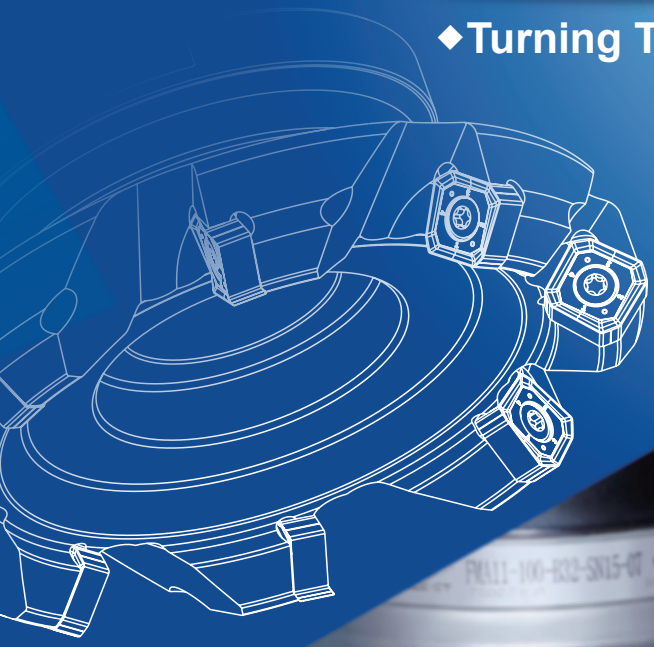
ZCC-CT

2015-2016

CUTTING TOOLS

◆Turning Tools ◆Milling Tools ◆Boring Tools







ZHUZHOU CEMENTED CARBIDE
CUTTING TOOLS CO., LTD.

By using this catalogue, you can get the following information:

- Information on new products.
- Product information: Turning tools, milling tools, boring tools, standard product series of tool holding system, description, basic dimensions, recommended grade and cutting parameters, stock, etc.
- Technical instruction: Tool selection and application, selection of insert chipbreaker and grade, typical machining case, etc.
- General technical information.

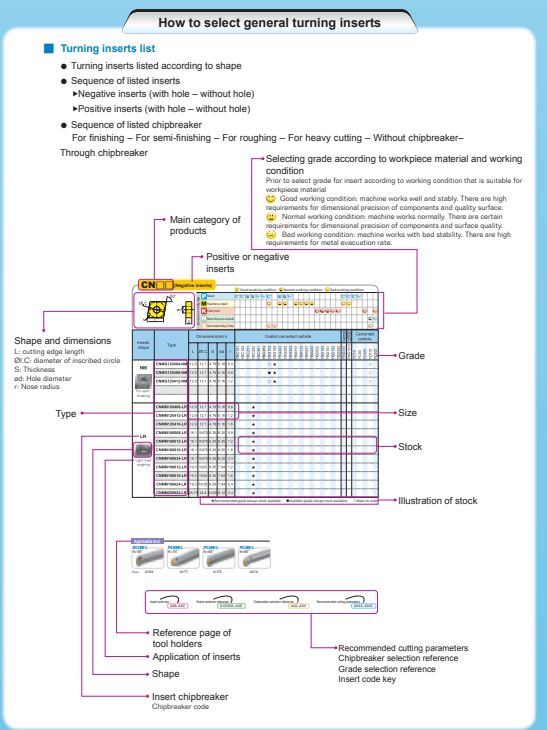
To better understand and use this catalogue, please pay more attention to the "how to choose ***", "*** overview" sections in the front of each main catalogue introduction.

Statement

- The product only provides the specifications information based on current productive conditions. We will continuously improve and innovate along with the development of technology.
- The product photos in the catalogue are for demonstration only. Due to different production technologies, product color (such as insert coating color, tool surface color) might be different from the colors shown in this catalogue. It would be advisable to refer to the real product.
- Please note that in the catalogue, the minimum ordering quantity of common inserts and ceramic insert is 10 pcs, and the minimum ordering quantity of CBN & PCD inserts is 2 pcs.
- The stock may change because new product or new grade is released.

Symbol explanation

- Good working condition
- Normal working condition
- Bad working condition
- ★ Recommended grade (always stock available)
- ● Available grade (always stock available)
- ○ Make-to-order
- ▲ Stock available
- △ Make-to-order
- ◎ Very suitable
- ○ Suitable



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, Hardened steel, Below 55HRC	H: Above 55HRC	Page: Specification	Page: Cutting parameters
High-performance general milling	Flattened	4	UM-4E (Unequal pitch)		Ø4.0~Ø20.0	◎	◎	○	◎			○	○		B230	B360 -361
			UM-4EL (Unequal pitch)		Ø4.0~Ø20.0	◎	◎	○	◎			○	○		B231	B360 -361
			UM-4EFP (Unequal pitch)		Ø6.0~Ø20.0	◎	◎	○	◎			○	○		B232	B362 -363
	Radius	4	UM-4R (Unequal pitch)		Ø4.0~Ø20.0	◎	◎	○	◎			○	○		B233	B364 -365
			UM-4RL (Unequal pitch)		Ø6.0~Ø16.0	◎	◎	○	◎			○	○		B234	B364 -365
			UM-4RFP (Unequal pitch)		Ø6.0~Ø16.0	◎	◎	○	◎			○	○		B235	B366
	Flattened	2	PML-2E (Corner protection)		Ø1.0~ Ø20.0	◎	◎	○	◎			○			B236	B367
			PML-2F (Sharp)		Ø1.0~ Ø20.0	◎	◎	○	◎			○			B237	B368
			PML-2EL (Corner protection)		Ø3.0~ Ø20.0	◎	◎	○	◎			○			B238	B367
			PML-2FL (Sharp)		Ø3.0~ Ø20.0	◎	◎	○	◎			○			B239	B368
			PML-2EFP (Corner protection)		Ø6.0~ Ø20.0	◎	◎	○	◎			○			B240	B369
		3	PML-3E-H (Corner protection)		Ø3.0~ Ø20.0	◎	◎	○	◎			○			B241	B370
			PML-3EL-H (Corner protection)		Ø3.0~ Ø20.0	◎	◎	○	◎			○			B242	B370
		4	PML-4E-G (Corner protection)		Ø1.0~ Ø20.0	◎	◎	○	◎			○			B243	B371 -372
			PML-4F-G (Sharp)		Ø1.0~ Ø20.0	◎	◎	○	◎			○			B244	B373 -374
			PML-4EL-G (Corner protection)		Ø3.0~ Ø20.0	◎	◎	○	◎			○			B245	B371 -372
			PML-4FL-G (Sharp)		Ø3.0~ Ø20.0	◎	◎	○	◎			○			B246	B373 -374
			PML-4EX-G (Corner protection)		Ø3.0~ Ø20.0	◎	◎	○	◎			○			B247	B375
			PML-4E (Corner protection)		Ø1.0~ Ø20.0	◎	◎	○	◎			○			B248	B376 -377
			PML-4EL (Corner protection)		Ø3.0~ Ø20.0	◎	◎	○	◎			○			B249	B376 -377
			PML-4E-H (Corner protection)		Ø3.0~ Ø20.0	◎	◎	○	◎			○			B250	B371 -372
			PML-4EL-H (Corner protection)		Ø3.0~ Ø20.0	◎	◎	○	◎			○			B251	B371 -372
			PML-4EFP (Corner protection)		Ø6.0~ Ø20.0	◎	◎	○	◎			○			B252	B378 -379
		6	PML-6E (Corner protection)		Ø6.0~ Ø20.0	◎	◎	○	◎			○			B253	B380
			PML-6EL (Corner protection)		Ø6.0~ Ø20.0	◎	◎	○	◎			○			B254	B381
	Ball nose	2	PML-2B		R0.5~R10.0	◎	◎	○	◎			○			B255	B382 -383

◎Very suitable ○Suitable

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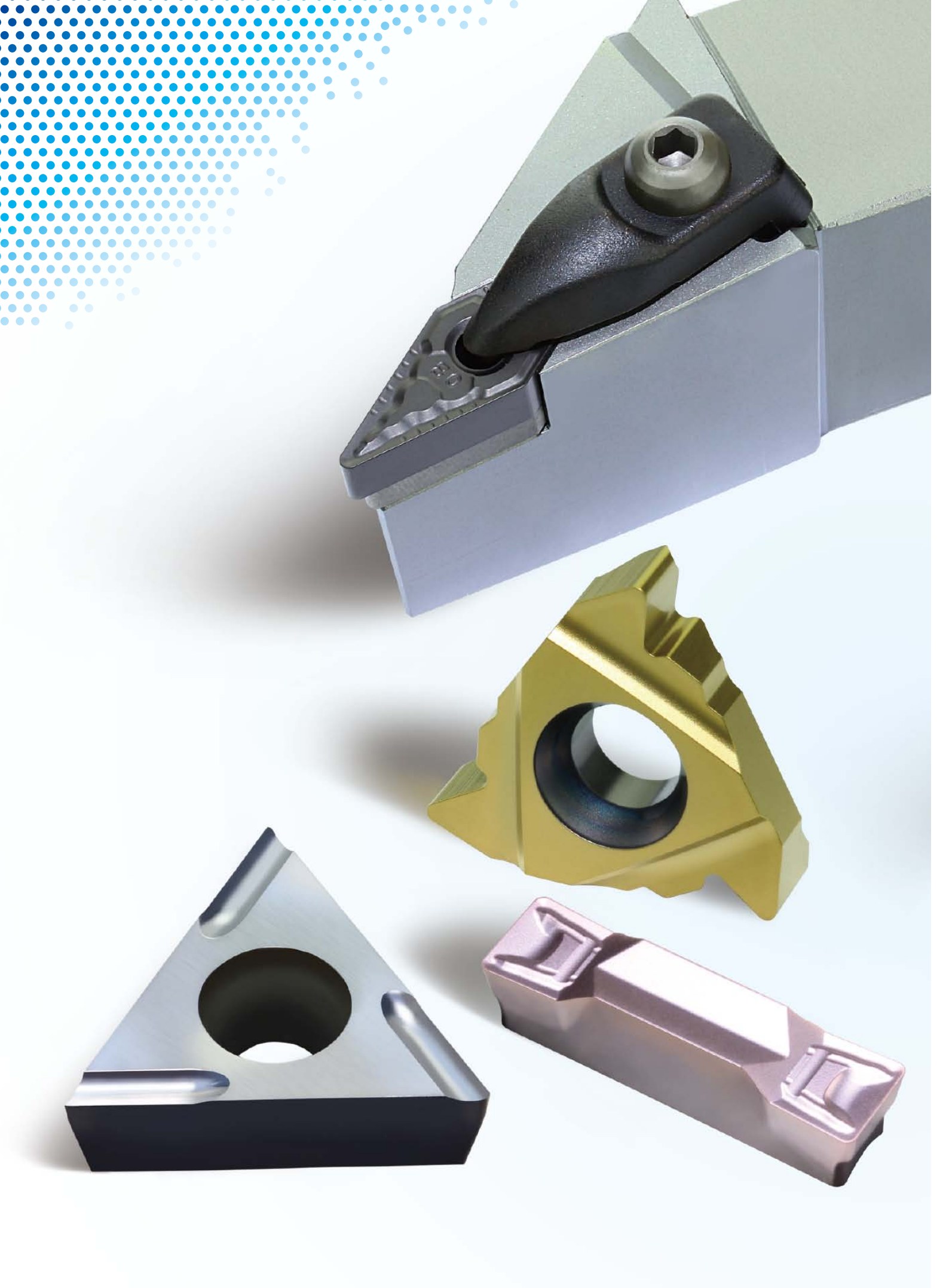


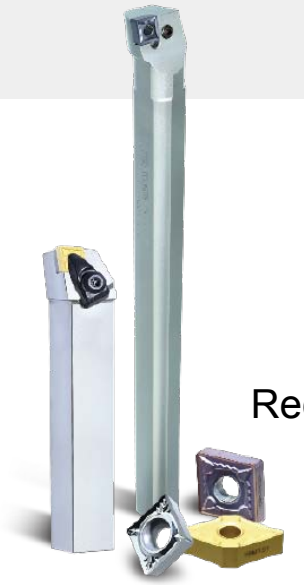


Turning Tools

General turning tools
Parting and grooving tools
Threading tools



Turning



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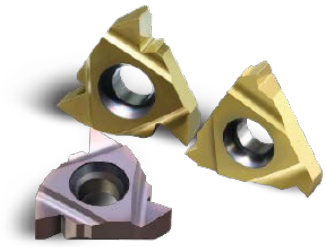
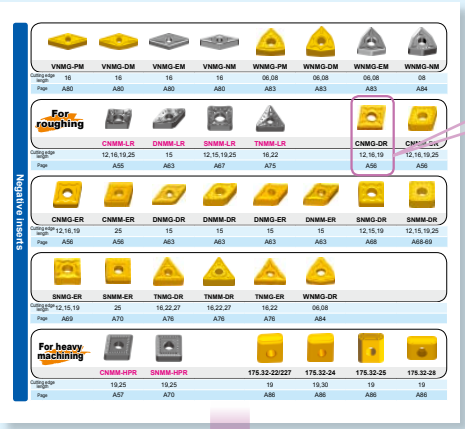
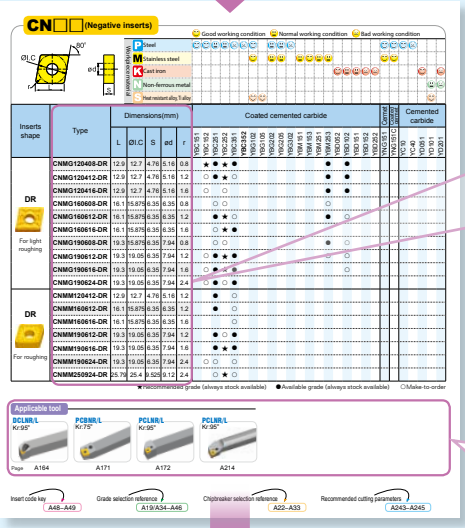
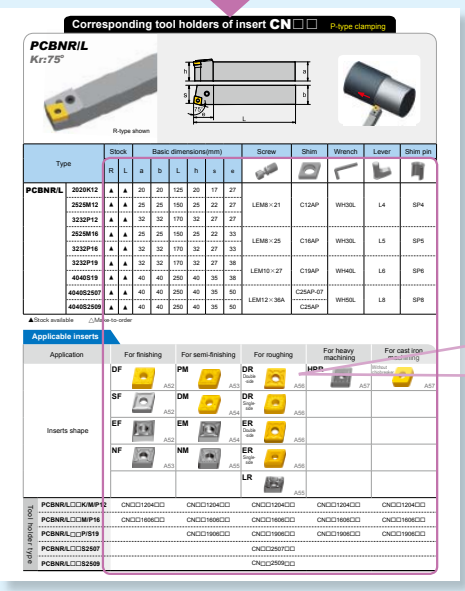


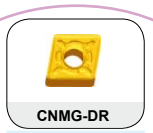
Guide to selecting general turning tools

Selection A











Step **1** : **I want to order inserts**

•Shape, •Size, •Chipbreaker

Dimensions(mm)				
L	I.C	S	d	r
12.9	12.7	4.76	5.16	0.4

Step **2** : **Details of inserts**

•Shape, •Size, •Chipbreaker, •Grade, •Stock

Applicable tool holders

•Approach angle, Page





Step **3** : **Selecting tool holder**

•Tool holder type, Size, •Stock

•Operation genre, •Applicable inserts

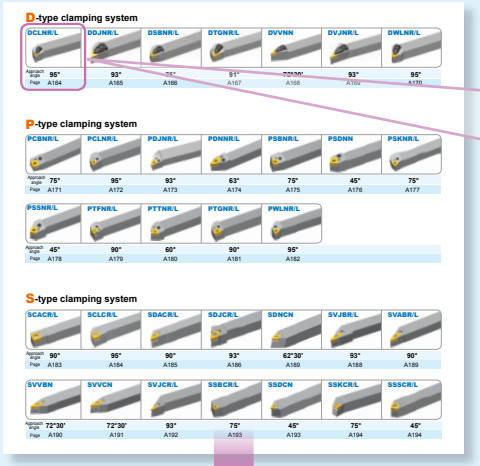
For roughing

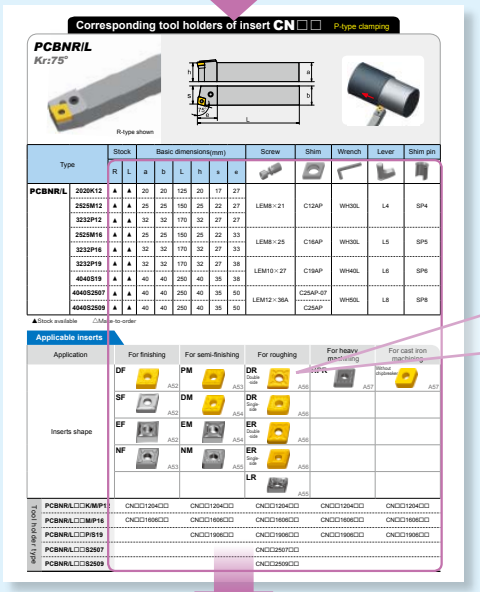
DR Double -side A56

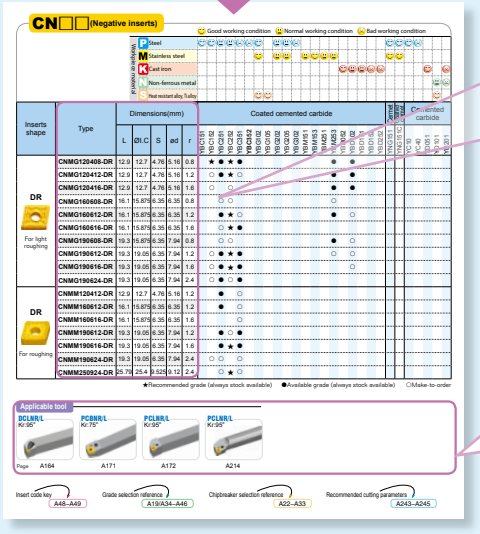
Step **4** : **Return to locate inserts**

Guide to selecting general turning tools

Selection B



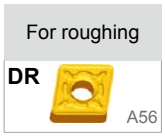








Step **1** : **I want to order tool holders**
•Approach angle, •Clamping system

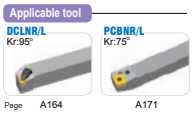


Step **2** : **Details of tool holder**
•Tool holder type, Size, •Operation genre
•Applicable inserts



Dimensions(mm)				
L	I.C	S	d	r
12.9	12.7	4.76	5.16	0.4

Step **3** : **Details of insert**
•Shape, •Size, •Chipbreaker, •Grade, •Stock
Applicable tool holders
•Approach angle, •Page



Step **4** : **Return to locate tool holder**

Guide to selecting parting and grooving tools

Parting and grooving tools



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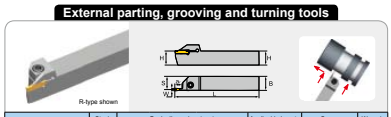
1 Selection of tool holder type

External parting, grooving and turning tools

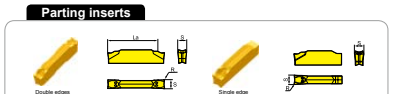


Type		Stock R	Stock L	Basic dimensions(mm) H×B	L	S	W	Applicable inserts	Screw	Wrench
QEED	1616RL10	▲	▲	16×16	125	15	2.5	10		
	1616RL17	▲	▲	16×16	125	15	2.5	17		
	2020RL10	▲	▲	20×20	125	19	2.5	10		
	2020RL17	▲	▲	20×20	125	19	2.5	17		
	2525RL10	▲	▲	25×25	150	24	2.5	10		
	2525RL17	▲	▲	25×25	150	24	2.5	17		
QEFD	1616RL10	▲	▲	16×16	125	14.8	3	10		
	1616RL17	▲	▲	16×16	125	14.8	3	17		
	2020RL10	▲	▲	20×20	125	18.8	3	10		
	2020RL17	▲	▲	20×20	125	18.8	3	17		
	2525RL10	▲	▲	25×25	150	23.8	3	10		
	2525RL17	▲	▲	25×25	150	23.8	3	17		
QEGD	2020RL13	▲	▲	20×20	140	18.5	4	13		
	2020RL22	▲	▲	20×20	140	18.5	4	22		
	2525RL13	▲	▲	25×25	150	23.5	4	13		
	2525RL22	▲	▲	25×25	150	23.5	4	22		
	3232RL13	▲	▲	32×32	170	30.5	4	13		
	3232RL22	▲	▲	32×32	170	30.5	4	22		
QEHD	2525RL13	▲	▲	25×25	150	23	5	13		
	2525RL22	▲	▲	25×25	150	23	5	22		
QEHS	2525N30	▲	▲	25×25	150	12.5	5	30		
QEHD	3232RL13	▲	▲	32×32	170	30	5	13		
	3232RL22	▲	▲	32×32	170	30	5	22		
QEHS	3232N30	▲	▲	32×32	170	16	5	30		
QEKD	2525RL13	▲	▲	25×25	150	22.6	6	13		
	2525RL22	▲	▲	25×25	150	22.6	6	22		
QEKS	2525N30	▲	▲	25×25	150	12.5	6	30		
QEKD	3232RL13	▲	▲	32×32	170	29.6	6	13		
	3232RL22	▲	▲	32×32	170	29.6	6	22		
QEKS	3232N30	▲	▲	32×32	170	16	6	30		
QELD	2525RL16	▲	▲	25×25	150	22	8	16		
	2525RL25	▲	▲	25×25	150	22	8	25		
	3232RL28	▲	▲	32×32	170	29	8	28		

▲Stock available □Make-to-order

2 Tool holder type, Size and applicable inserts

Parting inserts



Type		Basic dimensions(mm) $S^{+0.1}_{-0.1}$	Basic dimensions(mm) $R_{\pm 0.1}$	Basic dimensions(mm) Cutting depth $\ell_{2\,max.}$	Grade CVD Coating YBC151	Grade CVD Coating YBC251	Grade PVD Coating YBG205	Grade PVD Coating YBG302	Grade Cemented carbide YD101
Double edge type	ZPED02502-MG	2.5	0.2	17		○	★	★	
	ZPFD0302-MG	3.0	0.2	17		○	★	○	
	ZPGD0402-MG	4.0	0.2	22		○	★	○	
	ZPHD0503-MG	5.0	0.3	22		○	★	○	
	ZPKD0604-MG	6.0	0.4	22		○	★	○	
Single edge type	ZPES02502-MG	2.5	0.2			○	★	★	
	ZPFS0302-MG	3.0	0.2			○	★	○	
	ZPGS0402-MG	4.0	0.2			○	★	○	
	ZPHS0503-MG	5.0	0.3			○	★	○	
	ZPKS0604-MG	6.0	0.4			○	★	○	

The single-edge insert is only mounted on parting blade.

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

3 Insert type, Chip-breaker, Size and grade

Parting and grooving inserts

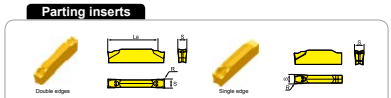
Little squirrel series



	ZP□D-MG	ZP□S-MG	ZT□D-MG
Cutting edge width	2.5,3,4,5,6	2.5,3,4,5,6	2.5,3,4,5,6
Page	A257	A257	A258

1 Selecting insert type

Parting inserts



Type		Basic dimensions(mm) $S^{+0.1}_{-0.1}$	Basic dimensions(mm) $R_{\pm 0.1}$	Basic dimensions(mm) Cutting depth $\ell_{2\,max.}$	Grade CVD Coating YBC151	Grade CVD Coating YBC251	Grade PVD Coating YBG205	Grade PVD Coating YBG302	Grade Cemented carbide YD101
Double edge type	ZPED02502-MG	2.5	0.2	17		○	★	★	
	ZPFD0302-MG	3.0	0.2	17		○	★	○	
	ZPGD0402-MG	4.0	0.2	22		○	★	○	
	ZPHD0503-MG	5.0	0.3	22		○	★	○	
	ZPKD0604-MG	6.0	0.4	22		○	★	○	
Single edge type	ZPES02502-MG	2.5	0.2			○	★	★	
	ZPFS0302-MG	3.0	0.2			○	★	○	
	ZPGS0402-MG	4.0	0.2			○	★	○	
	ZPHS0503-MG	5.0	0.3			○	★	○	
	ZPKS0604-MG	6.0	0.4			○	★	○	

The single-edge insert is only mounted on parting blade.

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

2 Insert type, Chip-breaker, Size and grade

Guide of selecting threading tools

Threading tools



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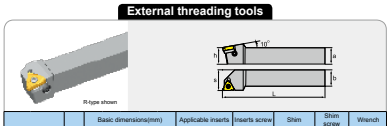
External threading tools



Type	Stock	Basic dimensions(mm) a	h	b	L	s	Applicable inserts	Inserts screw	Shim	Shim screw	Wrench
ZSER	1616H16 ▲	16	16	16	100	20	Z16ER□□□□	860 M3.5X12T	MT16-□□MN	SM40BC	WT15IP
	2020K16 ▲	20	20	20	125	25					
	2525M16 ▲	25	25	25	150	32					
	3225P16 ▲	32	32	25	170	32					
	3232P16 ▲	32	32	32	170	40					
	2525M22 ▲	25	25	25	150	32	Z22ER□□□□	860 M5X17	MT22-□□MN	SM5X8.5	WT20IP
	3225P22 ▲	32	32	25	170	32					
	3232P22 ▲	32	32	32	170	40					
	4040S22 △	40	40	40	250	50					
ZSEL	1616H16 ▲	16	16	16	100	20	Z16EL□□□□	860 M3.5X12T	MT16-□□MN	SM40BC	WT15IP
	2020K16 ▲	20	20	20	125	25					
	2525M16 ▲	25	25	25	150	32					
	3225P16 ▲	32	32	25	170	32					
	3232P16 ▲	32	32	32	170	40					
	2525M22 ▲	25	25	25	150	32	Z22EL□□□□	860 M5X17	MT22-□□MN	SM5X8.5	WT20IP
	3225P22 ▲	32	32	25	170	32					
	3232P22 ▲	32	32	32	170	40					
	4040S22 △	40	40	40	250	50					

▲Stock available △Make-to-order

ISO metric thread (with end)

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



Type		Basic dimensions(mm)				Recommended coating grade	
The right hand tools	The left hand tools	Pitch	S	Ø1.C	ød	YBG203	YBG205
Z16ER0.5ISO	Z16EL0.5ISO	0.50	3.52	9.525	4.0	★	○
Z16ER0.75ISO	Z16EL0.75ISO	0.75	3.52	9.525	4.0	★	○
Z16ER1.0ISO	Z16EL1.0ISO	1.00	3.52	9.525	4.0	★	○
Z16ER1.25ISO	Z16EL1.25ISO	1.25	3.52	9.525	4.0	★	○
Z16ER1.5ISO	Z16EL1.5ISO	1.50	3.52	9.525	4.0	★	○
Z16ER1.75ISO	Z16EL1.75ISO	1.75	3.52	9.525	4.0	★	○
Z16ER2.0ISO	Z16EL2.0ISO	2.00	3.52	9.525	4.0	★	○
Z16ER2.5ISO	Z16EL2.5ISO	2.50	3.52	9.525	4.0	★	○
Z16ER3.0ISO	Z16EL3.0ISO	3.00	3.52	9.525	4.0	★	○
Z22ER3.5ISO	Z22EL3.5ISO	3.50	4.65	12.7	5.0	★	○
Z22ER4.0ISO	Z22EL4.0ISO	4.00	4.65	12.7	5.0	★	○
Z22ER4.5ISO	Z22EL4.5ISO	4.50	4.65	12.7	5.0	★	○
Z22ER5.0ISO	Z22EL5.0ISO	5.00	4.65	12.7	5.0	★	○
Z22ER5.5ISO	Z22EL5.5ISO	5.50	4.65	12.7	5.0	★	○
Z22ER6.0ISO	Z22EL6.0ISO	6.00	4.65	12.7	5.0	★	○

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

1 Selection of tool holder type

2 Tool holder type, Size and applicable inserts

3 Insert type, Chip-breaker, Size and grade

Threading inserts

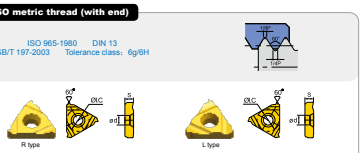
Right hand type shown



	External thread	Internal thread	External thread	Internal thread
Pitch/ Number of pitch	0.5~6	0.5~6	0.5~5	0.5~5
Page	A290	A291	A392	A392

ISO metric thread (with end)

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



Type		Basic dimensions(mm)				Recommended coating grade	
The right hand tools	The left hand tools	Pitch	S	Ø1.C	ød	YBG203	YBG205
Z16ER0.5ISO	Z16EL0.5ISO	0.50	3.52	9.525	4.0	★	○
Z16ER0.75ISO	Z16EL0.75ISO	0.75	3.52	9.525	4.0	★	○
Z16ER1.0ISO	Z16EL1.0ISO	1.00	3.52	9.525	4.0	★	○
Z16ER1.25ISO	Z16EL1.25ISO	1.25	3.52	9.525	4.0	★	○
Z16ER1.5ISO	Z16EL1.5ISO	1.50	3.52	9.525	4.0	★	○
Z16ER1.75ISO	Z16EL1.75ISO	1.75	3.52	9.525	4.0	★	○
Z16ER2.0ISO	Z16EL2.0ISO	2.00	3.52	9.525	4.0	★	○
Z16ER2.5ISO	Z16EL2.5ISO	2.50	3.52	9.525	4.0	★	○
Z16ER3.0ISO	Z16EL3.0ISO	3.00	3.52	9.525	4.0	★	○
Z22ER3.5ISO	Z22EL3.5ISO	3.50	4.65	12.7	5.0	★	○
Z22ER4.0ISO	Z22EL4.0ISO	4.00	4.65	12.7	5.0	★	○
Z22ER4.5ISO	Z22EL4.5ISO	4.50	4.65	12.7	5.0	★	○
Z22ER5.0ISO	Z22EL5.0ISO	5.00	4.65	12.7	5.0	★	○
Z22ER5.5ISO	Z22EL5.5ISO	5.50	4.65	12.7	5.0	★	○
Z22ER6.0ISO	Z22EL6.0ISO	6.00	4.65	12.7	5.0	★	○

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

1 Selecting insert category

2 Insert type, Chip-breaker, Size and grade

Cemented carbide and cermet inserts

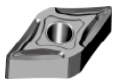
Negative inserts

For finishing









	CNMG-DF	CNMG-SF	CNMG-EF	CNEG-NF	DNMG-DF	DNMG-SF	DNMG-EF
Cutting edge length	09,12	09,12	09,12	12	11,15	11,15	11,15
Page	A52	A52	A52	A53	A59	A60	A60

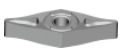









	DNEG-NF	SNMG-DF	SNMG-EF	SNMG-SF	TNMG-DF	TNMG-SF	TNMG-EF	VNMG-DF
Cutting edge length	15	09,12	09,12,15	09,12,15	16,22	11,16,22	11,16,22	16
Page	A60	A65	A65	A65	A73	A73	A74	A79

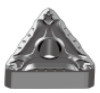




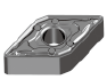
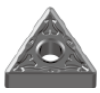

	VNMG-EF	VNEG-NF	VNMG-SF	WNMG-DF	WNMG-SF	WNMG-EF	WNEG-NF
Cutting edge length	16	16	16	06,08	06,08	06,08	08
Page	A79	A79	A79	A81	A81	A82	A82

New Wiper






	CNMG-WGF	DNMX-WGF	TNMX-WGF	WNMG-WGF
Cutting edge length	12	11,15	16	06,08
Page	A52	A59	A73	A81

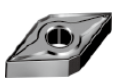

	CNMG-WGM	DNMX-WGM	TNMX-WGM	WNMG-WGM
Cutting edge length	12	15	16	06,08
Page	A53	A61	A74	A82

For semi-finishing

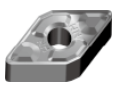








	CNMG-PM	CNMG-DM	CNMG-EM	CNMG-NM	DNMG-PM	DNMG-DM	DNMG-EM
Cutting edge length	09,12,16,19	09,12,16,19	12,16	12	11,15	11,15	11,15
Page	A53	A54	A54	A55	A61	A62	A62





	DNMG-NM	SNMG-PM	SNMG-DM	SNMG-EM	SNMG-NM	TNMG-PM	TNMG-DM	TNMG-EM
Cutting edge length	15	09,12,15,19	09,12,15,19	12,15	12	11,16,22	11,16,22	16,22
Page	A62	A66	A66	A67	A67	A74	A75	A75

Negative inserts



	VNMG-PM	VNMG-DM	VNMG-EM	VNMG-NM	WNMG-PM	WNMG-DM	WNMG-EM	WNMG-NM
Cutting edge length	16	16	16	16	06,08	06,08	06,08	08
Page	A80	A80	A80	A80	A83	A83	A83	A84

New

For roughing



		CNMM-LR	DNMM-LR	SNMM-LR	TNMM-LR		CNMG-DR	CNMM-DR
Cutting edge length		12,16,19,25	15	12,15,19,25	16,22		12,16,19	12,16,19,25
Page		A55	A63	A67	A75		A56	A56



	CNMG-ER	CNMM-ER	DNMG-DR	DNMM-DR	DNMG-ER	DNMM-ER	SNMG-DR	SNMM-DR
Cutting edge length	12,16,19	25	15	15	15	15	12,15,19	12,15,19,25
Page	A56	A56	A63	A63	A63	A63	A68	A68-69



	SNMG-ER	SNMM-ER	TNMG-DR	TNMM-DR	TNMG-ER	WNMG-DR
Cutting edge length	12,15,19	25	16,22,27	16,22,27	16,22	06,08
Page	A69	A70	A76	A76	A76	A84

New

For heavy machining



		CNMM-HPR	SNMM-HPR		175.32-22/227	175.32-24	175.32-25	175.32-28
Cutting edge length		19,25	19,25		19	19,30	19	19
Page		A57	A70		A86	A86	A86	A86

For profiling

All round



			KNUX			CNMG	CNMM	DNMG
Cutting edge length			16			12,16,19	12,19	15,19
Page			A85			A58	A58	A64



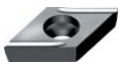
	SNMG	SNMM	TNMG	TNMM	VNMG
Cutting edge length	09,12,15,19,25	09,12,19,25	11,16,22,27,33	16,22,27	16
Page	A71	A71-72	A77	A78	A80

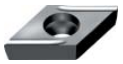
Without chipbreaker



		CNMA	DNMA	SNMA	TNMA	WNMA
Cutting edge length		12,16,19	11,15	09,12,15,19	16,22,27	06,08
Page		A57	A64	A72	A78	A84

For extra finishing — New -USF


	CCGT-USF	DCGT-USF	TCGT-USF	VCGT-USF	DPGT-USF	VPGT-USF
Cutting edge length	09	07,11	11	08,11	07,11	08,11
Page	A87	A91	A98	A103	A109	A112









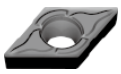

	CCGT-SF	DCGT-SF	TCGT-SF	VCGT-SF	VBGT-SF	CPGT-SF	DPGT-SF	TBGH-L
Cutting edge length	06,09	07,11	06,09,11	11	11	06,09	07,11	06
Page	A87	A91	A98	A103	A106	A108	A109	A111




	TPGT-SF	TPGH-L
Cutting edge length	09,11	09,11
Page	A111	A111

For finishing






	CCMT-HF	CCMT-EF	DCMT-HF	DCMT-EF	SCMT-HF	SCMT-EF	TCMT-HF
Cutting edge length	06,09,12	06,09,12	07,11	07,11	09	09	06,09,11,16
Page	A87	A88	A91	A92	A96	A96	A99



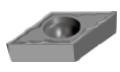





	TCMT-EF	VCGT-HF	VCGT-NF	VBMT-EF	VBMT-HF	VBET-NF
Cutting edge length	09,11,16	11	16	11,16	11	16
Page	A100	A103	A103	A106	A106	A106

For semi-finishing






	CCMT-HM	CCMT-EM	DCMT-HM	DCMT-EM	SCMT-HM	SCMT-EM	TCMT-HM
Cutting edge length	06,09,12	06,09,12	07,11	07, 11	09,12	09,12	09,11,16
Page	A88	A88	A92	A92	A96	A96	A101





	TCMT-EM	VBMT-EM	VBMT-HM
Cutting edge length	09,11,16	11	16
Page	A100	A107	A107

Positive inserts

For roughing

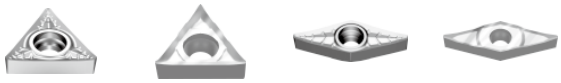


	CCMT-HR	DCMT-HR	SCMT-HR	TCMT-HR	VBMT-HR
Cutting edge length	06,09,12	11	09,12	09,11,16,22	16
Page	A89	A93	A97	A101	A107

For Al machining



	CCGX-LC	CCGX-LH	DCGX-LC	DCGX-LH	RCGX-LH	SCGX-LC	SCGX-LH
Cutting edge length	06,09,12	06,09,12	07,11	07,11	08	09,12	09,12
Page	A89	A89-90	A93	A93	A94	A97	A97



	TCGX-LC	TCGX-LH	VCGX-LC	VCGX-LH
Cutting edge length	09,11,16	09,11,16	11,16,22	11,16,22
Page	A101	A102	A104	A104

All round



	RCM(G)T	RCMX	SCMT	TCMT	WCMX-53
Cutting edge length	08,10,12,16,19	08,10,12,16,20,25,32	09,12	22	04,06,08
Page	A94	A95	A97	A102	A105

Without chipbreaker



	CCMW	DCMW	SCMW	TCMW	SPMW
Cutting edge length	06,09,12	07,11	06,09,12	11,16,22	09,12
Page	A90	A93	A97	A102	A110

New PCBN&PCD inserts

Negative inserts



	CNGA	DNGA	SNGA	TNGA	VNGA	WNGA
Cutting edge length	12	15	12	16	16	08
Page	A120	A122	A124	A126	A127	A128

PCBN inserts turning case



	CNGN	DNGN	SNGN	WNGN	RNGN
Cutting edge length	12	11	12,15	06,08	09,12,15
Page	A121	A123	A125	A129	A129

Positive inserts



	CCGW	CCMX	DCGW	DCMX	SCGW	SCMX	TCGW	TCMX
Cutting edge width	06,09,12	06,09,12	07,11	07,11	12	12	09,11,16	09,11,16
Page	A130	A131	A132	A132	A134	A134	A135	A136



	VBGW	VBMX	VCGW	VCMX		CCGN	DCGN	RCGN
Cutting edge width	16	16	16	16		12	11	09,12,15
Page	A137	A137	A138	A138		A131	A133	A138

Ceramic inserts



	CNGA	CNGN	CNGX	DNGA	DNGN	DNGX	SNGA	SNGX
Cutting edge width	12,16	12,16	12	15	15	15	12	12
Page	A142	A143	A144	A144	A145	A145	A146	A146



	SNGN	TNGA	TNGN	WNGA	RNGN
Cutting edge width	09,12,15,19,25	16,22	16,22	08	09,12,15,19,25
Page	A147	A148	A149	A150	A150

Parting and grooving inserts

Little squirrel series

	ZP□D-MG	ZP□S-MG	ZT□D-MG	ZT□D-MM (New)	ZT□S-MG	ZT□D-EG
Cutting edge width	2.5,3,4,5,6	2.5,3,4,5,6	2.5,3,4,5,6	2,3,4,5,6,8	5,6	1-2.4(tailor-made)
Page	A257	A257	A258	A258	A258	A259

	ZT□D-EG	ZIMF-NM	ZR□D-MG	ZR□D-EG	ZIGQ-NM	ZR□D-LH	ZILD-LC
Cutting edge width	2.4-6.5(tailor-made)	3,4,5,6	2.5,3,4,5,6	3,4,5,6	3,4,5,6	6,8	8
Page	A259	A260	A260	A261	A261	A262	A262

Supplemental series

	ZQMX-1E
Cutting edge width	3.125,4.125,5.125,6.4,7.05
Page	A263

Threading inserts (New)

Right hand type shown	ISO metric thread		General pitch thread		Whitworth thread	
	External thread	Internal thread	External thread	Internal thread	External thread	Internal thread
Pitch/ Number of pitch	0.5~6	0.5~6	0.5~5	0.5~5	8~19	8~19
Page	A290	A291	A292	A292	A293	A293

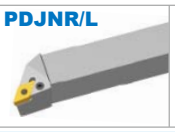
Right hand type shown	Unified thread		British Standard pipe thread		American standard pipe thread	
	External thread	Internal thread	External thread	Internal thread	External thread	Internal thread
Pitch/ Number of pitch	8~24	8~24	11~28	11~28	8~27	8~27
Page	A294	A294	A295	A295	A296	A296

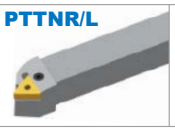
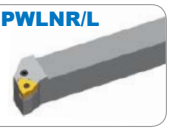
Tool holders for external turning

D-type clamping system

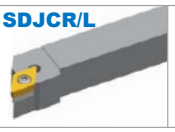
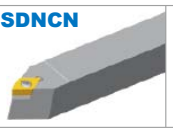
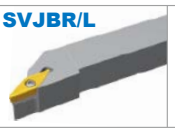
DCLNR/L	DDJNR/L	DSBNR/L	DTGNR/L	DVVNN	DVJNR/L	DWLNR/L
						
Approach angle 95°	93°	75°	91°	72°30'	93°	95°
Page A164	A165	A166	A167	A168	A169	A170

P-type clamping system

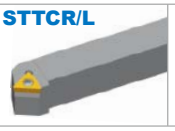
PCBNR/L	PCLNR/L	PDJNR/L	PDNNR/L	PSBNR/L	PSDNN	PSKNR/L
						
Approach angle 75°	95°	93°	63°	75°	45°	75°
Page A171	A172	A173	A174	A175	A176	A177

PSSNR/L	PTFNR/L	PTTNR/L	PTGNR/L	PWLNR/L
				
Approach angle 45°	91°	60°	90°	95°
Page A178	A179	A180	A181	A182

S-type clamping system

SCACR/L	SCLCR/L	SDACR/L	SDJCR/L	SDNCN	SVJBR/L	SVABR/L
						
Approach angle 90°	95°	90°	93°	62°30'	93°	90°
Page A183	A184	A185	A186	A187	A188	A189

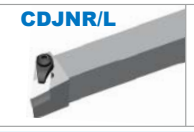
SVVBN	SVVCN	SVJCR/L	SSBCR/L	SSDCN	SSKCR/L	SSSCR/L
						
Approach angle 72°30'	72°30'	93°	75°	45°	75°	45°
Page A190	A191	A192	A193	A193	A194	A194

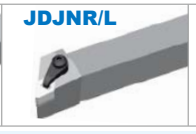
STACR/L	STFCR/L	STGCR/L	STTCR/L	SWACR/L	SRDCN	SRGCR/L
						
Approach angle 90°	91°	91°	60°	90°		
Page A195	A195	A196	A197	A198	A199	A200

C-type clamping system

CKJNR/L	CKNNR/L
	
Approach angle 93°	63°
Page A201	A201

Turning tool holders for ceramic inserts

CCLNR/L	CTJNR/L	CTUNR/L	CDJNR/L	CSRNR/L	CSKNR/L	CSDNN
						
Approach angle 95°	93°	93°	93°	75°	75°	45°
Page A202	A202	A203	A203	A204	A204	A205

CRDNN	JCLNR/L	JDJNR/L	JSDNN
			
Approach angle	95°	93°	45°
Page A205	A206	A206	A207

Turning tool holders for internal machining

P-type clamping system

PCLNR/L	PDSNR/L	PDUNR/L	PSKNR/L	PTFNR/L	PWLNR/L
					
Approach angle 95°	62°30'	93°	75°	90°	95°
Page A214	A215	A216	A217	A218	A219

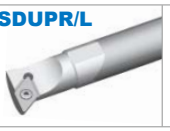
S-type clamping system

SCLCR/L	SDQCR/L	SDUCR/L	SDZCR/L	SSKCR/L	STFCR/L	SVQCR/L
						
Approach angle 95°	107°30'	93°	95°	75°	91°	107°30'
Page A220	A221	A222	A223	A224	A225	A226

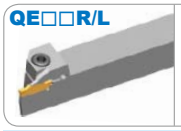
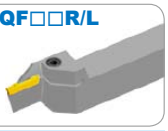
SVUCR/L	SVQBR/L	SVUBR/L	SCLPR/L	SDQPR/L	SDUPR/L	STUPR/L
						
Approach angle 93°	107°30'	93°	95°	107°30'	93°	93°
Page A227	A228	A229	A230	A231	A232	A233

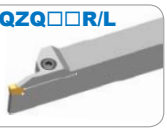
SCFCR	SCLCR
	
Approach angle 90°	95°
Page A234	A235

Damping tool holders

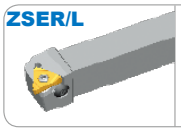
SCLPR/L	SDQPR/L	SDUPR/L	STUPR/L	SVQCR/L	SVUCR/L
					
Approach angle 95°	107°30'	93°	93°	107°30'	93°
Page A237	A238	A239	A240	A241	A241

Parting and grooving tools

QE□□R/L	QECDR/L	QX□DR/L	QE□SR/L	QE□S□□N	QZS□	QF□□R/L
						
Page A266	A267	A267	A268	A269	A269	A270-271

QF□□RR/LL	QF□DR/L	C□□□-Q□DR/L	C40X-Q□DR/L	QZQ□□R/L
				
Page A272-275	A276-277	A278	A278	A280

Threading tools

ZSER/L	ZSIR/L
	
Page A298	A299


-WGM
-WGF
New product for turning
Wiper


- HPR
New product for turning
New Generation of Roughing Chipbreaker
- LR


-LC chipbreaker
for Al machining

New product for turning

YBM153

Grade for stainless steel machining

Best choice for cutting stainless steel with high speed under good working condition





ISO		General turning								Threading	Parting and grooving		
Code		Coating		Cermet	Coated cermet	Ceramic	Cemented carbide	PCBN	PCD	Coating	Coating		Cemented carbide
		CVD	PVD							PVD	CVD	PVD	
P Steel	01												
	10	YBC151, YBC251, YBC152, YBC252, YBC351, YBC352	YBG102, YBG202	YNG151	YNG151C	CN2000, CA1000	YC10, YC40			YBG202, YBG203	YBC251	YBG205, YBG302	
	20												
	30												
	40												
M Stainless steel	01												
	10	YBM151, YBM153, YBM251, YBM253	YBG202, YBG205	YNG151	YNG151C					YBG202, YBG203		YBG205, YBG302	
	20												
	30												
	40												
K Cast iron	01							YCB211					
	10	YBD052, YBD102, YBD152, YBD151, YBD252		YNG151	YNG151C	CN1000	YD051, YD201	YCB011, YZB221		YBG202, YBG203		YBG205, YBG302	YD201
	20					CN2000		YZB231					
	30												
N Non ferrous metal	01								YCD412				
	10						YD101		YCD011, YCD421, YCD511	YBG202, YBG203			YD201
	20												
	30												
S Heat resistant alloy & Ti alloy	01												
	10		YBG102, YBG105, YBG202				YD101			YBG202, YBG203		YBG102, YBG302	YD201
	20												
	30												
H Super hard material	01							YCB121					
	10							YCB012		YBG202, YBG203			
	20							YZB121					
	30												

How to select general turning inserts

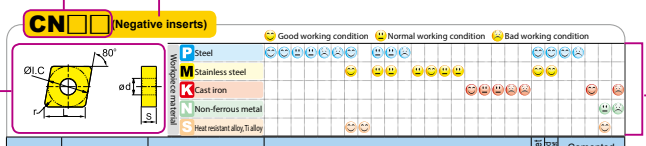
Turning inserts list

- Turning inserts listed according to shape
- Sequence of listed inserts
  - ▸Negative inserts (with hole – without hole)
  - ▸Positive inserts (with hole – without hole)
- Sequence of listed chipbreaker
  For finishing – For semi-finishing – For roughing – For heavy cutting – Without chipbreaker–
  Through chipbreaker

Selecting grade according to workpiece material and working condition
Prior to select grade for insert according to working condition that is suitable for workpiece material
😊 Good working condition: machine works well and stably. There are high requirements for dimensional precision of components and quality surface.
😐 Normal working condition: machine works normally. There are certain requirements for dimensional precision of components and surface quality.
☹ Bad working condition: machine works with bad stability. There are high requirements for metal evacuation rate.

Main category of products

Positive or negative inserts



Shape and dimensions
L: cutting edge length
ØI.C: diameter of inscribed circle
S: Thickness
ød: Hole diameter
r: Nose radius

Grade

Type

Size

Stock

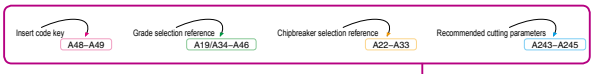
Illustration of stock

Inserts shape	Type	Dimensions(mm) L	ØI.C	S	ød	r	Coated cemented carbide YBC151	YBC152	YBC251	YBC252	YBC351	YBC352	YBG102	YBG105	YBG202	YBG205	YBG302	YBM151	YBM251	YBM253	YBD052	YBD102	YBD151	YBD152	YBD252	Cermet	Coated cermet	Cemented carbide YNG151	YNG151C	YC10	YC40	YD051	YD101	YD201
NM For semi-finishing	CNMG120404-NM	12.9	12.7	4.76	5.16	0.4							○	★																		○		
	CNMG120408-NM	12.9	12.7	4.76	5.16	0.8							●	★																		○		
	CNMG120412-NM	12.9	12.7	4.76	5.16	1.2							○	★																		○		
LR Light-load roughing	CNMM120408-LR	12.9	12.7	4.76	5.16	0.8						★																						
	CNMM120412-LR	12.9	12.7	4.76	5.16	1.2						★																						
	CNMM120416-LR	12.9	12.7	4.76	5.16	1.6						★																						
	CNMM160608-LR	16.1	15.875	6.35	6.35	0.8						★																						
	CNMM160612-LR	16.1	15.875	6.35	6.35	1.2						★																						
	CNMM160616-LR	16.1	15.875	6.35	6.35	1.6						★																						
	CNMM160624-LR	16.1	15.875	6.35	6.35	2.4						★																						
	CNMM190612-LR	19.3	19.05	6.35	7.94	1.2						★																						
	CNMM190616-LR	19.3	19.05	6.35	7.94	1.6						★																						
	CNMM190624-LR	19.3	19.05	6.35	7.94	2.4						★																						
	CNMM250924-LR	25.79	25.4	9.525	9.12	2.4						★																						

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

Illustration of stock





Reference page of tool holders

Application of inserts

Shape

Insert chipbreaker
Chipbreaker code

Recommended cutting parameters
Chipbreaker selection reference
Grade selection reference
Insert code key

TURNING

General turning inserts

A22-A25 **General turning inserts overview**

A26-A47 **Application instruction of general turning inserts**

A48-A150 **General turning inserts**

A48-A49 General turning inserts code key

A50-A51 Metric-Inch comparison table for general turning inserts

A52-A112 Cemented carbide and cermet inserts

A52-A86 Negative inserts

A87-A112 Positive inserts

A113-A139 PCBN&PCD inserts

A114-A115 PCBN&PCD inserts code key

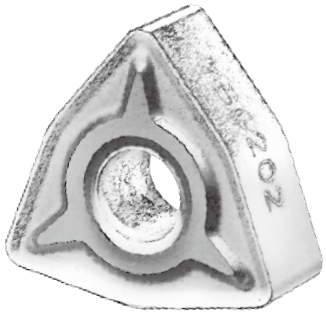
A116-A119 PCBN&PCD inserts overview

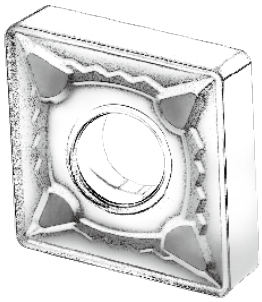
A120-A139 PCBN&PCD inserts

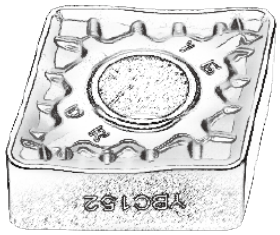
A140-A150 Ceramic inserts

A140-A141 Ceramic inserts code key

A142-A150 Ceramic inserts

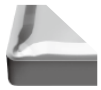
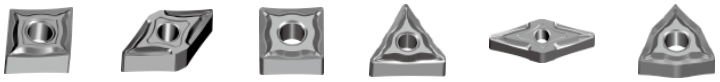
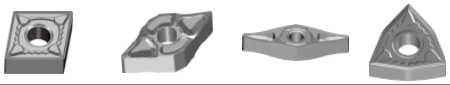
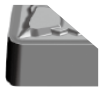






General turning inserts overview

Negative inserts with hole

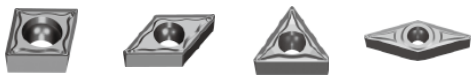
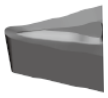
Appli-cation	Chipbreaker	Preci-sion	Recommended cutting parameters	Feature/Shape of insert
For finishing	SF 	M	ap=0.05~1(mm) fn=0.05~0.35(mm/r)	**Recommended chipbreaker for finishing of P-type materials** Double-sided chipbreaker with M-level tolerance has outstanding performance in finishing, achieving good surface quality. 
	DF 	M	ap=0.3~2(mm) fn=0.05~0.35(mm/r)	**Recommended chipbreaker for finishing of M- type materials** Double-sided chipbreaker with M-level tolerance has sharp edges, which can effectively cut off stainless steel and avoid adhering and surface hardening, achieving high surface quality. 
	EF 	M	ap=0.05~1(mm) fn=0.05~0.3 (mm/r)	**Recommended chipbreaker for finishing of S-type materials** Double-sided chipbreaker with M-level tolerance can prevent wear and hardening to achieve high machining precision and good surface quality. 
	NF 	E	ap=0.1~1(mm) fn=0.05~0.3(mm/r)	**Recommended chipbreaker for finishing of S-type materials** Double-sided chipbreaker with E-level tolerance can prevent wear and hardening to achieve high machining precision and good surface quality. 
Wiper	WGF 	M	ap=0.5~3.0(mm) fn=0.05~0.5(mm/r)	**Wiper chipbreaker for finishing** Double-sided chipbreaker with M-level tolerance, finishing chipbreaker with wiper designed can achieve high surface quality. With excellent chip breaking ability, It is suitable for machining at high feed and small depth of cut. 
For semi-finishing	DM 	M	ap=1.5~5(mm) fn=0.15~0.5(mm/r)	**Recommended chipbreaker for semi-finishing of P-type materials** Double-sided chipbreaker with M-level tolerance produces small cutting forces and has large chip breaking range, which ensures good performance for machining highly adhesive alloy steel. 
	PM 	M	ap=1.5~5(mm) fn=0.15~0.5(mm/r)	**Recommended chipbreaer for semi-finishing of P-type materials** Double-sided chipbreaker with M-level tolerance has higher strength of cutting edge than chipbreaker DM. It is suitable for semi-finishing under unstable working conditions as well as machining cast iron with small cutting forces. 
	NM 	M	ap=0.1~1.5(mm) fn= 0.05~0.3(mm/r)	**Recommended chipbreaker for semi-finishing of S-type materials** Double-sided chipbreaker with M-class tolerance keeps high precision after inserts are turned, with good capability to prevent wear and hardening to achieve higher machining efficiency than chipbreaker NF. 
	WGM 	M	ap=1.0~5.0(mm) fn=0.15~0.80(mm/r)	**Wiper chipbreaker for semi-finishing** Double-sided chipbreaker with M-level tolerance, semi-finishing chipbreaker with wiper designed, perfect combination of good wiper result and sturdy cutting edge structure, which perfectly meet the requirement of high efficiently and good surface quality. 
	EM 	M	ap=0.5~1.5(mm) fn=0.1~0.3(mm/r)	**Recommended chipbreaker for semi-finishing of M-type materials** Double-sided chipbreaker with M-level tolerance can solve the processing problems such as chip breaking and adhering of stainless steel, achieving higher machining efficiency than chipbreaker EF. 

Negative inserts with hole

Appli-cation	Chipbreaker	Preci-sion	Recommended cutting parameters	Feature/Shape of insert
For semi-finishing	All round 	M	ap=1.5~5(mm) fn=0.2~0.5(mm/r)	**From semi-finishing to roughing of P-type, M-type, K-type materials** Double-sided chipbreaker with M-level tolerance has good cutting edge strength and wide application. 
Light-load roughing	DR Double-side 	M	ap=3~12(mm) fn=0.3~0.8(mm/r)	**Recommended chipbreaker for light roughing of P-type and K-type materials** Double-sided chipbreaker with M-level tolerance is the first choice for light roughing, can achieve high evacuation rate and efficiency of cutting edge. 
	LR Single-side 	M	ap=3~15(mm) fn=0.3~1.0 (mm/r)	**Recommended chipbreaker for light-load roughing of P-type materials** Single-sided general chipbreaker with M-level tolerance, has wide chip breaking range and sharp cutting edge is designed with inclined angle, which enables it to cut lightly and easily and control the chipping flow direction. Chip-leaded-stages can reduces the contact area with chips, so that heat can easily be dissipated. 
For roughing	DR Single-side 	M	ap=3~15(mm) fn=0.3~0.8 (mm/r)	**Recommended chipbreaker for roughing of P-type materials** Single-sided chipbreaker with M-level tolerance has high security of cutting edge, which can achieve high feed rate and low cutting forces at great cutting depth and high feed rate. 
	ER Single/ Double side 	M	Double sided ap=2.5~8(mm) fn=0.2~0.6(mm/r) Single sided ap=2.5~20(mm) fn=0.2~1.2(mm/r)	**Recommended chipbreaker for roughing of M-type materials** Single / double-sided chipbreaker with M-level tolerance has good capacity of impact-resistance. It is designed to achieve balance between security and sharpness of the cutting edge, and it can achieve high efficiency by preventing the problems of adhering and high cutting heat when roughing stainless steel. 
	HPR Single-side 	M	ap=3~17(mm) fn= 0.5~1.2(mm/r)	**Recommended chipbreaker for heavy-load machining of P-type materials** Single-sided chipbreaker with M-level tolerance, strong cutting edge. Multi-stages chipbreaker ensures the flowing of chip and heat dissipation of insert. It is suitable for machining under unstable and relatively bad working condition, especially for external roughing of work piece with a rough oxidized surfaces. 
Cast iron machining	Without chipbreaker 	M	ap=0.3~12(mm) fn=0.05~0.6(mm/r)	**For cast iron machining** Double-sided chipbreaker with M-level tolerance has high cutting edge strength. It can overcome inferior factors such as intettruption and vibration, etc. when machining cast iron. 
Super hard inserts	Without chipbreaker 	G	ap=0.05~0.5(mm) fn=0.05~0.3(mm/r)	**For machining of non-ferrous metal and high-hardness metal** G-level tolerance is the best choice for machining non-ferrous metals and high-hardness material by welding PCBN and PCD material to cemented carbide substrate. 
Ceramic inserts	Without chipbreaker 	G	ap=0.1~3(mm) fn= 0.05~0.4(mm/r)	**For machining of hardened steel, cast iron and steel** Ceramic inserts with double-side G-level tolerance can be used for machining various materials such as hardened steel, cast iron and steel, etc. according to different treatment on cutting edge. 

General turning inserts overview

Positive inserts with hole

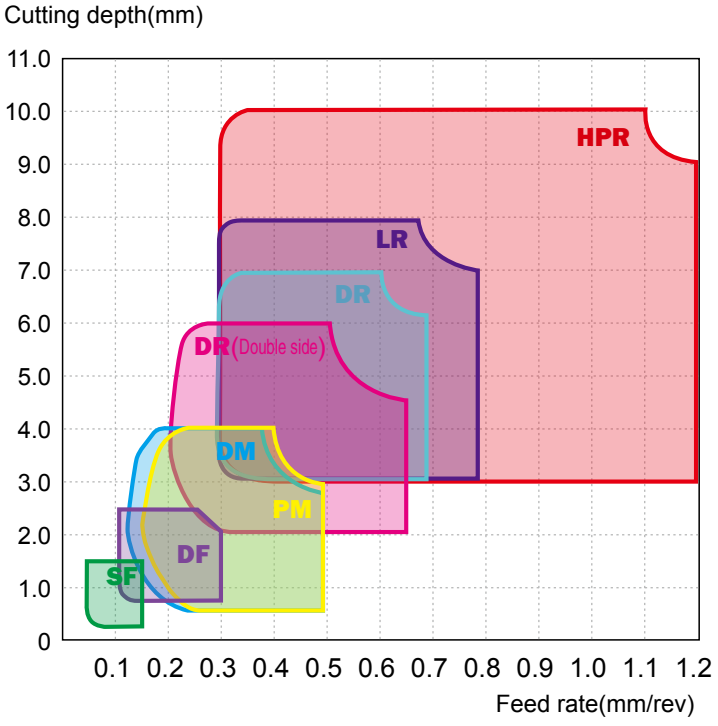
Appli-cation	Chipbreaker	Preci-sion	Recommended cutting parameters	Feature/Shape of insert
For extra finishing	**USF** 	G	ap=0.02~1.5(mm) fn= 0.01~0.08(mm/r)	**Precision turning chipbreaker** With G-level tolerance, large rake angle, sharp cutting edge, for soft cutting action, this is the first choice for precision turning of small shaft parts. 
	R/L 	G	ap=0.05~2.5(mm) fn= 0.03~0.25(mm/r)	**Recommended chipbreaker for precise boring inserts** With G-level tolerance, sharp cutting edge and small nose radius, it can effectively reduce the vibration in machining and is suitable for boring and external turning. 
	SF 	G	ap=0.05~1(mm) fn=0.05 ~0.3(mm/r)	**First choice for finishing with high requirements on chipbreaker** With G-level tolerance, it is the first choice for precise finishing due to its excellent performance on chip breaking. 
For finishing	**HF** 	M	ap=0.1~2(mm) fn=0.05~0.3 (mm/r)	**Chipbreaker for finishing with wide application** With M-level tolerance, it is suitable for internal and external finishing of various materials such as steel and cast iron. 
	EF 	M	ap=0.1~2(mm) fn=0.05~0.3 (mm/r)	**Recommended chipbreaker for finishing of M-type materials** With M-level tolerance, it has sharp cutting edges and is suitable for cutting adhesive materials such as stainless steel, soft steel, etc. 
	NF 	E G	ap=0.05~1(mm) fn=0.05~0.2 (mm/r)	**Recommended chipbreaker for finishing S-type materials** With E and G-level tolerance and sharp cutting edges, it is suitable for internal and external finishing of high-temperature alloy materials. 
For semi-finishing	**HM** 	M	ap=1~4(mm) fn=0.2~0.5(mm/r)	**Chipbreaker for semi-finishing with wide application** With M-level tolerance, it is suitable for internal and external semi-finishing of materials like steel, cast iron, etc. 
	EM 	M	ap=1~4(mm) fn=0.2~0.5(mm/r)	**Recommended chipbreaker for semi-finishing of M-Type materials** With M-level tolerance, it has higher hardness of cutting edge than EF and can achieve higher efficiency. 

Positive inserts with hole

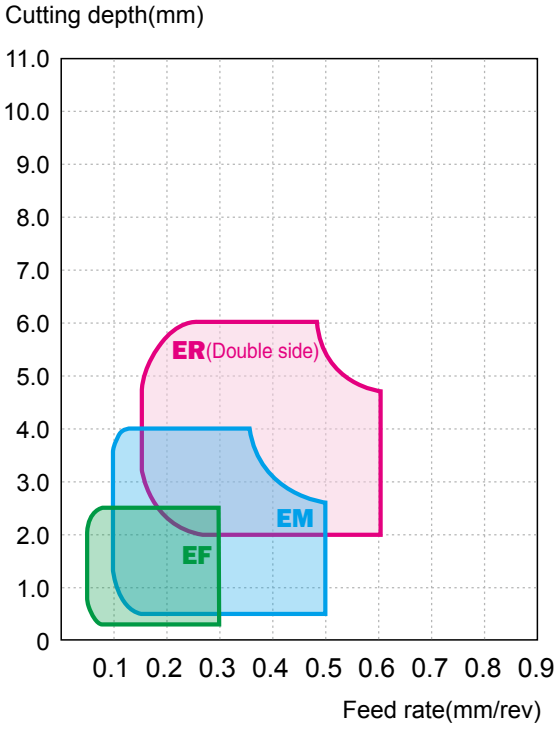
Appli-cation	Chipbreaker	Preci-sion	Recommended cutting parameters	Feature/Shape of insert
For semi-finishing	All round 	M	ap=1~8(mm) fn=0.2~0.6(mm/r)	**Recommended chipbreaker for semi-finishing of M-type materials** With M-level tolerance, it is suitable for profile machining materials like steel, cast iron, etc. 
Cast iron machining	Without chipbreaker 	M G	ap=0.3~12(mm) fn= 0.05~0.5(mm/r)	**Chipbreaker for machining of cast iron** With M- and G- level tolerance, it has high cutting edge strength and is suitable for internal and external machining of cast iron. 
For roughing	HR 	M	ap=3~7(mm) fn=0.3~0.7(mm/r)	**General chipbreaker for roughing** With M-level tolerance, it is suitable for both internal and external roughing of materials such as steel, stainless steel, cast iron, etc. 
	Special chipbreaker 	M	ap=3~10(mm) fn=0.3~1.2(mm/r)	**Recommended chipbreaker for heavy machining of P-type materials** Single-sided with M-level tolerance, it has good cutting edge strength with high security. It is the first choice for profile roughing. 
For Al machining	LC 	G	ap=0.02~4.8(mm) fn=0.05~0.5(mm/r)	**Chipbreaker for machining of Al alloy** With G-level tolerance, large rake angle and clearance angle make the cutting edge sharper, ensuring easy and fast cutting while remaining effective chip breaking. 
	LH 	G	ap=0.1~8(mm) fn=0.1~0.5(mm/r)	**Special chipbreaker for machining of Al alloy** With G-level tolerance, large rake angle and polishing treatment on surface, it can effectively prevent built-up edge and achieve high workpiece surface quality while maintaining long life. 
Super hard inserts	Without chipbreaker 	G	ap=0.05~0.5(mm) fn=0.05~0.3(mm/r)	**Special chipbreaker for non-ferrous metals and materials with high hardness** With G-level tolerance, it is the best choice for machining of non-ferrous metals and materials with high-hardness by welding PCBN and PCD material to cemented carbide substrate. 

Chip breaking range reference for general turning inserts

Negative inserts

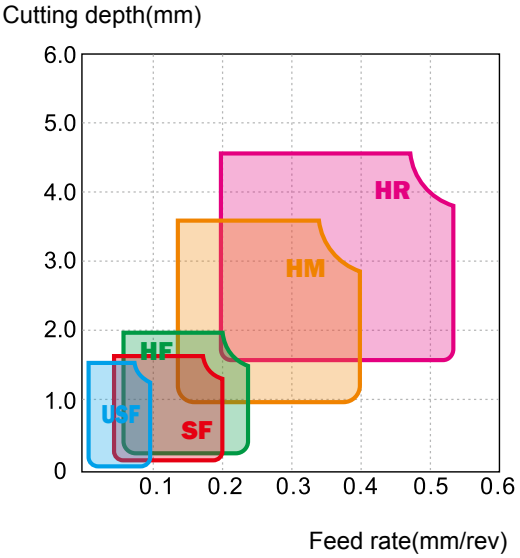


▶ Workpiece material: 45# steel

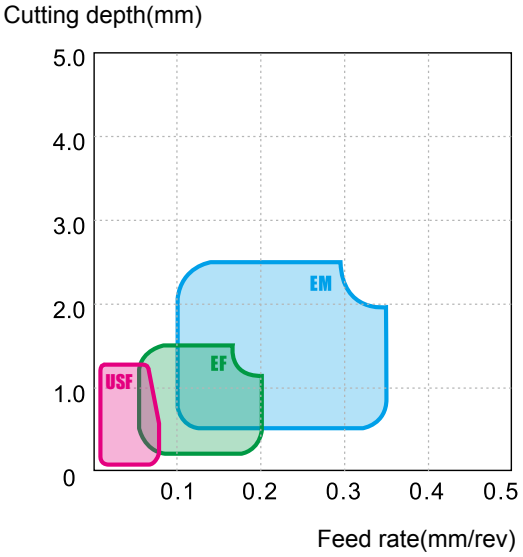


▶ Workpiece material: stainless steel (1Cr18Ni9Ti)

Positive inserts



▶ Workpiece material: 45# steel

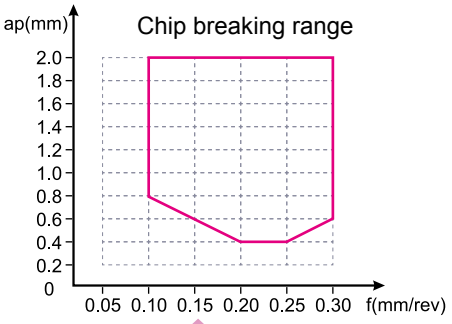


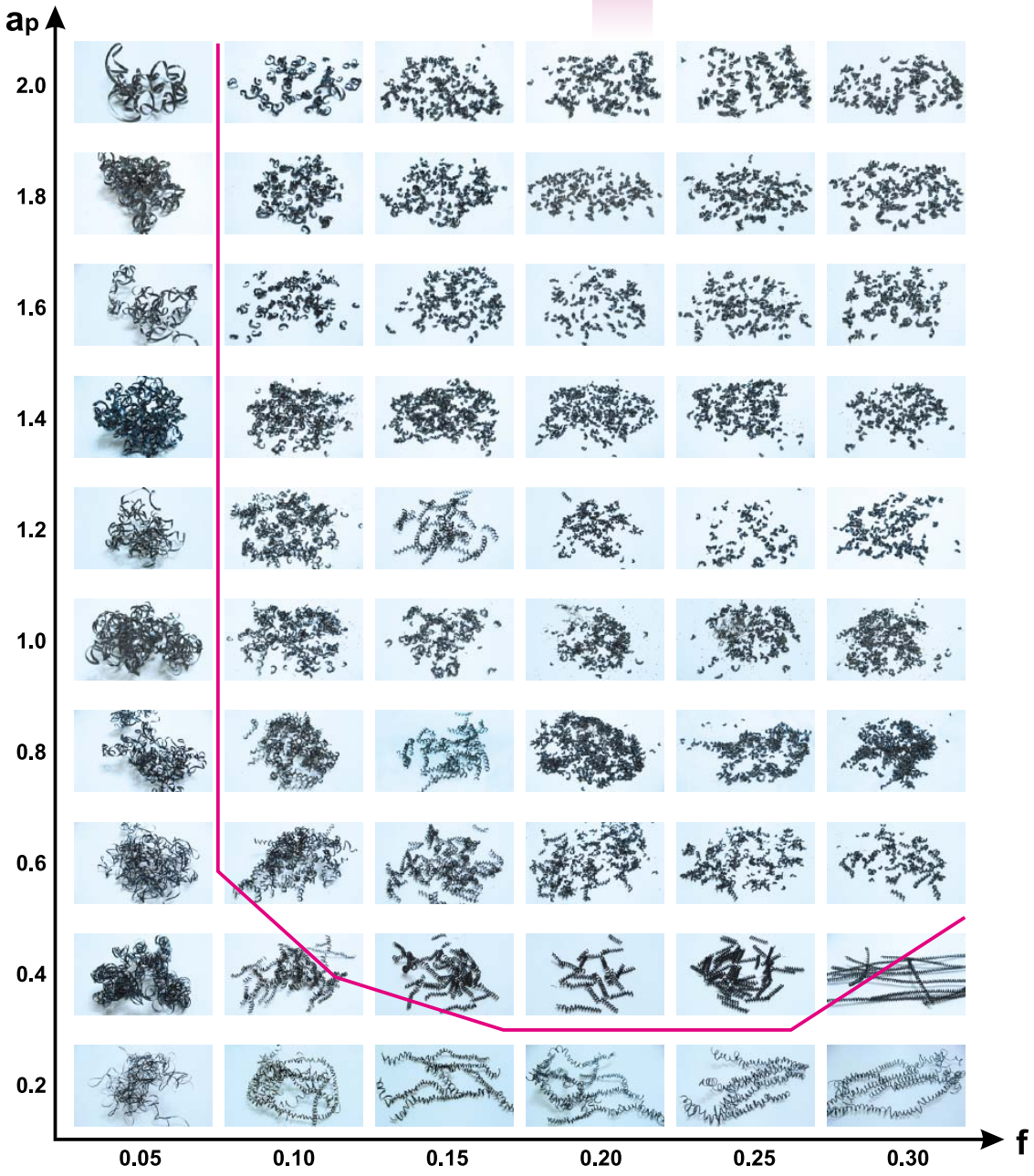
▶ Workpiece material: stainless steel (1Cr18Ni9Ti)

Cutting test for chip breaking range of general turning inserts

Case

Insert: CNMG120408-DF
Toolholder: PCLNL2525M12
Workpiece material: 45# steel
Cutting speed: 200(m/min)

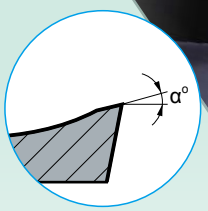




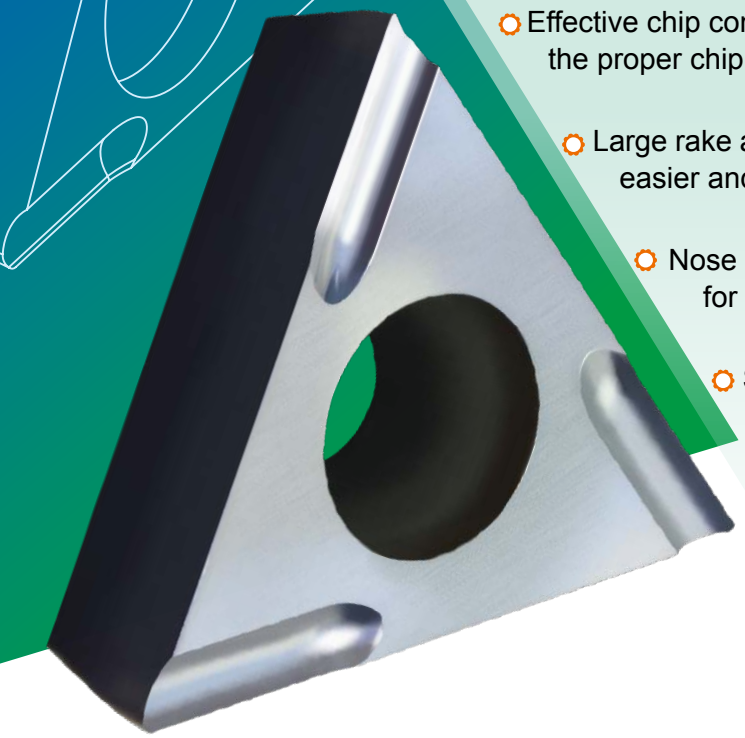
-USF

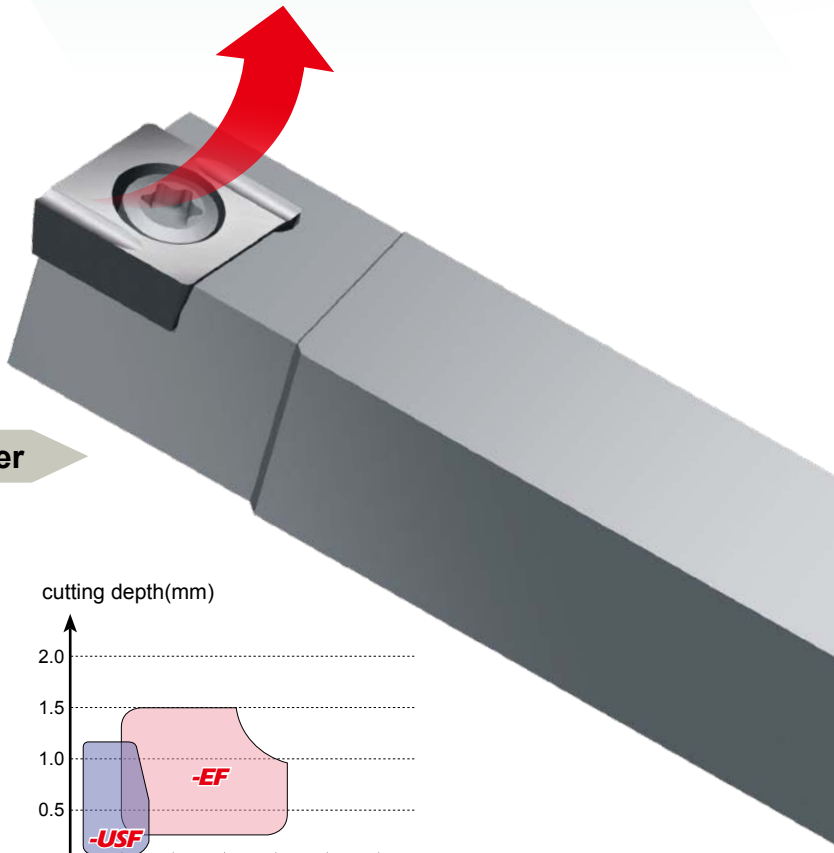
Precision turning chipbreaker

- Effective chip control due to the proper chipbreaker.
- Large rake angle makes cutting easier and faster.

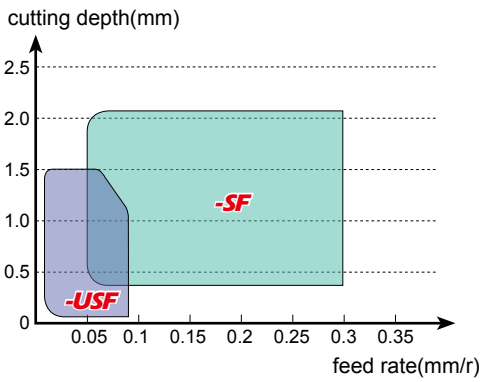


- Nose radius precision controlled within 0.02mm for excellent machining precision.
- Special surface after-treatment for better surface quality.
- High strength screw clamping ensures good repeatability and accuracy .





Application range of USF chipbreaker



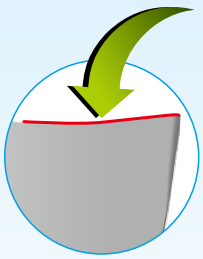
Workpiece material: 42CrMo

Workpiece material: 1Cr18Ni9Ti

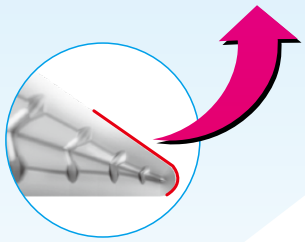
-LC chipbreaker for aluminum

- -LC inserts are designed with a special chipbreaker. Large rake angle and clearance angle make the cutting edge sharper, ensuring easier cutting while remaining effective chip breaking.
- Achieved the mirror rake face after special treatment. Reduced the friction resistence, and stick free. Accordingly, make the chip removal fluently and improve the surface quality and tool life.
- The G-class tolerance of insert, higher Repeated Position Accuracy, at the same time, it can effectively avoid the vibration during the machining process.

Optimized inclined angel makes controlling the chipping flow direction valid.

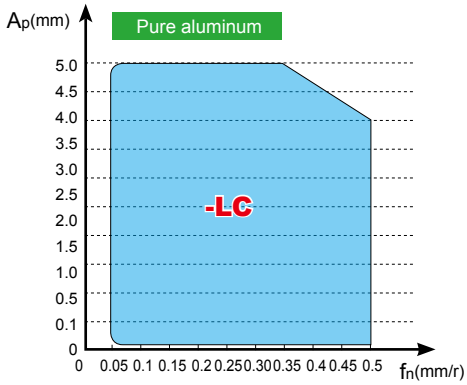


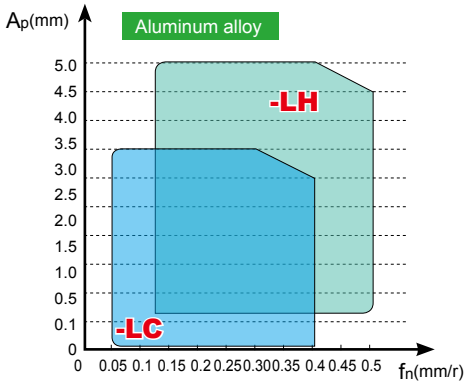
Smooth connection of insert nose and cutting edge makes rake face smoother.



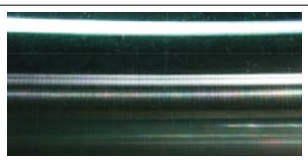
–LC and –LH chipbreaker characteristics and machining range

-LC chipbreaker can be used in machining of pure Al, while -LH chipbreaker can not.
-LC chipbreaker expand the chip breaking range of Al alloy machining.





Workpiece material: Pure aluminum

Cutting parameters	V=350m/min Ap=0.2mm F=0.2mm/r	
Chips		
Surface quality		
	-LC chipbreaker	similar products from overseas manufacturers

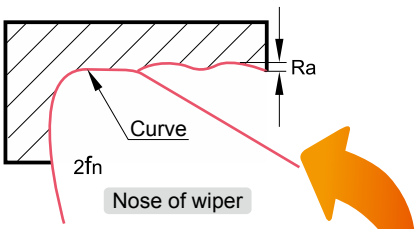
- **-LH chipbreaker is more suitable for machining aluminum alloy in condition of large cutting depth and high feed rate.**
- **-LC chipbreaker is more suitable for machining aluminum alloy in condition of small cutting depth and low feed rate.**
- **-LC chipbreaker can be used in machining pure aluminum.**



-WGF/WGM

chipbreaker series
Turning inserts with wiper





High efficiency

Roughness remains the same when feed rate is doubled.



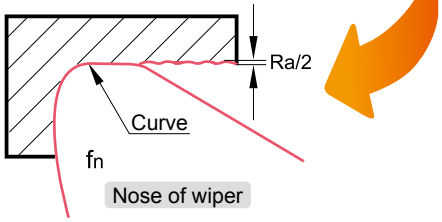
Wiper is assembled by three curves to form a circular arc edge. The nose of wiper provides less profile height on the surface that is formed by the cutting edge, resulting in a smooth turning surface.

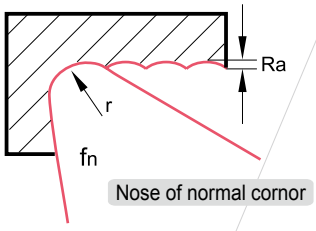
Inserts with wiper has high efficiency when used for finish and semi-finish turning. The surface quality remains the same even at double feed rate.

Wiper technique = high machining efficiency + high surface quality

High quality

Roughness value is reduced to half when feed rate remains the same.





When used for finishing, it can improve roughness of workpiece surface and achieve turning instead of grinding.
When used for semi-finishing, efficiency could be improved by doubling the feed rate, the roughness of workpiece surface remaining the same.

Guide to use

●Select reasonable approach angle of the tools

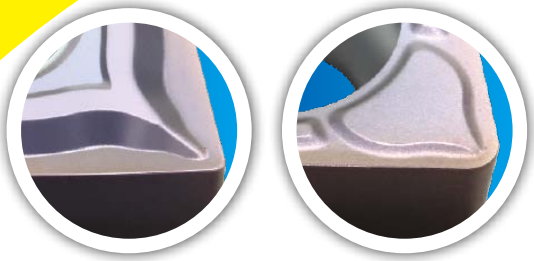
Minor angle being close to 0 degree is the reason that inserts with wiper can reduce roughness of the surface, which is determined by the shape of insert and approach angle of the tool holder. Therefore, acceptable roughness of surface is the result of reasonable approach (minor) angle. The finishing function of wiper would be reduced or invalid if unreasonable approach (minor) angle is chosen. For example, the approach angle should be 95°for CNMG / WNMG inserts, while 93°is the best for DNMX.TNMX inserts.

●Be careful with DNMX / TNMX inserts

DNMX / TNMX inserts with wiper don't have wide application. It cannot achieve a wiper result when minor angle is not 0 degree, like chamfer and profile surface, and will even cause over-cutting or no-cutting on workpiece, affecting the shape and size precision of workpiece. Please contact technical service regarding these problems.

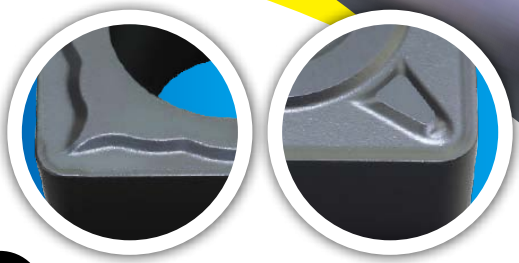
-EF -EM -ER

Specially designed for machining intensively adhesive and high-plasticity materials such as stainless steel, etc



-EF

Rake angle and inclined angle are specially designed for intensively adhesive stainless steel and high-plasticity materials which are hard to be machined. Sharp cutting edge enables it to cut lightly and easily and achieve good surface quality by well controlling chip breaking. It is especially suitable for finishing these kinds of materials.



-EM

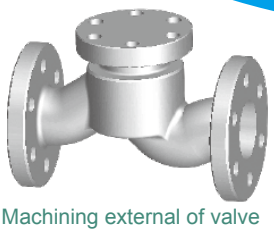
Inserts meet the requirements of machining intensively adhesive materials. Impact resistance of cutting edge is improved in addition to sharpness, which makes it suitable for semi-finishing and intermittent machining of adhesive materials such as austenitic stainless steel, etc.





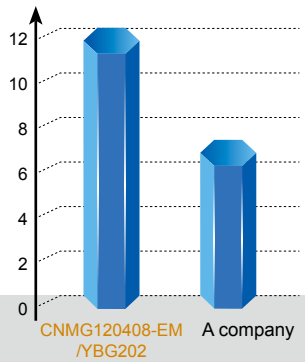
-ER

Specially designed double rake angle with wide land achieves balance between edge security and sharpness, and effectively reduces cutting resistance and wear on groove.



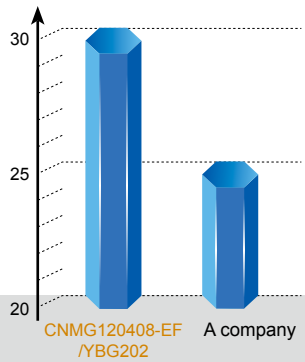
Machining external of valve

Number of machined parts / Cutting edge



Machining end surface of valve
(intermittent machining)
Workpiece diameter:135mm
Rotating speed:350rpm
Feed rate:0.25mm/r
Cutting depth:1.5mm

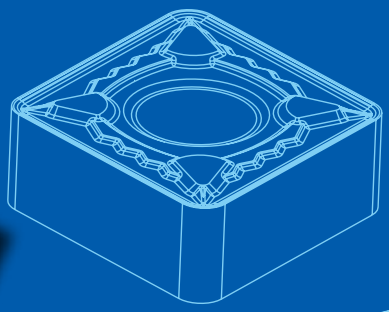
Number of machined parts / Cutting edge

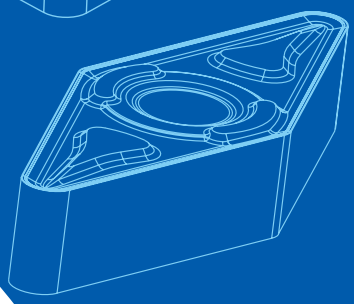


Machining external of valve
Workpiece diameter:89mm
Rotating speed:635rpm
Feed rate:0.15mm/r
Cutting depth:1.0mm

-NF/NM

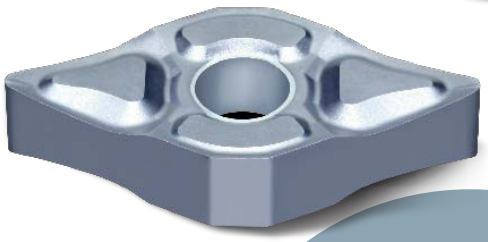
Overcome difficulties on machining Ni- base high temperature alloy









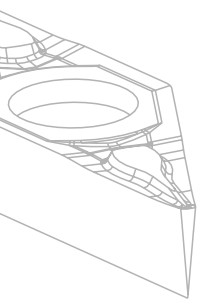


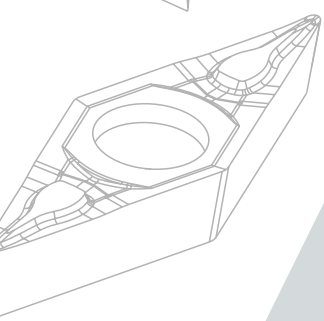
Characteristics of machining Ni-base high temperature alloy.

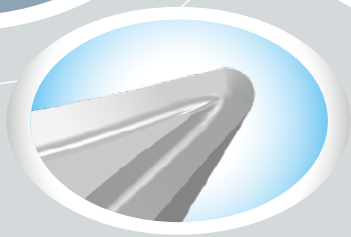
- Great cutting resistance (It contains massive alloy element, is easily hardened, and liable to plastic deformation during machining).
- High temperature during cutting.
- Inserts severely wear.

Feature of –NF/NM chipbreaker

- -NF chipbreaker has sharp cutting edge, while -NM chipbreaker high cutting edge strength.
- Smooth surface of chipbreaker ensures unobstructed chip flow.
- High wear resistance of cutting edge after special treatment.





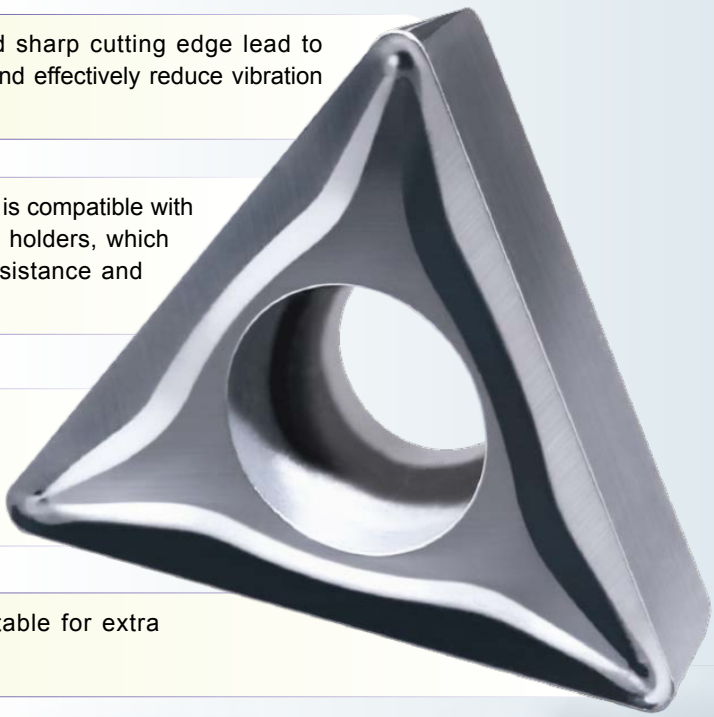


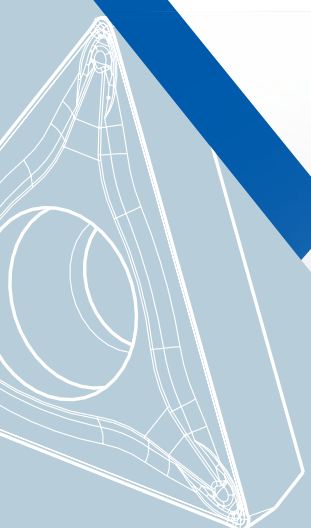
Chipbreaker of inserts for machining of Ni-high heat alloy is supposed to have sharp and hard edge nose, smooth rake face and rational inclined angle.

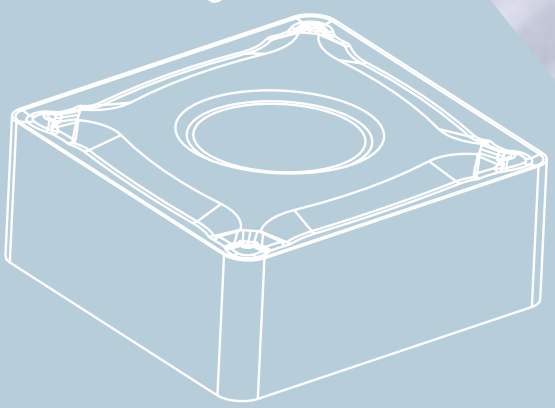


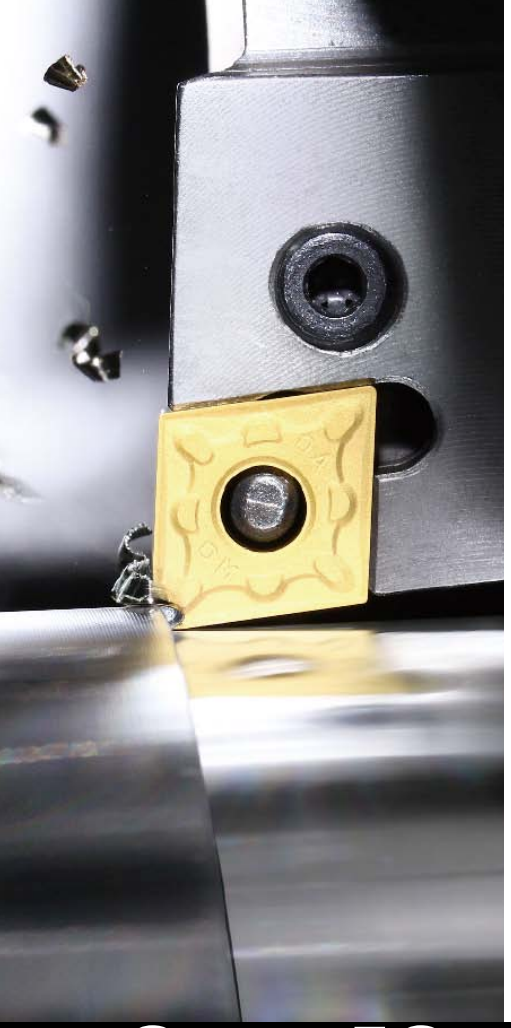
-SF chipbreaker for finishing

- Unique nose design and sharp cutting edge lead to small cutting resistance and effectively reduce vibration of the tool holder.
- With high re-positioning precision, the insert is compatible with specially developed cemented carbide tool holders, which can increase the capability of vibration resistance and improve machining quality.
- Special treatment on insert's surface can reduce the possibility of chips adhering to the rake face of insert. Good performance of chip breaking and chip flowing ensures improved surface quality of workpiece.
- By adopting excellent grade, it is suitable for extra finishing of various materials.









YBC151

The combination of substrate with excellent wear resistance and coating composed of MT-TiCN, thick layer of Al_2O_3 and TiN makes it suitable for finishing steel.

YBC251

The substrate with good toughness and high security of cutting edge, in optimal combination with coating composed of MT-TiCN, thick layer of Al_2O_3 and TiN makes it suitable for steel semi-finishing.

YBC351

The best combination of substrate with high wear resistance and coating composed of MT-Ti (CN), thick Al_2O_3 layer and TiN makes it suitable for finishing and semi-finishing of cast iron materials.

YBD151

The substrate with high strength and resistance against plastic deformation, in combination with coating composed of MT-TiCN, thick layer of Al_2O_3 and TiN makes it suitable for steel roughing.

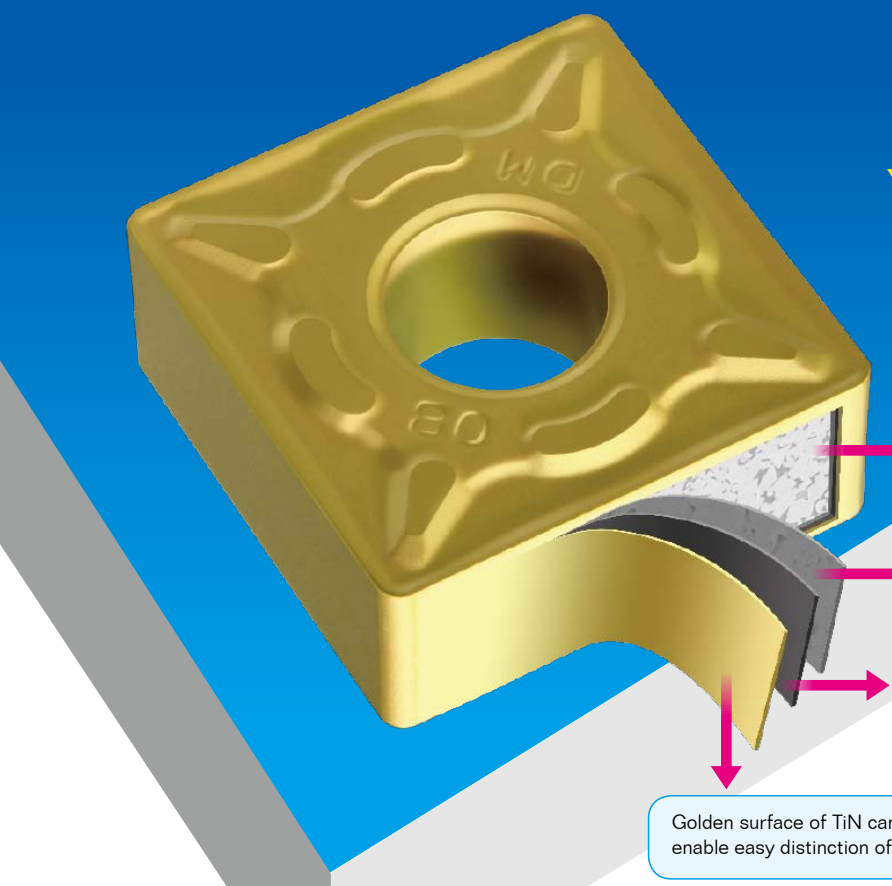
YBM151

Substrate with special structure, in combination with coating composed of TiCN, thin Al_2O_3 layer and TiN, with excellent resistance against diffusive wear and plastic deformation makes it suitable for finishing, semi-finishing and roughing of stainless steel.

YBM251

Combination of substrate with good toughness and strength and coating composed of TiCN, thin Al_2O_3 layer and TiN makes it suitable for semi-finishing and roughing of stainless steel.

Coated Cemented Carbide CVD



YBC251 Coating

Thanks to the technology of gradient sintering, impact resistance of cutting edge and wear resistance are improved which lead to improved capability of cutting edge against damage.

Carbide with special crystal structure improves the Red Hardness of substrate and strengthens heat resistance of insert.

TiCN layer acts against abrasion, which leads to the best wear resistance of the flank.

Special structure of Al_2O_3 deposit layer acts as a thermal barrier and strengthens the capability of substrate against plastic deformation under dry and high-speed cutting conditions.

Golden surface of TiN can reduce friction and enable easy distinction of the variety of wear.

BLACK DIAMOND INSERTS

Innovation of machining techniques for stainless steel turning

YBM

YBM153



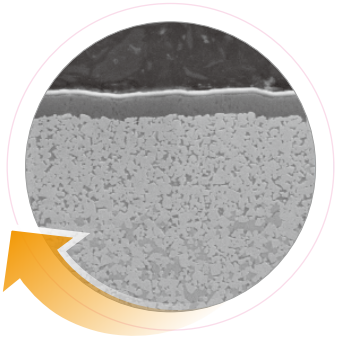
Best choice for roughing of stainless steel with high-speed under good working condition

Coating

- 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.

Substrate

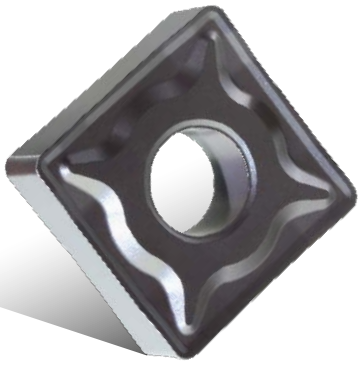
- Added with resist high temperature rare element, inserts shows a good capability against plastic deformation and good capability of Red Hardness.
- Unique manufacturing technology improves high temperature toughness and wear resistance of substrate.





Application fields YBM153 is suitable for finishing and semi-finishing of stainless steel with high cutting efficiency under stable working condition. Such as medium-size fluid valve components in petrochemical industry, flange and other parts in auto pipeline, valve and valve body in auto engine systems, ship mechanical parts, aviation hydraulic parts, adapting pieces in IT and semiconductor industry, medium and long-axis in food processing machinery, construction machinery and general machinery.

YBM253



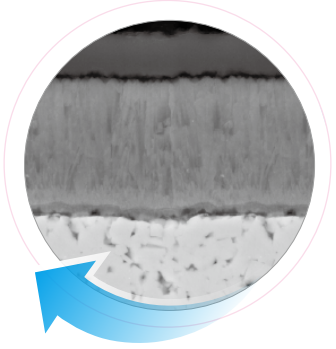
Ideal grade for turning of stainless steel with high cutting depth and high feed rate under bad working condition

Coating

- 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.

Substrate

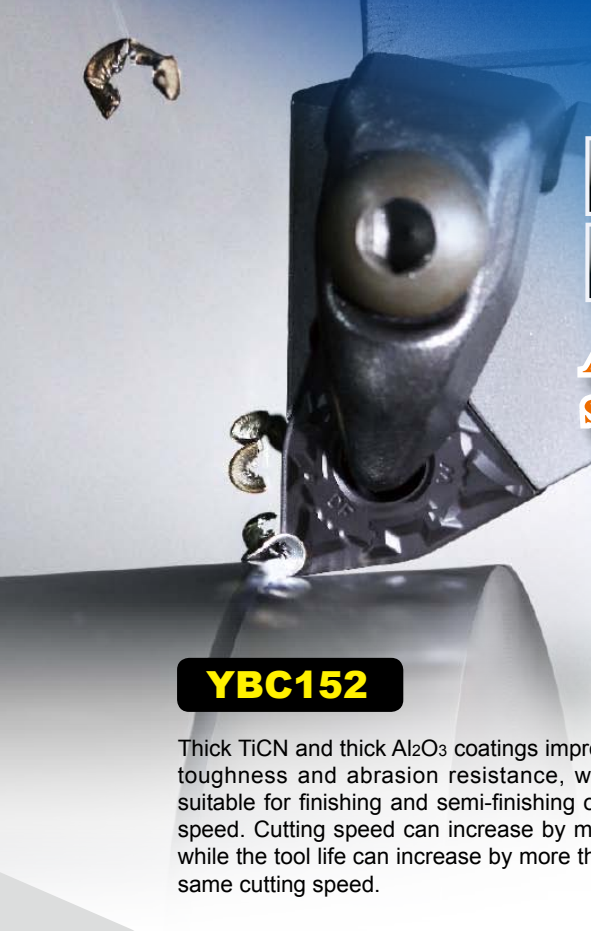
- With gradient carbide substrate insert has better impact resistance and cutting edge strength.



Application fields YBM253 grade is suitable for roughing of heavy stainless steel parts with high cutting depth and high feed rate under the condition with great impact.





BLACK DIAMOND INSERTS

Achieving both higher cutting speed and longer tool life

Second generation of YBC

Coated Cemented Carbide CVD

YBC152

Thick TiCN and thick Al_2O_3 coatings improve the impact toughness and abrasion resistance, which 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 more than 30% at the same cutting speed.

YBC252

Comprising of thick TiCN and thick Al_2O_3 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.

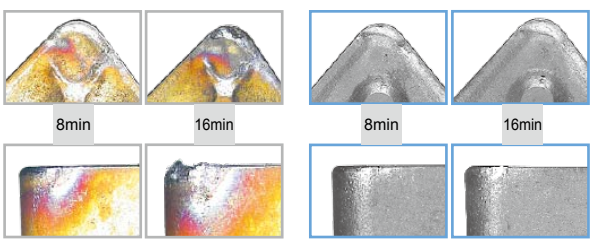
YBC352

Thickness TiCN and Al_2O_3 coating, with strongest toughness and plastic deformation resistance, the ideal grade for high efficient steel rough machining under the bad condition.

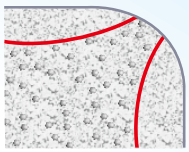
Test comparison of inserts abrasion

Workpiece material：45#steel
Inserts：CNMG120408-DM
Cutting parameters：Vc=400m/min　a_p=1mm　fn=0.2mm/r

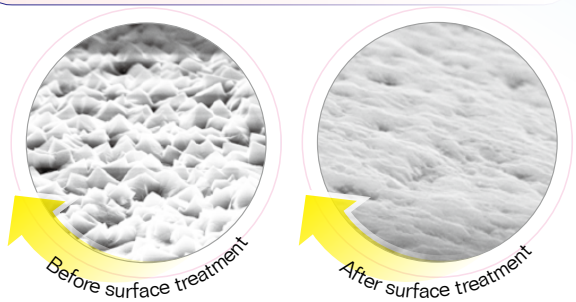
Grade from other company　　YBC152



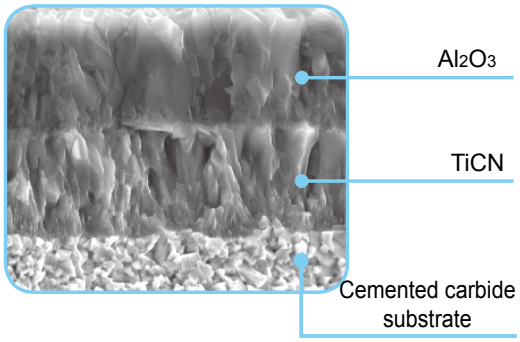
- Perfect unification of toughness and anti-plastic deformation.
  Specially designed cutting edge with “skeleton” realizes perfect unification of toughness and anti-plastic deformation.

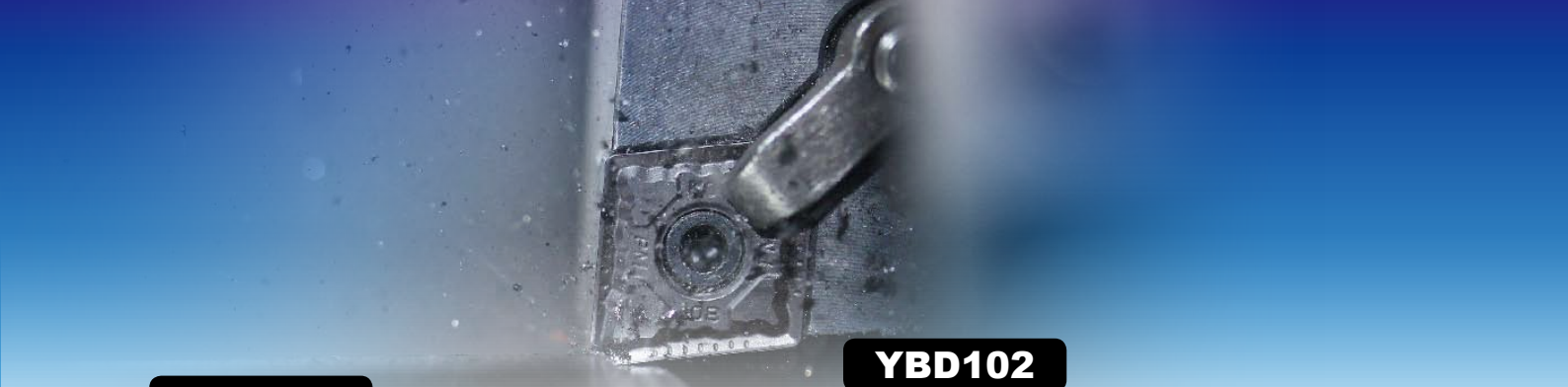


- Roughness of insert surface is improved after special treatment on surface, which effectively reduces cutting forces, prevents workpiece adhering to surface of inserts and improves operation stability of inserts.



- The perfect combination of fibrous TiCN and fine grain Al_2O_3 obviously improves abrasion resistance and anti-breakage of inserts.





YBD052

CVD coated grade, which is characterized by super fine grain and smooth surface, is the combination of hard substrate and coating (extra thick Al_2O_3 + thick TiCN). The grade is optimized for best wear resistance when machining gray cast iron at high speed under dry condition.

YBD152

CVD coated grade, which is the combination of hard substrate and coating (medium thick Al_2O_3 + 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.

YBD102

CVD coated grade, which is the combination of hard substrate and coating (thick Al_2O_3 + thick TiCN), shows excellent wear resistance and impact resistance when machining nodular cast iron at high speed.

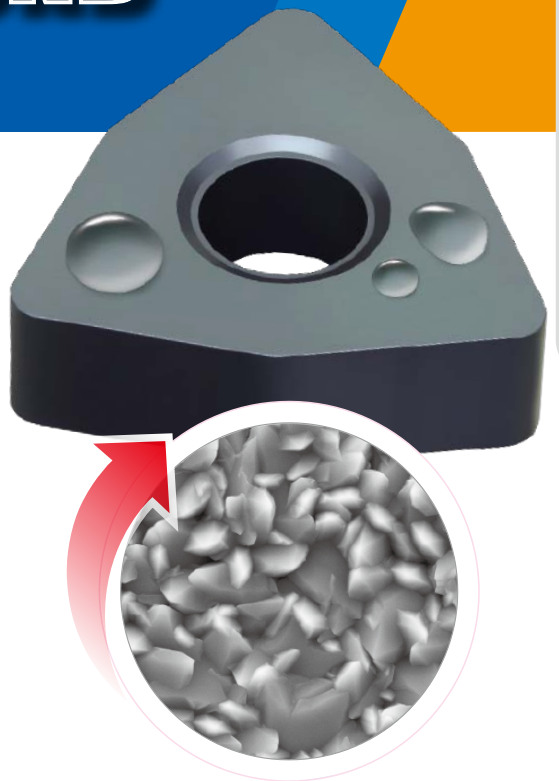
YBD252

CVD coated grade, which is the combination of hard substrate and coating (medium thick Al_2O_3 + thick TiCN), achieves the balance between wear resistance and toughness. It is suitable for wet milling of cast iron, which requires toughness (such as nodular cast iron) at moderate or low speed. It is also suitable for intermittent turning.

First choice for high-efficiency and high-speed machining of cast iron

BLACK DIAMOND INSERTS YBD

- The combination of thick coating and substrate with good hardness and impact resistance gives the inserts excellent impact resistance and stability under high temperature, and improves wear resistance of inserts. Inserts also satisfy the requirements of high speed and high feed rate when machining cast iron.
- The appearance of shining full black is easily identified.

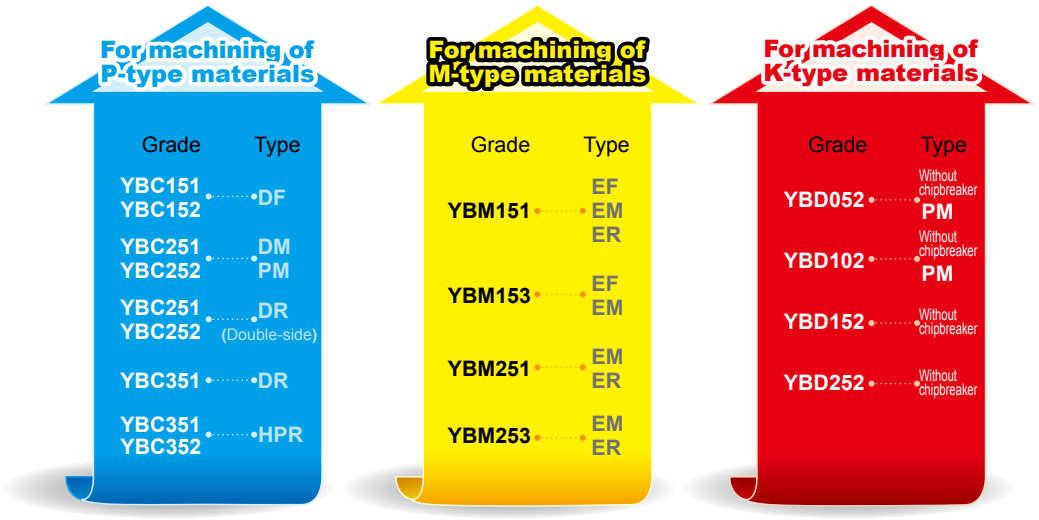


Layer of fine grain with compact surface

Significant results

- Working efficiency has been improved. Both the coating and the substrate are suitable for machining cast iron at high speed and high feed rate. Cutting speed can be increased by 30% to 40%.
- Cost is reduced as tool life is increased by 40%-50%.
- High machining stability.

Recommended combination of grade and chipbreaker

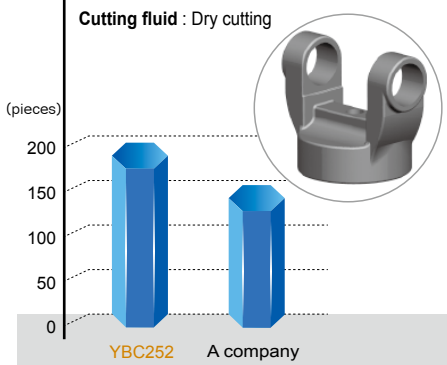


Recommended cutting parameters

Workpiece material	Range of machining	Grade	Recommended cutting speed(m/min)
P Steel	For finishing	YBC151	180-460
		YBC152	220-500
	For semi-finishing	YBC251	160-440
		YBC252	180-480
	For roughing	YBC351	130-380
		YBC352	
M Stainless steel	For finishing For semi-finishing For roughing	YBM151 YBM153 YBM251 YBM253	110-280
K Cast iron	For finishing	YBD052	200-500
		YBD102	200-480
	For semi-finishing	YBD151	180-450
		YBD152	190-450
	For roughing	YBD252	150-380

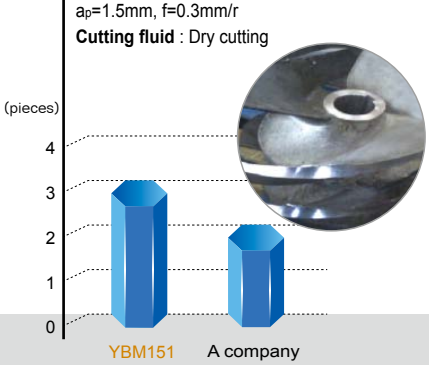
Case

Insert : YBC252/WNMG060408-PM
Material and hardness of workpiece : 45#Steel HB220
Cutting conditions : V=220m/min, a_p=1.5~2mm, f=0.25mm/r
Cutting fluid : Dry cutting



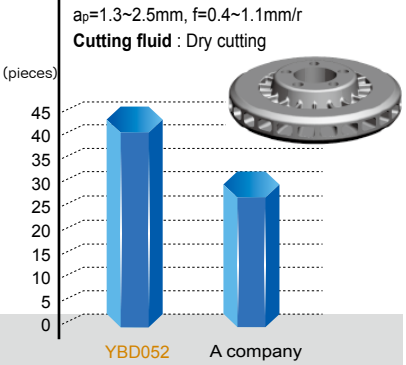
Number of machined parts/Cutting edge

Insert : YBM151/CNMG190616-ER
Material and hardness of workpiece : Double phase stainless steel HB260
Cutting conditions : V=103m/min, a_p=1.5mm, f=0.3mm/r
Cutting fluid : Dry cutting



Number of machined parts/Cutting edge

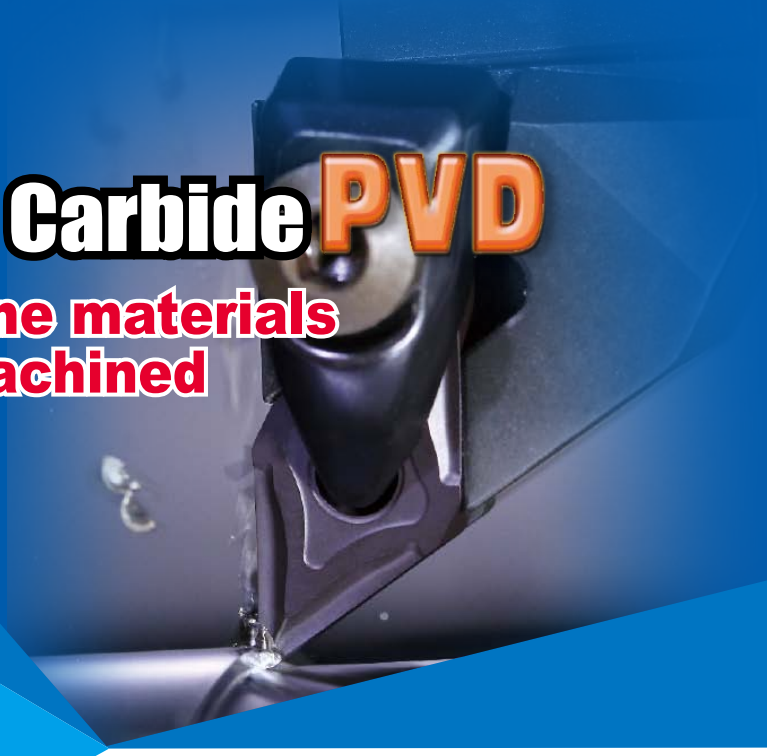
Insert : YBD052/TNMA220412
Material and hardness of workpiece : Gray cast iron HB280
Cutting conditions : Vmax=400m/min, a_p=1.3~2.5mm, f=0.4~1.1mm/r
Cutting fluid : Dry cutting



Number of machined parts/Cutting edge

Coated Cemented Carbide PVD

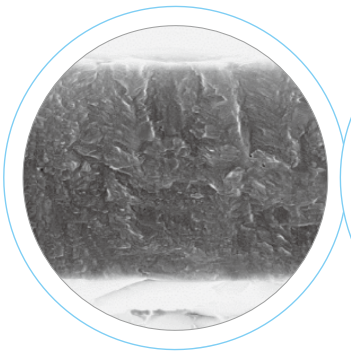
makes it easy to machine materials which are hard to be machined



New nano coating grade

- Special coating techniques make inserts smooth, which leads to low friction and unobstructed chip flow.
- Unique coating with nano structure closely integrates with substrate, ensuring higher hardness and toughness.
- Excellent thermal stability and chemical stability can effectively protect cutting edge.





nc-TiAlN coating(YBG202)



TiAlN base multi-elements coating (YBG105)

High-performance nanostructure coating guarantees good toughness and hardness of inserts. Special coating technology guarantees smooth surface and excellent wear resistance. Outstanding thermal stability and chemical stability effectively protect cutting edge.

YBG102

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.

YBG202

nc-TiAlN coating and ultra-fine grain substrate makes it suitable for finishing and semi-finishing of various materials and turning of super alloy.

YBG302

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.

YBG105

Finishing and semi-finishing for materials difficult to cut PVD coated grade

PVD coated grade, new TiAlN based multilayer coating, has higher wear resistance and Anti-thermal-oxidation ability. It is suitable for finishing and semi-finishing turning of various materials difficult to cut, such as high temperature alloy, heat resistant alloy, etc.

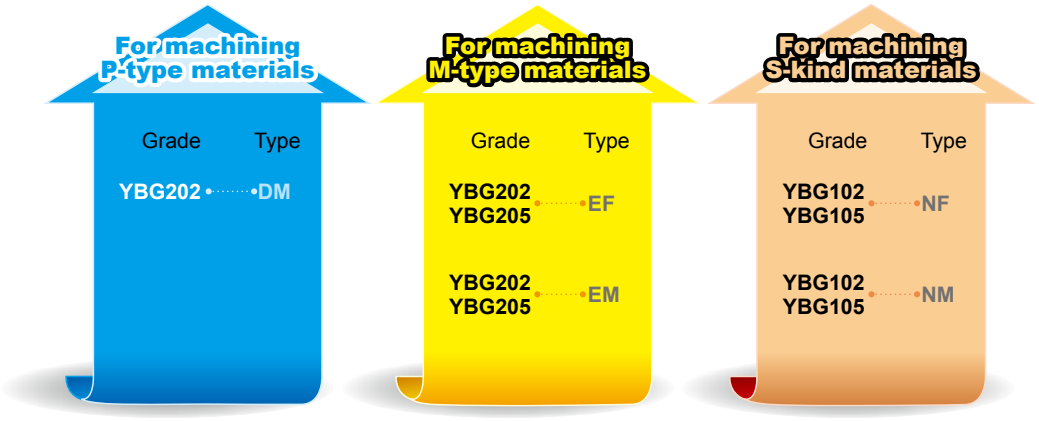
YBG205

PVD coating grade for finishing of stainless steel

Suitable for relatively small workpieces which require 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 coating technology ensures stronger combination of coating and substrate. It is suitable for extra finishing of stainless steel.

Recommended combination of grade and chipbreaker



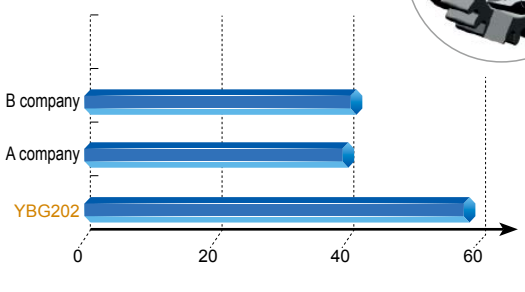
Recommended cutting parameters

Workpiece material	Range of machining	Grade	Recommended cutting speed(m/min)
P Steel	For finishing	YBG102	180-460
	For semi-finishing	YBG202 YBG205	150-380
M Stainless steel	For finishing ~for semi-finishing	YBG202 YBG205	170-300
S Heat resistant Alloy Ti alloy	For finishing	YBG102	30-90
		YBG105	40-90
	For semi-finishing	YBG202	20-70
		YBG105	30-70

Case

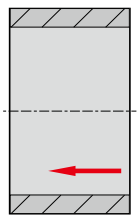
Insert : YBG202/TNMG120404-EF
Hardness and material of workpiece : 0Cr18Ni9 HB240
Cutting conditions : V=200m/min, a_p=1mm, f=0.15mm/r
Cutting fluid : Dry cutting

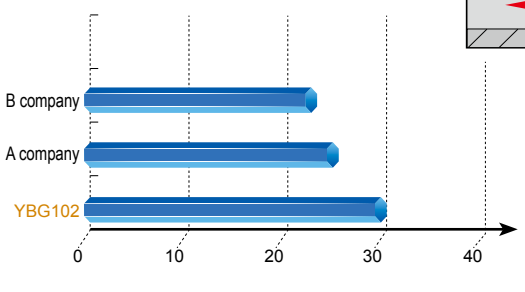




Number of machined parts/Cutting edge

Insert : YBG102/DNEG150404-NF
Hardness and material of workpiece :
High temperature alloy Inconel 718 HRC≥39
Cutting conditions : Vc=80m/min, a_p=0.3mm, f=0.15mm/r
Cutting fluid : Dry cutting





Tool life (min)

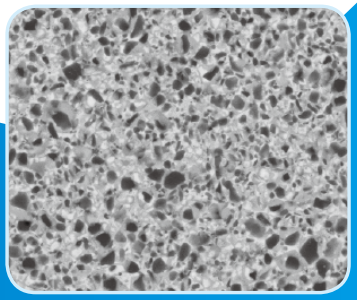
Cermet & Coated Cermet

The chemical stability between Ti(CN) base cermet inserts and workpieces is relatively high, which reduces the friction and temperature of the cutting edge during cutting, preventing mutual diffusion of atoms of the workpiece material and the inserts, and improving resistance to bonding abrasion. Therefore, Ti(CN) base cermet shows good capability of Red Hardness and resistance to crater wear. It is an optimal material for high-speed finishing and semi-finishing of steel. High temperature strength of cermet is higher than that of WC-Co, and toughness better than that of Al_2O_3 and Si_3N_4 ceramic. This fulfils the application blank of WC-base cemented carbide and Al_2O_3 and Si_3N_4 ceramic from finishing to semi-finishing at high speed.

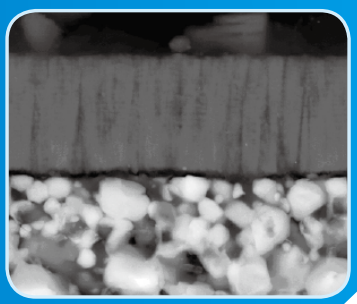
Product features

Scientifically designed structure ensures good material performance and long tool life. Refined production management assures the stability of product quality.

- Symmetrical fine grain organization, together with the control of symmetrical organization and toric phase structure, improves the strength and hardness of cermet.
- Intensified bonding phase and well-designed grain boundary improve the high temperature capacity, heat conductibility and thermal vibration resistance.
- Coating of Physical Vapor Deposition (PVD) is applied to cermet substrate with high toughness, so that the grade has high hardness and toughness with wide-range application.



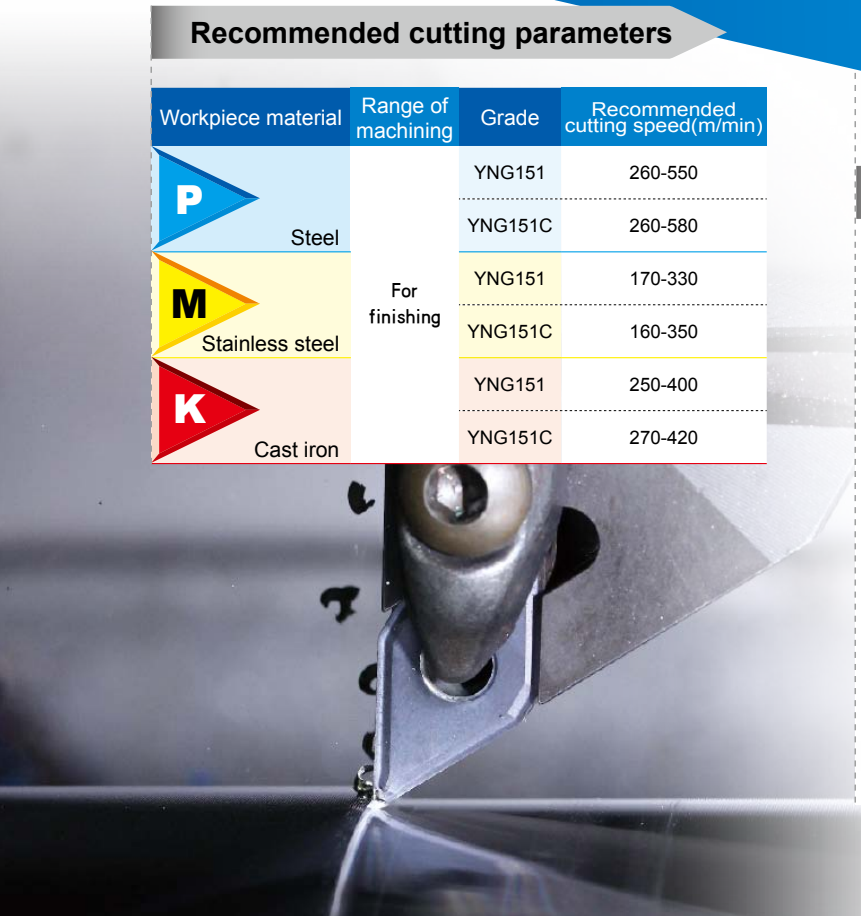
Substrate of cermet grade of YNG151 (homogenized ultra-fine structure)



PVD coating organization structure of cermet

Recommended cutting parameters

Workpiece material	Range of machining	Grade	Recommended cutting speed(m/min)
P Steel	For finishing	YNG151	260-550
		YNG151C	260-580
M Stainless steel		YNG151	170-330
		YNG151C	160-350
K Cast iron		YNG151	250-400
		YNG151C	270-420



Case

Insert: YNG151/CNMG120404-SF

Hardness and material of workpiece:

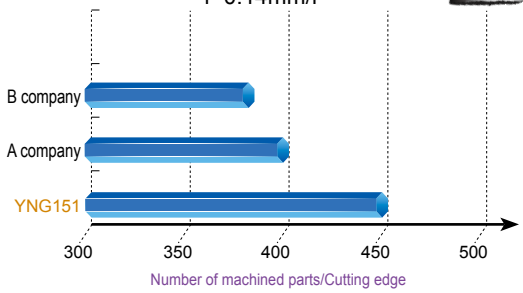
20CrMnTi HB180-223

Cutting parameters: v=220m/min

a_p=0.5~1.0mm

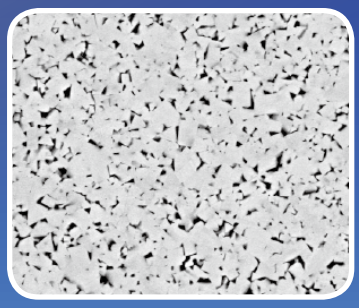
f=0.14mm/r





Outstanding chip breaking Good surface quality

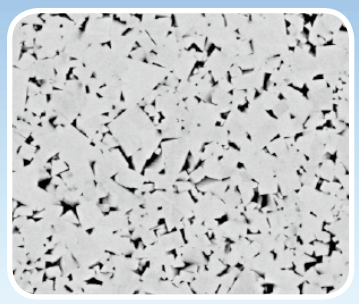




Substrate of YD101: the combination of cemented carbide phrase WC of fine grain and bonding phase Co

Cemented Carbide Grade

Uncoated cemented carbide grade is widely used for machining of non-ferrous metal, high temperature alloy, etc. It is economical and can be universally applied.



Substrate of YD201: the combination of cemented carbide phase WC of middle grain and bonding phase Co

Recommended cutting parameters

Workpiece material	Range of machining	Grade	Recommended cutting speed(m/min)
P Steel	For finishing	YC10	130-360
	For roughing	YC40	80-300
K Cast iron	For finishing	YD051	100-170
	For semi-finishing～For roughing	YD201	60-130
N Non-ferrous metal	For finishing～for semi-finishing	YD101	110-1750
S Heat resistant Alloy Ti alloy	For finishing	YD101	20-50

Case

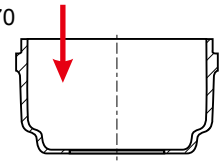
Insert: YD101/CCGX09T304-LH

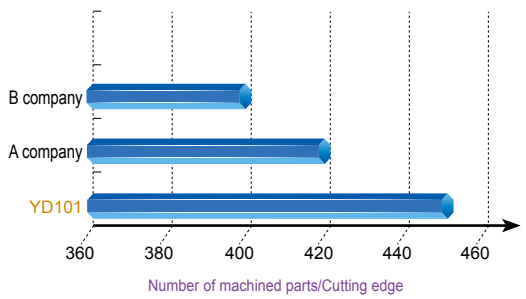
Workpiece material: ZL105 HB70

Cutting parameters: v=400m/min

a_p=1mm

f=0.3mm/r



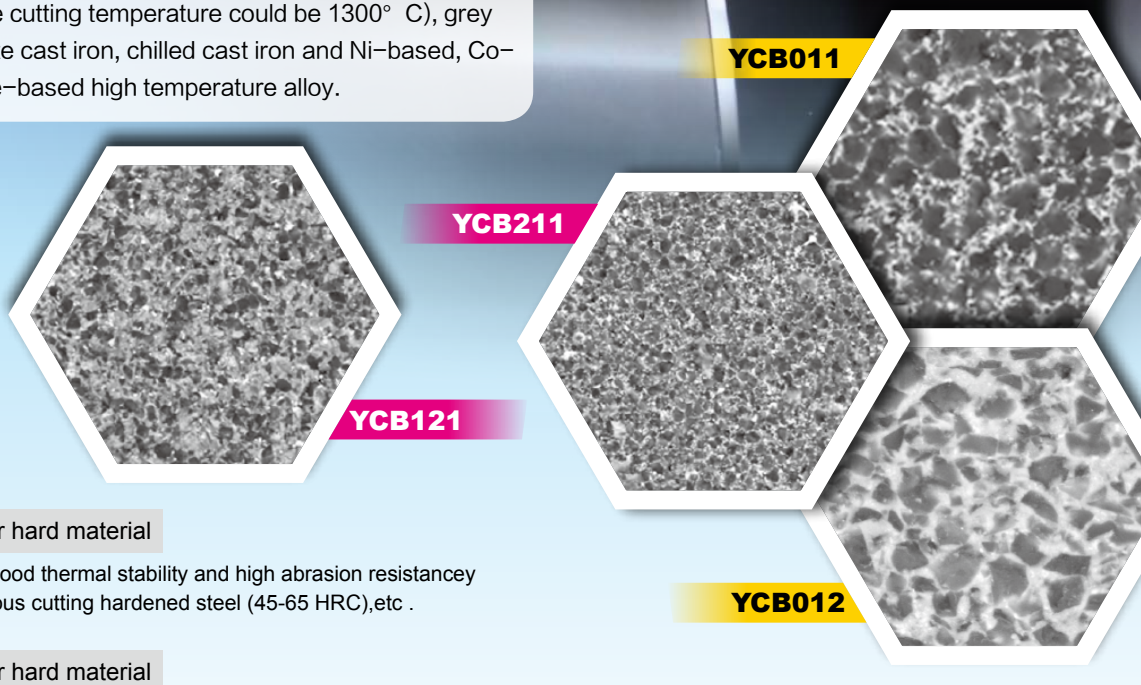


Workpiece has high surface quality and high dimensional precision.

Ceramic Grade

Polycrystalline Cubic Boron Nitride PCBN

PCBN cutting tools with high hardness, abrasion resistance , good heat resistance and high temperature hardness for cutting of hardened steel greater than 45 HRC (such as carbon steel , bearing steel, mould steel and high speed steel, the cutting temperature could be 1300° C), grey cast iron, nodular graphite cast iron, chilled cast iron and Ni-based, Co-based, Cr-based and Fe-based high temperature alloy.



YCB012 H Super hard material

Low-CBN content gradey with good thermal stability and high abrasion resistancey suitable for high speed continuous cutting hardened steel (45-65 HRC),etc .

YCB121 H Super hard material

Low-CBN content grade,with high abrasion resistance,good impact strength and chemical stability,suitable for continuous or weak interrupted cutting tool steel alloy steel,mould steel,etc .

YCB011 K Cast iron

High-CBN content grade, with high hardness and abrasion resistance, suitable for high speed continuous cutting cast iron, etc.

YCB211 K Cast iron

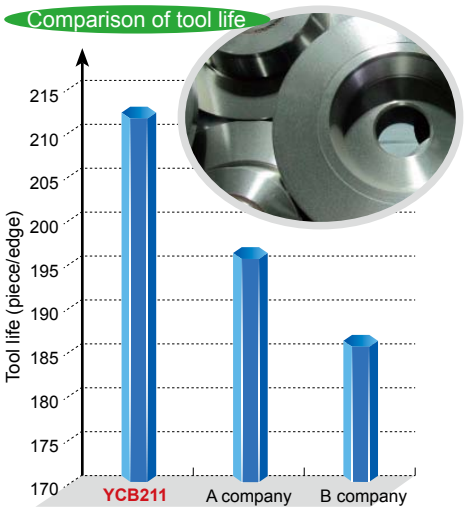
High-CBN content grade,with high hardness and abrasion resistance,excellent impact strength,suitable for continuous or weak interrupted cutting cast iron,etc.

Application and machining Parameter Guidelines:

Grade	Workpiece material	Speed(m/min)	Feed(mm/r)	Depth of Cut(mm)
YCB012	hardened steel	100~300	0.03~0.5	0.05~0.5
YCB121	alloy steel	120~200	0.1~0.2	0.1~0.5
	tools/mould steel	80~120	0.1~0.2	0.1~0.5
YCB011	grey cast iron	400~1500	0.2~0.5	<0.5
	nodular graphite cast iron	200~400	0.3~0.5	<0.5
	alloy cast iron	100~300	0.1~0.2	<0.5
YCB211	pearlitic grey cast iron	60~90	0.1~0.2	0.1~0.5

Case

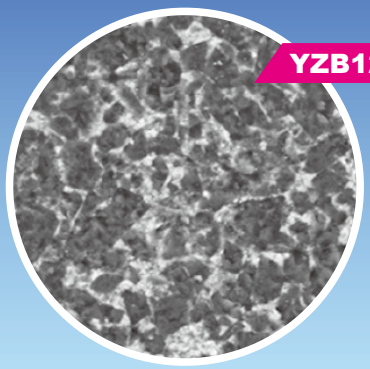
Workpiece material:Cast iron TL048
Insert grade:YCB211
Insert type:CNGA120408-2
Machining mode: Continuous dry cutting
Cutting parameters: v_c=600m/min
f_n=0.2mm/rev, a_p=0.5mm

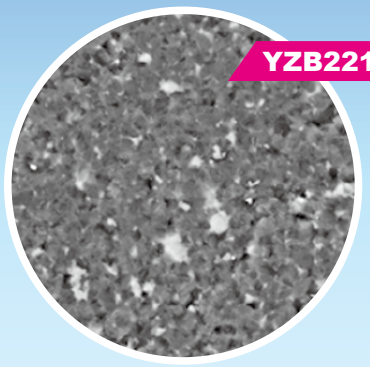


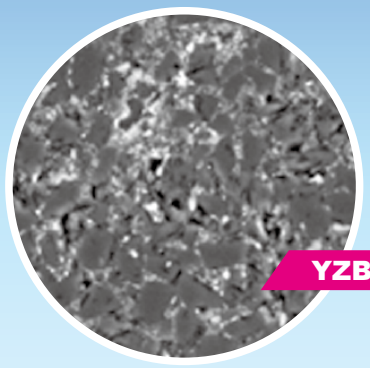
Ceramic Grade

PCBN inserts turning case

Solid PCBN with good abrasion resistance and chemical stability, compared with the PCBN compact has higher impact strength suitable for the turning/ milling roughing and semi-finishing.







YZB121 H Super hard material

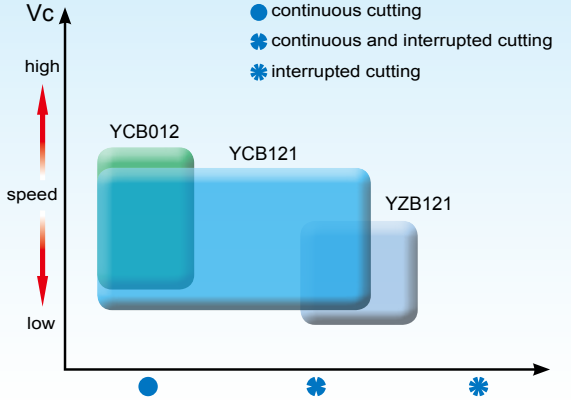
Solid PCBN grade, with good abrasion resistance and edge chipping resistance, suitable for low speed interrupted cutting bearing steel, mould steel ,tool steel , high speed steel , etc .

YZB221 K Cast iron

Solid PCBN grade, with good abrasion resistance and heat resistance, suitable for milling alloy cast iron , nodular graphite cast iron ,grey cast iron, high chromium cast iro ,high –Ni-Cr cast iron ,etc .

YZB231 K Cast iron

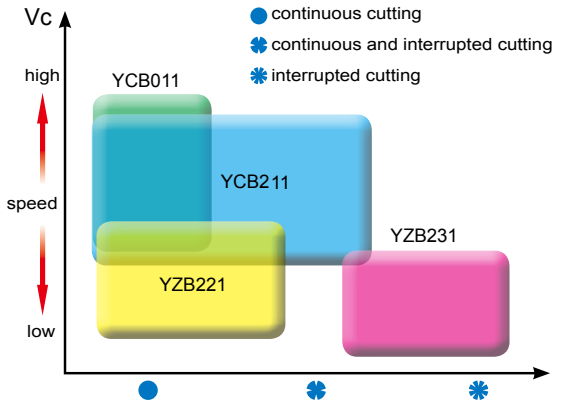
Solid PCBN grade, with excellent impact strength, suitable for low speed and heavy cutting alloy cast iron ,grey cast iron ,high chromium cast iron ,etc .



The PCBN cutting tools for machining of super hard material

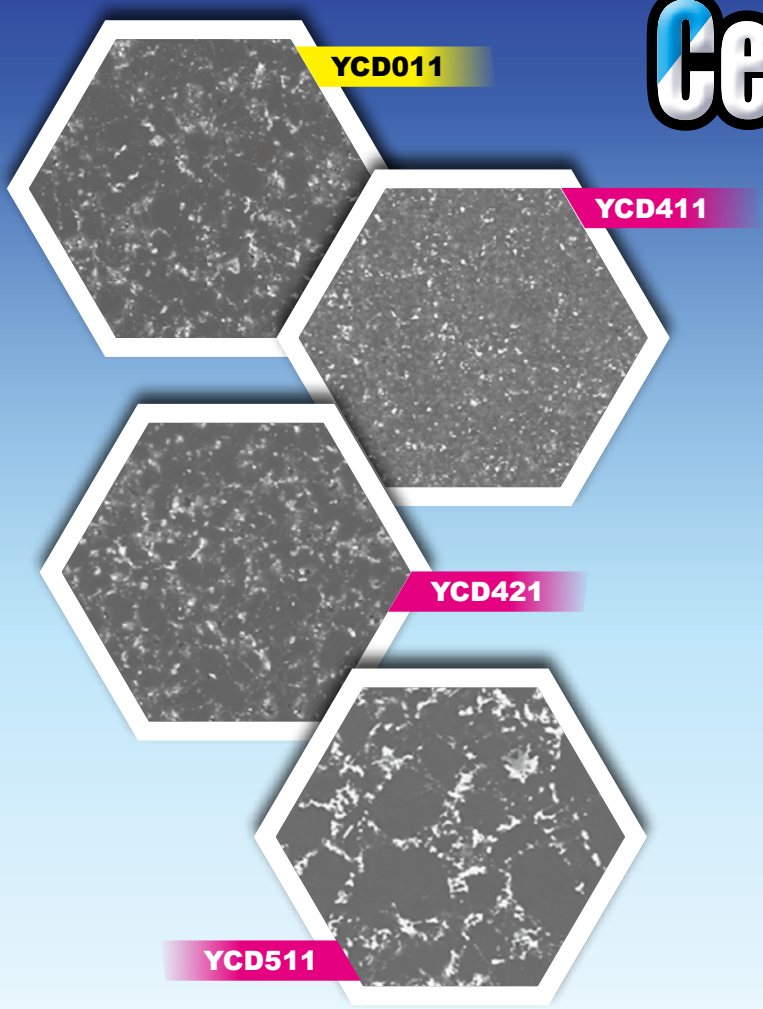
Application and machining Parameter Guidelines:

Grade	Workpiece material	Hardness	Speed (m/min)	Feed (mm/r)	Depth of Cut (mm)
YZB121	hardened steel	HRC45-65	50~200	0.1~0.5	<3
	bearing steel	HRC55-65	50~120	0.1~0.5	<3
YZB221	grey cast iron	HB170-300	100~600	0.3~1.0	<2
	nodular graphite cast iron	HB200-300	60~500	0.3~1.0	<5
	alloy cast iron	HB240-300	20~300	0.2~3.0	<5
YZB231	grey cast iron	HB170-300	100~600	0.3~1.0	<2
	nodular graphite cast iron	HB200-300	60~300	0.3~1.0	<5
	alloy cast iron	HB240-300	20~150	0.2~3.0	<5



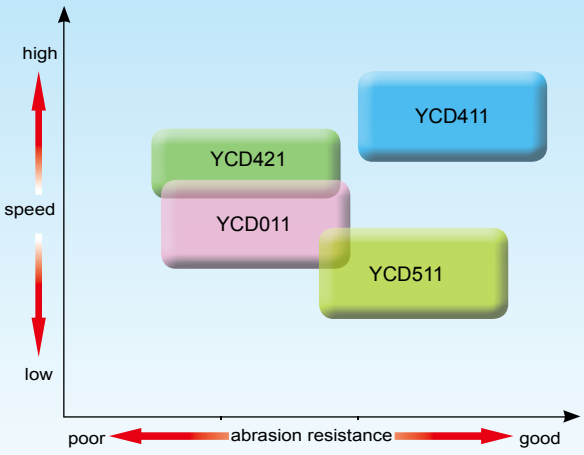
The PCBN cutting tools of machining cast iron

Ceramic Grade



Polycrystalline Diamond PCD

PCD cutting tools with high hardness , excellent abrasion resistance and thermal conductivity , low fiction coefficient for cutting of Non-ferrous metals and their alloys(such as Cu , Al , Mg , etc) , Non-metallic materials and compound materials.



YCD011

N Non-ferrous materials

Medium diamond grain size grade,with good hardness and abrasion resistance, suitable for turning low-medium content silicon aluminum alloys, compound materials, copper/magnesium and their alloys,YCD011 is the general turning grade.

YCD411

N Non-ferrous materials

Super-fine diamond grain size grade, with higher edge chipping resistance and abrasion resistance, suitable for high precision andmirror machining low-medium content silicon aluminum alloys, also precision cutting copper/magnesium and their alloys .

YCD421

N Non-ferrous materials

Medium diamond grain size grade,with high abrasion resistance and good edge quality, suitable for milling low-medium content siliconaluminum alloys,compound materials, copper/magnesium and their alloys, YCD421 is tgeneral milling grade.

YCD511

N Non-ferrous materials

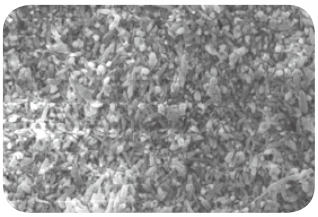
Mixed(2-30um) diamond grain size grade, with excelltent abrasion resistance and edge strength, suitable for cutting high -medium content silicon aluminum alloys, metal matrix composites(MMC),ceramic, Bi-metals.

Application and machining Parameter Guidelines:

Grade	Workpiece material	Cutting mode	Speed (m/min)
YCD011	silicon aluminum alloys (The content of Si 12%)	turning	400~1200
		milling	250~1400
	copper/magnesium and their alloys	turning /milling	400~1260
YCD411	silicon aluminum alloys (The content of Si 12%)	turning	500~1000
		milling	300~1500
	fiber reinforced composites	turning /milling	200~1000
YCD421	silicon aluminum alloys (The content of Si 12%)	turning	400~1200
		milling	600~2400
	MMC	turning /milling	1500~1800
	copper/magnesium and their alloys	turning /milling	400~1260
	cemented carbide	turning	20~40
YCD511	silicon aluminum alloys (The content of Si 12%)	turning	300~700
		turning	500~1000
	MMC	turning	500~1000
	ceramic(green)	milling	100~200
	ceramic(sintered)	milling	20~50
	Bi-metals	milling	200~300

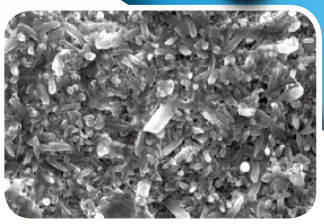
Ceramic Grade





CN1000

With Si_3N_4 substrate, it has excellent capacity against cutting edge breakage and thermal shock, suitable for finishing and semi-finishing of grey cast iron. It also has great performance on heavy-load intermittent cutting of cast surface materials.



CN2000

With Si_3N_4 substrate, it has good wear resistance and toughness. It is suitable for not only intermittent and continuous machining of hardened steel and grey cast iron, but also machining of die steel and other high hardness materials.



CA1000

With Si_3N_4 substrate, it combines high wear resistance and good toughness, suitable for not only intermittent and continuous turning of hardened steel and grey cast iron, but also machining of die steel and other high-hardness materials.

Physical properties

Grade	Density (g/cm^3)	Hardness Hv (GPa)	Bending strength (MPa)	Fracture toughness (MPa $m^{1/2}$)
CA1000 **(Al_2O_3+TiCN)**	4.2	19	≥700	4.5
CN1000 **(Si_3N_4)**	3.25	16	≥900	7.5
CN2000 **(Si_3N_4)**	3.25	16	≥900	8

Recommended cutting parameters

Grade	Workpiece material	Machining mode	Cutting speed (m/min)	Feed rate (mm/r)	Cutting depth (mm)
CA1000	Grey cast iron Malleable Cast Iron	For roughing	150~800	0.2~0.5	3.0~6.0
		For finishing	200~1200	0.3~0.5	0.1~0.5
	Chilled cast iron	For roughing	30~100	0.1~0.2	0.5~1.5
		For finishing	50~200	0.05~0.15	0.1~0.5
	Carbon steel Alloy steel Bearing steel	For roughing	150~400	0.2~0.5	2.0~5.0
		For finishing	200~800	0.05~0.20	0.1~0.5
	Chilled steel	For roughing	20~100	0.1~0.2	0.5~1.5
		For semi-finishing	40~200	0.05~0.50	0.1~0.5
		For finishing	300~1200	0.05~0.30	0.1~0.5
CN1000	Grey cast iron Malleable Cast Iron	For roughing	150~1100	0.3~0.8	<5
		For finishing	250~1200	0.15~0.4	<1
	Chilled cast iron	For roughing	20~250	0.2~0.8	<5
		For finishing	60~450	0.1~0.6	<1
CN2000	Ni-base Alloy Non-ferrous metal	For roughing	150~250	0.2~0.4	<5
		For finishing	150~450	0.1~0.2	<1

Table of correctional coefficient between material hardness and cutting speed

Workpiece material		Theoretical Hardness	Correctional coefficient between hardness of materials and cutting speed								
			Hardness decrease ← Hardness difference(Measured value – Theoretical value) → Hardness increase								
			-60	-40	-20	0	+20	+40	+60	+80	+100
P		HB180	1.42	1.24	1.11	1.0	0.91	0.84	0.77	0.72	0.67
M		HB180	1.44	1.25	1.11	1.0	0.91	0.84	0.78	0.73	0.68
K	Grey cast iron	HB220	1.21	1.13	1.06	1.0	0.95	0.90	0.86	0.82	0.79
	Nodular cast iron	HB250	1.33	1.21	1.09	1.0	0.91	0.84	0.75	0.70	0.65
N		HB75			1.05	1.0	0.95				
S		HB350			1.12	1.0	0.89				
Rockwell hardness HRC				-6	-3	0	+3	+6	+9		
H		HRC60		1.10	1.02	1.0	0.96	0.93	0.90		

Actual Cutting Speed = Recommended Cutting Speed×Correctional Coefficient of Cutting Speed

●Please find recommended cutting parameters on insert packing box.
Example: If the material you are going to machine is normal alloy steel, whose theoretical hardness is HB180, and the selected insert is CNMG120404-DF/YBC151, then the recommended cutting speed is V=150m/min. If the hardness measured value of the material is HB220, then the hardness difference value is 220-180= +40. Correctional coefficient found in the table is 0.84. Therefore, the actual applicable cutting speed is Vc=250×0.84=210m/min.

Correctional coefficient table between tool life and cutting speed

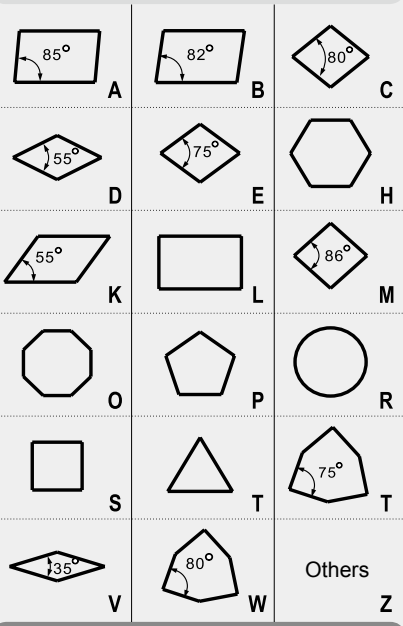
Tool life / Insert materials	Correctional coefficient between tool life and cutting speed					
	10 minutes	15 minutes (Standard life)	30 minutes	45 minutes	60 minutes	90 minutes
YBC151	1.12	1.00	0.82	0.73	0.67	0.60
YBC251	1.11	1.00	0.84	0.76	0.71	0.64
YBC351	1.11	1.00	0.84	0.76	0.70	0.63
YBC152	1.25	1.00	0.68	0.54	0.46	0.37
YBC252	1.55	1.00	0.47	0.30	0.22	0.14
YBM151	1.28	1.00	0.66	0.52	0.43	0.34
YBM153	1.32	1.00	0.64	0.48	0.37	0.31
YBM251	1.19	1.00	0.75	0.63	0.56	0.47
YBM253	1.22	1.00	0.73	0.61	0.54	0.45
YBG202	1.10	1.00	0.85	0.77	0.72	0.66
YBG205	1.15	1.00	0.82	0.74	0.69	0.64
YBD052	1.22	1.00	0.80	0.65	0.60	0.55
YBD102	1.20	1.00	0.75	0.62	0.58	0.50
YBD151	1.20	1.00	0.74	0.63	0.55	0.47
YBD152	1.11	1.00	0.70	0.60	0.50	0.40
YBG105	1.28	1.00	0.79	0.72	0.63	0.58

Actual cutting speed = Recommended cutting speed × Correctional coefficient of cutting speed

Example: If the material you are going to machine is normal alloy steel, and the selected insert is CNMG120404-DF/YBC151, then the recommended cutting speed is V=250m/min (standard life is 15 minutes). If you expect the tool life to reach 60 minutes, the correctional coefficient found in the table is 0.67, then the applicable cutting speed is Vc=250×0.67=167.5m/min.

General turning inserts code key

Insert shape/Code



Insert shape

Metric

Code	With/Without hole	With/Without chipbreaker	Section plane of insert	Code	With/Without hole	With/Without chipbreaker	Section plane of insert
B	With	Without	>65°	N	Without	Without	
H	With	Single-side	>65°	R	Without	Single-side	
C	With	Without	>65°	F	Without	Double-side	
J	With	Double-side	>65°	A	With	Without	
W	With	Without	≤65°	M	With	Single-side	
T	With	Single-side	≤65°	G	With	Double-side	
Q	With	Without	≤65°	X	---	---	Special
U	With	Double-side	≤65°				

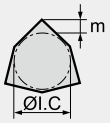
Chipbreaker and clamping system

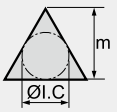
T N M G

Clearance angle of main cutting edge

Code	Clearance angle	Code	Clearance angle
A	3°	B	5°
C	7°	D	15°
E	20°	F	25°
G	30°	N	0°
P	11°	O	Other clearance angles

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	---	---	---	---

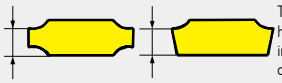
● Tolerance of inscribed circle ØI.C(mm)

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

General turning inserts code key

Diameter of IC	Insert shape							
	C	D	R	S	T	V	W	K
3.97					06			
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	06	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



Thickness is defined as the height from the bottom of insert to the highest part 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	5.96
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

22 04 08 - DM (ISO)

4 3 2 (inch)

Inscribed circle	
Code	Diameter of IC(mm)
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

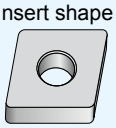
Nose radius	
Code	Nose radius (mm)
0	0.2
1	0.4
2	0.8
3	1.2
4	1.6
5	2.0
6	2.4

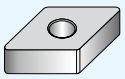
Nose radius code	
Code	Nose radius (mm)
00	No radius
02	0.2
04	0.4
08	0.8
12	1.2
16	1.6
20	2.0
24	2.4
32	3.2
X	Others
Diameter of insert (Metric)	Round insert

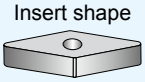
Chipbreaker code

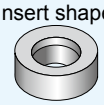
DF	DM	DR
		
HF	HM	HR
		
EF	EM	ER
		
NF	NM	SF
		
PM	HR	WGF
		

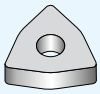
Metric and inch comparison table of negative inserts

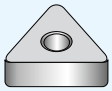
C-type negative angle	(ISO)	(Inch)	Chipbreaker
Insert shape 	090304	321	-DF -WGF -SF -EF -NF -WGM -PM -DM -EM -NM -DR -ER -LR -HPR
	090308	322	
	120404	431	
	120408	432	
	120412	433	
	120416	434	
	160608	542	
	160612	543	
	160616	544	
	190608	642	
	190612	643	
	190616	644	
	190624	646	
	250724	856	
	250732	858	
	250924	866	
	250932	868	

D-type negative angle	(ISO)	(Inch)	Chipbreaker
Insert shape 	110404	331	-EF -DF -WGF -SF -NF -WGM -PM -DM -EM -NM -DR -ER -LR
	110408	332	
	110412	333	
	150404	431	
	150408	432	
	150412	433	
	150604	441	
	150608	442	
	150612	443	
	150616	444	
	190608	542	
	190612	543	

V-type negative angle	(ISO)	(Inch)	Chipbreaker
Insert shape 	160404	331	-DF -EF -SF -NF -PM -DM -EM -NM
	160408	332	
	160412	333	

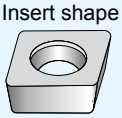
R-type negative angle	(ISO)	(Inch)	Chipbreaker
Insert shape 	0903MO	32	
	1204MO	43	

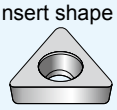
W-type negative angle	(ISO)	(Inch)	Chipbreaker
Insert shape 	06T304	3(2.5)1	-DF -WGF -SF -EF -NF -WGM -PM -DM -EM -NM -DR
	06T308	3(2.5)2	
	06T312	3(2.5)3	
	060404	331	
	060408	332	
	060412	333	
	080404	431	
	080408	432	
	080412	433	

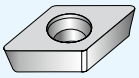
T-type negative angle	(ISO)	(Inch)	Chipbreaker
Insert shape 	110304	221	-DF -WGF -SF -EF -WGM -PM -DM -EM -DR -ER -LR
	110308	222	
	160404	331	
	160408	332	
	160412	333	
	220404	431	
	220408	432	
	220412	433	
	220416	434	
	270608	542	
	270612	543	
	270616	544	

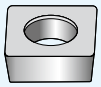
S-type negative angle	(ISO)	(Inch)	Chipbreaker
Insert shape 	090304	321	-DF -SF -EF -PM -DM -EM -NM -DR -ER -LR -HPR
	090308	322	
	090312	323	
	120404	431	
	120408	432	
	120412	433	
	120416	434	
	150608	542	
	150612	543	
	150616	544	
	190412	633	
	190424	636	
	190612	643	
	190616	644	
	250724	856	
	250732	858	
	250924	866	
	250932	868	

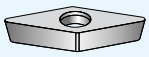
Metric and inch comparison table of positive insert

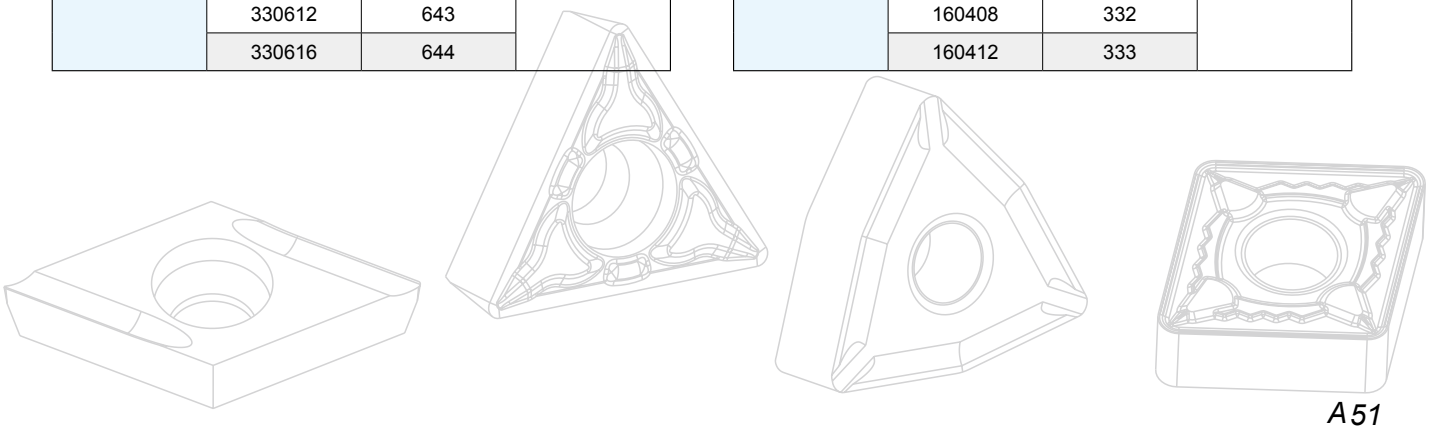
C-type positive angle	(ISO)	(Inch)	Chipbreaker
Insert shape 	060202	2(1.5)0	-USF
	060204	2(1.5)1	-SF
	060208	2(1.5)2	-HF
	09T302	3(2.5)0	-EF
	09T304	3(2.5)1	-HM
	09T308	3(2.5)2	-EM
	120404	431	-HR
	120408	432	-LH
	120412	433	-LC

T-type positive angle	(ISO)	(Inch)	Chipbreaker
Insert shape 	06T102	1.2(1.2)0	
	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	-USF
	110302	220	-SF
	110304	221	-HF
	110308	222	-EF
	16T302	3(2.5)0	-HM
	16T304	3(2.5)1	-EM
	16T308	3(2.5)2	-HR
	16T312	3(2.5)3	-LH
	160400	330	-LC
	220408	432	
	220412	433	
	220416	434	
	270408	532	
	270412	533	
	330612	643	
	330616	644	

D-type positive angle	(ISO)	(Inch)	Chipbreaker
Insert shape 	070202	2(1.5)0	-USF
	070204	2(1.5)1	-SF
	070208	2(1.5)2	-HF
	11T302	3(2.5)0	-EF
	11T304	3(2.5)1	-HM
	11T308	3(2.5)2	-EM
	11T312	3(2.5)3	-HR
			-LH
			-LC

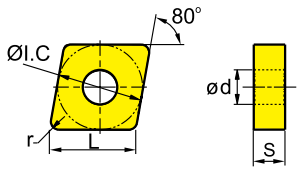
S-type positive angle	(ISO)	(Inch)	Chipbreaker
Insert shape 	060204	2(1.5)1	
	09T302	3(2.5)0	
	09T304	3(2.5)1	
	09T308	3(2.5) 2	-HF
	120404	431	-EF
	120408	432	-HM
	120412	433	-EM
	150404	531	-HR
	150408	532	-LH
	150412	533	-LC
	190408	632	
	190412	633	
	190416	634	

V-type positive angle	(ISO)	(Inch)	Chipbreaker
Insert shape 	110202	2(1.5)0	
	110204	2(1.5)1	
	110208	2(1.5)2	-USF
	110302	220	-SF
	110304	221	-HF
	110308	222	-NF
	160402	330	-LH
	160404	331	-LC
	160408	332	
	160412	333	



Cemented carbide and cermet inserts

CN□□ (Negative 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)					Coated cemented carbide																Cermet	Coated cermet	Cemented carbide				
		L	ØI.C	S	ød	r	YBC151	YBC152	YBC251	YBC252	YBC351	YBC352	YBG102	YBG105	YBG202	YBG205	YBG302	YBM151	YBM153	YBM251	YBM253	YBD052	YBD102	YBD151	YBD152	YBD252	YNG151	YNG151C	YC10	YC40	YD051	YD101	YD201
DF	CNMG090304-DF	9.7	9.525	3.18	3.81	0.4	○		○						○																	
	CNMG090308-DF	9.7	9.525	3.18	3.81	0.8	○	○	○																							
	CNMG120404-DF	12.9	12.7	4.76	5.16	0.4	★	●	★						○					○							○						
	CNMG120408-DF	12.9	12.7	4.76	5.16	0.8	★	●	★	○					○					○							●						
For finishing	CNMG120412-DF	12.9	12.7	4.76	5.16	1.2	★	○	○											○													
WGF	CNMG120404-WGF	12.9	12.7	4.76	5.16	0.4	★												★			★											
	CNMG120408-WGF	12.9	12.7	4.76	5.16	0.8	★												★			★											
For finishing Wiper																																	
SF	CNMG090304-SF	9.7	9.525	3.18	3.81	0.4							○														○						
	CNMG090308-SF	9.7	9.525	3.18	3.81	0.8							○														○	★					
	CNMG120404-SF	12.9	12.7	4.76	5.16	0.4							○															★					
	CNMG120408-SF	12.9	12.7	4.76	5.16	0.8							○															★					
For finishing	CNMG120412-SF	12.9	12.7	4.76	5.16	1.2							○														○						
EF	CNMG090304-EF	9.7	9.525	3.18	3.81	0.4									●	★			★														
	CNMG090308-EF	9.7	9.525	3.18	3.81	0.8									○	★			★														
	CNMG120404-EF	12.9	12.7	4.76	5.16	0.4									●	★			★														
	CNMG120408-EF	12.9	12.7	4.76	5.16	0.8							●		●	★			★														
For finishing	CNMG120412-EF	12.9	12.7	4.76	5.16	1.2									○	★			★														

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

Applicable tool

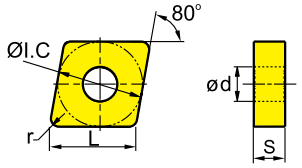

DCLNR/L
Kr:95°
Page A164


PCBNR/L
Kr:75°
A171


PCLNR/L
Kr:95°
A172

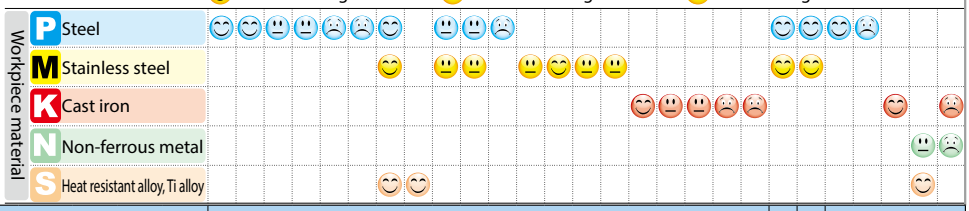

PCLNR/L
Kr:95°
A214

CN□□ (Negative inserts)



Good working condition Normal working condition Bad working condition

Workpiece material



Inserts shape	Type	Dimensions(mm)					Coated cemented carbide																Cermet	Coated cermet	Cemented carbide				
		L	ØI.C	S	ød	r	YBC151	YBC152	YBC251	YBC252	YBC351	**YBC352**	YBG102	YBG105	YBG202	YBG205	YBG302	YBM151	YBM153	YBM251	YBM253	YBD052	YBD102	YBD151	YBD152	YBD252	YNG151	YNG151C	YC10	YC40	YD051	YD101	YD201
NF  For finishing	**CNEG120404-NF**	12.9	12.7	4.76	5.16	0.4							●	★																	○	
	CNEG120408-NF	12.9	12.7	4.76	5.16	0.8							○	★																	○	
	CNEG120412-NF	12.9	12.7	4.76	5.16	1.2							○	★																	○	
WGM  For finishing Wiper	**CNMG120408-WGM**	12.9	12.7	4.76	5.16	0.8				★					★									★								
	CNMG120412-WGM	12.9	12.7	4.76	5.16	1.2				★					★									★								
PM  For semi-finishing	**CNMG090304-PM**	9.7	9.525	3.18	3.81	0.4		★	●	○																						
	CNMG090308-PM	9.7	9.525	3.18	3.81	0.8		○	●	○															★							
	CNMG120404-PM	12.9	12.7	4.76	5.16	0.4		★	●	★	○												★		★	○						
	CNMG120408-PM	12.9	12.7	4.76	5.16	0.8	●	★	●	★	●												★		★	★						
	CNMG120412-PM	12.9	12.7	4.76	5.16	1.2		○	●	★	●												★		★	★						
	CNMG120416-PM	12.9	12.7	4.76	5.16	1.6		★	●	○	●												★		○							
	CNMG160608-PM	16.1	15.875	6.35	6.35	0.8	●	○	●	○	○												○		○							
	CNMG160612-PM	16.1	15.875	6.35	6.35	1.2	●	○	●	○	●												★		○							
	CNMG160616-PM	16.1	15.875	6.35	6.35	1.6			●	○													○		○							
	CNMG190608-PM	19.3	19.05	6.35	7.94	0.8		★	●	○	○														★							
	CNMG190612-PM	19.3	19.05	6.35	7.94	1.2		★	●	★	●												○		★							
	CNMG190616-PM	19.3	19.05	6.35	7.94	1.6	●	★	●	○	●												○									

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

Applicable tool



Page A164



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A172

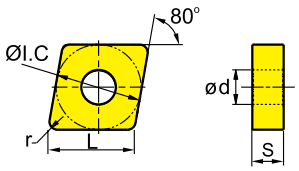


A214

Insert code key A48–A49
Grade selection reference A19/A34–A46
Chipbreaker selection reference A22–A33
Recommended cutting parameters A243–A245

Cemented carbide and cermet inserts

CN□□ (Negative 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)					Coated cemented carbide																Cermet	Coated cermet	Cemented carbide				
		L	ØI.C	S	ød	r	YBC151	YBC152	YBC251	YBC252	YBC351	**YBC352**	YBG102	YBG105	YBG202	YBG205	YBG302	YBM151	YBM153	YBM251	YBM253	YBD052	YBD102	YBD151	YBD152	YBD252	YNG151	YNG151C	YC10	YC40	YD051	YD101	YD201
DM	CNMG090304-DM	9.7	9.525	3.18	3.81	0.4	○	●	○											●												
	CNMG090308-DM	9.7	9.525	3.18	3.81	0.8		○	○											●												
	CNMG120404-DM	12.9	12.7	4.76	5.16	0.4	★	●	★	○					●		○			●							●						
	CNMG120408-DM	12.9	12.7	4.76	5.16	0.8	●	★	●	★	●				●		●	○		●							●						
	CNMG120412-DM	12.9	12.7	4.76	5.16	1.2		★	●	★	●				○					●												
	CNMG120416-DM	12.9	12.7	4.76	5.16	1.6			●	○	●									○												
	CNMG160608-DM	16.1	15.875	6.35	6.35	0.8		★	●	★	○									●												
	CNMG160612-DM	16.1	15.875	6.35	6.35	1.2		○	●	★	○									○												
	CNMG160616-DM	16.1	15.875	6.35	6.35	1.6		★	●	○	●									○												
	CNMG190608-DM	19.3	19.05	6.35	7.94	0.8		○	●	○										○												
	CNMG190612-DM	19.3	19.05	6.35	7.94	1.2		★	●	★	○									○												
	CNMG190616-DM	19.3	19.05	6.35	7.94	1.6			●	★	○									○												
EM	CNMG120404-EM	12.9	12.7	4.76	5.16	0.4									●	★					★											
	CNMG120408-EM	12.9	12.7	4.76	5.16	0.8									●	★					★											
	CNMG120412-EM	12.9	12.7	4.76	5.16	1.2									●	★					★											
	CNMG160608-EM	16.1	15.875	6.35	6.35	0.8							○		○	★					★											
	CNMG160612-EM	16.1	15.875	6.35	6.35	1.2									○	★					★											
	CNMG160616-EM	16.1	15.875	6.35	6.35	1.6									○	★					★											

DM: For semi-finishing

EM: For semi-finishing

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

Applicable tool

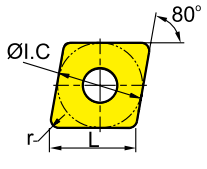

DCLNR/L Kr:95°
Page A164


PCBNR/L Kr:75°
A171


PCLNR/L Kr:95°
A172

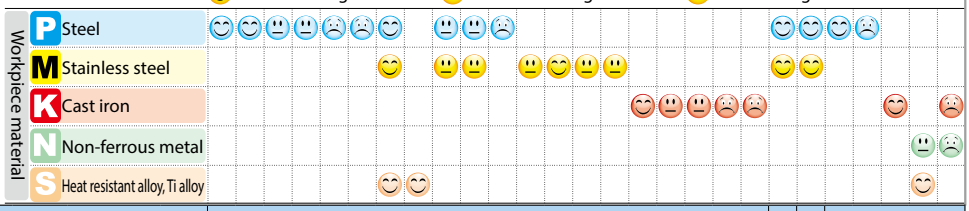

PCLNR/L Kr:95°
A214

CN□□ (Negative inserts)



Good working condition Normal working condition Bad working condition

Workpiece material



Inserts shape	Type	Dimensions(mm)					Coated cemented carbide																Cermet	Coated cermet	Cemented carbide				
		L	ØI.C	S	ød	r	YBC151	YBC152	YBC251	YBC252	YBC351	**YBC352**	YBG102	YBG105	YBG202	YBG205	YBG302	YBM151	YBM153	YBM251	YBM253	YBD052	YBD102	YBD151	YBD152	YBD252	YNG151	YNG151C	YC10	YC40	YD051	YD101	YD201
NM For semi-finishing	**CNMG120404-NM**	12.9	12.7	4.76	5.16	0.4							○	★																	○	
	CNMG120408-NM	12.9	12.7	4.76	5.16	0.8							●	★																	○	
	CNMG120412-NM	12.9	12.7	4.76	5.16	1.2							○	★																	○	
LR Light-load roughing	**CNMM120408-LR**	12.9	12.7	4.76	5.16	0.8				★																						
	CNMM120412-LR	12.9	12.7	4.76	5.16	1.2				★																						
	CNMM120416-LR	12.9	12.7	4.76	5.16	1.6				★																						
	CNMM160608-LR	16.1	15.875	6.35	6.35	0.8				★																						
	CNMM160612-LR	16.1	15.875	6.35	6.35	1.2				★																						
	CNMM160616-LR	16.1	15.875	6.35	6.35	1.6				★																						
	CNMM160624-LR	16.1	15.875	6.35	6.35	2.4				★																						
	CNMM190612-LR	19.3	19.05	6.35	7.94	1.2				★																						
	CNMM190616-LR	19.3	19.05	6.35	7.94	1.6				★																						
	CNMM190624-LR	19.3	19.05	6.35	7.94	2.4				★																						
	CNMM250924-LR	25.79	25.4	9.525	9.12	2.4				★																						

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

Applicable tool



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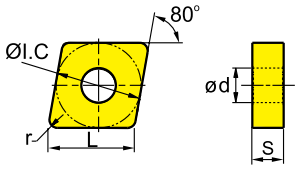
A172



A214

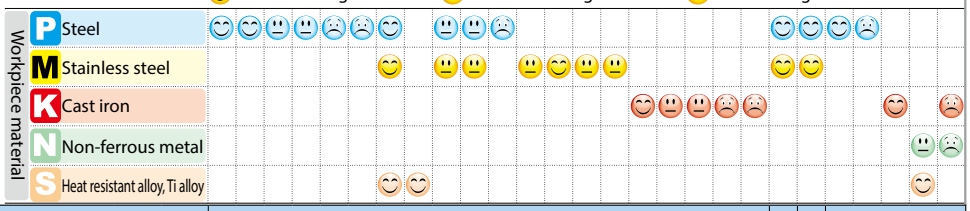
Insert code key A48–A49
Grade selection reference A19/A34–A46
Chipbreaker selection reference A22–A33
Recommended cutting parameters A243–A245

CN□□ (Negative inserts)



Good working condition Normal working condition Bad working condition

Workpiece material



Inserts shape	Type	Dimensions(mm)					Coated cemented carbide																Cermet	Coated cermet	Cemented carbide				
		L	ØI.C	S	ød	r	YBC151	YBC152	YBC251	YBC252	YBC351	**YBC352**	YBG102	YBG105	YBG202	YBG205	YBG302	YBM151	YBM153	YBM251	YBM253	YBD052	YBD102	YBD151	YBD152	YBD252	YNG151	YNG151C	YC10	YC40	YD051	YD101	YD201
DR For light roughing	CNMG120408-DR	12.9	12.7	4.76	5.16	0.8	★	●	★	●											●		●									
	CNMG120412-DR	12.9	12.7	4.76	5.16	1.2	○	●	★	○											●		●									
	CNMG120416-DR	12.9	12.7	4.76	5.16	1.6	○		○												●		●									
	CNMG160608-DR	16.1	15.875	6.35	6.35	0.8		○	○												○											
	CNMG160612-DR	16.1	15.875	6.35	6.35	1.2		●	★	○											●		○									
	CNMG160616-DR	16.1	15.875	6.35	6.35	1.6		○	★	●																						
	CNMG190608-DR	19.3	15.875	6.35	7.94	0.8		○	○												●		○									
	CNMG190612-DR	19.3	19.05	6.35	7.94	1.2	○	●	★	●											○		○									
	CNMG190616-DR	19.3	19.05	6.35	7.94	1.6	○	●	★	●													○									
	CNMG190624-DR	19.3	19.05	6.35	7.94	2.4	○	●	○	●																						
DR For roughing	CNMM120412-DR	12.9	12.7	4.76	5.16	1.2		●		○																						
	CNMM160612-DR	16.1	15.875	6.35	6.35	1.2		●		○																						
	CNMM160616-DR	16.1	15.875	6.35	6.35	1.6				○																						
	CNMM190612-DR	19.3	19.05	6.35	7.94	1.2		●	○	●																						
	CNMM190616-DR	19.3	19.05	6.35	7.94	1.6		●	★	●																						
	CNMM190624-DR	19.3	19.05	6.35	7.94	2.4	○	○		○																						
	CNMM250924-DR	25.79	25.4	9.525	9.12	2.4		○	★	○																						
ER For roughing	CNMG120408-ER	12.9	12.7	4.76	5.16	0.8												●			★											
	CNMG120412-ER	12.9	12.7	4.76	5.16	1.2												●			★											
	CNMG160612-ER	16.1	15.875	6.35	6.35	1.2												●			★											
	CNMG160616-ER	16.1	15.875	6.35	6.35	1.6															★											
	CNMG190612-ER	19.3	19.05	6.35	7.94	1.2															★											
	CNMG190616-ER	19.3	19.05	6.35	7.94	1.6															★											
ER For roughing	CNMM250724-ER	25.79	25.4	7.94	9.12	2.4				★											★											
	CNMM250732-ER	25.79	25.4	7.94	9.12	3.2				★											★											
	CNMM250924-ER	25.79	25.4	9.525	9.12	2.4				★											★											
	CNMM250932-ER	25.79	25.4	9.525	9.12	3.2				★											★											

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

Applicable tool

DCLNR/L Kr:95°



Page A164

PCBNR/L Kr:75°



A171

PCLNR/L Kr:95°



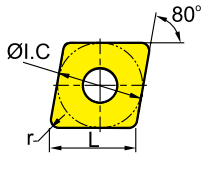
A172

PCLNR/L Kr:95°



A214

CN□□ (Negative 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)					Coated cemented carbide																Cermet	Coated cermet	Cemented carbide				
		L	ØI.C	S	ød	r	YBC151	YBC152	YBC251	YBC252	YBC351	**YBC352**	YBG102	YBG105	YBG202	YBG205	YBG302	YBM151	YBM153	YBM251	YBM253	YBD052	YBD102	YBD151	YBD152	YBD252	YNG151	YNG151C	YC10	YC40	YD051	YD101	YD201
HPR  For heavy machining	CNMM190616-HPR	19.5	19.05	6.35	7.94	1.6				★		○																			
	CNMM250924-HPR	25.19	25.4	9.525	9.12	2.4				★		○																			
Without chipbreaker 	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																○	★		★							

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

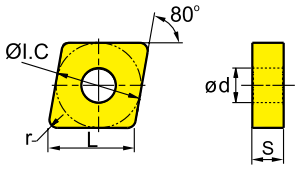
Applicable tool

DCLNR/L Kr:95°	PCBNR/L Kr:75°	PCLNR/L Kr:95°	PCLNR/L Kr:95°
			
Page A164	A171	A172	A214

Insert code key A48–A49
Grade selection reference A19/A34–A46
Chipbreaker selection reference A22–A33
Recommended cutting parameters A243–A245

Cemented carbide and cermet inserts

CN□□ (Negative 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)					Coated cemented carbide																Cermet	Coated cermet	Cemented carbide				
		L	ØI.C	S	ød	r	YBC151	YBC152	YBC251	YBC252	YBC351	**YBC352**	YBG102	YBG105	YBG202	YBG205	YBG302	YBM151	YBM153	YBM251	YBM253	YBD052	YBD102	YBD151	YBD152	YBD252	YNG151	YNG151C	YC10	YC40	YD051	YD101	YD201
All round 	**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	○		○		○													○									
All round 	**CNMM120404**	12.9	12.7	4.76	5.16	0.4	○																										
	CNMM120408	12.9	12.7	4.76	5.16	0.8	○		○																								
	CNMM120412	12.9	12.7	4.76	5.16	1.2	○																						○	○			
	CNMM190608	19.3	19.05	6.35	7.94	0.8					○																		○				
	CNMM190612	19.3	19.05	6.35	7.94	1.2			○		○																						
	CNMM190616	19.3	19.05	6.35	7.94	1.6			○																								
	CNMM190624	19.3	19.05	6.35	7.94	2.4					○																						

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

Applicable tool

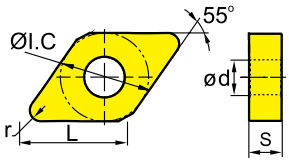

DCLNR/L Kr:95°
Page A164


PCBNR/L Kr:75°
A171

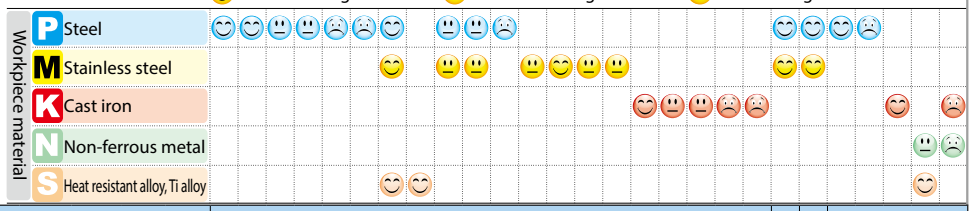

PCLNR/L Kr:95°
A172


PCLNR/L Kr:95°
A214

DN□□ (Negative inserts)



Good working condition Normal working condition Bad working condition



Inserts shape	Type	Dimensions(mm)					Coated cemented carbide																Cermet	Coated cermet	Cemented carbide				
		L	ØI.C	S	ød	r	YBC151	YBC152	YBC251	YBC252	YBC351	**YBC352**	YBG102	YBG105	YBG202	YBG205	YBG302	YBM151	YBM153	YBM251	YBM253	YBD052	YBD102	YBD151	YBD152	YBD252	YNG151	YNG151C	YC10	YC40	YD051	YD101	YD201
DF  For finishing	DNMG110404-DF	11.6	9.525	4.76	3.81	0.4		○	●	○																●						
	DNMG110408-DF	11.6	9.525	4.76	3.81	0.8		○	○	○																						
	DNMG110412-DF	11.6	9.525	4.76	3.81	1.2		○	○																							
	DNMG150404-DF	15.5	12.7	4.76	5.16	0.4		★	●	★																						
	DNMG150408-DF	15.5	12.7	4.76	5.16	0.8		★	●	★																						
	DNMG150412-DF	15.5	12.7	4.76	5.16	1.2		○		○																						
	DNMG150604-DF	15.5	12.7	6.35	5.16	0.4	●	★	●	★										○												
	DNMG150608-DF	15.5	12.7	6.35	5.16	0.8		★	●	○																						
	DNMG150612-DF	15.5	12.7	6.35	5.16	1.2			○																							
WGF  For finishing Wiper	DNMX110404-WGF	11.6	9.525	4.76	3.81	0.4		★											★			★										
	DNMX110408-WGF	11.6	9.525	4.76	3.81	0.8		★											★			★										
	DNMX150404-WGF	15.5	12.7	4.76	5.16	0.4		★											★			★										
	DNMX150408-WGF	15.5	12.7	4.761	5.16	0.8		★											★			★										
	DNMX150604-WGF	15.5	12.7	6.35	5.16	0.4		★											★			★										
	DNMX150608-WGF	15.5	12.7	6.35	5.16	0.8		★											★			★										

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

Applicable tool


DDJNR/L Kr:93°
Page A165


PDJNR/L Kr:93°
A173


PDNNR/L Kr:63°
A174

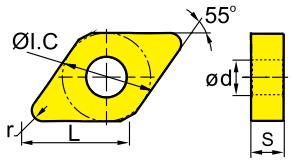

PDSNR/L Kr:62°30'
A215


PDUNR/L Kr:93°
A216

Insert code key A48–A49
Grade selection reference A19/A34–A46
Chipbreaker selection reference A22–A33
Recommended cutting parameters A243–A245

Cemented carbide and cermet inserts

DN□□ (Negative 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)					Coated cemented carbide															Cermet	Coated cermet	Cemented carbide				
		L	ØI.C	S	ød	r	YBC151	YBC152	YBC251	YBC252	YBC351	**YBC352**	YBG102	YBG105	YBG202	YBG205	YBG302	YBM151	YBM153	YBM251	YBM253	YBD052	YBD102	YBD151	YBD152	YBD252	YNG151	YNG151C	YC10	YC40	YD051	YD101	YD201
SF	DNMG110404-SF	11.6	9.525	4.76	3.81	0.4							○														○	★					
	DNMG150404-SF	15.5	12.7	4.76	5.16	0.4							○														○	★					
	DNMG150408-SF	15.5	12.7	4.76	5.16	0.8							○														○	★					
	DNMG150604-SF	15.5	12.7	6.35	5.16	0.4							○														○	★					
For finishing	DNMG150608-SF	15.5	12.7	6.35	5.16	0.8							○														○	★					
EF	DNMG110404-EF	11.6	9.525	4.76	3.81	0.4									●	★			★														
	DNMG110408-EF	11.6	9.525	4.76	3.81	0.8									○	★			★														
	DNMG110412-EF	11.6	9.525	4.76	3.81	1.2									○	★			★														
	DNMG150404-EF	15.5	12.7	4.76	5.16	0.4									●	★			★														
	DNMG150408-EF	15.5	12.7	4.76	5.16	0.8									●	★			★														
For finishing	DNMG150412-EF	15.5	12.7	4.76	5.16	1.2									○	★			★														
	DNMG150604-EF	15.5	12.7	6.35	5.16	0.4									●	★			★														
	DNMG150608-EF	15.5	12.7	6.35	5.16	0.8									●	★			★														
	DNMG150612-EF	15.5	12.7	6.35	5.16	1.2									○	★			★														
NF	DNEG150404-NF	15.5	12.7	4.76	5.16	0.4							○	★																		○	
	DNEG150408-NF	15.5	12.7	4.76	5.16	0.8							○	★																		○	
	DNEG150604-NF	15.5	12.7	6.35	5.16	0.4							●	★																		○	
For finishing	DNEG150608-NF	15.5	12.7	6.35	5.16	0.8							●	★																		○	

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

Applicable tool


DDJNR/L
Kr:93°
Page A165

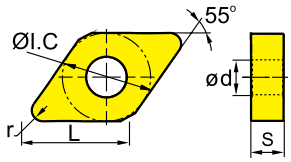

PDJNR/L
Kr:93°
A173


PDNNR/L
Kr:63°
A174


PDSNR/L
Kr:62°30'
A215

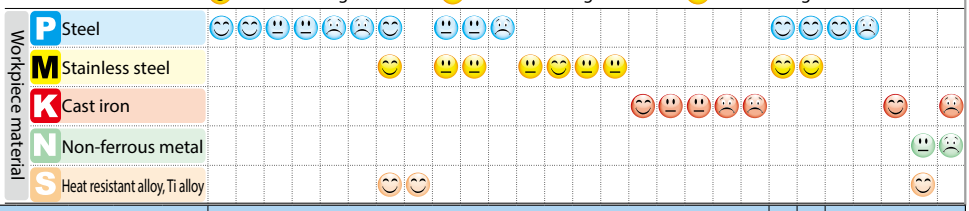

PDUNR/L
Kr:93°
A216

DN□□ (Negative inserts)



Good working condition Normal working condition Bad working condition

Workpiece material



Inserts shape	Type	Dimensions(mm)					Coated cemented carbide																Cermet	Coated cermet	Cemented carbide				
		L	ØI.C	S	ød	r	YBC151	YBC152	YBC251	YBC252	YBC351	**YBC352**	YBG102	YBG105	YBG202	YBG205	YBG302	YBM151	YBM153	YBM251	YBM253	YBD052	YBD102	YBD151	YBD152	YBD252	YNG151	YNG151C	YC10	YC40	YD051	YD101	YD201
WGM  For semi-finishing Wiper	**DNMX150408-WGM**	15.5	12.7	4.76	5.16	0.8				★					★										★							
	DNMX150412-WGM	15.5	12.7	4.76	5.161	1.2				★					★										★							
	DNMX150608-WGM	15.5	12.7	6.35	5.16	0.8				★					★										★							
	DNMX150612-WGM	15.5	12.7	6.35	5.16	1.2				★					★										★							
PM  For semi-finishing	**DNMG110404-PM**	11.6	9.525	4.76	3.81	0.4		●	●	○															●							
	DNMG110408-PM	11.6	9.525	4.76	3.81	0.8		●	●	○	○												★		○	○							
	DNMG110412-PM	11.6	9.525	4.76	3.81	1.2			○	○																							
	DNMG150404-PM	15.5	12.7	4.76	5.16	0.4		●	●	○																							
	DNMG150408-PM	15.5	12.7	4.76	5.16	0.8	●	●	●	○	○												★		★	○							
	DNMG150412-PM	15.5	12.7	4.76	5.16	1.2			●	○			○										○		★	○							
	DNMG150416-PM	15.5	12.7	4.76	5.16	1.6			○	○																							
	DNMG150604-PM	15.5	12.7	6.35	5.16	0.4		●	●	○	○												★		★								
	DNMG150608-PM	15.5	12.7	6.35	5.16	0.8	●	○	●	★	●												★		★	○							
	DNMG150612-PM	15.5	12.7	6.35	5.16	1.2		★	●	★	○												★		○								
	DNMG150616-PM	15.5	12.7	6.35	5.16	1.6			○	○																							

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

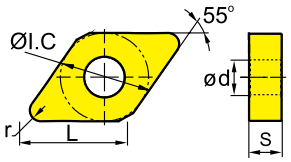
Applicable tool



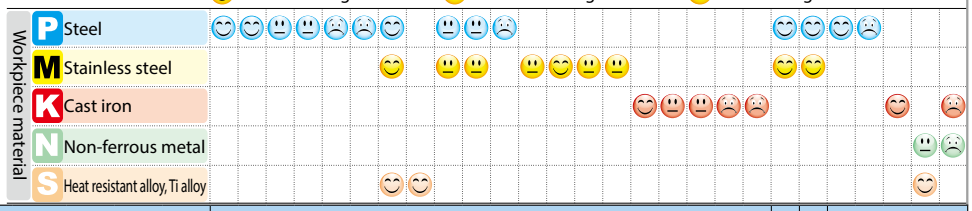
Page A165 A173 A174 A215 A216

Insert code key A48–A49
Grade selection reference A19/A34–A46
Chipbreaker selection reference A22–A33
Recommended cutting parameters A243–A245

DN□□ (Negative inserts)



Good working condition Normal working condition Bad working condition



Inserts shape	Type	Dimensions(mm)					Coated cemented carbide																	Cermet	Coated cermet	Cemented carbide				
		L	ØI.C	S	ød	r	YBC151	YBC152	YBC251	YBC252	YBC351	**YBC352**	YBG102	YBG105	YBG202	YBG205	YBG302	YBM151	YBM153	YBM251	YBM253	YBD052	YBD102	YBD151	YBD152	YBD252	YNG151	YNG151C	YC10	YC40	YD051	YD101	YD201
DM	DNMG110404-DM	11.6	9.525	4.76	3.81	0.4	●	●	○											○												
	DNMG110408-DM	11.6	9.525	4.76	3.81	0.8	★	●	★	○										●												
	DNMG110412-DM	11.6	9.525	4.76	3.81	1.2	○		○																							
	DNMG150404-DM	15.5	12.7	4.76	5.16	0.4	○	●	★																	○						
	DNMG150408-DM	15.5	12.7	4.76	5.16	0.8	★	●	★																	●						
	DNMG150412-DM	15.5	12.7	4.76	5.16	1.2	★	○	★																							
	DNMG150416-DM	15.5	12.7	4.76	5.16	1.6			○																							
	DNMG150604-DM	15.5	12.7	6.35	5.16	0.4	★	●	★	○										●						●						
	DNMG150608-DM	15.5	12.7	6.35	5.16	0.8	★	●	★	●										●												
	DNMG150612-DM	15.5	12.7	6.35	5.16	1.2	●	●	★	○																						
	DNMG150616-DM	15.5	12.7	6.35	5.16	1.6	○	○	○																							
EM	DNMG110404-EM	11.6	9.525	4.76	3.81	0.4									○	★					★											
	DNMG110408-EM	11.6	9.525	4.76	3.81	0.8									○	★					★											
	DNMG110412-EM	11.6	9.525	4.76	3.81	1.2									○	★					★											
	DNMG150404-EM	15.5	12.7	4.76	5.16	0.4									●	★					★											
	DNMG150408-EM	15.5	12.7	4.76	5.16	0.8									●	★					★											
	DNMG150412-EM	15.5	12.7	4.76	5.16	1.2									○	★					★											
	DNMG150604-EM	15.5	12.7	6.35	5.16	0.4							○		●	★					★											
	DNMG150608-EM	15.5	12.7	6.35	5.16	0.8									●	★					★											
	DNMG150612-EM	15.5	12.7	6.35	5.16	1.2									○	★					★											
NM	DNMG150412-NM	15.5	12.7	4.76	5.16	1.2							○	★																	○	
	DNMG150612-NM	15.5	12.7	6.35	5.16	1.2							●	★																	○	

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

Applicable tool


DDJNR/L
Kr:93°
Page A165

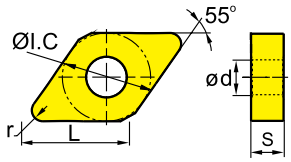

PDJNR/L
Kr:93°
A173


PDNNR/L
Kr:63°
A174


PDSNR/L
Kr:62°30'
A215


PDUNR/L
Kr:93°
A216

DN□□ (Negative 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)					Coated cemented carbide																Cermet	Coated cermet	Cemented carbide				
		L	ØI.C	S	ød	r	YBC151	YBC152	YBC251	YBC252	YBC351	YBC352	YBG102	YBG105	YBG202	YBG205	YBG302	YBM151	YBM153	YBM251	YBM253	YBD052	YBD102	YBD151	YBD152	YBD252	YNG151	YNG151C	YC10	YC40	YD051	YD101	YD201
LR	DNMM150608-LR	15.5	12.7	6.35	5.16	0.8				★																						
	DNMM150612-LR	15.5	12.7	6.35	5.16	1.2				★																						
Light-load roughing	DNMM150616-LR	15.5	12.7	6.35	5.16	1.6				★																						
DR	DNMG150408-DR	15.5	12.7	4.76	5.16	0.8				○																						
	DNMG150412-DR	15.5	12.7	4.76	5.16	1.2				○																						
	DNMG150416-DR	15.5	12.7	4.76	5.16	1.6				○	○																					
	DNMG150608-DR	15.5	12.7	6.35	5.16	0.8	★	○	○	○													●		●							
For light roughing	DNMG150612-DR	15.5	12.7	6.35	5.16	1.2	○	●	★	○													○		●							
	DNMG150616-DR	15.5	12.7	6.35	5.16	1.6					○														○							
DR	DNMM150608-DR	15.5	12.7	6.35	5.16	0.8	○	○																								
	DNMM150612-DR	15.5	12.7	6.35	5.16	1.2	○	●																								
For roughing	DNMM150616-DR	15.5	12.7	6.35	5.16	1.6					○																					
ER	DNMG150608-ER	15.5	12.7	6.35	5.16	0.8															★											
	DNMG150612-ER	15.5	12.7	6.35	5.16	1.2															★											
For roughing																																
ER	DNMM150608-ER	15.5	12.7	6.35	5.16	0.8															★											
	DNMM150612-ER	15.5	12.7	6.35	5.16	1.2															★											
For roughing																																

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

Applicable tool


DDJNR/L Kr:93°
Page A165


PDJNR/L Kr:93°
A173


PDNNR/L Kr:63°
A174

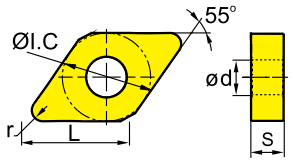

PDSNR/L Kr:62°30'
A215


PDUNR/L Kr:93°
A216

Insert code key A48–A49
Grade selection reference A19/A34–A46
Chipbreaker selection reference A22–A33
Recommended cutting parameters A243–A245

Cemented carbide and cermet inserts

DN□□ (Negative 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)					Coated cemented carbide															Cermet	Coated cermet	Cemented carbide				
		L	ØI.C	S	ød	r	YBC151	YBC152	YBC251	YBC252	YBC351	**YBC352**	YBG102	YBG105	YBG202	YBG205	YBG302	YBM151	YBM153	YBM251	YBM253	YBD052	YBD102	YBD151	YBD152	YBD252	YNG151	YNG151C	YC10	YC40	YD051	YD101	YD201
All round	**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	15.875	6.35	7.94	0.8			○																							
	DNMG190612	19.3	15.875	6.35	7.94	1.2			○		○																		○				
Without chipbreaker	**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																	○	○	○							

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

Applicable tool


DDJNR/L Kr:93° — Page A165

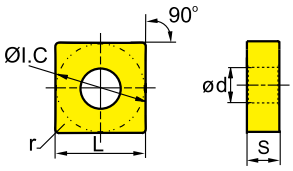

PDJNR/L Kr:93° — A173


PDNNR/L Kr:63° — A174


PDSNR/L Kr:62°30' — A215


PDUNR/L Kr:93° — A216

SN□□ (Negative 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)					Coated cemented carbide																Cermet	Coated cermet	Cemented carbide				
		L	ØI.C	S	ød	r	YBC151	YBC152	YBC251	YBC252	YBC351	YBC352	YBG102	YBG105	YBG202	YBG205	YBG302	YBM151	YBM153	YBM251	YBM253	YBD052	YBD102	YBD151	YBD152	YBD252	YNG151	YNG151C	YC10	YC40	YD051	YD101	YD201
DF	SNMG090304-DF	9.525	9.525	3.18	3.81	0.4	○																								
	SNMG090308-DF	9.525	9.525	3.18	3.81	0.8	○																								
	SNMG120404-DF	12.7	12.7	4.76	5.16	0.4	○																								
	SNMG120408-DF	12.7	12.7	4.76	5.16	0.8	○	●	○																	○					
	SNMG120412-DF	12.7	12.7	4.76	5.16	1.2	○		○																						
EF	SNMG090304-EF	9.525	9.525	3.18	3.81	0.4									○	★			★												
	SNMG090308-EF	9.525	9.525	3.18	3.81	0.8									○	★			★												
	SNMG090312-EF	9.525	9.525	3.18	3.81	1.2									○	★			★												
	SNMG120404-EF	12.7	12.7	4.76	5.16	0.4									●	★			★												
	SNMG120408-EF	12.7	12.7	4.76	5.16	0.8									●	★			★												
	SNMG120412-EF	12.7	12.7	4.76	5.16	1.2									○	★			★												
	SNMG150608-EF	15.875	15.875	6.35	6.35	0.8									○	★			★												
	SNMG150612-EF	15.875	15.875	6.35	6.35	1.2									○	★			★												
SF	SNMG090304-SF	9.525	9.525	3.18	3.81	0.4							○														○	★				
	SNMG090308-SF	9.525	9.525	3.18	3.81	0.8							○														○	★				
	SNMG120404-SF	12.7	12.7	4.76	5.16	0.4							○														○	★				
	SNMG120408-SF	12.7	12.7	4.76	5.16	0.8							○														○	★				
	SNMG120412-SF	12.7	12.7	4.76	5.16	1.2							○														○					
	SNMG150608-SF	15.875	15.875	6.35	6.35	0.8							○														○					

For finishing

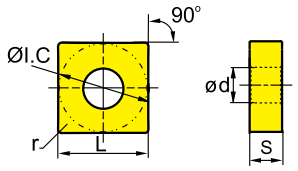
★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

Applicable tool

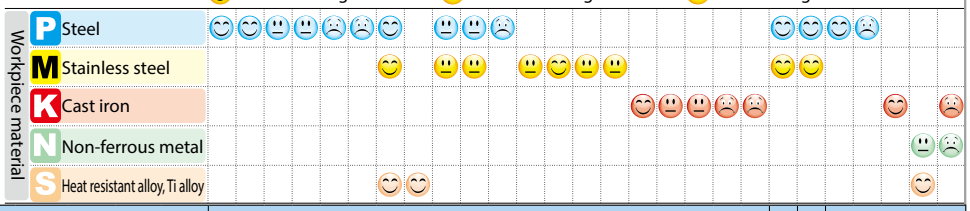
DSBNR/L	PSBNR/L	PSDNN	PSKNR/L	PSSNR/L	PSKNR/L
Kr:75°	Kr:75°	Kr:45°	Kr:75°	Kr:45°	Kr:75°
					
Page A166	A175	A176	A177	A178	A217

Insert code key A48–A49
Grade selection reference A19/A34–A46
Chipbreaker selection reference A22–A33
Recommended cutting parameters A243–A245

SN□□ (Negative inserts)



Good working condition Normal working condition Bad working condition



Inserts shape	Type	Dimensions(mm)					Coated cemented carbide																Cermet	Coated cermet	Cemented carbide				
		L	ØI.C	S	ød	r	YBC151	YBC152	YBC251	YBC252	YBC351	**YBC352**	YBG102	YBG105	YBG202	YBG205	YBG302	YBM151	YBM153	YBM251	YBM253	YBD052	YBD102	YBD151	YBD152	YBD252	YNG151	YNG151C	YC10	YC40	YD051	YD101	YD201
PM	SNMG090304-PM	9.525	9.525	3.18	3.81	0.4		○	●	○																						
	SNMG090308-PM	9.525	9.525	3.18	3.81	0.8		○	●	○	○												○									
	SNMG090312-PM	9.525	9.525	3.18	3.81	1.2		○		○																						
	SNMG120404-PM	12.7	12.7	4.76	5.16	0.4		○	●	○	○												○									
	SNMG120408-PM	12.7	12.7	4.76	5.16	0.8		●	●	○	●												★		★	★						
	SNMG120412-PM	12.7	12.7	4.76	5.16	1.2		●	●	○	○												★		★	★						
	SNMG120416-PM	12.7	12.7	4.76	5.16	1.6			●	○	○														○							
	SNMG150608-PM	15.875	15.875	6.35	6.35	0.8				○																						
	SNMG150612-PM	15.875	15.875	6.35	6.35	1.2		●	●	○													○		●							
	SNMG190616-PM	19.05	19.05	6.35	7.94	1.6			●	○																						
DM	SNMG090304-DM	9.525	9.525	3.18	3.81	0.4		○		○																						
	SNMG090308-DM	9.525	9.525	3.18	3.81	0.8		○	●	○	○																					
	SNMG120404-DM	12.7	12.7	4.76	5.16	0.4		★	●	○																						
	SNMG120408-DM	12.7	12.7	4.76	5.16	0.8				○										○							○					
	SNMG120412-DM	12.7	12.7	4.76	5.16	1.2		★	●	★																						
	SNMG120416-DM	12.7	12.7	4.76	5.16	1.6			●	○	○																					
	SNMG150608-DM	15.875	15.875	6.35	6.35	0.8		○	●	○										●												
	SNMG150612-DM	15.875	15.875	6.35	6.35	1.2		●	●	★	●																					
	SNMG150616-DM	15.875	15.875	6.35	6.35	1.6				○																						
	SNMG190612-DM	19.05	19.05	6.35	7.94	1.2		○	●	○	○									○												
	SNMG190616-DM	19.05	19.05	6.35	7.94	1.6				○																						

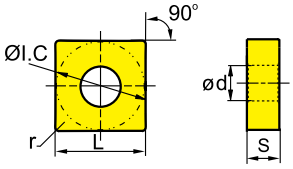
★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

Applicable tool



Page A166 A175 A176 A177 A178 A217

SN□□ (Negative 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)					Coated cemented carbide																Cermet	Coated cermet	Cemented carbide				
		L	ØI.C	S	ød	r	YBC151	YBC152	YBC251	YBC252	YBC351	**YBC352**	YBG102	YBG105	YBG202	YBG205	YBG302	YBM151	YBM153	YBM251	YBM253	YBD052	YBD102	YBD151	YBD152	YBD252	YNG151	YNG151C	YC10	YC40	YD051	YD101	YD201
EM  For semi-finishing	SNMG120404-EM	12.7	12.7	4.76	5.16	0.4									●	★					★											
	SNMG120408-EM	12.7	12.7	4.76	5.16	0.8									●	★					★											
	SNMG120412-EM	12.7	12.7	4.76	5.16	1.2									●	★					★											
	SNMG120416-EM	12.7	12.7	4.76	5.16	1.6									○	★					★											
	SNMG150612-EM	15.875	15.875	6.35	6.35	1.2									●	★					★											
	SNMG150616-EM	15.875	15.875	6.35	6.35	1.6									○	★					★											
NM  For semi-finishing	SNMG120408-NM	12.7	12.7	4.76	5.16	0.8							●	★																	○	
	SNMG120412-NM	12.7	12.7	4.76	5.16	1.2							○	★																	○	
LR  Light-load roughing	SNMM120408-LR	12.9	12.7	4.76	5.16	0.8				★																						
	SNMM120412-LR	12.9	12.7	4.76	5.16	1.2				★																						
	SNMM120416-LR	12.9	12.7	4.76	5.16	1.6				★																						
	SNMM150612-LR	15.875	15.875	6.35	6.35	1.2				★																						
	SNMM150616-LR	15.875	15.875	6.35	6.35	1.6				★																						
	SNMM190612-LR	19.3	19.05	6.35	7.94	1.2				★																						
	SNMM190616-LR	19.3	19.05	6.35	7.94	1.6				★																						
	SNMM190624-LR	19.3	19.05	6.35	7.94	2.4				★																						
	SNMM250924-LR	25.79	25.4	9.525	9.12	2.4				★																						

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

Applicable tool


DSBNR/L Kr:75°
Page A166


PSBNR/L Kr:75°
A175


PSDNN Kr:45°
A176

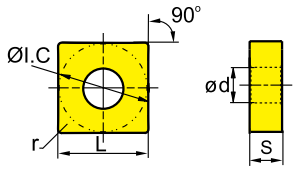

PSKNR/L Kr:75°
A177


PSSNR/L Kr:45°
A178

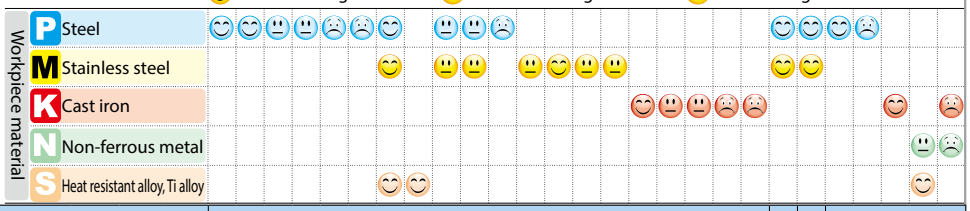

PSKNR/L Kr:75°
A217

Insert code key A48–A49
Grade selection reference A19/A34–A46
Chipbreaker selection reference A22–A33
Recommended cutting parameters A243–A245

SN□□ (Negative inserts)



Good working condition Normal working condition Bad working condition



Inserts shape	Type	Dimensions(mm)					Coated cemented carbide															Cermet	Coated cermet	Cemented carbide				
		L	ØI.C	S	ød	r	YBC151	YBC152	YBC251	YBC252	YBC351	**YBC352**	YBG102	YBG105	YBG202	YBG205	YBG302	YBM151	YBM153	YBM251	YBM253	YBD052	YBD102	YBD151	YBD152	YBD252	YNG151	YNG151C	YC10	YC40	YD051	YD101	YD201
DR  For light roughing	SNMG120408-DR	12.7	12.7	4.76	5.16	0.8	○		●	★	○												○		○								
	SNMG120412-DR	12.7	12.7	4.76	5.16	1.2			●	○	●												○										
	SNMG120416-DR	12.7	12.7	4.76	5.16	1.6	○		○	○																							
	SNMG150608-DR	15.875	15.875	6.35	6.35	0.8				○																							
	SNMG150612-DR	15.875	15.875	6.35	6.35	1.2			●	★	●												○		○								
	SNMG150616-DR	15.875	15.875	6.35	6.35	1.6			●	★													○		○								
	SNMG150624-DR	15.875	15.875	6.35	6.35	2.4				○																							
	SNMG190612-DR	19.05	19.05	6.35	7.94	1.2			●	○	○																						
	SNMG190616-DR	19.05	19.05	6.35	7.94	1.6			●	★	●												○		○								
	SNMG190624-DR	19.05	19.05	6.35	7.94	2.4			●	○	○																						
DR  For roughing	SNMM120408-DR	12.7	12.7	4.76	5.16	0.8					○																						
	SNMM120412-DR	12.7	12.7	4.76	5.16	1.2					○																						
	SNMM120416-DR	12.7	12.7	4.76	5.16	1.6					○																						
	SNMM150608-DR	15.875	15.875	6.35	6.35	0.8					○																						
	SNMM150612-DR	15.875	15.875	6.35	6.35	1.2					○																						
	SNMM150616-DR	15.875	15.875	6.35	6.35	1.6			●		○																						
	SNMM190608-DR	19.05	19.05	6.35	7.94	0.8					○																						

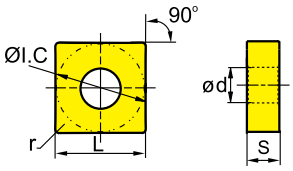
★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

Applicable tool



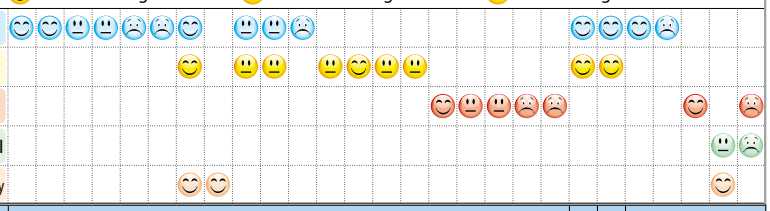
Page A166 A175 A176 A177 A178 A217

SN□□ (Negative inserts)



Good working condition　Normal working condition　Bad working condition

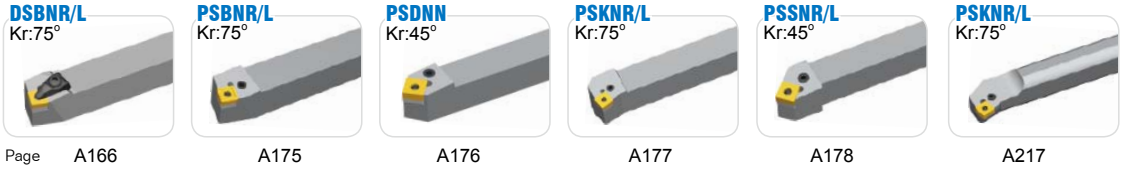
Workpiece material



Inserts shape	Type	Dimensions(mm)					Coated cemented carbide																Cermet	Coated cermet	Cemented carbide				
		L	ØI.C	S	ød	r	YBC151	YBC152	YBC251	YBC252	YBC351	**YBC352**	YBG102	YBG105	YBG202	YBG205	YBG302	YBM151	YBM153	YBM251	YBM253	YBD052	YBD102	YBD151	YBD152	YBD252	YNG151	YNG151C	YC10	YC40	YD051	YD101	YD201
DR	SNMM190612-DR	19.05	19.05	6.35	7.94	1.2			●	○	○																					
	SNMM190616-DR	19.05	19.05	6.35	7.94	1.6		○	●	★	●																					
	SNMM190624-DR	19.05	19.05	6.35	7.94	2.4		★	●	○	●																					
	SNMM250724-DR	25.4	25.4	7.94	9.12	2.4			●		○																					
For roughing	SNMM250924-DR	25.4	25.4	9.525	9.12	2.4			●	★	●																					
ER	SNMG120408-ER	12.7	12.7	4.76	5.16	0.8															★											
	SNMG120412-ER	12.7	12.7	4.76	5.16	1.2															★											
	SNMG150608-ER	15.875	15.875	6.35	6.35	0.8															★											
	SNMG150612-ER	15.875	15.875	6.35	6.35	1.2															★											
For roughing	SNMG190612-ER	19.05	19.05	6.35	7.94	1.2															★											
	SNMG190616-ER	19.05	19.05	6.35	7.94	1.6															★											

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

Applicable tool

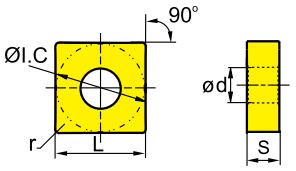


Page　A166　A175　A176　A177　A178　A217

Insert code key A48–A49　Grade selection reference A19/A34–A46　Chipbreaker selection reference A22–A33　Recommended cutting parameters A243–A245

Cemented carbide and cermet inserts

SN□□ (Negative 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)					Coated cemented carbide														Cermet	Coated cermet	Cemented carbide				
		L	ØI.C	S	ød	r	YBC151	YBC152	YBC251	YBC252	YBC351	**YBC352**	YBG102	YBG105	YBG202	YBG205	YBG302	YBM151	YBM153	YBM251	YBM253	YBD052	YBD102	YBD151	YBD152	YBD252	YNG151	YNG151C	YC10	YC40	YD051	YD101	YD201
ER	SNMM250724-ER	25.4	25.4	7.94	9.12	2.4				●											★											
	SNMM250732-ER	25.4	25.4	7.94	9.12	3.2				●											★											
	SNMM250924-ER	25.4	25.4	9.525	9.12	2.4				●											★											
For roughing	SNMM250932-ER	25.4	25.4	9.525	9.12	3.2				●											★											
HPR	SNMM190616-HPR	19.5	19.05	6.35	7.94	1.6				★		○																				
	SNMM250924-HPR	25.4	25.4	9.525	9.12	2.4				★		○																				
For heavy machining																																

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

Applicable tool


DSBNR/L
Kr:75°
Page A166


PSBNR/L
Kr:75°
A175

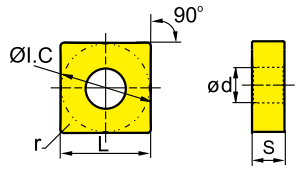

PSDNN
Kr:45°
A176


PSKNR/L
Kr:75°
A177


PSSNR/L
Kr:45°
A178


PSKNR/L
Kr:75°
A217

SN□□ (Negative inserts)



😊 Good working condition 😐 Normal working condition ☹ Bad working condition

Workpiece material	YBC151	YBC152	YBC251	YBC252	YBC351	**YBC352**	YBG102	YBG105	YBG202	YBG205	YBG302	YBM151	YBM153	YBM251	YBM253	YBD052	YBD102	YBD151	YBD152	YBD252	YNG151	YNG151C	YC10	YC40	YD051	YD101	YD201
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	Coated cemented carbide YBC151	YBC152	YBC251	YBC252	YBC351	**YBC352**	YBG102	YBG105	YBG202	YBG205	YBG302	YBM151	YBM153	YBM251	YBM253	YBD052	YBD102	YBD151	YBD152	YBD252	Cermet YNG151	Coated cermet YNG151C	Cemented carbide YC10	YC40	YD051	YD101	YD201
All round 	**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	15.875	15.875	6.35	6.35	0.8			○																								
	SNMG150612	15.875	15.875	6.35	6.35	1.2	○		●																								
	SNMG190612	19.05	19.05	6.35	7.94	1.2	○		●		○																						
	SNMG190616	19.05	19.05	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			○		●																						
All round 	**SNMM090304**	9.525	9.525	3.18	3.81	0.4																											○
	SNMM090308	9.525	9.525	3.18	3.81	0.8			○																								
	SNMM120408	12.7	12.7	4.76	5.16	0.8	○																										
	SNMM120412	12.7	12.7	4.76	5.16	1.2			○																								
	SNMM120416	12.7	12.7	4.76	5.16	1.6			○																								

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

Applicable tool

DSBNR/L Kr:75°

Page A166

PSBNR/L Kr:75°

A175

PSDNN Kr:45°

A176

PSKNR/L Kr:75°

A177

PSSNR/L Kr:45°

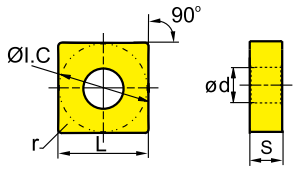
A178

PSKNR/L Kr:75°

A217

Insert code key A48–A49
Grade selection reference A19/A34–A46
Chipbreaker selection reference A22–A33
Recommended cutting parameters A243–A245

SN□□ (Negative 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)					Coated cemented carbide																Cermet	Coated cermet	Cemented carbide				
		L	ØI.C	S	ød	r	YBC151	YBC152	YBC251	YBC252	YBC351	**YBC352**	YBG102	YBG105	YBG202	YBG205	YBG302	YBM151	YBM153	YBM251	YBM253	YBD052	YBD102	YBD151	YBD152	YBD252	YNG151	YNG151C	YC10	YC40	YD051	YD101	YD201
All round	**SNMM190608**	19.05	19.05	6.35	7.94	0.8			○																							
	SNMM190612	19.05	19.05	6.35	7.94	1.2			○																							
	SNMM190616	19.05	19.05	6.35	7.94	1.6																							●			
	SNMM250724	25.4	25.4	7.94	9.12	2.4			●		●													○								
	SNMM250924	25.4	25.4	9.525	9.12	2.4					○																					
Without chipbreaker	**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																○	★	●	★					○		●
	SNMA120416	12.7	12.7	4.76	5.16	1.6																○	○		★							
	SNMA150608	15.875	15.875	6.35	6.35	0.8																		○								
	SNMA150612	15.875	15.875	6.35	6.35	1.2																		○	★					●		
	SNMA190612	19.05	19.05	6.35	7.94	1.2																○	○	●	★							
	SNMA190616	19.05	19.05	6.35	7.94	1.6																	★	●	★							

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

Applicable tool


DSBNR/L
Kr:75°
Page A166


PSBNR/L
Kr:75°
A175

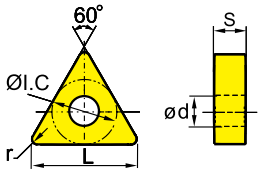

PSDNN
Kr:45°
A176


PSKNR/L
Kr:75°
A177


PSSNR/L
Kr:45°
A178

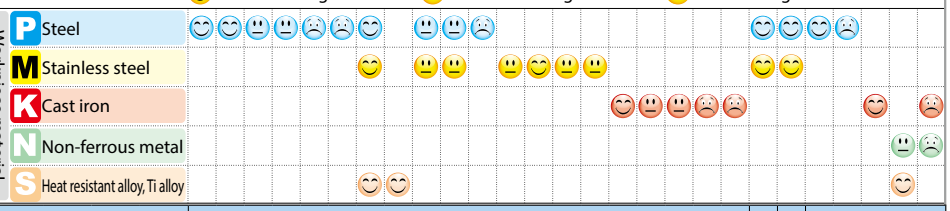

PSKNR/L
Kr:75°
A217

TN□□ (Negative inserts)



Good working condition Normal working condition Bad working condition

Workpiece material



Inserts shape	Type	Dimensions(mm)					Coated cemented carbide																Cermet	Coated cermet	Cemented carbide				
		L	ØI.C	S	ød	r	YBC151	YBC152	YBC251	YBC252	YBC351	**YBC352**	YBG102	YBG105	YBG202	YBG205	YBG302	YBM151	YBM153	YBM251	YBM253	YBD052	YBD102	YBD151	YBD152	YBD252	YNG151	YNG151C	YC10	YC40	YD051	YD101	YD201
DF  For finishing	**TNMG160404-DF**	16.5	9.525	4.76	3.81	0.4	★	●	★											○						●						
	TNMG160408-DF	16.5	9.525	4.76	3.81	0.8	★	○	★																	●						
	TNMG160412-DF	16.5	9.525	4.76	3.81	1.2	○	○	○																							
	TNMG220408-DF	22	12.7	4.76	5.16	0.8	★	○	○																							
	TNMG220412-DF	22	12.7	4.76	5.16	0.8	○																									
WGF  For finishing Wiper	**TNMX160404-WGF**	16.5	9.525	4.76	3.81	0.4	★												★			★										
	TNMX160408-WGF	16.5	9.525	4.76	3.81	0.8	★												★			★										
SF  For finishing	**TNMG110304-SF**	11	6.35	3.18	2.26	0.4							○													○	★					
	TNMG160404-SF	16.5	9.525	4.76	3.81	0.4							○													○	★					
	TNMG160408-SF	16.5	9.525	4.76	3.81	0.8							○													○	★					
	TNMG220408-SF	22	12.7	4.76	5.16	0.8							○													○	★					
	TNMG220412-SF	22	12.7	4.76	5.16	1.2							○													○	★					

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

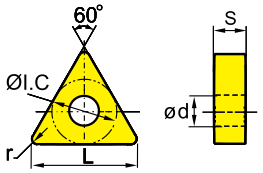
Applicable tool



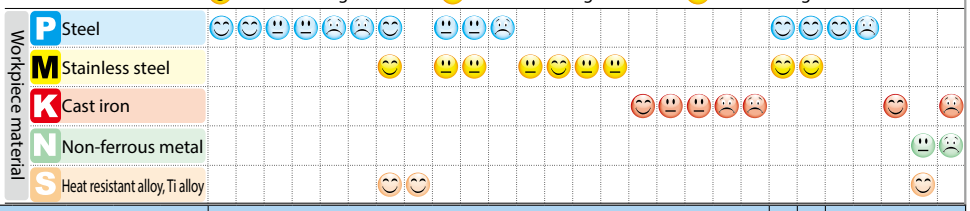
Page A167 A179 A180 A181 A218

Insert code key A48–A49
Grade selection reference A19/A34–A46
Chipbreaker selection reference A22–A33
Recommended cutting parameters A243–A245

TN□□ (Negative inserts)



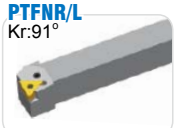
Good working condition Normal working condition Bad working condition



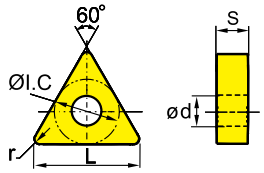
Inserts shape	Type	Dimensions(mm)					Coated cemented carbide																Cermet	Coated cermet	Cemented carbide				
		L	ØI.C	S	ød	r	YBC151	YBC152	YBC251	YBC252	YBC351	**YBC352**	YBG102	YBG105	YBG202	YBG205	YBG302	YBM151	YBM153	YBM251	YBM253	YBD052	YBD102	YBD151	YBD152	YBD252	YNG151	YNG151C	YC10	YC40	YD051	YD101	YD201
EF  For finishing	TNMG110304-EF	11	6.35	3.18	2.26	0.4									○	★			★														
	TNMG110308-EF	11	6.35	3.18	2.26	0.8									○	★			★														
	TNMG160404-EF	16.5	9.525	4.76	3.81	0.4									●	★			★														
	TNMG160408-EF	16.5	9.525	4.76	3.81	0.8									●	★			★														
	TNMG160412-EF	16.5	9.525	4.76	3.81	1.2									○	★			★														
	TNMG220404-EF	22	12.7	4.76	5.16	0.4									○	★			★														
	TNMG220408-EF	22	12.7	4.76	5.16	0.8									○	★			★														
	TNMG220412-EF	22	12.7	4.76	5.16	1.2									○	★			★														
WGM  For semi-finishing Wiper	TNMX160408-WGM	16.5	9.525	4.76	3.81	0.8				★						★									★								
	TNMX160412-WGM	16.5	9.525	4.76	3.81	1.2				★						★									★								
PM  For semi-finishing	TNMG110304-PM	11	6.35	3.18	2.26	0.4	★	●	○																								
	TNMG110308-PM	11	6.35	3.18	2.26	0.8	★	○	○																								
	TNMG160404-PM	16.5	9.525	4.76	3.81	0.4	★	●	★														★		★								
	TNMG160408-PM	16.5	9.525	4.76	3.81	0.8	★	●	★	●		○											★		★	★							
	TNMG160412-PM	16.5	9.525	4.76	3.81	1.2	★	●	○	○													★		★	○							
	TNMG220408-PM	22	12.7	4.76	5.16	0.8	★	●	○	●													★		○	○							
	TNMG220412-PM	22	12.7	4.76	5.16	1.2	●	★	●	○	○												○		○								
	TNMG220416-PM	22	12.7	4.76	5.16	1.6			○	○															○								

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

Applicable tool

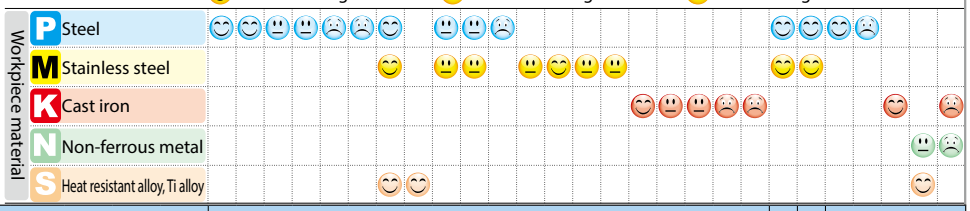
DTGNR/L Kr:91°	PTFNR/L Kr:91°	PTTNR/L Kr:60°	PTGNR/L Kr:90°	PTFNR/L Kr:90°
				
Page A167	A179	A180	A181	A218

TN□□ (Negative inserts)



Good working condition Normal working condition Bad working condition

Workpiece material



Inserts shape	Type	Dimensions(mm)					Coated cemented carbide																Cermet	Coated cermet	Cemented carbide				
		L	ØI.C	S	ød	r	YBC151	YBC152	YBC251	YBC252	YBC351	**YBC352**	YBG102	YBG105	YBG202	YBG205	YBG302	YBM151	YBM153	YBM251	YBM253	YBD052	YBD102	YBD151	YBD152	YBD252	YNG151	YNG151C	YC10	YC40	YD051	YD101	YD201
DM  For semi-finishing	**TNMG110308-DM**	11	6.35	3.18	2.26	0.8	○			○																						
	TNMG160404-DM	16.5	9.525	4.76	3.81	0.4	★	●	★	○					○												●						
	TNMG160408-DM	16.5	9.525	4.76	3.81	0.8	★	●	★	●					●					●							○						
	TNMG160412-DM	16.5	9.525	4.76	3.81	1.2	○	○	★	○																							
	TNMG220404-DM	22	12.7	4.76	5.16	0.4	★	●	★	○										○													
	TNMG220408-DM	22	12.7	4.76	5.16	0.8	★	●	★	●										○							○						
	TNMG220412-DM	22	12.7	4.76	5.16	1.2	○	○	○	○																							
	TNMG220416-DM	22	12.7	4.76	5.16	1.6	○	○	○																								
EM  For semi-finishing	**TNMG160404-EM**	16.5	9.525	4.76	3.81	0.4									●	★					★												
	TNMG160408-EM	16.5	9.525	4.76	3.81	0.8									●	★					★												
	TNMG160412-EM	16.5	9.525	4.76	3.81	1.2									○	★					★												
	TNMG220408-EM	22	12.7	4.76	5.16	0.8									●	★					★												
	TNMG220412-EM	22	12.7	4.76	5.16	1.2									○	★					★												
	TNMG220416-EM	22	12.7	4.76	5.16	1.6									○	★					★												
LR  Light-load roughing	**TNMM160408-LR**	16.5	9.525	4.76	3.81	0.8				★																							
	TNMM160412-LR	16.5	9.525	4.76	3.81	1.2				★																							
	TNMM220408-LR	22	12.7	4.76	5.16	0.8				★																							
	TNMM220412-LR	22	12.7	4.76	5.16	1.2				★																							
	TNMM220416-LR	22	12.7	4.76	5.16	1.6				★																							

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

Applicable tool

DTGNR/L Kr:91°



Page A167

PTFNR/L Kr:91°



A179

PTTNR/L Kr:60°



A180

PTGNR/L Kr:90°



A181

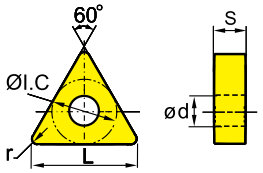
PTFNR/L Kr:90°



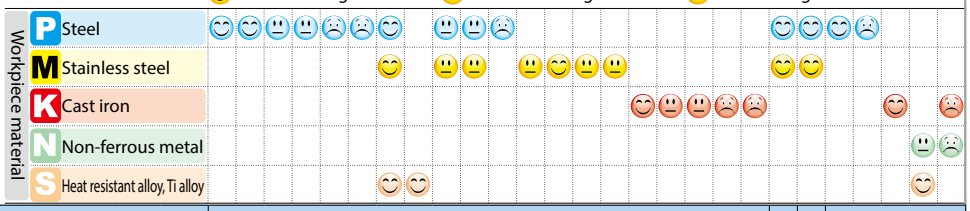
A218

Insert code key A48–A49
Grade selection reference A19/A34–A46
Chipbreaker selection reference A22–A33
Recommended cutting parameters A243–A245

TN□□ (Negative inserts)



Good working condition Normal working condition Bad working condition



Inserts shape	Type	Dimensions(mm)					Coated cemented carbide																Cermet	Coated cermet	Cemented carbide				
		L	ØI.C	S	ød	r	YBC151	YBC152	YBC251	YBC252	YBC351	**YBC352**	YBG102	YBG105	YBG202	YBG205	YBG302	YBM151	YBM153	YBM251	YBM253	YBD052	YBD102	YBD151	YBD152	YBD252	YNG151	YNG151C	YC10	YC40	YD051	YD101	YD201
DR	TNMG160408-DR	16.5	9.525	4.76	3.81	0.8		○		○	○												○		○								
	TNMG160412-DR	16.5	9.525	4.76	3.81	1.2		○	○	○	○												●		●								
	TNMG220408-DR	22	12.7	4.76	5.16	0.8				○	●												○										
	TNMG220412-DR	22	12.7	4.76	5.16	1.2			○	○	○														○								
	TNMG220416-DR	22	12.7	4.76	5.16	1.6					○												○										
	TNMG270608-DR	27.5	15.875	6.35	6.35	0.8					○																						
	TNMG270612-DR	27.5	15.875	6.35	6.35	1.2					○																						
	TNMG270616-DR	27.5	15.875	6.35	6.35	1.6					○																						
DR	TNMM160408-DR	16.5	9.525	4.76	3.81	0.8			○		○																						
	TNMM160412-DR	16.5	9.525	4.76	3.81	1.2			○		○																						
	TNMM220408-DR	22	12.7	4.76	5.16	0.8			●		●																						
	TNMM220412-DR	22	12.7	4.76	5.16	1.2			●		○																						
	TNMM220416-DR	22	12.7	4.76	5.16	1.6			○		○																						
	TNMM270612-DR	27.5	15.875	6.35	5.16	1.2					○																						
	TNMM270616-DR	27.5	15.875	6.35	5.16	1.6					○																						
ER	TNMG160408-ER	16.5	9.525	4.76	3.81	0.8															★												
	TNMG160412-ER	16.5	9.525	4.76	3.81	1.2															★												
	TNMG220408-ER	22	12.7	4.76	5.16	0.8															★												
	TNMG220412-ER	22	12.7	4.76	5.16	1.2															★												

For light roughing

For roughing

For roughing

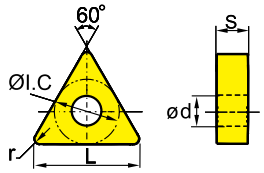
★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

Applicable tool



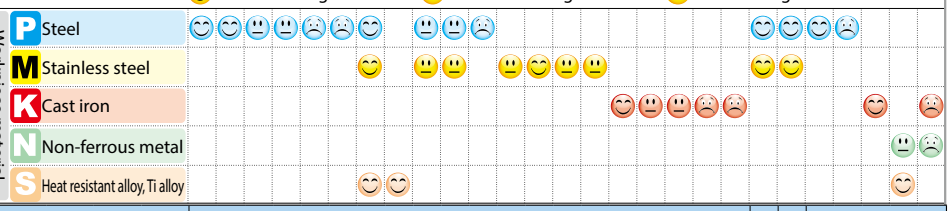
Page A167 A179 A180 A181 A218

TN□□ (Negative inserts)



Good working condition Normal working condition Bad working condition

Workpiece material



Inserts shape	Type	Dimensions(mm)					Coated cemented carbide																Cermet	Coated cermet	Cemented carbide				
		L	ØI.C	S	ød	r	YBC151	YBC152	YBC251	YBC252	YBC351	**YBC352**	YBG102	YBG105	YBG202	YBG205	YBG302	YBM151	YBM153	YBM251	YBM253	YBD052	YBD102	YBD151	YBD152	YBD252	YNG151	YNG151C	YC10	YC40	YD051	YD101	YD201
All round 	**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	15.875	6.35	6.35	1.2			●		●													○						○			
	TNMG270616	27.5	15.875	6.35	6.35	1.6			○		○																						
	TNMG330916	33	19.05	9.525	7.94	1.6					●																						
	TNMG330924	33	19.05	9.525	7.94	2.4	○		○		●																						

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

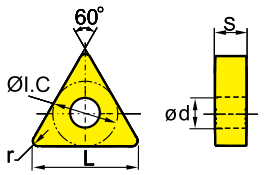
Applicable tool



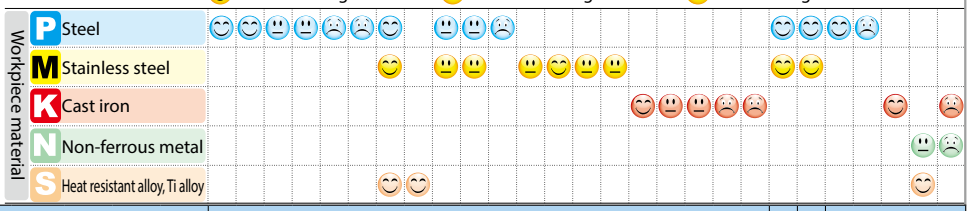
Page A167 A179 A180 A181 A218

Insert code key A48–A49
Grade selection reference A19/A34–A46
Chipbreaker selection reference A22–A33
Recommended cutting parameters A243–A245

TN□□ (Negative inserts)



Good working condition Normal working condition Bad working condition



Inserts shape	Type	Dimensions(mm)					Coated cemented carbide																Cermet	Coated cermet	Cemented carbide				
		L	ØI.C	S	ød	r	YBC151	YBC152	YBC251	YBC252	YBC351	**YBC352**	YBG102	YBG105	YBG202	YBG205	YBG302	YBM151	YBM153	YBM251	YBM253	YBD052	YBD102	YBD151	YBD152	YBD252	YNG151	YNG151C	YC10	YC40	YD051	YD101	YD201
All round	**TNMM160404**	16.5	9.525	4.76	3.81	0.4			○																							
	TNMM160408	16.5	9.525	4.76	3.81	0.8					○																						
	TNMM160412	16.5	9.525	4.76	3.81	1.2	○		○																				○				
	TNMM220408	22	12.7	4.76	5.16	0.8			○																								
	TNMM220412	22	12.7	4.76	5.16	1.2			●		○									○														
	TNMM220416	22	12.7	4.76	5.16	1.6					○																						
	TNMM270616	27.5	15.875	6.35	6.35	1.6			●		○																						
Without chipbreaker	**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																○	○	○	○								
	TNMA270616	27.5	15.875	6.35	6.35	1.6																			○								

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

Applicable tool


DTGNR/L
Kr:91°
Page A167

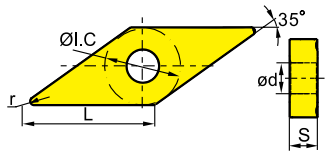

PTFNR/L
Kr:91°
A179


PTTNR/L
Kr:60°
A180


PTGNR/L
Kr:90°
A181

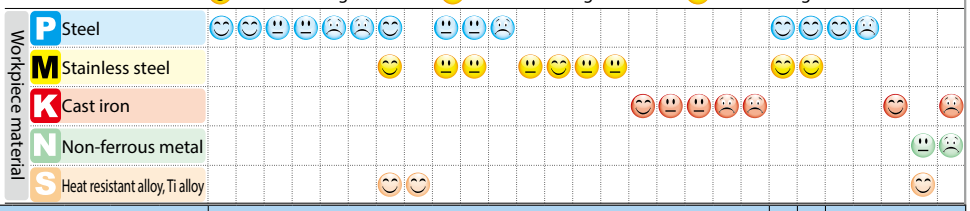

PTFNR/L
Kr:90°
A218

VN□□ (Negative inserts)



Good working condition Normal working condition Bad working condition

Workpiece material



Inserts shape	Type	Dimensions(mm)					Coated cemented carbide																Cermet	Coated cermet	Cemented carbide				
		L	ØI.C	S	ød	r	YBC151	YBC152	YBC251	YBC252	YBC351	**YBC352**	YBG102	YBG105	YBG202	YBG205	YBG302	YBM151	YBM153	YBM251	YBM253	YBD052	YBD102	YBD151	YBD152	YBD252	YNG151	YNG151C	YC10	YC40	YD051	YD101	YD201
DF  For finishing	VNMG160404-DF	16.6	9.525	4.76	3.81	0.4	★	●	★											●											
	VNMG160408-DF	16.6	9.525	4.76	3.81	0.8	★	○	○																						
EF  For finishing	VNMG160404-EF	16.6	9.525	4.76	3.81	0.4									○	★			★												
	VNMG160408-EF	16.6	9.525	4.76	3.81	0.8									○	★			★												
	VNMG160412-EF	16.6	9.525	4.76	3.81	1.2									○	★			★												
NF  For finishing	VNEG160404-NF	16.6	9.525	4.76	3.81	0.4							○	★																○	
	VNEG160408-NF	16.6	9.525	4.76	3.81	0.8							○	★																○	
SF  For finishing	VNMG160404-SF	16.6	9.525	4.76	3.81	0.4							○														○	★				
	VNMG160408-SF	16.6	9.525	4.76	3.81	0.8							○														○					

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

Applicable tool

DVVNN Kr:72°30'



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DVJNR/L Kr:93°

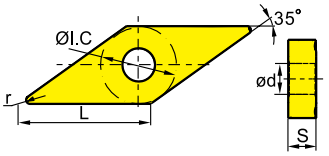


Page A169

Insert code key A48–A49
Grade selection reference A19/A34–A46
Chipbreaker selection reference A22–A33
Recommended cutting parameters A243–A245

Cemented carbide and cermet inserts

VN□□ (Negative 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)					Coated cemented carbide														Cermet	Coated cermet	Cemented carbide				
		L	ØI.C	S	ød	r	YBC151	YBC152	YBC251	YBC252	YBC351	**YBC352**	YBG102	YBG105	YBG202	YBG205	YBG302	YBM151	YBM153	YBM251	YBM253	YBD052	YBD102	YBD151	YBD152	YBD252	YNG151	YNG151C	YC10	YC40	YD051	YD101	YD201
PM	VNMG160404-PM	16.6	9.525	4.76	3.81	0.4	★	●	○	○															○	○							
	VNMG160408-PM	16.6	9.525	4.76	3.81	0.8	★	●	○														★		★	○							
For semi-finishing	VNMG160412-PM	16.6	9.525	4.76	3.81	1.2			○	○													○		○								
DM	VNMG160408-DM	16.6	9.525	4.76	3.81	0.8	★	●	★	○										○													
	VNMG160412-DM	16.6	9.525	4.76	3.81	1.2		○	○	○										○													
For semi-finishing																																	
EM	VNMG160404-EM	16.6	9.525	4.76	3.81	0.4									●	★					★												
	VNMG160408-EM	16.6	9.525	4.76	3.81	0.8									●	★					★												
For semi-finishing																																	
NM	VNMG160412-NM	16.6	9.525	4.76	3.81	1.2							○	★																		○	
For semi-finishing																																	
All round	VNMG160404	16.6	9.525	4.76	3.81	0.4	○		○															●									
	VNMG160408	16.6	9.525	4.76	3.81	0.8	●		●															●									

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

Applicable tool

DVVNN
Kr:72°30'



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DVJNR/L
Kr:93°



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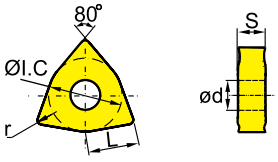
WN□□ (Negative inserts)



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)					Coated cemented carbide																Cermet	Coated cermet	Cemented carbide				
		L	ØI.C	S	ød	r	YBC151	YBC152	YBC251	YBC252	YBC351	**YBC352**	YBG102	YBG105	YBG202	YBG205	YBG302	YBM151	YBM153	YBM251	YBM253	YBD052	YBD102	YBD151	YBD152	YBD252	YNG151	YNG151C	YC10	YC40	YD051	YD101	YD201
DF  For finishing	WNMG06T304-DF	6.5	9.525	3.97	3.81	0.4		★																								
	WNMG06T308-DF	6.5	9.525	3.97	3.81	0.8		★		★																						
	WNMG06T312-DF	6.5	9.525	3.97	3.81	1.2		★		★																						
	WNMG060404-DF	6.5	9.525	4.76	3.81	0.4		★	●	★										○												
	WNMG060408-DF	6.5	9.525	4.76	3.81	0.8		★	●	★										●												
	WNMG060412-DF	6.5	9.525	4.76	3.81	1.2		★	●	○										○												
	WNMG080404-DF	8.7	12.7	4.76	5.16	0.4		★	●	○										○												
	WNMG080408-DF	8.7	12.7	4.76	5.16	0.8		★	●	★										●												
	WNMG080412-DF	8.7	12.7	4.76	5.16	1.2		○	○	○																						
WGF  For finishing Wiper	WNMG060404-WGF	6.5	9.525	4.76	3.81	0.4		★											★			★										
	WNMG060408-WGF	6.5	9.525	4.76	3.81	0.8		★											★			★										
	WNMG080404-WGF	8.7	12.7	4.76	5.16	0.4		★											★			★										
	WNMG080408-WGF	8.7	12.7	4.76	5.16	0.8		★											★			★										
SF  For finishing	WNMG06T304-SF	6.5	9.525	3.97	3.81	0.4							○													○	★					
	WNMG06T308-SF	6.5	9.525	3.97	3.81	0.8							○													○						
	WNMG06T312-SF	6.5	9.525	3.97	3.81	1.2							○													○						
	WNMG060404-SF	6.5	9.525	4.76	3.81	0.4							○													○	★					
	WNMG060408-SF	6.5	9.525	4.76	3.81	0.8							○													○	★					
	WNMG080404-SF	8.7	12.7	4.76	5.16	0.4							○													○	★					
	WNMG080408-SF	8.7	12.7	4.76	5.16	0.8							○													○	★					
	WNMG080412-SF	8.7	12.7	4.76	5.16	1.2							○													○						

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

Applicable tool

DWLNR/L Kr:95°



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PWLNR/L Kr:95°



A182

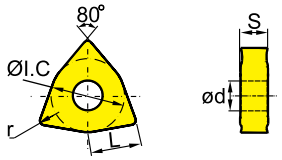
PWLNR/L Kr:95°



A219

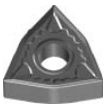
Insert code key A48–A49
Grade selection reference A19/A34–A46
Chipbreaker selection reference A22–A33
Recommended cutting parameters A243–A245

WN□□ (Negative 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)					Coated cemented carbide															Cermet	Coated cermet	Cemented carbide				
		L	ØI.C	S	ød	r	YBC151	YBC152	YBC251	YBC252	YBC351	**YBC352**	YBG102	YBG105	YBG202	YBG205	YBG302	YBM151	YBM153	YBM251	YBM253	YBD052	YBD102	YBD151	YBD152	YBD252	YNG151	YNG151C	YC10	YC40	YD051	YD101	YD201
EF  For finishing	**WNMG06T304-EF**	6.5	9.525	3.97	3.81	0.4									○	★			★														
	WNMG06T308-EF	6.5	9.525	3.97	3.81	0.8									○	★			★														
	WNMG06T312-EF	6.5	9.525	3.97	3.81	1.2									○	★			★														
	WNMG060404-EF	6.5	9.525	4.76	3.81	0.4									●	★			★														
	WNMG060408-EF	6.5	9.525	4.76	3.81	0.8									●	★			★														
	WNMG080404-EF	8.7	12.7	4.76	5.16	0.4							○		●	★			★														
	WNMG080408-EF	8.7	12.7	4.76	5.16	0.8							○		●	★			★														
NF  For finishing	**WNEG080404-NF**	8.7	12.7	4.76	5.16	0.4							○	★																		○	
	WNEG080408-NF	8.7	12.7	4.76	5.16	0.8							○	★																		○	
WGM  For semi-finishing Wiper	**WNMG060408-WGM**	6.5	9.525	4.76	3.81	0.8				★						★									★								
	WNMG060412-WGM	6.5	9.525	4.76	3.81	1.2				★						★									★								
	WNMG080408-WGM	8.7	12.7	4.76	5.16	0.8				★						★									★								
	WNMG080412-WGM	8.7	12.7	4.76	5.16	1.2				★						★									★								

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

Applicable tool

DWLNR/L Kr:95°



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PWLNR/L Kr:95°



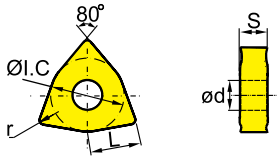
A182

PWLNR/L Kr:95°



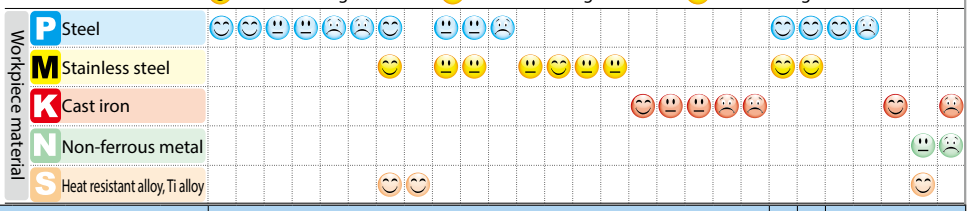
A219

WN□□ (Negative inserts)



Good working condition Normal working condition Bad working condition

Workpiece material



Inserts shape	Type	Dimensions(mm)					Coated cemented carbide																Cermet	Coated cermet	Cemented carbide				
		L	ØI.C	S	ød	r	YBC151	YBC152	YBC251	YBC252	YBC351	**YBC352**	YBG102	YBG105	YBG202	YBG205	YBG302	YBM151	YBM153	YBM251	YBM253	YBD052	YBD102	YBD151	YBD152	YBD252	YNG151	YNG151C	YC10	YC40	YD051	YD101	YD201
PM	WNMG060408-PM	6.5	9.525	4.76	3.81	0.8	★	●	○	○													★		★								
	WNMG060412-PM	6.5	9.525	4.76	3.81	1.2	○		○														★		★								
	WNMG080404-PM	8.7	12.7	4.76	5.16	0.4	○	●	○	○																							
	WNMG080408-PM	8.7	12.7	4.76	5.16	0.8	★	●	★	●													★		★	★							
	WNMG080412-PM	8.7	12.7	4.76	5.16	1.2	★	●	★	●													★		★	★							
	WNMG080416-PM	8.7	12.7	4.76	5.16	1.6			○														○		○								
	WNMG080608-PM	8.7	12.7	6.35	5.16	0.8			○																								
DM	WNMG06T304-DM	6.5	9.525	3.97	3.81	0.4			○																								
	WNMG06T308-DM	6.5	9.525	3.97	3.81	0.8			○	○																							
	WNMG06T312-DM	6.5	9.525	3.97	3.81	1.2			○																								
	WNMG060408-DM	6.5	9.525	4.76	3.81	0.8	★	●	★	●										●													
	WNMG060412-DM	6.5	9.525	4.76	3.81	1.2			○	○																							
	WNMG080404-DM	8.7	12.7	4.76	5.16	0.4	★	●	★	○					○					○													
	WNMG080408-DM	8.7	12.7	4.76	5.16	0.8	★	●	★	●										○													
	WNMG080412-DM	8.7	12.7	4.76	5.16	1.2	★	●	★											○													
	WNMG080416-DM	8.7	12.7	4.76	5.16	1.6			○																								
EM	WNMG06T304-EM	6.5	9.525	3.97	3.81	0.4									○	★					★												
	WNMG06T308-EM	6.5	9.525	3.97	3.81	0.8									○	★					★												
	WNMG06T312-EM	6.5	9.525	3.97	3.81	1.2									○	★					★												
	WNMG060404-EM	6.5	9.525	4.76	3.81	0.4									○	★					★												
	WNMG060408-EM	6.5	9.525	4.76	3.81	0.8									●	★					★												
	WNMG080404-EM	8.7	12.7	4.76	5.16	0.4									●	★					★												
	WNMG080408-EM	8.7	12.7	4.76	5.16	0.8									●	★					★												
	WNMG080412-EM	8.7	12.7	4.76	5.16	1.2									●	★					★												

For semi-finishing

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

Applicable tool

DWLNR/L Kr:95°



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PWLNR/L Kr:95°



A182

PWLNR/L Kr:95°

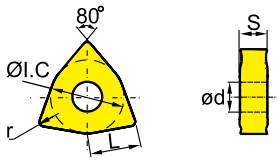


A219

Insert code key A48–A49
Grade selection reference A19/A34–A46
Chipbreaker selection reference A22–A33
Recommended cutting parameters A243–A245

Cemented carbide and cermet inserts

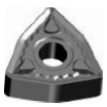
WN□□ (Negative inserts)



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)					Coated cemented carbide																Cermet	Coated cermet	Cemented carbide				
		L	ØI.C	S	ød	r	YBC151	YBC152	YBC251	YBC252	YBC351	**YBC352**	YBG102	YBG105	YBG202	YBG205	YBG302	YBM151	YBM153	YBM251	YBM253	YBD052	YBD102	YBD151	YBD152	YBD252	YNG151	YNG151C	YC10	YC40	YD051	YD101	YD201
NM	WNMG080408-NM	8.7	12.7	4.76	5.16	0.8							○	★																		○	
	WNMG080412-NM	8.7	12.7	4.76	5.16	1.2							○	★																		○	
For semi-finishing																																	
DR	WNMG060408-DR	6.5	9.525	4.76	3.81	0.8		○	○	○													○										
	WNMG060412-DR	6.5	9.525	4.76	3.81	1.2			○	○	○												○		○								
	WNMG080408-DR	8.7	12.7	4.76	5.16	0.8		○	○	★	○												●		●								
	WNMG080412-DR	8.7	12.7	4.76	5.16	1.2		○	○	★	○												●		●								
For roughing	WNMG080416-DR	8.7	12.7	4.76	5.16	1.6				○													○		○								
Without chipbreaker	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																			★								

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

Applicable tool

DWLNR/L Kr:95°



Page A170

PWLNR/L Kr:95°



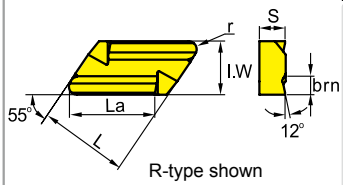
A182

PWLNR/L Kr:95°



A219

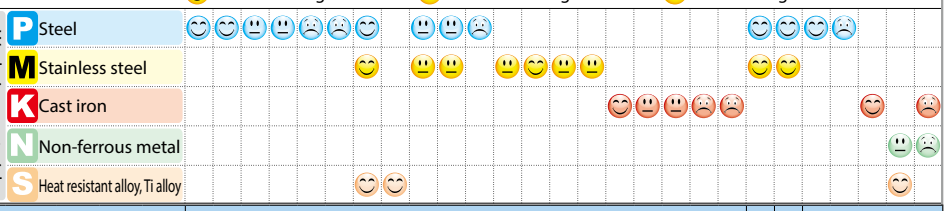
KN□□ (Negative inserts)



R-type shown

Good working condition　Normal working condition　Bad working condition

Workpiece material



Inserts shape	Type	Dimensions(mm)						Coated cemented carbide																Cermet	Coated cermet	Cemented carbide				
		La	L	I.W	S	brn	r	YBC151	YBC152	YBC251	YBC252	YBC351	YBC352	YBG102	YBG105	YBG202	YBG205	YBG302	YBM151	YBM153	YBM251	YBM253	YBD052	YBD102	YBD151	YBD152	YBD252	YNG151	YNG151C	YC10	YC40	YD051	YD101	YD201
 Profile turning	KNUX160405L11	16	16.15	9.525	4.76	2.2	0.5	○		●	★	○									●									○				
	KNUX160410L11	16	16.15	9.525	4.76	2.2	1.0			●											○													
	KNUX160405L12	16	16.15	9.525	4.76	2.2	0.5	○		●											○													
	KNUX160410L12	16	16.15	9.525	4.76	2.2	1.0	○	○	●											○									○				
	KNUX160415L12	16	16.15	9.525	4.76	2.2	1.5			○																								
	KNUX160405R11	16	16.15	9.525	4.76	2.2	0.5	●		●	○	●									●									●				
	KNUX160410R11	16	16.15	9.525	4.76	2.2	1.0	○		●											○									○				
	KNUX160405R12	16	16.15	9.525	4.76	2.2	0.5	●		●											○													
	KNUX160410R12	16	16.15	9.525	4.76	2.2	1.0	○	○	●		○									○									●				
	KNUX160415R12	16	16.15	9.525	4.76	2.2	1.5			○																								

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

Note: KNUX160405L11
└Chipbreaker code: 11→Declining chipbreaker　12→Straight chipbreaker

Applicable tool

CKJNR/L Kr:93°



Page A201

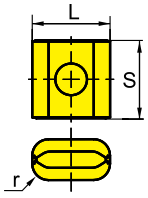
CKNNR/L Kr:63°

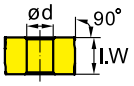


A201

Insert code key A48–A49
Grade selection reference A19/A34–A46
Chipbreaker selection reference A22–A33
Recommended cutting parameters A243–A245

Heavy turning(Negative inserts)





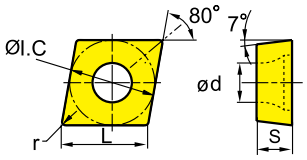
Good working condition　Normal working condition　Bad working condition

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)					Coated cemented carbide															Cermet	Coated cermet	Cemented carbide				
		L	l.W	S	ød	r	YBC151	YBC152	YBC251	YBC252	YBC351	**YBC352**	YBG102	YBG105	YBG202	YBG205	YBG302	YBM151	YBM153	YBM251	YBM253	YBD052	YBD102	YBD151	YBD152	YBD252	YNG151	YNG151C	YC10	YC40	YD051	YD101	YD201
 Inserts for train wheel hub	**175.32-191940-22**	19.05	10	19.05	6.35	4.0	●		●																							
	175.32-191940-227	19.05	10	19.05	7.2	4.0			●																							
 Inserts for train wheel hub	**175.32-191940-24**	19.05	10	19.05	6.35	4.0	○		●																							
	175.32-301940-24	30	10	19.05	6.35	4.0	○		●																							
 Inserts for train wheel hub	**175.32-191940-25**	19.05	10	19.05	6.35	4.0			●																							
 Inserts for train wheel hub	**175.32-191940-28**	19.05	10	19.05	6.35	4.0	●	★	●	○																						

★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

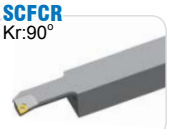
Workpiece material

P	Steel
M	Stainless steel
K	Cast iron
N	Non-ferrous metal
S	Heat resistant alloy, Ti alloy

Inserts shape	Type	Dimensions(mm)					Coated cemented carbide																Cermet	Coated cermet	Cemented carbide				
		L	ØI.C	S	ød	r	YBC151	YBC152	YBC251	YBC252	YBC351	YBC352	YBG102	YBG105	YBG202	YBG205	YBG302	YBM151	YBM153	YBM251	YBM253	YBD052	YBD102	YBD151	YBD152	YBD252	YNG151	YNG151C	YC10	YC40	YD051	YD101	YD201
USF	CCGT09T301R-USF	9.7	9.525	3.97	4.4	0.1									○	○																	
	CCGT09T302R-USF	9.7	9.525	3.97	4.4	0.2									●	○																	
For extra finishing	CCGT09T304R-USF	9.7	9.525	3.97	4.4	0.4									○	○																	
USF	CCGT09T301L-USF	9.7	9.525	3.97	4.4	0.1									○	○																	
	CCGT09T302L-USF	9.7	9.525	3.97	4.4	0.2									●	○																	
For extra finishing	CCGT09T304L-USF	9.7	9.525	3.97	4.4	0.4									○	○																	
SF	CCGT060202-SF	6.4	6.35	2.38	2.8	0.2							○														○	○					
	CCGT060204-SF	6.4	6.35	2.38	2.8	0.4							○														○	○					
For extra finishing	CCGT09T304-SF	9.7	9.525	3.97	4.4	0.4							○														○	★					
HF	CCMT060202-HF	6.4	6.35	2.38	2.8	0.2		★	●	★					●												○						○
	CCMT060204-HF	6.4	6.35	2.38	2.8	0.4		★	●	○	○				●										●		●					●	
	CCMT060208-HF	6.4	6.35	2.38	2.8	0.8		★	●		○				●					○							●						
For finishing	CCMT09T302-HF	9.7	9.525	3.97	4.4	0.2			●	○					●												●						○
	CCMT09T304-HF	9.7	9.525	3.97	4.4	0.4		★	●	★	○				●								●		●		●	○					○
	CCMT09T308-HF	9.7	9.525	3.97	4.4	0.8		★	●	○	○				●					○		○	○		○		●					○	○
	CCMT120404-HF	12.9	12.7	4.76	5.56	0.4	●	○	●	○															●		○		○				
	CCMT120408-HF	12.9	12.7	4.76	5.56	0.8		○																									

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

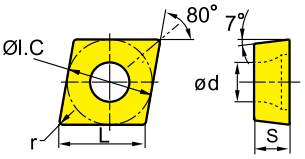
Applicable tool

SCACR/L Kr:90°	SCLCR/L Kr:95°	SCLCR/L Kr:95°	SCFCR Kr:90°	SCLCR Kr:95°
				
Page A183	A184	A220	A234	A235

Insert code key A48–A49
Grade selection reference A19/A34–A46
Chipbreaker selection reference A22–A33
Recommended cutting parameters A243–A245

