	Appearance	Type	INCH & METRIC	Page
DB312		2 FLUTES BALL NOSE ENDMILL	METRIC	128
DB342		2 FLUTES TAPERED NECK TYPE BALL NOSE ENDMILL	METRIC	129
TX202		2 FLUTES SHORT SHANK SQUARE ENDMILL	METRIC	130
TX204		4 FLUTES SHORT SHANK SQUARE ENDMILL	METRIC	131
TX222		2 FLUTES LONG SQUARE ENDMILL	METRIC	132
TX224		4 FLUTES LONG SQUARE ENDMILL	METRIC	133
TX302		2 FLUTES SQUARE ENDMILL	METRIC	134
TX304		4 FLUTES SQUARE ENDMILL	METRIC	135
TX304H		4 FLUTES 45° HELIX SQUARE ENDMILL	METRIC	136
TXB202		2 FLUTES SHORT SHANK BALL NOSE ENDMILL	METRIC	137
TXB204		4 FLUTES SHORT SHANK BALL NOSE ENDMILL	METRIC	138
TXB222		2 FLUTES LONG BALL NOSE ENDMILL	METRIC	139
TXB232		2 FLUTES LONG SHANK BALL NOSE ENDMILL	METRIC	140
TXB302		2 FLUTES BALL NOSE ENDMILL	METRIC	141
TXB304		4 FLUTES BALL NOSE ENDMILL	METRIC	142
ZE302P new		2 FLUTES SQUARE ENDMILL	METRIC	143
ZE304P new		4 FLUTES SQUARE ENDMILL	METRIC	144
ZE322		2 FLUTES EXTRA LONG SQUARE ENDMILL	METRIC	145
ZE324		4 FLUTES EXTRA LONG SQUARE ENDMILL	METRIC	146
ZR304H		4 FLUTES 45° HELIX RADIUS ENDMILL	METRIC	147
ZR322		2 FLUTES LONG SHANK RADIUS ENDMILL	METRIC	148
ZR324		4 FLUTES LONG SHANK RADIUS ENDMILL	METRIC	149
ZR324H		4 FLUTES 45° HELIX RADIUS ENDMILL	METRIC	150

Zamus Thunder Series

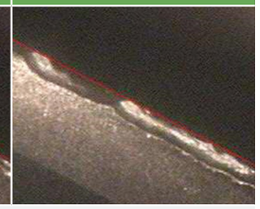
ZAMUS THUNDER

General Features

- Suitable for low hardness steel(Hrc 10 ~ 30) ; alloy steel, carbon steel, pre-harden, hardened steel etc.
- General purpose suitable for rough machining, finishing and curved and sloped surfaces

Characteristics

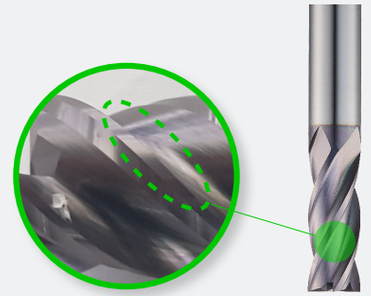
- Excellent Rake angle and Cutting edge considered the characteristics of workpiece.
- Improved chipping resistance and enhanced machinability by using high toughness materials
- TiAlN coating for enhanced oxidation resistance and chipping resistance

	WIDIN	Competitor
Square		

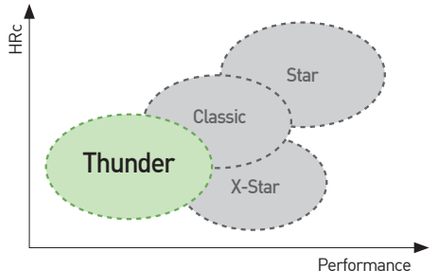
Workpiece : STC3 / RPM : 4,515 / FEED : 845 / ap : 10 / ae : 0.4
Test tool : ZE304100P

TX304H Series feature

Excellent workpiece finishes by 45° high helix angle



Applications



EDP No. System

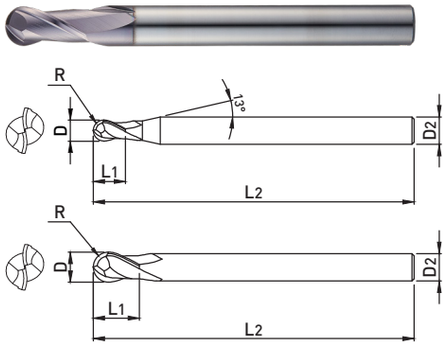
*If expressed as an integer, the decimal point is omitted.

TYPE	APPEARANCE	GRADE	LENGTH, SHANK TYPE	FLUTE	CUTTING DIA.	CORNER R	SHANK DIA.
D : Dynamic Z : Zamus Endmill T : Thunder	B : Ball E : Square R : Radius X : Square S : Square XB : Ball	3 : Grade 2 : Grade	0 : Straight 1 : Long Cutting Length 2 : Long Cutting Length 3 : Long Shank 4 : Tapered Neck	2 : 2 Flutes 4 : 4 Flutes 4H : 4 Flutes (Helix 45°)	1 ~ 20	0.2 ~ 3	4 ~ 20
Z	R	3	2	4H	08	10	
Zamus Endmill	Radius type	Grade	LONG CUTTING LENGTH	4 Flutes (Helix 45°)	Ø8	R1.0	

Ex) 4FLUTES CUTTING DIA. Ø8 CORNER R 1.0 30 GRADE CORNER RADIUS LONG CUTTING LEGNTH TYPE ZAMUS ENDMILL

DB312

2 FLUTES BALL NOSE ENDMILL



- Suitable for curvature and imitation machining of low hardness workpiece
- Stock of various dimensions from Ø1 to Ø20.

FINE GRAIN | 2 | 30° HELIX | R ±0.01 ALL SIZES | TiAlN | DATA p.480

■ TOLERANCE

D		SHANK DIA.
ALL SIZES	0 ~ -0.02mm	h6.5

EDP No	D	R	L_1	L_2	D_2
DB312 010 S4	1	0.5	2.5	50	4
DB312 010	1	0.5	2.5	50	6
DB312 012	1.2	0.6	3	50	6
DB312 015	1.5	0.75	4	50	6
DB312 020 S4	2	1	5	50	4
DB312 020	2	1	5	50	6
DB312 025	2.5	1.25	6	60	6
DB312 030 S3	3	1.5	8	60	3
DB312 030 S4	3	1.5	8	60	4
DB312 030	3	1.5	8	60	6
DB312 035	3.5	1.75	8	70	6
DB312 040 S4	4	2	8	70	4
DB312 040	4	2	8	70	6
DB312 045	4.5	2.25	8	70	6
DB312 050	5	2.5	10	80	6
DB312 055	5.5	2.75	10	80	6
DB312 060S	6	3	12	60	6
DB312 060	6	3	12	90	6
DB312 065	6.5	3.25	12	90	8
DB312 070	7	3.5	14	90	8
DB312 080S	8	4	14	60	8
DB312 080	8	4	14	100	8
DB312 090	9	4.5	18	100	10
DB312 100S	10	5	18	60	10
DB312 100	10	5	18	100	10
DB312 120	12	6	22	110	12
DB312 140	14	7	26	110	14
DB312 160	16	8	30	140	16
DB312 180	18	9	34	140	18
DB312 200	20	10	38	160	20

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

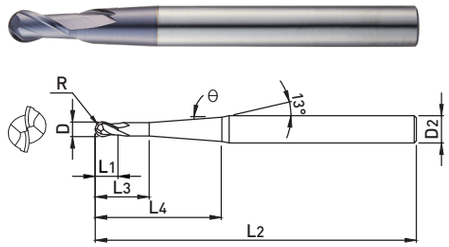
■ Applicable Working Material

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
◎	◎	○							

○ : GOOD ◎ : EXCELLENT

DB342

2 FLUTES TAPERED NECK TYPE BALL NOSE ENDMILL



- Reduced tool vibration and minimized chattering with taper type neck
- Suitable for deep slotting and side milling machining as long cutting length and overall length.

FINE GRAIN | 2 | 30° HELIX | R ±0.01 ALL SIZES | TiAlN | DATA p.480

■ TOLERANCE

D		SHANK DIA.
ALL SIZES	0 ~ -0.02mm	h6

EDP No	D	R	L_1	L_3	L_4	L_2	D_2	θ
DB342 01015	1	0.5	2	4	23	60	6	1°30´
DB342 01050	1	0.5	2	4	23	60	6	5°
DB342 01030	1	0.5	2	4	42	80	6	3°
DB342 02015	2	1	4	6	23	60	6	1°30´
DB342 02050	2	1	4	6	23	60	6	5°
DB342 02030	2	1	4	6	41	80	6	3°
DB342 03030	3	1.5	6	8	32	70	6	3°
DB342 03015	3	1.5	6	8	52	90	6	1°30´
DB342 04030	4	2	8	10	28	70	6	3°
DB342 04015	4	2	8	10	49	90	6	1°30´
DB342 05030	5	2.5	10	12	41	90	8	3°
DB342 05015	5	2.5	10	12	61	110	8	1°30´
DB342 06030	6	3	12	15	34	90	8	3°
DB342 06015	6	3	12	15	53	110	8	1°30´
DB342 08030	8	4	14	17	36	100	10	3°
DB342 08015	8	4	14	17	55	120	10	1°30´
DB342 10030	10	5	18	21	40	110	12	3°
DB342 10015	10	5	18	21	59	130	12	1°30´
DB342 12030	12	6	22	25	63	140	16	3°
DB342 12015	12	6	22	25	83	160	16	1°30´

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

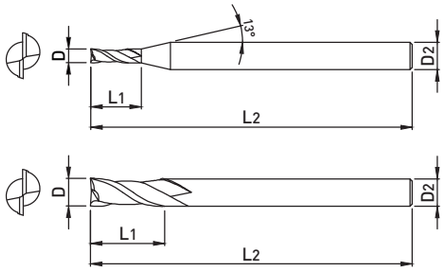
■ Applicable Working Material

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
◎	◎	○							

○ : GOOD ◎ : EXCELLENT

TX202

2 FLUTES SHORT SHANK SQUARE ENDMILL



- Suitable for general-purpose machining of low hardness workpiece
- Can be used in a variety of machining methods. Multi-purpose.

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

p.494

■ **TOLERANCE**

D		SHANK DIA.
D1 ~ 3	-0.014 ~ -0.028mm	h6
D4 ~ 6	-0.02 ~ -0.038mm	
D8 ~ 10	-0.025 ~ -0.047mm	
D12 ~ 16	-0.032 ~ -0.059mm	
D20 ~	-0.04 ~ -0.073mm	

EDP No	D	L_1	L_2	D_2
TX202 010	1	3	39	3
TX202 015	1.5	5	39	3
TX202 020	2	7	39	3
TX202 025	2.5	8	39	3
TX202 030	3	10	39	3
TX202 040	4	14	51	4
TX202 050	5	16	51	5
TX202 060	6	19	64	6
TX202 080	8	21	64	8
TX202 100	10	25	70	10
TX202 120	12	25	76	12
TX202 160	16	32	89	16
TX202 200	20	38	102	20

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

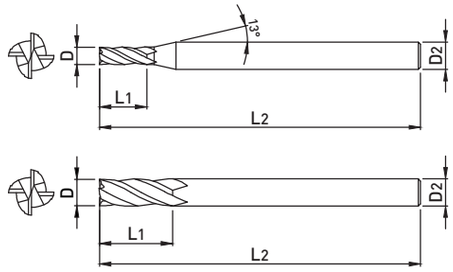
■ **Applicable Working Material**

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
◎	◎	○							

○ : GOOD ◎ : EXCELLENT

TX204

4 FLUTES SHORT SHANK SQUARE ENDMILL



- Suitable for general-purpose machining of low hardness workpiece

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

p.495

■ **TOLERANCE**

D		SHANK DIA.
D1 ~ 3	-0.014 ~ -0.028mm	h6
D4 ~ 6	-0.02 ~ -0.038mm	
D8 ~ 10	-0.025 ~ -0.047mm	
D12 ~ 16	-0.032 ~ -0.059mm	
D20 ~	-0.04 ~ -0.073mm	

EDP No	D	L_1	L_2	D_2
TX204 010	1	3	39	3
TX204 015	1.5	5	39	3
TX204 020	2	7	39	3
TX204 025	2.5	8	39	3
TX204 030	3	10	39	3
TX204 040	4	14	51	4
TX204 050	5	16	51	5
TX204 060	6	19	64	6
TX204 080	8	21	64	8
TX204 100	10	25	70	10
TX204 120	12	25	76	12
TX204 160	16	32	89	16
TX204 200	20	38	102	20

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

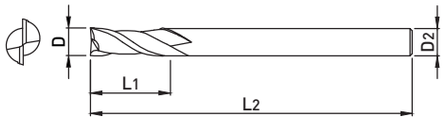
■ **Applicable Working Material**

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
◎	◎	○							

○ : GOOD ◎ : EXCELLENT

TX222

2 FLUTES LONG SQUARE ENDMILL



- Suitable for general-purpose machining of low hardness workpiece

■ **TOLERANCE**

D		SHANK DIA.
D1 ~ 3	-0.014 ~ -0.028mm	h6
D4 ~ 6	-0.02 ~ -0.038mm	
D8 ~ 10	-0.025 ~ -0.047mm	
D12 ~ 16	-0.032 ~ -0.059mm	
D20 ~	-0.04 ~ -0.073mm	

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

p.494

EDP No	D	L_1	L_2	D_2
TX222 030	3	20	60	3
TX222 040	4	20	60	4
TX222 050	5	25	75	5
TX222 060	6	30	75	6
TX222 080	8	30	75	8
TX222 100	10	40	100	10
TX222 120	12	45	100	12
TX222 140	14	45	100	14
TX222 160	16	45	100	16
TX222 180	18	45	100	18
TX222 200	20	45	100	20

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

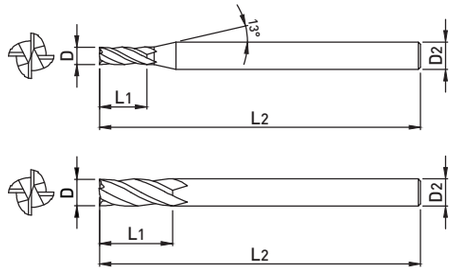
■ **Applicable Working Material**

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
◎	◎	○							

○ : GOOD ◎ : EXCELLENT

TX224

4 FLUTES LONG SQUARE ENDMILL



- Suitable for general-purpose machining of low hardness workpiece

■ **TOLERANCE**

D		SHANK DIA.
D1 ~ 3	-0.014 ~ -0.028mm	h6
D4 ~ 6	-0.02 ~ -0.038mm	
D8 ~ 10	-0.025 ~ -0.047mm	
D12 ~ 16	-0.032 ~ -0.059mm	
D20 ~	-0.04 ~ -0.073mm	

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

p.495

EDP No	D	L_1	L_2	D_2
TX224 030	3	20	60	3
TX224 040	4	20	60	4
TX224 050	5	25	75	5
TX224 060	6	30	75	6
TX224 080	8	30	75	8
TX224 081	8	30	100	8
TX224 100	10	40	100	10
TX224 120	12	45	100	12
TX224 140	14	45	100	14
TX224 160	16	45	100	16
TX224 180	18	45	100	18
TX224 200	20	45	100	20

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

■ **Applicable Working Material**

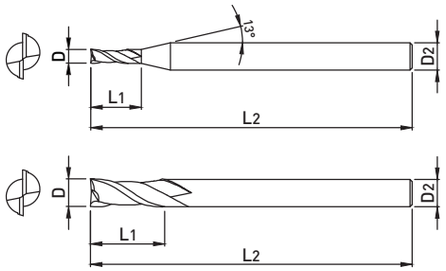
Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
◎	◎	○							

○ : GOOD ◎ : EXCELLENT

TX302

2 FLUTES SQUARE ENDMILL

- Suitable for general-purpose machining of low hardness workpiece



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

p.494

■ **TOLERANCE**

D		SHANK DIA.
D1 ~ 3	-0.014 ~ -0.028mm	h6
D4 ~ 6	-0.02 ~ -0.038mm	
D8 ~ 10	-0.025 ~ -0.047mm	
D12 ~ 16	-0.032 ~ -0.059mm	
D20 ~	-0.04 ~ -0.073mm	

EDP No	D	L_1	L_2	D_2
TX302 010	1	3	50	4
TX302 015	1.5	4	50	4
TX302 020	2	6	50	4
TX302 025	2.5	8	50	4
TX302 030	3	9	50	4
TX302 040	4	11	50	4
TX302 050	5	13	50	6
TX302 060	6	16	50	6
TX302 070	7	16	60	8
TX302 080	8	19	60	8
TX302 090	9	19	60	10
TX302 100	10	25	75	10
TX302 120	12	30	75	12
TX302 140	14	32	75	14
TX302 160	16	32	100	16
TX302 180	18	32	100	18
TX302 200	20	38	100	20

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

■ **Applicable Working Material**

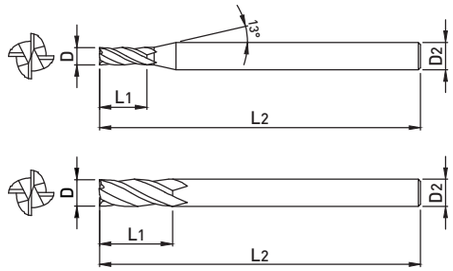
Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
◎	◎	○							

○ : GOOD ◎ : EXCELLENT

TX304

4 FLUTES SQUARE ENDMILL

- Suitable for general-purpose machining of low hardness workpiece



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

p.495

■ **TOLERANCE**

D		SHANK DIA.
D1 ~ 3	-0.014 ~ -0.028mm	h6
D4 ~ 6	-0.02 ~ -0.038mm	
D8 ~ 10	-0.025 ~ -0.047mm	
D12 ~ 16	-0.032 ~ -0.059mm	
D20 ~	-0.04 ~ -0.073mm	

EDP No	D	L_1	L_2	D_2
TX304 010	1	3	50	4
TX304 015	1.5	4	50	4
TX304 020	2	6	50	4
TX304 025	2.5	8	50	4
TX304 030	3	9	50	4
TX304 040	4	11	50	4
TX304 050	5	13	50	6
TX304 060	6	16	50	6
TX304 070	7	16	60	8
TX304 080	8	19	60	8
TX304 090	9	19	60	10
TX304 100	10	25	75	10
TX304 120	12	30	75	12
TX304 140	14	32	75	14
TX304 160	16	32	100	16
TX304 180	18	32	100	18
TX304 200	20	38	100	20

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

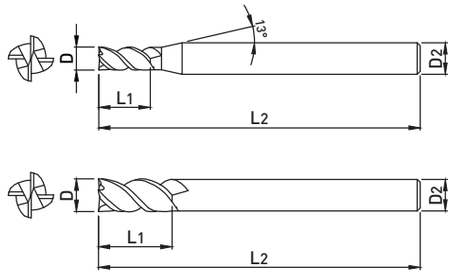
■ **Applicable Working Material**

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
◎	◎	○							

○ : GOOD ◎ : EXCELLENT

TX304H

4 FLUTES 45° HELIX SQUARE ENDMILL



- Suitable for general-purpose machining of low hardness workpiece
- Excellent processability and Surface roughness with 45° Helix angle

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

p.496

■ **TOLERANCE**

D		SHANK DIA.
D1 ~ 3	-0.014 ~ -0.028mm	h6
D4 ~ 6	-0.02 ~ -0.038mm	
D8 ~ 10	-0.025 ~ -0.047mm	
D12 ~ 16	-0.032 ~ -0.059mm	
D20 ~	-0.04 ~ -0.073mm	

EDP No	D	L_1	L_2	D_2
TX304H 030	3	8	50	6
TX304H 030 S3	3	8	50	3
TX304H 030 S4	3	8	50	4
TX304H 040	4	11	50	6
TX304H 040 S4	4	11	50	4
TX304H 050	5	13	50	6
TX304H 060	6	13	50	6
TX304H 080	8	19	60	8
TX304H 100	10	22	70	10
TX304H 120	12	26	75	12
TX304H 130	13	26	80	12
TX304H 140	14	26	80	14
TX304H 160	16	32	90	16
TX304H 180	18	32	100	18
TX304H 200	20	38	100	20

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

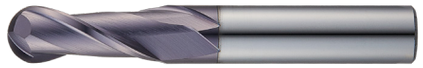
■ **Applicable Working Material**

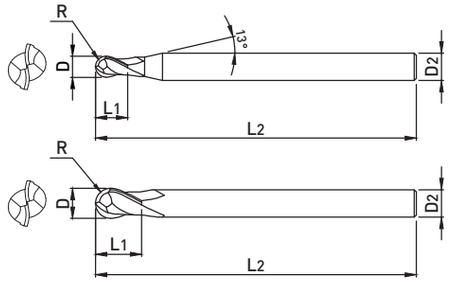
Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
◎	◎	○							

○ : GOOD ◎ : EXCELLENT

TXB202

2 FLUTES SHORT SHANK BALL NOSE ENDMILL





- Suitable for curvature and copy machining of low hardness workpiece

FINE GRAIN | 2 | 30° HELIX | R ±0.02 ALL SIZES | TiAlN | DATA

p.497

■ **TOLERANCE**

D		SHANK DIA.
ALL SIZES	0 ~ -0.04mm	h6

EDP No	D	R	L_1	L_2	D_2
TXB202 010	1	0.5	3	39	3
TXB202 015	1.5	0.75	5	39	3
TXB202 020	2	1	7	39	3
TXB202 025	2.5	1.25	8	39	3
TXB202 030	3	1.5	10	39	3
TXB202 040	4	2	14	51	4
TXB202 050	5	2.5	16	51	5
TXB202 060	6	3	19	64	6
TXB202 080	8	4	21	64	8
TXB202 100	10	5	25	70	10
TXB202 120	12	6	25	76	12
TXB202 160	16	8	32	89	16
TXB202 200	20	10	38	100	20

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

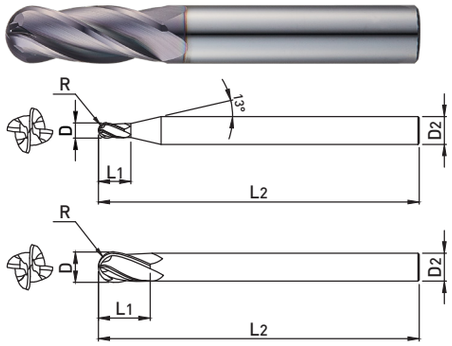
■ **Applicable Working Material**

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
◎	◎	○							

○ : GOOD ◎ : EXCELLENT

TXB204

4 FLUTES SHORT SHANK BALL NOSE ENDMILL



- Suitable for curvature and copy machining of low hardness workpiece

FINE GRAIN | 4 | 30° HELIX | R ±0.01 ALL SIZES | TiAlN | DATA p.498

■ TOLERANCE

D		SHANK DIA.
ALL SIZES	0 ~ -0.04mm	h6

EDP No	D	R	L_1	L_2	D_2
TXB204 020	2	1	7	39	3
TXB204 030	3	1.5	10	39	3
TXB204 040	4	2	14	51	4
TXB204 050	5	2.5	16	51	5
TXB204 060	6	3	19	64	6
TXB204 080	8	4	21	64	8
TXB204 100	10	5	25	70	10
TXB204 120	12	6	25	76	12
TXB204 160	16	8	32	89	16
TXB204 200	20	10	38	100	20

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

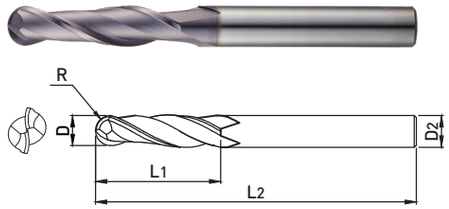
■ Applicable Working Material

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
◎	◎	○							

○ : GOOD ◎ : EXCELLENT

TXB222

2 FLUTES LONG BALL NOSE ENDMILL



- Suitable for curvature and copy machining of low hardness workpiece

FINE GRAIN | 2 | 30° HELIX | R ±0.02 ALL SIZES | TiAlN | DATA p.497

■ TOLERANCE

D		SHANK DIA.
ALL SIZES	0 ~ -0.04mm	h6

EDP No	D	R	L_1	L_2	D_2
TXB222 030	3	1.5	20	60	3
TXB222 040	4	2	20	60	4
TXB222 050	5	2.5	25	75	5
TXB222 060	6	3	30	75	6
TXB222 080	8	4	30	100	8
TXB222 100	10	5	40	100	10
TXB222 120	12	6	45	100	12
TXB222 140	14	7	45	100	14
TXB222 160	16	8	45	100	16
TXB222 180	18	9	45	100	18
TXB222 200	20	10	45	100	20

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

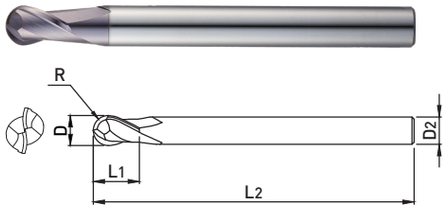
■ Applicable Working Material

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
◎	◎	○							

○ : GOOD ◎ : EXCELLENT

TXB232

2 FLUTES LONG SHANK BALL NOSE ENDMILL



- Suitable for curvature and copy machining of low hardness workpiece

FINE GRAIN | 2 | 30° HELIX | R ±0.02 ALL SIZES | TiAlN | DATA p.497

■ **TOLERANCE**

D		SHANK DIA.
ALL SIZES	0 ~ -0.04mm	h6

EDP No	D	R	L_1	L_2	D_2
TXB232 030	3	1.5	5	75	3
TXB232 040	4	2	8	75	4
TXB232 050	5	2.5	9	75	5
TXB232 060	6	3	10	100	6
TXB232 060-75	6	3	10	75	6
TXB232 080	8	4	12	100	8
TXB232 080-75	8	4	12	75	8
TXB232 100	10	5	14	100	10
TXB232 100L	10	5	14	150	10
TXB232 120	12	6	16	100	12
TXB232 120L	12	6	16	150	12
TXB232 140	14	7	18	100	14
TXB232 160	16	8	22	150	16
TXB232 200	20	10	26	150	20

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

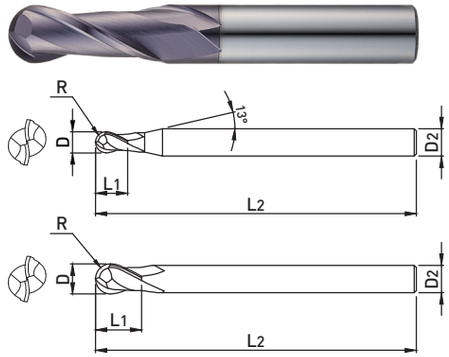
■ **Applicable Working Material**

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
◎	◎	○							

○ : GOOD ◎ : EXCELLENT

TXB302

2 FLUTES BALL NOSE ENDMILL



- Suitable for curvature and copy machining of low hardness workpiece

FINE GRAIN | 2 | 30° HELIX | R ±0.02 ALL SIZES | TiAlN | DATA p.497

■ **TOLERANCE**

D		SHANK DIA.
ALL SIZES	0 ~ -0.04mm	h6

EDP No	D	R	L_1	L_2	D_2
TXB302 010	1	0.5	2	50	4
TXB302 015	1.5	0.75	3	50	4
TXB302 020	2	1	4	50	4
TXB302 025	2.5	1.25	6	50	4
TXB302 030	3	1.5	6	50	4
TXB302 040	4	2	8	50	4
TXB302 050	5	2.5	10	50	6
TXB302 060	6	3	12	50	6
TXB302 080	8	4	14	60	8
TXB302 100	10	5	18	75	10
TXB302 120	12	6	22	75	12
TXB302 140	14	7	32	75	14
TXB302 160	16	8	32	100	16
TXB302 180	18	9	32	100	18
TXB302 200	20	10	38	100	20

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

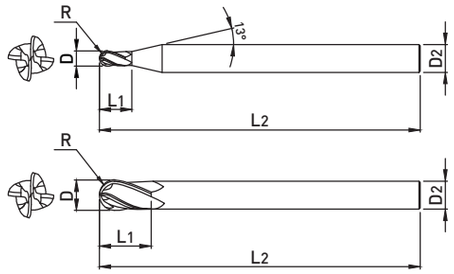
■ **Applicable Working Material**

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
◎	◎	○							

○ : GOOD ◎ : EXCELLENT

TXB304

4 FLUTES BALL NOSE ENDMILL



- Suitable for curvature and copy machining of low hardness workpiece

FINE GRAIN | 4 | 30° HELIX | R ±0.02 ALL SIZES | TiAlN | DATA p.498

■ TOLERANCE

D		SHANK DIA.
ALL SIZES	0 ~ -0.04mm	h6

EDP No	D	R	L_1	L_2	D_2
TXB304 010	1	0.5	2	50	4
TXB304 015	1.5	0.75	3	50	4
TXB304 020	2	1	4	50	4
TXB304 030	3	1.5	6	50	4
TXB304 040	4	2	8	50	4
TXB304 050	5	2.5	10	50	6
TXB304 060	6	3	12	50	6
TXB304 080	8	4	14	60	8
TXB304 100	10	5	18	75	10
TXB304 120	12	6	22	75	12
TXB304 140	14	7	32	75	14
TXB304 160	16	8	32	100	16
TXB304 180	18	9	32	100	18
TXB304 200	20	10	38	100	20

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

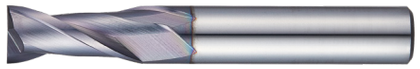
■ Applicable Working Material

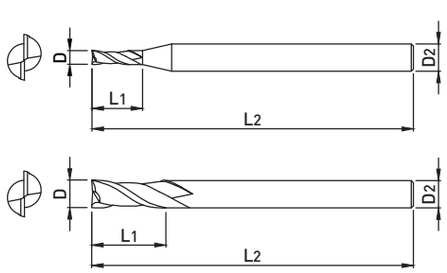
Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
◎	◎	○							

○ : GOOD ◎ : EXCELLENT

ZE302P

New 2 FLUTES SQUARE ENDMILL





- Suitable for general-purpose machining of low hardness workpiece
- Increased process ranges through 20% longer effective flute length
- Improved tool performance reliability by new coating with enhanced oxidation resistance and heat resistance

FINE GRAIN | 2 | 30° HELIX | TiAlN | DATA p.487

■ TOLERANCE

D		SHANK DIA.
ALL SIZES	0 ~ -0.02mm	h6

EDP No	D	L_1	L_2	D_2
ZE302 010P	1	2.5	50	6
ZE302 015P	1.5	4	50	6
ZE302 020P	2	6	50	6
ZE302 025P	2.5	8	50	6
ZE302 030P	3	10	50	6
ZE302 035P	3.5	10	50	6
ZE302 040P	4	12	50	6
ZE302 045P	4.5	14	50	6
ZE302 050P	5	15	60	6
ZE302 055P	5.5	15	60	6
ZE302 060P	6	15	60	6
ZE302 065P	6.5	18	60	8
ZE302 070P	7	20	65	8
ZE302 075P	7.5	20	65	8
ZE302 080P	8	20	65	8
ZE302 085P	8.5	22	70	10
ZE302 090P	9	22	70	10
ZE302 095P	9.5	24	70	10
ZE302 100P	10	25	70	10
ZE302 105P	10.5	26	80	12
ZE302 110P	11	30	80	12
ZE302 115P	11.5	30	80	12
ZE302 120P	12	30	80	12
ZE302 130P	13	35	90	12
ZE302 140P	14	35	100	14
ZE302 150P	15	40	100	16
ZE302 160P	16	40	100	16
ZE302 180P	18	45	100	18
ZE302 200P	20	45	100	20

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

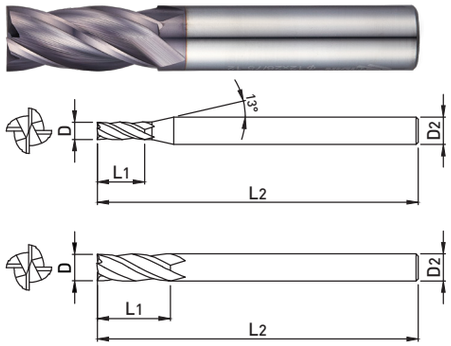
■ Applicable Working Material

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
◎	◎	○							

○ : GOOD ◎ : EXCELLENT

ZE304P

4 FLUTES SQUARE ENDMILL New



- Suitable for general-purpose machining of low hardness workpiece
- Increased process ranges through 20% longer effective flute length
- Improved tool performance reliability by new coating with enhanced oxidation resistance and heat resistance

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

p.489

■ TOLERANCE

D		SHANK DIA.
ALL SIZES	0 ~ -0.02mm	h6

EDP No	D	L_1	L_2	D_2
ZE304 010P	1	2.5	50	6
ZE304 015P	1.5	4	50	6
ZE304 020P	2	6	50	6
ZE304 025P	2.5	8	50	6
ZE304 030P	3	10	50	6
ZE304 035P	3.5	10	50	6
ZE304 040P	4	12	50	6
ZE304 045P	4.5	14	50	6
ZE304 050P	5	15	60	6
ZE304 055P	5.5	15	60	6
ZE304 060P	6	15	60	6
ZE304 065P	6.5	18	60	8
ZE304 070P	7	20	65	8
ZE304 075P	7.5	20	65	8
ZE304 080P	8	20	65	8
ZE304 085P	8.5	22	70	10
ZE304 090P	9	22	70	10
ZE304 095P	9.5	24	70	10
ZE304 100P	10	25	70	10
ZE304 105P	10.5	26	80	12
ZE304 110P	11	30	80	12
ZE304 115P	11.5	30	80	12
ZE304 120P	12	30	80	12
ZE304 130P	13	35	90	12
ZE304 140P	14	35	100	14
ZE304 150P	15	40	100	16
ZE304 160P	16	40	100	16
ZE304 180P	18	45	100	18
ZE304 200P	20	45	100	20

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

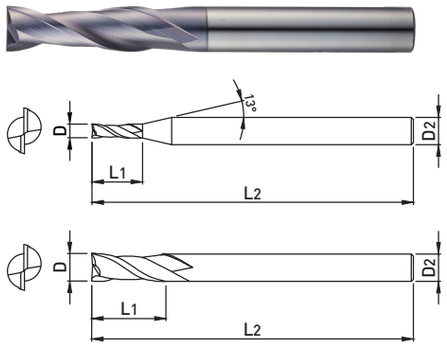
■ Applicable Working Material

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
◎	◎	○							

○ : GOOD ◎ : EXCELLENT

ZE322

2 FLUTES EXTRA LONG SQUARE ENDMILL



- Suitable for general-purpose machining of low hardness workpiece
- Suitable for deep machining with Extra Long Type

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

p.487

■ TOLERANCE

D		SHANK DIA.
ALL SIZES	0 ~ -0.03mm	h6

EDP No	D	L_1	L_2	D_2
ZE322 030	3	15	60	6
ZE322 031	3	20	70	6
ZE322 030S	3	20	100	3
ZE322 040	4	15	60	6
ZE322 041	4	20	70	6
ZE322 040S	4	20	100	4
ZE322 050	5	20	60	6
ZE322 051	5	20	80	6
ZE322 052	5	25	100	6
ZE322 060	6	20	80	6
ZE322 061	6	30	100	6
ZE322 062	6	40	150	6
ZE322 080	8	30	90	8
ZE322 081	8	35	100	8
ZE322 082	8	40	150	8
ZE322 100	10	30	90	10
ZE322 101	10	35	100	10
ZE322 102	10	45	150	10
ZE322 103	10	55	180	10
ZE322 120	12	30	90	12
ZE322 121	12	40	110	12
ZE322 122	12	50	150	12
ZE322 123	12	60	200	12
ZE322 140	14	40	120	14
ZE322 141	14	60	150	14
ZE322 160	16	50	140	16
ZE322 161	16	70	160	16

EDP No	D	L_1	L_2	D_2
ZE322 162	16	80	200	16
ZE322 180	18	50	140	18
ZE322 200	20	60	150	20
ZE322 201	20	100	200	20
ZE322 202	20	130	250	20

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

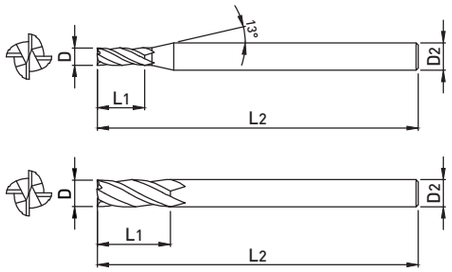
■ Applicable Working Material

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
◎	◎	○							

○ : GOOD ◎ : EXCELLENT

ZE324

4 FLUTES EXTRA LONG SQUARE ENDMILL



- Suitable for general-purpose machining of low hardness workpiece
- Suitable for deep machining with Extra Long Type

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

p.489

■ **TOLERANCE**

D		SHANK DIA.
ALL SIZES	0 ~ -0.03mm	h6

EDP No	D	L_1	L_2	D_2
ZE324 030	3	15	60	6
ZE324 031	3	20	70	6
ZE324 030S	3	20	100	3
ZE324 040	4	15	60	6
ZE324 041	4	20	70	6
ZE324 040S	4	20	100	4
ZE324 050	5	20	60	6
ZE324 051	5	20	80	6
ZE324 052	5	25	100	6
ZE324 060	6	20	80	6
ZE324 061	6	30	100	6
ZE324 062	6	40	150	6
ZE324 080	8	30	90	8
ZE324 081	8	35	100	8
ZE324 082	8	40	150	8
ZE324 100	10	30	90	10
ZE324 101	10	35	100	10
ZE324 102	10	45	150	10
ZE324 103	10	55	180	10
ZE324 120	12	30	90	12
ZE324 121	12	40	110	12
ZE324 122	12	50	150	12
ZE324 123	12	60	200	12
ZE324 140	14	40	120	14
ZE324 141	14	60	150	14
ZE324 160	16	50	140	16
ZE324 161	16	70	160	16
ZE324 162	16	80	200	16
ZE324 180	18	50	140	18
ZE324 200	20	60	150	20

EDP No	D	L_1	L_2	D_2
ZE324201	20	100	200	20
ZE324202	20	130	250	20

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

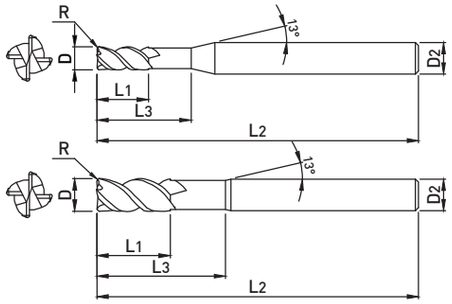
■ **Applicable Working Material**

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
◎	◎	○							

○ : GOOD ◎ : EXCELLENT

ZR304H

4 FLUTES 45° HELIX RADIUS ENDMILL



- Suitable for general-purpose machining of low hardness workpiece
- Excellent processability and Surface roughness with 45° Helix angle

FINE GRAIN | 4 | 45° HELIX | R ±0.02 | TiAlN | DATA

ALL SIZES

p.498

■ **TOLERANCE**

D		SHANK DIA.
ALL SIZES	0 ~ -0.03mm	h6

EDP No	D	R	L_1	L_3	L_2	D_2
ZR304H 0303	3	0.3	4	12	55	6
ZR304H 0302S3	3	0.2	4	12	55	3
ZR304H 0303S4	3	0.3	4	12	55	4
ZR304H 0305	3	0.5	4	12	55	6
ZR304H 0305S3	3	0.5	4	12	55	3
ZR304H 0305S4	3	0.5	4	12	55	4
ZR304H 0402S4	4	0.2	5	16	55	4
ZR304H 0403	4	0.3	5	16	55	6
ZR304H 0403S4	4	0.3	5	16	55	4
ZR304H 0405	4	0.5	5	16	55	6
ZR304H 0405S4	4	0.5	5	16	55	4
ZR304H 0605	6	0.5	7	20	60	6
ZR304H 0610	6	1	7	20	60	6
ZR304H 0805	8	0.5	10	25	65	8
ZR304H 0810	8	1	10	25	65	8
ZR304H 1005	10	0.5	12	30	70	10
ZR304H 1010	10	1	12	30	70	10
ZR304H 1015	10	1.5	12	30	70	10
ZR304H 1020	10	2	12	30	70	10
ZR304H 1205	12	0.5	15	30	80	12
ZR304H 1210	12	1	15	30	80	12
ZR304H 1215	12	1.5	15	30	80	12
ZR304H 1220	12	2	15	30	80	12

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

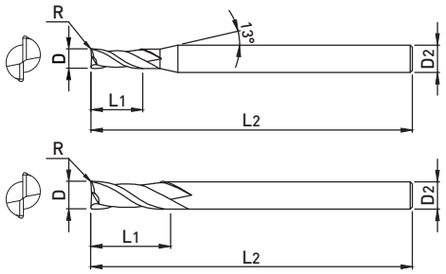
■ **Applicable Working Material**

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
◎	◎	○							

○ : GOOD ◎ : EXCELLENT

ZR322

2 FLUTES LONG SHANK RADIUS ENDMILL



- Suitable for general-purpose machining of low hardness workpiece
- Extend customer choice with various corner R size

FINE GRAIN | 2 | 30° HELIX | R ±0.02 | TiAlN | DATA

ALL SIZES

p.493

■ TOLERANCE

D		SHANK DIA.
ALL SIZES	0 ~ -0.03mm	h6

EDP No	D	R	L_1	L_2	D_2
ZR322 0302S4	3	0.2	8	60	4
ZR322 0302	3	0.2	8	60	6
ZR322 0303	3	0.3	8	60	6
ZR322 0305S4	3	0.5	8	60	4
ZR322 0305	3	0.5	8	60	6
ZR322 0402S4	4	0.2	11	70	4
ZR322 0402	4	0.2	11	70	6
ZR322 0403	4	0.3	11	70	6
ZR322 0405S4	4	0.5	11	70	4
ZR322 0405	4	0.5	11	70	6
ZR322 0410S4	4	1	11	70	4
ZR322 0410	4	1	11	70	6
ZR322 0502	5	0.2	13	80	6
ZR322 0503	5	0.3	13	80	6
ZR322 0505	5	0.5	13	80	6
ZR322 0510	5	1	13	80	6
ZR322 0602	6	0.2	13	90	6
ZR322 0603	6	0.3	13	90	6
ZR322 0605	6	0.5	13	90	6
ZR322 0610	6	1	13	90	6
ZR322 0803	8	0.3	19	100	8
ZR322 0805	8	0.5	19	100	8
ZR322 0810	8	1	19	100	8
ZR322 0815	8	1.5	19	100	8
ZR322 0820	8	2	19	100	8
ZR322 1003	10	0.3	22	100	10
ZR322 1005	10	0.5	22	100	10
ZR322 1010	10	1	22	100	10
ZR322 1015	10	1.5	22	100	10
ZR322 1020	10	2	22	100	10

EDP No	D	R	L_1	L_2	D_2
ZR322 1025	10	2.5	22	100	10
ZR322 1205	12	0.5	26	110	12
ZR322 1210	12	1	26	110	12
ZR322 1215	12	1.5	26	110	12
ZR322 1220	12	2	26	110	12
ZR322 1225	12	2.5	26	110	12
ZR322 1230	12	3	26	110	12

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

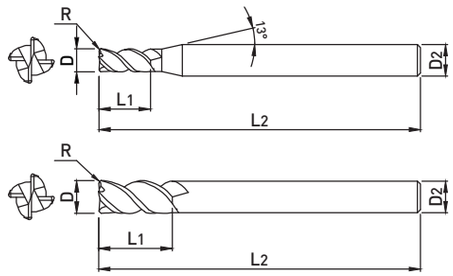
■ **Applicable Working Material**

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
◎	◎	○							

○ : GOOD ◎ : EXCELLENT

ZR324

4 FLUTES LONG SHANK RADIUS ENDMILL



- Suitable for general-purpose machining of low hardness workpiece
- Extend customer choice with various corner R size

FINE GRAIN | 4 | 30° HELIX | R ±0.02 | TiAlN | DATA

ALL SIZES

p.494

■ TOLERANCE

D		SHANK DIA.
ALL SIZES	0 ~ -0.03mm	h6

EDP No	D	R	L_1	L_2	D_2
ZR324 0302S4	3	0.2	8	60	4
ZR324 0302	3	0.2	8	60	6
ZR324 0303	3	0.3	8	60	6
ZR324 0305S4	3	0.5	8	60	4
ZR324 0305	3	0.5	8	60	6
ZR324 0402S4	4	0.2	11	70	4
ZR324 0402	4	0.2	11	70	6
ZR324 0403	4	0.3	11	70	6
ZR324 0405S4	4	0.5	11	70	4
ZR324 0405	4	0.5	11	70	6
ZR324 0410S4	4	1	11	70	4
ZR324 0410	4	1	11	70	6
ZR324 0502	5	0.2	13	80	6
ZR324 0503	5	0.3	13	80	6
ZR324 0505	5	0.5	13	80	6
ZR324 0510	5	1	13	80	6
ZR324 0602	6	0.2	13	90	6
ZR324 0603	6	0.3	13	90	6
ZR324 0605	6	0.5	13	90	6
ZR324 0610	6	1	13	90	6
ZR324 0803	8	0.3	19	100	8
ZR324 0805	8	0.5	19	100	8
ZR324 0810	8	1	19	100	8
ZR324 0815	8	1.5	19	100	8
ZR324 0820	8	2	19	100	8
ZR324 1003	10	0.3	22	100	10
ZR324 1005	10	0.5	22	100	10
ZR324 1010	10	1	22	100	10
ZR324 1015	10	1.5	22	100	10
ZR324 1020	10	2	22	100	10

EDP No	D	R	L_1	L_2	D_2
ZR324 1025	10	2.5	22	100	10
ZR324 1205	12	0.5	26	110	12
ZR324 1210	12	1	26	110	12
ZR324 1215	12	1.5	26	110	12
ZR324 1220	12	2	26	110	12
ZR324 1225	12	2.5	26	110	12
ZR324 1230	12	3	26	110	12

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

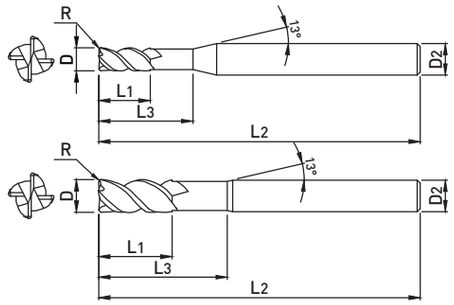
■ **Applicable Working Material**

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
◎	◎	○							

○ : GOOD ◎ : EXCELLENT

ZR324H

4 FLUTES 45° HELIX RADIUS ENDMILL



- Suitable for general-purpose machining of low hardness workpiece
- Excellent processability and Surface roughness with 45° Helix angle
- Minimize interference in machining by applying the neck shape

FINE GRAIN | 4 | 45° HELIX | R ±0.02 (ALL SIZES) | TiAlN | DATA (p.498)

▪ **TOLERANCE**

D		SHANK DIA.
ALL SIZES	0 ~ -0.03mm	h6

EDP No	D	R	L_1	L_3	L_2	D_2
ZR324H 0605	6	0.5	9	20	90	6
ZR324H 0610	6	1	9	20	90	6
ZR324H 0805	8	0.5	12	25	100	8
ZR324H 0810	8	1	12	25	100	8
ZR324H 1005	10	0.5	15	32	100	10
ZR324H 1010	10	1	15	32	100	10
ZR324H 1015	10	1.5	15	32	100	10
ZR324H 1020	10	2	15	32	100	10
ZR324H 1205	12	0.5	18	38	110	12
ZR324H 1210	12	1	18	38	110	12
ZR324H 1215	12	1.5	18	38	110	12
ZR324H 1220	12	2	18	38	110	12

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

■ **Applicable Working Material**

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
◎	◎	○							

○ : GOOD ◎ : EXCELLENT

MEMO

EDP. NO	Appearance	Type	INCH & METRIC	Page
WHPB902		2 FLUTES ULTRA HIGH PRECISION BALL NOSE ENDMILL	METRIC	154
WB502		2 FLUTES BALL NOSE ENDMILL	METRIC	155
WB502P		2 FLUTES HIGH PRECISION BALL NOSE ENDMILL	METRIC	157
WSB502		2 FLUTES STRAIGHT HELIX BALL NOSE ENDMILL	METRIC	158
WB503		3 FLUTES BALL NOSE ENDMILL	METRIC	159
WB504		4 FLUTES BALL NOSE ENDMILL	METRIC	160
WB532		2 FLUTES MMC SPHERE TYPE BALL NOSE ENDMILL	METRIC	161
WB542		2 FLUTES TAPERED NECK TYPE BALL NOSE ENDMILL	METRIC	162
WME502		2 FLUTES MINIATURE TYPE SQUARE ENDMILL	METRIC	166
WE502		2 FLUTES SQUARE ENDMILL	METRIC	167
WE502 S3		2 FLUTES SQUARE ENDMILL	METRIC	169
WE514		4 FLUTES NECK TYPE SQUARE ENDMILL	METRIC	170
WE522		2 FLUTES LONG SHANK SQUARE ENDMILL	METRIC	172
WE524		4 FLUTES LONG SHANK SQUARE ENDMILL	METRIC	174
WME504		4 FLUTES MINIATURE TYPE SQUARE ENDMILL	METRIC	176
WXE504		4 FLUTES VARIABLE HELIX SQUARE ENDMILL	METRIC	177
WE504H		4 FLUTES 45° HELIX SQUARE ENDMILL	METRIC	178
WE506		6 FLUTES 45° HELIX SQUARE ENDMILL	METRIC	179
WR502		2 FLUTES RADIUS ENDMILL	METRIC	180
WR504		4 FLUTES RADIUS ENDMILL	METRIC	182
WR506		6 FLUTES 45° HELIX RADIUS ENDMILL	METRIC	183
WR512		2 FLUTES NECK TYPE RADIUS ENDMILL	METRIC	184
WR514		4 FLUTES NECK TYPE RADIUS ENDMILL	METRIC	189
WXR504		4 FLUTES VARIABLE HELIX RADIUS ENDMILL	METRIC	190
WXR514		4 FLUTES VARIABLE HELIX NECK TYPE RADIUS ENDMILL	METRIC	192
WR542		2 FLUTES TAPERED NECK TYPE RADIUS ENDMILL	METRIC	196
WR544		4 FLUTES TAPERED NECK TYPE RADIUS ENDMILL	METRIC	200
WSPM4		4 FLUTES 10° HELIX RADIUS ENDMILL	METRIC	203
WDR503		3 FLUTES DOUBLE CORNER RADIUS ENDMILL	METRIC	204
WF60		3~5 FLUTES VARIABLE HELIX ROUGHING ENDMILL	METRIC	205
WF61		3~5 FLUTES ROUGHING ENDMILL	METRIC	206
WTB502		2 FLUTES TAPERED BALL NOSE ENDMILL	METRIC	207
WTE502		2 FLUTES TAPERED SQUARE ENDMILL	METRIC	208
WTE504		4 FLUTES TAPERED SQUARE ENDMILL	METRIC	210
WTE514		4 FLUTES TAPERED SQUARE ENDMILL	METRIC	211
WTR504		4 FLUTES TAPERED RADIUS ENDMILL	METRIC	213

WINNER

General Features

· Suitable for mid-high hardness steel (Hrc 30 ~ 55) ; alloy steel, carbon steel, mold steel etc.

· Various shape and specification; Miniature type, taper neck type, sphere ball nose type etc.

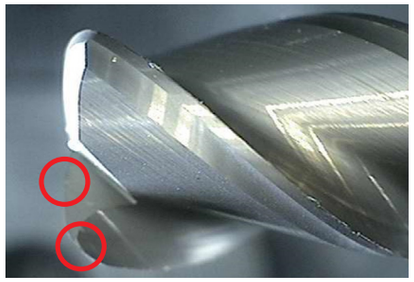
Characteristics

· Wide machining range for mold machining; rough, semi-finishing and finishing. Curved, sloped surface and special shape.

· Improved chipping resistance and high hardness by using high toughness materials

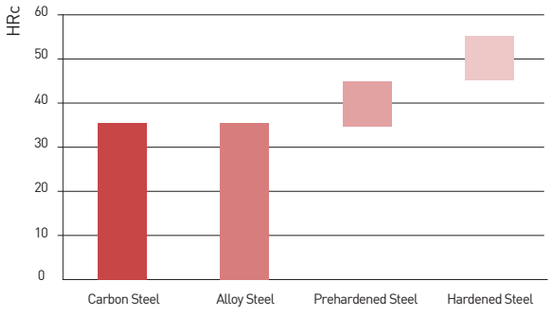
· W coating for enhanced oxidation resistance and high hardness cutting edge

WDR Series feature



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

Applications



EDP No. System

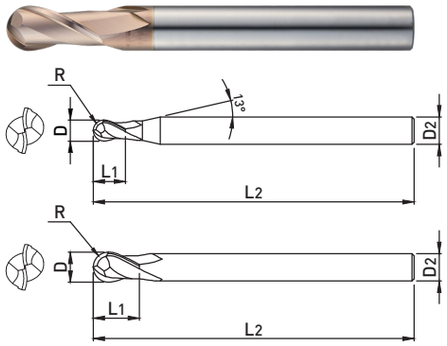
TYPE	APPEARANCE	GRADE	LENGTH, SHANK TYPE	FLUTE	CUTTING DIA.	CORNER RADIUS	Effective length
W : Winner WHP : Winner High Precision	B : Ball type SB : Straight Ball type R : Radius type DR : Double Radius type XR : Radius type (Unequal Division) SPM : Speed Power Mill ME : Miniature type F : Roughing TE : Tapered type TB : Tapered Ball type TR : Tapered Radius type XE : Square type (Unequal Division)	5 : Grade 9 : High Precision Grade	0 : Straight 1 : Neck 4 : Tapered Neck	2 : 2 Flutes 3 : 3 Flutes 4 : 4 Flutes 4H : 4 Flutes (Helix 45°)	0.03 ~ 25	0.05 ~ 2	0.2 ~ 100

W	R	5	1	2	030	10	26
Winner	Radius type	Grade	Neck type	2 Flutes	Ø3	R1.0	Effective length 26

Ex) 4FLUTES CUTTING DIA. Ø3 CORNER R 1.0 CUTTING LENGTH 26 50 GRADE CORNER RADIUS NECK TYPE WINNER ENDMILL

WHPB902

2 FLUTES ULTRA HIGH PRECISION BALL NOSE ENDMILL



- High-precision R tolerance applied to the cutting edge provides high-quality machining shape
- High strength of cutting edge by applying optimized rake angle

ULTRA FINE | 2 | 30° HELIX | R ±0.0015 | R ±0.0025 | R ±0.004 | W | DATA p.499

R1.5 OR UNDER ABOVE R1.5 / R3 OR UNDER ABOVE R3

■ **TOLERANCE**

D		SHANK DIA.
D0.1 ~ 6	0 ~ -0.012mm	h6
D8 ~ 12	0 ~ -0.015mm	

EDP No	D	R	L_1	L_2	D_2
WHPB902 001	0.1	0.05	0.2	40	4
WHPB902 0015	0.15	0.075	0.3	40	4
WHPB902 002	0.2	0.1	0.4	40	4
WHPB902 003	0.3	0.15	0.6	40	4
WHPB902 004	0.4	0.2	0.8	40	4
WHPB902 005	0.5	0.25	1	40	4
WHPB902 006	0.6	0.3	1.2	40	4
WHPB902 007	0.7	0.35	1.4	40	4
WHPB902 008	0.8	0.4	1.6	40	4
WHPB902 009	0.9	0.45	1.8	40	4
WHPB902 010	1.0	0.5	2.5	50	6
WHPB902 012	1.2	0.6	3	50	6
WHPB902 015	1.5	0.75	4	50	6
WHPB902 020	2	1	5	50	6
WHPB902 025	2.5	1.25	6	60	6
WHPB902 030	3	1.5	6	60	6
WHPB902 040	4	2	8	70	6
WHPB902 050	5	2.5	10	80	6
WHPB902 060	6	3	12	90	6
WHPB902 080	8	4	14	100	8
WHPB902 100	10	5	18	100	10
WHPB902 120	12	6	24	110	12

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

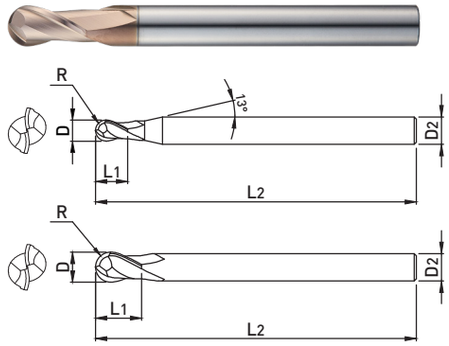
■ **Applicable Working Material**

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○	◎	○				○		○

○ : GOOD ◎ : EXCELLENT

WB502

2 FLUTES BALL NOSE ENDMILL



- High strength of cutting edge by applying optimized rake angle
- Extend customer choice with a wide range of specifications from Ø0.1 to Ø25

ULTRA FINE | 2 | 30° HELIX | R ±0.005 | R ±0.01 | W | DATA p.499

R3 OR UNDER ABOVE R3

■ **TOLERANCE**

D		SHANK DIA.
D1 ~ 6	0 ~ -0.012mm	h6
D6.5~25	0 ~ -0.015mm	

EDP No	D	R	L_1	L_2	D_2
WB502 001S	0.1	0.05	0.1	40	4
WB502 001	0.1	0.05	0.2	40	4
WB502 001 S3	0.1	0.05	0.2	40	3
WB502 0015S	0.15	0.075	0.15	40	4
WB502 0015	0.15	0.075	0.3	40	4
WB502 0015 S3	0.15	0.075	0.3	40	3
WB502 002S	0.2	0.1	0.2	40	4
WB502 002	0.2	0.1	0.4	40	4
WB502 002 S3	0.2	0.1	0.4	40	3
WB502 003S	0.3	0.15	0.3	40	4
WB502 003	0.3	0.15	0.6	40	4
WB502 003 S3	0.3	0.15	0.6	40	3
WB502 004S	0.4	0.2	0.4	40	4
WB502 004	0.4	0.2	0.8	40	4
WB502 004 S3	0.4	0.2	0.8	40	3
WB502 005S	0.5	0.25	0.5	40	4
WB502 005	0.5	0.25	1.0	40	4
WB502 005 S3	0.5	0.25	1.0	40	3
WB502 006S	0.6	0.3	0.6	40	4
WB502 006	0.6	0.3	1.2	40	4
WB502 006 S3	0.6	0.3	1.2	40	3
WB502 007S	0.7	0.35	0.7	40	4
WB502 007	0.7	0.35	1.4	40	4
WB502 007 S3	0.7	0.35	1.4	40	3
WB502 008S	0.8	0.4	0.8	40	4
WB502 008	0.8	0.4	1.6	40	4
WB502 008 S3	0.8	0.4	1.6	40	3
WB502 009S	0.9	0.45	0.9	40	4
WB502 009	0.9	0.45	1.8	40	4
WB502 009 S3	0.9	0.45	1.8	40	3
WB502 010S	1	0.5	1.5	40	6
WB502 010 S3	1	0.5	2.5	50	3
WB502 010 S4	1	0.5	2.5	50	4
WB502 010	1	0.5	2.5	50	6
WB502 010 070	1	0.5	2.5	70	6
WB502 010 100	1	0.5	2.5	100	6

EDP No	D	R	L_1	L_2	D_2
WB502 0120S	1.2	0.6	2	40	6
WB502 012 S3	1.2	0.6	3	50	3
WB502 012 S4	1.2	0.6	3	50	4
WB502 012	1.2	0.6	3	50	6
WB502 012 070	1.2	0.6	3	70	6
WB502 012 100	1.2	0.6	3	100	6
WB502 015S	1.5	0.75	2.5	40	6
WB502 015 S3	1.5	0.75	4	50	3
WB502 015 S4	1.5	0.75	4	50	4
WB502 015	1.5	0.75	4	50	6
WB502 015 070	1.5	0.75	4	70	6
WB502 015 100	1.5	0.75	4	100	6
WB502 020S	2	1	3	40	6
WB502 020 S3	2	1	5	50	3
WB502 020 S4	2	1	5	50	4
WB502 020	2	1	5	50	6
WB502 020 080	2	1	5	80	6
WB502 020 100	2	1	5	100	6
WB502 025S	2.5	1.25	4	40	6
WB502 025 S3	2.5	1.25	6	60	3
WB502 025 S4	2.5	1.25	6	60	4
WB502 025	2.5	1.25	6	60	6
WB502 025 080	2.5	1.25	6	80	6
WB502 025 100	2.5	1.25	6	100	6
WB502 030S	3	1.5	4.5	40	6
WB502 030 S3	3	1.5	6	60	3
WB502 030 S4	3	1.5	6	60	4
WB502 030	3	1.5	6	60	6
WB502 030 080	3	1.5	6	80	6
WB502 030 100	3	1.5	6	100	6
WB502 035	3.5	1.75	8	70	6
WB502 040S	4	2	6	50	6
WB502 040 S4	4	2	8	70	4
WB502 040	4	2	8	70	6
WB502 040 100 S4	4	2	8	100	4
WB502 040 120 S4	4	2	8	120	4

WB502

2 FLUTES BALL NOSE ENDMILL

EDP No	D	R	L_1	L_2	D_2
WB502 040 100	4	2	8	100	6
WB502 040 120	4	2	8	120	6
WB502 045	4.5	2.25	9	80	6
WB502 050S	5	2.5	7.5	60	6
WB502 050	5	2.5	10	80	6
WB502 050 S5	5	2.5	10	80	5
WB502 055	5.5	2.75	11	90	6
WB502 060S	6	3	9	50	6
WB502 060 060	6	3	9	60	6
WB502 060 080	6	3	9	80	6
WB502 060	6	3	12	90	6
WB502 060 110	6	3	12	110	6
WB502 060 130	6	3	12	130	6
WB502 060 150	6	3	12	150	6
WB502 065	6.5	3.25	13	90	8
WB502 070	7	3.5	14	90	8
WB502 080S	8	4	12	50	8
WB502 080 060	8	4	12	60	8
WB502 080 080	8	4	12	80	8
WB502 080 090	8	4	12	90	8
WB502 080	8	4	14	100	8
WB502 080 130	8	4	14	130	8
WB502 080 150	8	4	14	150	8
WB502 085	8.5	4.25	16	100	10
WB502 090	9	4.5	18	100	10
WB502 100S	10	5	15	50	10
WB502 100 060	10	5	15	60	10
WB502 100 080	10	5	15	80	10
WB502 100 090	10	5	15	90	10
WB502 100	10	5	18	100	10
WB502 100 130	10	5	18	130	10
WB502 100 150	10	5	18	150	10
WB502 100 180	10	5	18	180	10
WB502 100 200	10	5	18	200	10
WB502 110	11	5.5	20	100	12
WB502 120S	12	6	18	60	12
WB502 120 080	12	6	18	80	12
WB502 120 090	12	6	18	90	12
WB502 120 100	12	6	18	100	12
WB502 120	12	6	24	110	12
WB502 120 130	12	6	24	130	12
WB502 120 150	12	6	24	150	12
WB502 120 180	12	6	24	180	12
WB502 120 200	12	6	24	200	12
WB502 130	13	6.5	24	100	12
WB502 140 S12	14	7	26	100	12
WB502 140	14	7	26	100	14
WB502 140 S16	14	7	26	100	16

EDP No	D	R	L_1	L_2	D_2
WB502 150	15	7.5	28	140	16
WB502 160 100	16	8	24	100	16
WB502 160 130	16	8	24	130	16
WB502 160	16	8	30	150	16
WB502 160 180	16	8	30	180	16
WB502 160 200	16	8	30	200	16
WB502 180 S16	18	9	34	150	16
WB502 180	18	9	34	150	18
WB502 200 100	20	10	30	100	20
WB502 200 130	20	10	30	130	20
WB502 200	20	10	38	150	20
WB502 200 200	20	10	38	200	20
WB502 250 120	25	12.5	50	120	25
WB502 250	25	12.5	50	180	25

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

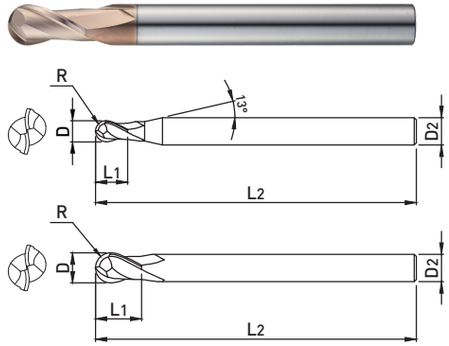
■ **Applicable Working Material**

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○	◎	○				○		○

○ : GOOD ◎ : EXCELLENT

2 FLUTES HIGH PRECISION BALL NOSE ENDMILL

WB502---P



- High-precision R tolerance applied to the cutting edge provides high-quality machining shape
- Extend customer choice with a wide range of specifications from Ø0.1 to Ø12

ULTRA FINE | 2 | 30° HELIX | R ±0.002 R3 OR UNDER | R ±0.003 ABOVE R3 | W | DATA p.499

■ **TOLERANCE**

D		SHANK DIA.
D0.1 ~ D6	0 ~ -0.012mm	h6
D8 ~ 12	0 ~ -0.015mm	

EDP No	D CUTTING DIA.	R 반경	L_1 날장	L_2 전장	D_2 SHANK DIA.
WB502 001P	0.1	0.05	0.2	40	4
WB502 0015P	0.15	0.075	0.3	40	4
WB502 002P	0.2	0.1	0.4	40	4
WB502 003P	0.3	0.15	0.6	40	4
WB502 004P	0.4	0.2	0.8	40	4
WB502 005P	0.5	0.25	1	40	4
WB502 006P	0.6	0.3	1.2	40	4
WB502 007P	0.7	0.35	1.4	40	4
WB502 008P	0.8	0.4	1.6	40	4
WB502 009P	0.9	0.45	1.8	40	4
WB502 010P	1	0.5	2.5	50	6
WB502 012P	1.2	0.6	3	50	6
WB502 015P	1.5	0.75	4	50	6
WB502 020P	2	1	5	50	6
WB502 025P	2.5	1.25	6	60	6
WB502 030P	3	1.5	6	60	6
WB502 040P	4	2	8	70	6
WB502 050P	5	2.5	10	80	6
WB502 060P	6	3	12	90	6
WB502 080P	8	4	14	100	8
WB502 100P	10	5	18	100	10
WB502 120P	12	6	24	110	12

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

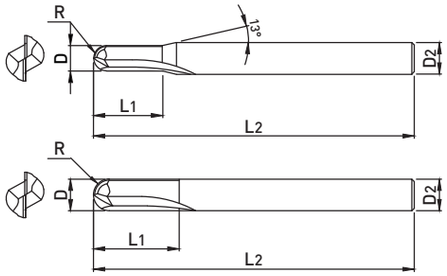
■ **Applicable Working Material**

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○	◎	○				○		○

○ : GOOD ◎ : EXCELLENT

WSB502

2 FLUTES STRAIGHT HELIX BALL NOSE ENDMILL



- High-precision R tolerance applied to the cutting edge provides high-quality machining shape
- Strengthen the hardness of flute with straight flute shape

ULTRA FINE | 2 | 0° HELIX | R ±0.005 R3 OR UNDER | R ±0.01 ABOVE R3 | W | DATA p.500

■ TOLERANCE

D		SHANK DIA.
D3 ~ 6	0 ~ -0.012mm	h6
D8 ~ 12	0 ~ -0.015mm	

EDP No	D	R	L_1	L_2	D_2
WSB502 030	3	1.5	10	70	6
WSB502 040	4	2	12	70	6
WSB502 050	5	2.5	18	90	6
WSB502 060	6	3	20	90	6
WSB502 080	8	4	25	100	8
WSB502 100	10	5	30	100	10
WSB502 120	12	6	32	110	12
WSB502 160	16	8	35	150	16
WSB502 200	20	10	40	150	20

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

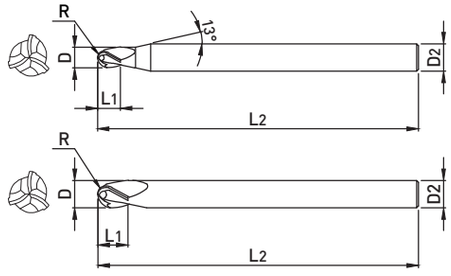
■ Applicable Working Material

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○	◎	○				○		○

○ : GOOD ◎ : EXCELLENT

WB503

3 FLUTES BALL NOSE ENDMILL



- High strength of cutting edge by applying optimized rake angle
- Excellent workpiece finishes by applying center match type 3 flutes in high speed processing

ULTRA FINE | 3 | 30° HELIX | R ±0.005 R3 OR UNDER | R ±0.01 ABOVE R3 | W | DATA p.500

■ TOLERANCE

D		SHANK DIA.
ALL SIZES	0 ~ -0.02mm	h6

EDP No	D	R	L_1	L_2	D_2
WB503 010	1	0.5	1	50	6
WB503 015	1.5	0.75	1.5	50	6
WB503 020	2	1	2	50	6
WB503 030	3	1.5	3	60	6
WB503 040	4	2	4	70	6
WB503 050	5	2.5	5	80	6
WB503 060	6	3	6	90	6
WB503 080	8	4	8	100	8
WB503 100	10	5	10	100	10
WB503 120	12	6	12	110	12

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

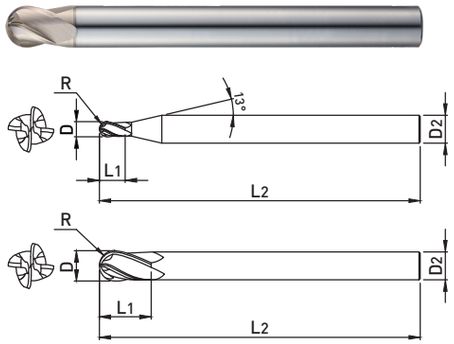
■ Applicable Working Material

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○	◎	○				○		○

○ : GOOD ◎ : EXCELLENT

WB504

4 FLUTES BALL NOSE ENDMILL



- High strength of cutting edge by applying optimized rake angle
- Excellent workpiece finishes by applying 4 flutes in high speed processing

ULTRA FINE | 4 | 30° HELIX | R ±0.005 R3 OR UNDER | R ±0.01 ABOVE R3 | W | DATA p.502

■ TOLERANCE

D		SHANK DIA.
ALL SIZES	0 ~ -0.02mm	h6

EDP No	D	R	L_1	L_2	D_2
WB504 010	1	0.5	1	50	6
WB504 015	1.5	0.75	1.5	50	6
WB504 020	2	1	2	50	6
WB504 030	3	1.5	3	60	6
WB504 040	4	2	4	70	6
WB504 050	5	2.5	5	80	6
WB504 060	6	3	6	90	6
WB504 080	8	4	8	100	8
WB504 100	10	5	10	100	10
WB504 120	12	6	12	110	12

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

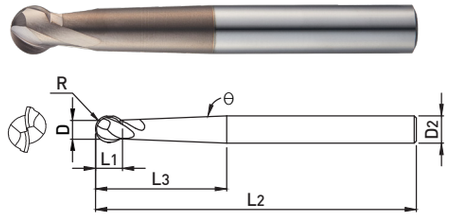
■ Applicable Working Material

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○	◎	○				○		○

○ : GOOD ◎ : EXCELLENT

WB532

2 FLUTES MMC SPHERE TYPE BALL NOSE ENDMILL



- A rounded cutting edge enable to machining a various curved shape
- Reduced High strength and chattering with tapered effective length

ULTRA FINE | 2 | 30° HELIX | R ±0.01 ALL SIZES | W | DATA p.502

■ TOLERANCE

D		SHANK DIA.
ALL SIZES	0 ~ -0.03mm	h6

EDP No	D	R	θ	L1	L3	L2	D2
WB532 030	3	1.5	1°30`	2.3	16	80	6
WB532 040	4	2	1°30`	3.1	20	80	6
WB532 050	5	2.5	1°30`	3.9	25	80	6
WB532 060	6	3	1°30`	4.9	30	100	6
WB532 080	8	4	1°30`	6.3	35	100	8
WB532 100	10	5	1°30`	7.9	40	100	10
WB532 120	12	6	1°30`	9.5	50	100	12

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

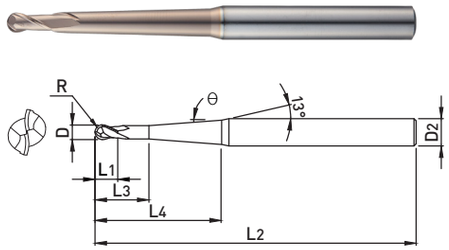
■ Applicable Working Material

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○	◎	○				○		○

○ : GOOD ◎ : EXCELLENT

WB542

2 FLUTES TAPERED NECK TYPE BALL NOSE ENDMILL



- Reduced High strength and chattering with tapered effective length
- Suitable for deep groove machining with various specifications on effective length

ULTRA FINE | 2 | 30° HELIX | R ±0.005 R3 OR UNDER | R ±0.01 ABOVE R3 | W | DATA p.503

▪ **TOLERANCE**

D		SHANK DIA.
D0.1 ~ D6	0 ~ -0.012mm	h6
D8 ~ 12	0 ~ -0.015mm	

EDP No	D	R	θ	L_1	L_3	L_4	L_2	D_2
WB542 001 05 005	0.1	0.05	30`	0.1	-	0.5	40	4
WB542 001 05 01	0.1	0.05	30`	0.1	-	1	40	4
WB542 001 10 005	0.1	0.05	1°	0.1	-	0.5	40	4
WB542 001 10 01	0.1	0.05	1°	0.1	-	1	40	4
WB542 001 15 005	0.1	0.05	1°30`	0.1	-	0.5	40	4
WB542 001 15 01	0.1	0.05	1°30`	0.1	-	1	40	4
WB542 001 20 005	0.1	0.05	2°	0.1	-	0.5	40	4
WB542 001 20 01	0.1	0.05	2°	0.1	-	1	40	4
WB542 001 30 005	0.1	0.05	3°	0.1	-	0.5	40	4
WB542 001 30 01	0.1	0.05	3°	0.1	-	1	40	4
WB542 002 05 01	0.2	0.1	30`	0.2	0.4	1	40	4
WB542 002 05 02	0.2	0.1	30`	0.2	0.4	2	40	4
WB542 002 05 03	0.2	0.1	30`	0.2	0.4	3	40	4
WB542 002 10 01	0.2	0.1	1°	0.2	0.4	1	40	4
WB542 002 10 02	0.2	0.1	1°	0.2	0.4	2	40	4
WB542 002 10 03	0.2	0.1	1°	0.2	0.4	3	40	4
WB542 002 15 01	0.2	0.1	1°30`	0.2	0.4	1	40	4
WB542 002 15 02	0.2	0.1	1°30`	0.2	0.4	2	40	4
WB542 002 15 03	0.2	0.1	1°30`	0.2	0.4	3	40	4
WB542 002 20 01	0.2	0.1	2°	0.2	0.4	1	40	4
WB542 002 20 02	0.2	0.1	2°	0.2	0.4	2	40	4
WB542 002 20 03	0.2	0.1	2°	0.2	0.4	3	40	4
WB542 002 30 01	0.2	0.1	3°	0.2	0.4	1	40	4
WB542 002 30 02	0.2	0.1	3°	0.2	0.4	2	40	4
WB542 002 30 03	0.2	0.1	3°	0.2	0.4	3	40	4
WB542 002 50 02	0.2	0.1	5°	0.2	0.4	2	40	4
WB542 002 50 03	0.2	0.1	5°	0.2	0.4	3	40	4
WB542 003 05 02	0.3	0.15	30`	0.3	0.6	2	40	4
WB542 003 05 03	0.3	0.15	30`	0.3	0.6	3	40	4
WB542 003 05 04	0.3	0.15	30`	0.3	0.6	4	40	4
WB542 003 05 05	0.3	0.15	30`	0.3	0.6	5	40	4
WB542 003 10 02	0.3	0.15	1°	0.3	0.6	2	40	4
WB542 003 10 03	0.3	0.15	1°	0.3	0.6	3	40	4
WB542 003 10 04	0.3	0.15	1°	0.3	0.6	4	40	4
WB542 003 10 05	0.3	0.15	1°	0.3	0.6	5	40	4
WB542 003 15 02	0.3	0.15	1°30′	0.3	0.6	2	40	4
WB542 003 15 03	0.3	0.15	1°30′	0.3	0.6	3	40	4
WB542 003 15 04	0.3	0.15	1°30′	0.3	0.6	4	40	4
WB542 003 15 05	0.3	0.15	1°30′	0.3	0.6	5	40	4
WB542 003 20 02	0.3	0.15	2°	0.3	0.6	2	40	4
WB542 003 20 03	0.3	0.15	2°	0.3	0.6	3	40	4
WB542 003 20 04	0.3	0.15	2°	0.3	0.6	4	40	4
WB542 003 20 05	0.3	0.15	2°	0.3	0.6	5	40	4
WB542 003 30 02	0.3	0.15	3°	0.3	0.6	2	40	4
WB542 003 30 03	0.3	0.15	3°	0.3	0.6	3	40	4
WB542 003 30 04	0.3	0.15	3°	0.3	0.6	4	40	4
WB542 003 30 05	0.3	0.15	3°	0.3	0.6	5	40	4
WB542 003 50 05	0.3	0.15	5°	0.3	0.6	5	40	4
WB542 004 05 02	0.4	0.2	30`	0.4	0.8	2	50	4
WB542 004 05 03	0.4	0.2	30`	0.4	0.8	3	50	4
WB542 004 05 04	0.4	0.2	30`	0.4	0.8	4	50	4
WB542 004 05 05	0.4	0.2	30`	0.4	0.8	5	50	4
WB542 004 05 06	0.4	0.2	30`	0.4	0.8	6	50	4
WB542 004 10 02	0.4	0.2	1°	0.4	0.8	2	50	4
WB542 004 10 03	0.4	0.2	1°	0.4	0.8	3	50	4
WB542 004 10 04	0.4	0.2	1°	0.4	0.8	4	50	4
WB542 004 10 05	0.4	0.2	1°	0.4	0.8	5	50	4
WB542 004 10 06	0.4	0.2	1°	0.4	0.8	6	50	4
WB542 004 15 02	0.4	0.2	1°30`	0.4	0.8	2	50	4
WB542 004 15 03	0.4	0.2	1°30`	0.4	0.8	3	50	4
WB542 004 15 04	0.4	0.2	1°30`	0.4	0.8	4	50	4
WB542 004 15 05	0.4	0.2	1°30`	0.4	0.8	5	50	4
WB542 004 15 06	0.4	0.2	1°30`	0.4	0.8	6	50	4
WB542 004 20 02	0.4	0.2	2°	0.4	0.8	2	50	4
WB542 004 20 03	0.4	0.2	2°	0.4	0.8	3	50	4
WB542 004 20 04	0.4	0.2	2°	0.4	0.8	4	50	4
WB542 004 20 05	0.4	0.2	2°	0.4	0.8	5	50	4
WB542 004 20 06	0.4	0.2	2°	0.4	0.8	6	50	4
WB542 004 30 02	0.4	0.2	3°	0.4	0.8	2	50	4
WB542 004 30 03	0.4	0.2	3°	0.4	0.8	3	50	4
WB542 004 30 04	0.4	0.2	3°	0.4	0.8	4	50	4
WB542 004 30 05	0.4	0.2	3°	0.4	0.8	5	50	4

EDP No	D	R	θ	L_1	L_3	L_4	L_2	D_2
WB542 004 30 06	0.4	0.2	3°	0.4	0.8	6	50	4
WB542 004 50 04	0.4	0.2	5°	0.4	0.8	4	50	4
WB542 004 50 06	0.4	0.2	5°	0.4	0.8	6	50	4
WB542 005 05 04	0.5	0.25	30`	0.5	1	4	50	4
WB542 005 05 06	0.5	0.25	30`	0.5	1	6	50	4
WB542 005 05 08	0.5	0.25	30`	0.5	1	8	50	4
WB542 005 05 10	0.5	0.25	30`	0.5	1	10	50	4
WB542 005 10 04	0.5	0.25	1°	0.5	1	4	50	4
WB542 005 10 06	0.5	0.25	1°	0.5	1	6	50	4
WB542 005 10 08	0.5	0.25	1°	0.5	1	8	50	4
WB542 005 10 10	0.5	0.25	1°	0.5	1	10	50	4
WB542 005 15 04	0.5	0.25	1°30`	0.5	1	4	50	4
WB542 005 15 06	0.5	0.25	1°30`	0.5	1	6	50	4
WB542 005 15 08	0.5	0.25	1°30`	0.5	1	8	50	4
WB542 005 15 10	0.5	0.25	1°30`	0.5	1	10	50	4
WB542 005 20 04	0.5	0.25	2°	0.5	1	4	50	4
WB542 005 20 06	0.5	0.25	2°	0.5	1	6	50	4
WB542 005 20 08	0.5	0.25	2°	0.5	1	8	50	4
WB542 005 20 10	0.5	0.25	2°	0.5	1	10	50	4
WB542 005 30 04	0.5	0.25	3°	0.5	1	4	50	4
WB542 005 30 06	0.5	0.25	3°	0.5	1	6	50	4
WB542 005 30 08	0.5	0.25	3°	0.5	1	8	50	4
WB542 005 30 10	0.5	0.25	3°	0.5	1	10	50	4
WB542 006 05 04	0.6	0.3	30`	0.6	1.2	4	50	4
WB542 006 05 06	0.6	0.3	30`	0.6	1.2	6	50	4
WB542 006 05 08	0.6	0.3	30`	0.6	1.2	8	50	4
WB542 006 05 10	0.6	0.3	30`	0.6	1.2	10	50	4
WB542 006 05 12	0.6	0.3	30`	0.6	1.2	12	50	4
WB542 006 10 04	0.6	0.3	1°	0.6	1.2	4	50	4
WB542 006 10 06	0.6	0.3	1°	0.6	1.2	6	50	4
WB542 006 10 08	0.6	0.3	1°	0.6	1.2	8	50	4
WB542 006 10 10	0.6	0.3	1°	0.6	1.2	10	50	4
WB542 006 10 12	0.6	0.3	1°	0.6	1.2	12	50	4
WB542 006 15 04	0.6	0.3	1°30`	0.6	1.2	4	50	4
WB542 006 15 06	0.6	0.3	1°30`	0.6	1.2	6	50	4
WB542 006 15 08	0.6	0.3	1°30`	0.6	1.2	8	50	4
WB542 006 15 10	0.6	0.3	1°30`	0.6	1.2	10	50	4
WB542 006 15 12	0.6	0.3	1°30`	0.6	1.2	12	50	4
WB542 006 20 04	0.6	0.3	2°	0.6	1.2	4	50	4
WB542 006 20 06	0.6	0.3	2°	0.6	1.2	6	50	4
WB542 006 20 08	0.6	0.3	2°	0.6	1.2	8	50	4
WB542 006 20 10	0.6	0.3	2°	0.6	1.2	10	50	4
WB542 006 20 12	0.6	0.3	2°	0.6	1.2	12	50	4
WB542 006 30 04	0.6	0.3	3°	0.6	1.2	4	50	4
WB542 006 30 06	0.6	0.3	3°	0.6	1.2	6	50	4
WB542 006 30 08	0.6	0.3	3°	0.6	1.2	8	50	4
WB542 006 30 10	0.6	0.3	3°	0.6	1.2	10	50	4
WB542 006 30 12	0.6	0.3	3°	0.6	1.2	12	50	4
WB542 008 05 04	0.8	0.4	30`	0.8	1.6	4	50	4
WB542 008 05 06	0.8	0.4	30`	0.8	1.6	6	50	4
WB542 008 05 08	0.8	0.4	30`	0.8	1.6	8	50	4
WB542 008 05 10	0.8	0.4	30`	0.8	1.6	10	50	4
WB542 008 05 12	0.8	0.4	30`	0.8	1.6	12	50	4
WB542 008 05 16	0.8	0.4	30`	0.8	1.6	16	50	4
WB542 008 10 04	0.8	0.4	1°	0.8	1.6	4	50	4
WB542 008 10 06	0.8	0.4	1°	0.8	1.6	6	50	4
WB542 008 10 08	0.8	0.4	1°	0.8	1.6	8	50	4
WB542 008 10 10	0.8	0.4	1°	0.8	1.6	10	50	4
WB542 008 10 12	0.8	0.4	1°	0.8	1.6	12	50	4
WB542 008 10 16	0.8	0.4	1°	0.8	1.6	16	50	4
WB542 008 15 04	0.8	0.4	1°30`	0.8	1.6	4	50	4
WB542 008 15 06	0.8	0.4	1°30`	0.8	1.6	6	50	4
WB542 008 15 08	0.8	0.4	1°30`	0.8	1.6	8	50	4
WB542 008 15 10	0.8	0.4	1°30`	0.8	1.6	10	50	4
WB542 008 15 12	0.8	0.4	1°30`	0.8	1.6	12	50	4
WB542 008 15 16	0.8	0.4	1°30`	0.8	1.6	16	50	4
WB542 008 20 04	0.8	0.4	2°	0.8	1.6	4	50	4
WB542 008 20 06	0.8	0.4	2°	0.8	1.6	6	50	4
WB542 008 20 08	0.8	0.4	2°	0.8	1.6	8	50	4
WB542 008 20 10	0.8	0.4	2°	0.8	1.6	10	50	4
WB542 008 20 12	0.8	0.4	2°	0.8	1.6	12	50	4
WB542 008 20 16	0.8	0.4	2°	0.8	1.6	16	50	4
WB542 008 30 04	0.8	0.4	3°	0.8	1.6	4	50	4
WB542 008 30 06	0.8	0.4	3°	0.8	1.6	6	50	4
WB542 008 30 08	0.8	0.4	3°	0.8	1.6	8	50	4
WB542 008 30 10	0.8	0.4	3°	0.8	1.6	10	50	4
WB542 008 30 12	0.8	0.4	3°	0.8	1.6	12	50	4
WB542 008 30 16	0.8	0.4	3°	0.8	1.6	16	50	4
WB542 010 05 06	1	0.5	30`	1	2.5	6	50	4
WB542 010 05 08	1	0.5	30`	1	2.5	8	50	4
WB542 010 05 10	1	0.5	30`	1	2.5	10	50	4
WB542 010 05 12	1	0.5	30`	1	2.5	12	50	4
WB542 010 05 16	1	0.5	30`	1	2.5	16	50	4
WB542 010 05 20	1	0.5	30`	1	2.5	20	50	4
WB542 010 05 25	1	0.5	30`	1	2.5	25	60	4
WB542 010 05 30	1	0.5	30`	1	2.5	30	70	4
WB542 010 05 40	1	0.5	30`	1	2.5	40	80	4
WB542 010 05 50	1	0.5	30`	1	2.5	50	90	4
WB542 010 10 06	1	0.5	1°	1	2.5	6	50	4
WB542 010 10 08	1	0.5	1°	1	2.5	8	50	4
WB542 010 10 10	1	0.5	1°	1	2.5	10	50	4
WB542 010 10 12	1	0.5	1°	1	2.5	12	50	4
WB542 010 10 16	1	0.5	1°	1	2.5	16	50	4
WB542 010 10 20	1	0.5	1°	1	2.5	20	50	4
WB542 010 10 25	1	0.5	1°	1	2.5	25	60	4
WB542 010 10 30	1	0.5	1°	1	2.5	30	70	4
WB542 010 10 40	1	0.5	1°	1	2.5	40	80	4
WB542 010 10 50	1	0.5	1°	1	2.5	50	90	4
WB542 010 15 06	1	0.5	1°30`	1	2.5	6	50	4
WB542 010 15 08	1	0.5	1°30`	1	2.5	8	50	4
WB542 010 15 10	1	0.5	1°30`	1	2.5	10	50	4
WB542 010 15 12	1	0.5	1°30`	1	2.5	12	50	4
WB542 010 15 16	1	0.5	1°30`	1	2.5	16	50	4
WB542 010 15 20	1	0.5	1°30`	1	2.5	20	50	4
WB542 010 15 25	1	0.5	1°30`	1	2.5	25	60	4
WB542 010 15 30	1	0.5	1°30`	1	2.5	30	70	4
WB542 010 15 40	1	0.5	1°30`	1	2.5	40	80	4
WB542 010 15 50	1	0.5	1°30`	1	2.5	50	90	4
WB542 010 20 06	1	0.5	2°	1	2.5	6	50	4
WB542 010 20 08	1	0.5	2°	1	2.5	8	50	4
WB542 010 20 10	1	0.5	2°	1	2.5	10	50	4
WB542 010 20 12	1	0.5	2°	1	2.5	12	50	4

EDP No	D	R	θ	L_1	L_3	L_4	L_2	D_2
WB542 010 20 16	1	0.5	2°	1	2.5	16	50	4
WB542 010 20 20	1	0.5	2°	1	2.5	20	50	4
WB542 010 20 25	1	0.5	2°	1	2.5	25	60	4
WB542 010 20 30	1	0.5	2°	1	2.5	30	70	4
WB542 010 20 40	1	0.5	2°	1	2.5	40	80	4
WB542 010 20 50	1	0.5	2°	1	2.5	50	90	6
WB542 010 30 06	1	0.5	3°	1	2.5	6	50	4
WB542 010 30 08	1	0.5	3°	1	2.5	8	50	4
WB542 010 30 10	1	0.5	3°	1	2.5	10	50	4
WB542 010 30 12	1	0.5	3°	1	2.5	12	50	4
WB542 010 30 16	1	0.5	3°	1	2.5	16	50	4
WB542 010 30 20	1	0.5	3°	1	2.5	20	50	4
WB542 010 30 25	1	0.5	3°	1	2.5	25	60	4
WB542 010 30 30	1	0.5	3°	1	2.5	30	70	6
WB542 010 30 40	1	0.5	3°	1	2.5	40	80	6
WB542 010 30 50	1	0.5	3°	1	2.5	50	90	6
WB542 010 50 30	1	0.5	5°	1	2.5	30	70	6
WB542 012 05 08	1.2	0.6	30`	1.2	3	8	50	4
WB542 012 05 12	1.2	0.6	30`	1.2	3	12	50	4
WB542 012 05 16	1.2	0.6	30`	1.2	3	16	50	4
WB542 012 05 20	1.2	0.6	30`	1.2	3	20	50	4
WB542 012 05 25	1.2	0.6	30`	1.2	3	25	60	4
WB542 012 05 30	1.2	0.6	30`	1.2	3	30	70	4
WB542 012 10 08	1.2	0.6	1°	1.2	3	8	50	4
WB542 012 10 12	1.2	0.6	1°	1.2	3	12	50	4
WB542 012 10 16	1.2	0.6	1°	1.2	3	16	50	4
WB542 012 10 20	1.2	0.6	1°	1.2	3	20	50	4
WB542 012 10 25	1.2	0.6	1°	1.2	3	25	60	4
WB542 012 10 30	1.2	0.6	1°	1.2	3	30	70	4
WB542 012 15 08	1.2	0.6	1°30`	1.2	3	8	50	4
WB542 012 15 12	1.2	0.6	1°30`	1.2	3	12	50	4
WB542 012 15 16	1.2	0.6	1°30`	1.2	3	16	50	4
WB542 012 15 20	1.2	0.6	1°30`	1.2	3	20	50	4
WB542 012 15 25	1.2	0.6	1°30`	1.2	3	25	60	4
WB542 012 15 30	1.2	0.6	1°30`	1.2	3	30	70	4
WB542 012 20 08	1.2	0.6	2°	1.2	3	8	50	4
WB542 012 20 12	1.2	0.6	2°	1.2	3	12	50	4
WB542 012 20 16	1.2	0.6	2°	1.2	3	16	50	4
WB542 012 20 20	1.2	0.6	2°	1.2	3	20	50	4
WB542 012 20 25	1.2	0.6	2°	1.2	3	25	60	4
WB542 012 20 30	1.2	0.6	2°	1.2	3	30	70	4
WB542 012 30 08	1.2	0.6	3°	1.2	3	8	50	4
WB542 012 30 12	1.2	0.6	3°	1.2	3	12	50	4
WB542 012 30 16	1.2	0.6	3°	1.2	3	16	50	4
WB542 012 30 20	1.2	0.6	3°	1.2	3	20	50	4
WB542 012 30 25	1.2	0.6	3°	1.2	3	25	60	4
WB542 012 30 30	1.2	0.6	3°	1.2	3	30	70	6
WB542 015 05 08	1.5	0.75	30`	1.5	4	8	50	4
WB542 015 05 10	1.5	0.75	30`	1.5	4	10	50	4
WB542 015 05 12	1.5	0.75	30`	1.5	4	12	50	4
WB542 015 05 16	1.5	0.75	30`	1.5	4	16	50	4
WB542 015 05 20	1.5	0.75	30`	1.5	4	20	50	4
WB542 015 05 25	1.5	0.75	30`	1.5	4	25	60	4
WB542 015 05 30	1.5	0.75	30`	1.5	4	30	70	4
WB542 015 05 40	1.5	0.75	30`	1.5	4	40	80	4
WB542 015 05 50	1.5	0.75	30`	1.5	4	50	90	4
WB542 015 10 08	1.5	0.75	1°	1.5	4	8	50	4
WB542 015 10 10	1.5	0.75	1°	1.5	4	10	50	4
WB542 015 10 12	1.5	0.75	1°	1.5	4	12	50	4
WB542 015 10 16	1.5	0.75	1°	1.5	4	16	50	4
WB542 015 10 20	1.5	0.75	1°	1.5	4	20	50	4
WB542 015 10 25	1.5	0.75	1°	1.5	4	25	60	4
WB542 015 10 30	1.5	0.75	1°	1.5	4	30	70	4
WB542 015 10 40	1.5	0.75	1°	1.5	4	40	80	4
WB542 015 10 50	1.5	0.75	1°	1.5	4	50	90	4
WB542 015 15 08	1.5	0.75	1°30`	1.5	4	8	50	4
WB542 015 15 10	1.5	0.75	1°30`	1.5	4	10	50	4
WB542 015 15 12	1.5	0.75	1°30`	1.5	4	12	50	4
WB542 015 15 16	1.5	0.75	1°30`	1.5	4	16	50	4
WB542 015 15 20	1.5	0.75	1°30`	1.5	4	20	50	4
WB542 015 15 25	1.5	0.75	1°30`	1.5	4	25	60	4
WB542 015 15 30	1.5	0.75	1°30`	1.5	4	30	70	4
WB542 015 15 40	1.5	0.75	1°30`	1.5	4	40	80	4
WB542 015 15 50	1.5	0.75	1°30`	1.5	4	50	90	4
WB542 015 20 08	1.5	0.75	2°	1.5	4	8	50	4
WB542 015 20 10	1.5	0.75	2°	1.5	4	10	50	4
WB542 015 20 12	1.5	0.75	2°	1.5	4	12	50	4
WB542 015 20 16	1.5	0.75	2°	1.5	4	16	50	4
WB542 015 20 20	1.5	0.75	2°	1.5	4	20	50	4
WB542 015 20 25	1.5	0.75	2°	1.5	4	25	60	4
WB542 015 20 30	1.5	0.75	2°	1.5	4	30	70	4
WB542 015 20 40	1.5	0.75	2°	1.5	4	40	80	4
WB542 015 20 50	1.5	0.75	2°	1.5	4	50	90	6
WB542 015 30 20	1.5	0.75	3°	1.5	4	20	50	6
WB542 015 30 30	1.5	0.75	3°	1.5	4	30	70	6
WB542 015 30 40	1.5	0.75	3°	1.5	4	40	80	6
WB542 015 30 50	1.5	0.75	3°	1.5	4	50	90	8
WB542 015 50 30	1.5	0.75	5°	1.5	4	30	70	8
WB542 020 05 10	2	1	30`	2	5	10	50	4
WB542 020 05 12	2	1	30`	2	5	12	50	4
WB542 020 05 16	2	1	30`	2	5	16	50	4
WB542 020 05 20	2	1	30`	2	5	20	50	4
WB542 020 05 25	2	1	30`	2	5	25	60	4
WB542 020 05 30	2	1	30`	2	5	30	70	4
WB542 020 05 40	2	1	30`	2	5	40	80	4
WB542 020 05 50	2	1	30`	2	5	50	100	6
WB542 020 05 60	2	1	30`	2	5	60	100	6
WB542 020 05 80	2	1	30`	2	5	80	140	6
WB542 020 10 10	2	1	1°	2	5	10	50	4
WB542 020 10 12	2	1	1°	2	5	12	50	4
WB542 020 10 16	2	1	1°	2	5	16	50	4
WB542 020 10 20	2	1	1°	2	5	20	50	4
WB542 020 10 25	2	1	1°	2	5	25	60	4
WB542 020 10 30	2	1	1°	2	5	30	70	4
WB542 020 10 40	2	1	1°	2	5	40	80	6
WB542 020 10 50	2	1	1°	2	5	50	100	6
WB542 020 10 60	2	1	1°	2	5	60	100	6
WB542 020 10 80	2	1	1°	2	5	80	140	6
WB542 020 15 10	2	1	1°30`	2	5	10	50	4
WB542 020 15 12	2	1	1°30`	2	5	12	50	4
WB542 020 15 16	2	1	1°30`	2	5	16	50	4
WB542 020 15 20	2	1	1°30`	2	5	20	50	4
WB542 020 15 25	2	1	1°30`	2	5	25	60	4
WB542 020 15 30	2	1	1°30`	2	5	30	70	6
WB542 020 15 40	2	1	1°30`	2	5	40	80	6
WB542 020 15 50	2	1	1°30`	2	5	50	100	6
WB542 020 15 60	2	1	1°30`	2	5	60	100	6
WB542 020 15 80	2	1	1°30`	2	5	80	140	6
WB542 020 20 10	2	1	2°	2	5	10	50	4
WB542 020 20 12	2	1	2°	2	5	12	50	4
WB542 020 20 16	2	1	2°	2	5	16	50	4
WB542 020 20 20	2	1	2°	2	5	20	55	4
WB542 020 20 25	2	1	2°	2	5	25	60	4
WB542 020 20 30	2	1	2°	2	5	30	70	4
WB542 020 20 40	2	1	2°	2	5	40	80	6
WB542 020 20 50	2	1	2°	2	5	50	90	6
WB542 020 20 60	2	1	2°	2	5	60	100	6
WB542 020 20 80	2	1	2°	2	5	80	140	8
WB542 020 30 30	2	1	3°	2	5	30	70	6
WB542 020 30 40	2	1	3°	2	5	40	80	6
WB542 020 30 50	2	1	3°	2	5	50	90	8
WB542 020 30 60	2	1	3°	2	5	60	100	8
WB542 020 30 80	2	1	3°	2	5	80	140	10
WB542 020 50 30	2	1	5°	2	5	30	70	8
WB542 020 50 40	2	1	5°	2	5	40	90	10
WB542 030 05 16	3	1.5	30`	4.5	6	16	60	6
WB542 030 05 20	3	1.5	30`	4.5	6	20	65	6
WB542 030 05 30	3	1.5	30`	4.5	6	30	70	6
WB542 030 05 40	3	1.5	30`	4.5	6	40	80	6
WB542 030 05 50	3	1.5	30`	4.5	6	50	90	6
WB542 030 05 60	3	1.5	30`	4.5	6	60	100	6
WB542 030 10 16	3	1.5	1°	4.5	6	16	60	6
WB542 030 10 20	3	1.5	1°	4.5	6	20	65	6
WB542 030 10 30	3	1.5	1°	4.5	6	30	70	6
WB542 030 10 40	3	1.5	1°	4.5	6	40	80	6
WB542 030 10 50	3	1.5	1°	4.5	6	50	90	6
WB542 030 10 60	3	1.5	1°	4.5	6	60	100	6
WB542 030 10 70	3	1.5	1°	4.5	6	70	120	6
WB542 030 15 16	3	1.5	1°30`	4.5	6	16	60	6
WB542 030 15 20	3	1.5	1°30`	4.5	6	20	65	6
WB542 030 15 30	3	1.5	1°30`	4.5	6	30	70	6
WB542 030 15 40	3	1.5	1°30`	4.5	6	40	80	6
WB542 030 15 50	3	1.5	1°30`	4.5	6	50	90	6
WB542 030 15 60	3	1.5	1°30`	4.5	6	60	100	6
WB542 030 20 16	3	1.5	2°	4.5	6	16	60	6
WB542 030 20 20	3	1.5	2°	4.5	6	20	65	6
WB542 030 20 30	3	1.5	2°	4.5	6	30	70	6
WB542 030 20 40	3	1.5	2°	4.5	6	40	80	6
WB542 030 20 50	3	1.5	2°	4.5	6	50	90	8
WB542 030 30 30	3	1.5	3°	4.5	6	30	70	6
WB542 030 30 40	3	1.5	3°	4.5	6	40	90	8
WB542 030 50 30	3	1.5	5°	4.5	6	30	70	8
WB542 030 50 40	3	1.5	5°	4.5	6	40	90	10
WB542 040 05 40	4	2	30`	6	8	40	90	6
WB542 040 05 50	4	2	30`	6	8	50	100	6
WB542 040 05 60	4	2	30`	6	8	60	110	6
WB542 040 05 70	4	2	30`	6	8	70	120	6
WB542 040 10 40	4	2	1°	6	8	40	90	6
WB542 040 10 50	4	2	1°	6	8	50	100	6
WB542 040 10 60	4	2	1°	6	8	60	110	8
WB542 040 10 70	4	2	1°	6	8	70	120	8
WB542 040 15 40	4	2	1°30`	6	8	40	90	6
WB542 040 15 50	4	2	1°30`	6	8	50	100	8
WB542 040 15 60	4	2	1°30`	6	8	60	110	8
WB542 040 15 70	4	2	1°30`	6	8	70	120	8
WB542 040 30 50	4	2	3°	6	8	50	100	10
WB542 040 50 50	4	2	5°	6	8	50	100	12
WB542 050 10 60	5	2.5	1°	10	13	60	120	8
WB542 050 15 60	5	2.5	1°30`	10	13	60	120	8
WB542 050 30 40	5	2.5	3°	10	13	40	120	8
WB542 060 10 60	6	3	1°	12	15	60	120	8
WB542 060 10 90	6	3	1°	12	15	90	150	10
WB542 060 15 60	6	3	1°30`	12	15	60	120	10
WB542 060 15 90	6	3	1°30`	12	15	90	150	10
WB542 060 20 60	6	3	2°	12	15	60	120	10
WB542 060 20 90	6	3	2°	12	15	90	150	12
WB542 060 30 60	6	3	3°	12	15	60	120	12
WB542 060 30 90	6	3	3°	12	15	90	150	14
WB542 080 10 70	8	4	1°	14	18	70	130	10
WB542 080 10 100	8	4	1°	14	18	100	150	12
WB542 080 15 70	8	4	1°30`	14	18	70	130	12
WB542 080 15 100	8	4	1°30`	14	18	100	150	14
WB542 080 20 70	8	4	2°	14	18	70	130	12
WB542 080 20 100	8	4	2°	14	18	100	150	14
WB542 080 30 70	8	4	3°	14	18	70	130	14
WB542 080 30 100	8	4	3°	14	18	100	150	18
WB542 100 10 70	10	5	1°	18	22	70	130	12
WB542 100 10 80	10	5	1°	18	22	80	150	14
WB542 100 10 100	10	5	1°	18	22	100	200	14
WB542 100 15 70	10	5	1°30`	18	22	70	130	14
WB542 100 15 80	10	5	1°30`	18	22	80	150	14
WB542 100 15 100	10	5	1°30`	18	22	100	200	16
WB542 100 20 70	10	5	2°	18	22	70	130	14
WB542 100 20 80	10	5	2°	18	22	80	150	16
WB542 100 20 100	10	5	2°	18	22	100	200	16
WB542 100 30 70	10	5	3°	18	22	70	130	16
WB542 100 30 80	10	5	3°	18	22	80	150	18
WB542 100 30 100	10	5	3°	18	22	100	200	20
WB542 120 10 60	12	6	1°	22	25	60	130	14
WB542 120 10 80	12	6	1°	22	25	80	150	14
WB542 120 10 90	12	6	1°	22	25	90	180	16
WB542 120 10 100	12	6	1°	22	25	100	200	16
WB542 120 15 60	12	6	1°30`	22	25	60	130	14
WB542 120 15 80	12	6	1°30`	22	25	80	150	16
WB542 120 15 90	12	6	1°30`	22	25	90	180	16
WB542 120 15 100	12	6	1°30`	22	25	100	200	16
WB542 120 20 60	12	6	2°	22	25	60	130	16
WB542 120 20 80	12	6	2°	22	25	80	150	16
WB542 120 20 90	12	6	2°	22	25	90	180	18
WB542 120 20 100	12	6	2°	22	25	100	200	18
WB542 120 30 60	12	6	3°	22	25	60	130	16
WB542 120 30 80	12	6	3°	22	25	80	150	18
WB542 120 30 90	12	6	3°	22	25	90	180	20
WB542 120 30 100	12	6	3°	22	25	100	200	20

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

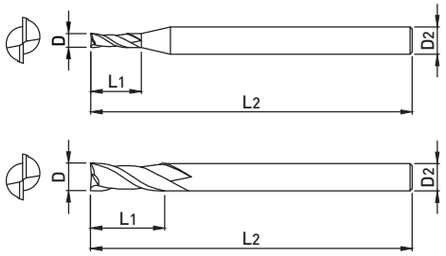
■ **Applicable Working Material**

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○	◎	○				○		○

○ : GOOD ◎ : EXCELLENT

WME502

2 FLUTES MINIATURE TYPE SQUARE ENDMILL



- Suitable for Mold & die machining, Superior chip evacuation and multi-purpose
- Extend customer choice with a wide range of specifications from Ø0.1 to Ø25

ULTRA FINE | 2 | 30° HELIX | W | DATA

p.504

■ TOLERANCE

D		SHANK DIA.
D0.1 ~ 6	0 ~ -0.012mm	h6
D6.5 ~ 25	0 ~ -0.015mm	

EDP No	D	L1	L2	D2
WME502 001	0.1	0.2	40	4
WME502 0015	0.15	0.3	40	4
WME502 002	0.2	0.4	40	4
WME502 0025	0.25	0.5	40	4
WME502 003	0.3	0.6	40	4
WME502 0035	0.35	0.7	40	4
WME502 004	0.40	0.8	40	4
WME502 0045	0.45	0.9	40	4
WME502 005	0.5	1	40	4
WME502 0055	0.55	1.1	40	4
WME502 006	0.6	1.2	40	4
WME502 0065	0.65	1.3	40	4
WME502 007	0.7	1.4	40	4
WME502 0075	0.75	1.5	40	4
WME502 008	0.8	1.6	40	4
WME502 0085	0.85	1.7	40	4
WME502 009	0.9	1.8	40	4
WME502 0095	0.95	2	40	4
WME502 010	1	2.5	50	6
WME502 012	1.2	3	50	6
WME502 015	1.5	4	50	6
WME502 020	2	6	50	6
WME502 025	2.5	7	50	6
WME502 030	3	8	50	6
WME502 035	3.5	10	50	6
WME502 040	4	10	50	6
WME502 045	4.5	14	50	6
WME502 050	5	15	60	6
WME502 055	5.5	15	60	6
WME502 060	6	15	60	6
WME502 065	6.5	18	60	8
WME502 070	7	20	60	8
WME502 075	7.5	20	60	8
WME502 080	8	20	70	8

EDP No	D	L1	L2	D2
WME502 085	8.5	22	70	10
WME502 090	9	22	70	10
WME502 095	9.5	24	70	10
WME502 100	10	25	75	10
WME502 105	10.5	26	75	12
WME502 110	11	30	75	12
WME502 115	11.5	30	80	12
WME502 120	12	30	80	12
WME502 130	13	35	100	12
WME502 140 S12	14	35	100	12
WME502 140	14	35	100	14
WME502 140 S16	14	35	100	16
WME502 150	15	38	100	16
WME502 160	16	40	100	16
WME502 170	17	42	100	16
WME502 180 S16	18	45	100	16
WME502 180	18	45	100	18
WME502 190	19	45	100	20
WME502 200	20	45	100	20
WME502 210	21	45	100	20
WME502 220	22	45	100	20
WME502 230	23	50	120	25
WME502 240	24	50	120	25
WME502 250	25	50	120	25

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

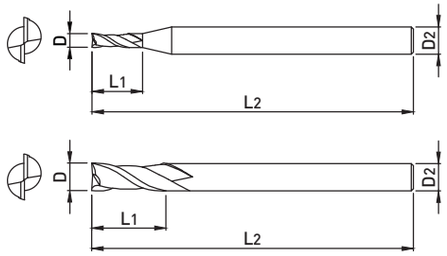
■ Applicable Working Material

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○	◎	○				○		○

○ : GOOD ◎ : EXCELLENT

WE502

2 FLUTES SQUARE ENDMILL



- Suitable for Mold & die machining, Superior chip evacuation and multi-purpose
- Extend customer choice with a wide range of specifications from Ø0.1 to Ø20

ULTRA FINE | 2 | 30° HELIX | W | DATA

p.504

■ TOLERANCE

D		SHANK DIA.
ALL SIZES	0 ~ -0.012mm	h6

EDP No	D	L1	L2	D2
WE502 001 001	0.1	0.1	40	4
WE502 001	0.1	0.2	40	4
WE502 001 003	0.1	0.3	40	4
WE502 002 002	0.2	0.2	40	4
WE502 002	0.2	0.4	40	4
WE502 002 006	0.2	0.6	40	4
WE502 003 003	0.3	0.3	40	4
WE502 003	0.3	0.6	40	4
WE502 003 009	0.3	0.9	40	4
WE502 004	0.4	0.6	40	4
WE502 004 004	0.4	0.8	40	4
WE502 004 012	0.4	1.2	40	4
WE502 005 005	0.5	0.5	40	4
WE502 005	0.5	1	40	4
WE502 005 015	0.5	1.5	40	4
WE502 006 006	0.6	0.6	40	4
WE502 006	0.6	1.2	40	4
WE502 006 018	0.6	1.8	40	4
WE502 007 007	0.7	0.7	40	4
WE502 007	0.7	1.4	40	4
WE502 007 021	0.7	2.1	40	4
WE502 008 008	0.8	0.8	40	4
WE502 008	0.8	1.6	40	4
WE502 008 024	0.8	2.4	40	4
WE502 009 009	0.9	0.9	40	4
WE502 009	0.9	1.8	40	4
WE502 009 027	1.9	2.7	40	4
WE502 010 01	1	1	40	6
WE502 010 02	1	2	40	6
WE502 010	1	2.5	50	6
WE502 010 S4	1	2.5	50	4
WE502 010 03	1	3	50	6
WE502 010 04	1	4	50	6
WE502 010 06	1	6	50	6
WE502 011 S4	1.1	3	50	4
WE502 012 02	1.2	2	40	6
WE502 012	1.2	3	50	6
WE502 012 S4	1.2	3	50	4
WE502 012 04	1.2	4	50	6
WE502 012 06	1.2	6	50	6
WE502 013 S4	1.3	3	50	4

EDP No	D	L1	L2	D2
WE502 014 S4	1.4	4	50	4
WE502 015 015	1.5	1.5	40	6
WE502 015 03	1.5	3	40	6
WE502 015	1.5	4	50	6
WE502 015 S4	1.5	4	50	4
WE502 015 06	1.5	6	50	6
WE502 015 08	1.5	8	50	6
WE502 015 10	1.5	10	50	6
WE502 016 S4	1.6	4	50	4
WE502 017 S4	1.7	4	50	4
WE502 018 S4	1.8	5	50	4
WE502 019 S4	1.9	5	50	4
WE502 020 02	2	2	40	6
WE502 020 04	2	4	40	6
WE502 020	2	6	50	6
WE502 020 S4	2	6	50	4
WE502 020 08	2	8	50	6
WE502 020 10	2	10	50	6
WE502 020 12	2	12	50	6
WE502 021 S4	2.1	6	50	4
WE502 022 S4	2.2	6	50	4
WE502 023 S4	2.3	6	50	4
WE502 024 S4	2.4	6	50	4
WE502 025 025	2.5	2.5	40	6
WE502 025 05	2.5	5	40	6
WE502 025	2.5	7	50	6
WE502 025 S4	2.5	8	50	4
WE502 025 10	2.5	10	50	6
WE502 025 12	2.5	12	50	6
WE502 026 S4	2.6	8	50	4
WE502 027 S4	2.7	8	50	4
WE502 028 S4	2.8	8	50	4
WE502 029 S4	2.9	8	50	4
WE502 030 03	3	3	40	6
WE502 030 06	3	6	40	6
WE502 030	3	8	50	6
WE502 030 S4	3	8	50	4
WE502 030 10	3	10	50	6
WE502 030 12	3	12	50	6
WE502 030 14	3	14	50	6
WE502 035 S4	3.5	10	50	4

WE502

2 FLUTES SQUARE ENDMILL

EDP No	D	L_1	L_2	D_2
WE502 040 04	4	4	40	6
WE502 040 08	4	8	40	6
WE502 040	4	10	50	6
WE502 040 S4	4	10	50	4
WE502 040 080 S4	4	10	80	4
WE502 040 12	4	12	50	6
WE502 040 14	4	14	50	6
WE502 040 16	4	16	50	6
WE502 050 05	5	5	50	6
WE502 050 10	5	10	50	6
WE502 050	5	15	60	6
WE502 050 20	5	20	60	6
WE502 050 25	5	25	60	6
WE502 060 06	6	6	50	6
WE502 060 12	6	12	50	6
WE502 060	6	15	60	6
WE502 060 20	6	20	60	6
WE502 060 25	6	25	60	6
WE502 080 16	8	16	60	8
WE502 080	8	20	70	8
WE502 080 25	8	25	70	8
WE502 080 30	8	30	70	8
WE502 100 22	10	22	65	10
WE502 100	10	25	75	10
WE502 100 30	10	30	75	10
WE502 100 35	10	35	75	10
WE502 120 26	12	26	70	12
WE502 120	12	30	80	12
WE502 120 35	12	35	80	12
WE502 120 40	12	40	80	12
WE502 140	14	35	100	16
WE502 160	16	32	100	16
WE502 16 040	16	40	100	16
WE502 180	18	45	100	20
WE502 200	20	45	100	20

EDP No	D	L_1	L_2	D_2

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

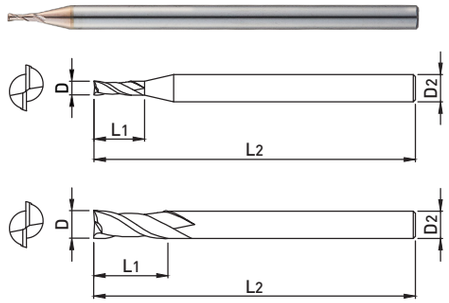
■ **Applicable Working Material**

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○	◎	○				○		○

○ : GOOD ◎ : EXCELLENT

2 FLUTES SQUARE ENDMILL

WE502---S3



- Suitable for Mold & die machining, Superior chip evacuation and multi-purpose
- Extend customer choice with a wide range of specifications from Ø0.1 to Ø3

ULTRA FINE | 2 | 30° HELIX | W | DATA

p.504

■ **TOLERANCE**

D		SHANK DIA.
ALL SIZES	0 ~ -0.012mm	h6

EDP No	D	L_1	L_2	D_2
WE502 001 S3	0.1	0.2	40	3
WE502 002 S3	0.2	0.4	40	3
WE502 003 S3	0.3	0.6	40	3
WE502 004 S3	0.4	0.8	40	3
WE502 005 S3	0.5	1	40	3
WE502 006 S3	0.6	1.2	40	3
WE502 007 S3	0.7	1.4	40	3
WE502 008 S3	0.8	1.6	40	3
WE502 009 S3	0.9	1.8	40	3
WE502 010 S3	1	2.5	50	3
WE502 012 S3	1.2	3	50	3
WE502 015 S3	1.5	4	50	3
WE502 020 S3	2	6	50	3
WE502 025 S3	2.5	7	50	3
WE502 030 S3	3	8	50	3

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

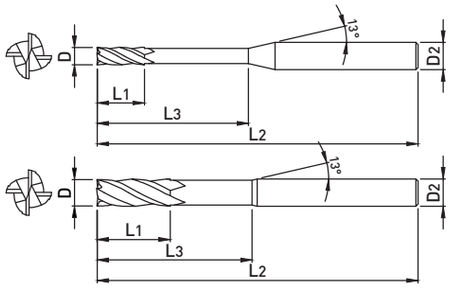
■ **Applicable Working Material**

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○	◎	○				○		○

○ : GOOD ◎ : EXCELLENT

WE514

4 FLUTES NECK TYPE SQUARE ENDMILL



- Superior stability of machining by design considered the characteristics of Mold & die machining
- Suitable for deep part machining with various neck size

ULTRA FINE | 4 | 30° HELIX | W | DATA

p.505

■ **TOLERANCE**

D		SHANK DIA.
ALL SIZES	0 ~ -0.03mm	h6

EDP No	D	L_1	L_3	L_2	D_2
WE514 010 02	1	1.5	2	50	4
WE514 010 03	1	1.5	3	50	4
WE514 010 04	1	1.5	4	50	4
WE514 010 05	1	1.5	5	50	4
WE514 010 06	1	1.5	6	50	4
WE514 010 07	1	1.5	7	50	4
WE514 010 08	1	1.5	8	50	4
WE514 010 10	1	1.5	10	50	4
WE514 010 12	1	1.5	12	50	4
WE514 010 14	1	1.5	14	50	4
WE514 010 16	1	1.5	16	50	4
WE514 010 18	1	1.5	18	50	4
WE514 010 20	1	1.5	20	50	4
WE514 010 22	1	1.5	22	60	4
WE514 010 26	1	1.5	26	60	4
WE514 010 30	1	1.5	30	70	4
WE514 010 40	1	1.5	40	80	4
WE514 010 50	1	1.5	50	100	4
WE514 012 04	1.2	1.8	4	50	4
WE514 012 06	1.2	1.8	6	50	4
WE514 012 08	1.2	1.8	8	50	4
WE514 012 10	1.2	1.8	10	50	4
WE514 012 12	1.2	1.8	12	50	4
WE514 012 14	1.2	1.8	14	50	4
WE514 012 16	1.2	1.8	16	50	4
WE514 012 20	1.2	1.8	20	50	4
WE514 012 26	1.2	1.8	26	60	4
WE514 012 30	1.2	1.8	30	70	4
WE514 015 04	1.5	2.3	4	50	4
WE514 015 05	1.5	2.3	5	50	4
WE514 015 06	1.5	2.3	6	50	4
WE514 015 07	1.5	2.3	7	50	4
WE514 015 08	1.5	2.3	8	50	4
WE514 015 10	1.5	2.3	10	50	4
WE514 015 12	1.5	2.3	12	50	4
WE514 015 14	1.5	2.3	14	50	4

EDP No	D	L_1	L_3	L_2	D_2
WE514 015 16	1.5	2.3	16	50	4
WE514 015 18	1.5	2.3	18	50	4
WE514 015 20	1.5	2.3	20	50	4
WE514 015 22	1.5	2.3	22	60	4
WE514 015 26	1.5	2.3	26	60	4
WE514 015 30	1.5	2.3	30	70	4
WE514 020 06	2	3	6	50	4
WE514 020 08	2	3	8	50	4
WE514 020 10	2	3	10	50	4
WE514 020 12	2	3	12	50	4
WE514 020 14	2	3	14	50	4
WE514 020 16	2	3	16	50	4
WE514 020 18	2	3	18	50	4
WE514 020 20	2	3	20	50	4
WE514 020 22	2	3	22	60	4
WE514 020 26	2	3	26	60	4
WE514 020 30	2	3	30	70	4
WE514 020 35	2	3	35	70	4
WE514 020 40	2	3	40	80	4
WE514 020 45	2	3	45	90	4
WE514 020 50	2	3	50	100	4
WE514 020 60	2	3	60	110	4
WE514 025 08	2.5	4	8	50	4
WE514 025 10	2.5	4	10	50	4
WE514 025 12	2.5	4	12	50	4
WE514 025 14	2.5	4	14	50	4
WE514 025 16	2.5	4	16	50	4
WE514 025 18	2.5	4	18	50	4
WE514 025 20	2.5	4	20	50	4
WE514 025 22	2.5	4	22	60	4
WE514 025 26	2.5	4	26	60	4
WE514 025 30	2.5	4	30	70	4
WE514 025 35	2.5	4	35	70	4
WE514 025 40	2.5	4	40	80	4
WE514 025 45	2.5	4	45	90	4
WE514 025 50	2.5	4	50	100	4

EDP No	D	L_1	L_3	L_2	D_2
WE514 030 06	3	4.5	6	50	6
WE514 030 08	3	4.5	8	50	6
WE514 030 10	3	4.5	10	50	6
WE514 030 12	3	4.5	12	50	6
WE514 030 14	3	4.5	14	60	6
WE514 030 16	3	4.5	16	60	6
WE514 030 18	3	4.5	18	60	6
WE514 030 20	3	4.5	20	60	6
WE514 030 22	3	4.5	22	65	6
WE514 030 26	3	4.5	26	65	6
WE514 030 30	3	4.5	30	70	6
WE514 030 35	3	4.5	35	70	6
WE514 030 40	3	4.5	40	80	6
WE514 030 45	3	4.5	45	90	6
WE514 030 50	3	4.5	50	100	6
WE514 030 60	3	4.5	60	100	6
WE514 040 08	4	4.5	8	50	6
WE514 040 10	4	4.5	10	50	6
WE514 040 12	4	4.5	12	50	6
WE514 040 14	4	4.5	14	60	6
WE514 040 16	4	4.5	16	60	6
WE514 040 18	4	4.5	18	60	6
WE514 040 20	4	4.5	20	60	6
WE514 040 22	4	4.5	22	65	6
WE514 040 26	4	4.5	26	65	6
WE514 040 30	4	4.5	30	70	6
WE514 040 35	4	4.5	35	70	6
WE514 040 40	4	4.5	40	80	6
WE514 040 45	4	4.5	45	90	6
WE514 040 50	4	4.5	50	100	6
WE514 040 60	4	4.5	60	100	6
WE514 050 16	5	8	16	60	6
WE514 050 20	5	8	20	60	6
WE514 050 26	5	8	26	65	6
WE514 050 30	5	8	30	70	6
WE514 050 35	5	8	35	75	6
WE514 050 40	5	8	40	80	6
WE514 050 50	5	8	50	90	6
WE514 050 60	5	8	60	100	6
WE514 060 15	6	9	15	60	6
WE514 060 20	6	9	20	60	6
WE514 060 30	6	9	30	70	6
WE514 060 32	6	9	32	90	6
WE514 080 25	8	12	25	70	8
WE514 080 30	8	12	30	80	8
WE514 080 42	8	12	42	100	8
WE514 100 30	10	15	30	75	10
WE514 100 35	10	15	35	80	10

EDP No	D	L_1	L_3	L_2	D_2
WE514 100 45	10	15	45	100	10
WE514 120 35	12	20	35	80	12
WE514 120 40	12	20	40	90	12
WE514 120 50	12	20	50	110	12

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

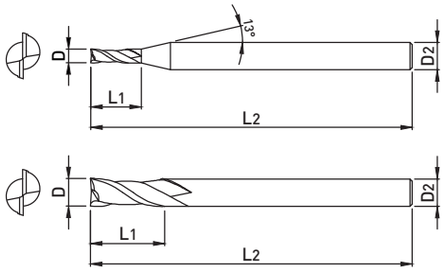
■ **Applicable Working Material**

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○	◎	○				○		○

○ : GOOD ◎ : EXCELLENT

WE522

2 FLUTES LONG SHANK SQUARE ENDMILL



- Superior stability of machining by design considered the characteristics of Mold & die machining
- Suitable for deep part machining with various neck size

ULTRA FINE | 2 | 30° HELIX | W | DATA

p.505

■ **TOLERANCE**

D		SHANK DIA.
ALL SIZES	0 ~ -0.03mm	h6

EDP No	D	L_1	L_2	D_2
WE522 010 03	1	3	60	6
WE522 010 04	1	4	60	6
WE522 010 05	1	5	60	6
WE522 010 06	1	6	60	6
WE522 010 07	1	7	60	6
WE522 010 08	1	8	60	6
WE522 010 10	1	10	60	6
WE522 010 12	1	12	60	6
WE522 012 04	1.2	4	60	6
WE522 012 06	1.2	6	60	6
WE522 012 08	1.2	8	60	6
WE522 012 10	1.2	10	60	6
WE522 012 12	1.2	12	60	6
WE522 015 06	1.5	6	60	6
WE522 015 08	1.5	8	60	6
WE522 015 10	1.5	10	60	6
WE522 015 12	1.5	12	60	6
WE522 015 14	1.5	14	60	6
WE522 015 16	1.5	16	60	6
WE522 020 08	2	8	60	6
WE522 020 10	2	10	60	6
WE522 020 12	2	12	60	6
WE522 020 14	2	14	60	6
WE522 020 16	2	16	60	6
WE522 025 10	2.5	10	60	6
WE522 025 12	2.5	12	60	6
WE522 025 16	2.5	16	60	6
WE522 025 20	2.5	20	60	6
WE522 025 26	2.5	26	60	6
WE522 030 16 S3	3	16	100	3
WE522 030 10	3	10	70	6
WE522 030 12	3	12	70	6
WE522 030 14	3	14	70	6
WE522 030 16	3	16	70	6
WE522 030 20	3	20	70	6
WE522 030 26	3	26	70	6

EDP No	D	L_1	L_2	D_2
WE522 030 30	3	30	70	6
WE522 040 20 S4	4	20	100	4
WE522 040 12	4	12	70	6
WE522 040 16	4	16	70	6
WE522 040 20	4	20	70	6
WE522 040 26	4	26	70	6
WE522 040 30	4	30	70	6
WE522 050 20	5	20	70	6
WE522 050 25	5	25	70	6
WE522 050 25 100	5	25	100	6
WE522 050 30	5	30	80	6
WE522 050 35	5	35	90	6
WE522 050 40	5	40	100	6
WE522 060 15	6	15	60	6
WE522 060 15 080	6	15	80	6
WE522 060 20	6	20	70	6
WE522 060 20 090	6	20	90	6
WE522 060 25	6	25	75	6
WE522 060 30	6	30	80	6
WE522 060 30 100	6	30	100	6
WE522 060 30 150	6	30	150	6
WE522 060 35	6	35	90	6
WE522 060 40	6	40	90	6
WE522 060 40 120	6	40	120	6
WE522 060 45	6	45	150	6
WE522 080 25	8	25	80	8
WE522 080 30	8	30	80	8
WE522 080 30 100	8	30	100	8
WE522 080 35	8	35	90	8
WE522 080 40	8	40	90	8
WE522 080 40 120	8	40	120	8
WE522 080 40 150	8	40	150	8
WE522 080 45	8	45	100	8
WE522 080 50	8	50	100	8
WE522 080 50 150	8	50	150	8
WE522 100 30	10	30	80	10

EDP No	D	L_1	L_2	D_2
WE522 100 30 100	10	30	100	10
WE522 100 35	10	35	90	10
WE522 100 40	10	40	90	10
WE522 100 40 120	10	40	120	10
WE522 100 45	10	45	100	10
WE522 100 50	10	50	100	10
WE522 100 50 150	10	50	150	10
WE522 100 50 200	10	50	200	10
WE522 100 55	10	55	150	10
WE522 100 60	10	60	110	10
WE522 100 60 200	10	60	200	10
WE522 120 35	12	35	90	12
WE522 120 40	12	40	100	12
WE522 120 40 120	12	40	120	12
WE522 120 45	12	45	130	12
WE522 120 50	12	50	100	12
WE522 120 50 150	12	50	150	12
WE522 120 55	12	55	110	12
WE522 120 60	12	60	110	12
WE522 120 60 150	12	60	150	12
WE522 120 60 200	12	60	200	12
WE522 120 65	12	65	150	12
WE522 120 70	12	70	120	12
WE522 120 70 200	12	70	200	12
WE522 140 50	14	50	110	16
WE522 140 60	14	60	150	16
WE522 160 40	16	40	150	16
WE522 160 50	16	50	110	16
WE522 160 50 150	16	50	150	16
WE522 160 60	16	60	120	16
WE522 160 70	16	70	130	16
WE522 160 70 150	16	70	150	16
WE522 160 70 200	16	70	200	16
WE522 160 80	16	80	150	16
WE522 160 90	16	90	150	16
WE522 160 110	16	110	200	16
WE522 160 120	16	120	250	16
WE522 180 50	18	50	120	20
WE522 180 70	18	70	130	20
WE522 180 100	18	100	200	20
WE522 200 50	20	50	110	20
WE522 200 50 150	20	50	150	20
WE522 200 60	20	60	130	20
WE522 200 70	20	70	130	20
WE522 200 80	20	80	150	20
WE522 200 90	20	90	150	20
WE522 200 90 200	20	90	200	20
WE522 200 110	20	110	200	20

EDP No	D	L_1	L_2	D_2
WE522 200 120	20	120	250	20
WE522 220 75	22	75	150	20
WE522 220 110	22	110	200	20
WE522 250 70	25	70	150	25
WE522 250 90	25	90	150	25
WE522 250 110	25	110	200	25
WE522 250 120	25	120	250	25

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

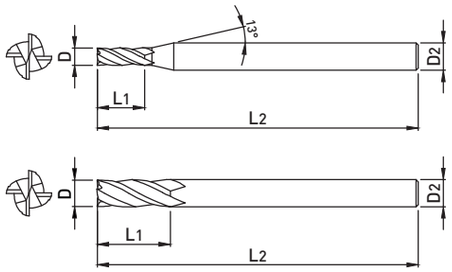
■ **Applicable Working Material**

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○	◎	○				○		○

○ : GOOD ◎ : EXCELLENT

WE524

4 FLUTES LONG SHANK SQUARE ENDMILL



- Superior stability of machining by design considered the characteristics of Mold & die machining
- Suitable for deep part machining with various neck size
- Excellent workpiece finishes in semi-finishing and finishing by 4 flutes cutting

ULTRA FINE | 4 | 30° HELIX | W | DATA

p.506

■ **TOLERANCE**

D		SHANK DIA.
ALL SIZES	0 ~ -0.03mm	h6

EDP No	D	L_1	L_2	D_2
WE524 010 03	1	3	60	6
WE524 010 04	1	4	60	6
WE524 010 05	1	5	60	6
WE524 010 06	1	6	60	6
WE524 010 07	1	7	60	6
WE524 010 08	1	8	60	6
WE524 010 10	1	10	60	6
WE524 010 12	1	12	60	6
WE524 012 04	1.2	4	60	6
WE524 012 06	1.2	6	60	6
WE524 012 08	1.2	8	60	6
WE524 012 10	1.2	10	60	6
WE524 012 12	1.2	12	60	6
WE524 015 06	1.5	6	60	6
WE524 015 08	1.5	8	60	6
WE524 015 10	1.5	10	60	6
WE524 015 12	1.5	12	60	6
WE524 015 14	1.5	14	60	6
WE524 015 16	1.5	16	60	6
WE524 015 20	1.5	20	60	6
WE524 015 26	1.5	26	60	6
WE524 020 08	2	8	60	6
WE524 020 10	2	10	60	6
WE524 020 12	2	12	60	6
WE524 020 14	2	14	60	6
WE524 020 16	2	16	60	6
WE524 025 10	2.5	10	60	6
WE524 025 12	2.5	12	60	6
WE524 025 16	2.5	16	60	6
WE524 025 20	2.5	20	60	6
WE524 025 26	2.5	26	60	6
WE524 030 16 S3	3	16	100	3
WE524 030 10	3	10	70	6
WE524 030 12	3	12	70	6
WE524 030 14	3	14	70	6
WE524 030 16	3	16	70	6

EDP No	D	L_1	L_2	D_2
WE524 030 20	3	20	70	6
WE524 030 26	3	26	70	6
WE524 030 30	3	30	70	6
WE524 030 35	3	35	90	6
WE524 040 20 S4	4	20	100	4
WE524 040 12	4	12	70	6
WE524 040 16	4	16	70	6
WE524 040 20	4	20	70	6
WE524 040 26	4	26	70	6
WE524 040 30	4	30	70	6
WE524 050 20	5	20	70	6
WE524 050 25	5	25	70	6
WE524 050 25 100	5	25	100	6
WE524 050 30	5	30	80	6
WE524 050 35	5	35	90	6
WE524 050 40	5	40	100	6
WE524 060 15	6	15	60	6
WE524 060 15 080	6	15	80	6
WE524 060 20	6	20	70	6
WE524 060 20 090	6	20	90	6
WE524 060 25	6	25	75	6
WE524 060 30	6	30	80	6
WE524 060 30 100	6	30	100	6
WE524 060 30 150	6	30	150	6
WE524 060 35	6	35	90	6
WE524 060 40	6	40	90	6
WE524 060 40 120	6	40	120	6
WE524 060 45	6	45	150	6
WE524 080 25	8	25	80	8
WE524 080 30	8	30	80	8
WE524 080 30 100	8	30	100	8
WE524 080 35	8	35	90	8
WE524 080 40	8	40	90	8
WE524 080 40 120	8	40	120	8
WE524 080 40 150	8	40	150	8
WE524 080 45	8	45	100	8

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

EDP No	D	L_1	L_2	D_2
WE524 080 50	8.0	50.0	100	8
WE524 080 50 150	8.0	50.0	150	8
WE524 100 30	10.0	30.0	80	10
WE524 100 30 100	10.0	30.0	100	10
WE524 100 35	10.0	35.0	90	10
WE524 100 40	10.0	40.0	90	10
WE524 100 40 120	10.0	40.0	120	10
WE524 100 45	10.0	45.0	100	10
WE524 100 50	10.0	50.0	100	10
WE524 100 50 150	10.0	50.0	150	10
WE524 100 50 200	10.0	50.0	200	10
WE524 100 55	10.0	55.0	150	10
WE524 100 60	10.0	60.0	110	10
WE524 100 60 200	10.0	60.0	200	10
WE524 120 35	12.0	35.0	90	12
WE524 120 40	12.0	40.0	100	12
WE524 120 40 120	12.0	40.0	120	12
WE524 120 45	12.0	45.0	130	12
WE524 120 50	12.0	50.0	100	12
WE524 120 50 150	12.0	50.0	150	12
WE524 120 55	12.0	55.0	110	12
WE524 120 60	12.0	60.0	110	12
WE524 120 60 150	12.0	60.0	150	12
WE524 120 60 200	12.0	60.0	200	12
WE524 120 65	12.0	65.0	150	12
WE524 120 70	12.0	70.0	120	12
WE524 120 70 200	12.0	70.0	200	12
WE524 140 50	14.0	50.0	110	16
WE524 140 60	14.0	60.0	150	16
WE524 160 40	16.0	40.0	150	16
WE524 160 50	16.0	50.0	110	16
WE524 160 50 150	16.0	50.0	150	16
WE524 160 60	16.0	60.0	120	16
WE524 160 70	16.0	70.0	130	16
WE524 160 70 150	16.0	70.0	150	16
WE524 160 70 200	16.0	70.0	200	16
WE524 160 80	16.0	80.0	150	16
WE524 160 90	16.0	90.0	150	16
WE524 160 110	16.0	110.0	200	16
WE524 160 120	16.0	120.0	250	16
WE524 180 50	18.0	50.0	120	20
WE524 180 70	18.0	70.0	130	20
WE524 180 100	18.0	100.0	200	20
WE524 200 50	20.0	50.0	110	20
WE524 200 50 150	20.0	50.0	150	20
WE524 200 60	20.0	60.0	130	20
WE524 200 70	20.0	70.0	130	20
WE524 200 80	20.0	80.0	150	20

EDP No	D	L_1	L_2	D_2
WE524 200 90	20.0	90.0	150	20
WE524 200 90 200	20.0	90.0	200	20
WE524 200 110	20.0	110.0	200	20
WE524 200 120	20.0	120.0	250	20
WE524 220 75	22.0	75.0	150	20
WE524 220 110	22.0	110.0	200	20
WE524 250 70	25.0	70.0	150	25
WE524 250 90	25.0	90.0	150	25
WE524 250 110	25.0	110.0	200	25
WE524 250 120	25.0	120.0	250	25

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

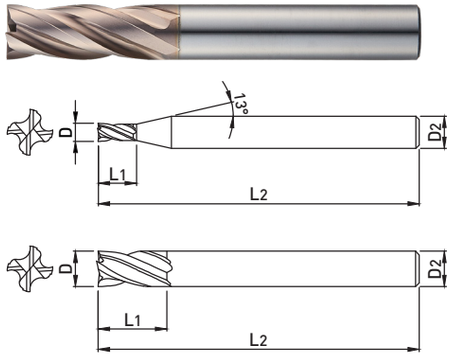
■ **Applicable Working Material**

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○	◎	○				○		○

○ : GOOD ◎ : EXCELLENT

WME504

4 FLUTES VARIABLE HELIX SQUARE ENDMILL



- Excellent machinability and cheap evacuation with a variable index geometry
- Increased tool life and excellent cutting performance reliability with a reduced chatter vibration
- Excellent machining surface with proper design of rake angle considered the characteristics of workpiece.

ULTRA FINE | 4 | M HELIX | W | DATA

p.506

■ TOLERANCE

D		SHANK DIA.
ALL SIZES	0 ~ -0.03mm	h6

EDP No	D	L_1	L_2	D_2
WME504 008	0.8	1.6	40	4
WME504 009	0.9	1.8	40	4
WME504 010	1	2.5	50	6
WME504 012	1.2	3	50	6
WME504 015	1.5	4	50	6
WME504 020	2	6	50	6
WME504 025	2.5	7	50	6
WME504 030	3	8	50	6
WME504 035	3.5	10	50	6
WME504 040	4	10	50	6
WME504 045	4.5	14	50	6
WME504 050	5	15	60	6
WME504 055	5.5	15	60	6
WME504 060	6	15	60	6
WME504 065	6.5	18	60	8
WME504 070	7	20	60	8
WME504 075	7.5	20	60	8
WME504 080	8	20	70	8
WME504 085	8.5	22	70	10
WME504 090	9	22	70	10
WME504 095	9.5	24	70	10
WME504 100	10	25	75	10
WME504 105	10.5	26	75	12
WME504 110	11	30	75	12
WME504 115	11.5	30	80	12
WME504 120	12	30	80	12
WME504 130	13	35	100	12
WME504 140 S12	14	35	100	12
WME504 140 S14	14	35	100	14
WME504 140	14	35	100	16

EDP No	D	L_1	L_2	D_2
WME504 150	15	38	100	16
WME504 160	16	40	100	16
WME504 170	17	42	100	16
WME504 180 S16	18	45	100	16
WME504 180	18	45	100	18
WME504 190	19	45	100	20
WME504 200	20	45	100	20
WME504 210	21	45	100	20
WME504 220	22	45	100	20
WME504 230	23	50	120	25
WME504 240	24	50	120	25
WME504 250	25	50	120	25

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

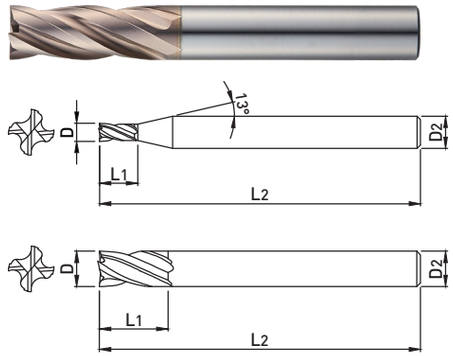
■ Applicable Working Material

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○	◎	○				○		○

○ : GOOD ◎ : EXCELLENT

WXE504

4 FLUTES VARIABLE HELIX SQUARE ENDMILL



- Excellent machinability and cheap evacuation with a variable index geometry
- Increased tool life and excellent cutting performance reliability with a reduced chatter vibration
- Excellent machining surface with proper design of rake angle considered the characteristics of workpiece.

