株洲圣达切削刀具有限公司
ZHUZHOU SANT CUTTING TOOLS CO.,LTD.

SANT

2016 切削刀片与硬质合金立铣刀

SANT
INSERT AND SOLID CARBIDE END MILL

Tel : 0731-28822550 28822551 28822559
Fax : 0731-28822560
Post : 412007
Web : www.hnsant.com
Add : Block A,Building7,B area,Auto parts Industrial Park,No.9 Zhongda Road, Tianyan District,Zhuzhou City,Hunan Province P.R.China.

株洲圣达切削刀具
ZHUZHOU SANT CUTTING

SANT / 公司简介
INTRODUCTION

株洲圣达切削刀具有限公司是一家专业设计、制造及销售数控刀具的工厂。公司位于中国最大的硬质合金生产基地——株洲。公司目前的主要产品有：数控车刀（P类、M类、D类、S类、W类、C类，内外螺纹车刀，切断切槽刀及切断刀板等），数控铣刀（面铣刀、方肩铣刀、大进给铣刀、重力切削铣刀、成型铣刀等），孔加工刀具（浅孔钻、镗刀等）及工具系统。

公司拥有强大的设计团队，通过了ISO9001质量管理体系认证；采用ERP系统进行高效准确的管理；拥有包括MAZAK五轴联动高精度加工中心在内的多台数控加工设备以及各种检测设备；同时与包括NIHONG-TECHNO热处理公司在内的多家优秀供应商建立了协作关系，以确保“SANT”系列产品的质量始终处于行业领先水平。

公司拥有多年的设计及制造数控刀具的经验，能够为客户提供各类非标刀具，也能为您提供整套产品加工所需的刀具配套方案。公司秉承“质量第一，服务至上”的理念，与全世界许多客户建立了长期友好的合作。

Zhuzhou Sant Cutting Tools Co.Ltd is a factory specializing in the designing, producing and selling of CNC cutting tools. Located in Zhuzhou - one of the biggest manufacturing bases of cemented carbide cutting tools in China,our company mainly produces various cnc turning tools(P、M、D、S、W、C type tool holders,internal and external threading tool holders, parting and grooving tools, parting blade and so on)、cnc milling tools(face milling tools, square-shoulder milling tools、high feed milling cutter、gravity cutting cutter、formed cutter and so on)、drilling tools(U drills、boring cutter and so on) and tooling systems.

We have strong design team and complete quality-testing system and has passed the ISO9001 Certification of Quality Management System. Besides ERP system is adopted to improve the efficient and accurate manage ment. More importantly, we have various kinds of processing equipment, including MAZAK Five-Axis Linkage High-Precision Machining Center.In order to make sure the quality of "SANT" series products always stands at the front of the industry, we have established collaboration relationships with many outstanding suppliers including NIHONG TECHNO - the heat treatment company.

With the experience of designing and manufacturing cnc cutting tools for many years, we can provide customers with various non-standard tool holders,and can also provide a complete set of supporting scheme for required tools during the processing. In accordance with the principle"Quality First, Service Supreme", we have established long-term friendly cooperation relationships with many customers all over the world.

目录
CONTENTS

TURNING INSERT PAGE

车削加工常见问题及对策 A1-A2
FAQ FOR TURNING PROCESSING

车削刀片牌号介绍 A3-A4
RECOMMENDED GRADE FOR TURNING INSERT

车削刀片槽型介绍 A5~A9
CHIPBREAKER FOR TURNING INSERT

普通车削刀片公、英制对照表 A10-A11
COMPARISON TABLE OF METRIC AND INCH INSERTS FOR TURNING

普通车削刀片命名规则 A12-A13
GENERAL TURNING INSERT CODE KEY

车削刀片一览表 A14~A16
TURNING INSERT OVERVIEW

普通车削刀片 A17~A50
GENERAL TURNING INSERT

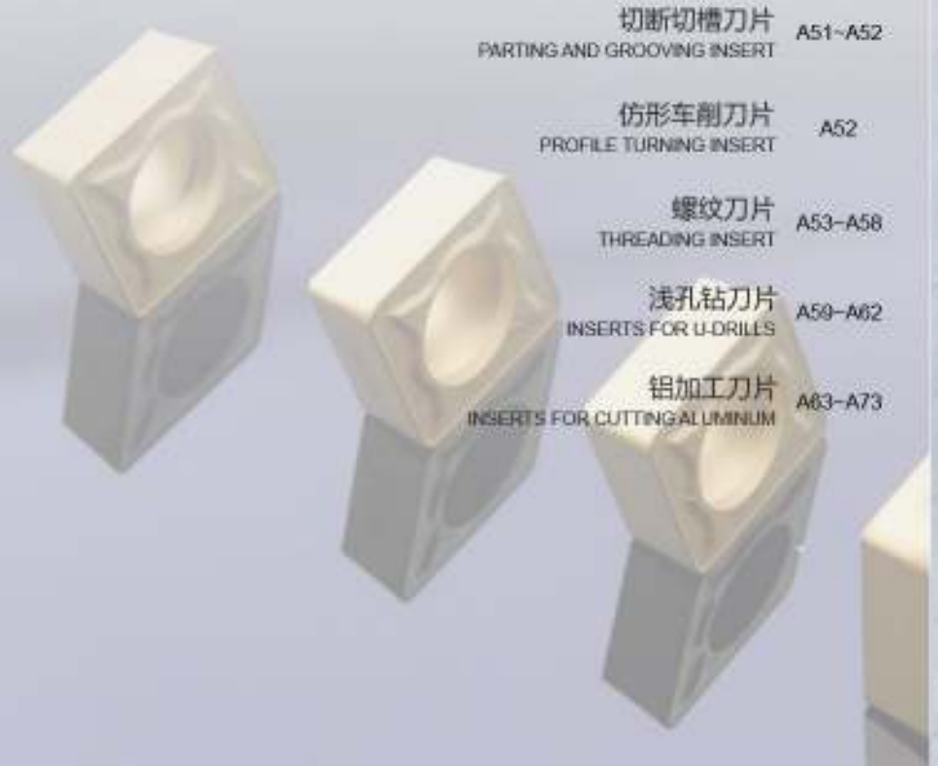
切断切槽刀片 A51~A52
PARTING AND GROOVING INSERT

仿形车削刀片 A52
PROFILE TURNING INSERT

螺纹刀片 A53-A58
THREADING INSERT

浅孔钻刀片 A59-A62
INSERTS FOR U-DRILLS

铝加工刀片 A63-A73
INSERTS FOR CUTTING ALUMINUM



目录
CONTENTS

SOLID CARBIDE END MILL PAGE

整体硬质合金立铣刀一览表 B1-B5
SOLID CARBIDE END MILLS OVERVIEW

整体硬质合金立铣刀命名规则 B4
SOLID CARBIDE END MILLS CODE KEY

图标种类及识别 B5
GRAPHICS CATEGORY AND IDENTIFICATION

通用加工GM系列 B6-B38
GM SERIES FOR GENERAL MACHINING

高硬度钢加工HM系列 B39~B59
HM SERIES FOR MACHINING HIGH HARDNESS STEEL

铜加工NM系列 B60-B64
NM SERIES FOR MACHINING COPPER

铝加工AL系列 B65-B74
AL SERIES FOR MACHINING ALUMINUM

不锈钢，耐热合金等难切削材料加工SM系列 B75-B80
SM SERIES FOR MACHINING STAINLESS STEEL, HEAT RESISTANT ALLOY ETC HARD-TO-CUT MATERIALS

整体硬质合金立铣刀切削参数 B81-B133
RECOMMENDED CUTTING PARAMETERS

整体硬质合金立铣刀技术信息 B134~B137
TECHNICAL INFORMATION

车削刀片
TURNING
INSERTS

▶ Frequent Problems of turning and solutions

Common Problem	Cause	Solutions	Tool material: Harder material	Tougher material	Cutting conditions: Cutting speed	Feed rate	Cutting depth	Cutting liquid	Tool shapes: Change chipbreaker of inserts	Rake face	Nose radius	Approach angle	Cutting edge strength	Increase precision of inserts	Increase rigidity of tool holder	Machine clamping system: Clamping of non holder and insertion	Overhang of tool holder	Power Grip
Over abrasion on nose	Bad precision during machining	Abrasion intensified on flank	○								↑							
		Unsuitable cutting conditions			↓	↑												
Surface precision deterioration	Bad surface quality	Abrasion intensified and cutting edge not sharping enough	○		↓			○		↑	↑		↓	○				
		Cutting edge breakage		○		↓	↓		○		↑		↑			○	○	○
		Unsuitable geometrical shape of cutting edge							○		↑		↓	○				
		Unsuitable cutting conditions			↑	↓	↓	○										
		Vibration		○	↑↓	↓	↓	○	○	↑	↓	↑	↓		○	○	○	○
		Built-up edge			↑	↑		○	○	↑			↓	○				
Radiation	Effect of cutting heat	Unsuitable cutting conditions			↓	↓	↓											
		Unsuitable geometrical shape of cutting edge		○					○	↑			↓					
Bad precision of dimensions	Dimension fluctuate during cutting	Inserts tolerance												○				
		Offset of workpiece or tools							○	↑	↓	↑			○	○	○	○
Breakage	Abrasion on flank and rake face	Abrasion on clearance face	○		↓				○	↑	↑		↓					
		Abrasion on rake face	○		↓	↓	↓		○	↑		↓						
	Edge chipping	Vibration and impact		○		↓	↓		○			↓	↑		○	○	○	○
	Built-up edge	Unsuitable workpiece hardness for cutting conditions			↑	↑		○	○	↑			↓	○				
	Thermal cracking	Hardness of workpiece material and tool material unsuitable for cutting conditions			↓	↓	↓	○	○	↑			↓					
	Cutting edge nose deformation	Occurring during intermittent machining with high feed rate	○		↑	↓	↓	○	○	↑	↑	↓	↓					
	Tool life	Unsuitable materials and cutting conditions		○		↓	↓		○		↑	↓	↑		○	○	○	○
Chip controlling	Long, unbroken and snarled chips	Unsuitable cutting conditions			↓	↑	↑	○										
		Unsuitable Geometry							○		↓	↑						
	Too short and hard chips	Unsuitable cutting conditions				↓	↓	○										
		unsuitable geometrical shape of cutting edge							○		↑	↓						
Burr and breakdown flange	Steel and Al, burrs occurring	Unsuitable cutting conditions			↑	↓		○										
		Tool abrasion and unsuitable geometrical shape	○						○	↑	↓	↑	↓					
	Edge break out on cast iron	Unsuitable cutting conditions			↓	↑		○										
		Tool abrasion and unsuitable geometrical shape	○						○	○	↓	↓	↓					
	Heavy burr on soft steel	Unsuitable cutting conditions				↓	↓											
		Tool abrasion and unsuitable geometrical shape	○						○	↑	↑		↑		○	○	○	○

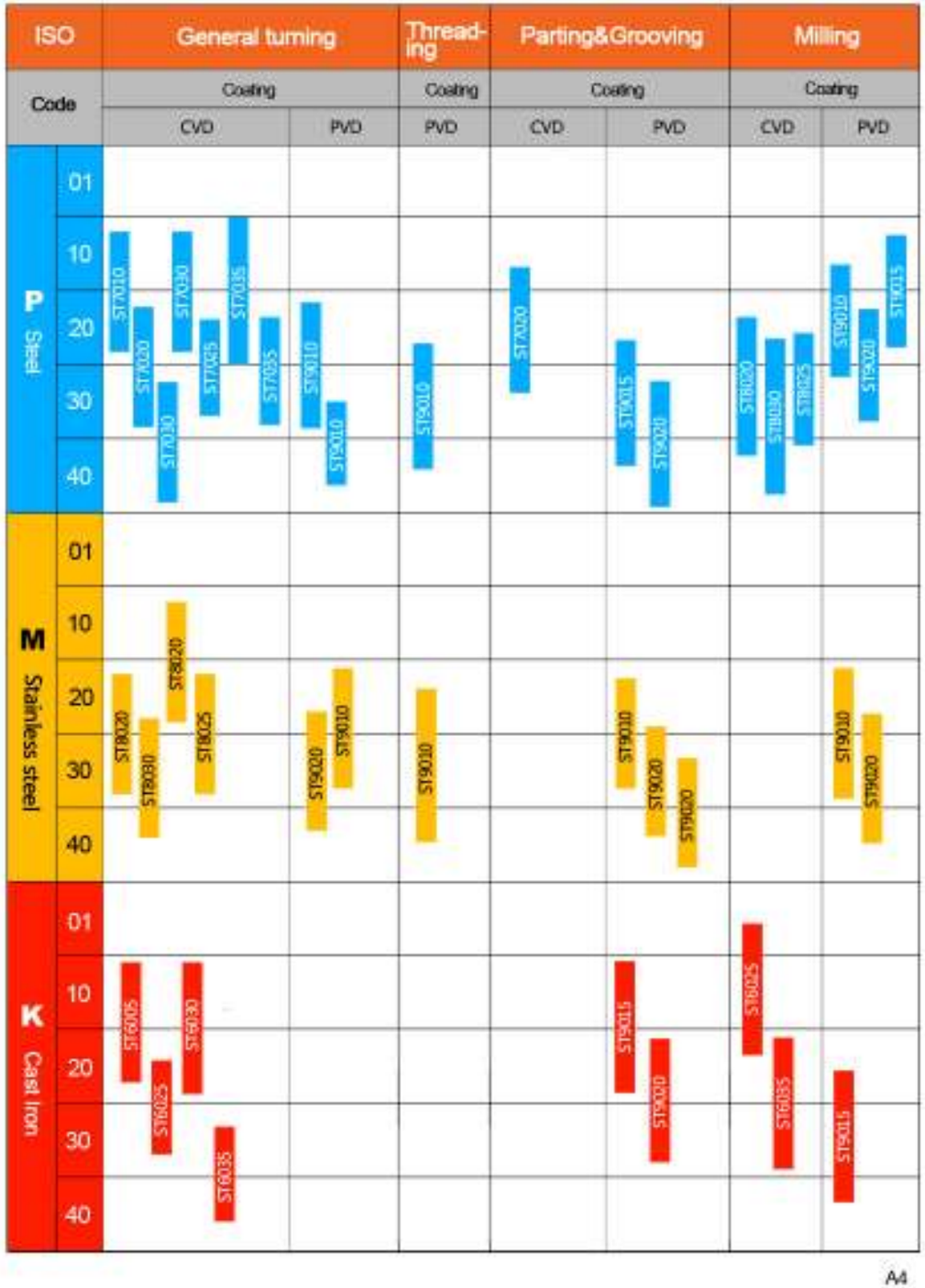
Tool damage type	Phenomenon	Cause	Solutions
Flank wear	Cutting resistant force increasing Groove wear on flank	Tool material is too soft Cutting speed is too high Clearance angle is too small Feed rate is too low	Select tool materials with good wear resistance Reduce cutting speed Enlarge clearance angle Increase feed rate
Rake face wear (Crater wear)	Bad chip controlling Surface quality deterioration	Tool material is too soft Cutting speed is too high Feed rate is too high	Select tool materials with good wear resistance Reduce cutting speed Reduceri feed rate
Cutting edge breakage	Occasional breakage Instability of tool life	Tool material is too hard Feed rate is high Cutting edge strength is not high enough Rigidity of tool holder and tool bar is small	Select tool materials with good toughness Reduce feed rate Increase land width(rounding changes into chamfering) Enlarge tool bar size
Breakage	Cutting resistant force increasing Deteriorating of surface	Tool material is too hard Feed rate is high Cutting edge strength is not high enough Rigidity of tool holder and tool bar is low	Select tool materials with good toughness Reduce feed rate Increase land width(rounding changes into chamfering) Enlarge tool bar size
Plastic deformation (cutting edge collapse)	Workpiece dimension change Nose abrasion	Tool material is too soft Cutting speed is too high Cutting depth and feed rate are too high Cutting edge temperature is too high	Select tool material with good wear resistance Reduce cutting speed Reduce cutting depth and feed rate Select tool materials with good heat conductivity
Built-up edge (Bonding)	Surface quality deterioration during floating Cutting resistant force increasing	Cutting speed is low Cutting edge is sharpe enough Tool material is unsuitable	Increase cutting speed Enlarge rake angle Select tool materials that are not easy to adhere together (coating, cermet, etc.)
Thermal cracking	Damage because of thermal circulation Normally occurring during intermittent machining	Tool material is too hard Premature edge failure due to thermal crack	Adopt dry cutting or enough cooling liquid Select tool materials with good toughness
Flaking	Usually occurring when machining super hard materials, which is accompanied with vibration	Flaking occurs on cutting edge Chip flow us obstructed	Sharpen cutting edge by enlarging rake angle Enlarge chip pocket
Chattering	Partial breakage Partial grooving	Workpiece material is too high. Oxide,High temperature ally.	Select CVD coating materials with good wear resistance Adopt taper cutting Reduce approach angle

Turning Inserts Grade Application

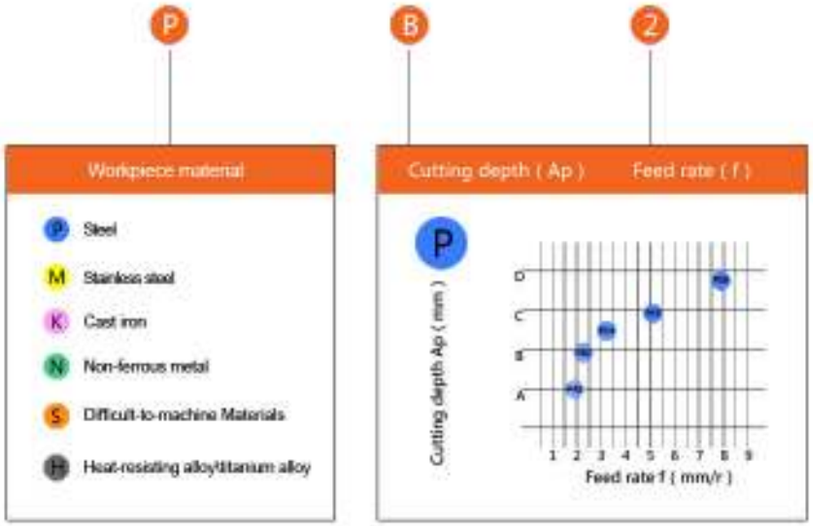
Grade	Application
ST6005	CVD coated grade , which is characterized by super fine grain and smooth surface,is the combination of hard substrate and coating (extra thick AL2O3 + thick TiCN). The grade is optimized for best wear resistance when machining gray cast iron at high speed under dry condition.
ST6015	CVD coated grade , which is the combination of hard subtrate and coating (thick AL2O3+thick TiCN), shows excellent wear resistance and impact resistance when machining nodular cast iron at high speed.
ST6035	CVD coated grade which is the combination of hard subtrate and coating (medium thick AL2O3+thick TiCN), has good flaking resistance, it is suitable for turning of cast iron at high speed,and light intermittent cutting can be supported even at moderate speed .It is also suitable for milling of cast iron.
ST7010	The combination of substrate with excellent wear resistance and coating composed of MT-TiCN, thick layer of AL2O3 and TiN makes it suitable for finishing steel.
ST7015	Thick TiCN+thick AL2O3 coated ,with excellent wear resistance and impact resistance , makes it suitable for finishing and semi-finishing of steel at high speed cutting speed can increase by more than 25%, while the tool life can increase by improve 30%at the same cutting speed.
ST7020	The substrate with good toughness and high security of cutting edge, in optimal combination with coating composed of MT-TiCN , thick layerof AL2O3 and TiN makes it suitable for steel semi-finishing.
ST7025	**Comprising of thick TiCN and thick AL2O3 coatings , the grade has high capability against plastic deformation and good hardness of cutting edge. It is preferred grade for machining of steel from finishing to roughing.** Under the same cutting conditions , the cutting speed can be increased by more than 25% , while the tool life can be 30% longer under the same cutting speed .
ST7030	The best combination of substrate with high wear resistance and coating composed of MT-TiCN , thick AL2O3 layer and TiN makes it suitable for roughing of steel .
ST8015	CVD coating with advanced ultra-fine grain coating technology , greatly improves wear resistance of inserts . Thanks to special treatment on transition layer , multi-layer coating are combined firmly . The exceptionally smooth coating surface and good low friction ability can reduce the occurrence of built-up-edges. Added with resist high temperature rare element, inserts shows a good capability against plastic deformation and good capability of Red Hardness. Unique manufacturing technology improves high temperature toughness and wear resistance of substrate .Its the best option for high speed cutting of stainless steel under good machining condition .
ST8025	Ultra-fine grain coating technology provides better wear resistance and toughness ; Improved remain internal stress design ensures good toughness and anti-cracking performance; Polishing treatment on coating surface makes it suitable for cutting adhesive materials. With gradient carbide substrate insert has better impact residence and cutting edge strength .Ideal grade for turning of stainless steel with high cutting depth and high feed rate under bad working condition.
ST9005	The combination of nc-TiAlN coating and fine grain substrate makes it suitable for turning of various materials and finishing and semi-finishing of high-temperature alloys.
ST9010	nc-TiAlN coating and Ultra-fine grain substrate makes it suitable for finishing and semi-finishing of various materials and turning of super alloy.
ST9015	PVD coating grade for finishinf of stainless steel . Suitable for relatively small workpieces which requir high surface smoothness. Superfine TiAlN nano coating added with wear-resistant and heat-resistant rare elements has high hardness and excellent heat-resistance , providing effective protection for the cutting edge. Special coatinl technology ensures stronger combination of coating and substrate . It is suitable for extra finishing of stainless steel .
ST9020	The combination of nc-TiAlN coating and tough cemented carbide substrate , which integrates security and wear resistance , makes it suitable for parting and grooving of various materials.

株洲圣达切削刀具
ZHUZHOU SANT CUTTING

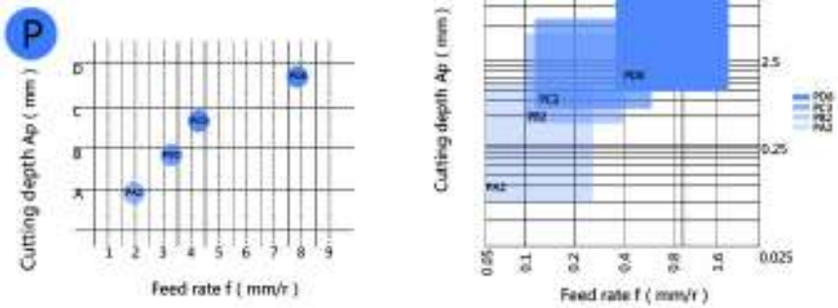
Recommended grade overview turning inserts

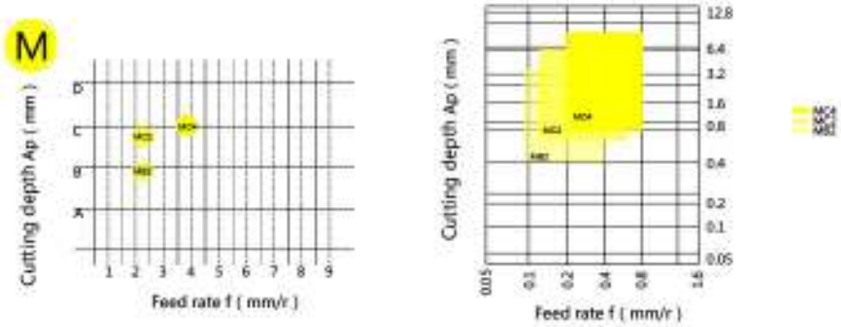


Groove introduction for turning inserts



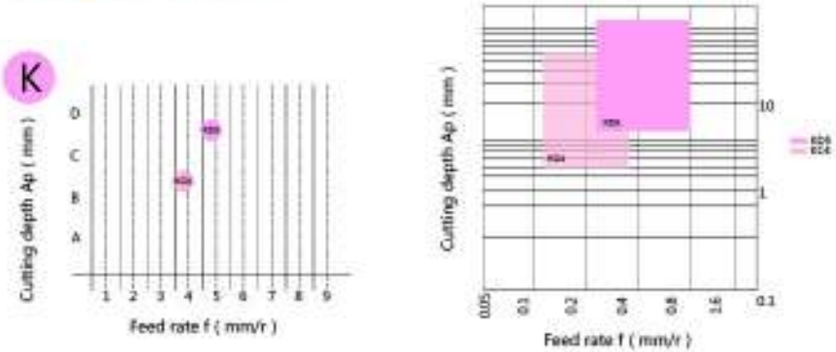
Cutting control chart

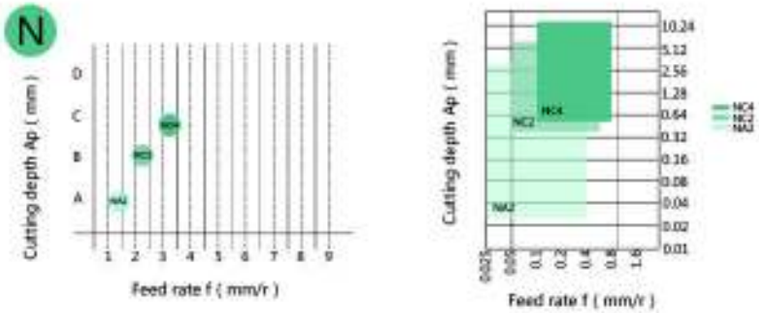


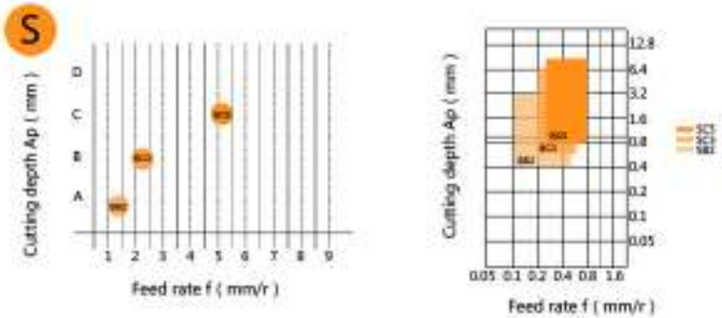


株洲圣达切削刀具
ZHUZHOU SANT CUTTING

Cutting control chart







Groove introduction for turning inserts

Negative groove		Application specification
	SDF	Suitable for finish machining of steel, cutting force is small, chip breaker is reliable, the workpiece can obtain the ideal processing precision and surface finish.
	SPM	Suitable for semi-finishing of steel.
	SEM	Suitable for semi-finishing of stainless steel.
	SDR	Suitable for semi-finishing of steel.
	SER	Suitable for rough machining of stainless steel.
	SDF	Suitable for finish machining of steel.

Positive groove		Application specification
	SHF	Suitable for finish machining of steel and stainless steel.
	SHM	Suitable for semi-finishing of steel and stainless steel.
	SHR	Suitable for rough machining of steel and stainless steel.
	SMP	Suitable for semi-finishing of steel and stainless steel.
	SLC	Suitable for aluminum, aluminum alloy materials.

株洲圣达切削刀具
ZHUZHOU SANT CUTTING

Select table for turning inserts groove

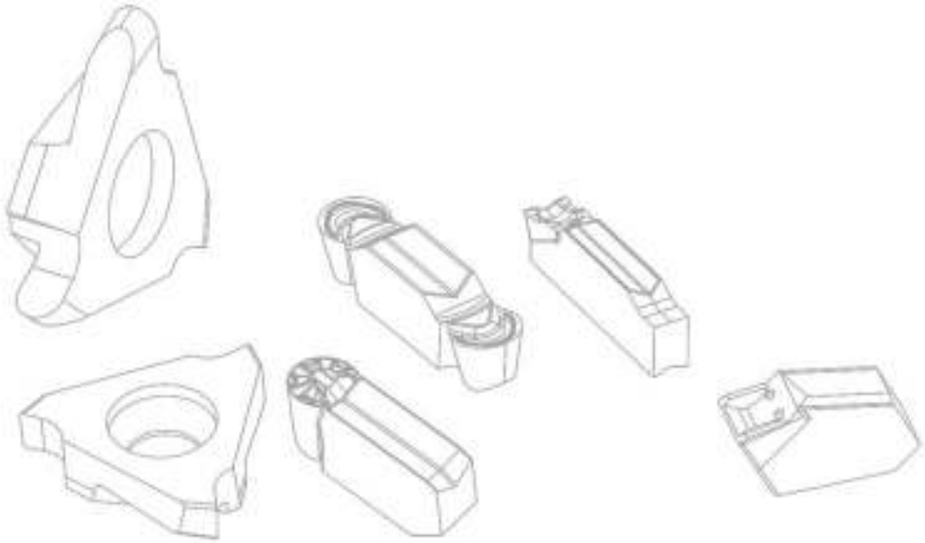
Negative inserts

ISO	Processing range	SANT	TaeguTec	KENNAMETAL	HITACHI	ZCC-CT	SANDVIK	TUNGALOY	KYOCERA	KORLOY	SUMTOMO	MISTUBISHI
P	superfinish	SF		UF,FF	FE		QF,LC	01&TF,ZF	DP,GP,VF, KF,CF,XP, KP-T	HU	FA,FL	PK&FH,FY, F,FS
	finish machining	SDF	FG,FA	LF,FN	BE,CE BH	DF	XF,PF,MF	TSF,AS NS,27	HQ,CQ, CJ,PQ,VF, GP,全周	HF	SU,LU,SX,SP FP,FA,FL,SE, ST,C	C,SA SH, LP
	finish machining (mild steel)	SDF			Y,V	SF	WL	17,TS,NS, CB,11,27 ZF	XQ,KS	HF	EX,SK,SJ,SX UU,UJ	SY
	finish machining (wiper)	SWG	WS,EA, WT,MG	FW,MW,RW		WG	WP,WF, WM,WMK	AFW,ASW	WP,WQ	HW	LUW,SEW, GUW	SW,MW
	semi-finishing	SPM	ML,ET,MP MC,SM MT	MN,P,MG	AB,AY,AR, AH,CT	DM,PM	PM,QM, SM,XM	TM,SM,ZM NM,33,38 37,TH,32Y, 32,37	CJ,GS,HK PS,HS,PT, CS	HC,HM,H A	GU,UQ,UX, GE,UA,UM	MV,MP,MZ, MA,MH
	轻切削	SPR		RN,RP,MG	RE	DR深切削	PR,HM, XMR		GT,HT		MU,MX,UX, UZ	GH,RP
	rough machining	SPR	RT, RH,HT	MR,RMn RH,PR,MG	HX,HE,H	DR深切削	QR,MR, PR,HR 金属23	57,65,TU 31,33,F-K, THS	HX PX PH	HR,HH	MP,HG,HP, MC,MU,MX, UZ	HZ,HX,HV, HZ,HXD,HA, HAS,HBS, HCS,HDS HXD
M	finish machining	SEF	FG,SF	K,FP	MP,SE	EF	MF	SS	GU,MQ	HA	SU	FS,SH, FJ,LM
	semi-finishing	SEM	ML,MP EM,VF	P,MP	PV,DE, AH	EM	MM,K	SA,SM, S,SF	SU,HU, MU,MS, ST,TK	HS	EX,UP, HP,HG	MS,ES,MA, MJ,MN,GM MM,ES,2G
	rough machining	SER	MT,RH	MT,RH		ER	MR	TH,SH		GS,HM	GS,HM	GS,HZ,RM
K	finish machining	SPM	PG	FN	VA,AH	PM	KF	Y,CF		无断屑槽	UZ	全周，MA
	semi-finishing	SPM	MC,MT, MG	金属,P,UN	Y,V	PM	KM	金属,CF,CM 33	ZS,C,全周	金属槽, HM	UX,GZ,UX, UJ	全周
	rough machining	SDR	RH,RT	RH,RT		无断屑槽	KR	KR	无断屑槽, GC	HR,GH, GR	无断屑槽, UZ,MU,MM	无断屑槽
S	finish machining	SNF	SF	FS,K		NF	SF,SGF		MQ		EF	FJ&
	semi-finishing	SNM		NGP,UP,P		NM	NGP,23, SM	SA,HMM	MS,MU, YK		SU&EG,EK, UP,FY,FX	MJ&MS
	rough machining	SNM		MS			SR,SMR	SM	SU			GJ

Select table for turning inserts groove

Negative inserts

ISO	Processing range	SANT	TaeguTec	KENNAMETAL	HITACHI	ZCC-CT	SANDVIK	TUNGALOY	KYOCERA	KORLOY	SUMITOMO	MEITURISHI
P	finish machining	SHF	FA,FG	11 , UF GF,LF,FP	JQ	SF,HF	UF,PF	01,PF FS,JS	GP,CK,XP VF,CF,GQ GF	HFP	FP,LU,FC, SU,SK,FK	FV,SV, FP,SQ, SMG
	finish machining (wiper)		WS	FW			WK8,W, WP		A,B,C,H,Y		LUM,SF,SU SS,FZ,US,W SDFX,FY	SW
	semi-finishing	SHM	MT,CMX	MP,MP	JE	HM	UM,WF, PM	PF,PS,PF PSF,PSS, 23,24	HQ,XQ, GK	HMP, C25	MU,SC	MV,MQ,AM All round, MP
	rough machining	SHR		GM,MP			WM,PR, UR,KM		GP,DP		UJ,SU,RP	MW
M	finish machining	SEF	FA,FG	FW,MW,FP	MP	EF	MF	SS8	CF,CK,GQ GF,DP	HFP	LU	SV,FV
	semi-finishing	SEM	MT,CMX	MP		EM	MM	PM	HQ,GK	HMP,C25		FM,MV,LM, All round
K	semi-finishing	SHR	MT,CMX			HR, No chip breaker, HM	KM,KR, KF	No chip breaker, CM	No chip breaker	HMP,C25	No chip breaker	No chip breaker
S	finish machining / semi-finishing	SNM		LF,HP					MQ		SC	FJ
N	general-cutting	SLH	FL	HP		LH	AL	PP,AL	A1,AH	TA,AK	AG,AW,FY	AZ



Metric and Inch Comparison Table for Non-clearance-angle Inserts

C type negative inserts	(ISO)	(Inch)	Groove
Inserts shape	090304	321	-SDF -SSF -SEF -SNF -SPM -SDM -SEM -SNM -SDR -SER -SLR
	090308	322	
	120404	431	
	120408	432	
	120412	433	
	120416	434	
	160608	542	
	160612	543	
	160616	544	
	190608	642	
	190612	643	
	190616	644	
	190624	646	
	250724	856	
	250732	858	
	250924	866	
	250932	868	

D type negative inserts	(ISO)	(Inch)	Groove
Inserts shape	110404	331	-SDF -SSF -SNF -SPM -SDM -SEM -SNM -SDR -SER -SLR
	110408	332	
	110412	333	
	150404	431	
	150408	432	
	150412	433	
	150604	441	
	150608	442	
	150612	443	
	150616	444	
	190608	642	
	190612	643	

V type negative inserts	(ISO)	(Inch)	Groove
Inserts shape	160404	331	-SDF -SEF -SSF -SNF -SPM -SDM -SEM -SNM
	160408	332	
	160412	333	

R type negative inserts	(ISO)	(Inch)	Groove
Inserts shape	0903MO	32	
	1204MO	43	

W type negative inserts	(ISO)	(Inch)	Groove
Inserts shape	06T304	3(2.5)1	-SDF -SSF -SEF -SNF -SPM -SDM -SEM -SNM -SDR
	06T308	3(2.5)2	
	06T312	3(2.5)3	
	060404	331	
	060408	332	
	060412	333	
	080404	431	
	080404	432	
	080412	433	

T type negative inserts	(ISO)	(Inch)	Groove
Inserts shape	110304	221	-SDF -SSF -SEF -SPM -SDM -SEM -SDR -SER -SLR
	110308	222	
	160404	331	
	160408	432	
	160412	433	
	220404	434	
	220408	542	
	220412	543	
	220416	544	
	270806	642	
	270612	643	
	270616	644	

S type negative inserts	(ISO)	(Inch)	Groove
Inserts shape	090304	321	-SDF -SSF -SEF -SPM -SDM -SEM -SNM -SDR -SER -SLR
	090308	322	
	090312	323	
	120404	431	
	120412	432	
	120416	434	
	160608	542	
	160612	543	
	160616	544	
	190608	633	
	190612	636	
	190616	643	
	190624	644	
	250724	856	
	250732	858	
	250924	866	
	250932	868	

Metric and Inch Comparison Table for Clearance-angle Inserts

C type positive inserts	(ISO)	(Inch)	Groove
Inserts shape	060202	2(1.5)0	-SSF -SHF -SEF -SHM -SEM -SHR -SLH -SLC
	060204	2(1.5)1	
	060208	2(1.5)2	
	09T302	3(2.5)0	
	09T304	3(2.5)1	
	09T308	3(2.5)2	
	120404	431	
	120408	432	
	120412	433	

T type positive inserts	(ISO)	(Inch)	Groove
Inserts shape	06T102	1.2(1.2)0	-SSF -SHF -SEF -SHM -SEM -SHR -SLH -SLC
	06T104	1.2(1.2)1	
	06T108	1.2(1.2)2	
	090202	1.8(1.5)0	
	090204	1.8(1.5)1	
	090208	1.8(1.5)2	
	110202	2(1.5)0	
	110204	2(1.5)1	
	110208	2(1.5)2	
	110302	220	
	110304	221	
	110308	222	
	16T302	3(2.5)0	
	16T304	3(2.5)1	
	16T308	3(2.5)2	
	16T312	3(2.5)3	
	160400	300	
	220408	432	
	220412	433	
	220416	434	
	270408	532	
	270412	533	
	330612	643	
	330616	644	

D type positive inserts	(ISO)	(Inch)	Groove
Inserts shape	070202	2(1.5)0	-SSF -SHF -SEF -SHM -SEM -SHR -SLH -SLC
	070204	2(1.5)1	
	070208	2(1.5)2	
	11T302	3(2.5)0	
	11T304	3(2.5)1	
	11T308	3(2.5)2	
	11T312	3(2.5)2	

S type positive inserts	(ISO)	(Inch)	Groove
Inserts shape	060204	221	-SHF -SEF -SHM -SEM -SHR -SLH -SLC
	09T302	222	
	09T304	331	
	09T308	432	
	120404	433	
	120408	434	
	120412	433	
	150404	531	
	150408	532	
	150412	533	
	190408	632	
	190412	633	
	190416	634	

V type positive inserts	(ISO)	(Inch)	Groove
Inserts shape	110202	2(1.5)0	-SSF -SHF -SPM -SDM -SEM
	110204	322	
	110208	323	
	110302	431	
	110304	432	
	110308	434	
	160402	542	
	160404	543	
	160408	544	
	160412	633	

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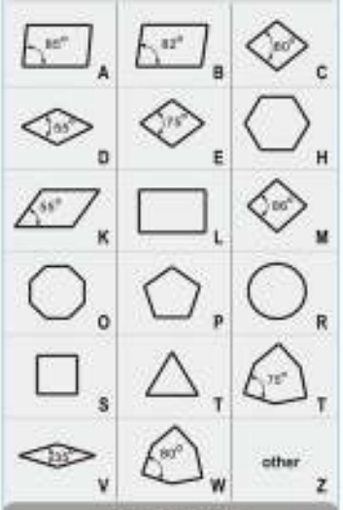
Insert shape/code



Shape code

ISO

Code	hole	chipbreaker	Section plane of insert	Code	hole	chipbreaker	Section plane of insert
B	YES	NO	>65°	N	NO	NO	
H	YES	Single-side	>65°	R	NO	Single-side	
C	YES	NO	>65°	F	NO	double-side	
J	YES	double-side	>65°	A	YES	NO	
W	YES	NO	≤65°	M	YES	Single-side	
T	YES	Single-side	≤65°	G	YES	double-side	
Q	YES	NO	≤65°	X	---	---	special
U	YES	double-side	≤65°				

Chipbreaker and clamping system

Diameter of IC (mm)	Insert shape C	D	R	S	T	V	W	K
3.97					08			
5.0			05					
5.56					09			
6.0			06					
6.35	06	07			11	11		
8.0			08					
9.525	09	11	09	09	16	16	08	16
10.0			10					
12.0			12					
12.7	12	15	12	12	22	22	08	
15.875	16		15	15	27			
16.0		19	16					
19.05	19		19	19	33			
20.0			20					
25.0	25	25	25					
25.4			25	25				
31.75			31					
32			32					

Length of cutting edge

Code	Insert thickness(mm)
00	0.79
T0	0.99
01	1.59
T1	1.98
02	2.38
T2	2.58
03	3.18
T3	3.97
04	4.76
T4	4.96
05	5.56
T5	5.95
06	6.35
T6	6.75
07	7.94
09	9.52
T9	9.72
11	11.11
12	12.70

Insert thickness

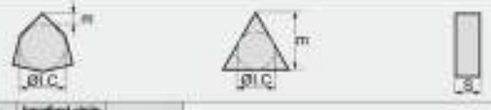
T N M G 22 04 08 - SDM (ISO)

4 3 2 (inch)

Clearance angle of main cutting edge

Code	Clearance angle	Code	Clearance angle
A	3°	B	5°
C	7°	D	15°
E	20°	F	20°
G	30°	N	0°
P	11°	O	其他的后角

Tolerance



Code	Nose height M tolerance (mm)	Inscribed circle ØI.C tolerance (mm)	Thickness S tolerance(mm)
A	±0.005	±0.025	±0.025
F	±0.005	±0.013	±0.025
C	±0.013	±0.025	±0.025
H	±0.013	±0.013	±0.025
E	±0.025	±0.025	±0.025
G	±0.025	±0.025	±0.13
J	±0.005	±0.05-±0.13	±0.025
K	±0.013	±0.05-±0.13	±0.025
L	±0.025	±0.05-±0.13	±0.025
M	±0.08-±0.18	±0.05-±0.13	±0.13
N	±0.08-±0.18	±0.05-±0.13	±0.025
U	±0.13-±0.38	±0.08-±0.25	±0.13

(Reference) Details of M-level tolerance(identified by shape)

● Nose height tolerance (mm)

Inscribed circle	Regular triangle	Square	Diamond with 80°	Diamond with 55°	Diamond with 35°	Round
6.35	±0.08	±0.08	±0.08	±0.11	±0.16	—
9.525	±0.08	±0.08	±0.08	±0.11	±0.16	—
12.7	±0.13	±0.13	±0.13	±0.15	—	—
15.875	±0.15	±0.15	±0.15	±0.18	—	—
19.05	±0.15	±0.15	±0.15	±0.18	—	—
25.4	—	±0.18	---	—	—	—

● Inscribed circle ØI.C tolerance (mm)

Inscribed circle	Regular triangle	Square	Diamond with 80°	Diamond with 55°	Diamond with 35°	Round
6.35	±0.05	±0.05	±0.05	±0.05	±0.05	—
9.525	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05
12.7	±0.08	±0.08	±0.08	±0.08	—	±0.08
15.875	±0.10	±0.10	±0.10	±0.10	—	±0.10
19.05	±0.10	±0.10	±0.10	±0.10	—	±0.10
25.4	—	±0.13	---	---	—	±0.13

Inscribed circle

Code	Diameter of IC
2	6.35
3	9.525
4	12.7
5	15.875
6	19.05
8	25.4

Thickness

Code	Thickness (mm)
2	3.18
3	4.76
4	6.35
5	7.94
6	9.52

Nose radius

Code	Nose radius (mm)
0	0.2
1	0.4
2	0.8
3	1.2
4	1.6
5	2.0
6	2.4

Nose radius code

Code	Nose radius (mm)
00	No radius
02	0.2
04	0.4
08	0.8
12	1.2
16	1.6
20	2.0
24	2.4
32	3.2
X	other
Diameter of insert(Metric)	Round insert

Chipbreaker code

INSERT LIST

Code	Length of cutting edge	Page
CNMG-SDF	9.7 12.9	A17
CNMG-SEF	9.7 12.9	A17
CNMG-SPM	9.7 12.9 16.1	A17
CNMG-SEM	12.9 16.1	A17
CNMG-SDR	12.9 16.1 19.3	A18
CNMM-SDR	12.9 19.3 25.79	A18
CNMG-SER	12.9 16.1 19.3 25.79	A18
CNMA	12.9 16.1 19.3	A19
CNMG	12.9 16.1 19.3	A19
DNMG-SDF	11.6 15.5	A19
DNMG-SEF	11.6 15.5	A20
DNMG-SPM	11.6 15.5	A20
DNMG-SEM	11.6 15.5	A21
DNMG-SDR	15.5	A22
DNMM-SDR	15.5	A22
DNMG-SER	15.5	A22
DNMG	15.5 19.3	A22
DNMA	11.6 15.5	A22
SNMG-SDF	9.525 12.7	A23
SNMG-SEF	9.525 12.7	A23
SNMG-SPM	9.525 12.7	A24
SNMG-SEM	12.7 15.9	A24
SNMG-SDR	12.7 15.9 19.1	A25
SNMM-SDR	12.7 15.9 19.1 25.4	A25
SNMG-SER	12.7 15.9	A25
SNMM-SER	25.4	A26
SNMG	9.525 12.7 15.9 25.4	A26
SNMA	9.525 12.7 15.9 19.1	A27
TNMG-SDF	16.5 22	A27
TNMG-SEF	11 16.5 22	A27
TNMG-SPM	11 16.5 22	A28
TNMG-SEM	16.5 22	A28
TNMG-SDR	16.5 22 27.5	A28
TNMM-SDR	16.5 22 27.5	A29
TNMG-SER	16.5 22	A29
TNMG	11 16.5 22 27.5 33	A30
TNMA	16.5 22 27.5	A30
VNMG-SDF	16.0	A31
VNMG-SEF	16.0	A31
VNMG-SPM	16.0	A31

株洲圣达切削刀具
ZHUZHOU SANT CUTTING

INSERT LIST

Code	Length of cutting edge	Page
VNMG-SEM	16.0	A31
VNMG	16.0	A32
VNMA	16.0	A32
WNMG-SDF	6.5 8.7	A33
WNMG-SEF	6.5 8.7	A33
WNMG-SPM	6.5 8.7	A34
WNMG-SEM	6.5 8.7	A34
WNMG-SDR	6.5 8.7	A35
WNMG	6.5 8.7	A35
WNMA	6.5 8.7	A35
RNMG	12.7	A36
CCMT-SHF	6.4 9.7 12.9	A37
CCMT-SHM	6.4 9.7 12.9	A37
CCMT-SHR	6.4 9.7 12.9	A38
CCMW	6.4 9.7 12.9	A38
DCMT-SHF	7.8 11.6	A39
DCMT-SHM	7.8 11.6	A39
DCMT-SHR	7.8 11.6	A39
DCMW	7.8 11.6	A39
RCGT	10,12 6.0 10 16	A40
RCMX	6.0 10 12 16 20 25 32	A40
SCMT-SHF	9.525	A41
SCMT-SHM	9.525 12.7	A41
SCMT-SHR	9.525 12.7	A41
SCMT	9.525 12.7	A42
SCMW	6.35 9.525 12.7	A42
TCMT-SHF	6.4 9.6 11 16.5	A43
TCMT-SHM	9.6 11 16.5	A43
TCMT-SHR	9.6 11 16.5 22	A44
VCGT-SHF	11	A45
VBMT-SHF	11 16.5	A45
VBMT-SHM	11 16.5	A46
VBMT-SHR	16.5	A46
TBGH	8.4	A47
TPGH	8.4	A47
KNUX160405L11	16	A48
175.32-191940-22	19	A50

株洲圣达切削刀具
ZHUZHOU SANT CUTTING

Insert List

Parting and grooving inserts

Insert			
Code	ZT□□-SMG	ZT□□-SMM	ZP□□-SMG
Cutting edge width	2.5~6	2.5~6	2.5~6
Page	A51	A51	A52

Threading inserts

Insert					
Code	RT16.01W-0.50~3.00GMB	RT16.01N-0.50GMB~3.00GMB	RT16.01W-A60B~AG55B	RT16.01N-A60B~AG55B	RT16.01W-8WB~16WB
Pitch	0.5-3	0.5-3	0.5-3	0.5-3	8-20
Page	A53	A53	A54	A54	A55

Insert					
Code	RT16.01N-8UNB~24UNB	RT16.01W-11BSPTB~28BSPTB	RT16.01N-11BSPTB~28BSPTB	RT16.01W-8NPTB~27NPTB	PT16.01N-8NPTB~27NPTB
Pitch	8-24	11-28	11-28	8-27	8-27
Page	A56	A57	A57	A58	A58

Insert for U drills

Insert				
Code	SPGT-SPM	SPGT-SBM	WCMX-S3	WCMX-SPG
Length of cutting edge	5-14.3	5-14.3	3.8-8.7	3.8-8.7
Page	A59	A59	A60	A60

Insert for Aluminum

Insert					
Code	CCGT-TK	CCGT-TK	DCGT-TK	DNMG-TK	VCGT-TK
Length of cutting edge	6.4-12.9	6.4-12.9	7.7 11.6	5.5 12.7	11-22.1
Page	A63	A64	A65	A66	A67

Insert					
Code	VBGT-TK	VNMG-TK	TCGT-TK	TNMG-TK	SCGT-TK
Length of cutting edge	11-22.1	16.6	9.6-16.5	16.5 22	9.525 12.7
Page	A68	A69	A70	A71	A72

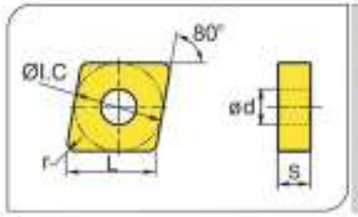
Insert	
Code	WNMG-TK
Length of cutting edge	6.52 10.86
Page	A73

CUTTING INSERT

CUTTING INSERT

CN□□ (Negative inserts)

★ Good working condition
▲ Normal working condition
● Bad working condition



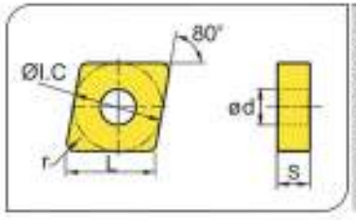
Workpiece material		P					M			K			N	S	
P	Steel	★	★	▲	▲	▲									
M	Stainless steel				▲	★	▲	▲							
K	Cast iron									★	●	●			
N	Non-ferrous metal												★	▲	
S	Heat resistant alloy, Ti alloy													★	★

Inserts shape		Type	Dimensions(mm) L	ØI.C	S	ød	r	P ST7010	ST7020	ST7015	ST9005	ST9015	M ST8015	ST8010	ST8020	K ST6005	ST6025	ST6030	N ST5010	S ST9120	ST9005
For finishing		CNMG090304-8DF	9.7	9.525	3.18	3.81	0.4	●		▲											
		CNMG090308-8DF	9.7	9.525	3.18	3.81	0.8	●		▲	○										
		CNMG120404-8DF	12.9	12.7	4.76	5.16	0.4	●		▲											
		CNMG120408-8DF	12.9	12.7	4.76	5.16	0.8	●		▲	○										
		CNMG120412-8DF	12.9	12.7	4.76	5.16	1.2	○		●											
		CNMG090304-8EF	9.7	9.525	3.18	3.81	0.4				○			▲	●						
		CNMG090308-8EF	9.7	9.525	3.18	3.81	0.8				○			▲	●						
		CNMG120404-8EF	12.9	12.7	4.76	5.16	0.4				○			▲	●						
		CNMG120408-8EF	12.9	12.7	4.76	5.16	0.8				○			▲	●						
		CNMG120412-8EF	12.9	12.7	4.76	5.16	1.2							○	○						
For semi-finishing		CNMG090304-8PM	9.7	9.525	3.18	3.81	0.4		●		▲										
		CNMG090308-8PM	9.7	9.525	3.18	3.81	0.8		●		▲										
		CNMG120404-8PM	12.9	12.7	4.76	5.16	0.4		●		▲										
		CNMG120408-8PM	12.9	12.7	4.76	5.16	0.8		●		▲										
		CNMG120412-8PM	12.9	12.7	4.76	5.16	1.2		●		▲										
		CNMG120416-8PM	12.9	12.7	4.76	5.16	1.6		●		▲										
		CNMG160608-8PM	16.1	15.875	6.35	6.35	0.8		●		▲										
		CNMG160612-8PM	16.1	15.875	6.35	6.35	1.2		▲		▲										
		CNMG160616-8PM	16.1	15.875	6.35	6.35	1.6		▲		▲										
		CNMG190608-8PM	19.3	19.05	6.35	7.94	0.8		●		▲										
		CNMG190612-8PM	19.3	19.05	6.35	7.94	1.2		▲		●										
		CNMG190616-8PM	19.3	19.05	6.35	7.94	1.6		▲		●										
		CNMG120404-8EM	12.9	12.7	4.76	5.16	0.4						○	▲	●						
		CNMG120408-8EM	12.9	12.7	4.76	5.16	0.8						○	▲	●						
		CNMG120412-8EM	12.9	12.7	4.76	5.16	1.2						○	▲	●						
		CNMG160608-8EM	16.1	15.875	6.35	6.35	0.8						○	▲	●						
		CNMG160612-8EM	16.1	15.875	6.35	6.35	1.2						○	○	○						
		CNMG160616-8EM	16.1	15.875	6.35	6.35	1.6						○	○	○						

Note: ▲ Recommended grade (always stock available) ● Available grade (always stock available) ○ Make-to-order

CN□□ (Negative inserts)

★ Good working condition
▲ Normal working condition
● Bad working condition



Workpiece material		ST7010	ST7020	ST7015	ST7025	ST9015	ST8015	ST8010	ST8020	ST8025	ST6025	ST6030	ST5010	ST9120	ST9005
P	Steel	★	▲	★	▲	▲									
M	Stainless steel					▲	★	▲	▲						
K	Cast iron									★	▲	●			
N	Non-ferrous metal												★	▲	
S	Heat resistant alloy, Ti alloy													★	★