Cemented carbide and cermet inserts

CC□□ (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)					Coated cemented carbide															Cermet	Coated cermet	Cemented carbide				
		L	ØI.C	S	ød	r	YBC151	YBC152	YBC251	YBC252	YBC351	**YBC352**	YBG102	YBG105	YBG202	YBG205	YBG302	YBM151	YBM153	YBM251	YBM253	YBD052	YBD102	YBD151	YBD152	YBD252	YNG151	YNG151C	YC10	YC40	YD051	YD101	YD201
EF	CCMT060202-EF	6.4	6.35	2.38	2.8	0.2							○		●	★			★														
	CCMT060204-EF	6.4	6.35	2.38	2.8	0.4							○		●	★			★														
	CCMT09T302-EF	9.7	9.525	3.97	4.4	0.2							○		●	★			★														
	CCMT09T304-EF	9.7	9.525	3.97	4.4	0.4							○		●	★			★														
	CCMT09T308-EF	9.7	9.525	3.97	4.4	0.8							○		●	★			○														
	CCMT120404-EF	12.9	12.7	4.76	5.56	0.4							○		●	★			★														
	CCMT120408-EF	12.9	12.7	4.76	5.56	0.8							○		●	★			○														
HM	CCMT060204-HM	6.4	6.35	2.38	2.8	0.4		★	●	★	○				●					●			●		●								●
	CCMT060208-HM	6.4	6.35	2.38	2.8	0.8		★	●	○	○				●					○			○		●								
	CCMT09T304-HM	9.7	9.525	3.97	4.4	0.4	●	★	●	★	●				●					●			●		●								
	CCMT09T308-HM	9.7	9.525	3.97	4.4	0.8		★	●	★	●				●					●			●		●								
	CCMT120404-HM	12.9	12.7	4.76	5.56	0.4		★	●	○	○									○			○		○								
	CCMT120408-HM	12.9	12.7	4.76	5.56	0.8		★	●	★	●				○					●			●		●								
	CCMT120412-HM	12.9	12.7	4.76	5.56	1.2		○	○														○										
EM	CCMT060204-EM	6.4	6.35	2.38	2.8	0.4									●	★					★												
	CCMT060208-EM	6.4	6.35	2.38	2.8	0.8									●	★					★												
	CCMT09T304-EM	9.7	9.525	3.97	4.4	0.4									●	★					★												
	CCMT09T308-EM	9.7	9.525	3.97	4.4	0.8									●	★					★												
	CCMT120404-EM	12.9	12.7	4.76	5.56	0.4									●	★					★												
	CCMT120408-EM	12.9	12.7	4.76	5.56	0.8									●	★					★												
	CCMT120412-EM	12.9	12.7	4.76	5.56	1.2									●	★					★												

For finishing

For semi-finishing

For semi-finishing

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

Applicable tool


SCACR/L Kr:90° Page A183

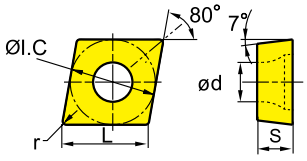

SCLCR/L Kr:95° A184


SCLCR/L Kr:95° A220


SCFCR Kr:90° A234


SCLCR Kr:95° A235

CC□□ (Positive inserts)



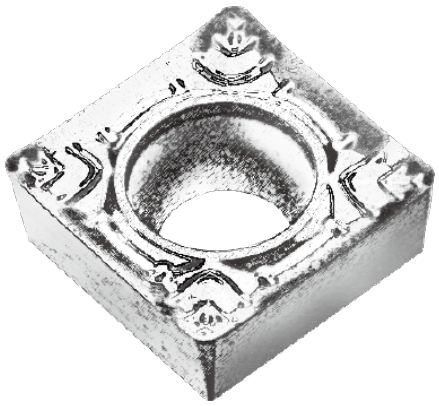
Good working condition Normal working condition Bad working condition

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)					Coated cemented carbide															Cermet	Coated cermet	Cemented carbide				
		L	ØI.C	S	ød	r	YBC151	YBC152	YBC251	YBC252	YBC351	**YBC352**	YBG102	YBG105	YBG202	YBG205	YBG302	YBM151	YBM153	YBM251	YBM253	YBD052	YBD102	YBD151	YBD152	YBD252	YNG151	YNG151C	YC10	YC40	YD051	YD101	YD201
HR	CCMT060204-HR	6.4	6.35	2.38	2.8	0.4		○	●	○	○				○																	
	CCMT060208-HR	6.4	6.35	2.38	2.8	0.8		○	●		●									●					●							
	CCMT09T304-HR	9.7	9.525	3.97	4.4	0.4			●		○				○																	
	CCMT09T308-HR	9.7	9.525	3.97	4.4	0.8		★	●	★	●									●		●	●		●				○		●	
For roughing	CCMT120408-HR	12.9	12.7	4.76	5.56	0.8		★	●		●				○					●		●	●	●	●				○		●	●
	CCMT120412-HR	12.9	12.7	4.76	5.56	1.2		○	●		●									○			●		○							
LC	CCGX060202-LC	6.4	6.35	2.38	2.8	0.2																									★	
	CCGX060204-LC	6.4	6.35	2.38	2.8	0.4																									★	
	CCGX09T302-LC	9.7	9.525	3.97	4.4	0.2																									★	
	CCGX09T304-LC	9.7	9.525	3.97	4.4	0.4																									★	
For Al machining	CCGX09T308-LC	9.7	9.525	3.97	4.4	0.8																									★	
	CCGX120404-LC	12.9	12.7	4.76	5.5	0.4																									★	
	CCGX120408-LC	12.9	12.7	4.76	5.5	0.8																									★	
LH	CCGX060202-LH	6.4	6.35	2.38	2.8	0.2																									★	
	CCGX060204-LH	6.4	6.35	2.38	2.8	0.4																									★	●
	CCGX060208-LH	6.4	6.35	2.38	2.8	0.8																									★	
For Al machining	CCGX09T302-LH	9.7	9.525	3.97	4.4	0.2																									★	

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



Applicable tool


SCACR/L Kr:90°
Page A183


SCLCR/L Kr:95°
A184

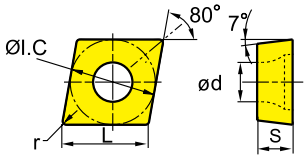

SCLCR/L Kr:95°
A220


SCFCR Kr:90°
A234

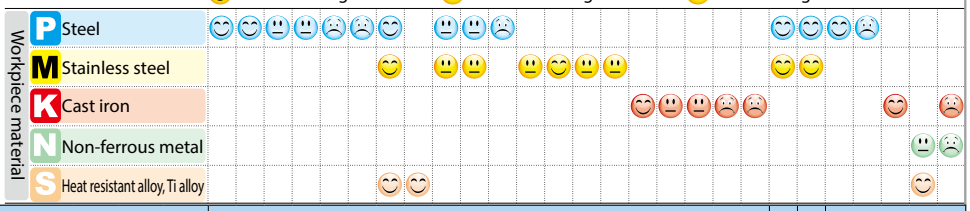

SCLCR Kr:95°
A235

Insert code key A48–A49
Grade selection reference A19/A34–A46
Chipbreaker selection reference A22–A33
Recommended cutting parameters A243–A245

CC□□ (Positive inserts)



Good working condition Normal working condition Bad working condition



Inserts shape	Type	Dimensions(mm)					Coated cemented carbide														Cermet	Coated cermet	Cemented carbide				
		L	ØI.C	S	ød	r	YBC151	YBC152	YBC251	YBC252	YBC351	**YBC352**	YBG102	YBG105	YBG202	YBG205	YBG302	YBM151	YBM153	YBM251	YBM253	YBD052	YBD102	YBD151	YBD152	YBD252	YNG151	YNG151C	YC10	YC40	YD051	YD101	YD201
LH  For Al machining	**CCGX09T304-LH**	9.7	9.525	3.97	4.4	0.4																									★	●
	CCGX09T308-LH	9.7	9.525	3.97	4.4	0.8																									★	
	CCGX120402-LH	12.9	12.7	4.76	5.56	0.2																									○	
	CCGX120404-LH	12.9	12.7	4.76	5.56	0.4																									★	
	CCGX120408-LH	12.9	12.7	4.76	5.56	0.8																									★	
	CCGX120412-LH	12.9	12.7	4.76	5.56	1.2																									○	
Without chipbreaker 	**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																		○						●	○

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

Applicable tool


SCACR/L Kr:90°
Page A183

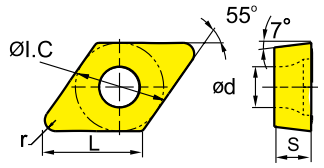

SCLCR/L Kr:95°
A184


SCLCR/L Kr:95°
A220


SCFCR Kr:90°
A234

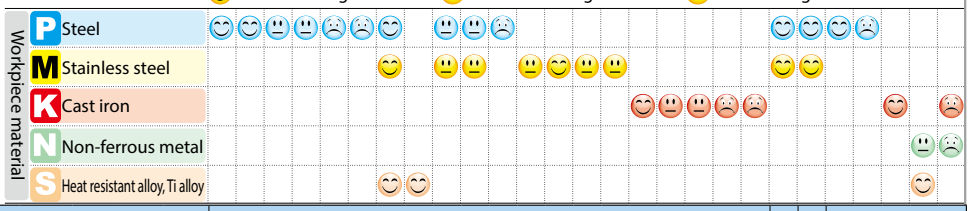

SCLCR Kr:95°
A235

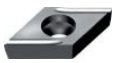
DC□□ (Positive inserts)



Good working condition Normal working condition Bad working condition

Workpiece material



Inserts shape	Type	Dimensions(mm)					Coated cemented carbide																Cermet	Coated cermet	Cemented carbide				
		L	ØI.C	S	ød	r	YBC151	YBC152	YBC251	YBC252	YBC351	YBC352	YBG102	YBG105	YBG202	YBG205	YBG302	YBM151	YBM153	YBM251	YBM253	YBD052	YBD102	YBD151	YBD152	YBD252	YNG151	YNG151C	YC10	YC40	YD051	YD101	YD201
USF	DCGT0702005R-USF	7.8	6.35	2.38	2.8	0.05									●	○																
	DCGT070201R-USF	7.8	6.35	2.38	2.8	0.1									●	○																
	DCGT070202R-USF	7.8	6.35	2.38	2.8	0.2									●	○																
For extra finishing	DCGT11T301R-USF	11.6	9.525	3.97	4.4	0.1									○	○																
	DCGT11T302R-USF	11.6	9.525	3.97	4.4	0.2									●	○																
USF	DCGT0702005L-USF	7.8	6.35	2.38	2.8	0.05									○	○																
	DCGT070201L-USF	7.8	6.35	2.38	2.8	0.1									○	○																
	DCGT070202L-USF	7.8	6.35	2.38	2.8	0.2									●	○																
For extra finishing	DCGT11T301L-USF	11.6	9.525	3.97	4.4	0.1									○	○																
	DCGT11T302L-USF	11.6	9.525	3.97	4.4	0.2									●	○																
SF	DCGT070202-SF	7.8	6.35	2.38	2.8	0.2							○													○						
	DCGT070204-SF	7.8	6.35	2.38	2.8	0.4							○														○					
	DCGT070208-SF	7.8	6.35	2.38	2.8	0.8							○																			
For extra finishing	DCGT11T302-SF	11.6	9.525	3.97	4.4	0.2							○													○	○					
	DCGT11T304-SF	11.6	9.525	3.97	4.4	0.4							○														★					
	DCGT11T308-SF	11.6	9.525	3.97	4.4	0.8							○													○	○					
HF	DCMT070202-HF	7.8	6.35	2.38	2.8	0.2		★	●	○					○											○						
	DCMT070204-HF	7.8	6.35	2.38	2.8	0.4		★	●	★	○				●									○		○					●	
	DCMT070208-HF	7.8	6.35	2.38	2.8	0.8		○	○		○																					
	DCMT11T302-HF	11.6	9.525	3.97	4.4	0.2		★	●	○					●											○						○
For finishing	DCMT11T304-HF	11.6	9.525	3.97	4.4	0.4		★	●	★	○												○		○	●		○				○
	DCMT11T308-HF	11.6	9.525	3.97	4.4	0.8		★	●	○					○											○						

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

Applicable tool

SDACR/L Kr:90° — Page A185



SDJCR/L Kr:93° — A186



SDNCN Kr:62°30' — A187



SDQCR/L Kr:107°30' — A221



SDUCR/L Kr:93° — A222

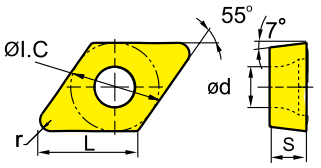


SDZCR/L Kr:95° — A223

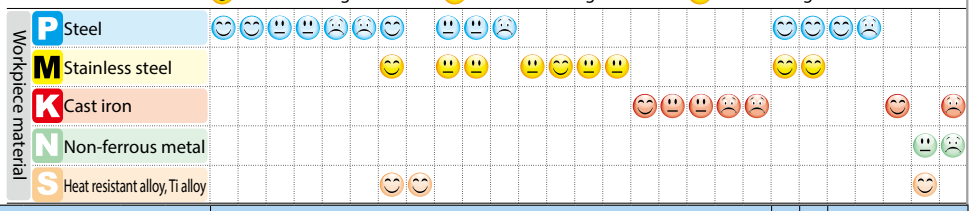


Insert code key A48–A49
Grade selection reference A19/A34–A46
Chipbreaker selection reference A22–A33
Recommended cutting parameters A243–A245

DC□□ (Positive inserts)



Good working condition Normal working condition Bad working condition



Inserts shape	Type	Dimensions(mm)					Coated cemented carbide															Cermet	Coated cermet	Cemented carbide				
		L	ØI.C	S	ød	r	YBC151	YBC152	YBC251	YBC252	YBC351	**YBC352**	YBG102	YBG105	YBG202	YBG205	YBG302	YBM151	YBM153	YBM251	YBM253	YBD052	YBD102	YBD151	YBD152	YBD252	YNG151	YNG151C	YC10	YC40	YD051	YD101	YD201
EF For finishing	DCMT070202-EF	7.8	6.35	2.38	2.8	0.2							○		●	★			★														
	DCMT070204-EF	7.8	6.35	2.38	2.8	0.4							○		●	★			★														
	DCMT11T302-EF	11.6	9.525	3.97	4.4	0.2							○		●	★			★														
	DCMT11T304-EF	11.6	9.525	3.97	4.4	0.4							○		●	★			★														
	DCMT11T308-EF	11.6	9.525	3.97	4.4	0.8							○		●	★			○														
HM For semi-finishing	DCMT070204-HM	7.8	6.35	2.38	2.8	0.4		★	●	★	●				●					●					●								
	DCMT070208-HM	7.8	6.35	2.38	2.8	0.8		★	●	★					○					○					○								
	DCMT11T304-HM	11.6	9.525	3.97	4.4	0.4	●	★	●	★	○				●					●			●		●		●		○			●	○
	DCMT11T308-HM	11.6	9.525	3.97	4.4	0.8	●	★	●	★	●				●					●			●		○		○						○
	DCMT11T312-HM	11.6	9.525	3.97	4.4	1.2			○																								
EM For semi-finishing	DCMT070204-EM	7.8	6.35	2.38	2.8	0.4									●	★					★												
	DCMT070208-EM	7.8	6.35	2.38	2.8	0.8									●	★					★												
	DCMT11T304-EM	11.6	9.525	3.97	4.4	0.4									●	★					★												
	DCMT11T308-EM	11.6	9.525	3.97	4.4	0.8									●	★					★												

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

Applicable tool


SDACR/L Kr:90°
Page A185


SDJCR/L Kr:93°
A186

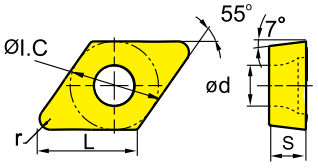

SDNCN Kr:62°30'
A187


SDQCR/L Kr:107°30'
A221


SDUCR/L Kr:93°
A222


SDZCR/L Kr:95°
A223

DC□□ (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)					Coated cemented carbide															Cermet	Coated cermet	Cemented carbide				
		L	ØI.C	S	ød	r	YBC151	YBC152	YBC251	YBC252	YBC351	YBC352	YBG102	YBG105	YBG202	YBG205	YBG302	YBM151	YBM153	YBM251	YBM253	YBD052	YBD102	YBD151	YBD152	YBD252	YNG151	YNG151C	YC10	YC40	YD051	YD101	YD201
HR	DCMT11T304-HR	11.6	9.525	3.97	4.4	0.4	○	●	○	○										○			○		●							
	DCMT11T308-HR	11.6	9.525	3.97	4.4	0.8	●	●	★	○										○		○	●		●				○			
	DCMT11T312-HR	11.6	9.525	3.97	4.4	1.2	○	●																								
For roughing																																
LC	DCGX070201-LC	7.8	6.35	2.38	2.8	0.1																									★	
	DCGX070202-LC	7.8	6.35	2.38	2.8	0.2																									★	
	DCGX070204-LC	7.8	6.35	2.38	2.8	0.4																									★	
	DCGX11T304-LC	11.6	9.525	3.97	4.4	0.4																									★	
For Al machining	DCGX11T308-LC	11.6	9.525	3.97	4.4	0.8																									★	
LH	DCGX070202-LH	7.8	6.35	2.38	2.8	0.2																									★	
	DCGX070204-LH	7.8	6.35	2.38	2.8	0.4																									★	○
	DCGX11T302-LH	11.6	9.525	3.97	4.4	0.2																									★	○
	DCGX11T304-LH	11.6	9.525	3.97	4.4	0.4																									★	●
For Al machining	DCGX11T308-LH	11.6	9.525	3.97	4.4	0.8																									★	
Without chipbreaker	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																		○					○		●		

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

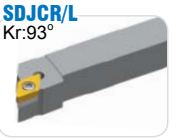
Applicable tool

SDACR/L Kr:90°



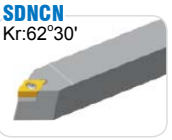
Page A185

SDJCR/L Kr:93°



A186

SDNCN Kr:62°30'



A187

SDQCR/L Kr:107°30'



A221

SDUCR/L Kr:93°



A222

SDZCR/L Kr:95°

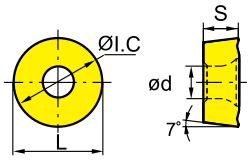


A223

Insert code key A48–A49
Grade selection reference A19/A34–A46
Chipbreaker selection reference A22–A33
Recommended cutting parameters A243–A245

RC□□ (Positive inserts)

Good working condition Normal working condition Bad working condition



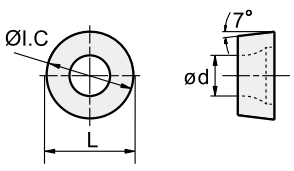
Workpiece material

- P Steel
- M Stainless steel
- K Cast iron
- N Non-ferrous metal
- S Heat resistant alloy, Ti alloy

Inserts shape	Type	Dimensions(mm)				Coated cemented carbide																Cermet	Coated cermet	Cemented carbide				
		L	ØI.C	S	ød	YBC151	YBC152	YBC251	YBC252	YBC351	**YBC352**	YBG102	YBG105	YBG202	YBG205	YBG302	YBM151	YBM153	YBM251	YBM253	YBD052	YBD102	YBD151	YBD152	YBD252	YNG151	YNG151C	YC10	YC40	YD051	YD101	YD201
	**RCGT1204MO**	12	12	4.76	4.4			○																								
	RCMT0803MO	8.0	8.0	3.18	3.36				○																							
	RCMT10T3MO	10	10	3.97	4.4				○																							
	RCMT1204MO	12	12	4.76	4.4	○		●	★												★	★		○								
	RCMT1606MO	16	16	6.35	5.5	○		●		●											★											

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

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)				Coated cemented carbide																Cermet	Coated cermet	Cemented carbide				
		L	ØI.C	S	ød	YBC151	YBC152	YBC251	YBC252	YBC351	**YBC352**	YBG102	YBG105	YBG202	YBG205	YBG302	YBM151	YBM153	YBM251	YBM253	YBD052	YBD102	YBD151	YBD152	YBD252	YNG151	YNG151C	YC10	YC40	YD051	YD101	YD201
LH  For Al machining	**RCGX0803MO-LH**	8.0	8.0	3.18	3.36																										★	

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

Applicable tool

SRDCN

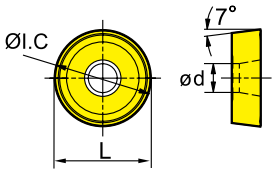


SRGCR/L



Page A199 A200

RC□□ (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

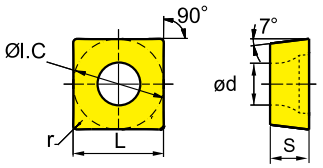
Inserts shape	Type	Dimensions(mm)				Coated cemented carbide															Cermet	Coated cermet	Cemented carbide				
		L	ØI.C	S	ød	YBC151	YBC152	YBC251	YBC252	YBC351	**YBC352**	YBG102	YBG105	YBG202	YBG205	YBG302	YBM151	YBM153	YBM251	YBM253	YBD052	YBD102	YBD151	YBD152	YBD252	YNG151	YNG151C	YC10	YC40	YD051	YD101	YD201
	**RCMX0803MO**	8.0	8.0	3.18	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	○	○	●	○	○												●										

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



Insert code key A48–A49
Grade selection reference A19/A34–A46
Chipbreaker selection reference A22–A33
Recommended cutting parameters A243–A245

SC□□ (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)					Coated cemented carbide															Cermet	Coated cermet	Cemented carbide				
		L	ØI.C	S	ød	r	YBC151	YBC152	YBC251	YBC252	YBC351	YBC352	YBG102	YBG105	YBG202	YBG205	YBG302	YBM151	YBM153	YBM251	YBM253	YBD052	YBD102	YBD151	YBD152	YBD252	YNG151	YNG151C	YC10	YC40	YD051	YD101	YD201
HF	SCMT09T302-HF	9.525	9.525	3.97	4.4	0.2		○	○						○																	
	SCMT09T304-HF	9.525	9.525	3.97	4.4	0.4		●	●	○																						
	SCMT09T308-HF	9.525	9.525	3.97	4.4	0.8		●	○						○									●	○				●			○
For finishing																																
EF	SCMT09T302-EF	9.525	9.525	3.97	4.4	0.2							○		●	★			★													
	SCMT09T304-EF	9.525	9.525	3.97	4.4	0.4							○		●	★			★													
	SCMT09T308-EF	9.525	9.525	3.97	4.4	0.8							○		●	★			○													
For finishing																																
HM	SCMT09T304-HM	9.525	9.525	3.97	4.4	0.4		○	●											●			●		●							
	SCMT09T308-HM	9.525	9.525	3.97	4.4	0.8		●	●	○	●				○					●			●	●	○							
	SCMT120404-HM	12.7	12.7	4.76	5.56	0.4		○	●		○														●							
	SCMT120408-HM	12.7	12.7	4.76	5.56	0.8		●	●	○	○		●		○					●			●						○				
For semi-finishing	SCMT120412-HM	12.7	12.7	4.76	5.56	1.2		○	○											○											○	
EM	SCMT09T304-EM	9.525	9.525	3.97	4.4	0.4									●	★					★											
	SCMT09T308-EM	9.525	9.525	3.97	4.4	0.8									●	★					★											
	SCMT120404-EM	12.7	12.7	4.76	5.56	0.4									●	★					★											
	SCMT120408-EM	12.7	12.7	4.76	5.56	0.8									●	★					★											
For semi-finishing	SCMT120412-EM	12.7	12.7	4.76	5.56	1.2									●	★					★											

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

Applicable tool


SSBCR/L
Kr:75°
Page A193

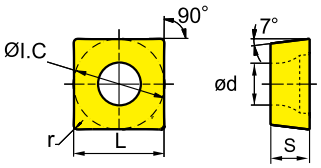

SSDCN
Kr:45°
A193


SSKCR/L
Kr:75°
A194


SSSCR/L
Kr:45°
A194


SSKCR/L
Kr:75°
A224

SC□□ (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)					Coated cemented carbide																Cermet	Coated cermet	Cemented carbide				
		L	ØI.C	S	ød	r	YBC151	YBC152	YBC251	YBC252	YBC351	YBC352	YBG102	YBG105	YBG202	YBG205	YBG302	YBM151	YBM153	YBM251	YBM253	YBD052	YBD102	YBD151	YBD152	YBD252	YNG151	YNG151C	YC10	YC40	YD051	YD101	YD201
LC	SCGX09T304-LC	9.525	9.525	3.97	4.4	0.4																									★	
	SCGX09T308-LC	9.525	9.525	3.97	4.4	0.8																									★	
For Al machining	SCGX120408-LC	12.7	12.7	4.76	5.5	0.8																									★	
LH	SCGX09T302-LH	9.525	9.525	3.97	4.4	0.2																									○	
	SCGX09T304-LH	9.525	9.525	3.97	4.4	0.4																									○	
	SCGX09T308-LH	9.525	9.525	3.97	4.4	0.8																									★	
For Al machining	SCGX120404-LH	12.7	12.7	4.76	5.56	0.4																									○	
	SCGX120408-LH	12.7	12.7	4.76	5.56	0.8																									★	
HR	SCMT09T304-HR	9.525	9.525	3.97	4.4	0.4		★	●		●				●										○							
	SCMT09T308-HR	9.525	9.525	3.97	4.4	0.8		★	○		●												●		●							
	SCMT09T312-HR	9.525	9.525	3.97	4.4	1.2		★																								
For roughing	SCMT120404-HR	12.7	12.7	4.76	5.56	0.4		○	●		○																					
	SCMT120408-HR	12.7	12.7	4.76	5.56	0.8		★	●	○	●				○							○	●		●							
	SCMT120412-HR	12.7	12.7	4.76	5.56	1.2		○	○		●											○	○									
All round	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	○		●																○							
Without chipbreaker	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	●																	●								

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

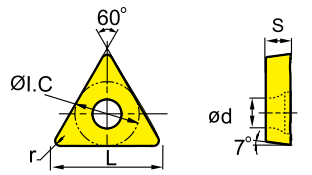
Applicable tool

SSBCR/L Kr:75°	SSDCN Kr:45°	SSKCR/L Kr:75°	SSSCR/L Kr:45°	SSKCR/L Kr:75°
				
Page A193	A193	A194	A194	A224

Insert code key A48–A49
Grade selection reference A19/A34–A46
Chipbreaker selection reference A22–A33
Recommended cutting parameters A243–A245

Cemented carbide and cermet inserts

TC□□ (Positive inserts)

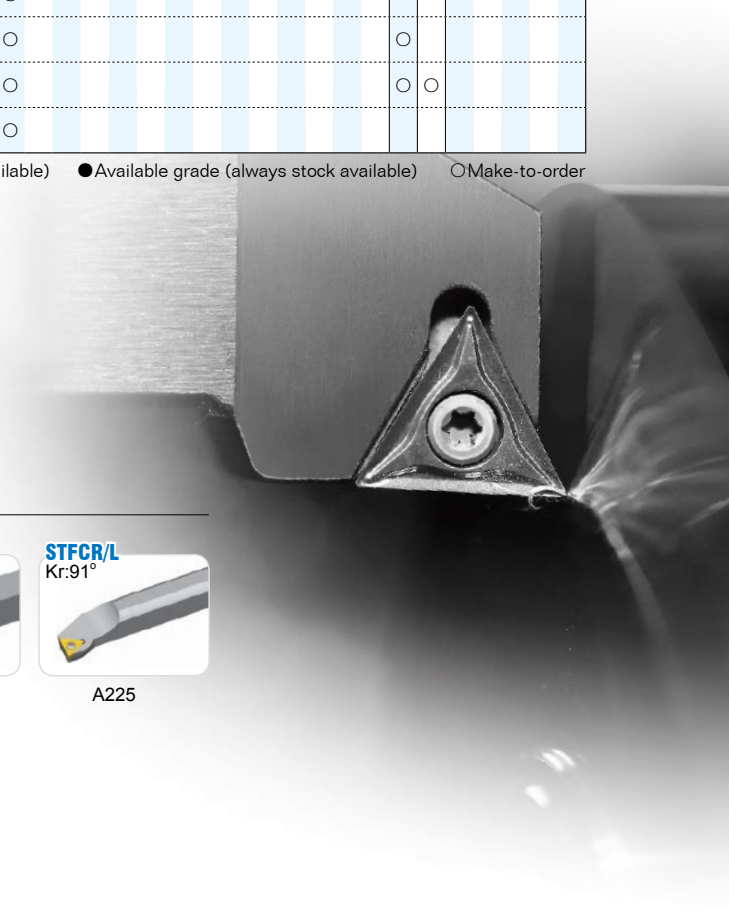


Good working condition Normal working condition Bad working condition

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)					Coated cemented carbide															Cermet	Coated cermet	Cemented carbide				
		L	ØI.C	S	ød	r	YBC151	YBC152	YBC251	YBC252	YBC351	**YBC352**	YBG102	YBG105	YBG202	YBG205	YBG302	YBM151	YBM153	YBM251	YBM253	YBD052	YBD102	YBD151	YBD152	YBD252	YNG151	YNG151C	YC10	YC40	YD051	YD101	YD201
USF For extra finishing	TCGT110301R-USF	11	6.35	3.18	2.8	0.1									●	○																	
	TCGT110302R-USF	11	6.35	3.18	2.8	0.2									●	○																	
USF For extra finishing	TCGT110301L-USF	11	6.35	3.18	2.8	0.1									●	○																	
	TCGT110302L-USF	11	6.35	3.18	2.8	0.2									●	○																	
SF For extra finishing	TCGT06T102-SF	6.4	3.97	1.98	2.2	0.2							○																				
	TCGT06T104-SF	6.4	3.97	1.98	2.2	0.4							○															○					
	TCGT090202-SF	9.6	5.56	2.38	2.5	0.2							○																				
	TCGT090204-SF	9.6	5.56	2.38	2.5	0.4							○															○					
	TCGT090208-SF	9.6	5.56	2.38	2.5	0.8							○																				
	TCGT110302-SF	11	6.35	3.18	2.8	0.2							○														○						
	TCGT110304-SF	11	6.35	3.18	2.8	0.4							○														○	○					
	TCGT110308-SF	11	6.35	3.18	2.8	0.8							○																				

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



Applicable tool


STACR/L
Kr:90°
Page A195

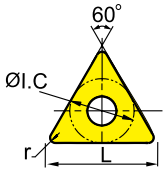

STFCR/L
Kr:91°
A195


STGCR/L
Kr:91°
A196


STTCR/L
Kr:60°
A197

STFCR/L
Kr:91°
A225

TC□□ (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)					Coated cemented carbide																Cermet	Coated cermet	Cemented carbide				
		L	ØI.C	S	ød	r	YBC151	YBC152	YBC251	YBC252	YBC351	**YBC352**	YBG102	YBG105	YBG202	YBG205	YBG302	YBM151	YBM153	YBM251	YBM253	YBD052	YBD102	YBD151	YBD152	YBD252	YNG151	YNG151C	YC10	YC40	YD051	YD101	YD201
HF  For finishing	**TCMT06T104-HF**	6.4	3.97	1.98	2.2	0.4		○																								
	TCMT06T108-HF	6.4	3.97	1.98	2.2	0.8		○																								
	TCMT090202-HF	9.6	5.56	2.38	2.5	0.2		★	●											○						○						○
	TCMT090204-HF	9.6	5.56	2.38	2.5	0.4		★	●																	●		○				
	TCMT090208-HF	9.6	5.56	2.38	2.5	0.8			○																○							
	TCMT110202-HF	11	6.35	2.38	2.8	0.2			●						●					○												
	TCMT110204-HF	11	6.35	2.38	2.8	0.4	●	★	●	★										●					●		○						
	TCMT110208-HF	11	6.35	2.38	2.8	0.8		○	●	○					●					○			○									○
	TCMT16T302-HF	16.5	9.525	3.97	4.4	0.2		○																								
	TCMT16T304-HF	16.5	9.525	3.97	4.4	0.4		●	●						○										●	●						
	TCMT16T308-HF	16.5	9.525	3.97	4.4	0.8		○	●																	○						○

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

Applicable tool


STACR/L Kr:90°
Page A195


STFCR/L Kr:91°
A195


STGCR/L Kr:91°
A196

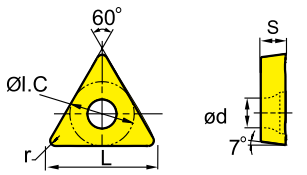

STTCR/L Kr:60°
A197


STFCR/L Kr:91°
A225

Insert code key A48–A49
Grade selection reference A19/A34–A46
Chipbreaker selection reference A22–A33
Recommended cutting parameters A243–A245

Cemented carbide and cermet inserts

TC□□ (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)					Coated cemented carbide														Cermet	Coated cermet	Cemented carbide				
		L	ØI.C	S	ød	r	YBC151	YBC152	YBC251	YBC252	YBC351	**YBC352**	YBG102	YBG105	YBG202	YBG205	YBG302	YBM151	YBM153	YBM251	YBM253	YBD052	YBD102	YBD151	YBD152	YBD252	YNG151	YNG151C	YC10	YC40	YD051	YD101	YD201
EF  For finishing	**TCMT090202-EF**	9.6	5.56	2.38	2.5	0.2							○		●	★			★														
	TCMT090204-EF	9.6	5.56	2.38	2.5	0.4							○		●	★			★														
	TCMT110202-EF	11	6.35	2.38	2.8	0.2							○		●	★			★														
	TCMT110204-EF	11	6.35	2.38	2.8	0.4							○		●	★			★														
	TCMT110208-EF	11	6.35	2.38	2.8	0.8							○		●	★			○														
	TCMT16T304-EF	16.5	9.525	3.97	4.4	0.4							○		●	★			★														
	TCMT16T308-EF	16.5	9.525	3.97	4.4	0.8							○		●	★			○														
EM  For semi-finishing	**TCMT090204-EM**	9.6	5.56	2.38	2.8	0.4									●	★					★												
	TCMT090208-EM	9.6	5.56	2.38	2.8	0.8									●	★					★												
	TCMT110204-EM	11	6.35	2.38	2.8	0.4									●	★					★												
	TCMT110208-EM	11	6.35	2.38	2.8	0.8									●	★					★												
	TCMT110212-EM	11	6.35	2.38	2.8	1.2									●	★					★												
	TCMT16T304-EM	16.5	9.525	3.97	4.4	0.4									●	★					★												
	TCMT16T308-EM	16.5	9.525	3.97	4.4	0.8									●	★					★												
	TCMT16T312-EM	16.5	9.525	3.97	4.4	1.2									●	★					★												

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

Applicable tool


STACR/L Kr:90°
Page A195

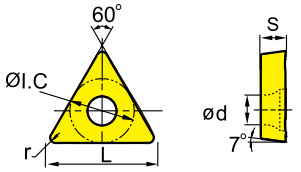

STFCR/L Kr:91°
A195


STGCR/L Kr:91°
A196


STTCR/L Kr:60°
A197

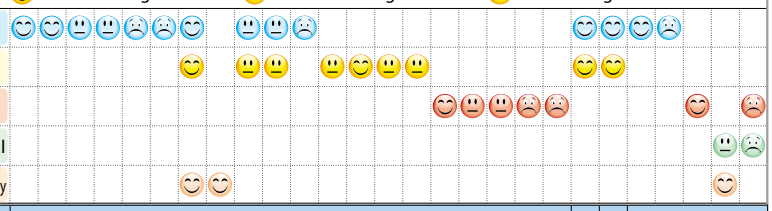

STFCR/L Kr:91°
A225

TC□□ (Positive inserts)



Good working condition Normal working condition Bad working condition

Workpiece material



Inserts shape	Type	Dimensions(mm)					Coated cemented carbide															Cermet	Coated cermet	Cemented carbide				
		L	ØI.C	S	ød	r	YBC151	YBC152	YBC251	YBC252	YBC351	**YBC352**	YBG102	YBG105	YBG202	YBG205	YBG302	YBM151	YBM153	YBM251	YBM253	YBD052	YBD102	YBD151	YBD152	YBD252	YNG151	YNG151C	YC10	YC40	YD051	YD101	YD201
HM  For semi-finishing	**TCMT090204-HM**	9.6	5.56	2.38	2.5	0.4	★	●			○									○					●							
	TCMT090208-HM	9.6	5.56	2.38	2.5	0.8		○	●		○																					
	TCMT110204-HM	11	6.35	2.38	2.8	0.4	★	●		○	○				●					●				●	●		○					
	TCMT110208-HM	11	6.35	2.38	2.8	0.8	★	●			○														●							
	TCMT16T304-HM	16.5	9.525	3.97	4.4	0.4	★	●	★	●										●			○		●							
	TCMT16T308-HM	16.5	9.525	3.97	4.4	0.8	★	●	★	●										●			●		●						○	
	TCMT16T312-HM	16.5	9.525	3.97	4.4	1.2		●		●										○												
HR  For roughing	**TCMT090204-HR**	9.6	5.56	2.38	2.5	0.4			○																							
	TCMT090208-HR	9.6	5.56	2.38	2.5	0.8																			○							●
	TCMT110204-HR	11	6.35	2.38	2.8	0.4			○																							
	TCMT110208-HR	11	6.35	2.38	2.8	0.8			○																							
	TCMT16T304-HR	16.5	9.525	3.97	4.4	0.4		○	●																							
	TCMT16T308-HR	16.5	9.525	3.97	4.4	0.8		●	●		●												●		●							
	TCMT16T312-HR	16.5	9.525	3.97	4.4	1.2		○	●														●		●							○
	TCMT220408-HR	22	12.7	4.76	5.5	0.8		○	●		○									●												
LC  For Al machining	**TCGX090202-LC**	9.6	5.56	2.38	2.5	0.2																									★	
	TCGX090204-LC	9.6	5.56	2.38	2.5	0.4																									★	
	TCGX110202-LC	11	6.35	2.38	2.8	0.2																									★	
	TCGX110204-LC	11	6.35	2.38	2.8	0.4																									★	
	TCGX110208-LC	11	6.35	2.38	2.8	0.8																									★	
	TCGX16T304-LC	16.5	9.525	3.97	4.4	0.4																									★	
	TCGX16T308-LC	16.5	9.525	3.97	4.4	0.8																									★	

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

Applicable tool



Page A195



A195



A196



A197

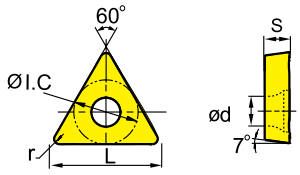


A225

Insert code key A48–A49
Grade selection reference A19/A34–A46
Chipbreaker selection reference A22–A33
Recommended cutting parameters A243–A245

Cemented carbide and cermet inserts

TC□□ (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)					Coated cemented carbide															Cermet	Coated cermet	Cemented carbide				
		L	ØI.C	S	ød	r	YBC151	YBC152	YBC251	YBC252	YBC351	**YBC352**	YBG102	YBG105	YBG202	YBG205	YBG302	YBM151	YBM153	YBM251	YBM253	YBD052	YBD102	YBD151	YBD152	YBD252	YNG151	YNG151C	YC10	YC40	YD051	YD101	YD201
LH  For Al machining	**TCGX090202-LH**	9.6	5.56	2.38	2.5	0.2																									★	
	TCGX090204-LH	9.6	5.56	2.38	2.5	0.4																									★	
	TCGX110202-LH	11	6.35	2.38	2.8	0.2																									★	
	TCGX110204-LH	11	6.35	2.38	2.8	0.4																									★	
	TCGX110208-LH	11	6.35	2.38	2.8	0.8																									★	
	TCGX16T302-LH	16.5	9.525	3.97	4.4	0.2																									○	
	TCGX16T304-LH	16.5	9.525	3.97	4.4	0.4																									★	
	TCGX16T308-LH	16.5	9.525	3.97	4.4	0.8																									★	
All round 	**TCMT220408**	22	12.7	4.76	5.5	0.8	○		●														○						○			○
Without chipbreaker 	**TCMW110204**	11	6.35	2.38	2.8	0.4																		○					○		●	○
	TCMW16T304	16.5	9.525	3.97	4.4	0.4																							○				
	TCMW16T308	16.5	9.525	3.97	4.4	0.8																		○								
	TCMW16T312	16.5	9.525	3.97	4.4	1.2	○																	○								
	TCMW220408	22	12.7	4.76	5.5	0.8	○																	○	○							

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

Applicable tool


STACR/L Kr:90°
Page A195

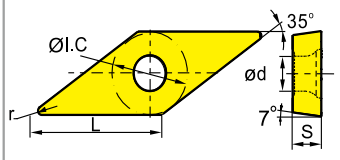

STFCR/L Kr:91°
A195


STGCR/L Kr:91°
A196


STTCR/L Kr:60°
A197

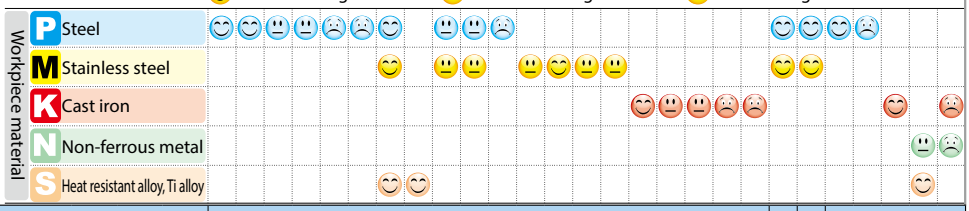

STFCR/L Kr:91°
A225

VC□□ (Positive inserts)



Good working condition Normal working condition Bad working condition

Workpiece material



Inserts shape	Type	Dimensions(mm)					Coated cemented carbide																Cermet	Coated cermet	Cemented carbide				
		L	ØI.C	S	ød	r	YBC151	YBC152	YBC251	YBC252	YBC351	**YBC352**	YBG102	YBG105	YBG202	YBG205	YBG302	YBM151	YBM153	YBM251	YBM253	YBD052	YBD102	YBD151	YBD152	YBD252	YNG151	YNG151C	YC10	YC40	YD051	YD101	YD201
USF For extra finishing	**VCGT080201R-USF**	8	4.76	2.38	2.3	0.1									○	○																	
	VCGT080202R-USF	8	4.76	2.38	2.3	0.2									●	○																	
	VCGT110301R-USF	11	6.35	3.18	2.8	0.1									●	○																	
	VCGT110302R-USF	11	6.35	3.18	2.8	0.2									●	○																	
USF For extra finishing	**VCGT080201L-USF**	8	4.76	2.38	2.3	0.1									○	○																	
	VCGT080202L-USF	8	4.76	2.38	2.3	0.2									○	○																	
	VCGT110301L-USF	11	6.35	3.18	2.8	0.1									○	○																	
	VCGT110302L-USF	11	6.35	3.18	2.8	0.2									●	○																	
SF For extra finishing	**VCGT110302-SF**	11	6.35	3.18	2.8	0.2							○														○	★					
	VCGT110304-SF	11	6.35	3.18	2.8	0.4							○														○	★					
HF For finishing	**VCGT110304-HF**	11	6.35	3.18	2.8	0.4			●																								
NF For finishing	**VCGT160408-NF**	16.5	9.525	4.76	4.4	0.8							●		★																		

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

Applicable tool

SVQCR/L Kr:107°30'



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SVUCR/L Kr:93°



A227

SVVCN Kr:72°30'



A191

SVJCR/L Kr:93°

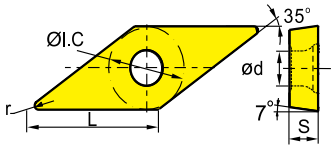


A192

Insert code key A48–A49
Grade selection reference A19/A34–A46
Chipbreaker selection reference A22–A33
Recommended cutting parameters A243–A245

Cemented carbide and cermet inserts

VC□□ (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)					Coated cemented carbide															Cermet	Coated cermet	Cemented carbide				
		L	ØI.C	S	ød	r	YBC151	YBC152	YBC251	YBC252	YBC351	**YBC352**	YBG102	YBG105	YBG202	YBG205	YBG302	YBM151	YBM153	YBM251	YBM253	YBD052	YBD102	YBD151	YBD152	YBD252	YNG151	YNG151C	YC10	YC40	YD051	YD101	YD201
LC	VCGX110301-LC	11	6.35	3.18	2.8	0.1																								★	
	VCGX110302-LC	11	6.35	3.18	2.8	0.2																								★	
	VCGX110304-LC	11	6.35	3.18	2.8	0.4																								★	
	VCGX110308-LC	11	6.35	3.18	2.8	0.8																								★	
	VCGX160404-LC	16.6	9.525	4.76	4.4	0.4																								★	
For Al machining	VCGX160408-LC	16.6	9.525	4.76	4.4	0.8																								★	
	VCGX160412-LC	16.6	9.525	4.76	4.4	1.2																								★	
	VCGX220530-LC	22	12.7	5.56	5.5	3.0																								★	
LH	VCGX110202-LH	11	6.35	2.38	2.8	0.2																								○	
	VCGX110204-LH	11	6.35	2.38	2.8	0.4																								★	
	VCGX110301-LH	11	6.35	3.18	2.8	0.1																								★	●
	VCGX110302-LH	11	6.35	3.18	2.8	0.2																								★	●
	VCGX110304-LH	11	6.35	3.18	2.8	0.4																								★	●
	VCGX110308-LH	11	6.35	3.18	2.8	0.8																								○	
For Al machining	VCGX160402-LH	16.6	9.525	4.76	4.4	0.2																								★	
	VCGX160404-LH	16.6	9.525	4.76	4.4	0.4																								★	○
	VCGX160408-LH	16.6	9.525	4.76	4.4	0.8																								★	○
	VCGX160412-LH	16.6	9.525	4.76	4.4	1.2																								★	●
	VCGX220530-LH	22	12.7	5.56	5.5	3.0																								★	●

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

Applicable tool

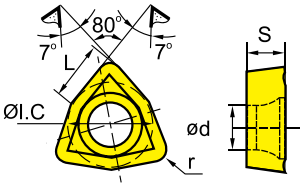

SVQCR/L
Kr:107°30'
Page A226


SVUCR/L
Kr:93°
A227


SVVCN
Kr:72°30'
A191


SVJCR/L
Kr:93°
A192

WC□□ (Positive inserts)

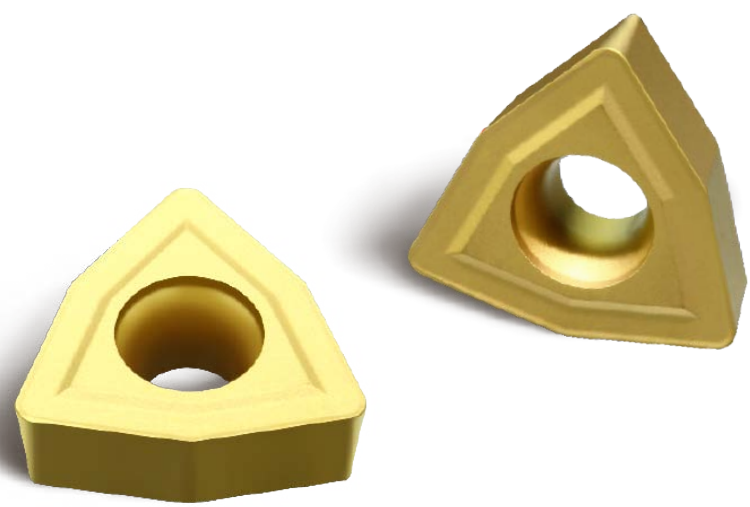


Good working condition / Normal working condition / Bad working condition

Workpiece material	YBC151	YBC152	YBC251	YBC252	YBC351	**YBC352**	YBG102	YBG105	YBG202	YBG205	YBG302	YBM151	YBM153	YBM251	YBM253	YBD052	YBD102	YBD151	YBD152	YBD252	YNG151	YNG151C	YC10	YC40	YD051	YD101	YD201
P Steel	Good	Good	Normal	Normal	Bad	Bad	Good		Normal	Normal	Bad										Good	Good	Good	Good			
M Stainless steel							Good		Normal	Normal		Normal	Good	Normal	Normal						Good	Good					
K Cast iron																Good	Normal	Normal	Bad	Bad					Good		Bad
N Non-ferrous metal																										Normal	Bad
S Heat resistant alloy, Ti alloy							Good	Good																		Good	

Inserts shape	Type	Dimensions(mm) L	ØI.C	S	ød	r	Coated cemented carbide YBC151	YBC152	YBC251	YBC252	YBC351	**YBC352**	YBG102	YBG105	YBG202	YBG205	YBG302	YBM151	YBM153	YBM251	YBM253	YBD052	YBD102	YBD151	YBD152	YBD252	Cermet YNG151	Coated cermet YNG151C	Cemented carbide YC10	YC40	YD051	YD101	YD201
53 	**WCMX040208R-53**	4.3	6.35	2.38	3.1	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																							○				

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



Applicable tool

SWACR/L
Kr:90°

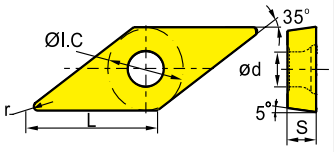


Page A198

Insert code key A48–A49
Grade selection reference A19/A34–A46
Chipbreaker selection reference A22–A33
Recommended cutting parameters A243–A245

Cemented carbide and cermet inserts

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)					Coated cemented carbide															Cermet	Coated cermet	Cemented carbide				
		L	ØI.C	S	Ød	r	YBC151	YBC152	YBC251	YBC252	YBC351	**YBC352**	YBG102	YBG105	YBG202	YBG205	YBG302	YBM151	YBM153	YBM251	YBM253	YBD052	YBD102	YBD151	YBD152	YBD252	YNG151	YNG151C	YC10	YC40	YD051	YD101	YD201
SF	VBGT110302-SF	11	6.35	3.18	2.8	0.2							○														○	○					
	VBGT110304-SF	11	6.35	3.18	2.8	0.4							○														○	○					
For extra finishing																																	
EF	VBMT110302-EF	11	6.35	3.18	2.8	0.2							○		●	★			★														
	VBMT110304-EF	11	6.35	3.18	2.8	0.4							○		●	★			★														
	VBMT110308-EF	11	6.35	3.18	2.8	0.8							○		●	★			○														
	VBMT160404-EF	16.5	9.525	4.76	4.4	0.4							○		●	★			★														
For finishing	VBMT160408-EF	16.5	9.525	4.76	4.4	0.8							○		●	★			○														
HF	VBMT110202-HF	11	6.35	2.38	2.8	0.2			●		○				●																		
	VBMT110204-HF	11	6.35	2.38	2.8	0.4			●						○										○								
	VBMT110208-HF	11	6.35	2.38	2.8	0.8			●						○																		
For finishing																																	
NF	VBET160404-NF	16.5	9.525	4.76	4.4	0.4							●	★																			
	VBET160408-NF	16.5	9.525	4.76	4.4	0.8							●	★																			
For finishing																																	

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

Applicable tool


SVJBR/L
Kr:93°
Page A188

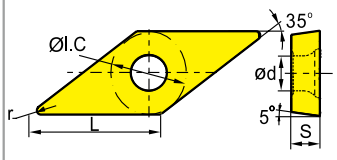

SVABR/L
Kr:90°
A189


SVVBN
Kr:72°30'
A190


SVQBR/L
Kr:107°30'
A228

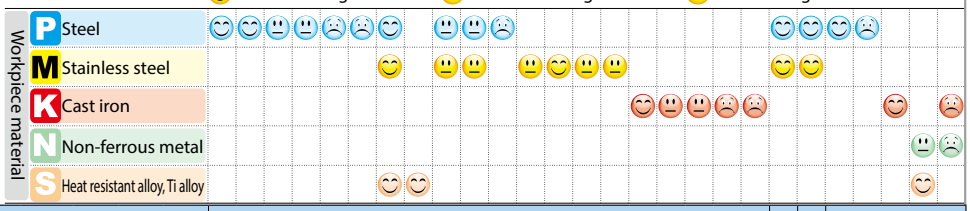

SVUBR/L
Kr:93°
A229

VB□□ (Positive inserts)



Good working condition Normal working condition Bad working condition

Workpiece material



Inserts shape	Type	Dimensions(mm)					Coated cemented carbide															Cermet		Cemented carbide				
		L	ØI.C	S	ød	r	YBC151	YBC152	YBC251	YBC252	YBC351	**YBC352**	YBG102	YBG105	YBG202	YBG205	YBG302	YBM151	YBM153	YBM251	YBM253	YBD052	YBD102	YBD151	YBD152	YBD252	YNG151	YNG151C	YC10	YC40	YD051	YD101	YD201
EM	**VBMT110304-EM**	11	6.35	3.18	2.8	0.4									●	★					★												
	**VBMT110308-EM**	11	6.35	3.18	2.8	0.8									●	★					★												
For semi-finishing																																	
HM	**VBMT160404-HM**	16.5	9.525	4.76	4.4	0.4		★	●	★	●				●					●			●									○
	**VBMT160408-HM**	16.5	9.525	4.76	4.4	0.8		★	●	★	●				●					●			●		●							
	VBMT160412-HM	16.5	9.525	4.76	4.4	1.2			●						○					○					○					○		○
For semi-finishing																																	
HR	**VBMT160404-HR**	16.5	9.525	4.76	4.4	0.4		★	●	○	●																						
	**VBMT160408-HR**	16.5	9.525	4.76	4.4	0.8		○	●	○	●														○							
	VBMT160412-HR	16.5	9.525	4.76	4.4	1.2					○																						
For roughing	**VBGT160408-HR**	16.5	9.525	4.76	4.4	0.8			○																								

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

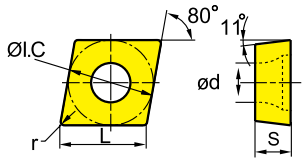
Applicable tool



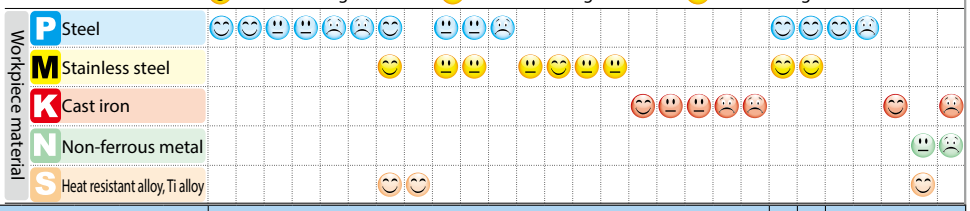
SVJBR/L Kr:93°	SVABR/L Kr:90°	SVVBN Kr:72°30'	SVQBR/L Kr:107°30'	SVUBR/L Kr:93°
Page A188	A189	A190	A228	A229

Insert code key A48–A49 Grade selection reference A19/A34–A46 Chipbreaker selection reference A22–A33 Recommended cutting parameters A243–A245

CP□□ (Positive inserts)



Good working condition Normal working condition Bad working condition



Inserts shape	Type	Dimensions(mm)					Coated cemented carbide															Cermet	Coated cermet	Cemented carbide				
		L	ØI.C	S	ød	r	YBC151	YBC152	YBC251	YBC252	YBC351	**YBC352**	YBG102	YBG105	YBG202	YBG205	YBG302	YBM151	YBM153	YBM251	YBM253	YBD052	YBD102	YBD151	YBD152	YBD252	YNG151	YNG151C	YC10	YC40	YD051	YD101	YD201
SF  For extra finishing	**CPGT060202-SF**	6.4	6.35	2.38	2.8	0.2							○														○						
	CPGT060204-SF	6.4	6.35	2.38	2.8	0.4							○														○						
	CPGT09T304-SF	9.7	9.525	3.97	4.4	0.4							○														○	○					

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

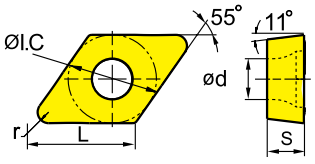
Applicable tool

SCLPR/L
Kr:95°



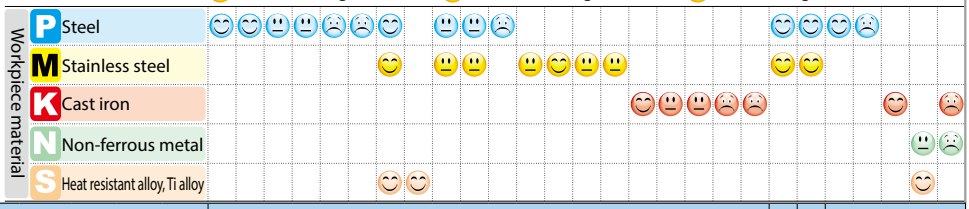
Page A230

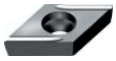
DP□□ (Positive inserts)



Good working condition Normal working condition Bad working condition

Workpiece material



Inserts shape	Type	Dimensions(mm)					Coated cemented carbide														Cermet	Coated cermet	Cemented carbide				
		L	ØI.C	S	ød	r	YBC151	YBC152	YBC251	YBC252	YBC351	**YBC352**	YBG102	YBG105	YBG202	YBG205	YBG302	YBM151	YBM153	YBM251	YBM253	YBD052	YBD102	YBD151	YBD152	YBD252	YNG151	YNG151C	YC10	YC40	YD051	YD101	YD201
USF  For extra finishing	**DPGT0702005R-USF**	7.8	6.35	2.38	2.8	0.05									○	○																	
	DPGT070201R-USF	7.8	6.35	2.38	2.8	0.1									○	○																	
	DPGT11T301R-USF	11.6	9.525	3.97	4.4	0.1									●	○																	
USF  For extra finishing	**DPGT0702005L-USF**	7.8	6.35	2.38	2.8	0.05									○	○																	
	DPGT070201L-USF	7.8	6.35	2.38	2.8	0.1									○	○																	
	DPGT11T301L-USF	11.6	9.525	3.97	4.4	0.1									○	○																	
SF  For extra finishing	**DPGT070202-SF**	7.8	6.35	2.38	2.8	0.2							○														○	○					
	DPGT070204-SF	7.8	6.35	2.38	2.8	0.4							○														○						
	DPGT070208-SF	7.8	6.35	2.38	2.8	0.8							○																				
	DPGT11T304-SF	11.6	9.525	3.97	4.4	0.4							○														○						
	DPGT11T308-SF	11.6	9.525	3.97	4.4	0.8							○																				

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

Applicable tool

SDQPR/L Kr:107°30'



Page A231

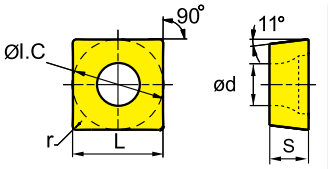
SDUPR/L Kr:93°



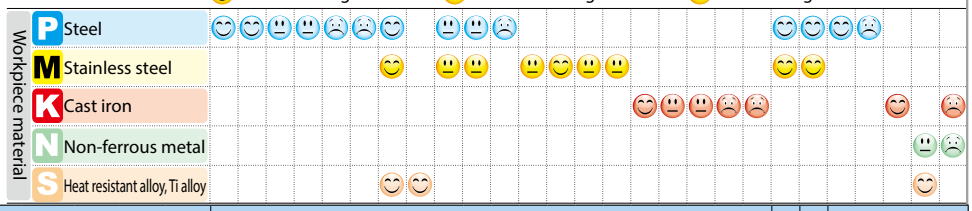
A232

Insert code key A48–A49
Grade selection reference A19/A34–A46
Chipbreaker selection reference A22–A33
Recommended cutting parameters A243–A245

SP□□ (Positive inserts)



Good working condition Normal working condition Bad working condition

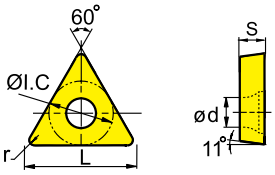


Inserts shape	Type	Dimensions(mm)					Coated cemented carbide														Cermet	Coated cermet	Cemented carbide				
		L	ØI.C	S	ød	r	YBC151	YBC152	YBC251	YBC252	YBC351	**YBC352**	YBG102	YBG105	YBG202	YBG205	YBG302	YBM151	YBM153	YBM251	YBM253	YBD052	YBD102	YBD151	YBD152	YBD252	YNG151	YNG151C	YC10	YC40	YD051	YD101	YD201
Without chipbreaker 	**SPMW09T304**	9.525	9.525	3.97	4.4	0.4			○																						○	
	SPMW09T308	9.525	9.525	3.97	4.4	0.8	●																							●		
	SPMW120408	12.7	12.7	4.76	5.56	0.8																		●								○

★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	Steel
M	Stainless steel
K	Cast iron
N	Non-ferrous metal
S	Heat resistant alloy, Ti alloy

Inserts shape	Type	Dimensions(mm)					Coated cemented carbide																Cermet	Coated cermet	Cemented carbide				
		L	ØI.C	S	ød	r	YBC151	YBC152	YBC251	YBC252	YBC351	**YBC352**	YBG102	YBG105	YBG202	YBG205	YBG302	YBM151	YBM153	YBM251	YBM253	YBD052	YBD102	YBD151	YBD152	YBD252	YNG151	YNG151C	YC10	YC40	YD051	YD101	YD201
SF	TPGT090202-SF	9.6	5.56	2.38	2.5	0.2							○															○					
	TPGT090204-SF	9.6	5.56	2.38	2.5	0.4							○														○	★					
	TPGT090208-SF	9.6	5.56	2.38	2.5	0.8							○														○						
	TPGT110302-SF	11	6.35	3.18	2.8	0.2							○														○						
For extra finishing	TPGT110304-SF	11	6.35	3.18	2.8	0.4							○														○	○					
	TPGT110308-SF	11	6.35	3.18	2.8	0.8							○															○					
	TPGH090202L	9.6	5.56	2.38	2.8	0.2							●														○						
	TPGH090204L	9.6	5.56	2.38	2.8	0.4							●														●						
	TPGH110302L	11	6.35	3.18	3.18	0.2							○														●						
For extra finishing	TPGH110304L	11	6.35	3.18	3.18	0.4							●														●		○				

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

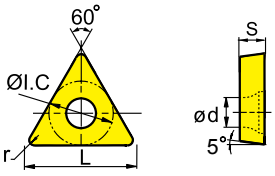
Applicable tool

STUPR/L
Kr:93°



Page A233

TB□□ (Positive inserts)



Good working condition Normal working condition Bad working condition

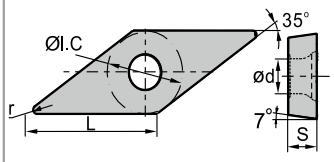
Workpiece material	
P	Steel
M	Stainless steel
K	Cast iron
N	Non-ferrous metal
S	Heat resistant alloy, Ti alloy

Inserts shape	Type	Dimensions(mm)					Coated cemented carbide																Cermet	Coated cermet	Cemented carbide				
		L	ØI.C	S	ød	r	YBC151	YBC152	YBC251	YBC252	YBC351	**YBC352**	YBG102	YBG105	YBG202	YBG205	YBG302	YBM151	YBM153	YBM251	YBM253	YBD052	YBD102	YBD151	YBD152	YBD252	YNG151	YNG151C	YC10	YC40	YD051	YD101	YD201
	TBGH060102L	6.4	3.97	1.59	2.2	0.2							★														★						
For extra finishing	TBGH060104L	6.4	3.97	1.59	2.2	0.4							★																				

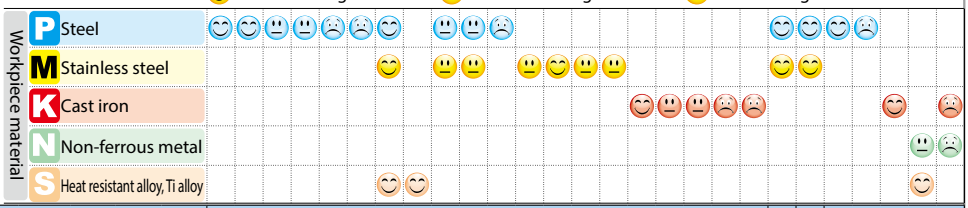
★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

Insert code key A48–A49
Grade selection reference A19/A34–A46
Chipbreaker selection reference A22–A33
Recommended cutting parameters A243–A245

VP□□ (Positive inserts)



Good working condition Normal working condition Bad working condition



Inserts shape	Type	Dimensions(mm)					Coated cemented carbide															Cermet	Coated cermet	Cemented carbide				
		L	ØI.C	S	ød	r	YBC151	YBC152	YBC251	YBC252	YBC351	**YBC352**	YBG102	YBG105	YBG202	YBG205	YBG302	YBM151	YBM153	YBM251	YBM253	YBD052	YBD102	YBD151	YBD152	YBD252	YNG151	YNG151C	YC10	YC40	YD051	YD101	YD201
USF  For extra finishing	**VPGT080201R-USF**	8	4.76	2.38	2.3	0.1									○	○																	
	VPGT080202R-USF	8	4.76	2.38	2.3	0.2									○	○																	
	VPGT110301R-USF	11	6.35	3.18	2.8	0.1									●	○																	
USF  For extra finishing	**VPGT080201L-USF**	8	4.76	2.43	2.3	0.1									●	○																	
	VPGT080202L-USF	8	4.76	2.43	2.3	0.2									●	○																	
	VPGT110301L-USF	11	6.35	3.18	2.8	0.1									○	○																	

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

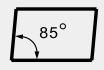
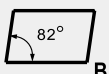
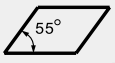
New product for turning

PCBN&PCD inserts

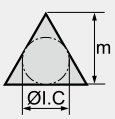


PCBN&PCD inserts code key

Insert shape

 A	 B	 C
 D	 E	 H
 K	 L	 M
 P	 S	 T
 V	 W	Others Z

Tolerance class

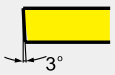
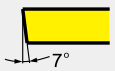
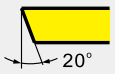
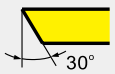
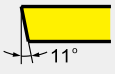




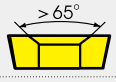
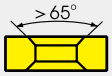
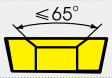
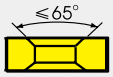
Code	Nose height M Tolerance(mm)	Inscribed circle Tolerance(mm)	Thickness S Tolerance(mm)	Code	Nose height M Tolerance(mm)	Inscribed circle Tolerance(mm)	Thickness S Tolerance(mm)
A	±0.005	±0.025	±0.025	J	±0.005	±0.05-±0.13	±0.025
F	±0.005	±0.013	±0.025	K	±0.013	±0.05-±0.13	±0.025
C	±0.013	±0.025	±0.025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

C N G A

Clearance angle of main cutting edge

Code	Clearance angle	Code	Clearance angle
A		B	
C		D	
E		F	
G		N	
P		O	Other clearance angle

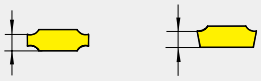
Chipbreaker and clamping system

Code	With/Without hole	Section plane of insert
N	Without	
B	With	
C	With	
A	With	
W	With	
Q	With	
X	---	Special

Length of cutting edge

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

Insert thickness



Thickness is defined as height from bottom of insert to the highest part of cutting edge.

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

Nose radius code

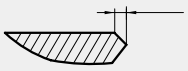
Code	Nose radius(mm)
00	No radius
02	0.2
04	0.4
08	0.8
12	1.2
16	1.6
20	2.0
24	2.4
32	3.2
X	Others
Diameter of insert (Metric)	Round insert

12 04 08 T 020 20 - 2

Type of cutting edge

Code	Type of cutting edge	Diagram
F	Sharp edges	
E	Honing	
T	Chamfering	
S	Chamfering +honing	

Chamfer width



010	0.10	040	0.40
015	0.15	045	0.45
020	0.20	050	0.50
025	0.25	100	1.00
030	0.30	200	2.00
035	0.35		

Chamfer angle



05	5°
10	10°
15	15°
20	20°
25	25°
30	30°

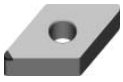
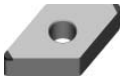
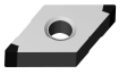
Number of cutting nose

Code	Number	Diagram
Unspeci-fied	Single edge	
2	Double edges	
3	Three edges	
4	Four edges	

CNGA120408 ISO standard code

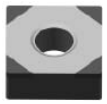
	Grade						
	YCB011	YCB012	YCB121	YCB211	YZB121	YZB221	YZB231
Type of cutting edge	T	S	T	S	S	T	T
Chamfer angle	15°	20°	20°	25°	20°	20°	20°
Chamfer width	0.15	0.10	0.20	0.15	0.10	0.20	0.25

PCBN&PCD inserts overview Negative inserts

Inserts shape	Type	Grade									
		YCB011	YCB012	YCB121	YCB211	YZB121	YZB221	YZB231	YCD011	YCD412	YCD421	YCD511
 A120	CNGA120404	○	○	○	○							
	CNGA120408	○	○	○	○							
	CNGA120412	○	○	○	○							
 A120	CNGA120404-2	★	★	★	★							
	CNGA120408-2	★	★	★	★							
	CNGA120412-2	○	○	○	○							
 A120	CNGA120404-2					○	○	○				
	CNGA120408-2					○	○	○				
	CNGA120412-2					○	○	○				
 A121	CNGN120404					○	★	○				
	CNGN12T608					○	★	○				
	CNGN120712					○	★	○				
 A122	DNGA150404	○	○	○	○							
	DNGA150408	○	○	○	○							
	DNGA150412	○	○	○	○							
	DNGA150602	○	○	○	○							
	DNGA150604	○	○	○	○							
	DNGA150608	○	○	○	○							
	DNGA150612	○	○	○	○							
 A122	DNGA150404-2	★	★	★	★							
	DNGA150408-2	★	★	★	★							
	DNGA150412-2	○	○	○	○							
	DNGA150602-2	○	○	○	○							
	DNGA150604-2	○	○	○	○							
	DNGA150608-2	○	○	○	○							
	DNGA150612-2	○	○	○	○							
 A122	DNGA150404-2					○	○	○				
	DNGA150408-2					○	○	○				
	DNGA150412-2					○	○	○				
	DNGA150604-2					○	○	○				
	DNGA150608-2					○	○	○				
	DNGA150612-2					○	○	○				

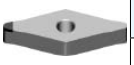
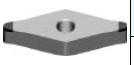
★ Recommended grade

PCBN&PCD inserts overview Negative inserts

Inserts shape	Type	Grade									
		YCB011	YCB012	YCB121	YCB211	YZB121	YZB221	YZB231	YCD011	YCD412	YCD421	YCD511
 A123	DNGN110404					○	★	○				
	DNGN110408					○	★	○				
 A124	SNGA120402	○	○	○	○							
	SNGA120404	○	○	○	○							
	SNGA120408	○	○	○	○							
	SNGA120412	○	○	○	○							
 A124	SNGA120402-2	○	○	○	○							
	SNGA120404-2	★	★	★	★							
	SNGA120408-2	★	★	★	★							
	SNGA120412-2	○	○	○	○							
 A124	SNGA120402-4	○	○	○	○							
	SNGA120404-4	○	○	○	○							
	SNGA120408-4	○	○	○	○							
	SNGA120412-4	○	○	○	○							
 A124	SNGA120404-4					○	○	○				
	SNGA120408-4					○	○	○				
	SNGA120412-4					○	○	○				
 A125	SNGN120404					○	★	○				
	SNGN120408					○	★	○				
	SNGN12T612					○	★	○				
	SNGN150716					○	★	○				
	SNGN150720					○	★	○				
 A126	TNGA160402	○	○	○	○							
	TNGA160404	○	○	○	○							
	TNGA160408	○	○	○	○							
	TNGA160412	○	○	○	○							
 A126	TNGA160402-3	○	○	○	○							
	TNGA160404-3	★	★	★	★							
	TNGA160408-3	★	★	★	★							
	TNGA160412-3	○	○	○	○							

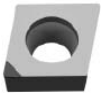
★ Recommended grade

PCBN&PCD inserts overview Negative inserts

Inserts shape	Type	Grade									
		YCB011	YCB012	YCB121	YCB211	YZB121	YZB221	YZB231	YCD011	YCD412	YCD421	YCD511
 A126	TNGA160404-3					○	○	○				
	TNGA160408-3					○	○	○				
	TNGA160412-3					○	○	○				
 A127	VNGA160402	○	○	○	○							
	VNGA160404	○	○	○	○							
	VNGA160408	○	○	○	○							
	VNGA160412	○	○	○	○							
 A127	VNGA160402-2	○	○	○	○							
	VNGA160404-2	★	★	★	★							
	VNGA160408-2	★	★	★	★							
	VNGA160412-2	○	○	○	○							
 A128	WNGA080404	○	○	○	○							
	WNGA080408	○	○	○	○							
	WNGA080412	○	○	○	○							
 A128	WNGA080404-3	★	★	★	★							
	WNGA080408-3	★	★	★	★							
	WNGA080412-3	○	○	○	○							
 A128	WNGA080404-3					○	○	○				
	WNGA080408-3					○	○	○				
	WNGA080412-3					○	○	○				
 A129	WNGN060304					○	★	○				
	WNGN080408					○	★	○				
	WNGN080412					○	★	○				
 A129	RNGN090300					○	★	○				
	RNGN120400					○	★	○				
	RNGN120700					○	★	○				
	RNGN150700					○	★	○				

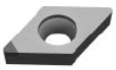
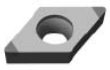
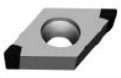
★ Recommended grade

PCBN&PCD inserts overview Positive inserts

Inserts shape	Type	Grade									
		YCB011	YCB012	YCB121	YCB211	YZB121	YZB221	YZB231	YCD011	YCD412	YCD421	YCD511
 A130	CCGW060204	○	○	○	○				★	○	★	○
	CCGW060208	○	○	○	○				★	○	★	○
	CCGW09T304	○	○	○	○				★	○	★	○
	CCGW09T308	○	○	○	○				★	○	★	○
	CCGW120404	○	○	○	○							
	CCGW120408	○	○	○	○				★	○	★	○
	CCGW120412	○	○	○	○							
 A130	CCGW060204-2	○	○	○	○							
	CCGW060208-2	○	○	○	○							
	CCGW09T304-2	★	★	★	★							
	CCGW09T308-2	★	★	★	★							
	CCGW120404-2	★	★	★	★							
	CCGW120408-2	★	★	★	★							
	CCGW120412-2	○	○	○	○							
 A131	CCGN120404					★	★	★				
	CCGN12T608					★	★	★				
	CCGN120712					★	★	★				
 A130	CCGW09T304-2					○	○	○				
	CCGW09T308-2					○	○	○				
	CCGW09T312-2					○	○	○				
	CCGW120404-2					○	○	○				
	CCGW120408-2					○	○	○				
	CCGW120412-2					○	○	○				
 A131	CCMX060202								★	○	★	○
	CCMX060204								★	○	★	○
	CCMX060208								★	○	★	○
	CCMX09T304								★	○	★	○
	CCMX09T308								★	○	★	○
	CCMX120408								★	○	★	○

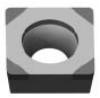
★ Recommended grade

PCBN&PCD inserts overview Positive inserts

Inserts shape	Type	Grade									
		YCB011	YCB012	YCB121	YCB211	YZB121	YZB221	YZB231	YCD011	YCD412	YCD421	YCD511
 A132	DCGW070202	○	○	○	○				★	○	★	○
	DCGW070204	○	○	○	○				★	○	★	○
	DCGW070208	○	○	○	○							
	DCGW11T304	○	○	○	○				★	○	★	○
	DCGW11T308	○	○	○	○				★	○	★	○
 A132	DCGW070202-2	○	○	○	○							
	DCGW070204-2	○	○	○	○							
	DCGW070208-2	○	○	○	○							
	DCGW11T304-2	★	★	★	★							
	DCGW11T308-2	★	★	★	★							
 A133	DCGN110404					★	★	★				
	DCGN110408					★	★	★				
 A132	DCGW11T304-2					○	○	○				
	DCGW11T308-2					○	○	○				
	DCGW11T312-2					○	○	○				
	DCGW11T304-2					○	○	○				
	DCGW11T308-2					○	○	○				
 A132	DCMX070202								★	○	★	○
	DCMX070204								★	○	★	○
	DCMX11T304								★	○	★	○
	DCMX11T308								★	○	★	○
 A134	SCGW120404	○	○	○	○				★	○	★	○
	SCGW120408	○	○	○	○				★	○	★	○
	SCGW120412	○	○	○	○				★	○	★	○
 A134	SCGW120404-2	★	★	★	★							
	SCGW120408-2	★	★	★	★							
	SCGW120412-2	○	○	○	○							

★ Recommended grade

PCBN&PCD inserts overview Positive inserts

Inserts shape	Type	Grade									
		YCB011	YCB012	YCB121	YCB211	YZB121	YZB221	YZB231	YCD011	YCD412	YCD421	YCD511
 A134	SCGW120404-4	○	○	○	○							
	SCGW120408-4	○	○	○	○							
	SCGW120412-4	○	○	○	○							
 A134	SCGW120404-4					○	○	○				
	SCGW120408-4					○	○	○				
	SCGW120412-4					○	○	○				
 A134	SCMX120404								★	○	★	○
	SCMX120408								★	○	★	○
	SCMX120412								★	○	★	○
 A135	TCGW090204	○	○	○	○				★	○	★	○
	TCGW090208	○	○	○	○				★	○	★	○
	TCGW110202	○	○	○	○				★	○	★	○
	TCGW110204	○	○	○	○				★	○	★	○
	TCGW110208	○	○	○	○				★	○	★	○
	TCGW110304	○	○	○	○				★	○	★	○
	TCGW16T304	○	○	○	○				★	○	★	○
	TCGW16T308	○	○	○	○				★	○	★	○
	TCGW16T312	○	○	○	○				★	○	★	○
 A135	TCGW090204-3	○	○	○	○							
	TCGW090208-3	○	○	○	○							
	TCGW110202-3	○	○	○	○							
	TCGW110204-3	★	★	★	★							
	TCGW110208-3	★	★	★	★							
	TCGW110304-3	★	★	★	★							
	TCGW16T304-3	★	★	★	★							
	TCGW16T308-3	★	★	★	★							
	TCGW16T312-3	○	○	○	○							

★ Recommended grade

PCBN&PCD inserts overview Positive inserts

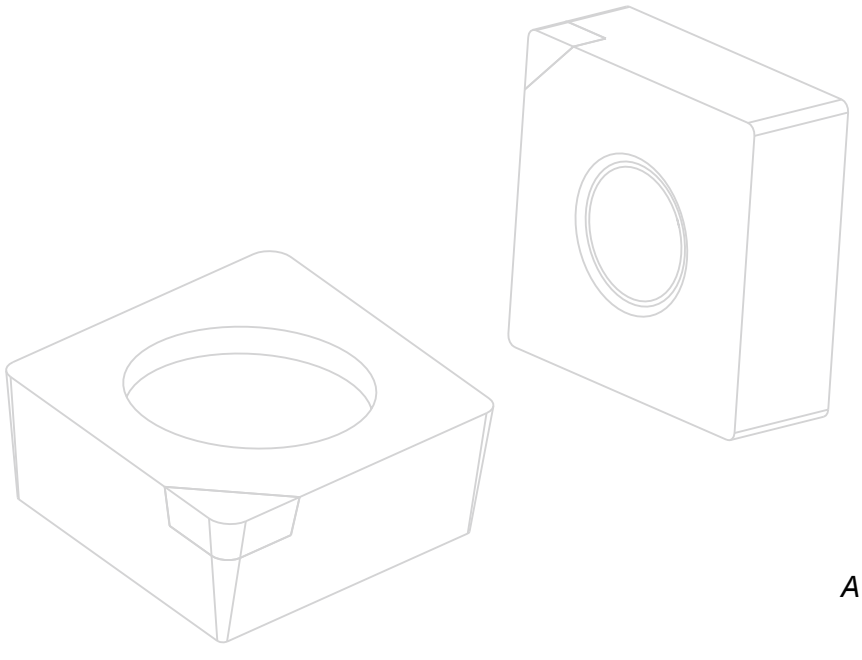
Inserts shape	Type	Grade									
		YCB011	YCB012	YCB121	YCB211	YZB121	YZB221	YZB231	YCD011	YCD412	YCD421	YCD511
	TCGW090204-3					○	○	○				
	TCGW090208-3					○	○	○				
	TCGW090212-3					○	○	○				
	TCGW110304-3					○	○	○				
	TCGW110308-3					○	○	○				
	TCGW110312-3					○	○	○				
	TCGW16T304-3					○	○	○				
	TCGW16T308-3					○	○	○				
A135	TCGW16T312-3					○	○	○				
	TCMX090204								★	○	★	○
	TCMX090208								★	○	★	○
	TCMX110202								★	○	★	○
	TCMX110204								★	○	★	○
	TCMX110208								★	○	★	○
	TCMX110304								★	○	★	○
	TCMX16T304								★	○	★	○
	TCMX16T308								★	○	★	○
A136	TCMX16T312								★	○	★	○

★ Recommended grade

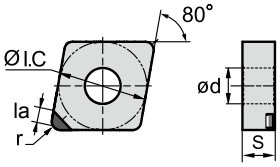
PCBN&PCD inserts overview Positive inserts

Inserts shape	Type	Grade									
		YCB011	YCB012	YCB121	YCB211	YZB121	YZB221	YZB231	YCD011	YCD412	YCD421	YCD511
	VBGW160404	○	○	○	○				★	○	★	○
	VBGW160408	○	○	○	○				★	○	★	○
A137	VBGW160412	○	○	○	○				★	○	★	○
	VBGW160404-2	★	★	★	★							
	VBGW160408-2	★	★	★	★							
A137	VBGW160412-2	○	○	○	○							
	VBMX160404								★	○	★	○
	VBMX160408								★	○	★	○
A137	VBMX160412								★	○	★	○
	VCGW160404								★	○	★	○
	VCGW160408								★	○	★	○
A138	VCGW160412								★	○	★	○
	VCMX160404								★	○	★	○
	VCMX160408								★	○	★	○
A138	VCMX160412								★	○	★	○
	RCGN090300					★	★	★				
	RCGN120400					★	★	★				
	RCGN120700					★	★	★				
A138	RCGN150700					★	★	★				

★ Recommended grade



CN□□ (Negative inserts)



Good working condition Normal working condition Bad working condition

Workpiece material	YCB011	YCB012	YCB121	YCB211	YZB121	YZB221	YZB231	YCD011	YCD412	YCD421	YCD511
H Super hard material		😐	😊		😐						
K Cast iron	😊			😊		😐	☹				
N Non ferrous metal								😐	😊	😐	☹

Inserts shape	Type	Dimensions(mm)					Grade										
		ØI.C	S	ød	r	la	YCB011	YCB012	YCB121	YCB211	YZB121	YZB221	YZB231	YCD011	YCD412	YCD421	YCD511
	CNGA120404	12.7	4.76	5.16	0.4	2.5	○	○	○	○							
	CNGA120408	12.7	4.76	5.16	0.8	2.4	○	○	○	○							
	CNGA120412	12.7	4.76	5.16	1.2	2.3	○	○	○	○							
	CNGA120404-2	12.7	4.76	5.16	0.4	2.5	★	★	★	★							
	CNGA120408-2	12.7	4.76	5.16	0.8	2.4	★	★	★	★							
	CNGA120412-2	12.7	4.76	5.16	1.2	2.3	○	○	○	○							
	CNGA120404-2	12.7	4.76	5.16	0.4	2.5					○	○	○				
	CNGA120408-2	12.7	4.76	5.16	0.8	2.4					○	○	○				
	CNGA120412-2	12.7	4.76	5.16	1.2	2.3					○	○	○				

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

Type of cutting edge

	YCB011	YCB012	YCB121	YCB211	YZB121	YZB221	YZB231
Negative inserts	T01515	S01020	S02020	T01525	S01020	T02020	T02025
Positive inserts							

Applicable tool

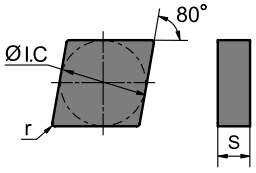

DCLNR/L Kr:95°
Page A164


PCLNR/L Kr:95°
A171


MCLNR/L Kr:95°
A172


PCLNR/L Kr:95°
A214

CN□□ (Negative inserts)



Good working condition Normal working condition Bad working condition

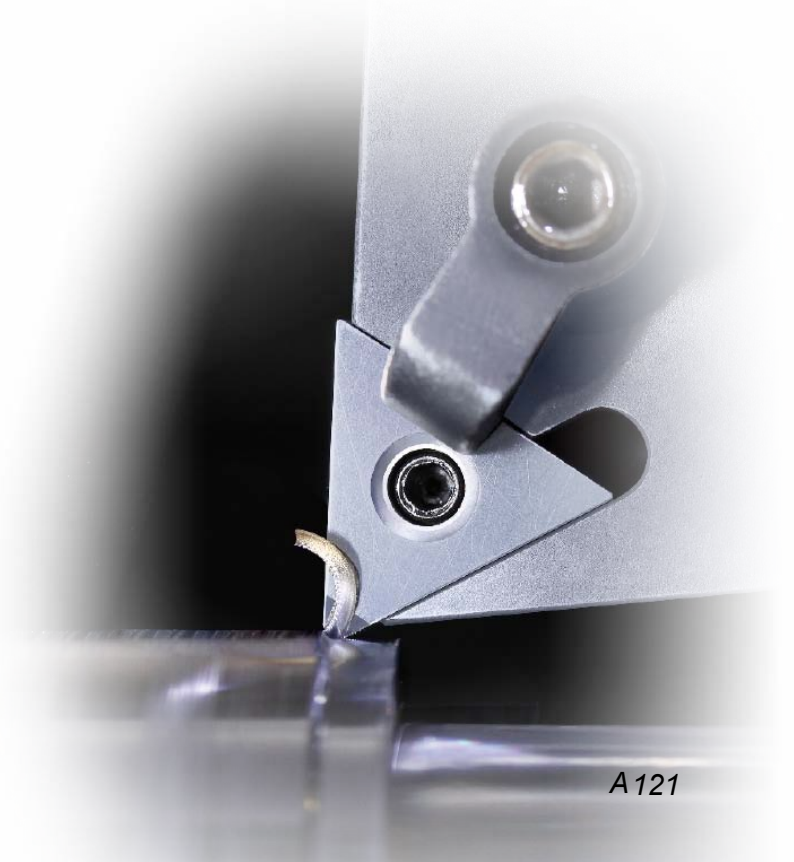
Workpiece material		YCB011	YCB012	YCB121	YCB211	YZB121	YZB221	YZB231	YCD011	YCD412	YCD421	YCD511
H	Super hard material	😐	😊		😐							
K	Cast iron	😊			😊		😐	☹				
N	Non ferrous metal								😐	😊	😐	☹

Inserts shape	Type	Dimensions(mm)			Grade										
		ØI.C	S	r	YCB011	YCB012	YCB121	YCB211	YZB121	YZB221	YZB231	YCD011	YCD412	YCD421	YCD511
	**CNGN120404**	12.7	4.76	0.4					○	★	○				
	CNGN12T608	12.7	6.75	0.8					○	★	○				
	CNGN120712	12.7	7.94	1.2					○	★	○				

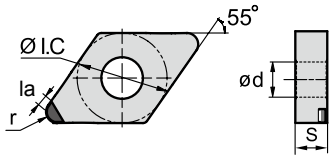
★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

Type of cutting edge

	YCB011	YCB012	YCB121	YCB211	YZB121	YZB221	YZB231
Negative inserts	T01515	S01020	S02020	T01525	S01020	T02020	T02025
Positive inserts							

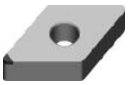
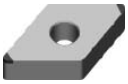
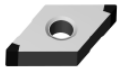


DN□□ (Negative inserts)



Good working condition | Normal working condition | Bad working condition

Workpiece material											
H	Super hard material		😐	😊		😐					
K	Cast iron	😊			😊		😐	☹			
N	Non ferrous metal							😐	😊	😐	☹

Inserts shape	Type	Dimensions(mm)					Grade										
		ØI.C	S	ød	r	la	YCB011	YCB012	YCB121	YCB211	YZB121	YZB221	YZB231	YCD011	YCD412	YCD421	YCD511
	**DNGA150404**	12.7	4.76	5.16	0.4	2.5	○	○	○	○							
	DNGA150408	12.7	4.76	5.16	0.8	2.1	○	○	○	○							
	DNGA150412	12.7	4.76	5.16	1.2	2.0	○	○	○	○							
	DNGA150602	12.7	6.35	5.16	0.2	2.7	○	○	○	○							
	DNGA150604	12.7	6.35	5.16	0.4	2.5	○	○	○	○							
	DNGA150608	12.7	6.35	5.16	0.8	2.1	○	○	○	○							
	DNGA150612	12.7	6.35	5.16	1.2	2.0	○	○	○	○							
	**DNGA150404-2**	12.7	4.76	5.16	0.4	2.5	★	★	★	★							
	DNGA150408-2	12.7	4.76	5.16	0.8	2.1	★	★	★	★							
	DNGA150412-2	12.7	4.76	5.16	1.2	2.0	○	○	○	○							
	DNGA150602-2	12.7	6.35	5.16	0.2	2.7	○	○	○	○							
	DNGA150604-2	12.7	6.35	5.16	0.4	2.5	○	○	○	○							
	DNGA150608-2	12.7	6.35	5.16	0.8	2.1	○	○	○	○							
	DNGA150612-2	12.7	6.35	5.16	1.2	2.0	○	○	○	○							
	**DNGA150404-2**	12.7	4.76	5.16	0.4	2.5					○	○	○				
	DNGA150408-2	12.7	4.76	5.16	0.8	2.1					○	○	○				
	DNGA150412-2	12.7	4.76	5.16	1.2	2.0					○	○	○				
	DNGA150604-2	12.7	6.35	5.16	0.4	2.5					○	○	○				
	DNGA150608-2	12.7	6.35	5.16	0.8	2.1					○	○	○				
	DNGA150612-2	12.7	6.35	5.16	1.2	2.0					○	○	○				

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

Type of cutting edge

	YCB011	YCB012	YCB121	YCB211	YZB121	YZB221	YZB231
Negative inserts	T01515	S01020	S02020	T01525	S01020	T02020	T02025
Positive inserts							

Applicable tool

DDJNR/L Kr:93°

Page A165

PDJNR/L Kr:93°

A173

PDNNR/L Kr:63°

A174

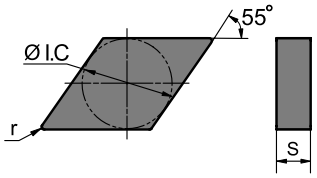
PDSNR/L Kr:62°30'

A215

PDUNR/L Kr:93°

A216

DN□□ (Negative inserts)



Good working condition Normal working condition Bad working condition

Workpiece material		YCB011	YCB012	YCB121	YCB211	YZB121	YZB221	YZB231	YCD011	YCD412	YCD421	YCD511
H	Super hard material		😐	😊		😐						
K	Cast iron	😊			😊		😐	☹				
N	Non ferrous metal								😐	😊	😐	☹

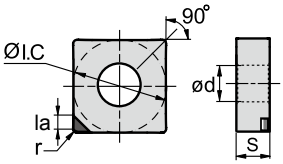
Inserts shape	Type	Dimensions(mm)			Grade										
		ØI.C	S	r	YCB011	YCB012	YCB121	YCB211	YZB121	YZB221	YZB231	YCD011	YCD412	YCD421	YCD511
	**DNGN110404**	9.525	4.76	0.4					○	★	○				
	DNGN110408	9.525	4.76	0.8					○	★	○				

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

Type of cutting edge

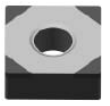
	YCB011	YCB012	YCB121	YCB211	YZB121	YZB221	YZB231
Negative inserts	T01515	S01020	S02020	T01525	S01020	T02020	T02025
Positive inserts							

SN□□ (Negative inserts)



Good working condition Normal working condition Bad working condition

Workpiece material		
H	Super hard material	😐 😊 😐
K	Cast iron	😊 😊 😐 ☹
N	Non ferrous metal	😐 😊 😐 ☹

Inserts shape	Type	Dimensions(mm)					Grade										
		ØI.C	S	ød	r	la	YCB011	YCB012	YCB121	YCB211	YZB121	YZB221	YZB231	YCD011	YCD412	YCD421	YCD511
	SNGA120402	12.7	4.76	5.16	0.2	2.7	○	○	○	○							
	SNGA120404	12.7	4.76	5.16	0.4	2.5	○	○	○	○							
	SNGA120408	12.7	4.76	5.16	0.8	2.3	○	○	○	○							
	SNGA120412	12.7	4.76	5.16	1.2	2.1	○	○	○	○							
	SNGA120402-2	12.7	4.76	5.16	0.2	2.7	○	○	○	○							
	SNGA120404-2	12.7	4.76	5.16	0.4	2.5	★	★	★	★							
	SNGA120408-2	12.7	4.76	5.16	0.8	2.3	★	★	★	★							
	SNGA120412-2	12.7	4.76	5.16	1.2	2.1	○	○	○	○							
	SNGA120402-4	12.7	4.76	5.16	0.2	2.7	○	○	○	○							
	SNGA120404-4	12.7	4.76	5.16	0.4	2.5	○	○	○	○							
	SNGA120408-4	12.7	4.76	5.16	0.8	2.3	○	○	○	○							
	SNGA120412-4	12.7	4.76	5.16	1.2	2.1	○	○	○	○							
	SNGA120404-4	12.7	4.76	5.16	0.4	2.5					○	○	○				
	SNGA120408-4	12.7	4.76	5.16	0.8	2.3					○	○	○				
	SNGA120412-4	12.7	4.76	5.16	1.2	2.1					○	○	○				

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

Type of cutting edge

	YCB011	YCB012	YCB121	YCB211	YZB121	YZB221	YZB231
Negative inserts	T01515	S01020	S02020	T01525	S01020	T02020	T02025
Positive inserts							

Applicable tool


DSBNR/L Kr:75°
Page A166


PSBNR/L Kr:75°
A175

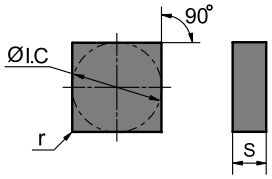

PSDNN Kr:45°
A176


PSKNR/L Kr:75°
A177


PSSNR/L Kr:45°
A178


PSKNR/L Kr:75°
A217

SN□□ (Negative inserts)



Good working condition Normal working condition Bad working condition

Workpiece material	YCB011	YCB012	YCB121	YCB211	YZB121	YZB221	YZB231	YCD011	YCD412	YCD421	YCD511
H Super hard material		😐	😊		😐						
K Cast iron	😊			😊		😐	☹				
N Non ferrous metal								😐	😊	😐	☹

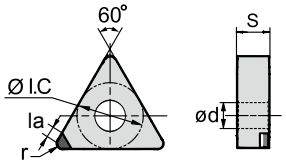
Inserts shape	Type	Dimensions(mm)			Grade										
		ØI.C	S	r	YCB011	YCB012	YCB121	YCB211	YZB121	YZB221	YZB231	YCD011	YCD412	YCD421	YCD511
	**SNGN120404**	12.7	4.76	0.4					○	★	○				
	SNGN120408	12.7	4.76	0.8					○	★	○				
	SNGN12T612	12.7	6.75	1.2					○	★	○				
	SNGN150716	15.875	7.94	1.6					○	★	○				
	SNGN150720	15.875	7.94	2.0					○	★	○				

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

Type of cutting edge

	YCB011	YCB012	YCB121	YCB211	YZB121	YZB221	YZB231
Negative inserts	T01515	S01020	S02020	T01525	S01020	T02020	T02025
Positive inserts							

TN□□ (Negative inserts)



Good working condition Normal working condition Bad working condition

Workpiece material											
H	Super hard material		😐	😊		😐					
K	Cast iron	😊			😊		😐	☹			
N	Non ferrous metal								😐	😊	😐	☹

Inserts shape	Type	Dimensions(mm)					Grade										
		ØI.C	S	ød	r	la	YCB011	YCB012	YCB121	YCB211	YZB121	YZB221	YZB231	YCD011	YCD412	YCD421	YCD511
	**TNGA160402**	9.525	4.76	3.81	0.2	2.5	○	○	○	○							
	TNGA160404	9.525	4.76	3.81	0.4	2.5	○	○	○	○							
	TNGA160408	9.525	4.76	3.81	0.8	2.2	○	○	○	○							
	TNGA160412	9.525	4.76	3.81	1.2	2.0	○	○	○	○							
	**TNGA160402-3**	9.525	4.76	3.81	0.2	2.5	○	○	○	○							
	TNGA160404-3	9.525	4.76	3.81	0.4	2.5	★	★	★	★							
	TNGA160408-3	9.525	4.76	3.81	0.8	2.2	★	★	★	★							
	TNGA160412-3	9.525	4.76	3.81	1.2	2.0	○	○	○	○							
	**TNGA160404-3**	9.525	4.76	3.81	0.4	2.5					○	○	○				
	TNGA160408-3	9.525	4.76	3.81	0.8	2.2					○	○	○				
	TNGA160412-3	9.525	4.76	3.81	1.2	2.0					○	○	○				

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

Type of cutting edge

	YCB011	YCB012	YCB121	YCB211	YZB121	YZB221	YZB231
Negative inserts	T01515	S01020	S02020	T01525	S01020	T02020	T02025
Positive inserts							

Applicable tool


DTGNR/L Kr:91°
Page A167

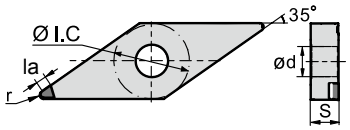

PTFNR/L Kr:91°
A179


PTTNR/L Kr:60°
A180


PTGNR/L Kr:90°
A181

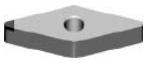
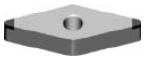

PTFNR/L Kr:90°
A218

VN□□ (Negative inserts)



Good working condition | Normal working condition | Bad working condition

Workpiece material											
H	Super hard material		😐	😊		😐					
K	Cast iron	😊			😊		😐	☹			
N	Non ferrous metal								😐	😊	😐	☹

Inserts shape	Type	Dimensions(mm)					Grade									
		ØI.C	S	ød	r	la	YCB011	YCB012	YCB121	YCB211	YZB121	YZB221	YZB231	YCD011	YCD412	YCD421	YCD511
	**VNGA160402**	9.525	4.76	3.81	0.2	3.3	○	○	○	○							
	VNGA160404	9.525	4.76	3.81	0.4	2.8	○	○	○	○							
	VNGA160408	9.525	4.76	3.81	0.8	2.5	○	○	○	○							
	VNGA160412	9.525	4.76	3.81	1.2	2.0	○	○	○	○							
	**VNGA160402-2**	9.525	4.76	3.81	0.2	3.3	○	○	○	○							
	VNGA160404-2	9.525	4.76	3.81	0.4	2.8	★	★	★	★							
	VNGA160408-2	9.525	4.76	3.81	0.8	2.5	★	★	★	★							
	VNGA160412-2	9.525	4.76	3.81	1.2	2.0	○	○	○	○							

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

Type of cutting edge

	YCB011	YCB012	YCB121	YCB211	YZB121	YZB221	YZB231
Negative inserts	T01515	S01020	S02020	T01525	S01020	T02020	T02025
Positive inserts							

Applicable tool

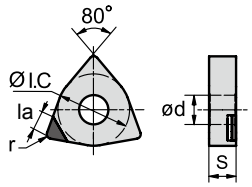
DVVNN
Kr:72°30'

Page A168

DVJNR/L
Kr:93°

A169

WN□□ (Negative inserts)



Good working condition Normal working condition Bad working condition

Workpiece material		
H	Super hard material	😐 😊 😐
K	Cast iron	😊 😊 😐 ☹
N	Non ferrous metal	😐 😊 😐 ☹

Inserts shape	Type	Dimensions(mm)					Grade										
		ØI.C	S	ød	r	la	YCB011	YCB012	YCB121	YCB211	YZB121	YZB221	YZB231	YCD011	YCD412	YCD421	YCD511
	WNGA080404	12.7	4.76	5.16	0.4	3.3	○	○	○	○							
	WNGA080408	12.7	4.76	5.16	0.8	2.8	○	○	○	○							
	WNGA080412	12.7	4.76	5.16	1.2	2.8	○	○	○	○							
	WNGA080404-3	12.7	4.76	5.16	0.4	3.3	★	★	★	★							
	WNGA080408-3	12.7	4.76	5.16	0.8	2.8	★	★	★	★							
	WNGA080412-3	12.7	4.76	5.16	1.2	2.8	○	○	○	○							
	WNGA080404-3	12.7	4.76	5.16	0.4	3.3					○	○	○				
	WNGA080408-3	12.7	4.76	5.16	0.8	2.8					○	○	○				
	WNGA080412-3	12.7	4.76	5.16	1.2	2.8					○	○	○				

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

Type of cutting edge

	YCB011	YCB012	YCB121	YCB211	YZB121	YZB221	YZB231
Negative inserts	T01515	S01020	S02020	T01525	S01020	T02020	T02025
Positive inserts							

Applicable tool

DWLNR/L Kr:95°

Page A170

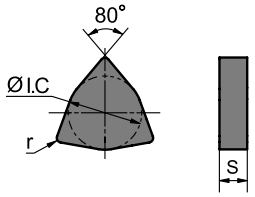
PWLNR/L Kr:95°

A182

PWLNR/L Kr:95°

A219

WN□□ (Negative inserts)



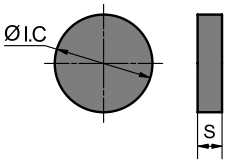
Good working condition Normal working condition Bad working condition

Workpiece material		YCB011	YCB012	YCB121	YCB211	YZB121	YZB221	YZB231	YCD011	YCD412	YCD421	YCD511
H	Super hard material		😐	😊		😐						
K	Cast iron	😊			😊		😐	☹				
N	Non ferrous metal								😐	😊	😐	☹

Inserts shape	Type	Dimensions(mm)			Grade										
		ØI.C	S	r	YCB011	YCB012	YCB121	YCB211	YZB121	YZB221	YZB231	YCD011	YCD412	YCD421	YCD511
	**WNGN060304**	9.525	3.18	0.4					○	★	○				
	WNGN080408	12.7	4.76	0.8					○	★	○				
	WNGN080412	12.7	4.76	1.2					○	★	○				

★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		YCB011	YCB012	YCB121	YCB211	YZB121	YZB221	YZB231	YCD011	YCD412	YCD421	YCD511
H	Super hard material		😐	😊		😐						
K	Cast iron	😊			😊		😐	☹				
N	Non ferrous metal								😐	😊	😐	☹

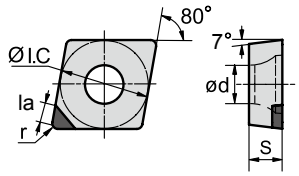
Inserts shape	Type	Dimensions(mm)		Grade										
		ØI.C	S	YCB011	YCB012	YCB121	YCB211	YZB121	YZB221	YZB231	YCD011	YCD412	YCD421	YCD511
	**RNGN090300**	9.525	3.18					○	★	○				
	RNGN120400	12.7	4.76					○	★	○				
	RNGN120700	12.7	7.94					○	★	○				
	RNGN150700	15.875	7.94					○	★	○				

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

Type of cutting edge

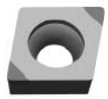
	YCB011	YCB012	YCB121	YCB211	YZB121	YZB221	YZB231
Negative inserts	T01515	S01020	S02020	T01525	S01020	T02020	T02025
Positive inserts							

CC□□ (Positive inserts)



Good working condition | Normal working condition | Bad working condition

Workpiece material	
H	Super hard material
K	Cast iron
N	Non ferrous metal

Inserts shape	Type	Dimensions(mm)					Grade									
		ØI.C	S	ød	r	la	YCB011	YCB012	YCB121	YCB211	YZB121	YZB221	YZB231	YCD011	YCD412	YCD421	YCD511
	CCGW060204	6.35	2.38	2.8	0.4	2.5	○	○	○	○				★	○	★	○
	CCGW060208	6.35	2.38	2.8	0.8	2.4	○	○	○	○				★	○	★	○
	CCGW09T304	9.525	3.97	4.4	0.4	2.5	○	○	○	○				★	○	★	○
	CCGW09T308	9.525	3.97	4.4	0.8	2.4	○	○	○	○				★	○	★	○
	CCGW120404	12.7	4.76	5.5	0.4	2.5	○	○	○	○							
	CCGW120408	12.7	4.76	5.5	0.8	2.4	○	○	○	○				★	○	★	○
	CCGW120412	12.7	4.76	5.5	1.2	2.3	○	○	○	○							
	CCGW060204-2	6.35	2.38	2.8	0.4	2.5	○	○	○	○							
	CCGW060208-2	6.35	2.38	2.8	0.8	2.4	○	○	○	○							
	CCGW09T304-2	9.525	3.97	4.4	0.4	2.5	★	★	★	★							
	CCGW09T308-2	9.525	3.97	4.4	0.8	2.4	★	★	★	★							
	CCGW120404-2	12.7	4.76	5.5	0.4	2.5	★	★	★	★							
	CCGW120408-2	12.7	4.76	5.5	0.8	2.4	★	★	★	★							
	CCGW120412-2	12.7	4.76	5.5	1.2	2.3	○	○	○	○							
	CCGW09T304-2	9.525	3.97	4.4	0.4	2.5					○	○	○				
	CCGW09T308-2	9.525	3.97	4.4	0.8	2.4					○	○	○				
	CCGW09T312-2	9.525	3.97	4.4	1.2	2.3					○	○	○				
	CCGW120404-2	12.7	4.76	5.5	0.4	2.5					○	○	○				
	CCGW120408-2	12.7	4.76	5.5	0.8	2.4					○	○	○				
	CCGW120412-2	12.7	4.76	5.5	1.2	2.3					○	○	○				

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

Type of cutting edge

	YCB011	YCB012	YCB121	YCB211	YZB121	YZB221	YZB231
Negative inserts	T01515	S01020	S02020	T01525	S01020	T02020	T02025
Positive inserts							

Applicable tool


SCACR/L Kr:90°
Page A183

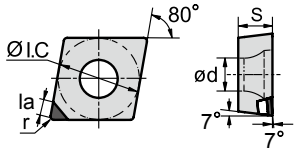

SCLCR/L Kr:95°
A184


SCLCR/L Kr:95°
A220


SCFCR Kr:90°
A234

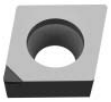

SCLCR Kr:95°
A235

CC□□ (Positive inserts)



Good working condition Normal working condition Bad working condition

Workpiece material		YCB011	YCB012	YCB121	YCB211	YZB121	YZB221	YZB231	YCD011	YCD412	YCD421	YCD511
H	Super hard material	😐	😊		😐							
K	Cast iron	😊		😊		😐	☹					
N	Non ferrous metal								😐	😊	😐	☹

Inserts shape	Type	Dimensions(mm) ØI.C	S	ød	r	la	YCB011	YCB012	YCB121	YCB211	YZB121	YZB221	YZB231	YCD011	YCD412	YCD421	YCD511
	CCMX060202	6.35	2.38	2.8	0.2	2.5								★	○	★	○
	CCMX060204	6.35	2.38	2.8	0.4	2.5								★	○	★	○
	CCMX060208	6.35	2.38	2.8	0.8	2.4								★	○	★	○
	CCMX09T304	9.525	3.97	4.4	0.4	2.5								★	○	★	○
	CCMX09T308	9.525	3.97	4.4	0.8	2.4								★	○	★	○
	CCMX120408	12.7	4.76	5.5	0.8	2.4								★	○	★	○

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

Applicable tool


SCACR/L Kr:90°
Page A183

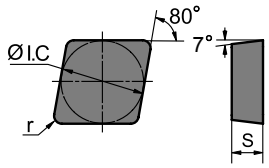

SCLCR/L Kr:95°
A184


SCLCR/L Kr:95°
A220


SCFCR Kr:90°
A234


SCLCR Kr:95°
A235

CC□□ (Positive inserts)



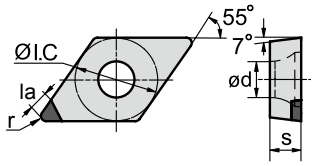
Good working condition Normal working condition Bad working condition

Workpiece material		YCB011	YCB012	YCB121	YCB211	YZB121	YZB221	YZB231	YCD011	YCD412	YCD421	YCD511
H	Super hard material	😐	😊		😐							
K	Cast iron	😊		😊		😐	☹					
N	Non ferrous metal								😐	😊	😐	☹

Inserts shape	Type	Dimensions(mm) ØI.C	S	r	YCB011	YCB012	YCB121	YCB211	YZB121	YZB221	YZB231	YCD011	YCD412	YCD421	YCD511
	CCGN120404	12.7	4.76	0.4					★	★	★				
	CCGN12T608	12.7	6.75	0.8					★	★	★				
	CCGN120712	12.7	7.94	1.2					★	★	★				

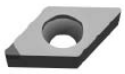
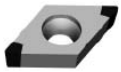
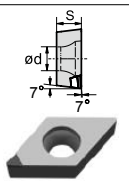
★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

DC□□ (Positive inserts)



Good working condition　Normal working condition　Bad working condition

Workpiece material											
H	Super hard material		😐	😊		😐					
K	Cast iron	😊			😊		😐	☹			
N	Non ferrous metal								😐	😊	😐	☹

Inserts shape	Type	Dimensions(mm)					Grade									
		ØI.C	S	ød	r	la	YCB011	YCB012	YCB121	YCB211	YZB121	YZB221	YZB231	YCD011	YCD412	YCD421	YCD511
	DCGW070202	6.35	2.38	2.8	0.2	2.7	○	○	○	○				★	○	★	○
	DCGW070204	6.35	2.38	2.8	0.4	2.5	○	○	○	○				★	○	★	○
	DCGW070208	6.35	2.38	2.8	0.8	2.1	○	○	○	○							
	DCGW11T304	9.525	3.97	4.4	0.4	2.5	○	○	○	○				★	○	★	○
	DCGW11T308	9.525	3.97	4.4	0.8	2.1	○	○	○	○				★	○	★	○
	DCGW070202-2	6.35	2.38	2.8	0.2	2.7	○	○	○	○							
	DCGW070204-2	6.35	2.38	2.8	0.4	2.5	○	○	○	○							
	DCGW070208-2	6.35	2.38	2.8	0.8	2.1	○	○	○	○							
	DCGW11T304-2	9.525	3.97	4.4	0.4	2.5	★	★	★	★							
	DCGW11T308-2	9.525	3.97	4.4	0.8	2.1	★	★	★	★							
	DCGW11T304-2	9.525	3.97	4.4	0.4	2.5					○	○	○				
	DCGW11T308-2	9.525	3.97	4.4	0.8	2.1					○	○	○				
	DCGW11T312-2	9.525	3.97	4.4	0.8	2					○	○	○				
	DCGW11T304-2	9.525	3.97	4.4	0.4	2.5					○	○	○				
	DCGW11T308-2	9.525	3.97	4.4	0.8	2.1					○	○	○				
	DCMX070202	6.35	2.38	2.8	0.2	2.7								★	○	★	○
	DCMX070204	6.35	2.38	2.8	0.4	2.5								★	○	★	○
	DCMX11T304	9.525	3.97	4.4	0.4	2.5								★	○	★	○
	DCMX11T308	9.525	3.97	4.4	0.8	2.1								★	○	★	○

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

Type of cutting edge

	YCB011	YCB012	YCB121	YCB211	YZB121	YZB221	YZB231
Negative inserts	T01515	S01020	S02020	T01525	S01020	T02020	T02025
Positive inserts							

Applicable tool


SDACR/L
Kr:90°
Page A185


SDJCR/L
Kr:93°
A186

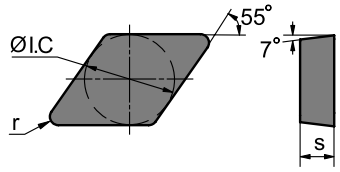

SDNCN
Kr:62°30'
A187


SDQCR/L
Kr:107°30'
A221


SDUCR/L
Kr:93°
A222


SDZCR/L
Kr:95°
A223

DC□□ (Positive inserts)



😊 Good working condition 😐 Normal working condition ☹ Bad working condition

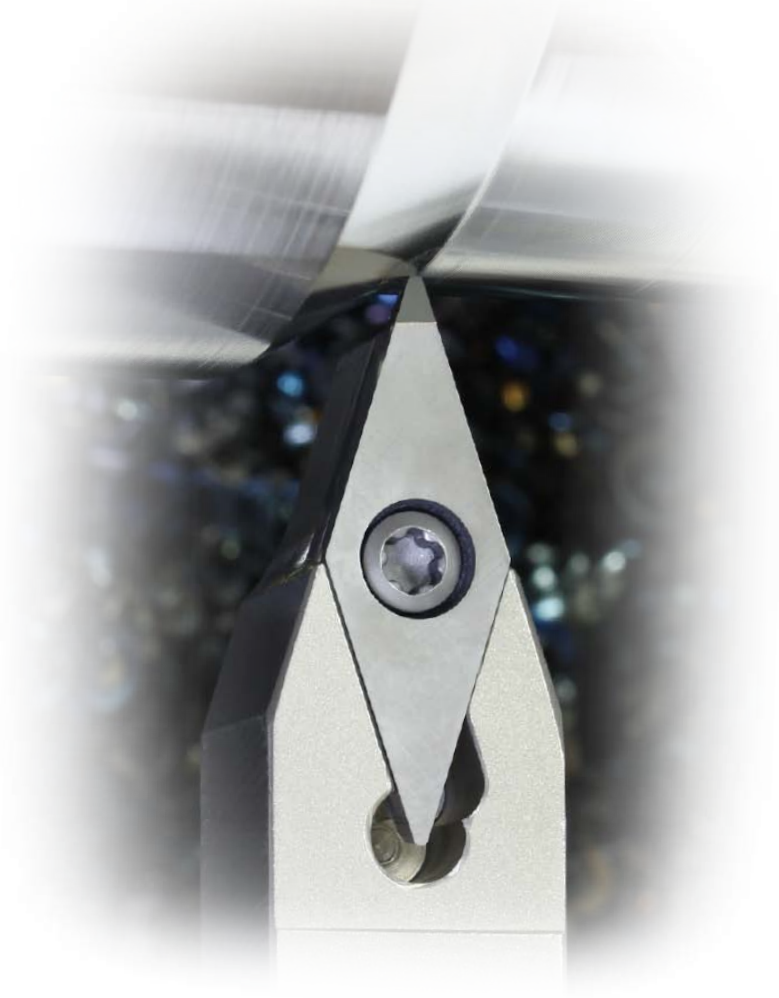
Workpiece material											
H Super hard material		😐	😊		😐						
K Cast iron	😊			😊		😐	☹				
N Non ferrous metal								😐	😊	😐	☹

Inserts shape	Type	Dimensions(mm)			Grade										
		ØI.C	S	r	YCB011	YCB012	YCB121	YCB211	YZB121	YZB221	YZB231	YCD011	YCD412	YCD421	YCD511
	**DCGN110404**	9.525	4.76	0.4					★	★	★				
	DCGN110408	9.525	4.76	0.8					★	★	★				

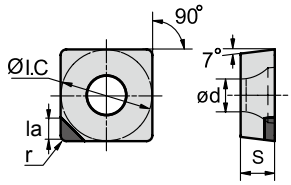
★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

Type of cutting edge

	YCB011	YCB012	YCB121	YCB211	YZB121	YZB221	YZB231
Negative inserts	T01515	S01020	S02020	T01525	S01020	T02020	T02025
Positive inserts							

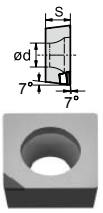


SC□□ (Positive inserts)



Good working condition Normal working condition Bad working condition

Workpiece material											
H	Super hard material		😐	😊		😐					
K	Cast iron	😊			😊		😐	☹			
N	Non ferrous metal								😐	😊	😐	☹

Inserts shape	Type	Dimensions(mm)					Grade									
		ØI.C	S	ød	r	la	YCB011	YCB012	YCB121	YCB211	YZB121	YZB221	YZB231	YCD011	YCD412	YCD421	YCD511
	SCGW120404	12.7	4.76	5.56	0.4	2.5	○	○	○	○				★	○	★	○
	SCGW120408	12.7	4.76	5.56	0.8	2.3	○	○	○	○				★	○	★	○
	SCGW120412	12.7	4.76	5.56	1.2	2.1	○	○	○	○				★	○	★	○
	SCGW120404-2	12.7	4.76	5.56	0.4	2.5	★	★	★	★							
	SCGW120408-2	12.7	4.76	5.56	0.8	2.3	★	★	★	★							
	SCGW120412-2	12.7	4.76	5.56	1.2	2.1	○	○	○	○							
	SCGW120404-4	12.7	4.76	5.56	0.4	2.5	○	○	○	○							
	SCGW120408-4	12.7	4.76	5.56	0.8	2.3	○	○	○	○							
	SCGW120412-4	12.7	4.76	5.56	1.2	2.1	○	○	○	○							
	SCGW120404-4	12.7	4.76	5.56	0.4	2.5					○	○	○				
	SCGW120408-4	12.7	4.76	5.56	0.8	2.3					○	○	○				
	SCGW120412-4	12.7	4.76	5.56	1.2	2.1					○	○	○				
	SCMX120404	12.7	4.76	4.4	0.4	2.5								★	○	★	○
	SCMX120408	12.7	4.76	4.4	0.8	2.3								★	○	★	○
	SCMX120412	12.7	4.76	4.4	1.2	2.1								★	○	★	○

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

Type of cutting edge

	YCB011	YCB012	YCB121	YCB211	YZB121	YZB221	YZB231
Negative inserts	T01515	S01020	S02020	T01525	S01020	T02020	T02025
Positive inserts							

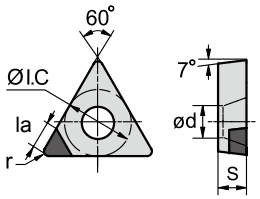
Applicable tool


SSBCR/L
Kr:75°
Page A193


SSSCR/L
Kr:45°
A193


SSKCR/L
Kr:75°
A194

TC□□ (Positive inserts)



Good working condition Normal working condition Bad working condition

Workpiece material

H	Super hard material		😐	😊		😐					
K	Cast iron	😊			😊		😐	☹			
N	Non ferrous metal								😐	😊	😐	☹

Inserts shape	Type	Dimensions(mm)					Grade									
		ØI.C	S	ød	r	la	YCB011	YCB012	YCB121	YCB211	YZB121	YZB221	YZB231	YCD011	YCD412	YCD421	YCD511
	TCGW090204	5.56	2.38	2.5	0.4	2.5	○	○	○	○				★	○	★	○
	TCGW090208	5.56	2.38	2.5	0.8	2.2	○	○	○	○				★	○	★	○
	TCGW110202	6.35	2.38	2.8	0.2	2.5	○	○	○	○				★	○	★	○
	TCGW110204	6.35	2.38	2.8	0.4	2.5	○	○	○	○				★	○	★	○
	TCGW110208	6.35	2.38	2.8	0.8	2.2	○	○	○	○				★	○	★	○
	TCGW110304	6.35	3.18	2.8	0.4	2.5	○	○	○	○				★	○	★	○
	TCGW16T304	9.525	3.97	4.4	0.4	2.5	○	○	○	○				★	○	★	○
	TCGW16T308	9.525	3.97	4.4	0.8	2.2	○	○	○	○				★	○	★	○
	TCGW16T312	9.525	3.97	4.4	1.2	2.0	○	○	○	○				★	○	★	○
	TCGW090204-3	5.56	2.38	2.5	0.4	2.5	○	○	○	○							
	TCGW090208-3	5.56	2.38	2.5	0.8	2.2	○	○	○	○							
	TCGW110202-3	6.35	2.38	2.8	0.2	2.5	○	○	○	○							
	TCGW110204-3	6.35	2.38	2.8	0.4	2.5	★	★	★	★							
	TCGW110208-3	6.35	2.38	2.8	0.8	2.2	★	★	★	★							
	TCGW110304-3	6.35	3.18	2.8	0.4	2.5	★	★	★	★							
	TCGW16T304-3	9.525	3.97	4.4	0.4	2.5	★	★	★	★							
	TCGW16T308-3	9.525	3.97	4.4	0.8	2.2	★	★	★	★							
	TCGW16T312-3	9.525	3.97	4.4	1.2	2.0	○	○	○	○							
	TCGW090204-3	5.56	2.38	2.5	0.4	2.5					○	○	○				
	TCGW090208-3	5.56	2.38	2.5	0.8	2.2					○	○	○				
	TCGW090212-3	5.56	2.38	2.5	1.2	2.2					○	○	○				
	TCGW110304-3	6.35	2.38	2.8	0.4	2.5					○	○	○				
	TCGW110308-3	6.35	2.38	2.8	0.8	2.2					○	○	○				
	TCGW110312-3	6.35	3.18	2.8	1.2	2.2					○	○	○				
	TCGW16T304-3	9.525	3.97	4.4	0.4	2.5					○	○	○				
	TCGW16T308-3	9.525	3.97	4.4	0.8	2.2					○	○	○				
	TCGW16T312-3	9.525	3.97	4.4	1.2	2.2					○	○	○				

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

Applicable tool


STACR/L
Kr:90°
Page A195

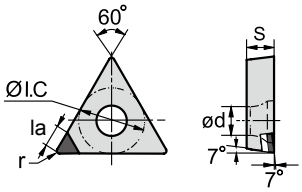

STFCR/L
Kr:91°
A195


STGCR/L
Kr:91°
A196


STTCR/L
Kr:60°
A197


STFCR/L
Kr:91°
A225

TC□□ (Positive inserts)



Good working condition Normal working condition Bad working condition

Workpiece material		
H	Super hard material	😐 😊 😐
K	Cast iron	😊 😊 😐 ☹
N	Non ferrous metal	😐 😊 😐 ☹

Inserts shape	Type	Dimensions(mm)					Grade									
		ØI.C	S	ød	r	la	YCB011	YCB012	YCB121	YCB211	YZB121	YZB221	YZB231	YCD011	YCD412	YCD421	YCD511
	TCMX090204	5.56	2.38	2.5	0.4	2.5								★	○	★	○
	TCMX090208	5.56	2.38	2.5	0.8	2.0								★	○	★	○
	TCMX110202	6.35	2.38	2.8	0.2	2.5								★	○	★	○
	TCMX110204	6.35	2.38	2.8	0.4	2.5								★	○	★	○
	TCMX110208	6.35	2.38	2.8	0.8	2.0								★	○	★	○
	TCMX110304	6.35	3.18	2.8	0.4	2.5								★	○	★	○
	TCMX16T304	9.525	3.97	4.4	0.4	2.5								★	○	★	○
	TCMX16T308	9.525	3.97	4.4	0.8	2.0								★	○	★	○
	TCMX16T312	9.525	3.97	4.4	1.2	2.0								★	○	★	○

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

Type of cutting edge

	YCB011	YCB012	YCB121	YCB211	YZB121	YZB221	YZB231
Negative inserts	T01515	S01020	S02020	T01525	S01020	T02020	T02025
Positive inserts							

Applicable tool


STACR/L
Kr:90°
Page A195

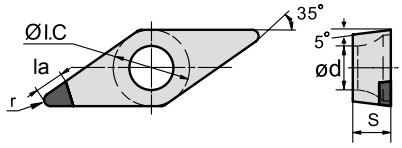

STFCR/L
Kr:91°
A195


STGCR/L
Kr:91°
A196


STTCR/L
Kr:60°
A197

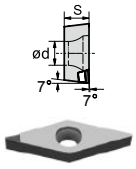

STFCR/L
Kr:91°
A225

VB□□ (Positive inserts)



Good working condition Normal working condition Bad working condition

Workpiece material											
H	Super hard material		😐	😊		😐					
K	Cast iron	😊			😊		😐	☹			
N	Non ferrous metal								😐	😊	😐	☹

Inserts shape	Type	Dimensions(mm)					Grade									
		ØI.C	S	ød	r	la	YCB011	YCB012	YCB121	YCB211	YZB121	YZB221	YZB231	YCD011	YCD412	YCD421	YCD511
	VBGW160404	9.525	4.76	4.4	0.4	2.8	○	○	○	○				★	○	★	○
	VBGW160408	9.525	4.76	4.4	0.8	2.5	○	○	○	○				★	○	★	○
	VBGW160412	9.525	4.76	4.4	1.2	2.0	○	○	○	○				★	○	★	○
	VBGW160404-2	9.525	4.76	4.4	0.4	2.8	★	★	★	★							
	VBGW160408-2	9.525	4.76	4.4	0.8	2.5	★	★	★	★							
	VBGW160412-2	9.525	4.76	4.4	1.2	2.0	○	○	○	○							
	VBMX160404	9.525	4.76	4.4	0.4	2.8								★	○	★	○
	VBMX160408	9.525	4.76	4.4	0.8	2.5								★	○	★	○
	VBMX160412	9.525	4.76	4.4	1.2	2.0								★	○	★	○

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

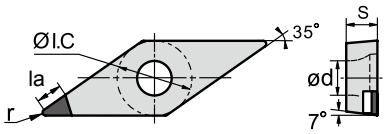
Type of cutting edge

	YCB011	YCB012	YCB121	YCB211	YZB121	YZB221	YZB231
Negative inserts	T01515	S01020	S02020	T01525	S01020	T02020	T02025
Positive inserts							

Applicable tool

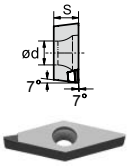
SVJBR/L Kr:93°	SVABR/L Kr:90°	SVVBN Kr:72°30'	SVQBR/L Kr:107°30'	SVUBR/L Kr:93°
				
Page A188	A189	A190	A228	A229

VC□□ (Positive inserts)



Good working condition | Normal working condition | Bad working condition

Workpiece material	
H	Super hard material
K	Cast iron
N	Non ferrous metal

Inserts shape	Type	Dimensions(mm)					Grade									
		ØI.C	S	ød	r	la	YCB011	YCB012	YCB121	YCB211	YZB121	YZB221	YZB231	YCD011	YCD412	YCD421	YCD511
	VCGW160404	9.525	4.76	4.4	0.4	2.8								★	○	★	○
	VCGW160408	9.525	4.76	4.4	0.8	2.5								★	○	★	○
	VCGW160412	9.525	4.76	4.4	1.2	2.0								★	○	★	○
	VCMX160404	9.525	4.76	4.4	0.4	2.8								★	○	★	○
	VCMX160408	9.525	4.76	4.4	0.8	2.5								★	○	★	○
	VCMX160412	9.525	4.76	4.4	1.2	2.0								★	○	★	○

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

Applicable tool

SVVCN
Kr:72°30'



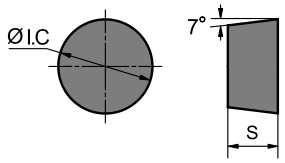
Page A191

SVJCR/L
Kr:93°



A192

RC□□ (Positive inserts)



Good working condition | Normal working condition | Bad working condition

Workpiece material	
H	Super hard material
K	Cast iron
N	Non ferrous metal

Inserts shape	Type	Dimensions(mm)			Grade										
		ØI.C	S	r	YCB011	YCB012	YCB121	YCB211	YZB121	YZB221	YZB231	YCD011	YCD412	YCD421	YCD511
	RCGN090300	9.525	3.18						★	★	★				
	RCGN120400	12.7	4.76						★	★	★				
	RCGN120700	12.7	7.94						★	★	★				
	RCGN150700	15.875	7.94						★	★	★				

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

Abnormal failure and solutions for cast iron machining

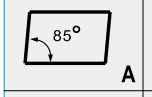
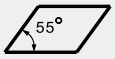
Abnormal failure		Solution
Breakage	Breakage occurring on chamfer of rake face	Enlarge chamfered negative rake angle
	Edge crashing when finishing grey cast iron	
Abrasion	Abrasion occurring when machining nodular cast iron	Change to dry cutting
	Abrasion under dry cutting conditions	Reduce cutting speed
	Abrasion occurring when machining grey cast iron	Change to dry cutting; increase cutting speed
Surface quality	Poor surface finish	Increase cutting speed; increase nose radius; reduce feed rate
	Bad cylindricity and coaxiality	Reduce nose radius; improve stability; change to positive insert
	Burrs	Change to positive insert; reduce chamfer width

Abnormal failure and solutions for hardened steel

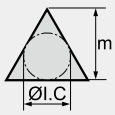
Abnormal failure			Solution
Breakage	Cutting edge breakage		Enlarge chamfered negative rake angle; raise cutting speed and reduce feed
	Flaking and crater wear on rake face		Reduce cutting speed
	Thermal cracks		Change to dry cutting; reduce cutting speed
Abrasion	Wear occurring on chamfer of rake face		Reduce cutting speed
	Rapid wear when finishing grey cast iron		
Surface quality	Poor surface finish	Vibration	Reduce chamfered negative rake angle; reduce nose radius; reduce feed rate; improve stability
		Tool mark	Increase nose radius; reduce feed rate; change to dry cutting; increase cutting speed
	Bad cylindricity and coaxiality		Reduce nose radius; improve stability; change to positive insert

Ceramic inserts code key

Insert shape

 A	 B	 C
 D	 E	 H
 K	 L	 M
 P	 S	 T
 V	 W	Others Z

Tolerance class

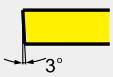
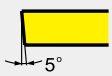
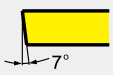
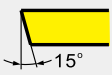
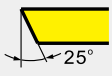
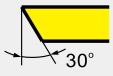




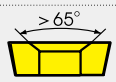
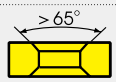
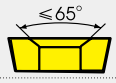
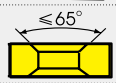
Code	Nose height M Tolerance(mm)	Inscribed circle Tolerance(mm)	Thickness S Tolerance(mm)	Code	Nose height M Tolerance(mm)	Inscribed circle Tolerance(mm)	Thickness S Tolerance(mm)
A	±0.005	±0.025	±0.025	J	±0.005	±0.05-±0.13	±0.025
F	±0.005	±0.013	±0.025	K	±0.013	±0.05-±0.13	±0.025
C	±0.013	±0.025	±0.025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

C N G A

Clearance angle of main cutting edge

Code	Clearance angle	Code	Clearance angle
A	 3°	B	 5°
C	 7°	D	 15°
E	 20°	F	 25°
G	 30°	N	 0°
P	 11°	O	Other clearance angle

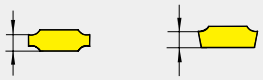
Chipbreaker and clamping system

Code	With/Without hole	Section plane of insert
N	Without	
B	With	
C	With	
A	With	
W	With	
Q	With	
X	---	Special

Length of cutting edge

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

Insert thickness



Thickness is defined as height from bottom of insert to the highest part of cutting edge.

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

Nose radius code

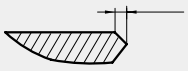
Code	Nose radius(mm)
00	No radius
02	0.2
04	0.4
08	0.8
12	1.2
16	1.6
20	2.0
24	2.4
32	3.2
X	Others
Diameter of insert (Metric)	Round insert

12 04 08 T 020 20

Type of cutting edge

Code	Type of cutting edge	Picture
E	Honing	
T	Chamfering	
S	Chamfering +honing	
F	Sharp edges	

Chamfer width (mm)



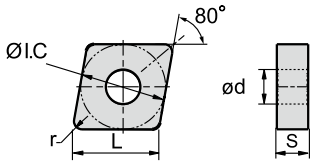
010	0.10	040	0.40
015	0.15	045	0.45
020	0.20	050	0.50
025	0.25	100	1.00
030	0.30	200	2.00
035	0.35		

Chamfer angle



05	5°
10	10°
15	15°
20	20°
25	25°
30	30°

Ceramic inserts



Good working condition
Normal working condition
Bad working condition

Workpiece material				
P	Steel	😊	☹	😊 ☹
K	Cast iron	😊	😊 😐 ☹	😊 ☹

Inserts shape	Type	Dimensions(mm)					Grade		
		L	ØI.C	S	ød	r	CA1000	CN1000	CN2000
	**CNGA120404T02020**	12.9	12.7	4.76	5.16	0.4		★	
	CNGA120408T02020	12.9	12.7	4.76	5.16	0.8		★	
	CNGA120412T02020	12.9	12.7	4.76	5.16	1.2		★	
	CNGA160608T02020	16.1	15.875	6.35	6.35	0.8		★	
	CNGA160612T02020	16.1	15.875	6.35	6.35	1.2		★	
	CNGA160616T02020	16.1	15.875	6.35	6.35	1.6		★	

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

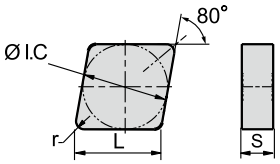
Applicable tool


DCLNR/L Kr:95°
Page A164


PCBNR/L Kr:75°
A171


PCLNR/L Kr:95°
A172


PCLNR/L Kr:95°
A214



Good working condition
Normal working condition
Bad working condition

Workpiece material				
P	Steel	😊	☹	😊 ☹
K	Cast iron	😊	😊 😐 ☹	😊 ☹

Inserts shape	Type	Dimensions(mm)					Grade		
		L	ØI.C	S	ød	r	CA1000	CN1000	CN2000
	**CNGN120404T02020**	12.9	12.7	4.76	-	0.4	★		
	CNGN120408T02020	12.9	12.7	4.76	-	0.8	★	○	★
	CNGN120412T02020	12.9	12.7	4.76	-	1.2	★	○	★
	CNGN120708T02020	12.9	12.7	7.94	-	0.8	★	○	★
	CNGN120712T02020	12.9	12.7	7.94	-	1.2	★	○	★
	CNGN120716T02020	12.9	12.7	7.94	-	1.6	★	○	★
	CNGN160408T02020	16.1	15.875	4.76	-	0.8	★		
	CNGN160412T02020	16.1	15.875	4.76	-	1.2	★	○	★
	CNGN160416T02020	16.1	15.875	4.76	-	1.6	★	○	★
	CNGN160612T02020	16.1	15.875	6.35	-	1.2	★		
	CNGN160616T02020	16.1	15.875	6.35	-	1.6	★	○	★

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

Applicable tool

CCLNR/L
Kr:95°



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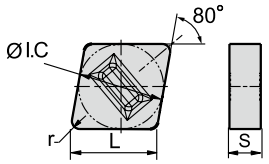
Ceramic inserts



Good working condition
Normal working condition
Bad working condition

Workpiece material				
P	Steel	😊	☹	😊 ☹
K	Cast iron	😊	😊 😐 ☹	😊 ☹

Inserts shape	Type	Dimensions(mm)					Grade		
		L	ØI.C	S	ød	r	CA1000	CN1000	CN2000
	**CNGX120712T02020**	12.9	12.7	7.94	-	1.2		★	
	CNGX120716T02020	12.9	12.7	7.94	-	1.6		★	

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

Applicable tool

JCLNR/L
Kr:95°



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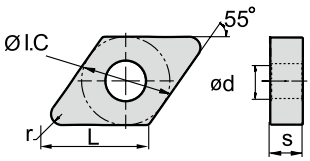
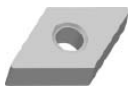


Good working condition
Normal working condition
Bad working condition

Workpiece material				
P	Steel	😊	☹	😊 ☹
K	Cast iron	😊	😊 😐 ☹	😊 ☹

Inserts shape	Type	Dimensions(mm)					Grade		
		L	ØI.C	S	ød	r	CA1000	CN1000	CN2000
	**DNGA150604T02020**	15.5	12.7	6.35	5.16	0.4		★	
	DNGA150608T02020	15.5	12.7	6.35	5.16	0.8		★	
	DNGA150612T02020	15.5	12.7	6.35	5.16	1.2		★	
	DNGA150616T02020	15.5	12.7	6.35	5.16	1.6		★	

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

Applicable tool

DDJNR/L
Kr:93°



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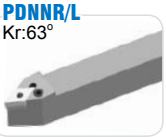
PDJNR/L
Kr:93°



A173

PDNNR/L
Kr:63°



A174

PDSNR/L
Kr:62°30'

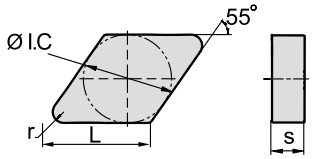


A215

PDUNR/L
Kr:93°



A216



Good working condition
Normal working condition
Bad working condition

Workpiece material				
P	Steel	😊	☹	😊 ☹
K	Cast iron	😊	😊 😐 ☹	😊 ☹

Inserts shape	Type	Dimensions(mm)					Grade		
		L	ØI.C	S	ød	r	CA1000	CN1000	CN2000
	**DNGN150408T02020**	15.5	12.7	4.76	-	0.8	★	★	★
	DNGN150412T02020	15.5	12.7	4.76	-	1.2	★	★	★
	DNGN150704T02020	15.5	12.7	7.94	-	0.4	★	★	★
	DNGN150708T02020	15.5	12.7	7.94	-	0.8	★	★	★
	DNGN150712T02020	15.5	12.7	7.94	-	1.2	★	★	★
	DNGN150716T02020	15.5	12.7	7.94	-	1.6	★	★	★

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

Applicable tool

CDJNR/L
Kr:93°



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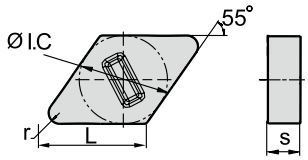

Good working condition
Normal working condition
Bad working condition

Workpiece material				
P	Steel	😊	☹	😊 ☹
K	Cast iron	😊	😊 😐 ☹	😊 ☹

Inserts shape	Type	Dimensions(mm)					Grade		
		L	ØI.C	S	ød	r	CA1000	CN1000	CN2000
	**DNGX150712T02020**	15.5	12.7	7.94	-	1.2		★	
	DNGX150716T02020	15.5	12.7	7.94	-	1.6		★	

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

Applicable tool

JDJNR/L
Kr:93°



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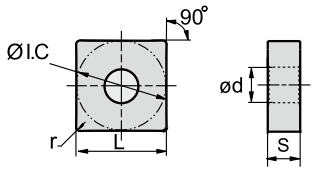


Good working condition
Normal working condition
Bad working condition

Workpiece material				
P	Steel	😊	☹	😊 ☹
K	Cast iron	😊	😊 😐 ☹	😊 ☹

Inserts shape	Type	Dimensions(mm)					Grade		
		L	ØI.C	S	ød	r	CA1000	CN1000	CN2000
	**SNGA120404T02020**	12.7	12.7	4.76	5.16	0.4		★	
	SNGA120408T02020	12.7	12.7	4.76	5.16	0.8		★	
	SNGA120412T02020	12.7	12.7	4.76	5.16	1.2		★	
	SNGA120416T02020	12.7	12.7	4.76	5.16	1.6		★	

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

Applicable tool


DSBNR/L Kr:75°
Page A166

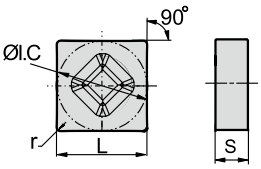

PSBNR/L Kr:75°
Page A175


PSDNN Kr:45°
Page A176


PSKNR/L Kr:75°
Page A177


PSSNR/L Kr:45°
Page A178


PSKNR/L Kr:75°
Page A217



Good working condition
Normal working condition
Bad working condition

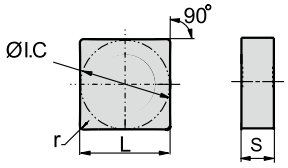
Workpiece material				
P	Steel	😊	☹	😊 ☹
K	Cast iron	😊	😊 😐 ☹	😊 ☹

Inserts shape	Type	Dimensions(mm)					Grade		
		L	ØI.C	S	ød	r	CA1000	CN1000	CN2000
	**SNGX120708T02020**	12.7	12.7	7.94	-	0.8		★	
	SNGX120712T02020	12.7	12.7	7.94	-	1.2		★	
	SNGX120716T02020	12.7	12.7	7.94	-	1.6		★	

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

Applicable tool


JSDNN Kr:45°
Page A207



Good working condition
Normal working condition
Bad working condition

Workpiece material				
P	Steel	😊	☹	😊 ☹
K	Cast iron	😊	😊 😐 ☹	😊 ☹

Inserts shape	Type	Dimensions(mm)					Grade		
		L	ØI.C	S	ød	r	CA1000	CN1000	CN2000
	SNGN090308T01020	9.525	9.525	3.18	-	0.8	★		
	SNGN090312T01020	9.525	9.525	3.18	-	1.2	★		
	SNGN120404T02020	12.7	12.7	4.76	-	0.4	★	○	★
	SNGN120408T02020	12.7	12.7	4.76	-	0.8	★	○	★
	SNGN120412T02020	12.7	12.7	4.76	-	1.2	★	○	★
	SNGN120416T02020	12.7	12.7	4.76	-	1.6	★		
	SNGN120704T02020	12.7	12.7	7.94	-	0.4	★		
	SNGN120708T02020	12.7	12.7	7.94	-	0.8	★	○	★
	SNGN120712T02020	12.7	12.7	7.94	-	1.2	★		
	SNGN120716T02020	12.7	12.7	7.94	-	1.6	★		
	SNGN150708T02020	15.875	15.875	7.94	-	0.8	★	○	★
	SNGN150712T02020	15.875	15.875	7.94	-	1.2	★	○	★
	SNGN150716T02020	15.875	15.875	7.94	-	1.6	★		
	SNGN190708T03020	19.05	19.05	7.94	-	0.8	★		
	SNGN190712T03020	19.05	19.05	7.94	-	1.2	★		
	SNGN190716T03020	19.05	19.05	7.94	-	1.6	★		
	SNGN190724T03020	19.05	19.05	7.94	-	2.4	★		
	SNGN191024T04020	19.05	19.05	10.05	-	2.4	★		
	SNGN251024T10015	25.4	25.4	10.05	-	2.4	★		

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

Applicable tool

CSRNR/L
Kr:75°



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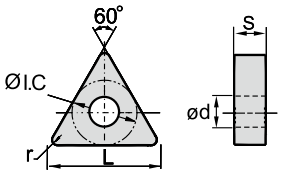
Ceramic inserts



Good working condition
Normal working condition
Bad working condition

Workpiece material				
P	Steel	😊	☹	😊 ☹
K	Cast iron	😊	😊 😐 ☹	😊 ☹

Inserts shape	Type	Dimensions(mm)					Grade		
		L	ØI.C	S	ød	r	CA1000	CN1000	CN2000
	**TNGA160404T01020**	16.50	9.525	4.76	3.86	0.4		★	
	TNGA160408T02020	16.50	9.525	4.76	3.86	0.8		★	
	TNGA160412T02020	16.50	9.525	4.76	3.86	1.2		★	
	TNGA220408T02020	22.00	12.7	4.76	5.16	0.8		★	
	TNGA220412T02020	22.00	12.7	4.76	5.16	1.2		★	
	TNGA220416T02020	22.00	12.7	4.76	5.16	1.6		★	

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

Applicable tool

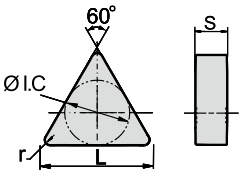

DTGNR/L Kr:91°
Page A167


PTFNR/L Kr:91°
A179


PTTNR/L Kr:60°
A180


PTGNR/L Kr:90°
A181


PTFNR/L Kr:90°
A218



Good working condition
Normal working condition
Bad working condition

Workpiece material				
P	Steel	😊	☹	😊 ☹
K	Cast iron	😊	😊 😐 ☹	😊 ☹

Inserts shape	Type	Dimensions(mm)					Grade		
		L	ØI.C	S	ød	r	CA1000	CN1000	CN2000
	**TNGN160404T02020**	16.50	9.525	4.76	-	0.4	★		
	TNGN160408T02020	16.50	9.525	4.76	-	0.8	★	○	★
	TNGN160412T02020	16.50	9.525	4.76	-	1.2	★	○	★
	TNGN160708T02020	16.50	9.525	7.94	-	0.8	★	○	★
	TNGN160712T02020	16.50	9.525	7.94	-	1.2	★		
	TNGN160716T02020	16.50	9.525	7.94	-	1.6	★		
	TNGN220408T02020	22.00	12.7	4.76	-	0.8	★	○	★
	TNGN220412T02020	22.00	12.7	4.76	-	1.2	★	○	★
	TNGN220416T02020	22.00	12.7	4.76	-	1.6	★	○	★
	TNGN220712T02020	22.00	12.7	7.94	-	1.2	★		
	TNGN220716T02020	22.00	12.7	7.94	-	1.6	★		

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

Applicable tool

CTJNR/L
Kr:93°



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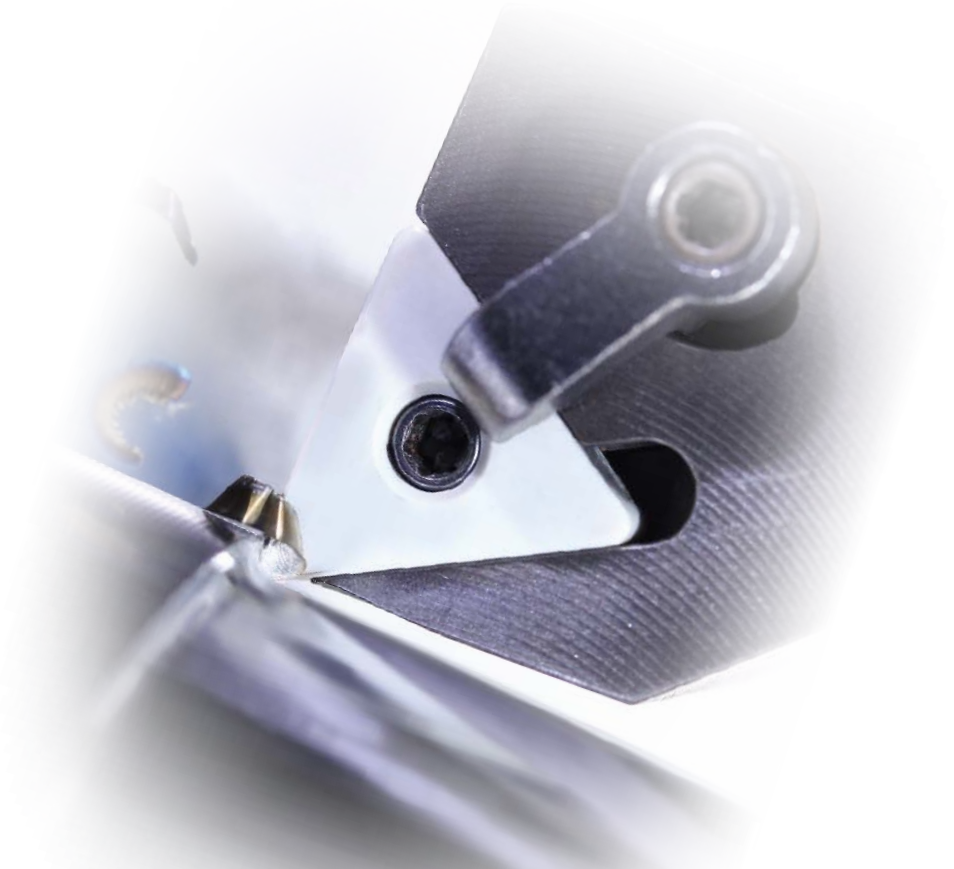

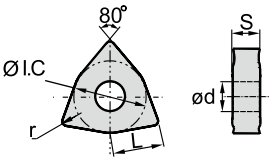

Good working condition
Normal working condition
Bad working condition

Workpiece material

P Steel	😊	☹	😊 ☹
K Cast iron	😊	😊 😐 ☹	😊 ☹

Inserts shape	Type	Dimensions(mm)					Grade		
		L	ØI.C	S	ød	r	CA1000	CN1000	CN2000
	**WNGA080408T02020**	8.69	12.7	4.76	5.16	0.8		★	
	WNGA080412T02020	8.69	12.7	4.76	5.16	1.2		★	
	WNGA080416T02020	8.69	12.7	4.76	5.16	1.6		★	

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

Applicable tool

DWLNR/L Kr:95°

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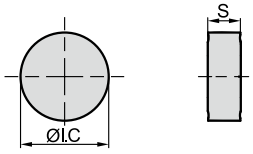
PWLNR/L Kr:95°

A182

PWLNR/L Kr:95°

A219



Good working condition
Normal working condition
Bad working condition

Workpiece material

P Steel	😊	☹	😊 ☹
K Cast iron	😊	😊 😐 ☹	😊 ☹

Inserts shape	Type	Dimensions(mm)					Grade		
		L	ØI.C	S	ød	r	CA1000	CN1000	CN2000
	**RNGN090400T02020**	---	9.53	4.76	---	---	★		
	RNGN120400T02020	---	12.7	4.76	---	---	★	○	★
	RNGN120700T02020	---	12.7	7.94	---	---	★	○	★
	RNGN150700T02020	---	15.875	7.94	---	---	★	○	★
	RNGN190700T03020	---	19.05	7.94	---	---	★	○	★
	RNGN251000T05020	---	25.40	10.05	---	---	★		

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

Applicable tool

CRDNN

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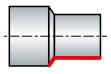
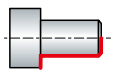
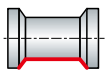
D-type
double-clamping tool holder

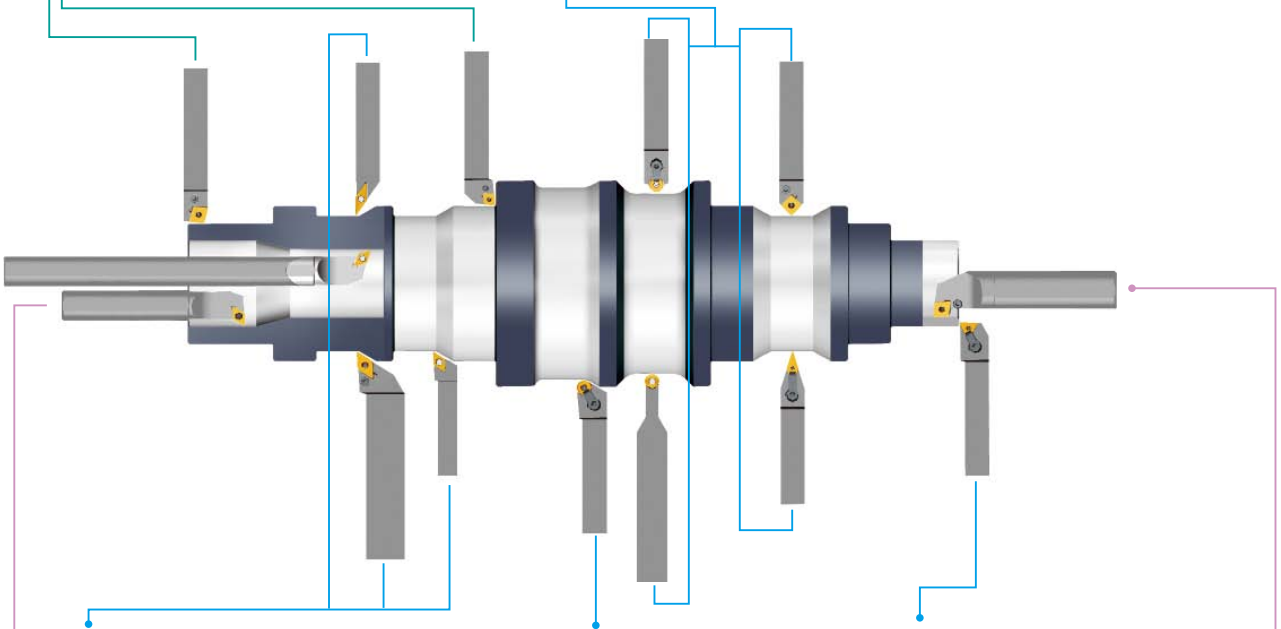
Applications sketch map of turning tools

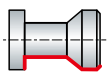
External and internal turning

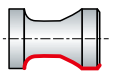
External turning	Tool holder type						
	DTJNR/L□□	DSBNR/L□□	PCBNR/L□□	PSBNR/L□□	PSSNR/L□□	PTGNR/L□□	PTTNR/L□□
	SCACR/L□□	SSBCR/L□□	SSSCR/L□□	STACR/L□□	STGCR/L□□	STTCR/L□□	SWACR/L□□

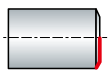
External and end surface turning	Tool holder type	
	DCLCR/L□□	DWLNR/L□□
	PCLNR/L□□	PWLNR/L□□
	SCLCR/L□□	

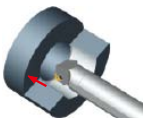
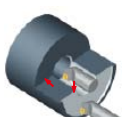
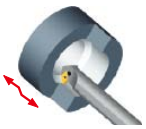
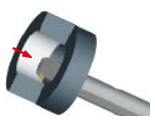
Profile turning	Tool holder type			
	DVVNN□□	PDNNR/L□□	PSDNN□□	SDNCN□□
	SVVBN□□	SVVCN□□	SSDCN□□	SRDCN□□
	CKNNR/L□□			

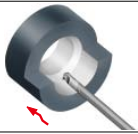


Profile turning	Tool holder type		
	DDJNR/L□□	DVJNR/L□□	PDJNR/L□□
	SDACR/L□□	SDJCR/L□□	SVABR/L□□
	SVJBR/L□□	SVJCR/L□□	CKJNR/L□□

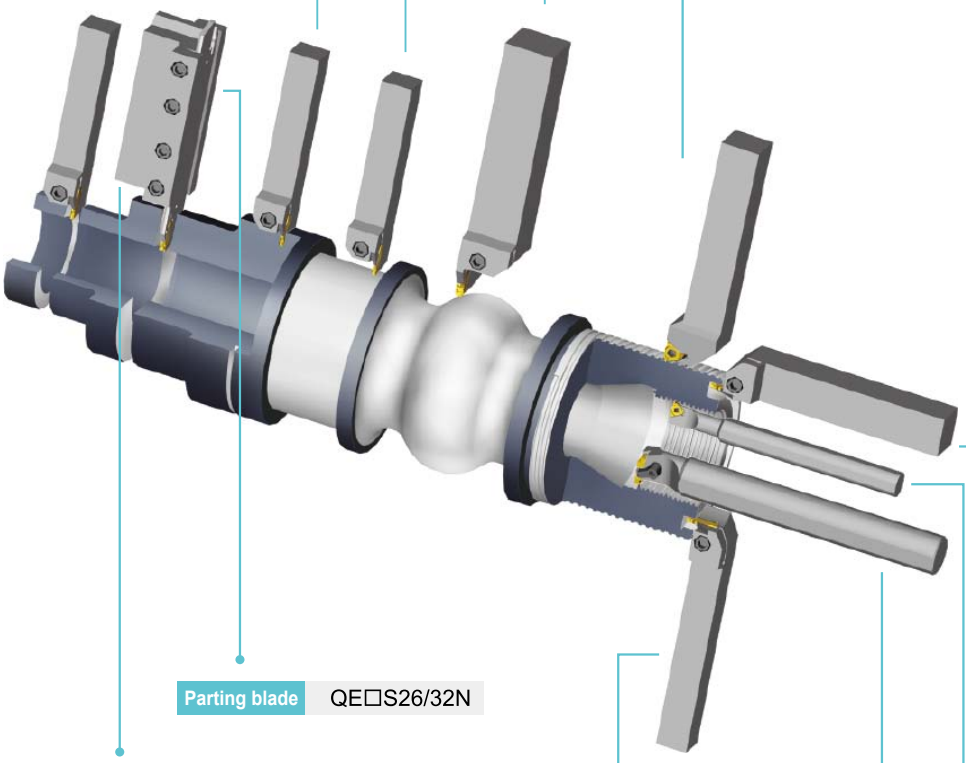
Profile turning	Tool holder type
	SRGCR/L□□

End surface turning	Tool holder type	
	PSKNR/L□□	PTFNR/L□□
	SSKCR/L□□	STFCR/L□□

Tool holders for internal turning (Steel tool shank)						
						
	S□-PSKNR/L□	S□-PCLNR/L□	S□-PDSNR/L□	S□-PDUNR/L□	S□-SDQCR/L□	S□-SDZCR/L□
	S□-PTFNR/L□	S□-PWLNR/L□		S□-SDUCR/L□	S□-SDQPR/L□	
	S□-SCFCR□	S□-SCLCR/L□		S□-SDUNR/L□	S□-SVQBR/L□	
	S□-SSKCR/L□	S□-SCLPR/L□		S□-SDUPR/L□	S□-SVQCR/L□	
	S□-STFCR/L□			S□-SVUBR/L□		
	S□-STUPR/L□			S□-SVUCR/L□		

Tool holders for internal turning (Cemented carbide tool shank)				
			
C□-STUPR/L□	C□-SCLPR/L□	C□-SDUPR/L□	C□-SDQPR/L□
		C□-SVUCR/L□	C□-SVQCR/L□

Parting, grooving and threading tools



External threading tools ZSER/L□

End surface grooving, turning QF□D□□R/L□-□H

Parting blade QE□S26/32N

Parting blade holder QZS□26/32

Internal threading tools ZSIR/L□

External parting, grooving, turning and profilin	QE□D□R/L□	the Little Squirrel series
	QZQ□R/L□	
	ZQS□R/L□	
	QT□R□	
Precise grooving and turning	QECD□R/L025	the Little Squirrel series
External recess and profiling	QX□D□R/L□-45	the Little Squirrel series
External grooving for hard-to-machine materials	QE□S□R/L□-□N	the Little Squirrel series

Internal grooving, turning C□-Q□DR/L□ the Little Squirrel series

End surface grooving, turning QF□D□R/L□-□L

How to select external turning tools

Explanation of external turning tools detailed table

- Listed according to clamping types.

Approach angle of tools

Tools type
The first 4 letters in the type description stands for tool shape and application

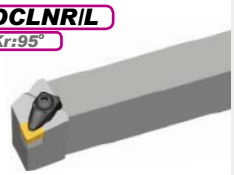
Inserts type

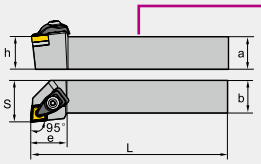
Specification chart

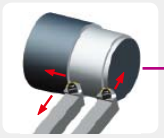
Application chart
The arrow shows suitable applications such as external turning, profiling and end turning, etc.

Corresponding tool holders of insert CN□□ D-type clamping

DCLNR/L
Kr:95°







Type		Stock		Basic dimensions(mm)						Screw	Shim	Wrench	Clamp	Shim screw	Spring
		R	L	a	b	L	h	s	e						
DCLNR/L	1616H09	▲	△	16	16	100	16	20	24						
	2020K09	▲	△	20	20	125	20	25	24	CM5×22C	C09BM	WH30L	C1RA	SM5×8.65XA1	SPR6
	2525M09	▲	△	25	25	150	25	32	24						
	2020K12	▲	▲	20	20	125	20	25	28						
	2525M12	▲	▲	25	25	150	25	32	28	CM6×25C	C12BM	WH40L	C2RA	SM6×10XA1	SPR4
	3225P12	▲	▲	32	25	170	32	32	28						

▲Stock available △Make-to-order

Applicable inserts

Application	For finishing	For semi-finishing	For roughing	For heavy machining	For cast iron machining	PCBN&PCD inserts
Inserts shape	DF A52	WGM Wiper A53	DR Double-side A56	HPR A57	Without chipbreaker A57	Without chipbreaker A120
	WGF Wiper A52	PM A53	DR Single-side A56			Without chipbreaker A120
	SF A52	DM A54	ER Double-side A56			Without chipbreaker A120
	EF A52	EM A54	ER Single-side A56			
	NF A53	NM A55	LR Single-side A55			
Tool holder type DCLNR/L□□H/K/M09	CN□□0903□□	CN□□0903□□				
DCLNR/L□□K/M/P12	CN□□1204□□	CN□□1204□□	CN□□1204□□	CN□□1204□□	CN□□1204□□	CN□□1204□□

Products specification
Including product description, stock (left and right hand), basic dimensions and applicable spare parts.

Applicable inserts
Including applications of inserts, reference page, insert shape and corresponding tool holders.

TURNING

External Turning Tools

A156-A159 **External turning tools overview**

A160-A161 **External turning tools code key**

A162-A201 **Detailed table of external turning tools**

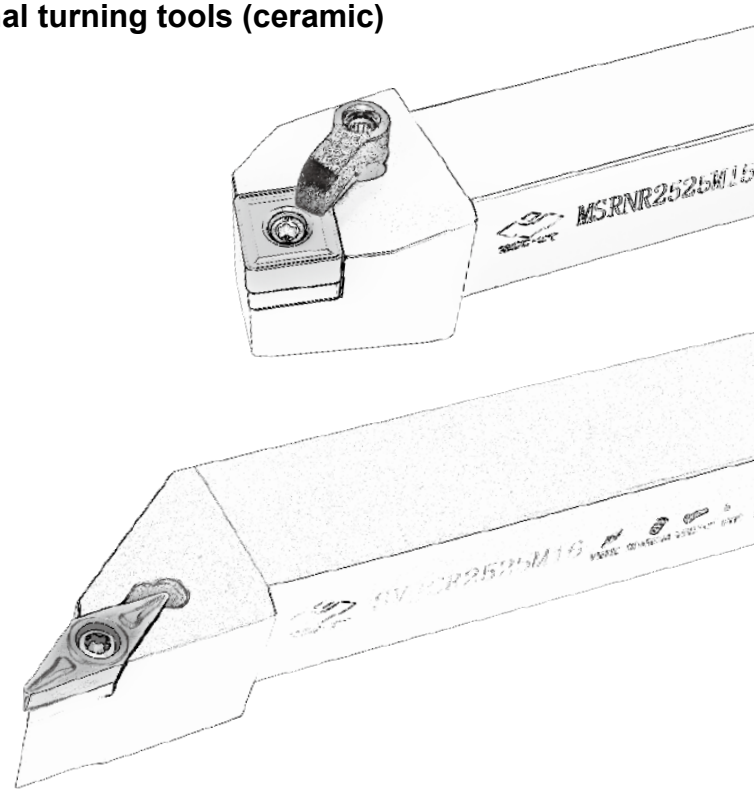
A162-A170 External turning tool holders by D type clamping

A171-A182 External turning tool holders by P type clamping

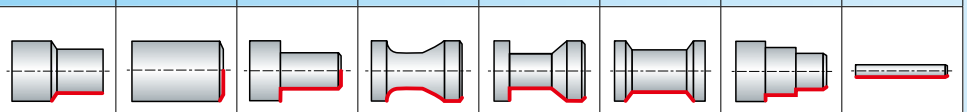
A183-A200 External turning tool holders by S type clamping

A201 External turning tool holders by C type clamping

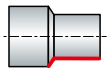
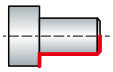
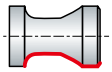
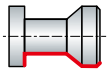
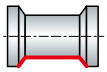
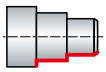
A202-A207 **Detailed table of external turning tools (ceramic)**



External turning tools overview

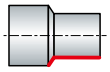
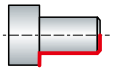
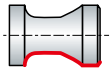
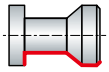
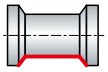
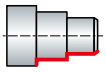
Clamping system	Tool type	Approach angle(Kr°)	Turning type						Applicable workpiece shape		Page
			External turning	End surface turning	External and end surface turning	Profile turning	Profile turning	Profile turning	Short, Thin, Long		
											
D	DCLNR/L 	95			☺				☺		A164
	DDJNR/L 	93					☺		☺	☺	A165
	DSBNR/L 	75	☺						☺		A166
	DTGNR/L 	91	☺						☺	☺	A167
	DVVNN 	72.5						☺	☺		A168
	DVJNR/L 	93					☺		☺	☺	A169
	DWLNR/L 	95			☺				☺		A170
P	PCBNR/L 	75	☺						☺		A171
	PCLNR/L 	95			☺				☺		A172
	PDJNR/L 	93					☺		☺	☺	A173
	PDNNR/L 	63						☺	☺		A174

☺ Recommended ☺ Available

Clamping system	Tool type	Approach angle(Kr°)	Turning type						Applicable workpiece shape		Page
			External turning	End surface turning	External and end surface turning	Profile turning	Profile turning	Profile turning	Short, Thick	Thin, Long	
											
P	PSBNR/L 	75	☺						☺		A175
	PSDNN 	45						☺	☺		A176
	PSKNR/L 	75		☺					☺		A177
	PSSNR/L 	45	☺						☺		A178
	PTFNR/L 	91		☺					☺	☺	A179
	PTTNR/L 	60	☺						☺		A180
	PTGNR/L 	90	☺						☺	☺	A181
	PWLNR/L 	95			☺				☺		A182
S	SCACR/L 	90	☺						☺	☺	A183
	SCLCR/L 	95			☺				☺	☺	A184
	SDACR/L 	90					☺		☺	☺	A185

☺ Recommended ☺ Available

External turning tools overview

Clamping system	Tool type	Approach angle(Kr°)	Turning type: External turning	End surface turning	External and end surface turning	Profile turning	Profile turning	Profile turning	Applicable workpiece shape: Short, Thick	Thin, Long	Page
											
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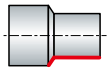
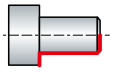
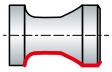
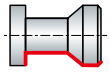
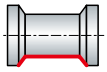
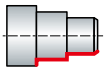
	SDNCN 	62.5						☺	☺	☺	A187
	SVJBR/L 	93					☺		☺	☺	A188
	SVABR/L 	90					☺		☺	☺	A189
	SVVBN 	72.5						☺	☺	☺	A190
	SVVCN 	72.5						☺	☺	☺	A191
	SVJCR/L 	93					☺		☺	☺	A192
	SSBCR/L 	75	☺						☺		A193
	SSDCN 	45						☺	☺		A193
	SSKCR/L 	75		☺					☺		A194
	SSSCR/L 	45	☺						☺		A194

☺ Recommended ☺ Available

Clamping system	Tool type	Approach angle(Kr°)	Turning type						Applicable workpiece shape		Page
			External turning	End surface turning	External and end surface turning	Profile turning	Profile turning	Profile turning	Short, Thick	Thin, Long	
											
S	STACR/L 	90	☺						☺	☺	A195
	STFCR/L 	91		☺					☺		A195
	STGCR/L 	91	☺						☺	☺	A196
	STTCR/L 	60	☺						☺		A197
	SWACR/L 	90	☺						☺	☺	A198
	SRDCN 							☺	☺		A199
	SRGCR/L 					☺			☺		A200
C	CKJNR/L 	93					☺		☺		A201
	CKNNR/L 	63						☺	☺		A201

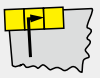
☺ Recommended ☺ Available

External turning tools code key

Clamping system



D – double clamping



P – Hole clamping



S – Screw on

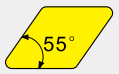


C – Top clamping

Insert shape



C



D



R



S



T

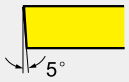


V



W

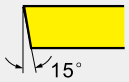
Clearance angle of insert



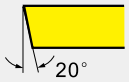
B



C



D



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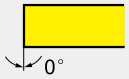

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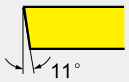
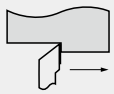
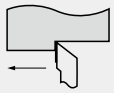


P

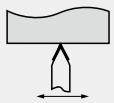
Cutting direction



L - Left-hand



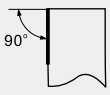
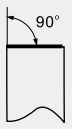
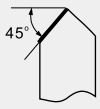
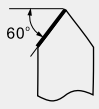
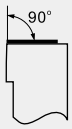
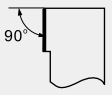
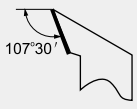
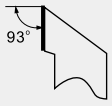
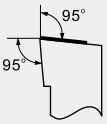
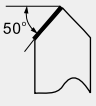
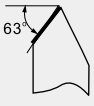
R - Right-hand



N- Right and left hand

P C L N L

Tool holder style and approach angle

A	B	C	D	E	F	G	H
							
J	**K**	**L**	**M**	**N**	**O**	**P**	**Q**
							
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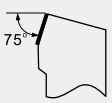
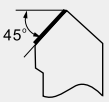
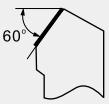
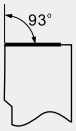
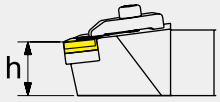
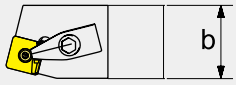
							

Nose height (mm)



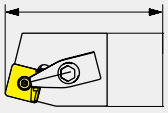
Code	Height
12	12
16	16
20	20
25	25
32	32
40	40
50	50

Width of tool holder (mm)



Code	Width
12	12
16	16
20	20
25	25
32	32
40	40
50	50

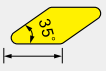
Length of tool holder (mm)

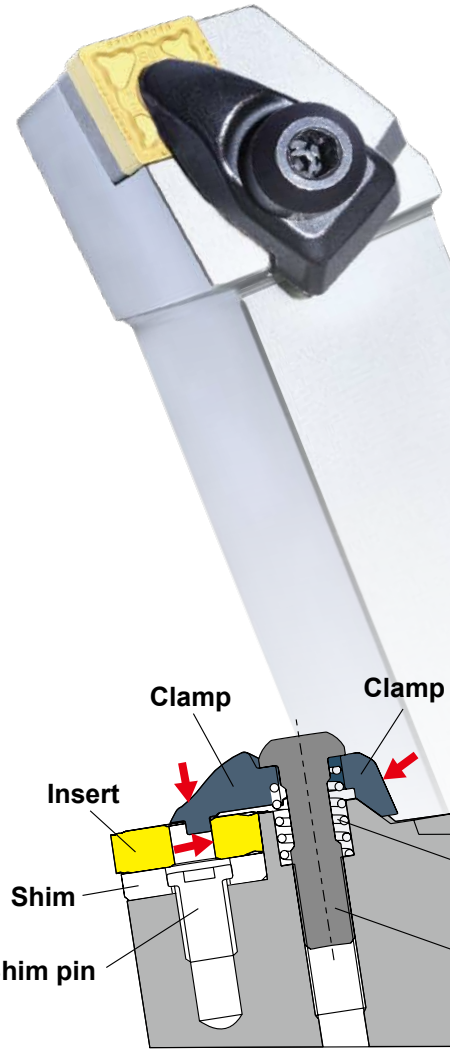


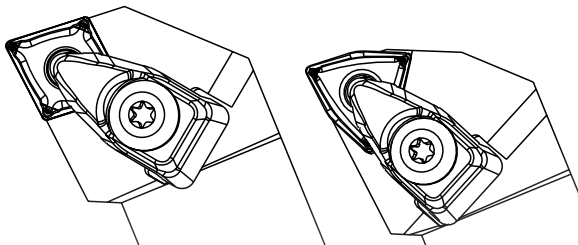
Code	Length
H	100
K	125
M	150
P	170
Q	180
R	200
S	250
T	300

25 **25** **M** **12**

Length of cutting edge

Inserts shape	C	D	R	S	T	V	W
							
Inscribed circle (mm)	Length of cutting edge(mm)						
5.556	---	---	---	---	09	---	---
6.350	06	07	---	---	11	---	---
9.525	09	11	09	09	16	16	06
12.700	12	15	12	12	22	22	08
15.875	16	19	15	15	27	---	---
19.050	19	---	19	19	33	---	---
25.400	25	---	25	25	44	---	---
32.000	---	---	32	---	---	---	---



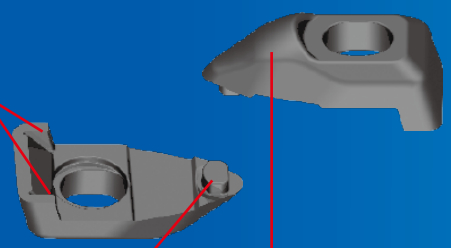


D-type double-clamping tool holder

With newly developed double-clamping structure, D-type turning tools have high clamping rigidity and high positioning accuracy, achieving easy and secure clamping of inserts. It is the best choice for the clamping of straight hole negative inserts.

Uniquely clamp

The clamp and the inner wall of insert hole make an arc contact. The stable and evenly distributed clamping force ensures more secure clamping.



lug boss on both ends and double-locating make more insert clamp secure .

Arc locating surface makes large contact area and the force is evenly distributed.

Simple and compact structure effectively prevents chip blocking while ensuring high clamping rigidity.

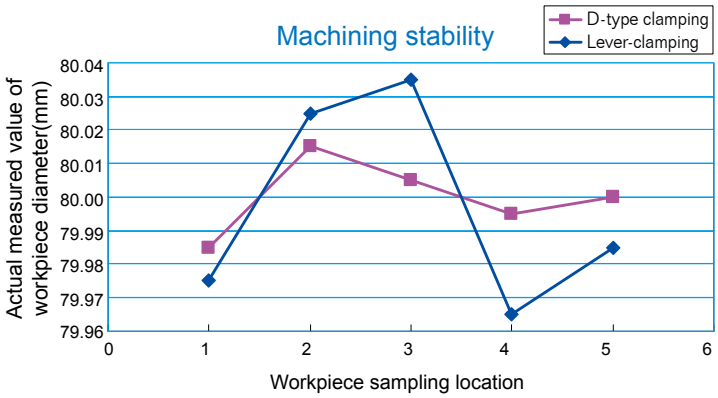
Convenient secure clamping device



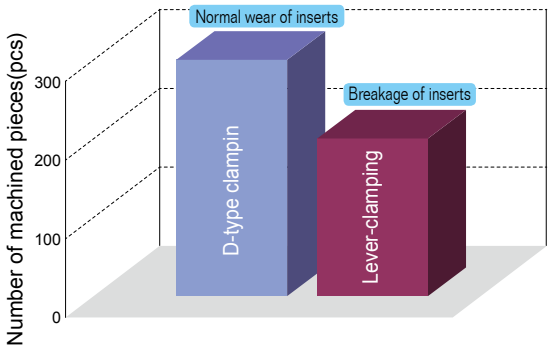
Slots in the tool body match perfectly with the clamp, realizing simple and easy clamping.

Compared with lever-clamping:

① Accurate locating ensures more stable machining accuracy.



② High clamping rigidity effectively improves resistance to breakage of insert.



Compared with similar products of company A:

① Locating surface contact: (checking the contact location of clamp by dyeing)

Force evenly distributed, firm clamping, high locating accuracy.



ZCC-CT

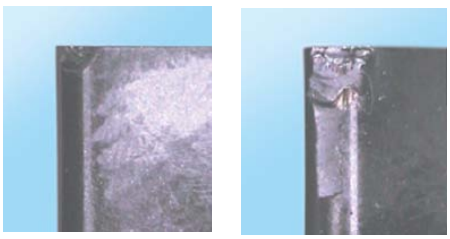


Similar product of company A

② Effect on tool life:

Tool holder：DCLNL3225P12
Insert：YBC252/CNMG120408-DR
Cutting material：45# steel
Cutting parameters：V_c=250m/min
a_p=2mm
f=0.6mm/r

After 60 minutes of cutting

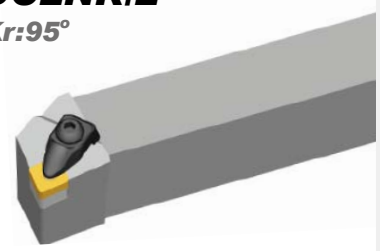


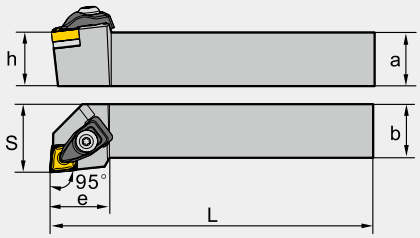
ZCC-CT

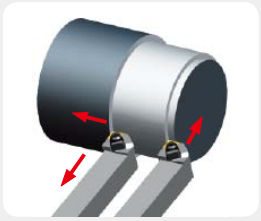
Similar product of company A

Corresponding tool holders of insert CN□□ D-type clamping

DCLNR/L
Kr:95°







Type		Stock		Basic dimensions(mm)						Screw	Shim	Wrench	Clamp	Shim screw	Spring
		R	L	a	b	L	h	s	e						
DCLNR/L	**1616H09**	▲	△	16	16	100	16	20	24	CM5×22C	C09BM	WH30L	C1RA	SM5×8.65XA1	SPR6
	2020K09	▲	△	20	20	125	20	25	24						
	2525M09	▲	△	25	25	150	25	32	24						
	2020K12	▲	▲	20	20	125	20	25	28	CM6×25C	C12BM	WH40L	C2RA	SM6×10XA1	SPR4
	2525M12	▲	▲	25	25	150	25	32	28						
	3225P12	▲	▲	32	25	170	32	32	28						

▲Stock available △Make-to-order

Applicable inserts

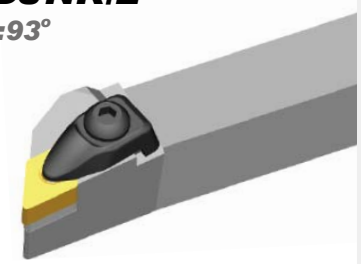
Application	For finishing	For semi-finishing	For roughing	For heavy machining	For cast iron machining	PCBN&PCD inserts
Inserts shape	**DF** A52	**WGM** Wiper A53	**DR** Double-side A56	**HPR** A57	Without chipbreaker A57	Without chipbreaker A120
	WGF Wiper A52	**PM** A53	**DR** Single-side A56			Without chipbreaker A120
	SF A52	**DM** A54	**ER** Double-side A56			Without chipbreaker A120
	EF A52	**EM** A54	**ER** Single-side A56			
	NF A53	**NM** A55	**LR** Single-side A55			

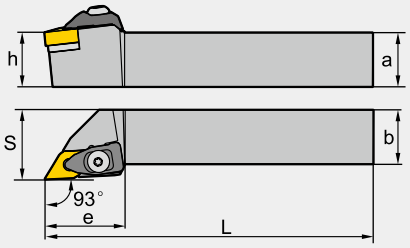
Tool holder type							
	DCLNR/L□□H/K/M09	CN□□0903□□	CN□□0903□□				
	DCLNR/L□□K/M/P12	CN□□1204□□	CN□□1204□□	CN□□1204□□	CN□□1204□□	CN□□1204□□	CN□□1204□□

Corresponding tool holders of insert DN□□ D-type clamping

DDJNR/L

Kr:93°



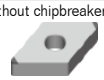




Type		Stock		Basic dimensions(mm)						Screw	Shim	Wrench	Clamp	Shim screw	Spring
		R	L	a	b	L	h	s	e						
DDJNR/L	1616H11	△	△	16	16	100	16	20	30	CM5×22C	D11BM	WH30L	C1RA	SM5×8.65XA1	SPR6
	2020K11	▲	△	20	20	125	20	25	30						
	2525M11	▲	△	25	25	150	25	32	30						
	3225P11	△	△	32	25	170	32	32	30						
	2020K15	▲	▲	20	20	125	20	25	35	CM6×25C	D15BM	WH40L	C2RA	SM6×10XA1	SPR4
	2525M15	▲	▲	25	25	150	25	32	35						
	3232P15	▲	▲	32	32	170	32	40	35						

▲Stock available △Make-to-order

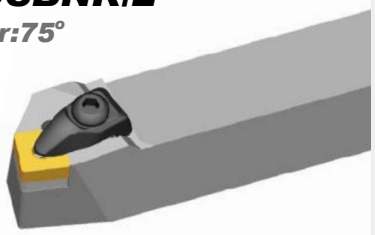
Applicable inserts

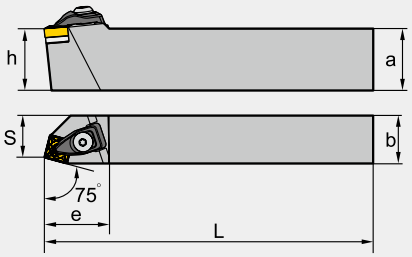
Application	For finishing	For semi-finishing	For roughing	For cast iron machining	PCBN&PCD inserts
Inserts shape	DF  A59	WGM Wiper  A61	DR Double-side  A63	Without chipbreaker  A64	Without chipbreaker  A122
	WGF Wiper  A59	PM  A61	DR Single-side  A63		Without chipbreaker  A122
	SF  A60	DM  A62	ER Double-side  A63		Without chipbreaker  A122
	EF  A60	EM  A62	ER Single-side  A63		
	NF  A60	NM  A62	LR Single-side  A63		

Tool holder type						
	DDJNR/L□□H/K/M/P11	DN□□1104□□	DN□□1104□□		DN□□1104□□	
	DDJNR/L□□K/M/P15	DN□□1506□□	DN□□1506□□	DN□□1506□□	DN□□1506□□	DN□□1506□□

Corresponding tool holders of insert SN□□ D-type clamping

DSBNR/L
Kr:75°







Type		Stock		Basic dimensions(mm)						Screw	Shim	Wrench	Clamp	Shim screw	Spring
		R	L	a	b	L	h	s	e						
DSBNR/L	**1616H09**	▲	△	16	16	100	16	13	26	CM5×22C	S09BM	WH30L	C1RA	SM5×8.65XA1	SPR6
	2020K12	▲	▲	20	20	125	20	17	34						
	2525M12	▲	▲	25	25	150	25	22	34	CM6×25C	S12BM	WH40L	C2RA	SM6×10XA1	SPR4
	3225P12	▲	▲	32	25	170	32	22	34						
	3232P15	▲	▲	32	32	170	32	27	41	CM6×25C	S15BM	WH40L	C3RA	SM6×10XA2	SPR4

▲Stock available △Make-to-order

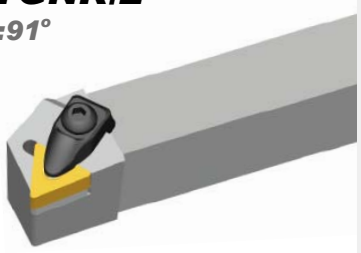
Applicable inserts

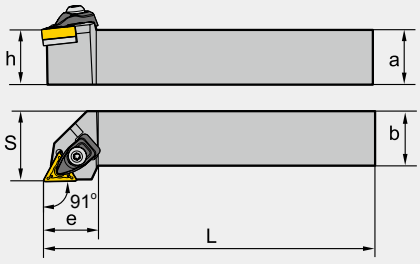
Application	For finishing	For semi-finishing	For roughing	For heavy machining	For cast iron machining	PCBN&PCD inserts
Inserts shape	**DF**  A65	**PM**  A66	**DR** Double-side  A68	**HPR**  A70	Without chipbreaker  A72	Without chipbreaker  A124
	EF  A65	**DM**  A66	**DR** Single-side  A68-69			Without chipbreaker  A124
	SF  A65	**EM**  A67	**ER** Double-side  A69			Without chipbreaker  A124
		NM  A67	**ER** Single-side  A70			Without chipbreaker  A124
			LR Single-side  A67			

Tool holder type							
	DSBNR/L□□H09	SN□□0903□□	SN□□0903□□			SN□□0903□□	
	DSBNR/L□□K/M/P12	SN□□1204□□	SN□□1204□□	SN□□1204□□	SN□□1204□□	SN□□1204□□	SN□□1204□□
	DSBNR/L□□P15	SN□□1506□□	SN□□1506□□	SN□□1506□□	SN□□1506□□	SN□□1506□□	

Corresponding tool holders of insert TN□□ D-type clamping

DTGNR/L
Kr:91°







Type		Stock		Basic dimensions(mm)						Screw	Shim	Wrench	Clamp	Shim screw	Spring
		R	L	a	b	L	h	s	e						
DTGNR/L	1616H16	△	△	16	16	100	16	20	25	CM5×22C	T16BM	WH30L	C1RA	SM5×8.65XA1	SPR6
	2020K16	▲	▲	20	20	125	20	25	25						
	2525M16	▲	▲	25	25	150	25	32	25						

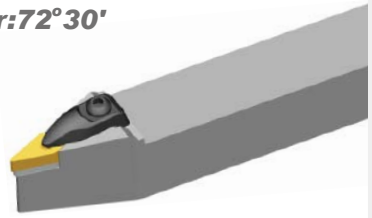
▲Stock available △Make-to-order

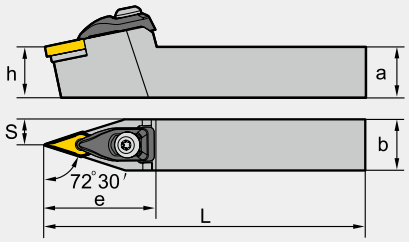
Applicable inserts

Application	For finishing	For semi-finishing	For roughing	For cast iron machining	PCBN&PCD inserts
Inserts shape	DF A73	WGM Wiper A74	DR Double-side A76	Without chipbreaker A78	Without chipbreaker A126
	WGF Wiper A73	PM A74	DR Single-side A76		Without chipbreaker A126
	SF A73	DM A75	ER Double-side A76		Without chipbreaker A126
	EF A74	EM A75	LR Single-side A75		
Tool holder type DTGNR/L□□H/K/M16	TN□□1604□□	TN□□1604□□	TN□□1604□□	TN□□1604□□	TN□□1604□□

Corresponding tool holders of insert VN□□ D-type clamping

DVVNN
Kr:72°30'



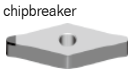




Type		Stock	Basic dimensions(mm)						Screw	Shim	Wrench	Clamp	Shim screw	Spring
			a	b	L	h	s	e						
DVVNN	**2020K16**	△	20	20	125	20	10	44	CM5×22C	V16BM	WH30L	C6RA	SM5×8.65XA1	SPR6
	2525M16	▲	25	25	150	25	12.5	44						

▲Stock available △Make-to-order

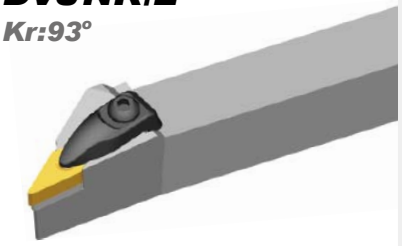
Applicable inserts

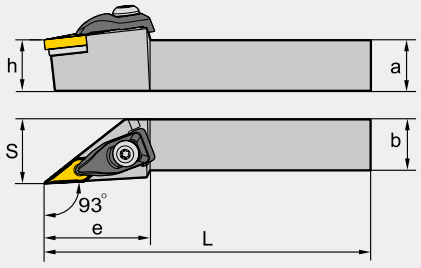
Application	For finishing	For semi-finishing	PCBN&PCD inserts
Inserts shape	**DF**  A79	**PM**  A80	Without chipbreaker  A127
	EF  A79	**DM**  A80	Without chipbreaker  A127
	SF  A79	**EM**  A80	
	NF  A79	**NM**  A80	
Tool holder type **DVVNN□□K/M16**	VN□□1604□□	VN□□1604□□	VN□□1604□□

Corresponding tool holders of insert VN□□ D-type clamping

DVJNR/L

Kr:93°







Type		Stock		Basic dimensions(mm)						Screw	Shim	Wrench	Clamp	Shim screw	Spring
		R	L	a	b	L	h	s	e						
DVJNR/L	**2020K16**	▲	▲	20	20	125	20	25	41	CM5×22C	V16BM	WH30L	C6RA	SM5×8.65XA1	SPR6
	2525M16	▲	▲	25	25	150	25	32	41						

▲Stock available △Make-to-order

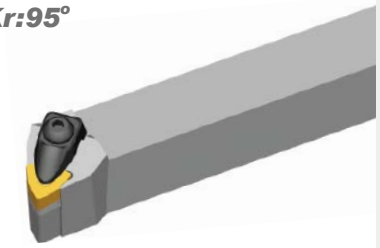
Applicable inserts

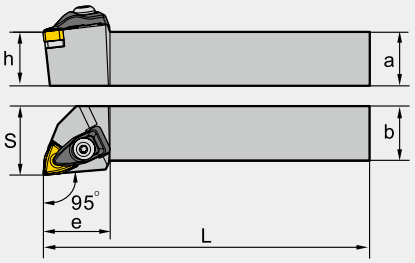
Application	For finishing	For semi-finishing	PCBN&PCD inserts
Inserts shape	**DF** A79	**PM** A80	Without chipbreaker A127
	EF A79	**DM** A80	Without chipbreaker A127
	SF A79	**EM** A80	
	NF A79	**NM** A80	
Tool holder type **DVJNR/L□□K/M16**	VN□□1604□□	VN□□1604□□	VN□□1604□□

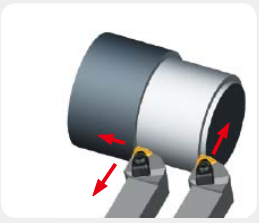
Corresponding tool holders of insert WN□□ D-type clamping

DWLNR/L

Kr:95°







Type		Stock		Basic dimensions(mm)						Screw	Shim	Wrench	Clamp	Shim screw	Spring
		R	L	a	b	L	h	s	e						
DWLNR/L	**1616H06**	▲	△	16	16	100	16	25	25	CM5×22C	W06BM	WH30L	C1RA	SM5×8.65XA1	SPR6
	2020K06	▲	▲	20	20	125	20	25	24						
	2525M06	▲	▲	25	25	150	25	32	24						
	2020K08	▲	▲	20	20	125	20	25	31	CM6×25C	W08BM	WH40L	C2RA	SM6×10XA1	SPR4
	2525M08	▲	▲	25	25	150	25	32	31						
	3225P08	△	△	32	25	170	32	32	31						

▲Stock available △Make-to-order

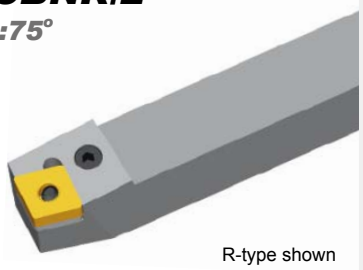
Applicable inserts

Application	For finishing	For semi-finishing	For roughing	For cast iron machining	PCBN&PCD inserts
Inserts shape	**DF**  A81	**WGM** Wiper  A82	**DR** Double -side  A84	Without chipbreaker  A84	Without chipbreaker  A128
	WGF Wiper  A81	**PM**  A83			Without chipbreaker  A128
	SF  A81	**DM**  A83			Without chipbreaker  A128
	EF  A82	**EM**  A83			
	NF  A82	**NM**  A84			
Tool holder type **DWLNR/L□□H/K/M06**	WN□□0604□□	WN□□0604□□	WN□□0604□□	WN□□0604□□	
DWLNR/L□□K/M/P08	WN□□0804□□	WN□□0804□□	WN□□0804□□	WN□□0804□□	WN□□0804□□

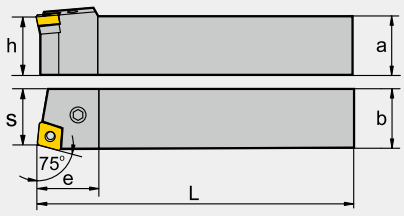
Corresponding tool holders of insert CN□□ P-type clamping

PCBNR/L

Kr:75°



R-type shown





Type		Stock		Basic dimensions(mm)						Screw	Shim	Wrench	Lever	Shim pin
		R	L	a	b	L	h	s	e					
PCBNR/L	2020K12	▲	▲	20	20	125	20	17	27	LEM8×21	C12AP	WH30L	L4	SP4
	2525M12	▲	▲	25	25	150	25	22	27					
	3232P12	▲	▲	32	32	170	32	27	27					
	2525M16	▲	▲	25	25	150	25	22	33	LEM8×25	C16AP	WH30L	L5	SP5
	3232P16	▲	▲	32	32	170	32	27	33					
	3232P19	▲	▲	32	32	170	32	27	38	LEM10×27	C19AP	WH40L	L6	SP6
	4040S19	▲	▲	40	40	250	40	35	38					
	4040S2507	▲	▲	40	40	250	40	35	50	LEM12×36A	C25AP-07	WH50L	L8	SP8
	4040S2509	▲	▲	40	40	250	40	35	50		C25AP			

▲Stock available △Make-to-order

Applicable inserts

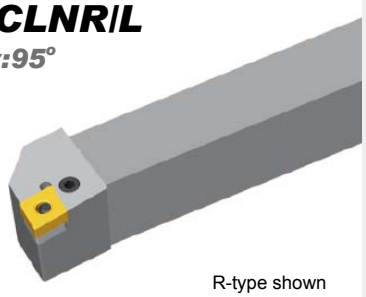
Application	For finishing	For semi-finishing	For roughing	For heavy machining	For cast iron machining
Inserts shape	DF  A52	PM  A53	DR Double-side  A56	HPR  A57	Without chipbreaker  A57
	SF  A52	DM  A54	DR Single-side  A56		
	EF  A52	EM  A54	ER Double-side  A56		
	NF  A53	NM  A55	ER Single-side  A56		
			LR  A55		

Tool holder type						
	PCBNR/L□□K/M/P12	CN□□1204□□	CN□□1204□□	CN□□1204□□	CN□□1204□□	CN□□1204□□
	PCBNR/L□□M/P16	CN□□1606□□	CN□□1606□□	CN□□1606□□	CN□□1606□□	CN□□1606□□
	PCBNR/L□□P/S19		CN□□1906□□	CN□□1906□□	CN□□1906□□	CN□□1906□□
	PCBNR/L□□S2507			CN□□2507□□		
	PCBNR/L□□S2509			CN□□2509□□		

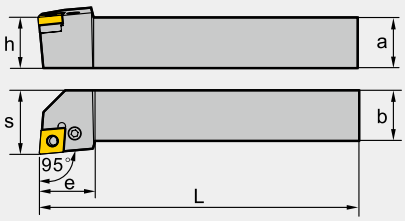
Corresponding tool holders of insert CN□□ P-type clamping

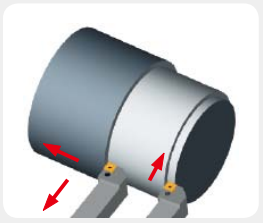
PCLNR/L

Kr:95°



R-type shown





Type		Stock		Basic dimensions(mm)						Screw	Shim	Wrench	Lever	Shim pin
		R	L	a	b	L	h	s	e					
PCLNR/L	1616H09	▲	▲	16	16	100	16	20	20	LEM6×13.4A	C09AP	WH25L	L3	SP10
	2020K09	▲	▲	20	20	125	20	25	22					
	2525M09	▲	▲	25	25	150	25	32	22					
	2020K12	▲	▲	20	20	125	20	25	28	LEM8×21	C12AP	WH30L	L4	SP4
	2525M12	▲	▲	25	25	150	25	32	28					
	3232P12	▲	▲	32	32	170	32	40	28					
	2525M16	▲	▲	25	25	150	25	32	33	LEM8×25	C16AP	WH30L	L5	SP5
	3232P16	▲	▲	32	32	170	32	40	33					
	3232P19	▲	▲	32	32	170	32	40	38	LEM10×27	C19AP	WH40L	L6	SP6
	4040S19	▲	▲	40	40	250	40	50	38					
	4040S2507	▲	▲	40	40	250	40	50	49	LEM12×36A	C25AP-07	WH50L	L8	SP8
	4040S2509	▲	▲	40	40	250	40	50	49		C25AP			

▲Stock available △Make-to-order

Applicable inserts

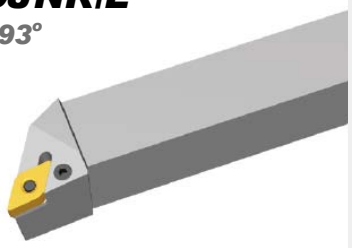
Application	For finishing	For semi-finishing	For roughing	For heavy machining	For cast iron machining	PCBN&PCD inserts
Inserts shape	DF  A52	WGM Wiper  A53	DR Double-side  A56	HPR  A57	Without chipbreaker  A57	Without chipbreaker  A120
	WGF Wiper  A52	PM  A53	DR Single-side  A56			Without chipbreaker  A120
	SF  A52	DM  A54	ER Double-side  A56			Without chipbreaker  A120
	EF  A52	EM  A54	ER Single-side  A56			
	NF  A53	NM  A55	LR Single-side  A55			

Tool holder type							
	PCLNR/L□□H/K/M09	CN□□0903□□	CN□□0903□□				
	PCLNR/L□□K/M/P12	CN□□1204□□	CN□□1204□□	CN□□1204□□	CN□□1204□□	CN□□1204□□	CN□□1204□□
	PCLNR/L□□M/P16	CN□□1606□□	CN□□1606□□	CN□□1606□□	CN□□1606□□	CN□□1606□□	
	PCLNR/L□□P/S19		CN□□1906□□	CN□□1906□□	CN□□1906□□	CN□□1906□□	
	PCLNR/L□□S2507			CN□□2507□□			
	PCLNR/L□□S2509			CN□□2509□□			

Corresponding tool holders of insert DN□□ P-type clamping

PDJNR/L

Kr:93°



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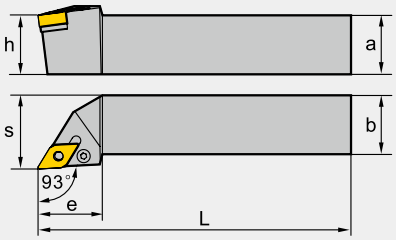
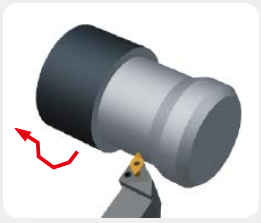




Type		Stock		Basic dimensions(mm)						Screw	Shim	Wrench	Lever	Shim pin
		R	L	a	b	L	h	s	e					
PDJNR/L	1616H11	▲	▲	16	16	100	16	20	25	LEM6×13.4A	D11AP	WH25L	L3	SP3
	2020K11	▲	▲	20	20	125	20	25	25					
	2525M11	▲	▲	25	25	150	25	32	30					
	2020K15	▲	▲	20	20	125	20	25	35	LEM8×21	D15AP	WH30L	L4B	SP4
	2525M15	▲	▲	25	25	150	25	32	35					
	3232P15	▲	▲	32	32	170	32	40	35					
	2020K15-3	▲	△	20	20	125	20	25	35	LEM8×21	D15AP	WH30L	L4	SP4
	2525M15-3	▲	▲	25	25	150	25	32	35					
	3232P15-3	▲	△	32	32	170	32	40	35					

▲Stock available △Make-to-order

Applicable inserts

Application	For finishing	For semi-finishing	For roughing	For cast iron machining	PCBN&PCD inserts
Inserts shape	DF A59	WGM Wiper A61	DR Double-side A63	Without chipbreaker A64	Without chipbreaker A122
	WGF Wiper A59	PM A61	DR Single-side A63		Without chipbreaker A122
	SF A60	DM A62	ER Double-side A63		Without chipbreaker A122
	EF A60	EM A62	ER Single-side A63		
	NF A60	NM A62	LR Single-side A63		

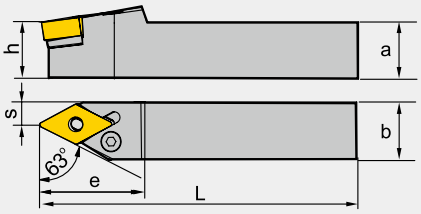
Tool holder type						
	PDJNR/L□□H/K/M11	DN□□1104□□	DN□□1104□□		DN□□1104□□	
	PDJNR/L□□K/M/P15	DN□□1506□□	DN□□1506□□	DN□□1506□□	DN□□1506□□	DN□□1506□□
	PDJNR/L□□K/M/P15-3	DN□□1504□□	DN□□1504□□		DN□□1504□□	DN□□1504□□

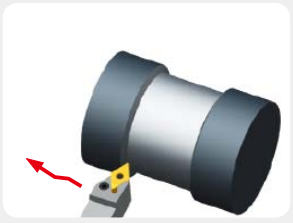
Corresponding tool holders of insert DN□□ P-type clamping

PDNNR/L
Kr:63°



R-type shown





Type		Stock		Basic dimensions(mm)						Screw	Shim	Wrench	Lever	Shim pin
		R	L	a	b	L	h	s	e					
PDNNR/L	2020K15	▲	▲	20	20	125	20	8	37	LEM8×21	D15AP	WH30L	L4B	SP4
	2525M15	▲	▲	25	25	150	25	12.5	37					
	3232P15	▲	▲	32	32	170	32	16	37					
	2020K15-3	▲	▲	20	20	125	20	8	37	LEM8×21	D15AP	WH30L	L4	SP4
	2525M15-3	▲	▲	25	25	150	25	12.5	37					
	3232P15-3	▲	▲	32	32	170	32	16	37					

▲Stock available △Make-to-order

Applicable inserts

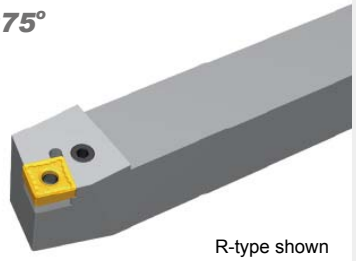
Application	For finishing	For semi-finishing	For roughing	For cast iron machining	PCBN&PCD inserts
Inserts shape	DF A59	PM A61	DR Double-side A63	Without chipbreaker A64	Without chipbreaker A122
	SF A60	DM A62	DR Single-side A63		Without chipbreaker A122
	EF A60	EM A62	ER Double-side A63		Without chipbreaker A122
	NF A60	NM A62	ER Single-side A63		
			LR Single-side A63		

Tool holder type						
	PDNNR/L□□K/M/P15	DN□□1506□□	DN□□1506□□	DN□□1506□□	DN□□1506□□	DN□□1506□□
	PDNNR/L□□K/M/P15-3	DN□□1504□□	DN□□1504□□		DN□□1504□□	DN□□1504□□

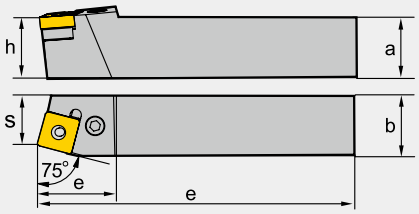
Corresponding tool holders of insert SN□□ P-type clamping

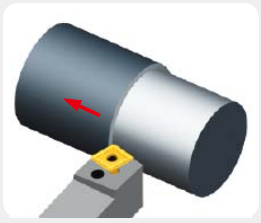
PSBNR/L

Kr:75°



R-type shown





Type		Stock		Basic dimensions(mm)						Screw	Shim	Wrench	Lever	Shim pin
		R	L	a	b	L	h	s	e					
PSBNR/L	1616H09	▲	▲	16	16	100	16	13	21	LEM6×13.4A	S09AP	WH25L	L3	SP3
	2020K09	▲	▲	20	20	125	20	17	23					
	2020K12	▲	▲	20	20	125	20	17	28	LEM8×21	S12AP	WH30L	L4	SP4
	2525M12	▲	▲	25	25	125	25	22	28					
	3225P12	▲	△	32	25	170	32	22	28					
	3232P12	▲	▲	32	32	170	32	27	28					
	2525M15	▲	▲	25	25	150	25	22	35	LEM8×25	S15AP	WH30L	L5	SP5
	3232P15	▲	▲	32	32	170	32	27	35					
	3232P19	▲	▲	32	32	170	32	27	40	LEM10×27	S19AP	WH40L	L6	SP6
	4040S19	▲	▲	40	40	250	40	35	40					
	4040S2507	▲	▲	40	40	250	40	35	48	LEM12×36A	S25AP	WH50L	L8	SP8
	4040S2509	▲	▲	40	40	250	40	35	48		S25AP-09			

▲Stock available △Make-to-order

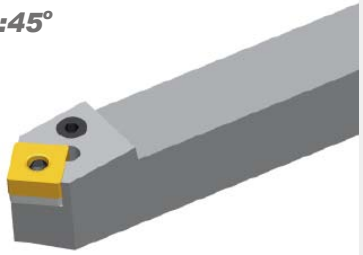
Applicable inserts

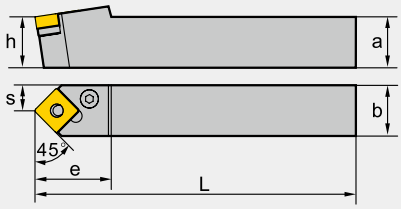
Application	For finishing	For semi-finishing	For roughing	For heavy machining	For cast iron machining	PCBN&PCD inserts
Inserts shape	DF  A65	PM  A66	DR Double-side  A68	HPR  A70	Without chipbreaker  A72	Without chipbreaker  A124
	EF  A65	DM  A66	DR Single-side  A68 -69			Without chipbreaker  A124
	SF  A65	EM  A67	ER Double-side  A69			Without chipbreaker  A124
		NM  A67	ER Single-side  A70			Without chipbreaker  A124
			LR Single-side  A67			

Tool holder type							
	PSBNR/L□□H/K09	SN□□0903□□	SN□□0903□□			SN□□0903□□	
	PSBNR/L□□K/M/P12	SN□□1204□□	SN□□1204□□	SN□□1204□□	SN□□1204□□	SN□□1204□□	SN□□1204□□
	PSBNR/L□□M/P15	SN□□1506□□	SN□□1506□□	SN□□1506□□	SN□□1506□□	SN□□1506□□	
	PSBNR/L□□P/S19		SN□□1906□□	SN□□1906□□	SN□□1906□□	SN□□1906□□	
	PSBNR/L□□S2507			SN□□2507□□	SN□□2507□□		
	PSBNR/L□□S2509			SN□□2509□□	SN□□2509□□		

Corresponding tool holders of insert SN□□ P-type clamping

PSDNN
Kr:45°







Type		Stock	Basic dimensions(mm)						Screw	Shim	Wrench	Lever	Shim pin
			a	b	L	h	s	e					
PSDNN	**1212F09**	△	12	12	80	12	6	21	LEM5×12B	—	WH20L	L3B	—
	1616H09	△	16	16	100	16	8	23	LEM6×13.4A	S09AP	WH25L	L3	SP3
	2020K12	▲	20	20	125	20	10	30	LEM8×21	S12AP	WH30L	L4	SP4
	2525M12	▲	25	25	150	20	12.5	30					
	3232P12	▲	32	32	170	32	16	40					
	2525M15	▲	25	25	150	25	12.5	40	LEM8×25	S15AP	WH30L	L5	SP5
	3232P15	▲	32	32	170	32	16	40					
	3232P19	▲	32	32	170	32	16	40	LEM10×27	S19AP	WH40L	L6	SP6
	4040S19	▲	40	40	250	40	20	40					

▲Stock available △Make-to-order

Applicable inserts

Application	For finishing	For semi-finishing	For roughing	For heavy machining	For cast iron machining	PCBN&PCD inserts
Inserts shape	**DF**  A65	**PM**  A66	**DR** Double-side  A68	**HPR**  A70	Without chipbreaker  A72	Without chipbreaker  A124
	EF  A65	**DM**  A66	**DR** Single-side  A68-69			Without chipbreaker  A124
	SF  A65	**EM**  A67	**ER** Double-side  A69			Without chipbreaker  A124
		NM  A67	**ER** Single-side  A70			Without chipbreaker  A124
			LR Single-side  A67			

Tool holder type							
	PSDNN□□F/H09	SN□□0903□□	SN□□0903□□			SN□□0903□□	
	PSDNN□□K/M/P12	SN□□1204□□	SN□□1204□□	SN□□1204□□	SN□□1204□□	SN□□1204□□	SN□□1204□□
	PSDNN□□M/P15	SN□□1506□□	SN□□1506□□	SN□□1506□□	SN□□1506□□	SN□□1506□□	
	PSDNN□□P/S19		SN□□1906□□	SN□□1906□□	SN□□1906□□	SN□□1906□□	

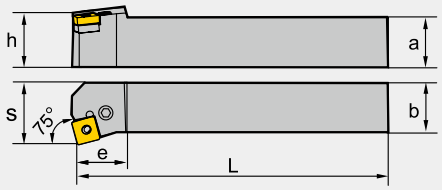
Corresponding tool holders of insert SN□□ P-type clamping

PSKNR/L

Kr:75°



R-type shown





Type		Stock		Basic dimensions(mm)						Screw	Shim	Wrench	Lever	Shim pin
		R	L	a	b	L	h	s	e					
PSKNR/L	1616H09	▲	▲	16	16	100	16	20	17	LEM6×13.4A	S09AP	WH25L	L3	SP3
	2020K09	▲	△	20	20	125	20	25	20					
	2020K12	▲	▲	20	20	125	20	25	26	LEM8×21	S12AP	WH30L	L4	SP4
	2525M12	▲	▲	25	25	150	25	32	26					
	3232P12	▲	▲	32	32	170	32	40	26					
	2525M15	▲	▲	25	25	150	25	32	32	LEM8×25	S15AP	WH30L	L5	SP5
	3232P15	▲	▲	32	32	170	32	40	32					
	3232P19	▲	▲	32	32	170	32	40	36	LEM10×27	S19AP	WH40L	L6	SP6
	4040S19	▲	▲	40	40	250	40	50	40					

▲Stock available △Make-to-order

Applicable inserts

Application	For finishing	For semi-finishing	For roughing	For heavy machining	For cast iron machining	PCBN&PCD inserts
Inserts shape	DF A65	PM A66	DR Double-side A68	HPR A70	Without chipbreaker A72	Without chipbreaker A124
	EF A65	DM A66	DR Single-side A68-69			Without chipbreaker A124
	SF A65	EM A67	ER Double-side A69			Without chipbreaker A124
		NM A67	ER Single-side A70			Without chipbreaker A124
			LR Single-side A67			

Tool holder type							
	PSKNR/L□□H/K09	SN□□0903□□	SN□□0903□□			SN□□0903□□	
	PSKNR/L□□K/M/P12	SN□□1204□□	SN□□1204□□	SN□□1204□□	SN□□1204□□	SN□□1204□□	SN□□1204□□
	PSKNR/L□□M/P15	SN□□1506□□	SN□□1506□□	SN□□1506□□	SN□□1506□□	SN□□1506□□	
	PSKNR/L□□P/S19		SN□□1906□□	SN□□1906□□	SN□□1906□□	SN□□1906□□	

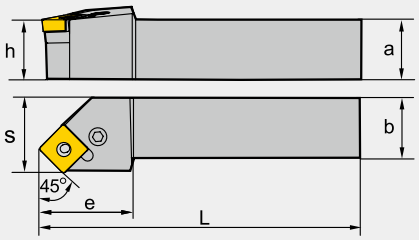
Corresponding tool holders of insert SN□□ P-type clamping

PSSNR/L

Kr:45°



R-type shown





Type		Stock		Basic dimensions(mm)						Screw	Shim	Wrench	Lever	Shim pin
		R	L	a	b	L	h	s	e					
PSSNR/L	**1616H09**	▲	▲	16	16	100	16	20	25	LEM6×13.4A	S09AP	WH25L	L3	SP3
	2020K12	▲	▲	20	20	125	20	25	30	LEM8×21	S12AP	WH30L	L4	SP4
	2525M12	▲	▲	25	25	150	25	32	30					
	3232P12	▲	▲	32	32	170	32	40	40					
	2525M15	▲	▲	25	25	150	25	32	30	LEM8×25	S15AP	WH30L	L5	SP5
	3232P15	▲	▲	32	32	170	32	40	40					
	3232P19	▲	▲	32	32	170	32	40	40	LEM10×27	S19AP	WH40L	L6	SP6
	4040S19	▲	▲	40	40	250	40	50	50					
	4040S2507	▲	▲	40	40	250	40	50	50	LEM12×36A	S25AP	WH50L	L8	SP8
	4040S2509	▲	▲	40	40	250	40	50	50		S25AP-09			

▲Stock available △Make-to-order

Applicable inserts

Application	For finishing	For semi-finishing	For roughing	For heavy machining	For cast iron machining	PCBN&PCD inserts
Inserts shape	**DF**  A65	**PM**  A66	**DR** Double-side  A68	**HPR**  A70	Without chipbreaker  A72	Without chipbreaker  A124
	EF  A65	**DM**  A66	**DR** Single-side  A68-69			Without chipbreaker  A124
	SF  A65	**EM**  A67	**ER** Double-side  A69			Without chipbreaker  A124
		NM  A67	**ER** Single-side  A70			Without chipbreaker  A124
			LR Single-side  A67			

Tool holder type							
	PSSNR/L□□H09	SN□□0903□□	SN□□0903□□	SN□□0903□□		SN□□0903□□	
	PSSNR/L□□K/M/P12	SN□□1204□□	SN□□1204□□	SN□□1204□□	SN□□1204□□	SN□□1204□□	SN□□1204□□
	PSSNR/L□□M/P15	SN□□1506□□	SN□□1506□□	SN□□1506□□	SN□□1506□□	SN□□1506□□	
	PSSNR/L□□P/S19		SN□□1906□□	SN□□1906□□	SN□□1906□□	SN□□1906□□	
	PSSNR/L□□S2507			SN□□2507□□	SN□□2507□□		
	PSSNR/L□□S2509			SN□□2509□□	SN□□2509□□		

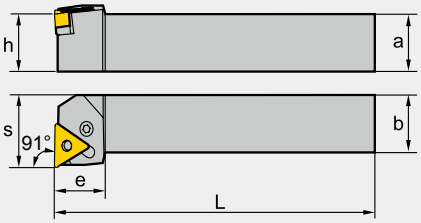
Corresponding tool holders of insert TN□□ P-type clamping

PTFNR/L

Kr:91°



R-type shown





Type		Stock		Basic dimensions(mm)						Screw	Shim	Wrench	Lever	Shim pin
		R	L	a	b	L	h	s	e					
PTFNR/L	1616H16	△	▲	16	16	100	16	20	20	LEM6×13.4A	T16AP	WH25L	L3	SP3
	2020K16	▲	▲	20	20	125	20	25	20					
	2525M16	▲	▲	25	25	150	25	32	20					
	2525M22	▲	▲	25	25	150	25	32	25	LEM8×21	T22AP	WH30L	L4	SP4
	3232P22	▲	▲	32	32	170	32	40	25					
	3232P27	▲	▲	32	32	170	32	40	34	LEM8×25	T27AP	WH30L	L5	SP5
	4040S27	▲	▲	40	40	250	40	50	34					

▲Stock available △Make-to-order

Applicable inserts

Application	For finishing	For semi-finishing	For roughing	For cast iron machining	PCBN&PCD inserts
Inserts shape	DF  A73	WGM Wiper  A74	DR Double-side  A76	Without chipbreaker  A78	Without chipbreaker  A126
	WGF  A73	PM  A74	DR Single-side  A76		Without chipbreaker  A126
	SF  A73	DM  A75	ER Double-side  A76		Without chipbreaker  A126
	EF  A74	EM  A75	LR Single-side  A75		

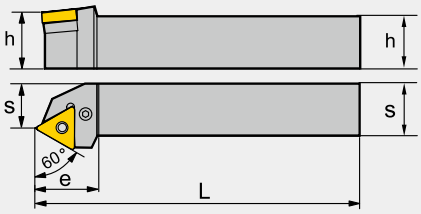
Tool holder type						
	PTFNR/L□□H/K/M16	TN□□1604□□	TN□□1604□□	TN□□1604□□	TN□□1604□□	TN□□1604□□
	PTFNR/L□□M/P22	TN□□2204□□	TN□□2204□□	TN□□2204□□	TN□□2204□□	
	PTFNR/L□□P/S27			TN□□2706□□	TN□□2706□□	

Corresponding tool holders of insert TN□□ P-type clamping

PTTNR/L
Kr:60°



R-type shown





Type		Stock		Basic dimensions(mm)						Screw	Shim	Wrench	Lever	Shim pin
		R	L	a	b	L	h	s	e					
PTTNR/L	1616H16	▲	▲	16	16	100	16	13	25	LEM6×13.4A	T16AP	WH25L	L3	SP3
	2020K16	▲	▲	20	20	125	20	17	25					
	2525M22	▲	▲	25	25	150	20	22	32	LEM8×21	T22AP	WH30L	L4	SP4

▲Stock available △Make-to-order

Applicable inserts

Application	For finishing	For semi-finishing	For roughing	For cast iron machining	PCBN&PCD inserts
Inserts shape	DF  A73	WGM Wiper  A74	DR Double-side  A76	Without chipbreaker  A78	Without chipbreaker  A126
	WGF Wiper  A73	PM  A74	DR Single-side  A76		Without chipbreaker  A126
	SF  A73	DM  A75	ER Double-side  A76		Without chipbreaker  A126
	EF  A74	EM  A75	LR Single-side  A75		
Tool holder type PTTNR/L□□H/K16	TN□□1604□□	TN□□1604□□	TN□□1604□□	TN□□1604□□	TN□□1604□□
PTTNR/L□□M22	TN□□2204□□	TN□□2204□□	TN□□2204□□	TN□□2204□□	

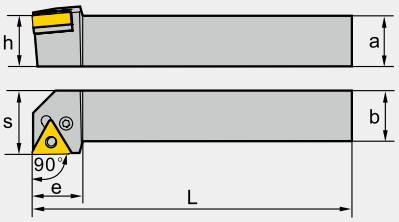
Corresponding tool holders of insert TN□□ P-type clamping

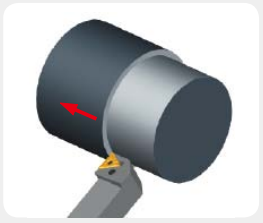
PTGNR/L

Kr:90°



R-type shown





Type		Stock		Basic dimensions(mm)						Screw	Shim	Wrench	Lever	Shim pin
		R	L	a	b	L	h	s	e					
PTGNR/L	1010E11	△	△	10	10	70	10	14	16	LEM5×9B	—	WH20L	L2	—
	1212F11	△	△	12	12	80	12	16	14					
	1616H11	▲	▲	16	16	100	16	20	18					
	2020K11	▲	▲	20	20	125	20	25	19					
	2525M11	▲	▲	25	25	150	25	32	20					
	1616H16	▲	▲	16	16	100	16	20	20	LEM6×13.4A	T16AP	WH25L	L3	SP3
	2020K16	▲	▲	20	20	125	20	25	20					
	2525M16	▲	▲	25	25	150	25	32	20					
	3232P16	▲	▲	32	32	170	32	40	20					
	2525M22	▲	▲	25	25	150	25	32	28	LEM8×21	T22AP	WH30L	L4	SP4
	3232P22	▲	▲	32	32	170	32	40	28					
	3232P27	▲	▲	32	32	170	32	40	33	LEM8×25	T27AP	WH30L	L5	SP5
	4040S27	▲	▲	40	40	250	40	50	33					

▲Stock available △Make-to-order

Applicable inserts

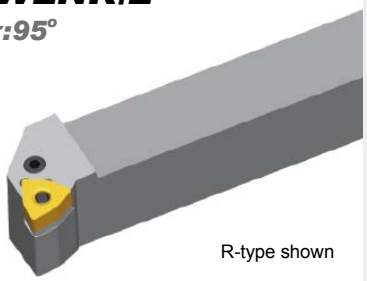
Application	For finishing	For semi-finishing	For roughing	For cast iron machining	PCBN&PCD inserts
Inserts shape	DF A73	WGM Wiper A74	DR Double-side A76	Without chipbreaker A78	Without chipbreaker A126
	WGF Wiper A73	PM A74	DR Single-side A76		Without chipbreaker A126
	SF A73	DM A75	ER Double-side A76		Without chipbreaker A126
	EF A74	EM A75	LR Single-side A75		

Tool holder type						
	PTGNR/L□□E/F/H/K/M11	TN□□1103□□	TN□□1103□□		TN□□1103□□	
	PTGNR/L□□H/K/M/P16	TN□□1604□□	TN□□1604□□	TN□□1604□□	TN□□1604□□	TN□□1604□□
	PTGNR/L□□M/P22	TN□□2204□□	TN□□2204□□	TN□□2204□□	TN□□2204□□	
	PTGNR/L□□P/S27			TN□□2706□□	TN□□2706□□	

Corresponding tool holders of insert WN□□ P-type clamping

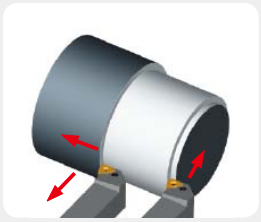
PWLNR/L

Kr:95°



R-type shown





Type		Stock		Basic dimensions(mm)						Screw	Shim	Wrench	Lever	Shim pin
		R	L	a	b	L	h	s	e					
PWLNR/L	**1616H06**	▲	▲	16	16	100	16	20	20	LEM6×13.4A	W06AP	WH25L	L3	SP3
	2020K06	▲	▲	20	20	125	20	25	20					
	2525M06	▲	▲	25	25	150	25	32	20					
	2020K08	▲	▲	20	20	125	20	25	26	LEM8×21	W08AP	WH30L	L4	SP4
	2525M08	▲	▲	25	25	150	25	32	26					

▲Stock available △Make-to-order

Applicable inserts

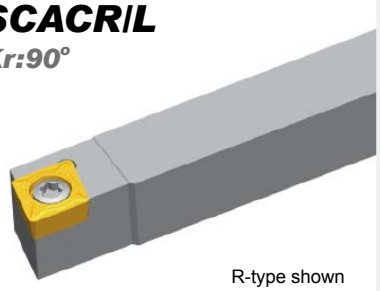
Application	For finishing	For semi-finishing	For roughing	For cast iron machining	PCBN&PCD inserts
Inserts shape	**DF**  A81	**WGM** Wiper  A82	**DR** Double -side  A84	Without chipbreaker  A84	Without chipbreaker  A128
	WGF Wiper  A81	**PM**  A83			Without chipbreaker  A128
	SF  A81	**DM**  A83			Without chipbreaker  A128
	EF  A82	**EM**  A83			
	NF  A82	**NM**  A84			

Tool holder type						
	PWLNR/L□□H/K/M06	WN□□0604□□	WN□□0604□□	WN□□0604□□	WN□□0604□□	
	PWLNR/L□□K/M08	WN□□0804□□	WN□□0804□□	WN□□0804□□	WN□□0804□□	WN□□0804□□

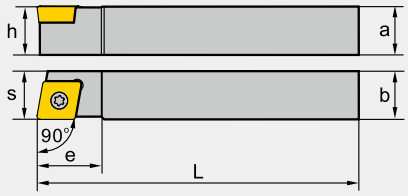
Corresponding tool holders of insert CC□□ S-type clamping

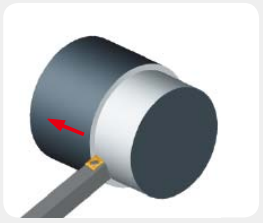
SCACR/L

Kr:90°



R-type shown

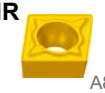




Type		Stock		Basic dimensions(mm)						Screw	Wrench
		R	L	a	b	L	h	s	e		
SCACR/L	1010E06	▲	△	10	10	70	10	10	10	I60M2.5×6.5	WT07IP
	1212F09	▲	▲	12	12	80	12	12	16	I60M3.5×8	WT15IP

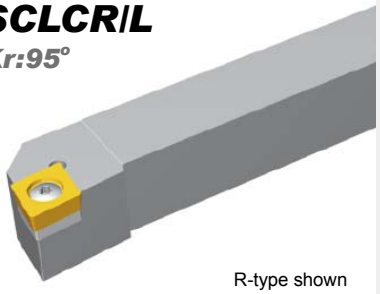
▲Stock available △Make-to-order

Applicable inserts

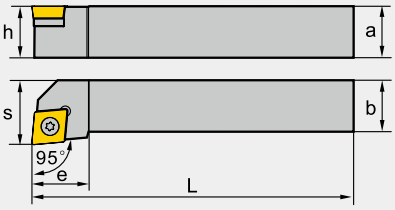
Application	For extra finishing	For finishing	For semi-finishing	For roughing	For Al machining	For cast iron machining	PCBN&PCD inserts
Inserts shape	USF  A87	HF  A87	HM  A88	HR  A89	LH  A89	Without chipbreaker  A90	Without chipbreaker  A130
	SF  A87	EF  A88	EM  A88		LC  A89		Without chipbreaker  A130
Tool holder type SCACR/L□□E06	CC□□0602□□	CC□□0602□□	CC□□0602□□	CC□□0602□□	CCGX 0602□□	CC□□ 0602□□	CC□□ 0602□□
Tool holder type SCACR/L□□F09	CC□□09T3□□	CC□□09T3□□	CC□□09T3□□	CC□□09T3□□	CCGX 09T3□□	CC□□ 09T3□□	CC□□ 09T3□□

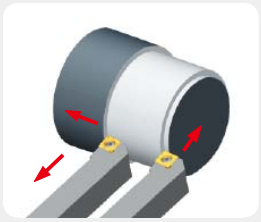
Corresponding tool holders of insert CC□□ S-type clamping

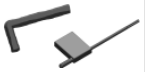
SCLCR/L
Kr:95°



R-type shown





Type		Stock		Basic dimensions(mm)						Screw	Shim	Shim screw	Wrench
		R	L	a	b	L	h	s	e				
SCLCR/L	**0808D06**	▲	△	08	08	60	08	10	10	I60M2.5×6.5	—	—	WT07IP
	1010E06	▲	▲	10	10	70	10	12	10				
	1212F09	▲	▲	12	12	80	12	16	16	I60M3.5×8	—	—	WT15IP
	1616H09	▲	▲	16	16	100	16	20	16				
	2020K12	▲	▲	20	20	125	20	25	25	I60M4×11X	C12BS	SM6×10XA	WT15IP WH40L
	2525M12	▲	▲	25	25	150	25	32	26				
	3225P12	▲	▲	32	25	170	32	32	26				

▲Stock available △Make-to-order

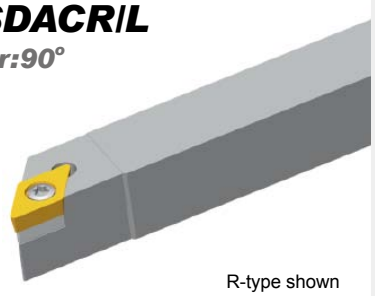
Applicable inserts

Application		For extra finishing	For finishing	For semi-finishing	For roughing	For Al machining	For cast iron machining	PCBN&PCD inserts
Inserts shape		**USF**  A87	**HF**  A87	**HM**  A88	**HR**  A89	**LH**  A89	Without chipbreaker  A90	Without chipbreaker  A130
		SF  A87	**EF**  A88	**EM**  A88		**LC**  A89		Without chipbreaker  A130
Tool holder type	**SCLCR/L□□D/E06**	CC□□ 0602□□	CC□□ 0602□□	CC□□ 0602□□	CC□□ 0602□□	CCGX 0602□□	CC□□ 0602□□	CC□□ 0602□□
	SCLCR/L□□F/H09	CC□□ 09T3□□	CC□□ 09T3□□	CC□□ 09T3□□	CC□□ 09T3□□	CCGX 09T3□□	CC□□ 09T3□□	CC□□ 09T3□□
	SCLCR/L□□K/M/P12		CC□□ 1204□□	CC□□ 1204□□	CC□□ 1204□□	CCGX 1204□□	CC□□ 1204□□	CC□□ 1204□□

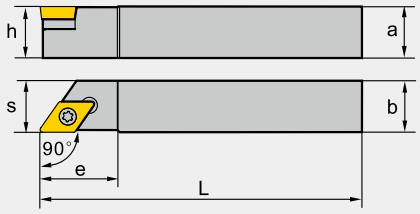
Corresponding tool holders of insert DC□□ S-type clamping

SDACR/L

Kr:90°



R-type shown

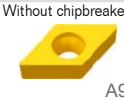
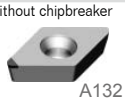
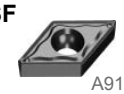
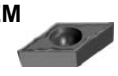
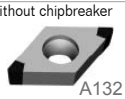




Type		Stock		Basic dimensions(mm)						Screw	Shim	Shim screw	Wrench
		R	L	a	b	L	h	s	e				
SDACR/L	**1010E07**	△	△	10	10	70	10	10	15	I60M2.5×6.5	—	—	WT07IP
	1212F11	△	△	12	12	80	12	12	15	I60M3.5×8	—	—	WT15IP
	1616H11	△	△	16	16	100	16	16	24	I60M3.5×12	D11BS	SM5×8.65XA	WT15IP WH35L

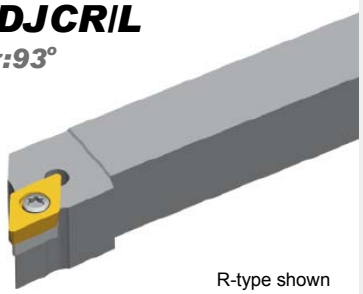
▲Stock available △Make-to-order

Applicable inserts

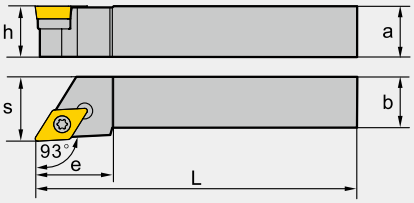
Application		For extra finishing	For finishing	For semi-finishing	For roughing	For Al machining	For cast iron machining	PCBN&PCD inserts
Inserts shape		**USF**  A91	**HF**  A91	**HM**  A92	**HR**  A93	**LH**  A93	Without chipbreaker  A93	Without chipbreaker  A132
		SF  A91	**EF**  A92	**EM**  A92		**LC**  A93		Without chipbreaker  A132
Tool holder type	**SDACR/L□□E07**	DC□□ 0702□□	DC□□ 0702□□	DC□□ 0702□□		DCGX 0702□□	DC□□0702□□	DC□□0702□□
	SDACR/L□□F/H11	DC□□ 11T3□□	DC□□ 11T3□□	DC□□ 11T3□□	DC□□ 11T3□□	DCGX 11T3□□	DC□□ 11T3□□	DC□□ 11T3□□

Corresponding tool holders of insert DC□□ S-type clamping

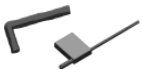
SDJCR/L
Kr:93°



R-type shown

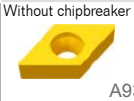
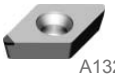
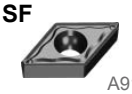
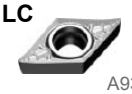
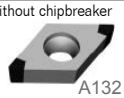




Type		Stock		Basic dimensions(mm)						Screw	Shim	Shim screw	Wrench
		R	L	a	b	L	h	s	e				
SDJCR/L	**1010E07**	▲	△	10	10	70	10	12	15	I60M2.5×6.5	—	—	WT07IP
	1212F07	▲	▲	12	12	80	12	16	15				
	1616H07	▲	▲	16	16	100	16	20	18				
	1616H11	▲	▲	16	16	100	16	20	24	I60M3.5×12	D11BS	SM5×8.65XA	WT15IP WH35L
	2020K11	▲	▲	20	20	125	20	25	24				
	2525M11	▲	▲	25	25	150	25	32	29				
	3225P11	▲	▲	32	25	170	32	32	29				

▲Stock available △Make-to-order

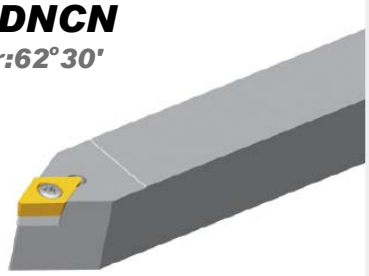
Applicable inserts

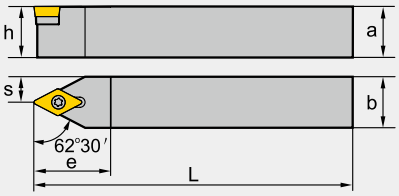
Application	For extra finishing	For finishing	For semi-finishing	For roughing	For Al machining	For cast iron machining	PCBN&PCD inserts
Inserts shape	**USF**  A91	**HF**  A91	**HM**  A92	**HR**  A93	**LH**  A93	Without chipbreaker  A93	Without chipbreaker  A132
	SF  A91	**EF**  A92	**EM**  A92		**LC**  A93		Without chipbreaker  A132
Tool holder type **SDJCR/L□□E/F/H07**	DC□□0702□□	DC□□ 0702□□	DC□□0702□□		DCGX 0702□□	DC□□ 0702□□	DC□□ 0702□□
SDJCR/L□□H/K/M/P11	DC□□ 11T3□□	DC□□ 11T3□□	DC□□11T3□□	DC□□11T3□□	DCGX 11T3□□	DC□□ 11T3□□	DC□□ 11T3□□

Corresponding tool holders of insert DC□□ S-type clamping

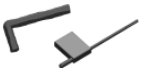
SDNCN

Kr:62°30'



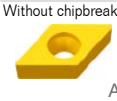
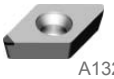
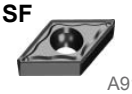
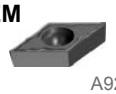
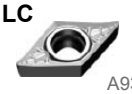
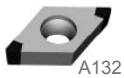




Type		Stock	Basic dimensions(mm)						Screw	Shim	Shim screw	Wrench
			a	b	L	h	s	e				
SDNCN	**1010E07**	▲	10	10	70	10	5	20	I60M2.5×6.5	—	—	WT07IP
	1212F07	▲	12	12	80	12	6	20				
	1212H11	▲	12	12	100	12	6	30	I60M3.5×8	—	—	WT15IP
	1616H11	▲	16	16	100	16	8	30	I60M3.5×12	D11BS	SM5×8.65XA	WT15IP WH35L
	2020K11	▲	20	20	125	20	10	30				
	2525M11	▲	25	25	150	25	12.5	30				

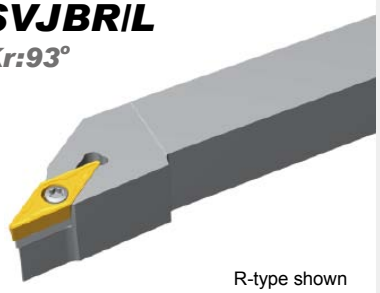
▲Stock available △Make-to-order

Applicable inserts

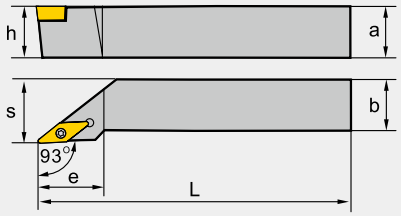
Application		For extra finishing	For finishing	For semi-finishing	For roughing	For Al machining	For cast iron machining	PCBN&PCD inserts
Inserts shape		**USF**  A91	**HF**  A91	**HM**  A92	**HR**  A93	**LH**  A93	Without chipbreaker  A93	Without chipbreaker  A132
		SF  A91	**EF**  A92	**EM**  A92		**LC**  A93		Without chipbreaker  A132
Tool holder type	**SDNCN□□E/F07**	DC□□0702□□	DC□□ 0702□□	DC□□0702□□		DCGX 0702□□	DC□□ 0702□□	DC□□ 0702□□
	SDNCN□□H/K/M11	DC□□ 11T3□□	DC□□ 11T3□□	DC□□11T3□□	DC□□11T3□□	DCGX 11T3□□	DC□□ 11T3□□	DC□□ 11T3□□

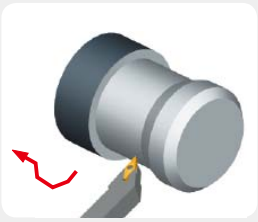
Corresponding tool holders of insert VB□□ S-type clamping

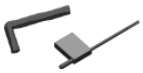
SVJBR/L
Kr:93°



R-type shown





Type		Stock		Basic dimensions(mm)						Screw	Shim	Shim screw	Wrench
		R	L	a	b	L	h	s	e				
SVJBR/L	1212F11	▲	▲	12	12	80	12	16	27	I60M2.5×6.5	—	—	WT07IP
	1616H11	▲	▲	16	16	100	16	20	27				
	2020K11	▲	▲	20	20	125	20	25	27				
	2525M11	▲	▲	25	25	150	25	32	27				
	1616H16	▲	▲	16	16	100	16	20	36	I60M3.5×12	V16BS	SM5×8.65XA	WT15IP WH35L
	2020K16	▲	▲	20	20	125	20	25	41				
	2525M16	▲	▲	25	25	150	25	32	41				
	3225P16	▲	▲	32	25	170	32	32	41				

▲Stock available △Make-to-order

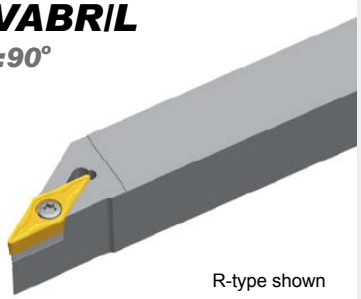
Applicable inserts

Application		For finishing	For semi-finishing	For roughing	PCBN&PCD inserts
Inserts shape		HF  A106	HM  A107	HR  A107	Without chipbreaker  A137
		NF  A106			Without chipbreaker  A137
Tool holder type	SVJBR/L□□F/H/K/M11	VB□□1102□□			
	SVJBR/L□□H/K/M/P16	VB□□1604□□	VB□□1604□□	VB□□1604□□	VB□□1604□□

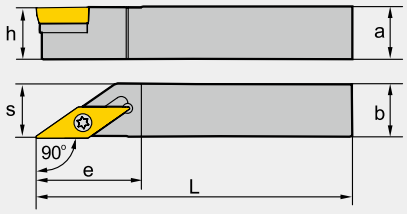
Corresponding tool holders of insert VB□□ S-type clamping

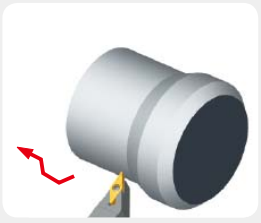
SVABR/L

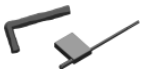
Kr:90°



R-type shown





Type		Stock		Basic dimensions(mm)						Screw	Shim	Shim screw	Wrench
		R	L	a	b	L	h	s	e				
SVABR/L	**1010F11**	△	△	10	10	80	10	10	25	I60M2.5×6.5	—	—	WT07IP
	1616H16	△	△	16	16	100	16	16	28	I60M3.5×12	V16BS	SM5×8.65XA	WT15IP WH35L
	2020K16	△	△	20	20	125	20	20	28				
	2525M16	△	△	25	25	150	25	25	28				

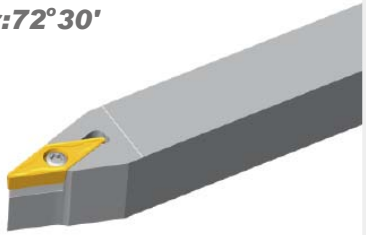
▲Stock available △Make-to-order

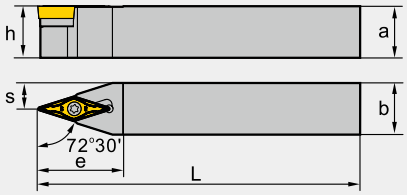
Applicable inserts

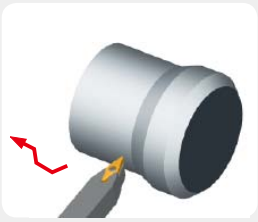
Application		For finishing	For semi-finishing	For roughing	PCBN&PCD inserts
Inserts shape		**HF**  A106	**HM**  A107	**HR**  A107	Without chipbreaker  A137
		NF  A106			Without chipbreaker  A137
Tool holder type	**SVABR/L□□F11**	VB□□1102□□			
	SVABR/L□□H/K/M16	VB□□1604□□	VB□□1604□□	VB□□1604□□	VB□□1604□□

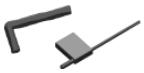
Corresponding tool holders of insert VB□□ S-type clamping

SVVBN
Kr:72°30'







Type		Stock	Basic dimensions(mm)						Screw	Shim	Shim screw	Wrench
			a	b	L	h	s	e				
SVVBN	**1212F11**	▲	12	12	80	12	6	27	I60M2.5×6.5	—	—	WT07IP
	1616H11	▲	16	16	100	16	8	27				
	2020K11	▲	20	20	125	20	10	30				
	1616H16	▲	16	16	100	16	8	33	I60M3.5×12	V16BS	SM5×8.65XA	WT15IP WH35L
	2020K16	▲	20	20	125	20	10	33				
	2525M16	▲	25	25	150	25	12.5	38				

▲Stock available △Make-to-order

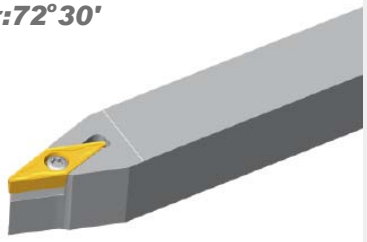
Applicable inserts

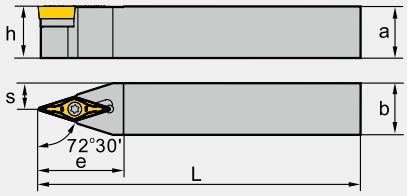
Application		For finishing	For semi-finishing	For roughing	PCBN&PCD inserts
Inserts shape		**HF**  A106	**HM**  A107	**HR**  A107	Without chipbreaker  A137
		NF  A106			Without chipbreaker  A137
Tool holder type	**SVVBN□□F/H/K11**	VB□□1102□□			
	SVVBN□□H/K/M16	VB□□1604□□	VB□□1604□□	VB□□1604□□	VB□□1604□□

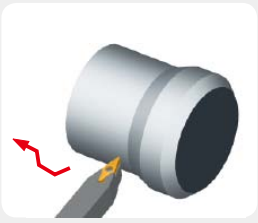
Corresponding tool holders of insert VC□□ S-type clamping

SVVCN

Kr:72°30'



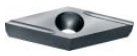




Type		Stock	Basic dimensions(mm)						Screw	Shim	Shim screw	Wrench
			a	b	L	h	s	e				
SVVCN	**1212F11**	▲	12	12	80	12	6	27	I60M2.5×6.5	—	—	WT07IP
	1212M11	▲	12	12	150	12	6	27				
	1616H11	▲	16	16	100	16	8	27				
	2020K11	▲	20	20	125	20	10	30				
	2525M11	△	25	25	150	25	12.5	38				
	1616H16	▲	16	16	100	16	8	33	I60M3.5×12	V16BSC	SM5×8.65XA	WT15IP WH35L
	2020K16	▲	20	20	125	20	10	33				
	2525M16	▲	25	25	150	25	12.5	38				

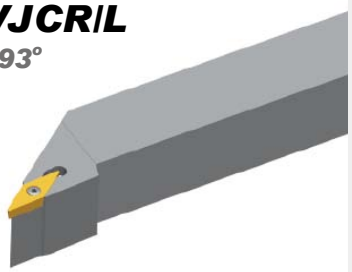
▲Stock available △Make-to-order

Applicable inserts

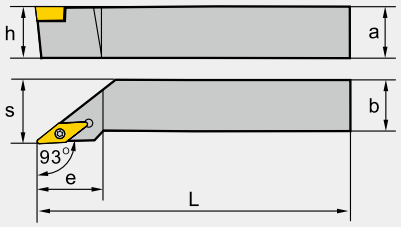
Application		For extra finishing	For finishing	For Al machining	PCBN&PCD inserts
Inserts shape		**USF**  A103	**HF**  A103	**LH**  A104	Without chipbreaker  A138
		SF  A103	**NF**  A103	**LC**  A104	Without chipbreaker  A138
Tool holder type	**SVVCN□□F/H/K/M11**	VC□□1103□□	VC□□1103□□	VCGX1103□□	
	SVVCN□□H/K/M16		VC□□1604□□	VCGX1604□□	VC□□1604□□

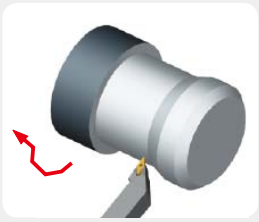
Corresponding tool holders of insert VC□□ S-type clamping

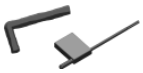
SVJCR/L
Kr:93°



R-type shown

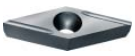




Type		Stock		Basic dimensions(mm)						Screw	Shim	Shim screw	Wrench
		R	L	a	b	L	h	s	e				
SVJCR/L	1010E11	▲	△	10	10	70	10	12	22	I60M2.5×6.5	—	—	WT07IP
	1212F11	△	△	12	12	80	12	16	27				
	1616H11	▲	▲	16	16	100	16	20	27				
	2020K11	▲	▲	20	20	125	20	25	27				
	2525M11	▲	▲	25	25	150	25	32	27				
	1616H16	▲	▲	16	16	100	16	20	36	I60M3.5×12	V16BSC	SM5×8.65XA	WT15IP WH35L
	2020K16	▲	▲	20	20	125	20	25	41				
	2525M16	▲	▲	25	25	150	25	32	41				
	3225P16	△	△	32	25	170	32	32	41				

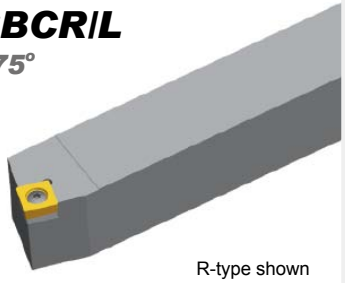
▲Stock available △Make-to-order

Applicable inserts

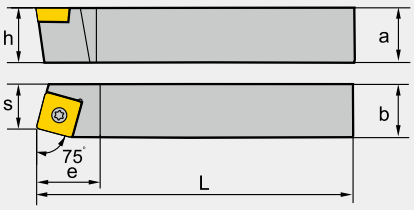
Application		For extra finishing	For finishing	For Al machining	PCBN&PCD inserts
Inserts shape		USF  A103	HF  A103	LH  A104	Without chipbreaker  A138
		SF  A103	NF  A103	LC  A104	Without chipbreaker  A138
Tool holder type	SVJCR/L□□E/F/H/K/M11	VC□□1103□□	VC□□1103□□	VCGX1103□□	
	SVJCR/L□□H/K/M/P16		VC□□1604□□	VCGX1604□□	VC□□1604□□

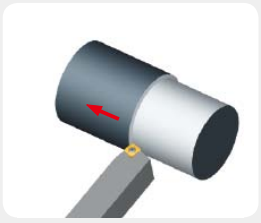
Corresponding tool holders of insert SC□□ S-type clamping

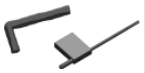
SSBCR/L
Kr:75°



R-type shown



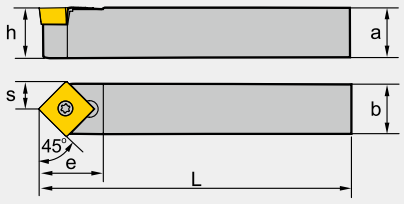


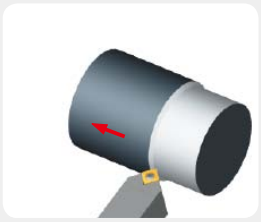
Type		Stock		Basic dimensions(mm)						Screw	Shim	Shim screw	Wrench
		R	L	a	b	L	h	s	e				
SSBCR/L	**1212F09**	▲	▲	12	12	80	12	11	16	I60M3.5×8	—	—	WT15IP
	1616H09	▲	▲	16	16	100	16	13	16	I60M3.5×8	S09BS	SM5×8.65XA	WT15IP WH35L
	2020K12	▲	▲	20	20	125	20	17	25	I60M4×11X	S12BS	SM6×10XA	WT15IP WH40L

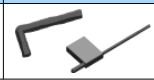
▲Stock available △Make-to-order

SSDCN
Kr:45°







Type		Stock	Basic dimensions(mm)						Screw	Shim	Shim screw	Wrench
			a	b	L	h	s	e				
SSDCN	**1212F09**	▲	12	12	80	12	6	15.5	I60M3.5×8	—	—	WT15IP
	1616H09	▲	16	16	100	16	8	15.5	I60M3.5×12	S09BS	SM5×8.65XA	WT15IP WH35L

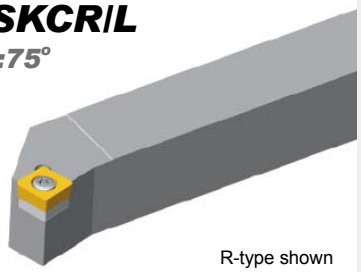
▲Stock available △Make-to-order

Applicable inserts

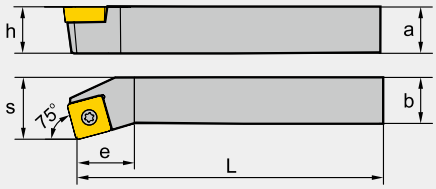
Application		For finishing	For semi-finishing	For roughing	For Al machining	For cast iron machining	PCBN&PCD inserts
Inserts shape		**HF**  A96	**HM**  A96	**HR**  A97	**LH**  A97	Without chipbreaker  A97	Without chipbreaker  A134
		EF  A96	**EM**  A96		**LC**  A97		Without chipbreaker  A134
Tool holder type	**SSBCR/L□□F/H09**	SC□□09T3□□	SC□□09T3□□	SC□□09T3□□	SCGX09T3□□	SC□□09T3□□	
	SSBCR/L□□K12		SC□□1204□□	SC□□1204□□	SCGX1204□□	SC□□1204□□	SC□□1204□□
	SSDCN□□F/H09	SC□□09T3□□	SC□□09T3□□	SC□□09T3□□	SCGX09T3□□	SC□□09T3□□	

Corresponding tool holders of insert SC□□ S-type clamping

SSKCR/L
Kr:75°



R-type shown

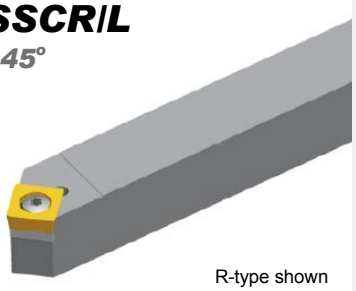




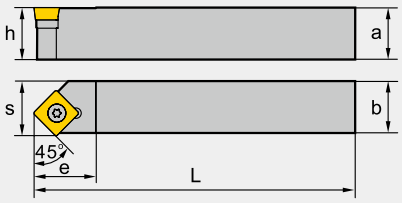
Type		Stock		Basic dimensions(mm)						Screw	Shim	Shim screw	Wrench
		R	L	a	b	L	h	s	e				
SSKCR/L	**1616H09**	▲	△	16	16	100	16	20	13	I60M3.5×12	S09BS	SM5×8.65XA	WT15IP WH35L

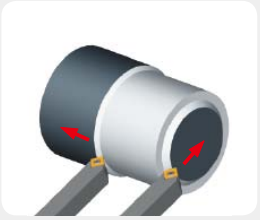
▲Stock available △Make-to-order

SSSCR/L
Kr:45°



R-type shown

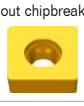




Type		Stock		Basic dimensions(mm)						Screw	Shim	Shim screw	Wrench
		R	L	a	b	L	h	s	e				
SSSCR/L	**1616H09**	▲	▲	16	16	100	16	17	16	I60M3.5×12	—	—	WT15IP
	2020K12	▲	▲	20	20	125	20	21	24	I60M4×11X	S12BS	SM6×10XA	WT15IP WH40L

▲Stock available △Make-to-order

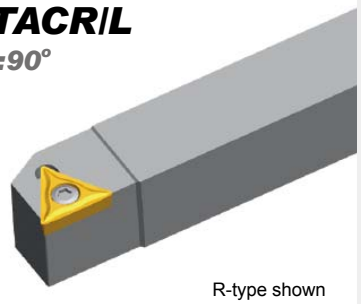
Applicable inserts

Application	For finishing	For semi-finishing	For roughing	For Al machining	For cast iron machining	PCBN&PCD inserts
Inserts shape	**HF**  A96	**HM**  A96	**HR**  A97	**LH**  A97	Without chipbreaker  A97	Without chipbreaker  A134
	EF  A96	**EM**  A96		**LC**  A97		Without chipbreaker  A134

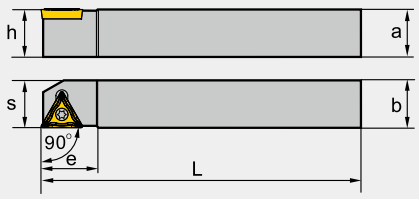
Tool holder type							
	SSKCR/L□□H09	SC□□09T3□□	SC□□09T3□□	SC□□09T3□□	SCGX09T3□□	SC□□09T3□□	
	SSSCR/L□□H09	SC□□09T3□□	SC□□09T3□□	SC□□09T3□□	SCGX09T3□□	SC□□09T3□□	
	SSSCR/L□□K12		SC□□1204□□	SC□□1204□□	SCGX1204□□	SC□□1204□□	SC□□1204□□

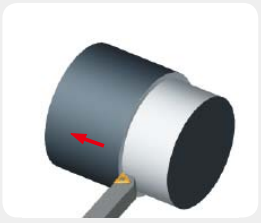
Corresponding tool holders of insert TC□□ S-type clamping

STACR/L
Kr:90°



R-type shown





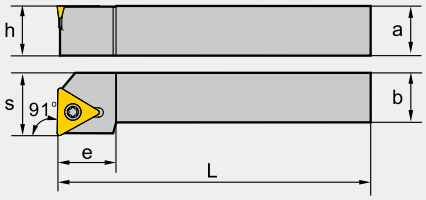
Type		Stock		Basic dimensions(mm)						Screw	Wrench		
		R	L	a	b	L	h	s	e				
STACR/L	**1212F11**	△	△	12	12	80	12	12	14	I60M2.5×6.5	WT07IP		

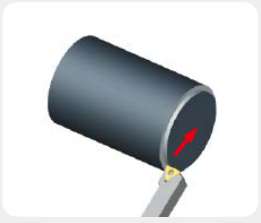
▲Stock available △Make-to-order

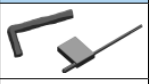
STFCR/L
Kr:91°



R-type shown





Type		Stock		Basic dimensions(mm)						Screw	Shim	Shim screw	Wrench
		R	L	a	b	L	h	s	e				
STFCR/L	**1212F11**	▲	▲	12	12	80	12	16	14	I60M2.5×6.5	—	—	WT07IP
	1616H11	▲	▲	16	16	100	16	20	14				
	1616H16	▲	▲	16	16	100	16	20	19	I60M3.5×12	T16BS	SM5×8.65XA	WT15IP WH35L
	2020K16	▲	▲	20	20	125	20	25	19				

▲Stock available △Make-to-order

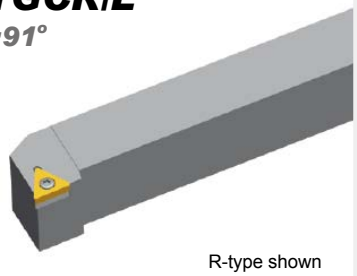
Applicable inserts

Application		For finishing	For semi-finishing	For roughing	For Al machining	For cast iron machining	PCBN&PCD inserts
Inserts shape		**HF**  A99	**HM**  A101	**HR**  A101	**LH**  A102	Without chipbreaker  A102	Without chipbreaker  A135
		EF  A100	**EM**  A100		**LC**  A101		Without chipbreaker  A135
Tool holder type	**STACR/L□□F11**	TC□□1102□□	TC□□1102□□	TC□□1102□□	TCGX1102□□	TC□□1102□□	TC□□1102□□
	STFCR/L□□F/H11	TC□□1102□□	TC□□1102□□	TC□□1102□□	TCGX1102□□	TC□□1102□□	TC□□1102□□
	STFCR/L□□H/K16	TC□□16T3□□	TC□□16T3□□	TC□□16T3□□	TCGX16T3□□	TC□□16T3□□	TC□□16T3□□

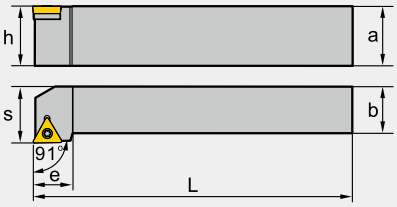
Corresponding tool holders of insert TC□□ S-type clamping

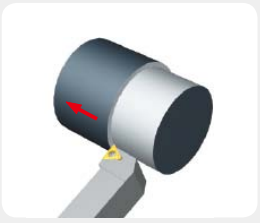
STGCR/L

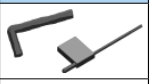
Kr:91°



R-type shown





Type		Stock		Basic dimensions(mm)						Screw	Shim	Shim screw	Wrench
		R	L	a	b	L	h	s	e				
STGCR/L	**0808D09**	▲	△	08	08	60	8	10	11	I60M2.2×5.5	—	—	WT06IP
	1010E09	▲	▲	10	10	70	10	12	11				
	1212F11	▲	▲	12	12	80	12	16	14	I60M2.5×6.5	—	—	WT07IP
	1616H11	▲	▲	16	16	100	16	20	16				
	2020K16	▲	▲	20	20	125	20	25	21	I60M3.5×12	T16BS	SM5×8.65XA	WT15IP WH35L
	2525M16	▲	▲	25	25	150	25	32	21				

▲Stock available △Make-to-order

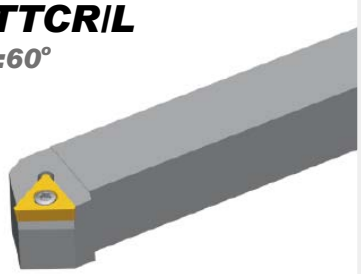
Applicable inserts

Application		For extra finishing	For finishing	For semi-finishing	For roughing	For Al machining	For cast iron machining	PCBN&PCD inserts
Inserts shape		**SF**  A98	**HF**  A99	**HM**  A101	**HR**  A101	**LH**  A102	Without chipbreaker  A102	Without chipbreaker  A135
			EF  A100	**EM**  A100		**LC**  A101		Without chipbreaker  A135
Tool holder type	**STGCR/L□□D/E09**	TC□□0902□□	TC□□0902□□	TC□□0902□□	TC□□0902□□	TCGX0902□□	TC□□0902□□	TC□□0902□□
	STGCR/L□□F/H11		TC□□1102□□	TC□□1102□□	TC□□1102□□	TCGX1102□□	TC□□1102□□	TC□□1102□□
	STGCR/L□□K/M16		TC□□16T3□□	TC□□16T3□□	TC□□16T3□□	TCGX16T3□□	TC□□16T3□□	TC□□16T3□□

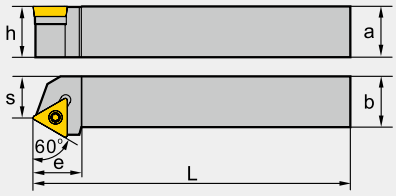
Corresponding tool holders of insert TC□□ S-type clamping

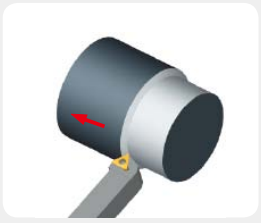
STTCR/L

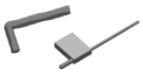
Kr:60°



R-type shown



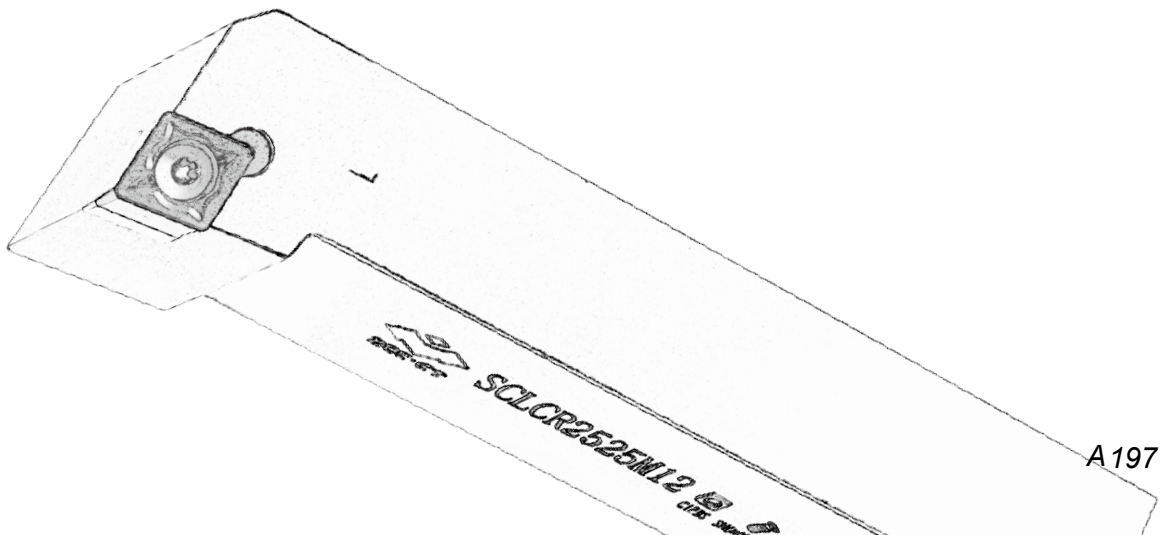


Type		Stock		Basic dimensions(mm)						Screw	Shim	Shim screw	Wrench
		R	L	a	b	L	h	s	e				
STTCR/L	**1616H11**	△	△	16	16	100	16	13	14	I60M2.5×6.5	—	—	WT07IP
	1616H16	△	△	16	16	100	16	13	19	I60M3.5×12	T16BS	SM5×8.65XA	WT15IP WH35L
	2020K16	△	△	20	20	125	20	17	19				

▲Stock available △Make-to-order

Applicable inserts

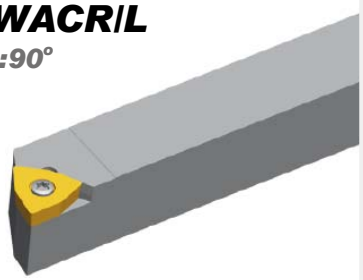
Application		For finishing	For semi-finishing	For roughing	For Al machining	For cast iron machining	PCBN&PCD inserts
Inserts shape		**HF**  A99	**HM**  A101	**HR**  A101	**LH**  A102	Without chipbreaker  A102	Without chipbreaker  A135
		EF  A100	**EM**  A100		**LC**  A101		Without chipbreaker  A135
Tool holder type	**STTCR/L□□H11**	TC□□1102□□	TC□□1102□□	TC□□1102□□	TCGX1102□□	TC□□1102□□	TC□□1102□□
	STTCR/L□□H/K16	TC□□16T3□□	TC□□16T3□□	TC□□16T3□□	TCGX16T3□□	TC□□16T3□□	TC□□16T3□□



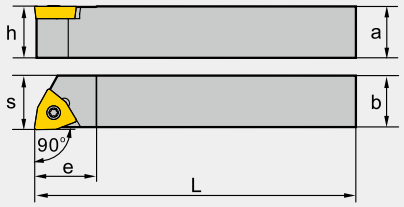
Corresponding tool holders of insert WC□□ S-type clamping

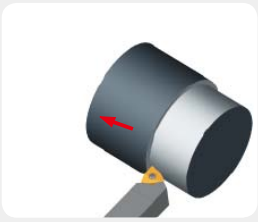
SWACR/L

Kr:90°



R-type shown





Type		Stock		Basic dimensions(mm)						Screw	Wrench	—	—
		R	L	a	b	L	h	s	e			—	—
SWACR/L	**1010E04**	△	△	10	10	70	10	10	10	I60M2.5×6.5	WT07IP	—	—
	1212F04	▲	△	12	12	80	12	12	14				
	1616H06	▲	△	16	16	100	16	16	20	I60M3×7	WT10IP	—	—
	2020K08	▲	▲	20	20	125	20	20	24	I60M3.5×12	WT15IP	—	—

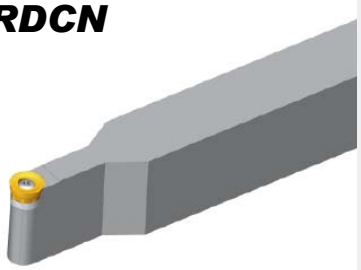
▲Stock available △Make-to-order

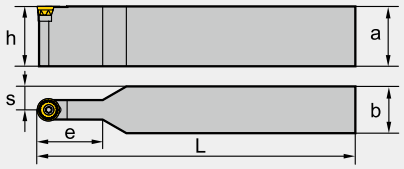
Applicable inserts

Application	For finishing
Inserts shape	**53**  A105
Tool holder type **SWACR/L□□E/F04**	WC□X0402□□
Tool holder type **SWACR/L□□H06**	WC□X06T3□□
Tool holder type **SWACR/L□□K08**	WC□X0804□□

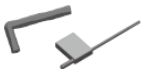
Corresponding tool holders of insert RC□□ S-type clamping

SRDCN







Type		Stock	Basic dimensions(mm)						Screw	Shim	Shim screw	Wrench
			a	b	L	h	s	e				
SRDCN	**1616H08**	△	16	16	100	16	8	16	I60M3×7	—	—	WT10IP
	1616H10	△	16	16	100	16	8	25	I60M3.5×10	—	—	WT15IP
	2020K10	△	20	20	125	20	10	25				
	2525M10	▲	25	25	150	25	12.5	25				
	2020K12	▲	20	20	125	20	10	35	I60M3.5×12	R12BS	SM5×8.65XA	WT15IP WH35L
	2525M12	▲	25	25	150	25	12.5	35				
	3225P12	▲	32	25	170	32	12.5	35				
	3225P16	▲	32	25	170	32	12.5	35	I60M4×15X	R16BS	SM6×10XA	WT15IP WH40L
	3232P16	▲	32	32	170	32	16	40				
	4040S16	▲	40	40	250	40	20	50				

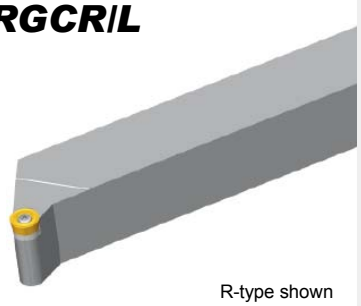
▲Stock available △Make-to-order

Applicable inserts

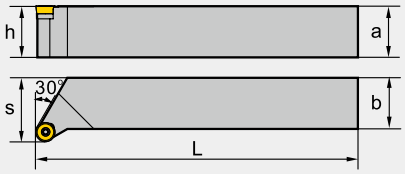
Application		For semi-finishing	For roughing	For Al machining	
Inserts shape		 A94	 A94	LH  A94	 A94
Tool holder type	**SRDCN□□H08**	RCMT0803MO	RCMT0803MO	RCGX0803MO-LH	RCMT0803MO
	SRDCN□□H/K/M10	RCMT10T3MO	RCMT10T3MO		RCMT10T3MO
	SRDCN□□K/M/P12	RCMT1204MO	RCMT1204MO		RCMT1204MO
	SRDCN□□P/S16	RCMT1606MO	RCMT1606MO		RCMT1606MO

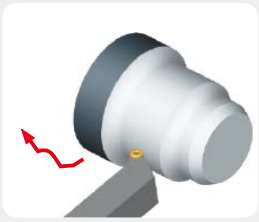
Corresponding tool holders of insert RC□□ S-type clamping

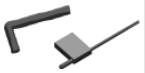
SRGCR/L



R-type shown





Type		Stock		Basic dimensions(mm)					Screw	Shim	Shim screw	Wrench
		R	L	a	b	L	h	s				
SRGCR/L	**1616H08**	△	△	16	16	100	16	20	I60M3×7	—	—	WT10IP
	1616H10	△	△	16	16	100	16	20	I60M3.5×10	—	—	WT15IP
	2020K10	▲	▲	20	20	125	20	25				
	2525M10	▲	▲	25	25	150	25	32				
	2020K12	▲	△	20	20	125	20	27	I60M3.5×12	R12BS	SM5×8.65XA	WT15IP WH35L
	2525M12	▲	▲	25	25	150	25	32				
	3232P16	▲	△	32	32	170	32	40	I60M4×15X	R16BS	SM6×10XA	WT15IP WH40L

▲Stock available △Make-to-order

Applicable inserts

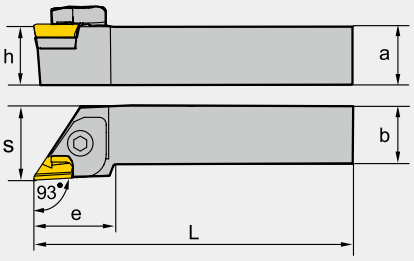
Application	For semi-finishing	For roughing	For Al machining	
Inserts shape	 A94	 A94	LH  A94	 A94
Tool holder type **SRGCR/L□□H08**	RCMT0803MO	RCMT0803MO	RCGX0803MO-LH	RCMT0803MO
SRGCR/L□□H/K/M10	RCMT10T3MO	RCMT10T3MO		RCMT10T3MO
SRGCR/L□□K/M12	RCMT1204MO	RCMT1204MO		RCMT1204MO

Corresponding tool holders of insert KNUX□□ C-type clamping

CKJNR/L
Kr:93°



R-type shown





Type		Stock	Basic dimensions(mm)						Applicable inserts	Clamp	Clamp screw	Spring	Clamping stud	Shim	Shim screw	Wrench
			a	b	L	h	s	e								
CKJNR	2525M16	△	25	25	150	25	32	32	KNUX1604□□R A85	C6R1T	CM6×25A	SPR1 SPR2	P0515	K16CC	SM3×10B	WH20L WH40L
	3232P16	△	32	32	170	32	40	32								
	4040R16	△	40	40	200	40	50	32								
CKJNL	2525M16	△	25	25	150	25	32	32	KNUX1604□□L A85	C6L1T				K16CCL		
	3232P16	△	32	32	170	32	40	32								
	4040R16	△	40	40	200	40	50	32								

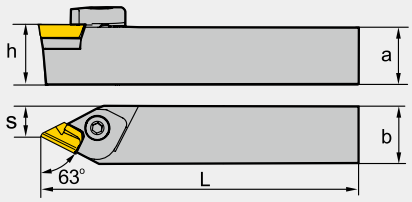
▲Stock available △Make-to-order

Corresponding tool holders of insert KNUX□□ C-type clamping

CKNNR/L
Kr:63°



R-type shown



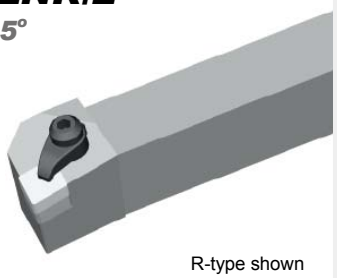


Type		Stock	Basic dimensions(mm)					Applicable inserts	Clamp	Clamp screw	Spring	Clamping stud	Shim	Shim screw	Wrench
			a	b	L	h	s								
CKNNR	2525M16	△	25	25	150	25	14.3	KNUX1604□□R A85	C6R1T	CM6×25A	SPR1 SPR2	P0515	K16CC	SM3×10B	WH20L WH40L
	3232P16	△	32	32	170	32	16.8								
CKNNL	2525M16	△	25	25	150	25	14.3	KNUX1604□□L A85	C6L1T	CM6×25A	SPR1 SPR2	P0515	K16CCL	SM3×10B	
	3232P16	△	32	32	170	32	16.8								

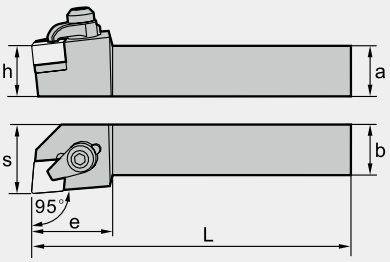
▲Stock available △Make-to-order

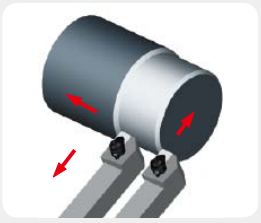
Corresponding tool holders of insert CN□□ C-type clamping

CCLNR/L
Kr:95°



R-type shown





Type		Stock		Basic dimensions(mm)						Applicable inserts	Clamp	Clamping screw	Wrench	Shim	Screw for clamping shim	Spring
		R	L	a	b	L	h	s	e							
CCLNR/L	**2020K12**	△	△	20	20	125	20	27	32	CNGN1207□□ (1204□□) A143	C1RC	CM6×30B	WH20L WH40L	C12CC-07 (C12CC-04)	SM3×10B	SPR1
	2525M12	△	△	25	25	150	25	27	36							
	2525M16	△	△	25	25	150	25	32	36	CNGN1606□□ (1604□□) A143	C2RC	CM8×30B	WH30L WH50L	C16CC-06 (C16CC-04)	SM4×12B	SPR3
	3225P16	△	△	32	25	170	32	32	36							

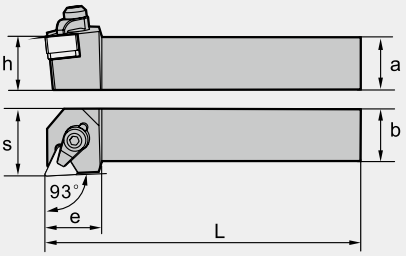
▲Stock available △Make-to-order

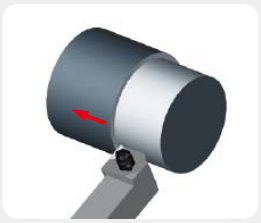
Corresponding tool holders of insert TN□□ C-type clamping

CTJNR/L
Kr:93°



R-type shown





Type		Stock		Basic dimensions(mm)						Applicable inserts	Clamp	Clamping screw	Wrench	Shim	Screw for clamping shim	Spring
		R	L	a	b	L	h	s	e							
CTJNR/L	**2020K16**	△	△	20	20	125	20	25	30	TNGN1607□□ (1604□□) A149	C1RC	CM6×30B	WH20L WH40L	T16CC-07 (T16CC-04)	SM3×10B	SPR1
	2525M16	△	△	25	25	150	25	32	30							

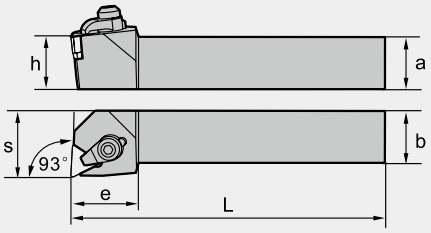
▲Stock available △Make-to-order

Corresponding tool holders of insert TN□□ C-type clamping

CTUNR/L
Kr:93°



R-type shown



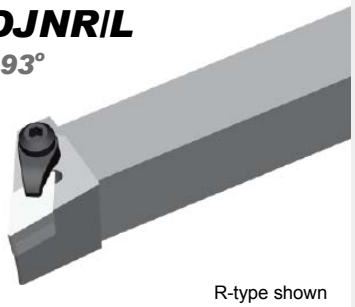


Type		Stock		Basic dimensions(mm)						Applicable inserts	Clamp	Clamping screw	Wrench	Shim	Screw for clamping shim	Spring
		R	L	a	b	L	h	s	e							
CTUNR/L	**2020K16**	△	△	20	20	125	20	25	27	TNGN1607□□ (1604□□) A149	C1RC	CM6×30B	WH20L WH40L	T16CC-07 (T16CC-04)	SM3×10B	SPR1
	2525M16	△	△	25	25	150	25	32	27							

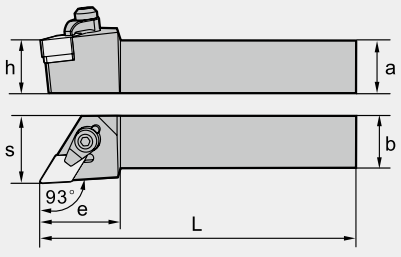
▲Stock available △Make-to-order

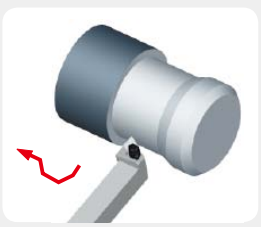
Corresponding tool holders of insert DN□□ C-type clamping

CDJNR/L
Kr:93°



R-type shown





Type		Stock		Basic dimensions(mm)						Applicable inserts	Clamp	Clamping screw	Wrench	Shim	Screw for clamping shim	Spring
		R	L	a	b	L	h	s	e							
CDJNR/L	**2525M15**	△	△	25	25	150	25	32	32	DNGN1507□□ (1504□□) A145	C1RC	CM6×30B	WH20L WH40L	D15CC-07 (D15CC-04)	SM3×10B	SPR1
	3225P15	△	△	32	25	170	32	32	32							

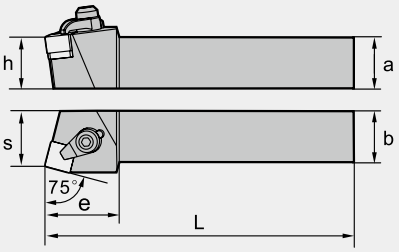
▲Stock available △Make-to-order

Corresponding tool holders of insert SN□□ C-type clamping

CSRNR/L
Kr:75°



R-type shown





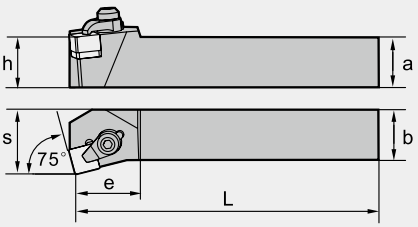
Type		Stock		Basic dimensions(mm)						Applicable inserts	Clamp	Clamping screw	Wrench	Shim	Screw for clamping shim	Spring
		R	L	a	b	L	h	s	e							
CSRNR/L	**2020K12**	△	△	20	20	125	20	22	32	SNGN1207□□ (1204□□) A147	C1RC	CM6×30B	WH20L WH40L	S12CC-07 (S12CC-04)	SM3×10B	SPR1
	2525M12	△	△	25	25	150	25	27	32							
	3225P12	△	△	32	25	170	32	27	32							
	3225P15	△	△	32	25	170	32	32	40	SNGN1507□□ A147	C2RC	CM8×30B	WH30L WH50L	S15CC-07	SM4×12B	SPR3
	4040R15	△	△	40	40	200	40	43	40							

▲Stock available △Make-to-order

CSKNR/L
Kr:75°



R-type shown





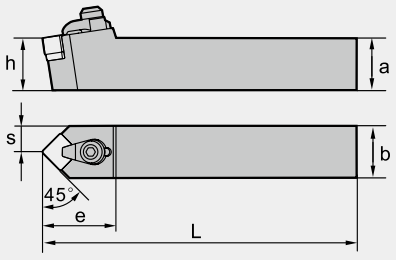
Type		Stock		Basic dimensions(mm)						Applicable inserts	Clamp	Clamping screw	Wrench	Shim	Screw for clamping shim	Spring
		R	L	a	b	L	h	s	e							
CSKNR/L	**2020K12**	△	△	20	20	125	20	25	25	SNGN1207□□ (1204□□) A147	C1RC	CM6×30B	WH20L WH40L	S12CC-07 (S12CC-04)	SM3×10B	SPR1
	2525M12	△	△	25	25	150	25	32	25							
	3225P12	△	△	32	25	170	32	32	25							
	3225P15	△	△	32	25	170	32	32	30	SNGN1507□□ A147	C2RC	CM8×30B	WH30L WH50L	S15CC-07	SM4×12B	SPR3

▲Stock available △Make-to-order

Corresponding tool holders of insert SN□□ C-type clamping

CSDNN
Kr:45°







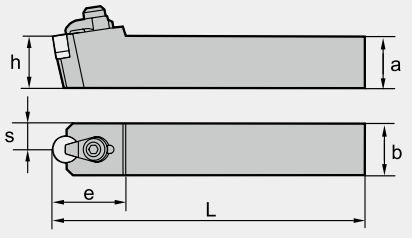
Type		Stock	Basic dimensions(mm)						Applicable inserts	Clamp	Clamping screw	Wrench	Shim	Screw for clamping shim	Spring
			a	b	L	h	s	e							
CSDNN	**2020K12**	△	20	20	125	20	10	35	SNGN1207□□ (1204□□) A147	C1RC	CM6×30B	WH20L WH40L	S12CC-07 (S12CC-04)	SM3×10B	SPR1
	2525M12	△	25	25	150	25	12.5	35							
	3225P12	△	32	25	170	32	12.5	35							

▲Stock available △Make-to-order

Corresponding tool holders of insert RN□□ C-type clamping

CRDNN





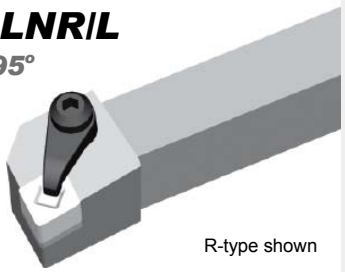


Type		Stock	Basic dimensions(mm)						Applicable inserts	Clamp	Clamping screw	Wrench	Shim	Screw for clamping shim	Spring
			a	b	L	h	s	e							
CRDNN	**2020K12**	△	20	20	125	20	10	32	RNGN1207□□ (1204□□) A150	C1RC	CM6×30B	WH20L WH40L	R12CC-07 (R12CC-04)	SM3×10B	SPR1
	2525M12	△	25	25	150	25	12.5	32							
	3225P12	△	32	25	170	32	12.5	32							
	3232P15	△	32	32	170	32	17.5	40	RNGN1507□□ A150	C2RC	CM8×30B	WH20L WH50L	R15CC-07	SM3×10B	SPR3
	4040R15	△	40	40	200	40	20	40							

▲Stock available △Make-to-order

Corresponding tool holders of insert CN□□ J-type clamping

JCLNR/L
Kr:95°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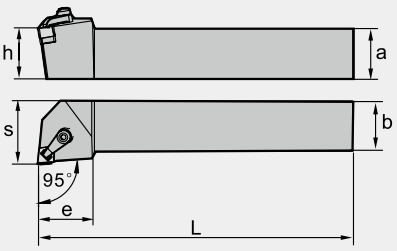


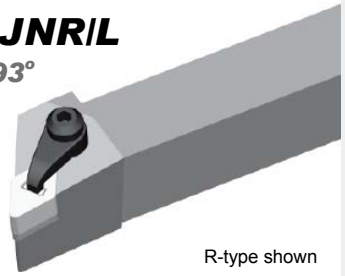


Type		Stock		Basic dimensions(mm)						Applicable inserts	Clamp	Clamping screw	Wrench	Shim	Screw for clamping shim	Spring
		R	L	a	b	L	h	s	e							
JCLNR/L	**2020K12**	△	△	20	20	125	20	29	32	CNGX1207□□ A144	C1RJ	CM6×30B	WH20L WH40L	C12CC-07	SM3×10B	SPR1
	2525M12	△	△	25	25	150	25	32	32							

▲Stock available △Make-to-order

Corresponding tool holders of insert DN□□ J-type clamping

JDJNR/L
Kr:93°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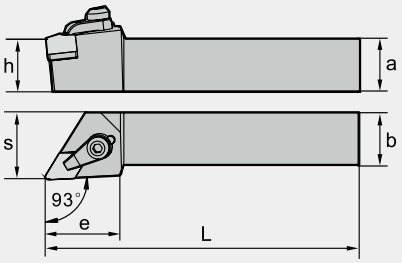




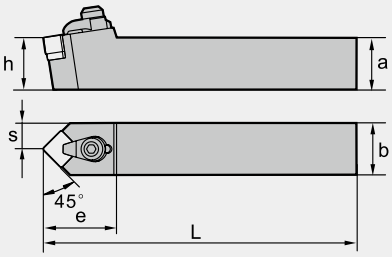
Type		Stock		Basic dimensions(mm)						Applicable inserts	Clamp	Clamping screw	Wrench	Shim	Screw for clamping shim	Spring
		R	L	a	b	L	h	s	e							
JDJNR/L	**2525M15**	△	△	25	25	150	25	32	38	DNGX1507□□ A145	C1RJ	CM6×30B	WH20L WH40L	D15CC-07	SM3×10B	SPR1
	3225P15	△	△	32	25	170	32	32	38							

▲Stock available △Make-to-order

Corresponding tool holders of insert SN□□ J-type clamping

JSDNN
Kr:45°







Type		Stock	Basic dimensions(mm)						Applicable inserts	Clamp	Clamping screw	Wrench	Shim	Screw for clamping shim	Spring
			a	b	L	h	s	e							
JSDNN	2020K12	△	20	20	125	20	10	40	SNGX1207□□ A146	C1RJ	CM6×30B	WH20L WH40L	S12CC-07	SM3×10B	SPR1
	2525M12	△	25	25	150	25	12.5	40							
	3225P12	△	32	25	170	32	12.5	40							

▲Stock available △Make-to-order

How to select internal turning tools

Explanation of internal turning tools detailed table

● Listed according to clamping types.