ULTRA FINE | 4 | M HELIX | W | DATA

p.506

■ TOLERANCE

D		SHANK DIA.
ALL SIZES	0 ~ -0.03mm	h6

EDP No	D	L_1	L_2	D_2
WXE504 010 01	1	1	40	6
WXE504 010 02	1	2	40	6
WXE504 010	1	2.5	50	6
WXE504 010 03	1	3	50	6
WXE504 010 04	1	4	50	6
WXE504 010 06	1	6	50	6
WXE504 012 02	1.2	2	40	6
WXE504 012	1.2	3	50	6
WXE504 012 04	1.2	4	50	6
WXE504 012 06	1.2	6	50	6
WXE504 015 015	1.5	1.5	40	6
WXE504 015 03	1.5	3	40	6
WXE504 015	1.5	4	50	6
WXE504 015 06	1.5	6	50	6
WXE504 015 08	1.5	8	50	6
WXE504 015 10	1.5	10	50	6
WXE504 020 02	2	2	40	6
WXE504 020 04	2	4	40	6
WXE504 020	2	6	50	6
WXE504 020 08	2	8	50	6
WXE504 020 10	2	10	50	6
WXE504 020 12	2	12	50	6
WXE504 025 025	2.5	2.5	40	6
WXE504 025 05	2.5	5	40	6
WXE504 025	2.5	7	50	6
WXE504 025 10	2.5	10	50	6
WXE504 025 12	2.5	12	50	6
WXE504 030 03	3	3	40	6
WXE504 030 06	3	6	40	6
WXE504 030	3	8	50	6
WXE504 030 10	3	10	50	6
WXE504 030 12	3	12	50	6
WXE504 030 14	3	14	50	6

EDP No	D	L_1	L_2	D_2
WXE504 040 04	4	4	40	6
WXE504 040 08	4	8	40	6
WXE504 040	4	10	50	6
WXE504 040 12	4	12	50	6
WXE504 040 14	4	14	50	6
WXE504 040 16	4	16	50	6
WXE504 050 05	5	5	50	6
WXE504 050 10	5	10	50	6
WXE504 050	5	15	60	6
WXE504 050 20	5	20	60	6
WXE504 050 25	5	25	60	6
WXE504 060 06	6	6	50	6
WXE504 060 12	6	12	50	6
WXE504 060	6	15	60	6
WXE504 060 20	6	20	60	6
WXE504 060 25	6	25	60	6
WXE504 080 16	8	16	60	8
WXE504 080	8	20	70	8
WXE504 080 25	8	25	70	8
WXE504 080 30	8	30	70	8
WXE504 100 22	10	22	65	10
WXE504 100	10	25	75	10
WXE504 100 30	10	30	75	10
WXE504 100 35	10	35	75	10
WXE504 120 26	12	26	70	12
WXE504 120	12	30	80	12
WXE504 120 35	12	35	80	12
WXE504 120 40	12	40	80	12
WXE504 140	14	35	100	16
WXE504 160 32	16	32	100	16
WXE504 160	16	40	100	16
WXE504 180	18	45	100	20
WXE504 200	20	45	100	20

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

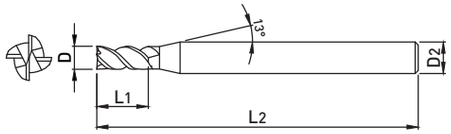
■ Applicable Working Material

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○	◎	○				○		○

○ : GOOD ◎ : EXCELLENT

WE504H

4 FLUTES 45° HELIX SQUARE ENDMILL



- Suitable for Mold & die machining, Superior chip evacuation and multi-purpose
- Excellent processability and Surface roughness with 45° Helix angle

ULTRA FINE | 4 | 45° HELIX | W | DATA

p.507

■ TOLERANCE

D		SHANK DIA.
ALL SIZES	0 ~ -0.03mm	h6

EDP No	D	L_1	L_2	D_2
WE504H 010	1	2.5	50	6
WE504H 010 04	1	4	60	6
WE504H 010 06	1	6	60	6
WE504H 015	1.5	4	50	6
WE504H 015 06	1.5	6	60	6
WE504H 015 08	1.5	8	60	6
WE504H 020	2	6	50	6
WE504H 020 08	2	8	60	6
WE504H 020 10	2	10	60	6
WE504H 030	3	8	50	6
WE504H 030 10	3	10	70	6
WE504H 030 12	3	12	70	6
WE504H 030 16	3	16	70	6
WE504H 040	4	10	50	6
WE504H 040 12	4	12	70	6
WE504H 040 16	4	16	70	6
WE504H 040 20	4	20	70	6
WE504H 050	5	15	50	6
WE504H 050 30	5	30	80	6
WE504H 060	6	15	60	6
WE504H 060 20	6	20	70	6
WE504H 060 30	6	30	80	6
WE504H 080	8	20	70	8
WE504H 080 30	8	30	80	8
WE504H 080 35	8	35	90	8
WE504H 080 40	8	40	90	8
WE504H 100	10	25	75	10
WE504H 100 30	10	30	80	10
WE504H 100 40	10	40	90	10
WE504H 100 50	10	50	100	10

EDP No	D	L_1	L_2	D_2
WE504H 120	12	30	80	12
WE504H 120 40	12	40	90	12
WE504H 120 50	12	50	100	12
WE504H 120 60	12	60	110	12
WE504H 160	16	40	100	16
WE504H 160 50	16	50	110	16
WE504H 160 60	16	60	120	16
WE504H 160 110	16	110	200	16
WE504H 200	20	45	100	20
WE504H 200 60	20	60	120	20
WE504H 200 70	20	70	130	20
WE504H 200 110	20	110	200	20

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

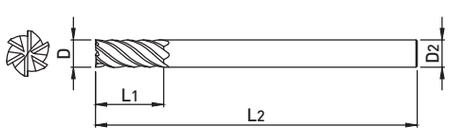
■ Applicable Working Material

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○	◎	○				○		○

○ : GOOD ◎ : EXCELLENT

WE506

6 FLUTES 45° HELIX SQUARE ENDMILL



- Excellent workpiece finishes by applying 6 flutes in finishing
- Excellent processability and reduced cutting load with 45° Helix angle

ULTRA FINE | 6 | 45° HELIX | W | DATA

p.508

■ TOLERANCE

D		SHANK DIA.
ALL SIZES	0 ~ -0.03mm	h6

EDP No	D	L_1	L_2	D_2
WE506 060	6	15	60	6
WE506 060 20	6	20	70	6
WE506 060 30	6	30	80	6
WE506 060 30 110	6	30	110	6
WE506 080	8	20	70	8
WE506 080 30	8	30	80	8
WE506 080 35	8	35	90	8
WE506 080 40	8	40	90	8
WE506 080 40 130	8	40	130	8
WE506 100	10	25	75	10
WE506 100 30	10	30	80	10
WE506 100 40	10	40	90	10
WE506 100 50	10	50	100	10
WE506 100 50 150	10	50	150	10
WE506 120	12	30	80	12
WE506 120 40	12	40	90	12
WE506 120 50	12	50	100	12
WE506 120 60	12	60	110	12
WE506 120 60 150	12	60	150	12
WE506 160	16	40	100	16
WE506 160 50	16	50	110	16
WE506 160 60	16	60	120	16
WE506 160 90	16	90	150	16
WE506 160 110	16	110	200	16
WE506 160 110 250	16	110	250	16
WE506 200	20	45	100	20
WE506 200 60	20	60	120	20
WE506 200 70	20	70	130	20
WE506 200 110	20	110	200	20
WE506 200 110 250	20	110	250	20
WE506 200 110 300	20	110	300	20

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

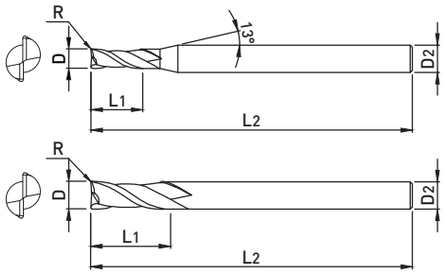
■ Applicable Working Material

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○	◎	○				○		○

○ : GOOD ◎ : EXCELLENT

WR502

2 FLUTES RADIUS ENDMILL



- Suitable for Mold & die machining, Superior chip evacuation and multi-purpose
- Suitable for deep groove machining with long shank type
- Extend customer choice with various corner R size

ULTRA FINE | 2 | 30° HELIX | R ±0.01 | R ±0.015 | W | DATA

ϕ6 OR UNDER ABOVE ϕ6

p.509

■ **TOLERANCE**

D		SHANK DIA.
D0.2~6	0 ~ -0.012mm	h6
D7~20	0 ~ -0.015mm	

EDP No	D	R	L_1	L_2	D_2
WR502 002 002	0.2	0.02	0.4	40	4
WR502 002 005	0.2	0.05	0.4	40	4
WR502 003 002	0.3	0.02	0.6	40	4
WR502 003 005	0.3	0.05	0.6	40	4
WR502 004 005	0.4	0.05	0.8	40	4
WR502 004 01	0.4	0.1	0.8	40	4
WR502 005 005	0.5	0.05	1	40	4
WR502 005 01	0.5	0.1	1	40	4
WR502 006 005	0.6	0.05	1.2	40	4
WR502 006 01	0.6	0.1	1.2	40	4
WR502 006 02	0.6	0.2	1.2	40	4
WR502 007 005	0.7	0.05	1.4	40	4
WR502 007 01	0.7	0.1	1.4	40	4
WR502 007 02	0.7	0.2	1.4	40	4
WR502 008 005	0.8	0.05	1.6	40	4
WR502 008 01	0.8	0.1	1.6	40	4
WR502 008 02	0.8	0.2	1.6	40	4
WR502 009 005	0.9	0.05	1.8	40	4
WR502 009 01	0.9	0.1	1.8	40	4
WR502 010 005	1	0.05	2.5	50	6
WR502 010 01	1	0.1	2.5	50	6
WR502 010 02	1	0.2	2.5	50	6
WR502 010 03	1	0.3	2.5	50	6
WR502 012 005	1.2	0.05	3	50	6
WR502 012 01	1.2	0.1	3	50	6
WR502 012 02	1.2	0.2	3	50	6
WR502 012 03	1.2	0.3	3	50	6
WR502 015 005	1.5	0.05	4	50	6
WR502 015 01	1.5	0.1	4	50	6
WR502 015 02	1.5	0.2	4	50	6
WR502 015 03	1.5	0.3	4	50	6
WR502 015 05	1.5	0.5	4	50	6
WR502 020 01	2	0.1	6	50	6
WR502 020 02	2	0.2	6	50	6
WR502 020 03	2	0.3	6	50	6
WR502 020 05	2	0.5	6	50	6

EDP No	D	R	L_1	L_2	D_2
WR502 025 01	2.5	0.1	7	60	6
WR502 025 02	2.5	0.2	7	60	6
WR502 025 03	2.5	0.3	7	60	6
WR502 025 05	2.5	0.5	7	60	6
WR502 030 01	3	0.1	8	60	6
WR502 030 02	3	0.2	8	60	6
WR502 030 03	3	0.3	8	60	6
WR502 030 05	3	0.5	8	60	6
WR502 030 10	3	1	8	60	6
WR502 035 01	3.5	0.1	10	70	6
WR502 035 02	3.5	0.2	10	70	6
WR502 035 03	3.5	0.3	10	70	6
WR502 035 05	3.5	0.5	10	70	6
WR502 040 01 S4	4	0.1	10	70	4
WR502 040 02 S4	4	0.2	10	70	4
WR502 040 03 S4	4	0.3	10	70	4
WR502 040 05 S4	4	0.5	10	70	4
WR502 040 10 S4	4	1	10	70	4
WR502 040 01 100 S4	4	0.1	10	100	4
WR502 040 02 100 S4	4	0.2	10	100	4
WR502 040 03 100 S4	4	0.3	10	100	4
WR502 040 05 100 S4	4	0.5	10	100	4
WR502 040 10 100 S4	4	1	10	100	4
WR502 040 01	4	0.1	10	100	6
WR502 040 02	4	0.2	10	100	6
WR502 040 03	4	0.3	10	100	6
WR502 040 05	4	0.5	10	100	6
WR502 040 10	4	1	10	100	6
WR502 045 01	4.5	0.1	11	80	6
WR502 045 02	4.5	0.2	11	80	6
WR502 045 03	4.5	0.3	11	80	6
WR502 045 05	4.5	0.5	11	80	6
WR502 050 01	5	0.1	13	90	6
WR502 050 02	5	0.2	13	90	6
WR502 050 03	5	0.3	13	90	6
WR502 050 05	5	0.5	13	90	6

EDP No	D	R	L_1	L_2	D_2
WR502 050 10	5	1	13	90	6
WR502 055 01	5.5	0.1	13	90	6
WR502 055 02	5.5	0.2	13	90	6
WR502 055 03	5.5	0.3	13	90	6
WR502 055 05	5.5	0.5	13	90	6
WR502 055 10	5.5	1	13	90	6
WR502 060 03 60	6	0.3	15	60	6
WR502 060 05 60	6	0.5	15	60	6
WR502 060 10 60	6	1	15	60	6
WR502 060 01	6	0.1	15	90	6
WR502 060 02	6	0.2	15	90	6
WR502 060 03	6	0.3	15	90	6
WR502 060 05	6	0.5	15	90	6
WR502 060 10	6	1	15	90	6
WR502 060 15	6	1.5	15	90	6
WR502 060 20	6	2	15	90	6
WR502 060 05 110	6	0.5	15	110	6
WR502 060 10 110	6	1	15	110	6
WR502 060 05 130	6	0.5	15	130	6
WR502 060 10 130	6	1	15	130	6
WR502 070 01	7	0.1	16	90	8
WR502 070 02	7	0.2	16	90	8
WR502 070 03	7	0.3	16	90	8
WR502 070 05	7	0.5	16	90	8
WR502 070 10	7	1	16	90	8
WR502 070 20	7	2	16	90	8
WR502 080 03 70	8	0.3	20	70	8
WR502 080 05 70	8	0.5	20	70	8
WR502 080 10 70	8	1	20	70	8
WR502 080 01	8	0.1	20	100	8
WR502 080 02	8	0.2	20	100	8
WR502 080 03	8	0.3	20	100	8
WR502 080 05	8	0.5	20	100	8
WR502 080 10	8	1	20	100	8
WR502 080 15	8	1.5	20	100	8
WR502 080 20	8	2	20	100	8
WR502 080 25	8	2.5	20	100	8
WR502 080 30	8	3	20	100	8
WR502 080 05 120	8	0.5	20	120	8
WR502 080 10 120	8	1	20	120	8
WR502 080 05 150	8	0.5	20	150	8
WR502 080 10 150	8	1	20	150	8
WR502 100 03 75	10	0.3	25	75	10
WR502 100 05 75	10	0.5	25	75	10
WR502 100 10 75	10	1	25	75	10
WR502 100 01	10	0.1	25	100	10
WR502 100 02	10	0.2	25	100	10
WR502 100 03	10	0.3	25	100	10

EDP No	D	R	L_1	L_2	D_2
WR502 100 05	10	0.5	25	100	10
WR502 100 10	10	1	25	100	10
WR502 100 15	10	1.5	25	100	10
WR502 100 20	10	2	25	100	10
WR502 100 25	10	2.5	25	100	10
WR502 100 30	10	3	25	100	10
WR502 100 40	10	4	25	100	10
WR502 100 05 130	10	0.5	25	130	10
WR502 100 10 130	10	1	25	130	10
WR502 100 05 150	10	0.5	25	150	10
WR502 100 10 150	10	1	25	150	10
WR502 110 02	11	0.2	25	110	12
WR502 110 03	11	0.3	25	110	12
WR502 110 05	11	0.5	25	110	12
WR502 110 10	11	1	25	110	12
WR502 110 20	11	2	25	110	12
WR502 120 03 80	12	0.3	30	80	12
WR502 120 05 80	12	0.5	30	80	12
WR502 120 10 80	12	1	30	80	12
WR502 120 01	12	0.1	30	110	12
WR502 120 02	12	0.2	30	110	12
WR502 120 03	12	0.3	30	110	12
WR502 120 05	12	0.5	30	110	12
WR502 120 10	12	1	30	110	12
WR502 120 15	12	1.5	30	110	12
WR502 120 20	12	2	30	110	12
WR502 120 25	12	2.5	30	110	12
WR502 120 30	12	3	30	110	12
WR502 120 40	12	4	30	110	12
WR502 120 50	12	5	30	110	12
WR502 120 05 130	12	0.5	30	130	12
WR502 120 10 130	12	1	30	130	12
WR502 120 05 150	12	0.5	30	150	12
WR502 120 10 150	12	1	30	150	12
WR502 140 05	14	0.5	30	150	16
WR502 140 10	14	1	30	150	16
WR502 140 20	14	2	30	150	16
WR502 160 05	16	0.5	32	150	16
WR502 160 10	16	1	32	150	16
WR502 160 15	16	1.5	32	150	16
WR502 160 20	16	2	32	150	16
WR502 200 05	20	0.5	38	150	20
WR502 200 10	20	1	38	150	20
WR502 200 15	20	1.5	38	150	20
WR502 200 20	20	2	38	150	20

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

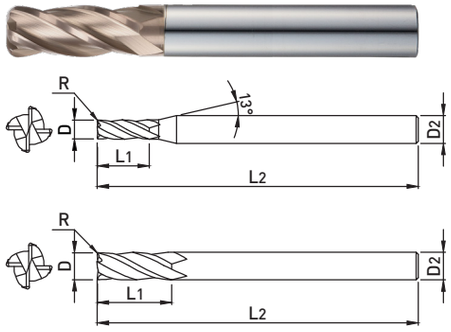
■ **Applicable Working Material**

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○	◎	○				○		○

○ : GOOD ◎ : EXCELLENT

WR504

4 FLUTES RADIUS ENDMILL



- Suitable for Mold & die machining, Superior chip evacuation and multi-purpose
- Excellent machinability and cheap evacuation with a variable index geometry
- Extend customer choice with various corner R size

ULTRA FINE | 4 | 38° HELIX | R ±0.02 | W | DATA

ALL SIZES

p.509

■ TOLERANCE

D		SHANK DIA.
ALL SIZES	0 ~ -0.03mm	h6

EDP No	D	R	L_1	L_2	D_2
WR504 030 02	3	0.2	8	60	6
WR504 030 03	3	0.3	8	60	6
WR504 030 05	3	0.5	8	60	6
WR504 040 02	4	0.2	10	70	6
WR504 040 03	4	0.3	10	70	6
WR504 040 05	4	0.5	10	70	6
WR504 040 10	4	1	10	70	6
WR504 050 03 060	5	0.3	13	60	6
WR504 050 05 060	5	0.5	13	60	6
WR504 050 03	5	0.3	13	90	6
WR504 050 05	5	0.5	13	90	6
WR504 060 03 060	6	0.3	15	60	6
WR504 060 05 060	6	0.5	15	60	6
WR504 060 10 060	6	1	15	60	6
WR504 060 03	6	0.3	15	90	6
WR504 060 05	6	0.5	15	90	6
WR504 060 10	6	1	15	90	6
WR504 080 03 070	8	0.3	20	70	8
WR504 080 05 070	8	0.5	20	70	8
WR504 080 10 070	8	1	20	70	8
WR504 080 03	8	0.3	20	100	8
WR504 080 05	8	0.5	20	100	8
WR504 080 10	8	1	20	100	8
WR504 100 03 075	10	0.3	25	75	10
WR504 100 05 075	10	0.5	25	75	10
WR504 100 10 075	10	1	25	75	10
WR504 100 03	10	0.3	25	100	10
WR504 100 05	10	0.5	25	100	10
WR504 100 10	10	1	25	100	10
WR504 120 03 080	12	0.3	30	80	12
WR504 120 05 080	12	0.5	30	80	12
WR504 120 10 080	12	1	30	80	12
WR504 120 03	12	0.3	30	110	12
WR504 120 05	12	0.5	30	110	12
WR504 120 10	12	1	30	110	12
WR504 160 05 100	16	0.5	32	100	16
WR504 160 10 100	16	1	32	100	16
WR504 160 15 100	16	1.5	32	100	16
WR504 160 20 100	16	2	32	100	16
WR504 160 05	16	0.5	32	150	16
WR504 160 10	16	1	32	150	16
WR504 160 15	16	1.5	32	150	16
WR504 160 20	16	2	32	150	16
WR504 200 05 100	20	0.5	38	100	20
WR504 200 10 100	20	1	38	100	20
WR504 200 15 100	20	1.5	38	100	20
WR504 200 20 100	20	2	38	100	20
WR504 200 05	20	0.5	38	150	20
WR504 200 10	20	1	38	150	20
WR504 200 15	20	1.5	38	150	20
WR504 200 20	20	2	38	150	20

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

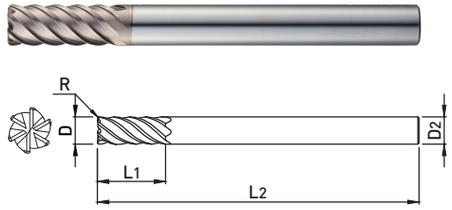
■ Applicable Working Material

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○	◎	○				○		○

○ : GOOD ◎ : EXCELLENT

WR506

6 FLUTES 45° HELIX RADIUS ENDMILL



- Excellent workpiece finishes by applying 6 flutes in finishing
- Excellent processability and reduced cutting load with 45° Helix angle
- Suitable for deep groove machining with long shank type

ULTRA FINE | 6 | 45° HELIX | R ±0.015 | W | DATA

ALL SIZES

p.510

■ TOLERANCE

D		SHANK DIA.
ALL SIZES	0 ~ -0.03mm	h6

EDP No	D	R	L_1	L_2	D_2
WR506 060 03	6	0.3	15	90	6
WR506 060 05	6	0.5	15	90	6
WR506 060 10	6	1	15	90	6
WR506 080 03	8	0.3	20	100	8
WR506 080 05	8	0.5	20	100	8
WR506 080 10	8	1	20	100	8
WR506 100 03	10	0.3	25	100	10
WR506 100 05	10	0.5	25	100	10
WR506 100 10	10	1	25	100	10
WR506 120 03	12	0.3	30	110	12
WR506 120 05	12	0.5	30	110	12
WR506 120 10	12	1	30	110	12
WR506 160 05	16	0.5	32	150	16
WR506 160 10	16	1	32	150	16
WR506 160 15	16	1.5	32	150	16
WR506 160 20	16	2	32	150	16
WR506 200 05	20	0.5	38	150	20
WR506 200 10	20	1	38	150	20
WR506 200 15	20	1.5	38	150	20
WR506 200 20	20	2	38	150	20

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

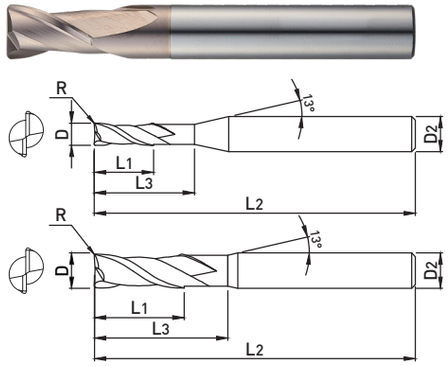
■ Applicable Working Material

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○	◎	○				○		○

○ : GOOD ◎ : EXCELLENT

WR512

2 FLUTES NECK TYPE RADIUS ENDMILL



- Excellent workpiece finishes by applying 2 flutes in finishing
- Excellent processability and reduced cutting load with 30° Helix angle
- Suitable for deep groove machining with long shank type

ULTRA FINE | 2 | 30° HELIX | R ±0.01 | R ±0.015 | W | DATA

Φ6 OR UNDER ABOVE Φ6

p.509

▪ **TOLERANCE**

D		SHANK DIA.
D0.2 ~ D6	0 ~ -0.012mm	h6
D8 ~ 12	0 ~ -0.015mm	

EDP No	D	R	L1	L3	L2	D2
WR512 002 002 005	0.2	0.02	0.3	0.5	50	6
WR512 002 002 01	0.2	0.02	0.3	1	50	6
WR512 002 002 015	0.2	0.02	0.3	1.5	50	6
WR512 002 002 02	0.2	0.02	0.3	2	50	6
WR512 002 005 005	0.2	0.05	0.3	0.5	50	6
WR512 002 005 01	0.2	0.05	0.3	1	50	6
WR512 002 005 015	0.2	0.05	0.3	1.5	50	6
WR512 002 005 02	0.2	0.05	0.3	2	50	6
WR512 003 002 01	0.3	0.02	0.5	1	50	6
WR512 003 002 02	0.3	0.02	0.5	2	50	6
WR512 003 002 03	0.3	0.02	0.5	3	50	6
WR512 003 005 01	0.3	0.05	0.5	1	50	6
WR512 003 005 02	0.3	0.05	0.5	2	50	6
WR512 003 005 03	0.3	0.05	0.5	3	50	6
WR512 004 005 01	0.4	0.05	0.6	1	50	6
WR512 004 005 015	0.4	0.05	0.6	1.5	50	6
WR512 004 005 02	0.4	0.05	0.6	2	50	6
WR512 004 005 025	0.4	0.05	0.6	2.5	50	6
WR512 004 005 03	0.4	0.05	0.6	3	50	6
WR512 004 005 04	0.4	0.05	0.6	4	50	6
WR512 004 01 01	0.4	0.1	0.6	1	50	6
WR512 004 01 015	0.4	0.1	0.6	1.5	50	6
WR512 004 01 02	0.4	0.1	0.6	2	50	6
WR512 004 01 025	0.4	0.1	0.6	2.5	50	6
WR512 004 01 03	0.4	0.1	0.6	3	50	6
WR512 004 01 04	0.4	0.1	0.6	4	50	6
WR512 005 005 01	0.5	0.05	0.7	1	45	6
WR512 005 005 015	0.5	0.05	0.7	1.5	45	6
WR512 005 005 02	0.5	0.05	0.7	2	45	6
WR512 005 005 025	0.5	0.05	0.7	2.5	45	6
WR512 005 005 03	0.5	0.05	0.7	3	45	6
WR512 005 005 04	0.5	0.05	0.7	4	45	6
WR512 005 005 05	0.5	0.05	0.7	5	45	6
WR512 005 005 06	0.5	0.05	0.7	6	45	6
WR512 005 01 01	0.5	0.10	0.7	1	45	6
WR512 005 01 015	0.5	0.10	0.7	1.5	45	6

EDP No	D	R	L1	L3	L2	D2
WR512 005 01 02	0.5	0.1	0.7	2	45	6
WR512 005 01 025	0.5	0.1	0.7	2.5	45	6
WR512 005 01 03	0.5	0.1	0.7	3	45	6
WR512 005 01 04	0.5	0.1	0.7	4	45	6
WR512 005 01 05	0.5	0.1	0.7	5	45	6
WR512 005 01 06	0.5	0.1	0.7	6	45	6
WR512 006 005 02	0.6	0.05	0.9	2	45	6
WR512 006 005 03	0.6	0.05	0.9	3	45	6
WR512 006 005 04	0.6	0.05	0.9	4	45	6
WR512 006 005 06	0.6	0.05	0.9	6	45	6
WR512 006 005 08	0.6	0.05	0.9	8	45	6
WR512 006 005 10	0.6	0.05	0.9	10	45	6
WR512 006 01 02	0.6	0.1	0.9	2	45	6
WR512 006 01 03	0.6	0.1	0.9	3	45	6
WR512 006 01 04	0.6	0.1	0.9	4	45	6
WR512 006 01 06	0.6	0.1	0.9	6	45	6
WR512 006 01 08	0.6	0.1	0.9	8	45	6
WR512 006 01 10	0.6	0.1	0.9	10	45	6
WR512 006 02 02	0.6	0.2	0.9	2	45	6
WR512 006 02 03	0.6	0.2	0.9	3	45	6
WR512 006 02 04	0.6	0.2	0.9	4	45	6
WR512 006 02 06	0.6	0.2	0.9	6	45	6
WR512 006 02 08	0.6	0.2	0.9	8	45	6
WR512 006 02 10	0.6	0.2	0.9	10	45	6
WR512 007 005 02	0.7	0.05	1.2	2	45	6
WR512 007 005 04	0.7	0.05	1.2	4	45	6
WR512 007 005 06	0.7	0.05	1.2	6	45	6
WR512 007 005 08	0.7	0.05	1.2	8	45	6
WR512 007 005 10	0.7	0.05	1.2	10	45	6
WR512 007 01 02	0.7	0.1	1.2	2	45	6
WR512 007 01 04	0.7	0.1	1.2	4	45	6
WR512 007 01 06	0.7	0.1	1.2	6	45	6
WR512 007 01 08	0.7	0.1	1.2	8	45	6
WR512 007 01 10	0.7	0.1	1.2	10	45	6
WR512 007 02 02	0.7	0.2	1.2	2	45	6
WR512 007 02 04	0.7	0.2	1.2	4	45	6

EDP No	D	R	L1	L3	L2	D2
WR512 007 02 06	0.7	0.2	1.2	6	50	6
WR512 007 02 08	0.7	0.2	1.2	8	50	6
WR512 007 02 10	0.7	0.2	1.2	10	50	6
WR512 008 005 02	0.8	0.05	1.2	2	50	6
WR512 008 005 03	0.8	0.05	1.2	3	50	6
WR512 008 005 04	0.8	0.05	1.2	4	50	6
WR512 008 005 06	0.8	0.05	1.2	6	50	6
WR512 008 005 08	0.8	0.05	1.2	8	50	6
WR512 008 005 10	0.8	0.05	1.2	10	50	6
WR512 008 01 02	0.8	0.1	1.2	2	50	6
WR512 008 01 03	0.8	0.1	1.2	3	50	6
WR512 008 01 04	0.8	0.1	1.2	4	50	6
WR512 008 01 06	0.8	0.1	1.2	6	50	6
WR512 008 01 08	0.8	0.1	1.2	8	50	6
WR512 008 01 10	0.8	0.1	1.2	10	50	6
WR512 008 02 02	0.8	0.2	1.2	2	50	6
WR512 008 02 03	0.8	0.2	1.2	3	50	6
WR512 008 02 04	0.8	0.2	1.2	4	50	6
WR512 008 02 06	0.8	0.2	1.2	6	50	6
WR512 008 02 08	0.8	0.2	1.2	8	50	6
WR512 008 02 10	0.8	0.2	1.2	10	50	6
WR512 010 005 03	1	0.05	1.5	3	50	6
WR512 010 005 04	1	0.05	1.5	4	50	6
WR512 010 005 06	1	0.05	1.5	6	50	6
WR512 010 005 08	1	0.05	1.5	8	50	6
WR512 010 005 10	1	0.05	1.5	10	50	6
WR512 010 005 12	1	0.05	1.5	12	50	6
WR512 010 005 14	1	0.05	1.5	14	50	6
WR512 010 005 16	1	0.05	1.5	16	50	6
WR512 010 005 20	1	0.05	1.5	20	50	6
WR512 010 01 03	1	0.1	1.5	3	50	6
WR512 010 01 04	1	0.1	1.5	4	50	6
WR512 010 01 06	1	0.1	1.5	6	50	6
WR512 010 01 08	1	0.1	1.5	8	50	6
WR512 010 01 10	1	0.1	1.5	10	50	6
WR512 010 01 12	1	0.1	1.5	12	50	6
WR512 010 01 14	1	0.1	1.5	14	50	6
WR512 010 01 16	1	0.1	1.5	16	50	6
WR512 010 01 20	1	0.1	1.5	20	50	6
WR512 010 02 03	1	0.2	1.5	3	50	6
WR512 010 02 04	1	0.2	1.5	4	50	6
WR512 010 02 06	1	0.2	1.5	6	50	6
WR512 010 02 08	1	0.2	1.5	8	50	6
WR512 010 02 10	1	0.2	1.5	10	50	6
WR512 010 02 12	1	0.2	1.5	12	50	6
WR512 010 02 14	1	0.2	1.5	14	50	6
WR512 010 02 16	1	0.2	1.5	16	50	6
WR512 010 02 20	1	0.2	1.5	20	50	6
WR512 010 03 03	1	0.3	1.5	3	50	6
WR512 010 03 04	1	0.3	1.5	4	50	6
WR512 010 03 06	1	0.3	1.5	6	50	6
WR512 010 03 08	1	0.3	1.5	8	50	6
WR512 010 03 10	1	0.3	1.5	10	50	6
WR512 010 03 12	1	0.3	1.5	12	50	6
WR512 010 03 14	1	0.3	1.5	14	50	6
WR512 010 03 16	1	0.3	1.5	16	50	6

EDP No	D	R	L1	L3	L2	D2
WR512 010 03 20	1	0.3	1.5	20	50	6
WR512 012 005 03	1.2	0.05	1.8	3	50	6
WR512 012 005 04	1.2	0.05	1.8	4	50	6
WR512 012 005 06	1.2	0.05	1.8	6	50	6
WR512 012 005 08	1.2	0.05	1.8	8	50	6
WR512 012 005 10	1.2	0.05	1.8	10	50	6
WR512 012 005 12	1.2	0.05	1.8	12	50	6
WR512 012 005 16	1.2	0.05	1.8	16	50	6
WR512 012 005 20	1.2	0.05	1.8	20	50	6
WR512 012 01 03	1.2	0.1	1.8	3	50	6
WR512 012 01 04	1.2	0.1	1.8	4	50	6
WR512 012 01 06	1.2	0.1	1.8	6	50	6
WR512 012 01 08	1.2	0.1	1.8	8	50	6
WR512 012 01 10	1.2	0.1	1.8	10	50	6
WR512 012 01 12	1.2	0.1	1.8	12	50	6
WR512 012 01 16	1.2	0.1	1.8	16	50	6
WR512 012 01 20	1.2	0.1	1.8	20	50	6
WR512 012 02 03	1.2	0.2	1.8	3	50	6
WR512 012 02 04	1.2	0.2	1.8	4	50	6
WR512 012 02 06	1.2	0.2	1.8	6	50	6
WR512 012 02 08	1.2	0.2	1.8	8	50	6
WR512 012 02 10	1.2	0.2	1.8	10	50	6
WR512 012 02 12	1.2	0.2	1.8	12	50	6
WR512 012 02 16	1.2	0.2	1.8	16	50	6
WR512 012 02 20	1.2	0.2	1.8	20	50	6
WR512 012 03 03	1.2	0.3	1.8	3	50	6
WR512 012 03 04	1.2	0.3	1.8	4	50	6
WR512 012 03 06	1.2	0.3	1.8	6	50	6
WR512 012 03 08	1.2	0.3	1.8	8	50	6
WR512 012 03 10	1.2	0.3	1.8	10	50	6
WR512 012 03 12	1.2	0.3	1.8	12	50	6
WR512 012 03 16	1.2	0.3	1.8	16	50	6
WR512 012 03 20	1.2	0.3	1.8	20	50	6
WR512 015 005 04	1.5	0.05	2.3	4	50	6
WR512 015 005 06	1.5	0.05	2.3	6	50	6
WR512 015 005 08	1.5	0.05	2.3	8	50	6
WR512 015 005 10	1.5	0.05	2.3	10	50	6
WR512 015 005 12	1.5	0.05	2.3	12	50	6
WR512 015 005 14	1.5	0.05	2.3	14	50	6
WR512 015 005 16	1.5	0.05	2.3	16	50	6
WR512 015 005 20	1.5	0.05	2.3	20	50	6
WR512 015 005 22	1.5	0.05	2.3	22	60	6
WR512 015 005 26	1.5	0.05	2.3	26	60	6
WR512 015 01 04	1.5	0.1	2.3	4	50	6
WR512 015 01 06	1.5	0.1	2.3	6	50	6
WR512 015 01 08	1.5	0.1	2.3	8	50	6
WR512 015 01 10	1.5	0.1	2.3	10	50	6
WR512 015 01 12	1.5	0.1	2.3	12	50	6
WR512 015 01 14	1.5	0.1	2.3	14	50	6
WR512 015 01 16	1.5	0.1	2.3	16	50	6
WR512 015 01 20	1.5	0.1	2.3	20	50	6
WR512 015 01 22	1.5	0.1	2.3	22	60	6
WR512 015 01 26	1.5	0.1	2.3	26	60	6
WR512 015 02 04	1.5	0.2	2.3	4	50	6
WR512 015 02 06	1.5	0.2	2.3	6	50	6
WR512 015 02 08	1.5	0.2	2.3	8	50	6

EDP No	D	R	L_1	L_3	L_2	D_2
WR512 015 02 10	1.5	0.2	2.3	10	50	6
WR512 015 02 12	1.5	0.2	2.3	12	50	6
WR512 015 02 14	1.5	0.2	2.3	14	50	6
WR512 015 02 16	1.5	0.2	2.3	16	50	6
WR512 015 02 20	1.5	0.2	2.3	20	50	6
WR512 015 02 22	1.5	0.2	2.3	22	60	6
WR512 015 02 26	1.5	0.2	2.3	26	60	6
WR512 015 03 04	1.5	0.3	2.3	4	50	6
WR512 015 03 06	1.5	0.3	2.3	6	50	6
WR512 015 03 08	1.5	0.3	2.3	8	50	6
WR512 015 03 10	1.5	0.3	2.3	10	50	6
WR512 015 03 12	1.5	0.3	2.3	12	50	6
WR512 015 03 14	1.5	0.3	2.3	14	50	6
WR512 015 03 16	1.5	0.3	2.3	16	50	6
WR512 015 03 20	1.5	0.3	2.3	20	50	6
WR512 015 03 22	1.5	0.3	2.3	22	60	6
WR512 015 03 26	1.5	0.3	2.3	26	60	6
WR512 015 05 04	1.5	0.5	2.3	4	50	6
WR512 015 05 06	1.5	0.5	2.3	6	50	6
WR512 015 05 08	1.5	0.5	2.3	8	50	6
WR512 015 05 10	1.5	0.5	2.3	10	50	6
WR512 015 05 12	1.5	0.5	2.3	12	50	6
WR512 015 05 14	1.5	0.5	2.3	14	50	6
WR512 015 05 16	1.5	0.5	2.3	16	50	6
WR512 015 05 20	1.5	0.5	2.3	20	50	6
WR512 015 05 22	1.5	0.5	2.3	22	60	6
WR512 015 05 26	1.5	0.5	2.3	26	60	6
WR512 020 01 06	2	0.1	3	6	50	6
WR512 020 01 08	2	0.1	3	8	50	6
WR512 020 01 10	2	0.1	3	10	50	6
WR512 020 01 12	2	0.1	3	12	50	6
WR512 020 01 14	2	0.1	3	14	50	6
WR512 020 01 16	2	0.1	3	16	50	6
WR512 020 01 20	2	0.1	3	20	50	6
WR512 020 01 22	2	0.1	3	22	60	6
WR512 020 01 26	2	0.1	3	26	60	6
WR512 020 01 30	2	0.1	3	30	70	6
WR512 020 02 06	2	0.2	3	6	50	6
WR512 020 02 08	2	0.2	3	8	50	6
WR512 020 02 10	2	0.2	3	10	50	6
WR512 020 02 12	2	0.2	3	12	50	6
WR512 020 02 14	2	0.2	3	14	50	6
WR512 020 02 16	2	0.2	3	16	50	6
WR512 020 02 20	2	0.2	3	20	50	6
WR512 020 02 22	2	0.2	3	22	60	6
WR512 020 02 26	2	0.2	3	26	60	6
WR512 020 02 30	2	0.2	3	30	70	6
WR512 020 03 06	2	0.3	3	6	50	6
WR512 020 03 08	2	0.3	3	8	50	6
WR512 020 03 10	2	0.3	3	10	50	6
WR512 020 03 12	2	0.3	3	12	50	6
WR512 020 03 14	2	0.3	3	14	50	6
WR512 020 03 16	2	0.3	3	16	50	6
WR512 020 03 20	2	0.3	3	20	50	6
WR512 020 03 22	2	0.3	3	22	60	6
WR512 020 03 26	2	0.3	3	26	60	6

EDP No	D	R	L_1	L_3	L_2	D_2
WR512 020 03 30	2	0.3	3	30	70	6
WR512 020 05 06	2	0.5	3	6	50	6
WR512 020 05 08	2	0.5	3	8	50	6
WR512 020 05 10	2	0.5	3	10	50	6
WR512 020 05 12	2	0.5	3	12	50	6
WR512 020 05 14	2	0.5	3	14	50	6
WR512 020 05 16	2	0.5	3	16	50	6
WR512 020 05 20	2	0.5	3	20	50	6
WR512 020 05 22	2	0.5	3	22	60	6
WR512 020 05 26	2	0.5	3	26	60	6
WR512 020 05 30	2	0.5	3	30	70	6
WR512 025 01 08	2.5	0.1	4	8	50	6
WR512 025 01 10	2.5	0.1	4	10	50	6
WR512 025 01 12	2.5	0.1	4	12	50	6
WR512 025 01 14	2.5	0.1	4	14	50	6
WR512 025 01 16	2.5	0.1	4	16	50	6
WR512 025 01 20	2.5	0.1	4	20	50	6
WR512 025 01 26	2.5	0.1	4	26	60	6
WR512 025 01 30	2.5	0.1	4	30	70	6
WR512 025 02 08	2.5	0.2	4	8	50	6
WR512 025 02 10	2.5	0.2	4	10	50	6
WR512 025 02 12	2.5	0.2	4	12	50	6
WR512 025 02 14	2.5	0.2	4	14	50	6
WR512 025 02 16	2.5	0.2	4	16	50	6
WR512 025 02 20	2.5	0.2	4	20	50	6
WR512 025 02 26	2.5	0.2	4	26	60	6
WR512 025 02 30	2.5	0.2	4	30	70	6
WR512 025 03 08	2.5	0.3	4	8	50	6
WR512 025 03 10	2.5	0.3	4	10	50	6
WR512 025 03 12	2.5	0.3	4	12	50	6
WR512 025 03 14	2.5	0.3	4	14	50	6
WR512 025 03 16	2.5	0.3	4	16	50	6
WR512 025 03 20	2.5	0.3	4	20	50	6
WR512 025 03 26	2.5	0.3	4	26	60	6
WR512 025 03 30	2.5	0.3	4	30	70	6
WR512 025 05 08	2.5	0.5	4	8	50	6
WR512 025 05 10	2.5	0.5	4	10	50	6
WR512 025 05 12	2.5	0.5	4	12	50	6
WR512 025 05 14	2.5	0.5	4	14	50	6
WR512 025 05 16	2.5	0.5	4	16	50	6
WR512 025 05 20	2.5	0.5	4	20	50	6
WR512 025 05 26	2.5	0.5	4	26	60	6
WR512 025 05 30	2.5	0.5	4	30	70	6
WR512 030 01 08	3	0.1	4.5	8	50	6
WR512 030 01 10	3	0.1	4.5	10	50	6
WR512 030 01 12	3	0.1	4.5	12	50	6
WR512 030 01 14	3	0.1	4.5	14	60	6
WR512 030 01 16	3	0.1	4.5	16	60	6
WR512 030 01 20	3	0.1	4.5	20	60	6
WR512 030 01 26	3	0.1	4.5	26	65	6
WR512 030 01 30	3	0.1	4.5	30	70	6
WR512 030 01 35	3	0.1	4.5	35	70	6
WR512 030 01 40	3	0.1	4.5	40	80	6
WR512 030 02 08	3	0.2	4.5	8	50	6
WR512 030 02 10	3	0.2	4.5	10	50	6
WR512 030 02 12	3	0.2	4.5	12	50	6

EDP No	D	R	L_1	L_3	L_2	D_2
WR512 030 02 14	3	0.2	4.5	14	60	6
WR512 030 02 16	3	0.2	4.5	16	60	6
WR512 030 02 20	3	0.2	4.5	20	60	6
WR512 030 02 26	3	0.2	4.5	26	65	6
WR512 030 02 30	3	0.2	4.5	30	70	6
WR512 030 02 35	3	0.2	4.5	35	70	6
WR512 030 02 40	3	0.2	4.5	40	80	6
WR512 030 03 08	3	0.3	4.5	8	50	6
WR512 030 03 10	3	0.3	4.5	10	50	6
WR512 030 03 12	3	0.3	4.5	12	50	6
WR512 030 03 14	3	0.3	4.5	14	60	6
WR512 030 03 16	3	0.3	4.5	16	60	6
WR512 030 03 20	3	0.3	4.5	20	60	6
WR512 030 03 26	3	0.3	4.5	26	65	6
WR512 030 03 30	3	0.3	4.5	30	70	6
WR512 030 03 35	3	0.3	4.5	35	70	6
WR512 030 03 40	3	0.3	4.5	40	80	6
WR512 030 05 08	3	0.5	4.5	8	50	6
WR512 030 05 10	3	0.5	4.5	10	50	6
WR512 030 05 12	3	0.5	4.5	12	50	6
WR512 030 05 14	3	0.5	4.5	14	60	6
WR512 030 05 16	3	0.5	4.5	16	60	6
WR512 030 05 20	3	0.5	4.5	20	60	6
WR512 030 05 26	3	0.5	4.5	26	65	6
WR512 030 05 30	3	0.5	4.5	30	70	6
WR512 030 05 35	3	0.5	4.5	35	70	6
WR512 030 05 40	3	0.5	4.5	40	80	6
WR512 030 10 08	3	1	4.5	8	50	6
WR512 030 10 10	3	1	4.5	10	50	6
WR512 030 10 12	3	1	4.5	12	50	6
WR512 030 10 14	3	1	4.5	14	60	6
WR512 030 10 16	3	1	4.5	16	60	6
WR512 030 10 20	3	1	4.5	20	60	6
WR512 030 10 26	3	1	4.5	26	65	6
WR512 030 10 30	3	1	4.5	30	70	6
WR512 030 10 35	3	1	4.5	35	70	6
WR512 030 10 40	3	1	4.5	40	80	6
WR512 040 01 10	4	0.1	6	10	50	6
WR512 040 01 12	4	0.1	6	12	50	6
WR512 040 01 14	4	0.1	6	14	60	6
WR512 040 01 16	4	0.1	6	16	60	6
WR512 040 01 20	4	0.1	6	20	60	6
WR512 040 01 26	4	0.1	6	26	65	6
WR512 040 01 30	4	0.1	6	30	65	6
WR512 040 01 35	4	0.1	6	35	70	6
WR512 040 01 40	4	0.1	6	40	80	6
WR512 040 01 45	4	0.1	6	45	90	6
WR512 040 01 50	4	0.1	6	50	100	6
WR512 040 02 10	4	0.2	6	10	50	6
WR512 040 02 12	4	0.2	6	12	50	6
WR512 040 02 14	4	0.2	6	14	60	6
WR512 040 02 16	4	0.2	6	16	60	6
WR512 040 02 20	4	0.2	6	20	60	6
WR512 040 02 26	4	0.2	6	26	65	6
WR512 040 02 30	4	0.2	6	30	65	6
WR512 040 02 35	4	0.2	6	35	70	6

EDP No	D	R	L_1	L_3	L_2	D_2
WR512 040 02 40	4	0.2	6	40	80	6
WR512 040 02 45	4	0.2	6	45	90	6
WR512 040 02 50	4	0.2	6	50	100	6
WR512 040 03 10	4	0.3	6	10	50	6
WR512 040 03 12	4	0.3	6	12	50	6
WR512 040 03 14	4	0.3	6	14	60	6
WR512 040 03 16	4	0.3	6	16	60	6
WR512 040 03 20	4	0.3	6	20	60	6
WR512 040 03 26	4	0.3	6	26	65	6
WR512 040 03 30	4	0.3	6	30	65	6
WR512 040 03 35	4	0.3	6	35	70	6
WR512 040 03 40	4	0.3	6	40	80	6
WR512 040 03 45	4	0.3	6	45	90	6
WR512 040 03 50	4	0.3	6	50	100	6
WR512 040 05 10	4	0.5	6	10	50	6
WR512 040 05 12	4	0.5	6	12	50	6
WR512 040 05 14	4	0.5	6	14	60	6
WR512 040 05 16	4	0.5	6	16	60	6
WR512 040 05 20	4	0.5	6	20	60	6
WR512 040 05 26	4	0.5	6	26	65	6
WR512 040 05 30	4	0.5	6	30	65	6
WR512 040 05 35	4	0.5	6	35	70	6
WR512 040 05 40	4	0.5	6	40	80	6
WR512 040 05 45	4	0.5	6	45	90	6
WR512 040 05 50	4	0.5	6	50	100	6
WR512 040 10 10	4	1	6	10	50	6
WR512 040 10 12	4	1	6	12	50	6
WR512 040 10 14	4	1	6	14	60	6
WR512 040 10 16	4	1	6	16	60	6
WR512 040 10 20	4	1	6	20	60	6
WR512 040 10 26	4	1	6	26	65	6
WR512 040 10 30	4	1	6	30	65	6
WR512 040 10 35	4	1	6	35	70	6
WR512 040 10 40	4	1	6	40	80	6
WR512 040 10 45	4	1	6	45	90	6
WR512 040 10 50	4	1	6	50	100	6
WR512 050 01	5	0.1	8	15	60	6
WR512 050 02	5	0.2	8	15	60	6
WR512 050 03	5	0.3	8	15	60	6
WR512 050 05	5	0.5	8	15	60	6
WR512 050 10	5	1	8	15	60	6
WR512 050 15	5	1.5	8	15	60	6
WR512 050 20	5	2	8	15	60	6
WR512 060 01	6	0.1	9	20	60	6
WR512 060 02	6	0.2	9	20	60	6
WR512 060 03	6	0.3	9	20	60	6
WR512 060 05	6	0.5	9	20	60	6
WR512 060 10	6	1	9	20	60	6
WR512 060 15	6	1.5	9	20	60	6
WR512 060 20	6	2	9	20	60	6
WR512 060 03 90	6	0.3	15	30	90	6
WR512 060 05 90	6	0.5	15	30	90	6
WR512 060 10 90	6	1	15	30	90	6
WR512 080 01	8	0.1	12	25	70	8
WR512 080 02	8	0.2	12	25	70	8
WR512 080 03	8	0.3	12	25	70	8

WR512

2 FLUTES NECK TYPE RADIUS ENDMILL

EDP No	D	R	L_1	L_3	L_2	D_2
WR512 080 05	8	0.5	12	25	70	8
WR512 080 10	8	1	12	25	70	8
WR512 080 15	8	1.5	12	25	70	8
WR512 080 20	8	2	12	25	70	8
WR512 080 03 100	8	0.3	20	35	100	8
WR512 080 05 100	8	0.5	20	35	100	8
WR512 080 10 100	8	1	20	35	100	8
WR512 100 01	10	0.1	15	30	75	10
WR512 100 02	10	0.2	15	30	75	10
WR512 100 03	10	0.3	15	30	75	10
WR512 100 05	10	0.5	15	30	75	10
WR512 100 10	10	1	15	30	75	10
WR512 100 15	10	1.5	15	30	75	10
WR512 100 20	10	2	15	30	75	10
WR512 100 03 100	10	0.3	25	40	100	10
WR512 100 05 100	10	0.5	25	40	100	10
WR512 100 10 100	10	1	25	40	100	10
WR512 120 02	12	0.2	18	32	80	12
WR512 120 03	12	0.3	18	32	80	12
WR512 120 05	12	0.5	18	32	80	12
WR512 120 10	12	1	18	32	80	12
WR512 120 15	12	1.5	18	32	80	12
WR512 120 20	12	2	18	32	80	12
WR512 120 03 110	12	0.3	30	45	110	12
WR512 120 05 110	12	0.5	30	45	110	12
WR512 120 10 110	12	1	30	45	110	12
WR512 160 05	16	0.5	20	35	100	16
WR512 160 10	16	1	20	35	100	16
WR512 160 05 150	16	0.5	35	50	150	16
WR512 160 10 150	16	1	35	50	150	16
WR512 200 05	20	0.5	25	40	100	20
WR512 200 10	20	1	25	40	100	20
WR512 200 05 150	20	0.50	40	55	150	20
WR512 200 10 150	20	1	40	55	150	20

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

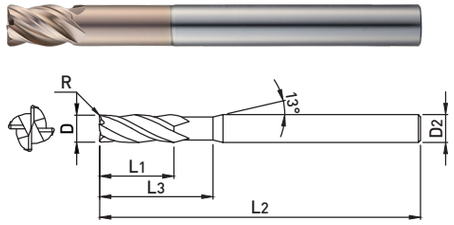
■ **Applicable Working Material**

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○	◎	○				○		○

○ : GOOD ◎ : EXCELLENT

WR514

4 FLUTES NECK TYPE RADIUS ENDMILL



- Suitable for Mold & die machining, Superior chip evacuation and multi-purpose
- Minimize interference in machining by applying the neck shape

ULTRA FINE | 4 | 38° HELIX | R ±0.02 ALL SIZES | W | DATA p.510

■ **TOLERANCE**

D		SHANK DIA.
ALL SIZES	0 ~ -0.03mm	h6

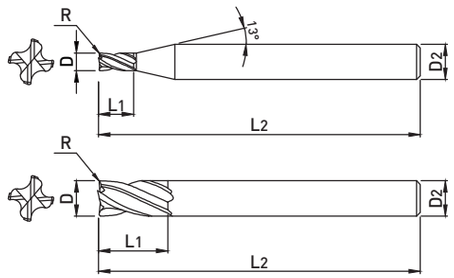
EDP No	D	R	L_1	L_3	L_2	D_2
WR514 060 05	6	0.5	10	30	90	6
WR514 060 10	6	1	10	30	90	6
WR514 080 05	8	0.5	12	35	100	8
WR514 080 10	8	1	12	35	100	8
WR514 100 05	10	0.5	15	40	100	10
WR514 100 10	10	1	15	40	100	10
WR514 120 05	12	0.5	20	45	110	12
WR514 120 10	12	1	20	45	110	12

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

■ **Applicable Working Material**

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○	◎	○				○		○

○ : GOOD ◎ : EXCELLENT



- Excellent machinability and cheap evacuation with a variable index geometry
- Extend customer choice with various corner R size
- Suitable for deep groove machining with long shank type

ULTRA FINE | 4 | M HELIX | R ±0.02 | W | DATA

ALL SIZES

p.511

■ TOLERANCE

D		SHANK DIA.
ALL SIZES	0 ~ -0.03mm	h6

EDP No	D	R	L1	L2	D2
WXR504 010 005	1	0.05	2.5	50	6
WXR504 010 01	1	0.1	2.5	50	6
WXR504 010 02	1	0.2	2.5	50	6
WXR504 010 03	1	0.3	2.5	50	6
WXR504 012 005	1.2	0.05	3	50	6
WXR504 012 01	1.2	0.1	3	50	6
WXR504 012 02	1.2	0.2	3	50	6
WXR504 012 03	1.2	0.3	3	50	6
WXR504 015 005	1.5	0.05	4	50	6
WXR504 015 01	1.5	0.1	4	50	6
WXR504 015 02	1.5	0.2	4	50	6
WXR504 015 03	1.5	0.3	4	50	6
WXR504 015 05	1.5	0.5	4	50	6
WXR504 020 01	2	0.1	6	50	6
WXR504 020 02	2	0.2	6	50	6
WXR504 020 03	2	0.3	6	50	6
WXR504 020 05	2	0.5	6	50	6
WXR504 025 01	2.5	0.1	7	60	6
WXR504 025 02	2.5	0.2	7	60	6
WXR504 025 03	2.5	0.3	7	60	6
WXR504 025 05	2.5	0.5	7	60	6
WXR504 030 01	3	0.1	8	60	6
WXR504 030 02	3	0.2	8	60	6
WXR504 030 03	3	0.3	8	60	6
WXR504 030 05	3	0.5	8	60	6
WXR504 030 10	3	1	8	60	6
WXR504 035 01	3.5	0.1	10	70	6
WXR504 035 02	3.5	0.2	10	70	6
WXR504 035 03	3.5	0.3	10	70	6
WXR504 035 05	3.5	0.5	10	70	6
WXR504 040 01 S4	4	0.1	10	70	4
WXR504 040 02 S4	4	0.2	10	70	4
WXR504 040 03 S4	4	0.3	10	70	4
WXR504 040 05 S4	4	0.5	10	70	4
WXR504 040 10 S4	4	1	10	70	4
WXR504 040 01 100 S4	4	0.1	10	100	4
WXR504 040 02 100 S4	4	0.2	10	100	4
WXR504 040 03 100 S4	4	0.3	10	100	4
WXR504 040 05 100 S4	4	0.5	10	100	4
WXR504 040 10 100 S4	4	1	10	100	4
WXR504 040 01	4	0.1	10	70	6
WXR504 040 02	4	0.2	10	70	6
WXR504 040 03	4	0.3	10	70	6
WXR504 040 05	4	0.5	10	70	6
WXR504 040 10	4	1	10	70	6
WXR504 045 01	4.5	0.1	11	80	6
WXR504 045 02	4.5	0.2	11	80	6
WXR504 045 03	4.5	0.3	11	80	6
WXR504 045 05	4.5	0.5	11	80	6
WXR504 050 01	5	0.1	13	90	6
WXR504 050 02	5	0.2	13	90	6
WXR504 050 03	5	0.3	13	90	6
WXR504 050 05	5	0.5	13	90	6
WXR504 050 10	5	1	13	90	6
WXR504 055 01	5.5	0.1	13	90	6
WXR504 055 02	5.5	0.2	13	90	6
WXR504 055 03	5.5	0.3	13	90	6
WXR504 055 05	5.5	0.5	13	90	6
WXR504 055 10	5.5	1	13	90	6
WXR504 060 01 060	6	0.1	15	60	6
WXR504 060 02 060	6	0.2	15	60	6
WXR504 060 01	6	0.1	15	90	6
WXR504 060 02	6	0.2	15	90	6
WXR504 060 03	6	0.3	15	90	6
WXR504 060 05	6	0.5	15	90	6
WXR504 060 10	6	1	15	90	6
WXR504 060 15	6	1.5	15	90	6
WXR504 060 20	6	2	15	90	6
WXR504 060 05 110	6	0.5	15	110	6
WXR504 060 10 110	6	1	15	110	6
WXR504 060 05 130	6	0.5	15	130	6
WXR504 060 10 130	6	1	15	130	6

EDP No	D	R	L1	L2	D2
WXR504 070 01	7	0.1	16	90	8
WXR504 070 02	7	0.2	16	90	8
WXR504 070 03	7	0.3	16	90	8
WXR504 070 05	7	0.5	16	90	8
WXR504 070 10	7	1	16	90	8
WXR504 070 20	7	2	16	90	8
WXR504 080 03 070	8	0.3	20	70	8
WXR504 080 05 070	8	0.5	20	70	8
WXR504 080 10 070	8	1	20	70	8
WXR504 080 01	8	0.1	20	100	8
WXR504 080 02	8	0.2	20	100	8
WXR504 080 03	8	0.3	20	100	8
WXR504 080 05	8	0.5	20	100	8
WXR504 080 10	8	1	20	100	8
WXR504 080 15	8	1.5	20	100	8
WXR504 080 20	8	2	20	100	8
WXR504 080 25	8	2.5	20	100	8
WXR504 080 30	8	3	20	100	8
WXR504 080 05 120	8	0.5	20	120	8
WXR504 080 10 120	8	1	20	120	8
WXR504 080 05 150	8	0.5	20	150	8
WXR504 080 10 150	8	1	20	150	8
WXR504 100 03 075	10	0.3	25	75	10
WXR504 100 05 075	10	0.5	25	75	10
WXR504 100 10 075	10	1	25	75	10
WXR504 100 01	10	0.1	25	100	10
WXR504 100 02	10	0.2	25	100	10
WXR504 100 03	10	0.3	25	100	10
WXR504 100 05	10	0.5	25	100	10
WXR504 100 10	10	1	25	100	10
WXR504 100 15	10	1.5	25	100	10
WXR504 100 20	10	2	25	100	10
WXR504 100 25	10	2.5	25	100	10
WXR504 100 30	10	3	25	100	10
WXR504 100 40	10	4	25	100	10
WXR504 100 05 130	10	0.5	22	130	10
WXR504 100 10 130	10	1	22	130	10
WXR504 100 05 150	10	0.5	22	150	10
WXR504 100 10 150	10	1	22	150	10
WXR504 110 02	11	0.2	25	110	12
WXR504 110 03	11	0.3	25	110	12
WXR504 110 05	11	0.5	25	110	12
WXR504 110 10	11	1	25	110	12
WXR504 110 20	11	2	25	110	12

EDP No	D	R	L1	L2	D2
WXR504 120 03 080	12	0.3	30	80	12
WXR504 120 05 080	12	0.5	30	80	12
WXR504 120 10 080	12	1	30	80	12
WXR504 120 01	12	0.1	30	110	12
WXR504 120 02	12	0.2	30	110	12
WXR504 120 03	12	0.3	30	110	12
WXR504 120 05	12	0.5	30	110	12
WXR504 120 10	12	1	30	110	12
WXR504 120 15	12	1.5	30	110	12
WXR504 120 20	12	2	30	110	12
WXR504 120 25	12	2.5	30	110	12
WXR504 120 30	12	3	30	110	12
WXR504 120 40	12	4	30	110	12
WXR504 120 50	12	5	30	110	12
WXR504 120 05 130	12	0.5	30	130	12
WXR504 120 10 130	12	1	30	130	12
WXR504 120 05 150	12	0.5	30	150	12
WXR504 120 10 150	12	1	30	150	12
WXR504 140 05	14	0.5	35	150	16
WXR504 140 10	14	1	35	150	16
WXR504 140 20	14	2	35	150	16
WXR504 160 05	16	0.5	32	150	16
WXR504 160 10	16	1	32	150	16
WXR504 160 15	16	1.5	32	150	16
WXR504 160 20	16	2	32	150	16
WXR504 200 05	20	0.5	38	150	20
WXR504 200 10	20	1	38	150	20
WXR504 200 15	20	1.5	38	150	20
WXR504 200 20	20	2	38	150	20

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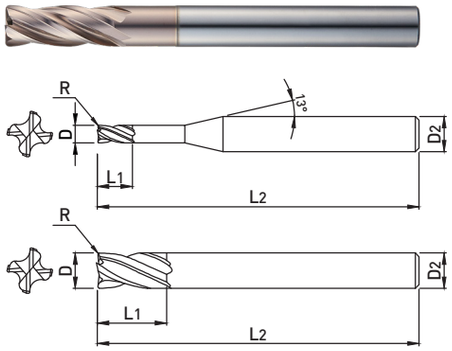
■ Applicable Working Material

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○	◎	○				○		◎

○ : GOOD ◎ : EXCELLENT



- Excellent machinability and cheap evacuation with a variable index geometry
- Extend customer choice with various neck size
- Suitable for deep groove machining with long shank type

ULTRA FINE | 4 | M HELIX | R ±0,02 | W | DATA

ALL SIZES

p.511

▪ **TOLERANCE**

D		SHANK DIA.
ALL SIZES	0 ~ -0.03mm	h6

EDP No	D	R	L1	L3	L2	D2
WXR514 010 005 03	1	0.05	1.5	3	50	4
WXR514 010 005 04	1	0.05	1.5	4	50	4
WXR514 010 005 06	1	0.05	1.5	6	50	4
WXR514 010 005 08	1	0.05	1.5	8	50	4
WXR514 010 005 10	1	0.05	1.5	10	50	4
WXR514 010 005 12	1	0.05	1.5	12	50	4
WXR514 010 005 14	1	0.05	1.5	14	50	4
WXR514 010 005 16	1	0.05	1.5	16	50	4
WXR514 010 005 20	1	0.05	1.5	20	50	4
WXR514 010 01 03	1	0.1	1.5	3	50	4
WXR514 010 01 04	1	0.1	1.5	4	50	4
WXR514 010 01 06	1	0.1	1.5	6	50	4
WXR514 010 01 08	1	0.1	1.5	8	50	4
WXR514 010 01 10	1	0.1	1.5	10	50	4
WXR514 010 01 12	1	0.1	1.5	12	50	4
WXR514 010 01 14	1	0.1	1.5	14	50	4
WXR514 010 01 16	1	0.1	1.5	16	50	4
WXR514 010 01 20	1	0.1	1.5	20	50	4
WXR514 010 02 03	1	0.2	1.5	3	50	4
WXR514 010 02 04	1	0.2	1.5	4	50	4
WXR514 010 02 06	1	0.2	1.5	6	50	4
WXR514 010 02 08	1	0.2	1.5	8	50	4
WXR514 010 02 10	1	0.2	1.5	10	50	4
WXR514 010 02 12	1	0.2	1.5	12	50	4
WXR514 010 02 14	1	0.2	1.5	14	50	4
WXR514 010 02 16	1	0.2	1.5	16	50	4
WXR514 010 02 20	1	0.2	1.5	20	50	4
WXR514 010 03 03	1	0.3	1.5	3	50	4
WXR514 010 03 04	1	0.3	1.5	4	50	4
WXR514 010 03 06	1	0.3	1.5	6	50	4
WXR514 010 03 08	1	0.3	1.5	8	50	4
WXR514 010 03 10	1	0.3	1.5	10	50	4
WXR514 010 03 12	1	0.3	1.5	12	50	4
WXR514 010 03 14	1	0.3	1.5	14	50	4
WXR514 010 03 16	1	0.3	1.5	16	50	4
WXR514 010 03 20	1	0.3	1.5	20	50	4

EDP No	D	R	L1	L3	L2	D2
WXR514 012 005 03	1.2	0.05	1.8	3	50	4
WXR514 012 005 04	1.2	0.05	1.8	4	50	4
WXR514 012 005 06	1.2	0.05	1.8	6	50	4
WXR514 012 005 08	1.2	0.05	1.8	8	50	4
WXR514 012 005 10	1.2	0.05	1.8	10	50	4
WXR514 012 005 12	1.2	0.05	1.8	12	50	4
WXR514 012 005 16	1.2	0.05	1.8	16	50	4
WXR514 012 005 20	1.2	0.05	1.8	20	50	4
WXR514 012 01 03	1.2	0.1	1.8	3	50	4
WXR514 012 01 04	1.2	0.1	1.8	4	50	4
WXR514 012 01 06	1.2	0.1	1.8	6	50	4
WXR514 012 01 08	1.2	0.1	1.8	8	50	4
WXR514 012 01 10	1.2	0.1	1.8	10	50	4
WXR514 012 01 12	1.2	0.1	1.8	12	50	4
WXR514 012 01 16	1.2	0.1	1.8	16	50	4
WXR514 012 01 20	1.2	0.1	1.8	20	50	4
WXR514 012 02 03	1.2	0.2	1.8	3	50	4
WXR514 012 02 04	1.2	0.2	1.8	4	50	4
WXR514 012 02 06	1.2	0.2	1.8	6	50	4
WXR514 012 02 08	1.2	0.2	1.8	8	50	4
WXR514 012 02 10	1.2	0.2	1.8	10	50	4
WXR514 012 02 12	1.2	0.2	1.8	12	50	4
WXR514 012 02 16	1.2	0.2	1.8	16	50	4
WXR514 012 02 20	1.2	0.2	1.8	20	50	4
WXR514 012 03 03	1.2	0.3	1.8	3	50	4
WXR514 012 03 04	1.2	0.3	1.8	4	50	4
WXR514 012 03 06	1.2	0.3	1.8	6	50	4
WXR514 012 03 08	1.2	0.3	1.8	8	50	4
WXR514 012 03 10	1.2	0.3	1.8	10	50	4
WXR514 012 03 12	1.2	0.3	1.8	12	50	4
WXR514 012 03 16	1.2	0.3	1.8	16	50	4
WXR514 012 03 20	1.2	0.3	1.8	20	50	4
WXR514 015 005 04	1.5	0.05	2.3	4	50	4
WXR514 015 005 06	1.5	0.05	2.3	6	50	4
WXR514 015 005 08	1.5	0.05	2.3	8	50	4
WXR514 015 005 10	1.5	0.05	2.3	10	50	4

EDP No	D	R	L1	L3	L2	D2
WXR514 015 005 12	1.5	0.05	2.3	12	50	4
WXR514 015 005 14	1.5	0.05	2.3	14	50	4
WXR514 015 005 16	1.5	0.05	2.3	16	50	4
WXR514 015 005 20	1.5	0.05	2.3	20	50	4
WXR514 015 005 22	1.5	0.05	2.3	22	60	4
WXR514 015 005 26	1.5	0.05	2.3	26	60	4
WXR514 015 01 04	1.5	0.1	2.3	4	50	4
WXR514 015 01 06	1.5	0.1	2.3	6	50	4
WXR514 015 01 08	1.5	0.1	2.3	8	50	4
WXR514 015 01 10	1.5	0.1	2.3	10	50	4
WXR514 015 01 12	1.5	0.1	2.3	12	50	4
WXR514 015 01 14	1.5	0.1	2.3	14	50	4
WXR514 015 01 16	1.5	0.1	2.3	16	50	4
WXR514 015 01 20	1.5	0.1	2.3	20	50	4
WXR514 015 01 22	1.5	0.1	2.3	22	60	4
WXR514 015 01 26	1.5	0.1	2.3	26	60	4
WXR514 015 02 04	1.5	0.2	2.3	4	50	4
WXR514 015 02 06	1.5	0.2	2.3	6	50	4
WXR514 015 02 08	1.5	0.2	2.3	8	50	4
WXR514 015 02 10	1.5	0.2	2.3	10	50	4
WXR514 015 02 12	1.5	0.2	2.3	12	50	4
WXR514 015 02 14	1.5	0.2	2.3	14	50	4
WXR514 015 02 16	1.5	0.2	2.3	16	50	4
WXR514 015 02 20	1.5	0.2	2.3	20	50	4
WXR514 015 02 22	1.5	0.2	2.3	22	60	4
WXR514 015 02 26	1.5	0.2	2.3	26	60	4
WXR514 015 03 04	1.5	0.3	2.3	4	50	4
WXR514 015 03 06	1.5	0.3	2.3	6	50	4
WXR514 015 03 08	1.5	0.3	2.3	8	50	4
WXR514 015 03 10	1.5	0.3	2.3	10	50	4
WXR514 015 03 12	1.5	0.3	2.3	12	50	4
WXR514 015 03 14	1.5	0.3	2.3	14	50	4
WXR514 015 03 16	1.5	0.3	2.3	16	50	4
WXR514 015 03 20	1.5	0.3	2.3	20	50	4
WXR514 015 03 22	1.5	0.3	2.3	22	60	4
WXR514 015 03 26	1.5	0.3	2.3	26	60	4
WXR514 015 05 04	1.5	0.5	2.3	4	50	4
WXR514 015 05 06	1.5	0.5	2.3	6	50	4
WXR514 015 05 08	1.5	0.5	2.3	8	50	4
WXR514 015 05 10	1.5	0.5	2.3	10	50	4
WXR514 015 05 12	1.5	0.5	2.3	12	50	4
WXR514 015 05 14	1.5	0.5	2.3	14	50	4
WXR514 015 05 16	1.5	0.5	2.3	16	50	4
WXR514 015 05 20	1.5	0.5	2.3	20	50	4
WXR514 015 05 22	1.5	0.5	2.3	22	60	4
WXR514 015 05 26	1.5	0.5	2.3	26	60	4
WXR514 020 01 06	2	0.1	3	6	50	4
WXR514 020 01 08	2	0.1	3	8	50	4
WXR514 020 01 10	2	0.1	3	10	50	4
WXR514 020 01 12	2	0.1	3	12	50	4
WXR514 020 01 14	2	0.1	3	14	50	4
WXR514 020 01 16	2	0.1	3	16	50	4
WXR514 020 01 20	2	0.1	3	20	50	4
WXR514 020 01 22	2	0.1	3	22	60	4
WXR514 020 01 26	2	0.1	3	26	60	4
WXR514 020 01 30	2	0.1	3	30	70	4

EDP No	D	R	L1	L3	L2	D2
WXR514 020 02 06	2	0.2	3	6	50	4
WXR514 020 02 08	2	0.2	3	8	50	4
WXR514 020 02 10	2	0.2	3	10	50	4
WXR514 020 02 12	2	0.2	3	12	50	4
WXR514 020 02 14	2	0.2	3	14	50	4
WXR514 020 02 16	2	0.2	3	16	50	4
WXR514 020 02 20	2	0.2	3	20	50	4
WXR514 020 02 22	2	0.2	3	22	60	4
WXR514 020 02 26	2	0.2	3	26	60	4
WXR514 020 02 30	2	0.2	3	30	70	4
WXR514 020 03 06	2	0.3	3	6	70	4
WXR514 020 03 08	2	0.3	3	8	70	4
WXR514 020 03 10	2	0.3	3	10	70	4
WXR514 020 03 12	2	0.3	3	12	50	4
WXR514 020 03 14	2	0.3	3	14	50	4
WXR514 020 03 16	2	0.3	3	16	50	4
WXR514 020 03 20	2	0.3	3	20	50	4
WXR514 020 03 22	2	0.3	3	22	60	4
WXR514 020 03 26	2	0.3	3	26	60	4
WXR514 020 03 30	2	0.3	3	30	70	4
WXR514 020 05 06	2	0.5	3	6	50	4
WXR514 020 05 08	2	0.5	3	8	50	4
WXR514 020 05 10	2	0.5	3	10	50	4
WXR514 020 05 12	2	0.5	3	12	50	4
WXR514 020 05 14	2	0.5	3	14	50	4
WXR514 020 05 16	2	0.5	3	16	50	4
WXR514 020 05 20	2	0.5	3	20	50	4
WXR514 020 05 22	2	0.5	3	22	60	4
WXR514 020 05 26	2	0.5	3	26	60	4
WXR514 020 05 30	2	0.5	3	30	70	4
WXR514 025 01 08	2.5	0.1	4	8	50	4
WXR514 025 01 10	2.5	0.1	4	10	50	4
WXR514 025 01 12	2.5	0.1	4	12	50	4
WXR514 025 01 14	2.5	0.1	4	14	50	4
WXR514 025 01 16	2.5	0.1	4	16	50	4
WXR514 025 01 20	2.5	0.1	4	20	50	4
WXR514 025 01 26	2.5	0.1	4	26	60	4
WXR514 025 01 30	2.5	0.1	4	30	70	4
WXR514 025 02 08	2.5	0.2	4	8	50	4
WXR514 025 02 10	2.5	0.2	4	10	50	4
WXR514 025 02 12	2.5	0.2	4	12	50	4
WXR514 025 02 14	2.5	0.2	4	14	50	4
WXR514 025 02 16	2.5	0.2	4	16	50	4
WXR514 025 02 20	2.5	0.2	4	20	50	4
WXR514 025 02 26	2.5	0.2	4	26	60	4
WXR514 025 02 30	2.5	0.2	4	30	70	4
WXR514 025 03 08	2.5	0.3	4	8	50	4
WXR514 025 03 10	2.5	0.3	4	10	50	4
WXR514 025 03 12	2.5	0.3	4	12	50	4
WXR514 025 03 14	2.5	0.3	4	14	50	4
WXR514 025 03 16	2.5	0.3	4	16	50	4
WXR514 025 03 20	2.5	0.3	4	20	50	4
WXR514 025 03 26	2.5	0.3	4	26	60	4
WXR514 025 03 30	2.5	0.3	4	30	70	4
WXR514 025 05 08	2.5	0.5	4	8	50	4
WXR514 025 05 10	2.5	0.5	4	10	50	4

EDP No	D	R	L_1	L_3	L_2	D_2
WXR514 025 05 12	2.5	0.5	4	12	50	4
WXR514 025 05 14	2.5	0.5	4	14	50	4
WXR514 025 05 16	2.5	0.5	4	16	50	4
WXR514 025 05 20	2.5	0.5	4	20	50	4
WXR514 025 05 26	2.5	0.5	4	26	60	4
WXR514 025 05 30	2.5	0.5	4	30	70	4
WXR514 030 01 08	3	0.1	4.5	8	50	6
WXR514 030 01 10	3	0.1	4.5	10	50	6
WXR514 030 01 12	3	0.1	4.5	12	50	6
WXR514 030 01 14	3	0.1	4.5	14	60	6
WXR514 030 01 16	3	0.1	4.5	16	60	6
WXR514 030 01 20	3	0.1	4.5	20	60	6
WXR514 030 01 26	3	0.1	4.5	26	65	6
WXR514 030 01 30	3	0.1	4.5	30	70	6
WXR514 030 01 35	3	0.1	4.5	35	70	6
WXR514 030 01 40	3	0.1	4.5	40	80	6
WXR514 030 02 08	3	0.2	4.5	8	50	6
WXR514 030 02 10	3	0.2	4.5	10	50	6
WXR514 030 02 12	3	0.2	4.5	12	50	6
WXR514 030 02 14	3	0.2	4.5	14	60	6
WXR514 030 02 16	3	0.2	4.5	16	60	6
WXR514 030 02 20	3	0.2	4.5	20	60	6
WXR514 030 02 26	3	0.2	4.5	26	65	6
WXR514 030 02 30	3	0.2	4.5	30	70	6
WXR514 030 02 35	3	0.2	4.5	35	70	6
WXR514 030 02 40	3	0.2	4.5	40	80	6
WXR514 030 03 08	3	0.3	4.5	8	50	6
WXR514 030 03 10	3	0.3	4.5	10	50	6
WXR514 030 03 12	3	0.3	4.5	12	50	6
WXR514 030 03 14	3	0.3	4.5	14	60	6
WXR514 030 03 16	3	0.3	4.5	16	60	6
WXR514 030 03 20	3	0.3	4.5	20	60	6
WXR514 030 03 26	3	0.3	4.5	26	65	6
WXR514 030 03 30	3	0.3	4.5	30	70	6
WXR514 030 03 35	3	0.3	4.5	35	70	6
WXR514 030 03 40	3	0.3	4.5	40	80	6
WXR514 030 05 08	3	0.5	4.5	8	50	6
WXR514 030 05 10	3	0.5	4.5	10	50	6
WXR514 030 05 12	3	0.5	4.5	12	50	6
WXR514 030 05 14	3	0.5	4.5	14	60	6
WXR514 030 05 16	3	0.5	4.5	16	60	6
WXR514 030 05 20	3	0.5	4.5	20	60	6
WXR514 030 05 26	3	0.5	4.5	26	65	6
WXR514 030 05 30	3	0.5	4.5	30	70	6
WXR514 030 05 35	3	0.5	4.5	35	70	6
WXR514 030 05 40	3	0.5	4.5	40	80	6
WXR514 030 10 08	3	1	4.5	8	50	6
WXR514 030 10 10	3	1	4.5	10	50	6
WXR514 030 10 12	3	1	4.5	12	50	6
WXR514 030 10 14	3	1	4.5	14	60	6
WXR514 030 10 16	3	1	4.5	16	60	6
WXR514 030 10 20	3	1	4.5	20	60	6
WXR514 030 10 26	3	1	4.5	26	65	6
WXR514 030 10 30	3	1	4.5	30	70	6
WXR514 030 10 35	3	1	4.5	35	70	6
WXR514 030 10 40	3	1	4.5	40	80	6

EDP No	D	R	L_1	L_3	L_2	D_2
WXR514 040 01 10	4	0.1	6	10	50	6
WXR514 040 01 12	4	0.1	6	12	50	6
WXR514 040 01 14	4	0.1	6	14	60	6
WXR514 040 01 16	4	0.1	6	16	60	6
WXR514 040 01 20	4	0.1	6	20	60	6
WXR514 040 01 26	4	0.1	6	26	65	6
WXR514 040 01 30	4	0.1	6	30	70	6
WXR514 040 01 35	4	0.1	6	35	70	6
WXR514 040 01 40	4	0.1	6	40	80	6
WXR514 040 01 45	4	0.1	6	45	90	6
WXR514 040 01 50	4	0.1	6	50	100	6
WXR514 040 02 10	4	0.2	6	10	50	6
WXR514 040 02 12	4	0.2	6	12	50	6
WXR514 040 02 14	4	0.2	6	14	60	6
WXR514 040 02 16	4	0.2	6	16	60	6
WXR514 040 02 20	4	0.2	6	20	60	6
WXR514 040 02 26	4	0.2	6	26	65	6
WXR514 040 02 30	4	0.2	6	30	70	6
WXR514 040 02 35	4	0.2	6	35	70	6
WXR514 040 02 40	4	0.2	6	40	80	6
WXR514 040 02 45	4	0.2	6	45	90	6
WXR514 040 02 50	4	0.2	6	50	100	6
WXR514 040 03 10	4	0.3	6	10	50	6
WXR514 040 03 12	4	0.3	6	12	50	6
WXR514 040 03 14	4	0.3	6	14	60	6
WXR514 040 03 16	4	0.3	6	16	60	6
WXR514 040 03 20	4	0.3	6	20	60	6
WXR514 040 03 26	4	0.3	6	26	65	6
WXR514 040 03 30	4	0.3	6	30	70	6
WXR514 040 03 35	4	0.3	6	35	70	6
WXR514 040 03 40	4	0.3	6	40	80	6
WXR514 040 03 45	4	0.3	6	45	90	6
WXR514 040 03 50	4	0.3	6	50	100	6
WXR514 040 05 10	4	0.5	6	10	50	6
WXR514 040 05 12	4	0.5	6	12	50	6
WXR514 040 05 14	4	0.5	6	14	60	6
WXR514 040 05 16	4	0.5	6	16	60	6
WXR514 040 05 20	4	0.5	6	20	60	6
WXR514 040 05 26	4	0.5	6	26	65	6
WXR514 040 05 30	4	0.5	6	30	70	6
WXR514 040 05 35	4	0.5	6	35	70	6
WXR514 040 05 40	4	0.5	6	40	80	6
WXR514 040 05 45	4	0.5	6	45	90	6
WXR514 040 05 50	4	0.5	6	50	100	6
WXR514 040 10 10	4	1	6	10	50	6
WXR514 040 10 12	4	1	6	12	50	6
WXR514 040 10 14	4	1	6	14	60	6
WXR514 040 10 16	4	1	6	16	60	6
WXR514 040 10 20	4	1	6	20	60	6
WXR514 040 10 26	4	1	6	26	65	6
WXR514 040 10 30	4	1	6	30	70	6
WXR514 040 10 35	4	1	6	35	70	6
WXR514 040 10 40	4	1	6	40	80	6
WXR514 040 10 45	4	1	6	45	90	6
WXR514 040 10 50	4	1	6	50	100	6
WXR514 050 01	5	0.1	8	15	60	6

EDP No	D	R	L_1	L_3	L_2	D_2
WXR514 050 02	5	0.2	8	15	60	6
WXR514 050 03	5	0.3	8	15	60	6
WXR514 050 05	5	0.5	8	15	60	6
WXR514 050 10	5	10	8	15	60	6
WXR514 050 15	5	1.5	8	15	60	6
WXR514 050 20	5	20	8	15	60	6
WXR514 060 01	6	0.1	9	20	60	6
WXR514 060 02	6	0.2	9	20	60	6
WXR514 060 03	6	0.3	9	20	60	6
WXR514 060 05	6	0.5	9	20	60	6
WXR514 060 10	6	1	9	20	60	6
WXR514 060 15	6	1.5	9	20	60	6
WXR514 060 20	6	2	9	20	60	6
WXR514 060 03 090	6	0.3	15	30	90	6
WXR514 060 05 090	6	0.5	15	30	90	6
WXR514 060 10 090	6	1	15	30	90	6
WXR514 080 01	8	0.1	12	25	70	8
WXR514 080 02	8	0.2	12	25	70	8
WXR514 080 03	8	0.3	12	25	70	8
WXR514 080 05	8	0.5	12	25	70	8
WXR514 080 10	8	1	12	25	70	8
WXR514 080 15	8	1.5	12	25	70	8
WXR514 080 20	8	2	12	25	70	8
WXR514 080 03 100	8	0.3	20	35	100	8
WXR514 080 05 100	8	0.5	20	35	100	8
WXR514 080 10 100	8	1	20	35	100	8
WXR514 100 01	10	0.1	15	30	75	10
WXR514 100 02	10	0.2	15	30	75	10
WXR514 100 03	10	0.3	15	30	75	10
WXR514 100 05	10	0.5	15	30	75	10
WXR514 100 10	10	1	15	30	75	10
WXR514 100 15	10	1.5	15	30	75	10
WXR514 100 20	10	2	15	30	75	10
WXR514 100 03 100	10	0.3	25	40	100	10
WXR514 100 05 100	10	0.5	25	40	100	10
WXR514 100 10 100	10	1	25	40	100	10
WXR514 120 02	12	0.2	18	32	80	12
WXR514 120 03	12	0.3	18	32	80	12
WXR514 120 05	12	0.5	18	32	80	12
WXR514 120 10	12	1	18	32	80	12
WXR514 120 15	12.0	1.50	18	32	80	12
WXR514 120 20	12.0	2.00	18	32	80	12
WXR514 120 03 110	12.0	0.30	30	45	110	12
WXR514 120 05 110	12.0	0.50	30	45	110	12
WXR514 120 10 110	12.0	1.00	30	45	110	12
WXR514 160 05	16.0	0.50	20	35	100	16
WXR514 160 10	16.0	1.00	20	35	100	16
WXR514 160 05 150	16.0	0.50	35	50	150	20

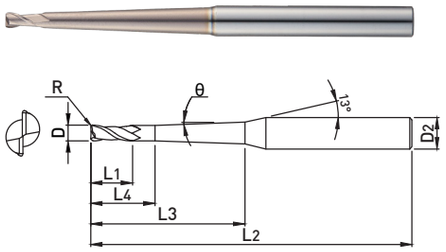
EDP No	D	R	L_1	L_3	L_2	D_2
WXR514 160 10 150	16.0	1.00	35	50	150	20
WXR514 200 05	20.0	0.50	25	40	100	20
WXR514 200 10	20.0	1.00	25	40	100	20
WXR514 200 05 150	20.0	0.50	40	55	150	20
WXR514 200 10 150	20.0	1.00	40	55	150	20

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

■ **Applicable Working Material**

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○	◎	○				○		○

○ : GOOD ◎ : EXCELLENT



- Reduced High strength and chattering with tapered effective length
- Suitable for deep groove machining with various specifications on effective length

ULTRA FINE | 2 | 30° HELIX | R ±0.01 | W | DATA

ALL SIZES

p.510

▪ **TOLERANCE**

D		SHANK DIA.
ALL SIZES	0 ~ -0.012mm	h6

EDP No	D	R	θ	L_1	L_3	L_4	L_2	D_2
WR542 002 005 01 01	0.2	0.05	1°	0.3	0.4	1	40	4
WR542 002 005 01 02	0.2	0.05	1°	0.3	0.4	2	40	4
WR542 002 005 01 03	0.2	0.05	1°	0.3	0.4	3	40	4
WR542 002 005 02 01	0.2	0.05	2°	0.3	0.4	1	40	4
WR542 002 005 02 02	0.2	0.05	2°	0.3	0.4	2	40	4
WR542 002 005 02 03	0.2	0.05	2°	0.3	0.4	3	40	4
WR542 003 005 01 02	0.3	0.05	1°	0.5	0.6	2	40	4
WR542 003 005 01 03	0.3	0.05	1°	0.5	0.6	3	40	4
WR542 003 005 01 04	0.3	0.05	1°	0.5	0.6	4	40	4
WR542 003 005 01 05	0.3	0.05	1°	0.5	0.6	5	40	4
WR542 003 005 02 02	0.3	0.05	2°	0.5	0.6	2	40	4
WR542 003 005 02 03	0.3	0.05	2°	0.5	0.6	3	40	4
WR542 003 005 02 04	0.3	0.05	2°	0.5	0.6	4	40	4
WR542 003 005 02 05	0.3	0.05	2°	0.5	0.6	5	40	4
WR542 004 005 01 02	0.4	0.05	1°	0.6	0.8	2	50	4
WR542 004 005 01 03	0.4	0.05	1°	0.6	0.8	3	50	4
WR542 004 005 01 04	0.4	0.05	1°	0.6	0.8	4	50	4
WR542 004 005 01 05	0.4	0.05	1°	0.6	0.8	5	50	4
WR542 004 005 01 06	0.4	0.05	1°	0.6	0.8	6	50	4
WR542 004 005 02 02	0.4	0.05	2°	0.6	0.8	2	50	4
WR542 004 005 02 03	0.4	0.05	2°	0.6	0.8	3	50	4
WR542 004 005 02 04	0.4	0.05	2°	0.6	0.8	4	50	4
WR542 004 005 02 05	0.4	0.05	2°	0.6	0.8	5	50	4
WR542 004 005 02 06	0.4	0.05	2°	0.6	0.8	6	50	4
WR542 004 01 01 02	0.4	0.1	1°	0.6	0.8	2	50	4
WR542 004 01 01 03	0.4	0.1	1°	0.6	0.8	3	50	4
WR542 004 01 01 04	0.4	0.1	1°	0.6	0.8	4	50	4
WR542 004 01 01 05	0.4	0.1	1°	0.6	0.8	5	50	4
WR542 004 01 01 06	0.4	0.1	1°	0.6	0.8	6	50	4
WR542 004 01 02 02	0.4	0.1	2°	0.6	0.8	2	50	4
WR542 004 01 02 03	0.4	0.1	2°	0.6	0.8	3	50	4
WR542 004 01 02 04	0.4	0.1	2°	0.6	0.8	4	50	4
WR542 004 01 02 05	0.4	0.1	2°	0.6	0.8	5	50	4
WR542 004 01 02 06	0.4	0.1	2°	0.6	0.8	6	50	4
WR542 005 005 01 04	0.5	0.05	1°	0.7	1	4	50	4
WR542 005 005 01 06	0.5	0.05	1°	0.7	1	6	50	4

EDP No	D	R	θ	L_1	L_3	L_4	L_2	D_2
WR542 005 005 01 08	0.5	0.05	1°	0.70	1	8	50	4
WR542 005 005 01 10	0.5	0.05	1°	0.70	1	10	50	4
WR542 005 005 02 04	0.5	0.05	2°	0.70	1	4	50	4
WR542 005 005 02 06	0.5	0.05	2°	0.70	1	6	50	4
WR542 005 005 02 08	0.5	0.05	2°	0.70	1	8	50	4
WR542 005 005 02 10	0.5	0.05	2°	0.70	1	10	50	4
WR542 005 01 01 04	0.5	0.1	1°	0.70	1	4	50	4
WR542 005 01 01 06	0.5	0.1	1°	0.70	1	6	50	4
WR542 005 01 01 08	0.5	0.1	1°	0.70	1	8	50	4
WR542 005 01 01 10	0.5	0.1	1°	0.70	1	10	50	4
WR542 005 01 02 04	0.5	0.1	2°	0.70	1	4	50	4
WR542 005 01 02 06	0.5	0.1	2°	0.70	1	6	50	4
WR542 005 01 02 08	0.5	0.1	2°	0.70	1	8	50	4
WR542 005 01 02 10	0.5	0.1	2°	0.70	1	10	50	4
WR542 006 01 01 04	0.6	0.1	1°	0.9	1.2	4	50	4
WR542 006 01 01 06	0.6	0.1	1°	0.9	1.2	6	50	4
WR542 006 01 01 08	0.6	0.1	1°	0.9	1.2	8	50	4
WR542 006 01 01 10	0.6	0.1	1°	0.9	1.2	10	50	4
WR542 006 01 01 12	0.6	0.1	1°	0.9	1.2	12	50	4
WR542 006 01 02 04	0.6	0.1	2°	0.9	1.2	4	50	4
WR542 006 01 02 06	0.6	0.1	2°	0.9	1.2	6	50	4
WR542 006 01 02 08	0.6	0.1	2°	0.9	1.2	8	50	4
WR542 006 01 02 10	0.6	0.1	2°	0.9	1.2	10	50	4
WR542 006 01 02 12	0.6	0.1	2°	0.9	1.2	12	50	4
WR542 006 02 01 04	0.6	0.2	1°	0.9	1.2	4	50	4
WR542 006 02 01 06	0.6	0.2	1°	0.9	1.2	6	50	4
WR542 006 02 01 08	0.6	0.2	1°	0.9	1.2	8	50	4
WR542 006 02 01 10	0.6	0.2	1°	0.9	1.2	10	50	4
WR542 006 02 01 12	0.6	0.2	1°	0.9	1.2	12	50	4
WR542 006 02 02 04	0.6	0.2	2°	0.9	1.2	4	50	4
WR542 006 02 02 06	0.6	0.2	2°	0.9	1.2	6	50	4
WR542 006 02 02 08	0.6	0.2	2°	0.9	1.2	8	50	4
WR542 006 02 02 10	0.6	0.2	2°	0.9	1.2	10	50	4
WR542 006 02 02 12	0.6	0.2	2°	0.9	1.2	12	50	4
WR542 008 01 01 04	0.8	0.1	1°	1.2	1.6	4	50	4
WR542 008 01 01 06	0.8	0.1	1°	1.2	1.6	6	50	4

EDP No	D	R	θ	L_1	L_3	L_4	L_2	D_2
WR542 008 01 01 08	0.8	0.1	1°	1.2	1.6	8	50	4
WR542 008 01 01 10	0.8	0.1	1°	1.2	1.6	10	50	4
WR542 008 01 01 12	0.8	0.1	1°	1.2	1.6	12	50	4
WR542 008 01 01 16	0.8	0.1	1°	1.2	1.6	16	50	4
WR542 008 01 02 04	0.8	0.1	2°	1.2	1.6	4	50	4
WR542 008 01 02 06	0.8	0.1	2°	1.2	1.6	6	50	4
WR542 008 01 02 08	0.8	0.1	2°	1.2	1.6	8	50	4
WR542 008 01 02 10	0.8	0.1	2°	1.2	1.6	10	50	4
WR542 008 01 02 12	0.8	0.1	2°	1.2	1.6	12	50	4
WR542 008 01 02 16	0.8	0.1	2°	1.2	1.6	16	50	4
WR542 008 02 01 04	0.8	0.2	1°	1.2	1.6	4	50	4
WR542 008 02 01 06	0.8	0.2	1°	1.2	1.6	6	50	4
WR542 008 02 01 08	0.8	0.2	1°	1.2	1.6	8	50	4
WR542 008 02 01 10	0.8	0.2	1°	1.2	1.6	10	50	4
WR542 008 02 01 12	0.8	0.2	1°	1.2	1.6	12	50	4
WR542 008 02 01 16	0.8	0.2	1°	1.2	1.6	16	50	4
WR542 008 02 02 04	0.8	0.2	2°	1.2	1.6	4	50	4
WR542 008 02 02 06	0.8	0.2	2°	1.2	1.6	6	50	4
WR542 008 02 02 08	0.8	0.2	2°	1.2	1.6	8	50	4
WR542 008 02 02 10	0.8	0.2	2°	1.2	1.6	10	50	4
WR542 008 02 02 12	0.8	0.2	2°	1.2	1.6	12	50	4
WR542 008 02 02 16	0.8	0.2	2°	1.2	1.6	16	50	4
WR542 010 01 01 06	1	0.1	1°	1.5	2.5	6	50	4
WR542 010 01 01 08	1	0.1	1°	1.5	2.5	8	50	4
WR542 010 01 01 10	1	0.1	1°	1.5	2.5	10	50	4
WR542 010 01 01 12	1	0.1	1°	1.5	2.5	12	50	4
WR542 010 01 01 16	1	0.1	1°	1.5	2.5	16	50	4
WR542 010 01 01 20	1	0.1	1°	1.5	2.5	20	50	4
WR542 010 01 01 25	1	0.1	1°	1.5	2.5	25	60	4
WR542 010 01 01 30	1	0.1	1°	1.5	2.5	30	70	4
WR542 010 01 01 40	1	0.1	1°	1.5	2.5	40	80	4
WR542 010 01 01 50	1	0.1	1°	1.5	2.5	50	90	6
WR542 010 01 02 06	1	0.1	2°	1.5	2.5	6	50	4
WR542 010 01 02 08	1	0.1	2°	1.5	2.5	8	50	4
WR542 010 01 02 10	1	0.1	2°	1.5	2.5	10	50	4
WR542 010 01 02 12	1	0.1	2°	1.5	2.5	12	50	4
WR542 010 01 02 16	1	0.1	2°	1.5	2.5	16	50	4
WR542 010 01 02 20	1	0.1	2°	1.5	2.5	20	50	4
WR542 010 01 02 25	1	0.1	2°	1.5	2.5	25	60	4
WR542 010 01 02 30	1	0.1	2°	1.5	2.5	30	70	4
WR542 010 01 02 40	1	0.1	2°	1.5	2.5	40	80	4
WR542 010 01 02 50	1	0.1	2°	1.5	2.5	50	90	6
WR542 010 02 01 06	1	0.2	1°	1.5	2.5	6	50	4
WR542 010 02 01 08	1	0.2	1°	1.5	2.5	8	50	4
WR542 010 02 01 10	1	0.2	1°	1.5	2.5	10	50	4
WR542 010 02 01 12	1	0.2	1°	1.5	2.5	12	50	4
WR542 010 02 01 16	1	0.2	1°	1.5	2.5	16	50	4
WR542 010 02 01 20	1	0.2	1°	1.5	2.5	20	50	4
WR542 010 02 01 25	1	0.2	1°	1.5	2.5	25	60	4
WR542 010 02 01 30	1	0.2	1°	1.5	2.5	30	70	4
WR542 010 02 01 40	1	0.2	1°	1.5	2.5	40	80	4
WR542 010 02 01 50	1	0.2	1°	1.5	2.5	50	90	6
WR542 010 02 02 06	1	0.2	2°	1.5	2.5	6	50	4
WR542 010 02 02 08	1	0.2	2°	1.5	2.5	8	50	4
WR542 010 02 02 10	1	0.2	2°	1.5	2.5	10	50	4
WR542 010 02 02 12	1	0.2	2°	1.5	2.5	12	50	4

EDP No	D	R	θ	L_1	L_3	L_4	L_2	D_2
WR542 010 02 02 16	1	0.2	2°	1.5	2.5	16	50	4
WR542 010 02 02 20	1	0.2	2°	1.5	2.5	20	50	4
WR542 010 02 02 25	1	0.2	2°	1.5	2.5	25	60	4
WR542 010 02 02 30	1	0.2	2°	1.5	2.5	30	70	4
WR542 010 02 02 40	1	0.2	2°	1.5	2.5	40	80	4
WR542 010 02 02 50	1	0.2	2°	1.5	2.5	50	90	6
WR542 012 01 01 08	1.2	0.1	1°	1.8	3	8	50	4
WR542 012 01 01 12	1.2	0.1	1°	1.8	3	12	50	4
WR542 012 01 01 16	1.2	0.1	1°	1.8	3	16	50	4
WR542 012 01 01 20	1.2	0.1	1°	1.8	3	20	50	4
WR542 012 01 01 25	1.2	0.1	1°	1.8	3	25	60	4
WR542 012 01 01 30	1.2	0.1	1°	1.8	3	30	70	4
WR542 012 01 02 08	1.2	0.1	2°	1.8	3	8	50	4
WR542 012 01 02 12	1.2	0.1	2°	1.8	3	12	50	4
WR542 012 01 02 16	1.2	0.1	2°	1.8	3	16	50	4
WR542 012 01 02 20	1.2	0.1	2°	1.8	3	20	50	4
WR542 012 01 02 25	1.2	0.1	2°	1.8	3	25	60	4
WR542 012 01 02 30	1.2	0.1	2°	1.8	3	30	70	4
WR542 012 02 01 08	1.2	0.2	1°	1.8	3	8	50	4
WR542 012 02 01 12	1.2	0.2	1°	1.8	3	12	50	4
WR542 012 02 01 16	1.2	0.2	1°	1.8	3	16	50	4
WR542 012 02 01 20	1.2	0.2	1°	1.8	3	20	50	4
WR542 012 02 01 25	1.2	0.2	1°	1.8	3	25	60	4
WR542 012 02 01 30	1.2	0.2	1°	1.8	3	30	70	4
WR542 012 02 02 08	1.2	0.2	2°	1.8	3	8	50	4
WR542 012 02 02 12	1.2	0.2	2°	1.8	3	12	50	4
WR542 012 02 02 16	1.2	0.2	2°	1.8	3	16	50	4
WR542 012 02 02 20	1.2	0.2	2°	1.8	3	20	50	4
WR542 012 02 02 25	1.2	0.2	2°	1.8	3	25	60	4
WR542 012 02 02 30	1.2	0.2	2°	1.8	3	30	70	4
WR542 015 01 01 08	1.5	0.1	1°	2.3	3	8	50	4
WR542 015 01 01 10	1.5	0.1	1°	2.3	3	10	50	4
WR542 015 01 01 12	1.5	0.1	1°	2.3	3	12	50	4
WR542 015 01 01 16	1.5	0.1	1°	2.3	3	16	50	4
WR542 015 01 01 20	1.5	0.1	1°	2.3	3	20	50	4
WR542 015 01 01 25	1.5	0.1	1°	2.3	3	25	60	4
WR542 015 01 01 30	1.5	0.1	1°	2.3	3	30	70	4
WR542 015 01 01 40	1.5	0.1	1°	2.3	3	40	80	4
WR542 015 01 01 50	1.5	0.1	1°	2.3	3	50	90	4
WR542 015 01 02 08	1.5	0.1	2°	2.3	3	8	50	4
WR542 015 01 02 10	1.5	0.1	2°	2.3	3	10	50	4
WR542 015 01 02 12	1.5	0.1	2°	2.3	3	12	50	4
WR542 015 01 02 16	1.5	0.1	2°	2.3	3	16	50	4
WR542 015 01 02 20	1.5	0.1	2°	2.3	3	20	50	4
WR542 015 01 02 25	1.5	0.1	2°	2.3	3	25	60	4
WR542 015 01 02 30	1.5	0.1	2°	2.3	3	30	70	4
WR542 015 01 02 40	1.5	0.1	2°	2.3	3	40	80	6
WR542 015 01 02 50	1.5	0.1	2°	2.3	3	50	90	6
WR542 015 02 01 08	1.5	0.2	1°	2.3	3	8	50	4
WR542 015 02 01 10	1.5	0.2	1°	2.3	3	10	50	4
WR542 015 02 01 12	1.5	0.2	1°	2.3	3	12	50	4
WR542 015 02 01 16	1.5	0.2	1°	2.3	3	16	50	4
WR542 015 02 01 20	1.5	0.2	1°	2.3	3	20	50	4
WR542 015 02 01 25	1.5	0.2	1°	2.3	3	25	60	4
WR542 015 02 01 30	1.5	0.2	1°	2.3	3	30	70	4
WR542 015 02 01 40	1.5	0.2	1°	2.3	3	40	80	4

EDP No	D	R	θ	L_1	L_3	L_4	L_2	D_2
WR542 015 02 01 50	1.5	0.2	1°	2.3	3	50	90	4
WR542 015 02 02 08	1.5	0.2	2°	2.3	3	8	50	4
WR542 015 02 02 10	1.5	0.2	2°	2.3	3	10	50	4
WR542 015 02 02 12	1.5	0.2	2°	2.3	3	12	50	4
WR542 015 02 02 16	1.5	0.2	2°	2.3	3	16	50	4
WR542 015 02 02 20	1.5	0.2	2°	2.3	3	20	50	4
WR542 015 02 02 25	1.5	0.2	2°	2.3	3	25	60	4
WR542 015 02 02 30	1.5	0.2	2°	2.3	3	30	70	4
WR542 015 02 02 40	1.5	0.2	2°	2.3	3	40	80	6
WR542 015 02 02 50	1.5	0.2	2°	2.3	3	50	90	6
WR542 015 03 01 08	1.5	0.3	1°	2.3	3	8	50	4
WR542 015 03 01 10	1.5	0.3	1°	2.3	3	10	50	4
WR542 015 03 01 12	1.5	0.3	1°	2.3	3	12	50	4
WR542 015 03 01 16	1.5	0.3	1°	2.3	3	16	50	4
WR542 015 03 01 20	1.5	0.3	1°	2.3	3	20	50	4
WR542 015 03 01 25	1.5	0.3	1°	2.3	3	25	60	4
WR542 015 03 01 30	1.5	0.3	1°	2.3	3	30	70	4
WR542 015 03 01 40	1.5	0.3	1°	2.3	3	40	80	4
WR542 015 03 01 50	1.5	0.3	1°	2.3	3	50	90	4
WR542 015 03 02 08	1.5	0.3	2°	2.3	3	8	50	4
WR542 015 03 02 10	1.5	0.3	2°	2.3	3	10	50	4
WR542 015 03 02 12	1.5	0.3	2°	2.3	3	12	50	4
WR542 015 03 02 16	1.5	0.3	2°	2.3	3	16	50	4
WR542 015 03 02 20	1.5	0.3	2°	2.3	3	20	50	4
WR542 015 03 02 25	1.5	0.3	2°	2.3	3	25	60	4
WR542 015 03 02 30	1.5	0.3	2°	2.3	3	30	70	4
WR542 015 03 02 40	1.5	0.3	2°	2.3	3	40	80	6
WR542 015 03 02 50	1.5	0.3	2°	2.3	3	50	90	6
WR542 020 01 01 10	2	0.1	1°	2	5	10	50	4
WR542 020 01 01 12	2	0.1	1°	2	5	12	50	4
WR542 020 01 01 16	2	0.1	1°	2	5	16	50	4
WR542 020 01 01 20	2	0.1	1°	2	5	20	50	4
WR542 020 01 01 25	2	0.1	1°	2	5	25	60	4
WR542 020 01 01 30	2	0.1	1°	2	5	30	70	4
WR542 020 01 01 40	2	0.1	1°	2	5	40	80	6
WR542 020 01 01 50	2	0.1	1°	2	5	50	100	6
WR542 020 01 01 60	2	0.1	1°	2	5	60	100	6
WR542 020 01 01 80	2	0.1	1°	2	5	80	140	6
WR542 020 01 02 10	2	0.1	2°	2	5	10	50	4
WR542 020 01 02 12	2	0.1	2°	2	5	12	50	4
WR542 020 01 02 16	2	0.1	2°	2	5	16	50	4
WR542 020 01 02 20	2	0.1	2°	2	5	20	50	4
WR542 020 01 02 25	2	0.1	2°	2	5	25	60	4
WR542 020 01 02 30	2	0.1	2°	2	5	30	70	4
WR542 020 01 02 40	2	0.1	2°	2	5	40	80	6
WR542 020 01 02 50	2	0.1	2°	2	5	50	100	6
WR542 020 01 02 60	2	0.1	2°	2	5	60	100	6
WR542 020 01 02 80	2	0.1	2°	2	5	80	140	8
WR542 020 02 01 10	2	0.2	1°	2	5	10	50	4
WR542 020 02 01 12	2	0.2	1°	2	5	12	50	4
WR542 020 02 01 16	2	0.2	1°	2	5	16	50	4
WR542 020 02 01 20	2	0.2	1°	2	5	20	50	4
WR542 020 02 01 25	2	0.2	1°	2	5	25	60	4
WR542 020 02 01 30	2	0.2	1°	2	5	30	70	4
WR542 020 02 01 40	2	0.2	1°	2	5	40	80	6
WR542 020 02 01 50	2	0.2	1°	2	5	50	100	6

EDP No	D	R	θ	L_1	L_3	L_4	L_2	D_2
WR542 020 02 01 60	2	0.2	1°	2	5	60	100	6
WR542 020 02 01 80	2	0.2	1°	2	5	80	140	6
WR542 020 02 02 10	2	0.2	2°	2	5	10	50	4
WR542 020 02 02 12	2	0.2	2°	2	5	12	50	4
WR542 020 02 02 16	2	0.2	2°	2	5	16	50	4
WR542 020 02 02 20	2	0.2	2°	2	5	20	50	4
WR542 020 02 02 25	2	0.2	2°	2	5	25	60	4
WR542 020 02 02 30	2	0.2	2°	2	5	30	70	4
WR542 020 02 02 40	2	0.2	2°	2	5	40	80	6
WR542 020 02 02 50	2	0.2	2°	2	5	50	100	6
WR542 020 02 02 60	2	0.2	2°	2	5	60	100	6
WR542 020 02 02 80	2	0.2	2°	2	5	80	140	8
WR542 020 03 01 10	2	0.3	1°	2	5	10	50	4
WR542 020 03 01 12	2	0.3	1°	2	5	12	50	4
WR542 020 03 01 16	2	0.3	1°	2	5	16	50	4
WR542 020 03 01 20	2	0.3	1°	2	5	20	50	4
WR542 020 03 01 25	2	0.3	1°	2	5	25	60	4
WR542 020 03 01 30	2	0.3	1°	2	5	30	70	4
WR542 020 03 01 40	2	0.3	1°	2	5	40	80	6
WR542 020 03 01 50	2	0.3	1°	2	5	50	100	6
WR542 020 03 01 60	2	0.3	1°	2	5	60	100	6
WR542 020 03 01 80	2	0.3	1°	2	5	80	140	6
WR542 020 03 02 10	2	0.3	2°	2	5	10	50	4
WR542 020 03 02 12	2	0.3	2°	2	5	12	50	4
WR542 020 03 02 16	2	0.3	2°	2	5	16	50	4
WR542 020 03 02 20	2	0.3	2°	2	5	20	50	4
WR542 020 03 02 25	2	0.3	2°	2	5	25	60	4
WR542 020 03 02 30	2	0.3	2°	2	5	30	70	4
WR542 020 03 02 40	2	0.3	2°	2	5	40	80	6
WR542 020 03 02 50	2	0.3	2°	2	5	50	100	6
WR542 020 03 02 60	2	0.3	2°	2	5	60	100	6
WR542 020 03 02 80	2	0.3	2°	2	5	80	140	8
WR542 020 05 01 10	2	0.5	1°	2	5	10	50	4
WR542 020 05 01 12	2	0.5	1°	2	5	12	50	4
WR542 020 05 01 16	2	0.5	1°	2	5	16	50	4
WR542 020 05 01 20	2	0.5	1°	2	5	20	50	4
WR542 020 05 01 25	2	0.5	1°	2	5	25	60	4
WR542 020 05 01 30	2	0.5	1°	2	5	30	70	4
WR542 020 05 01 40	2	0.5	1°	2	5	40	80	6
WR542 020 05 01 50	2	0.5	1°	2	5	50	100	6
WR542 020 05 01 60	2	0.5	1°	2	5	60	100	6
WR542 020 05 01 80	2	0.5	1°	2	5	80	140	6
WR542 020 05 02 10	2	0.5	2°	2	5	10	50	4
WR542 020 05 02 12	2	0.5	2°	2	5	12	50	4
WR542 020 05 02 16	2	0.5	2°	2	5	16	50	4
WR542 020 05 02 20	2	0.5	2°	2	5	20	50	4
WR542 020 05 02 25	2	0.5	2°	2	5	25	60	4
WR542 020 05 02 30	2	0.5	2°	2	5	30	70	4
WR542 020 05 02 40	2	0.5	2°	2	5	40	80	6
WR542 020 05 02 50	2	0.5	2°	2	5	50	100	6
WR542 020 05 02 60	2	0.5	2°	2	5	60	100	6
WR542 020 05 02 80	2	0.5	2°	2	5	80	140	8
WR542 030 02 01 16	3	0.2	1°	4.5	6	16	60	6
WR542 030 02 01 20	3	0.2	1°	4.5	6	20	65	6
WR542 030 02 01 30	3	0.2	1°	4.5	6	30	70	6
WR542 030 02 01 40	3	0.2	1°	4.5	6	40	80	6

EDP No	D	R	θ	L_1	L_3	L_4	L_2	D_2
WR542 030 02 01 50	3	0.2	1°	4.5	6	50	90	6
WR542 030 02 01 60	3	0.2	1°	4.5	6	60	100	6
WR542 030 02 02 16	3	0.2	2°	4.5	6	16	60	6
WR542 030 02 02 20	3	0.2	2°	4.5	6	20	65	6
WR542 030 02 02 30	3	0.2	2°	4.5	6	30	70	6
WR542 030 02 02 40	3	0.2	2°	4.5	6	40	80	6
WR542 030 02 02 50	3	0.2	2°	4.5	6	50	90	8
WR542 030 02 02 60	3	0.2	2°	4.5	6	60	100	8
WR542 030 02 02 70	3	0.2	2°	4.5	6	70	120	8
WR542 030 03 01 16	3	0.3	1°	4.5	6	16	60	6
WR542 030 03 01 20	3	0.3	1°	4.5	6	20	65	6
WR542 030 03 01 30	3	0.3	1°	4.5	6	30	70	6
WR542 030 03 01 40	3	0.3	1°	4.5	6	40	80	6
WR542 030 03 01 50	3	0.3	1°	4.5	6	50	90	6
WR542 030 03 01 60	3	0.3	1°	4.5	6	60	100	6
WR542 030 03 02 16	3	0.3	2°	4.5	6	16	60	6
WR542 030 03 02 20	3	0.3	2°	4.5	6	20	65	6
WR542 030 03 02 30	3	0.3	2°	4.5	6	30	70	6
WR542 030 03 02 40	3	0.3	2°	4.5	6	40	80	6
WR542 030 03 02 50	3	0.3	2°	4.5	6	50	90	8
WR542 030 03 02 60	3	0.3	2°	4.5	6	60	100	8
WR542 030 03 02 70	3	0.3	2°	4.5	6	70	120	8
WR542 030 05 01 16	3	0.5	1°	4.5	6	16	60	6
WR542 030 05 01 20	3	0.5	1°	4.5	6	20	65	6
WR542 030 05 01 30	3	0.5	1°	4.5	6	30	70	6
WR542 030 05 01 40	3	0.5	1°	4.5	6	40	80	6
WR542 030 05 01 50	3	0.5	1°	4.5	6	50	90	6
WR542 030 05 01 60	3	0.5	1°	4.5	6	60	100	6
WR542 030 05 02 16	3	0.5	2°	4.5	6	16	60	6
WR542 030 05 02 20	3	0.5	2°	4.5	6	20	65	6
WR542 030 05 02 30	3	0.5	2°	4.5	6	30	70	6
WR542 030 05 02 40	3	0.5	2°	4.5	6	40	80	6
WR542 030 05 02 50	3	0.5	2°	4.5	6	50	90	8
WR542 030 05 02 60	3	0.5	2°	4.5	6	60	100	8
WR542 030 05 02 70	3	0.5	2°	4.5	6	70	120	8
WR542 040 02 01 40	4	0.2	1°	6	8	40	90	6
WR542 040 02 01 50	4	0.2	1°	6	8	50	100	6
WR542 040 02 01 60	4	0.2	1°	6	8	60	110	6
WR542 040 02 01 70	4	0.2	1°	6	8	70	120	8
WR542 040 02 02 40	4	0.2	2°	6	8	40	90	8
WR542 040 02 02 50	4	0.2	2°	6	8	50	100	8
WR542 040 02 02 60	4	0.2	2°	6	8	60	110	8
WR542 040 02 02 70	4	0.2	2°	6	8	70	120	10
WR542 040 03 01 40	4	0.3	1°	6	8	40	90	6
WR542 040 03 01 50	4	0.3	1°	6	8	50	100	6
WR542 040 03 01 60	4	0.3	1°	6	8	60	110	6
WR542 040 03 01 70	4	0.3	1°	6	8	70	120	8
WR542 040 03 02 40	4	0.3	2°	6	8	40	90	8
WR542 040 03 02 50	4	0.3	2°	6	8	50	100	8
WR542 040 03 02 60	4	0.3	2°	6	8	60	110	8
WR542 040 03 02 70	4	0.3	2°	6	8	70	120	10
WR542 040 05 01 40	4	0.5	1°	6	8	40	90	6
WR542 040 05 01 50	4	0.5	1°	6	8	50	100	6
WR542 040 05 01 60	4	0.5	1°	6	8	60	110	6
WR542 040 05 01 70	4	0.5	1°	6	8	70	120	8
WR542 040 05 02 40	4	0.5	2°	6	8	40	90	8
WR542 040 05 02 50	4	0.5	2°	6	8	50	100	8
WR542 040 05 02 60	4	0.5	2°	6	8	60	110	8
WR542 040 05 02 70	4	0.5	2°	6	8	70	120	10

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

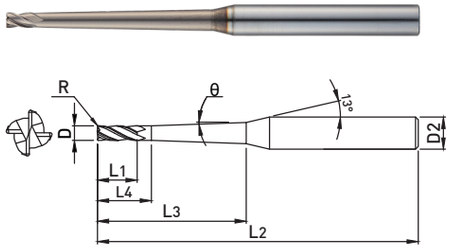
■ **Applicable Working Material**

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○	◎	○				○		○

○ : GOOD ◎ : EXCELLENT

WR544

4 FLUTES TAPERED NECK TYPE RADIUS ENDMILL



- Reduced High strength and chattering with tapered effective length
- Suitable for deep groove machining with various specifications on effective length

ULTRA FINE | 4 | 30° HELIX | R ±0.01 | W | DATA

ALL SIZES — p.511

▪ **TOLERANCE**

D		SHANK DIA.
ALL SIZES	0 ~ -0.012mm	h6

EDP No	D	R	θ	L_1	L_4	L_3	L_2	D_2
WR544 010 01 01 06	1	0.1	1°	1.5	2.5	6	50	4
WR544 010 01 01 08	1	0.1	1°	1.5	2.5	8	50	4
WR544 010 01 01 10	1	0.1	1°	1.5	2.5	10	50	4
WR544 010 01 01 12	1	0.1	1°	1.5	2.5	12	50	4
WR544 010 01 01 16	1	0.1	1°	1.5	2.5	16	50	4
WR544 010 01 01 20	1	0.1	1°	1.5	2.5	20	50	4
WR544 010 01 01 25	1	0.1	1°	1.5	2.5	25	60	4
WR544 010 01 01 30	1	0.1	1°	1.5	2.5	30	70	4
WR544 010 01 01 40	1	0.1	1°	1.5	2.5	40	80	4
WR544 010 01 01 50	1	0.1	1°	1.5	2.5	50	90	4
WR544 010 01 02 06	1	0.1	2°	1.5	2.5	6	50	4
WR544 010 01 02 08	1	0.1	2°	1.5	2.5	8	50	4
WR544 010 01 02 10	1	0.1	2°	1.5	2.5	10	50	4
WR544 010 01 02 12	1	0.1	2°	1.5	2.5	12	50	4
WR544 010 01 02 16	1	0.1	2°	1.5	2.5	16	50	4
WR544 010 01 02 20	1	0.1	2°	1.5	2.5	20	50	4
WR544 010 01 02 25	1	0.1	2°	1.5	2.5	25	60	4
WR544 010 01 02 30	1	0.1	2°	1.5	2.5	30	70	4
WR544 010 01 02 40	1	0.1	2°	1.5	2.5	40	80	4
WR544 010 01 02 50	1	0.1	2°	1.5	2.5	50	90	6
WR544 010 02 01 06	1	0.2	1°	1.5	2.5	6	50	4
WR544 010 02 01 08	1	0.2	1°	1.5	2.5	8	50	4
WR544 010 02 01 10	1	0.2	1°	1.5	2.5	10	50	4
WR544 010 02 01 12	1	0.2	1°	1.5	2.5	12	50	4
WR544 010 02 01 16	1	0.2	1°	1.5	2.5	16	50	4
WR544 010 02 01 20	1	0.2	1°	1.5	2.5	20	50	4
WR544 010 02 01 25	1	0.2	1°	1.5	2.5	25	60	4
WR544 010 02 01 30	1	0.2	1°	1.5	2.5	30	70	4
WR544 010 02 01 40	1	0.2	1°	1.5	2.5	40	80	4
WR544 010 02 01 50	1	0.2	1°	1.5	2.5	50	90	4
WR544 010 02 02 06	1	0.2	2°	1.5	2.5	6	50	4
WR544 010 02 02 08	1	0.2	2°	1.5	2.5	8	50	4
WR544 010 02 02 10	1	0.2	2°	1.5	2.5	10	50	4
WR544 010 02 02 12	1	0.2	2°	1.5	2.5	12	50	4
WR544 010 02 02 16	1	0.2	2°	1.5	2.5	16	50	4
WR544 010 02 02 20	1	0.2	2°	1.5	2.5	20	50	4

EDP No	D	R	θ	L_1	L_4	L_3	L_2	D_2
WR544 010 02 02 25	1	0.2	2°	1.5	2.5	25	60	4
WR544 010 02 02 30	1	0.2	2°	1.5	2.5	30	70	4
WR544 010 02 02 40	1	0.2	2°	1.5	2.5	40	80	4
WR544 010 02 02 50	1	0.2	2°	1.5	2.5	50	90	6
WR544 012 01 01 08	1.2	0.1	1°	1.8	3	8	50	4
WR544 012 01 01 12	1.2	0.1	1°	1.8	3	12	50	4
WR544 012 01 01 16	1.2	0.1	1°	1.8	3	16	50	4
WR544 012 01 01 20	1.2	0.1	1°	1.8	3	20	50	4
WR544 012 01 01 25	1.2	0.1	1°	1.8	3	25	60	4
WR544 012 01 01 30	1.2	0.1	1°	1.8	3	30	70	4
WR544 012 01 02 08	1.2	0.1	2°	1.8	3	8	50	4
WR544 012 01 02 12	1.2	0.1	2°	1.8	3	12	50	4
WR544 012 01 02 16	1.2	0.1	2°	1.8	3	16	50	4
WR544 012 01 02 20	1.2	0.1	2°	1.8	3	20	50	4
WR544 012 01 02 25	1.2	0.1	2°	1.8	3	25	60	4
WR544 012 01 02 30	1.2	0.1	2°	1.8	3	30	70	4
WR544 012 02 01 08	1.2	0.2	1°	1.8	3	8	50	4
WR544 012 02 01 12	1.2	0.2	1°	1.8	3	12	50	4
WR544 012 02 01 16	1.2	0.2	1°	1.8	3	16	50	4
WR544 012 02 01 20	1.2	0.2	1°	1.8	3	20	50	4
WR544 012 02 01 25	1.2	0.2	1°	1.8	3	25	60	4
WR544 012 02 01 30	1.2	0.2	1°	1.8	3	30	70	4
WR544 012 02 02 08	1.2	0.2	2°	1.8	3	8	50	4
WR544 012 02 02 12	1.2	0.2	2°	1.8	3	12	50	4
WR544 012 02 02 16	1.2	0.2	2°	1.8	3	16	50	4
WR544 012 02 02 20	1.2	0.2	2°	1.8	3	20	50	4
WR544 012 02 02 25	1.2	0.2	2°	1.8	3	25	60	4
WR544 012 02 02 30	1.2	0.2	2°	1.8	3	30	70	4
WR544 015 01 01 08	1.5	0.1	1°	2.3	3	8	50	4
WR544 015 01 01 10	1.5	0.1	1°	2.3	3	10	50	4
WR544 015 01 01 12	1.5	0.1	1°	2.3	3	12	50	4
WR544 015 01 01 16	1.5	0.1	1°	2.3	3	16	50	4
WR544 015 01 01 20	1.5	0.1	1°	2.3	3	20	50	4
WR544 015 01 01 25	1.5	0.1	1°	2.3	3	25	60	4
WR544 015 01 01 30	1.5	0.1	1°	2.3	3	30	70	4
WR544 015 01 01 40	1.5	0.1	1°	2.3	3	40	80	4

EDP No	D	R	θ	L_1	L_4	L_3	L_2	D_2
WR544 015 01 01 50	1.5	0.1	1°	2.3	3	50	90	4
WR544 015 01 02 08	1.5	0.1	2°	2.3	3	8	50	4
WR544 015 01 02 10	1.5	0.1	2°	2.3	3	10	50	4
WR544 015 01 02 12	1.5	0.1	2°	2.3	3	12	50	4
WR544 015 01 02 16	1.5	0.1	2°	2.3	3	16	50	4
WR544 015 01 02 20	1.5	0.1	2°	2.3	3	20	50	4
WR544 015 01 02 25	1.5	0.1	2°	2.3	3	25	60	4
WR544 015 01 02 30	1.5	0.1	2°	2.3	3	30	70	4
WR544 015 01 02 40	1.5	0.1	2°	2.3	3	40	80	6
WR544 015 01 02 50	1.5	0.1	2°	2.3	3	50	90	6
WR544 015 02 01 08	1.5	0.2	1°	2.3	3	8	50	4
WR544 015 02 01 10	1.5	0.2	1°	2.3	3	10	50	4
WR544 015 02 01 12	1.5	0.2	1°	2.3	3	12	50	4
WR544 015 02 01 16	1.5	0.2	1°	2.3	3	16	50	4
WR544 015 02 01 20	1.5	0.2	1°	2.3	3	20	50	4
WR544 015 02 01 25	1.5	0.2	1°	2.3	3	25	60	4
WR544 015 02 01 30	1.5	0.2	1°	2.3	3	30	70	4
WR544 015 02 01 40	1.5	0.2	1°	2.3	3	40	80	4
WR544 015 02 01 50	1.5	0.2	1°	2.3	3	50	90	4
WR544 015 02 02 08	1.5	0.2	2°	2.3	3	8	50	4
WR544 015 02 02 10	1.5	0.2	2°	2.3	3	10	50	4
WR544 015 02 02 12	1.5	0.2	2°	2.3	3	12	50	4
WR544 015 02 02 16	1.5	0.2	2°	2.3	3	16	50	4
WR544 015 02 02 20	1.5	0.2	2°	2.3	3	20	50	4
WR544 015 02 02 25	1.5	0.2	2°	2.3	3	25	60	4
WR544 015 02 02 30	1.5	0.2	2°	2.3	3	30	70	4
WR544 015 02 02 40	1.5	0.2	2°	2.3	3	40	80	6
WR544 015 02 02 50	1.5	0.2	2°	2.3	3	50	90	6
WR544 015 03 01 08	1.5	0.3	1°	2.3	3	8	50	4
WR544 015 03 01 10	1.5	0.3	1°	2.3	3	10	50	4
WR544 015 03 01 12	1.5	0.3	1°	2.3	3	12	50	4
WR544 015 03 01 16	1.5	0.3	1°	2.3	3	16	50	4
WR544 015 03 01 20	1.5	0.3	1°	2.3	3	20	50	4
WR544 015 03 01 25	1.5	0.3	1°	2.3	3	25	60	4
WR544 015 03 01 30	1.5	0.3	1°	2.3	3	30	70	4
WR544 015 03 01 40	1.5	0.3	1°	2.3	3	40	80	4
WR544 015 03 01 50	1.5	0.3	1°	2.3	3	50	90	4
WR544 015 03 02 08	1.5	0.3	2°	2.3	3	8	50	4
WR544 015 03 02 10	1.5	0.3	2°	2.3	3	10	50	4
WR544 015 03 02 12	1.5	0.3	2°	2.3	3	12	50	4
WR544 015 03 02 16	1.5	0.3	2°	2.3	3	16	50	4
WR544 015 03 02 20	1.5	0.3	2°	2.3	3	20	50	4
WR544 015 03 02 25	1.5	0.3	2°	2.3	3	25	60	4
WR544 015 03 02 30	1.5	0.3	2°	2.3	3	30	70	4
WR544 015 03 02 40	1.5	0.3	2°	2.3	3	40	80	6
WR544 015 03 02 50	1.5	0.3	2°	2.3	3	50	90	6
WR544 020 01 01 10	2	0.1	1°	2	5	10	50	4
WR544 020 01 01 12	2	0.1	1°	2	5	12	50	4
WR544 020 01 01 16	2	0.1	1°	2	5	16	50	4
WR544 020 01 01 20	2	0.1	1°	2	5	20	50	4
WR544 020 01 01 25	2	0.1	1°	2	5	25	60	4
WR544 020 01 01 30	2	0.1	1°	2	5	30	70	4
WR544 020 01 01 40	2	0.1	1°	2	5	40	80	6
WR544 020 01 01 50	2	0.1	1°	2	5	50	100	6
WR544 020 01 01 60	2	0.1	1°	2	5	60	100	6
WR544 020 01 01 80	2	0.1	1°	2	5	80	140	6

EDP No	D	R	θ	L_1	L_4	L_3	L_2	D_2
WR544 020 01 02 10	2	0.1	2°	2	5	10	50	4
WR544 020 01 02 12	2	0.1	2°	2	5	12	50	4
WR544 020 01 02 16	2	0.1	2°	2	5	16	50	4
WR544 020 01 02 20	2	0.1	2°	2	5	20	50	4
WR544 020 01 02 25	2	0.1	2°	2	5	25	60	4
WR544 020 01 02 30	2	0.1	2°	2	5	30	70	4
WR544 020 01 02 40	2	0.1	2°	2	5	40	80	6
WR544 020 01 02 50	2	0.1	2°	2	5	50	100	6
WR544 020 01 02 60	2	0.1	2°	2	5	60	100	6
WR544 020 01 02 80	2	0.1	2°	2	5	80	140	8
WR544 020 02 01 10	2	0.2	1°	2	5	10	50	4
WR544 020 02 01 12	2	0.2	1°	2	5	12	50	4
WR544 020 02 01 16	2	0.2	1°	2	5	16	50	4
WR544 020 02 01 20	2	0.2	1°	2	5	20	50	4
WR544 020 02 01 25	2	0.2	1°	2	5	25	60	4
WR544 020 02 01 30	2	0.2	1°	2	5	30	70	4
WR544 020 02 01 40	2	0.2	1°	2	5	40	80	6
WR544 020 02 01 50	2	0.2	1°	2	5	50	100	6
WR544 020 02 01 60	2	0.2	1°	2	5	60	100	6
WR544 020 02 01 80	2	0.2	1°	2	5	80	140	6
WR544 020 02 02 10	2	0.2	2°	2	5	10	50	4
WR544 020 02 02 12	2	0.2	2°	2	5	12	50	4
WR544 020 02 02 16	2	0.2	2°	2	5	16	50	4
WR544 020 02 02 20	2	0.2	2°	2	5	20	50	4
WR544 020 02 02 25	2	0.2	2°	2	5	25	60	4
WR544 020 02 02 30	2	0.2	2°	2	5	30	70	4
WR544 020 02 02 40	2	0.2	2°	2	5	40	80	6
WR544 020 02 02 50	2	0.2	2°	2	5	50	100	6
WR544 020 02 02 60	2	0.2	2°	2	5	60	100	6
WR544 020 02 02 80	2	0.2	2°	2	5	80	140	8
WR544 020 03 01 10	2	0.3	1°	2	5	10	50	4
WR544 020 03 01 12	2	0.3	1°	2	5	12	50	4
WR544 020 03 01 16	2	0.3	1°	2	5	16	50	4
WR544 020 03 01 20	2	0.3	1°	2	5	20	50	4
WR544 020 03 01 25	2	0.3	1°	2	5	25	60	4
WR544 020 03 01 30	2	0.3	1°	2	5	30	70	4
WR544 020 03 01 40	2	0.3	1°	2	5	40	80	6
WR544 020 03 01 50	2	0.3	1°	2	5	50	100	6
WR544 020 03 01 60	2	0.3	1°	2	5	60	100	6
WR544 020 03 01 80	2	0.3	1°	2	5	80	140	6
WR544 020 03 02 10	2	0.3	2°	2	5	10	50	4
WR544 020 03 02 12	2	0.3	2°	2	5	12	50	4
WR544 020 03 02 16	2	0.3	2°	2	5	16	50	4
WR544 020 03 02 20	2	0.3	2°	2	5	20	50	4
WR544 020 03 02 25	2	0.3	2°	2	5	25	60	4
WR544 020 03 02 30	2	0.3	2°	2	5	30	70	4
WR544 020 03 02 40	2	0.3	2°	2	5	40	80	6
WR544 020 03 02 50	2	0.3	2°	2	5	50	100	6
WR544 020 03 02 60	2	0.3	2°	2	5	60	100	6
WR544 020 03 02 80	2	0.3	2°	2	5	80	140	8
WR544 020 05 01 10	2	0.5	1°	2	5	10	50	4
WR544 020 05 01 12	2	0.5	1°	2	5	12	50	4
WR544 020 05 01 16	2	0.5	1°	2	5	16	50	4
WR544 020 05 01 20	2	0.5	1°	2	5	20	50	4
WR544 020 05 01 25	2	0.5	1°	2	5	25	60	4
WR544 020 05 01 30	2	0.5	1°	2	5	30	70	4

WR544

4 FLUTES TAPERED NECK TYPE RADIUS ENDMILL

EDP No	D	R	θ	L_1	L_4	L_3	L_2	D_2
WR544 020 05 01 40	2	0.5	1°	2	5	40	80	6
WR544 020 05 01 50	2	0.5	1°	2	5	50	100	6
WR544 020 05 01 60	2	0.5	1°	2	5	60	100	6
WR544 020 05 01 80	2	0.5	2°	2	5	80	140	6
WR544 020 05 02 10	2	0.5	2°	2	5	10	50	4
WR544 020 05 02 12	2	0.5	2°	2	5	12	50	4
WR544 020 05 02 16	2	0.5	2°	2	5	16	50	4
WR544 020 05 02 20	2	0.5	2°	2	5	20	50	4
WR544 020 05 02 25	2	0.5	2°	2	5	25	60	4
WR544 020 05 02 30	2	0.5	2°	2	5	30	70	4
WR544 020 05 02 40	2	0.5	2°	2	5	40	80	6
WR544 020 05 02 50	2	0.5	2°	2	5	50	100	6
WR544 020 05 02 60	2	0.5	2°	2	5	60	100	6
WR544 020 05 02 80	2	0.5	2°	2	5	80	140	8
WR544 030 02 01 16	3	0.2	1°	4.5	6	16	60	6
WR544 030 02 01 20	3	0.2	1°	4.5	6	20	65	6
WR544 030 02 01 30	3	0.2	1°	4.5	6	30	70	6
WR544 030 02 01 40	3	0.2	1°	4.5	6	40	80	6
WR544 030 02 01 50	3	0.2	1°	4.5	6	50	90	6
WR544 030 02 01 60	3	0.2	1°	4.5	6	60	100	6
WR544 030 02 02 16	3	0.2	2°	4.5	6	16	60	6
WR544 030 02 02 20	3	0.2	2°	4.5	6	20	65	6
WR544 030 02 02 30	3	0.2	2°	4.5	6	30	70	6
WR544 030 02 02 40	3	0.2	2°	4.5	6	40	80	6
WR544 030 02 02 50	3	0.2	2°	4.5	6	50	90	8
WR544 030 02 02 60	3	0.2	2°	4.5	6	60	100	8
WR544 030 02 02 70	3	0.2	2°	4.5	6	70	120	8
WR544 030 03 01 16	3	0.3	1°	4.5	6	16	60	6
WR544 030 03 01 20	3	0.3	1°	4.5	6	20	65	6
WR544 030 03 01 30	3	0.3	1°	4.5	6	30	70	6
WR544 030 03 01 40	3	0.3	1°	4.5	6	40	80	6
WR544 030 03 01 50	3	0.3	1°	4.5	6	50	90	6
WR544 030 03 01 60	3	0.3	1°	4.5	6	60	100	6
WR544 030 03 02 16	3	0.3	2°	4.5	6	16	60	6
WR544 030 03 02 20	3	0.3	2°	4.5	6	20	65	6
WR544 030 03 02 30	3	0.3	2°	4.5	6	30	70	6
WR544 030 03 02 40	3	0.3	2°	4.5	6	40	80	6
WR544 030 03 02 50	3	0.3	2°	4.5	6	50	90	8
WR544 030 03 02 60	3	0.3	2°	4.5	6	60	100	8
WR544 030 03 02 70	3	0.3	2°	4.5	6	70	120	8
WR544 030 05 01 16	3	0.5	1°	4.5	6	16	60	6
WR544 030 05 01 20	3	0.5	1°	4.5	6	20	65	6
WR544 030 05 01 30	3	0.5	1°	4.5	6	30	70	6
WR544 030 05 01 40	3	0.5	1°	4.5	6	40	80	6
WR544 030 05 01 50	3	0.5	1°	4.5	6	50	90	6
WR544 030 05 01 60	3	0.5	1°	4.5	6	60	100	6
WR544 030 05 02 16	3	0.5	2°	4.5	6	16	60	6
WR544 030 05 02 20	3	0.5	2°	4.5	6	20	65	6

EDP No	D	R	θ	L_1	L_4	L_3	L_2	D_2
WR544 030 05 02 30	3	0.5	2°	4.5	6	30	70	6
WR544 030 05 02 40	3	0.5	2°	4.5	6	40	80	6
WR544 030 05 02 50	3	0.5	2°	4.5	6	50	90	8
WR544 030 05 02 60	3	0.5	2°	4.5	6	60	100	8
WR544 030 05 02 70	3	0.5	2°	4.5	6	70	120	8
WR544 040 02 01 40	4	0.2	1°	6	8	40	90	6
WR544 040 02 01 50	4	0.2	1°	6	8	50	100	6
WR544 040 02 01 60	4	0.2	1°	6	8	60	110	6
WR544 040 02 01 70	4	0.2	1°	6	8	70	120	8
WR544 040 02 02 40	4	0.2	2°	6	8	40	90	8
WR544 040 02 02 50	4	0.2	2°	6	8	50	100	8
WR544 040 02 02 60	4	0.2	2°	6	8	60	110	8
WR544 040 02 02 70	4	0.2	2°	6	8	70	120	10
WR544 040 03 01 40	4	0.3	1°	6	8	40	90	6
WR544 040 03 01 50	4	0.3	1°	6	8	50	100	6
WR544 040 03 01 60	4	0.3	1°	6	8	60	110	6
WR544 040 03 01 70	4	0.3	1°	6	8	70	120	8
WR544 040 03 02 40	4	0.3	2°	6	8	40	90	8
WR544 040 03 02 50	4	0.3	2°	6	8	50	100	8
WR544 040 03 02 60	4	0.3	2°	6	8	60	110	8
WR544 040 03 02 70	4	0.3	2°	6	8	70	120	10
WR544 040 05 01 40	4	0.5	1°	6	8	40	90	6
WR544 040 05 01 50	4	0.5	1°	6	8	50	100	6
WR544 040 05 01 60	4	0.5	1°	6	8	60	110	6
WR544 040 05 01 70	4	0.5	1°	6	8	70	120	8
WR544 040 05 02 40	4	0.5	2°	6	8	40	90	8
WR544 040 05 02 50	4	0.5	2°	6	8	50	100	8
WR544 040 05 02 60	4	0.5	2°	6	8	60	110	8
WR544 040 05 02 70	4	0.5	2°	6	8	70	120	10

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

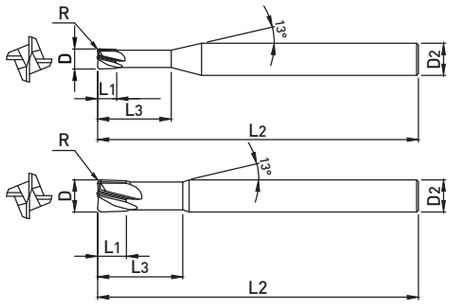
■ **Applicable Working Material**

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○	◎	○				○		○

○ : GOOD ◎ : EXCELLENT

WSPM4

4 FLUTES 10° HELIX RADIUS ENDMILL



ULTRA FINE | 4 | 10° HELIX | R ±0.02 | W | DATA

ALL SIZES

p.512

- Enhanced strength on cutting edge part by applying 45° Helix angle
- Extend customer choice with various corner R size

■ **TOLERANCE**

D		SHANK DIA.
ALL SIZES	0 ~ -0.03mm	h6

EDP No	D	R	L_1	L_3	L_2	D_2
WSPM4010-01	1	0.1	1	2.5	50	6
WSPM4010-02	1	0.2	1	2.5	50	6
WSPM4010-03	1	0.3	1	2.5	50	6
WSPM4015-02	1.5	0.2	1.5	4	50	6
WSPM4015-03	1.5	0.3	1.5	4	50	6
WSPM4015-05	1.5	0.5	1.5	4	50	6
WSPM4020-02	2	0.2	2	6	50	6
WSPM4020-03	2	0.3	2	6	50	6
WSPM4020-05	2	0.5	2	6	50	6
WSPM4030-02	3	0.2	3	8	50	6
WSPM4030-03	3	0.3	3	8	50	6
WSPM4030-05	3	0.5	3	8	50	6
WSPM4040-02	4	0.2	4	10	50	6
WSPM4040-03	4	0.3	4	10	50	6
WSPM4040-05	4	0.5	4	10	50	6
WSPM4040-10	4	1	4	10	50	6
WSPM4060-02	6	0.2	6	15	60	6
WSPM4060-03	6	0.3	6	15	60	6
WSPM4060-05	6	0.5	6	15	60	6
WSPM4060-10	6	1	6	15	60	6
WSPM4060-20	6	2	6	15	60	6
WSPM4060-02L	6	0.2	6	15	90	6
WSPM4060-03L	6	0.3	6	15	90	6
WSPM4060-05L	6	0.5	6	15	90	6
WSPM4060-10L	6	1	6	15	90	6
WSPM4060-20L	6	2	6	15	90	6
WSPM4080-02	8	0.2	8	20	70	8
WSPM4080-03	8	0.3	8	20	70	8
WSPM4080-05	8	0.5	8	20	70	8
WSPM4080-10	8	1	8	20	70	8
WSPM4080-20	8	2	8	20	70	8
WSPM4080-02L	8	0.2	8	20	100	8
WSPM4080-03L	8	0.3	8	20	100	8
WSPM4080-05L	8	0.5	8	20	100	8
WSPM4080-10L	8	1	8	20	100	8

EDP No	D	R	L_1	L_3	L_2	D_2
WSPM4080-20L	8	2	8	20	100	8
WSPM4100-10	10	1	10	25	75	10
WSPM4100-15	10	1.5	10	25	75	10
WSPM4100-20	10	2	10	25	75	10
WSPM4100-02L	10	0.2	10	25	100	10
WSPM4100-03L	10	0.3	10	25	100	10
WSPM4100-05L	10	0.5	10	25	100	10
WSPM4100-10L	10	1	10	25	100	10
WSPM4100-15L	10	1.5	10	25	100	10
WSPM4100-20L	10	2	10	25	100	10
WSPM4120-03	12	0.3	12	30	80	12
WSPM4120-05	12	0.5	12	30	80	12
WSPM4120-10	12	1	12	30	80	12
WSPM4120-15	12	1.5	12	30	80	12
WSPM4120-20	12	2	12	30	80	12
WSPM4120-30	12	3	12	30	80	12
WSPM4120-03L	12	0.3	12	30	110	12
WSPM4120-05L	12	0.5	12	30	110	12
WSPM4120-10L	12	1	12	30	110	12
WSPM4120-15L	12	1.5	12	30	110	12
WSPM4120-20L	12	2	12	30	110	12
WSPM4120-30L	12	3	12	30	110	12
WSPM4160-05	16	0.5	16	35	100	16
WSPM4160-10	16	1	16	35	100	16
WSPM4160-20	16	2	16	35	100	16
WSPM4160-05L	16	0.5	16	35	150	16
WSPM4160-10L	16	1	16	35	150	16
WSPM4160-20L	16	2	16	35	150	16
WSPM4200-05	20	0.5	20	40	100	20
WSPM4200-10	20	1	20	40	100	20
WSPM4200-20	20	2	20	40	100	20
WSPM4200-05L	20	0.5	20	40	150	20
WSPM4200-10L	20	1	20	40	150	20
WSPM4200-20L	20	2	20	40	150	20

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

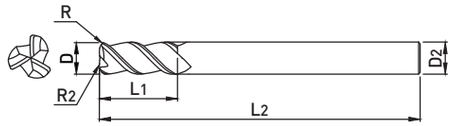
■ **Applicable Working Material**

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○	◎	○				○		○

○ : GOOD ◎ : EXCELLENT

WDR503

3 FLUTES DOUBLE CORNER RADIUS ENDMILL



- Reduced cutting load on end face part with double radius type
- Excellent machining surface with proper design of rake angle considered the characteristics of workpiece in high speed and feed machining

ULTRA FINE | 3 | 45° HELIX | R ±0.01 ALL SIZES | W | DATA p.513

■ TOLERANCE

D		SHANK DIA.
ALL SIZES	0 ~ -0.02mm	h6

EDP No	D	R	R_2	L_1	L_2	D_2
WDR503 060 05	6	0.5	6	10	90	6
WDR503 060 10	6	1	6	10	90	6
WDR503 060 20	6	2	6	10	90	6
WDR503 080 05	8	0.5	8	16	100	8
WDR503 080 10	8	1	8	16	100	8
WDR503 080 20	8	2	8	16	100	8
WDR503 100 05	10	0.5	10	20	100	10
WDR503 100 10	10	1	10	20	100	10
WDR503 100 20	10	2	10	20	100	10
WDR503 120 05	12	0.5	12	24	110	12
WDR503 120 10	12	1	12	24	110	12
WDR503 120 20	12	2	12	24	110	12
WDR503 160 05	16	0.5	16	32	150	16
WDR503 160 10	16	1	16	32	150	16
WDR503 200 05	20	0.5	20	40	150	20
WDR503 200 10	20	1	20	40	150	20

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

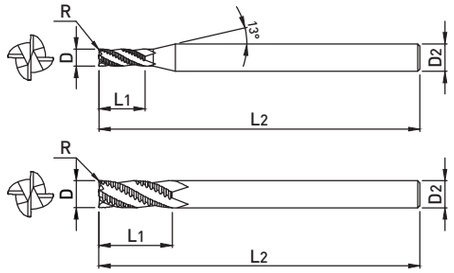
■ Applicable Working Material

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○	◎	○				○		○

○ : GOOD ◎ : EXCELLENT

WF60

3~5 FLUTES VARIABLE HELIX ROUGHING ENDMILL



- Excellent machinability and cheap evacuation with a variable index geometry
- Applying corner R form to reduce cutting edge chipping

ULTRA FINE | 3~5 | M HELIX | CHAMFERED | W | DATA p.514

■ TOLERANCE

D		SHANK DIA.
ALL SIZES	0 ~ -0.05mm	h6

EDP No	D	R	L_1	L_2	D_2	Z
WF603 030	3	0.2	8	50	6	3
WF603 040	4	0.2	10	50	6	3
WF604 050	5	0.2	13	50	6	4
WF604 060	6	0.2	10	50	6	4
WF604 060 15	6	0.2	15	60	6	4
WF604 070	7	0.2	18	70	8	4
WF604 080	8	0.2	12	60	8	4
WF604 080 20	8	0.2	20	70	8	4
WF604 090	9	0.3	22	75	10	4
WF604 100	10	0.3	15	65	10	4
WF604 100 25	10	0.3	25	75	10	4
WF604 110	11	0.3	27	80	12	4
WF604 120	12	0.3	20	70	12	4
WF604 120 30	12	0.3	30	80	12	4
WF605 130	13	0.5	35	100	12	5
WF605 140	14	0.5	35	100	14	5
WF605 140 S16	14	0.5	35	100	16	5
WF605 160	16	1	25	80	16	5
WF605 160 40	16	1	40	100	16	5
WF605 180	18	1	40	100	18	5
WF605 180 S20	18	1	40	100	20	5
WF605 200	20	1	25	80	20	5
WF605 200 45	20	1	45	100	20	5
WF605 250	25	1	45	100	25	5

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

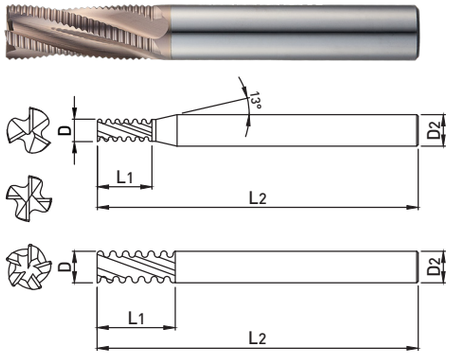
■ Applicable Working Material

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○	◎	○				○		○

○ : GOOD ◎ : EXCELLENT

WF61

3~5 FLUTES ROUGHING ENDMILL



- Applying chamfer type on end face to reduce cutting edge chipping, enhance flute edge hardness
- Enhanced strength of flute part by applying 20° Helix angle

■ **TOLERANCE**

D		SHANK DIA.
~ D3	0 ~ -0.04mm	h6
D4 ~ 6	0 ~ -0.048mm	
D7 ~ 10	0 ~ -0.058mm	
D12 ~ 18	0 ~ -0.07mm	
D20 ~	0 ~ -0.084mm	

ULTRA FINE | 3~5 | 20° HELIX | FINE | W | DATA

p.514

EDP No	D	L_1	L_2	D_2	Z
WF613 030	3	8	50	6	3
WF613 040	4	10	50	6	3
WF613 050	5	13	50	6	3
WF613 060	6	15	60	6	3
WF613 060 20	6	20	60	6	3
WF613 070	7	18	70	8	3
WF613 080	8	20	70	8	3
WF613 080 25	8	25	70	8	3
WF614 090	9	22	75	10	4
WF614 100	10	25	75	10	4
WF614 100 30	10	30	75	10	4
WF614 110	11	27	80	12	4
WF614 120	12	30	80	12	4
WF614 120 35	12	35	80	12	4
WF614 130	13	35	100	12	4
WF614 140	14	35	100	16	4
WF614 160	16	40	100	16	4
WF614 180	18	40	100	18	4
WF614 200	20	50	100	20	4
WF615 250	25	50	100	25	5

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

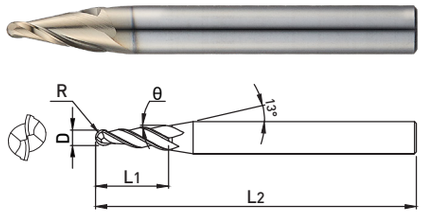
■ **Applicable Working Material**

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○	◎	○				○		○

○ : GOOD ◎ : EXCELLENT

WTB502

2 FLUTES TAPERED BALL NOSE ENDMILL



- Suitable for machining a slopped surface with various taper angle

■ **TOLERANCE**

D		SHANK DIA.
ALL SIZES	0 ~ -0.03mm	h6

ULTRA FINE | 2 | 30° HELIX | R ±0.01 ALL SIZES | W | DATA

p.515

EDP No	D	R	θ	L_1	L_2	D_2
WTB502 003 005	0.3	0.15	30`	1.2	40	4
WTB502 003 01	0.3	0.15	1°	1.2	40	4
WTB502 003 015	0.3	0.15	1°30`	1.2	40	4
WTB502 003 02	0.3	0.15	2°	1.2	40	4
WTB502 003 03	0.3	0.15	3°	1.2	40	4
WTB502 003 05	0.3	0.15	5°	1.2	40	4
WTB502 003 07	0.3	0.15	7°	1.5	40	4
WTB502 003 10	0.3	0.15	10°	1.5	40	4
WTB502 004 005	0.4	0.2	30`	1.6	40	4
WTB502 004 01	0.4	0.2	1°	1.6	40	4
WTB502 004 015	0.4	0.2	1°30`	1.6	40	4
WTB502 004 02	0.4	0.2	2°	1.6	40	4
WTB502 004 03	0.4	0.2	3°	1.6	40	4
WTB502 004 05	0.4	0.2	5°	1.6	40	4
WTB502 004 07	0.4	0.2	7°	2	40	4
WTB502 004 10	0.4	0.2	10°	2	40	4
WTB502 005 005	0.5	0.25	30`	2	45	4
WTB502 005 01	0.5	0.25	1°	2	45	4
WTB502 005 015	0.5	0.25	1°30`	2	45	4
WTB502 005 02	0.5	0.25	2°	2	45	4
WTB502 005 03	0.5	0.25	3°	2	45	4
WTB502 005 05	0.5	0.25	5°	2	45	4
WTB502 005 07	0.5	0.25	7°	2.5	45	4
WTB502 005 10	0.5	0.25	10°	2.5	45	4
WTB502 006 005	0.6	0.3	30`	2	45	4
WTB502 006 01	0.6	0.3	1°	2	45	4
WTB502 006 015	0.6	0.3	1°30`	2	45	4
WTB502 006 02	0.6	0.3	2°	2	45	4
WTB502 006 03	0.6	0.3	3°	2	45	4
WTB502 006 05	0.6	0.3	5°	2	45	4
WTB502 006 07	0.6	0.3	7°	2.5	45	4
WTB502 006 10	0.6	0.3	10°	2.5	45	4
WTB502 007 005	0.7	0.35	30`	2.5	45	4
WTB502 007 01	0.7	0.35	1°	2.5	45	4
WTB502 007 015	0.7	0.35	1°30`	2.5	45	4
WTB502 007 02	0.7	0.35	2°	2.5	45	4
WTB502 007 03	0.7	0.35	3°	2.5	45	4
WTB502 007 05	0.7	0.35	5°	2.5	45	4
WTB502 007 07	0.7	0.35	7°	3	45	4
WTB502 007 10	0.7	0.35	10°	3	45	4
WTB502 008 005	0.8	0.4	30`	3.2	45	4
WTB502 008 01	0.8	0.4	1°	3.2	45	4
WTB502 008 015	0.8	0.4	1°30`	3.2	45	4
WTB502 008 02	0.8	0.4	2°	3.2	45	4
WTB502 008 03	0.8	0.4	3°	3.2	45	4
WTB502 008 05	0.8	0.4	5°	3.2	45	4
WTB502 008 07	0.8	0.4	7°	3.2	45	4
WTB502 008 10	0.8	0.4	10°	3.2	45	4
WTB502 010 005	1	0.5	30`	4	50	4
WTB502 010 01	1	0.5	1°	4	50	4
WTB502 010 015	1	0.5	1°30`	4	50	4
WTB502 010 02	1	0.5	2°	4	50	4
WTB502 010 03	1	0.5	3°	4	50	4
WTB502 010 05	1	0.5	5°	4	50	4
WTB502 010 07	1	0.5	7°	4	50	4
WTB502 010 10	1	0.5	10°	4	50	4
WTB502 015 005	1.5	0.75	30`	6	50	4
WTB502 015 01	1.5	0.75	1°	6	50	4
WTB502 015 015	1.5	0.75	1°30`	6	50	4
WTB502 015 02	1.5	0.75	2°	7	50	4
WTB502 015 03	1.5	0.75	3°	8	50	4
WTB502 015 05	1.5	0.75	5°	10	50	4
WTB502 015 07	1.5	0.75	7°	10	50	4
WTB502 015 10	1.5	0.75	10°	10	50	6
WTB502 020 005	2	1	30`	6	50	4
WTB502 020 01	2	1	1°	6	50	4
WTB502 020 015	2	1	1°30`	6	50	4
WTB502 020 02	2	1	2°	10	50	4
WTB502 020 03	2	1	3°	10	50	4
WTB502 020 05	2	1	5°	10	50	4
WTB502 020 07	2	1	7°	10	50	6
WTB502 020 10	2	1	10°	11	50	6

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

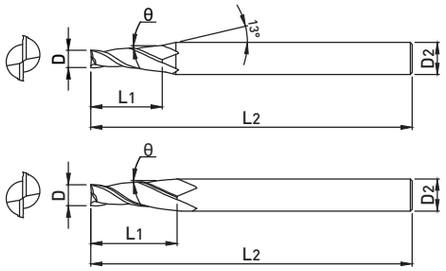
■ **Applicable Working Material**

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○	◎	○				○		○

○ : GOOD ◎ : EXCELLENT

WTE502

2 FLUTES TAPERED SQUARE ENDMILL



- Suitable for machining a slopped surface with various taper angle

ULTRA FINE | 2 | 30° HELIX | W | DATA

p.515

▪ **TOLERANCE**

D		SHANK DIA.
ALL SIZES	0 ~ -0.03mm	h6

EDP No	D	θ	L_1	L_2	D_2
WTE502 003 005	0.3	30`	1.2	40	4
WTE502 003 01	0.3	1°	1.2	40	4
WTE502 003 015	0.3	1°30`	1.2	40	4
WTE502 003 02	0.3	2°	1.2	40	4
WTE502 003 03	0.3	3°	1.5	40	4
WTE502 003 05	0.3	5°	1.5	40	4
WTE502 003 07	0.3	7°	1.5	40	4
WTE502 003 10	0.3	10°	1.5	40	4
WTE502 004 005	0.4	30`	1.6	40	4
WTE502 004 01	0.4	1°	1.6	40	4
WTE502 004 015	0.4	1°30`	1.6	40	4
WTE502 004 02	0.4	2°	1.6	40	4
WTE502 004 03	0.4	3°	1.6	40	4
WTE502 004 05	0.4	5°	2	40	4
WTE502 004 07	0.4	7°	2	40	4
WTE502 004 10	0.4	10°	2	40	4
WTE502 005 005	0.5	30`	2	45	4
WTE502 005 01	0.5	1°	2	45	4
WTE502 005 015	0.5	1°30`	2	45	4
WTE502 005 02	0.5	2°	2	45	4
WTE502 005 03	0.5	3°	2	45	4
WTE502 005 05	0.5	5°	2.5	45	4
WTE502 005 07	0.5	7°	2.5	45	4
WTE502 005 10	0.5	10°	2.5	45	4
WTE502 006 005	0.6	30`	2.4	45	4
WTE502 006 01	0.6	1°	2.4	45	4
WTE502 006 015	0.6	1°30`	2.4	45	4
WTE502 006 02	0.6	2°	2.4	45	4
WTE502 006 03	0.6	3°	2.4	45	4
WTE502 006 05	0.6	5°	3	45	4
WTE502 006 07	0.6	7°	3	45	4
WTE502 006 10	0.6	10°	3	45	4
WTE502 007 005	0.7	30`	2.8	45	4
WTE502 007 01	0.7	1°	2.8	45	4
WTE502 007 015	0.7	1°30`	2.8	45	4
WTE502 007 02	0.7	2°	2.8	45	4
WTE502 007 03	0.7	3°	2.8	45	4
WTE502 007 05	0.7	5°	3.5	45	4
WTE502 007 07	0.7	7°	3.5	45	4
WTE502 007 10	0.7	10°	3.5	45	4
WTE502 008 005	0.8	30`	3.2	45	4
WTE502 008 01	0.8	1°	3.2	45	4