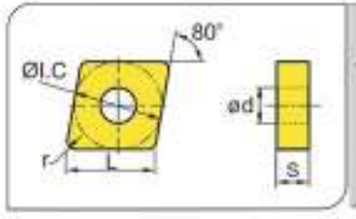
Inserts shape	Type	Dimensions(mm) L	ØI.C	S	Ød	r	P ST7010	ST7020	ST7015	ST7025	ST9015	M ST8015	ST8010	ST8020	K ST8025	ST6025	ST6030	N ST5010	S ST9120	ST9005
For roughing	CNMG120408-SDR	12.9	12.7	4.76	5.16	0.8		●		▲						○				
	CNMG120412-SDR	12.9	12.7	4.76	5.16	1.2		●		▲						○				
	CNMG120416-SDR	12.9	12.7	4.76	5.16	1.6		▲		●						○				
	CNMG160608-SDR	16.1	15.875	6.35	6.35	0.8		▲		▲						○				
	CNMG160612-SDR	16.1	15.875	6.35	6.35	1.2		▲		▲						○				
	CNMG160616-SDR	16.1	15.875	6.35	6.35	1.6		▲		●						○				
	CNMG190608-SDR	19.3	19.05	6.35	7.94	0.8		●		▲						○				
	CNMG190612-SDR	19.3	19.05	6.35	7.94	1.2		●		▲						○				
	CNMG190616-SDR	19.3	19.05	6.35	7.94	1.6		▲		●						○				
	CNMG190624-SDR	19.3	19.05	6.35	7.94	2.4		▲		●						○				
For heavy machining	CNMM120412-SDR	12.9	12.7	4.76	5.16	1.2														
	CNMM160612-SDR	16.1	15.875	6.35	6.35	1.2														
	CNMM160616-SDR	16.1	15.875	6.35	6.35	1.6														
	CNMM190612-SDR	19.3	19.05	6.35	7.94	1.2		▲		●										
	CNMM190616-SDR	19.3	19.05	6.35	7.94	1.6		▲		●										
	CNMM190624-SDR	19.3	19.05	6.35	7.94	2.4		▲		●										
	CNMM250924-SDR	25.79	25.4	9.525	9.12	2.4		▲		●										
For roughing	CNMG120408-SER	12.9	12.7	4.76	5.16	0.8						○								
	CNMG120412-SER	12.9	12.7	4.76	5.16	1.2						○								
	CNMG160612-SER	16.1	15.875	6.35	6.35	1.2						○								
	CNMG160616-SER	16.1	15.875	6.35	6.35	1.6						○								
	CNMG190612-SER	19.3	19.05	6.35	7.94	1.2						○								
	CNMG190616-SER	19.3	19.05	6.35	7.94	1.6						○								
For heavy machining	CNMM250724-SER	25.79	25.4	7.94	9.12	2.4						○								
	CNMM250732-SER	25.79	25.4	7.94	9.12	3.2						○								
	CNMM250924-SER	25.79	25.4	9.525	9.12	2.4						○								
	CNMM250932-SER	25.79	25.4	9.525	9.12	3.2						○								

Stock ▲ Recommended grade (always stock available) ● Available grade (always stock available) ○ Make to order

车削刀片
TURNING
INSERTS

CN□□ (Negative inserts)

★ Good working condition
▲ Normal working condition
● Bad working condition



Workpiece material		ST7010	ST7020	ST7015	ST7025	ST9015	ST8015	ST8010	ST8020	ST8025	ST6025	ST6030	ST5010	ST9120	ST9005
P	Steel	★	▲	★	▲	▲									
M	Stainless steel					▲	★	▲	▲						
K	Cast iron									★	▲	●			
N	Non-ferrous metal												★	▲	
S	Heat resistant alloy, Ti alloy													★	★

Inserts shape	Type	Dimensions(mm) L	ØI.C	S	Ød	r	P ST7010	ST7020	ST7015	ST7025	ST9015	M ST8015	ST8010	ST8020	K ST8025	ST6025	ST6030	N ST5010	S ST9120	ST9005
For roughing	CNMA120404	12.9	12.7	4.76	5.16	0.4										▲	●			
	CNMA120408	12.9	12.7	4.76	5.16	0.8										▲	●			
	CNMA120412	12.9	12.7	4.76	5.16	1.2										▲	●			
	CNMA120416	12.9	12.7	4.76	5.16	1.6										▲	●			
	CNMA160608	16.1	15.875	6.35	6.35	0.8										▲	●			
	CNMA160612	16.1	15.875	6.35	6.35	1.2										▲	●			
	CNMA160616	16.1	15.875	6.35	6.35	1.6										▲	●			
	CNMA160620	16.1	15.875	6.35	6.35	2.0										▲	●			
	CNMA160630	16.1	15.875	6.35	6.35	3.0										▲	●			
	CNMA190612	19.3	19.05	6.35	7.94	1.2										▲	●			
	CNMA190616	19.3	19.05	6.35	7.94	1.6										▲	●			
For semi-finishing	CNMG120404	12.9	12.7	4.76	5.16	0.4				○					▲	●				
	CNMG120408	12.9	12.7	4.76	5.16	0.8				○					▲	●				
	CNMG120412	12.9	12.7	4.76	5.16	1.2				○					▲	●				
	CNMG160608	16.1	15.875	6.35	6.35	0.8				○					▲	●				
	CNMG160612	16.1	15.875	6.35	6.35	1.2				○					▲	●				
	CNMG160616	16.1	15.875	6.35	6.35	1.6				○					▲	●				
	CNMG190608	19.3	19.05	6.35	7.94	0.8				○					▲	●				
	CNMG190612	19.3	19.05	6.35	7.94	1.2				○					▲	●				
	CNMG190616	19.3	19.05	6.35	7.94	1.6				○					▲	●				

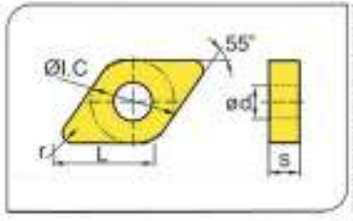
Stock ▲ Recommended grade (always stock available) ● Available grade (always stock available) ○ Make to order

Grade selection reference A03/A04

Chipbreaker selection reference A07/A09

DN□□ (Negative inserts)

★ Good working condition
▲ Normal working condition
● Bad working condition



Workpiece material		ST7010	ST7020	ST7015	ST7025	ST9015	ST8015	ST8010	ST8020	ST6005	ST6025	ST6030	ST5010	ST9120	ST9005
P	Steel	★	▲	★	▲	▲									
M	Stainless steel					▲	★	▲	▲						
K	Cast iron									★	●	●			
N	Non-ferrous metal												★	▲	
S	Heat resistant alloy, Ti alloy													★	★

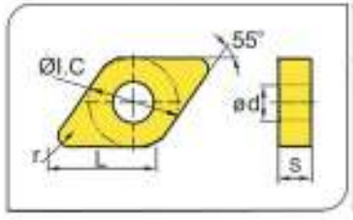
Inserts shape		Type	Dimensions(mm) L	Φ I.C	S	Φ d	r	P ST7010	ST7020	ST7015	ST7025	ST9015	M ST8015	ST8010	ST8020	K ST6005	ST6025	ST6030	N ST5010	S ST9120	ST9005
For finishing		DNMG110404-8DF	11.6	9.525	4.76	3.81	0.4	●		▲											
		DNMG110408-8DF	11.6	9.525	4.76	3.81	0.8	●		▲											
		DNMG110412-8DF	11.6	9.525	4.76	3.81	1.2	○		○	○										
		DNMG150404-8DF	15.5	12.7	4.76	5.16	0.4	●		▲											
		DNMG150408-8DF	15.5	12.7	4.76	5.16	0.8	○		▲											
		DNMG150412-8DF	15.5	12.7	4.76	5.16	1.2	●		▲	○										
		DNMG150604-8DF	15.5	12.7	6.35	5.16	0.4	●		▲											
		DNMG150608-8DF	15.5	12.7	6.35	5.16	0.8	●		▲											
		DNMG150612-8DF	15.5	12.7	6.35	5.16	1.2	●		▲	○										
		DNMG110404-8EF	11.6	9.525	4.76	3.81	0.4							▲	●						
		DNMG110408-8EF	11.6	9.525	4.76	3.81	0.8							▲	●						
		DNMG110412-8EF	11.6	9.525	4.76	3.81	1.2							○	○						
		DNMG150404-8EF	15.5	12.7	4.76	5.16	0.4							▲	●						
		DNMG150408-8EF	15.5	12.7	4.76	5.16	0.8							▲	●						
		DNMG150412-8EF	15.5	12.7	4.76	5.16	1.2							○	○						
		DNMG150604-8EF	15.5	12.7	6.35	5.16	0.4							▲	●						
		DNMG150608-8EF	15.5	12.7	6.35	5.16	0.8							▲	●						
		DNMG150612-8EF	15.5	12.7	6.35	5.16	1.2							○	○						

Stock ▲ Recommended grade (always stock available) ● Available grade (always stock available) ○ Make to order

车削刀片
TURNING
INSERTS

DN□□ (Negative inserts)

★ Good working condition
▲ Normal working condition
● Bad working condition



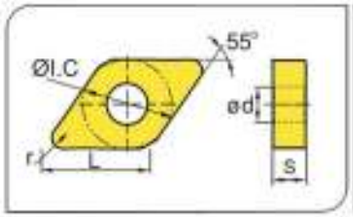
Workpiece material		ST7010	ST7020	ST7015	ST7025	ST9015	ST8015	ST8010	ST8020	ST6005	ST6025	ST6030	ST5010	ST9120	ST9005
P	Steel	★	▲	★	▲	▲									
M	Stainless steel					▲	★	▲	▲						
K	Cast iron									★	●	●			
N	Non-ferrous metal												★	▲	
S	Heat resistant alloy, Ti alloy													★	★

Inserts shape		Type	Dimensions(mm) L	Φ I.C	S	Φ d	r	P ST7010	ST7020	ST7015	ST7025	ST9015	M ST8015	ST8010	ST8020	K ST6005	ST6025	ST6030	N ST5010	S ST9120	ST9005
For semi-finishing		DNMG110404-SPM	11.6	9.525	4.76	3.81	0.4		●	●	▲										
		DNMG110408-SPM	11.6	9.525	4.76	3.81	0.8		●		▲										
		DNMG110412-SPM	11.6	9.525	4.76	3.81	1.2		●		▲										
		DNMG150404-SPM	15.5	12.7	4.76	5.16	0.4		●	●	▲										
		DNMG150408-SPM	15.5	12.7	4.76	5.16	0.8		●		▲										
		DNMG150412-SPM	15.5	12.7	4.76	5.16	1.2		●		▲										
		DNMG150416-SPM	15.5	12.7	4.76	5.16	1.6		●		▲										
		DNMG150604-SPM	15.5	12.7	6.35	5.16	0.4		●		▲										
		DNMG150608-SPM	15.5	12.7	6.35	5.16	0.8		●		▲										
		DNMG150612-SPM	15.5	12.7	6.35	5.16	1.2		●		▲										
		DNMG150616-SPM	15.5	12.7	6.35	5.16	1.6		●		▲										
		DNMG110404-SEM	11.6	9.525	4.76	3.81	0.4							▲	●						
		DNMG110408-SEM	11.6	9.525	4.76	3.81	0.8							▲	●						
		DNMG110412-SEM	11.6	9.525	4.76	3.81	1.2							○	○						
		DNMG150404-SEM	15.5	12.7	4.76	5.16	0.4							▲	●						
		DNMG150408-SEM	15.5	12.7	4.76	5.16	0.8							▲	●						
		DNMG150604-SEM	15.5	12.7	6.35	5.16	0.4							▲	●						
		DNMG150608-SEM	15.5	12.7	6.35	5.16	0.8							▲	●						
		DNMG150612-SEM	15.5	12.7	6.35	5.16	1.2							○	○						

Stock ▲ Recommended grade (always stock available) ● Available grade (always stock available) ○ Make to order

DN□□ (Negative inserts)

★ Good working condition
▲ Normal working condition
● Bad working condition



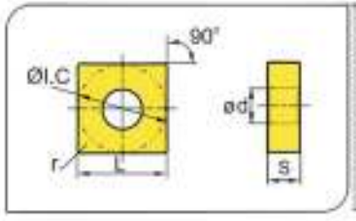
Workpiece material		P	M	K	N	S
P	Steel	★▲★▲▲				
M	Stainless steel		▲★▲▲			
K	Cast iron			★●●		
N	Non-ferrous metal				★▲	
S	Heat resistant alloy, Ti alloy					★★

Inserts shape	Type	Dimensions(mm) L	Φ I.C	S	Φ d	r	P ST7010	ST7020	ST7015	ST7025	ST9015	M ST8015	ST8010	ST8020	K ST8025	ST6020	ST6005	N ST5010	S ST9120	ST8005
For roughing	DNMG150408-SDR	15.5	12.7	4.76	5.16	0.8		●		▲						○				
	DNMG150412-SDR	15.5	12.7	4.76	5.16	1.2		●		▲						○				
	DNMG150416-SDR	15.5	12.7	4.76	5.16	1.6		●		▲						○				
	DNMG150608-SDR	15.5	12.7	6.35	5.16	0.8		●		▲						○				
	DNMG150612-SDR	15.5	12.7	6.35	5.16	1.2		●		▲						○				
	DNMG150616-SDR	15.5	12.7	6.35	5.16	1.6		●		▲						○				
	DNMM150608-SDR	15.5	12.7	6.35	5.16	0.8		○		○										
	DNMM150612-SDR	15.5	12.7	6.35	5.16	1.2		○		○										
	DNMM150616-SDR	15.5	12.7	6.35	5.16	1.6		○		○										
	DNMG150608-SER	15.5	12.7	6.35	5.16	0.8						○								
	DNMG150612-SER	15.5	12.7	6.35	5.16	1.2						○								
For semi-finishing	DNMG150604	15.5	12.7	6.35	5.16	0.4									▲					
	DNMG150608	15.5	12.7	6.35	5.16	0.8									▲					
	DNMG150612	15.5	12.7	6.35	5.16	1.2									●	▲				
	DNMG150616	15.5	12.7	6.35	5.16	1.6									●	▲				
	DNMG190608	19.3	15.9	6.35	7.94	0.8									▲	●				
	DNMG190612	19.3	15.9	6.35	7.94	1.2									●	▲				
	DNMA110416	11.6	9.525	4.76	3.81	1.6										▲	●			
	DNMA110424	11.6	9.525	4.76	3.81	2.4										▲	●			
	DNMA150404	15.5	12.7	4.76	5.16	0.4										▲	●			
	DNMA150408	15.5	12.7	4.76	5.16	0.8										▲	●			
	DNMA150604	15.5	12.7	6.35	5.16	0.4										▲	●			
	DNMA150608	15.5	12.7	6.35	5.16	0.8										▲	●			
	DNMA150612	15.5	12.7	6.35	5.16	1.2										▲	●			
	DNMA150616	15.5	12.7	6.35	5.16	1.6										▲	●			

Stock ▲ Recommended grade (always stock available) ● Available grade (always stock available) ○ Make-to-order

SN□□ (Negative inserts)

★ Good working condition
▲ Normal working condition
● Bad working condition



Workpiece material		P	M	K	N	S
P	Steel	★▲★▲▲				
M	Stainless steel		▲★▲▲			
K	Cast iron			★●●		
N	Non-ferrous metal				★▲	
S	Heat resistant alloy, Ti alloy					★★

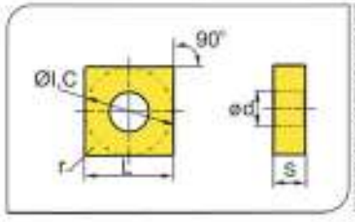
Inserts shape	Type	Dimensions(mm) L	Φ I.C	S	Φ d	r	P ST7010	ST7020	ST7015	ST7025	ST9015	M ST8015	ST8010	ST8020	K ST6020	ST6025	ST6030	N ST5010	S ST9120	ST7005
For finishing	SNMG090304-SDF	9.525	9.525	3.18	3.81	0.4	●		▲											
	SNMG090308-SDF	9.525	9.525	3.18	3.81	0.8	●		▲											
	SNMG120404-SDF	12.7	12.7	4.76	5.16	0.4	●		▲											
	SNMG120408-SDF	12.7	12.7	4.76	5.16	0.8	●		▲											
	SNMG120412-SDF	12.7	12.7	4.76	5.16	1.2														
	SNMG090304-SEF	9.525	9.525	3.18	3.81	0.4							▲	●						
	SNMG090308-SEF	9.525	9.525	3.18	3.81	0.8							▲	●						
	SNMG090312-SEF	9.525	9.525	3.18	3.81	1.2							●							
	SNMG120404-SEF	12.7	12.7	4.76	5.16	0.4							▲	●						
	SNMG120408-SEF	12.7	12.7	4.76	5.16	0.8							▲	●						
	SNMG120412-SEF	12.7	12.7	4.76	5.16	1.2							●							
	SNMG150608-SEF	15.9	15.9	6.35	6.35	0.8							▲	●						
	SNMG150612-SEF	15.9	15.9	6.35	6.35	1.2							●							

Stock ▲ Recommended grade (always stock available) ● Available grade (always stock available) ○ Make-to-order

Grade selection reference A03/A04
Chipbreaker selection reference A07/A09

SN□□ (Negative inserts)

★ Good working condition
▲ Normal working condition
● Bad working condition



Workpiece material		P					M			K			N	S	
P	Steel	★	▲	★	▲	▲									
M	Stainless steel				▲	★	▲	▲							
K	Cast iron								★	●	●				
N	Non-ferrous metal											★	▲		
S	Heat resistant alloy, Ti alloy													★	★

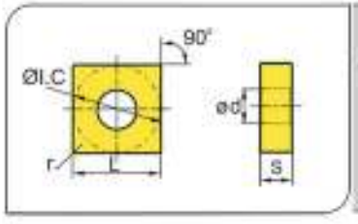
Inserts shape		Type	Dimensions(mm)					P					M			K			N	S	
			L	ø I.C	S	ø d	r	ST7010	ST7020	ST7015	ST7025	ST9015	ST8015	ST8010	ST8020	ST6005	ST6025	ST8030	ST9010	ST9120	ST9005
For semi-finishing		SNMG090304-SPM	9.525	9.525	3.18	3.81	0.4		●		▲										
		SNMG090308-SPM	9.525	9.525	3.18	3.81	0.8		●		▲										
		SNMG090312-SPM	9.525	9.525	3.18	3.81	1.2		●		▲										
		SNMG120404-SPM	12.7	12.7	4.76	5.16	0.4		●		▲										
		SNMG120408-SPM	12.7	12.7	4.76	5.16	0.8		●		▲										
		SNMG120412-SPM	12.7	12.7	4.76	5.16	1.2		●		▲										
		SNMG120416-SPM	12.7	12.7	4.76	5.16	1.6		●		▲										
		SNMG150608-SPM	15.9	15.9	6.35	6.35	0.8		●		▲										
		SNMG150612-SPM	15.9	15.9	6.35	6.35	1.2		●		▲										
		SNMG150616-SPM	15.9	15.9	6.35	6.35	1.6		●		▲										
		SNMG190612-SPM	19.1	19.1	6.35	7.94	1.2		●		▲										
		SNMG190616-SPM	19.1	19.1	6.35	7.94	1.6		●		▲										
		SNMG120404-SEM	12.7	12.7	4.76	5.16	0.4						▲	●							
		SNMG120408-SEM	12.7	12.7	4.76	5.16	0.8						▲	●							
		SNMG120412-SEM	12.7	12.7	4.76	5.16	1.2						○								
		SNMG120416-SEM	12.7	12.7	4.76	5.16	1.6						○								
		SNMG150612-SEM	15.9	15.9	6.35	6.35	1.2						○								
		SNMG150616-SEM	15.9	15.9	6.35	6.35	1.6						○								

Stock ▲ Recommended grade (always stock available) ● Available grade (always stock available) ○ Make-to-order

车削刀片
TURNING
INSERTS

SN□□ (Negative inserts)

★ Good working condition
▲ Normal working condition
● Bad working condition



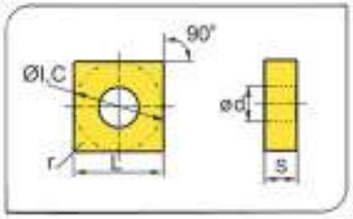
Workpiece material		P					M			K			N	S	
P	Steel	★	▲	★	▲	▲									
M	Stainless steel				▲	★	▲	▲							
K	Cast iron								★	●	●				
N	Non-ferrous metal											★	▲		
S	Heat resistant alloy, Ti alloy													★	★

Inserts shape		Type	Dimensions(mm)					P					M			K			N	S	
			L	ø I.C	S	ø d	r	ST7010	ST7020	ST7015	ST7025	ST9015	ST8025	ST9020	ST9010	ST8025	ST6025	ST8030	ST5010	ST9120	ST9005
For roughing		SNMG120408-SDR	12.7	12.7	4.76	5.16	0.8		●		▲						○				
		SNMG120412-SDR	12.7	12.7	4.76	5.16	1.2		▲		●						○				
		SNMG120416-SDR	12.7	12.7	4.76	5.16	1.6		▲		●						○				
		SNMG150608-SDR	15.9	15.9	6.35	6.35	0.8		●		▲						○				
		SNMG150612-SDR	15.9	15.9	6.35	6.35	1.2		▲		●						○				
		SNMG150416-SDR	15.9	15.9	6.35	6.35	1.6		▲		●						○				
		SNMG150624-SDR	15.9	15.9	6.35	6.35	2.4		▲		●						○				
		SNMG190612-SDR	19.1	19.1	6.35	7.94	1.2		▲		●						○				
		SNMG190616-SDR	19.1	19.1	6.35	7.94	1.6		▲		●						○				
		SNMG190624-SDR	19.1	19.1	6.35	7.94	2.4		▲		●						○				
		SNMM120408-SDR	12.7	12.7	4.76	5.16	0.8														
		SNMM120412-SDR	12.7	12.7	4.76	5.16	1.2														
		SNMM120416-SDR	12.7	12.7	4.76	5.16	1.6														
		SNMM150608-SDR	15.9	15.9	6.35	6.35	0.8		▲												
		SNMM150612-SDR	15.9	15.9	6.35	6.35	1.2		▲												
		SNMM150616-SDR	15.9	15.9	6.35	6.35	1.6		▲												
		SNMM190608-SDR	19.1	19.1	6.35	7.94	0.8		▲												
		SNMM190612-SDR	19.1	19.1	6.35	7.94	1.2		▲												
		SNMM190616-SDR	19.1	19.1	6.35	7.94	1.6		▲												
		SNMM190624-SDR	19.1	19.1	6.35	7.94	2.4		▲												
		SNMM250724-SDR	25.4	25.4	7.94	9.12	2.4		▲												
		SNMM250924-SDR	25.4	25.4	9.525	9.12	2.4		▲												
		SNMG120408-SER	12.7	12.7	4.76	5.16	0.8						○								
		SNMG120412-SER	12.7	12.7	4.76	5.16	1.2						○								
		SNMG150608-SER	15.9	15.9	6.35	6.35	0.8						○								
		SNMG150612-SER	15.9	15.9	6.35	6.35	1.2						○								
		SNMG190612-SER	19.1	19.1	6.35	7.94	1.2						○								
		SNMG190616-SER	19.1	19.1	6.35	7.94	1.6						○								

Stock ▲ Recommended grade (always stock available) ● Available grade (always stock available) ○ Make-to-order

SN□□ (Negative inserts)

★ Good working condition
▲ Normal working condition
● Bad working condition



Workpiece material		ST7010	ST7020	ST7015	ST7025	ST9015	ST8015	ST8010	ST8020	ST8025	ST8025	ST8030	ST5010	ST9120	ST9005
P	Steel	★	▲	★	▲	▲									
M	Stainless steel					▲	★	▲	▲						
K	Cast iron									★	●	●			
N	Non-ferrous metal												★	▲	
S	Heat resistant alloy, Ti alloy													★	★

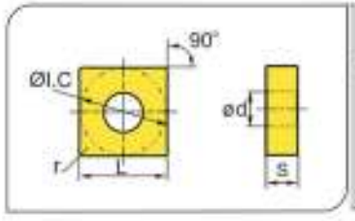
Inserts shape		Type	Dimensions(mm) L	Φ I.C	S	Φ d	r	P ST7010	ST7020	ST7015	ST7025	ST9015	M ST8015	ST8010	ST8020	K ST8025	ST8025	ST8030	N ST5010	S ST9120	ST9005
For roughing		SNMM250724-SER	25.4	25.4	7.94	9.12	2.4						○								
		SNMM250732-SER	25.4	25.4	7.94	9.12	3.2						○								
		SNMM250924-SER	25.4	25.4	9.525	9.12	2.4						○								
		SNMM250932-SER	25.4	25.4	9.525	9.12	3.2						○								
For semi-finishing		SNMG090304	9.525	9.525	3.18	3.81	0.4				○					▲	●				
		SNMG090308	9.525	9.525	3.18	3.81	0.8				○					▲	●				
		SNMG120404	12.7	12.7	4.76	5.16	0.4				○					▲	●				
		SNMG120408	12.7	12.7	4.76	5.16	0.8				○					▲	●				
		SNMG120412	12.7	12.7	4.76	5.16	1.2				○					▲	●				
		SNMG120416	12.7	12.7	4.76	5.16	1.6				○					▲	●				
		SNMG150608	15.9	15.9	6.35	6.35	0.8				○					▲	●				
		SNMG150612	15.9	15.9	6.35	6.35	1.2				○					▲	●				
		SNMG190612	19.1	19.1	6.35	7.94	1.2				○					▲	●				
		SNMG190616	19.1	19.1	6.35	7.94	1.6				○					▲	●				
		SNMG250724	25.4	25.4	7.94	9.12	2.4				○					▲	●				
		SNMG250924	25.4	25.4	9.525	9.12	2.4				○					▲	●				

Stock ▲ Recommended grade (always stock available) ● Available grade (always stock available) ○ Make-to-order

车削刀片
TURNING
INSERTS

SN□□ (Negative inserts)

★ Good working condition
▲ Normal working condition
● Bad working condition



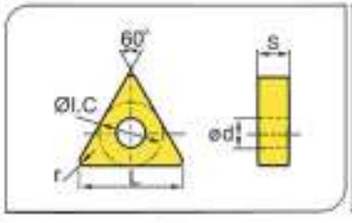
Workpiece material		ST7010	ST7020	ST7015	ST7025	ST9015	ST8015	ST8010	ST8020	ST6005	ST6025	ST6030	ST5010	ST9120	ST9005
P	Steel	★	▲	★	▲	▲									
M	Stainless steel					▲	★	▲	▲						
K	Cast iron									★	●	●			
N	Non-ferrous metal												★	▲	
S	Heat resistant alloy, Ti alloy													★	★

Inserts shape		Type	Dimensions(mm) L	Φ I.C	S	Φ d	r	P ST7010	ST7020	ST7015	ST7025	ST9015	M ST8015	ST8010	ST8020	K ST6005	ST6025	ST6030	N ST5010	S ST9120	ST9005
		SNMA090304	9.525	9.525	3.18	3.81	0.4										▲				
		SNMA090308	9.525	9.525	3.18	3.81	0.8										▲				
		SNMA120404	12.7	12.7	4.76	5.16	0.4										▲				
		SNMA120408	12.7	12.7	4.76	5.16	0.8										▲	●			
		SNMA120412	12.7	12.7	4.76	5.16	1.2										▲	●			
		SNMA120416	12.7	12.7	4.76	5.16	1.6										▲	●			
		SNMA150608	15.9	15.9	6.35	6.35	0.8										▲	●			
		SNMA150612	15.9	15.9	6.35	6.35	1.2										▲	●			
		SNMA190612	19.1	19.1	6.35	7.94	1.2										▲	●			
		SNMA190616	19.1	19.1	6.35	7.94	1.6										▲	●			
For finishing		TNMG160404-SDF	16.5	9.525	4.76	3.81	0.4	●		▲											
		TNMG160408-SDF	16.5	9.525	4.76	3.81	0.8	●		▲											
		TNMG160412-SDF	16.5	9.525	4.76	3.81	1.2	●		▲											
		TNMG220408-SDF	22	12.7	4.76	5.16	0.8	●		▲											
		TNMG220412-SDF	22	12.7	4.76	5.16	1.2	●		▲											
For finishing		TNMG110304-SEF	11	6.35	3.18	2.26	0.4							▲	●						
		TNMG110308-SEF	11	6.35	3.18	2.26	0.8							▲	●						
		TNMG160404-SEF	16.5	9.525	4.76	3.81	0.4							▲	●						
		TNMG160408-SEF	16.5	9.525	4.76	3.81	0.8							▲	●						
		TNMG160412-SEF	16.5	9.525	4.76	3.81	1.2														
		TNMG220404-SEF	22	12.7	4.76	5.16	0.4							▲	●						
		TNMG220408-SEF	22	12.7	4.76	5.16	0.8							▲	●						
		TNMG220412-SEF	22	12.7	4.76	5.16	1.2														

Stock ▲ Recommended grade (always stock available) ● Available grade (always stock available) ○ Make-to-order

TN□□ (Negative inserts)

★ Good working condition
▲ Normal working condition
● Bad working condition



Workpiece material		P					M			K			N	S	
P	Steel	★	▲	★	▲	▲									
M	Stainless steel					▲	★	▲	▲						
K	Cast iron									★	●	●			
N	Non-ferrous metal												★	▲	
S	Heat resistant alloy, Ti alloy														★ ★

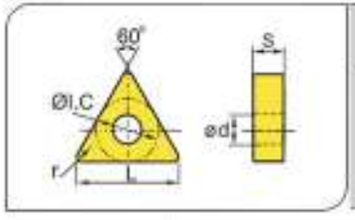
Inserts shape		Type	Dimensions(mm) L	Φ I.C	S	Φ d	r	P ST7010	ST7020	ST7015	ST7025	ST9015	M ST8015	ST8010	ST8020	K ST6005	ST6025	ST6030	N ST5010	S ST9120	ST9005
For semi-finishing		TNMG110304-SPM	11	6.35	3.18	2.26	0.4		●		▲										
		TNMG110308-SPM	11	6.35	3.18	2.26	0.8		●		▲										
		TNMG160404-SPM	16.5	9.525	4.76	3.81	0.4		●		▲										
		TNMG160408-SPM	16.5	9.525	4.76	3.81	0.8		●		▲										
		TNMG160412-SPM	16.5	9.525	4.76	3.81	1.2		●		▲										
		TNMG220408-SPM	22	12.7	4.76	5.16	0.8		●		▲										
		TNMG220412-SPM	22	12.7	4.76	5.16	1.2		●		▲										
		TNMG220416-SPM	22	12.7	4.76	5.16	1.6		●		▲										
		TNMG160404-SEM	16.5	9.525	4.76	3.81	0.4							▲							
		TNMG160408-SEM	16.5	9.525	4.76	3.81	0.8							▲		○					
		TNMG160412-SEM	16.5	9.525	4.76	3.81	1.2							▲		○					
		TNMG220408-SEM	22	12.7	4.76	5.16	0.8							▲							
		TNMG220412-SEM	22	12.7	4.76	5.16	1.2							▲		○					
		TNMG220416-SEM	22	12.7	4.76	5.16	1.6							▲							

Stock ▲Recommended grade (always stock available) ●Available grade (always stock available) Make to order

车削刀片
TURNING
INSERTS

TN□□ (Negative inserts)

★ Good working condition
▲ Normal working condition
● Bad working condition



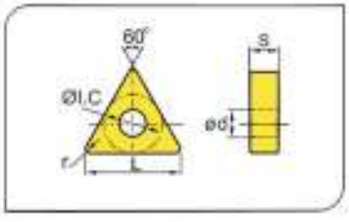
Workpiece material		P					M			K			N	S	
P	Steel	★	▲	★	▲	▲									
M	Stainless steel					▲	★	▲	▲						
K	Cast iron									★	●	●			
N	Non-ferrous metal												★	▲	
S	Heat resistant alloy, Ti alloy														★ ★

Inserts shape		Type	Dimensions(mm) L	Φ I.C	S	Φ d	r	P ST7010	ST7020	ST7015	ST7025	ST9015	M ST8015	ST8010	ST8020	K ST6005	ST6025	ST6030	N ST5010	S ST9120	ST9005
For roughing		TNMG160408-SEM	16.5	9.525	4.76	3.81	0.8		●		▲										
		TNMG160412-SEM	16.5	9.525	4.76	3.81	1.2		●		▲										
		TNMG220408-SEM	22	12.7	4.76	5.16	0.8		●		▲										
		TNMG220412-SEM	22	12.7	4.76	5.16	1.2		●		▲										
		TNMG220416-SEM	22	12.7	4.76	5.16	1.6		●		▲										
		TNMG270608-SEM	27.5	15.9	6.35	6.35	0.8														
		TNMG270612-SEM	27.5	15.9	6.35	6.35	1.2														
		TNMG270616-SEM	27.5	15.9	6.35	6.35	1.6														
		TNMM160408-SEM	16.5	9.525	4.76	3.81	0.8		○												
		TNMM160412-SEM	16.5	9.525	4.76	3.81	1.2		○												
		TNMM220408-SEM	22	12.7	4.76	5.16	0.8		○												
		TNMM220412-SEM	22	12.7	4.76	5.16	1.2		○												
		TNMM220416-SEM	22	12.7	4.76	5.16	1.6		○												
		TNMM270612-SEM	27.5	15.9	6.35	6.35	1.2		○												
		TNMM270616-SEM	27.5	15.9	6.35	6.35	1.6		○												
		TNMG160408-SER	16.5	9.525	4.76	3.81	0.8						○								
		TNMG160412-SER	16.5	9.525	4.76	3.81	1.2						○								
		TNMG220408-SER	22	12.7	4.76	5.16	0.8						○								
		TNMG220412-SER	22	12.7	4.76	5.16	1.2						○								
		TNMM160408-SER	16.5	9.525	4.76	3.81	0.8						○								
		TNMM160412-SER	16.5	9.525	4.76	3.81	1.2						○								
		TNMM220408-SER	22	12.7	4.76	5.16	0.8						○								
		TNMM220412-SER	22	12.7	4.76	5.16	1.2						○								
		TNMM220416-SER	22	12.7	4.76	5.16	1.6						○								

Stock ▲Recommended grade (always stock available) ●Available grade (always stock available) Make to order

TN□□ (Negative inserts)

★ Good working condition
▲ Normal working condition
● Bad working condition



Workpiece material		ST7010	ST7020	ST7015	ST7025	ST9015	ST8015	ST8010	ST8020	ST6005	ST6025	ST6030	ST5010	ST9120	ST9005
P	Steel	★	▲	★	▲	▲									
M	Stainless steel					▲	★	▲	▲						
K	Cast iron									★	●	●			
N	Non-ferrous metal												★	▲	
S	Heat resistant alloy, Ti alloy													★	★

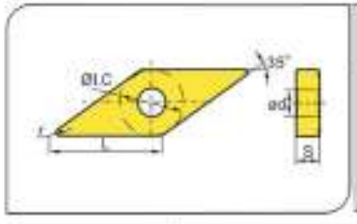
Inserts shape		Type	Dimensions(mm) L	Φ I.C	S	Φ d	r	P ST7010	ST7020	ST7015	ST7025	ST9015	M ST8015	ST8010	ST8020	K ST6005	ST6025	ST6030	N ST5010	S ST9120	ST9005
For semi-finishing		TNMG110308	11	6.35	3.18	2.26	0.8				○					▲	●				
		TNMG160404	16.5	9.525	4.76	3.81	0.4				○					▲	●				
		TNMG160408	16.5	9.525	4.76	3.81	0.8				○					▲	●				
		TNMG160412	16.5	9.525	4.76	3.81	1.2				○					▲	●				
		TNMG220404	22	12.7	4.76	5.16	0.4				○					▲	●				
		TNMG220408	22	12.7	4.76	5.16	0.8				○					▲	●				
		TNMG220412	22	12.7	4.76	5.16	1.2				○					▲	●				
		TNMG220416	22	12.7	4.76	5.16	1.6				○					▲	●				
		TNMG270612	27.5	15.9	6.35	6.35	1.2														
		TNMG270616	27.5	15.9	6.35	6.35	1.6														
		TNMG330916	33	19.1	9.525	7.94	1.6														
		TNMG330924	33	19.1	9.525	7.94	2.4														
		TNMA160404	16.5	9.525	4.76	3.81	0.4										▲	●			
		TNMA160408	16.5	9.525	4.76	3.81	0.8										▲	●			
		TNMA160412	16.5	9.525	4.76	3.81	1.2										▲	●			
		TNMA160416	16.5	9.525	4.76	3.81	1.6										▲	●			
		TNMA220404	22	12.7	4.76	5.16	0.4										▲	●			
		TNMA220408	22	12.7	4.76	5.16	0.8										▲	●			
		TNMA220412	22	12.7	4.76	5.16	1.2										▲	●			
		TNMA220416	22	12.7	4.76	5.16	1.6										▲	●			
		TNMA270616	27.5	15.9	6.35	6.35	1.6														

Stock ▲ Recommended grade (always stock availability) ● Available grade (always stock availability) ○ Make to order

车削刀片
TURNING
INSERTS

VN□□ (Negative inserts)

★ Good working condition
▲ Normal working condition
● Bad working condition



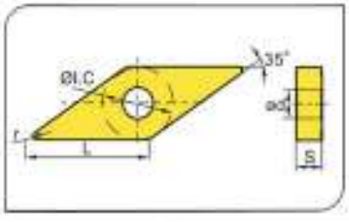
Workpiece material		ST7010	ST7020	ST7015	ST7025	ST9015	ST8015	ST8010	ST8020	ST6005	ST6025	ST6030	ST5010	ST9120	ST9005
P	Steel	★	▲	★	▲	▲									
M	Stainless steel					▲	★	▲	▲						
K	Cast iron									★	●	●			
N	Non-ferrous metal												★	▲	
S	Heat resistant alloy, Ti alloy													★	★

Inserts shape		Type	Dimensions(mm) L	Φ I.C	S	Φ d	r	P ST7010	ST7020	ST7015	ST7025	ST9015	M ST8015	ST8010	ST8020	K ST6005	ST6025	ST6030	N ST5010	S ST9120	ST9005
For finishing		VNMG160404-SDF	16.6	9.525	4.76	3.81	0.4	●		▲	○										
		VNMG160408-SDF	16.6	9.525	4.76	3.81	0.8	●		▲	○										
		VNMG160404-SEF	16.6	9.525	4.76	3.81	0.4							▲	●						
		VNMG160408-SEF	16.6	9.525	4.76	3.81	0.8							▲	●						
		VNMG160412-SEF	16.6	9.525	4.76	3.81	1.2							▲	●						
For semi-finishing		VNMG160404-SPM	16.6	9.525	4.76	3.81	0.4	○	●		▲										
		VNMG160408-SPM	16.6	9.525	4.76	3.81	0.8	○	●		▲										
		VNMG160412-SPM	16.6	9.525	4.76	3.81	1.2		●		▲										
		VNMG160404-SEM	16.6	9.525	4.76	3.81	0.4							▲	●						
		VNMG160408-SEM	16.6	9.525	4.76	3.81	0.8							▲	●						

Stock ▲ Recommended grade (always stock availability) ● Available grade (always stock availability) ○ Make to order

VN□□ (Negative inserts)

★ Good working condition
▲ Normal working condition
● Bad working condition



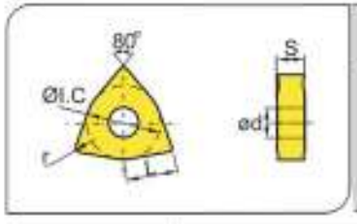
Workpiece material		P	M	K	N	S
P	Steel	★ ▲ ★ ▲ ▲				
M	Stainless steel		▲ ★ ▲ ▲			
K	Cast iron			★ ● ●		
N	Non-ferrous metal				★ ▲	
S	Heat resistant alloy, Ti alloy					★ ★

Inserts shape		Type	Dimensions(mm) L	Φ I.C	S	Φ d	r	P ST7010	ST7020	ST7015	ST7025	ST9015	M ST8015	ST8010	ST8020	K ST6005	ST6025	ST6030	N ST5010	S ST9120	ST9005
For semi-finishing		VNMG160404-SDM	16.6	9.525	4.76	3.81	0.4		●	△						▲	●				
		VNMG160408-SDM	16.6	9.525	4.76	3.81	0.8		○	○						▲	●				
		VNMG160404-SEM	16.6	9.525	4.76	3.81	0.4								▲						
		VNMG160408-SEM	16.6	9.525	4.76	3.81	0.8								▲						
For finishing		VNMG160404-SEF	16.6	9.525	4.76	3.81	0.4										▲	●			▲
		VNMG160408-SEF	16.6	9.525	4.76	3.81	0.8														▲
		VNMG160412-SEF	16.6	9.525	4.76	3.81	1.2														○

Stock ▲ Recommended grade (always stock available) ● Available grade (always stock available) ○ Make-to-order

WN□□ (Negative inserts)

★ Good working condition
▲ Normal working condition
● Bad working condition



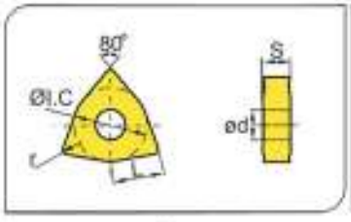
Workpiece material		P	M	K	N	S
P	Steel	★ ▲ ★ ▲ ▲				
M	Stainless steel		▲ ★ ▲ ▲			
K	Cast iron			★ ● ●		
N	Non-ferrous metal				★ ▲	
S	Heat resistant alloy, Ti alloy					★ ★

Inserts shape		Type	Dimensions(mm) L	Φ I.C	S	Φ d	r	P ST7010	ST7020	ST7015	ST7025	ST9015	M ST8015	ST8010	ST8020	K ST6005	ST6025	ST6030	N ST5010	S ST9120	ST9005
For finishing		WNMG06T304-SDF	6.5	9.525	3.97	3.81	0.4	●		▲											
		WNMG06T308-SDF	6.5	9.525	3.97	3.81	0.8	●		▲											
		WNMG06T312-SDF	6.5	9.525	3.97	3.81	1.2	●		▲											
		WNMG060404-SDF	6.5	9.525	4.76	3.81	0.4	●		▲											
		WNMG060408-SDF	6.5	9.525	4.76	3.81	0.8	●		▲											
		WNMG060412-SDF	6.5	9.525	4.76	3.81	1.2	●		▲											
		WNMG080404-SDF	8.7	12.7	4.76	5.16	0.4	●		▲											
		WNMG080408-SDF	8.7	12.7	4.76	5.16	0.8	●		▲											
		WNMG080412-SDF	8.7	12.7	4.76	5.16	1.2	●		▲											
		WNMG080404-SNF	6.5	9.525	3.97	3.81	0.4														▲
		WNMG080408-SNF	6.5	9.525	3.97	3.81	0.8														▲

Stock ▲ Recommended grade (always stock available) ● Available grade (always stock available) ○ Make-to-order

WN□□ (Negative inserts)

★ Good working condition
▲ Normal working condition
● Bad working condition



Workpiece material		P					M			K			N	S	
P	Steel	★	▲	★	▲	▲									
M	Stainless steel				▲	★	▲	▲							
K	Cast iron								★	●	●				
N	Non-ferrous metal											★	▲		
S	Heat resistant alloy, Ti alloy													★	★

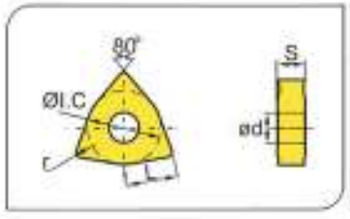
Inserts shape	Type	Dimensions(mm) L	Φ I.C	S	Φ d	r	P ST7010	ST7020	ST7015	ST7025	ST9015	M ST8015	ST8010	ST8020	K ST6005	ST6025	ST6030	N ST6010	S ST9120	ST9005
For semi-finishing	WNMG06T304- SPM	6.5	9.525	3.97	3.81	0.4		●		▲										
	WNMG06T308- SPM	6.5	9.525	3.97	3.81	0.8		●		▲										
	WNMG06T312- SPM	6.5	9.525	3.97	3.81	1.2		●		▲										
	WNMG060408- SPM	6.5	9.525	4.76	3.81	0.4		●		▲										
	WNMG060412- SPM	6.5	9.525	4.76	3.81	0.8		●		▲										
	WNMG080404- SPM	8.7	12.7	4.76	5.16	0.4		●		▲										
	WNMG080408- SPM	8.7	12.7	4.76	5.16	0.8		●		▲										
	WNMG080412- SPM	8.7	12.7	4.76	5.16	1.2		●		▲										
	WNMG080416- SPM	8.7	12.7	4.76	5.16	1.6		●		▲										
	WNMG06T304- SEM	6.5	9.525	3.97	3.81	0.4							▲	●						
	WNMG06T308- SEM	6.5	9.525	3.97	3.81	0.8							▲	●						
	WNMG06T312- SEM	6.5	9.525	3.97	3.81	1.2							▲	●						
	WNMG060404- SEM	6.5	9.525	4.76	3.81	0.4							▲	●						
	WNMG060408- SEM	6.5	9.525	4.76	3.81	0.8							▲	●						
	WNMG080404- SEM	8.7	12.7	4.76	5.16	0.4							▲	●						
	WNMG080408- SEM	8.7	12.7	4.76	5.16	0.8							▲	●						
	WNMG080412- SEM	8.7	12.7	4.76	5.16	1.2							▲	●						

Stock ▲ Recommended grade (always stock available) ● Available grade (always stock available) ○ Make to order

车削刀片
TURNING
INSERTS

WN□□ (Negative inserts)

★ Good working condition
▲ Normal working condition
● Bad working condition



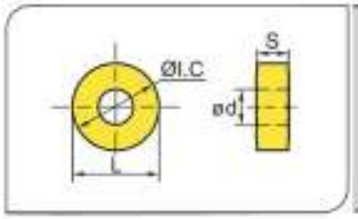
Workpiece material		P					M			K			N	S	
P	Steel	★	▲	★	▲	▲									
M	Stainless steel				▲	★	▲	▲							
K	Cast iron								★	●	●				
N	Non-ferrous metal											★	▲		
S	Heat resistant alloy, Ti alloy													★	★

Inserts shape	Type	Dimensions(mm) L	Φ I.C	S	Φ d	r	P ST7010	ST7020	ST7015	ST7025	ST9015	M ST8015	ST8010	ST8020	K ST6005	ST6025	ST6030	N ST6010	S ST9120	ST9005
For roughing	WNMG060408- SDR	6.5	9.525	4.76	3.81	0.8		●		▲						○				
	WNMG060412- SDR	6.5	9.525	4.76	3.81	1.2		●		▲						○				
	WNMG080408- SDR	8.7	12.7	4.76	5.16	0.8		●		▲						○				
	WNMG080412- SDR	8.7	12.7	4.76	5.16	1.2		●		▲						○				
	WNMG080416- SDR	8.7	12.7	4.76	5.16	1.6		●		▲						○				
For semi-finishing	WNMG06T308	6.5	9.525	3.97	3.81	0.8				○					▲	●				
	WNMG060408	6.5	9.525	4.76	3.81	0.8				○					▲	●				
	WNMG060412	6.5	9.525	4.76	3.81	1.2				○					▲	●				
	WNMG060416	6.5	9.525	4.76	3.81	1.6				○					▲	●				
	WNMG080404	8.7	12.7	4.76	5.16	0.4				○					▲	●				
	WNMG080408	8.7	12.7	4.76	5.16	0.8				○					▲	●				
	WNMG080412	8.7	12.7	4.76	5.16	1.2				○					▲	●				
	WNMA06T308	6.5	9.525	3.97	3.81	0.8										▲	●			
	WNMA060404	6.5	9.525	4.76	3.81	0.4										▲	●			
	WNMA060408	6.5	9.525	4.76	3.81	0.8										▲	●			
	WNMA060412	6.5	9.525	4.76	3.81	1.2										▲	●			
	WNMA080404	8.7	12.7	4.76	5.16	0.4										▲	●			
	WNMA080408	8.7	12.7	4.76	5.16	0.8										▲	●			
	WNMA080412	8.7	12.7	4.76	5.16	1.2										▲	●			
	WNMA080416	8.7	12.7	4.76	5.16	1.6										▲	●			

Stock ▲ Recommended grade (always stock available) ● Available grade (always stock available) ○ Make to order

RN□□ (Negative inserts)

★ Good working condition
▲ Normal working condition
● Bad working condition



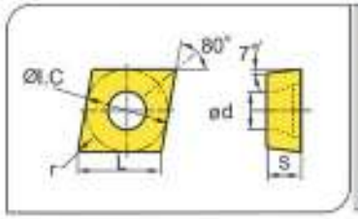
Workpiece material		ST7010	ST7020	ST7015	ST7025	ST9015	ST8020	ST9020	ST9010	ST8025	ST8025	OC3115C	ST5010	ST9120	ST9005
P	Steel	★	▲	★	▲	▲									
M	Stainless steel					▲	★	▲	▲						
K	Cast iron									★	●	●			
N	Non-ferrous metal												★	▲	
S	Heat resistant alloy, Ti alloy													★	★

Inserts shape		Type	Dimensions(mm) L	Φ I.C	S	Φ d	r	P ST7010	ST7020	ST7015	ST7025	ST9015	M ST8020	ST9020	ST9010	K ST8025	ST8025	OC3115C	N ST5010	S ST9120	ST9005
For semi-finishing		RNMG120400	12.7	12.7	4.76	5.16			●		▲										

Stock ▲ Recommended grade (always stock available) ● Available grade (always stock available) ○ Make to order

CC□□ (Positive inserts)

★ Good working condition
▲ Normal working condition
● Bad working condition



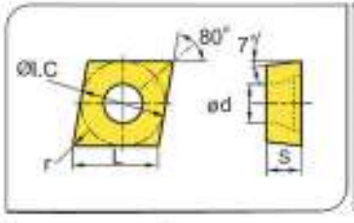
Workpiece material		ST7010	ST7020	ST7015	ST7025	ST9015	ST8015	ST8010	ST8020	ST5005	ST5025	ST5030	ST5010	ST9120	ST9005
P	Steel	★	▲	★	▲	▲									
M	Stainless steel					▲	★	▲	▲						
K	Cast iron									★	●	●			
N	Non-ferrous metal												★	▲	
S	Heat resistant alloy, Ti alloy													★	★

Inserts shape		Type	Dimensions(mm) L	Φ I.C	S	Φ d	r	P ST7010	ST7020	ST7015	ST7025	ST9015	M ST8015	ST8010	ST8020	K ST5005	ST5025	ST5030	N ST5010	S ST9120	ST9005
For finishing		CCMT060202-SHF	6.4	6.35	2.38	2.8	0.2					●		▲	●						
		CCMT060204-SHF	6.4	6.35	2.38	2.8	0.4	●		▲		●		▲	●						
		CCMT09T302-SHF	9.7	9.525	3.97	4.4	0.2					●									
		CCMT09T304-SHF	9.7	9.525	3.97	4.4	0.4	●		▲		●		▲	●						
		CCMT09T308-SHF	9.7	9.525	3.97	4.4	0.8	●		▲				▲	●						
		CCMT120404-SHF	12.9	12.7	4.76	5.56	0.4	●		▲		●		▲	●						
		CCMT120408-SHF	12.9	12.7	4.76	5.56	0.8	●		▲				▲	●						
For semi-finishing		CCMT060204-SHM	6.4	6.35	2.38	2.8	0.4	●		▲	●	○									
		CCMT060208-SHM	6.4	6.35	2.38	2.8	0.8		●		▲										
		CCMT09T304-SHM	9.7	9.525	3.97	4.4	0.4	●			▲	○									
		CCMT09T308-SHM	9.7	9.525	3.97	4.4	0.8		●		▲										
		CCMT120404-SHM	12.9	12.7	4.76	5.56	0.4	●			▲	○									
		CCMT120408-SHM	12.9	12.7	4.76	5.56	0.8		●		▲										
		CCMT120412-SHM	12.9	12.7	4.76	5.56	1.2		●		▲	○									

Stock ▲ Recommended grade (always stock available) ● Available grade (always stock available) ○ Make to order

CC□□ (Positive inserts)

★ Good working condition
▲ Normal working condition
● Bad working condition



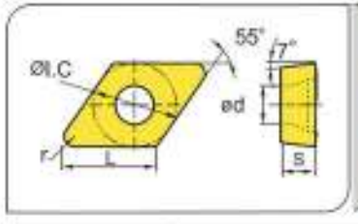
Workpiece material		ST7010	ST7020	ST7015	ST7025	ST6015	ST8015	ST8010	ST8020	ST6005	ST6025	ST6030	ST5010	ST9120	ST9005
P	Steel	★	▲	★	▲	▲									
M	Stainless steel					▲	★	▲	▲						
K	Cast iron									★	●	●			
N	Non-ferrous metal												★	▲	
S	Heat resistant alloy, Ti alloy													★	★

Inserts shape		Type	Dimensions(mm) L	Φ I.C	S	Φ d	r	P ST7010	ST7020	ST7015	ST7025	ST6015	M ST8015	ST8010	ST8020	K ST6005	ST6025	ST6030	N ST5010	S ST9120	ST9005
For roughing		CCMT060204-SHR	6.4	6.35	2.38	2.8	0.4		●		▲					▲					
		CCMT060208-SHR	6.4	6.35	2.38	2.8	0.8		●		▲					▲	○				
		CCMT09T304-SHR	9.7	9.525	3.97	4.4	0.4		●		▲					▲					
		CCMT09T308-SHR	9.7	9.525	3.97	4.4	0.8		●		▲					▲	●				
		CCMT120408-SHR	12.9	12.7	4.76	5.56	0.8		●		▲					▲	●				
		CCMT120412-SHR	12.9	12.7	4.76	5.56	1.2		●		▲					▲	●				
		CCMW060204	6.4	6.35	2.38	2.8	0.4													●	
		CCMW09T304	9.7	9.525	3.97	4.4	0.4										○			●	
		CCMW09T308	9.7	9.525	3.97	4.4	0.8										○			○	
		CCMW120404	12.9	12.7	4.76	5.56	0.4										○				
		CCMW120408	12.9	12.7	4.76	5.56	0.8										○			●	

NOTE ▲ Recommended grade (always stock available) ● Available grade (always stock available) ○ Make-to-order

DC□□ (Positive inserts)

★ Good working condition
▲ Normal working condition
● Bad working condition



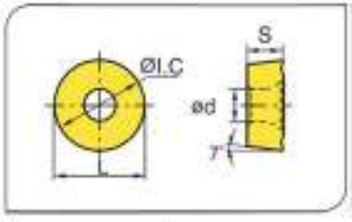
Workpiece material		ST7010	ST7020	ST7015	ST7025	ST6015	ST8015	ST8010	ST8020	ST6005	ST6025	ST6030	ST5010	ST9120	ST9005
P	Steel	★	▲	★	▲	▲									
M	Stainless steel					▲	★	▲	▲						
K	Cast iron									★	●	●			
N	Non-ferrous metal												★	▲	
S	Heat resistant alloy, Ti alloy													★	★