Approach angle of tools

Tools type
The first 4 letters in the type description stands for tool shape and applicatio.

Insert type

Specification chart

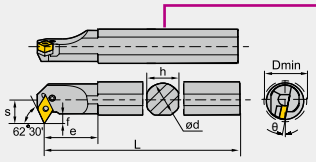
Application chart
The arrow shows suitable applications such as internal turning, profiling and end turning, etc.

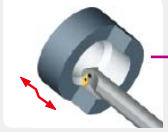
Corresponding tool holders of insert DN□□ P-type clamping

PDSNR/L
Kr:62°30'



R-type shown





Type	Stock		Basic dimensions(mm)								Screw	Wrench	Lever	Shim	Shim pin
	R	L	Dmin	ød	h	L	S	θ	e	f					
S32R-PDSNR/L15	△	△	40	32	30	200	22	-11°	45	8.5	LEM8×21	WH30L	L4B	D15AP	SP4
S32U-PDSNR/L15	▲	▲	40	32	30	350	22	-11°	45	8.5					
S32R-PDSNR/L15-3	△	△	40	32	30	200	22	-11°	45	8.5	LEM8×21	WH30L	L4	D15AP	SP4
S32U-PDSNR/L15-3	▲	△	40	32	30	350	22	-11°	45	8.5					
S40S-PDSNR/L15	△	△	50	40	37	250	27	-11°	43	9.4	LEM8×21	WH30L	L4B	D15AP	SP4
S40V-PDSNR/L15	▲	▲	50	40	37	400	27	-11°	43	9.4					
S40S-PDSNR/L15-3	△	△	50	40	37	250	27	-11°	43	9.4	LEM8×21	WH30L	L4	D15AP	SP4
S40V-PDSNR/L15-3	▲	△	50	40	37	400	27	-11°	43	9.4					
※A32S- PDSNR/L15	△	△	40	32	31	250	22	-11°	45	8.5	LEM8×21	WH30L	L4B	D15AP	SP4
※A32S- PDSNR/L15-3	△	△	40	32	31	250	22	-11°	45	8.5	LEM8×21	WH30L	L4	D15AP	SP4

※ Tool holders with oil hole ▲Stock available △Make-to-order

Applicable inserts

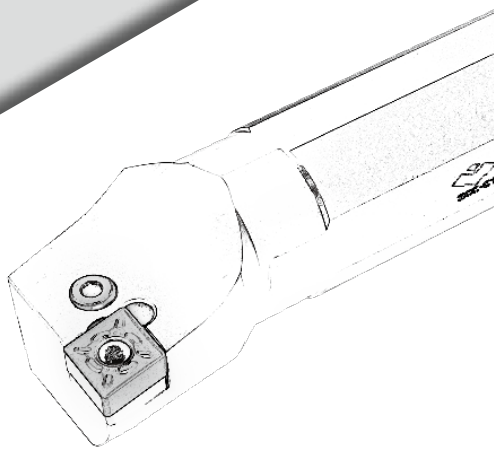
Application	For finishing	For semi-finishing	For roughing	For cast iron machining	PCBN/PCD inserts
Inserts shape	DF A59	WGM Wiper A61	DR Double -side A63	Without chipbreaker A64	Without chipbreaker A122
	WGF Wiper A59	PM A61	DR Single-side A63		Without chipbreaker A122
	SF A60	DM A62	ER Double -side A63		Without chipbreaker A122
	EF A60	EM A62	ER Single-side A63		
	NF A60	NM A62	LR Single-side A63		
Tool holder type □□-PDSNR/L15-3	DN□□1504□□	DN□□1504□□		DN□□1504□□	DN□□1504□□
Tool holder type □□-PDSNR/L15	DN□□1506□□	DN□□1506□□	DN□□1506□□	DN□□1506□□	DN□□1506□□

Tool holders with oil hole

Applicable inserts
Including applications of inserts, reference page, insert shape and corresponding tool holders.

Products specification
Including product description, stock (left and right hand), basic dimensions and applicable spare parts.

TURNING



Internal turning tools

A211 **Internal turning tools overview**

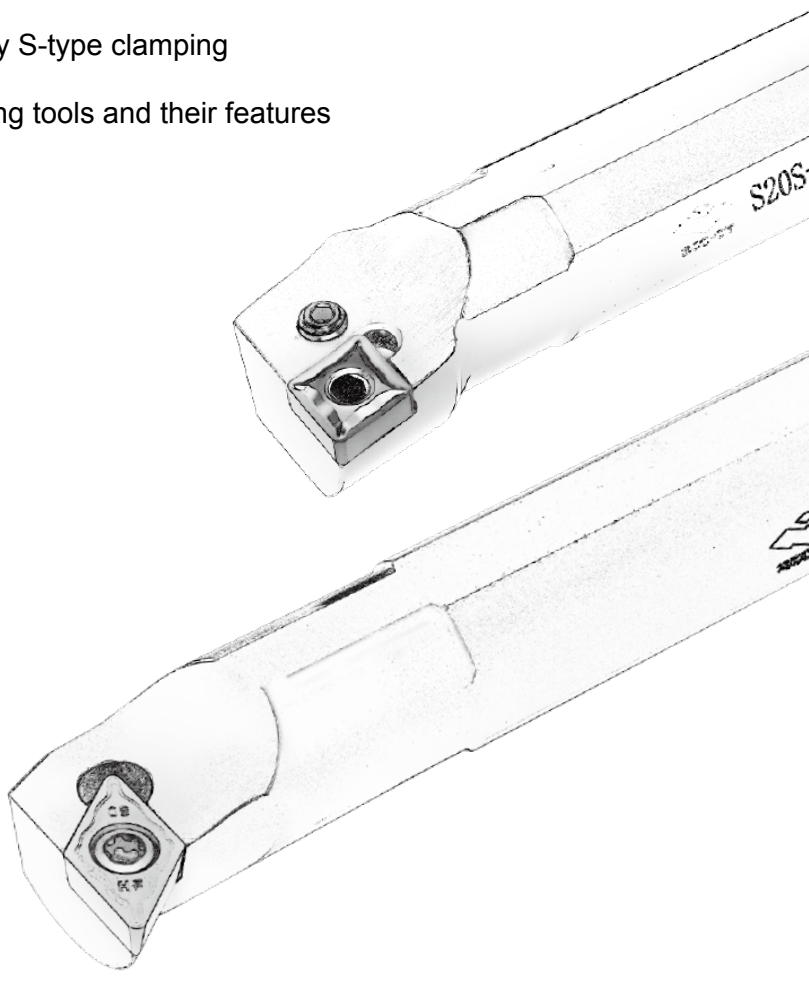
A212-A213 **Internal turning tools code key**

A214-A241 **Detailed table of internal turning tools**

A214-A219 Internal turning Tools by P-type clamping

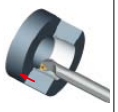
A220-A235 Internal turning tools by S-type clamping

A236-A241 Damping internal turning tools and their features



Internal turning tools



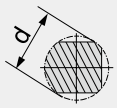
Name	Feature	62°30′	75°	90°	91°	93°	93°	95°	95°	107°30′
										
P-type internal turning tools	●The minimum machining diameter is 20mm. ●Applicable inserts are economic negative inserts. ●Hole clamping	PDSN A215	PSKN A217	PTFN A218			PDUN A216		PCLN A214	
									PWLN A219	
S-type internal turning tools	●The minimum machining diameter is 10mm. ●Applicable inserts are 5°, 7° and 11° positive inserts. ●Screw clamping.		SSKC A224	SCFC A234	STFC A225	STUP A233	SDUC A222	SDZC A223		SDQC A221
							SDUP A232		SCLC A220	SDQP A231
							SVUC A227		A235	SVQB A228
							SVUB A229		SCLP A230	SVQC A226
Damping internal turning tools	●The minimum diameter can be machined is 12mm. ●Applicable inserts are 7°、11° positive inserts. ●Good Performance on reducing shake.					STUP A240	SDUP A239		SCLP A237	SDQP A238
							SVUC A241			SVQC A241

Internal turning tools code key

Type of tool holder

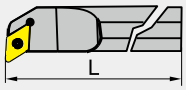
Code	Type
A	Steel tool holder with oil-hole
C	Cemented carbide tool holder
E	Cemented carbide tool holder with oil hole
S	Steel tool holder
X	Special inserts applied

Diameter of tool holder



Code	Diameter
16	16
20	20
25	25
32	32
40	40
50	50

Length of tool holder



Code	Length
H	100
K	125
M	150
N	160
Q	180
R	200
S	250
T	300
U	350
V	400

Clamping system



P-Hole clamping



M-Top and hole clamping



S-Screw on

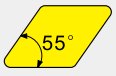


C-Top clamping

Inserts shape



C



D



R



S



T



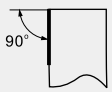
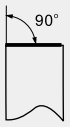
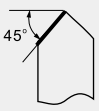
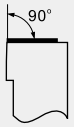
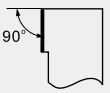
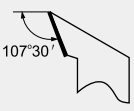
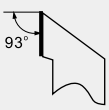
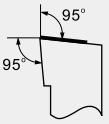
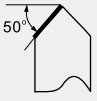
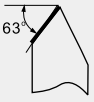
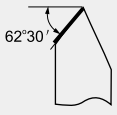
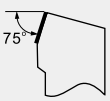
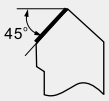
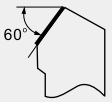
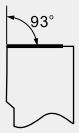
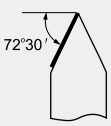
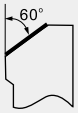
V

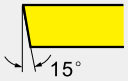
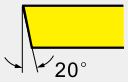
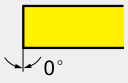


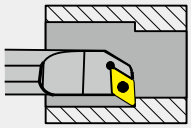
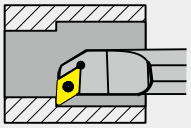
W

S 16 R - S D U

Tool holder style and approach angle

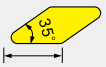
A	B	C	D	E	F	G	H
							
J	**K**	**L**	**M**	**N**	**O**	**P**	**Q**
							
R	**S**	**T**	**U**	**V**	**W**	**X**	
							

Clearance angle of insert	
	B
	C
	D
	E
	N
	P

Cutting direction	
	L - Left hand
	R - Right hand

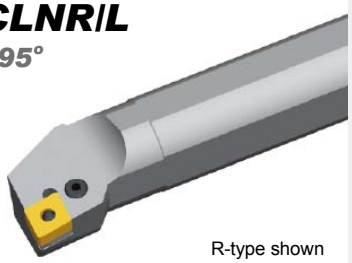
Manufacture option	
D	Increase offset f size+1.0mm
E	Increase offset f size+2.0mm
R	Round shank
W	Wedge clamping
X	Back boring



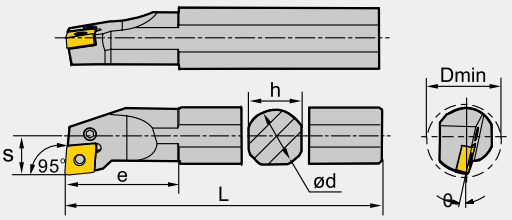
Length of cutting edge							
Inserts shape	C	D	R	S	T	V	W
							
Inscribed circle	Length of cutting edge(mm)						
5.556	---	---	---	---	09	---	---
6.350	06	07	---	---	11	---	---
9.525	09	11	09	09	16	16	06
12.700	12	15	12	12	22	22	08
15.875	16	19	15	15	27	---	---
19.050	19	---	19	19	33	---	---
25.400	25	---	25	25	44	---	---

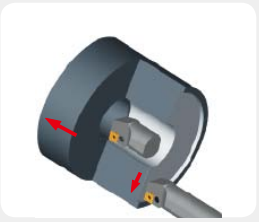
Corresponding tool holders of insert CN□□ P-type clamping

PCLNR/L
Kr:95°



R-type shown





Type	Stock		Basic dimensions(mm)							Screw	Wrench	Lever	Shim	Shim pin
	R	L	Dmin	ød	h	L	S	θ	e					
S16M-PCLNR/L09	△	△	20	16	15	150	11	-12°	28	LEM5×9B	WH20L	L3C	---	---
S16R-PCLNR/L09	▲	▲	20	16	15	200	11	-12°	28					
S20Q-PCLNR/L09	△	△	25	20	18	180	13	-11°	31					
S20S-PCLNR/L09	▲	▲	25	20	18	250	13	-11°	31					
S25Q-PCLNR/L09	△	△	32	25	23	180	17	-10°	35					
S25T- PCLNR/L09	▲	▲	32	25	23	300	17	-10°	35					
S25Q-PCLNR/L12	△	△	32	25	23	180	17	-12°	40	LEM6×13.4A	WH25L	L4A	---	---
S25T- PCLNR/L12	▲	▲	32	25	23	300	17	-12°	40					
S32R-PCLNR/L12	△	△	44	32	30	200	22	-10°	50	LEM8×21	WH30L	L4	C12APB	SP4
S32U-PCLNR/L12	▲	▲	44	32	30	350	22	-10°	50					
S40S-PCLNR/L12	△	△	54	40	37	250	27	-10°	55					
S40V-PCLNR/L12	▲	▲	54	40	37	400	27	-10°	55					
S50S-PCLNR/L12	△	△	63	50	47	250	35	-10°	56					
S50W-PCLNR/L12	▲	▲	63	50	47	450	35	-10°	56					
S50S-PCLNR/L19	△	△	63	50	47	250	35	-10°	63	LEM10×27	WH40L	L6	C19AP	SP6
S50W-PCLNR/L19	▲	▲	63	50	47	450	35	-10°	63					
※A25R-PCLNR/L12	▲	▲	32	25	24	200	17	-12°	40	LEM6×13.4A	WH25L	L4A	---	---
※A32S-PCLNR/L12	▲	▲	44	32	31	250	22	-10°	50	LEM8×21	WH30L	L4	C12APB	SP4

※ Tool holders with oil hole ▲Stock available △Make-to-order

Applicable inserts

Application	For finishing	For semi-finishing	For roughing	For cast iron machining	PCBN/PCD inserts
Inserts shape	**DF**  A52	**WGM** Wiper  A53	**DR** Double-side  A56	Without chipbreaker  A57	Without chipbreaker  A120
	WGF Wiper  A52	**PM**  A53	**DR** Single-side  A56		Without chipbreaker  A120
	SF  A52	**DM**  A54	**ER** Double-side  A56		Without chipbreaker  A120
	EF  A52	**EM**  A54	**ER** Single-side  A56		
	NF  A53	**NM**  A55	**LR** Single-side  A55		

Tool holder type						
	□□-PCLNR/L09	CN□□0903□□	CN□□0903□□		CN□□0903□□	
	□□-PCLNR/L12	CN□□1204□□	CN□□1204□□	CN□□1204□□	CN□□1204□□	CN□□1204□□
	□□-PCLNR/L19			CN□□1906□□	CN□□1906□□	

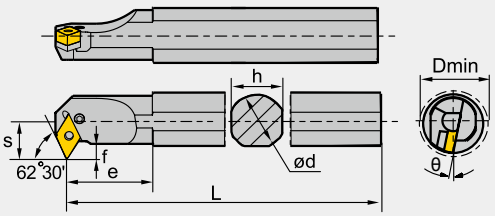
Corresponding tool holders of insert DN□□ P-type clamping

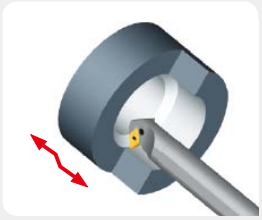
PDSNR/L

Kr:62°30'



R-type shown





Type	Stock		Basic dimensions(mm)								Screw	Wrench	Lever	Shim	Shim pin
	R	L	Dmin	ød	h	L	S	θ	e	f					
S32R-PDSNR/L15	△	△	40	32	30	200	22	-11°	45	8.5	LEM8×21	WH30L	L4B	D15AP	SP4
S32U-PDSNR/L15	▲	▲	40	32	30	350	22	-11°	45	8.5					
S32R-PDSNR/L15-3	△	△	40	32	30	200	22	-11°	45	8.5	LEM8×21	WH30L	L4	D15AP	SP4
S32U-PDSNR/L15-3	▲	△	40	32	30	350	22	-11°	45	8.5					
S40S-PDSNR/L15	△	△	50	40	37	250	27	-11°	43	9.4	LEM8×21	WH30L	L4B	D15AP	SP4
S40V-PDSNR/L15	▲	▲	50	40	37	400	27	-11°	43	9.4					
S40S-PDSNR/L15-3	△	△	50	40	37	250	27	-11°	43	9.4	LEM8×21	WH30L	L4	D15AP	SP4
S40V-PDSNR/L15-3	▲	△	50	40	37	400	27	-11°	43	9.4					
※A32S- PDSNR/L15	△	△	40	32	31	250	22	-11°	45	8.5	LEM8×21	WH30L	L4B	D15AP	SP4
※A32S- PDSNR/L15-3	△	△	40	32	31	250	22	-11°	45	8.5	LEM8×21	WH30L	L4	D15AP	SP4

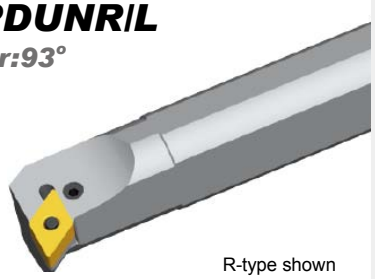
※ Tool holders with oil hole ▲Stock available △Make-to-order

Applicable inserts

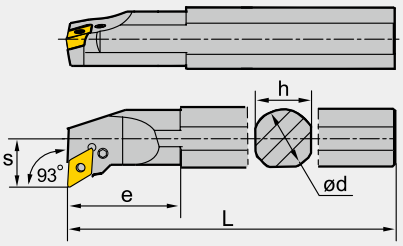
Application	For finishing	For semi-finishing	For roughing	For cast iron machining	PCBN/PCD inserts
Inserts shape	**DF** A59	**WGM** Wiper A61	**DR** Double-side A63	Without chipbreaker A64	Without chipbreaker A122
	WGF Wiper A59	**PM** A61	**DR** Single-side A63		Without chipbreaker A122
	SF A60	**DM** A62	**ER** Double-side A63		Without chipbreaker A122
	EF A60	**EM** A62	**ER** Single-side A63		
	NF A60	**NM** A62	**LR** Single-side A63		
Tool holder type **□□-PDSNR/L15-3**	DN□□1504□□	DN□□1504□□		DN□□1504□□	DN□□1504□□
□□-PDSNR/L15	DN□□1506□□	DN□□1506□□	DN□□1506□□	DN□□1506□□	DN□□1506□□

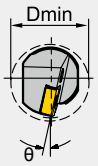
Corresponding tool holders of insert DN□□ P-type clamping

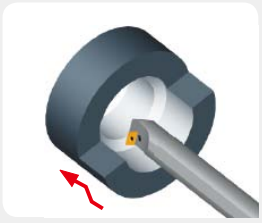
PDUNR/L
Kr:93°



R-type shown



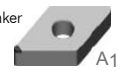
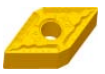
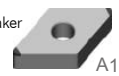
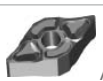
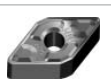




Type	Stock		Basic dimensions(mm)							Screw	Wrench	Lever	Shim	Shim pin
	R	L	Dmin	ød	h	L	S	θ	e					
S20Q-PDUNR/L11	△	△	25	20	18	180	13	-16°	30	LEM5×12B	WH20L	L3D	---	---
S20S-PDUNR/L11	▲	▲	25	20	18	250	13	-16°	30					
S25Q-PDUNR/L11	△	△	32	25	23	180	17	-13°	35					
S25T-PDUNR/L11	▲	▲	32	25	23	300	17	-13°	35					
S32R-PDUNR/L11	△	△	40	32	30	200	22	-16°	40	LEM6×17	WH25L	L3	D11AP	SP3
S32U-PDUNR/L11	▲	▲	40	32	30	350	22	-16°	40					
S32R-PDUNR/L15	△	△	40	32	30	200	22	-16°	50	LEM8×21	WH30L	L4B	D15AP	SP4
S32U-PDUNR/L15	▲	▲	40	32	30	350	22	-16°	50					
S32R-PDUNR/L15-3	△	△	40	32	30	200	22	-16°	50	LEM8×21	WH30L	L4	D15AP	SP4
S32U-PDUNR/L15-3	▲	▲	40	32	30	350	22	-16°	50					
S40S-PDUNR/L15	△	△	50	40	37	250	27	-11°	50	LEM8×21	WH30L	L4B	D15AP	SP4
S40V-PDUNR/L15	▲	▲	50	40	37	400	27	-11°	50					
S40S-PDUNR/L15-3	△	△	50	40	37	250	27	-11°	50	LEM8×21	WH30L	L4	D15AP	SP4
S40V-PDUNR/L15-3	▲	▲	50	40	37	400	27	-11°	50					
※A32S- PDUNR/L15	▲	▲	40	32	31	250	22	-16°	50	LEM8×21	WH30L	L4B	D15AP	SP4
※A32S- PDUNR/L15-3	▲	△	40	32	31	250	22	-16°	50	LEM8×21	WH30L	L4	D15AP	SP4

※ Tool holders with oil hole ▲Stock available △Make-to-order

Applicable inserts

Application	For finishing	For semi-finishing	For roughing	For cast iron machining	PCBN/PCD inserts
Inserts shape	**DF**  A59	**WGM** Wiper  A61	**DR** Double-side  A63	Without chipbreaker  A64	Without chipbreaker  A122
	WGF Wiper  A59	**PM**  A61	**DR** Single-side  A63		Without chipbreaker  A122
	SF  A60	**DM**  A62	**ER** Double-side  A63		Without chipbreaker  A122
	EF  A60	**EM**  A62	**ER** Single-side  A63		
	NF  A60	**NM**  A62	**LR** Single-side  A63		

Tool holder type						
	□□-PDUNR/L11	DN□□1104□□	DN□□1104□□			
	□□-PDUNR/L15-3	DN□□1504□□	DN□□1504□□		DN□□1504□□	DN□□1504□□
	□□-PDUNR/L15	DN□□1506□□	DN□□1506□□	DN□□1506□□	DN□□1506□□	DN□□1506□□

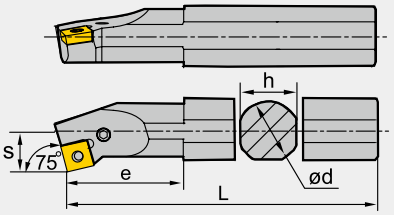
Corresponding tool holders of insert SN□□ P-type clamping

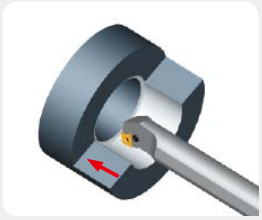
PSKNR/L

Kr:75°



R-type shown





Type	Stock		Basic dimensions(mm)							Screw	Wrench	Lever	Shim	Shim pin
	R	L	Dmin	ød	h	L	S	θ	e					
S25Q-PSKNR/L12	△	△	32	25	23	180	17	-12°	42	LEM6×13.4A	WH25L	L4A	---	---
S25T-PSKNR/L12	▲	▲	32	25	23	300	17	-12°	42					
S32R-PSKNR/L12	△	△	44	32	30	200	22	-10°	45	LEM8×21	WH30L	L4	S12APB	SP4
S32U-PSKNR/L12	▲	▲	44	32	30	350	22	-10°	45					
S40S-PSKNR/L12	△	△	54	40	37	250	27	-10°	50					
S40V-PSKNR/L12	▲	△	54	40	37	400	27	-10°	50					
※A25R-PSKNR/L12	▲	▲	32	25	24	200	17	-12°	42	LEM6×13.4A	WH25L	L4A	---	---
※A32S-PSKNR/L12	▲	△	44	32	31	250	22	-12°	50	LEM8×21	WH30L	L4	S12APB	SP4

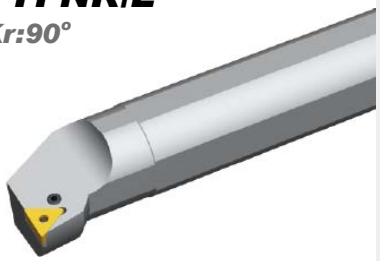
※ Tool holders with oil hole ▲Stock available △Make-to-order

Applicable inserts

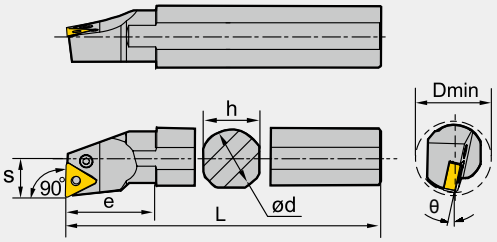
Application	For finishing	For semi-finishing	For roughing	For roughing	PCBN/PCD inserts
Inserts shape	**DF**  A65	**PM**  A66	**DR** Double-side  A68	Without chipbreaker  A72	Without chipbreaker  A124
	EF  A65	**DM**  A66	**DR** Single-side  A68 -69		Without chipbreaker  A124
	SF  A65	**EM**  A67	**ER**  A69		Without chipbreaker  A124
		NM  A67	**ER** Single-side  A70		Without chipbreaker  A124
			LR Single-side  A67		
Tool holder type **□□-PSKNR/L12**	SN□□1204□□	SN□□1204□□	SN□□1204□□	SN□□1204□□	SN□□1204□□

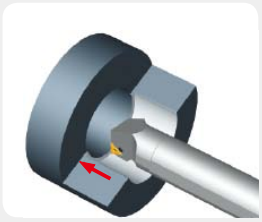
Corresponding tool holders of insert TN□□ P-type clamping

PTFNR/L
Kr:90°



R-type shown





Type	Stock		Basic dimensions(mm)							Screw	Wrench	Lever	Shim	Shim pin
	R	L	Dmin	ød	h	L	S	θ	e					
S16M-PTFNR/L11	△	△	20	16	15	150	11	-14°	28	LEM5×9B	WH20L	L2	---	---
S16R-PTFNR/L11	▲	▲	20	16	15	200	11	-14°	28					
S20Q-PTFNR/L11	△	△	25	20	18	180	13	-12°	31					
S20S-PTFNR/L11	▲	▲	25	20	18	250	13	-12°	31					
S25Q-PTFNR/L11	△	△	32	25	23	180	17	-10°	35					
S25T-PTFNR/L11	▲	▲	32	25	23	300	17	-10°	35					
S25Q-PTFNR/L16	△	△	32	25	23	180	17	-12°	42	LEM5×12B	WH20L	L3B	---	---
S25T-PTFNR/L16	▲	▲	32	25	23	300	17	-12°	42					
S32R-PTFNR/L16	△	△	44	32	30	200	22	-10°	50	LEM6×17	WH25L	L3	T16APB	SP3
S32U-PTFNR/L16	▲	▲	44	32	30	350	22	-10°	50					
S40S-PTFNR/L16	△	△	54	40	37	250	27	-10°	55					
S40V-PTFNR/L16	▲	▲	54	40	37	400	27	-10°	55					
※A25R-PTFNR/L16	△	△	32	25	24	200	17	-12°	40					
※A32S-PTFNR/L16	▲	▲	44	32	31	250	22	-10°	50					

※ Tool holders with oil hole ▲Stock available △Make-to-order

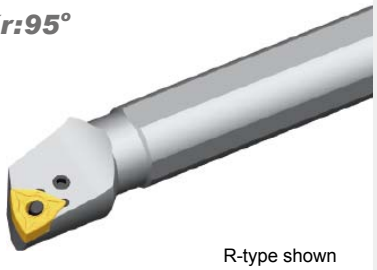
Applicable inserts

Application	For finishing	For semi-finishing	For roughing	For cast iron machining	PCBN/PCD inserts
Inserts shape	**DF**  A73	**WGM** Wiper  A74	**DR** Double-side  A76	Without chipbreaker  A78	Without chipbreaker  A126
	WGF Wiper  A73	**PM**  A74	**DR** Single-side  A76		Without chipbreaker  A126
	SF  A73	**DM**  A75	**ER** Double-side  A76		Without chipbreaker  A126
	EF  A74	**EM**  A75	**LR** Single-side  A75		

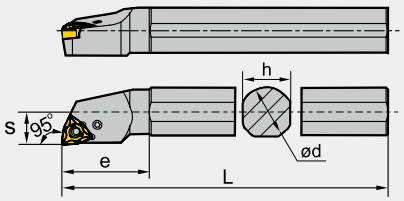
Tool holder type						
	□□PTFNR/L11	TN□□1103□□	TN□□1103□□		TN□□1103□□	
	□□PTFNR/L16	TN□□1604□□	TN□□1604□□	TN□□1604□□	TN□□1604□□	TN□□1604□□

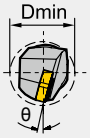
Corresponding tool holders of insert WN□□ P-type clamping

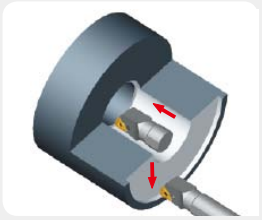
PWLNR/L
Kr:95°



R-type shown







Type	Stock		Basic dimensions(mm)							Screw	Wrench	Lever	Shim	Shim pin
	R	L	Dmin	ød	h	L	S	θ	e					
S16M-PWLNR/L06	△	△	20	16	15	150	11	-13°	25	LEM5X12B	WH20L	L3B	---	---
S16R-PWLNR/L06	△	△	20	16	15	200	11	-13°	25					
S20Q-PWLNR/L06	△	△	25	20	18	180	13	-13°	35	LEM5X12B	WH20L	L3B	---	---
S20S-PWLNR/L06	△	△	25	20	18	250	13	-13°	35					
S25Q-PWLNR/L06	△	△	32	25	23	180	17	-13°	35					
S25T-PWLNR/L06	△	△	32	25	23	300	17	-13°	35					
S20Q-PWLNR/L08	△	△	25	20	18	180	13	-13°	32	LEM6X13.4A	WH25L	L4A	---	---
S20S-PWLNR/L08	△	△	25	20	18	250	13	-13°	32					
S25Q-PWLNR/L08	△	△	32	25	23	180	17	-13°	45					
S25T-PWLNR/L08	△	△	32	25	23	300	17	-13°	45					
S32R-PWLNR/L08	△	△	40	32	30	200	22	-15°	50	LEM8X21	WH30L	L4	W08AP	SP4
S32U-PWLNR/L08	△	△	40	32	30	350	22	-15°	50					
※A25T-PWLNR/L08	△	△	32	25	23	300	17	-13°	45	LEM6X13.4A	WH25L	L4A	---	---
※A32R-PWLNR/L08	△	△	40	32	30	200	22	-15°	50	LEM8X21	WH30L	L4	W08AP	SP4

※ Tool holders with oil hole ▲Stock available △Make-to-order

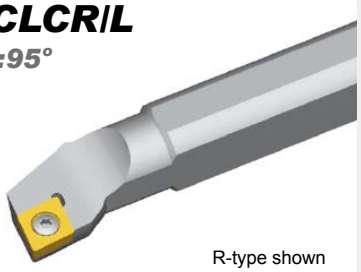
Applicable inserts

Application	For finishing	For semi-finishing	For roughing	For cast iron machining	PCBN/PCD inserts
Inserts shape	**DF**  A81	**WGM** Wiper  A82	**DR** Double -side  A84	Without chipbreaker  A84	Without chipbreaker  A128
	WGF Wiper  A81	**DM**  A83			Without chipbreaker  A128
	SF  A81	**PM**  A83			Without chipbreaker  A128
	EF  A82	**EM**  A83			
	NF  A82	**NM**  A84			

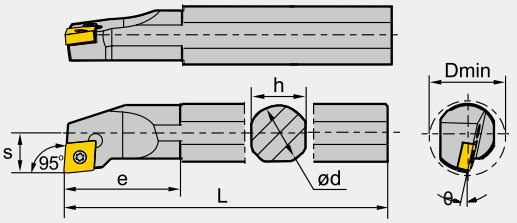
Tool holder type						
	□□-PWLNR/L06	WN□□0604□□	WN□□0604□□	WN□□0604□□	WN□□0604□□	
	□□-PWLNR/L08	WN□□0804□□	WN□□0804□□	WN□□0804□□	WN□□0804□□	WN□□0804□□

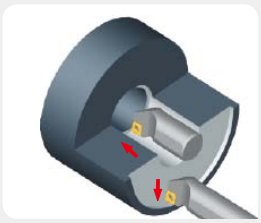
Corresponding tool holders of insert CC□□ S-type clamping

SCLCR/L
Kr:95°



R-type shown





Type	Stock		Basic dimensions(mm)							Screw	Wrench	Shim	Shim screw
	R	L	Dmin	ød	h	L	S	θ	e				
S08K-SCLCR/L06	▲	▲	10	8	7	125	5	-15°	14	I60M2.5×5.5	WT07IP	---	---
S10M-SCLCR/L06	▲	▲	12	10	9	150	6	-13°	14				
S12M-SCLCR/L06	▲	▲	16	12	11	150	9	-10°	25				
S12M-SCLCR/L09	▲	▲	16	12	11	150	9	-10°	25	I60M3.5×8	WT15IP	---	---
S16M-SCLCR/L09	△	△	20	16	15	150	11	-12°	32.5				
S16R-SCLCR/L09	▲	▲	20	16	15	200	11	-12°	32.5				
S20Q-SCLCR/L09	△	△	25	20	18	180	13	-8°	38				
S20S-SCLCR/L09	▲	▲	25	20	18	250	13	-8°	38				
S25Q-SCLCR/L09	△	△	32	25	23	180	17	-6°	45	I60M3.5×10	WT15IP	---	---
S25T-SCLCR/L09	▲	▲	32	25	23	300	17	-6°	45				
S25Q-SCLCR/L12	△	△	32	25	23	180	17	-6°	45	I60M4×11X	WT15IP	---	---
S25T-SCLCR/L12	▲	▲	32	25	23	300	17	-6°	45	I60M4×11X	WT15IP	---	---
S32R-SCLCR/L12	△	△	40	32	30	200	22	-10°	50	I60M4×11X	WH40L WT15IP	C12BS	SM6×10XA
S32U-SCLCR/L12	▲	▲	40	32	30	350	22	-10°	50				
S40S-SCLCR/L12	△	△	50	40	37	250	27	-8°	60				
S40V-SCLCR/L12	▲	▲	50	40	37	400	27	-8°	60				
※A08F-SCLCR/L06	▲	▲	10	8	7.5	80	5	-15°	14	I60M2.5×5.5	WT07IP	---	---
※A10H-SCLCR/L06	▲	▲	12	10	9.5	100	6	-13°	14				
※A12K-SCLCR/L06	▲	▲	16	12	11.5	125	9	-10°	25				
※A12K-SCLCR/L09	▲	▲	16	12	11.5	125	9	-10°	25	I60M3.5×8	WT15IP	---	---
※A16M-SCLCR/L09	▲	▲	20	16	15.5	150	11	-12°	32.5				
※A20Q-SCLCR/L09	▲	▲	25	20	19	180	13	-8°	38				
※A25R-SCLCR/L09	▲	▲	32	25	24	200	17	-6°	45	I60M3.5×10			
※A25R-SCLCR/L12	▲	▲	32	25	24	200	17	-6°	45	I60M4×11X	WT15IP	---	---
※A32S-SCLCR/L12	▲	▲	40	32	31	250	22	-10°	50		WH40L WT15IP	C12BS	SM6×10XA

※ Tool holders with oil hole ▲Stock available △Make-to-order

Applicable inserts

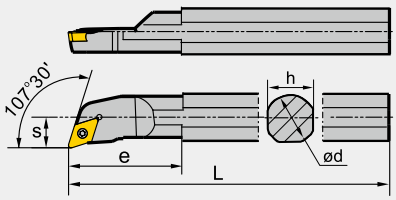
Application	For extra finishing	For finishing	For semi-finishing	For roughing	For Al machining	For cast iron machining	PCBN/PCD inserts
Inserts shape	**USF**  A87	**HF**  A87	**HM**  A88	**HR**  A89	**LH**  A89	Without chipbreaker  A90	Without chipbreaker  A130
	SF  A87	**EF**  A88	**EM**  A88		**LC**  A89		Without chipbreaker  A130
Tool holder type **□□-SCLCR/L06**	CC□□0602□□	CC□□0602□□	CC□□0602□□	CC□□0602□□	CCGX0602□□	CC□□0602□□	CC□□0602□□
□□-SCLCR/L09	CC□□09T3□□	CC□□09T3□□	CC□□09T3□□	CC□□09T3□□	CCGX09T3□□	CC□□09T3□□	CC□□09T3□□
□□-SCLCR/L12		CC□□1204□□	CC□□1204□□	CC□□1204□□	CCGX1204□□	CC□□1204□□	CC□□1204□□

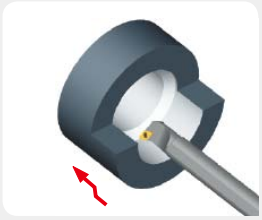
Corresponding tool holders of insert DC□□ S-type clamping

SDQCR/L
Kr:107°30'



R-type shown

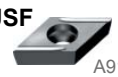
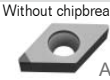
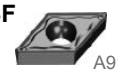
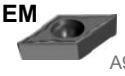




Type	Stock		Basic dimensions(mm)							Screw	Wrench	---	---
	R	L	Dmin	ød	h	L	S	θ	e			---	---
S10M-SDQCR/L07	▲	▲	13	10	9	150	7	-8°	20	I60M2.5×5.5	WT07IP	---	---
S12M-SDQCR/L07	▲	▲	16	12	11	150	9	-8°	22	I60M2.5×6.5			
S16M-SDQCR/L07	△	△	20	16	15	150	11	-6°	27				
S16R-SDQCR/L07	▲	▲	20	16	15	200	11	-6°	27				
S20Q-SDQCR/L11	△	△	25	20	18	180	13	-6°	32	I60M3.5×8	WT15IP	---	---
S20S-SDQCR/L11	▲	▲	25	20	18	250	13	-6°	32				
S25Q-SDQCR/L11	△	△	32	25	23	180	17	-6°	32	I60M3.5×10			
S25T-SDQCR/L11	▲	▲	32	25	23	300	17	-6°	32				
※A10H-SDQCR/L07	▲	△	13	10	9.5	100	7	-8°	20	I60M2.5×5.5	WT07IP	---	---
※A12K-SDQCR/L07	▲	▲	16	12	11.5	125	9	-8°	22	I60M2.5×6.5			
※A16M-SDQCR/L11	▲	△	20	16	15.5	150	11	-6°	27	I60M3.5×8	WT15IP	---	---
※A20Q-SDQCR/L11	▲	▲	25	20	19	180	13	-6°	32				
※A25R-SDQCR/L11	▲	▲	32	25	24	200	17	-6°	32	I60M3.5×10			

※ Tool holders with oil hole ▲Stock available △Make-to-order

Applicable inserts

Application	For extra finishing	For finishing	For semi-finishing	For roughing	For Al machining	For cast iron machining	PCBN/PCD inserts
Inserts shape	**USF**  A91	**HF**  A91	**HM**  A92	**HR**  A93	**LH**  A93	Without chipbreaker  A93	Without chipbreaker  A132
	SF  A91	**EF**  A92	**EM**  A92		**LC**  A93		Without chipbreaker  A132
Tool holder type **□□-SDQCR/L07**	DC□□0702□□	DC□□0702□□	DC□□0702□□		DCGX0702□□	DC□□0702□□	DC□□0702□□
□□-SDQCR/L11	DC□□11T3□□	DC□□11T3□□	DC□□11T3□□	DC□□11T3□□	DCGX11T3□□	DC□□11T3□□	DC□□11T3□□

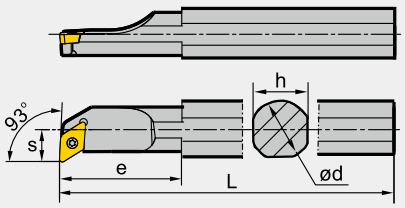
Corresponding tool holders of insert DC□□ S-type clamping

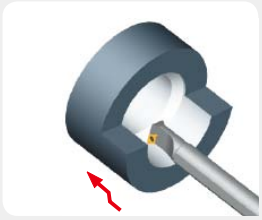
SDUCR/L

Kr:93°



R-type shown

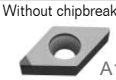
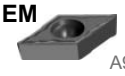




Type	Stock		Basic dimensions(mm)							Screw	Wrench	---	---
	R	L	Dmin	ød	h	L	S	θ	e			---	---
S10M-SDUCR/L07	▲	▲	13	10	9	150	7	-8°	0	I60M2.5×5.5	WT07IP	---	---
S12M-SDUCR/L07	▲	▲	16	12	11	150	9	-8°	22	I60M2.5×6.5			
S16M-SDUCR/L07	△	△	20	16	15	150	11	-6°	27				
S16R-SDUCR/L07	▲	▲	20	16	15	200	11	-6°	27				
S20Q-SDUCR/L11	△	△	25	20	18	180	13	-6°	40	I60M3.5×8	WT15IP	---	---
S20S-SDUCR/L11	▲	▲	25	20	18	250	13	-6°	40				
S25Q-SDUCR/L11	△	△	32	25	23	180	17	-6°	46	I60M3.5×10			
S25T-SDUCR/L11	▲	▲	32	25	23	300	17	-6°	46				
※A10H-SDUCR/L07	▲	▲	13	10	9.5	100	7	-8°	0	I60M2.5×5.5	WT07IP	---	---
※A12K-SDUCR/L07	△	▲	16	12	11.5	125	9	-8°	22	I60M2.5×6.5			
※A16M-SDUCR/L07	▲	▲	20	16	15.5	150	11	-6°	27				
※A20Q-SDUCR/L11	▲	▲	25	20	19	180	13	-6°	40	I60M3.5×8	WT15IP	---	---
※A25R-SDUCR/L11	▲	▲	32	25	24	200	17	-6°	46	I60M3.5×10			

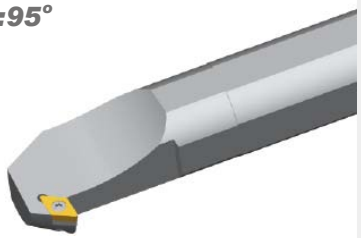
※ Tool holders with oil hole ▲Stock available △Make-to-order

Applicable inserts

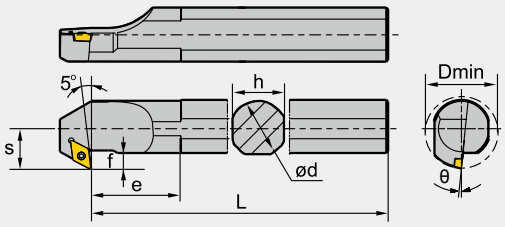
Application		For extra finishing	For finishing	For semi-finishing	For roughing	For Al machining	For cast iron machining	PCBN/PCD inserts
Inserts shape		**USF**  A91	**HF**  A91	**HM**  A92	**HR**  A93	**LH**  A93	Without chipbreaker  A93	Without chipbreaker  A132
		SF  A91	**EF**  A92	**EM**  A92		**LC**  A93		Without chipbreaker  A132
Tool holder type	**□□-SDUCR/L07**	DC□□0702□□	DC□□0702□□	DC□□0702□□		DCGX0702□□	DC□□0702□□	DC□□0702□□
	□□-SDUCR/L11	DC□□11T3□□	DC□□11T3□□	DC□□11T3□□	DC□□11T3□□	DCGX11T3□□	DC□□11T3□□	DC□□11T3□□

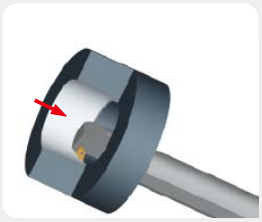
Corresponding tool holders of insert DC□□ S-type clamping

SDZCR/L
Kr:95°



R-type shown

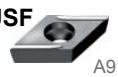
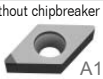
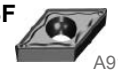
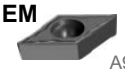




Type	Stock		Basic dimensions(mm)								Screw	Wrench	Shim	Shim screw
	R	L	Dmin	ød	h	L	S	θ	e	f				
S25Q-SDZCR/L11	△	△	32	25	23	180	17	-6°	30	6.9	I60M3.5×10	WT15IP	---	---
S25T-SDZCR/L11	▲	▲	32	25	23	300	17	-6°	30	6.9				
S32R-SDZCR/L11	△	△	40	32	30	200	22	-6°	39	8.4	I60M3.5×12	WT15IP WH35L	D11BS	SM5×8.65XA
S32U-SDZCR/L11	▲	▲	40	32	30	350	22	-6°	39	8.4				
S40S-SDZCR/L11	△	△	50	40	37	250	27	-4°	47	9.4				
S40V-SDZCR/L11	▲	▲	50	40	37	400	27	-4°	47	9.4				
※A25R-SDZCR/L11	▲	△	32	25	24	200	17	-6°	30	4.5	I60M3.5×10	WT15IP	---	---
※A32S-SDZCR/L11	△	△	40	32	31	250	22	-6°	39	6.0	I60M3.5×12	WT15IP WH35L	D11BS	SM5×8.65XA

※ Tool holders with oil hole ▲Stock available △Make-to-order

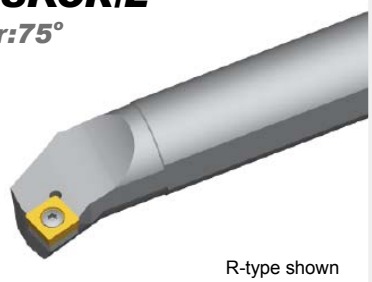
Applicable inserts

Application	For extra finishing	For finishing	For semi-finishing	For roughing	For Al machining	For cast iron machining	PCBN/PCD inserts
Inserts shape	**USF**  A91	**HF**  A91	**HM**  A92	**HR**  A93	**LH**  A93	Without chipbreaker  A93	Without chipbreaker  A132
	SF  A91	**EF**  A92	**EM**  A92		**LC**  A93		Without chipbreaker  A132
Tool holder type **□□-SDZCR/L11**	DC□□11T3□□	DC□□11T3□□	DC□□11T3□□	DC□□11T3□□	DCGX11T3□□	DC□□11T3□□	DC□□11T3□□

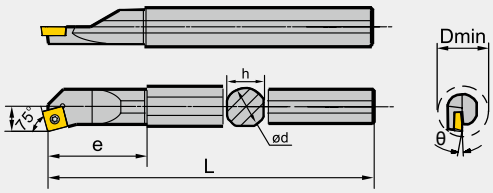
Corresponding tool holders of insert SC□□ S-type clamping

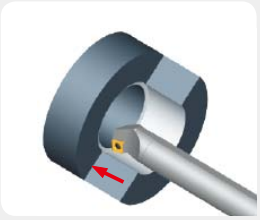
SSKCR/L

Kr:75°



R-type shown





Type	Stock		Basic dimensions(mm)							Screw	Wrench	Shim	Shim screw
	R	L	Dmin	ød	h	L	S	θ	e				
S12M- SSKCR/L09	▲	△	16	12	11	150	9	-10°	26	I60M3.5×8	WT15IP	---	---
S16M- SSKCR/L09	△	△	20	16	15	150	11	-11°	32.5				
S16R- SSKCR/L09	▲	▲	20	16	15	200	11	-11°	32.5				
S20Q- SSKCR/L09	△	△	25	20	18	180	13	-6°	34.5				
S20S- SSKCR/L09	▲	△	25	20	18	250	13	-6°	34.5				
S25Q- SSKCR/L12	△	△	32	25	23	180	17	-8°	36.3	I60M4×11X	WT15IP	---	---
S25T- SSKCR/L12	▲	▲	32	25	23	300	17	-8°	36.3				
S32R- SSKCR/L12	△	△	40	32	30	200	22	-10°	43.5		WT15IP WH40L	S12BS	SM6×10XA
S32U- SSKCR/L12	▲	△	40	32	30	350	22	-10°	43.5				
※A12K- SSKCR/L09	△	△	16	12	11	125	9	-10°	26	I60M3.5×8	WT15IP	---	---
※A16M- SSKCR/L09	△	△	20	16	15	150	11	-11°	32.5				
※A20Q- SSKCR/L09	▲	△	25	20	19	180	13	-6°	34.5				
※A25R- SSKCR/L12	△	△	32	25	24	200	17	-8°	41.3	I60M4×11X	WT15IP	---	---
※A32S- SSKCR/L12	▲	△	40	32	31	250	22	-10°	42.8		WT15IP WH40L	S12BS	SM6×10XA

※ Tool holders with oil hole ▲Stock available △Make-to-order

Applicable inserts

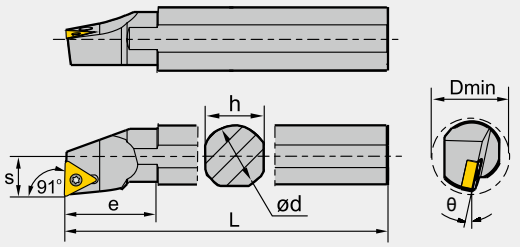
Application	For finishing	For semi-finishing	For roughing	For Al machining	For cast iron machining	PCBN/PCD inserts
Inserts shape	**HF**  A96	**HM**  A96	**HR**  A97	**LH**  A97	Without chipbreaker  A97	Without chipbreaker  A134
	EF  A96	**EM**  A96		**LC**  A97		Without chipbreaker  A134
Tool holder type **□□-SSKCR/L09**	SC□□09T3□□	SC□□09T3□□	SC□□09T3□□	SCGX09T3□□	SC□□09T3□□	
□□-SSKCR/L12		SC□□1204□□	SC□□1204□□	SCGX1204□□	SC□□1204□□	SC□□1204□□

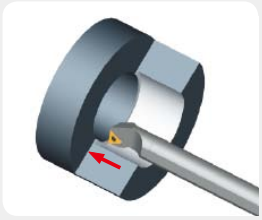
Corresponding tool holders of insert TC□□ S-type clamping

STFCR/L
Kr:91°



R-type shown





Type	Stock		Basic dimensions(mm)							Screw	Wrench	Shim	Shim screw
	R	L	Dmin	ød	h	L	S	θ	e				
S12M-STFCR/L11	▲	▲	16	12	11	150	9	-10°	30	I60M2.5×6.5	WT07IP	---	---
S16M-STFCR/L11	△	△	20	16	15	150	11	-6°	35				
S16R-STFCR/L11	▲	▲	20	16	15	200	11	-6°	35				
S20Q-STFCR/L11	△	△	25	20	18	180	13	-3°	36				
S20S-STFCR/L11	▲	▲	25	20	18	250	13	-3°	36				
S25Q-STFCR/L16	△	△	32	25	23	180	17	-6°	49	I60M3.5×10	WT15IP	---	---
S25T-STFCR/L16	▲	▲	32	25	23	300	17	-6°	49				
S32R-STFCR/L16	△	△	40	32	30	200	22	-10°	50	I60M3.5×12	WT15IP WH35L	T16BS	SM5×8.65XA
S32U-STFCR/L16	▲	▲	40	32	30	350	22	-10°	50				
S40S-STFCR/L16	△	△	50	40	37	250	27	-8°	60				
S40V-STFCR/L16	▲	▲	50	40	37	400	27	-8°	60				
※A12K-STFCR/L11	▲	△	16	12	11.5	125	9	-10°	26	I60M2.5×6.5	WT07IP	---	---
※A16M-STFCR/L11	▲	△	20	16	15.5	150	11	-6°	30				
※A20Q-STFCR/L11	▲	△	25	20	19	180	13	-3°	36				
※A25R-STFCR/L16	▲	▲	32	25	24	200	17	-6°	45	I60M3.5×10	WT15IP	---	---
※A32S-STFCR/L16	△	△	40	32	31	250	22	-10°	49	I60M3.5×12	WT15IP	T16BS	SM5×8.65XA

※ Tool holders with oil hole ▲Stock available △Make-to-order

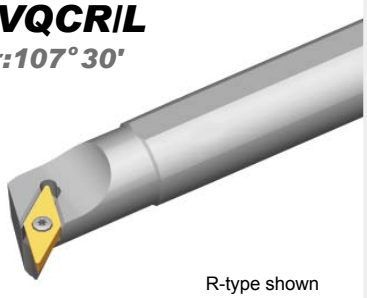
Applicable inserts

Application	For finishing	For semi-finishing	For roughing	For Al machining	For cast iron machining	PCBN/PCD inserts
Inserts shape	**HF**  A99	**HM**  A101	**HR**  A101	**LH**  A102	Without chipbreaker  A102	Without chipbreaker  A135
	EF  A100	**EM**  A100		**LC**  A101		Without chipbreaker  A135
Tool holder type **□□-STFCR/L11**	TC□□1102□□	TC□□1102□□	TC□□1102□□	TCGX1102□□	TC□□1102□□	TC□□1102□□
□□-STFCR/L16	TC□□16T3□□	TC□□16T3□□	TC□□16T3□□	TCGX16T3□□	TC□□16T3□□	TC□□16T3□□

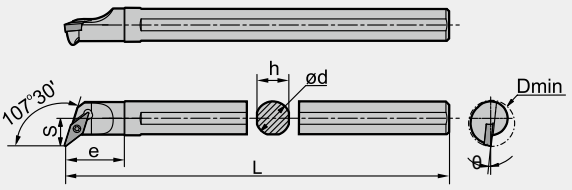
Corresponding tool holders of insert VC□□ S-type clamping

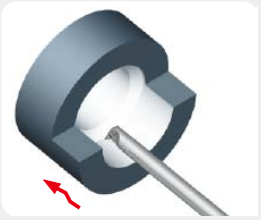
SVQCR/L

Kr:107°30'



R-type shown





Type	Stock		Basic dimensions(mm)							Screw	Wrench	---	---
	R	L	Dmin	ød	h	L	S	θ	e			---	---
S16Q-SVQCR/L11	▲	▲	22	16	15	180	13	-6°	28	I60M2.5×6.5	WT07IP	---	---
S20R-SVQCR/L11	△	△	26	20	18	200	15	-4°	32			---	---

▲Stock available △Make-to-order

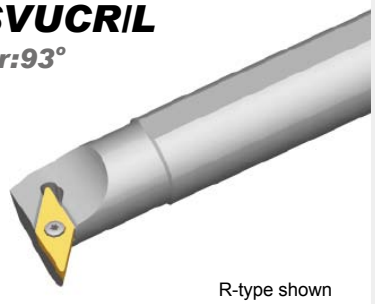
Applicable inserts

Application	For extra finishing	For finishing	For Al machining
Inserts shape	USF  A103	HF  A103	LH  A104
	SF  A103		LC  A104
Tool holder type □□-SVQCR/L11	VC□□1103□□	VC□□1103□□	VCGX1103□□

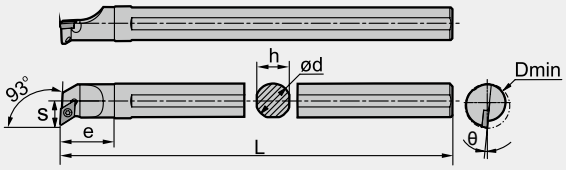
Corresponding tool holders of insert VC□□ S-type clamping

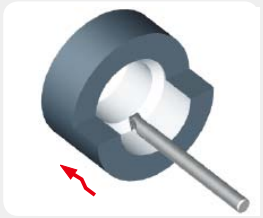
SVUCR/L

Kr:93°



R-type shown





Type	Stock		Basic dimensions(mm)							Screw	Wrench	---	---
	R	L	Dmin	ød	h	L	S	θ	e			---	---
S16Q-SVUCR/L11	△	△	24	16	15	180	15	-6°	25	I60M2.5×6.5	WT07IP	---	---
S20R-SVUCR/L11	△	△	28	20	18	200	17	-4°	30			---	---

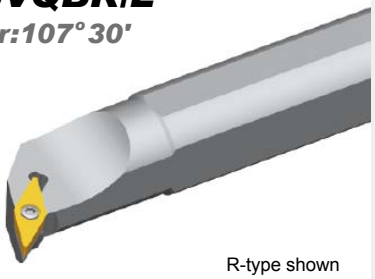
▲Stock available △Make-to-order

Applicable inserts

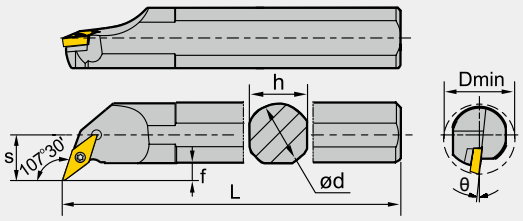
Application	For extra finishing	For finishing	For Al machining
Inserts shape	USF  A103	HF  A103	LH  A104
	SF  A103		LC  A104
Tool holder type □□-SVUCR/L11	VC□□1103□□	VC□□1103□□	VCGX1103□□

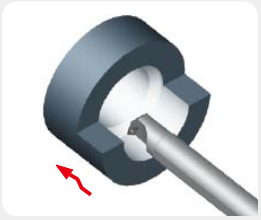
Corresponding tool holders of insert VB□□ S-type clamping

SVQBR/L
Kr:107°30'



R-type shown





Type	Stock		Basic dimensions(mm)								Screw	Wrench	Shim	Shim screw
	R	L	Dmin	ød	h	L	S	θ	e	f				
S32RSVQBR/L16	△	△	40	32	30	200	22	-8°	56	8.4	I60M3.5×12	WT15IP WH35L	V16BS	SM5×8.65XA
S32U-SVQBR/L16	▲	▲	40	32	30	350	22	-8°	56	8.4				
S40S-SVQBR/L16	△	△	50	40	37	250	27	-8°	64	9.4				
S40V-SVQBR/L16	▲	▲	50	40	37	400	27	-8°	64	9.4				
※A32S- SVQBR/L16	▲	△	40	32	31	250	22	-8°	56	8.4				

※ Tool holders with oil hole ▲Stock available △Make-to-order

Applicable inserts

Application		For finishing	For semi-finishing	For roughing	PCBN/PCD inserts
Inserts shape		**EF**  A106	**HM**  A107	**HR**  A107	Without chipbreaker  A137
		NF  A106			Without chipbreaker  A137
Tool holder type	**□□-SVQBR/L16**	VB□□1604□□	VB□□1604□□	VB□□1604□□	VB□□1604□□

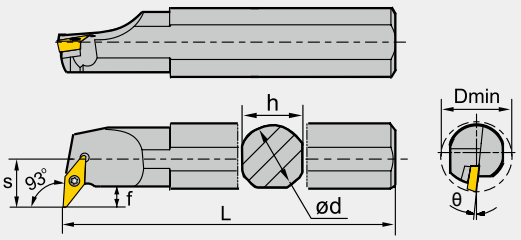
Corresponding tool holders of insert VB□□ S-type clamping

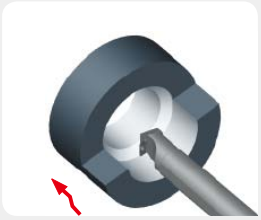
SVUBR/L

Kr:93°



R-type shown





Type	Stock		Basic dimensions(mm)								Screw	Wrench	Shim	Shim screw
	R	L	Dmin	ød	h	L	S	θ	e	f				
S32R-SVUBR/L16	△	△	40	32	30	200	22	-8°	49	8.4	I60M3.5×12	WT15IP WH35L	V16BS	SM5×8.65XA
S32U-SVUBR/L16	▲	▲	40	32	30	350	22	-8°	49	8.4				
S40S- SVUBR/L16	△	△	50	40	37	250	27	-8°	56.5	9.4				
S40V- SVUBR/L16	▲	▲	50	40	37	400	27	-8°	56.5	9.4				
※A32S- SVUBR/L16	▲	▲	40	32	31	250	22	-8°	49	8.4				

※ Tool holders with oil hole ▲Stock available △Make-to-order

Applicable inserts

Application		For finishing	For semi-finishing	For roughing	PCBN/PCD inserts
Inserts shape		**EF**  A106	**HM**  A107	**HR**  A107	Without chipbreaker  A137
		NF  A106			Without chipbreaker  A137
Tool holder type	**□□-SVUBR/L16**	VB□□1604□□	VB□□1604□□	VB□□1604□□	VB□□1604□□

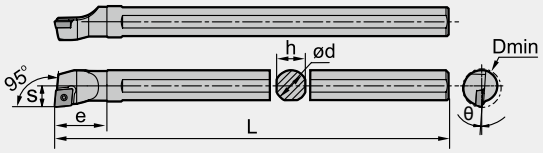
Corresponding tool holders of insert CP□□ S-type clamping

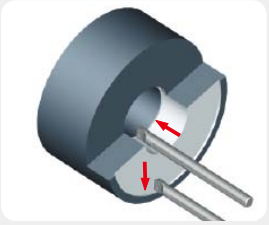
SCLPR/L

Kr:95°



R-type shown





Type	Stock		Basic dimensions(mm)							Screw	Wrench	---	---
	R	L	Dmin	ød	h	L	S	θ	e			---	---
S10K-SCLPR/L06	▲	▲	12	10	9	125	6	-7°	17	I60M2.5×5.5	WT07IP	---	---
S12M-SCLPR/L06	▲	▲	16	12	11	150	8	-4°	20				
S16Q-SCLPR/L09	▲	▲	20	16	15	180	10	-4°	29	I60M3.5×8	WT15IP	---	---
S20R-SCLPR/L09	△	△	25	20	18	200	13	-4°	35				

▲Stock available △Make-to-order

Applicable inserts

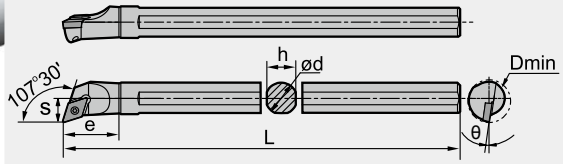
Application	For extra finishing
Inserts shape	SF  A108
Tool holder type □□-SCLPR/L06	CP□□0602□□
Tool holder type □□-SCLPR/L09	CP□□09T3□□

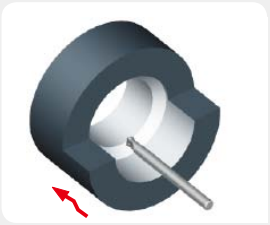
Corresponding tool holders of insert DP□□ S-type clamping

SDQPR/L
Kr:107°30'



R-type shown

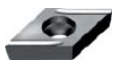




Type	Stock		Basic dimensions(mm)							Screw	Wrench	---	---
	R	L	Dmin	ød	h	L	S	θ	e			---	---
S10K-SDQPR/L07	△	△	13	10	9	125	7	-8°	20	I60M2.5×5.5	WT07IP	---	---
S12M-SDQPR/L07	▲	△	16	12	11	150	9	-8°	22				
S16Q-SDQPR/L07	▲	△	20	16	15	180	11	-6°	27	I60M2.5×6.5			
S16Q-SDQPR/L11	▲	△	20	16	15	180	11	-6°	32	I60M3.5×8	WT15IP	---	---
S20R-SDQPR/L11	△	△	25	20	18	200	13	-6°	33				

▲Stock available △Make-to-order

Applicable inserts

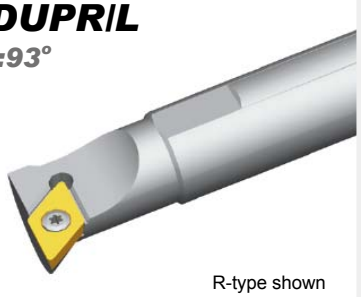
Application	For extra finishing
Inserts shape	**USF**  A109
	SF  A109
Tool holder type **□□-SDQPR/L07**	DP□□0702□□
□□-SDQPR/L11	DP□□11T3□□



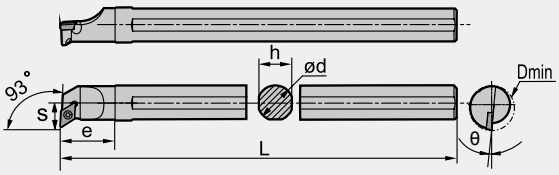
Corresponding tool holders of insert DP□□ S-type clamping

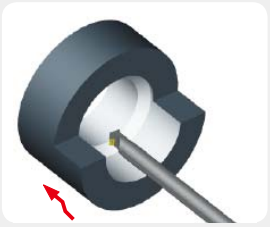
SDUPR/L

Kr:93°



R-type shown

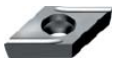
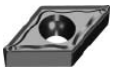




Type	Stock		Basic dimensions(mm)							Screw	Wrench	---	---
	R	L	Dmin	ød	h	L	S	θ	e			---	---
S10K-SDUPR/L07	▲	▲	15	10	9	125	9	-8°	18	I60M2.5×5.5	WT07IP	---	---
S12M-SDUPR/L07	▲	△	16	12	11	150	9	-8°	19				
S16Q-SDUPR/L07	△	△	20	16	15	180	11	-6°	25	I60M2.5×6.5			

▲Stock available △Make-to-order

Applicable inserts

Application	For extra finishing
Inserts shape	**USF**  A109
	SF  A109
Tool holder type **□□-SDUPR/L07**	DP□□0702□□

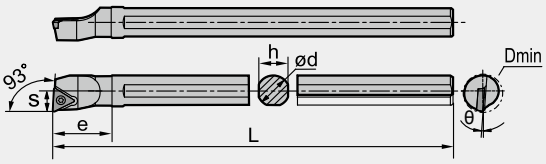
Corresponding tool holders of insert TP□□ S-type clamping

STUPR/L

Kr:93°



R-type shown





Type	Stock		Basic dimensions(mm)							Screw	Wrench	---	---
	R	L	Dmin	ød	h	L	S	θ	e			---	---
S10K-STUPR/L09	▲	△	12	10	9	125	6	-6°	20	I60M2.2×5.5	WT07IP	---	---
S12M-STUPR/L09	▲	△	16	12	11	150	8	-4°	22				
S12M-STUPR/L11	▲	△	16	12	11	150	8	-4°	25	I60M2.5×6.5	WT07IP	---	---
S16Q-STUPR/L11	▲	△	20	16	15	180	10	-3°	27				

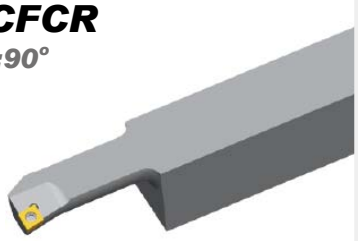
▲Stock available △Make-to-order

Applicable inserts

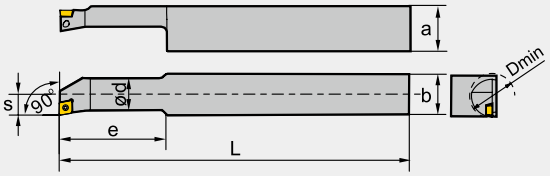
Application	For extra finishing
Inserts shape	**SF**  A111
Tool holder type □□-STUPR/L09	TP□□0902□□
Tool holder type □□-STUPR/L11	TP□□1103□□

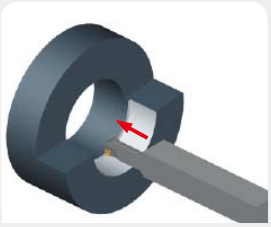
Corresponding tool holders of insert CC□□ S-type clamping

SCFCR
Kr:90°



R-type shown





Type	Stock		Basic dimensions(mm)							Screw	Wrench	---	---
	R	L	Dmin	ød	L	s	a	b	e			---	---
S10M-SCFCR06S25	▲	△	13	10	150	7	27	25	30	I60M2.5×5.5	WT07IP	---	---
S12P-SCFCR06S25	▲	△	16	12	170	9	27	25	35	I60M2.5×6.5			
S16Q-SCFCR09S25	△	△	20	16	180	11	27	25	40	I60M3.5×8	WT15IP	---	---
S20R-SCFCR09S25	▲	△	25	20	200	13	27	25	45				
S25R-SCFCR12S25	▲	△	32	25	200	17	27	25	50	I60M5×13	WT20IP	---	---

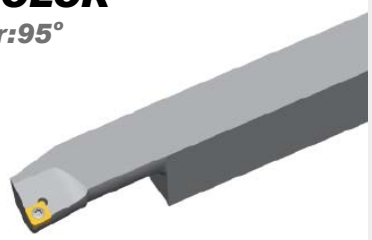
▲Stock available △Make-to-order

Applicable inserts

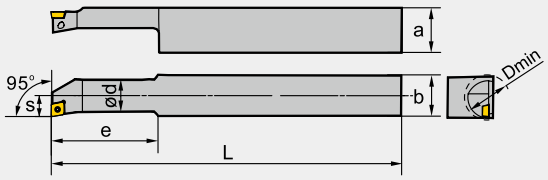
Application		For extra finishing	For finishing	For semi-finishing	For roughing	For Al machining	For cast iron machining	PCBN/PCD inserts
Inserts shape		**USF**  A87	**HF**  A87	**HM**  A88	**HR**  A89	**LH**  A89	Without chipbreaker  A90	Without chipbreaker  A130
		SF  A87	**EF**  A88	**EM**  A88		**LC**  A89		Without chipbreaker  A130
Tool holder type	**□□-SCFCR06S25**	CC□□0602□□	CC□□0602□□	CC□□0602□□	CC□□0602□□	CCGX0602□□	CC□□0602□□	CC□□0602□□
	□□-SCFCR09S25	CC□□09T3□□	CC□□09T3□□	CC□□09T3□□	CC□□09T3□□	CCGX09T3□□	CC□□09T3□□	CC□□09T3□□
	□□-SCFCR12S25		CC□□1204□□	CC□□1204□□	CC□□1204□□	CCGX1204□□	CC□□1204□□	CC□□1204□□

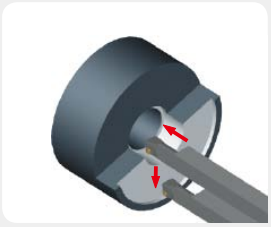
Corresponding tool holders of insert CC□□ S-type clamping

SCLCR
Kr:95°



R-type shown



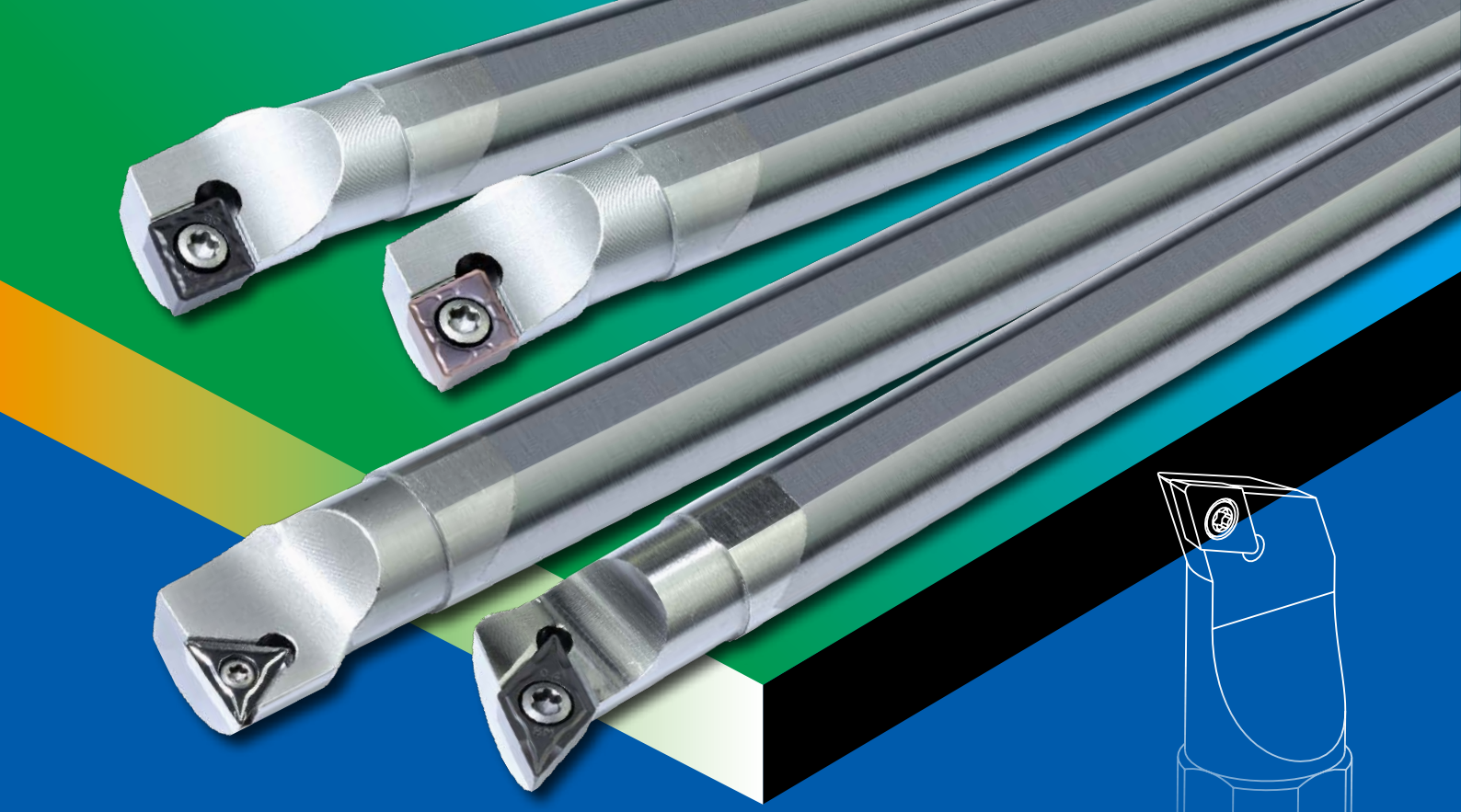


Type	Stock		Basic dimensions(mm)							Screw	Wrench	---	---
	R	L	Dmin	ød	L	s	a	b	e			---	---
S10M-SCLCR06S20	▲	△	13	10	150	7	22	20	30	I60M2.5×5.5	WT07IP	---	---
S12P-SCLCR06S20	▲	△	16	12	170	9	22	20	35				
S16Q-SCLCR09S20	▲	△	20	16	180	11	22	20	40	I60M3.5×8	WT15IP	---	---
S20R-SCLCR09S20	▲	△	25	20	200	13	22	20	60				

▲Stock available △Make-to-order

Applicable inserts

Application		For extra finishing	For finishing	For semi-finishing	For roughing	For Al machining	For cast iron machining	PCBN/PCD inserts
Inserts shape		**USF**  A87	**HF**  A87	**HM**  A88	**HR**  A89	**LH**  A89	Without chipbreaker  A90	Without chipbreaker  A130
		SF  A87	**EF**  A88	**EM**  A88		**LC**  A89		Without chipbreaker  A130
Tool holder type	**□□-SCLCR06S20**	CC□□0602□□	CC□□0602□□	CC□□0602□□	CC□□0602□□	CCGX0602□□	CC□□0602□□	CC□□0602□□
	□□-SCLCR09S20	CC□□09T3□□	CC□□09T3□□	CC□□09T3□□	CC□□09T3□□	CCGX09T3□□	CC□□09T3□□	CC□□09T3□□



Damping tool holders for internal turning

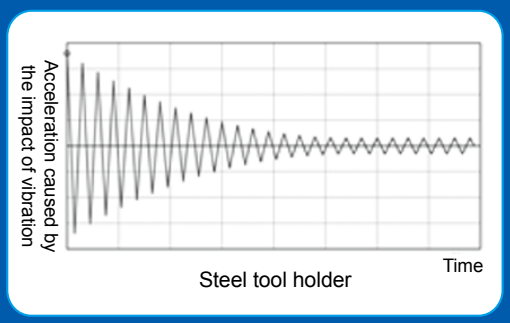
Technical features

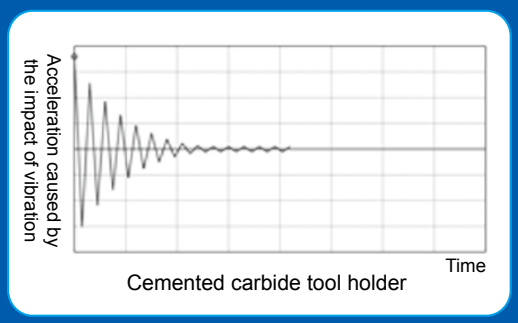
Increasing material rigidity of tool holder can reduce the amplitude, or obtain larger overhang under the condition of same systemic stability. Therefore, compared with steel tool holder, cemented carbide tool holder has better dampening effect, smaller amplitude and reaches convergence point sooner. As for machining under the condition of long overhang and easy vibration, they can exert excellent performance and achieve higher dimensional accuracy and surface quality.



Under the same machining condition

the maximum overhang of cemented carbide tool holder can reach L≤6D, while the recommended maximum overhang of steel tool holder is L≤3D.





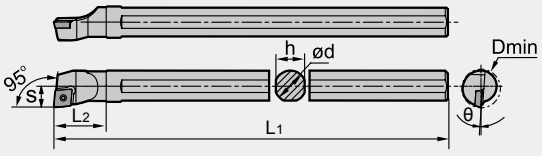
Corresponding tool holders of insert CP□□ (Damping tool holder) S-type clamping

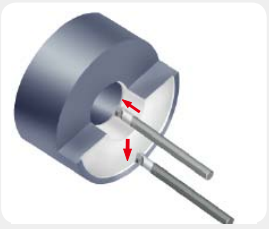
SCLPR/L

Kr:95°



R-type shown





Type	Stock		Basic dimensions(mm)							Screw	Wrench		
	R	L	Dmin	ød	s	L_1	L_2	h	θ				
C10M-SCLPR/L06	▲	△	12	10	6	150	17	9	-7°	I60M2.5×5.5	WT07IP		
C12Q-SCLPR/L06	△	△	16	12	8	180	20	11	-4°				
C16R-SCLPR/L09	▲	△	20	16	10	200	29	15	-4°	I60M3.5×8	WT15IP		
C20S-SCLPR/L09	△	△	25	20	13	250	35	18	-4°				

▲Stock available △Make-to-order

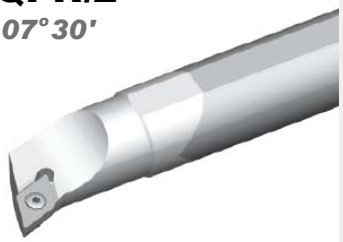
Applicable inserts

Application	For extra finishing
Inserts shape	**SF**  A108
Tool holder type **□□-SCLPR/L06**	CP□□0602□□
Tool holder type **□□--SCLPR/L09**	CP□□09T3□□

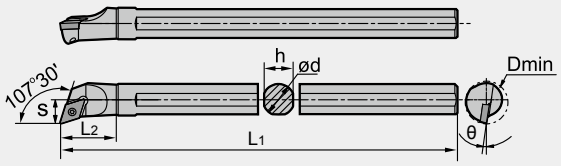
Corresponding tool holders of insert DP□□ (Damping tool holder) S-type clamping

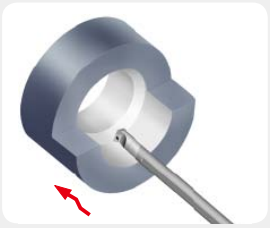
SDQPR/L

Kr:107°30'



R-type shown





Type	Stock		Basic dimensions(mm)							Screw	Wrench		
	R	L	Dmin	ød	s	L_1	L_2	h	θ				
C10M-SDQPR/L07	▲	△	13	10	7	150	20	9	-8°	I60M2.5×5.5	WT07IP		
C12Q-SDQPR/L07	△	△	16	12	9	180	22	11	-8°				
C16R-SDQPR/L07	△	△	20	16	11	200	27	15	-6°	I60M2.5×6.5			
C16R-SDQPR/L11	△	△	20	16	11	200	32	15	-6°	I60M3.5×8	WT15IP		
C20S-SDQPR/L11	▲	△	25	20	13	250	33	18	-6°				

▲Stock available △Make-to-order

Applicable inserts

Application	For extra finishing
Inserts shape	SF  A109
Tool holder type □□-SDQPR/L07	DP□□0702□□
Tool holder type □□-SDQPR/L11	DP□□11T3□□

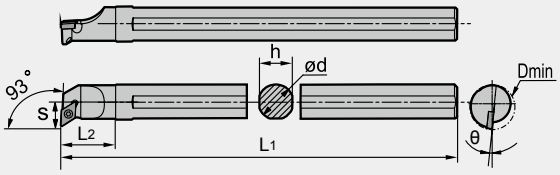
Corresponding tool holders of insert DP□□ (Damping tool holder) S-type clamping

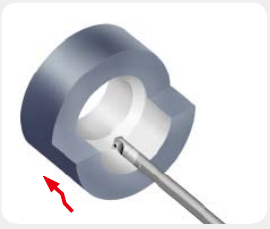
SDUPR/L

Kr:93°



R-type shown





Type	Stock		Basic dimensions(mm)							Screw	Wrench		
	R	L	Dmin	ød	s	L_1	L_2	h	θ				
C10M-SDUPR/L07	△	△	15	10	9	150	18	9	-8°	I60M2.5×5.5	WT07IP		
C12Q-SDUPR/L07	△	△	16	12	9	180	19	11	-8°	I60M2.5×6.5			
C16R-SDUPR/L07	△	△	20	16	11	200	25	15	-6°				

▲Stock available △Make-to-order

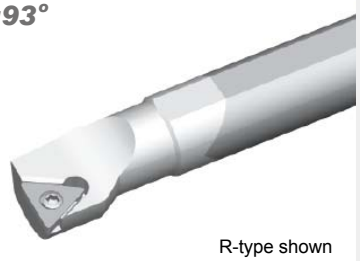
Applicable inserts

Application	For extra finishing
Inserts shape	**SF**  A109
Tool holder type: **□□-SDQPR/L07**	DP□□0702□□

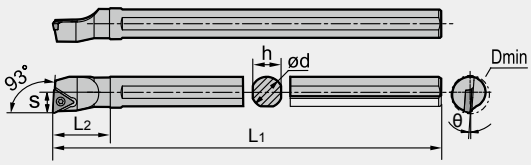
Corresponding tool holders of insert TP□□ (Damping tool holder) S-type clamping

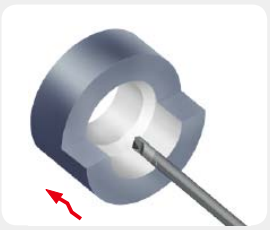
STUPR/L

Kr:93°



R-type shown



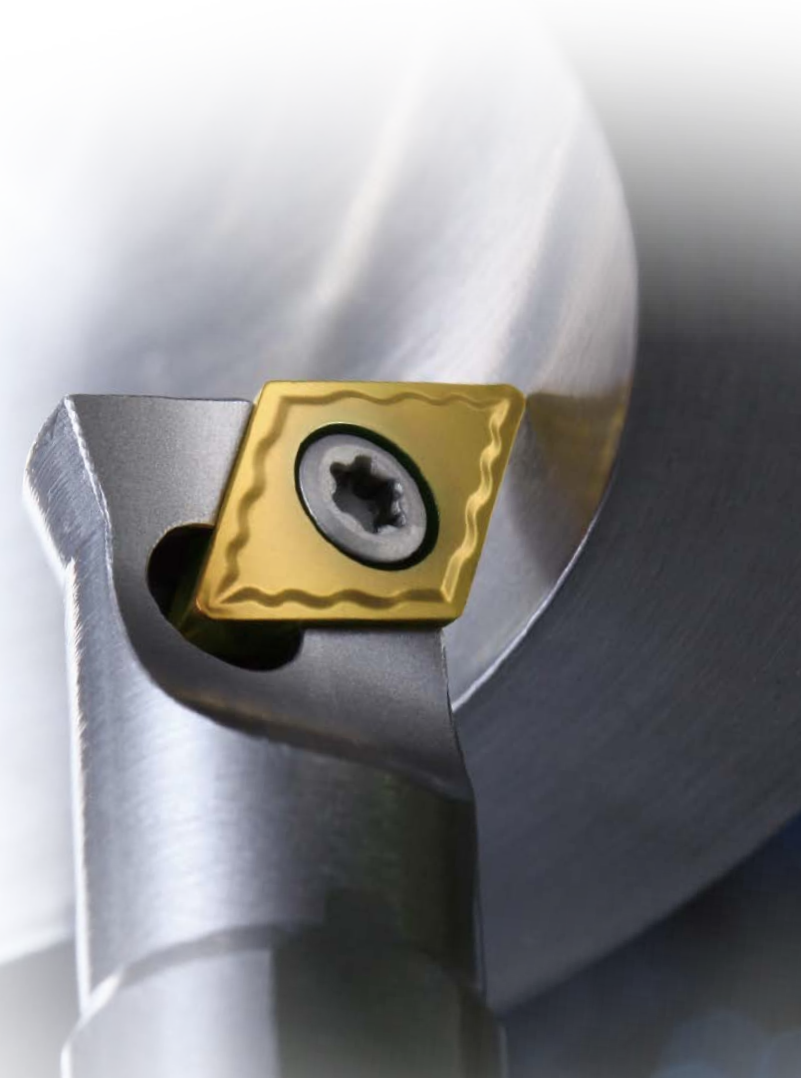


Type	Stock		Basic dimensions(mm)							Screw	Wrench		
	R	L	Dmin	ød	s	L1	L2	h	θ				
C10M-STUPR/L09	▲	△	12	10	6	150	20	9	-6°	I60M2.2×5.5	WT07IP		
C12Q-STUPR/L09	▲	△	16	12	8	180	22	11	-4°				
C12Q-STUPR/L11	▲	△	16	12	8	180	25	11	-4°	I60M2.5×6.5	WT07IP		
C16R-STUPR/L11	▲	△	20	16	10	250	27	15	-3°				

▲Stock available △Make-to-order

Applicable inserts

Application	For extra finishing
Inserts shape	**SF**  A111
Tool holder type **□□-STUPR/L09**	TP□□0902□□
□□-STUPR/L11	TP□□1103□□



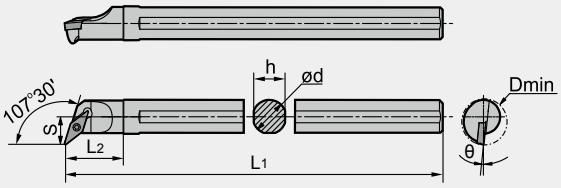
Corresponding tool holders of insert VC□□ (Damping tool holder) S-type clamping

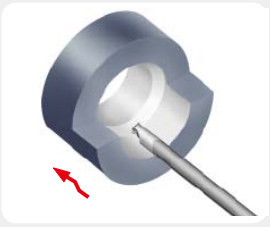
SVQCR/L

Kr:107°30'



R-type shown





Type	Stock		Basic dimensions(mm)							Screw	Wrench		
	R	L	Dmin	ød	s	L1	L2	h	θ				
C16R-SVQCR/L11	△	△	22	16	13	200	28	15	-6°	I60M2.5×6.5	WT07IP		
C20S-SVQCR/L11	△	△	26	20	15	250	32	18	-4°				

▲Stock available △Make-to-order

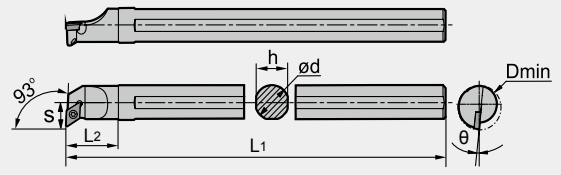
Corresponding tool holders of insert VC□□ (Damping tool holder) S-type clamping

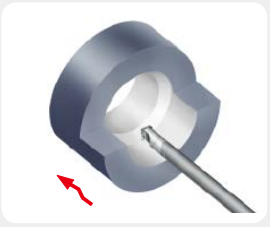
SVUCR/L

Kr:93°



R-type shown





Type	Stock		Basic dimensions(mm)							Screw	Wrench		
	R	L	Dmin	ød	s	L1	L2	h	θ				
C16R-SVUCR/L11	△	△	24	16	15	200	25	15	-6°	I60M2.5×6.5	WT07IP		
C20S-SVUCR/L11	△	△	28	20	17	250	30	18	-4°				

▲Stock available △Make-to-order

Applicable inserts

Application	For extra finishing	For finishing	For Al machining
Inserts shape	**USF**  A103	**HF**  A103	**LH**  A104
	SF  A103		**LC**  A104
Tool holder type **□□-SVQCR/L11**	VC□□1103□□	VC□□1103□□	VCGX1103□□
□□-SVUCR/L11	VC□□1103□□	VC□□1103□□	VCGX1103□□

Table of recommended cutting parameters for general turning

ISO	Materials		Hardness HB	CVD Coating						PVD Coating			Cermet	Coated cermet	Cemented carbide		Ceramic	
				YBC151	YBC251	YBC152	YBC252	YBC351	YBC352	YBG102	YBG202	YBG302	YNG151	YNG151C	YC10	YC40	CA1000	CN2000
				Feed rate (mm/rev)														
				0.1-0.6	0.1-0.8	0.1-0.6	0.1-0.8	0.2-1.0	0.2-1.0	0.2-0.4	0.1-0.6	0.05-0.8	0.05-0.2	0.05-0.2	0.1-0.4	0.1-0.5	0.1-1.5	0.1-1.5
				Cutting speed (m/min)														
P	Carbon steel	C=0.15%	125	430-200	430-190	500-270	480-240	380-165	430-220	460-220	380-180	360-165	550-350	580-350	360-165	300-145	800-300	
		C=0.35%	150	380-180	410-180	460-250	460-230	300-150	350-200	440-210	300-170	280-150	500-300	520-300	280-150	220-130	600-200	
		C=0.60%	200	330-150	350-150	400-220	400-200	260-130	310-180	380-180	260-150	240-130	460-260	480-260	240-130	180-80	400-150	
	Alloy steel	Anneal	180	350-170	350-150	400-180	400-200	200-100	250-150	380-180	200-120	180-100	410-240	430-240	180-100	160-80	150-180	400-150
		Hardened	275	230-100	210-100	280-150	260-140	140-70	200-120	240-120	140-90	120-70	300-180	320-180	120-70	120-50	350-120	300-100
		Hardened	300	210-100	190-70	260-150	240-120	125-60	180-110	220-100	125-80	100-60	250-170	270-170	100-60	80-40	300-100	250-80
		Hardened	350	180-80	170-70	230-120	220-120	110-55	160-100	200-100	110-75	90-55	230-150	250-150	90-55	70-45	300-80	
	High alloy steel	Anneal	200	320-150	260-120	360-190	310-170	175-80	220-130	290-150	175-100	155-80	350-200	370-200	155-80	135-60	400-150	350-120
		Hardene	325	140-90	100-50	190-130	150-100	85-40	140-90	130-80	85-60	65-40	170-110	190-110	65-40	45-30	300-100	280-80
	Cast steel	Non-Alloy	180	240-120	200-100	280-160	250-140	135-75	190-130	230-125	135-95	115-75	260-170	280-170	115-75	95-55	600-220	
		Low alloy	200	230-70	170-60	280-110	220-110	120-80	170-130	200-90	120-100	100-80	260-170	280-170	100-80	80-60	400-150	
		High alloy	225	160-70	140-50	210-110	190-100	95-55	150-110	170-80	95-55	95-55	260-100	280-100	95-55	75-35	350-120	

ISO	Materials		Hardness HB	CVD Coating						PVD Coating			Cermet	Coated cermet				
				YBM151	YBM153	YBM251	YBM253			YBG202	YBG205	YBG302	YNG151	YNG151C				
				Feed rate (mm/rev)														
				0.2-0.6	0.2-0.6	0.2-0.6	0.2-0.6			0.1-0.4	0.2-0.4	0.2-0.6	0.1-0.3	0.1-0.3				
				Cutting speed (m/min)														
M	Stainless steel	Ferrite	180	280-180	280-180	250-140	260-140			300-190	290-190	250-150	330-220	350-210				
		Austenite	260	250-150	250-150	200-110	210-110			250-160	240-160	220-120	250-150	270-140				
		Martensite	330	200-140	200-140	210-130	220-130			260-170	250-170	210-120	270-170	290-160				

Recommended table of cutting parameters for general turning

ISO	Materials		Hardness HB	CVD Coating					Cermet	Coated cermet	Ceramic			Cemented carbide	
				YBD052	YBD151	YBD102	YBD152	YBD252	YNG151	YNG151C	CA1000	CN1000	CN2000	YC10	YC40
				Feed rate (mm/rev)											
				0.1-0.4	0.1-0.6	0.1-0.4	0.1-0.5	0.1-0.8	0.1-0.4	0.1-0.4	0.1-1.5	0.1-1.5	0.1-1.5	0.1-0.3	0.1-0.4
				Cutting speed (m/min)											
K	Malleable cast iron	Ferrite	130	350-230	315-210	330-220	320-105	250-170	280-160	300-180	1200-200	800-600	800-600	150-90	105-45
		Pearlite	230	250-105	225-95	230-100	230-100	180-75	220-120	240-150	1000-200	700-500	700-500	120-70	80-30
	Low cast iron		180	520-200	450-180	480-200	480-190	380-150	400-250	420-270	1200-200	800-600	700-500	170-100	130-60
	High cast iron		260	230-120	210-110	220-115	210-100	170-90	360-240	380-260	1000-200	750-500	800-600	130-70	95-40
	Nodular cast iron	Ferrite	160	310-150	285-140	300-150	290-140	220-110	330-190	350-210	800-200	600-450	600-450	140-80	115-45
		Pearlite	250	230-110	210-100	220-105	210-100	170-90	310-200	330-220	700-200	500-350	500-350	110-70	80-30

ISO	Materials		Hardness HB	PVD Coating		Cemented carbide	CBN		PCD						
				YBG102	YBG105	YD101	YCB011	YCB012	YCD011						
				Feed rate (mm/rev)											
				0.05-0.15	0.05-0.15	0.05-0.35	0.05-0.5	0.05-0.2	0.05-0.5						
				Cutting speed (m/min)											
N	Al alloy	No heat treatment	60			1750-800			<2500						
		Heat treatment	100			510-250			<2500						
	Cast aluminum alloy	No heat treatment	75			460-175			<2500						
		Heat treatment	90			300-110			<2500						
	Copper alloy	Lead alloy	110			610-205			630-65						
		Copper, pure copper	90			310-195			630-65						
		Copper, nonleaded Copper, electrolytic copper	100			225-115			375-30						
S	Ni-base alloy	Ni-base alloy	40	90-30	90-40	70-20									
H	Other materials	Hard steel	45 HRC					350-225							
		Super hard steel	50~60 HRC					250-135							
		Chilled cast iron	500				180-120								

Table of correctional cutting parameters of internal turning

Internal turning tools by P-type clamping

Workpiece material		Hardness HB	Machining category	L/D≤3		L/D=3-4 (Diameter of shank≥Φ16mm)	
				Feed rate (mm/rev)	Cutting depth (mm)	Feed rate (mm/rev)	Cutting depth (mm)
P	Carbon steel, Alloy steel 45#, 42CrMo	HB180—280	For semi-finishing	0.1-**0.25**-0.4	<5.0	0.1-**0.2**-0.3	<4.0
M	Stainless steel 1Cr18Ni9Ti 0Cr18Ni9	⩽HB220	For semi-finishing	0.1-**0.2**-0.3	<4.0	0.1-**0.15**-0.25	<3.0
K	Cast iron HT250	HB170—230	For semi-finishing	0.1-**0.25**-0.4	<5.0	0.1-**0.2**-0.3	<4.0

Internal turning tools by S-type clamping

Workpiece material		Hardness HB	Machining category	L/D≤3		L/D=4		L/D=5		L/D=6	
				Feed rate (mm/rev)	Cutting depth (mm)	Feed rate (mm/rev)	Cutting depth (mm)	Feed rate (mm/rev)	Cutting depth (mm)	Feed rate (mm/rev)	Cutting depth (mm)
P	Carbon steel, Alloy steel 45#, 42CrMo	HB180-280	For finishing	0.05-**0.1**-0.15	<0.2	0.05-**0.1**-0.15	<0.2				
			For semi-finishing	0.15-**0.25**-0.35	<3.0	0.1-**0.15**-0.2	<1.5				
M	Stainless steel 1Cr18Ni9Ti 0Cr18Ni9	⩽HB220	For finishing	0.05-**0.1**-0.15	<0.2	0.05-**0.1**-0.15	<0.2				
			For semi-finishing	0.15-**0.2**-0.25	<2.0	0.1-**0.15**-0.2	<1.0				
N	Al Alloy	---	For finishing	0.05-**0.1**-0.15	<0.2	0.05-**0.1**-0.15	<0.2	0.05-**0.1**-0.15	-0.15	0.05-**0.1**-0.15	<0.1
			For semi-finishing	0.05-**0.1**-0.15	<2.0	0.05-**0.1**-0.15	<1.5	0.05-**0.1**-0.15	-1.0	0.05-**0.1**-0.15	<1.0

Damping internal turning tools

Workpiece material		Machining conditions	Chipbreaker	Inserts material	Feed rate (mm/rev)	Cutting depth (mm)
P	Steel HB180—280	For finishing	SF	YNG151 YNG151C	0.05-**0.2**-0.35	0.05-**0.1-0.3**-0.5
M	Stainless steel ⩽HB220				0.05-**0.2**-0.35	0.05-**0.1-0.3**-0.5
K	Cast iron HB170—230				0.05-**0.2**-0.35	0.05-**0.1-0.3**-0.5

Blue words are recommended cutting parameters.

Frequent problems of turning and solutions

Common problem	Cause	Solutions	Tool material: Harder materials	Tool material: Tougher materials	Cutting conditions: Cutting speed	Cutting conditions: Feed rate	Cutting conditions: Cutting depth	Cutting conditions: Cutting liquid	Tool shape: Change chipbreaker of inserts	Tool shape: Rake face	Tool shape: Nose radius	Tool shape: Approach angle	Tool shape: Cutting edge strength	Tool shape: Increase precision of inserts	Tool shape: Increase rigidity of tool holder	Machine clamping system: Clamping of tool holder and workpiece	Machine clamping system: Overhang of tool holder	Machine clamping system: Power, gap
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 sharp 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	Dimensions fluctuate during cutting	Insert 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 condition			↓	↑	↑	✓										
		Unsuitable geometry							✓		↓	↑						
	Too short and hard chips	Unsuitable cutting condition				↓	↓	✓										
		Unsuitable geometrical shape of cutting edge							✓		↑	↓						
Burr and knockdown flange	Steel and Al, burrs occurring	Unsuitable cutting condition			↑	↓		✓										
		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 condition				↓	↓											
		Tool abrasion and unsuitable geometrical shape	✓						✓	↑	↑		↑		✓	✓	✓	✓

Abrasion of tools and various damages

Tool damage type	Phenomenon	Cause	Solution
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 hig. Feed rate is too high.	◆Select tool materials with good wear resistance. ◆Reduce cutting speed. ◆Reduce 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 (if rounding changes into chamfering). ◆Enlarge tool bar size.
Breakage	Cutting resistant force increasing Deterioration of surface roughness	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 (if rounding changes into chamfering). ◆Enlarge tool bar size.
Plastic deformation (Cutting edge collapse)	Workpiece dimensions 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 finishing Cutting resistant force increasing	Cutting speed is low. Cutting edge is not sharp 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	Premature edge failure due to thermal cracks. Tool material is too hard.	◆Adopt dry cutting. ◆Select tool materials with good toughness.
Chattering	burrs occurring Cutting resistant force increasing	Feed rate and cutting speed are too high.	◆Select tool materials with good wear resistance. ◆Sharpen cutting edge by enlarging rake angle. ◆Reduce cutting speed.
Flaking	Usually occurring when machining super hard materials, which is accompanied with vibration	Bonding occurs on cutting edge. Chip flow is obstructed.	◆Sharpen cutting edge by enlarging rake angle. ◆Enlarge chip pocket.

Parting and grooving tools



How to select parting and grooving tools

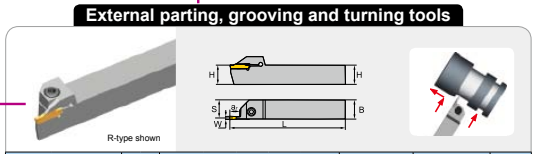
Structure of parting and grooving tools selection table

- Categorized as external machining, internal machining and profile machining.
- Concluded and separately listed according to product series (Little squirrel series and Supplementary series).

Dimensions

Application of external machining, internal machining and profile machining

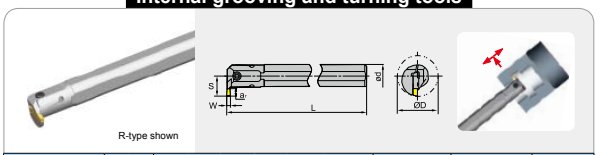
External parting, grooving and turning tools



Type		Stock R	Stock L	Basic dimensions(mm) H×B	L	S	W	ar max	Applicable inserts	Screw	Wrench
QEED	1616R/L10	▲	▲	16×16	125	15	2.5	10	ZQED025□□	GB70-85-M5×20	WH40L
	1616R/L17	▲	▲	16×16	125	15	2.5	17	ZQED025□□		
	2020R/L10	▲	▲	20×20	125	19	2.5	10	ZQED025□□	GB70-85-M6×20	WH50L
	2020R/L17	▲	▲	20×20	125	19	2.5	17	ZQED025□□		
	2525R/L10	▲	▲	25×25	150	24	2.5	10	ZQED025□□		
	2525R/L17	▲	▲	25×25	150	24	2.5	17	ZQED025□□		
QEFD	1616R/L10	▲	▲	16×16	125	14.8	3	10	ZQFD03□□	GB70-85-M5×20	WH40L
	1616R/L17	▲	▲	16×16	125	14.8	3	17	ZQFD03□□		
	2020R/L10	▲	▲	20×20	125	18.8	3	10	ZQFD03□□	GB70-85-M6×20	WH50L
	2020R/L17	▲	▲	20×20	125	18.8	3	17	ZQFD03□□		
	2525R/L10	▲	▲	25×25	150	23.8	3	10	ZQFD03□□		
	2525R/L17	▲	▲	25×25	150	23.8	3	17	ZQFD03□□		
QEGD	2020R/L13	▲	▲	20×20	140	18.5	4	13	ZQGD04□□	GB70-85-M6×20	WH50L
	2020R/L22	▲	▲	20×20	140	18.5	4	22	ZQGD04□□		
	2525R/L13	▲	▲	25×25	150	23.5	4	13	ZQGD04□□		
	2525R/L22	▲	▲	25×25	150	23.5	4	22	ZQGD04□□		
	3232R/L13	▲	▲	32×32	170	30.5	4	13	ZQGD04□□		
	3232R/L22	▲	▲	32×32	170	30.5	4	22	ZQGD04□□		
QEHD	2525R/L13	▲	▲	25×25	150	23	5	13	ZQHD05□□	GB70-85-M6×20	WH50L
	2525R/L22	▲	▲	25×25	150	23	5	22	ZQHD05□□		
QEHS	2525N30	▲	▲	25×25	150	12.5	5	30	ZQHS05□□		
QEHD	3232R/L13	▲	▲	32×32	170	30	5	13	ZQHD05□□		
	3232R/L22	▲	▲	32×32	170	30	5	22	ZQHD05□□		
QEHS	3232N30	▲	▲	32×32	170	16	5	30	ZQHS05□□		
QEKD	2525R/L13	▲	▲	25×25	150	22.6	6	13	ZQKD06□□	GB70-85-M6×20	WH50L
	2525R/L22	▲	▲	25×25	150	22.6	6	22	ZQKD06□□		
QEKS	2525N30	▲	▲	25×25	150	12.5	6	30	ZQKS06□□		
QEKD	3232R/L13	▲	▲	32×32	170	29.6	6	13	ZQKD06□□		
	3232R/L22	▲	▲	32×32	170	29.6	6	22	ZQKD06□□		
QEKS	3232N30	▲	▲	32×32	170	16	6	30	ZQKS06□□		
QELD	2525R/L16	▲	▲	25×25	150	22	8	16	ZTLD0808-MM	GB70-85-M6×20	WH50L
	2525R/L25	▲	▲	25×25	150	22	8	25	ZTLD0808-MM	GB70-85-M6×20	WH50L
	3232R/L28	▲	▲	32×32	170	29	8	28	ZTLD0808-MM	GB70-85-M8×30	WH60L

▲Stock available △Make-to-order

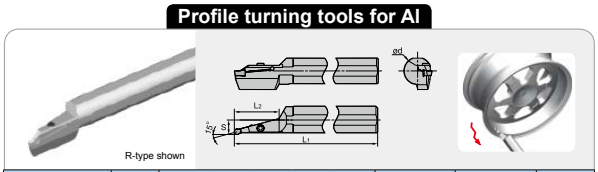
Internal grooving and turning tools



Type	Stock R	Stock L	Basic dimensions(mm) ød	L	S	W	ar max	ØDmin	Applicable inserts	Screw	Wrench
C20Q-QEDR/L05-27	▲	▲	20	180	15.2	2.5	5	27	ZTED025□□ ZRED025□□	GB70-85-M4×12	WH30L
C25R-QEDR/L07-33	▲	▲	25	200	20.3	2.5	7	33		GB70-85-M5×16	WH40L
C32S-QEDR/L09-42	▲	▲	32	250	25.3	2.5	9	42		GB70-85-M5×20	
C20Q-QFDR/L05-27	▲	▲	20	180	15.2	3	5	27	ZTFD03□□ ZRFD03□□	GB70-85-M4×12	WH30L
C25R-QFDR/L07-33	▲	▲	25	200	20.3	3	7	33		GB70-85-M5×16	WH40L
C32S-QFDR/L09-42	▲	▲	32	250	25.3	3	9	42		GB70-85-M5×20	
C25R-QGDR/L08-35	▲	▲	25	200	21.5	4	8	35	ZTGD04□□ ZRGD04□□	GB70-85-M5×16	WH40L
C32S-QGDR/L11-44	▲	▲	32	250	27.5	4	11	44		GB70-85-M6×20	WH50L
C40T-QGDR/L13-54	▲	▲	40	300	33.5	4	13	54		GB70-85-M6×20	
C25R-QHDR/L08-35	▲	▲	25	200	21.5	5	8	35	ZTHD05□□ ZRHD05□□	GB70-85-M5×16	WH40L
C32S-QHDR/L11-44	▲	▲	32	250	27.5	5	11	44		GB70-85-M6×20	WH50L
C40T-QHDR/L13-54	▲	▲	40	300	33.5	5	13	54		GB70-85-M6×20	
C25R-QKDR/L08-35	▲	▲	25	200	21.5	6	8	35	ZTKD06□□ ZRKD06□□	GB70-85-M5×16	WH40L
C32S-QKDR/L11-44	▲	▲	32	250	27.5	6	11	44		GB70-85-M6×20	WH50L
C40T-QKDR/L13-54	▲	▲	40	300	33.5	6	13	54		GB70-85-M6×20	

▲Stock available △Make-to-order

Profile turning tools for Al



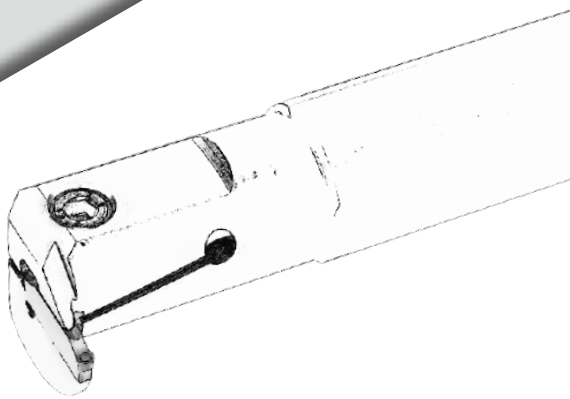
Type	Stock R	Stock L	Basic dimensions(mm) ØD (Minimum machining diameter)	ød	S	L1	L2	Applicable inserts	Screw	Wrench
C40X-QLDR/L65-15A	▲	▲	160	40	21	320	65	ZRLD08-LH	GB70-85-M6×20	WH50L
C40X-QLDR/L80-15A	▲	△	160	40	21	320	80	ZRLD08-LH		
C40X-QKDR/L60-15A	△	△	160	40	20	320	60	ZRKD06-LH		
C40X-QKDR/L75-15A	△	△	160	40	20	320	75	ZRKD06-LH		

▲Stock available △Make-to-order

Specification of products
Including type, basic dimensions, applicable inserts and accessories.

Indicating the minimum machining diameter
The minimum machining diameter is very important for internal machining.

TURNING



Parting and grooving tools

A250-A252 **Parting and grooving tools overview**

A253-A263 **Parting and grooving inserts**

A253-A255 Introduction of Little Squirrel series inserts chipbreaker

A256 Parting, grooving and profiling inserts code key

A257-A262 Inserts of Little Squirrel series

A263 Inserts of ZQMX series

A264-A280 **Parting and grooving tools**

Little squirrel series

A264-A265 Little squirrel series parting and grooving tools code key

A266 External parting, grooving and turning tools

A267 Precise grooving and turning tools

A267 External recess and profiling tools

A268 External grooving tools for materials hard to be machined

A269 External parting blade and holder for external parting

A270-A277 Surface grooving and turning tools

A278 Internal grooving and turning tools

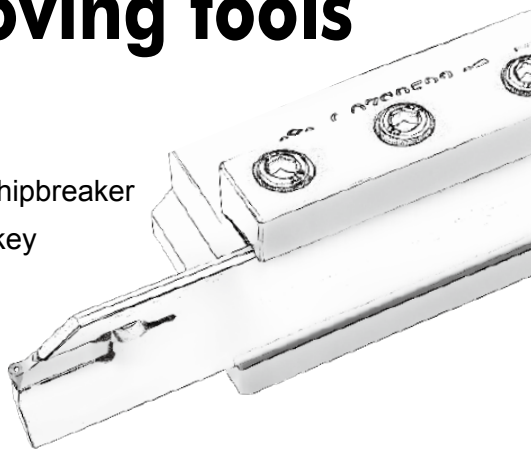
A278 Profile turning tools for Al

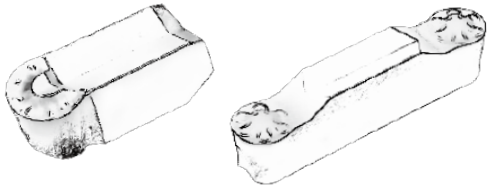
Supplementary series

A279 Supplementary series parting and grooving tools code key

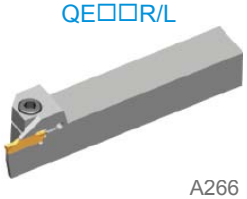
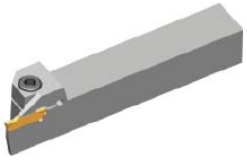
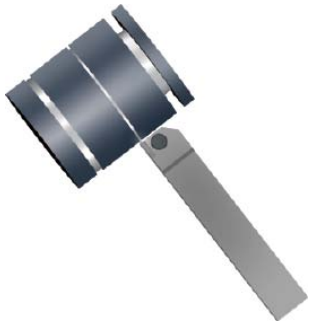
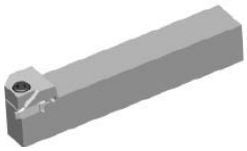
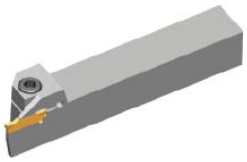
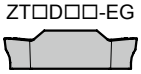
A280 QZQ external grooving series

A281-A282 **Application information on parting and grooving**

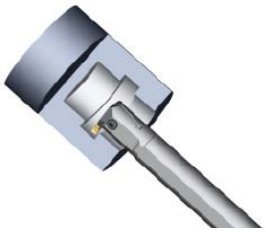
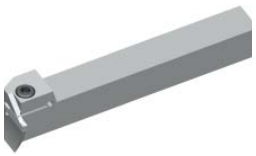
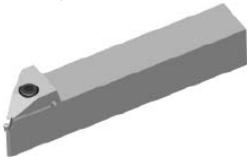




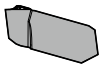
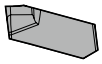
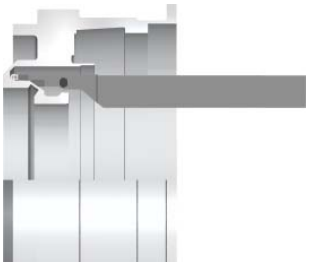
Parting and grooving tools overview

Machining application	Machining type	Applicable tools	Corresponding inserts	Tool features and parameters
External machining	Parting	Little squirrel series QZ□□+QE□□  A269	Parting inserts ZP□S□□ 	• Assemble structure of parting blade and holder; good rigidity; adjustable parting range • The maximum parting diameter is 120mm.
		Little squirrel series QE□□R/L  A266	ZP□D□□  ZP□S□ 	• Inserts have three-dimensional chipbreaker with low cutting force and good performance on chip-breaking. • The maximum parting diameter is 60mm.
		Supplementary series QZQ□□R/L  A280	ZQMX□□ 	• Cutting edge strength is suitable for bad machining conditions. • The maximum parting diameter is 70mm.
	Grooving and turning 	Little squirrel series QE□□R/L  A266	Double cutting edges for parting ZT□D□□  Profile turning ZR□D□□  Single cutting edge for deep grooving ZT□S□□ 	• A single tool with multiple applications such as grooving, parting and profile turning, reducing tools categories needed. • A multifunctional tool when used with grooving inserts. Suitable for profile machining. • The maximum slot depth machinable is 30mm.
	Precise grooving 	Little squirrel series QECD  A267	Precise grooving ZT□D□□-EG  Edge width1.2~2.4mm	• Grinded insert used for precise grooving • Edge width can be anything between 1.0-6.5mm, customized according to users' needs. • ZT□□D□□-EG inserts: When edge width is between 1.2-2.4mm, the maximum cutting depth is 2.5mm. When edge width is above 2.4-6.5mm, the maximum cutting depth is 22mm.
		Little squirrel series QE□□R/L  A266	Precise grooving ZT□D□□-EG  Edge width12.4~6.5mm	

Parting and grooving tools overview

Machining application	Machining type	Applicable tools	Corresponding inserts	Tool features and parameters
Internal machining	Grooving and turning		Little squirrel series C□□-Q□□R/L□  A278	Grooving, Turning ZT□D□□  Profile turning ZR□D□□ 	• By using inserts for grooving and profiling, one tool can be versatile, reducing the tool categories needed. • The maximum slot depth machinable is 13mm. • The minimum machining diameter is 27mm.
End surface machining	Grooving and turning		Little squirrel series QF□□□□H  A270-A275	Grooving, Turning ZT□D□□  Profile turning ZR□D□□ 	• By using inserts for grooving and profiling, one tool can be versatile, reducing the tool categories needed. • Grooving diameter is 48-400mm. • Grooving depth is 10-30mm.
			Little squirrel series QF□□□□L  A276-A277	Grooving, Turning ZT□D□□  Profile turning ZR□D□□ 	• 90°holder, top clamping. • By using inserts for grooving and profiling, one tool can be versatile, reducing the tool categories needed. • Grooving diameter is 48~400mm. • Grooving depth is 10~30mm.
recess machining	Recess machining		Little squirrel series QX□□D□□□  A267	Grooving, Turning ZT□D□□  Profile turning ZR□D□□ 	• The unique tool for recess machining. • Complete range of specifications, able to achieve various recess machining.
Al profiling	External machining		Little squirrel series QE□□R/L  A266	Little squirrel series ZR□□-LH 	• The unique tool for profiling of Al material. • Cutting edge is designed to combine sharpness and strength, suitable for continuous and intermittent turning. • Used for external, surface and inner wall machining of Al wheel hub.
	Inner wall and surface machining		Little squirrel series C40X□□  A278	

Parting and grooving tools overview

Machining application	Machining type		Applicable tools	Corresponding inserts	Tool features and parameters
Tools for aviation and aerospace industries	External machining		Little squirrel series QE□S□□N  A268	Little squirrel series ZIGQ□□  Little squirrel series ZIMF□□ 	• V-type locating, top clamping, precise locating, safe clamping. • Normal square-ended inserts and precise square-ended inserts are suitable for adhesive. materials hard to machine such as Ni-base high-temperature alloy, Ti alloy and stainless steel, etc.
	Non-standard Tools		Non-standard tools to match workpiece	Select and manufacture as required	• Tailor made solutions for machining various parts to satisfy your requirements.



New product for turning

Little squirrel series

– MM linear edge grooving insert

High strength cutting edge suitable for medium to high feed, mainly applied for flat bottom surfaces with high surface requirement.

Little squirrel series

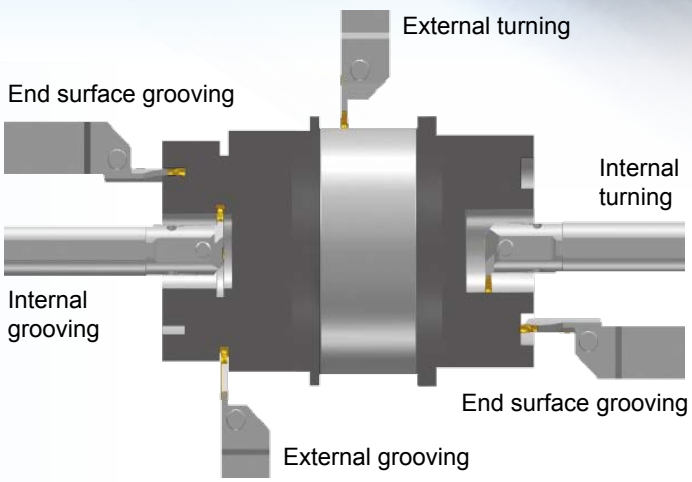
-MG Chipbreaker

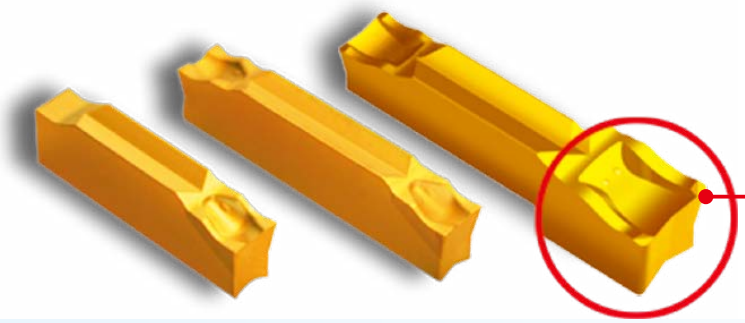
Customized -MG chipbreaker series

Suitable for parting ,grooving, profile turning and turning, etc. Easy machining and unobstructed chip flow lead to improved surface quality.

Human-centered design realizes various application of one single insert, reducing number of tools needed

Inserts of the same edge with can work with corresponding tool holders to satisfy the requirements of external, internal and surface grooving and turning by using minimum numbers of inserts and tool holders, effectively reducing cost of tool storage and management.





The cutting force is reduced by 20%, and the vibration is diminished.

Unique and professional structure design of parting inserts

- A special flank structure is designed to reduce cutting resistant force by 20% and diminish vibration, which improves the surface quality.
- A special edge design requires less rigidity of machine. It can be used on low power machines.



Little squirrel series

-EG

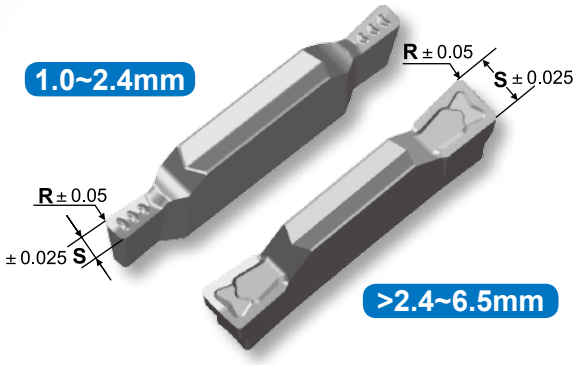
Precision grooving and profile turning inserts

Special chipbreaker design, suitable for precise grooving of low-carbon steel, stainless steel, adhesive materials and non-ferrous metal.

The tolerance of the edge width S of precise grooving and profiling inserts can reach ±0.025. Inserts can also be mounted on the corresponding specifications of original tool series.

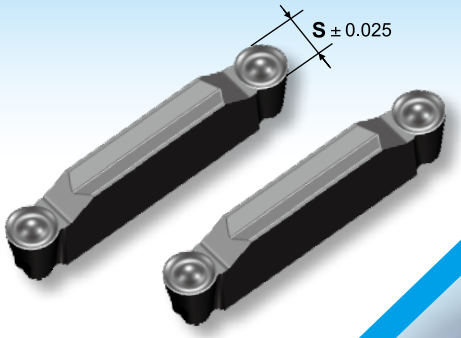
-EG Precision grooving inserts

The edge width can be anything between 1.0-6.5MM according to your requirements.



The width of the Little Squirrel series precise grooving inserts can be anything between 1.0mm to 6.5mm, which means products with any edge width or nose radius can be provided according to customers' requirements. The inserts are mainly used for precise grooving, such as sealing slot and locating slot, etc.

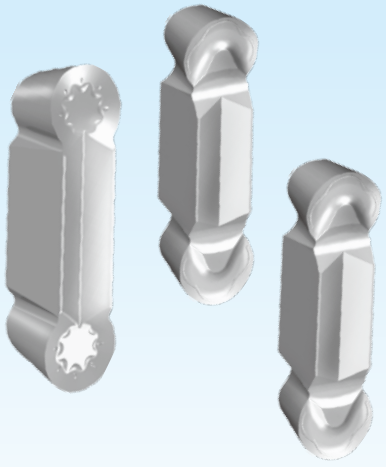
-EG Precision profile turning inserts



The Little Squirrel series precise profiling and turning inserts are mainly used for Precise grooving and profiling.



-LC/-LH



Profile turning inserts for Al

The special chipbreaker for aluminum profiling is designed to combine sharpness and strength of the cutting edge, effectively reducing the friction between chips and the rake face. The inserts are suitable for continuous and intermittent profiling of Al alloy.

Suitable for various machining of Al wheel boss periphery, surface and inner wall, etc.

Little squirrel series parting, grooving and profiling inserts code key

Insert applications

ZP ➤ Parting **ZT** ➤ Grooving and turning
ZR ➤ Profiling

Code of locating slot

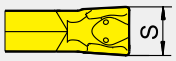
Code of locating slot	E	F	G	H	K	L
Corresponding edge width of inserts	2.5	3.0	4.0	5.0	6.0	8.0

Code of cutting edge number

S ➤ Single cutting edge **D** ➤ Double cutting edge

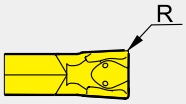
ZP G D 04 04 - M G

Cutting edge width



025=2.5mm
03=3.0mm
04=4.0mm
05=5.0mm
06=6.0mm
08=8.0mm

Nose radius



02=0.2mm
03=0.3mm
04=0.4mm
08=0.8mm

Tolerance class

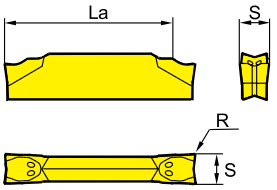
M ➤ M-level tolerance
E ➤ E-level tolerance

Chipbreaker code

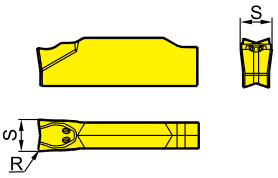
G ➤ Curve edges universal chipbreaker, suitable for machining various materials
M ➤ linear edges universal chipbreaker, suitable for machining various materials
F ➤ Special chipbreaker

Parting inserts


Double edges



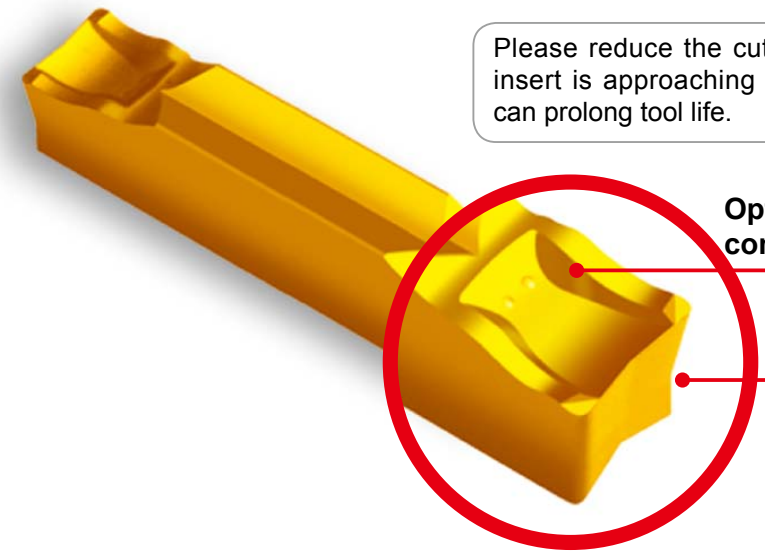

Single edge



Type		Basic dimensions(mm)			Grade				
					CVD Coating		PVD Coating		Cemented carbide
		$S^{+0.1}_{0}$	R±0.1	Cutting depth La_{max}	YBC151	YBC251	YBG205	YBG302	YD101
Double edges	**ZPED02502-MG**	2.5	0.2	17		○	★	★	
	ZPFD0302-MG	3.0	0.2	17		○	★	○	
	ZPGD0402-MG	4.0	0.2	22		○	★	○	
	ZPHD0503-MG	5.0	0.3	22		○	★	○	
	ZPKD0604-MG	6.0	0.4	22		○	★	○	
Single edge	**ZPES02502-MG**	2.5	0.2			○	★	★	
	ZPFS0302-MG	3.0	0.2			○	★	○	
	ZPGS0402-MG	4.0	0.2			○	★	○	
	ZPHS0503-MG	5.0	0.3			○	★	○	
	ZPKS0604-MG	6.0	0.4			○	★	○	

The single-edge insert is only mounted on parting blade.

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



Please reduce the cutting speed by 30% when the insert is approaching the centre of workpiece. This can prolong tool life.

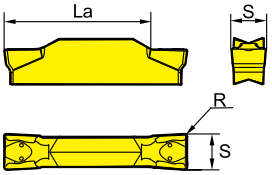
Optimal chipbreaker structure can well control chip flow and curling.

Cutting resistant force is reduced by 20% and vibration is diminished.

Grooving and turning inserts

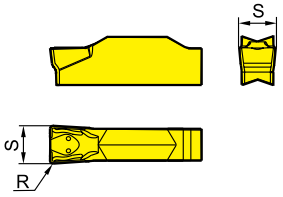


Double edges





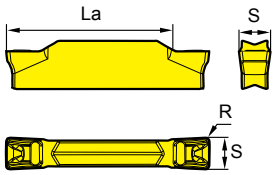
Single edge



Type		Basic dimensions(mm)			Grade					
					CVD Coating		PVD Coating			Cemented carbide
		$S^{+0.1}_{0}$	R±0.10	Cutting depth La_{max}	YBC151	YBC251	YBG202	YBG205	YBG302	YD101
Double edges	**ZTED02503-MG**	2.5	0.3	17	○	○	●	★	★	
	ZTFD0303-MG	3.0	0.3	17	○	○	●	★	★	
	ZTGD0404-MG	4.0	0.4	22	●	○	●	★	★	
	ZTHD0504-MG	5.0	0.4	22		○	●	★	★	
	ZTKD0608-MG	6.0	0.8	22		○	●	★	★	
Single edge	**ZTHS0504-MG**	5.0	0.4			○	○	★	○	
	ZTKS0608-MG	6.0	0.8			○	○	★	○	

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





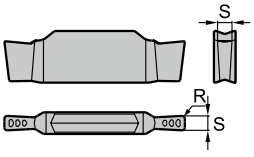
Type		Basic dimensions(mm)			Grade					
					CVD Coating		PVD Coating			Cemented carbide
		S	R±0.1	Cutting depth La_{max}	YBC151	YBC251	YBG202	YBG205	YBG302	YD101
Double edges	**ZTED02503-MM**	2.5±0.03	0.3	17	○	○	●	★	○	
	ZTFD0303-MM	3.0±0.03	0.3	17	○	○	●	★	○	
	ZTGD0404-MM	4.0±0.04	0.4	22	○	○	●	★	○	
	ZTHD0504-MM	5.0±0.04	0.4	22	○	○	●	★	○	
	ZTKD0608-MM	6.0±0.04	0.8	22	○	○	●	★	○	
	ZTLD0808-MM	8.0±0.05	0.8	28	○	○	●	★	○	

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

Precise grooving and turning inserts

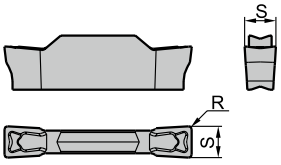


1.0~2.4mm series





>2.4~6.5mm series



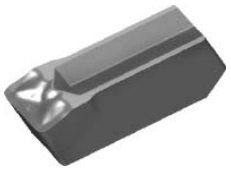
Type		Basic dimensions(mm)			Grade					
					CVD Coating		PVD Coating			Cemented carbide
		S±0.025	R(2)±0.05	Cutting depth La max	YBC151	YBC251	YBG202	YBG205	YBG302	YD101
Double edges	**ZTCD□□□□□(1)-EG**	1.0~1.6	See note. (2)	2.6	○	○	○	★	○	
		1.6~2.4		3.4						
	ZTED□□□□□-EG	2.4~3.0		17	○	○	○	★	○	
	ZTFD□□□□□-EG	3.0~3.8		17	○	○	○	★	○	
	ZTGD□□□□□-EG	3.8~4.8		22	○	○	○	★	○	
	ZTHD□□□□□-EG	4.8~5.8		22	○	○	○	★	○	
	ZTKD□□□□□-EG	5.8~6.5		22	○	○	○	★	○	

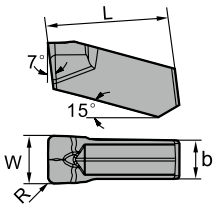
★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

Note: (1) □ The code here in the description is determined by edge width and nose radius requested by customers. For example, when the customer requires an edge width of 3.5mm and a nose radius of 0.3mm, the description of the insert would be ZTFD03503-EG.

(2) The nose radius range is 0.2≤R≤0.5 on request.

Single-edge grooving and turning inserts for machining (from semi-finishing to roughing) materials hard to be machined



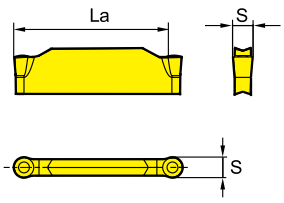


Type	Basic dimensions(mm)				Grade			
					PVD Coating			Cemented carbide
	W±0.05	R±0.1	b	L	YBG102	YBG202	YBG205	YD101
ZIMF304N-NM	3	0.4	2.4	15.3	★	○	★	○
ZIMF406N-NM	4	0.6	3.2	15.3	★	○	★	○
ZIMF506N-NM	5	0.6	4	15.3	★	○	★	○
ZIMF608N-NM	6	0.8	4	15.3	★	○	★	○

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

Profile turning inserts



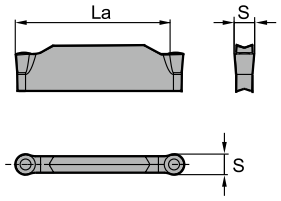


Type		Basic dimensions(mm)		Grade					
				CVD Coating		PVD Coating			Cemented carbide
		$S^{+0.1}_{0}$	Cutting depth La_{max}	YBC151	YBC251	YBG202	YBG205	YBG302	YD101
Double edges	**ZRED025-MG**	2.5	17.5		○	●	★	★	
	ZRFD03-MG	3.0	17		○	●	★	★	
	ZRGD04-MG	4.0	21		○	●	★	★	
	ZRHD05-MG	5.0	20		○	○	★	★	
	ZRKD06-MG	6.0	19		○	●	★	★	

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

Precision profiling inserts



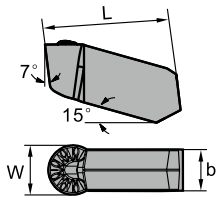


Type		Basic dimensions(mm)		Grade				
				CVD Coating		PVD Coating		Cemented carbide
		S±0.025	Cutting depth La_{max}	YBC151	YBC251	YBG202	YBG302	YD101
Double edges	**ZRFD03- EG**	3.0	17		○		○	
	ZRGD04- EG	4.0	21		○		○	
	ZRHD05-EG	5.0	20		○		○	
	ZRKD06-EG	6.0	19		○		○	

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

Single-edge inserts for machining materials hard to be machined



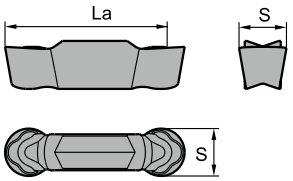


Type	Basic dimensions(mm)			Grade		
				PVD Coating		Cemented carbide
	W±0.025	b	L	YBG102	YBG202	YD101
ZIGQ3N-NM	3	2.4	15.3	★	○	○
ZIGQ4N-NM	4	3.2	15.3	★	○	○
ZIGQ5N-NM	5	4	15.3	★	○	○
ZIGQ6N-NM	6	5	15.3	★	○	○

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

Profiling inserts for Al

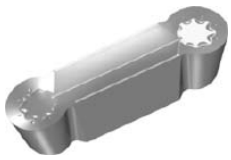


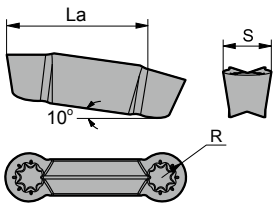


Type	Basic dimensions(mm)		Grade
	S±0.02	Cutting depth Lamax	Cemented carbide
			YD101
ZRKD06- LH	6.0	19	★
ZRLD08-LH	8.0	22	★

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

Profiling inserts for Al



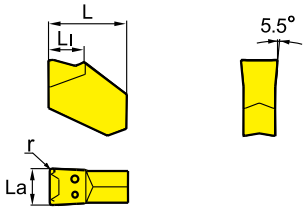


Type	Basic dimensions(mm)			Grade
	S±0.02	R	Cutting depth Lamax	Cemented carbide
				YD101
ZILD08-LC	8.0	4.0	22	●

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

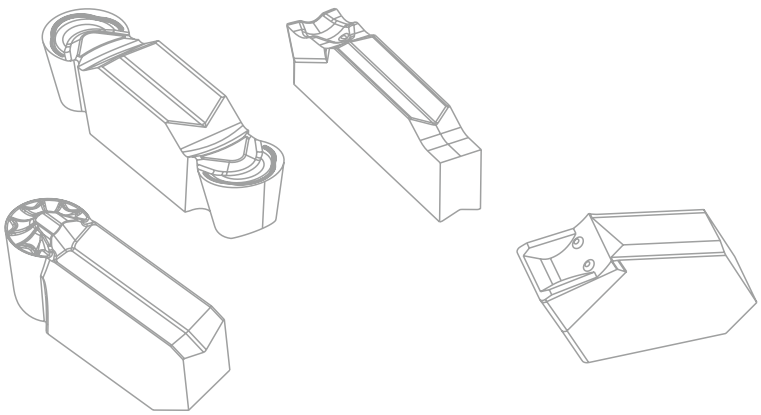
ZQMX series





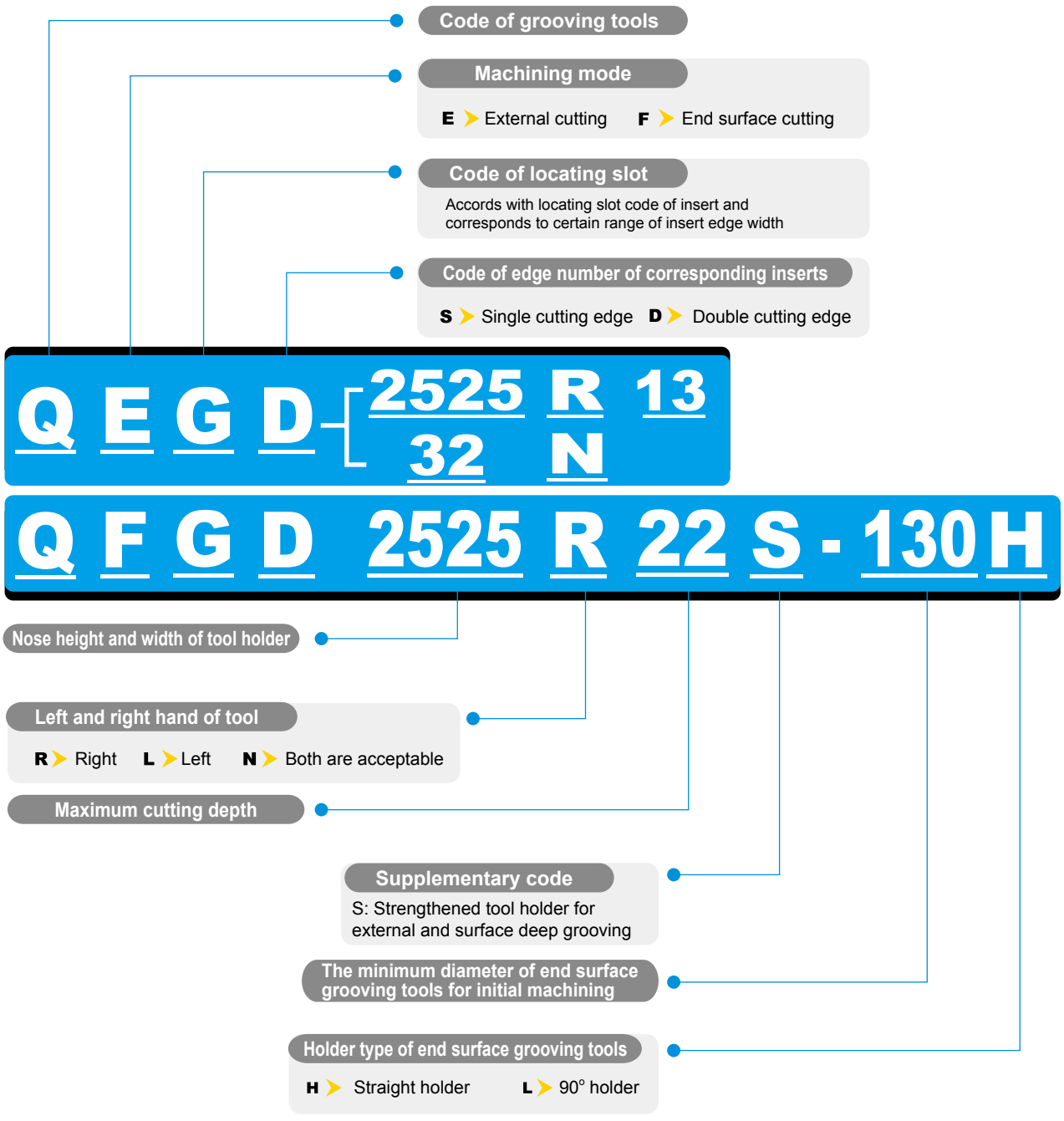
Type	Basic dimensions(mm)				Grade			
					CVD Coating	Cemented carbide		
	L1	La	r	L	YBC251	YC10	YC40	YD201
ZQMX3N11-1E	4.4	3.125	0.3	11	●	●	●	●
ZQMX4N11-1E	4.95	4.125	0.3	11	●		●	●
ZQMX5N11-1E	5	5.125	0.3	11	●		●	●
ZQMX6N11-1E	5.28	6.4	0.3	11	●		●	○
ZQMX7N11-1E	4.53	7.05	0.3	14			○	

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

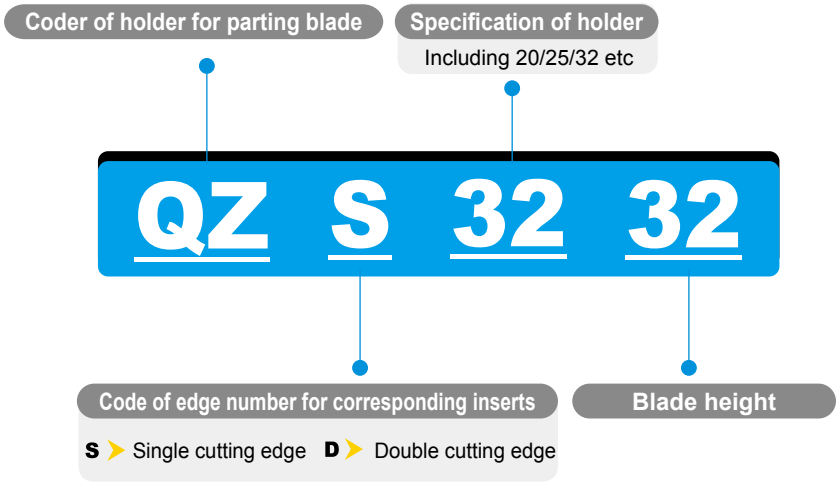


Little squirrel series parting and grooving tools code key

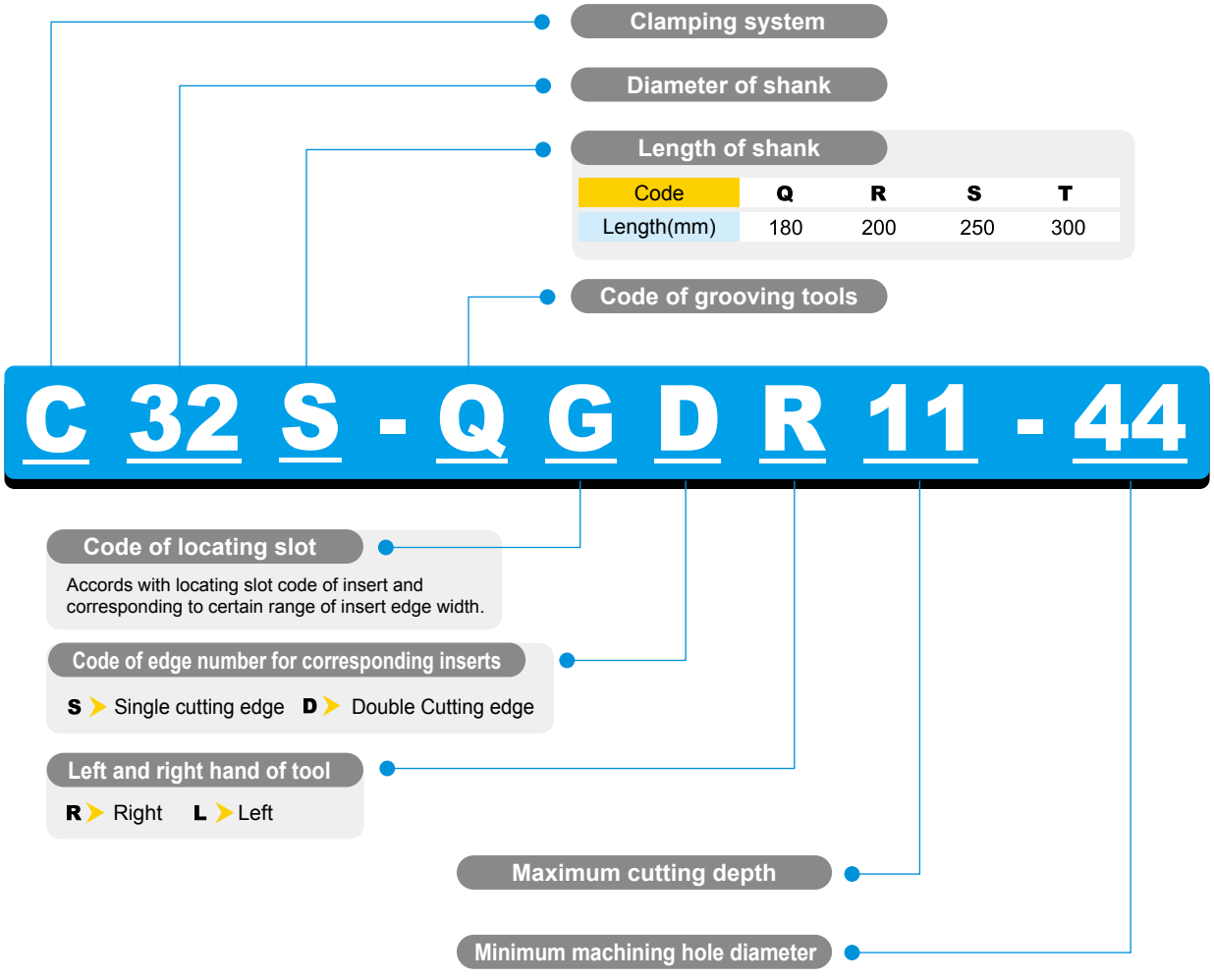
● External and surface turning



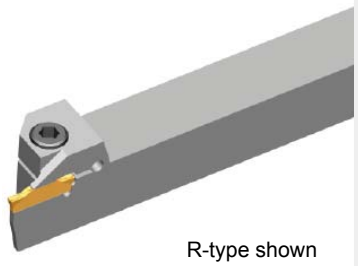
● Holder for parting blade



● Internal machining



External parting, grooving and turning tools



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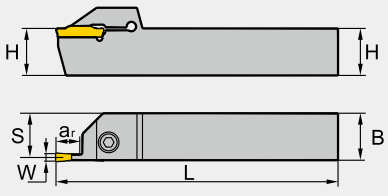
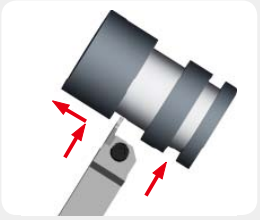
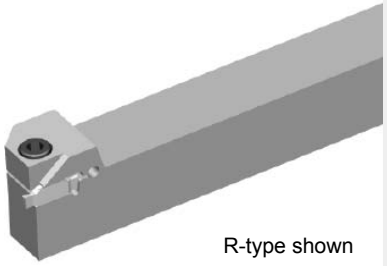




Type		Stock		Basic dimensions(mm)					Applicable inserts	Screw	Wrench
		R	L	H×B	L	S	W	a_{rmax}			
QEED	**1616R/L10**	▲	▲	16×16	125	15	2.5	10	ZD□ED025□□	GB70-85-M5×20	WH40L
	1616R/L17	▲	▲	16×16	125	15	2.5	17	ZD□ED025□□		
	2020R/L10	▲	▲	20×20	125	19	2.5	10	ZD□ED025□□	GB70-85-M6×20	WH50L
	2020R/L17	▲	▲	20×20	125	19	2.5	17	ZD□ED025□□		
	2525R/L10	▲	▲	25×25	150	24	2.5	10	ZD□ED025□□		
	2525R/L17	▲	▲	25×25	150	24	2.5	17	ZD□ED025□□		
QEFD	**1616R/L10**	▲	▲	16×16	125	14.8	3	10	ZD□FD03□□	GB70-85-M5×20	WH40L
	1616R/L17	▲	▲	16×16	125	14.8	3	17	ZD□FD03□□		
	2020R/L10	▲	▲	20×20	125	18.8	3	10	ZD□FD03□□	GB70-85-M6×20	WH50L
	2020R/L17	▲	▲	20×20	125	18.8	3	17	ZD□FD03□□		
	2525R/L10	▲	▲	25×25	150	23.8	3	10	ZD□FD03□□		
	2525R/L17	▲	▲	25×25	150	23.8	3	17	ZD□FD03□□		
QEGD	**2020R/L13**	▲	▲	20×20	140	18.5	4	13	ZD□GD04□□	GB70-85-M6×20	WH50L
	2020R/L22	▲	▲	20×20	140	18.5	4	22	ZD□GD04□□		
	2525R/L13	▲	▲	25×25	150	23.5	4	13	ZD□GD04□□		
	2525R/L22	▲	▲	25×25	150	23.5	4	22	ZD□GD04□□		
	3232R/L13	▲	▲	32×32	170	30.5	4	13	ZD□GD04□□		
	3232R/L22	▲	▲	32×32	170	30.5	4	22	ZD□GD04□□		
QEHD	**2525R/L13**	▲	▲	25×25	150	23	5	13	ZD□HD05□□	GB70-85-M6×20	WH50L
	2525R/L22	▲	▲	25×25	150	23	5	22	ZD□HD05□□		
QEHS	**2525N30**	▲	▲	25×25	150	12.5	5	30	ZD□HS05□□		
QEHD	**3232R/L13**	▲	▲	32×32	170	30	5	13	ZD□HD05□□		
	3232R/L22	▲	▲	32×32	170	30	5	22	ZD□HD05□□		
QEHS	**3232N30**	▲	▲	32×32	170	16	5	30	ZD□HS05□□		
QEKD	**2525R/L13**	▲	▲	25×25	150	22.6	6	13	ZD□KD06□□	GB70-85-M6×20	WH50L
	2525R/L22	▲	▲	25×25	150	22.6	6	22	ZD□KD06□□		
QEKS	**2525N30**	▲	▲	25×25	150	12.5	6	30	ZD□KS06□□		
QEKD	**3232R/L13**	▲	▲	32×32	170	29.6	6	13	ZD□KD06□□		
	3232R/L22	▲	▲	32×32	170	29.6	6	22	ZD□KD06□□		
QEKS	**3232N30**	▲	▲	32×32	170	16	6	30	ZD□KS06□□		
QELD	**2525R/L16**	▲	▲	25×25	150	22	8	16	ZTLD0808-MM	GB70-85-M6×20	WH50L
	2525R/L25	▲	▲	25×25	150	22	8	25	ZTLD0808-MM	GB70-85-M6×20	WH50L
	3232R/L28	▲	▲	32×32	170	29	8	28	ZTLD0808-MM	GB70-85-M8×30	WH60L

▲Stock available △Make-to-order

Precision grooving and turning tools



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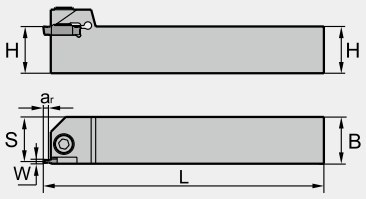
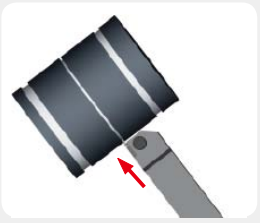
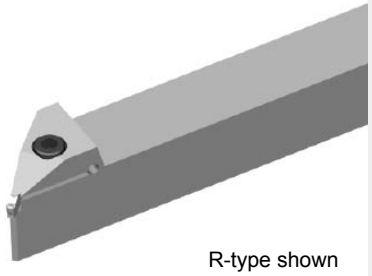




Type		Stock		Basic dimensions(mm)					Applicable inserts	Screw	Wrench
		R	L	H×B	L	S	W	a_r max			
QECD	**1616R/L025**	△	△	16×16	125	14.75			ZTCD□□□□□□-EG	GB70-85-M5×20	WH40L
	2020R/L025	▲	△	20×20	125	18.75		2.5		GB70-85-M6×20	WH50L
	2525R/L025	▲	△	25×25	150	23.75					

▲Stock available △Make-to-order

External recess and profiling turning tools



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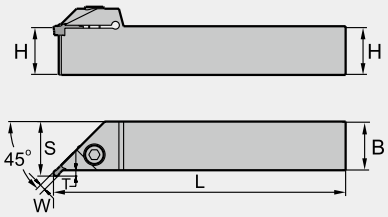
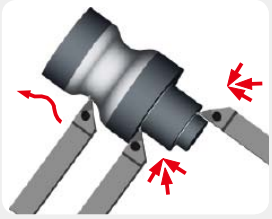
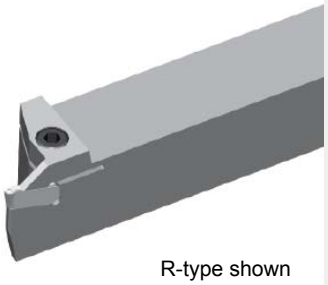




Type		Stock		Basic dimensions(mm)					Applicable inserts	Screw	Wrench
		R	L	H×B	L	S	W	a_r max			
QXFD	**2020R/L03-45**	△	△	20×20	125	23			ZR(T)FD03-EG ZR(T)FD03-MG	GB70-85-M6×20	WH50L
	2525R/L03-45	△	△	25×25	150	28	3.0	3.0			
	3232R/L03-45	△	△	32×32	170	35					
QXGD	**2020R/L03-45**	△	△	20×20	125	23			ZR(T)GD04-EG ZR(T)GD04-MG		
	2525R/L03-45	△	△	25×25	150	28	4.0	3.0			
	3232R/L03-45	△	△	32×32	170	35					
QXHD	**2020R/L04-45**	△	△	20×20	125	24			ZR(T)HD05-EG ZR(T)HD05-MG		
	2525R/L04-45	△	△	25×25	150	29	5.0	4.0			
	3232R/L04-45	△	△	32×32	170	36					
QXKD	**2020R/L04-45**	△	△	20×20	125	24			ZR(T)KD06-EG ZR(T)KD06-MG		
	2525R/L04-45	△	△	25×25	150	29	6.0	4.0			
	3232R/L04-45	△	△	32×32	170	36					

▲Stock available △Make-to-order

External grooving tools for materials hard to be machined



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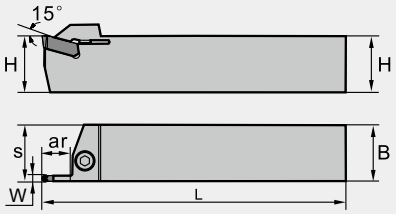
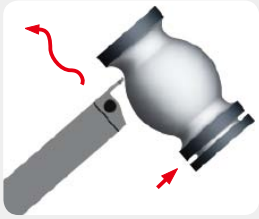
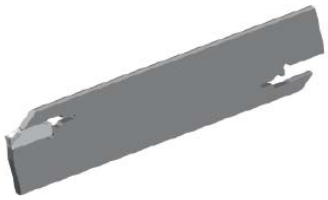


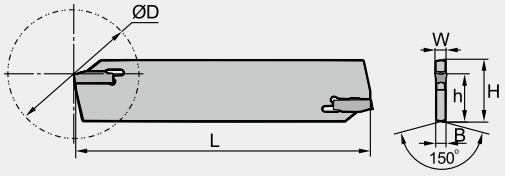


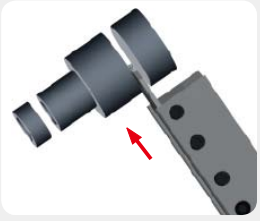
Type		Stock		Basic dimensions(mm)					Applicable inserts	Screw	Wrench
		R	L	H×B	L	S	W	ar max			
QEFS	**2525R/L12-3N**	△	△	25×25	150	25.3	3	12	ZIGQ3N-NM ZIMF304N-NM	GB70-85-M6×20	WH50L
	3232R/L22-3N	△	△	32×32	170	32.3	3	22			
QEGS	**2525R/L12-4N**	△	△	25×25	150	25.3	4	12	ZIGQ4N-NM ZIMF406N-NM		
	3232R/L22-4N	△	△	32×32	170	32.3	4	22			
QEHS	**2525R/L12-5N**	△	△	25×25	150	25.4	5	12	ZIGQ5N-NM ZIMF506N-NM		
	3232R/L22-5N	△	△	32×32	170	32.4	5	22			
QEKS	**2525R/L12-6N**	△	△	25×25	150	25.4	6	12	ZIGQ6N-NM ZIMF608N-NM		
	3232R/L22-6N	△	△	32×32	170	32.4	6	22			

▲Stock available △Make-to-order

Blade for external parting





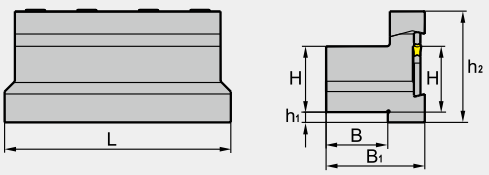


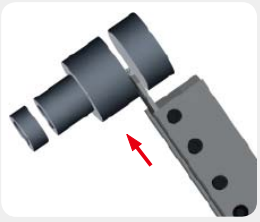
Type	Stock	Basic dimensions(mm)						Applicable inserts	Wrench
		L	H	h	B	W	ØDmax (Maximum parting diameter)		
QEES26N	▲	110	26	19	2	2.5	60	ZPES02502-MG	W50RL
QEFS26N	▲	110	26	19	2.4	3	60	ZPFS0302-MG	
QEGS26N	▲	110	26	19	3.2	4	70	ZPGS0402-MG	
QEHS26N	▲	110	26	19	4	5	70	ZPHS0503-MG	
QEKS26N	▲	110	26	19	5	6	70	ZPKS0604-MG	
QEES32N	▲	150	32	24.6	2	2.5	100	ZPES02502-MG	
QEFS32N	▲	150	32	24.6	2.4	3	100	ZPFS0302-MG	
QEGS32N	▲	150	32	24.6	3.2	4	120	ZPGS0402-MG	
QEHS32N	▲	150	32	24.6	4	5	120	ZPHS0503-MG	
QEKS32N	▲	150	32	24.6	5	6	120	ZPKS0604-MG	

▲Stock available △Make-to-order

Holder for blade used for external parting



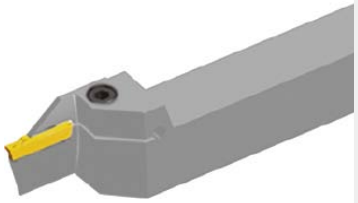




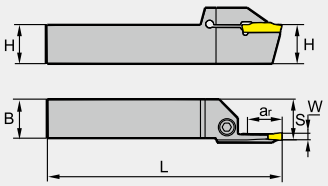
Type	Stock	Basic dimensions(mm)						Clamp	Screw	Wrench
		L	H	h_1	h_2	B	B_1			
QZS2026	▲	86	20	10	46.6	19	38	QZC26	GB70-85-M6×20	WH50L
QZS2526	▲	86	25	5	46.6	23	42	QZC26		
QZS3226	▲	86	30	3	51.6	30	48	QZC26		
QZS2032	▲	110	20	13	50	19	38	QZC32		
QZS2532	▲	110	25	8	50	23	42	QZC32		
QZS3232	▲	110	32	5	54	30	48	QZC32		

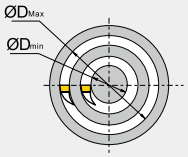
▲Stock available △Make-to-order

End surface grooving and turning tools



L-type shown





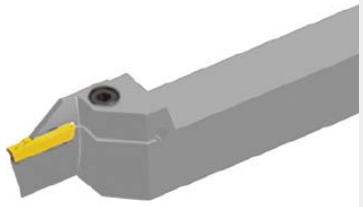
Diameter range of entering



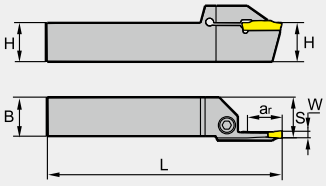
Type		Stock		Basic dimensions(mm)						Applicable inserts	Screw	Wrench
		R	L	H×B	L	S	W	ar max	ØD (min-max)			
QFFD	**2020R/L7-48H**	▲	▲	20×20	150	21	3	7	48-66	ZTFD0303-□□	GB70-85-M6×20	WH50L
	2020R/L10-48H	▲	▲	20×20	150	21	3	10	48-66			
	2525R/L10-48H	▲	▲	25×25	150	26	3	10	48-66			
	2525R/L17-48H	▲	▲	25×25	150	26	3	17	48-66			
	2020R/L7-60H	△	△	20×20	150	21	3	7	60-80			
	2020R/L10-60H	△	△	20×20	150	21	3	10	60-80			
	2525R/L10-60H	▲	▲	25×25	150	26	3	10	60-80			
	2525R/L17-60H	▲	▲	25×25	150	26	3	17	60-80			
	2020R/L7-74H	△	△	20×20	150	21	3	7	74-110			
	2020R/L10-74H	△	▲	20×20	150	21	3	10	74-110			
	2525R/L10-74H	▲	▲	25×25	150	26	3	10	74-110			
	2525R/L17-74H	▲	▲	25×25	150	26	3	17	74-110			
	2020R/L7-100H	△	△	20×20	150	21	3	7	100-150			
	2020R/L10-100H	△	△	20×20	150	21	3	10	100-150			
	2525R/L10-100H	▲	▲	25×25	150	26	3	10	100-150			
	2525R/L17-100H	▲	▲	25×25	150	26	3	17	100-150			
QFGD	**2020R/L10-52H**	△	△	20×20	150	21	4	10	52-72	ZTGD0404-□□		
	2525R/L13-52H	▲	▲	25×25	150	26	4	13	52-72			
	2020R/L15-52H	△	△	20×20	150	21	4	15	52-72			
	2525R/L22-52H	▲	▲	25×25	150	26	4	22	52-72			
	2020R/L10-64H	△	▲	20×20	150	21	4	10	64-100			
	2525R/L13-64H	▲	▲	25×25	150	26	4	13	64-100			
	2020R/L15-64H	△	△	20×20	150	21	4	15	64-100			
	2525R/L22-64H	▲	▲	25×25	150	26	4	22	64-100			
	2020R/L10-90H	△	△	20×20	150	21	4	10	90-140			
	2525R/L13-90H	▲	▲	25×25	150	26	4	13	90-140			
	2020R/L15-90H	△	△	20×20	150	21	4	15	90-140			
	2525R/L22-90H	▲	▲	25×25	150	26	4	22	90-140			
	2020R/L10-130H	△	△	20×20	150	21	4	10	130-230			
	2525R/L13-130H	▲	▲	25×25	150	26	4	13	130-230			
	2020R/L15-130H	△	△	20×20	150	21	4	15	130-230			
	2525R/L22-130H	▲	▲	25×25	150	26	4	22	130-230			

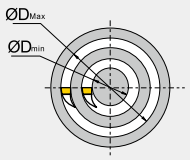
▲Stock available △Make-to-order

End surface grooving and turning tools



L-type shown





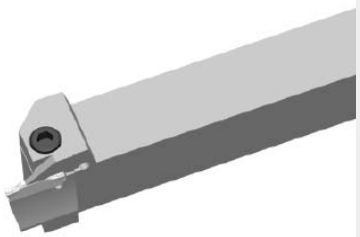
Diameter range of entering



Type		Stock		Basic dimensions(mm)						Applicable inserts	Screw	Wrench
		R	L	H×B	L	S	W	ar max	ØD (min-max)			
QFHD	2525R/L13-58H	▲	▲	25×25	150	26	5	13	58-96	ZTHD0504-□□	GB70-85-M6×20	WH50L
	2525R/L22-58H	▲	▲	25×25	150	26	5	22	58-96			
	2525R/L13-86H	△	▲	25×25	150	26	5	13	86-140			
	2525R/L22-86H	▲	▲	25×25	150	26	5	22	86-140			
	2525R/L13-130H	▲	▲	25×25	150	26	5	13	130-200			
	2525R/L22-130H	▲	▲	25×25	150	26	5	22	130-200			
	2525R/L13-185H	▲	▲	25×25	150	26	5	13	185-400			
	2525R/L22-185H	▲	▲	25×25	150	26	5	22	185-400			
QFHS	2525R/L30-185H	△	△	25×25	150	26	5	30	185-400	ZTHS0504-MG		
QFKD	2525R/L13-60H	▲	▲	25×25	150	26	6	13	60-100	ZTKD0608-□□	GB70-85-M6×20	WH50L
	2525R/L22-60H	▲	▲	25×25	150	26	6	22	60-100			
	2525R/L13-88H	△	▲	25×25	150	26	6	13	88-180			
	2525R/L22-88H	▲	▲	25×25	150	26	6	22	88-180			
	2525R/L13-160H	▲	▲	25×25	150	26	6	13	160-400			
	2525R/L22-160H	▲	▲	25×25	150	26	6	22	160-400			
QFKS	2525R/L30-160H	△	△	25×25	150	26	6	30	160-400	ZTKS0608-MG		
QFLD	2525R/L25-75H	▲	▲	25×25	150	27	8	25	75-150	ZTLD0808-MM	GB70-85-M6×20	WH50L
	2525R/L25-140H	▲	▲	25×25	150	27	8	25	140-400	ZTLD0808-MM	GB70-85-M6×20	WH50L
	3232R/L28-140H	▲	▲	32×32	170	30	8	28	140-400	ZTLD0808-MM	GB70-85-M8×30	WH60L

▲Stock available △Make-to-order

End surface grooving and turning tools



RR-type shown



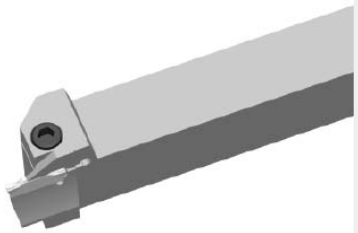
Diameter range of entering



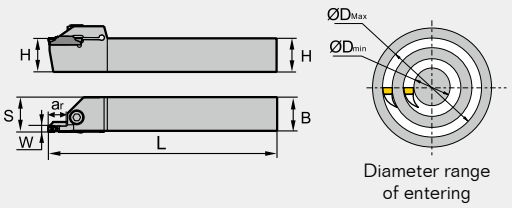
Type		Stock	Basic dimensions(mm)						Applicable inserts	Screw	Wrench
			H×B	L	S	W	ar max	ØD (min-max)			
QFFD	**2020RR7-48H**	△	20×20	150	21	3	7	48-66	ZTFD0303-□□	GB70-85-M6×20	WH50L
	2020RR10-48H	△	20×20	150	21	3	10	48-66			
	2525RR10-48H	△	25×25	150	26	3	10	48-66			
	2525RR17-48H	△	25×25	150	26	3	17	48-66			
	2020RR7-60H	△	20×20	150	21	3	7	60-80			
	2020RR10-60H	△	20×20	150	21	3	10	60-80			
	2525RR10-60H	△	25×25	150	26	3	10	60-80			
	2525RR17-60H	△	25×25	150	26	3	17	60-80			
	2020RR7-74H	△	20×20	150	21	3	7	74-110			
	2020RR10-74H	△	20×20	150	21	3	10	74-110			
	2525RR10-74H	△	25×25	150	26	3	10	74-110			
	2525RR17-74H	△	25×25	150	26	3	17	74-110			
	2020RR7-100H	△	20×20	150	21	3	7	100-150			
	2020RR10-100H	△	20×20	150	21	3	10	100-150			
	2525RR10-100H	△	25×25	150	26	3	10	100-150			
	2525RR17-100H	△	25×25	150	26	3	17	100-150			
QFGD	**2020RR10-52H**	△	20×20	150	21	4	10	52-72	ZTGD0404-□□		
	2020RR15-52H	△	20×20	150	26	4	15	52-72			
	2525RR13-52H	△	25×25	150	21	4	13	52-72			
	2525RR22-52H	△	25×25	150	26	4	22	52-72			
	2020RR10-64H	△	20×20	150	21	4	10	64-100			
	2020RR15-64H	△	20×20	150	26	4	15	64-100			
	2525RR13-64H	△	25×25	150	21	4	13	64-100			
	2525RR22-64H	△	25×25	150	26	4	22	64-100			
	2020RR10-90H	△	20×20	150	21	4	10	90-140			
	2020RR15-90H	△	20×20	150	26	4	15	90-140			
	2525RR13-90H	△	25×25	150	21	4	13	90-140			
	2525RR22-90H	△	25×25	150	26	4	22	90-140			
	2020RR10-130H	△	20×20	150	21	4	10	130-230			
	2020RR15-130H	△	20×20	150	26	4	15	130-230			
	2525RR13-130H	△	25×25	150	21	4	13	130-230			
	2525RR22-130H	△	25×25	150	26	4	22	130-230			

▲Stock available △Make-to-order

End surface grooving and turning tools



RR-type shown



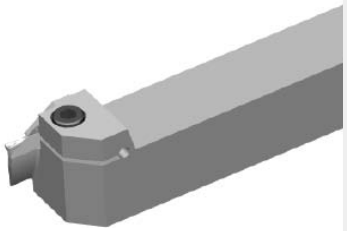


Type		Stock	Basic dimensions(mm)						Applicable inserts	Screw	Wrench
			H×B	L	S	W	ar max	ØD (min-max)			
QFHD	**2525RR13-58H**	△	25×25	150	26	5	13	58-96	ZTHD0504-□□	GB70-85-M6×20	WH50L
	2525RR22-58H	△	25×25	150	26	5	22	58-96			
	2525RR13-86H	△	25×25	150	26	5	13	86-140			
	2525RR22-86H	△	25×25	150	26	5	22	86-140			
	2525RR13-130H	△	25×25	150	26	5	13	130-200			
	2525RR22-130H	△	25×25	150	26	5	22	130-200			
	2525RR13-185H	△	25×25	150	26	5	13	185-400			
	2525RR22-185H	△	25×25	150	26	5	22	185-400			
QFHS	**2525RR30-185H**	△	25×25	150	26	5	30	185-400	ZTHS0504-MG		
QFKD	**2525RR13-60H**	△	25×25	150	26	6	13	60-100	ZTKD0608-□□	GB70-85-M6×20	WH50L
	2525RR22-60H	△	25×25	150	26	6	22	60-100			
	2525RR13-88H	△	25×25	150	26	6	13	88-180			
	2525RR22-88H	△	25×25	150	26	6	22	88-180			
	2525RR13-160H	△	25×25	150	26	6	13	160-400			
	2525RR22-160H	△	25×25	150	26	6	22	160-400			
QFKS	**2525RR30-160H**	△	25×25	150	26	6	30	160-400	ZTKS0608-MG		

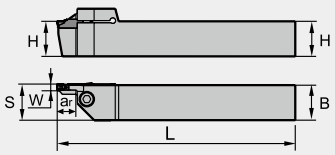
▲Stock available △Make-to-order

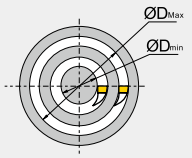


End surface grooving and turning tools



LL-type shown





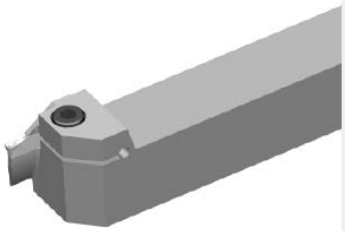
Diameter range of entering



Type		Stock	Basic dimensions(mm)						Applicable inserts	Screw	Wrench
			H×B	L	S	W	ar max	ØD (min-max)			
QFFD	**2020LL7-48H**	△	20×20	150	21	3	7	48-66	ZTFD0303-□□	GB70-85-M6×20	WH50L
	2020LL10-48H	△	20×20	150	21	3	10	48-66			
	2525LL10-48H	△	25×25	150	26	3	10	48-66			
	2525LL17-48H	△	25×25	150	26	3	17	48-66			
	2020LL7-60H	△	20×20	150	21	3	7	60-80			
	2020LL10-60H	△	20×20	150	21	3	10	60-80			
	2525LL10-60H	△	25×25	150	26	3	10	60-80			
	2525LL17-60H	△	25×25	150	26	3	17	60-80			
	2020LL7-74H	△	20×20	150	21	3	7	74-110			
	2020LL10-74H	△	20×20	150	21	3	10	74-110			
	2525LL10-74H	△	25×25	150	26	3	10	74-110			
	2525LL17-74H	△	25×25	150	26	3	17	74-110			
	2020LL7-100H	△	20×20	150	21	3	7	100-150			
	2020LL10-100H	△	20×20	150	21	3	10	100-150			
	2525LL10-100H	△	25×25	150	26	3	10	100-150			
	2525LL17-100H	△	25×25	150	26	3	17	100-150			
QFGD	**2020LL10-52H**	△	20×20	150	21	4	10	52-72	ZTGD0404-□□		
	2020LL15-52H	△	20×20	150	26	4	15	52-72			
	2525LL13-52H	△	25×25	150	21	4	13	52-72			
	2525LL22-52H	△	25×25	150	26	4	22	52-72			
	2020LL10-64H	△	20×20	150	21	4	10	64-100			
	2020LL15-64H	△	20×20	150	26	4	15	64-100			
	2525LL13-64H	△	25×25	150	21	4	13	64-100			
	2525LL22-64H	△	25×25	150	26	4	22	64-100			
	2020LL10-90H	△	20×20	150	21	4	10	90-140			
	2020LL15-90H	△	20×20	150	26	4	15	90-140			
	2525LL13-90H	△	25×25	150	21	4	13	90-140			
	2525LL22-90H	△	25×25	150	26	4	22	90-140			
	2020LL10-130H	△	20×20	150	21	4	10	130-230			
	2020LL15-130H	△	20×20	150	26	4	15	130-230			
	2525LL13-130H	△	25×25	150	21	4	13	130-230			
	2525LL22-130H	△	25×25	150	26	4	22	130-230			

▲Stock available △Make-to-order

End surface grooving and turning tools



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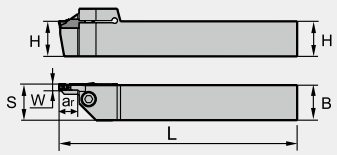
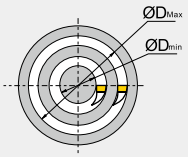


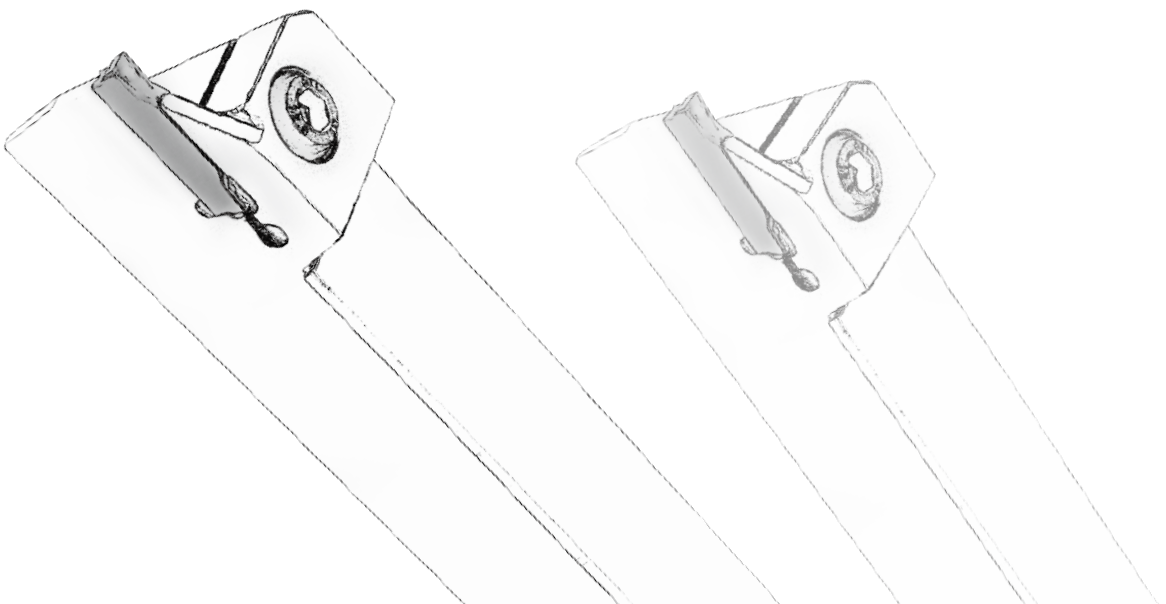


Diameter range of entering

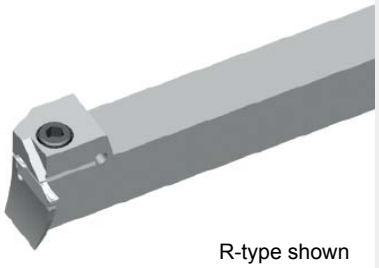


Type		Stock	Basic dimensions(mm)						Applicable inserts	Screw	Wrench
			H×B	L	S	W	ar max	ØD (min-max)			
QFHD	**2525LL13-58H**	△	25×25	150	26	5	13	58-96	ZTHD0504-□□	GB70-85-M6×20	WH50L
	2525LL22-58H	△	25×25	150	26	5	22	58-96			
	2525LL13-86H	△	25×25	150	26	5	13	86-140			
	2525LL22-86H	△	25×25	150	26	5	22	86-140			
	2525LL13-130H	△	25×25	150	26	5	13	130-200			
	2525LL22-130H	△	25×25	150	26	5	22	130-200			
	2525LL13-185H	△	25×25	150	26	5	13	185-400			
	2525LL22-185H	△	25×25	150	26	5	22	185-400			
QFHS	**2525LL30-185H**	△	25×25	150	26	5	30	185-400	ZTHS0504-MG		
QFKD	**2525LL13-60H**	△	25×25	150	26	6	13	60-100	ZTKD0608-□□	GB70-85-M6×20	WH50L
	2525LL22-60H	△	25×25	150	26	6	22	60-100			
	2525LL13-88H	△	25×25	150	26	6	13	88-180			
	2525LL22-88H	△	25×25	150	26	6	22	88-180			
	2525LL13-160H	△	25×25	150	26	6	13	160-400			
	2525LL22-160H	△	25×25	150	26	6	22	160-400			
QFKS	**2525LL30-160H**	△	25×25	150	26	6	30	160-400	ZTKS0608-MG		

▲Stock available △Make-to-order



L type tools for surface grooving and turning



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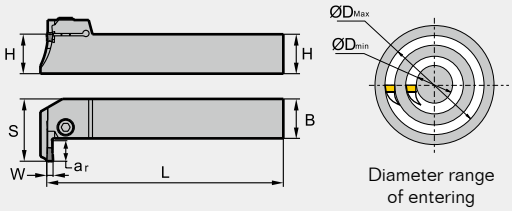
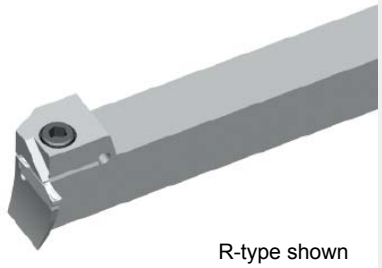




Type		Stock		Basic dimensions(mm)						Applicable inserts	Screw	Wrench
		R	L	H×B	L	S	W	ar max	ØD (min-max)			
QFFD	**2020R/L7-48L**	△	△	20×20	150	28.5	3	7	48-66	ZTFD0303-□□	GB70-85-M6×20	WH50L
	2020R/L10-48L	△	△	20×20	150	31.5	3	10	48-66			
	2525R/L10-48L	▲	▲	25×25	150	36.5	3	10	48-66			
	2525R/L17-48L	△	△	25×25	150	43.5	3	17	48-66			
	2020R/L7-60L	△	△	20×20	150	28.5	3	7	60-80			
	2020R/L10-60L	△	△	20×20	150	31.5	3	10	60-80			
	2525R/L10-60L	▲	▲	25×25	150	36.5	3	10	60-80			
	2525R/L17-60L	△	△	25×25	150	43.5	3	17	60-80			
	2020R/L7-74L	△	△	20×20	150	28.5	3	7	74-110			
	2020R/L10-74L	△	△	20×20	150	31.5	3	10	74-110			
	2525R/L10-74L	▲	▲	25×25	150	36.5	3	10	74-110			
	2525R/L17-74L	△	△	25×25	150	43.5	3	17	74-110			
	2020R/L7-100L	△	△	20×20	150	28.5	3	7	100-150			
	2020R/L10-100L	△	△	20×20	150	31.5	3	10	100-150			
	2525R/L10-100L	▲	▲	25×25	150	36.5	3	10	100-150			
	2525R/L17-100L	△	△	25×25	150	43.5	3	17	100-150			
QFGD	**2020R/L10-52L**	△	△	20×20	150	31.5	4	10	52-72	ZTGD0404-□□		
	2525R/L13-52L	▲	△	25×25	150	39.5	4	13	52-72			
	2020R/L15-52L	△	△	20×20	150	36.5	4	15	52-72			
	2525R/L22-52L	△	△	25×25	150	48.5	4	22	52-72			
	2020R/L10-64L	△	△	20×20	150	31.5	4	10	64-100			
	2525R/L13-64L	△	△	25×25	150	39.5	4	13	64-100			
	2020R/L15-64L	△	△	20×20	150	36.5	4	15	64-100			
	2525R/L22-64L	△	△	25×25	150	48.5	4	22	64-100			
	2020R/L10-90L	△	△	20×20	150	31.5	4	10	90-140			
	2525R/L13-90L	△	△	25×25	150	39.5	4	13	90-140			
	2020R/L15-90L	△	△	20×20	150	36.5	4	15	90-140			
	2525R/L22-90L	▲	△	25×25	150	48.5	4	22	90-140			
	2020R/L10-130L	△	△	20×20	150	31.5	4	10	130-230			
	2525R/L13-130L	△	△	25×25	150	39.5	4	13	130-230			
	2020R/L15-130L	△	△	20×20	150	36.5	4	15	130-230			
	2525R/L22-130L	▲	▲	25×25	150	48.5	4	22	130-230			

▲Stock available △Make-to-order

L type tools for surface grooving and turning



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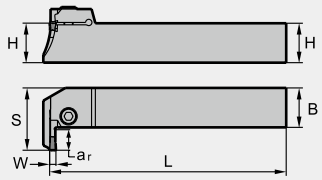
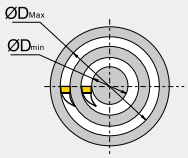
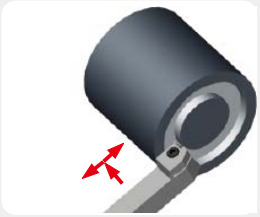




Diameter range of entering



Type		Stock		Basic dimensions(mm)						Applicable inserts	Screw	Wrench
		R	L	H×B	L	S	W	ar max	ØD (min-max)			
QFHD	**2525R/L13-58L**	△	△	25×25	150	39.5	5	13	58-96	ZTHD0504-□□	GB70-85-M6×20	WH50L
	2525R/L22-58L	△	△	25×25	150	48.5	5	22	58-96			
	2525R/L13-86L	△	△	25×25	150	39.5	5	13	86-140			
	2525R/L22-86L	△	△	25×25	150	48.5	5	22	86-140			
	2525R/L13-130L	△	△	25×25	150	39.5	5	13	130-200			
	2525R/L22-130L	△	△	25×25	150	48.5	5	22	130-200			
	2525R/L13-185L	△	△	25×25	150	39.5	5	13	185-400			
	2525R/L22-185L	▲	△	25×25	150	48.5	5	22	185-400			
QFHS	**2525R/L30-185L**	△	△	25×25	150	56.5	5	30	185-400	ZTHS0504-MG		
QFKD	**2525R/L13-60L**	▲	▲	25×25	150	39.5	6	13	60-100	ZTKD0608-□□	GB70-85-M6×20	WH50L
	2525R/L22-60L	▲	▲	25×25	150	48.5	6	22	60-100			
	2525R/L13-88L	△	▲	25×25	150	39.5	6	13	88-180			
	2525R/L22-88L	▲	▲	25×25	150	48.5	6	22	88-180			

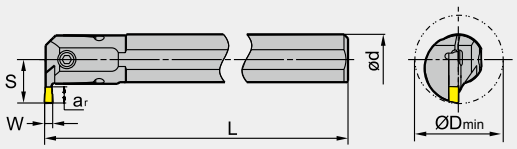
▲Stock available △Make-to-order

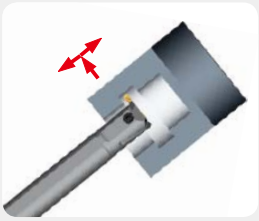


Internal grooving and turning tools



R-type shown

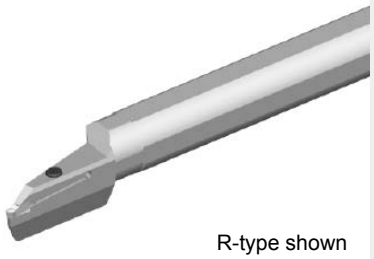




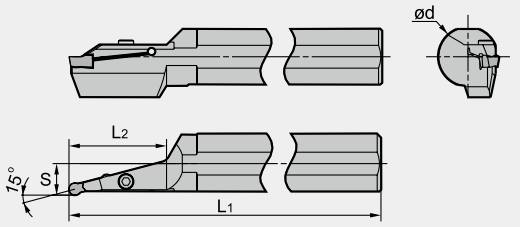
Type	Stock		Basic dimensions(mm)						Applicable inserts	Screw	Wrench
	R	L	ød	L	S	W	ar max	ØDmin			
C20Q-QEDR/L05-27	▲	▲	20	180	15.2	2.5	5	27	ZTED025□□ ZRED025□□	GB70-85-M4×12	WH30L
C25R-QEDR/L07-33	▲	▲	25	200	20.3	2.5	7	33		GB70-85-M5×16	WH40L
C32S-QEDR/L09-42	▲	▲	32	250	25.3	2.5	9	42		GB70-85-M5×20	
C20Q-QFDR/L05-27	▲	▲	20	180	15.2	3	5	27	ZTFD03□□ ZRFD03□□	GB70-85-M4×12	WH30L
C25R-QFDR/L07-33	▲	▲	25	200	20.3	3	7	33		GB70-85-M5×16	WH40L
C32S-QFDR/L09-42	▲	▲	32	250	25.3	3	9	42		GB70-85-M5×20	
C25R-QGDR/L08-35	▲	▲	25	200	21.5	4	8	35	ZTGD04□□ ZRGD04□□	GB70-85-M5×16	WH40L
C32S-QGDR/L11-44	▲	▲	32	250	27.5	4	11	44		GB70-85-M6×20	WH50L
C40T-QGDR/L13-54	▲	▲	40	300	33.5	4	13	54		GB70-85-M6×20	
C25R-QHDR/L08-35	▲	▲	25	200	21.5	5	8	35	ZTHD05□□ ZRHD05□□	GB70-85-M5×16	WH40L
C32S-QHDR/L11-44	▲	▲	32	250	27.5	5	11	44		GB70-85-M6×20	WH50L
C40T-QHDR/L13-54	▲	▲	40	300	33.5	5	13	54		GB70-85-M6×20	
C25R-QKDR/L08-35	▲	▲	25	200	21.5	6	8	35	ZTKD06□□ ZRKD06□□	GB70-85-M5×16	WH40L
C32S-QKDR/L11-44	▲	▲	32	250	27.5	6	11	44		GB70-85-M6×20	WH50L
C40T-QKDR/L13-54	▲	▲	40	300	33.5	6	13	54		GB70-85-M6×20	

▲Stock available △Make-to-order

Profile turning tools for Al



R-type shown



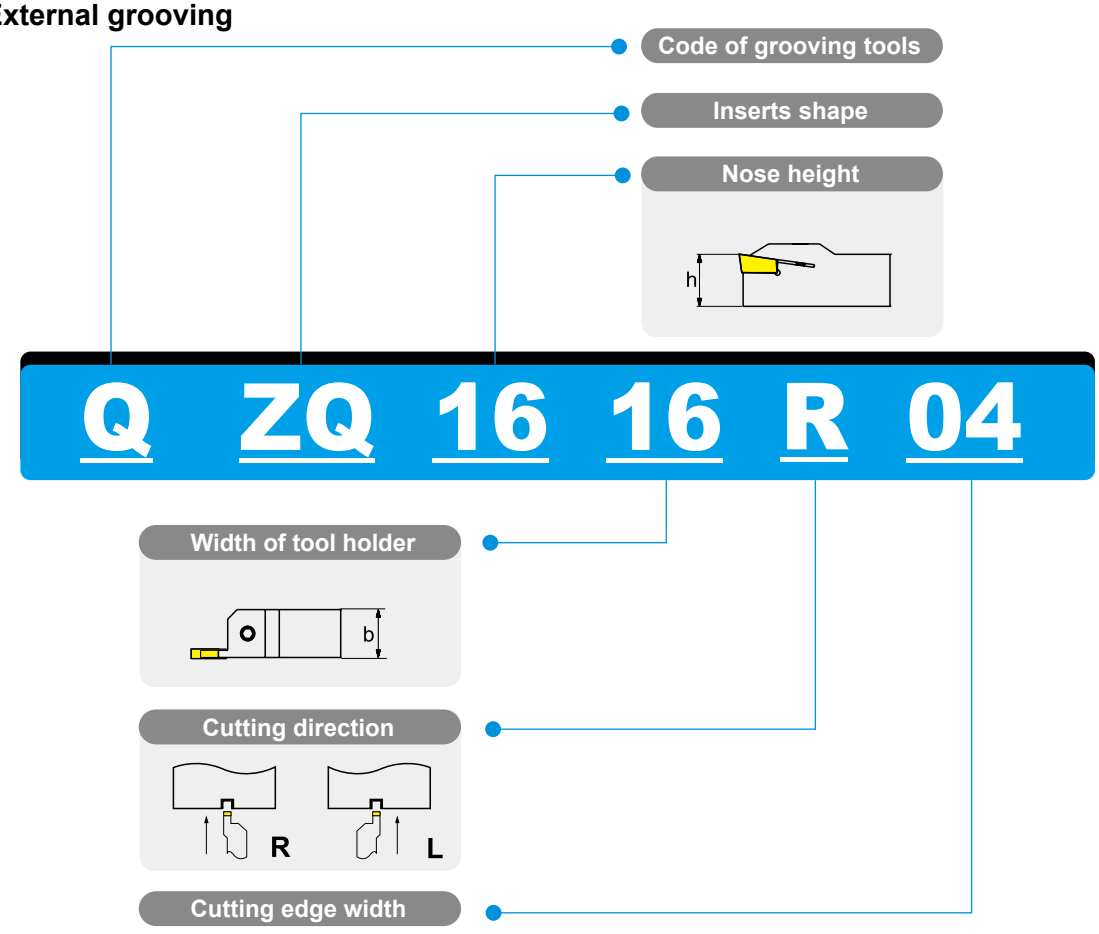


Type	Stock		Basic dimensions(mm)					Applicable inserts	Screw	Wrench
	R	L	ØD (Minimum machining diameter)	ød	S	L_1	L_2			
C40X-QLDR/L65-15A	▲	▲	160	40	21	320	65	ZRLD08-LH	GB70-85-M6×20	WH50L
C40X-QLDR/L80-15A	▲	△	160	40	21	320	80	ZRLD08-LH		
C40X-QKDR/L60-15A	△	△	160	40	20	320	60	ZRKD06-LH		
C40X-QKDR/L75-15A	△	△	160	40	20	320	75	ZRKD06-LH		

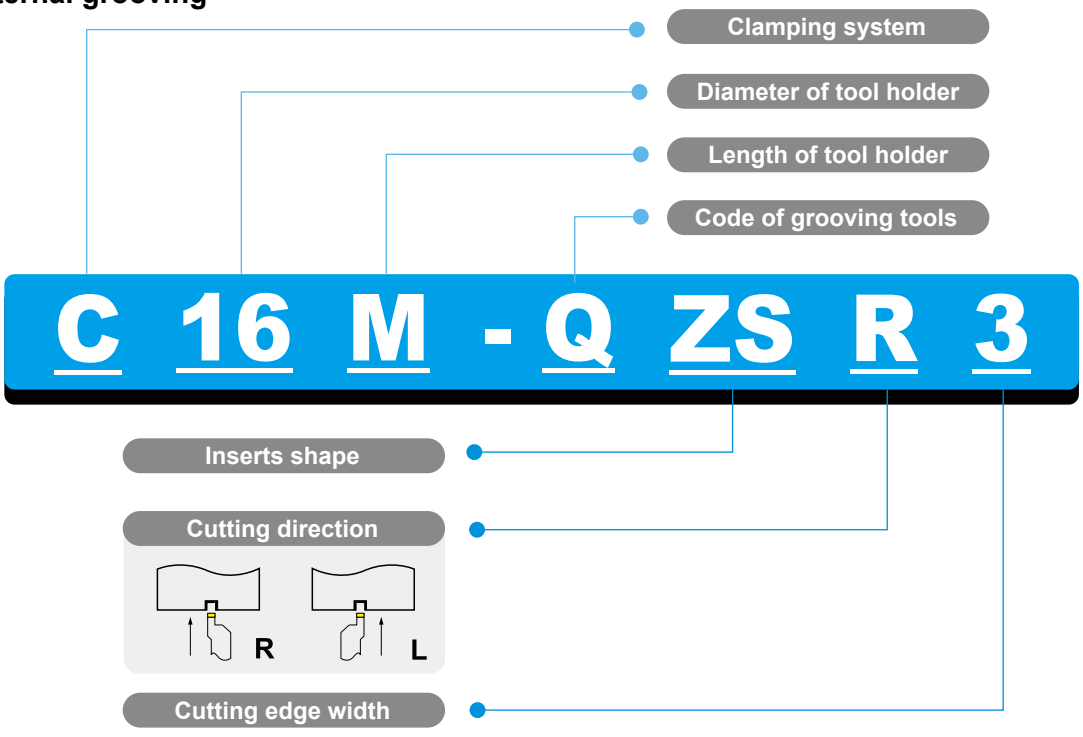
▲Stock available △Make-to-order

Parting and grooving tools code key

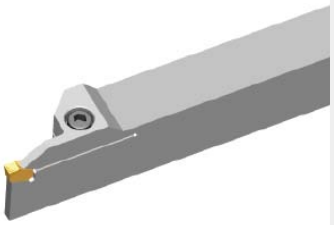
● External grooving



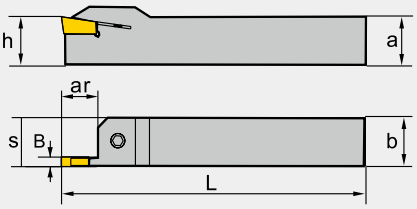
● Internal grooving

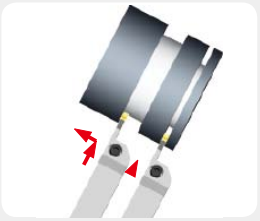


External parting and grooving tools: QZQ series



R-type shown



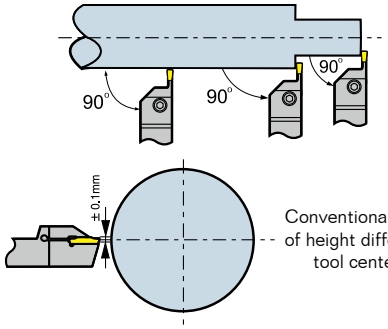


Type		Stock		Basic dimensions(mm)						Applicable inserts	Screw	Wrench
		R	L	a=h	b	L	S	B	$a_{r\,max}$			
QZQ	1616R/L03	▲	▲	16	16	100	16.4	3	16	ZQMX3N11-IE	GB70-85-M5×16	WH40L
	1616R/L04	▲	▲	16	16	100	16.4	4	18	ZQMX4N11-IE		
	2020R/L03	▲	▲	20	20	125	20.4	3	20	ZQMX3N11-IE	GB70-85-M6×20	WH50L
	2020R/L04	▲	▲	20	20	125	20.4	4	20	ZQMX4N11-IE		
	2525R/L03	▲	▲	25	25	150	25.4	3	20	ZQMX3N11-IE		
	2525R/L04	▲	▲	25	25	150	25.4	4	20	ZQMX4N11-IE		
	2525R/L05	▲	▲	25	25	150	25.4	5	25	ZQMX5N11-IE		
	2525R/L06	▲	▲	25	25	150	25.7	6	32	ZQMX6N11-IE		
	3225R/L03	▲	▲	32	25	170	25.4	3	25	ZQMX3N11-IE		
	3225R/L04	▲	▲	32	25	170	25.4	4	25	ZQMX4N11-IE		
	3225R/L05	▲	▲	32	25	170	25.4	5	25	ZQMX5N11-IE		
	3225R/L06	▲	▲	32	25	170	25.7	6	35	ZQMX6N11-IE		

▲Stock available △Make-to-order

Center height control of parting and grooving tools

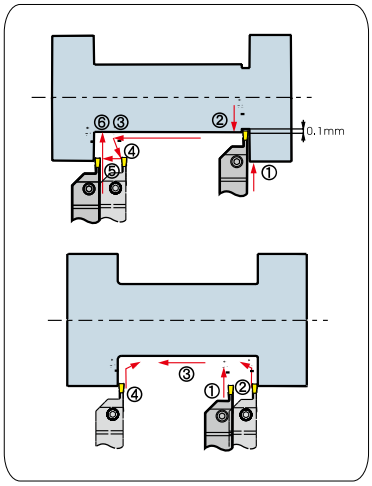
- No matter which parting or grooving tools you select, the ideal surface quality is only achieved by ensuring that insert is vertical from the center line of workpiece, which can also effectively reduce vibration during machining.
- The height tolerance between insert edge bottom and the center height of workpiece should be remained in ±0.1mm, especially for lever parting and grooving workpieces with small diameter. This can improve tool life, reduce cutting resistant force, and diminish burrs.



Conventional diagram of height difference of tool center line

Parting

- When the insert is approaching the center of workpiece, the cutting speed should be reduced by 30%, which is good for improving life and surface quality.
- As long as conditions allow, try to shorten the overhang of tools as much as possible to ensure good stability.

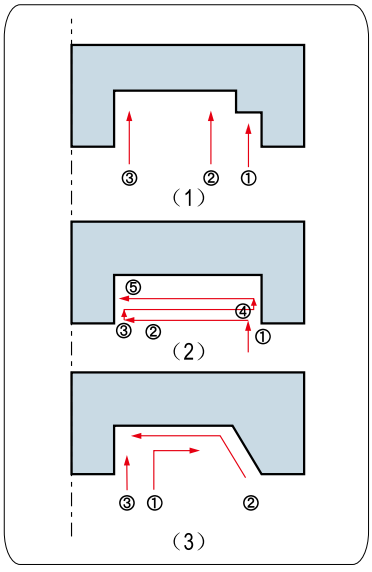


External grooving, turning and profiling

- In-feed sequence: When cutting depth>0.5mm, radial in-feed (Max. cutting depth can be 0.75×insert edge width S) → radial out-feed about 0.1mm → axial in-feed →flank out-feed → axial in-feed → radial machining to required depth.
- When finishing, adopt the sequence shown in the diagram. It can reduce vibration caused by the friction between tools and chips.

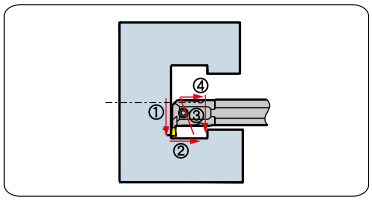
Surface grooving and turning

- Finishing (Multi-slot cutting)
  Cut inwards from Max. diameter. Inserts offset to inward flange when retracting, as is shown in diagram (1).
- Recess turning
  Axial turning depth should not exceed 0.75×S (cutting edge width).
  If slot width is larger than slot depth, it is recommended to adopt recess turning, as is shown in diagram (2).
  If slot depth is larger than slot depth, it is recommended to adopt multi-slot cutting.
- Finish machining
  First finish bottom and external diameter fringe, then finish the internal diameter to required size, as is shown in diagram (3).



Internal grooving and turning

- To facilitate chip flow, always feed along the direction of moving from the deepest in the hole to outside.



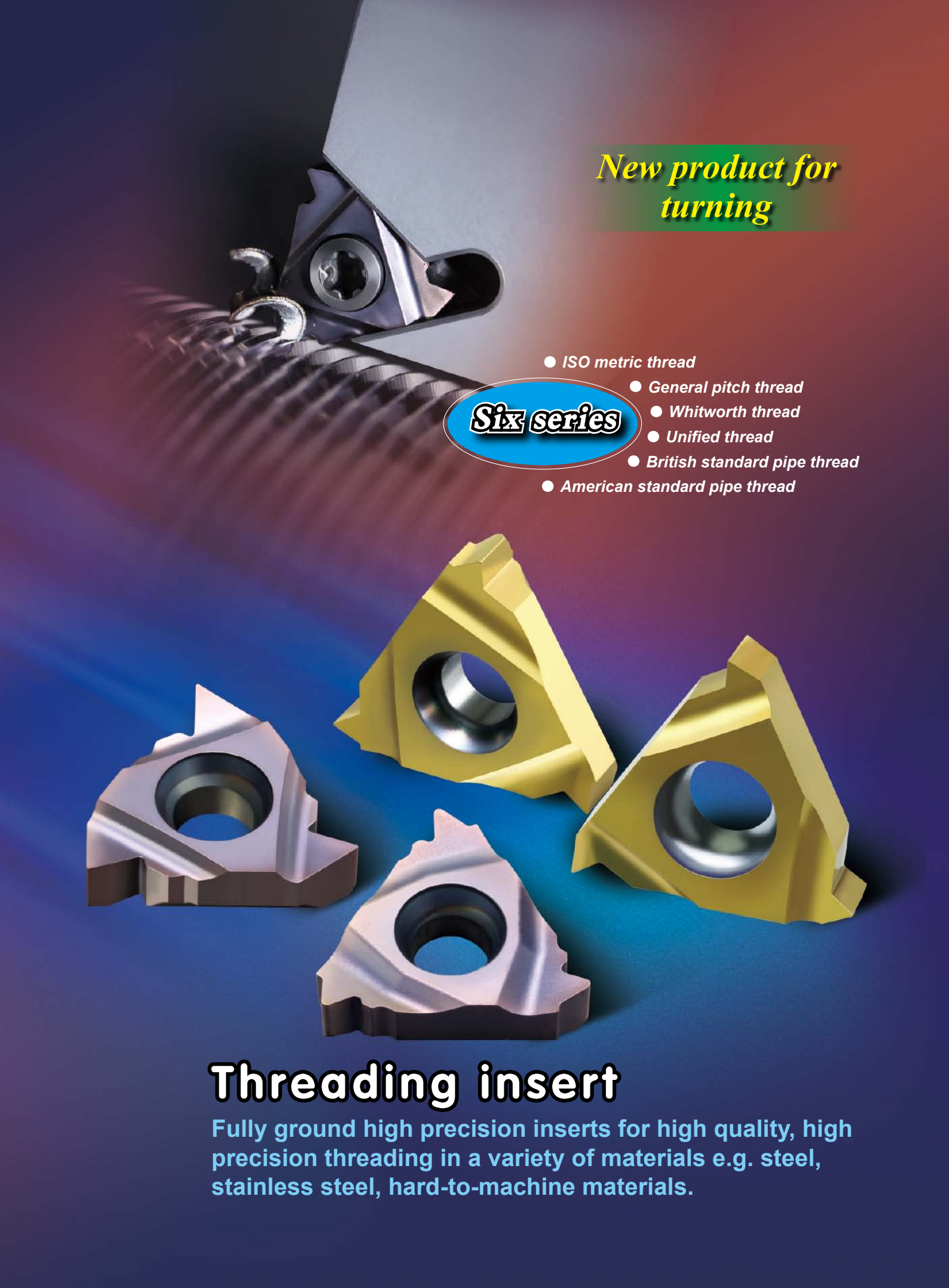
Application information of parting and grooving

The cutting parameters recommended are suitable for wet machining.

Insert size	Recommended feed rate(mm/r)					
Insert width(mm)	Parting	Grooving	Grooving(-MM)	Turning	Turning(-MM)	Profiling
2.5	0.05-0.15	0.05-0.15	0.05-0.2	0.05-0.15	0.05-0.2	0.05-0.15
3	0.05-0.15	0.05-0.15	0.05-0.2	0.07-0.15	0.07-0.2	0.1-0.2
4	0.05-0.2	0.05-0.2	0.05-0.25	0.07-0.25	0.07-0.3	0.1-0.2
5	0.07-0.2	0.07-0.22	0.07-0.25	0.1-0.25	0.1-0.3	0.15-0.3
6	0.1-0.3	0.07-0.25	0.07-0.3	0.1-0.3	0.1-0.35	0.15-0.3
8			0.1-0.4		0.15-0.45	

Workpiece material		Hardness	YBG302	YBG202 YBG205	YBC151	YBC251	YD101	YD201	YBG102	YC10	YC40
P	Carbon steel	125≤HB≤170	120-260	150-280	140-280	150-280				130-280	110-260
	Low alloy steel	180≤HB≤275	80-175	110-200	100-240	110-200				90-200	70-175
	High alloy steel	180≤HB≤325	80-160	110-190	100-220	110-190				90-190	70-160
	Cast steel	180≤HB≤250	75-140	100-170	80-160	100-170				80-170	60-140
M	Ferrite, Martensite	200≤HB≤300	70-170	100-200		100-200				80-200	60-170
	Austenite	180≤HB≤300	80-200	110-220		110-220				90-220	70-200
K	Malleable cast iron	130≤HB≤230	100-200	130-220				90-160			
	Grey cast iron	180≤HB≤220	90-170	120-200				80-140			
	Nodular cast iron	160≤HB≤250	80-150	110-180				60-140			
N	Al alloy	--					200-400				
S	High temperature alloy	≤400					20-50		30-60		

The cutting parameters recommended are suitable for wet machining.
Advice: internal machining and end machining, The cutting speed should be reduced by 30%-40%.



Threading insert

Fully ground high precision inserts for high quality, high precision threading in a variety of materials e.g. steel, stainless steel, hard-to-machine materials.

How to select threading tools

Structure of threading tools selected table

- Categorized as external threading and internal threading according to machining type.
- Separately listed out according to series.

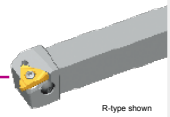
Dimensions of product

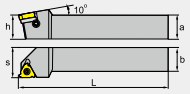
Indicating external threading or internal threading

Threading insert type
Including type, standard, tolerance class

Diagram of thread pitch

External threading tools


R-type shown



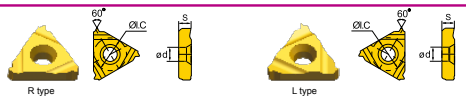
Type		Stock	Basic dimensions(mm) a	h	b	L	s	Applicable inserts	Inserts screw	Shim	Shim screw	Wrench
ZSER	1616H16	▲	16	16	16	100	20	Z16ER□□□□	I60 M3.5X12TT	MT16-□□MN	SM4X8C	WT15IP
	2020K16	▲	20	20	20	125	25					
	2525M16	▲	25	25	25	150	32					
	3225P16	▲	32	32	25	170	32					
	3232P16	▲	32	32	32	170	40					
	2525M22	▲	25	25	25	150	32	Z22ER□□□□	I60 M5X17	MT22-□□MN	SM5X8.5	WT20IP
	3225P22	▲	32	32	25	170	32					
	3232P22	▲	32	32	32	170	40					
	4040S22	△	40	40	40	250	50					
ZSEL	1616H16	▲	16	16	16	100	20	Z16EL□□□□	I60 M3.5X12TT	MT16-□□MN	SM4X8C	WT15IP
	2020K16	▲	20	20	20	125	25					
	2525M16	▲	25	25	25	150	32					
	3225P16	▲	32	32	25	170	32					
	3232P16	▲	32	32	32	170	40					
	2525M22	▲	25	25	25	150	32	Z22EL□□□□	I60 M5X17	MT22-□□MN	SM5X8.5	WT20IP
	3225P22	▲	32	32	25	170	32					
	3232P22	▲	32	32	32	170	40					
	4040S22	△	40	40	40	250	50					

▲Stock available △Make-to-order

ISO metric thread (with end)

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





	Type		Basic dimensions(mm)				Recommended coating grade	
	The right hand tools	The left hand tools	Pitch	S	ØI.C	ød	YBG203	YBG205
External thread	Z16ER0.5ISO	Z16EL0.5ISO	0.50	3.52	9.525	4.0	★	○
	Z16ER0.75ISO	Z16EL0.75ISO	0.75	3.52	9.525	4.0	★	○
	Z16ER1.0ISO	Z16EL1.0ISO	1.00	3.52	9.525	4.0	★	○
	Z16ER1.25ISO	Z16EL1.25ISO	1.25	3.52	9.525	4.0	★	○
	Z16ER1.5ISO	Z16EL1.5ISO	1.50	3.52	9.525	4.0	★	○
	Z16ER1.75ISO	Z16EL1.75ISO	1.75	3.52	9.525	4.0	★	○
	Z16ER2.0ISO	Z16EL2.0ISO	2.00	3.52	9.525	4.0	★	○
	Z16ER2.5ISO	Z16EL2.5ISO	2.50	3.52	9.525	4.0	★	○
	Z16ER3.0ISO	Z16EL3.0ISO	3.00	3.52	9.525	4.0	★	○
	Z22ER3.5ISO	Z22EL3.5ISO	3.50	4.65	12.7	5.0	★	○
	Z22ER4.0ISO	Z22EL4.0ISO	4.00	4.65	12.7	5.0	★	○
	Z22ER4.5ISO	Z22EL4.5ISO	4.50	4.65	12.7	5.0	★	○
	Z22ER5.0ISO	Z22EL5.0ISO	5.00	4.65	12.7	5.0	★	○
	Z22ER5.5ISO	Z22EL5.5ISO	5.50	4.65	12.7	5.0	★	○
	Z22ER6.0ISO	Z22EL6.0ISO	6.00	4.65	12.7	5.0	★	○

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

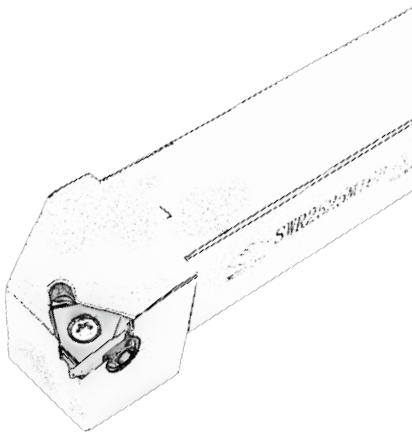
Product specification
Including type (right hand and left hand), basic dimensions, applicable inserts, spare parts

Product specification
Including type (right hand and left hand), basic dimensions, stock

Dimension diagram of insert

TURNING

Threading Tools



A286-A287 **Threading tools overview**

A288 **Introduction on threading insert grade and chipbreaker**

A289-A296 **Threading insert**

A289 Threading insert code key

A290-A291 ISO metric external thread

A292 General pitch thread

A293 Whitworth thread

A294 Unified thread

A295 British standard pipe thread

A296 American standard pipe thread

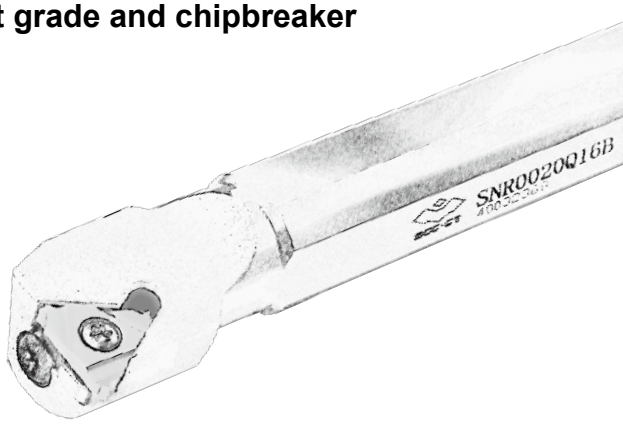
A297-A299 **Threading tools**

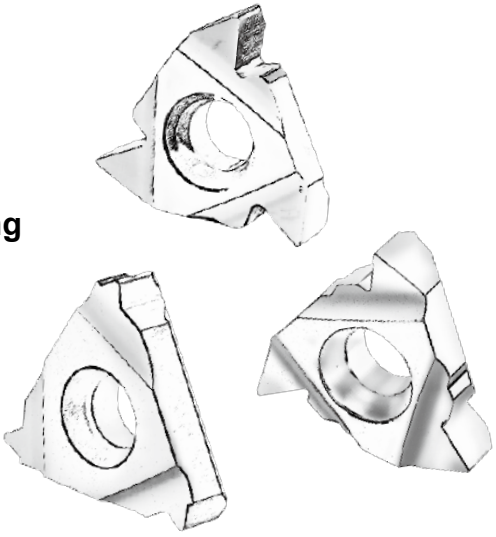
A297 Threading tools code key

A298 External threading tools

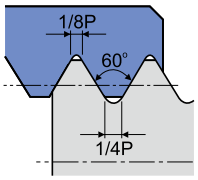
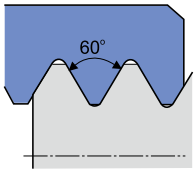
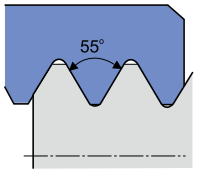
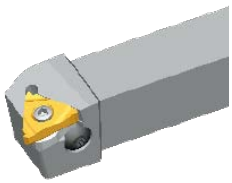
A299 Internal threading tools

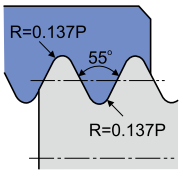
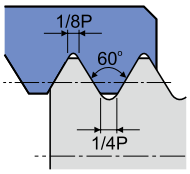
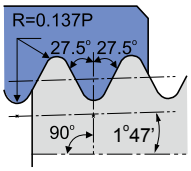
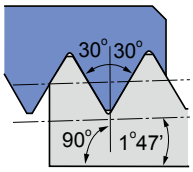
A300-A309 **Application information on threading**





Threading tools overview

Applications		For general use		
Legend				
Thread name		ISO metric thread With end	General pitch thread Without end	General pitch thread Without end
Profil		**GM**	**60**	**55**
Shape of insert (length: 11, 16, 22mm)		R style shown  A290-291	R style shown  A292	R style shown  A292
Tool holder \ Pitch	Dimensions (mm) (H×W×L) (Dia×L×Min. dia)	Pitch/mm	Pitch/mm (pitch/Inch)	Pitch/mm (pitch/Inch)
External thread	 R-type shown A298	16×16×100 20×20×125 25×25×150 32×25×170 32×32×170 40×40×250	0.5~6.0	0.5~5.0 (5~48)	0.5~5.0 (5~48)
Internal thread	 R-type shown A299	16×125×12 16×150×16 16×150×20 20×150×25 20×180×25 25×150×32 32×200×40 32×250×40 40×300×50 50×350×63	0.5~6.0	0.5~5.0 (5~48)	0.5~5.0 (5~48)

For general use	For aerospace industry	Heater, gas and water pipe thread	For gas and water faucet and pipe connection
			
Whitworth thread	Unified thread (American standard threads)	British standard taper piper threads	American standard taper pipe threads
W	**UN**	**BSPT**	**NPT**
R style shown  A293	R style shown  A294	R style shown  A295	R style shown  A296
Pitch/mm (pitch/Inch)	Pitch/mm (pitch/Inch)	Pitch/mm (pitch/Inch)	Pitch/mm (pitch/Inch)
8~19	8~24	11~28	8~27
8~19	8~24	11~28	8~27

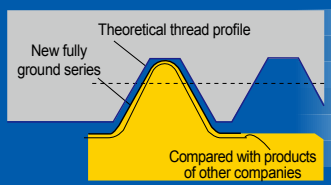
YBG203

New nano coating grade

suitable for threading in a variety of materials



- **Specially treated edge for superior surface quality**
- **Sharp nose with small cutting resistance and superior performance**
- **Full ground inserts with high dimensional precision for high quality threading**



Thread type	Grade of tolerance
ISO metric thread	6g/6H
Whitworth thread W	Medium Class A
British standard pipe thread	Standard BSPT
Unified thread	2A/2B
American standard pipe thread	Standard NPT

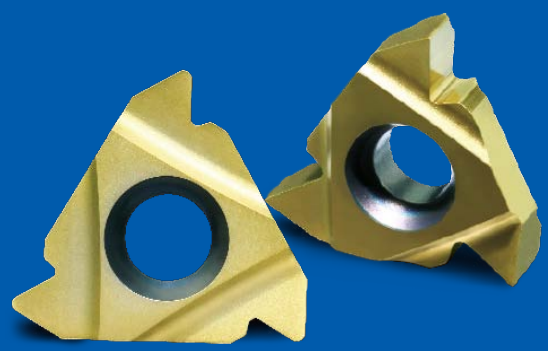
- **New nano coating grade specially designed for threading with longer insert life**



Advanced surface treatment techniques effectively reduce friction and allows for better wear observation.

Advanced TiAlN substrate nano coating, in combination with proper coating ingredients, improves the mechanical and thermal properties of coating.

Further optimizing coating structre, improving coating stress, enhancing bond strength of coating and substrate.



Case:

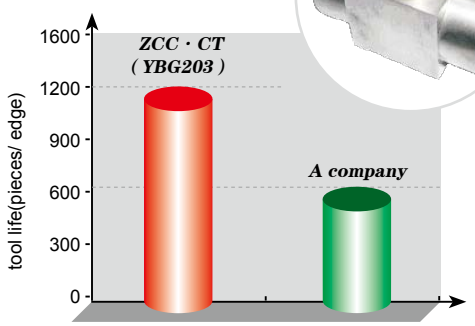
workpiece material: 42CrMo(HB260)

insert: Z16ER2.0ISO/YBG203

thread pitch: p=2.0mm

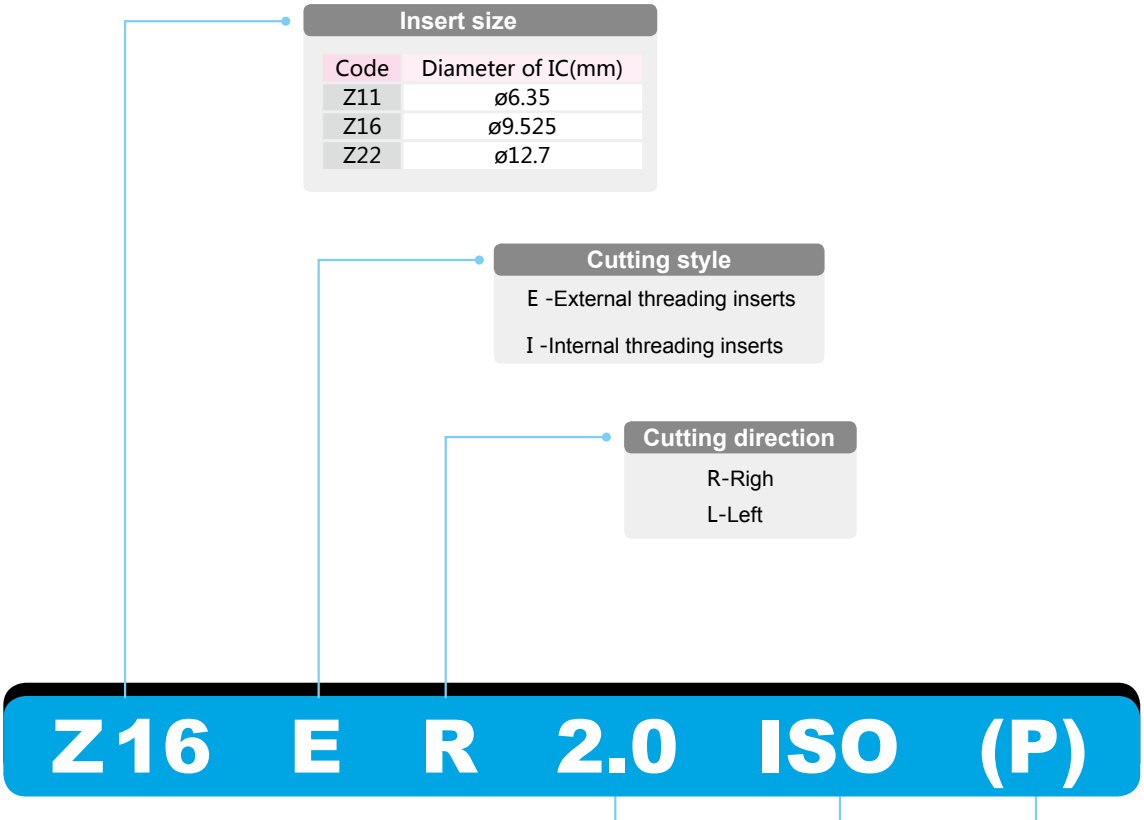
cutting data: Vc=120 m/min





84% tool life improvement of ZCC•CT product than that of company A under the same cutting condition.

Threading inserts code key



Insert size

Code	Diameter of IC(mm)
Z11	ø6.35
Z16	ø9.525
Z22	ø12.7

Cutting style

E -External threading inserts

I -Internal threading inserts

Cutting direction

R-Righ

L-Left

Screw pitch

Full profile (Range of screw pitch is indicated by numbers).

mm	TPI
0.5-6.0	48-5

V profile (Range of screw pitch is indicated by letters).

	mm	TPI
A	0.5-1.5	48-16
AG	0.5-3.0	48-8
G	1.75-3.0	14-8
N	3.5-5.0	7-5

Thread specification	Range of thread pitch
ISO metric thread	0.5-6.0
General pitch thread	0.5-5.0
Whitworth thread W	8-19
British standard pipe thread	11-28
Unified thread	8-24
American standard pipe thread	8-27

Profile

ISO—ISO metric 60° thread

60—60° general pitch thread

55—55° general pitch thread

W—Whitworth thread

UN—Unified thread(American standard threads)

BSPT—British standard taper piper thread

NPT—American standard taper piper thread

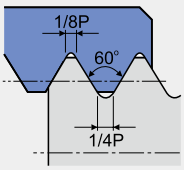
chip breaker

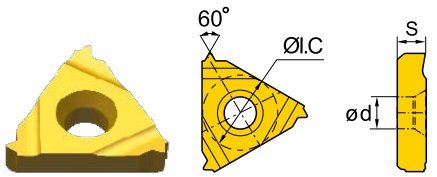
□-fully ground edge insert

P –3-Dimensional chip-breaking insert

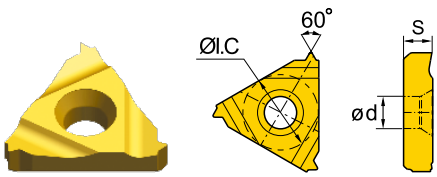
ISO metric thread (with end)

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





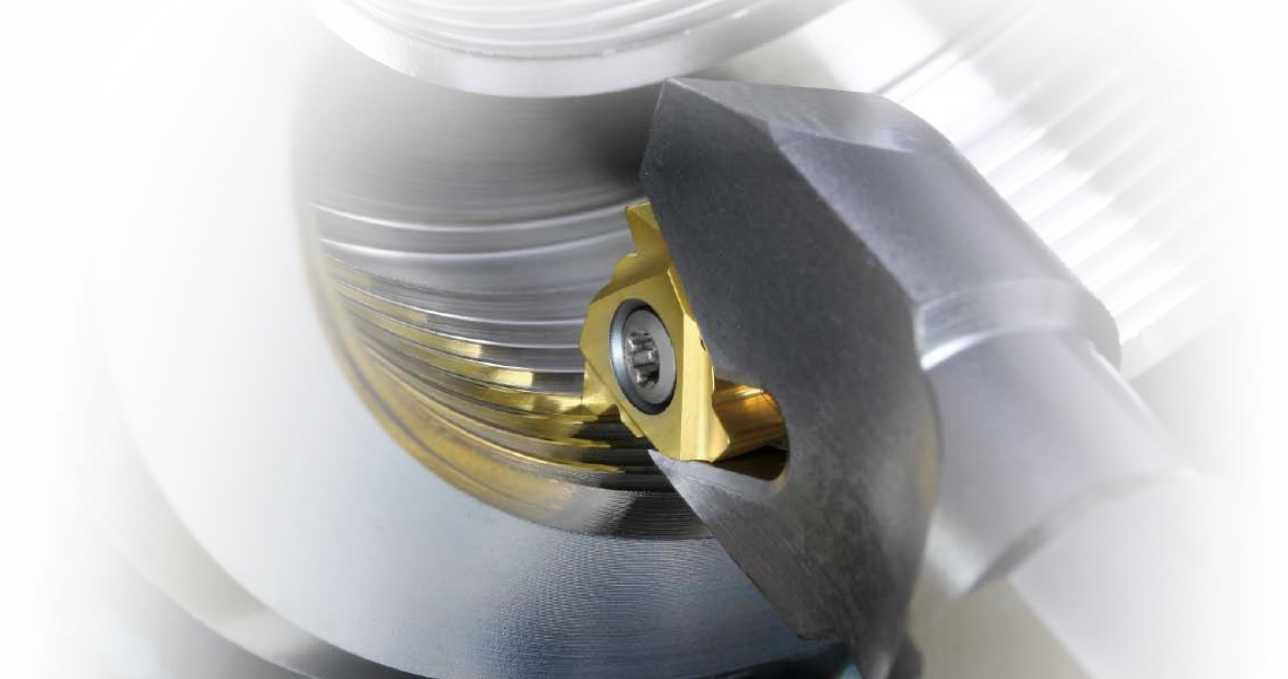
R type



L type

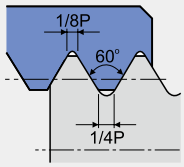
	Type		Basic dimensions(mm)				Recommended coating grade	
	The right hand tools	The left hand tools	Pitch	S	ØI.C	ød	YBG203	YBG205
External thread	**Z16ER0.5ISO**	**Z16EL0.5ISO**	0.50	3.52	9.525	4.0	★	○
	Z16ER0.75ISO	**Z16EL0.75ISO**	0.75	3.52	9.525	4.0	★	○
	Z16ER1.0ISO	**Z16EL1.0ISO**	1.00	3.52	9.525	4.0	★	○
	Z16ER1.25ISO	**Z16EL1.25ISO**	1.25	3.52	9.525	4.0	★	○
	Z16ER1.5ISO	**Z16EL1.5ISO**	1.50	3.52	9.525	4.0	★	○
	Z16ER1.75ISO	**Z16EL1.75ISO**	1.75	3.52	9.525	4.0	★	○
	Z16ER2.0ISO	**Z16EL2.0ISO**	2.00	3.52	9.525	4.0	★	○
	Z16ER2.5ISO	**Z16EL2.5ISO**	2.50	3.52	9.525	4.0	★	○
	Z16ER3.0ISO	**Z16EL3.0ISO**	3.00	3.52	9.525	4.0	★	○
	Z22ER3.5ISO	**Z22EL3.5ISO**	3.50	4.65	12.7	5.0	★	○
	Z22ER4.0ISO	**Z22EL4.0ISO**	4.00	4.65	12.7	5.0	★	○
	Z22ER4.5ISO	**Z22EL4.5ISO**	4.50	4.65	12.7	5.0	★	○
	Z22ER5.0ISO	**Z22EL5.0ISO**	5.00	4.65	12.7	5.0	★	○
	Z22ER5.5ISO	**Z22EL5.5ISO**	5.50	4.65	12.7	5.0	★	○
	Z22ER6.0ISO	**Z22EL6.0ISO**	6.00	4.65	12.7	5.0	★	○

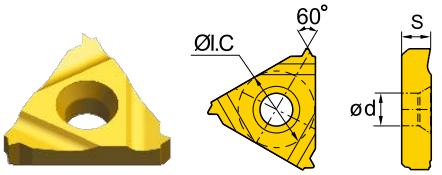
★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order



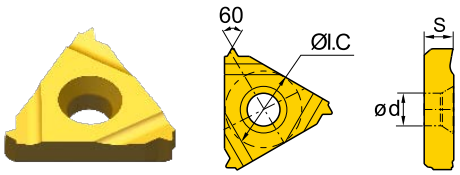
ISO metric thread (with end)

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





R type

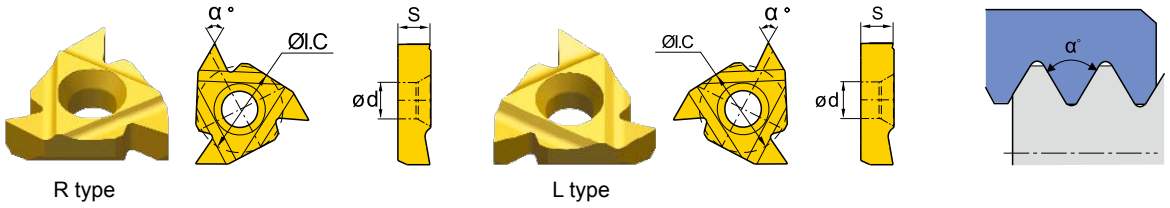


L type

	Type		Basic dimensions(mm)				Recommended coating grade	
	The right hand tools	The left hand tools	Pitch	S	ØI.C	ød	YBG203	YBG205
Internal thread	**Z11IR0.5ISO**	**Z11IL0.5ISO**	0.50	3.05	6.35	3.2	★	○
	Z11IR0.75ISO	**Z11IL0.75ISO**	0.75	3.05	6.35	3.2	★	○
	Z11IR1.0ISO	**Z11IL1.0ISO**	1.00	3.05	6.35	3.2	★	○
	Z11IR1.25ISO	**Z11IL1.25ISO**	1.25	3.05	6.35	3.2	★	○
	Z11IR1.5ISO	**Z11IL1.5ISO**	1.50	3.05	6.35	3.2	★	○
	Z11IR1.75ISO	**Z11IL1.75ISO**	1.75	3.05	6.35	3.2	★	○
	Z11IR2.0ISO	**Z11IL2.0ISO**	2.00	3.05	6.35	3.2	★	○
	Z16IR0.5ISO	**Z16IL0.5ISO**	0.50	3.52	9.525	4.0	★	○
	Z16IR0.75ISO	**Z16IL0.75ISO**	0.75	3.52	9.525	4.0	★	○
	Z16IR1.0ISO	**Z16IL1.0ISO**	1.00	3.52	9.525	4.0	★	○
	Z16IR1.25ISO	**Z16IL1.25ISO**	1.25	3.52	9.525	4.0	★	○
	Z16IR1.5ISO	**Z16IL1.5ISO**	1.50	3.52	9.525	4.0	★	○
	Z16IR1.75ISO	**Z16IL1.75ISO**	1.75	3.52	9.525	4.0	★	○
	Z16IR2.0ISO	**Z16IL2.0ISO**	2.00	3.52	9.525	4.0	★	○
	Z16IR2.5ISO	**Z16IL2.5ISO**	2.50	3.52	9.525	4.0	★	○
	Z16IR3.0ISO	**Z16IL3.0ISO**	3.00	3.52	9.525	4.0	★	○
	Z22IR3.5ISO	**Z22IL3.5ISO**	3.50	4.65	12.7	5.0	★	○
	Z22IR4.0ISO	**Z22IL4.0ISO**	4.00	4.65	12.7	5.0	★	○
	Z22IR4.5ISO	**Z22IL4.5ISO**	4.50	4.65	12.7	5.0	★	○
	Z22IR5.0ISO	**Z22IL5.0ISO**	5.00	4.65	12.7	5.0	★	○
	Z22IR5.5ISO	**Z22IL5.5ISO**	5.50	4.65	12.7	5.0	★	○
	Z22IR6.0ISO	**Z22IL6.0ISO**	6.00	4.65	12.7	5.0	★	○

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

General pitch thread (without end)



R type L type

		Type		Basic dimensions(mm)					Recommended coating grade	
		The right hand tools	The left hand tools	Pitch/mm (pitch/Inch)	S	ØI.C	ød	α°	YBG203	YBG205
External thread	55°	**Z16ERA55**	**Z16ELA55**	0.5-1.5(48-16)	3.52	9.525	4.0	55°	★	○
		Z16ERG55	**Z16ELG55**	1.75-3.0(14-8)	3.52	9.525	4.0	55°	★	○
		Z16ERAG55	**Z16ELAG55**	0.5-3.0(48-8)	3.52	9.525	4.0	55°	★	○
		Z22ERN55	**Z22ELN55**	3.5-5.0(7-5)	4.65	12.7	5.0	55°	★	○
	60°	**Z16ERA60**	**Z16ELA60**	0.5-1.5(48-16)	3.52	9.525	4.0	60°	★	○
		Z16ERG60	**Z16ELG60**	1.75-3.0(14-8)	3.52	9.525	4.0	60°	★	○
		Z16ERAG60	**Z16ELAG60**	0.5-3.0(48-8)	3.52	9.525	4.0	60°	★	○
		Z22ERN60	**Z22ELN60**	3.5-5.0(7-5)	4.65	12.7	5.0	60°	★	○

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



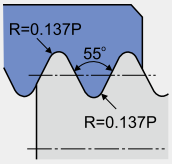
R type L type

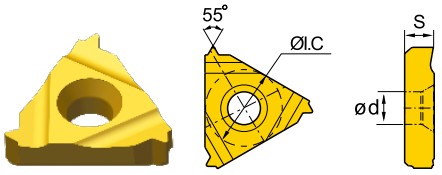
		Type		Basic dimensions(mm)					Recommended coating grade	
		The right hand tools	The left hand tools	Pitch/mm (pitch/Inch)	S	ØI.C	ød	α°	YBG203	YBG205
Internal thread	55°	**Z11IRA55**	**Z11ILA55**	0.5-1.5(48-16)	3.05	6.35	3.2	55°	★	○
		Z16IRA55	**Z16ILA55**	0.5-1.5(48-16)	3.52	9.525	4.0	55°	★	○
		Z16IRG55	**Z16ILG55**	1.75-3.0(14-8)	3.52	9.525	4.0	55°	★	○
		Z16IRAG55	**Z16ILAG55**	0.5-3.0(48-8)	3.52	9.525	4.0	55°	★	○
		Z22IRN55	**Z22ILN55**	3.5-5.0(7-5)	4.65	12.7	5.0	55°	★	○
	60°	**Z11IRA60**	**Z11ILA60**	0.5-1.5(48-16)	3.05	6.35	3.2	60°	★	○
		Z16IRA60	**Z16ILA60**	0.5-1.5(48-16)	3.52	9.525	4.0	60°	★	○
		Z16IRG60	**Z16ILG60**	1.75-3.0(14-8)	3.52	9.525	4.0	60°	★	○
		Z16IRAG60	**Z16ILAG60**	0.5-3.0(48-8)	3.52	9.525	4.0	60°	★	○
		Z22IRN60	**Z22ILN60**	3.5-5.0(7-5)	4.65	12.7	5.0	60°	★	○

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

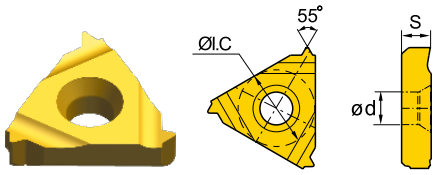
Whitworth thread (with end)

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





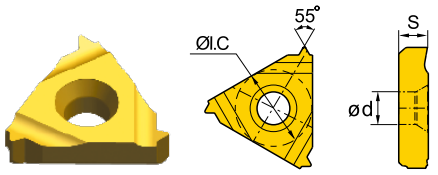
R type



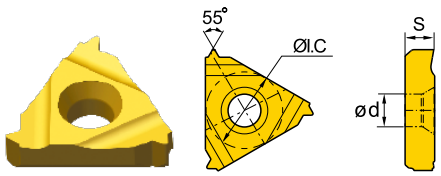
L type

	Type		Basic dimensions(mm)				Recommended coating grade	
	The right hand tools	The left hand tools	Pitch/mm (pitch/Inch)	S	ØI.C	ød	YBG203	YBG205
External thread	**Z16ER8W**	**Z16EL8W**	8	3.52	9.525	4.0	★	○
	Z16ER9W	**Z16EL9W**	9	3.52	9.525	4.0	★	○
	Z16ER10W	**Z16EL10W**	10	3.52	9.525	4.0	★	○
	Z16ER11W	**Z16EL11W**	11	3.52	9.525	4.0	★	○
	Z16ER12W	**Z16EL12W**	12	3.52	9.525	4.0	★	○
	Z16ER14W	**Z16EL14W**	14	3.52	9.525	4.0	★	○
	Z16ER16W	**Z16EL16W**	16	3.52	9.525	4.0	★	○
	Z16ER18W	**Z16EL18W**	18	3.52	9.525	4.0	★	○
	Z16ER19W	**Z16EL19W**	19	3.52	9.525	4.0	★	○

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



R type



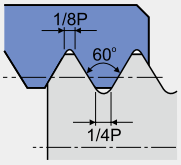
L type

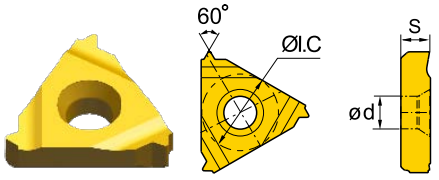
	Type		Basic dimensions(mm)				Recommended coating grade	
	The right hand tools	The left hand tools	Pitch/mm (pitch/Inch)	S	ØI.C	ød	YBG203	YBG205
Internal thread	**Z16IR8W**	**Z16IL8W**	8	3.52	9.525	4.0	★	○
	Z16IR9W	**Z16IL9W**	9	3.52	9.525	4.0	★	○
	Z16IR10W	**Z16IL10W**	10	3.52	9.525	4.0	★	○
	Z16IR11W	**Z16IL11W**	11	3.52	9.525	4.0	★	○
	Z16IR12W	**Z16IL12W**	12	3.52	9.525	4.0	★	○
	Z16IR14W	**Z16IL14W**	14	3.52	9.525	4.0	★	○
	Z16IR16W	**Z16IL16W**	16	3.52	9.525	4.0	★	○
	Z16IR18W	**Z16IL18W**	18	3.52	9.525	4.0	★	○
	Z16IR19W	**Z16IL19W**	19	3.52	9.525	4.0	★	○

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

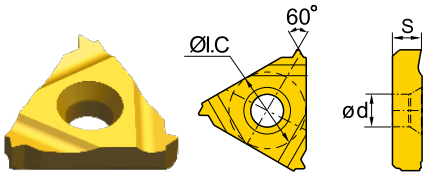
Unified thread (with end)

ASME B1.1-1989
Tolerance class：2A/2B





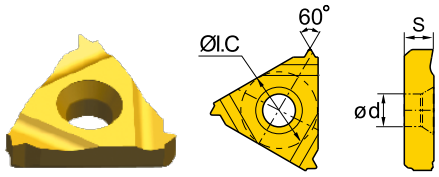
R type



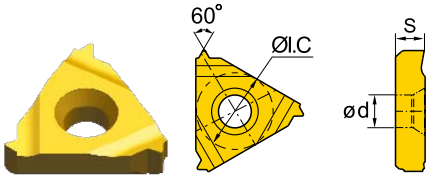
L type

	Type		Basic dimensions(mm)				Recommended coating grade	
	The right hand tools	The left hand tools	Pitch/mm (pitch/Inch)	S	ØI.C	ød	YBG203	YBG205
External thread	**Z16ER8UN**	**Z16EL8UN**	8	3.52	9.525	4.0	★	○
	Z16ER10UN	**Z16EL10UN**	10	3.52	9.525	4.0	★	○
	Z16ER12UN	**Z16EL12UN**	12	3.52	9.525	4.0	★	○
	Z16ER14UN	**Z16EL14UN**	14	3.52	9.525	4.0	★	○
	Z16ER16UN	**Z16EL16UN**	16	3.52	9.525	4.0	★	○
	Z16ER18UN	**Z16EL18UN**	18	3.52	9.525	4.0	★	○
	Z16ER20UN	**Z16EL20UN**	20	3.52	9.525	4.0	★	○
	Z16ER24UN	**Z16EL24UN**	24	3.52	9.525	4.0	★	○

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



R type



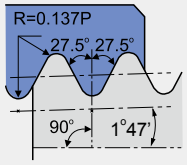
L type

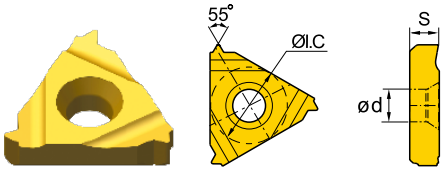
	Type		Basic dimensions(mm)				Recommended coating grade	
	The right hand tools	The left hand tools	Pitch/mm (pitch/Inch)	S	ØI.C	ød	YBG203	YBG205
Internal thread	**Z16IR8UN**	**Z16IL8UN**	8	3.52	9.525	4.0	★	○
	Z16IR10UN	**Z16IL10UN**	10	3.52	9.525	4.0	★	○
	Z16IR12UN	**Z16IL12UN**	12	3.52	9.525	4.0	★	○
	Z16IR14UN	**Z16IL14UN**	14	3.52	9.525	4.0	★	○
	Z16IR16UN	**Z16IL16UN**	16	3.52	9.525	4.0	★	○
	Z16IR18UN	**Z16IL18UN**	18	3.52	9.525	4.0	★	○
	Z16IR20UN	**Z16IL20UN**	20	3.52	9.525	4.0	★	○
	Z16IR24UN	**Z16IL24UN**	24	3.52	9.525	4.0	★	○

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

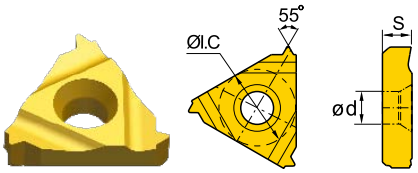
British standard taper piper thread (with end)

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





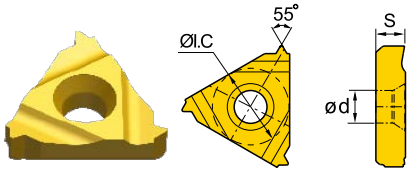
R type



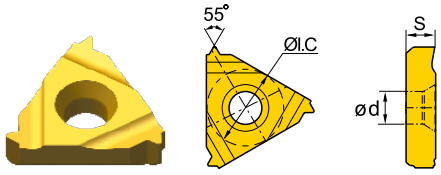
L type

	Type		Basic dimensions(mm)				Recommended coating grade	
	The right hand tools	The left hand tools	Pitch/mm (pitch/Inch)	S	ØI.C	ød	YBG203	YBG205
External thread	**Z16ER11BSPT**	**Z16EL11BSPT**	11	3.52	9.525	4.0	★	○
	Z16ER14BSPT	**Z16EL14BSPT**	14	3.52	9.525	4.0	★	○
	Z16ER19BSPT	**Z16EL19BSPT**	19	3.52	9.525	4.0	★	○
	Z16ER28BSPT	**Z16EL28BSPT**	28	3.52	9.525	4.0	★	○

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



R type



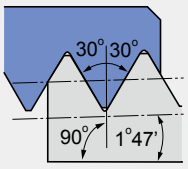
L type

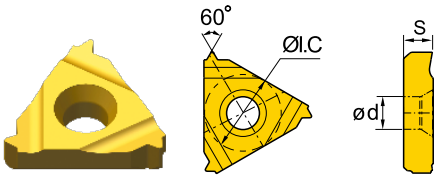
	Type		Basic dimensions(mm)				Recommended coating grade	
	The right hand tools	The left hand tools	Pitch/mm (pitch/Inch)	S	ØI.C	ød	YBG203	YBG205
Internal thread	**Z16IR11BSPT**	**Z16IL11BSPT**	11	3.52	9.525	4.0	★	○
	Z16IR14BSPT	**Z16IL14BSPT**	14	3.52	9.525	4.0	★	○
	Z16IR19BSPT	**Z16IL19BSPT**	19	3.52	9.525	4.0	★	○
	Z16IR28BSPT	**Z16IL28BSPT**	28	3.52	9.525	4.0	★	○

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

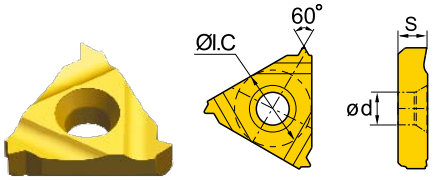
American standard taper piper thread (with end)

ASME B1.20.1-1983
Standard NPT





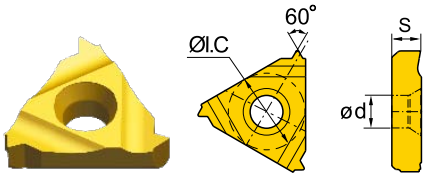
R type



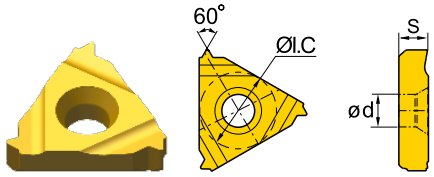
L type

	Type		Basic dimensions(mm)				Recommended coating grade	
	The right hand tools	The left hand tools	Pitch/mm (pitch/Inch)	S	ØI.C	ød	YBG203	YBG205
External thread	**Z16ER8NPT**	**Z16EL8NPT**	8	3.52	9.525	4.0	★	○
	Z16ER11.5NPT	**Z16EL11.5NPT**	11.5	3.52	9.525	4.0	★	○
	Z16ER14NPT	**Z16EL14NPT**	14	3.52	9.525	4.0	★	○
	Z16ER18NPT	**Z16EL18NPT**	18	3.52	9.525	4.0	★	○
	Z16ER27NPT	**Z16EL27NPT**	27	3.52	9.525	4.0	★	○

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



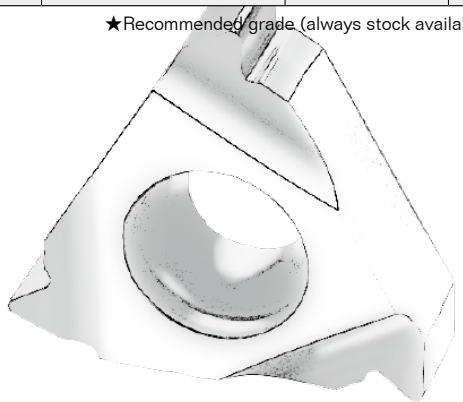
R type



L type

	Type		Basic dimensions(mm)				Recommended coating grade	
	The right hand tools	The left hand tools	Pitch/mm (pitch/Inch)	S	ØI.C	ød	YBG203	YBG205
Internal thread	**Z16IR8NPT**	**Z16IL8NPT**	8	3.52	9.525	4.0	★	○
	Z16IR11.5NPT	**Z16IL11.5NPT**	11.5	3.52	9.525	4.0	★	○
	Z16IR14NPT	**Z16IL14NPT**	14	3.52	9.525	4.0	★	○
	Z16IR18NPT	**Z16IL18NPT**	18	3.52	9.525	4.0	★	○
	Z16IR27NPT	**Z16IL27NPT**	27	3.52	9.525	4.0	★	○

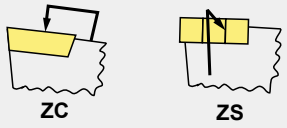
★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order



Threading tools code key

Clamping system

Top clamping | Screw clamping



Thread type

I ➤ Internal thread

E ➤ External thread

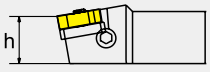
Cutting direction

Right hand | Left hand



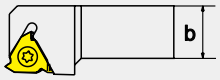
ZS E R 20 20 K 16

Nose height



Note: 00 for round tool holder.
Only to integer, for example:
h=8mm is labeled as 08.