EDP No	D	θ	L_1	L_2	D_2
WTE502 008 015	0.8	1°30`	3.2	45	4
WTE502 008 02	0.8	2°	3.2	45	4
WTE502 008 03	0.8	3°	3.2	45	4
WTE502 008 05	0.8	5°	4	45	4
WTE502 008 07	0.8	7°	4	45	4
WTE502 008 10	0.8	10°	4	45	4
WTE502 010 005	1	30`	4	50	4
WTE502 010 01	1	1°	4	50	4
WTE502 010 015	1	1°30`	4	50	4
WTE502 010 02	1	2°	6	50	4
WTE502 010 03	1	3°	6	50	4
WTE502 010 05	1	5°	8	50	4
WTE502 010 07	1	7°	8	50	4
WTE502 010 10	1	10°	8	50	4
WTE502 015 005	1.5	30`	6	50	4
WTE502 015 01	1.5	1°	6	50	4
WTE502 015 015	1.5	1°30`	6	50	4
WTE502 015 02	1.5	2°	8	50	4
WTE502 015 03	1.5	3°	8	50	4
WTE502 015 05	1.5	5°	10	50	4
WTE502 015 07	1.5	7°	10	50	4
WTE502 015 10	1.5	10°	10	50	6
WTE502 020 005	2	30`	8	50	4
WTE502 020 01	2	1°	8	50	4
WTE502 020 015	2	1°30`	8	50	4
WTE502 020 02	2	2°	10	50	4
WTE502 020 03	2	3°	10	50	4
WTE502 020 05	2	5°	12	50	6
WTE502 020 07	2	7°	12	50	6
WTE502 020 10	2	10°	12	50	8
WTE502 025 005	2.5	30`	10	50	6
WTE502 025 01	2.5	1°	10	50	6
WTE502 025 015	2.5	1°30`	10	50	6
WTE502 025 02	2.5	2°	12	50	6
WTE502 025 03	2.5	3°	12	50	6
WTE502 025 05	2.5	5°	14	50	6
WTE502 025 07	2.5	7°	14	50	6
WTE502 025 10	2.5	10°	14	50	8
WTE502 030 005	3	30`	12	50	6
WTE502 030 01	3	1°	12	50	6
WTE502 030 015	3	1°30`	12	50	6
WTE502 030 02	3	2°	14	50	6

EDP No	D	θ	L_1	L_2	D_2
WTE502 030 03	3	3°	14	50	6
WTE502 030 05	3	5°	16	50	6
WTE502 030 07	3	7°	16	50	8
WTE502 030 10	3	10°	16	50	10
WTE502 040 005	4	30`	16	60	6
WTE502 040 01	4	1°	16	60	6
WTE502 040 015	4	1°30`	16	60	6
WTE502 040 02	4	2°	16	60	6
WTE502 040 03	4	3°	19	60	6
WTE502 040 05	4	5°	22	65	8
WTE502 040 07	4	7°	16	65	8
WTE502 040 10	4	10°	17	65	10
WTE502 060 005	6	30`	20	65	8
WTE502 060 01	6	1°	20	65	8
WTE502 060 015	6	1°30`	20	65	8
WTE502 060 02	6	2°	20	65	8
WTE502 060 03	6	3°	19	65	8
WTE502 060 05	6	5°	22	75	10
WTE502 060 07	6	7°	24	75	12
WTE502 060 10	6	10°	17	75	12
WTE502 070 005	7	30`	28	70	8
WTE502 070 01	7	1°	28	70	8
WTE502 070 015	7	1°30`	28	70	10
WTE502 070 02	7	2°	28	80	10
WTE502 070 03	7	3°	28	80	10
WTE502 070 05	7	5°	28	80	12
WTE502 080 005	8	30`	35	90	10
WTE502 080 01	8	1°	35	90	10
WTE502 080 015	8	1°30`	35	90	10
WTE502 080 02	8	2°	28	90	10
WTE502 080 03	8	3°	38	90	12
WTE502 080 05	8	5°	45	100	16
WTE502 080 07	8	7°	32	90	16
WTE502 080 10	8	10°	34	100	20
WTE502 080 10 S25	8	10°	48	150	25
WTE502 100 00 5	10	30`	40	90	12
WTE502 100 01	10	1°	40	90	12
WTE502 100 015	10	1°30`	38	90	12
WTE502 100 02	10	2°	40	75	16
WTE502 100 03	10	3°	40	100	16
WTE502 100 05	10	5°	34	100	16
WTE502 100 07	10	7°	40	90	20
WTE502 100 10	10	10°	42	100	25

EDP No	D	θ	L_1	L_2	D_2

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

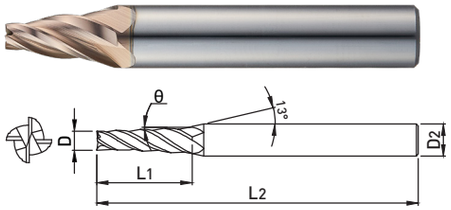
■ **Applicable Working Material**

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○	◎	○				○		○

○ : GOOD ◎ : EXCELLENT

WTE504

4 FLUTES TAPERED SQUARE ENDMILL



- Suitable for machining a slopped surface with various taper angle
- Excellent workpiece finishes in semi-finishing and finishing by 4 flutes cutting

ULTRA FINE | 4 | 30° HELIX | W | DATA

p.516

■ TOLERANCE

D		SHANK DIA.
ALL SIZES	0 ~ -0.03mm	h6

EDP No	D	θ	L_1	L_2	D_2
WTE504 030 005	3	30`	12	50	6
WTE504 030 01	3	1°	12	50	6
WTE504 030 015	3	1°30`	12	50	6
WTE504 030 02	3	2°	14	50	6
WTE504 030 03	3	3°	14	50	6
WTE504 030 05	3	5°	16	50	6
WTE504 030 07	3	7°	16	50	8
WTE504 030 10	3	10°	16	50	10
WTE504 040 005	4	30`	16	60	6
WTE504 040 01	4	1°	16	60	6
WTE504 040 015	4	1°30`	16	60	6
WTE504 040 02	4	2°	16	60	6
WTE504 040 03	4	3°	19	60	6
WTE504 040 05	4	5°	22	65	8
WTE504 040 07	4	7°	16	65	8
WTE504 040 10	4	10°	17	65	10
WTE504 060 005	6	30`	20	65	8
WTE504 060 01	6	1°	20	65	8
WTE504 060 015	6	1°30`	20	65	8
WTE504 060 02	6	2°	20	65	8
WTE504 060 03	6	3°	19	65	8
WTE504 060 05	6	5°	22	75	10
WTE504 060 07	6	7°	24	75	12
WTE504 060 10	6	10°	17	75	12
WTE504 070 005	7	30`	28	70	8
WTE504 070 01	7	1°	28	70	8
WTE504 070 015	7	1°30`	28	70	10
WTE504 070 02	7	2°	28	80	10
WTE504 070 03	7	3°	28	80	10
WTE504 070 05	7	5°	28	80	12

EDP No	D	θ	L_1	L_2	D_2
WTE504 080 005	8	30`	35	90	10
WTE504 080 01	8	1°	35	90	10
WTE504 080 015	8	1°30`	35	90	10
WTE504 080 02	8	2°	28	90	10
WTE504 080 03	8	3°	38	90	12
WTE504 080 05	8	5°	45	100	16
WTE504 080 07	8	7°	32	90	16
WTE504 080 10	8	10°	34	100	20
WTE504 100 005	10	30`	40	90	12
WTE504 100 01	10	1°	40	90	12
WTE504 100 015	10	1°30`	38	90	12
WTE504 100 02	10	2°	40	90	16
WTE504 100 03	10	3°	40	100	16
WTE504 100 05	10	5°	34	100	16
WTE504 100 07	10	7°	40	90	20
WTE504 100 10	10	10°	42	100	25

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

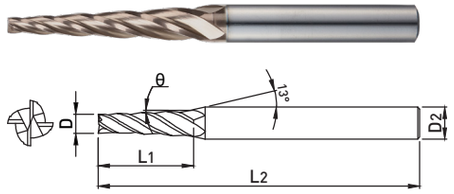
■ Applicable Working Material

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○	◎	○				○		○

○ : GOOD ◎ : EXCELLENT

WTE514

4 FLUTES TAPERED SQUARE ENDMILL



- Suitable for machining a slopped surface with various taper angle
- Excellent workpiece finishes in semi-finishing and finishing by 4 flutes cutting

ULTRA FINE | 4 | 30° HELIX | W | DATA

p.516

■ TOLERANCE

D		SHANK DIA.
ALL SIZES	0 ~ -0.03mm	h6

EDP No	D	θ	L_1	L_2	D_2
WTE514 008 005 04	0.8	30`	4	45	4
WTE514 008 005 06	0.8	30`	6	45	4
WTE514 008 005 08	0.8	30`	8	45	4
WTE514 008 005 10	0.8	30`	10	45	4
WTE514 008 005 12	0.8	30`	12	45	4
WTE514 008 010 04	0.8	1°	4	45	4
WTE514 008 010 06	0.8	1°	6	45	4
WTE514 008 010 08	0.8	1°	8	45	4
WTE514 008 010 10	0.8	1°	10	45	4
WTE514 008 010 12	0.8	1°	12	45	4
WTE514 008 015 04	0.8	1°30`	4	45	4
WTE514 008 015 06	0.8	1°30`	6	45	4
WTE514 008 015 08	0.8	1°30`	8	45	4
WTE514 008 015 10	0.8	1°30`	10	45	4
WTE514 008 015 12	0.8	1°30`	12	45	4
WTE514 008 020 04	0.8	2°	4	45	4
WTE514 008 020 06	0.8	2°	6	45	4
WTE514 008 020 08	0.8	2°	8	45	4
WTE514 008 020 10	0.8	2°	10	45	4
WTE514 008 020 12	0.8	2°	12	45	4
WTE514 010 005 04	1	30`	4	50	4
WTE514 010 005 06	1	30`	6	50	4
WTE514 010 005 08	1	30`	8	50	4
WTE514 010 005 10	1	30`	10	50	4
WTE514 010 005 12	1	30`	12	50	4
WTE514 010 005 16	1	30`	16	50	4
WTE514 010 010 04	1	1°	4	50	4
WTE514 010 010 06	1	1°	6	50	4
WTE514 010 010 08	1	1°	8	50	4
WTE514 010 010 10	1	1°	10	50	4
WTE514 010 010 12	1	1°	12	50	4
WTE514 010 010 16	1	1°	16	50	4
WTE514 010 015 04	1	1°30`	4	50	4
WTE514 010 015 06	1	1°30`	6	50	4
WTE514 010 015 08	1	1°30`	8	50	4
WTE514 010 015 10	1	1°30`	10	50	4

EDP No	D	θ	L_1	L_2	D_2
WTE514 010 015 12	1	1°30`	12	50	4
WTE514 010 015 16	1	1°30`	16	50	4
WTE514 010 020 04	1	2°	4	50	4
WTE514 010 020 06	1	2°	6	50	4
WTE514 010 020 08	1	2°	8	50	4
WTE514 010 020 10	1	2°	10	50	4
WTE514 010 020 12	1	2°	12	50	4
WTE514 010 020 16	1	2°	16	50	4
WTE514 010 030 04	1	3°	4	50	4
WTE514 010 030 06	1	3°	6	50	4
WTE514 010 030 08	1	3°	8	50	4
WTE514 010 030 10	1	3°	10	50	4
WTE514 010 030 12	1	3°	12	50	4
WTE514 010 030 16	1	3°	16	50	4
WTE514 012 005 06	1.2	30`	6	50	4
WTE514 012 005 08	1.2	30`	8	50	4
WTE514 012 005 10	1.2	30`	10	50	4
WTE514 012 005 12	1.2	30`	12	50	4
WTE514 012 005 16	1.2	30`	16	50	4
WTE514 012 010 06	1.2	1°	6	50	4
WTE514 012 010 08	1.2	1°	8	50	4
WTE514 012 010 10	1.2	1°	10	50	4
WTE514 012 010 12	1.2	1°	12	50	4
WTE514 012 010 16	1.2	1°	16	50	4
WTE514 012 015 06	1.2	1°30`	6	50	4
WTE514 012 015 08	1.2	1°30`	8	50	4
WTE514 012 015 10	1.2	1°30`	10	50	4
WTE514 012 015 12	1.2	1°30`	12	50	4
WTE514 012 015 16	1.2	1°30`	16	50	4
WTE514 012 020 06	1.2	2°	6	50	4
WTE514 012 020 08	1.2	2°	8	50	4
WTE514 012 020 10	1.2	2°	10	50	4
WTE514 012 020 12	1.2	2°	12	50	4
WTE514 012 020 16	1.2	2°	16	50	4
WTE514 012 030 06	1.2	3°	6	50	4
WTE514 012 030 08	1.2	3°	8	50	4

WTE514

4 FLUTES TAPERED SQUARE ENDMILL

EDP No	D	θ	L_1	L_2	D_2
WTE514 012 030 10	1.2	3°	10	50	4
WTE514 012 030 12	1.2	3°	12	50	4
WTE514 012 030 16	1.2	3°	16	50	4
WTE514 015 005 06	1.5	30`	6	50	4
WTE514 015 005 08	1.5	30`	8	50	4
WTE514 015 005 10	1.5	30`	10	50	4
WTE514 015 005 12	1.5	30`	12	50	4
WTE514 015 005 16	1.5	30`	16	50	4
WTE514 015 005 20	1.5	30`	20	60	4
WTE514 015 010 06	1.5	1°	6	50	4
WTE514 015 010 08	1.5	1°	8	50	4
WTE514 015 010 10	1.5	1°	10	50	4
WTE514 015 010 12	1.5	1°	12	50	4
WTE514 015 010 16	1.5	1°	16	50	4
WTE514 015 010 20	1.5	1°	20	60	4
WTE514 015 015 06	1.5	1°30`	6	50	4
WTE514 015 015 08	1.5	1°30`	8	50	4
WTE514 015 015 10	1.5	1°30`	10	50	4
WTE514 015 015 12	1.5	1°30`	12	50	4
WTE514 015 015 16	1.5	1°30`	16	50	4
WTE514 015 015 20	1.5	1°30`	20	60	4
WTE514 015 020 06	1.5	2°	6	50	4
WTE514 015 020 08	1.5	2°	8	50	4
WTE514 015 020 10	1.5	2°	10	50	4
WTE514 015 020 12	1.5	2°	12	50	4
WTE514 015 020 16	1.5	2°	16	50	4
WTE514 015 020 20	1.5	2°	20	60	4
WTE514 015 030 06	1.5	3°	6	50	4
WTE514 015 030 08	1.5	3°	8	50	4
WTE514 015 030 10	1.5	3°	10	50	4
WTE514 015 030 12	1.5	3°	12	50	4
WTE514 015 030 16	1.5	3°	16	50	4
WTE514 015 030 20	1.5	3°	20	60	4
WTE514 020 005 08	2	30`	8	50	4
WTE514 020 005 10	2	30`	10	50	4
WTE514 020 005 12	2	30`	12	50	4
WTE514 020 005 16	2	30`	16	50	4
WTE514 020 005 20	2	30`	20	60	4
WTE514 020 005 25	2	30`	25	60	4
WTE514 020 010 08	2	1°	8	50	4
WTE514 020 010 10	2	1°	10	50	4
WTE514 020 010 12	2	1°	12	50	4
WTE514 020 010 16	2	1°	16	50	4
WTE514 020 010 20	2	1°	20	60	4
WTE514 020 010 25	2	1°	25	60	4
WTE514 020 015 08	2	1°30`	8	50	4
WTE514 020 015 10	2	1°30`	10	50	4
WTE514 020 015 12	2	1°30`	12	50	4

EDP No	D	θ	L_1	L_2	D_2
WTE514 020 015 16	2	1°30`	16	50	4
WTE514 020 015 20	2	1°30`	20	60	4
WTE514 020 015 25	2	1°30`	25	60	4
WTE514 020 020 08	2	2°	8	50	4
WTE514 020 020 10	2	2°	10	50	4
WTE514 020 020 12	2	2°	12	50	4
WTE514 020 020 16	2	2°	16	50	4
WTE514 020 020 20	2	2°	20	60	4
WTE514 020 020 25	2	2°	25	60	4
WTE514 020 030 08	2	3°	8	50	4
WTE514 020 030 10	2	3°	10	50	4
WTE514 020 030 12	2	3°	12	50	4
WTE514 020 030 16	2	3°	16	50	4
WTE514 020 030 20	2	3°	20	60	6
WTE514 020 030 25	2	3°	25	60	6
WTE514 025 005 10	2.5	30`	10	50	4
WTE514 025 005 12	2.5	30`	12	50	4
WTE514 025 005 16	2.5	30`	16	50	4
WTE514 025 005 20	2.5	30`	20	60	4
WTE514 025 005 25	2.5	30`	25	60	4
WTE514 025 005 30	2.5	30`	30	60	4
WTE514 025 010 10	2.5	1°	10	50	4
WTE514 025 010 12	2.5	1°	12	50	4
WTE514 025 010 16	2.5	1°	16	50	4
WTE514 025 010 20	2.5	1°	20	60	4
WTE514 025 010 25	2.5	1°	25	60	4
WTE514 025 010 30	2.5	1°	30	60	4
WTE514 025 015 10	2.5	1°30`	10	50	4
WTE514 025 015 12	2.5	1°30`	12	50	4
WTE514 025 015 16	2.5	1°30`	16	50	4
WTE514 025 015 20	2.5	1°30`	20	60	4
WTE514 025 015 25	2.5	1°30`	25	60	4
WTE514 025 015 30	2.5	1°30`	30	60	6
WTE514 025 020 10	2.5	2°	10	50	4
WTE514 025 020 12	2.5	2°	12	50	4
WTE514 025 020 16	2.5	2°	16	50	4
WTE514 025 020 20	2.5	2°	20	60	4
WTE514 025 020 25	2.5	2°	25	60	6
WTE514 025 020 30	2.5	2°	30	60	6
WTE514 025 030 10	2.5	3°	10	50	4
WTE514 025 030 12	2.5	3°	12	50	4
WTE514 025 030 16	2.5	3°	16	50	6
WTE514 025 030 20	2.5	3°	20	60	6
WTE514 025 030 25	2.5	3°	25	60	6
WTE514 025 030 30	2.5	3°	30	60	6

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

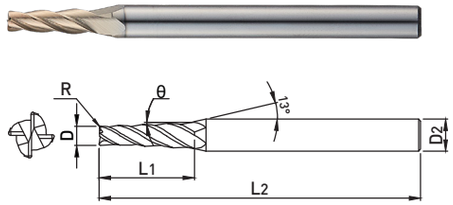
■ **Applicable Working Material**

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○	◎	○				○		○

○ : GOOD ◎ : EXCELLENT

WTR504

4 FLUTES TAPERED RADIUS ENDMILL



- Suitable for machining a slopped surface with various taper angle

ULTRA FINE | 4 | 30° HELIX | R ±0.01 ALL SIZES | W | DATA p.516

■ **TOLERANCE**

D		SHANK DIA.
ALL SIZES	0 ~ -0.03mm	h6

EDP No	D	R	θ	L_1	L_2	D_2
WTR504 008 01 01 04	0.8	0.1	1°	4	45	4
WTR504 008 01 01 06	0.8	0.1	1°	6	45	4
WTR504 008 01 01 08	0.8	0.1	1°	8	45	4
WTR504 008 01 015 04	0.8	0.1	1°30`	4	45	4
WTR504 008 01 015 06	0.8	0.1	1°30`	6	45	4
WTR504 008 01 015 08	0.8	0.1	1°30`	8	45	4
WTR504 008 02 01 04	0.8	0.1	1°	4	45	4
WTR504 008 02 01 06	0.8	0.1	1°	6	45	4
WTR504 008 02 01 08	0.8	0.1	1°	8	45	4
WTR504 008 02 015 04	0.8	0.1	1°30`	4	45	4
WTR504 008 02 015 06	0.8	0.1	1°30`	6	45	4
WTR504 008 02 015 08	0.8	0.1	1°30`	8	45	4
WTR504 010 01 01 04	1	0.1	1°	4	50	4
WTR504 010 01 01 06	1	0.1	1°	6	50	4
WTR504 010 01 01 08	1	0.1	1°	8	50	4
WTR504 010 01 01 10	1	0.1	1°	10	50	4
WTR504 010 01 01 12	1	0.1	1°	12	50	4
WTR504 010 01 015 04	1	0.1	1°30`	4	50	4
WTR504 010 01 015 06	1	0.1	1°30`	6	50	4
WTR504 010 01 015 08	1	0.1	1°30`	8	50	4
WTR504 010 01 015 10	1	0.1	1°30`	10	50	4
WTR504 010 01 015 12	1	0.1	1°30`	12	50	4
WTR504 010 01 02 04	1	0.1	2°	4	50	4
WTR504 010 01 02 06	1	0.1	2°	6	50	4
WTR504 010 01 02 08	1	0.1	2°	8	50	4
WTR504 010 01 02 10	1	0.1	2°	10	50	4
WTR504 010 01 02 12	1	0.1	2°	12	50	4
WTR504 010 01 03 04	1	0.1	3°	4	50	4
WTR504 010 01 03 06	1	0.1	3°	6	50	4
WTR504 010 01 03 08	1	0.1	3°	8	50	4
WTR504 010 01 03 10	1	0.1	3°	10	50	4
WTR504 010 01 03 12	1	0.1	3°	12	50	4
WTR504 010 02 01 04	1	0.2	1°	4	50	4
WTR504 010 02 01 06	1	0.2	1°	6	50	4
WTR504 010 02 01 08	1	0.2	1°	8	50	4
WTR504 010 02 01 10	1	0.2	1°	10	50	4

EDP No	D	R	θ	L_1	L_2	D_2
WTR504 010 02 01 12	1	0.2	1°	12	50	4
WTR504 010 02 015 04	1	0.2	1°30`	4	50	4
WTR504 010 02 015 06	1	0.2	1°30`	6	50	4
WTR504 010 02 015 08	1	0.2	1°30`	8	50	4
WTR504 010 02 015 10	1	0.2	1°30`	10	50	4
WTR504 010 02 015 12	1	0.2	1°30`	12	50	4
WTR504 010 02 02 04	1	0.2	2°	4	50	4
WTR504 010 02 02 06	1	0.2	2°	6	50	4
WTR504 010 02 02 08	1	0.2	2°	8	50	4
WTR504 010 02 02 10	1	0.2	2°	10	50	4
WTR504 010 02 02 12	1	0.2	2°	12	50	4
WTR504 010 02 03 04	1	0.2	3°	4	50	4
WTR504 010 02 03 06	1	0.2	3°	6	50	4
WTR504 010 02 03 08	1	0.2	3°	8	50	4
WTR504 010 02 03 10	1	0.2	3°	10	50	4
WTR504 010 02 03 12	1	0.2	3°	12	50	4
WTR504 010 03 01 04	1	0.3	1°	4	50	4
WTR504 010 03 01 06	1	0.3	1°	6	50	4
WTR504 010 03 01 08	1	0.3	1°	8	50	4
WTR504 010 03 01 10	1	0.3	1°	10	50	4
WTR504 010 03 01 12	1	0.3	1°	12	50	4
WTR504 010 03 015 04	1	0.3	1°30`	4	50	4
WTR504 010 03 015 06	1	0.3	1°30`	6	50	4
WTR504 010 03 015 08	1	0.3	1°30`	8	50	4
WTR504 010 03 015 10	1	0.3	1°30`	10	50	4
WTR504 010 03 015 12	1	0.3	1°30`	12	50	4
WTR504 010 03 02 04	1	0.3	2°	4	50	4
WTR504 010 03 02 06	1	0.3	2°	6	50	4
WTR504 010 03 02 08	1	0.3	2°	8	50	4
WTR504 010 03 02 10	1	0.3	2°	10	50	4
WTR504 010 03 02 12	1	0.3	2°	12	50	4
WTR504 010 03 03 04	1	0.3	3°	4	50	4
WTR504 010 03 03 06	1	0.3	3°	6	50	4
WTR504 010 03 03 08	1	0.3	3°	8	50	4
WTR504 010 03 03 10	1	0.3	3°	10	50	4
WTR504 010 03 03 12	1	0.3	3°	12	50	4

EDP No	D	R	θ	L_1	L_2	D_2
WTR504 012 01 01 06	1.2	0.1	1°	6	50	4
WTR504 012 01 01 08	1.2	0.1	1°	8	50	4
WTR504 012 01 01 10	1.2	0.1	1°	10	50	4
WTR504 012 01 01 12	1.2	0.1	1°	12	50	4
WTR504 012 01 02 06	1.2	0.1	2°	6	50	4
WTR504 012 01 02 08	1.2	0.1	2°	8	50	4
WTR504 012 01 02 10	1.2	0.1	2°	10	50	4
WTR504 012 01 02 12	1.2	0.1	2°	12	50	4
WTR504 012 01 03 06	1.2	0.1	3°	6	50	4
WTR504 012 01 03 08	1.2	0.1	3°	8	50	4
WTR504 012 01 03 10	1.2	0.1	3°	10	50	4
WTR504 012 01 03 12	1.2	0.1	3°	12	50	4
WTR504 012 02 01 06	1.2	0.2	1°	6	50	4
WTR504 012 02 01 08	1.2	0.2	1°	8	50	4
WTR504 012 02 01 10	1.2	0.2	1°	10	50	4
WTR504 012 02 01 12	1.2	0.2	1°	12	50	4
WTR504 012 02 02 06	1.2	0.2	2°	6	50	4
WTR504 012 02 02 08	1.2	0.2	2°	8	50	4
WTR504 012 02 02 10	1.2	0.2	2°	10	50	4
WTR504 012 02 02 12	1.2	0.2	2°	12	50	4
WTR504 012 02 03 06	1.2	0.2	3°	6	50	4
WTR504 012 02 03 08	1.2	0.2	3°	8	50	4
WTR504 012 02 03 10	1.2	0.2	3°	10	50	4
WTR504 012 02 03 12	1.2	0.2	3°	12	50	4
WTR504 012 03 01 06	1.2	0.3	1°	6	50	4
WTR504 012 03 01 08	1.2	0.3	1°	8	50	4
WTR504 012 03 01 10	1.2	0.3	1°	10	50	4
WTR504 012 03 01 12	1.2	0.3	1°	12	50	4
WTR504 012 03 02 06	1.2	0.3	2°	6	50	4
WTR504 012 03 02 08	1.2	0.3	2°	8	50	4
WTR504 012 03 02 10	1.2	0.3	2°	10	50	4
WTR504 012 03 02 12	1.2	0.3	2°	12	50	4
WTR504 012 03 03 06	1.2	0.3	3°	6	50	4
WTR504 012 03 03 08	1.2	0.3	3°	8	50	4
WTR504 012 03 03 10	1.2	0.3	3°	10	50	4
WTR504 012 03 03 12	1.2	0.3	3°	12	50	4
WTR504 015 01 01 06	1.5	0.1	1°	6	50	4
WTR504 015 01 01 08	1.5	0.1	1°	8	50	4
WTR504 015 01 01 10	1.5	0.1	1°	10	50	4
WTR504 015 01 01 12	1.5	0.1	1°	12	50	4
WTR504 015 01 01 16	1.5	0.1	1°	16	50	4
WTR504 015 01 01 20	1.5	0.1	1°	20	60	4
WTR504 015 01 02 06	1.5	0.1	2°	6	50	4
WTR504 015 01 02 08	1.5	0.1	2°	8	50	4
WTR504 015 01 02 10	1.5	0.1	2°	10	50	4
WTR504 015 01 02 12	1.5	0.1	2°	12	50	4
WTR504 015 01 02 16	1.5	0.1	2°	16	50	4
WTR504 015 01 02 20	1.5	0.1	2°	20	60	4
WTR504 015 01 03 06	1.5	0.1	3°	6	50	4
WTR504 015 01 03 08	1.5	0.1	3°	8	50	4
WTR504 015 01 03 10	1.5	0.1	3°	10	50	4
WTR504 015 01 03 12	1.5	0.1	3°	12	50	4
WTR504 015 01 03 16	1.5	0.1	3°	16	50	4
WTR504 015 01 03 20	1.5	0.1	3°	20	60	4
WTR504 015 02 01 06	1.5	0.2	1°	6	50	4
WTR504 015 02 01 08	1.5	0.2	1°	8	50	4

EDP No	D	R	θ	L_1	L_2	D_2
WTR504 015 02 01 10	1.5	0.2	1°	10	50	4
WTR504 015 02 01 12	1.5	0.2	1°	12	50	4
WTR504 015 02 01 16	1.5	0.2	1°	16	50	4
WTR504 015 02 01 20	1.5	0.2	1°	20	60	4
WTR504 015 02 02 06	1.5	0.2	2°	6	50	4
WTR504 015 02 02 08	1.5	0.2	2°	8	50	4
WTR504 015 02 02 10	1.5	0.2	2°	10	50	4
WTR504 015 02 02 12	1.5	0.2	2°	12	50	4
WTR504 015 02 02 16	1.5	0.2	2°	16	50	4
WTR504 015 02 02 20	1.5	0.2	2°	20	60	4
WTR504 015 02 03 06	1.5	0.2	3°	6	50	4
WTR504 015 02 03 08	1.5	0.2	3°	8	50	4
WTR504 015 02 03 10	1.5	0.2	3°	10	50	4
WTR504 015 02 03 12	1.5	0.2	3°	12	50	4
WTR504 015 02 03 16	1.5	0.2	3°	16	50	4
WTR504 015 02 03 20	1.5	0.2	3°	20	60	4
WTR504 015 03 01 06	1.5	0.3	1°	6	50	4
WTR504 015 03 01 08	1.5	0.3	1°	8	50	4
WTR504 015 03 01 10	1.5	0.3	1°	10	50	4
WTR504 015 03 01 12	1.5	0.3	1°1	12	50	4
WTR504 015 03 01 16	1.5	0.3	1°1	16	50	4
WTR504 015 03 01 20	1.5	0.3	1°1	20	60	4
WTR504 015 03 02 06	1.5	0.3	2°	6	50	4
WTR504 015 03 02 08	1.5	0.3	2°	8	50	4
WTR504 015 03 02 10	1.5	0.3	2°	10	50	4
WTR504 015 03 02 12	1.5	0.3	2°	12	50	4
WTR504 015 03 02 16	1.5	0.3	2°	16	50	4
WTR504 015 03 02 20	1.5	0.3	2°	20	60	4
WTR504 015 03 03 06	1.5	0.3	3°	6	50	4
WTR504 015 03 03 08	1.5	0.3	3°	8	50	4
WTR504 015 03 03 10	1.5	0.3	3°	10	50	4
WTR504 015 03 03 12	1.5	0.3	3°	12	50	4
WTR504 015 03 03 16	1.5	0.3	3°	16	50	4
WTR504 015 03 03 20	1.5	0.3	3°	20	60	4
WTR504 020 01 01 08	2	0.1	1°	8	50	4
WTR504 020 01 01 10	2	0.1	1°	10	50	4
WTR504 020 01 01 12	2	0.1	1°	12	50	4
WTR504 020 01 01 16	2	0.1	1°	16	50	4
WTR504 020 01 01 20	2	0.1	1°	20	60	4
WTR504 020 01 01 25	2	0.1	1°	25	60	4
WTR504 020 01 02 08	2	0.1	2°	8	50	4
WTR504 020 01 02 10	2	0.1	2°	10	50	4
WTR504 020 01 02 12	2	0.1	2°	12	50	4
WTR504 020 01 02 16	2	0.1	2°	16	50	4
WTR504 020 01 02 20	2	0.1	2°	20	60	4
WTR504 020 01 02 25	2	0.1	2°	25	60	4
WTR504 020 01 03 08	2	0.1	3°	8	50	4
WTR504 020 01 03 10	2	0.1	3°	10	50	4
WTR504 020 01 03 12	2	0.1	3°	12	50	4
WTR504 020 01 03 16	2	0.1	3°	16	50	4
WTR504 020 01 03 20	2	0.1	3°	20	60	6
WTR504 020 01 03 25	2	0.1	3°	25	60	6
WTR504 020 02 01 08	2	0.2	1°	8	50	4
WTR504 020 02 01 10	2	0.2	1°	10	50	4
WTR504 020 02 01 12	2	0.2	1°	12	50	4
WTR504 020 02 01 16	2	0.2	1°	16	50	4

EDP No	D	R	θ	L_1	L_2	D_2
WTR504 020 02 01 20	2	0.2	1°	20	60	4
WTR504 020 02 01 25	2	0.2	1°	25	60	4
WTR504 020 02 02 08	2	0.2	2°	8	50	4
WTR504 020 02 02 10	2	0.2	2°	10	50	4
WTR504 020 02 02 12	2	0.2	2°	12	50	4
WTR504 020 02 02 16	2	0.2	2°	16	50	4
WTR504 020 02 02 20	2	0.2	2°	20	60	4
WTR504 020 02 02 25	2	0.2	2°	25	60	4
WTR504 020 02 03 08	2	0.2	3°	8	50	4
WTR504 020 02 03 10	2	0.2	3°	10	50	4
WTR504 020 02 03 12	2	0.2	3°	12	50	4
WTR504 020 02 03 16	2	0.2	3°	16	50	4
WTR504 020 02 03 20	2	0.2	3°	20	60	6
WTR504 020 02 03 25	2	0.2	3°	25	60	6
WTR504 020 03 01 08	2	0.3	1°	8	50	4
WTR504 020 03 01 10	2	0.3	1°	10	50	4
WTR504 020 03 01 12	2	0.3	1°	12	50	4
WTR504 020 03 01 16	2	0.3	1°	16	50	4
WTR504 020 03 01 20	2	0.3	1°	20	60	4
WTR504 020 03 01 25	2	0.3	1°	25	60	4
WTR504 020 03 02 08	2	0.3	2°	8	50	4
WTR504 020 03 02 10	2	0.3	2°	10	50	4
WTR504 020 03 02 12	2	0.3	2°	12	50	4
WTR504 020 03 02 16	2	0.3	2°	16	50	4
WTR504 020 03 02 20	2	0.3	2°	20	60	4
WTR504 020 03 02 25	2	0.3	2°	25	60	4
WTR504 020 03 03 08	2	0.3	3°	8	50	4
WTR504 020 03 03 10	2	0.3	3°	10	50	4
WTR504 020 03 03 12	2	0.3	3°	12	50	4
WTR504 020 03 03 16	2	0.3	3°	16	50	4
WTR504 020 03 03 20	2	0.3	3°	20	60	6
WTR504 020 03 03 25	2	0.3	3°	25	60	6
WTR504 025 01 01 10	2.5	0.1	1°	10	50	4
WTR504 025 01 01 12	2.5	0.1	1°	12	50	4
WTR504 025 01 01 16	2.5	0.1	1°	16	50	4
WTR504 025 01 01 20	2.5	0.1	1°	20	60	4
WTR504 025 01 01 25	2.5	0.1	1°	25	60	4
WTR504 025 01 01 30	2.5	0.1	1°	30	60	4
WTR504 025 01 02 10	2.5	0.1	2°	10	50	4
WTR504 025 01 02 12	2.5	0.1	2°	12	50	4
WTR504 025 01 02 16	2.5	0.1	2°	16	50	4
WTR504 025 01 02 20	2.5	0.1	2°	20	60	4
WTR504 025 01 02 25	2.5	0.1	2°	25	60	6
WTR504 025 01 02 30	2.5	0.1	2°	30	60	6
WTR504 025 01 03 10	2.5	0.1	3°	10	50	4
WTR504 025 01 03 12	2.5	0.1	3°	12	50	4
WTR504 025 01 03 16	2.5	0.1	3°	16	50	6
WTR504 025 01 03 20	2.5	0.1	3°	20	60	6

EDP No	D	R	θ	L_1	L_2	D_2
WTR504 025 01 03 25	2.5	0.1	3°	25.0	60	6
WTR504 025 01 03 30	2.5	0.1	3°	30.0	60	6
WTR504 025 02 01 10	2.5	0.2	1°	10.0	50	4
WTR504 025 02 01 12	2.5	0.2	1°	12.0	50	4
WTR504 025 02 01 16	2.5	0.2	1°	16.0	50	4
WTR504 025 02 01 20	2.5	0.2	1°	20.0	60	4
WTR504 025 02 01 25	2.5	0.2	1°	25.0	60	4
WTR504 025 02 01 30	2.5	0.2	1°	30.0	60	4
WTR504 025 02 02 10	2.5	0.2	2°	10.0	50	4
WTR504 025 02 02 12	2.5	0.2	2°	12.0	50	4
WTR504 025 02 02 16	2.5	0.2	2°	16.0	50	4
WTR504 025 02 02 20	2.5	0.2	2°	20.0	60	4
WTR504 025 02 02 25	2.5	0.2	2°	25.0	60	6
WTR504 025 02 02 30	2.5	0.2	2°	30.0	60	6
WTR504 025 02 03 10	2.5	0.2	3°	10.0	50	4
WTR504 025 02 03 12	2.5	0.2	3°	12.0	50	4
WTR504 025 02 03 16	2.5	0.2	3°	16.0	50	6
WTR504 025 02 03 20	2.5	0.2	3°	20.0	60	6
WTR504 025 02 03 25	2.5	0.2	3°	25.0	60	6
WTR504 025 02 03 30	2.5	0.2	3°	30.0	60	6
WTR504 025 03 01 10	2.5	0.3	1°	10.0	50	4
WTR504 025 03 01 12	2.5	0.3	1°	12.0	50	4
WTR504 025 03 01 16	2.5	0.3	1°	16.0	50	4
WTR504 025 03 01 20	2.5	0.3	1°	20.0	60	4
WTR504 025 03 01 25	2.5	0.3	1°	25.0	60	4
WTR504 025 03 01 30	2.5	0.3	1°	30.0	60	4
WTR504 025 03 02 10	2.5	0.3	2°	10.0	50	4
WTR504 025 03 02 12	2.5	0.3	2°	12.0	50	4
WTR504 025 03 02 16	2.5	0.3	2°	16.0	50	4
WTR504 025 03 02 20	2.5	0.3	2°	20.0	60	4
WTR504 025 03 02 25	2.5	0.3	2°	25.0	60	6
WTR504 025 03 02 30	2.5	0.3	2°	30.0	60	6
WTR504 025 03 03 10	2.5	0.3	3°	10.0	50	4
WTR504 025 03 03 12	2.5	0.3	3°	12.0	50	4
WTR504 025 03 03 16	2.5	0.3	3°	16.0	50	6
WTR504 025 03 03 20	2.5	0.3	3°	20.0	60	6
WTR504 025 03 03 25	2.5	0.3	3°	25.0	60	6
WTR504 025 03 03 30	2.5	0.3	3°	30.0	60	6

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

■ **Applicable Working Material**

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○	◎	○				○		○

○ : GOOD ◎ : EXCELLENT

EDP. NO	Appearance	Type	INCH & METRIC	Page
XXB504		4 FLUTES VARIABLE HELIX BALL NOSE ENDMILL	METRIC	218
XCC503		3 FLUTES DOUBLE CORE CHAMFER ENDMILL	METRIC	219
XCC504		4 FLUTES DOUBLE CORE CHAMFER ENDMILL	METRIC	220
XCE503		3 FLUTES DOUBLE CORE SQUARE ENDMILL	METRIC	221
XCE504		4 FLUTES DOUBLE CORE SQUARE ENDMILL	METRIC	222
XCR503		3 FLUTES DOUBLE CORE RADIUS ENDMILL	METRIC	223
XCR504		4 FLUTES DOUBLE CORE RADIUS ENDMILL	METRIC	224
XE504		4 FLUTES VARIABLE HELIX SQUARE ENDMILL	METRIC	225
XE505		5 FLUTES VARIABLE HELIX SQUARE ENDMILL	METRIC	226
XE514		4 FLUTES VARIABLE HELIX NECK TYPE SQUARE ENDMILL	METRIC	227
XE515		5 FLUTES VARIABLE HELIX NECK TYPE SQUARE ENDMILL	METRIC	228
XE524		4 FLUTES VARIABLE HELIX LONG SHANK SQUARE	METRIC	229
XR504		4 FLUTES VARIABLE HELIX RADIUS ENDMILL	METRIC	230
XR505		5 FLUTES VARIABLE HELIX RADIUS ENDMILL	METRIC	231
XR514		4 FLUTES VARIABLE HELIX RADIUS ENDMILL	METRIC	232

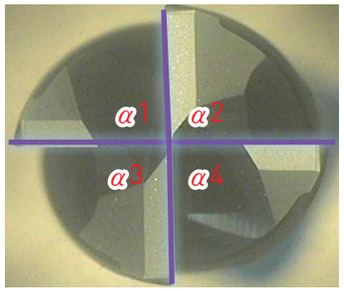
NEO-CLASSIC X-STAR

General Features

- Suitable for the difficult to cut material and low hardness material (Hrc ~ 35) ; Stainless and Inconel etc.
- Various product line considered machining methods for rough and finishing for the difficult to cut materials and flat, sloped surfaces.

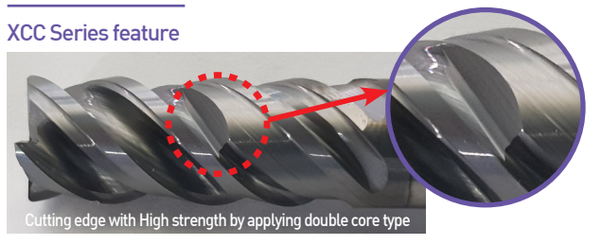
Characteristics

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



α 1° ≠ α 2° ≠ α 3° ≠ α 4°

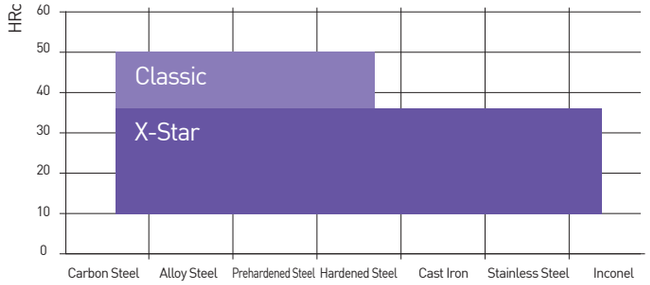
XCC Series feature



Cutting edge with High strength by applying double core type

β 1° ≠ β 2°

Applications



EDP No. System

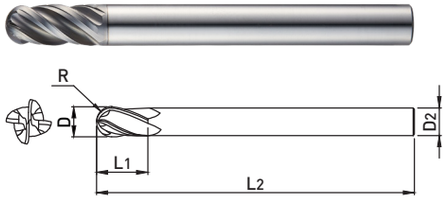
*If expressed as an integer, the decimal point is omitted.

TYPE	SHAPE	GRADE	LENGTH, SHANK TYPE	FLUTE	CUTTING DIA.	CORNER RADIUS
X STAR (Unequal Division)	E : Sqaure type R : Radius type XE : Square type (Edge protection) XB : Ball type XR : Radius type (Edge protecion) CE : Square type (Double Core) CC : Chamfer type (Double Core) CR : Radius type (Double Core)	3 : Grade 5 : Grade	0 - Straight type 1 - Neck 2 - Long neck	3 : 3 Flutes 4 : 4 Flutes 5 : 5 Flutes	1 ~ 25.4	0.1 ~ 5
X	CR	5	0	3	12	05
X-STAR (Unequal Division)	Radius type(Double Core)	Grade	Straight type	3Flutes	Ø12	R0.5

Ex) 3FLUTES CUTTING DIA. Ø12 CORNER R 0.5 50 GRADE CORNER RADIUS DOUBLE CORE TYPE X-STAR ENDMILL

XXB504

4 FLUTES VARIABLE HELIX BALL NOSE ENDMILL



- Excellent chip emission and smooth workpiece surface finish by applying Unequal Index flutes
- Suitable for semi-finishing and finishing by 4 flutes cutting

ULTRA FINE | 4 | M HELIX | R ±0.01 ALL SIZES | TiAlN | DATA p.517–519

■ TOLERANCE

D		SHANK DIA.
ALL SIZES	0 ~ -0.02mm	h6

EDP No	D	R	L_1	L_2	D_2
XXB504 040	4	2	8	70	4
XXB504 060	6	3	12	90	6
XXB504 080	8	4	15	100	8
XXB504 100	10	5	20	100	10
XXB504 120	12	6	25	110	12

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

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

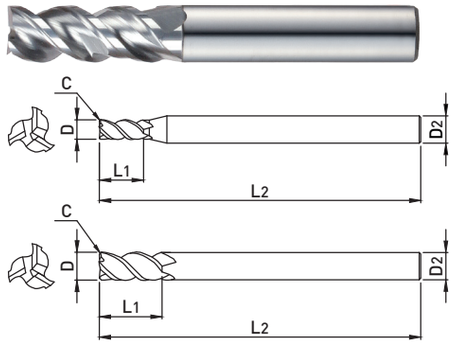
■ Applicable Working Material

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
◎	◎	○			○				◎

○ : GOOD ◎ : EXCELLENT

XCC503

3 FLUTES DOUBLE CORE CHAMFER ENDMILL



- Excellent chip emission and smooth workpiece surface finish by applying Unequal Index flutes
- Anti-bending strength with double core type
- Applying chamfer type on end face to reduce cutting edge chipping

ULTRA FINE | 3 | M HELIX | C | TiAlN | DATA p.517–519

■ TOLERANCE

D		SHANK DIA.
ALL SIZES	0 ~ -0.02mm	h6

EDP No	D	C	L_1	L_2	D_2
XCC503 020	2	0.025	6	50	6
XCC503 025	2.5	0.025	8	50	6
XCC503 030	3	0.035	10	50	6
XCC503 035	3.5	0.035	10	50	6
XCC503 040	4	0.045	12	50	6
XCC503 045	4.5	0.045	14	50	6
XCC503 050	5	0.055	15	50	6
XCC503 055	5.5	0.055	15	50	6
XCC503 060	6	0.075	15	50	6
XCC503 080	8	0.1	20	60	8
XCC503 100	10	0.125	25	70	10
XCC503 120	12	0.15	30	75	12
XCC503 160	16	0.2	40	90	16
XCC503 200	20	0.25	45	100	20
XCC503 250	25	0.3	50	120	25

※ Flat shank is available upon request
ex) XXC503100F : Flat shank

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

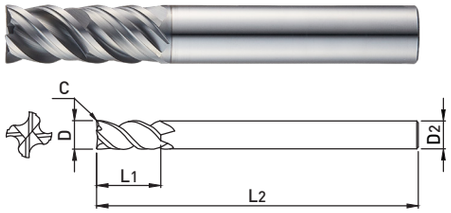
■ Applicable Working Material

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
◎	◎	○			○				◎

○ : GOOD ◎ : EXCELLENT

XCC504

4 FLUTES DOUBLE CORE CHAMFER ENDMILL



- Excellent chip emission and smooth workpiece surface finish by applying Unequal Index flutes
- Anti-bending strength with double core type
- Applying chamfer type on end face to reduce cutting edge chipping

ULTRA FINE | 4 | M HELIX | C | TiAlN | DATA

p.517–519

■ TOLERANCE

D		SHANK DIA.
ALL SIZES	0 ~ -0.02mm	h6

EDP No	D	C	L_1	L_2	D_2
XCC504 060	6	0.075	15	50	6
XCC504 080	8	0.1	20	60	8
XCC504 100	10	0.125	25	70	10
XCC504 120	12	0.15	30	75	12
XCC504 160	16	0.2	40	90	16
XCC504 200	20	0.3	45	100	20
XCC504 250	25	0.3	50	120	25

※ Flat shank is available upon request
ex) XXC504100F : Flat shank

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

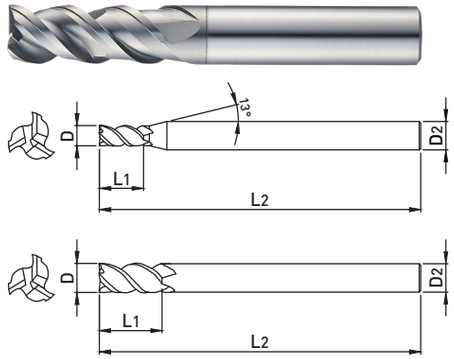
■ Applicable Working Material

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
◎	◎	○			○				◎

○ : GOOD ◎ : EXCELLENT

XCE503

3 FLUTES DOUBLE CORE SQUARE ENDMILL



- Excellent chip emission and smooth workpiece surface finish by applying Unequal Index flutes
- Anti-bending strength with double core type

ULTRA FINE | 3 | M HELIX | TiAlN | DATA

p.517–519

■ TOLERANCE

D		SHANK DIA.
ALL SIZES	0 ~ -0.02mm	h6

EDP No	D	L_1	L_2	D_2
XCE503 020	2	6	50	6
XCE503 025	2.5	8	50	6
XCE503 030	3	10	50	6
XCE503 035	3.5	10	50	6
XCE503 040	4	12	50	6
XCE503 045	4.5	14	50	6
XCE503 050	5	15	50	6
XCE503 055	5.5	15	50	6
XCE503 060	6	15	50	6
XCE503 080	8	20	60	8
XCE503 100	10	25	70	10
XCE503 120	12	30	75	12
XCE503 160	16	40	90	16
XCE503 200	20	45	100	20
XCE503 250	25	50	120	25

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

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

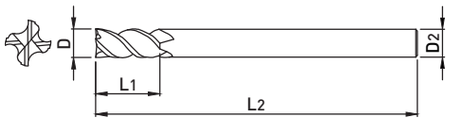
■ Applicable Working Material

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
◎	◎	○			○				◎

○ : GOOD ◎ : EXCELLENT

XCE504

4 FLUTES DOUBLE CORE SQUARE ENDMILL



- Excellent chip emission and smooth workpiece surface finish by applying Unequal Index flutes
- Anti-bending strength with double core type

ULTRA FINE | 4 | M HELIX | TiAlN | DATA

p.517–519

■ TOLERANCE

D		SHANK DIA.
ALL SIZES	0 ~ -0.02mm	h6

EDP No	D	L_1	L_2	D_2
XCE504 060	6	15	50	6
XCE504 080	8	20	60	8
XCE504 100	10	25	70	10
XCE504 120	12	30	75	12
XCE504 160	16	40	90	16
XCE504 200	20	45	100	20
XCE504 250	25	50	120	25

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

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

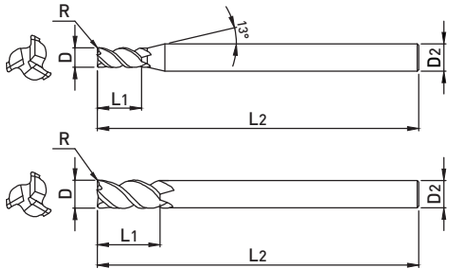
■ Applicable Working Material

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
◎	◎	○			○				◎

○ : GOOD ◎ : EXCELLENT

XCR503

3 FLUTES DOUBLE CORE RADIUS ENDMILL



- Excellent chip emission and smooth workpiece surface finish by applying Unequal Index flutes
- Anti-bending strength with double core type

ULTRA FINE | 3 | M HELIX | R ±0.02 | TiAlN | DATA

ALL SIZES

p.517–519

■ TOLERANCE

D		SHANK DIA.
ALL SIZES	0 ~ -0.02mm	h6

EDP No	D	R	L_1	L_2	D_2
XCR503 05 02	5	0.2	15	50	6
XCR503 06 02	6	0.2	15	50	6
XCR503 06 05	6	0.5	15	50	6
XCR503 06 10	6	1	15	50	6
XCR503 08 05	8	0.5	20	60	8
XCR503 08 10	8	1	20	60	8
XCR503 10 05	10	0.5	25	70	10
XCR503 10 10	10	1	25	70	10
XCR503 12 05	12	0.5	30	75	12
XCR503 12 10	12	1	30	75	12
XCR503 16 05	16	0.5	40	90	16
XCR503 16 10	16	1	40	90	16
XCR503 20 05	20	0.5	45	100	20
XCR503 20 10	20	1	45	100	20
XCR503 25 05	25	0.5	50	120	25
XCR503 25 10	25	1	50	120	25

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

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

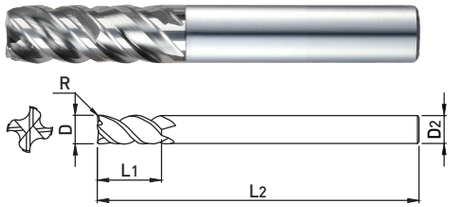
■ Applicable Working Material

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
◎	◎	○			○				◎

○ : GOOD ◎ : EXCELLENT

XCR504

4 FLUTES DOUBLE CORE RADIUS ENDMILL



- Excellent chip emission and smooth workpiece surface finish by applying Unequal Index flutes
- Anti-bending strength with double core type

ULTRA FINE | 4 | M HELIX | R ±0.02 ALL SIZES | TiAlN

■ TOLERANCE

D		SHANK DIA.
ALL SIZES	0 ~ -0.02mm	h6

EDP No	D	R	L_1	L_2	D_2
XCR504 0602	6	0.2	15	50	6
XCR504 0605	6	0.5	15	50	6
XCR504 0610	6	1	15	50	6
XCR504 0805	8	0.5	20	60	8
XCR504 0810	8	1	20	60	8
XCR504 1005	10	0.5	25	70	10
XCR504 1010	10	1	25	70	10
XCR504 1205	12	0.5	30	75	12
XCR504 1210	12	1	30	75	12
XCR504 1605	16	0.5	40	90	16
XCR504 1610	16	1	40	90	16
XCR504 2005	20	0.5	45	100	20
XCR504 2010	20	1	45	100	20
XCR504 2505	25	0.5	50	120	25
XCR504 2510	25	1	50	120	25

※ Flat shank is available upon request
ex) XCR5041005F : Flat shank

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

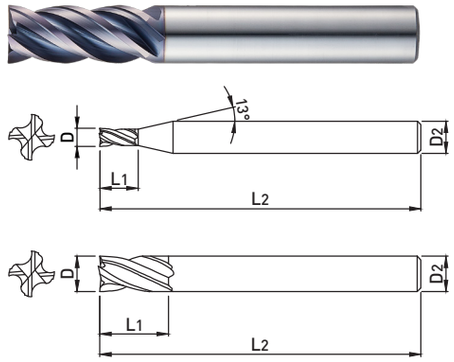
■ Applicable Working Material

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
◎	◎	○			○				◎

○ : GOOD ◎ : EXCELLENT

XE504

4 FLUTES VARIABLE HELIX SQUARE ENDMILL



- Excellent chip emission and smooth workpiece surface finish by applying Unequal Index flutes
- Excellent wear resistance with high hardness cutting edge

ULTRA FINE | 4 | M HELIX | AlTiN

■ TOLERANCE

D		SHANK DIA.
D1 ~ 12	0 ~ -0.02mm	h6
D13 ~ 25	0 ~ -0.03mm	

EDP No	D	L_1	L_2	D_2
XE504 010	1	2.5	45	4
XE504 020	2	5	45	4
XE504 030	3	8	50	6
XE504 040	4	11	50	6
XE504 050	5	13	50	6
XE504 060	6	13	50	6
XE504 070	7	16	60	8
XE504 080	8	19	60	8
XE504 090	9	19	70	10
XE504 100	10	22	70	10
XE504 110	11	22	75	12
XE504 120	12	26	75	12
XE504 130	13	26	80	12
XE504 140	14	26	80	14
XE504 160	16	32	90	16
XE504 180	18	32	100	18
XE504 200	20	38	100	20
XE504 250	25	45	120	25

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

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

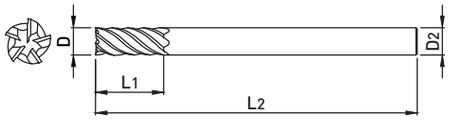
■ Applicable Working Material

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
◎	◎	○			○				◎

○ : GOOD ◎ : EXCELLENT

XE505

5 FLUTES VARIABLE HELIX SQUARE ENDMILL



- Excellent chip emission and smooth workpiece surface finish by applying Unequal Index flutes
- Excellent wear resistance with high hardness cutting edge
- Excellent machining surface with proper design of rake angle considered the characteristics of workpiece.

ULTRA FINE | 5 | M HELIX | TiAlN | DATA

p.517–519

■ TOLERANCE

D		SHANK DIA.
D1 ~ 8	0 ~ -0.04mm	h6
D10 ~ 25	0 ~ -0.05mm	

EDP No	D	L_1	L_2	D_2
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

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

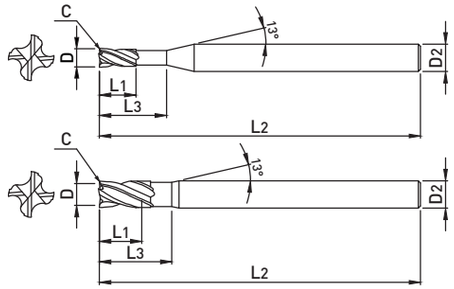
■ Applicable Working Material

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
◎	◎	○			○				◎

○ : GOOD ◎ : EXCELLENT

XE514

4 FLUTES VARIABLE HELIX NECK TYPE SQUARE ENDMILL



- Excellent chip emission and smooth workpiece surface finish by applying Unequal Index flutes
- Excellent wear resistance with high hardness cutting edge
- Applying corner chamfer type on end face to reduce cutting edge chipping

ULTRA FINE | 4 | M HELIX | C | AlTiN | DATA

p.517–519

■ TOLERANCE

D		SHANK DIA.
D1 ~ 12	0 ~ -0.02mm	h6
D13 ~ 20	0 ~ -0.03mm	

EDP No	D	L_1	L_3	L_2	D_2
XE514 010	1	2	10	45	4
XE514 020	2	3	12	45	4
XE514 030	3	4	14	50	6
XE514 040	4	5	16	50	6
XE514 050	5	6	18	50	6
XE514 060	6	7	20	50	6
XE514 080	8	9	26	60	8
XE514 100	10	11	31	70	10
XE514 120	12	13	37	75	12
XE514 160	16	17	43	90	16
XE514 200	20	21	53	100	20

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

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

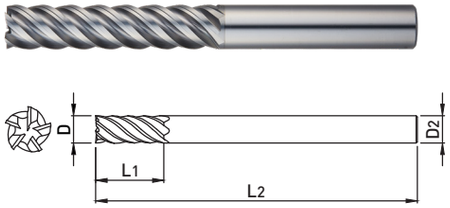
■ Applicable Working Material

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
◎	◎	○			○				◎

○ : GOOD ◎ : EXCELLENT

XE515

5 FLUTES VARIABLE HELIX NECK TYPE SQUARE ENDMILL



- Excellent chip emission and smooth workpiece surface finish by applying Unequal Index flutes
- Excellent wear resistance with high hardness cutting edge
- Excellent machining surface with proper design of rake angle considered the characteristics of workpiece.

ULTRA FINE | 5 | M HELIX | TiAlN | DATA

p.517–519

■ **TOLERANCE**

D		SHANK DIA.
D1 ~ 8	0 ~ -0.04mm	h6
D10 ~ 25	0 ~ -0.05mm	

EDP No	D	L_1	L_2	D_2
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

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

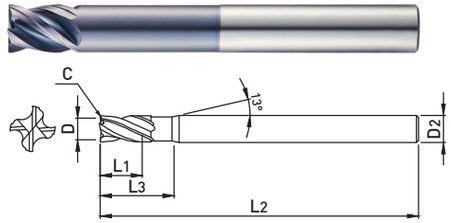
■ **Applicable Working Material**

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
◎	◎	○			○				◎

○ : GOOD ◎ : EXCELLENT

XE524

4 FLUTES VARIABLE HELIX LONG SHANK SQUARE ENDMILL



- Excellent chip emission and smooth workpiece surface finish by applying Unequal Index flutes
- Excellent wear resistance with high hardness cutting edge
- Applying corner chamfer type on end face to reduce cutting edge chipping

ULTRA FINE | 4 | M HELIX | C | AlTiN

■ **TOLERANCE**

D		SHANK DIA.
D6 ~ 12	0 ~ -0.02mm	h6
D16	0 ~ -0.03mm	

EDP No	D	L_1	L_3	L_2	D_2
XE524 060	6	7	33	70	6
XE524 080	8	9	43	80	8
XE524 100	10	11	43	84	10
XE524 120	12	13	51	97	12
XE524 160	16	17	66	115	16

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

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

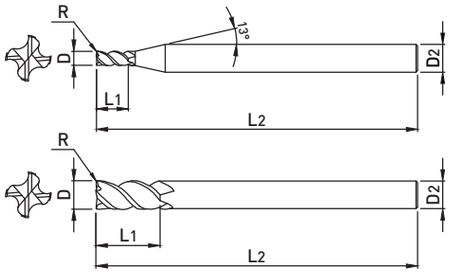
■ **Applicable Working Material**

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
◎	◎	○			○				◎

○ : GOOD ◎ : EXCELLENT

XR504

4 FLUTES VARIABLE HELIX RADIUS ENDMILL



- Excellent chip emission and smooth workpiece surface finish by applying Unequal Index flutes
- Excellent wear resistance with high hardness cutting edge

ULTRA FINE | 4 | M HELIX | R ±0.02 ALL SIZES | AlTiN | DATA p.517–519

■ TOLERANCE

D		SHANK DIA.
D1 ~ 12	0 ~ -0.02mm	h6
D13 ~ 25	0 ~ -0.03mm	

EDP No	D	R	L_1	L_2	D_2
XR504 020	2	0.1	5	45	4
XR504 030	3	0.1	8	50	6
XR504 040	4	0.2	11	50	6
XR504 050	5	0.2	13	50	6
XR504 060	6	0.2	13	50	6
XR504 070	7	0.2	16	60	8
XR504 080	8	0.2	19	60	8
XR504 090	9	0.2	19	70	10
XR504 100	10	0.3	22	70	10
XR504 110	11	0.3	22	75	12
XR504 120	12	0.3	26	75	12
XR504 130	13	0.3	26	80	12
XR504 140	14	0.3	26	80	14
XR504 160	16	0.3	32	90	16
XR504 180	18	0.3	32	100	18
XR504 200	20	0.3	38	100	20
XR504 250	25	0.3	45	120	25

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

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

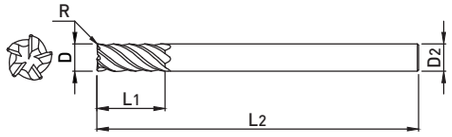
■ Applicable Working Material

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
◎	◎	○			○				◎

○ : GOOD ◎ : EXCELLENT

XR505

5 FLUTES VARIABLE HELIX RADIUS ENDMILL



- Excellent chip emission and smooth workpiece surface finish by applying Unequal Index flutes
- Excellent wear resistance with high hardness cutting edge
- Excellent machining surface with proper design of rake angle considered the characteristics of workpiece.

ULTRA FINE | 5 | M HELIX | R ±0.02 ALL SIZES | TiAlN | DATA p.517–519

■ TOLERANCE

D		SHANK DIA.
D1 ~ 8	0 ~ -0.02mm	h6
D10 ~ 25	0 ~ -0.03mm	

EDP No	D	R	L_1	L_2	D_2
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	14	0.75	26	92	16
XR505 16 100	16	1	32	92	16
XR505 18 100	18	1	32	92	18
XR505 18 100 S20	18	1	32	104	20
XR505 20 100	20	1	38	104	20
XR505 25 100	25	1	38	104	25

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

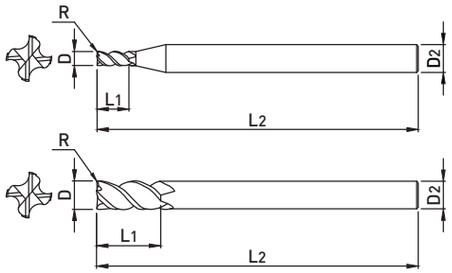
■ Applicable Working Material

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
◎	◎	○			○				◎

○ : GOOD ◎ : EXCELLENT

XR514

4 FLUTES VARIABLE HELIX RADIUS ENDMILL



- Excellent chip emission and smooth workpiece surface finish by applying Unequal Index flutes
- Excellent wear resistance with high hardness cutting edge
- Extend customer choice with various corner R size

ULTRA FINE | 4 | M HELIX | R ±0.02 ALL SIZES | AlTiN | DATA p.517–519

■ **TOLERANCE**

D		SHANK DIA.
D2 ~ 12	0 ~ -0.02mm	h6
D13 ~ 25	0 ~ -0.03mm	

EDP No	D	R	L_1	L_2	D_2
XR514 0201	2	0.1	5	45	4
XR514 0202	2	0.2	5	45	4
XR514 0302	3	0.2	8	50	6
XR514 0303	3	0.3	8	50	6
XR514 0305	3	0.5	8	50	6
XR514 0403	4	0.3	10	50	6
XR514 0405	4	0.5	10	50	6
XR514 0410	4	1	10	50	6
XR514 0505	5	0.5	13	50	6
XR514 0510	5	1	13	50	6
XR514 0605	6	0.5	13	50	6
XR514 0610	6	1	13	50	6
XR514 0615	6	1.5	13	50	6
XR514 0805	8	0.5	19	60	8
XR514 0810	8	1	19	60	8
XR514 0815	8	1.5	19	60	8
XR514 0820	8	2	19	60	8
XR514 1005	10	0.5	22	70	10
XR514 1010	10	1	22	70	10
XR514 1015	10	1.5	22	70	10
XR514 1020	10	2	22	70	10
XR514 1205	12	0.5	26	75	12
XR514 1210	12	1	26	75	12
XR514 1215	12	1.5	26	75	12
XR514 1220	12	2	26	75	12
XR514 1230	12	3	26	75	12
XR514 1615	16	1.5	32	90	16
XR514 1620	16	2	32	90	16

EDP No	D	R	L_1	L_2	D_2
XR514 1630	16	3	32	90	16
XR514 2030	20	3	38	100	20
XR514 2040	20	4	38	100	20
XR514 2050	20	5	38	100	20

※ Flat shank is available upon request
ex) XR5141010F : Flat shank

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

■ **Applicable Working Material**

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
◎	◎	○			○				◎

○ : GOOD ◎ : EXCELLENT

MEMO

EDP. NO	Appearance	Type	INCH & METRIC	Page
DS502		2 FLUTES BALL NOSE ENDMILL	METRIC	236
SM503		3 FLUTES VARIABLE HELIX SQUARE ENDMILL	METRIC	237
SM504		4 FLUTES VARIABLE HELIX RADIUS ENDMILL	METRIC	238
ZF62		4~6 FLUTES ROUGHING ENDMILL	METRIC	239

SUS-WAVE

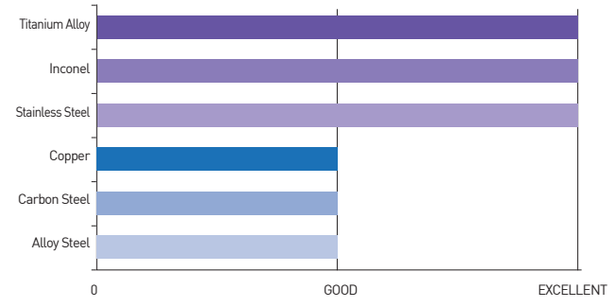
General Features

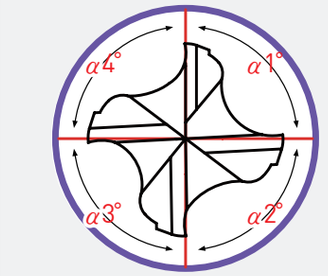
- Suitable for the difficult to cut material; Stainless, Inconel and Titanium alloy etc.
- Available to various process for rough machining and finishing of the difficult to cut material

Characteristics

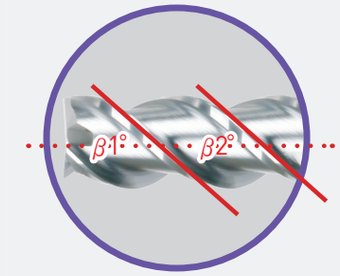
- Excellent chipping resistance and Minimized sudden breakage by using high toughness materials
- TiAlN+SH coating for deposition resistance and high hardness on surface
- Excellent chip emission and reduced chattering through unequal index cutting edge in all series
- Excellent chipping resistance by R shape

Applications





α 1° ≠ α 2° ≠ α 3° ≠ α 4°



β 1° ≠ β 2°

EDP No. System

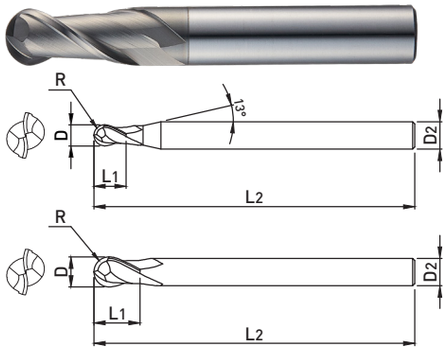
*If expressed as an integer, the decimal point is omitted.

TYPE	SHAPE	GRADE	LENGTH, SHANK TYPE	FLUTE	CUTTING DIA.
D : Dynamic	S : Ball type	6 : Grade	0 : Straight	2 : 2 Flutes	1
S : Stainless	M : Square type Radius type	5 : Grade	2 : Straight / Neck	3 : 3 Flutes	~
Z : ZAMUS	F : Roughing type			4 : 4 Flutes	20
				5 : 5 Flutes	
				6 : 6 Flutes	
Z	F	6	2	5	160
Zamus Endmill	Roughing type	Grade	Neck type	5Flutes	Ø16

Ex) 5FLUTES CUTTING DIA. Ø16 60 GRADE ROUGHING NECK TYPE ZAMUS ENDMILL

DS502

2 FLUTES BALL NOSE ENDMILL



- Applying proper cutting edge shape considered of the difficult to cut material with excellent deposition resistance
- Excellent chip emission by reduced friction resistance on groove part

ULTRA FINE | 2 | 38° HELIX | R ±0.01 ALL SIZES | TiAlN | DATA

p.520

■ TOLERANCE

D		SHANK DIA.
ALL SIZES	0 ~ -0.02mm	h6

EDP No	D	R	L_1	L_2	D_2
DS502 010	1	0.5	3	50	6
DS502 020	2	1	6	50	6
DS502 030	3	1.5	8	50	6
DS502 031	3	1.5	8	70	6
DS502 040	4	2	10	50	6
DS502 041	4	2	10	70	6
DS502 050	5	2.5	13	50	6
DS502 051	5	2.5	13	80	6
DS502 060	6	3	13	50	6
DS502 061	6	3	13	90	6
DS502 080	8	4	19	60	8
DS502 081	8	4	19	100	8
DS502 100	10	5	22	70	10
DS502 101	10	5	22	100	10
DS502 120	12	6	26	75	12
DS502 121	12	6	26	110	12

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

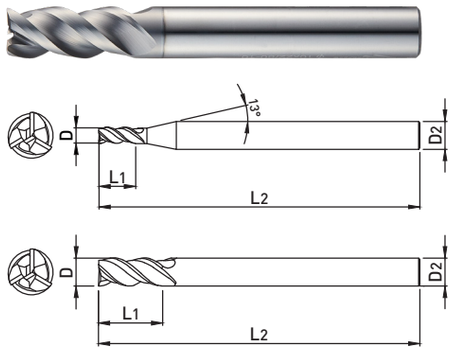
■ Applicable Working Material

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○	○			○				◎

○ : GOOD ◎ : EXCELLENT

SM503

3 FLUTES VARIABLE HELIX SQUARE ENDMILL



- Applying proper cutting edge shape considered of the difficult to cut material with excellent deposition resistance
- Reduced chattering and smooth workpiece surface finish by applying Unequal Index flutes
- Excellent chip emission by reduced friction resistance on groove part

ULTRA FINE | 3 | M HELIX | TiAlN | DATA

p.521

■ TOLERANCE

D		SHANK DIA.
ALL SIZES	0 ~ -0.02mm	h6

EDP No	D	L_1	L_2	D_2
SM503 010	1	2	45	4
SM503 015	1.5	3	45	4
SM503 020	2	4	50	6
SM503 030	3	6	50	6
SM503 040	4	8	50	6
SM503 050	5	10	50	6
SM503 060	6	13	60	6
SM503 080	8	19	70	8
SM503 100	10	22	80	10
SM503 120	12	26	90	12
SM503 140	14	26	90	12
SM503 160	16	30	110	16
SM503 180	18	32	110	18
SM503 200	20	32	140	20

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

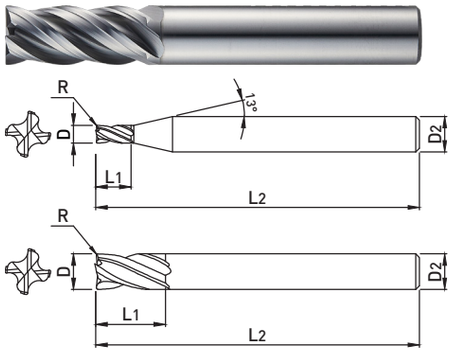
■ Applicable Working Material

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○	○			○				◎

○ : GOOD ◎ : EXCELLENT

SM504

4 FLUTES VARIABLE HELIX RADIUS ENDMILL



- Applying proper cutting edge shape considered of the difficult to cut material with excellent deposition resistance
- Reduced chattering and smooth workpiece surface finish by applying Unequal Index flutes
- Excellent chip emission by reduced friction resistance on groove part
- Applying R form to reduce cutting edge chipping
  (※ Not recommended for machining requiring R shape)

ULTRA FINE | 4 | M HELIX | TiAlN | DATA

p.522

■ TOLERANCE

D		SHANK DIA.
D2 ~ 6	0 ~ -0.02mm	h6
D7 ~ 20	0 ~ -0.03mm	

EDP No	D	R	L_1	L_2	D_2
SM504 020	2	0.1	6	45	6
SM504 030	3	0.1	10	45	6
SM504 040	4	0.2	12	50	6
SM504 050	5	0.2	13	50	6
SM504 060	6	0.2	13	50	6
SM504 070	7	0.2	16	60	8
SM504 080	8	0.2	16	60	8
SM504 090	9	0.2	19	70	10
SM504 100	10	0.3	22	70	10
SM504 120	12	0.3	26	75	12
SM504 140	14	0.3	26	82	14
SM504 160	16	0.3	32	90	16
SM504 180	18	0.3	32	100	18
SM504 200	20	0.3	38	100	20

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

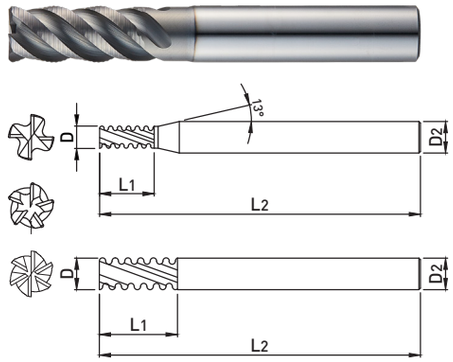
■ Applicable Working Material

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○	○			○				◎

○ : GOOD ◎ : EXCELLENT

ZF62

4~6 FLUTES ROUGHING ENDMILL



- Applying proper cutting edge shape considered of the difficult to cut material with excellent deposition resistance
- Excellent chip emission by reduced friction resistance on groove part

ULTRA FINE | 4~6 | 45° HELIX | TiAlN | FINE | DIN 6535HA | DIN 6535HB | DATA

p.523

■ TOLERANCE

D		SHANK DIA.
~ D6	-0.02 ~ -0.038mm	h6
D8 ~ 10	-0.025 ~ -0.047mm	
D12 ~ 16	-0.032 ~ -0.059mm	
D20 ~	-0.04 ~ -0.073mm	

EDP No		D	L_1	L_3	L_2	D_2	Z
PLAIN SHANK	FLAT SHANK						
ZF624 060	ZF624 060F	6	7	-	54	6	4
ZF624 061	ZF624 061F	6	16	-	57	6	4
ZF624 062	ZF624 062F	6	16	20	57	6	4
ZF624 080	ZF624 080F	8	9	-	58	8	4
ZF624 081	ZF624 081F	8	16	-	63	8	4
ZF624 082	ZF624 082F	8	16	26	63	8	4
ZF624 100	ZF624 100F	10	14	-	66	10	4
ZF624 101	ZF624 101F	10	22	-	72	10	4
ZF624 102	ZF624 102F	10	22	31	72	10	4
ZF624 120	ZF624 120F	12	16	-	73	12	4
ZF624 121	ZF624 121F	12	26	-	83	12	4
ZF624 122	ZF624 122F	12	26	37	83	12	4
ZF625 160	ZF625 160F	16	22	-	82	16	5
ZF625 161	ZF625 161F	16	32	-	92	16	5
ZF625 162	ZF625 162F	16	32	51	100	16	5
ZF626 200	ZF626 200F	20	26	-	92	20	6
ZF626 201	ZF626 201F	20	38	-	104	20	6
ZF626 202	ZF626 202F	20	38	59	110	20	6

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

■ Applicable Working Material

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○	○			○				

○ : GOOD ◎ : EXCELLENT

EDP. NO	Appearance	Type	INCH & METRIC	Page
VXE504 new		4 FLUTES VARIABLE HELIX SQUARE ENDMILL	METRIC	241
VXR504 new		4 FLUTES VARIABLE HELIX RADIUS ENDMILL	METRIC	242

EDP NUMBER SYSTEM

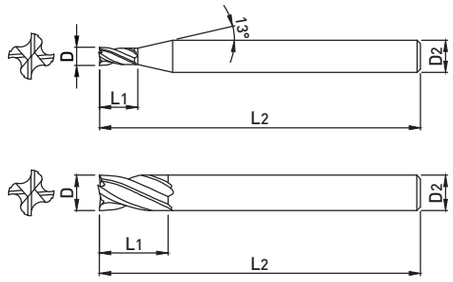
*If expressed as an integer, the decimal point is omitted.

TYPE	SHAPE	GRADE	LENGTH, SHANK TYPE	FLUTE	CUTTING DIA.	CUTTING LENGTH / CORNER RADIUS
VX Endmill (high performance Variable heliX)	E : Square type R : Raidus type	5 : Grade	0 : Standard	4 : 4 Flutes	1.0 ~ 20.0	Square type ▶ Cutting length Radius type ▶ Corner radius size R0.1 ~ R4
VX	R	5	0	4	120	30
High Performance Variable Helix	Radius type	Grade	Standard	4 Flutes	Ø12	R3

Ex) 4FLUTES CUTTING DIA. Ø12 CORNER R 3.0 50 GRADE VARIABLE HELIX TYPE V-STAR ENDMILL

New 4 FLUTES VARIABLE HELIX SQUARE ENDMILL

VXE504



- Reduced chattering and smooth workpiece surface finish by applying Unequal Index flutes
- New coating for prevention to high temperature oxidation of tools and with high surface hardness to reduce frictional resistance and improve chip emission
- Excellent anti chipping and deposition resistance by applying new cutting edge.

ULTRA FINE | 4 | M HELIX | AlCrN | DATA

p.522

■ TOLERANCE

D		SHANK DIA.
ALL SIZES	0 ~ -0.03mm	h6

EDP No	D	L_1	L_2	D_2
VXE504 010	1	2.5	50	6
VXE504 012	1.2	3	50	6
VXE504 015	1.5	4	50	6
VXE504 020	2	6	50	6
VXE504 025	2.5	7	50	6
VXE504 030	3	8	55	6
VXE504 030 10	3	10	60	6
VXE504 035	3.5	10	55	6
VXE504 040	4	10	55	6
VXE504 040 12	4	12	60	6
VXE504 045	4.5	12	55	6
VXE504 050	5	15	55	6
VXE504 055	5.5	15	60	6
VXE504 060	6	15	60	6
VXE504 060 20	6	20	65	6
VXE504 065	6.5	15	60	8
VXE504 070	7	20	80	8
VXE504 080	8	20	70	8
VXE504 080 25	8	25	70	8
VXE504 080 30	8	30	80	8
VXE504 085	8.5	20	70	10
VXE504 090	9	25	80	10
VXE504 100	10	25	75	10
VXE504 100 35	10	35	85	10
VXE504 120	12	30	80	12
VXE504 120 40	12	40	90	12
VXE504 140	14	35	90	16
VXE504 160	16	42	100	16
VXE504 180	18	45	100	16
VXE504 200	20	48	100	20

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

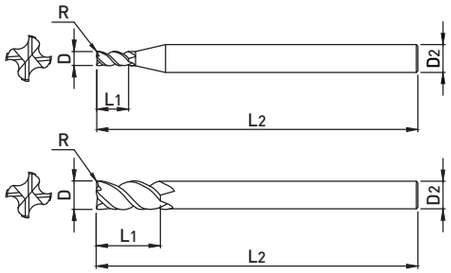
■ Applicable Working Material

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○	○			○				◎

○ : GOOD ◎ : EXCELLENT

VXR504

4 FLUTES VARIABLE HELIX RADIUS ENDMILL New



- Reduced chattering and smooth workpiece surface finish by applying Unequal Index flutes
- New coating for prevention to high temperature oxidation of tools and with high surface hardness to reduce frictional resistance and improve chip emission
- Excellent anti chipping and deposition resistance by applying new cutting edge.

ULTRA FINE | 4 | M HELIX | R ±0.01 ALL SIZES | AlCrN | DATA p.522

■ **TOLERANCE**

D		SHANK DIA.
ALL SIZES	0 ~ -0.03mm	h6

EDP No	D	R	L_1	L_2	D_2
VXR504 010	1	0.1	2.5	50	6
VXR504 010 02	1	0.2	2.5	50	6
VXR504 012	1.2	0.1	3	50	6
VXR504 015	1.5	0.1	4	50	6
VXR504 015 02	1.5	0.2	4	50	6
VXR504 020	2	0.1	6	50	6
VXR504 020 02	2	0.2	6	50	6
VXR504 025	2.5	0.2	7	50	6
VXR504 030	3	0.2	8	55	6
VXR504 030 03	3	0.3	8	55	6
VXR504 030 05	3	0.5	8	55	6
VXR504 040	4	0.2	10	55	6
VXR504 040 03	4	0.3	10	55	6
VXR504 040 05	4	0.5	10	55	6
VXR504 050	5	0.2	15	55	6
VXR504 050 03	5	0.3	15	55	6
VXR504 050 05	5	0.5	15	55	6
VXR504 060	6	0.3	15	60	6
VXR504 060 05	6	0.5	15	60	6
VXR504 060 10	6	1	15	60	6
VXR504 080	8	0.3	20	70	8
VXR504 080 05	8	0.5	20	70	8
VXR504 080 10	8	1	20	70	8
VXR504 100	10	0.3	25	75	10
VXR504 100 05	10	0.5	25	75	10
VXR504 100 10	10	1	25	75	10
VXR504 100 15	10	1.5	25	75	10
VXR504 100 20	10	2	25	75	10
VXR504 100 30	10	3	25	75	10
VXR504 120	12	0.5	30	80	12
VXR504 120 10	12	1	30	80	12
VXR504 120 15	12	1.5	30	80	12
VXR504 120 20	12	2	30	80	12
VXR504 120 30	12	3	30	80	12
VXR504 120 40	12	4	30	80	12
VXR504 140	14	0.5	35	90	16
VXR504 140 10	14	1	35	90	16
VXR504 160	16	0.5	42	100	16
VXR504 160 10	16	1	42	100	16
VXR504 180	18	0.5	45	100	16
VXR504 200	20	0.5	48	100	20
VXR504 200 10	20	1	48	100	20

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

■ **Applicable Working Material**

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○	○			○				◎

○ : GOOD ◎ : EXCELLENT

MEMO

EDP. NO	Appearance	Type	INCH & METRIC	Page
WAB312		2 FLUTES BALL NOSE ENDMILL	METRIC	246
WAE301		1 FLUTES SQUARE ENDMILL	METRIC	247
WAE302		2 FLUTES SQUARE ENDMILL	METRIC	248
WAE30(2)3		3 FLUTES SQUARE ENDMILL	METRIC	249
WAR302		2 FLUTES RADIUS ENDMILL	METRIC	251
WAR303		3 FLUTES RADIUS ENDMILL	METRIC	252
WAR502		2 FLUTES RADIUS ENDMILL	METRIC	253
WAR503		3 FLUTES RADIUS ENDMILL	METRIC	254
WAF303		3 FLUTES ROUGHING ENDMILL	METRIC	255

ALU-WAVE

General Features

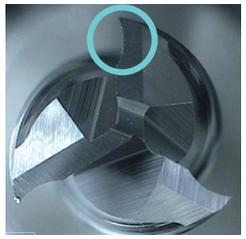
· Suitable for Aluminum, aluminum alloy and non-ferrous materials.

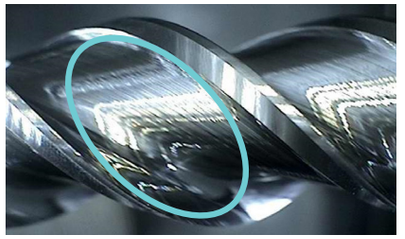
· Various specifications in the line such as Ball, single flute and roughing etc. for wide range in machining.

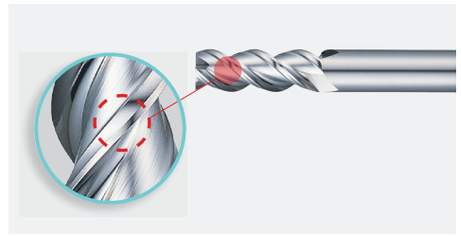
Characteristics

· Sharp cutting edge considered the characteristics of workpiece

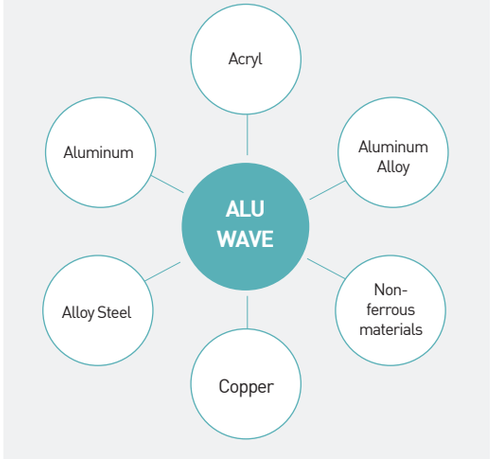
· High deposition resistance and enhanced chip emission through the surface of a mirror in the groove.



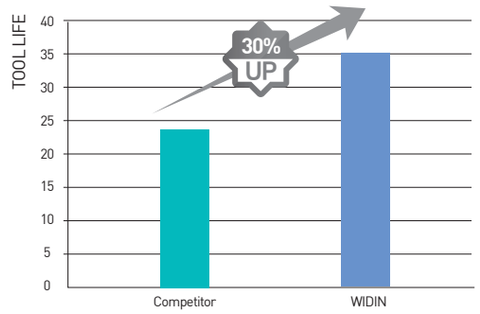




Applications



Case Study



EDP No. System

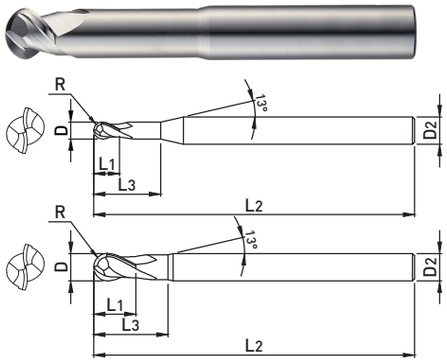
*If expressed as an integer, the decimal point is omitted.

TYPE	SHAPE	GRADE	LENGTH, SHANK TYPE	FLUTE	CUTTING DIA.	CORNER RADIUS
WA : WINNER ALUMINIUM	B : Ball type	3 : NON Coating	0 : Stub Length	1 : 1 Flute	0.2	0.05
	E : Square type	5 : D.L.C Coating	1 : Regula Length	2 : 2 Flutes	~	~
	R : Radius type		2 : Long Length	3 : 3 Flutes	25	5
	F : Roughing type					
WA	**R**	**3**	**0**	**3**	**14**	**10**
Winner Aluminum	**Radius type**	**Uncoated**	**Stub Length**	**3 Flutes**	**Ø14**	**R1**

Ex) 3FLUTES CUTTING DIA. Ø14 CORNER R 1.0 NON COATING CORNER RADIUS ALU-WAVE ENDMILL

WAB312

2 FLUTES BALL NOSE ENDMILL



- High machinability through the application of sharp cutting edge to soft materials
- Minimize interference in machining by applying the neck shape

FINE GRAIN | 2 | 50° HELIX | R ±0.02 ALL SIZES | Uncoated | DATA p.524

■ **TOLERANCE**

D		SHANK DIA.
ALL SIZES	±0.02mm	h6

EDP No	D	R	L_1	L_3	L_2	D_2
WAB312 060	6	3	5.5	25	55	6
WAB312 061	6	3	5.5	40	90	6
WAB312 080	8	4	7	30	65	8
WAB312 081	8	4	7	50	100	8
WAB312 100	10	5	8.5	35	75	10
WAB312 101	10	5	10	50	100	10
WAB312 102	10	5	10	60	150	10
WAB312 120	12	6	10.5	40	75	12
WAB312 121	12	6	12	50	110	12
WAB312 122	12	6	12	60	150	12
WAB312 160	16	8	14	50	90	16
WAB312 161	16	8	16	70	150	16
WAB312 162	16	8	16	90	200	16
WAB312 200	20	10	17	50	100	20

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

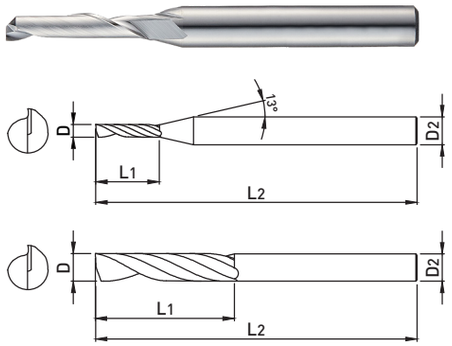
■ **Applicable Working Material**

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
					○			◎	

○ : GOOD ◎ : EXCELLENT

WAE301

1 FLUTES SQUARE ENDMILL



- High chip emission with optimal shape for single flute
- Suitable for cutting and side machining of non-ferrous materials

FINE GRAIN | 1 | 30° HELIX | Uncoated | DATA p.524

■ **TOLERANCE**

D		SHANK DIA.
D0.2 ~ 5	0 ~ -0.02mm	h5
D6 ~ 12	0 ~ -0.03mm	

EDP No	D	L_1	L_2	D_2
WAE301 002	0.2	0.3	40	4
WAE301 003	0.3	0.9	40	4
WAE301 004	0.4	1.2	40	4
WAE301 005	0.5	1.5	40	4
WAE301 006	0.6	1.8	40	4
WAE301 007	0.7	2.1	40	4
WAE301 008	0.8	2.4	40	4
WAE301 009	0.9	2.7	40	4
WAE301 010	1	3	45	6
WAE301 010-4.5	1	4.5	45	6
WAE301 010-6	1	6	50	6
WAE301 012	1.2	3	45	6
WAE301 012-5	1.2	5	45	6
WAE301 012-6	1.2	6	50	6
WAE301 015	1.5	4	45	6
WAE301 015-6	1.5	6	50	6
WAE301 015-8	1.5	8	50	6
WAE301 020	2	6	50	6
WAE301 020-8	2	8	50	6
WAE301 020-10	2	10	50	6
WAE301 025	2.5	7	50	6
WAE301 025-8	2.5	8	50	6
WAE301 025-10	2.5	10	50	6
WAE301 025-12	2.5	12	50	6
WAE301 030	3	8	50	6
WAE301 030-12	3	12	50	6
WAE301 030-15	3	15	50	6
WAE301 040	4	10	50	6
WAE301 040-15	4	15	50	6
WAE301 040-20	4	20	60	6

EDP No	D	L_1	L_2	D_2
WAE301 050	5	13	60	6
WAE301 050-20	5	20	60	6
WAE301 050-25	5	25	60	6
WAE301 060	6	15	60	6
WAE301 060-20	6	20	60	6
WAE301 060-25	6	25	60	6
WAE301 080	8	20	70	8
WAE301 080-25	8	25	75	8
WAE301 100	10	22	75	10
WAE301 100-30	10	30	80	10
WAE301 120	12	26	75	12
WAE301 120-35	12	35	90	12

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

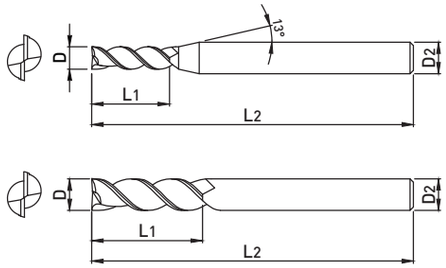
■ **Applicable Working Material**

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
					○			◎	

○ : GOOD ◎ : EXCELLENT

WAE302

2 FLUTES SQUARE ENDMILL



- High machinability through the application of sharp cutting edge to soft materials
- Excellent chip emission and deposition resistance with improvement of high quality surface roughness at groove

FINE GRAIN | 2 | 45° HELIX | SHARP EDGE | Uncoated | DATA

p.525

■ TOLERANCE

D		SHANK DIA.
ALL SIZES	0 ~ -0.02mm	h6

EDP No	D	L_1	L_2	D_2
WAE302 010	1	3	50	4
WAE302 010-6	1	6	60	6
WAE302 012	1.2	4	50	6
WAE302 015	1.5	6	50	6
WAE302 015-8	1.5	8	60	6
WAE302 020 S4	2	6	50	4
WAE302 020	2	6	50	6
WAE302 020-10	2	10	60	6
WAE302 025	2.5	12	55	6
WAE302 030	3	12	55	6
WAE302 030-15	3	15	65	6
WAE302 035	3.5	14	57	6
WAE302 040	4	14	55	6
WAE302 040-16	4	16	65	6
WAE302 050	5	17	55	6
WAE302 050-22	5	22	60	6
WAE302 060	6	17	60	6
WAE302 060-22	6	22	60	6
WAE302 070	7	20	63	8
WAE302 080	8	23	70	8
WAE302 080-31	8	31	80	8
WAE302 090	9	25	72	10
WAE302 100	10	28	75	10
WAE302 100-36	10	36	90	10
WAE302 110	11	30	80	12
WAE302 120	12	33	80	12
WAE302 120-41	12	41	95	12
WAE302 122	12	45	100	12
WAE302 130	13	35	85	14
WAE302 140	14	38	90	14

EDP No	D	L_1	L_2	D_2
WAE302 150	15	40	90	16
WAE302 160	16	45	100	16
WAE302 160-53	16	53	110	16
WAE302 180	18	49	100	18
WAE302 200	20	50	100	20
WAE302 200-55	20	55	110	20
WAE302 250	25	50	120	25

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

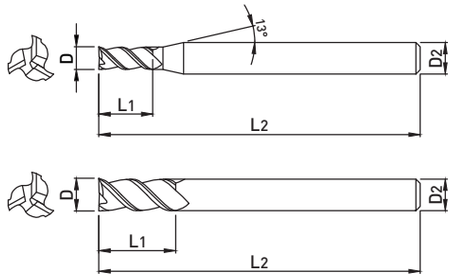
■ Applicable Working Material

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
					○			◎	

○ : GOOD ◎ : EXCELLENT

WAE30(2)3

3 FLUTES SQUARE ENDMILL



- High machinability through the application of sharp cutting edge to soft materials
- Excellent chip emission and deposition resistance with improvement of high quality surface roughness at groove

FINE GRAIN | 3 | 45° HELIX | SHARP EDGE | Uncoated | DATA

p.526

■ TOLERANCE

D		SHANK DIA.
ALL SIZES	0 ~ -0.02mm	h6

EDP No	D	L_1	L_2	D_2
WAE303 010-02	1	2	40	6
WAE303 010-025	1	2.5	40	6
WAE303 010	1	3	50	6
WAE303 010-04	1	4	60	6
WAE303 010-06	1	6	60	6
WAE303 012	1.2	4	50	6
WAE303 015-03	1.5	3	40	6
WAE303 015	1.5	5	50	6
WAE303 015-06	1.5	6	60	6
WAE303 015-08	1.5	8	60	6
WAE303 015-10	1.5	10	60	6
WAE303 020-03	2	3	40	6
WAE303 020	2	6	50	6
WAE303 020-08	2	8	60	6
WAE303 020-10	2	10	60	6
WAE303 020-12	2	12	60	6
WAE303 025	2.5	8	40	6
WAE303 025-10	2.5	10	55	6
WAE303 025-12	2.5	12	60	6
WAE303 030-04	3	4	45	6
WAE303 030-08	3	8	45	6
WAE303 030	3	12	55	6
WAE303 031	3	15	65	6
WAE323 030	3	20	70	6
WAE323 031	3	25	75	6
WAE323 032	3	30	80	6
WAE303 035	3.5	12	55	6
WAE303 040-05	4	5	45	6
WAE303 040-08	4	8	45	6
WAE303 040-11	4	11	45	6
WAE303 040	4	14	55	6
WAE303 040-16	4	16	65	6
WAE303 041	4	20	70	6
WAE323 040	4	26	75	6
WAE323 041	4	30	80	6
WAE303 045	4.5	15	55	6

EDP No	D	L_1	L_2	D_2
WAE303 050-06	5	6	45	6
WAE303 050	5	17	55	6
WAE303 051	5	22	60	6
WAE303 052	5	26	70	6
WAE323 050	5	31	75	6
WAE323 051	5	36	80	6
WAE323 052	5	41	85	6
WAE323 053	5	46	90	6
WAE303 055	5.5	17	55	6
WAE303 060-07	6	7	50	6
WAE303 060-13	6	13	50	6
WAE303 060	6	17	60	6
WAE303 061	6	22	60	6
WAE303 062	6	26	70	6
WAE303 063	6	31	75	6
WAE323 060	6	36	80	6
WAE323 061	6	43	90	6
WAE323 062	6	51	100	6
WAE303 070	7	23	65	8
WAE303 080-10	8	10	60	8
WAE303 080-20	8	20	60	8
WAE303 080	8	23	70	8
WAE303 080-29	8	29	80	8
WAE303 081	8	31	80	8
WAE303 082	8	36	85	8
WAE323 080	8	41	90	8
WAE323 081	8	46	95	8
WAE323 082	8	51	100	8
WAE323 083	8	56	105	8
WAE323 084	8	66	110	8
WAE303 090	9	28	70	10
WAE303 100-12	10	12	65	10
WAE303 100-23	10	23	65	10
WAE303 100	10	28	75	10
WAE303 100-33	10	33	90	10
WAE303 101	10	36	90	10

WAE30(2)3

3 FLUTES SQUARE ENDMILL

EDP No	D	L_1	L_2	D_2
WAE303 100-41	10	41	90	10
WAE303 102	10	46	100	10
WAE303 103	10	51	100	10
WAE323 100	10	56	110	10
WAE323 100-61	10	61	110	10
WAE323 101	10	66	120	10
WAE303 110	11	30	80	12
WAE303 120-14	12	14	70	12
WAE303 120-27	12	27	70	12
WAE303 120	12	33	80	12
WAE303 121	12	41	95	12
WAE303 122	12	46	100	12
WAE303 122-51	12	51	100	12
WAE303 123	12	56	110	12
WAE303 124-61	12	61	110	12
WAE323 120	12	66	120	12
WAE323 120-71	12	71	120	12
WAE323 121	12	76	135	12
WAE303 130	13	35	85	14
WAE303 140	14	38	90	14
WAE303 150	15	40	90	16
WAE303 160-19	16	19	90	16
WAE303 160-33	16	33	90	16
WAE303 160	16	45	100	16
WAE303 160-53	16	53	105	16
WAE303 161	16	56	110	16
WAE303 162	16	66	130	16
WAE303 163	16	76	150	16
WAE323 160	16	86	160	16
WAE323 161	16	96	180	16
WAE323 162	16	106	190	16
WAE323 163	16	116	200	16
WAE303 180	18	49	100	18
WAE303 200-23	20	23	90	20
WAE303 200-39	20	39	90	20
WAE303 200	20	50	100	20
WAE303 201	20	60	110	20
WAE303 202	20	70	130	20
WAE303 203	20	76	150	20
WAE323 200	20	86	160	20
WAE323 201	20	96	180	20
WAE323 202	20	106	190	20
WAE323 203	20	116	200	20
WAE323 204	20	126	220	20
WAE303 250	25	50	120	25

EDP No	D	L_1	L_2	D_2

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

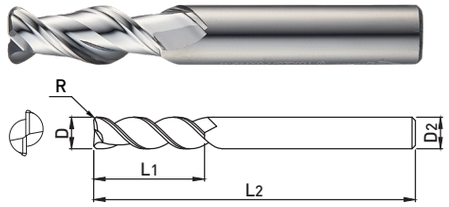
■ **Applicable Working Material**

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
					○			◎	

○ : GOOD ◎ : EXCELLENT

WAR302

2 FLUTES RADIUS ENDMILL



- High machinability through the application of sharp cutting edge to soft materials
- Excellent chip emission and deposition resistance with improvement of high quality surface roughness at groove
- Extend customer choice with various corner R size

FINE GRAIN | 2 | 45° HELIX | R ±0.015 | Uncoated | DATA

ALL SIZES

p.527

■ **TOLERANCE**

D		SHANK DIA.
ALL SIZES	0 ~ -0.02mm	h6

EDP No	D	R	L_1	L_2	D_2
WAR302 06 05	6	0.5	15	50	6
WAR302 06 10	6	1	15	50	6
WAR302 06 15	6	1.5	15	50	6
WAR302 06 20	6	2	15	50	6
WAR302 08 05	8	0.5	20	60	8
WAR302 08 10	8	1	20	60	8
WAR302 08 15	8	1.5	20	60	8
WAR302 08 20	8	2	20	60	8
WAR302 08 30	8	3	20	60	8
WAR302 10 05	10	0.5	25	70	10
WAR302 10 10	10	1	25	70	10
WAR302 10 15	10	1.5	25	70	10
WAR302 10 20	10	2	25	70	10
WAR302 10 30	10	3	25	70	10
WAR302 10 40	10	4	25	70	10
WAR302 12 10	12	1	30	75	12
WAR302 12 20	12	2	30	75	12
WAR302 12 30	12	3	30	75	12
WAR302 12 40	12	4	30	75	12
WAR302 14 10	14	1	35	80	14
WAR302 14 20	14	2	35	80	14
WAR302 14 30	14	3	35	80	14
WAR302 14 40	14	4	35	80	14
WAR302 14 50	14	5	35	80	14
WAR302 16 10	16	1	40	90	16
WAR302 16 20	16	2	40	90	16
WAR302 16 30	16	3	40	90	16
WAR302 16 40	16	4	40	90	16
WAR302 16 50	16	5	40	90	16
WAR302 20 10	20	1	45	100	20

EDP No	D	R	L_1	L_2	D_2
WAR302 20 20	20	2	45	100	20
WAR302 20 30	20	3	45	100	20
WAR302 20 40	20	4	45	100	20
WAR302 20 50	20	5	45	100	20

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

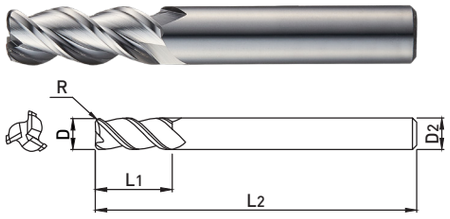
■ **Applicable Working Material**

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
					○			◎	

○ : GOOD ◎ : EXCELLENT

WAR303

3 FLUTES RADIUS ENDMILL



- High machinability through the application of sharp cutting edge to soft materials
- Excellent chip emission and deposition resistance with improvement of high quality surface roughness at groove
- Extend customer choice with various corner R size

ULTRA FINE | 3 | 45° HELIX | R ±0.015 | DATA

ALL SIZES p.526

■ **TOLERANCE**

D		SHANK DIA.
ALL SIZES	0 ~ -0.02mm	h6

EDP No	D	R	L_1	L_2	D_2
WAR303 06 05	6	0.5	15	50	6
WAR303 06 10	6	1	15	50	6
WAR303 06 15	6	1.5	15	50	6
WAR303 06 20	6	2	15	50	6
WAR303 08 05	8	0.5	20	60	8
WAR303 08 10	8	1	20	60	8
WAR303 08 15	8	1.5	20	60	8
WAR303 08 20	8	2	20	60	8
WAR303 10 05	10	0.5	25	70	10
WAR303 10 10	10	1	25	70	10
WAR303 10 15	10	1.5	25	70	10
WAR303 10 20	10	2	25	70	10
WAR303 10 30	10	3	25	70	10
WAR303 10 40	10	4	25	70	10
WAR303 12 10	12	1	30	75	12
WAR303 12 20	12	2	30	75	12
WAR303 12 30	12	3	30	75	12
WAR303 12 40	12	4	30	75	12
WAR303 14 10	14	1	35	80	14
WAR303 14 20	14	2	35	80	14
WAR303 14 30	14	3	35	80	14
WAR303 14 40	14	4	35	80	14
WAR303 14 50	14	5	35	80	14
WAR303 16 10	16	1	40	90	16
WAR303 16 20	16	2	40	90	16
WAR303 16 30	16	3	40	90	16
WAR303 16 40	16	4	40	90	16
WAR303 16 50	16	5	40	90	16
WAR303 20 10	20	1	45	100	20
WAR303 20 20	20	2	45	100	20
WAR303 20 30	20	3	45	100	20
WAR303 20 40	20	4	45	100	20
WAR303 20 50	20	5	45	100	20

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

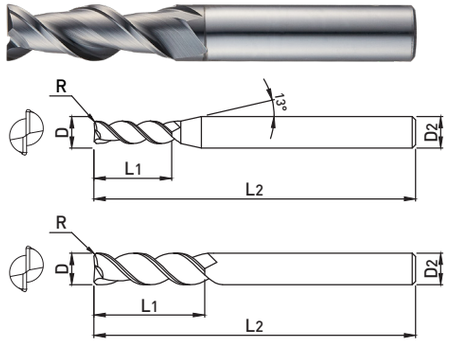
■ **Applicable Working Material**

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
					○			◎	

○ : GOOD ◎ : EXCELLENT

WAR502

2 FLUTES RADIUS ENDMILL



- High machinability through the application of sharp cutting edge to soft materials
- Excellent chip emission and deposition resistance with improvement of high quality surface roughness at groove
- High surface hardness and excellent wear resistance by D.L.C coating
- Extend customer choice with various corner R size

FINE GRAIN | 2 | 45° HELIX | R ±0.015 | D.L.C | DATA

ALL SIZES p.528

■ **TOLERANCE**

D		SHANK DIA.
ALL SIZES	0 ~ -0.02mm	h6

EDP No	D	R	L_1	L_2	D_2
WAR502 010	1	0.05	3	40	6
WAR502 015	1.5	0.05	5	40	6
WAR502 020	2	0.1	6	40	6
WAR502 021	2	0.1	12	50	6
WAR502 030	3	0.1	10	50	6
WAR502 031	3	0.1	20	60	6
WAR502 040	4	0.1	12	50	6
WAR502 041	4	0.1	20	60	6
WAR502 050	5	0.1	15	57	6
WAR502 060	6	0.1	15	57	6
WAR502 061	6	0.1	22	65	6
WAR502 070	7	0.1	20	63	8
WAR502 080	8	0.1	20	63	8
WAR502 081	8	0.1	28	70	8
WAR502 090	9	0.1	25	72	10
WAR502 100	10	0.2	28	72	10
WAR502 101	10	0.2	32	80	10
WAR502 110	11	0.2	30	80	12
WAR502 120	12	0.2	32	80	12
WAR502 121	12	0.2	40	100	12

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

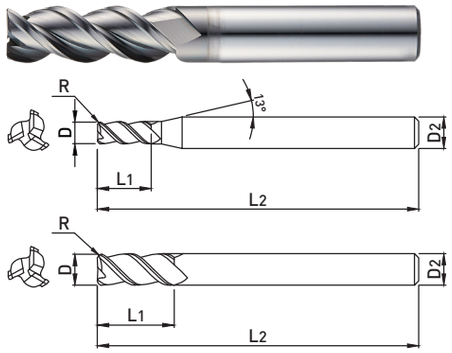
■ **Applicable Working Material**

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
					○			◎	

○ : GOOD ◎ : EXCELLENT

WAR503

3 FLUTES RADIUS ENDMILL



- High machinability through the application of sharp cutting edge to soft materials
- Excellent chip emission and deposition resistance with improvement of high quality surface roughness at groove
- High surface hardness and excellent wear resistance by D.L.C coating
- Extend customer choice with various corner R size

FINE GRAIN | 3 | 45° HELIX | R ±0.015 ALL SIZES | D.L.C | DATA p.529

■ **TOLERANCE**

D		SHANK DIA.
ALL SIZES	0 ~ -0.02mm	h6

EDP No	D	R	L_1	L_2	D_2
WAR503 040	4	0.5	14	57	6
WAR503 041	4	1	25	62	6
WAR503 060	6	0.5	16	57	6
WAR503 061	6	1	25	62	6
WAR503 080	8	0.5	22	63	8
WAR503 081	8	1	35	80	8
WAR503 100	10	0.5	28	72	10
WAR503 101	10	1	45	100	10
WAR503 120	12	0.5	32	80	12
WAR503 121	12	1	45	100	12
WAR503 160	16	0.5	45	90	16
WAR503 161	16	1	65	125	16
WAR503 200	20	0.5	50	100	20
WAR503 201	20	1	70	130	20

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

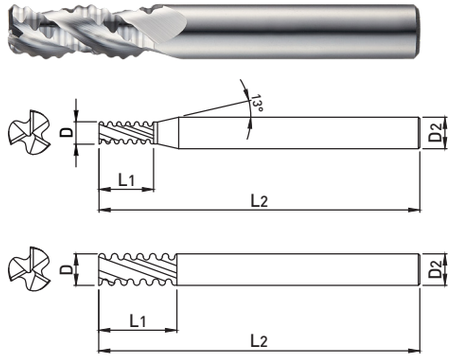
■ **Applicable Working Material**

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
					○			◎	

○ : GOOD ◎ : EXCELLENT

WAF303

3 FLUTES ROUGHING ENDMILL



- High machinability through the application of sharp cutting edge to soft materials
- Extend customer choice with various size

FINE GRAIN | 3 | 38° HELIX | COARSE | DIN 6535HA | DIN 6535HB | Uncoated | DATA p.531

■ **TOLERANCE**

D		SHANK DIA.
D4 ~ 6	0 ~ -0.048mm	h6
D7 ~ 10	0 ~ -0.058mm	
D12 ~ 18	0 ~ -0.07mm	
D20 ~	0 ~ -0.084mm	

EDP No	D	L_1	L_2	D_2
WAF303 040	4	10	55	6
WAF303 050	5	15	55	6
WAF303 060	6	16	60	6
WAF303 061	6	25	80	6
WAF303 070	7	16	63	8
WAF303 080	8	20	65	8
WAF303 081	8	30	90	8
WAF303 090	9	19	72	10
WAF303 100	10	25	75	10
WAF303 101	10	40	100	10
WAF303 120	12	30	80	12
WAF303 121	12	50	110	12
WAF303 140	14	35	90	14
WAF303 160	16	42	100	16
WAF303 161	16	52	150	16
WAF303 162	16	65	125	16
WAF303 180	18	32	92	18
WAF303 200	20	38	104	20
WAF303 201	20	55	160	20

※ Flat shank is available upon request
ex) WAF303100F : Flat shank

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

■ **Applicable Working Material**

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
					○			◎	

○ : GOOD ◎ : EXCELLENT

EDP. NO	Appearance	Type	INCH & METRIC	Page
B302		2 FLUTES BALL NOSE ENDMILL	METRIC	258
B304		4 FLUTES BALL NOSE ENDMILL	METRIC	259
BL422		2 FLUTES EXTRA LONG BALL NOSE ENDMILL	METRIC	260
E302		2 FLUTES SQUARE ENDMILL	METRIC	261
E304		4 FLUTES SQUARE ENDMILL	METRIC	262
E322		2 FLUTES LONG SHANK SQUARE ENDMILL	METRIC	263
EL422		2 FLUTES EXTRA LONG SQUARE ENDMILL	METRIC	264
E324		4 FLUTES LONG SHANK SQUARE ENDMILL	METRIC	265
EB302---W		2 FLUTES BRAZED SQUARE ENDMILL	METRIC	266
EB304---W		4 FLUTES BRAZED SQUARE ENDMILL	METRIC	267
EB322---W		2 FLUTES LONG BRAZED SQUARE ENDMILL	METRIC	268
EB324---W		4 FLUTES LONG BRAZED SQUARE ENDMILL	METRIC	269
BB302---W		2 FLUTES BRAZED BALL NOSE ENDMILL	METRIC	270

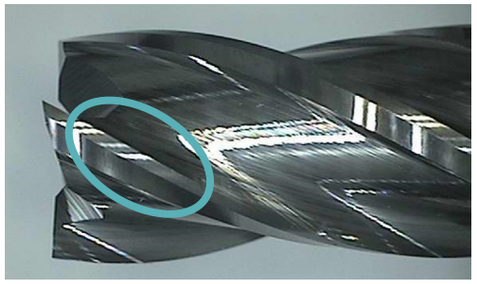
STANDARD ENDMILL

General Features

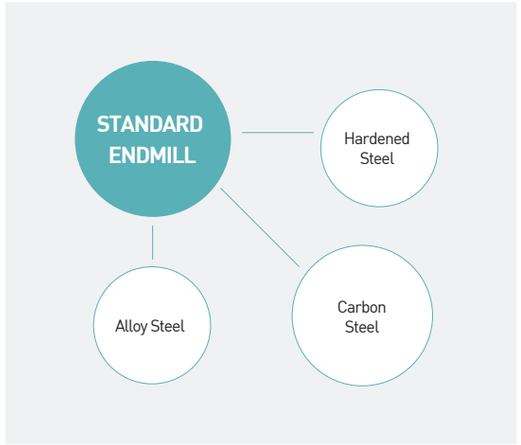
· Suitable for low hardness materials under HRC 30
· Various product line; Square, Ball, Brazing type

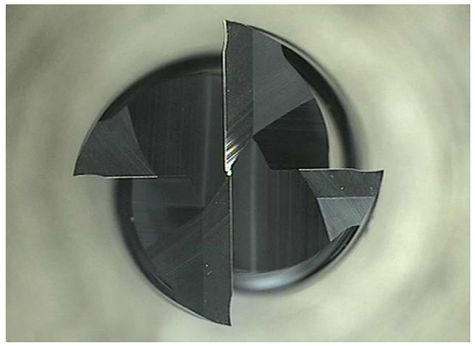
Characteristics

· Improved chipping resistance by using high toughness materials
· Proper cutting edge for low hardness materials



Applications





EDP No. System

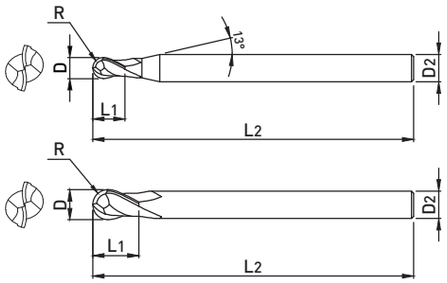
*If expressed as an integer, the decimal point is omitted.

SHAPE	GRADE	LENGTH, SHANK TYPE	FLUTE	CUTTING DIA.	SHANK DIA.
B : Ball Endmill	3 : Standard	0 : Regular Length	2 : 2 Flutes	1	3
E : Square Endmill	4 : Long Length	2 : Long Length	4 : 4 Flutes	~	~
BL : Long Length Ball				50	42
EB : Brazed Square					
BB : Brazed Ball					
E	3	0	4	130	S16
Square Endmill	Grade	Regular Length	4 Flutes	Ø13	SHANK DIA. Ø16

Ex) 4FLUTES CUTTING DIA. Ø13 SHANK DIA. Ø16 GENERAL TYPE SQUARE ENDMILL

B302

2 FLUTES BALL NOSE ENDMILL



- General purpose suitable for general machining
- Suitable for machining curved and sloped surfaces

FINE GRAIN | 2 | 30° HELIX | R ±0.02 ALL SIZES | Uncoated | DATA p.532

■ **TOLERANCE**

D		SHANK DIA.
D1 ~ 3	0 ~ -0.04 mm	h6
D3.5 ~ 6	0 ~ -0.048mm	
D6.5 ~ 10	0 ~ -0.058mm	
D11 ~ 18	0 ~ -0.07mm	
D20 ~	0 ~ -0.084mm	

EDP No	D	R	L_1	L_2	D_2
B302 010	1	0.5	3	50	6
B302 015	1.5	0.75	4	50	6
B302 020	2	1	6	60	6
B302 025	2.5	1.25	6	60	6
B302 030	3	1.5	8	70	6
B302 035	3.5	1.75	8	70	6
B302 040	4	2	8	70	6
B302 045	4.5	2.25	10	70	6
B302 050	5	2.5	12	80	6
B302 055	5.5	2.75	12	80	6
B302 060	6	3	12	90	6
B302 065	6.5	3.25	12	90	8
B302 070	7	3.5	20	90	8
B302 080	8	4	20	100	8
B302 090	9	4.5	25	100	10
B302 100	10	5	25	100	10
B302 110	11	5.5	30	110	12
B302 120	12	6	30	110	12
B302 130	13	6.5	35	120	14
B302 140	14	7	35	120	14
B302 150	15	7.5	40	140	16
B302 160	16	8	40	140	16
B302 180	18	9	45	150	18
B302 200	20	10	45	160	20
B302 250	25	12.5	50	180	25

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

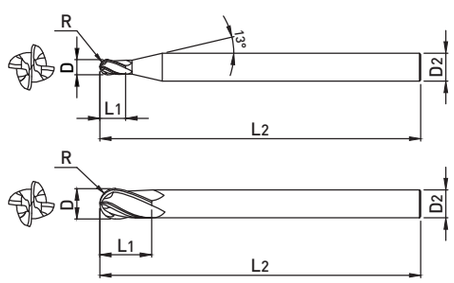
■ **Applicable Working Material**

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○								

○ : GOOD ◎ : EXCELLENT

B304

4 FLUTES BALL NOSE ENDMILL



- General purpose suitable for general machining
- Suitable for machining curved and sloped surfaces

FINE GRAIN | 4 | 30° HELIX | R ±0.02 ALL SIZES | Uncoated | DATA p.532

■ **TOLERANCE**

D		SHANK DIA.
~ D3	0 ~ -0.04mm	h6
D4 ~ 6	0 ~ -0.048mm	
D7 ~ 10	0 ~ -0.058mm	
D11 ~ 18	0 ~ -0.07mm	
D20 ~	0 ~ -0.084mm	

EDP No	D	R	L_1	L_2	D_2
B304 030	3	1.5	8	70	6
B304 040	4	2	8	70	6
B304 050	5	2.5	12	80	6
B304 060	6	3	12	90	6
B304 070	7	3.5	20	90	8
B304 080	8	4	20	100	8
B304 090	9	4.5	25	100	10
B304 100	10	5	25	100	10
B304 110	11	5.5	30	110	12
B304 120	12	6	30	110	12
B304 130	13	6.5	35	120	14
B304 140	14	7	35	120	14
B304 150	15	7.5	40	140	16
B304 160	16	8	40	140	16
B304 180	18	9	45	150	18
B304 200	20	10	45	160	20
B304 250	25	12.5	50	180	25

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

■ **Applicable Working Material**

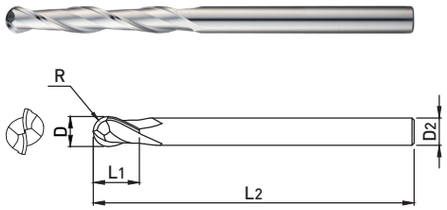
Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○								

○ : GOOD ◎ : EXCELLENT

Standard

BL422

2 FLUTES EXTRA LONG BALL NOSE ENDMILL



- General purpose suitable for general machining
- Suitable for machining curved and sloped surfaces
- Improved machining efficiency in side machining by adopting long-cutting length

■ **TOLERANCE**

D		SHANK DIA.
~ D3	0 ~ -0.04mm	h6
D4 ~ 6	0 ~ -0.048mm	
D8 ~ 10	0 ~ -0.058mm	
D12 ~ 18	0 ~ -0.07mm	
D20 ~	0 ~ -0.084mm	

FINE GRAIN | 2 | 30° HELIX | R ±0.02 | Uncoated | DATA

p.532

EDP No	D	R	L_1	L_2	D_2
BL422 030	3	1.5	30	75	3
BL422 040	4	2	30	75	4
BL422 050	5	2.5	40	100	5
BL422 060	6	3	50	150	6
BL422 080	8	4	50	150	8
BL422 090	9	4.5	60	150	10
BL422 100	10	5	60	150	10
BL422 120	12	6	75	150	12
BL422 140	14	7	75	150	14
BL422 160	16	8	75	150	16
BL422 180	18	9	75	150	18
BL422 200	20	10	75	150	20

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

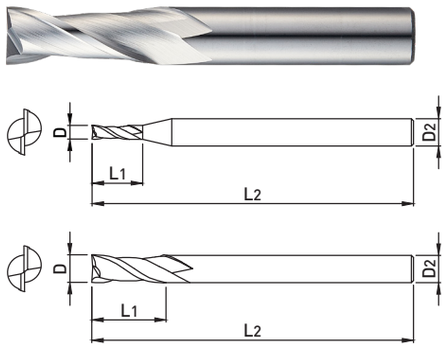
■ **Applicable Working Material**

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○								

○ : GOOD ◎ : EXCELLENT

E302

2 FLUTES SQUARE ENDMILL



- General purpose suitable for general machining

■ **TOLERANCE**

D		SHANK DIA.
D1 ~ 3	0 ~ -0.04mm	h6
D3.5 ~ 6	0 ~ -0.048mm	
D6.5 ~ 10	0 ~ -0.058mm	
D10.5 ~ 18	0 ~ -0.07mm	
D20 ~	0 ~ -0.084mm	

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

p.533

EDP No	D	L_1	L_2	D_2
E302 010S4	1	3	42	4
E302 010	1	3	42	6
E302 015S4	1.5	4	42	4
E302 015	1.5	4	42	6
E302 020S4	2	6	42	4
E302 020	2	6	42	6
E302 025S4	2.5	8	42	4
E302 025	2.5	8	42	6
E302 030	3	10	50	6
E302 035	3.5	10	50	6
E302 040	4	12	50	6
E302 045	4.5	14	50	6
E302 050	5	15	50	6
E302 055	5.5	15	50	6
E302 060	6	15	50	6
E302 065	6.5	18	60	8
E302 070	7	20	60	8
E302 075	7.5	20	60	8
E302 080	8	20	60	8
E302 085	8.5	23	70	10
E302 090	9	25	70	10
E302 095	9.5	25	70	10

EDP No	D	L_1	L_2	D_2
E302 100	10	25	70	10
E302 105	10.5	28	75	12
E302 110	11	30	75	12
E302 115	11.5	30	75	12
E302 120	12	30	75	12
E302 130	13	35	85	14
E302 130S16	13	35	90	16
E302 140	14	35	85	14
E302 140S16	14	35	90	16
E302 150	15	40	90	16
E302 160	16	40	90	16
E302 180	18	45	100	18
E302 200	20	45	100	20
E302 250	25	50	120	25

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

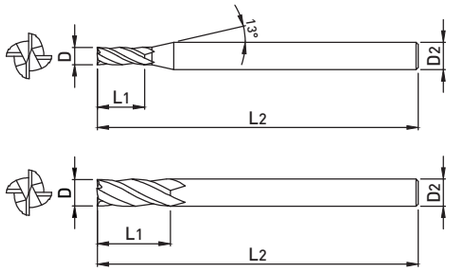
■ **Applicable Working Material**

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○								

○ : GOOD ◎ : EXCELLENT

E304

4 FLUTES SQUARE ENDMILL



- General purpose suitable for general machining

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

p.533

■ **TOLERANCE**

D		SHANK DIA.
D2 ~ 3	0 ~ -0.04mm	h6
D3.5 ~ 6	0 ~ -0.048mm	
D6.5 ~ 10	0 ~ -0.058mm	
D10.5 ~ 18	0 ~ -0.07mm	
D20 ~	0 ~ -0.084mm	

EDP No	D	L_1	L_2	D_2
E304 020S4	2	6	42	4
E304 020	2	6	42	6
E304 025	2.5	8	42	6
E304 030	3	10	50	6
E304 035	3.5	10	50	6
E304 040	4	12	50	6
E304 045	4.5	14	50	6
E304 050	5	15	50	6
E304 055	5.5	15	50	6
E304 060	6	15	50	6
E304 065	6.5	18	60	8
E304 070	7	20	60	8
E304 075	7.5	20	60	8
E304 080	8	20	60	8
E304 085	8.5	23	70	10
E304 090	9	25	70	10
E304 095	9.5	25	70	10
E304 100	10	25	70	10
E304 105	10.5	28	75	12
E304 110	11	30	75	12
E304 115	11.5	30	75	12
E304 120	12	30	75	12

EDP No	D	L_1	L_2	D_2
E304 130	13	35	85	14
E304 130S16	13	35	90	16
E304 140	14	35	85	14
E304 140S16	14	35	90	16
E304 150	15	40	90	16
E304 160	16	40	90	16
E304 180	18	45	100	18
E304 200	20	45	100	20
E304 250	25	50	120	25

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

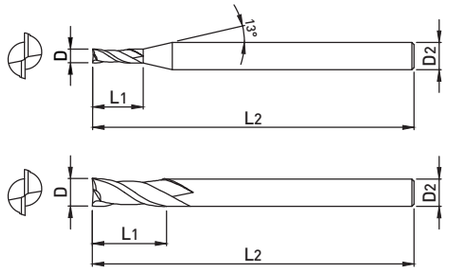
■ **Applicable Working Material**

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○								

○ : GOOD ◎ : EXCELLENT

E322

2 FLUTES LONG SHANK SQUARE ENDMILL



- General purpose suitable for general machining
- Improved machining efficiency in side machining by adopting long-cutting length

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

p.533

■ **TOLERANCE**

D		SHANK DIA.
~ D3	0 ~ -0.04mm	h6
D4 ~ 6	0 ~ -0.048mm	
D7 ~ 10	0 ~ -0.058mm	
D12 ~ 18	0 ~ -0.07mm	
D20 ~	0 ~ -0.084mm	

EDP No	D	L_1	L_2	D_2
E322 030	3	25	75	6
E322 040	4	25	75	6
E322 050	5	30	85	6
E322 060	6	30	85	6
E322 070	7	35	85	8
E322 080	8	35	85	8
E322 090	9	45	100	10
E322 100	10	45	100	10
E322 101	10	60	155	10
E322 120	12	55	120	12
E322 121	12	65	155	12
E322 140	14	60	120	14
E322 160	16	60	120	16
E322 161	16	75	165	16
E322 180	18	60	120	18
E322 200	20	60	120	20
E322 201	20	75	165	20

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

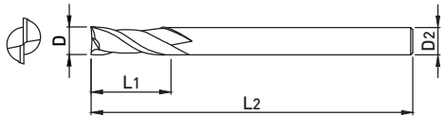
■ **Applicable Working Material**

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○								

○ : GOOD ◎ : EXCELLENT

EL422

2 FLUTES EXTRA LONG SQUARE ENDMILL



- General purpose suitable for general machining
- Improved machining efficiency in side machining by adopting long-cutting length

■ **TOLERANCE**

D		SHANK DIA.
~ D3	0 ~ -0.04mm	h6
D4 ~ 6	0 ~ -0.048mm	
D7 ~ 10	0 ~ -0.058mm	
D12 ~ 18	0 ~ -0.07mm	
D20 ~	0 ~ -0.084mm	

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

p.533

EDP No	D	L_1	L_2	D_2
EL422 030	3	30	75	3
EL422 040	4	30	75	4
EL422 050	5	40	100	5
EL422 060	6	50	150	6
EL422 080	8	50	150	8
EL422 100	10	60	150	10

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

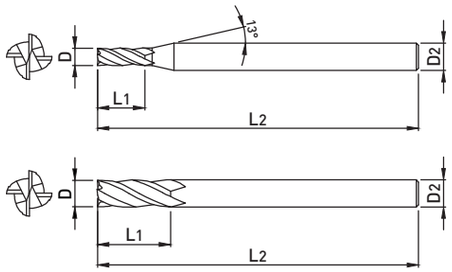
■ **Applicable Working Material**

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○								

○ : GOOD ◎ : EXCELLENT

E324

4 FLUTES LONG SHANK SQUARE ENDMILL



- General purpose suitable for general machining
- Improved machining efficiency in side machining by adopting long-cutting length

■ **TOLERANCE**

D		SHANK DIA.
~ D3	0 ~ -0.04mm	h6
D4 ~ 6	0 ~ -0.048mm	
D7 ~ 10	0 ~ -0.058mm	
D12 ~ 18	0 ~ -0.07mm	
D20 ~	0 ~ -0.084mm	

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

p.533

EDP No	D	L_1	L_2	D_2
E324 030	3	25	75	6
E324 040	4	25	75	6
E324 050	5	30	85	6
E324 060	6	30	85	6
E324 070	7	35	85	8
E324 080	8	35	85	8
E324 090	9	45	100	10
E324 100	10	45	100	10
E324 101	10	60	155	10
E324 120	12	55	120	12
E324 121	12	65	155	12
E324 140	14	60	120	14
E324 160	16	60	120	16
E324 161	16	75	165	16
E324 180	18	60	120	18
E324 200	20	60	120	20
E324 201	20	75	165	20

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

■ **Applicable Working Material**

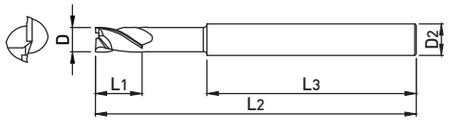
Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○								

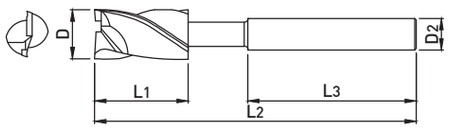
○ : GOOD ◎ : EXCELLENT

EB302---W

2 FLUTES BRAZED SQUARE ENDMILL

- General purpose suitable for general machining
- Brazing type with cutting edge only carbide





FINE GRAIN | 2 | 30° HELIX | Uncoated

■ **TOLERANCE**

D		SHANK DIA.
ALL SIZES	0 ~ -0.05mm	h7

EDP No	D	L_1	L_3	L_2	D_2
EB302 140W	14	28	60	98	16
EB302 150W	15	28	60	98	16
EB302 160W	16	28	60	98	16
EB302 170W	17	32	70	115	20
EB302 180W	18	32	70	115	20
EB302 190W	19	32	70	115	20
EB302 200W	20	32	70	115	20
EB302 210W	21	32	70	115	20
EB302 220W	22	32	70	115	20
EB302 230W	23	40	85	140	25
EB302 240W	24	40	85	140	25
EB302 250W	25	40	85	140	25
EB302 260W	26	40	85	140	25
EB302 270W	27	40	85	140	25
EB302 280W	28	40	85	140	25
EB302 290W	29	50	85	150	32
EB302 300W	30	50	85	150	32
EB302 310W	31	50	85	150	32
EB302 320W	32	50	85	150	32
EB302 350W	35	50	85	150	32
EB302 360W	36	50	85	150	32
EB302 380W	38	55	85	155	32
EB302 400W	40	55	85	155	32
EB302 420W	42	55	85	155	32
EB302 450W	45	63	85	160	32
EB302 500W	50	63	85	160	32

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

■ **Applicable Working Material**

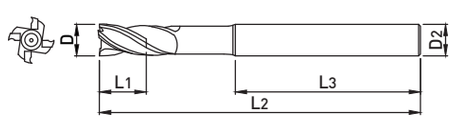
Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○								

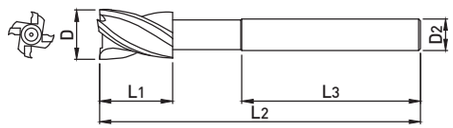
○ : GOOD ◎ : EXCELLENT

EB304---W

4 FLUTES BRAZED SQUARE ENDMILL

- General purpose suitable for general machining
- Brazing type with cutting edge only carbide





FINE GRAIN | 4 | 30° HELIX | Uncoated

■ **TOLERANCE**

D		SHANK DIA.
ALL SIZES	0 ~ -0.05mm	h7

EDP No	D	L_1	L_3	L_2	D_2
EB304 140W	14	28	60	98	16
EB304 150W	15	28	60	98	16
EB304 160W	16	28	60	98	16
EB304 170W	17	32	70	115	20
EB304 180W	18	32	70	115	20
EB304 190W	19	32	70	115	20
EB304 200W	20	32	70	115	20
EB304 210W	21	32	70	115	20
EB304 220W	22	32	70	115	20
EB304 230W	23	40	85	140	25
EB304 240W	24	40	85	140	25
EB304 250W	25	40	85	140	25
EB304 260W	26	40	85	140	25
EB304 270W	27	40	85	140	25
EB304 280W	28	40	85	140	25
EB304 290W	29	50	85	150	32
EB304 300W	30	50	85	150	32
EB304 310W	31	50	85	150	32
EB304 320W	32	50	85	150	32
EB304 350W	35	50	85	150	32
EB304 360W	36	50	85	150	32
EB304 380W	38	55	85	155	32
EB304 400W	40	55	85	155	32
EB304 420W	42	55	85	155	32
EB304 450W	45	63	85	160	32
EB304 500W	50	63	85	160	32

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

■ **Applicable Working Material**

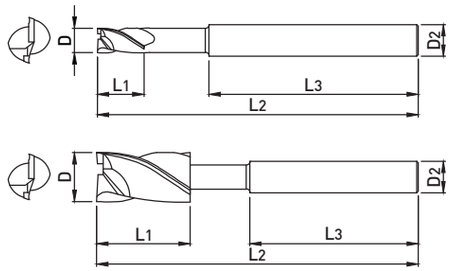
Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○								

○ : GOOD ◎ : EXCELLENT

EB322---W

2 FLUTES LONG BRAZED SQUARE ENDMILL

- General purpose suitable for general machining
- Brazing type with cutting edge only carbide



FINE GRAIN | 2 | 30° HELIX | Uncoated

■ **TOLERANCE**

D		SHANK DIA.
ALL SIZES	0 ~ -0.05mm	h7

EDP No	D	L_1	L_3	L_2	D_2
EB322 140W	14	50	60	130	16
EB322 150W	15	50	60	130	16
EB322 160W	16	50	60	130	16
EB322 180W	18	60	60	140	20
EB322 200W	20	60	60	140	20
EB322 220W	22	60	60	140	20
EB322 240W	24	70	60	150	25
EB322 250W	25	70	60	150	25
EB322 260W	26	70	60	150	25
EB322 280W	28	70	60	150	25
EB322 300W	30	80	70	180	32
EB322 320W	32	90	70	190	32
EB322 350W	35	100	70	200	32
EB322 380W	38	100	70	220	32
EB322 400W	40	100	70	220	32
EB322 450W	45	120	80	230	32

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

■ **Applicable Working Material**

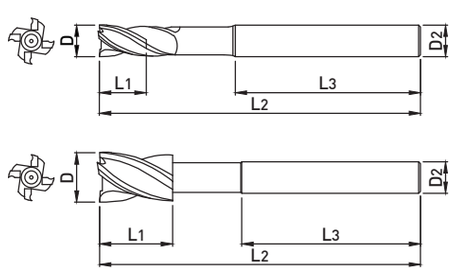
Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○								

○ : GOOD ◎ : EXCELLENT

EB324---W

4 FLUTES LONG BRAZED SQUARE ENDMILL

- General purpose suitable for general machining
- Brazing type with cutting edge only carbide



FINE GRAIN | 4 | 30° HELIX | Uncoated

■ **TOLERANCE**

D		SHANK DIA.
ALL SIZES	0 ~ -0.05mm	h7

EDP No	D	L_1	L_3	L_2	D_2
EB324 140W	14	50	60	130	16
EB324 150W	15	50	60	130	16
EB324 160W	16	50	60	130	16
EB324 180W	18	60	60	140	20
EB324 200W	20	60	60	140	20
EB324 220W	22	60	60	140	20
EB324 240W	24	70	60	150	25
EB324 250W	25	70	60	150	25
EB324 260W	26	70	60	150	25
EB324 280W	28	70	60	150	25
EB324 300W	30	80	70	180	32
EB324 320W	32	90	70	190	32
EB324 350W	35	100	70	200	32
EB324 380W	38	100	70	220	32
EB324 400W	40	100	70	220	32
EB324 450W	45	120	80	230	32
EB324 500W	50	140	80	240	32

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

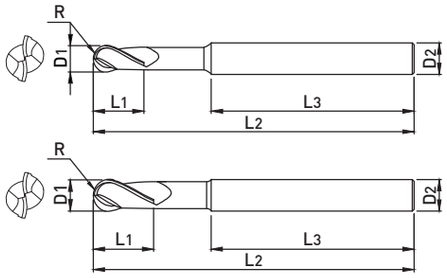
■ **Applicable Working Material**

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○								

○ : GOOD ◎ : EXCELLENT

BB302---W

2 FLUTES BRAZED BALL NOSE ENDMILL



- General purpose suitable for general machining
- Brazing type with cutting edge only carbide

FINE GRAIN | 2 | 30° HELIX | R ±0.05 ALL SIZES | Uncoated

■ **TOLERANCE**

D		SHANK DIA.
ALL SIZES	0 ~ -0.05mm	h7

EDP No	D	R	L_1	L_3	L_2	D_2
BB302 150W	15	7.5	28	55	100	16
BB302 160W	16	8	28	55	100	16
BB302 180W	18	9	29	55	110	20
BB302 200W	20	10	29	55	110	20
BB302 220W	22	11	36	60	110	25
BB302 240W	24	12	37	60	110	25
BB302 250W	25	12.5	38	60	120	25
BB302 280W	28	14	40	65	120	32
BB302 300W	30	15	46	65	130	32
BB302 320W	32	16	47	65	140	32

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

■ **Applicable Working Material**

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○								

○ : GOOD ◎ : EXCELLENT

MEMO

EDP. NO	Appearance	Type	INCH & METRIC	Page
BC502		2 FLUTES BALL NOSE ENDMILL	METRIC	274
RC502		2 FLUTES RADIUS ENDMILL	METRIC	275

Copper-Mate Series

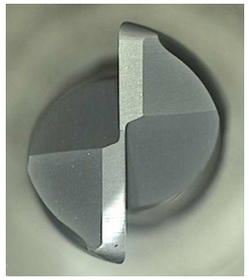
COPPER-MATE

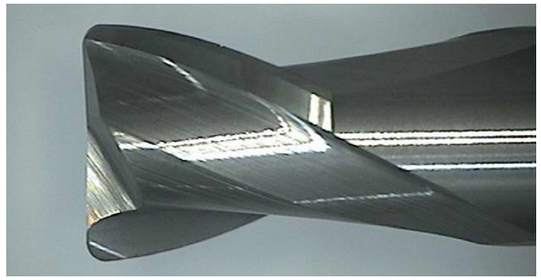
General Features

· Suitable for Copper, Bronze and non-ferrous materials
· Ball, Radius type

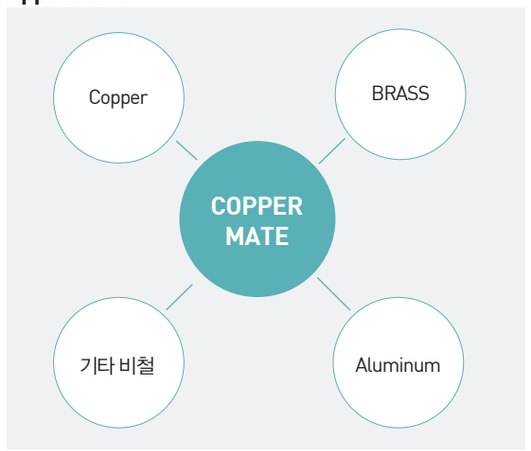
Characteristics

· Cutting edge considered the characteristics of non-ferrous materials
· Improved cutting edge hardness by using ultra-micro grain material
· CrN coating for enhanced oxidation resistance and corrosion resistance





Applications



EDP No. System

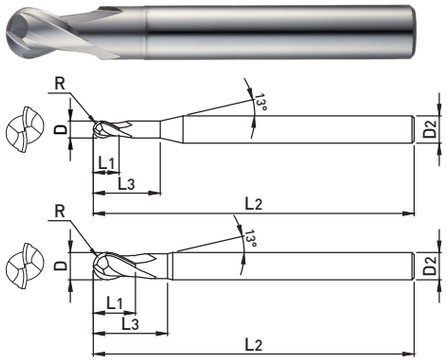
*If expressed as an integer, the decimal point is omitted.

TYPE	SHAPE	GRADE	LENGTH, SHANK TYPE	FLUTE	CUTTING DIA.	CORNER RADIUS	EFFECTIVE LENGTH
B : Ball Endmill R : Radius Endmill	C : Copper	5 : Grade	0 : Neck	2 : 2 Flutes	1 ~ 12	0.5 ~ 1	3 ~ 38
R	C	5	0	2	020	05	09
Radius Endmill	Copper	Grade	Neck	2 Flutes	Ø2	R0.5	9

Ex) 2FLUTES CUTTING DIA. Ø2CORNER R 0.5 EFFECTIVE LENGTH 9 50 GRADE CORNER RADIUS NECK TYPE RADIUS ENDMILL

BC502

2 FLUTES BALL NOSE ENDMILL



- Excellent machinability with cutting edge considered the characteristics of non-ferrous materials
- Minimize interference in machining by applying the neck shape

ULTRA FINE | 2 | 30° HELIX | R ±0.01 | CrN | DATA

ALL SIZES

p.534

■ TOLERANCE

D		SHANK DIA.
ALL SIZES	0 ~ -0.02mm	h6

EDP No	D	R	L_1	L_3	L_2	D_2
BC502 010	1	0.5	1.5	3	50	6
BC502 015	1.5	0.75	2	4	50	6
BC502 020	2	1	2.5	5	50	6
BC502 025	2.5	1.25	3	7	50	6
BC502 030	3	1.5	4	10	60	6
BC502 040	4	2	5	10	60	6
BC502 050	5	2.5	6	12	60	6
BC502 060	6	3	7	12	60	6
BC502 061	6	3	7	12	90	6
BC502 080	8	4	9	15	70	8
BC502 081	8	4	9	16	100	8
BC502 100	10	5	11	25	75	10
BC502 101	10	5	11	25	100	10
BC502 120	12	6	12	25	80	12
BC502 121	12	6	12	25	110	12

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

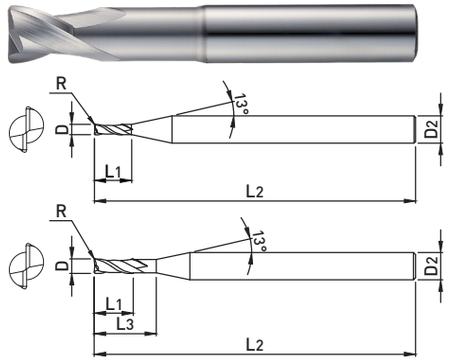
■ Applicable Working Material

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○				◎			○	

○ : GOOD ◎ : EXCELLENT

RC502

2 FLUTES RADIUS ENDMILL



- Excellent machinability with cutting edge considered the characteristics of non-ferrous materials
- Minimize interference in machining by applying the neck shape

ULTRA FINE | 2 | 30° HELIX | R ±0.01 | R ±0.015 | CrN | DATA

Φ6 OR UNDER ABOVE Φ6

p.534

■ TOLERANCE

D		SHANK DIA.
D2 ~ 6	0 ~ -0.012mm	h5
D8 ~ 12	0 ~ -0.015mm	

EDP No	D	R	L_1	L_3	L_2	D_2
RC502 020 05 09	2	0.5	3	9	55	6
RC502 030 05 09	3	0.5	4	9	55	6
RC502 030 05 16	3	0.5	4	16	55	6
RC502 030 05 20	3	0.5	4	20	55	6
RC502 040 05 12	4	0.5	5	12	55	6
RC502 040 05 16	4	0.5	5	16	55	6
RC502 040 05 20	4	0.5	5	20	55	6
RC502 060 05 20	6	0.5	7	20	60	6
RC502 060 10 20	6	1	7	20	60	6
RC502 080 05 25	8	0.5	9	25	60	8
RC502 080 10 25	8	1	9	25	60	8
RC502 100 05 32	10	0.5	11	32	70	10
RC502 100 10 32	10	1	11	32	70	10
RC502 120 05 38	12	0.5	12	38	80	12
RC502 120 10 38	12	1	12	38	80	12

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

■ Applicable Working Material

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○				◎			○	

○ : GOOD ◎ : EXCELLENT

EDP. NO	Appearance	Type	INCH & METRIC	Page
G		2 FLUTES NECK TYPE BALL NOSE ENDMILL	METRIC	278
WGB504		4 FLUTES BALL NOSE ENDMILL	METRIC	279
GE		2 FLUTES NECK TYPE SQUARE ENDMILL	METRIC	280
WGE504		4 FLUTES SQUARE ENDMILL	METRIC	281
WGR502		2 FLUTES NECK TYPE RADIUS ENDMILL	METRIC	282
WGR504		4 FLUTES RADIUS ENDMILL	METRIC	283

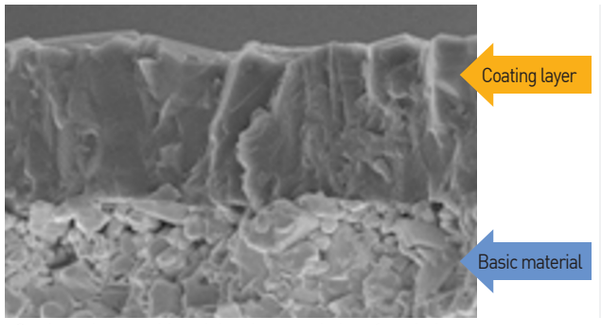
GRA-MATE

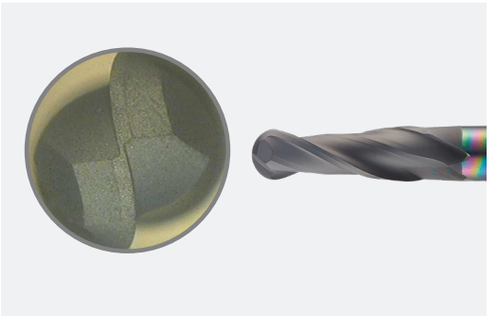
General Features

- Suitable for Graphite, reinforced plastics, non-ferrous materials
- High hardness Diamond Coating for better tool life
- Maximizing and Stabilizing Coating Thickness for Improved Wear Resistance
- Various specifications for a variety of machining methods

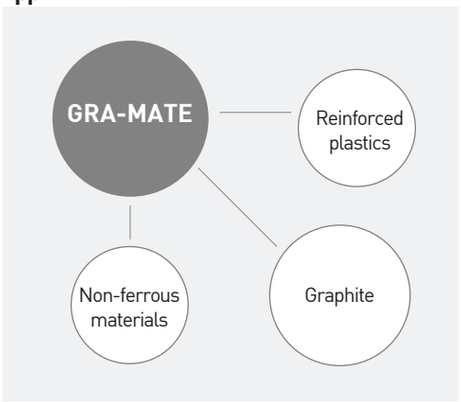
Characteristics

- High surface hardness and tool life with high adhesion diamond coating
- Minimize accidental damage by using dedicated materials with excellent wear resistance
- Cutting edge considered the characteristics of workpiece.