Inserts shape		Type	Dimensions(mm) L	Φ I.C	S	Φ d	r	P ST7010	ST7020	ST7015	ST7025	ST6015	M ST8015	ST8010	ST8020	K ST6005	ST6025	ST6030	N ST5010	S ST9120	ST9005
For finishing		DCMT070202-SHF	7.8	6.35	2.38	2.8	0.2			▲		●		▲	●						
		DCMT070204-SHF	7.8	6.35	2.38	2.8	0.4	●		▲		●		▲	●						
		DCMT070208-SHF	7.8	6.35	2.38	2.8	0.8	●		▲				▲	●						
		DCMT11T302-SHF	11.6	9.525	3.97	4.4	0.2			▲		●		▲	●						
		DCMT11T304-SHF	11.6	9.525	3.97	4.4	0.4	●		▲		●		▲	●						
		DCMT11T308-SHF	11.6	9.525	3.97	4.4	0.8	●		▲				▲	●						
For semi-finishing		DCMT070204-SHM	7.8	6.35	2.38	2.8	0.4			▲				▲							
		DCMT070208-SHM	7.8	6.35	2.38	2.8	0.8		●		▲			▲							
		DCMT11T304-SHM	11.6	9.525	3.97	4.4	0.4			▲				▲							
		DCMT11T308-SHM	11.6	9.525	3.97	4.4	0.8		●		▲			▲							
		DCMT11T312-SHM	11.6	9.525	3.97	4.4	1.2		●		▲			▲							
For roughing		DCMT070208-SHR	7.8	6.35	2.38	2.8	0.8		●		▲						▲				
		DCMT11T304-SHR	11.6	9.525	3.97	4.4	0.4		●		▲						▲				
		DCMT11T308-SHR	11.6	9.525	3.97	4.4	0.8		●		▲						▲				
		DCMT11T312-SHR	11.6	9.525	3.97	4.4	1.2		●		▲						▲				
		DCMW070204	7.8	6.35	2.38	2.8	0.4										○				
		DCMW11T304	11.6	9.525	3.97	4.4	0.4										○				
		DCMW11T308	11.6	9.525	3.97	4.4	0.8										○				

NOTE ▲ Recommended grade (always stock available) ● Available grade (always stock available) ○ Make-to-order

RC□□ (Positive inserts)

★ Good working condition
▲ Normal working condition
● Bad working condition



Workpiece material		ST7010	ST7020	ST7015	ST7025	ST9015	ST8015	ST8010	ST8020	ST6005	ST6025	ST6030	ST5010	ST9120	ST9005
P	Steel	★	▲	★	▲	▲									
M	Stainless steel					▲	★	▲	▲						
K	Cast iron									★	●	●			
N	Non-ferrous metal												★	▲	
S	Heat resistant alloy, Ti alloy													★	★

Inserts shape		Type	Dimensions(mm) L	Φ I.C	S	Φ d	r	P ST7010	ST7020	ST7015	ST7025	ST9015	M ST8015	ST8010	ST8020	K ST6005	ST6025	ST6030	N ST5010	S ST9120	ST9005
For semi-finishing		RCMT0803MO	8.0	8.0	3.18	3.36			●		▲						▲				
		RCMT1003MO	10	10	3.97	4.4			●		▲						▲				
		RCMT1204MO	12	12	4.76	4.4			●		▲						▲				
		RCMT1606MO	16	16	6.35	5.5			●		▲						▲				
For semi-finishing~For roughing		RCMX0803MO	8.0	8.0	3.2	3.36			●		▲						▲				
		RCMX1003MO	10	10	3.18	3.6			●		▲						▲				
		RCMX1204MO	12	12	4.76	4.4			●		▲						▲				○
		RCMX1606MO	16	16	6.35	5.5			●		▲						▲				○
		RCMX2006MO	20	20	6.35	6.5			●		▲						▲				○
		RCMX2507MO	25	25	7.94	7.2			▲		●						▲				○
		RCMX3209MO	32	32	9.52	9.5			▲		●						▲				

Stock ▲Recommended grade (always stock available) ●Available grade (always stock available) ○Make to order

车削刀片
TURNING
INSERTS

DC□□ (Positive inserts)

★ Good working condition
▲ Normal working condition
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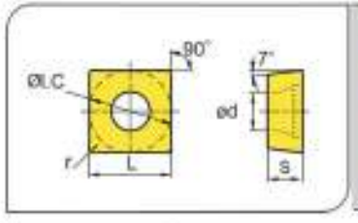


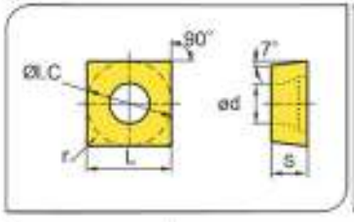
Workpiece material		ST7010	ST7020	ST7015	ST7025	ST9015	ST8015	ST8010	ST8020	ST6005	ST6025	ST6030	ST5010	ST9120	ST9005
P	Steel	★	▲	★	▲	▲									
M	Stainless steel					▲	★	▲	▲						
K	Cast iron									★	●	●			
N	Non-ferrous metal												★	▲	
S	Heat resistant alloy, Ti alloy													★	★

Inserts shape		Type	Dimensions(mm) L	Φ I.C	S	Φ d	r	P ST7010	ST7020	ST7015	ST7025	ST9015	M ST8015	ST8010	ST8020	K ST6005	ST6025	ST6030	N ST5010	S ST9120	ST9005
For finishing		SCMT09T302-SHF	9.525	9.525	3.97	4.4	0.2	●		▲		●		▲							
		SCMT09T304-SHF	9.525	9.525	3.97	4.4	0.4	●		▲		●		▲							
		SCMT09T308-SHF	9.525	9.525	3.97	4.4	0.8	●		▲				▲							
For semi-finishing		SCMT09T304-SHM	9.525	9.525	3.97	4.4	0.4	●		▲				▲							
		SCMT09T308-SHM	9.525	9.525	3.97	4.4	0.8		●		▲			▲							
		SCMT120404-SHM	12.7	12.7	4.76	5.56	0.4	●		▲				▲							
		SCMT120408-SHM	12.7	12.7	4.76	5.56	0.8		●		▲			▲							
		SCMT120412-SHM	12.7	12.7	4.76	5.56	1.2		●		▲			▲							
For roughing		SCMT09T304-SHR	9.525	9.525	3.97	4.4	0.4			●							▲				
		SCMT09T308-SHR	9.525	9.525	3.97	4.4	0.8		●		▲						▲				
		SCMT09T312-SHR	9.525	9.525	3.97	4.4	1.2		●		▲						▲				
		SCMT120404-SHR	12.7	12.7	4.76	5.56	0.4			●							▲				
		SCMT120408-SHR	12.7	12.7	4.76	5.56	0.8		●		▲						▲				
		SCMT120412-SHR	12.7	12.7	4.76	5.56	1.2		●		▲						▲				

Stock ▲Recommended grade (always stock available) ●Available grade (always stock available) ○Make to order

SC□□ (Positive inserts)

★ Good working condition
▲ Normal working condition
● Bad working condition



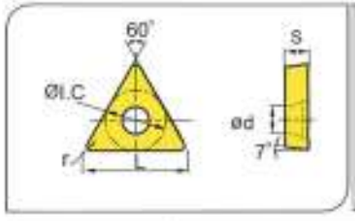
Workpiece material		ST7010	ST7020	ST7015	ST7025	ST9015	ST8015	ST8010	ST8020	ST6005	ST6025	ST6030	ST5010	ST9120	ST9005
P	Steel	★	▲	★	▲	▲									
M	Stainless steel					▲	★	▲	▲						
K	Cast iron									★	●	●			
N	Non-ferrous metal												★	▲	
S	Heat resistant alloy, Ti alloy													★	★

Inserts shape	Type	Dimensions(mm) L	Φ I.C	S	Φ d	r	ST7010	ST7020	ST7015	ST7025	ST9015	ST8015	ST8010	ST8020	ST6005	ST6025	ST6030	ST5010	ST9120	ST9005
	SCMT09T304	9.525	9.525	3.97	4.4	0.4									○	▲				
	SCMT120404	12.7	12.7	4.76	5.56	0.4									○	▲				
	SCMT120408	12.7	12.7	4.76	5.56	0.8									○	▲				
	SCMW060204	6.35	6.35	2.38	2.8	0.4										○				
	SCMW09T304	9.525	9.525	3.97	4.4	0.4										○				
	SCMW09T308	9.525	9.525	3.97	4.4	0.8	○									○				
	SCMW120408	12.7	12.7	4.76	5.56	0.8	●									○				

Stock ▲Recommended grade (always stock available) ●Available grade (always stock available) ○Make to order

DC□□ (Positive inserts)

★ Good working condition
▲ Normal working condition
● Bad working condition



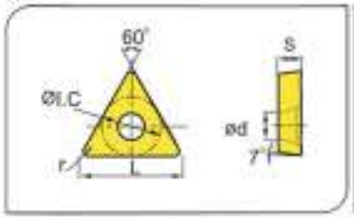
Workpiece material		ST7010	ST7020	ST7015	ST7025	ST9015	ST8015	ST8010	ST8020	ST6005	ST6025	ST6030	ST5010	ST9120	ST9005
P	Steel	★	▲	★	▲	▲									
M	Stainless steel					▲	★	▲	▲						
K	Cast iron									★	●	●			
N	Non-ferrous metal												★	▲	
S	Heat resistant alloy, Ti alloy													★	★

Inserts shape	Type	Dimensions(mm) L	Φ I.C	S	Φ d	r	ST7010	ST7020	ST7015	ST7025	ST9015	ST8015	ST8010	ST8020	ST6005	ST6025	ST6030	ST5010	ST9120	ST9005
For finishing	TCMT06T104-SHF	6.4	3.97	1.98	2.2	0.4	●		▲		●		▲							
	TCMT06T108-SHF	6.4	3.97	1.98	2.2	0.8	●		▲		●		▲							
	TCMT090202-SHF	9.6	5.56	2.38	2.5	0.2	●				●		▲							
	TCMT090204-SHF	9.6	5.56	2.38	2.5	0.4	●		▲		●		▲							
	TCMT090208-SHF	9.6	5.56	2.38	2.5	0.8	●		▲				▲							
	TCMT110202-SHF	11	6.35	2.38	2.8	0.2	●				●		▲							
	TCMT110204-SHF	11	6.35	2.38	2.8	0.4	●		▲		●		▲							
	TCMT110208-SHF	11	6.35	2.38	2.8	0.8	●		▲				▲							
	TCMT16T302-SHF	16.5	9.525	3.97	4.4	0.2	●		▲		●		▲							
	TCMT16T304-SHF	16.5	9.525	3.97	4.4	0.4	●		▲		●		▲							
	TCMT16T308-SHF	16.5	9.525	3.97	4.4	0.8	●		▲				▲							
For semi-finishing	TCMT090204-SHM	9.6	5.56	2.38	2.5	0.4	●		▲		○		▲							
	TCMT090208-SHM	9.6	5.56	2.38	2.5	0.8		●		▲			▲							
	TCMT110204-SHM	11	6.35	2.38	2.8	0.4	●		▲		○		▲							
	TCMT110208-SHM	11	6.35	2.38	2.8	0.8		●		▲			▲							
	TCMT16T304-SHM	16.5	9.525	3.97	4.4	0.4		●		▲	○		▲							
	TCMT16T308-SHM	16.5	9.525	3.97	4.4	0.8		●		▲			▲							
	TCMT16T312-SHM	16.5	9.525	3.97	4.4	1.2		●		▲			▲							

Stock ▲Recommended grade (always stock available) ●Available grade (always stock available) ○Make to order

TC□□ (Positive inserts)

★ Good working condition
▲ Normal working condition
● Bad working condition



Workpiece material		P					M			K			N	S	
P	Steel	★	▲	★	▲	▲									
M	Stainless steel					▲	★	▲	▲						
K	Cast iron									★	●	●			
N	Non-ferrous metal												★	▲	
S	Heat resistant alloy, Ti alloy													★	★

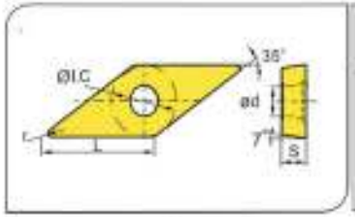
Inserts shape	Type	Dimensions(mm) L	ØI.C	S	Φd	r	P ST7010	ST7020	ST7015	ST7025	ST9015	M ST8015	ST8010	ST8020	K ST6005	ST6025	ST6030	N ST5010	S ST9120	ST9005
For roughing	TCMT090204-SHR	9.6	5.56	2.38	2.5	0.4		●		▲						▲				
	TCMT090208-SHR	9.6	5.56	2.38	2.5	0.8		●		▲						▲				
	TCMT110204-SHR	11	6.35	2.38	2.8	0.4		●		▲						▲				
	TCMT110208-SHR	11	6.35	2.38	2.8	0.8		●		▲						▲				
	TCMT16T304-SHR	16.5	9.525	3.97	4.4	0.4		●		▲						▲				
	TCMT16T308-SHR	16.5	9.525	3.97	4.4	0.8		●		▲						▲				
	TCMT16T312-SHR	16.5	9.525	3.97	4.4	1.2		●		▲						▲				
	TCMT220408-SHR	22	12.7	4.76	5.5	0.8				▲						▲				

NOTE ▲Recommended grade (always stock available) ●Available grade (always stock available) ○Make to order

车削刀片
TURNING
INSERTS

DC□□ (Positive inserts)

★ Good working condition
▲ Normal working condition
● Bad working condition



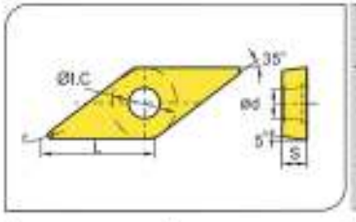
Workpiece material		P					M			K			N	S	
P	Steel	★	▲	★	▲	▲									
M	Stainless steel					▲	★	▲	▲						
K	Cast iron									★	●	●			
N	Non-ferrous metal												★	▲	
S	Heat resistant alloy, Ti alloy													★	★

Inserts shape	Type	Dimensions(mm) L	ØI.C	S	Φd	r	P ST7010	ST7020	ST7015	ST7025	ST9015	M ST8015	ST8010	ST8020	K ST6005	ST6025	ST6030	N ST5010	S ST9120	ST9005
For finishing	VCGT110302-SHF	11	6.35	3.18	2.8	0.2		●		▲		●		▲						
	VCGT110304-SHF	11	6.35	3.18	2.8	0.4		●		▲		●		▲						
	VCGT160408-SHF	16.5	9.525	4.76	4.4	0.8						●								▲

NOTE ▲Recommended grade (always stock available) ●Available grade (always stock available) ○Make to order

VB□□ (Positive inserts)

★ Good working condition
▲ Normal working condition
● Bad working condition



Workpiece material																				
P	Steel	★	▲	★	▲	▲														
M	Stainless steel					▲	★	▲	▲											
K	Cast iron									★	●	●								
N	Non-ferrous metal															★	▲			
S	Heat resistant alloy, Ti alloy																	★	★	

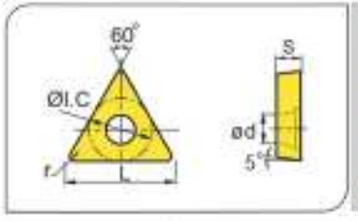
Inserts shape		Type	Dimensions(mm)					P					M			K			N	S	
			L	Φ I.C	S	Φ d	r	ST7010	ST7020	ST7015	ST7025	ST9015	ST8025	ST9020	ST9010	ST8025	ST6025	OC3115C	ST5010	ST9120	ST9005
For finishing		VBMT110302-SHF	11	6.35	3.18	2.8	0.2	●		▲		●		▲							
		VBMT110304-SHF	11	6.35	3.18	2.8	0.4	●		▲		●		▲							
		VBMT110308-SHF	11	6.35	3.18	2.8	0.8	●		▲				▲							
		VBMT160404-SHF	16.5	9.525	4.76	4.4	0.4	●		▲		●		▲							
		VBMT160408-SHF	16.5	9.525	4.76	4.4	0.8	●		▲				▲							
For semi-finishing		VBMT110304-SHM	11	6.35	3.18	2.8	0.4		●		▲			▲							
		VBMT110308-SHM	11	6.35	3.18	2.8	0.8		●		▲			▲							
		VBMT160404-SHM	16.5	9.525	4.76	4.4	0.4		●		▲			▲							
		VBMT160408-SHM	16.5	9.525	4.76	4.4	0.8		●		▲			▲							
		VBMT160412-SHM	16.5	9.525	4.76	4.4	1.2		●		▲			▲							
For roughing		VBMT160404-SHR	16.5	9.525	4.76	4.4	0.4		●		▲						▲				
		VBMT160408-SHR	16.5	9.525	4.76	4.4	0.8		●		▲						▲				
		VBMT160412-SHR	16.5	9.525	4.76	4.4	1.2		●		▲						▲				
		VBGT160408-SHR	16.5	9.525	4.76	4.4	0.8		●		▲						▲				

Stock ▲Recommended grade (always stock available) ●Available grade (always stock available) □Make-to-order

车削刀片
TURNING
INSERTS

TB□□ (Positive inserts)

★ Good working condition
▲ Normal working condition
● Bad working condition



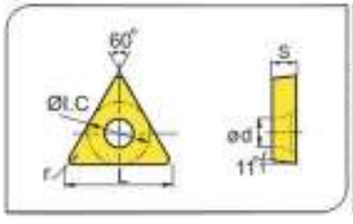
Workpiece material																				
P	Steel	★	▲	★	▲	▲														
M	Stainless steel					▲	★	▲	▲											
K	Cast iron									★	●	●								
N	Non-ferrous metal															★	▲			
S	Heat resistant alloy, Ti alloy																	★	★	

Inserts shape		Type	Dimensions(mm)					P					M			K			N	S	
			L	Φ I.C	S	Φ d	r	ST7010	ST7020	ST7015	ST7025	ST9015	ST8025	ST9020	ST9010	ST8025	ST6025	OC3115C	ST5010	ST9120	ST9005
		TBGH060102L	6.4	3.97	1.59	2.2	0.2					▲									▲
		TBGH060104L	6.4	3.97	1.59	2.2	0.4					▲									▲
		TBGH060202L	6.4	3.97	1.59	2.2	0.2					▲									▲
		TBGH060202R	6.4	3.97	1.59	2.2	0.2					▲									▲

Stock ▲Recommended grade (always stock available) ●Available grade (always stock available) □Make-to-order

TP□□ (Positive inserts)

★ Good working condition
▲ Normal working condition
● Bad working condition



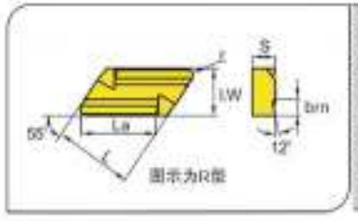
Workpiece material		P					M			K			N	S	
P	Steel	★	▲	★	▲	▲									
M	Stainless steel					▲	★	▲	▲						
K	Cast iron									★	●	●			
N	Non-ferrous metal												★	▲	
S	Heat resistant alloy, Ti alloy													★	★

Inserts shape	Type	Dimensions(mm)					P					M			K			N	S	
		L	Φ I.C	S	Φ d	r	ST7010	ST7020	ST7015	ST7025	ST9015	ST8015	ST8010	ST8020	ST6005	ST6025	ST6030	ST5010	ST9120	ST9005
	TPGH090202L	9.6	5.56	2.38	2.8	0.2					▲									▲
	TPGH090204L	9.6	5.56	2.38	2.8	0.4					▲									▲
	TPGH110302L	1.1	6.35	3.18	3.18	0.2					▲									○
	TPGH110304L	1.1	6.35	3.18	3.18	0.4					▲									▲

Note ★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

KN□□ (Positive inserts)

★ Good working condition
▲ Normal working condition
● Bad working condition



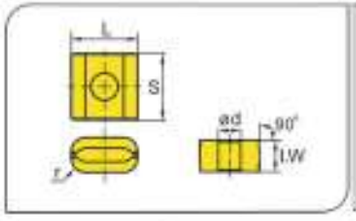
Workpiece material		P					M			K			N	S	
P	Steel	★	▲	★	▲	▲									
M	Stainless steel					▲	★	▲	▲						
K	Cast iron									★	●	●			
N	Non-ferrous metal												★	▲	
S	Heat resistant alloy, Ti alloy													★	★

Inserts shape	Type	Dimensions(mm)						P					M			K			N	S	
		La	L	I.W	S	b/n	r	ST7010	ST7020	ST7015	ST7025	ST9015	ST8015	ST8010	ST8020	ST6005	ST6025	ST6030	ST5010	ST9120	ST9005
	KNUX160405L11	16	16.2	9.525	4.76	2.2	0.5		●		▲										
	KNUX160410L11	16	16.2	9.525	4.76	2.2	1.0		●		▲										
	KNUX160405L12	16	16.2	9.525	4.76	2.2	0.5		●		▲										
	KNUX160410L12	16	16.2	9.525	4.76	2.2	1.0		○		○										
	KNUX160415L12	16	16.2	9.525	4.76	2.2	1.5														
	KNUX160404R11	16	16.2	9.525	4.76	2.2	0.5		●		▲										
	KNUX160410R11	16	16.2	9.525	4.76	2.2	1.0		●		▲										
	KNUX160405R12	16	16.2	9.525	4.76	2.2	0.5		●		▲										
	KNUX160410R12	16	16.2	9.525	4.76	2.2	1.0		○		○										
	KNUX160415R12	16	16.2	9.525	4.76	2.2	1.5														

Note ★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

For train wheel hub machining

★ Good working condition
▲ Normal working condition
● Bad working condition



Workpiece material		P	M	K	N	S
P	Steel	★ ▲ ★ ▲ ▲				
M	Stainless steel		▲ ★ ▲ ▲			
K	Cast iron			★ ● ●		
N	Non-ferrous metal				★ ▲	
S	Heat resistant alloy, Ti alloy					★ ★

Inserts shape	Type	Dimensions(mm)						P				M			K			N	S	
		La	L	I.W	S	brm	r	ST7010	ST7020	ST7015	ST7025	ST9015	ST9010	ST9020	ST8005	ST8025	ST6030	ST5010	ST9120	ST9005
	175.32-191940-22		16.2	9.525	4.76	2.2	0.5		●		▲									
	175.32-191940-227		16.2	9.525	4.76	2.2	1.0		●		▲									
	175.32-191940-28		16.2	9.525	4.76	2.2	0.5		●		▲									

Stock ▲Recommended grade (always stock available) ●Available grade (always stock available) ○Make to order

ZT□□ (Parting and grooving inserts)

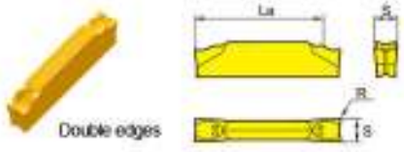
	Type	Dimensions(mm)			Grade					
					Coating CVD		Coating PVD			Cemented carbide
		$S^{+0.1}_{0}$	R±0.10	最大切深 Lamax	ST7010	ST7020	ST9010	ST9015	ST9020	ST9020
Double edges	ZTED02503-SMG	2.5	0.3	17	○	○	●	▲	▲	
	ZTFD0303-SMG	3.0	0.3	17	○	○	●	▲	▲	
	ZTGD0404-SMG	4.0	0.4	22	●	○	●	▲	▲	
	ZTHD0504-SMG	5.0	0.4	22		○	●	▲	▲	
	ZTKD0608-SMG	6.0	0.8	22		○	●	▲	▲	
single edge	ZTHS0504-SMG	5.0	0.4			○	○	▲	○	
	ZTKS0608-SMG	6.0	0.8			○	○	▲	○	

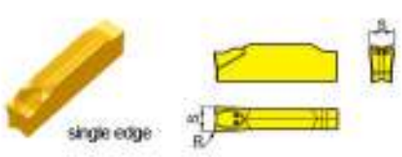
Stock ▲Recommended grade (always stock available) ●Available grade (always stock available) ○Make to order

	Type	Dimensions(mm)			Grade					
					Coating CVD		Coating PVD			Cemented carbide
		S	R±0.1	最大切深 Lamax	ST7010	ST7020	ST9010	ST9015	ST9020	ST9020
Double edges	ZTED02503-SMM	2.5±0.03	0.3	17	○	○	●	▲	○	
	ZTFD0303-SMM	3.0±0.03	0.3	17	○	○	●	▲	○	
	ZTGD0404-SMM	4.0±0.04	0.4	22	○	○	●	▲	○	
	ZTHD0504-SMM	5.0±0.04	0.4	22	○	○	●	▲	○	
	ZTKD0608-SMM	6.0±0.04	0.8	22	○	○	●	▲	○	
	ZTLD0808-SMM	8.0±0.05	0.8	28	○	○	●	▲	○	

Stock ▲Recommended grade (always stock available) ●Available grade (always stock available) ○Make to order

ZP□□ (Profile turning inserts)

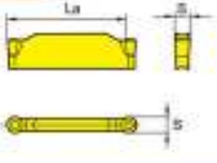




	Type	Dimensions(mm)			Grade				
					Coating CVD		Coating PVD		Cemented carbide
		$S^{+0.1}_{0}$	R ±0.1	Deepest depth Lamax	ST7010	ST7020	ST9015	ST9020	ST9020
Double edges	ZPED02502-SMG	2.5	0.2	17		○	▲	▲	
	ZPFD0302-SMG	3.0	0.2	17		○	▲	○	
	ZPGD0402-SMG	4.0	0.2	22		○	▲	○	
	ZPHD0503-SMG	5.0	0.3	22		○	▲	○	
	ZPKD0604-SMG	6.0	0.4	22		○	▲	○	
Single edge	ZPES02502-SMG	2.5	0.2			○	▲	▲	
	ZPFS0302-SMG	3.0	0.2			○	▲	○	
	ZPGS0402-SMG	4.0	0.2			○	▲	○	
	ZPHS0503-SMG	5.0	0.3			○	▲	○	
	ZPKS0604-SMG	6.0	0.4			○	▲	○	

The single-edge insert is only mounted on parting blade

ZR□D (Profile Turning Insert)



	Type	Dimensions(mm)		Grade					
				Coating CVD		Coating PVD			Cemented carbide
		$S^{+0.1}_{0}$	Deepest depth Lamax	ST7010	ST7020	ST7010	ST9015	ST9020	ST9120
Double edges	ZRED025-SMG	2.5	17.5		○	●	▲	▲	
	ZRFD03-SMG	3.0	17		○	●	▲	▲	
	ZRGD04-SMG	4.0	21		○	●	▲	▲	
	ZRHD05-SMG	5.0	20		○	○	▲	▲	
	ZRKD06-SMG	6.0	19		○	●	▲	▲	

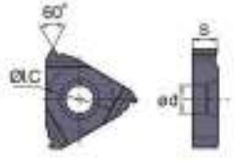
Stock ▲Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

Threading insert

ISO Metric thread (with end) Thin type

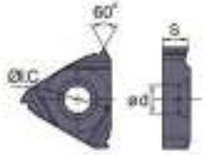
ISO 965-1980, DIN 13, GB/T 197-2003
Tolerance class: 6g/6H

R type



	Type	Dimensions(mm)				Recommended coating grade
	The right hand tools	Pitch	S	ØI.C	ød	ST9010
External thread	RT16.01W-0.50GMB	0.50	3.52	9.525	4.0	▲
	RT16.01W-0.75GMB	0.75	3.52	9.525	4.0	▲
	RT16.01W-1.00GMB	1.00	3.52	9.525	4.0	▲
	RT16.01W-1.25GMB	1.25	3.52	9.525	4.0	▲
	RT16.01W-1.50GMB	1.50	3.52	9.525	4.0	▲
	RT16.01W-1.75GMB	1.75	3.52	9.525	4.0	▲
	RT16.01W-2.00GMB	2.00	3.52	9.525	4.0	▲
	RT16.01W-2.50GMB	2.50	3.52	9.525	4.0	▲
	RT16.01W-3.00GMB	3.00	3.52	9.525	4.0	▲

R type



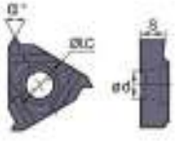
	Type	Dimensions(mm)				Recommended coating grade
	The right hand tools	Pitch	S	ØI.C	ød	ST9010
Internal thread	RT16.01N-0.50GMB	0.50	3.52	9.525	4.0	▲
	RT16.01N-0.75GMB	0.75	3.52	9.525	4.0	▲
	RT16.01N-1.00GMB	1.00	3.52	9.525	4.0	▲
	RT16.01N-1.25GMB	1.25	3.52	9.525	4.0	▲
	RT16.01N-1.50GMB	1.50	3.52	9.525	4.0	▲
	RT16.01N-1.75GMB	1.75	3.52	9.525	4.0	▲
	RT16.01N-2.00GMB	2.00	3.52	9.525	4.0	▲
	RT16.01N-2.50GMB	2.50	3.52	9.525	4.0	▲
	RT16.01N-3.00GMB	3.00	3.52	9.525	4.0	▲

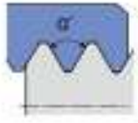
Stock ▲Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

Threading insert

General pitch thread (without end) Thin type

R type

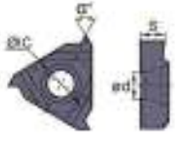




	Type		Dimensions(mm)					Recommended coating grade
		The right hand tools	Pitch/mm (pitch/inch)	S	ØI.C	ød	α°	ST9010
External thread	60°	RT16.01W-A60B	0.5-1.5(48-16)	3.52	9.525	4.0	60°	▲
		RT16.01W-G60B	1.75-3.0(14-8)	3.52	9.525	4.0	60°	▲
		RT16.01W-AG60B	0.5-3.0(48-8)	3.52	9.525	4.0	60°	▲
	55°	RT16.01W-A55B	0.5-1.5(48-16)	3.52	9.525	4.0	55°	▲
		RT16.01W-G55B	1.75-3.0(14-8)	3.52	9.525	4.0	55°	▲
		RT16.01W-AG55B	0.5-3.0(48-8)	3.52	9.525	4.0	55°	▲

Stock ▲Recommended grade (always stock available) ●Available grade (always stock available) □Make to order

R type



	Type		Dimensions(mm)					Recommended coating grade
		The right hand tools	Pitch/mm (pitch/inch)	S	ØI.C	ød	α°	ST9010
Internal thread	60°	RT16.01N-A60B	0.5-1.5(48-16)	3.52	9.525	4.0	60°	▲
		RT16.01N-G60B	1.75-3.0(14-8)	3.52	9.525	4.0	60°	▲
		RT16.01N-AG60B	0.5-3.0(48-8)	3.52	9.525	4.0	60°	▲
	55°	RT16.01N-A55B	0.5-1.5(48-16)	3.52	9.525	4.0	55°	▲
		RT16.01N-G55B	1.75-3.0(14-8)	3.52	9.525	4.0	55°	▲
		RT16.01N-AG55B	0.5-3.0(48-8)	3.52	9.525	4.0	55°	▲

Stock ▲Recommended grade (always stock available) ●Available grade (always stock available) □Make to order

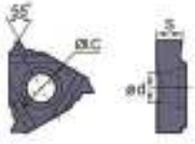
车削刀片
TURNING
INSERTS

Threading insert

Whitworth thread (with end) Thin type

ISO 228/1:1982,DIN 259,B.S.84:1956
Tolerance class: Medium class A

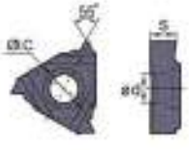
R type



	Type		Dimensions(mm)				Recommended coating grade
		The right hand tools	Pitch/mm (pitch/inch)	S	ØI.C	ød	ST9010
External thread		RT16.01W-8WB	8	3.52	9.525	4.0	▲
		RT16.01W-9WB	9	3.52	9.525	4.0	▲
		RT16.01W-10WB	10	3.52	9.525	4.0	▲
		RT16.01W-11WB	11	3.52	9.525	4.0	▲
		RT16.01W-12WB	12	3.52	9.525	4.0	▲
		RT16.01W-14WB	14	3.52	9.525	4.0	▲
		RT16.01W-16WB	16	3.52	9.525	4.0	▲

Stock ▲Recommended grade (always stock available) ●Available grade (always stock available) □Make to order

R type



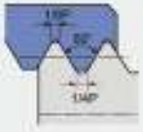
	Type		Dimensions(mm)				Recommended coating grade
		The right hand tools	Pitch/mm (pitch/inch)	S	ØI.C	ød	ST9010
Internal thread		RT16.01N-8WB	8	3.52	9.525	4.0	▲
		RT16.01N-9WB	9	3.52	9.525	4.0	▲
		RT16.01N-10WB	10	3.52	9.525	4.0	▲
		RT16.01N-11WB	11	3.52	9.525	4.0	▲
		RT16.01N-12WB	12	3.52	9.525	4.0	▲
		RT16.01N-14WB	14	3.52	9.525	4.0	▲
		RT16.01N-16WB	16	3.52	9.525	4.0	▲

Stock ▲Recommended grade (always stock available) ●Available grade (always stock available) □Make to order

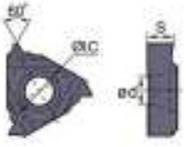
Threading insert

Unified thread (with end) Thin type

ASME B1.1-1989
Tolerance class: 2A/2B



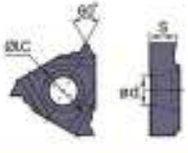
R type



	Type	Dimensions(mm)				Recommended coating grade
	The right hand tools	Pitch/mm (pitch/inch)	S	ØI.C	ød	ST9010
External thread	RT16.01W-8UNB	8	3.52	9.525	4.0	▲
	RT16.01W-10UNB	10	3.52	9.525	4.0	▲
	RT16.01W-12UNB	12	3.52	9.525	4.0	▲
	RT16.01W-14UNB	14	3.52	9.525	4.0	▲
	RT16.01W-16UNB	16	3.52	9.525	4.0	▲
	RT16.01W-18UNB	18	3.52	9.525	4.0	▲
	RT16.01W-20UNB	20	3.52	9.525	4.0	▲

Stock ▲Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

R type



	Type	Dimensions(mm)				Recommended coating grade
	The right hand tools	Pitch/mm (pitch/inch)	S	ØI.C	ød	ST9010
Internal thread	RT16.01N-8UNB	8	3.52	9.525	4.0	▲
	RT16.01N-10UNB	10	3.52	9.525	4.0	▲
	RT16.01N-12UNB	12	3.52	9.525	4.0	▲
	RT16.01N-14UNB	14	3.52	9.525	4.0	▲
	RT16.01N-16UNB	16	3.52	9.525	4.0	▲
	RT16.01N-18UNB	18	3.52	9.525	4.0	▲
	RT16.01N-20UNB	20	3.52	9.525	4.0	▲
	RT16.01N-24UNB	24	3.52	9.525	4.0	▲

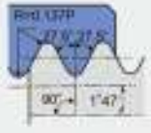
Stock ▲Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

车削刀片
TURNING
INSERTS

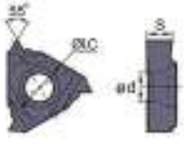
Threading insert

British standard taper piper thread (with end) Thin type

ISO 7/1:1994,B.S.21:1985
Standard BSPT



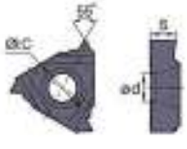
R type



	Type	Dimensions(mm)				Recommended coating grade
	The right hand tools	Pitch/mm (pitch/inch)	S	ØI.C	ød	ST9010
External thread	RT16.01W-11BSPTB	11	3.52	9.525	4.0	▲
	RT16.01W-14BSPTB	14	3.52	9.525	4.0	▲
	RT16.01W-19BSPTB	19	3.52	9.525	4.0	▲
	RT16.01W-28BSPTB	28	3.52	9.525	4.0	▲

Stock ▲Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

R type



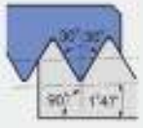
	Type	Dimensions(mm)				Recommended coating grade
	The right hand tools	Pitch/mm (pitch/inch)	S	ØI.C	ød	ST9010
Internal thread	RT16.01N-11BSPTB	11	3.52	9.525	4.0	▲
	RT16.01N-14BSPTB	14	3.52	9.525	4.0	▲
	RT16.01N-19BSPTB	19	3.52	9.525	4.0	▲
	RT16.01N-28BSPTB	28	3.52	9.525	4.0	▲

Stock ▲Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

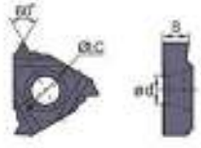
Threading insert

American standard taper piper thread (with end) Thin type

ASME B1.20.1-1983
Standard NPT



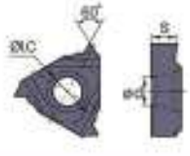
R型



	Type	Dimensions(mm)				Recommended coating grade
	The right hand tools	Pitch/mm (pitch/inch)	S	ØI.C	ød	ST9010
External thread	RT16.01W-8NPTB	8	3.52	9.525	4.0	▲
	RT16.01W-11.5NPTB	11.5	3.52	9.525	4.0	▲
	RT16.01W-14NPTB	14	3.52	9.525	4.0	▲
	RT16.01W-18NPTB	18	3.52	9.525	4.0	▲
	RT16.01W-27NPTB	27	3.52	9.525	4.0	▲

Stock ▲Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

R型

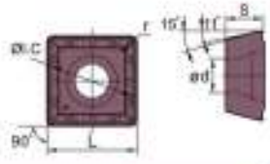


	Type	Dimensions(mm)				Recommended coating grade
	The right hand tools	Pitch/mm (pitch/inch)	S	ØI.C	ød	ST9010
Internal thread	RT16.01N-8NPTB	8	3.52	9.525	4.0	▲
	RT16.01N-11.5NPTB	11.5	3.52	9.525	4.0	▲
	RT16.01N-14NPTB	14	3.52	9.525	4.0	▲
	RT16.01N-18NPTB	18	3.52	9.525	4.0	▲
	RT16.01N-27NPTB	27	3.52	9.525	4.0	▲

Stock ▲Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

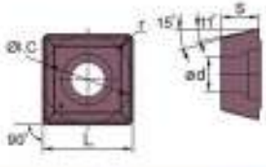
Insert for U drills

UD applicable inserts



Type	Dimensions(mm)					Grade	
	L	ØI.C	s	ød	r	ST9010 (Peripheral edge)	ST9110 (Inner edge)
SPGT050204-SPM	5	5	2.38	2.2	0.4	▲	▲
SPGT060204-SPM	6	6	2.38	2.6	0.4	▲	▲
SPGT07T308-SPM	7.94	7.94	3.97	2.8	0.8	▲	▲
SPGT090408-SPM	9.6	9.6	4.3	4.2	0.8	▲	▲
SPGT110408-SPM	11.5	11.5	4.76	4.4	0.8	▲	▲
SPGT140512-SPM	14.3	14.3	5.2	5.75	1.2	▲	▲

Stock ▲Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order



Type	Dimensions(mm)					Grade	
	L	ØI.C	s	ød	r	ST9010 (Peripheral edge)	ST9110 (Inner edge)
SPGT050204-SEM	5	5	2.38	2.2	0.4	▲	▲
SPGT060204-SEM	6	6	2.38	2.6	0.4	▲	▲
SPGT07T308-SEM	7.94	7.94	3.97	2.8	0.8	▲	▲
SPGT090408-SEM	9.6	9.6	4.3	4.2	0.8	▲	▲
SPGT110408-SEM	11.5	11.5	4.76	4.4	0.8	▲	▲
SPGT140512-SEM	14.3	14.3	5.2	5.75	1.2	▲	▲

Stock ▲Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

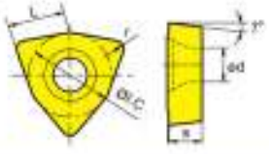
浅孔钻刀片
INSERT FOR
U DRILLS

Insert for U drills

UD30 applicable inserts

-53

-SPG



Type	Dimensions(mm)					Grade
	L	I.C	s	d	r	ST9010
WCMX030208R-53	3.8	5.56	2.38	2.8	0.8	▲
WCMX040208R-53	4.3	6.35	2.38	3.1	0.8	▲
WCMX050308R-53	5.4	7.94	3.18	3.2	0.8	▲
WCMX06T308R-53	6.5	9.525	3.97	3.7	0.8	▲
WCMX080412R-53	8.7	12.7	4.76	4.3	1.2	▲
WCMX030208R-SPG	3.8	5.56	2.38	2.8	0.8	▲
WCMX040208R-SPG	4.3	6.35	2.38	3.1	0.8	▲
WCMX050308R-SPG	5.4	7.94	3.18	3.2	0.8	▲
WCMX06T308R-SPG	6.5	9.525	3.97	3.7	0.8	▲
WCMX080412R-SPG	8.7	12.7	4.76	4.3	1.2	▲

产品说明 ▲表示常备现货 ●可选择性备货 ○按订单生产

SPG chipbreaker characteristics

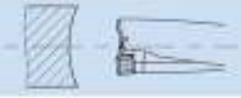
Unique design of corrugated edge ensures high edge strength and good chip breaking performance, for machining of carbon steel and alloy steel

53 chipbreaker characteristics

Sharp cutting edge beneficial to gaining low roughness surface, mainly applicable for low load cutting of aluminum alloy, mild steel and cast iron.

Initial drill penetration

Initial drill penetration is an important factor for successful drilling. One way of ensuring good hole quality is to make sure the penetration surface of the workpiece is vertical to the drill center axis. In addition, and indexable drill can carry out initial penetration of convex, concave, inclined and irregular surfaces by adjusting feed rates.

Workpiece surface	Countermeasures
	For a convex surface, the conditions are relatively good and the center of the drill ideally makes contact with the workpiece first, thus normal feed can be adopted.
	When penetrating an inclined surface, the cutting edges will be unevenly loaded, which may result in the premature drill abrasion. If the angle of the inclined surface is larger than 2°, the feed should be reduced to 1/3 of the value recommended for the drill.
	When drilling into concave surface, drill center axis normally tends to go off-center, the feed should be reduced to 1/3 of the value recommended for the drill.
	When drilling into non-symmetric curved surfaces, the drill tends to deviate from the center because it is penetrating an inclined surface. The feed should be reduced to lower than the value recommended for the initial penetration of concave surfaces.
	When drilling into irregular surface, the insert faces the risk of chipping, which may also occur when drilling through the workpiece. Therefore, the feed rate should be reduced.

Calculations for u drills

Cutting speed(Vc)

$$Vc = \frac{Dc \times \pi \times n}{1000}$$

Vc (m/min): cutting speed
Dc(mm): drill diameter
n (rev/min): rotating speed

◆ Example

Spindle speed is 1600 rev/min, drill diameter is 20mm, thus cutting speed is:

$$Vc = \frac{Dc \times \pi \times n}{1000} = \frac{20 \times 3.14 \times 1600}{1000} = 100\ (m/min)$$

Feed speed

$$Vf = fr \times n\ (mm/min)$$

Vf (mm/min): feed speed
fr (mm/rev): feed rate per revolution
n (rev/min): spindle speed

◆ Example

Spindle speed is 1500 rev/min, feed rate per revolution is 0.1mm/rev, thus feed speed is:

$$Vf = fr \times n = 0.1 \times 1500 = 150\ (mm/min)$$

Machining time

$$Tc = \frac{La \times i}{n \times f}$$

Tc (min): machining time
fr (mm/rev): feed rate per revolution
i: 孔数量
La (mm): drilling depth
n (rev/min): spindle speed

◆ Example

Drilling a hole with a diameter of 20mm and a depth of 40mm, cutting speed is 100m/min and feed rate per revolution is 0.1mm/rev. Calculate the drilling time.

$$n = \frac{Vc \times 1000}{Dc \times \pi} = \frac{100 \times 1000}{20 \times 3.14} = 1600\ (rev/min)$$

$$Tc = \frac{La \times i}{n \times fr} = \frac{40 \times 1}{1600 \times 0.1} = 0.25\ (min)$$

Metal removal rate

$$Q = \frac{Vf \times \pi \times Dc^2}{4 \times 1000}$$

Q (cm^3/min): metal removal rate
Dc(mm): drill diameter
Vf (mm/min): feed speed

◆ Example

Drill diameter is 20mm, feed speed is 160mm/rev, thus metal removal rate is:

$$Q = \frac{Vf \times \pi \times Dc^2}{4 \times 1000} = \frac{160 \times 3.14 \times 20^2}{4 \times 1000} = 50.24\ (cm^3/min)$$

Recommended cutting parameters for u drills

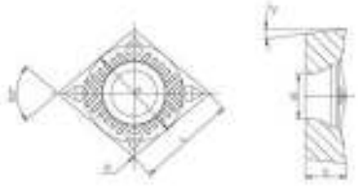
ISO	Materials	Hardness HB	Diameter Dc mm	Feed rate fn mm/r	Cutting speed Vc m/min
P	Carbon steel	80-200	13.0-21.0 22.0-33.0 34.0-41.0 42.0-50.0 51.0-58.0	0.05-0.09 0.05-0.09 0.06-0.10 0.07-0.11 0.08-0.12	200(170-240)
	Low alloy steel	150-260	13.0-21.0 22.0-33.0 34.0-41.0 42.0-50.0 51.0-58.0	0.05-0.09 0.05-0.12 0.06-0.14 0.08-0.16 0.10-0.20	170(140-220)
	High alloy steel	150-320	13.0-21.0 22.0-33.0 34.0-41.0 42.0-50.0 51.0-58.0	0.05-0.09 0.05-0.12 0.08-0.16 0.08-0.18 0.10-0.22	150(120-180)
	Cast steel	180-250	13.0-21.0 22.0-33.0 34.0-41.0 42.0-50.0 51.0-58.0	0.05-0.08 0.05-0.08 0.08-0.10 0.07-0.11 0.07-0.12	140(120-170)
M	Stainless steel Ferrite Martensite	150-270	13.0-21.0 22.0-33.0 34.0-41.0 42.0-50.0 51.0-58.0	0.05-0.09 0.05-0.12 0.06-0.16 0.08-0.18 0.10-0.22	160(110-230)
	Austenite	150-275	13.0-21.0 22.0-33.0 34.0-41.0 42.0-50.0 51.0-58.0	0.05-0.09 0.05-0.11 0.06-0.13 0.08-0.14 0.10-0.16	140(110-220)
K	Malleable cast iron	150-230	13.0-21.0 22.0-33.0 34.0-41.0 42.0-50.0 51.0-58.0	0.05-0.10 0.05-0.14 0.08-0.16 0.10-0.20 0.12-0.24	160(120-220)
	Gray cast iron	150-220	13.0-21.0 22.0-33.0 34.0-41.0 42.0-50.0 51.0-58.0	0.05-0.10 0.05-0.14 0.08-0.16 0.10-0.20 0.12-0.24	200(170-240)
	Nodular cast iron	160-250	13.0-21.0 22.0-33.0 34.0-41.0 42.0-50.0 51.0-58.0	0.05-0.08 0.05-0.12 0.06-0.14 0.08-0.16 0.10-0.20	160(130-200)
N	Non ferrous metals	60-110	13.0-21.0 22.0-33.0 34.0-41.0 42.0-50.0 51.0-58.0	0.05-0.10 0.05-0.14 0.08-0.16 0.10-0.20 0.12-0.24	300(250-350)

Insert for Aluminum

CCGT

菱形 80°

Rhombic 80°



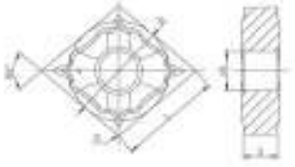
产品型号 Product model		尺寸规格 Dimensions(mm)					涂层硬质合金 Coated							硬质合金 Uncoated	金属陶瓷 Cermet		
		L	D	S	d1	R	TD9180	TD9170	TD9160	TD9110	TD9120	TD9130	TE9150T	ST5010	TX160	TX250	TX350
	CCGT060202-TK	6.4	6.35	2.38	2.8	0.2								●			
	CCGT060204-TK	6.4	6.35	2.38	2.8	0.4								●			
	CCGT060208-TK	6.4	6.35	2.38	2.8	0.8								●			
	CCGT09T302-TK	9.7	9.525	3.97	4.4	0.2								●			
	CCGT09T304-TK	9.7	9.525	3.97	4.4	0.4								●			
	CCGT09T308-TK	9.7	9.525	3.97	4.4	0.8								●			
	CCGT120402-TK	12.9	12.7	4.76	5.5	0.2								●			
	CCGT120404-TK	12.9	12.7	4.76	5.5	0.4								●			
	CCGT120408-TK	12.9	12.7	4.76	5.5	0.8								●			
	CCGT120412-TK	12.9	12.7	4.76	5.5	0.8								●			

Insert for Aluminum

CNMG

菱形 80°

Rhombic 80°



产品型号 Product model		尺寸规格 Dimensions(mm)					涂层硬质合金 Coated							硬质合金 Uncoated	金属陶瓷 Cermet		
		L	D	S	d1	R	TC9160	TC9170	TC9180	TC9110	TC9120	TC9130	TE9150T	STS110	TX180	TX250	TX350
	CNMG120404-TK	12.9	12.7	4.76	5.16	0.4								●			
	CNMG120408-TK	12.9	12.7	4.76	5.16	0.8								●			
	CNMG120412-TK	12.9	12.7	4.76	5.16	1.2								●			
	CNMG120418-TK	12.9	12.7	4.76	5.16	1.8								●			

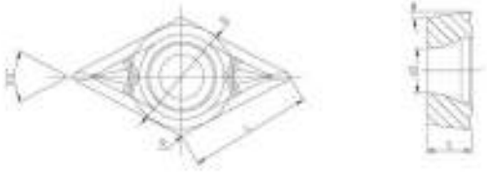
铝用刀片
INSERT FOR
ALUMINUM

Insert for Aluminum

DCGT

菱形 55°

Rhombic 55°



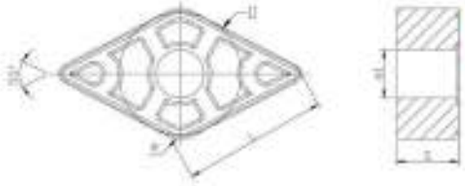
产品型号 Product model		尺寸规格 Dimensions(mm)					涂层硬质合金 Coated							硬质合金 Uncoated	金属陶瓷 Cermet		
		L	D	S	d1	R	TC9160	TC9170	TC9180	TC9110	TC9120	TC9130	TE9150T	STS110	TX180	TX250	TX350
	DCGT070202-TK	7.7	6.35	2.38	2.8	0.2								●			
	DCGT070204-TK	7.7	6.35	2.38	2.8	0.4								●			
	DCGT070208-TK	7.7	6.35	2.38	2.8	0.8								●			
	DCGT11T302-TK	11.6	9.525	3.97	4.4	0.2								●			
	DCGT11T304-TK	11.6	9.525	3.97	4.4	0.4								●			
	DCGT11T308-TK	11.6	9.525	3.97	4.4	0.8								●			
	DCGT11T312-TK	11.6	9.525	3.97	4.4	1.2								●			

Insert for Aluminum

DNMG

菱形 55°

Rhombic 55°



产品型号 Product model		尺寸规格 Dimensions(mm)					涂层硬质合金 Coated							硬质合金 Uncoated	金属陶瓷 Cermet		
		L	D	S	d1	R	TC9160	TC9170	TC9180	TC9110	TC9120	TC9130	TE9150T	STS110	TX180	TX250	TX350
	DNMG150404-TK	5.5	12.7	4.76	5.16	0.4								●			
	DNMG150408-TK	5.5	12.7	4.76	5.16	0.8								●			
	DNMG150604-TK	5.5	12.7	6.35	5.16	0.4								●			
	DNMG150608-TK	12.7	12.7	6.35	5.16	0.8								●			

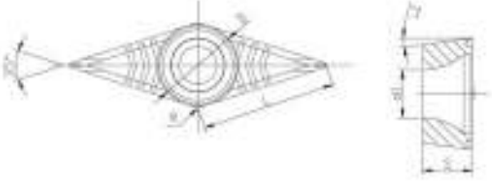
铝用刀片
INSERT FOR
ALUMINUM

Insert for Aluminum

VCGT

菱形 35°

Rhombic 35°



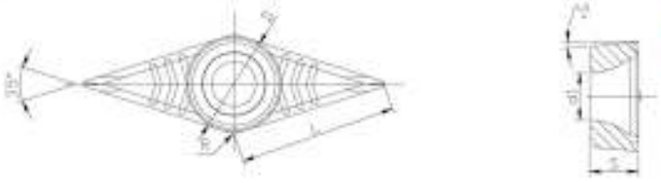
产品型号 Product model		尺寸规格 Dimensions(mm)					涂层硬质合金 Coated							硬质合金 Uncoated	金属陶瓷 Cermet		
		L	D	S	d1	R	TC9160	TC9170	TC9180	TC9110	TC9120	TC9130	TE9150T	STS110	TX180	TX250	TX350
	VCGT110302-TK	11	6.35	3.18	2.8	0.2								●			
	VCGT110304-TK	11	6.35	3.18	2.8	0.4								●			
	VCGT110308-TK	11	6.35	3.18	2.8	0.8								●			
	VCGT130302-TK	13.8	7.93	3.18	3.4	0.2								●			
	VCGT130304-TK	13.8	7.93	3.18	3.4	0.4								●			
	VCGT130308-TK	13.8	7.93	3.18	3.4	0.8								●			
	VCGT160302-TK	16.6	9.525	4.76	4.4	0.2								●			
	VCGT160304-TK	16.6	9.525	4.76	4.4	0.4								●			
	VCGT160308-TK	16.6	9.525	4.76	4.4	0.8								●			
	VCGT160312-TK	16.6	9.525	4.76	4.4	1.2								●			
	VCGT220516-TK	22.1	12.7	5.56	5.5	1.6								●			
	VCGT220525-TK	22.1	12.7	5.56	5.5	2.5								●			
	VCGT220530-TK	22.1	12.7	5.56	5.5	3								●			

Insert for Aluminum

VBGT

菱形 35°

Rhombic 35°



产品型号 Product model	尺寸规格 Dimensions(mm)					涂层硬质合金 Coated							硬质合金 Uncoated	金属陶瓷 Cermet		
	L	D	S	d1	R	TC9160	TC9170	TC9180	TC9110	TC9120	TC9130	TE9150T	ST5010	TX160	TX250	TX350
VBGT110302-TK	11	6.35	3.18	2.8	0.2								●			
VBGT110304-TK	11	6.35	3.18	2.8	0.4								●			
VBGT110308-TK	11	6.35	3.18	2.8	0.8								●			
VBGT130302-TK	13.8	7.93	3.18	3.4	0.2								●			
VBGT130304-TK	13.8	7.93	3.18	3.4	0.4								●			
VBGT130308-TK	13.8	7.93	3.18	3.4	0.8								●			
VBGT160302-TK	16.6	9.525	4.76	4.4	0.2								●			
VBGT160304-TK	16.6	9.525	4.76	4.4	0.4								●			
VBGT160308-TK	16.6	9.525	4.76	4.4	0.8								●			
VBGT160312-TK	16.6	9.525	4.76	4.4	1.2								●			
VBGT220516-TK	22.1	12.7	5.56	5.5	1.6								●			
VBGT220525-TK	22.1	12.7	5.56	5.5	2.5								●			
VBGT220530-TK	22.1	12.7	5.56	5.5	3								●			