Shank width



Note: Diameter for round tool holder
for example: b=8mm is labeled as 08.

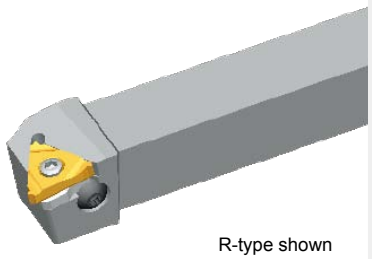
Tool length

Code	H	K	M	P	Q	R	S	T	U
Length	100	125	150	170	180	200	250	300	350

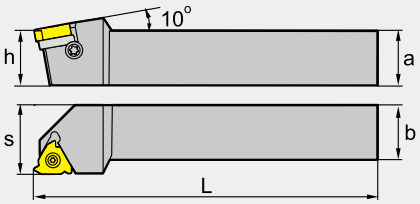
Insert size

Code	11	16	22
Triangle side length	11	16	22
Inscribed circle	6.35	9.525	12.70

External threading tools



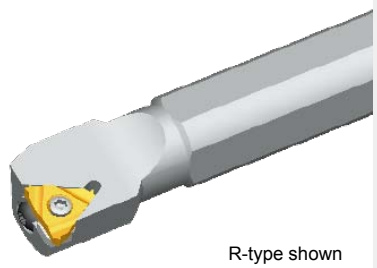
R-type shown



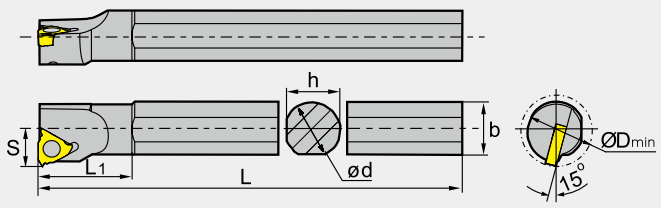
Type		Stock	Basic dimensions(mm)					Applicable inserts	Inserts screw	Shim	Shim screw	Wrench
			a	h	b	L	s					
ZSER	1616H16	▲	16	16	16	100	20	Z16ER□□□□	I60 M3.5X12TT	MT16-□□MN	SM4X8C	WT15IP
	2020K16	▲	20	20	20	125	25					
	2525M16	▲	25	25	25	150	32					
	3225P16	▲	32	32	25	170	32					
	3232P16	▲	32	32	32	170	40					
	2525M22	▲	25	25	25	150	32	Z22ER□□□□	I60 M5X17	MT22-□□MN	SM5X8.5	WT20IP
	3225P22	▲	32	32	25	170	32					
	3232P22	▲	32	32	32	170	40					
	4040S22	△	40	40	40	250	50					
ZSEL	1616H16	▲	16	16	16	100	20	Z16EL□□□□	I60 M3.5X12TT	MT16-□□MN	SM4X8C	WT15IP
	2020K16	▲	20	20	20	125	25					
	2525M16	▲	25	25	25	150	32					
	3225P16	▲	32	32	25	170	32					
	3232P16	▲	32	32	32	170	40					
	2525M22	▲	25	25	25	150	32	Z22EL□□□□	I60 M5X17	MT22-□□MN	SM5X8.5	WT20IP
	3225P22	▲	32	32	25	170	32					
	3232P22	▲	32	32	32	170	40					
	4040S22	△	40	40	40	250	50					

▲Stock available △Make-to-order

Internal threading tools



R-type shown



Type		Stock	Basic dimensions(mm)							Applicable inserts	Inserts screw	Shim	Shim screw	Wrench
			d	L	b	D_{min}	s	h	L_1					
ZSIR	0016K11	▲	16	125	16	12	10	15	20.9	Z11IR□□□□	I60 M2.5X6.5T	---	---	WT08IP
	0016M11	▲	16	150	15.5	16	10.5	15	25.9					
	0016M16	▲	16	150	15.5	20	12	15	27	Z16IR□□□□	I60 M3.5X08TT	---	---	WT15IP
	0020M16	▲	20	150	19	25	14	18	28.7		I60 M3.5X12TT	MT16-□□MN	SM4X8C	
	0020Q16	▲	20	180	19	25	14	18	34					
	0025M16	▲	25	150	24	32	17	23	28.8					
	0032R16	▲	32	200	31	40	22	30	30.9					
	0032S16	▲	32	250	31	40	22	30	30.9					
	0040T16	▲	40	300	38.5	50	27	37	31.5					
	0050U16	▲	50	350	49.5	63	35	49	40.2					
	0020Q22	▲	20	180	21.5	25	15	18	35	Z22IR□□□□	I60 M5X13.2	---	---	WT20IP
	0025R22	▲	25	200	24	32	19	23	39		I60 M5X17	MT22-□□MN	SM5X8.5	
	0032S22	▲	32	250	31	40	22	30	36.4					
	0040T22	▲	40	300	38.5	50	27	37	37.2					
	0050U22	▲	50	350	48.5	63	35	47	42.6					
ZSIL	0016K11	▲	16	125	16	12	10	15	20.9	Z11IL□□□□	I60 M2.5X6.5	---	---	WT07IP
	0016M11	▲	16	150	15.5	16	10.5	15	25.9					
	0016M16	▲	16	150	15.5	20	12	15	27	Z16IL□□□□	I60 M3.5X08TT	---	---	WT15IP
	0020M16	▲	20	150	19	25	14	18	28.7		I60 M3.5X12	MT16-□□MN	SM4X8C	
	0020Q16	▲	20	180	19	25	14	18	34					
	0025M16	▲	25	150	24	32	17	23	28.8					
	0032R16	▲	32	200	31	40	22	30	30.9					
	0032S16	▲	32	250	31	40	22	30	30.9					
	0040T16	▲	40	300	38.5	50	27	37	31.5					
	0050U16	▲	50	350	49.5	63	35	49	40.2					
	0020Q22	▲	20	180	21.5	25	15	18	35	Z22IL□□□□	I60 M5X13.2	---	---	WT20IP
	0025R22	▲	25	200	24	32	19	23	39		I60 M5X17	MT22-□□MN	SM5X8.5	
	0032S22	▲	32	250	31	40	22	30	36.4					
	0040T22	▲	40	300	38.5	50	27	37	37.2					
	0050U22	▲	50	350	48.5	63	35	47	42.6					

▲Stock available △Make-to-order

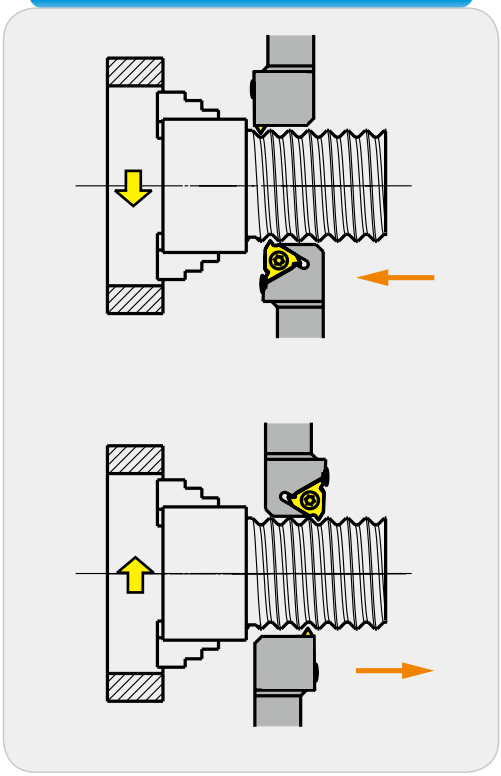
Application information of threading

Please follow the following steps to get the best threading result:

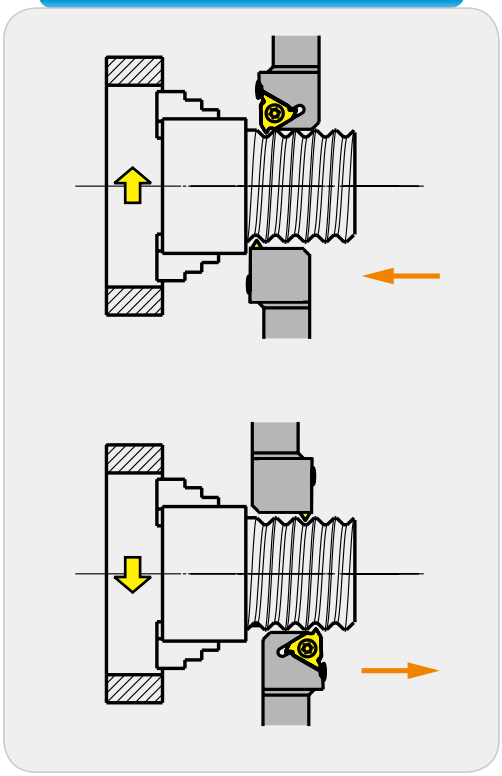
1. Select proper thread machining method.
2. Define helical angle and select shim.
3. Select proper insert and tool holder size.
4. By checking reference table of standard threading programs, select feasible cutting parameters.
5. Select feed way.

Machining method of threading tools

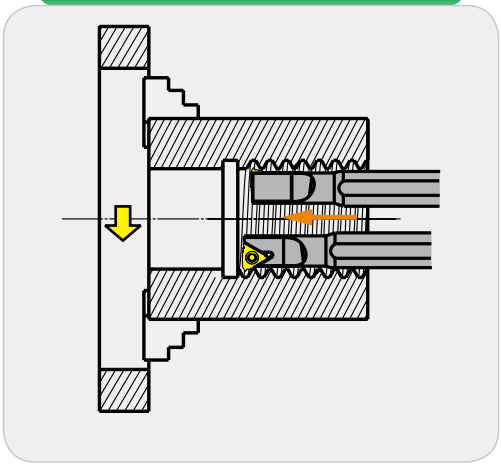
External threading machining (Right thread)



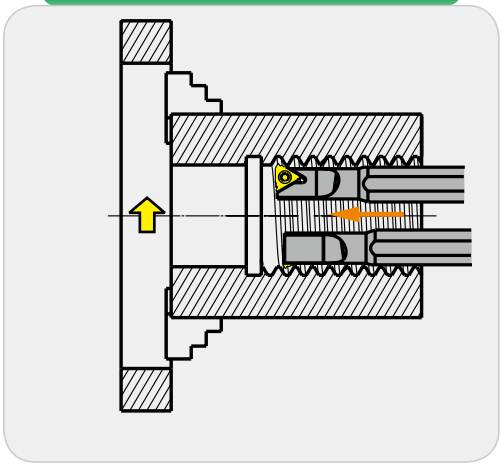
External threading machining (Left thread)



Internal threading machining (Right thread)



Internal threading machining (Left thread)



Decide helical angle and select shim

The clearance angle of threading inserts is actually along the edge (flank). This has significant effect on heat diffusion, spread of abrasion as well as tool life, security and pitch quality. The clearance angle of threading pitch on clearance face is determined by thread helical angle. These two angles are similar to each other to some extent. If inclined angle of insert is different from the helical angle, then the clearance angle won't be the same either.
The helical angle of pitch has to be the same with the inclined angle of insert to prevent over wearing on the clearance face which could affect tool life. the helical angle is calculated as below:

$$e = \arctan \frac{p}{d_2 \times \pi}$$

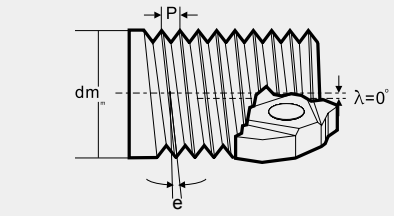
P= Pitch
d_2= pitch diameter
The most common inclined angle is 1°. MT standard shim and its inclined angle is also 1°.
Calculation of clearance angle:
Clearance angle is calculated as below:

$$\beta = \arctan (\tan\theta \times \tan\alpha)$$

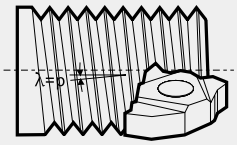
2θ=Thread profile angle
α=The rake angle of external standard threading tools is 10°; the rake angle of internal standard threading tools is 15°.

The shim has to be changed when helical angle of thread is ≤ clearance angle of tool, which could cause intervene on insert flank.
Please change the shim to adjust the difference between helical angle of thread and inclined angle of shim to be within 2°~0°.

e = Helical angle



λ = Inclined angle



Please refer to the table below for actual value:

Thread profile angle 2θ	β	
	External thread	Internal thread
60°	5.8°	8.79°
55°	5.24°	7.94°
30°	2.7°	4.1°
29°	2.6°	3.96°

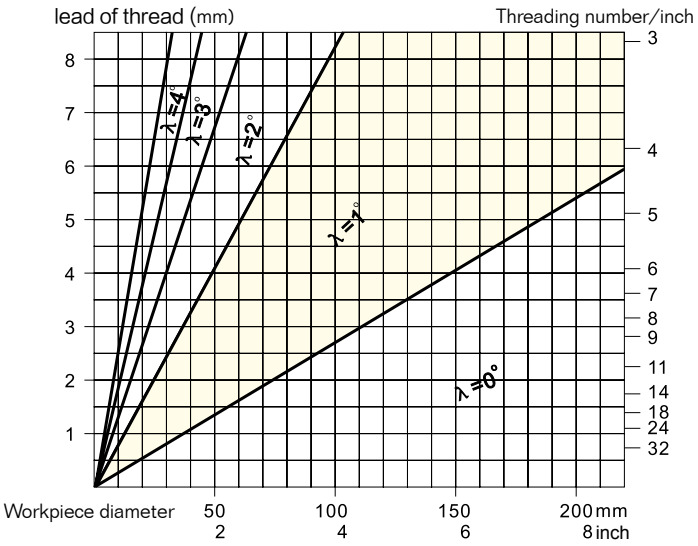
For example: when P=1.5, d2=24mm,
helical angle1.14°-(2°~0°)=inclined angle (-0.86°~1.14°)
it is feasible to use standard shim 1°.

Shim specification table is as follows:

Screw pitch range	Insert dimensions	Inclined angle	Shim
0.5-3.0	16	0	MT16-00MN
		1	MT16-01MN
		2	MT16-02MN
		3	MT16-03MN
3.5-6.0	22	0	MT22-00MN
		1	MT22-01MN
		2	MT22-02MN
		3	MT22-03MN

Note: the standard angle of shim for our threading tools is 1°. ((MT16-01MN or MT22-01MN)

Select shim:



Select proper inserts and size of tool holder (Please refer to detailed table of threading tools and inserts)

Parameter table for threading program under different standards

Table of recommended in-feed for metric ISO external threading with wiper edge

Screw pitch	1.0	1.25	1.5	1.75	2.0	2.5	3.0	4.0	5.0
Total in-feed	0.72	0.86	1.02	1.17	1.33	1.63	1.94	2.58	3.21
Number of passes	5	6	7	8	9	11	13	15	17
Order to follow in threading operation	Value of radial in-feed (X) and flank in-feed (Z)								
	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z
1	0.20/-	0.20/-	0.21/-	0.22/-	0.24/-	0.25/-	0.26/-	0.35/-	0.40/-
2	0.18/0.10	0.18/0.10	0.18/0.10	0.20/0.12	0.22/0.13	0.24/0.14	0.24/0.14	0.30/0.17	0.35/0.20
3	0.16/0.09	0.14/0.09	0.18/0.10	0.18/0.10	0.20/0.12	0.21/0.12	0.20/0.12	0.25/0.14	0.30/0.17
4	0.10/0.06	0.10/0.08	0.15/0.09	0.15/0.09	0.15/0.09	0.18/0.10	0.20/0.12	0.20/0.12	0.28/0.16
5	0.08/-	0.08/0.06	0.12/0.07	0.13/0.08	0.12/0.07	0.15/0.09	0.18/0.10	0.18/0.10	0.25/0.14
6			0.10/0.06	0.11/0.06	0.12/0.07	0.12/0.07	0.15/0.09	0.18//0.10	0.20/0.12
7			0.08/-	0.10/0.06	0.10/0.06	0.12/0.07	0.13/0.08	0.16/0.09	0.18/0.10
8				0.08/-	0.10/0.06	0.10/0.06	0.12/0.07	0.15/0.09	0.16/0.09
9					0.08/-	0.10/0.06	0.10/0.06	0.15/0.09	0.15/0.09
10						0.08/0.05	0.10/0.06	0.13/0.08	0.15/0.09
11						0.08/-	0.08/0.06	0.12/0.07	0.13/0.08
12							0.08/0.05	0.12/0.07	0.13/0.08
13								0.11/0.06	0.12/0.07
14								0.10/0.06	0.12/0.07
15								0.08/-	0.11/0.06
16									0.10/0.06
17									0.08/-

Table of recommended in-feed for metric ISO internal threading with wiper edge

Screw pitch	1.00	1.25	1.5	1.75	2.0	2.5	3.0	4.0	5.0
Total in-feed	0.62	0.77	0.92	1.06	1.21	0.15	1.79	2.36	2.95
Number of passes	5	6	7	8	9	11	13	15	17
Order to follow in threading operation	Value of radial in-feed (X) and flank in-feed (Z)								
	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z
1	0.18/-	0.20/-	0.22/-	0.23/-	0.24/-	0.25/-	0.26/-	0.30/-	0.32/-
2	0.14/0.08	0.15/0.09	0.16/0.09	0.16/0.09	0.18/0.10	0.20/0.12	0.20/0.12	0.25/0.14	0.28/0.16
3	0.12/0.07	0.12/0.07	0.14/0.08	0.14/0.08	0.15/0.09	0.15/0.09	0.20/0.12	0.22/0.13	0.25/0.14
4	0.10/0.06	0.12/0.07	0.12/0.07	0.13/0.08	0.14/0.08	0.15/0.09	0.18/0.10	0.20/0.12	0.22/0.13
5	0.08/-	0.10/0.06	0.11/0.06	0.12/0.07	0.12/0.07	0.13/0.08	0.15/0.09	0.18/0.10	0.21/0.12
6			0.09/0.05	0.10/0.06	0.11/0.06	0.12/0.07	0.12/0.07	0.15/0.09	0.20/0.12
7			0.08/-	0.10/0.06	0.10/0.06	0.12/0.07	0.12/0.07	0.15/0.09	0.18/0.10
8				0.08/-	0.09/0.05	0.10/0.06	0.10/0.06	0.15/0.09	0.18/0.10
9					0.08/-	0.10/0.06	0.10/0.06	0.12/0.07	0.15/0.09
10						0.09/0.05	0.10/0.06	0.12/0.07	0.15/0.09
11						0.08/-	0.10/0.06	0.12/0.07	0.15/0.09
12							0.08/0.05	0.11/0.06	0.15/0.09
13								0.11/0.06	0.12/0.07
14								0.10/0.06	0.11/0.06
15								0.08/-	0.10/0.06
16									0.10/0.06
17									0.08/-

Table of recommended in-feed for American unified standard external threading with wiper edge

Screw pitch	24	20	18	16	14	12	11	10	9	8	7	6	5
Total in-feed	0.649	0.779	0.866	0.974	1.113	1.299	1.416	1.558	1.731	1.948	2.226	2.597	3.116
Number of passes	5	6	6	7	9	9	10	11	12	13	14	15	16
Order to follow in threading operation	Value of radial in-feed (X) and flank in-feed (Z)												
	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z
1	0.206 / —	0.210 / —	0.233 / —	0.226 / —	0.196 / —	0.229 / —	0.220 / —	0.214 / —	0.210 / —	0.211 / —	0.213 / —	0.218 / —	0.229 / —
2	0.148 / 0.086	0.163 / 0.094	0.181 / 0.104	0.188 / 0.109	0.189 / 0.110	0.222 / 0.128	0.228 / 0.132	0.240 / 0.139	0.256 / 0.148	0.276 / 0.160	0.304 / 0.176	0.343 / 0.198	0.399 / 0.230
3	0.114 / 0.066	0.125 / 0.072	0.139 / 0.080	0.145 / 0.083	0.146 / 0.084	0.170 / 0.098	0.176 / 0.102	0.184 / 0.106	0.196 / 0.113	0.212 / 0.122	0.234 / 0.135	0.263 / 0.152	0.306 / 0.177
4	0.096 / 0.055	0.105 / 0.061	0.117 / 0.068	0.122 / 0.070	0.123 / 0.071	0.143 / 0.083	0.148 / 0.086	0.155 / 0.090	0.165 / 0.095	0.179 / 0.103	0.197 / 0.114	0.222 / 0.128	0.258 / 0.149
5	0.085 / 0.049	0.093 / 0.054	0.103 / 0.059	0.107 / 0.062	0.108 / 0.062	0.126 / 0.073	0.131 / 0.075	0.137 / 0.079	0.146 / 0.084	0.158 / 0.091	0.173 / 0.100	0.195 / 0.113	0.227 / 0.131
6		0.084 / 0.048	0.093 / 0.054	0.097 / 0.056	0.098 / 0.056	0.114 / 0.066	0.118 / 0.068	0.124 / 0.072	0.132 / 0.076	0.142 / 0.082	0.157 / 0.091	0.177 / 0.102	0.205 / 0.119
7				0.089 / 0.052	0.090 / 0.052	0.105 / 0.061	0.109 / 0.063	0.114 / 0.066	0.121 / 0.070	0.131 / 0.076	0.144 / 0.083	0.163 / 0.094	0.189 / 0.109
8					0.084 / 0.048	0.098 / 0.056	0.101 / 0.058	0.106 / 0.061	0.113 / 0.065	0.122 / 0.070	0.134 / 0.078	0.151 / 0.087	0.176 / 0.101
9					0.079 / 0.045	0.092 / 0.053	0.095 / 0.055	0.100 / 0.057	0.106 / 0.061	0.114 / 0.066	0.126 / 0.073	0.142 / 0.082	0.165 / 0.095
10							0.090 / 0.052	0.094 / 0.054	0.100 / 0.058	0.108 / 0.063	0.119 / 0.069	0.134 / 0.078	0.156 / 0.090
11								0.090 / 0.052	0.095 / 0.055	0.103 / 0.059	0.113 / 0.065	0.128 / 0.074	0.149 / 0.086
12									0.091 / 0.053	0.098 / 0.057	0.108 / 0.063	0.122 / 0.071	0.142 / 0.082
13										0.094 / 0.054	0.104 / 0.060	0.117 / 0.068	0.136 / 0.079
14											0.100 / 0.058	0.113 / 0.065	0.131 / 0.076
15												0.109 / 0.063	0.126 / 0.073
16													0.122 / 0.071

Table of recommended in-feed for American unified standard internal threading with wiper edge

Screw pitch	24	20	18	16	14	12	11	10	9	8	7	6	5
Total in-feed	0.573	0.687	0.764	0.860	0.982	1.146	1.250	1.375	1.528	1.719	1.964	2.291	2.750
Number of passes	5	6	6	7	8	9	9	10	11	12	13	14	15
Order to follow in threading operation	Value of radial in-feed (X) and flank in-feed (Z)												
	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z
1	0.193 / —	0.200 / —	0.222 / —	0.219 / —	0.220 / —	0.228 / —	0.250 / —	0.247 / —	0.246 / —	0.252 / —	0.262 / —	0.278 / —	0.302 / —
2	0.127 / 0.073	0.239 / 0.081	0.155 / 0.089	0.161 / 0.093	0.173 / 0.100	0.190 / 0.110	0.207 / 0.120	0.216 / 0.125	0.229 / 0.132	0.247 / 0.142	0.271 / 0.156	0.304 / 0.176	0.353 / 0.204
3	0.098 / 0.056	0.107 / 0.062	0.119 / 0.069	0.124 / 0.072	0.132 / 0.076	0.146 / 0.084	0.159 / 0.092	0.166 / 0.096	0.176 / 0.101	0.189 / 0.109	0.208 / 0.120	0.234 / 0.135	0.271 / 0.156
4	0.082 / 0.048	0.090 / 0.052	0.100 / 0.058	0.104 / 0.060	0.112 / 0.064	0.123 / 0.071	0.134 / 0.077	0.140 / 0.081	0.148 / 0.086	0.160 / 0.092	0.175 / 0.101	0.197 / 0.114	0.228 / 0.132
5	0.073 / 0.042	0.079 / 0.046	0.088 / 0.051	0.092 / 0.053	0.098 / 0.057	0.108 / 0.062	0.118 / 0.068	0.123 / 0.071	0.130 / 0.075	0.141 / 0.081	0.1543 / 0.089	0.173 / 0.100	0.201 / 0.116
6		0.072 / 0.041	0.080 / 0.046	0.083 / 0.048	0.089 / 0.051	0.098 / 0.056	0.107 / 0.062	0.111 / 0.064	0.118 / 0.068	0.127 / 0.073	0.140 / 0.081	0.157 / 0.091	0.182 / 0.105
7				0.077 / 0.044	0.082 / 0.047	0.090 / 0.052	0.098 / 0.057	0.102 / 0.059	0.108 / 0.063	0.117 / 0.067	0.128 / 0.074	0.144 / 0.083	0.167 / 0.097
8					0.076 / 0.044	0.084 / 0.048	0.091 / 0.053	0.095 / 0.055	0.101 / 0.058	0.109 / 0.063	0.119 / 0.069	0.134 / 0.078	0.156 / 0.090
9						0.079 / 0.045	0.086 / 0.050	0.090 / 0.052	0.095 / 0.055	0.102 / 0.059	0.112 / 0.065	0.126 / 0.073	0.146 / 0.084
10								0.085 / 0.049	0.090 / 0.052	0.097 / 0.056	0.106 / 0.061	0.119 / 0.069	0.138 / 0.080
11									0.085 / 0.049	0.092 / 0.053	0.101 / 0.058	0.113 / 0.065	0.131 / 0.076
12										0.088 / 0.051	0.096 / 0.056	0.108 / 0.063	0.126 / 0.073
13											0.092 / 0.053	0.101 / 0.060	0.121 / 0.070
14												0.100 / 0.058	0.116 / 0.067
15													0.112 / 0.065

Table of recommended in-feed for British standard internal and external threading with wiper edge

Screw pitch	28	20	19	16	14	12	11	10	9	8	7	6	5
Total in-feed	0.581	0.813	0.856	1.017	1.162	1.355	1.479	1.626	1.807	2.033	2.324	2.711	3.253
Number of passes	5	6	6	8	8	9	9	10	11	12	14	15	16
Order to follow in threading operation	Value of radial in-feed (X) and flank in-feed (Z)												
	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z	X/Z
1	0.179 / —	0.211 / —	0.223 / —	0.196 / —	0.223 / —	0.226 / —	0.246 / —	0.236 / —	0.230 / —	0.255 / —	0.195 / —	0.197 / —	0.204 / —
2	0.134 / 0.070	0.172 / 0.089	0.181 / 0.094	0.186 / 0.097	0.213 / 0.111	0.234 / 0.122	0.255 / 0.133	0.226 / 0.139	0.282 / 0.147	0.304 / 0.158	0.322 / 0.167	0.361 / 0.189	0.421 / 0.219
3	0.104 / 0.054	0.132 / 0.069	0.139 / 0.072	0.143 / 0.074	0.163 / 0.085	0.180 / 0.093	0.197 / 0.102	0.206 / 0.106	0.216 / 0.113	0.233 / 0.121	0.247 / 0.128	0.278 / 0.145	0.323 / 0.168
4	0.087 / 0.045	0.111 / 0.058	0.117 / 0.061	0.120 / 0.063	0.138 / 0.072	0.151 / 0.079	0.165 / 0.086	0.172 / 0.090	0.182 / 0.095	0.197 / 0.102	0.208 / 0.108	0.234 / 0.122	0.272 / 0.142
5	0.077 / 0.040	0.098 / 0.051	0.103 / 0.054	0.106 / 0.055	0.121 / 0.063	0.133 / 0.069	0.145 / 0.076	0.152 / 0.079	0.161 / 0.084	0.1738 / 0.090	0.183 / 0.095	0.207 / 0.108	0.240 / 0.125
6		0.089 / 0.046	0.093 / 0.049	0.096 / 0.050	0.110 / 0.057	0.121 / 0.063	0.131 / 0.068	0.137 / 0.071	0.145 / 0.076	0.157 / 0.082	0.166 / 0.086	0.187 / 0.097	0.217 / 0.113
7				0.088 / 0.046	0.101 / 0.052	0.111 / 0.058	0.121 / 0.063	0.126 / 0.066	0.134 / 0.070	0.144 / 0.075	0.152 / 0.079	0.172 / 0.089	0.200 / 0.104
8				0.082 / 0.043	0.093 / 0.049	0.103 / 0.054	0.113 / 0.059	0.117 / 0.061	0.124 / 0.065	0.134 / 0.070	0.142 / 0.074	0.160 / 0.083	0.186 / 0.097
9						0.097 / 0.050	0.106 / 0.055	0.110 / 0.057	0.117 / 0.061	0.126 / 0.066	0.133 / 0.069	0.150 / 0.078	0.174 / 0.091
10								0.104 / 0.054	0.111 / 0.058	0.119 / 0.062	0.126 / 0.066	0.142 / 0.074	0.165 / 0.086
11									0.105 / 0.055	0.113 / 0.059	0.120 / 0.062	0.135 / 0.070	0.157 / 0.082
12										0.108 / 0.056	0.114 / 0.060	0.129 / 0.067	0.150 / 0.078
13											0.110 / 0.055	0.124 / 0.064	0.144 / 0.075
14												0.119 / 0.062	0.138 / 0.072
15												0.115 / 0.060	0.133 / 0.069
16													0.129 / 0.067

Table of recommended in-feed for NPT internal and external threading with wiper edge

Screw pitch	27	18	14	11.5	8
Total in-feed	0.75	1.129	1.451	1.767	2.54
Number of passes	6	8	10	12	14
Order to follow in threading operation	Value of radial in-feed (X) and flank in-feed (Z)				
	X/Z	X/Z	X/Z	X/Z	X/Z
1	0.19/-	0.22/-	0.240/-	0.24/-	0.255/-
2	0.15/0.087	0.181/0.104	0.200/0.115	0.208/0.120	0.250/0.144
3	0.13/0.075	0.152/0.088	0.170/0.098	0.182/0.105	0.245/0.141
4	0.11/0.063	0.141/0.081	0.150/0.086	0.168/0.097	0.230/0.133
5	0.09/0.052	0.131/0.075	0.140/0.081	0.155/0.089	0.210/0.121
6	0.08/0.46	0.121/0.070	0.130/0.075	0.145/0.084	0.195/0.112
7		0.101/0.058	0.120/0.069	0.138/0.079	0.180/0.104
8		0.082/0.047	0.110/0.063	0.124/0.072	0.175/0.101
9			0.100/0.058	0.117/0.067	0.170/0.098
10			0.091/0.052	0.105/0.060	0.155/0.089
11				0.095/0.055	0.140/0.080
12				0.090/0.052	0.125/0.072
13					0.110/0.063
14					0.100/0.058

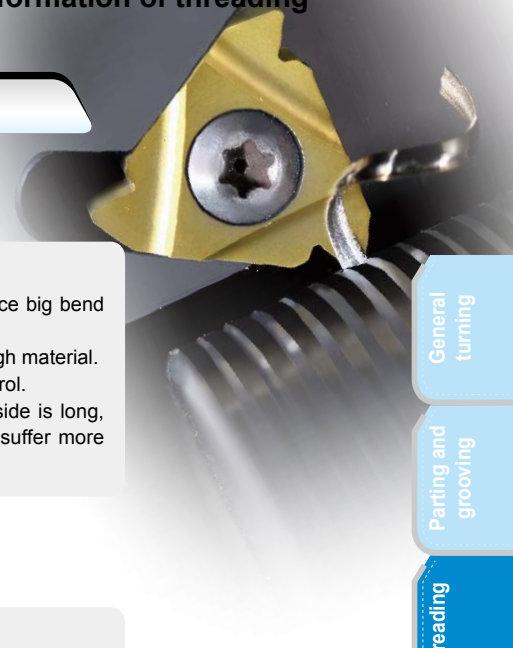
Table of recommended in-feed for BSPT internal and external threading with wiper edge

Screw pitch	28	19	14	11
Total in-feed	0.581	0.856	1.162	1.479
Number of passes	5	6	8	10
Order to follow in threading operation	Value of radial in-feed (X) and flank in-feed (Z)			
	X/Z	X/Z	X/Z	X/Z
1	0.179/-	0.223/-	0.222/-	0.214/-
2	0.134/0.070	0.181/0.094	0.213/0.111	0.242/0.126
3	0.103/0.054	0.139/0.072	0.163/0.085	0.186/0.097
4	0.087/0.045	0.117/0.061	0.138/0.072	0.157/0.082
5	0.078/0.040	0.103/0.054	0.121/0.063	0.138/0.072
6		0.093/0.049	0.110/0.057	0.125//0.065
7			0.101/0.052	0.115/0.060
8			0.094/0.049	0.107/0.056
9				0.100/0.052
10				0.095//0.049

Table of recommended cutting parameters

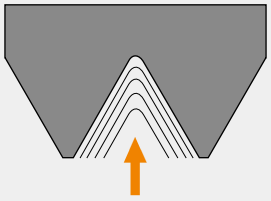
ISO	Material		Unit cutting force Kc0.4 N/mm²	Hardness HB	Grade YBG202 YBG203 YBG205 Cutting speed(m/min)
P	Carbon steel	C=0.15% C=0.35% C=0.60%	1900 2100 2250	125 150 200	150–175 140–155 130–145
	Alloy steel	Anneal Hardened Hardened Hardened	2100 2600 2700 2850	180 275 300 350	110–130 80–100 70–90 60–80
	High alloy steel	Anneal Hardened	2600 3900	200 325	90–115 70–90
	Cast steel	Non-alloy low alloy high alloy Martensite steel 12%Mn	2000 2500 2700 3600	180 200 225 250	180–210 90–115 90–115 40–50
M	Stainless steel	Austenite	2450	180	110–130
		Martensite/Ferrite	2300	200	130–170
K	Malleable cast iron	Ferrite Pearlite	1100 1100	130 230	110–140 85–105
	Gray cast iron	Low tensile-strength High tensile-strength	1100 1500	180 260	110–140 90–115
	Nodular cast iron	Ferrite Pearlite	1100 1800	160 250	110–130 80–100
N	Al alloy	Non-aging treatment Aging treatment	500 800	60 100	1300–1450 450–500
	Cast aluminum alloy	Non-aging treatment Aging treatment	750 900	75 90	430–470 250–290
S	Heat resistant alloy	Iron base: Anneal Iron base: Aging	3000 3050	200 280	35–50 25–35
		Ni- or Co-base: Anneal Ni- or Co-base: Aging Ni- or Co-base: Casting	3500 4150 4150	250 350 320	15–25 10–20 10–15
H	Hardened steel	Hardened steel	4500	HRC55	40–50

Note: •The values in the above table are range values. High values in the range could be considered in actual cutting. When trying new cutting speed, please check the cutting edge condition before operation.
•In stainless steel threading, high cutting speed should be used to prevent built-up edge.
•The cutting parameters should be reduced when cutting small pitch thread and when using tools with small nose radius.
•When cutting thread by tools with small nose radius, such as NPT standard thread, it is advisable to use tools with big nose radius first to rough, so as to improve the life of tools with small nose radius.



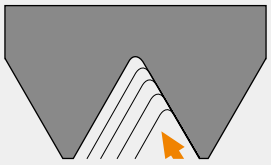
In-feed way of threading tools

Radial in-feed



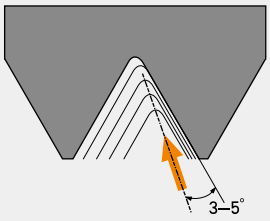
- Easy operating, high general.
- V-shape chip caused by long chip steel workpiece will produce big bend stress on cutting edge.
- It requires low cutting depth, sharp cutting edge and good tough material.
- Big quantity of heat when cutting ,V-shape chip is hard to control.
- Because the interface of cutting chips on the right and left side is long, so it is easy to cause vibration and make the cutting edge suffer more overloading.

Flank in-feed



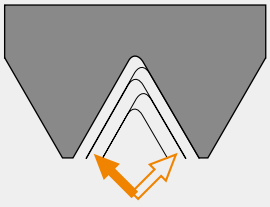
- Cutting edge suffer small bend stress, stable estate, it is easy for chips formation in deep cutting depth.
- There are enough space to leave chips flow when flank in-feed.
- Big abrasion on right flank.

Modified flank in-feed



- Right Cutting Edge also engage on cutting depth to a certain extent, it can reduce the abrasion on right side of clearance face.
- Cutting edge suffer small bend stress, stable estate, it is easy for chips formation in deep cutting depth.
- Good Cutting Performance.

Alternate flank in-feed



- Cutting edge trade off when machining, equality abrasion on left and right side of clearance face on cutting edge, it can improve the life of tools.
- Chips are flowing from both of right and left side, good chips flowing.
- Recommend using in big screw-pitch thread cutting.

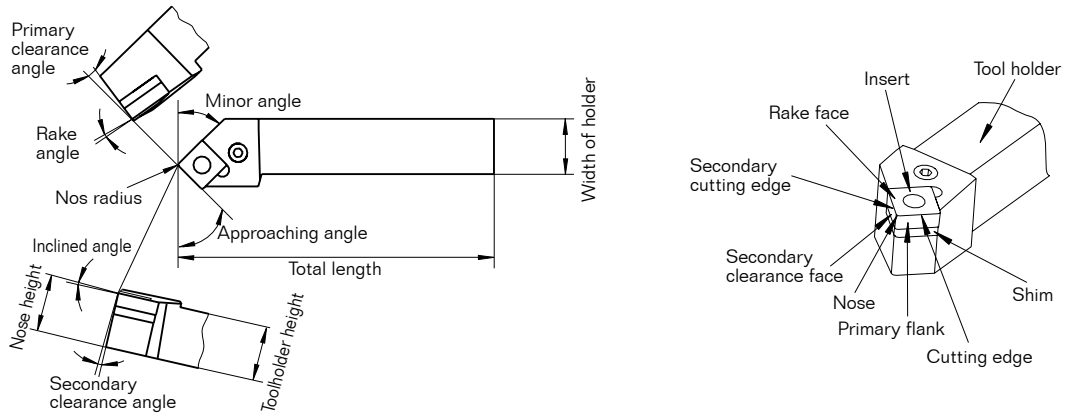
Recommend adopting flank in-feed or alternate flank in-feed under allowable range of machining equipment or programmer, it can eliminate the machining vibration effectively, and it has enough space discharge the chips between pitch. Cutting edge suffer a small stress, machining stable, it likes the general turning process when machining thread, good chip control without extra chips.

Common problems in threading and solutions

Problem	Cause	Solutions
Wear on clearance face	Cutting speed too high.	Reduce cutting speed.
	Low cutting depth, abrasion.	Reduce frequency of feed and friction of cutting edge.
	Inserts are over the center line.	Adopt correct center height.
Asymmetric wear on right and left cutting edge	The inclined angle of insert is different from the helical angle of thread.	Change to proper shim to get correct inclined angle.
	Flank in-feed is not correct.	Change the way of flank in-feed.
Breakage	Cutting speed too low.	Increase cutting speed.
	Cutting force too high.	Increase frequency of feed and reduce Max in-feed.
	Unstable clamping.	Check if workpiece vibrates. Reduce overhang of tool. Verify clamping of workpiece and tool.
	Chip twisting.	Increase the pressure of cooling liquid to blow away chips.
Plastic deformation	High cutting speed, high temperature on cutting area.	Reduce cutting speed. Increase feed frequency and reduce Max cutting depth.
	Insufficient cooling fluid.	Increase cooling fluid supply.
Low thread surface quality	Cutting speed too low. The insert is over the center line. Chips are not under control.	Increase cutting speed. Adjust centre height. Change the operation way of tools to well control chips.
Incorrect profile	Incorrect center height.	Adjust centre height.
	Pitch on machine is not correct.	Adjust machine.
Shallow profile	Cutting speed set wrong.	Adjust cutting depth.
Surface damage	Chips involved or contacted.	Change to flank in-feed to control chip flow direction.
Built-up edge	Temperature of cutting edge is too low. Usually occur when machining stainless steel and low carbon steel.	Increase cutting speed as well as pressure and concentration of cooling fluid. Choose inserts with good toughness.
Crack on surface	Cutting force too high	Reduce the cutting depth of each feed.
Vibration	Incorrect clamping of workpiece or tool	Verify clamping of workpiece and tool. Minimize overhang of tool.
	Incorrect cutting parameters	Increase cutting speed or reduce it substantially.
	Incorrect tool clamping	Adjust center height.

The functions of each part of turning tools

1 The names of each part of turning tools



2 Effects of rake angle

Larger rake angle makes cutting edge sharper, reduces resistant forces of chip flow, diminishes friction and prevent deformation, leading to smaller cutting forces and cutting power, lower cutting temperature, less abrasion and higher surface quality. However, too large rake angle would reduce the rigidity and strength of tool. Heat can't be diffused easily. Serious breakage and abrasion on tool would occur, reducing tool life. Please choose rake angle according to machining conditions.

Value selection	Situations
Small rake angle	●When machining brittle and hard materials ●When roughing and intermittent cutting
Big rake angle	●When machining plastic or soft materials ●When finishing

3 Effects of clearance angle

The main function of clearance angle is to reduce the friction between the clearance face of tool and the surface of workpiece. When the rake angle is fixed, larger clearance angle can increase the sharpness of cutting edge, reduce cutting forces and friction, and then achieve higher surface quality. However, if clearance angle is too large, the strength of cutting edge would decrease. Also, heat can't be diffused easily and serious abrasion would occur, reducing tool life.

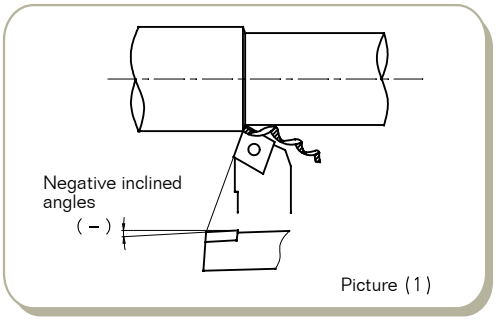
The principle of choosing clearance angle: Choose small clearance angle if friction is not serious.

Value Selection	Situations
Small clearance angle	●In order to increase nose strength when roughing ●When machining brittle and hard materials
Large clearance angle	●In order to reduce friction when finishing ●When machining materials easy to be hardened

4 Effects of inclined angle

Positive or negative inclined angle determines the direction of chip flow, and also affects the strength and impact resistance of insert nose.

◆As diagram (1) shows, when the inclined angle is negative, namely nose is in the lowest point as apposed to the bottom of tool, chips flow to the machined surface of workpiece.

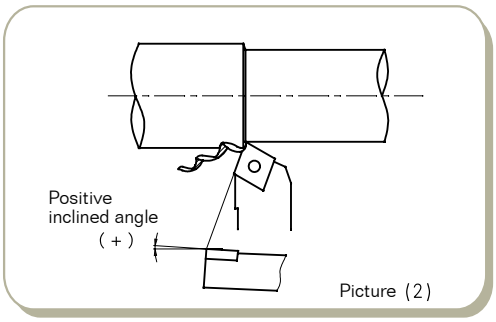


Picture (1)

General technical information for turning

◆ As diagram (2) shows, when inclined angle is positive, namely the nose is in the highest point as apposed to the bottom of the tool, chips flow to the areas of workpiece surface that haven't been machined.

◆ The change of inclined angle also affects insert nose strength and impact resistance. When the inclined angle is negative, the nose is in the lowest point of cutting edge. When the cutting edge enters the workpiece, the contacting point is on the cutting edge or rake face, protecting the nose from impact and increase the strength of the nose. Normally, negative inclined angle should be chosen for tools with big rake angle. This can not only increase nose strength, but also prevent the impact of entry.

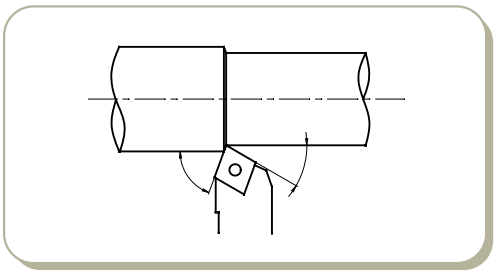


Picture (2)

5 Effects of approach angle

Reduced approaching angle increases the strength of tools and enable heat to diffuse easily, improving surface quality. This is because when the approach angle is small, cutting edge width is large, and then the unit width of cutting edge bears less cutting force. Meanwhile, tool life can be improved.

Normally, select 90°approach angle for turning of slender and step shaft; select 45° approach angle for external turning, end surface machining and chamfering. When approach angle is larger, radial force is reduced, cutting is stable, cutting thickness is increased, and chip breaking is excellent.



Value selection	Situations
Small approach angle	For those materials with high intensity, high hardness and hardened layer on the surface
Big approach angle	When rigidity of the machine is not enough

6 Effects of minor angle

Minor angle is the main angle that can affect surface quality, and it can also affect tool strength. If the approach angle is too small, the friction between the secondary flank and machined surface of workpiece will increase, causing vibration.

The principle of selecting minor angle: Select small minor angle when roughing or when the friction is unaffected and there is no vibration. Select large minor angle when finishing.

7 Nose radius

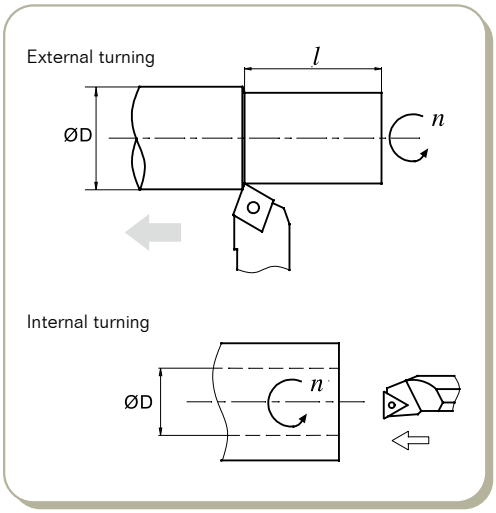
Nose radius significantly affects nose strength and surface quality.

Large nose radius means higher cutting edge strength, and the abrasion on the rake face and clearance face can be reduced to some extent. However, if the nose radius is too large, radial force will increase, and vibration is easy to occur, affecting machining precision and surface quality.

Value selection	Situations
Small nose radius	●Finishing at small cutting depth ●Machining parts such as slender shaft ●When the rigidity of the machine is not enough
Large nose radius	●When roughing ●When machining hard materials (intermittent cutting) ●When the rigidity of the machine is not enough

Calculation method of turning parameters

1 Calculation of cutting speed



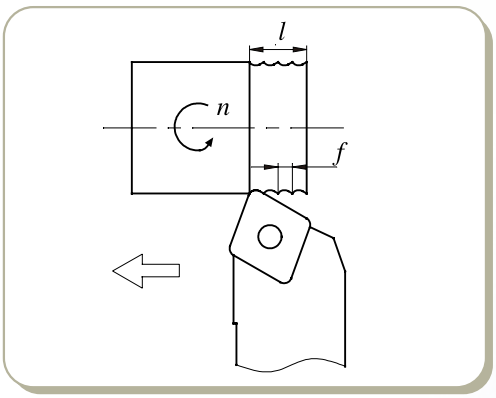
$$Vc=\frac{\pi\times D\times n}{1000}\ (m/min)$$

In the formula: Vc: Cutting speed (m/min)
n: Rotating speed of main axle (rev/min)
D: Diameter of workpiece (mm)

For example: When the rotating speed is 280rev/min and the diameter of workpiece is 150mm, the cutting speed should be:

$$Vc=\frac{\pi\times D\times n}{1000}\ (m/min)\ =132(m/min)$$

2 Calculation of feed rate



$$f=\frac{l}{n}\ (mm/rev)$$

In the formula: f: Feed rate per rotation (mm/rev)
l: Cutting length per minute (mm/min)
n: Rotating speed of main axle (rev/min)

For example: When the rotating speed of main axle is 500rev/min, and the cutting length per minute is 100mm/min, the feed rate per rotation should be:

$$f=\frac{l}{n}=\frac{100}{500}=0.2(mm/rev)$$



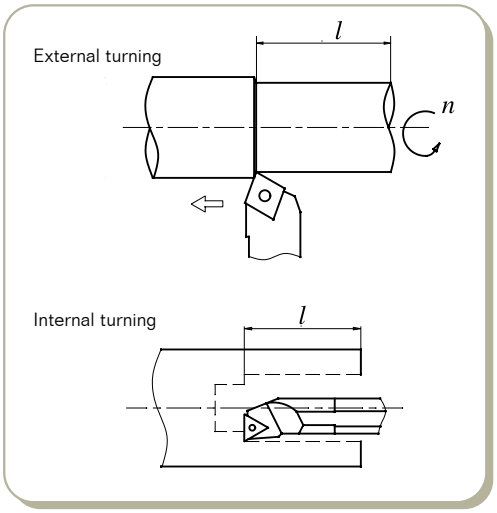
3 Cutting time calculation of external and internal turning

$$T=\frac{l}{f\times n}\ (min)$$

In the formula: T: Cutting time (min)
l: Length of machined areas (mm)
f: Feed rate (mm/rev)
n: Rotating speed of main axle (rev/min)

For example: When the rotating speed of main axle is 250rev/min, and the feed rate is 0.2mm/rev, the time needed for a cutting length of 150mm should be:

$$T=\frac{l}{f\times n}=\frac{150}{0.2\times 250}=3(min)$$

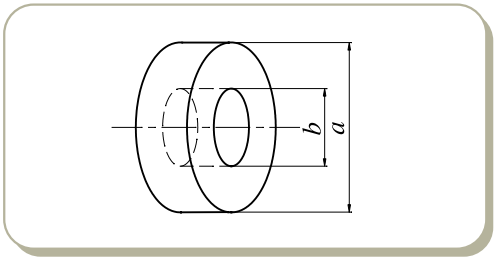


4 Time calculation for end surface turning (constant linear speed)

$$T=\frac{\pi\times(a^2-b^2)}{4000\times Vc\times f}\ (min)$$

In the formula: T: Cutting time (min)
Vc: Cutting speed (m/min)
f: Feed rate (mm/rev)

For end surface without hole, b=0, the formula is still valid.



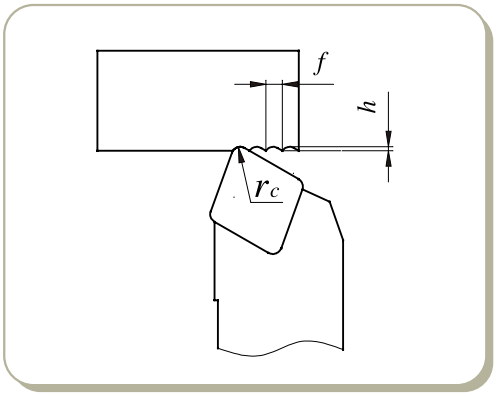
5 Theoretical value calculation of machined surface roughness

$$R=\frac{f^2}{8r_c}\times 1000\ (\mu m)$$

In the formula: R: Theoretical roughness value of machined surface
f: Feed rate (mm/rev)
rc: Nose radius (mm)

For example: When the feed rate is 0.2mm/rev, and the nose radius is 0.4mm, the theoretical roughness value of machined surface should be:

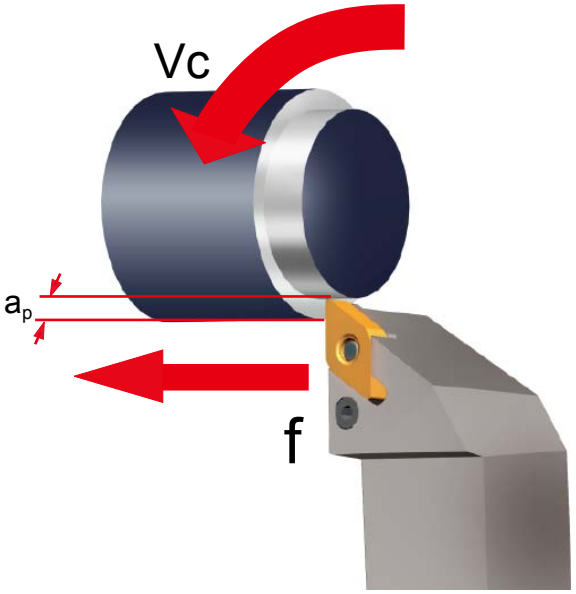
$$R=\frac{f^2}{8r_c}\times 1000=\frac{0.2^2}{8\times 0.4}\times 1000=12.5(\mu m)$$



Effect of three main turning parameters on machining

Effects of three main parameters

Normally, short machining time, long tool life and high machining precision are expected in machining, so the material quality, hardness, and shape of the workpiece, and properties of machine should be fully considered, and then we can select suitable tools and adopt high-efficiency cutting parameters, namely three parameters.



Cutting speed (Vc)

When the workpiece is rotating on the machine, the number of its rotation per minute is defined as Rotating speed of main axle (n). Because of its rotation, the cutting speed measured on the contacting point of diameter is defined as linear speed, m/min. Normally, linear speed is considered to measure the effect of cutting speed on machining.

Effect of cutting speed

Cutting speed has significant effect on tool life. When the cutting speed is increased, cutting temperature will increase and tool life will be shortened. Cutting speed varies according to the different types and hardness of workpiece. The below conclusions are reached after many cutting experiments:

(1) Normally tool life would be reduced to half when the cutting speed is increased by 20%. Tool life would be 20% of the original life if the cutting speed is raised by 50%.

(2) Low speed (20-40m/min) cutting could easily cause vibration and shorten tool life.

Feed rate (fn)

Feed rate is defined as the moving distance of tool after workpiece rotates for one circle, measured by mm/rotation.

Effect of feed rate

Feed rate is a key factor that determines surface quality. Meanwhile it also affect the range of chip forming and the thickness of chips during machining.

In term of the effect on tool life, small feed rate leads to serious abrasion on clearance face, greatly reducing tool life.

Cutting depth (ap)

Cutting depth is defined as the difference between machined surface and unmachined surface, measured by mm. It is half the difference value between the original diameter and machined diameter.

Effect of cutting depth

Cutting depth should be determined by the machining allowance and shape of workpiece, power and rigidity of machine, and tool rigidity.

The change of cutting depth has little effect on tool life. If the cutting depth is too low, the cutting nose only scrapes the hardened layer on the workpiece surface, reducing tool life. When there is hardened oxide layer on workpiece surface, higher cutting depth should be adopted within the possible range of machine's power to avoid cutting nose just cutting the hardened layer of workpiece.

Comparison table for turning insert chipbreaker

Negative inserts

ISO	Machining range	ZCC.CT	SANDVIK	KORLOY	TaeguTec	WALTER	SECO	MITSUBISHI	SUMITOMO	KENNAMETAL	DIJET	HITACHI	TUNGALOY	KYOCERA	VALANTTE
P	For extra finishing		QF	HU	FA, EA	NF3	FF1	PK※ FH, FY	FA, FL	UF, FF	F1, FA	FE	01※, TF, ZF	DP※, GP, VF XP, XP-T	F1
	For finishing	DF	PF MF	HF	FG, SF	NS6	MF2	C, SA, SH	SU, LU, SX	LF, FN	PF, UR UA, UT	BE, CE	NS, 27 TS, AS	HQ, CQ	F2(2B), F5(5C)
	For finishing (Soft steel)	SF		HF				SY					17	XQ, XS	
	For finishing (Wiper)	WGF	WP WF	HW		NF	W-MF2	SW	LUW	FW			AFW, ASW	WP, WQ	
	For semi-finishing	DM PM	PM QM SM	HA HC HM	MC MT MP	NM4 NM6	MF3 MR3 MF5	MV MA MH	GU UG UX	MG MN	PG UB	AB AY AE	NM ZM TM DM 37	CJ, GS PS, HS PT, CS	F3, F4(8A), M2(2C), M3 M4, M5(5B), M6, M7, 55, M8
	For semi-finishing	WGM	WM		WS, WT	NM	W-M3	MW	GUW	MW					
	(Wiper)	DR (Double-side)	PR		MT, MG	NM9	MR7	GH	MU, MX	RN	UD, GG	AR, RE	TH	GT, HT	
	For light roughing	LR, DR (Single-side) HDR, HPR	QR PR HR	HR HH	HT, RH	NR6	R4, R6 R7, PR9	HZ, HX HV	MP, HG HP	MR, RM RH	UC	HX HE	57, 65, TU	HX	R3, R4, R6(9A) R7(9B), R9(9C)

※ Periphery grinding type

Comparison table for turning insert chipbreaker

Negative inserts

ISO	Machining range	ZCC.CT	SANDVIK	KORLOY	TaeguTec	WALTER	SECO	MITSUBISHI	SUMITOMO	KENNAMETAL	DIJET	HITACHI	TUNGALOY	KYOCERA	VALANTTE
M	For finishing	EF	MF	HA	FG, SF	NF4		FS	SU	K, FP		SE	SS	GU	F1, F2(2B), F5(5C)
	For semi-finishing	EM	MM	HS	ML, MP	NM4		MS, ES	EX, UP	P, MP	SF, SG	DE	SA, SM, S	SU, HU, ST	F3, F4(8A), M2(2C), M3 M4, M5(5B), M6, M7, 55, M8
	For roughing	ER	MR	GS, HM	MT, RH	NR4	M5, MR7 56, R6	GH, HZ	MP	RP					R3, R4, R6(9A) R7(9B), R9(9C)
K	For finishing	PM	KF	Without chip-breaker	FG	MA		Through chip-breaker,	UZ	FN		Y	CM	Through chip-breaker, , C	F2(2B)
	For Semi-Finishing	PM	KM	Through chip-breaker, HM	MC, MT, MG	MA, NM5		Through chip-breaker,	UX	Through chip-breaker, , UN		V	33, through chip-breaker,	ZS, GC	M5(5B), M6, M8
	For roughing	Without chip-breaker	KR	GR, HR, GH	RT, RH	MA		Without chip-breaker	Without chip-breaker					Without chip-breaker	R3, R4, R7(9B)
S	For finishing	NF			SF	NF4	MF1※	FJ※		FS※, K※					F5(5C), M2(2C)
	For semi-finishing	NM	NGP※, 23			NM4	M1	MJ※	SU※	NGP※			SA		M4, M5(5B), M7, 55
	For roughing		SR			NR4		GJ		MS					

※ Periphery grinding type

Comparison table for turning insert chipbreaker

Positive inserts

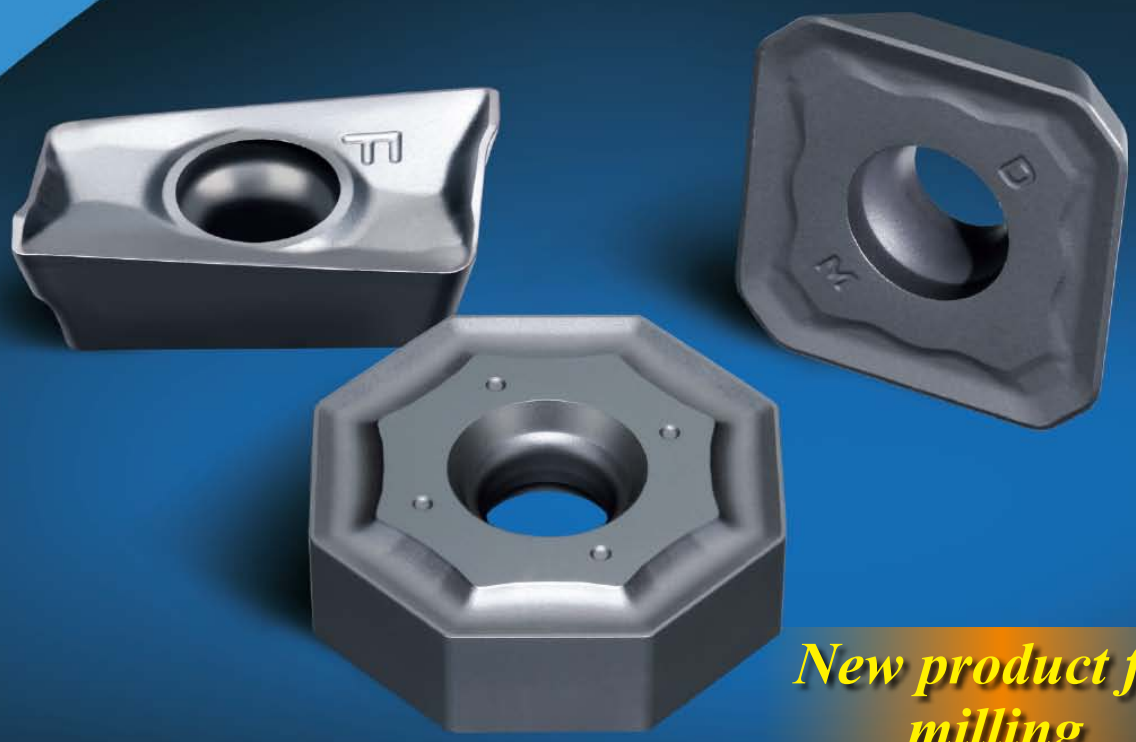
ISO	Machining range	ZCC.CT	SANDVIK	KORLOY	TaeguTec	WALTER	SECO	MITSUBISHI	SUMITOMO	KENNAMETAL	DIJET	HITACHI	TUNGALOY	KYOCERA	VALANTTE
P	For finishing	USF, SF, HF	UF, PF	HFP	FA, FG	PF4	FF1 F1	FV, SV	FP, LU SU, SK	11, UF LF		JQ	01※, PF FS	GP, XP VF	PF4 JQ, JZ
	For finishing (Wiper)		WK※, W WP			PF	W-F1	SW	LUW	FW					
	For semi-finishing	HM	UM PM	HMP C25	MT, CMX	PS5 PM5	F2	MV, through chip-breaker	MU	MF	FT	JE	PM 23, 24	HQ, XQ GK	PM2 PM4
	For semi-finishing (Wiper)		WM			PM		MW		MW					
M	For finishing	EF	MF	HFP	FA, FG	PF4		SV					SS※		1A, 2A
	For semi-finishing	EM	MM	HMP C25	MT CMX	PS5 PM5		Through chip-breaker, MV							PM2 PM4
K	For semi-finishing	HM, HR without chip-breaker	KF KM KR	HMP C25	MT CMX	MW PS5 PM5		Without chip-breaker	Without chip-breaker※		FT		Without chip-breaker	Without chip-breaker※	PM2 PM4
S	For finishing/ For semi-finishing					PF4 PS5 PM5		FJ※	SC※	LF※ HP※					PM2, 1A 2A
N	For general turning	LC, LH	AL	TAAK MA	FL	PM2			AG	HP	ALU ACB		PP	A3	1L, 1A 2A

※ Periphery grinding type

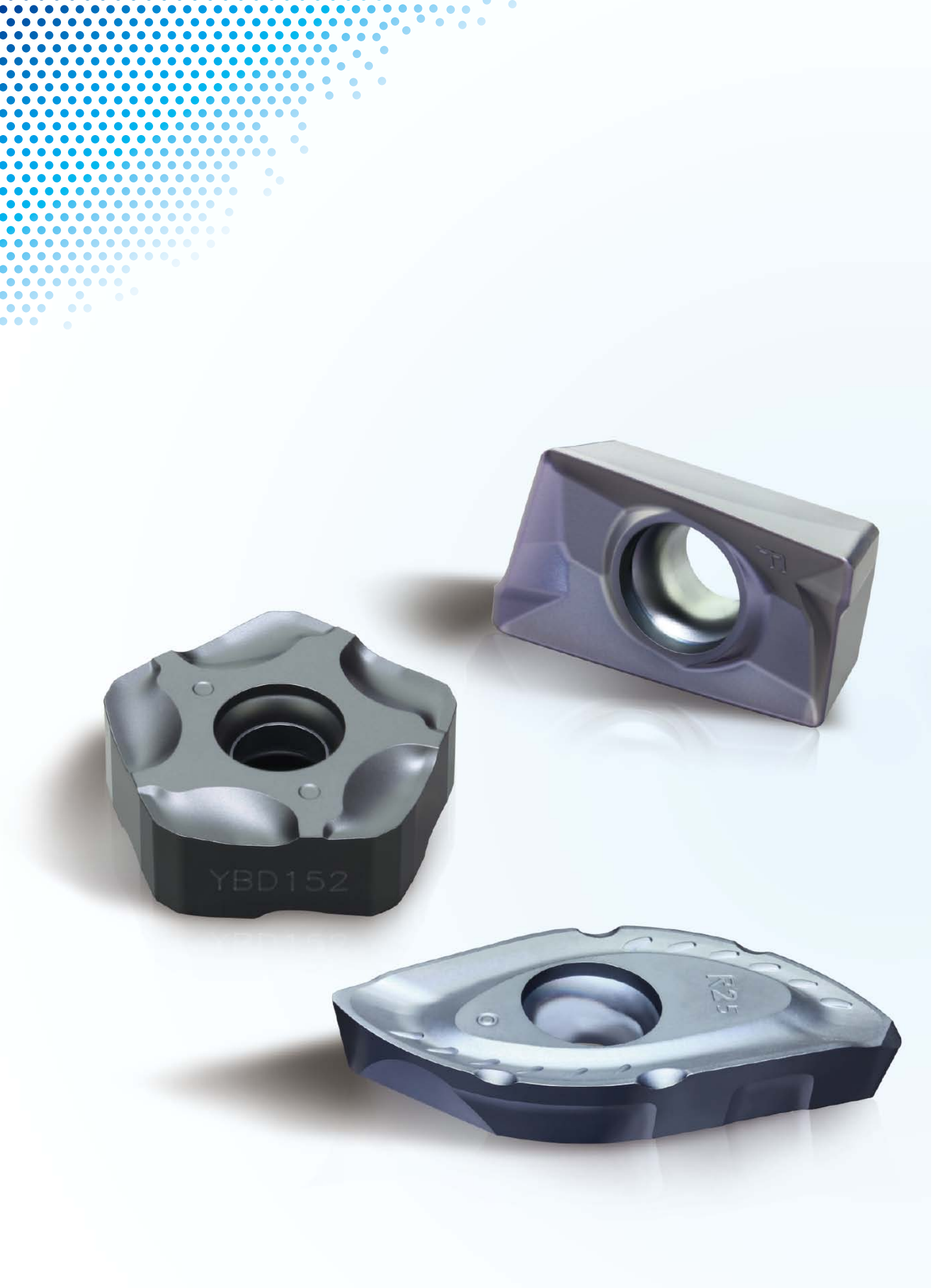


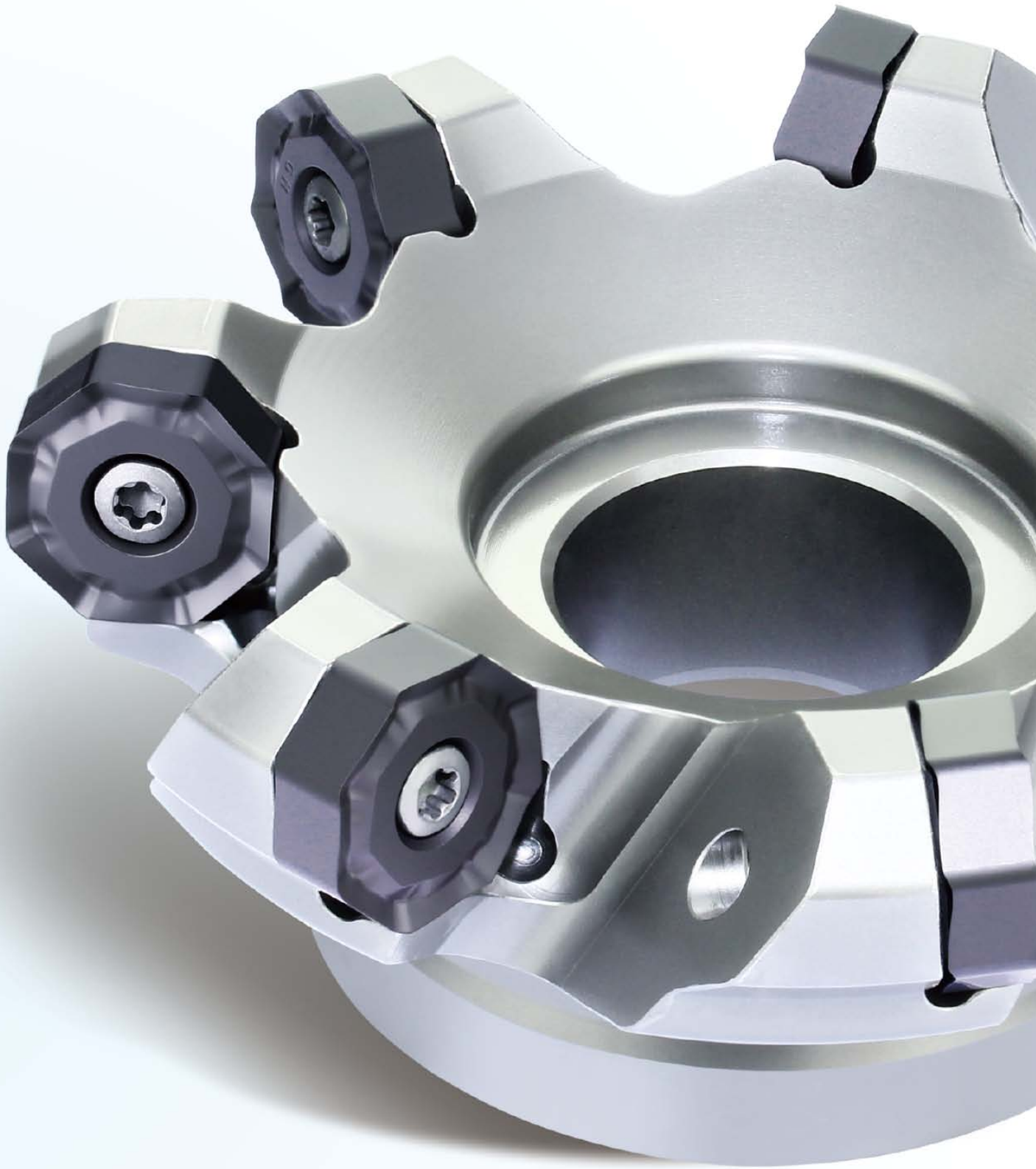
New Champion in Milling YBC302

Black Diamond Series grade



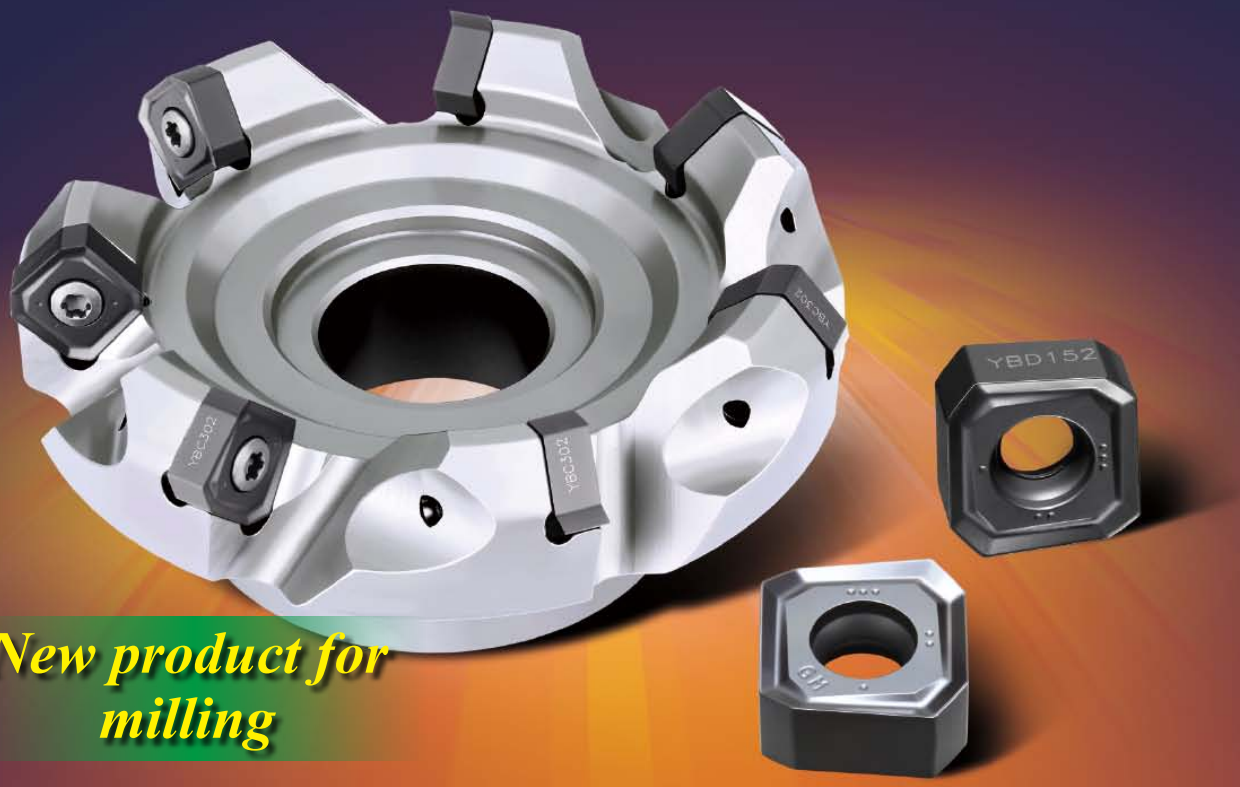
New product for milling


YBD152
R25



Milling Tools

Indexable milling tools



New product for milling

FMA11 *Face milling cutter series*

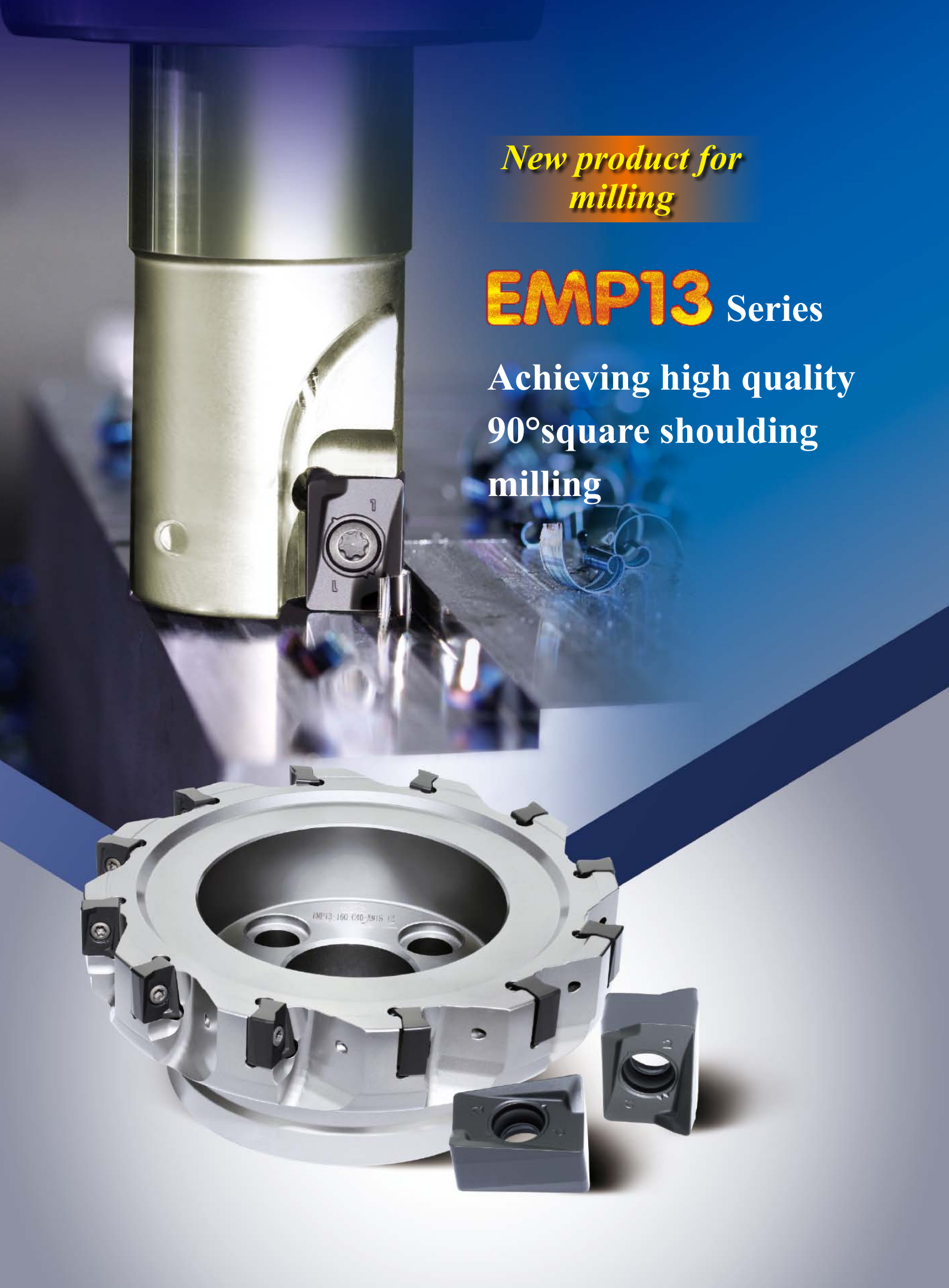


FMA12

High Performance Face Mill with 16 edges for outstanding economy



New product for milling


New product for milling
EMP13 Series
Achieving high quality 90°square shoulding milling



Milling

B

Indexable Milling Tools • B1-B198

Indexable milling tools B2-B163

Indexable milling inserts B164-B191

Technical information B192-B198

Solid Carbide End Mills • B199-B434

Solid carbide end mills B199-B430

Technical information • B431-B434









WHIRLWIND FMD02

milling cutter series



How to choose the right indexable milling tools

■ Classification of milling tools

According to types of machining operation

Applicable machining operations
For face milling, chamfering, shoulder milling etc.

product series

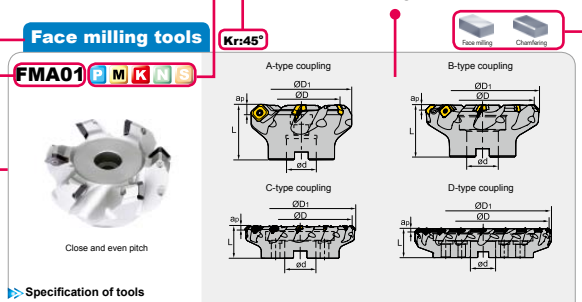
Type of machining

Workpiece materials

Approach angle

Structure and coupling size

Inserts specification
Insert shape, type, dimensions, grade, stock, etc.



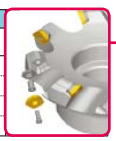
Specification of tools

Type		Stock R	Stock L	Basic dimensions(mm) ØD	ØD1	ød	L	apmax	Number of teeth Z	Type of coupling	Weight (kg)
FMA01	-050-A22-SE12-04	▲	△	50	61	22	40	6	4	A	0.3
	-063-A22-SE12-05	▲	△	63	74	22	40	6	5	A	0.5
	-080-A27-SE12-06	▲	△	80	91	27	50	6	6	A	1.2
	-100-B32-SE12-07	▲	△	100	107	32	50	6	7	B	1.2
	-125-B40-SE12-08	▲	△	125	136	40	63	6	8	B	2.6
	-160-B40-SE12-10	▲	△	160	170	40	63	6	10	B	4.3
	-200-C60-SE12-12	▲	△	200	210	60	63	6	12	C	7.6
	-250-C60-SE12-14	▲	△	250	260	60	63	6	14	C	13.5
	-315-D60-SE12-18	△	△	315	325	60	70	6	18	D	20.8

▲Stock available △Make-to-order

Spare parts

Diameter ØD	Insert screw	Shim	Shim screw	Wrench	Wrench
Ø50 -Ø100	I60M3.5×10	--	--	WT15IS	--
Ø125-Ø315	I60M3.5×12	S13BS	SM5×7XA		WH5L



Tools code key B22–B23 | Grade selection guide B18–B21 | Technical data B192–B198

Spare parts

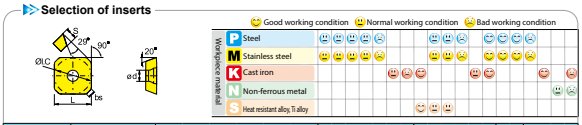
Assembly of tools and spare parts

Tools code key, reference to grade selection, technical data

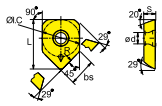
Tools specification
Tool shape, dimensions, stock, etc

Tool shape

Selection of inserts



Insert shape	Type	L	ØI.C	S	ød	bs	R	CVD Coating YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	PVD Coating YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	Cermet YNG151	YNG151C	Cemented carbide YC30S	YD051	YD101	YD201
	SEET12T3-DF	13.4	13.4	3.97	4.1	2.55		●	★	●						★		○								
	SEET12T3-CF	13.4	13.4	3.97	4.1	2.55							○		★	○		○								
	SEET12T3-EF	13.4	13.4	3.97	4.1	2.55										○		○								
	SEET12T3-DM	13.4	13.4	3.97	4.1	2.55		●	★	●		○				★		★								
	SEET12T3-CM	13.4	13.4	3.97	4.1	2.55							★			★		○								
	SEET12T3-EM	13.4	13.4	3.97	4.1	2.55				●		●				○		★								
	SEET12T3-DR	13.4	13.4	3.97	4.1	2.55		●	★			●				★		★								
	SEET12T3-CR	13.4	13.4	3.97	4.1	2.55		●					★					★								
	SEET12T3-LH	13.4	13.4	3.97	4.1	2.55																		○	★	
	SEET12T3-W	17.82	13.4	3.97	4.1	9.46	500	★	●				★		★						★					



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

Chipbreaker selection for FMA01 milling inserts

Classification \ Function	For finishing	For semi-finishing	For roughing
P	-DF	-DM	-DR
M, S	-EF	-EM	
K	-CF	-CM	-CR
N	-LH		

Chipbreaker selection

How to choose indexable milling inserts

■ Detailed information for indexable milling inserts

Listed according to insert shape

Select insert grade according to workpiece material and working condition. Prior to selecting grade, please refer to the working condition suitable for the workpiece material.

😊 Good working condition: machine works well and stably. There are high requirements for dimensional precision of components and quality surface.

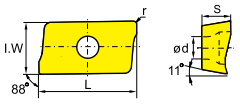
😐 Normal working condition: machine works normally. There are certain requirements for dimensional precision of components and surface quality.

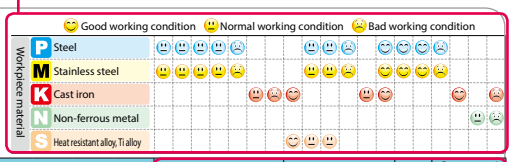
☹ Bad working condition: machine works with bad stability. There are high requirements for high metal removal rate.

Insert shape and size

Insert shape

APKT





Insert grade

Insert shape	Type	Basic dimensions(mm)					CVD Coating					PVD Coating					Cermet		Cemented carbide		
		L	I.W	S	ød	r	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	APKT11T304-PF	12.24	6.5	3.6	2.8	0.4	●	★	○		○			○	○		○								
	APKT11T308-PF	12.24	6.5	3.6	2.8	0.8		★	○					○	○										
	APKT11T312-PF	12.24	6.5	3.6	2.8	1.2		★							○										
	APKT11T316-PF	12.24	6.5	3.6	2.8	1.6		★							○										
	APKT160408-PF	17.877	9.33	5.76	4.4	0.8	●	★	○		○				○		○								
	APKT11T304-PM	12.24	6.5	3.6	2.8	0.4	●	★	●		●			★	★		★								
	APKT11T308-PM	12.24	6.5	3.6	2.8	0.8	●	★	●		○		★	★	★		★								
	APKT11T312-PM	12.24	6.5	3.6	2.8	1.2		★	○					○	★		○								
	APKT11T316-PM	12.24	6.5	3.6	2.8	1.6		★	○					○	★		○								
	APKT160408-PM	17.877	9.33	5.76	4.4	0.8	●	★	●		●		○	★	★		★								
	APKT11T304-PR	12.24	6.5	3.6	2.8	0.4	●	★	●		●			○	○		○								
	APKT11T308-PR	12.24	6.5	3.6	2.8	0.8		★									○								
	APKT11T312-PR	12.24	6.5	3.6	2.8	1.2		★									○								
	APKT11T316-PR	12.24	6.5	3.6	2.8	1.6		★									○								
	APKT160408-PR	17.877	9.33	5.76	4.4	0.8		★									○								
	APKT11T304-LH	12.24	6.5	3.6	2.8	0.4																	★	★	
	APKT11T308-LH	12.24	6.5	3.6	2.8	0.8																	★	○	
	APKT160408-LH	17.877	9.33	5.76	4.4	0.8																	★	★	

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

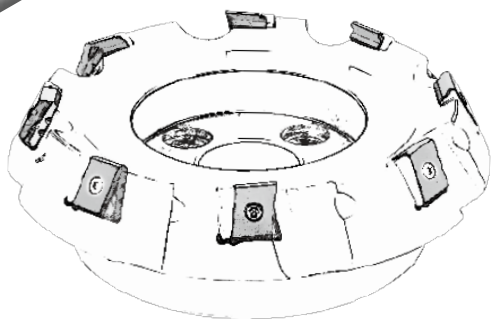
Insert shape

Stock condition

Insert dimension

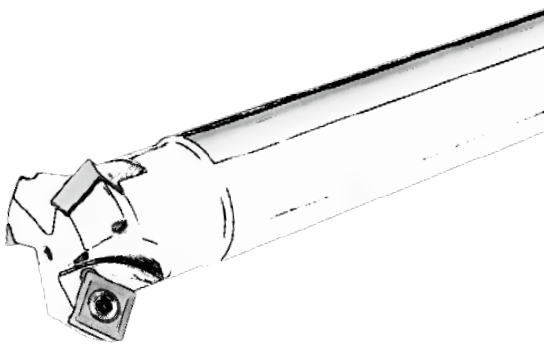
Insert type

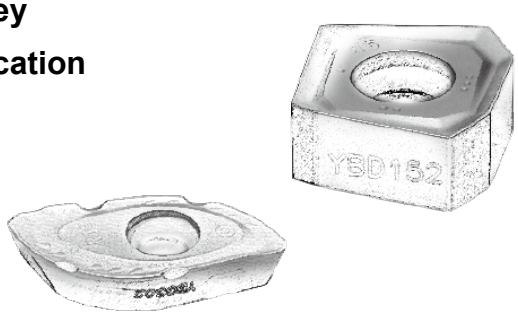
MILLING



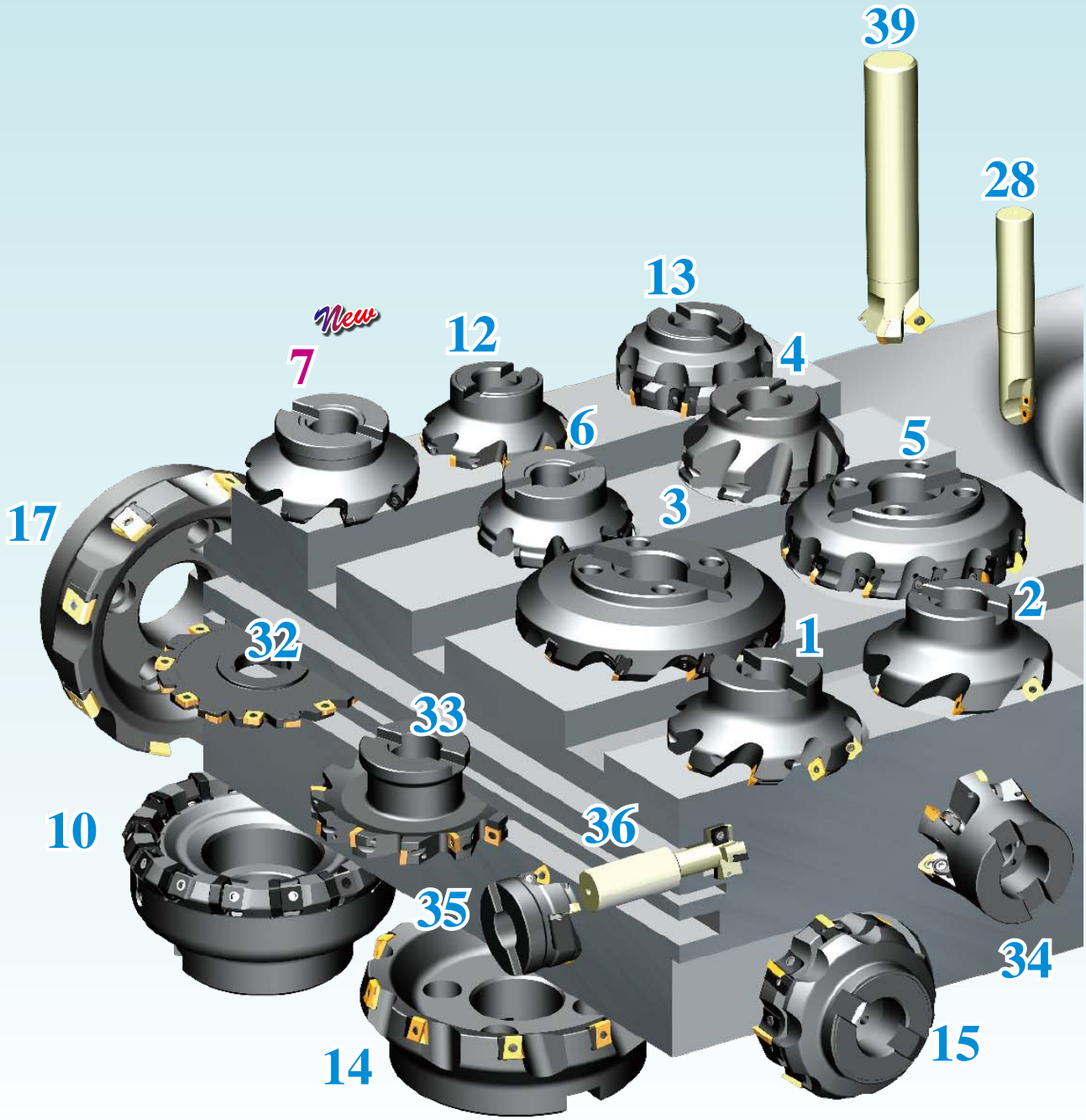
Indexable Milling Tools

B6-B7	**Indexable milling tools family**
B9-B14	**Indexable milling tools overview**
B17	**Milling insert grades overview**
B18-B21	**Grade classification for milling inserts**
B22-B23	**Indexable milling tools code key**
B24-B163	**Indexable milling tool series**
B24-B87	Face milling tool series
B88-B110	Square shoulder milling tool series
B111-B132	Profile milling tool series
B133-B139	Side and face milling series
B140-B148	Special milling tool series (high feed rate)
B149-B151	Boring millers
B152-B153	T-slot milling tool series
B154-B158	Helical end mill series
B159-B163	Chamfer milling tool series
B164-B165	**Indexable milling inserts overview**
B166-B167	**Indexable milling inserts code key**
B168-B191	**Indexable milling inserts specification**
B192-B198	**Technical information**





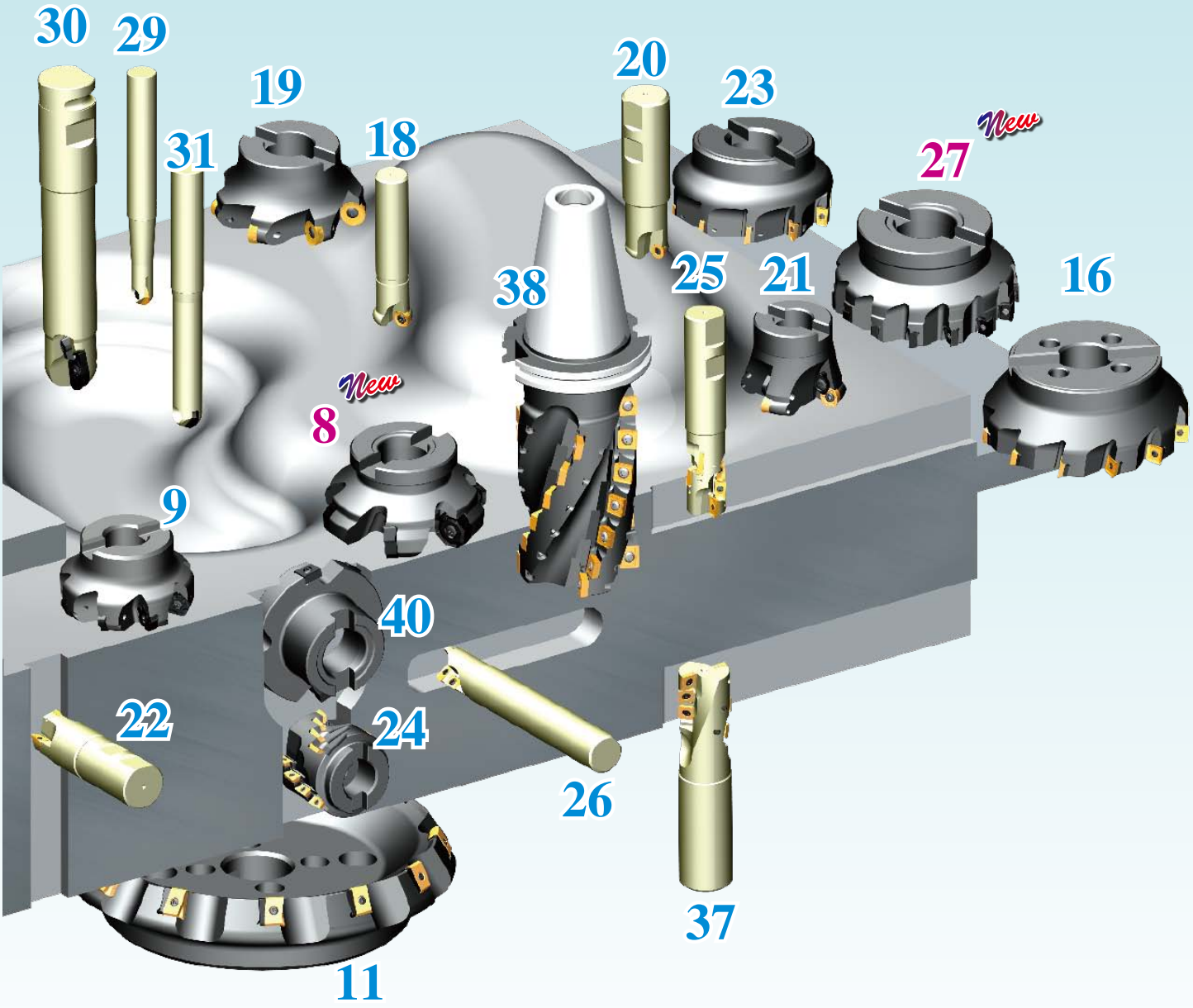
Indexable milling tools family



Number	Tool category	Page
1	FMA01	B24
2	FMA02	B25
3	FMA03	B29
4	FMA04(OFKT05□□)	B32
5	FMA04(OFKR07□□)	B36
6	FMA07	B40
7	FMA11	B44

Number	Tool category	Page
8	FMA12	B47
9	FMD02(PN11)	B50
10	FMD02(HN09)	B54
11	FMD03	B56
12	FME02	B59
13	FME03	B61
14	FME04	B65

Number	Tool category	Page
15	FMP01	B67
16	FMP02	B69
17	FMP03	B75
18	FMR01	B77
19	FMR02	B80
20	FMR03	B83
21	FMR04	B85



Number	Tool category	Page
22	EMP01	B88
23	EMP02	B95
24	EMP03	B98
25	EMP04	B99
26	EMP05	B103
27	EMP13	B106
28	BMR01	B111

Number	Tool category	Page
29	BMR02	B113
30	BMR03	B115
31	BMR04	B127
32	SMP01	B135
33	SMP03	B137
34	XMR01(SDMT□□)	B141
35	XMR01(WPGT□□)	B144

Number	Tool category	Page
36	TMP01	B152
37	HMP01(Ø40-Ø50)	B154
38	HMP01(Ø50-Ø80)	B155
	HMP01 EC(Ø50-Ø80)	B156
39	CM□01	B159
40	XMP01	B150



FMD03 FME04 FMP03

Heavy mill cutter series





Indexable milling tools overview

Operating pattern	Series/Shape	Approach angle / Max. cutting depth.	Applicable insert	Application overview	Features
Face milling	**FMA01**  B24	Kr=45° a_{pmax}=6.0	SEET12T3-DF/DM/DR SEET12T3-CF/CM/CR SEET12T3-EF/EM SEET12T3-LH/W	General face milling of the following materials: steel, alloy steel, stainless steel, cast iron, aluminum alloy, high-temperature alloy	• Diameter range Ø50-Ø315. • Large rake angle makes cutting easier and faster. • Wide applications can be achieved by using available inserts with different chipbreakers. • Adopting inserts with wiper can improve surface quality.
	FMA02  B25	Kr=45° a_{pmax} =6.0	SEET12T3-DF/DM/DR SEET12T3-CF/CM/CR SEET12T3-EF/EM SEET12T3-LH/W	General face milling of the following materials: steel, alloy steel, stainless steel, cast iron, aluminum alloy, high-temperature alloy	• Diameter range Ø50-Ø125. • Large rake angle makes cutting easier and faster. • Wide applications can be achieved by using available inserts with different chipbreakers. • Coarse and differential pitch, reducing vibration.
	FMA03  B29	Kr=45° a_{pmax}=5.5	SE□N1203AF□□ SE□R1203AF□□	General face milling of steel, stainless steel, cast iron	• Diameter range Ø80-Ø315. • large rake angle makes cutting easier and faster. • Top clamping achieves better vibration resistance.
		Kr=45° a_{pmax}=7.5	SE□N1504AF□□ SE□R1504AF□□		
	FMA04  B32	Kr=45° a_{pmax}=3.5	OFKT05T3-DF/DM OFKT05T3-LH	Face milling of steel, alloy steel, cast iron, aluminum alloy	• Diameter range Ø50-Ø160. • High-economy milling tool with 8 cutting edges. • Screw clamping, high precision.
	 B36	Kr=45° a_{pmax} =5.0	OFKR0704-DF/DM	Face milling of steel, alloy steel and cast iron	• Diameter range Ø125-Ø315. • High-economy milling tool with 8 cutting edges. • Top clamping makes it easy to assemble and disassemble.
	FMA07  B41	Kr=45° a_{pmax}=4.0	ONHU060408-PF/PM/W	General face milling of steel and cast iron	• Diameter range Ø25-Ø50. • High-economy milling tool with 16 cutting edges.
	 B40	Kr=45° a_{pmax}=5.0	ONHU08T508-PF/PM/W	General face milling of steel and cast iron	• Diameter range Ø50-Ø315. • High-economy milling tool with 16 cutting edges.
	FMA11 New  B44	Kr=45° a_{pmax}=5.5	SNEG1205ANR-GM	General face milling of steel and cast iron	• Diameter range Ø63- Ø315. • Double-sided chipbreaker milling insert has eight cutting edges and high economy. • Large rake angle design and unique chip breaker structure of insert lead to low power consumption. • Double negative rake angle structure and super thick insert has higher safety and outstanding toughness, which can realize great depth cutting. • Insert has excellent machining performance with wiper edge.
		Kr=45° a_{pmax}=7.0	SNEG1506ANR-GM/GR		
		Kr=45° a_{pmax}=9.0	SNEG1907ANR-GR		
	FMA12 New  B47	Kr=45° a_{pmax}=5.0	ONHU08T624R-GM ONHU08T508-PF/PM	General face milling of steel and cast iron	• Diameter rangeØ80-Ø315. • High Performance Face Mill with 16 edges for outstanding economy. •Double negative rake angle, in combination with helical insert structure, achieves double positive axial angle, which will help reduce cutting resistance and improve chip evacuation. • Unique 3-dimentional edge.

Indexable milling tools overview

Operating pattern	Series/Shape	Approach angle / Max. cutting depth.	Applicable insert	Application overview	Features
Face milling	**FMD02**  B50-51	Kr=67° a_{pmax}=5.0	PNEG110512R/L-CF/ CM/CR PNEG110512R/L-PF/ PM/PR	General face milling of steel and cast iron	• Diameter range Ø50-Ø315. • High-economy milling tool with 10 cutting edges.
	 B54	Kr=55° a_{pmax}=6.0	HNEX090512-DF/DM HNEX090512-DR	Face milling of cast iron	• Diameter range Ø80-Ø315. • High-economy milling tool with 12 cutting edges. • Top clamping makes it easy to assemble and disassemble.
	FMD03  B56	Kr=60° a_{pmax}=12.0	LNKT2007DN-ZR	Heavy-duty face milling of steel and alloy steel	• Diameter range Ø125-Ø400. • Double positive rake angles can reduce cutting forces. • Inserts are mounted upright, suitable for heavy machining with high cutting depth. • Easy to assemble and clamp inserts.
		Kr=60° a_{pmax}=17.0	LNKT2510-ZR		
	FME02  B59	Kr=75° a_{pmax}=6.0	SPKW1204EDFR SPKW1204EDSR SPKT1204EDR	Face milling of steel, alloy steel and cast iron	• Diameter range Ø50-Ø125. • Kr 75°, general face milling. • Wide applications can be achieved by using inserts with different chipbreakers.
	FME03  B61	Kr=75° a_{pmax}=6.0	SP□N1203(1504)ED□□ SP□R1203(1504)ED□□	Face milling of steel, alloy steel and cast iron	• Diameter range Ø80-Ø315. • Kr 75°, general face milling. • Top clamping makes it easy to assemble and disassemble.
		Kr=75° a_{pmax}=8.0	SP□N1504ED□□ SP□R1504ED□□		
	FME04  B65	Kr=75° a_{pmax}=8.0	LNKT1506EN-ZR	Heavy-duty face milling of steel and alloy steel	• Diameter range Ø125-Ø315. • Double positive rake angles can reduce the cutting force. • Inserts are mounted upright, suitable for heavy machining at high cutting depth. • Easy to assemble and clamp inserts.
	FMP01  B67	Kr=90° a_{pmax}=18.0	TP□N2204PD□ TPKN2204PDF□ TPKN2204PDT□	Face milling of steel, alloy steel and cast iron	• Diameter range Ø80-Ø315. • Kr 90° , for square shoulder milling. • Top clamping makes it easy to assemble and disassemble.
	FMP02  B69	Kr=90° a_{pmax}=6.7	SEET09T308PER-PF/PM SEET09T308PER-PR	Face milling of steel, alloy steel, stainless steel and cast iron	• Diameter range Ø50-Ø315. • Kr 90°, for square shoulder milling. • Different pitches: coarse pitch, close pitch and extra close pitch. • High precision insert, high work-piece surface quality. • Optimized chipbreaker and grade, suitable for finishing, semi-finishing and roughing.
		Kr=90° a_{pmax}=10.8	SEET120308PER-PF/PM SEET120308PER-PR		
	FMP03  B75	Kr=90° a_{pmax}=8.0	LNKT1506EN-ZR	Heavy-duty face milling of steel and alloy steel	• Diameter range Ø125-Ø315. • Double positive rake angles can reduce the cutting force. • Inserts are mounted upright, suitable for heavy machining at high cutting depth. • Easy to assemble and clamp inserts.
		Kr=90° a_{pmax}=12.0	LNKT2007DN-ZR		
		Kr=90° a_{pmax}=15.0	LNKT2510-ZR		

Indexable milling tools overview

Operating pattern	Series/Shape	Approach angle / Max. cutting depth.	Applicable insert	Application overview	Features
Face milling	**FMR01**  B77	a_{pmax}=5.0	RCKT10T3MO-DM	Cavity profile milling of steel, alloy steel, stainless steel and cast iron	• Diameter range Ø25-Ø50. • R-type inserts have extra-strong cutting edges. • Suitable for machining of curved surface of die. • Economical milling tools with screw clamping.
		a_{pmax}=6.0	RCKT1204MO-DM/DR/ER		
	FMR02  B80	a_{pmax}=6.0	RCKT1204MO-DM/DR /ER/PCBN	Face milling and cavity profile milling of steel, alloy steel, stainless steel and cast iron	• Diameter range Ø50-Ø160. • R-type inserts have extra-strong cutting edges. • Suitable for machining of curved surface of die. • Economical milling tools with screw clamping.
		a_{pmax}=8.0	RCKT1606MO-DM/DR/ER		
		a_{pmax}=10.0	RCKT2006MO-DR/ER		
	FMR03  B83	a_{pmax}=4.0	RDKW0803MO	Cavity profile milling of steel, alloy steel, stainless steel and cast iron	• Diameter range Ø16-Ø50. • R-type inserts have extra-strong cutting edges. • Suitable for machining of curved surface of die. • Economical milling tools with screw clamping.
		a_{pmax}=5.0	RDKW10T3MO		
		a_{pmax}=6.0	RDKW1204MO		
	FMR04  B85	a_{pmax}=6.0	RDKW1204MO	Face milling and cavity profile milling of steel, alloy steel, stainless steel and cast iron	• Diameter range Ø50-Ø160. • R-type inserts have extra-strong cutting edges. • Suitable for machining of curved surface of die.
		a_{pmax}=8.0	RDKW1605MO		
		a_{pmax}=10.0	RDKW2006MO		
Square shoulder milling	**EMP01**  B88	Kr=90° a_{pmax}=10.5	APKT11T3□□-PF/PM/ PR APKT11T3□□-LH	Multi-function milling of steel, alloy steel, stainless steel, cast iron and aluminum alloy	• Two mounting styles: Straight shank and Weldon shank, diameter range Ø12-Ø63. • Kr 90° , for square shoulder milling, slot milling, ramp milling, etc. • Inserts with wiper, also suitable for face milling. • Inserts with 3D helical cutting edge, less cutting force.
		Kr=90° a_{pmax}=15.5	APKT160408- PF/PM/PR APKT160408-LH		
	EMP02  B95	Kr=90° a_{pmax}=11.5	APKT11T3□□- PF/PM/ PR APKT11T3□□-LH	Face milling of steel, alloy steel, stainless steel, cast iron and aluminum alloy	• Diameter range Ø50-Ø160. • Kr 90° , for square shoulder milling, slot milling, ramp milling, etc. • Inserts with wiper, also suitable for face milling. • Inserts with 3D helical cutting edge, less cutting force.
		Kr=90° a_{pmax}=15.5	APKT160408- PF/PM/PR APKT160408-LH		
	EMP03  B98	Kr=90° a_{pmax}=39.0	APKT11T3□□-PF/PM/ PR APKT11T3□□-LH	Milling of steel, alloy steel, stainless steel, cast iron and aluminum alloy at high cutting depth	• Diameter range Ø50-Ø100. • End mills with positive helical angle, good chip removal. • For side face milling and slot machining. • Close pitch, high machining efficiency.
	EMP04  B99	Kr=90° a_{pmax}=58.0	APKT11T3□□-PF/PM/ PR APKT11T3□□-LH	Multi-function drilling and milling of steel alloy steel, stainless steel and cast iron	• Diameter range Ø20-Ø40. • End mills with positive helical angle, good chip removal. • For side face milling and slot machining. • Close pitch, high machining efficiency.

Indexable milling tools overview

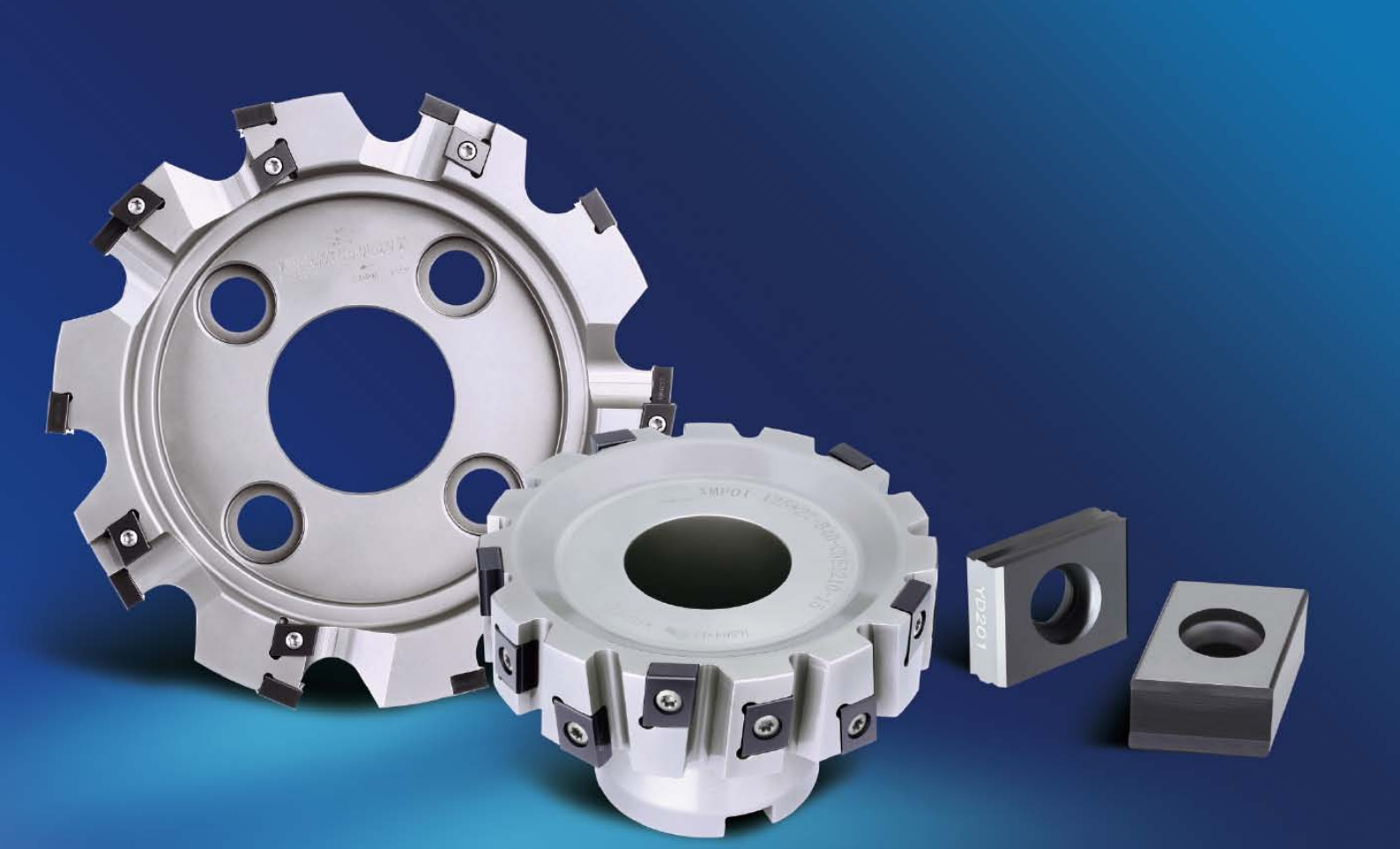
Operating pattern	Series/Shape	Approach angle / Max. cutting depth.	Applicable insert	Application overview	Features
Square shoulder milling	**EMP05**  B103	Kr=90° a_{pmax}=40.0	APMT1135PDR APMT160408PDER	Face milling of steel, alloy steel, stainless steel, cast iron and Al alloy	• Diameter range Ø25-Ø40. • End edge over center, for drilling directly.
	EMP13 New  B106	Kr=90° a_{pmax}=11.2	ANGX1105□□PNR-GM	Multi-functional milling of steel, alloy steel, stainless steel and cast iron	• Diameter range Ø25-Ø160. • Designed with extra thick insert in combination with double negative tool body, achieving double positive cutting angle, reducing cutting force, as well as greatly improving impact resistance. • Properly designed cutting edge with high precision control can achieve high quality 90°square shoulder milling.
	 B107	Kr=90° a_{pmax}=14.5	ANGX1506□□PNR-GM		
	 B108	Kr=90° a_{pmax}=64	ANGX1105□□PNR-GM ANGX1506□□PNR-GM		
	 B109	Kr=90° a_{pmax}=53			
Profile milling	**BMR01**  B111	Cutting depth: see the detailed information about tool specifications	ZDET□□CYR□□ ZPNT2204CYR□□ SPMT060304 SDMT□□	Profile machining of steel, stainless steel and cast iron	• Diameter range Ø20-Ø63. • Very suitable for rough machining large mold. • Ball nose cutter with 3-cutting-edge inserts, perfect economical efficiency.
	BMR02  B113		ROHX□□	Profile machining of steel, stainless steel and cast iron	• Diameter range Ø12-Ø20. • For profile finish machining. • Stable assembly. • Insert with two cutting edges, perfect economical efficiency.
	BMR03  B115		XPHT□□R□□- GM	Profile machining of steel, stainless steel and cast iron	• Diameter range Ø16-Ø50. • For profile finish machining. • Stable assembly. • Insert with two cutting edges, perfect economical efficiency.
	 B116				
	 B117				
	 B118				

Indexable milling tools overview

Operating pattern	Series/Shape	Approach angle / Max. cutting depth.	Applicable insert	Application overview	Features
Profile milling	**BMR04**  B127  B128	Cutting depth: see the detailed information about tool specifications	ZOHX□□	Profile machining of steel, stainless steel and cast iron	• Diameter range Ø12-Ø32. • High precision, for finish profile machining • Two types of chipbreaker, used in different machining conditions. • High assembling precision, good stability.
Side and face milling	**SMP01**  B134  B135	Cutting depth: see the detailed information about tool specifications	XSEQ12□□	Slot milling of steel, stainless steel and cast iron	• Diameter range Ø63-Ø250. • Two mounting styles: mounting by keyway and arbor mounting. • Groove width range : 8, 10, 12, 16, 18, 20mm.
	SMP03  B137  B138		MPHT□□	Slot milling of steel, stainless steel and cast iron	• Diameter range Ø80-Ø200. • Two mounting styles: mounting by keyway and arbor mounting. • Groove width range : 8, 10, 12, 16, 18, 20mm.
Special milling (high feed)	**XMR01**  B140  B141	Cutting depth: see the detailed information about tool specifications	SDMT□□-DM/PM	Slot milling of steel, stainless steel and cast iron	• Diameter range Ø20-Ø160. • Two mounting types: straight shank and arbor mounting. • Cutting forces are resolved effectively, achieving cutting with high feed rate. • For plunge milling. • Double clamping, firm and reliable.
	 B143  B144		WPGT□□ZSR WPGT□□ZSR-PM	Face and cavity profile milling of steel, stainless steel and cast iron in cavity applications	• Diameter range Ø20-Ø160. • Two mounting types: straight shank and arbor mounting. • Cutting forces are resolved effectively, achieving cutting with high feed rate. • Double clamping, firm and reliable.

Indexable milling tools overview

Operating pattern	Series/Shape	Approach angle / Max. cutting depth.	Applicable insert	Application overview	Features
Boring millers	**XMP01**  B150	Kr=90° ap_{max}=15~90	CNE121006A/B	Flat Milling, Side Milling, Flute Milling, and Bored Hole-making for Steel/ Alloy Steel/ Cast Iron.	• Diameter range Ø80-Ø400. • Inserts are vertically loaded with 90 degrees approach angle. Both axial and radical cutting width could be adjusted according to customers' demands. Opened chip pocket, which lead to unobstructed chip removal. It has large width of bottom edges, which helps to strengthen the capability of helical interpolation milling holes. It is generally loaded inserts for two kinds chipbreaker, while fits for different machining conditions.
T-slot milling	**TMP01**  B152	Kr=90°	MPHT□□	Machining T slot in cast iron	• Diameter range Ø21-Ø60. • Machining T-slot with nominal size 12, 14, 18, 22, 28, 36. • 86° rhombic inserts with positive angle.
Helical end mills	**HMP01**  B154	Kr=90° a_{pmax}=55	APKT150412-PM/KM SPMT120408-PM/KM	Milling of steel, alloy steel and cast iron at high cutting depth.	• Diameter range Ø40、Ø80. • Coarse and differential pitch, less vibration. • Holistic structure with good rigidity, interchangeable heads achieve high economical efficiency.
	 B155	Kr=90° a_{pmax}=144			
	HMP01 EC  B156	Kr=90° a_{pmax}=144			
Chamfer milling	**CMZ01**  B159	Kr=30°	SPMT120408	Chamfer machining of steel, alloy steel, stainless steel and cast iron	• Diameter range Ø12、Ø25、Ø32、Ø36. • With the function of milling small surface.
	CMA01  B160	Kr=45°			
	CMD01  B163	Kr=60°			

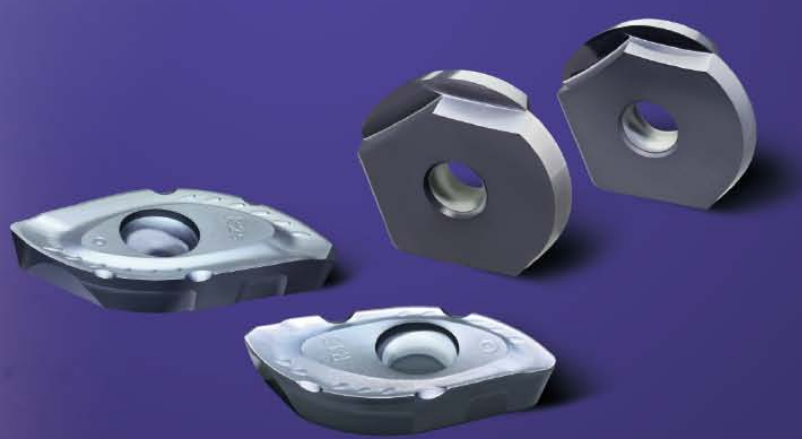


XMP01

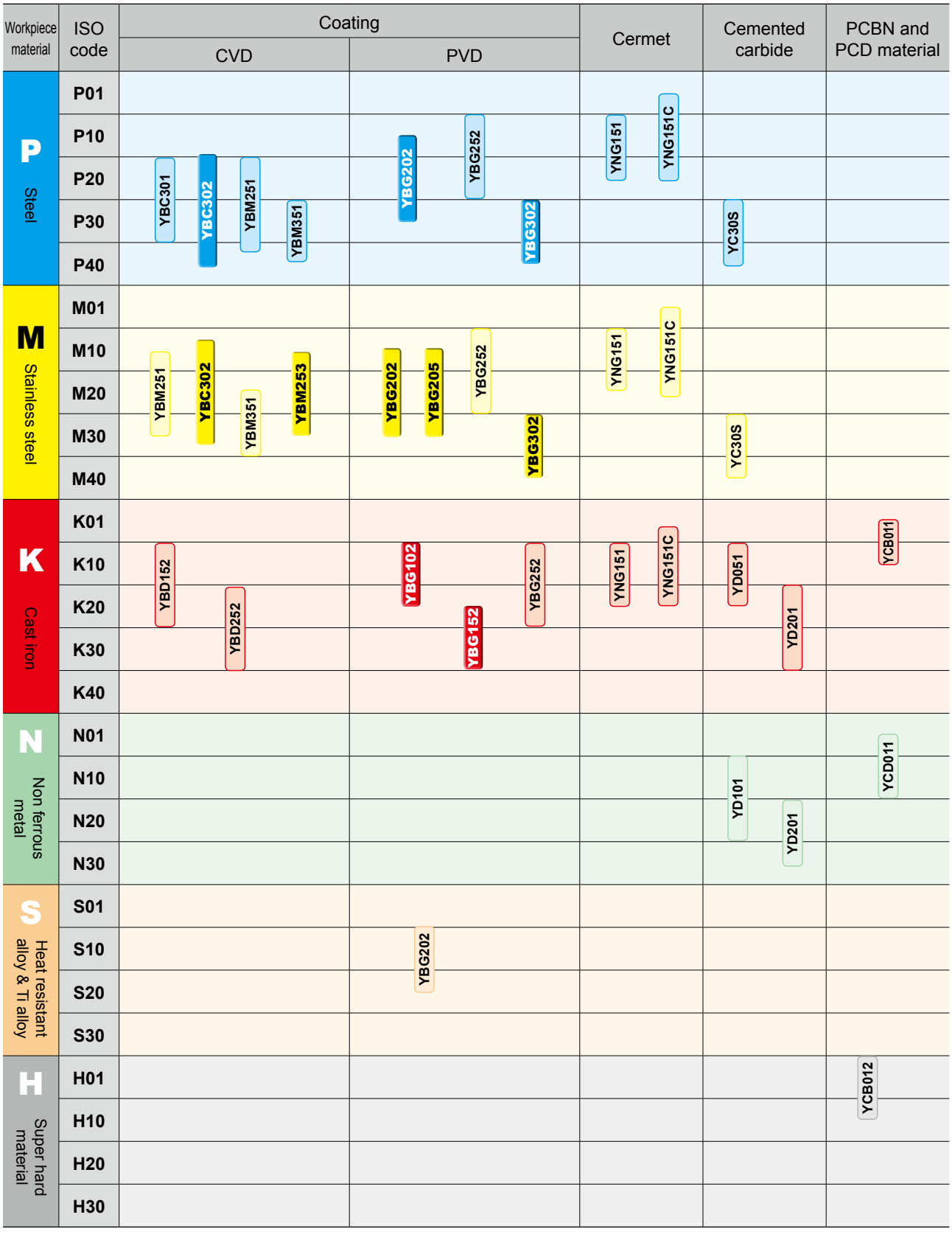
Boring millers



Profile milling tools series

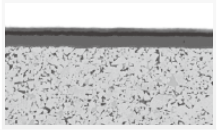
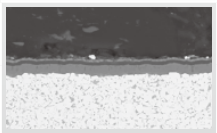
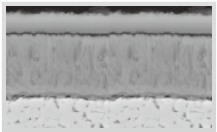
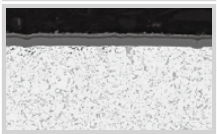
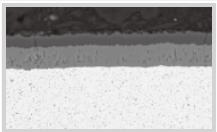
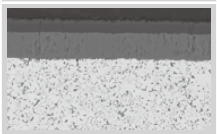


Milling insert grades overview

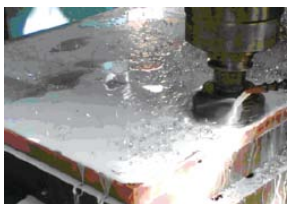
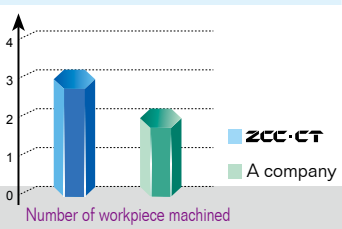
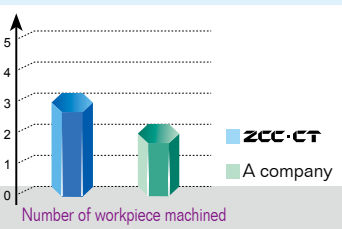
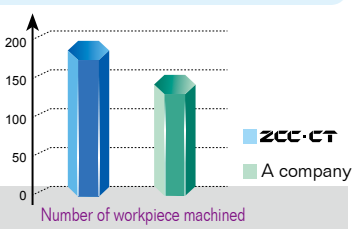


Grade classification for milling inserts

Coated Cemented Carbide CVD

Grade	Coating structure	Micro-structure	ISO applied range	Application field
YBC301	Combination of high-toughness, high-strength substrate and coating compo sed of TiCN、thin Al_2O_3 and TiN		P15~35	Suitable for semi-finish and rough milling of P-type material
YBC302	Combination of high toughness, high strength substrate and coating composed of TiCN, thin Al_2O_3 and TiN		P15~35 M10~30	Suitable for rough and semi-finish milling of P-type, M-type, whose hardness is below HRC45 and under
YBM251	Combination of high-toughness, high-strength substrate and coating compo sed of TiCN、thin Al_2O_3 and TiN		P15~40 M10~30	Suitable for semi-finish and rough milling of P- and M-type material
YBM253	Combination of high-toughness gradient substrate and coating composed of TiCN and ultra fine Al_2O_3		M10~30	Suitable for rough milling of M-type material
YBM351	Combination of high-toughness substrate and coating compoed of TiCN、thin Al_2O_3 and TiN		P25~40 M20~35	Suitable for rough milling of P- and M-type material
YBD152	Good combination of substrate with high wear-resistance and coating composed of TiCN and thick Al_2O_3		K05~25	Suitable for finish and semi-finish milling of K-type material
YBD252	Good combination of substrate with high wear-resistance and coating composed of TiCN and thick Al_2O_3		K15~35	Suitable for rough and semi-finish milling of K-type material

Application case

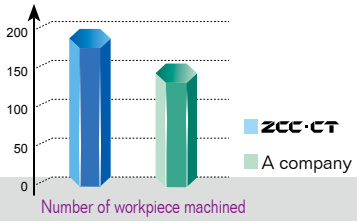
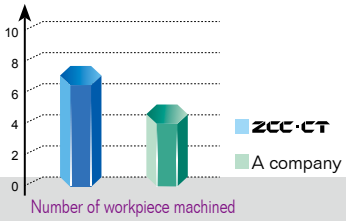
Component shape			
Machine and cooling	NC plane milling machine, wet machining	Vertical machining center, dry machining	Horizontal machining center, dry machining
Workpiece material and hardness	Casting stainless steel HB220-260	45# Forged steel HB240-270	HT250 HB220
Type of machining	Milling surface	Milling surface	Milling surface
Applicable tool	FMA04-200-C60-OF07-12	FMA01-125-B40-SE12-08	FMP02-100-B32-SE12-07
Applicable insert	YBM251/OFKR0704-DM	YBM351/SEET12T3-DR	YBD252/SEET120308PER-PM
Cutting parameters	Vc=120m/min, fz=0.15mm/z, a_p=2mm	Vc=212m/min, fz=0.2mm/z, a_p=3mm	Vc=160m/min, fz=0.2mm/z, a_p=1.5mm
Application results			

Grade classification for milling inserts

Coated Cemented Carbide PVD

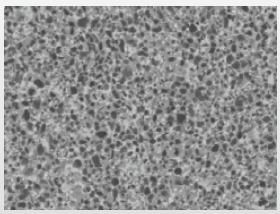
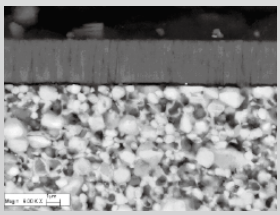
Grade	Coating structure	ISO applied range	Application field
YBG102	fine carbide substrate + Nano coating	K05~K20	Suitable for finish and semi-finish milling of K-type material
YBG202	Substrate with excellent deformation resistance + Nano coating	P10~30 M10~30 S05~20	PVD grade with wide application, widely applied in semi-finish milling of P-, M- and S-type material
YBG205	Ultra fine carbide substrate + Nano coating	M10~30	Suitable for rough milling of M-type material
YBG302	Substrate with good toughness and strength + Nano coating	P25~40 M25~40	Suitable for rough milling of P- and M-type material
YBG152	Substrate with moderate hardness and strength + Nano coating	K20~35	Suitable for rough and semi-finish milling of K-type material

Application case

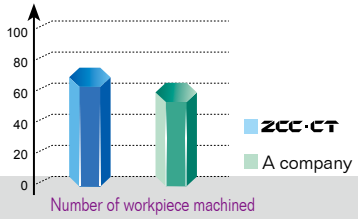
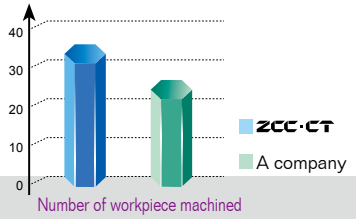
Component shape		
Machine and cooling	Machining center, dry cutting	Plane milling machine, dry cutting
Workpiece material and hardness	Nodular cast iron HB 220	7CrSiMoV HRC25
Type of machining	Milling surface	Cavity milling
Applicable tool	EMP02-050-A22-AP11-06	BMR03-050-MT5-M
Applicable insert	YBG102/APKT11T308-PM	YBG302/XPHT50R2507- GM
Cutting parameters	Vc=235m/min, fz=0.15mm/z, a_p=1~3mm	Vc=120m/min, fz=0.25mm/z, a_p=8mm
Application results		

Grade classification for milling inserts

Cermet

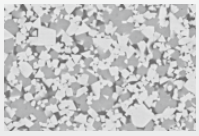
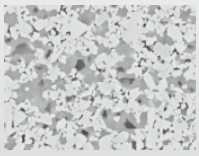
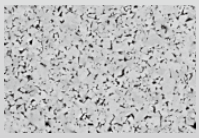
Grade	Coating structure	ISO applied range	Application field
YNG151		P05~20 M05~20 K05~20	Wide application in finish milling of P-, M-, and K-type material
YNG151C		P01~20 M01~20 K01~20	Wide application in finish milling of P-, M-, and K-type material

Application case

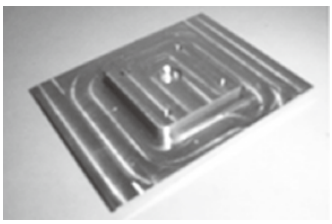
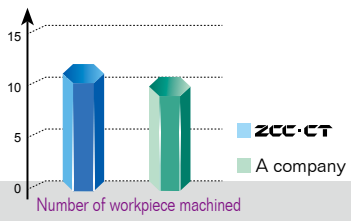
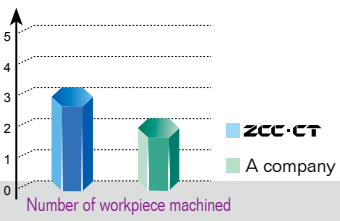
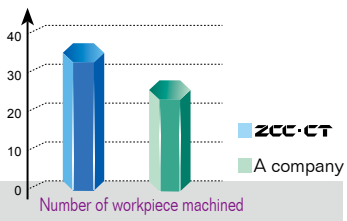
Component shape		
Machine and cooling	Machining center, dry cutting	Machining center, dry cutting
Workpiece material and hardness	45# HB 170~220	NAK80 HRC42~48
Type of machining	Finish milling surface	Finish milling surface
Applicable tool	FMA03-160-B40-SE12-08	FME03-160-B40-SP12-10
Applicable insert	YNG151/SEEN1203AFTN	YNG151C/SPEN1203EDER
Cutting parameters	Vc=400m/min, fz=0.1mm/z, a_p=0.3mm	Vc=420m/min, fz=0.12mm/z, a_p=0.35mm
Application results		

Grade classification for milling inserts

Cemented Carbide

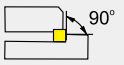
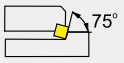
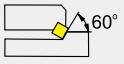
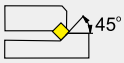
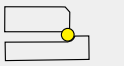
Grade	Coating structure	ISO applied range	Application field
YC30S		P25~40 M25~40	Suitable for rough milling of P- and M-type material
YD051		K05~20	Suitable for finish milling of K-type material
YD101		N05~25	Suitable for rough milling of N-type material
YD201		K15~35 N15~30	Suitable for rough and semi-finish milling of K-type material, and for rough milling of N-type material

Application case

Component shape			
Machine and cooling	Vertical machining center, wet machining	Plane milling machine, wet machining	plane milling machine, dry cutting
Workpiece material and hardness	Aluminum alloy HB100	40CrMnMo HB240	HT250 HB220
Type of machining	Milling surface	Milling surface	Milling surface
Applicable tool	FMA01-100-B32-SE12-07	FMP01-100-B32-TP22-06	FME03-160-B40-SP15-10
Applicable insert	YD101/SEET12T3-LH	YC30S/TPKN2204PDR	YD201/SPKN1504EDTR
Cutting parameters	Vc=300-350m/min, a_p=1~2mm, fz=0.2mm/z	Vc=170m/min, a_p=5~7mm fz=0.3mm/z	Vc=100-130m/min, a_p=7mm, fz=0.35mm/z
Application results			

Indexable milling tools code key

Cutter type	
FM	Face milling
EM	Square shoulder milling
HM	Helical end milling
SM	Side and face milling
BM	Profile milling
CM	Chamfer milling
XM	Special milling
TM	T-slot milling

Approach angle		
P	90°	
E	75°	
D	60°	
A	45°	
R		

Series code

Cutting diameter ØD

Side and face milling tool : diameter
X cutting edge width

Coupling structurebe (see below)

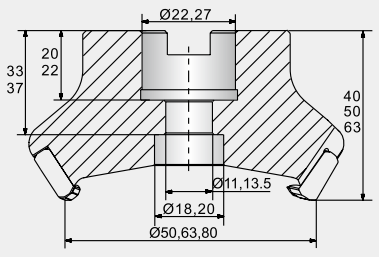
A	A-type coupling	XP	Weldon shank
B	B-type coupling	G	Straight shank
C	C-type coupling	MW	Morse adapter with a conical hole and without a flat tail
D	D-type coupling		

Coupling size(mm) (see below)

FM E 03 - 100 - B 32

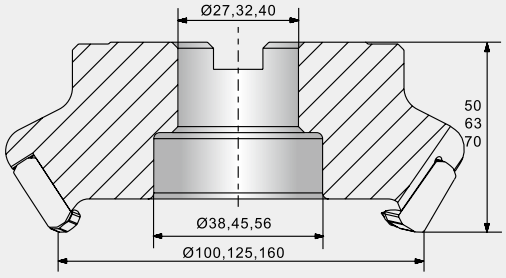
Coupling structure of arbor

A-type coupling



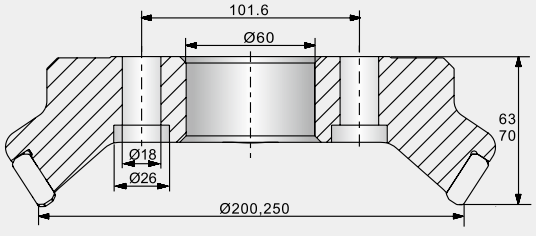
Ø50- Ø80 arbor face milling cutter as per GB5342-96

B-type coupling



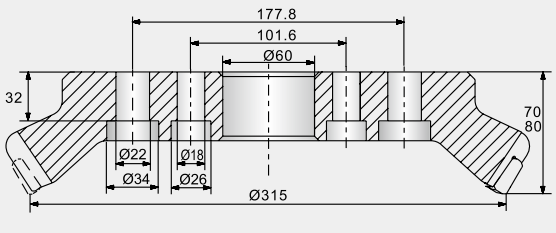
Ø100- Ø160 arbor face milling cutter as per GB5342-96

C-type coupling



Ø200- Ø250 arbor face milling cutter as per GB5342-96

D-type coupling



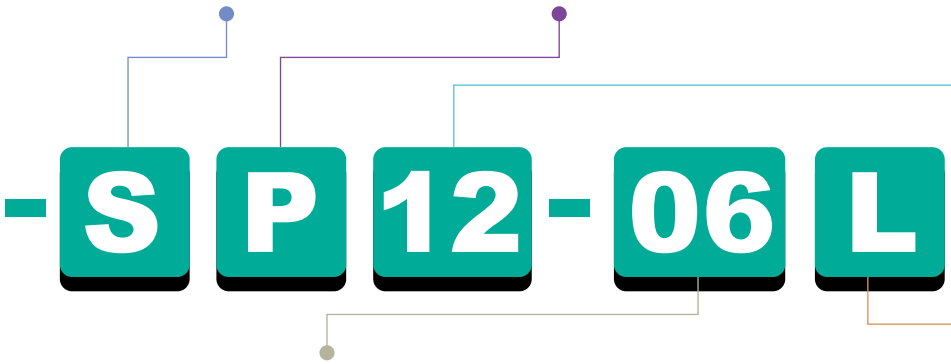
D≥Ø315 arbor face milling cutter as per GB5342-96

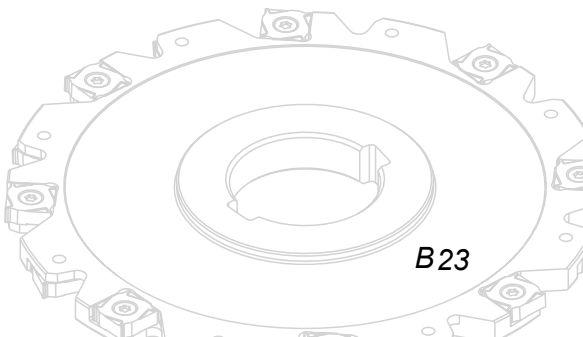
For coupling methods of Weldon shank, straight shank and Morse taper shank, etc., see technical information of tooling systems.

Insert shape	
80° C	55° D
R	S
60° T	L
H	O

Insert clearance angle	
N	0°
B	5°
C	7°
P	11°
D	15°
E	20°
F	25°

Length of cutting edge						
Diameter of insert's inscribed circle	Insert shape					
	C	D	R	S	T	L
5.556	—	—	—	—	09	—
6.350	06	07	—	—	11	—
9.525	09	11	09	09	16	—
12.700	12	15	12	12	22	—
15.875	16	19	15	15	27	—
19.050	19	—	19	19	33	—
25.400	25	—	25	25	44	2





Face milling tools

Kr:45°


Face milling

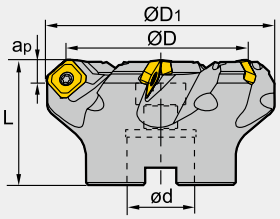

Chamfering

FMA01 P M K N S

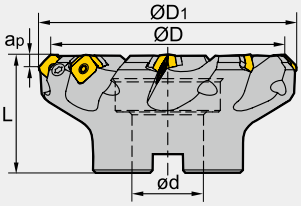


Close and even pitch

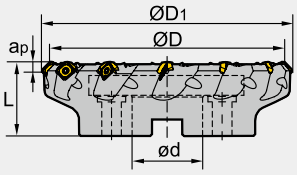
A-type coupling



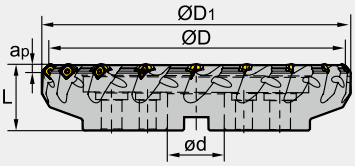
B-type coupling



C-type coupling



D-type coupling



Specification of tools

Type		Stock		Basic dimensions(mm)					Number of teeth Z	Type of coupling	Weight (kg)
		R	L	ØD	ØD1	ød	L	apmax			
FMA01	**-050-A22-SE12-04**	▲	△	50	61	22	40	6	4	A	0.3
	-063-A22-SE12-05	▲	△	63	74	22	40	6	5	A	0.5
	-080-A27-SE12-06	▲	△	80	91	27	50	6	6	A	1.2
	-100-B32-SE12-07	▲	△	100	107	32	50	6	7	B	1.2
	-125-B40-SE12-08	▲	△	125	136	40	63	6	8	B	2.6
	-160-B40-SE12-10	▲	△	160	170	40	63	6	10	B	4.3
	-200-C60-SE12-12	▲	△	200	210	60	63	6	12	C	7.6
	-250-C60-SE12-14	▲	△	250	260	60	63	6	14	C	13.5
	-315-D60-SE12-18	△	△	315	325	60	70	6	18	D	20.8

▲Stock available △Make-to-order

Spare parts

Diameter ØD	Insert screw	Shim	Shim screw	Wrench	Wrench
					
Ø50 -Ø100	I60M3.5×10	--	--	WT15IS	--
Ø125-Ø315	I60M3.5×12	S13BS	SM5×7XA		WH35L



Tools code key B22–B23
Grade selection guide B18–B21
Technical data B192–B198

Face milling tools

Kr:45°


Face milling

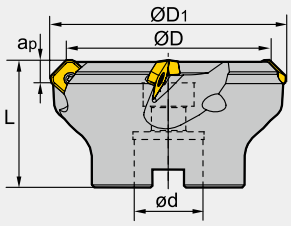

Chamfering

FMA02 P M K N S

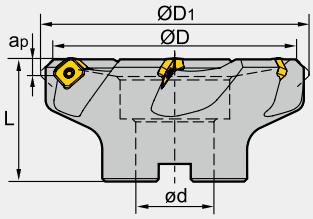


Coarse and differential pitch

A-type coupling



B-type coupling



Specification of tools

Type		Stock		Basic dimensions(mm)					Number of teeth Z	Type of coupling	Weight (kg)
		R	L	ØD	ØD1	ød	L	apmax			
FMA02	**-050-A22-SE12-03**	▲	△	50	61	22	40	6	3	A	0.4
	-063-A22-SE12-04	▲	△	63	74	22	40	6	4	A	0.6
	-080-A27-SE12-04	▲	△	80	91	27	50	6	4	A	1.3
	-100-B32-SE12-05	▲	△	100	107	32	50	6	5	B	1.3
	-125-B40-SE12-06	▲	△	125	131	40	63	6	6	B	2.6

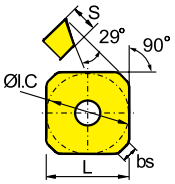
▲Stock available △Make-to-order

Spare parts

Diameter ØD	Insert screw	Wrench	
			
Ø50-Ø125	I60M3.5×10	WT15IS	

Tools code key B22–B23
Grade selection guide B18–B21
Technical data B192–B198

Selection of inserts

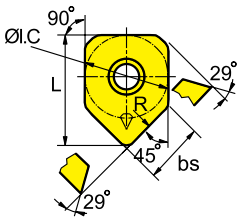


Good working condition Normal working condition Bad working condition

Workpiece material

P	Steel
M	Stainless steel
K	Cast iron
N	Non-ferrous metal
S	Heat resistant alloy, Ti alloy

Insert shape	Type	Basic dimensions(mm)						CVD Coating						PVD Coating						Cermet		Cemented carbide			
		L	ØI.C	S	ød	bs	R	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	SEET12T3-DF	13.4	13.4	3.97	4.1	2.55		●	★	●						★		○								
	SEET12T3-CF	13.4	13.4	3.97	4.1	2.55							○		★	○		○								
	SEET12T3-EF	13.4	13.4	3.97	4.1	2.55										○		○								
	SEET12T3-DM	13.4	13.4	3.97	4.1	2.55		●	★	●		○				★		★								
	SEET12T3-CM	13.4	13.4	3.97	4.1	2.55							★			★		○								
	SEET12T3-EM	13.4	13.4	3.97	4.1	2.55				●		●				○		★								
	SEET12T3-DR	13.4	13.4	3.97	4.1	2.55		●	★			●				★		★								
	SEET12T3-CR	13.4	13.4	3.97	4.1	2.55		●					★					★								
	SEET12T3-LH	13.4	13.4	3.97	4.1	2.55																			○	★
	SEET12T3-W	17.82	13.4	3.97	4.1	9.46	500		★	●			★			★					★					



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



Chipbreaker selection for FMA01 milling inserts

Classification \ Function	For finishing	For semi-finishing	For roughing
P	-DF	-DM	-DR
M, S	-EF	-EM	
K	-CF	-CM	-CR
N	-LH		

Recommended cutting parameters

Workpiece material		Hardness HB	Insert grade	Cutting parameters			
				V(m/min)	f(mm/z)		
					-DF	-DM	-DR
P	Low-carbon steel、Soft steel	⩽180	YBM251 YBC301	270(220-350)	0.15(0.1-0.2)	0.2 (0.1-0.3)	0.3(0.2-0.4)
			YBG202	270(200-360)	0.15(0.1-0.2)	0.2 (0.1-0.3)	0.3(0.2-0.4)
			YBG302	230(170-350)	0.15(0.1-0.2)	0.2 (0.1-0.3)	0.3(0.2-0.4)
	High-carbon steel、Alloy steel	180-280	YBM251 YBC301	240 (200-320)	0.15(0.1-0.2)	0.2 (0.1-0.3)	0.3(0.2-0.4)
			YBG202	240 (180-350)	0.15(0.1-0.2)	0.2 (0.1-0.3)	0.3(0.2-0.4)
			YBG302	220 (150-330)	0.15(0.1-0.2)	0.2 (0.1-0.3)	0.3(0.2-0.4)
	Alloy tool steel	280-350	YBM251 YBC301	220 (180-300)	0.15(0.1-0.2)	0.2 (0.1-0.3)	0.3(0.2-0.4)
			YBG202	220 (170-340)	0.15(0.1-0.2)	0.2 (0.1-0.3)	0.3(0.2-0.4)
			YBG302	190 (130-300)	0.15(0.1-0.2)	0.2 (0.1-0.3)	0.3(0.2-0.4)
M					-EF	-EM	
	Stainless steel	⩽270	YBM251	150 (120-240)	0.15(0.1-0.2)	0.2 (0.1-0.3)	
			YBG202	160 (110-270)	0.15(0.1-0.2)	0.2 (0.1-0.3)	
			YBG302	140 (100-250)	0.15(0.1-0.2)	0.2 (0.1-0.3)	
K					-CF	-CM	-CR
	Cast iron	180-250	YBG102	210 (120-300)	0.15(0.1-0.2)	0.2 (0.1-0.3)	0.3(0.2-0.4)
			YBD152	240 (180-300)	0.15(0.1-0.2)	0.2 (0.1-0.3)	0.3(0.2-0.4)
N					-LH		
	Al alloy steel	-	YD101	300-	0.25 (0.1-0.4)		
			YD201	300-			
S					-EF	-EM	
	High-temperature alloy	⩽400	YBG102	50(20-60)	0.1 (0.1-0.2)	0.15 (0.1-0.3)	
			YBG202	40(20-50)	0.1 (0.1-0.2)	0.15 (0.1-0.3)	

Case for FMA01







Workpiece material：1Cr18Ni9Ti (HB180)
Cooling system: Dry cutting
Machine: Vertical machining center
Cutting parameters：
Vc=160m/min
a_p=1mm
fz=0.2mm/z
a_e=60mm

Surface roughness of workpiece:

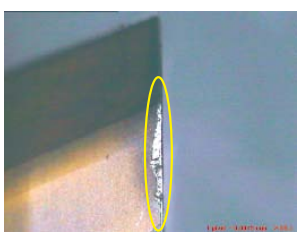
ZCC-CT:Ra1.2

Similar overseas products：Ra1.6

Tool type：FMA01-080-A27-SE12-06

Insert type/grade：SEET12T3-DM/YBG202

●Comparison of insert abrasion

	ZCC-CT	Similar overseas products
17'30"		
29'30"		
33'30"		



Face milling tools

Kr:45°

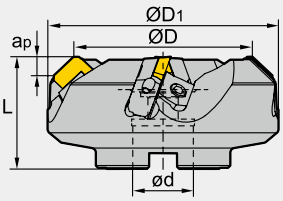

Face milling


Chamfering

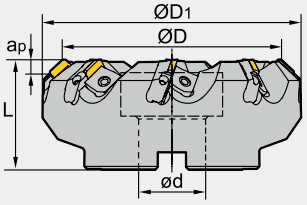
FMA03 P M K



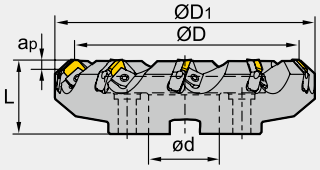
A-type coupling



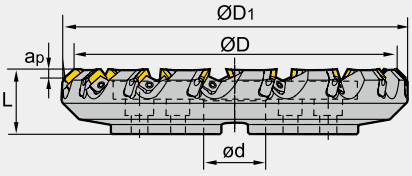
B-type coupling



C-type coupling



D-type coupling



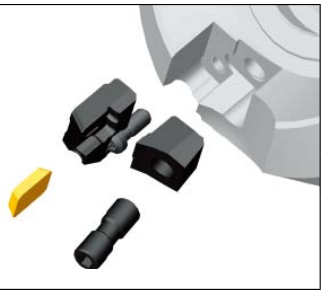
Specification of tools

Type		Stock		Basic dimensions(mm)					Number of teeth Z	Type of coupling	Weight (kg)
		R	L	ØD	ØD1	ød	L	apmax			
FMA03	-080-A27-SE12-04	▲	△	80	103	27	50	5.5	4	A	1.8
	-100-B32-SE12-05	▲	△	100	122	32	50	5.5	5	B	2.4
	-125-B40-SE12-06	▲	△	125	147	40	63	5.5	6	B	4.4
	-160-B40-SE12-08	▲	△	160	181	40	63	5.5	8	B	6.4
	-200-C60-SE12-10	▲	△	200	221	60	63	5.5	10	C	8.5
	-250-C60-SE12-12	▲	△	250	270	60	63	5.5	12	C	14.1
	-315-D60-SE12-15	△	△	315	353	60	63	5.5	15	D	22.2
	-080-A27-SE15-04	▲	△	80	103	27	50	7.5	4	A	1.7
	-100-B32-SE15-05	▲	△	100	122	32	50	7.5	5	B	2.3
	-125-B40-SE15-06	▲	△	125	147	40	63	7.5	6	B	4.2
	-160-B40-SE15-08	▲	△	160	181	40	63	7.5	8	B	6.1
	-200-C60-SE15-10	▲	△	200	221	60	63	7.5	10	C	8.3
	-250-C60-SE15-12	▲	△	250	270	60	63	7.5	12	C	13.6
	-315-D60-SE15-15	▲	△	315	353	60	63	7.5	15	D	21.8

▲Stock available △Make-to-order

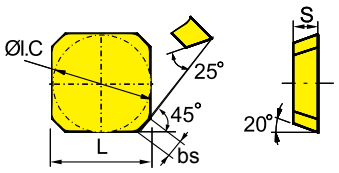
Spare parts

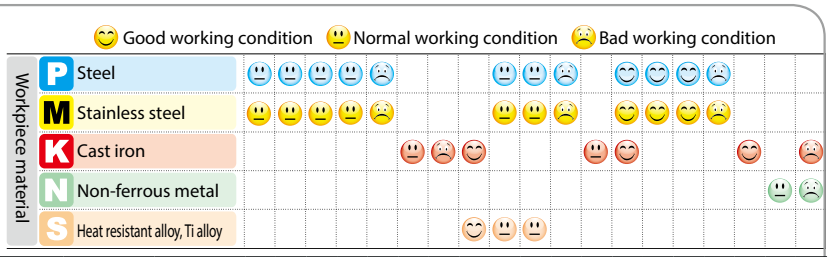
Diameter ØD	Inserts	Locator	Wedge	Wedge screw	Locator screw	Wrench
Ø80-Ø315	SE12	LSE12R/L	W01R/L	DM8×21X	LOM5×15.1	WT20T WH40T
Ø80-Ø315	SE15	LSE15R/L				



Tools code key B22–B23
Grade selection guide B18–B21
Technical data B192–B198

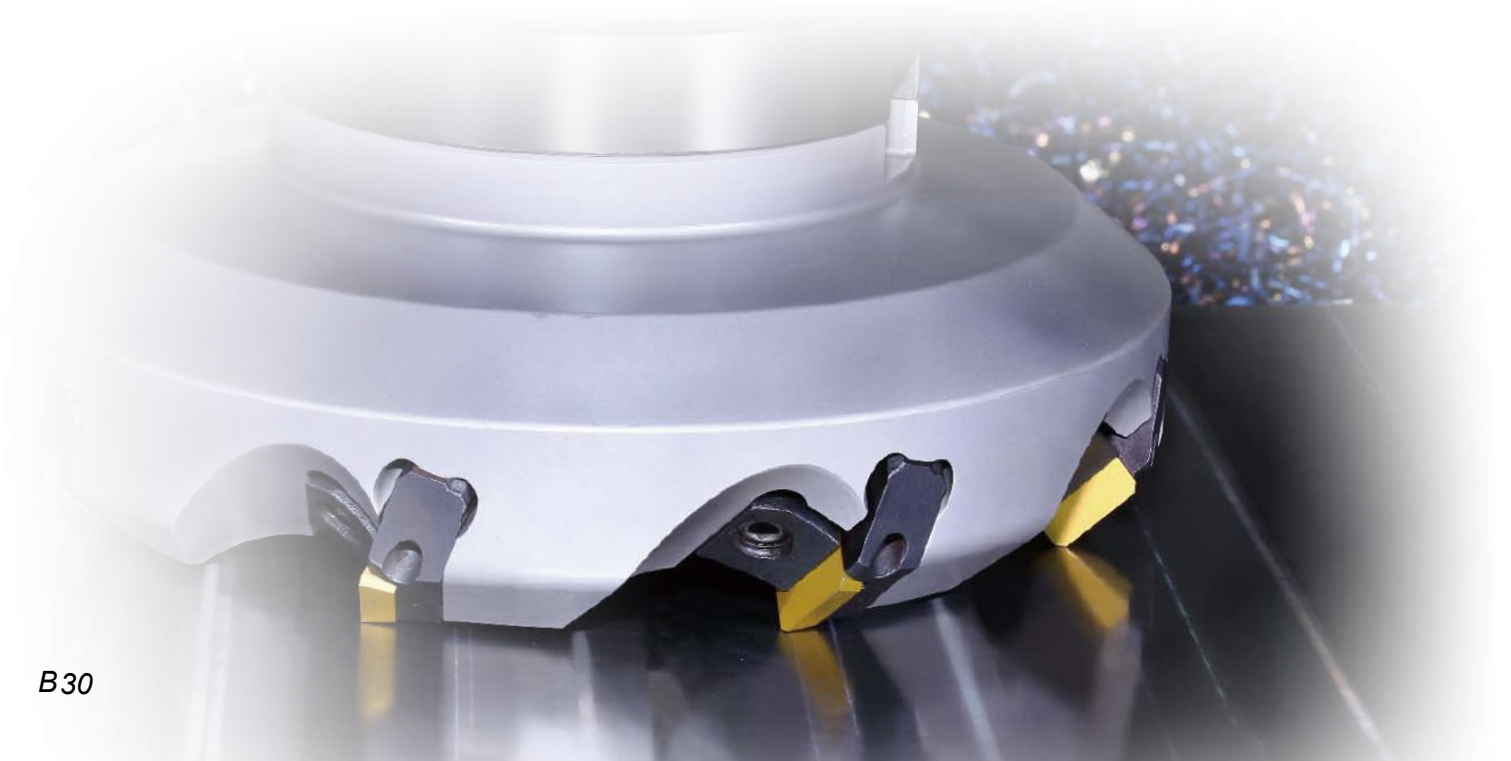
Selection of inserts





Insert shape	Type	Basic dimensions(mm)				CVD Coating						PVD Coating						Cermet		Cemented carbide			
		L	ØI.C	S	bs	YBC301	**YBC302**	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	**SEEN1203AFTN**	12.7	12.7	3.18	1.8									○					●					
	SEKN1203AFFN	12.7	12.7	3.18	1.8								★											
	SEKN1203AFN	12.7	12.7	3.18	1.8	●								○							●			○
	SEKN1203AFTN	12.7	12.7	3.18	1.8	●		●		●				★		○					●			●
	**SEKR1203AFN**	12.7	12.7	3.18	1.8	●								○		○								
	**SEKN1504AFN**	15.875	15.875	4.76	1.6	●		●																●
	SEKN1504AFTN	15.875	15.875	4.76	1.6	○		●		●						○					●			●
	**SEKR1504AFN**	15.875	15.875	4.76	1.6							★				★					●			

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



Recommended cutting parameters

Workpiece material		Hardness HB	Insert grade	Cutting parameters	
				V(m/min)	f(mm/z)
P	Low-carbon steel、Soft steel	≤180	YNG151	430 (340-500)	0.2 (0.1-0.4)
			YBM251 YBC301	270 (220-350)	0.2 (0.1-0.4)
			YBM351	220 (180-300)	0.25 (0.15-0.3)
			YBG202	270 (200-360)	0.2 (0.1-0.3)
			YC30S	140 (100-220)	0.27 (0.1-0.4)
	High-carbon steel、Alloy steel	180-280	YNG151	400 (320-480)	0.2 (0.1-0.4)
			YBM251 YBC301	240 (200-320)	0.2 (0.1-0.4)
			YBM351	200 (160-280)	0.25 (0.15-0.3)
			YBG202	240 (180-350)	0.2 (0.1-0.3)
			YC30S	120 (80-200)	0.27 (0.1-0.4)
	Alloy tool steel	280-350	YNG151	350 (300-450)	0.2 (0.1-0.4)
			YBM251 YBC301	220 (180-300)	0.2 (0.1-0.4)
			YBM351	180 (150-250)	0.25 (0.15-0.3)
			YBG202	220 (170-340)	0.2 (0.1-0.3)
			YC30S	100 (60-180)	0.27 (0.1-0.4)
M	Stainless steel	≤270	YNG151	220 (160-280)	0.2 (0.1-0.4)
			YBM251	130 (100-220)	0.2 (0.1-0.4)
			YBM351	140 (100-240)	0.25 (0.15-0.3)
			YBG202	140 (100-250)	0.2 (0.1-0.3)
K	Cast iron	180-250	YBG102	210 (120-300)	0.2 (0.1-0.3)
			YBD252	200 (150-250)	0.2 (0.1-0.4)
			YD201	100 (80-160)	0.25 (0.1-0.4)

Face milling tools

Kr:45°

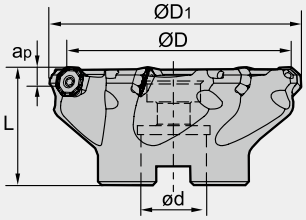
Face milling Chamfering

FMA04 P M K N

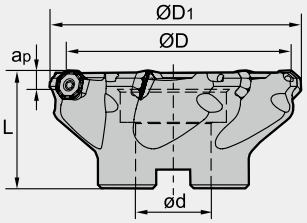


Screw clamping

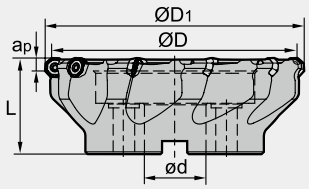
A-type coupling



B-type coupling



C-type coupling



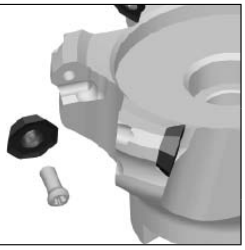
Specification of tools

Type		Stock		Basic dimensions(mm)					Number of teeth Z	Type of coupling	Weight (kg)
		R	L	ØD	ØD1	ød	L	apmax			
FMA04	**-050-A22-OF05-04**	▲	△	50	56	22	40	3.5	4	A	0.3
	-050-A22-OF05-05	△	△	50	56	22	40	3.5	5	A	0.4
	-063-A22-OF05-05	▲	△	63	69	22	40	3.5	5	A	0.5
	-080-A27-OF05-06	▲	△	80	86	27	50	3.5	6	A	0.8
	-100-B32-OF05-07	▲	△	100	106	32	50	3.5	7	B	1.2
	-125-B40-OF05-08	▲	△	125	130	40	63	3.5	8	B	2.7
	-160-B40-OF05-10	▲	△	160	165	40	63	3.5	10	B	5.1
	-160-C40-OF05-10	△	△	160	165	40	63	3.5	10	C	4.1

▲Stock available △Make-to-order

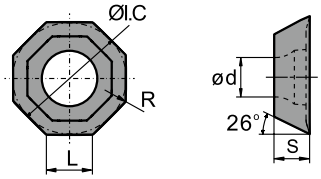
Spare parts

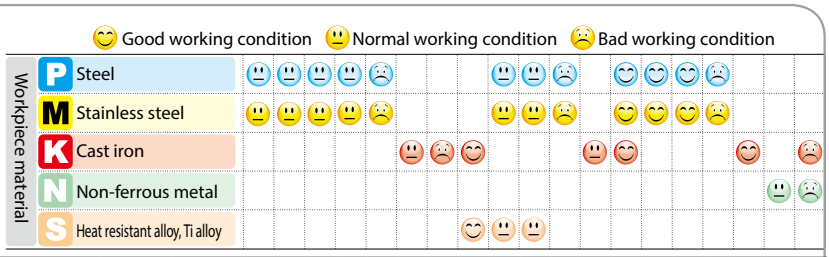
Diameter ØD	Insert screw	Wrench
Ø50- Ø63	I60M4×8.4	WT15IS
Ø80 -Ø160	I60M4×10	



Tools code key B22–B23
Grade selection guide B18–B21
Technical data B192–B198

Selection of inserts





Insert shape	Type	Basic dimensions(mm)					CVD Coating						PVD Coating						Cermet		Cemented carbide			
		L	ØI.C	S	ød	R	YBC301	**YBC302**	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	**OFKT05T3-DF**	5.26	12.7	3.97	4.4	0.5								○	★									
	**OFKT05T3-DM**	5.26	12.7	3.97	4.4	0.5			○					★	★		★							
	**OFKT05T3-LH**	5.26	12.7	3.97	4.4	0.5																	○	

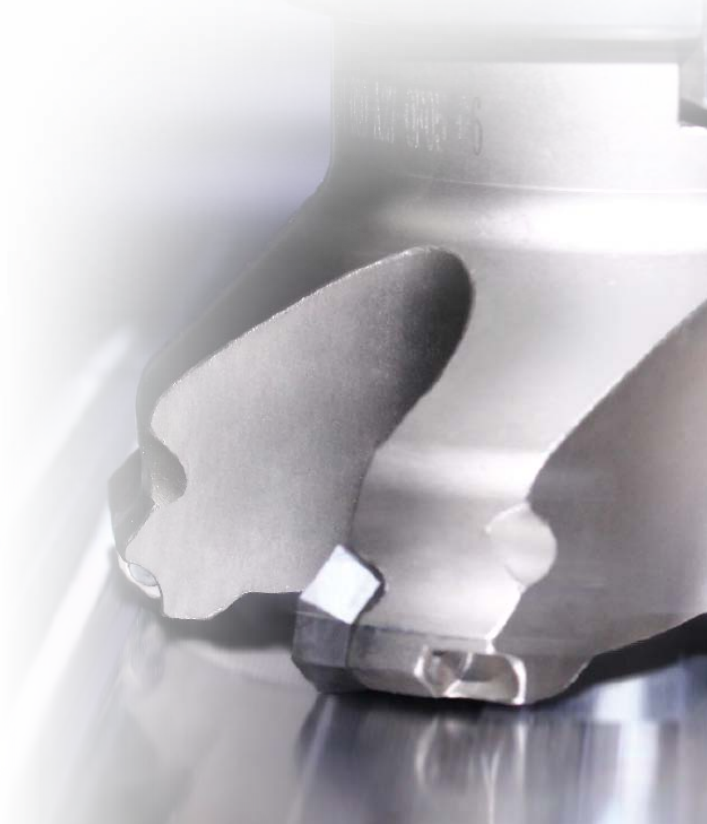
★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

Chipbreaker selection for FMA04 milling inserts

Classification \ Function	For finishing	For semi-finishing
P	-DF	-DM
M		
K		
N	-LH	

Recommended cutting parameters

Workpiece material		Hardness HB	Insert grade	Cutting parameters		
				V(m/min)	f(mm/z)	
					-DF	-DM
P	Low-carbon steel、Soft steel	≤180	YBM251	270 (220-350)	0.2 (0.1-0.3)	0.25 (0.1-0.4)
			YBG202	270 (200-360)	0.2 (0.1-0.3)	0.25 (0.1-0.4)
			YBM351	220 (180-300)	0.2 (0.1-0.3)	0.25 (0.1-0.4)
			YBG302	230 (170-350)	0.2 (0.1-0.3)	0.25 (0.1-0.4)
	High-carbon steel、Alloy steel	180-280	YBM251	240 (200-320)	0.15 (0.1-0.3)	0.2 (0.1-0.4)
			YBG202	240 (180-350)	0.15 (0.1-0.3)	0.2 (0.1-0.4)
			YBM351	200 (160-280)	0.2 (0.1-0.3)	0.25 (0.1-0.4)
			YBG302	220 (150-330)	0.2 (0.1-0.3)	0.25 (0.1-0.4)
	Alloy tool steel	280-350	YBM251	220 (180-300)	0.15 (0.1-0.3)	0.2 (0.1-0.4)
			YBG202	220 (170-340)	0.15 (0.1-0.3)	0.2 (0.1-0.4)
			YBM351	180 (150-250)	0.2 (0.1-0.3)	0.25 (0.1-0.4)
			YBG302	190 (130-300)	0.2 (0.1-0.3)	0.25 (0.1-0.4)
M	Stainless steel	≤270	YBG202	160 (110-270)	0.15 (0.1-0.3)	0.2 (0.1-0.4)
			YBG302	140 (100-250)	0.15 (0.1-0.3)	0.2 (0.1-0.4)
			YBM251	150 (120-250)	0.15 (0.1-0.3)	0.2 (0.1-0.4)
K	Cast iron	180-250	YBG102	210 (120-300)	0.2 (0.1-0.3)	0.25 (0.1-0.4)
N					-LH	
	Aluminium alloy	-	YD101	300-	0.15 (0.05-0.3)	



Case for FMA04





Workpiece material：42CrMo (HB280)
Cooling system: Dry cutting
Machine: Vertical machining center
Cutting parameters：
V_c=180m/min
a_p=1mm
fz=0.2mm/z
a_e=60mm

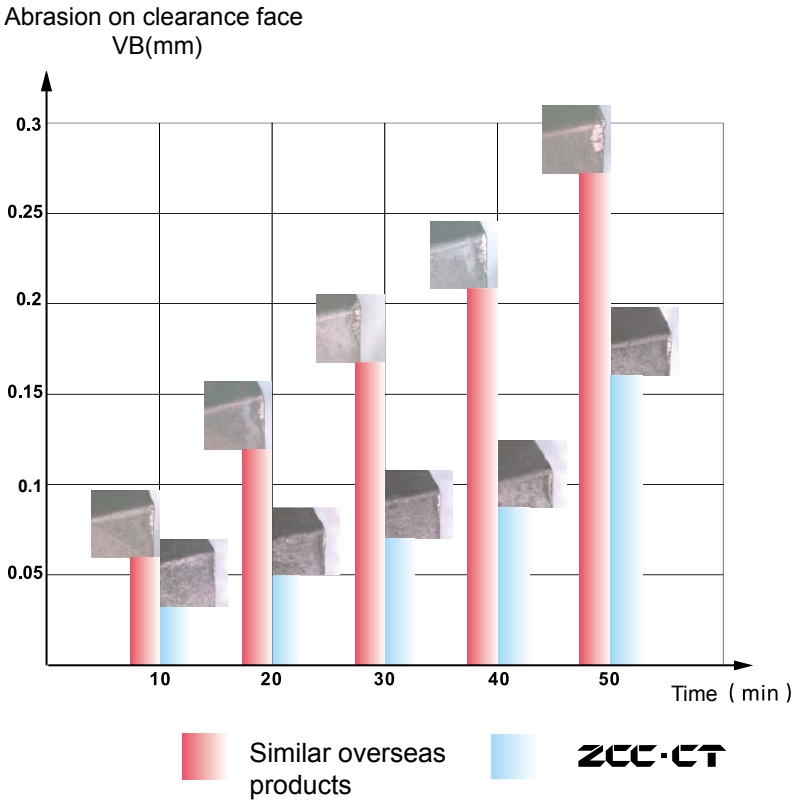
Tool type：FMA04-100-B32-OF05-07

Insert type/grade：OFKT05T3-DM/YBG202

Surface roughness of workpiece:
ZCC-CT:Ra1.2
Similar overseas products：
Ra1.6



●Comparison of insert abrasion



Face milling tools

Kr:45°

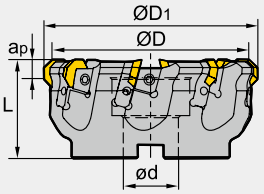
Face milling Chamfering

FMA04 P M K

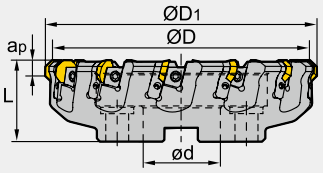


Top clamping

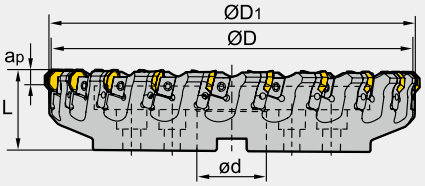
B-type coupling



C-type coupling



D-type coupling



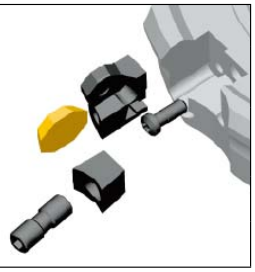
Specification of tools

Type		Stock		Basic dimensions(mm)					Number of teeth Z	Type of coupling	Weight (kg)
		R	L	ØD	ØD1	ød	L	apmax			
FMA04	**-125-B40-OF07-08**	▲	△	125	136	40	63	5	8	B	3.9
	-160-B40-OF07-10	▲	△	160	171	40	63	5	10	B	5.9
	-200-C60-OF07-12	▲	△	200	211	60	63	5	12	C	7.6
	-250-C60-OF07-16	▲	△	250	261	60	63	5	16	C	13.3
	-315-D60-OF07-20	▲	△	315	321	60	63	5	20	D	20.3

▲Stock available △Make-to-order

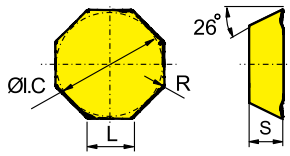
Spare parts

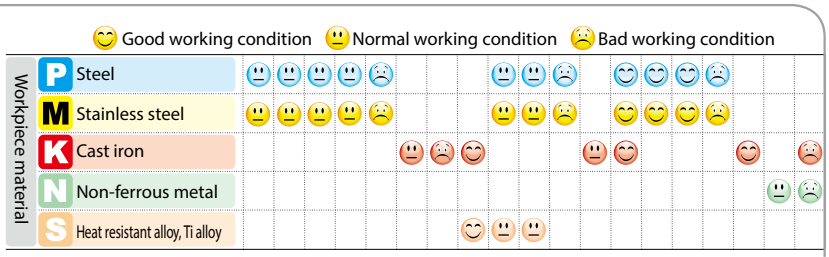
Diameter ØD	Locator	Wedge	Wedge screw	Locator screw	Wrench
Ø125-Ø315	LOF07R/L	W02R/L	DM8×21X	LOM5×15.1	WT20T WH40T



Tools code key B22–B23
Grade selection guide B18–B21
Technical data B192–B198

Selection of inserts





Insert shape	Type	Basic dimensions(mm)				CVD Coating						PVD Coating						Cermet		Cemented carbide			
		L	ØI.C	S	R	YBC301	**YBC302**	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	**OFKR0704-DF**	7.45	17.94	4.76	0.8			●	○					○										
	**OFKR0704-DM**	7.45	17.94	4.76	0.8	●		●	○	●		○	○	★		★								

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

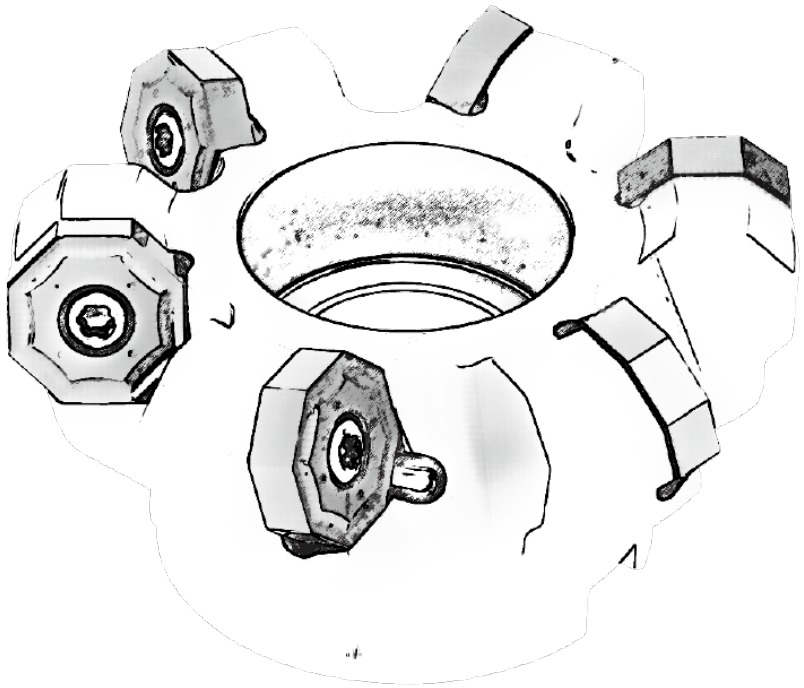
Chipbreaker selection for FMA04 milling inserts

Classification \ Function	For finishing	For semi-finishing
P	-DF	-DM
M		
K		



Recommended cutting parameters

Workpiece material		Hardness HB	Insert grade	Cutting parameters		
				V(m/min)	f(mm/z)	
					-DF	-DM
P	Low-carbon steel、Soft steel	≤180	YBM251 YBM253 YBC301	270 (220-350)	0.2 (0.1-0.3)	0.25 (0.1-0.4)
			YBG202	270 (200-360)	0.2 (0.1-0.3)	0.25 (0.1-0.4)
			YBM351	220 (180-300)	0.2 (0.1-0.3)	0.25 (0.1-0.4)
			YBG302	230 (170-350)	0.2 (0.1-0.3)	0.25 (0.1-0.4)
	High-carbon steel、Alloy steel	180-280	YBM251 YBM253 YBC301	240 (200-320)	0.15 (0.1-0.3)	0.2 (0.1-0.4)
			YBG202	240 (180-350)	0.15 (0.1-0.3)	0.2 (0.1-0.4)
			YBM351	200 (160-280)	0.2 (0.1-0.3)	0.25 (0.1-0.4)
			YBG302	220 (150-330)	0.2 (0.1-0.3)	0.25 (0.1-0.4)
	Alloy tool steel	280-350	YBM251 YBM253 YBC301	220 (180-300)	0.15 (0.1-0.3)	0.2 (0.1-0.4)
			YBG202	220 (170-340)	0.15 (0.1-0.3)	0.2 (0.1-0.4)
			YBM351	180 (150-250)	0.2 (0.1-0.3)	0.25 (0.1-0.4)
			YBG302	190 (130-300)	0.2 (0.1-0.3)	0.25 (0.1-0.4)
M	Stainless steel	≤270	YBG202	160 (110-270)	0.15 (0.1-0.3)	0.2 (0.1-0.4)
			YBG302	140 (100-250)	0.15 (0.1-0.3)	0.2 (0.1-0.4)
			YBM251	150 (120-250)	0.15 (0.1-0.3)	0.2 (0.1-0.4)
			YBM253	230 (180-300)	0.15 (0.1-0.3)	0.2 (0.1-0.4)
K	Cast iron	180-250	YBG102	210 (120-300)	0.2 (0.1-0.3)	0.25 (0.1-0.4)
			YBD252	200 (150-250)	0.2 (0.1-0.3)	0.25 (0.1-0.4)



HURRICANE

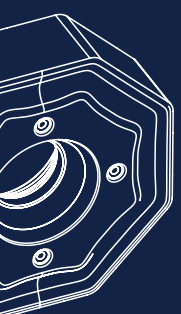
FMA07 milling cutter series

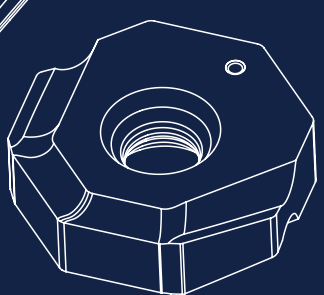
New generation of high economy milling cutters



16 cutting edges high economy

8×2=16





- Double negative rake angle structure, both axial and radial direction, super thick insert with outstanding toughness.
- Has good wiper capability, especially under the high feed rate, the wiper effect is better in comparison with similar tools.
- The unique hole design makes the insert clamp more secured.
- Tool diameters from 25 to 315mm and 3 geometries available, -PF, -PM and -W (wiper).

Face milling tools

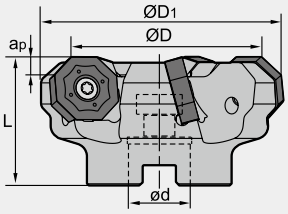
Kr:45°

Face milling

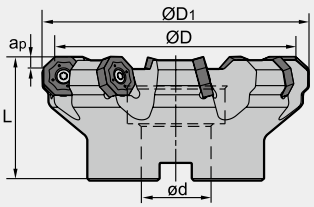
FMA07 P M K



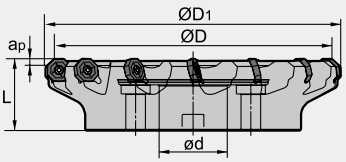
A-type coupling



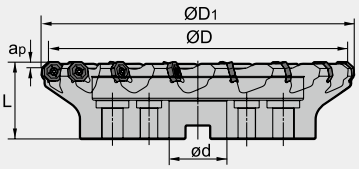
B-type coupling



C-type coupling



D-type coupling



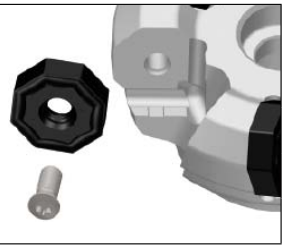
Specification of tools

type		Stock		Basic dimensions(mm)					Number of teeth Z	Style of coupling	Weight (kg)
		R	L	ØD	ØD1	Ød	L	apmax			
FMA07	-050-A22-ON06-05	▲	△	50	62	22	40	4	5	A	0.3
	-063-A22-ON06-06	▲	△	63	75	22	40	4	6	A	0.5
	-080-B27-ON06-07	▲	△	80	92	27	50	4	7	B	1.0
	-100-B32-ON06-08	▲	△	100	112	32	63	4	8	B	1.9
	-125-B40-ON06-09	▲	△	125	137	40	63	4	9	B	3.5
	-160-C40-ON06-11	▲	△	160	172	40	63	4	11	C	4.3
	-200-C60-ON06-13	▲	△	200	212	60	63	4	13	C	6.4
	-250-C60-ON06-15	▲	△	250	262	60	63	4	15	C	13.4
	-315-D60-ON06-17	▲	△	315	327	60	80	4	17	D	21.9
	-063-A22-ON08-05	▲	△	63	78	22	40	5	5	A	0.5
	-080-B27-ON08-06	▲	△	80	95	27	50	5	6	B	0.9
	-100-B32-ON08-07	▲	△	100	115	32	63	5	7	B	1.8
	-125-B40-ON08-08	▲	△	125	140	40	63	5	8	B	3.1
	-160-C40-ON08-10	▲	△	160	175	40	63	5	10	C	4.1
	-200-C60-ON08-12	▲	△	200	215	60	63	5	12	C	6.1
	-250-C60-ON08-14	▲	△	250	265	60	63	5	14	C	12.0
	-315-D60-ON08-16	▲	△	315	330	60	80	5	16	D	21.0

▲Stock available △Make-to-order

Spare parts

Diameter ØD	Inserts	Insert screw	Wrench	
				
Ø50 -Ø315	ONHU06□□□□-PF/PM/W	I60M4×10	--	WT15IS
Ø63 -Ø315	ONHU08□□□□-PF/PM/W	I60M5×13	WT20IT	--



Tools code key B22–B23
Grade selection guide B18–B21
Technical data B192–B198

Face milling tools

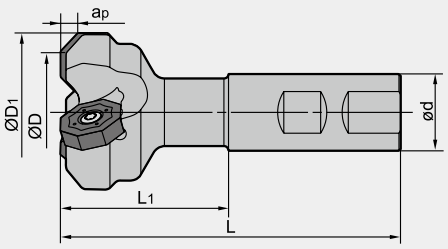
Kr:45°


Face milling


Chamfering

FMA07 P M K





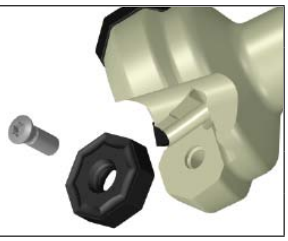
Specification of tools

type		Stock		Basic dimensions(mm)						Number of teeth Z	Weight (kg)
		R	L	ØD	ØD1	Ød	L	L1	apmax		
FMA07	-025-XP20-ON06-02	▲	△	25	37	20	95	45	4	2	0.2
	-040-XP25-ON06-03	▲	△	40	52	25	106	50	4	3	0.4
	-032-XP25-ON08-02	▲	△	32	47	25	111	55	5	2	0.4
	-040-XP25-ON08-03	▲	△	40	55	25	111	55	5	3	0.5
	-050-XP25-ON08-04	▲	△	50	65	25	111	55	5	4	0.6

▲Stock available △Make-to-order

Spare parts

Diameter ØD	Inserts	Insert screw	Wrench	
				
Ø25 -Ø40	ONHU06□□□□-PF/PM/W	I60M4×10	--	WT15IS
Ø32 -Ø50	ONHU08□□□□-PF/PM/W	I60M5×13	WT20IT	--



Case for FMA07





Tool type：FMA07-100-B32-ON08-07

Insert type/grade：ONHU08T508-PM/YBD152

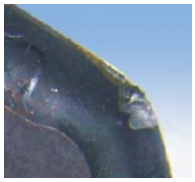
Part: Gear pump body
Workpiece material：HT400
Hardness：HRC22
Cooling system: Dry cutting
Machine: Vertical machining center
Cutting parameters：V_c=267m/min
a_p=1.5mm
f_z=0.42mm/z
a_e=80mm
Milling style: Down milling
Area of machining: End surface



●Comparison of insert abrasion

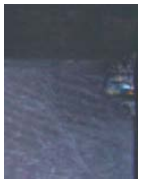
Abrasion on rake face


ZCC-CT


similar product of company A

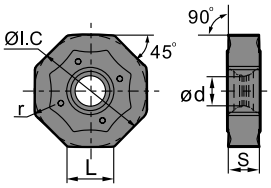
Abrasion on clearance face

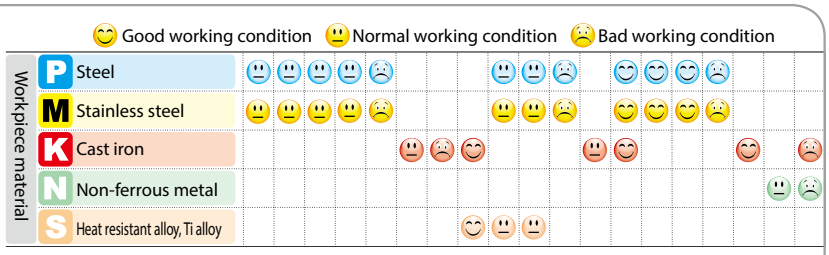

ZCC-CT


similar product of company A

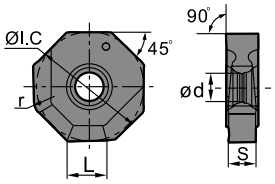
Tools code key B22–B23
Grade selection guide B18–B21
Technical data B192–B198

Selection of inserts





Insert shape	Type	Basic dimensions(mm)					CVD Coating						PVD Coating						Cermet		Cemented carbide			
		L	ØI.C	S	ød	r	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	**ONHU060408-PF**	6.58	15.875	4.76	4.4	0.83		★			★				★										
	ONHU08T508-PF	8.37	20.2	5.77	5.3	0.83		★			★				★										
	**ONHU060408-PM**	6.58	15.875	4.76	4.4	0.83		★		★	★														
	ONHU08T508-PM	8.37	20.2	5.79	5.3	0.83		★		★	★														
	**ONHU08T508-W**	6.9	20.5	6.00	5.3	0.80		★			★			★											



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

Recommended cutting parameters

Workpiece material		Hardness HB	Insert grade	Cutting parameters			
				V_c(m/min)	f_z(mm/z)	a_{pmax}(mm)	
						ONHU06□□□□-PF/PM	ONHU08□□□□-PF/PM/W
P	Low-carbon steel、Soft steel	⩽180	YBG102 YBM253 YBG202 YBC302	270 (220-350)	0.2 (0.1-0.4)	4	5
	High-carbon steel、Alloy steel	180-280	YBG102 YBM253 YBG202 YBC302	260 (200-320)	0.2 (0.1-0.4)	4	5
	Alloy tool steel	280-350	YBG102 YBM253 YBG202 YBC302	240 (180-300)	0.2 (0.1-0.4)	4	5
M	Stainless steel	⩽270	YBM253	230(180-300)	0.2(0.1-0.3)	4	5
K	Cast iron	180-250	YBD152	270 (150-300)	0.4 (0.1-0.5)	4	5

Note: The recommended feed rate per tooth for inserts with wiper fz⩽0.25mm/z.

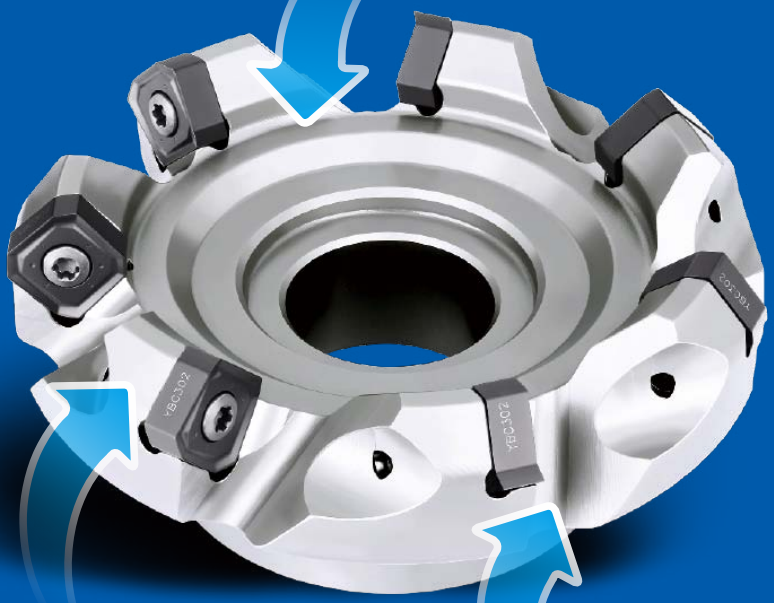


FMA11 Series

With outstanding economy and high performance

Kr:45°

PVD coating of cutter body provides outstanding corrosion resistance and heat resistance for longer tool life





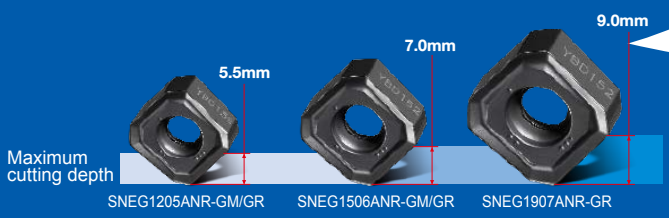
Unique geometry with large rake angle for excellent chip evacuation and low cutting force

Double-negative rake angle gives exceptional impact resistance.

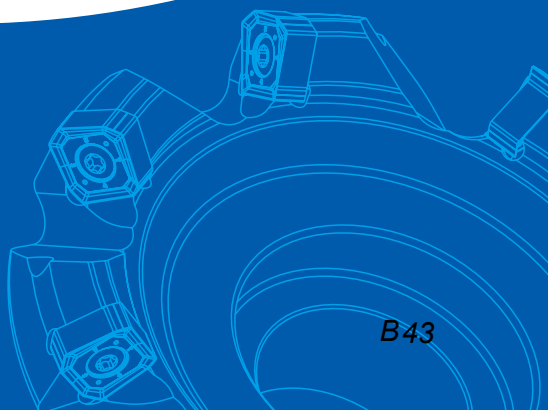
Optimized pitch and chip pocket ensure smooth chip evacuation and higher cutting efficiency.



Inserts with wiper ensure good surface finish.



Complete range of insert sizes and geometries for various depths of cut and machining conditions



Face milling tools

Kr:45°

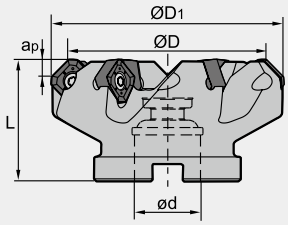

Face milling


Chamfering

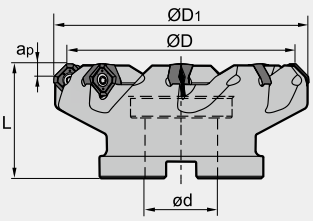
FMA11 P K



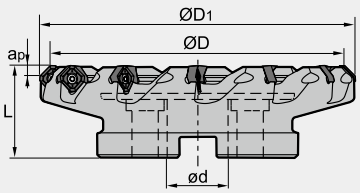
A-type coupling



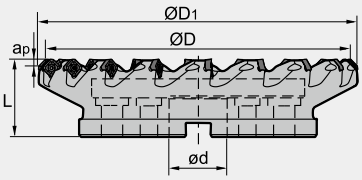
B-type coupling



C-type coupling



D-type coupling



Specification of tools

type		Stock	Basic dimensions(mm)					Number of teeth Z	Style of coupling	Weight (kg)
		R	ØD	ØD1	Ød	L	$a_p$max			
FMA11	**-063-A22-SN15-05**	▲	63	77.4	22	40	7.0	5	A	0.56
	-080-A27-SN15-06	▲	80	94.4	27	50	7.0	6	A	1.06
	-100-B32-SN15-07	▲	100	114.4	32	50	7.0	7	B	1.47
	-125-B40-SN15-08	▲	125	139.4	40	63	7.0	8	B	2.70
	-160-C40-SN15-10	▲	160	174.4	40	63	7.0	10	C	3.92
	-200-C60-SN15-12	▲	200	214.4	60	63	7.0	12	C	5.46
	-250-C60-SN15-14	▲	250	264.4	60	63	7.0	14	C	11.26
	-315-D60-SN15-18	▲	315	329.4	60	80	7.0	18	D	20.00
	-063-A22-SN12-05	▲	63	74.47	22	40	5.5	5	A	0.55
	-080-A27-SN12-06	▲	80	91.47	27	50	5.5	6	A	1.14
	-100-B32-SN12-07	▲	100	111.47	32	50	5.5	7	B	1.42
	-125-B40-SN12-08	▲	125	136.47	40	63	5.5	8	B	2.86
	-160-C40-SN12-10	▲	160	171.47	40	63	5.5	10	C	4.06
	-125-B40-SN19-07	▲	125	142.63	40	63	9.0	7	B	3.00
	-160-C40-SN19-09	▲	160	167.63	40	63	9.0	9	C	4.25
	-200-C60-SN19-11	▲	200	217.63	60	63	9.0	11	C	6.18
	-250-C60-SN19-13	▲	250	267.63	60	63	9.0	13	C	11.55
	-315-D60-SN19-16	▲	315	332.63	60	80	9.0	16	D	20.90

▲Stock available △Make-to-order

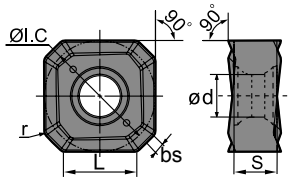
Spare parts

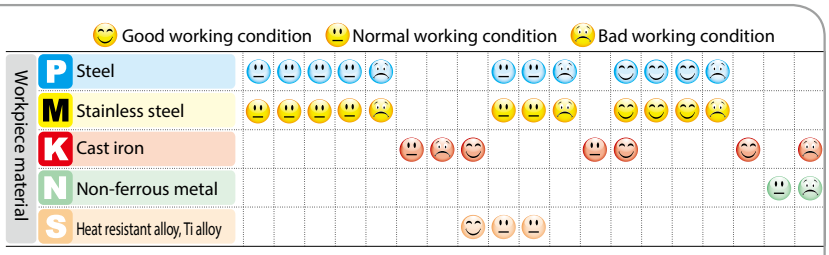
Diameter ØD	Inserts	Insert screw	Wrench	
				
Ø63 -Ø160	SNEG1205ANR-GR	I60M3.5×10	--	WT15IS
Ø63 -Ø315	SNEG1506ANR-GR	I60M5×13	WT20IT	--
Ø125 -Ø315	SNEG1907ANR-GR	I43M6×16	WT25IT	--



Tools code key B22–B23
Grade selection guide B18–B21
Technical data B192–B198

Selection of inserts





Insert shape	Type	Basic dimensions(mm)						CVD Coating						PVD Coating						Cermet		Cemented carbide			
		L	ØI.C	S	bs	ød	r	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	**SNEG1205ANR-GM**	7.6	12.0	4.76	1.05	4.6	0.8		★		★		★				★									
	SNEG1506ANR-GM	9.4	15.0	5.54	1.30	5.5	0.9		★		★		★				★									
	**SNEG1506ANR-GR**	9.4	15.0	5.54	1.30	5.5	0.9		★		★		★				★									
	SNEG1907ANR-GR	12.1	19.0	7.0	1.67	7.2	1.0		★		★		★				★									

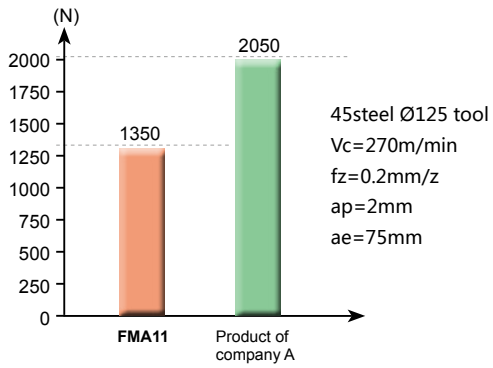
★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

Recommended cutting parameters

Workpiece material		Hardness HB	Insert grade	Cutting parameters		
				V(m/min)	f(mm/z)	a_{pmax}(mm)
P	Low-carbon steel、Soft steel	⩽180	YBG205 YBM253 YBC302	270 (220-350)	0.2 (0.1-0.4)	5.5-9.0
P	High-carbon steel、Alloy steel	180-280	YBG205 YBM253 YBC302	260 (200-320)	0.2 (0.1-0.4)	5.5-9.0
P	Alloy tool steel	280-350	YBG205 YBM253 YBC302	240 (180-300)	0.2 (0.1-0.4)	5.5-9.0
K	Cast iron	180-250	YBD152	270 (150-300)	0.4(0.1-0.5)	5.5-9.0

Case for FMA11

comparison of cutting force



45steel Ø125 tool
Vc=270m/min
fz=0.2mm/z
ap=2mm
ae=75mm

Workpiece: HT300
Operation: Face milling
Tool: FMA11-125-B40-SN12-08
Inser: SNEG1205ANR-GM/YBD152

Cutting data: Vc=300m/min,
fz=0.3mm/z,
a_p=3mm, a_e=80mm

Tool life comparison

	Rake face	Clearance face	Wiper
FMA11 After machining 3 pcs, normal wear.			
Product of ompany A After machining 2 pcs, severe wear.			

FMA12 Series

Kr:45°

High Performance Face Mill with 16 edges for outstanding economy



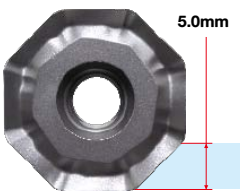
Unique 3-dimentional edge



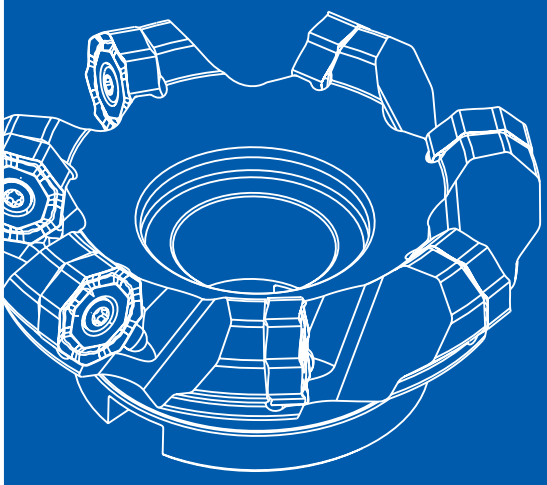
Double negative rake angle, in combination with helical insert structure, achieves double positive axial angle, which will help reduce cutting resistance and improve chip evacuation.



8 × 2=16edges



ONHU08T624R-GM



Face milling tools

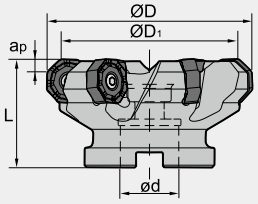
Kr:45°

Face milling Chamfering

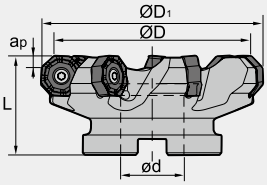
FMA12 P K



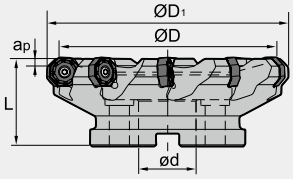
A-type coupling



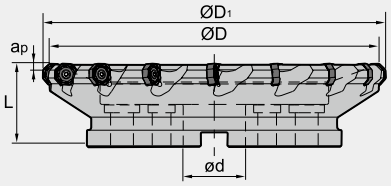
B-type coupling



C-type coupling



D-type coupling



Specification of tools

type		Stock	Basic dimensions(mm)					Number of teeth Z	Style of coupling	Weight (kg)
			ØD	ØD1	Ød	L	apmax			
FMA12	**-080-A27-ON08 -06**	▲	80	95	27	50	5.0	6	A	0.97
	-100-B32-ON08 -07	▲	100	115	32	50	5.0	7	B	1.28
	-125-B40-ON08-08	▲	125	140	40	63	5.0	8	B	2.59
	-160-C40-ON08-10	▲	160	175	40	63	5.0	10	C	4.10
	-200-C60-ON08-12	▲	200	215	60	63	5.0	12	C	5.68
	-250-C60-ON08-14	▲	250	265	60	63	5.0	14	C	11.90
	-315-D60-ON08-18	▲	315	330	60	80	5.0	18	D	20.41

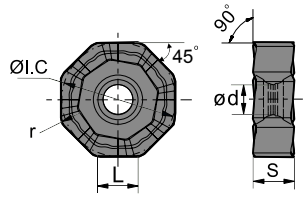
▲Stock available △Make-to-order

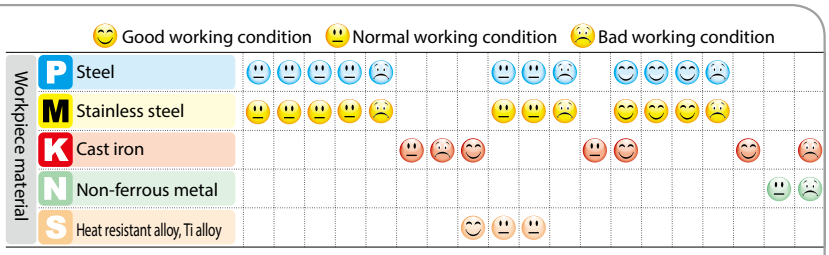
Spare parts

Diameter ØD	Inserts	Insert screw	Wrench	
				
Ø80-Ø315	ONHU08T624R-GM	I60M5X13	WT20IT	

Tools code key B22–B23
Grade selection guide B18–B21
Technical data B192–B198

Selection of inserts





Insert shape	Type	Basic dimensions(mm)					CVD Coating						PVD Coating						Cermet		Cemented carbide			
		L	ØI.C	S	ød	r	YBC301	**YBC302**	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	**ONHU08T624R-GM**	6.38	20.2	6.3	5.3	2.4				★		★				★								

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

Note：ONHU08T508-PF、ONHU08T508-PM also compatible.

Recommended cutting parameters

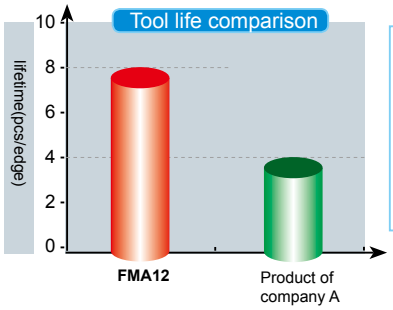
Workpiece material		Hardness HB	Insert grade	Cutting parameters		
				Cutting speed（m/min）	Feed per tooth（mm）	a_{pmax}(mm)
P	Low carbon steel	⩽180	YBM253 YBG205	270(220-350)	0.2(0.1-0.3)	5
P	Alloy steel	180-350	YBM253 YBG205	240(180-320)	0.15(0.1-0.3)	5
M	Stainless steel	⩽270	YBM253 YBG205	230 (180-300) 160 (110-270)	0.15 (0.1-0.3)	5
K	Cast iron	180-260	YBD152	270(150-300)	0.2(0.1-0.3)	5

Case for FMA12

Case (Cast iron machining)



Workpiece: Cylinder
Workpiece material: Gray cast iron (HB250)
Machining location: Milling 4 sides
Tool: FMA12-160-C40-ON08-10
Insert: ONHU08T624R-GM/YBD152
Cutting data: V_c=150m/min，f_z=0.25mm/z，
a_p=3mm，a_e=160mm
System of cooling: External

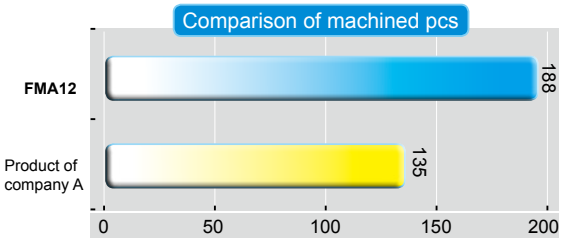


Doubled tool life of FMA12 series compared to similar product of company A.

Case (Steel machining)

A36(HB180~220)
Operation: Face milling
Tool: FMA12-200-C60-ON08-12
nsert: ONHU08T624R-GM/YBM253
Cutting data: V_c=250m/min，f_z=0.15mm/z，
a_p=3mm，a_e=125mm







High strength screw clamping



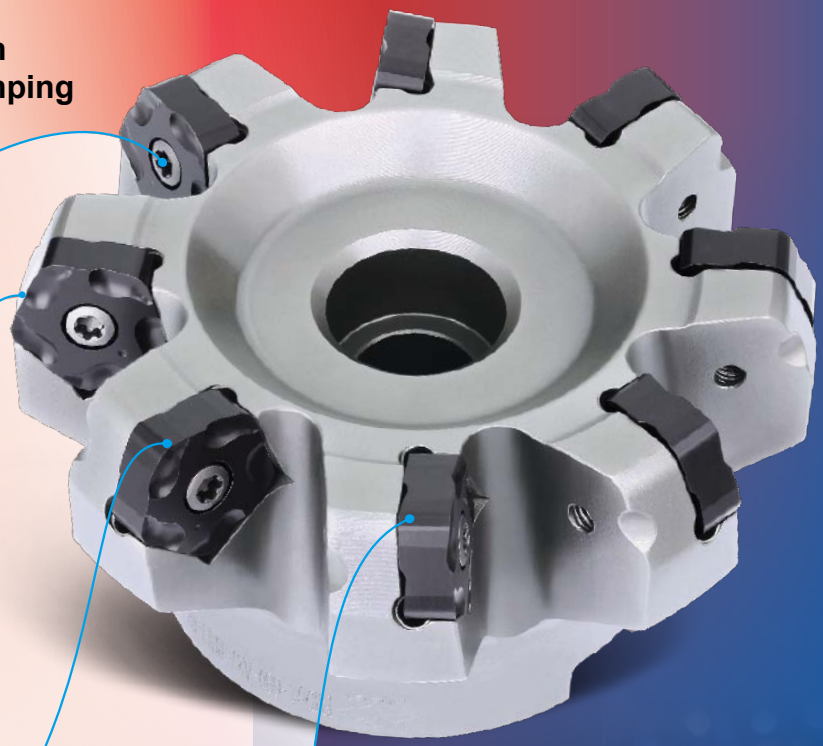
67° approach angle



Wiper



Each insert has 10 cutting edges



WHIRLWIND FMD02 milling cutter series

- New generation of milling cutter for face miling mainly in automotive industry.
- Open chipbreaker and large rake angle design, suitable for machines of different power.
- Wiper insert guarantees stable good surface quality at different feed rates.
- The high precision insert pocket design, ensures high accuracy insert positioning and strong clamping of inserts for a stable machining process.
- The Pentagon insert with 10 cutting edges and offers outstanding machining economy.



Face milling tools

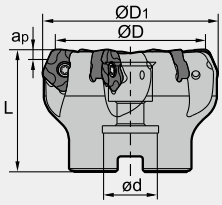
Kr:67°

Face milling

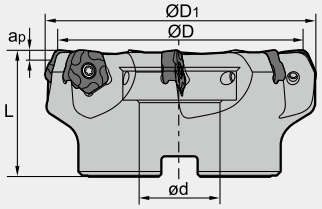
FMD02 K



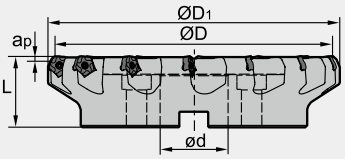
A-type coupling



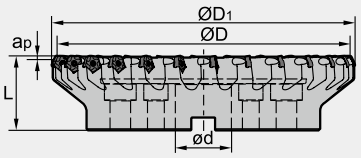
B-type coupling



C-type coupling



D-type coupling



Specification of tools

type		Stock		Basic dimensions(mm)					Number of teeth Z	Style of coupling	Weight (kg)
		R	L	ØD	ØD1	Ød	L	apmax			
FMD02 Coarse pitch (unequal pitch)	**-050-A22-PN11-04**	▲	△	50	60.1	22	50	5/7.5	4	A	0.6
	-063-A22-PN11-05	▲	△	63	73.1	22	50	5/7.5	5	A	0.8
	-080-A27-PN11-06	▲	△	80	90.1	27	50	5/7.5	6	A	1.1
	-100-B32-PN11-07	▲	△	100	110.1	32	50	5/7.5	7	B	1.8
	-125-B40-PN11-08	▲	△	125	135.1	40	63	5/7.5	8	B	2.9
	-160-B40-PN11-10	▲	△	160	170.1	40	63	5/7.5	10	B	5.6
	-200-C60-PN11-12	▲	△	200	210.1	60	63	5/7.5	12	C	7.9
	-250-C60-PN11-14	▲	△	250	260.1	60	63	5/7.5	14	C	13.4
Close pitch	**-050-A22-PN11-05**	▲	△	50	60.1	22	50	5/7.5	5	A	0.6
	-063-A22-PN11-06	▲	△	63	73.1	22	50	5/7.5	6	A	0.9
	-080-A27-PN11-08	▲	△	80	90.1	27	50	5/7.5	8	A	1.2
	-100-B32-PN11-10	▲	△	100	110.1	32	50	5/7.5	10	B	1.9
	-125-B40-PN11-12	▲	△	125	135.1	40	63	5/7.5	12	B	3.2
	-160-B40-PN11-14	▲	△	160	170.1	40	63	5/7.5	14	B	6.4
	-200-C60-PN11-16	▲	△	200	210.1	60	63	5/7.5	16	C	8.5
	-250-C60-PN11-18	▲	△	250	260.1	60	63	5/7.5	18	C	18.0
	-315-D60-PN11-26	▲	△	315	325.1	60	80	5/7.5	26	D	24.5

▲Stock available △Make-to-order

Spare parts

Diameter ØD	Insert screw	Wrench
		
Ø50 -Ø315	I60M4×10	WT15IS



Tools code key B22–B23
Grade selection guide B18–B21
Technical data B192–B198

Face milling tools

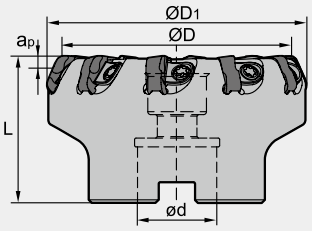
Kr:67°

Face milling

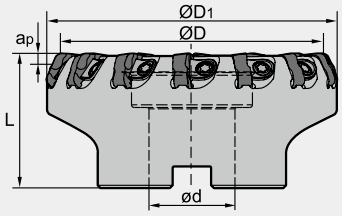
FMD02 K



A-type coupling



B-type coupling



Specification of tools

type		Stock		Basic dimensions(mm)					Number of teeth Z	Style of coupling	Weight (kg)
		R	L	ØD	ØD1	Ød	L	apmax			
FMD02 Extra close pitch	**-080-A27-PN11-10**	▲	△	80	90.1	27	50	5/7.5	10	A	1.3
	-100-B32-PN11-14	▲	△	100	110.1	32	50	5/7.5	14	B	1.6
	-125-B40-PN11-18	▲	△	125	135.1	40	63	5/7.5	18	B	3.2
	-160-B40-PN11-22	▲	△	160	170.1	40	63	5/7.5	22	B	5.8

▲Stock available △Make-to-order



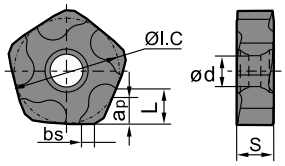
Spare parts

Diameter ØD	Wedge	Screw	Wrench
			
Ø80 -Ø160	W18N	DM6×20A	WT15IT



Tools code key B22–B23
Grade selection guide B18–B21
Technical data B192–B198

Selection of inserts



Good working condition Normal working condition Bad working condition

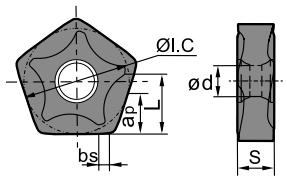
Workpiece material

P	Steel
M	Stainless steel
K	Cast iron
N	Non-ferrous metal
S	Heat resistant alloy, Ti alloy

Insert shape	Type	Basic dimensions(mm)						CVD Coating							PVD Coating							Cermet		Cemented carbide			
		L	ØI.C	S	ød	bs	$a_p$max	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	PNEG110512R-CF	5.4	15.875	5.56	4.64	1.6	5						●													
	PNEG110512L-CF	5.4	15.875	5.56	4.64	1.6	5						●													
	PNEG110512R-CM	5.4	15.875	5.56	4.64	1.6	5						●													
	PNEG110512L-CM	5.4	15.875	5.56	4.64	1.6	5						●													
	PNEG110512R-CR	5.4	15.875	5.56	4.64	1.6	5						●													
	PNEG110512L-CR	5.4	15.875	5.56	4.64	1.6	5						●													

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

Selection of 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

Insert shape	Type	Basic dimensions(mm)						CVD Coating							PVD Coating							Cermet		Cemented carbide			
		L	ØI.C	S	ød	bs	$a_p$max	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	PNEG110512R-PF	7.5	15.875	5.56	4.64	1.4	7.5		★		●															
	PNEG110512L-PF	7.5	15.875	5.56	4.64	1.4	7.5		★		●															
	PNEG110512R-PM	7.5	15.875	5.56	4.64	1.4	7.5		★		●															
	PNEG110512L-PM	7.5	15.875	5.56	4.64	1.4	7.5		★		●															
	PNEG110512R-PR	7.5	15.875	5.56	4.64	1.4	7.5		★		●															
	PNEG110512L-PR	7.5	15.875	5.56	4.64	1.4	7.5		★		●															

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

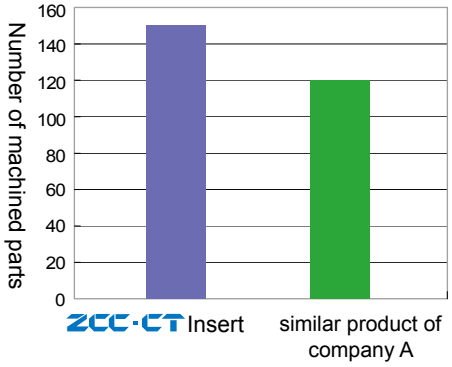
Recommended cutting parameters

Workpiece material		Hardness HB	Insert grade	Cutting parameters				
				V(m/min)	f(mm/z)			a_{pmax}(mm)
					PF	PM	PR	
P	Low-carbon steel、Soft steel	⩽180	YBM253 YBC302	270 (220-350)	0.15 (0.1-0.2)	0.2(0.1-0.3)	0.3(0.2-0.4)	7.5
P	High-carbon steel、Alloy steel	180-280	YBM253 YBC302	260 (200-320)	0.15 (0.1-0.2)	0.2(0.1-0.3)	0.3(0.2-0.4)	7.5
P	Alloy tool steel	280-350	YBM253 YBC302	240 (180-300)	0.15 (0.1-0.2)	0.2(0.1-0.3)	0.3(0.2-0.4)	7.5
K	Cast iron	180-250	YBD152	270 (150-300)	CF	CM	CR	5
					0.15(0.1-0.2)	0.2(0.1-0.3)	0.3(0.2-0.4)	

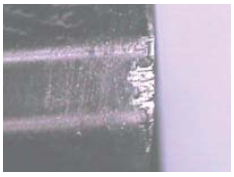
Case for FMD02

Tool type	FMD02-100-B32-PN11-10 ZCC-CT	similar product of company A
Insert type/ grade	PNEG110512R-CR/YBD152 (10-cutting-edge inserts without clearance angle)	
Cutting parameters	D=100mm a_p=3~5mm Vc=243m/min f_z=0.15mm/z T=145~155 piece	D=100mm a_p=3~5mm Vc=243m/min f_z=0.12mm/z T=120~133 piece

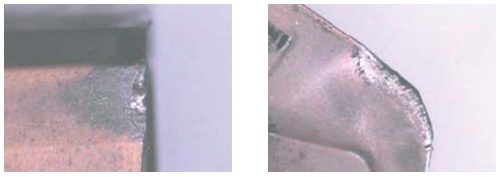




● Comparison of insert abrasion



ZCC-CT insert after 80 minutes machining



Insert of company A after 48 minutes machining

Face milling tools

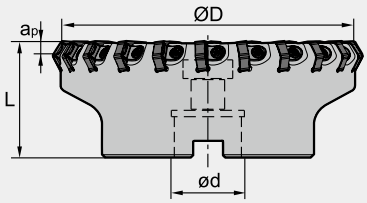
Kr:55°

Face milling

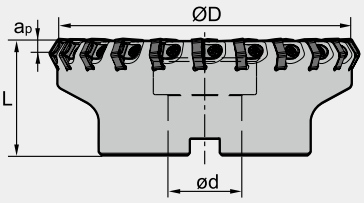
FMD02 K



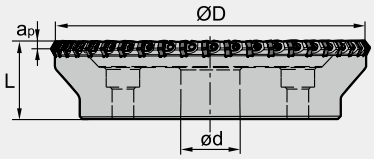
A-type coupling



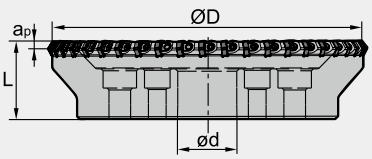
B-type coupling



C-type coupling



D-type coupling



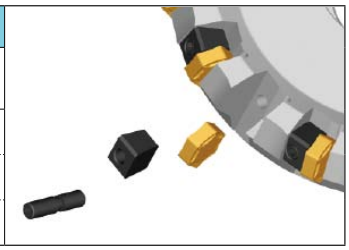
Specification of tools

Type		Stock		Basic dimensions(mm)				Number of teeth Z	Type of coupling	Weight (kg)
		R	L	ØD	ød	L	$a_p$max			
FMD02	**-080-A27-HN09-10**	▲	△	80	27	50	6	8	A	1.1
	-100-B32-HN09-14	▲	△	100	32	63	6	10	B	2.6
	-125-B40-HN09-18	▲	△	125	40	70	6	14	B	3.7
	-160-B40-HN09-22	▲	△	160	40	63	6	18	B	5.6
	-200-C60-HN09-28	▲	△	200	60	63	6	22	C	6.3
	-250-C60-HN09-36	▲	△	250	60	63	6	28	C	10.3
	-315-D60-HN09-44	▲	△	315	60	63	6	32	D	21.7

▲Stock available △Make-to-order

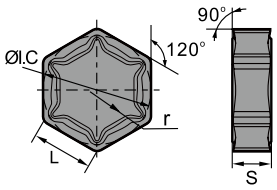
Spare parts

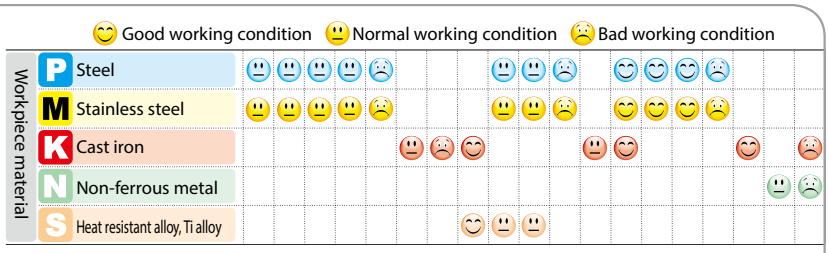
Diameter ØD	Wedge	Wedge screw	Wrench
			
Ø80-Ø315	W18N	DM6×20A	WT15IT



Tools code key B22–B23
Grade selection guide B18–B21
Technical data B192–B198

Selection of inserts





Insert shape	Type	Basic dimensions(mm)				CVD Coating							PVD Coating						Cermet		Cemented carbide			
		L	ØI.C	S	r	YBC301	**YBC302**	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	**HNEX090512-DF**	9.16	15.875	5.56	1.2						★													
	**HNEX090512-DM**	9.16	15.875	5.56	1.2						★													
	**HNEX090512-DR**	9.16	15.875	5.56	1.2						○	★												

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

Chipbreaker selection for FMD02 milling inserts

Classification \ Function	For finishing	For semi-finishing	For roughing
K	-DF	-DM	-DR

Recommended cutting parameters

Workpiece material		Hardness HB	Insert grade	Cutting parameters			
				V(m/min)	f(mm/z)		
					-DF	-DM	-DR
K	Cast iron	180-250	YBD152	180 (110-250)	0.15(0.1-0.2)	0.2 (0.1-0.3)	0.3(0.2-0.5)
			YBD252	130 (110-200)	0.2(0.1-0.2)	0.25 (0.1-0.3)	0.3(0.2-0.5)

Face milling tools

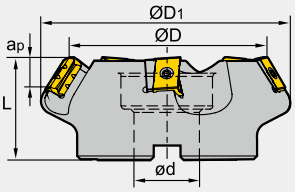
Kr:60°

Face milling

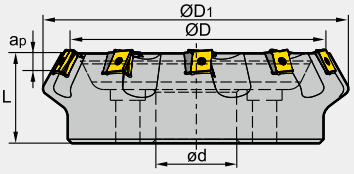
FMD03 P M K



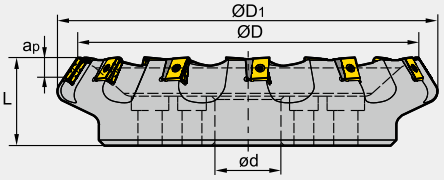
B-type coupling



C-type coupling



D-type coupling



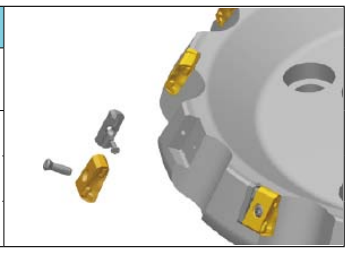
Specification of tools

type		Stock		Basic dimensions(mm)					Number of teeth Z	Applicable inserts	Style of coupling	Weight (kg)
		R	L	ØD	ØD1	Ød	L	apmax				
FMD03	-125-B40-LN20-06	▲	△	125	153	40	63	12	6	LNKT2007DN-ZR	B	4.5
	-160-C40-LN20-08	▲	△	160	187	40	63	12	8		C	6.9
	-200-C60-LN20-10	▲	△	200	227	60	70	12	10		C	10.5
	-250-C60-LN20-12	▲	△	250	276	60	70	12	12		C	13.4
	-315-D60-LN20-15	▲	△	315	339	60	80	12	15		D	26.2
	-125-B40-LN25-05	▲	△	125	154	40	63	17	5	LNKT2510-ZR	B	4.5
	-160-C40-LN25-06	▲	△	160	189	40	63	17	6		C	6.9
	-200-C60-LN25-08	▲	△	200	229	60	70	17	8		C	10.5
	-250-C60-LN25-10	▲	△	250	278	60	70	17	10		C	16.7
	-315-D60-LN25-12	▲	△	315	346	60	80	17	12		D	27.3
	-400-D60-LN25-16	▲	△	400	427	60	80	17	16		D	47.1

▲Stock available △Make-to-order

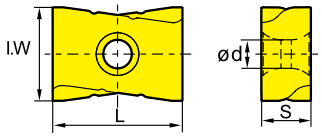
Spare parts

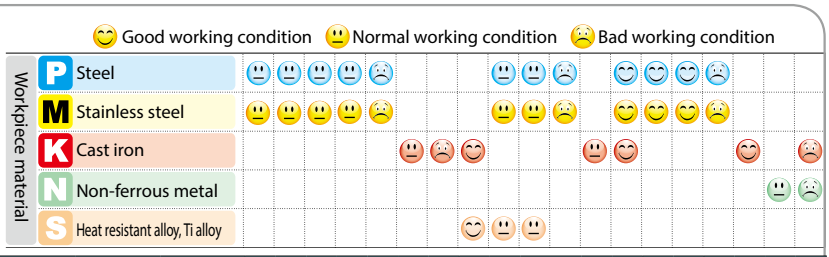
Inserts	Shim	Shim screw	Insert screw	Wrench	
					
LNKT2007DN-ZR	LLN20R-ZR	I60M3×7	I60M4×15	WT15IS	WT10IS
LNKT2510-ZR	LLN25R-ZR	I60M3.5×10.4	I60M5×17	WT20IT	WT15IS



Tools code key B22–B23
Grade selection guide B18–B21
Technical data B192–B198

Selection of inserts





Insert shape	Type	Basic dimensions(mm)				CVD Coating							PVD Coating						Cermet		Cemented carbide			
		L	I.W	S	ød	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	**LNKT2007DN-ZR**	20	17	7.94	4.6					○	○					★								
	**LNKT2510-ZR**	25	18	9.525	5.5					○		○				★								

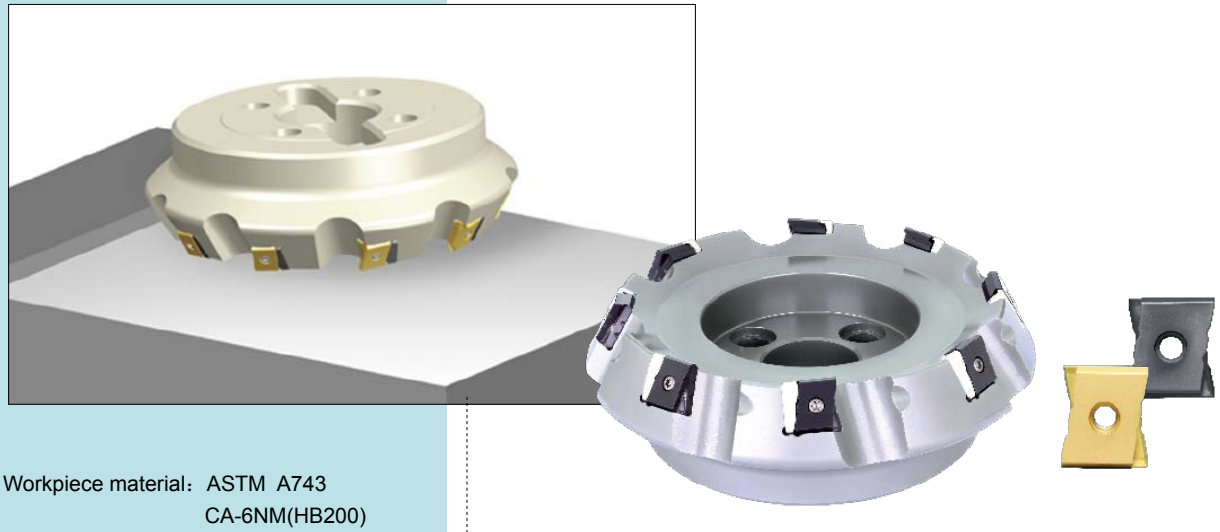
★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

Recommended cutting parameters

Workpiece material		Hardness HB	Insert grade	Cutting parameters	
				V(m/min)	f(mm/z)
P	Low-carbon steel、Soft steel	≤180	YBG302	180 (150-300)	0.5 (0.2-0.8)
			YBM351	180 (150-300)	0.5 (0.2-0.8)
	High-carbon steel、Alloy steel	180-280	YBG302	150 (120-280)	0.5 (0.2-0.8)
			YBM351	140 (120-280)	0.5 (0.2-0.8)
	Alloy tool steel	280-350	YBG302	120 (80-250)	0.45 (0.2-0.6)
			YBM351	100 (80-250)	0.45 (0.2-0.6)
M	Stainless steel	≤270	YBG302	120 (80-200)	0.45 (0.2-0.6)
			YBM351	100 (80-200)	0.45 (0.2-0.6)
K	Cast iron	180-250	YBD152	220 (150-300)	0.5 (0.2-0.8)
			YBD252	210 (150-300)	0.5 (0.2-0.8)
			YBG302	200 (150-300)	0.5 (0.2-0.8)

Note: Cutting parameters can be adjusted according to the Max. power of machine.

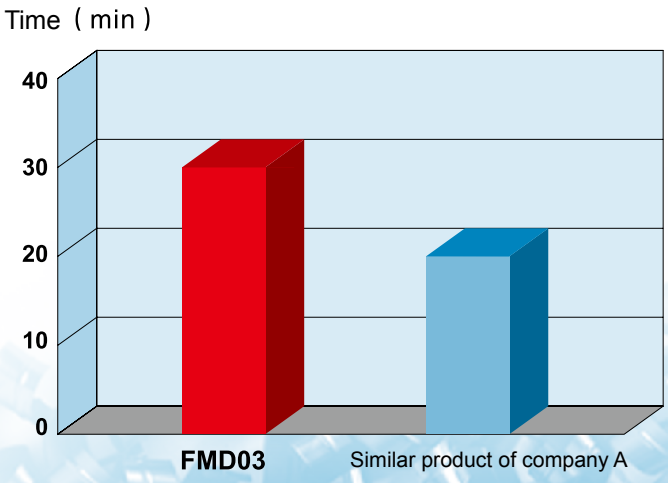
Case for FMD03



Workpiece material：ASTM A743
CA-6NM(HB200)
Cooling system: Dry cutting
Machine: NC floor type boring and milling machine, spindle power≥30KW
Cutting parameters：Vc=120m/min
a_p=12mm
f_z=0.55mm/z
a_e=230mm

Tool type：FMD03-315-D60-LN25-12
Insert type/grade：LNKT2510-ZR/YBG302

●Comparison of machining time





Face milling tools

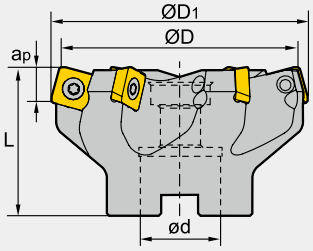
Kr:75°

Face milling

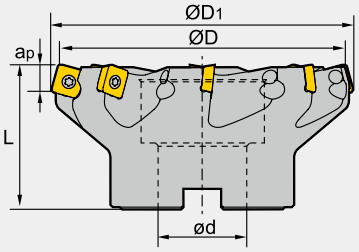
FME02 P M K



A-type coupling



B-type coupling



Specification of tools

Type		Stock	Basic dimensions(mm)					Number of teeth Z	Type of coupling	Weight (kg)
			ØD	ØD1	ød	L	apmax			
FME02	-050-A22-SP12-04	△	50	54	22	40	6	4	A	0.3
	-063-A22-SP12-05	△	63	66	22	50	6	5	A	0.6
	-080-A27-SP12-06	△	80	83	27	50	6	6	A	0.9
	-100-B32-SP12-07	△	100	103	32	50	6	7	B	1.4
	-125-B40-SP12-08	△	125	128	40	63	6	8	B	2.5

▲Stock available △Make-to-order



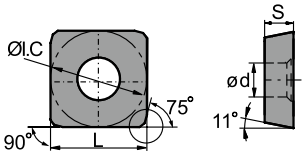
Spare parts

Diameter ØD	Insert screw	Wrench
		
Ø50-Ø125	I60M5×13.2	WT20IS



Tools code key B22–B23
Grade selection guide B18–B21
Technical data B192–B198

Selection of 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

Insert shape	Type	Basic dimensions(mm)				CVD Coating							PVD Coating						Cermet		Cemented carbide			
		L	ØI.C	S	ød	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	**SPKW1204EDFR**	12.7	12.7	4.76	5.56									○										
	SPKW1204EDSR	12.7	12.7	4.76	5.56									○										
	**SPKT1204EDR**	12.7	12.7	4.76	5.56									★										

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

Cutting edge treatment selection for FME02 milling inserts

Classification \ Function	For finishing	For semi-finishing	For roughing
P	EDFR	EDR	EDSR
M	EDFR	EDR	
K	EDFR	EDR	

Recommended cutting parameters

Workpiece material		Hardness HB	Insert grade	Cutting parameters	
				V(m/min)	f(mm/z)
P	Low-carbon steel、Soft steel	⩽180	YBG202	270(200-360)	0.2 (0.1-0.3)
	High-carbon steel、Alloy steel	180-280	YBG202	240 (180-350)	0.2 (0.1-0.3)
	Alloy tool steel	280-350	YBG202	220 (170-340)	0.2 (0.1-0.3)
M	Stainless steel	⩽270	YBG202	160 (110-270)	0.2 (0.1-0.3)
K	Cast iron	180-250	YBG202	160 (120-200)	0.2 (0.1-0.3)

Face milling tools

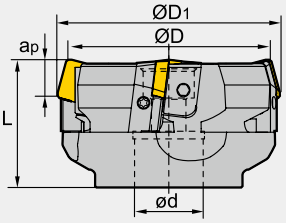
Kr:75°

Face milling

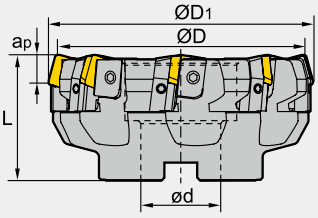
FME03 P M K



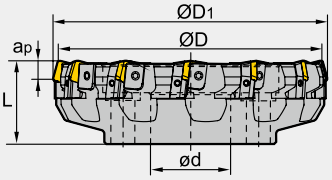
A-type coupling



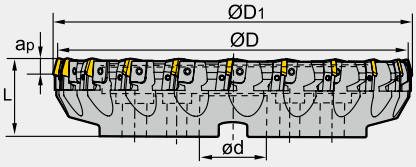
B-type coupling



C-type coupling



D-type coupling



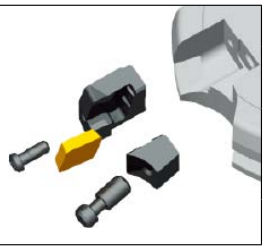
Specification of tools

Type		Stock		Basic dimensions(mm)					Number of teeth Z	Type of coupling	Weight (kg)
		R	L	ØD	ØD1	ød	L	apmax			
FME03	**-080-A27-SP12-04**	▲	△	80	84	27	50	6	4	A	1.1
	-100-B32-SP12-06	▲	△	100	104	32	50	6	6	B	1.9
	-125-B40-SP12-08	▲	△	125	129	40	63	6	8	B	3.5
	-160-B40-SP12-10	▲	△	160	164	40	63	6	10	B	5.7
	-200-C60-SP12-12	▲	△	200	203	60	63	6	12	C	8.2
	-250-C60-SP12-16	▲	△	250	253	60	63	6	16	C	13.8
	-315-D60-SP12-20	▲	△	315	318	60	70	6	20	D	23.5
	-080-A27-SP15-04	▲	△	80	84	27	50	8	4	A	1.0
	-100-B27-SP15-06	▲	△	100	104	27	50	8	6	B	1.8
	-125-B40-SP15-08	▲	▲	125	129	40	63	8	8	B	3.3
	-160-B40-SP15-10	▲	▲	160	164	40	63	8	10	B	5.4
	-200-C60-SP15-12	▲	▲	200	204	60	63	8	12	C	7.9
	-250-C60-SP15-16	▲	▲	250	253	60	63	8	16	C	13.6
	-315-D60-SP15-20	▲	▲	315	318	60	70	8	20	D	23.1

▲Stock available △Make-to-order

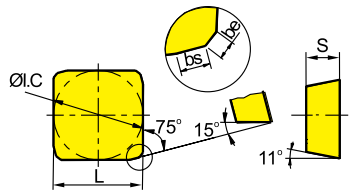
Spare parts

Diameter ØD	Inserts	Locator	Wedge	Wedge Screw	Locator screw	Wrench
Ø80-Ø100	SP12	LSP12R/L	W04R/L	WM8×17	LOM5×15.1	WT20T WT25T
Ø125-Ø315				WM8×22		
Ø80-Ø315	SP15	LSP15R/L	W04R/L	WM8×22		



Tools code key B22–B23
Grade selection guide B18–B21
Technical data B192–B198

Selection of inserts



Good working condition Normal working condition Bad working condition

Workpiece material

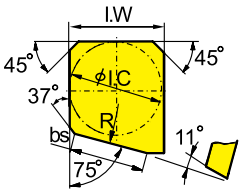
- P Steel
- M Stainless steel
- K Cast iron
- N Non-ferrous metal
- S Heat resistant alloy, Ti alloy

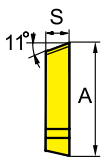
Insert shape	Type	Basic dimensions(mm)					CVD Coating						PVD Coating						Cermet		Cemented carbide			
		L	ØI.C	S	be	bs	YBC301	**YBC302**	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	SPKN1203EDER	12.7	12.7	3.18	1	1.4									○										
	SPKN1203EDEL	12.7	12.7	3.18	1	1.4									○										
	SPKN1203EDFR	12.7	12.7	3.18	1	1.4								★	○										●
	SPKN1203EDFL	12.7	12.7	3.18	1	1.4								○	○										○
	SPKN1203EDSKR	12.7	12.7	3.18	1	1.4											○					○			
	SPKN1203EDSKL	12.7	12.7	3.18	1	1.4											○					○			
	SPKN1203EDTKR	12.7	12.7	3.18	1	1.4	●				●				○		★					●			○
	SPKN1203EDTKL	12.7	12.7	3.18	1	1.4									○		○					○			○
	SPKN1203EDS31R	12.7	12.7	3.18	1	1.4											○					○			
	SPKN1203EDS31L	12.7	12.7	3.18	1	1.4											○					○			
	SPKN1203EDT31R	12.7	12.7	3.18	1	1.4	●				●				○		★					●			○
	SPKN1203EDT31L	12.7	12.7	3.18	1	1.4									○		○					○			○
	SPKR1203EDR-GM	12.7	12.7	3.18	1	1.4			●						★		★					●			●
	SPKR1203EDL-GM	12.7	12.7	3.18	1	1.4			●						★		★					●			●
	SPKN1504EDER	15.875	15.875	4.76	1	1.4									○										
	SPKN1504EDEL	15.875	15.875	4.76	1	1.4									○										
	SPKN1504EDFR	15.875	15.875	4.76	1	1.4								○	○										○
	SPKN1504EDFL	15.875	15.875	4.76	1	1.4								○	○										○
	SPKN1504EDSKR	15.875	15.875	4.76	1	1.4											○					○			
	SPKN1504EDSKL	15.875	15.875	4.76	1	1.4											○					○			
	SPKN1504EDTKR	15.875	15.875	4.76	1	1.4	●								★		○					●			●
	SPKN1504EDTKL	15.875	15.875	4.76	1	1.4									○		○					○			●
	SPKN1504EDS32R	15.875	15.875	4.76	1	1.4											○					○			
	SPKN1504EDS32L	15.875	15.875	4.76	1	1.4											○					○			
	SPKN1504EDT32R	15.875	15.875	4.76	1	1.4	●								★		○					●			●
	SPKN1504EDT32L	15.875	15.875	4.76	1	1.4									○		○					○			●
	SPKR1504EDR-GM	15.875	15.875	4.76	1	1.4			●						★		★					●			●
	SPKR1504EDL-GM	15.875	15.875	4.76	1	1.4			●						★		★					●			●

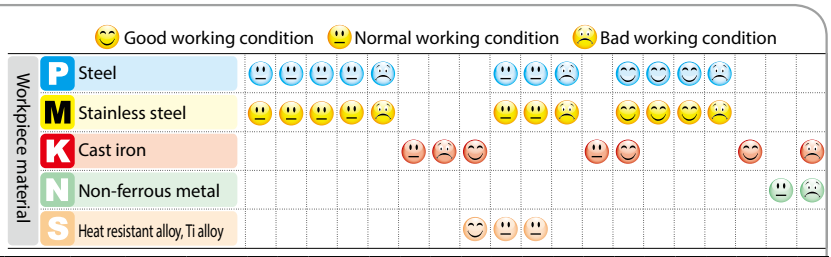
★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

Ordering guide: **SPKN1203EDT3 1 R** chamfering angle 20°, chamfering width 0.15mm. For other edge shapes, see inserts code key standard.

Selection of inserts







Insert shape	Type	Basic dimensions(mm)						CVD Coating							PVD Coating						Cermet		Cemented carbide			
		A	ØI.C	I.W	S	bs	R	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
Wiper inserts 	**SPEX1203EDL-1**	15	12.7	12.7	3.18	10	500																			●
	SPEX1203EDR-1	15	12.7	12.7	3.18	10	500																			●
	SPEX1504EDL-1	18.2	15.875	15.875	4.76	10	500																	○		●
	SPEX1504EDR-1	18.2	15.875	15.875	4.76	10	500																	○		●

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

Cutting edge treatment selection for FME03 milling inserts

Treatment of cutting edge	Recommended selection
SP□□EDER/L	Honing edge is suitable for semi-finish and finish machining of steel and stainless steel.
SP□□EDFR/L	Sharp cutting edge is suitable for finish machining of cast iron materials.
SP□□EDSKR/L **SP□□EDS□□R/L**	After chamfering and honing, the edge has strong anti-breakage capability, suitable for rough machining of steel parts under poor working conditions.
SP□□EDTKR/L **SP□□EDT□□R/L**	Chamfered edge is suitable for semi-finish and finish machining of steel, stainless steel and cast iron materials.
SP□□EDR/L-GM	3D chipbreaker can reduce cutting force, reinforce the capability of chip control, and improve insert life. It is widely applied in semi-finish machining of steel, stainless steel and cast iron materials.

Recommended cutting parameters

Workpiece material		Hardness HB	Insert grade	Cutting parameters	
				V(m/min)	f(mm/z)
P	Low-carbon steel、Soft steel	≤180	YBG202	270(200-360)	0.2 (0.1-0.4)
			YBG302	230 (170-350)	0.24 (0.1-0.3)
			YBM251 YBC301	270(220-350)	0.2 (0.1-0.4)
			YBM351	220 (180-300)	0.25 (0.15-0.3)
			YC30S	140 (100-220)	0.22 (0.1-0.3)
	High-carbon steel、Alloy steel	180-280	YBG202	240 (180-350)	0.2 (0.1-0.3)
			YBG302	220 (150-330)	0.24 (0.1-0.3)
			YBM251 YBC301	240 (200-320)	0.2 (0.1-0.4)
			YBM351	200 (160-280)	0.25 (0.15-0.3)
			YC30S	120 (80-200)	0.22 (0.1-0.3)
	Alloy tool steel	280-350	YBG202	220 (170-340)	0.2 (0.1-0.3)
			YBG302	190 (130-300)	0.24 (0.1-0.3)
			YBM251 YBC301	220 (180-300)	0.2 (0.1-0.4)
			YBM351	180 (150-250)	0.25 (0.15-0.3)
			YC30S	100 (60-180)	0.22 (0.1-0.3)
M	Stainless steel	≤270	YBG202	160 (110-270)	0.2 (0.1-0.3)
			YBG302	140 (100-250)	0.24 (0.1-0.3)
			YBM251	150 (120-240)	0.2 (0.1-0.4)
			YBM351	140 (100-240)	0.25 (0.15-0.3)
K	Cast iron	180-250	YBG102	210 (120-300)	0.12 (0.08-0.3)
			YBG302	160 (120-200)	0.2 (0.1-0.3)
			YD201	100 (80-160)	0.24 (0.15-0.4)



Face milling tools

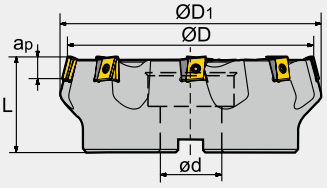
Kr:75°

Face milling

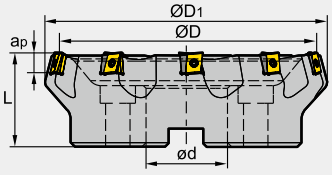
FME04 P M K



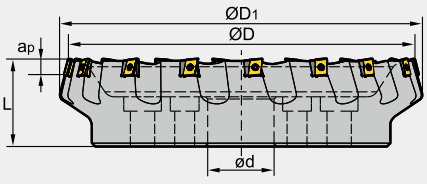
B-type coupling



C-type coupling



D-type coupling



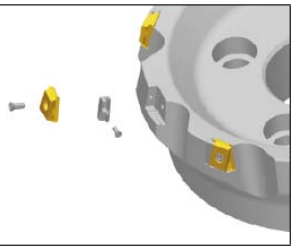
Specification of tools

type		Stock R	Stock L	ØD	ØD1	Ød	L	apmax	Number of teeth Z	Applicable inserts	Style of coupling	Weight (kg)
FME04	-125-B40-LN15-06	▲	△	125	137	40	63	8	6	LNKT1506EN-ZR	B	3.8
	-160-B40-LN15-08	▲	△	160	170	40	63	8	8		C	6.6
	-200-C60-LN15-10	▲	△	200	208	60	70	8	10		C	9.6
	-250-C60-LN15-12	▲	△	250	257	60	70	8	12		C	13.4
	-315-D60-LN15-16	▲	△	315	328	60	80	8	16		D	25.2

▲Stock available △Make-to-order

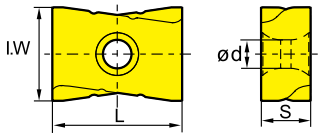
Spare parts

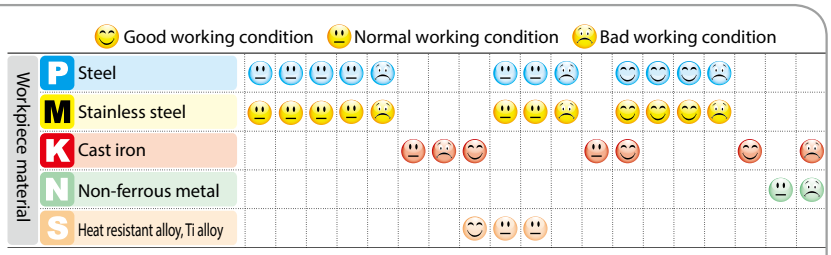
Diameter ØD	Shim	Shim screw	Insert screw	Wrench
				
Ø125-Ø315	LLN15-ZR	I60M3×7	I60M4×12	WT15IS, WT10IS



Tools code key B22–B23
Grade selection guide B18–B21
Technical data B192–B198

Selection of inserts





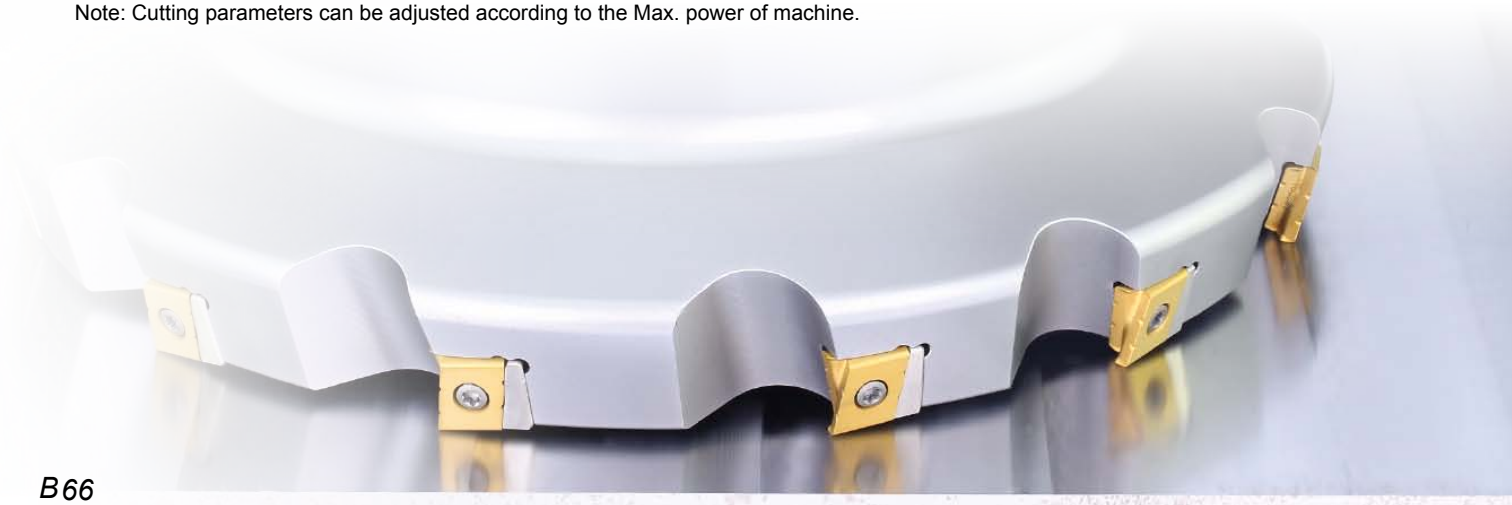
Insert shape	Type	Basic dimensions(mm)				CVD Coating							PVD Coating						Cermet		Cemented carbide			
		L	I.W	S	ød	YBC301	**YBC302**	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	**LNKT1506EN-ZR**	15.875	14	6.35	4.6					○	○					★								

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

Recommended cutting parameters

Workpiece material		Hardness HB	Insert grade	Cutting parameters	
				V(m/min)	f(mm/z)
P	Low-carbon steel、Soft steel	≤180	YBG302	180 (150-300)	0.5 (0.2-0.8)
			YBM351	180 (150-300)	0.5 (0.2-0.8)
	High-carbon steel、Alloy steel	180-280	YBG302	150 (120-280)	0.5 (0.2-0.8)
			YBM351	140 (120-280)	0.5 (0.2-0.8)
	Alloy tool steel	280-350	YBG302	120 (80-250)	0.45 (0.2-0.6)
			YBM351	100 (80-250)	0.45 (0.2-0.6)
M	Stainless steel	≤270	YBG302	120 (80-200)	0.45 (0.2-0.6)
			YBM351	100 (80-200)	0.45 (0.2-0.6)
K	Cast iron	180-250	YBD152	220 (150-300)	0.5 (0.2-0.8)
			YBD252	210 (150-300)	0.5 (0.2-0.8)
			YBG302	200 (150-300)	0.5 (0.2-0.8)

Note: Cutting parameters can be adjusted according to the Max. power of machine.