Applications



EDP No. System

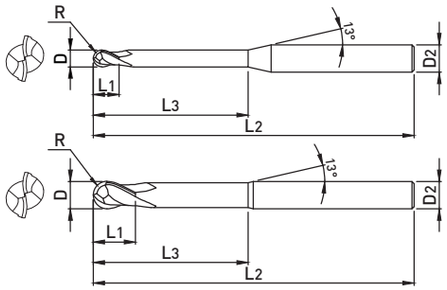
*If expressed as an integer, the decimal point is omitted.

TYPE	SHAPE	GRADE	LENGTH, SHANK TYPE	FLUTE	CUTTING DIA.	CORNER RADIUS	OVERALL
G : Graphite	E : Square type	5 : Grade	0 : Straight, Neck	2 : 2 Flutes	0.2	0.05	40
WG : Winner Graphite	R : Radius type			4 : 4 Flutes	~	~	~
					20	1	200
⋮	⋮	⋮	⋮	⋮	⋮	⋮	
WG	R	5	0	4	080	10	130
Winner Graphite	Radius type	Grade	Straight Neck	4 Flutes	Ø8	R1	130

Ex) 4FLUTES CUTTING DIA. Ø8 CORNER R 1.0 OVERALL LENGTH 130 50 GRADE CORNER RADIUS ENDMILL FOR GRAPHITE

G

2 FLUTES NECK TYPE BALL NOSE ENDMILL



- High machinability through the designed cutting edge considering the characteristics of workpiece
- Suitable for deep part machining with various neck size

WC | 2 | 30° HELIX | R ±0.015 | Diamond | DATA

ALL SIZES p.535

■ **TOLERANCE**

D		SHANK DIA.
ALL SIZES	0 ~ -0.03mm	h6

EDP No	D	R	L_1	L_3	L_2	D_2
G 005 010 03	0.5	0.25	1	3	50	4
G 005 010 06	0.5	0.25	1	6	50	4
G 005 010 10	0.5	0.25	1	10	50	4
G 006 012 03	0.6	0.3	1.2	3	50	4
G 006 012 06	0.6	0.3	1.2	6	50	4
G 006 012 08	0.6	0.3	1.2	8	50	4
G 006 012 10	0.6	0.3	1.2	10	50	4
G 006 012 12	0.6	0.3	1.2	12	50	4
G 008 016 4	0.8	0.4	1.6	4	50	4
G 008 016 6	0.8	0.4	1.6	6	50	4
G 008 016 8	0.8	0.4	1.6	8	50	4
G 010 030 6	1	0.5	3	6	60	4
G 010 030 8	1	0.5	3	8	60	4
G 010 03 10	1	0.5	3	10	60	4
G 010 03 12	1	0.5	3	12	60	4
G 010 03 14	1	0.5	3	14	60	4
G 010 03 16	1	0.5	3	16	60	4
G 010 03 18	1	0.5	3	18	60	4
G 010 03 20	1	0.5	3	20	60	4
G 012 04 10	1.2	0.6	4	10	70	4
G 015 05 10	1.5	0.75	5	10	60	4
G 015 05 12	1.5	0.75	5	12	60	4
G 015 05 16	1.5	0.75	5	16	60	4
G 015 05 20	1.5	0.75	5	20	60	4
G 015 05 25	1.5	0.75	5	25	70	4
G 015 05 30	1.5	0.75	5	30	70	4
G 020 08 12	2	1	8	12	60	4
G 020 08 16	2	1	8	16	60	4
G 020 08 20	2	1	8	20	60	4
G 020 08 25	2	1	8	25	70	4
G 020 08 30	2	1	8	30	70	4
G 020 08 35	2	1	8	35	80	4
G 020 08 40	2	1	8	40	80	4
G 020 10 20	2	1	10	20	80	4
G 020 10 20L	2	1	10	20	100	4
G 025 10 20	2.5	1.25	10	20	80	4
G 030 12 16	3	1.5	12	16	60	6
G 030 12 20	3	1.5	12	20	70	6
G 030 12 25	3	1.5	12	25	70	6

EDP No	D	R	L_1	L_3	L_2	D_2
G 030 12 30	3	1.5	12	30	80	6
G 030 12 35	3	1.5	12	35	80	6
G 030 12 40	3	1.5	12	40	90	6
G 030 12 45	3	1.5	12	45	90	6
G 030 15 25	3	1.5	15	25	80	4
G 040 15 20	4	2	15	20	60	6
G 040 15 25	4	2	15	25	70	6
G 040 15 30	4	2	15	30	80	6
G 040 15 35	4	2	15	35	80	6
G 040 15 40	4	2	15	40	90	6
G 040 15 45	4	2	15	45	90	6
G 040 15 50	4	2	15	50	100	6
G 040 15L	4	2	15	-	120	4
G 040 15M	4	2	15	-	80	4
G 040 15S	4	2	15	-	50	4
G 040 20 30	4	2	20	30	80	4
G 050 30 50	5	2.5	30	50	100	6
G 050 30 50L	5	2.5	30	50	150	6
G 060 20L	6	3	20	-	70	6
G 060 20M	6	3	20	-	100	6
G 060 20S	6	3	20	-	150	6
G 060 30 50	6	3	30	50	100	6
G 060 30 50L	6	3	30		150	6
G 080 25L	8	4	25	-	70	8
G 080 25M	8	4	25	-	110	8
G 080 25S	8	4	25	-	160	8
G 080 40 60	8	4	40	60	110	8
G 080 40 60L	8	4	40		200	8
G 100 30L	10	5	30	-	80	10
G 100 30M	10	5	30	-	120	10
G 100 30S	10	5	30	-	170	10
G 100 50 70	10	5	50	70	120	10
G 100 50 70L	10	5	50	70	200	10
G 120 35L	12	6	35	-	80	12
G 120 35M	12	6	35	-	130	12
G 120 35S	12	6	35	-	180	12
G 120 55 75	12	6	55	75	130	12
G 120 55 75L	12	6	55	75	200	12

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

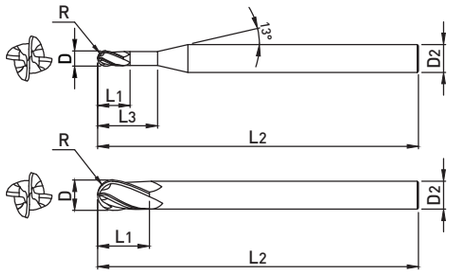
■ **Applicable Working Material**

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel SKD61 ~HRc55	Hardened Steel SKD11 ~HRc55	Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
						◎		○	

○ : GOOD ◎ : EXCELLENT

WGB504

4 FLUTES BALL NOSE ENDMILL



- High machinability through the designed cutting edge considering the characteristics of workpiece
- Suitable for deep part machining with various neck size
- Excellent workpiece finishes by 4 flutes cutting

WC | 4 | 30° HELIX | R ±0.01 | Diamond | DATA

ALL SIZES p.535

■ **TOLERANCE**

D		SHANK DIA.
D8 ~ 12	0 ~ -0.02mm	h6
D16 ~ 20	0 ~ -0.03mm	

EDP No	D	R	L_1	L_3	L_2	D_2
WGB504 010	1	0.5	3	-	60	4
WGB504 010 10	1	0.5	3	10	60	4
WGB504 010 15	1	0.5	3	15	60	4
WGB504 010 20	1	0.5	3	20	60	4
WGB504 010 25	1	0.5	3	25	80	4
WGB504 010 30	1	0.5	3	30	80	4
WGB504 015	1.5	0.75	4	-	60	4
WGB504 015 10	1.5	0.75	4	10	80	4
WGB504 015 15	1.5	0.75	4	15	80	4
WGB504 015 20	1.5	0.75	4	20	80	4
WGB504 015 25	1.5	0.75	4	25	80	4
WGB504 015 30	1.5	0.75	4	30	80	4
WGB504 020	2	1	6	-	60	4
WGB504 020 10	2	1	6	10	80	4
WGB504 020 15	2	1	6	15	80	4
WGB504 020 20	2	1	6	20	80	4
WGB504 020 25	2	1	6	25	80	4
WGB504 020 30	2	1	6	30	80	4
WGB504 020 40	2	1	6	40	100	4
WGB504 030	3	1.5	9	-	60	4
WGB504 030 15	3	1.5	9	15	100	4
WGB504 030 20	3	1.5	9	20	100	4
WGB504 030 25	3	1.5	9	25	100	4
WGB504 030 30	3	1.5	9	30	100	4
WGB504 030 40	3	1.5	9	40	100	4
WGB504 030 50	3	1.5	9	50	100	4
WGB504 040 060	4	2	12	-	60	4
WGB504 040 080	4	2	12	-	80	4
WGB504 040 110	4	2	12	-	110	4
WGB504 040 130	4	2	12	-	130	4

EDP No	D	R	L_1	L_3	L_2	D_2
WGB504 040 150	4	2	12	-	150	4
WGB504 050 080	5	2.5	15	25	80	6
WGB504 050 110	5	2.5	15	25	110	6
WGB504 060 090	6	3	20	-	90	6
WGB504 060 110	6	3	20	-	110	6
WGB504 060 130	6	3	20	-	130	6
WGB504 060 150	6	3	20	-	150	6
WGB504 060 180	6	3	20	-	180	6
WGB504 080 110	8	4	25	-	110	8
WGB504 080 130	8	4	25	-	130	8
WGB504 080 150	8	4	25	-	150	8
WGB504 080 200	8	4	25	-	200	8
WGB504 100 110	10	5	30	-	110	10
WGB504 100 130	10	5	30	-	130	10
WGB504 100 150	10	5	30	-	150	10
WGB504 100 180	10	5	30	-	180	10
WGB504 100 200	10	5	30	-	200	10
WGB504 120 110	12	6	35	-	110	12
WGB504 120 130	12	6	35	-	130	12
WGB504 120 150	12	6	35	-	150	12
WGB504 120 180	12	6	35	-	180	12
WGB504 120 200	12	6	35	-	200	12
WGB504 160 150	16	8	50	-	150	16
WGB504 160 200	16	8	50	-	200	16
WGB504 200 150	20	10	60	-	150	20
WGB504 200 200	20	10	60	-	200	20

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

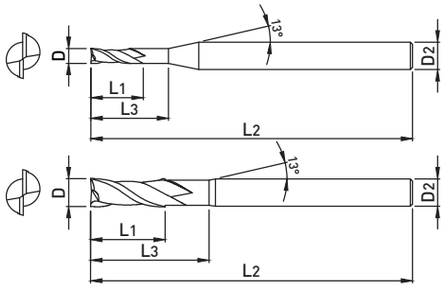
■ **Applicable Working Material**

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel SKD61 ~HRc55	Hardened Steel SKD11 ~HRc55	Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
						◎		○	

○ : GOOD ◎ : EXCELLENT

GE

2 FLUTES NECK TYPE SQUARE ENDMILL



- High machinability through the designed cutting edge considering the characteristics of workpiece
- Suitable for deep part machining with various neck size

MICRO GRAIN | 2 | 30° HELIX | Diamond | DATA

p.536

■ **TOLERANCE**

D		SHANK DIA.
ALL SIZES	0 ~ -0.03mm	h6

EDP No	D	L_1	L_2	L_2	D_2
GE 005 010 06	0.5	1	6	50	4
GE 006 012 06	0.6	1.2	6	50	4
GE 006 012 10	0.6	1.2	10	50	4
GE 007 015 06	0.7	1.5	6	50	4
GE 008 020 06	0.8	2	6	50	4
GE 010 03 08	1	3	8	60	4
GE 010 03 10	1	3	10	60	4
GE 010 03 12	1	3	12	60	4
GE 015 04 12	1.5	4	12	60	4
GE 020 06 12	2	6	12	60	4
GE 020 06 12 S6	2	6	12	60	6
GE 025 08 12	2.5	8	12	60	4
GE 030 10 12	3	10	12	60	4
GE 030 10 16	3	10	16	60	4
GE 030 10 12 S6	3	10	12	60	6
GE 030 10 16 S6	3	10	16	60	6
GE 040 12S	4	12	-	60	6
GE 040 12 16	4	12	16	60	6
GE 040 12 20	4	12	20	60	6
GE 050 15 20	5	15	20	60	6
GE 060 20S	6	20	-	60	6
GE 060 20 30	6	20	30	80	6
GE 060 30 50	6	30	50	150	6
GE 080 25S	8	25	-	70	8
GE 080 25 40	8	25	40	100	8
GE 080 40 70	8	40	70	150	8
GE 100 30S	10	30	-	80	10
GE 100 30 50	10	30	50	100	10
GE 100 45 80	10	45	80	160	10
GE 120 30S	12	30	-	80	12

EDP No	D	L_1	L_2	L_2	D_2
GE 120 30 50	12	30	50	110	12
GE 120 50 80	12	50	80	160	12

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

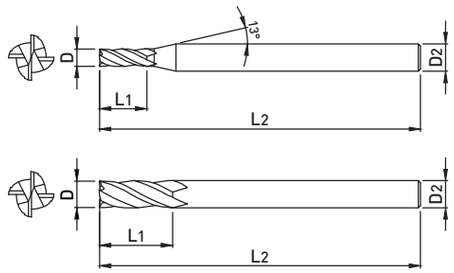
■ **Applicable Working Material**

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
						◎		○	

○ : GOOD ◎ : EXCELLENT

WGE504

4 FLUTES SQUARE ENDMILL



- High machinability through the designed cutting edge considering the characteristics of workpiece
- Suitable for deep part machining with various neck size
- Suitable for various machining with standard length and long type length etc.

MICRO GRAIN | 4 | 30° HELIX | Diamond | DATA

p.536

■ **TOLERANCE**

D		SHANK DIA.
ALL SIZES	0 ~ -0.03mm	h6

EDP No	D	L_1	L_2	D_2
WGE504 020	2	6	50	4
WGE504 020 08	2	8	50	4
WGE504 020 10	2	10	50	4
WGE504 025	2.5	8	50	4
WGE504 030	3	8	50	6
WGE504 030 10	3	10	50	6
WGE504 030 12	3	12	50	6
WGE504 030 16	3	16	60	6
WGE504 030 20	3	20	60	6
WGE504 040	4	10	50	6
WGE504 040 12	4	12	50	6
WGE504 040 16	4	16	60	6
WGE504 040 20	4	20	60	6
WGE504 040 25	4	25	60	6
WGE504 050	5	15	60	6
WGE504 060	5	15	60	6
WGE504 060 20	6	20	110	6
WGE504 060 30	6	30	150	6
WGE504 080	8	20	70	8
WGE504 080 30	8	30	110	8
WGE504 080 40	8	40	150	8
WGE504 100	10	25	75	10
WGE504 100 40	10	40	110	10
WGE504 100 50	10	50	150	10
WGE504 120	12	30	80	12
WGE504 120 50	12	50	120	12
WGE504 120 60	12	60	160	12
WGE504 160	16	50	110	16
WGE504 160 70	16	70	160	16
WGE504 160 90	16	90	160	16

EDP No	D	L_1	L_2	D_2
WGE504 160 100	16	100	200	16
WGE504 200	20	70	160	20
WGE504 200 90	20	90	160	20
WGE504 200 100	20	100	200	20

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

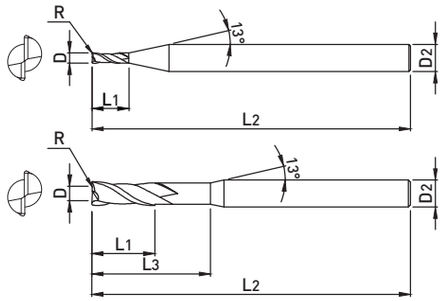
■ **Applicable Working Material**

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
						◎		○	

○ : GOOD ◎ : EXCELLENT

WGR502

2 FLUTES NECK TYPE RADIUS ENDMILL



- High machinability through the designed cutting edge considering the characteristics of workpiece
- Suitable for deep part machining with various neck size

MICRO GRAIN | 2 | 30° HELIX | R ±0.01 | Diamond | DATA

ALL SIZES

p.537

■ **TOLERANCE**

D		SHANK DIA.
ALL SIZES	0 ~ -0.02mm	h6

EDP No	D	R	L_1	L_3	L_2	D_2
WGR502 002	0.2	-	0.3	-	40	3
WGR502 003	0.3	-	0.5	-	40	3
WGR502 004	0.4	-	0.6	-	40	3
WGR502 005 025	0.5	0.05	0.7	2.5	40	3
WGR502 005 040	0.5	0.05	0.7	4	40	3
WGR502 006 030	0.6	0.05	0.9	3	40	3
WGR502 006 050	0.6	0.05	0.9	5	40	3
WGR502 008 040	0.8	0.05	1.2	4	40	3
WGR502 008 070	0.8	0.05	1.2	7	40	3
WGR502 010 050	1	0.1	1.5	5	40	3
WGR502 010 085	1	0.1	1.5	8.5	40	3
WGR502 010 120	1	0.1	1.5	12	40	3
WGR502 012 060	1.2	0.1	1.8	6	50	3
WGR502 012 100	1.2	0.1	1.8	10	50	3
WGR502 015 075	1.5	0.15	2.2	7.5	50	3
WGR502 015 120	1.5	0.15	2.2	12	50	3
WGR502 015 180	1.5	0.15	2.2	18	50	3
WGR502 020 100	2	0.15	2.2	10	60	3
WGR502 020 160	2	0.15	2.2	16	60	3
WGR502 020 250	2	0.15	2.2	25	60	3
WGR502 030 100	3	0.2	3	10	65	4
WGR502 030 150	3	0.2	3	15	65	4
WGR502 030 200	3	0.2	3	20	65	4
WGR502 030 250	3	0.2	3	25	75	4
WGR502 030 300	3	0.2	3	30	75	4
WGR502 040 200	4	0.2	4	20	65	6
WGR502 040 300	4	0.2	4	30	75	6
WGR502 040 400	4	0.2	4	40	90	6
WGR502 050 200	5	0.3	5	20	75	6
WGR502 050 300	5	0.3	5	30	75	6
WGR502 050 400	5	0.3	5	40	90	6
WGR502 050 500	5	0.3	5	50	90	6
WGR502 060 300	6	0.3	6	30	75	6
WGR502 060 400	6	0.3	6	40	90	6
WGR502 060 500	6	0.3	6	50	90	6
WGR502 060 600	6	0.3	6	60	100	6

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

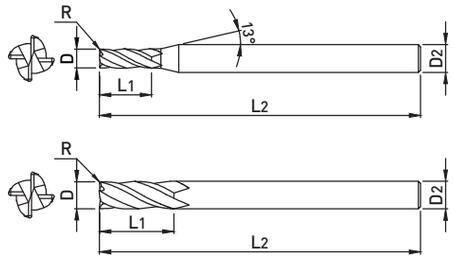
■ **Applicable Working Material**

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
						◎		○	

○ : GOOD ◎ : EXCELLENT

WGR504

4 FLUTES RADIUS ENDMILL



- High machinability through the designed cutting edge considering the characteristics of workpiece
- Excellent workpiece finishes by 4 flutes cutting
- Suitable for various machining with standard length and long type length etc.

MICRO GRAIN | 4 | 30° HELIX | R ±0.01 | R ±0.015 | Diamond | DATA

Φ12 OR UNDER ABOVE Φ12

p.537

■ **TOLERANCE**

D		SHANK DIA.
D3 ~ 12	0 ~ -0.02mm	h5
D16 ~ 20	0 ~ -0.03mm	

EDP No	D	R	L_1	L_2	D_2
WGR504 030 02 080	3	0.2	8	80	4
WGR504 030 03 080	3	0.3	8	80	4
WGR504 030 05 080	3	0.5	8	80	4
WGR504 040 03 100	4	0.3	10	100	4
WGR504 040 05 100	4	0.5	10	100	4
WGR504 040 10 100	4	1	10	100	4
WGR504 060 03 110	6	0.3	15	110	6
WGR504 060 05 110	6	0.5	15	110	6
WGR504 060 10 110	6	1	15	110	6
WGR504 080 05 110	8	0.5	20	110	8
WGR504 080 10 110	8	1	20	110	8
WGR504 080 05 130	8	0.5	20	130	8
WGR504 080 10 130	8	1	20	130	8
WGR504 100 05 130	10	0.5	25	130	10
WGR504 100 10 130	10	1	25	130	10
WGR504 100 05 150	10	0.5	25	150	10
WGR504 100 10 150	10	1	25	150	10
WGR504 120 05 130	12	0.5	30	130	12
WGR504 120 10 130	12	1	30	130	12
WGR504 120 05 150	12	0.5	30	150	12
WGR504 120 10 150	12	1	30	150	12
WGR504 160 05 200	16	0.5	32	200	16
WGR504 160 10 200	16	1	32	200	16
WGR504 200 05 200	20	0.5	40	200	20
WGR504 200 10 200	20	1	40	200	20

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

■ **Applicable Working Material**

Carbon Steel ~ HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
						◎		○	

○ : GOOD ◎ : EXCELLENT

DRILL SERIES

2020▸2021
WIDIN
PRODUCTS

DRILL SERIES 02

EDP. NO	Appearance	Type	INCH & METRIC	Page
NDPR new		4xD/ External Coolant Type / Single Margin	METRIC	288
NDPL new		6xD/ External Coolant Type / Single Margin	METRIC	290
CTS---W		3xD/ External Coolant Type / Flat Drill	METRIC	292

Power Drill Series

POWER DRILL

General Features

· Suitable to work for Alloy steels,Carbon steels , Cast iron , Mild steels [Recommendation : ~HRc35]
· Economical series, Excellent production efficiency as superior chip emission
· Retaining the stock for customer satisfaction

Characteristic

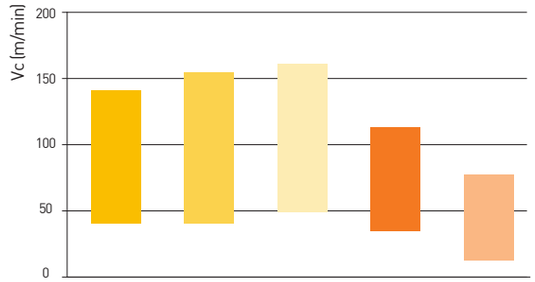
· Stable drilling work by applied to high toughness fine material
· Improvement of wear resistance and chipping resistance with Nano layer

Chip Management

	POWER DRILL	Competitor
	Compact Chip	Occur the Long Chip
3,200 Hole		

Workpieces : SCM440
Working condition
Vc : 80m/min / fn = 0.1mm/rev / Ap = 18mm / Blind Hole / External coolant
Test tool : NDPR060

Vc by Application area

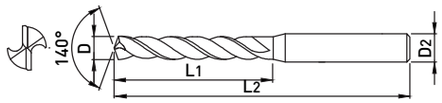


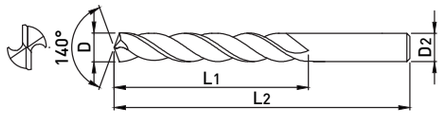
Power Drill Series Range

EDP. NO.	Flutes	Feature		Length			Internal Coolant	Margin Type	Tolerance D	Diameter range(Ø)	
INCH : ◆ / METRIC : ◇		Relief	Facet	3xD	4xD	6xD				Min.	Max.
NDPR ◇	2		O		O			Single	h7	1	20
NDPL ◇	2		O			O		Single	h7	3	20
CTS ◇	2		O	O				Single	h8	3	12

EDP No. System

TYPE	DRILLING DEPTH	CUTTING DIA.
NDP : New Dynamic Power Drill	S : Stub-Length	1
CT : Counter Boring	R : Regular	~
	L : Long	20
NDP	R	051
New Dynamic Power Drill	Regular Length	Ø5.1





ULTRA FINE | 30° HELIX | AlTiN | ▸4xD | 140° | DATA

p.539

- 3~4xD General Drill with External Coolant
- Improvement of tool life with wear resistance and chipping resistance
- Improvement of chip curling and wide chip pocket by applying New Gamma-Flute concept

up to 1.5mm | D1.6~D1.9 | over 1.9mm

■ **TOLERANCE**

D		SHANK DIA.
~ D3	0 ~ -0.01mm	h6
D3.1 ~ D6	0 ~ -0.012mm	
D6.1 ~ D10	0 ~ -0.015mm	
D10.1 ~ D18	0 ~ -0.018mm	
D18.1 ~	0 ~ -0.021mm	

EDP No	D	L_1	L_2	D_2
NDPR 010	1	8	38	3
NDPR 011	1.1	9	42	3
NDPR 012	1.2	10	42	3
NDPR 013	1.3	10	42	3
NDPR 014	1.4	11	42	3
NDPR 015	1.5	11	42	3
NDPR 016	1.6	12	42	3
NDPR 017	1.7	12	42	3
NDPR 018	1.8	13	42	3
NDPR 019	1.9	13	42	3
NDPR 020	2	18	50	3
NDPR 021	2.1	18	50	3
NDPR 022	2.2	18	50	3
NDPR 023	2.3	18	50	3
NDPR 024	2.4	18	50	3
NDPR 025	2.5	18	50	3
NDPR 026	2.6	18	50	3
NDPR 027	2.7	18	50	3
NDPR 028	2.8	18	50	3
NDPR 029	2.9	18	50	3
NDPR 030	3	20	55	3
NDPR 031	3.1	20	55	4
NDPR 032	3.2	20	55	4
NDPR 033	3.3	20	55	4
NDPR 034	3.4	20	55	4
NDPR 035	3.5	20	55	4
NDPR 036	3.6	25	55	4
NDPR 037	3.7	25	55	4
NDPR 038	3.8	25	55	4
NDPR 039	3.9	25	55	4
NDPR 040	4	25	55	4
NDPR 041	4.1	25	55	5
NDPR 042	4.2	33	63	5
NDPR 043	4.3	33	63	5
NDPR 044	4.4	33	63	5
NDPR 045	4.5	33	63	5

EDP No	D	L_1	L_2	D_2
NDPR 046	4.6	33	63	5
NDPR 047	4.7	33	63	5
NDPR 048	4.8	33	63	5
NDPR 049	4.9	33	63	5
NDPR 050	5	33	63	5
NDPR 051	5.1	33	63	6
NDPR 052	5.2	36	66	6
NDPR 053	5.3	36	66	6
NDPR 054	5.4	36	66	6
NDPR 055	5.5	36	66	6
NDPR 056	5.6	36	66	6
NDPR 057	5.7	36	66	6
NDPR 058	5.8	36	66	6
NDPR 059	5.9	36	66	6
NDPR 060	6	36	66	6
NDPR 061	6.1	36	66	7
NDPR 062	6.2	42	75	7
NDPR 063	6.3	42	75	7
NDPR 064	6.4	42	75	7
NDPR 065	6.5	42	75	7
NDPR 066	6.6	42	75	7
NDPR 067	6.7	42	75	7
NDPR 068	6.8	42	75	7
NDPR 069	6.9	42	75	7
NDPR 070	7	42	75	7
NDPR 071	7.1	42	75	8
NDPR 072	7.2	46	80	8
NDPR 073	7.3	46	80	8
NDPR 074	7.4	46	80	8
NDPR 075	7.5	46	80	8
NDPR 076	7.6	46	80	8
NDPR 077	7.7	46	80	8
NDPR 078	7.8	46	80	8
NDPR 079	7.9	46	80	8
NDPR 080	8	46	80	8
NDPR 081	8.1	46	80	9

EDP No	D	L_1	L_2	D_2
NDPR 082	8.2	50	85	9
NDPR 083	8.3	50	85	9
NDPR 084	8.4	50	85	9
NDPR 085	8.5	50	85	9
NDPR 086	8.6	50	85	9
NDPR 087	8.7	50	85	9
NDPR 088	8.8	50	85	9
NDPR 089	8.9	50	85	9
NDPR 090	9	50	85	9
NDPR 091	9.1	50	85	10
NDPR 092	9.2	55	90	10
NDPR 093	9.3	55	90	10
NDPR 094	9.4	55	90	10
NDPR 095	9.5	55	90	10
NDPR 096	9.6	55	90	10
NDPR 097	9.7	55	90	10
NDPR 098	9.8	55	90	10
NDPR 099	9.9	55	90	10
NDPR 100	10	55	90	10
NDPR 101	10.1	55	90	11
NDPR 102	10.2	57	95	11
NDPR 103	10.3	57	95	11
NDPR 104	10.4	57	95	11
NDPR 105	10.5	57	95	11
NDPR 106	10.6	57	95	11
NDPR 107	10.7	57	95	11
NDPR 108	10.8	57	95	11
NDPR 109	10.9	57	95	11
NDPR 110	11	57	95	11
NDPR 111	11.1	57	95	12
NDPR 112	11.2	63	102	12
NDPR 113	11.3	63	102	12
NDPR 114	11.4	63	102	12
NDPR 115	11.5	63	102	12
NDPR 116	11.6	63	102	12
NDPR 117	11.7	63	102	12
NDPR 118	11.8	63	102	12
NDPR 119	11.9	63	102	12
NDPR 120	12	63	102	12
NDPR 121	12.1	63	102	13
NDPR 122	12.2	63	102	13
NDPR 123	12.3	63	102	13
NDPR 124	12.4	63	102	13
NDPR 125	12.5	63	102	13
NDPR 126	12.6	63	102	13
NDPR 127	12.7	63	102	13
NDPR 128	12.8	63	102	13
NDPR 129	12.9	63	102	13

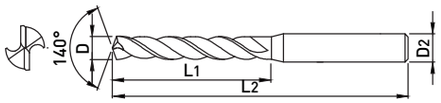
EDP No	D	L_1	L_2	D_2
NDPR 130	13	63	102	13
NDPR 131	13.1	63	102	14
NDPR 132	13.2	65	107	14
NDPR 133	13.3	65	107	14
NDPR 134	13.4	65	107	14
NDPR 135	13.5	65	107	14
NDPR 136	13.6	65	107	14
NDPR 137	13.7	65	107	14
NDPR 138	13.8	65	107	14
NDPR 139	13.9	65	107	14
NDPR 140	14	65	107	14
NDPR 141	14.1	65	107	15
NDPR 142	14.2	67	111	15
NDPR 143	14.3	67	111	15
NDPR 144	14.4	67	111	15
NDPR 145	14.5	67	111	15
NDPR 146	14.6	67	111	15
NDPR 147	14.7	67	111	15
NDPR 148	14.8	67	111	15
NDPR 149	14.9	67	111	15
NDPR 150	15	67	111	15
NDPR 151	15.1	67	111	16
NDPR 152	15.2	69	115	16
NDPR 153	15.3	69	115	16
NDPR 154	15.4	69	115	16
NDPR 155	15.5	69	115	16
NDPR 156	15.6	69	115	16
NDPR 157	15.7	69	115	16
NDPR 158	15.8	69	115	16
NDPR 159	15.9	69	115	16
NDPR 160	16	69	115	16
NDPR 165	16.5	71	119	17
NDPR 167	16.7	71	119	17
NDPR 170	17	71	119	17
NDPR 175	17.5	74	123	18
NDPR 180	18	74	123	18
NDPR 185	18.5	76	127	19
NDPR 190	19	76	127	19
NDPR 195	19.5	80	131	20
NDPR 200	20	80	131	20

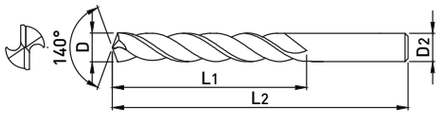
※The above specifications are subject to change without prior notice for product quality improvement.

■ **Applicable Working Material**

Carbon Steel ~HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~ FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
◎	◎	○					◎		○

○ : GOOD ◎ : EXCELLENT





ULTRA FINE | 30° HELIX | AlTiN | ▸6xD | 140° | DATA

p.539

- 5~6xD General Drill with External Coolant
- Improvement of tool life with wear resistance and chipping resistance
- Improvement of chip curling and wide chip pocket by applying New Gamma-Flute concept

■ **TOLERANCE**

D		SHANK DIA.
~ D3	0 ~ -0.01mm	h6
D3.1 ~ D6	0 ~ -0.012mm	
D6.1 ~ D10	0 ~ -0.015 mm	
D10.1 ~ D18	0 ~ -0.018 mm	
D18.1 ~	0 ~ -0.021 mm	

EDP No	D	L_1	L_2	D_2
NDPL 030	3	45	80	3
NDPL 031	3.1	45	80	4
NDPL 032	3.2	45	80	4
NDPL 033	3.3	45	80	4
NDPL 034	3.4	45	80	4
NDPL 035	3.5	45	80	4
NDPL 036	3.6	45	80	4
NDPL 037	3.7	45	80	4
NDPL 038	3.8	45	80	4
NDPL 039	3.9	45	80	4
NDPL 040	4	45	80	4
NDPL 041	4.1	45	80	5
NDPL 042	4.2	45	80	5
NDPL 043	4.3	45	80	5
NDPL 044	4.4	45	80	5
NDPL 045	4.5	45	80	5
NDPL 046	4.6	45	80	5
NDPL 047	4.7	45	80	5
NDPL 048	4.8	45	80	5
NDPL 049	4.9	45	80	5
NDPL 050	5	45	80	5
NDPL 051	5.1	45	80	6
NDPL 052	5.2	50	83	6
NDPL 053	5.3	50	83	6
NDPL 054	5.4	50	83	6
NDPL 055	5.5	50	83	6
NDPL 056	5.6	50	83	6
NDPL 057	5.7	50	83	6
NDPL 058	5.8	50	83	6
NDPL 059	5.9	50	83	6
NDPL 060	6	50	83	6
NDPL 061	6.1	50	83	7
NDPL 062	6.2	53	85	7
NDPL 063	6.3	53	85	7
NDPL 064	6.4	53	85	7
NDPL 065	6.5	53	85	7

EDP No	D	L_1	L_2	D_2
NDPL 066	6.6	53	85	7
NDPL 067	6.7	53	85	7
NDPL 068	6.8	53	85	7
NDPL 069	6.9	53	85	7
NDPL 070	7	53	85	7
NDPL 071	7.1	53	85	8
NDPL 072	7.2	58	90	8
NDPL 073	7.3	58	90	8
NDPL 074	7.4	58	90	8
NDPL 075	7.5	58	90	8
NDPL 076	7.6	58	90	8
NDPL 077	7.7	58	90	8
NDPL 078	7.8	58	90	8
NDPL 079	7.9	58	90	8
NDPL 080	8	58	90	8
NDPL 081	8.1	58	90	9
NDPL 082	8.2	64	98	9
NDPL 083	8.3	64	98	9
NDPL 084	8.4	64	98	9
NDPL 085	8.5	64	98	9
NDPL 086	8.6	64	98	9
NDPL 087	8.7	64	98	9
NDPL 088	8.8	64	98	9
NDPL 089	8.9	64	98	9
NDPL 090	9	64	98	9
NDPL 091	9.1	64	98	10
NDPL 092	9.2	68	105	10
NDPL 093	9.3	68	105	10
NDPL 094	9.4	68	105	10
NDPL 095	9.5	68	105	10
NDPL 096	9.6	68	105	10
NDPL 097	9.7	68	105	10
NDPL 098	9.8	68	105	10
NDPL 099	9.9	68	105	10
NDPL 100	10	68	105	10
NDPL 101	10.1	68	105	11

EDP No	D	L_1	L_2	D_2
NDPL 102	10.2	73	110	11
NDPL 103	10.3	73	110	11
NDPL 104	10.4	73	110	11
NDPL 105	10.5	73	110	11
NDPL 106	10.6	73	110	11
NDPL 107	10.7	73	110	11
NDPL 108	10.8	73	110	11
NDPL 109	10.9	73	110	11
NDPL 110	11	73	110	11
NDPL 111	11.1	73	110	12
NDPL 112	11.2	80	120	12
NDPL 113	11.3	80	120	12
NDPL 114	11.4	80	120	12
NDPL 115	11.5	80	120	12
NDPL 116	11.6	80	120	12
NDPL 117	11.7	80	120	12
NDPL 118	11.8	80	120	12
NDPL 119	11.9	80	120	12
NDPL 120	12	80	120	12
NDPL 121	12.1	80	120	13
NDPL 122	12.2	90	137	13
NDPL 123	12.3	90	137	13
NDPL 124	12.4	90	137	13
NDPL 125	12.5	90	137	13
NDPL 126	12.6	90	137	13
NDPL 127	12.7	90	137	13
NDPL 128	12.8	90	137	13
NDPL 129	12.9	90	137	13
NDPL 130	13	90	137	13
NDPL 131	13.1	90	137	14
NDPL 132	13.2	96	147	14
NDPL 133	13.3	96	147	14
NDPL 134	13.4	96	147	14
NDPL 135	13.5	96	147	14
NDPL 136	13.6	96	147	14
NDPL 137	13.7	96	147	14
NDPL 138	13.8	96	147	14
NDPL 139	13.9	96	147	14
NDPL 140	14	96	147	14
NDPL 141	14.1	96	147	15
NDPL 142	14.2	100	153	15
NDPL 143	14.3	100	153	15

EDP No	D	L_1	L_2	D_2
NDPL 144	14.4	100	153	15
NDPL 145	14.5	100	153	15
NDPL 146	14.6	100	153	15
NDPL 147	14.7	100	153	15
NDPL 148	14.8	100	153	15
NDPL 149	14.9	100	153	15
NDPL 150	15	100	153	15
NDPL 151	15.1	100	153	16
NDPL 152	15.2	112	160	16
NDPL 153	15.3	112	160	16
NDPL 154	15.4	112	160	16
NDPL 155	15.5	112	160	16
NDPL 156	15.6	112	160	16
NDPL 157	15.7	112	160	16
NDPL 158	15.8	112	160	16
NDPL 159	15.9	112	160	16
NDPL 160	16	112	160	16
NDPL 165	16.5	112	160	17
NDPL 170	17	112	160	17
NDPL 175	17.5	112	160	18
NDPL 176	17.6	112	160	18
NDPL 177	17.7	112	160	18
NDPL 178	17.8	112	160	18
NDPL 180	18	112	160	18
NDPL 185	18.5	112	160	19
NDPL 190	19	112	160	19
NDPL 195	19.5	112	160	20
NDPL 200	20	112	160	20

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

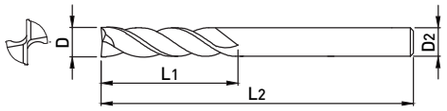
■ **Applicable Working Material**

Carbon Steel ~HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
◎	◎	○					◎		○

○ : GOOD ◎ : EXCELLENT

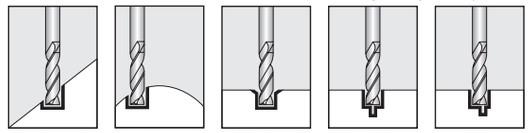
CTS---W

COUNTER BORED - BOTTOM DRILL



- 3xD Bottom Drill with External Coolant
- Suitable to Drilling by Bottom boring , Sloping, Round
- Improvement of tool life with chip emission and treated independent edge by applying New Flute concept

Shouldering, slotting are not possible.



ULTRA FINE | 20° HELIX | TiAlN | ▸3xD | DATA

p.540

■ **TOLERANCE**

D		SHANK DIA.
D3	0 ~ -0.014 mm	h6
D3.1 ~ D6	0 ~ -0.018 mm	
D6.1 ~ D10	0 ~ -0.022 mm	

EDP No	D	L_1	L_2	D_2
CTS 030W	3	18	60	4
CTS 033W	3.3	20	60	4
CTS 035W	3.5	22	60	4
CTS 040W	4	24	60	4
CTS 042W	4.2	26	62	5
CTS 045W	4.5	26	62	5
CTS 050W	5	26	62	5
CTS 053W	5.3	28	66	6
CTS 055W	5.5	28	66	6
CTS 060W	6	30	66	6
CTS 065W	6.5	34	74	7
CTS 068W	6.8	37	74	7
CTS 070W	7	37	74	7
CTS 075W	7.5	40	79	8
CTS 080W	8	40	79	8
CTS 085W	8.5	43	84	9
CTS 088W	8.8	43	84	9
CTS 090W	9	43	84	9
CTS 095W	9.5	47	89	10
CTS 100W	10	47	89	10
CTS 103W	10.3	51	95	11
CTS 105W	10.5	51	95	11
CTS 108W	10.8	51	95	11
CTS 110W	11	51	95	11
CTS 115W	11.5	54	102	12
CTS 120W	12	54	102	12

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

■ **Applicable Working Material**

Carbon Steel ~HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
◎	◎	○	○	○			◎		◎

○ : GOOD ◎ : EXCELLENT

MEMO

EDP. NO	Appearance	Type	INCH & METRIC	Page
PF503		3xD/ External Coolant Type / Single Margin	INCH & METRIC	296
PF505		5xD/ External Coolant Type / Single Margin	INCH & METRIC	299
SF503		3xD/ Internal Coolant Type / Single Margin	INCH & METRIC	302
SF505		5xD/ Internal Coolant Type / Single Margin	INCH & METRIC	305
SF508 new		8xD/ Internal Coolant Type / Single Margin	INCH & METRIC	308
SF510		10xD/ Internal Coolant Type / Double Margin	METRIC	310
SF520		20xD/ Internal Coolant Type / Double Margin	METRIC	312
HP503		High precision /3xD/ External Coolant Type / Double Margin	METRIC	313
HPI503		High precision /3xD/ Internal Coolant Type / Double Margin	INCH & METRIC	315
HPI505		High precision /5xD/ Internal Coolant Type / Double Margin	INCH & METRIC	317
HPI508--N		High precision /8xD/ Internal Coolant Type / Double Margin	INCH & METRIC	320
P503A(F)		DIN 6537K / External coolant	METRIC	322
PI503A(F)		DIN 6537K / Internal coolant	METRIC	324
PI505A(F)		DIN 6537L / Internal coolant /Flat shank	METRIC	326

POWER MAX DRILL

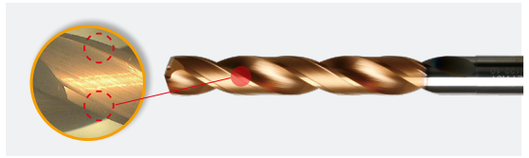
General Features

· Suitable to High speed work for Alloy steels,Cast iron, Stainless steels,Preharden Steels [Recommendation : ~HRc50]
· Extensive coverage of 3xD ~ 20xD Diameter

Characteristics

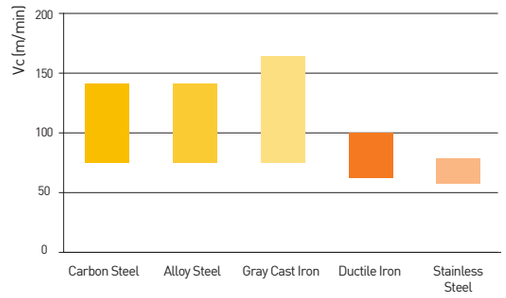
· High chipping resistance with high feed by used the high toughness material
· Toughening the surface hardness with heat resistance by applied to TiAlN coating
· Improvement of process-ability with decrease the frictional heat by possess the internal coolant series

Feature for HP Series



· Toughening the straightness and hole surface roughness by applied to double margin
· Toughening the chip emission by applied to wide chip pocket
· Improvement of processing efficiency with versatility who customer can choose between the external and internal coolant depends on the drilling depth

Vc by Application area

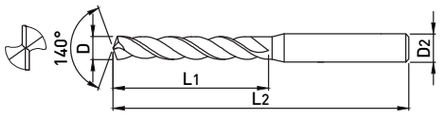


Power Max Drill Series Range

EDP. NO. 단위(INCH : ◆ / METRIC : ◇)	Flutes	Feature		Length					Internal Coolant	Margin Type	Tolerance D	Diameter range(Ø)	
		Relief	Facet	3xD	5xD	8xD	10xD	20xD				Min.	Max.
PF503 ◆◇	2		O	O						Single	h8	2	20
PF505 ◆◇	2		O		O					Single	h8	3	20
SF503 ◆◇	2		O	O					O	Single	h8	3	20
SF505 ◆◇	2		O		O				O	Single	h8	3.1	20
SF508 ◆◇	2		O			O			O	Single	h8	3	20
SF510 ◆◇	2		O				O		O	Double	h8	3	13
SF520 ◆◇	2		O					O	O	Double	h8	4.1	10
HP503 ◆◇	2		O	O						Double	m7	3	16
HPI 503 ◆◇	2		O	O					O	Double	m7	3	20
HPI 505 ◆◇	2		O		O				O	Double	m7	3	20
HPI 508--N ◆◇	2		O			O			O	Double	m7	3	20
P503A(F) ◇	2	O		O						Single	m7	3	20
PI503A(F) ◇	2		O	O					O	Single	m7	3	20
PI505A(F) ◇	2		O		O				O	Single	m7	4	20

EDP No. System

TYPE	APPEARANCE	GRADE	DRILLING DEPTH	SHANK TYPE	CUTTING DIA.
P : Power Max S : Spiral Coolant HP : High Precision	F : Facet Point I : Internal Coolant	5 : Grade	03 : 3xD 05 : 5xD 08 : 8xD 10 : 10xD 20 : 20xD	A : Plane F : DIN 6535 HE	3 ~ 20
P	I	5	05	A	040
Power Max	Inner-Coolant	Grade	5xD work	Shank Type Plane	Ø4.0



- 3xD High speed drill with External Coolant

ULTRA FINE | 30° HELIX | TiAlN | ▸3xD | 140° | DATA

p.541

▪ **TOLERANCE**

D		SHANK DIA.
~ D3	0 ~ -0.014 mm	h6
D3.1 ~ D6	0 ~ -0.018 mm	
D6.1 ~ D10	0 ~ -0.022 mm	
D10.1 ~ D18	0 ~ -0.027 mm	
D18.1 ~	0 ~ -0.033 mm	

EDP No	D			L1	L2	D2
	mm	fraction	inch			
PF503 020	2	-	0.0787	14	50	3
PF503 021	2.1	-	0.0827	14	50	3
PF503 022	2.2	-	0.0866	14	50	3
PF503 023	2.3	-	0.0906	14	50	3
PF503 024	2.4	-	0.0945	14	50	3
PF503 025	2.5	-	0.0984	14	50	3
PF503 026	2.6	-	0.1024	14	50	3
PF503 027	2.7	-	0.1063	14	50	3
PF503 028	2.8	-	0.1102	14	50	3
PF503 029	2.9	-	0.1142	14	50	3
PF503 030	3	-	0.1181	18	60	3
PF503 031	3.1	-	0.1220	20	60	4
PF503 03175	3.175	1/8	0.1250	20	60	4
PF503 032	3.2	-	0.1260	20	60	4
PF503 03264	3.264	-	0.1285	20	60	4
PF503 033	3.3	-	0.1299	20	60	4
PF503 034	3.4	-	0.1339	22	60	4
PF503 035	3.5	-	0.1378	22	60	4
PF503 03572	3.572	9/64	0.1406	22	60	4
PF503 036	3.6	-	0.1417	22	60	4
PF503 037	3.7	-	0.1457	22	60	4
PF503 038	3.8	-	0.1496	24	60	4
PF503 039	3.9	-	0.1535	24	60	4
PF503 040	4	-	0.1575	24	60	4
PF503 04039	4.039	-	0.1590	24	60	4
PF503 041	4.1	-	0.1614	24	60	4

EDP No	D			L1	L2	D2
	mm	fraction	inch			
PF503 042	4.2	-	0.1654	26	62	5
PF503 043	4.3	-	0.1693	26	62	5
PF503 044	4.4	-	0.1732	26	62	5
PF503 045	4.5	-	0.1772	26	62	5
PF503 046	4.6	-	0.1811	26	62	5
PF503 047	4.7	-	0.1850	26	62	5
PF503 04763	4.763	3/16	0.1875	26	62	5
PF503 048	4.8	-	0.1890	26	62	5
PF503 049	4.9	-	0.1920	26	62	5
PF503 050	5	-	0.1969	26	62	5
PF503 051	5.1	-	0.2008	26	62	5
PF503 05159	5.159	13/64	0.2031	28	66	6
PF503 052	5.2	-	0.2047	28	66	6
PF503 053	5.3	-	0.2087	28	66	6
PF503 054	5.4	-	0.2126	28	66	6
PF503 055	5.5	-	0.2165	28	66	6
PF503 05558	5.558	7/32	0.2188	30	66	6
PF503 056	5.6	-	0.2205	30	66	6
PF503 057	5.7	-	0.2244	30	66	6
PF503 058	5.8	-	0.2283	30	66	6
PF503 059	5.9	-	0.2323	30	66	6
PF503 05953	5.953	15/64	0.2344	30	66	6
PF503 060	6	-	0.2362	30	66	6
PF503 061	6.1	-	0.2402	30	66	6
PF503 062	6.2	-	0.2441	34	74	7
PF503 063	6.3	-	0.2480	34	74	7

EDP No	D			L1	L2	D2
	mm	fraction	inch			
PF503 0635	6.35	1/4	0.2500	34	74	7
PF503 064	6.4	-	0.2520	34	74	7
PF503 065	6.5	-	0.2559	34	74	7
PF503 066	6.6	-	0.2598	34	74	7
PF503 067	6.7	-	0.2638	37	74	7
PF503 06747	6.747	17/64	0.2656	37	74	7
PF503 068	6.8	-	0.2677	37	74	7
PF503 069	6.9	-	0.2717	37	74	7
PF503 070	7	-	0.2756	37	74	7
PF503 071	7.1	-	0.2795	37	74	7
PF503 07145	7.145	9/32	0.2813	40	79	8
PF503 072	7.2	-	0.2835	40	79	8
PF503 073	7.3	-	0.2874	40	79	8
PF503 074	7.4	-	0.2913	40	79	8
PF503 075	7.5	-	0.2953	40	79	8
PF503 07541	7.541	19/64	0.2969	40	79	8
PF503 076	7.6	-	0.2992	40	79	8
PF503 077	7.7	-	0.3031	40	79	8
PF503 078	7.8	-	0.3071	40	79	8
PF503 079	7.9	-	0.3110	40	79	8
PF503 07938	7.938	5/16	0.3125	40	79	8
PF503 080	8	-	0.3150	40	79	8
PF503 081	8.1	-	0.3189	40	79	8
PF503 082	8.2	-	0.3228	43	84	9
PF503 083	8.3	-	0.3268	43	84	9
PF503 08334	8.334	21/64	0.3281	43	84	9
PF503 084	8.4	-	0.3307	43	84	9
PF503 085	8.5	-	0.3320	43	84	9
PF503 086	8.6	-	0.3346	43	84	9
PF503 087	8.7	-	0.3386	43	84	9
PF503 08733	8.733	-	0.3425	43	84	9
PF503 088	8.8	-	0.3438	43	84	9
PF503 089	8.9	-	0.3465	43	84	9
PF503 090	9	-	0.3504	43	84	9
PF503 091	9.1	-	0.3543	43	84	9
PF503 09129	9.129	23/64	0.3594	47	89	10
PF503 092	9.2	-	0.3622	47	89	10
PF503 093	9.3	-	0.3661	47	89	10
PF503 09347	9.347	-	0.3680	47	89	10
PF503 094	9.4	-	0.3701	47	89	10

EDP No	D			L1	L2	D2
	mm	fraction	inch			
PF503 095	9.5	-	0.3740	47	89	10
PF503 09525	9.525	3/8	0.3750	47	89	10
PF503 096	9.6	-	0.3780	47	89	10
PF503 097	9.7	-	0.3819	47	89	10
PF503 098	9.8	-	0.3858	47	89	10
PF503 099	9.9	-	0.3898	47	89	10
PF503 09921	9.921	25/64	0.3906	47	89	10
PF503 100	10	-	0.3937	47	89	10
PF503 101	10.1	-	0.3976	47	89	10
PF503 102	10.2	-	0.4016	51	95	11
PF503 103	10.3	-	0.4055	51	95	11
PF503 1032	10.32	13/32	0.4063	51	95	11
PF503 104	10.4	-	0.4094	51	95	11
PF503 105	10.5	-	0.4134	51	95	11
PF503 106	10.6	-	0.4173	51	95	11
PF503 107	10.7	-	0.4213	51	95	11
PF503 10716	10.716	27/64	0.4219	51	95	11
PF503 108	10.8	-	0.4252	51	95	11
PF503 109	10.9	-	0.4291	51	95	11
PF503 110	11	-	0.4331	51	95	11
PF503 111	11.1	-	0.4370	51	95	11
PF503 11113	11.113	7/16	0.4375	54	102	12
PF503 112	11.2	-	0.4409	54	102	12
PF503 113	11.3	-	0.4449	54	102	12
PF503 114	11.4	-	0.4488	54	102	12
PF503 115	11.5	-	0.4528	54	102	12
PF503 116	11.6	-	0.4531	54	102	12
PF503 117	11.7	-	0.4567	54	102	12
PF503 118	11.8	-	0.4606	54	102	12
PF503 119	11.9	15/32	0.4646	54	102	12
PF503 11908	11.908	-	0.4685	54	102	12
PF503 120	12	-	0.4688	54	102	12
PF503 121	12.1	-	0.4724	54	102	12
PF503 122	12.2	-	0.4803	57	102	13
PF503 123	12.3	-	0.4843	57	102	13
PF503 12304	12.304	31/64	0.4844	57	102	13
PF503 124	12.4	-	0.4882	57	102	13
PF503 125	12.5	-	0.4921	57	102	13
PF503 126	12.6	-	0.4961	57	102	13
PF503 127	12.7	-	0.5000	57	102	13

PF503

GENERAL DRILL - 3xD

EDP No	D			L_1	L_2	D_2
	mm	fraction	inch			
PF503 128	12.8	-	0.5039	57	102	13
PF503 129	12.9	-	0.5079	57	102	13
PF503 130	13	-	0.5118	57	102	13
PF503 13096	13.096	33/64	0.5156	57	102	13
PF503 131	13.1	-	0.5157	57	102	13
PF503 132	13.2	-	0.5197	60	107	14
PF503 133	13.3	-	0.5236	60	107	14
PF503 134	13.4	-	0.5276	60	107	14
PF503 13494	13.494	17/32	0.5313	60	107	14
PF503 135	13.5	-	0.5315	60	107	14
PF503 136	13.6	-	0.5354	60	107	14
PF503 137	13.7	-	0.5394	60	107	14
PF503 138	13.8	-	0.5433	60	107	14
PF503 13891	13.891	35/64	0.5469	60	107	14
PF503 139	13.9	-	0.5472	60	107	14
PF503 140	14	-	0.5512	60	107	14
PF503 141	14.1	-	0.5551	60	107	14
PF503 142	14.2	-	0.5591	62	111	15
PF503 14288	14.288	9/16	0.5625	62	111	15
PF503 143	14.3	-	0.5630	62	111	15
PF503 144	14.4	-	0.5669	62	111	15
PF503 145	14.5	-	0.5709	62	111	15
PF503 146	14.6	-	0.5748	62	111	15
PF503 147	14.7	-	0.5787	62	111	15
PF503 148	14.8	-	0.5827	62	111	15
PF503 149	14.9	-	0.5866	62	111	15
PF503 150	15	-	0.5906	62	111	15
PF503 15081	15.081	19/32	0.5937	62	111	15
PF503 151	15.1	-	0.5945	62	111	15
PF503 152	15.2	-	0.5984	64	115	16
PF503 153	15.3	-	0.6063	64	115	16
PF503 154	15.4	-	0.6102	64	115	16
PF503 155	15.5	-	0.6142	64	115	16
PF503 156	15.6	-	0.6181	64	115	16

EDP No	D			L_1	L_2	D_2
	mm	fraction	inch			
PF503 157	15.7	-	0.6220	64	115	16
PF503 158	15.8	-	0.6250	64	115	16
PF503 15875	15.875	5/8	0.6299	64	115	16
PF503 160	16	-	0.6339	64	115	16
PF503 161	16.1	-	0.3071	64	115	16
PF503 163	16.3	-	0.6417	66	119	17
PF503 165	16.5	-	0.6496	66	119	17
PF503 16667	16.667	21/32	0.6562	66	119	17
PF503 170	17	-	0.6693	66	119	17
PF503 171	17.1	-	0.6732	66	119	17
PF503 172	17.2	-	0.6772	66	123	18
PF503 17463	17.463	11/16	0.6772	66	123	18
PF503 175	17.5	-	0.6875	66	123	18
PF503 177	17.7	-	0.6890	66	123	18
PF503 178	17.8	-	0.6969	66	123	18
PF503 180	18	-	0.7008	66	123	18
PF503 181	18.1	-	0.7087	66	123	18
PF503 182	18.2	-	0.7165	70	127	19
PF503 185	18.5	-	0.7283	70	127	19
PF503 190	19	-	0.7480	70	127	19
PF503 191	19.1	-	0.7520	70	127	19
PF503 195	19.5	-	0.7677	70	131	20
PF503 197	19.7	-	0.7756	70	131	20
PF503 200	20	-	0.7874	70	131	20

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

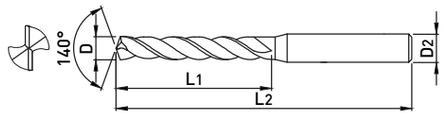
■ **Applicable Working Material**

Carbon Steel ~HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	◎	◎	○	○			◎		◎

○ : GOOD ◎ : EXCELLENT

PF505

GENERAL DRILL - 5xD



ULTRA FINE | 30° HELIX | TiAlN | ▸5xD | 140° | DATA

p.541

- 5xD High speed drill with External Coolant

■ **TOLERANCE**

D		SHANK DIA.
~ D3	0 ~ -0.014 mm	h6
D3.1 ~ D6	0 ~ -0.018 mm	
D6.1 ~ D10	0 ~ -0.022 mm	
D10.1 ~ D18	0 ~ -0.027 mm	
D18.1 ~	0 ~ -0.033 mm	

EDP No	D			L_1	L_2	D_2
	mm	fraction	inch			
PF505 030	3	-	0.1181	25	60	3
PF505 031	3.1	-	0.1220	27	60	4
PF505 03175	3.175	1/8	0.1250	27	60	4
PF505 032	3.2	-	0.1260	27	60	4
PF505 03264	3.264	#30	0.1285	27	60	4
PF505 033	3.3	-	0.1299	27	60	4
PF505 034	3.4	-	0.1339	30	65	4
PF505 035	3.5	-	0.1378	30	65	4
PF505 03572	3.572	9/64	0.1406	30	65	4
PF505 036	3.6	-	0.1417	30	65	4
PF505 037	3.7	-	0.1457	30	65	4
PF505 038	3.8	-	0.1496	33	71	4
PF505 039	3.9	-	0.1535	33	71	4
PF505 040	4	-	0.1575	33	71	4
PF505 04039	4.039	#21	0.1575	33	71	5
PF505 041	4.1	-	0.1590	33	71	5
PF505 042	4.2	-	0.1614	33	71	5
PF505 043	4.3	-	0.1654	36	71	5
PF505 044	4.4	-	0.1693	36	71	5
PF505 045	4.5	-	0.1732	36	71	5
PF505 046	4.6	-	0.1772	36	71	5
PF505 047	4.7	-	0.1811	36	71	5
PF505 04763	4.763	3/16	0.1850	39	71	5
PF505 048	4.8	-	0.1875	39	71	5
PF505 049	4.9	-	0.1890	39	71	5
PF505 050	5	-	0.1920	39	71	5

EDP No	D			L_1	L_2	D_2
	mm	fraction	inch			
PF505 051	5.1	-	0.2008	39	83	6
PF505 05159	5.159	13/64	0.2031	39	83	6
PF505 052	5.2	-	0.2047	39	83	6
PF505 053	5.3	-	0.2087	39	83	6
PF505 054	5.4	-	0.2126	43	83	6
PF505 055	5.5	-	0.2165	43	83	6
PF505 05558	5.558	7/32	0.2188	43	83	6
PF505 056	5.6	-	0.2205	43	83	6
PF505 057	5.7	-	0.2244	43	83	6
PF505 058	5.8	-	0.2283	43	83	6
PF505 059	5.9	-	0.2323	43	83	6
PF505 05953	5.953	15/64	0.2344	43	83	6
PF505 060	6	-	0.2362	43	83	6
PF505 061	6.1	-	0.2402	47	87	7
PF505 062	6.2	-	0.2441	47	87	7
PF505 063	6.3	-	0.2480	47	87	7
PF505 065	6.35	1/4	0.2500	47	87	7
PF505 064	6.4	-	0.2520	47	87	7
PF505 065	6.5	-	0.2559	47	87	7
PF505 066	6.6	-	0.2598	47	87	7
PF505 067	6.7	-	0.2638	47	87	7
PF505 06747	6.747	17/64	0.2656	47	87	7
PF505 068	6.8	-	0.2677	47	87	7
PF505 069	6.9	-	0.2717	47	87	7
PF505 070	7		0.2756	47	87	7
PF505 071	7.1	-	0.2795	52	92	8

EDP No	D			L_1	L_2	D_2
	mm	fraction	inch			
PF505 07145	7.145	9/32	0.2813	52	92	8
PF505 072	7.2	-	0.2835	52	92	8
PF505 073	7.3	-	0.2874	52	92	8
PF505 074	7.4	-	0.2913	52	92	8
PF505 075	7.5	-	0.2953	52	92	8
PF505 07541	7.541	19/64	0.2969	52	92	8
PF505 076	7.6	-	0.2992	52	92	8
PF505 077	7.7	-	0.3031	52	92	8
PF505 078	7.8	-	0.3071	52	92	8
PF505 079	7.9		0.3110	52	92	8
PF505 07938	7.938	5/16	0.3125	52	92	8
PF505 080	8	-	0.3150	52	92	8
PF505 081	8.1	-	0.3189	56	96	9
PF505 082	8.2	-	0.3228	56	96	9
PF505 083	8.3	-	0.3268	56	96	9
PF505 08334	8.334	21/64	0.3281	56	96	9
PF505 084	8.4	-	0.3307	56	96	9
PF505 085	8.5	-	0.3346	56	96	9
PF505 086	8.6	-	0.3386	56	96	9
PF505 087	8.7	-	0.3425	56	96	9
PF505 08733	8.733	11/32	0.3438	56	96	9
PF505 088	8.8	-	0.3465	56	96	9
PF505 089	8.9	-	0.3504	56	96	9
PF505 090	9	-	0.3543	56	96	9
PF505 091	9.1	-	0.3583	62	105	10
PF505 09129	9.129	23/64	0.3594	62	105	10
PF505 092	9.2	-	0.3622	62	105	10
PF505 093	9.3	-	0.3661	62	105	10
PF505 094	9.4	-	0.3701	62	105	10
PF505 095	9.5	-	0.3740	62	105	10
PF505 09525	9.525	3/8	0.3750	62	105	10
PF505 096	9.6	-	0.3780	62	105	10
PF505 097	9.7	-	0.3819	62	105	10
PF505 098	9.8	-	0.3858	62	105	10
PF505 099	9.9	-	0.3898	62	105	10
PF505 09921	9.921	25/64	0.3906	62	105	10
PF505 100	10	-	0.3937	62	105	10
PF505 101	10.1	-	0.3976	68	115	11
PF505 102	10.2	-	0.4016	68	115	11
PF505 103	10.3	-	0.4055	68	115	11

EDP No	D			L_1	L_2	D_2
	mm	fraction	inch			
PF505 01032	10.32	13/32	0.4063	68	115	11
PF505 104	10.4	-	0.4094	68	115	11
PF505 105	10.5	-	0.4134	68	115	11
PF505 106	10.6	-	0.4173	68	115	11
PF505 107	10.7	-	0.4213	68	115	11
PF505 10716	10.716	27/64	0.4219	68	115	11
PF505 108	10.8	-	0.4252	68	115	11
PF505 109	10.9	-	0.4291	68	115	11
PF505 110	11	-	0.4331	68	115	11
PF505 111	11.1	-	0.4370	71	121	12
PF505 11113	11.113	7/16	0.4375	71	121	12
PF505 112	11.2	-	0.4409	71	121	12
PF505 113	11.3	-	0.4449	71	121	12
PF505 114	11.4	-	0.4488	71	121	12
PF505 115	11.5	-	0.4528	71	121	12
PF505 116	11.6	-	0.4567	71	121	12
PF505 117	11.7	-	0.4606	71	121	12
PF505 118	11.8	-	0.4646	71	121	12
PF505 119	11.9	-	0.4685	71	121	12
PF505 11908	11.908	15/32	0.4688	71	121	12
PF505 120	12	-	0.4724	71	121	12
PF505 121	12.1	-	0.4764	75	125	13
PF505 122	12.2	-	0.4803	75	125	13
PF505 123	12.3	-	0.4843	75	125	13
PF505 12304	12.304	31/64	0.4844	75	125	13
PF505 124	12.4	-	0.4882	75	125	13
PF505 125	12.5	-	0.4921	75	125	13
PF505 126	12.6	-	0.4961	75	125	13
PF505 127	12.7	-	0.5000	75	125	13
PF505 128	12.8	-	0.5039	75	125	13
PF505 129	12.9	-	0.5079	75	125	13
PF505 130	13	-	0.5118	75	125	13
PF505 13096	13.096	33/64	0.5156	80	134	14
PF505 131	13.1	-	0.5157	80	134	14
PF505 132	13.2	-	0.5197	80	134	14
PF505 133	13.3	-	0.5236	80	134	14
PF505 134	13.4	-	0.5276	80	134	14
PF505 13494	13.494	17/32	0.5313	80	134	14
PF505 135	13.5	-	0.5315	80	134	14
PF505 136	13.6	-	0.5354	80	134	14

EDP No	D			L_1	L_2	D_2
	mm	fraction	inch			
PF505 137	13.7	-	0.5394	80	134	14
PF505 138	13.8	-	0.5433	80	134	14
PF505 13891	13.891	35/64	0.5469	80	134	14
PF505 139	13.9	-	0.5472	80	134	14
PF505 140	14	-	0.5512	80	134	14
PF505 141	14.1	-	0.5551	83	143	15
PF505 142	14.2	-	0.5591	83	143	15
PF505 14288	14.288	-	0.5625	83	143	15
PF505 143	14.3	-	0.5630	83	143	15
PF505 144	14.4	-	0.5669	83	143	15
PF505 145	14.5	-	0.5709	83	143	15
PF505 146	14.6	-	0.5748	83	143	15
PF505 147	14.7	-	0.5787	83	143	15
PF505 148	14.8	-	0.5827	83	143	15
PF505 149	14.9	-	0.5866	83	143	15
PF505 150	15	-	0.5906	83	143	15
PF505 15081	15.081	19/32	0.5937	90	152	16
PF505 151	15.1	-	0.5945	90	152	16
PF505 152	15.2	-	0.5984	90	152	16
PF505 154	15.4	-	0.6063	90	152	16
PF505 155	15.5	-	0.6102	90	152	16
PF505 156	15.6	-	0.6142	90	152	16
PF505 157	15.7	-	0.6181	90	152	16
PF505 158	15.8	-	0.6220	90	152	16
PF505 15875	15.875	5/8	0.6250	90	152	16
PF505 160	16	-	0.6299	90	152	16
PF505 161	16.1	-	0.6339	95	155	17
PF505 163	16.3	-	0.6417	95	155	17
PF505 165	16.5	-	0.6496	95	155	17
PF505 166 67	16.667	21/32	0.6562	95	155	17

EDP No	D			L_1	L_2	D_2
	mm	fraction	inch			
PF505 170	17	-	0.6693	95	155	17
PF505 171	17.1	-	0.6732	100	157	18
PF505 172	17.2	-	0.6772	100	157	18
PF505 17463	17.463	11/16	0.6875	100	157	18
PF505 175	17.5	-	0.6890	100	157	18
PF505 177	17.7	-	0.6969	100	157	18
PF505 178	17.8	-	0.7008	100	157	18
PF505 180	18	-	0.7087	100	157	18
PF505 181	18.1	-	0.7126	105	160	19
PF505 182	18.2	-	0.7165	105	160	19
PF505 185	18.5	-	0.7283	105	160	19
PF505 190	19	-	0.7480	105	160	19
PF505 191	19.1	-	0.7520	110	163	20
PF505 195	19.5	-	7677	110	163	20
PF505 197	19.7	-	0.7756	110	163	20
PF505 200	20	-	0.7874	110	163	20

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

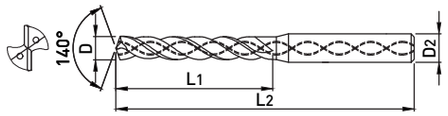
■ **Applicable Working Material**

Carbon Steel ~HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	◎	◎	○	○			◎		◎

○ : GOOD ◎ : EXCELLENT

SF503

INTERNAL COOLANT DRILL - 3xD



- 3xD High speed drill with Internal Coolant, Excellent high speed drilling with deposition resistance and decrease the frictional heat

ULTRA FINE | 30° HELIX | TiAlN | ▸3xD | 140° | DATA

p.541

▪ **TOLERANCE**

D		SHANK DIA.
~ D3	0 ~ -0.014 mm	h6
D3.1 ~ D6	0 ~ -0.018 mm	
D6.1 ~ D10	0 ~ -0.022 mm	
D10.1 ~ D18	0 ~ -0.027 mm	
D18.1 ~	0 ~ -0.033 mm	

EDP No	D			L_1	L_2	D_2
	mm	fraction	inch			
SF503 030	3	-	0.1181	18	60	3
SF503 031	3.1	-	0.1220	20	60	4
SF503 03175	3.175	1/8	0.1250	20	60	4
SF503 032	3.2	-	0.1260	20	60	4
SF503 032 64	3.264	-	0.1285	20	60	4
SF503 033	3.3	-	0.1299	20	60	4
SF503 034	3.4	-	0.1339	22	60	4
SF503 035	3.5	-	0.1378	22	60	4
SF503 03572	3.572	9/64	0.1406	22	60	4
SF503 036	3.6	-	0.1417	22	60	4
SF503 037	3.7	-	0.1457	22	60	4
SF503 038	3.8	-	0.1496	24	60	4
SF503 039	3.9	-	0.1535	24	60	4
SF503 040	4	-	0.1575	24	60	4
SF503 04039	4.039	-	0.1590	24	62	5
SF503 041	4.1	-	0.1614	24	62	5
SF503 042	4.2	-	0.1654	26	62	5
SF503 043	4.3	-	0.1693	26	62	5
SF503 044	4.4	-	0.1732	26	62	5
SF503 045	4.5	-	0.1772	26	62	5
SF503 046	4.6	-	0.1811	26	62	5
SF503 047	4.7	-	0.1850	26	62	5
SF503 04763	4.763	3/16	0.1875	26	62	5
SF503 048	4.8	-	0.1890	26	62	5
SF503 049	4.9	-	0.1920	26	62	5
SF503 050	5	-	0.1969	26	62	5

EDP No	D			L_1	L_2	D_2
	mm	fraction	inch			
SF503 051	5.1	-	0.2008	28	66	6
SF503 05159	5.159	13/64	0.2031	28	66	6
SF503 052	5.2	-	0.2047	28	66	6
SF503 053	5.3	-	0.2087	28	66	6
SF503 054	5.4	-	0.2126	28	66	6
SF503 055	5.5	-	0.2165	28	66	6
SF503 05558	5.558	7/32	0.2188	30	66	6
SF503 056	5.6	-	0.2205	30	66	6
SF503 057	5.7	-	0.2244	30	66	6
SF503 058	5.8	-	0.2283	30	66	6
SF503 059	5.9	-	0.2323	30	66	6
SF503 05953	5.953	15/64	0.2344	30	66	6
SF503 060	6	-	0.2362	30	66	6
SF503 061	6.1	-	0.2402	34	74	7
SF503 062	6.2	-	0.2441	34	74	7
SF503 063	6.3	-	0.2480	34	74	7
SF503 063 5	6.350	1/4	0.2500	34	74	7
SF503 064	6.4	-	0.2520	34	74	7
SF503 065	6.5	-	0.2559	34	74	7
SF503 066	6.6	-	0.2598	34	74	7
SF503 067	6.7	-	0.2638	37	74	7
SF503 06747	6.747	17/64	0.2656	37	74	7
SF503 068	6.8	-	0.2677	37	74	7
SF503 069	6.9	-	0.2717	37	74	7
SF503 070	7	-	0.2756	37	74	7
SF503 071	7.1	-	0.2795	40	79	8

EDP No	D			L_1	L_2	D_2
	mm	fraction	inch			
SF503 07145	7.145	9/32	0.2813	40	79	8
SF503 072	7.2	-	0.2835	40	79	8
SF503 073	7.3	-	0.2874	40	79	8
SF503 074	7.4	-	0.2913	40	79	8
SF503 075	7.5	-	0.2953	40	79	8
SF503 07541	7.541	19/64	0.2969	40	79	8
SF503 076	7.6	-	0.2992	40	79	8
SF503 077	7.7	-	0.3031	40	79	8
SF503 078	7.8	-	0.3071	40	79	8
SF503 079	7.9	-	0.3110	40	79	8
SF503 07938	7.938	5/16	0.3125	40	79	8
SF503 080	8	-	0.3150	40	79	8
SF503 081	8.1	-	0.3189	43	84	9
SF503 082	8.2	-	0.3228	43	84	9
SF503 083	8.3	-	0.3268	43	84	9
SF503 08334	8.334	21/64	0.3281	43	84	9
SF503 084	8.4	-	0.3307	43	84	9
SF503 085	8.5	-	0.3346	43	84	9
SF503 086	8.6	-	0.3386	43	84	9
SF503 087	8.7	-	0.3425	43	84	9
SF503 08733	8.733	11/32	0.3438	43	84	9
SF503 088	8.8	-	0.3465	43	84	9
SF503 089	8.9	-	0.3504	43	84	9
SF503 090	9	-	0.3543	43	84	9
SF503 091	9.1	-	0.3583	47	89	10
SF503 09129	9.129	23/64	0.3594	47	89	10
SF503 092	9.2	-	0.3622	47	89	10
SF503 093	9.3	-	0.3661	47	89	10
SF503 094	9.4	-	0.3701	47	89	10
SF503 095	9.5	-	0.3740	47	89	10
SF503 09525	9.525	3/8	0.3750	47	89	10
SF503 096	9.6	-	0.3780	47	89	10
SF503 097	9.7	-	0.3819	47	89	10
SF503 098	9.8	-	0.3858	47	89	10
SF503 099	9.9	-	0.3898	47	89	10
SF503 09921	9.921	25/64	0.3906	47	89	10
SF503 100	10	-	0.3937	47	89	10
SF503 101	10.1	-	0.3976	51	95	11
SF503 102	10.2	-	0.4016	51	95	11
SF503 103	10.3	-	0.4055	51	95	11

EDP No	D			L_1	L_2	D_2
	mm	fraction	inch			
SF503 1032	10.32	13/32	0.4063	51	95	11
SF503 104	10.4	-	0.4094	51	95	11
SF503 105	10.5	-	0.4134	51	95	11
SF503 106	10.6	-	0.4173	51	95	11
SF503 107	10.7	-	0.4213	51	95	11
SF503 10716	10.716	27/64	0.4219	51	95	11
SF503 108	10.8	-	0.4252	51	95	11
SF503 109	10.9	-	0.4291	51	95	11
SF503 110	11	-	0.4331	51	95	11
SF503 111	11.1	-	0.4370	54	102	12
SF503 11113	11.113	7/16	0.4375	54	102	12
SF503 112	11.2	-	0.4409	54	102	12
SF503 113	11.3	-	0.4449	54	102	12
SF503 114	11.4	-	0.4488	54	102	12
SF503 115	11.5	-	0.4528	54	102	12
SF503 11509	11.509	29/64	0.4531	54	102	12
SF503 116	11.6	-	0.4567	54	102	12
SF503 117	11.7	-	0.4606	54	102	12
SF503 118	11.8	-	0.4646	54	102	12
SF503 119	11.9	-	0.4685	54	102	12
SF503 11908	11.908	15/32	0.4688	54	102	12
SF503 120	12	-	0.4724	54	102	12
SF503 121	12.1	-	0.4764	57	102	13
SF503 122	12.2	-	0.4803	57	102	13
SF503 123	12.3	-	0.4843	57	102	13
SF503 12304	12.304	31/64	0.4844	57	102	13
SF503 124	12.4	-	0.4882	57	102	13
SF503 125	12.5	-	0.4921	57	102	13
SF503 126	12.6	-	0.4961	57	102	13
SF503 127	12.7	1/2	0.5000	57	102	13
SF503 128	12.8	-	0.5039	57	102	13
SF503 129	12.9	-	0.5079	57	102	13
SF503 130	13	-	0.5118	57	102	13
SF503 13096	13.096	33/64	0.5156	60	107	14
SF503 131	13.1	-	0.5157	60	107	14
SF503 132	13.2	-	0.5197	60	107	14
SF503 133	13.3	-	0.5236	60	107	14
SF503 134	13.4	-	0.5276	60	107	14
SF503 13494	13.494	17/32	0.5313	60	107	14
SF503 135	13.5	-	0.5315	60	107	14

SF503

INTERNAL COOLANT DRILL - 3xD

EDP No	D			L_1	L_2	D_2
	mm	fraction	inch			
SF503 136	13.6	-	0.5354	60	107	14
SF503 137	13.7	-	0.5394	60	107	14
SF503 138	13.8	-	0.5433	60	107	14
SF503 13891	13.891	35/64	0.5469	60	107	14
SF503 139	13.9	-	0.5472	60	107	14
SF503 140	14	-	0.5512	60	107	14
SF503 141	14.1	-	0.5551	62	111	15
SF503 142	14.2	-	0.5591	62	111	15
SF503 14288	14.288	9/16	0.5625	62	111	15
SF503 143	14.3	-	0.5630	62	111	15
SF503 144	14.4	-	0.5669	62	111	15
SF503 145	14.5	-	0.5709	62	111	15
SF503 146	14.6	-	0.5748	62	111	15
SF503 147	14.7	-	0.5787	62	111	15
SF503 148	14.8	-	0.5827	62	111	15
SF503 149	14.9	-	0.5866	62	111	15
SF503 150	15	-	0.5906	62	111	15
SF503 15081	15.081	19/32	0.5937	64	115	16
SF503 151	15.1	-	0.5945	64	115	16
SF503 152	15.2	-	0.5984	64	115	16
SF503 154	15.4	-	0.6063	64	115	16
SF503 155	15.5	-	0.6102	64	115	16
SF503 156	15.6	-	0.6142	64	115	16
SF503 157	15.7	-	0.6181	64	115	16
SF503 158	15.8	-	0.6220	64	115	16
SF503 15875	15.875	5/8	0.6250	64	115	16
SF503 160	16	-	0.6299	64	115	16
SF503 161	16.1	-	0.6339	66	119	17
SF503 163	16.3	-	0.6417	66	119	17
SF503 165	16.5	-	0.6496	66	119	17
SF503 16667	16.667	21/32	0.6562	66	119	17
SF503 170	17	-	0.6693	66	119	17
SF503 171	17.1	-	0.6732	66	123	18
SF503 172	17.2	-	0.6772	66	123	18
SF503 17463	17.463	11/16	0.6875	66	123	18
SF503 175	17.5	-	0.6890	66	123	18
SF503 177	17.7	-	0.6969	66	123	18
SF503 178	17.8	-	0.7008	66	123	18
SF503 180	18	-	0.7087	66	123	18
SF503 181	18.1	-	0.7126	70	127	19
SF503 182	18.2	-	0.7165	70	127	19
SF503 185	18.5	-	0.7283	70	127	19
SF503 190	19	-	0.7480	70	127	19
SF503 191	19.1	-	0.7520	70	131	20
SF503 195	19.5	-	0.7677	70	131	20
SF503 197	19.7	-	0.7756	70	131	20
SF503 200	20	-	0.7874	70	131	20

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

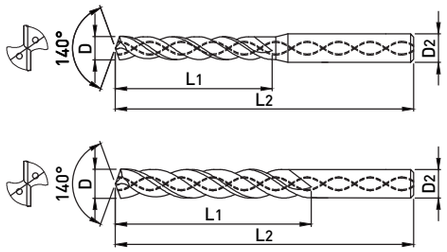
■ **Applicable Working Material**

Carbon Steel ~HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	◎	◎	○	○			◎		◎

○ : GOOD ◎ : EXCELLENT

SF505

INTERNAL COOLANT DRILL - 5xD



ULTRA FINE | 30° HELIX | TiAlN | ▸5xD | 140° | DATA

p.541

- 5xD High speed drill with Internal Coolant, Excellent high speed drilling with deposition resistance and decrease the frictional heat

■ **TOLERANCE**

D		SHANK DIA.
~ D3	0 ~ -0.014 mm	h6
D3.1 ~ D6	0 ~ -0.018 mm	
D6.1 ~ D10	0 ~ -0.022 mm	
D10.1 ~ D18	0 ~ -0.027 mm	
D18.1 ~	0 ~ -0.033 mm	

EDP No	D			L_1	L_2	D_2
	mm	fraction	inch			
SF505 031	3.1	-	0.1220	27	74	4
SF505 03175	3.175	1/8	0.1250	27	74	4
SF505 032	3.2	-	0.1260	27	74	4
SF505 03264	3.264	-	0.1285	27	74	4
SF505 033	3.3	-	0.1299	27	74	4
SF505 034	3.4	-	0.1339	30	74	4
SF505 035	3.5	-	0.1378	30	74	4
SF505 03572	3.572	9/64	0.1406	30	74	4
SF505 036	3.6	-	0.1417	30	74	4
SF505 037	3.7	-	0.1457	30	74	4
SF505 038	3.8	-	0.1496	33	74	4
SF505 039	3.9	-	0.1535	33	74	4
SF505 040	4	-	0.1575	33	74	4
SF505 04039	4.039	-	0.1590	33	80	5
SF505 041	4.1	-	0.1614	33	80	5
SF505 042	4.2	-	0.1654	33	80	5
SF505 043	4.3	-	0.1693	36	80	5
SF505 044	4.4	-	0.1732	36	80	5
SF505 045	4.5	-	0.1772	36	80	5
SF505 046	4.6	-	0.1811	36	80	5
SF505 047	4.7	-	0.1850	36	80	5
SF505 04763	4.763	3/16	0.1875	39	80	5
SF505 048	4.8	-	0.1890	39	80	5
SF505 049	4.9	-	0.1920	39	80	5
SF505 050	5	-	0.1969	39	80	5
SF505 051	5.1	-	0.2008	39	87	6
SF505 05159	5.159	13/64	0.2031	39	87	6
SF505 052	5.2	-	0.2047	39	87	6
SF505 053	5.3	-	0.2087	39	87	6
SF505 054	5.4	-	0.2126	43	87	6
SF505 055	5.5	-	0.2165	43	87	6
SF505 05558	5.558	7/32	0.2188	43	87	6
SF505 056	5.6	-	0.2205	43	87	6
SF505 057	5.7	-	0.2244	43	87	6
SF505 058	5.8	-	0.2283	43	87	6
SF505 059	5.9	-	0.2323	43	87	6
SF505 05953	5.953	15/64	0.2344	43	87	6
SF505 060	6	-	0.2362	43	87	6
SF505 061	6.1	-	0.2402	47	95	7
SF505 062	6.2	-	0.2441	47	95	7
SF505 063	6.3	-	0.2480	47	95	7
SF505 0635	6.350	1/4	0.2500	47	95	7
SF505 064	6.4	-	0.2520	47	95	7
SF505 065	6.5	-	0.2559	47	95	7
SF505 066	6.6	-	0.2598	47	95	7
SF505 067	6.7	-	0.2638	47	95	7
SF505 06747	6.747	17/64	0.2656	47	95	7
SF505 068	6.8	-	0.2677	47	95	7
SF505 069	6.9	-	0.2717	47	95	7
SF505 070	7	-	0.2756	47	95	7
SF505 071	7.1	-	0.2795	52	103	8
SF505 07145	7.145	9/32	0.2813	52	103	8

EDP No	D			L_1	L_2	D_2
	mm	fraction	inch			
SF505 072	7.2	-	0.2835	52	103	8
SF505 073	7.3	-	0.2874	52	103	8
SF505 074	7.4	-	0.2913	52	103	8
SF505 075	7.5	-	0.2953	52	103	8
SF505 07541	7.541	19/64	0.2969	52	103	8
SF505 076	7.6	-	0.2992	52	103	8
SF505 077	7.7	-	0.3031	52	103	8
SF505 078	7.8	-	0.3071	52	103	8
SF505 079	7.9	-	0.3110	52	103	8
SF505 07938	7.938	5/16	0.3125	52	103	8
SF505 080	8	-	0.3150	52	103	8
SF505 081	8.1	-	0.3189	56	105	9
SF505 082	8.2	-	0.3228	56	105	9
SF505 083	8.3	-	0.3268	56	105	9
SF505 08334	8.334	21/64	0.3281	56	105	9
SF505 084	8.4	-	0.3307	56	105	9
SF505 085	8.5	-	0.3346	56	105	9
SF505 086	8.6	-	0.3386	56	105	9
SF505 087	8.7	-	0.3425	56	105	9
SF505 08733	8.733	11/32	0.3438	56	105	9
SF505 088	8.8	-	0.3465	56	105	9
SF505 089	8.9	-	0.3504	56	105	9
SF505 090	9	-	0.3543	56	105	9
SF505 091	9.1	-	0.3583	62	108	10
SF505 09129	9.129	23/64	0.3594	62	108	10
SF505 092	9.2	-	0.3622	62	108	10
SF505 093	9.3	-	0.3661	62	108	10
SF505 094	9.4	-	0.3701	62	108	10
SF505 095	9.5	-	0.3740	62	108	10
SF505 09525	9.525	3/8	0.3750	62	108	10
SF505 096	9.6	-	0.3780	62	108	10
SF505 097	9.7	-	0.3819	62	108	10
SF505 098	9.8	-	0.3858	62	108	10
SF505 099	9.9	-	0.3898	62	108	10
SF505 09921	9.921	25/64	0.3906	62	108	10
SF505 100	10	-	0.3937	62	108	10
SF505 101	10.1	-	0.3976	68	125	11
SF505 102	10.2	-	0.4016	68	125	11
SF505 103	10.3	-	0.4055	68	125	11
SF505 1032	10.32	13/32	0.4063	68	125	11

EDP No	D			L_1	L_2	D_2
	mm	fraction	inch			
SF505 104	10.4	-	0.4094	68	125	11
SF505 105	10.5	-	0.4134	68	125	11
SF505 106	10.6	-	0.4173	68	125	11
SF505 107	10.7	-	0.4213	68	125	11
SF505 10716	10.716	27/64	0.4219	68	125	11
SF505 108	10.8	-	0.4252	68	125	11
SF505 109	10.9	-	0.4291	68	125	11
SF505 110	11	-	0.4331	68	125	11
SF505 111	11.1	-	0.4370	71	133	12
SF505 11113	11.113	7/16	0.4375	71	133	12
SF505 112	11.2	-	0.4409	71	133	12
SF505 113	11.3	-	0.4449	71	133	12
SF505 114	11.4	-	0.4488	71	133	12
SF505 115	11.5	-	0.4528	71	133	12
SF505 116	11.6	-	0.4567	71	133	12
SF505 117	11.7	-	0.4606	71	133	12
SF505 118	11.8	-	0.4646	71	133	12
SF505 119	11.9	-	0.4685	71	133	12
SF505 11908	11.908	15/32	0.4688	71	133	12
SF505 120	12	-	0.4724	71	133	12
SF505 121	12.1	-	0.4764	75	137	13
SF505 122	12.2	-	0.4803	75	137	13
SF505 123	12.3	-	0.4843	75	137	13
SF505 12304	12.304	31/64	0.4844	75	137	13
SF505 124	12.4	-	0.4882	75	137	13
SF505 125	12.5	-	0.4921	75	137	13
SF505 126	12.6	-	0.4961	75	137	13
SF505 127	12.7	-	0.5000	75	137	13
SF505 128	12.8	-	0.5039	75	137	13
SF505 129	12.9	-	0.5079	75	137	13
SF505 130	13	-	0.5118	75	137	13
SF505 13096	13.096	33/64	0.5156	80	142	14
SF505 131	13.1	-	0.5157	80	142	14
SF505 132	13.2	-	0.5197	80	142	14
SF505 133	13.3	-	0.5236	80	142	14
SF505 134	13.4		0.5276	80	142	14
SF505 13494	13.494	-	0.5313	80	142	14
SF505 135	13.5	17/32	0.5315	80	142	14
SF505 136	13.6	-	0.5354	80	142	14
SF505 137	13.7	-	0.5394	80	142	14

EDP No	D			L_1	L_2	D_2
	mm	fraction	inch			
SF505 138	13.8	-	0.5433	80	142	14
SF505 13891	13.891	35/64	0.5469	80	142	14
SF505 139	13.9	-	0.5472	80	142	14
SF505 140	14	-	0.5512	80	142	14
SF505 141	14.1	-	0.5551	83	148	15
SF505 142	14.2	-	0.5591	83	148	15
SF505 14288	14.288	9/16	0.5625	83	148	15
SF505 143	14.3	-	0.5630	83	148	15
SF505 144	14.4	-	0.5669	83	148	15
SF505 145	14.5	-	0.5709	83	148	15
SF505 146	14.6	-	0.5748	83	148	15
SF505 147	14.7	-	0.5787	83	148	15
SF505 148	14.8	-	0.5827	83	148	15
SF505 149	14.9	-	0.5866	83	148	15
SF505 150	15	-	0.5906	83	148	15
SF505 15081	15.081	19/32	0.5937	90	152	16
SF505 151	15.1	-	0.5945	90	152	16
SF505 152	15.2	-	0.5984	90	152	16
SF505 154	15.4	-	0.6063	90	152	16
SF505 155	15.5	-	0.6102	90	152	16
SF505 156	15.6	-	0.6142	90	152	16
SF505 157	15.7	-	0.6181	90	152	16
SF505 158	15.8	-	0.6220	90	152	16
SF505 15875	15.875	5/8	0.6250	90	152	16
SF505 160	16	-	0.6299	90	152	16
SF505 161	16.1	-	0.6339	95	155	17
SF505 163	16.3	-	0.6417	95	155	17
SF505 165	16.5	-	0.6496	95	155	17
SF505 16667	16.667	21/32	0.6562	95	155	17
SF505 170	17	-	0.6693	95	155	17

EDP No	D			L_1	L_2	D_2
	mm	fraction	inch			
SF505 171	17.1	-	0.6732	100	157	18
SF505 172	17.2	-	0.6772	100	157	18
SF505 17463	17.463	11/16	0.6875	100	157	18
SF505 175	17.5	-	0.6890	100	157	18
SF505 177	17.7	-	0.6969	100	157	18
SF505 178	17.8	-	0.7008	100	157	18
SF505 180	18	-	0.7087	100	157	18
SF505 181	18.1	-	0.7126	105	160	19
SF505 182	18.2	-	0.7165	105	160	19
SF505 185	18.5	-	0.7283	105	160	19
SF505 190	19	-	0.7480	105	160	19
SF505 191	19.1	-	0.7520	110	163	20
SF505 195	19.5	-	0.7677	110	163	20
SF505 197	19.7	-	0.7756	110	163	20
SF505 200	20	-	0.7874	110	163	20

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

■ **Applicable Working Material**

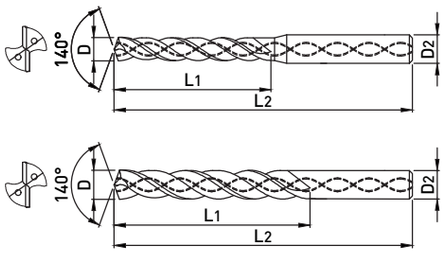
Carbon Steel ~HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	◎	◎	○	○			◎		◎

○ : GOOD ◎ : EXCELLENT

SF508

INTERNAL COOLANT DRILL - 8xD

New



ULTRA FINE | 30° HELIX | AlCrN | ▸8xD | 140° | DATA

p.541

- Improvement of depth hole cutting performance and chip emission with 8xD Internal coolant type
- Prevent to unsuspected broken by stable material and Toughening the hardness by adopted straightness form design
- Improvement of flute home surface roughness and coating adhesion by applied to independent special treatment

▪ **TOLERANCE**

D		SHANK DIA.
D3	0 ~ -0.014 mm	h6
D3.1 ~ D6	0 ~ -0.018 mm	
D6.1 ~ D10	0 ~ -0.022 mm	
D10.1 ~ D13	0 ~ -0.027 mm	

EDP No	D			L_1	L_2	D_2
	mm	fraction	inch			
SF508 030	3	-	.1181	43	80	3
SF508 031	3.1	-	.1120	43	80	4
SF508 03175	3.175	1/8	.1250	43	80	4
SF508 032	3.2	-	.1260	43	80	4
SF508 033	3.3	-	.1299	43	80	4
SF508 034	3.4	-	.1339	43	80	4
SF508 035	3.5	-	.1378	43	80	4
SF508 03572	3.572	-	.1406	43	80	4
SF508 036	3.6	-	.1417	43	80	4
SF508 037	3.7	-	.1457	43	80	4
SF508 038	3.8	-	.1496	49	87	4
SF508 039	3.9	-	.1535	49	87	4
SF508 0397	3.97	9/64	.1563	49	87	4
SF508 040	4	-	.1575	49	87	4
SF508 04039	4.039	-	.1590	49	87	5
SF508 041	4.1	-	.1614	49	87	5
SF508 042	4.2	-	.1654	49	87	5
SF508 043	4.3	-	.1693	49	87	5
SF508 04366	4.366	-	.1719	49	87	5
SF508 044	4.4	-	.1732	49	87	5
SF508 045	4.5	-	.1772	49	87	5
SF508 046	4.6	-	.1811	49	87	5
SF508 047	4.7	-	.1850	49	87	5
SF508 04763	4.763	3/16	.1875	56	94	5
SF508 048	4.8	-	.1890	56	94	5
SF508 049	4.9	-	.1929	56	94	5
SF508 050	5	-	.1969	56	94	5
SF508 051	5.1	-	.2008	56	94	6
SF508 05159	5.159	13/64	.2031	56	94	6
SF508 052	5.2	-	.2047	56	94	6
SF508 053	5.3	-	.2087	56	94	6
SF508 054	5.4	-	.2126	56	94	6
SF508 0541	5.41	-	.2130	56	94	6
SF508 055	5.5	-	.2165	56	94	6
SF508 05558	5.558	7/32	.2188	56	94	6
SF508 056	5.6	-	.2205	56	94	6

EDP No	D			L_1	L_2	D_2
	mm	fraction	inch			
SF508 057	5.7	-	.2244	56	94	6
SF508 058	5.8	-	.2283	56	94	6
SF508 059	5.9	-	.2323	56	94	6
SF508 05953	5.953	15/64	.2344	56	94	6
SF508 060	6	-	.2362		94	6
SF508 061	6.1	-	0.2402	67	105	7
SF508 062	6.2	-	.2441	67	105	7
SF508 063	6.3	-	.2480	67	105	7
SF508 0635	6.35	1/4	.2500	67	105	7
SF508 064	6.4	-	.2520	67	105	7
SF508 065	6.5	-	.2559	67	105	7
SF508 06528	6.528	-	.2570	67	105	7
SF508 066	6.6	-	.2598	67	105	7
SF508 067	6.7	-	.2638	67	105	7
SF508 06747	6.747	17/64	.2656	67	105	7
SF508 068	6.8	-	0.2677	67	105	7
SF508 069	6.9	-	.2717	67	105	7
SF508 070	7	-	.2756	76	116	7
SF508 071	7.1	-	.2795	76	116	8
SF508 07145	7.145	9/32	.2813	76	116	8
SF508 072	7.2	-	.2835	76	116	8
SF508 073	7.3	-	.2874	76	116	8
SF508 074	7.4	-	.2913	76	116	8
SF508 075	7.5	-	.2953	76	116	8
SF508 07541	7.541	19/64	.2969	76	116	8
SF508 076	7.6	-	.2992	76	116	8
SF508 077	7.7	-	.3031	76	116	8
SF508 078	7.8	-	.0371	76	116	8
SF508 079	7.9	-	.3110	76	116	8
SF508 07938	7.938	5/16	.3125	76	116	8
SF508 080	8	-	.3150	76	116	8
SF508 081	8.1	-	.3189	87	131	9
SF508 082	8.2	-	.3228	87	131	9
SF508 083	8.3	-	.3268	87	131	9
SF508 08334	8.334	21/64	.3281	87	131	9
SF508 084	8.4	-	3307	87	131	9

EDP No	D			L_1	L_2	D_2
	mm	fraction	inch			
SF508 08433	8.433	-	3320	87	131	9
SF508 085	8.5	-	.3346	87	131	9
SF508 086	8.6	-	.3386	87	131	9
SF508 087	8.7	-	.3425	87	131	9
SF508 08733	8.733	11/32	.3438	87	131	9
SF508 088	8.8	-	.3465	87	131	9
SF508 089	8.9	-	.3504	87	131	9
SF508 090	9	-	.3543	87	131	9
SF508 091	9.1	-	.3583	95	139	10
SF508 09129	9.129	23/64	.3594	95	139	10
SF508 092	9.2	-	.3622	95	139	10
SF508 093	9.3	-	.3661	95	139	10
SF508 094	9.4	-	.3701	95	139	10
SF508 095	9.5	-	.3740	95	139	10
SF508 09525	9.525	3/8	.3750	95	139	10
SF508 096	9.6	-	.3780	95	139	10
SF508 097	9.7	-	.3819	95	139	10
SF508 098	9.8	-	.3858	95	139	10
SF508 099	9.9	-	.3898	95	139	10
SF508 09921	9.921	25/64	.3906	95	139	10
SF508 100	10	-	.3937	95	139	10
SF508 101	10.1	-	.3976	106	155	11
SF508 102	10.2	-	.4016	106	155	11
SF508 103	10.3	-	.4055	106	155	11
SF508 1032	10.32	13/32	.4063	106	155	11
SF508 104	10.4	-	.4094	106	155	11
SF508 105	10.5	-	.4134	106	155	11
SF508 106	10.6	-	.4173	106	155	11
SF508 107	10.7	-	.4213	106	155	11
SF508 10716	10.716	27/64	.4219	106	155	11
SF508 108	10.8	-	.4252	106	155	11
SF508 109	10.9	-	.4291	106	155	11
SF508 110	11	-	.4331	106	155	11
SF508 111	11.1	-	.4370	114	163	12
SF508 11113	11.113	7/16	.4375	114	163	12
SF508 112	11.2	-	.4409	114	163	12
SF508 113	11.3	-	.4449	114	163	12
SF508 114	11.4	-	.4488	114	163	12
SF508 115	11.5	-	.4528	114	163	12
SF508 11509	11.509	29/64	.4531	114	163	12
SF508 116	11.6	-	.4567	114	163	12
SF508 117	11.7	-	.4606	114	163	12
SF508 118	11.8	-	.4646	114	163	12
SF508 119	11.9	-	.4685	114	163	12
SF508 11908	11.908	15/32	.4688	114	163	12
SF508 120	12	-	.4724	114	163	12

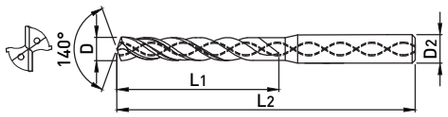
EDP No	D			L_1	L_2	D_2
	mm	fraction	inch			
SF508 121	12.1	-	.4764	133	182	13
SF508 122	12.2	-	.4803	133	182	13
SF508 123	12.3	-	.4843	133	182	13
SF508 12304	12.304	31/64	.4844	133	182	13
SF508 125	12.5	-	.4921	133	182	13
SF508 126	12.6	-	.4961	133	182	13
SF508 127	12.7	1/2	.5000	133	182	13
SF508 128	12.8	-	.5039	133	182	13
SF508 129	12.9	-	.5079	133	182	13
SF508 130	13	-	.5118	133	182	13
SF508 131	13.1	-	0.5157	133	182	14
SF508 132	13.2	-	.5197	133	182	14
SF508 133	13.3	-	.5236	133	182	14
SF508 134	13.4	-	0.5276	133	182	14
SF508 13494	13.494	17/32	.5313	133	182	14
SF508 135	13.5	-	.5315	133	182	14
SF508 136	13.6	-	.5354	133	182	14
SF508 137	13.7	-	.5394	133	182	14
SF508 140	14	-	.5512	133	182	14
SF508 14288	14.288	9/16	.5625	152	204	15
SF508 143	14.3	-	.5630	152	204	15
SF508 144	14.4	-	.5669	152	204	15
SF508 145	14.5	-	.5709	152	204	15
SF508 14683	14.683	37/64	.5781	152	204	15
SF508 147	14.7	-	.5787	152	204	15
SF508 150	15	-	.5906	152	204	15
SF508 15081	15.081	19/32	.5937	152	204	16
SF508 155	15.5	-	.6102	152	204	16
SF508 157	15.7	-	.6181	152	204	16
SF508 15875	15.875	5/8	.6250	152	204	16
SF508 160	16	-	.6299	152	204	16
SF508 165	16.5	-	.6496	171	223	17
SF508 16667	16.667	21/32	.6562	171	223	17
SF508 170	17	-	.6693	171	223	17
SF508 17463	17.463	11/16	.6875	171	223	18
SF508 175	17.5	-	.6890	171	223	18
SF508 180	18	-	.7087	171	223	18
SF508 185	18.5	-	.7283	191	244	19
SF508 190	19	-	.7480	191	244	19
SF508 1905	19.05	3/4	.7500	191	244	20
SF508 19446	19.446	49/64	.7656	191	244	20
SF508 195	19.5	-	.7677	191	244	20
SF508 200	20	-	.7874	191	244	20

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

■ **Applicable Working Material**

Carbon Steel ~HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	◎	◎	○	○			◎		◎

○ : GOOD ◎ : EXCELLENT



ULTRA FINE | 30° HELIX | TiAlN | ▶10xD | 140° | DATA

p.542

- 10xD High speed drill with Internal Coolant, Excellent high speed drilling with deposition resistance and decrease the frictional heat
- Toughening the hole straightness and surface roughness and tool life by applied to double margin

■ **TOLERANCE**

D		SHANK DIA.
D3	0 ~ -0.014 mm	h6
D3.1 ~ D6	0 ~ -0.018 mm	
D6.1 ~ D10	0 ~ -0.022 mm	
D10.1 ~ D13	0 ~ -0.027 mm	

EDP No	D	L_1	L_2	D_2
SF510 030	3	39	87	3
SF510 031	3.1	46	94	4
SF510 032	3.2	46	94	4
SF510 033	3.3	46	94	4
SF510 034	3.4	46	94	4
SF510 035	3.5	46	94	4
SF510 036	3.6	52	101	4
SF510 037	3.7	52	101	4
SF510 038	3.8	52	101	4
SF510 039	3.9	52	101	4
SF510 040	4	52	101	4
SF510 041	4.1	59	108	5
SF510 042	4.2	59	108	5
SF510 043	4.3	59	108	5
SF510 044	4.4	59	108	5
SF510 045	4.5	59	108	5
SF510 046	4.6	66	117	5
SF510 047	4.7	66	117	5
SF510 048	4.8	66	117	5
SF510 049	4.9	66	117	5
SF510 050	5	66	117	5
SF510 051	5.1	72	123	6
SF510 052	5.2	72	123	6
SF510 053	5.3	72	123	6
SF510 054	5.4	72	123	6
SF510 055	5.5	72	123	6
SF510 056	5.6	79	130	6
SF510 057	5.7	79	130	6
SF510 058	5.8	79	130	6
SF510 059	5.9	79	130	6
SF510 060	6	79	130	6
SF510 061	6.1	85	138	7
SF510 062	6.2	85	138	7
SF510 063	6.3	85	138	7

EDP No	D	L_1	L_2	D_2
SF510 064	6.4	85	138	7
SF510 065	6.5	85	138	7
SF510 066	6.6	92	145	7
SF510 067	6.7	92	145	7
SF510 068	6.8	92	145	7
SF510 069	6.9	92	145	7
SF510 070	7	92	145	7
SF510 071	7.1	98	153	8
SF510 072	7.2	98	153	8
SF510 073	7.3	98	153	8
SF510 074	7.4	98	153	8
SF510 075	7.5	98	153	8
SF510 076	7.6	105	160	8
SF510 077	7.7	105	160	8
SF510 078	7.8	105	160	8
SF510 079	7.9	105	160	8
SF510 080	8	105	160	8
SF510 081	8.1	111	166	9
SF510 082	8.2	111	166	9
SF510 083	8.3	111	166	9
SF510 084	8.4	111	166	9
SF510 085	8.5	111	166	9
SF510 086	8.6	118	173	9
SF510 087	8.7	118	173	9
SF510 088	8.8	118	173	9
SF510 089	8.9	118	173	9
SF510 090	9	118	173	9
SF510 091	9.1	124	179	10
SF510 092	9.2	124	179	10
SF510 093	9.3	124	179	10
SF510 094	9.4	124	179	10
SF510 095	9.5	124	179	10
SF510 096	9.6	131	186	10
SF510 097	9.7	131	186	10

EDP No	D	L_1	L_2	D_2
SF510 098	9.8	131	186	10
SF510 099	9.9	131	186	10
SF510 100	10	131	186	10
SF510 101	10.1	138	193	11
SF510 102	10.2	138	193	11
SF510 103	10.3	138	193	11
SF510 104	10.4	138	193	11
SF510 105	10.5	138	193	11
SF510 106	10.6	144	205	11
SF510 107	10.7	144	205	11
SF510 108	10.8	144	205	11
SF510 109	10.9	144	205	11
SF510 110	11	144	205	11
SF510 111	11.1	151	212	12
SF510 112	11.2	151	212	12
SF510 113	11.3	151	212	12
SF510 114	11.4	151	212	12
SF510 115	11.5	151	212	12
SF510 116	11.6	157	218	12
SF510 117	11.7	157	218	12
SF510 118	11.8	157	218	12
SF510 119	11.9	157	218	12
SF510 120	12	157	218	12
SF510 121	12.1	164	225	13
SF510 122	12.2	164	225	13
SF510 123	12.3	164	225	13
SF510 124	12.4	164	225	13
SF510 125	12.5	164	225	13
SF510 126	12.6	170	236	13
SF510 127	12.7	170	236	13
SF510 128	12.8	170	236	13
SF510 129	12.9	170	236	13
SF510 130	13	170	236	13

EDP No	D	L_1	L_2	D_2

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

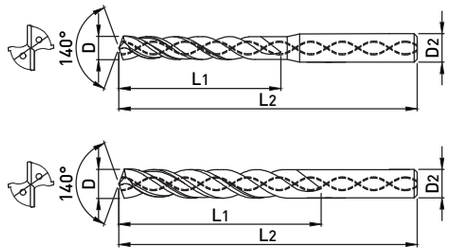
■ **Applicable Working Material**

Carbon Steel ~HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	◎	◎	○	○			◎		◎

○ : GOOD ◎ : EXCELLENT

SF520

INTERNAL COOLANT DRILL - 20xD



- 20xD High speed drill with Internal Coolant, Excellent high speed drilling with deposition resistance and decrease the frictional heat
- Toughening the hole straightness and surface roughness and tool life by applied to double margin

ULTRA FINE | 30° HELIX | TiAlN | ▶20xD | 140° | DATA

p.542

■ **TOLERANCE**

D		SHANK DIA.
D4.1 ~ D6	0 ~ -0.018 mm	h6
D6.1 ~ D10	0 ~ -0.022 mm	

EDP No	D	L_1	L_2	D_2
SF520 041	4.1	104	155	5
SF520 042	4.2	104	155	5
SF520 043	4.3	104	155	5
SF520 044	4.4	104	155	5
SF520 045	4.5	104	155	5
SF520 046	4.6	116	167	5
SF520 047	4.7	116	167	5
SF520 048	4.8	116	167	5
SF520 049	4.9	116	167	5
SF520 050	5	116	167	5
SF520 051	5.1	127	178	6
SF520 052	5.2	127	178	6
SF520 053	5.3	127	178	6
SF520 054	5.4	127	178	6
SF520 055	5.5	127	178	6
SF520 056	5.6	139	190	6
SF520 057	5.7	139	190	6
SF520 058	5.8	139	190	6
SF520 059	5.9	139	190	6
SF520 060	6	139	190	6
SF520 061	6.1	150	203	7
SF520 062	6.2	150	203	7
SF520 063	6.3	150	203	7
SF520 064	6.4	150	203	7
SF520 065	6.5	150	203	7
SF520 066	6.6	162	215	7
SF520 067	6.7	162	215	7
SF520 068	6.8	162	215	7
SF520 069	6.9	162	215	7
SF520 070	7	162	215	7

EDP No	D	L_1	L_2	D_2
SF520 071	7.1	173	228	8
SF520 072	7.2	173	228	8
SF520 073	7.3	173	228	8
SF520 074	7.4	173	228	8
SF520 075	7.5	173	228	8
SF520 076	7.6	185	240	8
SF520 077	7.7	185	240	8
SF520 078	7.8	185	240	8
SF520 079	7.9	185	240	8
SF520 080	8	185	240	8
SF520 081	8.1	196	251	9
SF520 082	8.2	196	251	9
SF520 083	8.3	196	251	9
SF520 084	8.4	196	251	9
SF520 085	8.5	196	251	9
SF520 086	8.6	208	263	9
SF520 087	8.7	208	263	9
SF520 088	8.8	208	263	9
SF520 089	8.9	208	263	9
SF520 090	9	208	263	9
SF520 091	9.1	219	274	10
SF520 092	9.2	219	274	10
SF520 093	9.3	219	274	10
SF520 094	9.4	219	274	10
SF520 095	9.5	219	274	10
SF520 096	9.6	231	286	10
SF520 097	9.7	231	286	10
SF520 098	9.8	231	286	10
SF520 099	9.9	231	286	10
SF520 100	10	231	286	10

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

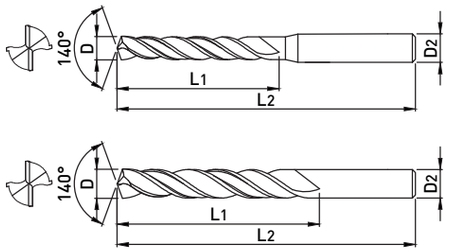
■ **Applicable Working Material**

Carbon Steel ~HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	◎	◎		○			◎		◎

○ : GOOD ◎ : EXCELLENT

HP503

DOUBLE MARGIN DRILL - 3xD



- 3xD High speed drill with External Coolant
- Toughening the hole straightness and surface roughness by applied to double margin

ULTRA FINE | 30° HELIX | TiAlN | ▶3xD | 140° | DATA

p.543

■ **TOLERANCE**

D		SHANK DIA.
D3	+0.012 ~ +0.002mm	h6
D3.1 ~ D6	+0.016 ~ +0.004mm	
D6.1 ~ D10	+0.021 ~ +0.006mm	
D10.1 ~ D16	+0.025 ~ +0.007mm	

EDP No	D		L_1	L_2	D_2
	mm	inch			
HP503 030	3	0.1181	20	62	6
HP503 031	3.1	0.1220	20	62	6
HP503 032	3.2	0.1260	20	62	6
HP503 033	3.3	0.1299	20	62	6
HP503 034	3.4	0.1339	20	62	6
HP503 035	3.5	0.1378	20	62	6
HP503 036	3.6	0.1417	20	62	6
HP503 037	3.7	0.1457	20	62	6
HP503 038	3.8	0.1496	24	66	6
HP503 039	3.9	0.1535	24	66	6
HP503 040	4	0.1575	24	66	6
HP503 041	4.1	0.1614	24	66	6
HP503 042	4.2	0.1654	24	66	6
HP503 043	4.3	0.1693	24	66	6
HP503 044	4.4	0.1732	24	66	6
HP503 045	4.5	0.1772	24	66	6
HP503 046	4.6	0.1811	24	66	6
HP503 047	4.7	0.1850	24	66	6
HP503 048	4.8	0.1890	28	66	6
HP503 049	4.9	0.1929	28	66	6
HP503 050	5	0.1969	28	66	6
HP503 051	5.1	0.2008	28	66	6
HP503 052	5.2	0.2047	28	66	6
HP503 053	5.3	0.2087	28	66	6
HP503 054	5.4	0.2126	28	66	6
HP503 055	5.5	0.2165	28	66	6
HP503 056	5.6	0.2205	28	66	6
HP503 057	5.7	0.2244	28	66	6
HP503 058	5.8	0.2283	28	66	6
HP503 059	5.9	0.2322	28	66	6
HP503 060	6	0.2362	28	66	6
HP503 061	6.1	0.2402	34	79	8
HP503 062	6.2	0.2441	34	79	8
HP503 063	6.3	0.2480	34	79	8
HP503 064	6.4	0.2520	34	79	8
HP503 065	6.5	0.2559	34	79	8

EDP No	D		L_1	L_2	D_2
	mm	inch			
HP503 066	6.6	0.2598	34	79	8
HP503 067	6.7	0.2638	34	79	8
HP503 068	6.8	0.2677	34	79	8
HP503 069	6.9	0.2717	34	79	8
HP503 070	7	0.2756	34	79	8
HP503 071	7.1	0.2795	41	79	8
HP503 072	7.2	0.2835	41	79	8
HP503 073	7.3	0.2874	41	79	8
HP503 074	7.4	0.2913	41	79	8
HP503 075	7.5	0.2953	41	79	8
HP503 076	7.6	0.2992	41	79	8
HP503 077	7.7	0.3031	41	79	8
HP503 078	7.8	0.3071	41	79	8
HP503 079	7.9	0.3110	41	79	8
HP503 080	8	0.3150	41	79	8
HP503 081	8.1	0.3189	47	89	10
HP503 082	8.2	0.3228	47	89	10
HP503 083	8.3	0.3268	47	89	10
HP503 084	8.4	0.3307	47	89	10
HP503 085	8.5	0.3346	47	89	10
HP503 086	8.6	0.3386	47	89	10
HP503 087	8.7	0.3425	47	89	10
HP503 088	8.8	0.3465	47	89	10
HP503 089	8.9	0.3504	47	89	10
HP503 090	9	0.3543	47	89	10
HP503 091	9.1	0.3583	47	89	10
HP503 092	9.2	0.3622	47	89	10
HP503 093	9.3	0.3661	47	89	10
HP503 094	9.4	0.3701	47	89	10
HP503 095	9.5	0.3740	47	89	10
HP503 096	9.6	0.3780	47	89	10
HP503 097	9.7	0.3819	47	89	10
HP503 098	9.8	0.3858	47	89	10
HP503 099	9.9	0.3898	47	89	10
HP503 100	10	0.3937	47	89	10
HP503 101	10.1	0.3976	55	102	12

HP503

DOUBLE MARGIN DRILL - 3xD

EDP No	D		L_1	L_2	D_2
	mm	inch			
HP503 102	10.2	0.4016	55	102	12
HP503 103	10.3	0.4055	55	102	12
HP503 104	10.4	0.4094	55	102	12
HP503 105	10.5	0.4134	55	102	12
HP503 106	10.6	0.4173	55	102	12
HP503 107	10.7	0.4213	55	102	12
HP503 108	10.8	0.4252	55	102	12
HP503 109	10.9	0.4291	55	102	12
HP503 110	11	0.4331	55	102	12
HP503 111	11.1	0.4370	55	102	12
HP503 112	11.2	0.4409	55	102	12
HP503 113	11.3	0.4449	55	102	12
HP503 114	11.4	0.4488	55	102	12
HP503 115	11.5	0.4528	55	102	12
HP503 116	11.6	0.4567	55	102	12
HP503 117	11.7	0.4606	55	102	12
HP503 118	11.8	0.4646	55	102	12
HP503 119	11.9	0.4685	55	102	12
HP503 120	12	0.4724	55	102	12
HP503 121	12.1	0.4764	60	107	14
HP503 122	12.2	0.4803	60	107	14
HP503 123	12.3	0.4843	60	107	14
HP503 124	12.4	0.4882	60	107	14
HP503 125	12.5	0.4921	60	107	14
HP503 126	12.6	0.4961	60	107	14
HP503 127	12.7	0.5000	60	107	14
HP503 128	12.8	0.5039	60	107	14
HP503 129	12.9	0.5079	60	107	14
HP503 130	13	0.5118	60	107	14
HP503 131	13.1	0.5157	60	107	14
HP503 132	13.2	0.5157	60	107	14
HP503 133	13.3	0.5236	60	107	14
HP503 135	13.5	0.5315	60	107	14
HP503 137	13.7	0.5394	60	107	14
HP503 140	14	0.5512	60	107	14
HP503 142	14.2	0.5591	65	115	16
HP503 143	14.3	0.5630	65	115	16
HP503 145	14.5	0.5709	65	115	16
HP503 146	14.6	0.5787	65	115	16
HP503 148	14.8	0.5827	65	115	16
HP503 150	15	0.5906	65	115	16
HP503 155	15.5	0.6102	65	115	16
HP503 157	15.7	0.6181	65	115	16
HP503 160	16	0.6299	65	115	16

EDP No	D		L_1	L_2	D_2
	mm	inch			

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

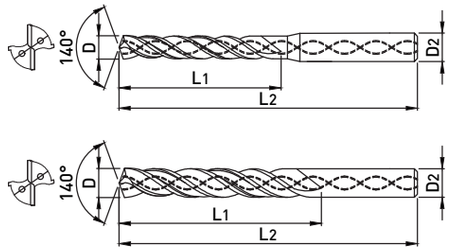
■ **Applicable Working Material**

Carbon Steel ~HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	◎	◎	○	○			◎		◎

○ : GOOD ◎ : EXCELLENT

HPI503

DOUBLE MARGIN INTERNAL COOLANT DRILL - 3xD



ULTRA FINE | 30° HELIX | TiAlN | ▸3xD | 140° | DATA

p.543

- 3xD High speed drill with Internal Coolant, Excellent high speed drilling with deposition resistance and decrease the frictional heat
- Toughening the hole straightness and surface roughness and tool life by applied to double margin

■ **TOLERANCE**

D		SHANK DIA.
D3	+0.012 ~ +0.002mm	h6
D3.1 ~ D6	+0.016 ~ +0.004mm	
D6.1 ~ D10	+0.021 ~ +0.006mm	
D10.1 ~ D18	+0.025 ~ +0.007mm	
D18.1 ~	+0.029 ~ +0.008mm	

EDP No	D			L_1	L_2	D_2
	mm	fraction	inch			
HPI503 030	3	-	.1181	20	62	6
HPI503 031	3.1	-	.1120	20	62	6
HPI503 03175	3.175	1/8	.1250	20	62	6
HPI503 032	3.2	-	.1260	20	62	6
HPI503 03264	3.264	-	.1285	20	62	6
HPI503 033	3.3	-	.1299	20	62	6
HPI503 034	3.4	-	.1339	20	62	6
HPI503 035	3.5	-	.1378	20	62	6
HPI503 03572	3.572	9/64	.1406	20	62	6
HPI503 036	3.6	-	.1417	20	62	6
HPI503 037	3.7	-	.1457	20	62	6
HPI503 038	3.8	-	.1496	24	66	6
HPI503 039	3.9	-	.1535	24	66	6
HPI503 0397	3.97	5/32	.1563	24	66	6
HPI503 040	4	-	.1575	24	66	6
HPI503 04039	4.039	-	.1590	24	66	6
HPI503 041	4.1	-	.1614	24	66	6
HPI503 042	4.2	-	.1654	24	66	6
HPI503 043	4.3	-	.1693	24	66	6
HPI503 04366	4.366	-	.1719	24	66	6
HPI503 044	4.4	-	.1732	24	66	6
HPI503 045	4.5	-	.1772	24	66	6
HPI503 046	4.6	-	.1811	24	66	6
HPI503 047	4.7	-	.1850	24	66	6
HPI503 04763	4.763	3/16	.1875	28	66	6
HPI503 048	4.8	-	.1890	28	66	6
HPI503 049	4.9	-	.1929	28	66	6
HPI503 050	5	-	.1969	28	66	6
HPI503 051	5.1	-	.2008	28	66	6
HPI503 05159	5.159	13/64	.2031	28	66	6
HPI503 052	5.2	-	.2047	28	66	6
HPI503 053	5.3	-	.2087	28	66	6
HPI503 054	5.4	-	.2126	28	66	6
HPI503 055	5.5	-	.2165	28	66	6
HPI503 05558	5.558	7/32	.2188	28	66	6
HPI503 056	5.6	-	.2205	28	66	6
HPI503 057	5.7	-	.2244	28	66	6
HPI503 058	5.8	-	.2283	28	66	6

EDP No	D			L_1	L_2	D_2
	mm	fraction	inch			
HPI503 059	5.9	-	.2323	28	66	6
HPI503 05953	5.953	15/64	.2344	28	66	6
HPI503 060	6	-	.2362	28	66	6
HPI503 061	6.1	-	.2402	34	79	8
HPI503 062	6.2	-	.2441	34	79	8
HPI503 063	6.3	-	.2480	34	79	8
HPI503 0635	6.35	1/4	.2500	34	79	8
HPI503 064	6.4	-	.2520	34	79	8
HPI503 065	6.5	-	.2559	34	79	8
HPI503 066	6.6	-	.2598	34	79	8
HPI503 067	6.7	-	.2638	34	79	8
HPI503 06747	6.747	17/64	.2656	34	79	8
HPI503 068	6.8	-	.2677	34	79	8
HPI503 069	6.9	-	.2717	34	79	8
HPI503 070	7	-	.2756	34	79	8
HPI503 071	7.1	-	.2795	41	79	8
HPI503 07145	7.145	9/32	.2813	41	79	8
HPI503 072	7.2	-	.2835	41	79	8
HPI503 073	7.3	-	.2874	41	79	8
HPI503 074	7.4	-	.2913	41	79	8
HPI503 075	7.5	-	.2953	41	79	8
HPI503 07541	7.541	19/64	.2969	41	79	8
HPI503 076	7.6	-	.2992	41	79	8
HPI503 077	7.7	-	.3031	41	79	8
HPI503 078	7.8	-	.0371	41	79	8
HPI503 079	7.9	-	.3110	41	79	8
HPI503 07938	7.938	5/16	.3125	41	79	8
HPI503 080	8	-	.3150	41	79	8
HPI503 081	8.1	-	.3189	47	89	10
HPI503 082	8.2	-	.3228	47	89	10
HPI503 083	8.3	-	.3268	47	89	10
HPI503 08334	8.334	21/64	.3281	47	89	10
HPI503 0834	8.34	-	.3283	47	89	10
HPI503 084	8.4	-	.3307	47	89	10
HPI503 085	8.5	-	.3346	47	89	10
HPI503 086	8.6	-	.3386	47	89	10
HPI503 087	8.7	-	.3425	47	89	10
HPI503 08733	8.733	11/32	.3438	47	89	10

HPI503

DOUBLE MARGIN INTERNAL COOLANT DRILL - 3xD

EDP No	D(날경)			L_1	L_2	D_2
	mm	fraction	inch	날장	전장	자루경
HPI503088	8.8	-	.3465	47	89	10
HPI503089	8.9	-	.6504	47	89	10
HPI503090	9	-	.3543	47	89	10
HPI503091	9.1	-	.3583	47	89	10
HPI50309129	9.129	23/64	.3594	47	89	10
HPI503092	9.2	-	.3622	47	89	10
HPI503093	9.3	-	.3661	47	89	10
HPI503094	9.4	-	.3680	47	89	10
HPI503095	9.5	-	.3740	47	89	10
HPI50309525	9.525	3/8	.3750	47	89	10
HPI503096	9.6	-	.3780	47	89	10
HPI503097	9.7	-	.3819	47	89	10
HPI503098	9.8	-	.3858	47	89	10
HPI503099	9.9	-	.3898	47	89	10
HPI50309921	9.9921	25/64	.3906	47	89	10
HPI503100	10	-	.3937	47	89	10
HPI503101	10.1	-	.3976	55	105	12
HPI503102	10.2	-	.4016	55	105	12
HPI503 103	10.3	-	.4055	55	105	12
HPI503 1032	10.32	13/32	.4063	55	105	12
HPI503 104	10.4	-	.4094	55	105	12
HPI503 105	10.5	-	.4134	55	105	12
HPI503 106	10.6	-	.4173	55	105	12
HPI503 107	10.7	-	.4213	55	105	12
HPI503 10716	10.716	27/64	.4219	55	105	12
HPI503 108	10.8	-	.4252	55	105	12
HPI503 109	10.9	-	.4291	55	105	12
HPI503 110	11	-	.4331	55	105	12
HPI503 111	11.1	-	.4370	55	105	12
HPI503 11113	11.113	7/16	.4375	55	105	12
HPI503 112	11.2	-	.4409	55	105	12
HPI503 113	11.3	-	.4449	55	105	12
HPI503114	11.4	-	.4488	55	105	12
HPI503 115	11.5	-	.4528	55	105	12
HPI503 11509	11.509	29/64	.4531	55	105	12
HPI503 116	11.6	-	.4567	55	105	12
HPI503 117	11.7	-	.4606	55	105	12
HPI503 118	11.8	-	.4646	55	105	12
HPI503 119	11.9	-	.4685	55	105	12
HPI503 11908	11.908	15/32	.4688	55	105	12
HPI503 120	12	-	.4724	55	105	12
HPI503 121	12.1	-	.4764	60	107	14
HPI503 122	12.2	-	.4803	60	107	14
HPI503 123	12.3	-	.4843	60	107	14

EDP No	D(날경)			L_1	L_2	D_2
	mm	fraction	inch	날장	전장	자루경
HPI503 12304	12.304	31/64	.4844	60	107	14
HPI503 124	12.4	-	.4882	60	107	14
HPI503 125	12.5	-	.4921	60	107	14
HPI503 126	12.6	-	.4961	60	107	14
HPI503 127	12.7	1/2	.5000	60	107	14
HPI503 128	12.8	-	.5039	60	107	14
HPI503 129	12.9	-	.5079	60	107	14
HPI503 130	13	-	.5118	60	107	14
HPI503 132	13.2	-	.5197	60	107	14
HPI503 133	13.3	-	.5236	60	107	14
HPI503 13494	13.494	17/32	.5313	60	107	14
HPI503 135	13.5	-	.5315	60	107	14
HPI503 137	13.7	-	.5394	60	107	14
HPI503 13891	13.891	35/64	.5469	60	107	14
HPI503 140	14	-	.5512	60	107	14
HPI503 141	14.1	-	.5551	65	115	16
HPI503 142	14.2	-	.5591	65	115	16
HPI503 14288	14.288	9/16	.5625	65	115	16
HPI503 145	14.5	-	.5709	65	115	16
HPI503 146	14.6	-	.5746	65	115	16
HPI503 147	14.7	-	.5787	65	115	16
HPI503 150	15	-	.5906	65	115	16
HPI503 15081	15.081	19/32	.5937	65	115	16
HPI503 155	15.5	-	.6102	65	115	16
HPI503 157	15.7	-	.6181	65	115	16
HPI503 158	15.8	-	.6220	65	115	16
HPI503 15875	15.875	5/8	.6250	65	115	16
HPI503 160	16	-	.6299	65	115	16
HPI503 162	16.2	-	.6378	73	123	18
HPI503 163	16.3	-	.6417	73	123	18
HPI503 165	16.5	-	.6496	73	123	18
HPI503 167	16.7	-	.6575	73	123	18
HPI503 168	16.8	-	.6614	73	123	18
HPI503 170	17	-	.6693	73	123	18
HPI503 171	17.1	-	.6732	73	123	18
HPI503 17463	17.463	11/16	.6875	73	123	18
HPI503 175	17.5	-	.6890	73	123	18
HPI503 180	18	-	.7087	73	123	18
HPI503 185	18.5	-	.7883	79	131	20
HPI503 190	19	-	.7480	79	131	20
HPI503 1905	19.05	3/4	.7500	79	131	20
HPI503 197	19.7	-	.7756	79	131	20
HPI503 200	20	-	.7874	79	131	20

※상기 제원은 제품의 품질향상을 위하여 예고없이 변경될 수 있습니다.

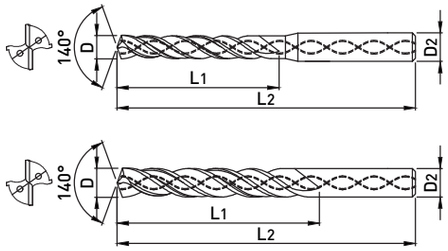
■ **Applicable Working Material**

Carbon Steel ~HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	◎	◎	○	○			◎		◎

○ : GOOD ◎ : EXCELLENT

HPI505

DOUBLE MARGIN INTERNAL COOLANT DRILL - 5xD



ULTRA FINE | 30° HELIX | TiAlN | ▸5xD | 140° | DATA

p.543

- 5xD High speed drill with Internal Coolant, Excellent high speed drilling with deposition resistance and decrease the frictional heat
- Toughening the hole straightness and surface roughness and tool life by applied to double margin

■ **TOLERANCE**

D		SHANK DIA.
D3	+0.012 ~ +0.002mm	h6
D3.1 ~ D6	+0.016 ~ +0.004mm	
D6.1 ~ D10	+0.021 ~ +0.006mm	
D10.1 ~ D18	+0.025 ~ +0.007mm	
D18.1 ~	+0.029 ~ +0.008mm	

EDP No	D			L_1	L_2	D_2
	mm	fraction	inch			
HPI505 030	3	-	.1181	30	66	6
HPI505 031	3.1	-	.1120	30	66	6
HPI505 03175	3.175	-	.1250	30	66	6
HPI505 032	3.2	-	.1260	30	66	6
HPI505 03264	3.264	1/8	.1285	30	66	6
HPI505 033	3.3	-	.1299	30	66	6
HPI505 034	3.4	-	.1339	30	66	6
HPI505 035	3.5	-	.1378	30	66	6
HPI505 03572	3.572	9/64	.1406	30	66	6
HPI505 036	3.6	-	.1417	30	66	6
HPI505 037	3.7	-	.1457	30	66	6
HPI505 038	3.8	-	.1496	36	74	6
HPI505 039	3.9	-	.1535	36	74	6
HPI505 0397	3.97	5/32	.1563	36	74	6
HPI505 040	4	-	.1575	36	74	6
HPI505 04039	4.039	-	.1590	36	74	6
HPI505 041	4.1	-	.1614	36	74	6
HPI505 042	4.2	-	.1654	36	74	6
HPI505 043	4.3	-	.1693	36	74	6
HPI505 04366	4.366	-	.1719	36	74	6
HPI505 044	4.4	-	.1732	36	74	6
HPI505 045	4.5	-	.1772	36	74	6
HPI505 0458	4.58	-	.1803	36	74	6
HPI505 046	4.6	-	.1811	36	74	6
HPI505 04623	4.623	-	.1820	36	74	6
HPI505 047	4.7	-	.1850	36	74	6
HPI505 04763	4.763	3/16	.1875	44	82	6
HPI505 048	4.8	-	.1890	44	82	6
HPI505 049	4.9	-	.1929	44	82	6
HPI505 050	5	-	.1969	44	82	6
HPI505 051	5.1	-	.2008	44	82	6
HPI505 05159	5.159	13/64	.2031	44	82	6
HPI505 052	5.2	-	.2047	44	82	6
HPI505 053	5.3	-	.2087	44	82	6
HPI505 054	5.4	-	.2126	44	82	6
HPI505 0541	5.41	-	.2130	44	82	6
HPI505 055	5.5	-	.2165	44	82	6
HPI505 05558	5.558	7/32	.2188	44	82	6

EDP No	D			L_1	L_2	D_2
	mm	fraction	inch			
HPI505 056	5.6	-	.2205	44	82	6
HPI505 057	5.7	-	.2244	44	82	6
HPI505 058	5.8	-	.2283	44	82	6
HPI505 059	5.9	-	.2323	44	82	6
HPI505 05953	5.953	15/64	.2344	44	82	6
HPI505 060	6	-	.2362	44	82	6
HPI505 061	6.1	-	.2402	53	91	8
HPI505 062	6.2	-	.2441	53	91	8
HPI505 063	6.3	-	.2480	53	91	8
HPI505 0635	6.35	1/4	.2500	53	91	8
HPI505 064	6.4	-	.2520	53	91	8
HPI505 065	6.5	-	.2559	53	91	8
HPI505 06528	6.528	-	.2570	53	91	8
HPI505 066	6.6	-	.2598	53	91	8
HPI505 067	6.7	-	.2638	53	91	8
HPI505 06747	6.747	17/64	.2656	53	91	8
HPI505 068	6.8	-	.2677	53	91	8
HPI505 069	6.9	-	.2717	53	91	8
HPI505 06909	6.909	-	.2720	53	91	8
HPI505 070	7	-	.2756	53	91	8
HPI505 071	7.1	-	.2795	53	91	8
HPI505 07145	7.145	9/32	.2813	53	91	8
HPI505 072	7.2	-	.2835	53	91	8
HPI505 073	7.3	-	.2874	53	91	8
HPI505 074	7.4	-	.2913	53	91	8
HPI505 075	7.5	-	.2953	53	91	8
HPI505 07541	7.541	19/64	.2969	53	91	8
HPI505 076	7.6	-	.2992	53	91	8
HPI505 077	7.7	-	.3031	53	91	8
HPI505 078	7.8	-	.3071	53	91	8
HPI505 079	7.9	-	.3110	53	91	8
HPI505 07938	7.938	5/16	.3125	53	91	8
HPI505 080	8	-	.3150	53	91	8
HPI505 081	8.1	-	.3189	61	103	10
HPI505 082	8.2	-	.3228	61	103	10
HPI505 083	8.3	-	.3268	61	103	10
HPI505 08334	8.334	21/64	.3281	61	103	10
HPI505 084	8.4	-	.3307	61	103	10

EDP No	D			L_1	L_2	D_2
	mm	fraction	inch			
HPI505 08433	8.433	-	.3320	61	103	10
HPI505 085	8.5	-	.3346	61	103	10
HPI505 086	8.6	-	.3386	61	103	10
HPI505 087	8.7	-	.3425	61	103	10
HPI505 08733	8.733	11/32	.3438	61	103	10
HPI505 088	8.8	-	.3465	61	103	10
HPI505 089	8.9	-	.3504	61	103	10
HPI505 090	9	-	.3543	61	103	10
HPI505 091	9.1	-	.3583	61	103	10
HPI505 09129	9.129	23/64	.3594	61	103	10
HPI505 092	9.2	-	.3622	61	103	10
HPI505 093	9.3	-	.3661	61	103	10
HPI505 09347	9.347	-	.3680	61	103	10
HPI505 094	9.4	-	.3701	61	103	10
HPI505 095	9.5	-	.3740	61	103	10
HPI505 09525	9.525	3/8	.3750	61	103	10
HPI505 096	9.6	-	.3780	61	103	10
HPI505 097	9.7	-	.3819	61	103	10
HPI505 09703	9.703	-	.3820	61	103	10
HPI505 09746	9.746	-	.3837	61	103	10
HPI505 098	9.8	-	.3858	61	103	10
HPI505 099	9.9	-	.3898	61	103	10
HPI505 09921	9.921	25/64	.3906	61	103	10
HPI505 100	10	-	.3937	61	103	10
HPI505 101	10.1	-	.3976	71	118	12
HPI505 102	10.2	-	.4016	71	118	12
HPI505 103	10.3	-	.4055	71	118	12
HPI505 1032	10.32	13/32	.4063	71	118	12
HPI505 104	10.4	-	.4074	71	118	12
HPI505 105	10.5	-	.4134	71	118	12
HPI505 106	10.6	-	.4173	71	118	12
HPI505 107	10.7	-	.4213	71	118	12
HPI505 10716	10.716	27/64	.4219	71	118	12
HPI505 108	10.8	-	.4252	71	118	12
HPI505 109	10.9	-	.4291	71	118	12
HPI505 110	11	-	.4331	71	118	12
HPI505 111	11.1	-	.4370	71	118	12
HPI505 11113	11.113	7/16	.4375	71	118	12
HPI505 112	11.2	-	.4409	71	118	12
HPI505 113	11.3	-	.4449	71	118	12
HPI505 114	11.4	-	.4488	71	118	12
HPI505 115	11.5	-	.4528	71	118	12
HPI505 11509	11.509	29/64	.4531	71	118	12
HPI505 116	11.6	-	.4567	71	118	12
HPI505 117	11.7	-	.4606	71	118	12
HPI505 118	11.8	-	.4646	71	118	12
HPI505 119	11.9	-	.4685	71	118	12
HPI505 11908	11.908	15/32	.4688	71	118	12
HPI505 120	12	-	.4724	71	118	12
HPI505 121	12.1	-	.4764	77	124	14
HPI505 122	12.2	-	.4803	77	124	14
HPI505 123	12.3	-	.4843	77	124	14
HPI505 12304	12.304	31/64	.4844	77	124	14
HPI505 124	12.4	-	.4882	77	124	14
HPI505 125	12.5	-	.4921	77	124	14
HPI505 126	12.6	-	.4961	77	124	14

EDP No	D			L_1	L_2	D_2
	mm	fraction	inch			
HPI505 127	12.7	1/2	.5000	77	124	14
HPI505 128	12.8	-	.5039	77	124	14
HPI505 129	12.9	-	.5079	77	124	14
HPI505 12903	12.903	-	.5080	77	124	14
HPI505 130	13	-	.5118	77	124	14
HPI505 13096	13.096	33/64	.5156	77	124	14
HPI505 131	13.1	-	.5157	77	124	14
HPI505 132	13.2	-	.5197	77	124	14
HPI505 133	13.3	-	.5236	77	124	14
HPI505 134	13.4	-	.5276	77	124	14
HPI505 13494	13.494	17/32	.5313	77	124	14
HPI505 135	13.5	-	.5315	77	124	14
HPI505 137	13.7	-	.5394	77	124	14
HPI505 138	13.8	-	.5433	77	124	14
HPI505 13891	13.981	35/64	.5504	77	124	14
HPI505 140	14	-	.5512	77	124	14
HPI505 141	14.1	-	.5551	83	133	16
HPI505 142	14.2	-	.5591	83	133	16
HPI505 14288	14.288	9/16	.5625	83	133	16
HPI505 145	14.5	-	.5709	83	133	16
HPI505 146	14.6	-	.5748	83	133	16
HPI505 147	14.7	-	.5787	83	133	16
HPI505 148	14.8	-	.5827	83	133	16
HPI505 149	14.9	-	.5866	83	133	16
HPI505 150	15	-	.5906	83	133	16
HPI505 15081	15.081	19/32	.5937	83	133	16
HPI505 151	15.1	-	.5945	83	133	16
HPI505 152	15.2	-	.5984	83	133	16
HPI505 155	15.5	-	.6102	83	133	16
HPI505 156	15.6	-	.6142	83	133	16
HPI505 157	15.7	-	.6181	83	133	16
HPI505 158	15.8	-	.6220	83	133	16
HPI505 15875	15.875	5/8	.6250	83	133	16
HPI505 159	15.9	-	.6260	83	133	16
HPI505 160	16	-	.6299	83	133	16
HPI505 16078	16.078	-	.6330	93	143	18
HPI505 162	16.2	-	.6378	93	143	18
HPI505 164	16.4	-	.6457	93	143	18
HPI505 165	16.5	-	.6496	93	143	18
HPI505 166	16.6	-	.6535	93	143	18
HPI505 16667	16.667	21/32	.6562	93	143	18
HPI505 167	16.7	-	.6575	93	143	18
HPI505 170	17	-	.6693	93	143	18
HPI505 171	17.1	-	.6732	93	143	18
HPI505 172	17.2	-	.6772	93	143	18
HPI505 173	17.3	-	.6811	93	143	18
HPI505 17463	17.463	11/16	.6875	93	143	18
HPI505 175	17.5	-	.6890	93	143	18
HPI505 176	17.6	-	.6929	93	143	18
HPI505 177	17.7	-	.6969	93	143	18
HPI505 178	17.8	-	.7008	93	143	18
HPI505 179	17.9	-	.7047	93	143	18
HPI505 180	18	-	.7087	93	143	18
HPI505 184	18.4	-	.7244	101	153	20
HPI505 185	18.5	-	.7283	101	153	20
HPI505 186	18.6	-	.7323	101	153	20

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

EDP No	D			L_1	L_2	D_2
	mm	fraction	inch			
HPI505 188	18.8	-	.7402	101	153	20
HPI505 189	18.9	-	.7441	101	153	20
HPI505 190	19	-	.7480	101	153	20
HPI505 1905	19.05	3/4	.7500	101	153	20
HPI505 192	19.2	-	.7559	101	153	20
HPI505 19253	19.253	-	.7580	101	153	20
HPI505 19446	19.446	49/64	.7656	101	153	20
HPI505 195	19.5	-	.7677	101	153	20
HPI505 197	19.7	-	.7756	101	153	20
HPI505 19844	19.844	25/32	.7813	101	153	20
HPI505 200	20	-	.7874	101	153	20

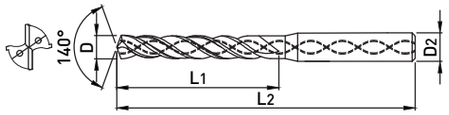
EDP No	D			L_1	L_2	D_2
	mm	fraction	inch			

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

■ **Applicable Working Material**

Carbon Steel ~HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	◎	◎	○	○			◎		◎

○ : GOOD ◎ : EXCELLENT



ULTRA FINE | 30° HELIX | TiAlN | ▸8xD | 140° | DATA

p.543

- 8xD High speed drill with Internal Coolant, Excellent high speed drilling with deposition resistance and decrease the frictional heat
- Toughening the hole straightness and surface roughness and tool life by applied to double margin

■ **TOLERANCE**

D		SHANK DIA.
D3	+0.012 ~ +0.002mm	h6
D3.1 ~ D6	+0.016 ~ +0.004mm	
D6.1 ~ D10	+0.021 ~ +0.006mm	
D10.1 ~ D18	+0.025 ~ +0.007mm	
D18.1 ~	+0.029 ~ +0.008mm	

EDP No	D			L1	L2	D2
	mm	fraction	inch			
HPI508 030N	3	-	.1181	43	80	6
HPI508 031N	3.1	-	.1220	43	80	6
HPI508 03175N	3.175	1/8	.1250	43	80	6
HPI508 032N	3.2	-	.1260	43	80	6
HPI508 03264N	3.264	-	.1285	43	80	6
HPI508 033N	3.3	-	.1299	43	80	6
HPI508 034N	3.4	-	.1339	43	80	6
HPI508 035N	3.5	-	.1378	43	80	6
HPI508 03572N	3.572	9/64	.1406	43	80	6
HPI508 036N	3.6	-	.1417	43	80	6
HPI508 037N	3.7	-	.1457	43	80	6
HPI508 038N	3.8	-	.1496	49	87	6
HPI508 039N	3.9	-	.1535	49	87	6
HPI508 0397N	3.97	5/32	.1563	49	87	6
HPI508 040N	4	-	.1575	49	87	6
HPI508 04039N	4.039	-	.1590	49	87	6
HPI508 041N	4.1	-	.1614	49	87	6
HPI508 042N	4.2	-	.1654	49	87	6
HPI508 043N	4.3	-	.1693	49	87	6
HPI508 04366N	4.366	-	.1719	49	87	6
HPI508 044N	4.4	-	.1732	49	87	6
HPI508 045N	4.5	-	.1772	49	87	6
HPI508 046N	4.6	-	.1811	49	87	6
HPI508 047N	4.7	-	.1850	49	87	6
HPI508 04763N	4.763	3/16	.1875	56	94	6
HPI508 048N	4.8	-	.1890	56	94	6
HPI508 049N	4.9	-	.1929	56	94	6
HPI508 050N	5	-	.1969	56	94	6
HPI508 051N	5.1	-	.2008	56	94	6
HPI508 05159N	5.159	13/64	.2031	56	94	6
HPI508 052N	5.2	-	.2047	56	94	6
HPI508 053N	5.3	-	.2087	56	94	6
HPI508 054N	5.4	-	.2126	56	94	6
HPI508 055N	5.5	-	.2165	56	94	6
HPI508 05558N	5.558	7/32	.2188	56	94	6
HPI508 056N	5.6	-	.2205	56	94	6
HPI508 057N	5.7	-	.2244	56	94	6
HPI508 058N	5.8	-	.2283	56	94	6

EDP No	D			L1	L2	D2
	mm	fraction	inch			
HPI508 059N	5.9	-	.2323	56	94	6
HPI508 05953N	5.953	15/64	.2344	56	94	6
HPI508 060N	6	-	.2362	65	94	6
HPI508 061N	6.1	-	.2402	67	105	8
HPI508 062N	6.2	-	.2441	67	105	8
HPI508 063N	6.3	-	.2480	67	105	8
HPI508 0635N	6.35	1/4	2500	67	105	8
HPI508 064N	6.4	-	.2520	67	105	8
HPI508 065N	6.5	-	.2559	67	105	8
HPI508 066N	6.6	-	.2598	67	105	8
HPI508 067N	6.7	-	.2638	67	105	8
HPI508 06746N	6.746	17/64	.2656	67	105	8
HPI508 068N	6.8	-	.2677	67	105	8
HPI508 069N	6.9	-	.2717	67	105	8
HPI508 070N	7	-	.2756	76	116	8
HPI508 071N	7.1	-	.2795	76	116	8
HPI508 07145N	7.145	9/32	.2813	76	116	8
HPI508 072N	7.2	-	.2835	76	116	8
HPI508 073N	7.3	-	.2874	76	116	8
HPI508 074N	7.4	-	.2913	76	116	8
HPI508 075N	7.5	-	.2953	76	116	8
HPI508 07541N	7.541	19/64	.2969	76	116	8
HPI508 076N	7.6	-	.2992	76	116	8
HPI508 077N	7.7	-	.3031	76	116	8
HPI508 078N	7.8	-	.3071	76	116	8
HPI508 079N	7.9	-	.3110	76	116	8
HPI508 07938N	7.938	5/16	.3125	76	116	8
HPI508 080N	8	-	.3150	76	116	8
HPI508 081N	8.1	-	.3189	87	131	10
HPI508 082N	8.2	-	.3228	87	131	10
HPI508 083N	8.3	-	.3268	87	131	10
HPI508 08334N	8.334	21/64	.3281	87	131	10
HPI508 084N	8.4	-	.3307	87	131	10
HPI508 085N	8.5	-	.3346	87	131	10
HPI508 086N	8.6	-	.3386	87	131	10
HPI508 087N	8.7	-	.3425	87	131	10
HPI508 08733N	8.733	11/32	.3438	87	131	10
HPI508 088N	8.8	-	.3465	87	131	10

EDP No	D			L1	L2	D2
	mm	fraction	inch			
HPI508 089N	8.9	-	.3504	87	131	10
HPI508 090N	9	-	.3543	87	131	10
HPI508 091N	9.1	-	.3583	95	139	10
HPI508 09129N	9.129	23/64	.3594	95	139	10
HPI508 092N	9.2	-	.3622	95	139	10
HPI508 093N	9.3	-	.3661	95	139	10
HPI508 094N	9.4	-	.3701	95	139	10
HPI508 095N	9.5	-	.3740	95	139	10
HPI508 09525N	9.525	3/8	.3750	95	139	10
HPI508 096N	9.6	-	.3780	95	139	10
HPI508 097N	9.7	-	.3819	95	139	10
HPI508 098N	9.8	-	.3858	95	139	10
HPI508 099N	9.9	-	.3898	95	139	10
HPI508 09921N	9.921	25/64	.3906	95	139	10
HPI508 100N	10	-	.3937	95	139	10
HPI508 101N	10.1	-	.3976	106	155	12
HPI508 102N	10.2	-	.4016	106	155	12
HPI508 103N	10.3	-	.4055	106	155	12
HPI508 1032N	10.32	13/32	.4063	106	155	12
HPI508 104N	10.4	-	.4094	106	155	12
HPI508 105N	10.5	-	.4134	106	155	12
HPI508 107N	10.7	-	.4213	106	155	12
HPI508 10716N	10.716	27/64	.4219	106	155	12
HPI508 108N	10.8	-	.4252	106	155	12
HPI508 109N	10.9	-	.4291	106	155	12
HPI508 110N	11	-	.4331	106	155	12
HPI508 111N	11.1	-	.4370	114	163	12
HPI508 11113N	11.113	7/16	.4375	114	163	12
HPI508 112N	11.2	-	.4409	114	163	12
HPI508 113N	11.3	-	.4449	114	163	12
HPI508 114N	11.4	-	.4488	114	163	12
HPI508 115N	11.5	-	.4528	114	163	12
HPI508 11509N	11.509	29/64	.4531	114	163	12
HPI508 116N	11.6	-	.4567	114	163	12
HPI508 117N	11.7	-	.4606	114	163	12
HPI508 118N	11.8	-	.4646	114	163	12
HPI508 119N	11.9	-	.4685	114	163	12
HPI508 11908N	11.908	15/32	.4688	114	163	12
HPI508 120N	12	-	.4724	114	163	12
HPI508 12304N	12.304	31/64	.4844	133	182	14
HPI508 125N	12.5	-	.4921	133	182	14
HPI508 127N	12.7	1/2	.5000	133	182	14
HPI508 128N	12.8	-	.5039	133	182	14
HPI508 130N	13	-	.5118	133	182	14
HPI508 13494N	13.494	-	.5313	133	182	14
HPI508 135N	13.5	-	.5315	133	182	14
HPI508 140N	14	-	.5512	133	182	14
HPI508 14288N	14.288	9/16	.5625	152	204	16

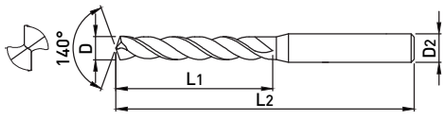
EDP No	D			L1	L2	D2
	mm	fraction	inch			
HPI508 145N	14.5	-	.5709	152	204	16
HPI508 150N	15	-	.5906	152	204	16
HPI508 151N	15.1	-	.5945	152	204	16
HPI508 152N	15.2	-	.5984	152	204	16
HPI508 153N	15.3	-	.6024	152	204	16
HPI508 155N	15.5	-	.6102	152	204	16
HPI508 158N	15.8	-	.6220	152	204	16
HPI508 15875N	15.875	5/8	.6250	152	204	16
HPI508 160N	16	-	.6299	152	204	16
HPI508 16078N	16.078	-	.6330	171	223	18
HPI508 162N	16.2	-	.6378	171	223	18
HPI508 165N	16.5	-	.6496	171	223	18
HPI508 170N	17	-	.6693	171	223	18
HPI508 17463N	17.463	11/16	.6875	171	223	18
HPI508 175N	17.5	-	.6890	171	223	18
HPI508 180N	18	-	.7087	171	223	18
HPI508 185N	18.5	-	.7283	191	244	20
HPI508 190N	19	-	.7480	191	244	20
HPI508 1905N	19.05	3/4	.7500	191	244	20
HPI508 19253N	19.253	-	.7580	191	244	20
HPI508 198N	19.8	-	.7795	191	244	20
HPI508 200N	20	-	.7874	191	244	20

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

■ **Applicable Working Material**

Carbon Steel ~HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	◎	◎	○	○			◎		◎

○ : GOOD ◎ : EXCELLENT



- 3xD High speed drill with external Coolant
(DIN6537K applied)

▪ Shank Form
· P503A : DIN 6535 HA – straight A type
· P503F : DIN 6535 HE – 2° Whistle Flat F type

DIN 6537K | ULTRA FINE | 30° HELIX | TiAlN | ▸3xD | 140° | DATA

p.541

▪ **TOLERANCE**

D		SHANK DIA.
D3	+0.012 ~ +0.002mm	h6
D3.1 ~ D6	+0.016 ~ +0.004mm	
D6.1 ~ D10	+0.021 ~ +0.006mm	
D10.1 ~ D18	+0.025 ~ +0.007mm	
D18.1 ~	+0.029 ~ +0.008mm	

EDP No	EDP No Weldon shank	D	L1	L2	D2
P503A 030	P503F 030	3	20	62	6
P503A 031	P503F 031	3.1	20	62	6
P503A 032	P503F 032	3.2	20	62	6
P503A 033	P503F 033	3.3	20	62	6
P503A 034	P503F 034	3.4	20	62	6
P503A 035	P503F 035	3.5	20	62	6
P503A 036	P503F 036	3.6	20	62	6
P503A 037	P503F 037	3.7	20	62	6
P503A 038	P503F 038	3.8	24	66	6
P503A 039	P503F 039	3.9	24	66	6
P503A 040	P503F 040	4	24	66	6
P503A 041	P503F 041	4.1	24	66	6
P503A 042	P503F 042	4.2	24	66	6
P503A 043	P503F 043	4.3	24	66	6
P503A 044	P503F 044	4.4	24	66	6
P503A 045	P503F 045	4.5	24	66	6
P503A 046	P503F 046	4.6	24	66	6
P503A 047	P503F 047	4.7	24	66	6
P503A 048	P503F 048	4.8	28	66	6
P503A 049	P503F 049	4.9	28	66	6
P503A 050	P503F 050	5	28	66	6
P503A 051	P503F 051	5.1	28	66	6
P503A 052	P503F 052	5.2	28	66	6
P503A 053	P503F 053	5.3	28	66	6
P503A 054	P503F 054	5.4	28	66	6
P503A 055	P503F 055	5.5	28	66	6
P503A 056	P503F 056	5.6	28	66	6
P503A 057	P503F 057	5.7	28	66	6
P503A 058	P503F 058	5.8	28	66	6
P503A 059	P503F 059	5.9	28	66	6
P503A 060	P503F 060	6	28	66	6
P503A 061	P503F 061	6.1	34	79	8
P503A 062	P503F 062	6.2	34	79	8
P503A 063	P503F 063	6.3	34	79	8
P503A 064	P503F 064	6.4	34	79	8
P503A 065	P503F 065	6.5	34	79	8

EDP No	EDP No Weldon shank	D	L1	L2	D2
P503A 066	P503F 066	6.6	34	79	8
P503A 067	P503F 067	6.7	34	79	8
P503A 068	P503F 068	6.8	34	79	8
P503A 069	P503F 069	6.9	34	79	8
P503A 070	P503F 070	7	34	79	8
P503A 071	P503F 071	7.1	41	79	8
P503A 072	P503F 072	7.2	41	79	8
P503A 073	P503F 073	7.3	41	79	8
P503A 074	P503F 074	7.4	41	79	8
P503A 075	P503F 075	7.5	41	79	8
P503A 076	P503F 076	7.6	41	79	8
P503A 077	P503F 077	7.7	41	79	8
P503A 078	P503F 078	7.8	41	79	8
P503A 079	P503F 079	7.9	41	79	8
P503A 080	P503F 080	8	41	79	8
P503A 081	P503F 081	8.1	47	89	10
P503A 082	P503F 082	8.2	47	89	10
P503A 083	P503F 083	8.3	47	89	10
P503A 084	P503F 084	8.4	47	89	10
P503A 085	P503F 085	8.5	47	89	10
P503A 086	P503F 086	8.6	47	89	10
P503A 087	P503F 087	8.7	47	89	10
P503A 088	P503F 088	8.8	47	89	10
P503A 089	P503F 089	8.9	47	89	10
P503A 090	P503F 090	9	47	89	10
P503A 091	P503F 091	9.1	47	89	10
P503A 092	P503F 092	9.2	47	89	10
P503A 093	P503F 093	9.3	47	89	10
P503A 094	P503F 094	9.4	47	89	10
P503A 095	P503F 095	9.5	47	89	10
P503A 096	P503F 096	9.6	47	89	10
P503A 097	P503F 097	9.7	47	89	10
P503A 098	P503F 098	9.8	47	89	10
P503A 099	P503F 099	9.9	47	89	10
P503A 100	P503F 100	10	47	89	10
P503A 101	P503F 101	10.1	55	102	12

EDP No	EDP No Weldon shank	D	L1	L2	D2
P503A 102	P503F 102	10.2	55	102	12
P503A 103	P503F 103	10.3	55	102	12
P503A 104	P503F 104	10.4	55	102	12
P503A 105	P503F 105	10.5	55	102	12
P503A 106	P503F 106	10.6	55	102	12
P503A 107	P503F 107	10.7	55	102	12
P503A 108	P503F 108	10.8	55	102	12
P503A 109	P503F 109	10.9	55	102	12
P503A 110	P503F 110	11	55	102	12
P503A 111	P503F 111	11.1	55	102	12
P503A 112	P503F 112	11.2	55	102	12
P503A 113	P503F 113	11.3	55	102	12
P503A 114	P503F 114	11.4	55	102	12
P503A 115	P503F 115	11.5	55	102	12
P503A 116	P503F 116	11.6	55	102	12
P503A 117	P503F 117	11.7	55	102	12
P503A 118	P503F 118	11.8	55	102	12
P503A 119	P503F 119	11.9	55	102	12
P503A 120	P503F 120	12	55	102	12
P503A 121	P503F 121	12.1	60	107	14
P503A 122	P503F 122	12.2	60	107	14
P503A 123	P503F 123	12.3	60	107	14
P503A 124	P503F 124	12.4	60	107	14
P503A 125	P503F 125	12.5	60	107	14
P503A 126	P503F 126	12.6	60	107	14
P503A 127	P503F 127	12.7	60	107	14
P503A 128	P503F 128	12.8	60	107	14
P503A 129	P503F 129	12.9	60	107	14
P503A 130	P503F 130	13	60	107	14
P503A 131	P503F 131	13.1	60	107	14
P503A 132	P503F 132	13.2	60	107	14
P503A 133	P503F 133	13.3	60	107	14
P503A 134	P503F 134	13.4	60	107	14
P503A 135	P503F 135	13.5	60	107	14
P503A 136	P503F 136	13.6	60	107	14

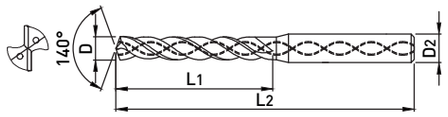
EDP No	EDP No Weldon shank	D	L1	L2	D2
P503A 137	P503F 137	13.7	60	107	14
P503A 138	P503F 138	13.8	60	107	14
P503A 139	P503F 139	13.9	60	107	14
P503A 140	P503F 140	14	60	107	14
P503A 141	P503F 141	14.1	65	115	16
P503A 142	P503F 142	14.2	65	115	16
P503A 143	P503F 143	14.3	65	115	16
P503A 144	P503F 144	14.4	65	115	16
P503A 145	P503F 145	14.5	65	115	16
P503A 146	P503F 146	14.6	65	115	16
P503A 147	P503F 147	14.7	65	115	16
P503A 148	P503F 148	14.8	65	115	16
P503A 149	P503F 149	14.9	65	115	16
P503A 150	P503F 150	15	65	115	16
P503A 151	P503F 151	15.1	65	115	16
P503A 152	P503F 152	15.2	65	115	16
P503A 153	P503F 153	15.3	65	115	16
P503A 154	P503F 154	15.4	65	115	16
P503A 155	P503F 155	15.5	65	115	16
P503A 156	P503F 156	15.6	65	115	16
P503A 157	P503F 157	15.7	65	115	16
P503A 158	P503F 158	15.8	65	115	16
P503A 159	P503F 159	15.9	65	115	16
P503A 160	P503F 160	16	65	115	16
P503A 161	P503F 161	16.1	73	123	18
P503A 163	P503F 163	16.3	73	123	18
P503A 165	P503F 165	16.5	73	123	18
P503A 170	P503F 170	17	73	123	18
P503A 171	P503F 171	17.1	73	123	18
P503A 172	P503F 172	17.2	73	123	18
P503A 175	P503F 175	17.5	73	123	18
P503A 177	P503F 177	17.7	73	123	18
P503A 178	P503F 178	17.8	73	123	18
P503A 180	P503F 180	18	73	123	18
P503A 181	P503F 181	18.1	79	131	20
P503A 182	P503F 182	18.2	79	131	20
P503A 185	P503F 185	18.5	79	131	20
P503A 190	P503F 190	19	79	131	20
P503A 191	P503F 191	19.1	79	131	20
P503A 195	P503F 195	19.5	79	131	20
P503A 197	P503F 197	19.7	79	131	20
P503A 200	P503F 200	20	79	131	20

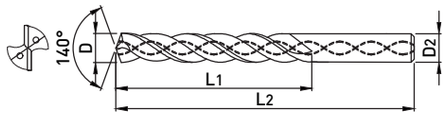
※The above specifications are subject to change without prior notice for product quality improvement.