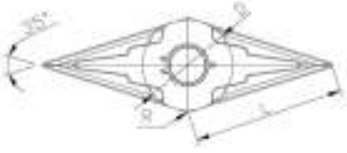
铝用刀片
INSERT FOR
ALUMINUM

Insert for Aluminum

VNMG

菱形 35°

Rhombic 35°



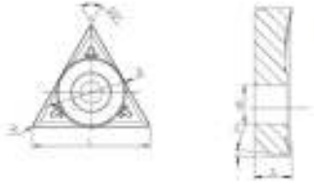
产品型号 Product model	尺寸规格 Dimensions(mm)					涂层硬质合金 Coated							硬质合金 Uncoated	金属陶瓷 Cermet		
	L	D	S	d1	R	TC9160	TC9170	TC9180	TC9110	TC9120	TC9130	TE9150T	ST5010	TX160	TX250	TX350
VNMG160402-TK	16.6	9.525	4.76	3.81	0.2								●			
VNMG160404-TK	16.6	9.525	4.76	3.81	0.4								●			
VNMG160408-TK	16.6	9.525	4.76	3.81	0.8								●			

Insert for Aluminum

TCGT

三角形 60°

Triangle 60°



产品型号 Product Model		尺寸规格 Dimensions(mm)					涂层硬质合金 Coated							硬质合金 Uncoated	金属陶瓷 Cermet		
		L	D	S	d1	R	TC9160	TC9170	TC9180	TC9110	TC9120	TC9130	TE915DT	ST5010	TX180	TX250	TX350
	TCGT090202-TK	9.6	5.56	2.38	2.5	0.2								●			
	TCGT090204-TK	9.6	5.56	2.38	2.5	0.4								●			
	TCGT110202-TK	11	6.35	2.38	2.8	0.2								●			
	TCGT110204-TK	11	6.35	2.38	2.8	0.4								●			
	TCGT110304-TK	11	6.35	3.18	2.8	0.4								●			
	TCGT110308-TK	11	6.35	3.18	2.8	0.8								●			
	TCGT16T302-TK	16.5	9.525	3.97	4.4	0.2								●			
	TCGT16T304-TK	16.5	9.525	3.97	4.4	0.4								●			
	TCGT16T308-TK	16.5	9.525	3.97	4.4	0.8								●			
	TCGT16T312-TK	16.5	9.525	3.97	4.4	1.2								●			
	TCGT16T316-TK	16.5	9.525	3.97	4.4	1.6								●			

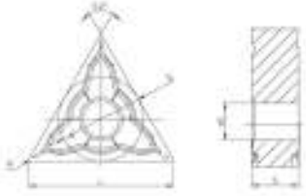
铝用刀片
INSERT FOR ALUMINUM

Insert for Aluminum

TNMG

正三角形 60°

Triangle 60°



产品型号 Product model		尺寸规格 Dimensions(mm)					涂层硬质合金 Coated							硬质合金 Uncoated	金属陶瓷 Cermet		
		L	D	S	d1	R	TC9160	TC9170	TC9180	TC9110	TC9120	TC9130	TE915DT	ST5010	TX180	TX250	TX350
	TNMG160404-TK	16.5	9.525	4.76	3.81	0.4								●			
	TNMG160408-TK	16.5	9.525	4.76	3.81	0.8								●			
	TNMG220408-TK	22	12.7	4.76	5.16	0.8								●			

Insert for Aluminum

SCGT

正方形 90°

Square 90°

产品型号 Product model		尺寸规格 Dimensions(mm)					涂层硬质合金 Coated							硬质合金 Uncoated	金属陶瓷 Cermet		
		L	D	S	d1	R	TC9160	TC9170	TC9180	TC9110	TC9120	TC9130	TE9150T	ST5010	TX180	TX250	TX350
	SCGT09T302-TK	9.525	9.525	3.97	4.4	0.2								●			
	SCGT09T304-TK	9.525	9.525	3.97	4.4	0.4								●			
	SCGT09T308-TK	9.525	9.525	3.97	4.4	0.8								●			
	SCGT120404-TK	12.7	12.7	4.76	5.5	0.4								●			
	SCGT120408-TK	12.7	12.7	4.76	5.5	0.8								●			
	SCGT120412-TK	12.7	12.7	4.76	5.5	1.2								●			
	SCGT120416-TK	12.7	12.7	4.76	5.5	1.6								●			

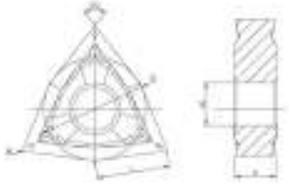
铝用刀片
INSERT FOR ALUMINUM

Insert for Aluminum

WNMG

异形六角 80°

Hexagon 80°



产品型号 Product model		尺寸规格 Dimensions(mm)					涂层硬质合金 Coated							硬质合金 Uncoated	金属陶瓷 Cermet		
		L	D	S	d1	R	TC9160	TC9170	TC9180	TC9110	TC9120	TC9130	TE9150T	ST5010	TX180	TX250	TX350
	WNMG060404-TK	6.52	9.525	4.76	3.81	0.4								●			
	WNMG060408-TK	6.52	9.525	4.76	3.81	0.8								●			
	WNMG080404-TK	10.86	12.7	4.76	5.16	0.4								●			
	WNMG080408-TK	10.86	12.7	4.76	5.16	0.8								●			
	WNMG080412-TK	10.86	12.7	4.76	5.16	1.2								●			

目录
CONTENTS

SOLID CARBIDE END MILL PAGE

整体硬质合金立铣刀一览表 B1-B5
SOLID CARBIDE END MILLS OVERVIEW

整体硬质合金立铣刀命名规则 B4
SOLID CARBIDE END MILLS CODE KEY

图标种类及识别 B5
GRAPHICS CATEGORY AND IDENTIFICATION

通用加工GM系列 B6-B38
GM SERIES FOR GENERAL MACHINING

高硬度钢加工HM系列 B39-B59
HM SERIES FOR MACHINING HIGH HARDNESS STEEL

铜加工NM系列 B60-B64
NM SERIES FOR MACHINING COPPER

铝加工AL系列 B65-B74
AL SERIES FOR MACHINING ALUMINUM

不锈钢，耐热合金等难切削材料加工SM系列 B75-B80
SM SERIES FOR MACHINING STAINLESS STEEL, HEAT RESISTANT ALLOY ETC HARD-TO-CUT MATERIALS

整体硬质合金立铣刀切削参数 B81-B133
RECOMMENDED CUTTING PARAMETERS

整体硬质合金立铣刀技术信息 B134-B137
TECHNICAL INFORMATION

SOLID CARBIDE END MILL OVERVIEW

Machining application	Geometry	Number of teeth	Type	Shape	Size range	Workpiece material: P Carbon steel, Alloy steel	P Pre-hardened steel	M Stainless steel	K Cast iron	N Copper alloy	N Aluminum alloy	S Heat resistant alloy	H High hardness steel 45~55HRC	H High hardness steel 55~65HRC	Page: Specification	Page: Cutting parameters
General milling	Flattened	2	GM-2E (Corner protection)		Ø1.0~ Ø20.0	●	●	○	●						B6	B81
			GM-2F (Sharp)		Ø1.0~ Ø20.0	●	●	○	●						B7	B82
			GM-2EL (Corner protection)		Ø3.0~ Ø20.0	●	●	○	●						B8	B81
			GM-2FL (Sharp)		Ø3.0~ Ø20.0	●	●	○	●						B9	B82
			GM-2EX (Corner protection)		Ø3.0~ Ø20.0	●	●	○	●						B10	B83
			GM-2EFP (Corner protection)		Ø6.0~ Ø20.0	●	●	○	●						B11	B84
		3	GM-3E (Corner protection)		Ø1.0~ Ø20.0	●	●	○	●						B12	B85
			GM-3EL (Corner protection)		Ø3.0~ Ø20.0	●	●	○	●						B13	B85
		4	GM-4E-G (Corner protection)		Ø1.0~ Ø20.0	●	●	○	●						B14	B86
			GM-4F-G (Sharp)		Ø1.0~ Ø20.0	●	●	○	●						B15	B87
			GM-4EL-G (Corner protection)		Ø3.0~ Ø20.0	●	●	○	●						B16	B86
			GM-4FL-G (Sharp)		Ø3.0~ Ø20.0	●	●	○	●						B17	B87
			GM-4EX-G (Corner protection)		Ø3.0~ Ø20.0	●	●	○	●						B18	B88
			GM-4E (Corner protection)		Ø1.0~ Ø20.0	●	●	○	●						B19	B89
			GM-4EL (Corner protection)		Ø3.0~ Ø20.0	●	●	○	●						B20	B89
			GM-4EFP (Corner protection)		Ø6.0~ Ø20.0	●	●	○	●						B21	B90
		6	GM-6E (Corner protection)		Ø6.0~ Ø20.0	●	●	○	●						B22	B91
			GM-6EL (Corner protection)		Ø6.0~ Ø20.0	●	●	○	●						B23	B92
	Long neck flattened	2	GM-2EP		Ø0.5~ Ø5.0	●	●	○	●						B24 -25	B93 -94
	Tiny head flattened	2	GM-2ES		Ø0.3~ Ø3.0	●	●	○	●						B26	B95

● Very suitable ○ Suitable

SOLID CARBIDE END MILL OVERVIEW

Machining application	Geometry	Number of teeth	Type	Shape	Size range	Workpiece material: P – Carbon steel, alloy steel	P – Pre-hardened steel	M – Stainless steel	K – Cast iron	N – Copper alloy	N – Aluminum alloy	S – Heat resistant alloy, Titanium alloy	H – High hardness steel (HRC45~55)	H – High hardness steel (HRC55~65)	Page – Specification	Page – Cutting parameters
General milling	Ball nose	2	GM-2B		R0.5~R10.0	◎	◎	○	◎						B27	B96
			GM-2BL		R1.0~R10.0	◎	◎	○	◎						B28	B96
			GM-2BFP		R0.5~R10.0	◎	◎	○	◎						B29	B96
		4	GM-4B		R1.5~R10.0	◎	◎	○	◎						B30	B97
			GM-4BL		R1.5~R10.0	◎	◎	○	◎						B31	B97
	Tiny ball nose	2	GM-2BS		R0.15~R1.5	◎	◎	○	◎						B32	B98
	Long neck ball nose	2	GM-2BP		R0.25~R2.5	◎	◎	○	◎						B33-34	B99-100
	Radius	2	GM-2R		Ø1.0~Ø12.0	◎	◎	○	◎						B35	B101
		4	GM-4R		Ø3.0~Ø12.0	◎	◎	○	◎						B36	B102
			GM-4RL		Ø6.0~Ø16.0	◎	◎	○	◎						B37	B102
	Corrugated edge		GM-4W		Ø6.0~Ø20.0	◎	◎	○	◎						B38	B103-104
Machining high hardness steel	Flattened	2	HM-2E (Corner protection)		Ø1.0~Ø20.0				○				◎	◎	B39	B105
			HM-2EFP (Corner protection)		Ø6.0~Ø20.0				○				◎	◎	B40	B106
		4	HM-4E (Corner protection)		Ø1.0~Ø20.0				○				◎	◎	B41	B107
			HM-4EL (Corner protection)		Ø3.0~Ø20.0				○				◎	◎	B42	B107
			HM-4EFP (Corner protection)		Ø6.0~Ø20.0				○				◎	◎	B43	B108
		6	HM-6E (Corner protection)		Ø6.0~Ø20.0				○				◎	◎	B44	B109
			HM-6EL (Corner protection)		Ø6.0~Ø20.0				○				◎	◎	B45	B110
	Long neck flattened	2	HM-2EP		Ø0.5~Ø5.0				○				◎	◎	B46-47	B111-112
	Tiny head flattened	2	HM-2ES		Ø0.3~Ø3.0				○				◎	◎	B48	B113
	Ball nose	2	HM-2B		R0.5~R10.0				○				◎	◎	B49	B114
			HM-2BL		R1.0~R10.0				○				◎	◎	B50	B114
			HM-2BFP		R0.5~R10.0				○				◎	◎	B51	B114
		4	HM-4B		R1.5~R10.0				○				◎	◎	B52	B115
			HM-4BL		R1.5~R10.0				○				◎	◎	B53	B115
	Tiny ball nose	2	HM-2BS		R0.15~R1.5				○				◎	◎	B54	B116

◎ Very suitable ○ Suitable

整体硬质合金立铣刀
SOLID CARBIDE END MILL

SOLID CARBIDE END MILL OVERVIEW

Machining application	Geometry	Number of teeth	Type	Shape	Size range	Workpiece material: P – Carbon steel, alloy steel	P – Pre-hardened steel	M – Stainless steel	K – Cast iron	N – Copper alloy	N – Aluminum alloy	S – Heat resistant alloy, Titanium alloy	H – High hardness steel (HRC45~55)	H – High hardness steel (HRC55~65)	Page – Specification	Page – Cutting parameters
Machining high hardness steel	Long neck ball nose	2	HM-2BP		R0.25~R2.5				○				◎	◎	B55-56	B117-118
	Radius	4	HM-4R		Ø3.0~Ø12.0				○				◎	◎	B57	B119
			HM-4RF		Ø6.0~Ø12.0				○				◎	◎	B58	B119
			HM-4RP		Ø6.0~Ø16.0				○				◎	◎	B59	B119
Machining copper	Flattened	2	NM-2E		Ø1.0~Ø12.0					◎	○				B60	B120
		4	NM-4E		Ø3.0~Ø12.0					◎	○				B61	B121
	Long neck flattened	2	NM-2EP		Ø0.5~Ø5.0					◎	○				B62	B122
	Ball nose	2	NM-2B		R0.5~R6.0					◎	○				B63	B123
	Long neck ball nose	2	NM-2BP		R0.25~R2.5					◎	○				B64	B124
Machining aluminum	Flattened	2	AL-2E		Ø1.0~Ø20.0						◎				B65	B125
			AL-2EL		Ø3.0~Ø20.0						◎				B66	B125
		3	AL-3E		Ø1.0~Ø20.0						◎				B67	B126
			AL-3EL		Ø3.0~Ø20.0						◎				B68	B126
	Ball nose	2	AL-2B		R1.0~R6.0						◎				B69	B127
	Corrugated edge	3	AL-3W		Ø6.0~Ø20.0						◎				B70	B127
	Radius (super high speed)	2	AL-2R-AIR		Ø6.0~Ø20.0						◎				B71	B128
			AL-2RL-AIR		Ø6.0~Ø20.0						◎				B72	B128
		3	AL-3R-AIR		Ø12.0~Ø20.0						◎				B73	B129
			AL-3RL-AIR		Ø12.0~Ø20.0						◎				B74	B129
Machining hard-to-cut materials	Flattened	3	SM-3E		Ø3.0~Ø20.0	◎		◎				○			B75	B130
		4	VSM-4E (Unequal pitch)		Ø4.0~Ø20.0	◎		◎				◎			B76	B131
			VSM-4EFP (Unequal pitch)		Ø6.0~Ø16.0	◎		◎				◎			B50	B131
	Radius	4	SM-4R		Ø6.0~Ø12.0	◎		◎				○			B51	B132
			VSM-4R (Unequal pitch)		Ø6.0~Ø20.0	◎		◎				◎			B52	B133
			VSM-4RFP (Unequal pitch)		Ø6.0~Ø16.0	◎		◎				◎			B53	B133

◎ Very suitable ○ Suitable

整体硬质合金立铣刀
SOLID CARBIDE END MILL

UM	High performance general machining with unequal pitch
PM	High performance general milling
GM	General milling
HM	Machining hardened material
NM	Machining copper
AL	Machining aluminum
SM	Machining of hard-to-cut materials

End mill category

E	Corner protection flattened
F	Sharp flattened
B	Ball nose
R	Radius
W	Corrugated edge
H	High-feed-rate

End mill type

S	Tiny diameter
P	Straight neck
C	Taper neck
Default	Standard

Structure type

Radius of nose arc or radius of ball nose

GM - 2 E L P - D12 R0.5 - M08

Number of teeth

Length category

L	Long cutting edge
X	Extra long cutting edge
F	Short cutting edge
Default	Standard

Tool diamter

Other

G	30° taper 4-flute flattened end mills
M	Neck length
S	Slim shank
AIR	Aluminum alloy super high speed end mills

- For unequal pitch end mills, letter "V" is added before category code
- 2-flute end face mill with taper shank
  PM-2BC08-R0.25-W03
  Taper

Coating of mills

NaNo TiAlN	Nano TiAlN coating
TiAlN	TiAlN coating
AlTiN	AlTiN coating
CrN	CrN coating

End tooth type of mills

	2-flute flattened end mills
	2-flute ball nose end mills
	2-flute R end mills
	3-flute flattened end mills
	3-flute R end mills
	4-flute flattened end mills
	4-flute ball nose end mills
	4-flute R end mills
	6-flute flattened end mills

Helical angle

β	β is helical angle:30°, 45°, 55°

Cutting diameter tolerance

D	Cutting diameter tolerance

Radius tolerance of ball nose end mills

R	Radius tolerance

Nose type

	Corner protection
	Sharp

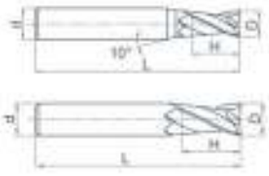
Machining operation

Side face	Flattened end mills for side machining
Step shoulder	Flattened end mills for shoulder machining
Straight slot	Flattened end mills for straight slot machining
Deep flattened slot	Flattened end mills for deep slot machining
Profile	Ball nose end mills for profile machining
Cavity	Ball nose end mills for cavity machining
Ball nose slot	Ball nose end mills for slot maching
Deep ball nose slot	Ball nose end mills for deep slot machining
Radius shoulder	R end mills for side machining
Radius corner slot	R end mills for slot machining
Profile	R end mills for profile machining

2-Flute flattened end mills with straight shank

Side face | Step shoulder | Straight slot

GM-2E



- Very suitable for slot milling
- Wide application

Ordering number	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	D	d	H	L			
GM-2E-D1.0S	1.0	4	3	50	2	Picture 1	●
GM-2E-D1.5S	1.5	4	4	50	2	Picture 1	●
GM-2E-D2.0S	3.0	4	6	50	2	Picture 1	●
GM-2E-D2.5S	2.5	4	8	50	2	Picture 1	●
GM-2E-D3.0S	3.0	4	6	50	2	Picture 1	●
GM-2E-D4.0S	4.0	4	11	50	2	Picture 2	●
GM-2E-D1.0	1.0	6	3	50	2	Picture 1	●
GM-2E-D1.5	1.5	6	4	50	2	Picture 1	●
GM-2E-D2.0	3.0	6	6	50	2	Picture 1	●
GM-2E-D2.5	2.5	6	8	50	2	Picture 1	●
GM-2E-D3.0	3.0	6	8	50	2	Picture 1	●
GM-2E-D3.5	3.5	6	10	50	2	Picture 1	●
GM-2E-D4.0	4.0	6	11	50	2	Picture 1	●
GM-2E-D4.5	4.5	6	11	50	2	Picture 1	●
GM-2E-D5.0	5.0	6	13	50	2	Picture 1	●
GM-2E-D5.5	5.5	6	16	50	2	Picture 1	●
GM-2E-D6.0	6.0	6	16	50	2	Picture 2	●
GM-2E-D7.0	7.0	8	20	60	2	Picture 1	●
GM-2E-D8.0	8.0	8	20	60	2	Picture 2	●
GM-2E-D9.0	9.0	10	22	75	2	Picture 1	●
GM-2E-D10.0	10.0	10	25	75	2	Picture 2	●
GM-2E-D11.0	11.0	12	26	75	2	Picture 1	●
GM-2E-D12.0	12.0	12	30	75	2	Picture 2	●
GM-2E-D14.0	14.0	14	32	75	2	Picture 2	●
GM-2E-D16.0	16.0	16	45	100	2	Picture 2	●
GM-2E-D18.0	18.0	18	45	100	2	Picture 2	●
GM-2E-D20.0	20.0	20	45	100	2	Picture 2	●

● Stock available ○ Make-to-order

Applicable workpiece material table

◎ Very suitable ○ Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel / Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	○			○	◎				

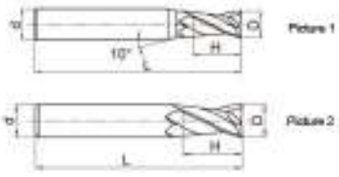
Graphics category and identification B5
Cutting parameters B81

整体硬质合金立铣刀
SOLID CARBIDE END MILL

2-Flute flattened end mills with straight shank

Side face | Step shoulder | Straight slot

GM-2F



- Very suitable for slot milling
- Wide application

Ordering number	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	D	d	H	L			
GM-2F-D1.0S	1.0	4	3	50	2	Picture 1	○
GM-2F-D1.5S	1.5	4	4	50	2	Picture 1	○
GM-2F-D2.0S	2.0	4	6	50	2	Picture 1	○
GM-2F-D2.5S	2.5	4	8	50	2	Picture 1	○
GM-2F-D3.0S	3.0	4	8	50	2	Picture 1	○
GM-2F-D4.0S	4.0	4	11	50	2	Picture 2	○
GM-2F-D1.0	1.0	6	3	50	2	Picture 1	○
GM-2F-D1.5	1.5	6	4	50	2	Picture 1	○
GM-2F-D2.0	2.0	6	6	50	2	Picture 1	○
GM-2F-D2.5	2.5	6	8	50	2	Picture 1	○
GM-2F-D3.0	3.0	6	8	50	2	Picture 1	○
GM-2F-D3.5	3.5	6	10	50	2	Picture 1	○
GM-2F-D4.0	4.0	6	11	50	2	Picture 1	○
GM-2F-D4.5	4.5	6	11	50	2	Picture 1	○
GM-2F-D5.0	5.0	6	13	50	2	Picture 1	○
GM-2F-D5.5	5.5	6	16	50	2	Picture 1	○
GM-2F-D6.0	6.0	6	16	50	2	Picture 2	○
GM-2F-D7.0	7.0	8	20	60	2	Picture 1	○
GM-2F-D8.0	8.0	8	20	60	2	Picture 2	○
GM-2F-D9.0	9.0	10	22	75	2	Picture 1	○
GM-2F-D10.0	10.0	10	25	75	2	Picture 2	○
GM-2F-D11.0	11.0	12	26	75	2	Picture 1	○
GM-2F-D12.0	12.0	12	30	75	2	Picture 2	○
GM-2F-D14.0	14.0	14	32	75	2	Picture 2	○
GM-2F-D16.0	16.0	16	45	100	2	Picture 2	○
GM-2F-D18.0	18.0	18	45	100	2	Picture 2	○
GM-2F-D20.0	20.0	20	45	100	2	Picture 2	○

● Stock available ○ Make-to-order

Applicable workpiece material table

◎ Very suitable ○ Suitable

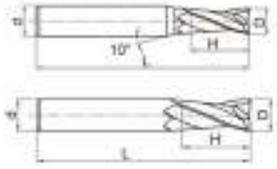
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel / Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	○			○	◎				

Graphics category and identification B5
Cutting parameters B82

2-flute flattened end mills with straight shank and long cutting edge

Side face | Step shoulder | Straight slot

GM-2EL



- GM-2E series with long cutting edge

Ordering number	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	D	d	H	L			
GM-2EL-D3.0	3.0	6	12	75	2	Picture 1	●
GM-2EL-D4.0	4.0	6	15	75	2	Picture 1	●
GM-2EL-D5.0	5.0	6	20	75	2	Picture 1	●
GM-2EL-D6.0	6.0	6	20	75	2	Picture 2	●
GM-2EL-D8.0	8.0	8	25	100	2	Picture 2	●
GM-2EL-D10.0	10.0	10	30	100	2	Picture 2	●
GM-2EL-D12.0	12.0	12	35	100	2	Picture 2	●
GM-2EL-D14.0	14.0	14	40	100	2	Picture 2	●
GM-2EL-D16.0	16.0	16	50	150	2	Picture 2	●
GM-2EL-D20.0	20.0	20	55	150	2	Picture 2	●

● Stock available ○ Make-to-order

Applicable workpiece material table

○ Very suitable ○ Suitable

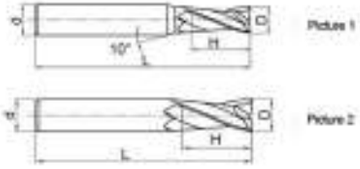
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel / Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
○	○	○	○			○	○				

整体硬质合金立铣刀
SOLID CARBIDE END MILL

2-flute flattened end mills with straight shank and long cutting edge

Side face | Step shoulder | Straight slot

GM-2FL



- GM-2E series with long cutting edge

Ordering number	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	D	d	H	L			
GM-2FL-D3.0	3.0	6	12	75	2	Picture 1	○
GM-2FL-D4.0	4.0	6	15	75	2	Picture 1	○
GM-2FL-D5.0	5.0	6	20	75	2	Picture 1	○
GM-2FL-D6.0	6.0	6	20	75	2	Picture 2	○
GM-2FL-D8.0	8.0	8	25	100	2	Picture 2	○
GM-2FL-D10.0	10.0	10	30	100	2	Picture 2	○
GM-2FL-D12.0	12.0	12	35	100	2	Picture 2	○
GM-2FL-D14.0	14.0	14	40	100	2	Picture 2	○
GM-2FL-D16.0	16.0	16	50	150	2	Picture 2	○
GM-2FL-D20.0	20.0	20	55	150	2	Picture 2	○

● Stock available ○ Make-to-order

Applicable workpiece material table

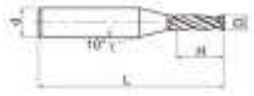
○ Very suitable ○ Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel / Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
○	○	○	○			○	○				

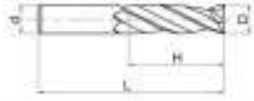
2-flute flattened end mills with straight shank, extra long cutting edge

Side face | Step shoulder | Straight slot

GM-2EX



Picture 1



Picture 2

- Extra long cutting edge, suitable for deep side milling

35° | TiAlN | D: D<12 0~-0.020, 12≤D 0~-0.030

Ordering number	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	D	d	H	L			
GM-2EX-D3.0	3.0	6	20	75	2	Picture 1	○
GM-2EX-D4.0	4.0	6	25	75	2	Picture 1	○
GM-2EX-D5.0	5.0	6	30	75	2	Picture 1	○
GM-2EX-D6.0	6.0	6	30	75	2	Picture 2	○
GM-2EX-D8.0	8.0	8	40	100	2	Picture 2	○
GM-2EX-D10.0	10.0	10	50	110	2	Picture 2	○
GM-2EX-D12.0	12.0	12	50	110	2	Picture 2	○
GM-2EX-D16.0	16.0	16	70	150	2	Picture 2	○
GM-2EX-D20.0	20.0	20	75	150	2	Picture 2	○

● Stock available ○ Make-to-order

Applicable workpiece material table

◎ Very suitable ○ Suitable

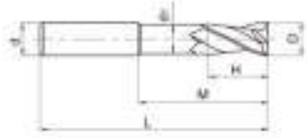
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel / Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	○			○	◎				

整体硬质合金立铣刀
SOLID CARBIDE END MILL

2-flute flattened end mills with straight shank, long neck and short cutting edge

Side face | Step shoulder | Straight slot

GM-2EFP



- High-rigidly short cutting edge, suitable for heavy cutting, and deep cavity milling

35° | TiAlN | D: D<12 0~-0.020, 12≤D 0~-0.030

Ordering number	Basic dimension(mm)						Number of teeth Z	Stock
	D	d	H	M	d1	L		
GM-2EFP-D6.0	6.0	6	9	30	5.8	75	2	○
GM-2EFP-D8.0	8.0	8	12	40	7.8	100	2	○
GM-2EFP-D10.0	10.0	10	16	50	9.6	100	2	○
GM-2EFP-D12.0	12.0	12	18	50	11.5	100	2	○
GM-2EFP-D16.0	16.0	16	24	50	15.5	150	2	○
GM-2EFP-D20.0	20.0	20	30	60	19.5	150	2	○

● Stock available ○ Make-to-order

Applicable workpiece material table

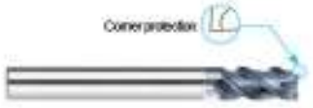
◎ Very suitable ○ Suitable

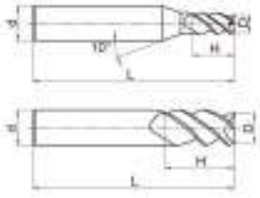
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel / Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	○			○	◎				

3-flute flattened end mills with straight shank

Side face | Step shoulder | Straight slot

GM-3E





- Excellent vibration resistance, able to achieve various machining operations such as slot milling, side milling, drilling, etc.

Ordering number	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	D	d	H	L			
GM-3E-D1.0S	1.0	4	3	50	3	Picture 1	○
GM-3E-D1.5S	1.5	4	4	50	3	Picture 1	○
GM-3E-D2.0S	2.0	4	6	50	3	Picture 1	○
GM-3E-D2.5S	2.5	4	8	50	3	Picture 1	○
GM-3E-D3.0S	3.0	4	8	50	3	Picture 1	○
GM-3E-D4.0S	4.0	4	11	50	3	Picture 2	○
GM-3E-D1.0	1.0	6	3	50	3	Picture 1	○
GM-3E-D1.5	1.5	6	4	50	3	Picture 1	○
GM-3E-D2.0	2.0	6	6	50	3	Picture 1	○
GM-3E-D2.5	2.5	6	8	50	3	Picture 1	○
GM-3E-D3.0	3.0	6	8	50	3	Picture 1	○
GM-3E-D3.5	3.5	6	10	50	3	Picture 1	○
GM-3E-D4.0	4.0	6	11	50	3	Picture 1	○
GM-3E-D4.5	4.5	6	11	50	3	Picture 1	○
GM-3E-D5.0	5.0	6	13	50	3	Picture 1	○
GM-3E-D5.5	5.5	6	16	50	3	Picture 1	○
GM-3E-D6.0	6.0	6	16	50	3	Picture 2	○
GM-3E-D7.0	7.0	8	20	60	3	Picture 1	○
GM-3E-D8.0	8.0	8	20	60	3	Picture 2	○
GM-3E-D9.0	9.0	10	22	75	3	Picture 1	○
GM-3E-D10.0	10.0	10	25	75	3	Picture 2	○
GM-3E-D11.0	11.0	12	26	75	3	Picture 1	○
GM-3E-D12.0	12.0	12	30	75	3	Picture 2	○
GM-3E-D14.0	14.0	14	32	75	3	Picture 2	○
GM-3E-D16.0	16.0	16	45	100	3	Picture 2	○
GM-3E-D18.0	18.0	18	45	100	3	Picture 2	○
GM-3E-D20.0	20.0	20	45	100	3	Picture 2	○

● Stock available ○ Make-to-order

Applicable workpiece material table

○ Very suitable ○ Suitable

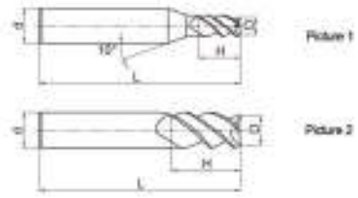
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel / Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
○	○	○	○			○	○				

整体硬质合金立铣刀
SOLID CARBIDE END MILL

3-flute flattened end mills with straight shank and long cutting edge

Side face | Step shoulder | Straight slot

GM-3EL



- GM-3E series with long cutting edge

Ordering number	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	D	d	H	L			
GM-3EL-D3.0	3.0	6	12	75	3	Picture 1	○
GM-3EL-D4.0	4.0	6	15	75	3	Picture 1	○
GM-3EL-D5.0	5.0	6	20	75	3	Picture 1	○
GM-3EL-D6.0	6.0	6	20	75	3	Picture 2	○
GM-3EL-D8.0	8.0	8	25	100	3	Picture 2	○
GM-3EL-D10.0	10.0	10	30	100	3	Picture 2	○
GM-3EL-D12.0	12.0	12	35	100	3	Picture 2	○
GM-3EL-D14.0	14.0	14	40	100	3	Picture 2	○
GM-3EL-D16.0	16.0	16	50	150	3	Picture 2	○
GM-3EL-D20.0	20.0	20	55	150	3	Picture 2	○

● Stock available ○ Make-to-order

Applicable workpiece material table

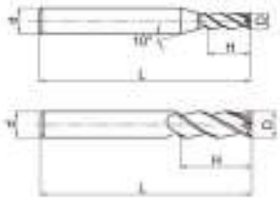
○ Very suitable ○ Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel / Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
○	○	○	○			○	○				

4-flute flattened end mills with straight shank

Side face | Step shoulder | Straight slot

GM-4E-G



- Very suitable for side milling
- Wide application

Ordering number	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	D	d	H	L			
GM-4E-D1.0S-G	1.0	4	3	50	4	Picture 1	●
GM-4E-D1.5S-G	1.5	4	4	50	4	Picture 1	●
GM-4E-D2.0S-G	2.0	4	6	50	4	Picture 1	●
GM-4E-D2.5S-G	2.5	4	8	50	4	Picture 1	●
GM-4E-D3.0S-G	3.0	4	8	50	4	Picture 1	●
GM-4E-D4.0S-G	4.0	4	11	50	4	Picture 2	●
GM-4E-D1.0-G	1.0	6	3	50	4	Picture 1	●
GM-4E-D1.5-G	1.5	6	4	50	4	Picture 1	●
GM-4E-D2.0-G	2.0	6	6	50	4	Picture 1	●
GM-4E-D2.5-G	2.5	6	8	50	4	Picture 1	●
GM-4E-D3.0-G	3.0	6	8	50	4	Picture 1	●
GM-4E-D3.5-G	3.5	6	10	50	4	Picture 1	●
GM-4E-D4.0-G	4.0	6	11	50	4	Picture 1	●
GM-4E-D4.5-G	4.5	6	11	50	4	Picture 1	●
GM-4E-D5.0-G	5.0	6	13	50	4	Picture 1	●
GM-4E-D5.5-G	5.5	6	16	50	4	Picture 1	●
GM-4E-D6.0-G	6.0	6	16	50	4	Picture 2	●
GM-4E-D7.0-G	7.0	8	20	60	4	Picture 1	●
GM-4E-D8.0-G	8.0	8	20	60	4	Picture 2	●
GM-4E-D9.0-G	9.0	10	22	75	4	Picture 1	●
GM-4E-D10.0-G	10.0	10	25	75	4	Picture 2	●
GM-4E-D11.0-G	11.0	12	26	75	4	Picture 1	●
GM-4E-D12.0-G	12.0	12	30	75	4	Picture 2	●
GM-4E-D14.0-G	14.0	14	32	75	4	Picture 2	●
GM-4E-D16.0-G	16.0	16	45	100	4	Picture 2	●
GM-4E-D18.0-G	18.0	18	45	100	4	Picture 2	●
GM-4E-D20.0-G	20.0	20	45	100	4	Picture 2	●

● Stock available ○ Make-to-order

Applicable workpiece material table

○ Very suitable ○ Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel / Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
○	○	○	○			○	○				

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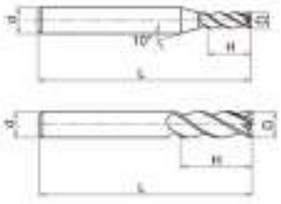
SOLID CARBIDE END MILL

4-flute flattened end mills with straight shank

Side face | Step shoulder | Straight slot

GM-4F-G



- Very suitable for side milling
- Wide application

Ordering number	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	D	d	H	L			
GM-4F-D1.0S-G	1.0	4	3	50	4	Picture 1	○
GM-4F-D1.5S-G	1.5	4	4	50	4	Picture 1	○
GM-4F-D2.0S-G	2.0	4	6	50	4	Picture 1	○
GM-4F-D2.5S-G	2.5	4	8	50	4	Picture 1	○
GM-4F-D3.0S-G	3.0	4	8	50	4	Picture 1	○
GM-4F-D4.0S-G	4.0	4	11	50	4	Picture 2	○
GM-4F-D1.0-G	1.0	6	3	50	4	Picture 1	○
GM-4F-D1.5-G	1.5	6	4	50	4	Picture 1	○
GM-4F-D2.0-G	2.0	6	6	50	4	Picture 1	○
GM-4F-D2.5-G	2.5	6	8	50	4	Picture 1	○
GM-4F-D3.0-G	3.0	6	8	50	4	Picture 1	○
GM-4F-D3.5-G	3.5	6	10	50	4	Picture 1	○
GM-4F-D4.0-G	4.0	6	11	50	4	Picture 1	○
GM-4F-D4.5-G	4.5	6	11	50	4	Picture 1	○
GM-4F-D5.0-G	5.0	6	13	50	4	Picture 1	○
GM-4F-D5.5-G	5.5	6	16	50	4	Picture 1	○
GM-4F-D6.0-G	6.0	6	16	50	4	Picture 2	○
GM-4F-D7.0-G	7.0	8	20	60	4	Picture 1	○
GM-4F-D8.0-G	8.0	8	20	60	4	Picture 2	○
GM-4F-D9.0-G	9.0	10	22	75	4	Picture 1	○
GM-4F-D10.0-G	10.0	10	25	75	4	Picture 2	○
GM-4F-D11.0-G	11.0	12	26	75	4	Picture 1	○
GM-4F-D12.0-G	12.0	12	30	75	4	Picture 2	○
GM-4F-D14.0-G	14.0	14	32	75	4	Picture 2	○
GM-4F-D16.0-G	16.0	16	45	100	4	Picture 2	○
GM-4F-D18.0-G	18.0	18	45	100	4	Picture 2	○
GM-4F-D20.0-G	20.0	20	45	100	4	Picture 2	○

● Stock available ○ Make-to-order

Applicable workpiece material table

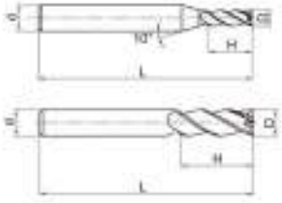
○ Very suitable ○ Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel / Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
○	○	○	○			○	○				

4-flute flattened end mills with straight shank and long cutting edge

Side face Step shoulder Straight slot

GM-4EL-G



- GM-4E-G series with long cutting edge

30° TAIN D<12 0~-0.030 12~D 0~-0.030

Ordering number	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	D	d	H	L			
GM-4EL-D3.0-G	3.0	6	12	75	4	Picture 1	○
GM-4EL-D4.0-G	4.0	6	15	75	4	Picture 1	○
GM-4EL-D5.0-G	5.0	6	20	75	4	Picture 1	○
GM-4EL-D6.0-G	6.0	6	20	75	4	Picture 2	○
GM-4EL-D8.0-G	8.0	8	25	100	4	Picture 2	○
GM-4EL-D10.0-G	10.0	10	30	100	4	Picture 2	○
GM-4EL-D12.0-G	12.0	12	35	100	4	Picture 2	○
GM-4EL-D14.0-G	14.0	14	40	100	4	Picture 2	○
GM-4EL-D16.0-G	16.0	16	50	150	4	Picture 2	○
GM-4EL-D20.0-G	20.0	20	55	150	4	Picture 2	○

● Stock available ○ Make-to-order

Applicable workpiece material table

○ Very suitable ○ Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel / Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~58HRC						
○	○	○	○			○	○				

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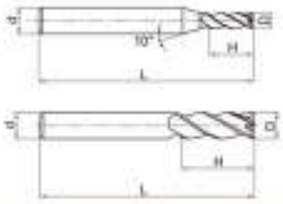
SOLID CARBIDE END MILL

4-flute flattened end mills with straight shank and long cutting edge

Side face Step shoulder Straight slot

GM-4FL-G



- GM-4F-G series with long cutting edge

30° TAIN D<12 0~-0.030 12~D 0~-0.030

Ordering number	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	D	d	H	L			
GM-4FL-D3.0-G	3.0	6	12	75	4	Picture 1	○
GM-4FL-D4.0-G	4.0	6	15	75	4	Picture 1	○
GM-4FL-D5.0-G	5.0	6	20	75	4	Picture 1	○
GM-4FL-D6.0-G	6.0	6	20	75	4	Picture 2	○
GM-4FL-D8.0-G	8.0	8	25	100	4	Picture 2	○
GM-4FL-D10.0-G	10.0	10	30	100	4	Picture 2	○
GM-4FL-D12.0-G	12.0	12	35	100	4	Picture 2	○
GM-4FL-D14.0-G	14.0	14	40	100	4	Picture 2	○
GM-4FL-D16.0-G	16.0	16	50	150	4	Picture 2	○
GM-4FL-D20.0-G	20.0	20	55	150	4	Picture 2	○

● Stock available ○ Make-to-order

Applicable workpiece material table

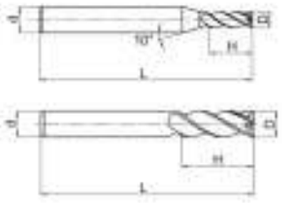
○ Very suitable ○ Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel / Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~58HRC						
○	○	○	○			○	○				

4-flute flattened end mills with straight shank, extra long cutting edge

Side face Step shoulder Straight slot

GM-4EX-G



- Extra long cutting edge, suitable for deep side milling

30° TAIN

Ordering number	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	D	d	H	L			
GM-4EX-D3.0-G	3.0	6	20	75	4	Picture 1	○
GM-4EX-D4.0-G	4.0	6	25	75	4	Picture 1	○
GM-4EX-D5.0-G	5.0	6	30	75	4	Picture 1	○
GM-4EX-D6.0-G	6.0	6	30	75	4	Picture 2	○
GM-4EX-D8.0-G	8.0	8	40	100	4	Picture 2	○
GM-4EX-D10.0-G	10.0	10	50	110	4	Picture 2	○
GM-4EX-D12.0-G	12.0	12	50	110	4	Picture 2	○
GM-4EX-D16.0-G	16.0	16	70	150	4	Picture 2	○
GM-4EX-D20.0-G	20.0	20	75	150	4	Picture 2	○

● Stock available ○ Make-to-order

Applicable workpiece material table

◎ Very suitable ○ Suitable

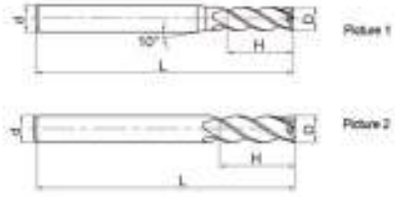
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel / Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	○			○	◎				

整体硬质合金立铣刀
SOLID CARBIDE END MILL

4-flute flattened end mills with straight shank

Side face Step shoulder Straight slot

GM-4E



- suitable for side milling and slot milling
- Wide application

45° TAIN

Ordering number	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	D	d	H	L			
GM-4E-D1.0S	1.0	4	3	50	4	Picture 1	●
GM-4E-D1.5S	1.5	4	4	50	4	Picture 1	●
GM-4E-D2.0S	2.0	4	6	50	4	Picture 1	●
GM-4E-D2.5S	2.5	4	8	50	4	Picture 1	●
GM-4E-D3.0S	3.0	4	8	50	4	Picture 1	●
GM-4E-D4.0S	4.0	4	11	50	4	Picture 2	●
GM-4E-D1.0	1.0	6	3	50	4	Picture 1	●
GM-4E-D1.5	1.5	6	4	50	4	Picture 1	●
GM-4E-D2.0	2.0	6	6	50	4	Picture 1	●
GM-4E-D2.5	2.5	6	8	50	4	Picture 1	●
GM-4E-D3.0	3.0	6	8	50	4	Picture 1	●
GM-4E-D3.5	3.5	6	10	50	4	Picture 1	●
GM-4E-D4.0	4.0	6	11	50	4	Picture 1	●
GM-4E-D4.5	4.5	6	11	50	4	Picture 1	●
GM-4E-D5.0	5.0	6	13	50	4	Picture 1	●
GM-4E-D5.5	5.5	6	16	50	4	Picture 1	●
GM-4E-D6.0	6.0	6	16	50	4	Picture 2	●
GM-4E-D7.0	7.0	8	20	60	4	Picture 1	●
GM-4E-D8.0	8.0	8	20	60	4	Picture 2	●
GM-4E-D9.0	9.0	10	22	75	4	Picture 1	●
GM-4E-D10.0	10.0	10	25	75	4	Picture 2	●
GM-4E-D11.0	11.0	12	28	75	4	Picture 1	●
GM-4E-D12.0	12.0	12	30	75	4	Picture 2	●
GM-4E-D14.0	14.0	14	32	75	4	Picture 2	●
GM-4E-D16.0	16.0	16	45	100	4	Picture 2	●
GM-4E-D18.0	18.0	18	45	100	4	Picture 2	●
GM-4E-D20.0	20.0	20	45	100	4	Picture 2	●

● Stock available ○ Make-to-order

Applicable workpiece material table

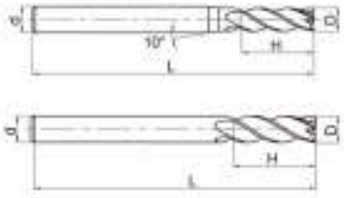
◎ Very suitable ○ Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel / Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	○			○	◎				

4-flute flattened end mills with straight shank, long cutting edge

Side face | Step shoulder | Straight slot

GM-4EL



- GM-4E series with long cutting edge

Ordering number	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	D	d	H	L			
GM-4EL-D3.0	3.0	6	12	75	4	Picture 1	●
GM-4EL-D4.0	4.0	6	15	75	4	Picture 1	●
GM-4EL-D5.0	5.0	6	20	75	4	Picture 1	●
GM-4EL-D6.0	6.0	6	20	75	4	Picture 2	●
GM-4EL-D8.0	8.0	8	25	100	4	Picture 2	●
GM-4EL-D10.0	10.0	10	30	100	4	Picture 2	●
GM-4EL-D12.0	12.0	12	35	100	4	Picture 2	●
GM-4EL-D14.0	14.0	14	40	100	4	Picture 2	●
GM-4EL-D16.0	16.0	16	50	150	4	Picture 2	●
GM-4EL-D20.0	20.0	20	55	150	4	Picture 2	●

● Stock available ○ Make-to-order

Applicable workpiece material table

○ Very suitable ○ Suitable

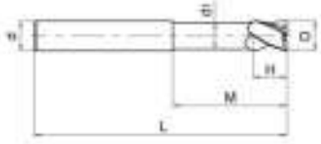
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel / Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
○	○	○	○			○	○				

整体硬质合金立铣刀
SOLID CARBIDE END MILL

4-flute flattened end mills with straight shank, long neck and short cutting edge

Side face | Step shoulder | Straight slot

GM-4EFP



- High rigidity with short cutting edge, suitable for heavy cutting, as well as the deep cavity milling

Ordering number	Basic dimension(mm)						Number of teeth Z	Stock
	D	d	H	M	d1	L		
GM-4EFP-D6.0	6.0	6	9	30	5.8	75	4	○
GM-4EFP-D8.0	8.0	8	12	40	7.8	100	4	○
GM-4EFP-D10.0	10.0	10	15	50	9.6	100	4	○
GM-4EFP-D12.0	12.0	12	18	50	11.5	100	4	○
GM-4EFP-D16.0	16.0	16	24	50	15.5	150	4	○
GM-4EFP-D20.0	20.0	20	30	60	19.5	150	4	○

● Stock available ○ Make-to-order

Applicable workpiece material table

○ Very suitable ○ Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel / Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
○	○	○	○			○	○				

6-flute flattened end mills with straight shank

Side face Step shoulder Straight slot

GM-6E

- Perfect rigidly, very suitable for side finish machining
- High speed, high feed rate machining applicable

Ordering number	Basic dimension(mm)				Number of teeth Z	Stock
	D	d	H	L		
GM-6E-D6.0	6.0	6	18	60	6	●
GM-6E-D8.0	8.0	8	20	60	6	●
GM-6E-D10.0	10.0	10	30	75	6	●
GM-6E-D12.0	12.0	12	32	75	6	●
GM-6E-D16.0	16.0	16	40	100	6	●
GM-6E-D20.0	20.0	20	45	100	6	●

● Stock available ○ Make-to-order

Applicable workpiece material table

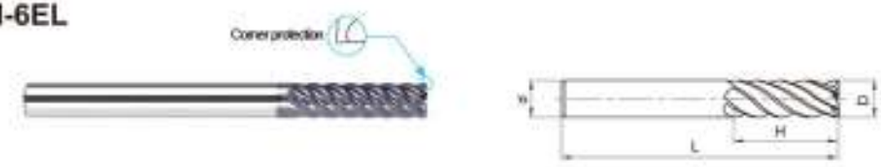
○ Very suitable ◇ Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel / Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
○	○	○	◇			◇	○				

6-flute flattened end mills with straight shank, long cutting edge

Side face Step shoulder Straight slot

GM-6EL



- GM-6E series with long cutting edge

Ordering number	Basic dimension(mm)				Number of teeth Z	Stock
	D	d	H	L		
GM-6EL-D6.0	6.0	6	24	75	6	●
GM-6EL-D8.0	8.0	8	32	75	6	●
GM-6EL-D10.0	10.0	10	40	100	6	●
GM-6EL-D12.0	12.0	12	45	100	6	●
GM-6EL-D16.0	16.0	16	64	150	6	●
GM-6EL-D20.0	20.0	20	75	150	6	●

● Stock available ○ Make-to-order

Applicable workpiece material table

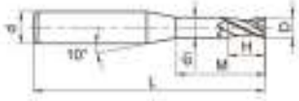
○ Very suitable ◇ Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel / Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
○	○	○	◇			◇	○				

2-flute flattened end mills with straight shank, long neck and short cutting edge

Deep ball nose slot

GM-2EP



- Suitable for narrow slot milling or milling of fine parts that could generate

Ordering number	Basic dimension(mm)						Number of teeth Z	Stock
	D	d	H	M	d1	L		
GM-2EP-D0.5-M04	0.5	4	0.7	4	0.45	50	2	●
GM-2EP-D0.5-M06	0.5	4	0.7	6	0.45	50	2	●
GM-2EP-D0.5-M08	0.5	4	0.7	8	0.45	50	2	●
GM-2EP-D0.8-M04	0.8	4	1.2	4	0.75	50	2	●
GM-2EP-D0.8-M06	0.8	4	1.2	6	0.75	50	2	●
GM-2EP-D0.8-M08	0.8	4	1.2	8	0.75	50	2	●
GM-2EP-D0.8-M10	0.8	4	1.2	10	0.75	50	2	●
GM-2EP-D1.0-M04	1.0	4	1.5	4	0.95	50	2	●
GM-2EP-D1.0-M06	1.0	4	1.5	6	0.95	50	2	●
GM-2EP-D1.0-M08	1.0	4	1.5	8	0.95	50	2	●
GM-2EP-D1.0-M10	1.0	4	1.5	10	0.95	50	2	●
GM-2EP-D1.0-M12	1.0	4	1.5	12	0.95	50	2	●
GM-2EP-D1.0-M14	1.0	4	1.5	14	0.95	50	2	●
GM-2EP-D1.2-M06	1.2	4	1.8	6	1.15	50	2	●
GM-2EP-D1.2-M08	1.2	4	1.8	8	1.15	50	2	●
GM-2EP-D1.2-M10	1.2	4	1.8	10	1.15	50	2	●
GM-2EP-D1.2-M12	1.2	4	1.8	12	1.15	50	2	●
GM-2EP-D1.5-M06	1.5	4	2.3	6	1.45	50	2	●
GM-2EP-D1.5-M08	1.5	4	2.3	8	1.45	50	2	●
GM-2EP-D1.5-M10	1.5	4	2.3	10	1.45	50	2	●
GM-2EP-D1.5-M12	1.5	4	2.3	12	1.45	50	2	●
GM-2EP-D1.5-M14	1.5	4	2.3	14	1.45	50	2	●
GM-2EP-D2.0-M06	2.0	4	3.0	6	1.95	50	2	●
GM-2EP-D2.0-M08	2.0	4	3.0	8	1.95	50	2	●
GM-2EP-D2.0-M10	2.0	4	3.0	10	1.95	50	2	●
GM-2EP-D2.0-M12	2.0	4	3.0	12	1.95	50	2	●

● Stock available ○ Make-to-order

Applicable workpiece material table

○ Very suitable ○ Suitable

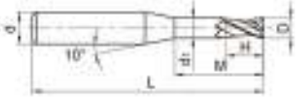
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel / Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
○	○	○	○			○	○				

整体硬质合金立铣刀
SOLID CARBIDE END MILL

2-flute flattened end mills with straight shank, long neck and short cutting edge

Deep ball nose slot

GM-2EP



- Suitable for narrow slot milling or milling of fine parts that could generate

Ordering number	Basic dimension(mm)						Number of teeth Z	Stock
	D	d	H	M	d1	L		
GM-2EP-D2.0-M14	2.0	4	3.0	14	1.95	50	2	●
GM-2EP-D2.0-M16	2.0	4	3.0	16	1.95	50	2	●
GM-2EP-D2.5-M08	2.5	4	3.7	8	2.4	50	2	●
GM-2EP-D2.5-M10	2.5	4	3.7	10	2.4	50	2	●
GM-2EP-D2.5-M12	2.5	4	3.7	12	2.4	50	2	●
GM-2EP-D2.5-M14	2.5	4	3.7	14	2.4	50	2	●
GM-2EP-D2.5-M16	2.5	4	3.7	16	2.4	60	2	●
GM-2EP-D2.5-M18	2.5	4	3.7	18	2.4	60	2	●
GM-2EP-D2.5-M20	2.5	4	3.7	20	2.4	60	2	●
GM-2EP-D3.0-M06	3.0	6	4.5	6	2.85	50	2	●
GM-2EP-D3.0-M08	3.0	6	4.5	8	2.85	50	2	●
GM-2EP-D3.0-M10	3.0	6	4.5	10	2.85	50	2	●
GM-2EP-D3.0-M12	3.0	6	4.5	12	2.85	50	2	●
GM-2EP-D3.0-M14	3.0	6	4.5	14	2.85	60	2	●
GM-2EP-D3.0-M16	3.0	6	4.5	16	2.85	60	2	●
GM-2EP-D3.0-M18	3.0	6	4.5	18	2.85	60	2	●
GM-2EP-D3.0-M20	3.0	6	4.5	20	2.85	60	2	●
GM-2EP-D4.0-M12	4.0	6	6.0	12	3.85	50	2	●
GM-2EP-D4.0-M16	4.0	6	6.0	16	3.85	60	2	●
GM-2EP-D4.0-M20	4.0	6	6.0	20	3.85	60	2	●
GM-2EP-D4.0-M25	4.0	6	6.0	25	3.85	60	2	●
GM-2EP-D5.0-M16	5.0	6	7.5	16	4.85	60	2	●
GM-2EP-D5.0-M25	5.0	6	7.5	25	4.85	70	2	●

● Stock available ○ Make-to-order

Applicable workpiece material table

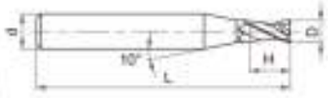
○ Very suitable ○ Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel / Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
○	○	○	○			○	○				

2-flute flattened end mills with straight shank and tiny diameter

Side face | Step shoulder | Straight slot

GM-2ES



- Tiny diameter end mills can fully display high speed and high precision performances of machining center, often used for machining of precision components such as electronic part etc.