Face milling tools

Kr:90°

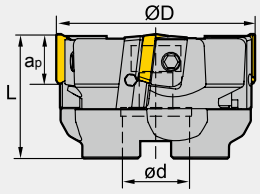

Face milling


Step shoulder

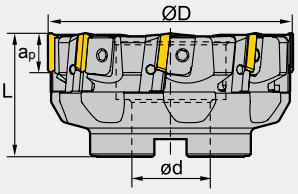
FMP01 P M K



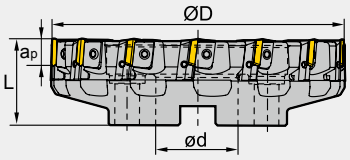
A-type coupling



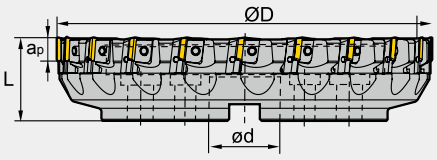
B-type coupling



C-type coupling



D-type coupling



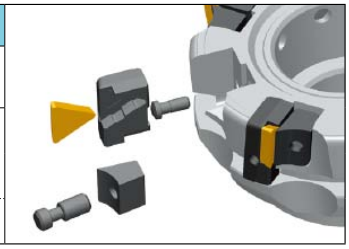
Specification of tools

Type		Stock		Basic dimensions(mm)				Number of teeth Z	Type of coupling	Weight (kg)
		R	L	ØD	ød	L	$a_p$max			
FMP01	**-080-A27-TP22-04**	▲	△	80	27	50	18	4	A	1.2
	-100-B32-TP22-06	▲	△	100	32	50	18	6	B	1.7
	-125-B40-TP22-08	▲	△	125	40	63	18	8	B	3.2
	-160-B40-TP22-10	▲	△	160	40	63	18	10	B	5.1
	-200-C60-TP22-12	▲	△	200	60	63	18	12	C	7.4
	-250-C60-TP22-16	▲	△	250	60	63	18	16	C	12.3
	-315-D60-TP22-20	▲	△	315	60	70	18	20	D	21.9

▲Stock available △Make-to-order

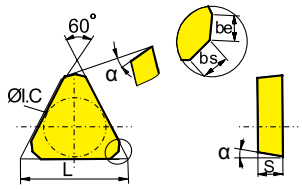
Spare parts

Diameter ØD	Locator	Wedge	Wedge Screw	Locator screw	Wrench
					
Ø80 Ø100	LTP4R1/L1	W04R/L	WM8×17	LOM5×15.1	WT20T
Ø125 ~ Ø315	LTP4R/L		WM8×22		WT25T



Tools code key B22–B23
Grade selection guide B18–B21
Technical data B192–B198

Selection of 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

Insert shape	Type	Basic dimensions(mm)						CVD Coating						PVD Coating						Cermet		Cemented carbide			
		L	ØI.C	S	be	bs	α	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	TPKN2204PDFR	22	12.7	4.76	1.4	0.7	11°								○											○
	TPKN2204PDFL	22	12.7	4.76	1.4	0.7	11°								○											○
	TPKN2204PDR	22	12.7	4.76	1.4	0.7	11°	●				●			★	★		★					●	○	○	●
	TPKN2204PDL	22	12.7	4.76	1.4	0.7	11°																●			
	TPKN2204PDTR	22	12.7	4.76	1.4	0.7	11°	●															●			
	TPKN2204PDTL	22	12.7	4.76	1.4	0.7	11°	○															○			

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

Recommended cutting parameters

Workpiece material		Hardness HB	Insert grade	Cutting parameters	
				V(m/min)	f(mm/z)
P	Low-carbon steel、Soft steel	≤180	YBC301	270 (220-350)	0.2 (0.1-0.4)
			YBM351	220 (180-300)	0.2 (0.08-0.3)
			YBG202	270 (200-360)	0.2 (0.1-0.3)
			YC30S	140 (100-220)	0.22 (0.1-0.3)
	High-carbon steel、Alloy steel	180—280	YBC301	240 (200-320)	0.2 (0.1-0.4)
			YBM351	200 (160-280)	0.2 (0.08-0.3)
			YBG202	240 (180-350)	0.2 (0.1-0.3)
			YC30S	120 (80-200)	0.22 (0.1-0.3)
	Alloy tool steel	280—350	YBC301	220 (180-300)	0.2 (0.1-0.4)
			YBM351	180 (150-250)	0.2 (0.08-0.3)
			YBG202	220 (170-340)	0.2 (0.1-0.3)
			YC30S	100 (60-180)	0.22 (0.1-0.3)
M	Stainless steel	≤270	YBM351	140 (100-240)	0.2 (0.08-0.3)
			YBG202	140 (100-250)	0.2 (0.1-0.3)
K	Cast iron	180—250	YBG102	210 (120-300)	0.2 (0.1-0.3)
			YBG302	160 (120-200)	0.35 (0.10-0.4)
			YD201	100 (80-160)	0.24 (0.15-0.4)

Face milling tools

Kr:90°

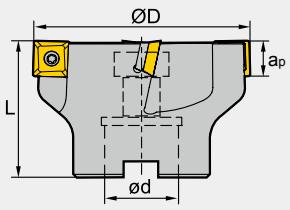




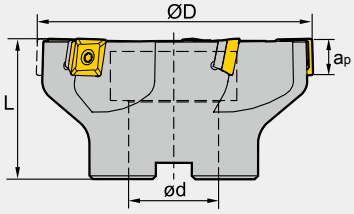
FMP02 P M K



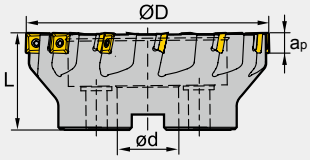
A-type coupling



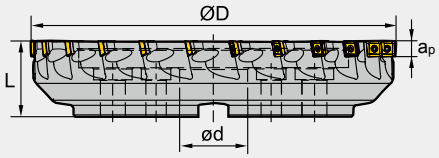
B-type coupling



C-type coupling



D-type coupling



Specification of tools

Type		Stock	Basic dimensions(mm)				Number of teeth Z	Type of coupling	Weight (kg)
			ØD	ød	L	$a_p$max			
FMP02	**-050-A22-SE09-05**	▲	50	22	40	6.7	5	A	0.3
	-063-A22-SE09-06	▲	63	22	40	6.7	6	A	0.5
	-080-A27-SE09-08	▲	80	27	50	6.7	8	A	0.9
	-100-B32-SE09-08	▲	100	32	50	6.7	8	B	1.7
	-100-B32-SE09-10	△	100	32	50	6.7	10	B	1.7
	-125-B40-SE09-12	△	125	40	63	6.7	12	B	2.6

▲Stock available △Make-to-order

Tools code key B22–B23
Grade selection guide B18–B21
Technical data B192–B198

Specification of tools

Type		Stock	Basic dimensions(mm)				Number of teeth Z	Type of coupling	Weight (kg)
			ØD	ød	L	$a_p$max			
FMP02	**-050-A22-SE12-03**	▲	50	22	40	10.8	3	A	0.3
	-063-A22-SE12-04	▲	63	22	40	10.8	4	A	0.4
	-080-A27-SE12-04	▲	80	27	50	10.8	4	A	0.9
	-100-B32-SE12-05	▲	100	32	50	10.8	5	B	1.2
	-125-B40-SE12-06	▲	125	40	63	10.8	6	B	3.1
	-160-C40-SE12-08	▲	160	40	63	10.8	8	C	4.1
	-250-C60-SE12-12	▲	250	60	63	10.8	12	C	11.1
	-050-A22-SE12-04	▲	50	22	40	10.8	4	A	0.3
	-063-A22-SE12-05	▲	63	22	40	10.8	5	A	0.4
	-080-A27-SE12-06	▲	80	27	50	10.8	6	A	0.8
	-100-B32-SE12-07	▲	100	32	50	10.8	7	B	1.2
	-125-B40-SE12-08	▲	125	40	63	10.8	8	B	3.0
	-160-C40-SE12-12	▲	160	40	63	10.8	12	C	3.9
	-050-A22-SE12-05	▲	50	22	40	10.8	5	A	0.2
	-063-A22-SE12-06	▲	63	22	40	10.8	6	A	0.4
	-080-A27-SE12-08	▲	80	27	50	10.8	8	A	0.8
	-100-B32-SE12-10	▲	100	32	50	10.8	10	B	1.2
	-125-B40-SE12-12	▲	125	40	63	10.8	12	B	2.9
	-200-C60-SE12-16	▲	200	60	63	10.8	16	C	6.1
	-250-C60-SE12-18	▲	250	60	63	10.8	18	C	10.9
	-315-D60-SE12-24	▲	315	60	63	10.8	24	D	21.6

▲Stock available △Make-to-order

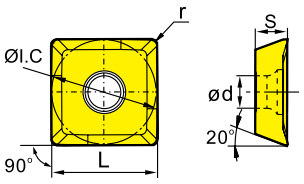
Spare parts

Diameter ØD	Inserts	Shim	Insert screw	Shim screw	Wrench	Wrench
						
Ø50 ~ Ø125	SE09	--	I60M3×7	--	WT09IS	--
Ø50	SE12	--	I60M3.5×10	--	WT15IS	--
Ø63 ~ Ø315		S12BSX	I60M3.5×12	SM5×7XA		WH35L



Tools code key B22–B23
Grade selection guide B18–B21
Technical data B192–B198

Selection of inserts



Good working condition Normal working condition Bad working condition

Workpiece material

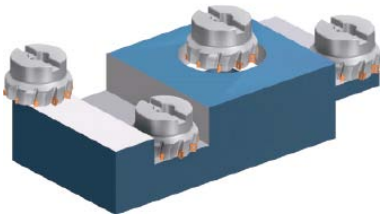
P	Steel
M	Stainless steel
K	Cast iron
N	Non-ferrous metal
S	Heat resistant alloy, Ti alloy

Insert shape	Type	Basic dimensions(mm)					CVD Coating						PVD Coating						Cermet		Cemented carbide			
		L	ØI.C	S	ød	r	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	SEET09T308PER-PF	9.525	9.525	4.01	3.3	0.8									★										
	SEET09T308PER-PM	9.525	9.525	4.01	3.3	0.8						○			★										
	SEET09T308PER-PR	9.525	9.525	4.01	3.3	0.8						★			○										
	SEET120308PER-PF	13.308	13.308	4.04	4.1	0.8									○										
	SEET120308PER-PM	13.308	13.308	4.04	4.1	0.8			●				★	★	★		★								
	SEET120308PER-PR	13.308	13.308	4.04	4.1	0.8					○			★	★		★								

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

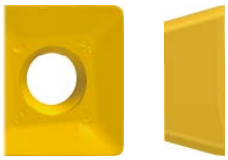
Chipbreaker selection for FMP02 milling inserts

Classification \ Function	For finishing	For semi-finishing	For roughing
P	PF  	PM  	PR  
M			
K			



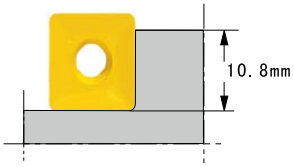
High economical efficiency

FMP02 series square shoulder milling cutters can carry out a variety of cutting operations including face milling, vertical square shoulder milling, slot milling, etc. Coarse pitch, close pitch and extra close pitch, each has its unique merit. Inserts' chipbreakers and grades have been applied and optimized over a long period of time. They can achieve high-efficiency machining under different conditions. Each insert has 4 cutting edges, which is highly economical.



Low cutting force

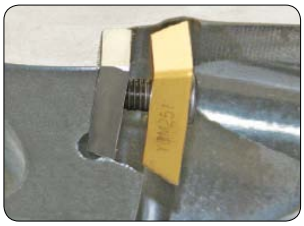
Large positive rake angle makes cutting easy and fast.



High productivity

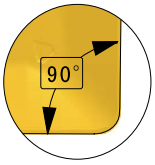
The major cutting edge is a α-curve, therefore, the S type insert can obtain an ideal 90° approach angle while retaining a suitable minor angle, ensuring stable cutting operation. The maximum cutting depth can reach 10.8mm, and the maximum feed rate can reach 0.3mm/z.

Features of FMP02 series milling cutters



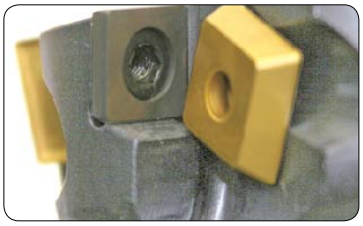
Easy and convenient use

Simple screw clamping, convenient insert displacement, large chip pocket of rake face for smooth chip removal.



High precision

Special structure design of inserts and tools and proper production ensure high precision, greatly improving the workpiece precision and surface quality.

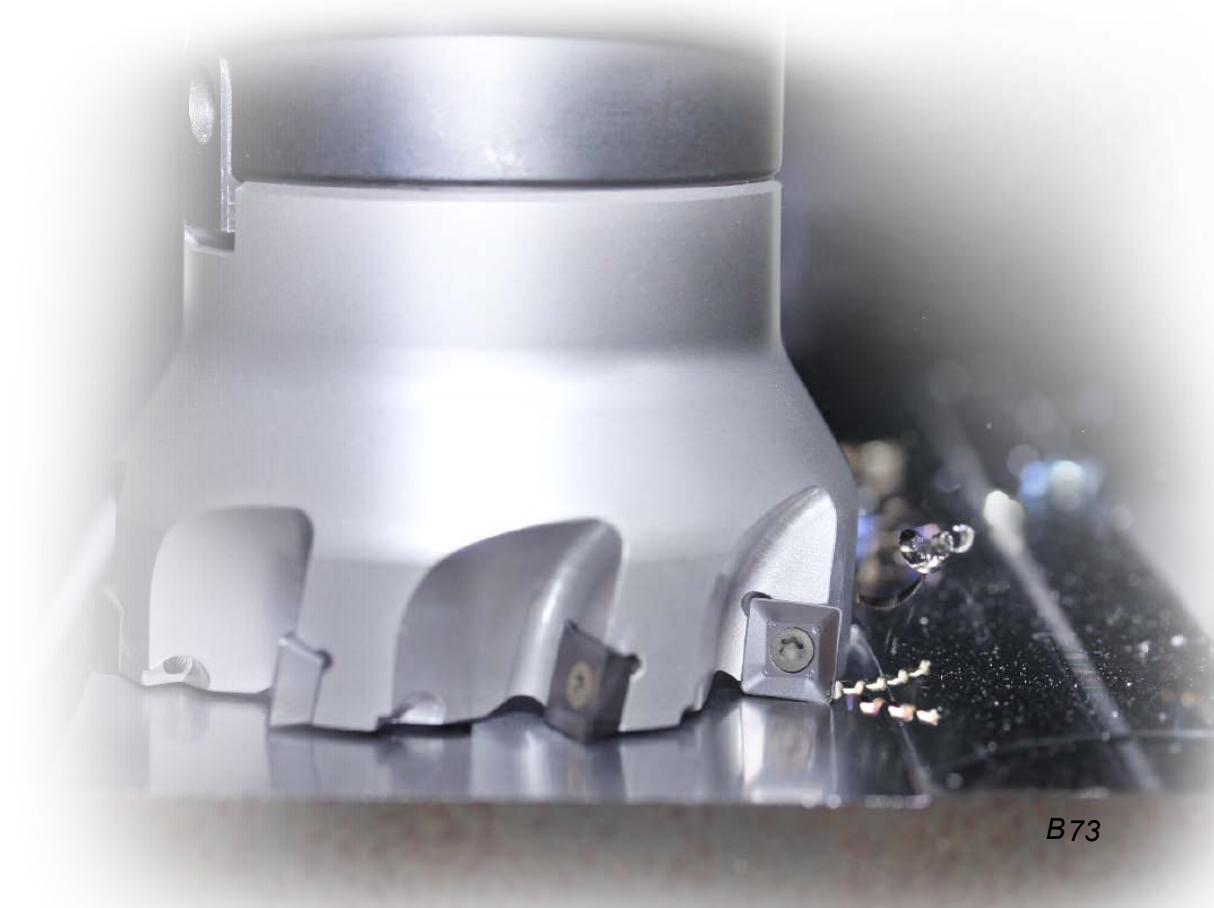


High security

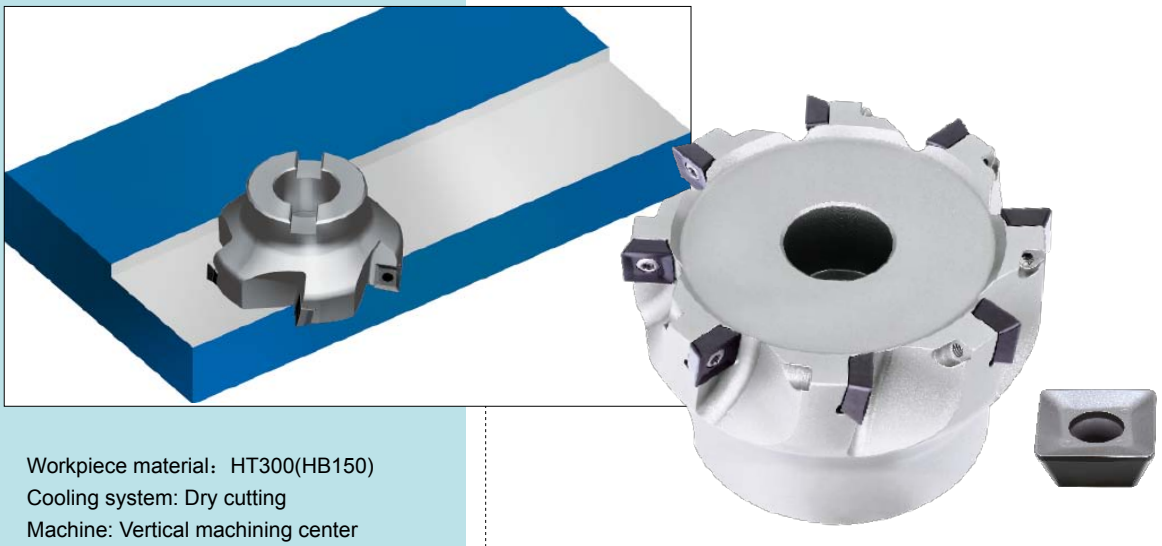
Precisely machined carbide shim is adopted to protect tool body and make it durable.

Recommended cutting parameters

Workpiece material		Hardness HB	Insert grade	Cutting parameters			
				V(m/min)	f(mm/z)		
					-PF	-PM	-PR
P	Low-carbon steel、Soft steel	⩽180	YBM251	270(220-350)	0.15(0.1-0.2)	0.2 (0.1-0.3)	0.3 (0.2-0.4)
			YBG202	270(200-360)	0.15(0.1-0.2)	0.2 (0.1-0.3)	0.3 (0.2-0.4)
			YBG302	230 (170-350)	0.15(0.1-0.2)	0.2 (0.1-0.3)	0.3 (0.2-0.4)
	High-carbon steel、Alloy steel	180—280	YBM251	240 (200-320)	0.15(0.1-0.2)	0.2 (0.1-0.3)	0.3 (0.2-0.4)
			YBG202	240 (180-350)	0.15(0.1-0.2)	0.2 (0.1-0.3)	0.3 (0.2-0.4)
			YBG302	220 (150-330)	0.15(0.1-0.2)	0.2 (0.1-0.3)	0.3 (0.2-0.4)
	Alloy tool steel	280—350	YBM251	220 (180-300)	0.1(0.1-0.2)	0.2 (0.1-0.3)	0.3 (0.2-0.4)
			YBG202	220 (170-340)	0.1(0.1-0.2)	0.2 (0.1-0.3)	0.3 (0.2-0.4)
			YBG302	190 (130-300)	0.15(0.1-0.2)	0.2 (0.1-0.3)	0.3 (0.2-0.4)
M	Stainless steel	⩽270	YBM251	150 (120-240)	0.1(0.1-0.2)	0.2 (0.1-0.3)	0.3 (0.2-0.4)
			YBG202	160 (110-270)	0.1(0.1-0.2)	0.2 (0.1-0.3)	0.3 (0.2-0.4)
			YBG302	140 (100-250)	0.15(0.1-0.2)	0.2 (0.1-0.3)	0.3 (0.2-0.4)
K	Cast iron	180—250	YBG102	210 (120-300)	0.15(0.1-0.2)	0.2 (0.1-0.3)	0.3 (0.2-0.4)
			YBG202	160 (120-200)	0.15(0.1-0.2)	0.2 (0.1-0.3)	0.3 (0.2-0.4)
			YBD252	200 (150-250)	0.15(0.1-0.2)	0.2 (0.1-0.3)	0.3 (0.2-0.4)



Case for FMP02

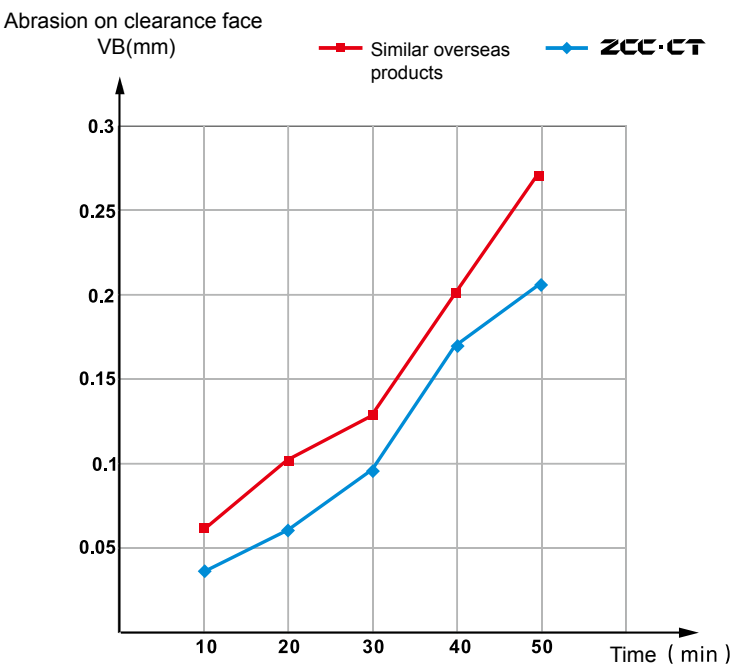


Workpiece material：HT300(HB150)
Cooling system: Dry cutting
Machine: Vertical machining center
Cutting parameters：
Vc=200m/min
a_p=3mm
f_z=0.2mm/z
a_e=80mm

Tool type：FMP02-100-B32-SE12-05

Insert type/grade：SEET120308PER-PM/YBD252

●Comparison of insert abrasion





Face milling tools

Kr:90°

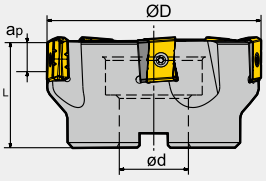

Face milling


Step shoulder

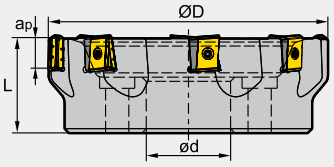
FMP03 P M K



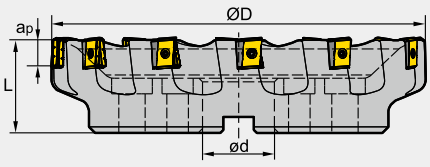
B-type coupling



C-type coupling



D-type coupling



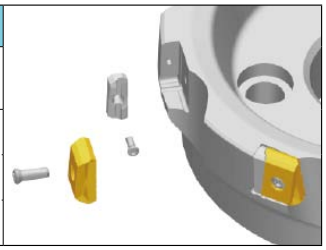
Specification of tools

type		Stock R	Stock L	ØD	Ød	L	apmax	Number of teeth Z	Applicable inserts	Style of coupling	Weight (kg)
FMP03	-125-B40-LN15-06	▲	△	125	40	63	8	6	LNKT1506EN-ZR	B	3.2
	-160-C40-LN15-08	▲	△	160	40	63	8	8		C	5.1
	-200-C60-LN15-10	▲	△	200	60	70	8	10		C	7.5
	-250-C60-LN15-12	▲	△	250	60	70	8	12		C	12.2
	-315-D60-LN15-16	▲	△	315	60	80	8	16		D	23.7
	-125-B40-LN20-06	▲	△	125	40	63	12	6	LNKT2007DN-ZR	B	3.3
	-160-C40-LN20-08	▲	△	160	40	63	12	8		C	5.3
	-200-C60-LN20-10	▲	△	200	60	70	12	10		C	8.8
	-250-C60-LN20-12	▲	△	250	60	70	12	12		C	14.0
	-315-D60-LN20-15	▲	△	315	60	80	12	15		D	23.9
	-125-B40-LN25-05	▲	△	125	40	63	15	5	LNKT2510-ZR	B	3.3
	-160-C40-LN25-06	▲	△	160	40	63	15	6		C	5.1
	-200-C60-LN25-08	▲	△	200	60	70	15	8		C	8.9
	-250-C60-LN25-10	▲	△	250	60	70	15	10		C	12.0
	-315-D60-LN25-12	▲	△	315	60	80	15	12		D	21.9

▲Stock available △Make-to-order

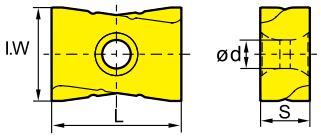
Spare parts

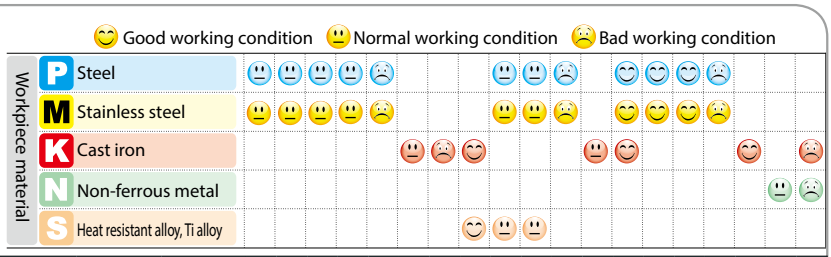
Inserts	Shim	Shim screw	Insert screw	Wrench	
LNKT1506EN-ZR	LLN15-ZR	I60M3×7	I60M4×12	WT15IS	WT10IS
LNKT2007DN-ZR	LLN20R-ZR	I60M3×7	I60M4×15	WT15IS	WT10IS
LNKT2510-ZR	LLN25R-ZR	I60M3.5×10.4	I60M5×17	WT20IT	WT15IS



Tools code key B22–B23
Grade selection guide B18–B21
Technical data B192–B198

Selection of inserts





Insert shape	Type	Basic dimensions(mm)				CVD Coating							PVD Coating						Cermet		Cemented carbide			
		L	I.W	S	ød	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	**LNKT1506EN-ZR**	15.875	14	6.35	4.6					○	○					★								
	LNKT2007DN-ZR	20	17	7.94	4.6					○	○					★								
	LNKT2510-ZR	25	18	9.525	5.5					○		○				★								

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

Recommended cutting parameters

Workpiece material		Hardness HB	Insert grade	Cutting parameters	
				V(m/min)	f(mm/z)
P	Low-carbon steel、Soft steel	≤180	YBG302	180 (150-300)	0.5 (0.2-0.8)
			YBM351	180 (150-300)	0.5 (0.2-0.8)
	High-carbon steel、Alloy steel	180-280	YBG302	150 (120-280)	0.5 (0.2-0.8)
			YBM351	140 (120-280)	0.5 (0.2-0.8)
	Alloy tool steel	280-350	YBG302	120 (80-250)	0.45 (0.2-0.6)
			YBM351	100 (80-250)	0.45 (0.2-0.6)
M	Stainless steel	≤270	YBG302	120 (80-200)	0.45 (0.2-0.6)
			YBM351	100 (80-200)	0.45 (0.2-0.6)
K	Cast iron	180-250	YBD152	220 (150-300)	0.5 (0.2-0.8)
			YBD252	210 (150-300)	0.5 (0.2-0.8)
			YBG302	200 (150-300)	0.5 (0.2-0.8)

Note: Cutting parameters can be adjusted according to the Max. power of machine.

Case for FMP03

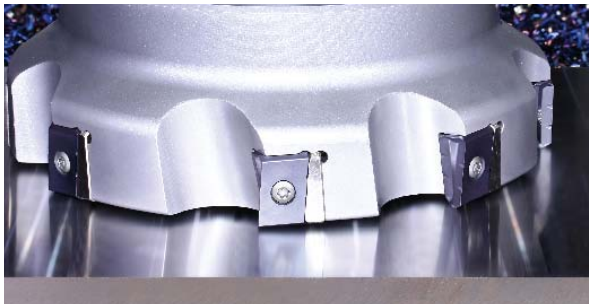


Tool type：FMP03-200-C60-LN25-08

Insert type/grade：LNKT2510-ZR/YBG302

The tool operates easily and fast at high cutting depth with good chip breaking performance. Cutting efficiency is doubled, and tool life increases to 1-2 times that of the original.

Workpiece material：45#
Hardness(HB)：190
Cooling system: Dry cutting
Cutting parameters：Vc=130m/min, a_p=12mm, f_z=0.5mm/z
a_e=140mm

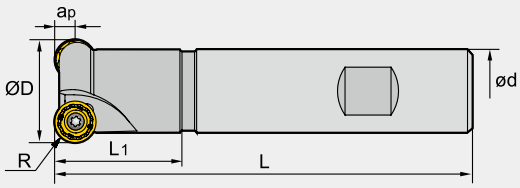


Face milling tools



FMR01 P M K



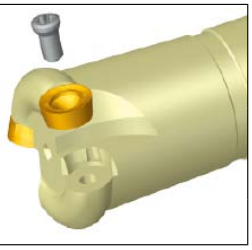


Specification of tools

Type		Stock	Basic dimensions(mm)						Number of teeth Z	Weight (kg)
			ØD	ød	L	L_1	R	a_{pmax}		
FMR01	**-025-XP20-RC10-02**	▲	25	20	100	30	5	5	2	0.2
	-032-XP25-RC10-02	▲	32	25	120	35	5	5	2	0.5
	-040-XP32-RC12-03	▲	40	32	120	40	6	6	3	0.7
	-050-XP32-RC12-03	▲	50	32	120	40	6	6	3	0.8

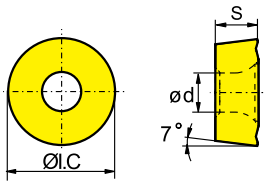
▲Stock available △Make-to-order

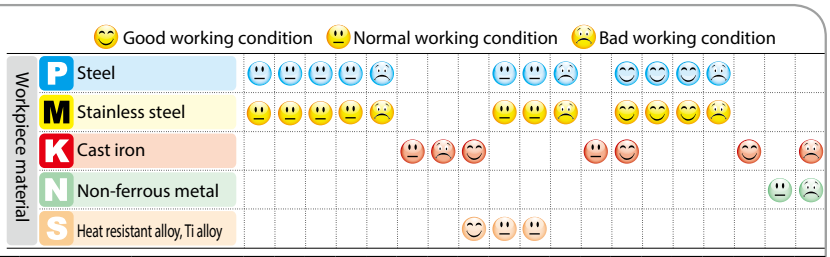
Spare parts

Diameter ØD	Insert screw	Wrench	
			
Ø25 -Ø32	I60M4×8.4	WT15S	
Ø40 -Ø50	I60M3.5×10		

Tools code key B22–B23
Grade selection guide B18–B21
Technical data B192–B198

Selection of inserts





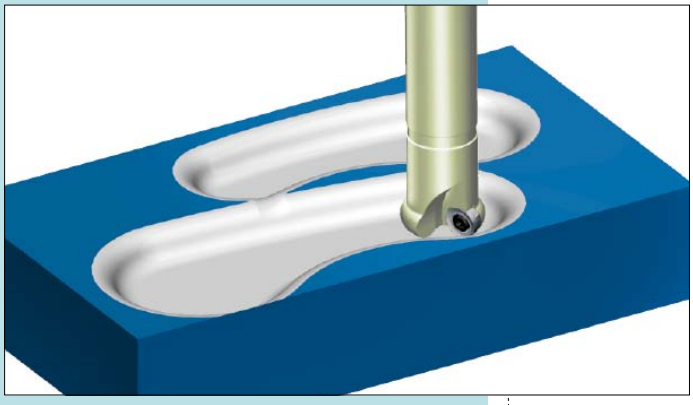
Insert shape	Type	Basic dimensions(mm)			CVD Coating							PVD Coating						Cermet		Cemented carbide			
		ØI.C	S	ød	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	**RCKT10T3MO-DM**	10.0	3.97	4.4	●								●	★									
	**RCKT1204MO-DM**	12.0	4.76	4.0	●		●		●	○			●	★	★								
	**RCKT1204MO-DR**	12.0	4.76	4.0	○		○		○				●	★									
	**RCKT1204MO-ER**	12.0	4.76	4.0				★															

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

Recommended cutting parameters

Workpiece material		Hardness HB	Insert grade	Cutting parameters		
				V(m/min)	f(mm/z)	
					-DM	-DR
P	Low-carbon steel、Soft steel	⩽180	YBM251 YBC301	270 (220-350)	0.2(0.1-0.5)	0.3 (0.2-0.8)
			YBM351 YBC302	220 (180-300)	0.25(0.1-0.5)	0.3 (0.2-0.8)
			YBG202	270 (200-360)	0.2(0.1-0.5)	0.3 (0.2-0.8)
	High-carbon steel、Alloy steel	180-280	YBM251 YBC301	240 (200-320)	0.2(0.1-0.5)	0.3 (0.2-0.8)
			YBM351 YBG302	200 (160-280)	0.25(0.1-0.5)	0.3 (0.2-0.8)
			YBG202	240 (180-350)	0.2(0.1-0.5)	0.3 (0.2-0.8)
	Alloy tool steel	280-350	YBM251 YBC301	220 (180-300)	0.2(0.1-0.4)	0.3 (0.2-0.6)
			YBM351 YBG302	180 (150-250)	0.2(0.1-0.5)	0.3 (0.2-0.8)
			YBG202	220 (170-340)	0.2(0.1-0.4)	0.3 (0.2-0.6)
M	Stainless steel	⩽270	YBM251	150 (120-240)	0.2(0.1-0.4)	0.3 (0.2-0.6)
			YBM253 YBM351	150 (100-220)	0.2(0.1-0.4)	0.3 (0.2-0.6)
			YBG202	160 (110-270)	0.2(0.1-0.4)	0.3 (0.2-0.6)
K	Cast iron	180-250	YBG302	210 (120-300)	0.2(0.1-0.5)	0.3 (0.2-0.8)

Case for FMR01



Workpiece material：42CrMo (HRC35)
Cooling system: Dry cutting
Machine: Vertical machining center
Cutting parameters：
Vc=200m/min
a_p=3mm
f_z=0.2mm/z

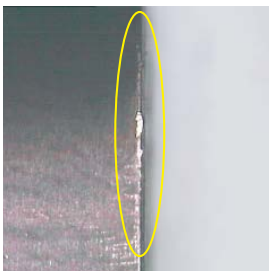


Tool type：FMR01-025-XP20-RC10-02

Insert type/grade：RCKT10T3MO-DM/YBG202

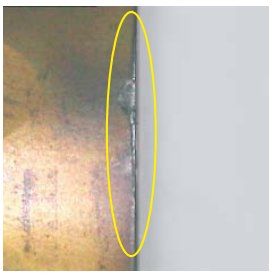
●Comparison of insert abrasion

ZCC-CT



22minutes later

Similar overseas products



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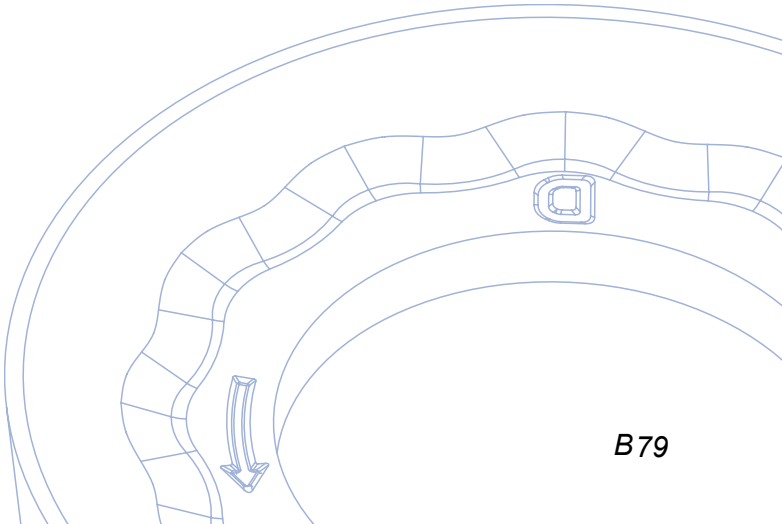


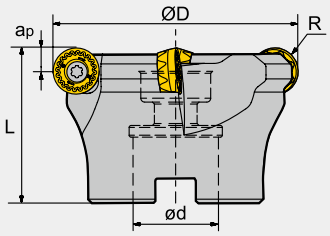
Face milling tools



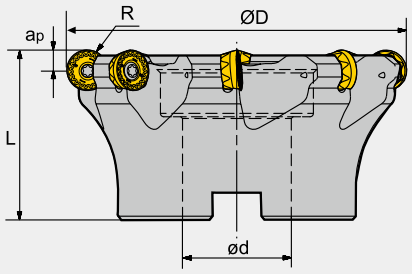
FMR02 P M K



A-type coupling



B-type coupling



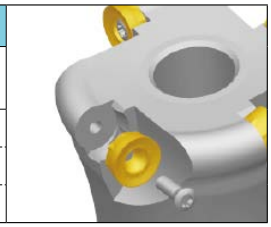
Specification of tools

Type		Stock	Basic dimensions(mm)					Number of teeth Z	Type of coupling	Weight (kg)
			ØD	ød	L	R	$a_p$max			
FMR02 Coarse pitch	**-050-A22-RC12-03**	△	50	22	40	6	6	3	A	0.29
	-063-A22-RC12-04	▲	63	27	50	6	6	4	A	0.41
	-080-B27-RC12-05	▲	80	27	50	6	6	5	B	0.81
	-100-B32-RC12-06	△	100	32	50	6	6	6	B	1.25
	-063-A22-RC16-04	△	63	22	40	8	8	4	A	0.35
	-080-B27-RC16-05	△	80	27	50	8	8	5	B	0.74
	-100-B32-RC16-06	▲	100	32	50	8	8	6	B	1.18
	-125-B40-RC16-07	△	125	40	63	8	8	7	B	2.49
	-080-A27-RC20-04	△	80	27	50	10	10	4	A	0.77
	-100-B32-RC20-05	△	100	32	50	10	10	5	B	1.07
	-125-B40-RC20-06	△	125	40	63	10	10	6	B	2.42
	-160-B40-RC20-06	△	160	40	63	10	10	6	B	4.17
Close pitch	**-050-A22-RC12-05**	△	50	22	40	6	6	5	A	0.27
	-063-A22-RC12-06	△	63	27	50	6	6	6	A	0.38
	-080-B27-RC12-07	△	80	27	50	6	6	7	B	0.79
	-100-B32-RC12-08	△	100	32	50	6	6	8	B	1.23
	-063-A22-RC16-05	△	63	22	40	8	8	5	A	0.34
	-080-B27-RC16-07	△	80	27	50	8	8	7	B	0.72
	-100-B32-RC16-08	△	100	32	50	8	8	8	B	1.17
	-125-B40-RC16-09	△	125	40	63	8	8	9	B	2.47
	-080-A27-RC20-05	△	80	27	50	10	10	5	A	0.74
	-100-B32-RC20-06	△	100	32	50	10	10	6	B	1.07
	-125-B40-RC20-07	△	125	40	63	10	10	7	B	2.39
	-160-B40-RC20-08	△	160	40	63	10	10	8	B	4.06

▲Stock available △Make-to-order

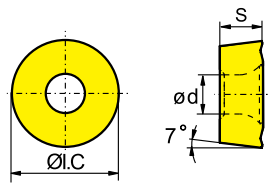
Spare parts

Diameter ØD	Insert	Insert screw	Wrench	
				
Ø50 -Ø100	RC□□1204MO-□□	I60M3.5×10	WT15IS	--
Ø63 -Ø125	RC□□1606MO-□□	I60M5×13	--	WT20IT
Ø125 -Ø160	RC□□2006MO-□□	I43M6×16	--	WT25IT



Tools code key B22–B23
Grade selection guide B18–B21
Technical data B192–B198

Selection of inserts



Good working condition Normal working condition Bad working condition

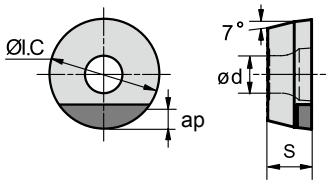
Workpiece material

P	Steel
M	Stainless steel
K	Cast iron
N	Non-ferrous metal
S	Heat resistant alloy, Ti alloy

Insert shape	Type	Basic dimensions(mm)			CVD Coating						PVD Coating						Cermet		Cemented carbide			
		ØI.C	S	ød	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	RCKT1204MO-DM	12.0	4.76	4.0	●		●		●	○			●	★	●								
	RCKT1606MO-DM	16.0	6.35	5.56	●										●								
	RCKT1204MO-DR	12.0	4.76	4.0	○		○		○				●	★									
	RCKT1606MO-DR	16.0	6.35	5.56	●				●		○		●	★									
	RCKT2006MO-DR	20.0	6.35	6.55	●				●		○		○	★	●								
	RCKT1204MO-ER	12.0	4.76	4.0				★															
	RCKT1606MO-ER	16.0	6.35	5.56				★															
	RCKT2006MO-ER	20.0	6.35	6.55				★															

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

Selection of inserts



Good working condition Normal working condition Bad working condition

Workpiece material

H	Super hard material
K	Cast iron
N	Non-ferrous metal

Insert shape	Type	Basic dimensions(mm)				PCBN				Cemented carbide		
		ØI.C	S	ød	$a_p$max	YCB011	YCB012	YCB121	YCB211	YD051	YD101	YD201
	RCMW1204MO-PCBN	12.0	4.76	4.1	2.7	○	●		●			

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

Recommended cutting parameters

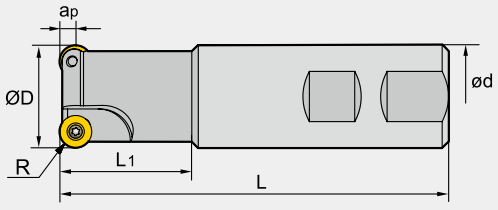
Workpiece material		Hardness HB	Insert grade	Cutting parameters				
				V(m/min)	f(mm/z)			
					-DM	-DR	-ER	-PCBN
P	Low-carbon steel、Soft steel	≤HB180	YBM251 YBC301	270 (220-350)	0.2(0.1-0.5)	0.3 (0.2-0.8)		
			YBM351 YBG302	220 (180-300)	0.25(0.1-0.5)	0.3 (0.2-0.8)		
			YBG202	270 (200-360)	0.2(0.1-0.5)	0.3 (0.2-0.8)		
	High-carbon steel、Alloy steel	HB180-280	YBM251 YBC301	240 (200-320)	0.2(0.1-0.5)	0.3 (0.2-0.8)		
			YBM351 YBG302	200 (160-280)	0.25(0.1-0.5)	0.3 (0.2-0.8)		
			YBG202	240 (180-350)	0.2(0.1-0.5)	0.3 (0.2-0.8)		
	Alloy tool steel	HB280-350	YBM251 YBC301	220 (180-300)	0.2(0.1-0.4)	0.3 (0.2-0.6)		
			YBM351 YBG302	180 (150-250)	0.2(0.1-0.5)	0.3 (0.2-0.8)		
			YBG202	220 (170-340)	0.2(0.1-0.4)	0.3 (0.2-0.6)		
M	Stainless steel	≤HB270	YBM251	150 (120-240)	0.2(0.1-0.4)	0.3 (0.2-0.6)		
			YBM253	150 (100-220)	0.2(0.1-0.4)	0.3 (0.2-0.6)	0.3(0.2-0.6)	
			YBM351	150 (100-220)	0.2(0.1-0.4)	0.3 (0.2-0.6)		
			YBG202	160 (110-270)	0.2(0.1-0.4)	0.3 (0.2-0.6)		
K	Cast iron	HB180-250	YBG302	210 (120-300)	0.2(0.1-0.5)	0.3 (0.2-0.8)		
			YCB011	800 (500-1200)				0.2(0.1-0.5)
			YCB211	800 (500-1200)				0.2(0.1-0.5)
H	Hardened steel	≥HRC45	YCB012	150 (100-500)				0.15(0.1-0.5)

Face milling tools



FMR03 P M K





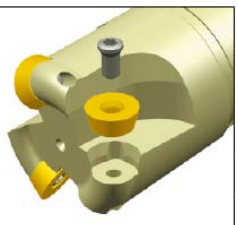
Specification of tools

Type		Stock	Basic dimensions(mm)						Number of teeth Z	Weight (kg)
			ØD	ød	L	L_1	R	a_{pmax}		
FMR03	**-016-XP16-RD08-02**	▲	16	16	100	25	4	4	2	0.1
	-025-XP25-RD08-02	▲	25	25	100	30	4	4	2	0.3
	-032-XP32-RD10-02	▲	32	32	120	40	5	5	2	0.7
	-040-XP32-RD12-03	▲	40	32	120	40	6	6	3	0.7
	-050-XP32-RD12-04	▲	50	32	120	40	6	6	4	0.8

▲Stock available △Make-to-order

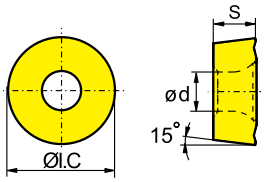
Spare parts

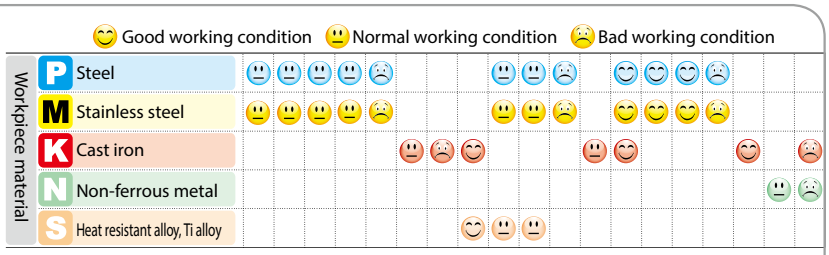
Diameter ØD	Insert screw	Wrench	
			
Ø16-Ø25	I60M3×7	WT09IP	
Ø32-Ø50	I60M4×10	WT15IP	



Tools code key B22–B23
Grade selection guide B18–B21
Technical data B192–B198

Selection of inserts





Insert shape	Type	Basic dimensions(mm)			CVD Coating						PVD Coating						Cermet		Cemented carbide			
		ØI.C	S	ød	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	**RDKW0803MO**	8	3.18	3.4	○				○				●	★	○								
	RDKW10T3MO	10	3.97	4.4	○				●				●	★									
	RDKW1204MO	12	4.76	4.4	●		●		●				●	★	●								

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

Recommended cutting parameters

Workpiece material		Hardness HB	Insert grade	Cutting parameters	
				V(m/min)	f(mm/z)
P	Low-carbon steel、Soft steel	⩽180	YBM251 YBC301	270 (220-350)	0.2 (0.08-0.45)
			YBM351 YBG302	220 (180-300)	0.25 (0.15-0.45)
			YBG202	270 (200-360)	0.2 (0.1-0.45)
	High-carbon steel、Alloy steel	180-280	YBM251 YBC301	240 (200-320)	0.2 (0.08-0.45)
			YBM351 YBG302	200 (160-280)	0.25 (0.15-0.45)
			YBG202	240 (180-350)	0.2 (0.1-0.45)
	Alloy tool steel	280-350	YBM251 YBC301	220 (180-300)	0.2 (0.08-0.45)
			YBM351 YBG302	180 (150-250)	0.25 (0.15-0.45)
			YBG202	220 (170-340)	0.2 (0.1-0.45)
M	Stainless steel	⩽270	YBG205	150 (120-240)	0.2 (0.08-0.45)
			YBM251	150 (120-240)	0.2 (0.08-0.45)
			YBM351	150 (100-220)	0.25 (0.1-0.45)
			YBG202	160 (110-270)	0.2 (0.1-0.45)
K	Cast iron	180-250	YBG302	210 (120-300)	0.2 (0.1-0.45)

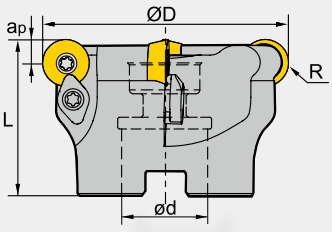
Face milling tools



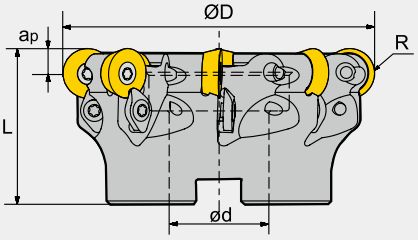
FMR04 P M K



A-type coupling



B-type coupling



Specification of tools

Type		Stock	Basic dimensions(mm)					Number of teeth Z	Type of coupling	Weight (kg)
			ØD	ød	L	R	$a_p$max			
FMR02 Coarse pitch	**-050-A22-RD12-03**	▲	50	22	40	6	6	3	A	0.25
	-063-A22-RD12-04	▲	63	22	40	6	6	4	A	0.37
	-080-B27-RD12-05	▲	80	27	50	6	6	5	B	0.77
	-063-A22-RD16-04	△	63	22	40	8	8	4	A	0.32
	-080-B27-RD16-05	△	80	27	50	8	8	5	B	0.67
	-100-B32-RD16-06	▲	100	32	50	8	8	6	B	1.18
	-125-B40-RD16-08	△	125	40	63	8	8	8	B	2.55
	-125-B40-RD20-06	▲	125	40	63	10	10	6	B	2.33
	-160-B40-RD20-07	▲	160	40	63	10	10	7	B	3.83
Close pitch	**-050-A22-RD12-05**	△	50	22	40	6	6	5	A	0.23
	-063-A22-RD12-06	△	63	22	40	6	6	6	A	0.48
	-080-B27-RD12-07	△	80	27	50	6	6	7	B	0.78
	-063-A22-RD16-05	△	63	22	40	8	8	5	A	0.3
	-080-B27-RD16-07	△	80	27	50	8	8	7	B	0.66
	-100-B32-RD16-08	△	100	32	50	8	8	8	B	1.18
	-125-B40-RD16-10	△	125	40	63	8	8	10	B	2.51
	-125-B40-RD20-08	△	125	40	63	10	10	8	B	2.45
	-160-B40-RD20-10	△	160	40	63	10	10	10	B	3.98

▲Stock available △Make-to-order

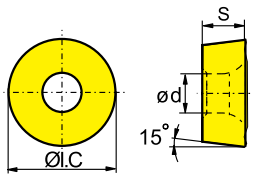
Spare parts

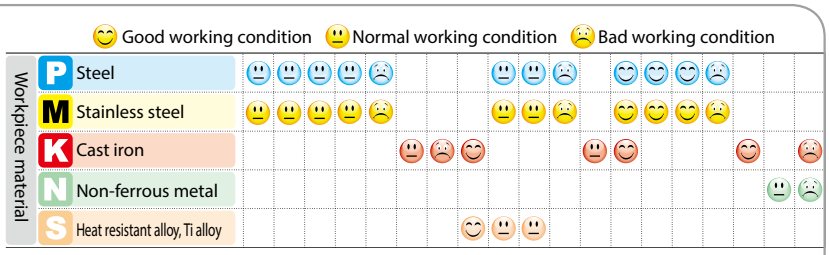
Diameter ØD	Insert	Insert screw	Clamp	Clamp screw	Wrench	
						
Ø50-Ø80	RDKW1204MO	I60M3.5×10	WD-204	I60M4×10	WT15IP	--
Ø63 -Ø125	RDKW1605MO	I60M5×13	WD-207	I60M5×13	--	WT20IT
Ø125 -Ø160	RDKW2006MO	I43M6×16	--	--	--	WT25IT



Tools code key B22–B23
Grade selection guide B18–B21
Technical data B192–B198

Selection of inserts





Insert shape	Type	Basic dimensions(mm)			CVD Coating						PVD Coating						Cermet		Cemented carbide			
		ØI.C	S	ød	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	**RDKW1204MO**	12.0	4.76	4.4	●		●		●				●	★	●								
	RDKW1605MO	16.0	5.56	5.5	○				○				○	★	○								
	RDKW2006MO	20.0	6.35	6.5	○				○					○									

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

Recommended cutting parameters

Workpiece material		Hardness HB	Insert grade	Cutting parameters	
				V(m/min)	f(mm/z)
P	Low-carbon steel、Soft steel	≤180	YBM251 YBC301	270 (220-350)	0.2 (0.08-0.45)
			YBM351 YBG302	220 (180-300)	0.25 (0.15-0.45)
			YBG202	270 (200-360)	0.2 (0.1-0.45)
	High-carbon steel、Alloy steel	180-280	YBM251 YBC301	240 (200-320)	0.2 (0.08-0.45)
			YBM351 YBG302	200 (160-280)	0.25 (0.15-0.45)
			YBG202	240 (180-350)	0.2 (0.1-0.45)
	Alloy tool steel	280-350	YBM251 YBC301	220 (180-300)	0.2 (0.08-0.45)
			YBM351 YBG302	180 (150-250)	0.25 (0.15-0.45)
			YBG202	220 (170-340)	0.2 (0.1-0.45)
M	Stainless steel	≤270	YBG205	150 (120-240)	0.2 (0.08-0.45)
			YBM251	150 (120-240)	0.2 (0.08-0.45)
			YBM351 YBG302	150 (100-220)	0.25 (0.1-0.45)
			YBG202	160 (110-270)	0.2 (0.1-0.45)
K	Cast iron	180-250	YBG302	210 (120-300)	0.2 (0.1-0.45)

Case for FMR04





Workpiece material：42CrMo (HRC35)
Cooling system: Dry cutting
Machine: Vertical machining center
Cutting parameters：
V_c=200m/min
a_p=3mm
f_z=0.3mm/z

Tool type：FMR04-063-A22-RD12-04

Insert type/grade：RDKW1204MO/YBG202

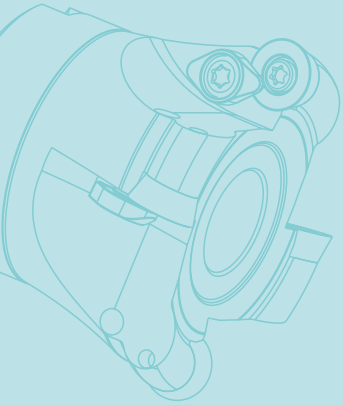
●Abrasion comparison after 90 minutes cavity milling

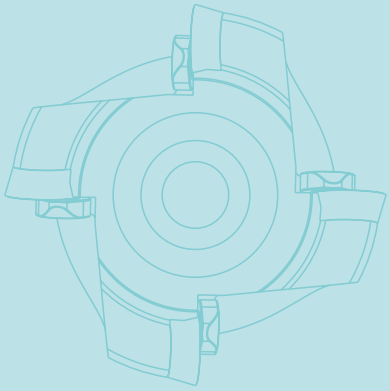
ZCC-CT

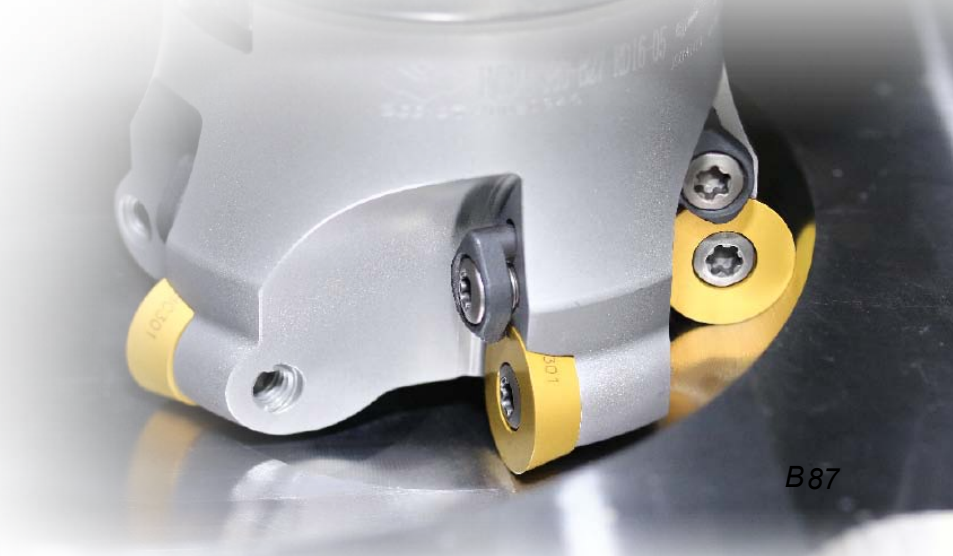


Similar overseas products









Square shoulder milling tools

Kr:90°


Step shoulder


Slot milling


Ramp milling

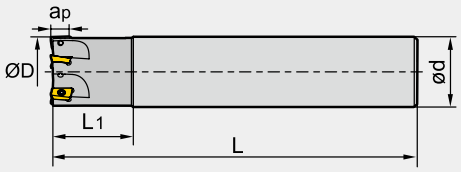

Helical machining


Plunge milling

EMP01 P M K N



Straight shank



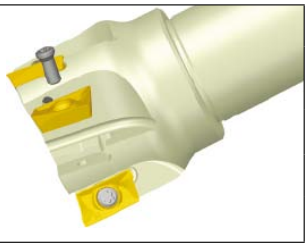
Specification of tools

Type		Stock	Basic dimensions(mm)					Number of teeth Z	Weight (kg)
			ØD	ød	L	L_1	a_{pmax}		
EMP01 Straight shank	**-012-G16-AP11-01**	▲	12	16	85	25	10.5	1	0.1
	-016-G16-AP11-02	▲	16	16	90	25	10.5	2	0.1
	-020-G20-AP11-02	▲	20	20	100	30	10.5	2	0.2
	-025-G25-AP11-03	▲	25	25	115	35	10.5	3	0.4
	-032-G32-AP11-04	▲	32	32	125	40	10.5	4	0.7
	-025-G25-AP16-02	▲	25	25	115	35	15.5	2	0.4
	-032-G32-AP16-03	▲	32	32	125	40	15.5	3	0.7
	-040-G32-AP16-04	▲	40	32	130	42	15.5	4	0.8
	-050-G32-AP16-05	▲	50	32	135	45	15.5	5	1.0
	-063-G32-AP16-06	▲	63	32	135	45	15.5	6	1.4

▲Stock available △Make-to-order

Spare parts

Diameter ØD	Inserts	Screw	Wrench	
				
Ø12-Ø32	AP11	I60M2.5×6.5T	WT08IP	--
Ø25-Ø63	AP16	I60M4×8.4	--	WT15IS



Tools code key B22–B23
Grade selection guide B18–B21
Technical data B192–B198

Square shoulder milling tools

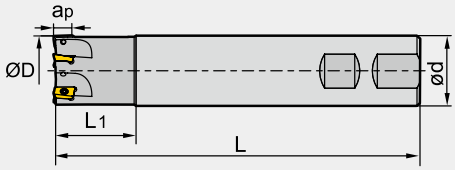
Kr:90°



EMP01 P M K N



Weldon shank



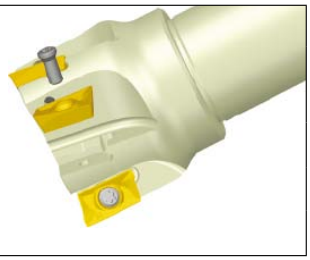
Specification of tools

Type		Stock	Basic dimensions(mm)					Number of teeth Z	Weight (kg)
			ØD	ød	L	L_1	a_{pmax}		
EMP01 Weldon shank	**-012-XP16-AP11-01**	▲	12	16	85	25	10.5	1	0.1
	-016-XP16-AP11-02	▲	16	16	90	25	10.5	2	0.1
	-020-XP20-AP11-02	▲	20	20	100	30	10.5	2	0.2
	-025-XP25-AP11-03	▲	25	25	115	35	10.5	3	0.4
	-032-XP32-AP11-04	▲	32	32	125	40	10.5	4	0.7
	-025-XP25-AP16-02	▲	25	25	115	35	15.5	2	0.4
	-032-XP32-AP16-03	▲	32	32	125	40	15.5	3	0.7
	-040-XP32-AP16-04	▲	40	32	130	42	15.5	4	0.8
	-050-XP32-AP16-05	▲	50	32	135	45	15.5	5	1.0
	-063-XP32-AP16-06	▲	63	32	135	45	15.5	6	1.4

▲Stock available △Make-to-order

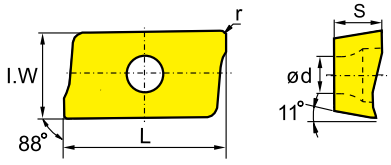
Spare parts

Diameter ØD	Inserts	Screw	Wrench	
				
Ø12-Ø32	AP11	I60M2.5×6.5T	WT08IP	--
Ø25-Ø63	AP16	I60M4×8.4	--	WT15IS



Tools code key B22–B23
Grade selection guide B18–B21
Technical data B192–B198

Selection of 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

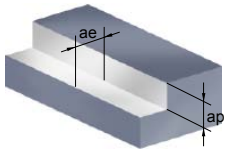
Insert shape	Type	Basic dimensions(mm)					CVD Coating							PVD Coating						Cermet		Cemented carbide			
		L	I.W	S	ød	r	YBC301	**YBC302**	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	**APKT11T304-PF**	12.24	6.5	3.6	2.8	0.4	●	★	○		○			○	○		○								
	APKT11T308-PF	12.24	6.5	3.6	2.8	0.8		★	○					○	○										
	APKT11T312-PF	12.24	6.5	3.6	2.8	1.2		★							○										
	APKT11T316-PF	12.24	6.5	3.6	2.8	1.6		★							○										
	APKT160408-PF	17.877	9.33	5.76	4.4	0.8	●	★	○		○				○		○								
	**APKT11T304-PM**	12.24	6.5	3.6	2.8	0.4	●	★	●		●			★	★		★								
	APKT11T308-PM	12.24	6.5	3.6	2.8	0.8	●	★	●		○		★	★	★		★								
	APKT11T312-PM	12.24	6.5	3.6	2.8	1.2		★	○					○	★		○								
	APKT11T316-PM	12.24	6.5	3.6	2.8	1.6		★	○					○	★		○								
	APKT160408-PM	17.877	9.33	5.76	4.4	0.8	●	★	●		●		○	★	★		★								
	**APKT11T304-PR**	12.24	6.5	3.6	2.8	0.4	●	★	●		●			○	○		○								
	APKT11T308-PR	12.24	6.5	3.6	2.8	0.8		★									○								
	APKT11T312-PR	12.24	6.5	3.6	2.8	1.2		★									○								
	APKT11T316-PR	12.24	6.5	3.6	2.8	1.6		★									○								
	APKT160408-PR	17.877	9.33	5.76	4.4	0.8		★									○								
	**APKT11T304-LH**	12.24	6.5	3.6	2.8	0.4																		★	★
	APKT11T308-LH	12.24	6.5	3.6	2.8	0.8																		★	○
	APKT160408-LH	17.877	9.33	5.76	4.4	0.8																		★	★

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

Chipbreaker selection

Classification \ Function	For finishing	For semi-finishing	For roughing
P	-PF	-PM	-PR
M	-PF	-PM	-PR
K	-PF	-PM	
N	-LH		

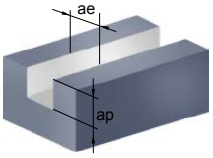
1 Square shoulder milling



Recommended cutting parameters (D: Diameter)

Workpiece material		Hardness HB	Insert grade	Cutting parameters				
				V（m/min）	f（mm/z）			ae(mm)
					-PF	-PM	-PR	
P	Low-carbon steel、Soft steel	⩽180	YBM251 YBC301 YBC302	320 (240-400)	0.1 (0.08-0.2)	0.2 (0.1-0.3)	0.25(0.2-0.35)	⩽0.5D
			YBM351	260 (180-380)	0.1 (0.08-0.2)	0.2 (0.1-0.3)	0.25(0.2-0.35)	⩽0.5D
			YBG202	320 (200-400)	0.1 (0.08-0.2)	0.2 (0.1-0.3)	0.25(0.2-0.35)	⩽0.5D
			YBG302	280 (180-400)	0.1 (0.08-0.2)	0.2 (0.1-0.3)	0.25(0.2-0.35)	⩽0.5D
	High-carbon steel、Alloy steel	180-280	YBM251 YBC301 YBC302	280 (210-380)	0.1 (0.08-0.2)	0.2 (0.1-0.3)	0.25(0.2-0.3)	⩽0.5D
			YBM351	240 (160-320)	0.1 (0.08-0.2)	0.2 (0.1-0.3)	0.25(0.2-0.35)	⩽0.5D
			YBG202	280 (180-350)	0.1 (0.08-0.2)	0.2 (0.1-0.3)	0.25(0.2-0.3)	⩽0.5D
			YBG302	260 (150-380)	0.1 (0.08-0.2)	0.2 (0.1-0.3)	0.25(0.2-0.35)	⩽0.5D
	Alloy tool steel	280-350	YBM251 YBC301 YBC302	260 (180-350)	0.1 (0.08-0.2)	0.2 (0.1-0.3)	0.25(0.2-0.3)	⩽0.5D
			YBM351	220 (150-280)	0.1 (0.08-0.2)	0.2 (0.1-0.3)	0.25(0.2-0.35)	⩽0.5D
			YBG202	260 (160-330)	0.1 (0.08-0.2)	0.2 (0.1-0.3)	0.25(0.2-0.3)	⩽0.5D
			YBG302	240 (120-350)	0.1 (0.08-0.2)	0.2 (0.1-0.3)	0.25(0.2-0.35)	⩽0.5D
M	Stainless steel	⩽270	YBM251	200 (120-270)	0.1 (0.08-0.2)	0.2 (0.1-0.3)	0.25(0.2-0.3)	⩽0.5D
			YBM351	180 (150-300)	0.1 (0.08-0.2)	0.2 (0.1-0.3)	0.25(0.2-0.3)	⩽0.5D
			YBG202	200 (110-300)	0.1 (0.08-0.2)	0.2 (0.1-0.3)	0.25(0.2-0.3)	⩽0.5D
			YBG302	170 (100-280)	0.1 (0.08-0.2)	0.2 (0.1-0.3)	0.25(0.2-0.3)	⩽0.5D
K	Cast iron	180-250	YBG102	220 (120-250)	0.1 (0.08-0.2)	0.2 (0.1-0.3)	-	⩽0.5D
			YBD252	200 (120-320)	0.1 (0.08-0.2)	0.2 (0.1-0.3)	-	⩽0.5D
N					-LH			
	Aluminium alloy	----	YD101	300-	0.2 (0.08-0.4)			⩽0.5D
			YD201	300-	0.2 (0.08-0.4)			⩽0.5D

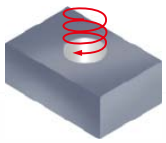
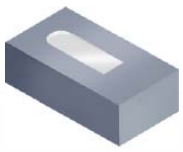
2 Slot milling



Recommended cutting parameters ((D: Diameter)

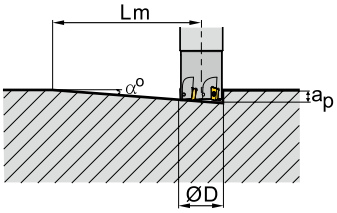
Workpiece material		Hardness HB	Insert grade	Cutting parameters				
				V（m/min）	f（mm/z）			ae(mm)
					-PF	-PM	-PR	
P	Low-carbon steel、Soft steel	≤180	YBM251 YBC301 YBC302	190 (170-250)	0.1 (0.08-0.15)	0.15 (0.1-0.25)	0.2 (0.2-0.3)	D
			YBM351	150 (130-210)	0.1 (0.08-0.15)	0.15 (0.1-0.25)	0.2 (0.2-0.3)	D
			YBG202	190 (140-250)	0.1 (0.08-0.15)	0.15 (0.1-0.25)	0.2 (0.2-0.3)	D
			YBG302	170 (130-250)	0.1 (0.08-0.15)	0.15 (0.1-0.25)	0.2 (0.2-0.3)	D
	High-carbon steel、Alloy steel	180-280	YBM251 YBC301 YBC302	170 (150-220)	0.1 (0.08-0.15)	0.15 (0.1-0.25)	0.2 (0.2-0.3)	D
			YBM351	140 (110-200)	0.1 (0.08-0.15)	0.15 (0.1-0.25)	0.2 (0.2-0.3)	D
			YBG202	170 (130-250)	0.1 (0.08-0.15)	0.15 (0.1-0.25)	0.2 (0.2-0.3)	D
			YBG302	150 (110-230)	0.1 (0.08-0.15)	0.15 (0.1-0.25)	0.2 (0.2-0.3)	D
	Alloy tool steel	280-350	YBM251 YBC301 YBC302	150 (130-210)	0.1 (0.08-0.15)	0.15 (0.1-0.25)	0.2 (0.2-0.3)	D
			YBM351	130 (100-180)	0.1 (0.08-0.15)	0.15 (0.1-0.25)	0.2 (0.2-0.3)	D
			YBG202	150 (110-240)	0.1 (0.08-0.15)	0.15 (0.1-0.25)	0.2 (0.2-0.3)	D
			YBG302	140 (80-210)	0.1 (0.08-0.15)	0.15 (0.1-0.25)	0.2 (0.2-0.3)	D
M	Stainless steel	≤270	YBM251	110 (80-190)	0.1 (0.08-0.15)	0.15 (0.1-0.25)	0.2 (0.2-0.3)	D
			YBM351	100 (80-170)	0.1 (0.08-0.15)	0.15 (0.1-0.25)	0.2 (0.2-0.3)	D
			YBG202	120 (80-190)	0.1 (0.08-0.15)	0.15 (0.1-0.25)	0.2 (0.2-0.3)	D
			YBG302	100 (70-180)	0.1 (0.08-0.15)	0.15 (0.1-0.25)	0.2 (0.2-0.3)	D
K	Cast iron	180-250	YBG102	130 (80-180)	0.1 (0.08-0.15)	0.15 (0.1-0.25)	-	D
			YBD252	120 (80-210)	0.1 (0.08-0.15)	0.15 (0.1-0.25)	-	D
N					-LH			
	Aluminium alloy	----	YD101	300-	0.2 (0.08-0.3)			D
			YD201	300-	0.2 (0.08-0.3)			D

3 Ramp milling, helical interpolation milling

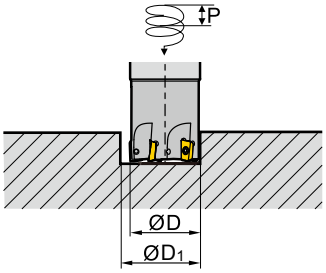
Recommended cutting parameters (D: Diameter)

● Ramp milling



$$L_m = \frac{a_p}{tg\alpha}$$ (α:Maximum ramp angle)

● Helical interpolation milling

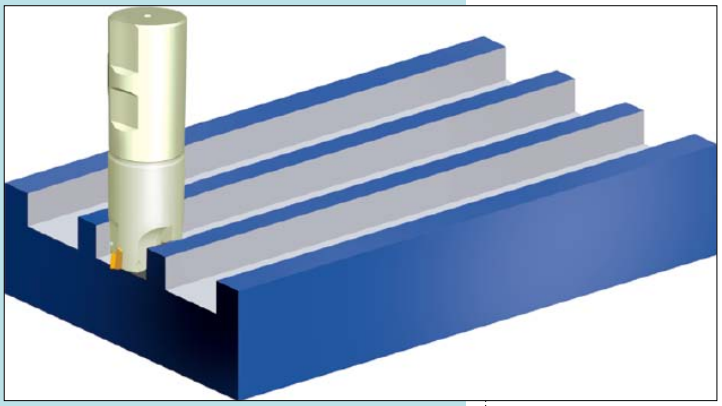


$$tg\alpha = \frac{P}{\pi D_1}$$ (α:Helical angle)

Diameter ØD(mm)	APKT Ramp milling, helical interpolation milling(Inserts—11)				
	Ramp milling			Helical interpolation milling	
	Maximum cutting depth a_p(mm)	Maximum ramp angle α°	Minimum length L_m(mm)	Minimum diameter $ØD_1$(mm)	Maximum pitch(mm)
16	10.0	10.0	56.7	20.0	2.0
20	10.0	5.0	114.4	28.0	2.0
25	10.0	4.5	127.0	40.0	2.0
32	10.0	3.0	190.8	56.0	2.0
40	10.0	2.0	286.4	70.0	2.0

Note: For cutting speed and feed rate per tooth, see square shoulder milling.

Case for EMP01





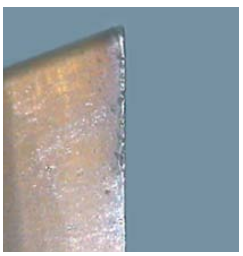
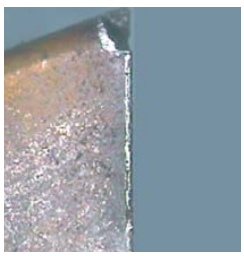
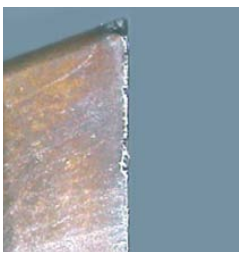
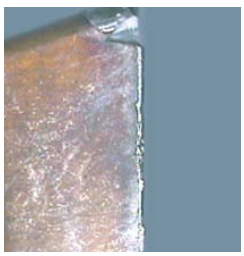


Workpiece material：Cast Stee (HB220)
Cooling system: Dry cutting
Machine: Vertical machining center
Cutting parameters：
Vc=180m/min
a_p=3mm
f_z=0.1mm/z

Insert type/grade：APKT160408-PM/YBC301

Tool type：EMP01-040-XP32-AP16-04

●Abrasion comparison of inserts

	ZCC·CT	Other company product
15'		
25'		



Square shoulder milling tools Kr:90°

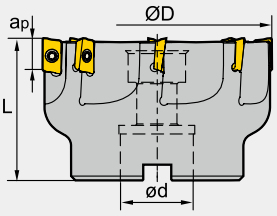

Face milling


Step shoulder

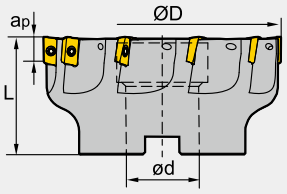
EMP02 P M K N



A-type coupling



B-type coupling



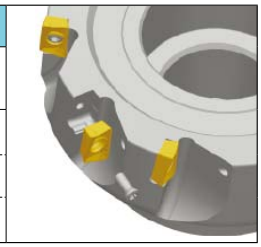
Specification of tools

Type		Stock	Basic dimensions(mm)				Number of teeth Z	Type of coupling	Weight (kg)
			ØD	ød	L	a_{pmax}			
EMP02	**-050-A22-AP11-06**	▲	50	22	40	11	6	A	0.3
	-063-A22-AP11-08	▲	63	22	40	11	8	A	0.6
	-080-A27-AP11-08	▲	80	27	50	11	8	A	1.2
	-100-B32-AP11-10	▲	100	32	50	11	10	B	1.7
	-050-A22-AP16-05	▲	50	22	40	15.5	5	A	0.3
	-063-A22-AP16-06	▲	63	22	40	15.5	6	A	0.5
	-080-A27-AP16-07	▲	80	27	50	15.5	7	A	1.1
	-100-B32-AP16-08	▲	100	32	50	15.5	8	B	1.6
	-125-B40-AP16-10	▲	125	40	63	15.5	10	B	3.2
	-160-B40-AP16-10	▲	160	40	63	15.5	10	B	6.3

▲Stock available △Make-to-order

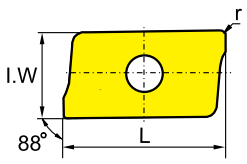
Spare parts

Diameter ØD	Inserts	Screw	Wrench
			
Ø50-Ø100	AP11	I60M2.5×6.5T	WT08IS
Ø50-Ø160	AP16	I60M4×10	WT15IS



Tools code key B22–B23
Grade selection guide B18–B21
Technical data B192–B198

Selection of 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

Insert shape	Type	Basic dimensions(mm)					CVD Coating						PVD Coating						Cermet		Cemented carbide			
		L	I.W	S	ød	r	YBC301	**YBC302**	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	**APKT11T304-PF**	12.24	6.5	3.6	2.8	0.4	●	★	○		○			○	○		○								
	APKT11T308-PF	12.24	6.5	3.6	2.8	0.8		★	○					○	○										
	APKT11T312-PF	12.24	6.5	3.6	2.8	1.2		★							○										
	APKT11T316-PF	12.24	6.5	3.6	2.8	1.6		★							○										
	APKT160408-PF	17.877	9.33	5.76	4.4	0.8	●	★	○		○				○		○								
	**APKT11T304-PM**	12.24	6.5	3.6	2.8	0.4	●	★	●		●			★	★		★								
	APKT11T308-PM	12.24	6.5	3.6	2.8	0.8	●	★	●		○		★	★	★		★								
	APKT11T312-PM	12.24	6.5	3.6	2.8	1.2		★	○					○	★		○								
	APKT11T316-PM	12.24	6.5	3.6	2.8	1.6		★	○					○	★		○								
	APKT160408-PM	17.877	9.33	5.76	4.4	0.8	●	★	●		●		○	★	★		★								
	**APKT11T304-PR**	12.24	6.5	3.6	2.8	0.4	●	★	●		●			○	○		○								
	APKT11T308-PR	12.24	6.5	3.6	2.8	0.8		★									○								
	APKT11T312-PR	12.24	6.5	3.6	2.8	1.2		★									○								
	APKT11T316-PR	12.24	6.5	3.6	2.8	1.6		★									○								
	APKT160408-PR	17.877	9.33	5.76	4.4	0.8		★									○								
	**APKT11T304-LH**	12.24	6.5	3.6	2.8	0.4																		★	★
	APKT11T308-LH	12.24	6.5	3.6	2.8	0.8																		★	○
	APKT160408-LH	17.877	9.33	5.76	4.4	0.8																		★	★

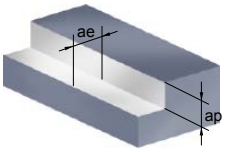
★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order



Chipbreaker selection

Classification \ Function	For finishing	For semi-finishing	For roughing
P	-PF	-PM	-PR
M	-PF	-PM	-PR
K	-PF	-PM	
N	-LH		

Square shoulder milling



Recommended cutting parameters (D: Diameter)

Workpiece material		Hardness HB	Insert grade	Cutting parameters				
				V（m/min）	f（mm/z）			ae(mm)
					-PF	-PM	-PR	
P	Low-carbon steel、Soft steel	⩽180	YBM251 YBC301 YBC302	320 (240-400)	0.1 (0.08-0.2)	0.2 (0.1-0.3)	0.25(0.2-0.35)	⩽0.5D
			YBM351	260 (180-380)	0.1 (0.08-0.2)	0.2 (0.1-0.3)	0.25(0.2-0.35)	⩽0.5D
			YBG202	320 (200-400)	0.1 (0.08-0.2)	0.2 (0.1-0.3)	0.25(0.2-0.35)	⩽0.5D
			YBG302	280 (180-400)	0.1 (0.08-0.2)	0.2 (0.1-0.3)	0.25(0.2-0.35)	⩽0.5D
	High-carbon steel、Alloy steel	180-280	YBM251 YBC301 YBC302	280 (210-380)	0.1 (0.08-0.2)	0.2 (0.1-0.3)	0.25(0.2-0.3)	⩽0.5D
			YBM351	240 (160-320)	0.1 (0.08-0.2)	0.2 (0.1-0.3)	0.25(0.2-0.35)	⩽0.5D
			YBG202	280 (180-350)	0.1 (0.08-0.2)	0.2 (0.1-0.3)	0.25(0.2-0.3)	⩽0.5D
			YBG302	260 (150-380)	0.1 (0.08-0.2)	0.2 (0.1-0.3)	0.25(0.2-0.35)	⩽0.5D
	Alloy tool steel	280-350	YBM251 YBC301 YBC302	260 (180-350)	0.1 (0.08-0.2)	0.2 (0.1-0.3)	0.25(0.2-0.3)	⩽0.5D
			YBM351	220 (150-280)	0.1 (0.08-0.2)	0.2 (0.1-0.3)	0.25(0.2-0.35)	⩽0.5D
			YBG202	260 (160-330)	0.1 (0.08-0.2)	0.2 (0.1-0.3)	0.25(0.2-0.3)	⩽0.5D
			YBG302	240 (120-350)	0.1 (0.08-0.2)	0.2 (0.1-0.3)	0.25(0.2-0.35)	⩽0.5D
M	Stainless steel	⩽270	YBM251	200 (120-270)	0.1 (0.08-0.2)	0.2 (0.1-0.3)	0.25(0.2-0.3)	⩽0.5D
			YBM351	180 (150-300)	0.1 (0.08-0.2)	0.2 (0.1-0.3)	0.25(0.2-0.3)	⩽0.5D
			YBG202	200 (110-300)	0.1 (0.08-0.2)	0.2 (0.1-0.3)	0.25(0.2-0.3)	⩽0.5D
			YBG302	170 (100-280)	0.1 (0.08-0.2)	0.2 (0.1-0.3)	0.25(0.2-0.3)	⩽0.5D
K	Cast iron	180-250	YBG102	220 (120-250)	0.1 (0.08-0.2)	0.2 (0.1-0.3)	-	⩽0.5D
			YBD252	200 (120-320)	0.1 (0.08-0.2)	0.2 (0.1-0.3)	-	⩽0.5D
N					-LH			
	Aluminium alloy	----	YD101	300-	0.2 (0.08-0.4)			⩽0.5D
			YD201	300-	0.2 (0.08-0.4)			⩽0.5D

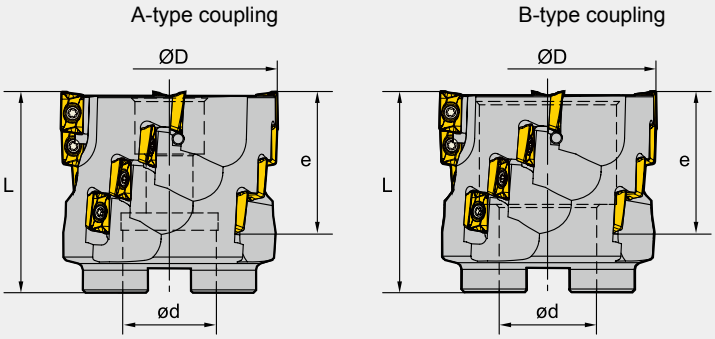
Square shoulder milling tools

Kr:90°



EMP03 P M K N





Specification of tools

Type		Stock	Basic dimensions(mm)				Number of flute z	Number of inserts	Type of coupling	Weight (kg)
			ØD	ød	L	e				
EMP03	**-050-A22-AP11-04**	▲	50	22	58	39	4	16	A	0.5
	-063-A27-AP11-04	▲	63	27	58	39	4	16	A	0.9
	-080-B32-AP11-05	▲	80	32	63	39	5	20	B	1.3
	-100-B40-AP11-06	▲	100	40	63	39	6	24	B	2.0

▲Stock available △Make-to-order

Spare parts

Diameter ØD	Screw	Wrench
		
Ø50-Ø100	I60M2.5×6.5T	WT08IS





Tools code key B22–B23
Grade selection guide B18–B21
Technical data B192–B198

Square shoulder milling tools

Kr:90°


Step shoulder

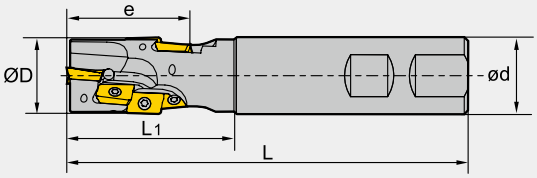

Slot milling


Side milling

EMP04 P M K N



Weldon shank



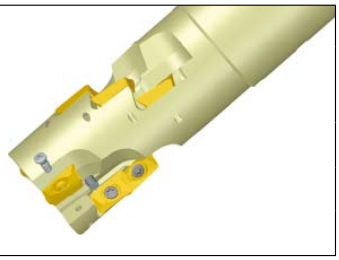
Specification of tools

Type		Stock	Basic dimensions(mm)					Number of flute z	Number of inserts	Weight (kg)
			ØD	ød	L	L_1	e			
EMP04	**-020-XP20-AP11-01**	▲	20	20	120	45	29.4	1	3	0.3
	-025-XP25-AP11-02	▲	25	25	130	55	38.9	2	8	0.4
	-032-XP32-AP11-02	▲	32	32	140	65	48.5	2	10	0.7
	-040-XP40-AP11-02	▲	40	40	150	75	58.0	2	14	1.3

▲Stock available △Make-to-order

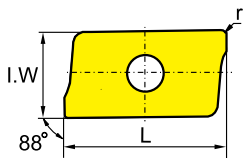
Spare parts

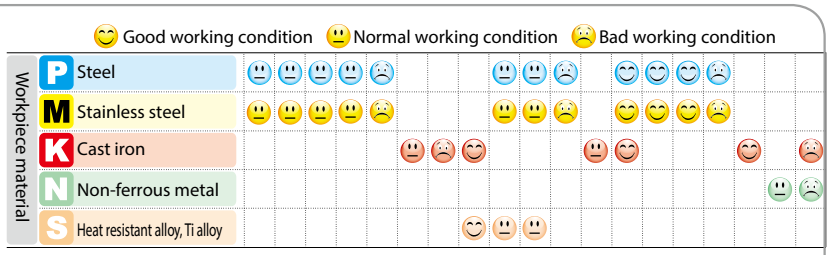
Diameter ØD	Screw	Wrench
		
Ø20-Ø40	I60M2.5×6.5T	WT08IS



Tools code key B22–B23
Grade selection guide B18–B21
Technical data B192–B198

Selection of inserts





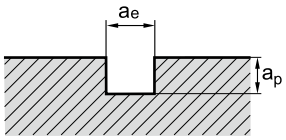
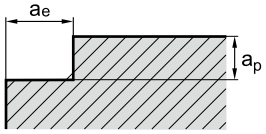
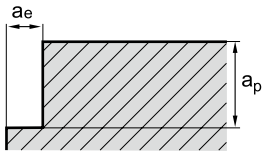
Insert shape	Type	Basic dimensions(mm)					CVD Coating						PVD Coating						Cermet		Cemented carbide			
		L	I.W	S	ød	r	YBC301	**YBC302**	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	**APKT11T304-PF**	12.24	6.5	3.6	2.8	0.4	●	★	○		○			○	○		○								
	APKT11T308-PF	12.24	6.5	3.6	2.8	0.8		★	○					○	○										
	APKT11T312-PF	12.24	6.5	3.6	2.8	1.2		★							○										
	APKT11T316-PF	12.24	6.5	3.6	2.8	1.6		★							○										
	**APKT11T304-PM**	12.24	6.5	3.6	2.8	0.4	●	★	●		●			★	★		★								
	APKT11T308-PM	12.24	6.5	3.6	2.8	0.8	●	★	●		○		★	★	★		★								
	APKT11T312-PM	12.24	6.5	3.6	2.8	1.2		★	○					○	★		○								
	APKT11T316-PM	12.24	6.5	3.6	2.8	1.6		★	○					○	★		○								
	**APKT11T304-PR**	12.24	6.5	3.6	2.8	0.4	●	★	●		●			○	○		○								
	APKT11T308-PR	12.24	6.5	3.6	2.8	0.8		★									○								
	APKT11T312-PR	12.24	6.5	3.6	2.8	1.2		★									○								
	APKT11T316-PR	12.24	6.5	3.6	2.8	1.6		★									○								
	**APKT11T304-LH**	12.24	6.5	3.6	2.8	0.4																		★	★
	APKT11T308-LH	12.24	6.5	3.6	2.8	0.8																		★	○

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

Chipbreaker selection

Classification \ Function	For finishing	For semi-finishing	For roughing
P	-PF	-PM	-PR
M	-PF	-PM	-PR
K	-PF	-PM	
N	-LH		

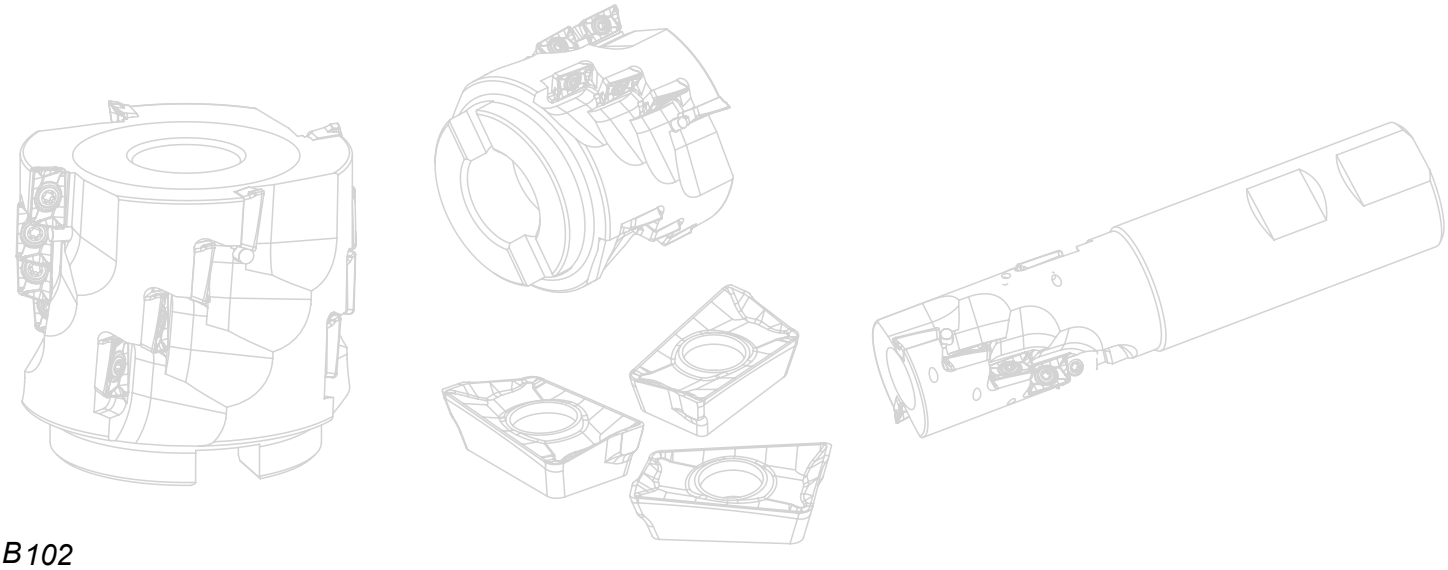
Recommended cutting parameters

Slot milling	Square shoulder milling	Deep square shoulder milling
		
a_e=D $a_p \leqslant 0.5D$	$a_e \leqslant 0.5D$ $a_p \leqslant 1.2D$	$a_e \leqslant 0.2D$ $a_p <$ Cutting length of insert

Workpiece material		Hardness HB	Insert grade	Cutting parameters			
				Square shoulder milling			
				V（m/min）	f（mm/z）		
					-PF	-PM	-PR
P	Low-carbon steel、Soft steel	⩽180	YBM251 YBC301 YBC302	270 (240-350)	0.1 (0.08-0.2)	0.2 (0.1-0.3)	0.25(0.2-0.35)
			YBM351	220 (180-300)	0.1 (0.08-0.2)	0.2 (0.1-0.3)	0.25(0.2-0.35)
			YBG202	270 (200-360)	0.1 (0.08-0.2)	0.2 (0.1-0.3)	0.25(0.2-0.35)
			YBG302	240 (180-350)	0.1 (0.08-0.2)	0.2 (0.1-0.3)	0.25(0.2-0.35)
	High-carbon steel、Alloy steel	180-280	YBM251 YBC301 YBC302	240 (210-320)	0.1 (0.08-0.2)	0.2 (0.1-0.3)	0.25(0.2-0.35)
			YBM351	200 (160-280)	0.1 (0.08-0.2)	0.2 (0.1-0.3)	0.25(0.2-0.35)
			YBG202	240 (180-360)	0.1 (0.08-0.2)	0.2 (0.1-0.3)	0.25(0.2-0.35)
			YBG302	220 (150-330)	0.1 (0.08-0.2)	0.2 (0.1-0.3)	0.25(0.2-0.35)
	Alloy tool steel	280-350	YBM251 YBC301 YBC302	220 (180-300)	0.1 (0.08-0.2)	0.2 (0.1-0.3)	0.25(0.2-0.35)
			YBM351	180 (150-250)	0.1 (0.08-0.2)	0.2 (0.1-0.3)	0.25(0.2-0.35)
			YBG202	220 (160-340)	0.1 (0.08-0.2)	0.2 (0.1-0.3)	0.25(0.2-0.35)
			YBG302	200 (120-300)	0.1 (0.08-0.2)	0.2 (0.1-0.3)	0.25(0.2-0.35)
M	Stainless steel	⩽270	YBM251	170 (120-240)	0.1 (0.08-0.2)	0.2 (0.1-0.3)	0.25(0.2-0.35)
			YBM351	160 (150-270)	0.1 (0.08-0.2)	0.2 (0.1-0.3)	0.25(0.2-0.35)
			YBG202	150 (110-270)	0.1 (0.08-0.2)	0.2 (0.1-0.3)	0.25(0.2-0.35)
			YBG302	140 (100-250)	0.1 (0.08-0.2)	0.2 (0.1-0.3)	0.25(0.2-0.35)
K	Cast iron	180-250	YBG102	200 (120-240)	0.1 (0.08-0.2)	0.2 (0.1-0.3)	
			YBD252	180 (120-300)	0.1 (0.08-0.2)	0.2 (0.1-0.3)	
N					-LH		
	Aluminium alloy	----	YD101	300-	0.2 (0.08-0.4)		
			YD201	300-	0.2 (0.08-0.4)		

Recommended cutting parameters

Workpiece material		Hardness HB	Insert grade	Cutting parameters			
				Slot milling、Deep square shoulder milling			
				V（m/min）	f（mm/z）		
					-PF	-PM	-PR
P	Low-carbon steel、Soft steel	⩽180	YBM251 YBC301 YBC302	270 (240-350)	0.1 (0.08-0.15)	0.15 (0.1-0.25)	0.2 (0.2-0.3)
			YBM351	220 (180-300)	0.1 (0.08-0.15)	0.15 (0.1-0.25)	0.2 (0.2-0.3)
			YBG202	270 (200-360)	0.1 (0.08-0.15)	0.15 (0.1-0.25)	0.2 (0.2-0.3)
			YBG302	240 (180-350)	0.1 (0.08-0.15)	0.15 (0.1-0.25)	0.2 (0.2-0.3)
	High-carbon steel、Alloy steel	180-280	YBM251 YBC301 YBC302	240 (210-320)	0.1 (0.08-0.15)	0.15 (0.1-0.25)	0.2 (0.2-0.3)
			YBM351	200 (160-280)	0.1 (0.08-0.15)	0.15 (0.1-0.25)	0.2 (0.2-0.3)
			YBG202	240 (180-360)	0.1 (0.08-0.15)	0.15 (0.1-0.25)	0.2 (0.2-0.3)
			YBG302	220 (150-330)	0.1 (0.08-0.15)	0.15 (0.1-0.25)	0.2 (0.2-0.3)
	Alloy tool steel	280-350	YBM251 YBC301 YBC302	220 (180-300)	0.1 (0.08-0.15)	0.15 (0.1-0.25)	0.2 (0.2-0.3)
			YBM351	180 (150-250)	0.1 (0.08-0.15)	0.15 (0.1-0.25)	0.2 (0.2-0.3)
			YBG202	220 (160-340)	0.1 (0.08-0.15)	0.15 (0.1-0.25)	0.2 (0.2-0.3)
			YBG302	200 (120-300)	0.1 (0.08-0.15)	0.15 (0.1-0.25)	0.2 (0.2-0.3)
M	Stainless steel	⩽270	YBM251	170 (120-240)	0.1 (0.08-0.15)	0.15 (0.1-0.25)	0.2 (0.2-0.3)
			YBM351	160 (150-270)	0.1 (0.08-0.15)	0.15 (0.1-0.25)	0.2 (0.2-0.3)
			YBG202	150 (110-270)	0.1 (0.08-0.15)	0.15 (0.1-0.25)	0.2 (0.2-0.3)
			YBG302	140 (100-250)	0.1 (0.08-0.15)	0.15 (0.1-0.25)	0.2 (0.2-0.3)
K	Cast iron	180-250	YBG102	200 (120-240)	0.1 (0.08-0.15)	0.15 (0.1-0.25)	
			YBD252	180 (120-300)	0.1 (0.08-0.15)	0.15 (0.1-0.25)	
N					-LH		
	Aluminium alloy	----	YD101	300-	0.2 (0.08-0.3)		
			YD201	300-	0.2 (0.08-0.3)		



Square shoulder milling tools Kr:90°

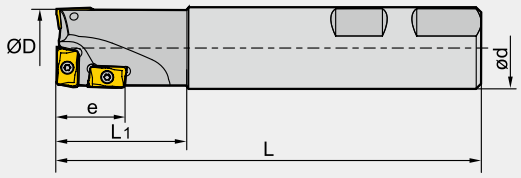

Step shoulder


Key slot milling

EMP05 P M K



Weldon shank



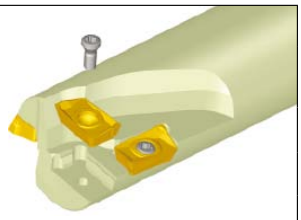
Specification of tools

Type		Stock	Basic dimensions(mm)					Number of inserts		Weight (kg)
		R	ØD	ød	L	L_1	e	APMT11	APMT16	
EMP05	**-025-XP25**	▲	25	25	130	40	20	3	--	0.5
	-032-XP32	▲	32	32	140	50	30	--	3	0.8
	-040-XP32	▲	40	32	150	60	40	--	4	1.0

▲Stock available △Make-to-order

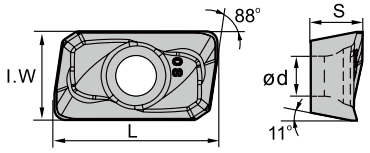
Spare parts

Diameter ØD	Inserts	Screw	Wrench
			
Ø25-Ø40	APMT11	I60M2.5×6.5T	WT08IP
	APMT16	I60M4×10	WT15IP

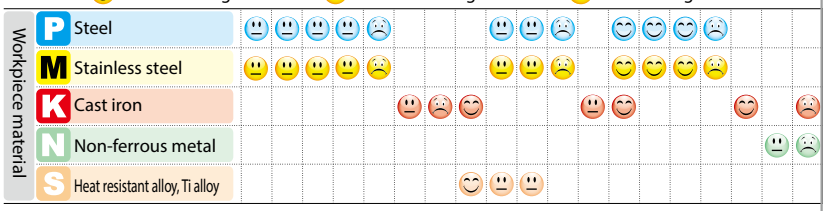


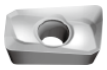
Tools code key B22–B23
Grade selection guide B18–B21
Technical data B192–B198

Selection of inserts

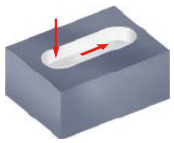


Good working condition Normal working condition Bad working condition



Insert shape	Type	Basic dimensions(mm)					CVD Coating						PVD Coating						Cermet		Cemented carbide			
		L	I.W	S	ød	r	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	**APMT1135PDR**	11.25	6.2	3.5	2.8	0.8			○					○	●	★	○								
	**APMT160408PDER**	17.25	9.25	4.76	4.4	0.8									●	★	○								

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



1 Drilling

Recommended cutting parameters

Workpiece material		Hardness HB	Insert grade	Cutting parameters	
				V（m/min）	f（mm/z）
P	Low-carbon steel、Soft steel	≤180	YBG202	180 (150-220)	0.2 (0.08-0.25)
P	High-carbon steel、Alloy steel	180-280	YBG202	160 (130-200)	0.15 (0.08-0.2)
P	Alloy tool steel	280-350	YBG202	140 (120-180)	0.12 (0.05-0.2)
M	Stainless steel	≤270	YBG202	80 (50-150)	0.08 (0.03-0.15)
K	Cast iron	180-250	YBG202	150 (100-220)	0.15 (0.08-0.2)

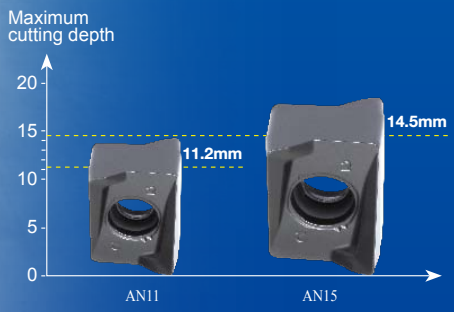
2 Milling

Recommended cutting parameters

Workpiece material		Hardness HB	Insert grade	Cutting parameters	
				V（m/min）	f（mm/z）
P	Low-carbon steel、Soft steel	≤180	YBG202	190 (140-250)	0.08 (0.04-0.15)
P	High-carbon steel、Alloy steel	180-280	YBG202	170 (130-250)	0.08 (0.04-0.15)
P	Alloy tool steel	280-350	YBG202	150 (110-240)	0.08 (0.04-0.15)
M	Stainless steel	≤270	YBG202	120 (80-190)	0.08 (0.04-0.15)
K	Cast iron	180-250	YBG202	120 (80-210)	0.08 (0.04-0.15)



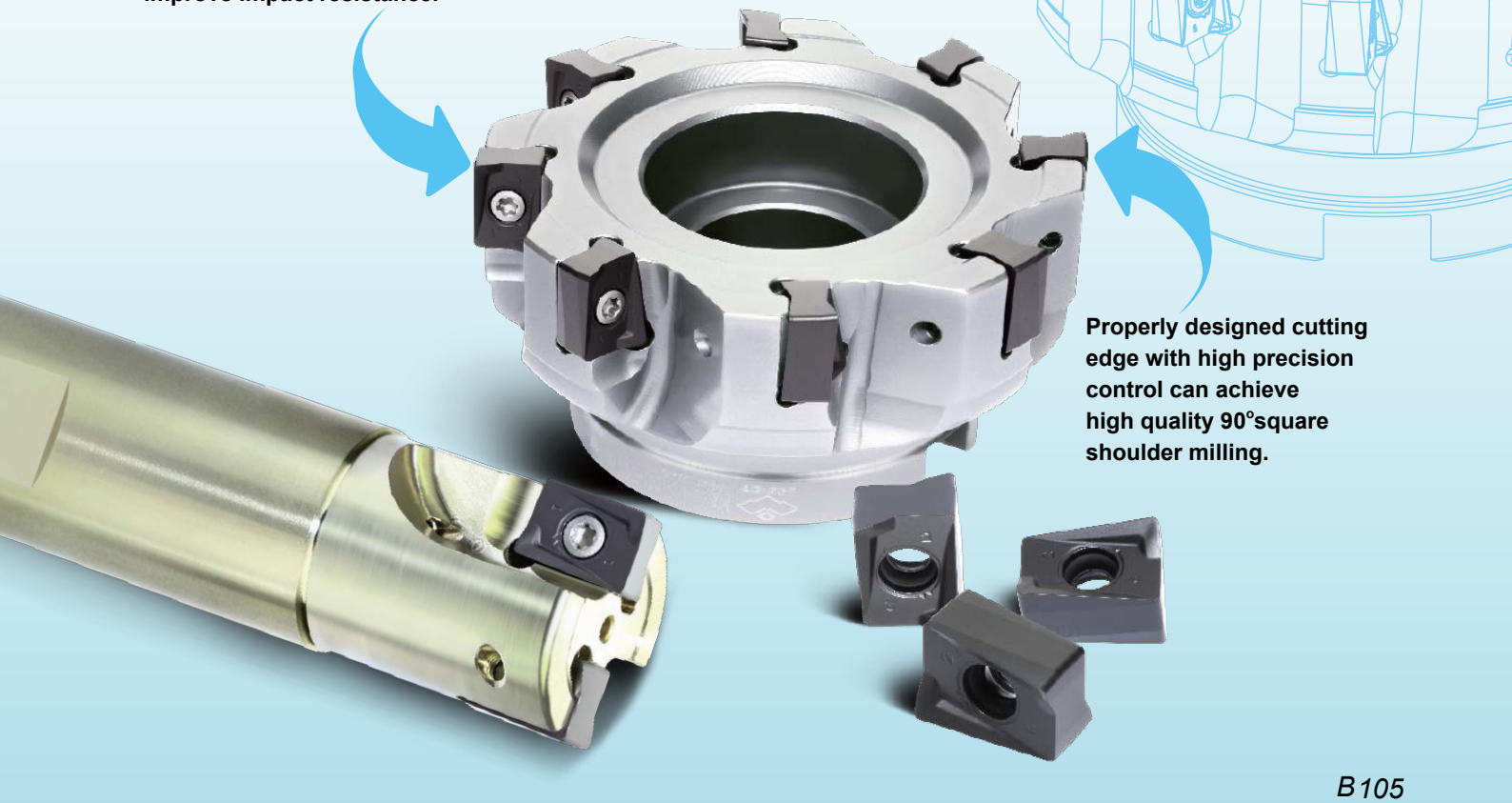
chieving high quality 90°
square shoulding milling



Kr:90°

EMP13 Series Square Shoulder Mills

Double negative rake angle of the tool body in combination with extra thick insert achieves double positive tool angle, which will help reduce cutting resistance and greatly improve impact resistance.



Properly designed cutting edge with high precision control can achieve high quality 90°square shoulder milling.

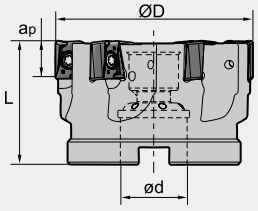
Square shoulder milling tools Kr:90°

Face milling Step shoulder

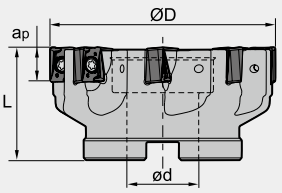
EMP13 P K



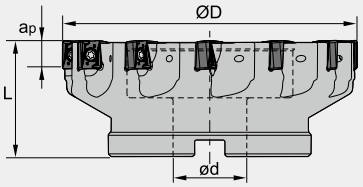
A-type coupling



B-type coupling



C-type coupling



Specification of tools

Type		Stock	Basic dimensions(mm)				Number of flute z	Type of coupling	Weight (kg)
			ØD	Ød	L	apmax			
EMP13	**-050-A22-AN11-06**	▲	50	22	40	11.2	6	A	0.30
	-063-A22-AN11-07	▲	63	22	40	11.2	7	A	0.49
	-080-A27-AN11-09	▲	80	27	50	11.2	9	A	1.18
	-100-B32-AN11-12	▲	100	32	50	11.2	12	B	1.46
	-125-B40-AN11-14	▲	125	40	63	11.2	14	B	2.92
	-160-C40-AN11-16	▲	160	40	63	11.2	16	C	4.30
	-050-A22-AN15-04	▲	50	22	40	14.5	4	A	0.26
	-063-A22-AN15-05	▲	63	22	40	14.5	5	A	0.53
	-080-A27-AN15-06	▲	80	27	50	14.5	6	A	1.23
	-100-B32-AN15-08	▲	100	32	50	14.5	8	B	1.52
	-125-B40-AN15-10	▲	125	40	63	14.5	10	B	3.05
	-160-C40-AN15-12	▲	160	40	63	14.5	12	C	4.46

▲Stock available △Make-to-order

Spare parts

Diameter ØD	Inserts	Screw	Wrench
			
Ø50-Ø160	ANGX110504PNR-GM	I60M3X9	WT09IS
	ANGX110508PNR-GM		
Ø50-Ø160	ANGX150608PNR-GM	I60M4X12	WT15IS
	ANGX150616PNR-GM		



Tools code key B22–B23
Grade selection guide B18–B21
Technical data B192–B198

Square shoulder milling tools Kr:90°

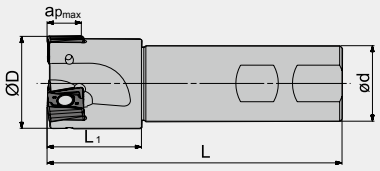


EMP13 P K

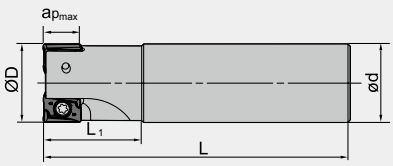

Weldon shank


Straight shank

Weldon shank



Straight shank



Specification of tools

Type		Stock	Basic dimensions(mm)					Number of flute z	Weight (kg)
			ØD	Ød	L	L_1	a_{pmax}		
EMP13 Weldon shank	**-025-XP25-AN11-02**	▲	25	25	100	32	11.2	2	0.31
	-032-XP32-AN11-03	▲	32	32	115	40	11.2	3	0.61
	-040-XP32-AN11-04	▲	40	32	125	40	11.2	4	0.75
	-032-XP32-AN15-02	▲	32	32	125	40	14.5	2	0.66
	-040-XP32-AN15-03	▲	40	32	125	40	14.5	3	0.76
Straight shank	**-025-G25-AN11-02**	▲	25	25	100	32	11.2	2	0.31
	-032-G32-AN11-03	▲	32	32	115	40	11.2	3	0.61
	-040-G32-AN11-04	▲	40	32	125	40	11.2	4	0.75
	-032-G32-AN15-02	▲	32	32	125	40	14.5	2	0.66
	-040-G32-AN15-03	▲	40	32	125	40	14.5	3	0.76

▲Stock available △Make-to-order

Spare parts

Diameter ØD	Inserts	Screw	Wrench	
				
Ø25-Ø40	ANGX110504PNR-GM	I60M3X9	WT09IS	
	ANGX110508PNR-GM			
Ø32-Ø40	ANGX150608PNR-GM	I60M4X12	WT15IS	
	ANGX150616PNR-GM			

Tools code key B22–B23
Grade selection guide B18–B21
Technical data B192–B198

Square shoulder milling tools

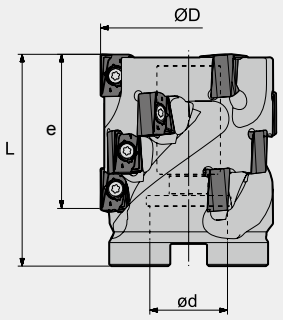
Kr:90°



EMP13 P K



A-type coupling



Specification of tools

Type		Stock	Basic dimensions(mm)				Number of grooves	Number of inserts	Type of coupling	Weight (kg)
			ØD	Ød	L	e				
EMP13	**-050×43-A22-AN11-03**	▲	50	22	60	43	3	12	A	0.52
	-063×65-A27-AN11-04	▲	63	27	80	64	4	24	A	1.15
	-063×53-A27-AN15-03	▲	63	27	75	53	3	12	A	1.14
	-080×56-A32-AN15-04	▲	80	32	75	53	4	16	A	1.82

▲Stock available △Make-to-order

Spare parts

Diameter ØD	Inserts	Screw	Wrench
			
Ø50-Ø63	ANGX110504PNR-GM	I60M3X9	WT09IS
Ø63-Ø80	ANGX150608PNR-GM	I60M4X12	WT15IS



Tools code key B22–B23
Grade selection guide B18–B21
Technical data B192–B198

Square shoulder milling tools

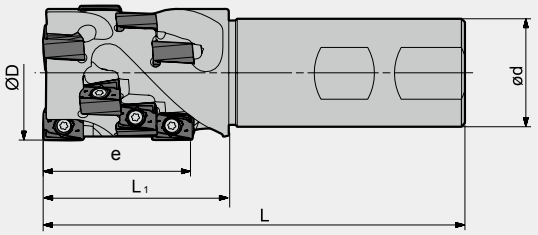
Kr:90°



EMP13 P K



Weldon shank



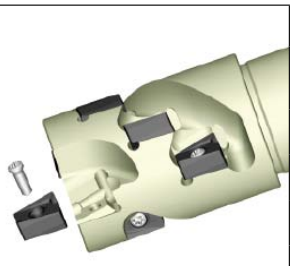
Specification of tools

Type		Stock	Basic dimensions(mm)					Number of grooves	Number of inserts	Weight (kg)
			ØD	Ød	L	L1	e			
EMP13	-032×43-XP32-AN11-02	▲	32	32	115	48	43	2	8	0.61
	-040×43-XP32-AN11-03	▲	40	32	125	55	43	3	12	0.79
	-040×40-XP32-AN15-02	▲	40	32	115	55	40	2	6	0.79
	-050×53-XP40-AN15-02	▲	50	40	145	70	53	2	8	1.53

▲Stock available △Make-to-order

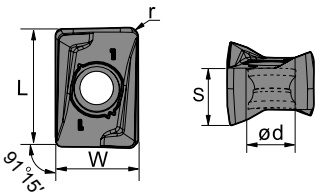
Spare parts

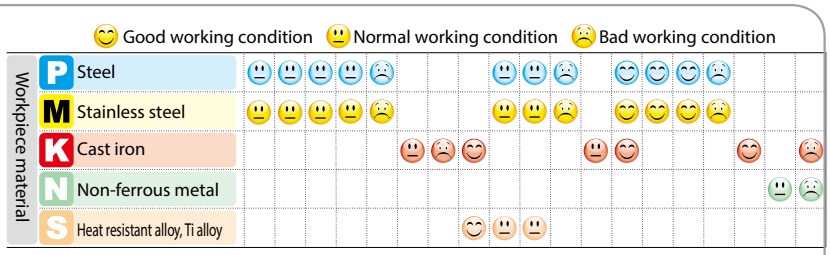
Diameter ØD	Inserts	Screw	Wrench
			
Ø32-Ø40	ANGX110504PNR-GM	I60M3X9	WT09IS
Ø40-Ø50	ANGX150608PNR-GM	I60M4X12	WT15IS



Tools code key B22–B23
Grade selection guide B18–B21
Technical data B192–B198

Selection of inserts





Insert shape	Type	Basic dimensions(mm)					CVD Coating							PVD Coating						Cermet		Cemented carbide			
		L	W	S	ød	r	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	**ANGX110504PNR-GM**	11.85	8.4	5.7	3.5	0.4				★		★				★									
	ANGX110508PNR-GM	11.85	8.4	5.7	3.5	0.8				★		★				★									
	ANGX150608PNR-GM	15.43	11.0	7.3	4.4	0.8				★		★				★									
	ANGX150616PNR-GM	15.43	11.0	7.3	4.4	1.6				★		★				★									

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

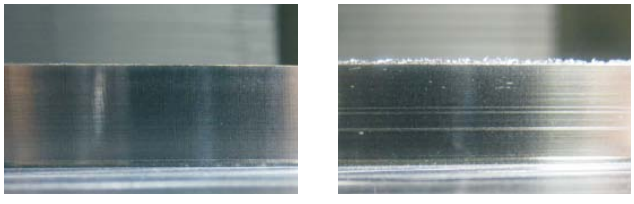
Recommended cutting parameters

Workpiece material		Hardness HB	Insert grade	Cutting parameters		
				Cutting speed (m/min)	Feed rate per tooth (mm)	a_{pmax}(mm)
P	Low carbon steel	⩽180	YBM253 YBG205	270(220-350)	0.25(0.1-0.4)	11.2(AN11) 14.5(AN15)
P	Alloy steel	180-350	YBM253 YBG205	240(180-320)	0.2(0.1-0.4)	
M	Stainless steel	⩽270	YBM253 YBG205	230 (180-300) 160 (110-270)	0.15 (0.1-0.3)	
K	Cast iron	180-260	YBD152	270(150-300)	0.25(0.1-0.4)	

Case for EMP13

Workpiece material: NAK80(HRC36)
Tool: EMP13-032-G32-AN15-02
Insert: ANGX150608PNR-GM/YBG205
Cutting data: Vc=220m/min,
f_z=0.1mm/z,
a_p=14.5mm,
a_e=10mm
Cutting condition: Dry cutting

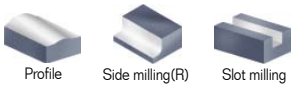
●Surface quality comparison



EMP13 Company A

Surface quality and perpendicularity of workpiece machined by EMP13 is obviously superior to that of company A.

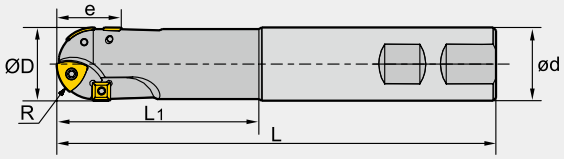
Profile milling tools



BMR01 P M K



Weldon shank



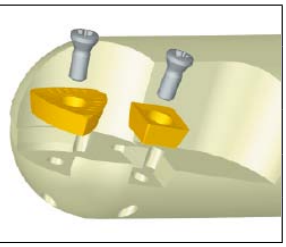
Specification of tools

Type		Stock	Basic dimensions(mm)						Applicable inserts				Weight (kg)
			R	ØD	e	ød	L	L1	Type	Quantity	Type	Quantity	
BMR01	-020-XP20-S	▲	10	20	20	20	125	50	ZDET08T2CYR10	2	SPMT060304	2	0.3
	-020-XP20-M	▲	10	20	20	20	150	75	ZDET08T2CYR10	2	SPMT060304	2	0.3
	-020-XP20-L	▲	10	20	20	20	200	100	ZDET08T2CYR10	2	SPMT060304	2	0.4
	-025-XP25-S	▲	12.5	25	23	25	150	70	ZDET1103CYR12.5	2	SPMT060304	2	0.5
	-025-XP25-M	▲	12.5	25	23	25	175	95	ZDET1103CYR12.5	2	SPMT060304	2	0.6
	-025-XP25-L	▲	12.5	25	23	25	200	100	ZDET1103CYR12.5	2	SPMT060304	2	0.7
	-032-XP32-S	▲	16	32	31	32	175	85	ZDET13T3CYR16	2	SDMT090308	2	0.9
	-032-XP32-M	▲	16	32	31	32	200	100	ZDET13T3CYR16	2	SDMT090308	2	1.1
	-032-XP32-L	▲	16	32	31	32	250	150	ZDET13T3CYR16	2	SDMT090308	2	1.4
	-040-XP40-S	▲	20	40	41	40	175	85	ZPNT2204CY(R20)	3	SPMT120408	2	1.4
	-040-XP40-M	▲	20	40	41	40	200	100	ZPNT2204CY(R20)	3	SPMT120408	2	1.7
	-040-XP40-L	▲	20	40	41	40	250	150	ZPNT2204CY(R20)	3	SPMT120408	2	2.1
	-050-XP40-S	▲	25	50	45	40	200	100	ZPNT2204CY(R25)	3	SPMT120408	2	1.8
	-050-XP40-M	▲	25	50	45	40	300	100	ZPNT2204CY(R25)	3	SPMT120408	2	2.8
	-063-XP40-S	▲	31.5	63	52	40	200	100	ZPNT2204CY(R31)	4	SPMT120408	2	3.0
	-063-XP40-M	▲	31.5	63	52	40	300	100	ZPNT2204CY(R31)	4	SPMT120408	2	3.5

▲Stock available △Make-to-order

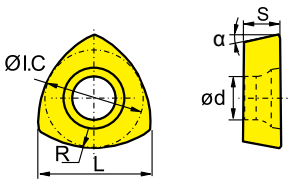
Spare parts

Diameter ØD	Screw	Wrench	
			
Ø20-Ø25	I43M2.5×5.7	WT07IP	--
Ø32	I43M4×8	--	WT15IS
Ø40-Ø63	I43M5×11	--	WT20IS



Tools code key B22–B23
Grade selection guide B18–B21
Technical data B192–B198

Selection of inserts

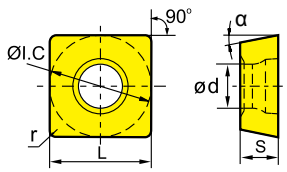


Good working condition 😊 Normal working condition 😐 Bad working condition

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

Insert shape	Type	Basic dimensions(mm)						CVD Coating							PVD Coating						Cermet		Cemented carbide			
		R	L	ØI.C	S	ød	α	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	ZDET08T2CYR10	10	8.4	6.75	2.78	2.8	14°			○								○								
	ZDET1103CYR12.5	12.5	10.6	8.5	3.18	2.8	14°			○								○								
	ZDET13T3CYR16	16	13.2	10.5	3.97	4.4	14°			○								○								
	ZPNT2204CY(R20)	20	16.1	12.7	4.76	5.56	11°			○								○								
	ZPNT2204CY(R25)	25	16.9	12.7	4.76	5.56	11°			○								○								
	ZPNT2204CY(R31)	31.5	17.6	12.7	4.76	5.56	11°			○								○								

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



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

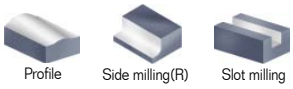
Insert shape	Type	Basic dimensions(mm)						CVD Coating							PVD Coating						Cermet		Cemented carbide			
		r	L	ØI.C	S	ød	α	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	SPMT060304	0.4	6.35	6.35	3.18	2.8	11°			○								○								
	SDMT090308	0.8	9.525	9.525	3.18	4.4	15°			○								○								
	SPMT120408	0.8	12.7	12.70	4.76	5.5	11°			●								★								

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

Recommended cutting parameters

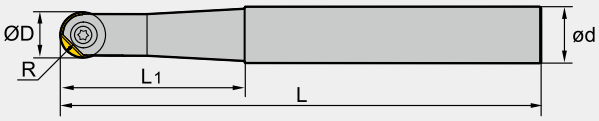
Workpiece material		Hardness HB	Insert grade	Cutting parameters	
				V(m/min)	f(mm/z)
P	Low-carbon steel、Soft steel	≤180	YBM251	180(120-220)	0.25(0.1-0.4)
			YBG302	160(120-220)	0.25(0.1-0.4)
	High-carbon steel、Alloy steel	180-280	YBM251	150(100-200)	0.2(0.1-0.4)
			YBG302	120(100-200)	0.2(0.1-0.4)
	Alloy tool steel	280-350	YBM251	100(80-150)	0.2(0.1-0.3)
			YBG302	100(80-150)	0.2(0.1-0.3)
M	Stainless steel	≤270	YBM251	100(80-150)	0.2(0.1-0.3)
			YBG302	100(80-150)	0.2(0.1-0.3)
K	Cast iron	180-250	YBG302	150(100-180)	0.3(0.2-0.5)

Profile milling tools



BMR02 P M K





Specification of tools

Type		Stock	Basic dimensions(mm)					Weight (kg)
			R	ØD	ød	L	L_1	
BMR02	-012-G16-S	▲	6	12	16	110	40	0.1
	-012-G16-M	▲	6	12	16	130	50	0.2
	-012-G16-L	▲	6	12	16	160	50	0.2
	-016-G20-S	▲	8	16	20	140	45	0.3
	-016-G20-M	▲	8	16	20	170	65	0.3
	-016-G20-L	▲	8	16	20	200	65	0.4
	-020-G25-S	▲	10	20	25	160	60	0.5
	-020-G25-M	▲	10	20	25	200	80	0.6
	-020-G25-L	▲	10	20	25	240	80	0.8

▲Stock available △Make-to-order

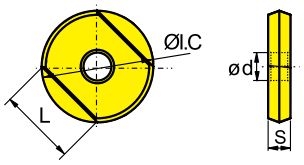
Spare parts

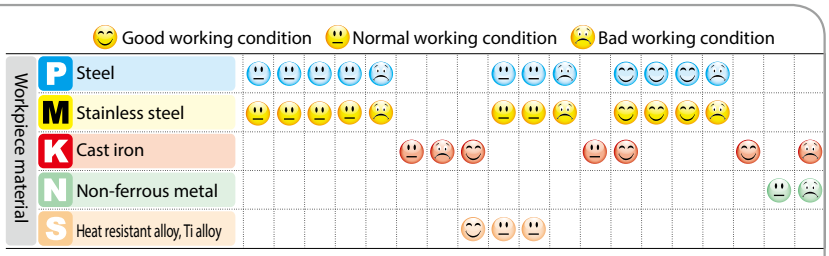
Diameter ØD	Screw	Wrench
Ø12	I70M4×10TT	WT15IS
Ø16	I70M5×12TT	WT20IS
Ø20	I70M5×16TT	WT20IS



Tools code key B22–B23
Grade selection guide B18–B21
Technical data B192–B198

Selection of inserts





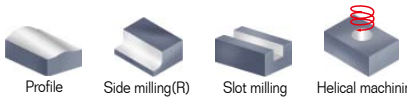
Insert shape	Type	Basic dimensions(mm)				CVD Coating							PVD Coating						Cermet		Cemented carbide			
		ØI.C	L	S	ød	YBC301	**YBC302**	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	**ROHX1203**	12	8.5	3	4													○						
	ROHX1604	16	11.3	4	5													○						
	ROHX2005	20	14.1	5	5													○						

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

Recommended cutting parameters

Workpiece material		Hardness HB	Insert grade	Cutting parameters	Diameter		
					Ø12	Ø16	Ø20
P	Carbon steel	HB≤180	YBG252	V(m/min)	100~200	100~200	100~200
				f_z(mm/z)	0.15~0.25	0.2~0.3	0.2~0.3
				a_{pmax}(mm)	0.8	1	1.25
				a_{emax}(mm)	0.8	1	1.25
	Alloy steel	HB180~280		V(m/min)	80~180	80~180	80~180
				f_z(mm/z)	0.15~0.25	0.2~0.3	0.2~0.3
				a_{pmax}(mm)	0.8	1	1.25
				a_{emax}(mm)	0.8	1	1.25
	Hardened steel	HRC55~65		V(m/min)	60~100	60~100	60~100
				f_z(mm/z)	0.15~0.25	0.2~0.3	0.2~0.3
				a_{pmax}(mm)	0.4	0.5	0.6
				a_{emax}(mm)	0.4	0.5	0.6
M	Stainless steel	HB≤270		V(m/min)	70~150	70~150	70~150
				f_z(mm/z)	0.1~0.2	0.1~0.25	0.1~0.25
				a_{pmax}(mm)	0.6	0.8	1
				a_{emax}(mm)	0.6	0.8	1
K	Cast iron	HB180-250		V(m/min)	160~300	160~300	160~300
				f_z(mm/z)	0.2~0.3	0.25~0.35	0.25~0.35
				a_{pmax}(mm)	1	1.5	1.8
				a_{emax}(mm)	1	1.5	1.8

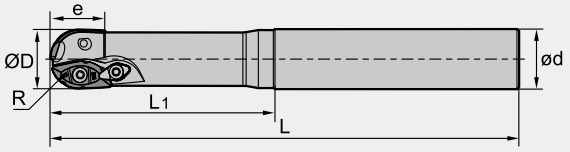
Profile milling tools



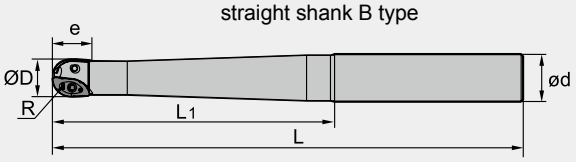
BMR03 P M K



straight shank A type



straight shank B type



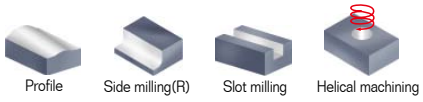
Specification of tools

Type		Stock	Basic dimensions(mm)						Number of teeth Z	Weight (kg)	Type	Clamp
			R	ØD	ød	L	L1	e				
BMR03	**-016-G20-S**	▲	8	16	20	150	70	16	2	0.3	B	--
	-016-G20-M	▲	8	16	20	180	80	16	2	0.4	B	
	-020-G25-S	▲	10	20	25	180	80	20	2	0.5	B	
	-020-G25-M	▲	10	20	25	200	100	20	2	0.6	B	
	-020-G25-L	▲	10	20	25	250	150	20	2	0.7	B	
	-020-G25-XL	▲	10	20	25	300	110	20	2	1.0	B	
	-025-G25-S	▲	12.5	25	25	180	80	25	2	0.6	B	
	-025-G25-M	▲	12.5	25	25	200	100	25	2	0.7	B	
	-025-G25-L	▲	12.5	25	25	250	110	25	2	0.8	B	
	-025-G25-XL	▲	12.5	25	25	300	120	25	2	1.0	B	
	-030-G32-S	△	15	30	32	200	120	30	2	1.0	A	WD-208
	-030-G32-M	▲	15	30	32	250	150	30	2	1.3	A	
	-030-G32-L	▲	15	30	32	300	200	30	2	1.6	A	
	-030-G32-XL	△	15	30	32	350	200	30	2	1.9	A	
	-032-G32-S	▲	16	32	32	200	120	32	2	1.1	A	
	-032-G32-M	▲	16	32	32	250	150	32	2	1.4	A	
	-032-G32-L	▲	16	32	32	300	200	32	2	1.6	A	
	-032-G32-XL	△	16	32	32	350	200	32	2	2.0	A	
	-040-G40-S	△	20	40	40	200	120	40	2	1.6	A	CBH5R1
	-040-G40-M	▲	20	40	40	250	150	40	2	2.0	A	
	-040-G40-L	▲	20	40	40	300	200	40	2	2.5	A	
	-040-G40-XL	△	20	40	40	350	200	40	2	3.0	A	

▲Stock available △Make-to-order

Tools code key B22–B23
Grade selection guide B18–B21
Technical data B192–B198

Profile milling tools



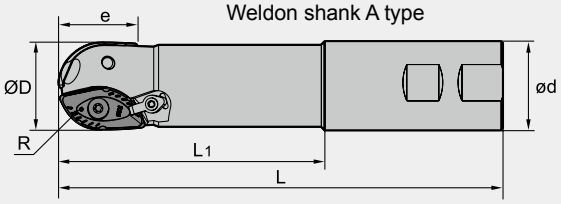
BMR03 P M K

A type(Ø30-Ø50)

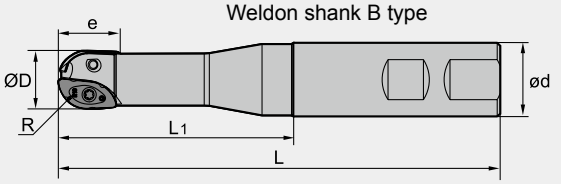


B type(Ø16-Ø25)

Weldon shank A type



Weldon shank B type



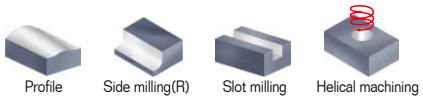
Specification of tools

Type		Stock	Basic dimensions(mm)						Number of teeth Z	Weight (kg)	Type	Clamp
			R	ØD	ød	L	L_1	e				
BMR03	**-016-XP20-M**	▲	8	16	20	111	60	16	2	0.2	B	--
	-020-XP25-M	▲	10	20	25	127	70	20	2	0.3	B	
	-020-XP25-L	▲	10	20	25	150	80	20	2	0.4	B	
	-025-XP25-M	▲	12.5	25	25	137	80	25	2	0.4	B	
	-025-XP25-L	▲	12.5	25	25	200	100	25	2	0.6	B	
	-030-XP32-M	▲	15	30	32	161	100	30	2	0.8	A	WD-208
	-030-XP32-L	▲	15	30	32	250	150	30	2	1.3	A	
	-032-XP32-M	▲	16	32	32	161	100	32	2	0.8	A	
	-032-XP32-L	▲	16	32	32	250	120	32	2	1.3	A	
	-040-XP40-M	▲	20	40	40	175	100	40	2	1.3	A	CBH5R1
	-040-XP40-L	▲	20	40	40	250	120	40	2	2.0	A	
	-050-XP50-M	▲	25	50	50	200	100	50	2	2.5	A	
	-050-XP50-L	▲	25	50	50	250	150	50	2	3.1	A	

▲Stock available △Make-to-order

Tools code key B22–B23
Grade selection guide B18–B21
Technical data B192–B198

Profile milling tools



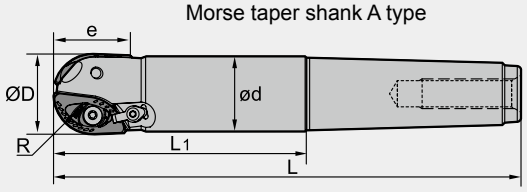
BMR03 P M K

A type(Ø30-Ø50)

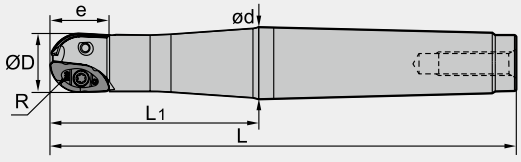


B type(Ø20-Ø25)

Morse taper shank A type



Morse taper shank B type



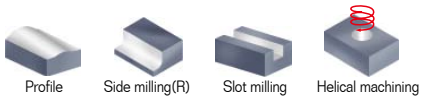
Specification of tools

Type		Stock	Basic dimensions(mm)						Number of teeth Z	Weight (kg)	Type	Clamp
			R	ØD	ød	L	L_1	e				
BMR03	**-020-MT3-M**	▲	10	20	18.7	156	70	20	2	0.4	B	--
	-020-MT3-L	△	10	20	18.7	186	100	20	2	0.4	B	
	-025-MT3-M	▲	12.5	25	23.5	156	70	25	2	0.4	B	
	-025-MT3-L	△	12.5	25	23.5	186	100	25	2	0.4	B	
	-030-MT4-M	▲	15	30	28.2	189	70	30	2	0.8	A	WD-208
	-030-MT4-L	△	15	30	28.2	229	120	30	2	1.0	A	
	-032-MT4-M	▲	16	32	29.2	179	70	32	2	0.9	A	
	-032-MT4-L	△	16	32	29.2	209	100	32	2	0.9	A	
	-040-MT4-M	▲	20	40	36.9	199	100	40	2	1.0	A	CBH5R1
	-040-MT5-L	▲	20	40	36.9	226	90	40	2	1.8	A	
	-040-MT5-XL	▲	20	40	36.9	256	120	40	2	2.0	A	
	-050-MT5-M	▲	25	50	46.8	236	100	50	2	2.2	A	
	-050-MT5-L	▲	25	50	46.8	286	150	50	2	2.9	A	

▲Stock available △Make-to-order

Tools code key B22–B23
Grade selection guide B18–B21
Technical data B192–B198

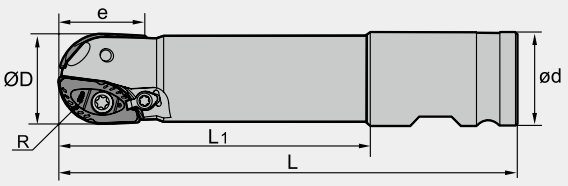
Profile milling tools



BMR03 P M K



Compound shank



Specification of tools

Type		Stock	Basic dimensions(mm)						Number of teeth Z	Weight (kg)	Clamp
			R	ØD	ød	L	L_1	e			
BMR03	**-040-XPX-M**	▲	20	40	50.8	250	170	40	2	1.3	CBH5R1
	-040-XPX-L	▲	20	40	50.8	300	220	40	2	3.1	
	-040-XPX-XL	▲	20	40	50.8	350	270	40	2	3.5	
	-050-XPX-M	▲	25	50	50.8	250	170	50	2	3.1	
	-050-XPX-L	▲	25	50	50.8	300	200	50	2	3.8	
	-050-XPX-XL	▲	25	50	50.8	350	270	50	2	4.4	

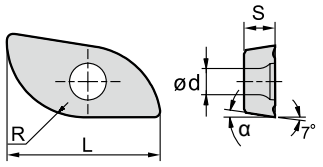
▲Stock available △Make-to-order

Spare parts

Diameter ØD	Clamp	Screw	Wrench		
					
Φ16	--	I60M2.5×6.5	--	WT07P	
Φ20	--	I60M3.5×08TT		WT10IP	
Φ25	--	I60M4×10		WT15S	
Φ30	WD-208	I60M5×13	WT20IT	--	
Φ32	WD-208	I60M5×13			
Φ40	CBH5R1	I43M6×16	WT25IT		
Φ50	CBH5R1	I43M8×21 I43M6×16	WT25IT WT30IT		

Tools code key B22–B23
Grade selection guide B18–B21
Technical data B192–B198

Selection of inserts



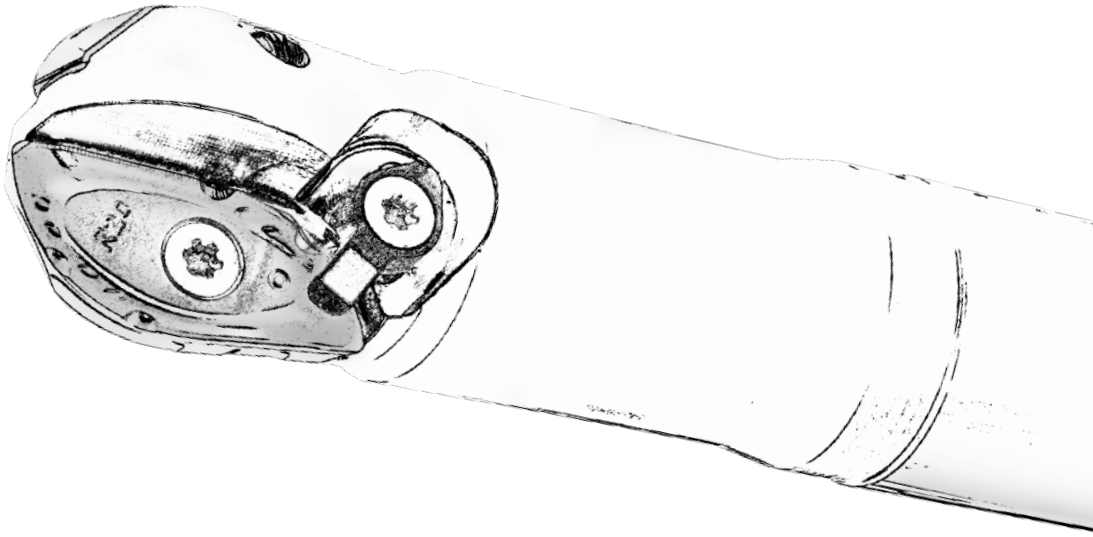
Good working condition Normal working condition Bad working condition

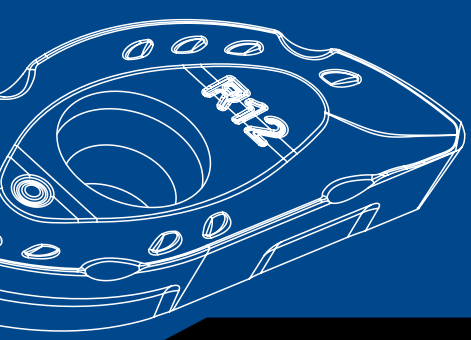
Workpiece material

P	Steel
M	Stainless steel
K	Cast iron
N	Non-ferrous metal
S	Heat resistant alloy, Ti alloy

Insert shape	Type	Basic dimensions(mm)						CVD Coating							PVD Coating						Cermet		Cemented carbide			
		R	ød	S	α	L	Applicable tools	YBC301	**YBC302**	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	**XPHT16R0803-GM**	8	3.1	3.18	9°	16	Φ16											★								
	XPHT20R10T3-GM	10	4.0	3.97	9°	20	Φ20											★								
	XPHT25R1204-GM	12.5	4.7	4.76	9°	25	Φ25											★								
	XPHT30R1506-GM	15	5.8	6.35	11°	30	Φ30											★								
	XPHT32R1606-GM	16	5.8	6.35	9°	32	Φ32											★								
	XPHT40R2007-GM	20	6.7	7.94	9°	40	Φ40											★								
	XPHT50R2507-GM	25	9.2	7.94	9°	50	Φ50											★								

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







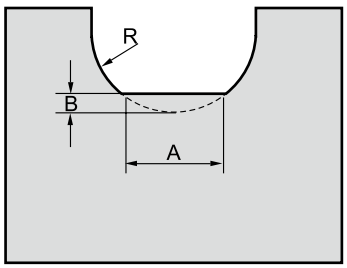
BMR03

series ball nose end milling tools

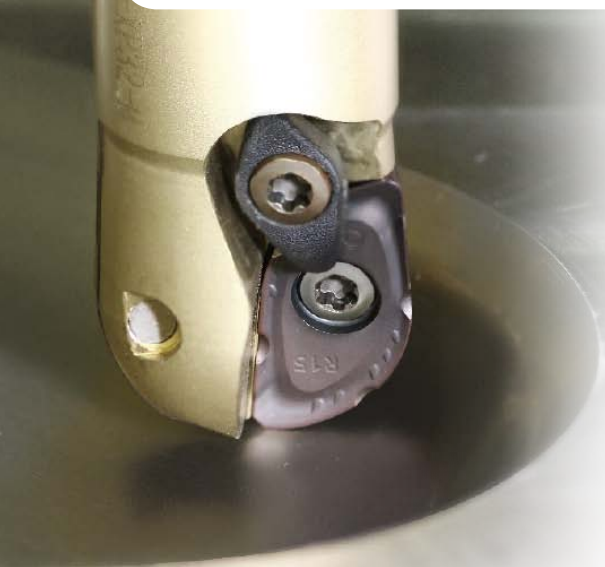
- The unique chipbreaker and big rake angle can effectively control the curling and flowing direction of chips and reduce the cutting force, improving workpiece surface quality and tool life.
- After precise grinding of periphery and locating surface, the insert can sufficiently ensure the shape accuracy of cutting edge and the precision of installation and location, improving installation security and workpiece precision after machining.
- The concave structure of the flank can effectively enhance the strength of cutting edge and prevent scraping between the clearance face and workpiece surface. Therefore, it improves the workpiece surface quality and prolongs the life of insert.
- The designs of cutting edge over center and a large negative rake angle make it possible to cut vertically, thus anti-breakage capability is enhanced.
- The rough ball nose milling cutters with large diameter adopt the top and hole clamping style, so insert clamping becomes more firm and stable. The machining is also highly efficient even under poor conditions such as long overhang and large vibration, etc.
- The adapter types include straight shank, Weldon shank, Morse taper shank and combination shank.



Slot shape after machining



R	A	B
08	1.7	0.09
10	2.2	0.12
12.5	3.0	0.18
15	3.9	0.20
16	3.5	0.22
20	3.6	0.24
25	3.8	0.26



Cautions:

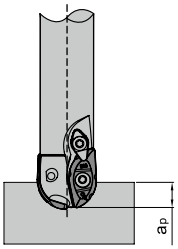
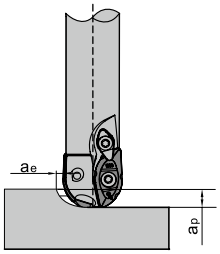
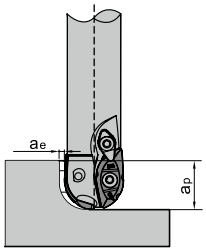
The insert edge should correspond to the locating face of insert pocket in the tool. Don't install the wrong side up.

Before screwing down the insert, confirm the good connection between insert and insert pocket.

Select and adjust the cutting parameters according to machine power and machining conditions.

If vibration occurs in the machining process, cutting speed should be reduced properly.

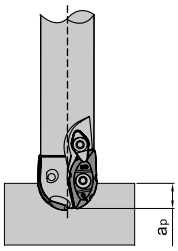
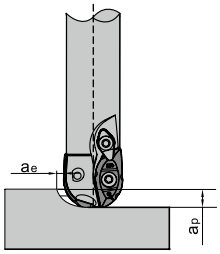
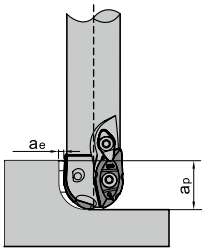
Recommended cutting parameters Diameter Ø16

Operations						
Workpiece material	Cutting parameters	Machining of slot	Side milling (slight)		Side milling (deep)	Insert grade
Medium carbon steel Hardness 150~250HB	V(m/min)	150~220	150~220	150~220	150~220	YBG302
	F_z(mm/z)	0.1~0.4	0.1~0.4	0.1~0.4	0.1~0.4	
	a_p(mm)	4	4	8	16	
	a_e(mm)	--	3	4	1.5	
Alloy steel Hardness 150~280HB	V(m/min)	100~150	100~150	100~150	100~150	
	F_z(mm/z)	0.1~0.4	0.1~0.4	0.1~0.4	0.1~0.4	
	a_p(mm)	4	4	8	16	
	a_e(mm)	--	3	4	1.5	
Die steel Hardness 150~255HB	V(m/min)	80~120	80~120	80~120	80~120	
	F_z(mm/z)	0.1~0.3	0.1~0.3	0.1~0.3	0.1~0.3	
	a_p(mm)	4	4	8	16	
	a_e(mm)	--	3	4	1.5	
Hardened steel Hardness 40~50HRC	V(m/min)	80~100	80~100	80~100	--	
	F_z(mm/z)	0.08~0.15	0.08~0.15	0.08~0.15	--	
	a_p(mm)	4	4	8	--	
	a_e(mm)	--	2	3	--	
Gray cast iron Hardness 160~260HB	V(m/min)	250~300	250~300	250~300	250~300	
	F_z(mm/z)	0.08~0.15	0.08~0.15	0.08~0.15	0.08~0.15	
	a_p(mm)	4	4	8	16	
	a_e(mm)	--	3	4	1.5	
Nodular cast iron Hardness 170~300HB	V(m/min)	200~250	200~250	200~250	200~250	
	F_z(mm/z)	0.08~0.15	0.08~0.15	0.08~0.15	0.08~0.15	
	a_p(mm)	4	4	8	16	
	a_e(mm)	--	3	4	1.5	

Note: 1, Parameters in the table shall be adjusted according to the rigidity of the machine or workpiece.

2. Wind cooling to be preferred.

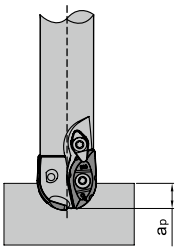
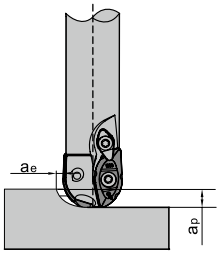
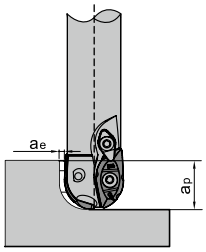
Recommended cutting parameters Diameter Ø20

Operations						
Workpiece material	Cutting parameters	Machining of slot	Side milling (slight)		Side milling (deep)	Insert grade
Medium carbon steel Hardness 150~250HB	V(m/min)	150~220	150~220	150~220	150~220	YBG302
	F_z(mm/z)	0.1~0.4	0.1~0.4	0.1~0.4	0.1~0.4	
	a_p(mm)	5	5	10	20	
	a_e(mm)	--	4	5	2	
Alloy steel Hardness 150~280HB	V(m/min)	100~150	100~150	100~150	100~150	
	F_z(mm/z)	0.1~0.4	0.1~0.4	0.1~0.4	0.1~0.4	
	a_p(mm)	5	5	10	20	
	a_e(mm)	--	4	5	2	
Die steel Hardness 150~255HB	V(m/min)	80~120	80~120	80~120	80~120	
	F_z(mm/z)	0.1~0.3	0.1~0.3	0.1~0.3	0.1~0.3	
	a_p(mm)	5	5	10	20	
	a_e(mm)	--	4	5	2	
Hardened steel Hardness 40~50HRC	V(m/min)	80~100	80~100	80~100	--	
	F_z(mm/z)	0.08~0.15	0.08~0.15	0.08~0.15	--	
	a_p(mm)	5	5	10	--	
	a_e(mm)	--	4	5	--	
Gray cast iron Hardness 160~260HB	V(m/min)	250~300	250~300	250~300	250~300	
	F_z(mm/z)	0.08~0.15	0.08~0.15	0.08~0.15	0.08~0.15	
	a_p(mm)	5	5	10	20	
	a_e(mm)	--	4	5	2	
Nodular cast iron Hardness 170~300HB	V(m/min)	200~250	200~250	200~250	200~250	
	F_z(mm/z)	0.08~0.15	0.08~0.15	0.08~0.15	0.08~0.15	
	a_p(mm)	5	5	10	20	
	a_e(mm)	--	4	5	2	

Note: 1, Parameters in the table shall be adjusted according to the rigidity of the machine or workpiece.

2. Wind cooling to be preferred.

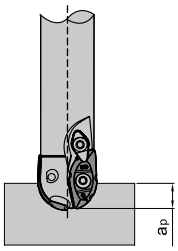
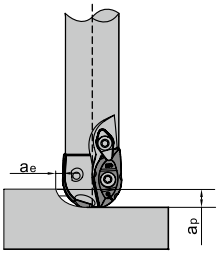
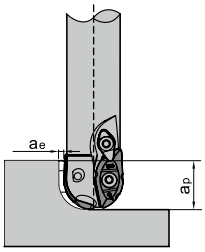
Recommended cutting parameters Diameter Ø25

Operations						
Workpiece material	Cutting parameters	Machining of slot	Side milling (slight)		Side milling (deep)	Insert grade
Medium carbon steel Hardness 150~250HB	V(m/min)	150~220	150~220	150~220	150~220	YBG302
	F_z(mm/z)	0.1~0.4	0.1~0.4	0.1~0.4	0.1~0.4	
	a_p(mm)	6	6	12.5	25	
	a_e(mm)	--	5	6.5	3	
Alloy steel Hardness 150~280HB	V(m/min)	100~150	100~150	100~150	100~150	
	F_z(mm/z)	0.1~0.4	0.1~0.4	0.1~0.4	0.1~0.4	
	a_p(mm)	6	6	12.5	25	
	a_e(mm)	--	5	6.5	3	
Die steel Hardness 150~255HB	V(m/min)	80~120	80~120	80~120	80~120	
	F_z(mm/z)	0.1~0.3	0.1~0.3	0.1~0.3	0.1~0.3	
	a_p(mm)	6	6	12.5	25	
	a_e(mm)	--	5	6.5	3	
Hardened steel Hardness 40~50HRC	V(m/min)	80~100	80~100	80~100	--	
	F_z(mm/z)	0.08~0.15	0.08~0.15	0.08~0.15	--	
	a_p(mm)	6	6	12.5	--	
	a_e(mm)	--	5	6.5	--	
Gray cast iron Hardness 160~260HB	V(m/min)	250~300	250~300	250~300	250~300	
	F_z(mm/z)	0.08~0.15	0.08~0.15	0.08~0.15	0.08~0.15	
	a_p(mm)	6	6	12.5	25	
	a_e(mm)	--	5	6.5	3	
Nodular cast iron Hardness 170~300HB	V(m/min)	200~250	200~250	200~250	200~250	
	F_z(mm/z)	0.08~0.15	0.08~0.15	0.08~0.15	0.08~0.15	
	a_p(mm)	6	6	12.5	25	
	a_e(mm)	--	5	6.5	3	

Note: 1, Parameters in the table shall be adjusted according to the rigidity of the machine or workpiece.

2. Wind cooling to be preferred.

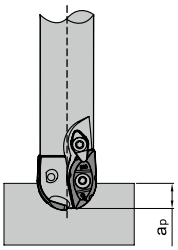
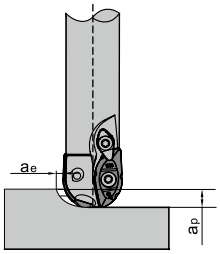
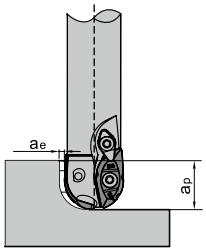
Recommended cutting parameters Diameter Ø30, Ø32

Operations						
Workpiece material	Cutting parameters	Machining of slot	Side milling (slight)		Side milling (deep)	Insert grade
Medium carbon steel Hardness 150~250HB	V(m/min)	150~220	150~220	150~220	150~220	YBG302
	F_z(mm/z)	0.1~0.4	0.1~0.4	0.1~0.4	0.1~0.4	
	a_p(mm)	10	10	16	28	
	a_e(mm)	--	6	9	6	
Alloy steel Hardness 150~280HB	V(m/min)	100~150	100~150	100~150	100~150	
	F_z(mm/z)	0.1~0.4	0.1~0.4	0.1~0.4	0.1~0.4	
	a_p(mm)	10	10	16	28	
	a_e(mm)	--	6	9	6	
Die steel Hardness 150~255HB	V(m/min)	80~120	80~120	80~120	80~120	
	F_z(mm/z)	0.1~0.3	0.1~0.3	0.1~0.3	0.1~0.3	
	a_p(mm)	10	10	16	28	
	a_e(mm)	--	6	9	6	
Hardened steel Hardness 40~50HRC	V(m/min)	80~100	80~100	80~100	--	
	F_z(mm/z)	0.08~0.15	0.08~0.15	0.08~0.15	--	
	a_p(mm)	10	10	16	--	
	a_e(mm)	--	6	9	--	
Gray cast iron Hardness 160~260HB	V(m/min)	250~300	250~300	250~300	250~300	
	F_z(mm/z)	0.08~0.15	0.08~0.15	0.08~0.15	0.08~0.15	
	a_p(mm)	10	10	16	28	
	a_e(mm)	--	6	9	6	
Nodular cast iron Hardness 170~300HB	V(m/min)	200~250	200~250	200~250	200~250	
	F_z(mm/z)	0.08~0.15	0.08~0.15	0.08~0.15	0.08~0.15	
	a_p(mm)	10	10	16	28	
	a_e(mm)	--	6	9	6	

Note: 1, Parameters in the table shall be adjusted according to the rigidity of the machine or workpiece.

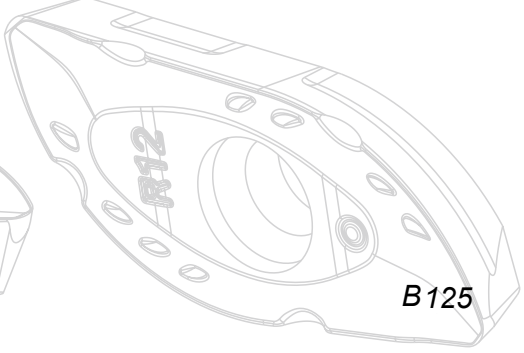
2. Wind cooling to be preferred.

Recommended cutting parameters Diameter Ø40

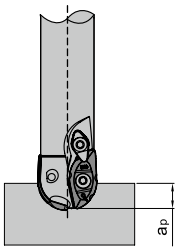
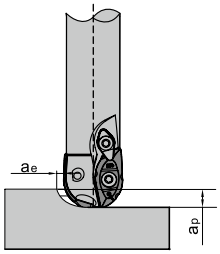
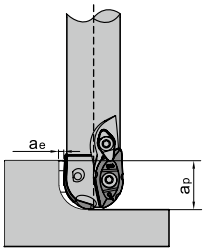
Operations						
Workpiece material	Cutting parameters	Machining of slot	Side milling (slight)		Side milling (deep)	Insert grade
Medium carbon steel Hardness 150~250HB	V(m/min)	150~220	150~220	150~220	150~220	YBG302
	Fz(mm/z)	0.1~0.4	0.1~0.4	0.1~0.4	0.1~0.4	
	ap(mm)	12	10	20	35	
	ae(mm)	--	8	12	8	
Alloy steel Hardness 150~280HB	V(m/min)	100~150	100~150	100~150	100~150	
	Fz(mm/z)	0.1~0.4	0.1~0.4	0.1~0.4	0.1~0.4	
	ap(mm)	12	10	20	35	
	ae(mm)	--	8	12	8	
Die steel Hardness 150~255HB	V(m/min)	80~120	80~120	80~120	80~120	
	Fz(mm/z)	0.1~0.3	0.1~0.3	0.1~0.3	0.1~0.3	
	ap(mm)	12	10	20	35	
	ae(mm)	--	8	12	8	
Hardened steel Hardness 40~50HRC	V(m/min)	80~100	80~100	80~100	--	
	Fz(mm/z)	0.08~0.15	0.08~0.15	0.08~0.15	--	
	ap(mm)	12	10	20	--	
	ae(mm)	--	8	12	--	
Gray cast iron Hardness 160~260HB	V(m/min)	250~300	250~300	250~300	250~300	
	Fz(mm/z)	0.08~0.15	0.08~0.15	0.08~0.15	0.08~0.15	
	ap(mm)	12	10	20	35	
	ae(mm)	--	8	12	8	
Nodular cast iron Hardness 170~300HB	V(m/min)	200~250	200~250	200~250	200~250	
	Fz(mm/z)	0.08~0.15	0.08~0.15	0.08~0.15	0.08~0.15	
	ap(mm)	12	10	20	35	
	ae(mm)	--	8	12	8	

Note: 1, Parameters in the table shall be adjusted according to the rigidity of the machine or workpiece.

2. Wind cooling to be preferred.



Recommended cutting parameters Diameter Ø50

Operations						
Workpiece material	Cutting parameters	Machining of slot	Side milling (slight)		Side milling (deep)	Insert grade
Medium carbon steel Hardness 150~250HB	V(m/min)	150~220	150~220	150~220	150~220	YBG302
	F_z(mm/z)	0.1~0.4	0.1~0.4	0.1~0.4	0.1~0.4	
	a_p(mm)	15	10	25	40	
	a_e(mm)	--	10	15	10	
Alloy steel Hardness 150~280HB	V(m/min)	100~150	100~150	100~150	100~150	
	F_z(mm/z)	0.1~0.4	0.1~0.4	0.1~0.4	0.1~0.4	
	a_p(mm)	15	10	25	40	
	a_e(mm)	--	10	15	10	
Die steel Hardness 150~255HB	V(m/min)	80~120	80~120	80~120	80~120	
	F_z(mm/z)	0.1~0.3	0.1~0.3	0.1~0.3	0.1~0.3	
	a_p(mm)	15	10	25	40	
	a_e(mm)	--	10	15	10	
Hardened steel Hardness 40~50HRC	V(m/min)	80~100	80~100	80~100	--	
	F_z(mm/z)	0.08~0.15	0.08~0.15	0.08~0.15	--	
	a_p(mm)	15	10	25	--	
	a_e(mm)	--	10	15	--	
Gray cast iron Hardness 160~260HB	V(m/min)	250~300	250~300	250~300	250~300	
	F_z(mm/z)	0.08~0.15	0.08~0.15	0.08~0.15	0.08~0.15	
	a_p(mm)	15	10	25	40	
	a_e(mm)	--	10	15	10	
Nodular cast iron Hardness 170~300HB	V(m/min)	200~250	200~250	200~250	200~250	
	F_z(mm/z)	0.08~0.15	0.08~0.15	0.08~0.15	0.08~0.15	
	a_p(mm)	15	10	25	40	
	a_e(mm)	--	10	15	10	

Note: 1, Parameters in the table shall be adjusted according to the rigidity of the machine or workpiece.

2. Wind cooling to be preferred.

Profile milling tools


Side milling(R)

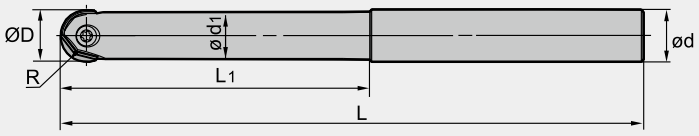

Slot milling


Profile

BMR04 P M K



Straight shank with straight neck



Specification of tools

Type		Stock	Basic dimensions(mm)						Weight (kg)
			R	ØD	ød	ød1	L1	L	
BMR04	**-012-G12-M**	▲	6	12	12	11	35	125	0.1
	-012-G12-L	△	6	12	12	11	45	150	0.1
	-016-G16-M	▲	8	16	16	14	40	150	0.2
	-016-G16-L	△	8	16	16	14	55	180	0.3
	-020-G20-M	▲	10	20	20	18	65	180	0.4
	-020-G20-L	△	10	20	20	18	100	250	0.6
	-025-G25-M	▲	12.5	25	25	23	70	200	0.7
	-025-G25-L	△	12.5	25	25	23	100	250	0.9
	-030-G32-M	▲	15	30	32	27	130	250	1.2
	-030-G32-L	△	15	30	32	27	150	300	1.5
	-032-G32-M	▲	16	32	32	29	80	250	1.4
	-032-G32-L	△	16	32	32	29	109	300	1.7

▲Stock available △Make-to-order

Tools code key B22–B23
Grade selection guide B18–B21
Technical data B192–B198

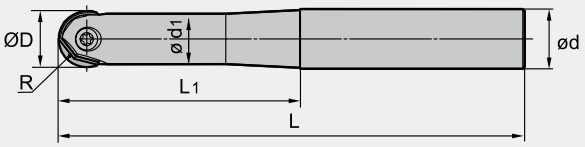
Profile milling tools



BMR04 P M K



Straight shank with taper neck



Specification of tools

Type		Stock	Basic dimensions(mm)						Weight (kg)
			R	ØD	ød	ød1	L1	L	
BMR04	-012-G16-M	▲	6	12	16	11	50	125	0.2
	-012-G16-L	△	6	12	16	11	60	150	0.2
	-016-G20-M	▲	8	16	20	14	60	150	0.3
	-016-G20-L	△	8	16	20	14	80	180	0.3
	-020-G25-M	▲	10	20	25	18	75	180	0.6
	-020-G25-L	△	10	20	25	18	85	200	0.6
	-025-G32-M	▲	12.5	25	32	23	90	200	1.0
	-025-G32-L	△	12.5	25	32	23	110	250	1.3
	-030-G40-M	▲	15	30	40	27	110	250	2.0
	-030-G40-L	△	15	30	40	27	125	300	2.4
	-032-G40-M	▲	16	32	40	29	110	250	2.0
	-032-G40-L	△	16	32	40	29	125	300	2.4

▲Stock available △Make-to-order

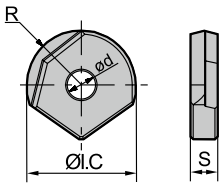
Tools code key B22–B23
Grade selection guide B18–B21
Technical data B192–B198

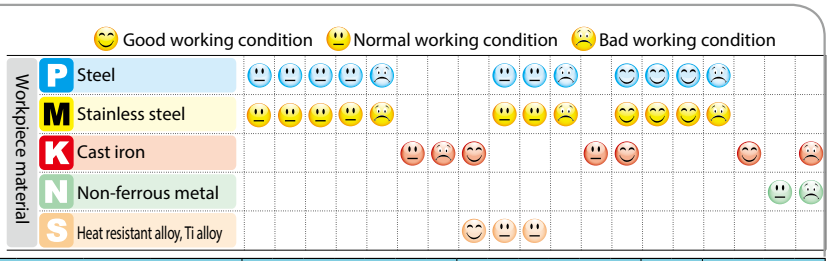
Spare parts

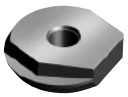
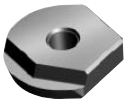
Diameter	Screw	Wrench	
			
Ø12	I70M4×10TT	WT15IP	--
Ø16	I70M5×12TT	WT20IP	--
Ø20	I70M5×16TT	WT20IP	--
Ø25	I70M6×20TT	WT20IP	--
Ø30	I70M8×25TT	--	WT30IT
Ø32	I70M8×25TT	--	WT30IT



Selection of inserts



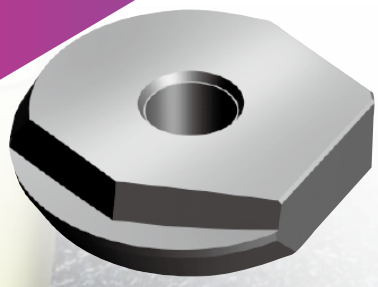


Insert shape	Type	Basic dimensions(mm)					CVD Coating							PVD Coating						Cermet		Cemented carbide			
		R	ØI.C	S	ød	Applicable insert ØD	YBC301	**YBC302**	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	**ZOHX1203-GF**	6	12	3	4	Φ12												★						
	ZOHX1604-GF	8	16	4	5	Φ16												★						
	ZOHX2005-GF	10	20	5	5	Φ20												★						
	ZOHX2506-GF	12.5	25	6	6	Φ25												○						
	ZOHX3007-GF	15	30	7	8	Φ30												○						
	ZOHX3207-GF	16	32	7	8	Φ32												○						
	**ZOHX1203-GM**	6	12	3	4	Φ12												★						
	ZOHX1604-GM	8	16	4	5	Φ16												★						
	ZOHX2005-GM	10	20	5	5	Φ20												★						
	ZOHX2506-GM	12.5	25	6	6	Φ25												★						
	ZOHX3007-GM	15	30	7	8	Φ30												★						
	ZOHX3207-GM	16	32	7	8	Φ32												★						

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

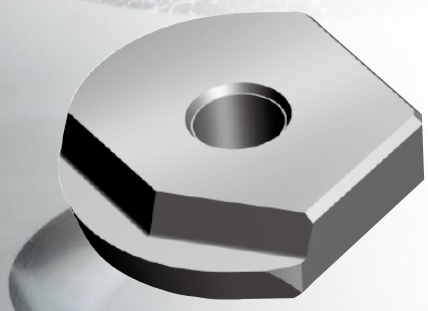
BMR04

Series ball nose finishing end milling tools



-GF

With positive rake angle and double clearance angle, the design of curved cutting edge combines sharpness and strength. The edge with high precision is applicable under stable machining conditions and in conditions requiring high workpiece profile precision.



-GM

0° rake angle, only one clearance angle, high edge strength, suitable for conditions requiring high cutting efficiency.

The inserts are a combination of ultra-fine cemented carbide substrate and nano coating grade YBG252. With excellent cutting performance, they are suitable for semi-finish till finish machining.

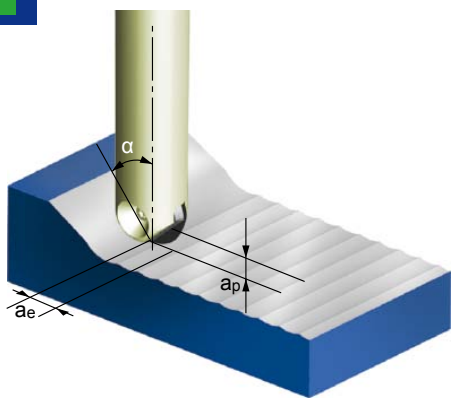
Calculation of cutting speed for BMR02/04 series ball nose end mills

1.When the tool axial line is vertical to the surface being machined,

$$N = \frac{1000Vc}{\pi Dc}(r/min)$$

$$Dc = 2\sqrt{a_p(D-a_p)}$$

N：rotating speed
Vc：actual cutting speed
Dc：effective cutting diameter
D：tool nominal diameter
a_p：axial cutting depth



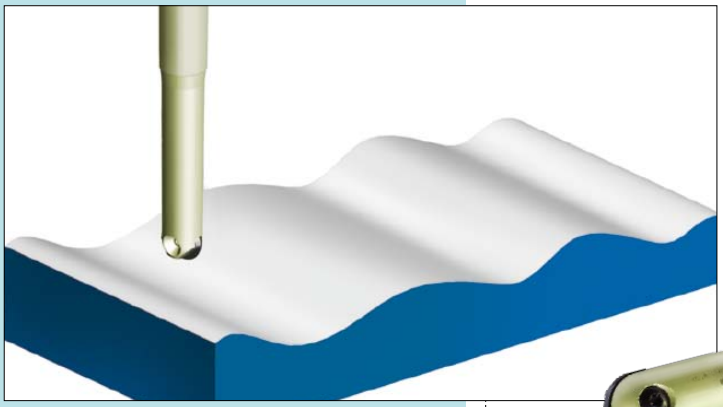
2.When there is an inclined angle between the tool axial line and the surface being machined, the recommended cutting speed should be multiplied by a factor in the table below to obtain the cutting speed used for programming.

Diameter(mm)		Ø12		Ø16		Ø20		Ø25		Ø30		Ø32	
Cutting depth a_p(mm)		0.2	0.5	0.2	0.5	0.5	1	0.5	1	0.5	1.5	0.5	1.5
Inclined angle α	15°	1.00	1.00	1.00	1.00	1.00	1.02	1.00	1.01	1.00	1.00	1.00	1.00
	30°	1.04	1.01	1.05	1.01	1.02	1.04	1.03	1.04	1.04	1.01	1.04	1.00
	45°	1.16	1.07	1.18	1.10	1.12	1.06	1.14	1.08	1.16	1.06	1.16	1.06
	60°	1.42	1.24	1.47	1.30	1.34	1.21	1.38	1.25	1.42	1.21	1.43	1.22
	75°	2.02	1.60	2.14	1.73	1.83	1.53	1.93	1.62	2.01	1.53	2.04	1.55
	90°	3.92	2.50	4.48	2.87	3.20	2.29	3.57	2.55	3.9	2.29	4.03	2.37

Recommended cutting parameters

Workpiece material		Hardness HB	Insert grade	Cutting parameters	Tool specification					
					Ø12	Ø16	Ø20	Ø25	Ø30	Ø32
P	Carbon steel	HB≤180	YBG252	V(m/min)	100~200	100~200	100~200	100~200	100~200	100~200
				f_z(mm/z)	0.15~0.25	0.2~0.3	0.2~0.3	0.25~0.35	0.25~0.35	0.25~0.35
				$a_p$max(mm)	0.8	1	1.25	1.5	2	2
				$a_e$max(mm)	0.8	1	1.25	1.5	2	2
	Alloy stee	HB180~280		V(m/min)	80~180	80~180	80~180	80~180	80~180	80~180
				f_z(mm/z)	0.15~0.25	0.2~0.3	0.2~0.3	0.25~0.35	0.25~0.35	0.25~0.35
				$a_p$max(mm)	0.8	1	1.25	1.5	2	2
				$a_e$max(mm)	0.8	1	1.25	1.5	2	2
	Hardened steel	HRC55~65		V(m/min)	60~100	60~100	60~100	60~100	60~100	60~100
				f_z(mm/z)	0.15~0.25	0.2~0.3	0.2~0.3	0.25~0.35	0.25~0.35	0.25~0.35
				$a_p$max(mm)	0.4	0.5	0.6	0.8	1	1
				$a_e$max(mm)	0.4	0.5	0.6	0.8	1	1
M	Stainless steel	HB≤270		V(m/min)	70~150	70~150	70~150	70~150	70~150	70~150
				f_z(mm/z)	0.1~0.2	0.1~0.25	0.1~0.25	0.2~0.3	0.2~0.3	0.2~0.3
				$a_p$max(mm)	0.6	0.8	1	1.25	1.5	1.5
				$a_e$max(mm)	0.6	0.8	1	1.25	1.5	1.5
K	Cast iron	HB180-250		V(m/min)	160~300	160~300	160~300	160~300	160~300	160~300
				f_z(mm/z)	0.2~0.3	0.25~0.35	0.25~0.35	0.3~0.4	0.3~0.4	0.3~0.4
				$a_p$max(mm)	1	1.5	1.8	2	2.5	2.5
				$a_e$max(mm)	1	1.5	1.8	2	2.5	2.5

Case for BMR04



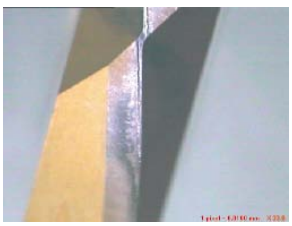


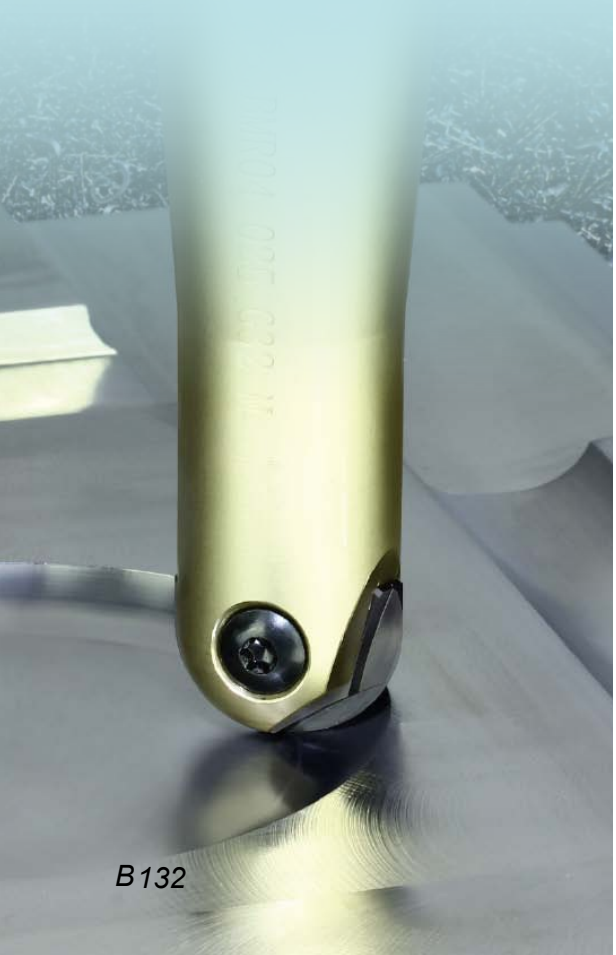
Workpiece material：42CrMo (HRC35)
Cooling system: Dry cutting
Machine: Vertical machining center
Cutting parameters：
Vc=150m/min
a_p=0.1mm
f_z=0.2mm/Z

Tool type：BMR04-020-G25-M

Insert type/grade：ZOHX2005-GM/YBG252

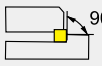
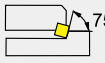
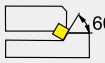
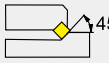
●Abrasion comparison of inserts after milling curved face

	ZCC·CT	Other company product
After 60 minutes of cutting	 Abrasion on the clearance face 0.08	 Abrasion on the clearance face 0.10
After 120 minutes of cutting	 Abrasion on the clearance face 0.12	 Abrasion on the clearance face 0.16



Side and face milling tools code key

Cutter style	
FM	Face milling
EM	Square shoulder milling
HM	Helical end milling
SM	Side and face milling
BM	Profile milling
CM	Chamfer milling
XM	Special milling

Approach angle		
P	90°	
E	75°	
D	60°	
A	45°	
R		

Sequence number of series

Cutting diameter ØD (mm)

Cutting width of milling tools

Coupling structure and demension			
A	A type of coupling	D	D type of coupling
B	B type of coupling	K	Mounting by keyway
C	C type of coupling		

SM P 03 - 160 × 16 - K40 - M P 12 - 12 L

Insert shape	
C	Diamond with 80°
D	Diamond with 55°
R	Round
S	Square
T	Regular triangle
V	Diamond with 35°
M	Diamond with 86°

Insert clearance angle	
N	0°
B	5°
C	7°
P	11°
D	15°
E	20°

Length of cutting edge						
Diameter of IC	Insert shape					
	C	D	R	S	T	V
5.556	—	—	—	—	09	—
6.350	06	07	—	—	11	—
9.525	09	11	09	09	16	16
12.700	12	15	12	12	22	22
15.875	16	19	15	15	27	—
19.050	19	—	19	19	33	—
25.400	25	—	25	25	44	—

Cutting direction

(R: Right L: Left)

Number of teeth

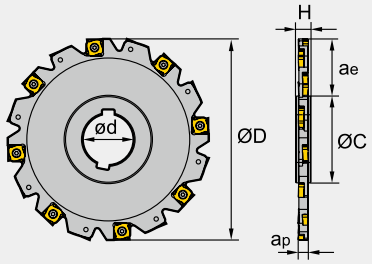
Side and face milling tools

Machining of slot

SMP01 P M K



K-type coupling



Specification of tools

Type		Stock	Basic dimensions(mm)						Applicable inserts	Number of teeth Z	Type of coupling	Weight (kg)
			ØD	ød	øc	H	a_p	a_{emax}				
SMP01 Mounting by keyway	**-100×4-K27-SN12-10**	△	100	27	45	12	4	25	XSEQ1202	10	K	0.2
	-125×4-K40-SN12-12	△	125	40	56	12	4	32		12	K	0.3
	-160×4-K40-SN12-16	△	160	40	67	12	4	44		16	K	0.5
	-100×5-K27-SN12-10	△	100	27	45	12	5	25	XSEQ1203	10	K	0.2
	-125×5-K40-SN12-12	△	125	40	56	12	5	32		12	K	0.3
	-160×5-K40-SN12-16	△	160	40	67	12	5	44		16	K	0.6
	-100×6-K27-SN12-10	△	100	27	45	12	6	25	XSEQ12T3	10	K	0.3
	-125×6-K40-SN12-12	△	125	40	56	12	6	32		12	K	0.4
	-160×6-K40-SN12-16	△	160	40	67	12	6	44		16	K	0.7
	-200×6-K50-SN12-18	△	200	50	71	12	6	62		18	K	1.1
	-250×6-K50-SN12-24	△	250	50	71	12	6	87		24	K	1.7
	-100×7-K27-SN12-10	△	100	27	45	12	7	25	XSEQ1204	10	K	0.3
	-125×7-K40-SN12-12	△	125	40	56	12	7	32		12	K	0.4
	-160×7-K40-SN12-16	△	160	40	67	12	7	44		16	K	0.8
	-200×7-K50-SN12-18	△	200	50	71	12	7	62		18	K	1.2
	-250×7-K50-SN12-24	△	250	50	71	12	7	87		24	K	1.9
	-100×8-K27-SN12-10	△	100	27	45	12	8	25	XSEQ12T4	10	K	0.3
	-125×8-K40-SN12-12	△	125	40	56	12	8	32		12	K	0.5
	-160×8-K40-SN12-16	△	160	40	67	12	8	44		16	K	0.9
	-200×8-K50-SN12-18	△	200	50	71	12	8	62		18	K	1.4
	-250×8-K50-SN12-24	△	250	50	71	12	8	87		24	K	2.2

▲Stock available △Make-to-order

Tools code key B133
Grade selection guide B18–B21
Technical data B192–B198

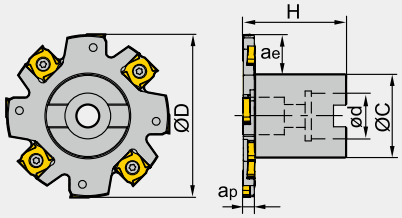
Side and face milling tools

Machining of slot

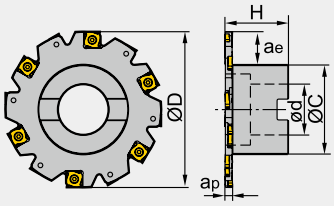
SMP01 P M K



A-type coupling



B-type coupling



Specification of tools

Type		Stock		Basic dimensions(mm)						Applicable inserts	Number of teeth Z	Type of coupling	Weight (kg)
		R	L	ØD	ød	øc	H	a_p	a_{emax}				
SMP01 Arbor mounting	**-063×4-A22-SN12-06**	△	△	63	22	32	40	4	14	XSEQ1202	6	A	0.2
	-080×4-A22-SN12-08	△	△	80	22	40	50	4	18		8	A	0.4
	-100×4-A27-SN12-10	△	△	100	27	48	50	4	23		10	A	0.6
	-063×5-A22-SN12-06	△	△	63	22	32	40	5	14	XSEQ1203	6	A	0.2
	-080×5-A22-SN12-08	△	△	80	22	40	50	5	18		8	A	0.4
	-100×5-A27-SN12-10	△	△	100	27	48	50	5	23		10	A	0.7
	-063×6-A22-SN12-06	△	△	63	22	32	40	6	14	XSEQ12T3	6	A	0.2
	-080×6-A22-SN12-08	△	△	80	22	40	50	6	18		8	A	0.5
	-100×6-A27-SN12-10	△	△	100	27	48	50	6	23		10	A	0.7
	-125×6-B32-SN12-12	△	△	125	32	70	50	6	30		12	B	1.0
	-160×6-B40-SN12-16	△	△	160	40	70	50	6	41		16	B	1.3
	-063×7-A22-SN12-06	△	△	63	22	32	40	7	14	XSEQ1204	6	A	0.2
	-080×7-A22-SN12-08	△	△	80	22	40	50	7	18		8	A	0.5
	-100×7-A27-SN12-10	△	△	100	27	48	50	7	23		10	A	0.7
	-125×7-B32-SN12-12	△	△	125	32	70	50	7	30		12	B	1.1
	-160×7-B40-SN12-16	△	△	160	40	70	50	7	41		16	B	1.4
	-063×8-A22-SN12-06	△	△	63	22	32	40	8	14	XSEQ12T4	6	A	0.2
	-080×8-A22-SN12-08	△	△	80	22	40	50	8	18		8	A	0.5
	-100×8-A27-SN12-10	△	△	100	27	48	50	8	23		10	A	0.8
	-125×8-B32-SN12-12	△	△	125	32	70	50	8	30		12	B	1.1
	-160×8-B40-SN12-16	△	△	160	40	70	50	8	41		16	B	1.5

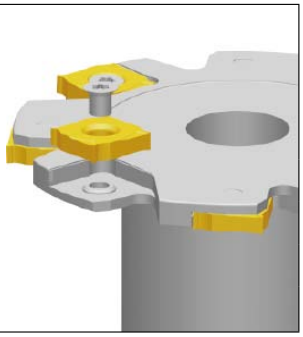
▲Stock available △Make-to-order

Indexable milling tools
Side and face milling tools

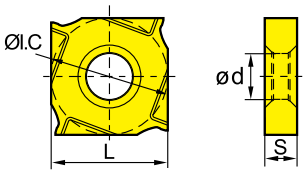
Tools code key B133
Grade selection guide B18–B21
Technical data B192–B198

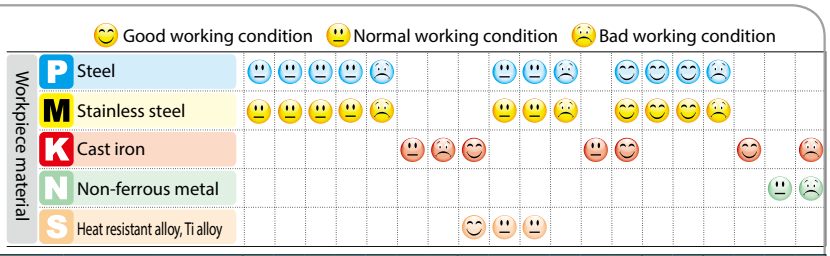
Spare parts

Diameter ØD	Edge width a_p	Screw	Wrench
Ø63-Ø160	4	I91M4×3.2X	WT09S
Ø63-Ø160	5	I91M4×4.2X	
Ø63-Ø250	6	I91M4×5.1X	
Ø63-Ø250	7	I91M4×6.1X	
Ø63-Ø250	8	I91M4×7.1X	



Selection of inserts





Insert shape	Type	Basic dimensions(mm)				CVD Coating							PVD Coating						Cermet		Cemented carbide			
		ØI.C	L	S	ød	YBC301	**YBC302**	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	**XSEQ1202**	12.7	12.7	2.3	5.0											★								
	XSEQ1203	12.7	12.7	3.0	5.0											★								
	XSEQ12T3	12.7	12.7	3.5	5.0											★								
	XSEQ1204	12.7	12.7	4.0	5.0											★								
	XSEQ12T4	12.7	12.7	4.5	5.0											★								

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

Recommended cutting parameters

Workpiece material		Hardness HB	Insert grade	Cutting parameters	
				V(m/min)	f(mm/z)
P	Low-carbon steel、Soft steel	≤180	YBG202	180 (100-250)	0.1(0.08-0.25)
			YBG302	150 (100-200)	0.15(0.1-0.3)
	High-carbon steel、Alloy steel	180-280	YBG202	150 (80-250)	0.1(0.08-0.25)
			YBG302	120 (80-200)	0.15(0.1-0.3)
	Alloy tool steel	280-350	YBG202	120 (80-250)	0.1(0.08-0.25)
			YBG302	100 (80-200)	0.15(0.1-0.3)
M	Stainless steel	≤270	YBG202	120 (80-250)	0.1(0.05-0.15)
			YBG302	100 (80-200)	0.08(0.05-0.15)
K	Cast iron	180-250	YBG152	120 (80-250)	0.1(0.05-0.15)
			YBG302	150 (100-250)	0.08(0.05-0.15)

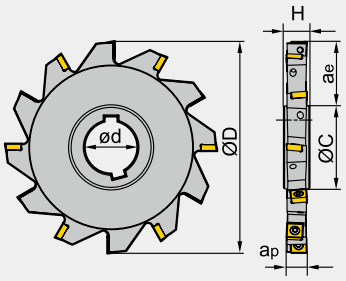
Side and face milling tools

Machining of slot

SMP03 P M K



K-type coupling

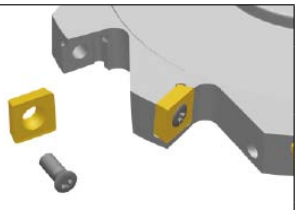


Specification of tools

Type		Stock	Basic dimensions(mm)						Applicable inserts	Number of teeth Z	Type of coupling	Weight (kg)
			ØD	øc	ød	a_{emax}	a_p	H				
SMP03 Mounting by keyway	**-080×8-K27-MP06-10**	△	80	43	27	17	8	12	MPHT060304-DM	10	K	0.2
	-100×8-K32-MP06-14	△	100	47	32	25	8	12		14	K	0.3
	-100×10-K32-MP06-14	△	100	47	32	25	10	14		14	K	0.4
	-125×10-K40-MP06-16	△	125	55	40	34	10	14		16	K	0.6
	-125×12-K40-MP08-12	△	125	55	40	34	12	16	MPHT080305-DM	12	K	0.7
	-160×12-K40-MP08-14	△	160	62	40	47	12	16		14	K	1.3
	-160×16-K40-MP12-12	△	160	62	40	49	16	20	MPHT120408-DM	12	K	1.6
	-160×18-K40-MP12-12	△	160	62	40	49	18	24		12	K	1.9
	-160×20-K40-MP12-12	△	160	62	40	49	20	26		12	K	2.1
	-200×16-K50-MP12-14	△	200	72	50	62	16	20		14	K	2.5
	-200×18-K50-MP12-14	△	200	72	50	62	18	24		14	K	2.9
	-200×20-K50-MP12-14	△	200	72	50	62	20	26		14	K	3.3

▲Stock available △Make-to-order

Spare parts

Diameter Ød	Inserts	Screw	Wrench		
					
Ø80-Ø125	MP06	I60M2.5x6.5	WT07IP	--	
Ø125-Ø160	MP08	I60M3x7	WT09IP	--	
Ø160-Ø200	MP12	I60M5x13	--	WT20IS	

Tools code key B133
Grade selection guide B18–B21
Technical data B192–B198

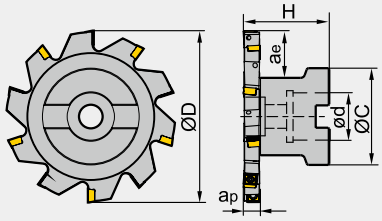
Side and face milling tools

Machining of slot

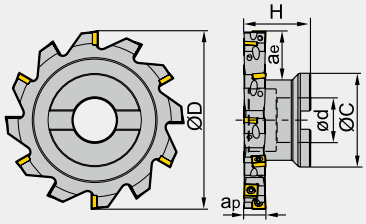
SMP03 P M K



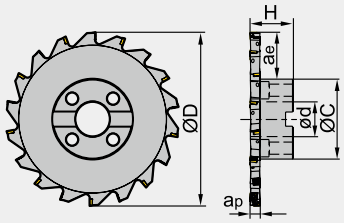
A-type coupling



B-type coupling



C-type coupling



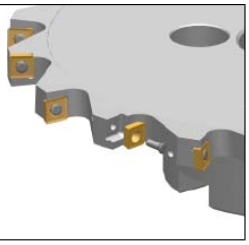
Specification of tools

Type		Stock		Basic dimensions(mm)						Applicable inserts	Number of teeth Z	Type of coupling	Weight (kg)
		R	L	ØD	øc	ød	a_{emax}	a_p	H				
SMP03 Arbor mounting	**-080×8-A22-MP06-10**	△	△	80	45	22	21	8	40	MPHT060304-DM	10	A	0.4
	-100×8-B27-MP06-14	△	△	100	55	27	24	8	40		14	B	0.6
	-100×10-B27-MP06-14	△	△	100	55	27	24	10	40		14	B	0.7
	-125×10-B32-MP06-16	△	△	125	65	32	33	10	45		16	B	1.1
	-125×12-B32-MP08-12	△	△	125	65	32	33	12	45	MPHT080305-DM	12	B	1.4
	-160×12-B40-MP08-14	△	△	160	80	40	45	12	50		14	B	1.9
	-200×12-C40-MP08-18	△	△	200	92	40	53	12	50		18	C	3.2
	-125×16-B32-MP12-10	△	△	125	65	32	33	16	50	MPHT120408-DM	10	B	2.3
	-160×16-B40-MP12-12	△	△	160	80	40	45	16	60		12	B	2.3
	-160×18-B40-MP12-12	△	△	160	80	40	45	18	60		12	B	2.4
	-200×16-C40-MP12-14	△	△	200	92	40	53	16	50		14	C	3.6
	-200×18-C40-MP12-14	△	△	200	92	40	53	18	50		14	C	3.9
	-200×20-C40-MP12-14	△	△	200	92	40	53	20	50		14	C	4.2

▲Stock available △Make-to-order

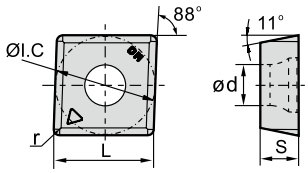
Spare parts

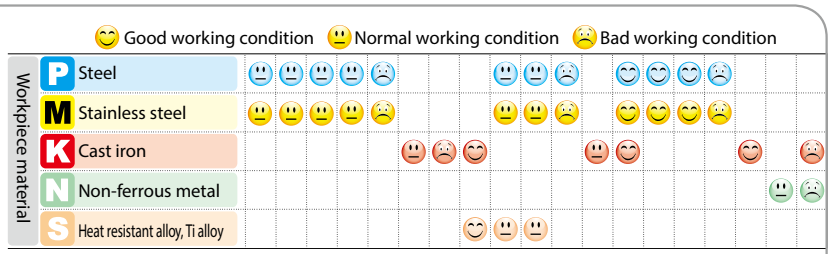
Diameter ØD	Inserts	Screw	Wrench	
				
Ø80-Ø125	MP06	I60M2.5×6.5	WT07IP	--
Ø125-Ø200	MP08	I60M3×7	WT09IP	--
Ø125-Ø200	MP12	I60M5×13	--	WT20IS



Tools code key B133
Grade selection guide B18–B21
Technical data B192–B198

Selection of inserts



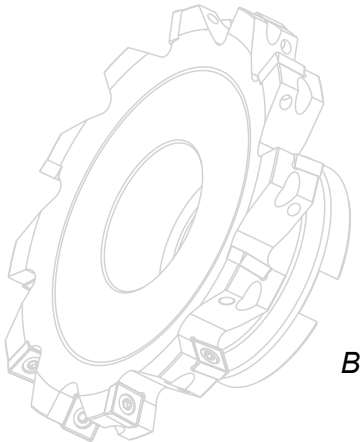


Insert shape	Type	Basic dimensions(mm)					CVD Coating							PVD Coating						Cermet		Cemented carbide			
		ØI.C	L	S	ød	r	YBC301	**YBC302**	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	**MPHT060304-DM**	6.35	6.35	3.18	2.8	0.4											★								
	MPHT080305-DM	8.3	8.3	3.18	3.4	0.5											★								
	MPHT120408-DM	12.7	12.7	4.76	5.56	0.8											★								

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

Recommended cutting parameters

Workpiece material		Hardness HB	Insert grade	Cutting parameters	
				V(m/min)	f(mm/z)
P	Low-carbon steel、Soft steel	≤180	YBG202	180 (100-250)	0.1(0.08-0.25)
			YBG302	150 (100-200)	0.15(0.1-0.3)
	High-carbon steel、Alloy steel	180-280	YBG202	150 (80-250)	0.1(0.08-0.25)
			YBG302	120 (80-200)	0.15(0.1-0.3)
	Alloy tool steel	280-350	YBG202	120 (80-250)	0.1(0.08-0.25)
			YBG302	100 (80-200)	0.15(0.1-0.3)
M	Stainless steel	≤270	YBG202	120 (80-250)	0.1(0.05-0.15)
			YBG302	100 (80-200)	0.08(0.05-0.15)
K	Cast iron	180-250	YBG152	120 (80-250)	0.1(0.05-0.15)
			YBG302	150 (100-250)	0.08(0.05-0.15)



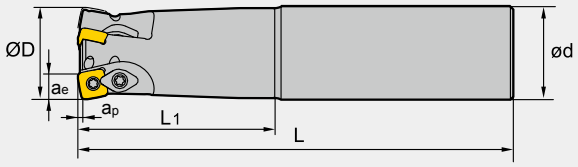
High feed milling cutters



XMR01 P M K



S-type insert, straight shank



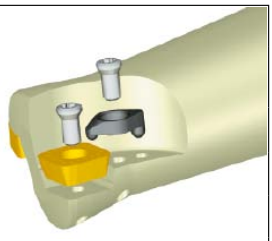
Specification of tools

Type		Stock	Basic dimensions(mm)						Number of teeth Z	Weight (kg)
			ØD	a_p	a_e	L_1	L	ød		
XMR01	-020-G20-SD06-02	▲	20	0.8	5.8	50	130	20	2	0.26
	-025-G25-SD06-03	▲	25	0.8	5.8	60	140	25	3	0.46
	-025-G25-SD09-02	▲	25	1.4	8.8	60	140	25	2	0.5
	-032-G32-SD09-03	▲	32	1.4	8.8	70	150	32	3	0.8
	-035-G32-SD09-03	▲	35	1.4	8.8	70	150	32	3	0.8
	-032-G32-SD12-02	▲	32	1.8	11.7	70	150	32	2	0.8
	-040-G40-SD12-03	▲	40	1.8	11.7	70	150	40	3	1.3
	-040-G40-SD15-02	▲	40	2.2	14	70	200	40	2	1.6

▲Stock available △Make-to-order

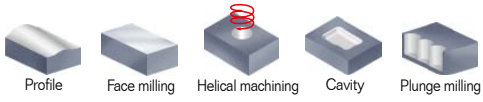
Spare parts

Tool type	Screw	Clamp Screw	Clamp	Wrench	
XMR01□□-SD06□□	I60M2.2×5.5	--	--	WT07IP	--
XMR01□□-SD09□□	I60M3.5×08TT	I60M4×8.4	WD-204	WT10IP	WT15IP
XMR01□□-SD12□□	I60M4×8.4			WT15IP	
XMR01□□-SD15□□	I60M5×13		WD-208	WT20IP	--



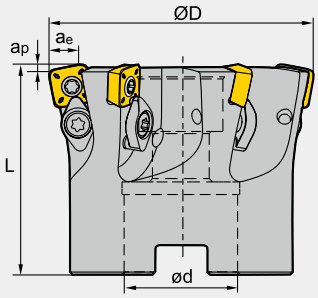
Tools code key B22–B23
Grade selection guide B18–B21
Technical data B192–B198

High feed milling cutters



XMR01 P M K





Specification of tools

Type		Stock	Basic dimensions(mm)					Number of teeth Z	Type of coupling	Weight (kg)
			ØD	a_p	a_e	L	ød			
XMR01	**-050-A22-SD06-07**	▲	50	0.8	5.8	40	22	7	A	0.36
	-063-A22-SD06-10	▲	63	0.8	5.8	40	22	10	A	0.53
	-063-A27-SD06-10	▲	63	0.8	5.8	50	27	10	A	0.57
	-050-A22-SD09-04	▲	50	1.4	8.8	40	22	4	A	0.3
	-063-A22-SD09-06	▲	63	1.4	8.8	40	22	6	A	0.5
	-063-A27-SD09-06	▲	63	1.4	8.8	50	27	6	A	0.6
	-063-A22-SD12-05	▲	63	1.8	11.7	40	22	5	A	0.5
	-063-A27-SD12-05	▲	63	1.8	11.7	50	27	5	A	0.6
	-080-A27-SD12-05	▲	80	1.8	11.7	50	27	5	A	0.9
	-100-B32-SD12-06	▲	100	1.8	11.7	50	32	6	B	1.8
	-080-A27-SD15-05	▲	80	2.2	14	50	27	5	A	0.78
	-080-A32-SD15-05	▲	80	2.2	14	50	32	5	A	0.72
	-100-B32-SD15-07	▲	100	2.2	14	50	32	7	B	1.2
	-125-B40-SD15-09	▲	125	2.2	14	63	40	9	B	2.9
	-160-B40-SD15-12	▲	160	2.2	14	63	40	12	B	4.4

▲Stock available △Make-to-order

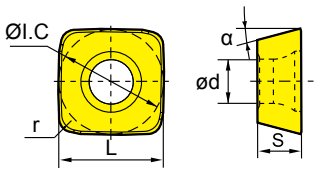
Spare parts

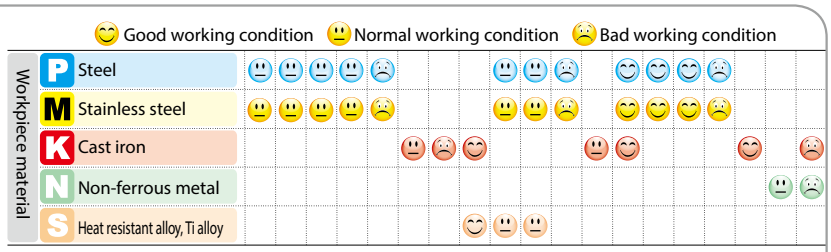
Tool type	Screw	Clamp Screw	Clamp	Wrench	
XMR01□□-SD06□□	I60M2.2×5.5	--	--	WT07IP	--
XMR01□□-SD09□□	I60M3.5×08TT	I60M4×8.4	WD-204	WT10IP	WT15IP
XMR01□□-SD12□□	I60M4×8.4			WT15IP	
XMR01□□-SD15□□	I60M5×13		WD-208	WT20IP	--



Tools code key B22–B23
Grade selection guide B18–B21
Technical data B192–B198

Selection of inserts

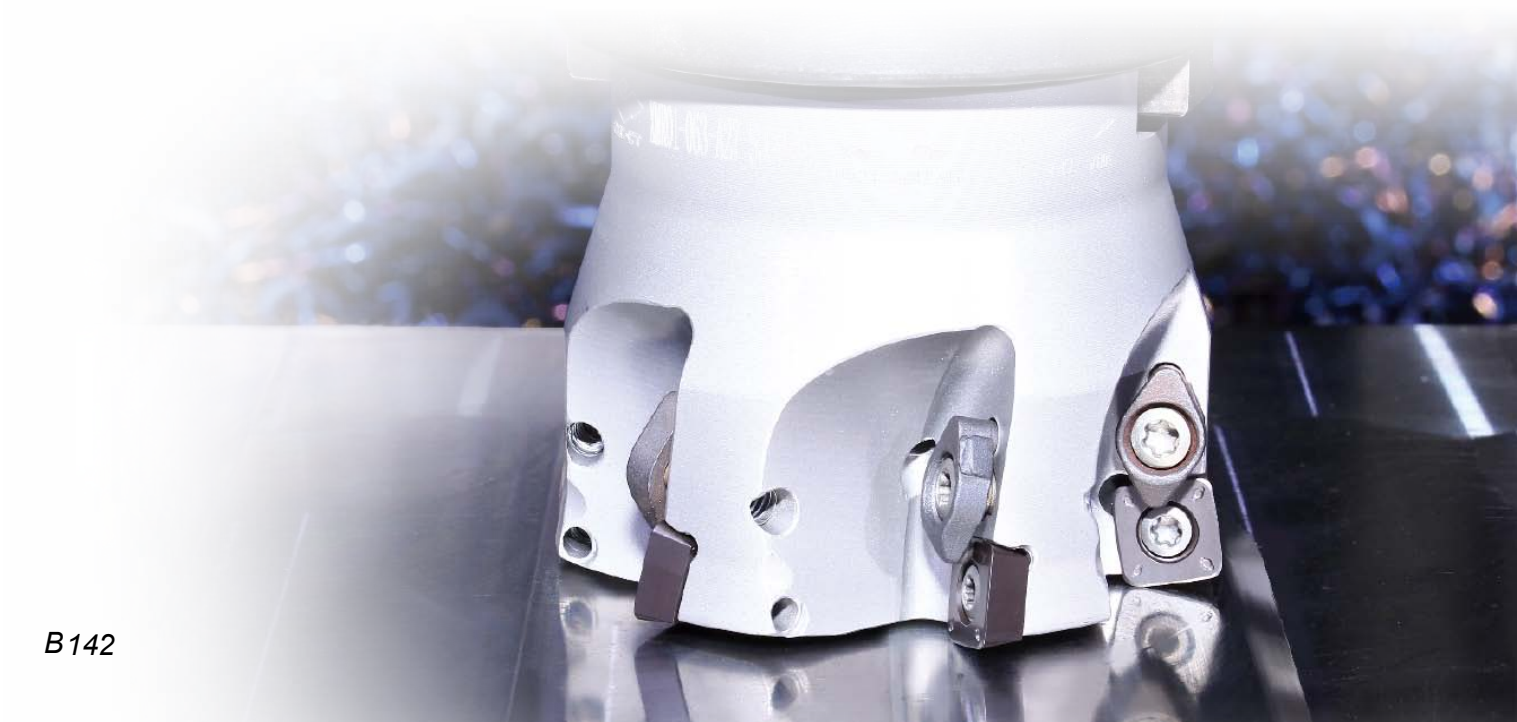




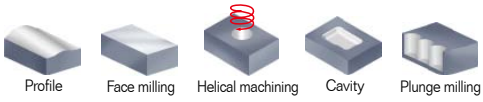
Insert shape	Type	Basic dimensions(mm)						CVD Coating						PVD Coating						Cermet		Cemented carbide			
		ØI.C	L	r	S	ød	α	YBC301	**YBC302**	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	**SDMT06T208-DM**	6.35	6.35	0.8	2.58	2.5	15°		★			★						○								
	SDMT09T312-DM	9.525	9.525	1.2	3.97	4.0	15°		★			★						○								
	SDMT120412-DM	12.7	12.7	2.0	4.76	4.4	15°		★			★						○								
	SDMT150520-DM	15.875	15.875	2.0	5.56	5.5	15°		★			★						○								
	**SDMT06T208-PM**	6.35	6.35	0.8	2.58	2.5	15°		★		○						●									
	SDMT09T312-PM	9.525	9.525	1.2	3.97	4.0	15°		★		●						●									
	SDMT120412-PM	12.7	12.7	2.0	4.76	4.4	15°		★		●						●									
	SDMT150520-PM	15.875	15.875	2.0	5.56	5.5	15°		★		●						●									

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

Chipbreaker introduction:
-PM chipbreaker has sharp cutting edge, it is more suitable for machining with power shortage and for relatively adhesive materials, such as stainless steel and Ti alloy, etc.
-DM chipbreaker has blunt cutting edge and is relatively suitable for machining of hard materials such as hardened steel and cast iron, etc.



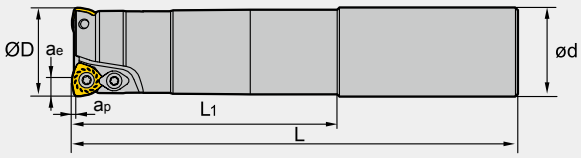
High feed milling cutters



XMR01 P M K



W-type insert, straight shank



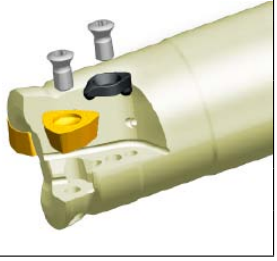
Specification of tools

Type		Stock	Basic dimensions(mm)						Number of teeth Z	Weight (kg)
			ØD	a_p	a_e	L_1	L	ød		
XMR01	-020-G20-WP05-02-M	△	20	1.5	3.8	50	130	20	2	0.2
	-020-G20-WP05-02-L	△	20	1.5	3.8	100	180	20	2	0.3
	-020-G20-WP05-02-XL	△	20	1.5	3.8	130	250	20	2	0.8
	-025-G25-WP06-02-M	△	25	1.5	4.35	60	140	25	2	0.4
	-025-G25-WP06-02-L	△	25	1.5	4.35	120	200	25	2	0.6
	-025-G25-WP06-02-XL	△	25	1.5	4.35	180	300	25	2	1.0
	-032-G32-WP06-03-M	△	32	1.5	4.35	70	150	32	3	0.8
	-032-G32-WP06-03-L	△	32	1.5	4.35	120	200	32	3	1.0
	-032-G32-WP06-03-XL	△	32	1.5	4.35	180	300	32	3	1.6
	-040-G32-WP06-03-M	△	40	1.5	4.35	50	150	32	3	0.9
	-040-G32-WP06-03-L	△	40	1.5	4.35	50	250	32	3	1.5
	-040-G32-WP06-03-XL	△	40	1.5	4.35	50	300	32	3	1.8
	-040-G32-WP08-02-M	△	40	1.5	5.66	50	150	32	2	0.9
	-040-G32-WP08-02-L	△	40	1.5	5.66	50	250	32	2	1.5
	-040-G32-WP08-02-XL	△	40	1.5	5.66	50	300	32	2	1.9
	-050-G32-WP09-02-M	△	50	3.0	6.8	50	150	32	2	1.9
	-050-G32-WP09-02-L	△	50	3.0	6.8	50	250	32	2	2.5

▲Stock available △Make-to-order

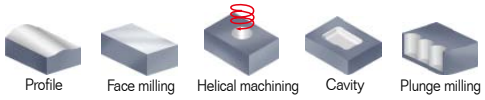
Spare parts

Tool type	Clamp/Insert screw	Clamp	Wrench	
XMR01□□-WP05□□	I60M3.5×08TT	--	WT10P	--
XMR01□□-WP06□□	I60M4×8.4		WT15P	
XMR01□□-WP08□□	I60M5×13	WD-208	--	WT20IT
XMR01□□-WP09□□				



Tools code key B22–B23
Grade selection guide B18–B21
Technical data B192–B198

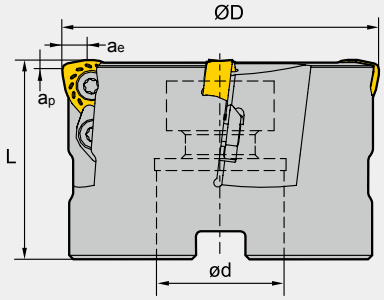
High feed milling cutters



XMR01 P M K



W-type insert, arbor mounting



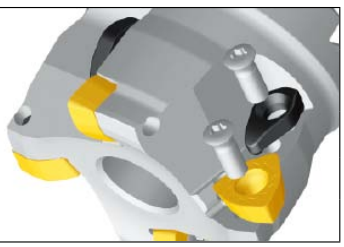
Specification of tools

Type		Stock	Basic dimensions(mm)					Number of teeth Z	Type of coupling	Weight (kg)
			ØD	a_p	a_e	L	ød			
XMR01	**-050-A22-WP06-04**	△	50	1.5	4.35	40	22	4	A	0.4
	-050-A22-WP08-03	△	50	1.5	5.66	50	22	3	A	0.4
	-063-A22-WP08-04	△	63	1.5	5.66	50	22	4	A	0.7
	-063-A27-WP08-04	△	63	1.5	5.66	50	27	4	A	0.7
	-080-A27-WP08-05	△	80	1.5	5.66	63	27	5	A	1.5
	-100-B32-WP08-06	△	100	1.5	5.66	63	32	6	B	2.2
	-125-B40-WP08-07	△	125	1.5	5.66	63	40	7	B	3.5
	-160-B40-WP08-08	△	160	1.5	5.66	63	40	8	B	6.0
	-063-A22-WP09-03	△	63	3.0	6.8	50	22	3	A	0.7
	-080-A27-WP09-04	△	80	3.0	6.8	63	27	4	A	1.4
	-100-B32-WP09-05	△	100	3.0	6.8	63	32	5	B	2.1
	-125-B40-WP09-06	△	125	3.0	6.8	63	40	6	B	3.7
	-160-B40-WP09-07	△	160	3.0	6.8	63	40	7	B	6.3

▲Stock available △Make-to-order

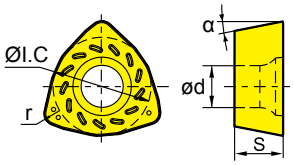
Spare parts

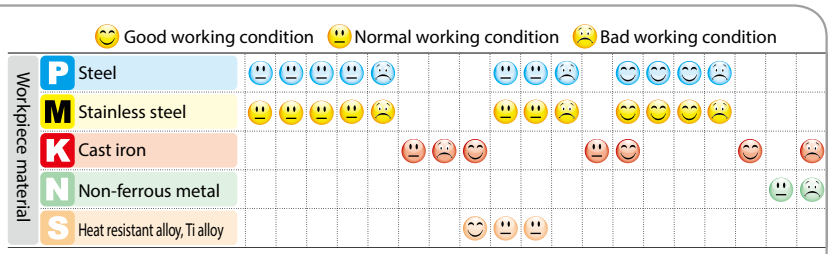
Tool type	Clamp/Insert screw	Clamp	Wrench	
XMR01□□-WP06□□	I60M4×8.4	--	WT15S	--
XMR01□□-WP08□□	I60M5×13	WD-208	--	WT20IT
XMR01□□-WP09□□	I60M5×13	WD-208	--	



Tools code key B22–B23
Grade selection guide B18–B21
Technical data B192–B198

Selection of inserts





Insert shape	Type	Basic dimensions(mm)					CVD Coating						PVD Coating						Cermet		Cemented carbide			
		ØI.C	r	S	ød	α	YBC301	**YBC302**	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	**WPGT050315ZSR**	7.94	1.5	3.5	4.0	11°		★			●														
	WPGT060415ZSR	9.525	1.5	4.2	4.4	11°		★			●														
	WPGT080615ZSR	12.85	1.5	6.35	5.5	11°		★			●														
	WPGT090725ZSR	15	2.5	7	5.5	11°		★			●														
	**WPGT050315ZSR-PM**	7.94	1.5	3.5	4.0	11°		★			●					●									
	WPGT060415ZSR-PM	9.525	1.5	4.2	4.4	11°		★			●					●									
	WPGT080615ZSR-PM	12.85	1.5	6.35	5.5	11°		★			●					●									
	WPGT090725ZSR-PM	15.00	2.5	7.00	5.5	11°		★			●					●									

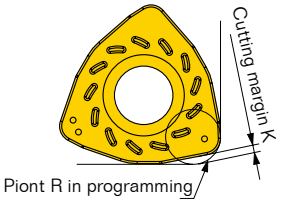
★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

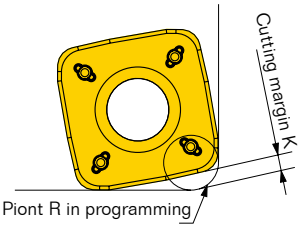
Chipbreaker introduction:
-PM chipbreaker has sharp cutting edge, it is more suitable for machining with power shortage and for relatively adhesive materials, such as stainless steel and Ti alloy, etc.
General chipbreaker has blunt cutting edge and is relatively suitable for machining of hard materials such as hardened steel and cast iron, etc.



Approximate R in machining program

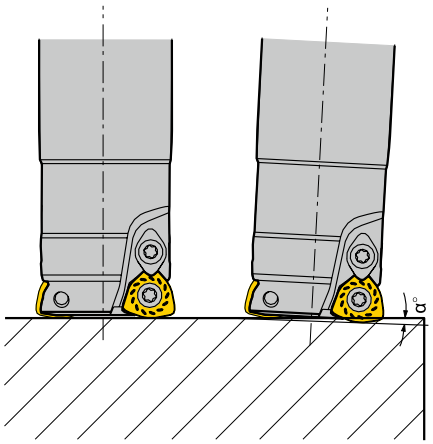
Applicable insert	Approximate R(mm)	Cutting margin K(mm)
WPGT050315ZSR/-PM	2	0.5
WPGT060415ZSR/-PM	2.5	0.7
WPGT080615ZSR/-PM	2.5	0.7
WPGT090725ZSR/-PM	4.5	1.2
SDMT06T208-DM/-PM	1.6	0.5
SDMT09T312-DM/-PM	2.5	0.87
SDMT120412-DM/-PM	4.0	0.93
SDMT150520-DM/-PM	4.0	1.38



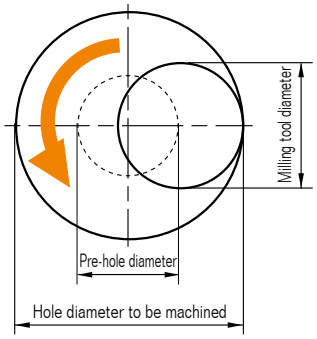


Different machining styles

■ Ramp machining



■ Helical interpolation milling



- Reduce the feed rate in ramp and helical machining operations.
- Set the axial feed rate below 0.2mm/rev in drilling operation.
- Be careful ! Long chippings may fly off in drilling operation.
- The cutting depth of each rotation must not exceed the maximum cutting depth (a_p).
- The S-type insert can be used for plunge milling in addition to the machining operations mentioned above.

Selection guide for XMR01 series

XMR01 series tools (with SD□□ inserts) have perfect edge strength and good economical efficiency, advantageous in face milling.

XMR01 series tools (with WP□□ inserts) possess good capability of chip removal, advantageous in cavity milling.

Recommended cutting parameters

Workpiece material		Hardness HB	Insert grade	Cutting speed (m/min)	Ø25		Ø30/32/35	
					Axial cutting depth	Feed rate per tooth	Axial cutting depth	Feed rate per tooth
P	Soft steel Carbon Steel	≤HB180 HB180-280	YBC302 YBM351 YBM253	170(120-220) 150(100-200)	0.6~1.0	0.8~1.2	0.8~1.2	1.0~1.4
P	Alloy steel Alloy tool steel	HB280-350	YBC302 YBM351 YBM253	130(80-180)	0.4~0.8	0.8~1.2	0.6~1.0	1.0~1.4
P	pre-hardened steel	≤HRC35	YBC302 YBM351 YBM253	120(80-160)	0.4~0.8	0.6~1.0	0.6~1.0	0.8~1.2
M	Stainless steel	≤HB270	YBM351 YBM253	120(80-160)	0.6~1.0	0.6~1.0	0.8~1.2	0.8~1.2
M	Stainless steel	≤HB270	YBG205	120(80-190)	0.6~1.0	0.6~1.0	0.8~1.2	0.8~1.2
K	Common cast Iron	Tensile strength ≤350MPa	YBG302	150(100-200)	0.6~1.0	1.0~1.4	0.8~1.2	1.2~1.6
K	Nodular cast iron	Tensile strength ≤800MPa	YBG302	120(80-160)	0.4~0.8	0.8~1.2	0.6~1.0	1.0~1.4

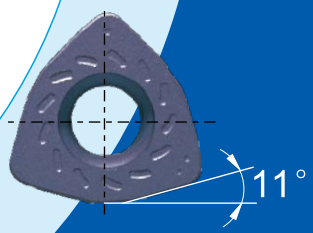
Recommended cutting parameters

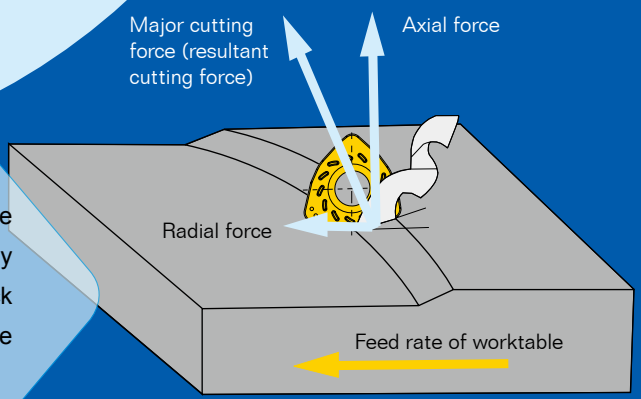
Workpiece material		Hardness HB	Insert grade	Cutting speed (m/min)	Ø40		Ø50/63		Ø80/100	
					Axial cutting depth	Feed rate per tooth	Axial cutting depth	Feed rate per tooth	Axial cutting depth	Feed rate per tooth
P	Soft steel Carbon steel	≤HB180 HB180-280	YBC302 YBM351 YBM253	170(120-220) 150(100-200)	0.8~1.2	1.0~1.4	1.1~1.5	1.1~1.5	1.0~1.5	1.0~1.5
P	Alloy steel Alloy tool steel	HB280-350	YBC302 YBM351 YBM253	130(80-180)	0.6~1.0	1.0~1.4	0.9~1.3	1.1~1.5	0.8~1.3	1.0~1.5
P	Pre-hardened steel	≤HRC35	YBC302 YBM351 YBM253	120(80-160)	0.6~1.0	0.8~1.2	0.9~1.3	0.9~1.3	0.8~1.3	0.8~1.3
M	Stainless steel	≤HB270	YBM351 YBM253	120(80-160)	0.8~1.2	0.8~1.2	1.1~1.5	0.9~1.3	1.0~1.5	0.8~1.3
M	Stainless steel	≤HB270	YBG205	120(80-190)	0.8~1.2	0.8~1.2	1.1~1.5	0.9~1.3	1.0~1.5	0.8~1.3
K	Common cast iron	Tensile strength ≤350MPa	YBG302	150(100-200)	0.8~1.2	1.2~1.6	1.1~1.5	1.3~1.7	1.0~1.5	1.2~1.7
K	Nodular cast iron	Tensile strength ≤800MPa	YBG302	120(80-160)	0.6~1.0	1.0~1.4	0.9~1.3	1.1~1.5	0.8~1.3	1.0~1.5



XMR01 series milling tools

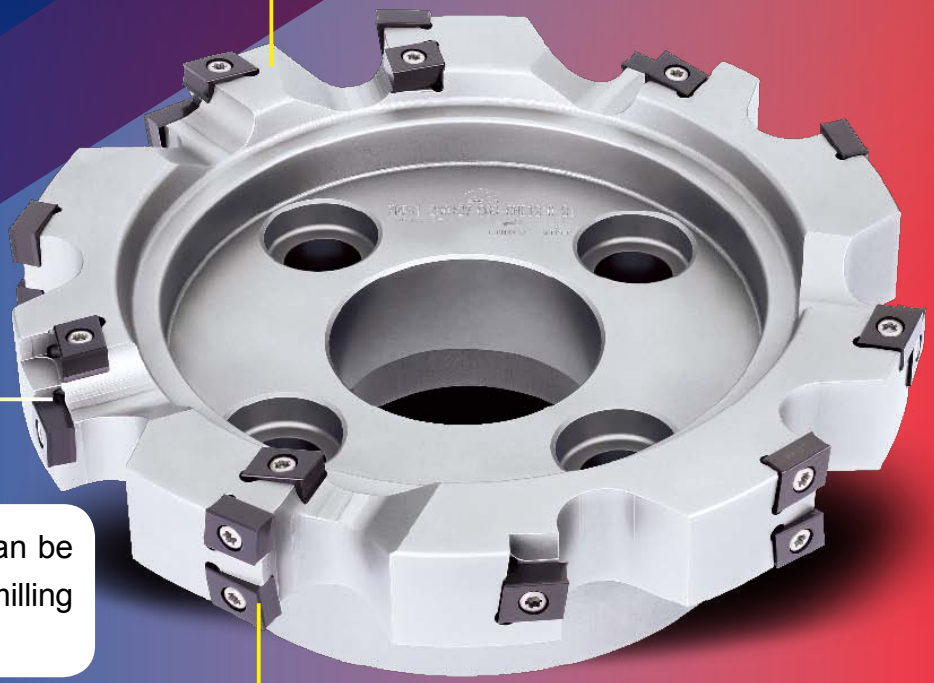






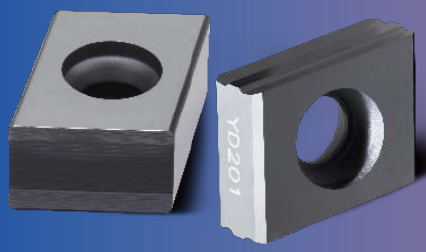
The main feature of high feed tools is to resolve the major cutting force to the axial direction, greatly reducing the radial cutting force, thus improve tool's shock resistance. In addition, this structure can effectively reduce vibration in long-overhang milling operation.

Complexed milling tools, which are mostly used in machining large diameter holes and boring milling cavities.



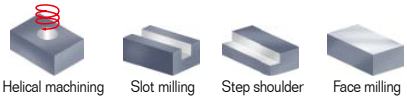
high versatility can be used for surface milling and side milling.

Inserts are vertically loaded. It provides two chipbreaker for you choose, while it fits to machining different cutting performance materials.



XMP01

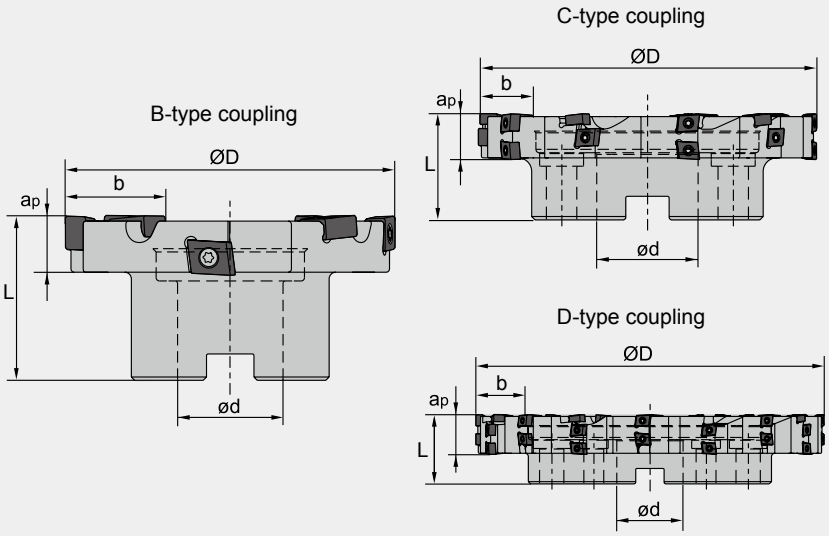
Boring millers



Boring millers

XMP01 P M K





Specification of tools

Type		Stock	Basic dimensions(mm)					Number of teeth Z	Zeff (Peripheral teeth/ end teeth)	Type of coupling	Weight (kg)
			ØD	ød	L	a_p	b				
XMP01	**-080X18-B27-CNE1210-08**	△	80	27	50	19	18	8	2/2	B	0.67
	-100X18-B32-CNE1210-08	△	100	32	50	19	18	8	2/2	A	0.99
	-125X27-B40-CNE1210-15	△	125	40	63	27	27	15	3/2	B	2.46
	-160X27-C40-CNE1210-18	△	160	40	63	27	27	18	4/2	C	3.7
	-200X27-C60-CNE1210-21	△	200	60	63	27	27	21	5/2	C	5.46
	-250X36-C60-CNE1210-32	△	250	40	63	36	36	32	6/2	C	9.79
	-315X36-D60-CNE1210-42	△	315	60	63	45	36	42	8/2	D	17.65
	-400X36-D60-CNE1210-52	△	400	60	63	53	36	52	10/2	D	27.36

Notes: The values of ap, b and D could be customized by requirements in a certain range; Zeff stands for valid teeth.

▲Stock available △Make-to-order

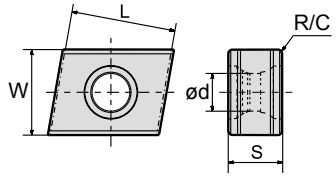
Spare parts

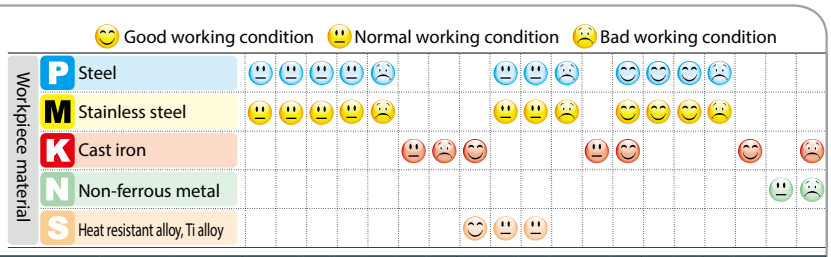
Diameter ØD	Inserts	Screw	Wrench
			
Ø80-Ø400	CNE121006*	I60M4X12	WT15IP



Tools code key B22–B23
Grade selection guide B18–B21
Technical data B192–B198

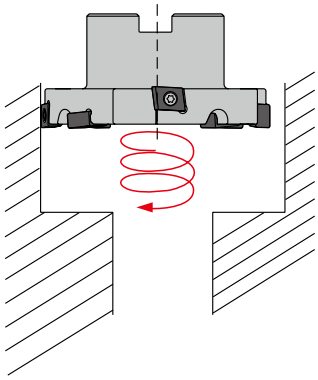
Selection of inserts





Insert shape	Type	Basic dimensions(mm)					CVD Coating							PVD Coating						Cermet		Cemented carbide			
		L	W	S	R/C	ød	YBC301	**YBC302**	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	**CNE121006A**	12.8	10.0	6.35	0.4	4.4				●		○													
	**CNE121006B**	12.0	10.0	6.35	0.6	4.4				●		○													

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



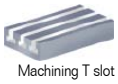
Recommended cutting parameters

Workpiece material		Hardness HB	Insert grade	Cutting parameters			
				V(m/min)	f(mm/Zeff)	$a_p$max(mm)	
						CNE121006A	CNE121006B
P	Soft steel Carbon Steel	⩽180	YBM253	270 (220-350)	0.2 (0.15-0.3)	15-90	15-90
P	Alloy steel Alloy tool steel	180-280	YBM253	260 (200-320)	0.2 (0.15-0.3)	15-90	15-90
P	pre-hardened steel	280-350	YBM253	240 (180-300)	0.2 (0.15-0.3)	15-90	15-90
M	Stainless steel	⩽270	YBM253	230(180-300)	0.2(0.1-0.3)	15-90	15-90
K	Common cast Iron	180-250	YBD152	270 (150-300)	0.2(0.15-0.3)	15-90	15-90

Note: Zeff means effective tooth number.

T-slot milling tools

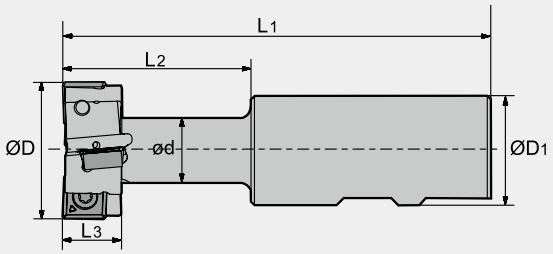
Kr:90°


Machining T slot

TMP01 K



Weldon shank



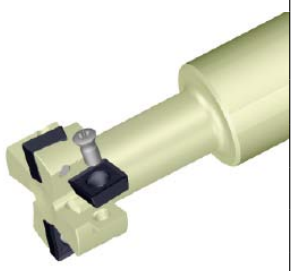
Specification of tools

Type		Stock	Basic dimensions(mm)						Number of teeth Z	Number of insert	T-slot specification
			ØD	ØD1	ød	L1	L2	L3			
TMP01	**-021-XP25-MP06-01**	▲	21	25	10	100	32	9	1	2	12
	-025-XP25-MP06-01	▲	25	25	12	100	35	11	1	2	14
	-032-XP32-MP08-02	▲	32	32	15	110	45	14	2	4	18
	-040-XP32-MP12-02	▲	40	32	19	125	55	18	2	4	22
	-050-XP40-MP12-02	▲	50	40	25	140	65	22	2	4	28
	-060-XP50-MP12-02	▲	60	50	32	160	80	28	2	6	36

▲Stock available △Make-to-order

Spare parts

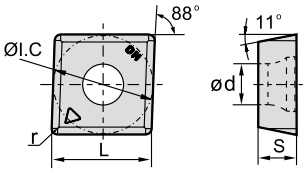
Tool type	Screw	Wrench	
			
TMP01-021-XP25-MP06-01	I60M2.5×5.5	WT07IP	--
TMP01-025-XP25-MP06-01	I60M2.5×5.5		
TMP01-032-XP32-MP08-02	I60M3×7	WT10IP	--
TMP01-040-XP32-MP12-02	I60M5×10	--	WT20IT
TMP01-050-XP40-MP12-02	I60M5×10		
TMP01-060-XP50-MP12-02	I60M5×10		

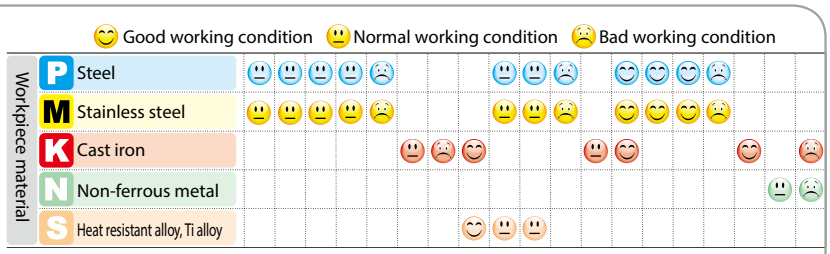


Caution: When installing inserts, make sure the insert nose marked with “DM” or “Δ” is pointing to the slot.

Tools code key B22–B23
Grade selection guide B18–B21
Technical data B192–B198

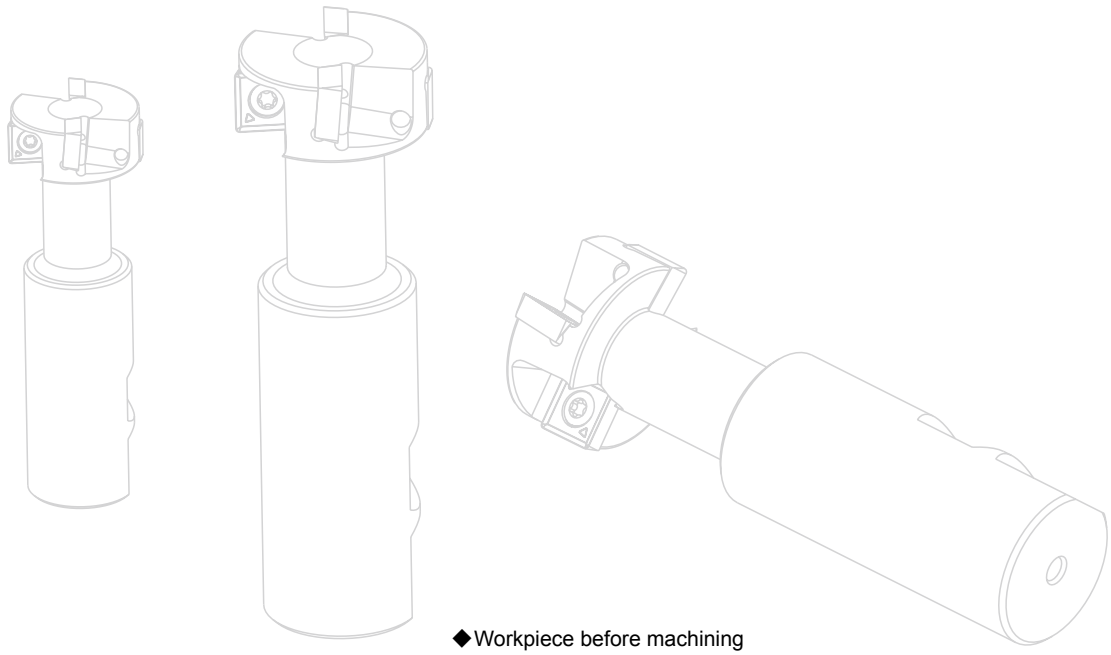
Selection of inserts



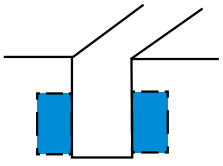


Insert shape	Type	Basic dimensions(mm)					CVD Coating							PVD Coating						Cermet		Cemented carbide			
		ØI.C	L	s	ød	r	YBC301	**YBC302**	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	**MPHT060304-DM**	6.35	6.35	3.18	2.8	0.4											★								
	MPHT080305-DM	8.3	8.3	3.18	3.4	0.5											★								
	MPHT120408-DM	12.7	12.7	4.76	5.56	0.8											★								

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



◆Workpiece before machining



Recommended cutting parameters

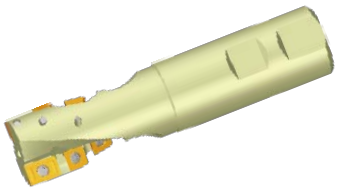
Workpiece material	Insert grade	Cutting parameters		
		V(m/min)	f(mm/z)	Cooling
Grey cast iron	YBG302	80~160	0.05~0.2	Wet / Dry

Helical end mill

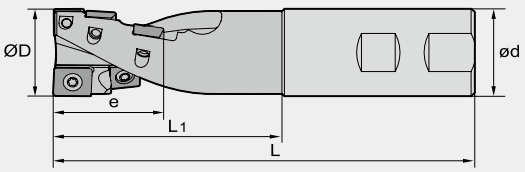
Kr:90°

Side milling Slot milling

HMP01 P K



Weldon shank

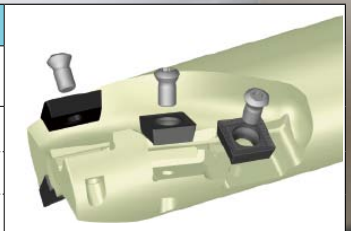


Specification of tools

Type		Stock		Basic dimensions(mm)					Number of flute Z	Number of inserts		Shank type
		R	L	ØD	ød	e	L_1	L		APKT 150412-PM/KM	SPMT 120408-PM/KM	
HMP01	**-040×55-XP40-SP12-02**	△	△	40	40	55	95	175	2	1	5	Weldon shank
	-050×55-XP40-SP12-04	△	△	50	40	55	95	175	4	2	10	Weldon shank

▲Stock available △Make-to-order

Diameter ØD	Screw	Wrench
		
Ø40	I60M5×10	WT20T
Ø50	I60M5×13	WT20T







Tools code key B22–B23
Grade selection guide B18–B21
Technical data B192–B198

Helical end mill

Kr:90°

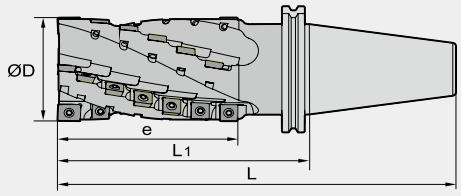

Side milling


Slot milling

HMP01 P K



JT shank/ BT shank (JT shank shown)



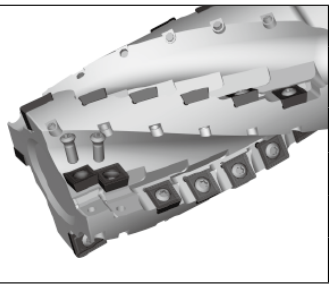
Specification of tools

Type		Stock		Basic dimensions(mm)				Number of flute	Number of inserts		Shank type
		R	L	ØD	e	L_1	L	Z	APKT 150412-PM/KM	SPMT 120408-PM/KM	
HMP01	**-050×84-JT50-SP12-04**	△	△	50	84	145	246.75	4	2	16	JT
	-063×74-JT50-SP12-04	△	△	63	74	135	236.75	4	2	14	JT
	-063×104-JT50-SP12-04	△	△	63	104	165	266.75	4	2	20	JT
	-063×134-JT50-SP12-04	△	△	63	134	195	296.75	4	2	26	JT
	-080×104-JT50-SP12-04	△	△	80	104	165	266.75	4	2	20	JT
	-080×144-JT50-SP12-04	△	△	80	144	205	306.75	4	2	28	JT
	-050×84-BT50-SP12-04	△	△	50	84	145	246.8	4	2	16	BT
	-063×74-BT50-SP12-04	△	△	63	74	135	236.8	4	2	14	BT
	-063×104-BT50-SP12-04	△	△	63	104	165	266.8	4	2	20	BT
	-063×134-BT50-SP12-04	△	△	63	134	195	296.8	4	2	26	BT
	-080×104-BT50-SP12-04	△	△	80	104	165	266.8	4	2	20	BT
	-080×144-BT50-SP12-04	△	△	80	144	205	306.8	4	2	28	BT

▲Stock available △Make-to-order

Spare parts

Diameter ØD	Screw	Wrench
Ø50	I60M5×13	WT20IS
Ø63	I60M5×13	WT20IS
Ø80	I60M5×13	WT20IS



Tools code key B22–B23
Grade selection guide B18–B21
Technical data B192–B198

Helical end mills with interchangeable heads

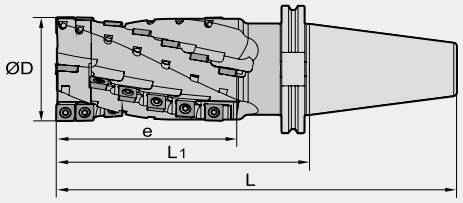
Kr:90°

Side milling Slot milling

HMP01 EC P K



JT shank/ BT shank (JT shank shown)



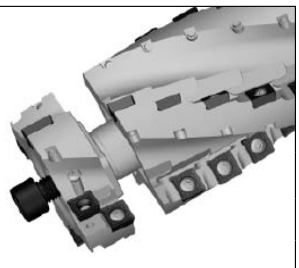
Specification of tools

Type		Stock		Basic dimensions(mm)				Number of flute Z	Number of inserts		Shank type
		R	L	ØD	e	L_1	L		APKT 150412-PM/KM	SPMT 120408-PM/KM	
HMP01	**-050×84EC-JT50-SP12-04**	△	△	50	84	145	246.75	4	2	16	JT
	-063×74EC-JT50-SP12-04	△	△	63	74	135	236.75	4	2	14	JT
	-063×104EC-JT50-SP12-04	△	△	63	104	165	266.75	4	2	20	JT
	-063×134EC-JT50-SP12-04	△	△	63	134	195	296.75	4	2	26	JT
	-080×104EC-JT50-SP12-04	△	△	80	104	165	266.75	4	2	20	JT
	-080×144EC-JT50-SP12-04	△	△	80	144	205	306.75	4	2	28	JT
	-050×84EC-BT50-SP12-04	△	△	50	84	145	246.8	4	2	16	BT
	-063×74EC-BT50-SP12-04	△	△	63	74	135	236.8	4	2	14	BT
	-063×104EC-BT50-SP12-04	△	△	63	104	165	266.8	4	2	20	BT
	-063×134EC-BT50-SP12-04	△	△	63	134	195	296.8	4	2	26	BT
	-080×104EC-BT50-SP12-04	△	△	80	104	165	266.8	4	2	20	BT
	-080×144EC-BT50-SP12-04	△	△	80	144	205	306.8	4	2	28	BT

▲Stock available △Make-to-order

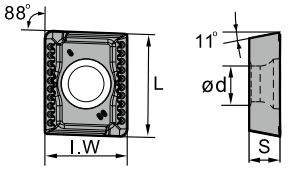
Spare parts

Diameter ØD	Insert screw	Screw of interchangeable head	Wrench of insert screw	Wrench of interchangeable head	Interchangeable head
					
Ø50	I60M5×13	M10×50	WT20IS	WH80L	050EC
Ø63	I60M5×13	M10×50	WT20IS	WH80L	063EC
Ø80	I60M5×13	M12×55	WT20IS	WH100L	080EC



Tools code key B22–B23
Grade selection guide B18–B21
Technical data B192–B198

Selection of inserts



Good working condition Normal working condition Bad working condition

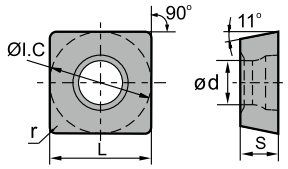
Workpiece material

P	Steel
M	Stainless steel
K	Cast iron
N	Non-ferrous metal
S	Heat resistant alloy, Ti alloy

Insert shape	Type	Basic dimensions(mm)					CVD Coating							PVD Coating						Cermet		Cemented carbide			
		L	I.W	S	ød	r	YBC301	**YBC302**	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	**APKT150412-PM**	16.33	12.7	4.76	5.4	1.2				★							●	○							
	APKT150412-KM	16.33	12.7	4.76	5.4	1.2											●	○							

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

Selection of 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

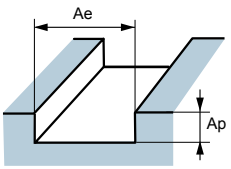
Insert shape	Type	Basic dimensions(mm)					CVD Coating							PVD Coating						Cermet		Cemented carbide			
		L	ØI.C	S	ød	r	YBC301	**YBC302**	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	**SPMT120408-PM**	12.7	12.7	4.76	5.5	0.8				★							●	○							
	SPMT120408-KM	12.7	12.7	4.76	5.5	0.8											●	○							

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

Chipbreaker selection for HMP01 milling inserts

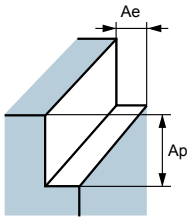
Classification \ Function	For semi-finishing	For roughing
P	-PM	-PM
K	-KM	-KM

A Slot milling



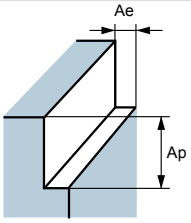
Ae=D
Ap=0.5D(cast iron)
Maximum 12mm(steel)

B Square shoulder milling



Ae=0.5D
Ap=1.5D(cast iron)
1.0D(steel)

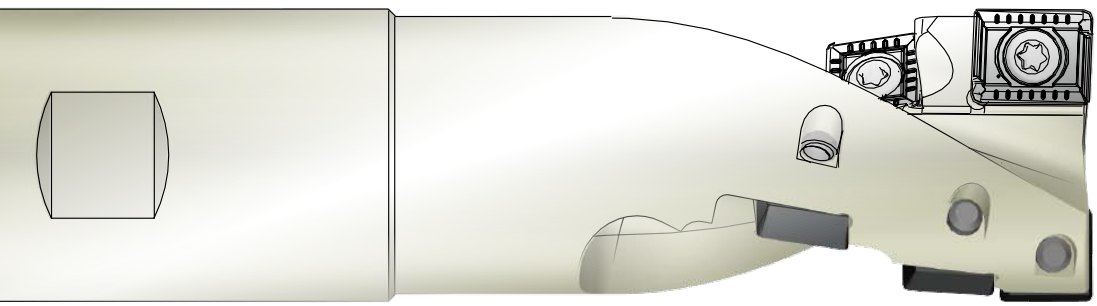
C Narrow shoulder milling



Ae=0.1D
Ap≤Maximum cutting length

Recommended cutting parameters

Workpiece material		Hardness HB	Insert grade	Cutting parameters		Operation (figure)
				Cutting speed(m/min)	Feed speed(mm/z)	
P	Low-carbon steel、Soft steel	⩽180	YBM253 YBG302	80(60-90)	0.25(0.1-0.35)	A
				90(70-120)	0.3(0.15-0.4)	B
				90(70-120)	0.3(0.15-0.4)	C
	High-carbon steel、Alloy steel	180-280	YBM253 YBG302	70(60-100)	0.2(0.1-0.35)	A
				80(60-120)	0.25(0.15-0.35)	B
				90(70-120)	0.25(0.15-0.35)	C
	Alloy tool steel	280-350	YBM253 YBG302	50(40-80)	0.15(0.08-0.25)	A
				60(50-100)	0.2(0.1-0.35)	B
				70(50-100)	0.2(0.1-0.35)	C
K	Cast iron	180-250	YBG152 YBG302	70(50-100)	0.2(0.1-0.35)	A
				80(60-120)	0.25(0.15-0.35)	B
				90(80-120)	0.25(0.15-0.35)	C



Chamfer milling tools

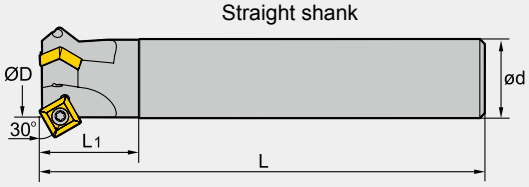
Kr:30°

Chamfering | Face milling | Hole stomata chamfer

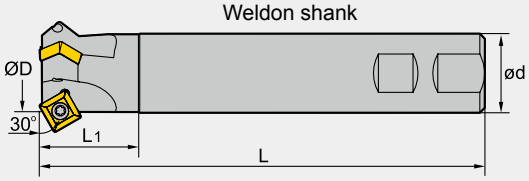
CMZ01 P M K



Straight shank



Weldon shank



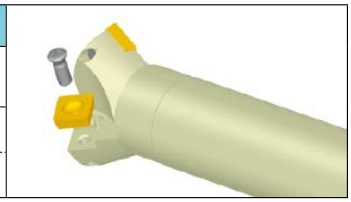
Specification of tools

Type		Stock	Basic dimensions(mm)				Number of teeth Z	Weight (kg)
			ØD	ød	L	L1		
CMZ01 Straight shank	**-012-G20-SP12-01**	△	12	20	100	40	1	0.2
	-025-G25-SP12-02	△	25	25	120	40	2	0.8
	-032-G32-SP12-03	△	32	32	180	40	3	1.1
Weldon shank	**-012-XP20-SP12-01**	△	12	20	100	40	1	0.2
	-025-XP25-SP12-02	△	25	25	120	40	2	0.6
	-032-XP32-SP12-03	△	32	32	180	40	3	1.0

▲Stock available △Make-to-order

Spare parts

Diameter ØD	Screw	Wrench
		
Ø12-Ø32	I43M5×11	WT20IS



Tools code key B22–B23
Grade selection guide B18–B21
Technical data B192–B198

Chamfer milling tools

Kr:45°

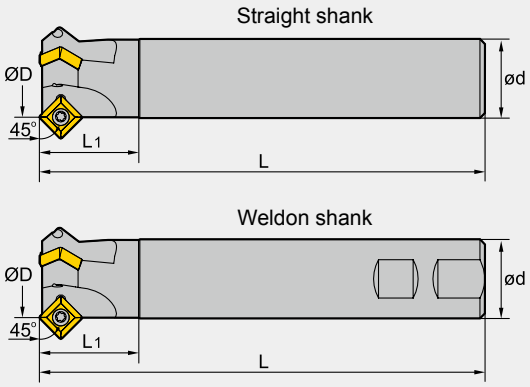

Chamfering


Face milling


Hole stomata chamfer

CMA01 P M K





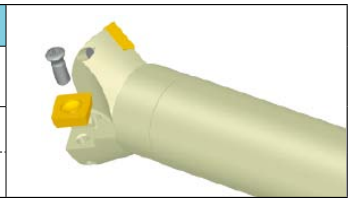
Specification of tools

Type		Stock	Basic dimensions(mm)				Number of teeth Z	Weight (kg)
			ØD	ød	L	L_1		
CMA01 Straight shank	**-012-G20-SP12-01**	▲	12	20	100	40	1	0.2
	-025-G25-SP12-02	▲	25	25	120	40	2	0.8
	-032-G32-SP12-03	▲	32	32	180	40	3	1.1
Weldon shank	**-012-XP20-SP12-01**	▲	12	20	100	40	1	0.2
	-025-XP25-SP12-02	▲	25	25	120	40	2	0.6
	-032-XP32-SP12-03	▲	32	32	180	40	3	1.0

▲Stock available △Make-to-order

Spare parts

Diameter ØD	Screw	Wrench
		
Ø12-Ø32	I43M5×11	WT20IS



Tools code key B22–B23
Grade selection guide B18–B21
Technical data B192–B198

Chamfer milling tools

Kr:60°

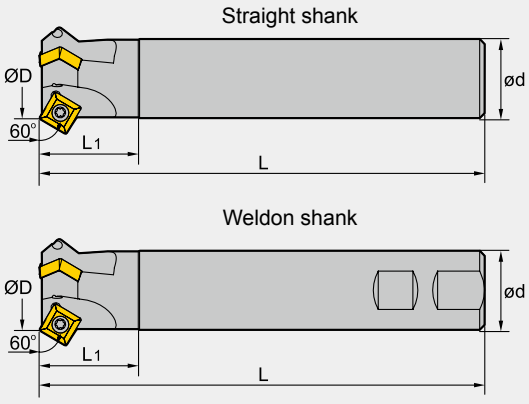

Chamfering


Face milling


Hole stomata chamfer

CMD01 P M K





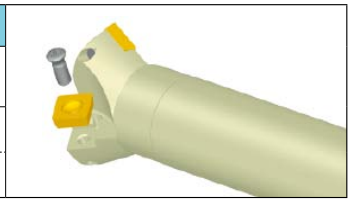
Specification of tools

Type		Stock	Basic dimensions(mm)				Number of teeth Z	Weight (kg)
			ØD	ød	L	L_1		
CMD01 Straight shank	**-012-G20-SP12-01**	▲	12	20	100	40	1	0.2
	-025-G25-SP12-02	▲	25	25	120	40	2	0.8
	-036-G32-SP12-03	▲	36	32	180	40	3	1.0
Weldon shank	**-012-XP20-SP12-01**	▲	12	20	100	40	1	0.2
	-025-XP25-SP12-02	▲	25	25	120	40	2	0.6
	-036-XP32-SP12-03	▲	36	32	180	40	3	1.0

▲Stock available △Make-to-order

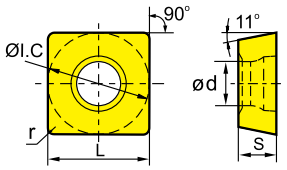
Spare parts

Diameter ØD	Screw	Wrench
		
Ø12-Ø36	I43M5×11	WT20IS

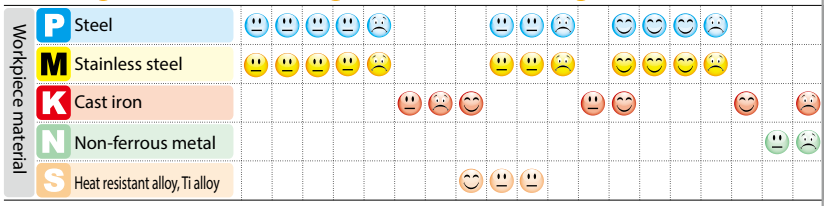


Tools code key B22–B23
Grade selection guide B18–B21
Technical data B192–B198

Selection of inserts



Good working condition Normal working condition Bad working condition



Insert shape	Type	Basic dimensions(mm)					CVD Coating						PVD Coating						Cermet		Cemented carbide			
		ØI.C	L	r	S	ød	YBC301	**YBC302**	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	**SPMT120408**	12.7	12.7	0.8	4.76	5.5	●		●		●						★					○			

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

Recommended cutting parameters

Workpiece material		Hardness HB	Insert grade	Cutting parameters	
				Cutting speed(m/min)	Feed speed(mm/z)
P	Low-carbon steel、Soft steel	⩽180	YBM251 YBC301	180(100—250)	0.25 (0.1-0.4)
			YBM351 YBG302	150(100—200)	0.3 (0.1-0.5)
			YC30S	120(80—150)	0.4 (0.1-0.5)
	High-carbon steel、Alloy steel	180-280	YBM251 YBC301	160(100—220)	0.3 (0.1-0.4)
			YBM351 YBG302	130(100—180)	0.3 (0.1-0.5)
			YC30S	100(60—150)	0.4 (0.1-0.5)
	Alloy tool steel	280-350	YBM251 YBC301	120(80—180)	0.3 (0.1-0.4)
			YBM351 YBG302	100(80—150)	0.3 (0.1-0.5)
			YC30S	80(60—120)	0.4 (0.1-0.5)
M	Stainless steel	⩽270	YBM251 YBC301	120(80—180)	0.3 (0.1-0.4)
			YBM351 YBG302	100(80—150)	0.3 (0.1-0.5)
			YC30S	80(60—120)	0.4 (0.1-0.5)
K	Cast iron	180-250	YBG302	130(100—180)	0.4 (0.1-0.5)

Inserts for face milling



	SEET-CF	SEET-CM	SEET-CR	SEET-DF	SEET-DM	SEET-DR	SEET-EF	SEET-EM
Page	B179	B179	B179	B179	B179	B179	B179	B179



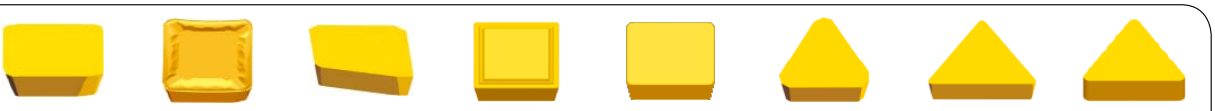
	SEET-LH	SEET-W	SEK(E)N	SEKR	OFKT-DF	OFKT-DM	OFKT-LH	OFKR-DF
Page	B179	B179	B180	B180	B172	B172	B172	B173



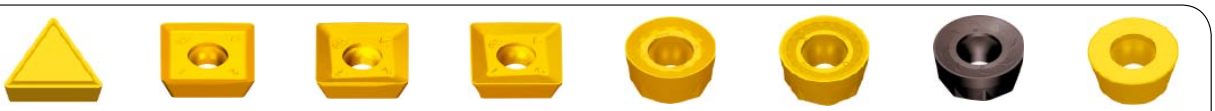
	OFKR-DM	ONHU-PF	ONHU-PM	ONHU-W	ONHU-GM	SNEG-GM/GR	HNEX-DF	HNEX-DM
Page	B173	B173	B173	B173	B174	B182	B171	B171



	HNEX-DR	PNEG-CF/CM/CR	PNEG-PF/PM/PR	LNKT-ZR	LNKT-ZR	LNKT-ZR	SPKW	SPKT
Page	B171	B174	B175	B171	B171	B171	B184	B182



	SP□N	SPKR-GM	SPEX	SPMR	SP□N	TPKN	TPGN	TPUN
Page	B183	B184	B185	B185	B186	B187	B187	B188



	TPMR	SEET□PER-PF	SEET□PER-PM	SEET□PER-PR	RCKT-DM	RCKT-DR	RCKT-ER	RDKW
Page	B188	B181	B181	B181	B176	B176	B176	B177

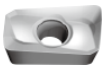


	RCMW-PCBN
Page	B176

Inserts for square shoulder milling







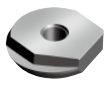
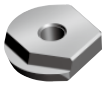


	APKT-PF	APKT-PM	APKT-PR	APKT-LH	APMT□PDR	APMT□PDER	ANGX□PNR-GM
Page	B168	B168	B168	B168	B169	B169	B170

Inserts for profile milling





	ZDET	ZPNT	SDMT/SPMT	ROHX	XPHT-GM	ZOHX-GF	ZOHX-GM
Page	B190	B191	B178/B182	B177	B189	B191	B191

Inserts for side and face milling




	XSEQ	MPHT
Page	B190	B172

Inserts for milling with high feed rate milling






	SDMT-DM	SDMT-PM	WPGT	WPGT-PM
Page	B178	B179	B189	B189

Inserts for boring millers



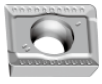

	CNE-A	CNE-B
Page	B170	B170

Inserts for T-slot milling



	MPHT
Page	B172

Inserts for helical end mills




	APKT-PM/KM	SPMT-PM/KM
Page	B169	B182

Inserts for chamfer milling

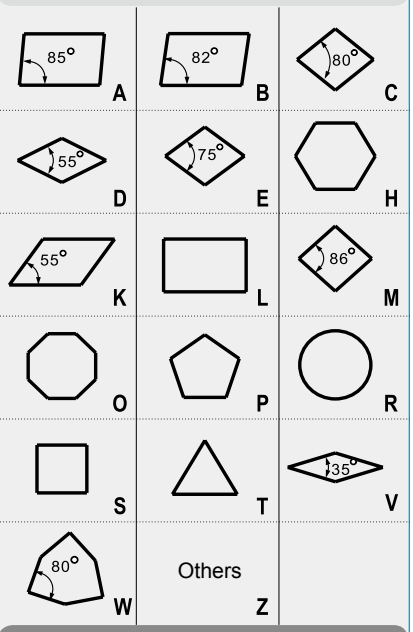


	SPMT
Page	B182

Indexable milling inserts code key

Insert shape

Insert Shape / Code



Chipbreaker and clamping system

Metric

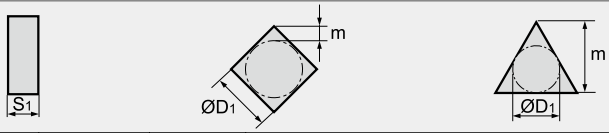
Code	With/Without hole	With/Without chipbreaker	Section plane of Insert	Code	With/Without hole	With/Without chipbreaker	Section plane of Insert
B	With	Without	>65°	N	Without	Without	
H	With	Single-side	>65°	R	Without	Single-side	
C	With	Without	>65°	F	Without	Double-side	
J	With	Double-side	>65°	A	With	Without	
W	With	Without	≤65°	M	With	Single-side	
T	With	Single-side	≤65°	G	With	Double-side	
Q	With	Without	≤65°	X	---	---	Special
U	With	Double-side	≤65°				

S P K N

Clearance angle of main cutting edge

Code	Clearance angle	Code	Clearance angle
A	3°	B	5°
C	7°	D	15°
E	20°	F	25°
G	30°	N	0°
P	11°	O	Other clearance angle

Tolerance



Code	Nose height M Tolerance(mm)	Inscribed circle ØD1 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-class tolerance (identified by shape and size)

● Nose height tolerance(mm)

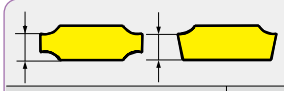
Inscribed circle	Regular triangle	Square	Diamond with 80°	Diamond with 55°	Diamond with 35°	Round
6.35	±0.08	±0.08	±0.08	±0.11	±0.16	---
9.525	±0.08	±0.08	±0.08	±0.11	±0.16	---
12.7	±0.13	±0.13	±0.13	±0.15	---	---
15.875	±0.15	±0.15	±0.15	±0.18	---	---
19.05	±0.15	±0.15	±0.15	±0.18	---	---
25.4	---	±0.18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

● Tolerance of Inscribed Circle ØD1(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

Diameter of IC	Insert shape						
	C	D	R	S	T	V	W
3.97					06		
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	06
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



Thickness is defined as the height from the bottom of insert to the highest part 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	5.96
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

12 04 ED T21 R -DM

Wiper

Kr		αn	
A	45°	A	3°
D	60°	B	5°
E	75°	C	7°
F	85°	D	15°
P	90°	E	20°
Z	Others	F	25°
		G	30°
		N	0°
		P	11°
		Z	Others

Chamfer (mm)

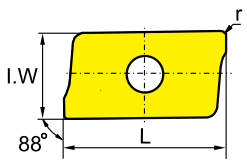
F	0-5°	0-0.10	K
E	1-10°	1-0.15	P
	2-15°	2-0.20	
	3-20°	3-0.25	
T	4-25°	4-0.30	W
	5-30°	5-0.35	
		6-0.40	
S		7-0.45	No mark

Chipbreaker code

Cutting direction

R	Right hand
L	Left hand
N	Neutral

APKT



Good working condition Normal working condition Bad working condition

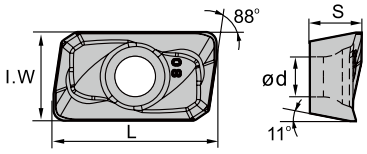
Workpiece material

P	Steel
M	Stainless steel
K	Cast iron
N	Non-ferrous metal
S	Heat resistant alloy, Ti alloy

Insert shape	Type	Basic dimensions(mm)					CVD Coating							PVD Coating						Cermet		Cemented carbide			
		L	I.W	S	ød	r	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	APKT11T304-PF	12.24	6.5	3.6	2.8	0.4	●	★	○		○			○	○		○								
	APKT11T308-PF	12.24	6.5	3.6	2.8	0.8		★	○					○	○										
	APKT11T312-PF	12.24	6.5	3.6	2.8	1.2		★							○										
	APKT11T316-PF	12.24	6.5	3.6	2.8	1.6		★							○										
	APKT160408-PF	17.877	9.33	5.76	4.4	0.8	●	★	○		○				○		○								
	APKT11T304-PM	12.24	6.5	3.6	2.8	0.4	●	★	●		●			★	★		★								
	APKT11T308-PM	12.24	6.5	3.6	2.8	0.8	●	★	●		○		★	★	★		★								
	APKT11T312-PM	12.24	6.5	3.6	2.8	1.2		★	○					○	★		○								
	APKT11T316-PM	12.24	6.5	3.6	2.8	1.6		★	○					○	★		○								
	APKT160408-PM	17.877	9.33	5.76	4.4	0.8	●	★	●		●		○	★	★		★								
	APKT11T304-PR	12.24	6.5	3.6	2.8	0.4	●	★	●		●			○	○		○								
	APKT11T308-PR	12.24	6.5	3.6	2.8	0.8		★									○								
	APKT11T312-PR	12.24	6.5	3.6	2.8	1.2		★									○								
	APKT11T316-PR	12.24	6.5	3.6	2.8	1.6		★									○								
	APKT160408-PR	17.877	9.33	5.76	4.4	0.8		★									○								
	APKT11T304-LH	12.24	6.5	3.6	2.8	0.4																		★	★
	APKT11T308-LH	12.24	6.5	3.6	2.8	0.8																		★	○
	APKT160408-LH	17.877	9.33	5.76	4.4	0.8																		★	★

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

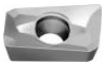
APㅁㅁ



Good working condition Normal working condition Bad working condition

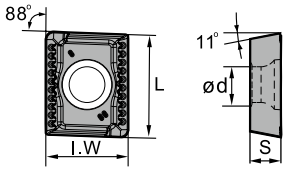
Workpiece material

P	Steel
M	Stainless steel
K	Cast iron
N	Non-ferrous metal
S	Heat resistant alloy, Ti alloy

Insert shape	Type	Basic dimensions(mm)					CVD Coating							PVD Coating						Cermet		Cemented carbide			
		L	I.W	S	ød	r	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	**APMT1135PDR**	11.25	6.2	3.5	2.8	0.8			○					○	●	★	○								
	**APMT160408PDER**	17.25	9.25	4.76	4.4	0.8									●	★	○								

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

APㅁㅁ



Good working condition Normal working condition Bad working condition

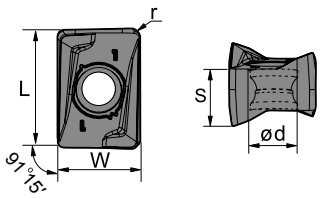
Workpiece material

P	Steel
M	Stainless steel
K	Cast iron
N	Non-ferrous metal
S	Heat resistant alloy, Ti alloy

Insert shape	Type	Basic dimensions(mm)					CVD Coating							PVD Coating						Cermet		Cemented carbide			
		L	I.W	S	ød	r	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	**APKT150412-PM**	16.33	12.7	4.76	5.4	1.2				★							●								
	APKT150412-KM	16.33	12.7	4.76	5.4	1.2											●	○							

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

ANㅁㅁ



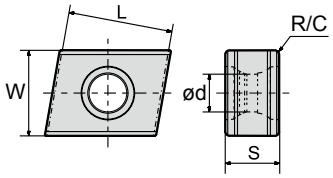
Good working condition　Normal working condition　Bad working condition

Workpiece material		
P	Steel	😐😐😐😐☹ 😐😐☹ 😊😊😊☹
M	Stainless steel	😐😐😐😐☹ 😐😐☹ 😊😊😊☹
K	Cast iron	😐☹😊 😐😊 😊 ☹
N	Non-ferrous metal	😐 ☹
S	Heat resistant alloy, Ti alloy	😊😐😐

Insert shape	Type	Basic dimensions(mm)					CVD Coating							PVD Coating						Cermet		Cemented carbide			
		L	W	S	ød	r	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	**ANGX110504PNR-GM**	11.85	8.4	5.7	3.5	0.4				★	★					★									
	ANGX110508PNR-GM	11.85	8.4	5.7	3.5	0.8				★	★					★									
	ANGX150608PNR-GM	15.43	11.0	7.3	4.4	0.8				★	★					★									
	ANGX150616PNR-GM	15.43	11.0	7.3	4.4	1.6				★	★					★									

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

CN



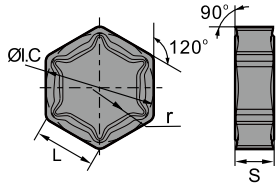
Good working condition　Normal working condition　Bad working condition

Workpiece material		
P	Steel	😐😐😐😐☹ 😐😐☹ 😊😊😊☹
M	Stainless steel	😐😐😐😐☹ 😐😐☹ 😊😊😊☹
K	Cast iron	😐☹😊 😐😊 😊 ☹
N	Non-ferrous metal	😐 ☹
S	Heat resistant alloy, Ti alloy	😊😐😐

Insert shape	Type	Basic dimensions(mm)					CVD Coating							PVD Coating						Cermet		Cemented carbide			
		L	W	S	R/C	ød	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	**CNE121006A**	12.8	10.0	6.35	0.4	4.4				●		○													
	**CNE121006B**	12.0	10.0	6.35	0.6	4.4				●		○													

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

HN□□



Good working condition Normal working condition Bad working condition

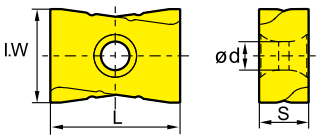
Workpiece material

P	Steel
M	Stainless steel
K	Cast iron
N	Non-ferrous metal
S	Heat resistant alloy, Ti alloy

Insert shape	Type	Basic dimensions(mm)				CVD Coating							PVD Coating						Cermet		Cemented carbide			
		L	ØI.C	S	r	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	HNEX090512-DF	9.16	15.875	5.56	1.2						★													
	HNEX090512-DM	9.16	15.875	5.56	1.2						★													
	HNEX090512-DR	9.16	15.875	5.56	1.2						○	★												

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

LN□□



Good working condition Normal working condition Bad working condition

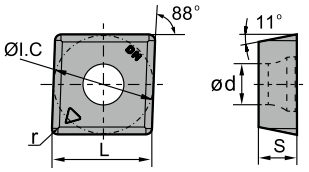
Workpiece material

P	Steel
M	Stainless steel
K	Cast iron
N	Non-ferrous metal
S	Heat resistant alloy, Ti alloy

Insert shape	Type	Basic dimensions(mm)				CVD Coating							PVD Coating						Cermet		Cemented carbide			
		L	I.W	S	ød	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	LNKT1506EN-ZR	15.875	14	6.35	4.6					○	○					★								
	LNKT2007DN-ZR	20	17	7.94	4.6					○	○					★								
	LNKT2510-ZR	25	18	9.525	5.5					○		○				★								

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

MP□□



Good working condition　Normal working condition　Bad working condition

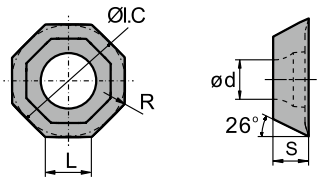
Workpiece material

P	Steel
M	Stainless steel
K	Cast iron
N	Non-ferrous metal
S	Heat resistant alloy, Ti alloy

Insert shape	Type	Basic dimensions(mm)					CVD Coating							PVD Coating						Cermet		Cemented carbide			
		ØI.C	L	S	ød	r	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	**MPHT060304-DM**	6.35	6.35	3.18	2.8	0.4											★								
	MPHT080305-DM	8.3	8.3	3.18	3.4	0.5											★								
	MPHT120408-DM	12.7	12.7	4.76	5.56	0.8											★								

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

OF□□



Good working condition　Normal working condition　Bad working condition

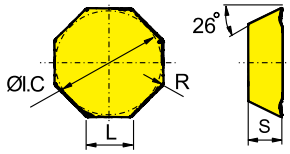
Workpiece material

P	Steel
M	Stainless steel
K	Cast iron
N	Non-ferrous metal
S	Heat resistant alloy, Ti alloy

Insert shape	Type	Basic dimensions(mm)					CVD Coating							PVD Coating						Cermet		Cemented carbide			
		L	ØI.C	S	ød	R	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	**OFKT05T3-DF**	5.26	12.7	3.97	4.4	0.5								○	★										
	**OFKT05T3-DM**	5.26	12.7	3.97	4.4	0.5			○					★	★		★								
	**OFKT05T3-LH**	5.26	12.7	3.97	4.4	0.5																		○	

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

OF□□



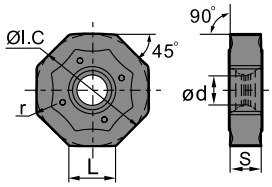
😊 Good working condition 😐 Normal working condition ☹ Bad working condition

Workpiece material																				
P	Steel	😐	😐	😐	😐	☹				😐	😐	☹		😊	😊	😊	☹			
M	Stainless steel	😐	😐	😐	😐	☹				😐	😐	☹		😊	😊	😊	☹			
K	Cast iron						😐	☹	😊				😐	😊				😊		☹
N	Non-ferrous metal																		😐	☹
S	Heat resistant alloy, Ti alloy								😊	😐	😐									

Insert shape	Type	Basic dimensions(mm)				CVD Coating							PVD Coating						Cermet		Cemented carbide			
		L	ØI.C	S	R	YBC301	**YBC302**	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	**OFKR0704-DF**	7.45	17.94	4.76	0.8			●	○					○										
	**OFKR0704-DM**	7.45	17.94	4.76	0.8	●		●	○	●		○	○	★		★								

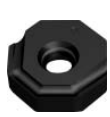
★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

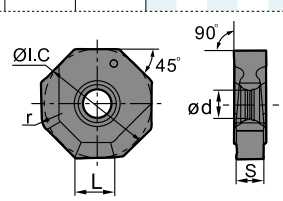
ON□□



😊 Good working condition 😐 Normal working condition ☹ Bad working condition

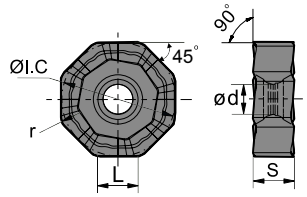
Workpiece material																				
P	Steel	😐	😐	😐	😐	☹				😐	😐	☹		😊	😊	😊	☹			
M	Stainless steel	😐	😐	😐	😐	☹				😐	😐	☹		😊	😊	😊	☹			
K	Cast iron						😐	☹	😊				😐	😊				😊		☹
N	Non-ferrous metal																		😐	☹
S	Heat resistant alloy, Ti alloy								😊	😐	😐									

Insert shape	Type	Basic dimensions(mm)					CVD Coating							PVD Coating						Cermet		Cemented carbide			
		L	ØI.C	S	ød	r	YBC301	**YBC302**	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	**ONHU060408-PF**	6.58	15.875	4.76	4.4	0.83		★				★			★										
	ONHU08T508-PF	8.37	20.2	5.77	5.3	0.83		★				★			★										
	**ONHU060408-PM**	6.58	15.875	4.76	4.4	0.83		★		★		★													
	ONHU08T508-PM	8.37	20.2	5.79	5.3	0.83		★		★		★													
	**ONHU08T508-W**	6.9	20.5	6.00	5.3	0.80		★				★		★											



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

ON□□



Good working condition　Normal working condition　Bad working condition

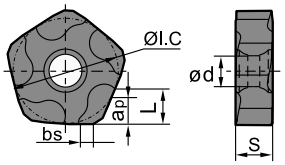
Workpiece material	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
P Steel	😐	😐	😐	😐	☹				😐	😐	☹			😊	😊	😊	☹			
M Stainless steel	😐	😐	😐	😐	☹				😐	😐	☹			😊	😊	😊	☹			
K Cast iron						😐	☹	😊				😐	😊				😊		☹
N Non-ferrous metal																		😐	☹
S Heat resistant alloy, Ti alloy								😊	😐	😐									

Insert shape	Type	Basic dimensions(mm) L	ØI.C	S	ød	r	CVD Coating YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	PVD Coating YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	Cermet YNG151	YNG151C	Cemented carbide YC30S	YD051	YD101	YD201
	**ONHU08T624R-GM**	6.38	20.2	6.3	5.3	2.4				★		★				★									

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

Note: FMA12 is compatible with our ONHU08T508-PF/ONHU08T508-PM inserts.