■ **Applicable Working Material**

Carbon Steel ~HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	◎	◎	○	○			◎		◎

○ : GOOD ◎ : EXCELLENT





- 3xD High speed drill with Internal Coolant, Excellent high speed drilling with deposition resistance and decrease the frictional heat
(DIN 6537K applied)

▪ Shank Form
· PI503A : DIN 6535 HA – straight A type
· PI503F : DIN 6535 HE – 2° Whistle Flat F type

DIN 6537K | ULTRA FINE | 30° HELIX | TiAlN | ▸3xD | 140° | DATA

p.541

▪ **TOLERANCE**

D		SHANK DIA.
D3	+0.012 ~ +0.002mm	h6
D3.1 ~ D6	+0.016 ~ +0.004mm	
D6.1 ~ D10	+0.021 ~ +0.006mm	
D10.1 ~ D18	+0.025 ~ +0.007mm	
D18.1 ~	+0.029 ~ +0.008mm	

EDP No	EDP No Weldon shank	D	L1	L2	D2
PI503A 030	PI503F 030	3	20	62	6
PI503A 031	PI503F 031	3.1	20	62	6
PI503A 032	PI503F 032	3.2	20	62	6
PI503A 033	PI503F 033	3.3	20	62	6
PI503A 034	PI503F 034	3.4	20	62	6
PI503A 035	PI503F 035	3.5	20	62	6
PI503A 036	PI503F 036	3.6	20	62	6
PI503A 037	PI503F 037	3.7	20	62	6
PI503A 038	PI503F 038	3.8	24	66	6
PI503A 039	PI503F 039	3.9	24	66	6
PI503A 040	PI503F 040	4	24	66	6
PI503A 041	PI503F 041	4.1	24	66	6
PI503A 042	PI503F 042	4.2	24	66	6
PI503A 043	PI503F 043	4.3	24	66	6
PI503A 044	PI503F 044	4.4	24	66	6
PI503A 045	PI503F 045	4.5	24	66	6
PI503A 046	PI503F 046	4.6	24	66	6
PI503A 047	PI503F 047	4.7	24	66	6
PI503A 048	PI503F 048	4.8	28	66	6
PI503A 049	PI503F 049	4.9	28	66	6
PI503A 050	PI503F 050	5	28	66	6
PI503A 051	PI503F 051	5.1	28	66	6
PI503A 052	PI503F 052	5.2	28	66	6
PI503A 053	PI503F 053	5.3	28	66	6
PI503A 054	PI503F 054	5.4	28	66	6
PI503A 055	PI503F 055	5.5	28	66	6
PI503A 056	PI503F 056	5.6	28	66	6
PI503A 057	PI503F 057	5.7	28	66	6
PI503A 058	PI503F 058	5.8	28	66	6
PI503A 059	PI503F 059	5.9	28	66	6
PI503A 060	PI503F 060	6	28	66	6
PI503A 061	PI503F 061	6.1	34	79	8
PI503A 062	PI503F 062	6.2	34	79	8
PI503A 063	PI503F 063	6.3	34	79	8
PI503A 064	PI503F 064	6.4	34	79	8
PI503A 065	PI503F 065	6.5	34	79	8
PI503A066	PI503F 066	6.6	34	79	8
PI503A067	PI503F 067	6.7	34	79	8
PI503A068	PI503F 068	6.8	34	79	8
PI503A069	PI503F 069	6.9	34	79	8
PI503A070	PI503F 070	7	34	79	8
PI503A071	PI503F 071	7.1	41	79	8
PI503A072	PI503F 072	7.2	41	79	8
PI503A073	PI503F 073	7.3	41	79	8
PI503A074	PI503F 074	7.4	41	79	8
PI503A075	PI503F 075	7.5	41	79	8
PI503A076	PI503F 076	7.6	41	79	8
PI503A077	PI503F 077	7.7	41	79	8
PI503A078	PI503F 078	7.8	41	79	8
PI503A079	PI503F 079	7.9	41	79	8
PI503A080	PI503F 080	8	41	79	8
PI503A081	PI503F 081	8.1	47	89	10
PI503A082	PI503F 082	8.2	47	89	10
PI503A083	PI503F 083	8.3	47	89	10
PI503A084	PI503F 084	8.4	47	89	10
PI503A085	PI503F 085	8.5	47	89	10
PI503A086	PI503F 086	8.6	47	89	10
PI503A087	PI503F 087	8.7	47	89	10
PI503A088	PI503F 088	8.8	47	89	10
PI503A089	PI503F 089	8.9	47	89	10
PI503A090	PI503F 090	9	47	89	10
PI503A091	PI503F 091	9.1	47	89	10
PI503A092	PI503F 092	9.2	47	89	10
PI503A093	PI503F 093	9.3	47	89	10
PI503A094	PI503F 094	9.4	47	89	10
PI503A095	PI503F 095	9.5	47	89	10
PI503A096	PI503F 096	9.6	47	89	10
PI503A097	PI503F 097	9.7	47	89	10
PI503A098	PI503F 098	9.8	47	89	10
PI503A099	PI503F 099	9.9	47	89	10
PI503A100	PI503F 100	10	47	89	10
PI503A101	PI503F 101	10.1	55	102	12

EDP No	EDP No Weldon shank	D	L1	L2	D2
PI503A 102	PI503F 102	10.2	55	102	12
PI503A 103	PI503F 103	10.3	55	102	12
PI503A 104	PI503F 104	10.4	55	102	12
PI503A 105	PI503F 105	10.5	55	102	12
PI503A 106	PI503F 106	10.6	55	102	12
PI503A 107	PI503F 107	10.7	55	102	12
PI503A 108	PI503F 108	10.8	55	102	12
PI503A 109	PI503F 109	10.9	55	102	12
PI503A 110	PI503F 110	11	55	102	12
PI503A 111	PI503F 111	11.1	55	102	12
PI503A 112	PI503F 112	11.2	55	102	12
PI503A 113	PI503F 113	11.3	55	102	12
PI503A 114	PI503F 114	11.4	55	102	12
PI503A 115	PI503F 115	11.5	55	102	12
PI503A 116	PI503F 116	11.6	55	102	12
PI503A 117	PI503F 117	11.7	55	102	12
PI503A 118	PI503F 118	11.8	55	102	12
PI503A 119	PI503F 119	11.9	55	102	12
PI503A 120	PI503F 120	12	55	102	12
PI503A 121	PI503F 121	12.1	60	107	14
PI503A 122	PI503F 122	12.2	60	107	14
PI503A 123	PI503F 123	12.3	60	107	14
PI503A 124	PI503F 124	12.4	60	107	14
PI503A 125	PI503F 125	12.5	60	107	14
PI503A 126	PI503F 126	12.6	60	107	14
PI503A 127	PI503F 127	12.7	60	107	14
PI503A 128	PI503F 128	12.8	60	107	14
PI503A 129	PI503F 129	12.9	60	107	14
PI503A 130	PI503F 130	13	60	107	14
PI503A 131	PI503F 131	13.1	60	107	14
PI503A 132	PI503F 132	13.2	60	107	14
PI503A 133	PI503F 133	13.3	60	107	14
PI503A 134	PI503F 134	13.4	60	107	14
PI503A 135	PI503F 135	13.5	60	107	14
PI503A 136	PI503F 136	13.6	60	107	14
PI503A 137	PI503F 137	13.7	60	107	14
PI503A 138	PI503F 138	13.8	60	107	14
PI503A 139	PI503F 139	13.9	60	107	14
PI503A 140	PI503F 140	14	60	107	14
PI503A 141	PI503F 141	14.1	65	115	16
PI503A 142	PI503F 142	14.2	65	115	16
PI503A 143	PI503F 143	14.3	65	115	16
PI503A 144	PI503F 144	14.4	65	115	16
PI503A 145	PI503F 145	14.5	65	115	16
PI503A 146	PI503F 146	14.6	65	115	16
PI503A 147	PI503F 147	14.7	65	115	16
PI503A 148	PI503F 148	14.8	65	115	16
PI503A 149	PI503F 149	14.9	65	115	16
PI503A 150	PI503F 150	15.0	65	115	16
PI503A 151	PI503F 151	15.1	65	115	16
PI503A 152	PI503F 152	15.2	65	115	16
PI503A 153	PI503F 153	15.3	65	115	16
PI503A 154	PI503F 154	15.4	65	115	16
PI503A 155	PI503F 155	15.5	65	115	16
PI503A 156	PI503F 156	15.6	65	115	16
PI503A 157	PI503F 157	15.7	65	115	16
PI503A 158	PI503F 158	15.8	65	115	16
PI503A 159	PI503F 159	15.9	65	115	16
PI503A 160	PI503F 160	16	65	115	16
PI503A 161	PI503F 161	16.1	73	123	18
PI503A 163	PI503F 163	16.3	73	123	18
PI503A 165	PI503F 165	16.5	73	123	18
PI503A 170	PI503F 170	17	73	123	18
PI503A 171	PI503F 171	17.1	73	123	18
PI503A 172	PI503F 172	17.2	73	123	18
PI503A 175	PI503F 175	17.5	73	123	18
PI503A 177	PI503F 177	17.7	73	123	18
PI503A 178	PI503F 178	17.8	73	123	18
PI503A 180	PI503F 180	18	73	123	18
PI503A 181	PI503F 181	18.1	79	131	20
PI503A 182	PI503F 182	18.2	79	131	20
PI503A 185	PI503F 185	18.5	79	131	20
PI503A 190	PI503F 190	19	79	131	20
PI503A 191	PI503F 191	19.1	79	131	20
PI503A 195	PI503F 195	19.5	79	131	20
PI503A 197	PI503F 197	19.7	79	131	20
PI503A 200	PI503F 200	20	79	131	20

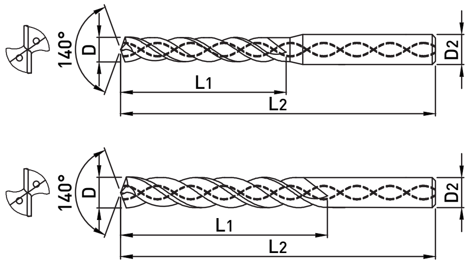
※The above specifications are subject to change without prior notice for product quality improvement.

■ **Applicable Working Material**

Carbon Steel ~HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	◎	◎	○	○			◎		◎

○ : GOOD ◎ : EXCELLENT

DIN 6537L TYPE INTERNAL COOLANT DRILL
PI505A(F)



- 5xD High speed drill with Internal Coolant, Excellent high speed drilling with deposition resistance and decrease the frictional heat
(DIN 6237L applied)

▪ Shank Form
· PI505A : DIN 6535 HA – straight A type
· PI505F : DIN 6535 HE – 2° Whistle Flat F type

▪ **TOLERANCE**

	D	SHANK DIA.
D4 ~ D6	+0.016 ~ +0.004mm	h6
D6.1 ~ D10	+0.021 ~ +0.006mm	
D10.1 ~ D18	+0.025 ~ +0.007mm	
D18.1 ~	+0.029 ~ +0.008mm	

p.541

EDP No	EDP No Weldon shank	D	L_1	L_2	D_2
PI505A 040	PI505F 040	4	36	74	6
PI505A 041	PI505F 041	4.1	36	74	6
PI505A 042	PI505F 042	4.2	36	74	6
PI505A 043	PI505F 043	4.3	36	74	6
PI505A 044	PI505F 044	4.4	36	74	6
PI505A 045	PI505F 045	4.5	36	74	6
PI505A 046	PI505F 046	4.6	36	74	6
PI505A 047	PI505F 047	4.7	36	74	6
PI505A 048	PI505F 048	4.8	44	82	6
PI505A 049	PI505F 049	4.9	44	82	6
PI505A 050	PI505F 050	5	44	82	6
PI505A 051	PI505F 051	5.1	44	82	6
PI505A 052	PI505F 052	5.2	44	82	6
PI505A 053	PI505F 053	5.3	44	82	6
PI505A 054	PI505F 054	5.4	44	82	6
PI505A 055	PI505F 055	5.5	44	82	6
PI505A 056	PI505F 056	5.6	44	82	6
PI505A 057	PI505F 057	5.7	44	82	6
PI505A 058	PI505F 058	5.8	44	82	6
PI505A 059	PI505F 059	5.9	44	82	6
PI505A 060	PI505F 060	6	44	82	6
PI505A 061	PI505F 061	6.1	53	91	8
PI505A 062	PI505F 062	6.2	53	91	8
PI505A 063	PI505F 063	6.3	53	91	8
PI505A 064	PI505F 064	6.4	53	91	8
PI505A 065	PI505F 065	6.5	53	91	8
PI505A 066	PI505F 066	6.6	53	91	8
PI505A 067	PI505F 067	6.7	53	91	8
PI505A 068	PI505F 068	6.8	53	91	8
PI505A 069	PI505F 069	6.9	53	91	8
PI505A 070	PI505F 070	7	53	91	8
PI505A 071	PI505F 071	7.1	53	91	8
PI505A 072	PI505F 072	7.2	53	91	8
PI505A 073	PI505F 073	7.3	53	91	8
PI505A 074	PI505F 074	7.4	53	91	8
PI505A 075	PI505F 075	7.5	53	91	8

EDP No	EDP No Weldon shank	D	L_1	L_2	D_2
PI505A 076	PI505F 076	7.6	53	91	8
PI505A 077	PI505F 077	7.7	53	91	8
PI505A 078	PI505F 078	7.8	53	91	8
PI505A 079	PI505F 079	7.9	53	91	8
PI505A 080	PI505F 080	8	53	91	8
PI505A 081	PI505F 081	8.1	61	103	10
PI505A 082	PI505F 082	8.2	61	103	10
PI505A 083	PI505F 083	8.3	61	103	10
PI505A 084	PI505F 084	8.4	61	103	10
PI505A 085	PI505F 085	8.5	61	103	10
PI505A 086	PI505F 086	8.6	61	103	10
PI505A 087	PI505F 087	8.7	61	103	10
PI505A 088	PI505F 088	8.8	61	103	10
PI505A 089	PI505F 089	8.9	61	103	10
PI505A 090	PI505F 090	9	61	103	10
PI505A 091	PI505F 091	9.1	61	103	10
PI505A 092	PI505F 092	9.2	61	103	10
PI505A 093	PI505F 093	9.3	61	103	10
PI505A 094	PI505F 094	9.4	61	103	10
PI505A 095	PI505F 095	9.5	61	103	10
PI505A 096	PI505F 096	9.6	61	103	10
PI505A 097	PI505F 097	9.7	61	103	10
PI505A 098	PI505F 098	9.8	61	103	10
PI505A 099	PI505F 099	9.9	61	103	10
PI505A 100	PI505F 100	10	61	103	10
PI505A 101	PI505F 101	10.1	71	118	12
PI505A 102	PI505F 102	10.2	71	118	12
PI505A 103	PI505F 103	10.3	71	118	12
PI505A 104	PI505F 104	10.4	71	118	12
PI505A 105	PI505F 105	10.5	71	118	12
PI505A 106	PI505F 106	10.6	71	118	12
PI505A 107	PI505F 107	10.7	71	118	12
PI505A 108	PI505F 108	10.8	71	118	12
PI505A 109	PI505F 109	10.9	71	118	12
PI505A 110	PI505F 110	11	71	118	12
PI505A 111	PI505F 111	11.1	71	118	12

EDP No	EDP No Weldon shank	D	L_1	L_2	D_2
PI505A 112	PI505F 112	11.2	71	118	12
PI505A 113	PI505F 113	11.3	71	118	12
PI505A 114	PI505F 114	11.4	71	118	12
PI505A 115	PI505F 115	11.5	71	118	12
PI505A 116	PI505F 116	11.6	71	118	12
PI505A 117	PI505F 117	11.7	71	118	12
PI505A 118	PI505F 118	11.8	71	118	12
PI505A 119	PI505F 119	11.9	71	118	12
PI505A 120	PI505F 120	12	71	118	12
PI505A 121	PI505F 121	12.1	77	124	14
PI505A 122	PI505F 122	12.2	77	124	14
PI505A 123	PI505F 123	12.3	77	124	14
PI505A 124	PI505F 124	12.4	77	124	14
PI505A 125	PI505F 125	12.5	77	124	14
PI505A 126	PI505F 126	12.6	77	124	14
PI505A 127	PI505F 127	12.7	77	124	14
PI505A 128	PI505F 128	12.8	77	124	14
PI505A 129	PI505F 129	12.9	77	124	14
PI505A 130	PI505F 130	13	77	124	14
PI505A 131	PI505F 131	13.1	77	124	14
PI505A 132	PI505F 132	13.2	77	124	14
PI505A 133	PI505F 133	13.3	77	124	14
PI505A 134	PI505F 134	13.4	77	124	14
PI505A 135	PI505F 135	13.5	77	124	14
PI505A 136	PI505F 136	13.6	77	124	14
PI505A 137	PI505F 137	13.7	77	124	14
PI505A 138	PI505F 138	13.8	77	124	14
PI505A 139	PI505F 139	13.9	77	124	14
PI505A 140	PI505F 140	14	77	124	14
PI505A 141	PI505F 141	14.1	83	133	16
PI505A 142	PI505F 142	14.2	83	133	16
PI505A 143	PI505F 143	14.3	83	133	16
PI505A 144	PI505F 144	14.4	83	133	16
PI505A 145	PI505F 145	14.5	83	133	16
PI505A 146	PI505F 146	14.6	83	133	16
PI505A 147	PI505F 147	14.7	83	133	16
PI505A 148	PI505F 148	14.8	83	133	16
PI505A 149	PI505F 149	14.9	83	133	16
PI505A 150	PI505F 150	15	83	133	16
PI505A 151	PI505F 151	15.1	83	133	16
PI505A 152	PI505F 152	15.2	83	133	16
PI505A 153	PI505F 153	15.3	83	133	16

EDP No	EDP No Weldon shank	D	L_1	L_2	D_2
PI505A 154	PI505F 154	15.4	83	133	16
PI505A 155	PI505F 155	15.5	83	133	16
PI505A 156	PI505F 156	15.6	83	133	16
PI505A 157	PI505F 157	15.7	83	133	16
PI505A 158	PI505F 158	15.8	83	133	16
PI505A 159	PI505F 159	15.9	83	133	16
PI505A 160	PI505F 160	16	83	133	16
PI505A 161	PI505F 161	16.1	93	143	18
PI505A 163	PI505F 163	16.3	93	143	18
PI505A 165	PI505F 165	16.5	93	143	18
PI505A 170	PI505F 170	17	93	143	18
PI505A 171	PI505F 171	17.1	93	143	18
PI505A 172	PI505F 172	17.2	93	143	18
PI505A 175	PI505F 175	17.5	93	143	18
PI505A 177	PI505F 177	17.7	93	143	18
PI505A 178	PI505F 178	17.8	93	143	18
PI505A 180	PI505F 180	18	93	143	18
PI505A 181	PI505F 181	18.1	101	153	20
PI505A 182	PI505F 182	18.2	101	153	20
PI505A 185	PI505F 185	18.5	101	153	20
PI505A 190	PI505F 190	19	101	153	20
PI505A 191	PI505F 191	19.1	101	153	20
PI505A 195	PI505F 195	19.5	101	153	20
PI505A 197	PI505F 197	19.7	101	153	20
PI505A 200	PI505F 200	20	101	153	20

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

■ **Applicable Working Material**

Carbon Steel ~HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○	◎	◎	○	○			◎		◎

○ : GOOD ◎ : EXCELLENT

EDP. NO	Appearance	Type	INCH & METRIC	Page
SSD		4xD / Non-coating / Standard size	METRIC	330
SSDL		8xD / Non-coating / Long size	METRIC	332
SSTD		4xD / TiN coating / Standard size	METRIC	333
APF		5xD / D.L.C coating / 3Flutes / Long size	METRIC, INCH	335

SOLID SPIRAL DRILL

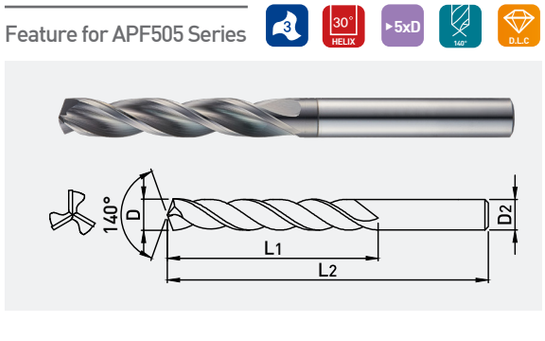
General Features

· Suitable to work for Copper,Aluminum, Alloy steels,Non-ferrous steels
· Reasonable price and extensive coverage

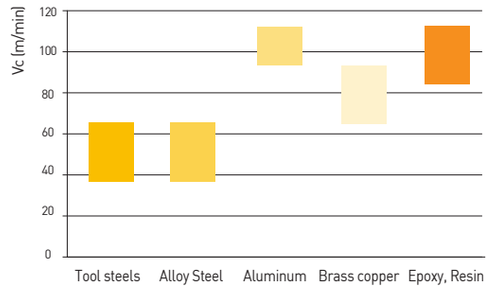
Characteristics

· High chipping resistance by applied to the high toughness material
· Improvement of Flute hardness and excellent chip mission by applied to TiN,DLC coating
· Improve to customer variety of choice by applied to equal to Diameter with Shank Diameter

Feature for APF505 Series



Vc by Application area



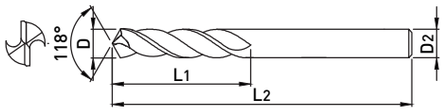
Solid Spiral Drill Range

EDP. NO. 단위(INCH : ◆ / METRIC : ◇)		Flutes	Feature		Length					Internal Coolant	Margin Type	Tolerance D	Diameter range(Ø)	
			Relief	Facet	4xD	5xD	8xD	10xD	20xD				Min.	Max.
SSD	◇	2		O	O						Single	h8	1	13
SSDL	◇	2		O			O				Single	h8	2	10
SSTD	◇	2		O	O						Single	h8	0.5	13
APF505	◆◇	3		O		O					Single	0 ~ -0.012	3	16

EDP No. System

TYPE	APPEARANCE	DRILLING DEPTH	CUTTING DIA.
SS : Solid Spiral AP : Aluminium Power	D : Drill TD : TiN Coated Drill F : Facet Point	L : Long 505 : 5 x D	0.5 ~ 16
SS	D	L	051
Solid Spiral	**Drill**	**Long**	**Ø5.1**

Ex) Diameter 5.1 Solid Spiral Long type Non-coating drill



- 4xD drill for Non-ferrous,Aluminum
- A drill having same diameter cutting and shank

▪ **TOLERANCE**

D		SHANK DIA.
~ D3	0 ~ -0.014mm	h7
D3.1 ~ D6	0 ~ -0.018mm	
D6.1 ~ D10	0 ~ -0.022mm	
D10.1 ~ D13	0 ~ -0.027mm	

FINE GRAIN | 30° HELIX | 118° | Uncoated | DATA

p.543

EDP No	D	L_1	L_2
SSD 010	1	10	38
SSD 011	1.1	10	38
SSD 012	1.2	10	38
SSD 013	1.3	10	38
SSD 014	1.4	10	38
SSD 015	1.5	13	38
SSD 016	1.6	13	38
SSD 017	1.7	13	38
SSD 018	1.8	13	38
SSD 019	1.9	13	38
SSD 020	2	16	45
SSD 021	2.1	16	45
SSD 022	2.2	16	45
SSD 023	2.3	16	45
SSD 024	2.4	18	50
SSD 025	2.5	20	50
SSD 026	2.6	20	50
SSD 027	2.7	22	50
SSD 028	2.8	22	50
SSD 029	2.9	22	50
SSD 030	3	22	50
SSD 031	3.1	25	50
SSD 032	3.2	25	50
SSD 033	3.3	25	50
SSD 034	3.4	25	50
SSD 035	3.5	25	50
SSD 036	3.6	28	55
SSD 037	3.7	28	55
SSD 038	3.8	28	55
SSD 039	3.9	28	55
SSD 040	4	28	55
SSD 041	4.1	30	60
SSD 042	4.2	30	60
SSD 043	4.3	30	60
SSD 044	4.4	30	60
SSD 045	4.5	30	60

EDP No	D	L_1	L_2
SSD 046	4.6	33	65
SSD 047	4.7	33	65
SSD 048	4.8	35	65
SSD 049	4.9	35	65
SSD 050	5	35	65
SSD 051	5.1	35	65
SSD 052	5.2	35	65
SSD 053	5.3	35	65
SSD 054	5.4	35	65
SSD 055	5.5	35	65
SSD 056	5.6	38	75
SSD 057	5.7	38	75
SSD 058	5.8	38	75
SSD 059	5.9	38	75
SSD 060	6	38	75
SSD 061	6.1	38	75
SSD 062	6.2	38	75
SSD 063	6.3	38	75
SSD 064	6.4	38	75
SSD 065	6.5	38	75
SSD 066	6.6	45	80
SSD 067	6.7	45	80
SSD 068	6.8	45	80
SSD 069	6.9	45	80
SSD 070	7	45	80
SSD 071	7.1	45	80
SSD 072	7.2	45	80
SSD 073	7.3	45	80
SSD 074	7.4	45	80
SSD 075	7.5	45	80
SSD 076	7.6	50	85
SSD 077	7.7	50	85
SSD 078	7.8	50	85
SSD 079	7.9	50	85
SSD 080	8	50	85
SSD 081	8.1	50	85

EDP No	D	L_1	L_2
SSD 082	8.2	50	85
SSD 083	8.3	50	85
SSD 084	8.4	50	85
SSD 085	8.5	50	85
SSD 086	8.6	50	95
SSD 087	8.7	50	95
SSD 088	8.8	50	95
SSD 089	8.9	50	95
SSD 090	9	50	95
SSD 091	9.1	50	95
SSD 092	9.2	50	95
SSD 093	9.3	50	95
SSD 094	9.4	50	95
SSD 095	9.5	50	95
SSD 096	9.6	50	95
SSD 097	9.7	50	95
SSD 098	9.8	50	95
SSD 099	9.9	55	100
SSD 100	10	55	100
SSD 101	10.1	55	115
SSD 102	10.2	55	115
SSD 103	10.3	55	115
SSD 104	10.4	55	115
SSD 105	10.5	55	115
SSD 106	10.6	60	115
SSD 107	10.7	60	115
SSD 108	10.8	60	115
SSD 109	10.9	60	115
SSD 110	11	60	115
SSD 111	11.1	65	120
SSD 112	11.2	65	120
SSD 113	11.3	65	120
SSD 115	11.5	65	120
SSD 118	11.8	65	120
SSD 119	11.9	65	120
SSD 120	12	65	120
SSD 124	12.4	70	125
SSD 125	12.5	70	125
SSD 130	13	75	130

EDP No	D	L_1	L_2

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

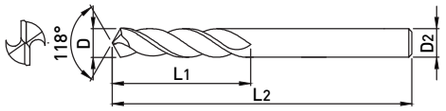
■ **Applicable Working Material**

Carbon Steel ~HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~ FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○					○		○	◎	

○ : GOOD ◎ : EXCELLENT

SSDL

NONFERROUS DRILL DRILL - LONG



- 8xD drill for Non-ferrous,Aluminum
- A drill having same diameter cutting and shank

FINE GRAIN | 30° HELIX | 118° | Uncoated | DATA

p.543

■ **TOLERANCE**

D		SHANK DIA.
~ D3	0 ~ -0.014mm	h7
D3.1 ~ D6	0 ~ -0.018mm	
D6.1 ~ D10	0 ~ -0.022mm	

EDP No	D	L_1	L_2
SSDL 020	2	30	65
SSDL 021	2.1	30	65
SSDL 022	2.2	30	65
SSDL 023	2.3	30	65
SSDL 024	2.4	30	65
SSDL 025	2.5	35	70
SSDL 026	2.6	35	70
SSDL 027	2.7	35	70
SSDL 028	2.8	35	70
SSDL 029	2.9	35	70
SSDL 030	3	42	73
SSDL 031	3.1	42	73
SSDL 032	3.2	42	73
SSDL 033	3.3	42	73
SSDL 034	3.4	42	73
SSDL 035	3.5	42	73
SSDL 036	3.6	45	80
SSDL 037	3.7	45	80
SSDL 038	3.8	48	80
SSDL 039	3.9	50	80
SSDL 040	4	54	85
SSDL 041	4.1	54	85
SSDL 042	4.2	54	85
SSDL 043	4.3	54	85
SSDL 044	4.4	54	85
SSDL 045	4.5	54	85
SSDL 046	4.6	59	90
SSDL 047	4.7	59	90
SSDL 048	4.8	59	90
SSDL 049	4.9	59	90
SSDL 050	5	59	90
SSDL 051	5.1	63	95
SSDL 052	5.2	63	95
SSDL 053	5.3	63	95
SSDL 054	5.4	63	95
SSDL 055	5.5	63	95
SSDL 056	5.6	66	100
SSDL 057	5.7	66	100
SSDL 060	6	66	100

EDP No	D	L_1	L_2
SSDL 062	6.2	70	105
SSDL 063	6.3	70	105
SSDL 064	6.4	70	105
SSDL 065	6.5	70	105
SSDL 066	6.6	73	105
SSDL 067	6.7	73	105
SSDL 068	6.8	73	105
SSDL 069	6.9	73	105
SSDL 070	7	73	105
SSDL 071	7.1	76	110
SSDL 072	7.2	76	110
SSDL 073	7.3	76	110
SSDL 074	7.4	76	110
SSDL 075	7.5	76	110
SSDL 076	7.6	80	115
SSDL 077	7.7	80	115
SSDL 078	7.8	80	115
SSDL 079	7.9	80	115
SSDL 080	8	80	115
SSDL 081	8.1	85	125
SSDL 082	8.2	85	125
SSDL 083	8.3	85	125
SSDL 084	8.4	85	125
SSDL 085	8.5	85	125
SSDL 086	8.6	85	125
SSDL 087	8.7	85	125
SSDL 088	8.8	85	125
SSDL 089	8.9	85	125
SSDL 090	9	85	125
SSDL 091	9.1	88	130
SSDL 092	9.2	88	130
SSDL 093	9.3	88	130
SSDL 094	9.4	88	130
SSDL 095	9.5	88	130
SSDL 096	9.6	90	130
SSDL 097	9.7	90	130
SSDL 098	9.8	90	130
SSDL 099	9.9	90	130
SSDL 100	10	90	130

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

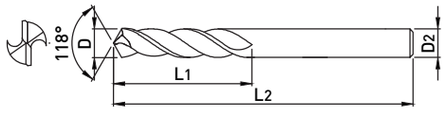
■ **Applicable Working Material**

Carbon Steel ~HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~ FCD 500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○					○		○	◎	

○ : GOOD ◎ : EXCELLENT

SSTD

NONFERROUS - TiN COATED DRILL - REGULAR



- 4xD High speed drill for Non-ferrous,Aluminum
- A drill having same diameter cutting and shank
- Improvement of Flute surface roughness and chip emission by applied to lubrication TiN coating

FINE GRAIN | 30° HELIX | 118° | TiN | DATA

p.543

■ **TOLERANCE**

D		SHANK DIA.
~ D3	0 ~ -0.014mm	h7
D3.1 ~ D6	0 ~ -0.018mm	
D6.1 ~ D10	0 ~ -0.022mm	
D10.1 ~ D13	0 ~ -0.027mm	

EDP No	D	L_1	L_2
SSTD 005	0.5	6	22
SSTD 0055	0.55	7	24
SSTD 006	0.6	7	24
SSTD 0065	0.65	8	26
SSTD 007	0.7	9	28
SSTD 0075	0.75	9	28
SSTD 008	0.8	10	30
SSTD 0085	0.85	10	30
SSTD 009	0.9	11	32
SSTD 0095	0.95	11	32
SSTD 010	1	10	38
SSTD 011	1.1	10	38
SSTD 012	1.2	10	38
SSTD 013	1.3	10	38
SSTD 014	1.4	10	38
SSTD 015	1.5	13	38
SSTD 016	1.6	13	38
SSTD 017	1.7	13	38
SSTD 018	1.8	13	38
SSTD 019	1.9	13	38
SSTD 020	2	16	45
SSTD 021	2.1	16	45
SSTD 022	2.2	16	45
SSTD 023	2.3	16	45
SSTD 024	2.4	18	50
SSTD 025	2.5	20	50
SSTD 026	2.6	20	50
SSTD 027	2.7	22	50
SSTD 028	2.8	22	50
SSTD 029	2.9	22	50
SSTD 030	3	22	50
SSTD 031	3.1	25	50
SSTD 032	3.2	25	50
SSTD 033	3.3	25	50
SSTD 034	3.4	25	50
SSTD 035	3.5	25	50

EDP No	D	L_1	L_2
SSTD 036	3.6	28	55
SSTD 037	3.7	28	55
SSTD 038	3.8	28	55
SSTD 039	3.9	28	55
SSTD 040	4	28	55
SSTD 041	4.1	30	60
SSTD 042	4.2	30	60
SSTD 043	4.3	30	60
SSTD 044	4.4	30	60
SSTD 045	4.5	30	60
SSTD 046	4.6	33	65
SSTD 047	4.7	33	65
SSTD 048	4.8	35	65
SSTD 049	4.9	35	65
SSTD 050	5	35	65
SSTD 051	5.1	35	65
SSTD 052	5.2	35	65
SSTD 053	5.3	35	65
SSTD 054	5.4	35	65
SSTD 055	5.5	35	65
SSTD 056	5.6	38	75
SSTD 057	5.7	38	75
SSTD 058	5.8	38	75
SSTD 059	5.9	38	75
SSTD 060	6	38	75
SSTD 061	6.1	38	75
SSTD 062	6.2	38	75
SSTD 063	6.3	38	75
SSTD 064	6.4	38	75
SSTD 066	6.6	45	80
SSTD 067	6.7	45	80
SSTD 068	6.8	45	80
SSTD 069	6.9	45	80
SSTD 070	7	45	80
SSTD 071	7.1	45	80
SSTD 072	7.2	45	80

EDP No	D	L_1	L_2
SSTD 073	7.3	45	80
SSTD 074	7.4	45	80
SSTD 075	7.5	45	80
SSTD 076	7.6	50	85
SSTD 077	7.7	50	85
SSTD 078	7.8	50	85
SSTD 079	7.9	50	85
SSTD 080	8	50	85
SSTD 081	8.1	50	85
SSTD 082	8.2	50	85
SSTD 083	8.3	50	85
SSTD 084	8.4	50	85
SSTD 085	8.5	50	85
SSTD 086	8.6	50	95
SSTD 087	8.7	50	95
SSTD 088	8.8	50	95
SSTD 089	8.9	50	95
SSTD 090	9	50	95
SSTD 091	9.1	50	95
SSTD 092	9.2	50	95
SSTD 093	9.3	50	95
SSTD 094	9.4	50	95
SSTD 095	9.5	50	95
SSTD 096	9.6	50	95
SSTD 097	9.7	50	95
SSTD 098	9.8	50	95
SSTD 099	9.9	55	100
SSTD 100	10	55	100
SSTD 101	10.1	55	115
SSTD 102	10.2	55	115
SSTD 103	10.3	55	115
SSTD 104	10.4	55	115
SSTD 105	10.5	55	115
SSTD 106	10.6	60	115
SSTD 107	10.7	60	115
SSTD 108	10.8	60	115
SSTD 109	10.9	60	115
SSTD 110	11	60	115
SSTD 111	11.1	65	120
SSTD 112	11.2	65	120
SSTD 113	11.3	65	120
SSTD 115	11.5	65	120
SSTD 118	11.8	65	120
SSTD 119	11.9	65	120
SSTD 120	12	65	120
SSTD 124	12.4	70	125
SSTD 125	12.5	70	125
SSTD 130	13	75	130

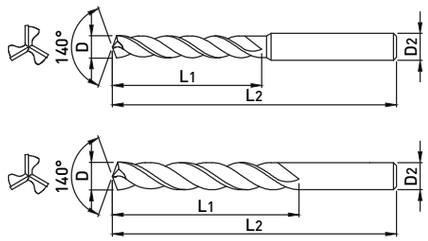
EDP No	D	L_1	L_2

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

■ **Applicable Working Material**

Carbon Steel ~HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~ FCD400, 500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
○					○		○	◎	○

○ : GOOD ◎ : EXCELLENT



- 5xD drill for Aluminum and Aluminum Alloy steels
- Suitable for High precision and High speed cutting by applied to 3 flutes of new concept
- Improvement of Flute surface roughness and chip emission by applied to lubrication D.L.C coating

FINE GRAIN | 3 | 30° HELIX | ▸5xD | 140° | D.L.C | DATA

p.544

■ **TOLERANCE**

D		SHANK DIA.
ALL SIZES	0 ~ -0.012mm	h6

EDP No	D			L_1	L_2	D_2
	mm	fraction	inch			
APF505 030	3	-	0.1181	20	60	3
APF505 03175	3.175	1/8"	0.1250	27/32	2-3/8	4
APF505 03263	3.263	#30	0.1285	27/32	2-3/8	4
APF505 035	3.5	-	0.1378	22	63	4
APF505 03572	3.571	9/64"	0.1406	15/16	2-1/2	4
APF505 03967	3.967	5/32"	0.1562	15/16	2-1/2	4
APF505 040	4	-	0.1575	24	65	4
APF505 045	4.5	-	0.1772	24	65	5
APF505 04762	4.762	3/16 "	0.1875	1-1/4	2-3/4	5
APF505 04800	4.800	#12	0.1890	1-1/4	2-3/4	5
APF505 04851	4.851	#11	0.1910	1-1/4	2-3/4	5
APF505 04914	4.914	#10	0.1935	1-1/4	2-3/4	5
APF505 050	5	-	0.1969	32	75	5
APF505 05054	5.054	#8	0.1990	1-5/16	3"	6
APF505 05105	5.105	#7	0.2010	1-5/16	3"	6
APF505 05158	5.158	13/64"	0.2031	1-5/16	3"	6
APF505 05181	5.181	#6	0.2040	1-3/8	3"	6
APF505 05219	5.219	#5	0.2055	1-3/8	3"	6
APF505 05308	5.308	#4	0.2090	1-3/8	3"	6
APF505 05410	5.410	#3	0.2130	1-3/8	3"	6
APF505 055	5.5	-	0.2165	35	75	6
APF505 05556	5.556	7/32 "	0.2188	1-3/8	3"	6
APF505 05613	5.613	#2	0.2210	1-3/8	3"	6
APF505 05791	5.791	#1	0.2280	1-3/8	3"	6
APF505 05953	5.953	15/64 "	0.2344	1-1/2	3-1/4	6
APF505 060	6	-	0.2362	38	82	6
APF505 06045	6.045	B	0.2380	1-5/8	3-1/4	7
APF505 06146	6.146	C	0.2420	1-5/8	3-1/4	7
APF505 06248	6.248	D	0.2460	1-5/8	3-1/4	7
APF505 06350	6.350	1/4 / E"	0.2500	1-5/8	3-1/4	7
APF505 065	6.5	-	0.2559	41	82	7
APF505 06527	6.527	F	0.2570	1-11/16	3-1/4	7
APF505 06629	6.629	G	0.2610	1-11/16	3-1/2	7
APF505 06746	6.746	17/64 "	0.2656	1-11/16	3-1/2	7
APF505 06756	6.756	H	0.2660	1-11/16	3-1/2	7
APF505 06908	6.908	I	0.2720	1-11/16	3-1/2	7

EDP No	D			L_1	L_2	D_2
	mm	fraction	inch			
APF505 070	7	-	0.2756	43	88	7
APF505 07035	7.035	J	0.2770	1-11/16	3-1/2	8
APF505 07142	7.142	9/32 "	0.2812	1-3/4	3-1/2	8
APF505 07366	7.366	L	0.2900	1-3/4	3-1/2	8
APF505 075	7.5	-	0.2953	44	95	8
APF505 07541	7.541	19/64 "	0.2969	1-7/8	3-3/4	8
APF505 07670	7.670	N	0.3020	1-7/8	3-3/4	8
APF505 07937	7.937	5/16 "	0.3125	1-7/8	3-3/4	8
APF505 080	8	-	0.3150	48	95	8
APF505 08026	8.026	O	0.3160	1-7/8	3-3/4	9
APF505 08204	8.204	P	0.3230	2-3/32	3-3/4	9
APF505 08333	8.333	21/64 "	0.3281	2-3/32	4"	9
APF505 08432	8.432	Q	0.3320	2-3/32	4"	9
APF505 085	8.5	-	0.3346	53	100	9
APF505 08610	8.610	R	0.3390	2-3/32	4"	9
APF505 08732	8.732	11/32 "	0.3438	2-3/16	4"	9
APF505 08839	8.839	S	0.3480	2-3/16	4"	9
APF505 090	9	-	0.3543	55	100	9
APF505 09093	9.093	T	0.3580	2-9/32	4-1/4	10
APF505 09128	9.128	23/64 "	0.3594	2-9/32	4-1/4	10
APF505 09347	9.347	U	0.3680	2-9/32	4-1/4	10
APF505 095	9.5	-	0.3740	58	108	10
APF505 09525	9.525	3/8 "	0.3750	2-3/8	4-1/4	10
APF505 09575	9.575	V	0.3770	2-3/8	4-1/4	10
APF505 09804	9.804	W	0.3860	2-3/8	4-1/2	10
APF505 09921	9.921	25/64 "	0.3906	2-3/8	4-1/2	10
APF505 100	10	-	0.3937	60	114	10
APF505 10083	10.083	X	0.3970	2-1/2	4-1/2	11
APF505 10261	10.261	Y	0.4040	2-9/16	4-1/2	11
APF505 10317	10.317	13/32 "	0.4062	2-9/16	4-1/2	11
APF505 105	10.5		0.4134	67	114	11
APF505 10716	10.716	27/64 "	0.4219	2-11/16	4-1/2	11
APF505 110	11	-	0.4331	68	114	11
APF505 11112	11.112	7/16 "	0.4375	2-13/16	4-3/4	12
APF505 115	11.5		0.4528	70	120	12
APF505 11508	11.508	29/64 "	0.4531	2-7/8	4-3/4	12

APF505

3F ALUMINUM DRILL - 5xD

EDP No	D			L_1	L_2	D_2
	mm	fraction	inch			
APF505 11907	11.907	15/32 "	0.4688	2-7/8	4-3/4	12
APF505 120	12	-	0.4724	73	120	12
APF505 12303	12.303	31/64 "	0.4844	3"	5-5/16	13
APF505 125	12.5	-	0.4921	75	135	13
APF505 127	12.7	1/2 "	0.5000	3-1/16	5-3/8	13
APF505 130	13	-	0.5118	78	136	13
APF505 13096	13.096	33/64 "	0.5156	3-1/8	5-3/8	14
APF505 13492	13.492	17/32 "	0.5312	3-5/16	5-11/16	14
APF505 13891	13.891	35/64 "	0.5469	3-3/8	5-13/16	14
APF505 140	14	-	0.5512	86	148	14
APF505 14287	14.287	9/16 "	0.5625	3-1/2	5-15/16	15
APF505 14683	14.683	37/64 "	0.5781	3-1/2	6"	15
APF505 150	15	-	0.5906	90	152	15
APF505 15082	15.082	19/32 "	0.5938	3-9/16	6"	16
APF505 15478	15.478	39/64 "	0.6094	3-11/16	6-3/16	16
APF505 15875	15.875	5/8 "	0.6250	3-3/4	6-5/16	16
APF505 160	16	-	0.6299	95	160	16

EDP No	D			L_1	L_2	D_2
	mm	fraction	inch			

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

■ **Applicable Working Material**

Carbon Steel ~HB225	Alloy Steel HB225~325	Prehardened Steel HRc30~50	Hardened Steel		Copper	Graphite	Cast Iron ~FCD500	Aluminum	Stainless Steel
			SKD61 ~HRc55	SKD11 ~HRc55					
					○			◎	

○ : GOOD ◎ : EXCELLENT

MEMO

TAP SERIES

2020▶2021
WIDIN
PRODUCTS

TAP SERIES 03

STANDARD TAP

Tap Series

Series		EDP. NO	Appearance	Description	Surface Treatment		Size Range	Page
					Coating	Uncoated		
CARBIDE TAP	JIS	WPOM		Spiral Flute Tap		○	M3~M12	343
		WPCM		Spiral Flute Tap	TiCN		M3~M12	344
		WSOM		Straight Flute Tap		○	M3~M12	345
		WSCM		Straight Flute Tap	TiCN		M3~M12	346
		WROM		Roll Tap		○	M3~M12	347
		WRCM		Roll Tap	TiCN		M3~M12	348
		WFOM		Spiral Roll Tap		○	M3~M6	349
		WFCM		Spiral Roll Tap	TiCN		M3~M6	350
	DIN	WQOM		Spiral Flute Tap		○	M3~M24	351
		WQCM		Spiral Flute Tap	TiCN		M3~M24	352
		WGOM		Straight Flute Tap		○	M3~M24	353
		WGCM		Straight Flute Tap	TiCN		M3~M24	354
		WMOM		Roll Tap		○	M3~M12	355
		WMCM		Roll Tap	TiCN		M3~M12	356
HSSE TAP	JIS	VPOM		Spiral Tap		○	M3~M24	357
		VPTM		Spiral Tap	TiN		M3~M24	358
		VPCM		Spiral Tap	TiCN		M3~M24	359
		VPHM		Spiral Tap	HOMO		M3~M24	360
		VNOM		Spira Point Tap		○	M3~M24	361
		VNTM		Spira Point Tap	TiN		M3~M24	362
		VNCM		Spira Point Tap	TiCN		M3~M24	363
		VNHM		Spira Point Tap	HOMO		M3~M24	364
		VSOM		Straight Flute Tap		○	M3~M24	365
		VSTM		Straight Flute Tap	TiN		M3~M24	366
		VSCM		Straight Flute Tap	TiCN		M3~M24	367
		VSHM		Straight Flute Tap	HOMO		M3~M24	368
		VROM		Roll Tap		○	M3~M12	369
		VRTM		Roll Tap	TiN		M3~M12	370
		VRCM		Roll Tap	TiCN		M3~M12	371
		VFOM		Spiral Roll Tap		○	M3~M6	372
		VFTM		Spiral Roll Tap	TiN		M3~M6	373
		VFCM		Spiral Roll Tap	TiCN		M3~M6	374

Series		EDP. NO	Appearance	Description	Surface Treatment		Size Range	Page
					Coating	Uncoated		
HSSE TAP	DIN	VQOM		Spiral Flute Tap		○	M3~M24	375
		VQTM		Spiral Flute Tap	TiN		M3~M24	376
		VQCM		Spiral Flute Tap	TiCN		M3~M24	377
		VQHM		Spiral Flute Tap	HOMO		M3~M24	378
		VDOM		Spiral Point Tap		○	M3~M24	379
		VDTM		Spiral Point Tap	TiN		M3~M24	380
		VDCM		Spiral Point Tap	TiCN		M3~M24	381
		VDHM		Spiral Point Tap	HOMO		M3~M24	382
		VGOM		Straight Flute Tap		○	M3~M24	383
		VGTM		Straight Flute Tap	TiN		M3~M24	384
		VGCM		Straight Flute Tap	TiCN		M3~M24	385
		VGHM		Straight Flute Tap	HOMO		M3~M24	386
		VMOM		Roll Tap		○	M3~M12	387
		VMTM		Roll Tap	TiN		M3~M12	388
		VMCM		Roll Tap	TiCN		M3~M12	389
PIPE TAP		VSOPT		Taper Pipe Tap		○	1/16-28~ 1-11	390
		VPOPT		Taper Pipe Tap		○	1/16-28~ 1-11	391
		VSONPT		Taper Pipe Tap		○	1/16-28~1-11	392
		VPONPT		Taper Pipe Tap		○	1/16-27~1-11½	393
		VSOPS		Straight Pipe Tap		○	1/8-28~ 1-11	394
		VPOPS		Straight Pipe Tap		○	1/8-28~ 1-11	395
		VSOPF		Straight Pipe Tap		○	1/8-28~ 1-11	396
		VPOPF		Straight Pipe Tap		○	1/8-28~ 1-11	397

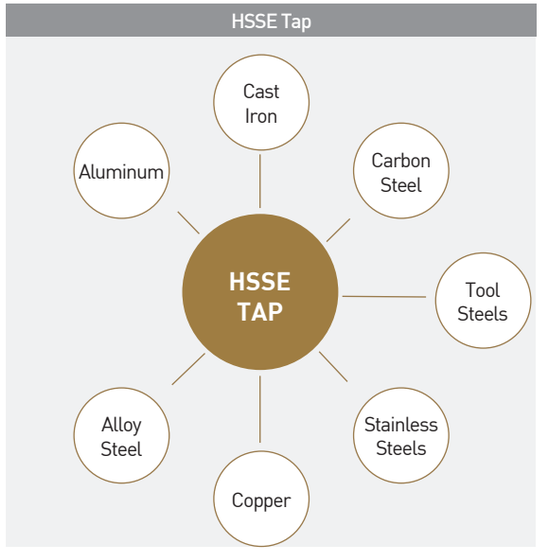
General Features

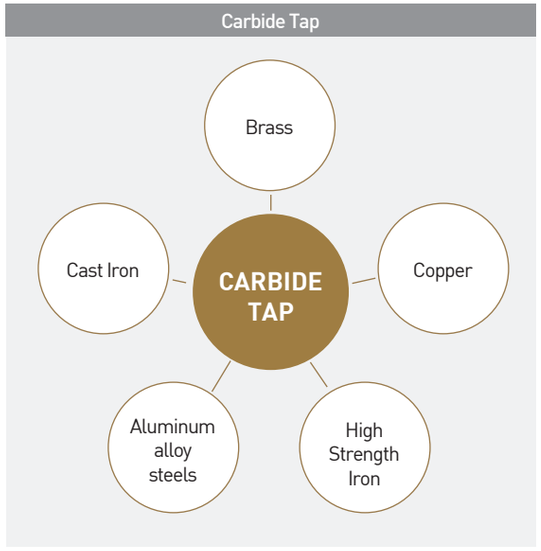
· Suitable for Alloy Steels, Carbon steels, Brass, Aluminum alloy steels
· Extend customer choice with variety of size and type

Characteristics

· Improvement of wear resistance and chipping resistance by applied to high toughness material
· High processability and Minimized chip deposition by applied to TiN,TiCN coating
· Response to a wide range of processing conditions by adopting the stepwise accuracy method of WH or GH

Applications

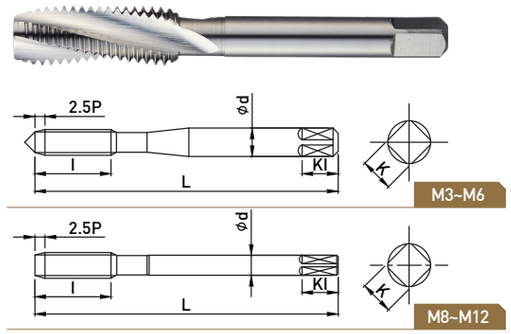




EDP No. System

Raw Material	Description	Surface Treatment	Thread	Size	Pitch	Chamfer length	Oil Groove
V : HSSE	S(JIS) : Straight	O : NON	M : Meter Thread	M3	0.5	1.5	S : 1 Groove
W : CARBIDE	G(DIN) : Straight	T : TiN	PT : Pipe Tapered	~	~	2.0	M : 4 Groove
	P(JIS) : Spiral	C : TiCN	NPT : National Pipe Tapered	M24	3.0	2.5	
	Q(DIN) : Spiral	H : HOMO	PS : Pipe Straight			4.0	
	N(JIS) : Point		PF : Pipe Fastening			5.0	
	D(DIN) : Point						
	R(JIS) : Roll						
	F(JIS) : Spiral Roll						
	M(DIN) : Roll						
V	R	O	M	06	100	40	S
HSSE	Roll	Uncoated	Meter screw	M6	Pitch 1.0	Chamfer 4.0	Single oil groove

Ex) Size M6 Pitch1.0mm Chamfer length 4.0 Single oil groove ,Non-coating HSSE Roll TAP



- Suitable for blind hole as Spiral flute type
- Excellent chip emission

CARBIDE | Uncoated | 15° HELIX

EDP No 2.5P	Thread Size	Limits	L	l	d	K	Kl	Z
WPOM0305025	M3 X 0.5	WH3	46	11	4	3.2	6	3
WPOM0407025	M4 X 0.7	WH3	52	13	5	4	7	3
WPOM0508025	M5 X 0.8	WH3	60	16	5.5	4.5	7	3
WPOM0610025	M6 X 1.0	WH3	62	19	6	4.5	7	3
WPOM0810025	M8 X 1.0	WH3	70	22	6.2	5	8	3
WPOM0812525	M8 X 1.25	WH4	70	22	6.2	5	8	3
WPOM1010025	M10 X 1.0	WH3	75	24	7	5.5	8	3
WPOM1012525	M10 X 1.25	WH4	75	24	7	5.5	8	3
WPOM1015025	M10 X 1.5	WH4	75	24	7	5.5	8	3
WPOM1210025	M12 X 1.0	WH3	82	29	8.5	6.5	9	3
WPOM1212525	M12 X 1.25	WH4	82	29	8.5	6.5	9	3
WPOM1215025	M12 X 1.5	WH4	82	29	8.5	6.5	9	3
WPOM1217525	M12 X 1.75	WH5	82	29	8.5	6.5	9	3

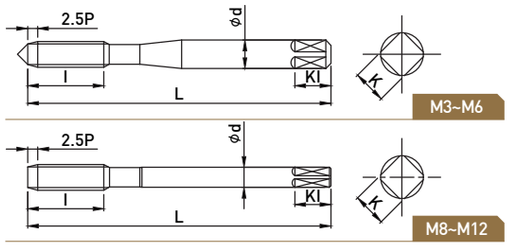
■ Applicable Working Material

Low Carbon Steels	Medium Carbon Steels	High Carbon Steels	Alloy Steel	Hardened Steels			Stainless Steels	Tool Steels	Cast Steels	Cast Iron	High Strength Steels	Copper	Brass	Casting Brass	Bronze	Aluminum rolled material	Aluminum alloy castings	Magnesium alloy castings	Zinc alloy castings	Titanium alloys	Nickel alloy	Thermo-setting plastic	Thermo-plastic
C ~0.25%	C0.25% ~0.45%	C 0.45%~	SCM	25~45 HRc	45~55 HRc	50~60 HRc	SUS	SKD	SC	FC	FCD	Cu	Bs	BsC	PB	AL	AC,ADC	MC	ZDC				
										○	◎	◎	◎	◎	○	○	○	○	○				◎

○ : GOOD ◎ : EXCELLENT

WPCM

JIS SPIRAL FLUTE TAPS



- Improvement of wear resistance by applied to TiCN Coating
- Suitable for blind hole work as Spiral flute type
- Excellent chip emission

CARBIDE TiCN 15° HELIX

EDP No 2.5P	Thread Size	Limits	L	l	d	K	Kl	Z
WPCM0305025	M3 X 0.5	WH3	46	11	4	3.2	6	3
WPCM0407025	M4 X 0.7	WH3	52	13	5	4	7	3
WPCM0508025	M5 X 0.8	WH3	60	16	5.5	4.5	7	3
WPCM0610025	M6 X 1.0	WH3	62	19	6	4.5	7	3
WPCM0810025	M8 X 1.0	WH3	70	22	6.2	5	8	3
WPCM0812525	M8 X 1.25	WH4	70	22	6.2	5	8	3
WPCM1010025	M10 X 1.0	WH3	75	24	7	5.5	8	3
WPCM1012525	M10 X 1.25	WH4	75	24	7	5.5	8	3
WPCM1015025	M10 X 1.5	WH4	75	24	7	5.5	8	3
WPCM1210025	M12 X 1.0	WH3	82	29	8.5	6.5	9	3
WPCM1212525	M12 X 1.25	WH4	82	29	8.5	6.5	9	3
WPCM1215025	M12 X 1.5	WH4	82	29	8.5	6.5	9	3
WPCM1217525	M12 X 1.75	WH5	82	29	8.5	6.5	9	3

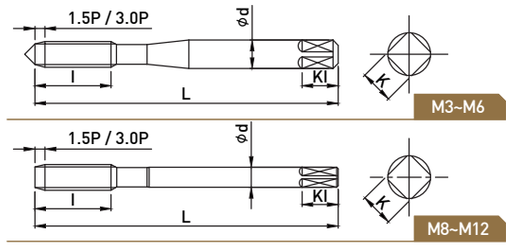
■ Applicable Working Material

Low Carbon Steels	Medium Carbon Steels	High Carbon Steels	Alloy Steel	Hardened Steels			Stainless Steels	Tool Steels	Cast Steels	Cast Iron	High Strength Steels	Copper	Brass	Casting Brass	Bronze	Aluminum rolled material	Aluminum alloy castings	Magnesium alloy castings	Zinc alloy castings	Titanium alloys	Nickel alloy	Thermo-setting plastic	Thermo-plastic
C ~0.25%	C0.25% ~0.45%	C 0.45%~	SCM	25~45 HRc	45~55 HRc	50~60 HRc	SUS	SKD	SC	FC	FCD	Cu	Bs	BsC	PB	AL	AC,ADC	MC	ZDC				
										○	◎	◎	◎	◎	○	○	○	○	○				◎

○ : GOOD ◎ : EXCELLENT

WSOM

JIS STRAIGHT FLUTE TAPS



- Suitable for through hole work as Straight flute type

CARBIDE Uncoated

EDP No 1.5P	EDP No 3P	Thread Size	Limits	L	l	d	K	Kl	Z
WSOM0305015	WSOM0305030	M3 X 0.5	WH3	46	11	4	3.2	6	3
WSOM0407015	WSOM0407030	M4 X 0.7	WH3	52	13	5	4	7	3
WSOM0508015	WSOM0508030	M5 X 0.8	WH3	60	16	5.5	4.5	7	3
WSOM0610015	WSOM0610030	M6 X 1.0	WH3	62	19	6	4.5	7	3
WSOM0810015	WSOM0810030	M8 X 1.0	WH3	70	22	6.2	5	8	4
WSOM0812515	WSOM0812530	M8 X 1.25	WH4	70	22	6.2	5	8	4
WSOM1010015	WSOM1010030	M10 X 1.0	WH3	75	24	7	5.5	8	4
WSOM1012515	WSOM1012530	M10 X 1.25	WH4	75	24	7	5.5	8	4
WSOM1015015	WSOM1015030	M10 X 1.5	WH4	75	24	7	5.5	8	4
WSOM1210015	WSOM1210030	M12 X 1.0	WH3	82	29	8.5	6.5	9	4
WSOM1212515	WSOM1212530	M12 X 1.25	WH4	82	29	8.5	6.5	9	4
WSOM1215015	WSOM1215030	M12 X 1.5	WH4	82	29	8.5	6.5	9	4
WSOM1217515	WSOM1217530	M12 X 1.75	WH5	82	29	8.5	6.5	9	4

1.5P Tap is removed external center as bottoming type

■ Applicable Working Material

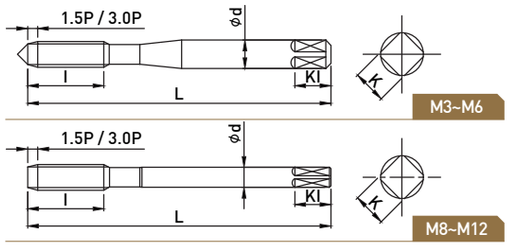
Low Carbon Steels	Medium Carbon Steels	High Carbon Steels	Alloy Steel	Hardened Steels			Stainless Steels	Tool Steels	Cast Steels	Cast Iron	High Strength Steels	Copper	Brass	Casting Brass	Bronze	Aluminum rolled material	Aluminum alloy castings	Magnesium alloy castings	Zinc alloy castings	Titanium alloys	Nickel alloy	Thermo-setting plastic	Thermo-plastic
C ~0.25%	C0.25% ~0.45%	C 0.45%~	SCM	25~45 HRc	45~55 HRc	50~60 HRc	SUS	SKD	SC	FC	FCD	Cu	Bs	BsC	PB	AL	AC, ADC	MC	ZDC				
										◎	○		○	○	◎		○	○	○			◎	

○ : GOOD ◎ : EXCELLENT

Carbide Tap

WSCM

JIS STRAIGHT FLUTE TAPS



- Improvement of wear resistance by applied to TiCN Coating
- Suitable for through hole work as Straight flute type

CARBIDE TiCN

EDP No 1.5P	EDP No 3P	Thread Size	Limits	L	l	d	K	Kl	Z
WSCM0305015	WSCM0305030	M3 X 0.5	WH3	46	11	4	3.2	6	3
WSCM0407015	WSCM0407030	M4 X 0.7	WH3	52	13	5	4	7	3
WSCM0508015	WSCM0508030	M5 X 0.8	WH3	60	16	5.5	4.5	7	3
WSCM0610015	WSCM0610030	M6 X 1.0	WH3	62	19	6	4.5	7	3
WSCM0810015	WSCM0810030	M8 X 1.0	WH3	70	22	6.2	5	8	4
WSCM0812515	WSCM0812530	M8 X 1.25	WH4	70	22	6.2	5	8	4
WSCM1010015	WSCM1010030	M10 X 1.0	WH3	75	24	7	5.5	8	4
WSCM1012515	WSCM1012530	M10 X 1.25	WH4	75	24	7	5.5	8	4
WSCM1015015	WSCM1015030	M10 X 1.5	WH4	75	24	7	5.5	8	4
WSCM1210015	WSCM1210030	M12 X 1.0	WH3	82	29	8.5	6.5	9	4
WSCM1212515	WSCM1212530	M12 X 1.25	WH4	82	29	8.5	6.5	9	4
WSCM1215015	WSCM1215030	M12 X 1.5	WH4	82	29	8.5	6.5	9	4
WSCM1217515	WSCM1217530	M12 X 1.75	WH5	82	29	8.5	6.5	9	4

1.5P Tap is removed external center as bottoming type

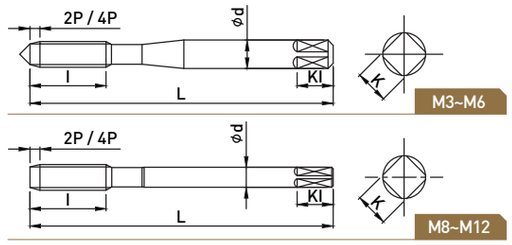
■ Applicable Working Material

Low Carbon Steels	Medium Carbon Steels	High Carbon Steels	Alloy Steel	Hardened Steels			Stainless Steels	Tool Steels	Cast Steels	Cast Iron	High Strength Steels	Copper	Brass	Casting Brass	Bronze	Aluminum rolled material	Aluminum alloy castings	Magnesium alloy castings	Zinc alloy castings	Titanium alloys	Nickel alloy	Thermo-setting plastic	Thermo-plastic
C ~0.25%	C0.25% ~0.45%	C 0.45%~	SCM	25~45 HRc	45~55 HRc	50~60 HRc	SUS	SKD	SC	FC	FCD	Cu	Bs	BsC	PB	AL	AC,ADC	MC	ZDC				
										◎	○		○	○	◎		○	○	○			◎	

○ : GOOD ◎ : EXCELLENT

WROM

JIS ROLL TAPS



- Suitable for blind hole work and through hole work
- Applied to oil groove design for outside fueling

CARBIDE Uncoated

EDP No 2P	EDP No 4P	Thread Size	Limits	L	l	d	K	Kl	Oil Groove
WROM0305020S	-	M3 X 0.5	GH5	46	11	4	3.2	6	S
WROM0305020M	WROM0305040M	M3 X 0.5	GH5	46	11	4	3.2	6	M
WROM0407020S	-	M4 X 0.7	GH6	52	13	5	4	7	S
WROM0407020M	WROM0407040M	M4 X 0.7	GH6	52	13	5	4	7	M
WROM0508020S	-	M5 X 0.8	GH6	60	16	5.5	4.5	7	S
WROM0508020M	WROM0508040M	M5 X 0.8	GH6	60	16	5.5	4.5	7	M
WROM0610020S	-	M6 X 1.0	GH7	62	19	6	4.5	7	S
WROM0610020M	WROM0610040M	M6 X 1.0	GH7	62	19	6	4.5	7	M
WROM0812520S	-	M8 X 1.25	GH7	70	22	6.2	5	8	S
WROM0812520M	WROM0812540M	M8 X 1.25	GH7	70	22	6.2	5	8	M
WROM1012520S	-	M10 X 1.25	GH7	75	24	7	5.5	8	S
WROM1012520M	WROM1012540M	M10 X 1.25	GH7	75	24	7	5.5	8	M
WROM1015020S	-	M10 X 1.5	GH7	75	24	7	5.5	8	S
WROM1015020M	WROM1015040M	M10 X 1.5	GH7	75	24	7	5.5	8	M
WROM1210020S	-	M12 X 1.0	GH7	82	29	8.5	6.5	9	S
WROM1210020M	WROM1210040M	M12 X 1.0	GH7	82	29	8.5	6.5	9	M
WROM1212520S	-	M12 X 1.25	GH7	82	29	8.5	6.5	9	S
WROM1212520M	WROM1212540M	M12 X 1.25	GH7	82	29	8.5	6.5	9	M
WROM1215020S	-	M12 X 1.5	GH7	82	29	8.5	6.5	9	S
WROM1215020M	WROM1215040M	M12 X 1.5	GH7	82	29	8.5	6.5	9	M
WROM1217520S	-	M12 X 1.75	GH8	82	29	8.5	6.5	9	S
WROM1217520M	WROM1217540M	M12 X 1.75	GH8	82	29	8.5	6.5	9	M

2.0P Tap is removed external center as bottoming type

Oil groove S : 1 oil groove
Oil groove M : 4 oil groove

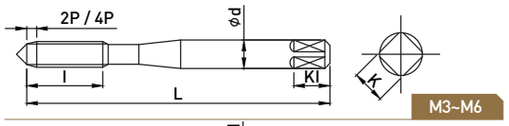
■ Applicable Working Material

Low Carbon Steels	Medium Carbon Steels	High Carbon Steels	Alloy Steel	Hardened Steels			Stainless Steels	Tool Steels	Cast Steels	Cast Iron	High Strength Steels	Copper	Brass	Casting Brass	Bronze	Aluminum rolled material	Aluminum alloy castings	Magnesium alloy castings	Zinc alloy castings	Titanium alloys	Nickel alloy	Thermo-setting plastic	Thermo-plastic
C ~0.25%	C0.25% ~0.45%	C 0.45%~	SCM	25~45 HRc	45~55 HRc	50~60 HRc	SUS	SKD	SC	FC	FCD	Cu	Bs	BsC	PB	AL	AC,ADC	MC	ZDC				
○												◎	◎	◎		◎	◎		◎				

○ : GOOD ◎ : EXCELLENT

WRCM

JIS ROLL TAPS



- Improvement of wear resistance by applied to TiCN Coating
- Suitable for blind hole work and through hole work
- Applied to oil groove design for outside fueling

CARBIDE TiCN

EDP No 2P	EDP No 4P	Thread Size	Limits	L	l	d	K	Kl	Oil Groove
WRCM0305020S	-	M3 X 0.5	GH5	46	11	4	3.2	6	S
WRCM0305020M	WRCM0305040M	M3 X 0.5	GH5	46	11	4	3.2	6	M
WRCM0407020S	-	M4 X 0.7	GH6	52	13	5	4	7	S
WRCM0407020M	WRCM0407040M	M4 X 0.7	GH6	52	13	5	4	7	M
WRCM0508020S	-	M5 X 0.8	GH6	60	16	5.5	4.5	7	S
WRCM0508020M	WRCM0508040M	M5 X 0.8	GH6	60	16	5.5	4.5	7	M
WRCM0610020S	-	M6 X 1.0	GH7	62	19	6	4.5	7	S
WRCM0610020M	WRCM0610040M	M6 X 1.0	GH7	62	19	6	4.5	7	M
WRCM0812520S	-	M8 X 1.25	GH7	70	22	6.2	5	8	S
WRCM0812520M	WRCM0812540M	M8 X 1.25	GH7	70	22	6.2	5	8	M
WRCM1012520S	-	M10 X 1.25	GH7	75	24	7	5.5	8	S
WRCM1012520M	WRCM1025040M	M10 X 1.25	GH7	75	24	7	5.5	8	M
WRCM1015020S	-	M10 X 1.5	GH7	75	24	7	5.5	8	S
WRCM1015020M	WRCM1015040M	M10 X 1.5	GH7	75	24	7	5.5	8	M
WRCM1210020S	-	M12 X 1.0	GH7	82	29	8.5	6.5	9	S
WRCM1210020M	WRCM1210040M	M12 X 1.0	GH7	82	29	8.5	6.5	9	M
WRCM1212520S	-	M12 X 1.25	GH7	82	29	8.5	6.5	9	S
WRCM1212520M	WRCM1212540M	M12 X 1.25	GH7	82	29	8.5	6.5	9	M
WRCM1215020S	-	M12 X 1.5	GH7	82	29	8.5	6.5	9	S
WRCM1215020M	WRCM1215040M	M12 X 1.5	GH7	82	29	8.5	6.5	9	M
WRCM1217520S	-	M12 X 1.75	GH8	82	29	8.5	6.5	9	S
WRCM1217520M	WRCM1217540M	M12 X 1.75	GH8	82	29	8.5	6.5	9	M

2,0P Tap is removed external center as bottoming type

Oil groove S : 1 oil groove
Oil groove M : 4 oil groove

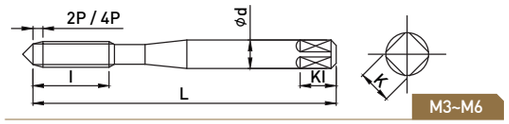
■ **Applicable Working Material**

Low Carbon Steels	Medium Carbon Steels	High Carbon Steels	Alloy Steel	Hardened Steels			Stainless Steels	Tool Steels	Cast Steels	Cast Iron	High Strength Steels	Copper	Brass	Casting Brass	Bronze	Aluminum rolled material	Aluminum alloy castings	Magnesium alloy castings	Zinc alloy castings	Titanium alloys	Nickel alloy	Thermo-setting plastic	Thermo-plastic
C ~0.25%	C0.25% ~0.45%	C 0.45%~	SCM	25~45 HRc	45~55 HRc	50~60 HRc	SUS	SKD	SC	FC	FCD	Cu	Bs	BsC	PB	AL	AC,ADC	MC	ZDC				
◎	◎	○	○				◎					◎	◎	◎		◎	◎		◎				

○ : GOOD ◎ : EXCELLENT

WFOM

JIS SPIRAL ROLL TAPS



- Suitable for blind hole work and through hole work

CARBIDE Uncoated

EDP No 2P	EDP No 4P	Thread Size	Limits	L	l	d	K	Kl
WFOM0305020	WFOM0305040	M3 X 0.5	GH6	46	18	4	3.2	6
WFOM03506020	WFOM03506040	M3.5 X 0.6	GH6	46	18	4	3.2	6
WFOM0407020	WFOM0407040	M4 X 0.7	GH7	52	20	5	4	7
WFOM0508020	WFOM0508040	M5 X 0.8	GH7	60	22	5.5	4.5	7
WFOM0610020	WFOM0610040	M6 X 1.0	GH7	62	24	6	4.5	7

2,0P Tap is removed external center as bottoming type

■ **Applicable Working Material**

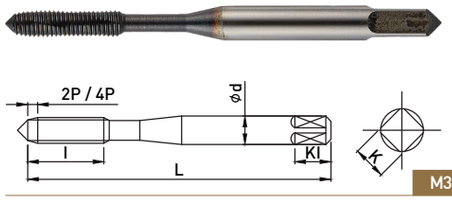
Low Carbon Steels	Medium Carbon Steels	High Carbon Steels	Alloy Steel	Hardened Steels			Stainless Steels	Tool Steels	Cast Steels	Cast Iron	High Strength Steels	Copper	Brass	Casting Brass	Bronze	Aluminum rolled material	Aluminum alloy castings	Magnesium alloy castings	Zinc alloy castings	Titanium alloys	Nickel alloy	Thermo-setting plastic	Thermo-plastic
C ~0.25%	C0.25% ~0.45%	C 0.45%~	SCM	25~45 HRc	45~55 HRc	50~60 HRc	SUS	SKD	SC	FC	FCD	Cu	Bs	BsC	PB	AL	AC,ADC	MC	ZDC				
												◎	◎	◎		◎	◎		◎				

○ : GOOD ◎ : EXCELLENT

Carbide Tap

WFCM

JIS SPIRAL ROLL TAPS



- Improvement of wear resistance by applied to TiCN Coating
- Suitable for blind hole work and through hole work

CARBIDE TiCN

EDP No 2P	EDP No 4P	Thread Size	Limits	L	l	d	K	Kl
WFCM0305020	WFCM0305040	M3 X 0.5	GH6	46	18	4	3.2	6
WFCM03506020	WFCM03506040	M3.5 X 0.6	GH6	46	18	4	3.2	6
WFCM0407020	WFCM0407040	M4 X 0.7	GH7	52	20	5	4	7
WFCM0508020	WFCM0508040	M5 X 0.8	GH7	60	22	5.5	4.5	7
WFCM0610020	WFCM0610040	M6 X 1.0	GH7	62	24	6	4.5	7

2,0P Tap is removed external center as bottoming type

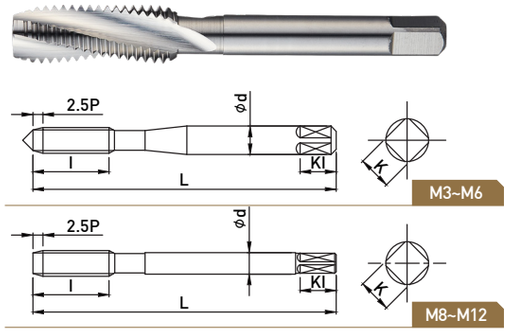
■ **Applicable Working Material**

Low Carbon Steels	Medium Carbon Steels	High Carbon Steels	Alloy Steel	Hardened Steels			Stainless Steels	Tool Steels	Cast Steels	Cast Iron	High Strength Steels	Copper	Brass	Casting Brass	Bronze	Aluminum rolled material	Aluminum alloy castings	Magnesium alloy castings	Zinc alloy castings	Titanium alloys	Nickel alloy	Thermo-setting plastic	Thermo-plastic
C ~0.25%	C0.25% ~0.45%	C 0.45%~	SCM	25~45 HRc	45~55 HRc	50~60 HRc	SUS	SKD	SC	FC	FCD	Cu	Bs	BsC	PB	AL	AC,ADC	MC	ZDC				
												◎	◎	◎		◎	◎		◎				

○ : GOOD ◎ : EXCELLENT

WQOM

JIS SPIRAL FLUTE TAPS



- Suitable for blind hole work as Spiral flute type
- Excellent chip emission

DIN 371-374 376 CARBIDE Uncoated 15° HELIX

EDP No 2.5P	Thread Size	Limits	L	l	d	K	Kl	Z	DIN Type
WQOM0305025	M3X0.5	6H	56	11	3.5	2.7	6	3	371
WQOM0407025	M4X0.7	6H	63	13	4.5	3.4	6	3	371
WQOM0508025	M5X0.8	6H	70	15	6	4.9	8	3	371
WQOM0610025	M6X1.0	6H	80	17	6	4.9	8	3	371
WQOM0810025	M8X1.0	6H	90	17	6	4.9	8	3	374
WQOM0812525	M8X1.25	6H	90	20	8	6.2	9	3	371
WQOM1010025	M10X1.0	6H	90	18	7	5.5	8	3	374
WQOM1012525	M10X1.25	6H	100	22	7	5.5	8	3	374
WQOM1015025	M10X1.5	6H	100	22	10	8	11	3	371
WQOM1210025	M12X1.0	6H	100	18	9	7	10	3	374
WQOM1212525	M12X1.25	6H	100	22	9	7	10	3	374
WQOM1215025	M12X1.5	6H	100	22	9	7	10	3	374
WQOM1217525	M12X1.75	6H	110	24	9	7	10	3	376

■ **Applicable Working Material**

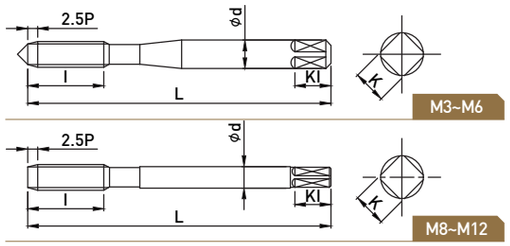
Low Carbon Steels	Medium Carbon Steels	High Carbon Steels	Alloy Steel	Hardened Steels			Stainless Steels	Tool Steels	Cast Steels	Cast Iron	High Strength Steels	Copper	Brass	Casting Brass	Bronze	Aluminum rolled material	Aluminum alloy castings	Magnesium alloy castings	Zinc alloy castings	Titanium alloys	Nickel alloy	Thermo-setting plastic	Thermo-plastic
C ~0.25%	C0.25% ~0.45%	C 0.45%~	SCM	25~45 HRc	45~55 HRc	50~60 HRc	SUS	SKD	SC	FC	FCD	Cu	Bs	BsC	PB	AL	AC,ADC	MC	ZDC				
										○	◎	◎	◎	◎	○	○	○	○	○				◎

○ : GOOD ◎ : EXCELLENT

Carbide Tap

WQCM

DIN SPIRAL FLUTE TAPS



- Improvement of wear resistance by applied to TiCN Coating
- Suitable for blind hole work as Spiral flute type
- Excellent chip emission

DIN 371-374 376 | CARBIDE | TiCN | 15° HELIX

EDP No 2.5P	Thread Size	Limits	L	l	d	K	Kl	Z	DIN Type
WQCM0305025	M3X0.5	6H	56	11	3.5	2.7	6	3	371
WQCM0407025	M4X0.7	6H	63	13	4.5	3.4	6	3	371
WQCM0508025	M5X0.8	6H	70	15	6	4.9	8	3	371
WQCM0610025	M6X1.0	6H	80	17	6	4.9	8	3	371
WQCM0810025	M8X1.0	6H	90	17	6	4.9	8	3	374
WQCM0812525	M8X1.25	6H	90	20	8	6.2	9	3	371
WQCM1010025	M10X1.0	6H	90	18	7	5.5	8	3	374
WQCM1012525	M10X1.25	6H	100	22	7	5.5	8	3	374
WQCM1015025	M10X1.5	6H	100	22	10	8	11	3	371
WQCM1210025	M12X1.0	6H	100	18	9	7	10	3	374
WQCM1212525	M12X1.25	6H	100	22	9	7	10	3	374
WQCM1215025	M12X1.5	6H	100	22	9	7	10	3	374
WQCM1217525	M12X1.75	6H	110	24	9	7	10	3	376

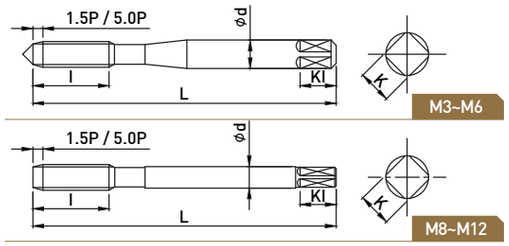
■ Applicable Working Material

Low Carbon Steels	Medium Carbon Steels	High Carbon Steels	Alloy Steel	Hardened Steels			Stainless Steels	Tool Steels	Cast Steels	Cast Iron	High Strength Steels	Copper	Brass	Casting Brass	Bronze	Aluminum rolled material	Aluminum alloy castings	Magnesium alloy castings	Zinc alloy castings	Titanium alloys	Nickel alloy	Thermo-setting plastic	Thermo-plastic
C ~0.25%	C0.25% ~0.45%	C 0.45%~	SCM	25~45 HRc	45~55 HRc	50~60 HRc	SUS	SKD	SC	FC	FCD	Cu	Bs	BsC	PB	AL	AC,ADC	MC	ZDC				
										○	◎	◎	◎	◎	○	○	◎	◎	◎				◎

○ : GOOD ◎ : EXCELLENT

WGOM

DIN STRAIGHT FLUTE TAPS



- Suitable for through hole work as Straight flute type

DIN 371-374 376 | CARBIDE | Uncoated

EDP No 1.5P	EDP No 5P	Thread Size	Limits	L	l	d	K	Kl	Z	DIN Type
WGOM0305015	WGOM0305050	M3X0.5	6H	56	11	3.5	2.7	6	3	371
WGOM0407015	WGOM0407050	M4X0.7	6H	63	13	4.5	3.4	6	3	371
WGOM0508015	WGOM0508050	M5X0.8	6H	70	15	6	4.9	8	3	371
WGOM0610015	WGOM0610050	M6X1.0	6H	80	17	6	4.9	8	3	371
WGOM0810015	WGOM0810050	M8X1.0	6H	90	17	6	4.9	8	4	374
WGOM0812515	WGOM0812550	M8X1.25	6H	90	20	8	6.2	9	4	371
WGOM1010015	WGOM1010050	M10X1.0	6H	90	18	7	5.5	8	4	374
WGOM1012515	WGOM1012550	M10X1.25	6H	100	22	7	5.5	8	4	374
WGOM1015015	WGOM1015050	M10X1.5	6H	100	22	10	8	11	4	371
WGOM1210015	WGOM1210050	M12X1.0	6H	100	18	9	7	10	4	374
WGOM1212515	WGOM1212550	M12X1.25	6H	100	22	9	7	10	4	374
WGOM1215015	WGOM1215050	M12X1.5	6H	100	22	9	7	10	4	374
WGOM1217515	WGOM1217550	M12X1.75	6H	110	24	9	7	10	4	376

1,5P Tap is removed external center as bottoming type

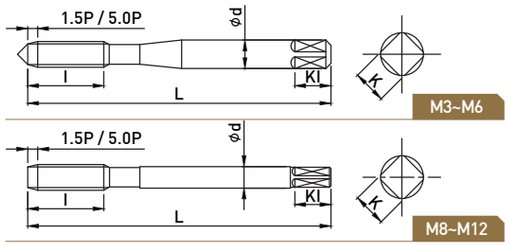
■ Applicable Working Material

Low Carbon Steels	Medium Carbon Steels	High Carbon Steels	Alloy Steel	Hardened Steels			Stainless Steels	Tool Steels	Cast Steels	Cast Iron	High Strength Steels	Copper	Brass	Casting Brass	Bronze	Aluminum rolled material	Aluminum alloy castings	Magnesium alloy castings	Zinc alloy castings	Titanium alloys	Nickel alloy	Thermo-setting plastic	Thermo-plastic
C ~0.25%	C0.25% ~0.45%	C 0.45%~	SCM	25~45 HRc	45~55 HRc	50~60 HRc	SUS	SKD	SC	FC	FCD	Cu	Bs	BsC	PB	AL	AC,ADC	MC	ZDC				
										◎	○		○	○	◎		○	○	○			○	

○ : GOOD ◎ : EXCELLENT

WGCM

DIN STRAIGHT FLUTE TAPS



- Improvement of wear resistance by applied to TiCN Coating
- Suitable for through hole work as Straight flute type

DIN 371-374 376 | CARBIDE | TiCN

EDP No		Thread Size	Limits	L	l	d	K	Kl	Z	DIN Type
1.5P	5P									
WGCM0305015	WGCM0305050	M3X0.5	6H	56	11	3.5	2.7	6	3	371
WGCM0407015	WGCM0407050	M4X0.7	6H	63	13	4.5	3.4	6	3	371
WGCM0508015	WGCM0508050	M5X0.8	6H	70	15	6	4.9	8	3	371
WGCM0610015	WGCM0610050	M6X1.0	6H	80	17	6	4.9	8	3	371
WGCM0810015	WGCM0810050	M8X1.0	6H	90	17	6	4.9	8	4	374
WGCM0812515	WGCM0812550	M8X1.25	6H	90	20	8	6.2	9	4	371
WGCM1010015	WGCM1010050	M10X1.0	6H	90	18	7	5.5	8	4	374
WGCM1012515	WGCM1012550	M10X1.25	6H	100	22	7	5.5	8	4	374
WGCM1015015	WGCM1015050	M10X1.5	6H	100	22	10	8	11	4	371
WGCM1210015	WGCM1210050	M12X1.0	6H	100	18	9	7	10	4	374
WGCM1212515	WGCM1212550	M12X1.25	6H	100	22	9	7	10	4	374
WGCM1215015	WGCM1215050	M12X1.5	6H	100	22	9	7	10	4	374
WGCM1217515	WGCM1217550	M12X1.75	6H	110	24	9	7	10	4	376

1,5P Tap is removed external center as bottoming type

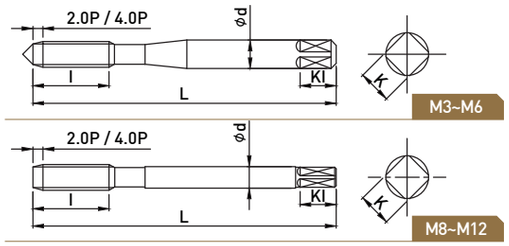
■ Applicable Working Material

Low Carbon Steels	Medium Carbon Steels	High Carbon Steels	Alloy Steel	Hardened Steels			Stainless Steels	Tool Steels	Cast Steels	Cast Iron	High Strength Steels	Copper	Brass	Casting Brass	Bronze	Aluminum rolled material	Aluminum alloy castings	Magnesium alloy castings	Zinc alloy castings	Titanium alloys	Nickel alloy	Thermo-setting plastic	Thermo-plastic
C ~0.25%	C0.25% ~0.45%	C 0.45%~	SCM	25~45 HRc	45~55 HRc	50~60 HRc	SUS	SKD	SC	FC	FCD	Cu	Bs	BsC	PB	AL	AC,ADC	MC	ZDC				
										◎	○		○	○	◎		○	○	○			○	

○ : GOOD ◎ : EXCELLENT

WMOM

DIN ROLL TAPS



- Suitable for blind hole work and through hole work
- Applied to oil groove design for outside fueling

DIN 371-374 376 | CARBIDE | Uncoated

EDP No		Thread Size	Limits	L	l	d	K	Kl	Oil Groove
2P	4P								
WMOM0305020S	-	M3x0.5	6HX	56	11	3.5	2.7	6	S
WMOM0305020M	WMOM0305040M	M3x0.5	6HX	56	11	3.5	2.7	6	M
WMOM0407020S	-	M4x0.7	6HX	63	13	4.5	3.4	6	S
WMOM0407020M	WMOM0407040M	M4x0.7	6HX	63	13	4.5	3.4	6	M
WMOM0508020S	-	M5x0.8	6HX	70	15	6	4.9	8	S
WMOM0508020M	WMOM0508040M	M5x0.8	6HX	70	15	6	4.9	8	M
WMOM0610020S	-	M6x1.0	6HX	80	17	6	4.9	8	S
WMOM0610020M	WMOM0610040M	M6x1.0	6HX	80	17	6	4.9	8	M
WMOM0810020S	-	M8x1.0	6HX	90	17	6	4.9	8	S
WMOM0810020M	WMOM0810040M	M8x1.0	6HX	90	17	6	4.9	8	M
WMOM0812520S	-	M8x1.25	6HX	90	20	8	6.2	9	S
WMOM0812520M	WMOM0812540M	M8x1.25	6HX	90	20	8	6.2	9	M
WMOM1010020S	-	M10x1.0	6HX	90	18	7	5.5	8	S
WMOM1010020M	WMOM1010040M	M10x1.0	6HX	90	18	7	5.5	8	M
WMOM1012520S	-	M10x1.25	6HX	100	22	7	5.5	8	S
WMOM1012520M	WMOM1012540M	M10x1.25	6HX	100	22	7	5.5	8	M
WMOM1015020S	-	M10x1.5	6HX	100	22	10	8	11	S
WMOM1015020M	WMOM1015040M	M10x1.5	6HX	100	22	10	8	11	M
WMOM1210020S	-	M12x1.0	6HX	100	18	9	7	10	S
WMOM1210020M	WMOM1210040M	M12x1.0	6HX	100	18	9	7	10	M
WMOM1212520S	-	M12x1.25	6HX	100	22	9	7	10	S
WMOM1212520M	WMOM1212540M	M12x1.25	6HX	100	22	9	7	10	M
WMOM1215020S	-	M12x1.5	6HX	100	22	9	7	10	S
WMOM1215020M	WMOM1215040M	M12x1.5	6HX	100	22	9	7	10	M
WMOM1217520S	-	M12x1.75	6HX	110	24	9	7	10	S
WMOM1217520M	WMOM1217540M	M12x1.75	6HX	110	24	9	7	10	M

2,0P Tap is removed external center as bottoming type

Oil groove S : 1 oil groove
Oil groove M : 4 oil groove

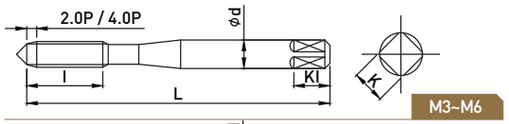
■ Applicable Working Material

Low Carbon Steels	Medium Carbon Steels	High Carbon Steels	Alloy Steel	Hardened Steels			Stainless Steels	Tool Steels	Cast Steels	Cast Iron	High Strength Steels	Copper	Brass	Casting Brass	Bronze	Aluminum rolled material	Aluminum alloy castings	Magnesium alloy castings	Zinc alloy castings	Titanium alloys	Nickel alloy	Thermo-setting plastic	Thermo-plastic
C ~0.25%	C0.25% ~0.45%	C 0.45%~	SCM	25~45 HRc	45~55 HRc	50~60 HRc	SUS	SKD	SC	FC	FCD	Cu	Bs	BsC	PB	AL	AC,ADC	MC	ZDC				
												◎	◎	◎		◎	◎		◎				

○ : GOOD ◎ : EXCELLENT

WMCM

DIN ROLL TAPS



- Improvement of wear resistance by applied to TiCN Coating
- Suitable for blind hole work and through hole work
- Applied to oil groove design for outside fueling

DIN 371-374 376 | CARBIDE | TiCN

EDP No 2P	EDP No 4P	Thread Size	Limits	L	l	d	K	Kl	Oil Groove
WMCM0305020S	-	M3x0.5	6HX	56	11	3.5	2.7	6	S
WMCM0305020M	WMCM0305040M	M3x0.5	6HX	56	11	3.5	2.7	6	M
WMCM0407020S	-	M4x0.7	6HX	63	13	4.5	3.4	6	S
WMCM0407020M	WMCM0407040M	M4x0.7	6HX	63	13	4.5	3.4	6	M
WMCM0508020S	-	M5x0.8	6HX	70	15	6	4.9	8	S
WMCM0508020M	WMCM0508040M	M5x0.8	6HX	70	15	6	4.9	8	M
WMCM0610020S	-	M6x1.0	6HX	80	17	6	4.9	8	S
WMCM0610020M	WMCM0610040M	M6x1.0	6HX	80	17	6	4.9	8	M
WMCM0810020S	-	M8x1.0	6HX	90	17	8	6.2	9	S
WMCM0810020M	WMCM0810040M	M8x1.0	6HX	90	17	8	6.2	9	M
WMCM0812520S	-	M8x1.25	6HX	90	20	8	6.2	9	S
WMCM0812520M	WMCM0812540M	M8x1.25	6HX	90	20	8	6.2	9	M
WMCM1010020S	-	M10x1.0	6HX	90	18	10	8	11	S
WMCM1010020M	WMCM1010040M	M10x1.0	6HX	90	18	10	8	11	M
WMCM1012520S	-	M10x1.25	6HX	100	22	10	8	11	S
WMCM1012520M	WMCM1012540M	M10x1.25	6HX	100	22	10	8	11	M
WMCM1015020S	-	M10x1.5	6HX	100	22	10	8	11	S
WMCM1015020M	WMCM1015040M	M10x1.5	6HX	100	22	10	8	11	M
WMCM1210020S	-	M12x1.0	6HX	100	18	9	7	10	S
WMCM1210020M	WMCM1210040M	M12x1.0	6HX	100	18	9	7	10	M
WMCM1212520S	-	M12x1.25	6HX	100	22	9	7	10	S
WMCM1212520M	WMCM1212540M	M12x1.25	6HX	100	22	9	7	10	M
WMCM1215020S	-	M12x1.5	6HX	100	22	9	7	10	S
WMCM1215020M	WMCM1215040M	M12x1.5	6HX	100	22	9	7	10	M
WMCM1217520S	-	M12x1.75	6HX	110	24	9	7	10	S
WMCM1217520M	WMCM1217540M	M12x1.75	6HX	110	24	9	7	10	M

2,0P Tap is removed external center as bottoming

Oil groove S : 1 oil groove
Oil groove M : 4 oil groove

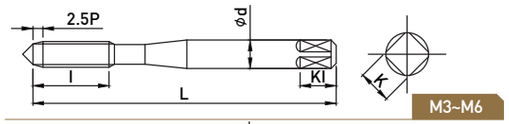
■ Applicable Working Material

Low Carbon Steels	Medium Carbon Steels	High Carbon Steels	Alloy Steel	Hardened Steels			Stainless Steels	Tool Steels	Cast Steels	Cast Iron	High Strength Steels	Copper	Brass	Casting Brass	Bronze	Aluminum rolled material	Aluminum alloy castings	Magnesium alloy castings	Zinc alloy castings	Titanium alloys	Nickel alloy	Thermo-setting plastic	Thermo-plastic
C ~0.25%	C0.25% ~0.45%	C 0.45%~	SCM	25~45 HRc	45~55 HRc	50~60 HRc	SUS	SKD	SC	FC	FCD	Cu	Bs	BsC	PB	AL	AC,ADC	MC	ZDC				
◎	◎	○	○				◎					◎	◎	◎		◎	◎		◎				

○ : GOOD ◎ : EXCELLENT

VPOM

JIS SPIRAL FLUTE TAPS



- Suitable for blind hole work as Spiral flute type
- Excellent chip emission

HSSE | Uncoated | 35° HELIX

EDP No 2.5P	Thread Size	Limits	L	l	d	K	Kl	Z
VPOM0305025	M3 X 0.5	WH2	46	11	4	3.2	6	3
VPOM0407025	M4 X 0.7	WH2	52	13	5	4	7	3
VPOM04507525	M4.5 X 0.75	WH2	55	13	5	4	7	3
VPOM0508025	M5 X 0.8	WH2	60	16	5.5	4.5	7	3
VPOM0610025	M6 X 1.0	WH2	62	19	6	4.5	7	3
VPOM0810025	M8 X 1.0	WH2	70	22	6.2	5	8	3
VPOM0812525	M8 X 1.25	WH2	70	22	6.2	5	8	3
VPOM1012525	M10 X 1.25	WH2	75	24	7	5.5	8	3
VPOM1015025	M10 X 1.5	WH2	75	24	7	5.5	8	3
VPOM1210025	M12 X 1.0	WH2	82	29	8.5	6.5	9	3
VPOM1212525	M12 X 1.25	WH2	82	29	8.5	6.5	9	3
VPOM1215025	M12 X 1.5	WH2	82	29	8.5	6.5	9	3
VPOM1217525	M12 X 1.75	WH2	82	29	8.5	6.5	9	3
VPOM1415025	M14 X 1.5	WH2	88	30	10.5	8	11	3
VPOM1420025	M14 X 2.0	WH2	88	30	10.5	8	11	3
VPOM1615025	M16 X 1.5	WH2	95	32	12.5	10	13	3
VPOM1620025	M16 X 2.0	WH2	95	32	12.5	10	13	3
VPOM1815025	M18 X 1.5	WH2	100	37	14	11	14	4
VPOM1825025	M18 X 2.5	WH3	100	37	14	11	14	4
VPOM2015025	M20 X 1.5	WH3	105	37	15	12	15	4
VPOM2025025	M20 X 2.5	WH3	105	37	15	12	15	4
VPOM2215025	M22 X 1.5	WH3	115	38	17	13	16	4
VPOM2225025	M22 X 2.5	WH3	115	38	17	13	16	4
VPOM2415025	M24 X 1.5	WH3	120	45	19	15	18	4
VPOM2420025	M24 X 2.0	WH3	120	45	19	15	18	4
VPOM2430025	M24 X 3.0	WH4	120	45	19	15	18	4

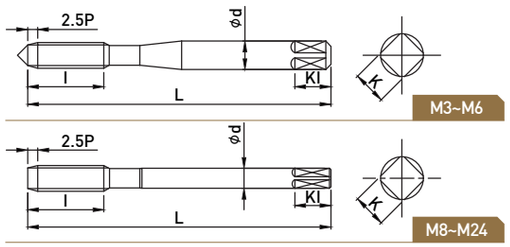
■ Applicable Working Material

Low Carbon Steels	Medium Carbon Steels	High Carbon Steels	Alloy Steel	Hardened Steels			Stainless Steels	Tool Steels	Cast Steels	Cast Iron	High Strength Steels	Copper	Brass	Casting Brass	Bronze	Aluminum rolled material	Aluminum alloy castings	Magnesium alloy castings	Zinc alloy castings	Titanium alloys	Nickel alloy	Thermo-setting plastic	Thermo-plastic
C ~0.25%	C0.25% ~0.45%	C 0.45%~	SCM	25~45 HRc	45~55 HRc	50~60 HRc	SUS	SKD	SC	FC	FCD	Cu	Bs	BsC	PB	AL	AC,ADC	MC	ZDC				
	◎		◎								○	○	○	○	○	○	○	○	○				○

○ : GOOD ◎ : EXCELLENT

VPTM

JIS SPIRAL FLUTE TAPS



- Improvement of wear resistance and deposition resistance by applied to TiN Coating
- Suitable for blind hole work as Spiral flute type
- Excellent chip emission

HSSE | TiN | 35° HELIX

EDP No 2.5P	Thread Size	Limits	L	l	d	K	Kl	Z
VPTM0305025	M3 X 0.5	WH2	46	11	4	3.2	6	3
VPTM0407025	M4 X 0.7	WH2	52	13	5	4	7	3
VPTM04507525	M4.5 X 0.75	WH2	55	13	5	4	7	3
VPTM0508025	M5 X 0.8	WH2	60	16	5.5	4.5	7	3
VPTM0610025	M6 X 1.0	WH2	62	19	6	4.5	7	3
VPTM0810025	M8 X 1.0	WH2	70	22	6.2	5	8	3
VPTM0812525	M8 X 1.25	WH2	70	22	6.2	5	8	3
VPTM1012525	M10 X 1.25	WH2	75	24	7	5.5	8	3
VPTM1015025	M10 X 1.5	WH2	75	24	7	5.5	8	3
VPTM1210025	M12 X 1.0	WH2	82	29	8.5	6.5	9	3
VPTM1212525	M12 X 1.25	WH2	82	29	8.5	6.5	9	3
VPTM1215025	M12 X 1.5	WH2	82	29	8.5	6.5	9	3
VPTM1217525	M12 X 1.75	WH2	82	29	8.5	6.5	9	3
VPTM1415025	M14 X 1.5	WH2	88	30	10.5	8	11	3
VPTM1420025	M14 X 2.0	WH2	88	30	10.5	8	11	3
VPTM1615025	M16 X 1.5	WH2	95	32	12.5	10	13	3
VPTM1620025	M16 X 2.0	WH2	95	32	12.5	10	13	3
VPTM1815025	M18 X 1.5	WH2	100	37	14	11	14	4
VPTM1825025	M18 X 2.5	WH3	100	37	14	11	14	4
VPTM2015025	M20 X 1.5	WH3	105	37	15	12	15	4
VPTM2025025	M20 X 2.5	WH3	105	37	15	12	15	4
VPTM2215025	M22 X 1.5	WH3	115	38	17	13	16	4
VPTM2225025	M22 X 2.5	WH3	115	38	17	13	16	4
VPTM2415025	M24 X 1.5	WH3	120	45	19	15	18	4
VPTM2420025	M24 X 2.0	WH3	120	45	19	15	18	4
VPTM2430025	M24 X 3.0	WH4	120	45	19	15	18	4

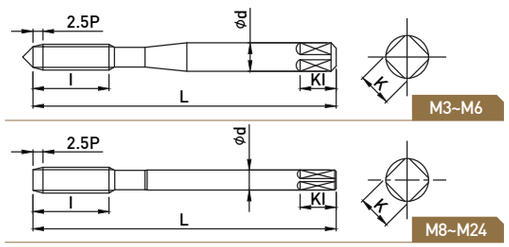
■ Applicable Working Material

Low Carbon Steels	Medium Carbon Steels	High Carbon Steels	Alloy Steel	Hardened Steels			Stainless Steels	Tool Steels	Cast Steels	Cast Iron	High Strength Steels	Copper	Brass	Casting Brass	Bronze	Aluminum rolled material	Aluminum alloy castings	Magnesium alloy castings	Zinc alloy castings	Titanium alloys	Nickel alloy	Thermo-setting plastic	Thermo-plastic
C ~0.25%	C0.25% ~0.45%	C 0.45%~	SCM	25~45 HRc	45~55 HRc	50~60 HRc	SUS	SKD	SC	FC	FCD	Cu	Bs	BsC	PB	AL	AC,ADC	MC	ZDC				
○	○	○	◎								○	○	○	○	○	○	○	○	○	○			○

○ : GOOD ◎ : EXCELLENT

VPCM

JIS SPIRAL FLUTE TAPS



- Improvement of wear resistance by applied to TiCN Coating
- Suitable for blind hole work as Spiral flute type
- Excellent chip emission

HSSE | TiCN | 35° HELIX

EDP No 2.5P	Thread Size	Limits	L	l	d	K	Kl	Z
VPCM0305025	M3 X 0.5	WH2	46	11	4	3.2	6	3
VPCM0407025	M4 X 0.7	WH2	52	13	5	4	7	3
VPCM04507525	M4.5 X 0.75	WH2	55	13	5	4	7	3
VPCM0508025	M5 X 0.8	WH2	60	16	5.5	4.5	7	3
VPCM0610025	M6 X 1.0	WH2	62	19	6	4.5	7	3
VPCM0810025	M8 X 1.0	WH2	70	22	6.2	5	8	3
VPCM0812525	M8 X 1.25	WH2	70	22	6.2	5	8	3
VPCM1012525	M10 X 1.25	WH2	75	24	7	5.5	8	3
VPCM1015025	M10 X 1.5	WH2	75	24	7	5.5	8	3
VPCM1210025	M12 X 1.0	WH2	82	29	8.5	6.5	9	3
VPCM1212525	M12 X 1.25	WH2	82	29	8.5	6.5	9	3
VPCM1215025	M12 X 1.5	WH2	82	29	8.5	6.5	9	3
VPCM1217525	M12 X 1.75	WH2	82	29	8.5	6.5	9	3
VPCM1415025	M14 X 1.5	WH2	88	30	10.5	8	11	3
VPCM1420025	M14 X 2.0	WH2	88	30	10.5	8	11	3
VPCM1615025	M16 X 1.5	WH2	95	32	12.5	10	13	3
VPCM1620025	M16 X 2.0	WH2	95	32	12.5	10	13	3
VPCM1815025	M18 X 1.5	WH2	100	37	14	11	14	4
VPCM1825025	M18 X 2.5	WH3	100	37	14	11	14	4
VPCM2015025	M20 X 1.5	WH3	105	37	15	12	15	4
VPCM2025025	M20 X 2.5	WH3	105	37	15	12	15	4
VPCM2215025	M22 X 1.5	WH3	115	38	17	13	16	4
VPCM2225025	M22 X 2.5	WH3	115	38	17	13	16	4
VPCM2415025	M24 X 1.5	WH3	120	45	19	15	18	4
VPCM2420025	M24 X 2.0	WH3	120	45	19	15	18	4
VPCM2430025	M24 X 3.0	WH4	120	45	19	15	18	4

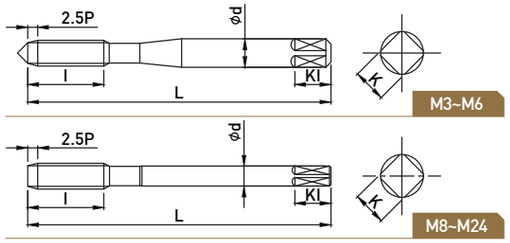
■ Applicable Working Material

Low Carbon Steels	Medium Carbon Steels	High Carbon Steels	Alloy Steel	Hardened Steels			Stainless Steels	Tool Steels	Cast Steels	Cast Iron	High Strength Steels	Copper	Brass	Casting Brass	Bronze	Aluminum rolled material	Aluminum alloy castings	Magnesium alloy castings	Zinc alloy castings	Titanium alloys	Nickel alloy	Thermo-setting plastic	Thermo-plastic
C ~0.25%	C0.25% ~0.45%	C 0.45%~	SCM	25~45 HRc	45~55 HRc	50~60 HRc	SUS	SKD	SC	FC	FCD	Cu	Bs	BsC	PB	AL	AC,ADC	MC	ZDC				
○	○	○	◎								○	○	○	○	○	○	◎	○	○	○	○		○

○ : GOOD ◎ : EXCELLENT

VPHM

JIS SPIRAL FLUTE TAPS



- Improvement of deposition resistance and decrease the friction by applied to Steam HOMO Coating
- Suitable for blind hole work as Spiral flute type
- Excellent chip emission

HSSE HOMO 35° HELIX

EDP No 2.5P	Thread Size	Limits	L	l	d	K	Kl	Z
VPHM0305025	M3 X 0.5	WH2	46	11	4	3.2	6	3
VPHM0407025	M4 X 0.7	WH2	52	13	5	4	7	3
VPHM04507525	M4.5 X 0.75	WH2	55	13	5	4	7	3
VPHM0508025	M5 X 0.8	WH2	60	16	5.5	4.5	7	3
VPHM0610025	M6 X 1.0	WH2	62	19	6	4.5	7	3
VPHM0810025	M8 X 1.0	WH2	70	22	6.2	5	8	3
VPHM0812525	M8 X 1.25	WH2	70	22	6.2	5	8	3
VPHM1012525	M10 X 1.25	WH2	75	24	7	5.5	8	3
VPHM1015025	M10 X 1.5	WH2	75	24	7	5.5	8	3
VPHM1210025	M12 X 1.0	WH2	82	29	8.5	6.5	9	3
VPHM1212525	M12 X 1.25	WH2	82	29	8.5	6.5	9	3
VPHM1215025	M12 X 1.5	WH2	82	29	8.5	6.5	9	3
VPHM1217525	M12 X 1.75	WH2	82	29	8.5	6.5	9	3
VPHM1415025	M14 X 1.5	WH2	88	30	10.5	8	11	3
VPHM1420025	M14 X 2.0	WH2	88	30	10.5	8	11	3
VPHM1615025	M16 X 1.5	WH2	95	32	12.5	10	13	3
VPHM1620025	M16 X 2.0	WH2	95	32	12.5	10	13	3
VPHM1815025	M18 X 1.5	WH2	100	37	14	11	14	4
VPHM1825025	M18 X 2.5	WH3	100	37	14	11	14	4
VPHM2015025	M20 X 1.5	WH3	105	37	15	12	15	4
VPHM2025025	M20 X 2.5	WH3	105	37	15	12	15	4
VPHM2215025	M22 X 1.5	WH3	115	38	17	13	16	4
VPHM2225025	M22 X 2.5	WH3	115	38	17	13	16	4
VPHM2415025	M24 X 1.5	WH3	120	45	19	15	18	4
VPHM2420025	M24 X 2.0	WH3	120	45	19	15	18	4
VPHM2430025	M24 X 3.0	WH4	120	45	19	15	18	4

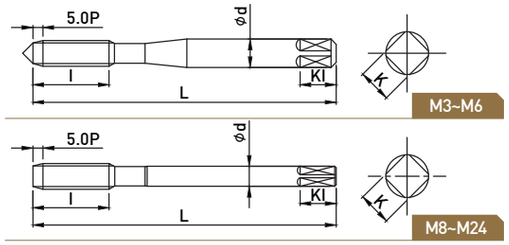
■ **Applicable Working Material**

Low Carbon Steels	Medium Carbon Steels	High Carbon Steels	Alloy Steel	Hardened Steels			Stainless Steels	Tool Steels	Cast Steels	Cast Iron	High Strength Steels	Copper	Brass	Casting Brass	Bronze	Aluminum rolled material	Aluminum alloy castings	Magnesium alloy castings	Zinc alloy castings	Titanium alloys	Nickel alloy	Thermo-setting plastic	Thermo-plastic
C ~0.25%	C0.25% ~0.45%	C 0.45%~	SCM	25~45 HRc	45~55 HRc	50~60 HRc	SUS	SKD	SC	FC	FCD	Cu	Bs	BsC	PB	AL	AC,ADC	MC	ZDC				
○	○								○														○

○ : GOOD ◎ : EXCELLENT

VNOM

JIS SPIRAL POINT TAPS



- Spiral Point type , chip emit to direction of front
- For through hole work

HSSE Uncoated

EDP No 5P	Thread Size	Limits	L	l	d	K	Kl	Z
VNOM0305050	M3 X 0.5	WH2	46	11	4	3.2	6	3
VNOM0407050	M4 X 0.7	WH2	52	13	5	4	7	3
VNOM04507550	M4.5 X 0.75	WH2	55	13	5	4	7	3
VNOM0508050	M5 X 0.8	WH2	60	16	5.5	4.5	7	3
VNOM0610050	M6 X 1.0	WH2	62	19	6	4.5	7	3
VNOM0810050	M8 X 1.0	WH3	70	22	6.2	5	8	3
VNOM0812550	M8 X 1.25	WH3	70	22	6.2	5	8	3
VNOM1012550	M10 X 1.25	WH3	75	24	7	5.5	8	3
VNOM1015050	M10 X 1.5	WH3	75	24	7	5.5	8	3
VNOM1210050	M12 X 1.0	WH3	82	29	8.5	6.5	9	3
VNOM1212550	M12 X 1.25	WH3	82	29	8.5	6.5	9	3
VNOM1215050	M12 X 1.5	WH3	82	29	8.5	6.5	9	3
VNOM1217550	M12 X 1.75	WH4	82	29	8.5	6.5	9	3
VNOM1415050	M14 X 1.5	WH3	88	30	10.5	8	11	3
VNOM1420050	M14 X 2.0	WH4	88	30	10.5	8	11	3
VNOM1615050	M16 X 1.5	WH3	95	32	12.5	10	13	3
VNOM1620050	M16 X 2.0	WH4	95	32	12.5	10	13	3
VNOM1815050	M18 X 1.5	WH4	100	37	14	11	14	3
VNOM1825050	M18 X 2.5	WH4	100	37	14	11	14	3
VNOM2015050	M20 X 1.5	WH4	105	37	15	12	15	3
VNOM2025050	M20 X 2.5	WH4	105	37	15	12	15	3
VNOM2215050	M22 X 1.5	WH4	115	38	17	13	16	3
VNOM2225050	M22 X 2.5	WH4	115	38	17	13	16	3
VNOM2415050	M24 X 1.5	WH4	120	45	19	15	18	3
VNOM2420050	M24 X 2.0	WH4	120	45	19	15	18	3
VNOM2430050	M24 X 3.0	WH4	120	45	19	15	18	3

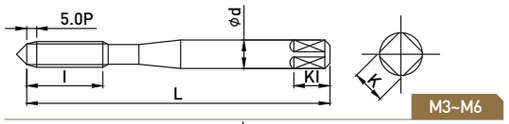
■ **Applicable Working Material**

Low Carbon Steels	Medium Carbon Steels	High Carbon Steels	Alloy Steel	Hardened Steels			Stainless Steels	Tool Steels	Cast Steels	Cast Iron	High Strength Steels	Copper	Brass	Casting Brass	Bronze	Aluminum rolled material	Aluminum alloy castings	Magnesium alloy castings	Zinc alloy castings	Titanium alloys	Nickel alloy	Thermo-setting plastic	Thermo-plastic
C ~0.25%	C0.25% ~0.45%	C 0.45%~	SCM	25~45 HRc	45~55 HRc	50~60 HRc	SUS	SKD	SC	FC	FCD	Cu	Bs	BsC	PB	AL	AC,ADC	MC	ZDC				
	○	○	◎							○	○	○	○	○	○	◎	○	○	○				○

○ : GOOD ◎ : EXCELLENT

VNTM

JIS FLUTE POINT TAPS



- Improvement of wear resistance and deposition resistance by applied to TiN Coating
- Spiral Point type , chip emit to direction of front
- For through hole work

HSSE TiN

EDP No 5P	Thread Size	Limits	L	l	d	K	Kl	Z
VNTM0305050	M3 X 0.5	WH2	46	11	4	3.2	6	3
VNTM0407050	M4 X 0.7	WH2	52	13	5	4	7	3
VNTM04507550	M4.5 X 0.75	WH2	55	13	5	4	7	3
VNTM0508050	M5 X 0.8	WH2	60	16	5.5	4.5	7	3
VNTM0610050	M6 X 1.0	WH2	62	19	6	4.5	7	3
VNTM0810050	M8 X 1.0	WH3	70	22	6.2	5	8	3
VNTM0812550	M8 X 1.25	WH3	70	22	6.2	5	8	3
VNTM1012550	M10 X 1.25	WH3	75	24	7	5.5	8	3
VNTM1015050	M10 X 1.5	WH3	75	24	7	5.5	8	3
VNTM1210050	M12 X 1.0	WH3	82	29	8.5	6.5	9	3
VNTM1212550	M12 X 1.25	WH3	82	29	8.5	6.5	9	3
VNTM1215050	M12 X 1.5	WH3	82	29	8.5	6.5	9	3
VNTM1217550	M12 X 1.75	WH4	82	29	8.5	6.5	9	3
VNTM1415050	M14 X 1.5	WH3	88	30	10.5	8	11	3
VNTM1420050	M14 X 2.0	WH4	88	30	10.5	8	11	3
VNTM1615050	M16 X 1.5	WH3	95	32	12.5	10	13	3
VNTM1620050	M16 X 2.0	WH4	95	32	12.5	10	13	3
VNTM1815050	M18 X 1.5	WH4	100	37	14	11	14	3
VNTM1825050	M18 X 2.5	WH4	100	37	14	11	14	3
VNTM2015050	M20 X 1.5	WH4	105	37	15	12	15	3
VNTM2025050	M20 X 2.5	WH4	105	37	15	12	15	3
VNTM2215050	M22 X 1.5	WH4	115	38	17	13	16	3
VNTM2225050	M22 X 2.5	WH4	115	38	17	13	16	3
VNTM2415050	M24 X 1.5	WH4	120	45	19	15	18	3
VNTM2420050	M24 X 2.0	WH4	120	45	19	15	18	3
VNTM2430050	M24 X 3.0	WH4	120	45	19	15	18	3

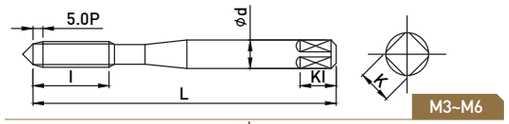
■ **Applicable Working Material**

Low Carbon Steels	Medium Carbon Steels	High Carbon Steels	Alloy Steel	Hardened Steels			Stainless Steels	Tool Steels	Cast Steels	Cast Iron	High Strength Steels	Copper	Brass	Casting Brass	Bronze	Aluminum rolled material	Aluminum alloy castings	Magnesium alloy castings	Zinc alloy castings	Titanium alloys	Nickel alloy	Thermo-setting plastic	Thermo-plastic
C ~0.25%	C0.25% ~0.45%	C 0.45%~	SCM	25~45 HRc	45~55 HRc	50~60 HRc	SUS	SKD	SC	FC	FCD	Cu	Bs	BsC	PB	AL	AC,ADC	MC	ZDC				
○	○	○	○				◎	○	○	○	○	○	○	○	○	○	○	○	○	○	○		○

○ : GOOD ◎ : EXCELLENT

VNCM

JIS FLUTE POINT TAPS



- Improvement of wear resistance by applied to TiCN Coating
- Spiral Point type , chip emit to direction of front
- For through hole work

HSSE TiCN

EDP No 5P	Thread Size	Limits	L	l	d	K	Kl	Z
VNCM0305050	M3 X 0.5	WH2	46	11	4	3.2	6	3
VNCM0407050	M4 X 0.7	WH2	52	13	5	4	7	3
VNCM04507550	M4.5 X 0.75	WH2	55	13	5	4	7	3
VNCM0508050	M5 X 0.8	WH2	60	16	5.5	4.5	7	3
VNCM0610050	M6 X 1.0	WH2	62	19	6	4.5	7	3
VNCM0810050	M8 X 1.0	WH3	70	22	6.2	5	8	3
VNCM0812550	M8 X 1.25	WH3	70	22	6.2	5	8	3
VNCM1012550	M10 X 1.25	WH3	75	24	7	5.5	8	3
VNCM1015050	M10 X 1.5	WH3	75	24	7	5.5	8	3
VNCM1210050	M12 X 1.0	WH3	82	29	8.5	6.5	9	3
VNCM1212550	M12 X 1.25	WH3	82	29	8.5	6.5	9	3
VNCM1215050	M12 X 1.5	WH3	82	29	8.5	6.5	9	3
VNCM1217550	M12 X 1.75	WH4	82	29	8.5	6.5	9	3
VNCM1415050	M14 X 1.5	WH3	88	30	10.5	8	11	3
VNCM1420050	M14 X 2.0	WH4	88	30	10.5	8	11	3
VNCM1615050	M16 X 1.5	WH3	95	32	12.5	10	13	3
VNCM1620050	M16 X 2.0	WH4	95	32	12.5	10	13	3
VNCM1815050	M18 X 1.5	WH4	100	37	14	11	14	3
VNCM1825050	M18 X 2.5	WH4	100	37	14	11	14	3
VNCM2015050	M20 X 1.5	WH4	105	37	15	12	15	3
VNCM2025050	M20 X 2.5	WH4	105	37	15	12	15	3
VNCM2215050	M22 X 1.5	WH4	115	38	17	13	16	3
VNCM2225050	M22 X 2.5	WH4	115	38	17	13	16	3
VNCM2415050	M24 X 1.5	WH4	120	45	19	15	18	3
VNCM2420050	M24 X 2.0	WH4	120	45	19	15	18	3
VNCM2430050	M24 X 3.0	WH4	120	45	19	15	18	3

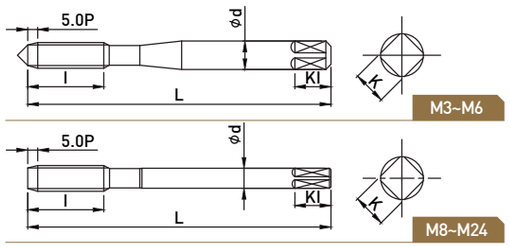
■ **Applicable Working Material**

Low Carbon Steels	Medium Carbon Steels	High Carbon Steels	Alloy Steel	Hardened Steels			Stainless Steels	Tool Steels	Cast Steels	Cast Iron	High Strength Steels	Copper	Brass	Casting Brass	Bronze	Aluminum rolled material	Aluminum alloy castings	Magnesium alloy castings	Zinc alloy castings	Titanium alloys	Nickel alloy	Thermo-setting plastic	Thermo-plastic
C ~0.25%	C0.25% ~0.45%	C 0.45%~	SCM	25~45 HRc	45~55 HRc	50~60 HRc	SUS	SKD	SC	FC	FCD	Cu	Bs	BsC	PB	AL	AC,ADC	MC	ZDC				
◎	◎	◎	○				○	○	○	○	○	○	○	○	○	○	○	○	○				○

○ : GOOD ◎ : EXCELLENT

VNHM

JIS FLUTE POINT TAPS



- Improvement of deposition resistance and decrease the friction by applied to Steam HOMO Coating
- Spiral Point type , chip emit to direction of front
- For through hole work

HSSE HOMO

EDP No 5P	Thread Size	Limits	L	l	d	K	Kl	Z
VNHM0305050	M3 X 0.5	WH2	46	11	4	3.2	6	3
VNHM0407050	M4 X 0.7	WH2	52	13	5	4	7	3
VNHM04507550	M4.5 X 0.75	WH2	55	13	5	4	7	3
VNHM0508050	M5 X 0.8	WH2	60	16	5.5	4.5	7	3
VNHM0610050	M6 X 1.0	WH2	62	19	6	4.5	7	3
VNHM0810050	M8 X 1.0	WH3	70	22	6.2	5	8	3
VNHM0812550	M8 X 1.25	WH3	70	22	6.2	5	8	3
VNHM1012550	M10 X 1.25	WH3	75	24	7	5.5	8	3
VNHM1015050	M10 X 1.5	WH3	75	24	7	5.5	8	3
VNHM1210050	M12 X 1.0	WH3	82	29	8.5	6.5	9	3
VNHM1212550	M12 X 1.25	WH3	82	29	8.5	6.5	9	3
VNHM1215050	M12 X 1.5	WH3	82	29	8.5	6.5	9	3
VNHM1217550	M12 X 1.75	WH4	82	29	8.5	6.5	9	3
VNHM1415050	M14 X 1.5	WH3	88	30	10.5	8	11	3
VNHM1420050	M14 X 2.0	WH4	88	30	10.5	8	11	3
VNHM1615050	M16 X 1.5	WH3	95	32	12.5	10	13	3
VNHM1620050	M16 X 2.0	WH4	95	32	12.5	10	13	3
VNHM1815050	M18 X 1.5	WH4	100	37	14	11	14	3
VNHM1825050	M18 X 2.5	WH4	100	37	14	11	14	3
VNHM2015050	M20 X 1.5	WH4	105	37	15	12	15	3
VNHM2025050	M20 X 2.5	WH4	105	37	15	12	15	3
VNHM2215050	M22 X 1.5	WH4	115	38	17	13	16	3
VNHM2225050	M22 X 2.5	WH4	115	38	17	13	16	3
VNHM2415050	M24 X 1.5	WH4	120	45	19	15	18	3
VNHM2420050	M24 X 2.0	WH4	120	45	19	15	18	3
VNHM2430050	M24 X 3.0	WH4	120	45	19	15	18	3

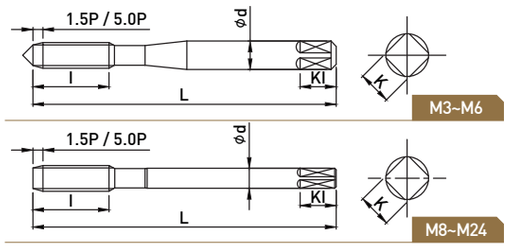
■ Applicable Working Material

Low Carbon Steels	Medium Carbon Steels	High Carbon Steels	Alloy Steel	Hardened Steels			Stainless Steels	Tool Steels	Cast Steels	Cast Iron	High Strength Steels	Copper	Brass	Casting Brass	Bronze	Aluminum rolled material	Aluminum alloy castings	Magnesium alloy castings	Zinc alloy castings	Titanium alloys	Nickel alloy	Thermo-setting plastic	Thermo-plastic
C ~0.25%	C0.25% ~0.45%	C 0.45%~	SCM	25~45 HRc	45~55 HRc	50~60 HRc	SUS	SKD	SC	FC	FCD	Cu	Bs	BsC	PB	AL	AC,ADC	MC	ZDC				
◎	◎		○						○														○

○ : GOOD ◎ : EXCELLENT

VSOM

JIS STRAIGHT FLUTE TAPS



- Suitable for through hole work as Straight flute type

HSSE Uncoated

EDP No 1.5P	EDP No 5P	Thread Size	Limits	L	l	d	K	Kl	Z
VSOM0305015	VSOM0305050	M3 X 0.5	WH2	46	11	4	3.2	6	3
VSOM0407015	VSOM0407050	M4 X 0.7	WH2	52	13	5	4	7	3
VSOM04507515	VSOM04507550	M4.5 X 0.75	WH2	55	13	5	4	7	3
VSOM0508015	VSOM0508050	M5 X 0.8	WH2	60	16	5.5	4.5	7	3
VSOM0610015	VSOM0610050	M6 X 1.0	WH2	62	19	6	4.5	7	3
VSOM0810015	VSOM0810050	M8 X 1.0	WH2	70	22	6.2	5	8	4
VSOM0812515	VSOM0812550	M8 X 1.25	WH2	70	22	6.2	5	8	4
VSOM1012515	VSOM1012550	M10 X 1.25	WH2	75	24	7	5.5	8	4
VSOM1015015	VSOM1015050	M10 X 1.5	WH3	75	24	7	5.5	8	4
VSOM1210015	VSOM1210050	M12 X 1.0	WH2	82	29	8.5	6.5	9	4
VSOM1212515	VSOM1212550	M12 X 1.25	WH2	82	29	8.5	6.5	9	4
VSOM1215015	VSOM1215050	M12 X 1.5	WH3	82	29	8.5	6.5	9	4
VSOM1217515	VSOM1217550	M12 X 1.75	WH3	82	29	8.5	6.5	9	4
VSOM1415015	VSOM1415050	M14 X 1.5	WH3	88	30	10.5	8	11	4
VSOM1420015	VSOM1420050	M14 X 2.0	WH3	88	30	10.5	8	11	4
VSOM1615015	VSOM1615050	M16 X 1.5	WH3	95	32	12.5	10	13	4
VSOM1620015	VSOM1620050	M16 X 2.0	WH3	95	32	12.5	10	13	4
VSOM1815015	VSOM1815050	M18 X 1.5	WH3	100	37	14	11	14	4
VSOM1825015	VSOM1825050	M18 X 2.5	WH3	100	37	14	11	14	4
VSOM2015015	VSOM2015050	M20 X 1.5	WH3	105	37	15	12	15	4
VSOM2025015	VSOM2025050	M20 X 2.5	WH3	105	37	15	12	15	4
VSOM2215015	VSOM2215050	M22 X 1.5	WH3	115	38	17	13	16	4
VSOM2225015	VSOM2225050	M22 X 2.5	WH3	115	38	17	13	16	4
VSOM2415015	VSOM2415050	M24 X 1.5	WH3	120	45	19	15	18	4
VSOM2420015	VSOM2420050	M24 X 2.0	WH3	120	45	19	15	18	4
VSOM2430015	VSOM2430050	M24 X 3.0	WH3	120	45	19	15	18	4

1.5P Tap is removed external center as bottoming type

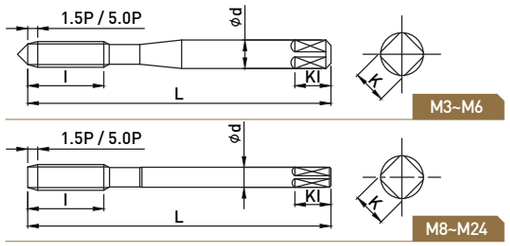
■ Applicable Working Material

Low Carbon Steels	Medium Carbon Steels	High Carbon Steels	Alloy Steel	Hardened Steels			Stainless Steels	Tool Steels	Cast Steels	Cast Iron	High Strength Steels	Copper	Brass	Casting Brass	Bronze	Aluminum rolled material	Aluminum alloy castings	Magnesium alloy castings	Zinc alloy castings	Titanium alloys	Nickel alloy	Thermo-setting plastic	Thermo-plastic
C ~0.25%	C0.25% ~0.45%	C 0.45%~	SCM	25~45 HRc	45~55 HRc	50~60 HRc	SUS	SKD	SC	FC	FCD	Cu	Bs	BsC	PB	AL	AC,ADC	MC	ZDC				
											○		○	○	○		○	○	○				

○ : GOOD ◎ : EXCELLENT

VSTM

JIS STRAIGHT FLUTE TAPS



- Improvement of wear resistance and deposition resistance by applied to TiN Coating
- Suitable for through hole work as Straight flute type

HSSE TiN

EDP No		Thread Size	Limits	L	l	d	K	Kl	Z
1.5P	5P								
VSTM0305015	VSTM0305050	M3 X 0.5	WH2	46	11	4	3.2	6	3
VSTM0407015	VSTM0407050	M4 X 0.7	WH2	52	13	5	4	7	3
VSTM04507515	VSTM04507550	M4.5 X 0.75	WH2	55	13	5	4	7	3
VSTM0508015	VSTM0508050	M5 X 0.8	WH2	60	16	5.5	4.5	7	3
VSTM0610015	VSTM0610050	M6 X 1.0	WH2	62	19	6	4.5	7	3
VSTM0810015	VSTM0810050	M8 X 1.0	WH2	70	22	6.2	5	8	4
VSTM0812515	VSTM0812550	M8 X 1.25	WH2	70	22	6.2	5	8	4
VSTM1012515	VSTM1012550	M10 X 1.25	WH2	75	24	7	5.5	8	4
VSTM1015015	VSTM1015050	M10 X 1.5	WH3	75	24	7	5.5	8	4
VSTM1210015	VSTM1210050	M12 X 1.0	WH2	82	29	8.5	6.5	9	4
VSTM1212515	VSTM1212550	M12 X 1.25	WH2	82	29	8.5	6.5	9	4
VSTM1215015	VSTM1215050	M12 X 1.5	WH3	82	29	8.5	6.5	9	4
VSTM1217515	VSTM1217550	M12 X 1.75	WH3	82	29	8.5	6.5	9	4
VSTM1415015	VSTM1415050	M14 X 1.5	WH3	88	30	10.5	8	11	4
VSTM1420015	VSTM1420050	M14 X 2.0	WH3	88	30	10.5	8	11	4
VSTM1615015	VSTM1615050	M16 X 1.5	WH3	95	32	12.5	10	13	4
VSTM1620015	VSTM1620050	M16 X 2.0	WH3	95	32	12.5	10	13	4
VSTM1815015	VSTM1815050	M18 X 1.5	WH3	100	37	14	11	14	4
VSTM1825015	VSTM1825050	M18 X 2.5	WH3	100	37	14	11	14	4
VSTM2015015	VSTM2015050	M20 X 1.5	WH3	105	37	15	12	15	4
VSTM2025015	VSTM2025050	M20 X 2.5	WH3	105	37	15	12	15	4
VSTM2215015	VSTM2215050	M22 X 1.5	WH3	115	38	17	13	16	4
VSTM2225015	VSTM2225050	M22 X 2.5	WH3	115	38	17	13	16	4
VSTM2415015	VSTM2415050	M24 X 1.5	WH3	120	45	19	15	18	4
VSTM2420015	VSTM2420050	M24 X 2.0	WH3	120	45	19	15	18	4
VSTM2430015	VSTM2430050	M24 X 3.0	WH3	120	45	19	15	18	4

1,5P Tap is removed external center as bottoming type

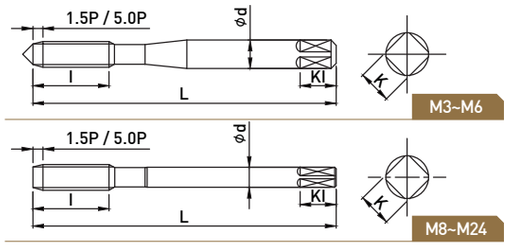
■ Applicable Working Material

Low Carbon Steels	Medium Carbon Steels	High Carbon Steels	Alloy Steel	Hardened Steels			Stainless Steels	Tool Steels	Cast Steels	Cast Iron	High Strength Steels	Copper	Brass	Casting Brass	Bronze	Aluminum rolled material	Aluminum alloy castings	Magnesium alloy castings	Zinc alloy castings	Titanium alloys	Nickel alloy	Thermo-setting plastic	Thermo-plastic
C ~0.25%	C0.25% ~0.45%	C 0.45%~	SCM	25~45 HRc	45~55 HRc	50~60 HRc	SUS	SKD	SC	FC	FCD	Cu	Bs	BsC	PB	AL	AC,ADC	MC	ZDC				
○	○	○	○	○									○	○	○		○	○	○				

○ : GOOD ◎ : EXCELLENT

VSCM

JIS STRAIGHT FLUTE TAPS



- Improvement of wear resistance by applied to TiCN Coating
- Suitable for through hole work as Straight flute type

HSSE TiCN

EDP No		Thread Size	Limits	L	l	d	K	Kl	Z
1.5P	5P								
VSCM0305015	VSCM0305050	M3 X 0.5	WH2	46	11	4	3.2	6	3
VSCM0407015	VSCM0407050	M4 X 0.7	WH2	52	13	5	4	7	3
VSCM04507515	VSCM04507550	M4.5 X 0.75	WH2	55	13	5	4	7	3
VSCM0508015	VSCM0508050	M5 X 0.8	WH2	60	16	5.5	4.5	7	3
VSCM0610015	VSCM0610050	M6 X 1.0	WH2	62	19	6	4.5	7	3
VSCM0810015	VSCM0810050	M8 X 1.0	WH2	70	22	6.2	5	8	4
VSCM0812515	VSCM0812550	M8 X 1.25	WH2	70	22	6.2	5	8	4
VSCM1012515	VSCM1012550	M10 X 1.25	WH2	75	24	7	5.5	8	4
VSCM1015015	VSCM1015050	M10 X 1.5	WH3	75	24	7	5.5	8	4
VSCM1210015	VSCM1210050	M12 X 1.0	WH2	82	29	8.5	6.5	9	4
VSCM1212515	VSCM1212550	M12 X 1.25	WH2	82	29	8.5	6.5	9	4
VSCM1215015	VSCM1215050	M12 X 1.5	WH3	82	29	8.5	6.5	9	4
VSCM1217515	VSCM1217550	M12 X 1.75	WH3	82	29	8.5	6.5	9	4
VSCM1415015	VSCM1415050	M14 X 1.5	WH3	88	30	10.5	8	11	4
VSCM1420015	VSCM1420050	M14 X 2.0	WH3	88	30	10.5	8	11	4
VSCM1615015	VSCM1615050	M16 X 1.5	WH3	95	32	12.5	10	13	4
VSCM1620015	VSCM1620050	M16 X 2.0	WH3	95	32	12.5	10	13	4
VSCM1815015	VSCM1815050	M18 X 1.5	WH3	100	37	14	11	14	4
VSCM1825015	VSCM1825050	M18 X 2.5	WH3	100	37	14	11	14	4
VSCM2015015	VSCM2015050	M20 X 1.5	WH3	105	37	15	12	15	4
VSCM2025015	VSCM2025050	M20 X 2.5	WH3	105	37	15	12	15	4
VSCM2215015	VSCM2215050	M22 X 1.5	WH3	115	38	17	13	16	4
VSCM2225015	VSCM2225050	M22 X 2.5	WH3	115	38	17	13	16	4
VSCM2415015	VSCM2415050	M24 X 1.5	WH3	120	45	19	15	18	4
VSCM2420015	VSCM2420050	M24 X 2.0	WH3	120	45	19	15	18	4
VSCM2430015	VSCM2430050	M24 X 3.0	WH3	120	45	19	15	18	4

1,5P Tap is removed external center as bottoming type

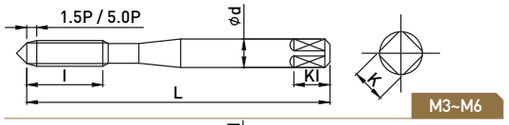
■ Applicable Working Material

Low Carbon Steels	Medium Carbon Steels	High Carbon Steels	Alloy Steel	Hardened Steels			Stainless Steels	Tool Steels	Cast Steels	Cast Iron	High Strength Steels	Copper	Brass	Casting Brass	Bronze	Aluminum rolled material	Aluminum alloy castings	Magnesium alloy castings	Zinc alloy castings	Titanium alloys	Nickel alloy	Thermo-setting plastic	Thermo-plastic
C ~0.25%	C0.25% ~0.45%	C 0.45%~	SCM	25~45 HRc	45~55 HRc	50~60 HRc	SUS	SKD	SC	FC	FCD	Cu	Bs	BsC	PB	AL	AC,ADC	MC	ZDC				
○	○	○	○	○									○	○	○		○	○	○				

○ : GOOD ◎ : EXCELLENT

VSHM

JIS STRAIGHT FLUTE TAPS



- Improvement of deposition resistance and decrease the friction by applied to Steam HOMO Coating
- Suitable for through hole work as Straight flute type