Ordering number	Basic dimension(mm)				Number of teeth Z	Stock
	D	d	H	L		
GM-2ES-D0.3	0.3	4	0.6	50	2	●
GM-2ES-D0.4	0.4	4	0.8	50	2	●
GM-2ES-D0.5	0.5	4	1.0	50	2	●
GM-2ES-D0.6	0.6	4	1.2	50	2	●
GM-2ES-D0.7	0.7	4	1.4	50	2	●
GM-2ES-D0.8	0.8	4	1.6	50	2	●
GM-2ES-D0.9	0.9	4	1.8	50	2	●
GM-2ES-D1.0	1.0	4	2.0	50	2	●
GM-2ES-D1.1	1.1	4	2.0	50	2	●
GM-2ES-D1.2	1.2	4	2.5	50	2	●
GM-2ES-D1.3	1.3	4	2.5	50	2	●
GM-2ES-D1.4	1.4	4	3.0	50	2	●
GM-2ES-D1.5	1.5	4	3.0	50	2	●
GM-2ES-D1.6	1.6	4	3.5	50	2	●
GM-2ES-D1.7	1.7	4	3.5	50	2	●
GM-2ES-D1.8	1.8	4	4.0	50	2	●
GM-2ES-D1.9	1.9	4	4.0	50	2	●
GM-2ES-D2.0	2.0	4	4.0	50	2	●
GM-2ES-D2.1	2.1	4	4.0	50	2	●
GM-2ES-D2.2	2.2	4	4.5	50	2	●
GM-2ES-D2.3	2.3	4	4.5	50	2	●
GM-2ES-D2.4	2.4	4	5.0	50	2	●
GM-2ES-D2.5	2.5	4	5.0	50	2	●
GM-2ES-D2.6	2.6	4	5.0	50	2	●
GM-2ES-D2.7	2.7	4	5.5	50	2	●
GM-2ES-D2.8	2.8	4	5.5	50	2	●
GM-2ES-D2.9	2.9	4	6.0	50	2	●
GM-2ES-D3.0	3.0	4	6.0	50	2	●

● Stock available ○ Make-to-order

Applicable workpiece material table

○ Very suitable ○ Suitable

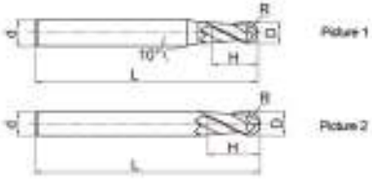
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel / Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
○	○	○	○			○	○				

整体硬质合金立铣刀
SOLID CARBIDE END MILL

2-flute ball nose end mills with straight shank

Profile | Cavity | Ball nose slot

GM-2B



- For profile milling, high speed machining applicable
- Wide application

Ordering number	Basic dimension(mm)					Number of teeth Z	Geometry	Stock
	D	R	d	H	L			
GM-2B-R0.5S	1.0	0.5	4	2	50	2	Picture 1	●
GM-2B-R0.75S	1.5	0.75	4	3	50	2	Picture 1	●
GM-2B-R1.0S	2.0	1.0	4	4	50	2	Picture 1	●
GM-2B-R1.25S	2.5	1.25	4	5	50	2	Picture 1	●
GM-2B-R1.5S	3.0	1.5	4	6	50	2	Picture 1	●
GM-2B-R2.0S	4.0	2.0	4	8	50	2	Picture 2	●
GM-2B-R0.5	1.0	0.5	6	2	50	2	Picture 1	●
GM-2B-R0.75	1.5	0.75	6	3	50	2	Picture 1	●
GM-2B-R1.0	2.0	1.0	6	4	50	2	Picture 1	●
GM-2B-R1.25	2.5	1.25	6	5	50	2	Picture 1	●
GM-2B-R1.5	3.0	1.5	6	6	50	2	Picture 1	●
GM-2B-R1.75	3.5	1.75	6	6	50	2	Picture 1	●
GM-2B-R2.0	4.0	2.0	6	8	50	2	Picture 1	●
GM-2B-R2.5	5.0	2.5	6	10	50	2	Picture 1	●
GM-2B-R2.75	5.5	2.75	6	12	50	2	Picture 1	●
GM-2B-R3.0	6.0	3.0	6	12	50	2	Picture 2	●
GM-2B-R3.5	7.0	3.5	8	14	60	2	Picture 1	●
GM-2B-R4.0	8.0	4.0	8	16	60	2	Picture 2	●
GM-2B-R4.5	9.0	4.5	10	18	75	2	Picture 1	●
GM-2B-R5.0	10	5.0	10	20	75	2	Picture 2	●
GM-2B-R6.0	12	6.0	12	24	75	2	Picture 2	●
GM-2B-R7.0	14	7.0	14	28	75	2	Picture 2	●
GM-2B-R8.0	16	8.0	16	32	100	2	Picture 2	●
GM-2B-R10.0	20	10.0	20	40	100	2	Picture 2	●

● Stock available ○ Make-to-order

Applicable workpiece material table

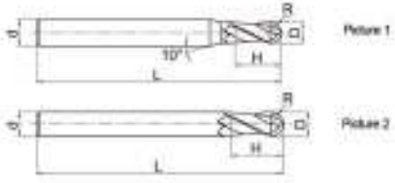
○ Very suitable ○ Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel / Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
○	○	○	○			○	○				

2-flute ball nose end mills with straight shank, long cutting edge

Profile | Cavity | Ball nose slot

GM-2BL



● GM-2B series with long cutting edge

35° | TiAlN | D: D<12 0~-0.015, 12≤D 0~-0.030 | R: R=0.01

Ordering number	Basic dimension(mm)					Number of teeth Z	Geometry	Stock
	D	R	d	H	L			
GM-2BL-R1.0	2.0	1.0	6	4	75	2	Picture 1	●
GM-2BL-R1.25	2.5	1.25	6	5	75	2	Picture 1	●
GM-2BL-R1.5	3.0	1.5	6	6	75	2	Picture 1	●
GM-2BL-R1.75	3.5	1.75	6	8	75	2	Picture 1	●
GM-2BL-R2.0	4.0	2.0	6	8	75	2	Picture 1	●
GM-2BL-R2.5	5.0	2.5	6	10	75	2	Picture 1	●
GM-2BL-R2.75	5.5	2.75	6	12	75	2	Picture 1	●
GM-2BL-R3.0	6.0	3.0	6	12	75	2	Picture 2	●
GM-2BL-R3.5	7.0	3.5	6	14	75	2	Picture 1	●
GM-2BL-R4.0	8.0	4.0	8	16	100	2	Picture 2	●
GM-2BL-R4.5	9.0	4.5	10	18	100	2	Picture 1	●
GM-2BL-R5.0	10.0	5.0	10	20	100	2	Picture 2	●
GM-2BL-R6.0	12.0	6.0	12	24	100	2	Picture 2	●
GM-2BL-R7.0	14.0	7.0	14	28	100	2	Picture 2	●
GM-2BL-R8.0	16.0	8.0	16	32	150	2	Picture 2	●
GM-2BL-R10.0	20.0	10.0	20	40	150	2	Picture 2	●

● Stock available ○ Make-to-order

Applicable workpiece material table

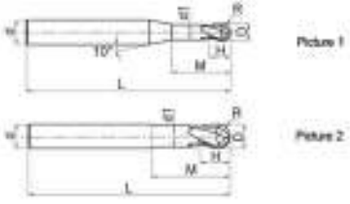
◎Very suitable ○Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel / Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	○			○	◎				

2-flute ball nose end mills with straight shank, long neck and short cutting edge

Profile | Cavity | Ball nose slot

GM-2BFP



● GM-2B series with long cutting edge

35° | TiAlN | D: D<12 0~-0.020, 12≤D 0~-0.030 | R: R=0.01

Ordering number	Basic dimension(mm)							Number of teeth Z	Geometry	Stock
	D	R	H	d1	M	d	L			
GM-2BFP-R0.5	1.0	0.5	1	0.95	2.5	6	75	2	Picture 1	○
GM-2BFP-R0.75	1.5	0.75	1	1.45	3	6	75	2	Picture 1	○
GM-2BFP-R1.0	2.0	1.0	2	1.95	4	6	75	2	Picture 1	○
GM-2BFP-R1.5	3.0	1.5	3	2.85	5	6	75	2	Picture 1	○
GM-2BFP-R2.0	4.0	2.0	4	3.85	8	6	75	2	Picture 1	○
GM-2BFP-R2.5	5.0	2.5	5	4.85	10	6	75	2	Picture 1	○
GM-2BFP-R3.0	6.0	3.0	6	5.8	12	6	75	2	Picture 2	○
GM-2BFP-R4.0	8.0	4.0	8	7.8	16	8	100	2	Picture 2	○
GM-2BFP-R5.0	10.0	5.0	10	9.6	20	10	100	2	Picture 2	○
GM-2BFP-R6.0	12.0	6.0	12	11.5	24	12	100	2	Picture 2	○
GM-2BFP-R8.0	16.0	8.0	16	15.5	32	16	150	2	Picture 2	○
GM-2BFP-R10.0	20.0	10.0	20	19.5	40	20	150	2	Picture 2	○

● Stock available ○ Make-to-order

Applicable workpiece material table

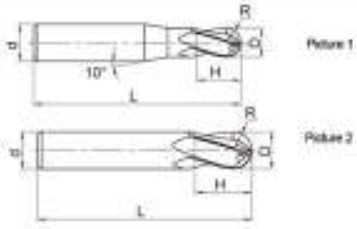
◎Very suitable ○Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel / Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	○			○	◎				

4-flute ball nose end mills with straight shank

Profile | Cavity | Ball nose slot

GM-4B



- 4-flute ball nose end mill can operate with higher feed speed and machining efficiency, extending tool life in machining high-hardness workpiece

Ordering number	Basic dimension(mm)					Number of teeth Z	Geometry	Stock
	D	R	d	H	L			
GM-4B-R1.5	3.0	1.5	6	8	50	4	Picture 1	●
GM-4B-R2.0	4.0	2.0	6	8	50	4	Picture 1	●
GM-4B-R2.5	5.0	2.5	6	10	50	4	Picture 1	●
GM-4B-R3.0	6.0	3.0	6	12	50	4	Picture 2	●
GM-4B-R4.0	8.0	4.0	8	16	60	4	Picture 2	●
GM-4B-R5.0	10.0	5.0	10	20	75	4	Picture 2	●
GM-4B-R6.0	12.0	6.0	12	24	75	4	Picture 2	●
GM-4B-R7.0	14.0	7.0	14	28	75	4	Picture 2	●
GM-4B-R8.0	16.0	8.0	16	32	100	4	Picture 2	●
GM-4B-R9.0	18.0	9.0	18	36	100	4	Picture 2	●
GM-4B-R10.0	20.0	10.0	20	40	100	4	Picture 2	●

● Stock available ○ Make-to-order

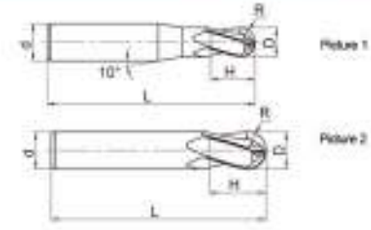
Applicable workpiece material table ○ Very suitable ○ Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel / Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
○	○	○	○			○	○				

4-flute ball nose end mills with straight shank, long cutting edge

Profile | Cavity | Ball nose slot

GM-4BL



- GM-4B series with long cutting edge

Ordering number	Basic dimension(mm)					Number of teeth Z	Geometry	Stock
	D	R	d	H	L			
GM-4BL-R1.5	3.0	1.5	6	8	75	4	Picture 1	○
GM-4BL-R2.0	4.0	2.0	6	8	75	4	Picture 1	○
GM-4BL-R2.5	5.0	2.5	6	10	75	4	Picture 1	○
GM-4BL-R3.0	6.0	3.0	6	12	75	4	Picture 2	○
GM-4BL-R4.0	8.0	4.0	8	16	100	4	Picture 2	○
GM-4BL-R5.0	10.0	5.0	10	20	100	4	Picture 2	○
GM-4BL-R6.0	12.0	6.0	12	24	100	4	Picture 2	○
GM-4BL-R7.0	14.0	7.0	14	28	100	4	Picture 2	○
GM-4BL-R8.0	16.0	8.0	16	32	150	4	Picture 2	○
GM-4BL-R9.0	18.0	9.0	18	36	150	4	Picture 2	○
GM-4BL-R10.0	20.0	10.0	20	40	150	4	Picture 2	○

● Stock available ○ Make-to-order

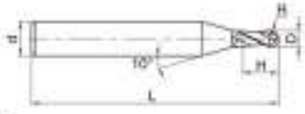
Applicable workpiece material table ○ Very suitable ○ Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel / Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
○	○	○	○			○	○				

2-flute ball nose end mills with straight shank and tiny diameter

Profile | Cavity | Ball nose slot

GM-2BS



- Tiny diameter end mills can fully display high speed and high precision performances of machining center, often used for machining of precision components such as electronic part etc.

Ordering number	Basic dimension(mm)					Number of teeth Z	Stock
	D	R	d	H	L		
GM-2BS-R0.15	0.30	0.15	4	0.5	50	2	●
GM-2BS-R0.20	0.40	0.20	4	0.6	50	2	●
GM-2BS-R0.25	0.50	0.25	4	0.8	50	2	●
GM-2BS-R0.30	0.60	0.30	4	0.9	50	2	●
GM-2BS-R0.35	0.70	0.35	4	1.0	50	2	●
GM-2BS-R0.40	0.80	0.40	4	1.2	50	2	●
GM-2BS-R0.45	0.90	0.45	4	1.3	50	2	●
GM-2BS-R0.50	1.00	0.50	4	1.5	50	2	●
GM-2BS-R0.60	1.20	0.60	4	1.8	50	2	●
GM-2BS-R0.70	1.40	0.70	4	2.0	50	2	●
GM-2BS-R0.75	1.50	0.75	4	2.3	50	2	●
GM-2BS-R0.80	1.60	0.80	4	2.5	50	2	●
GM-2BS-R0.90	1.80	0.90	4	2.7	50	2	●
GM-2BS-R1.00	2.00	1.00	4	3.0	50	2	●
GM-2BS-R1.25	2.50	1.25	4	3.7	50	2	●
GM-2BS-R1.50	3.00	1.50	4	4.5	50	2	●

● Stock available ○ Make-to-order

Applicable workpiece material table

◎ Very suitable ○ Suitable

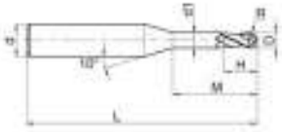
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel / Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	○			○	◎				

整体硬质合金立铣刀
SOLID CARBIDE END MILL

2-flute ball nose end mills with straight shank, long neck and short cutting edge

Deep ball nose slot

GM-2BP



- Suitable for machining narrow slot and free-form surface

Ordering number	Basic dimension(mm)							Number of teeth Z	Stock
	D	R	H	⊖h	M	d	L		
GM-2BP-R0.25-M04	0.5	0.25	0.7	0.46	4	4	50	2	●
GM-2BP-R0.25-M06	0.5	0.25	0.7	0.46	6	4	50	2	●
GM-2BP-R0.3-M04	0.6	0.3	0.9	0.55	4	4	50	2	●
GM-2BP-R0.3-M06	0.6	0.3	0.9	0.55	6	4	50	2	●
GM-2BP-R0.3-M08	0.6	0.3	0.9	0.55	8	4	50	2	●
GM-2BP-R0.4-M04	0.8	0.4	1.2	0.75	4	4	50	2	●
GM-2BP-R0.4-M06	0.8	0.4	1.2	0.75	6	4	50	2	●
GM-2BP-R0.4-M08	0.8	0.4	1.2	0.75	8	4	50	2	●
GM-2BP-R0.4-M10	0.8	0.4	1.2	0.75	10	4	50	2	●
GM-2BP-R0.5-M04	1.0	0.5	1.5	0.95	4	4	50	2	●
GM-2BP-R0.5-M06	1.0	0.5	1.5	0.95	6	4	50	2	●
GM-2BP-R0.5-M08	1.0	0.5	1.5	0.95	8	4	50	2	●
GM-2BP-R0.5-M10	1.0	0.5	1.5	0.95	10	4	50	2	●
GM-2BP-R0.5-M12	1.0	0.5	1.5	0.95	12	4	50	2	●
GM-2BP-R0.6-M06	1.2	0.6	1.8	1.15	6	4	50	2	●
GM-2BP-R0.6-M08	1.2	0.6	1.8	1.15	8	4	50	2	●
GM-2BP-R0.6-M12	1.2	0.6	1.8	1.15	12	4	50	2	●
GM-2BP-R0.6-M16	1.2	0.6	1.8	1.15	16	4	50	2	●
GM-2BP-R0.75-M08	1.5	0.75	2.3	1.45	8	4	50	2	●
GM-2BP-R0.75-M12	1.5	0.75	2.3	1.45	12	4	50	2	●
GM-2BP-R0.75-M16	1.5	0.75	2.3	1.45	16	4	50	2	●
GM-2BP-R1.0-M06	2.0	1.0	3.0	1.95	6	4	50	2	●
GM-2BP-R1.0-M08	2.0	1.0	3.0	1.95	8	4	50	2	●
GM-2BP-R1.0-M10	2.0	1.0	3.0	1.95	10	4	50	2	●

● Stock available ○ Make-to-order

Applicable workpiece material table

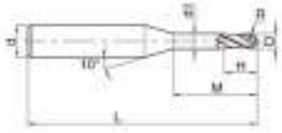
◎ Very suitable ○ Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel / Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	○			○	◎				

2-flute ball nose end mills with straight shank, long neck and short cutting edge

Deep ball nose slot

GM-2BP



- Suitable for machining narrow slot and free-form surface

Ordering number	Basic dimension(mm)							Number of teeth Z	Stock
	D	R	H	d1	M	d	L		
GM-2BP-R1.0-M12	2.0	1.0	3.0	1.95	12	4	50	2	●
GM-2BP-R1.0-M16	2.0	1.0	3.0	1.95	16	4	50	2	●
GM-2BP-R1.0-M20	2.0	1.0	3.0	1.95	20	4	50	2	●
GM-2BP-R1.25-M08	2.5	1.25	3.7	2.4	8	4	50	2	●
GM-2BP-R1.25-M12	2.5	1.25	3.7	2.4	12	4	50	2	●
GM-2BP-R1.25-M16	2.5	1.25	3.7	2.4	16	4	60	2	●
GM-2BP-R1.25-M20	2.5	1.25	3.7	2.4	20	4	60	2	●
GM-2BP-R1.5-M08	3.0	1.5	4.5	2.85	8	6	50	2	●
GM-2BP-R1.5-M10	3.0	1.5	4.5	2.85	10	6	50	2	●
GM-2BP-R1.5-M12	3.0	1.5	4.5	2.85	12	6	50	2	●
GM-2BP-R1.5-M16	3.0	1.5	4.5	2.85	16	6	60	2	●
GM-2BP-R1.5-M20	3.0	1.5	4.5	2.85	20	6	60	2	●
GM-2BP-R2.0-M10	4.0	2.0	6.0	3.85	10	6	60	2	●
GM-2BP-R2.0-M16	4.0	2.0	6.0	3.85	16	6	60	2	●
GM-2BP-R2.0-M20	4.0	2.0	6.0	3.85	20	6	60	2	●
GM-2BP-R2.0-M25	4.0	2.0	6.0	3.85	25	6	60	2	●
GM-2BP-R2.5-M16	5.0	2.5	7.5	4.85	16	6	60	2	●
GM-2BP-R2.5-M25	5.0	2.5	7.5	4.85	25	6	70	2	●

● Stock available ○ Make-to-order

Applicable workpiece material table

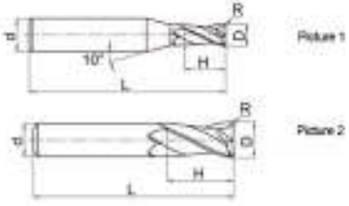
○ Very suitable ○ Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel / Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
○	○	○	○			○	○				

2-flute R end mills with straight shank

Radius shoulder Profile Radius corner slot

GM-2R



- Wide applications, applicable for several machining styles

Ordering number	Basic dimension(mm)					Number of teeth Z	Geometry	Stock
	D	R	d	H	L			
GM-2R-D1.0R0.2	1.0	0.2	4	3	50	2	Picture 1	●
GM-2R-D1.5R0.2	1.5	0.2	4	4	50	2	Picture 1	●
GM-2R-D2.0R0.2	2.0	0.2	4	8	50	2	Picture 1	●
GM-2R-D2.0R0.5	2.0	0.5	4	8	50	2	Picture 1	●
GM-2R-D2.5R0.2	2.5	0.2	4	8	50	2	Picture 1	●
GM-2R-D2.5R0.5	2.5	0.5	4	8	50	2	Picture 1	●
GM-2R-D3.0R0.2	3.0	0.2	4	8	50	2	Picture 1	●
GM-2R-D3.0R0.3	3.0	0.3	4	8	50	2	Picture 1	●
GM-2R-D3.0R0.5	3.0	0.5	4	8	50	2	Picture 1	●
GM-2R-D4.0R0.2	4.0	0.2	4	11	50	2	Picture 2	●
GM-2R-D4.0R0.3	4.0	0.3	4	11	50	2	Picture 2	●
GM-2R-D4.0R0.5	4.0	0.5	4	11	50	2	Picture 2	●
GM-2R-D4.0R1.0	4.0	1.0	4	11	50	2	Picture 2	●
GM-2R-D5.0R0.3	5.0	0.3	6	13	50	2	Picture 1	●
GM-2R-D5.0R0.5	5.0	0.5	6	13	50	2	Picture 1	●
GM-2R-D5.0R1.0	5.0	1.0	6	13	50	2	Picture 1	●
GM-2R-D6.0R0.3	6.0	0.3	6	16	50	2	Picture 2	●
GM-2R-D6.0R0.5	6.0	0.5	6	16	50	2	Picture 2	●
GM-2R-D6.0R1.0	6.0	1.0	6	16	50	2	Picture 2	●
GM-2R-D8.0R0.3	8.0	0.3	8	20	60	2	Picture 2	●
GM-2R-D8.0R0.5	8.0	0.5	8	20	60	2	Picture 2	●
GM-2R-D8.0R1.0	8.0	1.0	8	20	60	2	Picture 2	●
GM-2R-D10.0R0.5	10.0	0.5	10	25	75	2	Picture 2	●
GM-2R-D10.0R1.0	10.0	1.0	10	25	75	2	Picture 2	●
GM-2R-D10.0R1.5	10.0	1.5	10	25	75	2	Picture 2	●
GM-2R-D10.0R2.0	10.0	2.0	10	25	75	2	Picture 2	●
GM-2R-D12.0R0.5	12.0	0.5	12	30	75	2	Picture 2	●
GM-2R-D12.0R1.0	12.0	1.0	12	30	75	2	Picture 2	●
GM-2R-D12.0R1.5	12.0	1.5	12	30	75	2	Picture 2	●
GM-2R-D12.0R2.0	12.0	2.0	12	30	75	2	Picture 2	●

● Stock available ○ Make-to-order

Applicable workpiece material table

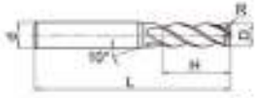
○ Very suitable ○ Suitable

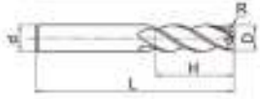
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel / Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
○	○	○	○			○	○				

4-flute R end mills with straight shank

Radius shoulder | Profile | Radius corner slot

GM-4R





- Wide applications, applicable for several machining styles

Ordering number	Basic dimension(mm)					Number of teeth Z	Geometry	Stock
	D	R	d	H	L			
GM-4R-D3.0R0.2	3.0	0.2	4	8	50	4	Picture 1	●
GM-4R-D4.0R0.3	4.0	0.3	4	10	50	4	Picture 2	●
GM-4R-D4.0R0.5	4.0	0.5	4	10	50	4	Picture 2	●
GM-4R-D5.0R0.5	5.0	0.5	6	13	50	4	Picture 1	●
GM-4R-D5.0R1.0	5.0	1.0	6	13	50	4	Picture 1	●
GM-4R-D6.0R0.5	6.0	0.5	6	16	50	4	Picture 2	●
GM-4R-D6.0R1.0	6.0	1.0	6	16	50	4	Picture 2	●
GM-4R-D8.0R0.5	8.0	0.5	8	20	60	4	Picture 2	●
GM-4R-D8.0R1.0	8.0	1.0	8	20	60	4	Picture 2	●
GM-4R-D10.0R0.5	10.0	0.5	10	25	75	4	Picture 2	●
GM-4R-D10.0R1.0	10.0	1.0	10	25	75	4	Picture 2	●
GM-4R-D10.0R2.0	10.0	2.0	10	25	75	4	Picture 2	●
GM-4R-D10.0R3.0	10.0	3.0	10	25	75	4	Picture 2	●
GM-4R-D12.0R0.5	12.0	0.5	12	30	75	4	Picture 2	●
GM-4R-D12.0R1.0	12.0	1.0	12	30	75	4	Picture 2	●
GM-4R-D12.0R2.0	12.0	2.0	12	30	75	4	Picture 2	●
GM-4R-D12.0R3.0	12.0	3.0	12	30	75	4	Picture 2	●

● Stock available ○ Make-to-order

Applicable workpiece material table

○ Very suitable ○ Suitable

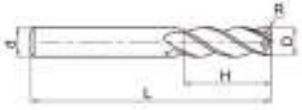
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel / Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
○	○	○	○			○	○				

整体硬质合金立铣刀
SOLID CARBIDE END MILL

4-flute R end mills with straight shank and long shank

Radius shoulder | Profile | Radius corner slot

GM-4RL



- GM-4R series with long cutting edge

Ordering number	Basic dimension(mm)					Number of teeth Z	Stock
	D	R	d	H	L		
GM-4RL-D6.0R0.5	6.0	0.5	6	16	75	4	●
GM-4RL-D6.0R1.0	6.0	1.0	6	16	75	4	●
GM-4RL-D8.0R0.5	8.0	0.5	8	20	100	4	●
GM-4RL-D8.0R1.0	8.0	1.0	8	20	100	4	●
GM-4RL-D10.0R0.5	10.0	0.5	10	25	100	4	●
GM-4RL-D10.0R1.0	10.0	1.0	10	25	100	4	●
GM-4RL-D10.0R2.0	10.0	2.0	10	25	100	4	●
GM-4RL-D12.0R0.5	12.0	0.5	12	30	100	4	●
GM-4RL-D12.0R1.0	12.0	1.0	12	30	100	4	●
GM-4RL-D12.0R2.0	12.0	2.0	12	30	100	4	●
GM-4RL-D16.0R1.0	16.0	1.0	16	45	150	4	●
GM-4RL-D16.0R2.0	16.0	2.0	16	45	150	4	●

● Stock available ○ Make-to-order

Applicable workpiece material table

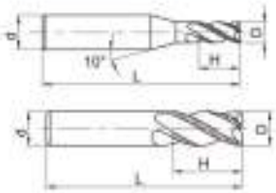
○ Very suitable ○ Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel / Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
○	○	○	○			○	○				

整体硬质合金立铣刀
SOLID CARBIDE END MILL

4-flute flattened end mills with straight shank and corrugated edges

GM-4W



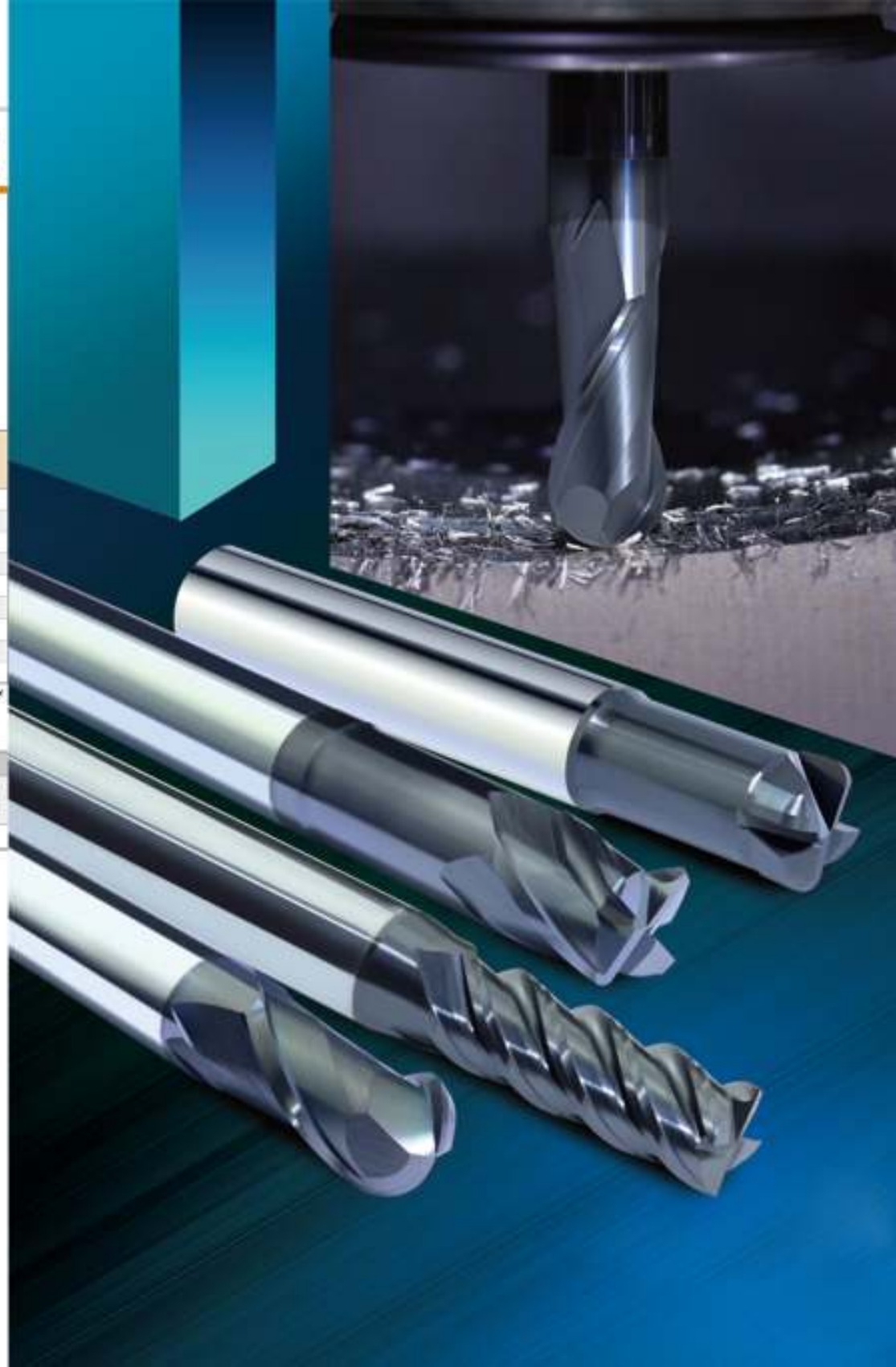
- Very suitable for high-efficiency rough machining

Ordering number	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	D	d	H	L			
GM-4W-D6.0	6.0	6	16	50	4	Picture 2	●
GM-4W-D7.0	7.0	8	20	60	4	Picture 1	●
GM-4W-D8.0	8.0	8	20	60	4	Picture 2	●
GM-4W-D9.0	9.0	10	22	75	4	Picture 1	●
GM-4W-D10.0	10.0	10	25	75	4	Picture 2	●
GM-4W-D11.0	11.0	12	26	75	4	Picture 1	●
GM-4W-D12.0	12.0	12	30	75	4	Picture 2	●
GM-4W-D16.0	16.0	16	45	100	4	Picture 2	●
GM-4W-D20.0	20.0	20	45	100	4	Picture 2	●

● Stock available ○ Make-to-order

Applicable workpiece material table ○ Very suitable ○ Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel / Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
○	○	○	○			○	○				



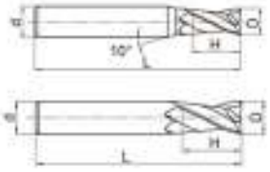
Graphics category and identification 85

Cutting parameters B103-B104

2-flute flattened end mills with straight shank

Side face | Step shoulder | Straight slot

HM-2E



- For slot milling
- Very suitable for high speed cutting and dry cutting

Ordering number	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	D	d	H	L			
HM-2E-D1.0S	1.0	4	3	50	2	Picture 1	●
HM-2E-D1.5S	1.5	4	4	50	2	Picture 1	●
HM-2E-D2.0S	2.0	4	6	50	2	Picture 1	●
HM-2E-D2.5S	2.5	4	8	50	2	Picture 1	●
HM-2E-D3.0S	3.0	4	8	50	2	Picture 1	●
HM-2E-D4.0S	4.0	4	11	50	2	Picture 2	●
HM-2E-D1.0	1.0	6	3	50	2	Picture 1	●
HM-2E-D1.5	1.5	6	4	50	2	Picture 1	●
HM-2E-D2.0	2.0	6	6	50	2	Picture 1	●
HM-2E-D2.5	2.5	6	8	50	2	Picture 1	●
HM-2E-D3.0	3.0	6	8	50	2	Picture 1	●
HM-2E-D3.5	3.5	6	10	50	2	Picture 1	●
HM-2E-D4.0	4.0	6	11	50	2	Picture 1	●
HM-2E-D4.5	4.5	6	11	50	2	Picture 1	●
HM-2E-D5.0	5.0	6	13	50	2	Picture 1	●
HM-2E-D5.5	5.5	6	16	50	2	Picture 1	●
HM-2E-D6.0	6.0	6	16	50	2	Picture 2	●
HM-2E-D7.0	7.0	8	20	60	2	Picture 1	●
HM-2E-D8.0	8.0	8	20	60	2	Picture 2	●
HM-2E-D9.0	9.0	10	22	75	2	Picture 1	●
HM-2E-D10.0	10.0	10	25	75	2	Picture 2	●
HM-2E-D11.0	11.0	12	26	75	2	Picture 1	●
HM-2E-D12.0	12.0	12	30	75	2	Picture 2	●
HM-2E-D14.0	14.0	14	32	100	2	Picture 2	●
HM-2E-D16.0	16.0	16	45	100	2	Picture 2	●
HM-2E-D18.0	18.0	18	45	100	2	Picture 2	●
HM-2E-D20.0	20.0	20	45	100	2	Picture 2	●

● Stock available ○ Make-to-order

Applicable workpiece material table

○ Very suitable ○ Suitable

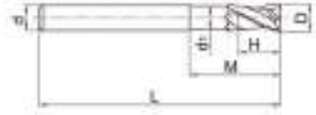
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel / Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
			○	○	○		○				

整体硬质合金立铣刀
SOLID CARBIDE END MILL

2-flute flattened end mills with long straight shank and short cutting edge

Side face | Step shoulder | Straight slot

HM-2EFP



- High-rigidity short cutting edge, suitable for heavy cutting and deep cavity milling

Ordering number	Basic dimension(mm)						Number of teeth Z	Stock
	D	d	H	M	d1	L		
HM-2EFP-D6.0	6.0	6	9	30	5.8	75	2	●
HM-2EFP-D8.0	8.0	8	12	40	7.8	100	2	●
HM-2EFP-D10.0	10.0	10	15	50	9.6	100	2	●
HM-2EFP-D12.0	12.0	12	18	50	11.5	100	2	●
HM-2EFP-D16.0	16.0	16	24	50	15.5	150	2	●
HM-2EFP-D20.0	20.0	20	30	60	19.5	150	2	●

● Stock available ○ Make-to-order

Applicable workpiece material table

○ Very suitable ○ Suitable

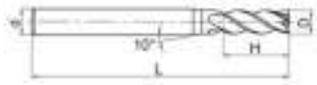
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel / Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
			○	○	○		○				

4-flute flattened end mills with straight shank

Side face | Step shoulder | Straight slot

HM-4E

Corner protection



Picture 1

Picture 2

- For side milling and shallow slot milling
- Very suitable for high speed cutting and dry cutting

Ordering number	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	D	d	H	L			
HM-4E-D1.0S	1.0	4	3	50	4	Picture 1	●
HM-4E-D1.5S	1.5	4	4	50	4	Picture 1	●
HM-4E-D2.0S	2.0	4	6	50	4	Picture 1	●
HM-4E-D2.5S	2.5	4	8	50	4	Picture 1	●
HM-4E-D3.0S	3.0	4	8	50	4	Picture 1	●
HM-4E-D4.0S	4.0	4	11	50	4	Picture 2	●
HM-4E-D1.0	1.0	6	3	50	4	Picture 1	●
HM-4E-D1.5	1.5	6	4	50	4	Picture 1	●
HM-4E-D2.0	2.0	6	6	50	4	Picture 1	●
HM-4E-D2.5	2.5	6	8	50	4	Picture 1	●
HM-4E-D3.0	3.0	6	8	50	4	Picture 1	●
HM-4E-D3.5	3.5	6	10	50	4	Picture 1	●
HM-4E-D4.0	4.0	6	11	50	4	Picture 1	●
HM-4E-D4.5	4.5	6	11	50	4	Picture 1	●
HM-4E-D5.0	5.0	6	13	50	4	Picture 1	●
HM-4E-D5.5	5.5	6	18	50	4	Picture 1	●
HM-4E-D6.0	6.0	6	16	50	4	Picture 2	●
HM-4E-D7.0	7.0	8	20	60	4	Picture 1	●
HM-4E-D8.0	8.0	8	20	60	4	Picture 2	●
HM-4E-D9.0	9.0	10	22	75	4	Picture 1	●
HM-4E-D10.0	10.0	10	25	75	4	Picture 2	●
HM-4E-D11.0	11.0	12	28	75	4	Picture 1	●
HM-4E-D12.0	12.0	12	30	75	4	Picture 2	●
HM-4E-D14.0	14.0	14	32	75	4	Picture 2	●
HM-4E-D16.0	16.0	16	45	100	4	Picture 2	●
HM-4E-D18.0	18.0	18	45	100	4	Picture 2	●
HM-4E-D20.0	20.0	20	45	100	4	Picture 2	●

● Stock available ○ Make-to-order

Applicable workpiece material table

○ Very suitable ○ Suitable

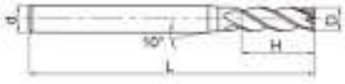
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel / Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
			○	○	○		○				

整体硬质合金立铣刀
SOLID CARBIDE END MILL

4-flute flattened end mills with straight shank and long cutting edge

Side face | Step shoulder | Straight slot

HM-4EL



Picture 1

Picture 2

- HM-4E series with long cutting edge

Ordering number	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	D	d	H	L			
HM-4EL-D3.0	3.0	6	12	75	4	Picture 1	●
HM-4EL-D4.0	4.0	6	15	75	4	Picture 1	●
HM-4EL-D5.0	5.0	6	20	75	4	Picture 1	●
HM-4EL-D6.0	6.0	6	20	75	4	Picture 2	●
HM-4EL-D8.0	8.0	8	25	100	4	Picture 2	●
HM-4EL-D10.0	10.0	10	30	100	4	Picture 2	●
HM-4EL-D12.0	12.0	12	35	100	4	Picture 2	●
HM-4EL-D14.0	14.0	14	40	100	4	Picture 2	●
HM-4EL-D16.0	16.0	16	50	150	4	Picture 2	●
HM-4EL-D20.0	20.0	20	55	150	4	Picture 2	●

● Stock available ○ Make-to-order

Applicable workpiece material table

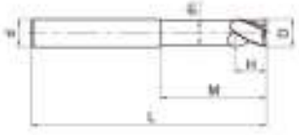
○ Very suitable ○ Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel / Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						

4-flute flattened end mills with straight shank, long neck and short cutting edge

Side face Step shoulder Straight slot

HM-4EFP



- High-rigidity short cutting edge, suitable for heavy cutting and deep cavity milling

45° AlTiN D D<12 0~-0.020 12<D 0~-0.030

Ordering number	Basic dimension(mm)						Number of teeth Z	Stock
	D	d	H	M	d1	L		
HM-4EFP-D6.0	6.0	6	9	30	5.8	75	4	●
HM-4EFP-D8.0	8.0	8	12	40	7.8	100	4	●
HM-4EFP-D10.0	10.0	10	15	50	9.8	100	4	●
HM-4EFP-D12.0	12.0	12	18	50	11.8	100	4	●
HM-4EFP-D16.0	16.0	16	24	50	15.5	150	4	●
HM-4EFP-D20.0	20.0	20	30	60	19.5	150	4	●

● Stock available ○ Make-to-order

Applicable workpiece material table ○Very suitable ○ Suitable

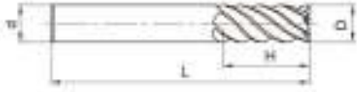
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel / Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
			○	○	○		○				

整体硬质合金立铣刀
SOLID CARBIDE END MILL

6-flute flattened end mills with straight shank

Side face Step shoulder Straight slot

HM-6E



- High tool rigidity reduce tool deflection in side milling
- Very suitable for high speed cutting and dry cutting

45° AlTiN D D<12 0~-0.020 12<D 0~-0.030

Ordering number	Basic dimension(mm)				Number of teeth Z	Stock
	D	d	H	L		
HM-6E-D6.0	6.0	6	18	60	6	●
HM-6E-D8.0	8.0	8	20	60	6	●
HM-6E-D10.0	10.0	10	30	75	6	●
HM-6E-D12.0	12.0	12	32	75	6	●
HM-6E-D16.0	16.0	16	40	100	6	●
HM-6E-D20.0	20.0	20	45	100	6	●

● Stock available ○ Make-to-order

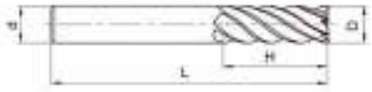
Applicable workpiece material table ○Very suitable ○ Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel / Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
			○	○	○		○				

6-flute flattened end mills with straight shank and long cutting edge

Side face | Step shoulder | Straight slot

HM-6EL



- HM-6E series with long cutting edge

45° | AlTiN | D<12 0~-0.025 12≤D 0~-0.032

Ordering number	Basic dimension(mm)				Number of teeth Z	Stock
	D	d	H	L		
HM-6EL-D6.0	6.0	6	24	75	6	●
HM-6EL-D8.0	8.0	8	32	75	6	●
HM-6EL-D10.0	10.0	10	40	100	6	●
HM-6EL-D12.0	12.0	12	45	100	6	●
HM-6EL-D16.0	16.0	16	54	150	6	●
HM-6EL-D20.0	20.0	20	75	150	6	●

● Stock available ○ Make-to-order

Applicable workpiece material table

○ Very suitable ○ Suitable

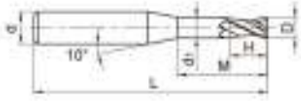
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel / Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
			○	○	○		○				

整体硬质合金立铣刀
SOLID CARBIDE END MILL

2-flute flattened end mills with straight shank, long neck and short cutting edge

Deep ball nose slot

HM-2EP



- Suitable for narrow slot milling or milling of fine parts that could generate

35° | AlTiN | D 3~4.016 | D<1mm | 1mm<D

Ordering number	Basic dimension(mm)						Number of teeth Z	Stock
	D	d	H	M	d1	L		
HM-2EP-D0.5-M04	0.5	4	0.7	4	0.45	50	2	●
HM-2EP-D0.5-M06	0.5	4	0.7	6	0.45	50	2	●
HM-2EP-D0.5-M08	0.5	4	0.7	8	0.45	50	2	●
HM-2EP-D0.8-M04	0.8	4	1.2	4	0.75	50	2	●
HM-2EP-D0.8-M06	0.8	4	1.2	6	0.75	50	2	●
HM-2EP-D0.8-M08	0.8	4	1.2	8	0.75	50	2	●
HM-2EP-D0.8-M10	0.8	4	1.2	10	0.75	50	2	●
HM-2EP-D1.0-M04	1.0	4	1.5	4	0.95	50	2	●
HM-2EP-D1.0-M06	1.0	4	1.5	6	0.95	50	2	●
HM-2EP-D1.0-M08	1.0	4	1.5	8	0.95	50	2	●
HM-2EP-D1.0-M10	1.0	4	1.5	10	0.95	50	2	●
HM-2EP-D1.0-M12	1.0	4	1.5	12	0.95	50	2	●
HM-2EP-D1.0-M14	1.0	4	1.5	14	0.95	50	2	●
HM-2EP-D1.2-M06	1.2	4	1.8	6	1.15	50	2	●
HM-2EP-D1.2-M08	1.2	4	1.8	8	1.15	50	2	●
HM-2EP-D1.2-M10	1.2	4	1.8	10	1.15	50	2	●
HM-2EP-D1.2-M12	1.2	4	1.8	12	1.15	50	2	●
HM-2EP-D1.5-M06	1.5	4	2.3	6	1.45	50	2	●
HM-2EP-D1.5-M08	1.5	4	2.3	8	1.45	50	2	●
HM-2EP-D1.5-M10	1.5	4	2.3	10	1.45	50	2	●
HM-2EP-D1.5-M12	1.5	4	2.3	12	1.45	50	2	●
HM-2EP-D1.5-M14	1.5	4	2.3	14	1.45	50	2	●
HM-2EP-D2.0-M06	2.0	4	3.0	6	1.95	50	2	●
HM-2EP-D2.0-M08	2.0	4	3.0	8	1.95	50	2	●
HM-2EP-D2.0-M10	2.0	4	3.0	10	1.95	50	2	●
HM-2EP-D2.0-M12	2.0	4	3.0	12	1.95	50	2	●

● Stock available ○ Make-to-order

Applicable workpiece material table

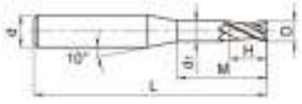
○ Very suitable ○ Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel / Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
			○	○	○		○				

2-flute flattened end mills with straight shank, long neck and short cutting edge

Deep ball nose slot

HM-2EP



- Suitable for narrow slot milling or milling of fine parts that could generate

Ordering number	Basic dimension(mm)						Number of teeth Z	Stock
	D	d	H	M	d1	L		
HM-2EP-D2.0-M14	2.0	4	3.0	14	1.85	50	2	●
HM-2EP-D2.0-M16	2.0	4	3.0	16	1.95	50	2	●
HM-2EP-D2.5-M08	2.5	4	3.7	8	2.4	50	2	●
HM-2EP-D2.5-M10	2.5	4	3.7	10	2.4	50	2	●
HM-2EP-D2.5-M12	2.5	4	3.7	12	2.4	50	2	●
HM-2EP-D2.5-M14	2.5	4	3.7	14	2.4	50	2	●
HM-2EP-D2.5-M16	2.5	4	3.7	16	2.4	60	2	●
HM-2EP-D2.5-M18	2.5	4	3.7	18	2.4	60	2	●
HM-2EP-D2.5-M20	2.5	4	3.7	20	2.4	60	2	●
HM-2EP-D3.0-M06	3.0	6	4.5	6	2.85	50	2	●
HM-2EP-D3.0-M08	3.0	6	4.5	8	2.85	50	2	●
HM-2EP-D3.0-M10	3.0	6	4.5	10	2.85	50	2	●
HM-2EP-D3.0-M12	3.0	6	4.5	12	2.85	50	2	●
HM-2EP-D3.0-M14	3.0	6	4.5	14	2.85	60	2	●
HM-2EP-D3.0-M16	3.0	6	4.5	16	2.85	60	2	●
HM-2EP-D3.0-M18	3.0	6	4.5	18	2.85	60	2	●
HM-2EP-D3.0-M20	3.0	6	4.5	20	2.85	60	2	●
HM-2EP-D4.0-M12	4.0	6	6.0	12	3.85	60	2	●
HM-2EP-D4.0-M16	4.0	6	6.0	16	3.85	60	2	●
HM-2EP-D4.0-M20	4.0	6	6.0	20	3.85	60	2	●
HM-2EP-D4.0-M25	4.0	6	6.0	25	3.85	60	2	●
HM-2EP-D5.0-M16	5.0	6	7.5	16	4.85	60	2	●
HM-2EP-D5.0-M25	5.0	6	7.5	25	4.85	70	2	●

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○ Suitable

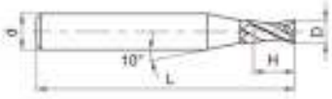
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel / Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
			○	◎	◎		○				

整体硬质合金立铣刀
SOLID CARBIDE END MILL

2-flute flattened end mills with straight shank and tiny diameter

Deep ball nose slot

HM-2ES



- milling cutter of the diameter of the tiny, it taken fully that the high speed machining center, the performance of high precision in electronic components and other precision parts processing commonly used.