PN□□



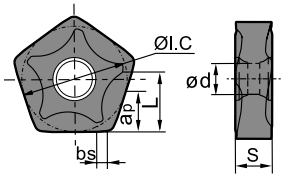
Good working condition　Normal working condition　Bad working condition

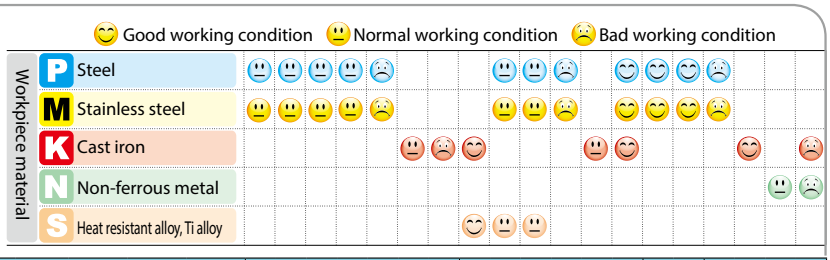
Workpiece material	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
P Steel	😐	😐	😐	😐	☹				😐	😐	☹			😊	😊	😊	☹			
M Stainless steel	😐	😐	😐	😐	☹				😐	😐	☹			😊	😊	😊	☹			
K Cast iron						😐	☹	😊				😐	😊				😊		☹
N Non-ferrous metal																		😐	☹
S Heat resistant alloy, Ti alloy								😊	😐	😐									

Insert shape	Type	Basic dimensions(mm) L	ØI.C	S	ød	bs	a_{pmax}	CVD Coating YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	PVD Coating YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	Cermet YNG151	YNG151C	Cemented carbide YC30S	YD051	YD101	YD201
	**PNEG110512R-CF**	5.4	15.875	5.56	4.64	1.6	5						●												
	PNEG110512L-CF	5.4	15.875	5.56	4.64	1.6	5						●												
	**PNEG110512R-CM**	5.4	15.875	5.56	4.64	1.6	5						●												
	PNEG110512L-CM	5.4	15.875	5.56	4.64	1.6	5						●												
	**PNEG110512R-CR**	5.4	15.875	5.56	4.64	1.6	5						●												
	PNEG110512L-CR	5.4	15.875	5.56	4.64	1.6	5						●												

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

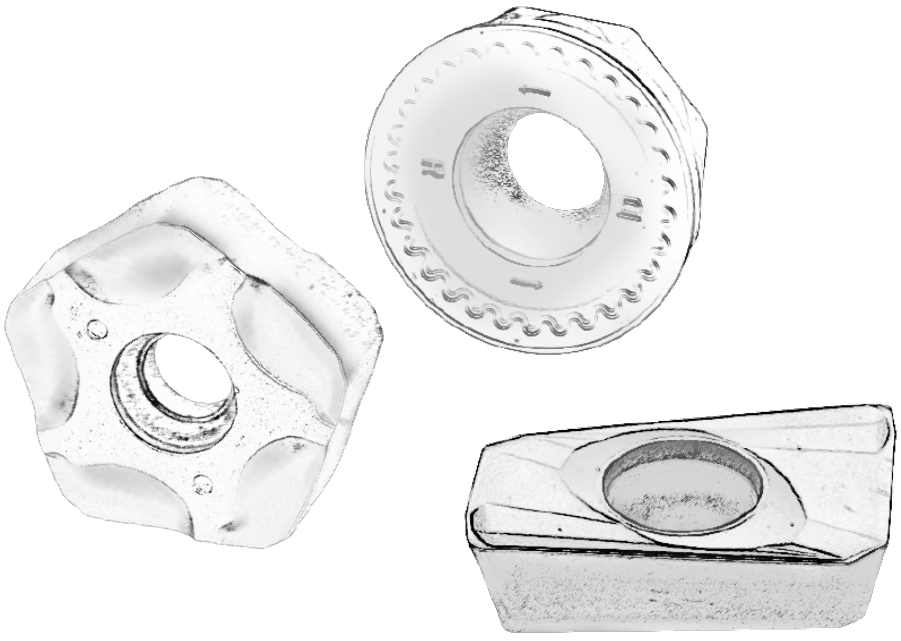
PN□□



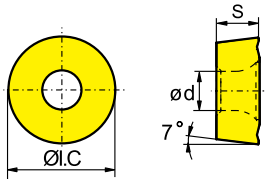


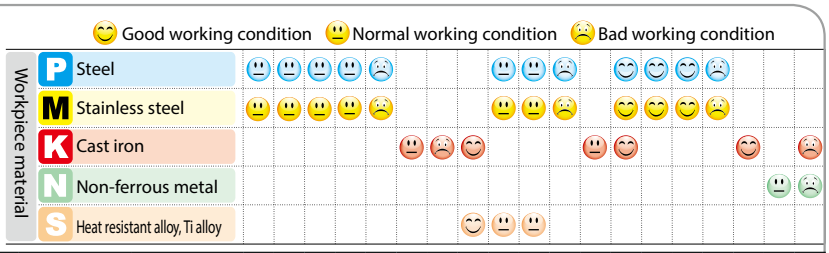
Insert shape	Type	Basic dimensions(mm)						CVD Coating							PVD Coating							Cermet		Cemented carbide			
		L	ØI.C	S	ød	bs	a_{pmax}	YBC301	**YBC302**	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	**PNEG110512R-PF**	7.5	15.875	5.56	4.64	1.4	7.5		★		●															
	PNEG110512L-PF	7.5	15.875	5.56	4.64	1.4	7.5		★		●															
	**PNEG110512R-PM**	7.5	15.875	5.56	4.64	1.4	7.5		★		●															
	PNEG110512L-PM	7.5	15.875	5.56	4.64	1.4	7.5		★		●															
	**PNEG110512R-PR**	7.5	15.875	5.56	4.64	1.4	7.5		★		●															
	PNEG110512L-PR	7.5	15.875	5.56	4.64	1.4	7.5		★		●															

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



RC□□

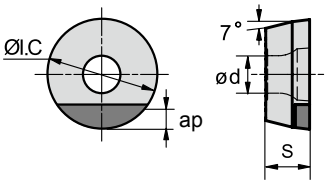


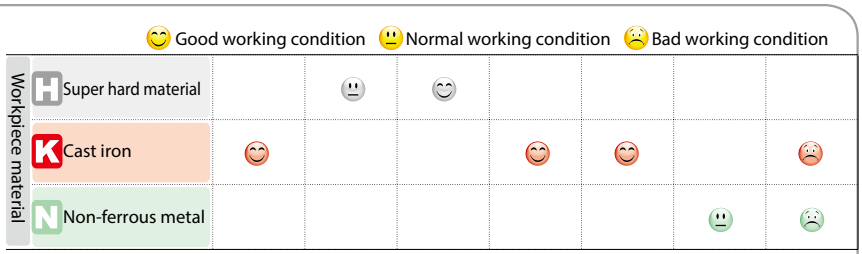


Insert shape	Type	Basic dimensions(mm)			CVD Coating							PVD Coating						Cermet		Cemented carbide				
		ØI.C	S	ød	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	RCKT10T3MO-DM	10.0	3.97	4.4	●								●	★									
	RCKT1204MO-DM	12.0	4.76	4.0	●		●		●	○			●	★	●								
	RCKT1606MO-DM	16.0	6.35	5.56	●										●								
	RCKT1204MO-DR	12.0	4.76	4.0	○		○		○				●	★									
	RCKT1606MO-DR	16.0	6.35	5.56	●				●		○		●	★									
	RCKT2006MO-DR	20.0	6.35	6.55	●				●		○		○	★	●								
	RCKT1204MO-ER	12.0	4.76	4.0				★															
	RCKT1606MO-ER	16.0	6.35	5.56				★															
	RCKT2006MO-ER	20.0	6.35	6.55				★															

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

RC□□

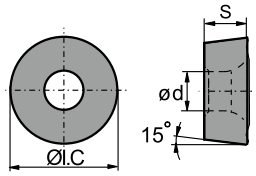




Insert shape	Type	Basic dimensions(mm)				PCBN				Cemented carbide		
		ØI.C	S	ød	$a_p$max	YCB011	YCB012	YCB121	YCB211	YD051	YD101	YD201
	RCMW1204MO-PCBN	12.0	4.76	4.1	2.7	○	●		●			

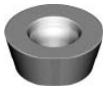
★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

RD□□



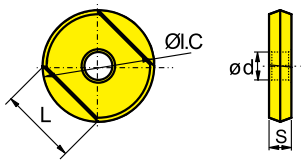
😊 Good working condition 😐 Normal working condition ☹ Bad working condition

Workpiece material	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
P Steel	😐	😐	😐	😐	☹				😐	😐	☹		😊	😊	😊	☹			
M Stainless steel	😐	😐	😐	😐	☹				😐	😐	☹		😊	😊	😊	☹			
K Cast iron						😐	☹	😊				😐	😊				😊		☹
N Non-ferrous metal																		😐	☹
S Heat resistant alloy, Ti alloy								😊	😐	😐									

Insert shape	Type	Basic dimensions(mm)			CVD Coating							PVD Coating						Cermet		Cemented carbide			
		ØI.C	S	ød	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	RDKW0702MO	7	2.38	2.8			○		●				●										
	RDKW0803MO	8	3.18	3.4	○				○				●	★	○								
	RDKW10T3MO	10	3.97	4.4	○				●				●	★									
	RDKW1204MO	12	4.76	4.4	●		●		●				●	★	●								
	RDKW1605MO	16	5.56	5.5	○				○				○	★	○								
	RDKW2006MO	20	6.35	6.5	○				○					○									

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

RO□□



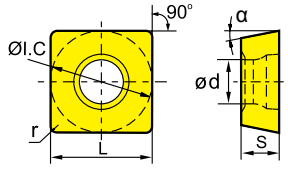
😊 Good working condition 😐 Normal working condition ☹ Bad working condition

Workpiece material	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
P Steel	😐	😐	😐	😐	☹				😐	😐	☹		😊	😊	😊	☹			
M Stainless steel	😐	😐	😐	😐	☹				😐	😐	☹		😊	😊	😊	☹			
K Cast iron						😐	☹	😊				😐	😊				😊		☹
N Non-ferrous metal																		😐	☹
S Heat resistant alloy, Ti alloy								😊	😐	😐									

Insert shape	Type	Basic dimensions(mm)				CVD Coating							PVD Coating						Cermet		Cemented carbide			
		ØI.C	L	S	ød	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	ROHX1203	12	8.5	3	4													○						
	ROHX1604	16	11.3	4	5													○						
	ROHX2005	20	14.1	5	5													○						

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

SD□□



Good working condition　Normal working condition　Bad working condition

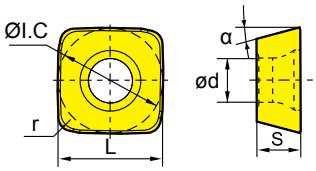
Workpiece material

P	Steel
M	Stainless steel
K	Cast iron
N	Non-ferrous metal
S	Heat resistant alloy, Ti alloy

Insert shape	Type	Basic dimensions(mm)						CVD Coating							PVD Coating						Cermet		Cemented carbide			
		r	L	ØI.C	S	ød	α	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	**SDMT090308**	0.8	9.525	9.525	3.18	4.4	15°			○								○								

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

SD□□



Good working condition　Normal working condition　Bad working condition

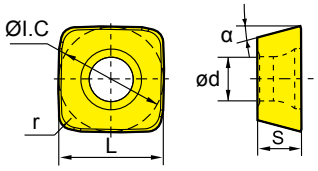
Workpiece material

P	Steel
M	Stainless steel
K	Cast iron
N	Non-ferrous metal
S	Heat resistant alloy, Ti alloy

Insert shape	Type	Basic dimensions(mm)						CVD Coating							PVD Coating						Cermet		Cemented carbide			
		ØI.C	L	r	S	ød	α	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	**SDMT06T208-DM**	6.35	6.35	0.8	2.58	2.5	15°		★			★						○								
	SDMT09T312-DM	9.525	9.525	1.2	3.97	4.0	15°		★			★						○								
	SDMT120412-DM	12.7	12.7	2.0	4.76	4.4	15°		★			★						○								
	SDMT150520-DM	15.875	15.875	2.0	5.56	5.5	15°		★			★						○								

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

SD□□



Good working condition Normal working condition Bad working condition

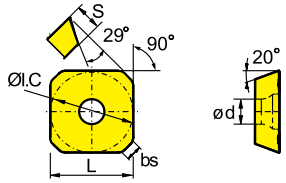
Workpiece material

P	Steel
M	Stainless steel
K	Cast iron
N	Non-ferrous metal
S	Heat resistant alloy, Ti alloy

Insert shape	Type	Basic dimensions(mm)						CVD Coating							PVD Coating						Cermet		Cemented carbide			
		ØI.C	L	r	S	ød	α	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	SDMT06T208-PM	6.35	6.35	0.8	2.58	2.5	15°		★		○						●									
	SDMT09T312-PM	9.525	9.525	1.2	3.97	4.0	15°		★		●						●									
	SDMT120412-PM	12.7	12.7	2.0	4.76	4.4	15°		★		●						●									
	SDMT150520-PM	15.875	15.875	2.0	5.56	5.5	15°		★		●						●									

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

SE□□

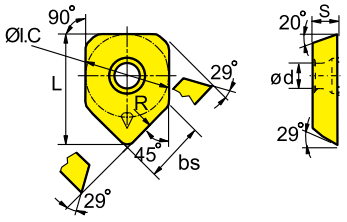


Good working condition Normal working condition Bad working condition

Workpiece material

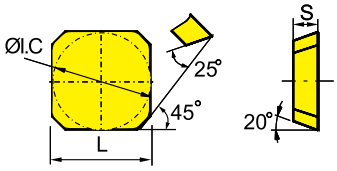
P	Steel
M	Stainless steel
K	Cast iron
N	Non-ferrous metal
S	Heat resistant alloy, Ti alloy

Insert shape	Type	Basic dimensions(mm)						CVD Coating							PVD Coating						Cermet		Cemented carbide			
		L	ØI.C	S	ød	bs	R	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	SEET12T3-DF	13.40	13.40	3.97	4.1	2.55		●	★	●						★		○								
	SEET12T3-CF	13.40	13.40	3.97	4.1	2.55							○		★	○		○								
	SEET12T3-EF	13.40	13.40	3.97	4.1	2.55										○		○								
	SEET12T3-DM	13.40	13.40	3.97	4.1	2.55		●	★	●		○				★		★								
	SEET12T3-CM	13.40	13.40	3.97	4.1	2.55							★			★		○								
	SEET12T3-EM	13.40	13.40	3.97	4.1	2.55				●		●				○		★								
	SEET12T3-DR	13.40	13.40	3.97	4.1	2.55		●	★			●				★		★								
	SEET12T3-CR	13.40	13.40	3.97	4.1	2.55		●					★					★								
	SEET12T3-LH	13.40	13.40	3.97	4.1	2.55																			○	★
	SEET12T3-W	17.82	13.40	3.97	4.1	9.46	500		★	●			★			★					★					



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

SE□□



Good working condition　Normal working condition　Bad working condition

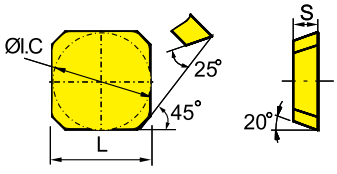
Workpiece material

P	Steel
M	Stainless steel
K	Cast iron
N	Non-ferrous metal
S	Heat resistant alloy, Ti alloy

Insert shape	Type	Basic dimensions(mm)			CVD Coating							PVD Coating						Cermet		Cemented carbide			
		L	ØI.C	S	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	**SEEN1203AFTN**	12.7	12.7	3.18									○					●					
	SEKN1203AFFN	12.7	12.7	3.18								★											
	SEKN1203AFN	12.7	12.7	3.18	●								○							●			○
	SEKN1203AFTN	12.7	12.7	3.18	●		●		●				★		○					●			●
	SEKN1504AFN	15.875	15.875	4.76	●		●																●
	SEKN1504AFTN	15.875	15.875	4.76	○		●		●						○					●			●

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

SE□□



Good working condition　Normal working condition　Bad working condition

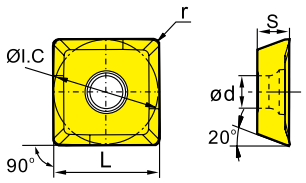
Workpiece material

P	Steel
M	Stainless steel
K	Cast iron
N	Non-ferrous metal
S	Heat resistant alloy, Ti alloy

Insert shape	Type	Basic dimensions(mm)			CVD Coating							PVD Coating						Cermet		Cemented carbide			
		L	ØI.C	S	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	**SEKR1203AFN**	12.7	12.7	3.18	●								○		○								
	SEKR1504AFN	15.875	15.875	4.76							★				★					●			

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

SE□□



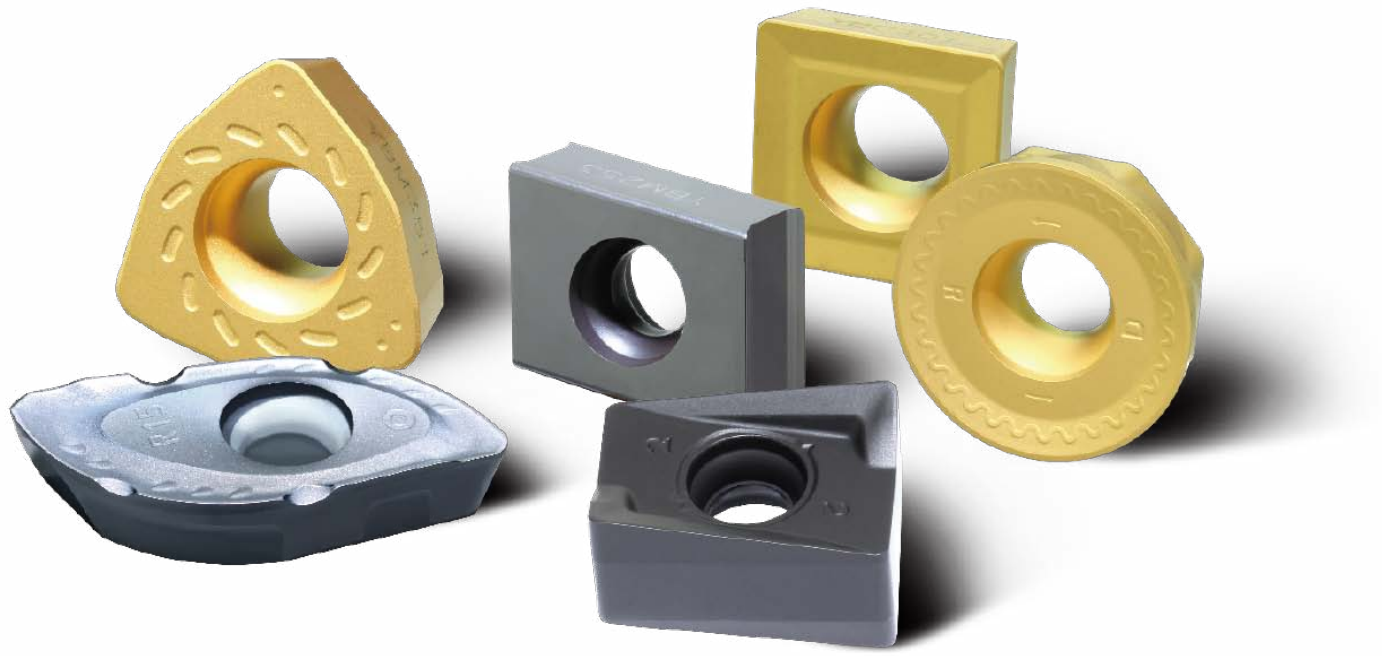
Good working condition Normal working condition Bad working condition

Workpiece material

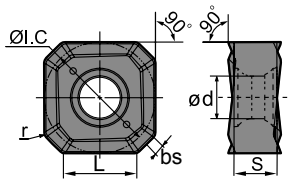
P	Steel
M	Stainless steel
K	Cast iron
N	Non-ferrous metal
S	Heat resistant alloy, Ti alloy

Insert shape	Type	Basic dimensions(mm)					CVD Coating							PVD Coating						Cermet		Cemented carbide			
		L	ØI.C	S	ød	r	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	SEET09T308PER-PF	9.525	9.525	4.01	3.3	0.8									★										
	SEET09T308PER-PM	9.525	9.525	4.01	3.3	0.8						○			★										
	SEET09T308PER-PR	9.525	9.525	4.01	3.3	0.8						★			○										
	SEET120308PER-PF	13.308	13.308	4.04	4.1	0.8									○										
	SEET120308PER-PM	13.308	13.308	4.04	4.1	0.8			●				★	★	★		★								
	SEET120308PER-PR	13.308	13.308	4.04	4.1	0.8					○			★	★		★								

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



SN□□



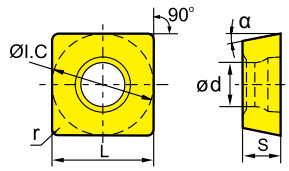
Good working condition　Normal working condition　Bad working condition

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

Insert shape	Type	Basic dimensions(mm)						CVD Coating							PVD Coating						Cermet		Cemented carbide			
		L	ØI.C	S	bs	ød	r	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	**SNEG1205ANR-GM**	7.6	12.0	4.76	1.05	4.6	0.8		★		★		★				★									
	SNEG1506ANR-GM	7.6	15.0	5.54	1.30	5.5	0.9		★		★		★				★									
	**SNEG1506ANR-GR**	9.4	15.0	5.54	1.30	5.5	0.9		★		★		★				★									
	SNEG1907ANR-GR	12.1	19.0	7.0	1.67	7.2	1.0		★		★		★				★									

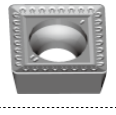
★Recommended grade (always stock available)　●Available grade (always stock available)　○Make-to-order

SP□□



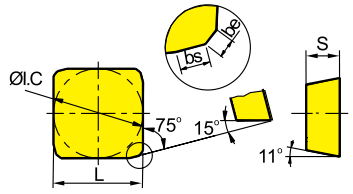
Good working condition　Normal working condition　Bad working condition

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

Insert shape	Type	Basic dimensions(mm)						CVD Coating							PVD Coating						Cermet		Cemented carbide			
		r	L	ØI.C	S	ød	α	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	**SPMT060304**	0.4	6.35	6.35	3.18	2.8	11°			○								○								
	SPMT120408	0.8	12.7	12.70	4.76	5.5	11°	●		●		●						★					○			
	**SPMT120408-PM**	0.8	12.7	12.70	4.76	5.5	11°				★							●								
	SPMT120408-KM	0.8	12.7	12.70	4.76	5.5	11°											●	○							
	**SPKT1204EDR**	--	12.7	12.7	4.76	5.56	11°									★										

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

SP□N



Good working condition Normal working condition Bad working condition

Workpiece material

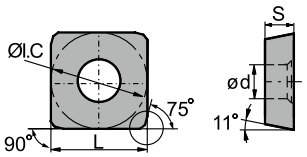
P	Steel
M	Stainless steel
K	Cast iron
N	Non-ferrous metal
S	Heat resistant alloy, Ti alloy

Insert shape	Type	Basic dimensions(mm)					CVD Coating							PVD Coating						Cermet		Cemented carbide			
		L	ØI.C	S	be	bs	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	SPKN1203EDER	12.7	12.7	3.18	1	1.4									○										
	SPKN1203EDEL	12.7	12.7	3.18	1	1.4									○										
	SPKN1203EDFR	12.7	12.7	3.18	1	1.4								★	○										●
	SPKN1203EDFL	12.7	12.7	3.18	1	1.4								○	○										○
	SPKN1203EDSKR	12.7	12.7	3.18	1	1.4											○					○			
	SPKN1203EDSKL	12.7	12.7	3.18	1	1.4											○					○			
	SPKN1203EDTKR	12.7	12.7	3.18	1	1.4	●				●				○		★					●			○
	SPKN1203EDTKL	12.7	12.7	3.18	1	1.4									○		○					○			○
	SPKN1203EDS31R	12.7	12.7	3.18	1	1.4											○					○			
	SPKN1203EDS31L	12.7	12.7	3.18	1	1.4											○					○			
	SPKN1203EDT31R	12.7	12.7	3.18	1	1.4	●				●				○		★					●			○
	SPKN1203EDT31L	12.7	12.7	3.18	1	1.4									○		○					○			○
	SPKN1504EDER	15.875	15.875	4.76	1	1.4									○										
	SPKN1504EDEL	15.875	15.875	4.76	1	1.4									○										
	SPKN1504EDFR	15.875	15.875	4.76	1	1.4								○	○										○
	SPKN1504EDFL	15.875	15.875	4.76	1	1.4								○	○										○
	SPKN1504EDSKR	15.875	15.875	4.76	1	1.4											○					○			
	SPKN1504EDSKL	15.875	15.875	4.76	1	1.4											○					○			
	SPKN1504EDTKR	15.875	15.875	4.76	1	1.4	●								★		○					●			●
	SPKN1504EDTKL	15.875	15.875	4.76	1	1.4									○		○					○			●
	SPKN1504EDS32R	15.875	15.875	4.76	1	1.4											○					○			
	SPKN1504EDS32L	15.875	15.875	4.76	1	1.4											○					○			
	SPKN1504EDT32R	15.875	15.875	4.76	1	1.4	●								★		○					●			●
	SPKN1504EDT32L	15.875	15.875	4.76	1	1.4									○		○					○			●

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

Ordering guide: **SPKN1203EDT3 1 R** chamfering angle 20°, chamfering width 0.15mm. For other edge shapes, see inserts code key standard.

SP□W



Good working condition Normal working condition Bad working condition

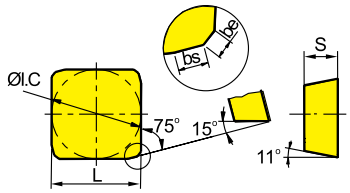
Workpiece material

P	Steel
M	Stainless steel
K	Cast iron
N	Non-ferrous metal
S	Heat resistant alloy, Ti alloy

Insert shape	Type	Basic dimensions(mm)						CVD Coating							PVD Coating						Cermet		Cemented carbide			
		r	L	ØI.C	S	ød	α	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	**SPKW1204EDFR**	---	12.7	12.7	4.76	5.56	11°									○										
	SPKW1204EDSR	---	12.7	12.7	4.76	5.56	11°									○										

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

SP□R



Good working condition Normal working condition Bad working condition

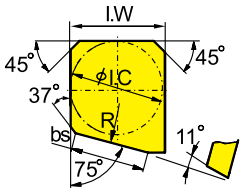
Workpiece material

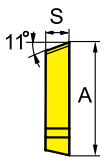
P	Steel
M	Stainless steel
K	Cast iron
N	Non-ferrous metal
S	Heat resistant alloy, Ti alloy

Insert shape	Type	Basic dimensions(mm)					CVD Coating							PVD Coating						Cermet		Cemented carbide			
		L	ØI.C	S	be	bs	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	**SPKR1203EDR-GM**	12.7	12.7	3.18	1	1.4			●						★		★					●			●
	SPKR1203EDL-GM	12.7	12.7	3.18	1	1.4			●						★		★					●			●
	SPKR1504EDR-GM	15.875	15.875	4.76	1	1.4			●						★		★					●			●
	SPKR1504EDL-GM	15.875	15.875	4.76	1	1.4			●						★		★					●			●

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

SP□X





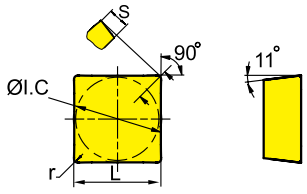
Good working condition Normal working condition Bad working condition

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

Insert shape	Type	Basic dimensions(mm)						CVD Coating							PVD Coating						Cermet		Cemented carbide			
		A	ØI.C	I.W	S	bs	R	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	**SPEX1203EDL-1**	15	12.7	12.7	3.18	10	500																			●
	SPEX1203EDR-1	15	12.7	12.7	3.18	10	500																			●
	SPEX1504EDL-1	18.2	15.875	15.875	4.76	10	500																	○		●
	SPEX1504EDR-1	18.2	15.875	15.875	4.76	10	500																	○		●

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

SP□□



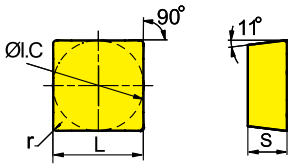
Good working condition Normal working condition Bad working condition

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

Insert shape	Type	Basic dimensions(mm)				CVD Coating							PVD Coating						Cermet		Cemented carbide			
		L	ØI.C	s	r	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	**SPMR090304**	9.525	9.525	3.18	0.4			○											○					
	SPMR09T304	9.525	9.525	3.97	0.4									○										
	SPMR090308	9.525	9.525	3.18	0.8			○																
	SPMR120304	12.7	12.7	3.18	0.4			○											○					
	SPMR120308	12.7	12.7	3.18	0.8			○																
	SPMR120312	12.7	12.7	3.18	1.2			○		○				○										

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

SP□□



Good working condition　Normal working condition　Bad working condition

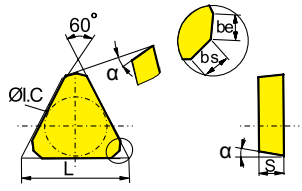
Workpiece material

P	Steel
M	Stainless steel
K	Cast iron
N	Non-ferrous metal
S	Heat resistant alloy, Ti alloy

Insert shape	Type	Basic dimensions(mm)				CVD Coating							PVD Coating						Cermet		Cemented carbide			
		L	ØI.C	s	r	YBC301	**YBC302**	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	**SPUN090304**	9.525	9.525	3.18	0.4																	○		
	SPUN090308	9.525	9.525	3.18	0.8																○		○	
	SPUN120304	12.7	12.7	3.18	0.4														○		○			○
	SPUN120308	12.7	12.7	3.18	0.8			○		○											●		○	○
	SPUN120312	12.7	12.7	3.18	1.2																○			
	SPUN150408	15.875	15.875	4.76	0.8																○			○
	SPUN150412	15.875	15.875	4.76	1.2																○		○	○
	SPUN190408	19.05	19.05	4.76	0.8																○		○	
	SPUN190412	19.05	19.05	4.76	1.2																○			
	SPUN190416	19.05	19.05	4.76	1.6																○			
	**SPGN090304**	9.525	9.525	3.18	0.4														●				●	
	SPGN090308	9.525	9.525	3.18	0.8																	○	○	○
	SPGN120308	12.7	12.7	3.18	0.8									○							●			●
	SPGN120404	12.7	12.7	4.76	0.4																○			○
	SPGN120408	12.7	12.7	4.76	0.8								○								○			
	SPGN120412	12.7	12.7	4.76	1.2																○			○
	SPGN150404	15.875	15.875	4.76	0.4																	●	○	
	SPGN150408	15.875	15.875	4.76	0.8																●			
	SPGN190408	19.05	19.05	4.76	0.8																		○	
	SPGN190416	19.05	19.05	4.76	1.6								○											

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

TP□□



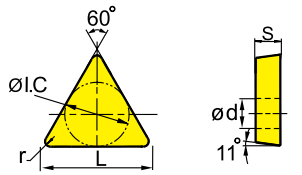
Good working condition Normal working condition Bad working condition

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

Insert shape	Type	Basic dimensions(mm)						CVD Coating							PVD Coating						Cermet		Cemented carbide			
		L	ØI.C	S	be	bs	α	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	**TPKN2204PDFR**	22	12.7	4.76	1.4	0.7	11°								○											○
	TPKN2204PDFL	22	12.7	4.76	1.4	0.7	11°								○											○
	TPKN2204PDR	22	12.7	4.76	1.4	0.7	11°	●				●			★	★		★					●	○	○	●
	TPKN2204PDL	22	12.7	4.76	1.4	0.7	11°																●			
	TPKN2204PDTR	22	12.7	4.76	1.4	0.7	11°	●															●			
	TPKN2204PDTL	22	12.7	4.76	1.4	0.7	11°	○															○			

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

TP□□



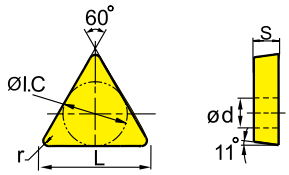
Good working condition Normal working condition Bad working condition

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

Insert shape	Type	Basic dimensions(mm)				CVD Coating							PVD Coating						Cermet		Cemented carbide			
		L	ØI.C	s	r	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	**TPGN090204**	9.6	5.56	2.38	0.4																		○	
	TPGN090208	9.6	5.56	2.38	0.8																	○		
	TPGN110204	11	6.35	2.38	0.4																		○	
	TPGN110304	11	6.35	3.18	0.4																	○	●	○
	TPGN110308	11	6.35	3.18	0.8																	○		○
	TPGN160304	16.5	9.525	3.18	0.4																●	○	○	
	TPGN160308	16.5	9.525	3.18	0.8																	○		●
	TPGN160312	16.5	9.525	3.18	1.2																			○
	TPGN160316	16.5	9.525	3.18	1.6																			○
	TPGN220404	22	12.7	4.76	0.4																		○	
	TPGN220408	22	12.7	4.76	0.8																○			○
	TPGN220412	22	12.7	4.76	1.2																			○
	TPGN270408	27.5	15.875	4.76	0.8																			○

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

TP□□



Good working condition Normal working condition Bad working condition

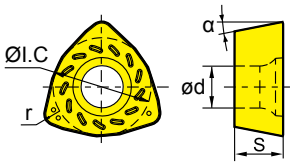
Workpiece material

P	Steel
M	Stainless steel
K	Cast iron
N	Non-ferrous metal
S	Heat resistant alloy, Ti alloy

Insert shape	Type	Basic dimensions(mm)				CVD Coating							PVD Coating						Cermet		Cemented carbide			
		L	ØI.C	s	r	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	TPUN110208	11	6.35	2.38	0.8	○															○			
	TPUN110304	11	6.35	3.18	0.4																○			
	TPUN110308	11	6.35	3.18	0.8	○															●		○	○
	TPUN160304	16.5	9.525	3.18	0.4			○													○		○	○
	TPUN160308	16.5	9.525	3.18	0.8			○		○											●		●	○
	TPUN160312	16.5	9.525	3.18	1.2			○													●			
	TPUN160408	16.5	9.525	4.76	0.8																○			○
	TPUN160412	16.5	9.525	4.76	1.2																○			○
	TPUN220404	22	12.7	4.76	0.4																		○	
	TPUN220408	22	12.7	4.76	0.8	●		○													●		○	
	TPUN220412	22	12.7	4.76	1.2					○											●			○
	TPUN220416	22	12.7	4.76	1.6																			○
	TPMR090204	9.6	5.56	2.38	0.4			○																
	TPMR110304	11	6.35	3.18	0.4			●											○					
	TPMR110308	11	6.35	3.18	0.8			○											○					
	TPMR160304	16.5	9.525	3.18	0.4			●		○									○		○			
	TPMR160308	16.5	9.525	3.18	0.8			●		●											○			○
	TPMR160312	16.5	9.525	3.18	1.2					○														
	TPMR220412	22	12.7	4.76	1.2					○														
	TPMR330916	33	19.05	9.52	1.6											★								

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

WP□□



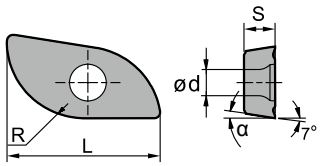
Good working condition Normal working condition Bad working condition

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

Insert shape	Type	Basic dimensions(mm)					CVD Coating							PVD Coating						Cermet		Cemented carbide			
		ØI.C	r	S	ød	α	YBC301	**YBC302**	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	**WPGT050315ZSR**	7.94	1.5	3.5	4.0	11°	★				●														
	WPGT060415ZSR	9.525	1.5	4.2	4.4	11°	★				●														
	WPGT080615ZSR	12.85	1.5	6.35	5.5	11°	★				●														
	WPGT090725ZSR	15	2.5	7	5.5	11°	★				●														
	**WPGT050315ZSR-PM**	7.94	1.5	3.5	4.0	11°	★				●					●									
	WPGT060415ZSR-PM	9.525	1.5	4.2	4.4	11°	★				●					●									
	WPGT080615ZSR-PM	12.85	1.5	6.35	5.5	11°	★				●					●									
	WPGT090725ZSR-PM	15.00	2.5	7.00	5.5	11°	★				●					●									

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

XP□□



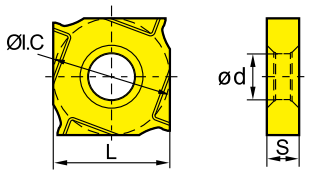
Good working condition Normal working condition Bad working condition

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

Insert shape	Type	Basic dimensions(mm)					CVD Coating							PVD Coating						Cermet		Cemented carbide			
		R	ød	S	α	L	YBC301	**YBC302**	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	**XPHT16R0803-GM**	8	3.1	3.18	9°	16											●								
	XPHT20R10T3-GM	10	4.0	3.97	9°	20											●								
	XPHT25R1204-GM	12.5	4.7	4.76	9°	25											●								
	XPHT30R1506-GM	15	5.8	6.35	11°	30											●								
	XPHT32R1606-GM	16	5.8	6.35	9°	32											●								
	XPHT40R2007-GM	20	6.7	7.94	9°	40											●								
	XPHT50R2507-GM	25	9.2	7.94	9°	50											●								

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

XS□□



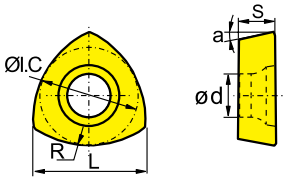
Good working condition　Normal working condition　Bad working condition

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

Insert shape	Type	Basic dimensions(mm)				CVD Coating							PVD Coating						Cermet		Cemented carbide			
		ØI.C	L	S	ød	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	**XSEQ1202**	12.7	12.7	2.3	5.0											★								
	XSEQ1203	12.7	12.7	3.0	5.0											★								
	XSEQ12T3	12.7	12.7	3.5	5.0											★								
	XSEQ1204	12.7	12.7	4.0	5.0											★								
	XSEQ12T4	12.7	12.7	4.5	5.0											★								

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

ZD□□



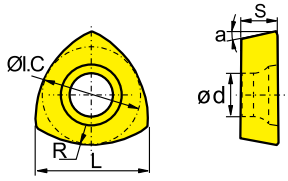
Good working condition　Normal working condition　Bad working condition

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

Insert shape	Type	Basic dimensions(mm)						CVD Coating							PVD Coating						Cermet		Cemented carbide			
		ØI.C	L	S	R	ød	α	YBC301	YBC302	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	**ZDET08T2CYR10**	6.75	8.4	2.78	10	2.8	14°			○								○								
	ZDET1103CYR12.5	8.5	10.6	3.18	12.5	2.8	14°			○								○								
	ZDET13T3CYR16	10.5	13.2	3.97	16	4.4	14°			○								○								

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

ZP□□



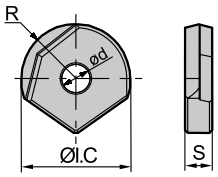
😊 Good working condition 😐 Normal working condition ☹️ Bad working condition

Workpiece material																												
P	Steel	😐	😐	😐	😐	☹️				😐	😐	☹️		😊	😊	😊	☹️											
M	Stainless steel	😐	😐	😐	😐	☹️				😐	😐	☹️		😊	😊	😊	☹️											
K	Cast iron						😐	☹️	😊				😐	😊						😊		☹️
N	Non-ferrous metal																					😐	☹️
S	Heat resistant alloy, Ti alloy								😊	😐	😐												

Insert shape	Type	Basic dimensions(mm)						CVD Coating							PVD Coating						Cermet		Cemented carbide			
		ØI.C	L	S	R	ød	α	YBC301	**YBC302**	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	**ZPNT2204CY(R20)**	12.7	16.1	4.76	20	5.56	11°			○								○								
	ZPNT2204CY(R25)	12.7	16.9	4.76	25	5.56	11°			○								○								
	ZPNT2204CY(R31)	12.7	17.6	4.76	31.5	5.56	11°			○								○								

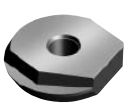
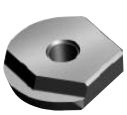
★Recommended grade (always stock available) ●Available grade (always stock available) ○Make-to-order

ZO□□



😊 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								😊	😐	😐												

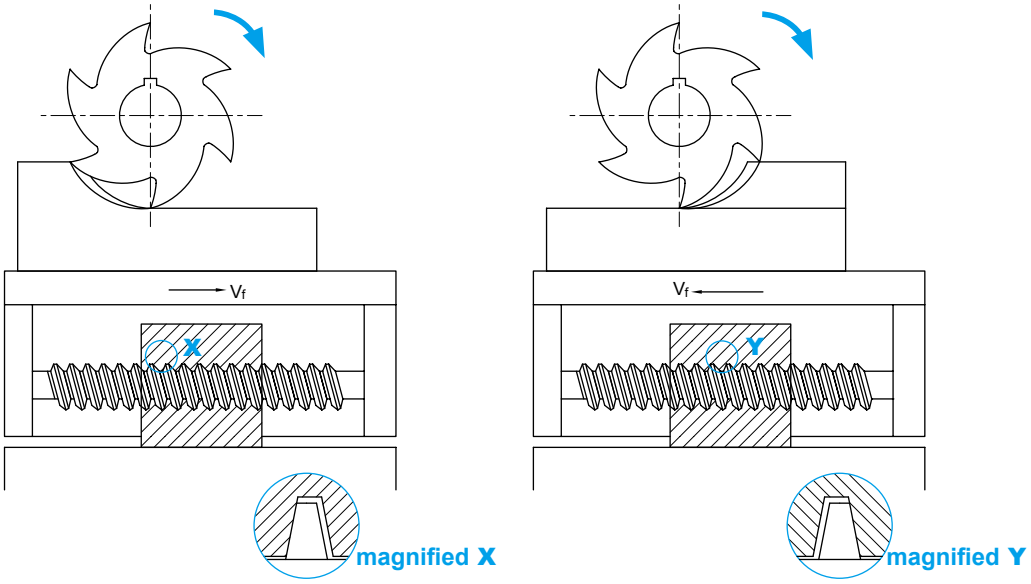
Insert shape	Type	Basic dimensions(mm)				CVD Coating							PVD Coating						Cermet		Cemented carbide			
		R	ØI.C	S	ød	YBC301	**YBC302**	YBM251	YBM253	YBM351	YBD152	YBD252	YBG102	YBG202	YBG205	YBG302	YBG152	YBG252	YNG151	YNG151C	YC30S	YD051	YD101	YD201
	**ZOHX1203-GF**	6	12	3	4													●						
	ZOHX1604-GF	8	16	4	5													●						
	ZOHX2005-GF	10	20	5	5													●						
	ZOHX2506-GF	12.5	25	6	6													○						
	ZOHX3007-GF	15	30	7	8													○						
	ZOHX3207-GF	16	32	7	8													○						
	**ZOHX1203-GM**	6	12	3	4													●						
	ZOHX1604-GM	8	16	4	5													●						
	ZOHX2005-GM	10	20	5	5													●						
	ZOHX2506-GM	12.5	25	6	6													●						
	ZOHX3007-GM	15	30	7	8													●						
	ZOHX3207-GM	16	32	7	8													★						

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

Common problems in milling and solutions

Failure			Main points of solution and inspection: Selection of tool material: Material with higher hardness	Selection of tool material: Material with perfect toughness	Cutting condition: Cutting speed	Cutting condition: Feed rate	Cutting condition: Cutting depth	Cutting condition: Change the diameter and width of milling tools	Cutting condition: Cutting liquid	Tool shape: Rake angle	Tool shape: Approach angle	Tool shape: Strength of cutting edge	Tool shape: Number of teeth	Tool shape: Increase the width of chip pocket	Tool shape: Examine the geometry shape of Minor cutting edge.	Tool shape: check the end face run-out	Tool shape: Improve the rigidity of tool	Machine clamping system: Clamping system of workpiece	Machine clamping system: Overhang of tool	Machine clamping system: Power, gap
Fracture of tool nose	severe abrasion on clearance face	Improper cutting condition			↓				✓												
		Unsuitable geometry shape of cutting edge	✓							↑		↓									
	severe abrasion on rake face	Improper cutting condition			↓	↓	↓		✓												
		Unsuitable geometry shape of cutting edge	✓							↑	↓	↓									
	Fracture of cutting edge	Improper cutting condition				↓	↓														
		Unsuitable geometry shape of cutting edge		✓							↓	↑			✓	✓	✓	✓	✓	✓	
	Thermal cracking	Improper cutting condition			↓	↓	↓		✓												
		Unsuitable geometry shape of cutting edge								↑		↓									
	Build-up edge	Improper cutting condition			↑	↑			✓												
		Unsuitable geometry shape of cutting edge								↑		↓									
Machining precision	Bad surface roughness	Abrasion of tool Great vibration of milling tool	✓		↑	↓	↓		✓			↓			Wiper	✓					
	Burrs occuring	Unsuitable geometry shape of cutting edge			↓	↓	↓	✓													
		Improper geometry shape of cutting edge								↑	↑	↓			✓						
	Side collapse	Unsuitable geometry shape of cutting edge				↓	↓														
		Unsuitable geometry shape of cutting edge								↑	↓	↓	↑		✓		✓				
	Planeness and parallelism deterioration	Improper geometry Improper technique				↓	↓			↑	↑		↓		✓	✓	✓	✓	✓	✓	
Other	Vibration	Cutting condition Improper technology			↓	↓	↓	✓		↑	↑	↓					✓	✓	✓	✓	
	Chips twisting and jamming	Improper cutting condition			↑	↑↓		✓	✓				↓								
		Unsuitable geometry shape of cutting edge								↑			↓	✓							

Difference and selection between down milling and up milling



Up milling

Down milling

Climb milling (also called down milling): the feed direction of workpiece is the same as that of the milling rotation at the connecting position.

Conventional milling (also called up milling): the feed direction of workpiece is opposite to that of the milling rotation at the connecting position.

In down milling, the major force of cutting edge is compressive stress, while in up milling the tensile stress. The compressive strength of cemented carbide material is much larger than its tensile strength. In down milling, as chips become thin from thick gradually, cutting edge and workpiece press against each other. The friction between edge and workpiece is small, thus reducing the abrasion of edge, the hardening of workpiece surface and the surface roughness (Ra). In up milling, chips become thick from thin gradually. When the insert is cutting into the workpiece, it produces strong friction and more heat than in down milling, and make workpiece surface hardened.

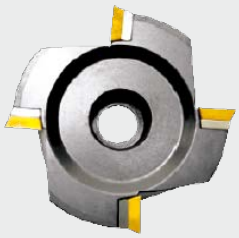
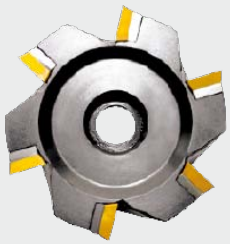
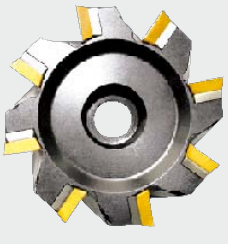
In up milling, because horizontal direction of cutting force milling cutter conducting on workpiece is opposite to the feed direction of workpiece, the lead screw of worktable joints closely with one side of the screw nut. In down milling, the direction of cutting force is the same as the feed direction. When edge's radial force on workpiece is large enough, the worktable will bounce left and right, thus make the gap fall behind. The gap will return to the front side with the continuing rotation of lead screw. At this moment the worktable stops motion, however, it will bounce left and right again when the radial cutting force is large enough again. The periodical bounce of worktable will cause poor surface quality of workpiece and tool breakage.

When using end mills for down milling, the edges always starts cutting at the workpiece surface, therefore end mills are not suitable for machining workpiece with hardened surface.

Up milling is recommended for milling thin-wall components or square milling with high requirement for precision.

Pitch selection

Pitch is the distance between one point on one cutting edge and the same point on the next edge. Milling cutters are mainly classified into coarse, close and extra close pitches.

optimized stability		
L (Low)	**M** (Medium)	**H** (High)
Coarse pitch Unequal pitch design 	**Close pitch** 	**Extra close pitch** 
When the milling width is equal to diameter of cutter, the machining system is stable and main power of machine is sufficient, the use of coarse pitch can achieve high productive efficiency.	Used in general milling and multiple mixed productions.	When the milling width is less than diameter of cutter, cutting by maximum edges can achieve high productive efficiency.

Selection of approach angle

The approach angle is formed by insert and tool body. It affects chip thickness, cutting forces and tool-life. Decreasing the approach angle reduces chip thickness and expands the cutting area between cutting edge and workpiece at a given feed rate.

A smaller approach angle also ensures stable entry into or exiting workpiece, protecting the cutting edge and extending tool life. However, this will increase axial cutting forces on the workpiece, thus is not suitable for machining thin workpiece such as thin plate.

Approach angle	Feed rate per tooth	Real maximum cutting depth
90°	f_z	$h_{ex}=f_z\times sinkr$
75°	f_z	$h_{ex}=0.96\times f_z$
60°	f_z	$h_{ex}=0.86\times f_z$
45°	f_z	$h_{ex}=0.707\times f_z$
Round insert	f_z	$h_{ex}=\frac{\sqrt{iC^2\times(iC-2a_p)^2}}{iC}\times f_z$

General formula

V_c : cutting speed(m/min)
D_c : nominal diameter of milling tool(mm)
n : spindle speed(rev/min)
z_n : number of teeth
Q : metal removal rate(cm^3/min)
L : Actual working distance(mm)
V_f : feed rate of worktable (feed speed)(mm/min)
f_z : feed rate per tooth(mm/z)
π : circumference ratio≈3.14
T_c : machining time(min)
f_z : feed rate per revolution (mm/rev)

- Cutting speed

$$V_c = \frac{\pi \times D_c \times n}{1000} \text{ (m/min)}$$

- Spindle speed

$$n = \frac{1000 \times V_c}{\pi \times D_c} \text{ (rev/min)}$$

- Feed rate of worktable (feed speed)

$$V_f = f_z \times n \times z_n \text{ (mm/min)}$$

- Feed rate per tooth

$$f_z = \frac{V_f}{n \times Z_n} \text{ (mm/z)}$$

- Feed rate per revolution

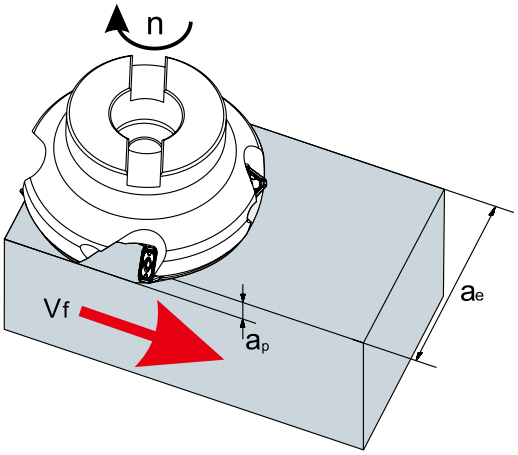
$$f_n = \frac{V_f}{n} \text{ (mm/rev)}$$

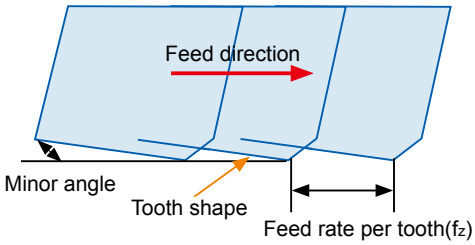
- Machining time

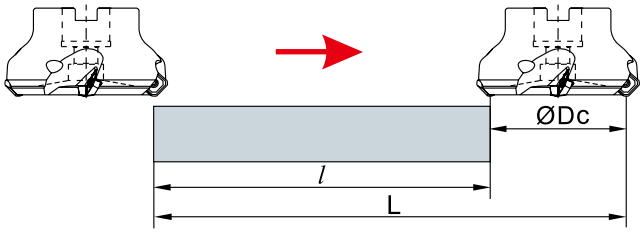
$$T_c = \frac{L}{V_f} \text{ (min)}$$

- Metal removal rate

$$Q = \frac{a_p \times a_e \times V_f}{1000} \text{ (cm}^3\text{/min)}$$

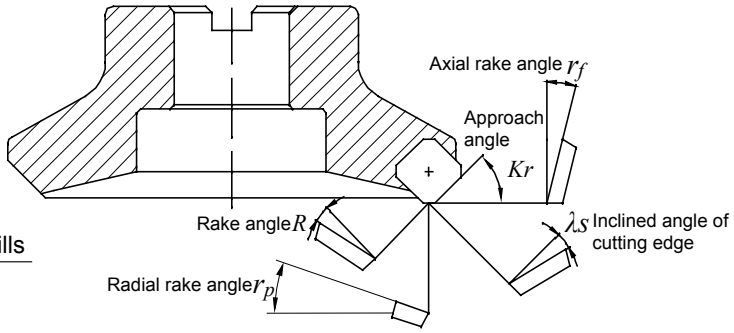






Function of each part in face milling

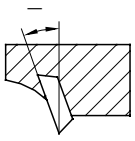
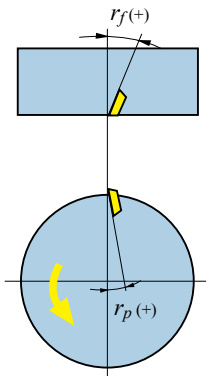
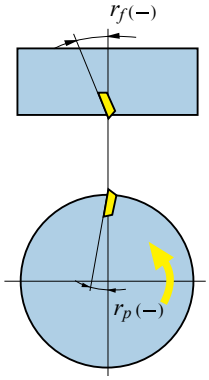
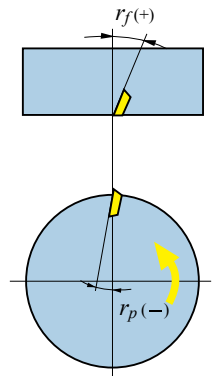
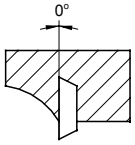
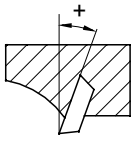
Main angles of face mills



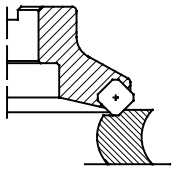
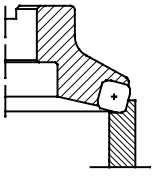
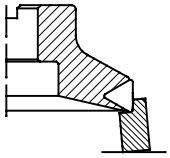
Main angles of face mills

Designation	Function	Effect		
Axial rake angle r_f	Determining the chip direction	Negative angle, excellent capability of chip removal		
Radial rake angle r_p	Determining whether the cutting is easy and fast or not	Positive angle: good cutting performanc		
Approach angle Kr	Determining the chip thickness	$Kr\uparrow$, chip thickness $\uparrow$; $Kr\downarrow$, chip thickness $\downarrow$;		
Rake angle R	Determining whether easy and fast the cutting is or not	Poor cutting performance, High-strength cutting edge	(−)←0→(+)	Good cutting performance, Low-strength cutting edge
Inclined angle of cutting edge λs	Determining the chip flow direction	Poor capability of chip removal, High-strength cutting edge	(−)←0→(+)	Good performance of chip removal, Low-strength cutting edge

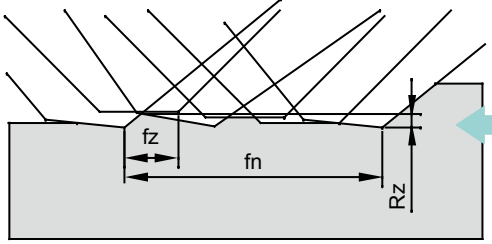
Characteristics of different rake angles combined

		Double positive rake angle	Double negative rake angle	Positive and negative rake angle
Negative rake angle				
0° rake angle				
Positive rake angle				
Axial rake angle r_f		+	−	+
Radial rake angle r_p		+	−	−
Applicable material machined	**P**	✓		✓
	M	✓		✓
	K		✓	✓
	N	✓		
	S	✓		✓

Cutting performances of different approach angles

Approach angle	**45°**	**75°**	**90°**
Schematic diagram			
Instruction	Axial force is the largest. It will bend when machining thin-wall workpiece, reducing the precision of workpiece. It can help avoid fringe breakage of workpiece when machining cast iron.	The main force is radial cutting force. It is often used in general face milling.	The axial force is zero in theory, suitable for milling thin plate workpiece.

Wiper insert

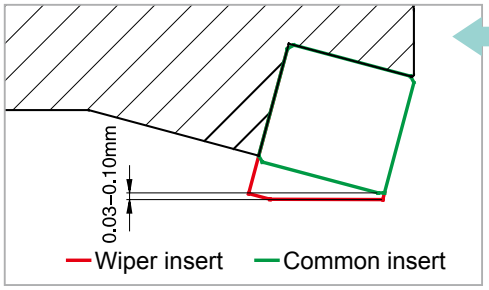


It has axial and radial run-out because tools and inserts have manufacturing tolerance. The axial run-out leads to poor surface roughness.

Solution

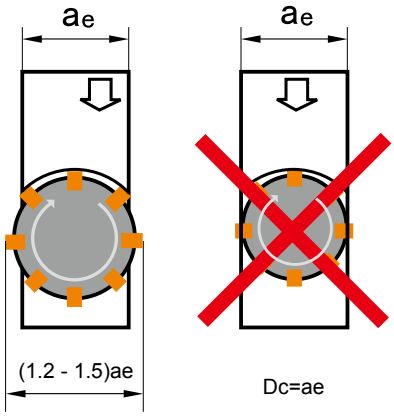
Mounting wiper inserts

usage



The wiper insert must protrude below the other inserts by 0.03-0.10 mm at axial direction, so that the wiping function can take effect. Generally speaking, a cutter just needs only one wiper insert. If the diameter of cutter is much larger or cutter's feed rate per revolution is higher than the length of wiper edge, 2 to 3 wiper inserts can be mounted.

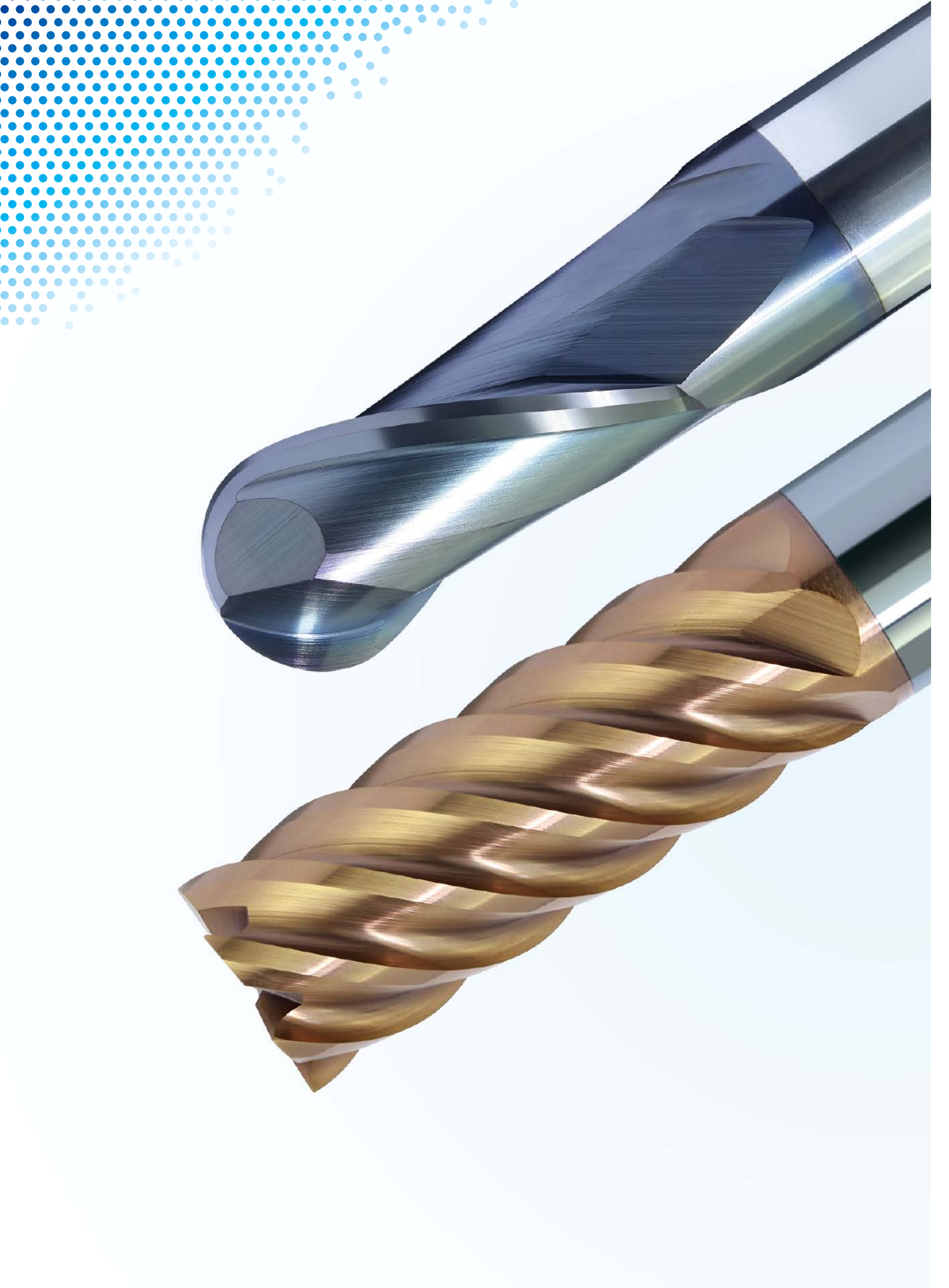
■Selection of cutting width and tool cutting diameter in face milling



Dc：Tool cutting diameter
ae：Cutting width

Generally speaking, the relation between cutting width and tool cutting diameter is Dc=(1.2—1.5) ae.
In practical machining, same center line of tool center and work piece center should be avoided.







Milling Tools

Solid carbide end mills

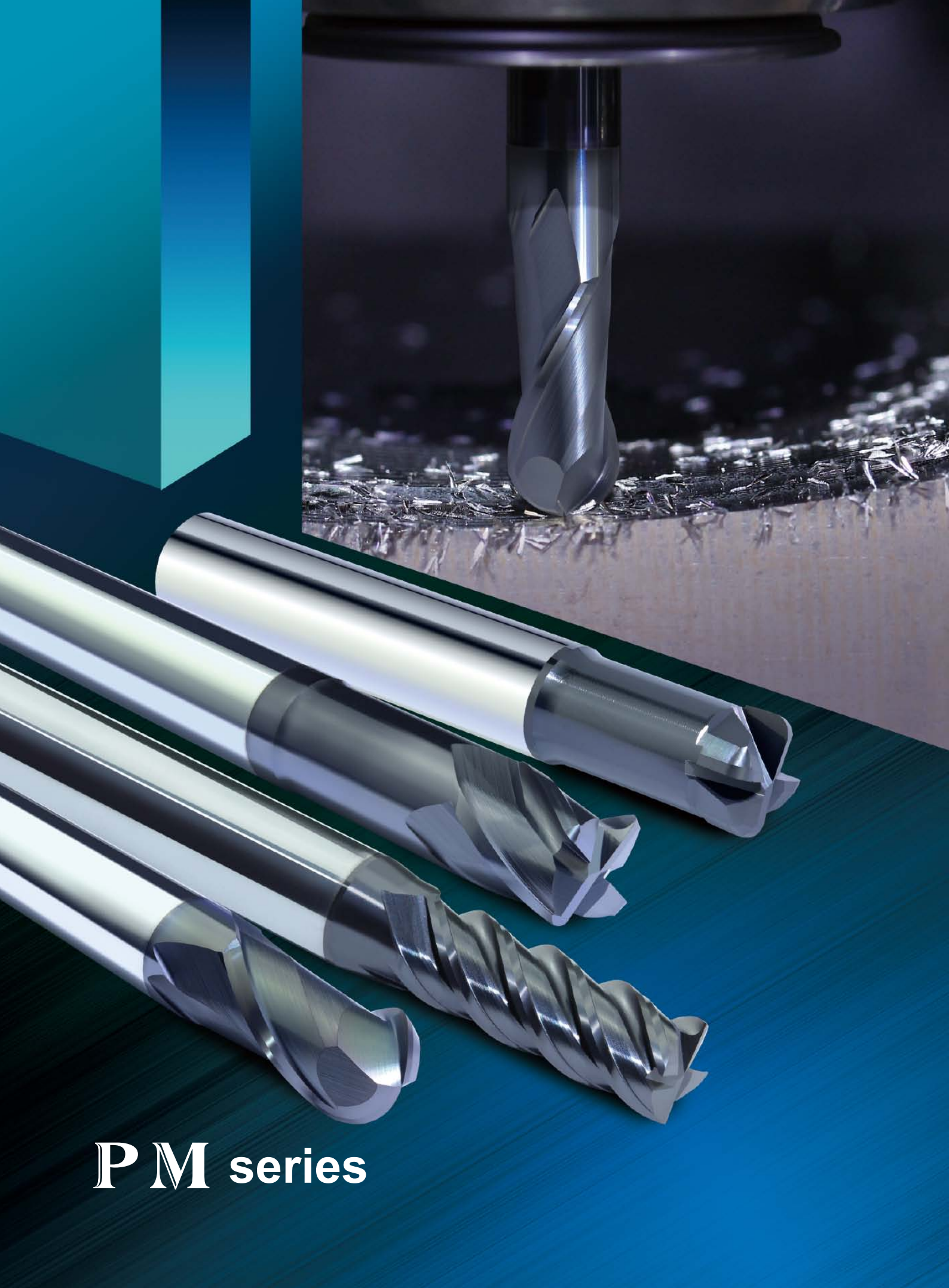


New product for milling

UM series

High performance machining with unequal pitch


New product for milling
PML series



PM series

New product for milling

HMX

High hardness machining series



Selection guide for solid carbide end mills

Tool shape

Tool type

Series of tools

Solid Carbide End Mills
PM series

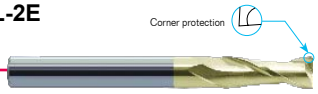
Machining application

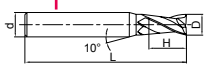
shape and size



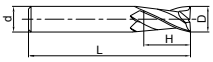
2-flute flattened end mills with straight shank

PML-2E





Picture 1



Picture 2

- Very suitable for slot milling.
- Wide application.



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

code key B213
Graphics category and identification B214
Cutting parameters B367

Applicable workpiece material range

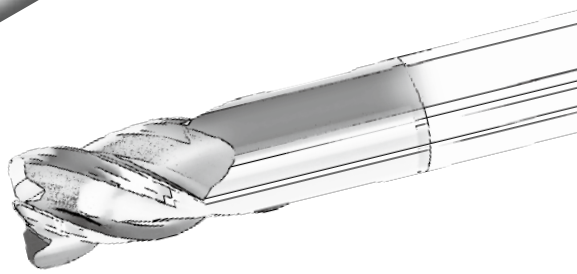
Helical angle, coating and cutting diameter tolerance, etc

Product features

Specification
Type, basic dimension, number of teeth and structure

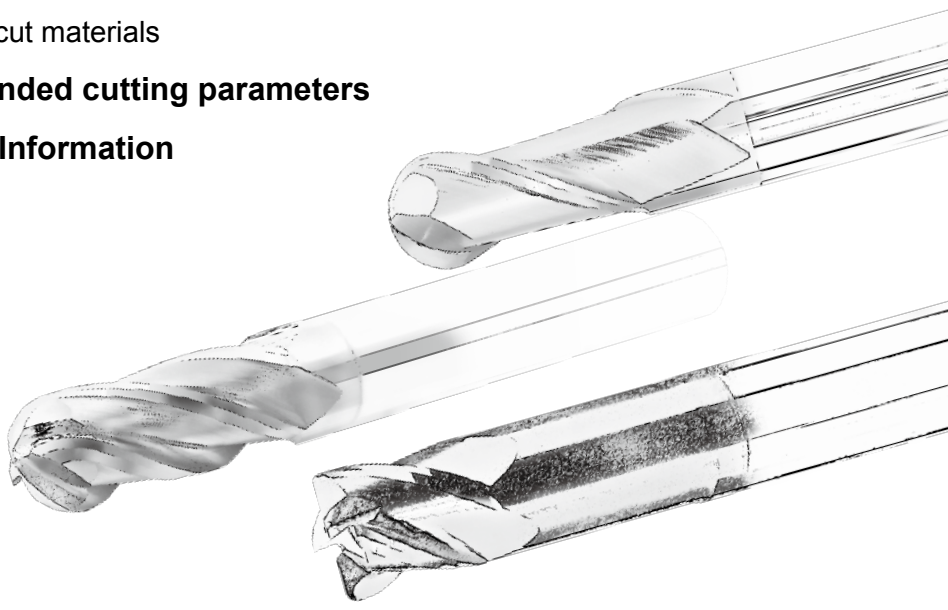
Code key, cutting parameters, graphics category and identification

MILLING



Solid Carbide End Mills

B208-B212	**Solid carbide end mills overview**
B213	**Solid carbide end mills code key**
B214	**Graphics category and identification**
B215-B359	**Detail information of solid carbide end mills**
B230-B235	High-performance UM series for general machining
B236-B263	High-performance PML Series for general machining
B264-B297	High-performance PM Series for general machining
B298-B325	GM series for general machining
B326-B348	HMX series for machining high hardness steel
B349-B356	AL series for machining aluminum
B357-B359	SM series for machining stainless steel, heat resistant alloy etc hard-to-cut materials
B360-B430	**Recommended cutting parameters**
B431-B434	**Technical Information**



Solid carbide end mills overview

Machining application	Geometry	Number of teeth	Type	Shape	Size range	Workpiece material									Page	
						P		M	K	N		S	H			
						Carbon steel, alloy steel	Pre-hardened steel	Stainless steel	Cast iron	Copper alloy	Aluminum alloy	Heat resistant alloy, Titanium alloy	High hardness steel Below 55HRC	High hardness steel Above 55HRC	Specification	Cutting parameters
High-performance general milling	Flattened	4	**UM-4E** (Unequal pitch)		Ø4.0~Ø20.0	◎	◎	○	◎			○	◎		B230	B360 -361
			UM-4EL (Unequal pitch)		Ø4.0~Ø20.0	◎	◎	○	◎			○	◎		B231	B360 -361
			UM-4EFP (Unequal pitch)		Ø6.0~Ø20.0	◎	◎	○	◎			○	◎		B232	B362 -363
	Radius	4	**UM-4R** (Unequal pitch)		Ø4.0~Ø20.0	◎	◎	○	◎			○	◎		B233	B364 -365
			UM-4RL (Unequal pitch)		Ø6.0~Ø16.0	◎	◎	○	◎			○	◎		B234	B364 -365
			UM-4RFP (Unequal pitch)		Ø6.0~Ø16.0	◎	◎	○	◎			○	◎		B235	B366
	Flattened	2	**PML-2E** (Corner protection)		Ø1.0~ Ø20.0	◎	◎	○	◎			○			B236	B367
			PML-2F (Sharp)		Ø1.0~ Ø20.0	◎	◎	○	◎			○			B237	B368
			PML-2EL (Corner protection)		Ø3.0~ Ø20.0	◎	◎	○	◎			○			B238	B367
			PML-2FL (Sharp)		Ø3.0~ Ø20.0	◎	◎	○	◎			○			B239	B368
			PML-2EFP (Corner protection)		Ø6.0~ Ø20.0	◎	◎	○	◎			○			B240	B369
		3	**PML-3E-H** (Corner protection)		Ø3.0~ Ø20.0	◎	◎	○	◎			○			B241	B370
			PML-3EL-H (Corner protection)		Ø3.0~ Ø20.0	◎	◎	○	◎			○			B242	B370
		4	**PML-4E-G** (Corner protection)		Ø1.0~ Ø20.0	◎	◎	○	◎			○			B243	B371 -372
			PML-4F-G (Sharp)		Ø1.0~ Ø20.0	◎	◎	○	◎			○			B244	B373 -374
			PML-4EL-G (Corner protection)		Ø3.0~ Ø20.0	◎	◎	○	◎			○			B245	B371 -372
			PML-4FL-G (Sharp)		Ø3.0~ Ø20.0	◎	◎	○	◎			○			B246	B373 -374
			PML-4EX-G (Corner protection)		Ø3.0~ Ø20.0	◎	◎	○	◎			○			B247	B375
			PML-4E (Corner protection)		Ø1.0~ Ø20.0	◎	◎	○	◎			○			B248	B376 -377
			PML-4EL (Corner protection)		Ø3.0~ Ø20.0	◎	◎	○	◎			○			B249	B376 -377
			PML-4E-H (Corner protection)		Ø3.0~ Ø20.0	◎	◎	○	◎			○			B250	B371 -372
			PML-4EL-H (Corner protection)		Ø3.0~ Ø20.0	◎	◎	○	◎			○			B251	B371 -372
			PML-4EFP (Corner protection)		Ø6.0~ Ø20.0	◎	◎	○	◎			○			B252	B378 -379
		6	**PML-6E** (Corner protection)		Ø6.0~ Ø20.0	◎	◎	○	◎			○			B253	B380
			PML-6EL (Corner protection)		Ø6.0~ Ø20.0	◎	◎	○	◎			○			B254	B381
	Ball nose	2	**PML-2B**		R0.5~R10.0	◎	◎	○	◎			○			B255	B382 -383

◎Very suitable ○Suitable

Solid carbide end mills overview

Machining application	Geometry	Number of teeth	Type	Shape	Size range	Workpiece material									Page	
						P		M	K	N		S	H			
						Carbon steel, alloy steel	Pre-hardened steel	Stainless steel	Cast iron	Copper alloy	Aluminum alloy	Heat resistant alloy, Titanium alloy	High hardness steel: Below 55HRC	High hardness steel: Above 55HRC	Specification	Cutting parameters
High-performance general milling	Ball nose	2	**PML-2BL**		R1.0~R10.0	◎	◎	○	◎			○			B256	B382 -383
			PML-2BFP		R0.5~R10.0	◎	◎	○	◎			○			B257	B382 -383
		4	**PML-4B**		R1.5~R10.0	◎	◎	○	◎			○			B258	B384
			PML-4BL		R1.5~R10.0	◎	◎	○	◎			○			B259	B384
	Radius	2	**PML-2R**		Ø1.0~ Ø12.0	◎	◎	○	◎			○			B260	B388
		4	**PML-4R**		Ø3.0~ Ø12.0	◎	◎	○	◎			○			B261	B389
			PML-4R-H		Ø3.0~ Ø12.0	◎	◎	○	◎			○			B262	B389
			PML-4RFP		Ø6.0~ Ø16.0	◎	◎	○	◎			○			B263	B389
	Flattened	2	**PM-2E** (Corner protection)		Ø1.0~ Ø20.0	◎	◎	○	◎			○	◎		B264	B367
			PM-2F (Sharp)		Ø1.0~ Ø20.0	◎	◎	○	◎			○	◎		B265	B368
			PM-2EL (Corner protection)		Ø3.0~ Ø20.0	◎	◎	○	◎			○	◎		B266	B367
			PM-2FL (Sharp)		Ø3.0~ Ø20.0	◎	◎	○	◎			○	◎		B267	B368
			PM-2EFP (Corner protection)		Ø6.0~ Ø20.0	◎	◎	○	◎			○	◎		B268	B369
		3	**PM-3E-H** (Corner protection)		Ø3.0~ Ø20.0	◎	◎	○	◎			○	◎		B269	B370
			PM-3EL-H (Corner protection)		Ø3.0~ Ø20.0	◎	◎	○	◎			○	◎		B270	B370
		4	**PM-4E-G** (Corner protection)		Ø1.0~ Ø20.0	◎	◎	○	◎			○	◎		B271	B371 -372
			PM-4F-G (Sharp)		Ø1.0~ Ø20.0	◎	◎	○	◎			○	◎		B272	B373 -374
			PM-4EL-G (Corner protection)		Ø3.0~ Ø20.0	◎	◎	○	◎			○	◎		B273	B371 -372
			PM-4FL-G (Sharp)		Ø3.0~ Ø20.0	◎	◎	○	◎			○	◎		B274	B373 -374
			PM-4EX-G (Corner protection)		Ø3.0~ Ø20.0	◎	◎	○	◎			○	◎		B275	B375
			PM-4E (Corner protection)		Ø1.0~ Ø20.0	◎	◎	○	◎			○	◎		B276	B376 -377
			PM-4EL (Corner protection)		Ø3.0~ Ø20.0	◎	◎	○	◎			○	◎		B277	B376 -377
			PM-4E-H (Corner protection)		Ø3.0~ Ø20.0	◎	◎	○	◎			○	◎		B278	B371 -372
			PM-4EL-H (Corner protection)		Ø3.0~ Ø20.0	◎	◎	○	◎			○	◎		B279	B371 -372
			PM-4EFP (Corner protection)		Ø6.0~ Ø20.0	◎	◎	○	◎			○	◎		B280	B378 -379
		6	**PM-6E** (Corner protection)		Ø6.0~ Ø20.0	◎	◎	○	◎			○	◎		B281	B380

◎Very suitable ○Suitable

Solid carbide end mills overview

Machining application	Geometry	Number of teeth	Type	Shape	Size range	Workpiece material									Page	
						P		M	K	N		S	H			
						Carbon steel, alloy steel	Pre-hardened steel	Stainless steel	Cast iron	Copper alloy	Aluminum alloy	Heat resistant alloy, Titanium alloy	High hardness steel: Below 55HRC	High hardness steel: Above 55HRC	Specification	Cutting parameters
High-performance general milling	Flattened	6	**PM-6EL** (Corner protection)		Ø6.0~ Ø20.0	◎	◎	○	◎			○	◎		B282	B381
	Ball nose	2	**PM-2B**		R0.5~R10.0	◎	◎	○	◎			○	◎		B283	B382 -383
			PM-2BL		R1.0~R10.0	◎	◎	○	◎			○	◎		B284	B382 -383
		2	**PM-2BFP**		R0.5~R10.0	◎	◎	○	◎			○	◎		B285	B382 -383
		4	**PM-4B**		R1.5~R10.0	◎	◎	○	◎			○	◎		B286	B384
			PM-4BL		R1.5~R10.0	◎	◎	○	◎			○	◎		B287	B384
	Taper neck ball nose	2	**PM-2BC**		R0.25~R2.0	◎	◎	○	◎			○	◎		B288 -291	B385 -387
	Radius		**PM-2R**		Ø1.0~ Ø12.0	◎	◎	○	◎			○	◎		B292	B388
		4	**PM-4R**		Ø3.0~ Ø12.0	◎	◎	○	◎			○	◎		B293	B389
			PM-4R-H		Ø3.0~ Ø12.0	◎	◎	○	◎			○	◎		B294	B389
			PM-4RFP		Ø6.0~ Ø16.0	◎	◎	○	◎			○	◎		B295	B389
	High-feed-rate		**PM-4H**		Ø3.0~ Ø12.0	◎	◎	○	◎			○	◎		B296	B390 -391
			PM-4HL		Ø4.0~ Ø12.0	◎	◎	○	◎			○	◎		B297	B390 -391
General milling	Flattened	2	**GM-2E** (Corner protection)		Ø1.0~ Ø20.0	◎	◎	○	◎						B302	B392
			GM-2EL (Corner protection)		Ø3.0~ Ø20.0	◎	◎	○	◎						B303	B392
		3	**GM-3E** (Corner protection)		Ø1.0~ Ø20.0	◎	◎	○	◎						B304	B393
			GM-3EL (Corner protection)		Ø3.0~ Ø20.0	◎	◎	○	◎						B305	B393
		4	**GM-4E-G** (Corner protection)		Ø1.0~ Ø20.0	◎	◎	○	◎						B306	B394
			GM-4EL-G (Corner protection)		Ø3.0~ Ø20.0	◎	◎	○	◎						B307	B394
			GM-4E (Corner protection)		Ø1.0~ Ø20.0	◎	◎	○	◎						B308	B395
			GM-4EL (Corner protection)		Ø3.0~ Ø20.0	◎	◎	○	◎						B309	B395
			GM-6E (Corner protection)		Ø6.0~ Ø20.0	◎	◎	○	◎						B310	B396
			GM-6EL (Corner protection)		Ø6.0~ Ø20.0	◎	◎	○	◎						B311	B397
	Long neck flattened		**GM-2EP**		Ø0.5~ Ø5.0	◎	◎	○	◎						B312 -313	B398 -399
	Tiny head flattened		**GM-2ES**		Ø0.3~ Ø3.0	◎	◎	○	◎						B314	B400

◎Very suitable ○Suitable

Solid carbide end mills overview

Machining application	Geometry	Number of teeth	Type	Shape	Size range	Workpiece material									Page	
						P		M	K	N		S	H			
						Carbon steel, alloy steel	Pre-hardened steel	Stainless steel	Cast iron	Copper alloy	Aluminum alloy	Heat resistant alloy, Titanium alloy	High hardness steel Below 55HRC	High hardness steel Above 55HRC	Specification	Cutting parameters
General milling	Ball nose	2	GM-2B		R0.5~R10.0	◎	◎	○	◎						B315	B401
			GM-2BL		R1.0~R10.0	◎	◎	○	◎						B316	B401
		4	GM-4B		R1.5~R10.0	◎	◎	○	◎						B317	B402
			GM-4BL		R1.5~R10.0	◎	◎	○	◎						B318	B402
	Tiny ball nos	2	GM-2BS		R0.15~ R1.5	◎	◎	○	◎						B319	B403
	Long neck ball nose		GM-2BP		R0.25~R2.5	◎	◎	○	◎						B320 -321	B404 -405
	Radius		GM-2R		Ø1.0~Ø12.0	◎	◎	○	◎						B322	B406
		4	GM-4R		Ø3.0~Ø12.0	◎	◎	○	◎						B323	B407
			GM-4RL		Ø6.0~Ø16.0	◎	◎	○	◎						B324	B407
	Corrugated edge		GM-4W		Ø6.0~Ø20.0	◎	◎	○	◎						B325	B408 -409
Machining high hardness steel	Flattened	2	HMX-2E (Corner protection)		Ø1.0~Ø20.0				○				◎	◎	B328	B410
			HMX-2EFP (Corner protection)		Ø6.0~Ø20.0				○				◎	◎	B329	B411
		4	HMX-4E (Corner protection)		Ø1.0~Ø20.0				○				◎	◎	B330	B412
			HMX-4EL (Corner protection)		Ø3.0~Ø20.0				○				◎	◎	B331	B412
			HMX-4EFP (Corner protection)		Ø6.0~Ø20.0				○				◎	◎	B332	B413
		6	HMX-6E (Corner protection)		Ø6.0~Ø20.0				○				◎	◎	B333	B414
			HMX-6EL (Corner protection)		Ø6.0~Ø20.0				○				◎	◎	B334	B415
	Long neck flattened	2	HMX-2EP		Ø0.5~Ø5.0				○				◎	◎	B335 -336	B416 -417
	Tiny head flattened		HMX-2ES		Ø0.3~Ø3.0				○				◎	◎	B337	B418
	Ball nose		HMX-2B		R0.5~R10.0				○				◎	◎	B338	B419
			HMX-2BL		R1.0~R10.0				○				◎	◎	B339	B419
			HMX-2BFP		R0.5~R10.0				○				◎	◎	B340	B419
		4	HMX-4B		R1.5~R10.0				○				◎	◎	B341	B420
			HMX-4BL		R1.5~R10.0				○				◎	◎	B342	B420

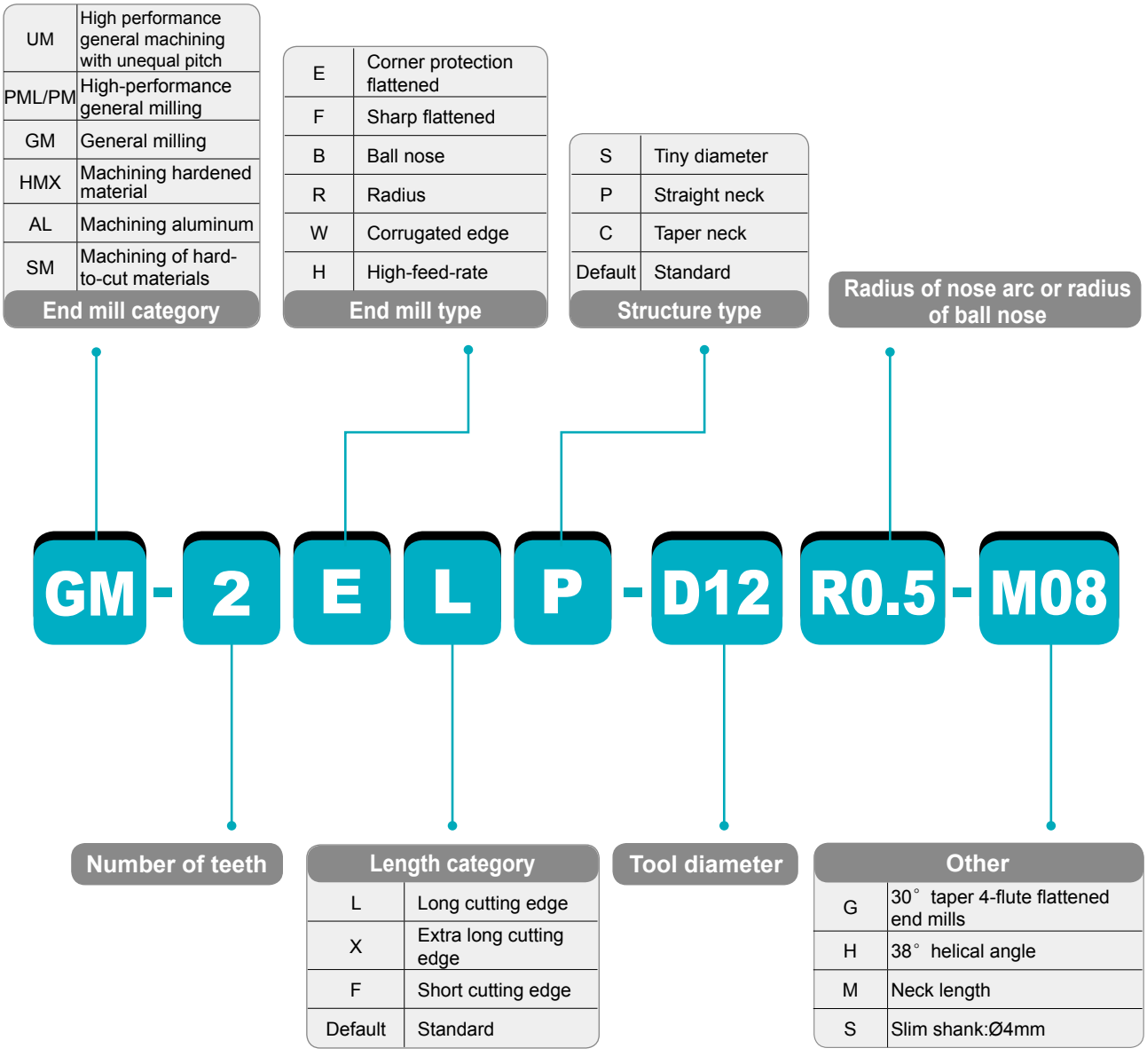
◎Very suitable ○Suitable

Solid carbide end mills overview

Machining application	Geometry	Number of teeth	Type	Shape	Size range	Workpiece material									Page	
						P		M	K	N		S	H			
						Carbon steel, alloy steel	Pre-hardened steel	Stainless steel	Cast iron	Copper alloy	Aluminum alloy	Heat resistant alloy, Titanium alloy	High hardness steel: Below 55HRC	High hardness steel: Above 55HRC	Specification	Cutting parameters
Machining high hardness steel	Tiny ball nos	2	HMX-2BS		R0.15~R1.5				○				◎	◎	B343	B421
	Long neck ball nose		HMX-2BP		R0.25~R2.5				○				◎	◎	B344 -345	B422 -423
	Radius	4	HMX-4R		Ø3.0~Ø12.0				○				◎	◎	B346	B424
			HMX-4RF		Ø6.0~Ø12.0				○				◎	◎	B347	B424
			HMX-4RP		Ø6.0~Ø16.0				○				◎	◎	B348	B424
Machining aluminum	Flattened		AL-2E		Ø1.0~Ø20.0						◎				B351	B425
			AL-2EL		Ø3.0~Ø20.0						◎				B352	B425
			AL-3E		Ø1.0~Ø20.0						◎				B353	B426
		3	AL-3EL		Ø3.0~Ø20.0						◎				B354	B426
	Ball nose	2	AL-2B		R1.0~R6.0						◎				B355	B427
	Corrugated edge	3	AL-3W		Ø6.0~Ø20.0						◎				B356	B428
Machining of hard-to-cut materials	Flattened	3	SM-3E		Ø3.0~Ø20.0	◎		◎				○			B358	B429
	Radius	4	SM-4R		Ø6.0~Ø12.0	◎		◎				○			B359	B430

◎Very suitable ○Suitable

Solid carbide end mills code key



- For unequal pitch end mills, letter "V" is added before category code.
- 2-flute end face mill with taper shank PM-2BC05-R0.25-M03.

Taper

Graphics category and identification

Coating of mills

Coated NaNo TiAlCrN	Super nanometer crystal TiAlCrN coating
Coated NaNo TiAlXN	Super crystal nano heat resistant TiAlN coatings
Coated NaNo TiAlN	Nano TiAlN coating
Coated TiAlN	TiAlN coating
Coated AlTiN	AlTiN coating

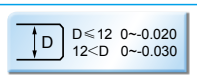
End tooth type of mills

	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

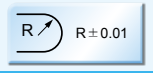
Helical angle

	β is helical angle: 30° ,35° ,38° ,45° ,55°

Cutting diameter tolerance

	Cutting diameter tolerance

Radius tolerance of ball nose end mills

	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 machining
 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

High-performance general machining end mills

UM Series

- Unequal pitch and variable inclined angle design reduce vibration risk and ensure better machining stability.
- Variable flute depth design improves rigidity for higher chip removal capacity.



Application range:

Suitable for high effectively machining of cast iron, carbon, alloy steel, pre-hardened steel, quenched and tempered steel, hardened steel under HRC55, ect. Excellent machining stability under weak rigidity working condition such as thin-walled parts, parts corner, large overhang, etc.

Machining case:

Work piece material: 42CrMo (HRC35)

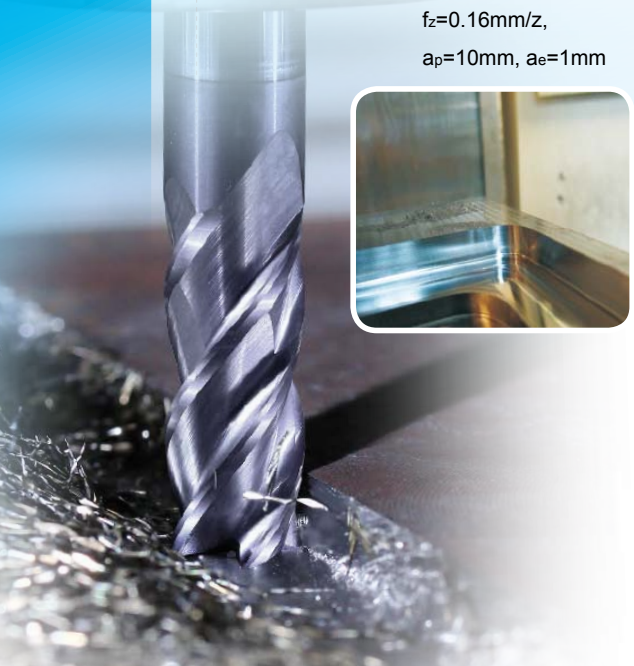
Cutting style: side milling

Tool type: UM-4E-D10.0

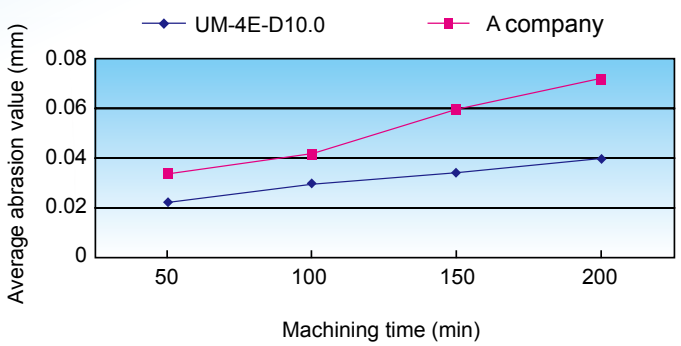
Cutting parameters: n=6000r/min,

f_z=0.16mm/z,

a_p=10mm, a_e=1mm



Comparison of tool wear



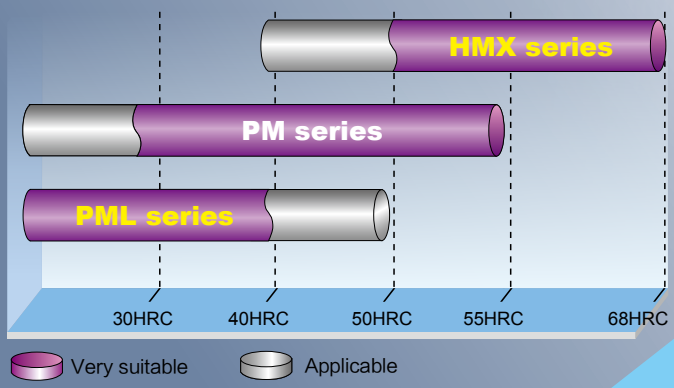
High performance universal machining

PML series

Applicable of high efficiency machining in a variety of materials under HRC50, while significantly promoting machinability of soft materials such as carbon steel, low carbon alloy steel underHRC40!

PML，**PM**，**HMX** high performance solid carbide endmills series

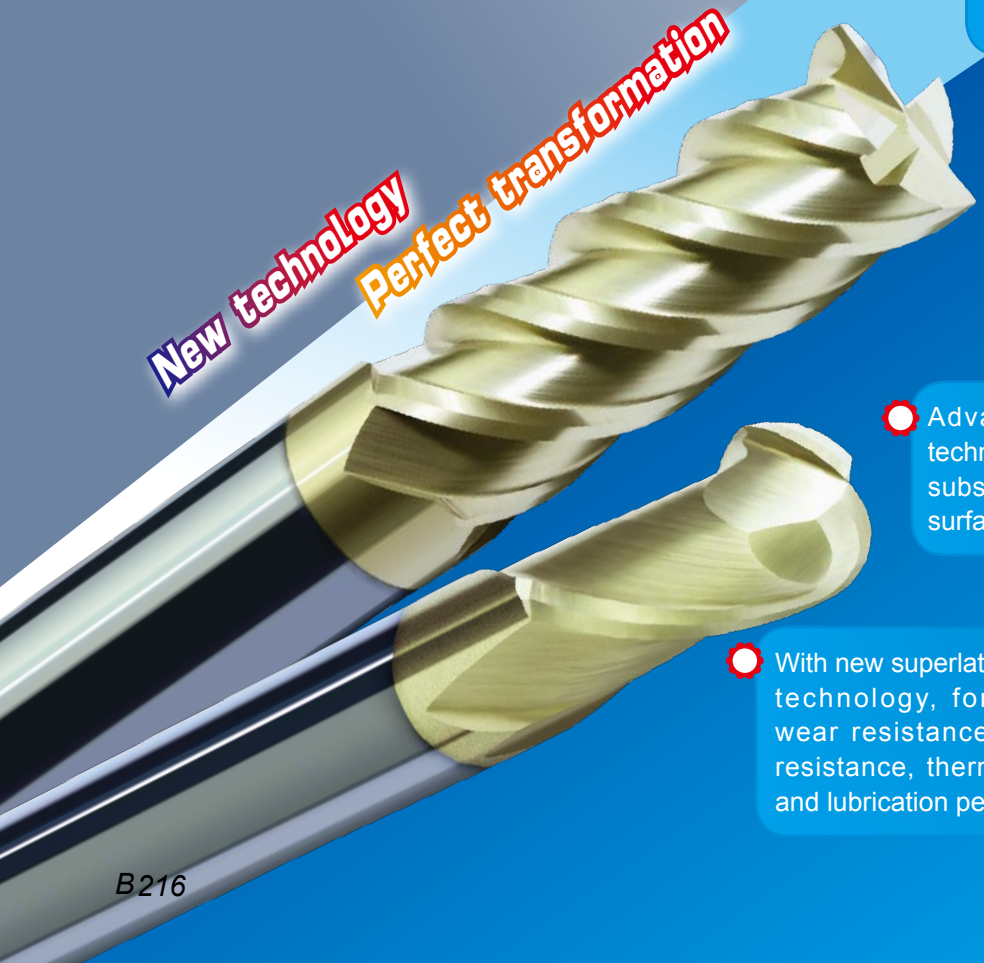
Recommendation for steel materials machining application



Application range:

Applicable to high-efficiency machining in a variety of materials under HRC50, e.g. non-ferrous alloy, steel, pre-hardened steel, stainless steel, especially suitable for soft materials such as carbon steel, low carbon alloy steel under HRC40. With excellent cutting performance in both dry and wet cutting.

New technology
Perfect transformation



- Unique cutting edge design, balancing edges strength and sharpness, with low cutting force.
- Light yellow coating allows for better wear observation.
- Advanced coating after-treatment technology, for closer combination with substrate, lower friction and superior surface quality.
- With new superlattice coatings technology, for excellent wear resistance, oxidation resistance, thermal stability and lubrication performance.

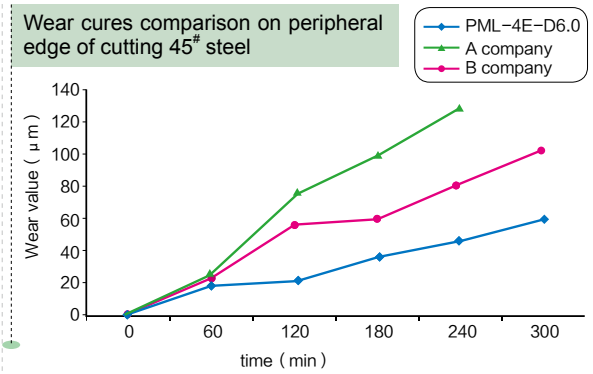


PML-4E-D6.0 Application of machining 45# steel

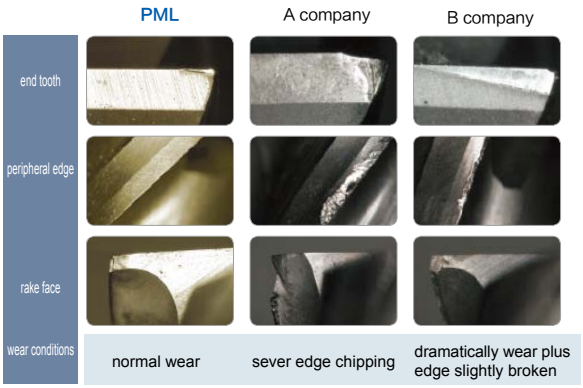
tool: PML-4E-D6.0
workipiece material: 45# steel(HB180)
cutting data: Vc=150m/min, f_z=0.05mm/z,
a_p=6mm, a_e=0.5mm
Machine: machining center
cooling system: air cooling



Wear cures comparison on peripheral edge of cutting 45# steel



Wear comparison after 240min machining



PML-2B-R2.5 Application of machining grey cast iron HT250

workpiece: brake disc
workpiece material: HT250(HB200)
machining parts: slot milling
tool: PML-2B-R2.5
cutting data: Vc=150m/min, f_r=0.15mm/r,
a_p=0.25mm
machine: machining center
cooling system: air cooling



wear comparison after machining 1000pcs

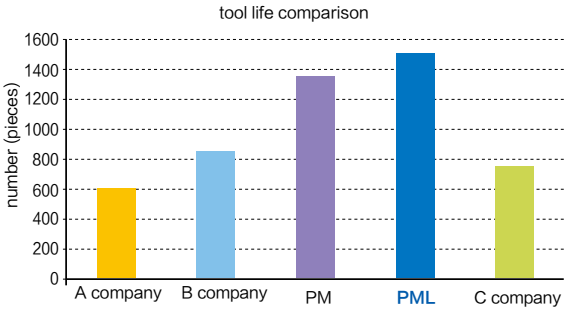


PML-2E-D20.0 Application of machining carbon steel

workpiece: valve
workipiece material: carbon steel (HB220)
machining parts: kidney slots(Ø24mm×40mm×20mm)
tool: PML-2E-D20.0
cutting data: Vc=130m/min, f_r=0.15mm/r,
a_p=10mm
machine: machining center
cooling system: water soluble cooling



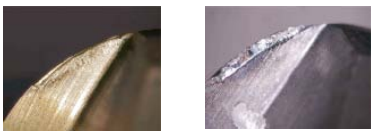
number of slots comparison



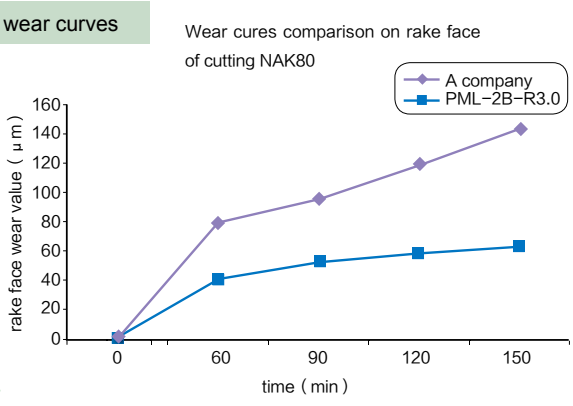
PML-2B-R3.0 Application of machining pre-hardened steel NAK80

milling method: profile milling
workpiece material: NAK80(HRC36)
tool: PML-2B-R3.0
cutting data: Vc=100m/min, f_r=0.3mm/r, a_p=1mm, a_e=1mm
machine: machining center
cooling system: water soluble cooling

rake face wear comparison after150min machining



wear curves

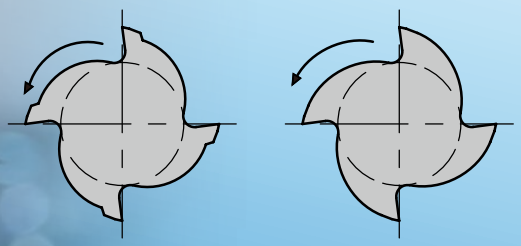


High performance universal machining

PM series



Optimized geometry, improves chip removal and chip forming with reduced cutting force.



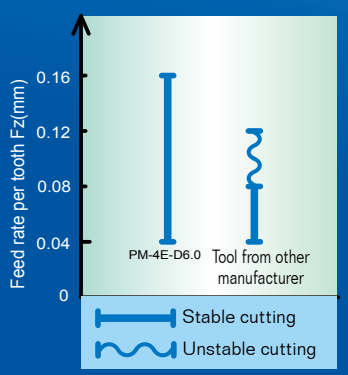
a) PM chipbreaker

b) Conventional chipbreaker



Higher feed rates and improved metal removal rate for efficient machining, due to high stability of cutting edge and rigid tool structure.

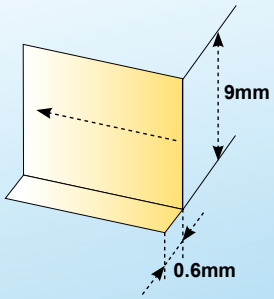
Tool diameter: Ø6.0mm
Tool type: a) PM-4E-D6.0
b) Tool from overseas manufacturer
Mmachine tool: Mikron UCP1000
Workpiece material: NAK80(40HRC)
Cooling system: air blow
Machining operation: side milling (down milling)
Cutting parameters: V_c=100m/min,
a_p=9mm, a_e=0.6mm,
F_z=0.04mm~0.16mm



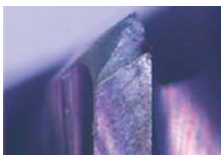
With excellent wear resistance and toughness, high wear resistance and breakage resistance is achieved even during high performance milling.

Tool type: PM-4E-D6.0
Diameter: Ø6.0mm
Workpiece material: NAK80(40HRC)
Rotating speed: 5300r/min (100m/min)
Feed speed: 1696mm/min (0.32mm/r)
Axial cutting depth: a_p=9mm

Radial cutting depth: a_e=0.6mm
Cutting style: side milling (down milling)
Cooling system: air blow
Mmachine tool: MIKRON UCP1000
Tool overhang: 22mm



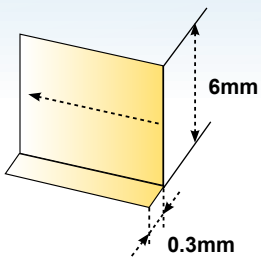
Machining results

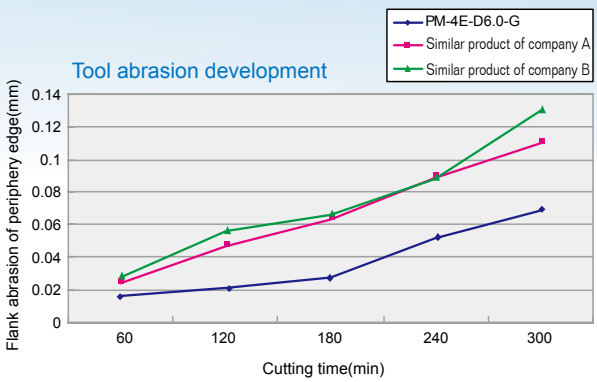
Machining time	50min			
Tool abrasion				
Tool type	PM–4E–D6.0	Similar product of company A	Similar product of company B	PM–4E–D6.0

Conclusion: compared with other tools manufacturer, PM series has better breakage resistance.

The application status of PM-4E-D6.0-G in high speed milling.

Tool type: PM-4E-D6.0-G
Diameter: Ø6.0mm
Workpiece material: NAK80(40HRC)
Rotating speed: 13260r/min(250m/min)
Feed speed: 2652mm/min(0.2mm/r)
Axial cutting depth: a_p=6mm
Radial cutting depth: a_e=0.3mm
Cutting style: side milling (down milling)
Cooling system: air blow
Mmachine tool: MIKRON HSM800
Tool overhang: 22mm

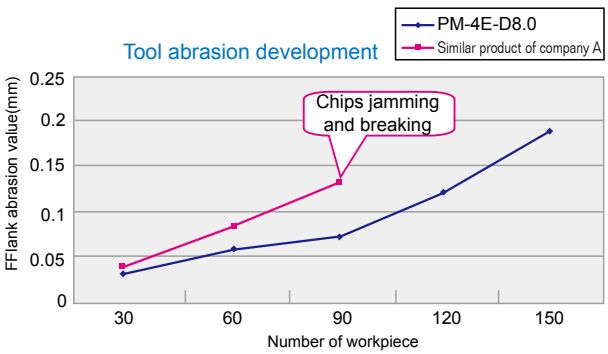




High efficiency machining alloy steel of PM-4E-D8.0.

Machine tool: MIKRON UCP1000
Tool holder: HSK63-A
Workpiece material: alloy steel
Cutting speed: 100(m/min)
Feed rate per tooth: 0.04(mm/tooth)
Axial cutting depth: 8(mm)
Radial cutting width(mm): changing, Maximum at full cutting
Cooling system: Emulsified liquid
Milling style: Contour following
Tool overhang: 30mm



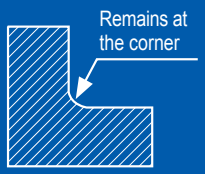


End mills series of sharp and corner protection type

The characteristic of corner protection end mill:

It's suitalbe for bad cutting condition or hardness material machining.

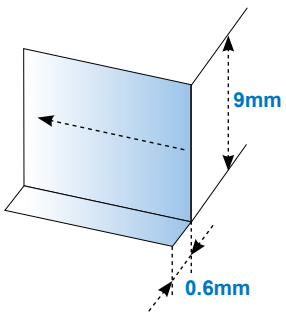
- **High cutting edge strength and breakage resistance.**
- **The degree of nose sharpness is reduced.**





Two kind of cutting nose being used in side face milling of NAK80(40HRC)

Machine tool: MIKRON UCP1000
Tool holder: HSK63-A
Workpiece material: NAK80(40HRC)
Cutting speed: 100(m/min)(5300r/min)
Feed rate per tooth: 0.04-0.16(mm/tooth)
Axial cutting depth: 9(mm)
Radial cutting width: 0.6(mm)
Cooling system: air blow
Milling style: side milling (down milling)
Tool overhang: 22(mm)



Tool abrasion when machining NAK80(HRC40)

Machining length	50m		100m		150m	
Feed rate per tooth(mm/z)	Corner protection	Sharp	Corner protection	Sharp	Corner protection	Sharp
0.04	✓	✓	✓	✓	✓	✓
0.08	✓	✓	✓	×	✓	×
0.12	✓	×	✓	×	✓	×
0.16	✓	×	✓	×	✓	×

"✓" Nose is intact "×" Nose severely flakes

Two kind of cutting nose being used in side face milling of SKD61

Machine tool: MIKRON HSM800
Tool holder: HSK A40
Workpiece material: SKD61(55HRC)
Cutting speed: 150(m/min)(7960r/min)
Feed rate per tooth: 0.03-0.09(mm/tooth)
Axial cutting depth: 6(mm)
Radial cutting width: 0.2(mm)
Cooling system: air blow
Milling style: side milling (down milling)
Tool overhang: 22(mm)

Tool abrasion when machining SKD61(HRC55)

Cutting time	90m		180m		270m		360m	
Feed rate per tooth(mm/z)	Corner protection	Sharp	Corner protection	Sharp	Corner protection	Sharp	Corner protection	Sharp
0.03	✓	✓	✓	✓	✓	✓	✓	×
0.06	✓	✓	✓	×	✓	×	✓	×
0.09	✓	×	✓	×	✓	×	×	×

"✓" Nose is intact "×" Nose severely flakes

Corner protection

Sharp

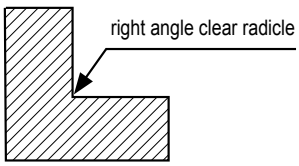


The characteristic of sharp end mill:

True 90 degree angle is obtained without material remaining in the corner.

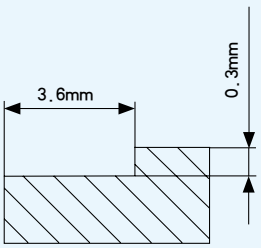
The corner part is sharp; it is applicable in finishing or soft material machining. Especially, it is usually used in machining of non-ferrous material such as Al.

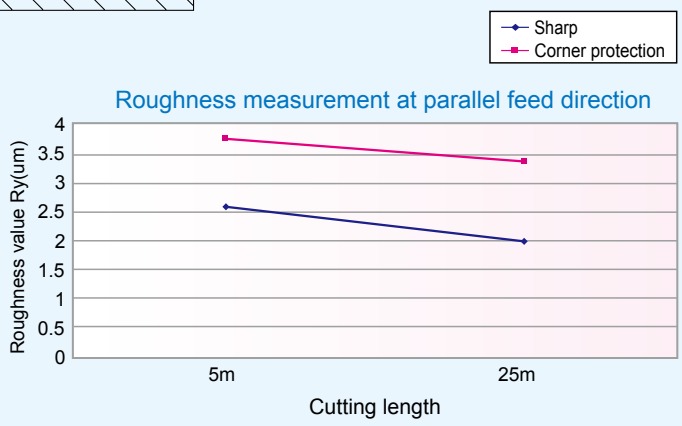




Bottom face finishing of NAK80(HRC40) by tools with the two corner structures roughness measurement parallel with feed direction

Machine tool: MIKRON UCP1000
Diameter: Ø6.0mm
Tool holder: HSK63-A
Workpiece material: NAK80(40HRC)
Cutting speed: 200(m/min)
Feed rate per tooth: 0.03(mm/tooth)
Axial cutting depth: 0.3(mm)
Radial cutting width: 3.6(mm)
Cooling system: air blow
Milling style: end milling (down milling)
Tool overhang: 22(mm)





The best choice for finish milling of molds

PM-2BC

Taper neck type ball nose end mills:

- **Suitable for high precision and high performance machining of molds.**
- **In accordance with draft of dies, a wide range of angles is available.**

Excellent Radius R precision

High performance lubricating nano coating.

Taper-neck structure greatly increases rigidity.



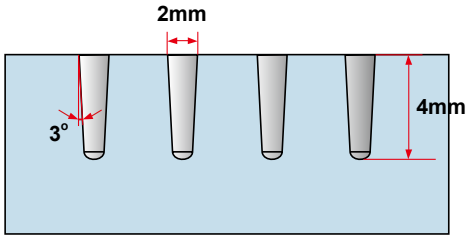
Compared with general straight neck, the 1.5° taper angle structure make tool cutting width abatement reduce 80%.

Super micro grain carbide with good abrasion resistance and toughness.

Please select proper taper angle according to workpiece shape!

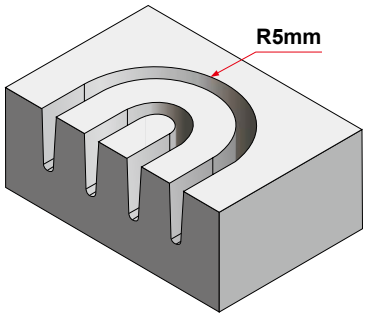
Application of PM-2BC15-R0.25-M05 in machining mold slot

Workpiece material: NAK80(40HRC)
Rotating speed: 30000r/min
Feed speed: 300mm/min
Axial cutting depth: a_p=0.03mm
Radial cutting depth: a_e=0.03mm
Cutting style: contour line machining
Cooling system: water cooling
Machine tool: MIKRON UCP1000



Front view

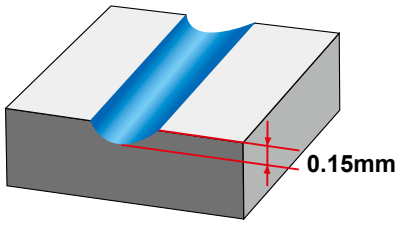
Tool	PM-2BC15-R0.25-M05(taper neck) R0.25×1.5° ×5	(parallel neck) R0.25×5
Machining results	Taper neck ball nose end mill completed slot machining successfully. Machining time is 160min. Tool abrasion is acceptable and tool is still usable.	Parallel neck ball nose end mill failed to complete machining. The tool breaks after 90 minutes of operating.

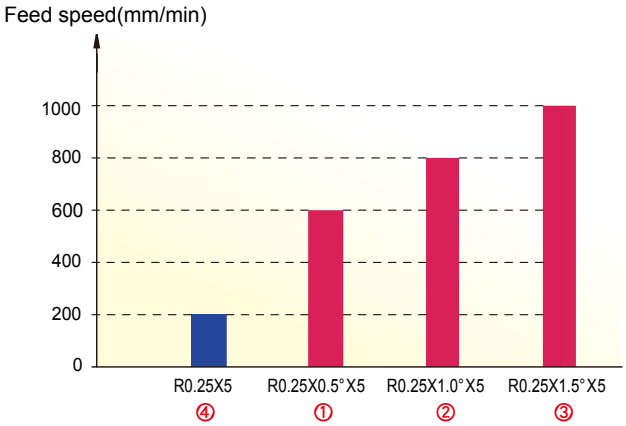


Isometric drawing

Effect of taper neck angle on feed speed

Tool type and size:
① PM-2BC05-R0.25-M05(taper neck) R0.25×0.5° ×5
② PM-2BC10-R0.25-M05(taper neck) R0.25×1.0° ×5
③ PM-2BC15-R0.25-M05 (taper neck) R0.25×1.5° ×5
④ (parallel neck) R0.25×5
Workpiece material: NAK80(37HRC)
Rotating speed: 30000r/min
Axial cutting depth: a_p=0.15mm
Cutting style: linear cutting
Cooling system: air blow
Machine tool: MIKRON UCP1000





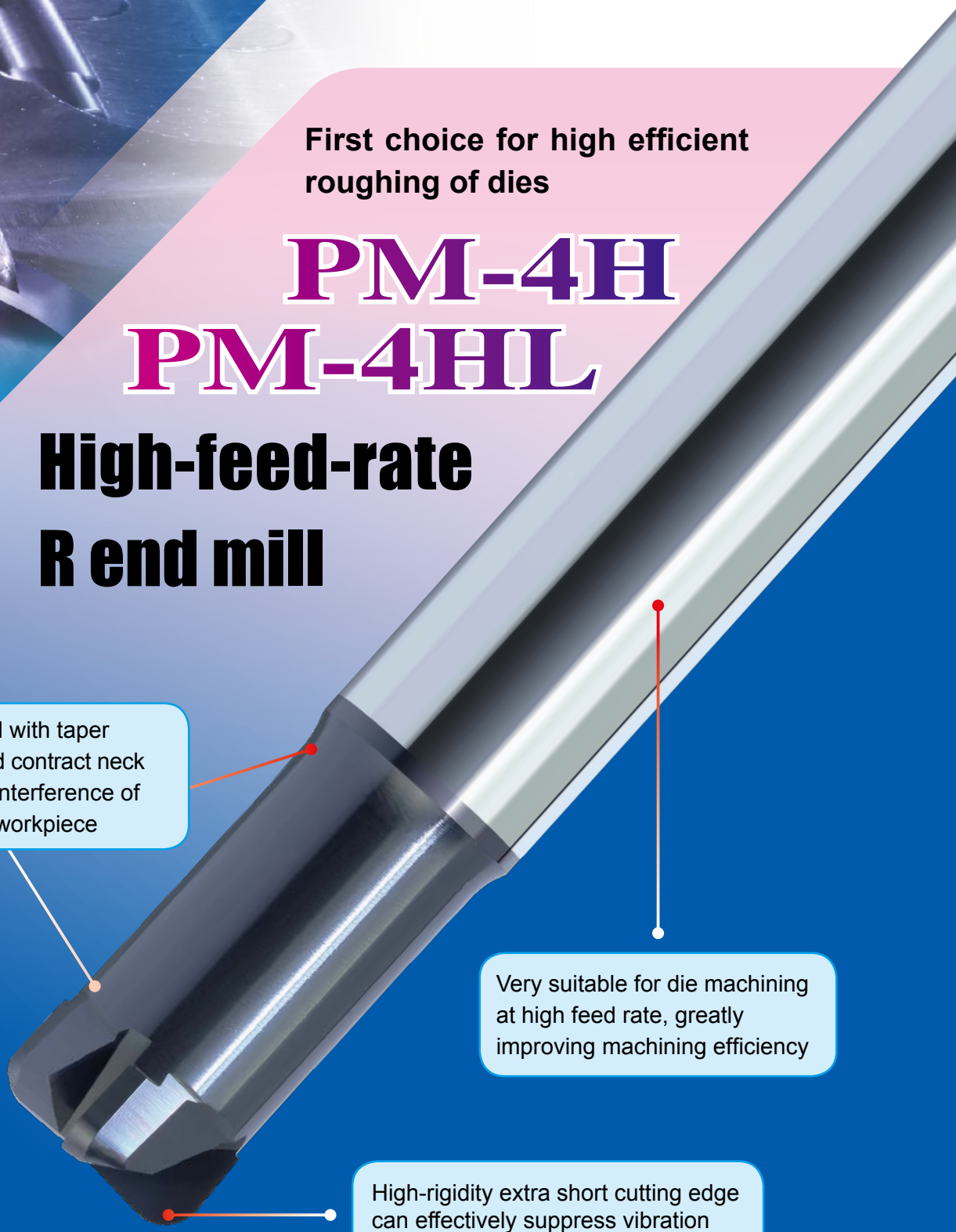
○ Feed rate range applicable to tools with different tapers is shown in the graph.
○ Feed rate of parallel neck tools is lower than that of all taper neck tools.
○ The larger the taper angle, the higher the feed rate.



First choice for high efficient roughing of dies

PM-4H
PM-4HL

High-feed-rate R end mill



Designed with taper angle and contract neck to avoid interference of tool and workpiece

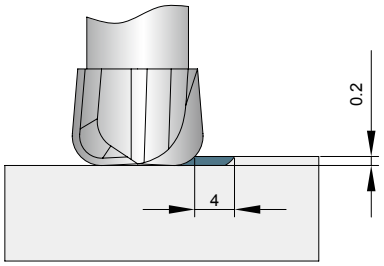
Very suitable for die machining at high feed rate, greatly improving machining efficiency

High-rigidity extra short cutting edge can effectively suppress vibration during corner machining

Improve metal removal rate as much as possible and reduce machining cost!

Application of PM-4H-D8.0R2.0 milling NAK80: Feed rate per tooth Fz up to 0.6mm

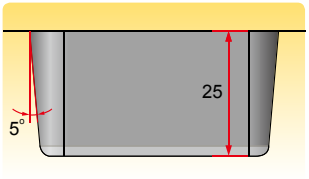
Tool type: PM-4H-D8.0R2.0
Diameter: Ø8.0mm
Workpiece material: NAK80(40HRC)
Rotating speed: 3980r/min
Cutting speed: 100m/min
Feed speed: 9550mm/min
Feed rate per tooth: 0.6mm/z
Axial cutting depth: a_p=0.2mm
Radial cutting depth: a_e=4mm
Cutting style: Linear end milling (down milling)
Cooling system: air blow
Machine tool: MIKRON UCP1000
Tool overhang: 32mm



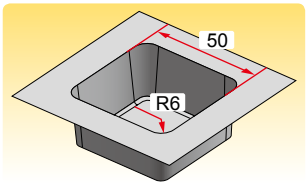
Note: The tool is still usable when cutting length reaches 800m.

Application of PM-4H-D8.0R2.0 in die cavity milling

Tool type: PM-4H-D8.0R2.0
Diameter: Ø8.0mm
Workpiece material: NAK80(40HRC)
Rotating speed: 5970r/min
Cutting speed: 150m/min
Feed speed: 7160mm/min
Feed rate per tooth: 0.3mm/z
Axial cutting depth: a_p=0.2mm
Radial cutting depth: a_e=4mm
Cutting style: cavity milling(down milling)
Cooling system: air blow
Machine tool: MIKRON UCP1000
Tool overhang: 32mm



Front view

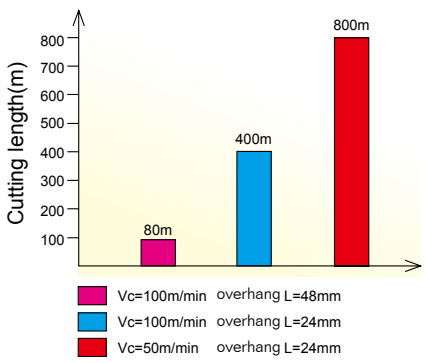


Isometric drawing

Note: It takes just 13min to machine a complete cavity. The tool is almost intact and still usable.

Cutting performance of high-feed-rate end mills under different cutting conditions

Tool type and overhang:
①PM-4H-D6.0R1.5 overhang:24mm
②PM-4HL-D6.0R1.5 overhang:48mm
Diameter: Ø6.0mm
Workpiece material: NAK80(40HRC)
Cutting speed: 50~100m/min
Feed rate per tooth: 0.25mm/z
Axial cutting depth: a_p=0.2mm
Radial cutting depth: a_e=2mm
Cutting style: Linear end milling (down milling)
Cooling system: air blow
Machine tool: MIKRON UCP1000



Note: Other cutting conditions being the same:
①When the cutting speed is reduced to half, the cutting length would be doubled before reaching the same grinding standard.
②When the overhang of tool is doubled, the tool life would be one fifth of the original.



Ultra fine cemented carbide substrate with excellent wear resistance.

High-rigidity tool structure reduces vibration.

Nano coating guarantees excellent wear resistance and high temperature stability.

Seamless connection of peripheral cutting edge and ball cutting edge is achieved. Optimized center design of ball cutting edge greatly improves surface quality.

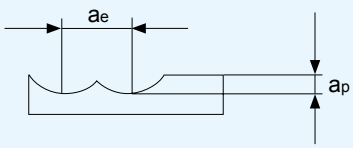
High precision profile milling

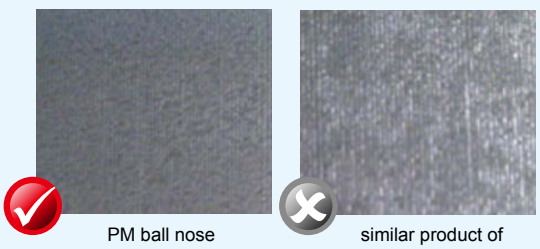
PM series 2-flute ball nose end mill

PM-2B PM-2BL PM-2BFP

Application of high-performance 2-flute ball nose end mill milling NAK80

Tool type: PM-2B-R3.0
Diameter: Ø6.0mm
Workpiece material: NAK80(40HRC)
Rotating speed: 10600r/min (200m/min)
Feed speed: 2120mm/min (0.2mm/r)
Axial cutting depth: a_p=0.2mm
Radial cutting depth: a_e=0.3mm
Cutting style: single direction linear milling Zig
Cooling system: air blow
Mmachine tool: MIKRON UCP1000
Tool overhang: 20mm
Roughness measure: TM2000

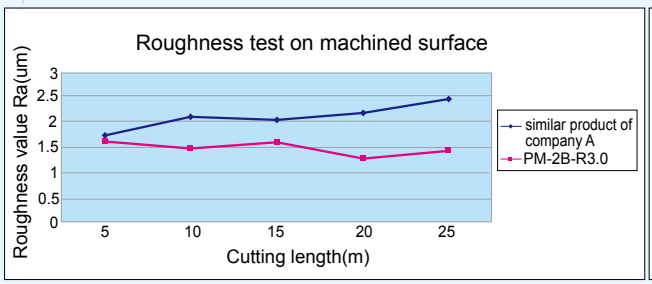


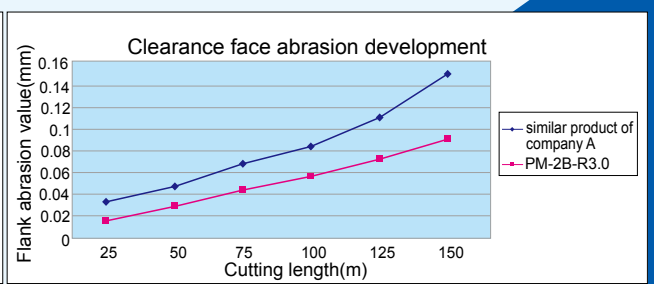


PM ball nose end mills

similar product of company A

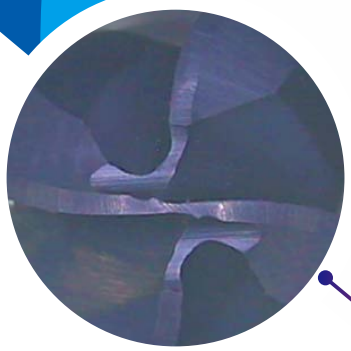
PM ball nose end mills can achieve distinct grooves with low roughness and high surface quality.





High efficient profile milling tools

PM series 4-flute ball nose end mills

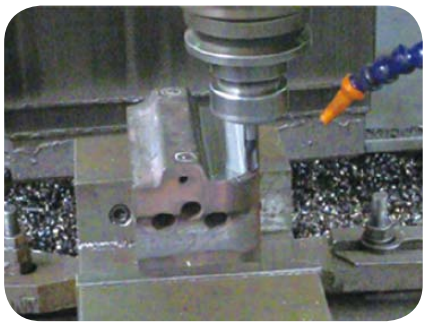


The center design of ball cutting edge combines high strength and sharpness, and properly manages the chips generated during machining.



PM-4B
PM-4BL

Application of high-performance 4-flute ball nose end mill milling Cr12



Tool type: PM-4B-R5.0
Diameter: Ø10.0mm
Workpiece material: Cr12(36HRC)
Rotating speed: 2800r/min (88m/min)
Feed speed: 3000 mm/min
Axial cutting depth: a_p=1mm
Radial cutting depth: a_e=0.6mm
Cutting style: profile milling
Cooling system: air blow
Machine tool: Xiehong CNC-1600
Tool overhang: 45mm
Workpiece clamp: SafeWay CV-200V
Tooling systems: BT50-ER40-100

Number of workpiece machined	5 pieces(150min)	2 pieces(60min)
Failure mode		
Tool type	PM-4B-R5.0	Similar product of company A
Explanation	The tool is slightly worn and still usable even after machining 5 workpieces.	The ball cutting edge center suffers severe breakage after machining 2 workpieces.

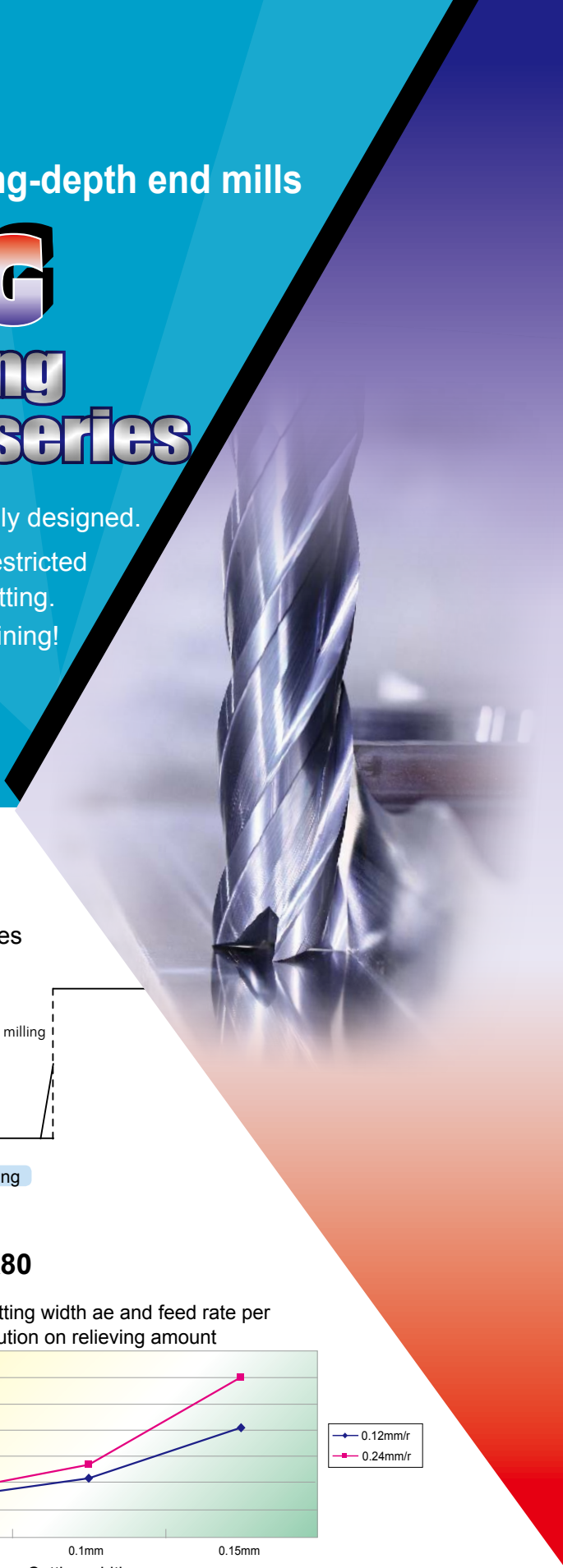


High-efficiency and high-cutting-depth end mills

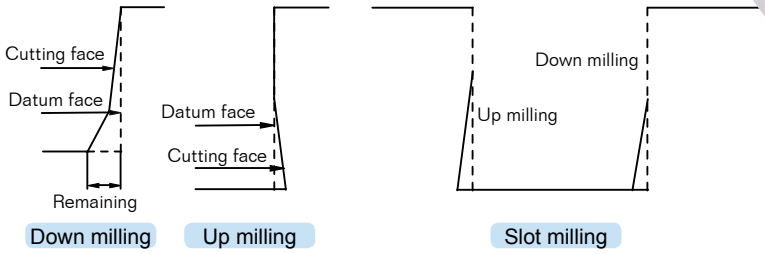
PM-4EX-G

Extra long cutting edge end mills series

- Chipbreaker and cutting edge are optimally designed.
  The relieving amount of the side wall is restricted within a small range even in full length cutting.
- Very suitable for high-cutting-depth machining!



Remaining amount in different cutting styles



Application of PM-4EX-D6.0-G milling NAK80

Tool type: PM-4EX-D6.0-G
Diameter: Ø6.0mm
Workpiece material: NAK80(40HRC)
Cutting speed: 80 m/min
Feed speed: 0.12 mm/r，0.24 mm/r
Axial cutting depth: a_p=28mm
Radial cutting depth: a_e=0.05~0.15mm
cutting style: side milling (down milling)
cooling system: air blow
machine tool: MIKRON UCP1000

Effect of cutting width ae and feed rate per revolution on relieving amount

Conclusion: Reduced remaining amount with optimized cutting conditions.



High efficiency milling tools

PML-H/PM-H

series endmills

- 38°helical angle
- Optimized geometry for smooth chip evacuation
- Strengthened nose and tooth with greatly improved vibration resistance
- More suitable for slot milling

Case:

machine: vertical machining center
tool: PML-4E-D12.0-H
workpiece material: 45# steel
machining parts: slot milling
cooling system: air cooling
cutting speed: 200m/min
feed per tooth: 0.06mm/z
depth of cut: 6mm

machined surface quality comparison



A company



PML-4E-D12.0-H

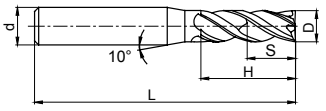
Result: with excellent vibration resistance, PML-H series demonstrate outstanding machinablity performance in cutting operation and the machined surface quality is superior to that of company A.

4-flute unequal pitch flattened end mill with straight shan

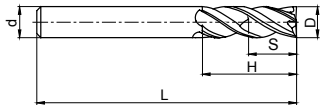


UM-4E

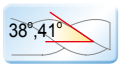




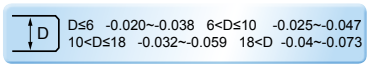
Picture 1



Picture 2









Ordering number	Basic dimension(mm)					Number of teeth Z	Geometry	Stock
	D	d	H	S	L			
UM-4E-D4.0S	4.0	4	11	6.00	50	4	Picture 2	○
UM-4E-D4.0	4.0	6	11	6.00	50	4	Picture 1	○
UM-4E-D4.5	4.5	6	11	6.75	50	4	Picture 1	○
UM-4E-D5.0	5.0	6	13	7.50	50	4	Picture 1	○
UM-4E-D5.5	5.5	6	16	8.25	50	4	Picture 1	○
UM-4E-D6.0	6.0	6	16	9.00	50	4	Picture 2	○
UM-4E-D7.0	7.0	8	20	10.5	60	4	Picture 1	○
UM-4E-D8.0	8.0	8	20	12.0	60	4	Picture 2	○
UM-4E-D9.0	9.0	10	22	13.5	75	4	Picture 1	○
UM-4E-D10.0	10.0	10	25	15.0	75	4	Picture 2	○
UM-4E-D11.0	11.0	12	26	16.5	75	4	Picture 1	○
UM-4E-D12.0	12.0	12	30	18.0	75	4	Picture 2	○
UM-4E-D14.0	14.0	14	32	21.0	75	4	Picture 2	○
UM-4E-D16.0	16.0	16	45	24.0	100	4	Picture 2	○
UM-4E-D18.0	18.0	18	45	27.0	100	4	Picture 2	○
UM-4E-D20.0	20.0	20	45	30.0	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						
◎	◎	◎	◎	◎		○	◎			○	○

Code key B213
Graphics category and identification B214
Cutting parameters B360–B361

4-flute long cutting edge and unequal pitch flattened end mill with straight shank

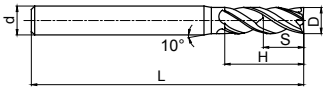

Side face


Step shoulder

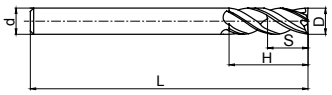

Straight slot

UM-4EL

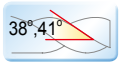




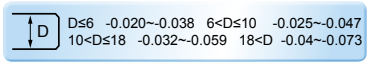
Picture 1



Picture 2



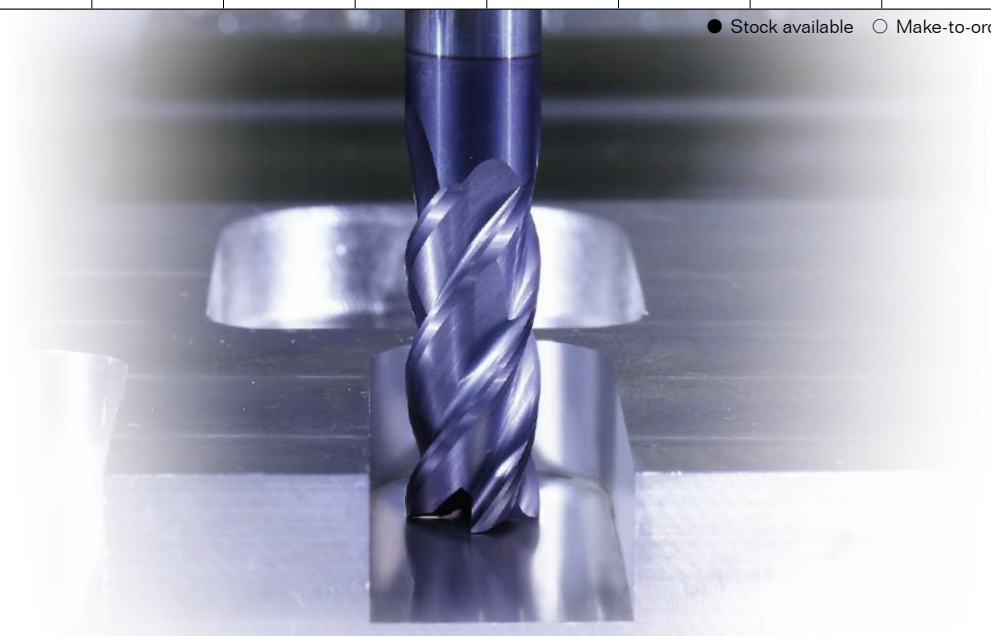






Ordering number	Basic dimension(mm)					Number of teeth Z	Geometry	Stock
	D	d	H	S	L			
UM-4EL-D4.0	4.0	6	15	6.00	75	4	Picture 1	○
UM-4EL-D5.0	5.0	6	20	7.50	75	4	Picture 1	○
UM-4EL-D6.0	6.0	6	20	9.00	75	4	Picture 2	○
UM-4EL-D8.0	8.0	8	25	12.0	100	4	Picture 2	○
UM-4EL-D10.0	10.0	10	30	15.0	100	4	Picture 2	○
UM-4EL-D12.0	12.0	12	35	18.0	100	4	Picture 2	○
UM-4EL-D14.0	14.0	14	40	21.0	100	4	Picture 2	○
UM-4EL-D16.0	16.0	16	50	24.0	150	4	Picture 2	○
UM-4EL-D20.0	20.0	20	55	30.0	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						
◎	◎	◎	◎	◎		○	◎			○	○

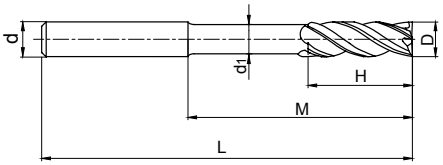
Code key B213
Graphics category and identification B214
Cutting parameters B360–B361

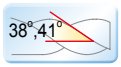
4-flute unequal pitch flattened end mill with long neck, short cutting edge and straight shank



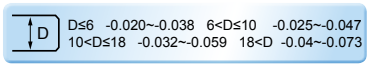
UM-4EFP













Ordering number	Basic dimension(mm)						Number of teeth Z	Stock
	D	d	H	M	d_1	L		
UM-4EFP-D6.0	6.0	6	9	30	5.8	75	4	○
UM-4EFP-D8.0	8.0	8	12	40	7.8	100	4	○
UM-4EFP-D10.0	10.0	10	15	50	9.6	100	4	○
UM-4EFP-D12.0	12.0	12	18	50	11.5	100	4	○
UM-4EFP-D16.0	16.0	16	24	50	15.5	150	4	○
UM-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						
◎	◎	◎	◎	◎		○	◎			○	○

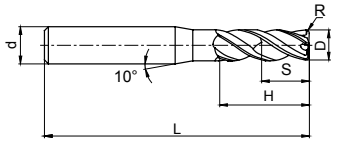
Code key B213
Graphics category and identification B214
Cutting parameters B362–B363

4-flute unequal pitch R end mill with straight shank

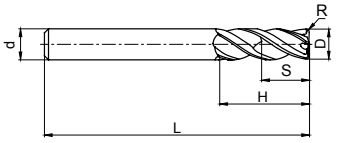
Radius shoulder Profile Radius corner slot

UM-4R

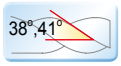




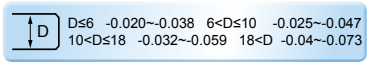
Picture 1



Picture 2









Ordering number	Basic dimension(mm)						Number of teeth Z	Geometry	Stock
	D	S	d	H	S	L			
UM-4R-D4.0R0.3	4.0	0.3	6	10	6.0	50	4	Picture 1	○
UM-4R-D4.0R0.5	4.0	0.5	6	10	6.0	50	4	Picture 1	○
UM-4R-D5.0R0.5	5.0	0.5	6	13	7.5	50	4	Picture 1	○
UM-4R-D5.0R1.0	5.0	1.0	6	13	7.5	50	4	Picture 1	○
UM-4R-D6.0R0.5	6.0	0.5	6	16	9.0	50	4	Picture 2	○
UM-4R-D6.0R1.0	6.0	1.0	6	16	9.0	50	4	Picture 2	○
UM-4R-D8.0R0.5	8.0	0.5	8	20	12	60	4	Picture 2	○
UM-4R-D8.0R1.0	8.0	1.0	8	20	12	60	4	Picture 2	○
UM-4R-D10.0R0.5	10.0	0.5	10	25	15	75	4	Picture 2	○
UM-4R-D10.0R1.0	10.0	1.0	10	25	15	75	4	Picture 2	○
UM-4R-D10.0R2.0	10.0	2.0	10	25	15	75	4	Picture 2	○
UM-4R-D10.0R3.0	10.0	3.0	10	25	15	75	4	Picture 2	○
UM-4R-D12.0R0.5	12.0	0.5	12	30	18	75	4	Picture 2	○
UM-4R-D12.0R1.0	12.0	1.0	12	30	18	75	4	Picture 2	○
UM-4R-D12.0R2.0	12.0	2.0	12	30	18	75	4	Picture 2	○
UM-4R-D12.0R3.0	12.0	3.0	12	30	18	75	4	Picture 2	○
UM-4R-D16.0R1.0	16.0	1.0	16	45	24	100	4	Picture 2	○
UM-4R-D16.0R2.0	16.0	2.0	16	45	24	100	4	Picture 2	○
UM-4R-D16.0R3.0	16.0	3.0	16	45	24	100	4	Picture 2	○
UM-4R-D20.0R1.0	20.0	1.0	20	45	30	100	4	Picture 2	○
UM-4R-D20.0R2.0	20.0	2.0	20	45	30	100	4	Picture 2	○
UM-4R-D20.0R3.0	20.0	3.0	20	45	30	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						
◎	◎	◎	◎	◎		○	◎			○	○

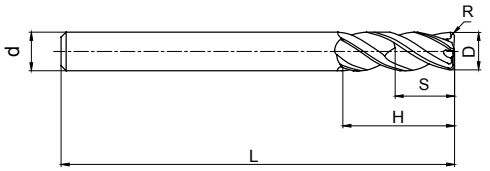
Code key B213
Graphics category and identification B214
Cutting parameters B364–B365

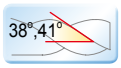
4-flute long cutting edge and unequal pitch R end mill with straight shank



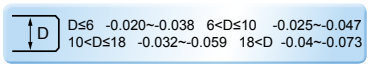
UM-4RL













Ordering number	Basic dimension(mm)						Number of teeth Z	Stock
	D	R	d	H	S	L		
UM-4RL-D6.0R0.5	6.0	0.5	6	16	9	75	4	○
UM-4RL-D6.0R1.0	6.0	1.0	6	16	9	75	4	○
UM-4RL-D8.0R0.5	8.0	0.5	8	20	12	100	4	○
UM-4RL-D8.0R1.0	8.0	1.0	8	20	12	100	4	○
UM-4RL-D10.0R0.5	10.0	0.5	10	25	15	100	4	○
UM-4RL-D10.0R1.0	10.0	1.0	10	25	15	100	4	○
UM-4RL-D10.0R2.0	10.0	2.0	10	25	15	100	4	○
UM-4RL-D12.0R0.5	12.0	0.5	12	30	18	100	4	○
UM-4RL-D12.0R1.0	12.0	1.0	12	30	18	100	4	○
UM-4RL-D12.0R2.0	12.0	2.0	12	30	18	100	4	○
UM-4RL-D16.0R1.0	16.0	1.0	16	45	24	150	4	○
UM-4RL-D16.0R2.0	16.0	2.0	16	45	24	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						
◎	◎	◎	◎	◎		○	◎			○	○

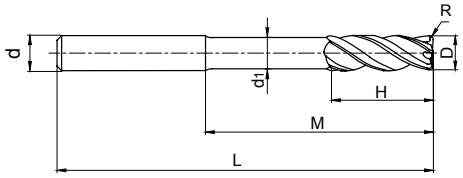
Code key B213
Graphics category and identification B214
Cutting parameters B364–B365

4-flute long neck and short cutting edge unequal pitch R end mill with straight shank

Radius shoulder Profile Radius corner slot

UM-4RFP





38°,41° Coated AlTiN D D≤6 -0.020~-0.038 6<D≤10 -0.025~-0.047 10<D≤18 -0.032~-0.059 18<D -0.04~-0.073

Ordering number	Basic dimension(mm)							Number of teeth Z	Stock
	D	R	d	d_1	H	M	L		
UM-4RFP-D6.0R0.5	6.0	0.5	6	5.8	6	18	75	4	○
UM-4RFP-D6.0R1.0	6.0	1.0	6	5.8	6	18	75	4	○
UM-4RFP-D8.0R0.5	8.0	0.5	8	7.7	8	24	100	4	○
UM-4RFP-D8.0R1.0	8.0	1.0	8	7.7	8	24	100	4	○
UM-4RFP-D10.0R0.5	10.0	0.5	10	9.6	10	30	100	4	○
UM-4RFP-D10.0R1.0	10.0	1.0	10	9.6	10	30	100	4	○
UM-4RFP-D10.0R2.0	10.0	2.0	10	9.6	10	30	100	4	○
UM-4RFP-D12.0R0.5	12.0	0.5	12	11.5	12	36	100	4	○
UM-4RFP-D12.0R1.0	12.0	1.0	12	11.5	12	36	100	4	○
UM-4RFP-D12.0R2.0	12.0	2.0	12	11.5	12	36	100	4	○
UM-4RFP-D16.0R1.0	16.0	1.0	16	15.5	16	40	150	4	○
UM-4RFP-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						
◎	◎	◎	◎	◎		○	◎			○	○

Code key B213 Graphics category and identification B214 Cutting parameters B366

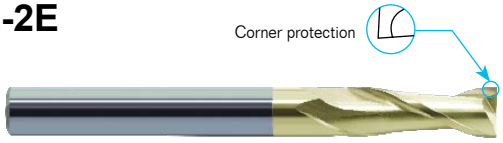
2-flute flattened end mills with straight shank

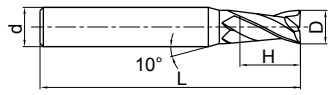

Side face


Step shoulder

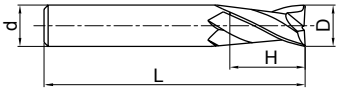

Straight slot

PML-2E



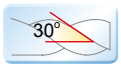


Picture 1



Picture 2

- Very suitable for slot milling.
- Wide application.









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

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

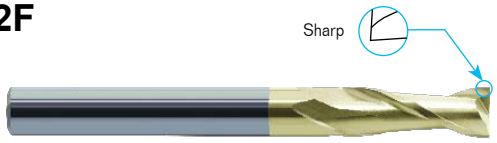
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	○			○	◎			○	○

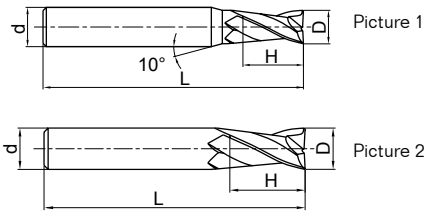
Code key B213
Graphics category and identification B214
Cutting parameters B367

2-flute flattened end mills with straight shank



PML-2F





- Very suitable for slot milling.
- Wide application.



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

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

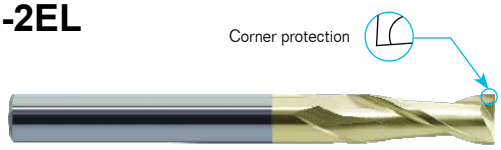
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	○			○	◎			○	○

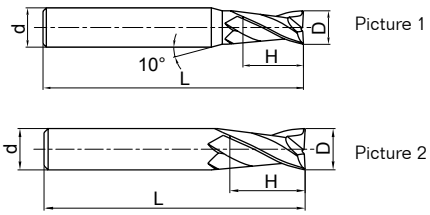
Code key B213
Graphics category and identification B214
Cutting parameters B368

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

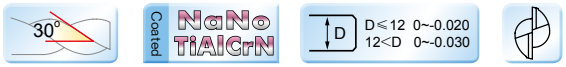


PML-2EL





- PML-2E series with long cutting edge.



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

Code key B213
Graphics category and identification B214
Cutting parameters B367

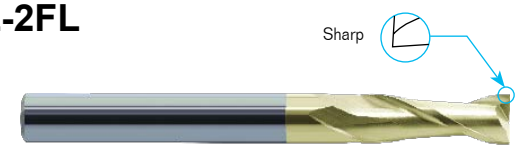
2-flute flattened end mills with straight shank and long cutting edge

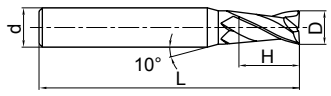

Side face


Step shoulder

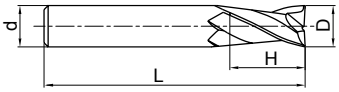

Straight slot

PML-2FL



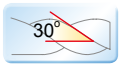


Picture 1



Picture 2

- PML-2F series with long cutting edge.









Ordering number	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	D	d	H	L			
PML-2FL-D3.0	3.0	6	12	75	2	Picture 1	○
PM-L2FL-D4.0	4.0	6	15	75	2	Picture 1	○
PML-2FL-D5.0	5.0	6	20	75	2	Picture 1	○
PML-2FL-D6.0	6.0	6	20	75	2	Picture 2	○
PML-2FL-D8.0	8.0	8	25	100	2	Picture 2	○
PML-2FL-D10.0	10.0	10	30	100	2	Picture 2	○
PML-2FL-D12.0	12.0	12	35	100	2	Picture 2	○
PML-2FL-D14.0	14.0	14	40	100	2	Picture 2	○
PML-2FL-D16.0	16.0	16	50	150	2	Picture 2	○
PML-2FL-D20.0	20.0	20	55	150	2	Picture 2	○

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

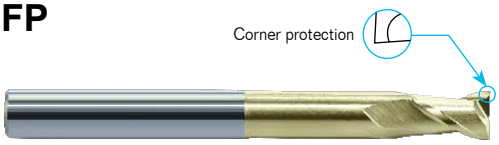
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	○			○	◎			○	○

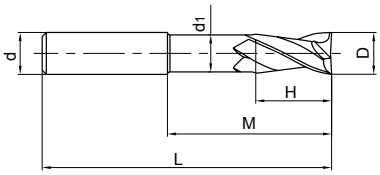
Code key B213
Graphics category and identification B214
Cutting parameters B368

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

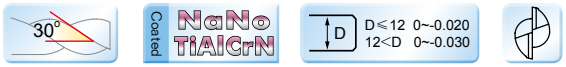


PML-2EFP





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



Ordering number	Basic dimension(mm)						Number of teeth Z	Stock
	D	d	H	M	d_1	L		
PML-2EFP-D6.0	6.0	6	9	30	5.8	75	2	○
PML-2EFP-D8.0	8.0	8	12	40	7.8	100	2	○
PML-2EFP-D10.0	10.0	10	15	50	9.6	100	2	○
PML-2EFP-D12.0	12.0	12	18	50	11.5	100	2	○
PML-2EFP-D16.0	16.0	16	24	50	15.5	150	2	○
PML-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						
◎	◎	◎	○			○	◎			○	○

Code key B213
Graphics category and identification B214
Cutting parameters B369

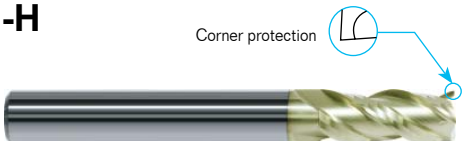
3-flute flattened end mills with straight shank

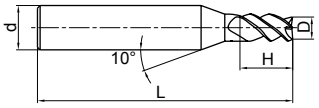

Side face


Step shoulder

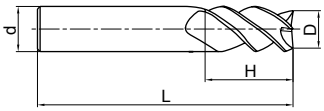

Straight slot

PML-3E-H



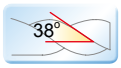


Picture 1



Picture 2

● Especially suitable for slot milling. ● Wide application.









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

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

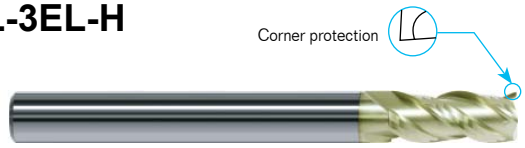
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	○			○	◎			○	○

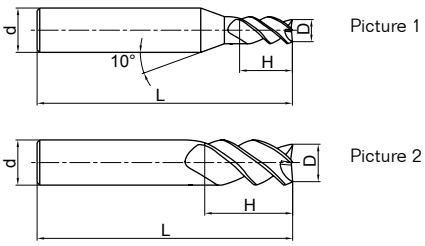
Code key B213
Graphics category and identification B214
Cutting parameters B370

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



PML-3EL-H





- PML-3E-H series with long shank.



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

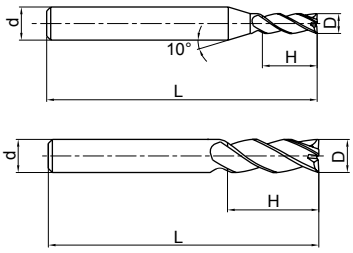
Code key B213
Graphics category and identification B214
Cutting parameters B370

4-flute flattened end mills with straight shank



PML-4E-G





● Very suitable for side milling. ● Wide application.



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

Code key B213
Graphics category and identification B214
Cutting parameters B371–B372

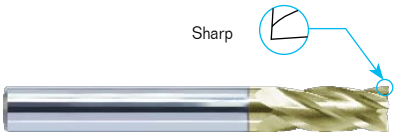
4-flute flattened end mills with straight shank

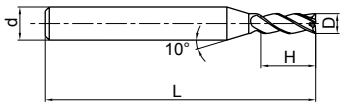

Side face


Step shoulder

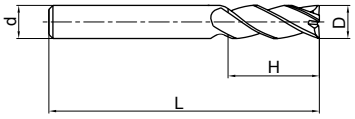

Straight slot

PML-4F-G



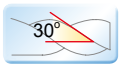


Picture 1



Picture 2

● Very suitable for side milling. ● Wide application.









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

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

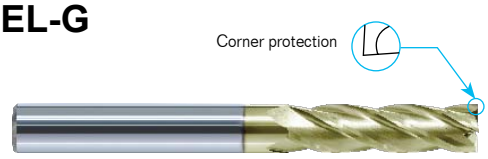
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	○			○	◎			○	○

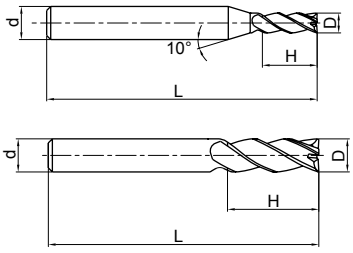
Code key B213
Graphics category and identification B214
Cutting parameters B373–B374

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



PML-4EL-G





- PML-4E-G series with long cutting edge.



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

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

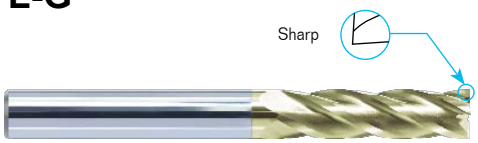
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	○			○	◎			○	○

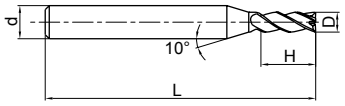
Code key B213
Graphics category and identification B214
Cutting parameters B371–B372

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

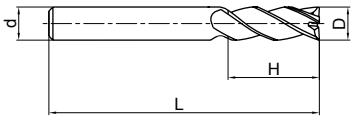


PML-4FL-G



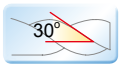


Picture 1



Picture 2

● PML-4F-G series with long cutting edge.









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

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

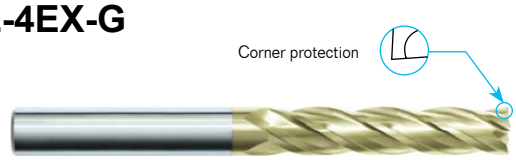
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	○			○	◎			○	○

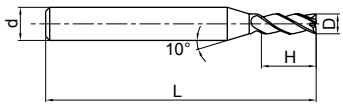
Code key B213
Graphics category and identification B214
Cutting parameters B373–B374

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

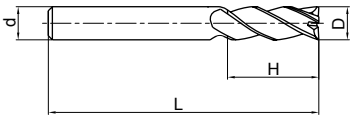


PML-4EX-G



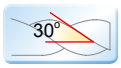


Picture 1



Picture 2

- Extra long cutting edge, for deep side wall machining.









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

Code key B213
Graphics category and identification B214
Cutting parameters B375

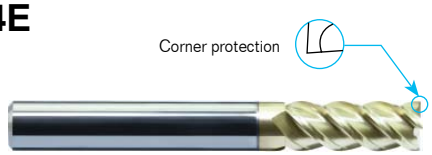
4-flute flattened end mills with straight shank

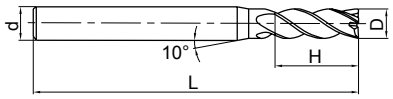

Side face


Step shoulder

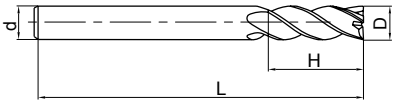

Straight slot

PML-4E



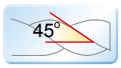


Picture 1



Picture 2

- Very suitable for side milling and shallow slot machining.
- Wide application.









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

Code key B213
Graphics category and identification B214
Cutting parameters B376–B377

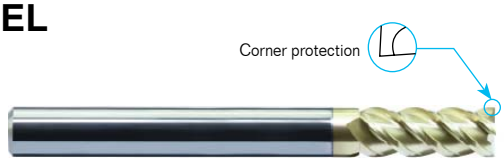
4-flute flattened end mills with straight shank and long cutting edge

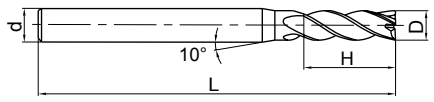

Side face


Step shoulder

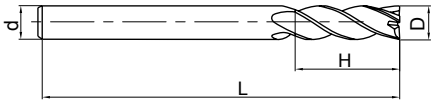

Straight slot

PML-4EL



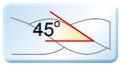


Picture 1

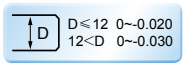


Picture 2

● PML-4E series with long cutting edge.









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

Code key B213
Graphics category and identification B214
Cutting parameters B376–B377

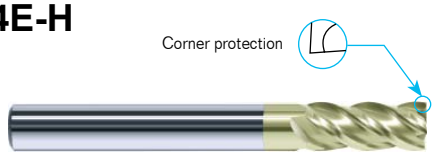
4-flute flattened end mills with straight shank

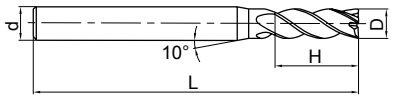

Side face


Step shoulder

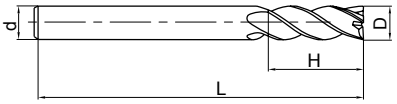

Straight slot

PML-4E-H



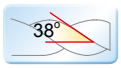


Picture 1



Picture 2

● Most suitable for slot milling. ● Wide application.









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

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

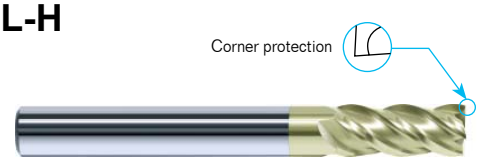
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	○			○	◎			○	○

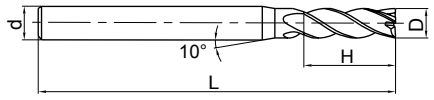
Code key B213
Graphics category and identification B214
Cutting parameters B376–B377

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

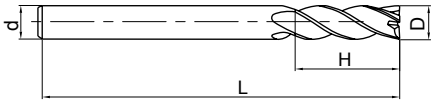


PML-4EL-H





Picture 1



Picture 2

● PML-4E-H series with long shank.



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

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

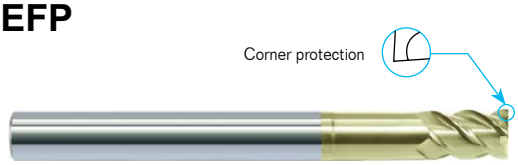
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	○			○	◎			○	○

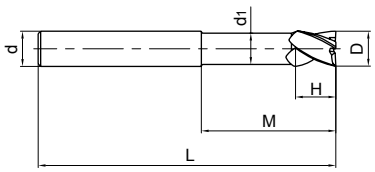
Code key B213
Graphics category and identification B214
Cutting parameters B376–B377

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



PML-4EFP





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



Ordering number	Basic dimension(mm)						Number of teeth Z	Stock
	D	d	H	M	d_1	L		
PML-4EFP-D6.0	6.0	6	9	30	5.8	75	4	○
PML-4EFP-D8.0	8.0	8	12	40	7.8	100	4	○
PML-4EFP-D10.0	10.0	10	15	50	9.6	100	4	○
PML-4EFP-D12.0	12.0	12	18	50	11.5	100	4	○
PML-4EFP-D16.0	16.0	16	24	50	15.5	150	4	○
PML-4EFP-D20.0	20.0	20	30	60	19.5	150	4	○

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

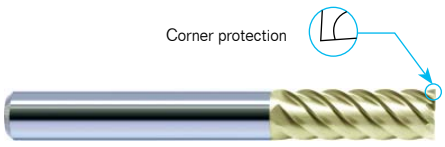
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	○			○	◎			○	○

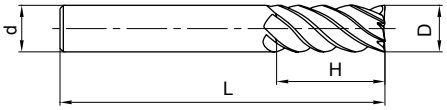
Code key B213
Graphics category and identification B214
Cutting parameters B378–B379

6-flute flattened end mills with straight shank



PML-6E





- Perfect rigidity, 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		
PML-6E-D6.0	6.0	6	18	60	6	○
PML-6E-D8.0	8.0	8	20	60	6	○
PML-6E-D10.0	10.0	10	30	75	6	○
PML-6E-D12.0	12.0	12	32	75	6	○
PML-6E-D16.0	16.0	16	40	100	6	○
PML-6E-D20.0	20.0	20	45	100	6	○

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

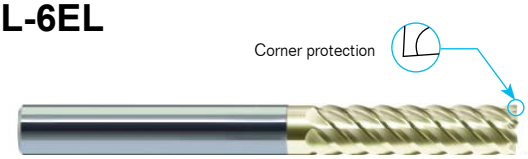
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	○			○	◎			○	○

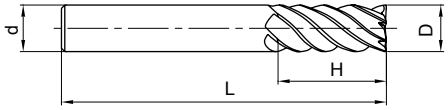
Code key B213
Graphics category and identification B214
Cutting parameters B380

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



PML-6EL





- PML-6E series with long cutting edge.



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

Code key B213
Graphics category and identification B214
Cutting parameters B381

2-flute ball nose end mills with straight shank

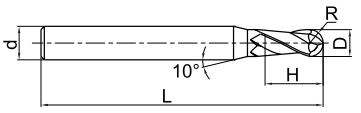

Profile


Cavity

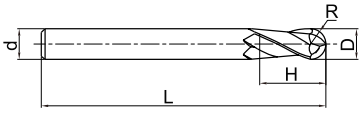

Ball nose slot

PML-2B



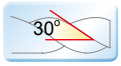


Picture 1

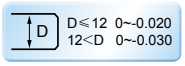


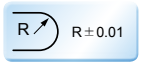
Picture 2

- 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			
PML-2B-R0.5S	1.0	0.5	4	2	50	2	Picture 1	●
PML-2B-R0.75S	1.5	0.75	4	3	50	2	Picture 1	●
PML-2B-R1.0S	2.0	1.0	4	4	50	2	Picture 1	●
PML-2B-R1.25S	2.5	1.25	4	5	50	2	Picture 1	●
PML-2B-R1.5S	3.0	1.5	4	6	50	2	Picture 1	●
PML-2B-R2.0S	4.0	2.0	4	8	50	2	Picture 2	●
PML-2B-R0.5	1.0	0.5	6	2	50	2	Picture 1	●
PML-2B-R0.75	1.5	0.75	6	3	50	2	Picture 1	●
PML-2B-R1.0	2.0	1.0	6	4	50	2	Picture 1	●
PML-2B-R1.25	2.5	1.25	6	5	50	2	Picture 1	●
PML-2B-R1.5	3.0	1.5	6	6	50	2	Picture 1	●
PML-2B-R1.75	3.5	1.75	6	8	50	2	Picture 1	●
PML-2B-R2.0	4.0	2.0	6	8	50	2	Picture 1	●
PML-2B-R2.5	5.0	2.5	6	10	50	2	Picture 1	●
PML-2B-R2.75	5.5	2.75	6	12	50	2	Picture 1	●
PML-2B-R3.0	6.0	3.0	6	12	50	2	Picture 2	●
PML-2B-R3.5	7.0	3.5	8	14	60	2	Picture 1	●
PML-2B-R4.0	8.0	4.0	8	16	60	2	Picture 2	●
PML-2B-R4.5	9.0	4.5	10	18	75	2	Picture 1	●
PML-2B-R5.0	10.0	5.0	10	20	75	2	Picture 2	●
PML-2B-R6.0	12.0	6.0	12	24	75	2	Picture 2	●
PML-2B-R7.0	14.0	7.0	14	28	75	2	Picture 2	●
PML-2B-R8.0	16.0	8.0	16	32	100	2	Picture 2	●
PML-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						
◎	◎	◎	○			○	◎			○	○

Code key B213
Graphics category and identification B214
Cutting parameters B382–B383

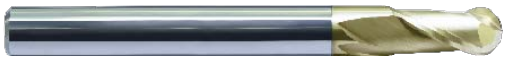
2-flute ball nose end mills with straight shank

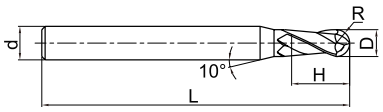

Profile


Cavity

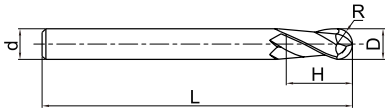

Ball nose slot

PML-2BL



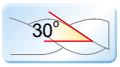


Picture 1



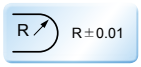
Picture 2

● PML-2B series with long shank.











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

Code key B213
Graphics category and identification B214
Cutting parameters B382–B383

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

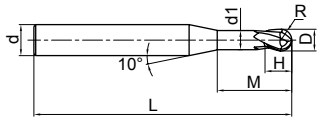

Profile


Cavity

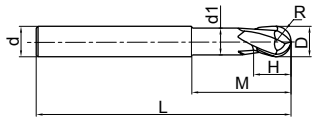

Ball nose slot

PML-2BFP



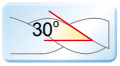


Picture 1

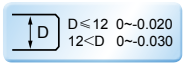


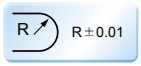
Picture 2

- High-rigidity short cutting edge, suitable for heavy cutting.











Ordering number	Basic dimension(mm)							Number of teeth Z	Geometry	Stock
	D	R	H	d_1	M	d	L			
PML-2BFP-R0.5	1.0	0.5	1	0.95	2.5	6	75	2	Picture 1	○
PML-2BFP-R0.75	1.5	0.75	1.5	1.45	3	6	75	2	Picture 1	○
PML-2BFP-R1.0	2.0	1.0	2	1.95	4	6	75	2	Picture 1	○
PML-2BFP-R1.5	3.0	1.5	3	2.85	6	6	75	2	Picture 1	○
PML-2BFP-R2.0	4.0	2.0	4	3.85	8	6	75	2	Picture 1	○
PML-2BFP-R2.5	5.0	2.5	5	4.85	10	6	75	2	Picture 1	○
PML-2BFP-R3.0	6.0	3.0	6	5.8	12	6	75	2	Picture 2	○
PML-2BFP-R4.0	8.0	4.0	8	7.8	16	8	100	2	Picture 2	○
PML-2BFP-R5.0	10.0	5.0	10	9.6	20	10	100	2	Picture 2	○
PML-2BFP-R6.0	12.0	6.0	12	11.5	24	12	100	2	Picture 2	○
PML-2BFP-R8.0	16.0	8.0	16	15.5	32	16	150	2	Picture 2	○
PML-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						
◎	◎	◎	○			○	◎			○	○

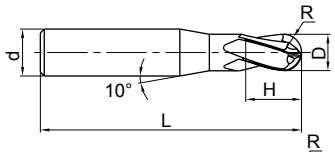
Code key B213
Graphics category and identification B214
Cutting parameters B382–B383

4-flute ball nose end mills with straight shank

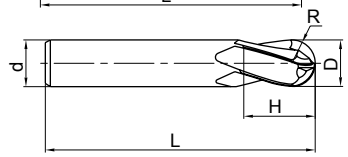
Profile | Cavity | Ball nose slot

PML-4B





Picture 1



Picture 2

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



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

Code key B213
Graphics category and identification B214
Cutting parameters B384

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


Profile

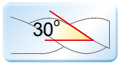
Cavity

Ball nose slot

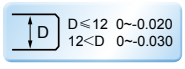
PML-4BL

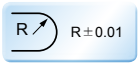


- PML-4B series with long shank.

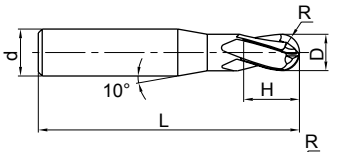




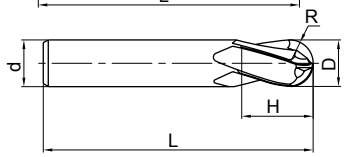








Picture 1



Picture 2

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

Code key B213
Graphics category and identification B214
Cutting parameters B384

2-flute R end mills with straight shank

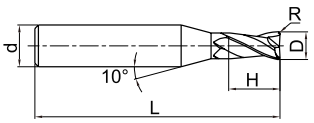

Radius shoulder


Profile

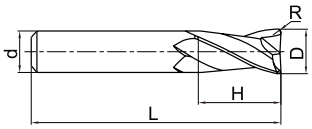

Radius corner slot

PML-2R



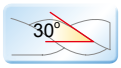


Picture 1

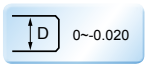


Picture 2

- Wide applications, applicable for several machining styles.









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

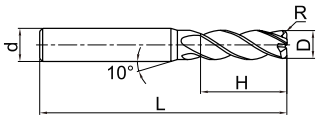
Code key B213
Graphics category and identification B214
Cutting parameters B388

4-flute R end mills with straight shank

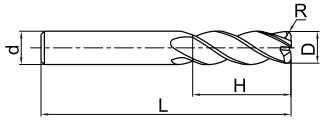
Radius shoulder | Profile | Radius corner slot

PML-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			
PML-4R-D3.0R0.2	3.0	0.2	6	8	50	4	Picture 1	●
PML-4R-D4.0R0.3	4.0	0.3	6	10	50	4	Picture 2	●
PML-4R-D4.0R0.5	4.0	0.5	6	10	50	4	Picture 2	●
PML-4R-D5.0R0.5	5.0	0.5	6	13	50	4	Picture 1	●
PML-4R-D5.0R1.0	5.0	1.0	6	13	50	4	Picture 1	●
PML-4R-D6.0R0.5	6.0	0.5	6	16	50	4	Picture 2	●
PML-4R-D6.0R1.0	6.0	1.0	6	16	50	4	Picture 2	●
PML-4R-D8.0R0.5	8.0	0.5	8	20	60	4	Picture 2	●
PML-4R-D8.0R1.0	8.0	1.0	8	20	60	4	Picture 2	●
PML-4R-D10.0R0.5	10.0	0.5	10	25	75	4	Picture 2	●
PML-4R-D10.0R1.0	10.0	1.0	10	25	75	4	Picture 2	●
PML-4R-D10.0R2.0	10.0	2.0	10	25	75	4	Picture 2	●
PML-4R-D10.0R3.0	10.0	3.0	10	25	75	4	Picture 2	●
PML-4R-D12.0R0.5	12.0	0.5	12	30	75	4	Picture 2	●
PML-4R-D12.0R1.0	12.0	1.0	12	30	75	4	Picture 2	●
PML-4R-D12.0R2.0	12.0	2.0	12	30	75	4	Picture 2	●
PML-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						
◎	◎	◎	○			○	◎			○	○

Code key B213
Graphics category and identification B214
Cutting parameters B389

4-flute R end mills with straight shank

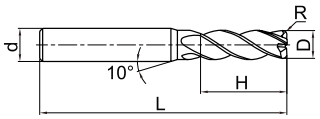

Radius shoulder


Profile

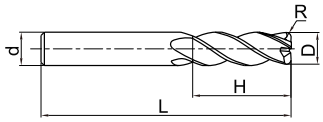

Radius corner slot

PML-4R-H



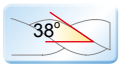


Picture 1

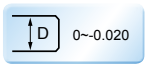


Picture 2

- Wide applications, applicable for several machining styles.









Ordering number	Basic dimension(mm)					Number of teeth Z	Geometry	Stock
	D	R	d	H	L			
PML-4R-D3.0R0.2-H	3.0	0.2	6	8	50	4	Picture 1	●
PML-4R-D4.0R0.3-H	4.0	0.3	6	10	50	4	Picture 1	●
PML-4R-D4.0R0.5-H	4.0	0.5	6	10	50	4	Picture 1	●
PML-4R-D5.0R0.5-H	5.0	0.5	6	13	50	4	Picture 1	●
PML-4R-D5.0R1.0-H	5.0	1.0	6	13	50	4	Picture 1	●
PML-4R-D6.0R0.5-H	6.0	0.5	6	16	50	4	Picture 2	●
PML-4R-D6.0R1.0-H	6.0	1.0	6	16	50	4	Picture 2	●
PML-4R-D8.0R0.5-H	8.0	0.5	8	20	60	4	Picture 2	●
PML-4R-D8.0R1.0-H	8.0	1.0	8	20	60	4	Picture 2	●
PML-4R-D10R0.5-H	10.0	0.5	10	25	75	4	Picture 2	●
PML-4R-D10R1.0-H	10.0	1.0	10	25	75	4	Picture 2	●
PML-4R-D10R2.0-H	10.0	2.0	10	25	75	4	Picture 2	●
PML-4R-D10R3.0-H	10.0	3.0	10	25	75	4	Picture 2	●
PML-4R-D12R0.5-H	12.0	0.5	12	30	75	4	Picture 2	●
PML-4R-D12R1.0-H	12.0	1.0	12	30	75	4	Picture 2	●
PML-4R-D12R2.0-H	12.0	2.0	12	30	75	4	Picture 2	●
PML-4R-D12R3.0-H	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						
◎	◎	◎	○			○	◎			○	○

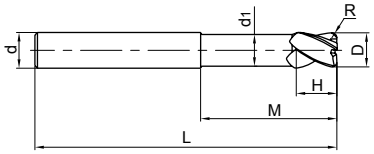
Code key B213
Graphics category and identification B214
Cutting parameters B389

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

Radius shoulder Profile Radius corner slot

PML-4RFP





- Long shank and short cutting edge designed for deep cavity milling.

30° Coated NaNo TiAlCrN D D≤12 0~-0.020 12<D 0~-0.030

Ordering number	Basic dimension(mm)							Number of teeth Z	Stock
	D	R	d	d_1	H	M	L		
PML-4RFP-D6.0R0.5	6.0	0.5	6	5.8	6	18	75	4	○
PML-4RFP-D6.0R1.0	6.0	1.0	6	5.8	6	18	75	4	○
PML-4RFP-D8.0R0.5	8.0	0.5	8	7.8	8	24	100	4	○
PML-4RFP-D8.0R1.0	8.0	1.0	8	7.8	8	24	100	4	○
PML-4RFP-D10.0R0.5	10.0	0.5	10	9.6	10	30	100	4	○
PML-4RFP-D10.0R1.0	10.0	1.0	10	9.6	10	30	100	4	○
PML-4RFP-D10.0R2.0	10.0	2.0	10	9.6	10	30	100	4	○
PML-4RFP-D12.0R0.5	12.0	0.5	12	11.5	12	36	100	4	○
PML-4RFP-D12.0R1.0	12.0	1.0	12	11.5	12	36	100	4	○
PML-4RFP-D12.0R2.0	12.0	2.0	12	11.5	12	36	100	4	○
PML-4RFP-D16.0R1.0	16.0	1.0	16	15.5	16	40	150	4	○
PML-4RFP-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

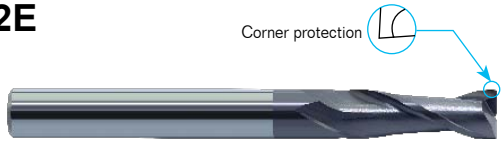
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	○			○	◎			○	○

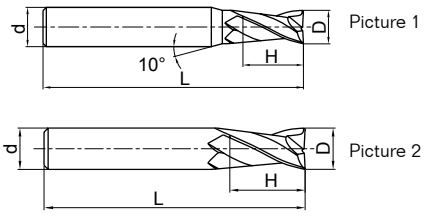
Code key B213 Graphics category and identification B214 Cutting parameters B389

2-flute flattened end mills with straight shank



PM-2E





- Very suitable for slot milling.
- Wide application.



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

Code key B213
Graphics category and identification B214
Cutting parameters B367

2-flute flattened end mills with straight shank

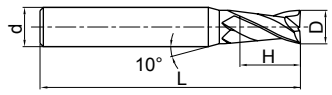

Side face


Step shoulder

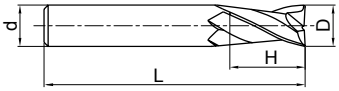

Straight slot

PM-2F



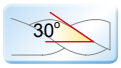


Picture 1



Picture 2

- Very suitable for slot milling.
- Wide application.









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

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

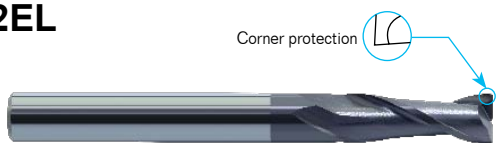
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	◎	◎		○	◎			○	○

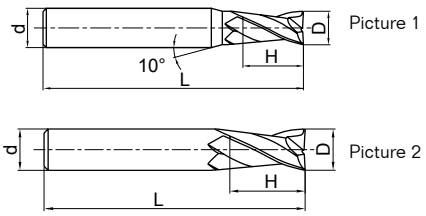
Code key B213
Graphics category and identification B214
Cutting parameters B368

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



PM-2EL





- PM-2E series with long cutting edge.



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

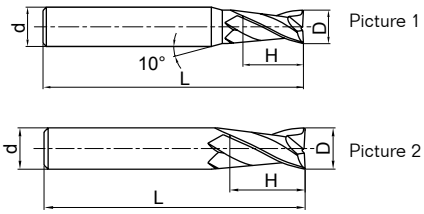
Code key B213
Graphics category and identification B214
Cutting parameters B367

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



PM-2FL





- PM-2F series with long cutting edge.



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

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

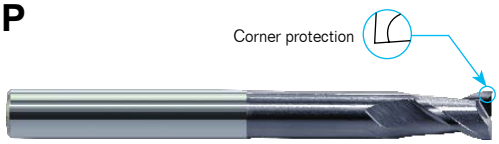
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	◎	◎		○	◎			○	○

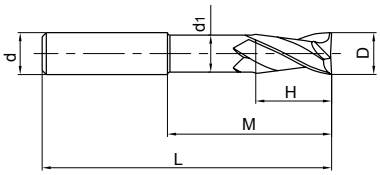
Code key B213
Graphics category and identification B214
Cutting parameters B368

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



PM-2EFP





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



Ordering number	Basic dimension(mm)						Number of teeth Z	Stock
	D	d	H	M	d_1	L		
PM-2EFP-D6.0	6.0	6	9	30	5.8	75	2	○
PM-2EFP-D8.0	8.0	8	12	40	7.8	100	2	○
PM-2EFP-D10.0	10.0	10	15	50	9.6	100	2	○
PM-2EFP-D12.0	12.0	12	18	50	11.5	100	2	○
PM-2EFP-D16.0	16.0	16	24	50	15.5	150	2	○
PM-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						
◎	◎	◎	◎	◎		○	◎			○	○

Code key B213
Graphics category and identification B214
Cutting parameters B369

3-flute flattened end mills with straight shank

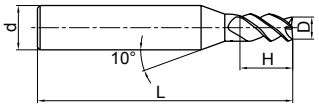

Side face


Step shoulder

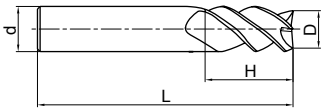

Straight slot

PM-3E-H



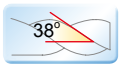


Picture 1



Picture 2

● Especially suitable for slot milling. ● Wide application.









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

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

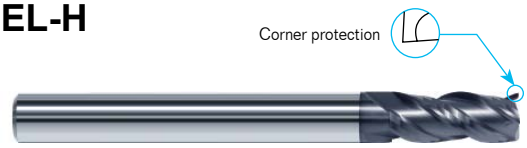
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	◎	◎		○	◎			○	○

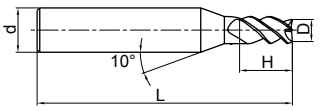
Code key B213
Graphics category and identification B214
Cutting parameters B370

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

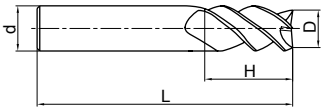


PM-3EL-H



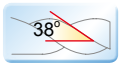


Picture 1

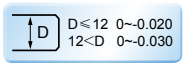


Picture 2

- PM-3E-H series with long shank.









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

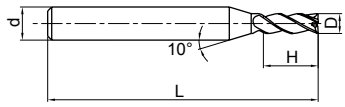
Code key B213
Graphics category and identification B214
Cutting parameters B370

4-flute flattened end mills with straight shank

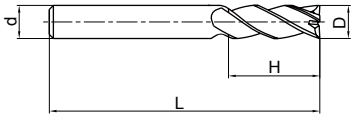


PM-4E-G





Picture 1



Picture 2

● Very suitable for side milling. ● Wide application.



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

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

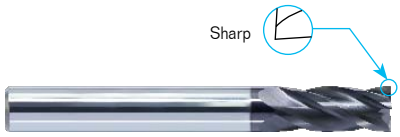
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	◎	◎		○	◎			○	○

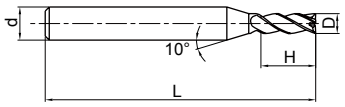
Code key B213
Graphics category and identification B214
Cutting parameters B371–B372

4-flute flattened end mills with straight shank

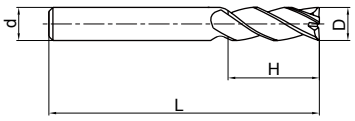


PM-4F-G





Picture 1



Picture 2

● Very suitable for side milling. ● Wide application.



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

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

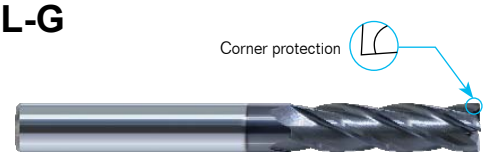
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	◎	◎		○	◎			○	○

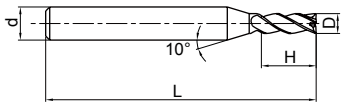
Code key B213
Graphics category and identification B214
Cutting parameters B373–B374

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

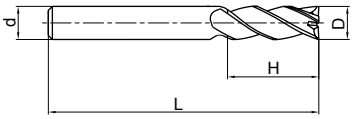


PM-4EL-G





Picture 1



Picture 2

- PM-4E-G series with long cutting edge.



Ordering number	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	D	d	H	L			
PM-4EL-D3.0-G	3.0	6	12	75	4	Picture 1	○
PM-4EL-D4.0-G	4.0	6	15	75	4	Picture 1	○
PM-4EL-D5.0-G	5.0	6	20	75	4	Picture 1	○
PM-4EL-D6.0-G	6.0	6	20	75	4	Picture 2	○
PM-4EL-D8.0-G	8.0	8	25	100	4	Picture 2	○
PM-4EL-D10.0-G	10.0	10	30	100	4	Picture 2	○
PM-4EL-D12.0-G	12.0	12	35	100	4	Picture 2	○
PM-4EL-D14.0-G	14.0	14	40	100	4	Picture 2	○
PM-4EL-D16.0-G	16.0	16	50	150	4	Picture 2	○
PM-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	~68HRC						
◎	◎	◎	◎	◎		○	◎			○	○

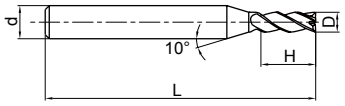
Code key B213
Graphics category and identification B214
Cutting parameters B371–B372

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

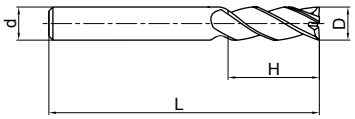


PM-4FL-G



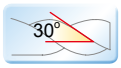


Picture 1



Picture 2

● PM-4F-G series with long cutting edge.









Ordering number	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	D	d	H	L			
PM-4FL-D3.0-G	3.0	6	12	75	4	Picture 1	○
PM-4FL-D4.0-G	4.0	6	15	75	4	Picture 1	○
PM-4FL-D5.0-G	5.0	6	20	75	4	Picture 1	○
PM-4FL-D6.0-G	6.0	6	20	75	4	Picture 2	○
PM-4FL-D8.0-G	8.0	8	25	100	4	Picture 2	○
PM-4FL-D10.0-G	10.0	10	30	100	4	Picture 2	○
PM-4FL-D12.0-G	12.0	12	35	100	4	Picture 2	○
PM-4FL-D14.0-G	14.0	14	40	100	4	Picture 2	○
PM-4FL-D16.0-G	16.0	16	50	150	4	Picture 2	○
PM-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	~68HRC						
◎	◎	◎	◎	◎		○	◎			○	○

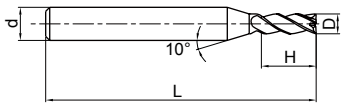
Code key B213
Graphics category and identification B214
Cutting parameters B373–B374

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

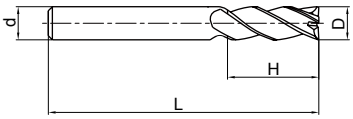


PM-4EX-G





Picture 1



Picture 2

- Extra long cutting edge, for deep side wall machining.



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

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

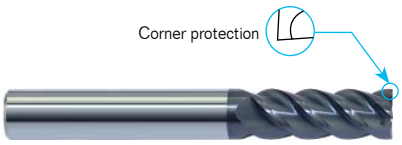
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	◎	◎		○	◎			○	○

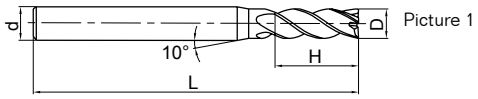
Code key B213
Graphics category and identification B214
Cutting parameters B375

4-flute flattened end mills with straight shank

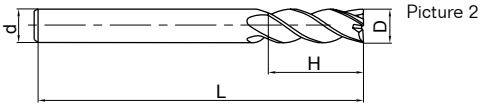


PM-4E





Picture 1



Picture 2

- Very suitable for side milling and shallow slot machining.
- Wide application.



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

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

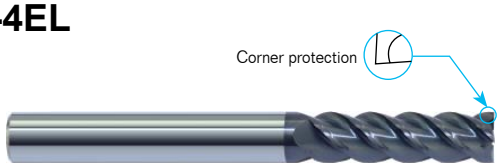
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	◎	◎		○	◎			○	○

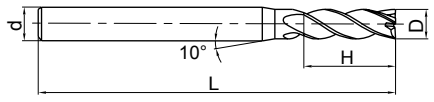
Code key B213
Graphics category and identification B214
Cutting parameters B376–B377

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

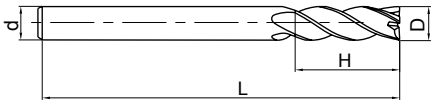


PM-4EL



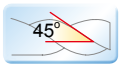


Picture 1



Picture 2

- PM-4E series with long cutting edge.









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

Code key B213
Graphics category and identification B214
Cutting parameters B376–B377

4-flute flattened end mills with straight shank

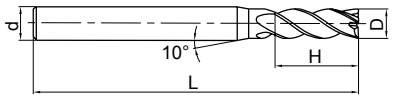

Side face


Step shoulder

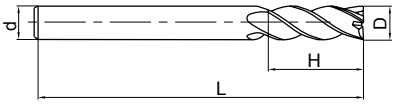

Straight slot

PM-4E-H



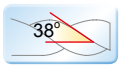


Picture 1



Picture 2

● Most suitable for slot milling. ● Wide application.









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

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

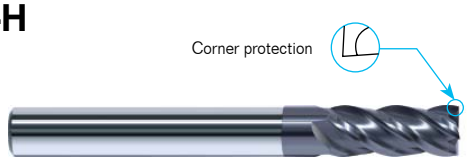
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	◎	◎		○	◎			○	○

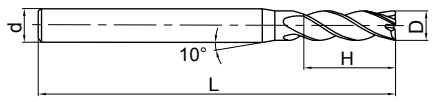
Code key B213
Graphics category and identification B214
Cutting parameters B376–B377

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

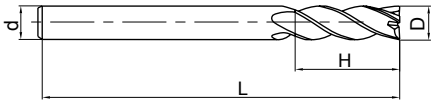


PM-4EL-H



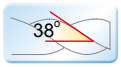


Picture 1



Picture 2

● PM-4E-H series with long shank.









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

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

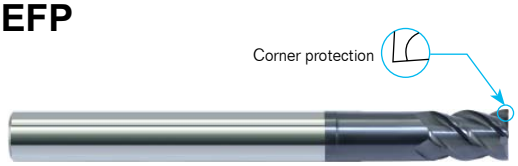
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	◎	◎		○	◎			○	○

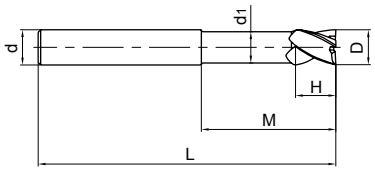
Code key B213
Graphics category and identification B214
Cutting parameters B376–B377

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



PM-4EFP





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



Ordering number	Basic dimension(mm)						Number of teeth Z	Stock
	D	d	H	M	d_1	L		
PM-4EFP-D6.0	6.0	6	9	30	5.8	75	4	○
PM-4EFP-D8.0	8.0	8	12	40	7.8	100	4	○
PM-4EFP-D10.0	10.0	10	15	50	9.6	100	4	○
PM-4EFP-D12.0	12.0	12	18	50	11.5	100	4	○
PM-4EFP-D16.0	16.0	16	24	50	15.5	150	4	○
PM-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						
◎	◎	◎	◎	◎		○	◎			○	○

Code key B213
Graphics category and identification B214
Cutting parameters B378–B379

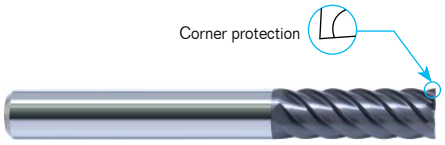
6-flute flattened end mills with straight shank

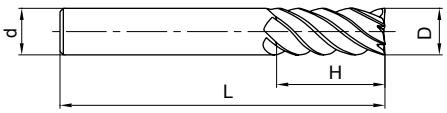

Side face

Step shoulder

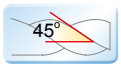
Straight slot

PM-6E





- Perfect rigidity, 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		
PM-6E-D6.0	6.0	6	18	60	6	○
PM-6E-D8.0	8.0	8	20	60	6	○
PM-6E-D10.0	10.0	10	30	75	6	○
PM-6E-D12.0	12.0	12	32	75	6	○
PM-6E-D16.0	16.0	16	40	100	6	○
PM-6E-D20.0	20.0	20	45	100	6	○

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

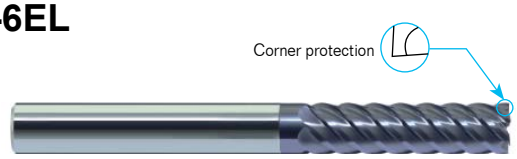
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	◎	◎		○	◎			○	○

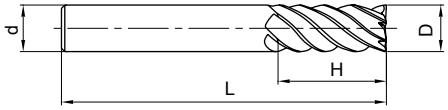
Code key B213
Graphics category and identification B214
Cutting parameters B380

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



PM-6EL





● PM-6E series with long cutting edge.



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

Code key B213
Graphics category and identification B214
Cutting parameters B381

2-flute ball nose end mills with straight shank

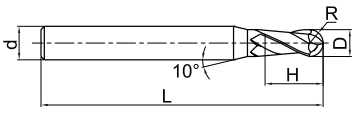

Profile


Cavity

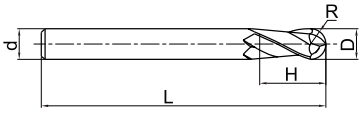

Ball nose slot

PM-2B



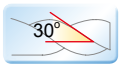


Picture 1



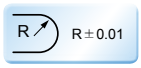
Picture 2

- 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			
PM-2B-R0.5S	1.0	0.5	4	2	50	2	Picture 1	●
PM-2B-R0.75S	1.5	0.75	4	3	50	2	Picture 1	●
PM-2B-R1.0S	2.0	1.0	4	4	50	2	Picture 1	●
PM-2B-R1.25S	2.5	1.25	4	5	50	2	Picture 1	●
PM-2B-R1.5S	3.0	1.5	4	6	50	2	Picture 1	●
PM-2B-R2.0S	4.0	2.0	4	8	50	2	Picture 2	●
PM-2B-R0.5	1.0	0.5	6	2	50	2	Picture 1	●
PM-2B-R0.75	1.5	0.75	6	3	50	2	Picture 1	●
PM-2B-R1.0	2.0	1.0	6	4	50	2	Picture 1	●
PM-2B-R1.25	2.5	1.25	6	5	50	2	Picture 1	●
PM-2B-R1.5	3.0	1.5	6	6	50	2	Picture 1	●
PM-2B-R1.75	3.5	1.75	6	8	50	2	Picture 1	●
PM-2B-R2.0	4.0	2.0	6	8	50	2	Picture 1	●
PM-2B-R2.5	5.0	2.5	6	10	50	2	Picture 1	●
PM-2B-R2.75	5.5	2.75	6	12	50	2	Picture 1	●
PM-2B-R3.0	6.0	3.0	6	12	50	2	Picture 2	●
PM-2B-R3.5	7.0	3.5	8	14	60	2	Picture 1	●
PM-2B-R4.0	8.0	4.0	8	16	60	2	Picture 2	●
PM-2B-R4.5	9.0	4.5	10	18	75	2	Picture 1	●
PM-2B-R5.0	10.0	5.0	10	20	75	2	Picture 2	●
PM-2B-R6.0	12.0	6.0	12	24	75	2	Picture 2	●
PM-2B-R7.0	14.0	7.0	14	28	75	2	Picture 2	●
PM-2B-R8.0	16.0	8.0	16	32	100	2	Picture 2	●
PM-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						
◎	◎	◎	◎	◎		○	◎			○	○

Code key B213
Graphics category and identification B214
Cutting parameters B382–B383

2-flute ball nose end mills with straight shank

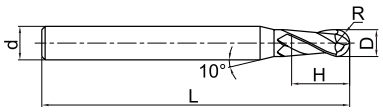

Profile


Cavity

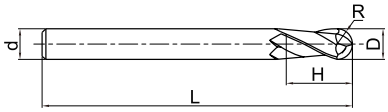

Ball nose slot

PM-2BL



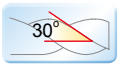


Picture 1



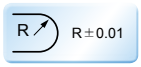
Picture 2

● PM-2B series with long shank.











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

Code key B213
Graphics category and identification B214
Cutting parameters B382–B383

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

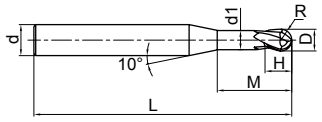

Profile


Cavity

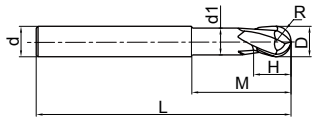

Ball nose slot

PM-2BFP



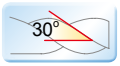


Picture 1

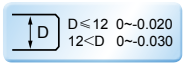


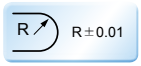
Picture 2

- High-rigidity short cutting edge, suitable for heavy cutting.











Ordering number	Basic dimension(mm)							Number of teeth Z	Geometry	Stock
	D	R	H	d_1	M	d	L			
PM-2BFP-R0.5	1.0	0.5	1	0.95	2.5	6	75	2	Picture 1	○
PM-2BFP-R0.75	1.5	0.75	1.5	1.45	3	6	75	2	Picture 1	○
PM-2BFP-R1.0	2.0	1.0	2	1.95	4	6	75	2	Picture 1	○
PM-2BFP-R1.5	3.0	1.5	3	2.85	6	6	75	2	Picture 1	○
PM-2BFP-R2.0	4.0	2.0	4	3.85	8	6	75	2	Picture 1	○
PM-2BFP-R2.5	5.0	2.5	5	4.85	10	6	75	2	Picture 1	○
PM-2BFP-R3.0	6.0	3.0	6	5.8	12	6	75	2	Picture 2	○
PM-2BFP-R4.0	8.0	4.0	8	7.8	16	8	100	2	Picture 2	○
PM-2BFP-R5.0	10.0	5.0	10	9.6	20	10	100	2	Picture 2	○
PM-2BFP-R6.0	12.0	6.0	12	11.5	24	12	100	2	Picture 2	○
PM-2BFP-R8.0	16.0	8.0	16	15.5	32	16	150	2	Picture 2	○
PM-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						
◎	◎	◎	◎	◎		○	◎			○	○

Code key B213
Graphics category and identification B214
Cutting parameters B382–B383

4-flute ball nose end mills with straight shank

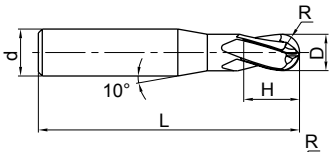

Profile


Cavity

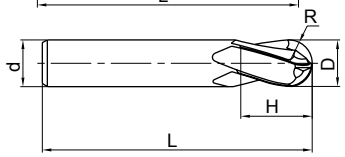

Ball nose slot

PM-4B



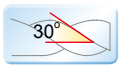


Picture 1

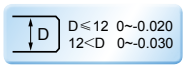


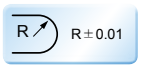
Picture 2

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











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

Code key B213
Graphics category and identification B214
Cutting parameters B384

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


Profile

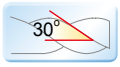

Cavity


Ball nose slot

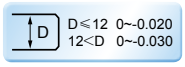
PM-4BL

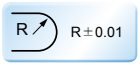


- PM-4B series with long shank.

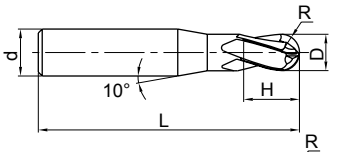




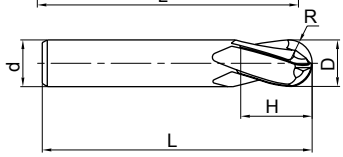








Picture 1



Picture 2

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

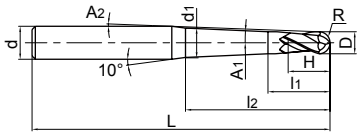
Code key B213
Graphics category and identification B214
Cutting parameters B384

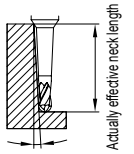
2-flute ball nose end mills with taper neck

Deep ball nose slot

PM-2BC







Degree of workpiece declining

- High-rigidity taper neck structure.

30° | Coated NaNo TiAlN | D 0~-0.015 | R R±0.005 R>0.5 R±0.01 R≥0.5

Ordering number	Basic dimension(mm)										Number of teeth Z	Degree of workpiece declining corresponding actually effective neck length				Stock
	D	R	A_1	H	l_2	l_1	A_2	d_1	L	d		0.5°	1°	2°	3°	
PM-2BC05-R0.25-M03	0.5	0.25	0.5°	0.5	3	1.5	7.8°	0.49	50	4	2	3.3	3.5	3.9	4.4	○
PM-2BC05-R0.25-M05					5		6.8°	0.53			2	5.3	5.6	6.2	7.1	○
PM-2BC10-R0.25-M03			1.0°		3		7.8°	0.52			2	-	3.4	3.8	4.3	○
PM-2BC10-R0.25-M05					5		6.9°	0.59			2	-	5.4	6.0	6.8	○
PM-2BC15-R0.25-M03			1.5°		3		7.9°	0.54			2	-	-	3.7	4.1	○
PM-2BC15-R0.25-M05					5		7.0°	0.65			2	-	-	5.8	6.6	○
PM-2BC05-R0.30-M05	0.6	0.30	0.5°	0.6	5	1.6	6.8°	0.62	50	4	2	5.3	5.6	6.2	7.1	○
PM-2BC05-R0.30-M08					8		5.7°	0.68			2	8.3	8.7	9.8	11.1	○
PM-2BC10-R0.30-M05			1.0°		5		6.8°	0.68			2	-	5.4	6.0	6.8	○
PM-2BC10-R0.30-M08					8		5.8°	0.79			2	-	8.4	9.4	10.7	○
PM-2BC10-R0.30-M10					10		5.2°	0.86			2	-	10.4	11.6	13.2	○
PM-2BC10-R0.30-M12					12		4.8°	0.93			2	-	12.4	13.9	15.8	○
PM-2BC10-R0.30-M15					15		4.2°	1.03			2	-	15.4	17.2	19.6	○
PM-2BC15-R0.30-M05			1.5°		5		6.9°	0.74			2	-	-	5.8	6.6	○
PM-2BC15-R0.30-M08					8		5.9°	0.90			2	-	-	9.0	10.2	○
PM-2BC05-R0.40-M08	0.8	0.40	0.5°	0.8	8	1.8	5.5°	0.87	50	4	2	8.3	8.7	9.8	11.1	○
PM-2BC05-R0.40-M12					12		4.5°	0.94	60		2	12.3	13.0	14.5	16.5	○
PM-2BC10-R0.40-M08			1.0°		8		5.6°	0.98	50		2	-	8.4	9.4	10.7	○
PM-2BC10-R0.40-M12					12		4.6°	1.12	60		2	-	12.4	13.9	15.8	○
PM-2BC15-R0.40-M08			1.5°		8		5.8°	1.09	50		2	-	-	9.0	10.2	○
PM-2BC15-R0.40-M12					12		4.8°	1.30	60		2	-	-	13.2	15.0	○

● 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						
◎	◎	◎	◎	◎		○	◎			○	○

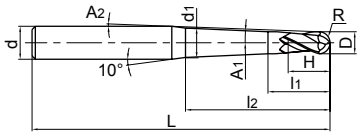
Code key B213 | Graphics category and identification B214 | Cutting parameters B386–B387

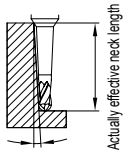
2-flute ball nose end mills with taper neck

Deep ball nose slot

PM-2BC

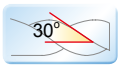




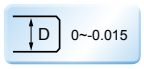


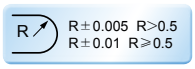
Degree of workpiece declining

- High-rigidity taper neck structure.











Ordering number	Basic dimension(mm)										Number of teeth Z	Degree of workpiece declining corresponding actually effective neck length				Stock
	D	R	A1	H	l2	l1	A2	d1	L	d		0.5°	1°	2°	3°	
PM-2BC05-R0.50-M10	1.0	0.50	0.5°	1.0	10	2.5	6.1°	1.08	60	6	2	10.4	10.9	12.2	13.9	○
PM-2BC05-R0.50-M15					15		5.1°	1.16	60		2	15.4	16.2	18.2	20.7	○
PM-2BC05-R0.50-M20					20		4.4°	1.25	70		2	20.4	21.5	24.1	27.4	○
PM-2BC05-R0.50-M25					25		3.8°	1.34	70		2	25.4	26.8	30.0	34.2	○
PM-2BC05-R0.50-M30					30		3.4°	1.42	70		2	30.4	32.0	35.9	41.0	○
PM-2BC10-R0.50-M10			1.0°		10		6.2°	1.21	60		2	-	10.5	11.8	13.4	○
PM-2BC10-R0.50-M15					15		5.2°	1.38	60		2	-	15.5	17.4	19.8	○
PM-2BC10-R0.50-M20					20		4.5°	1.56	70		2	-	20.5	23.0	26.2	○
PM-2BC10-R0.50-M25					25		3.9°	1.73	70		2	-	25.5	28.6	32.6	○
PM-2BC10-R0.50-M30					30		3.5°	1.91	70		2	-	30.5	34.2	39.0	○
PM-2BC10-R0.50-M35					35		3.2°	2.08	80		2	-	35.5	39.8	45.4	○
PM-2BC15-R0.50-M10			1.5°		10		6.3°	1.34	60		2	-	-	11.3	12.8	○
PM-2BC15-R0.50-M15					15		5.3°	1.60	60		2	-	-	16.6	18.9	○
PM-2BC15-R0.50-M20					20		4.6°	1.86	70		2	-	-	21.9	24.9	○
PM-2BC20-R0.50-M15			2°		15		5.4°	1.82	60		2	-	-	15.8	18.0	○
PM-2BC20-R0.50-M20					20		4.7°	2.17	70		2	-	-	20.8	23.7	○
PM-2BC30-R0.50-M20			3°		20		5.0°	2.78	70		2	-	-	-	21.2	○
PM-2BC50-R0.50-M20			5°		20		5.7°	4.01	70		2	-	-	-	-	○
PM-2BC05-R0.60-M12	1.2	0.60	0.5°	1.2	12	2.7	5.6°	1.31	60	6	2	12.4	13.1	14.6	16.6	○
PM-2BC05-R0.60-M24					24		3.8°	1.52	70		2	24.4	25.7	28.8	32.8	○
PM-2BC10-R0.60-M12			1.0°		12		5.7°	1.47	60		2	-	12.5	14.0	15.9	○
PM-2BC10-R0.60-M24					24		3.9°	1.89	70		2	-	24.5	27.5	31.3	○
PM-2BC15-R0.60-M12			1.5°		12		5.8°	1.63	60		2	-	-	13.4	15.2	○
PM-2BC15-R0.60-M24					24		4.1°	2.26	70		2	-	-	26.2	29.8	○

● 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						
◎	◎	◎	◎	◎		○	◎			○	○

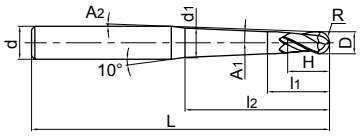
Code key B213
Graphics category and identification B214
Cutting parameters B386–B387

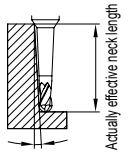
2-flute ball nose end mills with taper neck

Deep ball nose slot

PM-2BC

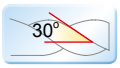




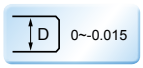


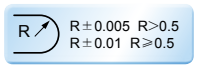
Degree of workpiece declining

- High-rigidity taper neck structure.











Ordering number	Basic dimension(mm)										Number of teeth Z	Degree of workpiece declining corresponding actually effective neck length				Stock
	D	R	A1	H	l2	l1	A2	d1	L	d		0.5°	1°	2°	3°	
PM-2BC05-R0.75-M10	1.5	0.75	0.5°	1.5	10	3	5.9°	1.57	60	6	2	10.4	10.9	12.2	13.8	○
PM-2BC05-R0.75-M15					15		4.9°	1.65	60		2	15.4	16.2	18.1	20.6	○
PM-2BC05-R0.75-M30					30		3.2°	1.92	70		2	30.4	32.0	35.9	40.9	○
PM-2BC10-R0.75-M10			1.0°		10		6.0°	1.69	60		2	-	10.5	11.8	13.3	○
PM-2BC10-R0.75-M15					15		5.0°	1.86	60		2	-	15.5	17.4	19.7	○
PM-2BC10-R0.75-M20	1.5	0.75	1.0°	1.5	20	3	4.2°	2.04	70	6	2	-	20.5	23.0	26.1	○
PM-2BC10-R0.75-M30					30		3.3°	2.39	70		2	-	30.5	34.2	39.0	○
PM-2BC15-R0.75-M10			1.5°		10		6.1°	1.81	60		2	-	-	11.3	12.8	○
PM-2BC15-R0.75-M15					15		5.1°	2.07	60		2	-	-	16.6	18.9	○
PM-2BC15-R0.75-M30					30		3.4°	2.86	70		2	-	-	32.5	37.0	○
PM-2BC05-R1.0-M20	2.0	1.0	0.5°	2.0	20	4	3.9°	2.18	60	6	2	20.7	21.7	24.3	27.6	○
PM-2BC05-R1.0-M30					30		2.9°	2.36	70		2	30.7	32.3	36.2	non-interference	○
PM-2BC05-R1.0-M40					40		2.4°	2.53	80		2	40.7	42.8	48.0	non-interference	○
PM-2BC10-R1.0-M20			1.0°		20		4.0°	2.46	60		2	-	20.8	23.3	26.4	○
PM-2BC10-R1.0-M25					25		3.4°	2.64	60		2	-	25.8	28.9	32.9	○
PM-2BC10-R1.0-M30					30		3.0°	2.81	70		2	-	30.8	34.5	39.3	○
PM-2BC10-R1.0-M35					35		2.7°	2.99	80		2	-	35.8	40.1	non-interference	○
PM-2BC10-R1.0-M40					40		2.5°	3.16	80		2	-	40.8	45.8	non-interference	○
PM-2BC10-R1.0-M50					50		2.1°	3.51	90		2	-	50.8	57.0	non-interference	○
PM-2BC15-R1.0-M20	2.0	1.0	1.5°	2	20	4	4.1°	2.74	60	6	2	-	-	22.3	25.3	○
PM-2BC15-R1.0-M30					30		3.1°	3.27	70		2	-	-	32.9	37.4	○
PM-2BC15-R1.0-M40					40		2.6°	3.79	80		2	-	-	43.5	non-interference	○
PM-2BC20-R1.0-M30			2°		30		3.3°	3.72	70		2	-	-	31.3	35.5	○
PM-2BC20-R1.0-M40					40		2.7°	4.42	80		2	-	-	41.3	non-interference	○
PM-2BC30-R1.0-M30			3°		30		3.5°	4.63	70		2	-	-	-	31.8	○
PM-2BC30-R1.0-M40					40		2.9°	5.68	80		2	-	-	-	non-interference	○

● 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						
◎	◎	◎	◎	◎		○	◎			○	○

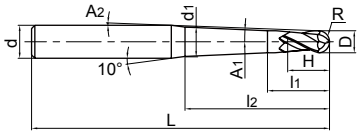
Code key B213
Graphics category and identification B214
Cutting parameters B386–B387

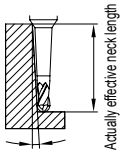
2-flute ball nose end mills with taper neck

Deep ball nose slot

PM-2BC







Degree of workpiece declining

- High-rigidity taper neck structure.

30° | Coated NaNo TiAlN | D 0~-0.015 | R R±0.005 R>0.5 R±0.01 R≥0.5

Ordering number	Basic dimension(mm)										Number of teeth Z	Degree of workpiece declining corresponding actually effective neck length				Stock
	D	R	A_1	H	l_2	l_1	A_2	d_1	L	d		0.5°	1°	2°	3°	
PM-2BC05-R1.5-M30	3.0	1.5	0.5°	3	30	6	2.4°	3.32	70	6	2	30.7	32.3	36.2	non-interference	○
PM-2BC05-R1.5-M40					40		1.9°	3.50	80		2	40.7	42.9	non-interference	non-interference	○
PM-2BC05-R1.5-M50					50		1.6°	3.67	90		2	50.7	53.4	non-interference	non-interference	○
PM-2BC10-R1.5-M30			1.0°		30		2.5°	3.74	70		2	-	31.0	34.7	non-interference	○
PM-2BC10-R1.5-M40					40		2.0°	4.09	80		2	-	41.0	45.9	non-interference	○
PM-2BC10-R1.5-M50					50		1.7°	4.44	90		2	-	51.0	non-interference	non-interference	○
PM-2BC15-R1.5-M30			1.5°		30		2.6°	4.16	70		2	-	-	33.1	non-interference	○
PM-2BC15-R1.5-M40					40		2.1°	4.69	80		2	-	-	43.8	non-interference	○
PM-2BC15-R1.5-M50					50		1.7°	5.21	90		2	-	-	non-interference	non-interference	○
PM-2BC05-R2.0-M60	4.0	2.0	0.5°	4	60	7	1.0°	4.83	110	6	2	60.8	64.0	non-interference	non-interference	○
PM-2BC10-R2.0-M60			1.0°		60		1.0°	5.76	110		2	-	61.1	non-interference	non-interference	○

● 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						
◎	◎	◎	◎	◎		○	◎			○	○

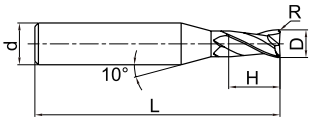
Code key B213 | Graphics category and identification B214 | Cutting parameters B386–B387

2-flute R end mills with straight shank

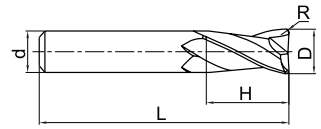
Radius shoulder | Profile | Radius corner slot

PM-2R





Picture 1



Picture 2

- Wide applications, applicable for several machining styles.

30° | Coated NaNo TiAlN | D 0~-0.020

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

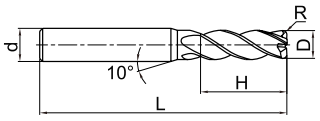
Code key B213 | Graphics category and identification B214 | Cutting parameters B388

4-flute R end mills with straight shank

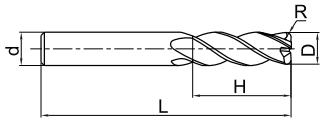
Radius shoulder | Profile | Radius corner slot

PM-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			
PM-4R-D3.0R0.2	3.0	0.2	6	8	50	4	Picture 1	●
PM-4R-D4.0R0.3	4.0	0.3	6	10	50	4	Picture 2	●
PM-4R-D4.0R0.5	4.0	0.5	6	10	50	4	Picture 2	●
PM-4R-D5.0R0.5	5.0	0.5	6	13	50	4	Picture 1	●
PM-4R-D5.0R1.0	5.0	1.0	6	13	50	4	Picture 1	●
PM-4R-D6.0R0.5	6.0	0.5	6	16	50	4	Picture 2	●
PM-4R-D6.0R1.0	6.0	1.0	6	16	50	4	Picture 2	●
PM-4R-D8.0R0.5	8.0	0.5	8	20	60	4	Picture 2	●
PM-4R-D8.0R1.0	8.0	1.0	8	20	60	4	Picture 2	●
PM-4R-D10.0R0.5	10.0	0.5	10	25	75	4	Picture 2	●
PM-4R-D10.0R1.0	10.0	1.0	10	25	75	4	Picture 2	●
PM-4R-D10.0R2.0	10.0	2.0	10	25	75	4	Picture 2	●
PM-4R-D10.0R3.0	10.0	3.0	10	25	75	4	Picture 2	●
PM-4R-D12.0R0.5	12.0	0.5	12	30	75	4	Picture 2	●
PM-4R-D12.0R1.0	12.0	1.0	12	30	75	4	Picture 2	●
PM-4R-D12.0R2.0	12.0	2.0	12	30	75	4	Picture 2	●
PM-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						
◎	◎	◎	◎	◎		○	◎			○	○

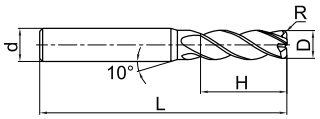
Code key B213
Graphics category and identification B214
Cutting parameters B389

4-flute R end mills with straight shank

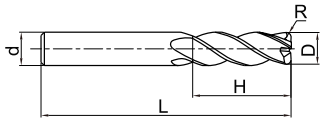
Radius shoulder | Profile | Radius corner slot

PM-4R-H





Picture 1



Picture 2

- Wide applications, applicable for several machining styles.

38° | Coated NaNo TiAlN | D 0~-0.020

Ordering number	Basic dimension(mm)					Number of teeth Z	Geometry	Stock
	D	R	d	H	L			
PM-4R-D3.0R0.2-H	3.0	0.2	6	8	50	4	Picture 1	●
PM-4R-D4.0R0.3-H	4.0	0.3	6	10	50	4	Picture 1	●
PM-4R-D4.0R0.5-H	4.0	0.5	6	10	50	4	Picture 1	●
PM-4R-D5.0R0.5-H	5.0	0.5	6	13	50	4	Picture 1	●
PM-4R-D5.0R1.0-H	5.0	1.0	6	13	50	4	Picture 1	●
PM-4R-D6.0R0.5-H	6.0	0.5	6	16	50	4	Picture 2	●
PM-4R-D6.0R1.0-H	6.0	1.0	6	16	50	4	Picture 2	●
PM-4R-D8.0R0.5-H	8.0	0.5	8	20	60	4	Picture 2	●
PM-4R-D8.0R1.0-H	8.0	1.0	8	20	60	4	Picture 2	●
PM-4R-D10R0.5-H	10.0	0.5	10	25	75	4	Picture 2	●
PM-4R-D10R1.0-H	10.0	1.0	10	25	75	4	Picture 2	●
PM-4R-D10R2.0-H	10.0	2.0	10	25	75	4	Picture 2	●
PM-4R-D10R3.0-H	10.0	3.0	10	25	75	4	Picture 2	●
PM-4R-D12R0.5-H	12.0	0.5	12	30	75	4	Picture 2	●
PM-4R-D12R1.0-H	12.0	1.0	12	30	75	4	Picture 2	●
PM-4R-D12R2.0-H	12.0	2.0	12	30	75	4	Picture 2	●
PM-4R-D12R3.0-H	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						
◎	◎	◎	◎	◎		○	◎			○	○

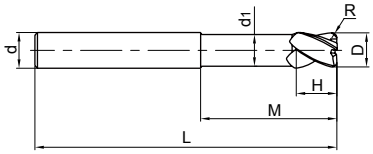
Code key B213 | Graphics category and identification B214 | Cutting parameters B389

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

Radius shoulder | Profile | Radius corner slot

PM-4RFP





- Long shank and short cutting edge designed for deep cavity milling.

30° | Coated NaNo TiAlN | D: D≤12 0~-0.020, 12<D 0~-0.030

Ordering number	Basic dimension(mm)							Number of teeth Z	Stock
	D	R	d	d_1	H	M	L		
PM-4RFP-D6.0R0.5	6.0	0.5	6	5.8	6	18	75	4	○
PM-4RFP-D6.0R1.0	6.0	1.0	6	5.8	6	18	75	4	○
PM-4RFP-D8.0R0.5	8.0	0.5	8	7.8	8	24	100	4	○
PM-4RFP-D8.0R1.0	8.0	1.0	8	7.8	8	24	100	4	○
PM-4RFP-D10.0R0.5	10.0	0.5	10	9.6	10	30	100	4	○
PM-4RFP-D10.0R1.0	10.0	1.0	10	9.6	10	30	100	4	○
PM-4RFP-D10.0R2.0	10.0	2.0	10	9.6	10	30	100	4	○
PM-4RFP-D12.0R0.5	12.0	0.5	12	11.5	12	36	100	4	○
PM-4RFP-D12.0R1.0	12.0	1.0	12	11.5	12	36	100	4	○
PM-4RFP-D12.0R2.0	12.0	2.0	12	11.5	12	36	100	4	○
PM-4RFP-D16.0R1.0	16.0	1.0	16	15.5	16	40	150	4	○
PM-4RFP-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						
◎	◎	◎	◎	◎		○	◎			○	○

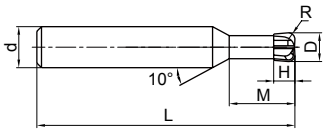
Code key B213
Graphics category and identification B214
Cutting parameters B389

4-flute end mills with high feed rate

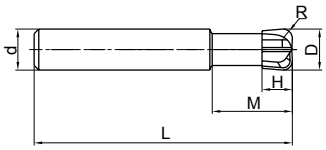
Radius shoulder | Profile | Radius corner slot

PM-4H





Picture 1



Picture 2

- High-rigidity short cutting edge, suitable for machining with high feed rate.

Coated NaNo TiAlN | D D~-0.030

Ordering number	Basic dimension(mm)							Number of teeth Z	Geometry	Stock
	D	R	d	d_1	H	M	L			
PM-4H-D3.0R0.8	3.0	0.8	6	2.7	1.2	8	50	4	Picture 1	○
PM-4H-D4.0R1.0	4.0	1.0	6	3.6	1.6	10	50	4	Picture 1	○
PM-4H-D5.0R1.2	5.0	1.2	6	4.5	2	12.5	50	4	Picture 1	○
PM-4H-D6.0R1.0	6.0	1.0	6	5.4	2.5	12	50	4	Picture 2	○
PM-4H-D6.0R1.5	6.0	1.5	6	5.4	2.5	12	50	4	Picture 2	○
PM-4H-D8.0R1.0	8.0	1.0	8	7.0	3.5	16	60	4	Picture 2	○
PM-4H-D8.0R2.0	8.0	2.0	8	7.0	3.5	16	60	4	Picture 2	○
PM-4H-D10.0R1.0	10.0	1.0	10	9.0	4	20	75	4	Picture 2	○
PM-4H-D10.0R2.0	10.0	2.0	10	9.0	4	20	75	4	Picture 2	○
PM-4H-D12.0R2.0	12.0	2.0	12	11.0	5	24	75	4	Picture 2	○
PM-4H-D12.0R3.0	12.0	3.0	12	11.0	5	24	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						
◎	◎	◎	◎	◎		○	◎			○	○

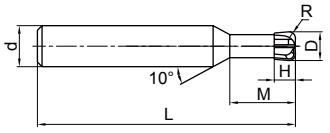
Code key B213 | Graphics category and identification B214 | Cutting parameters B390–B391

4-flute end mills with high feed rate

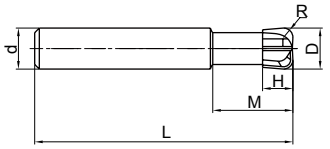
Radius shoulder | Profile | Radius corner slot

PM-4HL





Picture 1



Picture 2

- PM-4H series with long shank.

Coated NaNo TiAlN | D D~-0.030

Ordering number	Basic dimension(mm)							Number of teeth Z	Geometry	Stock
	D	R	d	d_1	H	M	L			
PM-4HL-D4.0R1.0	4.0	1.0	6	3.6	1.6	10	75	4	Picture 1	○
PM-4HL-D5.0R1.2	5.0	1.2	6	4.5	2	12.5	75	4	Picture 1	○
PM-4HL-D6.0R1.0	6.0	1.0	6	5.4	2.5	12	75	4	Picture 2	○
PM-4HL-D6.0R1.5	6.0	1.5	6	5.4	2.5	12	75	4	Picture 2	○
PM-4HL-D8.0R1.0	8.0	1.0	8	7.0	3.5	16	100	4	Picture 2	○
PM-4HL-D8.0R2.0	8.0	2.0	8	7.0	3.5	16	100	4	Picture 2	○
PM-4HL-D10.0R1.0	10.0	1.0	10	9.0	4	20	100	4	Picture 2	○
PM-4HL-D10.0R2.0	10.0	2.0	10	9.0	4	20	100	4	Picture 2	○
PM-4HL-D12.0R2.0	12.0	2.0	12	11.0	5	24	100	4	Picture 2	○
PM-4HL-D12.0R3.0	12.0	3.0	12	11.0	5	24	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						
◎	◎	◎	◎	◎		○	◎			○	○

Code key B213 | Graphics category and identification B214 | Cutting parameters B390–B391



GM series general end mills

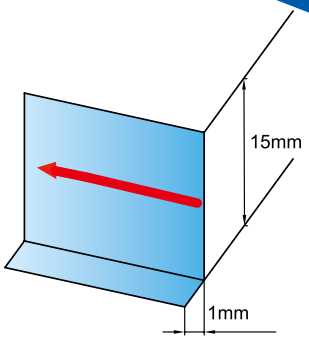
Wide application High efficiency machining can be achieved ranging from common steel to pre-hardened steel machining.

Optimized structure Appropriate combination of sharp cutting edge and tool strength makes cutting easier and faster, extending tool life.

Versatile product series Suitable for rough machining with high metal removal rate to finish machining with high surface quality.

Complete diameter range Minimum diameter of 0.3mm for machining of the smallest parts.

Tool type: GM-4E-D10.0
Dimensions: Ø10.0mm
Workpiece material: NAK80(40HRC)
Rotating speed: 3200r/min (100m/min)
Feed rate: 640mm/min(0.2mm/r)
Axial cutting depth: a_p=15mm
Radial cutting depth: a_e=1.0mm
Cutting style: side milling (down milling)
Cooling system: air blow
Machine tool: MIKRON UCP 1000

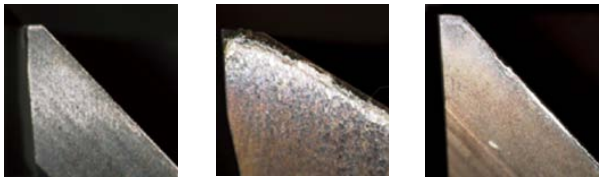




Cutting edge abrasion and workpiece surface quality

End mill	GM-4E-D10.0	Similar product of company A	Similar product of company B
Cutting length	60m	20m	60m

Cutting edge abrasion



Workpiece surface quality





Multipurpose 3-flute end mills

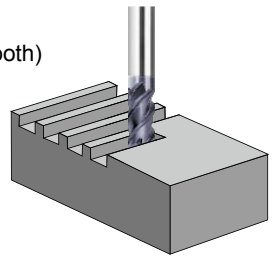
GM-3E GM-3EL

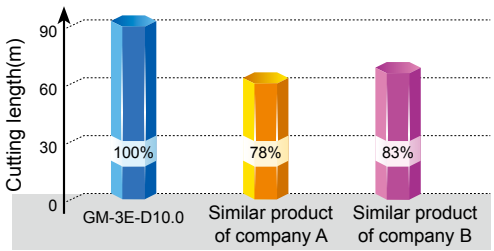
Excellent vibration resistance, able to achieve various machining operations such as slot milling, side milling, drilling, etc.!



GM-3E-D10.0 slot milling 718H(32HRC)

Machine tool: MIKRON UCP1000
Tool holder: HSK63-A
Workpiece material: 718H(32HRC)
Cutting speed: 80(m/min)
Feed rate per tooth: 0.06(mm/tooth)
Axial cutting depth: 5(mm)
Radial cutting depth: 10(mm)
Cooling system: air blow
Milling style: slot milling
Overhang: 35mm
Failure identification:
(A)Severe breakage occurs with a breakage value above 0.2mm.
(B)Even abrasion value of flank reaches 0.1mm.
Either situation is regarded as tool failure.



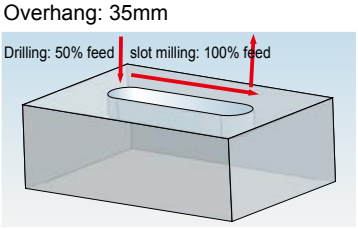


Slot milling cutting length comparison

GM-3E-D10.0 combined machining 718H(32HRC)

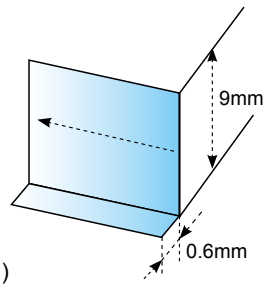
Machine tool: MIKRON UCP1000
Tool holder: HSK63-A
Workpiece material: 718H(32HRC)
Cutting speed: 80(m/min)
Feed rate per tooth: 0.06(mm/tooth)
Axial cutting depth: 5(mm)
Radial cutting depth: 10(mm)
Cooling system: air blow
Milling style: combined cutting
Overhang: 35mm

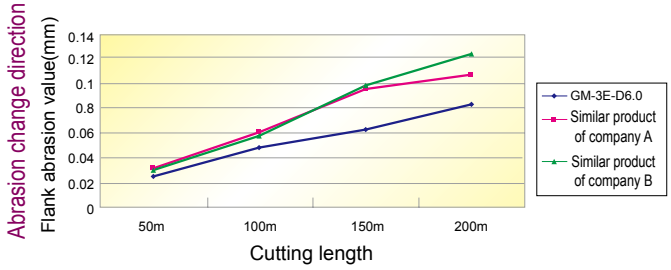
Overhang: 35mm



GM-3E-D6.0 side milling NAK80(37HRC)

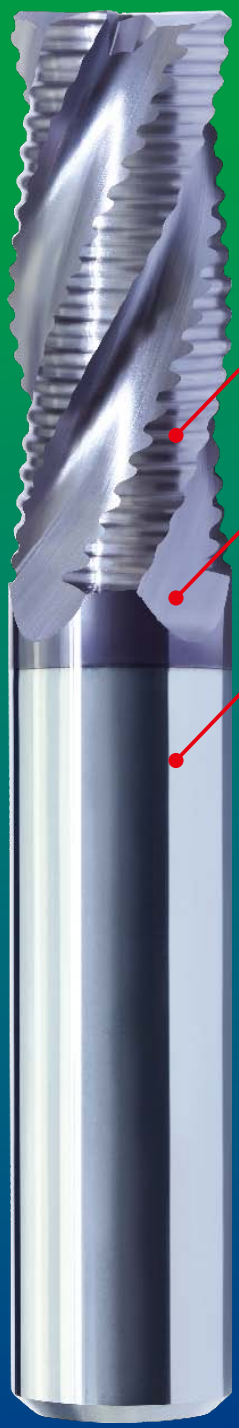
Machine tool: MIKRON UCP1000
Tool holder: HSK63-A
Workpiece material: NAK80(37HRC)
Cutting speed: 100(m/min)
Feed rate per tooth: 0.06(mm/tooth)
Axial cutting depth: 9(mm)
Radial cutting depth: 0.6(mm)
Cooling system: air blow
Milling style: side milling (down milling)
Overhang: 22mm





High-efficiency roughing of steel

GM-4W
Corrugated edge end mills



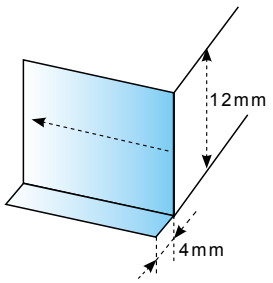
Optimized corrugation specially designed for P-type material with proper control of chips size, improving tool life and stability.

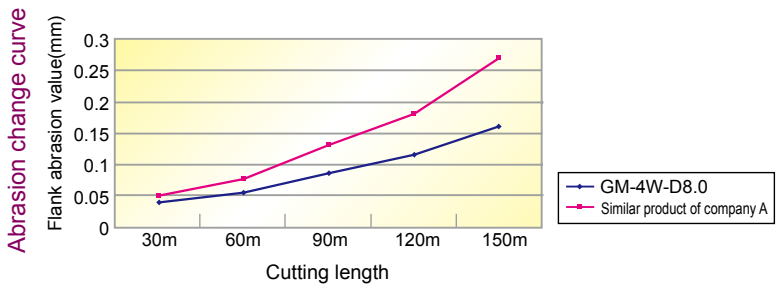
Nano coating with excellent lubrication property can reduce vibration as well as resist wear.

Ultra fine cemented carbide substrate with high toughness can easily achieve heavy roughing.

End mills for high-efficiency roughingGM-4W-D8.0 cutting die steel NAK55(33HRC)

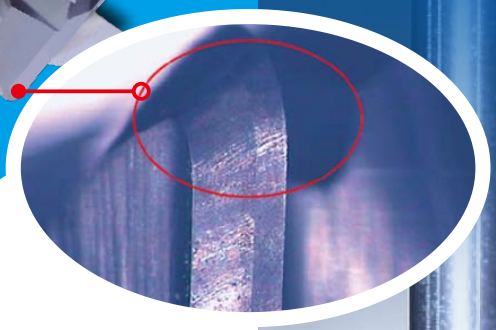
Machine tool: MIKRON UCP1000
Tool holder: HSK63-A
Workpiece material: NAK55(33HRC)
Cutting speed: 100(m/min)
Feed rate per tooth: 0.06(mm/tooth)
Axial cutting depth: 12(mm)
Radial cutting depth: 4(mm)
Cooling system: air blow
Milling style: side milling (down milling)
Overhang: 30mm





High-precision R end mill series

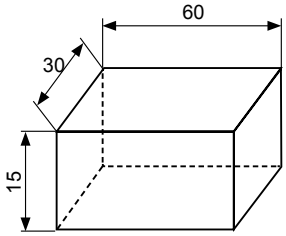
GM-4R
GM-4RL
GM-2R

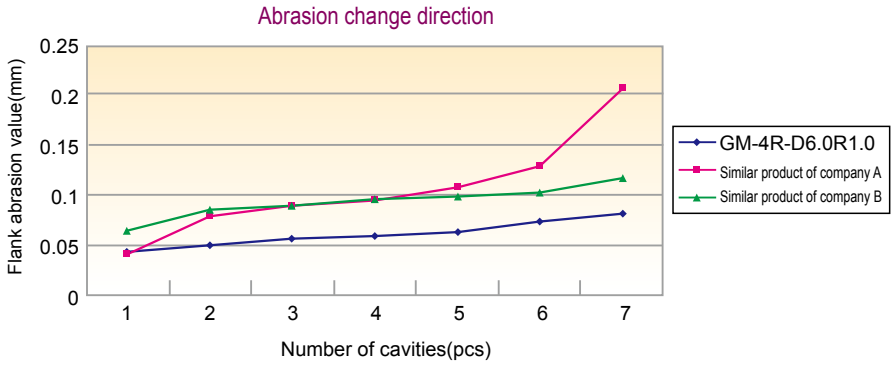


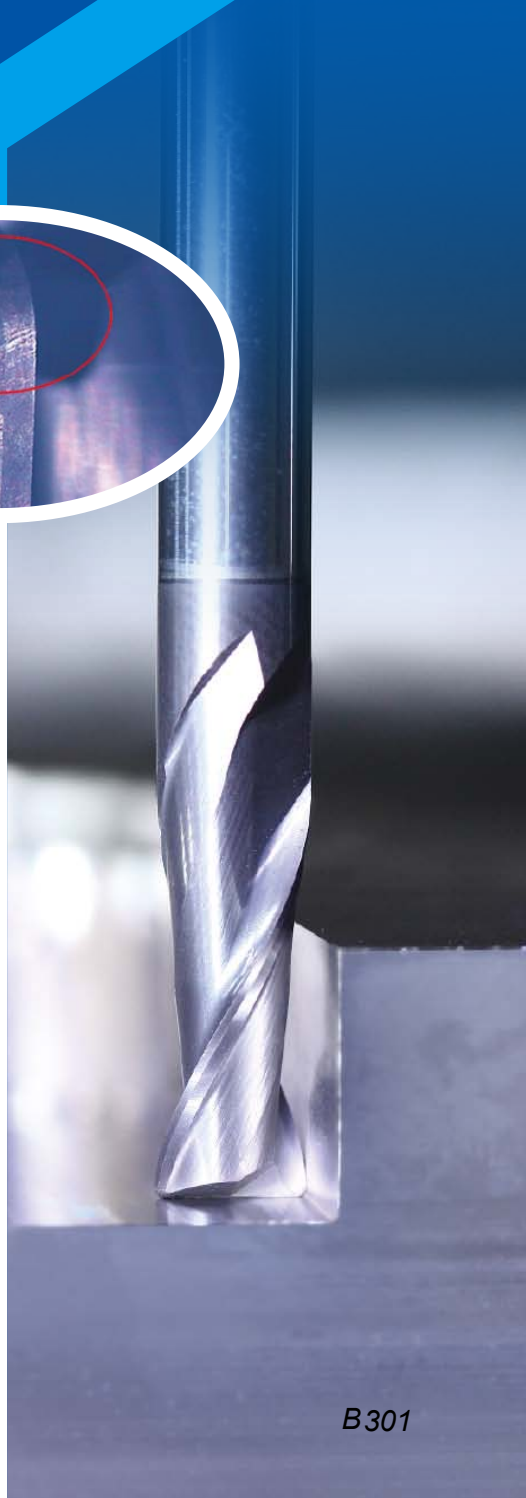
High-precision seamless connection of nose and peripheral cutting edge reduces the abrasion at the juncture and improves tool life.

GM-4R-D6.0R1.0 cavity milling 42CrMo(35HRC)

Machine tool: MIKRON UCP1000
Tool holder: HSK63-A
Workpiece material: 42CrMo(35HRC)
Cutting speed: 100(m/min)
Feed rate per tooth: 0.06(mm/tooth)
Axial cutting depth: 0.3(mm)
Radial cutting depth: 2(mm)
Cooling system: air blow
Milling style: cavity milling
Overhang: 30mm



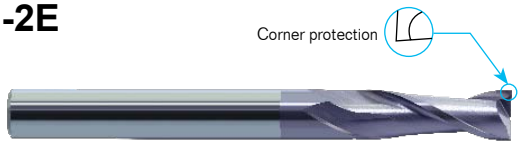


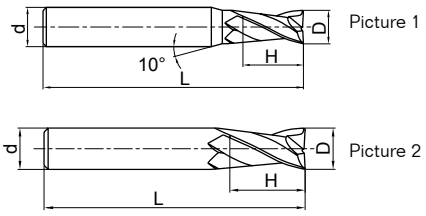


2-flute flattened end mills with straight shank



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	2.0	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	8	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	2.0	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						
◎	◎	◎	○			○	◎				

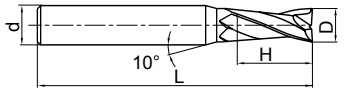
Code key B213
Graphics category and identification B214
Cutting parameters B392

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

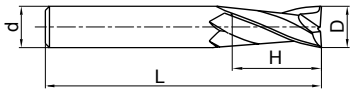


GM-2EL





Picture 1



Picture 2

- 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						
◎	◎	◎	○			○	◎				

Code key B213
Graphics category and identification B214
Cutting parameters B392

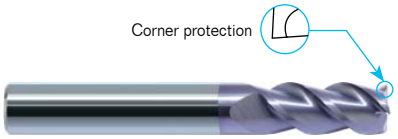
3-flute flattened end mills with straight shank

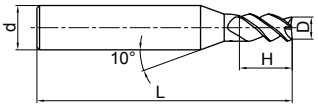

Side face


Step shoulder

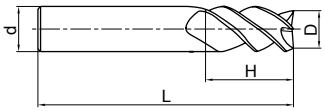

Straight slot

GM-3E



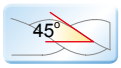


Picture 1



Picture 2

● 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

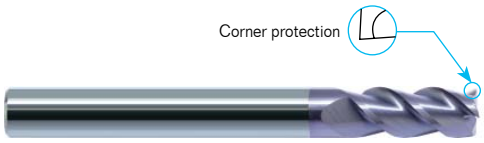
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	○			○	◎				

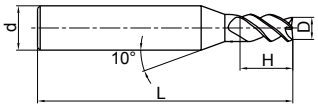
Code key B213
Graphics category and identification B214
Cutting parameters B393

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

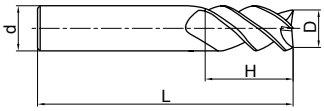


GM-3EL





Picture 1



Picture 2

- 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						
◎	◎	◎	○			○	◎				

Code key B213
Graphics category and identification B214
Cutting parameters B393

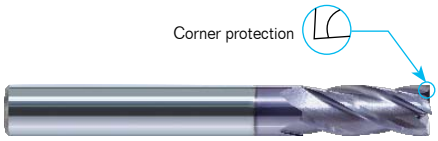

Side face

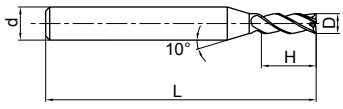
Step shoulder

Straight slot

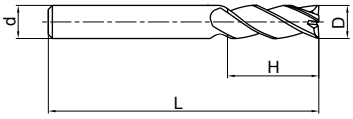
4-flute flattened end mills with straight shank

GM-4E-G



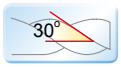


Picture 1



Picture 2

- 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

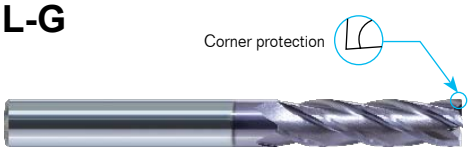
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	○			○	◎				

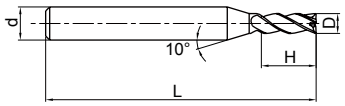
Code key B213
Graphics category and identification B214
Cutting parameters B394

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

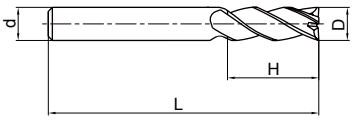


GM-4EL-G





Picture 1



Picture 2

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



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	~68HRC						
◎	◎	◎	○			○	◎				

Code key B213
Graphics category and identification B214
Cutting parameters B394

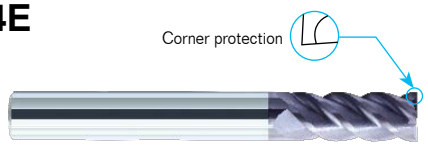
4-flute flattened end mills with straight shank

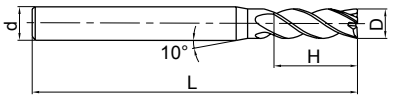

Side face


Step shoulder

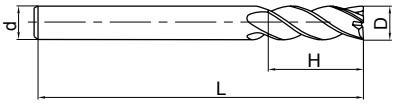

Straight slot

GM-4E



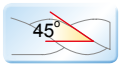


Picture 1



Picture 2

- Very suitable for side milling and shallow slot machining.
- Wide application.