HSSE HOMO

EDP No		Thread Size	Limits	L	l	d	K	Kl	Z
1.5P	5P								
VSHM0305015	VSHM0305050	M3 X 0.5	WH2	46	11	4	3.2	6	3
VSHM0407015	VSHM0407050	M4 X 0.7	WH2	52	13	5	4	7	3
VSHM04507515	VSHM04507550	M4.5 X 0.75	WH2	55	13	5	4	7	3
VSHM0508015	VSHM0508050	M5 X 0.8	WH2	60	16	5.5	4.5	7	3
VSHM0610015	VSHM0610050	M6 X 1.0	WH2	62	19	6	4.5	7	3
VSHM0810015	VSHM0810050	M8 X 1.0	WH2	70	22	6.2	5	8	4
VSHM0812515	VSHM0812550	M8 X 1.25	WH2	70	22	6.2	5	8	4
VSHM1012515	VSHM1012550	M10 X 1.25	WH2	75	24	7	5.5	8	4
VSHM1015015	VSHM1015050	M10 X 1.5	WH3	75	24	7	5.5	8	4
VSHM1210015	VSHM1210050	M12 X 1.0	WH2	82	29	8.5	6.5	9	4
VSHM1212515	VSHM1212550	M12 X 1.25	WH2	82	29	8.5	6.5	9	4
VSHM1215015	VSHM1215050	M12 X 1.5	WH3	82	29	8.5	6.5	9	4
VSHM1217515	VSHM1217550	M12 X 1.75	WH3	82	29	8.5	6.5	9	4
VSHM1415015	VSHM1415050	M14 X 1.5	WH3	88	30	10.5	8	11	4
VSHM1420015	VSHM1420050	M14 X 2.0	WH3	88	30	10.5	8	11	4
VSHM1615015	VSHM1615050	M16 X 1.5	WH3	95	32	12.5	10	13	4
VSHM1620015	VSHM1620050	M16 X 2.0	WH3	95	32	12.5	10	13	4
VSHM1815015	VSHM1815050	M18 X 1.5	WH3	100	37	14	11	14	4
VSHM1825015	VSHM1825050	M18 X 2.5	WH3	100	37	14	11	14	4
VSHM2015015	VSHM2015050	M20 X 1.5	WH3	105	37	15	12	15	4
VSHM2025015	VSHM2025050	M20 X 2.5	WH3	105	37	15	12	15	4
VSHM2215015	VSHM2215050	M22 X 1.5	WH3	115	38	17	13	16	4
VSHM2225015	VSHM2225050	M22 X 2.5	WH3	115	38	17	13	16	4
VSHM2415015	VSHM2415050	M24 X 1.5	WH3	120	45	19	15	18	4
VSHM2420015	VSHM2420050	M24 X 2.0	WH3	120	45	19	15	18	4
VSHM2430015	VSHM2430050	M24 X 3.0	WH3	120	45	19	15	18	4

1,5P Tap is removed external center as bottoming type

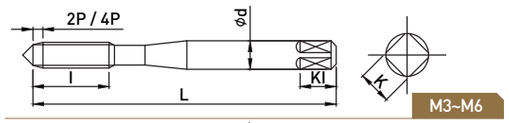
■ **Applicable Working Material**

Low Carbon Steels	Medium Carbon Steels	High Carbon Steels	Alloy Steel	Hardened Steels			Stainless Steels	Tool Steels	Cast Steels	Cast Iron	High Strength Steels	Copper	Brass	Casting Brass	Bronze	Aluminum rolled material	Aluminum alloy castings	Magnesium alloy castings	Zinc alloy castings	Titanium alloys	Nickel alloy	Thermo-setting plastic	Thermo-plastic
C ~0.25%	C0.25% ~0.45%	C 0.45%~	SCM	25~45 HRc	45~55 HRc	50~60 HRc	SUS	SKD	SC	FC	FCD	Cu	Bs	BsC	PB	AL	AC,ADC	MC	ZDC				
○			○						○														

○ : GOOD ◎ : EXCELLENT

VROM

JIS ROLL TAPS



- Suitable for blind hole work and through hole work
- Applied to oil groove design for outside fueling

HSSE Uncoated

EDP No		Thread Size	Limits	L	l	d	K	Kl	Oil Groove
2P	4P								
VROM0305020S	-	M3 X 0.5	GH5	46	11	4	3.2	6	S
VROM0305020M	VROM0305040M	M3 X 0.5	GH5	46	11	4	3.2	6	M
VROM0407020S	-	M4 X 0.7	GH6	52	13	5	4	7	S
VROM0407020M	VROM0407040M	M4 X 0.7	GH6	52	13	5	4	7	M
VROM0508020S	-	M5 X 0.8	GH6	60	16	5.5	4.5	7	S
VROM0508020M	VROM0508040M	M5 X 0.8	GH6	60	16	5.5	4.5	7	M
VROM0610020S	-	M6 X 1.0	GH7	62	19	6	4.5	7	S
VROM0610020M	VROM0610040M	M6 X 1.0	GH7	62	19	6	4.5	7	M
VROM0810020S	-	M8 X 1.0	GH7	70	22	6.2	5	8	S
VROM0810040M	VROM0810040M	M8 X 1.0	GH7	70	22	6.2	5	8	M
VROM0812520S	-	M8 X 1.25	GH7	70	22	6.2	5	8	S
VROM0812520M	VROM0812540M	M8 X 1.25	GH7	70	22	6.2	5	8	M
VROM1012520S	-	M10 X 1.25	GH7	75	24	7	5.5	8	S
VROM1012520M	VROM1012540M	M10 X 1.25	GH7	75	24	7	5.5	8	M
VROM1015020S	-	M10 X 1.5	GH7	75	24	7	5.5	8	S
VROM1015020M	VROM1015040M	M10 X 1.5	GH7	75	24	7	5.5	8	M
VROM1210020S	-	M12 X 1.0	GH7	82	29	8.5	6.5	9	S
VROM1210020M	VROM1210040M	M12 X 1.0	GH7	82	29	8.5	6.5	9	M
VROM1212520S	-	M12 X 1.25	GH7	82	29	8.5	6.5	9	S
VROM1212520M	VROM1212540M	M12 X 1.25	GH7	82	29	8.5	6.5	9	M
VROM1215020S	-	M12 X 1.5	GH7	82	29	8.5	6.5	9	S
VROM1215020M	VROM1215040M	M12 X 1.5	GH7	82	29	8.5	6.5	9	M
VROM1217520S	-	M12 X 1.75	GH8	82	29	8.5	6.5	9	S
VROM1217520M	VROM1217540M	M12 X 1.75	GH8	82	29	8.5	6.5	9	M

2,0P Tap is removed external center as bottoming type

Oil groove S : 1 oil groove
Oil groove M : 4 oil groove

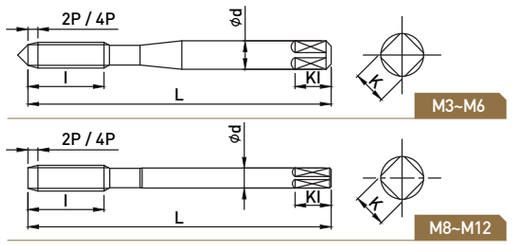
■ **Applicable Working Material**

Low Carbon Steels	Medium Carbon Steels	High Carbon Steels	Alloy Steel	Hardened Steels			Stainless Steels	Tool Steels	Cast Steels	Cast Iron	High Strength Steels	Copper	Brass	Casting Brass	Bronze	Aluminum rolled material	Aluminum alloy castings	Magnesium alloy castings	Zinc alloy castings	Titanium alloys	Nickel alloy	Thermo-setting plastic	Thermo-plastic
C ~0.25%	C0.25% ~0.45%	C 0.45%~	SCM	25~45 HRc	45~55 HRc	50~60 HRc	SUS	SKD	SC	FC	FCD	Cu	Bs	BsC	PB	AL	AC,ADC	MC	ZDC				
												◎	◎	◎		◎	◎		◎				

○ : GOOD ◎ : EXCELLENT

VRTM

JIS ROLL TAPS



- Improvement of wear resistance and deposition resistance by applied to TiN Coating
- Suitable for blind hole work and through hole work
- Applied to oil groove design for outside fueling

HSSE TiN

EDP No		Thread Size	Limits	L	l	d	K	Kl	Oil Groove
2P	4P								
VRTM0305020S	-	M3 X 0.5	GH5	46	11	4	3.2	6	S
VRTM0305020M	VRTM0305040M	M3 X 0.5	GH6	46	11	4	3.2	6	M
VRTM0407020S	-	M4 X 0.7	GH6	52	13	5	4	7	S
VRTM0407020M	VRTM0407040M	M4 X 0.7	GH6	52	13	5	4	7	M
VRTM0508020S	-	M5 X 0.8	GH6	60	16	5.5	4.5	7	S
VRTM0508020M	VRTM0508040M	M5 X 0.8	GH6	60	16	5.5	4.5	7	M
VRTM0610020S	-	M6 X 1.0	GH7	62	19	6	4.5	7	S
VRTM0610020M	VRTM0610040M	M6 X 1.0	GH7	62	19	6	4.5	7	M
VRTM0810020S	-	M8 X 1.0	GH7	70	22	6.2	5	8	S
VRTM0810020M	VRTM0810040M	M8 X 1.0	GH7	70	22	6.2	5	8	M
VRTM0812520S	-	M8 X 1.25	GH7	70	22	6.2	5	8	S
VRTM0812520M	VRTM0812540M	M8 X 1.25	GH7	70	22	6.2	5	8	M
VRTM1012520S	-	M10 X 1.25	GH7	75	24	7	5.5	8	S
VRTM1012520M	VRTM1012540M	M10 X 1.25	GH7	75	24	7	5.5	8	M
VRTM1015020S	-	M10 X 1.5	GH7	75	24	7	5.5	8	S
VRTM1015020M	VRTM1015040M	M10 X 1.5	GH7	75	24	7	5.5	8	M
VRTM1210020S	-	M12 X 1.0	GH7	82	29	8.5	6.5	9	S
VRTM1210020M	VRTM1210040M	M12 X 1.0	GH7	82	29	8.5	6.5	9	M
VRTM1212520S	-	M12 X 1.25	GH7	82	29	8.5	6.5	9	S
VRTM1212520M	VRTM1212540M	M12 X 1.25	GH7	82	29	8.5	6.5	9	M
VRTM1215020S	-	M12 X 1.5	GH7	82	29	8.5	6.5	9	S
VRTM1215020M	VRTM1215040M	M12 X 1.5	GH7	82	29	8.5	6.5	9	M
VRTM1217520S	-	M12 X 1.75	GH8	82	29	8.5	6.5	9	S
VRTM1217520M	VRTM1217540M	M12 X 1.75	GH8	82	29	8.5	6.5	9	M

2,0P Tap is removed external center as bottoming type

Oil groove S : 1 oil groove
Oil groove M : 4 oil groove

HSS Tap

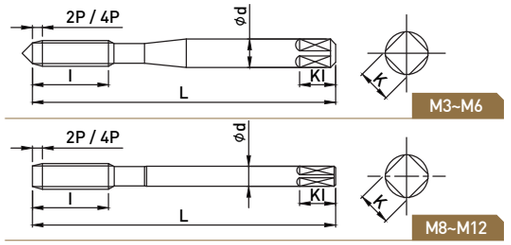
■ Applicable Working Material

Low Carbon Steels	Medium Carbon Steels	High Carbon Steels	Alloy Steel	Hardened Steels			Stainless Steels	Tool Steels	Cast Steels	Cast Iron	High Strength Steels	Copper	Brass	Casting Brass	Bronze	Aluminum rolled material	Aluminum alloy castings	Magnesium alloy castings	Zinc alloy castings	Titanium alloys	Nickel alloy	Thermo-setting plastic	Thermo-plastic
C ~0.25%	C0.25% ~0.45%	C 0.45%~	SCM	25~45 HRc	45~55 HRc	50~60 HRc	SUS	SKD	SC	FC	FCD	Cu	Bs	BsC	PB	AL	AC,ADC	MC	ZDC				
○	○	○	○				◎					○	○	○		○	○		○				

○ : GOOD ◎ : EXCELLENT

VRCM

JIS ROLL TAPS



- Improvement of wear resistance by applied to TiCN Coating
- Suitable for blind hole work and through hole work
- Applied to oil groove design for outside fueling

HSSE TiCN

EDP No		Thread Size	Limits	L	l	d	K	Kl	Oil Groove
2P	4P								
VRCM0305020S	-	M3 X 0.5	GH5	46	11	4	3.2	6	S
VRCM0305020M	VRCM0305040M	M3 X 0.5	GH5	46	11	4	3.2	6	M
VRCM0407020S	-	M4 X 0.7	GH6	52	13	5	4	7	S
VRCM0407020M	VRCM0407040M	M4 X 0.7	GH6	52	13	5	4	7	M
VRCM0508020S	-	M5 X 0.8	GH6	60	16	5.5	4.5	7	S
VRCM0508020M	VRCM0508040M	M5 X 0.8	GH6	60	16	5.5	4.5	7	M
VRCM0610020S	-	M6 X 1.0	GH7	62	19	6	4.5	7	S
VRCM0610020M	VRCM0610040M	M6 X 1.0	GH7	62	19	6	4.5	7	M
VRCM0810020S	-	M8 X 1.0	GH7	70	22	6.2	5	8	S
VRCM0810040S	VRCM0810040M	M8 X 1.0	GH7	70	22	6.2	5	8	M
VRCM0812520S	-	M8 X 1.25	GH7	70	22	6.2	5	8	S
VRCM0812520M	VRCM0812540M	M8 X 1.25	GH7	70	22	6.2	5	8	M
VRCM1012520S	-	M10 X 1.25	GH7	75	24	7	5.5	8	S
VRCM1012520M	VRCM1012540M	M10 X 1.25	GH7	75	24	7	5.5	8	M
VRCM1015020S	-	M10 X 1.50	GH7	75	24	7	5.5	8	S
VRCM1015020M	VRCM1015040M	M10 X 1.50	GH7	75	24	7	5.5	8	M
VRCM1210020S	-	M12 X 1.0	GH7	82	29	8.5	6.5	9	S
VRCM1210020M	VRCM1210040M	M12 X 1.0	GH7	82	29	8.5	6.5	9	M
VRCM1212520S	-	M12 X 1.25	GH7	82	29	8.5	6.5	9	S
VRCM1212520M	VRCM1212540M	M12 X 1.25	GH7	82	29	8.5	6.5	9	M
VRCM1215020S	-	M12 X 1.5	GH7	82	29	8.5	6.5	9	S
VRCM1215020M	VRCM1215040M	M12 X 1.5	GH7	82	29	8.5	6.5	9	M
VRCM1217520S	-	M12 X 1.75	GH8	82	29	8.5	6.5	9	S
VRCM1217520M	VRCM1217540M	M12 X 1.75	GH8	82	29	8.5	6.5	9	M

2,0P Tap is removed external center as bottoming type

Oil groove S : 1 oil groove
Oil groove M : 4 oil groove

HSS Tap

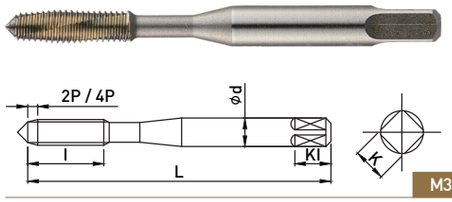
■ Applicable Working Material

Low Carbon Steels	Medium Carbon Steels	High Carbon Steels	Alloy Steel	Hardened Steels			Stainless Steels	Tool Steels	Cast Steels	Cast Iron	High Strength Steels	Copper	Brass	Casting Brass	Bronze	Aluminum rolled material	Aluminum alloy castings	Magnesium alloy castings	Zinc alloy castings	Titanium alloys	Nickel alloy	Thermo-setting plastic	Thermo-plastic
C ~0.25%	C0.25% ~0.45%	C 0.45%~	SCM	25~45 HRc	45~55 HRc	50~60 HRc	SUS	SKD	SC	FC	FCD	Cu	Bs	BsC	PB	AL	AC,ADC	MC	ZDC				
◎	◎	○	○				◎					◎	◎	◎		◎	◎		◎				

○ : GOOD ◎ : EXCELLENT

VFOM

JIS SPIRAL ROLL TAPS



- Suitable for blind hole work and through hole work

HSSE | Uncoated

EDP No		Thread Size	Limits	L	l	d	K	Kl
2P	4P							
VFOM0305020	VFOM0305040	M3 X 0.5	GH6	46	18	4	3.2	6
VFOM03506020	VFOM03506040	M3.5 X 0.6	GH6	46	18	4	3.2	6
VFOM0407020	VFOM0407040	M4 X 0.7	GH7	52	20	5	4	7
VFOM0508020	VFOM0508040	M5 X 0.8	GH7	60	22	5.5	4.5	7
VFOM0610020	VFOM0610040	M6 X 1.0	GH7	62	24	6	4.5	7

2,0P Tap is removed external center as bottoming type

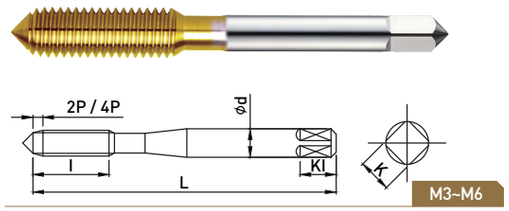
■ Applicable Working Material

Low Carbon Steels	Medium Carbon Steels	High Carbon Steels	Alloy Steel	Hardened Steels			Stainless Steels	Tool Steels	Cast Steels	Cast Iron	High Strength Steels	Copper	Brass	Casting Brass	Bronze	Aluminum rolled material	Aluminum alloy castings	Magnesium alloy castings	Zinc alloy castings	Titanium alloys	Nickel alloy	Thermo-setting plastic	Thermo-plastic
C ~0.25%	C0.25% ~0.45%	C 0.45%~	SCM	25~45 HRc	45~55 HRc	50~60 HRc	SUS	SKD	SC	FC	FCD	Cu	Bs	BsC	PB	AL	AC,ADC	MC	ZDC				
												○	○	○		○	○		○				

○ : GOOD ◎ : EXCELLENT

VFTM

JIS SPIRAL ROLL TAPS



- Improvement of wear resistance and deposition resistance by applied to TiN Coating
- Suitable for blind hole work and through hole work

HSSE | TiN

EDP No		Thread Size	Limits	L	l	d	K	Kl
2P	4P							
VFTM0305020	VFTM0305040	M3 X 0.5	GH6	46	18	4	3.2	6
VFTM03506020	VFTM03506040	M3.5 X 0.6	GH6	46	18	4	3.2	6
VFTM0407020	VFTM0407040	M4 X 0.7	GH7	52	20	5	4	7
VFTM0508020	VFTM0508040	M5 X 0.8	GH7	60	22	5.5	4.5	7
VFTM0610020	VFTM0610040	M6 X 1.0	GH7	62	24	6	4.5	7

2,0P Tap is removed external center as bottoming type

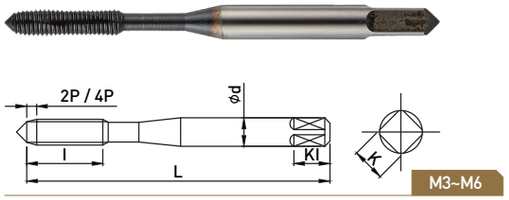
■ Applicable Working Material

Low Carbon Steels	Medium Carbon Steels	High Carbon Steels	Alloy Steel	Hardened Steels			Stainless Steels	Tool Steels	Cast Steels	Cast Iron	High Strength Steels	Copper	Brass	Casting Brass	Bronze	Aluminum rolled material	Aluminum alloy castings	Magnesium alloy castings	Zinc alloy castings	Titanium alloys	Nickel alloy	Thermo-setting plastic	Thermo-plastic
C ~0.25%	C0.25% ~0.45%	C 0.45%~	SCM	25~45 HRc	45~55 HRc	50~60 HRc	SUS	SKD	SC	FC	FCD	Cu	Bs	BsC	PB	AL	AC,ADC	MC	ZDC				
○	○	○	○				◎					○	○	○		○	○		○				

○ : GOOD ◎ : EXCELLENT

VFCM

JIS SPIRAL ROLL TAPS



- Improvement of wear resistance by applied to TiCN Coating
- Suitable for blind hole work and through hole work

HSSE TiCN

EDP No		Thread Size	Limits	L	l	d	K	KI
2P	4P							
VFCM0305020	VFCM0305040	M3 X 0.5	GH6	46	18	4	3.2	6
VFCM03506020	VFCM03506040	M3.5 X 0.6	GH6	46	18	4	3.2	6
VFCM0407020	VFCM0407040	M4 X 0.7	GH7	52	20	5	4	7
VFCM0508020	VFCM0508040	M5 X 0.8	GH7	60	22	5.5	4.5	7
VFCM0610020	VFCM0610040	M6 X 1.0	GH7	62	24	6	4.5	7

2,0P Tap is removed external center as bottoming type

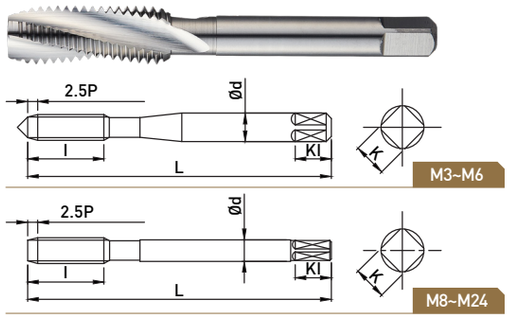
■ Applicable Working Material

Low Carbon Steels	Medium Carbon Steels	High Carbon Steels	Alloy Steel	Hardened Steels			Stainless Steels	Tool Steels	Cast Steels	Cast Iron	High Strength Steels	Copper	Brass	Casting Brass	Bronze	Aluminum rolled material	Aluminum alloy castings	Magnesium alloy castings	Zinc alloy castings	Titanium alloys	Nickel alloy	Thermo-setting plastic	Thermo-plastic
C ~0.25%	C0.25% ~0.45%	C 0.45%~	SCM	25~45 HRc	45~55 HRc	50~60 HRc	SUS	SKD	SC	FC	FCD	Cu	Bs	BsC	PB	AL	AC,ADC	MC	ZDC				
◎	◎	○	○				◎					◎	◎	◎		◎	◎		◎				

○ : GOOD ◎ : EXCELLENT

VQOM

DIN SPIRAL FLUTE TAPS



- Suitable for blind hole work as Spiral flute type
- Excellent chip emission

DIN 371-376 374 HSSE Uncoated 35° HELIX

EDP No	Thread Size	Limits	L	l	d	K	KI	Z	DIN Type
2.5P									
VQOM0305025	M3X0.5	6H	56	11	3.5	2.7	6	3	371
VQOM0407025	M4X0.7	6H	63	13	4.5	3.4	6	3	371
VQOM0508025	M5X0.8	6H	70	15	6	4.9	8	3	371
VQOM0610025	M6X1.0	6H	80	17	6	4.9	8	3	371
VQOM0810025	M8X1.0	6H	90	17	6	4.9	8	3	374
VQOM0812525	M8X1.25	6H	90	20	8	6.2	9	3	371
VQOM1010025	M10X1.0	6H	90	18	7	5.5	8	3	374
VQOM1012525	M10X1.25	6H	100	22	7	5.5	8	3	374
VQOM1015025	M10X1.5	6H	100	22	10	8	11	3	371
VQOM1210025	M12X1.0	6H	100	18	9	7	10	3	374
VQOM1212525	M12X1.25	6H	100	22	9	7	10	3	374
VQOM1215025	M12X1.5	6H	100	22	9	7	10	3	374
VQOM1217525	M12X1.75	6H	110	24	9	7	10	3	376
VQOM1415025	M14X1.5	6H	100	22	11	9	12	3	374
VQOM1420025	M14X2.0	6H	110	26	11	9	12	3	376
VQOM1615025	M16X1.5	6H	100	22	12	9	12	3	374
VQOM1620025	M16X2.0	6H	110	27	12	9	12	3	376
VQOM1815025	M18X1.5	6H	110	25	14	11	14	4	374
VQOM1825025	M18X2.5	6H	125	30	14	11	14	4	376
VQOM2015025	M20X1.5	6H	125	25	16	12	15	4	374
VQOM2025025	M20X2.5	6H	140	32	16	12	15	4	376
VQOM2215025	M22X1.5	6H	125	25	18	14.5	17	4	374
VQOM2225025	M22X2.5	6H	140	32	18	14.5	17	4	376
VQOM2415025	M24X1.5	6H	140	27	18	14.5	17	4	374
VQOM2420025	M24X2.0	6H	140	27	18	14.5	17	4	374
VQOM2430025	M24X3.0	6H	160	34	18	14.5	17	4	376

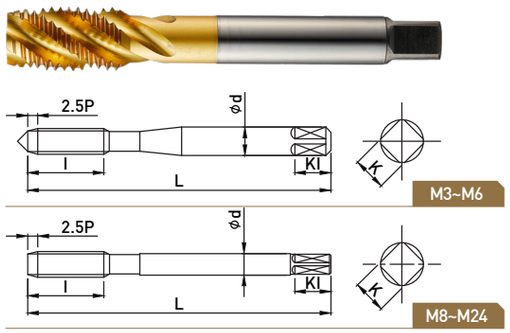
■ Applicable Working Material

Low Carbon Steels	Medium Carbon Steels	High Carbon Steels	Alloy Steel	Hardened Steels			Stainless Steels	Tool Steels	Cast Steels	Cast Iron	High Strength Steels	Copper	Brass	Casting Brass	Bronze	Aluminum rolled material	Aluminum alloy castings	Magnesium alloy castings	Zinc alloy castings	Titanium alloys	Nickel alloy	Thermo-setting plastic	Thermo-plastic
C ~0.25%	C0.25% ~0.45%	C 0.45%~	SCM	25~45 HRc	45~55 HRc	50~60 HRc	SUS	SKD	SC	FC	FCD	Cu	Bs	BsC	PB	AL	AC,ADC	MC	ZDC				
	◎		◎								○	○	○	○	○	○	○	○	○				○

○ : GOOD ◎ : EXCELLENT

VQTM

DIN SPIRAL FLUTE TAPS



- Improvement of wear resistance and deposition resistance by applied to TiN Coating
- Suitable for blind hole work as Spiral flute type
- Excellent chip emission

DIN 371-376 374 | HSSE | TiN | 35° HELIX

EDP No 2.5P	Thread Size	Limits	L	l	d	K	Kl	Z	DIN Type
VQTM0305025	M3X0.5	6H	56	11	3.5	2.7	6	3	371
VQTM0407025	M4X0.7	6H	63	13	4.5	3.4	6	3	371
VQTM0508025	M5X0.8	6H	70	15	6	4.9	8	3	371
VQTM0610025	M6X1.0	6H	80	17	6	4.9	8	3	371
VQTM0810025	M8X1.0	6H	90	17	6	4.9	8	3	374
VQTM0812525	M8X1.25	6H	90	20	8	6.2	9	3	371
VQTM1010025	M10X1.0	6H	90	18	7	5.5	8	3	374
VQTM1012525	M10X1.25	6H	100	22	7	5.5	8	3	374
VQTM1015025	M10X1.5	6H	100	22	10	8	11	3	371
VQTM1210025	M12X1.0	6H	100	18	9	7	10	3	374
VQTM1212525	M12X1.25	6H	100	22	9	7	10	3	374
VQTM1215025	M12X1.5	6H	100	22	9	7	10	3	374
VQTM1217525	M12X1.75	6H	110	24	9	7	10	3	376
VQTM1415025	M14X1.5	6H	100	22	11	9	12	3	374
VQTM1420025	M14X2.0	6H	110	26	11	9	12	3	376
VQTM1615025	M16X1.5	6H	100	22	12	9	12	3	374
VQTM1620025	M16X2.0	6H	110	27	12	9	12	3	376
VQTM1815025	M18X1.5	6H	110	25	14	11	14	4	374
VQTM1825025	M18X2.5	6H	125	30	14	11	14	4	376
VQTM2015025	M20X1.5	6H	125	25	16	12	15	4	374
VQTM2025025	M20X2.5	6H	140	32	16	12	15	4	376
VQTM2215025	M22X1.5	6H	125	25	18	14.5	17	4	374
VQTM2225025	M22X2.5	6H	140	32	18	14.5	17	4	376
VQTM2415025	M24X1.5	6H	140	27	18	14.5	17	4	374
VQTM2420025	M24X2.0	6H	140	27	18	14.5	17	4	374
VQTM2430025	M24X3.0	6H	160	34	18	14.5	17	4	376

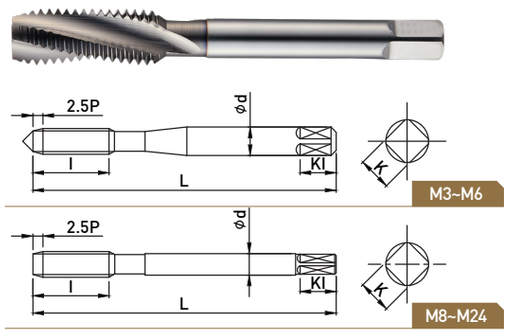
■ **Applicable Working Material**

Low Carbon Steels	Medium Carbon Steels	High Carbon Steels	Alloy Steel	Hardened Steels			Stainless Steels	Tool Steels	Cast Steels	Cast Iron	High Strength Steels	Copper	Brass	Casting Brass	Bronze	Aluminum rolled material	Aluminum alloy castings	Magnesium alloy castings	Zinc alloy castings	Titanium alloys	Nickel alloy	Thermo-setting plastic	Thermo-plastic
C ~0.25%	C0.25% ~0.45%	C 0.45%~	SCM	25~45 HRc	45~55 HRc	50~60 HRc	SUS	SKD	SC	FC	FCD	Cu	Bs	BsC	PB	AL	AC,ADC	MC	ZDC				
○	○	○	◎								○	○	○	○	○	○	○	○	○	○			○

○ : GOOD ◎ : EXCELLENT

VQCM

DIN SPIRAL FLUTE TAPS



- Improvement of wear resistance by applied to TiCN Coating
- Suitable for blind hole work as Spiral flute type
- Excellent chip emission

DIN 371-376 374 | HSSE | TiCN | 35° HELIX

EDP No 2.5P	Thread Size	Limits	L	l	d	K	Kl	Z	DIN Type
VQCM0305025	M3X0.5	6H	56	11	3.5	2.7	6	3	371
VQCM0407025	M4X0.7	6H	63	13	4.5	3.4	6	3	371
VQCM0508025	M5X0.8	6H	70	15	6	4.9	8	3	371
VQCM0610025	M6X1.0	6H	80	17	6	4.9	8	3	371
VQCM0810025	M8X1.0	6H	90	17	6	4.9	8	3	374
VQCM0812525	M8X1.25	6H	90	20	8	6.2	9	3	371
VQCM1010025	M10X1.0	6H	90	18	7	5.5	8	3	374
VQCM1012525	M10X1.25	6H	100	22	7	5.5	8	3	374
VQCM1015025	M10X1.5	6H	100	22	10	8	11	3	371
VQCM1210025	M12X1.0	6H	100	18	9	7	10	3	374
VQCM1212525	M12X1.25	6H	100	22	9	7	10	3	374
VQCM1215025	M12X1.5	6H	100	22	9	7	10	3	374
VQCM1217525	M12X1.75	6H	110	24	9	7	10	3	376
VQCM1415025	M14X1.5	6H	100	22	11	9	12	3	374
VQCM1420025	M14X2.0	6H	110	26	11	9	12	3	376
VQCM1615025	M16X1.5	6H	100	22	12	9	12	3	374
VQCM1620025	M16X2.0	6H	110	27	12	9	12	3	376
VQCM1815025	M18X1.5	6H	110	25	14	11	14	4	374
VQCM1825025	M18X2.5	6H	125	30	14	11	14	4	376
VQCM2015025	M20X1.5	6H	125	25	16	12	15	4	374
VQCM2025025	M20X2.5	6H	140	32	16	12	15	4	376
VQCM2215025	M22X1.5	6H	125	25	18	14.5	17	4	374
VQCM2225025	M22X2.5	6H	140	32	18	14.5	17	4	376
VQCM2415025	M24X1.5	6H	140	27	18	14.5	17	4	374
VQCM2420025	M24X2.0	6H	140	27	18	14.5	17	4	374
VQCM2430025	M24X3.0	6H	160	34	18	14.5	17	4	376

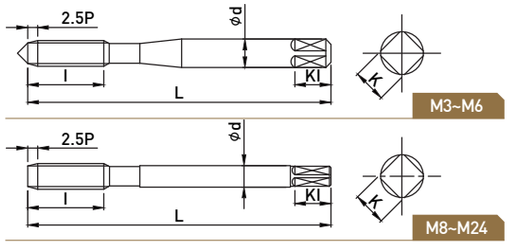
■ **Applicable Working Material**

Low Carbon Steels	Medium Carbon Steels	High Carbon Steels	Alloy Steel	Hardened Steels			Stainless Steels	Tool Steels	Cast Steels	Cast Iron	High Strength Steels	Copper	Brass	Casting Brass	Bronze	Aluminum rolled material	Aluminum alloy castings	Magnesium alloy castings	Zinc alloy castings	Titanium alloys	Nickel alloy	Thermo-setting plastic	Thermo-plastic
C ~0.25%	C0.25% ~0.45%	C 0.45%~	SCM	25~45 HRc	45~55 HRc	50~60 HRc	SUS	SKD	SC	FC	FCD	Cu	Bs	BsC	PB	AL	AC,ADC	MC	ZDC				
○	○	○	◎								○	○	○	○	○	○	◎	○	○				○

○ : GOOD ◎ : EXCELLENT

VQHM

DIN SPIRAL FLUTE TAPS



- Improvement of deposition resistance and decrease the friction by applied to Steam HOMO Coating
- Suitable for blind hole work as Spiral flute type
- Excellent chip emission

DIN 371-376 374 | HSSE | HOMO | 35° HELIX

EDP No 2.5P	Thread Size	Limits	L	l	d	K	Kl	Z	DIN Type
VQHM0305025	M3X0.5	6H	56	11	3.5	2.7	6	3	371
VQHM0407025	M4X0.7	6H	63	13	4.5	3.4	6	3	371
VQHM0508025	M5X0.8	6H	70	15	6	4.9	8	3	371
VQHM0610025	M6X1.0	6H	80	17	6	4.9	8	3	371
VQHM0810025	M8X1.0	6H	90	17	6	4.9	8	3	374
VQHM0812525	M8X1.25	6H	90	20	8	6.2	9	3	371
VQHM1010025	M10X1.0	6H	90	18	7	5.5	8	3	374
VQHM1012525	M10X1.25	6H	100	22	7	5.5	8	3	374
VQHM1015025	M10X1.5	6H	100	22	10	8	11	3	371
VQHM1210025	M12X1.0	6H	100	18	9	7	10	3	374
VQHM1212525	M12X1.25	6H	100	22	9	7	10	3	374
VQHM1215025	M12X1.5	6H	100	22	9	7	10	3	374
VQHM1217525	M12X1.75	6H	110	24	9	7	10	3	376
VQHM1415025	M14X1.5	6H	100	22	11	9	12	3	374
VQHM1420025	M14X2.0	6H	110	26	11	9	12	3	376
VQHM1615025	M16X1.5	6H	100	22	12	9	12	3	374
VQHM1620025	M16X2.0	6H	110	27	12	9	12	3	376
VQHM1815025	M18X1.5	6H	110	25	14	11	14	4	374
VQHM1825025	M18X2.5	6H	125	30	14	11	14	4	376
VQHM2015025	M20X1.5	6H	125	25	16	12	15	4	374
VQHM2025025	M20X2.5	6H	140	32	16	12	15	4	376
VQHM2215025	M22X1.5	6H	125	25	18	14.5	17	4	374
VQHM2225025	M22X2.5	6H	140	32	18	14.5	17	4	376
VQHM2415025	M24X1.5	6H	140	27	18	14.5	17	4	374
VQHM2420025	M24X2.0	6H	140	27	18	14.5	17	4	374
VQHM2430025	M24X3.0	6H	160	34	18	14.5	17	4	376

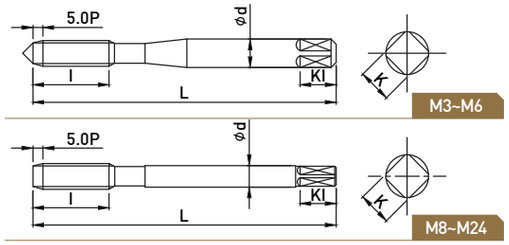
■ Applicable Working Material

Low Carbon Steels	Medium Carbon Steels	High Carbon Steels	Alloy Steel	Hardened Steels			Stainless Steels	Tool Steels	Cast Steels	Cast Iron	High Strength Steels	Copper	Brass	Casting Brass	Bronze	Aluminum rolled material	Aluminum alloy castings	Magnesium alloy castings	Zinc alloy castings	Titanium alloys	Nickel alloy	Thermo-setting plastic	Thermo-plastic
C ~0.25%	C0.25% ~0.45%	C 0.45%~	SCM	25~45 HRc	45~55 HRc	50~60 HRc	SUS	SKD	SC	FC	FCD	Cu	Bs	BsC	PB	AL	AC,ADC	MC	ZDC				
○	○								○														○

○ : GOOD ◎ : EXCELLENT

VDOM

DIN POINT FLUTE TAPS



- Spiral Point type , chip emit to direction of front
- For through hole work

DIN 371-376 374 | HSSE | Uncoated

EDP No 5P	Thread Size	Limits	L	l	d	K	Kl	Z	DIN Type
VDOM0305050	M3X0.5	6H	56	11	3.5	2.7	6	3	371
VDOM0407050	M4X0.7	6H	63	13	4.5	3.4	6	3	371
VDOM0508050	M5X0.8	6H	70	15	6	4.9	8	3	371
VDOM0610050	M6X1.0	6H	80	17	6	4.9	8	3	371
VDOM0810050	M8X1.0	6H	90	17	6	4.9	8	3	374
VDOM0812550	M8X1.25	6H	90	20	8	6.2	9	3	371
VDOM1010050	M10X1.0	6H	90	18	7	5.5	8	3	374
VDOM1012550	M10X1.25	6H	100	22	7	5.5	8	3	374
VDOM1015050	M10X1.5	6H	100	22	10	8	11	3	371
VDOM1210050	M12X1.0	6H	100	18	9	7	10	3	374
VDOM1212550	M12X1.25	6H	100	22	9	7	10	3	374
VDOM1215050	M12X1.5	6H	100	22	9	7	10	3	374
VDOM1217550	M12X1.75	6H	110	24	9	7	10	3	376
VDOM1415050	M14X1.5	6H	100	22	11	9	12	3	374
VDOM1420050	M14X2.0	6H	110	26	11	9	12	3	376
VDOM1615050	M16X1.5	6H	100	22	12	9	12	3	374
VDOM1620050	M16X2.0	6H	110	27	12	9	12	3	376
VDOM1815050	M18X1.5	6H	110	25	14	11	14	3	374
VDOM1825050	M18X2.5	6H	125	30	14	11	14	3	376
VDOM2015050	M20X1.5	6H	125	25	16	12	15	3	374
VDOM2025050	M20X2.5	6H	140	32	16	12	15	3	376
VDOM2215050	M22X1.5	6H	125	25	18	14.5	17	3	374
VDOM2225050	M22X2.5	6H	140	32	18	14.5	17	3	376
VDOM2415050	M24X1.5	6H	140	27	18	14.5	17	3	374
VDOM2420050	M24X2.0	6H	140	27	18	14.5	17	3	374
VDOM2430050	M24X3.0	6H	160	34	18	14.5	17	3	376

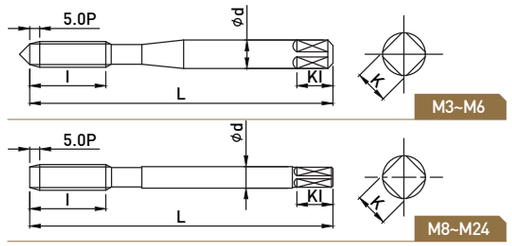
■ Applicable Working Material

Low Carbon Steels	Medium Carbon Steels	High Carbon Steels	Alloy Steel	Hardened Steels			Stainless Steels	Tool Steels	Cast Steels	Cast Iron	High Strength Steels	Copper	Brass	Casting Brass	Bronze	Aluminum rolled material	Aluminum alloy castings	Magnesium alloy castings	Zinc alloy castings	Titanium alloys	Nickel alloy	Thermo-setting plastic	Thermo-plastic
C ~0.25%	C0.25% ~0.45%	C 0.45%~	SCM	25~45 HRc	45~55 HRc	50~60 HRc	SUS	SKD	SC	FC	FCD	Cu	Bs	BsC	PB	AL	AC,ADC	MC	ZDC				
	○	○	◎							○	○	○	○	○	○	◎	○	○	○				○

○ : GOOD ◎ : EXCELLENT

VDTM

DIN POINT FLUTE TAP



- Improvement of wear resistance and deposition resistance by applied to TiN Coating
- Spiral Point type , chip emit to direction of front
- For through hole work

DIN 371-376 374 | HSSE | TiN

EDP No 5P	Thread Size	Limits	L	l	d	K	Kl	Z	DIN Type
VDTM0305050	M3X0.5	6H	56	11	3.5	2.7	6	3	371
VDTM0407050	M4X0.7	6H	63	13	4.5	3.4	6	3	371
VDTM0508050	M5X0.8	6H	70	15	6	4.9	8	3	371
VDTM0610050	M6X1.0	6H	80	17	6	4.9	8	3	371
VDTM0810050	M8X1.0	6H	90	17	6	4.9	8	3	374
VDTM0812550	M8X1.25	6H	90	20	8	6.2	9	3	371
VDTM1010050	M10X1.0	6H	90	18	7	5.5	8	3	374
VDTM1012550	M10X1.25	6H	100	22	7	5.5	8	3	374
VDTM1015050	M10X1.5	6H	100	22	10	8	11	3	371
VDTM1210050	M12X1.0	6H	100	18	9	7	10	3	374
VDTM1212550	M12X1.25	6H	100	22	9	7	10	3	374
VDTM1215050	M12X1.5	6H	100	22	9	7	10	3	374
VDTM1217550	M12X1.75	6H	110	24	9	7	10	3	376
VDTM1415050	M14X1.5	6H	100	22	11	9	12	3	374
VDTM1420050	M14X2.0	6H	110	26	11	9	12	3	376
VDTM1615050	M16X1.5	6H	100	22	12	9	12	3	374
VDTM1620050	M16X2.0	6H	110	27	12	9	12	3	376
VDTM1815050	M18X1.5	6H	110	25	14	11	14	3	374
VDTM1825050	M18X2.5	6H	125	30	14	11	14	3	376
VDTM2015050	M20X1.5	6H	125	25	16	12	15	3	374
VDTM2025050	M20X2.5	6H	140	32	16	12	15	3	376
VDTM2215050	M22X1.5	6H	125	25	18	14.5	17	3	374
VDTM2225050	M22X2.5	6H	140	32	18	14.5	17	3	376
VDTM2415050	M24X1.5	6H	140	27	18	14.5	17	3	374
VDTM2420050	M24X2.0	6H	140	27	18	14.5	17	3	374
VDTM2430050	M24X3.0	6H	160	34	18	14.5	17	3	376

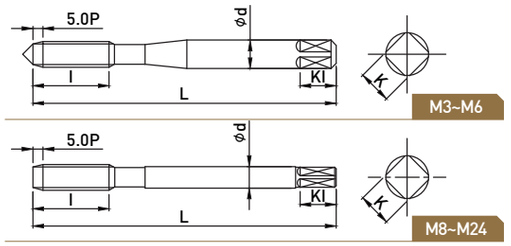
■ **Applicable Working Material**

Low Carbon Steels	Medium Carbon Steels	High Carbon Steels	Alloy Steel	Hardened Steels			Stainless Steels	Tool Steels	Cast Steels	Cast Iron	High Strength Steels	Copper	Brass	Casting Brass	Bronze	Aluminum rolled material	Aluminum alloy castings	Magnesium alloy castings	Zinc alloy castings	Titanium alloys	Nickel alloy	Thermo-setting plastic	Thermo-plastic
C ~0.25%	C0.25% ~0.45%	C 0.45%~	SCM	25~45 HRc	45~55 HRc	50~60 HRc	SUS	SKD	SC	FC	FCD	Cu	Bs	BsC	PB	AL	AC,ADC	MC	ZDC				
○	○	○	○				◎	○	○	○	○	○	○	○	○	○	○	○	○	○	○		○

○ : GOOD ◎ : EXCELLENT

VDCM

DIN POINT FLUTE TAPS



- Improvement of wear resistance by applied to TiCN Coating
- Spiral Point type , chip emit to direction of front
- For through hole work

DIN 371-376 374 | HSSE | TiCN

EDP No 5P	Thread Size	Limits	L	l	d	K	Kl	Z	DIN Type
VDCM0305050	M3X0.5	6H	56	11	3.5	2.7	6	3	371
VDCM0407050	M4X0.7	6H	63	13	4.5	3.4	6	3	371
VDCM0508050	M5X0.8	6H	70	15	6	4.9	8	3	371
VDCM0610050	M6X1.0	6H	80	17	6	4.9	8	3	371
VDCM0810050	M8X1.0	6H	90	17	6	4.9	8	3	374
VDCM0812550	M8X1.25	6H	90	20	8	6.2	9	3	371
VDCM1010050	M10X1.0	6H	90	18	7	5.5	8	3	374
VDCM1012550	M10X1.25	6H	100	22	7	5.5	8	3	374
VDCM1015050	M10X1.5	6H	100	22	10	8	11	3	371
VDCM1210050	M12X1.0	6H	100	18	9	7	10	3	374
VDCM1212550	M12X1.25	6H	100	22	9	7	10	3	374
VDCM1215050	M12X1.5	6H	100	22	9	7	10	3	374
VDCM1217550	M12X1.75	6H	110	24	9	7	10	3	376
VDCM1415050	M14X1.5	6H	100	22	11	9	12	3	374
VDCM1420050	M14X2.0	6H	110	26	11	9	12	3	376
VDCM1615050	M16X1.5	6H	100	22	12	9	12	3	374
VDCM1620050	M16X2.0	6H	110	27	12	9	12	3	376
VDCM1815050	M18X1.5	6H	110	25	14	11	14	3	374
VDCM1825050	M18X2.5	6H	125	30	14	11	14	3	376
VDCM2015050	M20X1.5	6H	125	25	16	12	15	3	374
VDCM2025050	M20X2.5	6H	140	32	16	12	15	3	376
VDCM2215050	M22X1.5	6H	125	25	18	14.5	17	3	374
VDCM2225050	M22X2.5	6H	140	32	18	14.5	17	3	376
VDCM2415050	M24X1.5	6H	140	27	18	14.5	17	3	374
VDCM2420050	M24X2.0	6H	140	27	18	14.5	17	3	374
VDCM2430050	M24X3.0	6H	160	34	18	14.5	17	3	376

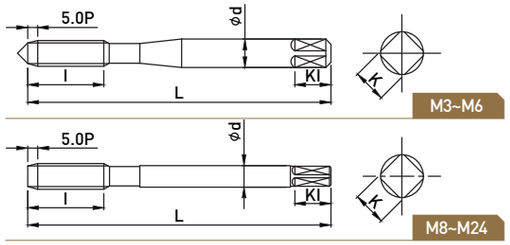
■ **Applicable Working Material**

Low Carbon Steels	Medium Carbon Steels	High Carbon Steels	Alloy Steel	Hardened Steels			Stainless Steels	Tool Steels	Cast Steels	Cast Iron	High Strength Steels	Copper	Brass	Casting Brass	Bronze	Aluminum rolled material	Aluminum alloy castings	Magnesium alloy castings	Zinc alloy castings	Titanium alloys	Nickel alloy	Thermo-setting plastic	Thermo-plastic
C ~0.25%	C0.25% ~0.45%	C 0.45%~	SCM	25~45 HRc	45~55 HRc	50~60 HRc	SUS	SKD	SC	FC	FCD	Cu	Bs	BsC	PB	AL	AC,ADC	MC	ZDC				
◎	◎	◎	○				○	○	○	○	○	○	○	○	○	○	○	○	○	○	○		○

○ : GOOD ◎ : EXCELLENT

VDHM

DIN POINT FLUTE TAPS



- Improvement of deposition resistance and decrease the friction by applied to Steam HOMO Coating
- Spiral Point type , chip emit to direction of front
- For through hole work

DIN 371-376 374 | HSSE | HOMO

EDP No 5P	Thread Size	Limits	L	l	d	K	Kl	Z	DIN Type
VDHM0305050	M3X0.5	6H	56	11	3.5	2.7	6	3	371
VDHM0407050	M4X0.7	6H	63	13	4.5	3.4	6	3	371
VDHM0508050	M5X0.8	6H	70	15	6	4.9	8	3	371
VDHM0610050	M6X1.0	6H	80	17	6	4.9	8	3	371
VDHM0810050	M8X1.0	6H	90	17	6	4.9	8	3	374
VDHM0812550	M8X1.25	6H	90	20	8	6.2	9	3	371
VDHM1010050	M10X1.0	6H	90	18	7	5.5	8	3	374
VDHM1012550	M10X1.25	6H	100	22	7	5.5	8	3	374
VDHM1015050	M10X1.5	6H	100	22	10	8	11	3	371
VDHM1210050	M12X1.0	6H	100	18	9	7	10	3	374
VDHM1212550	M12X1.25	6H	100	22	9	7	10	3	374
VDHM1215050	M12X1.5	6H	100	22	9	7	10	3	374
VDHM1217550	M12X1.75	6H	110	24	9	7	10	3	376
VDHM1415050	M14X1.5	6H	100	22	11	9	12	3	374
VDHM1420050	M14X2.0	6H	110	26	11	9	12	3	376
VDHM1615050	M16X1.5	6H	100	22	12	9	12	3	374
VDHM1620050	M16X2.0	6H	110	27	12	9	12	3	376
VDHM1815050	M18X1.5	6H	110	25	14	11	14	3	374
VDHM1825050	M18X2.5	6H	125	30	14	11	14	3	376
VDHM2015050	M20X1.5	6H	125	25	16	12	15	3	374
VDHM2025050	M20X2.5	6H	140	32	16	12	15	3	376
VDHM2215050	M22X1.5	6H	125	25	18	14.5	17	3	374
VDHM2225050	M22X2.5	6H	140	32	18	14.5	17	3	376
VDHM2415050	M24X1.5	6H	140	27	18	14.5	17	3	374
VDHM2420050	M24X2.0	6H	140	27	18	14.5	17	3	374
VDHM2430050	M24X3.0	6H	160	34	18	14.5	17	3	376

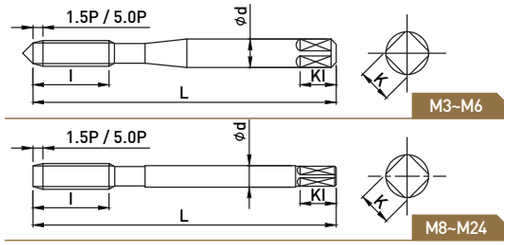
■ Applicable Working Material

Low Carbon Steels	Medium Carbon Steels	High Carbon Steels	Alloy Steel	Hardened Steels			Stainless Steels	Tool Steels	Cast Steels	Cast Iron	High Strength Steels	Copper	Brass	Casting Brass	Bronze	Aluminum rolled material	Aluminum alloy castings	Magnesium alloy castings	Zinc alloy castings	Titanium alloys	Nickel alloy	Thermo-setting plastic	Thermo-plastic
C ~0.25%	C0.25% ~0.45%	C 0.45%~	SCM	25~45 HRc	45~55 HRc	50~60 HRc	SUS	SKD	SC	FC	FCD	Cu	Bs	BsC	PB	AL	AC,ADC	MC	ZDC				
◎	◎		○						○														○

○ : GOOD ◎ : EXCELLENT

VGOM

DIN STRAIGHT FLUTE TAPS



- Suitable for through hole work and blind hole work as Straight flute type

DIN 371-376 374 | HSSE | Uncoated

EDP No 1.5P	EDP No 5P	Thread Size	Limits	L	l	d	K	Kl	Z	DIN Type
VGOM0305015	VGOM0305050	M3X0.5	6H	56	11	3.5	2.7	6	3	371
VGOM0407015	VGOM0407050	M4X0.7	6H	63	13	4.5	3.4	6	3	371
VGOM0508015	VGOM0508050	M5X0.8	6H	70	15	6	4.9	8	3	371
VGOM0610015	VGOM0610050	M6X1.0	6H	80	17	6	4.9	8	3	371
VGOM0810015	VGOM0810050	M8X1.0	6H	90	17	6	4.9	8	4	374
VGOM0812515	VGOM0812550	M8X1.25	6H	90	20	8	6.2	9	4	371
VGOM1010015	VGOM1010050	M10X1.0	6H	90	18	7	5.5	8	4	374
VGOM1012515	VGOM1012550	M10X1.25	6H	100	22	7	5.5	8	4	374
VGOM1015015	VGOM1015050	M10X1.5	6H	100	22	10	8	11	4	371
VGOM1210015	VGOM1210050	M12X1.0	6H	100	18	9	7	10	4	374
VGOM1212515	VGOM1212550	M12X1.25	6H	100	22	9	7	10	4	374
VGOM1215015	VGOM1215050	M12X1.5	6H	100	22	9	7	10	4	374
VGOM1217515	VGOM1217550	M12X1.75	6H	110	24	9	7	10	4	376
VGOM1415015	VGOM1415050	M14X1.5	6H	100	22	11	9	12	4	374
VGOM1420015	VGOM1420050	M14X2.0	6H	110	26	11	9	12	4	376
VGOM1615015	VGOM1615050	M16X1.5	6H	100	22	12	9	12	4	374
VGOM1620015	VGOM1620050	M16X2.0	6H	110	27	12	9	12	4	376
VGOM1815015	VGOM1815050	M18X1.5	6H	110	25	14	11	14	4	374
VGOM1825015	VGOM1825050	M18X2.5	6H	125	30	14	11	14	4	376
VGOM2015015	VGOM2015050	M20X1.5	6H	125	25	16	12	15	4	374
VGOM2025015	VGOM2025050	M20X2.5	6H	140	32	16	12	15	4	376
VGOM2215015	VGOM2215050	M22X1.5	6H	125	25	18	14.5	17	4	374
VGOM2225015	VGOM2225050	M22X2.5	6H	140	32	18	14.5	17	4	376
VGOM2415015	VGOM2415050	M24X1.5	6H	140	27	18	14.5	17	4	374
VGOM2420015	VGOM2420050	M24X2.0	6H	140	27	18	14.5	17	4	374
VGOM2430015	VGOM2430050	M24X3.0	6H	160	34	18	14.5	17	4	376

1.5P Tap is removed external center as bottoming type

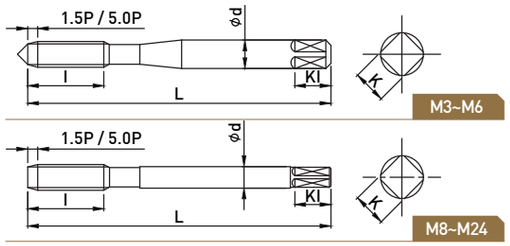
■ Applicable Working Material

Low Carbon Steels	Medium Carbon Steels	High Carbon Steels	Alloy Steel	Hardened Steels			Stainless Steels	Tool Steels	Cast Steels	Cast Iron	High Strength Steels	Copper	Brass	Casting Brass	Bronze	Aluminum rolled material	Aluminum alloy castings	Magnesium alloy castings	Zinc alloy castings	Titanium alloys	Nickel alloy	Thermo-setting plastic	Thermo-plastic
C ~0.25%	C0.25% ~0.45%	C 0.45%~	SCM	25~45 HRc	45~55 HRc	50~60 HRc	SUS	SKD	SC	FC	FCD	Cu	Bs	BsC	PB	AL	AC,ADC	MC	ZDC				
											○		○	○	○		○	○	○				

○ : GOOD ◎ : EXCELLENT

VGTM

DIN STRAIGHT FLUTE TAPS



- Improvement of wear resistance and deposition resistance by applied to TiN Coating
- Suitable for through hole work and blind hole work as Straight flute type

DIN 371-376 374 | HSSE | TiN

EDP No		Thread Size	Limits	L	l	d	K	Kl	Z	DIN Type
1.5P	5P									
VGTM0305015	VGTM0305050	M3X0.5	6H	56	11	3.5	2.7	6	3	371
VGTM0407015	VGTM0407050	M4X0.7	6H	63	13	4.5	3.4	6	3	371
VGTM0508015	VGTM0508050	M5X0.8	6H	70	15	6	4.9	8	3	371
VGTM0610015	VGTM0610050	M6X1.0	6H	80	17	6	4.9	8	3	371
VGTM0810015	VGTM0810050	M8X1.0	6H	90	17	6	4.9	8	4	374
VGTM0812515	VGTM0812550	M8X1.25	6H	90	20	8	6.2	9	4	371
VGTM1010015	VGTM1010050	M10X1.0	6H	90	18	7	5.5	8	4	374
VGTM1012515	VGTM1012550	M10X1.25	6H	100	22	7	5.5	8	4	374
VGTM1015015	VGTM1015050	M10X1.5	6H	100	22	10	8	11	4	371
VGTM1210015	VGTM1210050	M12X1.0	6H	100	18	9	7	10	4	374
VGTM1212515	VGTM1212550	M12X1.25	6H	100	22	9	7	10	4	374
VGTM1215015	VGTM1215050	M12X1.5	6H	100	22	9	7	10	4	374
VGTM1217515	VGTM1217550	M12X1.75	6H	110	24	9	7	10	4	376
VGTM1415015	VGTM1415050	M14X1.5	6H	100	22	11	9	12	4	374
VGTM1420015	VGTM1420050	M14X2.0	6H	110	26	11	9	12	4	376
VGTM1615015	VGTM1615050	M16X1.5	6H	100	22	12	9	12	4	374
VGTM1620015	VGTM1620050	M16X2.0	6H	110	27	12	9	12	4	376
VGTM1815015	VGTM1815050	M18X1.5	6H	110	25	14	11	14	4	374
VGTM1825015	VGTM1825050	M18X2.5	6H	125	30	14	11	14	4	376
VGTM2015015	VGTM2015050	M20X1.5	6H	125	25	16	12	15	4	374
VGTM2025015	VGTM2025050	M20X2.5	6H	140	32	16	12	15	4	376
VGTM2215015	VGTM2215050	M22X1.5	6H	125	25	18	14.5	17	4	374
VGTM2225015	VGTM2225050	M22X2.5	6H	140	32	18	14.5	17	4	376
VGTM2415015	VGTM2415050	M24X1.5	6H	140	27	18	14.5	17	4	374
VGTM2420015	VGTM2420050	M24X2.0	6H	140	27	18	14.5	17	4	374
VGTM2430015	VGTM2430050	M24X3.0	6H	160	34	18	14.5	17	4	376

1,5P Tap is removed external center as bottoming type

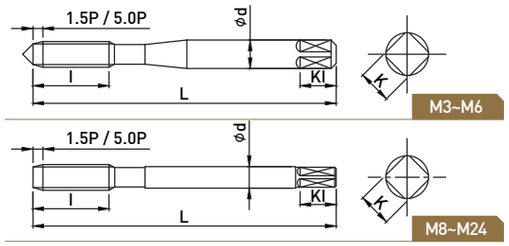
■ Applicable Working Material

Low Carbon Steels	Medium Carbon Steels	High Carbon Steels	Alloy Steel	Hardened Steels			Stainless Steels	Tool Steels	Cast Steels	Cast Iron	High Strength Steels	Copper	Brass	Casting Brass	Bronze	Aluminum rolled material	Aluminum alloy castings	Magnesium alloy castings	Zinc alloy castings	Titanium alloys	Nickel alloy	Thermo-setting plastic	Thermo-plastic
C ~0.25%	C0.25% ~0.45%	C 0.45%~	SCM	25~45 HRc	45~55 HRc	50~60 HRc	SUS	SKD	SC	FC	FCD	Cu	Bs	BsC	PB	AL	AC,ADC	MC	ZDC				
○	○	○	○	○									○	○	○		○	○	○				

○ : GOOD ◎ : EXCELLENT

VGCM

DIN STRAIGHT FLUTE TAPS



- Improvement of wear resistance by applied to TiCN Coating
- Suitable for through hole work and blind hole work as Straight flute type

DIN 371-376 374 | HSSE | TiCN

EDP No		Thread Size	Limits	L	l	d	K	Kl	Z	DIN Type
1.5P	5P									
VGCM0305015	VGCM0305050	M3X0.5	6H	56	11	3.5	2.7	6	3	371
VGCM0407015	VGCM0407050	M4X0.7	6H	63	13	4.5	3.4	6	3	371
VGCM0508015	VGCM0508050	M5X0.8	6H	70	15	6	4.9	8	3	371
VGCM0610015	VGCM0610050	M6X1.0	6H	80	17	6	4.9	8	3	371
VGCM0810015	VGCM0810050	M8X1.0	6H	90	17	6	4.9	8	4	374
VGCM0812515	VGCM0812550	M8X1.25	6H	90	20	8	6.2	9	4	371
VGCM1010015	VGCM1010050	M10X1.0	6H	90	18	7	5.5	8	4	374
VGCM1012515	VGCM1012550	M10X1.25	6H	100	22	7	5.5	8	4	374
VGCM1015015	VGCM1015050	M10X1.5	6H	100	22	10	8	11	4	371
VGCM1210015	VGCM1210050	M12X1.0	6H	100	18	9	7	10	4	374
VGCM1212515	VGCM1212550	M12X1.25	6H	100	22	9	7	10	4	374
VGCM1215015	VGCM1215050	M12X1.5	6H	100	22	9	7	10	4	374
VGCM1217515	VGCM1217550	M12X1.75	6H	110	24	9	7	10	4	376
VGCM1415015	VGCM1415050	M14X1.5	6H	100	22	11	9	12	4	374
VGCM1420015	VGCM1420050	M14X2.0	6H	110	26	11	9	12	4	376
VGCM1615015	VGCM1615050	M16X1.5	6H	100	22	12	9	12	4	374
VGCM1620015	VGCM1620050	M16X2.0	6H	110	27	12	9	12	4	376
VGCM1815015	VGCM1815050	M18X1.5	6H	110	25	14	11	14	4	374
VGCM1825015	VGCM1825050	M18X2.5	6H	125	30	14	11	14	4	376
VGCM2015015	VGCM2015050	M20X1.5	6H	125	25	16	12	15	4	374
VGCM2025015	VGCM2025050	M20X2.5	6H	140	32	16	12	15	4	376
VGCM2215015	VGCM2215050	M22X1.5	6H	125	25	18	14.5	17	4	374
VGCM2225015	VGCM2225050	M22X2.5	6H	140	32	18	14.5	17	4	376
VGCM2415015	VGCM2415050	M24X1.5	6H	140	27	18	14.5	17	4	374
VGCM2420015	VGCM2420050	M24X2.0	6H	140	27	18	14.5	17	4	374
VGCM2430015	VGCM2430050	M24X3.0	6H	160	34	18	14.5	17	4	376

1,5P Tap is removed external center as bottoming type

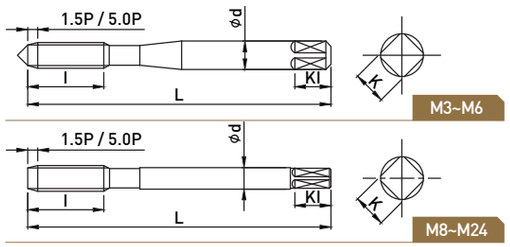
■ Applicable Working Material

Low Carbon Steels	Medium Carbon Steels	High Carbon Steels	Alloy Steel	Hardened Steels			Stainless Steels	Tool Steels	Cast Steels	Cast Iron	High Strength Steels	Copper	Brass	Casting Brass	Bronze	Aluminum rolled material	Aluminum alloy castings	Magnesium alloy castings	Zinc alloy castings	Titanium alloys	Nickel alloy	Thermo-setting plastic	Thermo-plastic
C ~0.25%	C0.25% ~0.45%	C 0.45%~	SCM	25~45 HRc	45~55 HRc	50~60 HRc	SUS	SKD	SC	FC	FCD	Cu	Bs	BsC	PB	AL	AC,ADC	MC	ZDC				
○	○	○	○	○									○	○	○		○	○	○				

○ : GOOD ◎ : EXCELLENT

VGHM

DIN STRAIGHT FLUTE TAPS



- Improvement of deposition resistance and decrease the friction by applied to Steam HOMO Coating
- Suitable for through hole work and blind hole work as Straight flute type

DIN 371-376 374 | HSSE | HOMO

EDP No		Thread Size	Limits	L	l	d	K	Kl	Z	DIN Type
1.5P	5P									
VGHM0305015	VGHM0305050	M3X0.5	6H	56	11	3.5	2.7	6	3	371
VGHM0407015	VGHM0407050	M4X0.7	6H	63	13	4.5	3.4	6	3	371
VGHM0508015	VGHM0508050	M5X0.8	6H	70	15	6	4.9	8	3	371
VGHM0610015	VGHM0610050	M6X1.0	6H	80	17	6	4.9	8	3	371
VGHM0810015	VGHM0810050	M8X1.0	6H	90	17	6	4.9	8	4	374
VGHM0812515	VGHM0812550	M8X1.25	6H	90	20	8	6.2	9	4	371
VGHM1010015	VGHM1010050	M10X1.0	6H	90	18	7	5.5	8	4	374
VGHM1012515	VGHM1012550	M10X1.25	6H	100	22	7	5.5	8	4	374
VGHM1015015	VGHM1015050	M10X1.5	6H	100	22	10	8	11	4	371
VGHM1210015	VGHM1210050	M12X1.0	6H	100	18	9	7	10	4	374
VGHM1212515	VGHM1212550	M12X1.25	6H	100	22	9	7	10	4	374
VGHM1215015	VGHM1215050	M12X1.5	6H	100	22	9	7	10	4	374
VGHM1217515	VGHM1217550	M12X1.75	6H	110	24	9	7	10	4	376
VGHM1415015	VGHM1415050	M14X1.5	6H	100	22	11	9	12	4	374
VGHM1420015	VGHM1420050	M14X2.0	6H	110	26	11	9	12	4	376
VGHM1615015	VGHM1615050	M16X1.5	6H	100	22	12	9	12	4	374
VGHM1620015	VGHM1620050	M16X2.0	6H	110	27	12	9	12	4	376
VGHM1815015	VGHM1815050	M18X1.5	6H	110	25	14	11	14	4	374
VGHM1825015	VGHM1825050	M18X2.5	6H	125	30	14	11	14	4	376
VGHM2015015	VGHM2015050	M20X1.5	6H	125	25	16	12	15	4	374
VGHM2025015	VGHM2025050	M20X2.5	6H	140	32	16	12	15	4	376
VGHM2215015	VGHM2215050	M22X1.5	6H	125	25	18	14.5	17	4	374
VGHM2225015	VGHM2225050	M22X2.5	6H	140	32	18	14.5	17	4	376
VGHM2415015	VGHM2415050	M24X1.5	6H	140	27	18	14.5	17	4	374
VGHM2420015	VGHM2420050	M24X2.0	6H	140	27	18	14.5	17	4	374
VGHM2430015	VGHM2430050	M24X3.0	6H	160	34	18	14.5	17	4	376

1,5P Tap is removed external center as bottoming type

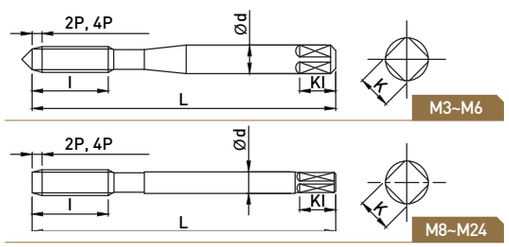
■ Applicable Working Material

Low Carbon Steels	Medium Carbon Steels	High Carbon Steels	Alloy Steel	Hardened Steels			Stainless Steels	Tool Steels	Cast Steels	Cast Iron	High Strength Steels	Copper	Brass	Casting Brass	Bronze	Aluminum rolled material	Aluminum alloy castings	Magnesium alloy castings	Zinc alloy castings	Titanium alloys	Nickel alloy	Thermo-setting plastic	Thermo-plastic
C ~0.25%	C0.25% ~0.45%	C 0.45%~	SCM	25~45 HRc	45~55 HRc	50~60 HRc	SUS	SKD	SC	FC	FCD	Cu	Bs	BsC	PB	AL	AC,ADC	MC	ZDC				
○			○						○														

○ : GOOD ◎ : EXCELLENT

VMOM

DIN ROLL TAPS



- Suitable for blind hole work and through hole work
- Applied to oil groove design for outside fueling

DIN 371-376 374 | HSSE | Uncoated

EDP No		Thread Size	Limits	L	l	d	K	Kl	Oil Groove
2P	4P								
VMOM0305020S	-	M3x0.5	6HX	56	11	3.5	2.7	6	S
VMOM0305020M	VMOM0305040M	M3x0.5	6HX	56	11	3.5	2.7	6	M
VMOM0407020S	-	M4x0.7	6HX	63	13	4.5	3.4	6	S
VMOM0407020M	VMOM0407040M	M4x0.7	6HX	63	13	4.5	3.4	6	M
VMOM0508020S	-	M5x0.8	6HX	70	15	6	4.9	8	S
VMOM0508020M	VMOM0508040M	M5x0.8	6HX	70	15	6	4.9	8	M
VMOM0610020S	-	M6x1.0	6HX	80	17	6	4.9	8	S
VMOM0610020M	VMOM0610040M	M6x1.0	6HX	80	17	6	4.9	8	M
VMOM0810020S	-	M8x1.0	6HX	90	17	6	4.9	8	S
VMOM0810020M	VMOM0810040M	M8x1.0	6HX	90	17	6	4.9	8	M
VMOM0812520S	-	M8x1.25	6HX	90	20	8	6.2	9	S
VMOM0812520M	VMOM0812540M	M8x1.25	6HX	90	20	8	6.2	9	M
VMOM1010020S	-	M10x1.0	6HX	90	18	7	5.5	8	S
VMOM1010020M	VMOM1010040M	M10x1.0	6HX	90	18	7	5.5	8	M
VMOM1012520S	-	M10x1.25	6HX	100	22	7	5.5	8	S
VMOM1012520M	VMOM1012540M	M10x1.25	6HX	100	22	7	5.5	8	M
VMOM1015020S	-	M10x1.5	6HX	100	22	10	8	11	S
VMOM1015020M	VMOM1015040M	M10x1.5	6HX	100	22	10	8	11	M
VMOM1210020S	-	M12x1.0	6HX	100	18	9	7	10	S
VMOM1210020M	VMOM1210040M	M12x1.0	6HX	100	18	9	7	10	M
VMOM1212520S	-	M12x1.25	6HX	100	22	9	7	10	S
VMOM1212520M	VMOM1212540M	M12x1.25	6HX	100	22	9	7	10	M
VMOM1215020S	-	M12x1.5	6HX	100	22	9	7	10	S
VMOM1215020M	VMOM1215040M	M12x1.5	6HX	100	22	9	7	10	M
VMOM1217520S	-	M12x1.75	6HX	110	24	9	7	10	S
VMOM1217520M	VMOM1217540M	M12x1.75	6HX	100	24	9	7	10	M

2,0P Tap is removed external center as bottoming type

Oil groove S : 1 oil groove
Oil groove M : 4 oil groove

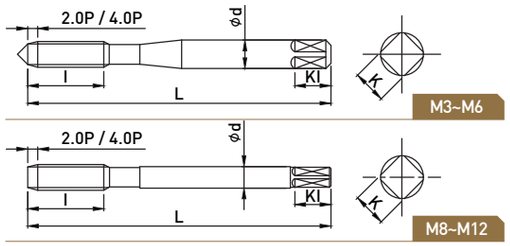
■ Applicable Working Material

Low Carbon Steels	Medium Carbon Steels	High Carbon Steels	Alloy Steel	Hardened Steels			Stainless Steels	Tool Steels	Cast Steels	Cast Iron	High Strength Steels	Copper	Brass	Casting Brass	Bronze	Aluminum rolled material	Aluminum alloy castings	Magnesium alloy castings	Zinc alloy castings	Titanium alloys	Nickel alloy	Thermo-setting plastic	Thermo-plastic
C ~0.25%	C0.25% ~0.45%	C 0.45%~	SCM	25~45 HRc	45~55 HRc	50~60 HRc	SUS	SKD	SC	FC	FCD	Cu	Bs	BsC	PB	AL	AC,ADC	MC	ZDC				
												◎	◎	◎		◎	◎		◎				

○ : GOOD ◎ : EXCELLENT

VMTM

DIN ROLL TAPS



- Improvement of wear resistance and deposition resistance by applied to TiN Coating
- Suitable for blind hole work and through hole work
- Applied to oil groove design for outside fueling

DIN 371-376 374 | HSSE | TiN

EDP No		Thread Size	Limits	L	l	d	K	Kl	Oil Groove
2P	4P								
VMTM0305020S	-	M3x0.5	6HX	56	11	3.5	2.7	6	S
VMTM0305020M	VMTM0305040M	M3x0.5	6HX	56	11	3.5	2.7	6	M
VMTM0407020S	-	M4x0.7	6HX	63	13	4.5	3.4	6	S
VMTM0407020M	VMTM0407040M	M4x0.7	6HX	63	13	4.5	3.4	6	M
VMTM0508020S	-	M5x0.8	6HX	70	15	6	4.9	8	S
VMTM0508020M	VMTM0508040M	M5x0.8	6HX	70	15	6	4.9	8	M
VMTM0610020S	-	M6x1.0	6HX	80	17	6	4.9	8	S
VMTM0610020M	VMTM0610040M	M6x1.0	6HX	80	17	6	4.9	8	M
VMTM0810020S	-	M8x1.0	6HX	90	17	8	6.2	9	S
VMTM0810020M	VMTM0810040M	M8x1.0	6HX	90	17	8	6.2	9	M
VMTM0812520S	-	M8x1.25	6HX	90	20	8	6.2	9	S
VMTM0812520M	VMTM0812540M	M8x1.25	6HX	90	20	8	6.2	9	M
VMTM1010020S	-	M10x1.0	6HX	90	18	10	8	11	S
VMTM1010020M	VMTM1010040M	M10x1.0	6HX	90	18	10	8	11	M
VMTM1012520S	-	M10x1.25	6HX	100	22	10	8	11	S
VMTM1012520M	VMTM1012540M	M10x1.25	6HX	100	22	10	8	11	M
VMTM1015020S	-	M10x1.5	6HX	100	22	10	8	11	S
VMTM1015020M	VMTM1015040M	M10x1.5	6HX	100	22	10	8	11	M
VMTM1210020S	-	M12x1.0	6HX	100	18	9	7	10	S
VMTM1210020M	VMTM1210040M	M12x1.0	6HX	100	18	9	7	10	M
VMTM1212520S	-	M12x1.25	6HX	100	22	9	7	10	S
VMTM1212520M	VMTM1212540M	M12x1.25	6HX	100	22	9	7	10	M
VMTM1215020S	-	M12x1.5	6HX	100	22	9	7	10	S
VMTM1215020M	VMTM1215040M	M12x1.5	6HX	100	22	9	7	10	M
VMTM1217520S	-	M12x1.75	6HX	110	24	9	7	10	S
VMTM1217520M	VMTM1217540M	M12x1.75	6HX	110	24	9	7	10	M

2,0P Tap is removed external center as bottoming type

Oil groove S : 1 oil groove
Oil groove M : 4 oil groove

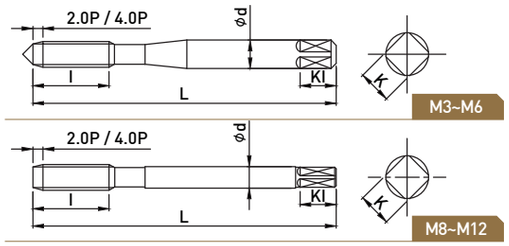
■ Applicable Working Material

Low Carbon Steels	Medium Carbon Steels	High Carbon Steels	Alloy Steel	Hardened Steels			Stainless Steels	Tool Steels	Cast Steels	Cast Iron	High Strength Steels	Copper	Brass	Casting Brass	Bronze	Aluminum rolled material	Aluminum alloy castings	Magnesium alloy castings	Zinc alloy castings	Titanium alloys	Nickel alloy	Thermo-setting plastic	Thermo-plastic
C ~0.25%	C0.25% ~0.45%	C 0.45%~	SCM	25~45 HRc	45~55 HRc	50~60 HRc	SUS	SKD	SC	FC	FCD	Cu	Bs	BsC	PB	AL	AC,ADC	MC	ZDC				
○	○	○	○				◎					○	○	○		○	○		○				

○ : GOOD ◎ : EXCELLENT

VMCM

DIN ROLL TAPS



- Improvement of wear resistance by applied to TiCN Coating
- Suitable for blind hole work and through hole work
- Applied to oil groove design for outside fueling

DIN 371-376 374 | HSSE | TiCN

EDP No		Thread Size	Limits	L	l	d	K	Kl	Oil Groove
2P	4P								
VMCM0305020S	-	M3x0.5	6HX	56	11	3.5	2.7	6	S
VMCM0305020M	VMCM0305040M	M3x0.5	6HX	56	11	3.5	2.7	6	M
VMCM0407020S	-	M4x0.7	6HX	63	13	4.5	3.4	6	S
VMCM0407020M	VMCM0407040M	M4x0.7	6HX	63	13	4.5	3.4	6	M
VMCM0508020S	-	M5x0.8	6HX	70	15	6	4.9	8	S
VMCM0508020M	VMCM0508040M	M5x0.8	6HX	70	15	6	4.9	8	M
VMCM0610020S	-	M6x1.0	6HX	80	17	6	4.9	8	S
VMCM0610020M	VMCM0610040M	M6x1.0	6HX	80	17	6	4.9	8	M
VMCM0810020S	-	M8x1.0	6HX	90	17	8	6.2	9	S
VMCM0810020M	VMCM0810040M	M8x1.0	6HX	90	17	8	6.2	9	M
VMCM0812520S	-	M8x1.25	6HX	90	20	8	6.2	9	S
VMCM0812520M	VMCM0812540M	M8x1.25	6HX	90	20	8	6.2	9	M
VMCM1010020S	-	M10x1.0	6HX	90	18	10	8	11	S
VMCM1010020M	VMCM1010040M	M10x1.0	6HX	90	18	10	8	11	M
VMCM1012520S	-	M10x1.25	6HX	100	22	10	8	11	S
VMCM1012520M	VMCM1012540M	M10x1.25	6HX	100	22	10	8	11	M
VMCM1015020S	-	M10x1.5	6HX	100	22	10	8	11	S
VMCM1015020M	VMCM1015040M	M10x1.5	6HX	100	22	10	8	11	M
VMCM1210020S	-	M12x1.0	6HX	100	18	9	7	10	S
VMCM1210020M	VMCM1210040M	M12x1.0	6HX	100	18	9	7	10	M
VMCM1212520S	-	M12x1.25	6HX	100	22	9	7	10	S
VMCM1212520M	VMCM1212540M	M12x1.25	6HX	100	22	9	7	10	M
VMCM1215020S	-	M12x1.5	6HX	100	22	9	7	10	S
VMCM1215020M	VMCM1215040M	M12x1.5	6HX	100	22	9	7	10	M
VMCM1217520S	-	M12x1.75	6HX	110	24	9	7	10	S
VMCM1217520M	VMCM1217540M	M12x1.75	6HX	110	24	9	7	10	M

2,0P Tap is removed external center as bottoming type

Oil groove S : 1 oil groove
Oil groove M : 4 oil groove

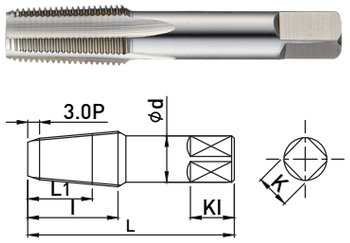
■ Applicable Working Material

Low Carbon Steels	Medium Carbon Steels	High Carbon Steels	Alloy Steel	Hardened Steels			Stainless Steels	Tool Steels	Cast Steels	Cast Iron	High Strength Steels	Copper	Brass	Casting Brass	Bronze	Aluminum rolled material	Aluminum alloy castings	Magnesium alloy castings	Zinc alloy castings	Titanium alloys	Nickel alloy	Thermo-setting plastic	Thermo-plastic
C ~0.25%	C0.25% ~0.45%	C 0.45%~	SCM	25~45 HRc	45~55 HRc	50~60 HRc	SUS	SKD	SC	FC	FCD	Cu	Bs	BsC	PB	AL	AC,ADC	MC	ZDC				
◎	◎	○	○				◎					◎	◎	◎		◎	◎		◎				

○ : GOOD ◎ : EXCELLENT

VSOPT

PT TAPER PIPE TAPS



- Suitable for internal threading as PT standard pipe taper thread

HSSE Uncoated

EDP No	Thread Size	Limits	Basic Major Dia(mm)	L	l	L1	d	K	KI	Z
VSOPT1/16	1/16-28	JIS ‖	7.723	55	19	13	8	6	9	4
VSOPT1/8	1/8-28	JIS ‖	9.728	55	19	13	8	6	9	4
VSOPT1/4	1/4-19	JIS ‖	13.157	62	28	21	11	9	12	4
VSOPT3/8	3/8-19	JIS ‖	16.662	65	28	21	14	11	14	4
VSOPT1/2	1/2-14	JIS ‖	20.955	80	35	25	18	14	17	4
VSOPT3/4	3/4-14	JIS ‖	26.441	85	35	25	23	17	20	4
VSOPT1	1-11	JIS ‖	33.249	95	45	32	26	21	24	4

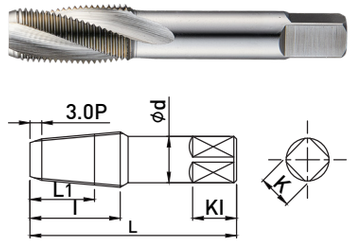
■ **Applicable Working Material**

Low Carbon Steels	Medium Carbon Steels	High Carbon Steels	Alloy Steel	Hardened Steels			Stainless Steels	Tool Steels	Cast Steels	Cast Iron	High Strength Steels	Copper	Brass	Casting Brass	Bronze	Aluminum rolled material	Aluminum alloy castings	Magnesium alloy castings	Zinc alloy castings	Titanium alloys	Nickel alloy	Thermo-setting plastic	Thermo-plastic
C ~0.25%	C0.25% ~0.45%	C 0.45%~	SCM	25~45 HRc	45~55 HRc	50~60 HRc	SUS	SKD	SC	FC	FCD	Cu	Bs	BsC	PB	AL	AC,ADC	MC	ZDC				
	○	○							○	○	○	○	○	○		○	○	○	○				○

○ : GOOD ◎ : EXCELLENT

VPOPT

PT TAPER PIPE TAPS



- Suitable for internal threading as PT standard pipe taper thread
- Excellent chip emission by applied to Spiral flutes type groove

HSSE Uncoated 30° HELIX

EDP No	Thread Size	Limits	Basic Major Dia(mm)	L	l	L1	d	K	KI	Z
VPOPT1/16	1/16-28	JIS ‖	7.723	55	19	13	8	6	9	3
VPOPT1/8	1/8-28	JIS ‖	9.728	55	19	13	8	6	9	3
VPOPT1/4	1/4-19	JIS ‖	13.157	62	28	21	11	9	12	3
VPOPT3/8	3/8-19	JIS ‖	16.662	65	28	21	14	11	14	3
VPOPT1/2	1/2-14	JIS ‖	20.955	80	35	25	18	14	17	4
VPOPT3/4	3/4-14	JIS ‖	26.441	85	35	25	23	17	20	4
VPOPT1	1-11	JIS ‖	33.249	95	45	32	26	21	24	4

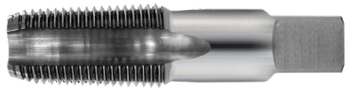
■ **Applicable Working Material**

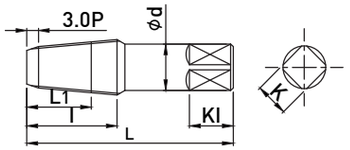
Low Carbon Steels	Medium Carbon Steels	High Carbon Steels	Alloy Steel	Hardened Steels			Stainless Steels	Tool Steels	Cast Steels	Cast Iron	High Strength Steels	Copper	Brass	Casting Brass	Bronze	Aluminum rolled material	Aluminum alloy castings	Magnesium alloy castings	Zinc alloy castings	Titanium alloys	Nickel alloy	Thermo-setting plastic	Thermo-plastic
C ~0.25%	C0.25% ~0.45%	C 0.45%~	SCM	25~45 HRc	45~55 HRc	50~60 HRc	SUS	SKD	SC	FC	FCD	Cu	Bs	BsC	PB	AL	AC,ADC	MC	ZDC				
	○		○						○									○					

○ : GOOD ◎ : EXCELLENT

VSONPT

NPT TAPER PIPE TAPS





- Suitable for mechanical coupling work as NPT standard taper pipe thread

HSSE | Uncoated

EDP No	Thread Size	Limits	Basic Major Dia(mm)	L	l	L1	d	K	Kl	Z
VSONPT1/16	1/16-27	ANSI G	7.770	55	19	12	8	6	9	4
VSONPT1/8	1/8-27	ANSI G	10.117	55	19	12.05	8	6	9	4
VSONPT1/4	1/4-18	ANSI G	13.426	62	28	17.45	11	9	12	4
VSONPT3/8	3/8-18	ANSI G	16.866	65	28	17.65	14	11	14	4
VSONPT1/2	1/2-14	ANSI G	20.980	80	35	22.85	18	14	17	4
VSONPT3/4	3/4-14	ANSI G	26.325	85	35	22.95	23	17	20	4
VSONPT1	1-11½	ANSI G	32.934	95	45	27.4	26	21	24	4

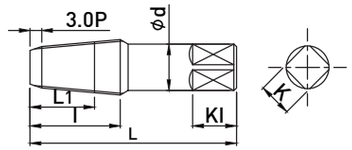
■ **Applicable Working Material**

Low Carbon Steels	Medium Carbon Steels	High Carbon Steels	Alloy Steel	Hardened Steels			Stainless Steels	Tool Steels	Cast Steels	Cast Iron	High Strength Steels	Copper	Brass	Casting Brass	Bronze	Aluminum rolled material	Aluminum alloy castings	Magnesium alloy castings	Zinc alloy castings	Titanium alloys	Nickel alloy	Thermo-setting plastic	Thermo-plastic
C ~0.25%	C0.25% ~0.45%	C 0.45%~	SCM	25~45 HRc	45~55 HRc	50~60 HRc	SUS	SKD	SC	FC	FCD	Cu	Bs	BsC	PB	AL	AC,ADC	MC	ZDC				
	○	○							○	○	○	○	○	○		○	○	○	○				○

○ : GOOD ◎ : EXCELLENT

VPONPT

NPT TAPER PIPE TAPS



- Suitable for mechanical coupling work as NPT standard taper thread
- Excellent chip emission by applied to Spiral flutes type groove

HSSE | Uncoated | 30° HELIX

EDP No	Thread Size	Limits	Basic Major Dia(mm)	L	l	L1	d	K	Kl	Z
VPONPT1/16	1/16-27	ANSI G	7.770	55	19	12	8	6	9	3
VPONPT1/8	1/8-27	ANSI G	10.117	55	19	12.05	8	6	9	3
VPONPT1/4	1/4-18	ANSI G	13.426	62	28	17.45	11	9	12	3
VPONPT3/8	3/8-18	ANSI G	16.866	65	28	17.65	14	11	14	3
VPONPT1/2	1/2-14	ANSI G	20.980	80	35	22.85	18	14	17	4
VPONPT3/4	3/4-14	ANSI G	26.325	85	35	22.95	23	17	20	4
VPONPT1	1-11½	ANSI G	32.934	95	45	27.4	26	21	24	4

※Production outside of the above specifications is possible upon separate request

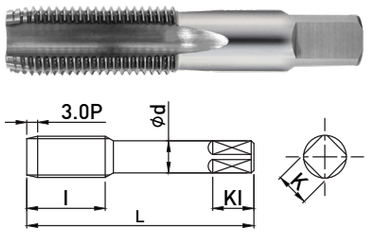
■ **Applicable Working Material**

Low Carbon Steels	Medium Carbon Steels	High Carbon Steels	Alloy Steel	Hardened Steels			Stainless Steels	Tool Steels	Cast Steels	Cast Iron	High Strength Steels	Copper	Brass	Casting Brass	Bronze	Aluminum rolled material	Aluminum alloy castings	Magnesium alloy castings	Zinc alloy castings	Titanium alloys	Nickel alloy	Thermo-setting plastic	Thermo-plastic
C ~0.25%	C0.25% ~0.45%	C 0.45%~	SCM	25~45 HRc	45~55 HRc	50~60 HRc	SUS	SKD	SC	FC	FCD	Cu	Bs	BsC	PB	AL	AC,ADC	MC	ZDC				
	○		○						○									○					

○ : GOOD ◎ : EXCELLENT

VSOPS

PS STRAIGHT PIPE TAPS



- Suitable for internal threading as PS standard Straight pipe thread

HSSE Uncoated

EDP No	Thread Size	Limits	Basic Major Dia(mm)	L	l	d	K	Kl	Z
VSOPS1/8	1/8-28	JIS ll	9.728	55	19	8	6	9	4
VSOPS1/4	1/4-19	JIS ll	13.157	62	28	11	9	12	4
VSOPS3/8	3/8-19	JIS ll	16.662	65	28	14	11	14	4
VSOPS1/2	1/2-14	JIS ll	20.955	80	35	18	14	17	4
VSOPS3/4	3/4-14	JIS ll	26.441	85	35	23	17	20	4
VSOPS1	1-11	JIS ll	33.249	95	45	26	21	24	4

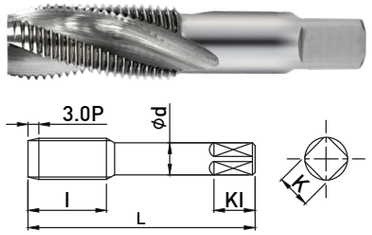
■ Applicable Working Material

Low Carbon Steels	Medium Carbon Steels	High Carbon Steels	Alloy Steel	Hardened Steels			Stainless Steels	Tool Steels	Cast Steels	Cast Iron	High Strength Steels	Copper	Brass	Casting Brass	Bronze	Aluminum rolled material	Aluminum alloy castings	Magnesium alloy castings	Zinc alloy castings	Titanium alloys	Nickel alloy	Thermo-setting plastic	Thermo-plastic
C ~0.25%	C0.25% ~0.45%	C 0.45%~	SCM	25~45 HRc	45~55 HRc	50~60 HRc	SUS	SKD	SC	FC	FCD	Cu	Bs	BsC	PB	AL	AC,ADC	MC	ZDC				
		○							○	○	○		○	○	○	○	○	○	○				

○ : GOOD ◎ : EXCELLENT

VPOPS

PS STRAIGHT PIPE TAPS



- Suitable for internal threading as PS standard straight pipe thread
- Excellent chip emission by applied to Spiral flutes type groove

HSSE Uncoated 35° HELIX

EDP No	Thread Size	Limits	Basic Major Dia(mm)	L	l	d	K	Kl	Z
VPOPS1/8	1/8-28	JIS ll	9.728	55	19	8	6	9	3
VPOPS1/4	1/4-19	JIS ll	13.157	62	28	11	9	12	3
VPOPS3/8	3/8-19	JIS ll	16.662	65	28	14	11	14	3
VPOPS1/2	1/2-14	JIS ll	20.955	80	35	18	14	17	4
VPOPS3/4	3/4-14	JIS ll	26.441	85	35	23	17	20	4
VPOPS1	1-11	JIS ll	33.249	95	45	26	21	24	4

※Production outside of the above specifications is possible upon separate request

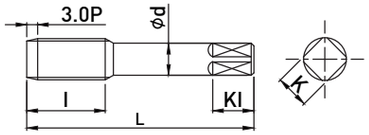
■ Applicable Working Material

Low Carbon Steels	Medium Carbon Steels	High Carbon Steels	Alloy Steel	Hardened Steels			Stainless Steels	Tool Steels	Cast Steels	Cast Iron	High Strength Steels	Copper	Brass	Casting Brass	Bronze	Aluminum rolled material	Aluminum alloy castings	Magnesium alloy castings	Zinc alloy castings	Titanium alloys	Nickel alloy	Thermo-setting plastic	Thermo-plastic
C ~0.25%	C0.25% ~0.45%	C 0.45%~	SCM	25~45 HRc	45~55 HRc	50~60 HRc	SUS	SKD	SC	FC	FCD	Cu	Bs	BsC	PB	AL	AC,ADC	MC	ZDC				
	◎		◎						◎		○		○	○	○	○	○	○	○				○

○ : GOOD ◎ : EXCELLENT

VSOPF

PF STRAIGHT PIPE TAPS



- Suitable for mechanical coupling work as PF taper thread standard

HSSE | Uncoated

EDP No	Thread Size	Limits	Basic Major Dia(mm)	L	l	d	K	Kl	Z
VSOPF1/8	1/8-28	JIS ⅡⅡ	9.728	55	19	8	6	9	4
VSOPF1/4	1/4-19	JIS ⅡⅡ	13.157	62	28	11	9	12	4
VSOPF3/8	3/8-19	JIS ⅡⅡ	16.662	65	28	14	11	14	4
VSOPF1/2	1/2-14	JIS ⅡⅡ	20.955	80	35	18	14	17	4
VSOPF3/4	3/4-14	JIS ⅡⅡ	26.441	85	35	23	17	20	4
VSOPF1	1-11	JIS ⅡⅡ	33.249	95	45	26	21	24	4

※Production outside of the above specifications is possible upon separate request

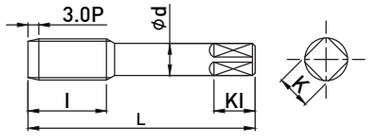
■ Applicable Working Material

Low Carbon Steels	Medium Carbon Steels	High Carbon Steels	Alloy Steel	Hardened Steels			Stainless Steels	Tool Steels	Cast Steels	Cast Iron	High Strength Steels	Copper	Brass	Casting Brass	Bronze	Aluminum rolled material	Aluminum alloy castings	Magnesium alloy castings	Zinc alloy castings	Titanium alloys	Nickel alloy	Thermo-setting plastic	Thermo-plastic
C ~0.25%	C0.25% ~0.45%	C 0.45%~	SCM	25~45 HRc	45~55 HRc	50~60 HRc	SUS	SKD	SC	FC	FCD	Cu	Bs	BsC	PB	AL	AC,ADC	MC	ZDC				
	○								○	○	○		○	○	○	○	○	○	○				

○ : GOOD ◎ : EXCELLENT

VPOPF

PF SPIRAL PIPE TAPS



- Suitable for mechanical coupling work as PF taper thread standard
- Excellent chip emission by applied to Spiral flutes type groove

HSSE | Uncoated | 35° HELIX

EDP No	Thread Size	Limits	Basic Major Dia(mm)	L	l	d	K	Kl	Z
VPOPF1/8	1/8-28	JIS ⅡⅡ	9.728	55	19	8	6	9	3
VPOPF1/4	1/4-19	JIS ⅡⅡ	13.157	62	28	11	9	12	3
VPOPF3/8	3/8-19	JIS ⅡⅡ	16.662	65	28	14	11	14	3
VPOPF1/2	1/2-14	JIS ⅡⅡ	20.955	80	35	18	14	17	4
VPOPF3/4	3/4-14	JIS ⅡⅡ	26.441	85	35	23	17	20	4
VPOPF1	1-11	JIS ⅡⅡ	33.249	95	45	26	21	24	4

※Production outside of the above specifications is possible upon separate request

■ Applicable Working Material

Low Carbon Steels	Medium Carbon Steels	High Carbon Steels	Alloy Steel	Hardened Steels			Stainless Steels	Tool Steels	Cast Steels	Cast Iron	High Strength Steels	Copper	Brass	Casting Brass	Bronze	Aluminum rolled material	Aluminum alloy castings	Magnesium alloy castings	Zinc alloy castings	Titanium alloys	Nickel alloy	Thermo-setting plastic	Thermo-plastic
C ~0.25%	C0.25% ~0.45%	C 0.45%~	SCM	25~45 HRc	45~55 HRc	50~60 HRc	SUS	SKD	SC	FC	FCD	Cu	Bs	BsC	PB	AL	AC,ADC	MC	ZDC				
	◎		◎						◎		○		○	○	○	○	○	○	○				○

○ : GOOD ◎ : EXCELLENT

CENTERING TOOLS &REAMERS SERIES

2020▶2021
WIDIN
PRODUCTS

CENTERING TOOLS & REAMERS SERIES 04

EDP. NO	Appearance	Description	Page
CDS		Solid center drill	402
LDS		NC Spotting drill	403
LDF---W		NC Spotting drill - Multi type	404
CES302		Centering endmill - Solid type	405
CEM---W		Centering endmill - brazed type	406
CRC		Corner Rounding cutter	407
CFT---W		Chamfer Tool	408
CCT		Chamfer Cutter	409
CCF		Chamfer Cutter Face	410

CENTERING TOOL

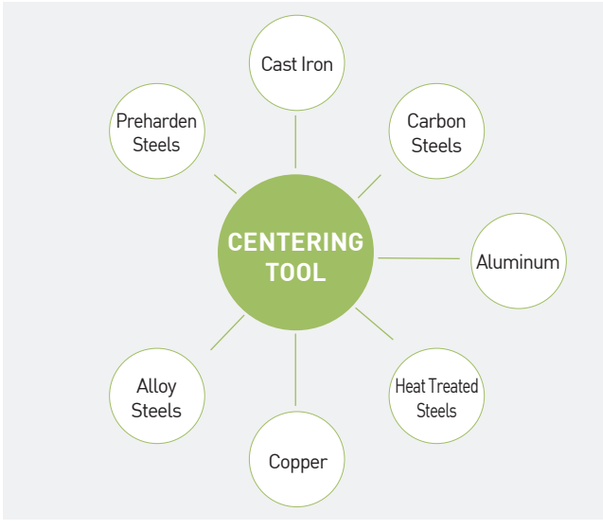
General Features

· Suitable to work for Die Steels,Alloy Steels, Cast Iron, Stainless Steels, Graphite
· Processing the corners chamfering and R shape processing

Characteristics

· Enough to customized work on corner chamfering and R shape processing
· Excellent retentivity for Flute hardness and High temperature harness by applied to TiAlN, AlTiN coating


Applications

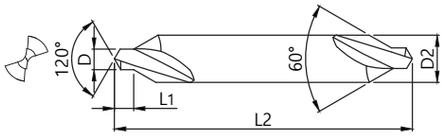


EDP No. System

APPEARANCE	TYPE	DIAMETER
C : Center	DS : Drill Spotting(Metric)	030
L : Leading	DA : Drill Spotting(Inch) (Variable Point Angle)	035
CE : Centering EndMIll	DF : Drill Spotting Multy Type	040
CR : Corner Rounding	S : End Mill Solid Type	
CF : Chamfer	M : End Mill Brazed Type	
CC : Chamfer Cutter	C : Cutter	
	T : Tool	
	F : Face	
C	DS	030
Center	Drill Spotting(Metric)	Ø3.0

CDS

SOLID CENTER DRILL



- Excellent chamfering and centering process

FINE GRAIN | 15° HELIX | Uncoated | DATA

p.548

■ **TOLERANCE**

D		SHANK DIA.
ALL SIZES	0 ~ +0.1mm	h6

EDP No	D	L_1	L_2	D_2
CDS010	1	1	40	3
CDS015	1.5	1.5	40	4
CDS020	2	2	45	5
CDS025	2.5	2.5	45	6
CDS030	3	3	55	8
CDS040	4	4.5	60	10
CDS050	5	5.5	65	12

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

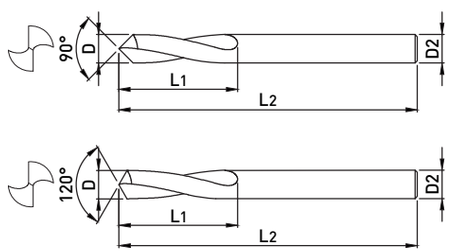
■ **Applicable Working Material**

Carbon Steels ~ HB225	Alloy Steels HB225~325	Preharden Steels HRc30~50	Heat Treated Steels		Copper	Graphite	Cast Iron ~FCD400, 500	Aluminum	Stainless Steels
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○			○			○	○	○

○ : GOOD ◎ : EXCELLENT

LDS

NC SPOTTING DRILL



- Suitable for chamfering and Centering work
- Long Shank Type

FINE GRAIN | 12° HELIX | TiAlN | 90° | 120° | DATA

p.548

■ **TOLERANCE**

D		SHANK DIA.
ALL SIZES	±0.01mm	h6

EDP No	D	L_1	L_2	D_2	Point Angle
LDS030	3	9	50	3	90°
LDS030L	3	10	100	3	90°
LDS030A	3	9	50	3	120°
LDS040	4	10	50	4	90°
LDS040L	4	12	100	4	90°
LDS040A	4	10	50	4	120°
LDS050	5	12	50	5	90°
LDS050A	5	12	50	5	120°
LDS060	6	13	60	6	90°
LDS060L	6	18	110	6	90°
LDS060A	6	13	60	6	120°
LDS080	8	23	70	8	90°
LDS080L	8	23	150	8	90°
LDS080A	8	23	70	8	120°
LDS100	10	24	80	10	90°
LDS100L	10	24	150	10	90°
LDS100A	10	24	80	10	120°
LDS120	12	28	80	12	90°
LDS120L	12	24	150	12	90°
LDS120A	12	28	80	12	120°
LDS160	16	32	90	16	90°
LDS160A	16	32	90	16	120°
LDS200	20	35	100	20	90°
LDS200A	20	35	100	20	120°

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

■ **Applicable Working Material**

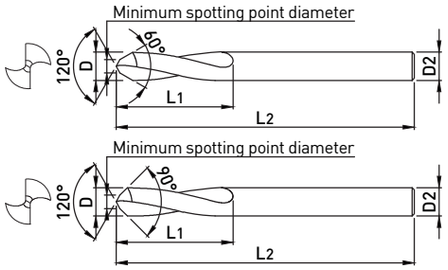
Carbon Steels ~ HB225	Alloy Steels HB225~325	Preharden Steels HRc30~50	Heat Treated Steels		Copper	Graphite	Cast Iron ~FCD400, 500	Aluminum	Stainless Steels
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○	○			○		○		○

○ : GOOD ◎ : EXCELLENT

Centering

LDF---W

NC SPOTTING DRILL MULTY TYPE



- Suitable for chamfering and Centering work
- Minimized broken the chisel by applied to double chamfer on point part

FINE GRAIN | 20° HELIX | TiAlN | 60° | 90° | DATA

p.548

■ **TOLERANCE**

D		SHANK DIA.
ALL SIZES	±0.01mm	h6

EDP No	D	L_1	L_2	D_2	θ	Minimum spotting point diameter
LDF0360W	3	9	50	3	60°	1.5
LDF0390W	3	9	50	3	90°	1.2
LDF0460W	4	10	50	4	60°	1.7
LDF0490W	4	10	50	4	90°	1.3
LDF0560W	5	12	50	5	60°	1.9
LDF0590W	5	12	50	5	90°	1.5
LDF0660W	6	13	60	6	60°	1.9
LDF0690W	6	13	60	6	90°	1.5
LDF0860W	8	23	70	8	60°	1.9
LDF0890W	8	23	70	8	90°	1.6
LDF1060W	10	24	80	10	60°	2.1
LDF1090W	10	24	80	10	90°	2.1
LDF1260W	12	28	80	12	60°	2.1
LDF1290W	12	28	80	12	90°	2.1

※The Minimum spotting point represents the minimum value of the spotting point hole when used for chamfering.

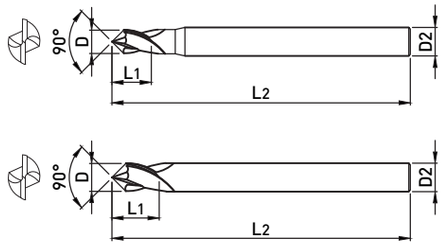
■ **Applicable Working Material**

Carbon Steels ~ HB225	Alloy Steels HB225~325	Preharden Steels HRc30~50	Heat Treated Steels		Copper	Graphite	Cast Iron ~FCD400, 500	Aluminum	Stainless Steels
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○	○			○		○		○

○ : GOOD ◎ : EXCELLENT

CES302

CENTERING END MILL - SOLID



- Multi-functional carbide end mills as centering and edge chamfering with side cutting at the same time
- Various workpieces can be processed by dividing coated and uncoated less than HRC 50

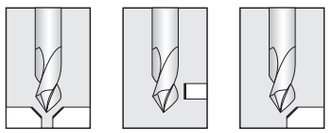
FINE GRAIN | 2 | TiAlN | 30° HELIX | 90° | DATA

p.549

■ **TOLERANCE**

D		SHANK DIA.
ALL SIZES	0 ~ -0.05mm	h6

EDP No		D	L_1	L_2	D_2
Uncoated	Coating				
CES302 030	CES302 030-C	3	6	50	6
CES302 040	CES302 040-C	4	8	50	6
CES302 050	CES302 050-C	5	10	50	6
CES302 060	CES302 060-C	6	12	60	6
CES302 080	CES302 080-C	8	16	70	8
CES302 100	CES302 100-C	10	18	70	10
CES302 120	CES302 120-C	12	20	75	12
CES302 140	CES302 140-C	14	24	80	14
CES302 160	CES302 160-C	16	26	80	16
CES302 200	CES302 200-C	20	32	100	20



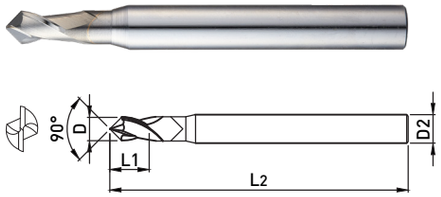
■ **Applicable Working Material**

Carbon Steels ~ HB225	Alloy Steels HB225~325	Preharden Steels HRc30~50	Heat Treated Steels		Copper	Graphite	Cast Iron ~FCD400, 500	Aluminum	Stainless Steels
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○	○			○		○	○	○

○ : GOOD ◎ : EXCELLENT

CEM---W

CENTERING END MILL - BRAZED TYPE



- Multi-functional carbide end mills as centering and edge chamfering with side cutting at the same time
- Various workpieces can be processed by dividing coated and uncoated less than HRC 50

WC | 2 | 30° HELIX | 90° | DATA

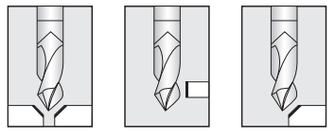
p.549

■ TOLERANCE

D		SHANK DIA.
ALL SIZES	0 ~ +0.1mm	h7

EDP No	D	L_1	L_2	D_2
CEM1016W	10	15	115	16
CEM1216W	12	20	145	16
CEM1620W	16	23	150	20
CEM2025W	20	25	155	25

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



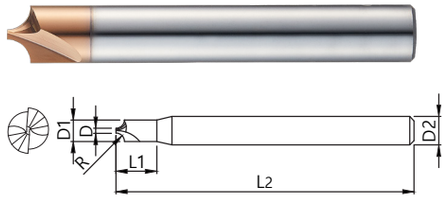
■ Applicable Working Material

Carbon Steels ~ HB225	Alloy Steels HB225~325	Preharden Steels HRc30~50	Heat Treated Steels		Copper	Graphite	Cast Iron ~FCD400, 500	Aluminum	Stainless Steels
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○	○			○		○	○	○

○ : GOOD ◎ : EXCELLENT

CRC

CORNER ROUNDING CUTTER



- Various workpieces can be processed by dividing coated and uncoated less than HRC 50
- Excellent wear resistance and chipping resistance by using an ultra-fine particle base material, suitable for high-speed processing
- For processing Corner R-shape

ULTRA FINE | 2 | 0° HELIX | R ±0.05 | AlTiN | DATA

p.549

■ TOLERANCE

D		SHANK DIA.
ALL SIZES	±0.05mm	h6

EDP No	D	R	D_1	L_1	L_2	D_2
CRC209 050	0.9	0.5	2	3	45	4
CRC209 075	0.9	0.75	2.5	4	45	4
CRC209 100	0.9	1	3	5	50	6
CRC259 100	5.9	1	8	-	60	8
CRC214 150	1.4	1.5	4.5	8	50	6
CRC249 150	4.9	1.5	8	-	60	8
CRC214 200	1.4	2	5.5	10	50	6
CRC239 200	3.9	2	8	-	60	8
CRC219 250	1.9	2.5	7	13	60	8
CRC219 300	1.9	3	8	-	60	8
CRC219 350	1.9	3.5	9	13	70	10
CRC219 400	1.9	4	10	-	70	10
CRC219 450	1.9	4.5	11	13	80	12
CRC219 500	1.9	5	12	-	80	12
CRC239 600	3.9	6	16	-	85	16
CRC259 700	5.9	7	20	-	85	20
CRC239 800	3.9	8	20	-	85	20

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

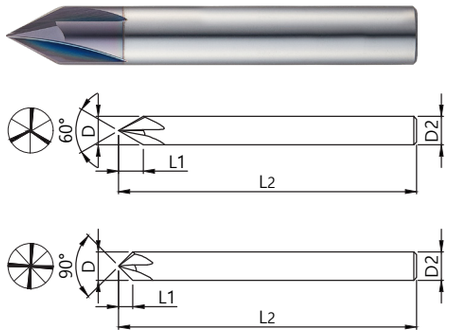
■ Applicable Working Material

Carbon Steels ~ HB225	Alloy Steels HB225~325	Preharden Steels HRc30~50	Heat Treated Steels		Copper	Graphite	Cast Iron ~FCD400, 500	Aluminum	Stainless Steels
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○	◎	◎	◎	○		○	○	○

○ : GOOD ◎ : EXCELLENT

CFT---W

CHAMFER TOOL



- Excellent wear resistance by applied to TiAlN coating
- Reinforcing the tool hardness and the surface roughness by applied to multiple straight type flutes
- Suitable for Chamfering work

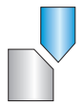
FINE GRAIN | 3~4 | TiAlN | 0° HELIX | 60° | 90° | DATA

p.550

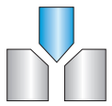
■ TOLERANCE

D		SHANK DIA.
ALL SIZES	+0.01mm	h6

EDP No	D	θ	L_1	L_2	D_2	Z
CFT0660W	6	60°	5.1	50	6	3
CFT0690W	6	90°	3	50	6	3
CFT0860W	8	60°	6.9	60	8	3
CFT0890W	8	90°	4	60	8	3
CFT1060W	10	60°	8.6	70	10	4
CFT1090W	10	90°	5	70	10	4
CFT1260W	12	60°	10.3	75	12	4
CFT1290W	12	90°	6	75	12	4



Available work(O)



Available work(O)

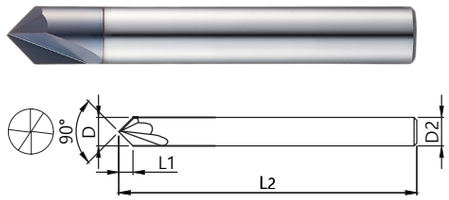
■ Applicable Working Material

Carbon Steels ~ HB225	Alloy Steels HB225~325	Preharden Steels HRc30~50	Heat Treated Steels		Copper	Graphite	Cast Iron ~FCD400, 500	Aluminum	Stainless Steels
			SKD61 ~HRc55	SKD11 ~HRc55					
O	O	O			O		O		O

O : GOOD ◎ : EXCELLENT

CCT

CHAMFER CUTTER



- Excellent heat-resistance by applied to AlTiN coating
- Improvement of chip emission by applied to Straight type 2 flutes and expansion the chip pocket
- Suitable for Chamfering and Centering work

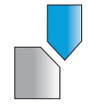
FINE GRAIN | 2 | AlTiN | 0° HELIX | DATA

p.550

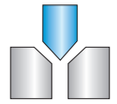
■ TOLERANCE

D		SHANK DIA.
ALL SIZES	+0.01mm	h6

EDP No	D	θ	L_1	L_2	D_2
CCT502 030 S3	3	90 °	1.5	60	3
CCT502 040 S4	4	90 °	2	60	4
CCT502 060	6	90 °	3	60	6
CCT502 080	8	90 °	4	65	8
CCT502 100	10	90 °	5	70	10
CCT502 120	12	90 °	6	75	12



Available work(O)



Available work(O)

Available work(△)

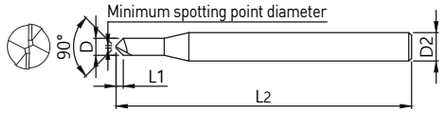
■ Applicable Working Material

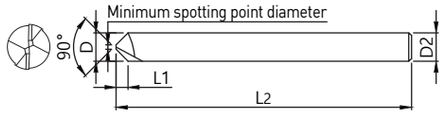
Carbon Steels ~ HB225	Alloy Steels HB225~325	Preharden Steels HRc30~50	Heat Treated Steels		Copper	Graphite	Cast Iron ~FCD400, 500	Aluminum	Stainless Steels
			SKD61 ~HRc55	SKD11 ~HRc55					
O	O	O			O		O		O

O : GOOD ◎ : EXCELLENT

CCF

CHAMFER CUTTER FACE





- Excellent heat-resistance by applied to AlTiN coating
- Suitable for chamfering work and supplemented the cutting force by applied to Straight Type 2 flutes

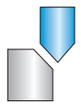
ULTRA FINE | 2 | 5° HELIX | AlTiN | DATA

p.550

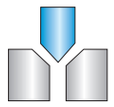
■ **TOLERANCE**

D		SHANK DIA.
ALL SIZES	±0.01mm	h6

EDP No	D	θ	L_1	L_2	D_2	Minimum spotting point diameter
CCF502 020 S4	2	90 °	0.85	50	4	0.3
CCF502 020	2		0.85	50	6	0.3
CCF502 040 S4	4		1.85	50	4	0.3
CCF502 040	4		1.85	50	6	0.3
CCF502 060	6		2.85	50	6	0.3
CCF502 080	8		3.8	60	8	0.4
CCF502 100	10		4.75	70	10	0.5
CCF502 120	12		5.75	75	12	0.5



Available work(O)



Available work(O)

■ **Applicable Working Material**

Carbon Steels ~ HB225	Alloy Steels HB225~325	Preharden Steels HRc30~50	Heat Treated Steels		Copper	Graphite	Cast Iron ~FCD400, 500	Aluminum	Stainless Steels
			SKD61 ~HRc55	SKD11 ~HRc55					
O	O	O			O		O	O	O

O : GOOD ◎ : EXCELLENT

MEMO

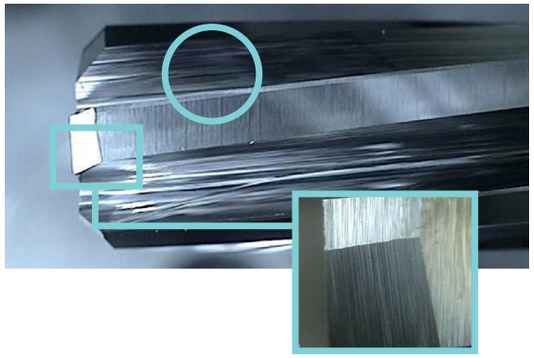
EDP. NO	Appearance	Description	Page
SSR		Straight Flute Reamer	413
SHR		Helical Flute Reamer	414
HRS---W		Helical Neck Type Reamer	415
SBR		High-Helix Broach Reamer	416

General Features

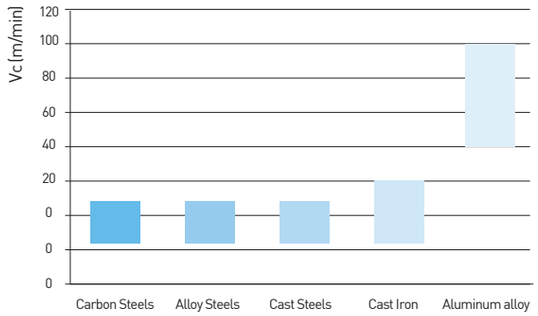
· Suitable to work for Carbon Steels, Alloy Steels, Preharden Steels, Copper, Cast Iron, Aluminum
· Extend customer choice with variety of size and type

Characteristics

· Excellent Chip emission by applied to Helical cutting edge
· Reduced friction by applied to clearance angle of the chamfer

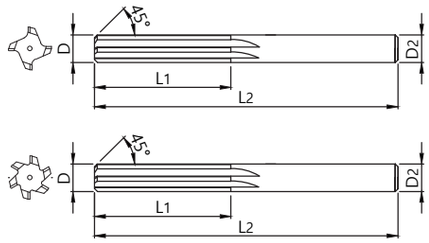


Applications



EDP No. System

APPEARANCE	TYPE	DIAMETER
SS : Solid Straight	R : Reamer	030
SH : Solid Helix	S : Separate Diameter	035
HR : Neck Type Helix		040
SB : Solid Broach		
SS	R	060
Solid Straight	Reamer	Ø6.0



- Straight Helix applied, chips are emitted through flute, Suitable for blind holes
- Excellent Straightness by supplemented the Flute

WC | 4&6 | 0° HELIX | Uncoated

■ **TOLERANCE**

D		SHANK DIA.
~ D3	+0.006 ~ +0.002mm	h6
D3.1 ~ D6	+0.009 ~ +0.004mm	
D6.1 ~ D10	+0.012 ~ +0.006mm	
D10.1 ~ D12	+0.015 ~ +0.007mm	

EDP No	D	L_1	L_2	D_2	Z
SSR020	2	25	60	4	4
SSR025	2.5	25	60	4	4
SSR030	3	28	70	4	6
SSR035	3.5	30	75	4	6
SSR040	4	30	75	4	6
SSR045	4.5	35	80	6	6
SSR050	5	35	80	6	6
SSR055	5.5	35	80	6	6
SSR060	6	35	80	6	6
SSR065	6.5	45	100	8	6
SSR070	7	45	100	8	6
SSR080	8	45	100	8	6
SSR090	9	50	110	10	6
SSR100	10	50	110	10	6
SSR110	11	50	120	12	6
SSR120	12	50	120	12	6

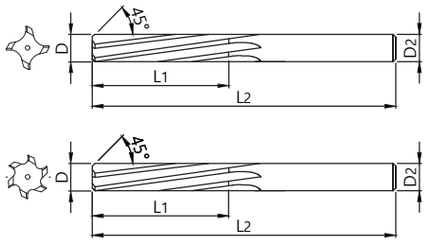
■ **Applicable Working Material**

Carbon Steels ~ HB225	Alloy Steels HB225~325	Preharden Steels HRc30~50	Heat Treated Steels		Copper	Graphite	Cast Iron ~FCD400, 500	Aluminum	Stainless Steels
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○	○			○		○	○	○

○ : GOOD ◎ : EXCELLENT

SHR

HELICAL FLUTE REAMER



- Applied to Left Helix, Chips emitted in the direction of processing. Suitable for through holes work
- Enhancement of Cutting force by twisting the cutting edge

WC | 4&6 | 7° HELIX | Uncoated

■ **TOLERANCE**

D		SHANK DIA.
~ D3	+0.006 ~ +0.002mm	h6
D3.1 ~ D6	+0.009 ~ +0.004mm	
D6.1 ~ D10	+0.012 ~ +0.006mm	
D10.1 ~ D12	+0.015 ~ +0.007mm	

EDP No	D	L_1	L_2	D_2	Z
SHR020	2	25	60	4	4
SHR025	2.5	25	60	4	4
SHR030	3	28	70	4	6
SHR035	3.5	30	75	4	6
SHR040	4	30	75	4	6
SHR045	4.5	35	80	6	6
SHR050	5	35	80	6	6
SHR055	5.5	35	80	6	6
SHR060	6	35	80	6	6
SHR065	6.5	45	100	8	6
SHR070	7	45	100	8	6
SHR080	8	45	100	8	6
SHR090	9	50	110	10	6
SHR100	10	50	110	10	6
SHR110	11	50	120	12	6
SHR120	12	50	120	12	6

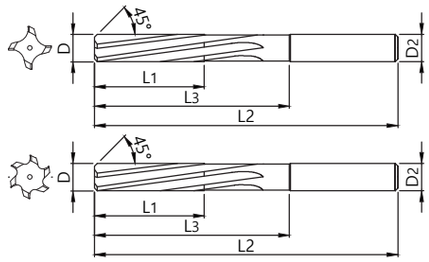
■ **Applicable Working Material**

Carbon Steels ~ HB225	Alloy Steels HB225~325	Preharden Steels HRc30~50	Heat Treated Steels		Copper	Graphite	Cast Iron ~FCD400, 500	Aluminum	Stainless Steels
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○	○			○		○	○	○

○ : GOOD ◎ : EXCELLENT

HELICAL FLUTE NECK TYPE REAMER

HRS---W



- Left Helix Flute type Reamer with Neck
- Suitable for through holes work Enhancement of Cutting force by twisting the cutting edge
- Possessing the various size for customer precision tolerance work

WC | 4&6 | 7° HELIX | Uncoated

■ **TOLERANCE**

D		SHANK DIA.
~ D5.03	0 ~ +0.004mm	h6
D5.5 ~ D12.05	0 ~ +0.005mm	

EDP No	D	L_1	L_3	L_2	D_2	Z
HRS0198W	1.98	12	22	50	4	4
HRS0199W	1.99	12	22	50	4	4
HRS0200W	2	12	22	50	4	4
HRS0201W	2.01	12	22	50	4	4
HRS0202W	2.02	12	22	50	4	4
HRS0203W	2.03	12	22	50	4	4
HRS0248W	2.48	16	26	60	4	4
HRS0249W	2.49	16	26	60	4	4
HRS0250W	2.5	16	26	60	4	4
HRS0251W	2.51	16	26	60	4	4
HRS0252W	2.52	16	26	60	4	4
HRS0253W	2.53	16	26	60	4	4
HRS0297W	2.97	18	30	65	4	6
HRS0298W	2.98	18	30	65	4	6
HRS0299W	2.99	18	30	65	4	6
HRS0300W	3	18	30	65	4	6
HRS0301W	3.01	18	30	65	4	6
HRS0302W	3.02	18	30	65	4	6
HRS0303W	3.03	18	30	65	4	6
HRS0350W	3.5	20	35	75	4	6
HRS0397W	3.97	20	35	75	4	6
HRS0398W	3.98	20	35	75	4	6
HRS0399W	3.99	20	35	75	4	6
HRS0400W	4	20	35	75	4	6
HRS0401W	4.01	20	35	75	4	6
HRS0402W	4.02	20	35	75	4	6
HRS0403W	4.03	20	35	75	4	6
HRS0450W	4.5	25	40	80	6	6
HRS0497W	4.97	25	40	80	6	6
HRS0498W	4.98	25	40	80	6	6
HRS0499W	4.99	25	40	80	6	6
HRS0500W	5	25	40	80	6	6
HRS0501W	5.01	25	40	80	6	6
HRS0502W	5.02	25	40	80	6	6
HRS0503W	5.03	25	40	80	6	6
HRS0550W	5.5	25	45	80	6	6
HRS0597W	5.97	25	45	80	6	6
HRS0598W	5.98	25	45	80	6	6

EDP No	D	L_1	L_3	L_2	D_2	Z
HRS0599W	5.99	25	45	80	6	6
HRS0600W	6	25	45	80	6	6
HRS0601W	6.01	25	45	80	6	6
HRS0602W	6.02	25	45	80	6	6
HRS0603W	6.03	25	45	80	6	6
HRS0650W	6.5	30	60	100	8	6
HRS0700W	7	30	60	100	8	6
HRS0750W	7.5	33	65	100	8	6
HRS0797W	7.97	33	65	100	8	6
HRS0798W	7.98	33	65	100	8	6
HRS0799W	7.99	33	65	100	8	6
HRS0800W	8	33	65	100	8	6
HRS0801W	8.01	33	65	100	8	6
HRS0802W	8.02	33	65	100	8	6
HRS0803W	8.03	33	65	100	8	6
HRS0850W	8.5	35	70	110	10	6
HRS0900W	9	35	70	110	10	6
HRS0997W	9.97	35	70	110	10	6
HRS0998W	9.98	35	70	110	10	6
HRS0999W	9.99	35	70	110	10	6
HRS1000W	10	35	70	110	10	6
HRS1001W	10.01	35	70	110	10	6
HRS1002W	10.02	35	70	110	10	6
HRS1003W	10.03	35	70	110	10	6
HRS1004W	10.04	35	70	110	10	6
HRS1005W	10.05	35	70	110	10	6
HRS1100W	11	40	80	120	12	6
HRS1197W	11.97	40	80	120	12	6
HRS1198W	11.98	40	80	120	12	6
HRS1199W	11.99	40	80	120	12	6
HRS1200W	12	40	80	120	12	6
HRS1201W	12.01	40	80	120	12	6
HRS1202W	12.02	40	80	120	12	6
HRS1203W	12.03	40	80	120	12	6
HRS1204W	12.04	40	80	120	12	6
HRS1205W	12.05	40	80	120	12	6

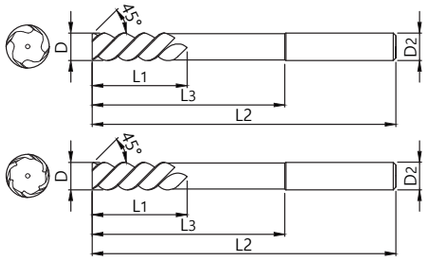
■ **Applicable Working Material**

Carbon Steels ~ HB225	Alloy Steels HB225~325	Preharden Steels HRc30~50	Heat Treated Steels		Copper	Graphite	Cast Iron ~FCD400, 500	Aluminum	Stainless Steels
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○	○			○		○		○

○ : GOOD ◎ : EXCELLENT

SBR

BROACH REAMER



- Applied to Left Helix, Chips emitted in the direction of processing. Suitable for through holes work
- Excellent for High precision speed work by applied to Taper on cutting edge

WC | 4&6 | 60° HELIX | Uncoated

■ **TOLERANCE**

D		SHANK DIA.
~ D3	+0.006 ~ +0.002mm	h6
D4 ~ 6	+0.009 ~ +0.004mm	
D8 ~ 10	+0.012 ~ +0.006mm	
D12 ~ 16	+0.015 ~ +0.007mm	
D20 ~	+0.017 ~ +0.007mm	

EDP No	D	L_1	L_2	L_3	D_2	Z
SBR030	3	12	70	40	4	4
SBR040	4	12	75	45	4	4
SBR050	5	16	80	45	6	4
SBR060	6	16	80	45	6	4
SBR080	8	20	100	60	8	4
SBR100	10	25	110	65	10	4
SBR120	12	28	120	70	12	4
SBR140	14	30	145	90	14	4
SBR160	16	35	155	100	16	6
SBR180	18	38	170	110	18	6
SBR200	20	40	180	120	20	6

* Over the ø14 diameter tools will be made by brazed type
* Tools in the range of ø14 to ø20 are manufactured only upon customer order

■ **Applicable Working Material**

Carbon Steels ~ HB225	Alloy Steels HB225~325	Preharden Steels HRc30~50	Heat Treated Steels		Copper	Graphite	Cast Iron ~FCD400, 500	Aluminum	Stainless Steels
			SKD61 ~HRc55	SKD11 ~HRc55					
○	○	○			○		○	○	○

○ : GOOD ◎ : EXCELLENT

MEMO

CARBIDE RODS & BLANKS

2020▶2021
WIDIN
PRODUCTS

CARBIDE RODS & BLANKS

05

CARBIDE RODS & BLANKS

Carbide Grade

	ISO Code	Co	Typical Grain Size	Density	Hv10	HRA	TRS
		Wt%	㎛	g/㎤			N/㎟
WU08	K01	8.0	0.3~0.4	14.30	2,000	94.2	3,000
WF08	K05	8.0	0.5	14.40	1,950	93.5	3,000
WF10	K10	10.0	0.5	14.40	1,700	92.5	3,000
WF12	K10~K20	12.0	0.5	14.10	1,650	92.0	3,400
WK10	K20	10.0	0.7~0.8	14.40	1,600	91.5	3,200

Grade Application

	Carbon Steel (＜45HRC)	Graphite & Carbon fiber	Stainless Steel	Cast Iron	Titanium Alloy	Aluminum Alloy	Heat Resistant Alloy	Hardened Steel
WU08		◎	○		◎	○		◎
WF08					○	◎		○
WF10	◎		◎	○	○	○		
WF12	○		○	◎		○	◎	
WK10	◎		○	○	○		○	

◎ : Suitable ○ : Recommended

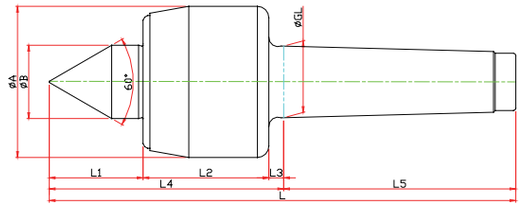
LIVE CENTER SERIES

2020▶2021
WIDIN
PRODUCTS

LIVE CENTER SERIES

06

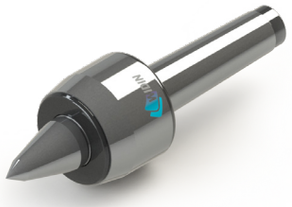
▶ NC-TYPE

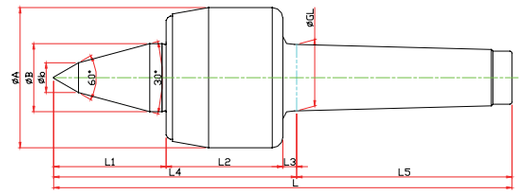


Model	Order Number	Morse Taper	Dimension									Weight MAX.	R.P.M MAX.	Run Out
			GL	A	B	L1	L2	L3	L4	L5	L			
LC-3NC	010003	NO.3	23.825	50	22	27	45	5	77	81	158	630	4800	0.003
LC-4NC	010004	NO.4	31.267	66	32	41	55	6.5	102.5	101.5	204	1100	3800	0.003
LC-5NC	010005	NO.5	44.399	82	40	50	65	6.5	121.5	129.5	251	1600	3400	0.005
LC-6NC	010006	NO.6	63.384	105	45	54	80	8	142	182	324	2100	3000	0.005

▶ NCB-TYPE

※ SHAFT EXTENTION(Minimize the bite-interference)

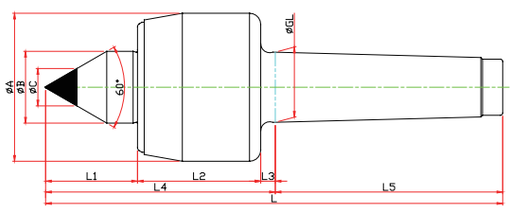




Model	Order Number	Morse Taper	Dimension										Weight MAX.	R.P.M MAX.	Run Out
			GL	A	B	b	L1	L2	L3	L4	L5	L			
LC-3NCB	011003	NO.3	23.825	50	22	10	47	45	5	97	81	178	630	4800	0.003
LC-4NCB	011004	NO.4	31.267	66	32	14	53	55	6.5	114.5	101.5	216	1100	3800	0.003
LC-5NCB	011005	NO.5	44.399	82	40	16	65	65	6.5	129.5	129.5	266	1600	3400	0.005
LC-6NCB	011006	NO.6	63.384	105	45	18	78	80	8	182	182	348	2100	3000	0.005

▶ NCC-TYPE

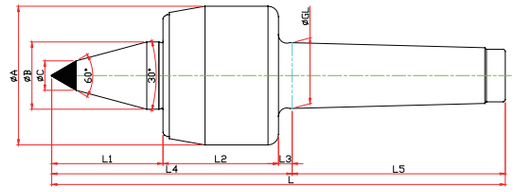
※ Carbide Type



Model	Order Number	Morse Taper	Dimension										Weight MAX.	R.P.M MAX.	Run Out
			GL	A	B	L1	L2	L3	L4	L5	C	L			
LC-3NCC	010103	NO.3	23.825	50	22	27	45	5	77	81	10	158	630	4800	0.003
LC-4NCC	010104	NO.4	31.267	66	32	41	55	6.5	102.5	101.5	14	204	1100	3800	0.003
LC-5NCC	010105	NO.5	44.399	82	40	50	65	6.5	121.5	129.5	18	251	1600	3400	0.005
LC-6NCC	010106	NO.6	63.384	105	45	54	80	8	142	182	25	324	2100	3000	0.005

▶ NCBC-TYPE

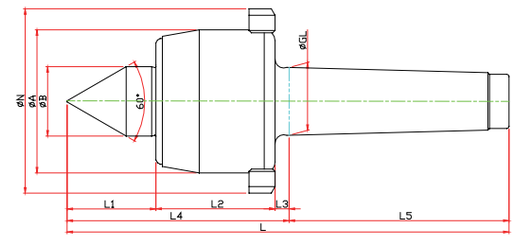
※ SHAFT EXTENTION(Minimize the bite-interference)
※ Carbide Type



Model	Order Number	Morse Taper	Dimension										Weight MAX.	R.P.M MAX.	Run Out
			GL	A	B	L1	L2	L3	L4	L5	C	L			
LC-3NCBC	011102	NO.3	23.825	50	22	47	45	5	97	81	10	178	630	4800	0.003
LC-4NCBC	011103	NO.4	31.267	66	32	53	55	6.5	114.5	101.5	14	216	1100	3800	0.003
LC-5NCBC	011104	NO.5	44.399	82	40	65	65	6.5	136.5	129.5	16	266	1600	3400	0.005
LC-6NCBC	011105	NO.6	63.384	105	45	78	80	8	166	182	18	348	2100	3000	0.005

▶ NCN-TYPE

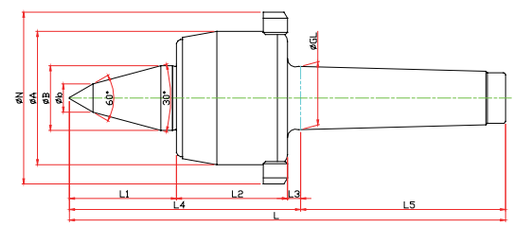
※ Nut Type



Model	Order Number	Morse Taper	Dimension										Weight MAX.	R.P.M MAX.	Run Out
			GL	A	B	L1	L2	L3	L4	L5	N	L			
LC-3NCN	010013	NO.3	23.825	50	22	27	45	5	77	81	70	158	630	4800	0.003
LC-4NCN	010014	NO.4	31.267	66	32	41	55	6.5	102.5	101.5	85	204	1100	3800	0.003
LC-5NCN	010015	NO.5	44.399	82	40	50	65	6.5	121.5	129.5	105	251	1600	3400	0.005
LC-6NCN	010016	NO.6	63.384	105	45	54	80	8	142	182	130	324	2100	3000	0.005

▶ NCBN-TYPE

※ SHAFT EXTENTION(Minimize the bite-interference)
※ Nut Type

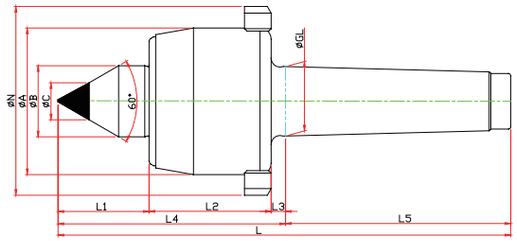


Model	Order Number	Morse Taper	Dimension											Weight MAX.	R.P.M MAX.	Run Out
			GL	A	B	b	L1	L2	L3	L4	L5	N	L			
LC-3NCBN	011013	NO.3	23.825	50	22	10	47	45	5	97	81	70	178	630	4800	0.003
LC-4NCBN	011014	NO.4	31.267	66	32	14	53	55	6.5	114.5	101.5	85	216	1100	3800	0.003
LC-5NCBN	011015	NO.5	44.399	82	40	16	65	65	6.5	136.5	129.5	105	266	1600	3400	0.005
LC-6NCBN	011016	NO.6	63.384	105	45	18	78	80	8	166	182	130	348	2100	3000	0.005

NC TYPE

▸ NCCN-TYPE

※ Nut, Carbide Type Type

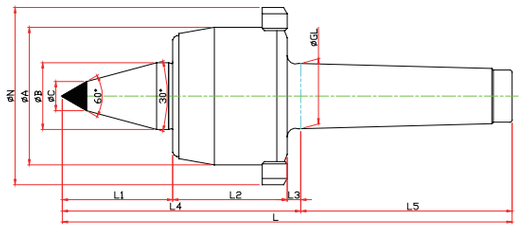


Model	Order Number	Morse Taper	Dimension											Weight MAX.	R.P.M MAX.	Run Out
			GL	A	B	L1	L2	L3	L4	L5	C	N	L			
LC-3NCCN	010113	NO.3	23.825	50	22	27	45	5	77	81	10	70	158	630	4800	0.003
LC-4NCCN	010114	NO.4	31.267	66	32	41	55	6.5	102.5	101.5	14	85	204	1100	3800	0.003
LC-5NCCN	010115	NO.5	44.399	82	40	50	65	6.5	121.5	129.5	18	105	251	1600	3400	0.005
LC-6NCCN	010116	NO.6	63.384	105	45	54	80	8	142	182	25	130	324	2100	3000	0.005

▸ NCBCN-TYPE

※ SHAFT EXTENTION(Minimize the bite-interference)

※ Nut, Carbide Type Type

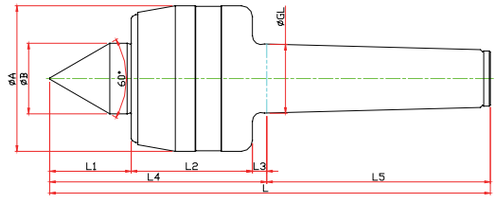


Model	Order Number	Morse Taper	Dimension											Weight MAX.	R.P.M MAX.	Run Out
			GL	A	B	L1	L2	L3	L4	L5	C	N	L			
LC-3NCBCN	011113	NO.3	23.825	50	22	47	45	5	97	81	10	70	178	630	4800	0.003
LC-4NCBCN	011114	NO.4	31.267	66	32	53	55	6.5	114.5	101.5	14	85	216	1100	3800	0.003
LC-5NCBCN	011115	NO.5	44.399	82	40	65	65	6.5	136.5	129.5	16	105	266	1600	3400	0.005
LC-6NCBCN	011116	NO.6	63.384	105	45	78	80	8	166	182	18	130	348	2100	3000	0.005

▸ NC-SPECIAL

NCP TYPE

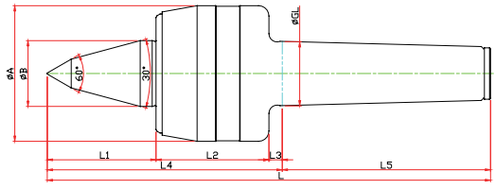
▸ NCP-TYPE



Model	Order Number	Morse Taper	Dimension									Weight MAX.	R.P.M MAX.	Run Out
			GL	A	B	L1	L2	L3	L4	L5	L			
LC-3NCP	030003	NO.3	23.825	50	22	27	45	5	77	81	158	800	4800	0.003
LC-4NCP	030004	NO.4	31.267	66	32	37	55	6.5	98.5	101.5	200	1300	3800	0.003
LC-5NCP	030005	NO.5	44.399	82	40	45	65	6.5	116.5	129.5	246	1900	3400	0.005
LC-6NCP	030006	NO.6	63.384	100	45	65	80	8	153	182	335	2500	3000	0.005

▸ NCPB-TYPE

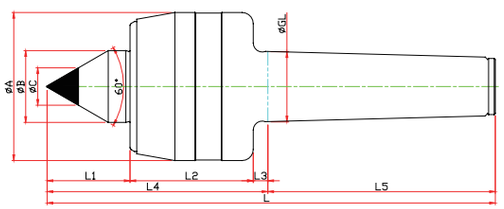
※ SHAFT EXTENTION(Minimize the bite-interference)



Model	Order Number	Morse Taper	Dimension										Weight MAX.	R.P.M MAX.	Run Out
			GL	A	B	b	L1	L2	L3	L4	L5	L			
LC-3NCPB	031003	NO.3	23.825	50	22	10	27	45	5	97	81	178	800	4800	0.003
LC-4NCPB	031004	NO.4	31.267	66	32	14	37	55	6.5	114.5	101.5	216	1300	3800	0.003
LC-5NCPB	031005	NO.5	44.399	82	40	16	45	65	6.5	136.5	129.5	266	1900	3400	0.005
LC-6NCPB	031006	NO.6	63.384	100	45	18	65	80	8	166	182	348	2500	3000	0.005

▸ NCPC-TYPE

※ Carbide Type

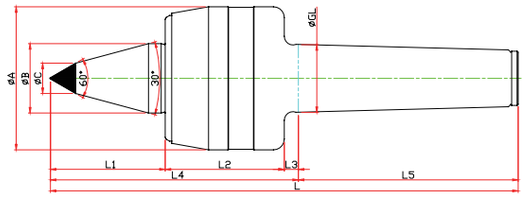


Model	Order Number	Morse Taper	Dimension										Weight MAX.	R.P.M MAX.	Run Out
			GL	A	B	L1	L2	L3	L4	L5	C	L			
LC-3NCPC	030103	NO.3	23.825	50	22	27	45	5	77	81	10	158	800	4800	0.003
LC-4NCPC	030104	NO.4	31.267	66	32	37	55	6.5	98.5	101.5	14	200	1300	3800	0.003
LC-5NCPC	030105	NO.5	44.399	82	40	45	65	6.5	116.5	129.5	18	246	1900	3400	0.005
LC-6NCPC	030106	NO.6	63.384	100	45	65	80	8	153	182	25	335	2500	3000	0.005

Live Center

▸ NCPBC-TYPE

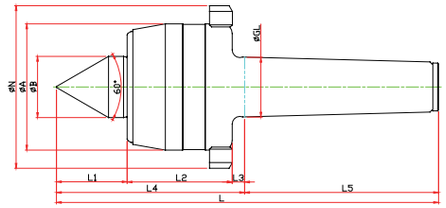
※ SHAFT EXTENTION(Minimize the bite-interference)
※ Carbide Type



Model	Order Number	Morse Taper	Dimension										Weight MAX.	R.P.M MAX.	Run Out
			GL	A	B	L1	L2	L3	L4	L5	C	L			
LC-3NCPBC	031103	NO.3	23.825	50	22	27	45	5	97	81	10	178	800	4800	0.003
LC-4NCPBC	031104	NO.4	31.267	66	32	37	55	6.5	114.5	101.5	14	216	1300	3800	0.003
LC-5NCPBC	031105	NO.5	44.399	82	40	45	65	6.5	136.5	129.5	16	266	1900	3400	0.005
LC-6NCPBC	031106	NO.6	63.384	100	45	65	80	8	166	182	18	348	2500	3000	0.005

▸ NCPN-TYPE

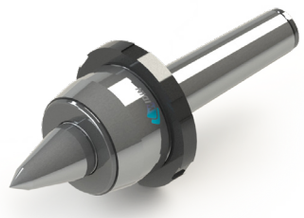
※ Nut Type

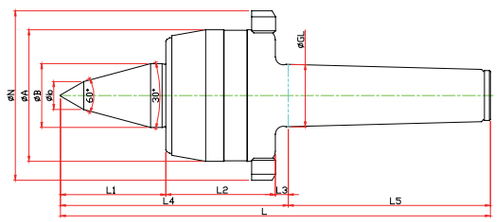


Model	Order Number	Morse Taper	Dimension										Weight MAX.	R.P.M MAX.	Run Out
			GL	A	B	L1	L2	L3	L4	L5	N	L			
LC-3NCPN	030013	NO.3	23.825	50	22	27	45	5	77	81	70	158	800	4800	0.003
LC-4NCPN	030014	NO.4	31.267	66	32	37	55	6.5	98.5	101.5	85	200	1300	3800	0.003
LC-5NCPN	030015	NO.5	44.399	82	40	45	65	6.5	116.5	129.5	105	246	1900	3400	0.005
LC-6NCPN	030016	NO.6	63.384	100	45	65	80	8	153	182	130	335	2500	3000	0.005

▸ NCPBN-TYPE

※ SHAFT EXTENTION(Minimize the bite-interference)
※ Nut Type

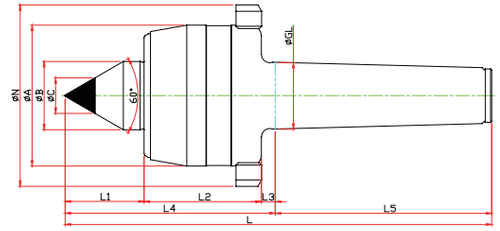




Model	Order Number	Morse Taper	Dimension											Weight MAX.	R.P.M MAX.	Run Out
			GL	A	B	b	L1	L2	L3	L4	L5	N	L			
LC-3NCPBN	031013	NO.3	23.825	50	22	10	47	45	5	97	81	70	178	800	4800	0.003
LC-4NCPBN	031014	NO.4	31.267	66	32	14	53	55	6.5	114.5	101.5	85	216	1300	3800	0.003
LC-5NCPBN	031015	NO.5	44.399	82	40	16	65	65	6.5	136.5	129.5	105	266	1900	3400	0.005
LC-6NCPBN	031016	NO.6	63.384	100	45	18	78	80	8	166	182	130	348	2500	3000	0.005

▸ NCPCN-TYPE

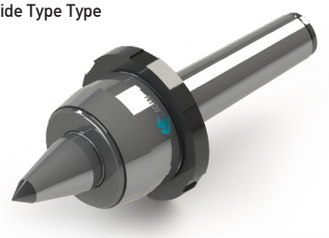
※ Nut, Carbide Type Type

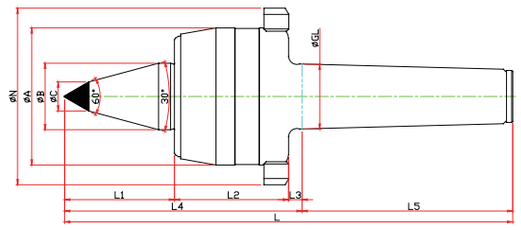


Model	Order Number	Morse Taper	Dimension											Weight MAX.	R.P.M MAX.	Run Out
			GL	A	B	L1	L2	L3	L4	L5	C	N	L			
LC-3NCPCN	030113	NO.3	23.825	50	22	27	45	5	77	81	10	70	158	800	4800	0.003
LC-4NCPCN	030114	NO.4	31.267	66	32	37	55	6.5	98.5	101.5	14	85	200	1300	3800	0.003
LC-5NCPCN	030115	NO.5	44.399	82	40	45	65	6.5	116.5	129.5	18	105	246	1900	3400	0.005
LC-6NCPCN	030116	NO.6	63.384	100	45	65	80	8	153	182	25	130	335	2500	3000	0.005

▸ NCPBCN-TYPE

※ SHAFT EXTENTION(Minimize the bite-interference)
※ Nut, Carbide Type Type





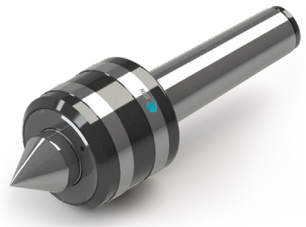
Model	Order Number	Morse Taper	Dimension										Weight MAX.	R.P.M MAX.	Run Out
			GL	A	B	L1	L2	L3	L4	L5	C	N	L			
LC-3NCPBCN	031113	NO.3	23.825	50	22	47	45	5	97	81	10	70	178	800	4800	0.003
LC-4NCPBCN	031114	NO.4	31.267	66	32	53	55	6.5	114.5	101.5	14	85	216	1300	3800	0.003
LC-5NCPBCN	031115	NO.5	44.399	82	40	65	65	6.5	136.5	129.5	16	105	266	1900	3400	0.005
LC-6NCPBCN	031116	NO.6	63.384	100	45	78	80	8	166	182	25	130	348	2500	3000	0.005