Ordering number	Basic dimension(mm)				Number of teeth Z	Stock
	D	d	H	L		
HM-2ES-D0.3	0.3	4	0.6	50	2	●
HM-2ES-D0.4	0.4	4	0.8	50	2	●
HM-2ES-D0.5	0.5	4	1.0	50	2	●
HM-2ES-D0.6	0.6	4	1.2	50	2	●
HM-2ES-D0.7	0.7	4	1.4	50	2	●
HM-2ES-D0.8	0.8	4	1.6	50	2	●
HM-2ES-D0.9	0.9	4	1.8	50	2	●
HM-2ES-D1.0	1.0	4	2.0	50	2	●
HM-2ES-D1.1	1.1	4	2.0	50	2	●
HM-2ES-D1.2	1.2	4	2.5	50	2	●
HM-2ES-D1.3	1.3	4	2.5	50	2	●
HM-2ES-D1.4	1.4	4	3.0	50	2	●
HM-2ES-D1.5	1.5	4	3.0	50	2	●
HM-2ES-D1.6	1.6	4	3.5	50	2	●
HM-2ES-D1.7	1.7	4	3.5	50	2	●
HM-2ES-D1.8	1.8	4	4.0	50	2	●
HM-2ES-D1.9	1.9	4	4.0	50	2	●
HM-2ES-D2.0	2.0	4	4.0	50	2	●
HM-2ES-D2.1	2.1	4	4.0	50	2	●
HM-2ES-D2.2	2.2	4	4.5	50	2	●
HM-2ES-D2.3	2.3	4	4.5	50	2	●
HM-2ES-D2.4	2.4	4	5.0	50	2	●
HM-2ES-D2.5	2.5	4	5.0	50	2	●
HM-2ES-D2.6	2.6	4	5.0	50	2	●
HM-2ES-D2.7	2.7	4	5.5	50	2	●
HM-2ES-D2.8	2.8	4	5.5	50	2	●
HM-2ES-D2.9	2.9	4	6.0	50	2	●
HM-2ES-D3.0	3.0	4	6.0	50	2	●

● Stock available ○ Make-to-order

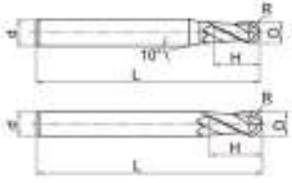
Applicable workpiece material table ◎Very suitable ○ Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel / Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
			○	◎	◎		○				

2-flute ball nose end mills with straight shank

Profile | Cavity | Ball nose slot

HM-2B



- Suit for profile milling
- The most suitable high-speed cutting and non-coolant cutting

Ordering number	Basic dimension(mm)					Number of teeth Z	Geometry	Stock
	D	R	d	H	L			
HM-2B-R0.5S	1.0	0.5	4	2	50	2	Picture 1	●
HM-2B-R0.75S	1.5	0.75	4	3	50	2	Picture 1	●
HM-2B-R1.0S	2.0	1.0	4	4	50	2	Picture 1	●
HM-2B-R1.25S	2.5	1.25	4	5	50	2	Picture 1	●
HM-2B-R1.5S	3.0	1.5	4	6	50	2	Picture 1	●
HM-2B-R2.0S	4.0	2.0	4	8	50	2	Picture 2	●
HM-2B-R0.5	1.0	0.5	6	2	50	2	Picture 1	●
HM-2B-R0.75	1.5	0.75	6	3	50	2	Picture 1	●
HM-2B-R1.0	2.0	1.0	6	4	50	2	Picture 1	●
HM-2B-R1.25	2.5	1.25	6	5	50	2	Picture 1	●
HM-2B-R1.5	3.0	1.5	6	6	50	2	Picture 1	●
HM-2B-R1.75	3.5	1.75	6	8	50	2	Picture 1	●
HM-2B-R2.0	4.0	2.0	6	8	50	2	Picture 1	●
HM-2B-R2.5	5.0	2.5	6	10	50	2	Picture 1	●
HM-2B-R2.75	5.5	2.75	6	12	50	2	Picture 1	●
HM-2B-R3.0	6.0	3.0	6	12	50	2	Picture 2	●
HM-2B-R3.5	7.0	3.5	8	14	60	2	Picture 1	●
HM-2B-R4.0	8.0	4.0	8	16	60	2	Picture 2	●
HM-2B-R4.5	9.0	4.5	10	18	75	2	Picture 1	●
HM-2B-R5.0	10.0	5.0	10	20	75	2	Picture 2	●
HM-2B-R6.0	12.0	6.0	12	24	75	2	Picture 2	●
HM-2B-R7.0	14.0	7.0	14	28	75	2	Picture 2	●
HM-2B-R8.0	16.0	8.0	16	32	100	2	Picture 2	●
HM-2B-R10.0	20.0	10.0	20	40	100	2	Picture 2	●

● Stock available ○ Make-to-order

Applicable workpiece material table

○ Very suitable ○ Suitable

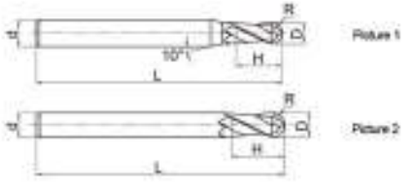
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel / Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
			○	○	○		○				

整体硬质合金立铣刀
SOLID CARBIDE END MILL

2-flute ball nose end mills with straight shank

Profile | Cavity | Ball nose slot

HM-2BL



- HM-2B with long shank

Ordering number	Basic dimension(mm)					Number of teeth Z	Geometry	Stock
	D	R	d	H	L			
HM-2BL-R1.0	2.0	1.0	6	4	75	2	Picture 1	●
HM-2BL-R1.25	2.5	1.25	6	6	75	2	Picture 1	●
HM-2BL-R1.5	3.0	1.5	6	6	75	2	Picture 1	●
HM-2BL-R1.75	3.5	1.75	6	8	75	2	Picture 1	●
HM-2BL-R2.0	4.0	2.0	6	8	75	2	Picture 1	●
HM-2BL-R2.5	5.0	2.5	6	10	75	2	Picture 1	●
HM-2BL-R2.75	5.5	2.75	6	12	75	2	Picture 1	●
HM-2BL-R3.0	6.0	3.0	6	12	75	2	Picture 2	●
HM-2BL-R3.5	7.0	3.5	8	14	75	2	Picture 1	●
HM-2BL-R4.0	8.0	4.0	8	16	100	2	Picture 2	●
HM-2BL-R4.5	9.0	4.5	10	18	100	2	Picture 1	●
HM-2BL-R5.0	10.0	5.0	10	20	100	2	Picture 2	●
HM-2BL-R6.0	12.0	6.0	12	24	100	2	Picture 2	●
HM-2BL-R7.0	14.0	7.0	14	28	100	2	Picture 2	●
HM-2BL-R8.0	16.0	8.0	16	32	150	2	Picture 2	●
HM-2BL-R10.0	20.0	10.0	20	40	150	2	Picture 2	●

● Stock available ○ Make-to-order

Applicable workpiece material table

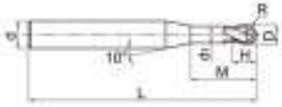
○ Very suitable ○ Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel / Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
			○	○	○		○				

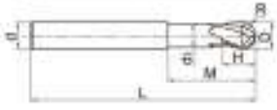
2-flute ball nose end mills with straight shank,long neck and short cutting edge

Profile | Cavity | Ball nose slot

HM-2BFP



Picture 1



Picture 2

- Short cutting edge and high rigidity designed,applicable for heavy cutting

Ordering number	Basic dimension(mm)							Number of teeth Z	Geometry	Stock
	D	R	H	d1	M	d	L			
HM-2BFP-R0.5	1.0	0.5	1	0.95	2.5	6	75	2	Picture 1	●
HM-2BFP-R0.75	1.5	0.75	1.5	1.45	3	6	75	2	Picture 1	●
HM-2BFP-R1.0	2.0	1.0	2	1.95	4	6	75	2	Picture 1	●
HM-2BFP-R1.5	3.0	1.5	3	2.85	6	6	75	2	Picture 1	●
HM-2BFP-R2.0	4.0	2.0	4	3.85	8	6	75	2	Picture 1	●
HM-2BFP-R2.5	5.0	2.5	5	4.85	10	6	75	2	Picture 1	●
HM-2BFP-R3.0	6.0	3.0	6	5.8	12	6	75	2	Picture 2	●
HM-2BFP-R4.0	8.0	4.0	8	7.8	16	8	100	2	Picture 2	●
HM-2BFP-R5.0	10.0	5.0	10	9.6	20	10	100	2	Picture 2	●
HM-2BFP-R6.0	12.0	6.0	12	11.5	24	12	100	2	Picture 2	●
HM-2BFP-R8.0	16.0	8.0	16	15.5	32	16	150	2	Picture 2	●
HM-2BFP-R10.0	20.0	10.0	20	19.5	40	20	150	2	Picture 2	●

● Stock available ○ Make-to-order

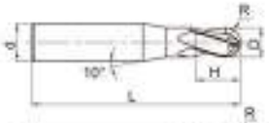
Applicable workpiece material table ○Very suitable ○ Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel / Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~65HRC						
			○	○	○		○				

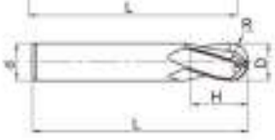
4-flute ball nose end mills with straight shank

Profile | Cavity | Ball nose slot

HM-4B



Picture 1



Picture 2

- 4-flute ball nose end mill can operate with higher feed speed and machining efficiency, extending tool life in machining high-hardness workpiece

Ordering number	Basic dimension(mm)					Number of teeth Z	Geometry	Stock
	D	R	d	H	L			
HM-4B-R1.5	3.0	1.5	6	6	50	4	Picture 1	●
HM-4B-R2.0	4.0	2.0	6	8	50	4	Picture 1	●
HM-4B-R2.5	5.0	2.5	6	10	50	4	Picture 1	●
HM-4B-R3.0	6.0	3.0	6	12	50	4	Picture 2	●
HM-4B-R4.0	8.0	4.0	8	16	50	4	Picture 2	●
HM-4B-R5.0	10.0	5.0	10	20	75	4	Picture 2	●
HM-4B-R6.0	12.0	6.0	12	24	75	4	Picture 2	●
HM-4B-R7.0	14.0	7.0	14	28	75	4	Picture 2	●
HM-4B-R8.0	16.0	8.0	16	32	100	4	Picture 2	●
HM-4B-R9.0	18.0	9.0	16	36	100	4	Picture 2	●
HM-4B-R10.0	20.0	10.0	20	40	100	4	Picture 2	●

● Stock available ○ Make-to-order

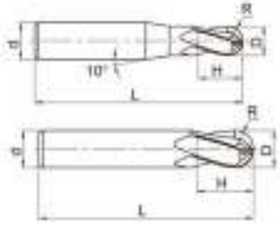
Applicable workpiece material table ○Very suitable ○ Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel / Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~65HRC						
			○	○	○		○				

4-flute ball nose end mills with straight shank and long shank

Profile | Cavity | Ball nose slot

HM-4BL



- The series of HM-4B for long shank

Ordering number	Basic dimension(mm)					Number of teeth Z	Geometry	Stock
	D	R	d	H	L			
HM-4BL-R1.5	3.0	1.5	6	6	75	4	Picture 1	○
HM-4BL-R2.0	4.0	2.0	6	8	75	4	Picture 1	○
HM-4BL-R2.5	5.0	2.5	6	10	75	4	Picture 1	○
HM-4BL-R3.0	6.0	3.0	6	12	75	4	Picture 2	○
HM-4BL-R4.0	8.0	4.0	8	16	100	4	Picture 2	○
HM-4BL-R5.0	10.0	5.0	10	20	100	4	Picture 2	○
HM-4BL-R6.0	12.0	6.0	12	24	100	4	Picture 2	○
HM-4BL-R7.0	14.0	7.0	14	28	100	4	Picture 2	○
HM-4BL-R8.0	16.0	8.0	16	32	150	4	Picture 2	○
HM-4BL-R9.0	18.0	9.0	18	36	150	4	Picture 2	○
HM-4BL-R10.0	20.0	10.0	20	40	150	4	Picture 2	○

● Stock available ○ Make-to-order

Applicable workpiece material table

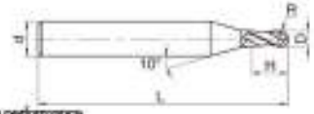
◎ Very suitable ○ Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel / Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
			○	◎	◎		○				

2-flute flattened ball nose end mills with straight shank and tiny diameter

Profile | Cavity | Ball nose slot

HM-2BS



- milling cutter of the diameter of the tiny, it taken fully that the high speed machining center, the performance of high precision in electronic components and other precision parts processing commonly used.

Ordering number	Basic dimension(mm)					Number of teeth Z	Stock
	D	R	d	H	L		
HM-2BS-R0.15	0.30	0.15	4	0.5	50	2	●
HM-2BS-R0.20	0.40	0.20	4	0.6	50	2	●
HM-2BS-R0.25	0.50	0.25	4	0.8	50	2	●
HM-2BS-R0.30	0.60	0.30	4	0.9	50	2	●
HM-2BS-R0.35	0.70	0.35	4	1.0	50	2	●
HM-2BS-R0.40	0.80	0.40	4	1.2	50	2	●
HM-2BS-R0.45	0.90	0.45	4	1.3	50	2	●
HM-2BS-R0.50	1.00	0.50	4	1.5	50	2	●
HM-2BS-R0.60	1.20	0.60	4	1.8	50	2	●
HM-2BS-R0.70	1.40	0.70	4	2.0	50	2	●
HM-2BS-R0.75	1.50	0.75	4	2.3	50	2	●
HM-2BS-R0.80	1.60	0.80	4	2.5	50	2	●
HM-2BS-R0.90	1.80	0.90	4	2.7	50	2	●
HM-2BS-R1.00	2.00	1.00	4	3.0	50	2	●
HM-2BS-R1.25	2.50	1.25	4	3.7	50	2	●
HM-2BS-R1.50	3.00	1.50	4	4.5	50	2	●

● Stock available ○ Make-to-order

Applicable workpiece material table

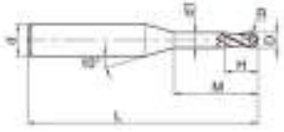
◎ Very suitable ○ Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel / Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
			○	◎	◎		○				

2-flute flattened ball nose end mills with straight shank, long neck and short cutting edge

Deep ball nose slot

HM-2BP



- Suit for Grooves and free-form surface machining

Ordering number	Basic dimension(mm)							Number of teeth Z	Stock
	D	R	H	d_1	M	d	L		
HM-2BP-R0.25-M04	0.5	0.25	0.7	0.45	4	4	50	2	●
HM-2BP-R0.25-M06	0.5	0.25	0.7	0.45	6	4	50	2	●
HM-2BP-R0.3-M04	0.6	0.3	0.9	0.55	4	4	50	2	●
HM-2BP-R0.3-M06	0.6	0.3	0.9	0.55	6	4	50	2	●
HM-2BP-R0.3-M08	0.6	0.3	0.9	0.55	8	4	50	2	●
HM-2BP-R0.4-M04	0.8	0.4	1.2	0.75	4	4	50	2	●
HM-2BP-R0.4-M06	0.8	0.4	1.2	0.75	6	4	50	2	●
HM-2BP-R0.4-M08	0.8	0.4	1.2	0.75	8	4	50	2	●
HM-2BP-R0.4-M10	0.8	0.4	1.2	0.75	10	4	50	2	●
HM-2BP-R0.5-M04	1.0	0.5	1.5	0.95	4	4	50	2	●
HM-2BP-R0.5-M06	1.0	0.5	1.5	0.95	6	4	50	2	●
HM-2BP-R0.5-M08	1.0	0.5	1.5	0.95	8	4	50	2	●
HM-2BP-R0.5-M10	1.0	0.5	1.5	0.95	10	4	50	2	●
HM-2BP-R0.5-M12	1.0	0.5	1.5	0.95	12	4	50	2	●
HM-2BP-R0.6-M06	1.2	0.6	1.8	1.15	6	4	50	2	●
HM-2BP-R0.6-M08	1.2	0.6	1.8	1.15	8	4	50	2	●
HM-2BP-R0.6-M12	1.2	0.6	1.8	1.15	12	4	50	2	●
HM-2BP-R0.6-M16	1.2	0.6	1.8	1.15	16	4	50	2	●
HM-2BP-R0.75-M08	1.5	0.75	2.3	1.45	8	4	50	2	●
HM-2BP-R0.75-M12	1.5	0.75	2.3	1.45	12	4	50	2	●
HM-2BP-R0.75-M16	1.5	0.75	2.3	1.45	16	4	50	2	●
HM-2BP-R1.0-M06	2.0	1.0	3.0	1.95	6	4	50	2	●
HM-2BP-R1.0-M08	2.0	1.0	3.0	1.95	8	4	50	2	●
HM-2BP-R1.0-M10	2.0	1.0	3.0	1.95	10	4	50	2	●
HM-2BP-R1.0-M12	2.0	1.0	3.0	1.95	12	4	50	2	●
HM-2BP-R1.0-M16	2.0	1.0	3.0	1.95	16	4	50	2	●
HM-2BP-R1.0-M20	2.0	1.0	3.0	1.95	20	4	50	2	●
HM-2BP-R1.25-M08	2.5	1.25	3.7	2.4	8	4	50	2	●
HM-2BP-R1.25-M12	2.5	1.25	3.7	2.4	12	4	50	2	●
HM-2BP-R1.25-M16	2.5	1.25	3.7	2.4	16	4	60	2	●
HM-2BP-R1.25-M20	2.5	1.25	3.7	2.4	20	4	60	2	●

● Stock available ○ Make-to-order

Applicable workpiece material table

○ Very suitable ○ Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel / Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
			○	○	○		○				

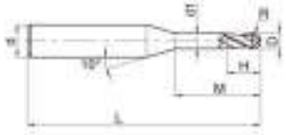
Graphics category and identification 85 Cutting parameters B117

整体硬质合金立铣刀
SOLID CARBIDE END MILL

2-flute flattened ball nose end mills with straight shank, long neck and short cutting edge

Deep ball nose slot

HM-2BP



- Suit for Grooves and free-form surface machining

Ordering number	Basic dimension(mm)							Number of teeth Z	Stock
	D	R	H	d_1	M	d	L		
HM-2BP-R1.5-M08	3.0	1.5	4.5	2.85	8	6	50	2	●
HM-2BP-R1.5-M10	3.0	1.5	4.5	2.85	10	6	50	2	●
HM-2BP-R1.5-M12	3.0	1.5	4.5	2.85	12	6	50	2	●
HM-2BP-R1.5-M16	3.0	1.5	4.5	2.85	16	6	60	2	●
HM-2BP-R1.5-M20	3.0	1.5	4.5	2.85	20	6	60	2	●
HM-2BP-R2.0-M10	4.0	2.0	6.0	3.85	10	6	60	2	●
HM-2BP-R2.0-M16	4.0	2.0	6.0	3.85	16	6	60	2	●
HM-2BP-R2.0-M20	4.0	2.0	6.0	3.85	20	6	60	2	●
HM-2BP-R2.0-M25	4.0	2.0	6.0	3.85	25	6	60	2	●
HM-2BP-R2.5-M16	5.0	2.5	7.5	4.85	16	6	60	2	●
HM-2BP-R2.5-M25	5.0	2.5	7.5	4.85	25	6	70	2	●

● Stock available ○ Make-to-order

Tool type: HM-2BP-R0.3-M08
Dimensions: R0.3mm
Workpiece material: S136(52HRC)
Rotating speed: 30000r/min
Feed speed: 200mm/min
Axial cutting depth: a_p=0.02mm
Radial cutting depth: a_e=0.04mm
Cutting style: contour machining(mould of car light)
Cooling system: air blow
Machine tool: MIKRON HSM 800

End mill	HM-2BP-R0.3-M08	Similar product of company A
Cutting time	300min	180min
Abrasion value	0.025mm	0.048mm

Abrasion condition

Applicable workpiece material table

○ Very suitable ○ Suitable

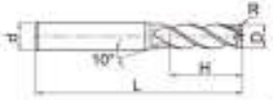
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel / Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
			○	○	○		○				

Graphics category and identification 85 Cutting parameters B118

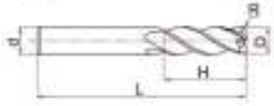
4-flute R end mills with straight shank

Radius shoulder | Profile | Radius corner slot

HM-4R



Picture 1



Picture 2

- Wide applications, applicable for several machining styles

Ordering number	Basic dimension(mm)					Number of teeth Z	Geometry	Stock
	D	R	d	H	L			
HM-4R-D3.0R0.2	3.0	0.2	4	8	50	4	Picture 1	●
HM-4R-D4.0R0.3	4.0	0.3	4	10	50	4	Picture 2	●
HM-4R-D4.0R0.5	4.0	0.5	4	10	50	4	Picture 2	●
HM-4R-D5.0R0.5	5.0	0.5	6	13	50	4	Picture 1	●
HM-4R-D5.0R1.0	5.0	1.0	6	13	50	4	Picture 1	●
HM-4R-D6.0R0.5	6.0	0.5	6	16	50	4	Picture 2	●
HM-4R-D6.0R1.0	6.0	1.0	6	16	50	4	Picture 2	●
HM-4R-D8.0R0.5	8.0	0.5	8	20	60	4	Picture 2	●
HM-4R-D8.0R1.0	8.0	1.0	8	20	60	4	Picture 2	●
HM-4R-D10.0R0.5	10.0	0.5	10	25	75	4	Picture 2	●
HM-4R-D10.0R1.0	10.0	1.0	10	25	75	4	Picture 2	●
HM-4R-D10.0R2.0	10.0	2.0	10	25	75	4	Picture 2	●
HM-4R-D10.0R3.0	10.0	3.0	10	25	75	4	Picture 2	●
HM-4R-D12.0R0.5	12.0	0.5	12	30	75	4	Picture 2	●
HM-4R-D12.0R1.0	12.0	1.0	12	30	75	4	Picture 2	●
HM-4R-D12.0R2.0	12.0	2.0	12	30	75	4	Picture 2	●
HM-4R-D12.0R3.0	12.0	3.0	12	30	75	4	Picture 2	●

● Stock available ○ Make-to-order

Applicable workpiece material table

○ Very suitable ○ Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel / Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
			○	○	○		○				

整体硬质合金立铣刀
SOLID CARBIDE END MILL

4-flute R end mills with straight shank and short cutting edge.

Radius shoulder | Profile | Radius corner slot

HM-4RF

- The design of short cutting edge with high rigidity roughing feed for High speed cutting can be performed.

Ordering number	Basic dimension(mm)					Number of teeth Z	Stock
	D	R	d	H	L		
HM-4RF-D6.0R0.5	6.0	0.5	6	6	50	4	●
HM-4RF-D6.0R1.0	6.0	1.0	6	6	50	4	●
HM-4RF-D8.0R0.5	8.0	0.5	8	8	60	4	●
HM-4RF-D8.0R1.0	8.0	1.0	8	8	60	4	●
HM-4RF-10.0R0.5	10.0	0.5	10	10	75	4	●
HM-4RF-D10.0R1.0	10.0	1.0	10	10	75	4	●
HM-4RF-D10.0R2.0	10.0	2.0	10	10	75	4	●
HM-4RF-D12.0R0.5	12.0	0.5	12	12	75	4	●
HM-4RF-D12.0R1.0	12.0	1.0	12	12	75	4	●
HM-4RF-D12.0R2.0	12.0	2.0	12	12	75	4	●

● Stock available ○ Make-to-order

Applicable workpiece material table

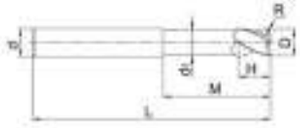
○ Very suitable ○ Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel / Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
			○	○	○		○				

4-flute R end mills with straight shank,long neck and short cutting edge

Radius shoulder | Profile | Radius corner slot

HM-4RP



- The design of Long shank with short cutting edge,suit for deep cavity milling.

Ordering number	Basic dimension(mm)							Number of teeth Z	Stock
	D	R	d	d1	H	M	L		
HM-4RP-D6.0R0.5	6.0	0.5	6	5.8	6	18	75	4	●
HM-4RP-D6.0R1.0	6.0	1.0	6	5.8	6	18	75	4	●
HM-4RP-D8.0R0.5	8.0	0.5	8	7.8	8	24	100	4	●
HM-4RP-D8.0R1.0	8.0	1.0	8	7.8	8	24	100	4	●
HM-4RP-10.0R0.5	10.0	0.5	10	9.6	10	30	100	4	●
HM-4RP-10.0R1.0	10.0	1.0	10	9.6	10	30	100	4	●
HM-4RP-10.0R2.0	10.0	2.0	10	9.6	10	30	100	4	●
HM-4RP-12.0R0.5	12.0	0.5	12	11.5	12	38	100	4	●
HM-4RP-12.0R1.0	12.0	1.0	12	11.5	12	38	100	4	●
HM-4RP-12.0R2.0	12.0	2.0	12	11.5	12	38	100	4	●
HM-4RP-D16.0R1.0	16.0	1.0	16	15.5	16	40	150	4	●
HM-4RP-D16.0R2.0	16.0	2.0	16	15.5	16	40	150	4	●

● Stock available ○ Make-to-order

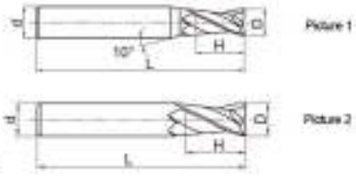
Applicable workpiece material table ○Very suitable ○ Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel / Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
			○	○	○		○				

2-flute flattened end mills with straight shank

Side face | Step shoulder | Straight slot

NM-2E



- The most suitable groove milling
- Sharp cutting edges,Can achieve higher surface treatment

Ordering number	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	D	d	H	L			
NM-2E-D1.0	1.0	4	3	50	2	Picture 1	○
NM-2E-D2.0	2.0	4	6	50	2	Picture 1	○
NM-2E-D3.0	3.0	6	8	50	2	Picture 1	○
NM-2E-D4.0	4.0	6	11	50	2	Picture 1	○
NM-2E-D5.0	5.0	6	13	50	2	Picture 1	○
NM-2E-D6.0	6.0	6	16	50	2	Picture 2	○
NM-2E-D8.0	8.0	8	20	60	2	Picture 2	○
NM-2E-D10.0	10.0	10	25	75	2	Picture 2	○
NM-2E-D12.0	12.0	12	30	75	2	Picture 2	○

● Stock available ○ Make-to-order

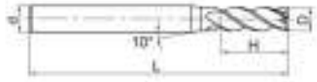
Applicable workpiece material table ○Very suitable ○ Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel / Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
								○	○		

4-flute flattened end mills with straight shank

Side face | Step shoulder | Straight slot

NM-4E



Picture 1

Picture 2

- Long cutting edge,suit for Fine milling of copper electrode side face.

Ordering number	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	D	d	H	L			
NM-4E-D3.0	3.0	6	5	50	4	Picture 1	○
NM-4E-D4.0	4.0	6	11	50	4	Picture 1	○
NM-4E-D5.0	5.0	6	13	50	4	Picture 1	○
NM-4E-D6.0	6.0	6	16	50	4	Picture 2	○
NM-4E-D8.0	8.0	8	20	60	4	Picture 2	○
NM-4E-D10.0	10.0	10	25	75	4	Picture 2	○
NM-4E-D12.0	12.0	12	30	75	4	Picture 2	○

● Stock available ○ Make-to-order

Applicable workpiece material table ○Very suitable ○ Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel / Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~58HRC						
								○	○		

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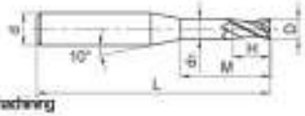
SOLID CARBIDE END MILL

2-flute flattened end mills with straight shank, long neck and short cutting edge

Deep ball nose slot

NM-2EP



- With long neck and short cutting edge.Can avoid the problem that cutter interference of deep cavity machining

Ordering number	Basic dimension(mm)						Number of teeth Z	Stock
	D	d	H	M	d1	L		
NM-2EP-D0.5-M04	0.5	4	0.7	4	0.45	50	2	○
NM-2EP-D0.5-M06	0.5	4	0.7	6	0.45	50	2	○
NM-2EP-D0.5-M08	0.5	4	0.7	8	0.45	50	2	○
NM-2EP-D0.8-M04	0.8	4	1.2	4	0.75	50	2	○
NM-2EP-D0.8-M06	0.8	4	1.2	6	0.75	50	2	○
NM-2EP-D0.8-M08	0.8	4	1.2	8	0.75	50	2	○
NM-2EP-D0.8-M10	0.8	4	1.2	10	0.75	50	2	○
NM-2EP-D1.0-M04	1.0	4	1.5	4	0.95	50	2	○
NM-2EP-D1.0-M06	1.0	4	1.5	6	0.95	50	2	○
NM-2EP-D1.0-M08	1.0	4	1.5	8	0.95	50	2	○
NM-2EP-D1.0-M10	1.0	4	1.5	10	0.95	50	2	○
NM-2EP-D1.0-M12	1.0	4	1.5	12	0.95	50	2	○
NM-2EP-D1.0-M14	1.0	4	1.5	14	0.95	50	2	○
NM-2EP-D1.5-M08	1.5	4	2.3	8	1.45	50	2	○
NM-2EP-D1.5-M16	1.5	4	2.3	16	1.45	50	2	○
NM-2EP-D2.0-M06	2.0	4	3.0	6	1.95	50	2	○
NM-2EP-D2.0-M08	2.0	4	3.0	8	1.95	50	2	○
NM-2EP-D2.0-M10	2.0	4	3.0	10	1.95	50	2	○
NM-2EP-D2.0-M12	2.0	4	3.0	12	1.95	50	2	○
NM-2EP-D2.0-M14	2.0	4	3.0	14	1.95	50	2	○
NM-2EP-D2.0-M16	2.0	4	3.0	16	1.95	50	2	○
NM-2EP-D2.5-M10	2.5	4	3.7	10	2.4	50	2	○
NM-2EP-D2.5-M20	2.5	4	3.7	20	2.4	60	2	○
NM-2EP-D3.0-M10	3.0	6	4.5	10	2.85	50	2	○
NM-2EP-D3.0-M20	3.0	6	4.5	20	2.85	60	2	○
NM-2EP-D4.0-M16	4.0	6	6.0	16	3.85	60	2	○
NM-2EP-D4.0-M25	4.0	6	6.0	25	3.85	60	2	○
NM-2EP-D5.0-M16	5.0	6	7.5	16	4.85	60	2	○
NM-2EP-D5.0-M25	5.0	6	7.5	25	4.85	70	2	○

● Stock available ○ Make-to-order

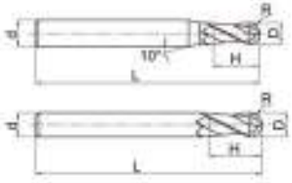
Applicable workpiece material table ○Very suitable ○ Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel / Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~58HRC						
								○	○		

2-flute ball nose end mills with straight shank

Profile | Cavity | Ball nose slot

NM-2B



- Suit for profile milling ,the surface treatment of workpiece is very good.

35° | CrN | D h-0.020 | R R:0.01

Ordering number	Basic dimension(mm)					Number of teeth Z	Geometry	Stock
	D	R	d	H	L			
NM-2B-R0.5	1.0	0.5	4	2	50	2	Picture 1	○
NM-2B-R0.75	1.5	0.75	4	3	50	2	Picture 1	○
NM-2B-R1.0	2.0	1.0	4	4	50	2	Picture 1	○
NM-2B-R1.25	2.5	1.25	4	5	50	2	Picture 1	○
NM-2B-R1.5	3.0	1.5	6	6	50	2	Picture 1	○
NM-2B-R1.75	3.5	1.75	6	8	50	2	Picture 1	○
NM-2B-R2.0	4.0	2.0	6	8	50	2	Picture 1	○
NM-2B-R2.5	5.0	2.5	6	10	50	2	Picture 1	○
NM-2B-R3.0	6.0	3.0	6	12	50	2	Picture 2	○
NM-2B-R4.0	8.0	4.0	8	16	60	2	Picture 2	○
NM-2B-R5.0	10.0	5.0	10	20	75	2	Picture 2	○
NM-2B-R6.0	12.0	6.0	12	24	75	2	Picture 2	○

● Stock available ○ Make-to-order

Applicable workpiece material table

○ Very suitable ○ Suitable

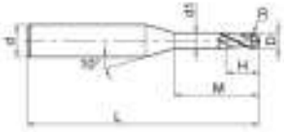
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel / Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
								○	○		

整体硬质合金立铣刀
SOLID CARBIDE END MILL

2-flute ball nose end mills with straight shank, long neck and short cutting edge

Deep ball nose slot

NM-2BP



- Suit for three dimensional processing of copper electrode

35° | CrN | D h-0.015 | R R:0.005 R:0.5 R:0.01 R:0.8

Ordering number	Basic dimension(mm)							Number of teeth Z	Stock
	D	R	H	d1	M	d	L		
NM-2BP-R0.25-M04	0.5	0.25	0.7	0.45	4	4	50	2	○
NM-2BP-R0.25-M06	0.5	0.25	0.7	0.45	6	4	50	2	○
NM-2BP-R0.3-M04	0.6	0.3	0.9	0.55	4	4	50	2	○
NM-2BP-R0.3-M06	0.6	0.3	0.9	0.55	6	4	50	2	○
NM-2BP-R0.3-M08	0.6	0.3	0.9	0.55	8	4	50	2	○
NM-2BP-R0.4-M04	0.8	0.4	1.2	0.75	4	4	50	2	○
NM-2BP-R0.4-M06	0.8	0.4	1.2	0.75	6	4	50	2	○
NM-2BP-R0.4-M08	0.8	0.4	1.2	0.75	8	4	50	2	○
NM-2BP-R0.4-M10	0.8	0.4	1.2	0.75	10	4	50	2	○
NM-2BP-R0.5-M04	1.0	0.5	1.5	0.95	4	4	50	2	○
NM-2BP-R0.5-M06	1.0	0.5	1.5	0.95	6	4	50	2	○
NM-2BP-R0.5-M08	1.0	0.5	1.5	0.95	8	4	50	2	○
NM-2BP-R0.5-M10	1.0	0.5	1.5	0.95	10	4	50	2	○
NM-2BP-R0.5-M12	1.0	0.5	1.5	0.95	12	4	50	2	○
NM-2BP-R0.75-M08	1.5	0.75	2.3	1.45	8	4	50	2	○
NM-2BP-R0.75-M16	1.5	0.75	2.3	1.45	16	4	50	2	○
NM-2BP-R1.0-M06	2.0	1.0	3.0	1.95	6	4	50	2	○
NM-2BP-R1.0-M08	2.0	1.0	3.0	1.95	8	4	50	2	○
NM-2BP-R1.0-M10	2.0	1.0	3.0	1.95	10	4	50	2	○
NM-2BP-R1.0-M12	2.0	1.0	3.0	1.95	12	4	50	2	○
NM-2BP-R1.0-M16	2.0	1.0	3.0	1.95	16	4	50	2	○
NM-2BP-R1.0-M20	2.0	1.0	3.0	1.95	20	4	60	2	○
NM-2BP-R1.5-M10	3.0	1.5	4.5	2.85	10	6	50	2	○
NM-2BP-R1.5-M20	3.0	1.5	4.5	2.85	20	6	60	2	○
NM-2BP-R2.0-M10	4.0	2.0	6.0	3.85	10	6	60	2	○
NM-2BP-R2.0-M16	4.0	2.0	6.0	3.85	16	6	60	2	○
NM-2BP-R2.0-M20	4.0	2.0	6.0	3.85	20	6	60	2	○
NM-2BP-R2.0-M25	4.0	2.0	6.0	3.85	25	6	60	2	○
NM-2BP-R2.5-M16	5.0	2.5	7.5	4.85	16	6	60	2	○
NM-2BP-R2.5-M25	5.0	2.5	7.5	4.85	25	6	70	2	○

● Stock available ○ Make-to-order

Applicable workpiece material table

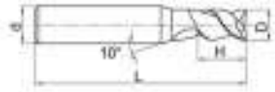
○ Very suitable ○ Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel / Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
								○	○		

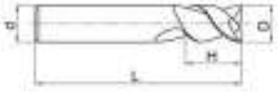
2-flute flattened end mills with straight shank

Side face | Step shoulder | Straight slot

AL-2E



Picture 1



Picture 2

- good chip removal performance,high machining efficiency.

55° | D: D<=12 0~-0.020; 12<D 0~-0.030

Ordering number	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	D	d	H	L			
AL-2E-D1.0	1.0	4	3	50	2	Picture 1	●
AL-2E-D1.5	1.5	4	4	50	2	Picture 1	●
AL-2E-D2.0	2.0	4	6	50	2	Picture 1	●
AL-2E-D2.5	2.5	4	7	50	2	Picture 1	●
AL-2E-D3.0	3.0	6	9	50	2	Picture 1	●
AL-2E-D4.0	4.0	6	12	50	2	Picture 1	●
AL-2E-D5.0	5.0	6	15	50	2	Picture 1	●
AL-2E-D6.0	6.0	6	18	60	2	Picture 2	●
AL-2E-D8.0	8.0	8	20	60	2	Picture 2	●
AL-2E-D10.0	10.0	10	30	75	2	Picture 2	●
AL-2E-D12.0	12.0	12	32	75	2	Picture 2	●
AL-2E-D16.0	16.0	16	45	100	2	Picture 2	●
AL-2E-D20.0	20.0	20	45	100	2	Picture 2	●

● Stock available ○ Make-to-order

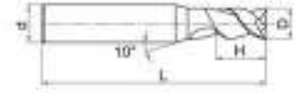
Applicable workpiece material table ○Very suitable ○ Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel / Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
									○		

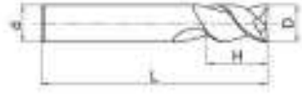
2-flute flattened end mills with straight shank

Side face | Step shoulder | Straight slot

AL-2EL



Picture 1



Picture 2

- Suit for profile milling ,the surface treatment of workpiece is very good.

55° | D: D<=12 0~-0.020; 12<D 0~-0.030

Ordering number	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	D	d	H	L			
AL-2EL-D3.0	3.0	6	12	60	2	Picture 1	●
AL-2EL-D4.0	4.0	6	16	60	2	Picture 1	●
AL-2EL-D5.0	5.0	6	20	60	2	Picture 1	●
AL-2EL-D6.0	6.0	6	25	75	2	Picture 2	●
AL-2EL-D8.0	8.0	8	32	75	2	Picture 2	●
AL-2EL-D10.0	10.0	10	45	100	2	Picture 2	●
AL-2EL-D12.0	12.0	12	45	100	2	Picture 2	●
AL-2EL-D16.0	16.0	16	65	150	2	Picture 2	●
AL-2EL-D20.0	20.0	20	75	150	2	Picture 2	●

● Stock available ○ Make-to-order

Applicable workpiece material table ○Very suitable ○ Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel / Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
									○		

3-flattdened end mills with straight shank

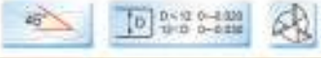
Side face | Step shoulder | Straight slot

AL-3E

Picture 1

Picture 2

- Outstanding cutting performance with no chattering,achieving high precision machining



Ordering number	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	D	d	H	L			
AL-3E-D1.0	1.0	4	3	50	3	Picture 1	●
AL-3E-D1.5	1.5	4	4	50	3	Picture 1	●
AL-3E-D2.0	2.0	4	6	50	3	Picture 1	●
AL-3E-D2.5	2.5	4	7	50	3	Picture 1	●
AL-3E-D3.0	3.0	6	9	50	3	Picture 1	●
AL-3E-D4.0	4.0	6	12	50	3	Picture 1	●
AL-3E-D5.0	5.0	6	15	50	3	Picture 1	●
AL-3E-D6.0	6.0	6	18	60	3	Picture 2	●
AL-3E-D8.0	8.0	8	20	60	3	Picture 2	●
AL-3E-D10.0	10.0	10	30	75	3	Picture 2	●
AL-3E-D12.0	12.0	12	32	75	3	Picture 2	●
AL-3E-D16.0	16.0	16	45	100	3	Picture 2	●
AL-3E-D20.0	20.0	20	45	100	3	Picture 2	●

● Stock available ○ Make-to-order

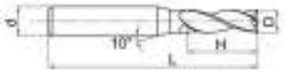
Applicable workpiece material table ○Very suitable ○ Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel / Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
									○		

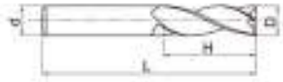
3-flute flattened end mills with straight shank and long cutting edge

Side face | Step shoulder | Straight slot

AL-3EL



Picture 1



Picture 2

- AL-3E series with long cutting edge

Ordering number	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	D	d	H	L			
AL-3EL-D3.0	3.0	6	12	60	3	Picture 1	●
AL-3EL-D4.0	4.0	6	16	60	3	Picture 1	●
AL-3EL-D5.0	5.0	6	20	60	3	Picture 1	●
AL-3EL-D6.0	6.0	6	25	75	3	Picture 2	●
AL-3EL-D8.0	8.0	8	32	75	3	Picture 2	●
AL-3EL-D10.0	10.0	10	45	100	3	Picture 2	●
AL-3EL-D12.0	12.0	12	45	100	3	Picture 2	●
AL-3EL-D16.0	16.0	16	65	150	3	Picture 2	●
AL-3EL-D20.0	20.0	20	75	150	3	Picture 2	●

● Stock available ○ Make-to-order

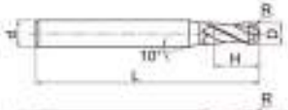
Applicable workpiece material table ○Very suitable ○ Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel / Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
									○		

2-flute ball nose end mills with straight shank

Profile | Cavity | Ball nose slot

AL-2B



Picture 1

Picture 2

- For profile milling of AL alloy

Ordering number	Basic dimension(mm)					Number of teeth Z	Geometry	Stock
	D	R	d	H	L			
AL-2B-R1.0	2.0	1.0	6	4	60	2	Picture 1	●
AL-2B-R1.5	3.0	1.5	6	6	60	2	Picture 1	●
AL-2B-R2.0	4.0	2.0	6	8	60	2	Picture 1	●
AL-2B-R2.5	5.0	2.5	6	10	60	2	Picture 1	●
AL-2B-R3.0	6.0	3.0	6	12	60	2	Picture 2	●
AL-2B-R4.0	8.0	4.0	8	16	75	2	Picture 2	●
AL-2B-R5.0	10.0	5.0	10	20	75	2	Picture 2	●
AL-2B-R6.0	12.0	6.0	12	24	75	2	Picture 2	●

● Stock available ○ Make-to-order

Applicable workpiece material table ○ Very suitable ◐ Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel / Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
									○		

3-flute flattened end mills with straight shank and corrugated edges

Side face | Step shoulder | Straight slot

AL-3W

- For rough machining of alloy

Ordering number	Basic dimension(mm)				Number of teeth Z	Stock
	D	d	H	L		
AL-3W-D6.0	6.0	6	16	50	3	●
AL-3W-D8.0	8.0	8	20	60	3	●
AL-3W-D10.0	10.0	10	25	75	3	●
AL-3W-D12.0	12.0	12	30	75	3	●
AL-3W-D16.0	16.0	16	45	100	3	●
AL-3W-D20.0	20.0	20	45	100	3	●

● Stock available ○ Make-to-order

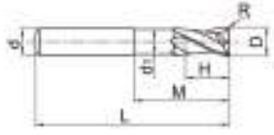
Applicable workpiece material table ○ Very suitable ◐ Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel / Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
									○		

2-flute circle arc end mills with straight shank

Radius shoulder | Profile | Radius corner slot

Ultra-high speed type **AL-2R-AIR**



- Suit for machining High-speed milling for Aluminum workpiece

Ordering number	Basic dimension(mm)							Number of teeth Z	Stock
	D	R	d	d1	H	M	L		
AL-2R-D6.0R1.0- AIR	6.0	1.0	6	5.5	7	20	57	2	○
AL-2R-D8.0R1.0- AIR	8.0	1.0	8	7.4	9	26	63	2	○
AL-2R-D10.0R1.0- AIR	10.0	1.0	10	9.2	11	31	72	2	○
AL-2R-D10.0R2.0- AIR	10.0	2.0	10	9.2	11	31	72	2	○
AL-2R-D12.0R1.0- AIR	12.0	1.0	12	11.0	12	37	83	2	○
AL-2R-D12.0R2.0- AIR	12.0	2.0	12	11.0	12	37	83	2	○
AL-2R-D12.0R3.0- AIR	12.0	3.0	12	11.0	12	37	83	2	○
AL-2R-D16.0R1.0- AIR	16.0	1.0	16	15.0	16	43	92	2	○
AL-2R-D16.0R2.0- AIR	16.0	2.0	16	15.0	16	43	92	2	○
AL-2R-D16.0R3.0- AIR	16.0	3.0	16	15.0	16	43	92	2	○
AL-2R-D16.0R4.0- AIR	16.0	4.0	16	15.0	16	43	92	2	○
AL-2R-D20.0R1.0- AIR	20.0	1.0	20	19.0	20	53	104	2	○
AL-2R-D20.0R2.0- AIR	20.0	2.0	20	19.0	20	53	104	2	○
AL-2R-D20.0R3.0- AIR	20.0	3.0	20	19.0	20	53	104	2	○
AL-2R-D20.0R4.0- AIR	20.0	4.0	20	19.0	20	53	104	2	○
AL-2R-D20.0R5.0- AIR	20.0	5.0	20	19.0	20	53	104	2	○
AL-2R-D20.0R6.0- AIR	20.0	6.0	20	19.0	20	53	104	2	○

● Stock available ○ Make-to-order

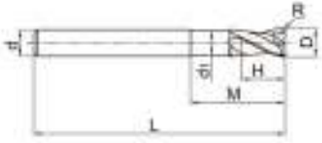
Applicable workpiece material table ○Very suitable ○ Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel / Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
									○		

2-flute circle arc end mills with straight shank and long shank

Radius shoulder | Profile | Radius corner slot

Ultra-high speed type **AL-2RL-AIR**



- Suit for machining High-speed milling for Aluminum workpiece

Ordering number	Basic dimension(mm)							Number of teeth Z	Stock
	D	R	d	d1	H	M	L		
AL-2RL-D6.0R1.0- AIR	6.0	1.0	6	5.5	7	43	80	2	○
AL-2RL-D8.0R1.0- AIR	8.0	1.0	8	7.4	9	53	90	2	○
AL-2RL-D10.0R1.0- AIR	10.0	1.0	10	9.2	11	59	100	2	○
AL-2RL-D10.0R2.0- AIR	10.0	2.0	10	9.2	11	59	100	2	○
AL-2RL-D12.0R1.0- AIR	12.0	1.0	12	11.0	12	74	120	2	○
AL-2RL-D12.0R2.0- AIR	12.0	2.0	12	11.0	12	74	120	2	○
AL-2RL-D12.0R3.0- AIR	12.0	3.0	12	11.0	12	74	120	2	○
AL-2RL-D16.0R1.0- AIR	16.0	1.0	16	15.0	16	84	140	2	○
AL-2RL-D16.0R2.0- AIR	16.0	2.0	16	15.0	16	84	140	2	○
AL-2RL-D16.0R3.0- AIR	16.0	3.0	16	15.0	16	84	140	2	○
AL-2RL-D16.0R4.0- AIR	16.0	4.0	16	15.0	16	84	140	2	○
AL-2RL-D20.0R1.0- AIR	20.0	1.0	20	19.0	20	89	140	2	○
AL-2RL-D20.0R2.0- AIR	20.0	2.0	20	19.0	20	89	140	2	○
AL-2RL-D20.0R3.0- AIR	20.0	3.0	20	19.0	20	89	140	2	○
AL-2RL-D20.0R4.0- AIR	20.0	4.0	20	19.0	20	89	140	2	○
AL-2RL-D20.0R5.0- AIR	20.0	5.0	20	19.0	20	89	140	2	○
AL-2RL-D20.0R6.0- AIR	20.0	6.0	20	19.0	20	89	140	2	○

● Stock available ○ Make-to-order

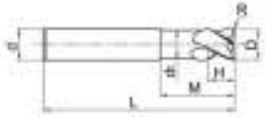
Applicable workpiece material table ○Very suitable ○ Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel / Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
									○		

3-flute circle arc end mills with straight shank

Radius shoulder | Profile | Radius corner slot

Ultra-high speed type **AL-3R-AIR**



- Suit for machining High-speed milling for Aluminum workpiece

Ordering number	Basic dimension(mm)							Number of teeth Z	Stock
	D	R	d	d1	H	M	L		
AL-3R-D12.0R1.0- AIR	12.0	1.0	12	11.0	12	37	83	3	○
AL-3R-D12.0R2.0- AIR	12.0	2.0	12	11.0	12	37	83	3	○
AL-3R-D12.0R3.0- AIR	12.0	3.0	12	11.0	12	37	83	3	○
AL-3R-D16.0R1.0- AIR	16.0	1.0	16	15.0	16	43	92	3	○
AL-3R-D16.0R2.0- AIR	16.0	2.0	16	15.0	16	43	92	3	○
AL-3R-D16.0R3.0- AIR	16.0	3.0	16	15.0	16	43	92	3	○
AL-3R-D16.0R4.0- AIR	16.0	4.0	16	15.0	16	43	92	3	○
AL-3R-D20.0R1.0- AIR	20.0	1.0	20	19.0	20	53	104	3	○
AL-3R-D20.0R2.0- AIR	20.0	2.0	20	19.0	20	53	104	3	○
AL-3R-D20.0R3.0- AIR	20.0	3.0	20	19.0	20	53	104	3	○
AL-3R-D20.0R4.0- AIR	20.0	4.0	20	19.0	20	53	104	3	○
AL-3R-D20.0R5.0- AIR	20.0	5.0	20	19.0	20	53	104	3	○
AL-3R-D20.0R6.0- AIR	20.0	6.0	20	19.0	20	53	104	3	○

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○ Suitable

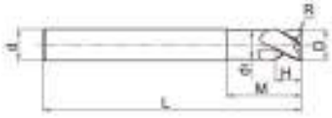
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel / Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
									◎		

整体硬质合金立铣刀
SOLID CARBIDE END MILL

3-flute circle arc end mills with straight shank and long shank

Radius shoulder | Profile | Radius corner slot

Ultra-high speed type **AL-3RL-AIR**



- Suit for machining High-speed milling for Aluminum workpiece

Ordering number	Basic dimension(mm)							Number of teeth Z	Stock
	D	R	d	d1	H	M	L		
AL-3RL-D12.0R1.0- AIR	12.0	1.0	12	11.0	12	74	120	3	○
AL-3RL-D12.0R2.0- AIR	12.0	2.0	12	11.0	12	74	120	3	○
AL-3RL-D12.0R3.0- AIR	12.0	3.0	12	11.0	12	74	120	3	○
AL-3RL-D16.0R1.0- AIR	16.0	1.0	16	15.0	16	84	140	3	○
AL-3RL-D16.0R2.0- AIR	16.0	2.0	16	15.0	16	84	140	3	○
AL-3RL-D16.0R3.0- AIR	16.0	3.0	16	15.0	16	84	140	3	○
AL-3RL-D16.0R4.0- AIR	16.0	4.0	16	15.0	16	84	140	3	○
AL-3RL-D20.0R1.0- AIR	20.0	1.0	20	19.0	20	89	140	3	○
AL-3RL-D20.0R2.0- AIR	20.0	2.0	20	19.0	20	89	140	3	○
AL-3RL-D20.0R3.0- AIR	20.0	3.0	20	19.0	20	89	140	3	○
AL-3RL-D20.0R4.0- AIR	20.0	4.0	20	19.0	20	89	140	3	○
AL-3RL-D20.0R5.0- AIR	20.0	5.0	20	19.0	20	89	140	3	○
AL-3RL-D20.0R6.0- AIR	20.0	6.0	20	19.0	20	89	140	3	○

● Stock available ○ Make-to-order

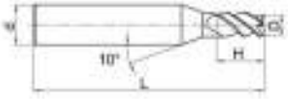
Applicable workpiece material table ◎Very suitable ○ Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel / Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
									◎		

3-flute flattened end mills with straight shank

Side face | Step shoulder | Straight slot

SM-3E



Picture 1

Picture 2

- Large helical angle, for machining of hard-to-cut materials such as Austenite stainless steel, heat-resistant alloy, etc.

45° | AlTiN | D: D<12 0~-0.020; 12<D 0~-0.030

Ordering number	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	D	d	H	L			
SM-3E-D3.0	3.0	6	8	50	3	Picture 1	○
SM-3E-D4.0	4.0	6	11	50	3	Picture 1	○
SM-3E-D5.0	5.0	6	13	50	3	Picture 1	○
SM-3E-D6.0	6.0	6	16	50	3	Picture 2	○
SM-3E-D7.0	7.0	8	20	60	3	Picture 1	○
SM-3E-D8.0	8.0	8	20	60	3	Picture 2	○
SM-3E-D9.0	9.0	10	22	75	3	Picture 1	○
SM-3E-D10.0	10.0	10	25	75	3	Picture 2	○
SM-3E-D11.0	11.0	12	28	75	3	Picture 1	○
SM-3E-D12.0	12.0	12	30	75	3	Picture 2	○
SM-3E-D16.0	16.0	16	45	100	3	Picture 2	○
SM-3E-D20.0	20.0	20	45	100	3	Picture 2	○

● Stock available ○ Make-to-order

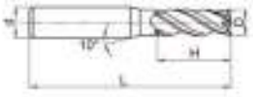
Applicable workpiece material table ○ Very suitable ○ Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel / Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
○	○					○					

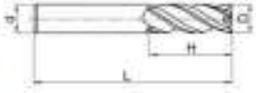
4-flute flattened end mills with unequal pitch

Side face | Step shoulder | Straight slot

VSM-4E



Picture 1



Picture 2

- Unequal helical angle, can improve the vibration resistance, and make the surface treatment better.
- Suit for Machining stainless, heat-resesting alloy, titanium alloy and other hard-cutting materials.

38°,41° | AlTiN | D: D<6 -0.020~-0.036; 6<D<16 -0.029~-0.047; 16<D<18 -0.032~-0.050; 18<D -0.04~-0.073

Ordering number	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	D	d	H	L			
VSM-4E-D4.0	4.0	6	11	50	4	Picture 1	●
VSM-4E-D5.0	5.0	6	13	50	4	Picture 1	●
VSM-4E-D6.0	6.0	6	16	50	4	Picture 2	●
VSM-4E-D8.0	8.0	8	20	60	4	Picture 2	●
VSM-4E-D10.0	10.0	10	25	75	4	Picture 2	●
VSM-4E-D12.0	12.0	12	30	75	4	Picture 2	●
VSM-4E-D16.0	16.0	16	45	100	4	Picture 2	●
VSM-4E-D20.0	20.0	20	45	100	4	Picture 2	●

● Stock available ○ Make-to-order

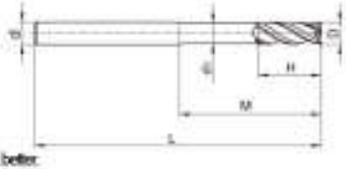
Applicable workpiece material table ○ Very suitable ○ Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel / Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
○	○					○				○	○

4-flute flattened end mills with unequal pitch, straight shank, long neck and short cutting edge

Side face | Step shoulder | Straight slot

VSM-4EFP



- High rigidity with short cutting edge, suitable for the deep cavity milling
- Unequal helical angle, can improve the vibration resistance, and make the surface treatment better

Ordering number	Basic dimension(mm)						Number of teeth Z	Stock
	D	d	H	M	d_1	L		
VSM-4EFP-D6.0	6.0	6	9	27	5.7	75	4	●
VSM-4EFP-D8.0	8.0	8	12	36	7.7	100	4	●
VSM-4EFP-D10.0	10.0	10	14	42	9.5	100	4	●
VSM-4EFP-D12.0	12.0	12	16	48	11.5	100	4	●
VSM-4EFP-D16.0	16.0	16	20	60	15.5	150	4	●

● Stock available ○ Make-to-order

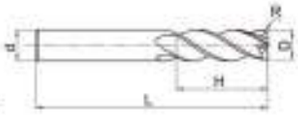
Applicable workpiece material table ◎ Very suitable ○ Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel / Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎					◎				◎	◎

4-flute R end mills with straight shank

Radius shoulder | Profile | Radius corner slot

SM-4R



- Large helical angle and strong nose, for machining of hard-to-cut materials such as Austenite stainless steel, heat-resistant alloy, etc.

Ordering number	Basic dimension(mm)					Number of teeth Z	Stock
	D	R	d	H	L		
SM-4R-D6.0R0.5	6.0	0.5	6	16	50	4	○
SM-4R-D6.0R1.0	6.0	1.0	6	16	50	4	○
SM-4R-D8.0R0.5	8.0	0.5	8	20	60	4	○
SM-4R-D8.0R1.0	8.0	1.0	8	20	60	4	○
SM-4R-D10.0R0.5	10.0	0.5	10	25	75	4	○
SM-4R-D10.0R1.0	10.0	1.0	10	25	75	4	○
SM-4R-D12.0R0.5	12.0	0.5	12	30	75	4	○
SM-4R-D12.0R1.0	12.0	1.0	12	30	75	4	○

● Stock available ○ Make-to-order

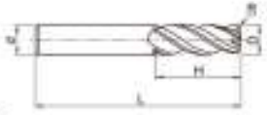
Applicable workpiece material table ◎ Very suitable ○ Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel / Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎					◎					

4-flute ball nose end mills with unequal pitch

Radius shoulder | Profile | Radius corner slot

VSM-4R



- Unequal helical angle, can improve the vibration resistance, and make the surface treatment better.
- Suit for Machining stainless, heat-resisting alloy, titanium alloy and other hard-cutting materials.

38°,41° | AlTiN | D: D<6 -0.020~-0.038, 6≤D<10 -0.025~-0.047, 10≤D<18 -0.032~-0.059, 18≤D -0.34~-0.073

Ordering number	Basic dimension(mm)					Number of teeth Z	Stock
	D	R	d	H	L		
VSM-4R-D6.0R0.5	6.0	0.5	6	16	50	4	●
VSM-4R-D6.0R1.0	6.0	1.0	6	16	50	4	●
VSM-4R-D8.0R0.5	8.0	0.5	8	20	60	4	●
VSM-4R-D8.0R1.0	8.0	1.0	8	20	60	4	●
VSM-4R-D10.0R0.5	10.0	0.5	10	25	75	4	●
VSM-4R-D10.0R1.0	10.0	1.0	10	25	75	4	●
VSM-4R-D10.0R2.0	10.0	2.0	10	25	75	4	●
VSM-4R-D12.0R0.5	12.0	0.5	12	30	75	4	●
VSM-4R-D12.0R1.0	12.0	1.0	12	30	75	4	●
VSM-4R-D12.0R2.0	12.0	2.0	12	30	75	4	●
VSM-4R-D16.0R1.0	16.0	1.0	16	45	100	4	●
VSM-4R-D16.0R2.0	16.0	2.0	16	45	100	4	●
VSM-4R-D16.0R3.0	16.0	3.0	16	45	100	4	●
VSM-4R-D20.0R1.0	20.0	1.0	20	45	100	4	●
VSM-4R-D20.0R2.0	20.0	2.0	20	45	100	4	●
VSM-4R-D20.0R3.0	20.0	3.0	20	45	100	4	●

● Stock available ○ Make-to-order

Applicable workpiece material table

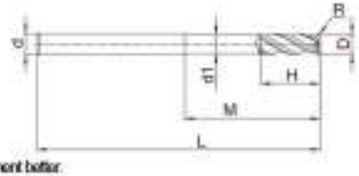
○ Very suitable ○ Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel / Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
○	○					○				○	○

4-flute ball nose end mills with unequal pitch, straight shank, long neck and short cutting edge

Side face | Step shoulder | Straight slot

VSM-4RFP



- High rigidity with short cutting edge, suitable for the deep cavity milling
- Unequal helical angle, can improve the vibration resistance, and make the surface treatment better.