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	26	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						
◎	◎	◎	○			○	◎				

Code key B213
Graphics category and identification B214
Cutting parameters B395

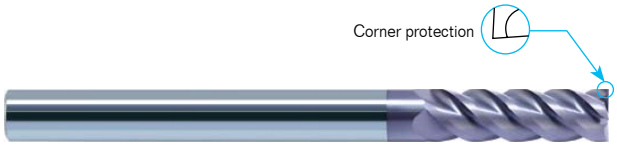
4-flute flattened end mills with straight shank and long cutting edge

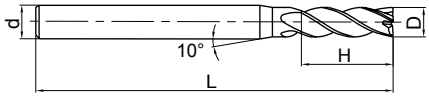

Side face


Step shoulder

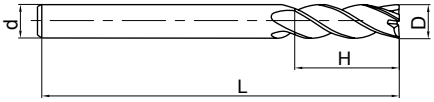

Straight slot

GM-4EL



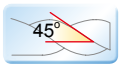


Picture 1

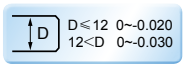


Picture 2

● 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

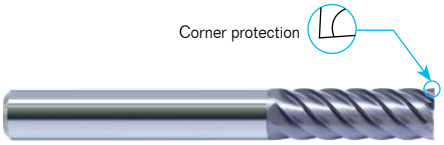
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	○			○	◎				

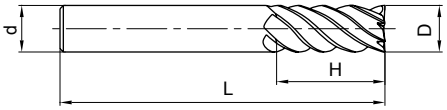
Code key B213
Graphics category and identification B214
Cutting parameters B395

6-flute flattened end mills with straight shank



GM-6E





- Perfect rigidity, 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

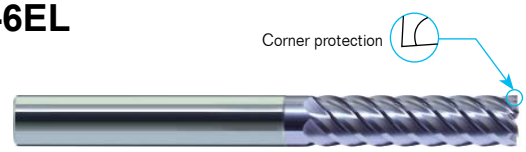
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	○			○	◎				

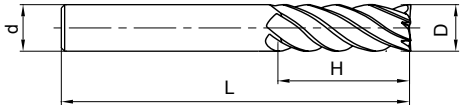
Code key B213
Graphics category and identification B214
Cutting parameters B396

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



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						
◎	◎	◎	○			○	◎				

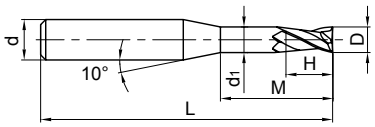
Code key B213
Graphics category and identification B214
Cutting parameters B397

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

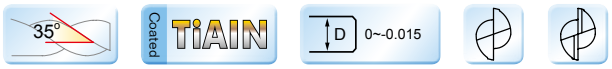

Deep flattened slot

GM-2EP





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



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						
◎	◎	◎	○			○	◎				

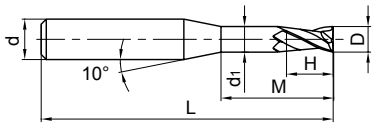
Code key B213
Graphics category and identification B214
Cutting parameters B398–B399

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

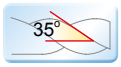

Deep flattened slot

GM-2EP

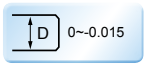




- Suitable for narrow slot milling or milling of fine parts that could generate interference.







D<1mm

1mm≤D


Ordering number	Basic dimension(mm)						Number of teeth Z	Stock
	D	d	H	M	d_1	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						
◎	◎	◎	○			○	◎				

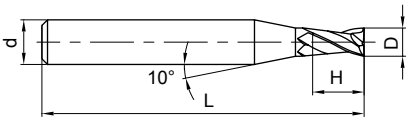
Code key B213
Graphics category and identification B214
Cutting parameters B398–B399

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

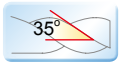


GM-2ES

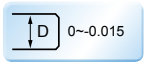




- Tiny diameter end mills can fully display high speed and high precision performances of machining center, often used for machining of precision components such as electronic part etc.











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						
◎	◎	◎	○			○	◎				

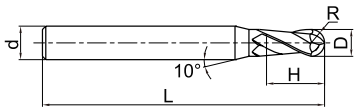
Code key B213
Graphics category and identification B214
Cutting parameters B400

2-flute ball nose end mills with straight shank

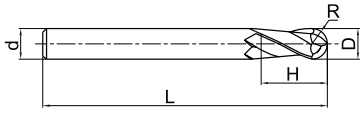
Profile | Cavity | Ball nose slot

GM-2B





Picture 1



Picture 2

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

35° | Coated 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	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	8	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						
◎	◎	◎	○			○	◎				

Code key B213 | Graphics category and identification B214 | Cutting parameters B401

2-flute ball nose end mills with straight shank

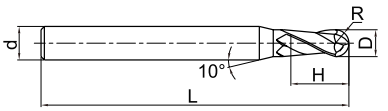

Profile


Cavity

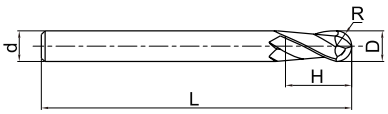

Ball nose slot

GM-2BL



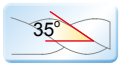


Picture 1

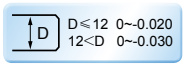


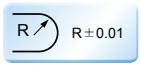
Picture 2

- GM-2B series with long shank.











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	8	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						
◎	◎	◎	○			○	◎				

Code key B213
Graphics category and identification B214
Cutting parameters B401

4-flute ball nose end mills with straight shank

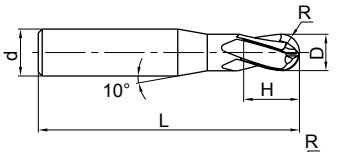

Profile


Cavity

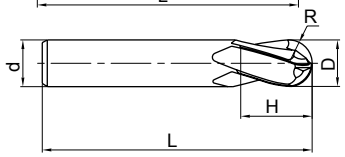

Ball nose slot

GM-4B



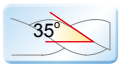


Picture 1



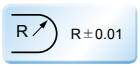
Picture 2

- 4-flute ball nose end mill can operate with higher feed speed and machining efficiency, extending too 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	6	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						
◎	◎	◎	○			○	◎				

Code key B213
Graphics category and identification B214
Cutting parameters B402

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

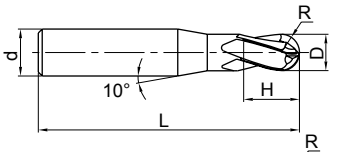

Profile


Cavity

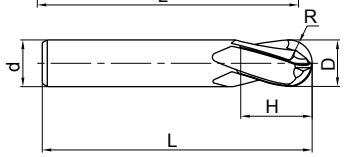

Ball nose slot

GM-4BL



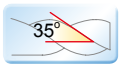


Picture 1

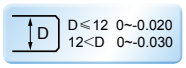


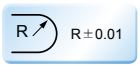
Picture 2

- GM-4B series with long shank.











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	6	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						
◎	◎	◎	○			○	◎				

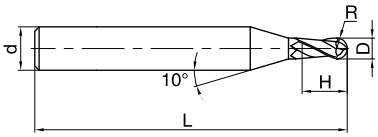
Code key B213
Graphics category and identification B214
Cutting parameters B402

2-flute tiny ball nose end mills with straight shank

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.

35° | Coated TiAlN | D 0~-0.015 | R ±0.005 R<0.5 ±0.01 R≥0.5

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						
◎	◎	◎	○			○	◎				

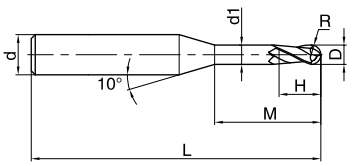
Code key B213 | Graphics category and identification B214 | Cutting parameters B403

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.

35° | Coated TiAlN | D 0~-0.015 | R ±0.005 R<0.5 ±0.01 R≥0.5

Ordering number	Basic dimension(mm)							Number of teeth Z	Stock
	D	R	H	d_1	M	d	L		
GM-2BP-R0.25-M04	0.5	0.25	0.7	0.45	4	4	50	2	●
GM-2BP-R0.25-M06	0.5	0.25	0.7	0.45	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						
◎	◎	◎	○			○	◎				

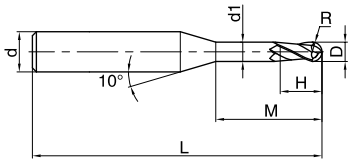
Code key B213 | Graphics category and identification B214 | Cutting parameters B404–B405

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.

35° | Coated TiAlN | D 0~-0.015 | R ±0.005 R<0.5 R ±0.01 R≥0.5

Ordering number	Basic dimension(mm)							Number of teeth Z	Stock
	D	R	H	d_1	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						
◎	◎	◎	○			○	◎				

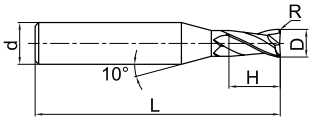
Code key B213 | Graphics category and identification B214 | Cutting parameters B404–B405

2-flute R end mills with straight shank

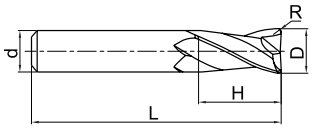
Radius shoulder | Profile | Radius corner slot

GM-2R





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			
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	6	50	2	Picture 1	●
GM-2R-D2.0R0.5	2.0	0.5	4	6	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						
◎	◎	◎	○			○	◎				

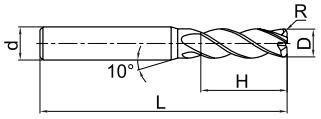
Code key B213 | Graphics category and identification B214 | Cutting parameters B406

4-flute R end mills with straight shank

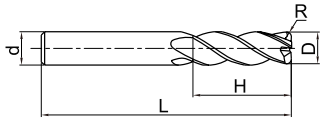
Radius shoulder | Profile | Radius corner slot

GM-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			
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						
◎	◎	◎	○			○	◎				

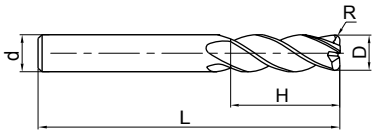
Code key B213 | Graphics category and identification B214 | Cutting parameters B407

4-flute R end mills with straight and long shank

Radius shoulder | Profile | Radius corner slot

GM-4RL





● GM-4R series with long shank.

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

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

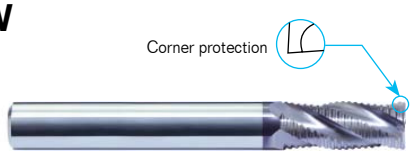
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	○			○	◎				

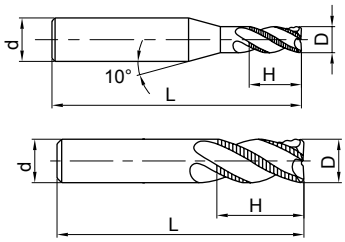
Code key B213 | Graphics category and identification B214 | Cutting parameters B407

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

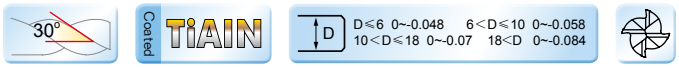


GM-4W





- 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						
◎	◎	◎	○			○	◎				

Code key B213
Graphics category and identification B214
Cutting parameters B408–B409



HMX series

end mills for high-hardness steel machining



Lattice heterogeneous coating

Lattice heterogeneous coating added with special elements, with high hardness and excellent high temperature oxidation resistance, more suitable for high hardness materials and high speed machining

Excellent coating processing technology, more closely combined with substrate

- unique cutter structure, properly designed chipbreaker, for outstanding cutting performance.
- Orange red coating allows for better wear observation.
- Special after treatment greatly reduces friction, for smoother chip evacuation and superior surface quality.

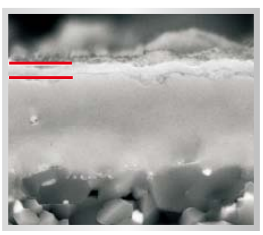
New technology

Breakthrough upgrading



Perfect high temperature oxidation resistance:

After oxidation at 1100 ° C, HMX series cutter coating only has a very thin oxide layer, while the similar products of Company A has completely oxidized.



HMX series



A company

HMX series end mills for high-hardness steel machining

Longer tool life

tool: HMX-4E-D10.0
workpiece material: SKD11(62HRC)
cutting speed: 100m/min
feed per tooth: 0.2mm/r
axial depth of cut: a_p=10mm
radial depth of cut: ae=0.3mm
cooling system: air cooling

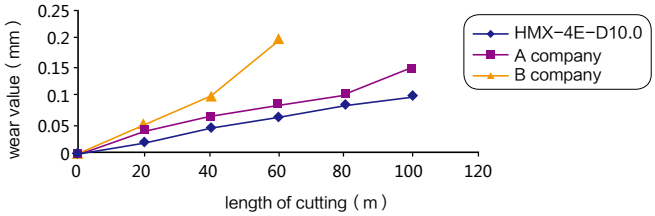


wear comparison after machining 60min



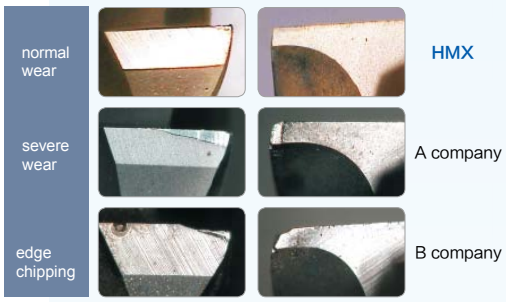
HMX series | A company | B company

peripheral edges wear curves



tool: HMX-4EL-D8.0
milling method: end milling
workpiece material: quenched steel(HRC65)
cutting speed: 100m/min
feed per revolution: 0.15mm/r
depth of cut: 0.3mm
cutting width: 5mm
cooling system: air cooling

wear comparison after machining 40min

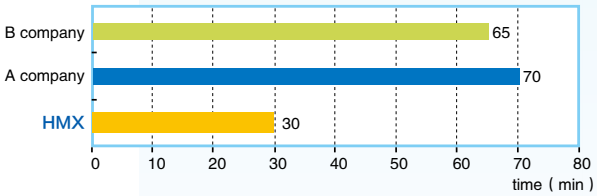


high machining efficient

tool: HMX-4R-D6.0R1.0
machininig parts: cavity machining
(30mm×30mm×10mm)
workpiece material: quenched steel(HRC55)
cutting speed: 200m/min
feed per revolution: 0.2mm/r
cutting width: 0.3mm
cutting depth: 5mm
cooling system: air cooling



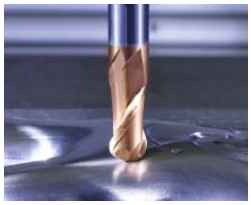
time comparison for complete one cavity



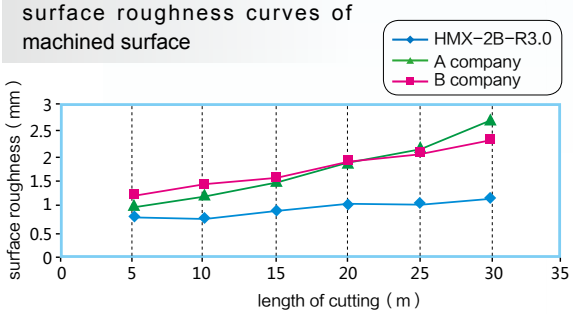
100% improvement of machining efficient on HMX than others!

Good machining quality

tool: HMX-2B-R3.0
workpiece material: SKD11(HRC62)
cutting speed : 200m/min
feed per revolution: 0.2mm/r
cutting width: 0.2mm
cutting depth: 0.3mm
cooling system: air cooling



surface roughness curves of machined surface



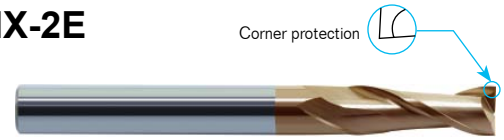
2-flute flattened end mills with straight shank

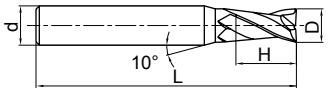

Side face


Step shoulder

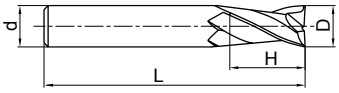

Straight slot

HMX-2E



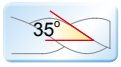


Picture 1

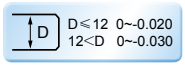


Picture 2

● 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			
HMX-2E-D1.0S	1.0	4	3	50	2	Picture 1	●
HMX-2E-D1.5S	1.5	4	4	50	2	Picture 1	●
HMX-2E-D2.0S	2.0	4	6	50	2	Picture 1	●
HMX-2E-D2.5S	2.5	4	8	50	2	Picture 1	●
HMX-2E-D3.0S	3.0	4	8	50	2	Picture 1	●
HMX-2E-D4.0S	4.0	4	11	50	2	Picture 2	●
HMX-2E-D1.0	1.0	6	3	50	2	Picture 1	●
HMX-2E-D1.5	1.5	6	4	50	2	Picture 1	●
HMX-2E-D2.0	2.0	6	6	50	2	Picture 1	●
HMX-2E-D2.5	2.5	6	8	50	2	Picture 1	●
HMX-2E-D3.0	3.0	6	8	50	2	Picture 1	●
HMX-2E-D3.5	3.5	6	10	50	2	Picture 1	●
HMX-2E-D4.0	4.0	6	11	50	2	Picture 1	●
HMX-2E-D4.5	4.5	6	11	50	2	Picture 1	●
HMX-2E-D5.0	5.0	6	13	50	2	Picture 1	●
HMX-2E-D5.5	5.5	6	16	50	2	Picture 1	●
HMX-2E-D6.0	6.0	6	16	50	2	Picture 2	●
HMX-2E-D7.0	7.0	8	20	60	2	Picture 1	●
HMX-2E-D8.0	8.0	8	20	60	2	Picture 2	●
HMX-2E-D9.0	9.0	10	22	75	2	Picture 1	●
HMX-2E-D10.0	10.0	10	25	75	2	Picture 2	●
HMX-2E-D11.0	11.0	12	26	75	2	Picture 1	●
HMX-2E-D12.0	12.0	12	30	75	2	Picture 2	●
HMX-2E-D14.0	14.0	14	32	100	2	Picture 2	●
HMX-2E-D16.0	16.0	16	45	100	2	Picture 2	●
HMX-2E-D18.0	18.0	18	45	100	2	Picture 2	●
HMX-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						
			○	◎	◎		○				

Code key B213
Graphics category and identification B214
Cutting parameters B410

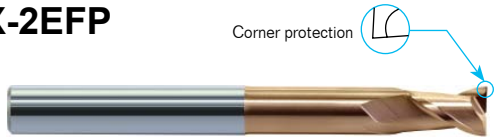
2-flute flattened end mills with long straight shank and short cutting edge

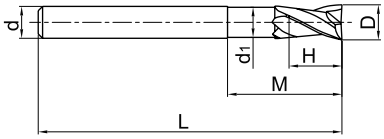

Side face


Step shoulder

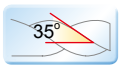

Straight slot

HMX-2EFP

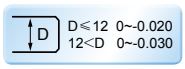




● High-rigidity short cutting edge, suitable for heavy cutting and deep cavity milling.









Ordering number	Basic dimension(mm)						Number of teeth Z	Stock
	D	d	H	M	d_1	L		
HMX-2EFP-D6.0	6.0	6	9	30	5.8	75	2	●
HMX-2EFP-D8.0	8.0	8	12	40	7.8	100	2	●
HMX-2EFP-D10.0	10.0	10	15	50	9.6	100	2	●
HMX-2EFP-D12.0	12.0	12	18	50	11.5	100	2	●
HMX-2EFP-D16.0	16.0	16	24	50	15.5	150	2	●
HMX-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						
			○	◎	◎		○				

Code key B213
Graphics category and identification B214
Cutting parameters B411

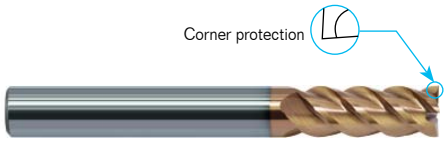
4-flute flattened end mills with straight shank

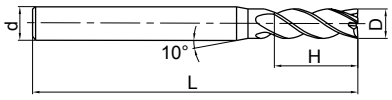

Side face


Step shoulder

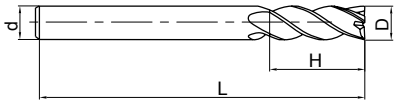

Straight slot

HMX-4E



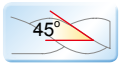


Picture 1

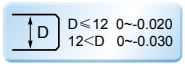


Picture 2

- 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			
HMX-4E-D1.0S	1.0	4	3	50	4	Picture 1	●
HMX-4E-D1.5S	1.5	4	4	50	4	Picture 1	●
HMX-4E-D2.0S	2.0	4	6	50	4	Picture 1	●
HMX-4E-D2.5S	2.5	4	8	50	4	Picture 1	●
HMX-4E-D3.0S	3.0	4	8	50	4	Picture 1	●
HMX-4E-D4.0S	4.0	4	11	50	4	Picture 2	●
HMX-4E-D1.0	1.0	6	3	50	4	Picture 1	●
HMX-4E-D1.5	1.5	6	4	50	4	Picture 1	●
HMX-4E-D2.0	2.0	6	6	50	4	Picture 1	●
HMX-4E-D2.5	2.5	6	8	50	4	Picture 1	●
HMX-4E-D3.0	3.0	6	8	50	4	Picture 1	●
HMX-4E-D3.5	3.5	6	10	50	4	Picture 1	●
HMX-4E-D4.0	4.0	6	11	50	4	Picture 1	●
HMX-4E-D4.5	4.5	6	11	50	4	Picture 1	●
HMX-4E-D5.0	5.0	6	13	50	4	Picture 1	●
HMX-4E-D5.5	5.5	6	16	50	4	Picture 1	●
HMX-4E-D6.0	6.0	6	16	50	4	Picture 2	●
HMX-4E-D7.0	7.0	8	20	60	4	Picture 1	●
HMX-4E-D8.0	8.0	8	20	60	4	Picture 2	●
HMX-4E-D9.0	9.0	10	22	75	4	Picture 1	●
HMX-4E-D10.0	10.0	10	25	75	4	Picture 2	●
HMX-4E-D11.0	11.0	12	26	75	4	Picture 1	●
HMX-4E-D12.0	12.0	12	30	75	4	Picture 2	●
HMX-4E-D14.0	14.0	14	32	75	4	Picture 2	●
HMX-4E-D16.0	16.0	16	45	100	4	Picture 2	●
HMX-4E-D18.0	18.0	18	45	100	4	Picture 2	●
HMX-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						
			○	◎	◎		○				

Code key B213
Graphics category and identification B214
Cutting parameters B412

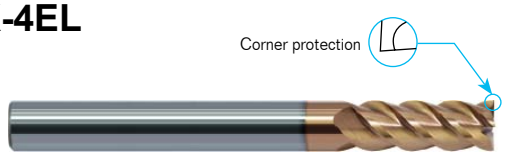
4-flute flattened end mills with straight shank and long cutting edge

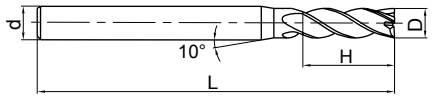

Side face


Step shoulder

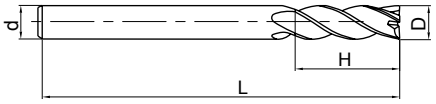

Straight slot

HMX-4EL



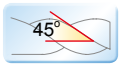


Picture 1

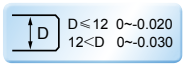


Picture 2

● HM-4E series with long cutting edge.



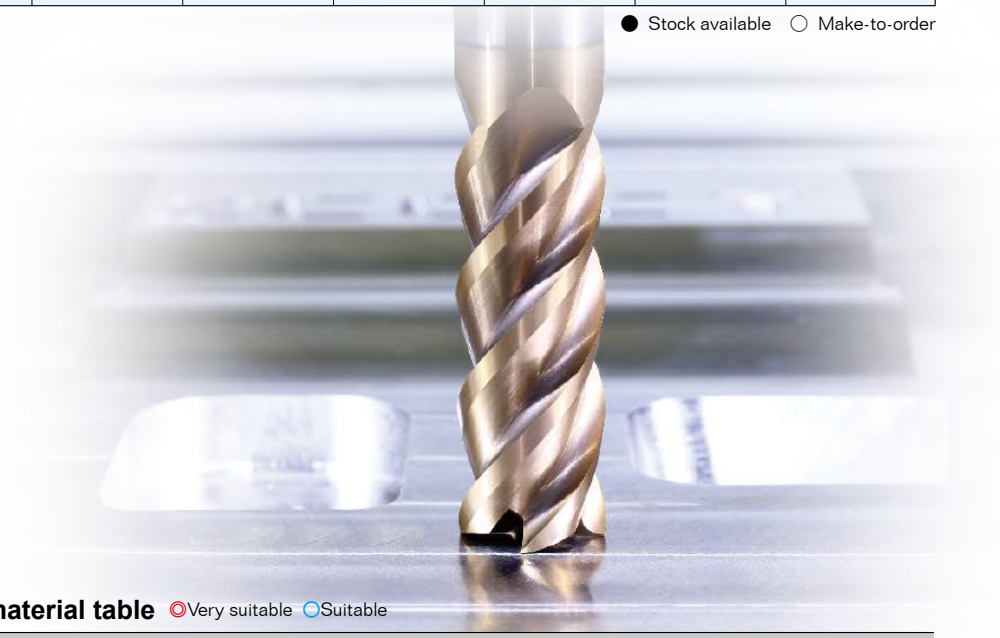






Ordering number	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	D	d	H	L			
HMX-4EL-D3.0	3.0	6	12	75	4	Picture 1	●
HMX-4EL-D4.0	4.0	6	15	75	4	Picture 1	●
HMX-4EL-D5.0	5.0	6	20	75	4	Picture 1	●
HMX-4EL-D6.0	6.0	6	20	75	4	Picture 2	●
HMX-4EL-D8.0	8.0	8	25	100	4	Picture 2	●
HMX-4EL-D10.0	10.0	10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

Code key B213
Graphics category and identification B214
Cutting parameters B412

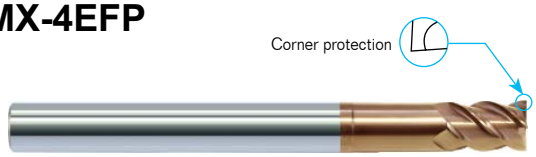
4-flute flattened end mills with straight shank, long neck and short cutting edge

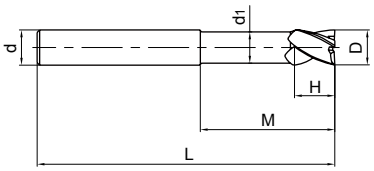

Side face


Step shoulder

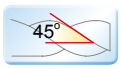

Straight slot

HMX-4EFP

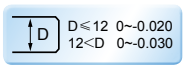




- High-rigidity short cutting edge, suitable for heavy cutting and deep cavity milling.









Ordering number	Basic dimension(mm)						Number of teeth Z	Stock
	D	d	H	M	d_1	L		
HMX-4EFP-D6.0	6.0	6	9	30	5.8	75	4	●
HMX-4EFP-D8.0	8.0	8	12	40	7.8	100	4	●
HMX-4EFP-D10.0	10.0	10	15	50	9.6	100	4	●
HMX-4EFP-D12.0	12.0	12	18	50	11.5	100	4	●
HMX-4EFP-D16.0	16.0	16	24	50	15.5	150	4	●
HMX-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						
			○	◎	◎		○				

Code key B213
Graphics category and identification B214
Cutting parameters B413

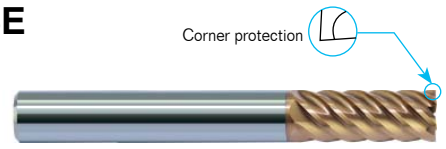
6-flute flattened end mills with straight shank

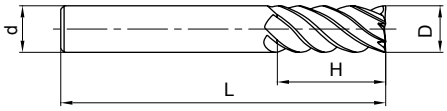

Side face


Step shoulder

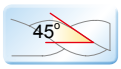

Straight slot

HMX-6E

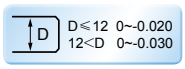




- High tool rigidity reduce tool deflection in side milling.
- Very suitable for high speed cutting and dry cutting.









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

Code key B213
Graphics category and identification B214
Cutting parameters B414

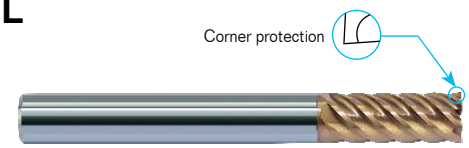
6-flute flattened end mills with straight shank and long cutting edge

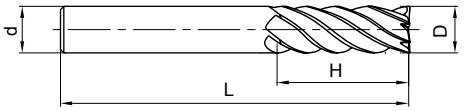

Side face


Step shoulder

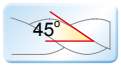

Straight slot

HMX-6EL

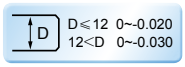




● HM-6E series with long cutting edge.









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

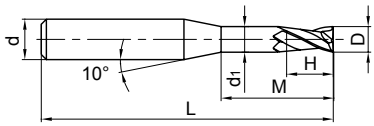
Code key B213
Graphics category and identification B214
Cutting parameters B415

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

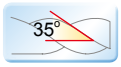

Deep flattened slot

HMX-2EP

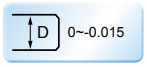




- Suitable for narrow slot milling or milling of fine parts that could generate interference.







D<1mm

1mm≤D


Ordering number	Basic dimension(mm)						Number of teeth Z	Stock
	D	d	H	M	d_1	L		
HMX-2EP-D0.5-M04	0.5	4	0.7	4	0.45	50	2	●
HMX-2EP-D0.5-M06	0.5	4	0.7	6	0.45	50	2	●
HMX-2EP-D0.5-M08	0.5	4	0.7	8	0.45	50	2	●
HMX-2EP-D0.8-M04	0.8	4	1.2	4	0.75	50	2	●
HMX-2EP-D0.8-M06	0.8	4	1.2	6	0.75	50	2	●
HMX-2EP-D0.8-M08	0.8	4	1.2	8	0.75	50	2	●
HMX-2EP-D0.8-M10	0.8	4	1.2	10	0.75	50	2	●
HMX-2EP-D1.0-M04	1.0	4	1.5	4	0.95	50	2	●
HMX-2EP-D1.0-M06	1.0	4	1.5	6	0.95	50	2	●
HMX-2EP-D1.0-M08	1.0	4	1.5	8	0.95	50	2	●
HMX-2EP-D1.0-M10	1.0	4	1.5	10	0.95	50	2	●
HMX-2EP-D1.0-M12	1.0	4	1.5	12	0.95	50	2	●
HMX-2EP-D1.0-M14	1.0	4	1.5	14	0.95	50	2	●
HMX-2EP-D1.2-M06	1.2	4	1.8	6	1.15	50	2	●
HMX-2EP-D1.2-M08	1.2	4	1.8	8	1.15	50	2	●
HMX-2EP-D1.2-M10	1.2	4	1.8	10	1.15	50	2	●
HMX-2EP-D1.2-M12	1.2	4	1.8	12	1.15	50	2	●
HMX-2EP-D1.5-M06	1.5	4	2.3	6	1.45	50	2	●
HMX-2EP-D1.5-M08	1.5	4	2.3	8	1.45	50	2	●
HMX-2EP-D1.5-M10	1.5	4	2.3	10	1.45	50	2	●
HMX-2EP-D1.5-M12	1.5	4	2.3	12	1.45	50	2	●
HMX-2EP-D1.5-M14	1.5	4	2.3	14	1.45	50	2	●
HMX-2EP-D2.0-M06	2.0	4	3.0	6	1.95	50	2	●
HMX-2EP-D2.0-M08	2.0	4	3.0	8	1.95	50	2	●
HMX-2EP-D2.0-M10	2.0	4	3.0	10	1.95	50	2	●
HMX-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						
			○	◎	◎		○				

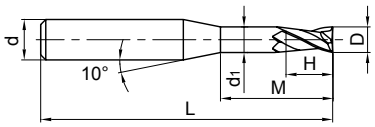
Code key B213
Graphics category and identification B214
Cutting parameters B416–B417

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

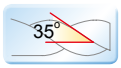

Deep flattened slot

HMX-2EP

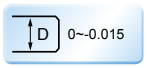




● Suitable for narrow slot milling or milling of fine parts that could generate interference.











Ordering number	Basic dimension(mm)						Number of teeth Z	Stock
	D	d	H	M	d_1	L		
HMX-2EP-D2.0-M14	2.0	4	3.0	14	1.95	50	2	●
HMX-2EP-D2.0-M16	2.0	4	3.0	16	1.95	50	2	●
HMX-2EP-D2.5-M08	2.5	4	3.7	8	2.4	50	2	●
HMX-2EP-D2.5-M10	2.5	4	3.7	10	2.4	50	2	●
HMX-2EP-D2.5-M12	2.5	4	3.7	12	2.4	50	2	●
HMX-2EP-D2.5-M14	2.5	4	3.7	14	2.4	50	2	●
HMX-2EP-D2.5-M16	2.5	4	3.7	16	2.4	60	2	●
HMX-2EP-D2.5-M18	2.5	4	3.7	18	2.4	60	2	●
HMX-2EP-D2.5-M20	2.5	4	3.7	20	2.4	60	2	●
HMX-2EP-D3.0-M06	3.0	6	4.5	6	2.85	50	2	●
HMX-2EP-D3.0-M08	3.0	6	4.5	8	2.85	50	2	●
HMX-2EP-D3.0-M10	3.0	6	4.5	10	2.85	50	2	●
HMX-2EP-D3.0-M12	3.0	6	4.5	12	2.85	50	2	●
HMX-2EP-D3.0-M14	3.0	6	4.5	14	2.85	60	2	●
HMX-2EP-D3.0-M16	3.0	6	4.5	16	2.85	60	2	●
HMX-2EP-D3.0-M18	3.0	6	4.5	18	2.85	60	2	●
HMX-2EP-D3.0-M20	3.0	6	4.5	20	2.85	60	2	●
HMX-2EP-D4.0-M12	4.0	6	6.0	12	3.85	60	2	●
HMX-2EP-D4.0-M16	4.0	6	6.0	16	3.85	60	2	●
HMX-2EP-D4.0-M20	4.0	6	6.0	20	3.85	60	2	●
HMX-2EP-D4.0-M25	4.0	6	6.0	25	3.85	60	2	●
HMX-2EP-D5.0-M16	5.0	6	7.5	16	4.85	60	2	●
HMX-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						
			○	◎	◎		○				

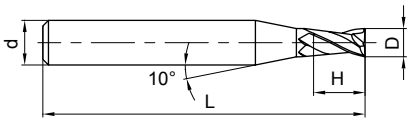
Code key B213
Graphics category and identification B214
Cutting parameters B416–B417

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

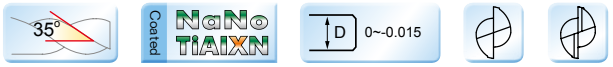


HMX-2ES





● 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		
HMX-2ES-D0.3	0.3	4	0.6	50	2	●
HMX-2ES-D0.4	0.4	4	0.8	50	2	●
HMX-2ES-D0.5	0.5	4	1.0	50	2	●
HMX-2ES-D0.6	0.6	4	1.2	50	2	●
HMX-2ES-D0.7	0.7	4	1.4	50	2	●
HMX-2ES-D0.8	0.8	4	1.6	50	2	●
HMX-2ES-D0.9	0.9	4	1.8	50	2	●
HMX-2ES-D1.0	1.0	4	2.0	50	2	●
HMX-2ES-D1.1	1.1	4	2.0	50	2	●
HMX-2ES-D1.2	1.2	4	2.5	50	2	●
HMX-2ES-D1.3	1.3	4	2.5	50	2	●
HMX-2ES-D1.4	1.4	4	3.0	50	2	●
HMX-2ES-D1.5	1.5	4	3.0	50	2	●
HMX-2ES-D1.6	1.6	4	3.5	50	2	●
HMX-2ES-D1.7	1.7	4	3.5	50	2	●
HMX-2ES-D1.8	1.8	4	4.0	50	2	●
HMX-2ES-D1.9	1.9	4	4.0	50	2	●
HMX-2ES-D2.0	2.0	4	4.0	50	2	●
HMX-2ES-D2.1	2.1	4	4.0	50	2	●
HMX-2ES-D2.2	2.2	4	4.5	50	2	●
HMX-2ES-D2.3	2.3	4	4.5	50	2	●
HMX-2ES-D2.4	2.4	4	5.0	50	2	●
HMX-2ES-D2.5	2.5	4	5.0	50	2	●
HMX-2ES-D2.6	2.6	4	5.0	50	2	●
HMX-2ES-D2.7	2.7	4	5.5	50	2	●
HMX-2ES-D2.8	2.8	4	5.5	50	2	●
HMX-2ES-D2.9	2.9	4	6.0	50	2	●
HMX-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						
			○	◎	◎		○				

Code key B213
Graphics category and identification B214
Cutting parameters B418

2-flute ball nose end mills with straight shank

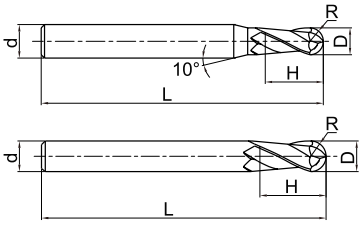

Profile


Cavity

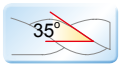

Ball nose slot

HMX-2B



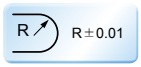


- For profile milling.
- Very suitable for high speed cutting and dry cutting.











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

Code key B213
Graphics category and identification B214
Cutting parameters B419

2-flute ball nose end mills with straight shank

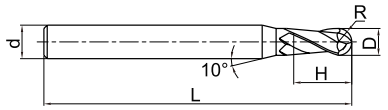

Profile

Cavity

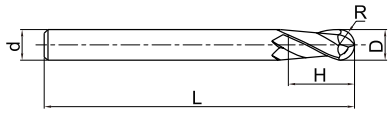
Ball nose slot

HMX-2BL





Picture 1



Picture 2

●HM-2B series with long shank.

35° | Coated NaNo TiAlXN | 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	d	H	L			
HMX-2BL-R1.0	2.0	1.0	6	4	75	2	Picture 1	●
HMX-2BL-R1.25	2.5	1.25	6	6	75	2	Picture 1	●
HMX-2BL-R1.5	3.0	1.5	6	6	75	2	Picture 1	●
HMX-2BL-R1.75	3.5	1.75	6	8	75	2	Picture 1	●
HMX-2BL-R2.0	4.0	2.0	6	8	75	2	Picture 1	●
HMX-2BL-R2.5	5.0	2.5	6	10	75	2	Picture 1	●
HMX-2BL-R2.75	5.5	2.75	6	12	75	2	Picture 1	●
HMX-2BL-R3.0	6.0	3.0	6	12	75	2	Picture 2	●
HMX-2BL-R3.5	7.0	3.5	8	14	75	2	Picture 1	●
HMX-2BL-R4.0	8.0	4.0	8	16	100	2	Picture 2	●
HMX-2BL-R4.5	9.0	4.5	10	18	100	2	Picture 1	●
HMX-2BL-R5.0	10.0	5.0	10	20	100	2	Picture 2	●
HMX-2BL-R6.0	12.0	6.0	12	24	100	2	Picture 2	●
HMX-2BL-R7.0	14.0	7.0	14	28	100	2	Picture 2	●
HMX-2BL-R8.0	16.0	8.0	16	32	150	2	Picture 2	●
HMX-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						
			○	◎	◎		○				

Code key B213
Graphics category and identification B214
Cutting parameters B419

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

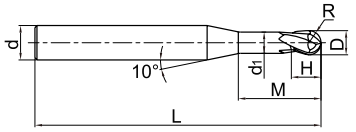

Profile


Cavity

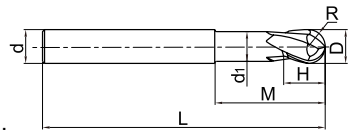

Ball nose slot

HMX-2BFP





Picture 1



Picture 2

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

35° | Coated NaNo TiAlXN | 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	d_1	M	d	L			
HMX-2BFP-R0.5	1.0	0.5	1	0.95	2.5	6	75	2	Picture 1	●
HMX-2BFP-R0.75	1.5	0.75	1.5	1.45	3	6	75	2	Picture 1	●
HMX-2BFP-R1.0	2.0	1.0	2	1.95	4	6	75	2	Picture 1	●
HMX-2BFP-R1.5	3.0	1.5	3	2.85	6	6	75	2	Picture 1	●
HMX-2BFP-R2.0	4.0	2.0	4	3.85	8	6	75	2	Picture 1	●
HMX-2BFP-R2.5	5.0	2.5	5	4.85	10	6	75	2	Picture 1	●
HMX-2BFP-R3.0	6.0	3.0	6	5.8	12	6	75	2	Picture 2	●
HMX-2BFP-R4.0	8.0	4.0	8	7.8	16	8	100	2	Picture 2	●
HMX-2BFP-R5.0	10.0	5.0	10	9.6	20	10	100	2	Picture 2	●
HMX-2BFP-R6.0	12.0	6.0	12	11.5	24	12	100	2	Picture 2	●
HMX-2BFP-R8.0	16.0	8.0	16	15.5	32	16	150	2	Picture 2	●
HMX-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						
			○	◎	◎		○				

Code key B213
Graphics category and identification B214
Cutting parameters B419

4-flute ball nose end mills with straight shank

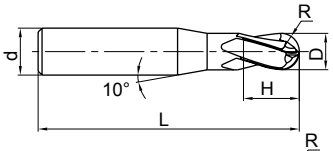

Profile


Cavity

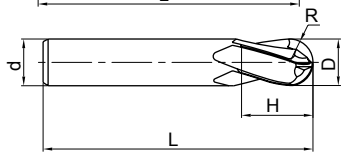

Ball nose slot

HMX-4B



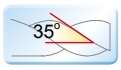


Picture 1

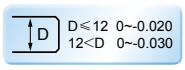


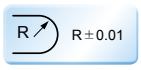
Picture 2

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











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

Code key B213
Graphics category and identification B214
Cutting parameters B420

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

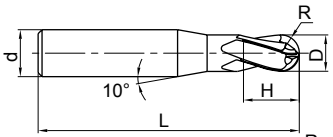

Profile


Cavity

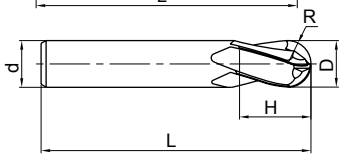

Ball nose slot

HMX-4BL



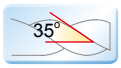


Picture 1



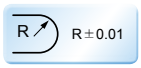
Picture 2

- HM-4B series with long shank.











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

Code key B213
Graphics category and identification B214
Cutting parameters B420

2-flute tiny ball nose end mills with straight shank

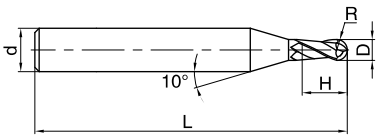

Profile


Cavity

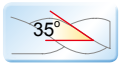

Ball nose slot

HMX-2BS

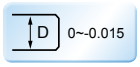


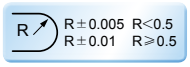


● Tiny diameter end mills can fully display high speed and high precision performances of machining center, often used for machining of precision components such as electronic part etc..











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

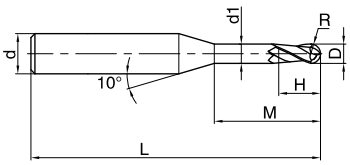
Code key B213
Graphics category and identification B214
Cutting parameters B421

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

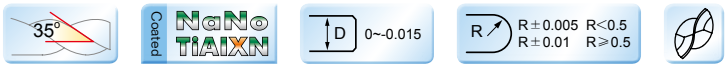

Deep ball nose slot

HMX-2BP





- Applicable for machining narrow slot and free-form surface.



Ordering number	Basic dimension(mm)							Number of teeth	Stock
	D	R	H	d1	M	d	L	Z	
HMX-2BP-R0.25-M04	0.5	0.25	0.7	0.45	4	4	50	2	●
HMX-2BP-R0.25-M06	0.5	0.25	0.7	0.45	6	4	50	2	●
HMX-2BP-R0.3-M04	0.6	0.3	0.9	0.55	4	4	50	2	●
HMX-2BP-R0.3-M06	0.6	0.3	0.9	0.55	6	4	50	2	●
HMX-2BP-R0.3-M08	0.6	0.3	0.9	0.55	8	4	50	2	●
HMX-2BP-R0.4-M04	0.8	0.4	1.2	0.75	4	4	50	2	●
HMX-2BP-R0.4-M06	0.8	0.4	1.2	0.75	6	4	50	2	●
HMX-2BP-R0.4-M08	0.8	0.4	1.2	0.75	8	4	50	2	●
HMX-2BP-R0.4-M10	0.8	0.4	1.2	0.75	10	4	50	2	●
HMX-2BP-R0.5-M04	1.0	0.5	1.5	0.95	4	4	50	2	●
HMX-2BP-R0.5-M06	1.0	0.5	1.5	0.95	6	4	50	2	●
HMX-2BP-R0.5-M08	1.0	0.5	1.5	0.95	8	4	50	2	●
HMX-2BP-R0.5-M10	1.0	0.5	1.5	0.95	10	4	50	2	●
HMX-2BP-R0.5-M12	1.0	0.5	1.5	0.95	12	4	50	2	●
HMX-2BP-R0.6-M06	1.2	0.6	1.8	1.15	6	4	50	2	●
HMX-2BP-R0.6-M08	1.2	0.6	1.8	1.15	8	4	50	2	●
HMX-2BP-R0.6-M12	1.2	0.6	1.8	1.15	12	4	50	2	●
HMX-2BP-R0.6-M16	1.2	0.6	1.8	1.15	16	4	50	2	●
HMX-2BP-R0.75-M08	1.5	0.75	2.3	1.45	8	4	50	2	●
HMX-2BP-R0.75-M12	1.5	0.75	2.3	1.45	12	4	50	2	●
HMX-2BP-R0.75-M16	1.5	0.75	2.3	1.45	16	4	50	2	●
HMX-2BP-R1.0-M06	2.0	1.0	3.0	1.95	6	4	50	2	●
HMX-2BP-R1.0-M08	2.0	1.0	3.0	1.95	8	4	50	2	●
HMX-2BP-R1.0-M10	2.0	1.0	3.0	1.95	10	4	50	2	●
HMX-2BP-R1.0-M12	2.0	1.0	3.0	1.95	12	4	50	2	●
HMX-2BP-R1.0-M16	2.0	1.0	3.0	1.95	16	4	50	2	●
HMX-2BP-R1.0-M20	2.0	1.0	3.0	1.95	20	4	50	2	●
HMX-2BP-R1.25-M08	2.5	1.25	3.7	2.4	8	4	50	2	●
HMX-2BP-R1.25-M12	2.5	1.25	3.7	2.4	12	4	50	2	●
HMX-2BP-R1.25-M16	2.5	1.25	3.7	2.4	16	4	60	2	●
HMX-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						
			○	◎	◎		○				

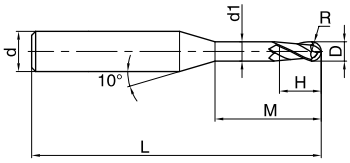
Code key B213
Graphics category and identification B214
Cutting parameters B422–B423

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

Deep ball nose slot

HMX-2BP





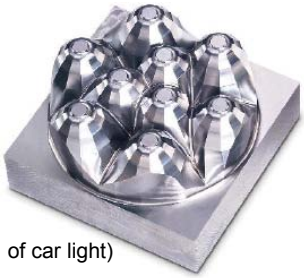
- Applicable for machining narrow slot and free-form surface

35° | Coated NaNo TiAlXN | D 0~-0.015 | R ±0.005 R<0.5 R ±0.01 R≥0.5

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

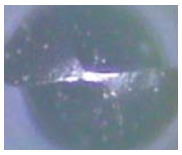
● Stock available ○ Make-to-order

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						
			○	◎	◎		○				

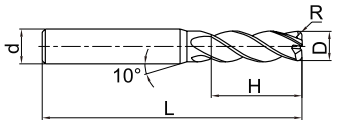
Code key B213 | Graphics category and identification B214 | Cutting parameters B422–B423

4-flute R end mills with straight shank

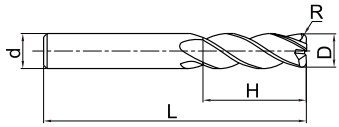
Radius shoulder | Profile | Radius corner slot

HMX-4R





Picture 1



Picture 2

- Wide applications, applicable for several machining conditions.



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

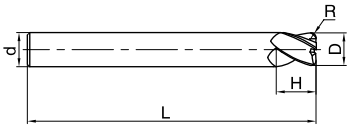
Code key B213 | Graphics category and identification B214 | Cutting parameters B424

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

Radius shoulder | Profile | Radius corner slot

HMX-4RF



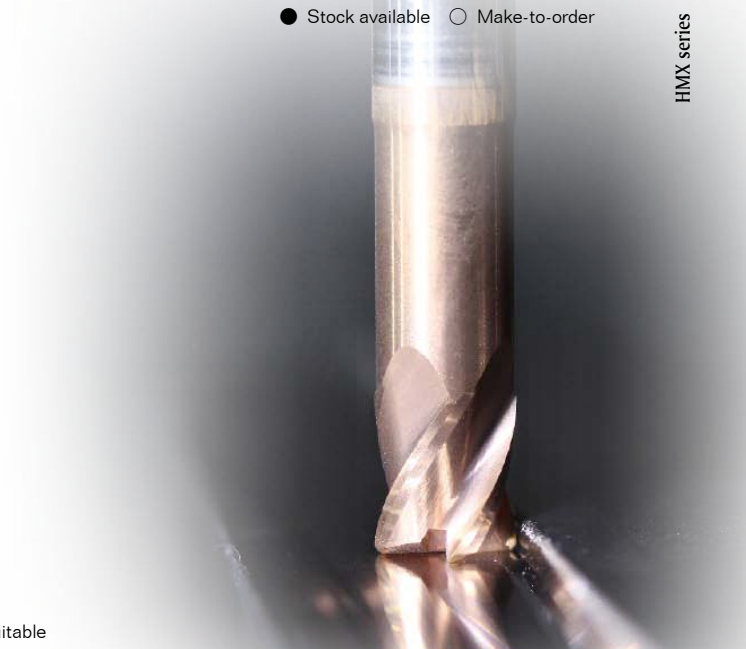


- High-rigidity short edge design, for cutting with high feed rate at high speed.

35° | Coated NaNo TiAlXN | D 0~-0.020

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

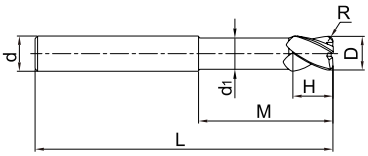
Code key B213 | Graphics category and identification B214 | Cutting parameters B424

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

Radius shoulder | Profile | Radius corner slot

HMX-4RP





- Long shank and short cutting edge designed for deep cavity milling.

35° | Coated NaNo TiAlXN | D D≤12 0~-0.020 12<D 0~-0.030

Ordering number	Basic dimension(mm)							Number of teeth Z	Stock
	D	R	d	d_1	H	M	L		
HMX-4RP-D6.0R0.5	6.0	0.5	6	5.8	6	18	75	4	●
HMX-4RP-D6.0R1.0	6.0	1.0	6	5.8	6	18	75	4	●
HMX-4RP-D8.0R0.5	8.0	0.5	8	7.8	8	24	100	4	●
HMX-4RP-D8.0R1.0	8.0	1.0	8	7.8	8	24	100	4	●
HMX-4RP-10.0R0.5	10.0	0.5	10	9.6	10	30	100	4	●
HMX-4RP-10.0R1.0	10.0	1.0	10	9.6	10	30	100	4	●
HMX-4RP-10.0R2.0	10.0	2.0	10	9.6	10	30	100	4	●
HMX-4RP-12.0R0.5	12.0	0.5	12	11.5	12	36	100	4	●
HMX-4RP-12.0R1.0	12.0	1.0	12	11.5	12	36	100	4	●
HMX-4RP-12.0R2.0	12.0	2.0	12	11.5	12	36	100	4	●
HMX-4RP-D16.0R1.0	16.0	1.0	16	15.5	16	40	150	4	●
HMX-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						
			○	◎	◎		○				

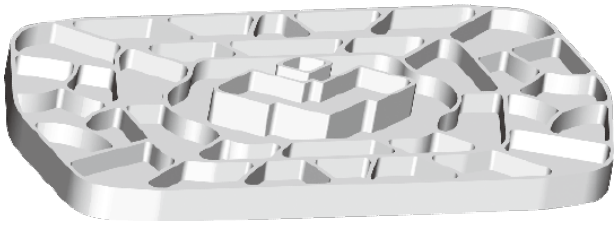
Code key B213 | Graphics category and identification B214 | Cutting parameters B424

AL series end mills for Al machining

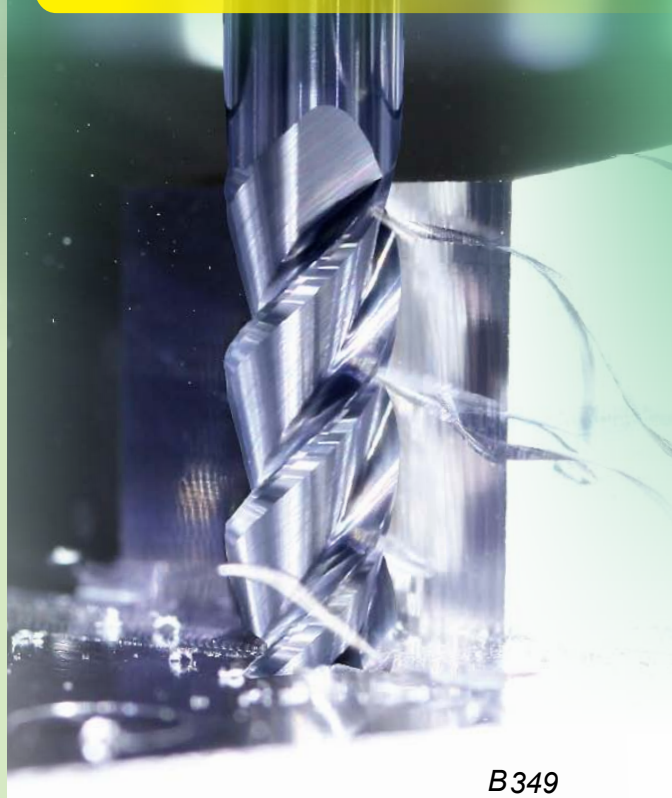


- **Chip pocket with unique shape exerts excellent performances even in slot and cavity machining.**
- **Sharp cutting edge and large helical angle design effectively prevent built-up edge.**
- **Anti-vibration design of whole edge can suppress the chattering during machining and improve surface quality.**

Tool type：AL-3E-D6.0
Dimensions：Ø6.0mm
Workpiece material：LC4
Rotating speed：13000r/min (250m/min)
Feed speed：1950mm/min (0.15mm/r)
Axial cutting depth：a_p=9.0mm
Radial cutting depth：a_e=1.0mm
Cutting style：Complicated cavity machining
Cooling system：air blow
Machine tool： MIKRON UCP 1000



Even the complicated machining of thin-wall cavity parts can be achieved easily.



High-efficiency rough machining of Al alloy

Corrugated edge endmills

AL-3W

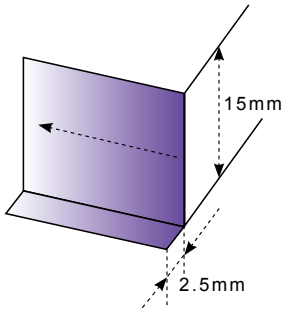


Excellent tool surface quality and good chips evacuation improve the cutting conditions and greatly extend tool life.

Unique design of corrugated edge reduces cutting forces during cutting and improves tool rigidity.

Cutting force and chips during high-efficiency roughing of AL-3W-D10.0

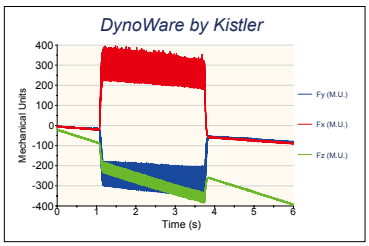
Tool type：AL-3W-D10.0
Diameter：Ø10.0mm
Workpiece material：LC4
Cutting speed：250m/min
Feed rate：9550mm/min
Amount of feed per tooth：f_z=0.12mm/z
Axial cutting depth：a_p=15mm
Radial cutting depth：a_e=2.5mm
Cutting style：Linear side milling
(down milling)
Cooling system：air blow
Machine tool：MIKRON UCP1000



Comparison of AL-3W end mills with general end mills

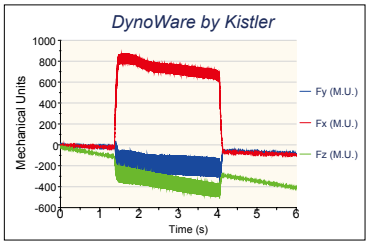
AL-3W-D10.0





General end mills





Chips shape　　Cutting force

2-flute flattened end mills with straight shank

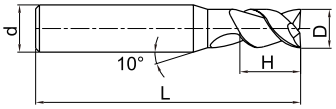

Side face


Step shoulder

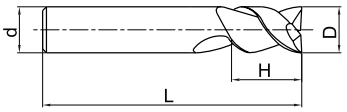

Straight slot

AL-2E



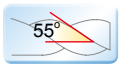


Picture 1



Picture 2

- Good chip removal performance, high machining efficiency.







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						
									◎		

Code key B213
Graphics category and identification B214
Cutting parameters B425

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

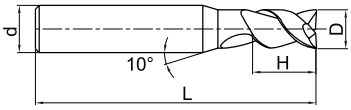

Side face


Step shoulder

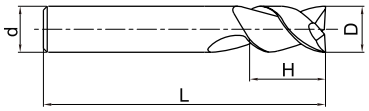

Straight slot

AL-2EL



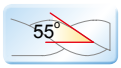


Picture 1



Picture 2

● AL-2E series with long cutting edge.







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						
									◎		

Code key B213
Graphics category and identification B214
Cutting parameters B425

3-flute flattened end mills with straight shank

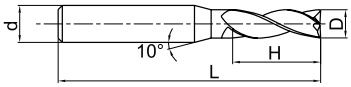

Side face


Step shoulder

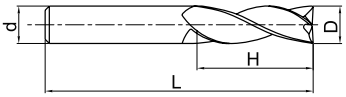

Straight slot

AL-3E



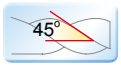


Picture 1



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						
									◎		

Code key B213
Graphics category and identification B214
Cutting parameters B426

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

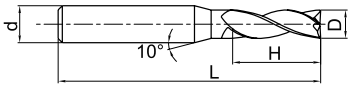

Side face


Step shoulder

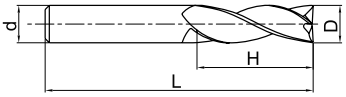

Straight slot

AL-3EL



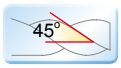


Picture 1



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						
									◎		

Code key B213
Graphics category and identification B214
Cutting parameters B426

2-flute ball nose end mills with straight shank

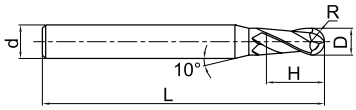

Profile


Cavity

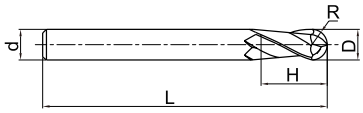

Ball nose slot

AL-2B



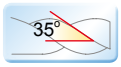


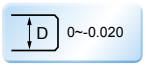
Picture 1

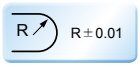


Picture 2

- 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						
									◎		

Code key B213
Graphics category and identification B214
Cutting parameters B427

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

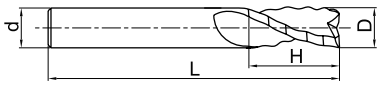

Side face


Step shoulder

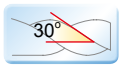

Straight slot

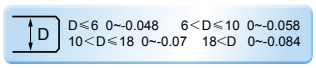
AL-3W





- For rough machining of Al 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						
									◎		

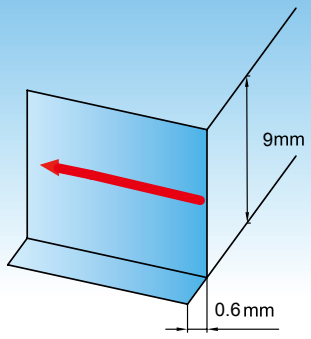
Code key B213
Graphics category and identification B214
Cutting parameters B428

SM series end mills for machining of hard-to-cut materials such as stainless steel, heat-resistant alloy, etc.



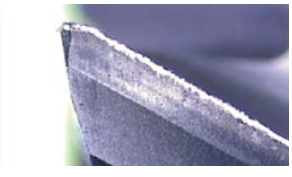
- Large helical and rake angle, sharp cutting edge, unique edge geometry can retrain cutting-heat's influence on tool nose, and greatly improve wear resistance and heat resistance.
- The coating with good heat resistance can achieve stable machining even at high temperature.
- Very suitable for machining of hard-to-cut materials such as stainless steel, Ni substrate high temperature alloy, etc.

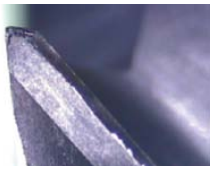
Tool type：SM-3E-D6.0
Dimensions：Ø6mm
Workpiece material：1Cr18Ni9Ti
Rotating speed：3700r/min (70m/min)
Feed speed 555mm/min(0.15mm/r)
Axial cutting depth：a_p=9mm
Radial cutting depth：a_e=0.6mm
Cutting style：side milling (down milling)
Cooling system：oil water emulsion
Machine tool：MIKRON UCP 1000



End mills	SM-3E-D6.0	Similar product of company A
Cutting length	100m	100m
Abrasion of peripheral edge	Even abrasion on cutting edge, value is 0.08 mm	Cutting edge is flaked fully, value is 0.135mm

Abrasion condition of peripheral edge





3-flute flattened end mills with straight shank

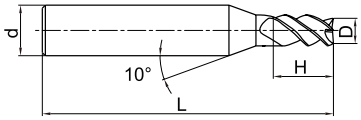

Side face


Step shoulder

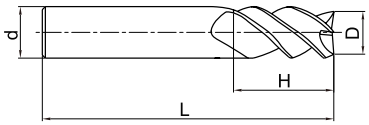

Straight slot

SM-3E



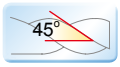


Picture 1

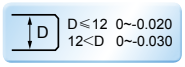


Picture 2

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









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	26	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						
◎	◎					◎					

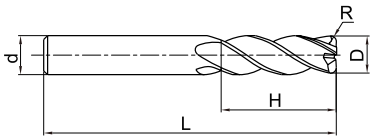
Code key B213
Graphics category and identification B214
Cutting parameters B429

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 austenitic stainless steel, heat-resistant alloy, etc.

45° | Coated AlTiN | D D≤12 0~-0.020 12<D 0~-0.030

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						
◎	◎					◎					

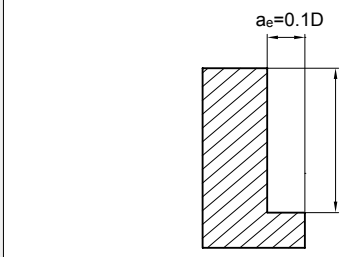
Code key B213 | Graphics category and identification B214 | Cutting parameters B430

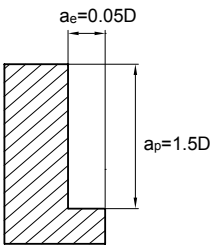
Cutting parameters for UM series end mills

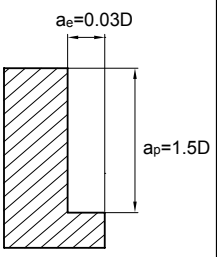
UM-4E★UM-4EL(general cutting)

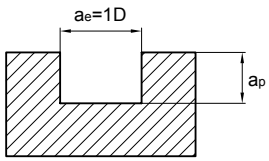
Workpiece material	Cast iron, Carbon steel, Alloy steel ~30HRC		Stainless steel		Pre-hardened steel, quenched and tempered steel ~40HRC		Pre-hardened steel, quenched and tempered steel ~50HRC		Hardened steel ~55HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	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)
4	10800	1000	5500	180	8000	770	6500	605	5570	440
5	8200	1050	4500	180	6400	810	5000	635	4460	465
6	7000	1080	3700	195	5300	825	4200	645	3710	465
8	5200	1065	2800	195	4000	815	3200	665	2785	485
10	4200	1050	2200	195	3200	810	2500	630	2230	450
12	3500	1050	1850	195	2650	810	2100	630	1855	450
14	3000	975	1600	180	2300	755	1800	595	1590	430
16	2600	975	1400	170	2000	755	1600	595	1390	430
18	2300	960	1250	150	1800	745	1400	580	1240	420
20	2050	960	1100	150	1600	745	1250	580	1115	420

Maximum cutting depth









Diameter range	Cutting depth a_p
Ø1⩽D<Ø3	0.15D
Ø3⩽D<Ø6	0.3D
Ø6⩽D<Ø20	0.5D

Diameter range	Cutting depth a_p
Ø1⩽D<Ø3	0.1D
Ø3⩽D	0.2D

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.

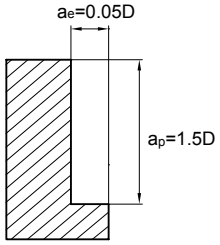
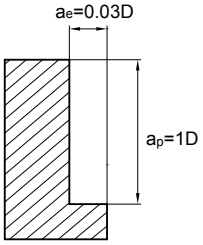
3.Please use air blow or cutting liquid with high mist retardant property.

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.

UM-4E★UM-4EL(high speed side milling)

Workpiece material	Cast iron, Carbon steel, Alloy steel ~30HRC		Carbon steel, Alloy steel ~40HRC		Pre-hardened steel, quenched and tempered steel ~45HRC		Pre-hardened steel, quenched and tempered steel ~50HRC		Hardened steel ~55HRC	
Cutting speed	300m/min		250 m/min		200 m/min		150 m/min		100 m/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	15915	2045	13260	1700	10600	1360	7960	1020	5300	680
8	11935	2040	9950	1680	7960	1355	5970	1020	3980	680
10	9550	1990	7960	1655	6370	1330	4775	995	3180	660
12	7960	1990	6630	1655	5300	1330	3980	995	2650	660
14	6820	1850	5685	1545	4550	1235	3410	1080	2275	615
16	5970	1850	4975	1545	3980	1235	2985	1080	1990	615
18	5305	1850	4420	1545	3540	1235	2650	1080	1770	615
20	4775	1850	3980	1545	3180	1235	2390	1080	1590	615
Maximum cutting depth	 Maximum a_e=1.0mm						 Maximum a_e=0.5mm			

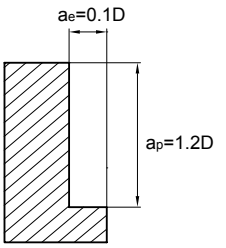
1.Please select high-precision machine and tool holder.
2.Please use air blow or MQL(minimum oil mist cooling).
3.Down milling is recommended in the case of side milling.
4.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the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

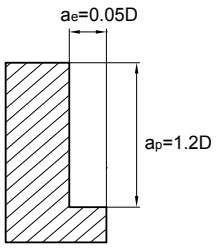
Cutting parameters for UM series end mills

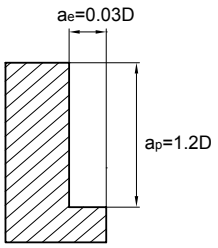
UM-4EFP(general cutting)

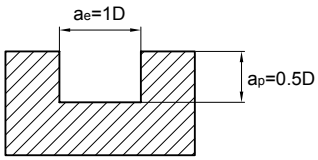
Workpiece material	Cast iron, Carbon steel, Alloy steel ~30HRC		Stainless steel		Pre-hardened steel, quenched and tempered steel ~40HRC		Pre-hardened steel, quenched and tempered steel ~50HRC		Hardened steel ~55HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	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	7000	1400	3700	250	5300	1080	4200	845	3710	610
8	5200	1385	2800	250	4000	1060	3200	865	2785	630
10	4200	1365	2200	250	3200	1050	2500	815	2230	585
12	3500	1365	1850	250	2650	1050	2100	815	1855	585
16	2600	1270	1400	220	2000	975	1600	770	1390	560
20	2050	1255	1100	195	1600	965	1250	755	1115	545

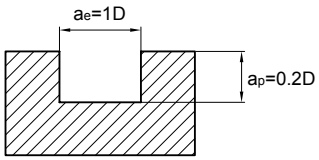
Maximum cutting depth











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.

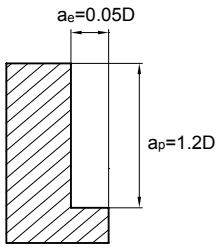
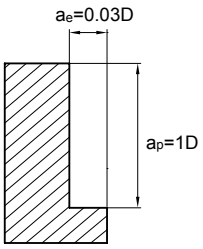
3.Please use air blow or cutting liquid with high mist retardant property.

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.

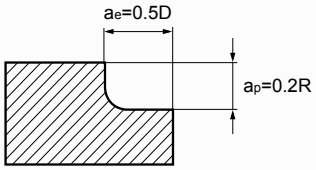
UM-4EFP(high speed side milling)

Workpiece material	Cast iron, Carbon steel, Alloy steel ~30HRC		Carbon steel, Alloy steel ~40HRC		Pre-hardened steel, quenched and tempered steel ~45HRC		Pre-hardened steel, quenched and tempered steel ~50HRC		Hardened steel ~55HRC	
Cutting speed	300m/min		250 m/min		200 m/min		150 m/min		100 m/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	15915	2655	13260	2210	10600	1770	7960	1325	5300	885
8	11935	2650	9950	2180	7960	1760	5970	1295	3980	885
10	9550	2590	7960	2150	6370	1730	4775	1295	3180	855
12	7960	2590	6630	2150	5300	1730	3980	1400	2650	855
16	5970	2410	4975	2015	3980	1605	2985	1400	1990	800
20	4775	2410	3980	2375	3180	1605	2390	1325	1590	800
Maximum cutting depth	 Maximum ae=1.0mm						 Maximum ae=0.5mm			

1.Please select high-precision machine and tool holder.
2.Please use air blow or MQL(minimum oil mist cooling).
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.

Cutting parameters for UM series end mills

UM-4R★UM-4RL(Standard)

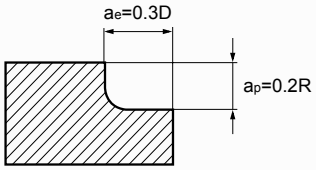
Workpiece material	Cast iron, Carbon steel, Alloy steel ~30HRC		Quenched and tempered steel ~40HRC		Quenched and tempered steel ~45HRC		Quenched and tempered steel ~50HRC		Quenched and tempered steel ~55HRC	
Diameter× Corner radius	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	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)
4.0×R0.3 4.0×R0.5	7950	3960	6350	2880	5550	2520	4000	1650	2400	755
5.0×R0.5 5.0×R1.0	6350	4200	5100	3060	4450	2670	3200	1710	1900	690
6.0×R0.5 6.0×R1.0	5300	4200	4250	3060	3700	2670	2650	1710	1600	690
8.0×R0.5 8.0×R1.0	4550	4200	3200	3060	2800	2670	2000	1710	1200	690
10.0×R0.5 10.0×R1.0 10.0×R2.0 10.0×R3.0	3200	4200	2550	3060	2250	2670	1600	1710	955	690
12.0×R0.5 12.0×R1.0 12.0×R2.0 12.0×R3.0	2650	4200	2100	3060	1850	2670	1350	1710	795	690
16.0×R1.0 16.0×R2.0 16.0×R3.0	2200	3485	1745	2540	1535	2215	1140	1420	660	570
20.0×R1.0 20.0×R2.0 20.0×R3.0	1825	2895	1450	2110	1275	1840	960	1180	550	475
Maximum cutting depth	Maximum a_p=0.5mm						Maximum a_p=0.4mm		Maximum a_p=0.2mm	
										

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.
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.
6.The above cutting parameters are based on contour machining when overhang L/D≤4. Please make adjustments according to the table below when overhang is different.

Different cutting parameters under different overhang of tool:

Overhang	Cutting speed(m/min)	Axial cutting depth (mm)	Feed speed (mm/min)
L/D⩽4	100%	100%	100%
L/D=5	60%~80%	60%~80%	60%~80%
L/D=6	40%~60%	40%~60%	40%~60%

UM-4R★UM-4RL(High speed)

Workpiece material	Cast iron, Carbon steel, Alloy steel ~30HRC		Quenched and tempered steel ~40HRC		Quenched and tempered steel ~45HRC		Quenched and tempered steel ~50HRC		Quenched and tempered steel ~55HRC	
Diameter× Corner radius	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)
4.0×R0.3 4.0×R0.5	16000	7800	16000	7200	12000	5400	12000	4920	7950	2130
5.0×R0.5 5.0×R1.0	12500	8400	12500	7500	9550	5730	9550	5160	6350	2280
6.0×R0.5 6.0×R1.0	10600	8400	10600	7620	7950	5730	7950	5160	5300	2280
8.0×R0.5 8.0×R1.0	7950	8400	7950	7620	5950	5730	5950	5160	4000	2280
10.0×R0.5 10.0×R1.0 10.0×R2.0 10.0×R3.0	6350	8400	6350	7620	4750	5730	4750	5160	3200	2280
12.0×R0.5 12.0×R1.0 12.0×R2.0 12.0×R3.0	5300	8400	5300	7620	4000	5730	4000	5160	2650	2280
16.0×R1.0 16.0×R2.0 16.0×R3.0	3980	6970	3980	6320	2985	4755	2985	4280	1990	1890
20.0×R1.0 20.0×R2.0 20.0×R3.0	3185	5785	3185	5245	2385	3945	2385	3550	1590	1570
Maximum cutting depth	Maximum a_p=0.4mm						Maximum a_p=0.2mm		Maximum a_p=0.1mm	
										

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.
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.
6.The above cutting parameters are based on contour machining when overhang L/D≤4. Please make adjustments according to the table below when overhang is different.

Different cutting parameters under different overhang of tool:

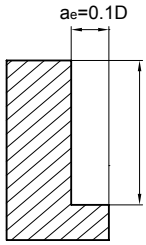
Ratio of neck length to diameter	Cutting speed(m/min)	Axial cutting depth(mm)	Feed speed (mm/min)
L/D⩽4	100%	100%	100%
L/D=5	60%~80%	60%~80%	60%~80%
L/D=6	40%~60%	40%~60%	40%~60%

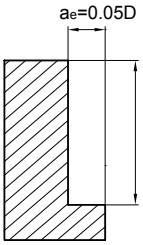
Cutting parameters for UM series end mills

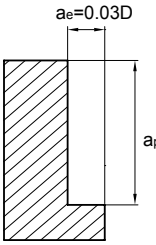
UM-4RFP

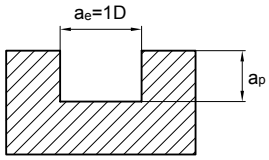
Workpiece material	Cast iron, Carbon steel, Alloy steel ~30HRC		Stainless steel		Pre-hardened steel, quenched and tempered steel ~40HRC		Pre-hardened steel, quenched and tempered steel ~50HRC		Hardened steel ~55HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	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)
4	10800	1210	5500	210	8000	925	6500	720	5570	530
5	8200	1265	4500	210	6400	965	5000	765	4460	560
6	7000	1295	3700	235	5300	995	4200	780	3710	560
8	5200	1285	2800	235	4000	975	3200	790	2785	580
10	4200	1265	2200	235	3200	965	2500	750	2230	540
12	3500	1265	1850	235	2650	965	2100	750	1855	540
16	2600	1180	1400	210	2000	925	1600	705	1390	520

Maximum cutting depth





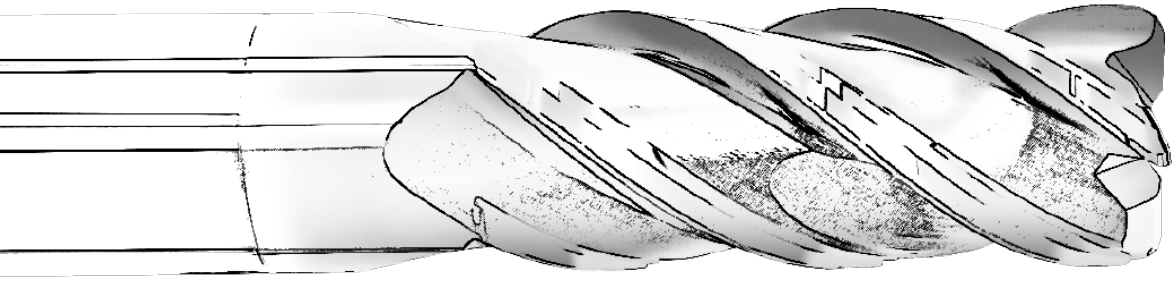




Diameter range	Cutting depth a_p
Ø1⩽D<Ø3	0.15D
Ø3⩽D<Ø6	0.3D
Ø6⩽D<Ø20	0.5D

Diameter range	Cutting depth a_p
Ø1⩽D<Ø3	0.1D
Ø3⩽D	0.2D

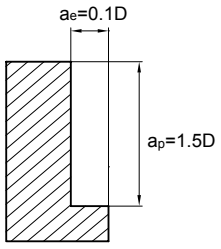
1.The above table shows the standard value of side milling. When milling slot, 50%~70% of rotating speed and 40%~60% of feed speed stated above are recommended as standard.
2.Please select high-precision machine and tool holder.
3.Please use air blow or cutting liquid with high mist retardant property.
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.

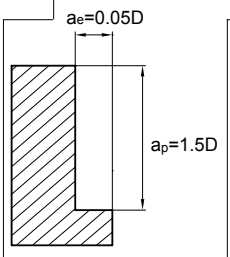


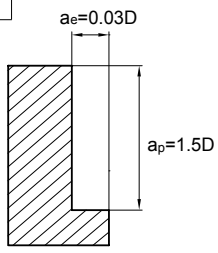
PML-2E★PM-2E★PML-2EL★PM-2EL

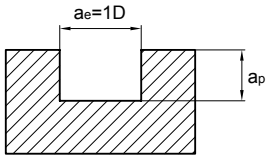
Workpiece material	Cast iron, Carbon steel, Alloy steel ~30HRC		Stainless steel		Pre-hardened steel, quenched and tempered steel ~40HRC		Pre-hardened steel, quenched and tempered steel ~50HRC		Hardened steel ~55HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	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)
1	20000	200	20000	60	20000	165	20000	120	20000	90
2	15000	320	11150	85	15000	285	13000	180	11140	130
3	14000	545	7500	120	10600	420	8500	330	7430	240
4	10800	560	5500	135	8000	425	6500	335	5570	245
5	8200	585	4500	135	6400	445	5000	355	4460	260
6	7000	600	3700	140	5300	465	4200	360	3710	260
8	5200	595	2800	140	4000	455	3200	365	2785	270
10	4200	585	2200	140	3200	445	2500	350	2230	250
12	3500	585	1850	140	2650	445	2100	350	1855	250
14	3000	545	1600	135	2300	420	1800	330	1590	240
16	2600	545	1400	120	2000	420	1600	330	1390	240
18	2300	535	1250	120	1800	415	1400	325	1240	235
20	2050	535	1100	120	1600	415	1250	325	1115	235

Maximum cutting depth









Diameter range	Cutting depth a_p
Ø1⩽D<Ø3	0.15D
Ø3⩽D<Ø6	0.3D
Ø6⩽D<Ø20	0.5D

Diameter range	Cutting depth a_p
Ø1⩽D<Ø3	0.1D
Ø3⩽D	0.2D

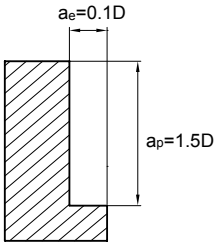
1.The above table shows the standard value of side milling. When milling slot, 50%~70% of rotating speed and 40%~60% of feed speed stated above are recommended as standard.
2.Please select high-precision machine and tool holder.
3.Please use air blow or cutting liquid with high mist retardant property.
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.

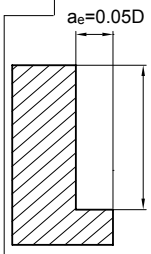
Cutting parameters for PML/PM series end mills

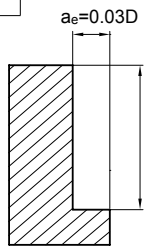
PML-2F★PM-2F★PML-2FL★PM-2FL

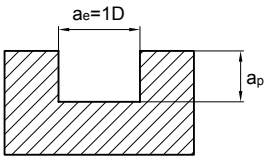
Workpiece material	Cast iron, Carbon steel, Alloy steel ~30HRC		Stainless steel		Pre-hardened steel, quenched and tempered steel ~40HRC		Pre-hardened steel, quenched and tempered steel ~50HRC		Hardened steel ~55HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	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)
1	20000	140	20000	45	20000	115	20000	85	20000	65
2	15000	225	11150	60	15000	200	13000	125	11140	90
3	14000	385	7500	85	10600	295	8500	230	7430	170
4	10800	390	5500	95	8000	300	6500	235	5570	170
5	8200	410	4500	95	6400	315	5000	245	4460	180
6	7000	420	3700	95	5300	325	4200	255	3710	180
8	5200	415	2800	95	4000	320	3200	255	2785	190
10	4200	410	2200	95	3200	315	2500	240	2230	175
12	3500	410	1850	95	2650	315	2100	240	1855	175
14	3000	385	1600	95	2300	295	1800	230	1590	170
16	2600	385	1400	85	2000	295	1600	230	1390	170
18	2300	375	1250	85	1800	290	1400	230	1240	165
20	2050	375	1100	85	1600	290	1250	230	1115	165

Maximum cutting depth









Diameter range	Cutting depth a_p
Ø1⩽D<Ø3	0.15D
Ø3⩽D<Ø6	0.3D
Ø6⩽D<Ø20	0.5D

Diameter range	Cutting depth a_p
Ø1⩽D<Ø3	0.1D
Ø3⩽D	0.2D

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.

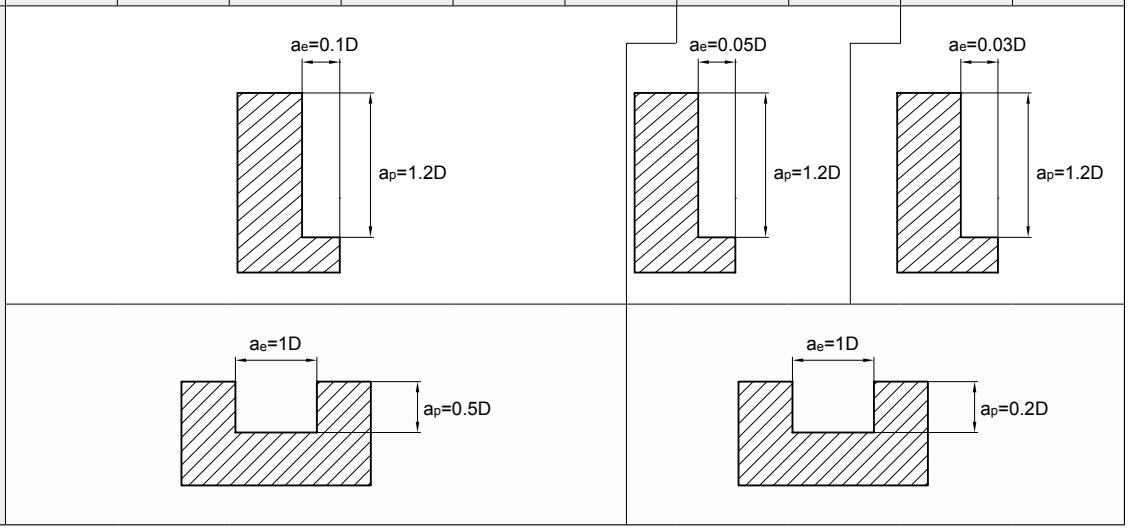
5.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.

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

PML-2EFP★PM-2EFP

Workpiece material	Cast iron, Carbon steel, Alloy steel ~30HRC		Stainless steel		Pre-hardened steel, quenched and tempered steel ~40HRC		Pre-hardened steel, quenched and tempered steel ~50HRC		Hardened steel ~55HRC	
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	7000	780	3700	180	5300	600	4200	470	3710	340
8	5200	775	2800	180	4000	595	3200	475	2785	350
10	4200	755	2200	180	3200	575	2500	455	2230	325
12	3500	755	1850	180	2650	575	2100	455	1855	325
16	2600	710	1400	155	2000	545	1600	425	1390	310
20	2050	700	1100	155	1600	540	1250	420	1115	305

Maximum cutting depth



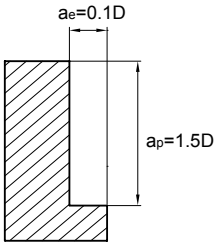
1. The above table shows the standard value of side milling. When milling slot, 50%~70% of rotating speed and 40%~60% of feed speed stated above are recommended as standard.
2. Please select high-precision machine and tool holder.
3. Please use air blow or cutting liquid with high mist retardant property.
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.

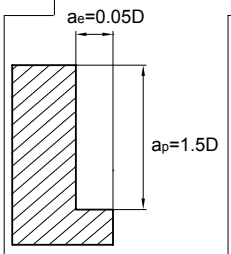
Cutting parameters for PML/PM series end mills

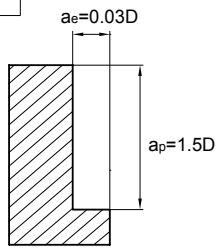
PML-3E-H★PM-3E-H★PML-3EL-H★PM-3EL-H

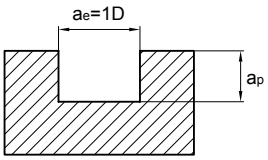
Workpiece material	Cast iron, Carbon steel, Alloy steel ~30HRC		Stainless steel		Pre-hardened steel, quenched and tempered steel ~40HRC		Pre-hardened steel, quenched and tempered steel ~50HRC		Hardened steel ~55HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	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)
1	20000	200	20000	75	20000	160	20000	100	20000	90
2	15000	325	11150	80	15000	285	13000	150	11140	130
3	14000	550	7500	100	10600	425	8500	280	7430	245
4	10800	565	5500	105	8000	430	6500	285	5570	250
5	8200	600	4500	105	6400	455	5000	300	4460	260
6	7000	605	3700	110	5300	465	4200	305	3710	260
8	5200	600	2800	110	4000	460	3200	310	2785	275
10	4200	600	2200	110	3200	455	2500	290	2230	255
12	3500	600	1850	110	2650	455	2100	290	1855	255
14	3000	550	1600	105	2300	425	1800	280	1590	245
16	2600	550	1400	100	2000	425	1600	280	1390	245
18	2300	540	1250	85	1800	415	1400	275	1240	240
20	2050	540	1100	85	1600	415	1250	275	1115	240

Maximum cutting depth









Diameter range	Cutting depth a_p
Ø1⩽D<Ø3	0.15D
Ø3⩽D<Ø6	0.3D
Ø6⩽D<Ø20	0.5D

Diameter range	Cutting depth a_p
Ø1⩽D<Ø3	0.1D
Ø3⩽D	0.2D

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.

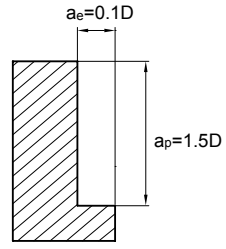
5.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.

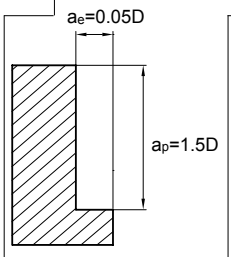
6.Make overhang of tool as short as possible in conditions of non-interference.

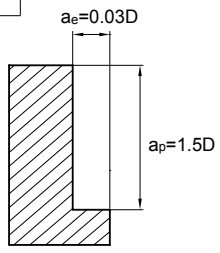
PML-4E-G★PM-4E-G★PML-4EL-G★PM-4EL-G
PML-4E-H★PM-4E-H★PML-4EL-H★PM-4EL-H(general cutting)

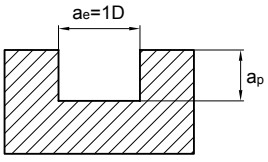
Workpiece material	Cast iron, Carbon steel, Alloy steel ~30HRC		Stainless steel		Pre-hardened steel, quenched and tempered steel ~40HRC		Pre-hardened steel, quenched and tempered steel ~50HRC		Hardened steel ~55HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	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)
1	20000	270	20000	95	20000	215	20000	135	20000	120
2	15000	435	11150	110	15000	380	13000	200	11140	175
3	14000	735	7500	135	10600	565	8500	370	7430	325
4	10800	755	5500	140	8000	575	6500	380	5570	335
5	8200	795	4500	140	6400	605	5000	400	4460	350
6	7000	810	3700	145	5300	620	4200	405	3710	350
8	5200	800	2800	145	4000	615	3200	415	2785	365
10	4200	795	2200	145	3200	605	2500	390	2230	340
12	3500	795	1850	145	2650	605	2100	390	1855	340
14	3000	735	1600	140	2300	565	1800	370	1590	325
16	2600	735	1400	135	2000	565	1600	370	1390	325
18	2300	720	1250	115	1800	555	1400	365	1240	315
20	2050	720	1100	115	1600	555	1250	365	1115	315

Maximum cutting depth









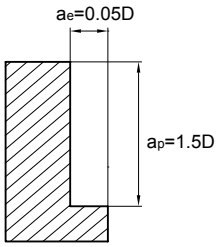
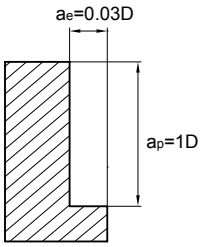
Diameter range	Cutting depth ap
Ø1⩽D<Ø3	0.15D
Ø3⩽D<Ø6	0.3D
Ø6⩽D<Ø20	0.5D

Diameter range	Cutting depth ap
Ø1⩽D<Ø3	0.1D
Ø3⩽D	0.2D

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.

Cutting parameters for PML/PM series end mills

PML-4E-G★PM-4E-G★PML-4EL-G★PM-4EL-G★PML-4E-H PM-4E-H★PML-4EL-H★PM-4EL-H(high speed side milling)

Workpiece material	Cast iron, Carbon steel, Alloy steel ~30HRC		Carbon steel, Alloy steel ~40HRC		Pre-hardened steel, quenched and tempered steel ~45HRC		Pre-hardened steel, quenched and tempered steel ~50HRC		Hardened steel ~55HRC	
Cutting speed	300m/min		250 m/min		200 m/min		150 m/min		100 m/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	15915	1535	13260	1280	10600	1020	7960	765	5300	515
8	11935	1530	9950	1260	7960	1020	5970	765	3980	515
10	9550	1450	7960	1245	6370	1000	4775	750	3180	495
12	7960	1450	6630	1245	5300	1000	3980	750	2650	495
14	6820	1390	5685	1160	4550	930	3410	810	2275	465
16	5970	1390	4975	1160	3980	930	2985	810	1990	465
18	5305	1390	4420	1160	3540	930	2650	810	1770	465
20	4775	1390	3980	1160	3180	930	2390	810	1590	465
Maximum cutting depth	 Maximum ae=1.0mm						 Maximum ae=0.5mm			

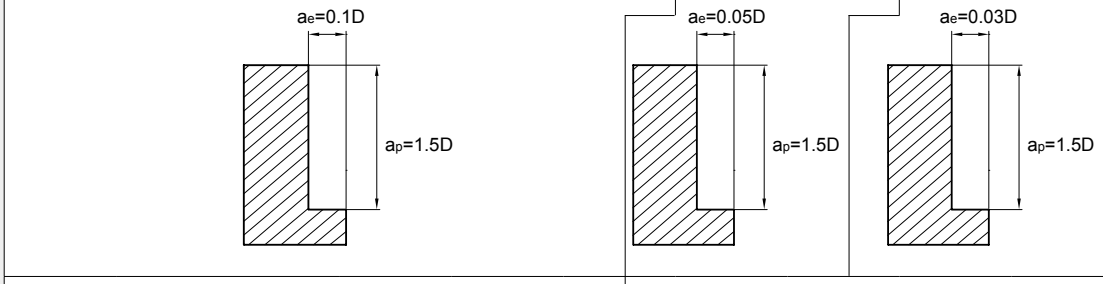
1.Please select high-precision machine and tool holder.
2.Please use air blow or MQL(minimum oil mist cooling).
3.Down milling is recommended in the case of side milling.
4.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the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

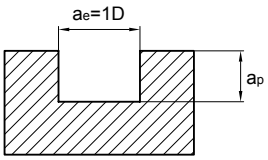


PML-4F-G★PM-4F-G★PML-4FL-G★PM-4FL-G(general cutting)

Workpiece material	Cast iron, Carbon steel, Alloy steel ~30HRC		Stainless steel		Pre-hardened steel, quenched and tempered steel ~40HRC		Pre-hardened steel, quenched and tempered steel ~50HRC		Hardened steel ~55HRC	
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)
1	20000	190	20000	70	20000	150	20000	95	20000	85
2	15000	305	11150	80	15000	265	13000	140	11140	125
3	14000	515	7500	95	10600	395	8500	260	7430	230
4	10800	530	5500	100	8000	4055	6500	265	5570	235
5	8200	555	4500	100	6400	425	5000	280	4460	245
6	7000	570	3700	100	5300	435	4200	283	3710	245
8	5200	560	2800	100	4000	430	3200	290	2785	255
10	4200	555	2200	100	3200	425	2500	275	2230	240
12	3500	555	1850	100	2650	425	2100	275	1855	240
14	3000	515	1600	100	2300	395	1800	260	1590	230
16	2600	515	1400	95	2000	395	1600	260	1390	230
18	2300	505	1250	80	1800	390	1400	255	1240	220
20	2050	505	1100	80	1600	390	1250	255	1115	220

Maximum cutting depth





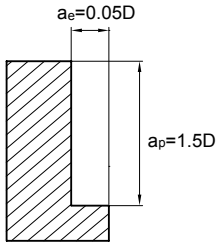
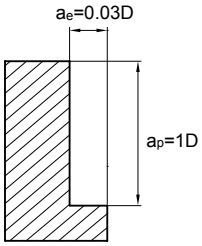
Diameter range	Cutting depth a_p
Ø1⩽D<Ø3	0.15D
Ø3⩽D<Ø6	0.3D
Ø6⩽D<Ø20	0.5D

Diameter range	Cutting depth a_p
Ø1⩽D<Ø3	0.1D
Ø3⩽D	0.2D

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.

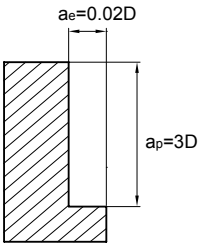
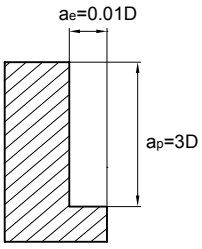
Cutting parameters for PML/PM series end mills

PML-4F-G★PM-4F-G★PML-4FL-G★PM-4FL-G(high speed side milling)

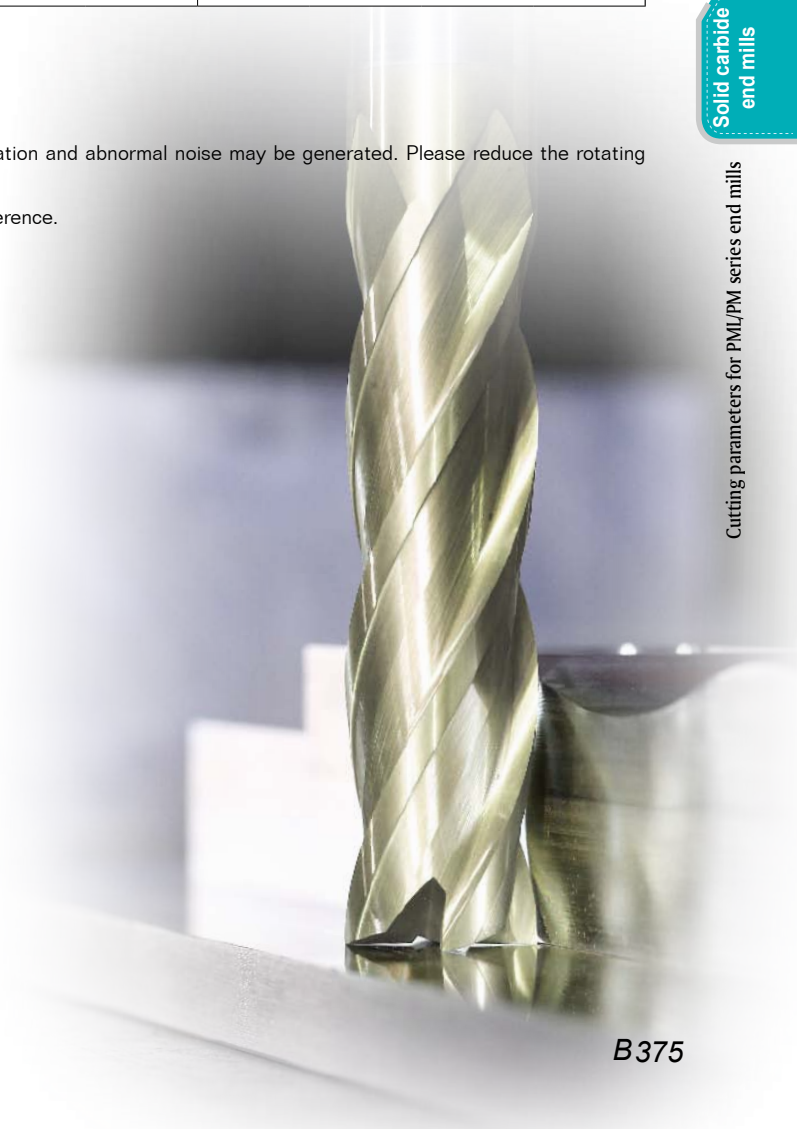
Workpiece material	Cast iron, Carbon steel, Alloy steel ~30HRC		Carbon steel, Alloy steel ~40HRC		Pre-hardened steel, quenched and tempered steel ~45HRC		Pre-hardened steel, quenched and tempered steel ~50HRC		Hardened steel ~55HRC	
Cutting speed	300m/min		250 m/min		200 m/min		150 m/min		100 m/min	
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	15915	1075	13260	900	10600	715	7960	535	5300	360
8	11935	1070	9950	885	7960	715	5970	535	3980	360
10	9550	1015	7960	870	6370	700	4775	525	3180	345
12	7960	1015	6630	870	5300	700	3980	525	2650	345
14	6820	975	5685	815	4550	650	3410	570	2275	325
16	5970	975	4975	815	3980	650	2985	570	1990	325
18	5305	975	4420	815	3540	650	2650	570	1770	325
20	4775	975	3980	815	3180	650	2390	570	1590	325
Maximum cutting depth	 Maximum ae=1.0mm						 Maximum ae=0.5mm			

1.Please select high-precision machine and tool holder.
2.Please use air blow or MQL(minimum oil mist cooling).
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.

PML-4EX-G★PM-4EX-G

Workpiece material	Cast iron, Carbon steel, Alloy steel ~30HRC		Stainless steel		Pre-hardened steel, quenched and tempered steel ~40HRC		Pre-hardened steel, quenched and tempered steel ~50HRC		Hardened steel ~55HRC	
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	5800	570	2650	85	4250	410	3600	345	3180	305
8	4400	570	2000	85	3180	410	2700	350	2390	310
10	3500	555	1600	85	2550	400	2150	340	1910	300
12	2900	555	1350	85	2120	400	1800	340	1590	300
16	2200	520	1000	80	1590	380	1350	315	1195	280
20	1750	510	800	75	1270	375	1050	310	955	280
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.

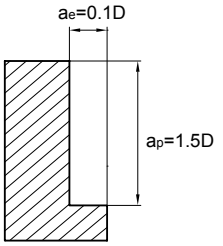


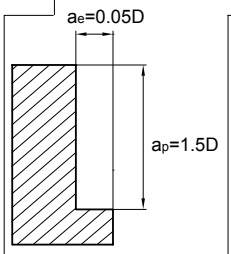
Cutting parameters for PML/PM series end mills

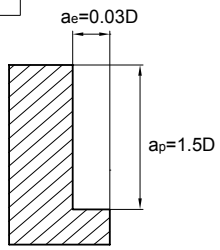
PML-4E★PM-4E★PML-4EL★PM-4EL(general cutting)

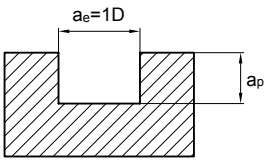
Workpiece material	Cast iron, Carbon steel, Alloy steel ~30HRC		Stainless steel		Pre-hardened steel, quenched and tempered steel ~40HRC		Pre-hardened steel, quenched and tempered steel ~50HRC		Hardened steel ~55HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	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)
1	20000	300	20000	108	20000	240	20000	180	20000	135
2	15000	480	11150	120	15000	420	13000	270	11140	195
3	14000	815	7500	145	10600	630	8500	495	7430	360
4	10800	840	5500	150	8000	645	6500	505	5570	370
5	8200	875	4500	150	6400	675	5000	530	4460	390
6	7000	900	3700	165	5300	690	4200	540	3710	390
8	5200	890	2800	165	4000	680	3200	555	2785	405
10	4200	875	2200	165	3200	675	2500	525	2230	375
12	3500	875	1850	165	2650	675	2100	525	1855	375
14	3000	815	1600	150	2300	630	1800	495	1590	360
16	2600	815	1400	145	2000	630	1600	495	1390	360
18	2300	805	1250	125	1800	620	1400	485	1240	350
20	2050	805	1100	125	1600	620	1250	485	1115	350

Maximum cutting depth









Diameter range	Cutting depth a_p
Ø1⩽D<Ø3	0.15D
Ø3⩽D<Ø6	0.3D
Ø6⩽D<Ø20	0.5D

Diameter range	Cutting depth a_p
Ø1⩽D<Ø3	0.1D
Ø3⩽D	0.2D

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.

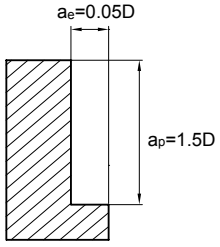
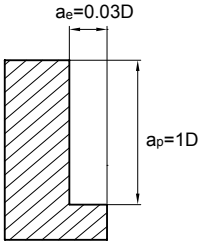
3.Please use air blow or cutting liquid with high mist retardant property.

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.

PML-4E★PM-4E★PML-4EL★PM-4EL(high speed side milling)

Workpiece material	Cast iron, Carbon steel, Alloy steel ~30HRC		Carbon steel, Alloy steel ~40HRC		Pre-hardened steel, quenched and tempered steel ~45HRC		Pre-hardened steel, quenched and tempered steel ~50HRC		Hardened steel ~55HRC	
Cutting speed	300m/min		250 m/min		200 m/min		150 m/min		100 m/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	15915	1705	13260	1420	10600	1135	7960	850	5300	570
8	11935	1700	9950	1400	7960	1130	5970	850	3980	570
10	9550	1660	7960	1380	6370	1110	4775	830	3180	550
12	7960	1660	6630	1380	5300	1110	3980	830	2650	550
14	6820	1545	5685	1290	4550	1030	3410	900	2275	515
16	5970	1545	4975	1290	3980	1030	2985	900	1990	515
18	5305	1545	4420	1290	3540	1030	2650	900	1770	515
20	4775	1545	3980	1290	3180	1030	2390	900	1590	515
Maximum cutting depth	 Maximum a_e=1.0mm						 Maximum a_e=0.5mm			

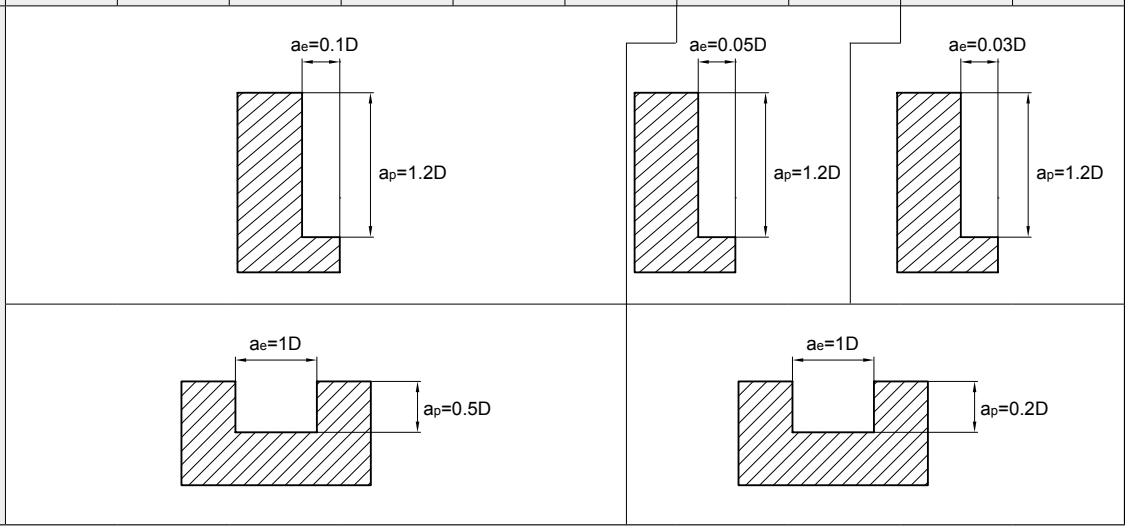
1.Please select high-precision machine and tool holder.
2.Please use air blow or MQL(minimum oil mist cooling).
3.Down milling is recommended in the case of side milling.
4.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the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

Cutting parameters for PML/PM series end mills

PML-4EFP★PM-4EFP(general cutting)

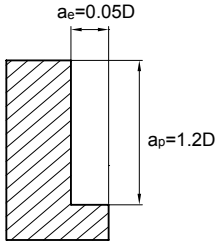
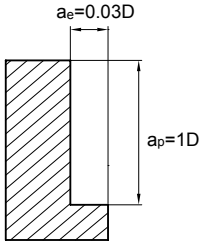
Workpiece material	Cast iron, Carbon steel, Alloy steel ~30HRC		Stainless steel		Pre-hardened steel, quenched and tempered steel ~40HRC		Pre-hardened steel, quenched and tempered steel ~50HRC		Hardened steel ~55HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	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	7000	1170	3700	210	5300	900	4200	705	3710	510
8	5200	1155	2800	210	4000	885	3200	720	2785	525
10	4200	1140	2200	210	3200	875	2500	680	2230	490
12	3500	1140	1850	210	2650	875	2100	680	1855	490
16	2600	1065	1400	185	2000	815	1600	645	1390	470
20	2050	1045	1100	165	1600	805	1250	630	1115	455

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.

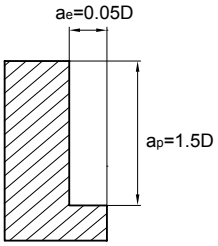
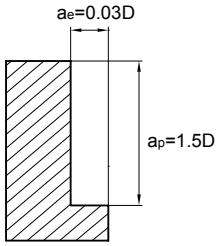
PML-4EFP★PM-4EFP(high speed side milling)

Workpiece material	Cast iron, Carbon steel, Alloy steel ~30HRC		Carbon steel, Alloy steel ~40HRC		Pre-hardened steel, quenched and tempered steel ~45HRC		Pre-hardened steel, quenched and tempered steel ~50HRC		Hardened steel ~55HRC	
Cutting speed	300m/min		250 m/min		200 m/min		150 m/min		100 m/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	15915	2215	13260	1845	10600	1475	7960	1105	5300	740
8	11935	2210	9950	1820	7960	1470	5970	1080	3980	740
10	9550	2160	7960	1795	6370	1445	4775	1080	3180	715
12	7960	2160	6630	1795	5300	1445	3980	1170	2650	715
16	5970	2010	4975	1680	3980	1340	2985	1170	1990	670
20	4775	2010	3980	1980	3180	1340	2390	1105	1590	670
Maximum cutting depth	 Maximum ae=1.0mm						 Maximum ae=0.5mm			

1.Please select high-precision machine and tool holder.
2.Please use air blow or MQL(minimum oil mist cooling).
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.

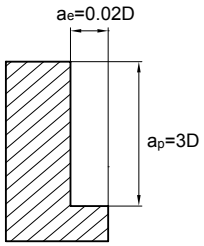
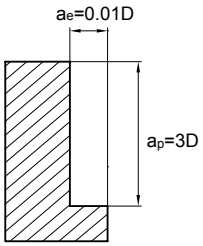
Cutting parameters for PML/PM series end mills

PML-6E★PM-6E

Workpiece material	Cast iron, Carbon steel, Alloy steel ~30HRC		Stainless steel		Pre-hardened steel, quenched and tempered steel ~40HRC		Pre-hardened steel, quenched and tempered steel ~50HRC		Hardened steel ~55HRC	
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	7000	1070	3700	195	5300	815	4200	650	3710	470
8	5200	1070	2800	195	4000	815	3200	660	2785	485
10	4200	1035	2200	195	3200	800	2500	630	2230	450
12	3500	1035	1850	195	2650	800	2100	630	1855	450
16	2600	975	1400	180	2000	750	1600	590	1390	435
20	2050	960	1100	150	1600	740	1250	580	1115	420
Maximum cutting depth	 Maximum a_e=1.0mm						 Maximum a_e=0.5mm			

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.

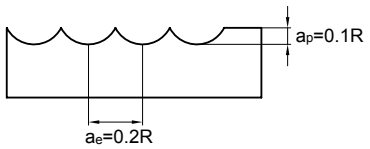
PML-6EL★PM-6EL

Workpiece material	Cast iron, Carbon steel, Alloy steel ~30HRC		Stainless steel		Pre-hardened steel, quenched and tempered steel ~40HRC		Pre-hardened steel, quenched and tempered steel ~50HRC		Hardened steel ~55HRC	
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	5800	900	2650	140	4250	655	3600	555	3180	490
8	4400	900	2000	140	3180	655	2700	560	2390	495
10	3500	875	1600	140	2550	635	2150	530	1910	470
12	2900	875	1350	140	2120	635	1800	530	1590	470
16	2200	825	1000	125	1590	600	1350	500	1195	445
20	1750	810	800	110	1270	590	1050	495	955	440
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.

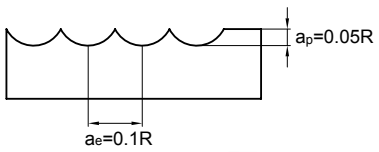
Cutting parameters for PML/PM series end mills

PML-2B★PM-2B★PML-2BL★PM-2BL
PML-2BFP★PM-2BFP(general cutting)

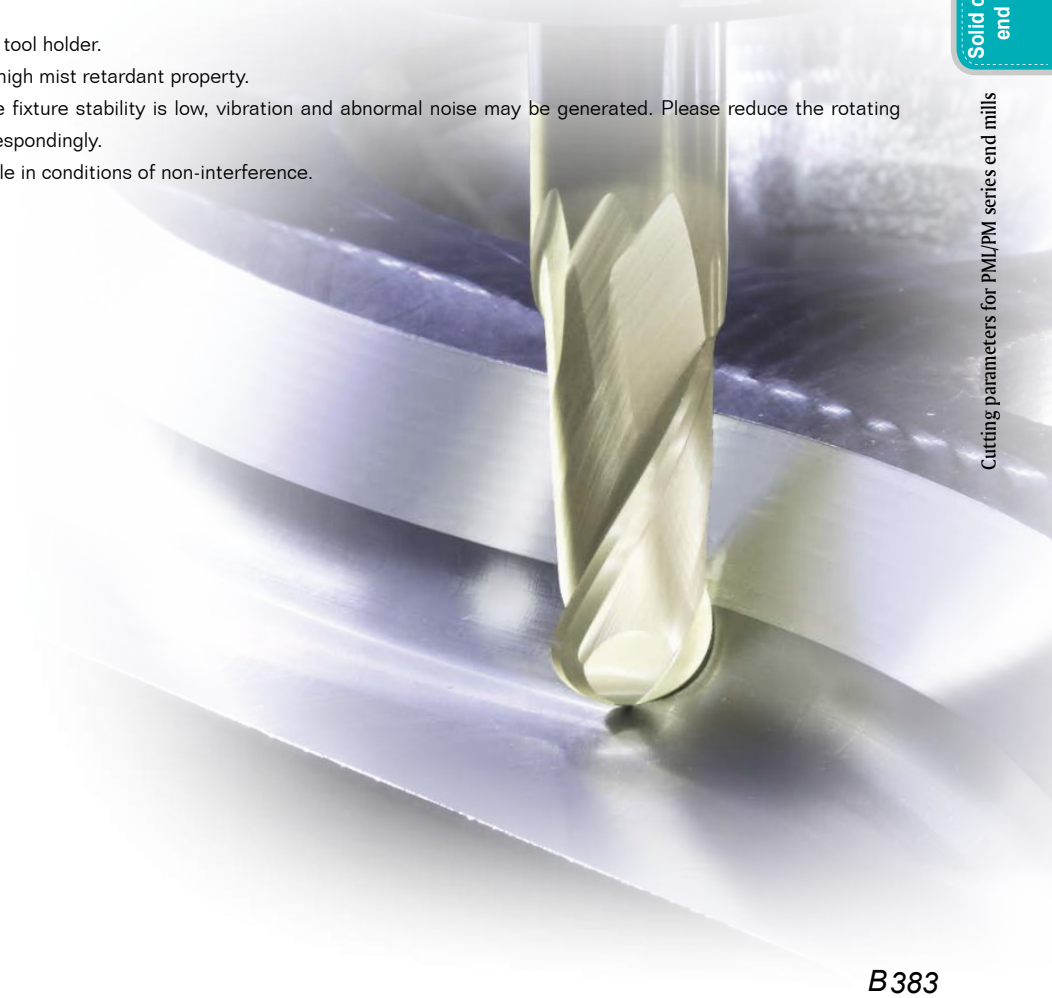
Workpiece material	Cast iron, Carbon steel, Alloy steel ~30HRC		Stainless steel		Pre-hardened steel, quenched and tempered steel ~40HRC		Pre-hardened steel, quenched and tempered steel ~50HRC		Hardened steel ~55HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	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)
R0.5	40000	960	22300	240	32000	385	25000	330	22280	295
R1.0	24000	1080	11150	275	16000	480	13000	330	11140	295
R1.5	15500	1150	7400	350	10600	545	8500	335	7430	295
R2.0	11500	1150	5550	445	8000	665	6500	450	5570	385
R2.5	9500	1270	4450	445	6400	665	5000	455	4455	405
R3.0	8000	1270	3700	470	5300	700	4200	470	3715	420
R4.0	6000	1575	2750	550	4000	850	3200	535	2785	465
R5.0	4800	1455	2200	520	3200	785	2500	535	2230	465
R6.0	4000	1330	1850	520	2650	740	2100	505	1855	450
R8.0	3000	1270	1350	455	2000	725	1600	455	1395	395
R10.0	2400	1150	1100	445	1600	675	1250	400	1115	360
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.

PML-2B★PM-2B★PML-2BL★PM-2BL
PML-2BFP★PM-2BFP(high speed cutting)

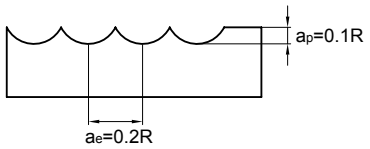
Workpiece material	Cast iron, Carbon steel, Alloy steel ~30HRC		Carbon steel, Alloy steel ~400HRC		Pre-hardened steel, quenched and tempered steel ~45HRC		Pre-hardened steel, quenched and tempered steel ~50HRC		Hardened steel ~55HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating 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)
R3.0	15000	4800	11500	2750	9500	2250	7960	1885	6370	1510
R4.0	11500	3650	8950	2100	7150	1700	5970	1420	4775	1135
R5.0	9500	3000	7150	1700	5700	1350	4775	1130	3820	905
R6.0	7950	2500	5950	1400	4750	1100	3980	920	3180	735
R8.0	5950	1900	4450	1050	3550	850	2985	760	2390	610
R10.0	4750	1500	3550	850	2850	680	2390	570	1910	455
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.



Cutting parameters for PML/PM series end mills

PML-4B★PM-4B★PML-4BL★PM-4BL

Workpiece material	Cast iron, Carbon steel, Alloy steel ~30HRC		Stainless steel		Pre-hardened steel, quenched and tempered steel ~40HRC		Pre-hardened steel, quenched and tempered steel ~50HRC		Hardened steel ~55HRC	
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)
R1.5	15500	2055	7400	625	10600	975	8500	600	7430	525
R2.0	11500	2055	5550	795	8000	1190	6500	800	5570	685
R2.5	9500	2270	4450	795	6400	1190	5000	810	4455	720
R3.0	8000	2270	3700	840	5300	1245	4200	840	3715	745
R4.0	6000	2810	2750	985	4000	1515	3200	950	2785	825
R5.0	4800	2595	2200	925	3200	1405	2500	950	2230	825
R6.0	4000	2375	1850	925	2650	1320	2100	905	1855	800
R8.0	3000	2270	1350	815	2000	1295	1600	810	1395	705
R10.0	2400	2055	1100	795	1600	1200	1250	715	1115	640
Maximum cutting depth										

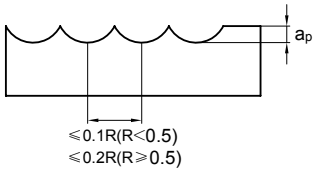
1.Please select high-precision machine and tool holder.

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.

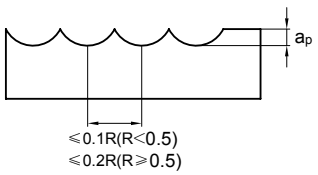
4.Make overhang of tool as short as possible in conditions of non-interference.

PM-2BC

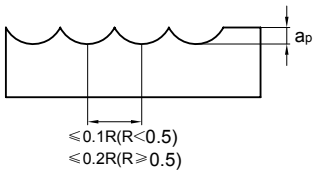
Workpiece material			Pre-hardened steel, quenched and tempered steel ~40HRC			Pre-hardened steel, quenched and tempered steel ~50HRC			Hardened steel ~55HRC		
Diameter (mm)	Taper half angle (°)	Effective length (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	a_p (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	a_p (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	a_p (mm)
R0.25	0.5°	3	30000	300	0.03	30000	270	0.03	30000	240	0.03
		5	30000	250	0.02	30000	225	0.02	30000	200	0.02
	1.0°	3	30000	330	0.03	30000	300	0.03	30000	265	0.03
		5	30000	270	0.02	30000	245	0.02	30000	215	0.02
	1.5°	3	30000	350	0.03	30000	315	0.03	30000	280	0.03
		5	30000	300	0.02	30000	270	0.02	30000	240	0.02
R0.30	0.5°	5	30000	300	0.03	30000	270	0.03	30000	240	0.03
		8	30000	250	0.02	30000	225	0.02	30000	200	0.02
	1.0°	5	30000	350	0.03	30000	315	0.03	30000	280	0.03
		8	30000	300	0.02	30000	270	0.02	30000	240	0.02
		10	30000	270	0.02	30000	245	0.02	30000	215	0.02
		12	30000	250	0.015	30000	225	0.015	30000	200	0.015
		15	30000	250	0.01	30000	225	0.01	30000	200	0.01
	1.5°	8	30000	350	0.03	30000	315	0.03	30000	280	0.03
		15	30000	300	0.01	30000	270	0.01	30000	240	0.01
R0.40	0.5°	8	30000	350	0.05	30000	315	0.05	30000	280	0.05
		12	30000	300	0.04	30000	270	0.04	30000	240	0.04
	1.0°	8	30000	400	0.05	30000	360	0.05	30000	320	0.05
		12	30000	350	0.04	30000	315	0.04	30000	280	0.04
	1.5°	8	30000	450	0.05	30000	405	0.05	30000	360	0.05
		12	30000	400	0.04	30000	360	0.04	30000	320	0.04
R0.50	0.5°	10	22000	450	0.05	22000	405	0.05	22000	360	0.05
		15	22000	400	0.04	22000	360	0.04	22000	320	0.04
		20	22000	370	0.03	22000	335	0.03	22000	295	0.03
		25	22000	350	0.01	22000	315	0.01	22000	280	0.01
		30	22000	320	0.005	22000	290	0.005	22000	255	0.005
	1.0°	10	22000	500	0.05	22000	450	0.05	22000	400	0.05
		15	22000	450	0.04	22000	405	0.04	22000	360	0.04
		20	22000	430	0.02	22000	390	0.02	22000	345	0.02
		25	22000	400	0.015	22000	360	0.015	22000	320	0.015
		30	22000	360	0.01	22000	325	0.01	22000	290	0.01
		35	22000	320	0.005	22000	290	0.005	22000	255	0.005
Maximum cutting depth											

Cutting parameters for PML/PM series end mills

PM-2BC

Workpiece material			Pre-hardened steel, quenched and tempered steel ~40HRC			Pre-hardened steel, quenched and tempered steel ~50HRC			Hardened steel ~55HRC		
Diameter (mm)	Taper half angle (°)	Effective length (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	a_p (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	a_p (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	a_p (mm)
R0.50	1.5°	10	22000	530	0.05	22000	475	0.05	22000	425	0.05
		15	22000	500	0.04	22000	450	0.04	22000	400	0.04
		20	22000	460	0.02	22000	415	0.02	22000	370	0.02
	2°	15	22000	600	0.04	22000	540	0.04	22000	480	0.04
		20	22000	500	0.02	22000	450	0.02	22000	400	0.02
	3°	20	22000	550	0.03	22000	495	0.03	22000	440	0.03
	5°	20	22000	600	0.03	22000	540	0.03	22000	480	0.03
R0.60	0.5°	12	22000	500	0.05	22000	450	0.05	22000	400	0.05
		24	22000	400	0.02	22000	360	0.02	22000	320	0.02
	1.0°	12	22000	550	0.05	22000	495	0.05	22000	440	0.05
		24	22000	450	0.02	22000	405	0.02	22000	360	0.02
	1.5°	12	22000	600	0.05	22000	540	0.05	22000	480	0.05
		24	22000	550	0.02	22000	495	0.02	22000	440	0.02
R0.75	0.5°	10	20000	600	0.1	20000	540	0.1	20000	480	0.1
		15	20000	550	0.08	20000	495	0.08	20000	440	0.08
		30	20000	500	0.02	20000	450	0.02	20000	400	0.02
	1.0°	10	20000	650	0.1	20000	585	0.1	20000	520	0.1
		15	20000	600	0.08	20000	540	0.08	20000	480	0.08
		20	20000	550	0.05	20000	495	0.05	20000	440	0.05
		30	20000	530	0.02	20000	480	0.02	20000	425	0.02
	1.5°	10	20000	700	0.1	20000	630	0.1	20000	560	0.1
		15	20000	650	0.08	20000	585	0.08	20000	520	0.08
		30	20000	600	0.02	20000	540	0.02	20000	480	0.02
R1.0	0.5°	20	18000	800	0.05	18000	720	0.05	18000	640	0.05
		30	18000	650	0.03	18000	585	0.03	18000	520	0.03
		40	18000	500	0.02	18000	450	0.02	18000	400	0.02
	1.0°	20	18000	900	0.05	18000	810	0.05	18000	720	0.05
		25	18000	850	0.04	18000	765	0.04	18000	680	0.04
		30	18000	800	0.03	18000	720	0.03	18000	640	0.03
		35	18000	750	0.03	18000	675	0.03	18000	600	0.03
		40	18000	600	0.02	18000	540	0.02	18000	480	0.02
		50	18000	550	0.02	18000	495	0.02	18000	440	0.02
Maximum cutting depth											

PM-2BC

Workpiece material			Pre-hardened steel, quenched and tempered steel ~40HRC			Pre-hardened steel, quenched and tempered steel ~50HRC			Hardened steel ~55HRC		
Diameter (mm)	Taper half angle (°)	Effective length (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	a_p (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	a_p (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	a_p (mm)
R1.0	1.5°	20	18000	1000	0.05	18000	900	0.05	18000	800	0.05
		30	18000	900	0.03	18000	810	0.03	18000	720	0.03
		40	18000	750	0.03	18000	675	0.03	18000	600	0.03
	2°	30	18000	900	0.04	18000	810	0.04	18000	720	0.04
		40	18000	850	0.03	18000	765	0.03	18000	680	0.03
	3°	30	18000	1000	0.04	18000	900	0.04	18000	800	0.04
		40	18000	900	0.03	18000	810	0.03	18000	720	0.03
R1.5	0.5°	30	16000	1100	0.1	16000	990	0.1	16000	880	0.1
		40	16000	950	0.06	16000	855	0.06	16000	760	0.06
		50	16000	800	0.03	16000	720	0.03	16000	640	0.03
	1.0°	30	16000	1200	0.1	16000	1080	0.1	16000	960	0.1
		40	16000	1000	0.06	16000	900	0.06	16000	800	0.06
		50	16000	850	0.03	16000	765	0.03	16000	680	0.03
R1.5	1.5°	30	16000	1300	0.1	16000	1170	0.1	16000	1040	0.1
		40	16000	1100	0.06	16000	990	0.06	16000	880	0.06
		50	16000	950	0.03	16000	855	0.03	16000	760	0.03
R2.0	0.5°	60	14000	1100	0.1	14000	990	0.1	14000	880	0.1
	1.0°	60	14000	1100	0.1	14000	990	0.1	14000	880	0.1
Maximum cutting depth											

1.Please select high-precision machine and tool holder. When vibration and abnormal noise occur during machining, please reduce axial cutting depth ap.

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

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

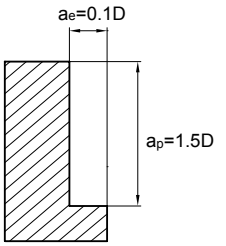
4.Because machining conditions such as machine and allowance for machining may vary, please adjust the parameters based on actual requirements.

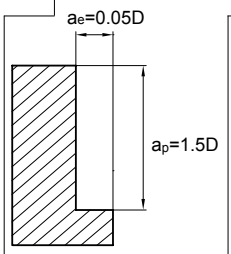
Cutting parameters for PML/PM series end mills

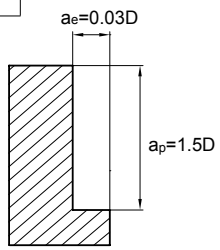
PML-2R★PM-2R

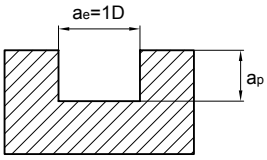
Workpiece material	Cast iron, Carbon steel, Alloy steel ~30HRC		Stainless steel		Pre-hardened steel, quenched and tempered steel ~40HRC		Pre-hardened steel, quenched and tempered steel ~50HRC		Hardened steel ~55HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	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)
1	20000	240	20000	75	20000	195	20000	145	20000	95
2	15000	385	11150	100	15000	335	13000	215	11140	130
3	14000	655	7500	145	10600	505	8500	395	7430	245
4	10800	675	5500	155	8000	515	6500	405	5570	245
5	8200	695	4500	155	6400	540	5000	425	4460	260
6	7000	720	3700	170	5300	555	4200	435	3710	260
8	5200	720	2800	170	4000	555	3200	440	2785	275
10	4200	695	2200	170	3200	535	2500	420	2230	255
12	3500	695	1850	170	2650	535	2100	420	1855	255

Maximum cutting depth









Diameter range	Cutting depth a_p
Ø1⩽D<Ø3	0.15D
Ø3⩽D<Ø6	0.3D
Ø6⩽D<Ø20	0.5D

Diameter range	Cutting depth a_p
Ø1⩽D<Ø3	0.1D
Ø3⩽D	0.2D

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.

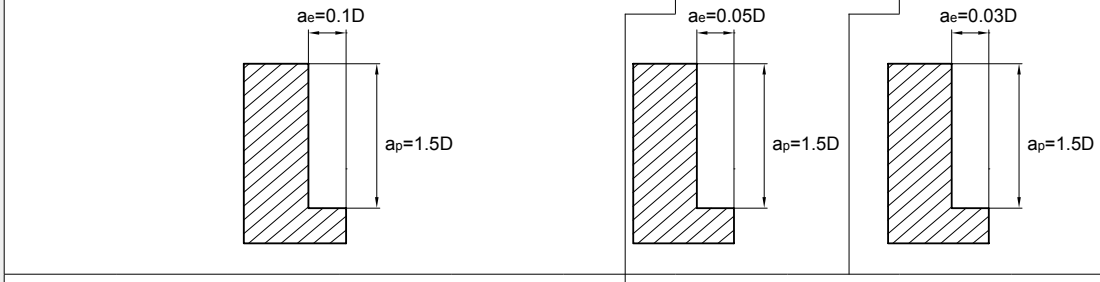
5.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.

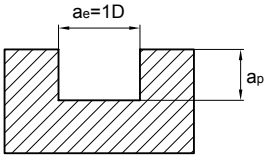
6.Make overhang of tool as short as possible in conditions of non-interference.

PML-4R★PML-4R-H★PM-4R★PM-4R-H★PML-4RFP★PM-4RFP

Workpiece material	Cast iron, Carbon steel, Alloy steel ~30HRC		Stainless steel		Pre-hardened steel, quenched and tempered steel ~40HRC		Pre-hardened steel, quenched and tempered steel ~50HRC		Hardened steel ~55HRC	
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)
3	14000	985	7500	175	10600	755	8500	590	7430	435
4	10800	1010	5500	175	8000	770	6500	600	5570	445
5	8200	1055	4500	175	6400	805	5000	640	4460	470
6	7000	1080	3700	195	5300	830	4200	650	3710	470
8	5200	1070	2800	195	4000	815	3200	660	2785	485
10	4200	1055	2200	195	3200	805	2500	625	2230	450
12	3500	1055	1850	195	2650	805	2100	625	1855	450
16	2600	985	1400	175	2000	755	1600	590	1390	435

Maximum cutting depth





Diameter range	Cutting depth a_p
Ø1⩽D<Ø3	0.15D
Ø3⩽D<Ø6	0.3D
Ø6⩽D<Ø20	0.5D

Diameter range	Cutting depth a_p
Ø1⩽D<Ø3	0.1D
Ø3⩽D	0.2D

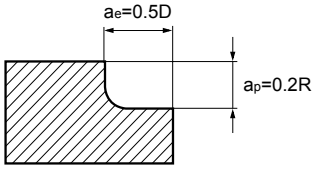
1.The above table shows the standard value of side milling. When milling slot, 50%~70% of rotating speed and 40%~60% of feed speed stated above are recommended as standard.
2.Please select high-precision machine and tool holder.
3.Please use air blow or cutting liquid with high mist retardant property.
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.

Cutting parameters for PML/PM series end mills

PM-4H★PM-4HL

Standard：

Workpiece material	Cast iron, Carbon steel, Alloy steel ~30HRC		Quenched and tempered steel ~40HRC		Quenched and tempered steel ~45HRC		Quenched and tempered steel ~50HRC		Quenched and tempered steel ~55HRC	
Diameter× Corner radius	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)
3.0×R0.8	10500	6250	8500	4500	7450	3900	5300	2600	3200	995
4.0×R1.0	7950	6600	6350	4800	5550	4200	4000	2750	2400	1050
5.0×R1.2	6350	7000	5100	5100	4450	4450	3200	2850	1900	1150
6.0×R1.0 6.0×R1.5	5300	7000	4250	5100	3700	4450	2650	2850	1600	1150
8.0×R1.0 8.0×R2.0	4550	7000	3200	5100	2800	4450	2000	2850	1200	1150
10.0×R1.0 10.0×R2.0	3200	7000	2550	5100	2250	4450	1600	2850	955	1150
12.0×R2.0 12.0×R3.0	2650	7000	2100	5100	1850	4450	1350	2850	795	1150
Maximum cutting depth	Maximum a_p=0.5mm						Maximum a_p=0.4mm		Maximum a_p=0.2mm	



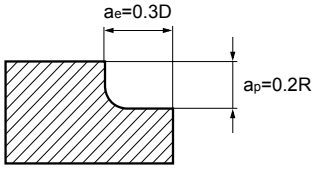
1.Please select high-precision machine and tool holder.
2.Please use air blow or cutting liquid with high mist retardant property.
3.Down milling is recommended.
4.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
5.Make overhang of tool as short as possible in conditions of non-interference.
6.The above cutting parameters are based on contour machining when overhang L/D≤4. Please make adjustments according to the table below when overhang is different.

Different cutting parameters under different overhang of tool:

Overhang	Cutting speed(m/min)	Axial cutting depth (mm)	Feed speed (mm/min)
L/D⩽4	100%	100%	100%
L/D=5	80%~90%	70%~90%	80%~90%
L/D=6	60%~80%	50%~70%	60%~80%

PM-4H★PM-4HL

High speed:

Workpiece material	Cast iron, Carbon steel, Alloy steel ~30HRC		Quenched and tempered steel ~40HRC		Quenched and tempered steel ~45HRC		Quenched and tempered steel ~50HRC		Quenched and tempered steel ~55HRC	
Diameter× Corner radius	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)
3.0×R0.8	21000	12500	21000	12000	16000	8400	16000	7850	10500	3300
4.0×R1.0	16000	13000	16000	12000	12000	9000	12000	8200	7950	3550
5.0×R1.2	12500	14000	12500	12500	9550	9550	9550	8600	6350	3800
6.0×R1.0 6.0×R1.5	10600	14000	10600	12700	7950	9550	7950	8600	5300	3800
8.0×R1.0 8.0×R2.0	7950	14000	7950	12700	5950	9550	5950	8600	4000	3800
10.0×R1.0 10.0×R2.0	6350	14000	6350	12700	4750	9550	4750	8600	3200	3800
12.0×R2.0 12.0×R3.0	5300	14000	5300	12700	4000	9550	4000	8600	2650	3800
Maximum cutting depth	Maximum a_p=0.4mm						Maximum a_p=0.2mm		Maximum a_p=0.1mm	
										

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.
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.
6.The above cutting parameters are based on contour machining when overhang L/D≤4. Please make adjustments according to the table below when overhang is different.

Different cutting parameters under different overhang of tool:

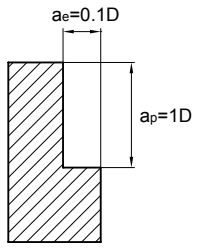
Ratio of neck length to diameter	Cutting speed(m/min)	Axial cutting depth(mm)	Feed speed (mm/min)
L/D⩽4	100%	100%	100%
L/D=5	60%~80%	60%~80%	60%~80%
L/D=6	40%~60%	40%~60%	40%~60%

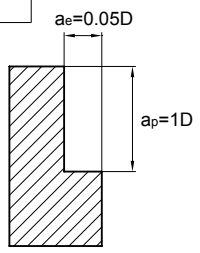
Cutting parameters for GM series end mills

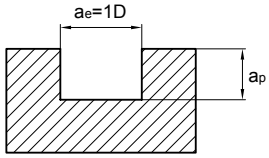
GM-2E★GM-2EL

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 ~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	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

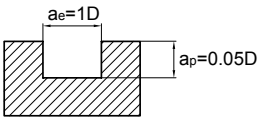
Maximum cutting depth







Diameter range	Cutting depth a_p
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.

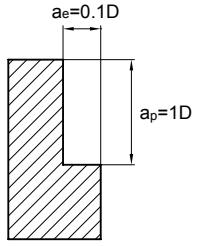
5.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.

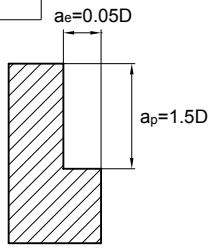
6.Make overhang of tool as short as possible in conditions of non-interference.

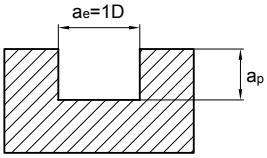
GM-3E★GM-3EL

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	605	10000	560	8000	460	5500	145	6500	365
5	8200	630	8200	630	7600	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	360
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

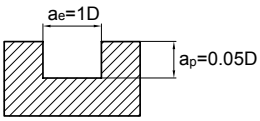
Maximum cutting depth







Diameter range	Cutting depth a_p
Ø1⩽D<Ø3	0.15D
Ø3⩽D	0.3D



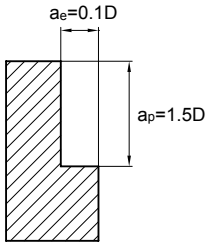
1.The above table shows the standard value of side milling. When milling slot, 50%~70% of rotating speed and 40%~60% of feed speed stated above are recommended as standard.
2.Please select high-precision machine and tool holder.
3.Please use air blow or cutting liquid with high mist retardant property.
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.

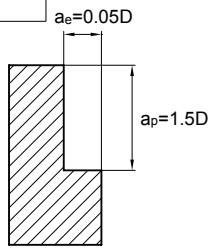
Cutting parameters for GM series end mills

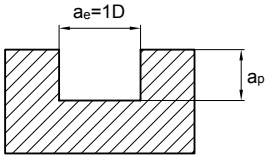
GM-4E-G★GM-4EL-G

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	10600	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

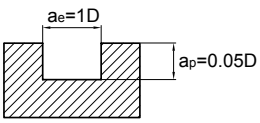
Maximum cutting depth







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, 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.

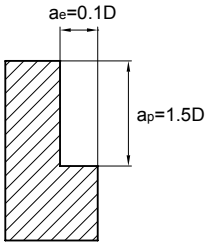
5.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.

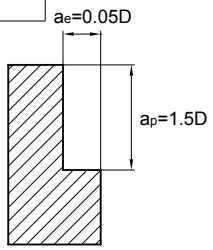
6.Make overhang of tool as short as possible in conditions of non-interference.

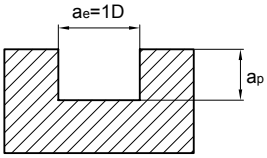
GM-4E★GM-4EL

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	535	5500	125	6500	420
5	8200	730	8200	730	7600	670	6400	560	4500	125	5000	440
6	7000	750	7000	750	6400	690	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

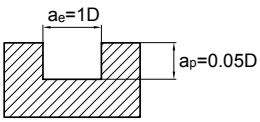
Maximum cutting depth







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.

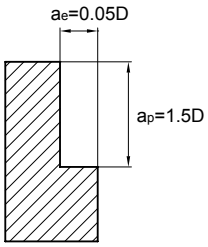
4.Down milling is recommended in the case of side milling.

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.

Cutting parameters for GM series end mills

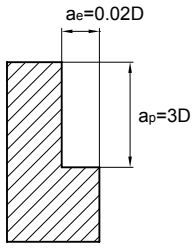
GM-6E

Workpiece material	Cast iron, Nodular cast iron		Carbon steel, Alloy steel ~750N/mm^2		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.



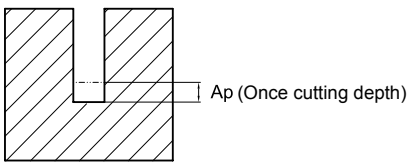
GM-6EL

Workpiece material	Cast iron, Nodular cast iron		Carbon steel, Alloy steel ~750N/mm^2		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	3600	460
8	4400	750	4400	750	4000	685	3180	545	2000	115	2700	465
10	3500	730	3500	730	3200	665	2550	530	1600	115	2150	440
12	2900	730	2900	730	2650	665	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												

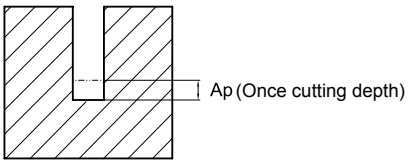
1.Please select high-precision machine and tool holder.
2.Please use air blow or cutting liquid with high mist retardant property.
3.Down milling is recommended in the case of side milling.
4.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. 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.

Cutting parameters for GM series end mills

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)	a_p (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	a_p (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	a_p (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	a_p (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	26000	700	0.036	26000	450	0.034	26000	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	25000	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	0.16
	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													

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)	a_p (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	a_p (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	a_p (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	a_p (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	0.05
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	0.16
	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	0.16	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													

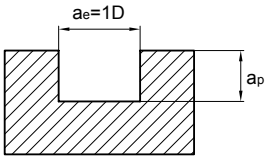
1.Please select high-precision machine and tool holder.
2.Please use air blow or cutting liquid with high mist retardant property.
3.Make overhang of tool as short as possible in conditions of non-interference.
4.Reduce feed speed correspondingly when rotating speed is low.

Cutting parameters for GM series end mills

GM-2ES

Workpiece material	Cast iron, Nodular cast iron		Carbon steel, Alloy steel ~750N/mm^2		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	90	27500	50
0.5	32000	125	32000	125	29500	125	25000	90	22000	50
0.6	32000	125	32000	125	24500	125	21000	90	18500	50
0.7	32000	125	32000	125	24500	125	21000	90	18500	50
0.8	24500	125	24500	125	18500	125	15500	90	13500	50
0.9	24500	125	24500	125	18500	125	15500	90	13500	50
1.0	21000	140	25000	165	16800	130	14500	90	10000	50
1.5	13000	140	15000	165	11800	130	10000	90	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 a_p
D<Ø1	0.05D
Ø1≤D≤Ø3	0.15D

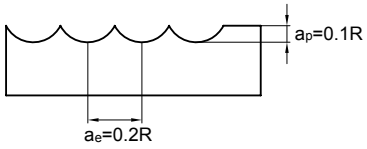
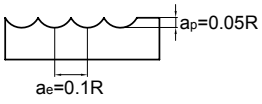
1.Please select high-precision machine and tool holder.

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 correspondingly.

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

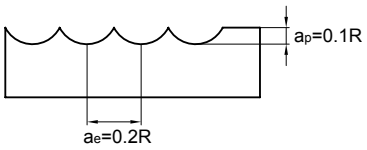
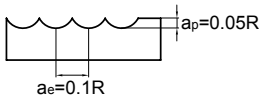
GM-2B★GM-2BL

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	375
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	680	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.

Cutting parameters for GM series end mills

GM-4B★GM-4BL

Workpiece material	Cast iron, Nodular cast iron		Carbon steel, Alloy steel ~750N/mm^2		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		80m/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	755
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	660	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.

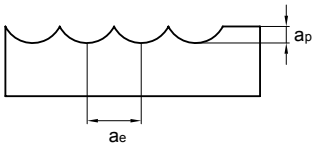
3.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.

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/mm^2		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)
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

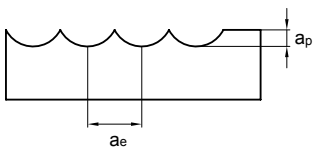


Diameter range	Cutting depth a_p	Cutting width a_e
D<Ø1	0.05R	0.2R
Ø1≤D≤Ø3	0.1R	0.2R

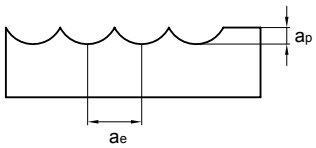
1.Please select high-precision machine and tool holder.
2.Please use air blow or cutting liquid with high mist retardant property.
3.Make overhang of tool as short as possible in conditions of non-interference.
4.Reduce feed speed correspondingly when rotating speed is low.

Cutting parameters for GM series end mills

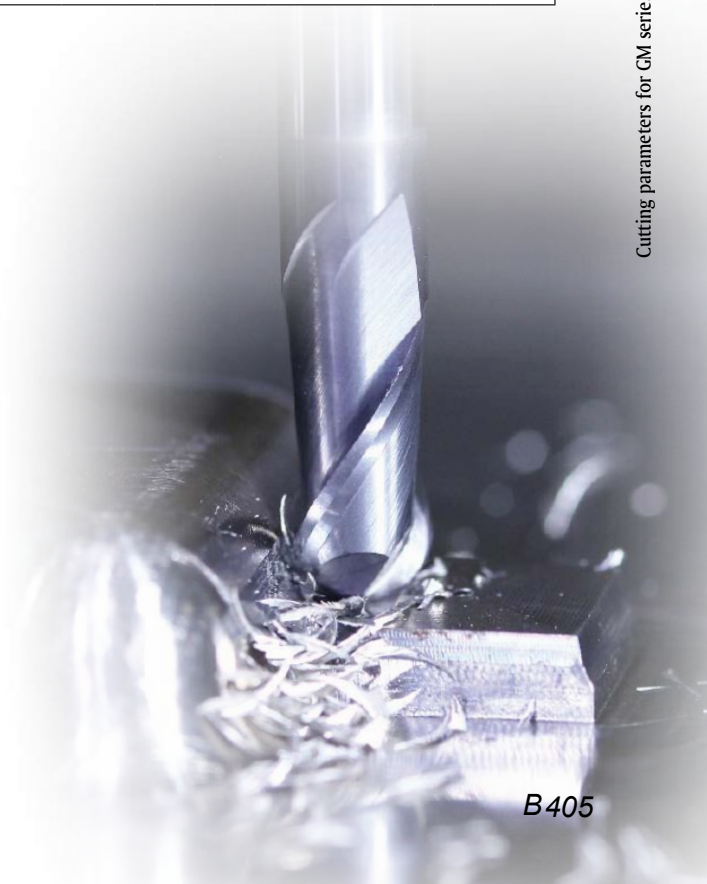
GM-2BP

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	16000	200	0.05	0.2
	8	21000	360	0.05	0.15	21000	320	0.05	0.15	19000	270	0.05	0.15	16000	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	0.06	0.30	14000	600	0.06	0.30	13000	450	0.06	0.30	10000	270	0.06	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																	

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)
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	0.06	0.30	13000	600	0.06	0.30	12000	450	0.06	0.30	10000	270	0.06	0.30
	16	13000	550	0.06	0.24	13000	530	0.06	0.24	12000	400	0.06	0.24	10000	270	0.06	0.24
	20	10000	360	0.06	0.16	10000	330	0.06	0.16	8000	225	0.06	0.16	7000	175	0.06	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	0.60
	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.

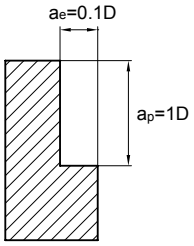


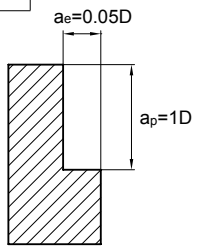
Cutting parameters for GM series end mills

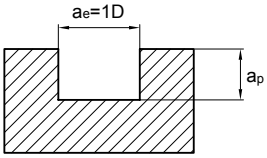
GM-2R

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	160	20000	60	20000	120
2	15000	320	15000	320	15000	290	15000	280	11150	84	13000	180
3	14000	545	14000	545	13000	510	10600	420	7500	120	8500	330
4	10800	560	10800	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	350
12	3500	580	3500	580	3200	540	2650	445	1850	140	2100	350

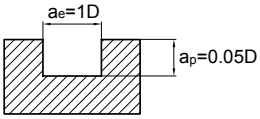
Maximum cutting depth







Diameter range	Cutting depth a_p
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.

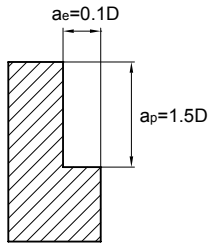
5.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.

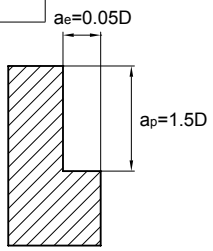
6.Make overhang of tool as short as possible in conditions of non-interference.

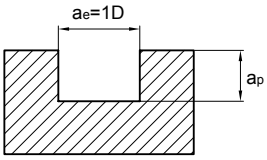
GM-4R★GM-4RL

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	8500	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	680	2600	680	2400	630	2000	525	1400	120	1600	490

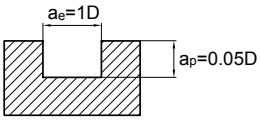
Maximum cutting depth







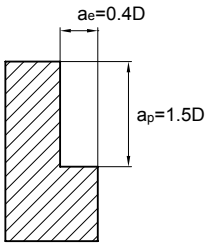
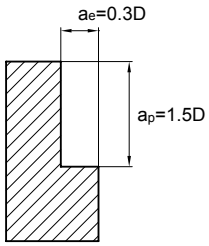
Diameter range	Cutting depth ap
Ø1⩽D<Ø3	0.15D
Ø3⩽D	0.3D



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.

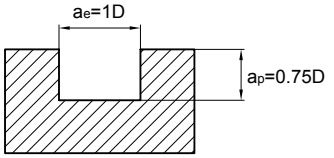
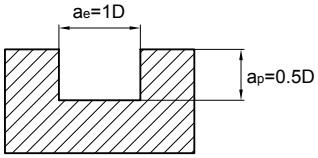
Cutting parameters for GM series end mills

GM-4W——side cutting

Workpiece material	Cast iron, Nodular cast iron		Carbon steel, Alloy steel ~750N/mm^2		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	3650	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.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.

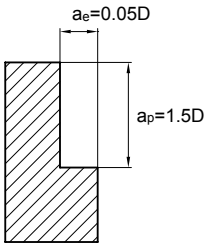
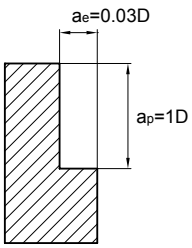
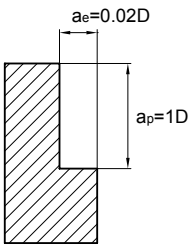
GM-4W——slot cutting

Workpiece material	Cast iron, Nodular cast iron		Carbon steel, Alloy steel ~750N/mm^2		Carbon steel, Alloy steel ~30HRC		Pre-hardened steel, quenched and tempered steel ~40HRC		Stainless steel	
Cutting speed	80~120 m/min		70~100m/min		60~90m/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	 Maximum a_p=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.

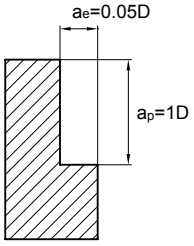
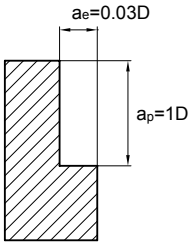
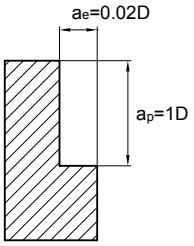
Cutting parameters for HMX series end mills

HMX-2E

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	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	6800	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	 Maximum a_e=1.0mm		 Maximum a_e=0.5mm		 Maximum a_e=0.3mm	

1.Please select high-precision and rigidity 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.

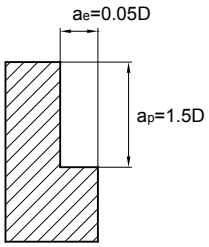
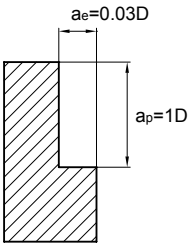
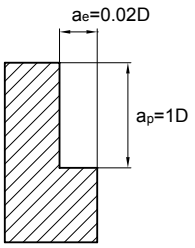
HMX-2EFP

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	8000	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	 Maximum ae=1.0mm		 Maximum ae=0.5mm		 Maximum ae=0.3mm	

1.Please select high-precision and rigidity 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.

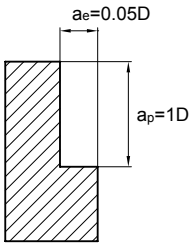
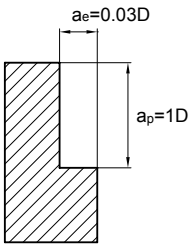
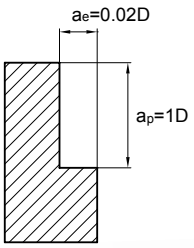
Cutting parameters for HMX series end mills

HMX-4E★HMX-4EL

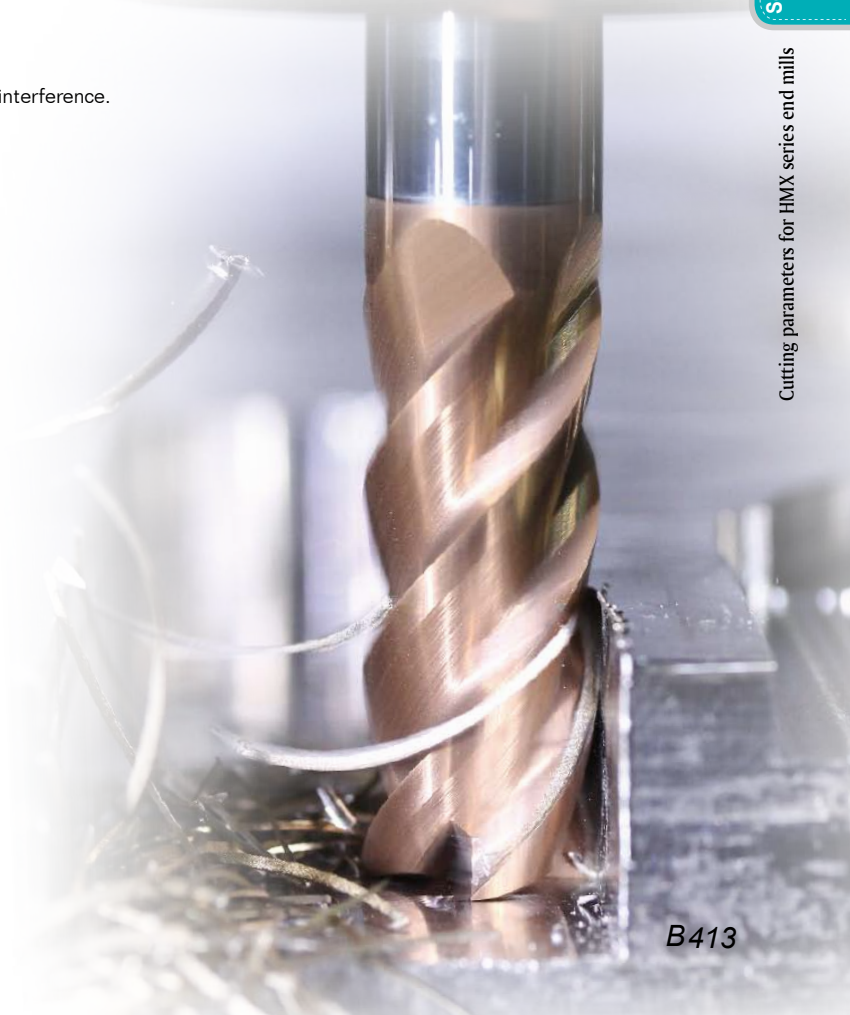
Workpiece material	Pre-hardened steel, Hardened steel 40~50HRC		Hardened steel 50~60HRC		Hardened steel 60~68HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
1	40000	320	40000	320	32000	260
2	40000	800	24000	480	16000	320
3	32000	1020	16000	510	11000	350
4	24000	1250	12000	620	8000	420
5	19000	1360	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	 Maximum a_e=1.0mm		 Maximum a_e=0.5mm		 Maximum a_e=0.3mm	

1.Please select high-precision and rigidity 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.

HMX-4EFP

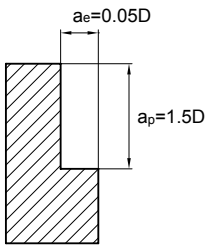
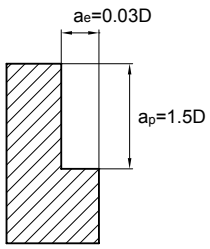
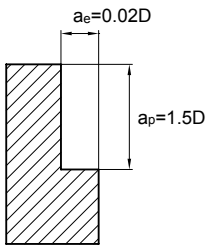
Workpiece material	Pre-hardened steel, Hardened steel 40~50HRC		Hardened steel 50~60HRC		Hardened steel 60~68HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
6	16000	1730	8000	920	5300	610
8	12000	1730	6000	920	4000	610
10	9600	1730	4800	920	3200	610
12	8000	1800	4000	960	2700	650
16	6000	1350	3000	720	2000	480
20	4800	1080	2400	570	1600	390
Maximum cutting depth	 Maximum ae=1.0mm		 Maximum ae=0.5mm		 Maximum ae=0.3mm	

1.Please select high-precision and rigidity 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.



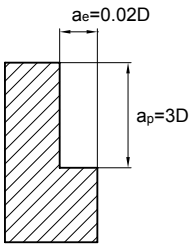
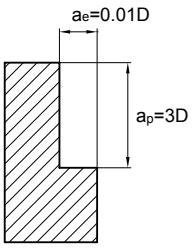
Cutting parameters for HMX series end mills

HMX-6E

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	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	 Maximum a_e=1.0mm		 Maximum a_e=0.5mm		 Maximum a_e=0.3mm	

1.Please select high-precision and rigidity 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.

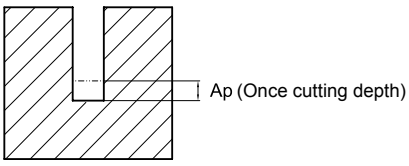
HMX-6EL

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	 Maximum ae=0.3mm					

1.Please select high-precision and rigidity 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.

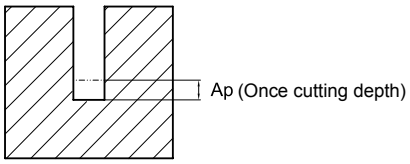
Cutting parameters for HMX series end mills

HMX-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)	a_p (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	a_p (mm)
0.5	4	21000	100	0.009	17000	50	0.009
	6	20000	75	0.006	15000	35	0.007
	8	20000	50	0.002	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	0.016
	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	0.005
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							

Cutting parameters for HMX series end mills

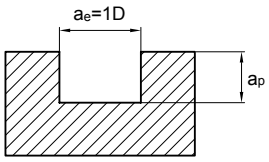
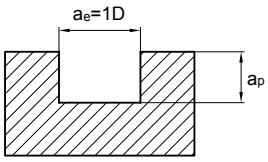
HMX-2EP

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)	a_p (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	a_p (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	0.05
	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							

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.

Cutting parameters for HMX series end mills

HMX-2ES

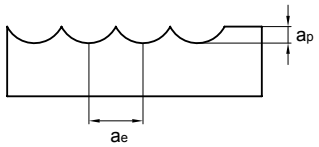
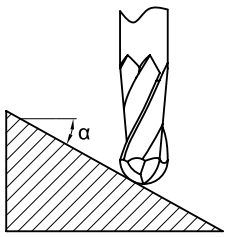
Workpiece material	Pre-hardened steel, Hardened steel 40~50HRC		Hardened steel 50~60HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
0.3	23000	30	16500	25
0.4	17500	30	12500	25
0.5	14000	30	10000	25
0.6	11500	30	8450	25
0.7	10000	30	7500	25
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	3950	40	2750	25
2.5	3500	45	2500	30
3.0	2750	45	2000	30
Maximum cutting depth				

Diameter range	Cutting depth a_p
D<Ø1	0.02D
Ø1≤D≤Ø3	0.05D

Diameter range	Cutting depth a_p
D<Ø1	0.01D
Ø1≤D≤Ø3	0.02D

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.

HMX-2B★HMX-2BL★HMX-2BFP

Workpiece material	Pre-hardened steel, Hardened steel 40~50HRC				Hardened steel 50~60HRC				Hardened steel 60~68HRC			
Radius of ball nose (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)
R0.5	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	26000	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												

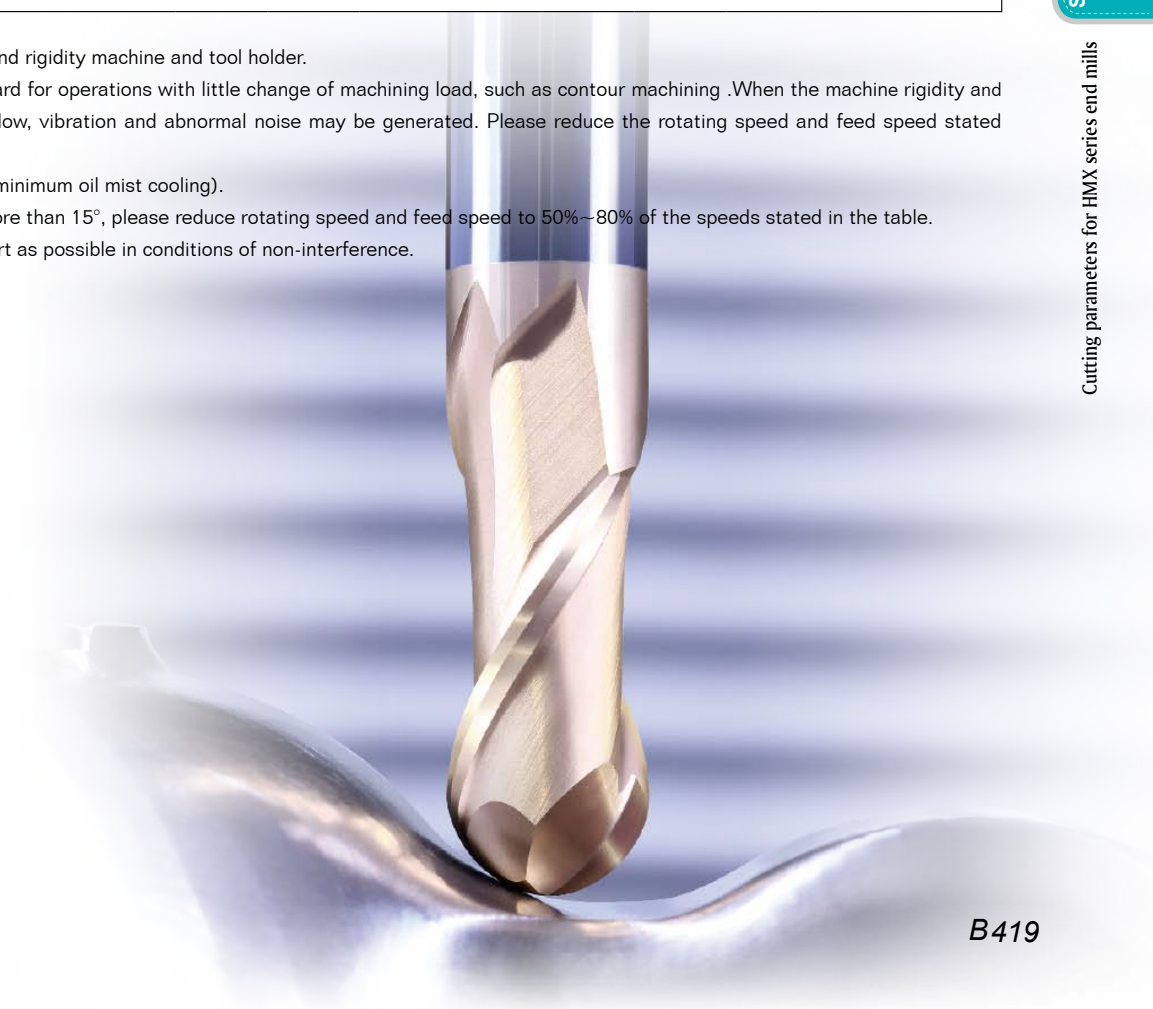
1.Please select high-precision and rigidity machine and tool holder.

2.Above table shows the standard for operations with little change of machining load, such as contour machining .When the machine 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).

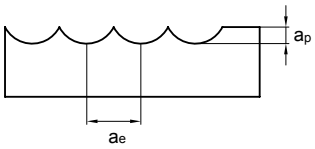
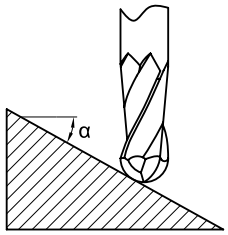
4.When inclination angle α is more than 15°, please reduce rotating speed and feed speed to 50%~80% of the speeds stated in the table.

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



Cutting parameters for HMX series end mills

HMX-4B★HMX-4BL

Workpiece material	Pre-hardened steel, Hardened steel 40~50HRC				Hardened steel 50~60HRC				Hardened steel 60~68HRC			
Radius of ball nose (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)
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	13600	3520	0.05	0.15	12700	3200	0.05	0.15
R3.0	14500	5000	0.06	0.2	11400	3000	0.06	0.2	10600	2500	0.06	0.2
R4.0	10900	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 and rigidity machine and tool holder.

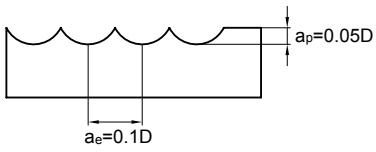
2.Above table shows the standard for operations with little change of machining load, such as contour machining .When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.

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

4.When inclination angle α is more than 15°, please reduce rotating speed and feed speed to 50%~80% of the speeds stated in the table.

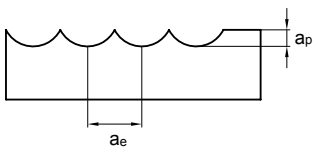
5.Make overhang of tool as short as possible in conditions of non-interference.

HMX-2BS

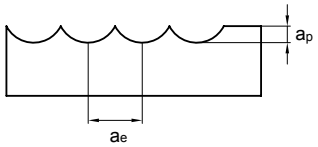
Workpiece material	Pre-hardened steel, Hardened steel 40~50HRC		Hardened steel 50~60HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
R0.15	25000	135	25000	115
R0.2	25000	140	25000	120
R0.25	25000	150	25000	130
R0.3	25000	175	24000	150
R0.35	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.

HMX-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)
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	19000	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	16000	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	9800	100	0.01	0.03
	12	14000	135	0.01	0.03	9800	75	0.01	0.03
R0.6	**6**	14000	200	0.06	0.12	9500	175	0.06	0.12
	8	14000	180	0.06	0.12	9500	150	0.06	0.12
	12	11000	150	0.04	0.06	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	0.06	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	0.06	0.16	5500	175	0.06	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									

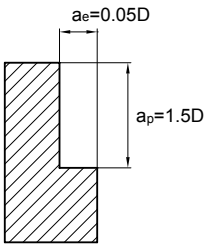
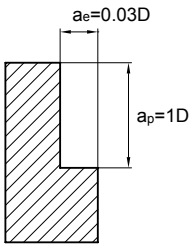
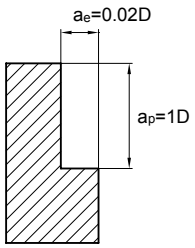
HMX-2BP

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	360	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									

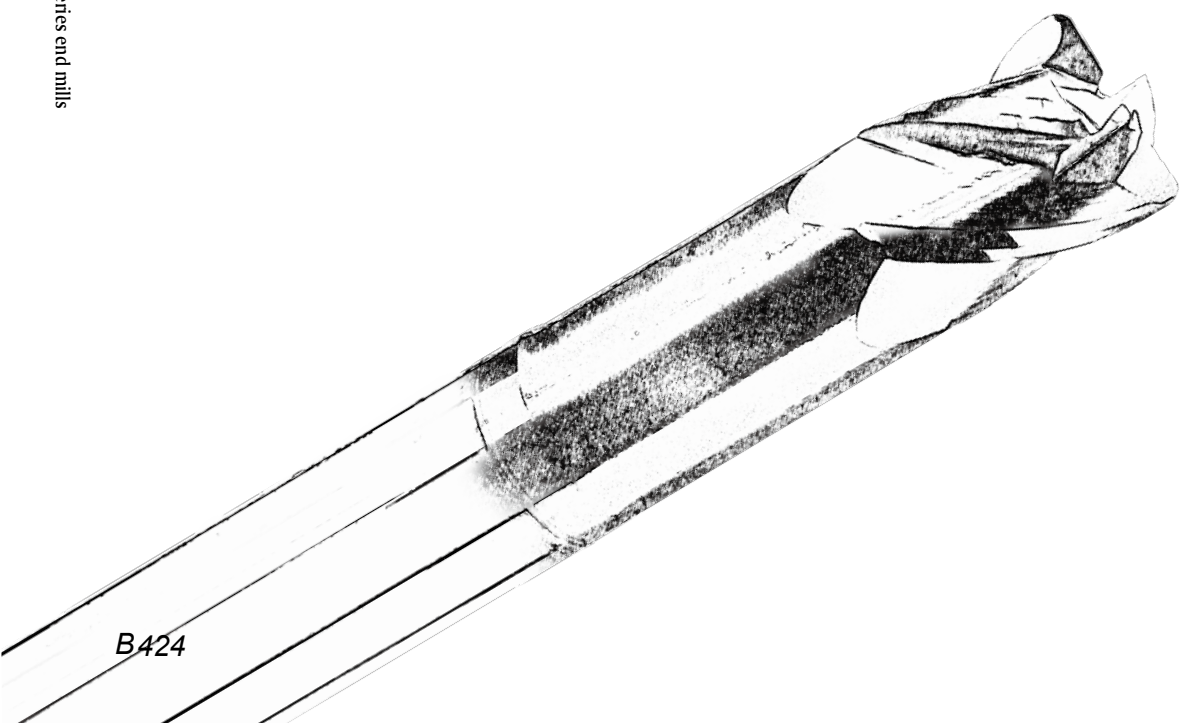
1.Please select high-precision machine and tool holder.
2.Please use air blow or cutting liquid with high mist retardant property.
3.Make overhang of tool as short as possible in conditions of non-interference.
4.Reduce feed speed correspondingly when rotating speed is low.

Cutting parameters for HMX series end mills

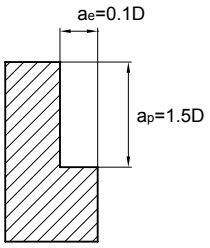
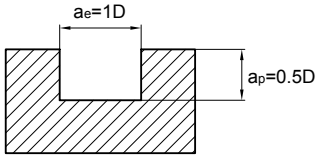
HMX-4R★HMX-4RP★HMX-4RF

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	 Maximum ae=1.0mm		 Maximum ae=0.5mm		 Maximum ae=0.3mm	

1.Please select high-precision and rigidity 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.



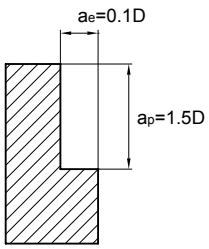
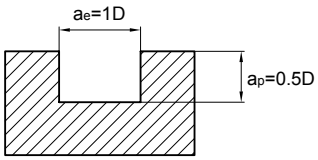
AL-2E★AL-2EL

Workpiece material	Aluminum alloy		Silicon aluminum alloy Si≤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	10600	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	3500	1350
20	4000	1700	3200	1350
Maximum cutting depth				

1.The above table shows the reference value of side milling. The feed speed in slot milling is 70% of the reference value stated in the table.
2.Please select high rigidity and precision machine and tool holder. Vibration and abnormal noise may be generated if the machine rigidity and workpiece fixture stability is low. Please reduce the rotating speed and feed speed stated above correspondingly.
3.It is possible to increase the rotating speed and feed speed correspondingly if the cutting depth is low.
4.Please use water-soluble cutting liquid.
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.

Cutting parameters for AL series end mills

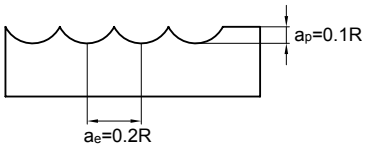
AL-3E★AL-3EL

Workpiece material	Aluminum alloy		Silicon aluminum alloy Si≤10%	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
1	40000	800	40000	600
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	3500	1600
20	4000	2000	3200	1600
Maximum cutting depth				

1.The above table shows the reference value of side milling. The feed speed in slot milling is 70% of the reference value stated in the table.
2.Please select high rigidity and precision machine and tool holder. Vibration and abnormal noise may be generated if the machine rigidity and workpiece fixture stability is low. Please reduce the rotating speed and feed speed stated above correspondingly.
3.It is possible to increase the rotating speed and feed speed correspondingly if the cutting depth is low.
4.Please use water-soluble cutting liquid.
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.



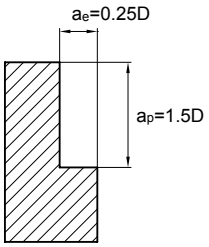
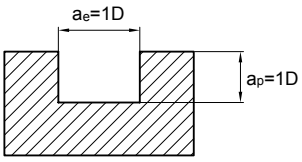
AL-2B

Workpiece material	Aluminum alloy		Silicon aluminum alloy Si≤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 rigidity and precision machine and tool holder. Vibration and abnormal noise may be generated if the machine rigidity and workpiece fixture stability is low. Please reduce the rotating speed and feed speed stated above correspondingly.
2.If the cutting depth is low, it is possible to increase the rotating speed and feed speed correspondingly.
3.Please use water-soluble cutting liquid.
4.Make overhang of tool as short as possible in conditions of non-interference.

Cutting parameters for AL series end mills

AL-3W

Workpiece material	Aluminum alloy		Silicon aluminum alloy Si≤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	3500	1550
20	4000	2400	3200	1500
Maximum cutting depth				

1.The above table shows the reference value of side milling. The feed speed in slot milling is 70% of the reference value stated in the table, and feed rate 50%.

2.Please select high rigidity and precision machine and tool holder. Vibration and abnormal noise may be generated if the machine rigidity and workpiece fixture stability is low. Please reduce the rotating speed and feed speed stated above correspondingly.

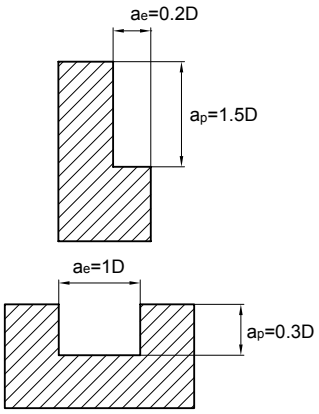
3.It is possible to increase the rotating speed and feed speed correspondingly if the cutting depth is low.

4.Please use water-soluble cutting liquid.

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.

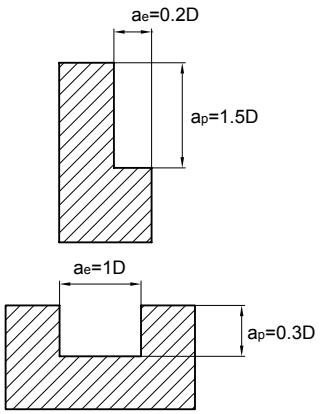
SM-3E

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, rotating speed is around 80%~100% of the stated value, and feed speed around 60%~80%.
2.Non water-soluble cutting liquid is recommended in machining of stainless steel and heat-resistant alloy.
3.Please select high rigid and precise machine and tool holder.
4.Adjust rotating speed and feed speed according to cutting depth and machine rigidity.
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.

Cutting parameters for SM series end mills

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, rotating speed is around 80%~100% of the stated value, and feed speed around 60%~80%.

2.Non water-soluble cutting liquid is recommended in machining of stainless steel and heat-resistant alloy.

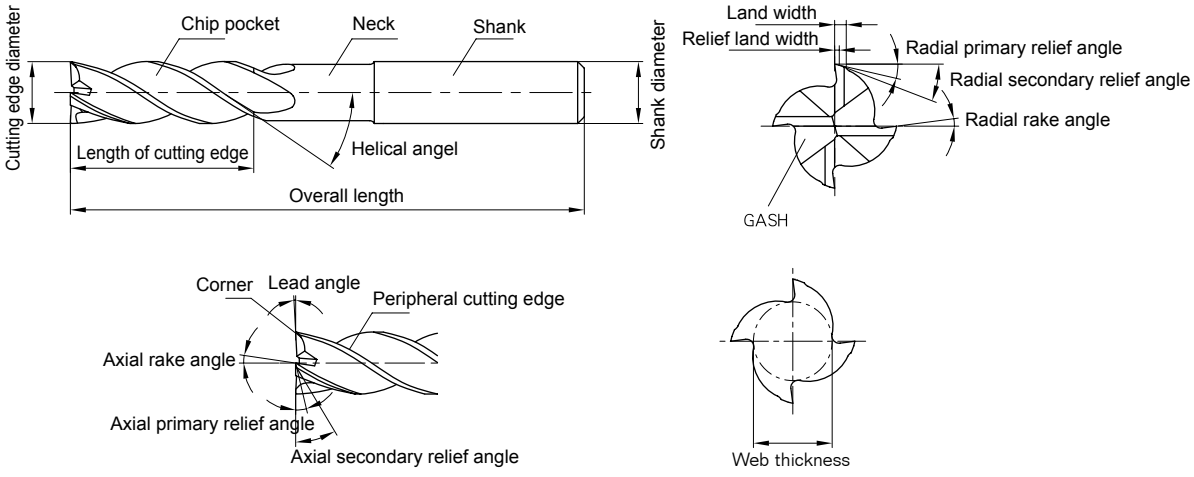
3.Please select high rigid and precise machine and tool holder.

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

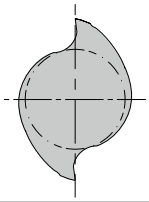
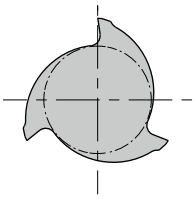
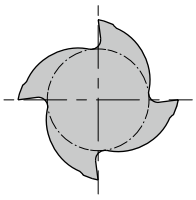
5.Down milling is recommended in the case of side milling.

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

Parts terminology of end mill

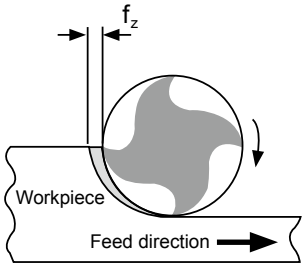


Number of teeth, chip pocket and tool rigidity

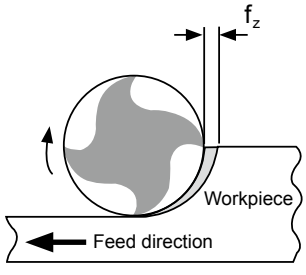
Number of teeth		2 Flutes	3 Flutes	4 Flutes
Profile of cross section				
Proportion of cross section		54%	56%	60%
Features	Advantages	● Large chip pocket ● Easy chip removal	● Easy chip removal ● Perfect surface finish	● Good rigidity ● Perfect surface finish
	Disadvantages	Low rigidity	Difficult to measure external diameter	Chip removal is not smooth
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

● Side milling

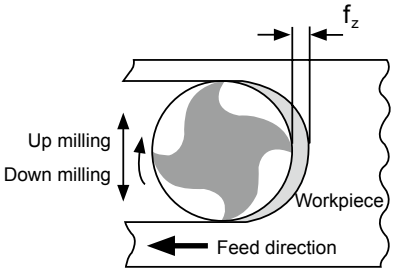


(a) up milling



(b) Down milling

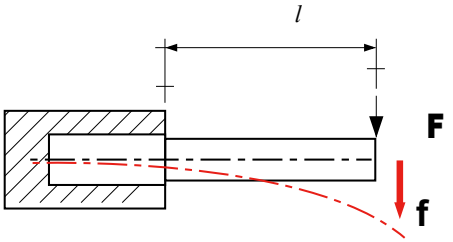
● Slot milling



Length of cutting edge (overhang) and cutting edge diameter

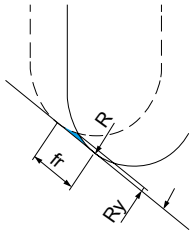
The shorter of overhang is, the higher the rigidity is. Thus it is not easy to bend or vibrate in the cutting process, and machining precision is improved. When length of cutting edge (overhang) doubles, the Deflection degree (f) will be 8 times of the original.

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×{1-cos[arc sin(fr/2R)]}

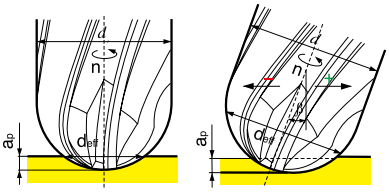
Ry：Theoretical value of surface roughness
fr：Feed rate
R：Ball nose radius or corner radius

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 fr									
	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	0.005	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	0.025
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 fr									
	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

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 fz[mm/tooth]	$f_z=\frac{V_f}{z \cdot n}$
f	Amount of feed per rotation fz[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[cm^3/min]	$Q=\frac{a_e \cdot a_p \cdot v_f}{1000}$
d_{eff}	Effective diameter of ball nose end mill deff[mm] 	$\beta = 0$ $d_{eff}=2 \cdot \sqrt{d \cdot a_p - a_p^2}$ $\beta \neq 0$ $d_{eff}=d \cdot sin[\beta \pm arccos(\frac{d-2a_p}{d})]$
V_{eff}	Effective cutting speed of end mill Veff[m/min]	$V_{eff}=\frac{d_{eff} \cdot \pi \cdot n}{1000}$
a_e	Radial cutting width ae[mm]	
a_p	Axial cutting depth ap[mm]	
d	Milling diameter[mm]	
z	Number of teeth	
β	Inclined angle	

Common problems and solutions for end mill

Solutions / Common problems		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 fracture	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 slice frittering			↓	↓					↓							
	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.															


New product of
hole making
GD series
General-purpose
twist drill

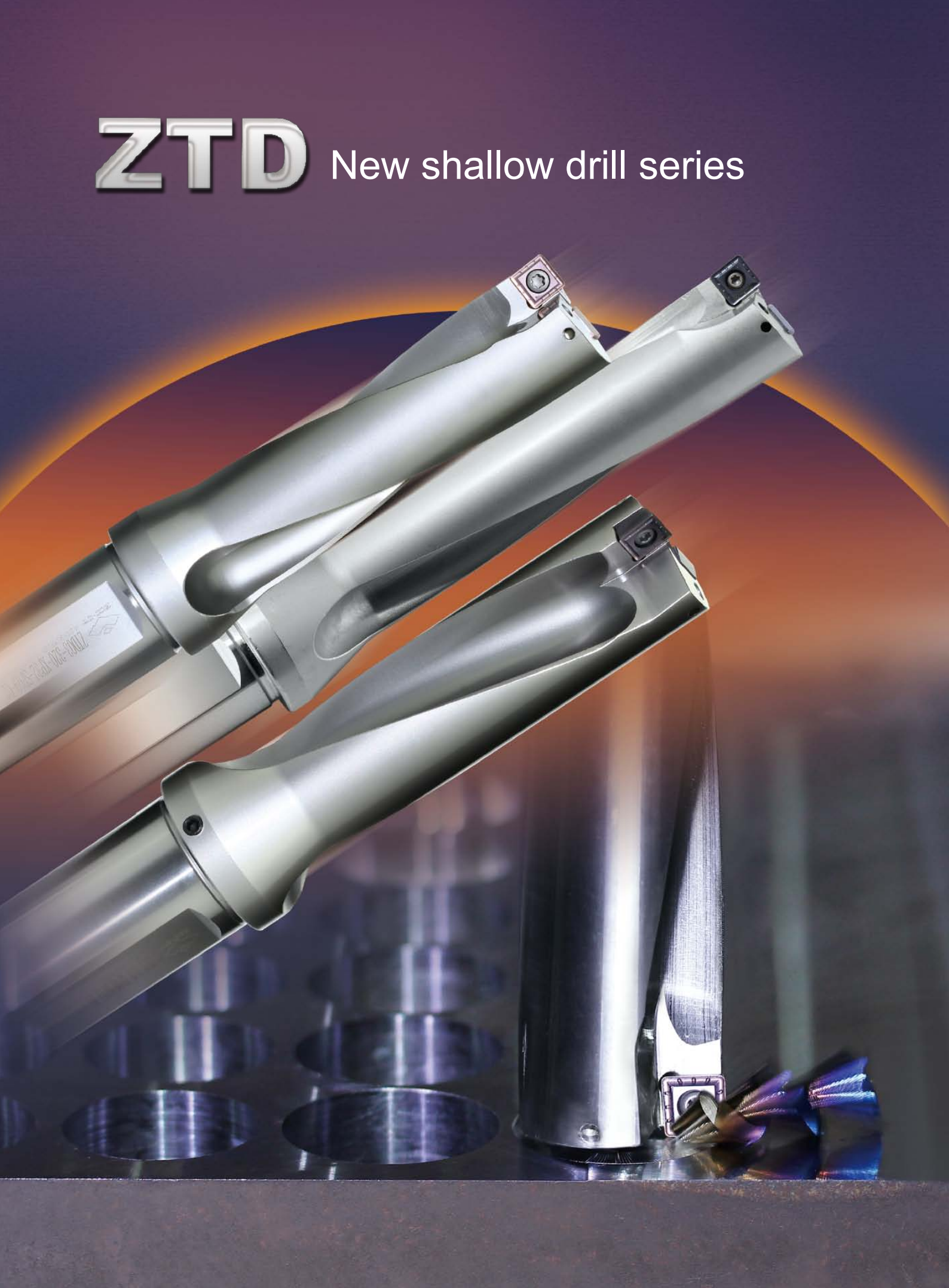




Boring Tools

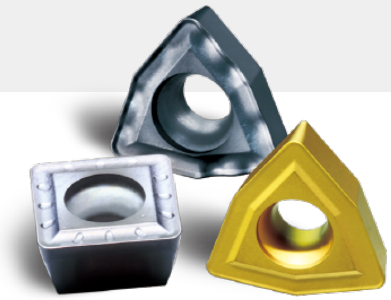
Drills
Reamers
Thead cutters

ZTD New shallow drill series



Boring tools

C



Drills C2-C103

Solid carbide drills C2-C86

Indexable shallow drills C87-C103

Reamers C104-C113

Solid carbide reamers C104-C113

Threading cutters C114-C140

Solid carbide threading cutters C120-C131

Solid carbide threading mills C133



How to choose the right solid carbide drills

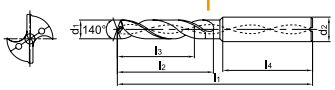
Shape

Product category

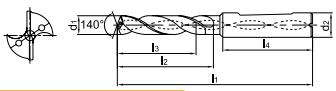
Shape size

ST series for machining of soft steel, stainless steel









- First choice for drilling soft steel and stainless steel.
- Sharp cutting edge can avoid build--up edge, suitable for drilling hole with high performance.

Drill diameter $d_1(m_7)$	Drilling depth (l/d)	Cooling mode	Shank type	Type	Basic dimension(mm)					Recommended grade
					Shank diameter	Overall length	Flute length	Recommended drilling depth	Shank length	
					$d_2(h_6)$	l_1	l_2	l_3	l_4	KDG303
3.0	3	Internal coolant	Straight shank	1534ST03C-0300	6	62	20	14	36	☆
	5			1536ST05C-0300	6	66	28	23	36	☆
	5		Whistle notch shank	1736ST05C-0300	6	66	28	23	36	☆
3.1	3		Straight shank	1534ST03C-0310	6	62	20	14	36	☆
	5			1536ST05C-0310	6	66	28	23	36	☆
	5		Whistle notch shank	1736ST05C-0310	6	66	28	23	36	☆
3.2	3		Straight shank	1534ST03C-0320	6	62	20	14	36	☆
	5			1536ST05C-0320	6	66	28	23	36	☆
	5		Whistle notch shank	1736ST05C-0320	6	66	28	23	36	☆
3.25	3		Straight shank	1534ST03C-0325	6	62	20	14	36	☆
	5			1536ST05C-0325	6	66	28	23	36	☆
	5		Whistle notch shank	1736ST05C-0325	6	66	28	23	36	☆
3.3	3		Straight shank	1534ST03C-0330	6	62	20	14	36	☆
	5			1536ST05C-0330	6	66	28	23	36	☆
	5		Whistle notch shank	1736ST05C-0330	6	66	28	23	36	☆
3.4	3		Straight shank	1534ST03C-0340	6	62	20	14	36	☆
	5			1536ST05C-0340	6	66	28	23	36	☆
	5		Whistle notch shank	1736ST05C-0340	6	66	28	23	36	☆
3.5	3		Straight shank	1534ST03C-0350	6	62	20	14	36	☆
	5			1536ST05C-0350	6	66	28	23	36	☆
	5		Whistle notch shank	1736ST05C-0350	6	66	28	23	36	☆

☆Recommended grade (produce according to order)

Applicable material table ◎Very suitable ○Suitable

Grade	Workpiece material										
	Mild steel HB≤180	Carbon steel, Alloy steel	Pre-hardened steel, Hardened steel			Stainless steel	Cast iron	Nodular cast iron	Aluminum alloy	Copper alloy	Heat resistant alloy
			~40HRC	~50HRC	~60HRC						
KDG303	◎	○				◎					○

Code key C6 Cutting parameters C78 Cutting parameters C80–C86

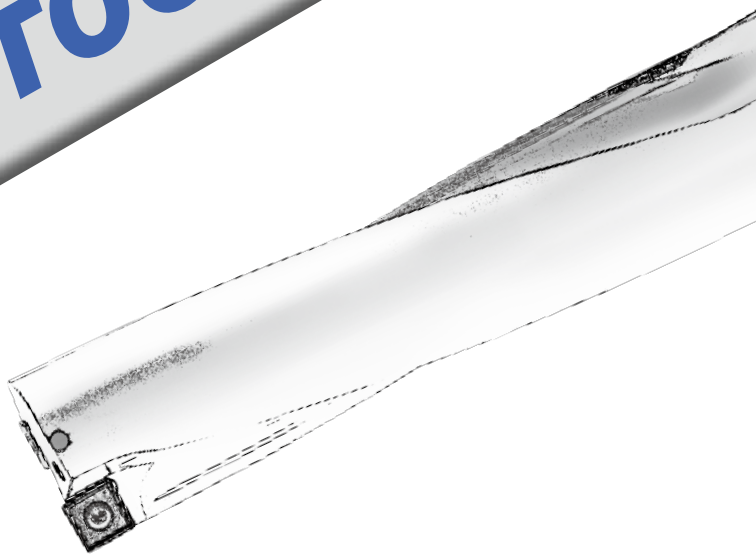
Specifications
Type, depth of drilling, cooling system, type of shank, basic dimensions and grade.

Applicable workpiece material range

Product features

Code key, cutting parameters, technical information

BORING TOOLS



Drills

C4 **Drilling tools overview**

C5-C86 **Solid carbide drills**

C5 Grade introduction for solid carbide drills

C6 Solid carbide drills code key

C7-C73 Solid carbide drills overview

C74-C79 Recommended cutting parameters for solid carbide drills

C80-C86 Technical information for solid carbide drills

C87-C103 **Indexable shallow drills**

C88 Shallow drills code key

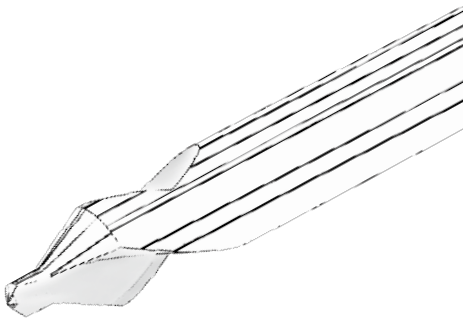
C89-C97 Shallow drills overview

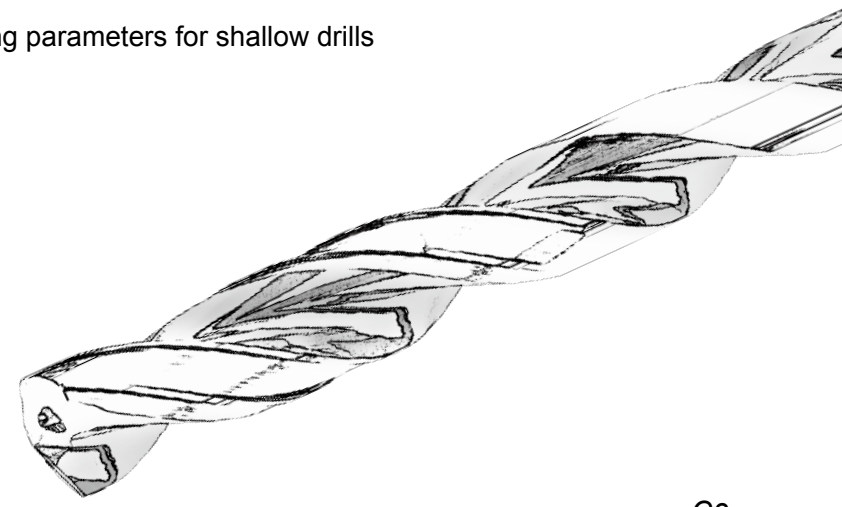
C98-C99 Shallow drills code key

C100-C101 Shallow drilling inserts overview

C102 Technical information for shallow drills

C103 Recommended cutting parameters for shallow drills





Drilling tools overview

Application	Type of drills	Type	Shape of drills	Coolant mode	Diameter range	Workpiece material							Page	
						P		M	K	N	S	H	Specification	Cutting parameters
						Soft steel	Common steel	Stainless steel	Cast iron	Non-ferrous metal	Heat resistant alloy	High hardness steel		
General machining	Twist drill	**GD03**		External cooling	Ø2-Ø25	○	◎	○	◎	○	○		C7-C44	C74-C76
		GD03C		Internal cooling	Ø3-Ø25	○	◎	○	◎	○	○			
		GD05		External cooling	Ø2-Ø25	○	◎	○	◎	○	○			
		GD05C		Internal cooling	Ø3-Ø25	○	◎	○	◎	○	○			
		GD08C		Internal cooling	Ø3-Ø18	○	◎	○	◎	○	○			
Deep drilling	Twist drill	**1588SL 12/20/30C**		Internal cooling	Ø3-Ø20	○	◎	○	◎	○	○		C45-C51	C77
For soft steel, stainless steel	Twist drill	**1534ST03C**		Internal cooling	Ø3-Ø20	◎	○	◎			○		C54-C67	C78
		1536ST05C		Internal cooling	Ø3-Ø20	◎	○	◎			○			
		1736ST05C		Internal cooling	Ø3-Ø20	◎	○	◎			○			
For aluminum, cast iron	Twist drill	**1105SC03**		External cooling	Ø2-Ø16				◎	◎			C68-71	C78
		1101SC05		External cooling	Ø2-Ø16				◎	◎				
	Straight flute drill	**1576PC05**		External cooling	Ø4-Ø20				◎	◎			C72-C73	C79
		1579PC15C		Internal cooling	Ø5-Ø14				◎	◎				
Indexable drills series	Shallow drills	**ZTD 02/03/04/05**		Internal cooling	Ø13-Ø50	◎	◎	○	◎	○			C89-C95	C103
		ZD03		Internal cooling	Ø16-Ø58	◎	◎	○	◎	○			C96-C97	C103

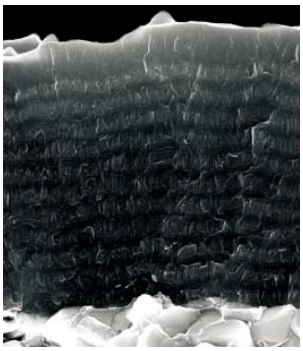
◎Very suitable ○Suitable

Grade introduction of solid carbide drills

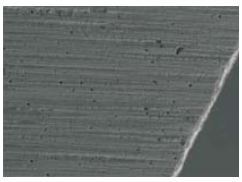
Coated grade

KDG3013

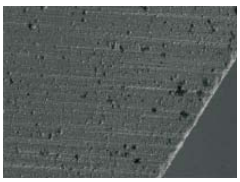
New AlCrN substrate composite coating, with excellent abrasion resistance and bonding resistance, improves the stability of the insert edge.
Unique coating after-treatment technology effectively reduces the cutting resistance for smoother chip evacuation and higher security.



AlCrN substrate composite coating



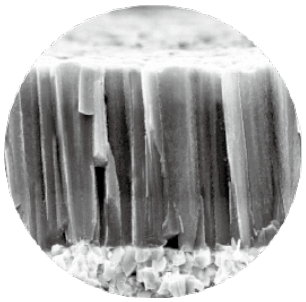
KDG3013



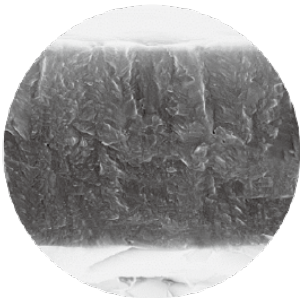
Conventional coating

KDG303

Ultra-fine carbide substrate with high strength, toughness and wear resistance, in combination with nano-structured nc-TiAlN coating aiming at optimizing drilling operations, makes sure the tools have very high toughness and hardness. Unique coating technology gives the tools smooth surface and excellent wear resistance, and outstanding thermal stability and chemical stability provide effective protection for the cutting edge.



Common TiAlN coating



nc-TiAlN coating

Uncoated grade

YK20F

Ultra-fine grain carbide substrate with high hardness, outstanding wear resistance, and long tool life.

YK30F

Ultra-fine carbide substrate with high strength, toughness and wear resistance gives the cutting edge perfect strength.

Solid carbide drills code key

Solid carbide drills code key

Type to tool
GD ▶ General-purpose twist drill

Mode of cooling
C ▶ Intrnal cooling
Default ▶ Extemal cooling

Type of shank
S ▶ slim shank
Default ▶ meet DIN6535HA standard

GD 03 C -0600 S

Length code
03 ▶ 3d
05 ▶ 5d
08 ▶ 8d

Specification
0600 ▶ Nominal diameter in compliance with DIN6535HA regulation

Code	Description
1	As per DIN338
2	As per DIN1897
3	As per QJ/ZZQ(TO)01.001.002
4	As per DIN6537K
5	As per DIN6537K
6	As per DIN6537K
7	As per the rule ZZC-C in QJ/ZZQ(TO)01.001.002
8	As per the rule ZZC-D in QJ/ZZQ(TO)01.001.002
9	As per the rule ZZC-E in QJ/ZZQ(TO)01.001.002

Length code

Code	Description
SL	Deep twist drills
ST	Twist drill for soft steel, stainless steel
PC	Straight flute drill for aluminum, cast iron

Geometry

Code	Description
1	Drills

Type to tool

Code	Description
C	Internal coolant
Default	External coolant

Mode of cooling

1 5 8 8 SL 12 C -0850

Type of shank

Code	Description
1	Straight shank
2	Square head straight shank as per DIN10
3	Double flattened straight shank as per DIN1809
5	Straight shank as per DIN6535HA
7	Whistle notch shank as per DIN6535HE
9	Tapered shank

Type of drill

Code	Description
0	Twist drill
3	Multiple functions twist drill
4	Centering drill
5	Step drill
7	Straight flute drill
8	Deep drill

Specification

Code	Description
0850	Nominal diameter of drill

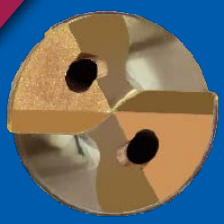
Identification of drilling depth

Cutting depth shown when the tool is non-pilot drill		Point angle identification shown when tool is pilot drill	
Code	Description	Code	Description
03	(2~3) d	90	pilot drill with 90° point angle
05	(4~5) d		
08	(7~8) d	120	pilot drill with 120° point angle
12	(12) d		
15	(15) d		
20	(20) d		
30	(30) d		

GD series
General-purpose twist drill

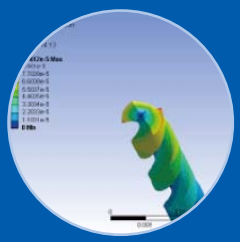
Application range

Versatile, for high efficiency machining in a variety of material e.g. P(steel), M(stainless steel), K (Cast iron).





- **Linear cutting edge with high strength.**
  Optimized drill point structure for better cutting performance.



- **Simulation in combination with testing for superior overall performance.**

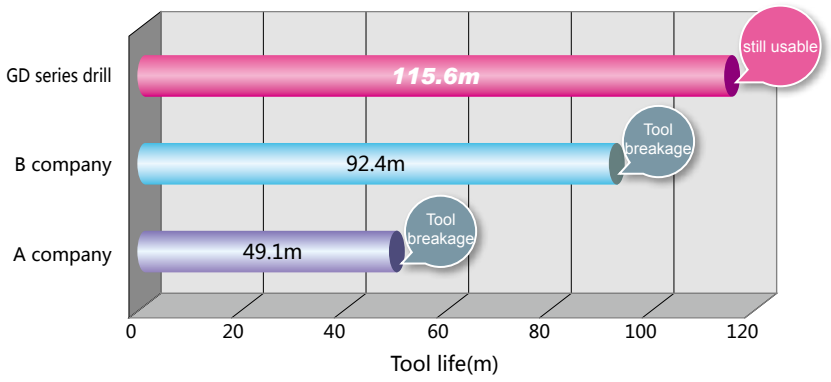
- **Professional after treatment for coating ensures low-resistance high-efficiency machining.**



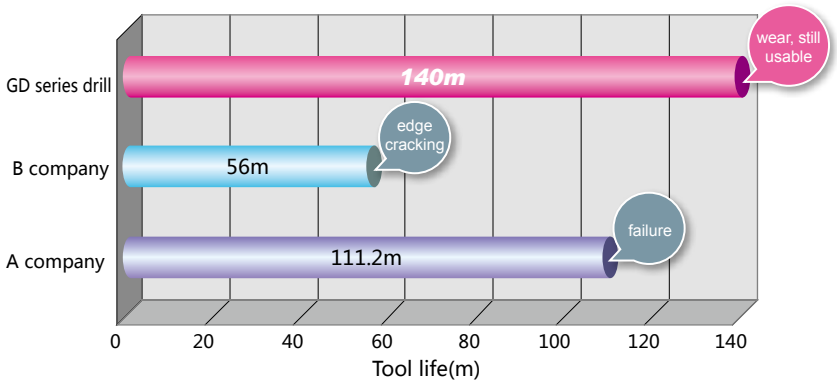


- **Double edge-line design for improved machining stability.**

Long and stable tool life



tool ： GD05C-0560
workpiece material：C70S6(HRC30)
V=100m/min; f= 0.15mm/r; H=27mm
cooling system: water soluble cooling

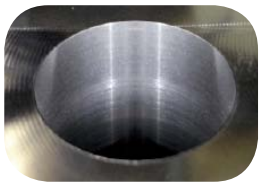


tool：GD05C-1000
workpiece material：45#steel(HB180)
V=150m/min; f=0.25mm/r; H=40mm
cooling system: water soluble cooling

outstanding machining precision

quality of hole wall:

tool：GD03C-0820
workpiece material: C70S6(HRC30)
V=120m/min；f=0.23mm/r；H=30mm；
cooling system: water soluble cooling



GD series drill



A company

excellent chip breaking performance

chip breaking performance:

tool：GD05C-0600
workpiece material: 1Cr18Ni9Ti(HB180)
V=75m/min；f=0.2mm/r；H=30mm；
cooling system: water soluble cooling



GD series drill

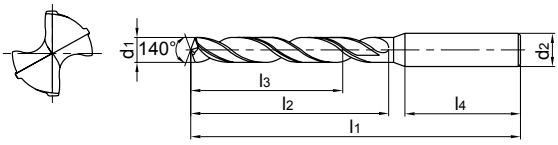


A company

GD series General machining

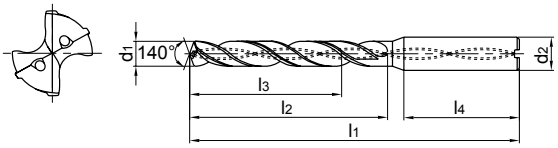


External coolant Straight shank





Internal coolant Straight shank



● Suitable for high efficiency drilling in a variety of materials e.g steel, stainless steel, cast iron.

Drill diameter $d_1(m_7)$	Drilling depth (l/d)	Cooling mode	Shank type	Type	Basic dimension(mm)					Suitable for thread		Grade
					Shank diameter	Overall length	Flute length	Recommended drilling depth	Shank length	cutting taps / tread milling cutters	forming taps	KDG3013
					$d_2(h_6)$	l_1	l_2	l_3	l_4			
2.0	3	External coolant	Straight shank	**GD03-0200S**	3	58	13	9	28		NO.2-64UNF	○
	5			**GD05-0200S**	3	58	18	14	28			○
	3			**GD03-0200**	4	58	13	9	28			●
	5			**GD05-0200**	4	58	18	14	28			●
2.1	3			**GD03-0210S**	3	58	13	9	28	NO.3-48UNC		○
	5			**GD05-0210S**	3	58	18	14	28			○
	3			**GD03-0210**	4	58	13	9	28			●
	5			**GD05-0210**	4	58	18	14	28			●
2.15	3			**GD03-0215S**	3	58	13	9	28	NO.3-56UNF		○
	5			**GD05-0215S**	3	58	18	14	28			○
	3			**GD03-0215**	4	58	13	9	28			●
	5			**GD05-0215**	4	58	18	14	28			●
2.2	3			**GD03-0220S**	3	58	13	9	28			○
	5			**GD05-0220S**	3	58	18	14	28			○
	3			**GD03-0220**	4	58	13	9	28			●
	5			**GD05-0220**	4	58	18	14	28			●
2.3	3			**GD03-0230S**	3	58	13	9	28		M2.5×0.45 NO.3-56UNF	○
	5			**GD05-0230S**	3	58	18	14	28			○
	3			**GD03-0230**	4	58	13	9	28			●
	5			**GD05-0230**	4	58	18	14	28			●

Note: For drilling depth (l/d) of 8 ,namely GD08C series, tolerance of shank diameter is h_5.

● Stock available ○ Make-to-order

Applicable material table

◎Very suitable ○Suitable

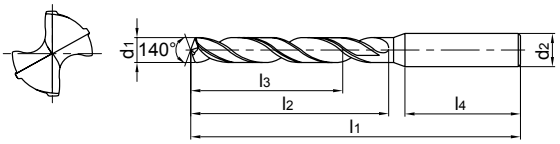
Grade	Workpiece material										
	Mild steel HB≤180	Carbon steel, Alloy steel	Pre-hardened steel, Hardened steel			Stainless steel	Cast iron	Nodular cast iron	Aluminum alloy	Copper alloy	Heat resistant alloy
			~40HRC	~50HRC	~60HRC						
KDG3013	○	◎	◎			○	◎	◎			○

Code key C6 Cutting parameters C74–C76 Technical information C80–C86

GD series General machining

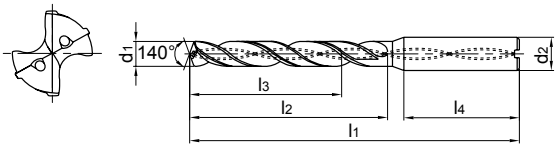


External coolant Straight shank





Internal coolant Straight shank



● Suitable for high efficiency drilling in a variety of materials e.g steel, stainless steel, cast iron.

Drill diameter d_1(m_7)	Drilling depth (l/d)	Cooling mode	Shank type	Type	Basic dimension(mm)					Suitable for thread		Grade
					Shank diameter d_2(h_6)	Overall length l_1	Flute length l_2	Recommended drilling depth l_3	Shank length l_4	cutting taps / tread milling cutters	forming taps	KDG3013
2.35	3	External coolant	Straight shank	GD03-0235S	3	58	17	12	28	NO.4-40UNC		○
	5			GD05-0235S	3	58	22	17	28			○
	3			GD03-0235	4	58	17	12	28			●
	5			GD05-0235	4	58	22	17	28			●
2.4	3			GD03-0240S	3	58	17	12	28	NO.4-48UNF		○
	5			GD05-0240S	3	58	22	17	28			○
	3			GD03-0240	4	58	17	12	28			●
	5			GD05-0240	4	58	22	17	28			●
2.5	3			GD03-0250S	3	58	17	12	28	M3×0.5		○
	5			GD05-0250S	3	58	22	17	28			○
	3			GD03-0250	4	58	17	12	28			●
	5			GD05-0250	4	58	22	17	28			●
2.55	3			GD03-0255S	3	58	17	12	28		NO.4-40UNC	○
	5			GD05-0255S	3	58	22	17	28			○
	3			GD03-0255	4	58	17	12	28			●
	5			GD05-0255	4	58	22	17	28			●
2.6	3			GD03-0260S	3	58	17	12	28		NO.4-48UNF	○
	5			GD05-0260S	3	58	22	17	28			○
	3			GD03-0260	4	58	17	12	28			●
	5			GD05-0260	4	58	22	17	28			●
2.65	3			GD03-0265S	3	58	17	12	28	NO.5-40UNC		○
	5			GD05-0265S	3	58	22	17	28			○
	3			GD03-0265	4	58	17	12	28			●
	5			GD05-0265	4	58	22	17	28			●
2.7	3			GD03-0270S	3	58	17	12	28	NO.5-44UNF		○
	5			GD05-0270S	3	58	22	17	28			○
	3			GD03-0270	4	58	17	12	28			●
	5			GD05-0270	4	58	22	17	28			●

● Stock available ○ Make-to-order

Drill diameter $d_1(m_7)$	Drilling depth (l/d)	Cooling mode	Shank type	Type	Basic dimension(mm)					Suitable for thread		Grade
					Shank diameter	Overall length	Flute length	Recommended drilling depth	Shank length	cutting taps / tread milling cutters	forming taps	KDG3013
					$d_2(h_6)$	l_1	l_2	l_3	l_4			
2.8	3	External coolant	Straight shank	GD03-0280S	3	58	17	12	28		M3×0.5	○
	5			GD05-0280S	3	58	22	17	28			○
	3			GD03-0280	4	58	17	12	28			●
	5			GD05-0280	4	58	22	17	28			●
2.85	3			GD03-0285S	3	58	17	12	28	NO.6-32UNC		○
	5			GD05-0285S	3	58	22	17	28			○
	3			GD03-0285	4	58	17	12	28			●
	5			GD05-0285	4	58	22	17	28			●
2.9	3			GD03-0290S	3	58	17	12	28		NO.5-40UNC NO.5-44UNF	○
	5			GD05-0290S	3	58	22	17	28			○
	3			GD03-0290	4	58	17	12	28			●
	5			GD05-0290	4	58	22	17	28			●
2.95	3			GD03-0295S	3	58	17	12	28	NO.6-40UNF		○
	5			GD05-0295S	3	58	22	17	28			○
	3			GD03-0295	4	58	17	12	28			●
	5			GD05-0295	4	58	22	17	28			●
3.0	3			GD03-0300S	3	62	20	14	36			○
	5			GD05-0300S	3	66	28	23	36			○
	3	Internal coolant		GD03C-0300S	3	62	20	14	36			○
	5			GD05C-0300S	3	66	28	23	36			○
	3	External coolant		GD03-0300	6	62	20	14	36			●
	5			GD05-0300	6	66	28	23	36			●
	3	Internal coolant		GD03C-0300	6	62	20	14	36			●
	5			GD05C-0300	6	66	28	23	36			●
	8			GD08C-0300	6	72	34	29	36			
3.1	3	External coolant		GD03-0310S	4	62	20	14	36			●
	5			GD05-0310S	4	66	28	23	36			●
	3	Internal coolant		GD03C-0310S	4	62	20	14	36			●
	5			GD05C-0310S	4	66	28	23	36			●
	3	External coolant		GD03-0310	6	62	20	14	36			○
	5			GD05-0310	6	66	28	23	36			○
	3	Internal coolant		GD03C-0310	6	62	20	14	36			○
	5			GD05C-0310	6	66	28	23	36			○
	8			GD08C-0310	6	72	34	29	36			

Note: For drilling depth (l/d) of 8 ,namely GD08C series, tolerance of shank diameter is h_5.

● Stock available ○ Make-to-order

Applicable material table

◎Very suitable ○Suitable

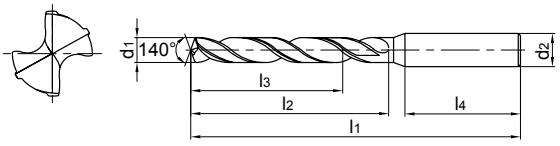
Grade	Workpiece material										
	Mild steel HB≤180	Carbon steel, Alloy steel	Pre-hardened steel, Hardened steel			Stainless steel	Cast iron	Nodular cast iron	Aluminum alloy	Copper alloy	Heat resistant alloy
			~40HRC	~50HRC	~60HRC						
KDG3013	○	◎	◎			○	◎	◎			○

Code key C6
Cutting parameters C74–C76
Technical information C80–C86

GD series General machining

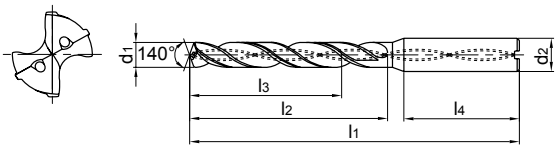

External coolant

Straight shank




Internal coolant

Straight shank



● Suitable for high efficiency drilling in a variety of materials e.g steel, stainless steel, cast iron.

Drill diameter $d_1(m_7)$	Drilling depth (l/d)	Cooling mode	Shank type	Type	Basic dimension(mm)					Suitable for thread		Grade
					Shank diameter	Overall length	Flute length	Recommended drilling depth	Shank length	cutting taps / tread milling cutters	forming taps	KDG3013
					$d_2(h_6)$	l_1	l_2	l_3	l_4			
3.15	3	External coolant	Straight shank	GD03-0315S	4	62	20	14	36		NO.6-32UNC	●
	5			GD05-0315S	4	66	28	23	36			●
	3	Internal coolant		GD03C-0315S	4	62	20	14	36			●
	5			GD05C-0315S	4	66	28	23	36			●
	3	External coolant		GD03-0315	6	62	20	14	36			○
	5			GD05-0315	6	66	28	23	36			○
	3	Internal coolant		GD03C-0315	6	62	20	14	36			○
	5			GD05C-0315	6	66	28	23	36			○
3.2	3	External coolant		GD03-0320S	4	62	20	14	36		NO.6-40UNF	●
	5			GD05-0320S	4	66	28	23	36			●
	3	Internal coolant		GD03C-0320S	4	62	20	14	36			●
	5			GD05C-0320S	4	66	28	23	36			●
	3	External coolant		GD03-0320	6	62	20	14	36			○
	5			GD05-0320	6	66	28	23	36			○
	3	Internal coolant		GD03C-0320	6	62	20	14	36			○
	5			GD05C-0320	6	66	28	23	36			○
	8			GD08C-0320	6	72	34	29	36			○
3.25	3	External coolant		GD03-0325S	4	62	20	14	36			●
	5			GD05-0325S	4	66	28	23	36			●
	3	Internal coolant		GD03C-0325S	4	62	20	14	36			●
	5			GD05C-0325S	4	66	28	23	36			●
	3	External coolant		GD03-0325	6	62	20	14	36			○
	5			GD05-0325	6	66	28	23	36			○
	3	Internal coolant		GD03C-0325	6	62	20	14	36			○
	5			GD05C-0325	6	66	28	23	36			○

● Stock available ○ Make-to-order

Drill diameter $d_1(m_7)$	Drilling depth (l/d)	Cooling mode	Shank type	Type	Basic dimension(mm)					Suitable for thread		Grade
					Shank diameter	Overall length	Flute length	Recommended drilling depth	Shank length	cutting taps / tread milling cutters	forming taps	KDG3013
					$d_2(h_6)$	l_1	l_2	l_3	l_4			
	3	External coolant		**GD03-0330S**	4	62	20	14	36			●
	5			**GD05-0330S**	4	66	28	23	36			●
	3	Internal coolant		**GD03C-0330S**	4	62	20	14	36			●
	5			**GD05C-0330S**	4	66	28	23	36			●
3.3	3	External coolant		**GD03-0330**	6	62	20	14	36	M4×0.7		○
	5			**GD05-0330**	6	66	28	23	36			○
	3	Internal coolant		**GD03C-0330**	6	62	20	14	36			○
	5			**GD05C-0330**	6	66	28	23	36			○
	8			**GD08C-0330**	6	72	34	29	36			○
	3	External coolant		**GD03-0340S**	4	62	20	14	36			●
	5			**GD05-0340S**	4	66	28	23	36			●
	3	Internal coolant		**GD03C-0340S**	4	62	20	14	36			●
	5			**GD05C-0340S**	4	66	28	23	36			●
3.4	3	External coolant		**GD03-0340**	6	62	20	14	36			○
	5			**GD05-0340**	6	66	28	23	36			○
	3	Internal coolant		**GD03C-0340**	6	62	20	14	36			○
	5			**GD05C-0340**	6	66	28	23	36			○
	8		Straight shank	**GD08C-0340**	6	72	34	29	36			○
	3	External coolant		**GD03-0350S**	4	62	20	14	36			●
	5			**GD05-0350S**	4	66	28	23	36			●
	3	Internal coolant		**GD03C-0350S**	4	62	20	14	36			●
	5			**GD05C-0350S**	4	66	28	23	36	M4×0.5		●
3.5	3	External coolant		**GD03-0350**	6	62	20	14	36	NO.8-32UNC		○
	5			**GD05-0350**	6	66	28	23	36	NO.8-36UNF		○
	3	Internal coolant		**GD03C-0350**	6	62	20	14	36			○
	5			**GD05C-0350**	6	66	28	23	36			○
	8			**GD08C-0350**	6	72	34	29	36			○
	3	External coolant		**GD03-0360S**	4	62	20	14	36			●
	5			**GD05-0360S**	4	66	28	23	36			●
	3	Internal coolant		**GD03C-0360S**	4	62	20	14	36			●
	5			**GD05C-0360S**	4	66	28	23	36			●
3.6	3	External coolant		**GD03-0360**	6	62	20	14	36			○
	5			**GD05-0360**	6	66	28	23	36			○
	3	Internal coolant		**GD03C-0360**	6	62	20	14	36			○
	5			**GD05C-0360**	6	66	28	23	36			○
	8			**GD08C-0360**	6	72	34	29	36			○

Note: For drilling depth (l/d) of 8 ,namely GD08C series, tolerance of shank diameter is h_5. ● Stock available ○ Make-to-order

Applicable material table

◎Very suitable ○Suitable

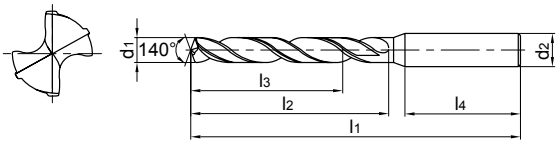
Grade	Workpiece material										
	Mild steel HB⩽180	Carbon steel, Alloy steel	Pre-hardened steel, Hardened steel			Stainless steel	Cast iron	Nodular cast iron	Aluminum alloy	Copper alloy	Heat resistant alloy
			~40HRC	~50HRC	~60HRC						
KDG3013	○	◎	◎			○	◎	◎			○

Code key C6
Cutting parameters C74–C76
Technical information C80–C86

GD series General machining

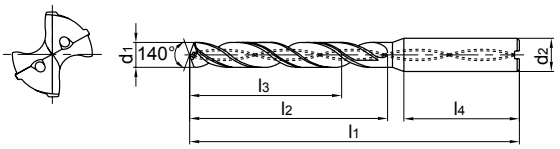

External coolant

Straight shank




Internal coolant

Straight shank



● Suitable for high efficiency drilling in a variety of materials e.g steel, stainless steel, cast iron.

Drill diameter $d_1(m_7)$	Drilling depth (l/d)	Cooling mode	Shank type	Type	Basic dimension(mm)					Suitable for thread		Grade
					Shank diameter	Overall length	Flute length	Recommended drilling depth	Shank length	cutting taps / tread milling cutters	forming taps	KDG3013
					$d_2(h_6)$	l_1	l_2	l_3	l_4			
3.7	3	External coolant	Straight shank	GD03-0370S	4	62	20	14	36		M4×0.7	●
	5			GD05-0370S	4	66	28	23	36			●
	3	Internal coolant		GD03C-0370S	4	62	20	14	36			●
	5			GD05C-0370S	4	66	28	23	36			●
	3	External coolant		GD03-0370	6	62	20	14	36			○
	5			GD05-0370	6	66	28	23	36			○
	3	Internal coolant		GD03C-0370	6	62	20	14	36			○
	5			GD05C-0370	6	66	28	23	36			○
	8			GD08C-0370	6	72	34	29	36			○
3.8	3	External coolant		GD03-0380S	4	66	24	17	36		M4×0.5 NO.8-32UNC	●
	5			GD05-0380S	4	74	36	29	36			●
	3	Internal coolant		GD03C-0380S	4	66	24	17	36			●
	5			GD05C-0380S	4	74	36	29	36			●
	3	External coolant		GD03-0380	6	66	24	17	36			○
	5			GD05-0380	6	74	36	29	36			○
	3	Internal coolant		GD03C-0380	6	66	24	17	36			○
	5			GD05C-0380	6	74	36	29	36			○
	8			GD08C-0380	6	81	43	36	36			○
3.85	3	External coolant		GD03-0385S	4	66	24	17	36		NO.8-36UNF	●
	5			GD05-0385S	4	74	36	29	36			●
	3	Internal coolant		GD03C-0385S	4	66	24	17	36			●
	5			GD05C-0385S	4	74	36	29	36			●
	3	External coolant		GD03-0385	6	66	24	17	36			○
	5			GD05-0385	6	74	36	29	36			○
	3	Internal coolant		GD03C-0385	6	66	24	17	36			○
	5			GD05C-0385	6	74	36	29	36			○

● Stock available ○ Make-to-order

Drill diameter $d_1(m_7)$	Drilling depth (l/d)	Cooling mode	Shank type	Type	Basic dimension(mm)					Suitable for thread		Grade
					Shank diameter	Overall length	Flute length	Recommended drilling depth	Shank length	cutting taps / tread milling cutters	forming taps	KDG3013
					$d_2(h_6)$	l_1	l_2	l_3	l_4			
	3	External coolant		**GD03-0390S**	4	66	24	17	36			●
	5			**GD05-0390S**	4	74	36	29	36			●
	3	Internal coolant		**GD03C-0390S**	4	66	24	17	36			●
	5			**GD05C-0390S**	4	74	36	29	36			●
3.9	3	External coolant		**GD03-0390**	6	66	24	17	36	NO.10-24UNC		○
	5			**GD05-0390**	6	74	36	29	36			○
	3	Internal coolant		**GD03C-0390**	6	66	24	17	36			○
	5			**GD05C-0390**	6	74	36	29	36			○
	8			**GD08C-0390**	6	81	43	36	36			○
	3	External coolant		**GD03-0400S**	4	66	24	17	36			●
	5			**GD05-0400S**	4	74	36	29	36			●
	3	Internal coolant		**GD03C-0400S**	4	66	24	17	36			●
	5			**GD05C-0400S**	4	74	36	29	36			●
4.0	3	External coolant		**GD03-0400**	6	66	24	17	36			○
	5			**GD05-0400**	6	74	36	29	36			○
	3	Internal coolant		**GD03C-0400**	6	66	24	17	36			○
	5			**GD05C-0400**	6	74	36	29	36			○
	8		Straight shank	**GD08C-0400**	6	81	43	36	36			○
	3	External coolant		**GD03-0410S**	5	66	24	17	36			○
	5			**GD05-0410S**	5	74	36	29	36			○
	3	Internal coolant		**GD03C-0410S**	5	66	24	17	36			○
	5			**GD05C-0410S**	5	74	36	29	36			○
4.1	3	External coolant		**GD03-0410**	6	66	24	17	36	NO.10-32UNF		●
	5			**GD05-0410**	6	74	36	29	36			●
	3	Internal coolant		**GD03C-0410**	6	66	24	17	36			●
	5			**GD05C-0410**	6	74	36	29	36			●
	8			**GD08C-0410**	6	81	43	36	36			○
	3	External coolant		**GD03-0420S**	5	66	24	17	36			○
	5			**GD05-0420S**	5	74	36	29	36			○
	3	Internal coolant		**GD03C-0420S**	5	66	24	17	36			○
	5			**GD05C-0420S**	5	74	36	29	36			○
4.2	3	External coolant		**GD03-0420**	6	66	24	17	36	M5×0.8		●
	5			**GD05-0420**	6	74	36	29	36			●
	3	Internal coolant		**GD03C-0420**	6	66	24	17	36			●
	5			**GD05C-0420**	6	74	36	29	36			●
	8			**GD08C-0420**	6	81	43	36	36			○

Note: For drilling depth (l/d) of 8 ,namely GD08C series, tolerance of shank diameter is h_5. ● Stock available ○ Make-to-order

Applicable material table

◎Very suitable ○Suitable

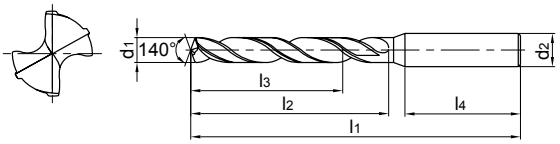
Grade	Workpiece material										
	Mild steel HB≤180	Carbon steel, Alloy steel	Pre-hardened steel, Hardened steel			Stainless steel	Cast iron	Nodular cast iron	Aluminum alloy	Copper alloy	Heat resistant alloy
			~40HRC	~50HRC	~60HRC						
KDG3013	○	◎	◎			○	◎	◎			○

Code key C6
Cutting parameters C74–C76
Technical information C80–C86

GD series General machining

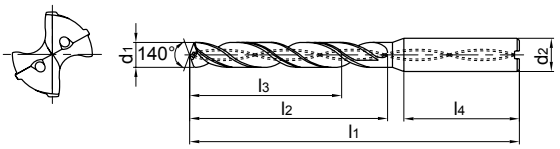

External coolant

Straight shank




Internal coolant

Straight shank



● Suitable for high efficiency drilling in a variety of materials e.g steel, stainless steel, cast iron.

Drill diameter $d_1(m_7)$	Drilling depth (l/d)	Cooling mode	Shank type	Type	Basic dimension(mm)					Suitable for thread		Grade
					Shank diameter	Overall length	Flute length	Recommended drilling depth	Shank length	cutting taps / tread milling cutters	forming taps	KDG3013
					$d_2(h_6)$	l_1	l_2	l_3	l_4			
4.3	3	External coolant	Straight shank	GD03-0430S	5	66	24	17	36			○
	5			GD05-0430S	5	74	36	29	36			○
	3	Internal coolant		GD03C-0430S	5	66	24	17	36			○
	5			GD05C-0430S	5	74	36	29	36			○
	3	External coolant		GD03-0430	6	66	24	17	36			●
	5			GD05-0430	6	74	36	29	36			●
	3	Internal coolant		GD03C-0430	6	66	24	17	36			●
	5			GD05C-0430	6	74	36	29	36			●
	8			GD08C-0430	6	81	43	36	36			○
4.35	3	External coolant		GD03-0435S	5	66	24	17	36		NO.10-24UNC	○
	5			GD05-0435S	5	74	36	29	36			○
	3	Internal coolant		GD03C-0435S	5	66	24	17	36			○
	5			GD05C-0435S	5	74	36	29	36			○
	3	External coolant		GD03-0435	6	66	24	17	36			●
	5			GD05-0435	6	74	36	29	36			●
	3	Internal coolant		GD03C-0435	6	66	24	17	36			●
	5			GD05C-0435	6	74	36	29	36			●
4.4	3	External coolant		GD03-0440S	5	66	24	17	36			○
	5			GD05-0440S	5	74	36	29	36			○
	3	Internal coolant		GD03C-0440S	5	66	24	17	36			○
	5			GD05C-0440S	5	74	36	29	36			○
	3	External coolant		GD03-0440	6	66	24	17	36			●
	5			GD05-0440	6	74	36	29	36			●
	3	Internal coolant		GD03C-0440	6	66	24	17	36			●
	5			GD05C-0440	6	74	36	29	36			●
	8			GD08C-0440	6	81	43	36	36			○

● Stock available ○ Make-to-order

Drill diameter $d_1(m_7)$	Drilling depth (l/d)	Cooling mode	Shank type	Type	Basic dimension(mm)					Suitable for thread		Grade
					Shank diameter	Overall length	Flute length	Recommended drilling depth	Shank length	cutting taps / tread milling cutters	forming taps	KDG3013
					$d_2(h_6)$	l_1	l_2	l_3	l_4			
4.45	3	External coolant	Straight shank	GD03-0445S	5	66	24	17	36		NO.10-32UNF	○
	5			GD05-0445S	5	74	36	29	36			○
	3	Internal coolant		GD03C-0445S	5	66	24	17	36			○
	5			GD05C-0445S	5	74	36	29	36			○
	3	External coolant		GD03-0445	6	66	24	17	36			●
	5			GD05-0445	6	74	36	29	36			●
	3	Internal coolant		GD03C-0445	6	66	24	17	36			●
	5			GD05C-0445	6	74	36	29	36			●
4.5	3	External coolant		GD03-0450S	5	66	24	17	36	NO.12-24UNC M5×0.5		○
	5			GD05-0450S	5	74	36	29	36			○
	3	Internal coolant		GD03C-0450S	5	66	24	17	36			○
	5			GD05C-0450S	5	74	36	29	36			○
	3	External coolant		GD03-0450	6	66	24	17	36			●
	5			GD05-0450	6	74	36	29	36			●
	3	Internal coolant		GD03C-0450	6	66	24	17	36			●
	5			GD05C-0450	6	74	36	29	36			●
	8			GD08C-0450	6	81	43	36	36			○
4.6	3	External coolant		GD03-0460S	5	66	24	17	36			○
	5			GD05-0460S	5	74	36	29	36			○
	3	Internal coolant		GD03C-0460S	5	66	24	17	36			○
	5			GD05C-0460S	5	74	36	29	36			○
	3	External coolant		GD03-0460	6	66	24	17	36			●
	5			GD05-0460	6	74	36	29	36			●
	3	Internal coolant		GD03C-0460	6	66	24	17	36			●
	5			GD05C-0460	6	74	36	29	36			●
	8			GD08C-0460	6	81	43	36	36			○
4.65	3	External coolant		GD03-0465S	5	66	24	17	36		M5×0.8	○
	5			GD05-0465S	5	74	36	29	36			○
	3	Internal coolant		GD03C-0465S	5	66	24	17	36			○
	5			GD05C-0465S	5	74	36	29	36			○
	3	External coolant		GD03-0465	6	66	24	17	36			●
	5			GD05-0465	6	74	36	29	36			●
	3	Internal coolant		GD03C-0465	6	66	24	17	36			●
	5			GD05C-0465	6	74	36	29	36			●

Note: For drilling depth (l/d) of 8 ,namely GD08C series, tolerance of shank diameter is h_5.

● Stock available ○ Make-to-order

Applicable material table

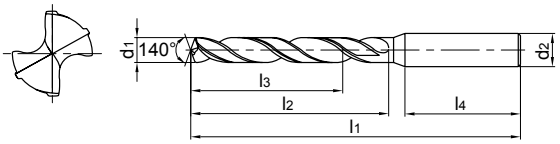
◎Very suitable ○Suitable

Grade	Workpiece material										
	Mild steel HB≤180	Carbon steel, Alloy steel	Pre-hardened steel, Hardened steel			Stainless steel	Cast iron	Nodular cast iron	Aluminum alloy	Copper alloy	Heat resistant alloy
			~40HRC	~50HRC	~60HRC						
KDG3013	○	◎	◎			○	◎	◎			○

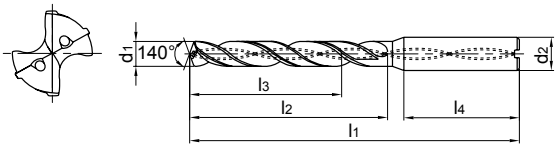
Code key C6
Cutting parameters C74–C76
Technical information C80–C86

GD series General machining


External coolant　　Straight shank




Internal coolant　　Straight shank



● Suitable for high efficiency drilling in a variety of materials e.g steel, stainless steel, cast iron.

Drill diameter $d_1(m_7)$	Drilling depth (l/d)	Cooling mode	Shank type	Type	Basic dimension(mm)					Suitable for thread		Grade
					Shank diameter	Overall length	Flute length	Recommended drilling depth	Shank length	cutting taps / tread milling cutters	forming taps	KDG3013
					$d_2(h_6)$	l_1	l_2	l_3	l_4			
	3	External coolant		**GD03-0470S**	5	66	24	17	36			○
	5			**GD05-0470S**	5	74	36	29	36			○
	3	Internal coolant		**GD03C-0470S**	5	66	24	17	36			○
	5			**GD05C-0470S**	5	74	36	29	36			○
4.7	3	External coolant		**GD03-0470**	6	66	24	17	36	NO.12-28UNF		●
	5			**GD05-0470**	6	74	36	29	36			●
	3	Internal coolant		**GD03C-0470**	6	66	24	17	36			●
	5			**GD05C-0470**	6	74	36	29	36			●
	8			**GD08C-0470**	6	81	43	36	36			○
	3	External coolant		**GD03-0480S**	5	66	28	20	36			○
	5			**GD05-0480S**	5	82	44	35	36			○
	3	Internal coolant		**GD03C-0480S**	5	66	28	20	36			○
	5			**GD05C-0480S**	5	82	44	35	36			○
4.8	3	External coolant	Straight shank	**GD03-0480**	6	66	28	20	36		M5×0.5	●
	5			**GD05-0480**	6	82	44	35	36			●
	3	Internal coolant		**GD03C-0480**	6	66	28	20	36			●
	5			**GD05C-0480**	6	82	44	35	36			●
	8			**GD08C-0480**	6	95	57	48	36			○
	3	External coolant		**GD03-0490S**	5	66	28	20	36			○
	5			**GD05-0490S**	5	82	44	35	36			○
	3	Internal coolant		**GD03C-0490S**	5	66	28	20	36			○
	5			**GD05C-0490S**	5	82	44	35	36			○
4.9	3	External coolant		**GD03-0490**	6	66	28	20	36			●
	5			**GD05-0490**	6	82	44	35	36			●
	3	Internal coolant		**GD03C-0490**	6	66	28	20	36			●
	5			**GD05C-0490**	6	82	44	35	36			●
	8			**GD08C-0490**	6	95	57	48	36			○

● Stock available　○ Make-to-order

Drill diameter $d_1(m_7)$	Drilling depth (l/d)	Cooling mode	Shank type	Type	Basic dimension(mm)					Suitable for thread		Grade
					Shank diameter	Overall length	Flute length	Recommended drilling depth	Shank length	cutting taps / tread milling cutters	forming taps	KDG3013
					$d_2(h_6)$	l_1	l_2	l_3	l_4			
5.0	3	External coolant	Straight shank	GD03-0500S	5	66	28	20	36	M6×1	NO.12-24UNC	○
	5			GD05-0500S	5	82	44	35	36			○
	3	Internal coolant		GD03C-0500S	5	66	28	20	36			○
	5			GD05C-0500S	5	82	44	35	36			○
	3	External coolant		GD03-0500	6	66	28	20	36			●
	5			GD05-0500	6	82	44	35	36			●
	3	Internal coolant		GD03C-0500	6	66	28	20	36			●
	5			GD05C-0500	6	82	44	35	36			●
	8			GD08C-0500	6	95	57	48	36			○
5.1	3	External coolant		GD03-0510	6	66	28	20	36	1/4-20UNC	NO.12-28UNF	●
	5			GD05-0510	6	82	44	35	36			●
	3	Internal coolant		GD03C-0510	6	66	28	20	36			●
	5			GD05C-0510	6	82	44	35	36			●
	8			GD08C-0510	6	95	57	48	36			○
5.2	3	External coolant		GD03-0520	6	66	28	20	36			●
	5			GD05-0520	6	82	44	35	36			●
	3	Internal coolant		GD03C-0520	6	66	28	20	36			●
	5			GD05C-0520	6	82	44	35	36			●
	8			GD08C-0520	6	95	57	48	36			○
5.25	3	External coolant		GD03-0525	6	66	28	20	36	M6×0.75		●
	5			GD05-0525	6	82	44	35	36			●
	3	Internal coolant		GD03C-0525	6	66	28	20	36			●
	5			GD05C-0525	6	82	44	35	36			●
5.3	3	External coolant		GD03-0530	6	66	28	20	36			●
	5			GD05-0530	6	82	44	35	36			●
	3	Internal coolant		GD03C-0530	6	66	28	20	36			●
	5			GD05C-0530	6	82	44	35	36			●
	8			GD08C-0530	6	95	57	48	36			○
5.4	3	External coolant		GD03-0540	6	66	28	20	36			●
	5			GD05-0540	6	82	44	35	36			●
	3	Internal coolant		GD03C-0540	6	66	28	20	36			●
	5			GD05C-0540	6	82	44	35	36			●
	8			GD08C-0540	6	95	57	48	36			○

Note: For drilling depth (l/d) of 8 ,namely GD08C series, tolerance of shank diameter is h_5.

● Stock available ○ Make-to-order

Applicable material table

◎Very suitable ○Suitable

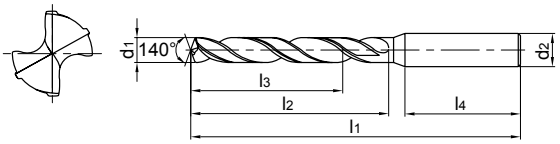
Grade	Workpiece material										
	Mild steel HB⩽180	Carbon steel, Alloy steel	Pre-hardened steel, Hardened steel			Stainless steel	Cast iron	Nodular cast iron	Aluminum alloy	Copper alloy	Heat resistant alloy
			~40HRC	~50HRC	~60HRC						
KDG3013	○	◎	◎			○	◎	◎			○

Code key C6
Cutting parameters C74–C76
Technical information C80–C86

GD series General machining

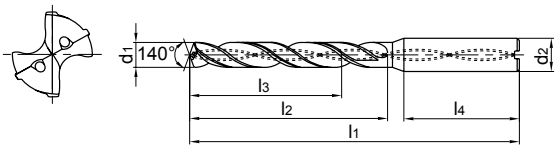

External coolant

Straight shank




Internal coolant

Straight shank



● Suitable for high efficiency drilling in a variety of materials e.g steel, stainless steel, cast iron.

Drill diameter $d_1(m_7)$	Drilling depth (l/d)	Cooling mode	Shank type	Type	Basic dimension(mm)					Suitable for thread		Grade
					Shank diameter	Overall length	Flute length	Recommended drilling depth	Shank length	cutting taps / tread milling cutters	forming taps	KDG3013
					$d_2(h_6)$	l_1	l_2	l_3	l_4			
5.5	3	External coolant	Straight shank	GD03-0550	6	66	28	20	36	1/4-28UNF		●
	5			GD05-0550	6	82	44	35	36			●
	3	Internal coolant		GD03C-0550	6	66	28	20	36			●
	5			GD05C-0550	6	82	44	35	36			●
	8			GD08C-0550	6	95	57	48	36			○
5.55	3	External coolant		GD03-0555	6	66	28	20	36			●
	5			GD05-0555	6	82	44	35	36			●
	3	Internal coolant		GD03C-0555	6	66	28	20	36			●
	5			GD05C-0555	6	82	44	35	36			●
5.6	3	External coolant		GD03-0560	6	66	28	20	36		M6×1	●
	5			GD05-0560	6	82	44	35	36			●
	3	Internal coolant		GD03C-0560	6	66	28	20	36			●
	5			GD05C-0560	6	82	44	35	36			●
	8			GD08C-0560	6	95	57	48	36			○
5.7	3	External coolant		GD03-0570	6	66	28	20	36		M6×0.75	●
	5			GD05-0570	6	82	44	35	36			●
	3	Internal coolant		GD03C-0570	6	66	28	20	36			●
	5			GD05C-0570	6	82	44	35	36			●
	8			GD08C-0570	6	95	57	48	36			○
5.75	3	External coolant		GD03-0575	6	66	28	20	36		1/4-20UNC	●
	5			GD05-0575	6	82	44	35	36			●
	3	Internal coolant		GD03C-0575	6	66	28	20	36			●
	5			GD05C-0575	6	82	44	35	36			●
5.8	3	External coolant		GD03-0580	6	66	28	20	36			●
	5			GD05-0580	6	82	44	35	36			●
	3	Internal coolant		GD03C-0580	6	66	28	20	36			●
	5			GD05C-0580	6	82	44	35	36			●
	8			GD08C-0580	6	95	57	48	36			○

● Stock available ○ Make-to-order

Drill diameter $d_1(m_7)$	Drilling depth (l/d)	Cooling mode	Shank type	Type	Basic dimension(mm)					Suitable for thread		Grade
					Shank diameter	Overall length	Flute length	Recommended drilling depth	Shank length	cutting taps / tread milling cutters	forming taps	KDG3013
					$d_2(h_6)$	l_1	l_2	l_3	l_4			
5.9	3	External coolant	Straight shank	GD03-0590	6	66	28	20	36			●
	5			GD05-0590	6	82	44	35	36			●
	3	Internal coolant		GD03C-0590	6	66	28	20	36			●
	5			GD05C-0590	6	82	44	35	36			●
	8			GD08C-0590	6	95	57	48	36			○
5.95	3	External coolant		GD03-0595	6	66	28	20	36		1/4-28UNF	●
	5			GD05-0595	6	82	44	35	36			●
	3	Internal coolant		GD03C-0595	6	66	28	20	36			●
	5			GD05C-0595	6	82	44	35	36			●
6.0	3	External coolant		GD03-0600	6	66	28	20	36	M7×1		●
	5			GD05-0600	6	82	44	35	36			●
	3	Internal coolant		GD03C-0600	6	66	28	20	36			●
	5			GD05C-0600	6	82	44	35	36			●
	8			GD08C-0600	6	95	57	48	36			○
6.1	3	External coolant		GD03-0610S	7	79	34	24	36			○
	5			GD05-0610S	7	91	53	43	36			○
	3	Internal coolant		GD03C-0610S	7	79	34	24	36			○
	5			GD05C-0610S	7	91	53	43	36			○
	3	External coolant		GD03-0610	8	79	34	24	36			●
	5			GD05-0610	8	91	53	43	36			●
	3	Internal coolant		GD03C-0610	8	79	34	24	36			●
	5			GD05C-0610	8	91	53	43	36			●
	8			GD08C-0610	8	114	76	66	36			○
6.2	3	External coolant		GD03-0620S	7	79	34	24	36			○
	5			GD05-0620S	7	91	53	43	36			○
	3	Internal coolant		GD03C-0620S	7	79	34	24	36			○
	5			GD05C-0620S	7	91	53	43	36			○
	3	External coolant		GD03-0620	8	79	34	24	36			●
	5			GD05-0620	8	91	53	43	36			●
	3	Internal coolant		GD03C-0620	8	79	34	24	36			●
	5			GD05C-0620	8	91	53	43	36			●
	8			GD08C-0620	8	114	76	66	36			○

Note: For drilling depth (l/d) of 8 ,namely GD08C series, tolerance of shank diameter is h_5.

● Stock available ○ Make-to-order

Applicable material table

◎Very suitable ○Suitable

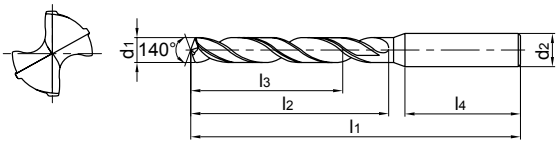
Grade	Workpiece material										
	Mild steel HB⩽180	Carbon steel, Alloy steel	Pre-hardened steel, Hardened steel			Stainless steel	Cast iron	Nodular cast iron	Aluminum alloy	Copper alloy	Heat resistant alloy
			~40HRC	~50HRC	~60HRC						
KDG3013	○	◎	◎			○	◎	◎			○

Code key C6
Cutting parameters C74–C76
Technical information C80–C86

GD series General machining

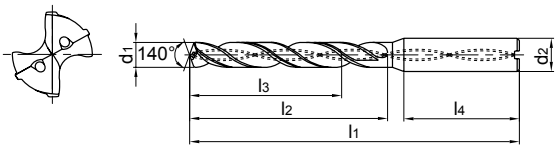


External coolant Straight shank





Internal coolant Straight shank



● Suitable for high efficiency drilling in a variety of materials e.g steel, stainless steel, cast iron.

Drill diameter $d_1(m_7)$	Drilling depth (l/d)	Cooling mode	Shank type	Type	Basic dimension(mm)					Suitable for thread		Grade
					Shank diameter $d_2(h_6)$	Overall length l_1	Flute length l_2	Recommended drilling depth l_3	Shank length l_4	cutting taps / tread milling cutters	forming taps	KDG3013
6.3	3	External coolant	Straight shank	GD03-0630S	7	79	34	24	36			○
	5			GD05-0630S	7	91	53	43	36			○
	3	Internal coolant		GD03C-0630S	7	79	34	24	36			○
	5			GD05C-0630S	7	91	53	43	36			○
	3	External coolant		GD03-0630	8	79	34	24	36			●
	5			GD05-0630	8	91	53	43	36			●
	3	Internal coolant		GD03C-0630	8	79	34	24	36			●
	5			GD05C-0630	8	91	53	43	36			●
	8			GD08C-0630	8	114	76	66	36			○
6.4	3	External coolant		GD03-0640S	7	79	34	24	36			○
	5			GD05-0640S	7	91	53	43	36			○
	3	Internal coolant		GD03C-0640S	7	79	34	24	36			○
	5			GD05C-0640S	7	91	53	43	36			○
	3	External coolant		GD03-0640	8	79	34	24	36			●
	5			GD05-0640	8	91	53	43	36			●
	3	Internal coolant		GD03C-0640	8	79	34	24	36			●
	5			GD05C-0640	8	91	53	43	36			●
	8			GD08C-0640	8	114	76	66	36			○
6.5	3	External coolant		GD03-0650S	7	79	34	24	36			○
	5			GD05-0650S	7	91	53	43	36			○
	3	Internal coolant		GD03C-0650S	7	79	34	24	36			○
	5			GD05C-0650S	7	91	53	43	36			○
	3	External coolant		GD03-0650	8	79	34	24	36			●
	5			GD05-0650	8	91	53	43	36			●
	3	Internal coolant		GD03C-0650	8	79	34	24	36			●
	5			GD05C-0650	8	91	53	43	36			●
	8			GD08C-0650	8	114	76	66	36			○

● Stock available ○ Make-to-order

Drill diameter $d_1(m_7)$	Drilling depth (l/d)	Cooling mode	Shank type	Type	Basic dimension(mm)					Suitable for thread		Grade
					Shank diameter	Overall length	Flute length	Recommended drilling depth	Shank length	cutting taps / tread milling cutters	forming taps	KDG3013
					$d_2(h_6)$	l_1	l_2	l_3	l_4			
6.6	3	External coolant	Straight shank	GD03-0660S	7	79	34	24	36	5/16-18UNC	M7×1	○
	5			GD05-0660S	7	91	53	43	36			○
	3	Internal coolant		GD03C-0660S	7	79	34	24	36			○
	5			GD05C-0660S	7	91	53	43	36			○
	3	External coolant		GD03-0660	8	79	34	24	36			●
	5			GD05-0660	8	91	53	43	36			●
	3	Internal coolant		GD03C-0660	8	79	34	24	36			●
	5			GD05C-0660	8	91	53	43	36			●
	8			GD08C-0660	8	114	76	66	36			○
6.7	3	External coolant		GD03-0670S	7	79	34	24	36			○
	5			GD05-0670S	7	91	53	43	36			○
	3	Internal coolant		GD03C-0670S	7	79	34	24	36			○
	5			GD05C-0670S	7	91	53	43	36			○
	3	External coolant		GD03-0670	8	79	34	24	36			●
	5			GD05-0670	8	91	53	43	36			●
	3	Internal coolant		GD03C-0670	8	79	34	24	36			●
	5			GD05C-0670	8	91	53	43	36			●
	8			GD08C-0670	8	114	76	66	36			○
6.75	3	External coolant		GD03-0675S	7	79	34	24	36	M8×1.25		○
	5			GD05-0675S	7	91	53	43	36			○
	3	Internal coolant		GD03C-0675S	7	79	34	24	36			○
	5			GD05C-0675S	7	91	53	43	36			○
	3	External coolant		GD03-0675	8	79	34	24	36			●
	5			GD05-0675	8	91	53	43	36			●
	3	Internal coolant		GD03C-0675	8	79	34	24	36			●
	5			GD05C-0675	8	91	53	43	36			●
6.8	3	External coolant		GD03-0680S	7	79	34	24	36			○
	5			GD05-0680S	7	91	53	43	36			○
	3	Internal coolant		GD03C-0680S	7	79	34	24	36			○
	5			GD05C-0680S	7	91	53	43	36			○
	3	External coolant		GD03-0680	8	79	34	24	36			●
	5			GD05-0680	8	91	53	43	36			●
	3	Internal coolant		GD03C-0680	8	79	34	24	36			●
	5			GD05C-0680	8	91	53	43	36			●
	8			GD08C-0680	8	114	76	66	36			○

Note: For drilling depth (l/d) of 8 ,namely GD08C series, tolerance of shank diameter is h_5.

● Stock available ○ Make-to-order

Applicable material table

◎Very suitable ○Suitable

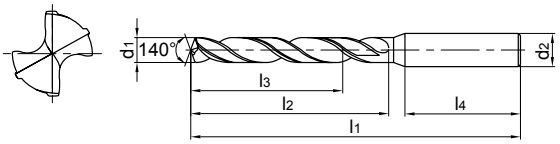
Grade	Workpiece material										
	Mild steel HB≤180	Carbon steel, Alloy steel	Pre-hardened steel, Hardened steel			Stainless steel	Cast iron	Nodular cast iron	Aluminum alloy	Copper alloy	Heat resistant alloy
			~40HRC	~50HRC	~60HRC						
KDG3013	○	◎	◎			○	◎	◎			○

Code key C6
Cutting parameters C74–C76
Technical information C80–C86

GD series General machining

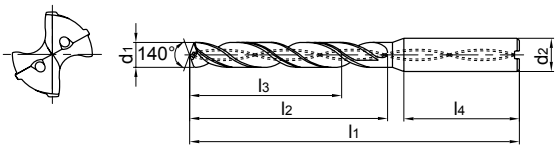

External coolant

Straight shank




Internal coolant

Straight shank



● Suitable for high efficiency drilling in a variety of materials e.g steel, stainless steel, cast iron.

Drill diameter $d_1(m_7)$	Drilling depth (l/d)	Cooling mode	Shank type	Type	Basic dimension(mm)					Suitable for thread		Grade
					Shank diameter	Overall length	Flute length	Recommended drilling depth	Shank length	cutting taps / tread milling cutters	forming taps	KDG3013
					$d_2(h_6)$	l_1	l_2	l_3	l_4			
	3	External coolant		**GD03-0690S**	7	79	34	24	36			○
	5			**GD05-0690S**	7	91	53	43	36			○
	3	Internal coolant		**GD03C-0690S**	7	79	34	24	36			○
	5			**GD05C-0690S**	7	91	53	43	36			○
6.9	3	External coolant		**GD03-0690**	8	79	34	24	36	5/16-24UNF		●
	5			**GD05-0690**	8	91	53	43	36			●
	3	Internal coolant		**GD03C-0690**	8	79	34	24	36			●
	5			**GD05C-0690**	8	91	53	43	36			●
	8			**GD08C-0690**	8	114	76	66	36			○
	3	External coolant		**GD03-0700S**	7	79	34	24	36			○
	5			**GD05-0700S**	7	91	53	43	36			○
	3	Internal coolant		**GD03C-0700S**	7	79	34	24	36			○
	5			**GD05C-0700S**	7	91	53	43	36			○
7.0	3	External coolant	Straight shank	**GD03-0700**	8	79	34	24	36	M8×1		●
	5			**GD05-0700**	8	91	53	43	36			●
	3	Internal coolant		**GD03C-0700**	8	79	34	24	36			●
	5			**GD05C-0700**	8	91	53	43	36			●
	8			**GD08C-0700**	8	116	76	66	36			○
	3	External coolant		**GD03-0710**	8	79	41	29	36			●
	5			**GD05-0710**	8	91	53	43	36			●
7.1	3	Internal coolant		**GD03C-0710**	8	79	41	29	36			●
	5			**GD05C-0710**	8	91	53	43	36			●
	8			**GD08C-0710**	8	116	76	66	36			○
	3	External coolant		**GD03-0720**	8	79	41	29	36			●
	5			**GD05-0720**	8	91	53	43	36			●
7.2	3	Internal coolant		**GD03C-0720**	8	79	41	29	36			●
	5			**GD05C-0720**	8	91	53	43	36			●
	8			**GD08C-0720**	8	116	76	66	36			○

● Stock available ○ Make-to-order

Drill diameter $d_1(m_7)$	Drilling depth (l/d)	Cooling mode	Shank type	Type	Basic dimension(mm)					Suitable for thread		Grade
					Shank diameter	Overall length	Flute length	Recommended drilling depth	Shank length	cutting taps / tread milling cutters	forming taps	KDG3013
					$d_2(h_6)$	l_1	l_2	l_3	l_4			
7.3	3	External coolant	Straight shank	GD03-0730	8	79	41	29	36		5/16-18UNC	●
	5			GD05-0730	8	91	53	43	36			●
	3	Internal coolant		GD03C-0730	8	79	41	29	36			●
	5			GD05C-0730	8	91	53	43	36			●
	8			GD08C-0730	8	116	76	66	36			○
7.4	3	External coolant		GD03-0740	8	79	41	29	36			●
	5			GD05-0740	8	91	53	43	36			●
	3	Internal coolant		GD03C-0740	8	79	41	29	36			●
	5			GD05C-0740	8	91	53	43	36			●
	8			GD08C-0740	8	116	76	66	36			○
7.45	3	External coolant		GD03-0745	8	79	41	29	36			●
	5			GD05-0745	8	91	53	43	36		M8×1.25	●
	3	Internal coolant		GD03C-0745	8	79	41	29	36		5/16-24UNF	●
	5			GD05C-0745	8	91	53	43	36			●
7.5	3	External coolant		GD03-0750	8	79	41	29	36			●
	5			GD05-0750	8	91	53	43	36			●
	3	Internal coolant		GD03C-0750	8	79	41	29	36			●
	5			GD05C-0750	8	91	53	43	36			●
	8			GD08C-0750	8	116	76	66	36			○
7.6	3	External coolant		GD03-0760	8	79	41	29	36			●
	5			GD05-0760	8	91	53	43	36			●
	3	Internal coolant		GD03C-0760	8	79	41	29	36		M8×1	●
	5			GD05C-0760	8	91	53	43	36			●
	8			GD08C-0760	8	116	76	66	36			○
7.7	3	External coolant		GD03-0770	8	79	41	29	36			●
	5			GD05-0770	8	91	53	43	36			●
	3	Internal coolant		GD03C-0770	8	79	41	29	36			●
	5			GD05C-0770	8	91	53	43	36			●
	8			GD08C-0770	8	116	76	66	36			○
7.8	3	External coolant		GD03-0780	8	79	41	29	36			●
	5			GD05-0780	8	91	53	43	36			●
	3	Internal coolant		GD03C-0780	8	79	41	29	36			●
	5			GD05C-0780	8	91	53	43	36			●
	8			GD08C-0780	8	116	76	66	36			○

Note: For drilling depth (l/d) of 8 ,namely GD08C series, tolerance of shank diameter is h_5.

● Stock available ○ Make-to-order

Applicable material table

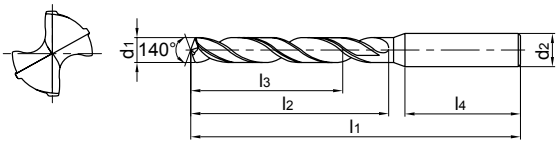
◎Very suitable ○Suitable

Grade	Workpiece material										
	Mild steel HB≤180	Carbon steel, Alloy steel	Pre-hardened steel, Hardened steel			Stainless steel	Cast iron	Nodular cast iron	Aluminum alloy	Copper alloy	Heat resistant alloy
			~40HRC	~50HRC	~60HRC						
KDG3013	○	◎	◎			○	◎	◎			○

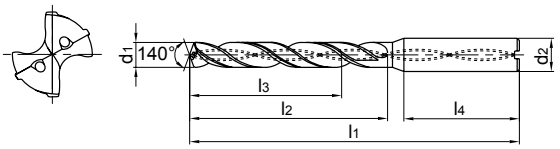
Code key C6
Cutting parameters C74–C76
Technical information C80–C86

GD series General machining


External coolant　　Straight shank




Internal coolant　　Straight shank



● Suitable for high efficiency drilling in a variety of materials e.g steel, stainless steel, cast iron.