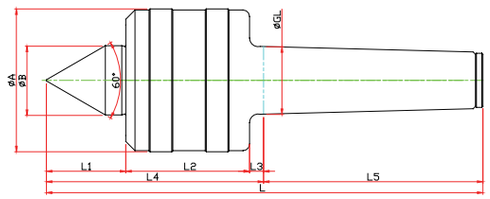
▸ NCP SPECIAL

※ Customized-special production for user's condition

▶ NK-TYPE

※ Center for heavy duty and Semi High Speed

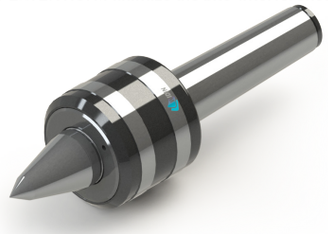


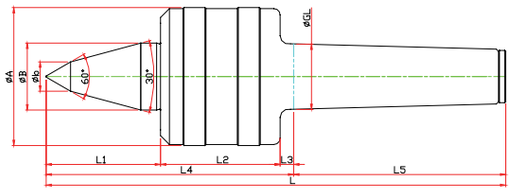


Model	Order Number	Morse Taper	Dimension									Weight MAX.	R.P.M MAX.	Run Out
			GL	A	B	L1	L2	L3	L4	L5	L			
LC-3NK	020003	NO.3	23.825	52	22	29	42	5	76	80	156	1900	5000	0.003
LC-4NK	020004	NO.4	31.267	66	32	37	57	6.5	100.5	101.5	202	2700	3800	0.003
LC-5NK	020005	NO.5	44.399	80	40	45.5	57	6.5	109	129.5	238.5	3200	3400	0.005
LC-6NK	020006	NO.6	63.348	132	65	65	100	8	173	182	355	10000	1800	0.005
LC-7NK	020007	NO.7	83.058	168	72	84	128	10	222	250	427	17200	1200	0.005

▶ NKB-TYPE

※ SHAFT EXTENTION(Minimize the bite-interference)

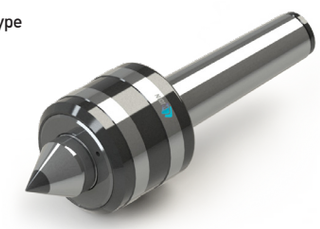


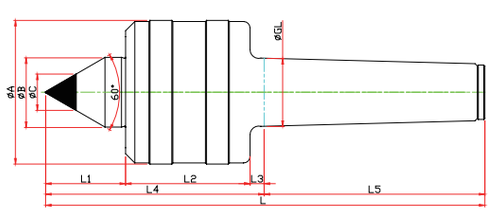


Model	Order Number	Morse Taper	Dimension										Weight MAX.	R.P.M MAX.	Run Out
			GL	A	B	b	L1	L2	L3	L4	L5	L			
LC-3NKB	021003	NO.3	23.825	52	22	10	48	42	5	95	80	175	1900	5000	0.003
LC-4NKB	021004	NO.4	31.267	66	32	14	53	57	6.5	116.5	101.5	218	2700	3800	0.003
LC-5NKB	021005	NO.5	44.399	80	40	18	65.5	57	6.5	129	129.5	258.5	3200	3400	0.005
LC-6NKB	021006	NO.6	63.348	132	65	25	78	100	8	186	182	368	10000	1800	0.005

▶ NKC-TYPE

※ Carbide Type



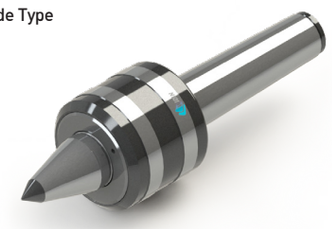


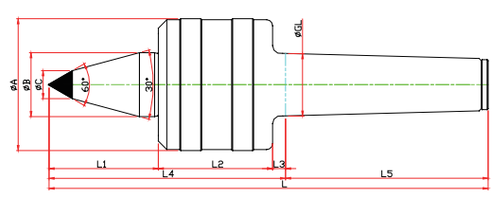
Model	Order Number	Morse Taper	Dimension										Weight MAX.	R.P.M MAX.	Run Out
			GL	A	B	L1	L2	L3	L4	L5	C	L			
LC-3NKC	020103	NO.3	23.825	52	22	29	42	5	76	80	10	156	1900	5000	0.003
LC-4NKC	020104	NO.4	31.267	66	32	37	57	6.5	100.5	101.5	14	202	2700	3800	0.003
LC-5NKC	020105	NO.5	44.399	80	40	45.5	57	6.5	109	129.5	18	238.5	3200	3400	0.005
LC-6NKC	020106	NO.6	63.348	132	65	65	100	8	173	182	25	355	10000	1800	0.005

▶ NKBC-TYPE

※ SHAFT EXTENTION(Minimize the bite-interference)

※ Carbide Type

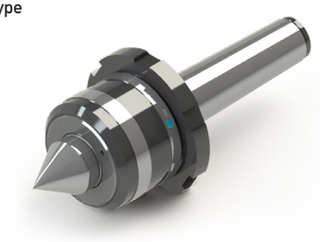


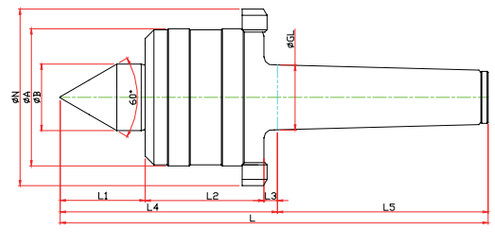


Model	Order Number	Morse Taper	Dimension										Weight MAX.	R.P.M MAX.	Run Out
			GL	A	B	L1	L2	L3	L4	L5	C	L			
LC-3NKBC	021103	NO.3	23.825	52	22	48	42	5	95	80	10	175	1900	5000	0.003
LC-4NKBC	021104	NO.4	31.267	66	32	53	57	6.5	116.5	101.5	14	218	2700	3800	0.003
LC-5NKBC	021105	NO.5	44.399	80	40	65.5	57	6.5	129	129.5	18	258.5	3200	3400	0.005
LC-6NKBC	021106	NO.6	63.348	132	65	78	100	8	186	182	25	368	10000	1800	0.005

▶ NKN-TYPE

※ Nut Type



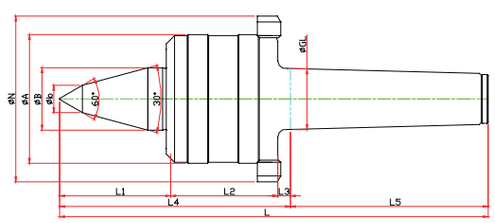


Model	Order Number	Morse Taper	Dimension									Weight MAX.	R.P.M MAX.	Run Out
			GL	A	B	L1	L2	L3	L4	L5	N	L			
LC-3NKN	020013	NO.3	23.825	52	22	29	42	5	76	80	70	156	1900	5000	0.003
LC-4NKN	020014	NO.4	31.267	66	32	37	57	6.5	100.5	101.5	85	202	2700	3800	0.003
LC-5NKN	020015	NO.5	44.399	80	40	45.5	57	6.5	109	129.5	98	238.5	3200	3400	0.005
LC-6NKN	020016	NO.6	63.348	132	65	65	100	8	173	182	165	355	10000	1800	0.005
LC-7NKN	020017	NO.7	83.058	168	72	84	128	10	222	250	210	427	17200	1200	0.005

▶ NKBN-TYPE

※ SHAFT EXTENTION(Minimize the bite-interference)

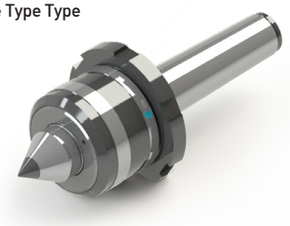
※ Nut Type

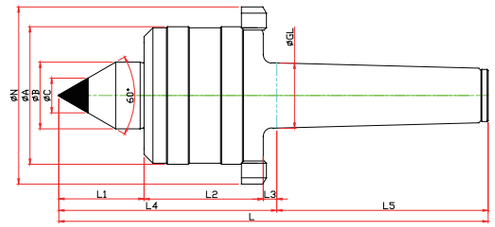


Model	Order Number	Morse Taper	Dimension											Weight MAX.	R.P.M MAX.	Run Out
			GL	A	B	b	L1	L2	L3	L4	L5	N	L			
LC-3NKBN	021013	NO.3	23.825	52	22	10	48	42	5	95	80	70	175	1900	5000	0.003
LC-4NKBN	021014	NO.4	31.267	66	32	14	53	57	6.5	116.5	101.5	85	218	2700	3800	0.003
LC-5NKBN	021015	NO.5	44.399	80	40	18	65.5	57	6.5	129	129.5	98	258.5	3200	3400	0.005
LC-6NKBN	021016	NO.6	63.348	132	65	25	78	100	8	186	182	165	368	10000	1800	0.005

▶ NKCN-TYPE

※ Nut, Carbide Type Type



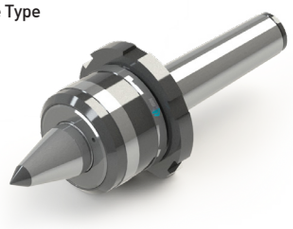


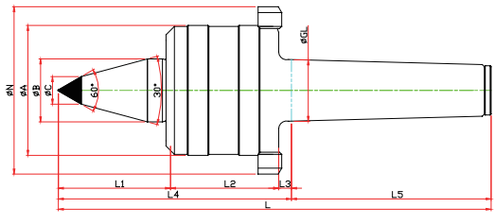
Model	Order Number	Morse Taper	Dimension											Weight MAX.	R.P.M MAX.	Run Out
			GL	A	B	L1	L2	L3	L4	L5	C	N	L			
LC-3NKCN	020113	NO.3	23.825	52	22	29	42	5	76	80	10	70	156	1900	5000	0.003
LC-4NKCN	020114	NO.4	31.267	66	32	37	57	6.5	100.5	101.5	14	85	202	2700	3800	0.003
LC-5NKCN	020115	NO.5	44.399	80	40	45.5	57	6.5	109	129.5	18	98	238.5	3200	3400	0.005
LC-6NKCN	020116	NO.6	63.348	132	65	65	100	8	173	182	25	165	355	10000	1800	0.005

▶ NKBCN-TYPE

※ SHAFT EXTENTION(Minimize the bite-interference)

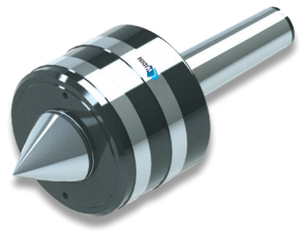
※ Nut, Carbide Type Type

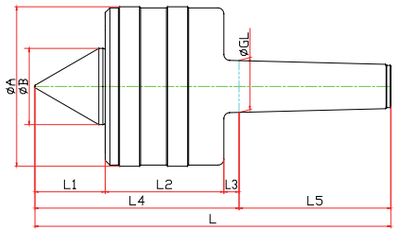




Model	Order Number	Morse Taper	Dimension											Weight MAX.	R.P.M MAX.	Run Out
			GL	A	B	L1	L2	L3	L4	L5	C	N	L			
LC-3NKBCN	021113	NO.3	23.825	52	22	48	42	5	95	80	10	70	175	1900	5000	0.003
LC-4NKBCN	021114	NO.4	31.267	66	32	53	57	6.5	116.5	101.5	14	85	218	2700	3800	0.003
LC-5NKBCN	021115	NO.5	44.399	80	40	65.5	57	6.5	129	129.5	18	98	258.5	3200	3400	0.005
LC-6NKBCN	021116	NO.6	63.348	132	65	78	100	8	186	182	25	165	368	10000	1800	0.005

▶ NKD-TYPE

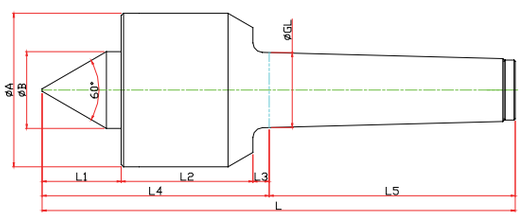




Model	Order Number	Morse Taper	Dimension									Weight MAX.	R.P.M MAX.	Run Out
			GL	A	B	L1	L2	L3	L4	L5	L			
LC-5NKD	090005	NO.5	44.399	136	65	60	101	13	174	129.5	303.5	13000	3400	0.005
LC-6NKD	090006	NO.6	63.348	148	70	80	110.5	15	205.5	181	387.5	16000	1800	0.005
LC-7NKD	090007	NO.7	83.058	200	95	90	141	20	251	250	501	22000	1200	0.005

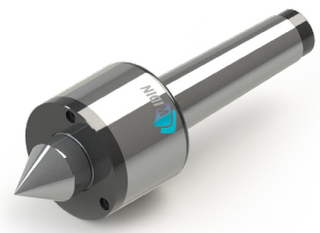
GR · SM TYPE

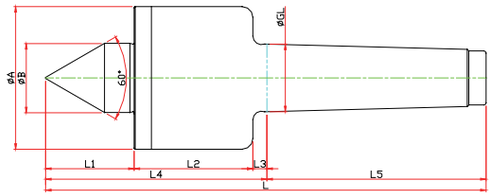
▶ GR-TYPE



Model	Order Number	Morse Taper	Dimension									Weight MAX.	R.P.M MAX.	Run Out
			GL	A	B	L1	L2	L3	L4	L5	L			
LC-4GR	080004	NO.4	31.267	71	40	45	59.5	6.5	111	101.5	212.5	1300	7000	0.002
LC-5GR	080005	NO.5	44.399	88	50	45	66	6.5	117.5	129.5	247	3500	4500	0.002
LC-6GR	080006	NO.6	63.348	114	52	55	92	8	155	182	337	5000	3400	0.002
LC-7GR	080007	NO.7	83.058	200	98	78	132	10	200	250	470	20000	1900	0.002

▸ SM-TYPE

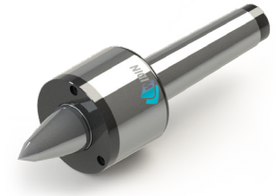


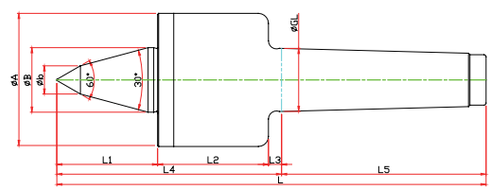


Model	Order Number	Morse Taper	Dimension									Weight MAX.	R.P.M MAX.	Run Out
			GL	A	B	L1	L2	L3	L4	L5	L			
LC-3SM	040003	NO.3	23.825	52	22	30	51	5	86	81	167	330	12000	0.003
LC-4SM	040004	NO.4	31.267	66	32	41	55	6.5	102.5	101.5	204	1100	10000	0.003
LC-5SM	040005	NO.5	44.399	82	40	51	75	6.5	132.5	129.5	262	2200	8000	0.005

▸ SMB-TYPE

※ SHAFT EXTENTION(Minimize the bite-interference)

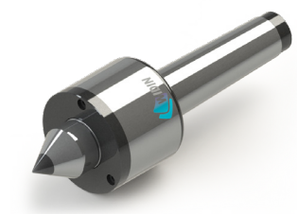


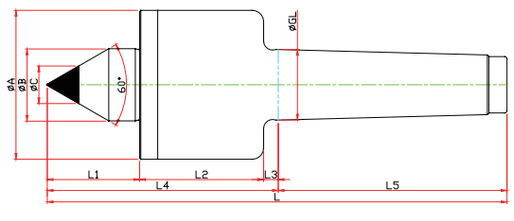


Model	Order Number	Morse Taper	Dimension										Weight MAX.	R.P.M MAX.	Run Out
			GL	A	B	b	L1	L2	L3	L4	L5	L			
LC-3SMB	041003	NO.3	23.825	52	22	10	40	51	5	96	81	177	330	12000	0.003
LC-4SMB	041004	NO.4	31.267	66	32	14	50	55	6.5	111.5	101.5	213	1100	10000	0.003
LC-5SMB	041005	NO.5	44.399	82	40	16	65	75	6.5	146.5	129.5	276	2200	8000	0.005

▸ SMC-TYPE

※ Carbide Type



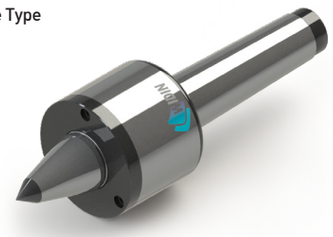


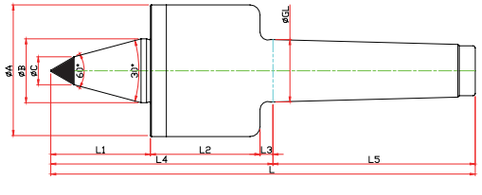
Model	Order Number	Morse Taper	Dimension										Weight MAX.	R.P.M MAX.	Run Out
			GL	A	B	L1	L2	L3	L4	L5	C	L			
LC-3SMC	040103	NO.3	23.825	52	22	30	51	5	86	81	10	167	330	12000	0.003
LC-4SMC	040104	NO.4	31.267	66	32	41	55	6.5	102.5	101.5	14	204	1100	10000	0.003
LC-5SMC	040105	NO.5	44.399	82	40	51	75	6.5	132.5	129.5	18	262	2200	8000	0.005

▸ SMBC-TYPE

※ SHAFT EXTENTION(Minimize the bite-interference)

※ Carbide Type

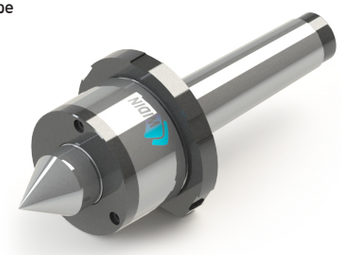


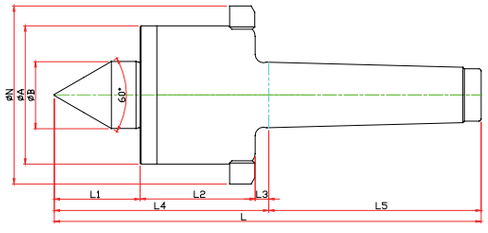


Model	Order Number	Morse Taper	Dimension											Weight MAX.	R.P.M MAX.	Run Out
			GL	A	B	b	L1	L2	L3	L4	L5	C	L			
LC-3SMBC	041103	NO.3	23.825	52	22	10	40	51	5	96	81	10	177	330	12000	0.003
LC-4SMBC	041104	NO.4	31.267	66	32	14	50	55	6.5	111.5	101.5	14	213	1100	10000	0.003
LC-5SMBC	041105	NO.5	44.399	82	40	16	65	75	6.5	146.55	129.5	16	276	2200	8000	0.005

▸ SMN-TYPE

※ Nut Type



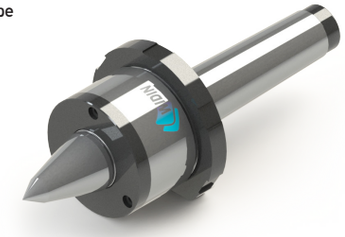


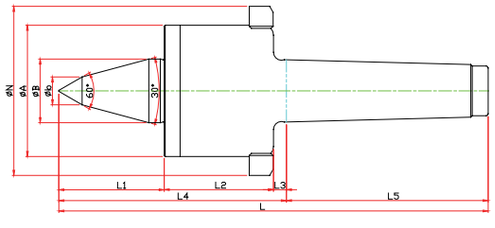
Model	Order Number	Morse Taper	Dimension										Weight MAX.	R.P.M MAX.	Run Out
			GL	A	B	L1	L2	L3	L4	L5	N	L			
LC-3SMN	040013	NO.3	23.825	52	22	30	51	5	86	81	70	167	330	12000	0.003
LC-4SMN	040014	NO.4	31.267	66	32	41	55	6.5	102.5	101.5	85	204	1100	10000	0.003
LC-5SMN	040015	NO.5	44.399	82	40	51	75	6.5	132.5	129.5	105	262	2200	8000	0.005

▸ SMBN-TYPE

※ SHAFT EXTENTION(Minimize the bite-interference)

※ Nut Type

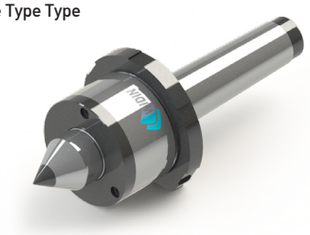


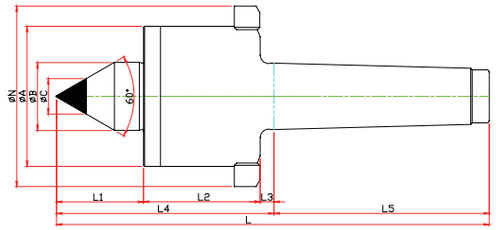


Model	Order Number	Morse Taper	Dimension											Weight MAX.	R.P.M MAX.	Run Out
			GL	A	B	b	L1	L2	L3	L4	L5	N	L			
LC-3SMBN	041013	NO.3	23.825	52	22	10	40	51	5	96	81	70	177	330	12000	0.003
LC-4SMBN	041014	NO.4	31.267	66	32	14	50	55	6.5	111.5	101.5	85	213	1100	10000	0.003
LC-5SMBN	041015	NO.5	44.399	82	40	16	65	75	6.5	146.5	129.5	105	276	2200	8000	0.005

▸ SMCN-TYPE

※ Nut, Carbide Type Type





Model	Order Number	Morse Taper	Dimension											Weight MAX.	R.P.M MAX.	Run Out
			GL	A	B	C	D	E	F	G	N	T	L			
LC-3SMCN	040113	NO.3	23.825	52	22	30	51	5	86	81	70	10	167	300	12000	0.003
LC-4SMCN	040114	NO.4	31.267	66	32	41	55	6.5	102.5	101.5	85	14	204	1100	10000	0.003
LC-5SMCN	040115	NO.5	44.399	82	40	51	75	6.5	132.5	129.5	105	16	262	2200	8000	0.005

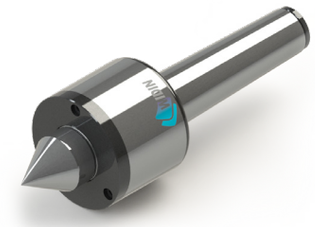
▸ SMBCN-TYPE

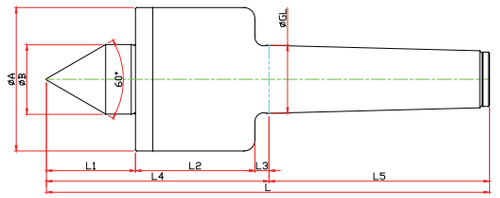
※ SHAFT EXTENTION(Minimize the bite-interference)

※ Nut, Carbide Type Type

Model	Order Number	Morse Taper	Dimension												Weight MAX.	R.P.M MAX.	Run Out
			GL	A	B	b	L1	L2	L3	L4	L5	C	N	L			
LC-3SMBCN	041113	NO.3	23.825	52	22	10	40	51	5	96	81	10	70	177	330	12000	0.003
LC-4SMBCN	041114	NO.4	31.267	66	32	14	50	55	6.5	111.5	101.5	14	85	213	1100	10000	0.003
LC-5SMBCN	041115	NO.5	44.399	82	40	16	65	75	6.5	146.5	129.5	16	105	276	2200	8000	0.005

▸ SMP-TYPE





Model	Order Number	Morse Taper	Dimension									Weight MAX.	R.P.M MAX.	Run Out
			GL	A	B	L1	L2	L3	L4	L5	L			
LC-3SMP	050003	NO.3	23.825	52	22	30	51	5	86	81	167	330	12000	0.003
LC-4SMP	050004	NO.4	31.267	66	32	41	55	6.5	102.5	101.5	204	1100	10000	0.003
LC-5SMP	050005	NO.5	44.399	82	40	51	75	6.5	132.5	129.5	262	2200	8000	0.005

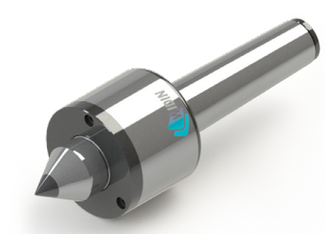
▸ SMPB-TYPE

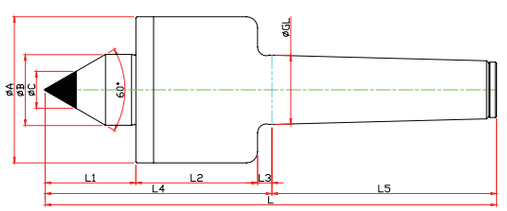
※ SHAFT EXTENTION(Minimize the bite-interference)

Model	Order Number	Morse Taper	Dimension										Weight MAX.	R.P.M MAX.	Run Out
			GL	A	B	b	L1	L2	L3	L4	L5	L			
LC-3SMPB	051003	NO.3	23.825	52	22	10	40	51	5	96	81	177	330	12000	0.003
LC-4SMPB	051004	NO.4	31.267	66	32	14	50	55	6.5	111.5	101.5	213	1100	10000	0.003
LC-5SMPB	051005	NO.5	44.399	82	40	16	65	75	6.5	146.5	129.5	276	2200	8000	0.005

▸ SMPC-TYPE

※ Carbide Type

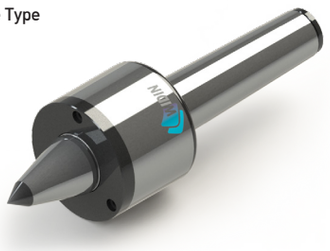


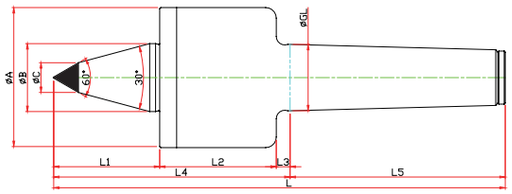


Model	Order Number	Morse Taper	Dimension										Weight MAX.	R.P.M MAX.	Run Out
			GL	A	B	L1	L2	L3	L4	L5	C	L			
LC-3SMPC	050103	NO.3	23.825	52	22	30	51	5	86	81	10	167	330	12000	0.003
LC-4SMPC	050104	NO.4	31.267	66	32	41	55	6.5	102.5	101.5	14	204	1100	10000	0.003
LC-5SMPC	050105	NO.5	44.399	82	40	51	75	6.5	132.5	129.5	18	262	2200	8000	0.005

▸ SMPBC-TYPE

※ SHAFT EXTENTION(Minimize the bite-interference)
※ Carbide Type

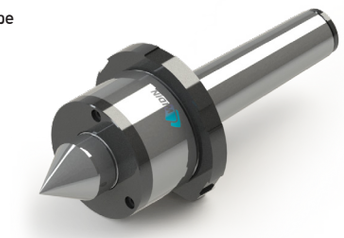


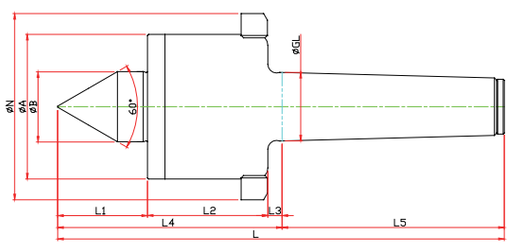


Model	Order Number	Morse Taper	Dimension											Weight MAX.	R.P.M MAX.	Run Out
			GL	A	B	b	L1	L2	L3	L4	L5	C	L			
LC-3SMPBC	051103	NO.3	23.825	52	22	10	40	51	5	96	81	10	177	330	12000	0.003
LC-4SMPBC	051104	NO.4	31.267	66	32	14	50	55	6.5	111.5	101.5	14	213	1100	10000	0.003
LC-5SMPBC	051105	NO.5	44.399	82	40	16	65	75	6.5	146.5	129.5	18	276	2200	8000	0.005

▸ SMPN-TYPE

※ Nut Type

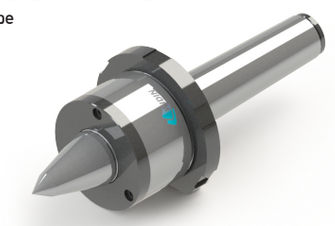


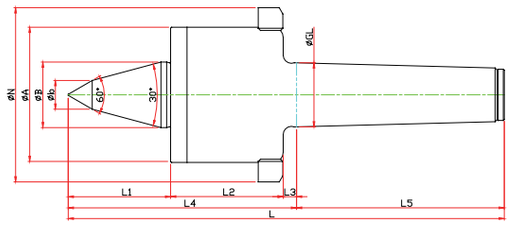


Model	Order Number	Morse Taper	Dimension									Weight MAX.	R.P.M MAX.	Run Out
			GL	A	B	L1	L2	L3	L4	L5	N	L			
LC-3SMPN	050013	NO.3	23.825	52	22	30	51	5	86	81	70	167	330	12000	0.003
LC-4SMPN	050014	NO.4	31.267	66	32	41	55	6.5	102.5	101.5	85	204	1100	10000	0.003
LC-5SMPN	050015	NO.5	44.399	82	40	51	75	6.5	132.5	129.5	105	262	2200	8000	0.005

▸ SMPBN-TYPE

※ SHAFT EXTENTION(Minimize the bite-interference)
※ Nut Type

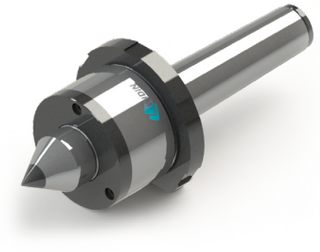


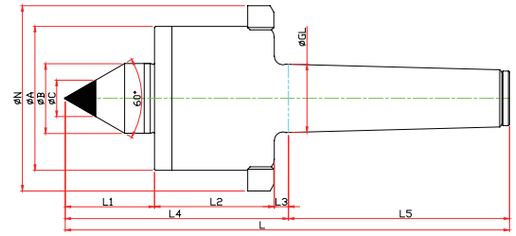


Model	Order Number	Morse Taper	Dimension										Weight MAX.	R.P.M MAX.	Run Out
			GL	A	B	b	L1	L2	L3	L4	L5	N	L			
LC-3SMPBN	051013	NO.3	23.825	52	22	10	40	51	5	96	81	70	177	330	12000	0.003
LC-4SMPBN	051014	NO.4	31.267	66	32	14	50	55	6.5	111.5	101.5	85	213	1100	10000	0.003
LC-5SMPBN	051015	NO.5	44.399	82	40	16	65	75	6.5	146.5	129.5	105	276	2200	8000	0.005

▸ SMPCN-TYPE

※ Carbide, Nut Type

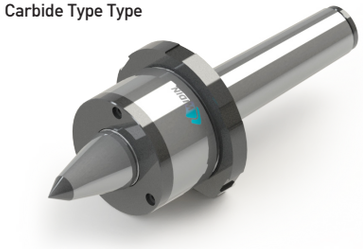


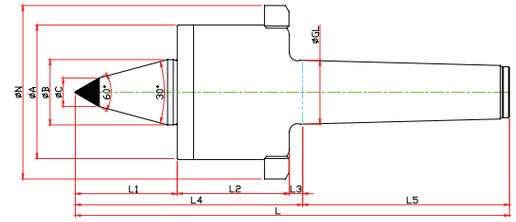


Model	Order Number	Morse Taper	Dimension										Weight MAX.	R.P.M MAX.	Run Out
			GL	A	B	L1	L2	L3	L4	L5	C	N	L			
LC-3SMPCN	050113	NO.3	23.825	52	22	30	51	5	86	81	10	70	167	330	12000	0.003
LC-4SMPCN	050114	NO.4	31.267	66	32	41	55	6.5	102.5	101.5	14	85	204	1100	10000	0.003
LC-5SMPCN	050115	NO.5	44.399	82	40	51	75	6.5	132.5	129.5	18	105	262	2200	8000	0.005

▸ SMPBCN-TYPE

※ SHAFT EXTENTION(Minimize the bite-interference)
※ Nut, Carbide Type Type

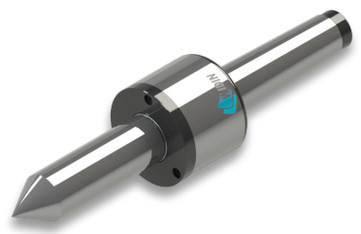




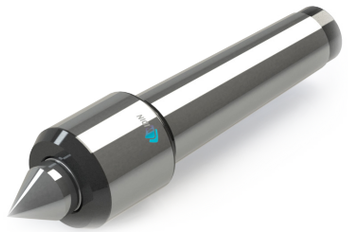
Model	Order Number	Morse Taper	Dimension											Weight MAX.	R.P.M MAX.	Run Out
			GL	A	B	b	L1	L2	L3	L4	L5	C	N	L			
LC-3SMPBCN	051113	NO.3	23.825	52	22	10	40	51	5	96	81	10	70	177	330	12000	0.003
LC-4SMPBCN	051114	NO.4	31.267	66	32	14	50	55	6.5	111.5	101.5	14	85	213	1100	10000	0.003
LC-5SMPBCN	051115	NO.5	44.399	82	40	16	65	75	6.5	146.5	129.5	16	105	276	2200	8000	0.005

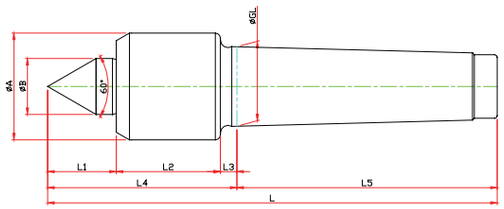
▸ SMP SPECIAL

※ Customized-special production for user's condition



▶ D50-TYPE

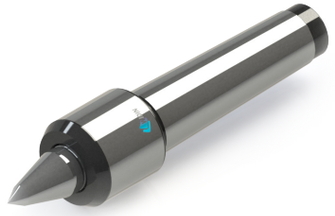


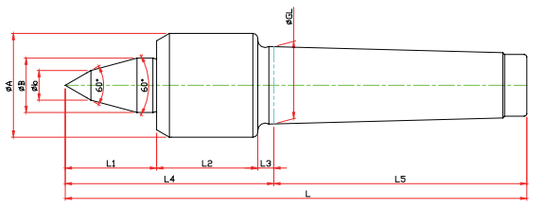


Model	Order Number	Morse Taper	Dimension									Weight MAX.	R.P.M MAX.	Run Out
			GL	A	B	L1	L2	L3	L4	L5	L			
LC-3D50	080350	NO.3	23.825	34	22	21	38	5	64	81	145	400	4800	0.003
LC-4D50	080450	NO.4	31.267	42	22	27	41	6.5	74.5	102.5	177	800	3800	0.003
LC-5D50	080550	NO.5	44.399	58	32	35	60	6.5	101.5	129.5	231	1600	3400	0.005

▶ D50B-TYPE

※ SHAFT EXTENTION(Minimize the bite-interference)

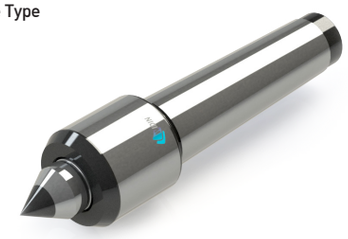


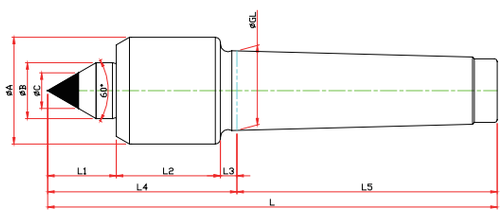


Model	Order Number	Morse Taper	Dimension										Weight MAX.	R.P.M MAX.	Run Out
			GL	A	B	b	L1	L2	L3	L4	L5	L			
LC-3D50B	082350	NO.3	23.825	34	22	10	25	38	5	72	81	153	400	4800	0.003
LC-4D50B	082450	NO.4	31.267	42	22	12	36	41	6.5	83.5	102.5	186.5	800	3800	0.003
LC-5D50B	082550	NO.5	44.399	58	32	16	53	60	6.5	119.5	129.5	249	1600	3400	0.005

▶ D50C-TYPE

※ Carbide Type



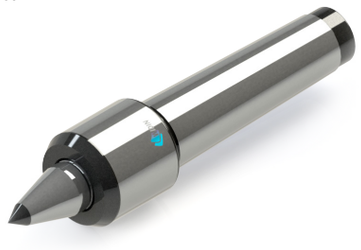


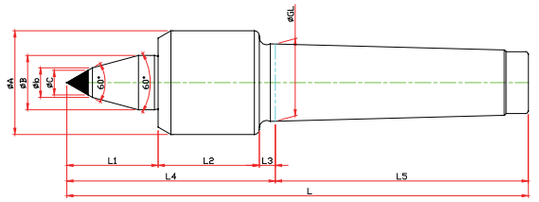
Model	Order Number	Morse Taper	Dimension										Weight MAX.	R.P.M MAX.	Run Out
			GL	A	B	L1	L2	L3	L4	L5	C	L			
LC-3D50C	081350	NO.3	23.825	34	22	21	38	5	64	81	10	145	400	4800	0.003
LC-4D50C	081450	NO.4	31.267	42	22	27	41	6.5	74.5	102.5	14	177	800	3800	0.003
LC-5D50C	081550	NO.5	44.399	58	32	35	60	6.5	101.5	129.5	18	231	1600	3400	0.005

▶ D50BC-TYPE

※ SHAFT EXTENTION(Minimize the bite-interference)

※ Carbide Type

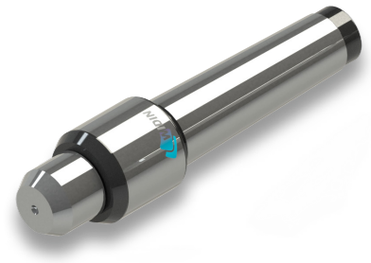


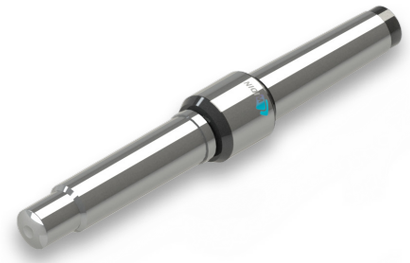


Model	Order Number	Morse Taper	Dimension											Weight MAX.	R.P.M MAX.	Run Out
			GL	A	B	b	L1	L2	L3	L4	L5	C	L			
LC-3D50BC	083350	NO.3	23.825	34	22	10	25	38	5	72	81	8	153	400	4800	0.003
LC-4D50BC	083450	NO.4	31.267	42	22	12	36	41	6.5	83.5	102.5	10	186.5	800	3800	0.003
LC-5D50BC	083550	NO.5	44.399	58	32	16	53	60	6.5	119.5	129.5	14	249	1600	3400	0.005

▶ D50 SPECIAL

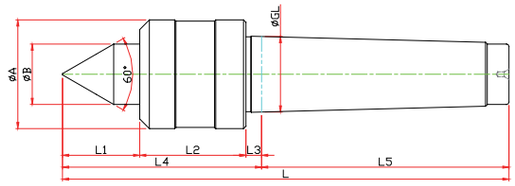
※ Customized-special production for user's condition





▸ HD-TYPE

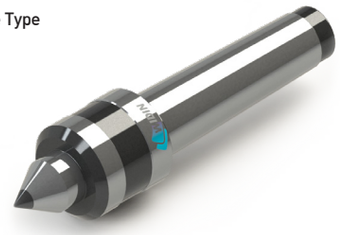
※ Economical live center

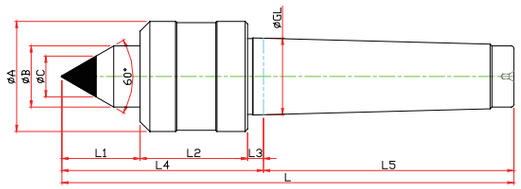


Model	Order Number	Morse Taper	Dimension									Weight MAX.	R.P.M MAX.	Run Out
			GL	A	B	L1	L2	L3	L4	L5	L			
LC-1HD	070001	NO.1	12.065	34	15	21	37	3.5	61.5	53.5	115	120	5000	0.003
LC-2HD	070002	NO.2	17.780	40	18	24	37	5	66	64	130	140	4000	0.003
LC-3HD	070003	NO.3	23.825	45	25	32	44	5	81	81	162	190	3800	0.003
LC-4HD	070004	NO.4	31.267	45	25	32	44	6.5	82.5	102.5	185	190	3800	0.003
LC-5HD	070005	NO.5	44.399	78	38	47	66	6.5	119.5	129.5	249	350	2000	0.005
LC-6HD	070006	NO.6	63.384	102	55	62	82	8	152	182	334	1200	2000	0.005

▸ HDC-TYPE

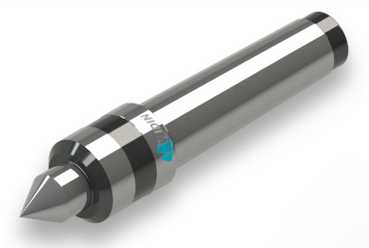
※ Carbide Type

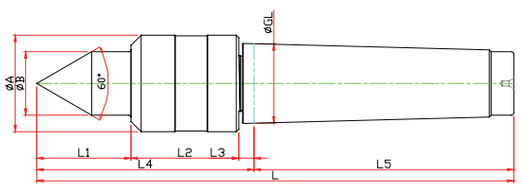




Model	Order Number	Morse Taper	Dimension										Weight MAX.	R.P.M MAX.	Run Out
			GL	A	B	L1	L2	L3	L4	L5	C	L			
LC-3HDC	071003	NO.3	23.825	25	45	32	44	5	81	81	10	162	190	3800	0.003
LC-4HDC	071004	NO.4	31.267	25	45	32	44	6.5	82.5	102.5	14	185	190	3800	0.003
LC-5HDC	071005	NO.5	44.399	38	78	47	66	6.5	119.5	129.5	18	249	350	2000	0.005
LC-6HDC	071006	NO.6	63.384	55	102	62	82	8	152	182	25	334	1200	2000	0.005

▸ HDS-TYPE

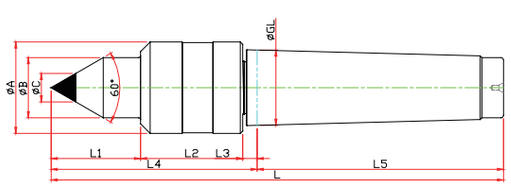




Model	Order Number	Morse Taper	Dimension								Weight MAX.	R.P.M MAX.	Run Out
			GL	A	B	L1	L2	L3	L4	L5	L			
LC-2HDS	070012	NO.2	17.780	34	15	25	40	5	70	64	134	70	4500	0.003
LC-3HDS	070013	NO.3	23.825	36	18	27.5	40.5	5	73	81	154	80	4500	0.003
LC-4HDS	070014	NO.4	31.267	38	22	32	42.5	6	80.5	102.5	183	80	4500	0.003
LC-5HDS	070015	NO.5	44.399	64	30	47	56.5	10	113.5	129.5	243	230	2000	0.005
LC-6HDS	070016	NO.6	63.384	86	42	60	66.5	10	136.5	182	318.5	600	1500	0.005

▸ HDSC-TYPE

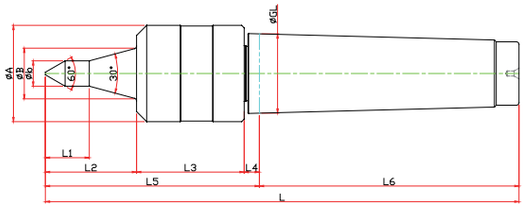
※ Economical live center
※ Suitable for lathe
※ Optimal RPM(below 3,800)



Model	Order Number	Morse Taper	Dimension										Weight MAX.	R.P.M MAX.	Run Out
			GL	A	B	L1	L2	L3	L4	L5	C	L			
LC-3HDSC	071012	NO.3	23.825	36	18	27.5	40.5	5	73	81	10	154	80	4500	0.003
LC-4HDSC	071013	NO.4	31.267	38	22	32	42.5	6	80.5	102.5	14	183	80	4500	0.003
LC-5HDSC	071014	NO.5	44.399	64	30	47	56.5	10	113.5	129.5	18	243	230	2000	0.005
LC-6HDSC	071015	NO.6	63.384	86	42	60	66.5	10	136.5	182	30	318.5	600	1500	0.005

▸ HDSTH-TYPE

※ The type of thread milling
※ triplexed bearing fit
※ Structure resistant to coolant
※ Optimal RPM(below 3,800)



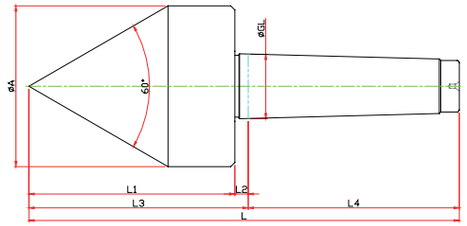
Model	Order Number	Morse Taper	Dimension											Weight MAX.	R.P.M MAX.	Run Out
			GL	A	B	b	L1	L2	L3	L4	L5	L6	L			
LC-3HDSTH-06	073011	NO.3	23.825	36	18	6	12.6	35	40.5	5	80.5	81	161.5	55	3800	0.003
LC-3HDSTH-08	073012					8	16.3									
LC-3HDSTH-10	073013					10	20.1									
LC-3HDSTH-12	073014					12	23.8									
LC-4HDSTH-06	074011	NO.4	31.267	38	20	6	10.1	36.2	40.5	6	84.5	102.5	187	65		
LC-4HDSTH-08	074012					8	13.9									
LC-4HDSTH-10	074013					10	17.6									
LC-4HDSTH-12	074014					12	21.3									
LC-5HDSTH-06	075011	NO.5	44.399	64	24	6	13.4	47	56.5	10	113.5	129.5	243	150		
LC-5HDSTH-08	075012					8	17.1									
LC-5HDSTH-10	075013					10	20.8									
LC-4HDSTH-12	075014					12	24.6									

▸ HD SPECIAL

PT TYPE

▶ PT-60 TYPE

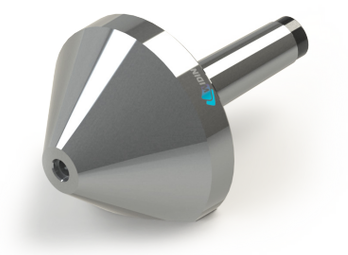
※ For PIPE machining
※ Optimal RPM(below 3,800)

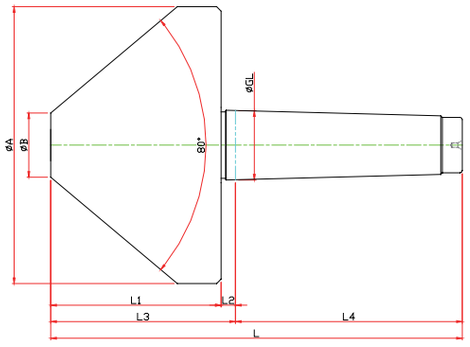


Model	Order Number	Morse Taper	Dimension							Weight MAX.	R.P.M MAX.	Run Out
			GL	A	L1	L2	L3	L4	L			
LC-2PT-60	066002	NO.2	17.780	44	66	5	71	64	135	70	4500	0.003
LC-3PT-60	066003	NO.3	23.825	56	78.5	5	83.5	81	164.5	80	4500	0.003
LC-4PT-60	066004	NO.4	31.267	78	100	6.5	106.5	101.5	208	80	4500	0.003
LC-5PT-60	066005	NO.5	44.399	98	125	6.5	131.5	129.5	261	230	2000	0.005
LC-6PT-60	066006	NO.6	63.384	118	154	8	162	182	344	600	1500	0.005

▶ PT-80 TYPE

※ For PIPE machining
※ Optimal RPM(below 3,800)

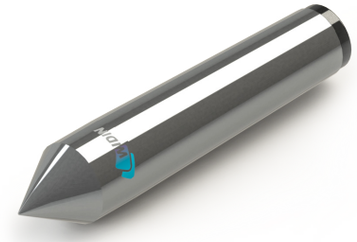


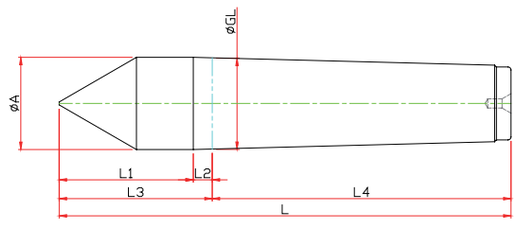


Model	Order Number	Morse Taper	Dimension								Weight MAX.	R.P.M MAX.	Run Out
			GL	A	B	L1	L2	L3	L4	L			
LC-3PT-80	068003	NO.3	23.825	95	20	66	5	65	81	146	190	3800	0.003
LC-4PT-80	068004	NO.4	31.267	125	29	77	6.5	83.5	102.5	185	190	3800	0.003
LC-5PT-80	068005	NO.5	44.399	150	32	90	6.5	96.5	129.5	226	350	2000	0.005
LC-6PT-80	068006	NO.6	63.384	200	38	120	8	128	182	310	1200	1500	0.005

LM CENTER

▶ LM-A TYPE

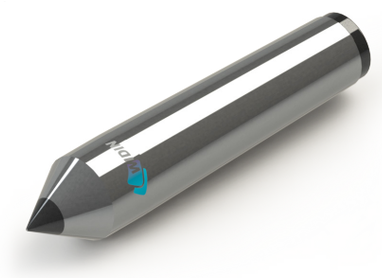


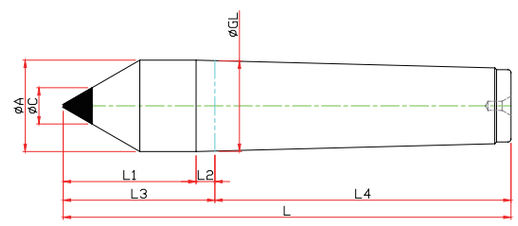


Model	Order Number	Morse Taper	Dimension							Run Out
			GL	A	L1	L2	L3	L4	L	
LM-1A	110001	NO.1	12.065	12.2	25	3.5	28.5	53.5	82	0.003
LM-2A	110002	NO.2	17.780	18	31	5	36	64	100	0.003
LM-3A	110003	NO.3	23.825	24	39	5	44	81	125	0.003
LM-4A	110004	NO.4	31.267	31.6	46	6.5	52.5	102.5	155	0.003
LM-5A	110005	NO.5	44.399	44.7	64	6.5	70.5	129.5	200	0.003
LM-6A	110006	NO.6	63.348	63.8	80	8	88	182	270	0.005
LM-7A	110007	NO.7	83.058	83.6	105	10	115	250	365	0.005

▶ LM-C TYPE

※ Carbide Type



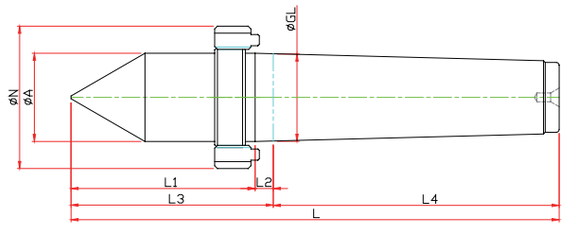


Model	Order Number	Morse Taper	Dimension								Run Out
			GL	A	L1	L2	L3	L4	C	L	
LM-1C	110101	NO.1	12.065	12.2	25	3.5	28.5	53.5	7	82	0.003
LM-2C	110102	NO.2	17.780	18	31	5	36	64	7	100	0.003
LM-3C	110103	NO.3	23.825	24	39	5	44	81	10	125	0.003
LM-4C	110104	NO.4	31.267	31.6	46	6.5	52.5	102.5	14	155	0.003
LM-5C	110105	NO.5	44.399	44.7	64	6.5	70.5	129.5	18	200	0.003
LM-6C	110106	NO.6	63.348	63.8	80	8	88	182	25	270	0.005
LM-7C	110107	NO.7	83.058	83.6	105	10	115	250	30	365	0.005

LM CENTER

▸ LM-AN TYPE

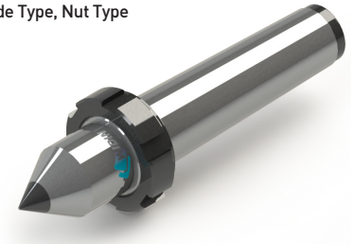
※ Nut Type

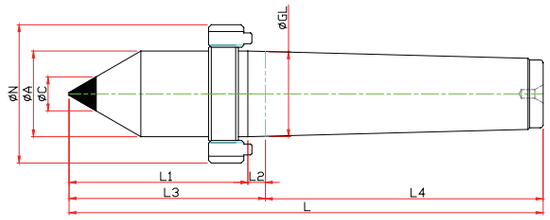


Model	Order Number	Morse Taper	Dimension								Run Out
			GL	A	L1	L2	L3	L4	N	L	
LM-1AN	110011	NO.1	12.065	12.2	31.5	5	36.5	53.5	M16	90	0.003
LM-2AN	110012	NO.2	17.780	18	41.5	6.5	48	64	M22	112	0.003
LM-3AN	110013	NO.3	23.825	24	49.5	7.5	57	81	M27	138	0.003
LM-4AN	110014	NO.4	31.267	31.6	62.5	10	72.5	102.5	M36	175	0.003
LM-5AN	110015	NO.5	44.399	44.7	77	11	88	129.6	M48	217.5	0.003
LM-6AN	110016	NO.6	63.348	63.8	96.5	11.5	108	182	M68	290	0.005
LM-7AN	110017	NO.7	83.058	83.6	108.5	11.5	120	250	M90	370	0.005

▸ LM-CN TYPE

※ Carbide Type, Nut Type





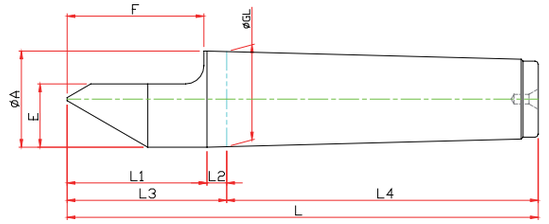
Model	Order Number	Morse Taper	Dimension									Run Out
			GL	A	L1	L2	L3	L4	C	N	L	
LM-1CN	110111	NO.1	12.065	12	31.5	5	36.5	53.5	7	M16	90	0.003
LM-2CN	110112	NO.2	17.780	18	41.5	6.5	48	64	7	M22	112	0.003
LM-3CN	110113	NO.3	23.825	24	49.5	7.5	57	81	10	M27	138	0.003
LM-4CN	110114	NO.4	31.267	32	62.5	10	72.5	102.5	14	M36	175	0.003
LM-5CN	110115	NO.5	44.399	45	77	11	88	129.5	18	M48	217.5	0.003
LM-6CN	110116	NO.6	63.348	64	96.5	11.5	108	182	18	M68	290	0.005

▸ LM SPECIAL

※ Customized-special production for user's condition

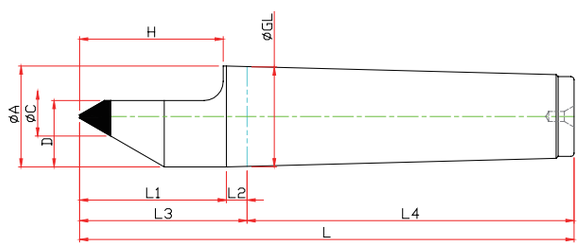
LM-H CENTER

▸ LM-H TYPE



Model	Order Number	Morse Taper	Dimension									Run Out
			GL	A	L1	L2	L3	L4	E	F	L	
LM-1H	110001	NO.1	12.065	12.2	25	3.5	28.5	53.5	7.6	22	82	0.003
LM-2H	110002	NO.2	17.780	18	31	5	36	64	11	30	100	0.003
LM-3H	110003	NO.3	23.825	24	39	5	44	81	15	38	125	0.003
LM-4H	110004	NO.4	31.267	31.6	46	6.5	52.5	102.5	21	45	155	0.003
LM-5H	110005	NO.5	44.399	44.7	64	6.5	70.5	129.5	27.4	63	200	0.003
LM-6H	110006	NO.6	63.348	63.8	80	8	88	182	38.9	79	270	0.005

▸ LM-HC TYPE

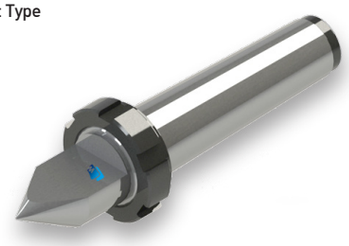


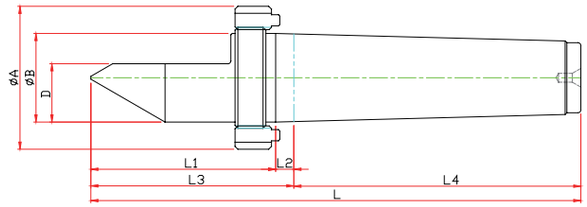
Model	Order Number	Morse Taper	Dimension										Run Out
			GL	A	L1	L2	L3	L4	C	D	H	L	
LM-1HC	210101	NO.1	12.065	12.2	25	3.5	28.5	53.5	7	7.6	22	82	0.003
LM-2HC	210102	NO.2	17.780	18	31	5	36	64	7	11	30	100	0.003
LM-3HC	210103	NO.3	23.825	24	39	5	44	81	10	15	38	125	0.003
LM-4HC	210104	NO.4	31.267	31.6	46	6.5	52.5	102.5	14	21	45	125	0.003
LM-5HC	210105	NO.5	44.399	44.7	64	6.5	70.5	129.5	18	27.4	63	200	0.003
LM-6HC	210106	NO.6	63.348	63.8	80	8	88	182	25	38.9	79	270	0.005

LM-H CENTER

▸ LM-HN TYPE

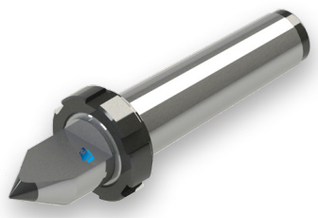
※ Nut Type

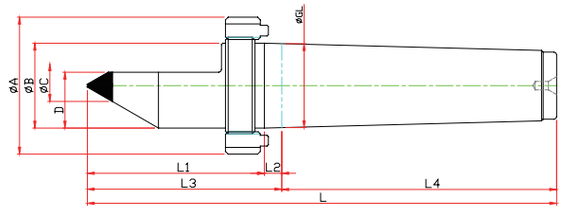




Model	Order Number	Morse Taper	Dimension										Run Out
			GL	A	L1	L2	L3	L4	D	E	N	L	
LM-1HN	210011	NO.1	12.065	12	31.5	5	36.5	53.5	7.6	22	M16	90	0.003
LM-2HN	210012	NO.2	17.780	18	41.5	6.5	48	64	11	30	M22	112	0.003
LM-3HN	210013	NO.3	23.825	24	49.5	7.5	57	81	15	38	M27	138	0.003
LM-4HN	210014	NO.4	31.267	32	62.5	10	72.5	102.5	21	50	M36	175	0.003
LM-5HN	210015	NO.5	44.399	45	77	11	88	129.5	29.4	63	M48	217.5	0.003
LM-6HN	210016	NO.6	63.348	64	96.5	11.5	108	182	42	79	M68	290	0.005

▸ LM-HCN TYPE

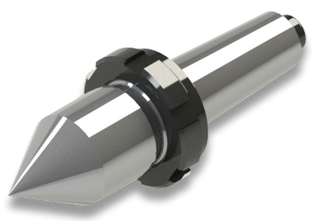




Model	Order Number	Morse Taper	Dimension											Run Out
			GL	A	L1	L2	L3	L4	C	D	E	N	L	
LM-1HCN	210111	NO.1	12.065	12	31.5	5	36.5	53.5	7	7.6	22	M16	90	0.003
LM-2HCN	210112	NO.2	17.780	18	41.5	6.5	48	64	7	11	30	M22	112	0.003
LM-3HCN	210113	NO.3	23.825	24	49.5	7.5	57	81	10	15	38	M27	138	0.003
LM-4HCN	210114	NO.4	31.267	32	62.5	10	72.5	102.5	14	21	50	M36	175	0.003
LM-5HCN	210115	NO.5	44.399	45	77	11	88	129.5	18	29.4	63	M48	217.5	0.003
LM-6HCN	210116	NO.6	63.348	64	96.5	11.5	108	182	18	42	79	M68	290	0.005

▸ LM-H SPECIAL

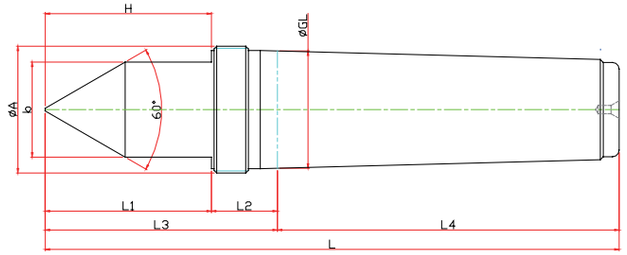
※ Customized-special production for user's condition



LM-FN TYPE

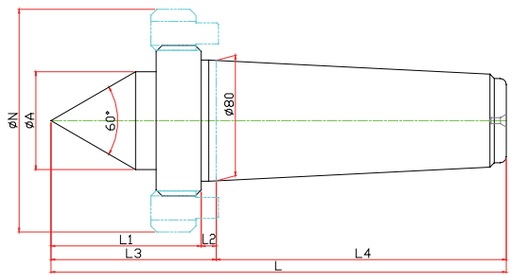
▸ LM-FN TYPE

※ Spanner Type



Model	Order Number	Morse Taper	Dimension									Run Out
			GL	A	b	L1	L2	L3	L4	E	L	
LM-1FN	120011	NO.1	12.065	12.2	10	25	3.5	28.5	53.5	22	82	0.003
LM-2FN	120012	NO.2	17.780	18	14	31	5	36	64	30	100	0.003
LM-3FN	120013	NO.3	23.825	24	19	39	5	44	81	38	125	0.003
LM-4FN	120014	NO.4	31.267	31.6	27	46	6.5	52.5	102.5	50	155	0.003
LM-5FN	120015	NO.5	44.399	44.7	36	64	6.5	70.5	129.5	53	200	0.003

▸ LM-#80 TYPE



Model	Order Number	Morse Taper	Dimension									Run Out
			GL	A	b	L1	L2	L3	L4	E	L	
#80-60	260010	1/10 TAPER	80	65	148	70	30	10	110	193	303	0.005
#80-75	275010	1/10 TAPER	80	65	148	70	30	10	110	193	303	0.005

TECHNICAL DATA

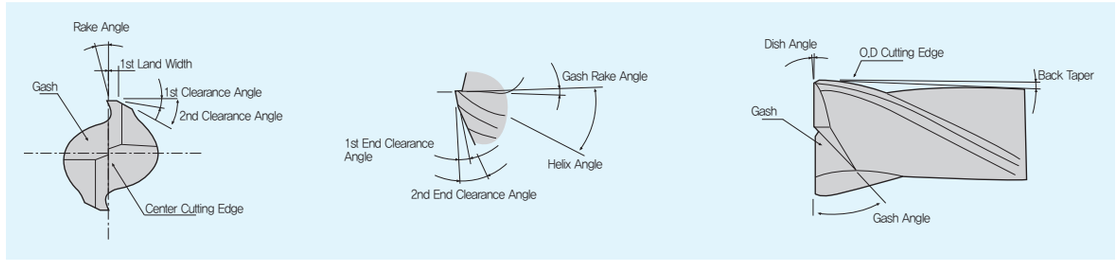
2020▸2021
WIDIN
PRODUCTS

TECHNICAL
DATA

07

Recommended Cutting Condition

[Nomenclature of EndMill]



[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]

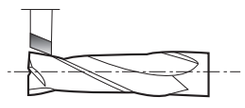
1) Cutting Speed (V) = $\frac{\pi \times D \times N}{1000}$ (m/min)	V : Cutting Speed (m/min) D : Diameter of End Mill (mm) N : End Mill revolution (RPM)
2) Feed per tooth (fz) = $\frac{F}{Z \times N}$ (mm/tooth)	fz : Feed per tooth (mm/tooth) Z : No. of teeth N : End Mill revolution (RPM)
3) Table Feed rate (F) = fz x Z x 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

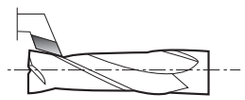
APPLICATION RANGE	CUTTER Dia.	AMOUNT OF FLANK WEAR
Finish Machining	~ ø10 ø 11 ~ ø30 ø 31 ~ ø50	0.05 ~ 0.1 0.1 ~ 0.25 0.2 ~ 0.35
Rough Machining	~ ø10 ø 11 ~ ø30 ø 31 ~ ø50	0.08 ~ 0.15 0.15 ~ 0.35 0.3 ~ 0.45

2. Regrinding Method of Relief



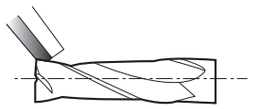
(1) Concave method

- In case when precise outer diameter dimension is required.
- In case of aluminium machining.



(2) Flat method

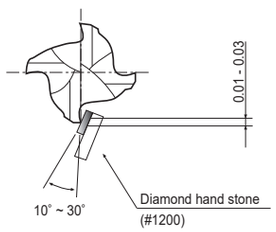
- Excellent machinability
  - Applicable to ball end mill and taper end mill.
- Secondary clearance angle work is required.
  - When Diameter is large.



(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.

Recommended Cutting Condition

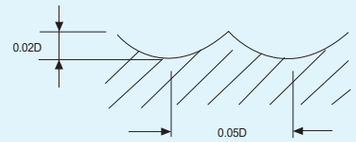
[Trouble Shooting for End Milling]

Problem	Cause	Solution
Rupture	• High feed • High slotting volume • High protrusion volume • Worn out of flute • Longer cutting length	• Reduce feed • Reduce slotting volume • Reduce protrusion volume • Regrind at the beginning • Reduce cutting length
Wear / Burning	• High speed • Small rake angle • High hardness of material	• Reduce speed, Supply enough oil • Correct to proper rake angle • Supply Dry 〉soluble 〉Non-water soluble oil and do surface treatment"
Chattering	• Improper cutting condition • Lack of strength in machinery and chuck • Poorly fixed material • High protrusion volume • Large clearance of rake angle	• Adjust cutting and feed speed • Replace machinery and chuck • Contain a material firmly • Reduce protrusion volume • Reduce clearance of rake angle
Defective of cutting edge	• Hige feed • Small rake angle • Chattering occurs • Poorly sealed material • High slotting volume • High protrusion volume • Lack of strength in machinery	• Reduce feed • Adjust angle properly • Reduce Chattering by lowing the number of turning • Contain a material firmly • Reduce slotting volume • Reduce protrusion volume • Replace machinery
Bad Cutability	• Worn out of cutting edge • Improper endmill • Small rake angle	• Regrind at the beginning • Replace proper endmill • Correct to proper rake angle
Poor chip emission	• Low injection pressure of the oil • Small chip pocket • Worn out of cutting edge • High slotting volume	• Increase oil volume and pressure • Use fewer flute endmill or Reduce feed • Regrind at the beginning • Reduce slotting volume
Burr on surface	• High feed • Low speed • Worn out of cutting edge • High slotting volume	• Reduce feed • Speed up • Regrind at the beginning • Reduce slotting volume
Incorrect dimension	• Incorrect machinery or chuck • Incorrect rigidity of machinery or chuck • longer cutting length • Fewer number of flutes	• Correct machinery or chuck • Replace machinery or chuck • Reduce cutting length • Replace to larger number of flutes endmill
Fusion	• Lack of oil or affination between tool and material	• Supply Dry 〉soluble 〉Non-water soluble oil • For alloy steel, use active type non-water soluble oil

[DB702, DB712 series]

WORKPIECE	HARDENED STEELS HEAT RESISTANT STEELS		HARDENED STEELS									
HARDNESS	HRc30 ~ HRc40		HRc40 ~ HRc50		HRc50 ~ HRc55		HRc55 ~ HRc60		HRc60 ~ HRc65		HRc 65 ~ HRc70	
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
0.2	50,000	1,200	50,000	1,050	45,000	960	40,000	770	35,000	674	31,500	570
0.3	50,000	1,500	50,000	1,350	45,000	1,200	40,000	965	35,000	840	31,500	700
0.4	50,000	1,900	50,000	1,700	45,000	1,500	40,000	1,200	35,000	1,050	31,500	890
0.5	50,000	2,400	50,000	2,100	45,000	1,900	40,000	1,500	35,000	1,300	31,500	1,100
0.6	50,000	2,900	50,000	2,500	45,000	2,200	40,000	1,800	35,000	1,600	31,500	1,400
0.8	50,000	3,900	50,000	3,300	45,000	3,000	40,000	2,400	35,000	2,100	31,500	1,800
1	50,000	4,800	50,000	4,200	45,000	3,800	40,000	3,000	35,000	2,600	35,000	2,300
1.5	50,000	5,400	48,000	4,500	43,000	4,000	37,000	3,100	33,000	2,700	29,700	2,300
2	49,700	5,700	47,800	4800	40,000	4,000	35,000	3,150	32,000	2,800	28,500	2,300
3	33,100	6,000	31,800	5300	26,500	4,000	23,500	3,150	21,000	2,800	19,000	2,300
4	24,900	6,000	23,900	5300	20,000	4,000	17,500	3,150	16,000	2,800	14,500	2,300
5	18,600	5,800	17,800	4900	15,000	3,750	13,500	3,050	11,500	2,550	10,500	2,100
6	13,900	4,850	13,400	4100	11,000	3,100	10,000	2,500	8,800	2,150	8,000	1,750
8	11,100	4,200	10,700	3,500	9,000	2,700	8,000	2,150	7,000	1,850	6,500	1,550
10	9,300	3,700	8,900	3,100	7,500	2,400	6,600	1,900	5,800	1,650	5,300	1,380
12	6,950	2,950	6,680	2,500	5,600	1,900	5,000	1,550	4,400	1,250	4,000	1,050

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



[DB703 series]

WORKPIECE	HARDENED STEELS											
DIAMETER	HRc30~ HRc40		HRc40~ HRc50		HRc50~ HRc55		HRc55~ HRc60		HRc60~ HRc65		HRc65~ HRc70	
D X R(mm)	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
2	57,000	7,100	55,000	6,000	46,000	5,000	40,300	3,900	36,800	3,500	32,800	2,900
2.5	57,000	7,100	55,000	6,000	46,000	5,000	40,300	3,900	36,800	3,500	32,800	2,900
3	38,000	7,500	36,600	6,600	30,500	5,000	27,000	3,900	24,200	3,500	21,900	2,900
4	28,500	7,500	27,500	6,600	23,000	5,000	20,100	3,900	18,400	3,500	16,700	2,900
5	21,500	7,300	20,500	6,100	17,300	4,700	15,500	3,800	13,200	3,200	12,100	2,600
6	16,000	6,100	15,400	5,100	12,700	3,900	11,500	3,100	10,100	2,700	9,200	2,200
8	12,700	5,300	12,300	4,400	10,400	3,400	9,200	2,700	8,100	2,300	7,500	1,900
10	10,700	4,600	10,200	3,900	8,600	3,000	7,600	2,400	6,700	2,100	6,100	1,700
12	8,000	3,700	7,700	3,100	6,400	2,400	5,800	1,900	5,100	1,600	4,600	1,300

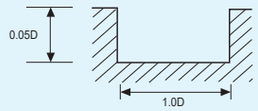
[DB734 series]

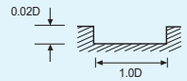
WORKPIECE	HARDENED STEELS											
DIAMETER	HRc30~ HRc40		HRc40~ HRc50		HRc50~ HRc55		HRc55~ HRc60		HRc60~ HRc65		HRc65~ HRc70	
D X R(mm)	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
2	62,100	8,600	59,800	7,200	50,000	6,000	43,800	4,700	40,000	4,200	35,600	3,500
2.5	62,100	8,600	59,800	7,200	50,000	6,000	43,800	4,700	40,000	4,200	35,600	3,500
3	41,400	9,000	39,800	8,000	33,100	6,000	29,400	4,700	26,300	4,200	23,800	3,500
4	31,100	9,000	29,900	8,000	25,000	6,000	21,900	4,700	20,000	4,200	18,100	3,500
5	23,300	8,700	22,300	7,400	18,800	5,600	16,900	4,600	14,400	3,800	13,100	3,200
6	17,400	7,300	16,800	6,200	13,800	4,700	12,500	3,800	11,000	3,200	10,000	2,600
8	13,900	6,300	13,400	5,300	11,300	4,100	10,000	3,200	8,800	2,800	8,100	2,300
10	11,600	5,600	11,100	4,700	9,400	3,600	8,300	2,900	7,300	2,500	6,600	2,100

[ZE702, ZE712 series] ▶ Slotting

WORKPIECE	HARDENED STEELS, HEAT RESISTANT STEELS		HARDENED STEELS									
HARDNESS	HRc30 ~ HRc40		HRc40 ~ HRc50		HRc50 ~ HRc55		HRc55 ~ HRc60		HRc60 ~ HRc65		HRc65 ~ HRc70	
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
0.2	50,000	130	45,000	115	40,000	95	33,000	60	33,000	45	26,400	30
0.3	50,000	190	45,000	140	40,000	115	33,000	70	25,000	50	20,000	35
0.4	50,000	235	45,000	180	40,000	140	33,000	90	25,000	55	20,000	40
0.5	50,000	370	45,000	280	40,000	220	33,000	140	25,000	85	20,000	60
0.6	50,000	470	45,000	360	40,000	285	30,000	160	25,000	105	20,000	75
0.8	50,000	600	40,000	440	30,000	295	25,000	185	19,000	110	15,200	80
0.9	49,000	655	39,000	520	27,800	330	22,700	205	17,500	125	14,000	90
1	48,000	750	38,000	570	25,500	360	20,500	215	16,000	135	12,500	85
2	33,300	850	26,000	680	17,500	420	14,500	260	11,000	160	9,500	115
3	21,800	850	17,300	680	11,500	420	9,500	260	7,500	160	6,400	115
4	16,700	880	13,200	700	8,800	440	7,200	270	5,600	170	4,750	118
5	15,700	1,000	12,500	805	8,300	500	6,400	285	5,100	180	4,450	132
6	13,100	950	10,350	770	6,900	480	5,300	280	4,200	180	3,700	130
8	9,880	930	7,800	720	5,200	445	4,000	255	3,200	165	2,800	120
10	7,800	850	6,150	680	4,100	415	3,200	240	2,550	155	2,200	112
12	6,650	850	5,250	680	3,500	415	2,650	240	2,100	155	1,860	112
16	4,900	730	3,900	580	2,600	365	2,000	210	1,600	135	1,400	95
20	3,900	660	3,100	525	2,050	335	1,600	195	1,300	125	1,100	85

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

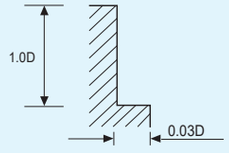




[ZE702, ZE712 series] ▶ Side cutting

WORKPIECE	HARDENED STEELS, HEAT RESISTANT STEELS		HARDENED STEELS									
HARDNESS	HRc30 ~ HRc40		HRc40 ~ HRc50		HRc50 ~ HRc55		HRc55 ~ HRc60		HRc60 ~ HRc65		HRc65 ~ HRc70	
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
1	48,000	1,050	38,000	820	25,500	510	20,500	310	16,000	190	12,500	125
2	33,300	1,200	26,000	970	17,500	600	14,500	370	11,000	230	9,500	165
3	21,800	1,200	17,300	970	11,500	600	9,500	370	7,500	230	6,400	165
4	16,700	1,250	13,200	1,000	8,800	625	7,200	385	5,600	240	4,750	170
5	15,700	1,450	12,500	1,150	8,300	710	6,400	410	5,100	260	4,450	190
6	13,100	1,350	10,350	1,100	6,900	690	5,300	400	4,200	255	3,700	185
8	9,880	1,320	7,800	1,030	5,200	635	4,000	365	3,200	235	2,800	170
10	7,800	1,200	6,150	970	4,100	590	3,200	340	2,550	220	2,200	160
12	6,650	1,200	5,250	970	3,500	590	2,650	340	2,100	220	1,860	160
16	4,900	1,050	3,900	840	2,600	520	2,000	300	1,600	190	1,400	140
20	3,900	950	3,100	750	2,050	475	1,600	275	1,300	175	1,100	125

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

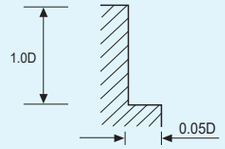


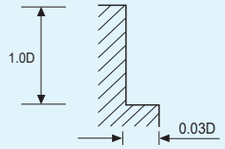
Recommended Cutting Condition

[ZE704, ZE714, ZE724 series] ▶ Side cutting

WORKPIECE	HARDENED STEELS, HEAT RESISTANT STEELS		HARDENED STEELS									
HARDNESS	HRc30 ~ HRc40		HRc40 ~ HRc50		HRc50 ~ HRc55		HRc55 ~ HRc60		HRc60 ~ HRc65		HRc65 ~ HRc70	
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
1	48,000	1,480	38,000	1,050	25,500	710	20,500	430	16,000	270	12,500	175
2	33,300	1,750	26,000	1,250	17,500	840	14,500	520	11,000	320	9,500	230
3	21,800	1,750	17,300	1,250	11,500	840	9,500	520	7,500	320	6,400	230
4	16,700	1,800	13,200	1,300	8,800	880	7,200	540	5,600	335	4,750	240
5	15,700	2,000	12,500	1,500	8,300	1,000	6,400	580	5,100	370	4,450	270
6	13,100	1,950	10,350	1,400	6,900	950	5,300	560	4,200	350	3,700	260
8	9,880	1,880	7,800	1,350	5,200	900	4,000	520	3,200	330	2,800	240
10	7,800	1,750	6,150	1,260	4,100	840	3,200	480	2,550	310	2,200	220
12	6,650	1,750	5,250	1,260	3,500	840	2,650	480	2,100	300	1,860	220
16	4,900	1,500	3,900	1,100	2,600	730	2,000	420	1,600	270	1,400	200
20	3,900	1,300	3,100	970	2,050	650	1,600	380	1,300	250	1,100	180

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

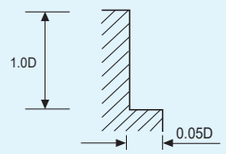


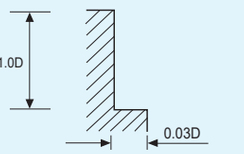


[ZR706, ZR736, ZE716, ZE726 series]

WORKPIECE	HARDENED STEELS, HEAT RESISTANT STEELS		HARDENED STEELS									
HARDNESS	HRc30 ~ HRc40		HRc40 ~ HRc50		HRc50 ~ HRc 55		HRc55 ~ HRc60		HRc60 ~ HRc65		HRc65 ~ HRc70	
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
6	24,800	5,350	23,500	4,900	16,000	4,900	13,500	3,300	10,500	2,100	8,000	1,450
8	20,000	5,500	19,000	5,000	12,000	4,600	10,000	3,100	8,000	2,000	6,000	1,400
10	16,000	4,900	15,500	4,500	9,500	4,100	8,000	2,900	6,400	1,800	4,800	1,300
12	13,000	4,500	12,500	4,100	8,000	3,800	6,600	2,500	5,300	1,600	4,000	1,150
16	10,000	4,000	9,700	3,700	6,000	3,400	5,000	2,300	4,000	1,250	3,000	870
20	8,000	3,350	7,800	3,400	4,800	3,200	4,000	2,100	3,200	1,020	2,400	690

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

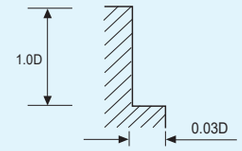




[ZR702, ZR732 series] ▶ Side cutting

WORKPIECE	HARDENED STEELS, HEAT RESISTANT STEELS		HARDENED STEELS									
HARDNESS	HRc30 ~ HRc40		HRc40 ~ HRc50		HRc50 ~ HRc55		HRc55 ~ HRc60		HRc60 ~ HRc65		HRc65 ~ HRc70	
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
2	33,300	960	26,000	776	17,500	480	14,500	296	11,000	184	9,500	132
3	21,800	960	17,300	776	11,500	480	9,500	296	7,500	184	6,400	132
4	16,700	1,000	13,200	800	8,800	500	7,200	308	5,600	192	4,750	136
5	15,700	1,160	12,500	920	8,300	568	6,400	328	5,100	208	4,450	152
6	13,100	1,080	10,350	880	6,900	552	5,300	320	4,200	204	3,700	148
8	9,880	1,056	7,800	824	5,200	508	4,000	292	3,200	188	2,800	136
10	7,800	960	6,150	776	4,100	472	3,200	272	2,550	176	2,200	128
12	6,650	960	5,250	776	3,500	472	2,650	272	2,100	176	1,860	128
16	4,900	840	3,900	672	2,600	416	2,000	240	1,600	152	1,400	112
20	3,900	760	3,100	600	2,050	380	1,600	220	1,300	140	1,100	100

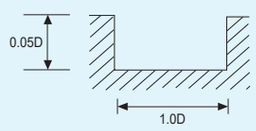
RPM = rev. / min.
FEED = mm / min.

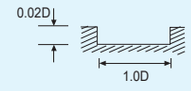


[ZR702, ZR732 series] ▶ Slotting

WORKPIECE	HARDENED STEELS, HEAT RESISTANT STEELS		HARDENED STEELS									
HARDNESS	HRc30 ~ HRc40		HRc40 ~ HRc50		HRc50 ~ HRc55		HRc55 ~ HRc60		HRc60 ~ HRc65		HRc65 ~ HRc70	
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
2	33,300	680	26,000	544	17,500	336	14,500	208	11,000	128	9,500	92
3	21,800	680	17,300	544	11,500	336	9,500	208	7,500	128	6,400	92
4	16,700	704	13,200	560	8,800	352	7,200	216	5,600	136	4,750	94
5	15,700	800	12,500	644	8,300	400	6,400	228	5,100	144	4,450	106
6	13,100	760	10,350	616	6,900	384	5,300	224	4,200	144	3,700	104
8	9,880	744	7,800	576	5,200	356	4,000	204	3,200	132	2,800	96
10	7,800	680	6,150	544	4,100	332	3,200	192	2,550	124	2,200	90
12	6,650	680	5,250	544	3,500	332	2,650	192	2,100	124	1,860	90
16	4,900	584	3,900	464	2,600	292	2,000	168	1,600	108	1,400	78
20	3,900	528	3,100	420	2,050	268	1,600	168	1,300	100	1,100	70

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





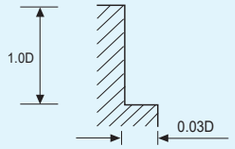
Recommended Cutting Condition

[ZR704, ZR714, ZR724, ZR734 series]

▶ Side cutting

WORKPIECE	HARDENED STEELS, HEAT RESISTANT STEELS		HARDENED STEELS									
HARDNESS	HRc30 ~ HRc40		HRc40 ~ HRc50		HRc50 ~ HRc55		HRc55 ~ HRc60		HRc60 ~ HRc65		HRc65 ~ HRc70	
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
3	21,800	1,400	17,300	1,000	11,500	672	9,500	416	7,500	256	6,400	184
4	16,700	1,440	13,200	1,040	8,800	704	7,200	432	5,600	268	4,750	192
5	15,700	1,600	12,500	1,200	8,300	800	6,400	464	5,100	296	4,450	216
6	13,100	1,560	10,350	1,120	6,900	760	5,300	448	4,200	280	3,700	208
8	9,880	1,504	7,800	1,080	5,200	720	4,000	416	3,200	264	2,800	192
10	7,800	1,400	6,150	1,008	4,100	672	3,200	384	2,550	248	2,200	176
12	6,650	1,400	5,250	1,008	3,500	672	2,650	384	2,100	240	1,860	176
16	4,900	1,200	3,900	880	2,600	584	2,000	336	1,600	216	1,400	160
20	3,900	1,040	3,100	776	2,050	520	1,600	304	1,300	200	1,100	144

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



[WB712+ Series]

WORKPIECE		ALLOY STEELS,CARBON STEELS (SCM, SNCM, S45C)			PREHARDENED STEELS (NAK, CENA, KP4)			HARDENED STEELS (SKD, SKT, STAVAX)		
HARDNESS		~HRc35			HRc35~HRc45			HRc45~HRc55		
STRENGTH		~1100N/mm2			1100~1500N/mm2			1500~2000N/mm2		
DIAMETER(mm)	Effective Length	RPM	FEED	Ap(mm)	RPM	FEED	Ap(mm)	RPM	FEED	Ap(mm)
0.1	0.3	50,000	240	0.009	50,000	215	0.007	50,000	190	0.005
0.1	0.5	50,000	240	0.006	50,000	215	0.005	50,000	190	0.004
0.1	1	45,000	195	0.002	45,000	175	0.002	45,000	155	0.001
0.2	0.5	50,000	335	0.018	50,000	310	0.014	43,200	260	0.010
0.2	1	50,000	335	0.013	50,000	310	0.010	43,200	260	0.007
0.2	1.5	45,000	270	0.007	45,000	250	0.006	38,880	210	0.004
0.2	2	45,000	270	0.005	45,000	250	0.004	38,880	210	0.003
0.2	3	45,000	270	0.003	45,000	250	0.003	38,880	210	0.002
0.3	1	50,000	475	0.019	50,000	430	0.015	42,800	365	0.011
0.3	1.5	50,000	475	0.019	50,000	430	0.015	42,800	365	0.011
0.3	2	45,000	385	0.011	45,000	350	0.008	38,520	295	0.006
0.3	2.5	45,000	385	0.007	45,000	350	0.005	38,520	295	0.004
0.3	3	45,000	385	0.007	45,000	350	0.005	38,520	295	0.004
0.3	4	40,000	305	0.004	40,000	275	0.003	34,240	235	0.002
0.3	5	30,000	200	0.003	30,000	180	0.002	25,680	155	0.002
0.4	1	41,000	490	0.036	38,800	425	0.028	34,200	340	0.020
0.4	1.5	41,000	490	0.025	38,800	425	0.020	34,200	340	0.014
0.4	2	41,000	490	0.025	38,800	425	0.020	34,200	340	0.014
0.4	2.5	36,900	395	0.014	34,920	345	0.011	30,780	275	0.008
0.4	3	36,900	395	0.014	34,920	345	0.011	30,780	275	0.008
0.4	4	36,900	395	0.009	34,920	345	0.007	30,780	275	0.005
0.4	5	32,800	315	0.009	31,040	270	0.007	27,360	220	0.005
0.4	6	32,800	315	0.005	31,040	270	0.004	27,360	220	0.003
0.4	8	24,600	205	0.004	23,280	180	0.003	20,520	145	0.002
0.4	10	12,300	90	0.004	11,640	75	0.003	10,260	60	0.002
0.5	1	34,200	685	0.045	32,300	580	0.035	28,500	515	0.025
0.5	1.5	34,200	685	0.045	32,300	580	0.035	28,500	515	0.025
0.5	2	34,200	685	0.032	32,300	580	0.025	28,500	515	0.018
0.5	2.5	34,200	685	0.032	32,300	580	0.025	28,500	515	0.018
0.5	3	30,780	555	0.018	29,070	470	0.014	25,650	415	0.010
0.5	4	30,780	555	0.018	29,070	470	0.014	25,650	415	0.010
0.5	5	30,780	555	0.011	29,070	470	0.009	25,650	415	0.006
0.5	6	27,360	440	0.011	25,840	370	0.009	22,800	330	0.006
0.5	8	20,520	290	0.007	19,380	245	0.005	17,100	215	0.004
0.5	10	20,520	290	0.005	19,380	245	0.004	17,100	215	0.003
0.5	12	10,260	125	0.005	9,690	105	0.004	8,550	95	0.003
0.5	14	10,260	125	0.005	9,690	105	0.004	8,550	95	0.003
0.5	16	3,420	35	0.005	3,230	30	0.004	2,850	25	0.003
0.6	1	34,200	1,025	0.038	32,300	840	0.029	28,500	685	0.021
0.6	2	34,200	1,025	0.038	32,300	840	0.029	28,500	685	0.021
0.6	3	34,200	1,025	0.038	32,300	840	0.029	28,500	685	0.021
0.6	4	30,780	830	0.022	29,070	680	0.017	25,650	555	0.012
0.6	5	30,780	830	0.014	29,070	680	0.011	25,650	555	0.008
0.6	6	30,780	830	0.014	29,070	680	0.011	25,650	555	0.008
0.6	8	27,360	655	0.008	25,840	540	0.006	22,800	440	0.005
0.6	10	20,520	430	0.005	19,380	355	0.004	17,100	290	0.003
0.6	12	20,520	430	0.005	19,380	355	0.004	17,100	290	0.003
0.6	14	10,260	185	0.005	9,690	150	0.004	8,550	125	0.003
0.6	16	10,260	185	0.005	9,690	150	0.004	8,550	125	0.003
0.7	2	34,200	1,130	0.063	32,300	930	0.049	28,500	765	0.035
0.7	4	30,780	915	0.025	29,070	755	0.020	25,650	620	0.014
0.7	6	30,780	915	0.016	29,070	755	0.012	25,650	620	0.009
0.7	8	27,360	725	0.016	25,840	595	0.012	22,800	490	0.009

[WB712+ Series]

WORKPIECE		ALLOY STEELS,CARBON STEELS (SCM, SNCM, S45C)			PREHARDENED STEELS (NAK, CENA, KP4)			HARDENED STEELS (SKD, SKT, STAVAX)		
HARDNESS		~HRc35			HRc35~HRc45			HRc45~HRc55		
STRENGTH		~1100N/mm2			1100~1500N/mm2			1500~2000N/mm2		
DIAMETER(mm)	Effective Length	RPM	FEED	Ap(mm)	RPM	FEED	Ap(mm)	RPM	FEED	Ap(mm)
0.7	10	27,360	725	0.009	25,840	595	0.007	22,800	490	0.005
0.7	12	20,520	475	0.006	19,380	390	0.005	17,100	320	0.004
0.8	2	34,200	1,230	0.072	32,300	1,035	0.056	28,500	855	0.040
0.8	3	34,200	1,230	0.050	32,300	1,035	0.039	28,500	855	0.028
0.8	4	34,200	1,230	0.050	32,300	1,035	0.039	28,500	855	0.028
0.8	5	30,780	995	0.029	29,070	840	0.022	25,650	695	0.016
0.8	6	30,780	995	0.029	29,070	840	0.022	25,650	695	0.016
0.8	8	30,780	995	0.018	29,070	840	0.014	25,650	695	0.010
0.8	10	27,360	785	0.018	25,840	660	0.014	22,800	545	0.010
0.8	12	27,360	785	0.011	25,840	660	0.008	22,800	545	0.006
0.8	14	20,520	515	0.007	19,380	435	0.006	17,100	360	0.004
0.8	16	20,520	515	0.007	19,380	435	0.006	17,100	360	0.004
0.8	20	10,260	220	0.007	9,690	185	0.006	8,550	155	0.004
0.9	4	29,250	1,120	0.032	27,630	935	0.025	24,390	775	0.018
0.9	6	29,250	1,120	0.032	27,630	935	0.025	24,390	775	0.018
0.9	8	29,250	1,120	0.020	27,630	935	0.016	24,390	775	0.011
0.9	10	26,000	885	0.020	24,560	740	0.016	21,680	610	0.011
1.0	2	30,800	1,540	0.090	29,100	1,310	0.070	25,700	1,075	0.050
1.0	3	30,800	1,540	0.090	29,100	1,310	0.070	25,700	1,075	0.050
1.0	4	30,800	1,540	0.063	29,100	1,310	0.049	25,700	1,075	0.035
1.0	5	30,800	1,540	0.063	29,100	1,310	0.049	25,700	1,075	0.035
1.0	6	27,720	1,245	0.036	26,190	1,060	0.028	23,130	870	0.020
1.0	7	27,720	1,245	0.036	26,190	1,060	0.028	23,130	870	0.020
1.0	8	27,720	1,245	0.036	26,190	1,060	0.028	23,130	870	0.020
1.0	10	27,720	1,245	0.023	26,190	1,060	0.018	23,130	870	0.013
1.0	12	24,640	985	0.023	23,280	840	0.018	20,560	690	0.013
1.0	14	24,640	985	0.014	23,280	840	0.011	20,560	690	0.008
1.0	16	18,480	645	0.014	17,460	550	0.011	15,420	450	0.008
1.0	18	18,480	645	0.009	17,460	550	0.007	15,420	450	0.005
1.0	20	18,480	645	0.009	17,460	550	0.007	15,420	450	0.005
1.0	22	9,240	275	0.009	8,730	235	0.007	7,710	195	0.005
1.0	26	9,240	275	0.009	8,730	235	0.007	7,710	195	0.005
1.0	30	9,240	275	0.009	8,730	235	0.007	7,710	195	0.005
1.0	40	3,080	75	0.009	2,910	65	0.007	2,570	55	0.005
1.0	50	3,080	75	0.006	2,910	65	0.005	2,570	55	0.003
1.2	4	26,300	1,375	0.076	24,800	1,150	0.059	21,900	950	0.042
1.2	6	26,300	1,375	0.076	24,800	1,150	0.059	21,900	950	0.042
1.2	8	23,670	1,115	0.043	22,320	930	0.034	19,710	770	0.024
1.2	10	23,670	1,115	0.027	22,320	930	0.021	19,710	770	0.015
1.2	12	23,670	1,115	0.027	22,320	930	0.021	19,710	770	0.015
1.2	16	21,040	880	0.016	19,840	735	0.013	17,520	610	0.009
1.2	20	15,780	580	0.011	14,880	485	0.008	13,140	400	0.006
1.2	26	7,890	245	0.011	7,440	205	0.008	6,570	170	0.006
1.4	6	21,500	1,295	0.088	20,300	1,100	0.069	18,000	935	0.049
1.4	8	19,350	1,050	0.050	18,270	890	0.039	16,200	755	0.028
1.4	10	19,350	1,050	0.050	18,270	890	0.039	16,200	755	0.028
1.4	16	17,200	830	0.032	16,240	705	0.025	14,400	600	0.018
1.5	4	23,900	1,580	0.135	22,600	1,355	0.105	20,000	1,075	0.075
1.5	5	23,900	1,580	0.095	22,600	1,355	0.074	20,000	1,075	0.053
1.5	6	23,900	1,580	0.095	22,600	1,355	0.074	20,000	1,075	0.053
1.5	7	23,900	1,580	0.095	22,600	1,355	0.074	20,000	1,075	0.053
1.5	8	21,510	1,280	0.054	20,340	1,100	0.042	18,000	870	0.030
1.5	10	21,510	1,280	0.054	20,340	1,100	0.042	18,000	870	0.030

[WB712+ Series]

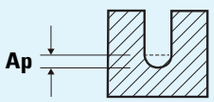
WORKPIECE		ALLOY STEELS,CARBON STEELS (SCM, SNCM, S45C)			PREHARDENED STEELS (NAK, CENA, KP4)			HARDENED STEELS (SKD, SKT, STAVAX)		
HARDNESS		~HRc35			HRc35~HRc45			HRc45~HRc55		
STRENGTH		~1100N/mm2			1100~1500N/mm2			1500~2000N/mm2		
DIAMETER(mm)	Effective Length	RPM	FEED	Ap(mm)	RPM	FEED	Ap(mm)	RPM	FEED	Ap(mm)
1.5	12	21,510	1,280	0.054	20,340	1,100	0.042	18,000	870	0.030
1.5	14	21,510	1,280	0.034	20,340	1,100	0.026	18,000	870	0.019
1.5	16	19,120	1,010	0.034	18,080	865	0.026	16,000	690	0.019
1.5	18	19,120	1,010	0.034	18,080	865	0.026	16,000	690	0.019
1.5	20	19,120	1,010	0.020	18,080	865	0.016	16,000	690	0.011
1.5	22	19,120	1,010	0.020	18,080	865	0.016	16,000	690	0.011
1.5	26	14,340	665	0.014	13,560	570	0.011	12,000	450	0.008
1.5	30	14,340	665	0.014	13,560	570	0.011	12,000	450	0.008
1.5	35	7,170	285	0.010	6,780	245	0.008	6,000	195	0.005
1.5	40	7,170	285	0.010	6,780	245	0.008	6,000	195	0.005
1.6	4	22,200	1,555	0.101	21,000	1,300	0.078	18,500	1,110	0.056
1.6	6	22,200	1,555	0.101	21,000	1,300	0.078	18,500	1,110	0.056
1.6	8	22,200	1,555	0.101	21,000	1,300	0.078	18,500	1,110	0.056
1.6	10	19,980	1,260	0.058	18,900	1,055	0.045	16,650	900	0.032
1.6	12	19,980	1,260	0.058	18,900	1,055	0.045	16,650	900	0.032
1.6	16	19,980	1,260	0.036	18,900	1,055	0.028	16,650	900	0.020
1.6	20	17,760	995	0.036	16,800	830	0.028	14,800	710	0.020
1.8	4	22,200	1,780	0.113	21,000	1,470	0.088	18,500	1,225	0.063
1.8	6	22,200	1,780	0.113	21,000	1,470	0.088	18,500	1,225	0.063
1.8	8	22,200	1,780	0.113	21,000	1,470	0.088	18,500	1,225	0.063
1.8	10	19,980	1,440	0.065	18,900	1,190	0.050	16,650	990	0.036
1.8	12	19,980	1,440	0.065	18,900	1,190	0.050	16,650	990	0.036
1.8	16	19,980	1,440	0.041	18,900	1,190	0.032	16,650	990	0.023
1.8	20	17,760	1,140	0.041	16,800	940	0.032	14,800	785	0.023
2.0	6	18,000	1,795	0.180	17,000	1,525	0.140	15,000	1,285	0.100
2.0	8	18,000	1,795	0.126	17,000	1,525	0.098	15,000	1,285	0.070
2.0	10	18,000	1,795	0.126	17,000	1,525	0.098	15,000	1,285	0.070
2.0	12	16,200	1,455	0.072	15,300	1,235	0.056	13,500	1,040	0.040
2.0	14	16,200	1,455	0.072	15,300	1,235	0.056	13,500	1,040	0.040
2.0	16	16,200	1,455	0.072	15,300	1,235	0.056	13,500	1,040	0.040
2.0	18	16,200	1,455	0.045	15,300	1,235	0.035	13,500	1,040	0.025
2.0	20	16,200	1,455	0.045	15,300	1,235	0.035	13,500	1,040	0.025
2.0	22	14,400	1,150	0.045	13,600	975	0.035	12,000	820	0.025
2.0	26	14,400	1,150	0.045	13,600	975	0.035	12,000	820	0.025
2.0	30	14,400	1,150	0.027	13,600	975	0.021	12,000	820	0.015
2.0	35	10,800	755	0.018	10,200	640	0.014	9,000	540	0.010
2.0	40	10,800	755	0.018	10,200	640	0.014	9,000	540	0.010
2.0	45	5,400	325	0.018	5,100	275	0.014	4,500	230	0.010
2.0	50	5,400	325	0.018	5,100	275	0.014	4,500	230	0.010
2.0	60	5,400	325	0.018	5,100	275	0.014	4,500	230	0.010
2.5	8	15,800	1,925	0.158	14,900	1,605	0.123	13,200	1,305	0.088
2.5	10	15,800	1,925	0.158	14,900	1,605	0.123	13,200	1,305	0.088
2.5	12	15,800	1,925	0.158	14,900	1,605	0.123	13,200	1,305	0.088
2.5	16	14,220	1,560	0.090	13,410	1,300	0.070	11,880	1,055	0.050
2.5	20	14,220	1,560	0.090	13,410	1,300	0.070	11,880	1,055	0.050
2.5	22	14,220	1,560	0.056	13,410	1,300	0.044	11,880	1,055	0.031
2.5	26	12,640	1,230	0.056	11,920	1,025	0.044	10,560	835	0.031
2.5	30	12,640	1,230	0.056	11,920	1,025	0.044	10,560	835	0.031
2.5	35	12,640	1,230	0.034	11,920	1,025	0.026	10,560	835	0.019
2.5	40	9,480	810	0.034	8,940	675	0.026	7,920	550	0.019
2.5	45	9,480	810	0.023	8,940	675	0.018	7,920	550	0.013
2.5	50	9,480	810	0.023	8,940	675	0.018	7,920	550	0.013
3.0	6	13,700	2,050	0.270	12,900	1,730	0.210	11,400	1,435	0.150

Recommended Cutting Condition

[WB712+ Series]

WORKPIECE		ALLOY STEELS,CARBON STEELS (SCM, SNCM, S45C)			PREHARDENED STEELS (NAK, CENA, KP4)			HARDENED STEELS (SKD, SKT, STAVAX)		
HARDNESS		~HRc35			HRc35~HRc45			HRc45~HRc55		
STRENGTH		~1100N/mm2			1100~1500N/mm2			1500~2000N/mm2		
DIAMETER(mm)	Effective Length	RPM	FEED	Ap(mm)	RPM	FEED	Ap(mm)	RPM	FEED	Ap(mm)
3.0	8	13,700	2,050	0.270	12,900	1,730	0.210	11,400	1,435	0.150
3.0	10	13,700	2,050	0.189	12,900	1,730	0.147	11,400	1,435	0.105
3.0	12	13,700	2,050	0.189	12,900	1,730	0.147	11,400	1,435	0.105
3.0	14	13,700	2,050	0.189	12,900	1,730	0.147	11,400	1,435	0.105
3.0	16	12,330	1,660	0.108	11,610	1,400	0.084	10,260	1,160	0.060
3.0	18	12,330	1,660	0.108	11,610	1,400	0.084	10,260	1,160	0.060
3.0	20	12,330	1,660	0.108	11,610	1,400	0.084	10,260	1,160	0.060
3.0	22	12,330	1,660	0.108	11,610	1,400	0.084	10,260	1,160	0.060
3.0	26	12,330	1,660	0.068	11,610	1,400	0.053	10,260	1,160	0.038
3.0	30	12,330	1,660	0.068	11,610	1,400	0.053	10,260	1,160	0.038
3.0	35	10,960	1,310	0.068	10,320	1,105	0.053	9,120	920	0.038
3.0	40	10,960	1,310	0.041	10,320	1,105	0.032	9,120	920	0.023
3.0	45	10,960	1,310	0.041	10,320	1,105	0.032	9,120	920	0.023
3.0	50	8,220	860	0.027	7,740	725	0.021	6,840	605	0.015
3.0	60	8,220	860	0.027	7,740	725	0.021	6,840	605	0.015
4.0	8	9,800	1,965	0.360	9,300	1,670	0.280	8,200	1,395	0.200
4.0	10	9,800	1,965	0.360	9,300	1,670	0.280	8,200	1,395	0.200
4.0	12	9,800	1,965	0.360	9,300	1,670	0.280	8,200	1,395	0.200
4.0	14	9,800	1,965	0.252	9,300	1,670	0.196	8,200	1,395	0.140
4.0	16	9,800	1,965	0.252	9,300	1,670	0.196	8,200	1,395	0.140
4.0	18	9,800	1,965	0.252	9,300	1,670	0.196	8,200	1,395	0.140
4.0	20	9,800	1,965	0.252	9,300	1,670	0.196	8,200	1,395	0.140
4.0	22	8,820	1,590	0.144	8,370	1,355	0.112	7,380	1,130	0.080
4.0	26	8,820	1,590	0.144	8,370	1,355	0.112	7,380	1,130	0.080
4.0	30	8,820	1,590	0.144	8,370	1,355	0.112	7,380	1,130	0.080
4.0	35	8,820	1,590	0.090	8,370	1,355	0.070	7,380	1,130	0.050
4.0	40	8,820	1,590	0.090	8,370	1,355	0.070	7,380	1,130	0.050
4.0	45	7,840	1,260	0.090	7,440	1,070	0.070	6,560	895	0.050
4.0	50	7,840	1,260	0.090	7,440	1,070	0.070	6,560	895	0.050
4.0	60	7,840	1,260	0.054	7,440	1,070	0.042	6,560	895	0.030
5.0	15	7,700	1,845	0.315	7,300	1,455	0.245	6,400	1,285	0.175
5.0	20	7,700	1,845	0.315	7,300	1,455	0.245	6,400	1,285	0.175
5.0	26	6,930	1,495	0.180	6,570	1,180	0.140	5,760	1,040	0.100
5.0	30	6,930	1,495	0.180	6,570	1,180	0.140	5,760	1,040	0.100
5.0	35	6,930	1,495	0.180	6,570	1,180	0.140	5,760	1,040	0.100
5.0	40	6,930	1,495	0.180	6,570	1,180	0.140	5,760	1,040	0.100
5.0	50	6,930	1,495	0.113	6,570	1,180	0.088	5,760	1,040	0.063
5.0	60	6,160	1,180	0.113	5,840	930	0.088	5,120	820	0.063
6.0	20	6,500	1,900	0.378	6,200	1,600	0.294	5,500	1,330	0.210
6.0	30	6,500	1,900	0.378	6,200	1,600	0.294	5,500	1,330	0.210
8.0	25	4,850	1,800	0.504	4,600	1,500	0.392	4,000	1,280	0.280
8.0	30	4,850	1,800	0.504	4,600	1,500	0.392	4,000	1,280	0.280
10.0	30	3,850	1,650	0.900	3,680	1,400	0.700	3,200	1,200	0.500
10.0	40	3,850	1,650	0.630	3,680	1,400	0.490	3,200	1,200	0.350
12.0	32	3,200	1,520	1.080	3,050	1,300	0.840	2,650	1,100	0.600
12.0	45	3,200	1,520	0.756	3,050	1,300	0.588	2,650	1,100	0.420

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



[WE712+ Series]

WORKPIECE		ALLOY STEELS,CARBON STEELS (SCM, SNCM, S45C)			PREHARDENED STEELS (NAK, CENA, KP4)			HARDENED STEELS (SKD, SKT, STAVAX)		
HARDNESS		~HRc35			HRc35~HRc45			HRc45~HRc55		
STRENGTH		~1100N/mm2			1100~1500N/mm2			1500~2000N/mm2		
DIAMETER(mm)	Effective Length	RPM	FEED	Ap(mm)	RPM	FEED	Ap(mm)	RPM	FEED	Ap(mm)
0.1	0.3	50,000	315	0.009	46,200	230	0.007	40,600	170	0.005
0.1	0.5	50,000	315	0.006	46,200	230	0.005	40,600	170	0.004
0.1	1	45,000	255	0.002	41,580	185	0.002	36,540	140	0.001
0.2	0.5	38,500	380	0.018	36,300	270	0.014	32,100	200	0.010
0.2	1	38,500	380	0.013	36,300	270	0.010	32,100	200	0.007
0.2	1.5	34,650	310	0.007	32,670	220	0.006	28,890	160	0.004
0.2	2	34,650	310	0.005	32,670	220	0.004	28,890	160	0.003
0.3	1	34,200	390	0.019	32,300	270	0.015	28,500	230	0.011
0.3	1.5	34,200	390	0.019	32,300	270	0.015	25,800	230	0.011
0.3	2	30,780	315	0.011	29,070	220	0.008	25,650	185	0.006
0.3	2.5	30,780	315	0.007	29,070	220	0.005	25,650	185	0.004
0.3	3	30,780	315	0.007	29,070	220	0.005	25,650	185	0.004
0.3	4	27,360	250	0.004	25,840	175	0.003	22,800	145	0.002
0.3	5	20,520	165	0.003	19,380	115	0.002	17,100	95	0.002
0.4	1	27,400	540	0.036	25,800	380	0.028	22,800	280	0.020
0.4	1.5	27,400	540	0.025	25,800	380	0.020	22,800	280	0.014
0.4	2	27,400	540	0.025	25,800	380	0.020	22,800	280	0.014
0.4	2.5	24,660	435	0.014	23,220	310	0.011	20,520	225	0.008
0.4	3	24,660	435	0.014	23,220	310	0.011	20,520	225	0.008
0.4	4	24,660	435	0.009	23,220	310	0.007	20,520	225	0.005
0.4	5	21,920	345	0.009	20,640	245	0.007	18,240	180	0.005
0.4	6	21,920	345	0.005	20,640	245	0.004	18,240	180	0.003
0.4	8	16,440	225	0.004	15,480	160	0.003	13,680	120	0.002
0.4	10	8,220	95	0.004	7,740	70	0.003	6,840	50	0.002
0.5	1	27,400	540	0.045	25,800	425	0.035	22,800	285	0.025
0.5	1.5	27,400	540	0.045	25,800	425	0.035	22,800	285	0.025
0.5	2	27,400	540	0.032	25,800	425	0.025	22,800	285	0.018
0.5	2.5	27,400	540	0.032	25,800	425	0.025	22,800	285	0.018
0.5	3	24,660	435	0.018	23,220	345	0.014	20,520	230	0.010
0.5	4	24,660	435	0.018	23,220	345	0.014	20,520	230	0.010
0.5	5	24,660	435	0.011	23,220	345	0.009	20,520	230	0.006
0.5	6	21,920	345	0.011	20,640	270	0.009	18,240	180	0.006
0.5	8	16,440	225	0.007	15,480	180	0.005	13,680	120	0.004
0.5	10	16,440	225	0.005	15,480	180	0.004	13,680	120	0.003
0.5	12	8,220	95	0.005	7,740	75	0.004	6,840	50	0.003
0.5	14	8,220	95	0.005	7,740	75	0.004	6,840	50	0.003
0.5	16	2,740	25	0.005	2,580	20	0.004	2,280	15	0.003
0.6	2	27,400	775	0.038	25,800	545	0.029	22,800	405	0.021
0.6	3	27,400	775	0.038	25,800	545	0.029	22,800	405	0.021
0.6	4	24,660	630	0.022	23,220	440	0.017	20,520	330	0.012
0.6	5	24,660	630	0.014	23,220	440	0.011	20,520	330	0.008
0.6	6	24,660	630	0.014	23,220	440	0.011	20,520	330	0.008
0.6	8	21,920	495	0.008	20,640	350	0.006	18,240	260	0.005
0.6	10	16,440	325	0.005	15,480	230	0.004	13,680	170	0.003
0.6	12	16,440	325	0.005	15,480	230	0.004	13,680	170	0.003
0.6	14	8,220	140	0.005	7,740	100	0.004	6,840	75	0.003
0.6	16	8,220	140	0.005	7,740	100	0.004	6,840	75	0.003
0.7	2	27,400	775	0.063	25,800	545	0.049	22,800	405	0.035
0.7	4	24,660	630	0.025	23,220	440	0.020	20,520	330	0.014
0.7	6	24,660	630	0.016	23,220	440	0.012	20,520	330	0.009
0.7	8	21,920	495	0.016	20,640	350	0.012	18,240	260	0.009
0.7	10	21,920	495	0.009	20,640	350	0.007	18,240	260	0.005
0.7	12	16,440	325	0.009	15,480	230	0.005	13,680	170	0.004

[WE712+ Series]

WORKPIECE		ALLOY STEELS,CARBON STEELS (SCM, SNCM, S45C)			PREHARDENED STEELS (NAK, CENA, KP4)			HARDENED STEELS (SKD, SKT, STAVAX)		
HARDNESS		~HRc35			HRc35~HRc45			HRc45~HRc55		
STRENGTH		~1100N/mm2			1100~1500N/mm2			1500~2000N/mm2		
DIAMETER(mm)	Effective Length	RPM	FEED	Ap(mm)	RPM	FEED	Ap(mm)	RPM	FEED	Ap(mm)
0.8	2	27,400	775	0.072	25,800	605	0.056	22,800	450	0.040
0.8	3	27,400	775	0.050	25,800	605	0.039	22,800	450	0.028
0.8	4	27,400	775	0.050	25,800	605	0.039	22,800	450	0.028
0.8	5	24,660	630	0.029	23,220	490	0.022	20,520	365	0.016
0.8	6	24,660	630	0.029	23,220	490	0.022	20,520	365	0.016
0.8	8	24,660	630	0.018	23,220	490	0.014	20,520	365	0.010
0.8	10	21,920	495	0.018	20,640	385	0.014	18,240	290	0.010
0.8	12	21,920	495	0.011	20,640	385	0.008	18,240	290	0.006
0.8	14	16,440	325	0.007	15,480	255	0.006	13,680	190	0.004
0.8	16	16,440	325	0.007	15,480	255	0.006	13,680	190	0.004
0.8	20	8,220	140	0.007	7,740	110	0.006	6,840	80	0.004
0.9	6	22,140	575	0.032	20,970	440	0.025	18,450	330	0.018
0.9	8	22,140	575	0.020	20,970	440	0.016	18,450	330	0.011
0.9	10	19,680	455	0.020	18,640	350	0.016	16,400	260	0.011
1.0	2	24,600	1,045	0.090	23,300	890	0.070	20,500	665	0.050
1.0	3	24,600	1,045	0.090	23,300	890	0.070	20,500	665	0.050
1.0	4	24,600	1,045	0.063	23,300	890	0.049	20,500	665	0.035
1.0	5	24,600	1,045	0.063	23,300	890	0.049	20,500	665	0.035
1.0	6	22,140	845	0.036	20,970	720	0.028	18,450	540	0.020
1.0	7	22,140	845	0.036	20,970	720	0.028	18,450	540	0.020
1.0	8	22,140	845	0.036	20,970	720	0.028	18,450	540	0.020
1.0	10	22,140	845	0.023	20,970	720	0.018	18,450	540	0.013
1.0	12	19,680	670	0.023	18,640	570	0.018	16,400	425	0.013
1.0	14	19,680	670	0.014	18,640	570	0.011	16,400	425	0.008
1.0	16	14,760	440	0.014	13,980	375	0.011	12,300	280	0.008
1.0	18	14,760	440	0.009	13,980	375	0.007	12,300	280	0.005
1.0	20	14,760	440	0.009	13,980	375	0.007	12,300	280	0.005
1.0	22	7,380	190	0.009	6,990	160	0.007	6,150	120	0.005
1.0	26	7,380	190	0.009	6,990	160	0.007	6,150	120	0.005
1.0	30	7,380	190	0.009	6,990	160	0.007	6,150	120	0.005
1.0	40	2,460	50	0.009	2,330	45	0.007	2,050	35	0.005
1.0	50	2,460	50	0.006	2,330	45	0.005	2,050	35	0.003
1.2	4	21,900	930	0.076	20,700	720	0.059	18,200	485	0.042
1.2	6	21,900	930	0.076	20,700	720	0.059	18,200	485	0.042
1.2	8	19,710	755	0.043	18,630	585	0.034	16,380	395	0.024
1.2	10	19,710	755	0.027	18,630	585	0.021	16,380	395	0.015
1.2	12	19,710	755	0.027	18,630	585	0.021	16,380	395	0.015
1.2	14	17,520	595	0.027	16,560	460	0.021	14,560	310	0.015
1.2	16	17,520	595	0.016	16,560	460	0.013	14,560	310	0.009
1.2	20	13,140	390	0.011	12,420	300	0.008	10,920	205	0.006
1.2	26	6,570	165	0.011	6,210	130	0.008	5,460	85	0.006
1.2	30	6,570	165	0.011	6,210	130	0.008	5,460	85	0.006
1.4	6	19,200	815	0.088	18,100	570	0.069	16,000	425	0.049
1.4	8	17,280	660	0.050	16,290	460	0.039	14,400	345	0.028
1.4	10	17,280	660	0.050	16,290	460	0.039	14,400	345	0.028
1.4	14	17,280	660	0.032	16,290	460	0.025	14,400	345	0.018
1.4	16	15,360	520	0.032	14,480	365	0.025	12,800	270	0.018
1.4	20	15,360	520	0.019	14,480	365	0.015	12,800	270	0.011
1.5	4	19,200	905	0.135	18,100	635	0.105	16,000	475	0.075
1.5	5	19,200	905	0.095	18,100	635	0.074	16,000	475	0.053
1.5	6	19,200	905	0.095	18,100	635	0.074	16,000	475	0.053
1.5	7	19,200	905	0.095	18,100	635	0.074	16,000	475	0.053
1.5	8	17,280	735	0.054	16,290	515	0.042	14,400	385	0.030

[WE712+ Series]

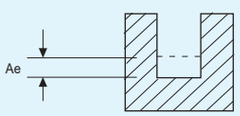
WORKPIECE		ALLOY STEELS,CARBON STEELS (SCM, SNCM, S45C)			PREHARDENED STEELS (NAK, CENA, KP4)			HARDENED STEELS (SKD, SKT, STAVAX)		
HARDNESS		~HRc35			HRc35~HRc45			HRc45~HRc55		
STRENGTH		~1100N/mm2			1100~1500N/mm2			1500~2000N/mm2		
DIAMETER(mm)	Effective Length	RPM	FEED	Ap(mm)	RPM	FEED	Ap(mm)	RPM	FEED	Ap(mm)
1.5	10	17,280	735	0.054	16,290	515	0.042	14,400	385	0.030
1.5	12	17,280	735	0.054	16,290	515	0.042	14,400	385	0.030
1.5	14	17,280	735	0.034	16,290	515	0.026	14,400	385	0.019
1.5	16	15,360	580	0.034	14,480	405	0.026	12,800	305	0.019
1.5	18	15,360	580	0.034	14,480	405	0.026	12,800	305	0.019
1.5	20	15,360	580	0.020	14,480	405	0.016	12,800	305	0.011
1.5	22	15,360	580	0.020	14,480	405	0.016	12,800	305	0.011
1.5	26	11,520	380	0.014	10,860	265	0.011	9,600	200	0.008
1.5	30	11,520	380	0.014	10,860	265	0.011	9,600	200	0.008
1.6	8	17,800	840	0.101	16,800	655	0.078	14,800	490	0.056
1.6	10	16,020	680	0.058	15,120	530	0.045	13,320	395	0.032
1.6	12	16,020	680	0.058	15,120	530	0.045	13,320	395	0.032
1.6	16	16,020	680	0.036	15,120	530	0.028	13,320	395	0.020
1.6	20	14,240	540	0.036	13,440	420	0.028	11,840	315	0.020
1.8	8	17,800	840	0.113	16,800	655	0.088	14,800	490	0.063
1.8	10	16,020	680	0.065	15,120	530	0.050	13,320	395	0.036
1.8	12	16,020	680	0.065	15,120	530	0.050	13,320	395	0.036
1.8	16	16,020	680	0.041	15,120	530	0.032	13,320	395	0.023
1.8	20	14,240	540	0.041	13,440	420	0.032	11,840	315	0.023
2.0	6	14,400	820	0.180	13,600	620	0.140	12,000	475	0.100
2.0	8	14,400	820	0.126	13,600	620	0.098	12,000	475	0.070
2.0	10	14,400	820	0.126	13,600	620	0.098	12,000	475	0.070
2.0	12	12,960	665	0.072	12,240	500	0.056	10,800	385	0.040
2.0	14	12,960	665	0.072	12,240	500	0.056	10,800	385	0.040
2.0	16	12,960	665	0.072	12,240	500	0.056	10,800	385	0.040
2.0	18	12,960	665	0.045	12,240	500	0.035	10,800	385	0.025
2.0	20	12,960	665	0.045	12,240	500	0.035	10,800	385	0.025
2.0	22	11,520	525	0.045	10,880	395	0.035	9,600	305	0.025
2.0	26	11,520	525	0.045	10,880	395	0.035	9,600	305	0.025
2.0	30	11,520	525	0.027	10,880	395	0.021	9,600	305	0.015
2.0	35	8,640	345	0.018	8,160	260	0.014	7,200	200	0.010
2.0	40	8,640	345	0.018	8,160	260	0.014	7,200	200	0.010
2.0	45	4,320	150	0.018	4,080	110	0.014	3,600	85	0.010
2.0	50	4,320	150	0.018	4,080	110	0.014	3,600	85	0.010
2.0	60	4,320	150	0.018	4,080	110	0.014	3,600	85	0.010
2.5	8	12,300	970	0.158	11,600	680	0.123	10,300	510	0.088
2.5	10	12,300	970	0.158	11,600	680	0.123	10,300	510	0.088
2.5	12	12,300	970	0.158	11,600	680	0.123	10,300	510	0.088
2.5	14	11,070	785	0.090	10,440	550	0.070	9,270	415	0.050
2.5	16	11,070	785	0.090	10,440	550	0.070	9,270	415	0.050
2.5	18	11,070	785	0.090	10,440	550	0.070	9,270	415	0.050
2.5	20	11,070	785	0.090	10,440	550	0.070	9,270	415	0.050
2.5	22	11,070	785	0.056	10,440	550	0.044	9,270	415	0.031
2.5	26	9,840	620	0.056	9,280	435	0.044	8,240	325	0.031
2.5	30	9,840	620	0.056	9,280	435	0.044	8,240	325	0.031
2.5	35	9,840	620	0.034	9,280	435	0.026	8,240	325	0.019
2.5	40	7,380	405	0.034	6,960	285	0.026	6,180	215	0.019
2.5	45	7,380	405	0.023	6,960	285	0.018	6,180	215	0.013
2.5	50	7,380	405	0.023	6,960	285	0.018	6,180	215	0.013
3.0	6	10,900	860	0.270	10,300	605	0.210	6,600	450	0.150
3.0	8	10,900	860	0.270	10,300	605	0.210	6,600	450	0.150
3.0	10	10,900	860	0.189	10,300	605	0.147	6,600	450	0.105
3.0	12	10,900	860	0.189	10,300	605	0.147	6,600	450	0.105

Recommended Cutting Condition

[WE712+ Series]

WORKPIECE		ALLOY STEELS,CARBON STEELS (SCM, SNCM, S45C)			PREHARDENED STEELS (NAK, CENA, KP4)			HARDENED STEELS (SKD, SKT, STAVAX)		
HARDNESS		~HRc35			HRc35~HRc45			HRc45~HRc55		
STRENGTH		~1100N/mm2			1100~1500N/mm2			1500~2000N/mm2		
DIAMETER(mm)	Effective Length	RPM	FEED	Ap(mm)	RPM	FEED	Ap(mm)	RPM	FEED	Ap(mm)
3.0	14	10,900	860	0.189	10,300	605	0.147	6,600	450	0.105
3.0	16	9,810	695	0.108	9,270	490	0.084	5,940	365	0.060
3.0	18	9,810	695	0.108	9,270	490	0.084	5,940	365	0.060
3.0	20	9,810	695	0.108	9,270	490	0.084	5,940	365	0.060
3.0	22	9,810	695	0.108	9,270	490	0.084	5,940	365	0.060
3.0	26	9,810	695	0.068	9,270	490	0.053	5,940	365	0.038
3.0	30	9,810	695	0.068	9,270	490	0.053	5,940	365	0.038
3.0	35	8,720	550	0.068	8,240	385	0.053	5,280	290	0.038
3.0	40	8,720	550	0.041	8,240	385	0.032	5,280	290	0.023
3.0	45	8,720	550	0.041	8,240	385	0.032	5,280	290	0.023
3.0	50	6,540	360	0.027	6,180	255	0.021	3,960	190	0.015
3.0	60	6,540	360	0.027	6,180	255	0.021	3,960	190	0.015
4.0	8	8,000	1,300	0.360	7,600	1,160	0.280	6,700	770	0.200
4.0	10	8,000	1,300	0.360	7,600	1,160	0.280	6,700	770	0.200
4.0	12	8,000	1,300	0.360	7,600	1,160	0.280	6,700	770	0.200
4.0	14	8,000	1,300	0.252	7,600	1,160	0.196	6,700	770	0.140
4.0	16	8,000	1,300	0.252	7,600	1,160	0.196	6,700	770	0.140
4.0	18	8,000	1,300	0.252	7,600	1,160	0.196	6,700	770	0.140
4.0	20	8,000	1,300	0.252	7,600	1,160	0.196	6,700	770	0.140
4.0	22	7,200	1,055	0.144	6,840	940	0.112	6,030	625	0.080
4.0	26	7,200	1,055	0.144	6,840	940	0.112	6,030	625	0.080
4.0	30	7,200	1,055	0.144	6,840	940	0.112	6,030	625	0.080
4.0	35	7,200	1,055	0.090	6,840	940	0.070	6,030	625	0.050
4.0	40	7,200	1,055	0.090	6,840	940	0.070	6,030	625	0.050
4.0	45	6,400	830	0.090	6,080	740	0.070	5,360	495	0.050
4.0	50	6,400	830	0.090	6,080	740	0.070	5,360	495	0.050
4.0	60	6,400	830	0.054	6,080	740	0.042	5,360	495	0.030
5.0	16	6,400	1,155	0.315	6,100	900	0.245	5,400	605	0.175
5.0	20	6,400	1,155	0.315	6,100	900	0.245	5,400	605	0.175
5.0	26	5,760	935	0.180	5,490	730	0.140	4,860	490	0.100
5.0	30	5,760	935	0.180	5,490	730	0.140	4,860	490	0.100
5.0	35	5,760	935	0.180	5,490	730	0.140	4,860	490	0.100
5.0	40	5,760	935	0.180	5,490	730	0.140	4,860	490	0.100
5.0	50	5,760	935	0.113	5,490	730	0.088	4,860	490	0.063
5.0	60	5,120	740	0.113	4,880	575	0.088	4,320	385	0.063
6.0	15	5,300	1,055	0.540	5,000	820	0.420	4,400	550	0.300
6.0	20	5,300	1,055	0.378	5,000	820	0.294	4,400	550	0.210
6.0	30	5,300	1,055	0.378	5,000	820	0.294	4,400	550	0.210
6.0	32	4,770	855	0.216	4,500	665	0.168	3,960	445	0.120
8.0	25	4,000	950	0.504	3,800	750	0.392	3,300	500	0.280
8.0	30	4,000	950	0.504	3,800	750	0.392	3,300	500	0.280
8.0	42	3,600	770	0.288	3,400	605	0.224	2,950	405	0.160
10.0	30	3,200	900	0.900	3,050	680	0.700	2,630	400	0.500
10.0	35	3,200	900	0.630	3,050	680	0.490	2,630	400	0.350
10.0	45	3,200	900	0.630	3,050	680	0.490	2,630	400	0.350
12.0	35	2,650	800	1.080	2,520	600	0.840	2,180	350	0.600
12.0	40	2,650	800	0.756	2,520	600	0.588	2,180	350	0.420
12.0	50	2,650	800	0.756	2,520	600	0.588	2,180	350	0.420

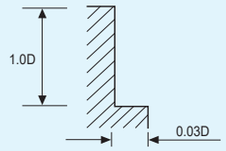
RPM = rev. / min.
FEED = mm / min.



[ZS1(2)04, ZS124, ZS204 series] ▶ Side cutting

WORKPIECE	HARDENED STEELS									
HARDNESS	HRc40 ~ HRc50		HRc50 ~ HRc55		HRc55 ~ HRc60		HRc60 ~ HRc65		HRc65 ~ HRc70	
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
4	17,200	1,690	11,440	1,140	9,360	700	7,280	430	6,170	310
6	13,450	1,820	8,970	1,230	6,890	720	5,460	450	4,810	330
8	9,100	1,750	6,760	1,170	5,200	670	4,160	420	3,640	310
10	8,000	1,630	5,330	1,090	4,160	620	3,320	400	2,860	280
12	6,830	1,630	4,550	1,010	3,450	580	2,730	370	2,420	260

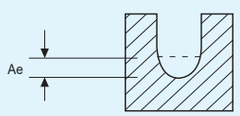
RPM = rev. / min.
FEED = mm / min.



[ZSLNB series]

WORKPIECE	ALLOY STEELS, HEAT RESISTANT STEELS			HARDENED STEELS			HARDENED STEELS			COPPER, COPPER ALLOY		
HARDNESS	HRc30 ~ HRc45			HRc45 ~ HRc55			HRc55 ~ HRc65					
DIAMETER(mm)	RPM	FEED	Ae(mm)	RPM	FEED	Ae(mm)	RPM	FEED	Ae(mm)	RPM	FEED	Ae(mm)
0.5	34,100~49,500	600~870	0.007~0.028	31,900~35,200	490~540	0.005~0.023	31,900~35,200	440~480	0.005~0.021	49,000~50,000	1,100~1,400	0.010~0.042
0.6	28,600~40,700	590~850	0.007~0.034	26,400~29,700	480~540	0.006~0.028	26,400~29,700	400~480	0.006~0.025	42,000~50,000	1,100~1,700	0.011~0.050
0.8	22,000~30,800	640~890	0.016~0.064	19,800~22,000	490~550	0.013~0.052	19,800~22,000	440~500	0.012~0.048	31,000~50,000	1,100~2,250	0.024~0.096
1.0	17,600~24,200	600~850	0.008~0.080	15,400~17,600	470~540	0.007~0.065	15,400~17,600	440~500	0.006~0.060	24,000~49,500	1,100~2,200	0.012~0.120
1.2	14,300~18,700	590~780	0.024~0.032	12,000~14,000	480~540	0.020~0.026	12,000~14,000	420~480	0.018~0.024	28,500~38,500	1,480~1,950	0.036~0.048
1.5	11,000~14,300	580~760	0.031~0.048	10,000~11,500	480~540	0.025~0.039	10,000~11,500	420~480	0.023~0.036	17,000~28,500	1,100~1,950	0.046~0.072
2.0	8,500~11,000	590~800	0.024~0.160	7,900~8,800	470~530	0.020~0.130	7,900~8,800	440~480	0.018~0.120	12,600~24,000	1,100~2,150	0.036~0.240
3.0	5,700~8,200	730~1,000	0.064~0.24	5,300~5,800	590~650	0.052~0.195	5,300~5,800	550~620	0.048~0.120	11,900~17,000	1,850~2,700	0.096~0.360
4.0	4,300~6,200	680~990	0.080~0.320	3,950~4,400	550~620	0.065~0.260	3,850~4,400	530~570	0.060~0.240	6,600~12,500	1,260~2,500	0.120~0.480

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



[ZSTNB series]

WORKPIECE					CARBON STEELS, ALLOY STEELS (180~250HB)		PREHARDENED STEELS (HRc35~45)		HARDENED STEELS (HRc45~55)		HARDENED STEELS (HRc55~65)	
Ratio to standard depth of cut					Depth of Cut X 100%		Depth of Cut X 100%		Depth of Cut X 100%		Depth of Cut X 100%	
R (mm)	Diameter (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]

WORKPIECE					CARBON STEELS, ALLOY STEELS (180~250HB)		PREHARDENED STEELS (HRc35~45)		HARDENED STEELS (HRc45~55)		HARDENED STEELS (HRc55~65)	
Ratio to standard depth of cut					Depth of Cut X 100%		Depth of Cut X 100%		Depth of Cut X 100%		Depth of Cut X 100%	
R (mm)	Diameter (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

Recommended Cutting Condition

[ZSTNB series]

WORKPIECE					CARBON STEELS, ALLOY STEELS (180~250HB)		PREHARDENED STEELS (HRc35~45)		HARDENED STEELS (HRc45~55)		HARDENED STEELS (HRc55~65)	
Ratio to standard depth of cut					Depth of Cut X 100%		Depth of Cut X 100%		Depth of Cut X 100%		Depth of Cut X 100%	
R (mm)	Diameter (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]

WORKPIECE					CARBON STEELS, ALLOY STEELS (180~250HB)		PREHARDENED STEELS (HRc35~45)		HARDENED STEELS (HRc45~55)		HARDENED STEELS (HRc55~65)	
Ratio to standard depth of cut					Depth of Cut X 100%		Depth of Cut X 100%		Depth of Cut X 100%		Depth of Cut X 100%	
R (mm)	Diameter (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.

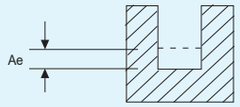
※ If RPM of the machine is low, the feed rate should be low in the same ratio as RPM.

Recommended Cutting Condition

[ZSLNS20, ZSLNS40 series]

WORKPIECE	ALLOY STEELS, HEAT RESISTANT STEELS			HARDENED STEELS			HARDENED STEELS			Copper, Copper alloy		
HARDNESS	HRc30 ~ HRc45			HRc45 ~ HRc55			HRc55 ~ HRc65					
DIAMETER(mm)	RPM	FEED	Ae(mm)	RPM	FEED	Ae(mm)	RPM	FEED	Ae(mm)	RPM	FEED	Ae(mm)
0.4	34,100~50,000	350~590	0.005~0.028	30,500~35,200	295~340	0.003~0.020	18,300~24,600	120~200	0.002~0.012	48,000~50,000	790~920	0.008~0.048
0.5	25,650~33,000	370~470	0.006~0.035	23,750~26,000	285~315	0.004~0.025	14,200~18,000	115~130	0.003~0.015	44,000~50,000	800~1,150	0.010~0.060
0.6	20,900~35,200	330~560	0.007~0.030	19,900~22,000	260~290	0.005~0.021	11,900~15,500	100~120	0.003~0.013	37,500~50,000	770~1,250	0.011~0.051
0.8	16,150~26,400	360~590	0.009~0.040	15,200~16,700	280~310	0.006~0.028	9,000~11,700	110~125	0.004~0.017	28,500~47,000	770~1,300	0.015~0.068
1.0	12,300~18,700	350~540	0.011~0.028	10,500~11,500	250~280	0.008~0.020	6,300~8,050	100~115	0.005~0.012	22,500~34,000	810~1,300	0.018~0.048
1.2	10,450~17,600	350~590	0.025~0.070	9,100~10,000	250~280	0.015~0.042	5,400~7,000	100~115	0.009~0.026	22,500~31,500	950~1,350	0.036~0.101
1.5	9,100~17,600	430~830	0.017~0.077	7,000~8,000	250~280	0.012~0.055	4,300~5,500	100~115	0.007~0.033	14,500~25,000	770~1,320	0.028~0.132
2.0	6,350~10,550	340~570	0.021~0.140	6,100~6,700	270~300	0.015~0.100	3,600~4,700	100~120	0.009~0.060	11,500~18,500	770~1,250	0.036~0.240
3.0	4,300~7,050	550~900	0.056~0.210	3,990~4,600	445~515	0.040~0.150	2,400~3,200	105~310	0.024~0.090	9,000~13,000	1,400~2,110	0.096~0.360
4.0	3,200~5,300	400~675	0.074~0.280	3,000~3,400	335~380	0.053~0.200	1,800~2,400	75~230	0.032~0.120	6,750~9,750	1,050~1,575	0.128~0.480

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



[ZSLNR series]

WORKPIECE				CARBON STEELS, ALLOY STEELS (180~250HB)		PREHARDENED STEELS (HRc35~45)		HARDENED STEELS (HRc45~55)		HARDENED STEELS (HRc55~65)	
Ratio to standard depth of cut				Depth of Cut X 100%		Depth of Cut X 100%		Depth of Cut X 100%		Depth of Cut X 100%	
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

[ZSLNR series]

WORKPIECE				CARBON STEELS, ALLOY STEELS (180~250HB)		PREHARDENED STEELS (HRc35~45)		HARDENED STEELS (HRc45~55)		HARDENED STEELS (HRc55~65)	
Ratio to standard depth of cut				Depth of Cut X 100%		Depth of Cut X 100%		Depth of Cut X 100%		Depth of Cut X 100%	
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

[ZSLNR series]

WORKPIECE				CARBON STEELS, ALLOY STEELS (180~250HB)		PREHARDENED STEELS (HRc35~45)		HARDENED STEELS (HRc45~55)		HARDENED STEELS (HRc55~65)	
Ratio to standard depth of cut				Depth of Cut X 100%		Depth of Cut X 100%		Depth of Cut X 100%		Depth of Cut X 100%	
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.

Recommended Cutting Condition

[ZSTNR series]

WORKPIECE				CARBON STEELS, ALLOY STEELS (180~250HB)		PREHARDENED STEELS (HRc35~45)		HARDENED STEELS (HRc45~55)		HARDENED STEELS (HRc55~65)	
Ratio to standard depth of cut				Depth of Cut X 100%		Depth of Cut X 100%		Depth of Cut X 100%		Depth of Cut X 100%	
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]

WORKPIECE				CARBON STEELS, ALLOY STEELS (180~250HB)		PREHARDENED STEELS (HRc35~45)		HARDENED STEELS (HRc45~55)		HARDENED STEELS (HRc55~65)	
Ratio to standard depth of cut				Depth of Cut X 100%		Depth of Cut X 100%		Depth of Cut X 100%		Depth of Cut X 100%	
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

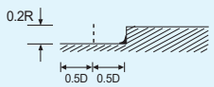
※ Please adjust the cutting depth index according to the cutting depth factors of above table.
※ In actual machining, the condition should be adjusted according to the machining shape, purpose and machine type.
※ If RPM of the machine is low, the feed rate should be low in the same ratio as RPM.

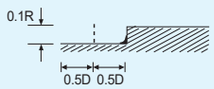
Recommended Cutting Condition

[ZSPM4...-.. series]

WORKPIECE	HARDENED STEELS									
HARDNESS	~HRc40		HRc40 ~ HRc50		HRc50 ~ HRc55		HRc55 ~ HRc60		HRc60 ~ HRc65	
DIAMETER X R(mm)	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
3 X R0.5	9,550	6,500	6,900	4,150	4,550	2,750	2,850	1,150	1,900	610
4 X R0.5	7,950	7,000	5,750	4,600	4,000	3,200	2,550	1,350	1,750	700
6 X R0.5	5,800	7,650	4,100	4,900	2,900	3,500	1,850	1,850	1,350	795
6 X R1.0	5,800	7,650	4,100	4,900	2,900	3,500	1,850	1,850	1,350	795
8 X R1.0	4,350	7,650	3,050	4,900	2,200	3,500	1,400	1,850	995	795
8 X R2.0	4,350	7,650	3,050	4,900	2,200	3,500	1,400	1,850	995	795
10 X R1.0	3,500	7,650	2,450	4,900	1,750	3,500	1,100	1,850	795	795
10 X R2.0	3,500	7,650	2,450	4,900	1,750	3,500	1,100	1,850	795	795
12 X R2.0	2,900	7,650	2,050	4,900	1,450	3,500	925	1,850	665	795
12 X R3.0	2,900	7,650	2,050	4,900	1,450	3,500	925	1,850	665	795

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

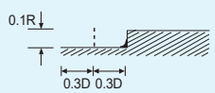


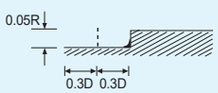


[ZSPM4...-.. series] ▶ High Speed Cutting

WORKPIECE	HARDENED STEELS									
HARDNESS	~HRc40		HRc40 ~ HRc50		HRc50 ~ HRc55		HRc55 ~ HRc60		HRc60 ~ HRc65	
DIAMETER X R(mm)	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
3 X R0.5	22,000	16,000	17,000	10,000	12,500	8,000	9,500	4,600	6,900	2,500
4 X R0.5	17,000	17,500	13,000	12,000	11,000	9,200	8,000	5,500	5,600	2,900
6 X R0.5	13,500	18,500	10,500	13,800	9,000	11,000	6,400	6,400	4,500	3,600
6 X R1.0	13,500	18,500	10,500	13,800	9,000	11,000	6,400	6,400	4,500	3,600
8 X R1.0	10,000	18,500	8,000	14,000	6,800	11,000	4,800	6,700	3,400	4,100
8 X R2.0	10,000	18,500	8,000	14,000	6,800	11,000	4,800	6,700	3,400	4,100
10 X R1.0	8,000	18,500	6,400	14,000	5,400	11,000	3,800	6,800	2,700	3,800
10 X R2.0	8,000	18,500	6,400	14,000	5,400	11,000	3,800	6,800	2,700	3,800
12 X R2.0	6,600	18,500	5,300	14,000	4,500	11,000	3,200	7,000	2,250	3,600
12 X R3.0	6,600	18,500	5,300	14,000	4,500	11,000	3,200	7,000	2,250	3,600

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



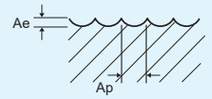


[DB412 series]

WORKPIECE	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	20,000	460	20,000	400	20,000	350	20,000	240
1.5	16,300	640	16,100	580	16,000	570	14,200	360
2	14,500	800	14,200	740	13,850	760	11,300	465
2.5	13,400	950	13,000	890	12,600	920	9,600	560
3	12,700	1,100	12,300	1,050	11,800	1,000	8,400	660
4	10,600	1,100	10,300	1,050	9,800	1,000	6,650	650
5	9,400	1,100	9,050	1,050	8,600	950	5,600	680
6	8,600	1,150	8,250	1,100	7,850	950	4,850	700
8	7,000	1,050	6,700	1,000	6,350	950	3,800	650
10	6,050	1,000	5,800	960	5,450	900	3,200	620
12	5,450	1,000	5,200	960	4,900	900	2,750	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

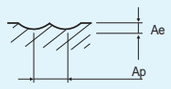


[DB312, 342, 402, 502, 512, 522, 54(5)2 series] ▶ General Cutting

WORKPIECE	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	16,500	290	13,300	230	6,100	105
1.5	16,500	405	12,700	310	5,590	140
2	15,100	865	11,200	565	4,900	175
2.5	15,100	865	11,200	565	4,900	175
3	13,800	780	10,500	530	4,750	175
4	11,000	850	8,800	610	4,410	205
5	9,600	945	7,600	665	3,860	205
6	8,900	1,150	7,200	955	3,340	220
8	7,500	1,500	6,050	1,060	2,590	255
10	6,700	1,750	5,300	1,170	2,140	260
12	6,150	2,000	4,900	1,280	1,840	280
16	5,000	1,950	3,900	1,220	1,420	280
20	4,350	1,900	3,400	1,200	1,170	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 table or DB522 series..

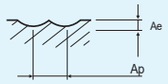
Recommended Cutting Condition

[DB312, 342, 402, 502, 512, 522, 54(5)2 series] ▶ High Speed Cutting

WORKPIECE	NON-ALLOYED STEELS ALLOY STEELS · CAST IRON		ALLOY STEELS, HEAT RESISTANT STEELS	
HARDNESS	~ HRc45		HRc30 ~ HRc40	
STRENGTH	~ 1500N/mm²		1500 ~ 2000N/mm²	
DIAMETER(mm)	RPM	FEED	RPM	FEED
1	26,000	1,500	26,000	920
1.5	24,000	1,600	24,000	990
2	22,000	1,700	22,000	1,080
2.5	22,000	2,000	20,000	1,130
3	22,000	2,300	17,800	1,200
4	22,000	3,350	14,300	1,300
5	22,000	4,150	12,600	1,380
6	22,000	4,600	11,000	1,440
8	17,500	4,600	8,800	1,440
10	14,700	4,450	7,350	1,380
12	12,800	4,450	6,400	1,330
16	10,000	4,000	5,000	1,150
20	8,350	3,650	4,150	1,060

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

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



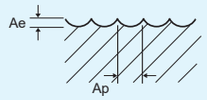
· Please reduce cutting speed around 20~30% from the above table or DB522 series..

[DB514 series] ▶ High Speed Cutting

WORKPIECE	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	21,000	1,500	17,000	780
4	21,000	2,210	13,660	870
5	21,000	2,700	12,000	900
6	21,000	3,470	10,500	940
8	15,760	4,260	7,880	1,110
10	13,660	4,580	6,300	1,260
12	10,500	3,950	5,260	1,260
16	8,200	3,950	3,780	1,060
20	6,300	3,780	2,940	790

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

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

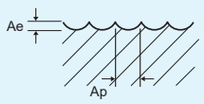


[DB514 series] ▶ General Cutting

WORKPIECE	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	13,100	1,020	10,000	690	4,520	220
4	10,500	1,110	8,400	800	4,200	270
5	9,140	1,230	7,300	870	3,680	270
6	7,780	1,260	6,300	950	3,160	280
8	5,260	1,430	4,420	990	2,100	280
10	4,620	1,530	3,780	1,070	1,780	280
12	3,780	1,350	2,940	990	1,360	280
16	2,740	1,380	2,320	980	1,160	280
20	2,100	1,260	1,900	950	840	280

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

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

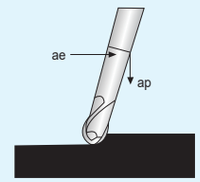


Ae: D1~D6=0.2mm
D8~D20=0.3mm
Ap: 0.1 X D

[DB532 series] ▶ General Cutting

WORKPIECE	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	35,000	2,800	33,000	2,600	12,000	900
4	26,000	2,300	25,000	2,200	9,000	800
5	21,000	2,100	20,000	2,000	7,000	700
6	17,000	1,900	16,000	1,800	6,000	650
8	13,000	1,700	12,000	1,600	4,500	550
10	10,500	1,450	10,000	1,400	3,500	500
12	9,000	1,400	8,000	1,300	3,000	450
16	6,000	1,200	5,500	1,100	2,000	400

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



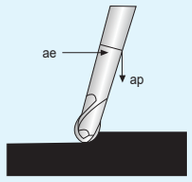
ae = 0.05 x d1
ap = 0.02 x d1

Recommended Cutting Condition

[DB532 series] ▶ High Speed Cutting

WORKPIECE	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	47,000	3,700	44,000	3,500	17,000	1,400
4	35,000	3,200	33,000	3,000	13,000	1,200
5	28,000	2,800	27,000	2,600	10,000	1,100
6	23,000	2,600	22,000	2,400	8,000	950
8	18,000	2,300	17,000	2,100	6,000	850
10	14,000	2,000	13,000	1,900	5,000	750
12	12,000	1,800	11,000	1,800	4,000	700
16	9,000	1,600	8,000	1,500	3,300	600

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

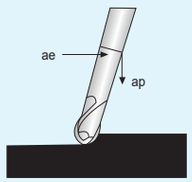


ae = 0.05 x d1
ap = 0.02 x d1

[DB534 series] ▶ General Cutting

WORKPIECE	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	21,000	4,000	20,000	4,000	7,000	1,400
6	17,000	4,000	16,000	3,500	6,000	1,300
8	13,000	3,500	12,000	3,000	4,500	1,100
10	10,500	3,000	10,000	2,500	3,500	1,000
12	9,000	2,800	8,000	2,500	3,000	950
16	6,000	2,800	5,500	2,200	2,000	800

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

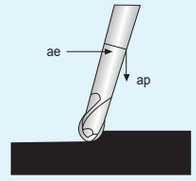


ae = 0.05 x d1
ap = 0.02 x d1

[DB534 series] ▶ High Speed Cutting

WORKPIECE	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	28,000	5,600	27,000	5,300	11,000	2,100
6	23,000	5,100	22,000	4,900	9,000	1,900
8	18,000	4,600	17,000	4,300	7,000	1,700
10	14,000	3,900	13,000	3,700	5,000	1,400
12	12,000	3,700	11,000	3,500	4,500	1,300
16	9,000	3,100	8,000	3,000	3,300	1,100

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



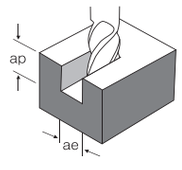
ae = 0.05 x d1
ap = 0.02 x d1

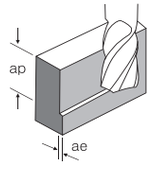
Recommended Cutting Condition

[PK503 series]

WORKPIECE		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

WORKPIECE		SUS304·316·PREHARDENED STEELS HRc40 ~ 45				TITANIUM ALLOYS			
(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





[TE503, TB503, TB504 series]

WORK-PIECE	CAST IRON FC, FCD		MILD STEEL · CARBON STEELS S5400, S55C (~750N/mm²)		ALLOY STEELS, TOOL STEELS SCM, SKT, SKS, SKD (~30HRc)		PREHARDENED STEELS (FREE-MACHINING) SKT, SKD, NAK55, HPM1 (30~38HRc)		STAINLESS STEELS, HARDENED STEELS SUS304, SKD (38~45HRc)		HARDENED STEELS (45~55HRc)	
DIAMETER (mm)	SPEED (min^{-1})	FEED (mm/min)	SPEED (min^{-1})	FEED (mm/min)	SPEED (min^{-1})	FEED (mm/min)	SPEED (min^{-1})	FEED (mm/min)	SPEED (min^{-1})	FEED (mm/min)	SPEED (min^{-1})	FEED (mm/min)
1.0	20,125	231	17,825	193	17,825	162	14,950	112	13,800	112	12,075	50
1.5	13,225	231	12,075	193	12,075	162	10,235	112	9,487	112	8,050	50
2.0	10,235	237	9,142	193	9,142	162	76,475	112	7,130	112	6,037	50
2.5	8,165	237	7,130	181	7,130	156	6,095	112	5,692	112	4,830	50
3.0	6,785	237	5,922	181	5,922	156	5,117	112	4,715	112	4,025	50
4.0	5,562	237	4,457	181	4,457	156	3,795	112	3,565	106	2,990	50
5.0	4,437	237	3,565	181	3,565	156	3,047	112	2,817	106	2,415	50
6.0	3,392	237	2,990	181	2,990	156	2,530	112	2,357	106	2,012	50
8.0	2,530	231	2,242	181	2,242	156	1,897	112	1,782	106	1,495	50
10	2,012	218	1,782	181	1,782	150	1,495	112	1,380	106	1,207	50

Recommended Cutting Condition

[TPRB4, TPRE4 series]

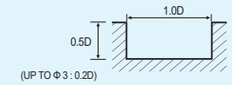
WORKPIECE	MILD STEEL, CARBON STEELS, CAST IRON SS400, S55C, FC250 (~750N/mm2)			ALLOY STEELS, TOOL STEELS SCM,SKT,SKS,SKD (~30HRc)			HARDENED STEELS, PREHARDENED STEELS (FREE-MACHINING) SKT, SKD, NAK55, HPM1 (30~38HRc)		
DIAMETER(mm)	SPEED (min-1)	FEED (mm/min)	ap	SPEED (min^{-1})	FEED (mm/min)	ap	SPEED (min^{-1})	FEED (mm/min)	ap
0.5	31,500	630	0.01~0.025	31,500	565	0.01~0.025	31,500	475	0.01~0.025
0.6	31,500	755	0.012~0.03	31,500	680	0.012~0.03	29,500	530	0.012~0.03
0.7	29,000	940	0.014~0.035	27,000	680	0.014~0.035	25,000	530	0.014~0.035
0.8	25,000	935	0.016~0.04	23,500	680	0.016~0.04	22,000	530	0.016~0.04
0.9	22,500	935	0.018~0.045	21,000	680	0.018~0.045	19,500	530	0.018~0.045
1.0	20,000	930	0.02~0.05	19,000	680	0.02~0.05	17,500	530	0.02~0.05
1.2	16,500	930	0.024~0.06	15,500	680	0.024~0.06	14,500	530	0.024~0.06
1.5	13,500	930	0.03~0.075	12,500	680	0.03~0.075	11,500	530	0.03~0.075
1.6	12,500	930	0.032~0.08	11,500	680	0.032~0.08	11,000	530	0.032~0.08
1.8	11,000	930	0.036~0.09	10,500	680	0.036~0.09	9,900	530	0.036~0.09
2.0	10,000	930	0.04~0.1	9,500	680	0.04~0.1	8,900	530	0.04~0.1
2.5	8,100	930	0.05~0.125	7,600	680	0.05~0.125	7,100	530	0.05~0.125
3.0	6,750	930	0.06~0.15	6,350	680	0.06~0.15	5,900	530	0.06~0.15

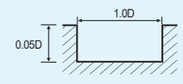
WORKPIECE	MILD STEEL, CARBON STEELS, CAST IRON SS400, S55C, FC250 (~750N/mm2)			ALLOY STEELS, TOOL STEELS SCM,SKT,SKS,SKD (~30HRc)		
DIAMETER(mm)	SPEED (min^{-1})	FEED (mm/min)	ap	SPEED (min^{-1})	FEED (mm/min)	ap
0.5	31,500	440	0.01~0.025	19,000	250	0.005~0.01
0.6	26,500	445	0.012~0.03	15,500	260	0.006~0.012
0.7	22,500	445	0.014~0.035	13,500	260	0.007~0.014
0.8	19,500	445	0.016~0.04	11,500	260	0.008~0.016
0.9	17,500	445	0.018~0.045	10,500	260	0.009~0.018
1.0	15,500	445	0.02~0.05	9,500	260	0.01~0.02
1.2	13,000	445	0.024~0.06	7,950	260	0.012~0.024
1.5	10,500	445	0.03~0.075	6,350	260	0.015~0.03
1.6	9,900	445	0.032~0.08	5,950	260	0.016~0.032
1.8	8,800	445	0.036~0.09	5,300	260	0.018~0.036
2.0	7,950	445	0.04~0.1	4,750	260	0.02~0.04
2.5	6,350	445	0.05~0.125	3,800	260	0.025~0.05
3.0	5,300	445	0.06~0.15	3,150	260	0.03~0.06

[ZE302, ZE322, ZE402, ZE502, ZE522, ZE512 series] ▶ General Cutting

WORKPIECE	ALLOY STEELS, HEAT RESISTANT STEELS		HARDENED STEELS		STAINLESS STEELS	
HARDNESS	HRc30 ~ HRc40		HRc40 ~ HRc50			
STRENGTH	1000 ~ 1250N/mm^2		1250 ~ 1750N/mm^2			
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED
2	9,700	220	6,350	135	5,300	105
3	7,500	240	4,670	160	3,880	135
4	6,350	345	3,880	205	3,250	175
5	5,300	370	3,170	220	2,650	185
6	4,670	405	2,830	255	2,380	205
8	3,530	435	2,120	230	1,760	205
10	2,730	380	1,680	185	1,420	185
12	2,310	320	1,420	150	1,140	150
16	1,850	255	1,140	125	890	125
20	1,420	195	890	90	705	90
25	1,150	150	705	80	580	70

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



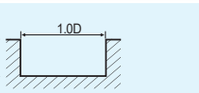


· Please reduce cutting speed around 20~30% from the above table or ZE522, ZE322 series.