38°,41° | AlTiN | D: D<6 -0.020~-0.038, 6≤D<10 -0.025~-0.047, 10≤D<18 -0.032~-0.059, 18≤D -0.34~-0.073

Ordering number	Basic dimension(mm)							Number of teeth Z	Stock
	D	R	d	d1	H	M	L		
VSM-4RFP-D6.0R0.5	6.0	0.5	6	5.7	9	27	75	4	●
VSM-4RFP-D6.0R1.0	6.0	1.0	6	5.7	9	27	75	4	●
VSM-4RFP-D8.0R0.5	8.0	0.5	8	7.7	12	36	100	4	●
VSM-4RFP-D8.0R1.0	8.0	1.0	8	7.7	12	36	100	4	●
VSM-4RFP-D10.0R0.5	10.0	0.5	10	9.5	14	42	100	4	●
VSM-4RFP-D10.0R1.0	10.0	1.0	10	9.5	14	42	100	4	●
VSM-4RFP-D10.0R2.0	10.0	2.0	10	9.5	14	42	100	4	●
VSM-4RFP-D12.0R0.5	12.0	0.5	12	11.5	16	48	100	4	●
VSM-4RFP-D12.0R1.0	12.0	1.0	12	11.5	16	48	100	4	●
VSM-4RFP-D12.0R2.0	12.0	2.0	12	11.5	16	48	100	4	●
VSM-4RFP-D16.0R1.0	16.0	1.0	16	15.5	20	60	150	4	●
VSM-4RFP-D16.0R2.0	16.0	2.0	16	15.5	20	60	150	4	●

● Stock available ○ Make-to-order

Applicable workpiece material table

○ Very suitable ○ Suitable

Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel / Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
○	○					○				○	○

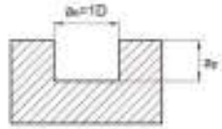
UM SERIES

High performance machining with unequal pitch

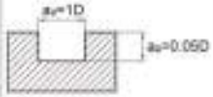
GM-2E★GM-2EL

Workpiece material	Cast iron, Nodular cast iron		Carbon steel Alloy steel ~750N/mm²		Carbon steel Alloy steel ~30HRC		Pre-hardened steel quenched and tempered steel ~40HRC		Stainless steel		Pre-hardened steel quenched and tempered steel ~52HRC	
Diameter (mm)	Rotating speed (min⁻¹)	Feed speed (mm/min)	Rotating speed (min⁻¹)	Feed speed (mm/min)	Rotating speed (min⁻¹)	Feed speed (mm/min)	Rotating speed (min⁻¹)	Feed speed (mm/min)	Rotating speed (min⁻¹)	Feed speed (mm/min)	Rotating speed (min⁻¹)	Feed speed (mm/min)
1	20000	165	20000	165	20000	135	20000	135	20000	50	20000	100
2	15000	265	15000	265	15000	240	15000	235	11150	70	13000	150
3	14000	455	14000	455	13000	420	10600	350	7500	100	8500	275
4	10800	465	10800	465	10000	430	8000	355	5500	110	6500	280
5	8200	485	8200	485	7600	450	6400	370	4500	110	5000	295
6	7000	500	7000	500	6400	460	5300	385	3700	115	4200	300
8	5200	495	5200	495	4800	455	4000	380	2800	115	3200	305
10	4200	485	4200	485	3800	450	3200	370	2200	115	2500	290
12	3500	485	3500	485	3200	450	2650	370	1850	115	2100	290
14	3000	455	3000	455	2700	420	2300	350	1600	110	1800	275
16	2600	455	2600	455	2400	420	2000	350	1400	100	1600	275
18	2300	445	2300	445	2100	410	1800	345	1250	100	1400	270
20	2050	445	2050	445	1900	410	1600	345	1100	100	1250	270

Maximum cutting depth

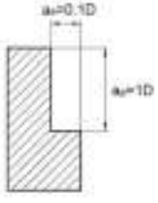
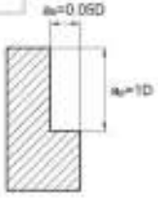
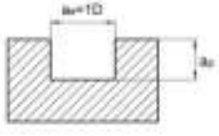
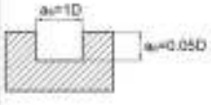


Diameter range	Cutting depth ap
Ø1<D≤Ø3	0.15D
Ø3<D	0.3D



1. The above table shows the standard value of side milling. When milling slot, 50%~70% of rotating speed and 40%~60% of feed speed stated above are recommended as standard.
2. Please select high-precision machine and tool holder.
3. Please use air blow or cutting liquid with high mist retardant property.
4. Down milling is recommended in the case of side milling.
5. When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
6. Make overhang of tool as short as possible in conditions of non-interference.

GM-2F★GM-2FL

Workpiece material	Cast iron, Nodular cast iron		Carbon steel Alloy steel ~750N/mm²		Carbon steel Alloy steel ~30HRC		Pre-hardened steel quenched and tempered steel ~40HRC		Stainless steel		Pre-hardened steel quenched and tempered steel ~50HRC	
Diameter (mm)	Rotating speed (min⁻¹)	Feed speed (mm/min)	Rotating speed (min⁻¹)	Feed speed (mm/min)	Rotating speed (min⁻¹)	Feed speed (mm/min)	Rotating speed (min⁻¹)	Feed speed (mm/min)	Rotating speed (min⁻¹)	Feed speed (mm/min)	Rotating speed (min⁻¹)	Feed speed (mm/min)
1	20000	115	20000	115	20000	95	20000	95	20000	35	20000	70
2	15000	185	15000	185	15000	170	15000	165	11150	50	13000	105
3	14000	320	14000	320	13000	295	10800	245	7500	70	8500	190
4	10800	325	10800	325	10000	300	8000	250	5500	80	6500	195
5	8200	340	8200	340	7600	315	6400	260	4500	80	5000	205
6	7000	350	7000	350	6400	320	5300	270	3700	80	4200	210
8	5200	345	5200	345	4800	320	4000	265	2800	80	3200	210
10	4200	340	4200	340	3800	315	3200	260	2200	80	2500	200
12	3500	340	3500	340	3200	315	2650	260	1850	80	2100	200
14	3000	320	3000	320	2700	295	2300	245	1600	80	1800	190
16	2600	320	2600	320	2400	295	2000	245	1400	70	1600	190
18	2300	310	2300	310	2100	290	1800	240	1250	70	1400	190
20	2050	310	2050	310	1900	290	1600	240	1100	70	1250	190
Maximum cutting depth												
												

Diameter range	Cutting depth ap
Ø1<D<Ø3	0.15D
Ø3<D	0.3D

1.The above table shows the standard value of side milling. When milling slot, 50%~70% of rotating speed and 40%~60% of feed speed stated above are recommended as standard.

2.Please select high-precision machine and tool holder.

3.Please use air blow or cutting liquid with high mist retardant property.

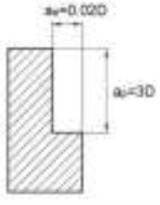
4.Down milling is recommended in the case of side milling.

5.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.

6.Make overhang of tool as short as possible in conditions of non-interference.

SOLID CARBIDE END MILL
GM-SERIES END MILL CUTTING PARAMETER

GM-2EX

Workpiece material	Cast iron, Nodular cast iron		Carbon steel Alloy steel ~750N/mm²		Carbon steel Alloy steel ~30HRC		Pre-hardened steel quenched and tempered steel ~40HRC		Stainless steel		Pre-hardened steel quenched and tempered steel ~50HRC	
Diameter (mm)	Rotating speed (min⁻¹)	Feed speed (mm/min)	Rotating speed (min⁻¹)	Feed speed (mm/min)	Rotating speed (min⁻¹)	Feed speed (mm/min)	Rotating speed (min⁻¹)	Feed speed (mm/min)	Rotating speed (min⁻¹)	Feed speed (mm/min)	Rotating speed (min⁻¹)	Feed speed (mm/min)
6	5800	375	5800	375	5300	345	4250	275	2650	60	3600	230
8	4400	375	4400	375	4000	345	3180	275	2000	60	2700	235
10	3500	365	3500	365	3200	330	2550	265	1600	60	2150	220
12	2900	365	2900	365	2650	330	2120	265	1350	60	1800	220
16	2200	345	2200	345	2000	315	1590	250	1000	50	1350	210
20	1750	340	1750	340	1600	310	1270	245	800	45	1050	205
Maximum cutting depth												

1.Please select high-precision machine and tool holder.

2.Please use air blow or cutting liquid with high mist retardant property.

3.Down milling is recommended in the case of side milling.

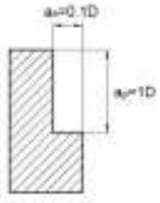
4.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.

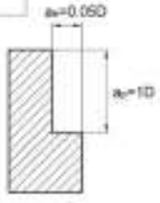
5.Make overhang of tool as short as possible in conditions of non-interference.

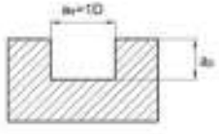
GM-2EFP

Workpiece material	Cast iron, Nodular cast iron		Carbon steel Alloy steel ~750N/mm²		Carbon steel Alloy steel ~30HRC		Pre-hardened steel quenched and tempered steel ~40HRC		Stainless steel		Pre-hardened steel quenched and tempered steel ~50HRC	
Diameter (mm)	Rotating speed (min⁻¹)	Feed speed (mm/min)	Rotating speed (min⁻¹)	Feed speed (mm/min)	Rotating speed (min⁻¹)	Feed speed (mm/min)	Rotating speed (min⁻¹)	Feed speed (mm/min)	Rotating speed (min⁻¹)	Feed speed (mm/min)	Rotating speed (min⁻¹)	Feed speed (mm/min)
6	7000	650	7000	650	6400	600	5300	500	3700	150	4200	390
8	5200	645	5200	645	4800	590	4000	495	2800	150	3200	395
10	4200	630	4200	630	3800	585	3200	480	2200	150	2500	380
12	3500	630	3500	630	3200	585	2650	480	1850	150	2100	380
16	2600	590	2600	590	2400	545	2000	455	1400	130	1600	355
20	2050	580	2050	580	1900	530	1600	450	1100	130	1250	350

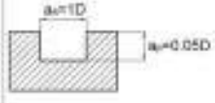
Maximum cutting depth







Diameter range	Cutting depth ap
Ø1<D<Ø3	0.15D
Ø3<D	0.3D



1.The above table shows the standard value of side milling. When milling slot, 50%~70% of rotating speed and 40%~60% of feed speed stated above are recommended as standard.

2.Please select high-precision machine and tool holder.

3.Please use air blow or cutting liquid with high mist retardant property.

4.Down milling is recommended in the case of side milling.

5.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above corresponding.

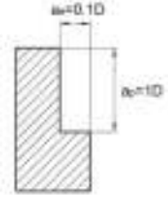
6.Make overhang of tool as short as possible in conditions of non-interference.

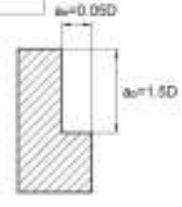
SOLID CARBIDE END MILL
GM-SERIES END MILL CUTTING PARAMETER

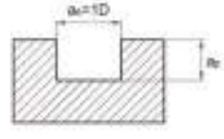
GM-3E★GM-3EL

Workpiece material	Cast iron, Nodular cast iron		Carbon steel Alloy steel ~750N/mm²		Carbon steel Alloy steel ~30HRC		Pre-hardened steel quenched and tempered steel ~40HRC		Stainless steel		Pre-hardened steel quenched and tempered steel ~50HRC	
Diameter (mm)	Rotating speed (min⁻¹)	Feed speed (mm/min)	Rotating speed (min⁻¹)	Feed speed (mm/min)	Rotating speed (min⁻¹)	Feed speed (mm/min)	Rotating speed (min⁻¹)	Feed speed (mm/min)	Rotating speed (min⁻¹)	Feed speed (mm/min)	Rotating speed (min⁻¹)	Feed speed (mm/min)
1	20000	215	20000	215	20000	175	20000	175	20000	65	20000	130
2	15000	345	15000	345	15000	310	15000	305	11150	90	13000	195
3	14000	590	14000	590	13000	546	10600	455	7500	130	8500	360
4	10800	600	10800	600	10000	560	8000	460	5600	145	6500	365
5	8200	630	8200	630	7500	585	6400	480	4500	145	5000	380
6	7000	650	7000	650	6400	600	5300	500	3700	150	4200	390
8	5200	645	5200	645	4800	590	4000	495	2800	150	3200	400
10	4200	630	4200	630	3800	585	3200	480	2200	150	2500	380
12	3500	630	3500	630	3200	585	2650	480	1850	150	2100	380
14	3000	590	3000	590	2700	545	2300	455	1600	145	1800	380
16	2600	590	2600	590	2400	545	2000	455	1400	130	1600	360
18	2300	580	2300	580	2100	530	1800	450	1250	130	1400	350
20	2050	580	2050	580	1900	530	1600	450	1100	130	1250	350

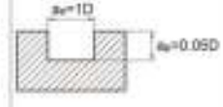
Maximum cutting depth







Diameter range	Cutting depth ap
Ø1<D<Ø3	0.15D
Ø3<D	0.3D



1.The above table shows the standard value of side milling. When milling slot, 50%~70% of rotating speed and 40%~60% of feed speed stated above are recommended as standard.

2.Please select high-precision machine and tool holder.

3.Please use air blow or cutting liquid with high mist retardant property.

4.Down milling is recommended in the case of side milling.

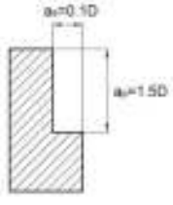
5.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above corresponding.

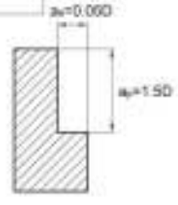
6.Make overhang of tool as short as possible in conditions of non-interference.

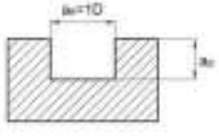
GM-4E-G★GM-4EL-G

Workpiece material	Cast iron, Nodular cast iron		Carbon steel Alloy steel ~750N/mm²		Carbon steel Alloy steel ~30HRC		Pre-hardened steel quenched and tempered steel ~40HRC		Stainless steel		Pre-hardened steel quenched and tempered steel ~50HRC	
Diameter (mm)	Rotating speed (min⁻¹)	Feed speed (mm/min)	Rotating speed (min⁻¹)	Feed speed (mm/min)	Rotating speed (min⁻¹)	Feed speed (mm/min)	Rotating speed (min⁻¹)	Feed speed (mm/min)	Rotating speed (min⁻¹)	Feed speed (mm/min)	Rotating speed (min⁻¹)	Feed speed (mm/min)
1	20000	225	20000	225	20000	180	20000	180	20000	80	20000	135
2	15000	360	15000	360	15000	325	15000	315	11150	90	13000	200
3	14000	610	14000	610	13000	570	10800	470	7500	110	8500	370
4	10800	630	10800	630	10000	575	8000	480	5500	115	6500	380
5	8200	660	8200	660	7600	600	6400	505	4500	115	5000	400
6	7000	675	7000	675	6400	620	5300	515	3700	120	4200	405
8	5200	665	5200	665	4800	610	4000	510	2800	120	3200	415
10	4200	660	4200	660	3800	600	3200	505	2200	120	2500	390
12	3500	660	3500	660	3200	600	2650	505	1850	120	2100	390
14	3000	610	3000	610	2700	570	2300	470	1600	115	1800	370
16	2600	610	2600	610	2400	570	2000	470	1400	110	1600	370
18	2300	600	2300	600	2100	560	1800	460	1250	95	1400	365
20	2050	600	2050	600	1900	560	1600	460	1100	95	1250	365

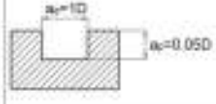
Maximum cutting depth







Diameter range	Cutting depth ap
Ø1<D<Ø3	0.15D
Ø3<D	0.3D



1.The above table shows the standard value of side milling. When milling slot, 60%~70% of rotating speed and 40%~60% of feed speed stated above are recommended as standard.

2.Please select high-precision machine and tool holder.

3.Please use air blow or cutting liquid with high mist retardant property.

4.Down milling is recommended in the case of side milling.

5.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.

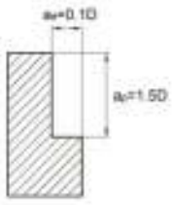
6.Make overhang of tool as short as possible in conditions of non-interference.

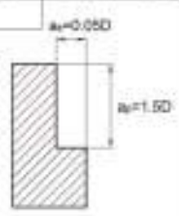
SOLID CARBIDE END MILL
GM-SERIES END MILL CUTTING PARAMETER

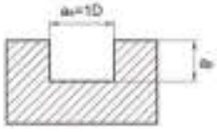
GM-4F-G★GM-4FL-G

Workpiece material	Cast iron, Nodular cast iron		Carbon steel Alloy steel ~750N/mm²		Carbon steel Alloy steel ~30HRC		Pre-hardened steel quenched and tempered steel ~40HRC		Stainless steel		Pre-hardened steel quenched and tempered steel ~50HRC	
Diameter (mm)	Rotating speed (min⁻¹)	Feed speed (mm/min)	Rotating speed (min⁻¹)	Feed speed (mm/min)	Rotating speed (min⁻¹)	Feed speed (mm/min)	Rotating speed (min⁻¹)	Feed speed (mm/min)	Rotating speed (min⁻¹)	Feed speed (mm/min)	Rotating speed (min⁻¹)	Feed speed (mm/min)
1	20000	180	20000	180	20000	125	20000	125	20000	55	20000	95
2	15000	250	15000	250	15000	230	15000	220	11150	65	13000	140
3	14000	430	14000	430	13000	400	10800	330	7500	80	8500	260
4	10800	440	10800	440	10000	400	8000	335	5500	80	6500	265
5	8200	460	8200	460	7600	420	6400	355	4500	80	5000	280
6	7000	470	7000	470	6400	435	5300	360	3700	85	4200	285
8	5200	465	5200	465	4800	430	4000	360	2800	85	3200	290
10	4200	460	4200	460	3800	420	3200	355	2200	85	2500	275
12	3500	460	3500	460	3200	420	2650	355	1850	80	2100	275
14	3000	430	3000	430	2700	400	2300	330	1600	80	1800	260
16	2600	430	2600	430	2400	400	2000	330	1400	80	1600	260
18	2300	420	2300	420	2100	390	1800	325	1250	70	1400	255
20	2050	420	2050	420	1900	390	1600	325	1100	70	1250	255

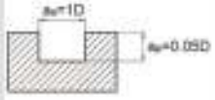
Maximum cutting depth







Diameter range	Cutting depth ap
Ø1<D<Ø3	0.15D
Ø3<D	0.3D



1.The above table shows the standard value of side milling. When milling slot, 50%~70% of rotating speed and 40%~60% of feed speed stated above are recommended as standard.

2.Please select high-precision machine and tool holder.

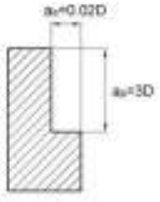
3.Please use air blow or cutting liquid with high mist retardant property.

4.Down milling is recommended in the case of side milling.

5.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.

6.Make overhang of tool as short as possible in conditions of non-interference.

GM-4EX-G

Workpiece material	Cast iron, Nodular cast iron		Carbon steel Alloy steel ~750N/mm²		Carbon steel Alloy steel ~30HRC		Pre-hardened steel quenched and tempered steel ~40HRC		Stainless steel		Pre-hardened steel quenched and tempered steel ~50HRC	
Diameter (mm)	Rotating speed (min⁻¹)	Feed speed (mm/min)	Rotating speed (min⁻¹)	Feed speed (mm/min)	Rotating speed (min⁻¹)	Feed speed (mm/min)	Rotating speed (min⁻¹)	Feed speed (mm/min)	Rotating speed (min⁻¹)	Feed speed (mm/min)	Rotating speed (min⁻¹)	Feed speed (mm/min)
6	5800	475	5800	475	5300	430	4250	340	2650	70	3600	290
8	4400	475	4400	475	4000	430	3180	340	2000	70	2700	290
10	3500	460	3500	460	3200	420	2550	330	1600	70	2150	280
12	2900	460	2900	460	2650	420	2120	330	1350	70	1800	280
16	2200	430	2200	430	2000	390	1590	315	1000	65	1350	260
20	1750	430	1750	430	1600	385	1270	310	800	60	1050	255
Maximum cutting depth												

1.Please select high-precision machine and tool holder.

2.Please use air blow or cutting liquid with high mist retardant property.

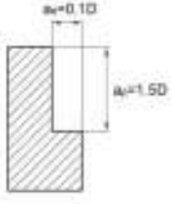
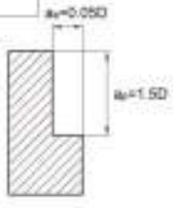
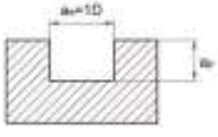
3.Down milling is recommended in the case of side milling.

4.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.

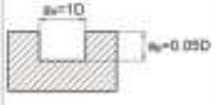
5.Make overhang of tool as short as possible in conditions of non-interference.

SOLID CARBIDE END MILL
GM-SERIES END MILL CUTTING PARAMETER

GM-4E★GM-4EL

Workpiece material	Cast iron, Nodular cast iron		Carbon steel Alloy steel ~750N/mm²		Carbon steel Alloy steel ~30HRC		Pre-hardened steel quenched and tempered steel ~40HRC		Stainless steel		Pre-hardened steel quenched and tempered steel ~50HRC	
Diameter (mm)	Rotating speed (min⁻¹)	Feed speed (mm/min)	Rotating speed (min⁻¹)	Feed speed (mm/min)	Rotating speed (min⁻¹)	Feed speed (mm/min)	Rotating speed (min⁻¹)	Feed speed (mm/min)	Rotating speed (min⁻¹)	Feed speed (mm/min)	Rotating speed (min⁻¹)	Feed speed (mm/min)
1	20000	250	20000	250	20000	200	20000	200	20000	90	20000	150
2	15000	400	15000	400	15000	360	15000	350	11150	100	13000	225
3	14000	680	14000	680	13000	630	10600	525	7500	120	8500	410
4	10800	700	10800	700	10000	640	8000	635	6000	125	6500	420
5	8200	730	8200	730	7600	670	6400	660	4500	125	5000	440
6	7000	750	7000	750	6400	680	5300	575	3700	135	4200	450
8	5200	740	5200	740	4800	680	4000	565	2800	135	3200	460
10	4200	730	4200	730	3800	670	3200	560	2200	135	2500	435
12	3500	730	3500	730	3200	670	2650	560	1850	135	2100	435
14	3000	680	3000	680	2700	630	2300	525	1600	125	1800	410
16	2600	680	2600	680	2400	630	2000	525	1400	120	1600	410
18	2300	670	2300	670	2100	620	1800	515	1250	105	1400	405
20	2050	670	2050	670	1900	620	1600	515	1100	105	1250	405
Maximum cutting depth	  											

Diameter range	Cutting depth ap
Ø1<D<Ø3	0.15D
Ø3<D	0.3D



1.The above table shows the standard value of side milling. When milling slot, 50%~70% of rotating speed and 40%~60% of feed speed stated above are recommended as standard.

2.Please select high-precision machine and tool holder.

3.Please use air blow or cutting liquid with high mist retardant property.

4.Down milling is recommended in the case of side milling.

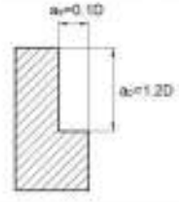
5.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.

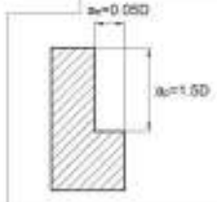
6.Make overhang of tool as short as possible in conditions of non-interference.

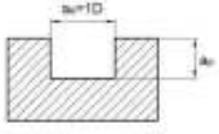
GM-4EFP

Workpiece material	Cast iron, Nodular cast iron		Carbon steel Alloy steel ~750N/mm²		Carbon steel Alloy steel ~30HRC		Pre-hardened steel quenched and tempered steel ~40HRC		Stainless steel		Pre-hardened steel quenched and tempered steel ~50HRC	
Diameter (mm)	Rotating speed (min⁻¹)	Feed speed (mm/min)	Rotating speed (min⁻¹)	Feed speed (mm/min)	Rotating speed (min⁻¹)	Feed speed (mm/min)	Rotating speed (min⁻¹)	Feed speed (mm/min)	Rotating speed (min⁻¹)	Feed speed (mm/min)	Rotating speed (min⁻¹)	Feed speed (mm/min)
6	7000	975	7000	975	6400	900	5300	750	3700	175	4200	585
8	5200	960	5200	960	4800	895	4000	735	2800	175	3200	600
10	4200	950	4200	950	3800	970	3200	730	2200	175	2500	565
12	3500	950	3500	950	3200	970	2850	730	1850	175	2100	565
16	2600	885	2600	885	2400	820	2000	680	1400	155	1600	535
20	2050	870	2050	870	1900	805	1600	670	1100	135	1250	525

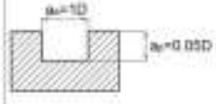
Maximum cutting depth







Diameter range	Cutting depth ap
Ø1<D<Ø3	0.15D
Ø3<D	0.3D

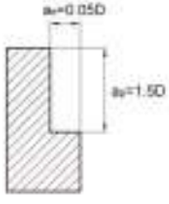


1. The above table shows the standard value of side milling. When milling slot, 50%~70% of rotating speed and 40%~60% of feed speed stated above are recommended as standard.
2. Please select high-precision machine and tool holder.
3. Please use air blow or cutting liquid with high mist retardant property.
4. Down milling is recommended in the case of side milling.
5. When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
6. Make overhang of tool as short as possible in conditions of non-interference.

GM-6E

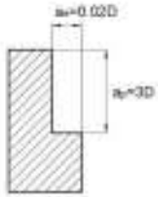
Workpiece material	Cast iron, Nodular cast iron		Carbon steel Alloy steel ~750N/mm²		Carbon steel Alloy steel ~30HRC		Pre-hardened steel quenched and tempered steel ~40HRC		Stainless steel		Pre-hardened steel quenched and tempered steel ~50HRC	
Diameter (mm)	Rotating speed (min⁻¹)	Feed speed (mm/min)	Rotating speed (min⁻¹)	Feed speed (mm/min)	Rotating speed (min⁻¹)	Feed speed (mm/min)	Rotating speed (min⁻¹)	Feed speed (mm/min)	Rotating speed (min⁻¹)	Feed speed (mm/min)	Rotating speed (min⁻¹)	Feed speed (mm/min)
6	7000	890	7000	890	6400	820	5300	680	3700	160	4200	540
8	5200	890	5200	890	4800	820	4000	680	2800	160	3200	550
10	4200	860	4200	860	3800	800	3200	665	2200	160	2500	520
12	3500	860	3500	860	3200	800	2650	665	1850	160	2100	520
14	3000	810	3000	810	2700	750	2300	625	1600	150	1800	490
16	2600	810	2600	810	2400	750	2000	625	1400	150	1600	490
18	2300	800	2300	800	2100	740	1800	615	1250	125	1400	485
20	2050	800	2050	800	1900	740	1600	615	1100	125	1250	485

Maximum cutting depth



1. Please select high-precision machine and tool holder.
2. Please use air blow or cutting liquid with high mist retardant property.
3. Down milling is recommended in the case of side milling.
4. When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
5. Make overhang of tool as short as possible in conditions of non-interference.

GM-6EL

Workpiece material	Cast iron, Nodular cast iron		Carbon steel Alloy steel ~750N/mm²		Carbon steel Alloy steel ~30HRC		Pre-hardened steel quenched and tempered steel ~40HRC		Stainless steel		Pre-hardened steel quenched and tempered steel ~50HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
6	5800	750	5800	750	5300	685	4250	545	2650	115	3000	460
8	4400	750	4400	750	4000	685	3180	545	2000	115	2700	465
10	3500	730	3500	730	3200	685	2550	530	1600	115	2150	440
12	2900	730	2900	730	2650	685	2120	530	1350	115	1800	440
14	2500	685	2500	685	2300	625	1820	500	1150	105	1550	415
16	2200	685	2200	685	2000	625	1590	500	1000	105	1350	415
18	1950	675	1950	675	1800	615	1420	490	900	90	1200	410
20	1750	675	1750	675	1600	615	1270	490	800	90	1050	410
Maximum cutting depth												

1.Please select high-precision machine and tool holder.

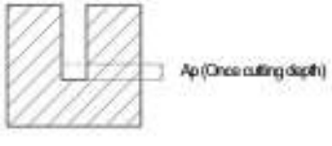
2.Please use air blow or cutting liquid with high mist retardant property.

3.Down milling is recommended in the case of side milling.

4.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated.Please reduce the rotating speed and feed speed stated above correspondingly.

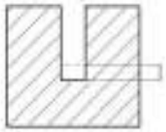
5.Make overhang of tool as short as possible in conditions of non-interference.

GM-2EP

Workpiece material		Cast iron, Carbon steel Alloy steel ~750N/mm²			Carbon steel Alloy steel ~30HRC			Pre-hardened steel,quenched and tempered steel~40HRC			Stainless steel		
Diameter (mm)	Effective length (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	ap (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	ap (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	ap (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	ap (mm)
0.5	4	28000	500	0.023	28000	400	0.021	28000	250	0.018	25000	200	0.014
	6	22000	400	0.007	22000	350	0.06	22000	150	0.005	20000	150	0.004
	8	18000	300	0.005	18000	300	0.005	18000	150	0.004	20000	150	0.003
0.8	4	32000	900	0.057	32000	600	0.053	32000	600	0.044	25000	400	0.035
	6	28000	700	0.036	28000	450	0.034	28000	400	0.028	21000	300	0.022
	8	22000	500	0.026	22000	350	0.024	22000	300	0.02	18000	200	0.016
	10	22000	500	0.01	22000	350	0.01	22000	300	0.008	18000	200	0.006
1.0	4	2900	1300	0.08	27000	1000	0.08	26000	900	0.07	20000	600	0.05
	6	29000	1300	0.07	27000	1000	0.07	26000	900	0.06	20000	600	0.04
	8	24000	900	0.05	23000	800	0.04	22000	700	0.04	18000	400	0.03
	10	20000	700	0.03	19000	600	0.03	18000	500	0.03	15000	300	0.02
	12	20000	700	0.02	19000	600	0.02	18000	500	0.02	15000	300	0.01
	14	18000	500	0.015	15000	400	0.01	15000	360	0.01	12000	200	0.008
1.2	6	26000	1100	0.09	23000	1000	0.08	22000	900	0.07	17000	600	0.05
	8	21000	900	0.07	20000	700	0.07	19000	700	0.05	14000	400	0.04
	10	21000	900	0.06	20000	700	0.05	19000	700	0.04	14000	400	0.03
	12	18000	700	0.04	17000	600	0.04	16000	500	0.03	11000	300	0.02
1.5	6	20000	1200	0.15	18000	1000	0.14	18000	900	0.11	14000	600	0.09
	8	19000	900	0.11	16000	800	0.1	15000	700	0.08	12000	400	0.07
	10	19000	900	0.09	16000	800	0.08	15000	700	0.06	12000	400	0.05
	12	19000	900	0.07	16000	800	0.06	15000	700	0.05	12000	400	0.04
	14	19000	700	0.06	16000	650	0.05	15000	630	0.04	12000	360	0.03
2.0	6	16000	1300	0.34	15000	1100	0.31	14000	1000	0.26	11000	700	0.21
	8	16000	1300	0.29	15000	1100	0.26	14000	1000	0.22	11000	700	0.18
	10	14000	900	0.26	1300	800	0.24	12000	700	0.20	9000	500	0.18
	12	14000	900	0.14	13000	800	0.13	12000	700	0.11	9000	500	0.09
	14	14000	900	0.10	13000	800	0.11	12000	700	0.09	9000	500	0.07
	16	14000	900	0.08	13000	800	0.08	12000	700	0.07	9000	500	0.06
Maximum cutting depth													

SOLID CARBIDE END MILL
GM-SERIES END MILL CUTTING PARAMETER

GM-2EP

Workpiece material		Cast iron, Carbon steel Alloy steel ~750N/mm²			Carbon steel Alloy steel ~30HRC			Pre-hardened steel quenched and tempered steel~40HRC			Stainless steel		
Diameter (mm)	Effective length (mm)	Rotating speed (min⁻¹)	Feed speed (mm/min)	ap (mm)	Rotating speed (min⁻¹)	Feed speed (mm/min)	ap (mm)	Rotating speed (min⁻¹)	Feed speed (mm/min)	ap (mm)	Rotating speed (min⁻¹)	Feed speed (mm/min)	ap (mm)
2.5	8	13000	1300	0.42	12000	1100	0.39	11000	1000	0.33	9000	700	0.26
	10	13000	1300	0.36	12000	1100	0.33	11000	1000	0.28	9000	700	0.22
	12	13000	1300	0.24	12000	1100	0.23	11000	1000	0.19	9000	700	0.15
	14	12000	900	0.18	10000	800	0.17	9000	700	0.14	7000	500	0.11
	16	12000	900	0.13	10000	800	0.12	9000	700	0.09	7000	500	0.08
	18	12000	800	0.11	10000	720	0.10	9000	630	0.07	7000	450	0.07
	20	12000	800	0.09	10000	720	0.08	9000	630	0.05	7000	450	0.06
3.0	6	11000	1300	0.42	10000	1100	0.39	10000	1000	0.32	8000	700	0.27
	8	11000	1300	0.39	10000	1100	0.36	10000	1000	0.30	8000	700	0.24
	10	11000	1300	0.31	10000	1100	0.29	10000	1000	0.24	8000	700	0.19
	12	11000	1100	0.29	10000	1000	0.27	10000	900	0.22	8000	650	0.18
	14	11000	1100	0.27	10000	1000	0.25	10000	900	0.20	8000	650	0.15
	16	10000	850	0.22	10000	750	0.20	9000	650	0.17	6000	450	0.13
	18	10000	850	0.18	10000	750	0.14	9000	650	0.12	6000	450	0.10
	20	10000	850	0.12	10000	750	0.10	9000	650	0.08	6000	450	0.07
4.0	12	8000	1300	0.42	7000	1100	0.38	7000	1000	0.32	6000	700	0.26
	16	8000	1100	0.39	7000	1000	0.35	7000	900	0.30	6000	650	0.24
	20	7000	900	0.34	7000	800	0.30	6000	700	0.27	5000	500	0.20
	25	7000	900	0.30	7000	800	0.27	6000	700	0.24	5000	500	0.15
5.0	16	6000	1200	0.49	6000	1000	0.45	5000	1000	0.38	5000	600	0.30
	25	5000	800	0.45	5000	720	0.42	5000	700	0.35	5000	600	0.25
Maximum cutting depth		 Ap (Once cutting depth)											

1.Please select high-precision machine and tool holder.

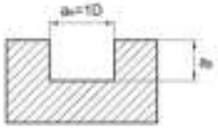
2.Please use air blow or cutting liquid with high mist retardant property.

3.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above corresponding.

4.Make overhang of tool as short as possible in conditions of non-interference.

SOLID CARBIDE END MILL
GM-SERIES END MILL CUTTING PARAMETER

GM-2ES

Workpiece material	Cast iron, Nodular cast iron		Carbon steel Alloy steel ~750N/mm²		Carbon steel Alloy steel ~30HRC		Pre-hardened steel quenched and tempered steel ~40HRC		Stainless steel	
Diameter (mm)	Rotating speed (min⁻¹)	Feed speed (mm/min)	Rotating speed (min⁻¹)	Feed speed (mm/min)	Rotating speed (min⁻¹)	Feed speed (mm/min)	Rotating speed (min⁻¹)	Feed speed (mm/min)	Rotating speed (min⁻¹)	Feed speed (mm/min)
0.3	32000	115	32000	115	32000	115	32000	80	32000	40
0.4	32000	125	32000	125	32000	125	32000	80	27500	50
0.5	32000	125	32000	125	29500	125	25000	80	22000	50
0.6	32000	125	32000	125	24500	125	21000	80	18500	50
0.7	32000	125	32000	125	24500	125	21000	80	18500	50
0.8	24500	125	24500	125	18500	125	16500	80	13500	50
0.9	24500	125	24500	125	18500	125	16500	80	13500	50
1.0	21000	140	25000	165	16800	130	14500	80	10000	50
1.5	13000	140	15000	165	11800	130	10000	80	7000	50
2.0	13000	160	15000	185	11800	145	10000	100	7000	60
2.5	8700	200	10000	240	8200	185	6600	100	4700	60
3.0	8700	235	10000	270	8200	220	6600	100	4700	75
Maximum cutting depth										

Diameter range	Cutting depth ae
D<Ø1	0.0D
Ø1<D<Ø3	0.15D

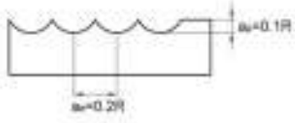
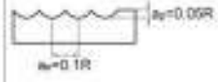
1.Please select high-precision machine and tool holder.

2.Please use air blow or cutting liquid with high mist retardant property.

3.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above corresponding.

4.Make overhang of tool as short as possible in conditions of non-interference.

GM-2B★GM-2BL★GM-2BFP

Workpiece material	Cast iron, Nodular cast iron		Carbon steel Alloy steel ~750N/mm²		Carbon steel Alloy steel ~30HRC		Pre-hardened steel quenched and tempered steel ~40HRC		Stainless steel		Pre-hardened steel quenched and tempered steel ~50HRC	
Diameter (mm)	Rotating speed (min⁻¹)	Feed speed (mm/min)	Rotating speed (min⁻¹)	Feed speed (mm/min)	Rotating speed (min⁻¹)	Feed speed (mm/min)	Rotating speed (min⁻¹)	Feed speed (mm/min)	Rotating speed (min⁻¹)	Feed speed (mm/min)	Rotating speed (min⁻¹)	Feed speed (mm/min)
R0.5	40000	800	40000	800	38000	700	32000	320	22300	200	25000	275
R1.0	24000	900	24000	900	19000	760	16000	400	11150	230	13000	275
R1.5	15500	950	15500	950	12750	760	10600	450	7400	290	8500	280
R2.0	11500	950	11500	950	9550	760	8000	550	5550	370	6500	370
R2.5	9500	1050	9500	1050	7650	800	6400	550	4450	370	5000	370
R3.0	8000	1050	8000	1050	6400	800	5300	580	3700	390	4200	390
R4.0	6000	1300	6000	1300	4800	950	4000	700	2750	455	3200	440
R5.0	4800	1200	4800	1200	3800	900	3200	650	2200	430	2500	440
R6.0	4000	1100	4000	1100	3200	840	2650	610	1850	430	2100	420
R8.0	3000	1050	3000	1050	2400	800	2000	600	1350	380	1600	375
R10.0	2400	950	2400	950	1900	660	1600	560	1100	370	1250	330
Maximum cutting depth												

1.Please select high-precision machine and tool holder.

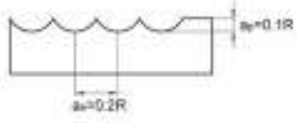
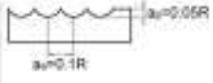
2.Please use air blow or cutting liquid with high mist retardant property.

3.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.

4.Make overhang of tool as short as possible in conditions of non-interference.

SOLID CARBIDE END MILL
GM-SERIES END MILL CUTTING PARAMETER

GM-4B★GM-4BL

Workpiece material	Cast iron, Nodular cast iron		Carbon steel Alloy steel ~750N/mm²		Carbon steel Alloy steel ~30HRC		Pre-hardened steel quenched and tempered steel ~40HRC		Stainless steel		Pre-hardened steel quenched and tempered steel ~50HRC	
cutting speed	150 m/min		150m/min		120m/min		100m/min		70m/min		60m/min	
Diameter (mm)	Rotating speed (min⁻¹)	Feed speed (mm/min)	Rotating speed (min⁻¹)	Feed speed (mm/min)	Rotating speed (min⁻¹)	Feed speed (mm/min)	Rotating speed (min⁻¹)	Feed speed (mm/min)	Rotating speed (min⁻¹)	Feed speed (mm/min)	Rotating speed (min⁻¹)	Feed speed (mm/min)
R1.5	15500	1710	15500	1710	12750	1340	10600	810	7400	520	8500	500
R2.0	11500	1710	11500	1710	9550	1340	8000	990	5550	660	6500	665
R2.5	9500	1890	9500	1890	7650	1440	6400	990	4450	660	5000	675
R3.0	8000	1890	8000	1890	6400	1440	5300	1040	3700	700	4200	700
R4.0	6000	2340	6000	2340	4800	1710	4000	1260	2750	820	3200	790
R5.0	4800	2160	4800	2160	3800	1620	3200	1170	2200	770	2500	790
R6.0	4000	1980	4000	1980	3200	1510	2650	1100	1850	770	2100	756
R8.0	3000	1890	3000	1890	2400	1440	2000	1080	1350	680	1600	675
R10.0	2400	1710	2400	1710	1900	1220	1600	1000	1100	680	1250	595
Maximum cutting depth												

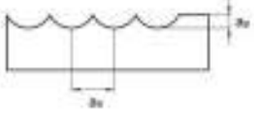
1.Please select high-precision machine and tool holder.

2.Please use air blow or cutting liquid with high mist retardant property.

3.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.

4.Make overhang of tool as short as possible in conditions of non-interference.

GM-2BS

Workpiece material	Cast iron, Nodular cast iron		Carbon steel Alloy steel ~750N/mm²		Carbon steel Alloy steel ~30HRC		Pre-hardened steel quenched and tempered steel ~42HRC		Stainless steel	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
R0.15	32000	300	32000	300	32000	270	32000	250	32000	150
R0.2	32000	380	32000	380	32000	320	32000	300	32000	175
R0.25	32000	460	32000	460	32000	410	32000	330	32000	205
R0.3	32000	535	32000	535	32000	500	32000	420	32000	265
R0.35	32000	550	32000	550	32000	520	32000	440	32000	270
R0.4	32000	610	32000	610	32000	560	32000	460	27500	285
R0.45	32000	700	32000	700	32000	600	25000	400	27500	285
R0.5	32000	765	32000	765	32000	640	25000	400	22000	285
R1.0	24000	900	24000	900	19000	760	16000	400	11150	230
R1.5	15500	950	15500	950	12750	760	10600	450	7400	290
Maximum cutting depth										

Diameter range	Cutting depth a_p	Cutting width a_e
D<Ø1	0.05R	0.2R
Ø1<D<Ø3	0.1R	0.2R

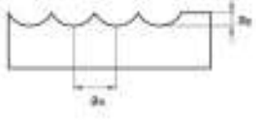
1.Please select high-precision machine and tool holder.

2.Please use air blow or cutting liquid with high mist retardant property.

3.Make overhang of tool as short as possible in conditions of non-interference.

4.Reduce feed speed correspondingly when rotating speed is low.

GM-2BP

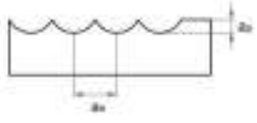
Workpiece material		Cast iron, Carbon steel Alloy steel ~750N/mm²				Carbon steel Alloy steel ~30HRC				Pre-hardened steel quenched and tempered steel ~40HRC				Stainless steel			
Diameter (mm)	Effective length (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	a_p (mm)	a_e (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	a_p (mm)	a_e (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	a_p (mm)	a_e (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	a_p (mm)	a_e (mm)
R0.25	4	27000	400	0.02	0.025	27000	380	0.02	0.025	27000	300	0.02	0.025	27000	200	0.02	0.025
	6	21000	200	0.01	0.015	21000	180	0.01	0.015	21000	160	0.01	0.015	21000	150	0.01	0.015
R0.3	4	27000	400	0.03	0.12	27000	380	0.03	0.12	25000	250	0.03	012	24000	200	0.03	0.12
	6	25000	300	0.03	0.12	25000	280	0.03	0.12	20000	150	0.03	0.12	20000	140	0.03	0.12
	8	25000	240	0.03	0.12	25000	225	0.03	0.12	20000	120	0.03	0.12	20000	110	0.03	0.12
R0.4	4	27000	600	0.04	0.16	27000	550	0.04	0.16	23000	450	0.04	0.16	21000	300	0.04	0.16
	6	24000	400	0.04	0.12	24000	360	0.04	0.12	21000	250	0.04	0.12	19000	200	0.04	0.12
	8	22000	300	0.04	0.12	22000	270	0.04	0.12	19000	150	0.04	0.12	19000	140	0.04	0.12
	10	22000	270	0.03	0.09	22000	250	0.03	0.09	19000	135	0.03	0.09	19000	120	0.03	0.09
R0.5	4	28000	600	0.05	0.20	28000	550	0.05	0.20	25000	500	0.05	0.20	21000	300	0.05	0.20
	6	21000	400	0.05	0.20	21000	360	0.05	0.20	19000	300	0.05	0.20	18000	200	0.05	0.2
	8	21000	360	0.05	0.15	21000	320	0.05	0.15	19000	270	0.05	0.15	18000	180	0.05	0.15
	10	18000	300	0.03	0.10	18000	270	0.03	0.10	17000	200	0.03	0.10	14000	150	0.03	0.10
	12	18000	270	0.03	0.10	18000	250	0.03	0.10	17000	180	0.03	0.10	14000	135	0.03	0.10
R0.6	6	20000	600	0.06	0.24	20000	540	0.06	0.24	17000	300	0.06	0.24	14000	200	0.06	0.24
	8	20000	540	0.06	0.24	20000	500	0.06	0.24	17000	270	0.06	0.24	14000	170	0.06	0.24
	12	16000	300	0.06	0.18	16000	270	0.06	0.18	14000	200	0.06	0.18	11000	150	0.06	0.18
	16	16000	270	0.03	0.12	16000	230	0.03	0.12	14000	175	0.03	0.12	11000	135	0.03	0.12
R0.75	8	17000	600	0.08	0.30	17000	540	0.08	0.30	15000	300	0.08	0.30	12000	250	0.08	0.30
	12	17000	540	0.06	0.24	17000	500	0.06	0.24	15000	275	0.06	0.24	12000	225	0.06	0.24
	16	13000	300	0.04	0.16	13000	275	0.04	0.16	12000	200	0.04	0.16	9500	150	0.04	0.16
R1.0	6	16500	800	0.10	0.40	16500	750	0.10	0.40	16500	560	0.10	0.40	13500	450	0.10	0.40
	8	16500	800	0.10	0.32	16500	750	0.10	0.32	16500	560	0.10	0.32	13500	450	0.10	0.32
	10	14000	630	0.08	0.30	14000	600	0.08	0.30	13000	450	0.08	0.30	10000	270	0.08	0.30
	12	14000	630	0.08	0.30	14000	600	0.08	0.30	13000	450	0.08	0.30	10000	270	0.08	0.30
	16	14000	550	0.06	0.24	14000	530	0.06	0.24	13000	400	0.06	0.24	10000	270	0.06	0.24
	20	11000	360	0.06	0.16	11000	330	0.06	0.16	10000	225	0.06	0.16	8000	175	0.06	0.16
Maximum cutting depth																	

SOLID CARBIDE END MILL
GM-SERIES END MILL CUTTING PARAMETER

GM-2BP

Workpiece material		Cast iron, Carbon steel Alloy steel ~750N/mm²				Carbon steel Alloy steel ~30HRC				Pre-hardened steel, quenched and tempered steel ~40HRC				Stainless steel			
Diameter (mm)	Effective length (mm)	Rotating speed (min⁻¹)	Feed speed (mm/min)	ap (mm)	ae (mm)	Rotating speed (min⁻¹)	Feed speed (mm/min)	ap (mm)	ae (mm)	Rotating speed (min⁻¹)	Feed speed (mm/min)	ap (mm)	ae (mm)	Rotating speed (min⁻¹)	Feed speed (mm/min)	ap (mm)	ae (mm)
R1.25	8	14000	800	0.10	0.32	14000	750	0.10	0.32	14000	560	0.10	0.32	12500	450	0.10	0.32
	12	13000	630	0.08	0.30	13000	600	0.08	0.30	12000	450	0.08	0.30	10000	270	0.08	0.30
	16	13000	550	0.06	0.24	13000	530	0.08	0.24	12000	400	0.08	0.24	10000	270	0.08	0.24
	20	10000	360	0.06	0.16	10000	330	0.08	0.16	8000	225	0.08	0.16	7000	175	0.08	0.16
R1.5	10	12000	800	0.15	0.40	12000	720	0.15	0.40	9500	600	0.15	0.40	7500	400	0.15	0.40
	12	12000	720	0.15	0.40	12000	650	0.15	0.40	9500	540	0.15	0.40	7500	360	0.15	0.40
	16	10000	600	0.15	0.40	10000	540	0.15	0.40	8500	300	0.15	0.40	6500	250	0.15	0.40
	20	10000	600	0.10	0.32	10000	540	0.10	0.32	8500	300	0.10	0.32	6500	250	0.10	0.32
R2.0	10	9000	800	0.20	0.80	9000	720	0.20	0.80	7500	600	0.20	0.80	6000	400	0.20	0.80
	16	9000	800	0.20	0.60	9000	720	0.20	0.60	7500	600	0.20	0.60	6000	400	0.20	0.80
	20	7000	600	0.20	0.40	7000	540	0.20	0.40	6000	400	0.20	0.40	5000	250	0.20	0.40
	25	7000	600	0.15	0.40	7000	540	0.15	0.40	6000	400	0.15	0.40	5000	250	0.15	0.40
R2.5	16	7000	600	0.25	1.00	7000	540	0.25	0.10	6500	500	0.25	1.0	5000	400	0.25	1.00
	25	6000	500	0.25	1.00	6000	450	0.25	1.00	5000	500	0.25	1.00	4000	250	0.25	1.00

Maximum cutting depth



1.Please select high-precision machine and tool holder.

2.Please use air blow or cutting liquid with high mist retardant property.

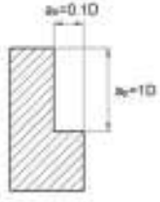
3.Make overhang of tool as short as possible in conditions of non-interference.

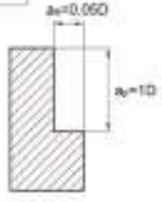
4.Reduce feed speed correspondingly when rotating speed is low.

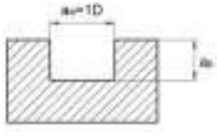
GM-2R

Workpiece material	Cast iron, Nodular cast iron		Carbon steel Alloy steel ~750N/mm²		Carbon steel Alloy steel ~30HRC		Pre-hardened steel quenched and tempered steel ~40HRC		Stainless steel		Pre-hardened steel quenched and tempered steel ~50HRC	
Diameter (mm)	Rotating speed (min⁻¹)	Feed speed (mm/min)	Rotating speed (min⁻¹)	Feed speed (mm/min)	Rotating speed (min⁻¹)	Feed speed (mm/min)	Rotating speed (min⁻¹)	Feed speed (mm/min)	Rotating speed (min⁻¹)	Feed speed (mm/min)	Rotating speed (min⁻¹)	Feed speed (mm/min)
1	20000	200	20000	200	20000	160	20000	180	20000	60	20000	120
2	15000	320	15000	320	15000	280	15000	280	11150	84	13000	180
3	14000	545	14000	545	13000	510	10600	420	7500	120	8500	330
4	10800	560	10600	560	10000	520	8000	430	5500	130	6500	335
5	8200	580	8200	580	7600	540	6400	450	4500	130	5000	355
6	7000	600	7000	600	6400	550	5300	460	3700	140	4200	360
8	5200	600	5200	600	4800	550	4000	460	2800	140	3200	365
10	4200	580	4200	580	3800	540	3200	445	2200	140	2500	360
12	3500	580	3500	580	3200	540	2650	445	1850	140	2100	360

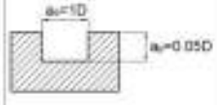
Maximum cutting depth







Diameter range	Cutting depth ap
Ø1<D<Ø3	0.15D
Ø3<D	0.3D



1.The above table shows the standard value of side milling. When milling slot, 50%~70% of rotating speed and 40%~60% of feed speed stated above are recommended as standard.

2.Please select high-precision machine and tool holder.

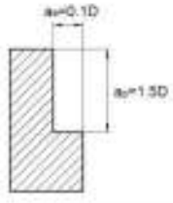
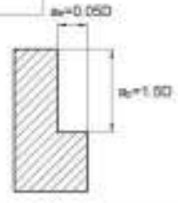
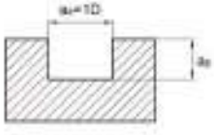
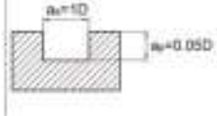
3.Please use air blow or cutting liquid with high mist retardant property.

4.Down milling is recommended in the case of side milling.

5.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.

6.Make overhang of tool as short as possible in conditions of non-interference.

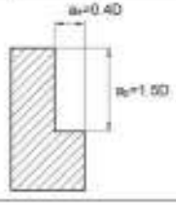
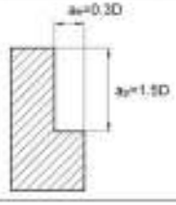
GM-4R★GM-4RL

Workpiece material	Cast iron, Nodular cast iron		Carbon steel Alloy steel ~750N/mm²		Carbon steel Alloy steel ~30HRC		Pre-hardened steel quenched and tempered steel ~40HRC		Stainless steel		Pre-hardened steel quenched and tempered steel ~50HRC	
Diameter (mm)	Rotating speed (min⁻¹)	Feed speed (mm/min)	Rotating speed (min⁻¹)	Feed speed (mm/min)	Rotating speed (min⁻¹)	Feed speed (mm/min)	Rotating speed (min⁻¹)	Feed speed (mm/min)	Rotating speed (min⁻¹)	Feed speed (mm/min)	Rotating speed (min⁻¹)	Feed speed (mm/min)
3	14000	820	14000	820	13000	755	10600	630	7500	145	6500	490
4	10800	840	10800	840	10000	770	8000	640	5500	145	6500	500
5	8200	880	8200	880	7600	810	6400	670	4500	145	5000	530
6	7000	900	7000	900	6400	830	5300	690	3700	160	4200	540
8	5200	890	5200	890	4800	815	4000	680	2800	160	3200	550
10	4200	880	4200	880	3800	810	3200	670	2200	160	2500	520
12	3500	880	3500	880	3200	810	2650	670	1850	160	2100	520
16	2600	880	2600	880	2400	830	2000	525	1400	120	1600	490
Maximum cutting depth												
												

Diameter range	Cutting depth ap
Ø1<D<Ø3	0.1xD
Ø3<D	0.3D

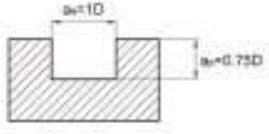
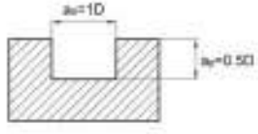
1. The above table shows the standard value of side milling. When milling slot, 50%~70% of rotating speed and 40%~60% of feed speed stated above are recommended as standard.
2. Please select high-precision machine and tool holder.
3. Please use air blow or cutting liquid with high mist retardant property.
4. Down milling is recommended in the case of side milling.
5. When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
6. Make overhang of tool as short as possible in conditions of non-interference.