[ZE302, ZE322, ZE402, ZE502, ZE522, ZE512 series] ▶ High Speed Cutting

WORKPIECE	ALLOY STEELS, HEAT RESIS-TANT STEELS		HARDENED STEELS				STAINLESS STEELS	
HARDNESS	HRc30 ~ HRc40		HRc40 ~ HRc50		HRc40 ~ HRc55			
STRENGTH	1000 ~ 1250N/mm^2		1250 ~ 1750N/mm^2		1750 ~ 2000N/mm^2			
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
2	18,000	665	11,800	415	8,700	175	9,800	345
3	11,000	655	6,800	435	5,600	185	6,200	370
4	10,300	725	6,300	430	4,300	185	5,300	370
5	9,350	715	5,570	420	3,700	185	4,620	355
6	8,200	750	4,930	470	3,250	185	4,100	390
8	6,300	770	3,780	410	2,470	185	3,120	355
10	4,830	750	2,940	360	2,000	160	2,470	310
12	4,100	750	2,520	345	1,680	160	2,100	300
16	3,260	715	2,000	355	1,890	150	1,940	290
20	2,520	665	1,580	310	1,680	150	1,630	275
25	2,000	635	1,260	340	1,570	150	1,420	290

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

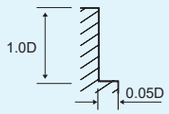


Recommended Cutting Condition

[ZE503 series] ▶ Side cutting

WORKPIECE	NON-ALLOYED STEELS ALLOY STEELS · CAST IRON		ALLOY STEELS, HEAT RESISTANT STEELS		STAINLESS 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	5,560	500	3,360	310	2,840	250	2,000	60	1,100	45
8	4,200	530	2,520	290	2,100	265	1,680	80	840	45
10	3,260	460	2,000	230	1,680	230	1,360	70	680	35
12	2,740	390	1,680	190	1,360	180	1,160	60	560	35
16	2,200	310	1,360	150	1,060	150	900	45	440	20
18	1,940	280	1,210	135	950	130	790	35	380	20
20	1,680	240	1,060	120	840	115	680	30	320	20

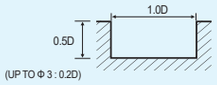
RPM = rev. / min.
FEED = mm / min.

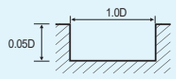


[ZE503 series] ▶ Slotting

WORKPIECE	NON-ALLOYED STEELS ALLOY STEELS · CAST IRON		ALLOY STEELS, HEAT RESISTANT STEELS		STAINLESS 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	5,560	310	3,360	200	2,840	160	2,000	50	1,100	35
8	4,200	340	2,520	180	2,100	160	1,680	65	840	35
10	3,260	300	2,000	140	1,680	145	1,360	55	680	30
12	2,740	250	1,680	120	1,360	120	1160	50	560	30
16	2,200	200	1,360	100	1,060	100	900	35	440	20
18	1,940	175	1,210	85	950	85	790	30	380	20
20	1,680	150	1,060	70	840	70	680	25	320	20

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

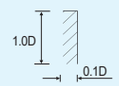


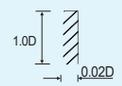


[ZE304, ZE324, ZE404, ZE504, ZE524, ZE534, ZE514 series] ▶ General Cutting

WORKPIECE	NON-ALLOYED 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	12,100	320	7,900	195	2,700	47	6,600	160
3	9,400	370	5,840	230	2,000	58	4,850	195
4	7,900	655	4,850	405	1,500	58	4,070	320
5	6,600	690	3,970	415	1,300	58	3,320	345
6	5,830	760	3,530	470	1,150	58	2,980	380
8	4,410	815	2,650	435	880	58	2,200	405
10	3,420	700	2,100	345	720	46	1,760	345
12	2,880	600	1,760	290	590	46	1,430	275
16	2,310	470	1,430	230	460	29	1,150	230
20	1,760	370	1,110	185	340	29	880	175
25	1,430	290	880	150	270	23	715	140

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



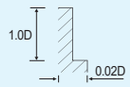


· Please reduce cutting speed around 20~30% from the above table or ZE524 & ZE324 series.

[ZE304, ZE324, ZE404, ZE504, ZE524, ZE534, ZE514 series] ▶ High Speed Cutting

WORKPIECE	NON-ALLOYED 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	31,400	1,230	23,500	520	12,600	275	21,600	465
3	19,300	1,210	13,600	735	8,900	390	13,500	660
4	18,100	1,330	12,600	865	7,090	465	11,800	775
5	16,400	1,310	11,100	1,010	6,040	530	10,300	910
6	14,400	1,380	9,900	1,100	5,300	580	9,100	990
8	11,000	1,430	7,600	1,090	3,990	575	6,900	980
10	8,500	1,380	5,880	1,110	3,150	580	5,420	1,000
12	7,200	1,380	5,040	1,090	2,620	575	4,600	985
16	5,700	1,320	3,990	1,010	2,000	535	3,590	910
20	4,400	1,270	3,150	930	1,580	490	2,840	840
25	3,500	1,170	2,520	755	1,260	390	2,270	680

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

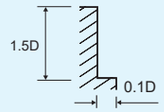


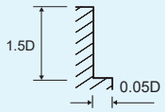
Recommended Cutting Condition

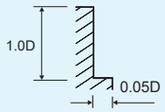
[ZE506, ZE516 series] ▶ General Cutting

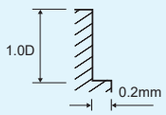
WORKPIECE	NON-ALLOYED STEELS ALLOY STEELS · CAST IRON		ALLOY STEELS, HEAT RESISTANT STEELS		HARDENED STEELS			
HARDNESS	~ HRc30		HRc30 ~ HRc50		HRc50 ~ HRc60		HRc60 ~ HRc65	
STRENGTH	~ 1000N/mm²		1000 ~ 1750N/mm²		1750 ~ 2080N/mm²		2080N/mm²	
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
6	5,560	2,000	3,880	1,370	1,580	210	1,100	130
8	4,200	2,000	2,940	1,370	1,160	210	840	130
10	3,360	2,000	2,320	1,370	1,000	210	680	130
12	2,840	1,680	2,000	1,160	840	180	560	110
16	2,100	1,260	1,480	880	640	130	420	70
20	1,680	1,010	1,160	690	500	110	320	60
25	1,500	900	1,100	600	430	90	260	50

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





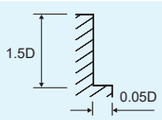


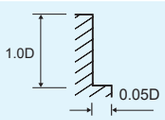


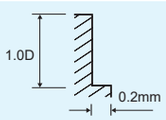
[ZE506, ZE516 series] ▶ High Speed Cutting

WORKPIECE	HEAT RESISTANT 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	16,800	6,090	8,400	3,050	4,200	1,470
8	12,600	6,090	6,300	3,050	3,160	1,470
10	9,980	5,990	5,040	3,050	2,520	1,470
12	8,400	5,040	4,200	2,520	2,100	1,260
16	6,300	3,780	3,160	1,890	1,580	950
20	5,040	3,050	2,520	1,470	1,260	760
25	4,500	2,750	2,200	1,300	1,120	670

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





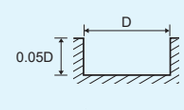


· The FEED for long & extra long types, should be reduced by around 20~30%

[ZF60, ZF61 series]

WORKPIECE	NON-ALLOYED STEELS ALLOY STEELS · CAST IRON		ALLOY STEELS, HEAT RESISTANT STEELS		STAINLESS 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	15,600	2,320	12,400	840	8,400	570	3,400	260	2,400	190
8	11,600	2,320	9,200	840	6,300	570	2,400	240	1,800	180
10	9,200	2,320	7,600	840	5,100	570	2,000	290	1,300	190
12	8,000	2,400	6,000	800	4,200	570	1,680	260	1,200	190
14	6,800	2,400	5,200	840	3,600	570	1,400	200	900	130
16	6,000	2,400	4,800	760	3,300	510	1,200	160	800	110
18	5,200	2,320	4,400	720	2,700	420	1,100	150	700	100
20	4,800	2,160	3,600	560	2,400	360	1,000	150	660	100
25	4,300	2,150	3,200	620	2,160	410	900	160	600	100

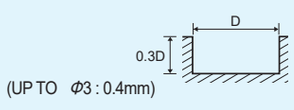
RPM = rev. / min.
FEED = mm / min.



[ZM502, ZM522 series]

WORKPIECE	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	6,300	60	5,040	50	3,150	25
3	4,410	70	3,570	60	2,200	30
4	3,570	85	2,840	70	1,790	35
5	3,050	105	2,420	85	1,580	40
6	2,630	125	2,100	105	1,370	50
8	2,000	135	1,580	105	1,050	50
10	1,680	135	1,370	105	840	50
12	1,370	105	1,160	95	700	40
16	1,160	95	890	75	560	35
20	840	70	680	50	420	25

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



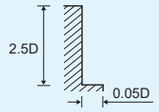
(UP TO Φ3 : 0.4mm)

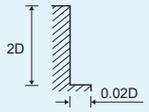
Recommended Cutting Condition

[ZM504, ZM524 series]

WORKPIECE	NON-ALLOYED STEELS ALLOY STEELS · CAST IRON		ALLOY STEELS, HEAT RESISTANT 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	6,300	100	5,040	80	3,150	45		
3	4,410	115	3,570	100	2,200	55	1,890	30
4	3,570	140	2,840	115	1,790	60	1,470	35
5	3,050	180	2,420	140	1,580	70	1,260	40
6	2,630	215	2,100	180	1,370	90	1,160	50
8	2,000	230	1,580	180	1,050	90	840	50
10	1,680	230	1,370	180	840	90	670	50
12	1,370	180	1,160	160	700	70	560	40
16	1,160	160	890	125	560	60	440	35
20	840	115	680	90	420	45	340	25

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

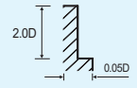


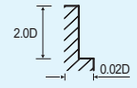


[ZR322, ZR502, ZR512, ZR522 series] ▶ Side cutting

WORKPIECE	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	6,950	195	4,500	150	3,300	100
4	5,600	240	3,600	170	2,700	105
5	4,800	250	3,050	210	2,350	125
6	4,150	250	2,650	210	2,050	125
8	3,150	265	2,000	210	1,600	125
10	2,150	265	1,700	210	1,250	125
12	1,800	210	1,500	185	1,050	105
16	1,800	185	1,100	140	840	90
20	1,300	130	860	105	625	65

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

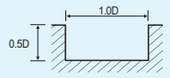




[ZR322, ZR502, ZR512, ZR522 series] ▶ Slotting

WORKPIECE	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	6,950	160	4,500	80	3,300	55
4	5,600	195	3,600	100	2,700	60
5	4,800	240	3,050	115	2,350	75
6	4,150	290	2,650	145	2,050	90
8	3,150	210	2,000	145	1,600	90
10	2,150	250	1,700	140	1,250	90
12	1,800	200	1,500	135	1,050	75
16	1,800	215	1,100	100	840	60
20	1,300	160	860	70	625	45

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

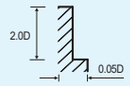


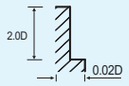
Recommended Cutting Condition

[ZR324, ZR504, ZR514, ZR524 series]

WORKPIECE	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	6,950	195	4,500	150	3,300	100
4	5,600	240	3,600	170	2,700	105
5	4,800	250	3,050	210	2,350	125
6	4,150	250	2,650	210	2,050	125
8	3,150	265	2,000	210	1,600	125
10	2,150	265	1,700	210	1,250	125
12	1,800	210	1,500	185	1,050	105
16	1,880	185	1,100	140	840	90
20	1,300	130	860	105	625	65

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

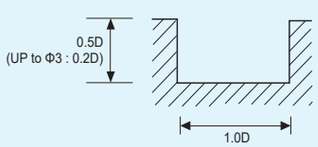


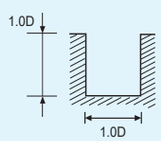


[TX202, 222, 302 ...series]

WORKPIECE	NON-ALLOY STEELS, ALLOY STEELS, CAST IRON		ALLOY STEELS, HEAT RESISTANT STEELS		STAINLESS STEELS		CAST IRON		ALUMINUM ALLOYS		COPPER, BRASS NONFERROUS METALS	
HARDNESS	~ HRc30		HRc30 ~ HRc45									
STRENGTH	~ 1000N/mm²		1000 ~ 1500N/mm²									
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
1	14,300	105	8,500	65	7,150	50	18,700	205	44,000	330	24,700	200
1.5	9,350	150	5,550	85	5,600	80	12,100	205	27,500	385	20,300	300
2	7,850	160	5,150	100	4,300	80	9,350	220	22,000	460	16,500	340
3	6,100	180	3,800	120	3,150	100	6,050	220	15,400	460	11,000	340
4	5,150	255	3,150	155	2,650	130	4,600	220	11,000	460	8,800	340
5	4,300	270	2,550	160	2,150	135	3,650	220	9,150	460	6,800	340
6	3,800	300	2,300	190	1,950	155	2,950	255	7,600	485	5,700	375
8	2,850	325	1,700	170	1,450	155	2,200	275	5,700	485	4,400	375
10	2,200	280	1,350	135	1,150	135	1,850	285	4,600	485	3,400	375
12	1,850	240	1,150	110	950	110	1,450	295	3,750	485	2,850	375
14	1,700	215	1,050	100	850	100	1,300	310	3,300	485	2,400	375
16	1,500	185	950	95	700	95	1,100	320	2,850	485	2,200	375
20	1,150	145	700	70	550	70	900	340	2,200	485	1,700	375

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



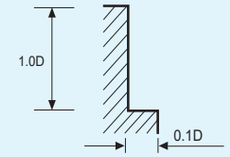


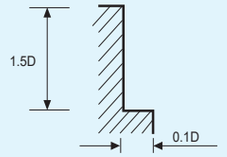
※ The FEED for long & extra long types, should be reduced by around 30~40%.

[TX204, 224, 304 ...series]

WORKPIECE	NON-ALLOY STEELS, ALLOY STEELS, CAST IRON		ALLOY STEELS, HEAT RESISTANT STEELS		STAINLESS STEELS		CAST IRON		ALUMINUM ALLOYS		COPPER, BRASS NON-FERROUS METALS	
HARDNESS	~ HRc30		HRc 30 ~ HRc45									
STRENGTH	~ 1000N/mm²		1000 ~ 1500N/mm²									
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
1	17,600	150	10,250	85	8,650	75	18,700	620	44,000	1,050	24,700	605
1.5	11,800	215	7,050	115	7,050	120	12,100	620	27500	1,160	20,300	910
2	9,850	240	6,450	145	5,350	120	9,350	640	22000	1,320	16,500	1,035
3	7,600	270	4,750	170	3,950	145	6,050	640	15400	1,320	11,000	1,035
4	6,450	485	3,950	300	3,300	240	4,600	640	11000	1,320	8,800	1,035
5	5,350	510	3,200	305	2,700	255	3,650	640	9150	1,320	6,800	1,035
6	4,750	560	2,850	350	2,400	280	2,950	770	7600	1,430	5,700	1,100
8	3,550	605	2,150	325	1,800	300	2,200	815	5700	1,430	4,400	1,100
10	2,750	520	1,700	255	1,450	255	1,850	860	4600	1,430	3,400	1,100
12	2,350	440	1,450	215	1,150	205	1,450	900	3750	1,430	2,850	1,100
14	2,100	395	1,300	195	1,050	190	1,300	945	3300	1,430	2,400	1,100
16	1,850	350	1,150	170	950	170	1,100	970	2850	1,430	2,200	1,100
20	1,450	270	900	135	700	130	900	1,035	2200	1,430	1,700	1,100

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





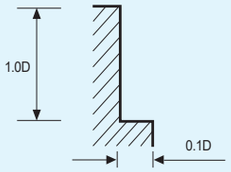
※ The FEED for long & extra long types, should be reduced by around 30~40%.

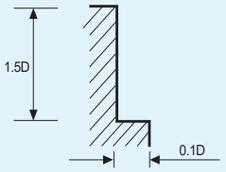
Recommended Cutting Condition

[TX304H Series]

WORKPIECE	NON-ALLOY STEELS, ALLOY STEELS, CAST IRON		ALLOY STEELS, HEAT RESISTANT STEELS		STAINLESS STEELS		CAST IRON		ALUMINUM ALLOYS		COPPER, BRASS NON-FERROUS METALS	
HARDNESS	≤ 30 HRc		30 ~ 45 HRc		-		-		-		-	
STRENGTH	~ 1000N / mm²		1000 ~ 1500N / mm²		-		-		-		-	
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
1	17,600	150	10,250	85	8,650	75	18,700	620	44,000	1,050	24,700	605
1.5	11,800	215	7,050	115	7,050	120	12,100	620	27,500	1,160	20,300	910
2	9,850	240	6,450	145	5,350	120	9,350	640	22,000	1,320	16,500	1,035
3	7,600	270	4,750	170	3,950	145	6,050	640	15,400	1,320	11,000	1,035
4	6,450	485	3,950	300	3,300	240	4,600	640	11,000	1,320	8,800	1,035
5	5,350	510	3,200	305	2,700	255	3,650	640	9,150	1,320	6,800	1,035
6	4,750	560	2,850	350	2,400	280	2,950	770	7,600	1,430	5,700	1,100
8	3,550	605	2,150	325	1,800	300	2,200	815	5,700	1,430	4,400	1,100
10	2,750	520	1,700	255	1,450	255	1,850	860	4,600	1,430	3,400	1,100
12	2,350	440	1,450	215	1,150	205	1,450	900	3,750	1,430	2,850	1,100
14	2,100	395	1,300	195	1,080	190	1,300	945	3,300	1,430	2,400	1,100
16	1,850	350	1,150	170	950	170	1,100	970	2,850	1,430	2,200	1,100
20	1,450	270	900	135	700	130	900	1,035	2,200	1,430	1,700	1,100

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



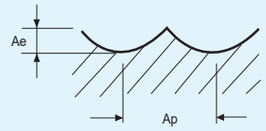


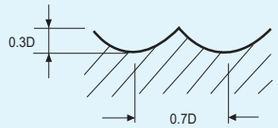
[TXB202, 222, 232, 302 ...series]

WORKPIECE	CARBON STEELS, ALLOY STEELS, TOOL STEELS				HARDENED STEELS		CAST IRON		ALUMINUM ALLOYS	
HARDNESS	~ HRc30		HRc30 ~ HRc45		HRc45 ~ HRc50					
STRENGTH	~ 1000N/mm²		1000 ~ 1500N/mm²		1500N/mm²					
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
2	12,350	640	9,150	415	4,000	125	10,500	220	30,800	395
3	11,400	575	8,550	390	3,800	125	7,050	230	20,500	395
4	8,950	630	7,150	450	3,600	150	5,150	285	15,400	395
5	7,800	700	6,200	490	3,100	150	4,150	330	12,100	470
6	7,250	870	5,900	705	2,700	160	3,400	360	10,300	470
8	6,100	1,090	4,900	785	2,050	190	2,500	460	7,900	540
10	5,450	1,330	4,350	870	1,750	190	2,050	460	6,150	540
12	4,990	1,500	3,950	950	1,500	210	1,750	460	5,150	630
14	4,530	1,495	3,600	925	1,300	210	1,400	460	4,300	630
16	4,085	1,470	3,200	905	1,150	210	1,300	460	3,850	540
18	3,800	1,425	3,000	890	1,050	210	1,100	460	3,400	540
20	3,550	1,425	2,800	885	950	210	1,050	420	2,950	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 30~40%.

Recommended Cutting Condition

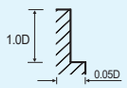
[TXB304, TXB204 ...series]

WORKPIECE	ALLOY STEELS, TOOL STEELS				HARDENED STEELS		CAST IRON		ALUMINUM ALLOYS	
HARDNESS	~ HRc30		HRc30 ~ HRc45		HRc45 ~ HRc50					
STRENGTH	~ 1000N/mm2		1000 ~ 1500N/mm2		1500N/mm2					
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
2	15,400	1,000	11,400	600	5,000	200	13,100	300	38,500	600
3	14,300	900	10,700	600	4,800	200	8,800	300	25,600	600
4	11,200	900	8,900	700	4,500	200	6,400	400	19,300	600
5	9,800	1,100	7,800	700	3,900	200	5,200	500	15,100	700
6	9,100	1,300	7,400	1,100	3,400	200	4,300	500	12,900	700
8	7,600	1,600	6,100	1,200	2,600	300	3,100	700	9,900	800
10	6,800	2,000	5,400	1,300	2,200	300	2,600	700	7,700	800
12	6,200	2,300	4,900	1,400	1,900	300	2,200	700	6,400	900
14	5,700	2,200	4,500	1,400	1,600	300	1,800	700	5,400	900
16	5,100	2,200	4,000	1,400	1,400	300	1,600	700	4,800	800
18	4,800	2,100	3,800	1,300	1,300	300	1,400	700	4,300	800
20	4,400	2,100	3,500	1,300	1,200	300	1,300	600	3,700	800

[ZR304H, ZR324H series]

WORKPIECE	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	7,000	910	4,200	560	3,000	140
8	5,300	980	3,200	530	2,500	190
10	4,100	840	2,500	410	2,050	165
12	3,500	730	2,100	340	1,700	140

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



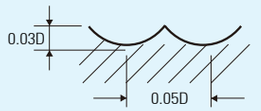
[WHPB902 series]

WORKPIECE	ALLOY STEELS/CARBON STEELS		PREHARDENED STEELS		HARDENED STEELS	
HARDNESS	~HRc35		~HRc35~ HRc45		HRc45~HRc55	
STRENGTH	~1100N/mm²		1100~1500N/mm²		1500~2000N/mm²	
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED
0.1	40,000	550	40,000	500	33,000	400
0.2	30,000	720	30,000	630	27,000	575
0.3	30,000	900	30,000	810	27,000	720
0.4	30,000	1,140	30,000	1,020	27,000	900
0.5	30,000	1,440	30,000	1,260	27,000	1,140
0.6	30,000	1,740	30,000	1,500	27,000	1,320
0.8	30,000	2,340	30,000	1,980	27,000	1,800
1.0	30,000	2,880	30,000	2520	27,000	2,280
1.2	30,000	3,060	28,800	2,580	25,800	2,310
1.5	30,000	3,240	28,800	2,700	25,800	2,400
2.0	29,820	3,420	28,680	2,880	24,000	2,400
3.0	19,860	3,600	19,080	3,180	15,900	2,400
4.0	14,940	3,600	14,340	3,180	12,000	2,400
5.0	11,160	3,480	10,680	2,940	9,000	2,250
6.0	8,340	2,910	8,040	2,460	6,600	1,860
8.0	6,660	2,520	6,420	2,100	5,400	1,620
10.0	5,580	2,220	5,340	1,860	4,500	1,440
12.0	4,170	1,770	4,008	1,500	3,360	1,440
16.0	3,340	1,590	3,210	1,320	2,700	1,020
20.0	2,670	1,410	2,580	1,170	2,160	900
25.0	2,130	1,150	2,060	950	1,730	730

[WHPB902, WB502, WB502...P series]

WORKPIECE	ALLOY STEELS, CARBON STEELS		PREHARDENED STEELS		HARDENED STEELS	
	Alloy Steels Carbon Steels (SCM, SNCM, S45C)		Prehardened Steels (NAK, CENA, KP4)		Hardened Steels (SKD, SKT, STAVAX)	
HARDNESS	~HRc35		HRc35~HRc45		HRc45~HRc55	
STRENGTH	~1100N/mm²		1100~1500N/mm²		1500~2000N/mm²	
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED
0.1	40,000	550	40,000	500	33,000	400
0.2	30,000	720	30,000	630	27,000	575
0.3	30,000	900	30,000	810	27,000	720
0.4	30,000	1,140	30,000	1,020	27,000	900
0.5	30,000	1,440	30,000	1,260	27,000	1,140
0.6	30,000	1,740	30,000	1,500	27,000	1,320
0.8	30,000	2,340	30,000	1,980	27,000	1,800
1.0	30,000	2,880	30,000	2,520	27,000	2,280
1.2	30,000	3,060	28,800	2,580	25,800	2,310
1.5	30,000	3,240	28,800	2,700	25,800	2,400
2.0	29,820	3,420	28,680	2,880	24,000	2,400
3.0	19,860	3,600	19,080	3,180	15,900	2,400
4.0	14,940	3,600	14,340	3,180	12,000	2,400
5.0	11,160	3,480	10,680	2,940	9,000	2,250
6.0	8,340	2,910	8,040	2,460	6,600	1,860
8.0	6,660	2,520	6,420	2,100	5,400	1,620
10.0	5,580	2,220	5,340	1,860	4,500	1,440
12.0	4,170	1,770	4,008	1,500	3,360	1,140
16.0	3,340	1,590	3,210	1,320	2,700	1,020
20.0	2,670	1,410	2,580	1,170	2,160	900
25.0	2,130	1,150	2,060	950	1,730	730

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

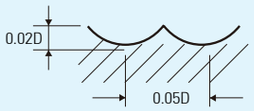


Recommended Cutting Condition

[WSB502 series]

WORKPIECE	ALLOY STEELS, CARBON STEELS		PREHARDENED STEELS		HARDENED STEELS	
	Alloy Steels Carbon Steels (SCM, SNCM, S45C)		Prehardened Steels (NAK, CENA, KP4)		Hardened Steels (SKD, SKT, STAVAX)	
HARDNESS	~HRc35		HRc35~HRc45		HRc45~HRc55	
STRENGTH	~1100N/mm^2		1100~1500N/mm^2		1500~2000N/mm^2	
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED
3.0	13,500	1,700	13,200	1,620	12,500	860
4.0	10,600	1,700	10,300	1,620	9,800	860
5.0	9,400	1,650	9,050	1,570	8,600	860
6.0	8,600	1,750	8,250	1,670	7,850	865
8.0	7,000	1,550	6,700	1,460	6,350	890
10.0	6,050	1,450	5,800	1,360	5,450	870
12.0	5,450	1,420	5,200	1,330	4,900	785
16.0	4,300	1,200	4,000	1,100	3,700	650
20.0	3,600	1,050	3,200	900	3,000	550

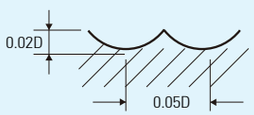
RPM = rev. / min.
FEED = mm / min.



[WB503 series]

WORKPIECE	ALLOY STEELS, CARBON STEELS		PREHARDENED STEELS		HARDENED STEELS	
	Alloy Steels Carbon Steels (SCM, SNCM, S45C)		Prehardened Steels (NAK, CENA, KP4)		Hardened Steels (SKD, SKT, STAVAX)	
HARDNESS	~HRc35		HRc35~HRc45		HRc45~HRc55	
STRENGTH	~1100N/mm^2		1100~1500N/mm^2		1500~2000N/mm^2	
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED
1.0	50,000	4,150	44,000	3,000	33,000	2100
1.5	40,000	5,100	35,000	3,660	36,400	2600
2.0	33,000	5,890	29,000	4,150	21,700	3000
3.0	25,000	6,930	22,000	4,880	16,500	3490
4.0	21,670	6,930	18,120	4,880	13,400	3490
5.0	18,000	6,520	15,100	4,880	11,160	3320
6.0	16,200	7,710	13,680	5,590	10,980	4050
8.0	12,150	6,610	10,170	4,720	8,280	3580
10.0	9,720	5,870	8,190	4,130	6,620	3100
12.0	8,150	5,490	4,130	3,830	5,520	2870

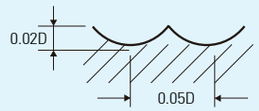
RPM = rev. / min.
FEED = mm / min.



[WSB502 series]

WORKPIECE	ALLOY STEELS, CARBON STEELS		PREHARDENED STEELS		HARDENED STEELS	
	Alloy Steels Carbon Steels (SCM, SNCM, S45C)		Prehardened Steels (NAK, CENA, KP4)		Hardened Steels (SKD, SKT, STAVAX)	
HARDNESS	~HRc35		HRc35~HRc45		HRc45~HRc55	
STRENGTH	~1100N/mm^2		1100~1500N/mm^2		1500~2000N/mm^2	
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED
3.0	13,500	1,700	13,200	1,620	12,500	860
4.0	10,600	1,700	10,300	1,620	9,800	860
5.0	9,400	1,650	9,050	1,570	8,600	860
6.0	8,600	1,750	8,250	1,670	7,850	865
8.0	7,000	1,550	6,700	1,460	6,350	890
10.0	6,050	1,450	5,800	1,360	5,450	870
12.0	5,450	1,420	5,200	1,330	4,900	785
16.0	4,300	1,200	4,000	1,100	3,700	650
20.0	3,600	1,050	3,200	900	3,000	550

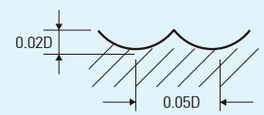
RPM = rev. / min.
FEED = mm / min.



[WB503 series]

WORKPIECE	ALLOY STEELS, CARBON STEELS		PREHARDENED STEELS		HARDENED STEELS	
	Alloy Steels Carbon Steels (SCM, SNCM, S45C)		Prehardened Steels (NAK, CENA, KP4)		Hardened Steels (SKD, SKT, STAVAX)	
HARDNESS	~HRc35		HRc35~HRc45		HRc45~HRc55	
STRENGTH	~1100N/mm^2		1100~1500N/mm^2		1500~2000N/mm^2	
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED
1.0	50,000	4,150	44,000	3,000	33,000	2100
1.5	40,000	5,100	35,000	3,660	36,400	2600
2.0	33,000	5,890	29,000	4,150	21,700	3000
3.0	25,000	6,930	22,000	4,880	16,500	3490
4.0	21,670	6,930	18,120	4,880	13,400	3490
5.0	18,000	6,520	15,100	4,880	11,160	3320
6.0	16,200	7,710	13,680	5,590	10,980	4050
8.0	12,150	6,610	10,170	4,720	8,280	3580
10.0	9,720	5,870	8,190	4,130	6,620	3100
12.0	8,150	5,490	4,130	3,830	5,520	2870

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

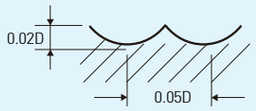


Recommended Cutting Condition

[WB504 series]

WORKPIECE	ALLOY STEELS, CARBON STEELS		PREHARDENED STEELS		HARDENED STEELS	
	Alloy Steels Carbon Steels (SCM, SNCM, S45C)		Prehardened Steels (NAK, CENA, KP4)		Hardened Steels (SKD, SKT, STAVAX)	
HARDNESS	~HRc35		HRc35~HRc45		HRc45~HRc55	
STRENGTH	~1100N/mm^2		1100~1500N/mm^2		1500~2000N/mm^2	
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED
1.0	48,000	3,300	35,000	2,350	32,000	2,200
1.5	38,400	4,100	28,000	2,900	25,600	2,700
2.0	31,680	4,600	23,100	3,300	21,000	3,100
3.0	24,000	5,430	17,500	3,880	16,000	3,650
4.0	20,130	5,430	14,880	3,880	14,220	3,650
5.0	16,780	5,430	12,400	3,690	11,670	3,470
6.0	15,200	6,220	12,200	4,500	11,100	3,830
8.0	11,300	5,250	9,200	3,980	8,320	3,350
10.0	9,100	4,590	7,350	3,450	6,660	2,870
12.0	7,590	4,260	6,130	3,190	5,530	2,400

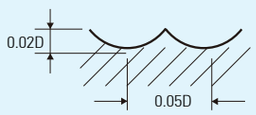
RPM = rev. / min.
FEED = mm / min.



[WB532 series]

WORKPIECE	ALLOY STEELS, CARBON STEELS		PREHARDENED STEELS		HARDENED STEELS	
	Alloy Steels Carbon Steels (SCM, SNCM, S45C)		Prehardened Steels (NAK, CENA, KP4)		Hardened Steels (SKD, SKT, STAVAX)	
HARDNESS	~HRc35		HRc35~HRc45		HRc45~HRc55	
STRENGTH	~1100N/mm^2		1100~1500N/mm^2		1500~2000N/mm^2	
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED
3.0	35,000	2,800	33,000	2,600	12,000	900
4.0	26,000	2,300	25,000	2,200	9,000	800
5.0	21,000	2,100	20,000	2,000	7,000	700
6.0	17,000	1,900	16,000	1,800	6,000	650
8.0	13,000	1,700	12,000	1,600	4,500	550
10.0	10,500	1,450	10,000	1,400	3,500	500
12.0	9,000	1,400	8,000	1,300	3,000	450

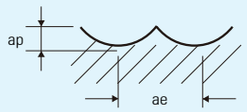
RPM = rev. / min.
FEED = mm / min.



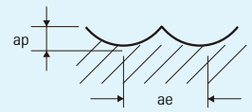
[WB542 series] ▶ General Cutting

WORKPIECE	ALLOY STEELS, CARBON STEELS		PREHARDENED STEELS		HARDENED STEELS	
	Alloy Steels Carbon Steels (SCM, SNCM, S45C)		Prehardened Steels (NAK, CENA, KP4)		Hardened Steels (SKD, SKT, STAVAX)	
HARDNESS	~HRc35		HRc35~HRc45		HRc45~HRc55	
STRENGTH	~1100N/mm^2		1100~1500N/mm^2		1500~2000N/mm^2	
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED
0.1	16,500	80	25,500	185	25,500	160
0.2	16,500	90	25,500	220	25,500	200
0.3	15,300	112	24,000	260	24,000	220
0.4	15,300	112	24,000	260	24,000	220
0.5	13,300	128	20,800	300	20,800	250
0.6	11,200	144	17,600	330	17,600	280
0.8	11,200	144	17,600	330	17,600	280
1.0	10,180	160	16,000	370	16,000	320
1.5	9,500	220	13,000	500	12,800	400
2.0	9,250	260	11,500	640	11,300	590
3.0	8,000	370	10,200	880	9,800	850
4.0	6,720	420	8,500	880	8,200	850
5.0	5,840	460	7,500	880	7,200	850
6.0	5,500	660	6,900	920	6,500	880
8.0	4,600	740	5,600	840	5,300	800
10.0	4,070	820	4,850	800	4,650	770
12.0	3,700	890	4,350	800	4,150	770

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



ap : D1~D6=0.2mm
D8~D12=0.3mm
ae : 0.2×D



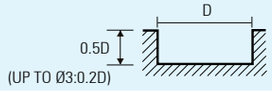
ap : D1~D4=0.05×D
D5~D8=0.25mm
D10~D12=0.3mm
ae : 0.1×D

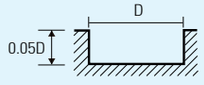
Recommended Cutting Condition

[WME502, WE502 S3, WE502 series]

WORKPIECE	ALLOY STEELS, CARBON STEELS		PREHARDENED STEELS		STAINLESS STEELS		HARDENED STEELS	
	Alloy Steels Carbon Steels (SCM, SNCM, S45C)		Prehardened Steels (NAK, CENA, KP4)		Stainless Steels (SUS)		Hardened Steels (SKD, SKT, STAVAX)	
HARDNESS	~HRc35		HRc35~HRc45				HRc45~HRc55	
STRENGTH	~1100N/mm²		1100~1500N/mm²				1500~2000N/mm²	
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
2.0	11,560	190	7,560	120	6,300	90	5,040	35
3.0	8,920	210	5,560	140	4,620	120	3,360	40
4.0	7,560	300	4,620	180	3,880	150	2,940	40
5.0	6,300	320	3,780	190	3,160	160	2,320	50
6.0	5,560	350	3,360	220	2,840	180	2,000	55
8.0	4,200	380	2,520	200	2,100	180	1,680	75
10.0	3,260	330	2,000	160	1,680	160	1,360	60
12.0	2,740	280	1,680	130	1,360	130	1,160	55
16.0	2,200	220	1,360	110	1,060	110	900	40
20.0	1,680	170	1,060	80	840	80	680	30
25.0	1,360	130	840	70	680	60	540	20

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

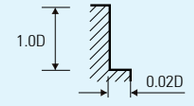




[WE514 series]

WORKPIECE	ALLOY STEELS, CARBON STEELS		PREHARDENED STEELS		STAINLESS STEELS		HARDENED STEELS	
	Alloy Steels Carbon Steels (SCM, SNCM, S45C)		Prehardened Steels (NAK, CENA, KP4)		Stainless Steels (SUS)		Hardened Steels (SKD, SKT, STAVAX)	
HARDNESS	~HRc35		HRc35~HRc45				HRc45~HRc55	
STRENGTH	~1100N/mm²		1100~1500N/mm²				1500~2000N/mm²	
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
1.0	22,000	310	13,500	180	10,750	140	8,500	50
1.5	17,000	320	10,700	190	8,500	150	6,500	50
2.0	13,900	330	9,070	200	7,560	165	6,000	60
2.5	12,000	350	7,600	220	6,000	180	4,500	60
3.0	10,700	380	6,670	240	5,110	200	4,030	70
4.0	9,070	680	5,540	420	4,650	330	3,530	70
5.0	7,560	720	4,530	430	3,800	360	2,780	85
6.0	6,670	790	4,030	490	3,400	390	2,400	95
8.0	5,040	850	3,020	450	2,520	420	2,010	130
10.0	3,910	730	2,400	360	2,010	360	1,630	105
12.0	3,300	620	2,010	300	1,630	280	1,400	95

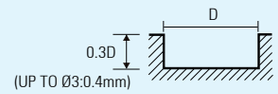
RPM = rev. / min.
FEED = mm / min.

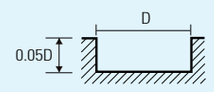


[WE522 series]

WORKPIECE	ALLOY STEELS, CARBON STEELS		PREHARDENED STEELS		HARDENED STEELS	
	Alloy Steels Carbon Steels (SCM, SNCM, S45C)		Prehardened Steels (NAK, CENA, KP4)		Hardened Steels (SKD, SKT, STAVAX)	
HARDNESS	~HRc35		HRc35~HRc45		HRc45~HRc55	
STRENGTH	~1100N/mm²		1100~1500N/mm²		1500~2000N/mm²	
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED
2.0	6,300	60	5,040	50	3,150	25
3.0	4,410	70	3,570	60	2,200	30
4.0	3,570	85	2,840	70	1,790	35
5.0	3,050	105	2,420	85	1,580	40
6.0	2,630	125	2,100	105	1,370	50
8.0	2,000	135	1,580	105	1,050	50
10.0	1,680	135	1,370	105	840	50
12.0	1,370	105	1,160	95	700	40
16.0	1,160	95	890	75	560	35
20.0	840	70	680	50	420	25

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



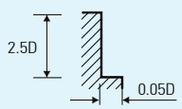


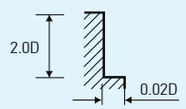
Recommended Cutting Condition

[WE524 series]

WORKPIECE	ALLOY STEELS/CARBON STEELS		PREHARDENED STEELS		HARDENED STEELS	
	Alloy Steels Carbon Steels (SCM, SNCM, S45C)		Prehardened Steels (NAK, CENA, KP4)		Hardened Steels (SKD, SKT, STAVAX)	
HARDNESS	~HRc35		HRc35~HRc45		HRc45~HRc55	
STRENGTH	~1100N/mm^2		1100~1500N/mm^2		1500~2000N/mm^2	
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED
2.0	6,300	100	5,040	80	3,150	45
3.0	4,410	115	3,570	100	2,200	55
4.0	3,570	140	2,840	115	1,790	60
5.0	3,050	180	2,420	140	1,580	70
6.0	2,630	215	2,100	180	1,370	90
8.0	2,000	230	1,580	180	1,050	90
10.0	1,680	230	1,370	180	840	90
12.0	1,370	180	1,160	160	700	70
16.0	1,160	160	890	125	560	60
20.0	840	115	680	90	420	45

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

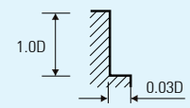




[WE504...H series]

WORKPIECE	ALLOY STEELS, CARBON STEELS		PREHARDENED STEELS		HARDENED STEELS	
	Alloy Steels Carbon Steels (SCM, SNCM, S45C)		Prehardened Steels (NAK, CENA, KP4)		Hardened Steels (SKD, SKT, STAVAX)	
HARDNESS	~HRc35		HRc35~HRc45		HRc45~HRc55	
STRENGTH	~1100N/mm^2		1100~1500N/mm^2		1500~2000N/mm^2	
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED
1.0	45,000	750	37,000	560	23,000	300
2.0	23,500	800	18,000	540	12,000	360
3.0	15,750	810	12,600	580	8,280	380
4.0	12,150	830	9,540	600	6,345	400
6.0	9,450	900	7,470	640	4,950	440
8.0	7,110	860	5,625	620	3,780	410
10.0	5,580	800	4,410	570	2,925	380
12.0	4,770	800	3,780	570	2,520	380
16.0	3,600	810	2,900	570	2,000	400
20.0	3,000	810	2,300	570	1,600	400

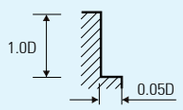
RPM = rev. / min.
FEED = mm / min.



[WME504, WXE504 series]

WORKPIECE	ALLOY STEELS, CARBON STEELS		PREHARDENED STEELS		STAINLESS STEELS		HARDENED STEELS	
	Alloy Steels Carbon Steels (SCM, SNCM, S45C)		Prehardened Steels (NAK, CENA, KP4)		Stainless Steels (SUS)		Hardened Steels (SKD, SKT, STAVAX)	
HARDNESS	~HRc35		HRc35~HRc45				HRc45~HRc55	
STRENGTH	~1100N/mm^2		1100~1500N/mm^2				1500~2000N/mm^2	
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
2.0	11,560	280	7,560	170	6,300	140	5,040	50
3.0	8,920	320	5,560	200	4,620	170	3,360	60
4.0	7,560	570	4,620	350	3,880	280	2,940	60
5.0	6,300	600	3,780	360	3,160	300	2,320	70
6.0	5,560	660	3,360	410	2,840	330	2,000	80
8.0	4,200	710	2,520	380	2,100	350	1,680	110
10.0	3,260	610	2,000	300	1,680	300	1,360	90
12.0	2,740	520	1,680	250	1,360	240	1,160	80
16.0	2,200	410	1,360	200	1,100	300	900	60
20.0	1,680	320	1,060	160	840	150	680	40
25.0	1,360	250	840	130	680	120	540	30

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



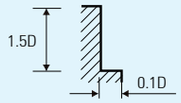
Recommended Cutting Condition

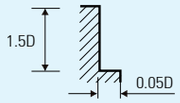
[WE506 series]

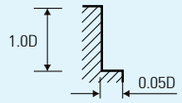
▶ General Cutting

WORKPIECE	ALLOY STEELS, CARBON STEELS		PREHARDENED STEELS		HARDENED STEELS	
	Alloy Steels Carbon Steels (SCM, SNCM, S45C)		Prehardened Steels (NAK, CENA, KP4)		Hardened Steels (SKD, SKT, STAVAX)	
HARDNESS	~HRc35		HRc35~HRc45		HRc45~HRc55	
STRENGTH	~1100N/mm²		1100~1500N/mm²		1500~2000N/mm²	
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED
6.0	5,560	2,000	3,880	1,370	1,580	210
8.0	4,200	2,000	2,940	1,370	1,160	210
10.0	3,360	2,000	2,320	1,370	1,000	210
12.0	2,840	1,680	2,000	1,160	840	180
16.0	2,100	1,260	1,480	880	640	130
20.0	1,680	1,010	1,160	690	500	110
25.0	1,500	90	1,100	600	430	90

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



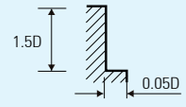


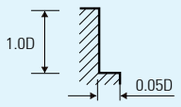


▶ High Speed Cutting

WORKPIECE	PREHARDENED STEELS		HARDENED STEELS	
	Prehardened Steels (NAK, CENA, KP4)		Hardened Steels (SKD, SKT, STAVAX)	
HARDNESS	HRc35~HRc45		HRc45~HRc55	
STRENGTH	1100~1500N/mm²		1500~2000N/mm²	
DIAMETER(mm)	RPM	FEED	RPM	FEED
6.0	16,800	6,090	8,400	3,050
8.0	12,600	6,090	6,300	3,050
10.0	9,980	5,990	5,040	3,050
12.0	8,400	5,040	4,200	2,520
16.0	6,300	3,780	3,160	1,890
20.0	5,040	3,050	2,520	1,470
25.0	4,500	2,700	2,200	1,300

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

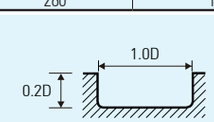


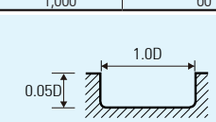


[WR502 series]

WORKPIECE	ALLOY STEELS, CARBON STEELS		PREHARDENED STEELS		HARDENED STEELS	
	Alloy Steels Carbon Steels (SCM, SNCM, S45C)		Prehardened Steels (NAK, CENA, KP4)		Hardened Steels (SKD, SKT, STAVAX)	
HARDNESS	~HRc35		HRc35~HRc45		HRc45~HRc55	
STRENGTH	~1100N/mm²		1100~1500N/mm²		1500~2000N/mm²	
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED
0.2	44,000	145	28,800	60	17,600	40
0.3	41,000	170	27,000	70	16,500	45
0.4	41,000	170	27,000	70	16,500	45
0.5	36,000	190	23,400	80	14,300	50
0.6	30,000	210	19,800	90	12,100	55
0.8	30,000	210	19,800	90	12,100	55
1.0	27,600	240	18,000	100	11,000	60
1.5	22,000	250	13,500	110	8,500	60
2.0	18,000	260	11,560	120	7,200	70
2.5	15,000	270	9,500	130	6,100	70
3.0	13,240	280	8,560	140	5,280	70
4.0	10,720	340	6,820	170	4,300	80
5.0	9,160	420	5,800	200	3,800	100
6.0	7,900	500	5,040	250	3,280	120
8.0	6,000	540	3,800	250	2,520	120
10.0	5,040	540	3,280	250	2,020	120
12.0	4,120	420	2,780	230	1,680	100
16.0	3,100	360	2,100	170	1,280	80
20.0	2,520	280	1,640	120	1,000	60

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

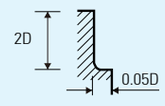


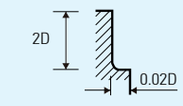


[WR504, WR512 series]

WORKPIECE	ALLOY STEELS, CARBON STEELS		PREHARDENED STEELS		HARDENED STEELS	
	Alloy Steels Carbon Steels (SCM, SNCM, S45C)		Prehardened Steels (NAK, CENA, KP4)		Hardened Steels (SKD, SKT, STAVAX)	
HARDNESS	~HRc35		HRc35~HRc45		HRc45~HRc55	
STRENGTH	~1100N/mm²		1100~1500N/mm²		1500~2000N/mm²	
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED
3.0	4,410	115	3,570	100	2,200	55
4.0	3,570	140	2,840	115	1,790	60
5.0	3,050	180	2,420	140	1,580	70
6.0	2,630	215	2,100	180	1,370	85
8.0	2,000	230	1,580	180	1,050	85
10.0	1,680	230	1,370	180	840	85
12.0	1,370	180	1,160	160	700	70
16.0	1,160	160	890	125	560	60
20.0	840	115	680	90	420	45

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



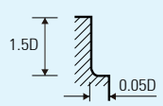


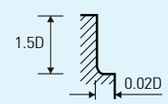
Recommended Cutting Condition

[WR506 series]

WORKPIECE	ALLOY STEELS, CARBON STEELS		PREHARDENED STEELS		HARDENED STEELS	
	Alloy Steels Carbon Steels (SCM, SNCM, S45C)		Prehardened Steels (NAK, CENA, KP4)		Hardened Steels (SKD, SKT, STAVAX)	
HARDNESS	~HRc35		HRc35~HRc45		HRc45~HRc55	
STRENGTH	~1100N/mm²		1100~1500N/mm²		1500~2000N/mm²	
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED
6.0	14,880	3,210	14,100	2,940	9,600	2,940
8.0	12,000	3,300	11,400	3,000	7,200	2,760
10.0	9,600	2,940	9,300	2,700	5,700	2,460
12.0	7,800	2,700	7,500	2,460	4,800	2,280
16.0	6,000	2,400	5,820	2,220	3,600	2,040
20.0	4,800	2,010	4,680	2,040	2,880	1,920

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

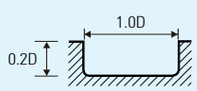


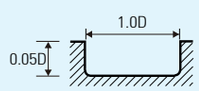


[WR514, WR542 series]

WORKPIECE	ALLOY STEELS, CARBON STEELS		PREHARDENED STEELS		HARDENED STEELS	
	Alloy Steels Carbon Steels (SCM, SNCM, S45C)		Prehardened Steels (NAK, CENA, KP4)		Hardened Steels (SKD, SKT, STAVAX)	
HARDNESS	~HRc35		HRc35~HRc45		HRc45~HRc55	
STRENGTH	~1100N/mm²		1100~1500N/mm²		1500~2000N/mm²	
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED
0.2	50,000	170	34,500	75	21,150	45
0.3	50,000	200	32,000	85	20,000	50
0.4	50,000	200	32,000	85	20,000	50
0.5	43,000	220	28,000	95	17,100	60
0.6	36,400	250	24,000	110	14,500	65
0.8	36,400	250	24,000	110	14,500	65
1.0	33,100	280	21,600	120	13,200	70
1.5	26,400	300	16,200	130	10,200	70
2.0	21,600	310	13,800	140	8,640	80
2.5	18,000	320	11,400	150	7,320	80
3.0	15,900	330	10,300	160	6,300	80
4.0	12,800	400	8,200	200	5,150	95
5.0	11,000	500	7,000	240	4,560	120
6.0	9,500	600	6,000	300	3,930	140
8.0	7,200	640	4,550	300	3,020	140
10.0	6,000	640	4,000	300	2,420	140
12.0	5,000	500	3,340	270	2,000	120
16.0	3,720	450	2,520	210	1,540	95
20.0	3,000	330	1,950	140	1,200	70

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

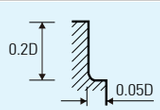


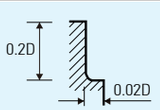


[WXR504 series]

WORKPIECE	ALLOY STEELS, CARBON STEELS		PREHARDENED STEELS		HARDENED STEELS	
	Alloy Steels Carbon Steels (SCM, SNCM, S45C)		Prehardened Steels (NAK, CENA, KP4)		Hardened Steels (SKD, SKT, STAVAX)	
HARDNESS	~HRc35		HRc35~HRc45		HRc45~HRc55	
STRENGTH	~1100N/mm²		1100~1500N/mm²		1500~2000N/mm²	
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED
1.0	27,600	300	18,000	220	11,000	120
1.5	22,000	310	13,500	230	8,500	120
2.0	18,000	320	11,560	240	7,200	130
2.5	15,000	330	9,500	250	6,100	130
3.0	13,240	340	8,560	260	5,280	130
4.0	10,720	420	6,820	300	4,300	140
5.0	9,160	430	5,800	360	3,800	170
6.0	7,900	430	5,040	360	3,280	170
8.0	6,000	460	3,800	360	2,520	170
10.0	5,040	460	3,280	360	2,020	170
12.0	4,120	360	2,780	320	1,680	140
16.0	3,100	280	2,100	230	1,280	115
20.0	2,520	230	1,640	180	1,000	90

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

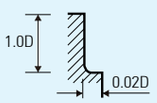




[WXR514, WR544 series]

WORKPIECE	ALLOY STEELS, CARBON STEELS		PREHARDENED STEELS		HARDENED STEELS	
	Alloy Steels Carbon Steels (SCM, SNCM, S45C)		Prehardened Steels (NAK, CENA, KP4)		Hardened Steels (SKD, SKT, STAVAX)	
HARDNESS	~HRc35		HRc35~HRc45		HRc45~HRc55	
STRENGTH	~1100N/mm²		1100~1500N/mm²		1500~2000N/mm²	
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED
1.0	33,100	360	21,600	260	13,200	140
1.5	26,400	370	16,200	270	10,200	140
2.0	21,600	380	13,800	280	8,640	150
2.5	18,000	390	11,400	300	7,320	150
3.0	15,900	400	10,300	310	6,300	150
4.0	12,800	500	8,200	360	5,150	160
5.0	11,000	510	7,000	430	4,560	200
6.0	9,500	510	6,000	430	3,930	200
8.0	7,200	550	4,550	430	3,020	200
10.0	6,000	550	4,000	430	2,420	200
12.0	5,000	430	3,340	380	2,000	160
16.0	3,720	330	2,520	280	1,540	135
20.0	3,000	270	1,950	210	1,200	100

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

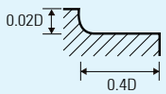


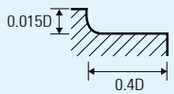
Recommended Cutting Condition

[WSPM4 series]

WORKPIECE	ALLOY STEELS, CARBON STEELS		PREHARDENED STEELS		HARDENED STEELS	
	Alloy Steels Carbon Steels (SCM, SNCM, S45C)		Prehardened Steels (NAK, CENA, KP4)		Hardened Steels (SKD, SKT, STAVAX)	
HARDNESS	~HRc35		HRc35~HRc45		HRc45~HRc55	
STRENGTH	~1100N/mm²		1100~1500N/mm²		1500~2000N/mm²	
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED
1.0	49000	7650	40000	6500	35000	5750
1.5	37000	8550	30000	7200	27000	6400
2.0	29700	9000	24300	7560	21600	6750
3.0	19800	9900	16200	8100	14400	7650
4.0	15300	10800	12600	8550	10800	7920
6.0	9900	11700	8100	9900	7200	8640
8.0	7380	11700	6300	9900	5400	8640
10.0	5850	10800	4950	9000	4320	8550
12.0	4950	10800	4140	9000	3690	8100
16.0	3690	9000	3060	7920	2700	7020
20.0	2970	7200	2430	6300	2160	5670

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



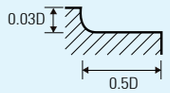


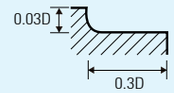
[WDR503 series]

▶ General Cutting

WORKPIECE	ALLOY STEELS, CARBON STEELS		PREHARDENED STEELS		HARDENED STEELS	
	Alloy Steels Carbon Steels (SCM, SNCM, S45C)		Prehardened Steels (NAK, CENA, KP4)		Hardened Steels (SKD, SKT, STAVAX)	
HARDNESS	~HRc35		HRc35~HRc45		HRc45~HRc55	
STRENGTH	~1100N/mm²		1100~1500N/mm²		1500~2000N/mm²	
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED
6.0	5,100	3,500	5,500	3,750	3,850	2,700
8.0	3,800	3,400	4,150	3,700	2,850	2,550
10.0	3,800	3,750	3,600	3,500	2,700	2,700
12.0	3,200	4,200	3,250	4,250	2,250	2,300
16.0	2,400	3,100	2,250	2,900	1,700	1,750
20.0	1,900	2,500	1,800	2,350	1,350	1,400

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

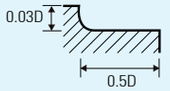


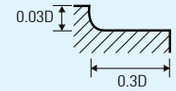


▶ High Speed Cutting

WORKPIECE	ALLOY STEELS, CARBON STEELS		PREHARDENED STEELS		HARDENED STEELS	
	Alloy Steels Carbon Steels (SCM, SNCM, S45C)		Prehardened Steels (NAK, CENA, KP4)		Hardened Steels (SKD, SKT, STAVAX)	
HARDNESS	~HRc35		HRc35~HRc45		HRc45~HRc55	
STRENGTH	~1100N/mm²		1100~1500N/mm²		1500~2000N/mm²	
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED
6.0	8,300	5,700	7,650	5,250	6,400	4,550
8.0	6,200	5,550	5,750	5,100	5,250	4,700
10.0	5,750	5,650	5,000	4,900	4,200	4,250
12.0	4,800	6,300	4,150	5,450	3,500	3,650
16.0	3,600	4,700	3,100	4,050	2,650	2,700
20.0	2,900	3,750	2,500	3,250	2,100	2,150

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



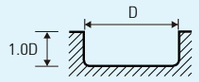


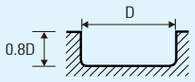
Recommended Cutting Condition

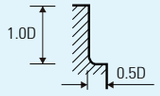
[WF60 series]

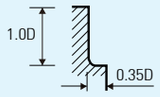
WORKPIECE	ALLOY STEELS, CARBON STEELS		ALLOY STEELS, CARBON STEELS, PREHARDENED STEELS		ALLOY STEELS, CARBON STEELS		ALLOY STEELS, CARBON STEELS, PREHARDENED STEELS	
	Alloy Steels Carbon Steels (SCM, S45C, S50C)		Alloy Steels Carbon Steels Prehardened Steels (SCM, SKD, NAK, KP4)		Alloy Steels Carbon Steels [SCM, S45C, S50C]		Alloy Steels Carbon Steels Prehardened Steels [SCM, SKD, NAK, KP4]	
HARDNESS	~HRc25		HRc25~HRc40		~HRc25		HRc25~HRc40	
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
6.0	12,000	1,550	10,600	1,100	15,800	2,570	14,300	1,850
8.0	9,000	1,650	8,100	1,180	11,900	2,700	10,700	1,950
10.0	7,200	1,650	6,400	1,180	9,500	2,700	8,500	1,950
12.0	6,000	1,540	5,400	1,140	8,000	2,570	7,100	1,850
16.0	4,500	1,500	4,100	1,050	6,000	2,450	5,400	1,750
20.0	3,600	1,330	3,200	900	4,800	2,140	4,300	1,500

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





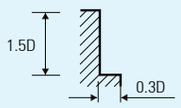


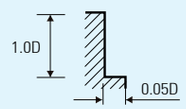


[WF61 series]

WORKPIECE	ALLOY STEELS, CARBON STEELS		PREHARDENED STEELS		HARDENED STEELS	
	Alloy Steels Carbon Steels (SCM, SNCM, S45C)		Prehardened Steels (NAK, CENA, KP4)		Hardened Steels (SKD, SKT, STAVAX)	
HARDNESS	~HRc35		HRc35~HRc45		HRc45~HRc55	
STRENGTH	~1100N/mm^2		1100~1500N/mm^2		1500~2000N/mm^2	
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED
6.0	12,400	840	8,400	570	3,400	260
8.0	9,200	840	6,300	570	2,400	240
10.0	7,600	840	5,100	570	2,000	290
12.0	6,000	800	4,200	570	1,680	260
14.0	5,200	840	3,600	570	1,400	200
16.0	4,800	760	3,300	510	1,200	160
18.0	4,400	720	2,700	420	1,100	150
20.0	3,600	560	2,400	360	1,000	150
25.0	3,200	620	2,160	410	900	160

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

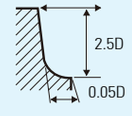




[WTB502 series]

WORKPIECE	ALLOY STEELS, CARBON STEELS		PREHARDENED STEELS	
	Alloy Steels Carbon Steels [SCM, SNCM, S45C]		Prehardened Steels (NAK, CENA, KP4)	
HARDNESS	~ HRc35		HRc35 ~ HRc45	
STRENGTH	~ 1100N/mm^2		1100 ~ 1500N/mm^2	
DIAMETER(mm)	RPM	FEED	RPM	FEED
0.4	36,000	144	27,900	113
0.6	25,200	144	18,900	113
0.8	18,000	144	13,950	108
1.0	14,850	149	11,250	113
2.0	7,560	153	5,670	113
3.0	3,969	108	3,213	90
4.0	3,213	126	2,556	104

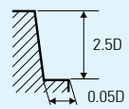
RPM = rev. / min.
FEED = mm / min.



[WTE502 series]

WORKPIECE	ALLOY STEELS, CARBON STEELS		PREHARDENED STEELS	
	Alloy Steels Carbon Steels [SCM, SNCM, S45C]		Prehardened Steels [NAK, CENA, KP4]	
HARDNESS	~ HRc35		HRc35 ~ HRc45	
STRENGTH	~ 1100N/mm^2		1100 ~ 1500N/mm^2	
DIAMETER(mm)	RPM	FEED	RPM	FEED
0.3	45,000	135	35,000	105
0.4	36,000	144	27,900	113
0.6	25,200	144	18,900	113
0.8	18,000	144	13,950	108
1.0	14,850	149	11,250	113
2.0	7,560	153	5,670	113
3.0	3,969	108	3,213	90
4.0	3,213	126	2,556	104
6.0	2,367	189	1,890	153
8.0	1,800	225	1,422	162
10.0	1,440	225	1,170	167

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

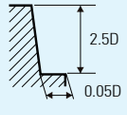


Recommended Cutting Condition

[WTE504, WTE514 series]

WORKPIECE	ALLOY STEELS, CARBON STEELS		PREHARDENED STEELS	
	Alloy Steels Carbon Steels [SCM, SNCM, S45C]		Prehardened Steels [NAK, CENA, KP4]	
HARDNESS	~ HRc35		HRc35 ~ HRc45	
STRENGTH	~ 1100N/mm^2		1100 ~ 1500N/mm^2	
DIAMETER(mm)	RPM	FEED	RPM	FEED
3.0	3,969	216	3,213	180
4.0	3,213	252	2,556	207
6.0	2,367	378	1,890	306
8.0	1,800	450	1,422	324
10.0	1,440	450	1,170	333

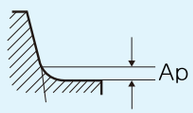
RPM = rev. / min.
FEED = mm / min.



[WTR504 series]

WORKPIECE	ALLOY STEELS, CARBON STEELS			PREHARDENED STEELS			HARDENED STEELS		
	Alloy Steels Carbon Steels (SCM, SNCM, S45C)			Prehardened Steels (NAK, CENA, KP4)			Hardened Steels (SKD, SKT, STAVAX)		
HARDNESS	~HRc35			HRc35~HRc45			HRc45~HRc55		
STRENGTH	~1100N/mm^2			1100~1500N/mm^2			1500~2000N/mm^2		
DIAMETER(mm)	RPM	FEED	Ap(mm)	RPM	FEED	Ap(mm)	RPM	FEED	Ap(mm)
0.4	40,000	630	0.008~0.016	32,000	450	0.008~0.012	22,000	270	0.004~0.008
0.6	30,000	630	0.012~0.024	23,000	450	0.012~0.018	15,000	270	0.006~0.012
0.8	22,500	630	0.016~0.032	17,000	450	0.016~0.024	11,500	270	0.008~0.016
1.0	18,000	630	0.020~0.040	13,500	450	0.020~0.030	9,000	270	0.010~0.020
1.2	14,400	630	0.025~0.050	11,700	450	0.025~0.040	7,200	270	0.012~0.025
1.5	11,700	630	0.030~0.060	9,000	450	0.030~0.050	5,850	270	0.015~0.030
2.0	9,000	630	0.040~0.080	7,200	450	0.040~0.060	4,500	270	0.020~0.040

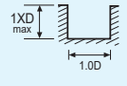
RPM = rev. / min.
FEED = mm / min.

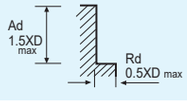


[X-STAR series]

WORKPIECE	LOW CARBON STEELS		LOW CARBON STEELS		MED ALLOY STEELS		MOLD&DIE STEELS		GREY CAST IRON		CAST IRON-DUCTILE	
HARDNESS	~HB175		~HB275		~HB275		~HB275		~HB200		~HB300	
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
3	16,500	335	13,585	276	11,320	230	5,820	118	15,360	300	7,765	158
4	12,340	326	10,190	326	8,520	340	4,380	175	11,550	462	5,810	232
5	9,895	502	8,150	413	6,790	345	3,490	177	9,215	468	4,655	236
6	8,250	586	6,795	483	5,660	403	2,910	207	7,680	546	3,880	276
8	6,185	754	5,095	620	4,245	517	2,185	266	5,760	702	2,910	354
10	4,950	955	4,075	786	3,395	656	1,745	337	4,610	889	2,330	449
12	4,125	963	3,395	793	2,830	661	1,455	340	3,840	897	1,940	453
14	3,535	890	2,910	733	2,425	592	1,250	314	3,290	829	1,665	419
16	3,095	817	2,545	672	2,125	561	1,090	288	2,880	761	1,455	384
18	2,750	809	2,265	667	1,885	556	970	285	2,560	754	1,295	381
20	2,475	804	2,040	662	1,700	552	875	283	2,305	749	1,165	378
25	1,975	631	1,630	521	1,360	435	700	230	1,850	600	930	300

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





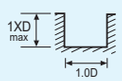
※ Use a rigid and precise machines and holders.
※ Use a suitable cutting oil.

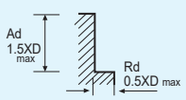
Recommended Cutting Condition

[X-STAR series]

WORKPIECE	CAST IRONMALLEABLE		STAINLESS 300 SERIES		STAINLESS 400 SERIES		STAINLESS PH SERIES		TITANIUM ALLOYS		HEAT RESISTANT STEELS	
HARDNESS	~HB300		~HB275		~HB185		~HB325		~HB295		~HB300	
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
3	4,850	95	9,705	175	13,585	250	8,085	125	9,705	225	2,590	50
4	3,660	146	7,245	290	10,190	407	6,050	242	7,245	290	1,910	76
5	2,910	147	5,820	300	8,150	430	4,850	250	5,820	355	1,550	75
6	2,425	173	4,850	355	6,795	560	4,045	300	4,850	405	1,295	75
8	1,820	221	3,640	405	5,095	635	3,030	355	3,640	455	970	100
10	1,455	280	2,910	405	4,075	635	2,425	355	2,910	455	775	100
12	1,215	283	2,425	405	3,395	635	2,020	355	2,425	455	645	100
14	1,040	262	2,080	405	2,910	635	1,735	355	2,080	455	555	100
16	910	240	1,820	405	2,545	635	1,515	355	1,820	455	485	100
18	810	238	1,615	380	2,265	560	1,350	300	1,615	405	430	100
20	730	236	1,455	380	2,040	560	1,215	300	1,455	405	390	100
25	585	187	1,160	370	1,630	560	970	300	1,160	405	305	73

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



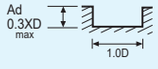


※ Use a rigid and precise machines and holders.
※ Use a suitable cutting oil.

[X-STAR series] ▶ High Speed Cutting

WORKPIECE	HARDENED STEELS	
HARDNESS	HRc30~45	
DIAMETER(mm)	RPM	FEED
3	6,900	552
4	5,175	414
5	4,140	331
6	3,450	414
8	2,588	414
10	2,070	414
12	1,725	414
14	1,479	414
16	1,294	414
18	1,150	368
20	1,035	414
25	828	397

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

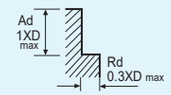


※ Use a rigid and precise machines and holders.
※ Use a suitable cutting oil.

[X-STAR series] ▶ Side cutting

WORKPIECE	HARDENED STEELS	
HARDNESS	HRc30~45	
DIAMETER(mm)	RPM	FEED
3	8,493	679
4	6,369	510
5	5,096	611
6	4,246	849
8	3,185	764
10	2,548	713
12	2,123	764
14	1,820	728
16	1,592	701
18	1,415	679
20	1,274	662
25	1,019	611

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

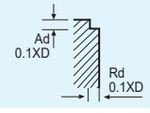


※ Use a rigid and precise machines and holders.
※ Use a suitable cutting oil.

[X-STAR series] ▶ High Speed Cutting

WORKPIECE	HARDENED STEELS	
HARDNESS	HRc30~45	
DIAMETER(mm)	RPM	FEED
3	18,047	2,166
4	13,535	1,624
5	10,828	1,732
6	9,023	2,166
8	6,768	1,895
10	5,414	1,732
12	4,512	1,985
14	3,867	1,856
16	3,384	1,895
18	3,008	1,805
20	2,707	1,841
25	2,166	1,646

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



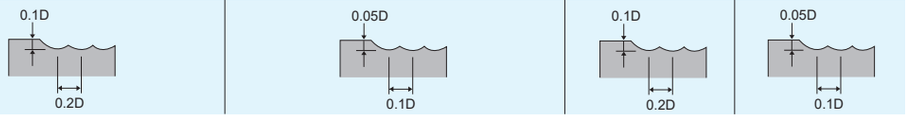
※ Use a rigid and precise machines and holders.
※ Use a suitable cutting oil.

Recommended Cutting Condition

[DS502 ...series]

WORK-PIECE	CARBON STEELS, CAST IRON		ALLOY STEELS, PREHARDENED STEELS		HARDENED STEELS				STAINLESS STEELS		NICKEL ALLOY, TITANIUM ALLOY	
HARDNESS	150~250HB		25~35HRC		35~45HRC		45~55HRC		SUS304, 316			
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
2	19,100	770	12,800	370	10,200	270	8,900	190	8,900	210	6,400	120
4	10,800	1,100	7,200	550	5,700	400	5,000	280	5,000	310	3,600	180
6	7,700	1,300	5,200	660	4,100	480	3,600	330	3,600	380	2,600	210
8	6,000	1,400	4,000	700	3,200	510	2,800	360	2,800	400	2,000	230
10	4,800	1,400	3,200	700	2,600	520	2,300	370	2,300	410	1,600	230
12	4,000	1,400	2,700	710	2,200	530	1,900	370	1,900	410	1,400	240

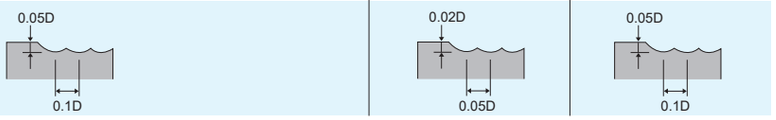
RPM = rev. / min.
FEED = mm / min.



[DS502 ...series]

WORKPIECE	CARBON STEELS, CAST IRON		ALLOY STEELS, PREHARDENED STEELS		HARDENED STEELS				STAINLESS STEELS	
HARDNESS	150~250HB		25~35HRc		35~45HRc		45~55HRc		SUS304, 316	
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
2	51,000	2,100	39,800	1,300	35,700	960	23,700	640	35,700	960
4	25,500	2,700	19,900	1,700	17,900	1,300	11,900	830	17,900	1,300
6	17,000	3,000	13,300	1,900	11,900	1,400	7,900	920	11,900	1,400
8	12,800	3,100	10,000	2,000	9,000	1,500	6,000	960	9,000	1,500
10	10,200	3,100	8,000	2,000	7,200	1,500	4,800	960	7,200	1,500
12	8500	3,100	6,700	2,000	6,000	1,500	4,000	960	6,000	1,500

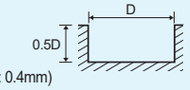
RPM = rev. / min.
FEED = mm / min.



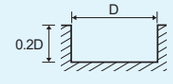
[SM503 series] ▶ Slotting

WORKPIECE	CARBON STEELS, ALLOY STEELS, TOOL STEELS						CAST IRON		STAINLESS STEELS		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	10,080	950	7,750	740	5,550	395	6,700	520	5,550	320	8,300	360	5,550	395	2,200	100
4	7,550	1,400	5,850	1,100	4,200	595	5,050	550	4,200	320	6,200	400	4,200	595	1,650	105
6	5,050	1,650	3,850	1,250	2,800	700	3,350	660	2,800	370	4,100	440	2,800	700	1,150	130
8	3,750	1,700	2,950	1,330	2,100	710	2,500	665	2,100	375	3,100	500	2,100	710	850	120
10	3,050	1,650	2,300	1,250	1,650	655	2,000	630	1,650	355	2,500	530	1,650	665	650	120
12	2,500	1,500	2,000	1,200	1,350	605	1,650	570	1,350	320	2,000	550	1,350	605	555	110

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



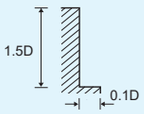
(UP TO Φ3 : 0.4mm)

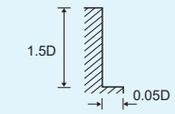


[SM503 series] ▶ Side cutting

WORKPIECE	CARBON STEELS, ALLOY STEELS, TOOL STEELS						CAST IRON		STAINLESS STEELS		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	10,080	1,080	7,750	850	5,550	450	6,700	605	5,550	365	8,300	390	5,550	450	2,200	110
4	7,550	1,630	5,850	1,260	4,200	680	5050	630	4,200	365	6,200	440	4,200	680	1,650	125
6	5,050	1,910	3,850	1,470	2,800	810	3,350	755	2,800	430	4,100	490	2,800	810	1,150	150
8	3,750	1,950	2,950	1,500	2,100	810	2,500	770	2,100	430	3,100	550	2,100	810	850	140
10	3,050	1,890	2,300	1,400	1,650	775	2,000	720	1,650	415	2,500	570	1,650	775	650	140
12	2,500	1,700	2,000	1,340	1,350	700	1,650	665	1,350	365	2,000	620	1,350	700	555	125

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



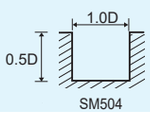


Recommended Cutting Condition

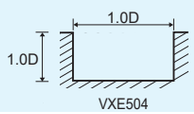
[SM504, VXE504, VXR504 series]

WORKPIECE	ALLOY STEELS, CAST IRON		STAINLESS STEELS 300 SERIES TITANIUM		STAINLESS STEELS 400 SERIES	
HARDNESS	~HB230					
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED
1	40,500	300	20,000	250	28,000	160
1.5	27,000	300	13,000	180	18,500	160
2	20,300	300	10,000	150	14,000	160
2.5	16,200	300	8,000	120	11,000	165
3	13,500	275	6,690	105	9,350	145
4	10,100	370	5,050	135	7,000	185
5	8,090	410	4,050	165	5,600	230
6	6,750	480	3,350	190	4,700	265
8	5,050	620	2,500	250	3,500	340
10	4,050	780	2,050	320	2,800	430
12	3,370	750	1,680	310	2,350	435
14	2,890	670	1,400	280	2,000	405
16	2,500	630	1,250	265	1,750	370
18	2,250	630	1,100	260	1,550	365
20	2,000	620	1,000	260	1,400	365

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



SM504

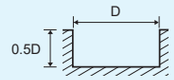


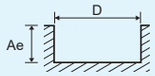
VXE504

[ZF62 series] ▶ Slotting

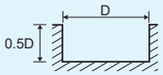
WORKPIECE	NON-ALLOYED STEELS ALLOY STEELS · CAST IRON		ALLOY STEELS, HEAT RESIS-TANT STEELS		STAINLESS STEELS		INCONEL	
HARDNESS	~ HRc30		HRc30 ~ HRc45					
STRENGTH	~ 1000N/mm²		1000 ~ 1500N/mm²					
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
6	16,380	2,680	13,020	970	8,820	670	3,000	285
8	12,180	2,680	9,660	970	6,615	670	2,250	270
10	9,660	2,680	7,980	970	5,355	660	1,625	285
12	8,400	2,770	6,300	925	4,410	660	1,500	285
16	6,300	2,770	5,040	880	3,465	590	1,000	165
20	5,040	2,495	3,780	650	2,520	415	825	150

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





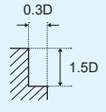
Ae : Φ4 ~ Φ10 = 0.25 x D
Φ12 ~ Φ16 = 0.15 x D
Φ18 ~ Φ20 = 0.10 x D

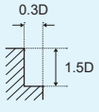


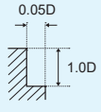
[ZF62 series] ▶ Side cutting

WORKPIECE	NON-ALLOYED STEELS ALLOY STEELS · CAST IRON		ALLOY STEELS, HEAT RESIS-TANT 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	16,380	2,680	13,020	970	8,820	670	3,000	285
8	12,180	2,680	9,660	970	6,615	670	2,250	270
10	9,660	2,680	7,980	970	5,355	660	1,625	285
12	8,400	2,770	6,300	925	4,410	660	1,500	285
16	6,300	2,770	5,040	880	3,465	590	1,000	165
20	5,040	2,495	3,780	650	2,520	415	825	150

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





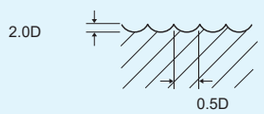


Recommended Cutting Condition

[WAB312 series]

WORKPIECE	ALUMINIUM ALLOY		COPPER ALLOY	
DIAMETER(mm)	RPM	FEED	RPM	FEED
6	18,000	1,750	5,500	440
8	14,000	2,000	4,200	500
10	14,000	2,350	4,200	580
12	14,000	3,000	4,200	750
16	11,000	2,700	3,300	670
20	8,000	2,200	2,200	600

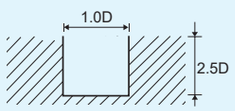
RPM = rev. / min.
FEED = mm / min.



[WAE301 series] ▶ Slotting, General Cutting

WORKPIECE	ACRYLIC		ALLOY STEELS	
DIAMETER(mm)	RPM	FEED	RPM	FEED
1.0	32,000	2,000	23,000	1,300
2.0	32,000	2,200	23,000	1,500
3.0	25,000	2,400	18,000	1,700
4.0	20,000	2,400	15,000	1,800
5.0	15,000	2,200	12,000	1,800
6.0	13,500	2,300	10,000	1,800
8.0	10,000	2,400	7,800	1,900
10.0	8,000	2,400	6,000	2,000
12.0	7,000	2,200	5,000	1,900

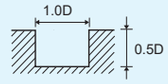
RPM = rev. / min.
FEED = mm / min.



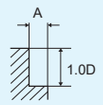
[WAE302 series] ▶ Slotting, Side cutting

WORKPIECE	ALLOY STEELS, CAST IRON		ALUMINIUM	
HARDNESS	~HB230			
DIAMETER(mm)	RPM	FEED	RPM	FEED
1.0	16,870	505	16,870	845
1.5	13,150	525	13,150	790
2.0	11,300	565	11,300	790
2.5	10,565	635	10,565	845
3.0	10,000	700	10,000	900
4.0	10,000	900	10,000	1,100
5.0	10,000	1,000	10,000	1,300
6.0	10,000	1,200	10,000	1,500
7.0	8,850	1,240	8,850	1,505
8.0	8,000	1,400	8,000	1,800
9.0	8,000	1,550	8,000	1,680
10.0	8,000	1,700	8,000	2,100
12.0	8,000	2,100	8,000	2,600
14.0	6,000	1,800	6,000	2,200
16.0	6,000	1,900	6,000	2,400
18.0	4,000	1,400	4,000	1,800
20.0	4,000	1,600	4,000	1,900

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



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

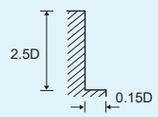


Recommended Cutting Condition

[WAE30(2)3, WAR303 series] ▶ Side cutting , General Cutting

WORKPIECE	ALUMINIUM, NONFERROUS METALS	
DIAMETER(mm)	RPM	FEED
3	7,000	455
4	7,000	546
5	7,000	651
6	7,000	756
8	5,600	861
10	5,600	1,050
12	5,600	882
14	4,200	1106
16	4,200	1,211
18	2,800	910
20	2,800	956

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

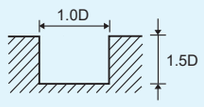


※ Please reduce cutting speed around 20~30% from the above table or AE323 series.

[WAE30(2)3, WAR303 series] ▶ Slotting, General Cutting

WORKPIECE	ALUMINIUM, NONFERROUS METALS	
DIAMETER(mm)	RPM	FEED
3	7,000	350
4	7,000	441
5	7,000	504
6	7,000	606
8	5,600	700
10	5,600	854
12	5,600	1,050
14	4,200	903
16	4,200	945
18	2,800	700
20	2,800	805

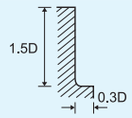
RPM = rev. / min.
FEED = mm / min.



[WAR302 series] ▶ Side cutting , General Cutting

WORKPIECE	ALUMINIUM ALLOY (<Si 4%)		ALUMINIUM ALLOY (<Si 8%)		ALUMINIUM ALLOY (DIE CASTING)		ALUMINIUM ALLOY (Cu)	
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
4	24,000	4,800	19,900	3,980	16,000	3,200	12,000	2,400
6	16,000	3,840	13,200	3,160	10,600	2,544	8,000	1,920
8	12,000	3,600	9,900	2,970	8,000	2,400	6,000	1,800
10	9,500	3,420	8,000	2,880	6,300	2,260	4,800	1,720
12	8,000	3,200	6,600	2,640	5,300	2,120	4,000	1,600
14	6,800	2,990	5,600	2,460	4,500	1,980	3,400	1,490
16	6,000	3,000	5,000	2,500	4,000	2,000	3,000	1,500
18	5,300	2,600	4,400	2,200	3,500	1,750	2,600	1,300
20	4,800	2,400	4,000	2,000	3,200	1,600	2,400	1,200

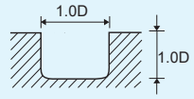
RPM = rev. / min.
FEED = mm / min.



[WAR302 series] ▶ Slotting, General Cutting

WORKPIECE	ALUMINIUM ALLOY (<Si 4%)		ALUMINIUM ALLOY (<Si 8%)		ALUMINIUM ALLOY (DIE CASTING)		ALUMINIUM ALLOY (Cu)	
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
4	24,000	3,840	19,900	2,980	16,000	2,240	12,000	1,440
6	16,000	3,072	13,200	2,370	10,600	1,780	8,000	1,150
8	12,000	2,880	9,900	2,230	8,000	1,680	6,000	1,080
10	9,500	2,730	8,000	2,160	6,300	1,580	4,800	1,030
12	8,000	2,560	6,600	1,980	5,300	1,480	4,000	960
14	6,800	2,390	5,600	1,845	4,500	1,380	3,400	890
16	6,000	2,400	5,000	1,870	4,000	1,400	3,000	900
18	5,300	2,080	4,400	1,650	3,500	1,220	2,600	780
20	4,800	1,920	4,000	1,500	3,200	1,260	2,400	720

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

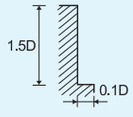


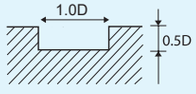
Recommended Cutting Condition

[WAR502 series] ▶ Side Cutting, Slotting, General Cutting

WORKPIECE	ALUMINIUM ALLOY (A7075)		ALUMINUM ALLOY CASTING (Si13%)		MAGNESIUM ALLOY·COPPER ALLOYS	
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED
1	32,000	220	32,000	220	23,000	220
1.2	32,000	230	32,000	230	19,000	220
1.4	32,000	260	32,000	260	16,500	220
1.5	32,000	280	32,000	280	15,500	220
1.6	32,000	320	32,000	320	14,500	220
1.8	32,000	360	32,000	360	13,000	220
2	32,000	420	32,000	420	11,500	220
2.5	25,000	600	25,000	600	9,500	250
3	21,000	700	21,000	700	7,950	250
4	15,500	725	15,500	725	5,950	280
5	12,500	760	12,500	760	4,750	295
6	10,500	830	10,500	830	3,950	310
8	7,950	890	7,950	890	2,950	300
10	6,350	995	6,350	995	2,350	365
12	5,300	1,050	5,300	1,050	1,950	390

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

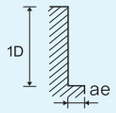




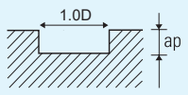
[WAR502 series] ▶Side Cutting, Slotting, High Speed Cutting

WORKPIECE	ALUMINIUM ALLOY (A7075)		ALUMINUM ALLOY CASTING (Si13%)		MAGNESIUM ALLOY·COPPER ALLOYS	
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED
1	50,000	1,000	50,000	950	42,000	700
1.2	50,000	1,200	50,000	1,150	36,000	700
1.4	50,000	1,400	50,000	1,250	31,000	700
1.5	50,000	1,600	48,000	1,250	29,500	700
1.6	50,000	1,700	45,000	1,250	28,000	700
1.8	50,000	1,850	41,000	1,250	26,500	750
2	50,000	2,000	38,000	1,250	24,000	750
2.5	48,000	2,100	31,000	1,250	20,000	750
3	40,000	2,100	26,000	1,250	17,000	750
4	33,000	2,250	20,000	1,350	14,000	800
5	31,000	2,800	19,200	1,650	12,500	950
6	26,000	2,800	15,900	1,700	10,500	1,000
8	19,500	2,900	12,000	1,800	7,900	1,000
10	15,500	3,200	9,600	1,900	6,350	1,100
12	13,000	3,200	8,000	1,900	5,300	1,100

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



	ae
ALUMINIUM ALLOY, ALUMINUM ALLOY CASTING	0.15D
MAGNESIUM ALLOY, COPPER ALLOYS	0.1D

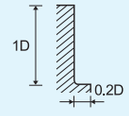


	ap
ALUMINIUM ALLOY, ALUMINUM ALLOY CASTING	0.15D
MAGNESIUM ALLOY, COPPER ALLOYS	0.1D

[WAR503 series] ▶ Side cutting , General Cutting

WORKPIECE	ALUMINIUM ALLOY (A7075)		ALUMINUM ALLOY CASTING (Si13%)		MAGNESIUM ALLOY·COPPER ALLOYS	
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED
3	21,000	1,100	21,000	1,100	7,950	325
4	15,500	1,250	15,500	1,250	5,950	365
5	12,500	1,300	12,500	1,275	4,750	385
6	10,500	1,400	10,500	1,400	3,950	400
8	7,950	1,500	7,950	1,500	2,950	460
10	6,350	1,700	6,350	1,700	2,350	475
12	5,300	1,750	5,300	1,750	1,950	510
16	3,950	1,750	3,950	1,750	1,450	510
20	3,150	1,750	3,150	1,750	1,150	510

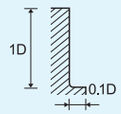
RPM = rev. / min.
FEED = mm / min.



[WAR503 series] ▶Side cutting , High Speed Cutting

WORKPIECE	ALUMINIUM ALLOY (A7075)		ALUMINUM ALLOY CASTING (Si13%)		MAGNESIUM ALLOY·COPPER ALLOYS	
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED
3	40,000	2,100	24,000	1,250	17,000	625
4	32,000	2,250	19,200	1,550	14,300	800
5	32,000	3,250	19,200	1,950	12,700	925
6	26,500	3,500	15,900	2,150	10,600	960
8	20,000	3,750	12,000	2,250	8,000	1,130
10	16,000	4,300	9,600	2,580	6,350	1,150
12	13,300	4,400	8,000	2,650	5,300	1,250
16	10,000	4,400	6,000	2,650	4,000	1,250
20	8,000	4,400	4,800	2,650	3,200	1,250

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

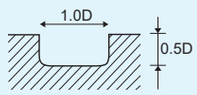


Recommended Cutting Condition

[WAR503 series] ▶ Slotting, General Cutting

WORKPIECE	ALUMINIUM ALLOY (A7075)		ALUMINUM ALLOY CASTING (Si13%)		MAGNESIUM ALLOY·COPPER ALLOYS (AZ91·AZ80A·C1100)	
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED
3	21,000	770	2,100	770	7,950	325
4	15,500	810	15,500	810	5,950	375
5	12,500	860	12,500	860	4,750	385
6	10,500	950	10,500	950	3,950	400
8	8,000	1,000	8,000	1,000	2,950	460
10	6,350	1,150	6,350	1,150	2,350	475
12	5,300	1,200	5,300	1,200	1,950	510
16	3,950	1,200	3,950	1,200	1,450	510
20	3,150	1,200	3,150	1,200	1,150	510

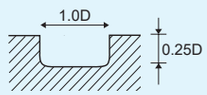
RPM = rev. / min.
FEED = mm / min.



[WAR503 series] ▶ Slotting, High Speed Cutting

WORKPIECE	ALUMINIUM ALLOY (A7075)		ALUMINUM ALLOY CASTING (Si13%)	
DIAMETER(mm)	RPM	FEED	RPM	FEED
3	40,000	1,450	24,000	880
4	32,000	1,700	19,200	1,000
5	32,000	2,200	19,200	1,350
6	26,500	2,400	15,900	1,450
8	20,000	2,500	12,000	1,500
10	16,000	2,800	9,600	1,700
12	13,300	2,950	8,000	1,800
16	10,000	3,000	6,000	1,800
20	8,000	3,000	4,800	1,800

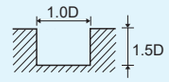
RPM = rev. / min.
FEED = mm / min.

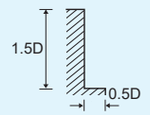


[WAF303 series] ▶ Slotting

WORKPIECE	ALUMINIUM, NONFERROUS METALS			
DIAMETER(mm)	RPM	FEED	RPM	FEED
6	10,500	800	13,500	1,050
8	8,000	700	10,500	900
10	6,500	750	8,500	950
12	5,250	800	6,800	1,050
16	4,000	800	5,200	1,050
20	3,200	800	4,200	1,050

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





Recommended Cutting Condition

[B302, BL422 series]

WORKPIECE	CARBON STEELS, ALLOY STEELS, TOOL STEELS		ALLOY STEELS, TOOL STEELS	
HARDNESS	~ HB225		HB225~325	
DIAMETER(mm)	RPM	FEED	RPM	FEED
R0.5	31,800	572	27,900	502
R1	31,800	1,910	27,900	1,670
R2	15,900	1,910	13,900	1,670
R3	10,600	1,910	9,280	1,670
R4	7,960	1,910	6,960	1,670
R5	6,370	1,780	5,570	1,560
R6	5,310	1,590	4,640	1,390
R8	4,000	1,300	3,500	1,050
R10	3,200	1,000	2,800	840
R12.5	2,400	800	2,100	650

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

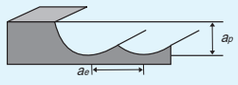
R	a_p	a_e
R≦1.0	0.05 x up to R	0.2 x up to R
1.0< R	0.1 x up to R	0.2 x up to R

※ Please reduce cutting speed around 20~30% from the above table or BL422 series.

[B304 series]

WORKPIECE	CARBON STEELS, ALLOY STEELS, TOOL STEELS		ALLOY STEELS, TOOL STEELS	
HARDNESS	~ HB225		HB225~325	
DIAMETER(mm)	RPM	FEED	RPM	FEED
R0.5	39,750	718.25	34,875	6,275
R1	39,750	2,387.5	34,875	2,087.5
R2	19,875	2,387.5	17,375	2,087.5
R3	13,250	2,387.5	11,600	2,087.5
R4	9,950	2,387.5	8,700	2,087.5
R5	7,962.5	2,225	6,962.5	1,950
R6	6,637.5	1,987.5	5,800	1,737.5
R8	5,000	1,625	4,375	1,312.5
R10	4,000	1,250	3,500	1050
R12.5	3,000	1,000	2,625	812.5

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



R	a_p	a_e
R≦1.0	0.05 x up to R	0.2 x up to R
1.0< R	0.1 x up to R	0.2 x up to R

[E302, E322, EL422 series]

	Side Cutting				Slotting			
	DepthofCut : 1.5D WIDTH : 0.1D				DepthofCut : 0.5D WIDTH : 1D			
	CARBON STEELS, ALLOY STEELS, TOOL STEELS		ALLOY STEELS, TOOL STEELS		CARBON STEELS, ALLOY STEELS, TOOL STEELS		ALLOY STEELS, TOOL STEELS	
HARDNESS	~ HB225		HB225~325		~ HB225		HB225~325	
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
1	5,300	60	4,300	50	4,300	40	3,500	20
2	4,500	80	3,800	60	3,800	50	3,100	30
3	3,700	80	3,200	60	3,200	50	2,650	30
4	2,750	110	2,400	60	2,400	50	2,000	30
6	1,850	110	1,600	60	1,600	50	1,320	30
8	1,400	110	1,200	90	1,200	60	1,000	40
10	1,100	110	950	90	950	60	800	40
12	930	110	800	90	800	60	660	40
16	700	110	600	90	600	60	500	40
20	560	110	480	90	480	60	400	40
25	450	110	380	90	380	60	320	40

※ Please reduce cutting speed around 20~30% from the above table or E322 series.

[E304, E324 series]

	Side Cutting				Slotting			
	DepthofCut : 1.5D WIDTH : 0.1D				DepthofCut : 0.5D WIDTH : 1D			
	CARBON STEELS, ALLOY STEELS, TOOL STEELS		ALLOY STEELS, TOOL STEELS		CARBON STEELS, ALLOY STEELS, TOOL STEELS		ALLOY STEELS, TOOL STEELS	
DIAMETER(mm)	~ HB225		HB225~325		~ HB225		HB225~325	
HARDNESS	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
1	6,630	90	5,380	75	5,380	60	4,380	30
2	5,630	120	4,750	90	4,750	75	3,880	45
3	4,630	120	4,000	90	4,000	75	3,310	45
4	3,440	165	3,000	90	3,000	75	2,500	45
6	2,310	165	2,000	90	2,000	75	1,650	45
8	1,750	165	1,500	135	1,500	90	1,250	60
10	1,380	165	1,190	135	1,190	90	1,000	60
12	1,160	165	1,000	135	1,000	90	830	60
16	880	165	750	135	750	90	630	60
20	700	165	600	135	600	90	500	60
25	560	165	480	135	480	90	400	60

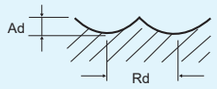
※ Please reduce cutting speed around 20~30% from the above table or E324 series.

Recommended Cutting Condition

[BC502 series]

WORKPIECE		UNALLOYED COPPER			
R(mm)	DIAMETER(mm)	RPM	FEED	Rd	Ad
0.5	1	41,000	1,660	0.040	0.063
0.75	1.5	27,000	1,830	0.068	0.087
1	2	20,000	1,780	0.089	0.112
1.25	2.5	16,000	1,840	0.115	0.090
1.5	3	13,000	2,220	0.171	0.168
2	4	10,000	2,080	0.208	0.200
2.5	5	8,300	1,990	0.240	0.200
3	6	6,900	1,940	0.281	0.250
4	8	5,720	1,000	0.175	0.400
5	10	4,550	700	0.154	0.500
6	12	3,770	600	0.159	0.600

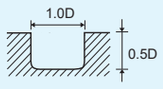
RPM = rev. / min.
FEED = mm / min.

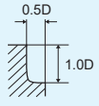


[RC502 series]

WORKPIECE	UNALLOYED COPPER			
DIAMETER(mm)	RPM	FEED	RPM	FEED
3	44,500	2,350	50,000	3,700
4	33,400	2,100	50,000	4,700
6	22,300	2,100	33,400	4,900
8	16,700	2,100	25,000	4,700
10	13,370	2,100	20,000	4,800
12	11,100	2,100	16,700	4,700

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

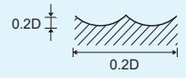




[G series]

WORKPIECE	GRAPHITE	
DIAMETER(mm)	RPM	FEED
0.5	16,000	480
0.75	16,000	640
1	16,000	800
1.5	16,000	1,450
2	16,000	2,100
3	15,000	2,950
4	13,000	3,000
5	11,500	3,050
6	10,500	3,150
8	8,555	2,960

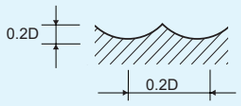
RPM = rev. / min.
FEED = mm / min.



[WGB504 series]

WORKPIECE	GRAPHITE	
DIAMETER(mm)	RPM	FEED
1.0	20,000	700
2.0	16,000	1,200
3.0	16,000	2,000
4.0	16,000	3,100
5.0	15,000	3,800
6.0	15,000	4,400
8.0	13,000	4,500
10.0	12,000	4,600
12.0	10,000	4,700
16.0	7,500	3,800
20.0	6,000	3,500

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

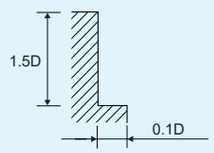


Recommended Cutting Condition

[GE series]

WORKPIECE	GRAPHITE	
DIAMETER(mm)	RPM	FEED
0.4	40,000	200
0.6	40,000	350
0.8	40,000	550
1.0	40,000	700
2.0	25,000	800
3.0	20,000	800
4.0	18,000	950
5.0	14,000	1,200
6.0	11,000	1,400
8.0	8,000	1,300
10.0	6,500	1,200
12.0	5,500	1,200

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

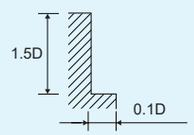


※ Please reduce cutting speed 50% from the above table when using long and extra long type

[WGE504 series]

WORKPIECE	GRAPHITE	
DIAMETER(mm)	RPM	FEED
3.0	20,000	1,600
4.0	18,000	1,900
5.0	14,000	2,400
6.0	11,000	2,800
8.0	8,000	2,600
10.0	6,500	2,400
12.0	5,500	2,400
16.0	4,200	2,450
20.0	3,300	2,400

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

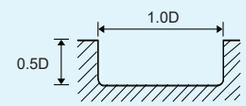


※ Please reduce cutting speed 50% from the above table when using long and extra long type

[WGR502 series]

WORKPIECE	GRAPHITE	
DIAMETER(mm)	RPM	FEED
0.4	40,000	640
0.6	40,000	640
0.8	40,000	800
1.0	40,000	960
1.2	40,000	1,200
1.5	40,000	1,440
2.0	40,000	1,600
3.0	27,000	1,900
4.0	20,000	2,300
5.0	16,000	2,300
6.0	14,000	2,300

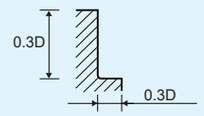
RPM = rev. / min.
FEED = mm / min.



[WGR504 series]

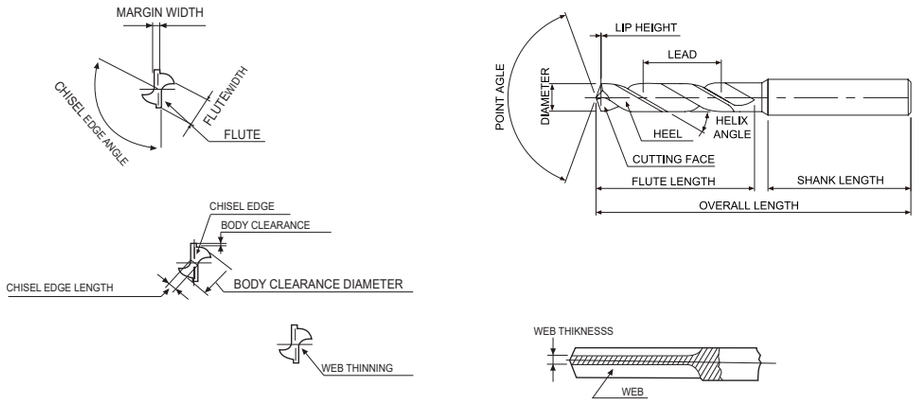
WORKPIECE	GRAPHITE	
DIAMETER(mm)	RPM	FEED
4.0	40,000	3,500
6.0	40,000	5,600
8.0	32,000	5,600
10.0	26,000	5,700
12.0	21,000	5,450
16.0	15,800	5,450
20.0	12,800	5,500

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



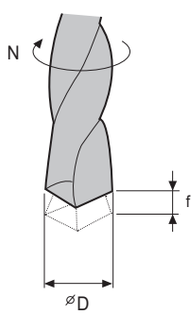
Recommended Cutting Condition

[Nomenclature of Drill]



[Working of Main Angle]

POINT ANGLE	HELIX ANGLE	LIP RELIEF ANGLE
70° 118° 140°	10° 38° 40°	7° 10° 12° 15°
Large → Torque → Small Small → Thrust → Large	Bad → Cutting Capacity → Good Good → Chip Ejection → Bad Large → Rigidity of tool → Small	Small → Tool Wear → Large Small → Vibration → Large



●Cutting Speed

$$V = \frac{\pi \times D \times N}{1000} \text{ (m/min)}$$

- V : Cutting Speed (m/min)
- D : Diameter of drill (mm)
- N : Revolution (rpm)
- π : (3.14)

●Feed

$$f = \frac{S}{N} \text{ (m/rev)}$$

- f : Feed (mm/rev)
- S : Depth of cut per min (mm/min)
- N : Revolution (rpm)

●Helix Angle

$$\delta^{\circ} = \mathrm{Tan}^{-1}\left(\frac{\pi D}{L}\right)$$

- δ : Helix angle
- D : Diameter of drill (mm)
- L : lead (mm)
- π : (3.14)

[NDPR/NDPL series]

WORKPIECE	CARBON STEELS(C〈0.3%) ALLOY STEELS/SS400 SCM ~710N/㎟		CARBON STEELS(C〈0.3%) ALLOY STEELS/S50C SCM ~1,060N/㎟		GREY CAST IRON 〈HB240		GREY CAST IRON 〈HB350		STAINLESS STEELS	
V	80~120m/min		80~120m/min		120~200m/min		80~130m/min		40~45m/min	
DIAMETER (mm)	RPM	fn (mm/rev)	RPM	fn (mm/rev)	RPM	fn (mm/rev)	RPM	fn (mm/rev)	RPM	fn (mm/rev)
1	13,000	0.04	13,000	0.04	21,300	0.04	14,200	0.04	7,160	0.03
2	13,000	0.06	13,000	0.06	21,300	0.06	14,200	0.06	7,160	0.04
3	13,000	0.13	13,000	0.13	21,000	0.13	14,000	0.13	4,780	0.07
4	9,500	0.14	9,500	0.14	16,000	0.14	10,500	0.14	3,600	0.08
5	7,600	0.15	7,600	0.15	13,000	0.15	8,300	0.15	2,850	0.09
6	6,400	0.17	6,400	0.17	11,000	0.17	6,900	0.17	2,400	0.1
8	4,800	0.21	4,800	0.21	8,000	0.21	5,200	0.21	1,800	0.12
10	3,800	0.25	3,800	0.25	6,400	0.25	4,150	0.25	1,450	0.15
12	3,200	0.27	3,200	0.27	5,300	0.27	3,450	0.27	1,200	0.17
14	2,750	0.29	2,750	0.29	4,550	0.29	3,000	0.29	1,000	0.19
16	2,400	0.31	2,400	0.31	4,000	0.31	2,600	0.31	900	0.21
18	2,100	0.33	2,100	0.33	3,550	0.33	2,300	0.33	800	0.23
20	1,900	0.35	1,900	0.35	3,200	0.35	2,100	0.35	700	0.25

※Recommended conditions in the above table are ideal conditions, and work by adjusting the conditions according to the equipment and other conditions.

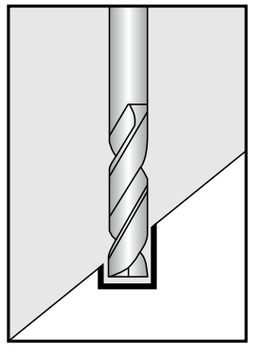
*NDPL : Apply 85% of the table

Recommended Cutting Condition

[CTS BOTTOM DRILL Cutting Condition]

WORK-PIECE	GREY CAST IRON CARBON STEELS		ALLOY STEELS PREHARDENED STEELS		MOLD&DIE STEELS		HARDENED STEELS STAINLESS STEELS		DUCTILE CAST IRON		ALUMINIUM ALLOY STEELS		ALUMINIUM	
	RPM	fn (mm/rev)	RPM	fn (mm/rev)	RPM	fn (mm/rev)	RPM	fn (mm/rev)	RPM	fn (mm/rev)	RPM	fn (mm/rev)	RPM	fn (mm/rev)
3	8,150	0.05	7,120	0.05	3,790	0.05	2,650	0.03	7,180	0.04	17,400	0.06	12,500	0.05
4	6,100	0.07	5,260	0.07	2,870	0.06	2,000	0.04	5,280	0.06	12,850	0.08	9,550	0.07
5	4,920	0.08	4,240	0.08	2,260	0.08	1,600	0.05	4,210	0.07	10,300	0.10	7,650	0.09
6	4,100	0.09	3,540	0.1	1,840	0.09	1,300	0.06	3,550	0.09	8,750	0.12	6,400	0.10
8	3,080	0.14	2,660	0.13	1,400	0.12	1,000	0.08	2,670	0.12	6,480	0.16	4,750	0.14
10	2,400	0.17	2,110	0.17	1,100	0.15	800	0.10	2,110	0.15	5,230	0.20	3,800	0.17
12	2,000	0.21	1,750	0.21	950	0.18	650	0.12	1,740	0.18	4,330	0.24	3,200	0.21

※ When using non-water soluble oil, the RPM and V should be lowered by 20%.



Sloping surface machining

* For slope drilling, the conditions in the table above must be reduced depending on the slope angle.

Sloping surface rake	Cutting Condition	
	RPM	fn (mm/rev)
0 ~ 15°	100%	100%
15° ~ 30°	100%	50% ↓
30° ~	70% ↓	30% ↓

[PF50, P50, HP50 series]

WORKPIECE	CARBON STEELS(C<0.3%) ALLOY STEELS/SS400 SCM ~710N/mm²		CARBON STEELS(C≥0.3%) ALLOY STEELS / S50C SCM ~1.060N/mm²		SUJ2· SUS440		SKD61 HRc34~43		HRc43~48		SKD11 HRc48~53		CAST IRON FC 250~350		DUCTILE FC 400~500	
V	80~125m/min		80~125m/min		63~80m/min		40~63m/min		32~45m/min		25~36m/min		80~125m/min		63~90m/min	
DIAMETER (mm)	RPM	fn (mm/rev)	RPM	fn (mm/rev)	RPM	fn (mm/rev)	RPM	fn (mm/rev)	RPM	fn (mm/rev)	RPM	fn (mm/rev)	RPM	fn (mm/rev)	RPM	fn (mm/rev)
2	12,000	0.06-0.08	12,000	0.06-0.08	11,000	0.06-0.08	8,000	0.06-0.08	6,000	0.05-0.07	4,500	0.03-0.06	15,000	0.06-0.08	11,000	0.06-0.08
3	9,600	0.09-0.12	9,600	0.09-0.12	7,500	0.09-0.12	5,300	0.09-0.12	4,000	0.07-0.11	3,200	0.05-0.09	10,000	0.09-0.12	7,600	0.09-0.12
4	8,000	0.10-0.15	8,000	0.10-0.15	5,650	0.10-0.15	4,000	0.10-0.15	3,000	0.08-0.13	2,600	0.06-0.10	8,000	0.10-0.15	6,000	0.10-0.15
5	6,400	0.12-0.18	6,400	0.12-0.18	4,550	0.12-0.18	3,300	0.12-0.18	2,400	0.10-0.15	2,000	0.8-0.12	6,400	0.12-0.18	4,800	0.12-0.18
6	5,300	0.14-0.20	5,300	0.14-0.20	3,800	0.14-0.20	2,750	0.14-0.20	2,000	0.12-0.18	1,700	0.09-0.15	5,300	0.14-0.20	4,000	0.14-0.20
8	4,000	0.16-0.24	4,000	0.16-0.24	2,850	0.16-0.24	2,100	0.16-0.24	1,500	0.14-0.22	1,300	0.12-0.20	4,000	0.16-0.24	3,000	0.16-0.24
10	3,200	0.18-0.27	3,200	0.18-0.27	2,250	0.18-0.27	1,700	0.18-0.27	1,200	0.15-0.25	1,000	0.13-0.23	3,200	0.18-0.27	2,400	0.18-0.27
12	2,650	0.20-0.30	2,650	0.20-0.30	1,900	0.20-0.30	1,400	0.20-0.30	1,000	0.17-0.26	850	0.14-0.24	2,700	0.20-0.30	2,000	0.20-0.30
14	2,300	0.22-0.35	2,300	0.22-0.35	1,600	0.22-0.35	1,200	0.22-0.35	860	0.18-0.30	730	0.15-0.26	2,300	0.22-0.35	1,700	0.22-0.35
16	2,000	0.25-0.36	2,000	0.25-0.36	1,400	0.25-0.36	1,050	0.25-0.36	760	0.20-0.32	640	0.16-0.26	2,000	0.25-0.36	1,500	0.25-0.36
18	1,800	0.28-0.38	1,800	0.28-0.38	1,250	0.28-0.38	920	0.28-0.38	670	0.23-0.33	570	0.18-0.28	1,800	0.28-0.38	1,350	0.28-0.38
20	1,600	0.30-0.40	1,600	0.30-0.40	1,150	0.30-0.40	850	0.30-0.40	600	0.25-0.35	500	0.20-0.30	1,600	0.30-0.40	1,200	0.30-0.40

[SF503, SF505, SF508, PI503, PI505 Series]

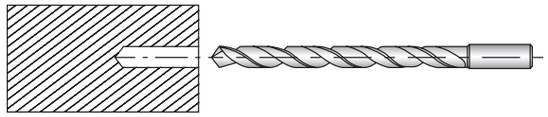
WORKPIECE	CARBON STEELS(C<0.3%) ALLOY STEELS/SS400 SCM ~710N/mm²		CARBON STEELS(C≥0.3%) ALLOY STEELS / S50C SCM ~1.060N/mm²		SUJ22· SUS440		SKD61 HRc34~43		HRc43~48		SKD11 HRc48~53		CAST IRON FC 250~350		DUCTILE FC 400~500	
V	80~150m/min		80~150m/min		63~100m/min		40~70m/min		32~50m/min		25~40m/min		80~150m/min		63~100m/min	
DIAMETER (mm)	RPM	fn (mm/rev)	RPM	fn (mm/rev)	RPM	fn (mm/rev)	RPM	fn (mm/rev)	RPM	fn (mm/rev)	RPM	fn (mm/rev)	RPM	fn (mm/rev)	RPM	fn (mm/rev)
3	12,000	0.09~0.12	13,000	0.09~0.12	7,600	0.09~0.12	6,400	0.09~0.12	5,300	0.07~0.11	3,800	0.05~0.09	12,000	0.09~0.12	8,500	0.09~0.12
4	9,500	0.1~0.15	10,000	0.1~0.15	5,700	0.1~0.15	4,800	0.1~0.15	4,000	0.08~0.13	2,950	0.06~0.1	9,000	0.1~0.15	6,350	0.1~0.15
5	7,600	0.12~0.18	8,000	0.12~0.18	4,600	0.12~0.18	3,800	0.12~0.18	3,200	0.1~0.15	2,300	0.08~0.12	7,600	0.12~0.18	5,100	0.12~0.18
6	6,400	0.14~0.20	6,600	0.14~0.20	3,800	0.14~0.20	3,200	0.14~0.20	2,650	0.12~0.18	1,900	0.09~0.15	6,400	0.14~0.20	4,250	0.14~0.20
8	4,800	0.16~0.24	5,000	0.16~0.24	2,900	0.16~0.24	2,400	0.16~0.24	2,000	0.14~0.22	1,450	0.12~0.2	4,800	0.16~0.24	3,200	0.16~0.24
10	3,800	0.18~0.27	4,000	0.18~0.27	2,300	0.18~0.27	1,900	0.18~0.27	1,600	0.15~0.25	1,150	0.13~0.23	3,800	0.18~0.27	2,550	0.18~0.27
12	3,200	0.20~0.30	3,300	0.20~0.30	1,900	0.20~0.30	1,600	0.20~0.30	1,300	0.17~0.26	950	0.14~0.24	3,200	0.20~0.30	2,100	0.20~0.30
14	2,700	0.22~0.35	2,800	0.22~0.35	1,600	0.22~0.35	1,350	0.22~0.35	1,150	0.18~0.3	800	0.15~0.26	2,700	0.22~0.35	1,800	0.22~0.35
16	2,400	0.25~0.36	2,500	0.25~0.36	1,400	0.25~0.36	1,200	0.25~0.36	1,000	0.2~0.32	700	0.16~0.26	2,400	0.25~0.36	1,600	0.25~0.36
18	2,100	0.28~0.38	2,200	0.28~0.38	1,300	0.28~0.38	1,100	0.28~0.38	900	0.23~0.33	650	0.18~0.28	2,100	0.28~0.38	1,400	0.28~0.38
20	1,900	0.30~0.40	2,000	0.30~0.40	1,150	0.30~0.40	1,000	0.30~0.40	800	0.25~0.35	600	0.2~0.3	1,900	0.30~0.40	1,250	0.30~0.40

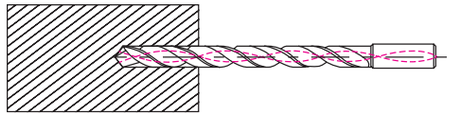
• SF503(3xD) : fn 100%
• SF505(5xD) : fn 90%
• SF508(8xD) : fn 70~80%

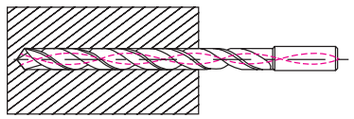
Recommended Cutting Condition

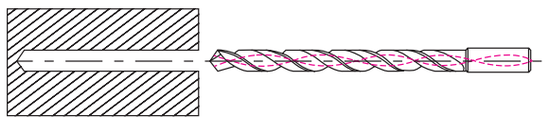
[SF510, SF520 series]

WORKPIECE	CARBON STEELS, ALLOY STEELS ~1060 N/mm²		CAST IRON 250~350 N/mm²		DUCTILE CAST IRON 400~500 N/mm²	
V	63~125 m/min		63~125 m/min		60~80 m/min	
DIAMETER(mm)	RPM	fn (mm/rev)	RPM	fn (mm/rev)	RPM	fn (mm/rev)
3	7,500	0.06 ~ 0.12	7,500	0.06 ~ 0.12	7,500	0.06 ~ 0.12
4	6,400	0.08 ~ 0.16	6,400	0.08 ~ 0.16	5,600	0.08 ~ 0.16
5	5,800	0.10 ~ 0.20	5,800	0.10 ~ 0.20	4,500	0.10 ~ 0.20
6	4,800	0.12 ~ 0.24	4,800	0.12 ~ 0.24	3,800	0.12 ~ 0.24
8	3,600	0.16 ~ 0.28	3,600	0.16 ~ 0.28	2,800	0.16 ~ 0.28
10	2,900	0.20 ~ 0.35	2,900	0.20 ~ 0.35	2,300	0.20 ~ 0.35
12	2,900	0.24 ~ 0.42	2,400	0.24 ~ 0.42	1,900	0.24 ~ 0.42
14	2,050	0.28 ~ 0.46	2,050	0.28 ~ 0.46	1,600	0.28 ~ 0.46









1. Guide Drilling should be done as Diameter+0.1mm between 3×D and 5×D

2. For Main Drilling, proceed with low RPM at Guide Drilling segment.
(RPM 300, FEED 400mm/min)

3. Just before the end of Guide Drilling segment, reduce feed to zero and increase the RPM according to Recommended

4. After then, proceed main drilling by increasing feed without step drilling.

5. When coming out from Guide Drilling start point after drilling, RPM should be reduced as 300 and feed should be 1000 mm/min.

6. When coming out from Guide Drilling segment to the outside, the feed should be decreased as 50%

[HPI503, 505, 508, HP503 series]

WORKPIECE	NON-ALLOY STEELS		ALLOY STEELS		SOFT CAST IRON		STRONG CAST IRON	
STRENGTH	＜700N/㎟		＜1000N/㎟		＜HB240, GG25		＜HB300, GG40	
DIAMETER(mm)	RPM	fn (mm/rev)	RPM	fn (mm/rev)	RPM	fn (mm/rev)	RPM	fn (mm/rev)
1.0	16,250	0.05	14,800	0.05	26,600	0.05	17,300	0.05
2.0	16,250	0.07	14,800	0.07	26,600	0.07	17,300	0.07
3.0	16,000	0.16	14,500	0.16	26,000	0.16	17,000	0.16
4.0	12,000	0.17	11,000	0.17	20,000	0.17	13,000	0.17
5.0	9,550	0.18	8,600	0.18	16,000	0.18	10,000	0.18
6.0	8,000	0.20	7,200	0.20	13,000	0.20	8,500	0.20
7.0	6,800	0.22	6,100	0.22	11,500	0.22	7,300	0.22
8.0	6,000	0.24	5,400	0.24	9,900	0.24	6,400	0.24
9.0	5,300	0.27	4,800	0.27	8,800	0.27	5,700	0.27
10.0	4,800	0.30	4,300	0.30	8,000	0.30	5,100	0.30
12.0	4,000	0.33	3,600	0.33	6,600	0.33	4,250	0.33
14.0	3,400	0.36	3,050	0.36	5,700	0.36	3,650	0.36
16.0	3,000	0.39	2,700	0.39	5,000	0.39	3,200	0.39
18.0	2,650	0.42	2,400	0.42	4,400	0.42	2,850	0.42
20.0	2,400	0.45	2,150	0.45	4,000	0.45	2,550	0.45

※ Reduce each product feed as shown below.
HPI503(3xD) : Feed 100%
HPI505(5xD) : Feed 90%
HPI508(8xD) : Feed 70~80%

[SSD, SSDL series]

WORKPIECE	TOOL STEELS, ALLOY STEELS		ALUMINIUM, ALUMINIUM ALLOY		BRASS, BRONZE		EPOXY, RESIN	
DIAMETER (mm)	RPM	fn (mm/rev)	RPM	fn (mm/rev)	RPM	fn (mm/rev)	RPM	fn (mm/rev)
3	4000~7000	0.02	10000~12000	0.03	7000~10000	0.02	9000~12000	0.08
5	2400~4200	0.03	6000~8000	0.05	4200~6000	0.04	5400~7200	0.08
8	1500~2600	0.05	3700~5000	0.08	2600~3700	0.08	3400~4500	0.09
12	1000~1700	0.06	2500~3200	0.12	1700~2500	0.12	2200~3000	0.11

[SSTD series]

WORKPIECE	TOOL STEELS, ALLOY STEELS		ALUMINIUM, ALUMINIUM ALLOY		BRASS, BRONZE		EPOXY, RESIN	
DIAMETER (mm)	RPM	fn (mm/rev)	RPM	fn (mm/rev)	RPM	fn (mm/rev)	RPM	fn (mm/rev)
3	4,000~7,000	0.02	10,000~12,000	0.03	7,000~10,000	0.02	9,000~12,000	0.08
5	2,400~4,200	0.03	6,000~8,000	0.05	4,200~6,000	0.04	5,400~7,200	0.08
8	1,500~2,600	0.05	3,700~5,000	0.08	2,600~3,700	0.08	3,400~4,500	0.09
12	1,000~1,700	0.06	2,500~3,200	0.12	1,700~2,500	0.12	2,200~3,000	0.11

Recommended Cutting Condition

[APF505 series]

Metric

Work Material	ALUMINIUM ALLOY STEELS	Cast Aluminum	MAGNESIUM	Copper & Brass	TITANIUM
Type	6061	380			6Al-4V
V	140~200	90~150	75~150	75~151	30~90
DIAMETER(mm)	fn(mm/rev)				
4	0.15~0.20	0.11~0.23	0.11~0.23	0.08~0.18	0.08~0.18
6	0.19~0.38	0.15~0.30	0.15~0.30	0.15~0.23	0.15~0.23
8	0.27~0.45	0.23~0.38	0.23~0.38	0.15~0.23	0.15~0.23
10	0.34~0.53	0.23~0.45	0.23~0.45	0.15~0.30	0.15~0.30
12	0.45~0.60	0.27~0.53	0.27~0.53	0.23~0.38	0.23~0.38
16	0.49~0.75	0.30~0.60	0.30~0.60	0.21~0.45	0.21~0.45

[Technical Solutions about general problems to use drill]

Problems and Circumstances	Cause	Technical Countermeasures
Not drill into workpiece	· No enough Lip Relief · Thick Web	Re-grinding of Lip Relief Get the Web thinner
Chipping-off on margin part	large jig-bushing	Use the right sized bushing on drill
Balance of cutting flutes	To overheat on drill during the operation	Reduce feed rate Supply enoungh cutting oil
Chipped-off on cutting flutes	· Large relief angle · High feed rate	· Adjust Lip Relief · Reduce feed rate
Damage on tang	Incomplete adhesiveness between soket and shaft	Remove foreign substance and replace it to new one when it is worn out
Damage on a drill during a processing of brass	· Wrong choice of shape of drill · Clogged-up with chips in groove	Choose suitable drill for material
Crack on center of drill	· Lack of number of flutes · Huge feed rate	· Re-grinding with proper relief angle · Reduce feed rate
Getting hole size larger	· Difference between point angle and cutting flutes · Loose main spindle	· Choose good qualitative drill · Adjust spindle within measure
Damage on edge	· High feed rate · foreign substance on workpiece · Lack of cutting oil supply on drill tip	· Grind tip of drill suitable for workpiece · Reduce feed rate · Regrind it on early stage
Irregular size of chip	inappropriate grind on edge of flute or using only one side of flute	· Need a exact re-grinding · Choose good qualitative drill
Roughness of hole	· blunt edge of flute or inappropriate grinding excessive feed rate · No supply cutting oil on tip of drill	· Regrind flute edge angle · Suppy plenty of appropriate cutting oil · Reduce feed rate

Recommended Cutting Condition

WH Limits

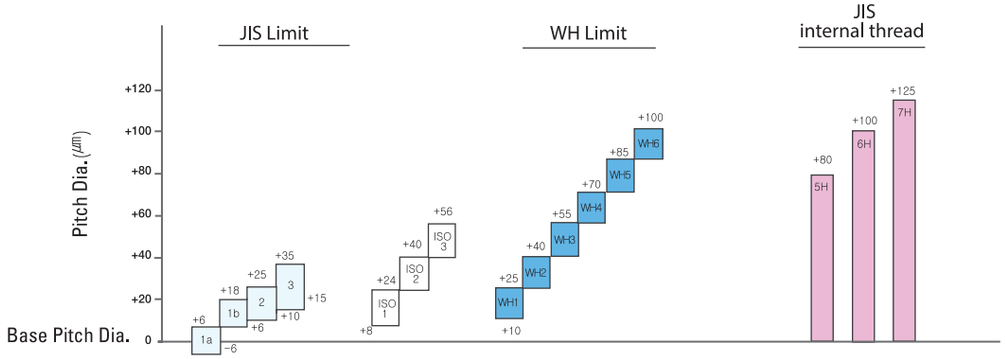
WH Limits

WIDIN applies an unique WH limits system in order to fulfill the degree of an internal thread and provides users the best taps for suitable working and operating conditions.

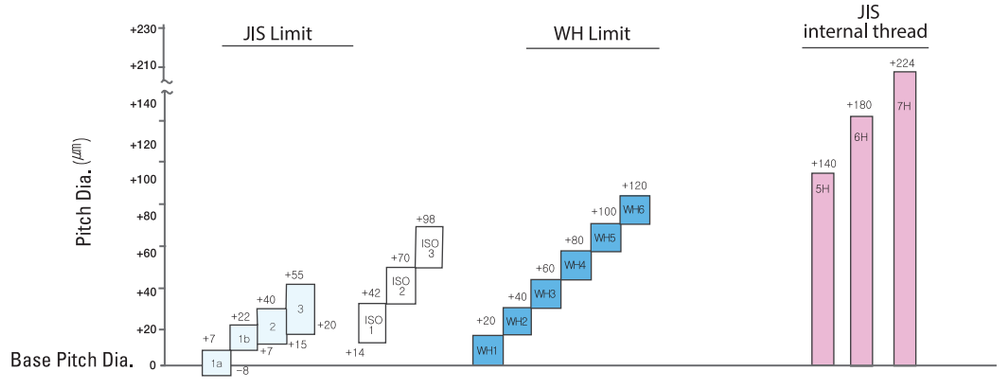
1. {P≤ 0.6(T.P.I≥40)}
   Upper Limits : 0.010 + 0.015 x n
   Lower Limits : Upper Limits - 0.015
   Unit :mm (n=WH number)

2. {P≤ 0.7(T.P.I≤36)}
   Upper Limits : 0.020 x n
   Lower Limits : Upper Limits -0.020
   Unit:mm (n=WH number)

Example M3×0.5



Example M10×1.5

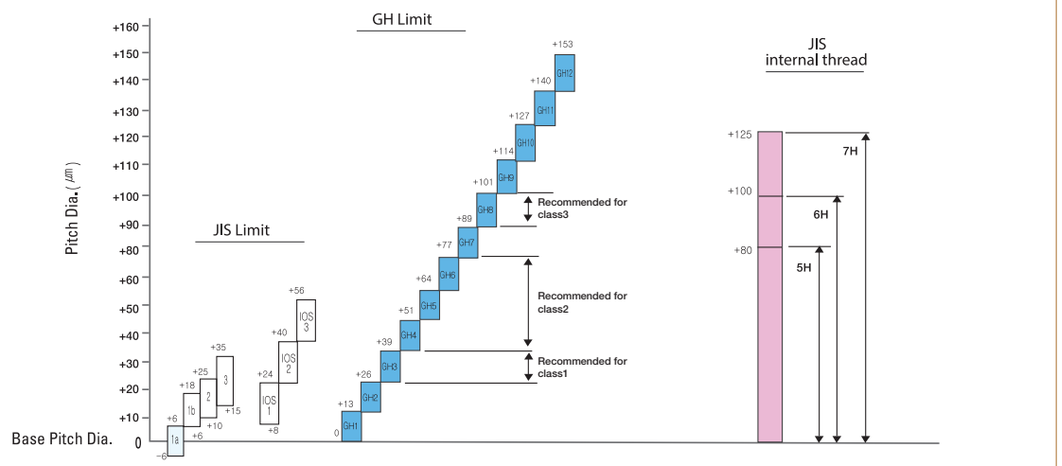


GH Limits

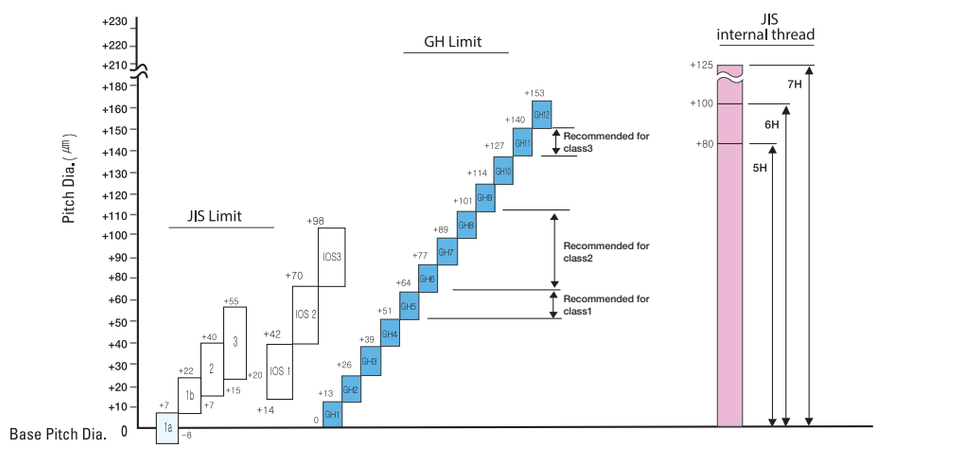
GH Limits

Since roll taps process female threads by plastic deformation, strict drill diameter management is required, unlike other cutting taps. Tap limit is strictly applied to.
WIDIN adopts the limit of 12.7㎛(0.0005") increments.

Example M3×0.5



Example M10×1.5



Recommended Cutting Condition

Recommended tapping speeds and cutting fluids

Tapping speeds depend on very important factors such as material type of tap, chamfer length, drill size, work materials and cutting fluids.
Users need to check every aspect before applying it.
Morever, cutting fluids, cooling and abrasion resistance are three important factors affecting cutting fluids.
Therefore, users should provide enough fluids during the tapping process.

Recommended tapping speeds and cutting fluids

Work Material		Tapping(m/min)						Cutting Fluids			
		Straight Fluted Tap	Spiral Fluted Tap	Sprial Pointed Tap	Tungsten Carbide Tap	Roll Tap	Pipe Thread Tap	Non Water-soluble	Water-soluble	Semidry	dry
Low Carbon Steels	C ~0.25%	8~13	8~13	15~25	-	8~13	3~6	◎	○	△	△
Medium Carbon Steels	CO,25~ 0.45%	7~12	7~12	10~15	-	7~10	3~6	◎	○	△	△
High Carbon Steels	C 0.45%~	6~9	6~9	8~13	-	5~8	2~5	◎	○	△	△
Alloy Steels	SCM	7~12	7~12	10~15	-	5~8	2~5	◎	△	△	△
Hardened Steels	25~45 HRc	3~5	3~5	4~6	-	-	2~5	◎	△	–	–
Stainless Steels	SUS	4~7	5~8	8~13	-	5~10	3~6	◎	○	–	–
Precipitation Hardened Stainless Steels	SUS630 SUS631	3~5	3~5	4~6	-	-	2~5	◎	–	–	–
Tool Steels	SKD	6~9	6~9	7~10	-	-	2~5	◎	–	–	–
Cast Steels	SC	6~11	6~11	10~15	-	-	2~5	◎	○	–	–
Cast Iron	FC	10~15	-	-	10~20	-	2~5	◎	○	○	○
Ductile Cast Iron	FCD	7~12	7~12	10~20	10~20	-	4~8	◎	○	○	–
Copper	Cu	6~9	6~11	7~12	10~20	7~12	2~5	○	○	–	–
Brass, Brass Casting	Bs, Bsc	10~15	10~20	15~25	15~25	7~12	5~10	○	○	○	○
Bronze, Bronze Casting	PB, PBC	6~11	6~11	10~20	10~20	7~12	6~11	○	○	–	–
Aluminum	AL	10~20	10~20	15~25	-	10~20	5~10	◎	○	△	–
Aluminum Alloy Casting	AC, ADC	10~15	10~15	15~20	10~20	10~25	10~15	◎	○	△	–
Magnesium Alloy Casting	MC	7~12	7~12	10~15	10~20	-	10~15	◎	○	○	–
Zinc Alloy Casting	ZDC	1~12	7~12	10~15	10~20	7~12	10~15	◎	○	△	–
Thermo Setting Plastic	Bakelite, Phenol Epoxy	10~20	-	-	15~25	-	5~10	–	○	○	○
Thermo Plastic	Vinyl Chloride Nylon	10~20	10~15	10~20	10~20	-	5~10	–	○	○	○

◎: Ideal / ○:Good / △: Applicable / - : Not Applicable

Recommended Drill hole size with JIS internal thread Class 2

Thread Size	Recommended Drill Size (mm)	Drill Size(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 Cutting Condition

[CDS series]

WORKPIECE	MOLD&DIE STEELS	ALLOY STEELS		STAINLESS STEELS
STRENGTH	＜700N/㎟	~HRc23	~HRc32	
V	30~50 m/min	30~50 m/min	20~40 m/min	15~25 m/min
DIAMETER(mm)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)	fn (mm/rev)
1.0	0.01~0.03	0.01~0.03	0.01~0.03	0.01~0.03
2.0	0.01~0.035	0.01~0.035	0.01~0.035	0.01~0.035
3.0	0.015~0.05	0.015~0.05	0.015~0.05	0.015~0.05
4.0	0.02~0.06	0.02~0.06	0.02~0.06	0.02~0.06
5.0	0.03~0.07	0.03~0.07	0.03~0.07	0.03~0.07
6.0	0.04~0.07	0.04~0.07	0.04~0.07	0.04~0.07

[LDS, LDF series]

WORKPIECE	S15C ·SS400 ~500N/mm²		S45C		SCM440		SKD61 28HRc		SKD61 34HRc		FC250		AC4D	
V	63~80m/min		40~63m/min		32~50m/min		20~28m/min		16~22m/min		63~100m/min		80~160m/min	
DIAMETER(mm)	RPM	fn (mm/rev)	RPM	fn (mm/rev)	RPM	fn (mm/rev)	RPM	fn (mm/rev)	RPM	fn (mm/rev)	RPM	fn (mm/rev)	RPM	fn (mm/rev)
3	7,500	0.04~0.08	5,500	0.04~0.08	4,500	0.04~0.08	2,500	0.04~0.08	1,500	0.04~0.08	8,000	0.05~0.09	12,000	0.10~0.22
4	5,700	0.05~0.10	4,100	0.05~0.10	3,300	0.05~0.10	1,900	0.05~0.10	1,100	0.05~0.1	6,500	0.07~0.12	9,500	0.12~0.25
6	3,800	0.06~0.12	2,700	0.06~0.12	2,300	0.06~0.12	1,250	0.06~0.12	750	0.06~0.12	4,300	0.12~0.18	6,400	0.14~0.28
8	2,800	0.08~0.15	2,000	0.08~0.15	1,700	0.08~0.15	950	0.08~0.15	550	0.08~0.15	3,200	0.13~0.20	4,800	0.18~0.32
10	2,300	0.10~0.18	1,700	0.10~0.18	1,400	0.10~0.18	750	0.10~0.18	450	0.1~0.18	2,600	0.17~0.25	3,800	0.22~0.36
12	1,900	0.12~0.21	1,400	0.12~0.21	1,200	0.12~0.21	650	0.12~0.21	370	0.12~0.21	2,200	0.21~0.30	3,200	0.25~0.40
16	1,400	0.16~0.28	1,000	0.16~0.28	900	0.16~0.28	500	0.16~0.28	280	0.16~0.28	1,600	0.24~0.32	2,400	0.32~0.48
20	1,150	0.20~0.34	820	0.20~0.34	700	0.20~0.34	400	0.20~0.34	220	0.2~0.34	1,300	0.26~0.40	1,900	0.40~0.60
25	900	0.25~0.45	650	0.25~0.45	560	0.25~0.45	300	0.25~0.45	180	0.25~0.45	1,000	0.30~0.50	1,500	0.50~0.75

[CES series]

WORKPIECE	CARBON STEELS, ALLOY STEELS						STAINLESS STEELS. TITANIUM ALLOY		ALUMINIUM	
HARDNESS	~HRc20		HRc20~ HRc30		HRc30~ HRc40					
STRENGTH	500~800N/mm²		800~1000N/mm²		1000~1300N/mm²					
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
3	5,900	60	4,000	30	3,300	25	2,400	20	14,000	220
4	4,800	60	3,300	30	2,800	25	2,000	20	11,800	230
5	3,800	60	2,500	30	2,200	25	1,760	20	9,500	240
6	3,000	60	2,000	30	1,800	30	1,400	20	7,700	250
8	2,300	65	1,540	35	1,300	35	1,100	20	5,800	260
10	2,000	65	1,300	35	1,200	35	1,000	20	5,000	260
12	1,760	65	1,000	40	1,000	35	540	20	4,400	260
16	1,400	65	900	40	770	35	660	25	3,300	270
20	1,100	65	700	40	600	35	440	25	2,600	270

FEED : mm/min

[CEM series]

WORKPIECE	CARBON STEELS, ALLOY STEELS						STAINLESS STEELS. TITANIUM ALLOY		ALUMINIUM	
HARDNESS	~HRc20		HRc20~ HRc30		HRc30~ HRc40					
STRENGTH	500~800N/mm²		800~1000N/mm²		1000~1300N/mm²					
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED	RPM	FEED
3	5,900	95	3,900	65	3,300	50	2,400	40	14,000	230
4	4,800	95	3,200	65	2,800	50	2,000	40	12,000	240
5	3,800	100	2,500	65	2,200	55	1,760	45	9,500	250
6	3,000	110	2,000	70	1,800	60	1,400	50	7,700	300
8	2,300	115	1,540	75	1,300	65	1,100	55	5,800	350
10	2,000	120	1,300	80	1,200	65	1,000	55	5,100	380
12	1,760	130	1,100	90	1,000	70	840	60	4,400	400
16	1,400	140	900	90	770	70	660	60	3,000	330
20	1,100	140	700	90	600	70	440	60	2,640	340

FEED : mm/min

[CRC series]

WORKPIECE	CARBON STEELS S54C ~ S55C		ALLOY STEELS, TOOL STEELS SKD / SUS / SCM		HARDENED STEELS NAK / HPM	
HARDNESS					HRc35~ HRc45	
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED
1.9	3,200	60	2,300	50	2,500	40
2.9	2,500	60	1,800	50	1,800	40
3.9	1,850	60	1,400	50	1,400	40
4.9	1,600	60	1,100	50	1,200	40
5.9	1,400	60	900	50	1,000	40

FEED : mm/min

Recommended Cutting Condition

[CFT, CCT, CCF series]

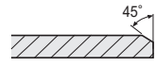
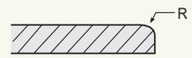
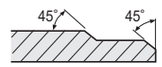
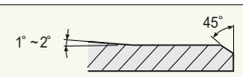
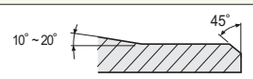
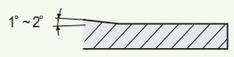
▶ Metric

WORKPIECE	CARBON STEELS		ALLOY STEELS		PREHARDENED STEELS	
DIAMETER(mm)	RPM	FEED	RPM	FEED	RPM	FEED
2	3,400-7,000	70-100	2,600-5,200	50-90	2,000-4,000	40-60
3	2,700 - 5,300	60-85	2,100-4,200	45-70	1,600-3,200	35-50
4	2,000 - 4,000	50-70	1,600-3,200	40-55	1,200-2,400	30-40
5	1,700 - 3,400	45-60	1,400-2,600	35-50	1,000-2,000	26-35
6	1,300 - 2,700	40-50	1,100-2,100	30-40	800-1,600	22-30
7	1,150-2,400	35-45	950-1,900	28-37	700-1,400	21-28
8	1,000-2,000	30-40	800-1,600	26-34	600-1,200	20-25
9	900-1,800	30-40	700-1,450	24-32	550-1,100	18-23
10	800-1,600	30-37	600-1,300	23-29	500-1,000	17-22
11	750-1,450	30-37	550-1,200	22-28	450-900	16-21
12	700-1,300	28-35	500-1,100	21-27	400-800	16-20

[Recommendation of Cutting Conditions in Reamer]

WORKPIECE			DIAMETER(mm)	CUTTING CONDITIONS	
MATERIAL	TENSILE STRENGTH(Kg/mm²)	HARDNESS(HB)		V (m/min)	fn (mm/rev)
CARBON STEELS ALLOY STEELS	~ 100		~10 10~25 25~40	8 ~ 12	0.15 ~ 0.25 0.20 ~ 0.40 0.30 ~ 0.50
	100 ~ 140		~10 10~25 25~40	6 ~ 10	0.12 ~ 0.20 0.15 ~ 0.30 0.20 ~ 0.40
STEEL CASTINGS	40 ~ 50		~10 10~25 25~40	8 ~ 12	0.15 ~ 0.25 0.20 ~ 0.40 0.30 ~ 0.50
	50 ~ 70		~10 10~25 25~40	6 ~ 10	0.12 ~ 0.20 0.15 ~ 0.30 0.20 ~ 0.40
CAST IRON		~ 200	~10 10~25 25~40	8 ~ 15	0.20 ~ 0.30 0.30 ~ 0.50 0.40 ~ 0.70
		200 ~	~10 10~25 25~40	6 ~ 12	0.15 ~ 0.25 0.20 ~ 0.40 0.30 ~ 0.50
ALUMINUM ALLOYS			~10	15 ~ 25	0.20 ~ 0.30 0.30 ~ 0.50 0.40 ~ 0.70
			10~25 25~40	20 ~30	

[The Effect of Chamfer]

TWIST DIRECTION	CHARACTERISTICS
	If the work piece is caught by sharp blade edge, dent occurs on the machined surface. It is applied to chucking reamer, etc.
	Guide edge was rounded. The ground surface is excellent but round machining is difficult and it may deteriorate the machined surface.
	It is 2 blade-type. Chip is produced in 2 stages and it provides good results. But regrinding is difficult.
	The guide part of second stage of cutting edge is 1~2°. Cutting edge blade is long and life is limited. It provides good results on finish machining
	The guide part of second stage is 10~20. It is very economical as the length of blade is short and utilized length is long
	It is used for finish machining. It is applied to hand reamer.

[The Effect of Twist Angle]

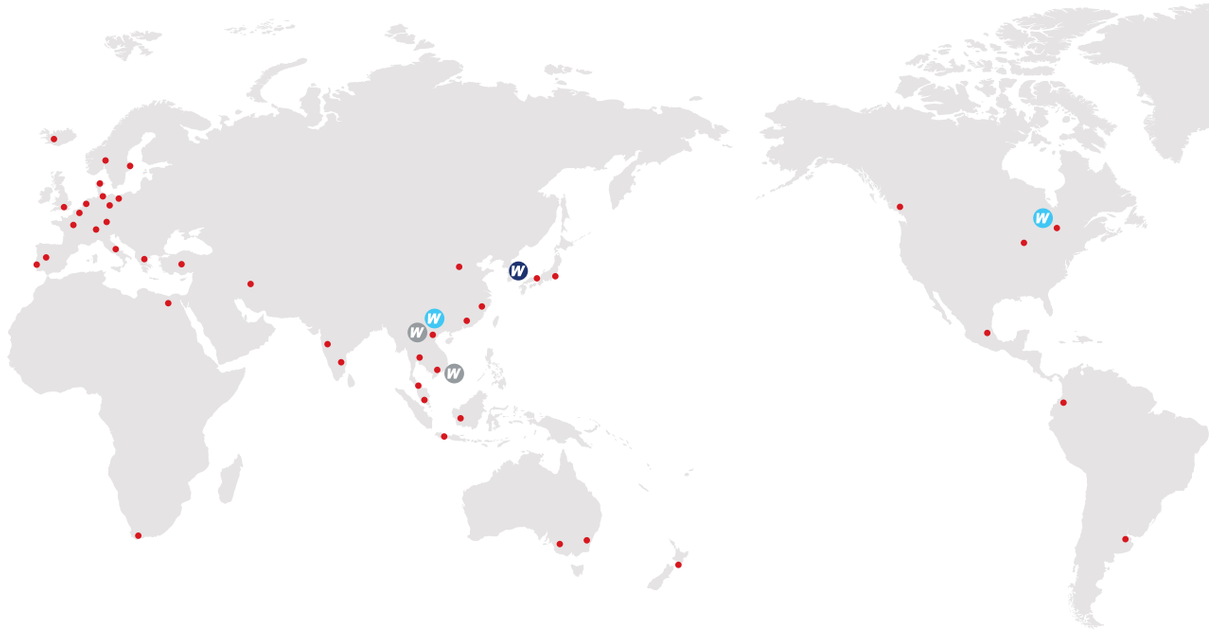
TWIST DIRECTION	CHARACTERISTICS
Straight blade (twist angle is 0°)	• Surface is generally poor except cast iron.
Right twist blade	• Excellent machinability and easy to discharge chip • Applicable work piece range is wide. • Excellent for high hardness work piece
Left twist blade	• Excellent surface roughness for work piece of aluminium alloys, copper, and copper alloys • It is good for machining soft materials

Recommended Cutting Condition

[Trouble Shooting of Reaming]

TROUBLE	PLAN	MEASURES
Enlarged Hole	Increase burnishing effects	• Decrease chamfer angle • Decrease back taper • Use S.CI type cutting oil • Increase margin width • Grind 2 stages chamfer • Check reamer diameter
	Suppress the occurrence of built-up-edge	• Increase margin width • Grind 2 stages chamfer • Change heat treatment conditions and microstructure of workpiece • Increase cutting oil supply • Increase cutting speed and reduce feed rate
	Reduce the unbalance of cutting force	• The cutting edge difference shall be less than 0.005mm • Increase cutting speed • Reduce the deviation of main axis and basic Diameter • Check wear conditions of bush and replace it • Change water soluble cutting oil to non-water soluble oil
Shrinked Hole	Reduce finish effects	• Increase the clearance angle of cutting edge • Decrease margin width • Increase back taper • Increase cutting speed
Poor roundness	Reduce Chattering	• Increase the strength of machine • Change to left helix reamer • Increase back taper • Increase feed rate • Reduce the tolerance of bush • Increase margin width • Decrease cutting speed
Poor surface roughness	Increase burnishing	• Use left helix • Grind with 2 stage chamfer • Decrease chamfer angle
	Remove deposit	• Increase rake angle • Reduce feed rate • Increase cutting speed
	Remove chattering	• The cutting edge difference shall be less than 0.005mm • Increase cutting speed • Align main axis center and basic diameter center • Change water soluble cutting oil to non-water soluble oil
	Remove chip interference	• Change shape of flute type • Increase the depth of flute

WIDIN
GLOBAL NETWORK



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2020.10

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