GM-4W side cutting

Workpiece material	Cast iron, Nodular cast iron		Carbon steel Alloy steel ~750N/mm²		Carbon steel Alloy steel ~30HRC		Pre-hardened steel quenched and tempered steel ~40HRC		Stainless steel	
Diameter (mm)	Rotating speed (min⁻¹)	Feed speed (mm/min)	Rotating speed (min⁻¹)	Feed speed (mm/min)	Rotating speed (min⁻¹)	Feed speed (mm/min)	Rotating speed (min⁻¹)	Feed speed (mm/min)	Rotating speed (min⁻¹)	Feed speed (mm/min)
6	6350	760	5300	640	4500	360	3450	280	2650	210
7	5460	760	4550	640	3850	360	3000	280	2250	310
8	4750	760	4000	640	3400	410	2650	310	2000	240
9	4250	760	3540	640	2850	410	2300	310	1750	240
10	3800	760	3200	640	2700	430	2050	330	1600	260
11	3470	760	2900	640	2400	430	1850	330	1450	260
12	3200	770	2250	650	1950	470	1500	360	1150	280
16	2400	770	2000	640	1700	480	1300	360	1000	280
20	1900	760	1600	610	1350	470	1050	350	800	260
Maximum cutting depth										

1. The above table shows the standard value of side milling. When milling slot, 50%~70% of rotating speed and 40%~60% of feed speed stated above are recommended as standard.
2. Please select high-precision machine and tool holder.
3. Please use air blow or cutting liquid with high mist retardant property.
4. Down milling is recommended in the case of side milling.
5. When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
6. Make overhang of tool as short as possible in conditions of non-interference.

GM-4W — slot cutting

Workpiece material	Cast iron, Nodular cast iron		Carbon steel Alloy steel ~750N/mm²		Carbon steel Alloy steel ~30HRC		Pre-hardened steel quenched and tempered steel ~40HRC		Stainless steel	
cutting speed	80~120 m/min		70~100m/min		60~80m/min		40~70m/min		30~60m/min	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
6	5300	640	4500	540	3700	300	2900	230	2400	190
7	4500	630	3800	540	3200	300	2500	230	2050	190
8	4000	640	3400	540	2800	340	2200	260	1800	220
9	3500	630	3000	540	2450	340	1950	260	1600	220
10	3200	640	2700	540	2250	360	1750	280	1450	230
11	3000	630	2450	540	2050	360	1600	280	1300	230
12	2650	640	2250	540	1850	370	1450	290	1200	240
16	2000	640	1700	540	1400	390	1100	310	900	250
20	1600	640	1350	510	1100	390	900	300	700	230
Maximum cutting depth	 最大ap=12mm									

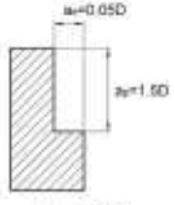
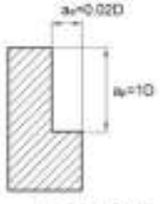
1.Please select high-precision machine and tool holder.

2.Please use air blow or cutting liquid with high mist retardant property.

3.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.

4.Make overhang of tool as short as possible in conditions of non-interference.

HM-2E

Workpiece material	Pre-hardened steel Hardened steel 40~50HRC		Hardened steel 50~60HRC		Hardened steel 60~65HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
1	40000	160	40000	160	32000	130
2	40000	400	24000	240	16000	160
3	32000	510	16000	255	11000	175
4	24000	625	12000	310	8000	210
5	19000	685	9500	340	6400	230
6	16000	770	8000	385	5300	255
8	12000	770	6000	385	4000	255
10	9600	770	4800	385	3200	255
12	8000	800	4000	400	2700	270
14	6850	680	3400	340	2300	230
16	6000	600	3000	300	2000	200
18	5300	530	2700	270	1800	180
20	4800	480	2400	240	1600	160
Maximum cutting depth	 最大ae=1.0mm		最大ae=0.5mm		 最大ae=0.3mm	

1.Please select high-precision machine and tool holder.

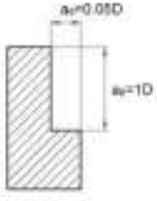
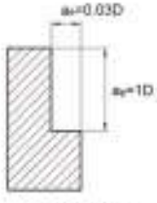
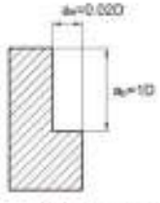
2.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.

3.Please use air blow or MQL(minimum oil mist cooling).

4.Down milling is recommended in the case of side milling.

5.Make overhang of tool as short as possible in conditions of non-interference.

HM-2EFP

Workpiece material	Pre-hardened steel Hardened steel 40~50HRC		Hardened steel 50~60HRC		Hardened steel 60~68HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
6	16000	1155	6000	460	5300	305
8	12000	1155	6000	460	4000	305
10	9600	1155	4800	460	3200	305
12	8000	1200	4000	480	2700	325
16	6000	900	3000	360	2000	240
20	4800	720	2400	285	1600	195
Maximum cutting depth	 最大ae=1.0mm		 最大ae=0.5mm		 最大ae=0.3mm	

1.Please select high-precision machine and tool holder.

2.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.

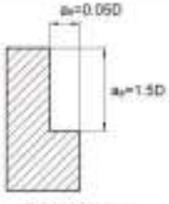
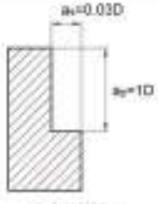
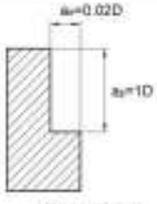
3.Please use air blow or MQL(minimum oil mist cooling).

4.Down milling is recommended in the case of side milling.

5.Make overhang of tool as short as possible in conditions of non-interference.

SOLID CARBIDE END MILL
HM-SERIES END MILL CUTTING PARAMETER

HM-4E★HM-4EL

Workpiece material	Pre-hardened steel Hardened steel 40~50HRC		Hardened steel 50~60HRC		Hardened steel 60~68HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
1	40000	320	40000	320	32000	260
2	40000	800	24000	480	16000	320
3	32000	1020	16000	510	11000	350
4	24000	1250	12000	620	8000	420
5	19000	1380	9500	680	6400	460
6	16000	1540	8000	770	5300	510
8	12000	1540	6000	770	4000	510
10	9600	1540	4800	770	3200	510
12	8000	1600	4000	800	2700	540
14	6800	1340	3400	680	2300	460
16	6000	1200	3000	600	2000	400
18	5300	1060	2700	530	1800	360
20	4800	960	2400	480	1600	320
Maximum cutting depth	 最大ae=1.0mm		 最大ae=0.5mm		 最大ae=0.3mm	

1.Please select high-precision machine and tool holder.

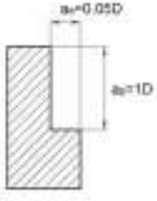
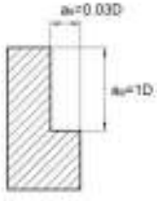
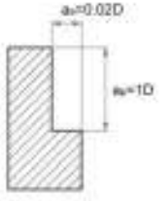
2.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.

3.Please use air blow or MQL(minimum oil mist cooling).

4.Down milling is recommended in the case of side milling.

5.Make overhang of tool as short as possible in conditions of non-interference.

HM-4EFP

Workpiece material	Pre-hardened steel Hardened steel 40~50HRC		Hardened steel 50~60HRC		Hardened steel 60~65HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
6	16000	1730	8000	920	5300	610
8	12000	1730	6000	920	4000	610
10	9600	1730	4800	920	3200	610
12	8000	1600	4000	960	2700	650
16	6000	1350	3000	720	2000	480
20	4800	1080	2400	570	1600	390
Maximum cutting depth	 最大ae=1.0mm		 最大ae=0.5mm		 最大ae=0.3mm	

1.Please select high-precision machine and tool holder.

2.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.

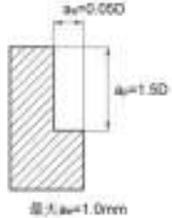
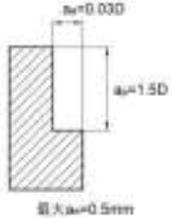
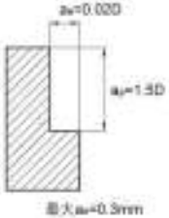
3.Please use air blow or MQL (minimum oil mist cooling).

4.Down milling is recommended in the case of side milling.

5.Make overhang of tool as short as possible in conditions of non-interference.

SOLID CARBIDE END MILL
HM-SERIES END MILL CUTTING PARAMETER

HM-6E

Workpiece material	Pre-hardened steel Hardened steel 40~50HRC		Hardened steel 50~60HRC		Hardened steel 60~65HRC	
cutting speed	300m/min		150m/min		100m/min	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
6	16000	1850	8000	925	5300	610
8	12000	1850	6000	925	4000	610
10	9600	1850	4800	925	3200	610
12	8000	1920	4000	960	2700	650
14	6800	1600	3400	815	2300	550
16	6000	1440	3000	720	2000	480
18	5300	1270	2700	635	1800	430
20	4800	1150	2400	575	1600	385
Maximum cutting depth	 最大ae=1.0mm		 最大ae=0.5mm		 最大ae=0.3mm	

1.Please select high-precision machine and tool holder.

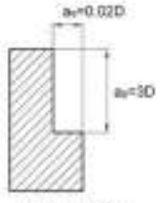
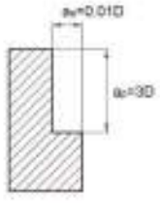
2.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.

3.Please use air blow or MQL (minimum oil mist cooling).

4.Down milling is recommended in the case of side milling.

5.Make overhang of tool as short as possible in conditions of non-interference.

HM-6EL

Workpiece material	Pre-hardened steel Hardened steel 40~50HRC		Hardened steel 50~60HRC		Hardened steel 60~68HRC	
cutting speed	300m/min		150m/min		100m/min	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
6	16000	1300	8000	650	5300	430
8	12000	1300	6000	650	4000	430
10	9600	1300	4800	650	3200	430
12	8000	1350	4000	670	2700	460
14	6800	1150	3400	570	2300	380
16	6000	1000	3000	500	2000	340
18	5300	890	2700	450	1800	300
20	4800	800	2400	400	1600	270
Maximum cutting depth	 注:ae=0.3mm					

1.Please select high-precision machine and tool holder.

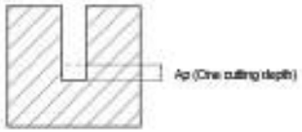
2.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.

3.Please use air blow or MQL(minimum oil mist cooling).

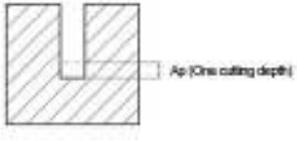
4.Down milling is recommended in the case of side milling.

5.Make overhang of tool as short as possible in conditions of non-interference.

HM-2EP

Workpiece material		Pre-hardened steel Hardened steel 40~50HRC			Hardened steel 50~60HRC		
Diameter (mm)	Effective length (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	ae (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	ae (mm)
0.5	4	21000	100	0.009	17000	50	0.009
	6	20000	75	0.006	15000	35	0.007
	8	20000	50	0.003	15000	20	0.003
0.8	4	20000	200	0.022	14000	100	0.011
	6	18000	150	0.014	14000	75	0.009
	8	18000	100	0.01	14000	50	0.006
	10	18000	75	0.007	14000	30	0.004
1.0	4	17000	400	0.035	12000	100	0.018
	6	17000	400	0.03	12000	100	0.014
	8	15000	300	0.02	10000	75	0.01
	10	15000	250	0.015	10000	50	0.008
	12	12000	150	0.01	10000	50	0.006
	14	12000	100	0.007	10000	30	0.004
1.2	6	14000	400	0.03	10000	100	0.017
	8	12000	300	0.03	10000	100	0.014
	10	12000	300	0.02	10000	75	0.01
	12	10000	200	0.01	10000	50	0.00
1.5	6	12000	400	0.06	8000	200	0.028
	8	10000	300	0.04	7000	150	0.021
	10	10000	300	0.03	7000	150	0.017
	12	10000	300	0.025	7000	100	0.01
	14	10000	250	0.02	7000	75	0.006
2.0	6	9000	400	0.13	6000	300	0.07
	8	9000	400	0.11	6000	300	0.06
	10	7000	300	0.10	6000	200	0.05
	12	7000	300	0.06	6000	200	0.03
	14	7000	250	0.04	6000	150	0.015
	16	7000	200	0.02	6000	100	0.008
Maximum cutting depth							

HM-2EP

Workpiece material		Pre-hardened steel Hardened steel 40~50HRC			Hardened steel 50~60HRC		
Diameter (mm)	Effective length (mm)	Rotating speed (min⁻¹)	Feed speed (mm/min)	ae (mm)	Rotating speed (min⁻¹)	Feed speed (mm/min)	ae (mm)
2.5	8	8000	400	0.16	5000	300	0.08
	10	8000	400	0.14	5000	300	0.07
	12	8000	400	0.09	5000	300	0.06
	14	6000	300	0.07	5000	200	0.03
	16	6000	300	0.05	5000	200	0.025
	18	6000	300	0.04	5000	150	0.02
	20	6000	300	0.02	5000	100	0.01
3.0	6	7000	400	0.18	5000	300	0.10
	8	7000	400	0.15	5000	300	0.08
	10	7000	400	0.12	5000	300	0.06
	12	7000	400	0.10	5000	300	0.05
	14	6000	300	0.08	5000	200	0.04
	16	6000	300	0.06	5000	200	0.03
	18	6000	300	0.05	5000	200	0.025
	20	6000	250	0.04	5000	150	0.01
4.0	12	4500	400	0.16	4000	300	0.08
	16	4500	400	0.14	4000	300	0.06
	20	4500	300	0.10	4000	300	0.04
	25	4500	300	0.08	4000	300	0.03
5.0	16	4000	400	0.19	3000	300	0.09
	25	4000	400	0.15	3000	300	0.06
Maximum cutting depth		 Ap (One cutting depth)					

1.Please select high-precision machine and tool holder.

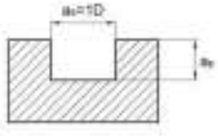
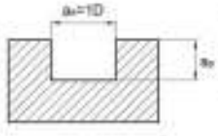
2.Please use air blow or cutting liquid with high mist retardant property.

3.Make overhang of tool as short as possible in conditions of non-interference.

4.Reduce feed speed corespondingly when rotating speed is low.

SOLID CARBIDE END MILL
HM-SERIES END MILL CUTTING PARAMETER

HM-2ES

Workpiece material	Pre-hardened steel Hardened steel 40~50HRC		Hardened steel 50~60HRC	
Diameter (mm)	Rotating speed (min⁻¹)	Feed speed (mm/min)	Rotating speed (min⁻¹)	Feed speed (mm/min)
0.3	23000	30	16500	25
0.4	17500	30	12500	25
0.5	14000	30	10000	25
0.6	11500	30	8450	25
0.7	10000	30	7500	25
0.8	8750	30	6350	25
0.9	8000	30	5500	25
1.0	7000	30	5050	25
1.5	5050	40	3550	25
2.0	3850	40	2750	25
2.5	3500	45	2500	30
3.0	2750	45	2000	30
Maximum cutting depth				

Diameter range	Cutting depth ap
D<Ø1	0.02D
Ø1<D<Ø3	0.05D

Diameter range	Cutting depth ap
D<Ø1	0.01D
Ø1<D<Ø3	0.03D

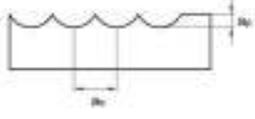
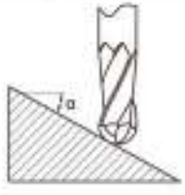
1.Please select high-precision machine and tool holder.

2.Please use air blow or cutting liquid with high mist retardant property.

3.Make overhang of tool as short as possible in conditions of non-interference.

4.Reduce feed speed corespondingly when rotating speed is low.

HM-2B★HM-2BL★HM-2BFP

Workpiece material	Pre-hardened steel Hardened steel 40~52HRC				Hardened steel 52~60HRC				Hardened steel 60~68HRC			
Radius of ball nose (mm)	Rotating speed (min⁻¹)	Feed speed (mm/min)	ap (mm)	ae (mm)	Rotating speed (min⁻¹)	Feed speed (mm/min)	ap (mm)	ae (mm)	Rotating speed (min⁻¹)	Feed speed (mm/min)	ap (mm)	ae (mm)
R0.5	40000	1900	0.01	0.05	36000	1500	0.01	0.05	32000	1400	0.01	0.05
R1.0	33000	3100	0.02	0.075	28000	2100	0.02	0.075	24000	2000	0.02	0.075
R1.5	29000	4100	0.03	0.1	23000	2900	0.03	0.1	21000	2600	0.03	0.1
R2.0	22000	3900	0.04	0.15	17000	2500	0.04	0.15	15500	2100	0.04	0.15
R2.5	17500	3500	0.05	0.15	13500	2200	0.05	0.15	13000	2000	0.05	0.15
R3.0	15000	3100	0.06	0.2	11500	1700	0.06	0.2	10500	1500	0.06	0.2
R4.0	11000	2500	0.08	0.25	8600	1600	0.08	0.25	8000	1400	0.08	0.25
R5.0	9000	2000	0.1	0.3	7000	1400	0.1	0.3	6000	1200	0.1	0.3
R6.0	7500	1800	0.1	0.35	5700	1300	0.1	0.35	5300	1200	0.1	0.35
R8.0	5500	1800	0.1	0.4	4300	1300	0.1	0.4	4000	1200	0.1	0.4
R10.0	4500	1800	0.1	0.5	3500	1300	0.1	0.5	3200	1200	0.1	0.5
Maximum cutting depth	 											

1.Please select high-precision machine and tool holder.

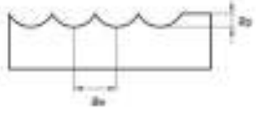
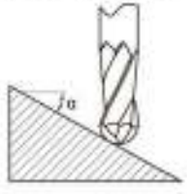
2.Above table shows the standard for operations with little change of machining load such as contour machining.When the machine rigidly and workpiece fixture stability is low,vibration and abnormal noise may be generated.Please reduce the rotating speed and feed seed stilled above correspondingly.

3.Please reduce the otating speed and feed speed into 50%-80% when angle of inclination exceeds 15°

4.Please use air blow or MQL(minimum oil mist cooling).

5.Make overhang of tool as short as possible in conditions of non-interference.

HM-4B★HM-4BL

Workpiece material	Pre-hardened steel Hardened steel 40~52HRC				Hardened steel 52~60HRC				Hardened steel 60~68HRC			
Radius of ball nose (mm)	Rotating speed (min⁻¹)	Feed speed (mm/min)	ap (mm)	ae (mm)	Rotating speed (min⁻¹)	Feed speed (mm/min)	ap (mm)	ae (mm)	Rotating speed (min⁻¹)	Feed speed (mm/min)	ap (mm)	ae (mm)
R1.5	29000	6560	0.03	0.1	22800	4560	0.03	0.1	21100	4240	0.03	0.1
R2.0	22000	6250	0.04	0.15	17100	4000	0.04	0.15	15800	3520	0.04	0.15
R2.5	17400	5600	0.05	0.15	13800	3520	0.05	0.15	12700	3200	0.05	0.15
R3.0	14600	5000	0.06	0.2	11400	3000	0.06	0.2	10600	2500	0.06	0.2
R4.0	10600	4200	0.08	0.25	8550	2500	0.08	0.25	7950	2250	0.08	0.25
R5.0	8700	3500	0.1	0.3	6850	2200	0.1	0.3	6350	2000	0.1	0.3
R6.0	7250	3000	0.1	0.35	5700	2000	0.1	0.35	5300	1900	0.1	0.35
R8.0	5450	3000	0.1	0.4	4280	2000	0.1	0.4	4000	1900	0.1	0.4
R10.0	4350	3000	0.1	0.5	3425	2000	0.1	0.5	3200	1900	0.1	0.5
Maximum cutting depth	 											

1.Please select high-precision machine and tool holder.

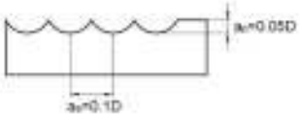
2.Above table shows the standard for operations with little change of machining load such as contour machining.When the machine rigidly and workpiece fixture stability is low,vibration and abnormal noise may be generated.Please reduce the rotating speed and feed seed stilled above correspondingly.

3.Please reduce the otating speed and feed speed into 50%-80% when angle of inclination exceeds 15°

4.Please use air blow or MQL(minimum oil mist cooling).

5.Make overhang of tool as short as possible in conditions of non-interference.

HM-2BS

Workpiece material	Pre-hardened steel Hardened steel 40~55HRC		Hardened steel 55~60HRC	
Diameter (mm)	Rotating speed (min⁻¹)	Feed speed (mm/min)	Rotating speed (min⁻¹)	Feed speed (mm/min)
R0.15	25000	135	25000	115
R0.2	25000	140	25000	120
R0.25	25000	150	25000	130
R0.3	25000	175	24000	150
R0.35	25000	190	24000	150
R0.4	24000	210	18000	140
R0.45	21000	210	15000	140
R0.5	19000	210	14000	140
R1.0	9500	210	7200	140
R1.5	6400	210	4800	140
Maximum cutting depth				

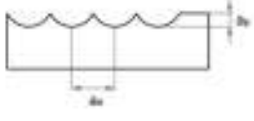
1.Please select high-precision machine and tool holder.

2.Please use air blow or cutting liquid with high mist retardant property.

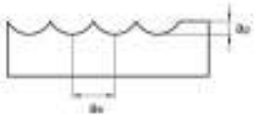
3.Make overhang of tool as short as possible in conditions of non-interference.

4.Reduce feed speed correspondingly when rotating speed is low.

HM-2BP

Workpiece material		Pre-hardened steel Hardened steel 40~55HRC				Hardened steel 55~60HRC			
Diameter (mm)	Effective length (mm)	Rotating speed (min⁻¹)	Feed speed (mm/min)	ap (mm)	ae (mm)	Rotating speed (min⁻¹)	Feed speed (mm/min)	ap (mm)	ae (mm)
R0.25	4	27000	200	0.01	0.01	27000	100	0.01	0.01
	6	20000	150	0.005	0.01	20000	75	0.005	0.005
R0.3	4	24000	200	0.03	0.06	17000	150	0.02	0.04
	6	20000	150	0.02	0.03	17000	150	0.01	0.02
	8	20000	120	0.02	0.03	17000	120	0.01	0.02
R0.4	4	21000	300	0.04	0.08	14500	200	0.03	0.08
	6	18000	200	0.02	0.04	12000	150	0.02	0.04
	8	17000	150	0.02	0.04	12000	100	0.02	0.04
	10	17000	135	0.02	0.03	12000	75	0.01	0.02
R0.5	4	21000	300	0.05	0.10	14500	200	0.05	0.10
	6	18000	200	0.05	0.10	11500	150	0.05	0.10
	8	16000	180	0.03	0.05	11500	135	0.03	0.05
	10	14000	150	0.01	0.03	9600	100	0.01	0.03
	12	14000	135	0.01	0.03	9600	75	0.01	0.03
R0.6	6	14000	200	0.06	0.12	9600	175	0.06	0.12
	8	14000	180	0.06	0.12	9600	150	0.06	0.12
	12	11000	150	0.04	0.08	7500	100	0.03	0.06
	16	11000	135	0.02	0.04	7500	75	0.02	0.03
R0.75	8	12000	250	0.08	0.15	8000	200	0.08	0.15
	12	12000	225	0.08	0.15	8000	175	0.06	0.15
	16	9500	150	0.01	0.05	6500	100	0.01	0.03
R1.0	6	13500	400	0.10	0.20	7500	225	0.10	0.20
	8	13500	400	0.10	0.16	7500	225	0.10	0.16
	10	10000	275	0.08	0.16	5500	175	0.08	0.16
	12	10000	275	0.08	0.16	5500	175	0.08	0.16
	16	10000	250	0.02	0.10	5500	150	0.02	0.10
	20	8000	175	0.02	0.05	5500	125	0.01	0.05
Maximum cutting depth									

HM-2BP

Workpiece material		Pre-hardened steel Hardened steel 40~50HRC				Hardened steel 50~60HRC			
Diameter (mm)	Effective length (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	a_p (mm)	a_e (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	a_p (mm)	a_e (mm)
R1.25	8	12500	400	0.10	0.16	7000	225	0.10	0.16
	12	9000	275	0.06	0.16	5000	175	0.06	0.16
	16	9000	250	0.02	0.10	5000	150	0.02	0.10
	20	5500	175	0.02	0.05	5000	125	0.01	0.05
R1.5	10	7500	400	0.10	0.30	4000	200	0.10	0.30
	12	7500	380	0.10	0.30	4000	180	0.10	0.30
	16	6500	250	0.05	0.20	3000	150	0.05	0.20
	20	6500	250	0.02	0.10	3000	150	0.02	0.05
R2.0	10	6000	400	0.20	0.40	3000	200	0.20	0.40
	16	6000	400	0.10	0.32	3000	200	0.20	0.20
	20	5000	250	0.10	0.20	2500	100	0.10	0.20
	25	5000	250	0.10	0.20	2500	100	0.10	0.10
R2.5	16	5000	400	0.25	0.50	3000	200	0.2	0.2
	25	4000	250	0.25	0.50	3000	100	0.20	0.2
Maximum cutting depth									

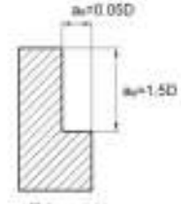
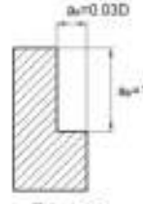
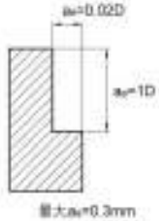
1.Please select high-precision machine and tool holder.

2.Please use air blow or cutting liquid with high mist retardant property.

3.Make overhang of tool as short as possible in conditions of non-interference.

4.Reduce feed speed correspondingly when rotating speed is low.

HM-4R★HM-4RP★HM-4RF

Workpiece material	Pre-hardened steel Hardened steel 40~50HRC		Hardened steel 50~60HRC		Hardened steel 60~68HRC	
cutting speed	300m/min		150m/min		100m/min	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
3	32000	1225	16000	610	11000	420
4	24000	1500	12000	745	8000	500
5	19000	1630	9500	815	6400	550
6	16000	1850	8000	925	5300	610
8	12000	1850	6000	925	4000	610
10	9600	1850	4800	925	3200	610
12	8000	1920	4000	960	2700	648
16	6000	1440	3000	720	2000	480
Maximum cutting depth	 ※:a_e=1.0mm		 ※:a_e=0.5mm		 ※:a_e=0.3mm	

1.Please select high-precision machine and tool holder.

2.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above corresponding.

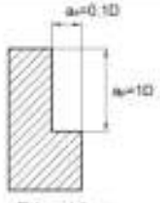
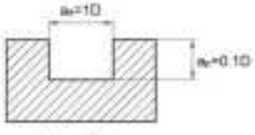
3.Please use air blow or MQL(minimum oil mist cooling).

4.Down milling is recommended in the case of side milling.

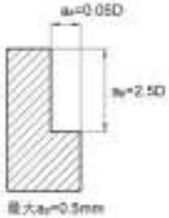
5.Make overhang of tool as short as possible in conditions of non-interference.

SOLID CARBIDE END MILL
NM-SERIES END MILL CUTTING PARAMETER

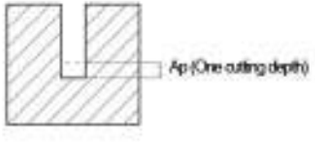
NM-2E

Workpiece material	Copper,Copper alloy	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)
1	40000	1800
2	30000	2500
3	20000	2300
4	15000	2000
5	12000	1500
6	10000	1400
8	8000	1000
10	6500	900
12	6000	850
Maximum cutting depth	 最大ap=1.0mm	 最大ap=1.0mm

NM-4E

Workpiece material	Copper,Copper alloy	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)
3	10600	250
4	8000	300
5	6500	400
6	5300	400
8	4000	450
10	3500	450
12	3000	450
Maximum cutting depth	 最大ap=0.5mm	

NM-2EP

Workpiece material		Copper,Copper alloy		
Diameter (mm)	Effective length (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	de (mm)
0.5	4	40000	800	0.004
	6	40000	700	0.002
	8	40000	500	0.001
0.8	4	40000	1000	0.02
	6	40000	1000	0.015
	8	40000	800	0.01
	10	40000	800	0.005
1.0	4	40000	1800	0.04
	6	40000	1500	0.04
	8	40000	1500	0.03
	10	30000	1000	0.02
	12	30000	800	0.015
	14	30000	600	0.01
1.5	8	40000	2000	0.09
	16	20000	1000	0.03
2.0	6	40000	2400	0.18
	8	40000	2200	0.15
	10	40000	2000	0.12
	12	30000	1500	0.10
	14	30000	1200	0.08
	16	30000	1000	0.06
2.5	10	40000	2500	0.15
	20	20000	1000	0.08
3.0	10	20000	2500	0.20
	20	20000	2000	0.12
4.0	16	15000	1800	0.25
	25	15000	1200	0.15
5.0	16	12000	2000	0.40
	25	12000	1500	0.35
Maximum cutting depth				

1.Please select high-precision machine and tool holder.

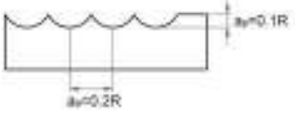
2.Please use the water-soluble cutting fluid.

3.Make overhang of tool as short as possible in conditions of non-interference.

4.Reduce feed speed correspondingly when rotating speed is low.

SOLID CARBIDE END MILL
NM-SERIES END MILL CUTTING PARAMETER

NM-2B

Workpiece material	Copper,Copper alloy	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)
R0.5	40000	900
R0.75	32000	900
R1.0	24000	870
R1.25	19000	800
R1.5	16000	650
R1.75	14000	850
R2.0	12000	900
R2.5	9600	900
R3.0	8000	1200
R4.0	7000	1500
R5.0	4800	1300
R6.0	4000	1200
Maximum cutting depth		

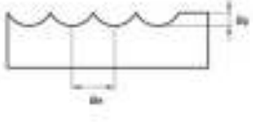
1.Please select high-precision machine and tool holder.

2.Please use the water-soluble cutting fluid.

3.Make overhang of tool as short as possible in conditions of non-interference.

4.Reduce feed speed correspondingly when rotating speed is low.

NM-2BP

Workpiece material		Copper,Copper alloy			
Diameter (mm)	Effective length (mm)	Rotating speed (min⁻¹)	Feed speed (mm/min)	ap (mm)	ae (mm)
R0.25	4	40000	750	0.01	0.025
	6	36000	500	0.008	0.02
R0.3	4	40000	900	0.012	0.03
	6	40000	750	0.010	0.02
	8	30000	400	0.008	0.01
R0.4	4	40000	1050	0.016	0.04
	6	40000	800	0.012	0.03
	8	40000	500	0.01	0.02
	10	30000	400	0.008	0.01
R0.5	4	40000	1050	0.02	0.05
	6	40000	800	0.016	0.04
	8	40000	500	0.014	0.03
	10	33000	400	0.012	0.02
	12	39000	300	0.010	0.010
R0.75	8	40000	900	0.03	0.075
	16	20000	400	0.015	0.04
R1.0	6	40000	1100	0.04	0.10
	8	40000	900	0.034	0.08
	10	40000	750	0.028	0.065
	12	40000	500	0.022	0.05
	16	30000	400	0.018	0.04
	20	20000	300	0.012	0.03
R1.5	10	40000	1100	0.06	0.15
	20	32000	600	0.03	0.08
R2.0	10	32000	1100	0.08	0.20
	16	32000	900	0.06	0.16
	20	32000	600	0.04	0.12
	25	20000	400	0.02	0.08
R2.5	16	25000	1250	0.10	0.25
	25	20000	900	0.06	0.12
Maximum cutting depth					

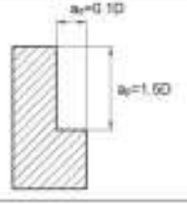
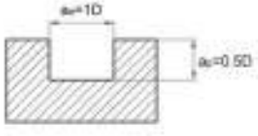
1.Please select high-precision machine and tool holder.

2.Please use air blow or cutting liquid with high mist retardant property.

3.Make overhang of tool as short as possible in conditions of non-interference.

4.Reduce feed speed correspondingly when rotating speed is low.

AL-2E★AL-2EL

Workpiece material	Aluminum alloy		Silicon<10%	
Diameter (mm)	Rotating speed (min⁻¹)	Feed speed (mm/min)	Rotating speed (min⁻¹)	Feed speed (mm/min)
1	40000	650	40000	500
2	40000	950	32000	750
3	26500	1500	21000	1100
4	20000	1600	16000	1250
5	16000	1500	13000	1100
6	13000	1250	10800	1000
8	10000	1400	8000	1100
10	8000	1600	6500	1250
12	6600	1650	5300	1300
14	5700	1700	4600	1350
16	5000	1700	4000	1350
18	4400	1700	3600	1350
20	4000	1700	3200	1350
Maximum cutting depth				

1.Please select high-precision machine and tool holder.

2.Please use the water-soluble cutting fluid.

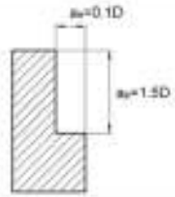
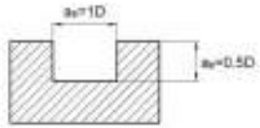
3.Make overhang of tool as short as possible in conditions of non-interference.

4.Reduce feed speed correspondingly when rotating speed is low.

5.The above table shows the standard value of side milling.

6.Down milling is recommended in the case of side milling.

AL-3E★AL-3EL

Workpiece material	Aluminum alloy		Silumin≤10%	
Diameter (mm)	Rotating speed (min⁻¹)	Feed speed (mm/min)	Rotating speed (min⁻¹)	Feed speed (mm/min)
1	40000	800	40000	800
2	40000	1200	32000	900
3	26500	1800	21000	1300
4	20000	2000	16000	1500
5	16000	1750	13000	1300
6	13000	1500	10600	1200
8	10000	1650	8000	1300
10	8000	1900	6500	1500
12	6600	1950	5300	1550
14	5700	2000	4600	1600
16	5000	2000	4000	1600
18	4400	2000	3600	1600
20	4000	2000	3200	1600
Maximum cutting depth				

1.Please select high-precision machine and tool holder.

2.Please use the water-soluble cutting fluid.

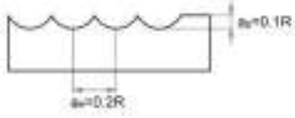
3.Make overhang of tool as short as possible in conditions of non-interference.

4.Reduce feed speed correspondingly when rotating speed is low.

5.The above table shows the standard value of side milling.

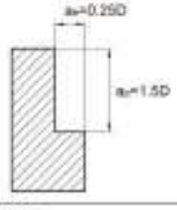
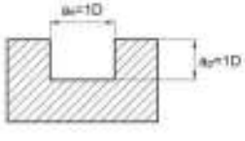
6.Down milling is recommended in the case of side milling.

AL-2B

Workpiece material	Aluminum alloy		Silumin≤10%	
Diameter (mm)	Rotating speed (min⁻¹)	Feed speed (mm/min)	Rotating speed (min⁻¹)	Feed speed (mm/min)
R1.0	40000	2000	32000	1600
R1.5	26500	1950	21000	1550
R2.0	20000	1950	16000	1550
R2.5	16000	1950	13000	1550
R3.0	13000	2000	10600	1600
R4.0	10000	2450	8000	2000
R5.0	8000	2200	6500	1750
R6.0	6600	2050	5300	1650
Maximum cutting depth				

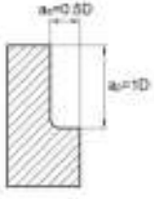
1.Please select high-precision machine and tool holder.
2.Please use the water-soluble cutting fluid.
3.Make overhang of tool as short as possible in conditions of non-interference.
4.If the cutting depth is low,it is possible to increase the rotating speed and feed speed correspondingly.

AL-3W

Workpiece material	Aluminum alloy		Silumin≤10%	
cutting speed	250m/min		200m/min	
Diameter (mm)	Rotating speed (min⁻¹)	Feed speed (mm/min)	Rotating speed (min⁻¹)	Feed speed (mm/min)
6	13000	3000	10600	1900
8	10000	3000	8000	1900
10	8000	2900	6500	1850
12	6600	2700	5300	1700
14	5700	2600	4600	1650
16	5000	2550	4000	1600
18	4400	2500	3600	1550
20	4000	2400	3200	1500
Maximum cutting depth				

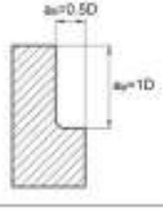
1.Please select high-precision machine and tool holder.
2.Please use the water-soluble cutting fluid.
3.Make overhang of tool as short as possible in conditions of non-interference.
4.Reduce feed speed correspondingly when rotating speed is low.
5.The above table shows the standard value of side milling.
6.Down milling is recommended in the case of side milling.

AL-2R-AIR

Workpiece material	Aluminum alloy		Si≤max≤10%	
cutting speed	500~800m/min		500~800m/min	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
6	35000	3500	35000	3500
8	26000	3800	26000	3800
10	21000	4000	21000	4000
12	18000	4300	18000	4300
16	15000	4800	15000	4800
20	12000	5500	12000	5500
Maximum cutting depth				

1.The cutting condition is suitable for the aluminum alloy high-speed machining processing center.
2.Please discharge scraps with cutting fluid or powerful cooled air.
3.Sparks when processing and heat caused by damage may result in burns or fire, please pay attention to fire prevention.
4.Balance testing must be conducted before processing.

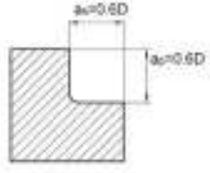
AL-2RL-AIR

Workpiece material	Aluminum alloy		Si≤max≤10%	
cutting speed	500~800m/min		500~800m/min	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
6	30000	3000	30000	3000
8	24000	3200	24000	3200
10	20000	3500	20000	3500
12	18000	3800	18000	3800
16	12000	4000	12000	4000
20	10000	4600	10000	4600
Maximum cutting depth				

1.The cutting condition is suitable for the aluminum alloy high-speed machining processing center.
2.Please discharge scraps with cutting fluid or powerful cooled air.
3.Sparks when processing and heat caused by damage may result in burns or fire, please pay attention to fire prevention.
4.Balance testing must be conducted before processing.

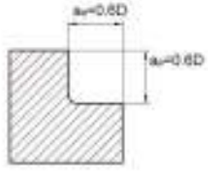
SOLID CARBIDE END MILL
AL-SERIES END MILL CUTTING PARAMETER

AL-3R-AIR

Workpiece material	Aluminum alloy		Si≤max≤10%	
cutting speed	800~1200m/min		800~1200m/min	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
12	25000	6000	25000	6000
16	20000	6400	20000	6400
20	15000	7000	15000	7000
Maximum cutting depth				

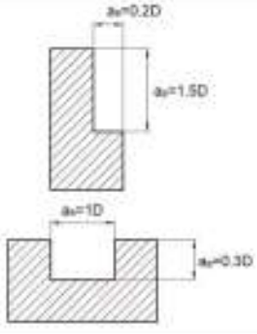
1.The cutting condition is suitable for the aluminum alloy high-speed machining processing center.
2.Please discharge scraps with cutting fluid or powerful cooled air.
3.Sparks when processing and heat caused by damage may result in burns or fire, please pay attention to fire prevention.
4.Balance testing must be conducted before processing.

AL-3RL-AIR

Workpiece material	Aluminum alloy		Si≤max≤10%	
cutting speed	800~1200m/min		800~1200m/min	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
12	22000	5300	22000	5300
16	18000	5700	18000	5700
20	13000	6000	13000	6000
Maximum cutting depth				

1.The cutting condition is suitable for the aluminum alloy high-speed machining processing center.
2.Please discharge scraps with cutting fluid or powerful cooled air.
3.Sparks when processing and heat caused by damage may result in burns or fire, please pay attention to fire prevention.
4.Balance testing must be conducted before processing.

SM-3E

Workpiece material	Carbon steel Alloy steel		Stainless steel	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
3	8500	660	4400	100
4	6400	690	3700	160
5	5800	710	3000	190
6	5300	750	2700	200
8	3900	700	2000	210
10	3100	640	1600	210
12	2600	600	1300	170
16	1900	520	1000	130
20	1500	445	800	140
Maximum cutting depth				

1.The above table shows the standard value of side milling. When milling slot, 80%~100% of rotating speed and 60%~80% of feed speed stated above are recommended as standard.

2.When cutting stainless steel and heat resistant alloy, water-soluble cutting fluid is recommended.

3.Please select high-rigidity and high-precision machine and tool holder.

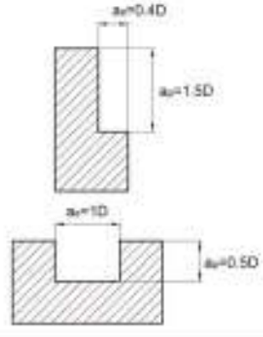
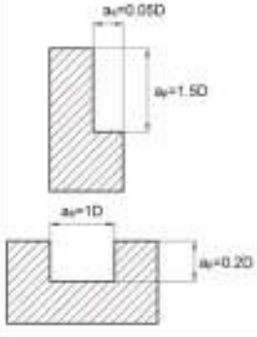
4.Adjust rotating speed and feed rate according to the cutting depth and rigidity of machine.

5.Down milling is recommended in the case of side milling.

6.Make overhang of tool as short as possible in conditions of non-interference.

SOLID CARBIDE END MILL
SM-SERIES END MILL CUTTING PARAMETER

VSM-4E★VSM-4EFP

Workpiece material	Carbon steel Alloy steel		Stainless steel		Heat resistant alloy, Titanium alloy	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
4	6400	690	3700	160	3055	90
5	5800	710	3000	190	2470	90
6	5300	750	2700	200	2470	120
8	3900	700	2000	210	1820	130
10	3100	640	1600	210	1430	130
12	2600	600	1300	170	1235	110
16	1900	520	1000	150	935	90
20	1500	445	800	140	740	90
Maximum cutting depth						

1.The above table shows the standard value of side milling. When milling slot, 80%~100% of rotating speed and 60%~80% of feed speed stated above are recommended as standard.

2.When cutting stainless steel and heat resistant alloy, water-soluble cutting fluid is recommended.

3.Please select high-rigidity and high-precision machine and tool holder.

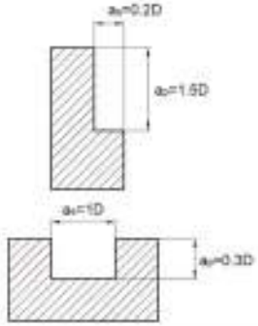
4.Adjust rotating speed and feed rate according to the cutting depth and rigidity of machine.

5.Down milling is recommended in the case of side milling.

6.Make overhang of tool as short as possible in conditions of non-interference.

7.Above table is made when L/D≤4, when L/D > 4, please reduce the rotating speed and feed rate by 70% correspondingly.

SM-4R

Workpiece material	Carbon steel Alloy steel		Stainless steel	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
6	5300	900	2700	240
8	3900	840	2000	255
10	3100	770	1600	255
12	2600	720	1300	205
Maximum cutting depth				

1.The above table shows the standard value of side milling. When milling slot, 80%~100% of rotating speed and 60%~80% of feed speed stated above are recommended as standard.

2.When cutting stainless steel and heat resistant alloy, water-soluble cutting fluid is recommended.

3.Please select high-rigidity and high-precision machine and tool holder.

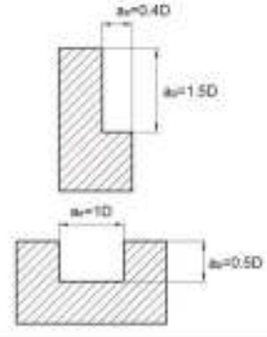
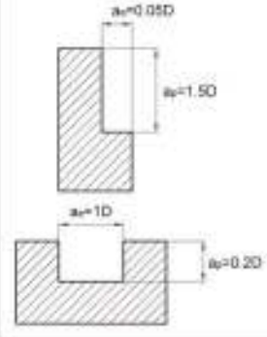
4.Adjust rotating speed and feed rate according to the cutting depth and rigidity of machine.

5.Down milling is recommended in the case of side milling.

6.Make overhang of tool as short as possible in conditions of non-interference.

SOLID CARBIDE END MILL
SM-SERIES END MILL CUTTING PARAMETER

VSM-4R★VSM-4RFP

Workpiece material	Carbon steel Alloy steel		Stainless steel		Heat resistant alloy, Titanium alloy	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
6	5300	900	2700	240	2470	145
8	3900	840	2000	255	1820	155
10	3100	770	1600	255	1430	155
12	2600	720	1300	205	1235	135
16	1900	625	1000	190	935	110
Maximum cutting depth						

1.The above table shows the standard value of side milling. When milling slot, 80%~100% of rotating speed and 60%~80% of feed speed stated above are recommended as standard.

2.When cutting stainless steel and heat resistant alloy, water-soluble cutting fluid is recommended.

3.Please select high-rigidity and high-precision machine and tool holder.

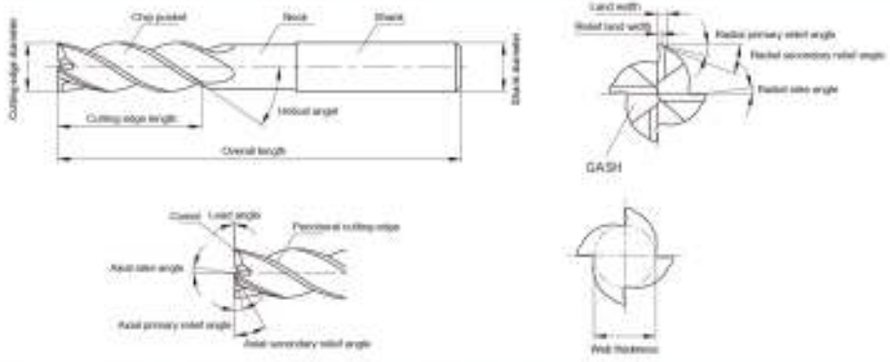
4.Adjust rotating speed and feed rate according to the cutting depth and rigidity of machine.

5.Down milling is recommended in the case of side milling.

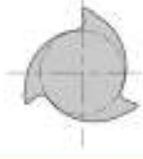
6.Make overhang of tool as short as possible in conditions of non-interference.

7.Above table is made when L/D≤4, when L/D > 4, please reduce the rotating speed and feed rate by 70% correspondingly.

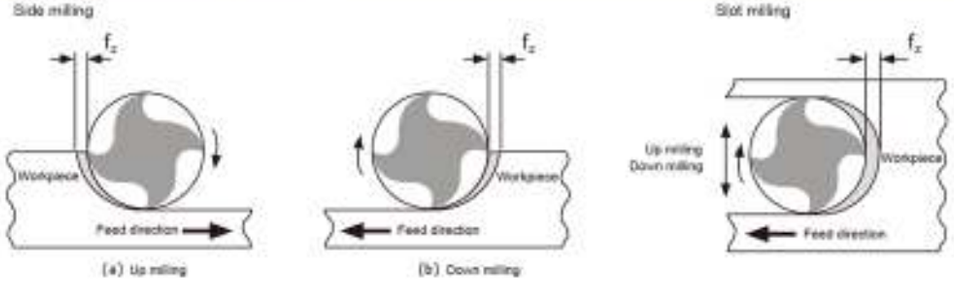
PARTS TERMINOLOGY OF END MILL



NUMBER OF TEETH , CHIP POCKET AND TOOL RIGIDITY

Number of teeth	2 Flutes	3 Flutes	4 Flutes
Profile of cross section			
Proportion of cross section	54%	56%	60%
Features: Advantages	● Large chip pocket ● Easy chip removal	● Large chip pocket ● Perfect surface finish	● Good rigidity ● Perfect surface finish
Features: Disadvantages	Low rigidity	Difficult to measure external diameter	Low rigidity
Functions	1.Slot machining 2.Side face machining 3.Hole machining	1.Slot machining 2.Side face machining 3.Heavy cutting 4.For finishing	1.Shallow slot machining 2.Side face machining 3.For finishing

DOWN MILLING AND UP MILLING

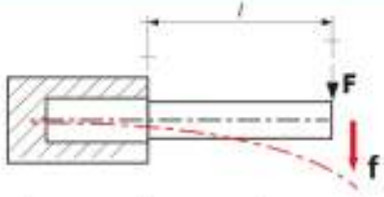


CUTTING EDGE LENGTH(OVERHANG) AND CUTTING EDGE DIAMETER

THE SHORTER OF OVERHANG IS, THE HIGHER THE RIGIDITY IS. THUS IT IS NOT EASY TO BEND OR VIBRATE IN THE CUTTING PROCESS, AND MACHINING PRECISION IS IMPROVED. WHEN LENGTH OF CUTTING EDGE (OVERHANG) DOUBLES, THE DEFLECTION DEGREE(F) WILL BE 8 TIMES OF THE ORIGINAL.

WHEN THE OVERHANG IS REDUCED BY 20%, THE DEFLECTION DEGREE(F) WILL DECREASE BY 50%

WHEN THE DIAMETER INCREASES BY 20%, THE DEFLECTION DEGREE(F) WILL DECREASE BY 50%



$$f=\frac{F\cdot l^3}{3\cdot E\cdot I}=\frac{F\cdot l^3\cdot 64}{3\cdot E\cdot d^4\cdot \pi}$$

FEED RATE SELECTION TABLE IN PROFILE MACHINING BY BALL NOSE AND R END MILLS:

$$Ry=R\times\{1-\cos[\arcsin(fr/2R)]\}$$

Ry: THEORETICAL VALUE OF SURFACE ROUGHNESS

fr: FEED RATE

R: BALL NOSE RADIUS OR CORNER RADIUS

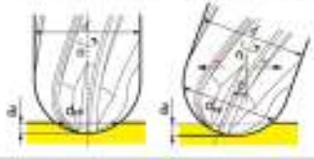
TABLE OF THEORETICAL ROUGHNESS FORMED BY BALL NOSE OF END MILL (CORNER RADIUS OF R END MILL) AND FEED RATE(MM)

Ry \ R	FEED RATE 0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
0.5	0.003	0.010	0.023	0.042	0.067	0.100				
1.0	0.001	0.005	0.011	0.020	0.032	0.046	0.063	0.083	0.107	
1.5	0.001	0.003	0.008	0.013	0.021	0.030	0.041	0.054	0.069	0.086
2.0	0.001	0.003	0.006	0.010	0.015	0.023	0.031	0.040	0.051	0.064
2.5	0.001	0.002	0.005	0.008	0.013	0.018	0.025	0.032	0.041	0.051
3.0		0.001	0.004	0.007	0.010	0.015	0.020	0.027	0.034	0.042
4.0		0.001	0.003	0.006	0.008	0.011	0.015	0.020	0.025	0.031
5.0		0.001	0.002	0.004	0.006	0.009	0.012	0.016	0.020	0.026
6.0			0.002	0.003	0.005	0.008	0.010	0.013	0.017	0.021
8.0			0.001	0.003	0.004	0.006	0.008	0.010	0.013	0.016
10.0			0.001	0.002	0.003	0.005	0.006	0.008	0.010	0.013
12.5			0.001	0.002	0.003	0.004	0.005	0.006	0.008	0.010

Ry \ R	Feed rate 1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.0
0.5										
1.0										
1.5	0.104									
2.0	0.077	0.092	0.109							
2.5	0.061	0.073	0.086	0.100						
3.0	0.051	0.061	0.071	0.083	0.095	0.109				
4.0	0.038	0.045	0.053	0.062	0.071	0.081	0.091	0.103		
5.0	0.030	0.036	0.042	0.049	0.057	0.064	0.073	0.082	0.091	0.101
6.0	0.025	0.030	0.035	0.041	0.047	0.054	0.061	0.068	0.076	0.084
8.0	0.019	0.023	0.026	0.031	0.035	0.040	0.045	0.051	0.057	0.063
10.0	0.015	0.018	0.021	0.025	0.028	0.032	0.036	0.041	0.045	0.050
12.5	0.012	0.014	0.017	0.020	0.023	0.026	0.029	0.032	0.036	0.040

SOLID CARBIDE END MILL
TECHNICAL INFORMATION

CUTTING PARAMETERS CALCULATION

Symbol	Description	Formula
n	Rotating speed per minute n[min⁻¹]r/min	$n=\frac{v_c \cdot 1000}{d \cdot \pi}$
v_c	Cutting speed Vc[m/min]	$v_c=\frac{d \cdot \pi \cdot n}{1000}$
f_z	Amount of feed per tooth f_z [mm/tooth]	$f_z=\frac{V_f}{z \cdot n}$
f	Amount of feed per rotation f[mm/rev.]	$f=f_z \cdot z$
V_f	Feed rate Vf[mm/min]	$V_f=f_z \cdot z \cdot n=f \cdot n$
Q	Removal rate Q[cm³/min]	$Q=\frac{a_e \cdot a_p \cdot v_f}{1000}$
d_{ef}	Effective diameter of ball nose end mill deff[mm] 	$\beta=0$ $d_{ef}=2 \cdot \sqrt{d \cdot a_e - a_e^2}$ $\beta \neq 0$ $d_{ef}=d \cdot sin[\beta+arccos(\frac{d-2a_e}{d})]$
V_{ef}	Effective cutting speed of end mill Veff[m/min]	$V_{ef}=\frac{d_{ef} \cdot \pi \cdot n}{1000}$
a_e	Radial cutting width ae[mm]	
a_p	Axial cutting depth ap[mm]	
d	Milling diameter[mm]	
z	Milling diameter[mm]	
β	Inclined angle	

COMMON PROBLEMS AND SOLUTIONS FOR END MILL

Common problems \ Solutions		Tool material	Cutting condition							Tool shape			Machine clamping				
		Select coated end mill	Cutting speed	Feed rate	Cutting depth	Cutting direction(down/up milling)	Cutting liquid: Increase the amount of cutting liquid	Cutting liquid: Water insoluble cutting liquid	Cutting liquid: Dry or wet machining	Helical angle	Number of tooth	Milling diameter	Reduce the overhang length	Improve tool clamping precision	Change collet	Increase clamping force	Improve workpiece clamping rigidity
Tool fractured	Fracture of end mill			↓	↓						↓	↑	✓		✓	✓	
Damage of cutting edge	Rapid wear of cutting edge	✓	↓	↑		down		✓				↑					
	Breakage		↓	↓	↓	down			dry				✓		✓		✓
	Severe chips bond	✓					✓		wet	↑							
Machining precision	Poor surface quality		↑	↓	↓			✓	wet					✓			
	Uneven			↓	↓					↓	↑	↑		✓	✓		
	Uneven side face of workpiece			↓	↓	up		✓		↑	↑	↑	✓				
	Burrs,breakage and size fritterring			↓	↓					↓							
	Large vibration		↓	↑						↑	↓	↑	✓		✓	✓	✓
Chip control	Obstructed chip removal			↓	↓		✓				↓						
Others		1.Large abrasion of cutting edge is easy to cause fracture of end mill or poor surface quality,so it is recommended to regrind the end mills. 2.Make overhang of tool as short as possible.															