Drill diameter $d_1(m_7)$	Drilling depth (l/d)	Cooling mode	Shank type	Type	Basic dimension(mm)					Suitable for thread		Grade
					Shank diameter	Overall length	Flute length	Recommended drilling depth	Shank length	cutting taps / tread milling cutters	forming taps	KDG3013
					$d_2(h_6)$	l_1	l_2	l_3	l_4			
7.9	3	External coolant	Straight shank	GD03-0790	8	79	41	29	36			●
	5			GD05-0790	8	91	53	43	36			●
	3	Internal coolant		GD03C-0790	8	79	41	29	36			●
	5			GD05C-0790	8	91	53	43	36			●
	8			GD08C-0790	8	116	76	66	36			○
8.0	3	External coolant		GD03-0800	8	79	41	29	36	3/8-16UNC		●
	5			GD05-0800	8	91	53	43	36			●
	3	Internal coolant		GD03C-0800	8	79	41	29	36			●
	5			GD05C-0800	8	91	53	43	36			●
	8			GD08C-0800	8	116	76	66	36			○
8.1	3	External coolant		GD03-0810S	9	89	47	35	40			○
	5			GD05-0810S	9	103	61	49	40			○
	3	Internal coolant		GD03C-0810S	9	89	47	35	40			○
	5			GD05C-0810S	9	103	61	49	40			○
	3	External coolant		GD03-0810	10	89	47	35	40			●
	5			GD05-0810	10	103	61	49	40			●
	3	Internal coolant		GD03C-0810	10	89	47	35	40			●
	5			GD05C-0810	10	103	61	49	40			●
	8			GD08C-0810	10	142	95	83	40			○
8.2	3	External coolant		GD03-0820S	9	89	47	35	40			○
	5			GD05-0820S	9	103	61	49	40			○
	3	Internal coolant		GD03C-0820S	9	89	47	35	40			○
	5			GD05C-0820S	9	103	61	49	40			○
	3	External coolant		GD03-0820	10	89	47	35	40			●
	5			GD05-0820	10	103	61	49	40			●
	3	Internal coolant		GD03C-0820	10	89	47	35	40			●
	5			GD05C-0820	10	103	61	49	40			●
	8			GD08C-0820	10	142	95	83	40			○

● Stock available　○ Make-to-order

Drill diameter $d_1(m_7)$	Drilling depth (l/d)	Cooling mode	Shank type	Type	Basic dimension(mm)					Suitable for thread		Grade
					Shank diameter	Overall length	Flute length	Recommended drilling depth	Shank length	cutting taps / tread milling cutters	forming taps	KDG3013
					$d_2(h_6)$	l_1	l_2	l_3	l_4			
8.3	3	External coolant	Straight shank	GD03-0830S	9	89	47	35	40			○
	5			GD05-0830S	9	103	61	49	40			○
	3	Internal coolant		GD03C-0830S	9	89	47	35	40			○
	5			GD05C-0830S	9	103	61	49	40			○
	3	External coolant		GD03-0830	10	89	47	35	40			●
	5			GD05-0830	10	103	61	49	40			●
	3	Internal coolant		GD03C-0830	10	89	47	35	40			●
	5			GD05C-0830	10	103	61	49	40			●
	8			GD08C-0830	10	142	95	83	40			○
8.4	3	External coolant		GD03-0840S	9	89	47	35	40			○
	5			GD05-0840S	9	103	61	49	40			○
	3	Internal coolant		GD03C-0840S	9	89	47	35	40			○
	5			GD05C-0840S	9	103	61	49	40			○
	3	External coolant		GD03-0840	10	89	47	35	40			●
	5			GD05-0840	10	103	61	49	40			●
	3	Internal coolant		GD03C-0840	10	89	47	35	40			●
	5			GD05C-0840	10	103	61	49	40			●
	8			GD08C-0840	10	142	95	83	40			○
8.5	3	External coolant		GD03-0850S	9	89	47	35	40	M10×1.5 3/8-24UNF		○
	5			GD05-0850S	9	103	61	49	40			○
	3	Internal coolant		GD03C-0850S	9	89	47	35	40			○
	5			GD05C-0850S	9	103	61	49	40			○
	3	External coolant		GD03-0850	10	89	47	35	40			●
	5			GD05-0850	10	103	61	49	40			●
	3	Internal coolant		GD03C-0850	10	89	47	35	40			●
	5			GD05C-0850	10	103	61	49	40			●
	8			GD08C-0850	10	142	95	83	40			○
8.6	3	External coolant		GD03-0860S	9	89	47	35	40			○
	5			GD05-0860S	9	103	61	49	40			○
	3	Internal coolant		GD03C-0860S	9	89	47	35	40			○
	5			GD05C-0860S	9	103	61	49	40			○
	3	External coolant		GD03-0860	10	89	47	35	40			●
	5			GD05-0860	10	103	61	49	40			●
	3	Internal coolant		GD03C-0860	10	89	47	35	40			●
	5			GD05C-0860	10	103	61	49	40			●
	8			GD08C-0860	10	142	95	83	40			○

Note: For drilling depth (l/d) of 8 ,namely GD08C series, tolerance of shank diameter is h_5.

● Stock available ○ Make-to-order

Applicable material table

◎Very suitable ○Suitable

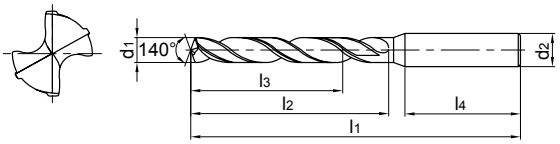
Grade	Workpiece material										
	Mild steel HB≤180	Carbon steel, Alloy steel	Pre-hardened steel, Hardened steel			Stainless steel	Cast iron	Nodular cast iron	Aluminum alloy	Copper alloy	Heat resistant alloy
			~40HRC	~50HRC	~60HRC						
KDG3013	○	◎	◎			○	◎	◎			○

Code key C6
Cutting parameters C74–C76
Technical information C80–C86

GD series General machining

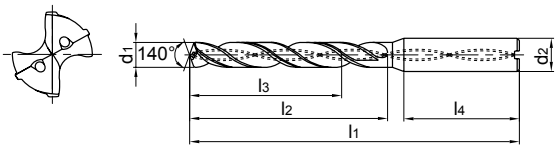

External coolant

Straight shank




Internal coolant

Straight shank



● Suitable for high efficiency drilling in a variety of materials e.g steel, stainless steel, cast iron.

Drill diameter $d_1(m_7)$	Drilling depth (l/d)	Cooling mode	Shank type	Type	Basic dimension(mm)					Suitable for thread		Grade
					Shank diameter	Overall length	Flute length	Recommended drilling depth	Shank length	cutting taps / tread milling cutters	forming taps	KDG3013
					$d_2(h_6)$	l_1	l_2	l_3	l_4			
8.7	3	External coolant	Straight shank	GD03-0870S	9	89	47	35	40			○
	5			GD05-0870S	9	103	61	49	40			○
	3	Internal coolant		GD03C-0870S	9	89	47	35	40			○
	5			GD05C-0870S	9	103	61	49	40			○
	3	External coolant		GD03-0870	10	89	47	35	40			●
	5			GD05-0870	10	103	61	49	40			●
	3	Internal coolant		GD03C-0870	10	89	47	35	40			●
	5			GD05C-0870	10	103	61	49	40			●
	8			GD08C-0870	10	142	95	83	40			○
8.75	3	External coolant		GD03-0875S	9	89	47	35	40	M10×1.25		○
	5			GD05-0875S	9	103	61	49	40			○
	3	Internal coolant		GD03C-0875S	9	89	47	35	40			○
	5			GD05C-0875S	9	103	61	49	40			○
	3	External coolant		GD03-0875	10	89	47	35	40			●
	5			GD05-0875	10	103	61	49	40			●
	3	Internal coolant		GD03C-0875	10	89	47	35	40			●
	5			GD05C-0875	10	103	61	49	40			●
8.8	3	External coolant		GD03-0880S	9	89	47	35	40			○
	5			GD05-0880S	9	103	61	49	40			○
	3	Internal coolant		GD03C-0880S	9	89	47	35	40			○
	5			GD05C-0880S	9	103	61	49	40			○
	3	External coolant		GD03-0880	10	89	47	35	40		3/8-16UNC	●
	5			GD05-0880	10	103	61	49	40			●
	3	Internal coolant		GD03C-0880	10	89	47	35	40			●
	5			GD05C-0880	10	103	61	49	40			●
	8			GD08C-0880	10	142	95	83	40			○

● Stock available ○ Make-to-order

Drill diameter $d_1(m_7)$	Drilling depth (l/d)	Cooling mode	Shank type	Type	Basic dimension(mm)					Suitable for thread		Grade
					Shank diameter	Overall length	Flute length	Recommended drilling depth	Shank length	cutting taps / tread milling cutters	forming taps	KDG3013
					$d_2(h_6)$	l_1	l_2	l_3	l_4			
8.9	3	External coolant	Straight shank	GD03-0890S	9	89	47	35	40			○
	5			GD05-0890S	9	103	61	49	40			○
	3	Internal coolant		GD03C-0890S	9	89	47	35	40			○
	5			GD05C-0890S	9	103	61	49	40			○
	3	External coolant		GD03-0890	10	89	47	35	40			●
	5			GD05-0890	10	103	61	49	40			●
	3	Internal coolant		GD03C-0890	10	89	47	35	40			●
	5			GD05C-0890	10	103	61	49	40			●
	8			GD08C-0890	10	142	95	83	40			○
9.0	3	External coolant		GD03-0900S	9	89	47	35	40	M10×1	3/8-24UNF	○
	5			GD05-0900S	9	103	61	49	40			○
	3	Internal coolant		GD03C-0900S	9	89	47	35	40			○
	5			GD05C-0900S	9	103	61	49	40			○
	3	External coolant		GD03-0900	10	89	47	35	40			●
	5			GD05-0900	10	103	61	49	40			●
	3	Internal coolant		GD03C-0900	10	89	47	35	40			●
	5			GD05C-0900	10	103	61	49	40			●
	8			GD08C-0900	10	142	95	83	40			○
9.1	3	External coolant		GD03-0910	10	89	47	35	40			●
	5			GD05-0910	10	103	61	49	40			●
	3	Internal coolant		GD03C-0910	10	89	47	35	40			●
	5			GD05C-0910	10	103	61	49	40			●
	8			GD08C-0910	10	142	95	83	40			○
9.2	3	External coolant		GD03-0920	10	89	47	35	40			●
	5			GD05-0920	10	103	61	49	40			●
	3	Internal coolant		GD03C-0920	10	89	47	35	40			●
	5			GD05C-0920	10	103	61	49	40			●
	8			GD08C-0920	10	142	95	83	40			○
9.3	3	External coolant		GD03-0930	10	89	47	35	40			●
	5			GD05-0930	10	103	61	49	40			●
	3	Internal coolant		GD03C-0930	10	89	47	35	40			●
	5			GD05C-0930	10	103	61	49	40			●
	8			GD08C-0930	10	142	95	83	40			○

Note: For drilling depth (l/d) of 8 ,namely GD08C series, tolerance of shank diameter is h_5.

● Stock available ○ Make-to-order

Applicable material table

◎Very suitable ○Suitable

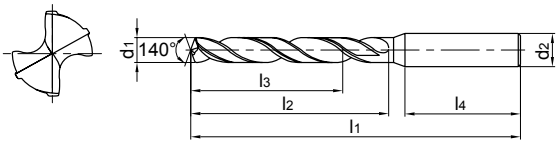
Grade	Workpiece material										
	Mild steel HB≤180	Carbon steel, Alloy steel	Pre-hardened steel, Hardened steel			Stainless steel	Cast iron	Nodular cast iron	Aluminum alloy	Copper alloy	Heat resistant alloy
			~40HRC	~50HRC	~60HRC						
KDG3013	○	◎	◎			○	◎	◎			○

Code key C6
Cutting parameters C74–C76
Technical information C80–C86

GD series General machining

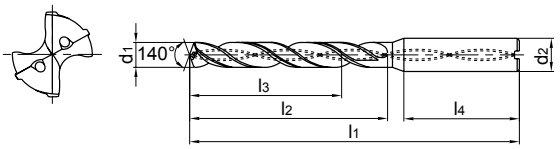

External coolant

Straight shank




Internal coolant

Straight shank



● Suitable for high efficiency drilling in a variety of materials e.g steel, stainless steel, cast iron.

Drill diameter $d_1(m_7)$	Drilling depth (l/d)	Cooling mode	Shank type	Type	Basic dimension(mm)					Suitable for thread		Grade
					Shank diameter	Overall length	Flute length	Recommended drilling depth	Shank length	cutting taps / tread milling cutters	forming taps	KDG3013
					$d_2(h_6)$	l_1	l_2	l_3	l_4			
9.35	3	External coolant	Straight shank	GD03-0935	10	89	47	35	40		M10×1.5	●
	5			GD05-0935	10	103	61	49	40			●
	3	Internal coolant		GD03C-0935	10	89	47	35	40			●
	5			GD05C-0935	10	103	61	49	40			●
9.4	3	External coolant		GD03-0940	10	89	47	35	40	7/16-14UNC		●
	5			GD05-0940	10	103	61	49	40			●
	3	Internal coolant		GD03C-0940	10	89	47	35	40			●
	5			GD05C-0940	10	103	61	49	40			●
	8			GD08C-0940	10	142	95	83	40			○
9.45	3	External coolant		GD03-0945	10	89	47	35	40		M10×1.25	●
	5			GD05-0945	10	103	61	49	40			●
	3	Internal coolant		GD03C-0945	10	89	47	35	40			●
	5			GD05C-0945	10	103	61	49	40			●
9.5	3	External coolant		GD03-0950	10	89	47	35	40			●
	5			GD05-0950	10	103	61	49	40			●
	3	Internal coolant		GD03C-0950	10	89	47	35	40			●
	5			GD05C-0950	10	103	61	49	40			●
	8			GD08C-0950	10	142	95	83	40			○
9.6	3	External coolant		GD03-0960	10	89	47	35	40		M10×1	●
	5			GD05-0960	10	103	61	49	40			●
	3	Internal coolant		GD03C-0960	10	89	47	35	40			●
	5			GD05C-0960	10	103	61	49	40			●
	8			GD08C-0960	10	142	95	83	40			○
9.7	3	External coolant		GD03-0970	10	89	47	35	40			●
	5			GD05-0970	10	103	61	49	40			●
	3	Internal coolant		GD03C-0970	10	89	47	35	40			●
	5			GD05C-0970	10	103	61	49	40			●
	8			GD08C-0970	10	142	95	83	40			○

● Stock available ○ Make-to-order

Drill diameter $d_1(m_7)$	Drilling depth (l/d)	Cooling mode	Shank type	Type	Basic dimension(mm)					Suitable for thread		Grade
					Shank diameter	Overall length	Flute length	Recommended drilling depth	Shank length	cutting taps / tread milling cutters	forming taps	KDG3013
					$d_2(h_6)$	l_1	l_2	l_3	l_4			
9.8	3	External coolant	Straight shank	GD03-0980	10	89	47	35	40			●
	5			GD05-0980	10	103	61	49	40			●
	3	Internal coolant		GD03C-0980	10	89	47	35	40			●
	5			GD05C-0980	10	103	61	49	40			●
	8			GD08C-0980	10	142	95	83	40			○
9.9	3	External coolant		GD03-0990	10	89	47	35	40	7/16-20UNF		●
	5			GD05-0990	10	103	61	49	40			●
	3	Internal coolant		GD03C-0990	10	89	47	35	40			●
	5			GD05C-0990	10	103	61	49	40			●
	8			GD08C-0990	10	142	95	83	40			○
10.0	3	External coolant		GD03-1000	10	89	47	35	40			●
	5			GD05-1000	10	103	61	49	40			●
	3	Internal coolant		GD03C-1000	10	89	47	35	40			●
	5			GD05C-1000	10	103	61	49	40			●
	8			GD08C-1000	10	142	95	83	40			○
10.1	3	External coolant		GD03-1010S	11	102	55	40	45			○
	5			GD05-1010S	11	118	71	56	45			○
	3	Internal coolant		GD03C-1010S	11	102	55	40	45			○
	5			GD05C-1010S	11	118	71	56	45			○
	3	External coolant		GD03-1010	12	102	55	40	45			●
	5			GD05-1010	12	118	71	56	45			●
	3	Internal coolant		GD03C-1010	12	102	55	40	45			●
	5			GD05C-1010	12	118	71	56	45			●
	8			GD08C-1010	12	162	114	99	45			○
10.2	3	External coolant		GD03-1020S	11	102	55	40	45			○
	5			GD05-1020S	11	118	71	56	45			○
	3	Internal coolant		GD03C-1020S	11	102	55	40	45			○
	5			GD05C-1020S	11	118	71	56	45			○
	3	External coolant		GD03-1020	12	102	55	40	45			●
	5			GD05-1020	12	118	71	56	45			●
	3	Internal coolant		GD03C-1020	12	102	55	40	45			●
	5			GD05C-1020	12	118	71	56	45			●
	8			GD08C-1020	12	162	114	99	45			○

Note: For drilling depth (l/d) of 8 ,namely GD08C series, tolerance of shank diameter is h_5. ● Stock available ○ Make-to-order

Applicable material table

◎Very suitable ○Suitable

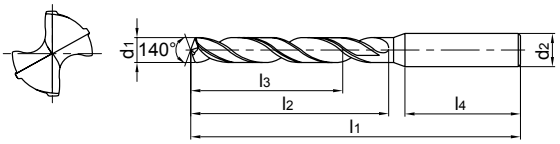
Grade	Workpiece material										
	Mild steel HB⩽180	Carbon steel, Alloy steel	Pre-hardened steel, Hardened steel			Stainless steel	Cast iron	Nodular cast iron	Aluminum alloy	Copper alloy	Heat resistant alloy
			~40HRC	~50HRC	~60HRC						
KDG3013	○	◎	◎			○	◎	◎			○

Code key C6
Cutting parameters C74–C76
Technical information C80–C86

GD series General machining

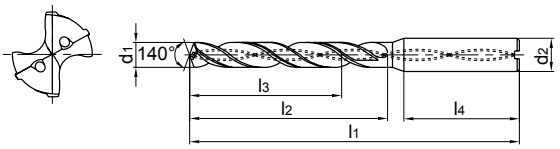


External coolant　　Straight shank





Internal coolant　　Straight shank



● Suitable for high efficiency drilling in a variety of materials e.g steel, stainless steel, cast iron.

Drill diameter $d_1(m_7)$	Drilling depth (l/d)	Cooling mode	Shank type	Type	Basic dimension(mm)					Suitable for thread		Grade
					Shank diameter	Overall length	Flute length	Recommended drilling depth	Shank length	cutting taps / tread milling cutters	forming taps	KDG3013
					$d_2(h_6)$	l_1	l_2	l_3	l_4			
10.25	3	External coolant	Straight shank	GD03-1025S	11	102	55	40	45	M12×1.75		○
	5			GD05-1025S	11	118	71	56	45			○
	3	Internal coolant		GD03C-1025S	11	102	55	40	45			○
	5			GD05C-1025S	11	118	71	56	45			○
	3	External coolant		GD03-1025	12	102	55	40	45			●
	5			GD05-1025	12	118	71	56	45			●
	3	Internal coolant		GD03C-1025	12	102	55	40	45			●
	5			GD05C-1025	12	118	71	56	45			●
10.3	3	External coolant		GD03-1030S	11	102	55	40	45			○
	5			GD05-1030S	11	118	71	56	45			○
	3	Internal coolant		GD03C-1030S	11	102	55	40	45			○
	5			GD05C-1030S	11	118	71	56	45			○
	3	External coolant		GD03-1030	12	102	55	40	45		7/16-14UNC	●
	5			GD05-1030	12	118	71	56	45			●
	3	Internal coolant		GD03C-1030	12	102	55	40	45			●
	5			GD05C-1030	12	118	71	56	45			●
	8			GD08C-1030	12	162	114	99	45			○
10.4	3	External coolant		GD03-1040S	11	102	55	40	45			○
	5			GD05-1040S	11	118	71	56	45			○
	3	Internal coolant		GD03C-1040S	11	102	55	40	45			○
	5			GD05C-1040S	11	118	71	56	45			○
	3	External coolant		GD03-1040	12	102	55	40	45			●
	5			GD05-1040	12	118	71	56	45			●
	3	Internal coolant		GD03C-1040	12	102	55	40	45			●
	5			GD05C-1040	12	118	71	56	45			●
	8			GD08C-1040	12	162	114	99	45			○

● Stock available　○ Make-to-order

Drill diameter $d_1(m_7)$	Drilling depth (l/d)	Cooling mode	Shank type	Type	Basic dimension(mm)					Suitable for thread		Grade
					Shank diameter	Overall length	Flute length	Recommended drilling depth	Shank length	cutting taps / tread milling cutters	forming taps	KDG3013
					$d_2(h_6)$	l_1	l_2	l_3	l_4			
	3	External coolant		**GD03-1050S**	11	102	55	40	45			○
	5			**GD05-1050S**	11	118	71	56	45			○
	3	Internal coolant		**GD03C-1050S**	11	102	55	40	45			○
	5			**GD05C-1050S**	11	118	71	56	45			○
10.5	3	External coolant		**GD03-1050**	12	102	55	40	45	M12×1.5	7/16-20UNF	●
	5			**GD05-1050**	12	118	71	56	45			●
	3	Internal coolant		**GD03C-1050**	12	102	55	40	45			●
	5			**GD05C-1050**	12	118	71	56	45			●
	8			**GD08C-1050**	12	162	114	99	45			○
	3	External coolant		**GD03-1060S**	11	102	55	40	45			○
	5			**GD05-1060S**	11	118	71	56	45			○
	3	Internal coolant		**GD03C-1060S**	11	102	55	40	45			○
	5			**GD05C-1060S**	11	118	71	56	45			○
10.6	3	External coolant		**GD03-1060**	12	102	55	40	45			●
	5			**GD05-1060**	12	118	71	56	45			●
	3	Internal coolant		**GD03C-1060**	12	102	55	40	45			●
	5			**GD05C-1060**	12	118	71	56	45			●
	8		Straight shank	**GD08C-1060**	12	162	114	99	45			○
	3	External coolant		**GD03-1070S**	11	102	55	40	45			○
	5			**GD05-1070S**	11	118	71	56	45			○
	3	Internal coolant		**GD03C-1070S**	11	102	55	40	45			○
	5			**GD05C-1070S**	11	118	71	56	45			○
10.7	3	External coolant		**GD03-1070**	12	102	55	40	45			●
	5			**GD05-1070**	12	118	71	56	45			●
	3	Internal coolant		**GD03C-1070**	12	102	55	40	45			●
	5			**GD05C-1070**	12	118	71	56	45			●
	8			**GD08C-1070**	12	162	114	99	45			○
	3	External coolant		**GD03-1075S**	11	102	55	40	45			○
	5			**GD05-1075S**	11	118	71	56	45			○
	3	Internal coolant		**GD03C-1075S**	11	102	55	40	45			○
	5			**GD05C-1075S**	11	118	71	56	45			○
10.75	3	External coolant		**GD03-1075**	12	102	55	40	45	M12×1.25		●
	5			**GD05-1075**	12	118	71	56	45			●
	3	Internal coolant		**GD03C-1075**	12	102	55	40	45			●
	5			**GD05C-1075**	12	118	71	56	45			●

Note: For drilling depth (l/d) of 8 ,namely GD08C series, tolerance of shank diameter is h_5.

● Stock available ○ Make-to-order

Applicable material table

◎Very suitable ○Suitable

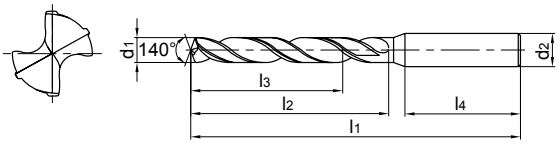
Grade	Workpiece material										
	Mild steel HB≤180	Carbon steel, Alloy steel	Pre-hardened steel, Hardened steel			Stainless steel	Cast iron	Nodular cast iron	Aluminum alloy	Copper alloy	Heat resistant alloy
			~40HRC	~50HRC	~60HRC						
KDG3013	○	◎	◎			○	◎	◎			○

Code key C6
Cutting parameters C74–C76
Technical information C80–C86

GD series General machining

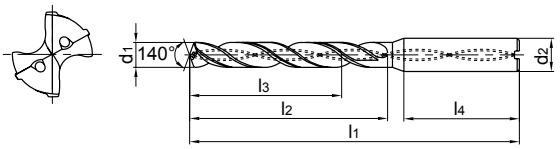

External coolant

Straight shank




Internal coolant

Straight shank



● Suitable for high efficiency drilling in a variety of materials e.g steel, stainless steel, cast iron.

Drill diameter $d_1(m_7)$	Drilling depth (l/d)	Cooling mode	Shank type	Type	Basic dimension(mm)					Suitable for thread		Grade
					Shank diameter	Overall length	Flute length	Recommended drilling depth	Shank length	cutting taps / tread milling cutters	forming taps	KDG3013
					$d_2(h_6)$	l_1	l_2	l_3	l_4			
	3	External coolant		**GD03-1080S**	11	102	55	40	45			○
	5			**GD05-1080S**	11	118	71	56	45			○
	3	Internal coolant		**GD03C-1080S**	11	102	55	40	45			○
	5			**GD05C-1080S**	11	118	71	56	45			○
10.8	3	External coolant		**GD03-1080**	12	102	55	40	45	1/2-13UNC		●
	5			**GD05-1080**	12	118	71	56	45			●
	3	Internal coolant		**GD03C-1080**	12	102	55	40	45			●
	5			**GD05C-1080**	12	118	71	56	45			●
	8			**GD08C-1080**	12	162	114	99	45			○
	3	External coolant		**GD03-1090S**	11	102	55	40	45			○
	5			**GD05-1090S**	11	118	71	56	45			○
	3	Internal coolant		**GD03C-1090S**	11	102	55	40	45			○
	5			**GD05C-1090S**	11	118	71	56	45			○
10.9	3	External coolant	Straight shank	**GD03-1090**	12	102	55	40	45			●
	5			**GD05-1090**	12	118	71	56	45			●
	3	Internal coolant		**GD03C-1090**	12	102	55	40	45			●
	5			**GD05C-1090**	12	118	71	56	45			●
	8			**GD08C-1090**	12	162	114	99	45			○
	3	External coolant		**GD03-1100S**	11	102	55	40	45			○
	5			**GD05-1100S**	11	118	71	56	45			○
	3	Internal coolant		**GD03C-1100S**	11	102	55	40	45			○
	5			**GD05C-1100S**	11	118	71	56	45			○
11.0	3	External coolant		**GD03-1100**	12	102	55	40	45			●
	5			**GD05-1100**	12	118	71	56	45			●
	3	Internal coolant		**GD03C-1100**	12	102	55	40	45			●
	5			**GD05C-1100**	12	118	71	56	45			●
	8			**GD08C-1100**	12	162	114	99	45			○

● Stock available ○ Make-to-order

Drill diameter $d_1(m_7)$	Drilling depth (l/d)	Cooling mode	Shank type	Type	Basic dimension(mm)					Suitable for thread		Grade
					Shank diameter	Overall length	Flute length	Recommended drilling depth	Shank length	cutting taps / tread milling cutters	forming taps	KDG3013
					$d_2(h_6)$	l_1	l_2	l_3	l_4			
11.1	3	External coolant	Straight shank	GD03-1110	12	102	55	40	45			●
	5			GD05-1110	12	118	71	56	45			●
	3	Internal coolant		GD03C-1110	12	102	55	40	45			●
	5			GD05C-1110	12	118	71	56	45			●
	8			GD08C-1110	12	162	114	99	45			○
11.2	3	External coolant		GD03-1120	12	102	55	40	45			●
	5			GD05-1120	12	118	71	56	45			●
	3	Internal coolant		GD03C-1120	12	102	55	40	45			●
	5			GD05C-1120	12	118	71	56	45			●
	8			GD08C-1120	12	162	114	99	45			○
11.25	3	External coolant		GD03-1125	12	102	55	40	45		M12×1.75	●
	5			GD05-1125	12	118	71	56	45			●
	3	Internal coolant		GD03C-1125	12	102	55	40	45			●
	5			GD05C-1125	12	118	71	56	45			●
11.3	3	External coolant		GD03-1130	12	102	55	40	45			●
	5			GD05-1130	12	118	71	56	45			●
	3	Internal coolant		GD03C-1130	12	102	55	40	45			●
	5			GD05C-1130	12	118	71	56	45			●
	8			GD08C-1130	12	162	114	99	45			○
11.35	3	External coolant		GD03-1135	12	102	55	40	45		M12×1.5	●
	5			GD05-1135	12	118	71	56	45			●
	3	Internal coolant		GD03C-1135	12	102	55	40	45			●
	5			GD05C-1135	12	118	71	56	45			●
11.4	3	External coolant		GD03-1140	12	102	55	40	45			●
	5			GD05-1140	12	118	71	56	45			●
	3	Internal coolant		GD03C-1140	12	102	55	40	45			●
	5			GD05C-1140	12	118	71	56	45			●
	8			GD08C-1140	12	162	114	99	45			○
11.45	3	External coolant		GD03-1145	12	102	55	40	45		M12×1.25	●
	5			GD05-1145	12	118	71	56	45			●
	3	Internal coolant		GD03C-1145	12	102	55	40	45			●
	5			GD05C-1145	12	118	71	56	45			●

Note: For drilling depth (l/d) of 8 ,namely GD08C series, tolerance of shank diameter is h_5.

● Stock available ○ Make-to-order

Applicable material table

◎Very suitable ○Suitable

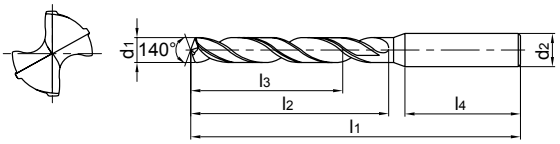
Grade	Workpiece material										
	Mild steel HB≤180	Carbon steel, Alloy steel	Pre-hardened steel, Hardened steel			Stainless steel	Cast iron	Nodular cast iron	Aluminum alloy	Copper alloy	Heat resistant alloy
			~40HRC	~50HRC	~60HRC						
KDG3013	○	◎	◎			○	◎	◎			○

Code key C6
Cutting parameters C74–C76
Technical information C80–C86

GD series General machining

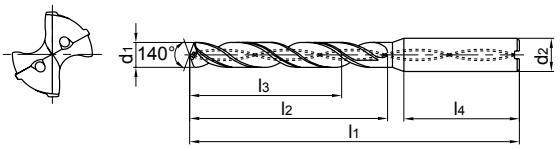

External coolant

Straight shank




Internal coolant

Straight shank



● Suitable for high efficiency drilling in a variety of materials e.g steel, stainless steel, cast iron.

Drill diameter $d_1(m_7)$	Drilling depth (l/d)	Cooling mode	Shank type	Type	Basic dimension(mm)					Suitable for thread		Grade
					Shank diameter	Overall length	Flute length	Recommended drilling depth	Shank length	cutting taps / tread milling cutters	forming taps	KDG3013
					$d_2(h_6)$	l_1	l_2	l_3	l_4			
11.5	3	External coolant	Straight shank	GD03-1150	12	102	55	40	45	1/2-20UNF		●
	5			GD05-1150	12	118	71	56	45			●
	3	Internal coolant		GD03C-1150	12	102	55	40	45			●
	5			GD05C-1150	12	118	71	56	45			●
	8			GD08C-1150	12	162	114	99	45			○
11.6	3	External coolant		GD03-1160	12	102	55	40	45			●
	5			GD05-1160	12	118	71	56	45			●
	3	Internal coolant		GD03C-1160	12	102	55	40	45			●
	5			GD05C-1160	12	118	71	56	45			●
	8			GD08C-1160	12	162	114	99	45			○
11.7	3	External coolant		GD03-1170	12	102	55	40	45			●
	5			GD05-1170	12	118	71	56	45			●
	3	Internal coolant		GD03C-1170	12	102	55	40	45			●
	5			GD05C-1170	12	118	71	56	45			●
	8			GD08C-1170	12	162	114	99	45			○
11.8	3	External coolant		GD03-1180	12	102	55	40	45		1/2-13UNC	●
	5			GD05-1180	12	118	71	56	45			●
	3	Internal coolant		GD03C-1180	12	102	55	40	45			●
	5			GD05C-1180	12	118	71	56	45			●
	8			GD08C-1180	12	162	114	99	45			○
11.9	3	External coolant		GD03-1190	12	102	55	40	45			●
	5			GD05-1190	12	118	71	56	45			●
	3	Internal coolant		GD03C-1190	12	102	55	40	45			●
	5			GD05C-1190	12	118	71	56	45			●
	8			GD08C-1190	12	162	114	99	45			○
12.0	3	External coolant		GD03-1200	12	102	55	40	45	M14×2		●
	5			GD05-1200	12	118	71	56	45			●
	3	Internal coolant		GD03C-1200	12	102	55	40	45			●
	5			GD05C-1200	12	118	71	56	45			●
	8			GD08C-1200	12	162	114	99	45			○

● Stock available ○ Make-to-order

Drill diameter $d_1(m_7)$	Drilling depth (l/d)	Cooling mode	Shank type	Type	Basic dimension(mm)					Suitable for thread		Grade
					Shank diameter	Overall length	Flute length	Recommended drilling depth	Shank length	cutting taps / tread milling cutters	forming taps	KDG3013
					$d_2(h_6)$	l_1	l_2	l_3	l_4			
12.1	3	External coolant	Straight shank	GD03-1210	14	107	60	43	45		1/2-20UNF	●
	5			GD05-1210	14	124	77	60	45			●
	3	Internal coolant		GD03C-1210	14	107	60	43	45			●
	5			GD05C-1210	14	124	77	60	45			●
12.2	3	External coolant		GD03-1220	14	107	60	43	45	9/16-12UNC		●
	5			GD05-1220	14	124	77	60	45			●
	3	Internal coolant		GD03C-1220	14	107	60	43	45			●
	5			GD05C-1220	14	124	77	60	45			●
12.25	3	External coolant		GD03-1225	14	107	60	43	45			●
	5			GD05-1225	14	124	77	60	45			●
	3	Internal coolant		GD03C-1225	14	107	60	43	45			●
	5			GD05C-1225	14	124	77	60	45			●
12.3	3	External coolant		GD03-1230	14	107	60	43	45			●
	5			GD05-1230	14	124	77	60	45			●
	3	Internal coolant		GD03C-1230	14	107	60	43	45			●
	5			GD05C-1230	14	124	77	60	45			●
12.5	3	External coolant		GD03-1250	14	107	60	43	45			●
	5			GD05-1250	14	124	77	60	45			●
	3	Internal coolant		GD03C-1250	14	107	60	43	45	M14×1.5		●
	5			GD05C-1250	14	124	77	60	45			●
	8			GD08C-1250	14	178	133	116	45			○
12.7	3	External coolant		GD03-1270	14	107	60	43	45			●
	5			GD05-1270	14	124	77	60	45			●
	3	Internal coolant		GD03C-1270	14	107	60	43	45			●
	5			GD05C-1270	14	124	77	60	45			●
	8			GD08C-1270	14	178	133	116	45			○
12.75	3	External coolant		GD03-1275	14	107	60	43	45			●
	5			GD05-1275	14	124	77	60	45			●
	3	Internal coolant		GD03C-1275	14	107	60	43	45			●
	5			GD05C-1275	14	124	77	60	45			●
12.8	3	External coolant		GD03-1280	14	107	60	43	45			●
	5			GD05-1280	14	124	77	60	45			●
	3	Internal coolant		GD03C-1280	14	107	60	43	45			●
	5			GD05C-1280	14	124	77	60	45			●
	8			GD08C-1280	14	178	133	116	45			○

Note: For drilling depth (l/d) of 8 ,namely GD08C series, tolerance of shank diameter is h_5. ● Stock available ○ Make-to-order

Applicable material table

◎Very suitable ○Suitable

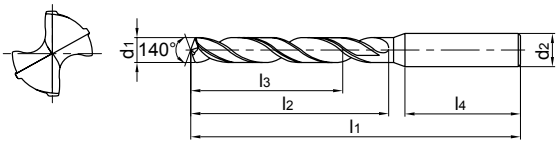
Grade	Workpiece material										
	Mild steel HB≤180	Carbon steel, Alloy steel	Pre-hardened steel, Hardened steel			Stainless steel	Cast iron	Nodular cast iron	Aluminum alloy	Copper alloy	Heat resistant alloy
			~40HRC	~50HRC	~60HRC						
KDG3013	○	◎	◎			○	◎	◎			○

Code key C6
Cutting parameters C74–C76
Technical information C80–C86

GD series General machining

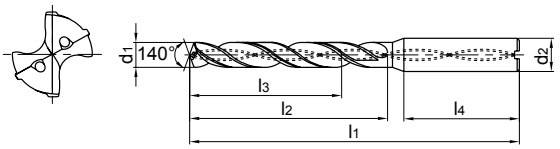

External coolant

Straight shank




Internal coolant

Straight shank



● Suitable for high efficiency drilling in a variety of materials e.g steel, stainless steel, cast iron.

Drill diameter $d_1(m_7)$	Drilling depth (l/d)	Cooling mode	Shank type	Type	Basic dimension(mm)					Suitable for thread		Grade
					Shank diameter	Overall length	Flute length	Recommended drilling depth	Shank length	cutting taps / tread milling cutters	forming taps	KDG3013
					$d_2(h_6)$	l_1	l_2	l_3	l_4			
12.9	3	External coolant	Straight shank	GD03-1290	14	107	60	43	45	9/16-18UNF		●
	5			GD05-1290	14	124	77	60	45			●
	3	Internal coolant		GD03C-1290	14	107	60	43	45			●
	5			GD05C-1290	14	124	77	60	45			●
13.0	3	External coolant		GD03-1300	14	107	60	43	45			●
	5			GD05-1300	14	124	77	60	45			●
	3	Internal coolant		GD03C-1300	14	107	60	43	45			●
	5			GD05C-1300	14	124	77	60	45			●
	8			GD08C-1300	14	178	133	116	45			○
13.1	3	External coolant		GD03-1310	14	107	60	43	45		M14×2	●
	5			GD05-1310	14	124	77	60	45			●
	3	Internal coolant		GD03C-1310	14	107	60	43	45			●
	5			GD05C-1310	14	124	77	60	45			●
13.35	3	External coolant		GD03-1335	14	107	60	43	45		M14×1.5 9/16-12UNC	●
	5			GD05-1335	14	124	77	60	45			●
	3	Internal coolant		GD03C-1335	14	107	60	43	45			●
	5			GD05C-1335	14	124	77	60	45			●
13.5	3	External coolant		GD03-1350	14	107	60	43	45	5/8-11UNC		●
	5			GD05-1350	14	124	77	60	45			●
	3	Internal coolant		GD03C-1350	14	107	60	43	45			●
	5			GD05C-1350	14	124	77	60	45			●
	8			GD08C-1350	14	178	133	116	45			○
13.65	3	External coolant		GD03-1365	14	107	60	43	45		9/16-18UNF	●
	5			GD05-1365	14	124	77	60	45			●
	3	Internal coolant		GD03C-1365	14	107	60	43	45			●
	5			GD05C-1365	14	124	77	60	45			●

● Stock available ○ Make-to-order

Drill diameter $d_1(m_7)$	Drilling depth (l/d)	Cooling mode	Shank type	Type	Basic dimension(mm)					Suitable for thread		Grade
					Shank diameter	Overall length	Flute length	Recommended drilling depth	Shank length	cutting taps / tread milling cutters	forming taps	KDG3013
					$d_2(h_6)$	l_1	l_2	l_3	l_4			
13.8	3	External coolant	Straight shank	GD03-1380	14	107	60	43	45			●
	5			GD05-1380	14	124	77	60	45			●
	3	Internal coolant		GD03C-1380	14	107	60	43	45			●
	5			GD05C-1380	14	124	77	60	45			●
14.0	3	External coolant		GD03-1400	14	107	60	43	45	M16×2		●
	5			GD05-1400	14	124	77	60	45			●
	3	Internal coolant		GD03C-1400	14	107	60	43	45			●
	5			GD05C-1400	14	124	77	60	45			●
	8			GD08C-1400	14	178	133	116	45			○
14.25	3	External coolant		GD03-1425	16	115	65	45	48			●
	5			GD05-1425	16	133	83	63	48			●
	3	Internal coolant		GD03C-1425	16	115	65	45	48			●
	5			GD05C-1425	16	133	83	63	48			●
14.3	3	External coolant		GD03-1430	16	115	65	45	48			●
	5			GD05-1430	16	133	83	63	48			●
	3	Internal coolant		GD03C-1430	16	115	65	45	48			●
	5			GD05C-1430	16	133	83	63	48			●
14.5	3	External coolant		GD03-1450	16	115	65	45	48	M16×1.5 5/8-18UNF		●
	5			GD05-1450	16	133	83	63	48			●
	3	Internal coolant		GD03C-1450	16	115	65	45	48			●
	5			GD05C-1450	16	133	83	63	48			●
	8			GD08C-1450	16	204	152	132	48			○
14.75	3	External coolant		GD03-1475	16	115	65	45	48			●
	5			GD05-1475	16	133	83	63	48			●
	3	Internal coolant		GD03C-1475	16	115	65	45	48			●
	5			GD05C-1475	16	133	83	63	48			●
14.8	3	External coolant		GD03-1480	16	115	65	45	48		5/8-11UNC	●
	5			GD05-1480	16	133	83	63	48			●
	3	Internal coolant		GD03C-1480	16	115	65	45	48			●
	5			GD05C-1480	16	133	83	63	48			●
	8			GD08C-1480	16	204	152	132	48			○
15.0	3	External coolant		GD03-1500	16	115	65	45	48			●
	5			GD05-1500	16	133	83	63	48			●
	3	Internal coolant		GD03C-1500	16	115	65	45	48			●
	5			GD05C-1500	16	133	83	63	48			●
	8			GD08C-1500	16	204	152	132	48			○

Note: For drilling depth (l/d) of 8 ,namely GD08C series, tolerance of shank diameter is h_5.

● Stock available ○ Make-to-order

Applicable material table

◎Very suitable ○Suitable

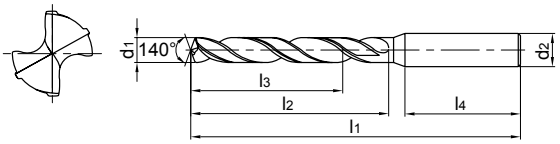
Grade	Workpiece material										
	Mild steel HB⩽180	Carbon steel, Alloy steel	Pre-hardened steel, Hardened steel			Stainless steel	Cast iron	Nodular cast iron	Aluminum alloy	Copper alloy	Heat resistant alloy
			~40HRC	~50HRC	~60HRC						
KDG3013	○	◎	◎			○	◎	◎			○

Code key C6
Cutting parameters C74–C76
Technical information C80–C86

GD series General machining

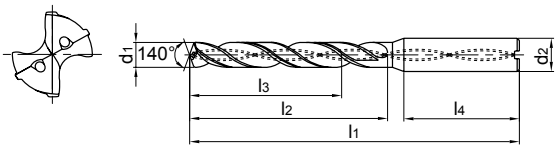

External coolant

Straight shank




Internal coolant

Straight shank



● Suitable for high efficiency drilling in a variety of materials e.g steel, stainless steel, cast iron.

Drill diameter $d_1(m_7)$	Drilling depth (l/d)	Cooling mode	Shank type	Type	Basic dimension(mm)					Suitable for thread		Grade
					Shank diameter	Overall length	Flute length	Recommended drilling depth	Shank length	cutting taps / tread milling cutters	forming taps	KDG3013
					$d_2(h_6)$	l_1	l_2	l_3	l_4			
15.1	3	External coolant	Straight shank	GD03-1510	16	115	65	45	48		M16×2	●
	5			GD05-1510	16	133	83	63	48			●
	3	Internal coolant		GD03C-1510	16	115	65	45	48			●
	5			GD05C-1510	16	133	83	63	48			●
15.25	3	External coolant		GD03-1525	16	115	65	45	48		5/8-18UNF	●
	5			GD05-1525	16	133	83	63	48			●
	3	Internal coolant		GD03C-1525	16	115	65	45	48			●
	5			GD05C-1525	16	133	83	63	48			●
15.35	3	External coolant		GD03-1535	16	115	65	45	48		M16×1.5	●
	5			GD05-1535	16	133	83	63	48			●
	3	Internal coolant		GD03C-1535	16	115	65	45	48			●
	5			GD05C-1535	16	133	83	63	48			●
15.5	3	External coolant		GD03-1550	16	115	65	45	48	M18×2.5		●
	5			GD05-1550	16	133	83	63	48			●
	3	Internal coolant		GD03C-1550	16	115	65	45	48			●
	5			GD05C-1550	16	133	83	63	48			●
	8			GD08C-1550	16	204	152	132	48			○
15.8	3	External coolant		GD03-1580	16	115	65	45	48			●
	5			GD05-1580	16	133	83	63	48			●
	3	Internal coolant		GD03C-1580	16	115	65	45	48			●
	5			GD05C-1580	16	133	83	63	48			●
16.0	3	External coolant		GD03-1600	16	115	65	45	48			●
	5			GD05-1600	16	133	83	63	48			●
	3	Internal coolant		GD03C-1600	16	115	65	45	48	M18×2		●
	5			GD05C-1600	16	133	83	63	48			●
	8			GD08C-1600	16	204	152	132	48			○

● Stock available ○ Make-to-order

Drill diameter $d_1(m_7)$	Drilling depth (l/d)	Cooling mode	Shank type	Type	Basic dimension(mm)					Suitable for thread		Grade
					Shank diameter	Overall length	Flute length	Recommended drilling depth	Shank length	cutting taps / tread milling cutters	forming taps	KDG3013
					$d_2(h_6)$	l_1	l_2	l_3	l_4			
16.5	3	External coolant	Straight shank	GD03-1650	18	123	73	51	48	3/4-10UNC		●
	5			GD05-1650	18	143	93	71	48			●
	3	Internal coolant		GD03C-1650	18	123	73	51	48			●
	5			GD05C-1650	18	143	93	71	48			●
	8			GD08C-1650	18	223	171	149	48			○
16.75	3	External coolant		GD03-1675	18	123	73	51	48			●
	5			GD05-1675	18	143	93	71	48			●
	3	Internal coolant		GD03C-1675	18	123	73	51	48			●
	5			GD05C-1675	18	143	93	71	48			●
16.8	3	External coolant		GD03-1680	18	123	73	51	48		M18×2.5	●
	5			GD05-1680	18	143	93	71	48			●
	3	Internal coolant		GD03C-1680	18	123	73	51	48			●
	5			GD05C-1680	18	143	93	71	48			●
17.0	3	External coolant		GD03-1700	18	123	73	51	48			●
	5			GD05-1700	18	143	93	71	48			●
	3	Internal coolant		GD03C-1700	18	123	73	51	48			●
	5			GD05C-1700	18	143	93	71	48			●
	8			GD08C-1700	18	223	171	149	48			○
17.5	3	External coolant		GD03-1750	18	123	73	51	48	M20×2.5 3/4-16UNF		●
	5			GD05-1750	18	143	93	71	48			●
	3	Internal coolant		GD03C-1750	18	123	73	51	48			●
	5			GD05C-1750	18	143	93	71	48			●
	8			GD08C-1750	18	223	171	149	48			○
17.8	3	External coolant		GD03-1780	18	123	73	51	48			●
	5			GD05-1780	18	143	93	71	48			●
	3	Internal coolant		GD03C-1780	18	123	73	51	48			●
	5			GD05C-1780	18	143	93	71	48			●
17.9	3	External coolant		GD03-1790	18	123	73	51	48		3/4-10UNC	●
	5			GD05-1790	18	143	93	71	48			●
	3	Internal coolant		GD03C-1790	18	123	73	51	48			●
	5			GD05C-1790	18	143	93	71	48			●
18.0	3	External coolant		GD03-1800	18	123	73	51	48	M20×2		●
	5			GD05-1800	18	143	93	71	48			●
	3	Internal coolant		GD03C-1800	18	123	73	51	48			●
	5			GD05C-1800	18	143	93	71	48			●
	8			GD08C-1800	18	223	171	149	48			○

Note: For drilling depth (l/d) of 8 ,namely GD08C series, tolerance of shank diameter is h_5.

● Stock available ○ Make-to-order

Applicable material table

◎Very suitable ○Suitable

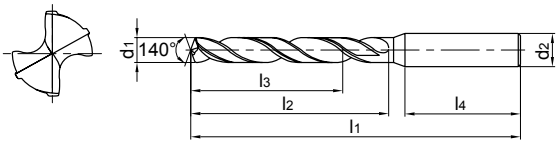
Grade	Workpiece material										
	Mild steel HB⩽180	Carbon steel, Alloy steel	Pre-hardened steel, Hardened steel			Stainless steel	Cast iron	Nodular cast iron	Aluminum alloy	Copper alloy	Heat resistant alloy
			~40HRC	~50HRC	~60HRC						
KDG3013	○	◎	◎			○	◎	◎			○

Code key C6
Cutting parameters C74–C76
Technical information C80–C86

GD series General machining

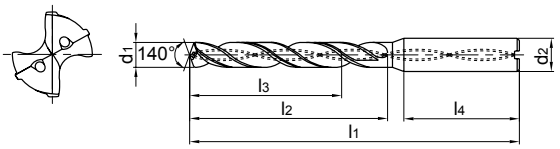

External coolant

Straight shank




Internal coolant

Straight shank



● Suitable for high efficiency drilling in a variety of materials e.g steel, stainless steel, cast iron.

Drill diameter $d_1(m_7)$	Drilling depth (l/d)	Cooling mode	Shank type	Type	Basic dimension(mm)					Suitable for thread		Grade
					Shank diameter	Overall length	Flute length	Recommended drilling depth	Shank length	cutting taps / tread milling cutters	forming taps	KDG3013
					$d_2(h_6)$	l_1	l_2	l_3	l_4			
18.3	3	External coolant	Straight shank	GD03-1830	20	131	79	55	50		3/4-16UNF	●
	5			GD05-1830	20	153	101	77	50			●
	3	Internal coolant		GD03C-1830	20	131	79	55	50			●
	5			GD05C-1830	20	153	101	77	50			●
18.5	3	External coolant		GD03-1850	20	131	79	55	50			●
	5			GD05-1850	20	153	101	77	50			●
	3	Internal coolant		GD03C-1850	20	131	79	55	50			●
	5			GD05C-1850	20	153	101	77	50			●
18.8	3	External coolant		GD03-1880	20	131	79	55	50		M20×2.5	●
	5			GD05-1880	20	153	101	77	50			●
	3	Internal coolant		GD03C-1880	20	131	79	55	50			●
	5			GD05C-1880	20	153	101	77	50			●
19.0	3	External coolant		GD03-1900	20	131	79	55	50			●
	5			GD05-1900	20	153	101	77	50			●
	3	Internal coolant		GD03C-1900	20	131	79	55	50			●
	5			GD05C-1900	20	153	101	77	50			●
19.5	3	External coolant		GD03-1950	20	131	79	55	50	M22×2.5 7/8-9UNC		●
	5			GD05-1950	20	153	101	77	50			●
	3	Internal coolant		GD03C-1950	20	131	79	55	50			●
	5			GD05C-1950	20	153	101	77	50			●
19.8	3	External coolant		GD03-1980	20	131	79	55	50			●
	5			GD05-1980	20	153	101	77	50			●
	3	Internal coolant		GD03C-1980	20	131	79	55	50			●
	5			GD05C-1980	20	153	101	77	50			●
20.0	3	External coolant		GD03-2000	20	131	79	55	50	M22×2		●
	5			GD05-2000	20	153	101	77	50			●
	3	Internal coolant		GD03C-2000	20	131	79	55	50			●
	5			GD05C-2000	20	153	101	77	50			●

● Stock available ○ Make-to-order

Drill diameter $d_1(m_7)$	Drilling depth (l/d)	Cooling mode	Shank type	Type	Basic dimension(mm)					Suitable for thread		Grade
					Shank diameter	Overall length	Flute length	Recommended drilling depth	Shank length	cutting taps / tread milling cutters	forming taps	KDG3013
					$d_2(h_6)$	l_1	l_2	l_3	l_4			
20.4	3	External coolant	Straight shank	GD03-2040	20	141	86	60	50	7/8-14UNF		○
	5			GD05-2040	20	167	112	85	50			○
	3	Internal coolant		GD03C-2040	20	141	86	60	50			○
	5			GD05C-2040	20	167	112	85	50			○
20.5	3	External coolant		GD03-2050	20	141	86	60	50			○
	5			GD05-2050	20	167	112	85	50			○
	3	Internal coolant		GD03C-2050	20	141	86	60	50			○
	5			GD05C-2050	20	167	112	85	50			○
21.0	3	External coolant		GD03-2100	20	141	86	60	50	M24×3	7/8-9UNC	○
	5			GD05-2100	20	167	112	85	50			○
	3	Internal coolant		GD03C-2100	20	141	86	60	50			○
	5			GD05C-2100	20	167	112	85	50			○
21.4	3	External coolant		GD03-2140	20	141	86	60	50		7/8-14UNF	○
	5			GD05-2140	20	167	112	85	50			○
	3	Internal coolant		GD03C-2140	20	141	86	60	50			○
	5			GD05C-2140	20	167	112	85	50			○
21.5	3	External coolant		GD03-2150	20	141	86	60	50			○
	5			GD05-2150	20	167	112	85	50			○
	3	Internal coolant		GD03C-2150	20	141	86	60	50			○
	5			GD05C-2150	20	167	112	85	50			○
22.0	3	External coolant		GD03-2200	20	141	86	60	50	M24×2		○
	5			GD05-2200	20	167	112	85	50			○
	3	Internal coolant		GD03C-2200	20	141	86	60	50			○
	5			GD05C-2200	20	167	112	85	50			○
22.25	3	External coolant		GD03-2225	25	153	95	65	56	1-8UNC		○
	5			GD05-2225	25	184	126	98	56			○
	3	Internal coolant		GD03C-2225	25	153	95	65	56			○
	5			GD05C-2225	25	184	126	98	56			○
22.5	3	External coolant		GD03-2250	25	153	95	65	56			○
	5			GD05-2250	25	184	126	98	56			○
	3	Internal coolant		GD03C-2250	25	153	95	65	56			○
	5			GD05C-2250	25	184	126	98	56			○
23.0	3	External coolant		GD03-2300	25	153	95	65	56	M25×2		○
	5			GD05-2300	25	184	126	98	56			○
	3	Internal coolant		GD03C-2300	25	153	95	65	56			○
	5			GD05C-2300	25	184	126	98	56			○

Note: For drilling depth (l/d) of 8 ,namely GD08C series, tolerance of shank diameter is h_5.

● Stock available ○ Make-to-order

Applicable material table

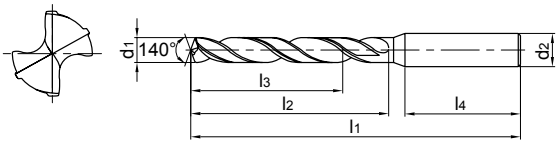
◎Very suitable ○Suitable

Grade	Workpiece material										
	Mild steel HB≤180	Carbon steel, Alloy steel	Pre-hardened steel, Hardened steel			Stainless steel	Cast iron	Nodular cast iron	Aluminum alloy	Copper alloy	Heat resistant alloy
			~40HRC	~50HRC	~60HRC						
KDG3013	○	◎	◎			○	◎	◎			○

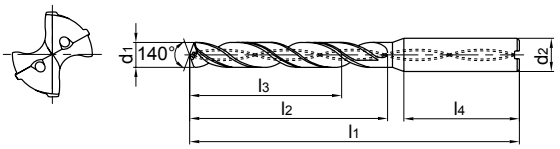
Code key C6
Cutting parameters C74–C76
Technical information C80–C86

GD series General machining


External coolant Straight shank




Internal coolant Straight shank



● Suitable for high efficiency drilling in a variety of materials e.g steel, stainless steel, cast iron.

Drill diameter $d_1(m_7)$	Drilling depth (l/d)	Cooling mode	Shank type	Type	Basic dimension(mm)					Suitable for thread		Grade
					Shank diameter	Overall length	Flute length	Recommended drilling depth	Shank length	cutting taps / tread milling cutters	forming taps	KDG3013
					$d_2(h_6)$	l_1	l_2	l_3	l_4			
23.25	3	External coolant	Straight shank	GD03-2325	25	153	95	65	56	1-12UNF		○
	5			GD05-2325	25	184	126	98	56			○
	3	Internal coolant		GD03C-2325	25	153	95	65	56			○
	5			GD05C-2325	25	184	126	98	56			○
23.5	3	External coolant		GD03-2350	25	153	95	65	56			○
	5			GD05-2350	25	184	126	98	56			○
	3	Internal coolant		GD03C-2350	25	153	95	65	56			○
	5			GD05C-2350	25	184	126	98	56			○
24.0	3	External coolant		GD03-2400	25	153	95	65	56	M27×3	1-8UNC	○
	5			GD05-2400	25	184	126	98	56			○
	3	Internal coolant		GD03C-2400	25	153	95	65	56			○
	5			GD05C-2400	25	184	126	98	56			○
24.5	3	External coolant		GD03-2450	25	153	95	65	56		1-12UNF	○
	5			GD05-2450	25	184	126	98	56			○
	3	Internal coolant		GD03C-2450	25	153	95	65	56			○
	5			GD05C-2450	25	184	126	98	56			○
25.0	3	External coolant		GD03-2500	25	153	95	65	56	M27×2 11/8-7UNC		○
	5			GD05-2500	25	184	126	98	56			○
	3	Internal coolant		GD03C-2500	25	153	95	65	56			○
	5			GD05C-2500	25	184	126	98	56			○

Note: For drilling depth (l/d) of 8 ,namely GD08C series, tolerance of shank diameter is h_5.

● Stock available ○ Make-to-order

Applicable material table

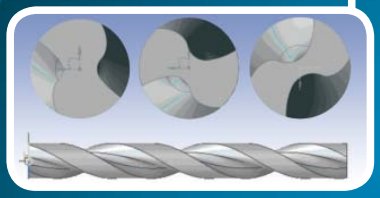
◎Very suitable ○Suitable

Grade	Workpiece material										
	Mild steel HB≤180	Carbon steel, Alloy steel	Pre-hardened steel, Hardened steel			Stainless steel	Cast iron	Nodular cast iron	Aluminum alloy	Copper alloy	Heat resistant alloy
			~40HRC	~50HRC	~60HRC						
KDG3013	○	◎	◎			○	◎	◎			○

Code key C6
Cutting parameters C74–C76
Technical information C80–C86

Achieving the optimization of tool structure through analysis of simulated cutting.



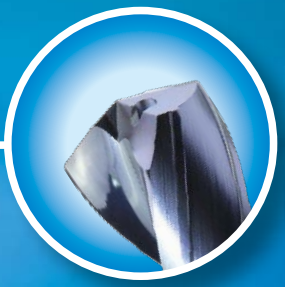


Design with change parameter helical flute, good rigidity and chip removal capability.

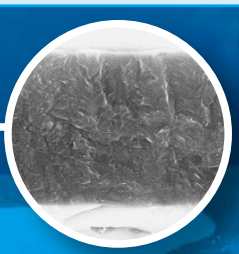
Unique cutting edge design, good chip breaking capability even for sticky, softer materials, high versatility.



Double special guiding margin, more credible guiding and more stable machining.



Special nano structure coating with better self lubricating capability and superb wear resistance.

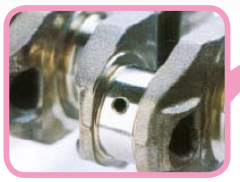


1588SL series

deep hole twist drills

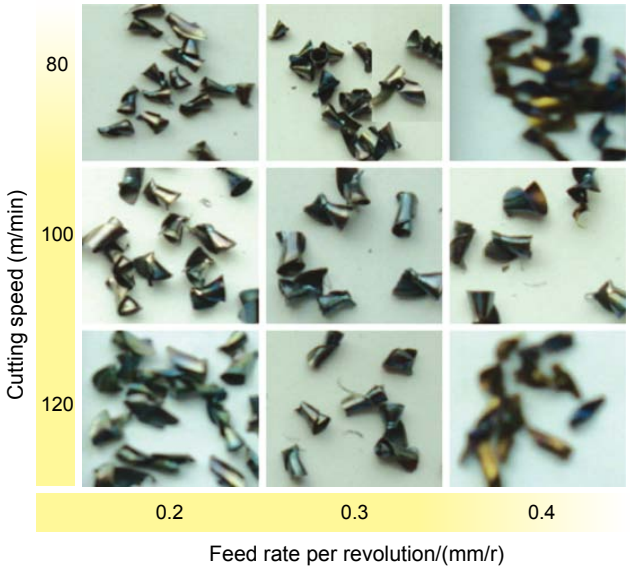
1588SL seriesdeep hole twist drills

Outstandingly chip breaking capability





Work piece: crank shaft
Work piece material: 40Cr
Machining area: inclined oil hole
Tool type: 1588SL20C-0690/KDG303
Cutting parameters: V_c =80~120m/min
f_r=0.2~0.4mm/r
Cooling system: Water soluble liquid
Drilling depth: 105mm



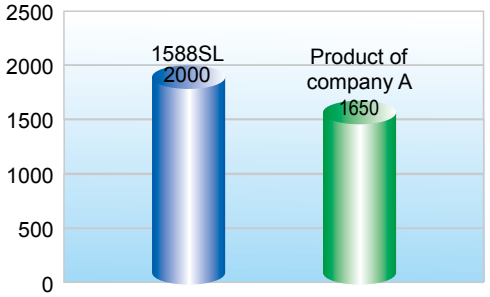
Good chip breaking capability and stable machining with different cutting speed and feed rate.

Extremely high efficiency and long tool life



Work piece: cylinder
Work material: HT300
Machined area: crank shaft joint surface drilling
Drilling depth: 30mm
Tool type: 1588SL12C-0850/KDG303
Recommend parameters: Vc=80m/min f_r=0.2mm/r
Cooling system: water-soluble liquid

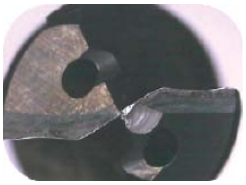
Comparison of tool life(number of machined holes)



Comparison of tool life(tool wear)



1588SL(regular wear)



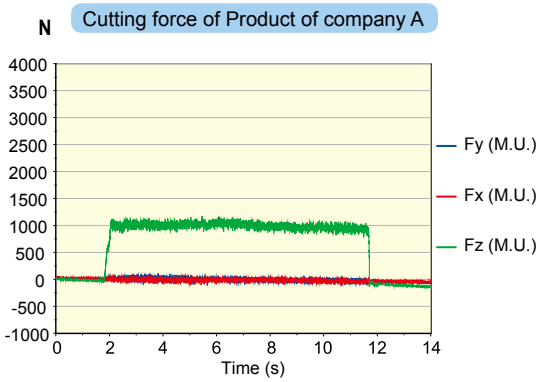
Product of company A(falling)



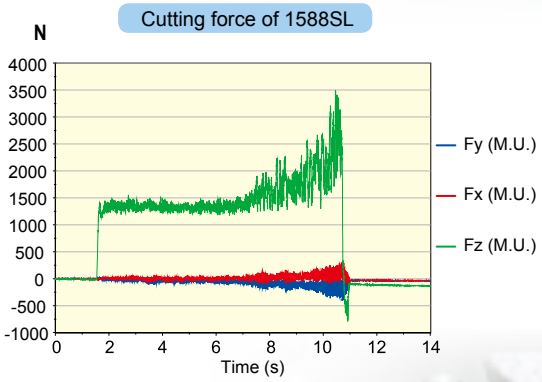
Good cutting performance

Tool type: 1588SL12C-0850/KDG303
Feed rate: 0.2mm/r Drilling depth: 72mm
Work material: 42CrMo(HB250)
Cooling system: Emulsified liquid
Cutting speed: 80m/min
Machine equipment: Vertical machining center

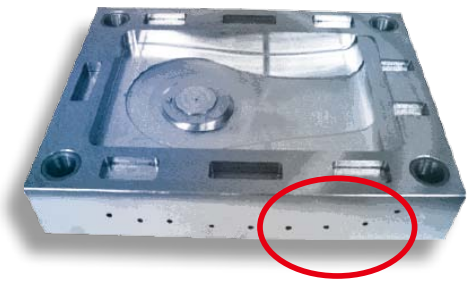
Cutting force of Product of company A



Cutting force of 1588SL

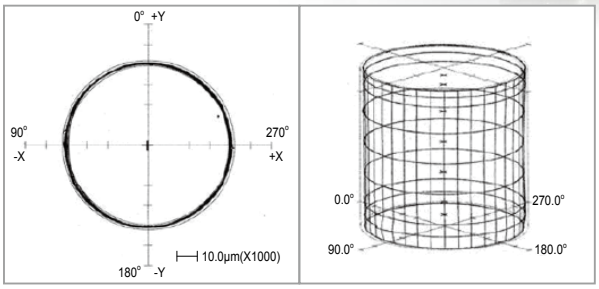


Stable machining precision

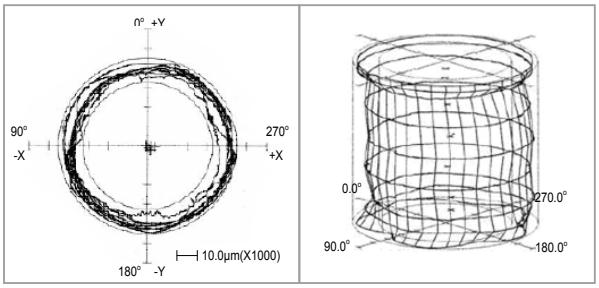


Workpiece: Die
Machined materials: 738H
Machined area: Hole of sidewall
Drilling depth: 70mm
Tool type: 1588SL12C-0600/KDG303
Recommended parameters: Vc=85m/min, f_r=0.2mm/r
Cooling system: Water-soluble liquid

Comparison of Machined Hole's Accuracy



1588SL

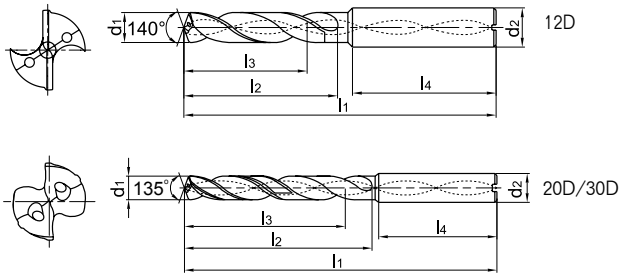


Product of company A

SL series Deep-hole machining



Internal coolant　　Straight shank



● Suitable for deep-hole drilling of steel，cast iron etc.

Drill diameter d_1 12D(m_7) 20D/30D(h_7)	Drilling depth (l/d)	Type	Basic dimension(mm)				
			Shank diameter	Overall length	Flute length	Recommended drilling depth	Shank length
			$d_2(h_5)$	l_1	l_2	l_3	l_4
3.0	12	1588SL12C-0300	6	90	50	40	36
	20	1588SL20C-0300	6	110	70	62	36
	30	1588SL30C-0300	6	140	100	92	36
3.1	12	1588SL12C-0310	6	90	50	40	36
	20	1588SL20C-0310	6	123	83	72	36
	30	1588SL30C-0310	6	160	120	108	36
3.2	12	1588SL12C-0320	6	90	50	40	36
	20	1588SL20C-0320	6	123	83	72	36
	30	1588SL30C-0320	6	160	120	108	36
3.3	12	1588SL12C-0330	6	90	50	40	36
	20	1588SL20C-0330	6	123	83	72	36
	30	1588SL30C-0330	6	160	120	108	36
3.4	12	1588SL12C-0340	6	90	50	40	36
	20	1588SL20C-0340	6	123	83	72	36
	30	1588SL30C-0340	6	160	120	108	36
3.5	12	1588SL12C-0350	6	90	50	40	36
	20	1588SL20C-0350	6	123	83	72	36
	30	1588SL30C-0350	6	160	120	108	36
3.6	12	1588SL12C-0360	6	90	50	40	36
	20	1588SL20C-0360	6	136	96	84	36
	30	1588SL30C-0360	6	176	136	124	36
3.7	12	1588SL12C-0370	6	90	50	46	36
	20	1588SL20C-0370	6	136	96	84	36
	30	1588SL30C-0370	6	176	136	124	36
3.8	12	1588SL12C-0380	6	90	50	46	36
	20	1588SL20C-0380	6	136	96	84	36
	30	1588SL30C-0380	6	176	136	124	36
3.9	12	1588SL12C-0390	6	90	50	46	36
	20	1588SL20C-0390	6	136	96	84	36
	30	1588SL30C-0390	6	176	136	124	36
4.0	12	1588SL12C-0400	6	102	64	56	36
	20	1588SL20C-0400	6	136	96	84	36
	30	1588SL30C-0400	6	176	136	124	36
4.1	12	1588SL12C-0410	6	102	64	56	36
	20	1588SL20C-0410	6	148	108	96	36
	30	1588SL30C-0410	6	192	152	140	36

Drill diameter d_1 12D(m_7) 20D/30D(h_7)	Drilling depth (l/d)	Type	Basic dimension(mm)				
			Shank diameter	Overall length	Flute length	Recommended drilling depth	Shank length
			$d_2(h_5)$	l_1	l_2	l_3	l_4
4.2	12	1588SL12C-0420	6	102	64	56	36
	20	1588SL20C-0420	6	148	108	96	36
	30	1588SL30C-0420	6	192	152	140	36
4.3	12	1588SL12C-0430	6	102	64	56	36
	20	1588SL20C-0430	6	148	108	96	36
	30	1588SL30C-0430	6	192	152	140	36
4.4	12	1588SL12C-0440	6	102	64	56	36
	20	1588SL20C-0440	6	148	108	96	36
	30	1588SL30C-0440	6	192	152	140	36
4.5	12	1588SL12C-0450	6	102	64	56	36
	20	1588SL20C-0450	6	148	108	96	36
	30	1588SL30C-0450	6	192	152	140	36
4.6	12	1588SL12C-0460	6	102	64	56	36
	20	1588SL20C-0460	6	158	118	106	36
	30	1588SL30C-0460	6	208	168	156	36
4.7	12	1588SL12C-0470	6	102	64	56	36
	20	1588SL20C-0470	6	158	118	106	36
	30	1588SL30C-0470	6	208	168	156	36
4.8	12	1588SL12C-0480	6	102	64	56	36
	20	1588SL20C-0480	6	158	118	106	36
	30	1588SL30C-0480	6	208	168	156	36
4.9	12	1588SL12C-0490	6	102	64	56	36
	20	1588SL20C-0490	6	158	118	106	36
	30	1588SL30C-0490	6	208	168	156	36
5.0	12	1588SL12C-0500	6	116	78	72	36
	20	1588SL20C-0500	6	158	118	106	36
	30	1588SL30C-0500	6	208	168	156	36
5.1	12	1588SL12C-0510	6	116	78	72	36
	20	1588SL20C-0510	6	168	128	116	36
	30	1588SL30C-0510	6	228	188	170	36
5.2	12	1588SL12C-0520	6	116	78	72	36
	20	1588SL20C-0520	6	168	128	116	36
	30	1588SL30C-0520	6	228	188	170	36
5.3	12	1588SL12C-0530	6	116	78	72	36
	20	1588SL20C-0530	6	168	128	116	36
	30	1588SL30C-0530	6	228	188	170	36

Drill diameter d_1 12D(m_7) 20D/30D(h_7)	Drilling depth (l/d)	Type	Basic dimension(mm)				
			Shank diameter	Overall length	Flute length	Recommended drilling depth	Shank length
			$d_2(h_5)$	l_1	l_2	l_3	l_4
5.4	12	**1588SL12C-0540**	6	116	78	72	36
	20	**1588SL20C-0540**	6	168	128	116	36
	30	**1588SL30C-0540**	6	228	188	170	36
5.5	12	**1588SL12C-0550**	6	116	78	72	36
	20	**1588SL20C-0550**	6	168	128	116	36
	30	**1588SL30C-0550**	6	228	188	170	36
5.6	12	**1588SL12C-0560**	6	116	78	72	36
	20	**1588SL20C-0560**	6	180	140	126	36
	30	**1588SL30C-0560**	6	240	200	182	36
5.7	12	**1588SL12C-0570**	6	116	78	72	36
	20	**1588SL20C-0570**	6	180	140	126	36
	30	**1588SL30C-0570**	6	240	200	182	36
5.8	12	**1588SL12C-0580**	6	116	78	72	36
	20	**1588SL20C-0580**	6	180	140	126	36
	30	**1588SL30C-0580**	6	240	200	182	36
5.9	12	**1588SL12C-0590**	6	116	78	72	36
	20	**1588SL20C-0590**	6	180	140	126	36
	30	**1588SL30C-0590**	6	240	200	182	36
6.0	12	**1588SL12C-0600**	6	116	78	72	36
	20	**1588SL20C-0600**	6	180	140	126	36
	30	**1588SL30C-0600**	6	240	200	182	36
6.1	12	**1588SL12C-0610**	8	131	93	84	36
	20	**1588SL20C-0610**	8	192	150	132	36
	30	**1588SL30C-0610**	8	260	220	202	36
6.2	12	**1588SL12C-0620**	8	131	93	84	36
	20	**1588SL20C-0620**	8	192	150	132	36
	30	**1588SL30C-0620**	8	260	220	202	36
6.3	12	**1588SL12C-0630**	8	131	93	84	36
	20	**1588SL20C-0630**	8	192	150	132	36
	30	**1588SL30C-0630**	8	260	220	202	36
6.4	12	**1588SL12C-0640**	8	131	93	84	36
	20	**1588SL20C-0640**	8	192	150	132	36
	30	**1588SL30C-0640**	8	260	220	202	36
6.5	12	**1588SL12C-0650**	8	131	93	84	36
	20	**1588SL20C-0650**	8	192	150	132	36
	30	**1588SL30C-0650**	8	260	220	202	36

Drill diameter d_1 12D(m_7) 20D/30D(h_7)	Drilling depth (l/d)	Type	Basic dimension(mm)				
			Shank diameter	Overall length	Flute length	Recommended drilling depth	Shank length
			$d_2(h_5)$	l_1	l_2	l_3	l_4
6.6	12	**1588SL12C-0660**	8	131	93	84	36
	20	**1588SL20C-0660**	8	202	162	144	36
	30	**1588SL30C-0660**	8	272	232	214	36
6.7	12	**1588SL12C-0670**	8	131	93	84	36
	20	**1588SL20C-0670**	8	202	162	144	36
	30	**1588SL30C-0670**	8	272	232	214	36
6.8	12	**1588SL12C-0680**	8	131	93	84	36
	20	**1588SL20C-0680**	8	202	162	144	36
	30	**1588SL30C-0680**	8	272	232	214	36
6.9	12	**1588SL12C-0690**	8	131	93	84	36
	20	**1588SL20C-0690**	8	202	162	144	36
	30	**1588SL30C-0690**	8	272	232	214	36
7.0	12	**1588SL12C-0700**	8	131	93	84	36
	20	**1588SL20C-0700**	8	202	162	144	36
	30	**1588SL30C-0700**	8	272	232	214	36
7.1	12	**1588SL12C-0710**	8	146	108	96	36
	20	**1588SL20C-0710**	8	213	173	155	36
	30	**1588SL30C-0710**	8	290	250	232	36
7.2	12	**1588SL12C-0720**	8	146	108	96	36
	20	**1588SL20C-0720**	8	213	173	155	36
	30	**1588SL30C-0720**	8	290	250	232	36
7.3	12	**1588SL12C-0730**	8	146	108	96	36
	20	**1588SL20C-0730**	8	213	173	155	36
	30	**1588SL30C-0730**	8	290	250	232	36
7.4	12	**1588SL12C-0740**	8	146	108	96	36
	20	**1588SL20C-0740**	8	213	173	155	36
	30	**1588SL30C-0740**	8	290	250	232	36
7.5	12	**1588SL12C-0750**	8	146	108	96	36
	20	**1588SL20C-0750**	8	213	173	155	36
	30	**1588SL30C-0750**	8	290	250	232	36
7.6	12	**1588SL12C-0760**	8	146	108	96	36
	20	**1588SL20C-0760**	8	223	183	165	36
	30	**1588SL30C-0760**	8	305	265	246	36
7.7	12	**1588SL12C-0770**	8	146	108	96	36
	20	**1588SL20C-0770**	8	223	183	165	36
	30	**1588SL30C-0770**	8	305	265	246	36

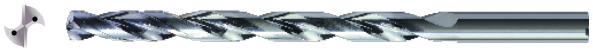
Applicable material table

◎Very suitable ○Suitable

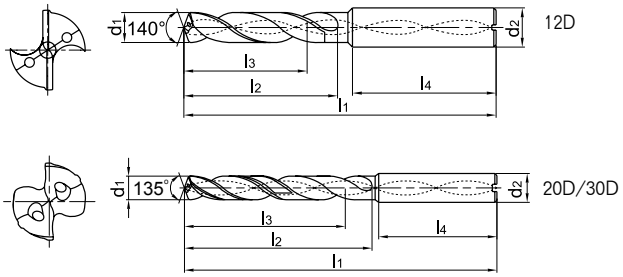
Grade	Workpiece material										
	Mild steel HB≤180	Carbon steel, Alloy steel	Pre-hardened steel, Hardened steel			Stainless steel	Cast iron	Nodular cast iron	Aluminum alloy	Copper alloy	Heat resistant alloy
			~40HRC	~50HRC	~60HRC						
KDG303	○	◎	◎			○	◎	◎	○		○

Code key C6
Cutting parameters C77
Cutting parameters C80–C86

SL series Deep-hole machining



Internal coolant　　Straight shank



● Suitable for deep-hole drilling of steel，cast iron etc.

Drill diameter d_1 12D(m_7) 20D/30D(h_7)	Drilling depth (l/d)	Type	Basic dimension(mm)				
			Shank diameter	Overall length	Flute length	Recommended drilling depth	Shank length
			$d_2(h_5)$	l_1	l_2	l_3	l_4
7.8	12	1588SL12C-0780	8	146	108	96	36
	20	1588SL20C-0780	8	223	183	165	36
	30	1588SL30C-0780	8	305	265	246	36
7.9	12	1588SL12C-0790	8	146	108	96	36
	20	1588SL20C-0790	8	223	183	165	36
	30	1588SL30C-0790	8	305	265	246	36
8.0	12	1588SL12C-0800	8	146	108	96	36
	20	1588SL20C-0800	8	223	183	165	36
	30	1588SL30C-0800	8	305	265	246	36
8.1	12	1588SL12C-0810	10	162	120	108	40
	20	1588SL20C-0810	10	239	195	176	40
	30	1588SL30C-0810	10	330	285	265	40
8.2	12	1588SL12C-0820	10	162	120	108	40
	20	1588SL20C-0820	10	239	195	176	40
	30	1588SL30C-0820	10	330	285	265	40
8.3	12	1588SL12C-0830	10	162	120	108	40
	20	1588SL20C-0830	10	239	195	176	40
	30	1588SL30C-0830	10	330	285	265	40
8.4	12	1588SL12C-0840	10	162	120	108	40
	20	1588SL20C-0840	10	239	195	176	40
	30	1588SL30C-0840	10	330	285	265	40
8.5	12	1588SL12C-0850	10	162	120	108	40
	20	1588SL20C-0850	10	239	195	176	40
	30	1588SL30C-0850	10	330	285	265	40
8.6	12	1588SL12C-0860	10	162	120	108	40
	20	1588SL20C-0860	10	249	205	186	40
	30	1588SL30C-0860	10	340	295	275	40
8.7	12	1588SL12C-0870	10	162	120	108	40
	20	1588SL20C-0870	10	249	205	186	40
	30	1588SL30C-0870	10	340	295	275	40
8.8	12	1588SL12C-0880	10	162	120	108	40
	20	1588SL20C-0880	10	249	205	186	40
	30	1588SL30C-0880	10	340	295	275	40
8.9	12	1588SL12C-0890	10	162	120	108	40
	20	1588SL20C-0890	10	249	205	186	40
	30	1588SL30C-0890	10	340	295	275	40

Drill diameter d_1 12D(m_7) 20D/30D(h_7)	Drilling depth (l/d)	Type	Basic dimension(mm)				
			Shank diameter	Overall length	Flute length	Recommended drilling depth	Shank length
			$d_2(h_5)$	l_1	l_2	l_3	l_4
9.0	12	1588SL12C-0900	10	162	120	108	40
	20	1588SL20C-0900	10	249	205	186	40
	30	1588SL30C-0900	10	340	295	275	40
9.1	12	1588SL12C-0910	10	174	132	120	40
	20	1588SL20C-0910	10	262	218	196	40
	30	1588SL30C-0910	10	360	315	292	40
9.2	12	1588SL12C-0920	10	174	132	120	40
	20	1588SL20C-0920	10	262	218	196	40
	30	1588SL30C-0920	10	360	315	292	40
9.3	12	1588SL12C-0930	10	174	132	120	40
	20	1588SL20C-0930	10	262	218	196	40
	30	1588SL30C-0930	10	360	315	292	40
9.4	12	1588SL12C-0940	10	174	132	120	40
	20	1588SL20C-0940	10	262	218	196	40
	30	1588SL30C-0940	10	360	315	292	40
9.5	12	1588SL12C-0950	10	174	132	120	40
	20	1588SL20C-0950	10	262	218	196	40
	30	1588SL30C-0950	10	360	315	292	40
9.6	12	1588SL12C-0960	10	174	132	120	40
	20	1588SL20C-0960	10	272	228	206	40
	30	1588SL30C-0960	10	372	328	305	40
9.7	12	1588SL12C-0970	10	174	132	120	40
	20	1588SL20C-0970	10	272	228	206	40
	30	1588SL30C-0970	10	372	328	305	40
9.8	12	1588SL12C-0980	10	174	132	120	40
	20	1588SL20C-0980	10	272	228	206	40
	30	1588SL30C-0980	10	372	328	305	40
9.9	12	1588SL12C-0990	10	174	132	120	40
	20	1588SL20C-0990	10	272	228	206	40
	30	1588SL30C-0990	10	372	328	305	40
10.0	12	1588SL12C-1000	10	174	132	120	40
	20	1588SL20C-1000	10	272	228	206	40
	30	1588SL30C-1000	10	372	328	305	40
10.1	12	1588SL12C-1010	12	204	156	144	45
	20	1588SL20C-1010	12	292	242	220	45

Drill diameter d_1 12D(m_7) 20D/30D(h_7)	Drilling depth (l/d)	Type	Basic dimension(mm)				
			Shank diameter	Overall length	Flute length	Recommended drilling depth	Shank length
			$d_2(h_5)$	l_1	l_2	l_3	l_4
10.2	12	**1588SL12C-1020**	12	204	156	144	45
	20	**1588SL20C-1020**	12	292	242	220	45
10.3	12	**1588SL12C-1030**	12	204	156	144	45
	20	**1588SL20C-1030**	12	292	242	220	45
10.4	12	**1588SL12C-1040**	12	204	156	144	45
	20	**1588SL20C-1040**	12	292	242	220	45
10.5	12	**1588SL12C-1050**	12	204	156	144	45
	20	**1588SL20C-1050**	12	292	242	220	45
10.6	12	**1588SL12C-1060**	12	204	156	144	45
	20	**1588SL20C-1060**	12	300	250	228	45
10.7	12	**1588SL12C-1070**	12	204	156	144	45
	20	**1588SL20C-1070**	12	300	250	228	45
10.8	12	**1588SL12C-1080**	12	204	156	144	45
	20	**1588SL20C-1080**	12	300	250	228	45
10.9	12	**1588SL12C-1090**	12	204	156	144	45
	20	**1588SL20C-1090**	12	300	250	228	45
11.0	12	**1588SL12C-1100**	12	204	156	144	45
	20	**1588SL20C-1100**	12	300	250	228	45
11.1	12	**1588SL12C-1110**	12	204	156	144	45
	20	**1588SL20C-1110**	12	315	265	240	45
11.2	12	**1588SL12C-1120**	12	204	156	144	45
	20	**1588SL20C-1120**	12	315	265	240	45
11.3	12	**1588SL12C-1130**	12	204	156	144	45
	20	**1588SL20C-1130**	12	315	265	240	45
11.4	12	**1588SL12C-1140**	12	204	156	144	45
	20	**1588SL20C-1140**	12	315	265	240	45
11.5	12	**1588SL12C-1150**	12	204	156	144	45
	20	**1588SL20C-1150**	12	315	265	240	45
11.6	12	**1588SL12C-1160**	12	204	156	144	45
	20	**1588SL20C-1160**	12	325	275	250	45

Drill diameter d_1 12D(m_7) 20D/30D(h_7)	Drilling depth (l/d)	Type	Basic dimension(mm)				
			Shank diameter	Overall length	Flute length	Recommended drilling depth	Shank length
			$d_2(h_5)$	l_1	l_2	l_3	l_4
11.7	12	**1588SL12C-1170**	12	204	156	144	45
	20	**1588SL20C-1170**	12	325	275	250	45
11.8	12	**1588SL12C-1180**	12	204	156	144	45
	20	**1588SL20C-1180**	12	325	275	250	45
11.9	12	**1588SL12C-1190**	12	204	156	144	45
	20	**1588SL20C-1190**	12	325	275	250	45
12.0	12	**1588SL12C-1200**	12	204	156	144	45
	20	**1588SL20C-1200**	12	325	275	250	45
12.5	12	**1588SL12C-1250**	14	230	182	168	45
	20	**1588SL20C-1250**	14	323	275	250	45
12.7	12	**1588SL12C-1270**	14	230	182	168	45
12.8	12	**1588SL12C-1280**	14	230	182	168	45
13.0	12	**1588SL12C-1300**	14	230	182	168	45
	20	**1588SL20C-1300**	14	338	290	265	45
13.5	12	**1588SL12C-1350**	14	230	182	168	45
	20	**1588SL20C-1350**	14	338	290	265	45
14.0	12	**1588SL12C-1400**	14	230	182	168	45
	20	**1588SL20C-1400**	14	367	318	290	45
14.5	12	**1588SL12C-1450**	16	260	208	194	48
15.0	12	**1588SL12C-1500**	16	260	208	194	48
15.5	12	**1588SL12C-1550**	16	260	208	194	48
16.0	12	**1588SL12C-1600**	16	260	208	194	48
16.5	12	**1588SL12C-1650**	18	286	234	218	48
17.0	12	**1588SL12C-1700**	18	286	234	218	48
17.5	12	**1588SL12C-1750**	18	286	234	218	48
18.0	12	**1588SL12C-1800**	18	286	234	218	48
18.5	12	**1588SL12C-1850**	20	310	258	240	48
19.0	12	**1588SL12C-1900**	20	310	258	240	48
19.5	12	**1588SL12C-1950**	20	310	258	240	48
20.0	12	**1588SL12C-2000**	20	310	258	240	48

Applicable material table

◎Very suitable ○Suitable

Grade	Workpiece material										
	Mild steel HB≤180	Carbon steel, Alloy steel	Pre-hardened steel, Hardened steel			Stainless steel	Cast iron	Nodular cast iron	Aluminum alloy	Copper alloy	Heat resistant alloy
			~40HRC	~50HRC	~60HRC						
KDG303	○	◎	◎			○	◎	◎	○		○

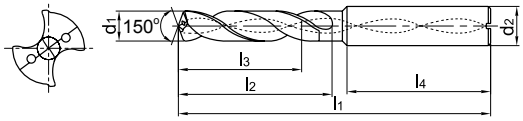
Code key C6
Cutting parameters C77
Cutting parameters C80–C86

1534SP series Guide-hole machining



Internal coolant

Straight shank



Drill diameter $d_1(h_7)$	Drilling depth (l/d)	Type	Basic dimension(mm)				
			Shank diameter	Overall length	Flute length	Recommended drilling depth	Shank length
			$d_2(h_5)$	l_1	l_2	l_3	l_4
3.03	3	**1534SP03C-0303**	6	62	20	14	36
3.13	3	**1534SP03C-0313**	6	62	20	14	36
3.23	3	**1534SP03C-0323**	6	62	20	14	36
3.33	3	**1534SP03C-0333**	6	62	20	14	36
3.43	3	**1534SP03C-0343**	6	62	20	14	36
3.53	3	**1534SP03C-0353**	6	62	20	14	36
3.63	3	**1534SP03C-0363**	6	62	20	14	36
3.73	3	**1534SP03C-0373**	6	62	20	14	36
3.83	3	**1534SP03C-0383**	6	66	24	17	36
3.93	3	**1534SP03C-0393**	6	66	24	17	36
4.03	3	**1534SP03C-0403**	6	66	24	17	36
4.13	3	**1534SP03C-0413**	6	66	24	17	36
4.23	3	**1534SP03C-0423**	6	66	24	17	36
4.33	3	**1534SP03C-0433**	6	66	24	17	36
4.43	3	**1534SP03C-0443**	6	66	24	17	36
4.53	3	**1534SP03C-0453**	6	66	24	17	36
4.63	3	**1534SP03C-0463**	6	66	24	17	36
4.73	3	**1534SP03C-0473**	6	66	24	17	36
4.83	3	**1534SP03C-0483**	6	66	28	20	36
4.93	3	**1534SP03C-0493**	6	66	28	20	36
5.03	3	**1534SP03C-0503**	6	66	28	20	36
5.13	3	**1534SP03C-0513**	6	66	28	20	36
5.23	3	**1534SP03C-0523**	6	66	28	20	36
5.33	3	**1534SP03C-0533**	6	66	28	20	36
5.43	3	**1534SP03C-0543**	6	66	28	20	36
5.53	3	**1534SP03C-0553**	6	66	28	20	36
5.63	3	**1534SP03C-0563**	6	66	28	20	36
5.73	3	**1534SP03C-0573**	6	66	28	20	36
5.83	3	**1534SP03C-0583**	6	66	28	20	36
5.93	3	**1534SP03C-0593**	6	66	28	20	36
6.03	3	**1534SP03C-0603**	6	66	28	20	36
6.13	3	**1534SP03C-0613**	8	79	34	24	36
6.23	3	**1534SP03C-0623**	8	79	34	24	36
6.33	3	**1534SP03C-0633**	8	79	34	24	36
6.43	3	**1534SP03C-0643**	8	79	34	24	36
6.53	3	**1534SP03C-0653**	8	79	34	24	36

Drill diameter $d_1(h_7)$	Drilling depth (l/d)	Type	Basic dimension(mm)				
			Shank diameter	Overall length	Flute length	Recommended drilling depth	Shank length
			$d_2(h_5)$	l_1	l_2	l_3	l_4
6.63	3	**1534SP03C-0663**	8	79	34	24	36
6.73	3	**1534SP03C-0673**	8	79	34	24	36
6.83	3	**1534SP03C-0683**	8	79	34	24	36
6.93	3	**1534SP03C-0693**	8	79	34	24	36
7.03	3	**1534SP03C-0703**	8	79	34	24	36
7.13	3	**1534SP03C-0713**	8	79	41	29	36
7.23	3	**1534SP03C-0723**	8	79	41	29	36
7.33	3	**1534SP03C-0733**	8	79	41	29	36
7.43	3	**1534SP03C-0743**	8	79	41	29	36
7.53	3	**1534SP03C-0753**	8	79	41	29	36
7.63	3	**1534SP03C-0763**	8	79	41	29	36
7.73	3	**1534SP03C-0773**	8	79	41	29	36
7.83	3	**1534SP03C-0783**	8	79	41	29	36
7.93	3	**1534SP03C-0793**	8	79	41	29	36
8.03	3	**1534SP03C-0803**	8	79	41	29	36
8.13	3	**1534SP03C-0813**	10	89	47	35	40
8.23	3	**1534SP03C-0823**	10	89	47	35	40
8.33	3	**1534SP03C-0833**	10	89	47	35	40
8.43	3	**1534SP03C-0843**	10	89	47	35	40
8.53	3	**1534SP03C-0853**	10	89	47	35	40
8.63	3	**1534SP03C-0863**	10	89	47	35	40
8.73	3	**1534SP03C-0873**	10	89	47	35	40
8.83	3	**1534SP03C-0883**	10	89	47	35	40
8.93	3	**1534SP03C-0893**	10	89	47	35	40
9.03	3	**1534SP03C-0903**	10	89	47	35	40
9.13	3	**1534SP03C-0913**	10	89	47	35	40
9.23	3	**1534SP03C-0923**	10	89	47	35	40
9.33	3	**1534SP03C-0933**	10	89	47	35	40
9.43	3	**1534SP03C-0943**	10	89	47	35	40
9.53	3	**1534SP03C-0953**	10	89	47	35	40
9.63	3	**1534SP03C-0963**	10	89	47	35	40
9.73	3	**1534SP03C-0973**	10	89	47	35	40
9.83	3	**1534SP03C-0983**	10	89	47	35	40
9.93	3	**1534SP03C-0993**	10	89	47	35	40
10.03	3	**1534SP03C-1003**	10	89	47	35	40
10.13	3	**1534SP03C-1013**	12	102	55	40	45

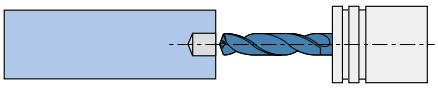
Drill diameter $d_1(h_7)$	Drilling depth (l/d)	Type	Basic dimension(mm)				
			Shank diameter	Overall length	Flute length	Recommended drilling depth	Shank length
			$d_2(h_5)$	l_1	l_2	l_3	l_4
10.23	3	**1534SP03C-1023**	12	102	55	40	45
10.33	3	**1534SP03C-1033**	12	102	55	40	45
10.43	3	**1534SP03C-1043**	12	102	55	40	45
10.53	3	**1534SP03C-1053**	12	102	55	40	45
10.63	3	**1534SP03C-1063**	12	102	55	40	45
10.73	3	**1534SP03C-1073**	12	102	55	40	45
10.83	3	**1534SP03C-1083**	12	102	55	40	45
10.93	3	**1534SP03C-1093**	12	102	55	40	45
11.03	3	**1534SP03C-1103**	12	102	55	40	45
11.13	3	**1534SP03C-1113**	12	102	55	40	45
11.23	3	**1534SP03C-1123**	12	102	55	40	45
11.33	3	**1534SP03C-1133**	12	102	55	40	45
11.43	3	**1534SP03C-1143**	12	102	55	40	45

Drill diameter $d_1(h_7)$	Drilling depth (l/d)	Type	Basic dimension(mm)				
			Shank diameter	Overall length	Flute length	Recommended drilling depth	Shank length
			$d_2(h_5)$	l_1	l_2	l_3	l_4
11.53	3	**1534SP03C-1153**	12	102	55	40	45
11.63	3	**1534SP03C-1163**	12	102	55	40	45
11.73	3	**1534SP03C-1173**	12	102	55	40	45
11.83	3	**1534SP03C-1183**	12	102	55	40	45
11.93	3	**1534SP03C-1193**	12	102	55	40	45
12.03	3	**1534SP03C-1203**	12	102	55	40	45
12.53	3	**1534SP03C-1253**	14	107	60	43	45
12.73	3	**1534SP03C-1273**	14	107	60	43	45
12.83	3	**1534SP03C-1283**	14	107	60	43	45
13.03	3	**1534SP03C-1303**	14	107	60	43	45
13.53	3	**1534SP03C-1353**	14	107	60	43	45
14.03	3	**1534SP03C-1403**	14	107	60	43	45

◆Cutting condition of SP series hole-guide drill please reference 1534SU03C Series.

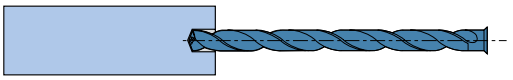
Recommended Machining Method of SL series Deep-hole Drills

1.Hole-guided Machining



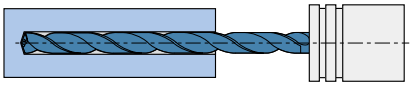
◆Apex angle of drills used for hole-guided machining has to be greater than the apex angle of deep-hole drills.
◆Diameter of drills used for hole-guided machining has to be respectively greater than the diameter of deep-hole drills. Generally the diameter range of deep-hole drills is between 0 and positive 0.1.
◆Generally the depth of pre-drilling hole is 1-3D (D is the diameter of pre-drilling holes). Also, it basically needs to ensure the accuracy of pre-drilling holes at the same time.

2.Deep-hole Machining (Inserting into the Pre-drilling Holes)



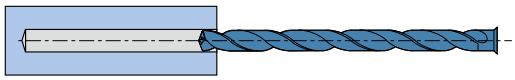
◆lower speed should be applied in the process of inserting deep-hole drills into the pre-drilling holes.
◆Insert deep hole drill to the location 1-3mm away from the bottom of pre-drilling holes (Please make sure that the parts of drilling point are entirely inserted).

3.Deep-hole Machining (Beginning machining, to the end)



◆Non-stopped machining with fixed speed and feed rates. (Completed at one time, not a “Step-by-Step” machining).

4.Deep-hole Machining (Retract from hole)



◆Reduce speed located 1-2mm away from hole bottom at the end of machining.
◆Quickly secedes the deep-hole drills back to the location where it begins to machine.
◆Retract under the same conditions of inserting pre-drilling holes.

Applicable material table

◎Very suitable ○Suitable

Grade	Workpiece material										
	Mild steel HB≤180	Carbon steel, Alloy steel	Pre-hardened steel, Hardened steel			Stainless steel	Cast iron	Nodular cast iron	Aluminum alloy	Copper alloy	Heat resistant alloy
			~40HRC	~50HRC	~60HRC						
KDG303	○	◎	◎			○	◎	◎	○		○

ST machining of soft steel and stainless steel series twist drill



ST series drills with superior performance will solve the difficulties in machining of high-elongation materials such as soft steel, stainless steel, etc.

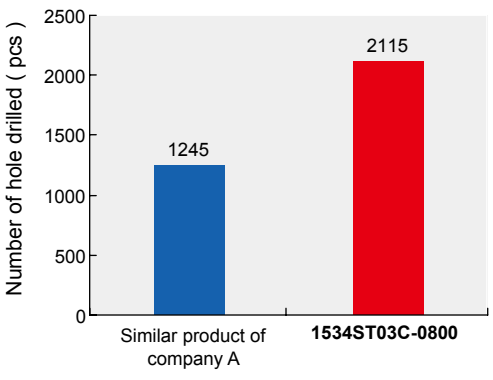
Optimized drill point design with strengthened chisel edge and ensures easy and fast cutting and excellent chip breaking.

Nano-structured TiAlN coating, outstanding wear resistance and heat resistance.

Special chipbreaker with large chip pocket ensures good chip evacuation and smooth drilling.

Application of st series twist drills

Tool type: 1534ST03C-0800
Workpiece material: 1Cr18Ni9Ti
Cooling system: oil water emulsion(internal cooling)
Cutting speed: V_c=85m/min
Feed rate: f_r=0.16mm/r
Drilling depth: 24mm(blind hole)

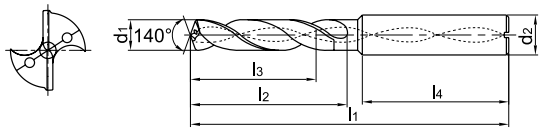




ST series for machining of soft steel, stainless steel

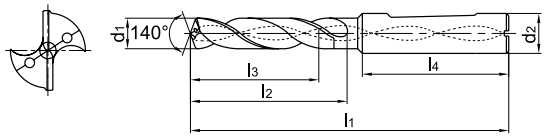

Internal coolant

Straight shank




Internal coolant

Whistle notch shank



- First choice for drilling soft steel and stainless steel.
- Sharp cutting edge can avoid build--up edge, suitable for drilling hole with high performance.

Drill diameter $d_1(m_7)$	Drilling depth (l/d)	Cooling mode	Shank type	Type	Basic dimension(mm)					Recommended grade
					Shank diameter	Overall length	Flute length	Recommended drilling depth	Shank length	
					$d_2(h_6)$	l_1	l_2	l_3	l_4	KDG303
3.0	3	Internal coolant	Straight shank	**1534ST03C-0300**	6	62	20	14	36	☆
	5			**1536ST05C-0300**	6	66	28	23	36	☆
	5		Whistle notch shank	**1736ST05C-0300**	6	66	28	23	36	☆
3.1	3		Straight shank	**1534ST03C-0310**	6	62	20	14	36	☆
	5			**1536ST05C-0310**	6	66	28	23	36	☆
	5		Whistle notch shank	**1736ST05C-0310**	6	66	28	23	36	☆
3.2	3		Straight shank	**1534ST03C-0320**	6	62	20	14	36	☆
	5			**1536ST05C-0320**	6	66	28	23	36	☆
	5		Whistle notch shank	**1736ST05C-0320**	6	66	28	23	36	☆
3.25	3		Straight shank	**1534ST03C-0325**	6	62	20	14	36	☆
	5			**1536ST05C-0325**	6	66	28	23	36	☆
	5		Whistle notch shank	**1736ST05C-0325**	6	66	28	23	36	☆
3.3	3		Straight shank	**1534ST03C-0330**	6	62	20	14	36	☆
	5			**1536ST05C-0330**	6	66	28	23	36	☆
	5		Whistle notch shank	**1736ST05C-0330**	6	66	28	23	36	☆
3.4	3		Straight shank	**1534ST03C-0340**	6	62	20	14	36	☆
	5			**1536ST05C-0340**	6	66	28	23	36	☆
	5		Whistle notch shank	**1736ST05C-0340**	6	66	28	23	36	☆
3.5	3		Straight shank	**1534ST03C-0350**	6	62	20	14	36	☆
	5			**1536ST05C-0350**	6	66	28	23	36	☆
	5		Whistle notch shank	**1736ST05C-0350**	6	66	28	23	36	☆

☆Recommended grade (produce according to order)

Applicable material table

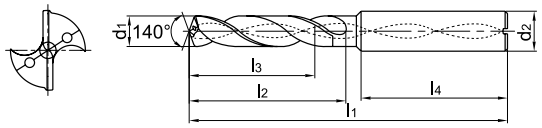
◎Very suitable ○Suitable

Grade	Workpiece material										
	Mild steel HB≤180	Carbon steel, Alloy steel	Pre-hardened steel, Hardened steel			Stainless steel	Cast iron	Nodular cast iron	Aluminum alloy	Copper alloy	Heat resistant alloy
			~40HRC	~50HRC	~60HRC						
KDG303	◎	○				◎					○

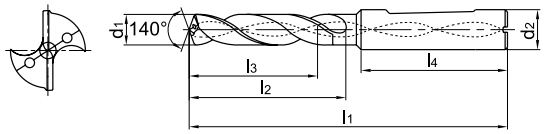
Code key C6
Cutting parameters C78
Cutting parameters C80–C86

ST series for machining of soft steel, stainless steel


Internal coolant Straight shank




Internal coolant Whistle notch shank



- First choice for drilling soft steel and stainless steel.
- Sharp cutting edge can avoid build--up edge, suitable for drilling hole with high performance.

Drill diameter $d_1(m_7)$	Drilling depth (l/d)	Cooling mode	Shank type	Type	Basic dimension(mm)					Recommended grade
					Shank diameter	Overall length	Flute length	Recommended drilling depth	Shank length	
					$d_2(h_6)$	l_1	l_2	l_3	l_4	KDG303
3.6	3	Internal coolant	Straight shank	1534ST03C-0360	6	62	20	14	36	☆
	5			1536ST05C-0360	6	66	28	23	36	☆
	5		Whistle notch shank	1736ST05C-0360	6	66	28	23	36	☆
3.7	3		Straight shank	1534ST03C-0370	6	62	20	14	36	☆
	5			1536ST05C-0370	6	66	28	23	36	☆
	5		Whistle notch shank	1736ST05C-0370	6	66	28	23	36	☆
3.8	3		Straight shank	1534ST03C-0380	6	66	24	17	36	☆
	5			1536ST05C-0380	6	74	36	29	36	☆
	5		Whistle notch shank	1736ST05C-0380	6	74	36	29	36	☆
3.9	3		Straight shank	1534ST03C-0390	6	66	24	17	36	☆
	5			1536ST05C-0390	6	74	36	29	36	☆
	5		Whistle notch shank	1736ST05C-0390	6	74	36	29	36	☆
4.0	3		Straight shank	1534ST03C-0400	6	66	24	17	36	☆
	5			1536ST05C-0400	6	74	36	29	36	☆
	5		Whistle notch shank	1736ST05C-0400	6	74	36	29	36	☆
4.1	3		Straight shank	1534ST03C-0410	6	66	24	17	36	☆
	5			1536ST05C-0410	6	74	36	29	36	☆
	5		Whistle notch shank	1736ST05C-0410	6	74	36	29	36	☆
4.2	3		Straight shank	1534ST03C-0420	6	66	24	17	36	☆
	5			1536ST05C-0420	6	74	36	29	36	☆
	5		Whistle notch shank	1736ST05C-0420	6	74	36	29	36	☆
4.3	3		Straight shank	1534ST03C-0430	6	66	24	17	36	☆
	5			1536ST05C-0430	6	74	36	29	36	☆
	5		Whistle notch shank	1736ST05C-0430	6	74	36	29	36	☆
4.4	3		Straight shank	1534ST03C-0440	6	66	24	17	36	☆
	5			1536ST05C-0440	6	74	36	29	36	☆
	5		Whistle notch shank	1736ST05C-0440	6	74	36	29	36	☆
4.5	3		Straight shank	1534ST03C-0450	6	66	24	17	36	☆
	5			1536ST05C-0450	6	74	36	29	36	☆
	5		Whistle notch shank	1736ST05C-0450	6	74	36	29	36	☆

☆Recommended grade (produce according to order)

Drill diameter $d_1(m_7)$	Drilling depth (l/d)	Cooling mode	Shank type	Type	Basic dimension(mm)					Recommended grade
					Shank diameter	Overall length	Flute length	Recommended drilling depth	Shank length	
					$d_2(h_6)$	l_1	l_2	l_3	l_4	KDG303
4.6	3	Internal coolant	Straight shank	**1534ST03C-0460**	6	66	24	17	36	☆
	5			**1536ST05C-0460**	6	74	36	29	36	☆
	5		Whistle notch shank	**1736ST05C-0460**	6	74	36	29	36	☆
4.65	3		Straight shank	**1534ST03C-0465**	6	66	24	17	36	☆
	5			**1536ST05C-0465**	6	74	36	29	36	☆
	5		Whistle notch shank	**1736ST05C-0465**	6	74	36	29	36	☆
4.7	3		Straight shank	**1534ST03C-0470**	6	66	24	17	36	☆
	5			**1536ST05C-0470**	6	74	36	29	36	☆
	5		Whistle notch shank	**1736ST05C-0470**	6	74	36	29	36	☆
4.8	3		Straight shank	**1534ST03C-0480**	6	66	28	20	36	☆
	5			**1536ST05C-0480**	6	82	44	35	36	☆
	5		Whistle notch shank	**1736ST05C-0480**	6	82	44	35	36	☆
4.9	3		Straight shank	**1534ST03C-0490**	6	66	28	20	36	☆
	5			**1536ST05C-0490**	6	82	44	35	36	☆
	5		Whistle notch shank	**1736ST05C-0490**	6	82	44	35	36	☆
5.0	3		Straight shank	**1534ST03C-0500**	6	66	28	20	36	☆
	5			**1536ST05C-0500**	6	82	44	35	36	☆
	5		Whistle notch shank	**1736ST05C-0500**	6	82	44	35	36	☆
5.1	3		Straight shank	**1534ST03C-0510**	6	66	28	20	36	☆
	5			**1536ST05C-0510**	6	82	44	35	36	☆
	5		Whistle notch shank	**1736ST05C-0510**	6	82	44	35	36	☆
5.2	3		Straight shank	**1534ST03C-0520**	6	66	28	20	36	☆
	5			**1536ST05C-0520**	6	82	44	35	36	☆
	5		Whistle notch shank	**1736ST05C-0520**	6	82	44	35	36	☆
5.3	3		Straight shank	**1534ST03C-0530**	6	66	28	20	36	☆
	5			**1536ST05C-0530**	6	82	44	35	36	☆
	5		Whistle notch shank	**1736ST05C-0530**	6	82	44	35	36	☆
5.4	3		Straight shank	**1534ST03C-0540**	6	66	28	20	36	☆
	5			**1536ST05C-0540**	6	82	44	35	36	☆
	5		Whistle notch shank	**1736ST05C-0540**	6	82	44	35	36	☆
5.5	3		Straight shank	**1534ST03C-0550**	6	66	28	20	36	☆
	5			**1536ST05C-0550**	6	82	44	35	36	☆
	5		Whistle notch shank	**1736ST05C-0550**	6	82	44	35	36	☆

☆Recommended grade (produce according to order)

Applicable material table

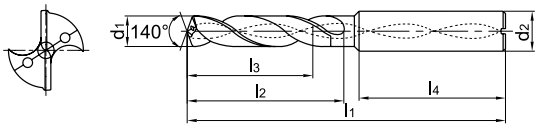
◎Very suitable ○Suitable

Grade	Workpiece material										
	Mild steel HB≤180	Carbon steel, Alloy steel	Pre-hardened steel, Hardened steel			Stainless steel	Cast iron	Nodular cast iron	Aluminum alloy	Copper alloy	Heat resistant alloy
			~40HRC	~50HRC	~60HRC						
KDG303	◎	○				◎					○

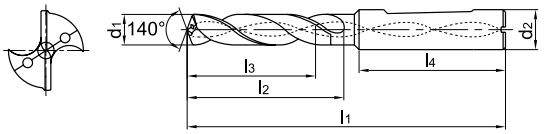
Code key C6
Cutting parameters C78
Cutting parameters C80–C86

ST series for machining of soft steel, stainless steel


Internal coolant Straight shank




Internal coolant Whistle notch shank



- First choice for drilling soft steel and stainless steel.
- Sharp cutting edge can avoid build--up edge, suitable for drilling hole with high performance.

Drill diameter $d_1(m_7)$	Drilling depth (l/d)	Cooling mode	Shank type	Type	Basic dimension(mm)					Recommended grade
					Shank diameter	Overall length	Flute length	Recommended drilling depth	Shank length	
					$d_2(h_6)$	l_1	l_2	l_3	l_4	KDG303
5.55	3	Internal coolant	Straight shank	1534ST03C-0555	6	66	28	20	36	☆
	5			1536ST05C-0555	6	82	44	35	36	☆
	5		Whistle notch shank	1736ST05C-0555	6	82	44	35	36	☆
5.6	3		Straight shank	1534ST03C-0560	6	66	28	20	36	☆
	5			1536ST05C-0560	6	82	44	35	36	☆
	5		Whistle notch shank	1736ST05C-0560	6	82	44	35	36	☆
5.7	3		Straight shank	1534ST03C-0570	6	66	28	20	36	☆
	5			1536ST05C-0570	6	82	44	35	36	☆
	5		Whistle notch shank	1736ST05C-0570	6	82	44	35	36	☆
5.8	3		Straight shank	1534ST03C-0580	6	66	28	20	36	☆
	5			1536ST05C-0580	6	82	44	35	36	☆
	5		Whistle notch shank	1736ST05C-0580	6	82	44	35	36	☆
5.9	3		Straight shank	1534ST03C-0590	6	66	28	20	36	☆
	5			1536ST05C-0590	6	82	44	35	36	☆
	5		Whistle notch shank	1736ST05C-0590	6	82	44	35	36	☆
6.0	3		Straight shank	1534ST03C-0600	6	66	28	20	36	☆
	5			1536ST05C-0600	6	82	44	35	36	☆
	5		Whistle notch shank	1736ST05C-0600	6	82	44	35	36	☆
6.1	3		Straight shank	1534ST03C-0610	8	79	34	24	36	☆
	5			1536ST05C-0610	8	91	53	43	36	☆
	5		Whistle notch shank	1736ST05C-0610	8	91	53	43	36	☆
6.2	3		Straight shank	1534ST03C-0620	8	79	34	24	36	☆
	5			1536ST05C-0620	8	91	53	43	36	☆
	5		Whistle notch shank	1736ST05C-0620	8	91	53	43	36	☆
6.3	3		Straight shank	1534ST03C-0630	8	79	34	24	36	☆
	5			1536ST05C-0630	8	91	53	43	36	☆
	5		Whistle notch shank	1736ST05C-0630	8	91	53	43	36	☆
6.4	3		Straight shank	1534ST03C-0640	8	79	34	24	36	☆
	5			1536ST05C-0640	8	91	53	43	36	☆
	5		Whistle notch shank	1736ST05C-0640	8	91	53	43	36	☆

☆Recommended grade (produce according to order)

Drill diameter $d_1(m_7)$	Drilling depth (l/d)	Cooling mode	Shank type	Type	Basic dimension(mm)					Recommended grade
					Shank diameter	Overall length	Flute length	Recommended drilling depth	Shank length	
					$d_2(h_6)$	l_1	l_2	l_3	l_4	KDG303
6.5	3	Internal coolant	Straight shank	1534ST03C-0650	8	79	34	24	36	☆
	5			1536ST05C-0650	8	91	53	43	36	☆
	5		Whistle notch shank	1736ST05C-0650	8	91	53	43	36	☆
6.6	3		Straight shank	1534ST03C-0660	8	79	34	24	36	☆
	5			1536ST05C-0660	8	91	53	43	36	☆
	5		Whistle notch shank	1736ST05C-0660	8	91	53	43	36	☆
6.7	3		Straight shank	1534ST03C-0670	8	79	34	24	36	☆
	5			1536ST05C-0670	8	91	53	43	36	☆
	5		Whistle notch shank	1736ST05C-0670	8	91	53	43	36	☆
6.75	3		Straight shank	1534ST03C-0675	8	79	34	24	36	☆
	5			1536ST05C-0675	8	91	53	43	36	☆
	5		Whistle notch shank	1736ST05C-0675	8	91	53	43	36	☆
6.9	3		Straight shank	1534ST03C-0690	8	79	34	24	36	☆
	5			1536ST05C-0690	8	91	53	43	36	☆
	5		Whistle notch shank	1736ST05C-0690	8	91	53	43	36	☆
7.0	3		Straight shank	1534ST03C-0700	8	79	34	24	36	☆
	5			1536ST05C-0700	8	91	53	43	36	☆
	5		Whistle notch shank	1736ST05C-0700	8	91	53	43	36	☆
7.1	3		Straight shank	1534ST03C-0710	8	79	41	29	36	☆
	5			1536ST05C-0710	8	91	53	43	36	☆
	5		Whistle notch shank	1736ST05C-0710	8	91	53	43	36	☆
7.2	3		Straight shank	1534ST03C-0720	8	79	41	29	36	☆
	5			1536ST05C-0720	8	91	53	43	36	☆
	5		Whistle notch shank	1736ST05C-0720	8	91	53	43	36	☆
7.3	3		Straight shank	1534ST03C-0730	8	79	41	29	36	☆
	5			1536ST05C-0730	8	91	53	43	36	☆
	5		Whistle notch shank	1736ST05C-0730	8	91	53	43	36	☆
7.4	3		Straight shank	1534ST03C-0740	8	79	41	29	36	☆
	5			1536ST05C-0740	8	91	53	43	36	☆
	5		Whistle notch shank	1736ST05C-0740	8	91	53	43	36	☆
7.5	3		Straight shank	1534ST03C-0750	8	79	41	29	36	☆
	5			1536ST05C-0750	8	91	53	43	36	☆
	5		Whistle notch shank	1736ST05C-0750	8	91	53	43	36	☆

☆Recommended grade (produce according to order)

Applicable material table

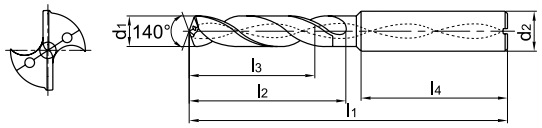
◎Very suitable ○Suitable

Grade	Workpiece material										
	Mild steel HB≤180	Carbon steel, Alloy steel	Pre-hardened steel, Hardened steel			Stainless steel	Cast iron	Nodular cast iron	Aluminum alloy	Copper alloy	Heat resistant alloy
			~40HRC	~50HRC	~60HRC						
KDG303	◎	○				◎					○

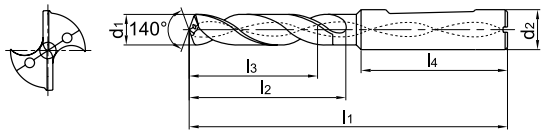
Code key C6
Cutting parameters C78
Cutting parameters C80–C86

ST series for machining of soft steel, stainless steel


Internal coolant Straight shank




Internal coolant Whistle notch shank



- First choice for drilling soft steel and stainless steel.
- Sharp cutting edge can avoid build--up edge, suitable for drilling hole with high performance.

Drill diameter $d_1(m_7)$	Drilling depth (l/d)	Cooling mode	Shank type	Type	Basic dimension(mm)					Recommended grade
					Shank diameter	Overall length	Flute length	Recommended drilling depth	Shank length	
					$d_2(h_6)$	l_1	l_2	l_3	l_4	KDG303
7.6	3	Internal coolant	Straight shank	1534ST03C-0760	8	79	41	29	36	☆
	5			1536ST05C-0760	8	91	53	43	36	☆
	5		Whistle notch shank	1736ST05C-0760	8	91	53	43	36	☆
7.7	3		Straight shank	1534ST03C-0770	8	79	41	29	36	☆
	5			1536ST05C-0770	8	91	53	43	36	☆
	5		Whistle notch shank	1736ST05C-0770	8	91	53	43	36	☆
7.8	3		Straight shank	1534ST03C-0780	8	79	41	29	36	☆
	5			1536ST05C-0780	8	91	53	43	36	☆
	5		Whistle notch shank	1736ST05C-0780	8	91	53	43	36	☆
7.9	3		Straight shank	1534ST03C-0790	8	79	41	29	36	☆
	5			1536ST05C-0790	8	91	53	43	36	☆
	5		Whistle notch shank	1736ST05C-0790	8	91	53	43	36	☆
8.0	3		Straight shank	1534ST03C-0800	8	79	41	29	36	☆
	5			1536ST05C-0800	8	91	53	43	36	☆
	5		Whistle notch shank	1736ST05C-0800	8	91	53	43	36	☆
8.1	3		Straight shank	1534ST03C-0810	10	89	47	35	40	☆
	5			1536ST05C-0810	10	103	61	49	40	☆
	5		Whistle notch shank	1736ST05C-0810	10	103	61	49	40	☆
8.2	3		Straight shank	1534ST03C-0820	10	89	47	35	40	☆
	5			1536ST05C-0820	10	103	61	49	40	☆
	5		Whistle notch shank	1736ST05C-0820	10	103	61	49	40	☆
8.3	3		Straight shank	1534ST03C-0830	10	89	47	35	40	☆
	5			1536ST05C-0830	10	103	61	49	40	☆
	5		Whistle notch shank	1736ST05C-0830	10	103	61	49	40	☆
8.4	3		Straight shank	1534ST03C-0840	10	89	47	35	40	☆
	5			1536ST05C-0840	10	103	61	49	40	☆
	5		Whistle notch shank	1736ST05C-0840	10	103	61	49	40	☆
8.5	3		Straight shank	1534ST03C-0850	10	89	47	35	40	☆
	5			1536ST05C-0850	10	103	61	49	40	☆
	5		Whistle notch shank	1736ST05C-0850	10	103	61	49	40	☆

☆Recommended grade (produce according to order)

Drill diameter $d_1(m_7)$	Drilling depth (l/d)	Cooling mode	Shank type	Type	Basic dimension(mm)					Recommended grade
					Shank diameter	Overall length	Flute length	Recommended drilling depth	Shank length	
					$d_2(h_6)$	l_1	l_2	l_3	l_4	KDG303
8.6	3	Internal coolant	Straight shank	1534ST03C-0860	10	89	47	35	40	☆
	5			1536ST05C-0860	10	103	61	49	40	☆
	5		Whistle notch shank	1736ST05C-0860	10	103	61	49	40	☆
8.7	3		Straight shank	1534ST03C-0870	10	89	47	35	40	☆
	5			1536ST05C-0870	10	103	61	49	40	☆
	5		Whistle notch shank	1736ST05C-0870	10	103	61	49	40	☆
8.8	3		Straight shank	1534ST03C-0880	10	89	47	35	40	☆
	5			1536ST05C-0880	10	103	61	49	40	☆
	5		Whistle notch shank	1736ST05C-0880	10	103	61	49	40	☆
8.9	3		Straight shank	1534ST03C-0890	10	89	47	35	40	☆
	5			1536ST05C-0890	10	103	61	49	40	☆
	5		Whistle notch shank	1736ST05C-0890	10	103	61	49	40	☆
9.0	3		Straight shank	1534ST03C-0900	10	89	47	35	40	☆
	5			1536ST05C-0900	10	103	61	49	40	☆
	5		Whistle notch shank	1736ST05C-0900	10	103	61	49	40	☆
9.1	3		Straight shank	1534ST03C-0910	10	89	47	35	40	☆
	5			1536ST05C-0910	10	103	61	49	40	☆
	5		Whistle notch shank	1736ST05C-0910	10	103	61	49	40	☆
9.3	3		Straight shank	1534ST03C-0930	10	89	47	35	40	☆
	5			1536ST05C-0930	10	103	61	49	40	☆
	5		Whistle notch shank	1736ST05C-0930	10	103	61	49	40	☆
9.4	3		Straight shank	1534ST03C-0940	10	89	47	35	40	☆
	5			1536ST05C-0940	10	103	61	49	40	☆
	5		Whistle notch shank	1736ST05C-0940	10	103	61	49	40	☆
9.5	3		Straight shank	1534ST03C-0950	10	89	47	35	40	☆
	5			1536ST05C-0950	10	103	61	49	40	☆
	5		Whistle notch shank	1736ST05C-0950	10	103	61	49	40	☆
9.6	3		Straight shank	1534ST03C-0960	10	89	47	35	40	☆
	5			1536ST05C-0960	10	103	61	49	40	☆
	5		Whistle notch shank	1736ST05C-0960	10	103	61	49	40	☆
9.7	3		Straight shank	1534ST03C-0970	10	89	47	35	40	☆
	5			1536ST05C-0970	10	103	61	49	40	☆
	5		Whistle notch shank	1736ST05C-0970	10	103	61	49	40	☆

☆Recommended grade (produce according to order)

Applicable material table

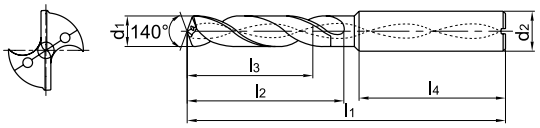
◎Very suitable ○Suitable

Grade	Workpiece material										
	Mild steel HB≤180	Carbon steel, Alloy steel	Pre-hardened steel, Hardened steel			Stainless steel	Cast iron	Nodular cast iron	Aluminum alloy	Copper alloy	Heat resistant alloy
			~40HRC	~50HRC	~60HRC						
KDG303	◎	○				◎					○

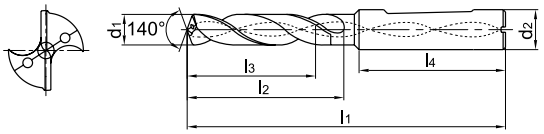
Code key C6
Cutting parameters C78
Cutting parameters C80–C86

ST series for machining of soft steel, stainless steel


Internal coolant Straight shank




Internal coolant Whistle notch shank



- First choice for drilling soft steel and stainless steel.
- Sharp cutting edge can avoid build--up edge, suitable for drilling hole with high performance.

Drill diameter $d_1(m_7)$	Drilling depth (l/d)	Cooling mode	Shank type	Type	Basic dimension(mm)					Recommended grade
					Shank diameter	Overall length	Flute length	Recommended drilling depth	Shank length	
					$d_2(h_6)$	l_1	l_2	l_3	l_4	KDG303
9.8	3	Internal coolant	Straight shank	1534ST03C-0980	10	89	47	35	40	☆
	5			1536ST05C-0980	10	103	61	49	40	☆
	5		Whistle notch shank	1736ST05C-0980	10	103	61	49	40	☆
9.9	3		Straight shank	1534ST03C-0990	10	89	47	35	40	☆
	5			1536ST05C-0990	10	103	61	49	40	☆
	5		Whistle notch shank	1736ST05C-0990	10	103	61	49	40	☆
10.0	3		Straight shank	1534ST03C-1000	10	89	47	35	40	☆
	5			1536ST05C-1000	10	103	61	49	40	☆
	5		Whistle notch shank	1736ST05C-1000	10	103	61	49	40	☆
10.1	3		Straight shank	1534ST03C-1010	12	102	55	40	45	☆
	5			1536ST05C-1010	12	118	71	56	45	☆
	5		Whistle notch shank	1736ST05C-1010	12	118	71	56	45	☆
10.25	3		Straight shank	1534ST03C-1025	12	102	55	40	45	☆
	5			1536ST05C-1025	12	118	71	56	45	☆
	5		Whistle notch shank	1736ST05C-1025	12	118	71	56	45	☆
10.3	3		Straight shank	1534ST03C-1030	12	102	55	40	45	☆
	5			1536ST05C-1030	12	118	71	56	45	☆
	5		Whistle notch shank	1736ST05C-1030	12	118	71	56	45	☆
10.4	3		Straight shank	1534ST03C-1040	12	102	55	40	45	☆
	5			1536ST05C-1040	12	118	71	56	45	☆
	5		Whistle notch shank	1736ST05C-1040	12	118	71	56	45	☆
10.5	3		Straight shank	1534ST03C-1050	12	102	55	40	45	☆
	5			1536ST05C-1050	12	118	71	56	45	☆
	5		Whistle notch shank	1736ST05C-1050	12	118	71	56	45	☆
10.6	3		Straight shank	1534ST03C-1060	12	102	55	40	45	☆
	5			1536ST05C-1060	12	118	71	56	45	☆
	5		Whistle notch shank	1736ST05C-1060	12	118	71	56	45	☆
10.7	3		Straight shank	1534ST03C-1070	12	102	55	40	45	☆
	5			1536ST05C-1070	12	118	71	56	45	☆
	5		Whistle notch shank	1736ST05C-1070	12	118	71	56	45	☆

☆Recommended grade (produce according to order)

Drill diameter $d_1(m_7)$	Drilling depth (l/d)	Cooling mode	Shank type	Type	Basic dimension(mm)					Recommended grade
					Shank diameter	Overall length	Flute length	Recommended drilling depth	Shank length	
					$d_2(h_6)$	l_1	l_2	l_3	l_4	KDG303
10.8	3	Internal coolant	Straight shank	1534ST03C-1080	12	102	55	40	45	☆
	5			1536ST05C-1080	12	118	71	56	45	☆
	5		Whistle notch shank	1736ST05C-1080	12	118	71	56	45	☆
10.9	3		Straight shank	1534ST03C-1090	12	102	55	40	45	☆
	5			1536ST05C-1090	12	118	71	56	45	☆
	5		Whistle notch shank	1736ST05C-1090	12	118	71	56	45	☆
11.0	3		Straight shank	1534ST03C-1100	12	102	55	40	45	☆
	5			1536ST05C-1100	12	118	71	56	45	☆
	5		Whistle notch shank	1736ST05C-1100	12	118	71	56	45	☆
11.1	3		Straight shank	1534ST03C-1110	12	102	55	40	45	☆
	5			1536ST05C-1110	12	118	71	56	45	☆
	5		Whistle notch shank	1736ST05C-1110	12	118	71	56	45	☆
11.2	3		Straight shank	1534ST03C-1120	12	102	55	40	45	☆
	5			1536ST05C-1120	12	118	71	56	45	☆
	5		Whistle notch shank	1736ST05C-1120	12	118	71	56	45	☆
11.3	3		Straight shank	1534ST03C-1130	12	102	55	40	45	☆
	5			1536ST05C-1130	12	118	71	56	45	☆
	5		Whistle notch shank	1736ST05C-1130	12	118	71	56	45	☆
11.4	3		Straight shank	1534ST03C-1140	12	102	55	40	45	☆
	5			1536ST05C-1140	12	118	71	56	45	☆
	5		Whistle notch shank	1736ST05C-1140	12	118	71	56	45	☆
11.5	3		Straight shank	1534ST03C-1150	12	102	55	40	45	☆
	5			1536ST05C-1150	12	118	71	56	45	☆
	5		Whistle notch shank	1736ST05C-1150	12	118	71	56	45	☆
11.6	3		Straight shank	1534ST03C-1160	12	102	55	40	45	☆
	5			1536ST05C-1160	12	118	71	56	45	☆
	5		Whistle notch shank	1736ST05C-1160	12	118	71	56	45	☆
11.7	3		Straight shank	1534ST03C-1170	12	102	55	40	45	☆
	5			1536ST05C-1170	12	118	71	56	45	☆
	5		Whistle notch shank	1736ST05C-1170	12	118	71	56	45	☆
11.8	3		Straight shank	1534ST03C-1180	12	102	55	40	45	☆
	5			1536ST05C-1180	12	118	71	56	45	☆
	5		Whistle notch shank	1736ST05C-1180	12	118	71	56	45	☆

☆Recommended grade (produce according to order)

Applicable material table

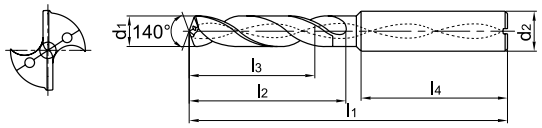
◎Very suitable ○Suitable

Grade	Workpiece material										
	Mild steel HB≤180	Carbon steel, Alloy steel	Pre-hardened steel, Hardened steel			Stainless steel	Cast iron	Nodular cast iron	Aluminum alloy	Copper alloy	Heat resistant alloy
			~40HRC	~50HRC	~60HRC						
KDG303	◎	○				◎					○

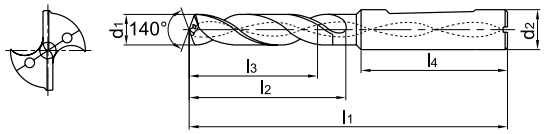
Code key C6
Cutting parameters C78
Cutting parameters C80–C86

ST series for machining of soft steel, stainless steel


Internal coolant Straight shank




Internal coolant Whistle notch shank



- First choice for drilling soft steel and stainless steel.
- Sharp cutting edge can avoid build--up edge, suitable for drilling hole with high performance.

Drill diameter $d_1(m_7)$	Drilling depth (l/d)	Cooling mode	Shank type	Type	Basic dimension(mm)					Recommended grade
					Shank diameter	Overall length	Flute length	Recommended drilling depth	Shank length	
					$d_2(h_6)$	l_1	l_2	l_3	l_4	KDG303
11.9	3	Internal coolant	Straight shank	1534ST03C-1190	12	102	55	40	45	☆
	5			1536ST05C-1190	12	118	71	56	45	☆
	5		Whistle notch shank	1736ST05C-1190	12	118	71	56	45	☆
12.0	3		Straight shank	1534ST03C-1200	12	102	55	40	45	☆
	5			1536ST05C-1200	12	118	71	56	45	☆
	5		Whistle notch shank	1736ST05C-1200	12	118	71	56	45	☆
12.25	3		Straight shank	1534ST03C-1225	14	107	60	43	45	☆
	5			1536ST05C-1225	14	124	77	60	45	☆
	5		Whistle notch shank	1736ST05C-1225	14	124	77	60	45	☆
12.3	3		Straight shank	1534ST03C-1230	14	107	60	43	45	☆
	5			1536ST05C-1230	14	124	77	60	45	☆
	5		Whistle notch shank	1736ST05C-1230	14	124	77	60	45	☆
12.5	3		Straight shank	1534ST03C-1250	14	107	60	43	45	☆
	5			1536ST05C-1250	14	124	77	60	45	☆
	5		Whistle notch shank	1736ST05C-1250	14	124	77	60	45	☆
12.7	3		Straight shank	1534ST03C-1270	14	107	60	43	45	☆
	5			1536ST05C-1270	14	124	77	60	45	☆
	5		Whistle notch shank	1736ST05C-1270	14	124	77	60	45	☆
12.75	3		Straight shank	1534ST03C-1275	14	107	60	43	45	☆
	5			1536ST05C-1275	14	124	77	60	45	☆
	5		Whistle notch shank	1736ST05C-1275	14	124	77	60	45	☆
12.8	3		Straight shank	1534ST03C-1280	14	107	60	43	45	☆
	5			1536ST05C-1280	14	124	77	60	45	☆
	5		Whistle notch shank	1736ST05C-1280	14	124	77	60	45	☆
13.0	3		Straight shank	1534ST03C-1300	14	107	60	43	45	☆
	5			1536ST05C-1300	14	124	77	60	45	☆
	5		Whistle notch shank	1736ST05C-1300	14	124	77	60	45	☆
13.1	3		Straight shank	1534ST03C-1310	14	107	60	43	45	☆
	5			1536ST05C-1310	14	124	77	60	45	☆
	5		Whistle notch shank	1736ST05C-1310	14	124	77	60	45	☆

☆Recommended grade (produce according to order)

Drill diameter $d_1(m_7)$	Drilling depth (l/d)	Cooling mode	Shank type	Type	Basic dimension(mm)					Recommended grade
					Shank diameter	Overall length	Flute length	Recommended drilling depth	Shank length	
					$d_2(h_6)$	l_1	l_2	l_3	l_4	KDG303
13.5	3	Internal coolant	Straight shank	1534ST03C-1350	14	107	60	43	45	☆
	5			1536ST05C-1350	14	124	77	60	45	☆
	5		Whistle notch shank	1736ST05C-1350	14	124	77	60	45	☆
13.8	3		Straight shank	1534ST03C-1380	14	107	60	43	45	☆
	5			1536ST05C-1380	14	124	77	60	45	☆
	5		Whistle notch shank	1736ST05C-1380	14	124	77	60	45	☆
14.0	3		Straight shank	1534ST03C-1400	14	107	60	43	45	☆
	5			1536ST05C-1400	14	124	77	60	45	☆
	5		Whistle notch shank	1736ST05C-1400	14	124	77	60	45	☆
14.25	3		Straight shank	1534ST03C-1425	16	115	65	45	48	☆
	5			1536ST05C-1425	16	133	83	63	48	☆
	5		Whistle notch shank	1736ST05C-1425	16	133	83	63	48	☆
14.3	3		Straight shank	1534ST03C-1430	16	115	65	45	48	☆
	5			1536ST05C-1430	16	133	83	63	48	☆
	5		Whistle notch shank	1736ST05C-1430	16	133	83	63	48	☆
14.5	3		Straight shank	1534ST03C-1450	16	115	65	45	48	☆
	5			1536ST05C-1450	16	133	83	63	48	☆
	5		Whistle notch shank	1736ST05C-1450	16	133	83	63	48	☆
14.75	3		Straight shank	1534ST03C-1475	16	115	65	45	48	☆
	5			1536ST05C-1475	16	133	83	63	48	☆
	5		Whistle notch shank	1736ST05C-1475	16	133	83	63	48	☆
14.8	3		Straight shank	1534ST03C-1480	16	115	65	45	48	☆
	5			1536ST05C-1480	16	133	83	63	48	☆
	5		Whistle notch shank	1736ST05C-1480	16	133	83	63	48	☆
15.0	3		Straight shank	1534ST03C-1500	16	115	65	45	48	☆
	5			1536ST05C-1500	16	133	83	63	48	☆
	5		Whistle notch shank	1736ST05C-1500	16	133	83	63	48	☆
15.1	3		Straight shank	1534ST03C-1510	16	115	65	45	48	☆
	5			1536ST05C-1510	16	133	83	63	48	☆
	5		Whistle notch shank	1736ST05C-1510	16	133	83	63	48	☆
15.5	3		Straight shank	1534ST03C-1550	16	115	65	45	48	☆
	5			1536ST05C-1550	16	133	83	63	48	☆
	5		Whistle notch shank	1736ST05C-1550	16	133	83	63	48	☆

☆Recommended grade (produce according to order)

Applicable material table

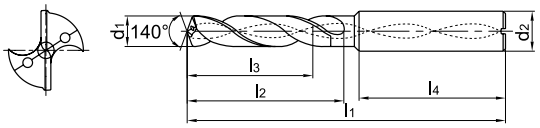
◎Very suitable ○Suitable

Grade	Workpiece material										
	Mild steel HB≤180	Carbon steel, Alloy steel	Pre-hardened steel, Hardened steel			Stainless steel	Cast iron	Nodular cast iron	Aluminum alloy	Copper alloy	Heat resistant alloy
			~40HRC	~50HRC	~60HRC						
KDG303	◎	○				◎					○

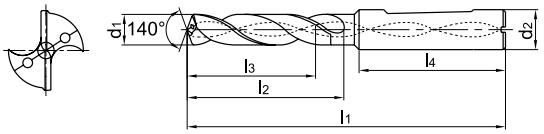
Code key C6
Cutting parameters C78
Cutting parameters C80–C86

ST series for machining of soft steel, stainless steel


Internal coolant Straight shank




Internal coolant Whistle notch shank



- First choice for drilling soft steel and stainless steel.
- Sharp cutting edge can avoid build--up edge, suitable for drilling hole with high performance.

Drill diameter $d_1(m_7)$	Drilling depth (l/d)	Cooling mode	Shank type	Type	Basic dimension(mm)					Recommended grade
					Shank diameter	Overall length	Flute length	Recommended drilling depth	Shank length	
					$d_2(h_6)$	l_1	l_2	l_3	l_4	KDG303
15.8	3	Internal coolant	Straight shank	**1534ST03C-1580**	16	115	65	45	48	☆
	5			**1536ST05C-1580**	16	133	83	63	48	☆
	5		Whistle notch shank	**1736ST05C-1580**	16	133	83	63	48	☆
16.0	3		Straight shank	**1534ST03C-1600**	16	115	65	45	48	☆
	5			**1536ST05C-1600**	16	133	83	63	48	☆
	5		Whistle notch shank	**1736ST05C-1600**	16	133	83	63	48	☆
16.5	3		Straight shank	**1534ST03C-1650**	18	123	73	51	48	☆
	5			**1536ST05C-1650**	18	143	93	71	48	☆
	5		Whistle notch shank	**1736ST05C-1650**	18	143	93	71	48	☆
16.75	3		Straight shank	**1534ST03C-1675**	18	123	73	51	48	☆
	5			**1536ST05C-1675**	18	143	93	71	48	☆
	5		Whistle notch shank	**1736ST05C-1675**	18	143	93	71	48	☆
16.8	3		Straight shank	**1534ST03C-1680**	18	123	73	51	48	☆
	5			**1536ST05C-1680**	18	143	93	71	48	☆
	5		Whistle notch shank	**1736ST05C-1680**	18	143	93	71	48	☆
17.0	3		Straight shank	**1534ST03C-1700**	18	123	73	51	48	☆
	5			**1536ST05C-1700**	18	143	93	71	48	☆
	5		Whistle notch shank	**1736ST05C-1700**	18	143	93	71	48	☆
17.5	3		Straight shank	**1534ST03C-1750**	18	123	73	51	48	☆
	5			**1536ST05C-1750**	18	143	93	71	48	☆
	5		Whistle notch shank	**1736ST05C-1750**	18	143	93	71	48	☆
17.8	3		Straight shank	**1534ST03C-1780**	18	123	73	51	48	☆
	5			**1536ST05C-1780**	18	143	93	71	48	☆
	5		Whistle notch shank	**1736ST05C-1780**	18	143	93	71	48	☆
18.0	3		Straight shank	**1534ST03C-1800**	18	123	73	51	48	☆
	5			**1536ST05C-1800**	18	143	93	71	48	☆
	5		Whistle notch shank	**1736ST05C-1800**	18	143	93	71	48	☆
18.5	3		Straight shank	**1534ST03C-1850**	20	131	79	55	50	☆
	5			**1536ST05C-1850**	20	153	101	77	50	☆
	5		Whistle notch shank	**1736ST05C-1850**	20	153	101	77	50	☆

☆Recommended grade (produce according to order)

Drill diameter $d_1(m_7)$	Drilling depth (l/d)	Cooling mode	Shank type	Type	Basic dimension(mm)					Recommended grade
					Shank diameter	Overall length	Flute length	Recommended drilling depth	Shank length	
					$d_2(h_6)$	l_1	l_2	l_3	l_4	KDG303
18.8	3	Internal coolant	Straight shank	**1534ST03C-1880**	20	131	79	55	50	☆
	5			**1536ST05C-1880**	20	153	101	77	50	☆
	5		Whistle notch shank	**1736ST05C-1880**	20	153	101	77	50	☆
19.0	3		Straight shank	**1534ST03C-1900**	20	131	79	55	50	☆
	5			**1536ST05C-1900**	20	153	101	77	50	☆
	5		Whistle notch shank	**1736ST05C-1900**	20	153	101	77	50	☆
19.5	3		Straight shank	**1534ST03C-1950**	20	131	79	55	50	☆
	5			**1536ST05C-1950**	20	153	101	77	50	☆
	5		Whistle notch shank	**1736ST05C-1950**	20	153	101	77	50	☆
19.8	3		Straight shank	**1534ST03C-1980**	20	131	79	55	50	☆
	5			**1536ST05C-1980**	20	153	101	77	50	☆
	5		Whistle notch shank	**1736ST05C-1980**	20	153	101	77	50	☆
20.0	3		Straight shank	**1534ST03C-2000**	20	131	79	55	50	☆
	5			**1536ST05C-2000**	20	153	101	77	50	☆
	5		Whistle notch shank	**1736ST05C-2000**	20	153	101	77	50	☆

☆Recommended grade (produce according to order)

Applicable material table

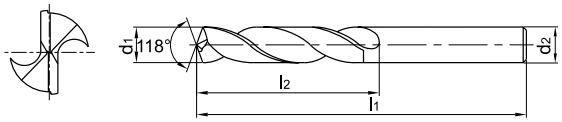
◎Very suitable ○Suitable

Grade	Workpiece material										
	Mild steel HB≤180	Carbon steel, Alloy steel	Pre-hardened steel, Hardened steel			Stainless steel	Cast iron	Nodular cast iron	Aluminum alloy	Copper alloy	Heat resistant alloy
			~40HRC	~50HRC	~60HRC						
KDG303	◎	○				◎					○

Code key C6
Cutting parameters C78
Cutting parameters C80–C86

SC series(twist drill) for machining of cast iron, Al alloy





- For materials with short chips such as cast iron, silicon-aluminum alloy, etc.
- Cutting edge and shank with same diameter.

Drill diameter $d_1(h_8)$	Drilling depth (l/d)	Cooling mode	Shank type	Type	Basic dimension(mm)			Recommended grade
					Shank diameter	Overall length	Flute length	
					$d_2(h_7)$	l_1	l_2	YK20F
2.0	3	External coolant	Straight shank	**1105SC03-0200**	2.0	38	12	☆
	5			**1101SC05-0200**	2.0	49	24	☆
2.5	3			**1105SC03-0250**	2.5	43	14	☆
	5			**1101SC05-0250**	2.5	57	30	☆
2.8	3			**1105SC03-0280**	2.8	46	16	☆
	5			**1101SC05-0280**	2.8	61	33	☆
3.0	3			**1105SC03-0300**	3.0	46	16	☆
	5			**1101SC05-0300**	3.0	61	33	☆
3.1	3			**1105SC03-0310**	3.1	49	18	☆
3.2	3			**1105SC03-0320**	3.2	49	18	☆
3.3	3			**1105SC03-0330**	3.3	49	18	☆
3.4	3			**1105SC03-0340**	3.4	52	20	☆
3.5	3			**1105SC03-0350**	3.5	52	20	☆
	5			**1101SC05-0350**	3.5	70	39	☆
3.6	3			**1105SC03-0360**	3.6	52	20	☆
3.7	3			**1105SC03-0370**	3.7	52	20	☆
3.8	3			**1105SC03-0380**	3.8	55	22	☆
	5			**1101SC05-0380**	3.8	75	43	☆
3.9	3			**1105SC03-0390**	3.9	55	22	☆
4.0	3			**1105SC03-0400**	4.0	55	22	☆
	5			**1101SC05-0400**	4.0	75	43	☆
4.1	3			**1105SC03-0410**	4.1	55	22	☆
4.2	3			**1105SC03-0420**	4.2	55	22	☆
	5			**1101SC05-0420**	4.2	75	43	☆
4.3	3			**1105SC03-0430**	4.3	58	24	☆
4.4	3			**1105SC03-0440**	4.4	58	24	☆
4.5	3			**1105SC03-0450**	4.5	58	24	☆
	5			**1101SC05-0450**	4.5	80	47	☆
4.6	3			**1105SC03-0460**	4.6	58	24	☆
4.7	3			**1105SC03-0470**	4.7	58	24	☆
4.8	3			**1105SC03-0480**	4.8	62	26	☆
	5			**1101SC05-0480**	4.8	86	52	☆

☆Recommended grade (produce according to order)

Drill diameter $d_1(h_8)$	Drilling depth (l/d)	Cooling mode	Shank type	Type	Basic dimension(mm)			Recommended grade
					Shank diameter	Overall length	Flute length	
					$d_2(h_7)$	l_1	l_2	YK20F
4.9	3	External coolant	Straight shank	**1105SC03-0490**	4.9	62	26	☆
5.0	3			**1105SC03-0500**	5.0	62	26	☆
	5			**1101SC05-0500**	5.0	86	52	☆
5.1	3			**1105SC03-0510**	5.1	62	26	☆
5.2	3			**1105SC03-0520**	5.2	62	26	☆
5.3	3			**1105SC03-0530**	5.3	62	26	☆
5.4	3			**1105SC03-0540**	5.4	66	28	☆
5.5	3			**1105SC03-0550**	5.5	66	28	☆
	5			**1101SC05-0550**	5.5	93	57	☆
5.6	3			**1105SC03-0560**	5.6	66	28	☆
5.7	3			**1105SC03-0570**	5.7	66	28	☆
5.8	3			**1105SC03-0580**	5.8	66	28	☆
	5			**1101SC05-0580**	5.8	93	57	☆
5.9	3			**1105SC03-0590**	5.9	66	28	☆
6.0	3			**1105SC03-0600**	6.0	66	28	☆
	5			**1101SC05-0600**	6.0	93	57	☆
6.1	3			**1105SC03-0610**	6.1	70	31	☆
6.2	3			**1105SC03-0620**	6.2	70	31	☆
6.3	3			**1105SC03-0630**	6.3	70	31	☆
6.4	3			**1105SC03-0640**	6.4	70	31	☆
6.5	3			**1105SC03-0650**	6.5	70	31	☆
	5			**1101SC05-0650**	6.5	101	63	☆
6.6	3			**1105SC03-0660**	6.6	70	31	☆
6.7	3			**1105SC03-0670**	6.7	70	31	☆
6.8	3			**1105SC03-0680**	6.8	74	34	☆
	5			**1101SC05-0680**	6.8	109	69	☆
6.9	3			**1105SC03-0690**	6.9	74	34	☆
7.0	3			**1105SC03-0700**	7.0	74	34	☆
	5			**1101SC05-0700**	7.0	109	69	☆
7.1	3			**1105SC03-0710**	7.1	74	34	☆
7.2	3			**1105SC03-0720**	7.2	74	34	☆
7.3	3			**1105SC03-0730**	7.3	74	34	☆
7.4	3			**1105SC03-0740**	7.4	74	34	☆

☆Recommended grade (produce according to order)

Applicable material table

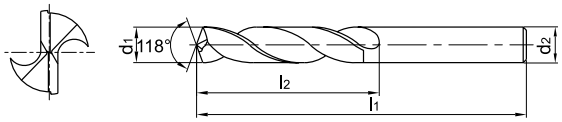
◎Very suitable ○Suitable

Grade	Workpiece material										
	Mild steel HB≤180	Carbon steel, Alloy steel	Pre-hardened steel, Hardened steel			Stainless steel	Cast iron	Nodular cast iron	Aluminum alloy	Copper alloy	Heat resistant alloy
			~40HRC	~50HRC	~60HRC						
YK20F							◎	○	◎		

Code key C6
Cutting parameters C78
Cutting parameters C80–C86

SC series(twist drill) for machining of cast iron, Al alloy





- For materials with short chips such as cast iron, silicon-aluminum alloy, etc.
- Cutting edge and shank with same diameter.

Drill diameter $d_1(h_8)$	Drilling depth (l/d)	Cooling mode	Shank type	Type	Basic dimension(mm)			Recommended grade
					Shank diameter	Overall length	Flute length	
					$d_2(h_7)$	l_1	l_2	YK20F
7.5	3	External coolant	Straight shank	**1105SC03-0750**	7.5	74	34	☆
	5			**1101SC05-0750**	7.5	109	69	☆
7.6	3			**1105SC03-0760**	7.6	79	37	☆
7.7	3			**1105SC03-0770**	7.7	79	37	☆
7.8	3			**1105SC03-0780**	7.8	79	37	☆
	5			**1101SC05-0780**	7.8	117	75	☆
7.9	3			**1105SC03-0790**	7.9	79	37	☆
8.0	3			**1105SC03-0800**	8.0	79	37	☆
	5			**1101SC05-0800**	8.0	117	75	☆
8.1	3			**1105SC03-0810**	8.1	79	37	☆
8.2	3			**1105SC03-0820**	8.2	79	37	☆
8.3	3			**1105SC03-0830**	8.3	79	37	☆
8.4	3			**1105SC03-0840**	8.4	79	37	☆
8.5	3			**1105SC03-0850**	8.5	79	37	☆
	5			**1101SC05-0850**	8.5	117	75	☆
8.6	3			**1105SC03-0860**	8.6	84	40	☆
8.7	3			**1105SC03-0870**	8.7	84	40	☆
8.8	3			**1105SC03-0880**	8.8	84	40	☆
	5			**1101SC05-0880**	8.8	125	81	☆
8.9	3			**1105SC03-0890**	8.9	84	40	☆
9.0	3			**1105SC03-0900**	9.0	84	40	☆
	5			**1101SC05-0900**	9.0	125	81	☆
9.1	3			**1105SC03-0910**	9.1	84	40	☆
9.2	3			**1105SC03-0920**	9.2	84	40	☆
9.3	3			**1105SC03-0930**	9.3	84	40	☆
9.4	3			**1105SC03-0940**	9.4	84	40	☆
9.5	3			**1105SC03-0950**	9.5	84	40	☆
	5			**1101SC05-0950**	9.5	125	81	☆
9.6	3			**1105SC03-0960**	9.6	89	43	☆
9.7	3			**1105SC03-0970**	9.7	89	43	☆
9.8	3			**1105SC03-0980**	9.8	89	43	☆
	5			**1101SC05-0980**	9.8	133	87	☆
9.9	3			**1105SC03-0990**	9.9	89	43	☆

☆Recommended grade (produce according to order)

Drill diameter $d_1(h_8)$	Drilling depth (l/d)	Cooling mode	Shank type	Type	Basic dimension(mm)			Recommended grade
					Shank diameter	Overall length	Flute length	
					$d_2(h_7)$	l_1	l_2	YK20F
10.0	3	External coolant	Straight shank	**1105SC03-1000**	10.0	89	43	☆
	5			**1101SC05-1000**	10.0	133	87	☆
10.1	3			**1105SC03-1010**	10.1	89	43	☆
10.2	3			**1105SC03-1020**	10.2	89	43	☆
10.4	3			**1105SC03-1040**	10.4	89	43	☆
10.5	3			**1105SC03-1050**	10.5	89	43	☆
	5			**1101SC05-1050**	10.5	133	87	☆
10.7	3			**1105SC03-1070**	10.7	95	47	☆
10.8	3			**1105SC03-1080**	10.8	95	47	☆
	5			**1101SC05-1080**	10.8	142	94	☆
11.0	3			**1105SC03-1100**	11.0	95	47	☆
	5			**1101SC05-1100**	11.0	142	94	☆
11.5	3			**1105SC03-1150**	11.5	95	47	☆
	5			**1101SC05-1150**	11.5	142	94	☆
12.0	3			**1105SC03-1200**	12.0	102	51	☆
	5			**1101SC05-1200**	12.0	151	101	☆
12.5	3			**1105SC03-1250**	12.5	102	51	☆
	5			**1101SC05-1250**	12.5	151	101	☆
12.8	3			**1105SC03-1280**	12.8	102	51	☆
13.0	3			**1105SC03-1300**	13.0	102	51	☆
	5			**1101SC05-1300**	13.0	151	101	☆
13.1	3			**1105SC03-1310**	13.1	102	51	☆
13.5	3			**1105SC03-1350**	13.5	107	54	☆
	5			**1101SC05-1350**	13.5	160	108	☆
14.0	3			**1105SC03-1400**	14.0	107	54	☆
	5			**1101SC05-1400**	14.0	160	108	☆
14.3	3			**1105SC03-1430**	14.3	111	56	☆
14.5	3			**1105SC03-1450**	14.5	111	56	☆
	5			**1101SC05-1450**	14.5	169	114	☆
15.0	3			**1105SC03-1500**	15.0	111	56	☆
	5			**1101SC05-1500**	15.0	169	114	☆
15.5	5			**1101SC05-1550**	15.5	178	120	☆
16.0	3			**1105SC03-1600**	16.0	115	58	☆
	5			**1101SC05-1600**	16.0	178	120	☆

☆Recommended grade (produce according to order)

Applicable material table

◎Very suitable ○Suitable

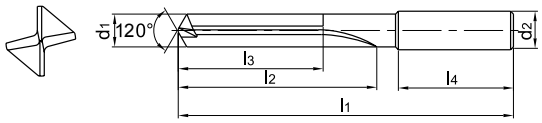
Grade	Workpiece material										
	Mild steel HB≤180	Carbon steel, Alloy steel	Pre-hardened steel, Hardened steel			Stainless steel	Cast iron	Nodular cast iron	Aluminum alloy	Copper alloy	Heat resistant alloy
			~40HRC	~50HRC	~60HRC						
YK20F							◎	○	◎		

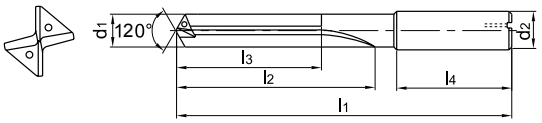
Code key C6
Cutting parameters C78
Cutting parameters C80–C86

PC series(straight flute drill) for machining of cast iron , Al alloy


External coolant Straight shank


Internal coolant Straight shank





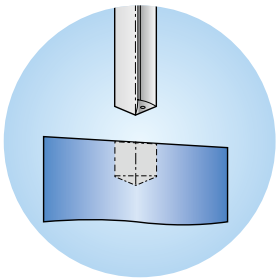
- For materials with short chips such as cast iron, silicon-aluminum alloy, etc.
- Excellent self centering capability, able to machine with high efficiency, the hole precision up to H7.
- High positional accuracy, high linearity and good surface finish can be obtained in the hole drilled.

Drill diameter $d_1(m_7)$	Drilling depth (l/d)	Cooling mode	Shank type	Type	Basic dimension(mm)					Recommended grade
					Shank diameter	Overall length	Flute length	Recommended drilling depth	Shank length	
					$d_2(h_6)$	l_1	l_2	l_3	l_4	YK20F
4.0	5	External coolant	Straight shank	**1576PC05-0400**	6.0	74	36	29	36	☆
4.2	5			**1576PC05-0420**	6.0	74	36	29	36	☆
5.0	5			**1576PC05-0500**	6.0	82	44	35	36	☆
	15	Internal coolant		**1579PC15C-0500**	6.0	145	105	96	36	☆
6.0	5	External coolant		**1576PC05-0600**	6.0	82	44	35	36	☆
	15	Internal coolant		**1579PC15C-0600**	6.0	145	105	96	36	☆
6.75	5	External coolant		**1576PC05-0675**	8.0	91	53	43	36	☆
7.0	5			**1576PC05-0700**	8.0	91	53	43	36	☆
8.0	5			**1576PC05-0800**	8.0	91	53	43	36	☆
	15	Internal coolant		**1579PC15C-0800**	8.0	180	137	127	36	☆
8.5	5	External coolant		**1576PC05-0850**	10.0	103	61	49	40	☆
9.0	5			**1576PC05-0900**	10.0	103	61	49	40	☆
	15	Internal coolant		**1579PC15C-0900**	10.0	217	170	158	40	☆
10.0	5	External coolant		**1576PC05-1000**	10.0	103	61	49	40	☆
	15	Internal coolant		**1579PC15C-1000**	10.0	217	170	158	40	☆
10.25	5	External coolant		**1576PC05-1025**	12.0	118	71	56	45	☆
11.0	5			**1576PC05-1100**	12.0	118	71	56	45	☆
	15	Internal coolant		**1579PC15C-1100**	12.0	258	205	190	45	☆
12.0	5	External coolant		**1576PC05-1200**	12.0	118	71	56	45	☆
	15	Internal coolant		**1579PC15C-1200**	12.0	258	205	190	45	☆
13.0	5	External coolant		**1576PC05-1300**	14.0	124	77	60	45	☆
14.0	5			**1576PC05-1400**	14.0	124	77	60	45	☆
	15	Internal coolant		**1579PC15C-1400**	14.0	290	236	219	45	☆
15.0	5	External coolant		**1576PC05-1500**	16.0	133	83	63	48	☆
15.5	5			**1576PC05-1550**	16.0	133	83	63	48	☆

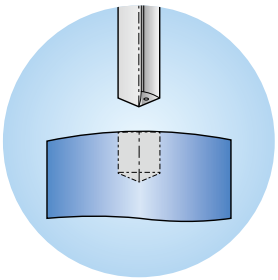
☆Recommended grade (produce according to order)

Drill diameter $d_1(m_7)$	Drilling depth (l/d)	Cooling mode	Shank type	Type	Basic dimension(mm)					Recommended grade
					Shank diameter	Overall length	Flute length	Recommended drilling depth	Shank length	
					$d_2(h_6)$	l_1	l_2	l_3	l_4	YK20F
16.0	5	External coolant	Straight shank	**1576PC05-1600**	16.0	133	83	63	48	☆
17.0	5			**1576PC05-1700**	18.0	143	93	71	48	☆
17.5	5			**1576PC05-1750**	18.0	143	93	71	48	☆
18.0	5			**1576PC05-1800**	18.0	143	93	71	48	☆
19.5	5			**1576PC05-1950**	20.0	153	101	77	50	☆
20.0	5			**1576PC05-2000**	20.0	153	101	77	50	☆

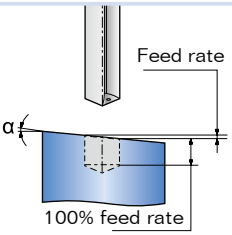
☆Recommended grade (produce according to order)



Inclined face drilling

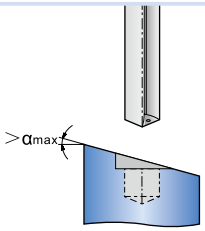


Curved face drilling



When drilling inclined face or curved face, feed rate should be reduced as recommended.

Inclined angle α	Max. feed rate
1°	80%
2°	50%
3°	30%



Surface with a large inclined angle should be pre-treated. Face milling should be conducted before drilling.

Applicable material table

◎Very suitable ○Suitable

Grade	Workpiece material										
	Mild steel HB≤180	Carbon steel, Alloy steel	Pre-hardened steel, Hardened steel			Stainless steel	Cast iron	Nodular cast iron	Aluminum alloy	Copper alloy	Heat resistant alloy
			~40HRC	~50HRC	~60HRC						
YK20F							◎	○	◎		

Code key C6
Cutting parameters C79
Cutting parameters C80–C86

Recommended cutting parameters

GD series twist drills(external coolant) 3D 5D

workpiece material	Mild steel HB≤180		Carbon steel, alloy steel ~30HRC		Pre-hardened steel ~40HRC		Stainless steel		Cast iron		Nodular cast iron		Aluminum alloy		Heat resistant alloy	
Cutting speed	60~120m/min		60~120m/min		40~70m/min		25~40m/min		60~120m/min		50~100m/min		60~140m/min		15~25m/min	
Diameter (mm)	Rotating speed (min^{-1})	Feed rate (mm/r)	Rotating speed (min^{-1})	Feed rate (mm/r)	Rotating speed (min^{-1})	Feed rate (mm/r)	Rotating speed (min^{-1})	Feed rate (mm/r)	Rotating speed (min^{-1})	Feed rate (mm/r)	Rotating speed (min^{-1})	Feed rate (mm/r)	Rotating speed (min^{-1})	Feed rate (mm/r)	Rotating speed (min^{-1})	Feed rate (mm/r)
2	14000	0.06~0.08	14000	0.06~0.08	9500	0.06~0.08	5500	0.02~0.05	14000	0.06~0.08	11000	0.06~0.08	16000	0.06~0.08	3200	0.02~0.04
3	9500	0.09~0.12	9500	0.09~0.12	6300	0.09~0.12	3700	0.03~0.07	9500	0.09~0.12	7400	0.09~0.12	10600	0.09~0.12	2100	0.03~0.06
4	7000	0.10~0.15	7000	0.10~0.15	4700	0.10~0.15	2700	0.04~0.08	7000	0.10~0.15	5600	0.10~0.15	8000	0.10~0.15	1600	0.04~0.07
5	5700	0.12~0.18	5700	0.12~0.18	3800	0.12~0.18	2200	0.05~0.10	5700	0.12~0.18	4500	0.12~0.18	6400	0.12~0.18	1250	0.05~0.09
6	4700	0.14~0.20	4700	0.14~0.20	3100	0.14~0.20	1850	0.06~0.12	4700	0.14~0.20	3700	0.14~0.20	5300	0.14~0.20	1050	0.06~0.11
8	3600	0.16~0.24	3600	0.16~0.24	2400	0.16~0.24	1400	0.08~0.16	3600	0.16~0.24	2800	0.16~0.24	4000	0.16~0.24	800	0.08~0.14
10	2800	0.18~0.27	2800	0.18~0.27	1900	0.18~0.27	1100	0.10~0.18	2800	0.18~0.27	2200	0.18~0.27	3200	0.18~0.27	600	0.10~0.16
12	2400	0.20~0.30	2400	0.20~0.30	1600	0.20~0.30	930	0.12~0.20	2400	0.20~0.30	1900	0.20~0.30	2700	0.20~0.30	500	0.12~0.18
14	2100	0.22~0.35	2100	0.22~0.35	1400	0.22~0.35	800	0.13~0.22	2100	0.22~0.35	1600	0.22~0.35	2300	0.22~0.35	450	0.13~0.20
16	1800	0.25~0.36	1800	0.25~0.36	1200	0.25~0.36	700	0.14~0.25	1800	0.25~0.36	1400	0.25~0.36	2000	0.25~0.36	400	0.14~0.23
18	1600	0.28~0.38	1600	0.28~0.38	1100	0.28~0.38	620	0.15~0.28	1600	0.28~0.38	1200	0.28~0.38	1800	0.28~0.38	350	0.15~0.25
20	1400	0.30~0.40	1400	0.30~0.40	950	0.30~0.40	550	0.16~0.30	1400	0.30~0.40	1100	0.30~0.40	1600	0.30~0.40	320	0.16~0.28

1.When the tool is used for the first time, please do a test cutting with 90% of the cutting speed or 85% of the feed rate stated above. As cutting conditions become stable, gradually increase the cutting speed and feed rate.

2.The cutting conditions above are applicable for drilling with emulsion.

3.When clamping drill, please use a collet without any defect or dust, and keep the radial run-out of drill under 0.02mm.

4.These conditions above are applicable for cutting depth under 5D.

GD series twist drills(internal coolant)

3D 5D

workpiece material	Mild steel HB≤180		Carbon steel, alloy steel ~30HRC		Pre-hardened steel ~40HRC		Stainless steel		Cast iron		Nodular cast iron		Aluminum alloy		Heat resistant alloy	
Cutting speed	80~150m/min		80~150m/min		50~80m/min		50~80m/min		80~150m/min		60~120m/min		100~180m/min		15~25m/min	
Diameter (mm)	Rotating speed (min^{-1})	Feed rate (mm/r)	Rotating speed (min^{-1})	Feed rate (mm/r)	Rotating speed (min^{-1})	Feed rate (mm/r)	Rotating speed (min^{-1})	Feed rate (mm/r)	Rotating speed (min^{-1})	Feed rate (mm/r)	Rotating speed (min^{-1})	Feed rate (mm/r)	Rotating speed (min^{-1})	Feed rate (mm/r)	Rotating speed (min^{-1})	Feed rate (mm/r)
3	12700	0.09~0.12	12700	0.09~0.12	7400	0.09~0.12	6300	0.03~0.07	12700	0.09~0.12	9500	0.09~0.12	15000	0.09~0.12	2100	0.03~0.06
4	9600	0.10~0.15	9600	0.10~0.15	5600	0.10~0.15	4700	0.04~0.08	9600	0.10~0.15	7000	0.10~0.15	11100	0.10~0.15	1600	0.04~0.07
5	7600	0.12~0.18	7600	0.12~0.18	4500	0.12~0.18	3800	0.05~0.10	7600	0.12~0.18	5700	0.12~0.18	9000	0.12~0.18	1250	0.05~0.09
6	6400	0.14~0.20	6400	0.14~0.20	3700	0.14~0.20	3200	0.06~0.12	6400	0.14~0.20	4700	0.14~0.20	7400	0.14~0.20	1050	0.06~0.11
8	4800	0.16~0.24	4800	0.16~0.24	2800	0.16~0.24	2400	0.08~0.16	4800	0.16~0.24	3600	0.16~0.24	5600	0.16~0.24	800	0.08~0.14
10	3800	0.18~0.27	3800	0.18~0.27	2200	0.18~0.27	1900	0.10~0.18	3800	0.18~0.27	2800	0.18~0.27	4500	0.18~0.27	600	0.10~0.16
12	3200	0.20~0.30	3200	0.20~0.30	1900	0.20~0.30	1600	0.12~0.20	3200	0.20~0.30	2400	0.20~0.30	3700	0.20~0.30	500	0.12~0.18
14	2700	0.22~0.35	2700	0.22~0.35	1600	0.22~0.35	1350	0.13~0.22	2700	0.22~0.35	2100	0.22~0.35	3200	0.22~0.35	450	0.13~0.20
16	2400	0.25~0.36	2400	0.25~0.36	1400	0.25~0.36	1200	0.14~0.25	2400	0.25~0.36	1800	0.25~0.36	2800	0.25~0.36	400	0.14~0.23
18	2100	0.28~0.38	2100	0.28~0.38	1200	0.28~0.38	1050	0.15~0.28	2100	0.28~0.38	1600	0.28~0.38	2500	0.28~0.38	350	0.15~0.25
20	1900	0.30~0.40	1900	0.30~0.40	1100	0.30~0.40	950	0.16~0.30	1900	0.30~0.40	1400	0.30~0.40	2300	0.30~0.40	320	0.16~0.28

1.When the tool is used for the first time, please do a test cutting with 90% of the cutting speed or 85% of the feed rate stated above. As cutting conditions become stable, gradually increase the cutting speed and feed rate.

2.The cutting conditions above are applicable for drilling with emulsion.

3.When clamping drill, please use a collet without any defect or dust, and keep the radial run-out of drill under 0.02mm.

4.These conditions above are applicable for cutting depth under 5D.

Recommended cutting parameters

GD series twist drills(internal coolant)

8D

Workpiece material	Mild steel HB≤180		Carbon steel, alloy steel ~30HRC		Pre-hardened steel ~40HRC		Stainless steel		Cast iron		Nodular cast iron		Aluminum alloy		Heat resistant alloy	
Cutting speed	80~150m/min		80~150m/min		50~80m/min		40~60m/min		80~150m/min		60~120m/min		100~180m/min		15~25m/min	
Diameter (mm)	Rotating speed (min^{-1})	Feed rate (mm/r)	Rotating speed (min^{-1})	Feed rate (mm/r)	Rotating speed (min^{-1})	Feed rate (mm/r)	Rotating speed (min^{-1})	Feed rate (mm/r)	Rotating speed (min^{-1})	Feed rate (mm/r)	Rotating speed (min^{-1})	Feed rate (mm/r)	Rotating speed (min^{-1})	Feed rate (mm/r)	Rotating speed (min^{-1})	Feed rate (mm/r)
3	12700	0.06~0.10	12700	0.06~0.10	7400	0.06~0.10	5300	0.03~0.07	12700	0.06~0.10	9500	0.06~0.10	15000	0.09~0.12	2100	0.03~0.06
4	9600	0.08~0.12	9600	0.08~0.12	5600	0.08~0.12	4000	0.04~0.08	9600	0.08~0.12	7000	0.08~0.12	11100	0.10~0.15	1600	0.04~0.07
5	7600	0.10~0.14	7600	0.10~0.14	4500	0.10~0.14	3200	0.05~0.10	7600	0.10~0.14	5700	0.10~0.14	9000	0.10~0.14	1250	0.05~0.09
6	6400	0.11~0.16	6400	0.11~0.16	3700	0.11~0.16	2700	0.06~0.12	6400	0.11~0.16	4700	0.11~0.16	7400	0.11~0.16	1050	0.06~0.11
8	4800	0.13~0.19	4800	0.13~0.19	2800	0.13~0.19	2000	0.08~0.16	4800	0.13~0.19	3600	0.13~0.19	5600	0.13~0.19	800	0.08~0.14
10	3800	0.14~0.22	3800	0.14~0.22	2200	0.14~0.22	1600	0.10~0.18	3800	0.14~0.22	2800	0.14~0.22	4500	0.14~0.22	600	0.10~0.16
12	3200	0.16~0.24	3200	0.16~0.24	1900	0.16~0.24	1300	0.12~0.20	3200	0.16~0.24	2400	0.16~0.24	3700	0.16~0.24	500	0.12~0.18
14	2700	0.18~0.28	2700	0.18~0.28	1600	0.18~0.28	1100	0.13~0.22	2700	0.18~0.28	2100	0.18~0.28	3200	0.18~0.28	450	0.13~0.20
16	2400	0.20~0.29	2400	0.20~0.29	1400	0.20~0.29	1000	0.14~0.25	2400	0.20~0.29	1800	0.20~0.29	2800	0.20~0.29	400	0.14~0.23
18	2100	0.24~0.32	2100	0.24~0.32	1200	0.24~0.32	880	0.15~0.28	2100	0.24~0.32	1600	0.24~0.32	2500	0.24~0.32	350	0.15~0.25

1.When the tool is used for the first time, please do a test cutting with 90% of the cutting speed or 85% of the feed rate stated above. As cutting conditions become stable, gradually increase the cutting speed and feed rate.

2.The cutting conditions above are applicable for drilling with emulsion.

3.When clamping drill, please use a collet without any defect or dust, and keep the radial run-out of drill under 0.02mm.

4.These conditions above are applicable for cutting depth under 8D.

SL series deep twist drills(internal coolant) 12D

workpiece material	Mild steel HB≤180		Carbon steel, alloy steel ~30HRC		Pre-hardened steel ~40HRC		Stainless steel		Cast iron		Nodular cast iron		Aluminum alloy		Heat resistant alloy	
Cutting speed	60~120m/min		60~120m/min		50~80m/min		40~60m/min		80~150m/min		60~120m/min		100~180m/min		10~20m/min	
Diameter (mm)	Rotating speed (min^{-1})	Feed rate (mm/r)	Rotating speed (min^{-1})	Feed rate (mm/r)	Rotating speed (min^{-1})	Feed rate (mm/r)	Rotating speed (min^{-1})	Feed rate (mm/r)	Rotating speed (min^{-1})	Feed rate (mm/r)	Rotating speed (min^{-1})	Feed rate (mm/r)	Rotating speed (min^{-1})	Feed rate (mm/r)	Rotating speed (min^{-1})	Feed rate (mm/r)
3	10600	0.06~0.1	10600	0.06~0.1	7400	0.06~0.1	5300	0.03~0.07	12700	0.06~0.1	9500	0.06~0.1	15000	0.09~0.12	2100	0.03~0.06
4	8000	0.08~0.12	8000	0.08~0.12	5600	0.08~0.12	4000	0.04~0.08	96000	0.08~0.12	7000	0.08~0.12	11000	0.10~0.15	1600	0.04~0.07
5	6400	0.10~0.14	6400	0.10~0.14	4500	0.10~0.14	3200	0.05~0.10	7600	0.10~0.14	5700	0.10~0.14	9000	0.10~0.15	1250	0.05~0.9
6	5300	0.11~0.16	5300	0.11~0.16	3700	0.11~0.16	2700	0.06~0.12	6400	0.11~0.16	4700	0.11~0.16	7400	0.11~0.16	1050	0.06~0.11
8	4000	0.13~0.19	4000	0.13~0.19	2800	0.13~0.19	2000	0.08~0.16	4800	0.13~0.19	3600	0.13~0.19	5600	0.13~0.19	800	0.08~0.14
10	3200	0.14~0.22	3200	0.14~0.22	2200	0.14~0.22	1600	0.10~0.18	3800	0.14~0.22	2800	0.14~0.22	4500	0.14~0.22	600	0.10~0.16
12	2700	0.16~0.24	2700	0.16~0.24	1900	0.16~0.24	1300	0.12~0.20	3200	0.16~0.24	2400	0.16~0.24	3700	0.16~0.24	500	0.12~0.18
14	2300	0.18~0.28	2300	0.18~0.28	1600	0.18~0.28	1100	0.13~0.22	2700	0.18~0.28	2100	0.18~0.28	3200	0.18~0.28	450	0.13~0.20

1. When the tool is used for the first time, please do a test cutting with 90% of the cutting speed or 85% of the feed rate stated above. As cutting conditions become stable, gradually increase the cutting speed and feed rate.
2. The cutting conditions above are applicable for drilling with emulsion.
3. When clamping drill, please use a collet without any defect or dust, and keep the radial run-out of drill under 0.02mm.

SL series deep twist drills(internal coolant) 20D 30D

workpiece material	Mild steel HB≤180		Carbon steel, alloy steel ~30HRC		Pre-hardened steel ~40HRC		Stainless steel		Cast iron		Nodular cast iron		Aluminum alloy		Heat resistant alloy	
Cutting speed	70~90m/min		50~80m/min		40~60m/min		40~60m/min		50~80m/min		60~80m/min		100~180m/min		8~15m/min	
Diameter (mm)	Rotating speed (min^{-1})	Feed rate (mm/r)	Rotating speed (min^{-1})	Feed rate (mm/r)	Rotating speed (min^{-1})	Feed rate (mm/r)	Rotating speed (min^{-1})	Feed rate (mm/r)	Rotating speed (min^{-1})	Feed rate (mm/r)	Rotating speed (min^{-1})	Feed rate (mm/r)	Rotating speed (min^{-1})	Feed rate (mm/r)	Rotating speed (min^{-1})	Feed rate (mm/r)
3	8250	0.06~0.1	7650	0.06~0.1	5200	0.06~0.1	4750	0.03~0.07	7100	0.06~0.1	7600	0.06~0.1	12750	0.09~0.12	1350	0.03~0.06
4	6250	0.08~0.12	5750	0.08~0.12	3900	0.08~0.12	3600	0.04~0.08	5400	0.08~0.12	5600	0.08~0.12	9350	0.10~0.15	1050	0.04~0.07
5	5000	0.10~0.14	4600	0.10~0.14	3150	0.10~0.14	2900	0.05~0.10	4250	0.10~0.14	4550	0.10~0.14	7650	0.10~0.15	800	0.05~0.9
6	4150	0.11~0.16	3800	0.11~0.16	2600	0.11~0.16	2450	0.06~0.12	3600	0.11~0.16	3750	0.11~0.16	6300	0.11~0.16	700	0.06~0.11
8	3100	0.13~0.19	2900	0.13~0.19	1950	0.13~0.19	1800	0.08~0.16	2700	0.13~0.19	2900	0.13~0.19	4750	0.13~0.19	500	0.08~0.14
10	2500	0.14~0.22	2300	0.14~0.22	1550	0.14~0.22	1450	0.10~0.18	2150	0.14~0.22	2250	0.14~0.22	3850	0.14~0.22	400	0.10~0.16
12	2100	0.16~0.24	1950	0.16~0.24	1350	0.16~0.24	1150	0.12~0.20	1800	0.16~0.24	1900	0.16~0.24	3150	0.16~0.24	350	0.12~0.18
14	1800	0.18~0.28	1650	0.18~0.28	1100	0.18~0.28	1000	0.13~0.22	1500	0.18~0.28	1700	0.18~0.28	2700	0.18~0.28	300	0.13~0.20

1. When the tool is used for the first time, please do a test cutting with 90% of the cutting speed or 85% of the feed rate stated above. As cutting conditions become stable, gradually increase the cutting speed and feed rate.
2. The cutting conditions above are applicable for drilling with emulsion.
3. When clamping drill, please use a collet without any defect or dust, and keep the radial run-out of drill under 0.02mm.

Recommended cutting parameters

ST series twist drills(internal coolant) 3D 5D

Workpiece material	Mild steel HB≤180		Carbon steel, alloy steel ~30HRC		Stainless steel					
					Austenite		Martensite		Ferrite	
Cutting speed	80~150m/min		80~150m/min		40~80 m/min		50~100 m/min		60~120 m/min	
Diameter (mm)	Rotating speed (min^{-1})	Feed rate (mm/r)	Rotating speed (min^{-1})	Feed rate (mm/r)	Rotating speed (min^{-1})	Feed rate (mm/r)	Rotating speed (min^{-1})	Feed rate (mm/r)	Rotating speed (min^{-1})	Feed rate (mm/r)
3	12700	0.09~0.12	12700	0.09~0.12	6300	0.03~0.07	7400	0.03~0.07	9000	0.03~0.07
4	9600	0.10~0.15	9600	0.10~0.15	4700	0.04~0.08	5600	0.04~0.08	6700	0.04~0.08
5	7600	0.12~0.18	7600	0.12~0.18	3800	0.05~0.10	4500	0.05~0.10	5400	0.05~0.10
6	6400	0.14~0.20	6400	0.14~0.20	3200	0.06~0.12	3700	0.06~0.12	4500	0.06~0.12
8	4800	0.16~0.24	4800	0.16~0.24	2400	0.08~0.16	2800	0.08~0.16	3400	0.08~0.16
10	3800	0.18~0.27	3800	0.18~0.27	1900	0.10~0.18	2200	0.10~0.18	2700	0.10~0.18
12	3200	0.20~0.30	3200	0.20~0.30	1600	0.12~0.20	1900	0.12~0.20	2300	0.12~0.20
14	2700	0.22~0.35	2700	0.22~0.35	1350	0.13~0.22	1600	0.13~0.22	1900	0.13~0.22
16	2400	0.25~0.36	2400	0.25~0.36	1200	0.14~0.25	1400	0.14~0.25	1700	0.14~0.25
18	2100	0.28~0.38	2100	0.28~0.38	1050	0.15~0.28	1200	0.15~0.28	1500	0.15~0.28
20	1900	0.30~0.40	1900	0.30~0.40	950	0.16~0.30	1100	0.16~0.30	1350	0.16~0.30

1.When the tool is used for the first time, please do a test cutting with 90% of the cutting speed or 85% of the feed rate stated above. As cutting conditions become stable, gradually increase the cutting speed and feed rate.
2.The cutting conditions above are applicable for drilling with emulsion.
3.When clamping drill, please use a collet without any defect or dust, and keep the radial run-out of drill under 0.02mm.
4.These conditions above are applicable for cutting depth under 5D.

SC series twist drills(external coolant) 3D 5D

Workpiece material	Cast iron		Nodular cast iron		Silicon aluminium alloy				Aluminum alloy	
					Si≤10%		Si＞10%			
Cutting speed	50~80m/min		40~70m/min		100~180m/min		80~140m/min		120~200m/min	
Diameter (mm)	Rotating speed (min^{-1})	Feed rate (mm/r)	Rotating speed (min^{-1})	Feed rate (mm/r)	Rotating speed (min^{-1})	Feed rate (mm/r)	Rotating speed (min^{-1})	Feed rate (mm/r)	Rotating speed (min^{-1})	Feed rate (mm/r)
2	9550	0.06~ 0.08	8000	0.06~ 0.08	20000	0.07~0.16	18000	0.07~0.16	24000	0.07~0.16
3	6400	0.09~ 0.12	5300	0.09~ 0.12	15000	0.09~0.18	12700	0.09~0.18	16000	0.09~0.18
4	4800	0.10~ 0.15	4000	0.10~ 0.15	11000	0.10~0.22	9600	0.10~0.22	12000	0.10~0.22
5	3800	0.12~ 0.18	3200	0.12~ 0.18	9000	0.12~0.25	7600	0.12~0.25	10000	0.12~0.25
6	3100	0.14~ 0.20	2700	0.14~ 0.20	7400	0.14~0.28	6400	0.14~0.28	8500	0.14~0.28
8	2400	0.16~ 0.24	2000	0.16~ 0.24	5600	0.18~0.32	4800	0.18~0.32	6400	0.18~0.32
10	1900	0.18~ 0.27	1600	0.18~ 0.27	4500	0.22~0.36	3800	0.22~0.36	5000	0.22~0.36
12	1600	0.20~ 0.30	1300	0.20~ 0.30	3700	0.25~0.40	3200	0.25~0.40	4200	0.25~0.40
14	1350	0.22~ 0.35	1150	0.22~ 0.35	3200	0.27~0.44	2700	0.27~0.44	3600	0.27~0.44
16	1200	0.25~ 0.36	1000	0.25~ 0.36	2800	0.32~0.48	2400	0.32~0.48	3200	0.32~0.48

1. When the tool is used for the first time, please do a test cutting with 90% of the cutting speed or 85% of the feed rate stated above. As cutting conditions become stable, gradually increase the cutting speed and feed rate.
2 .The cutting conditions above are applicable for drilling with emulsion.
3.When clamping drill, please use a collet without any defect or dust, and keep the radial run-out of drill under 0.02mm.
4.These conditions above are applicable for cutting depth under 5D.

PC series straight flute drill(external coolant) 5D

Workpiece material	Cast iron		Nodular cast iron		Silicon aluminium alloy				Aluminum alloy	
					Si≤10%		Si＞10%			
Cutting speed	60~120m/min		50~100m/min		100~200m/min		80~160m/min		120~220m/min	
Diameter (mm)	Rotating speed (min^{-1})	Feed rate (mm/r)	Rotating speed (min^{-1})	Feed rate (mm/r)	Rotating speed (min^{-1})	Feed rate (mm/r)	Rotating speed (min^{-1})	Feed rate (mm/r)	Rotating speed (min^{-1})	Feed rate (mm/r)
4	7000	0.10~ 0.15	5600	0.10~ 0.15	11000	0.12~ 0.20	9600	0.12~ 0.20	12000	0.12~ 0.20
5	5700	0.12~ 0.18	4500	0.12~ 0.18	9000	0.14~ 0.26	7600	0.14~ 0.26	10000	0.14~ 0.26
6	4700	0.14~ 0.20	3700	0.14~ 0.20	7400	0.16~ 0.28	6400	0.16~ 0.28	8500	0.16~ 0.28
8	3600	0.16~ 0.24	2800	0.16~ 0.24	5500	0.18~ 0.30	4800	0.18~ 0.30	6400	0.18~ 0.30
10	2800	0.18~ 0.27	2200	0.18~ 0.27	4500	0.20~ 0.32	3800	0.20~ 0.32	5000	0.20~ 0.32
12	2400	0.20~ 0.30	1900	0.20~ 0.30	3700	0.24~ 0.36	3200	0.24~ 0.36	4200	0.24~ 0.36
14	2100	0.22~ 0.35	1600	0.22~ 0.35	3200	0.28~ 0.44	2700	0.28~ 0.44	3600	0.28~ 0.44
16	1800	0.25~ 0.36	1400	0.25~ 0.36	2800	0.30~ 0.48	2400	0.30~ 0.48	3200	0.30~ 0.48
18	1600	0.28~0.38	1200	0.28~ 0.38	2500	0.34~ 0.52	2100	0.34~ 0.52	3000	0.34~ 0.52
20	1400	0.30~0.40	1100	0.30~ 0.40	2300	0.40~ 0.63	1900	0.40~ 0.63	2500	0.40~ 0.63

1. When the tool is used for the first time, please do a test cutting with 90% of the cutting speed or 85% of the feed rate stated above. As cutting conditions become stable, gradually increase the cutting speed and feed rate.
2 .The cutting conditions above are applicable for drilling with emulsion.
3.When clamping drill, please use a collet without any defect or dust, and keep the radial run-out of drill under 0.02mm.
4.These conditions above are applicable for cutting depth under 5D.

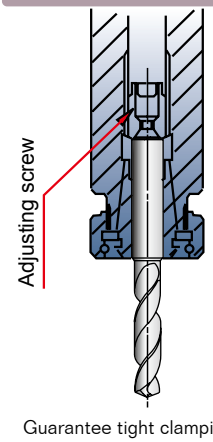
PC series straight flute drill(internal coolant) 15D

Workpiece material	Cast iron		Nodular cast iron		Silicon aluminium alloy				Aluminum alloy	
					Si≤10%		Si＞10%			
Cutting speed	60~120m/min		50~100m/min		100~200m/min		80~160m/min		120~220m/min	
Diameter (mm)	Rotating speed (min^{-1})	Feed rate (mm/r)	Rotating speed (min^{-1})	Feed rate (mm/r)	Rotating speed (min^{-1})	Feed rate (mm/r)	Rotating speed (min^{-1})	Feed rate (mm/r)	Rotating speed (min^{-1})	Feed rate (mm/r)
5	5700	0.08~ 0.14	4500	0.08~ 0.14	9000	0.09~ 0.18	7600	0.09~ 0.18	10000	0.09~ 0.18
6	4700	0.10~ 0.16	3700	0.10~ 0.16	7400	0.12~ 0.20	6400	0.12~ 0.20	8500	0.12~ 0.20
8	3600	0.12~ 0.20	2800	0.12~ 0.20	5500	0.12~ 0.24	4800	0.12~ 0.24	6400	0.12~ 0.24
10	2800	0.14~ 0.23	2200	0.14~ 0.23	4500	0.16~ 0.28	3800	0.16~ 0.28	5000	0.16~ 0.28
12	2400	0.16~ 0.26	1900	0.16~ 0.26	3700	0.18~ 0.32	3200	0.18~ 0.32	4200	0.18~ 0.32
14	2100	0.18~ 0.32	1600	0.18~ 0.32	3200	0.20~ 0.36	2700	0.20~ 0.36	3600	0.20~ 0.36

1. When the tool is used for the first time, please do a test cutting with 90% of the cutting speed or 85% of the feed rate stated above. As cutting conditions become stable, gradually increase the cutting speed and feed rate.
2 .The cutting conditions above are applicable for drilling with emulsion.
3.When clamping drill, please use a collet without any defect or dust, and keep the radial run-out of drill under 0.02mm.
4.These conditions above are applicable for cutting depth under 15D.

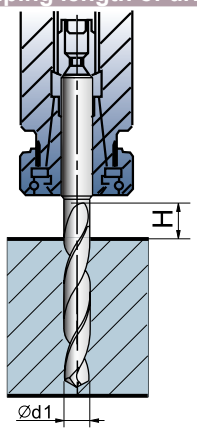
Application guide of drills

Drill clampling



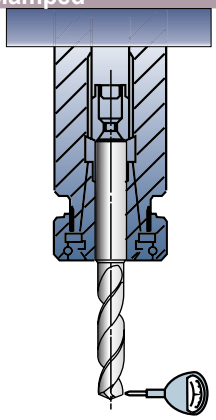
Guarantee tight clamping by using thrust bearing type collet chuck.

How to define the clamping length of drill



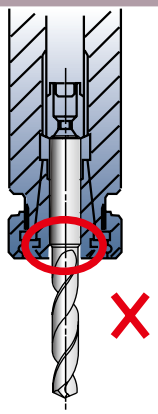
Ensure the size of H is over 1.5d1

Radial run-out of drill clamped



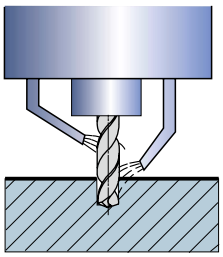
The Radial Run-out should be under 0.02mm.

Wrong drill clamping



Do not clamp on the drill flutes.

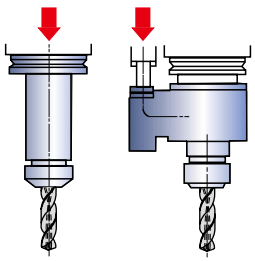
Correct coolant method



The coolant liquid should be injected to the end and the middle of drill as shown in the figure.

Internal cooling: coolant supply method

Coolant through spindle　Coolant not through spindle



coolant pressure is about 0.5~1MPa
(coolant pressure is 2~3MPa when the diameter is less than Ø5 mm)
Coolant volume is 1.5~4L/min.

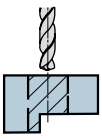
Cautions on coolant use

When using internal coolant

①The little chip particles and dust will cause jamming in the oil hole. A fine mesh filter should be used to prevent such jamming, especially for small-diameter drills.

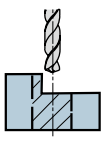
②Dirt and dust particles will adhere to the oil hole and lead to unsmooth coolant flow. Coolant change as early as possible is recommended.

Cautions on interrupted cutting



Can be drilled

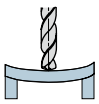
Reduce the feed rate when drilling interrupted part.



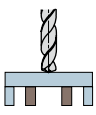
Pre-machining prior to drilling

Countersink with end mill prior to drilling.

Correct method for thin workpiece

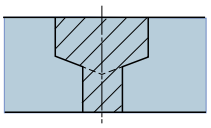


Bending occurs



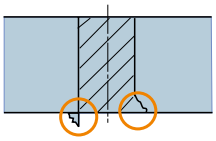
Add a supporter

Drilling method of stepped holes



①Divided to two drilling processes.
②Drill the larger diameter hole firstly.
※Multiple step and chamfer drill can be produced by us.

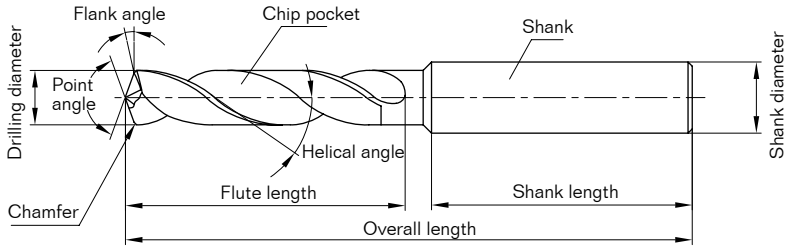
Burrs and workpiece chippings on exit

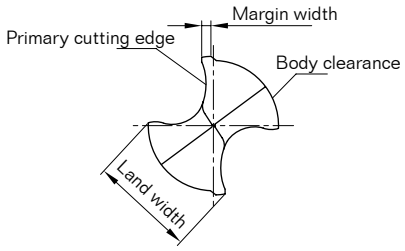


①Reduce the feed rate when approaching the exit.
②Machine chamfers at the point of exit.
③Change the point angle.

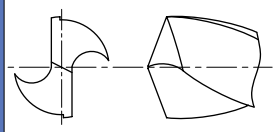
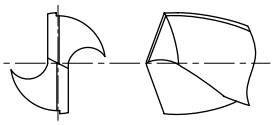
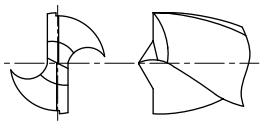
Parts terminology of drill

Terminology of drill





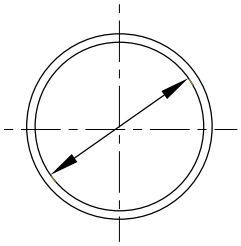
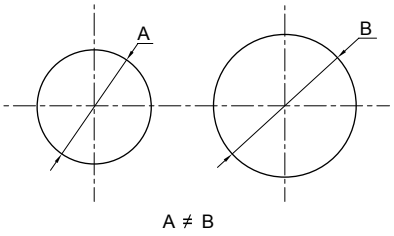
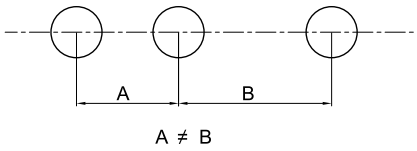
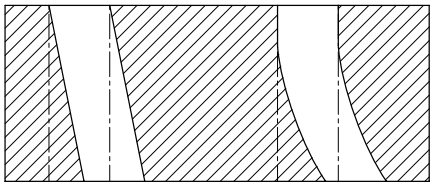
Representative cutting edge shapes

Shape	 (Conical)	 (Dual face)	 (Candler)
Features	● The flank face is conical and the clearance angel increases toward the center of drill. ● Wide applications, commonly used for both soft and hard materials	● Flank face with dual flats to facilitate cutting and initial entering. ● often used for small-diameter drills.	● Two-stage point angle with perfect centering capability, less burr generated when drilling hole. ● First choice for drilling thin plate.

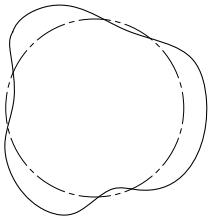
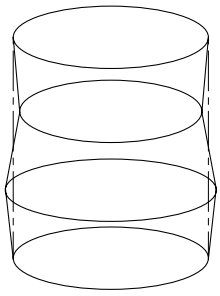
Structure specification and cutting characteristics

Chip pocket	The function of chip pocket is to remove the chips out of the hole. The larger the cross-sectional area is, the easier for chips to be evacuated.
Helical angle	The helical angle is the inclined angle of flute at the axial direction of a drill. It varies according to the different position of cutting edge. It decreases greatly from the peripheral toward the center. High hardness material Small ← Helical angle → Large Soft material
Flute length	It is determined by depth of hole, guide bushing length and regrinding allowance. The longer the flute is, the lower the drill rigidity is, which greatly affects tool life. So it is recommended to minimize the flute length as much as possible when other requirements are met. The minimal flute length generally is depth of hole plus 1.5 times of the hole diameter.
Point angle	Generally 118°, set differently as per various applications. Soft easy-to-cut material Small ← Point angle → Large for hard materials or high-efficiency machining
Core	It is an important factor that influence the rigidity and chip control of a drill. It is set according to applications. Low axial cutting force Low rigidity Easy-to-cut materials thin ← core → Thick Large axial cutting force High rigidity For machining of high hardness materials, cross hole drilling etc.
Margin	As a drill guide during drilling process. The margin width need to take the hole friction into consideration. Low friction with hole wall, poor guiding performance small ← margin width → large Good guiding performance, high friction with hole wall
Back taper	In order to decrease the friction with inside wall of the drilled hole, there is a slight back taper from tool nose to shank. The degree is usually represented by the quantity decreasing in the diameter per 100 mm flute length.
Body clearance	It is the part formed on the clearance face after margin, mainly to reduce the friction between inside wall of hole and drill peripheral.

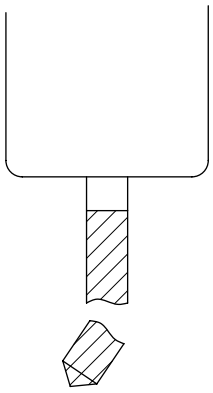
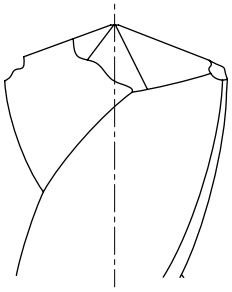
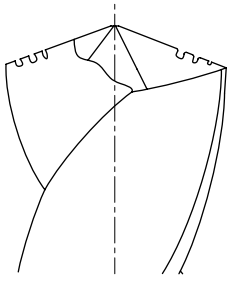
Common problems and solutions for drilling

	Problem	Cause	Solution
Hole	Oversize holes 	Poor clamping Large run-out around spindle	Select the holder and chuck with high precision Calibrating spindle Check and adjust after clamping drill
		Non-symmetric point angle Large run-out Chisel edge is off center	Regrind drill Check the precision after regrinding
	Irregular hole size 	Non-symmetric point angle Large run-out Chisel edge is off center Excessive margin abrasion	Select the holder and chuck with high precision Calibrating the spindle Check and adjust after clamping drill
		Poor clamping Large spindle run-out Workpiece is not firmly held	Select the holder and chuck with high precision Calibrating spindle Check and adjust after clamping drill
		Feed rate is too high	Reduce the feed speed
		Coolant provide is not enough	Change the coolant supply method, or increase coolant volume
	Low position accuracy 	Poor re-positioning precision of spindle Poor clamping Large run-out with spindle	Improve the re-positioning precision of machine Select the holder and chuck with high precision Calibrating the spindle Check and adjust after clamping drill
		The feed direction is not vertical to the workpiece surface	Adjust the feed direction vertical to the workpiece
		Top center not align with the spindle center (lathe)	Check and adjust alignment carefully before drilling
	Bad linearity Bad perpendicularity 	Excessive tool abrasion	Regrind
		Poor center hole accuracy	Increase the position accuracy of hole
		Non-symmetric point angle Large run-out Chisel edge is off center	Regrind drill Check the precision after regrinding
		Insufficient drill rigidity	Increase drill rigidity
		Uneven workpiece surface Top center does not align with the spindle center (lathe)	The workpiece must be horizontal or pre-machined to horizontal before drilling Pre-drill a center hole

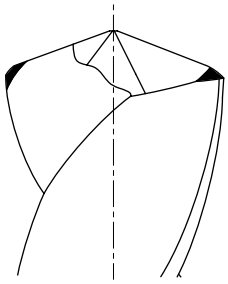
Technical information for solid carbide drills

	Problem	Cause	Solution
Hole	Poor roundness 	Non-symmetric point angle Large drill run-out Chisel edge is off center	Regrind drill Check the precision after regrinding
		Poor clamping Large spindle run-out Workpiece is not firmly held	Select the holder and chuck with high precision Calibrating the spindle Check run-out and adjust after clamping drill
		Clearance angle is too large	Regrind drill
		Insufficient drill rigidity	Increase drill rigidity
	Poor workpiece surface quality	Incorrect regrinding	Regrind calibration
		Insufficient coolant or unsuitable coolant type	Change coolant supply method, increase coolant volume Select the cutting oil with good lubricating property
		Poor clamping Large spindle run-out	Select the holder and chuck with high precision Calibrating the spindle
		Feed rate is too high	Decrease the feed rate
		Excessive abrasion on cutting edge Excessive build-up on margin	Regrind drill Select a coated drill
		Chip jamming	Select a suitable drill (considering flute geometry , helical angle etc) Change the cutting method (adjust feed rate, use step feed etc)
	Poor cylindricity 	Non-symmetric point angle Large drill run-out Chisel edge is off center Excessive margin abrasion	Regrind drill Check the precision after regrinding
		Feed speed is too low	Increase the feed speed

Common problems and solutions for drilling

	Problem	Cause	Solution
Drill	Drill breakage 	Bend ,distortion and slippage of machine and workpiece	Increase the rigidity of drill, machine, workpiece and clamping rigidity
		Clearance angle is too small	Regrind and calibrate
		Feed rate is too high	Decrease the feed rate
		Excessive drill abrasion	Regrind drill
		Chip jamming	Select a suitable drill (considering flute geometry , helical angle etc) Change the cutting method (adjust feed rate, use step feed etc)
		Difficult entering the workpiece	Increase the rigidity of drill and machine Increase rigidity of workpiece and clamping. Select the drill with a sharp point for easy entry Pre-drill a centre hole Adjust the level of workpiece or pre-machined to horizontal before drilling Use guide bushing or bushing plate
	Chipping on the cutting corner 	Unsuitable drill material	Select the suitable drill material
		Hard lump on the workpiece	Analyse the workpiece or select a suitable workpiece Change the cutting parameters(cutting speed , feed rate or machining method)
		Feed rate is too high	Reduce feed rate
		Insufficient coolant	Change coolant supply method, increase coolant volume
	Breakage 	Poor clamping Large spindle run-out	Select the holder and chuck with high precision Calibrating the spindle
		Cutting speed and feed speed are too high	Reduce the cutting speed and feed speed.
		Clearance angle is too large	Regrind and calibrate
		Unsuitable drill material	Select the suitable drill material

Technical information for solid carbide drills

	Problem	Cause	Solution
Drill	Abnormal abrasion on cutting corner 	Regrinding delay	Regrind in time
		Drill point does not align with the spindle center (lathe)	Check and adjust alignment carefully before drilling
		Cutting speed is too high	Reduce cutting speed
		Cutting edge shape is inappropriate	Select appropriate cutting edge shape
		Unsuitable drill material	Select suitable drill material
		Incorrect coolant type	Change coolant
	Abrasion and chipping on chisel edge	Feed speed is too high	Reduce feed speed.
		Cutting edge shape is inappropriate	Select appropriate cutting edge shap
		Unsuitable drill material	Select suitable drill material
		Clearance angle is too small	Regrind drill
	Breakage on margin	The size of guide bushing or drill bushing is too large	Select another bush with correct size
	Margin build-up	Excessive abrasion on cutting edge generates high heat	Regrind drill
		Insufficient coolant	Change coolant supply method, increase coolant volume
		Incorrect coolant type	Change coolant
		Workpiece material is too soft	Change drill or machining method
	High vibration	Clearance angle is too large	Regrind drill
		Drill rigidity is not enough	Increase drill rigidity
	Chips roll around the drill	Long chips Chip removal is not fluent	Change the drill and adjust machining method and cutting parameters
	One-side abrasion	Drill point does not align with the spindle center (lathe)	Check and adjust the alignment carefully before drilling
		Poor clamping	Fix drill carefully, control the radial run-out

How to choose the right indexable shallow drills

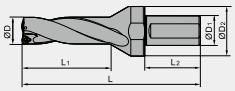
Product category

Shape

Indexable shallow drills

3D





Type	Stock	Basic dimension(mm)						Applicable inserts	Screw	Wrench
		D	D1	D2	L2	L1	L			
ZD03-400-XP40-WC06-02	△	40	40	60	70	125	231	WCMX06T308	I60M3×7	WT09IP
ZD03-410-XP40-WC06-02	△	41	40	60	70	128	234	WCMX06T308	I60M3×7	WT09IP
ZD03-420-XP40-WC08-02	△	42	40	60	70	131	239	WCMX080412	I60M3.5×10.4	WT15IP
ZD03-430-XP40-WC08-02	△	43	40	60	70	134	242	WCMX080412	I60M3.5×10.4	WT15IP
ZD03-440-XP40-WC08-02	△	44	40	60	70	137	245	WCMX080412	I60M3.5×10.4	WT15IP
ZD03-450-XP40-WC08-02	△	45	40	60	70	140	248	WCMX080412	I60M3.5×10.4	WT15IP
ZD03-460-XP40-WC08-02	△	46	40	60	70	143	251	WCMX080412	I60M3.5×10.4	WT15IP
ZD03-470-XP40-WC08-02	△	47	40	60	70	146	253	WCMX080412	I60M3.5×10.4	WT15IP
ZD03-480-XP40-WC08-02	△	48	40	70	70	149	255	WCMX080412	I60M3.5×10.4	WT15IP
ZD03-490-XP40-WC08-02	△	49	40	70	70	152	257	WCMX080412	I60M3.5×10.4	WT15IP
ZD03-500-XP40-WC08-02	△	50	40	70	70	155	259	WCMX080412	I60M3.5×10.4	WT15IP
ZD03-510-XP40-WC08-02	△	51	40	70	70	158	261	WCMX080412	I60M3.5×10.4	WT15IP
ZD03-520-XP40-WC08-02	△	52	40	70	70	161	263	WCMX080412	I60M3.5×10.4	WT15IP
ZD03-530-XP40-WC08-02	△	53	40	70	70	164	265	WCMX080412	I60M3.5×10.4	WT15IP
ZD03-540-XP40-WC08-02	△	54	40	70	70	167	267	WCMX080412	I60M3.5×10.4	WT15IP
ZD03-550-XP40-WC08-02	△	55	40	70	70	170	269	WCMX080412	I60M3.5×10.4	WT15IP
ZD03-560-XP40-WC08-02	△	56	40	70	70	173	271	WCMX080412	I60M3.5×10.4	WT15IP
ZD03-570-XP40-WC08-02	△	57	40	70	70	176	273	WCMX080412	I60M3.5×10.4	WT15IP
ZD03-580-XP40-WC08-02	△	58	40	70	70	179	275	WCMX080412	I60M3.5×10.4	WT15IP

▲Stock available △Make-to-order

ZTD03 applicable inserts

-53



-PG



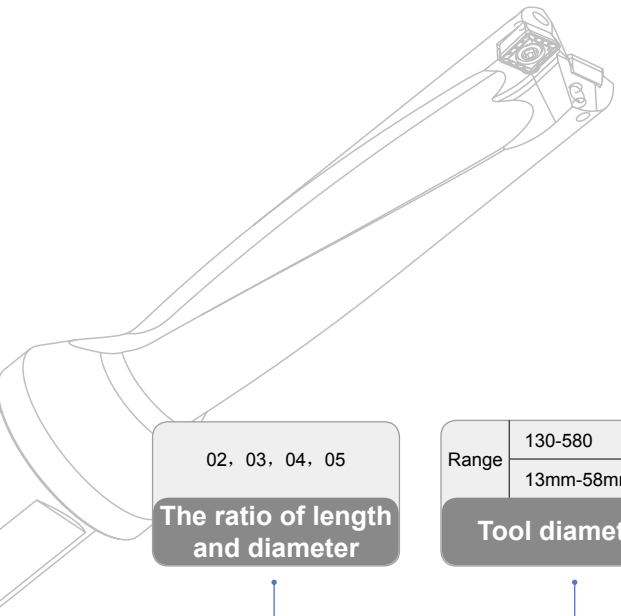
Type	Basic dimension(mm)					Grade
	L	ØI.C	s	d	r	YBG202
WCMX030208R-53	3.8	5.56	2.38	2.8	0.8	★
WCMX040208R-53	4.3	6.35	2.38	3.1	0.8	★
WCMX050308R-53	5.4	7.94	3.18	3.2	0.8	★
WCMX06T308R-53	6.5	9.525	3.97	3.7	0.8	★
WCMX080412R-53	8.7	12.7	4.76	4.3	1.2	★
WCMX030208R-PG	3.8	5.56	2.38	2.8	0.8	★
WCMX040208R-PG	4.3	6.35	2.38	3.1	0.8	★
WCMX050308R-PG	5.4	7.94	3.18	3.2	0.8	★
WCMX06T308R-PG	6.5	9.525	3.97	3.7	0.8	★
WCMX080412R-PG	8.7	12.7	4.76	4.3	1.2	★

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

Inserts specification
Including type, dimension, grade and stock.

Tool specification
Including type, dimension, applicable inserts and spare parts

Indexable shallow drill code key



The ratio of length and diameter
02，03，04，05

Tool diameter	
Range	130-580
	13mm-58mm

Insert shape	
W	80°
S	

Insert clearance angle	
C	7°
P	11°

Cutting edge length(mm)		
Code	Edge length	
	W	S
03	3.8	
04	4.3	
05	5.4	5.0
06	6.5	6.0
07		7.94
08	8.7	
09		9.8
11		11.5

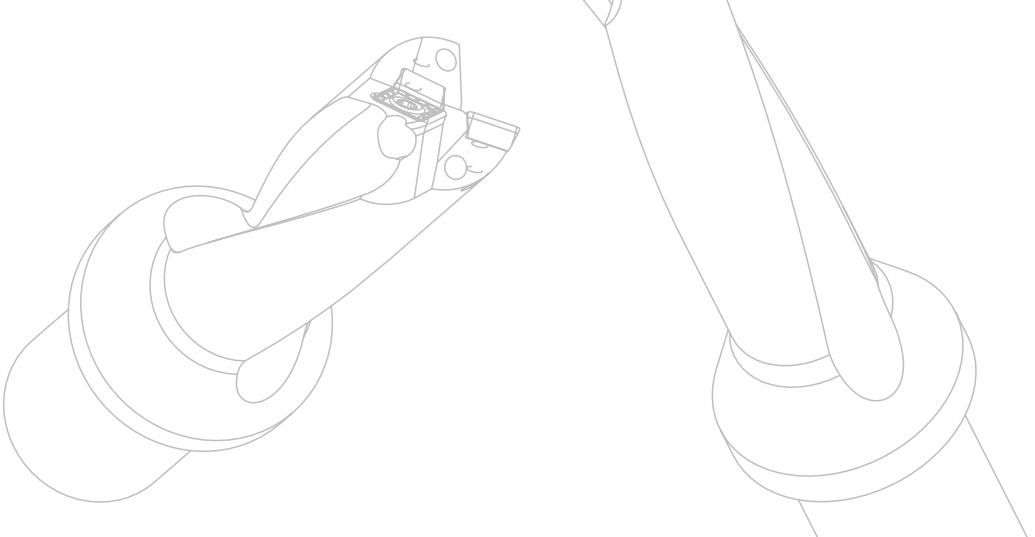
ZD 03 - 300 - XP 32 - W C 05 - 02

Tool type	
Code	Description
ZD	Shallow drill
ZTD	Double helical inner coolant indexable shallow drill

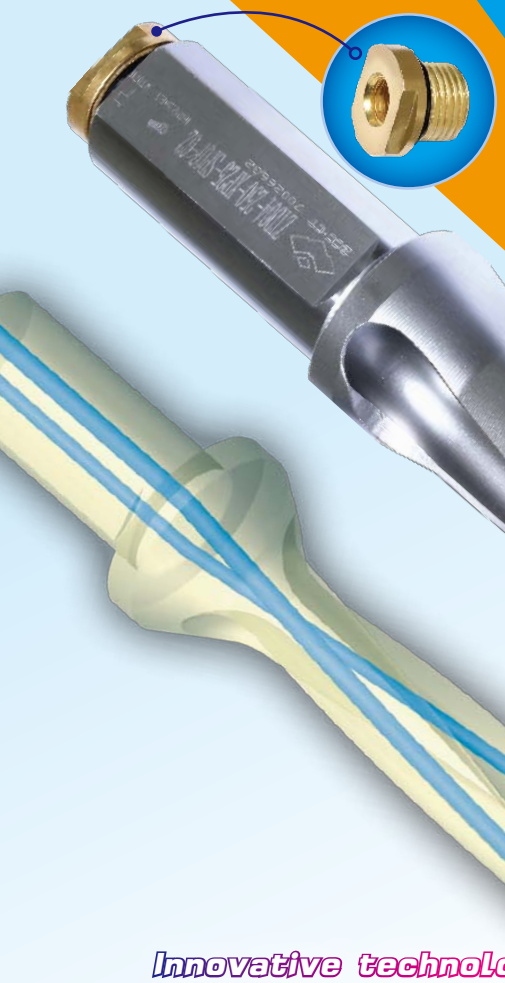
Coupling structure and type	
Code	Description
XP	Weldon shank

Coupling size(mm)
20，25，32，40

Number of tooth



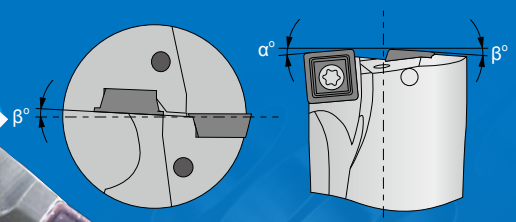
Silver fox -New indexable drills for shallow holes



1. Internal coolant hose connecter, which is used in lathe.

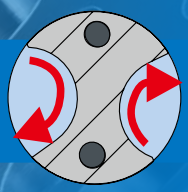
2. New tool body material with greatly improved tool rigidity.

3. Tool body with specially treated coating for superior lubricating performance.



4. Optimized structure for better chip breaking, lower vibration during cutting, higher machining precision.

5. Extremely large chip pocket, innovative liquid angle, for smoother chip evacuation.



Innovative technology fully upgrading

Optimized flutes and double spiraled internal coolant holes for high efficient drilling.

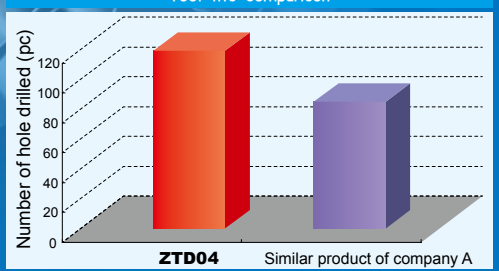
Case

Tool applied	ZTD04-260-XP25-SP07-02
Insert applied	SPGT07T308-PM /YBG205(Peripheral edge)
	SPGT07T308-PM /YBG212(Inner edge)
Workpiece material	50Mn(HB240)
Cooling system	Double helical internal cooling
Cutting parameters	V_c=130m/min f=210mm/min a_p=90mm



Machining situation

Tool life comparison



Chips

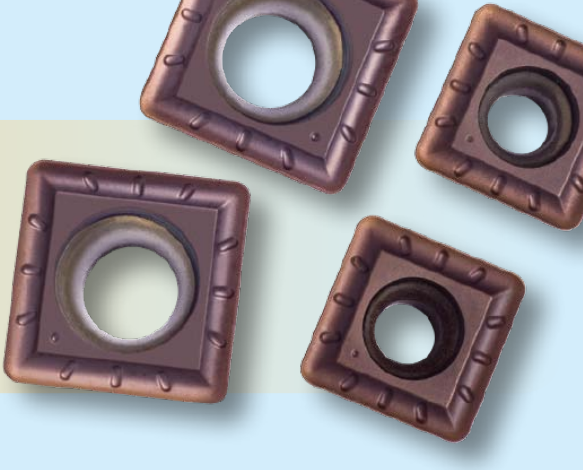


ZTD04-260-XP25-SP07-02



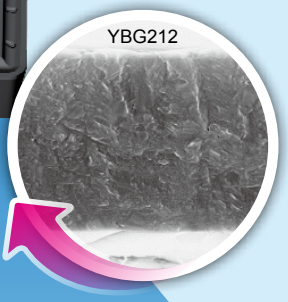
Similar product of company A

- Optimized cutting edge design ensures more stable cutting and better chip breaking.
- Meeting the requirements of central edge and peripheral edge with economy and efficiency.
- Perfect combination of grade and chipbreaker solves all your difficulties in machining.





Inner edge insert

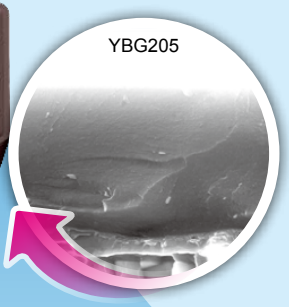


YBG212

- Special coating technology makes insert surface smooth, reducing friction and ensuring unobstructed chip flow.
- Unique nano coating, stronger combination of substrate and highly wear-resistant TiAlN coating, higher toughness and hardness.
- Good thermal stability and chemical stability of coating provide more effective protection for the cutting edge.
- Ultra-fine solid carbide substrate with high toughness ensures high strength of cutting edge.



Peripheral edge insert



YBG205

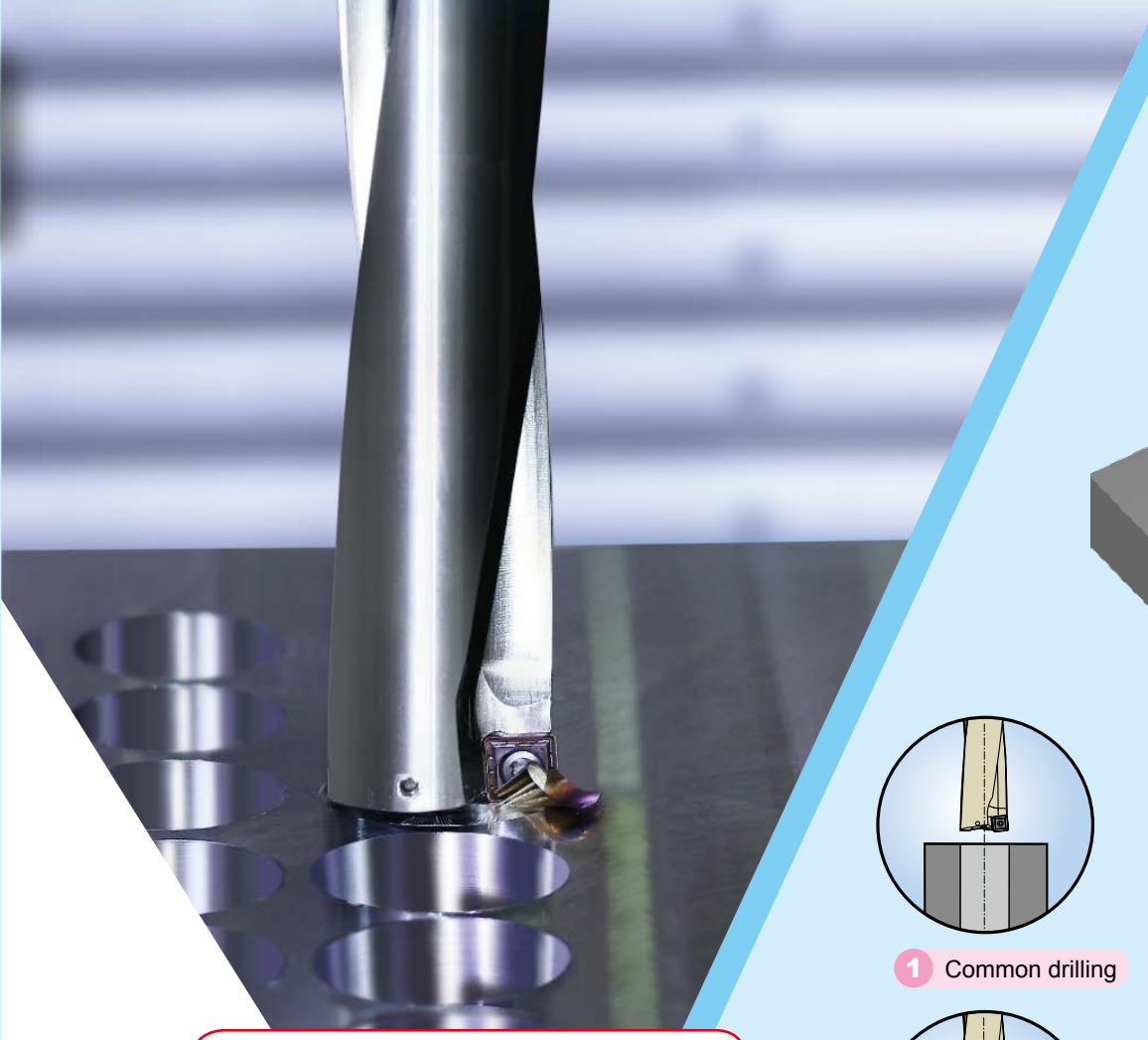
- Ultra-fine TiAlN base nano coating added with wear-resistant and heat-resistant rare elements greatly improves over-all properties.
- Special coating technology ensures stronger combination of substrate and coating.
- Thin PVD coating, sharp cutting edge.
- Fine grain WC base solid carbide with high hardness and high toughness.
- Special surface treatment after coating improves surface finish while eliminating harmful stress.



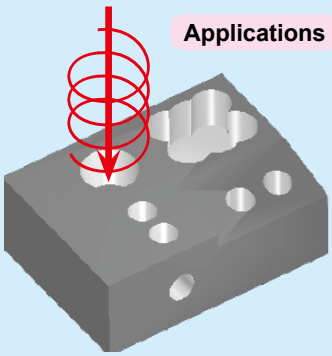
Because of the low speed of inner edge and the poor working condition, there is high requirement for insert toughness. Therefore, YBG212 with good over-all properties is recommended for inner edge and YBG205 with high wear resistance for peripheral edge.

Case

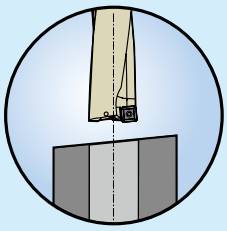
Workpiece		Cooling system	Double helical internal cooling	
		Insert applied	SPGT07T308-PM/YBG205	Similar product of company A
Workpiece material	42CrMo（HRC25）	Comparison of insert abrasion (after 15 minutes of machining)		
Cutting parameters	V_c=150m/min f_r=0.12mm/r a_p=80mm			



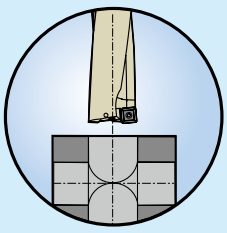
If stationary drilling method is used, the small ejected discs may lead to accidents when workpiece is drilled through, so please see to it that the machine has adequate safety measurements.



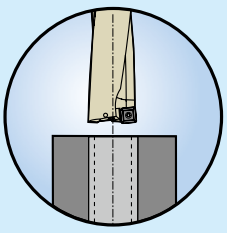
1 Common drilling



2 inclined face drilling



3 Cross-hole drilling



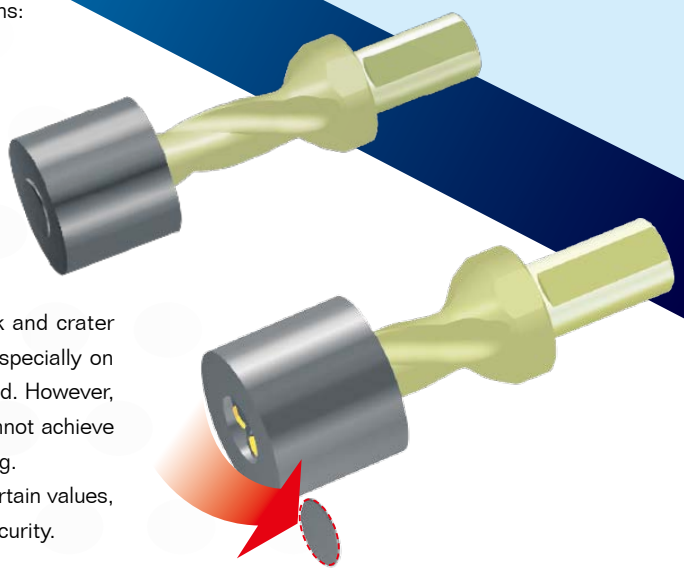
4 Counter boring

Safety information

Breakage

Chipping on cutting edges can be caused by various conditions:

- Off-center drill.
- Tool overhang or feed rate is too large.
- Incorrect inserts seating, tip seat was damaged.
- Poor insert stability.
- Insufficient coolant supply.
- Incorrect insert chipbreaker or grade.



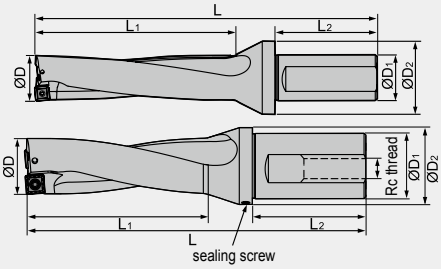
Insert abrasion

The two most common types of insert abrasion are flank and crater abrasion. The flank abrasion is generally natural abrasion, especially on the peripheral insert which is applied with higher cutting speed. However, this abrasion will finally result that the insert cutting edge cannot achieve the tolerance and/or surface quality required for the machining.

In drilling operations, if flank and crater abrasion exceed certain values, the inserts should be changed without delay for production security.

Indexable shallow drills ZTD02 2D





Picture 1

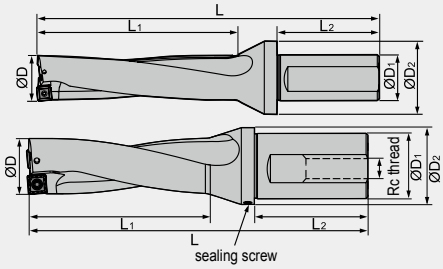
Picture 2

Type	Stock	Basic dimension(mm)						Applicable inserts	Insert screw	wrench	sealing screw	Rc thread	style
		ØD	ØD1	ØD2	L1	L2	L						
ZTD02-130-XP20-SP05-02	▲	13	20	25	31	50	98	SPGT050204-PM/EM	I60M2×4.3	WT06IP			
ZTD02-140-XP20-SP05-02	▲	14	20	25	33	50	100	SPGT050204-PM/EM	I60M2×4.3	WT06IP			
ZTD02-150-XP20-SP05-02	▲	15	20	25	35	50	102	SPGT050204-PM/EM	I60M2×4.3	WT06IP			
ZTD02-160-XP20-SP05-02	▲	16	20	25	37	50	104	SPGT050204-PM/EM	I60M2×4.3	WT06IP			
ZTD02-170-XP25-SP06-02	▲	17	25	32	39	56	117	SPGT060204-PM/EM	I60M2.2×5.5	WT07IP			
ZTD02-180-XP25-SP06-02	▲	18	25	32	41	56	119	SPGT060204-PM/EM	I60M2.2×5.5	WT07IP			
ZTD02-190-XP25-SP06-02	▲	19	25	32	43	56	121	SPGT060204-PM/EM	I60M2.2×5.5	WT07IP			
ZTD02-200-XP25-SP06-02	▲	20	25	32	45	56	123	SPGT060204-PM/EM	I60M2.2×5.5	WT07IP			
ZTD02-210-XP25-SP06-02	▲	21	25	32	47	56	125	SPGT060204-PM/EM	I60M2.2×5.5	WT07IP			
ZTD02-220-XP25-SP07-02	▲	22	25	32	49	56	127	SPGT07T308-PM/EM	I60M2.5×6.5	WT07IP			
ZTD02-230-XP25-SP07-02	▲	23	25	32	51	56	129	SPGT07T308-PM/EM	I60M2.5×6.5	WT07IP	---	---	Picture 1
ZTD02-240-XP25-SP07-02	▲	24	25	32	53	56	131	SPGT07T308-PM/EM	I60M2.5×6.5	WT07IP			
ZTD02-250-XP25-SP07-02	▲	25	25	32	55	56	133	SPGT07T308-PM/EM	I60M2.5×6.5	WT07IP			
ZTD02-260-XP25-SP07-02	▲	26	25	32	57	56	135	SPGT07T308-PM/EM	I60M2.5×6.5	WT07IP			
ZTD02-270-XP25-SP07-02	▲	27	25	32	59	56	137	SPGT07T308-PM/EM	I60M2.5×6.5	WT07IP			
ZTD02-280-XP32-SP09-02	▲	28	32	37	61	60	146	SPGT090408-PM/EM	I60M3.5×8	WT15IP			
ZTD02-290-XP32-SP09-02	▲	29	32	37	63	60	148	SPGT090408-PM/EM	I60M3.5×8	WT15IP			
ZTD02-300-XP32-SP09-02	▲	30	32	37	65	60	150	SPGT090408-PM/EM	I60M3.5×8	WT15IP			
ZTD02-310-XP32-SP09-02	▲	31	32	37	67	60	152	SPGT090408-PM/EM	I60M3.5×8	WT15IP			
ZTD02-320-XP32-SP09-02	▲	32	32	37	69	60	154	SPGT090408-PM/EM	I60M3.5×8	WT15IP			
ZTD02-330-XP32-SP09-02	▲	33	32	37	71	60	156	SPGT090408-PM/EM	I60M3.5×8	WT15IP			
ZTD02-340-XP40-SP11-02	▲	34	40	47	73	70	173	SPGT110408-PM/EM	I60M4×10	WT15IP			
ZTD02-350-XP40-SP11-02	▲	35	40	47	75	70	175	SPGT110408-PM/EM	I60M4×10	WT15IP			
ZTD02-360-XP40-SP11-02	▲	36	40	47	77	70	177	SPGT110408-PM/EM	I60M4×10	WT15IP			
ZTD02-370-XP40-SP11-02	▲	37	40	47	79	70	179	SPGT110408-PM/EM	I60M4×10	WT15IP			
ZTD02-380-XP40-SP11-02	▲	38	40	47	81	70	181	SPGT110408-PM/EM	I60M4×10	WT15IP	M6×6	Rc1/4	Picture 2
ZTD02-390-XP40-SP11-02	▲	39	40	47	83	70	183	SPGT110408-PM/EM	I60M4×10	WT15IP			
ZTD02-400-XP40-SP11-02	▲	40	40	47	85	70	185	SPGT110408-PM/EM	I60M4×10	WT15IP			
ZTD02-410-XP40-SP11-02	▲	41	40	47	87	70	187	SPGT110408-PM/EM	I60M4×10	WT15IP			
ZTD02-420-XP40-SP14-02	△	42	40	52	89	70	199	SPGT140512-PM/EM	I60M5×13	WT20IP			
ZTD02-430-XP40-SP14-02	△	43	40	52	91	70	201	SPGT140512-PM/EM	I60M5×13	WT20IP			
ZTD02-440-XP40-SP14-02	△	44	40	52	93	70	203	SPGT140512-PM/EM	I60M5×13	WT20IP			
ZTD02-450-XP40-SP14-02	△	45	40	52	95	70	205	SPGT140512-PM/EM	I60M5×13	WT20IP			
ZTD02-460-XP40-SP14-02	△	46	40	52	97	70	207	SPGT140512-PM/EM	I60M5×13	WT20IP			
ZTD02-470-XP40-SP14-02	△	47	40	52	99	70	209	SPGT140512-PM/EM	I60M5×13	WT20IP	M8×8	Rc1/4	Picture 2
ZTD02-480-XP40-SP14-02	△	48	40	52	101	70	211	SPGT140512-PM/EM	I60M5×13	WT20IP			
ZTD02-490-XP40-SP14-02	△	49	40	52	103	70	213	SPGT140512-PM/EM	I60M5×13	WT20IP			
ZTD02-500-XP40-SP14-02	△	50	40	52	105	70	215	SPGT140512-PM/EM	I60M5×13	WT20IP			

▲Stock available △Make-to-order

Indexable shallow drills ZTD03 3D





Picture 1

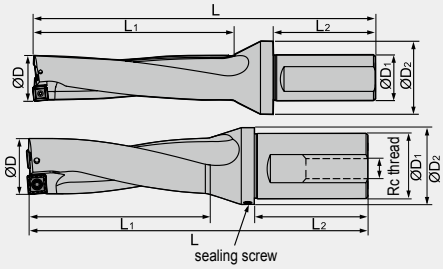
Picture 2

Type	Stock	Basic dimension(mm)						Applicable inserts	Insert screw	wrench	sealing screw	Rc thread	style
		ØD	ØD1	ØD2	L1	L2	L						
ZTD03-130-XP20-SP05-02	▲	13	20	25	44	50	111	SPGT050204-PM/EM	I60M2×4.3	WT06IP			
ZTD03-140-XP20-SP05-02	▲	14	20	25	47	50	114	SPGT050204-PM/EM	I60M2×4.3	WT06IP			
ZTD03-150-XP20-SP05-02	▲	15	20	25	50	50	117	SPGT050204-PM/EM	I60M2×4.3	WT06IP			
ZTD03-160-XP20-SP05-02	▲	16	20	25	53	50	120	SPGT050204-PM/EM	I60M2×4.3	WT06IP			
ZTD03-170-XP25-SP06-02	▲	17	25	32	56	56	134	SPGT060204-PM/EM	I60M2.2×5.5	WT07IP			
ZTD03-180-XP25-SP06-02	▲	18	25	32	59	56	137	SPGT060204-PM/EM	I60M2.2×5.5	WT07IP			
ZTD03-190-XP25-SP06-02	▲	19	25	32	62	56	140	SPGT060204-PM/EM	I60M2.2×5.5	WT07IP			
ZTD03-200-XP25-SP06-02	▲	20	25	32	65	56	143	SPGT060204-PM/EM	I60M2.2×5.5	WT07IP			
ZTD03-210-XP25-SP06-02	▲	21	25	32	68	56	146	SPGT060204-PM/EM	I60M2.2×5.5	WT07IP			
ZTD03-220-XP25-SP07-02	▲	22	25	32	71	56	149	SPGT07T308-PM/EM	I60M2.5×6.5	WT07IP			
ZTD03-230-XP25-SP07-02	▲	23	25	32	74	56	152	SPGT07T308-PM/EM	I60M2.5×6.5	WT07IP	---	---	Picture 1
ZTD03-240-XP25-SP07-02	▲	24	25	32	77	56	155	SPGT07T308-PM/EM	I60M2.5×6.5	WT07IP			
ZTD03-250-XP25-SP07-02	▲	25	25	32	80	56	158	SPGT07T308-PM/EM	I60M2.5×6.5	WT07IP			
ZTD03-260-XP25-SP07-02	▲	26	25	32	83	56	161	SPGT07T308-PM/EM	I60M2.5×6.5	WT07IP			
ZTD03-270-XP25-SP07-02	▲	27	25	32	86	56	164	SPGT07T308-PM/EM	I60M2.5×6.5	WT07IP			
ZTD03-280-XP32-SP09-02	▲	28	32	37	89	60	174	SPGT090408-PM/EM	I60M3.5×8	WT15IP			
ZTD03-290-XP32-SP09-02	▲	29	32	37	92	60	177	SPGT090408-PM/EM	I60M3.5×8	WT15IP			
ZTD03-300-XP32-SP09-02	▲	30	32	37	95	60	180	SPGT090408-PM/EM	I60M3.5×8	WT15IP			
ZTD03-310-XP32-SP09-02	▲	31	32	37	98	60	183	SPGT090408-PM/EM	I60M3.5×8	WT15IP			
ZTD03-320-XP32-SP09-02	▲	32	32	37	101	60	186	SPGT090408-PM/EM	I60M3.5×8	WT15IP			
ZTD03-330-XP32-SP09-02	▲	33	32	37	104	60	189	SPGT090408-PM/EM	I60M3.5×8	WT15IP			
ZTD03-340-XP40-SP11-02	▲	34	40	47	107	70	207	SPGT110408-PM/EM	I60M4×10	WT15IP			
ZTD03-350-XP40-SP11-02	▲	35	40	47	110	70	210	SPGT110408-PM/EM	I60M4×10	WT15IP			
ZTD03-360-XP40-SP11-02	▲	36	40	47	113	70	213	SPGT110408-PM/EM	I60M4×10	WT15IP			
ZTD03-370-XP40-SP11-02	▲	37	40	47	116	70	216	SPGT110408-PM/EM	I60M4×10	WT15IP			
ZTD03-380-XP40-SP11-02	▲	38	40	47	119	70	219	SPGT110408-PM/EM	I60M4×10	WT15IP	M6×6	Rc1/4	Picture 2
ZTD03-390-XP40-SP11-02	▲	39	40	47	122	70	222	SPGT110408-PM/EM	I60M4×10	WT15IP			
ZTD03-400-XP40-SP11-02	▲	40	40	47	125	70	225	SPGT110408-PM/EM	I60M4×10	WT15IP			
ZTD03-410-XP40-SP11-02	▲	41	40	47	128	70	228	SPGT110408-PM/EM	I60M4×10	WT15IP			
ZTD03-420-XP40-SP14-02	△	42	40	52	131	70	241	SPGT140512-PM/EM	I60M5×13	WT20IP			
ZTD03-430-XP40-SP14-02	△	43	40	52	134	70	244	SPGT140512-PM/EM	I60M5×13	WT20IP			
ZTD03-440-XP40-SP14-02	△	44	40	52	137	70	247	SPGT140512-PM/EM	I60M5×13	WT20IP			
ZTD03-450-XP40-SP14-02	△	45	40	52	140	70	250	SPGT140512-PM/EM	I60M5×13	WT20IP			
ZTD03-460-XP40-SP14-02	△	46	40	52	143	70	253	SPGT140512-PM/EM	I60M5×13	WT20IP			
ZTD03-470-XP40-SP14-02	△	47	40	52	146	70	256	SPGT140512-PM/EM	I60M5×13	WT20IP	M8×8	Rc1/4	Picture 2
ZTD03-480-XP40-SP14-02	△	48	40	52	149	70	259	SPGT140512-PM/EM	I60M5×13	WT20IP			
ZTD03-490-XP40-SP14-02	△	49	40	52	152	70	262	SPGT140512-PM/EM	I60M5×13	WT20IP			
ZTD03-500-XP40-SP14-02	△	50	40	52	155	70	265	SPGT140512-PM/EM	I60M5×13	WT20IP			

▲Stock available △Make-to-order

Indexable shallow drills ZTD04 4D





Picture 1

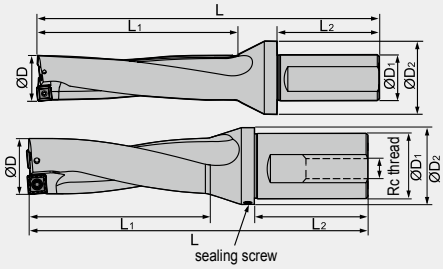
Picture 2

Type	Stock	Basic dimension(mm)						Applicable inserts	Insert screw	wrench	sealing screw	Rc thread	style
		ØD	ØD1	ØD2	L1	L2	L						
ZTD04-130-XP20-SP05-02	▲	13	20	25	57	50	124	SPGT050204-PM/EM	I60M2×4.3	WT06IP			
ZTD04-140-XP20-SP05-02	▲	14	20	25	61	50	128	SPGT050204-PM/EM	I60M2×4.3	WT06IP			
ZTD04-150-XP20-SP05-02	▲	15	20	25	65	50	132	SPGT050204-PM/EM	I60M2×4.3	WT06IP			
ZTD04-160-XP20-SP05-02	▲	16	20	25	69	50	136	SPGT050204-PM/EM	I60M2×4.3	WT06IP			
ZTD04-170-XP25-SP06-02	▲	17	25	32	73	56	151	SPGT060204-PM/EM	I60M2.2×5.5	WT07IP			
ZTD04-180-XP25-SP06-02	▲	18	25	32	77	56	155	SPGT060204-PM/EM	I60M2.2×5.5	WT07IP			
ZTD04-190-XP25-SP06-02	▲	19	25	32	81	56	159	SPGT060204-PM/EM	I60M2.2×5.5	WT07IP			
ZTD04-200-XP25-SP06-02	▲	20	25	32	85	56	163	SPGT060204-PM/EM	I60M2.2×5.5	WT07IP			
ZTD04-210-XP25-SP06-02	▲	21	25	32	89	56	167	SPGT060204-PM/EM	I60M2.2×5.5	WT07IP			
ZTD04-220-XP25-SP07-02	▲	22	25	32	93	56	171	SPGT07T308-PM/EM	I60M2.5×6.5	WT07IP			
ZTD04-230-XP25-SP07-02	▲	23	25	32	97	56	175	SPGT07T308-PM/EM	I60M2.5×6.5	WT07IP	---	---	Picture 1
ZTD04-240-XP25-SP07-02	▲	24	25	32	101	56	179	SPGT07T308-PM/EM	I60M2.5×6.5	WT07IP			
ZTD04-250-XP25-SP07-02	▲	25	25	32	105	56	183	SPGT07T308-PM/EM	I60M2.5×6.5	WT07IP			
ZTD04-260-XP25-SP07-02	▲	26	25	32	109	56	187	SPGT07T308-PM/EM	I60M2.5×6.5	WT07IP			
ZTD04-270-XP25-SP07-02	▲	27	25	32	113	56	191	SPGT07T308-PM/EM	I60M2.5×6.5	WT07IP			
ZTD04-280-XP32-SP09-02	▲	28	32	37	117	60	202	SPGT090408-PM/EM	I60M3.5×8	WT15IP			
ZTD04-290-XP32-SP09-02	▲	29	32	37	121	60	206	SPGT090408-PM/EM	I60M3.5×8	WT15IP			
ZTD04-300-XP32-SP09-02	▲	30	32	37	125	60	210	SPGT090408-PM/EM	I60M3.5×8	WT15IP			
ZTD04-310-XP32-SP09-02	▲	31	32	37	129	60	214	SPGT090408-PM/EM	I60M3.5×8	WT15IP			
ZTD04-320-XP32-SP09-02	▲	32	32	37	133	60	218	SPGT090408-PM/EM	I60M3.5×8	WT15IP			
ZTD04-330-XP32-SP09-02	▲	33	32	37	137	60	222	SPGT090408-PM/EM	I60M3.5×8	WT15IP			
ZTD04-340-XP40-SP11-02	▲	34	40	47	141	70	241	SPGT110408-PM/EM	I60M4×10	WT15IP			
ZTD04-350-XP40-SP11-02	▲	35	40	47	145	70	245	SPGT110408-PM/EM	I60M4×10	WT15IP			
ZTD04-360-XP40-SP11-02	▲	36	40	47	149	70	249	SPGT110408-PM/EM	I60M4×10	WT15IP			
ZTD04-370-XP40-SP11-02	▲	37	40	47	153	70	253	SPGT110408-PM/EM	I60M4×10	WT15IP			
ZTD04-380-XP40-SP11-02	▲	38	40	47	157	70	257	SPGT110408-PM/EM	I60M4×10	WT15IP	M6×6	Rc1/4	Picture 2
ZTD04-390-XP40-SP11-02	▲	39	40	47	161	70	261	SPGT110408-PM/EM	I60M4×10	WT15IP			
ZTD04-400-XP40-SP11-02	▲	40	40	47	165	70	265	SPGT110408-PM/EM	I60M4×10	WT15IP			
ZTD04-410-XP40-SP11-02	▲	41	40	47	169	70	269	SPGT110408-PM/EM	I60M4×10	WT15IP			
ZTD04-420-XP40-SP14-02	△	42	40	52	173	70	283	SPGT140512-PM/EM	I60M5×13	WT20IP			
ZTD04-430-XP40-SP14-02	△	43	40	52	177	70	287	SPGT140512-PM/EM	I60M5×13	WT20IP			
ZTD04-440-XP40-SP14-02	△	44	40	52	181	70	291	SPGT140512-PM/EM	I60M5×13	WT20IP			
ZTD04-450-XP40-SP14-02	△	45	40	52	185	70	295	SPGT140512-PM/EM	I60M5×13	WT20IP			
ZTD04-460-XP40-SP14-02	△	46	40	52	189	70	299	SPGT140512-PM/EM	I60M5×13	WT20IP			
ZTD04-470-XP40-SP14-02	△	47	40	52	193	70	303	SPGT140512-PM/EM	I60M5×13	WT20IP	M8×8	Rc1/4	Picture 2
ZTD04-480-XP40-SP14-02	△	48	40	52	197	70	307	SPGT140512-PM/EM	I60M5×13	WT20IP			
ZTD04-490-XP40-SP14-02	△	49	40	52	201	70	311	SPGT140512-PM/EM	I60M5×13	WT20IP			
ZTD04-500-XP40-SP14-02	△	50	40	52	205	70	315	SPGT140512-PM/EM	I60M5×13	WT20IP			

▲Stock available △Make-to-order

Indexable shallow drills ZTD05 5D





Picture 1

Picture 2

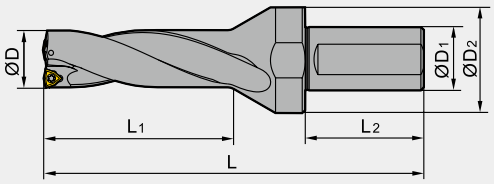
Type	Stock	Basic dimension(mm)						Applicable inserts	Insert screw	wrench	sealing screw	Rc thread	style
		ØD	ØD1	ØD2	L1	L2	L						
ZTD05-170-XP25-SP06-02	▲	17	25	32	90	56	168	SPGT060204-PM/EM	I60M2.2×5.5	WT07IP			
ZTD05-180-XP25-SP06-02	▲	18	25	32	95	56	173	SPGT060204-PM/EM	I60M2.2×5.5	WT07IP			
ZTD05-190-XP25-SP06-02	▲	19	25	32	100	56	178	SPGT060204-PM/EM	I60M2.2×5.5	WT07IP			
ZTD05-200-XP25-SP06-02	▲	20	25	32	105	56	183	SPGT060204-PM/EM	I60M2.2×5.5	WT07IP			
ZTD05-210-XP25-SP06-02	▲	21	25	32	110	56	188	SPGT060204-PM/EM	I60M2.2×5.5	WT07IP			
ZTD05-220-XP25-SP07-02	▲	22	25	32	115	56	193	SPGT07T308-PM/EM	I60M2.5×6.5	WT07IP			
ZTD05-230-XP25-SP07-02	▲	23	25	32	120	56	198	SPGT07T308-PM/EM	I60M2.5×6.5	WT07IP			
ZTD05-240-XP25-SP07-02	▲	24	25	32	125	56	203	SPGT07T308-PM/EM	I60M2.5×6.5	WT07IP			
ZTD05-250-XP25-SP07-02	▲	25	25	32	130	56	208	SPGT07T308-PM/EM	I60M2.5×6.5	WT07IP	---	---	Picture 1
ZTD05-260-XP25-SP07-02	▲	26	25	32	135	56	213	SPGT07T308-PM/EM	I60M2.5×6.5	WT07IP			
ZTD05-270-XP25-SP07-02	▲	27	25	32	140	56	218	SPGT07T308-PM/EM	I60M2.5×6.5	WT07IP			
ZTD05-280-XP32-SP09-02	▲	28	32	37	145	60	230	SPGT090408-PM/EM	I60M3.5×8	WT15IP			
ZTD05-290-XP32-SP09-02	▲	29	32	37	150	60	235	SPGT090408-PM/EM	I60M3.5×8	WT15IP			
ZTD05-300-XP32-SP09-02	▲	30	32	37	155	60	240	SPGT090408-PM/EM	I60M3.5×8	WT15IP			
ZTD05-310-XP32-SP09-02	▲	31	32	37	160	60	245	SPGT090408-PM/EM	I60M3.5×8	WT15IP			
ZTD05-320-XP32-SP09-02	▲	32	32	37	165	60	250	SPGT090408-PM/EM	I60M3.5×8	WT15IP			
ZTD05-330-XP32-SP09-02	▲	33	32	37	170	60	255	SPGT090408-PM/EM	I60M3.5×8	WT15IP			
ZTD05-340-XP40-SP11-02	▲	34	40	47	175	70	275	SPGT110408-PM/EM	I60M4×10	WT15IP			
ZTD05-350-XP40-SP11-02	▲	35	40	47	180	70	280	SPGT110408-PM/EM	I60M4×10	WT15IP			
ZTD05-360-XP40-SP11-02	▲	36	40	47	185	70	285	SPGT110408-PM/EM	I60M4×10	WT15IP			
ZTD05-370-XP40-SP11-02	▲	37	40	47	190	70	290	SPGT110408-PM/EM	I60M4×10	WT15IP			
ZTD05-380-XP40-SP11-02	▲	38	40	47	195	70	295	SPGT110408-PM/EM	I60M4×10	WT15IP	M6×6	Rc1/4	Picture 2
ZTD05-390-XP40-SP11-02	▲	39	40	47	200	70	300	SPGT110408-PM/EM	I60M4×10	WT15IP			
ZTD05-400-XP40-SP11-02	▲	40	40	47	205	70	305	SPGT110408-PM/EM	I60M4×10	WT15IP			
ZTD05-410-XP40-SP11-02	▲	41	40	47	210	70	310	SPGT110408-PM/EM	I60M4×10	WT15IP			
ZTD05-420-XP40-SP14-02	△	42	40	52	215	70	325	SPGT140512-PM/EM	I60M5×13	WT20IP			
ZTD05-430-XP40-SP14-02	△	43	40	52	220	70	330	SPGT140512-PM/EM	I60M5×13	WT20IP			
ZTD05-440-XP40-SP14-02	△	44	40	52	225	70	335	SPGT140512-PM/EM	I60M5×13	WT20IP			
ZTD05-450-XP40-SP14-02	△	45	40	52	230	70	340	SPGT140512-PM/EM	I60M5×13	WT20IP			
ZTD05-460-XP40-SP14-02	△	46	40	52	235	70	345	SPGT140512-PM/EM	I60M5×13	WT20IP	M8×8	Rc1/4	Picture 2
ZTD05-470-XP40-SP14-02	△	47	40	52	240	70	350	SPGT140512-PM/EM	I60M5×13	WT20IP			
ZTD05-480-XP40-SP14-02	△	48	40	52	245	70	355	SPGT140512-PM/EM	I60M5×13	WT20IP			
ZTD05-490-XP40-SP14-02	△	49	40	52	250	70	360	SPGT140512-PM/EM	I60M5×13	WT20IP			
ZTD05-500-XP40-SP14-02	△	50	40	52	255	70	365	SPGT140512-PM/EM	I60M5×13	WT20IP			

▲Stock available △Make-to-order

Indexable shallow drills

3D





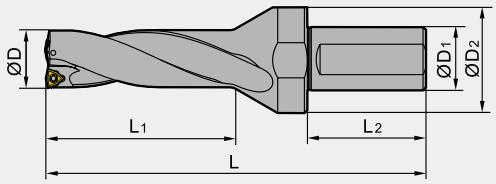
Type	Stock	Basic dimension(mm)						Applicable inserts	Screw	Wrench
		D	D1	D2	L2	L1	L			
ZD03-160-XP25-WC03-02	△	16	25	32	56	52	129	WCMX030208	I60M2.5×6.5	WT07IP
ZD03-170-XP25-WC03-02	△	17	25	32	56	55	133	WCMX030208	I60M2.5×6.5	WT07IP
ZD03-180-XP25-WC03-02	△	18	25	32	56	58	137	WCMX030208	I60M2.5×6.5	WT07IP
ZD03-190-XP25-WC03-02	△	19	25	32	56	61	140	WCMX030208	I60M2.5×6.5	WT07IP
ZD03-200-XP25-WC03-02	△	20	25	32	56	64	143	WCMX030208	I60M2.5×6.5	WT07IP
ZD03-210-XP25-WC04-02	△	21	25	45	56	67	153	WCMX040208	I60M2.5×6.5T	WT08IP
ZD03-220-XP25-WC04-02	△	22	25	45	56	70	156	WCMX040208	I60M2.5×6.5T	WT08IP
ZD03-230-XP25-WC04-02	△	23	25	45	56	73	159	WCMX040208	I60M2.5×6.5T	WT08IP
ZD03-240-XP25-WC04-02	△	24	25	45	56	76	162	WCMX040208	I60M2.5×6.5T	WT08IP
ZD03-250-XP25-WC04-02	△	25	25	45	56	79	165	WCMX040208	I60M2.5×6.5T	WT08IP
ZD03-260-XP32-WC05-02	△	26	32	55	60	83	176	WCMX050308	I60M3×7	WT09IP
ZD03-270-XP32-WC05-02	△	27	32	55	60	86	180	WCMX050308	I60M3×7	WT09IP
ZD03-280-XP32-WC05-02	△	28	32	55	60	89	184	WCMX050308	I60M3×7	WT09IP
ZD03-290-XP32-WC05-02	△	29	32	55	60	92	188	WCMX050308	I60M3×7	WT09IP
ZD03-300-XP32-WC05-02	△	30	32	55	60	95	192	WCMX050308	I60M3×7	WT09IP
ZD03-310-XP40-WC06-02	△	31	40	60	70	98	203	WCMX06T308	I60M3×7	WT09IP
ZD03-320-XP40-WC06-02	△	32	40	60	70	101	206	WCMX06T308	I60M3×7	WT09IP
ZD03-330-XP40-WC06-02	△	33	40	60	70	104	209	WCMX06T308	I60M3×7	WT09IP
ZD03-340-XP40-WC06-02	△	34	40	60	70	107	212	WCMX06T308	I60M3×7	WT09IP
ZD03-350-XP40-WC06-02	△	35	40	60	70	110	215	WCMX06T308	I60M3×7	WT09IP
ZD03-360-XP40-WC06-02	△	36	40	60	70	113	218	WCMX06T308	I60M3×7	WT09IP
ZD03-370-XP40-WC06-02	△	37	40	60	70	116	221	WCMX06T308	I60M3×7	WT09IP
ZD03-380-XP40-WC06-02	△	38	40	60	70	119	225	WCMX06T308	I60M3×7	WT09IP
ZD03-390-XP40-WC06-02	△	39	40	60	70	122	228	WCMX06T308	I60M3×7	WT09IP

▲Stock available △Make-to-order

Indexable shallow drills

3D





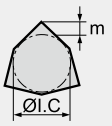
Type	Stock	Basic dimension(mm)						Applicable inserts	Screw	Wrench
		D	D1	D2	L2	L1	L			
ZD03-400-XP40-WC06-02	△	40	40	60	70	125	231	WCMX06T308	I60M3×7	WT09IP
ZD03-410-XP40-WC06-02	△	41	40	60	70	128	234	WCMX06T308	I60M3×7	WT09IP
ZD03-420-XP40-WC08-02	△	42	40	60	70	131	239	WCMX080412	I60M3.5×10.4	WT15IP
ZD03-430-XP40-WC08-02	△	43	40	60	70	134	242	WCMX080412	I60M3.5×10.4	WT15IP
ZD03-440-XP40-WC08-02	△	44	40	60	70	137	245	WCMX080412	I60M3.5×10.4	WT15IP
ZD03-450-XP40-WC08-02	△	45	40	60	70	140	248	WCMX080412	I60M3.5×10.4	WT15IP
ZD03-460-XP40-WC08-02	△	46	40	60	70	143	251	WCMX080412	I60M3.5×10.4	WT15IP
ZD03-470-XP40-WC08-02	△	47	40	60	70	146	253	WCMX080412	I60M3.5×10.4	WT15IP
ZD03-480-XP40-WC08-02	△	48	40	70	70	149	255	WCMX080412	I60M3.5×10.4	WT15IP
ZD03-490-XP40-WC08-02	△	49	40	70	70	152	257	WCMX080412	I60M3.5×10.4	WT15IP
ZD03-500-XP40-WC08-02	△	50	40	70	70	155	259	WCMX080412	I60M3.5×10.4	WT15IP
ZD03-510-XP40-WC08-02	△	51	40	70	70	158	261	WCMX080412	I60M3.5×10.4	WT15IP
ZD03-520-XP40-WC08-02	△	52	40	70	70	161	263	WCMX080412	I60M3.5×10.4	WT15IP
ZD03-530-XP40-WC08-02	△	53	40	70	70	164	265	WCMX080412	I60M3.5×10.4	WT15IP
ZD03-540-XP40-WC08-02	△	54	40	70	70	167	267	WCMX080412	I60M3.5×10.4	WT15IP
ZD03-550-XP40-WC08-02	△	55	40	70	70	170	269	WCMX080412	I60M3.5×10.4	WT15IP
ZD03-560-XP40-WC08-02	△	56	40	70	70	173	271	WCMX080412	I60M3.5×10.4	WT15IP
ZD03-570-XP40-WC08-02	△	57	40	70	70	176	273	WCMX080412	I60M3.5×10.4	WT15IP
ZD03-580-XP40-WC08-02	△	58	40	70	70	179	275	WCMX080412	I60M3.5×10.4	WT15IP

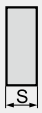
▲Stock available △Make-to-order

Shallow drills code key

Code	Insert shap
S	
W	

Insert shape / code



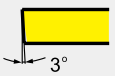
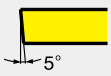
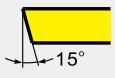
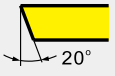
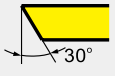
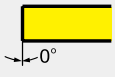


Code	Nose Height m Tolerance(mm)	Inscribed Circle ØI.C Tolerance(mm)	Thickness S Tolerance(mm)	Code	Nose Height m Tolerance(mm)	Inscribed Circle ØI.C Tolerance(mm)	Thickness S Tolerance(mm)
A	±0.005	±0.025	±0.025	J	±0.005	±0.05-±0.13	±0.025
F	±0.005	±0.013	±0.025	K	±0.013	±0.05-±0.13	±0.025
C	±0.013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

Tolerance

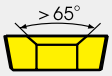
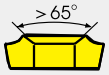
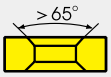
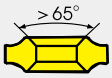
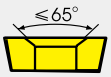
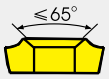
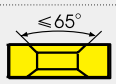
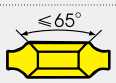
W C M X

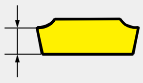
Clearance angle of main cutting edge

Code	Clearance angle	Code	Clearance angle
A		B	
C		D	
E		F	
G		N	
P		O	Other clearance angle

Chipbreaker and clamping system

Metric

Code	With/Without hole	With/Without chipbreaker	Section plane of Insert	Code	With/Without hole	With/Without chipbreaker	Section plane of Insert
B	With	Without		N	Without	Without	
H	With	Single-side		R	Without	Single-side	
C	With	Without		F	Without	Double-side	
J	With	Double-side		A	With	Without	
W	With	Without		M	With	Single-side	
T	With	Single-side		G	With	Double-side	
Q	With	Without		X	---	---	Special
U	With	Double-side					

Thickness is defined as the height from the bottom of insert to the highest part of cutting edge.

Code	Insert thickness (mm)	Code	Insert thickness (mm)
00	0.79	**05**	5.96
T0	0.99	**T5**	5.95
01	1.59	**06**	6.35
T1	1.98	**T6**	6.75
02	2.38	**07**	7.94
T2	2.58	**09**	9.52
03	3.18	**T9**	9.72
T3	3.97	**11**	11.11
04	4.76	**12**	12.70
T4	4.96		

Insert thickness

Code	Length	
	W	S
03	3.8	
04	4.3	
05	5.4	
06	6.5	6.35
08	8.7	8.0
09		9.525
12		12.7

Length of cutting edge

08 04 12 R – PG

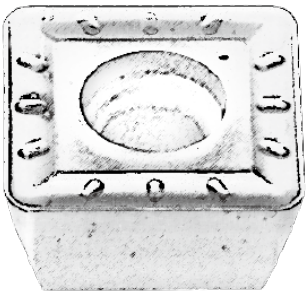
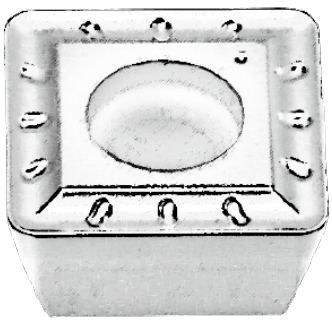
Nose radius

Code	Description
04	0.4mm
08	0.8mm
12	1.2mm

Cutting direction

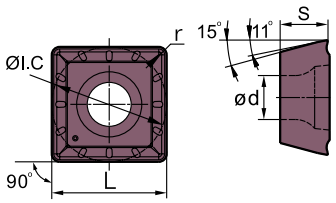
Code	Description
R	Right hand
L	Left hand
N	Neutral

Chipbreaker code

ZTDapplicable inserts

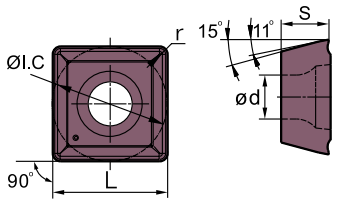




Type	Basic dimension(mm)					Grade	
	L	ØI.C	s	ød	r	YBG205 (peripheral edge)	YBG212 (inner edge)
SPGT050204-PM	5	5	2.38	2.2	0.4	★	★
SPGT060204-PM	6	6	2.38	2.6	0.4	★	★
SPGT07T308-PM	7.94	7.94	3.97	2.8	0.8	★	★
SPGT090408-PM	9.8	9.8	4.3	4.2	0.8	★	★
SPGT110408-PM	11.5	11.5	4.76	4.4	0.8	★	★
SPGT140512-PM	14.3	14.3	5.2	5.75	1.2	★	★

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





Type	Basic dimension(mm)					Grade	
	L	ØI.C	s	ød	r	YBG205 (peripheral edge)	YBG212 (inner edge)
SPGT050204-EM	5	5	2.38	2.2	0.4	★	★
SPGT060204-EM	6	6	2.38	2.6	0.4	★	★
SPGT07T308-EM	7.94	7.94	3.97	2.8	0.8	★	★
SPGT090408-EM	9.8	9.8	4.3	4.2	0.8	★	★
SPGT110408-EM	11.5	11.5	4.76	4.4	0.8	★	★
SPGT140512-EM	14.3	14.3	5.2	5.75	1.2	★	★

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




-EM chipbreaker characteristics

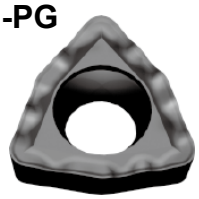
Recommended chipbreaker for M kind materials drilling. With G-class accuracy, sharp cutting edges, and high strength, better performance of resist impacts. Inserts meet the required of machining adhesive material, It is also properly suited for machining Austenite Stainless steel etc adhesive materials.

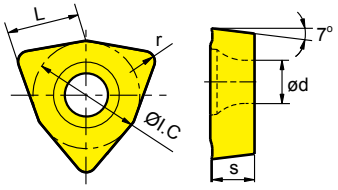
ZTD03applicable inserts

-53



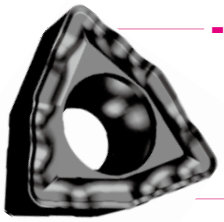
-PG





Type	Basic dimension(mm)					Grade
	L	ØI.C	s	d	r	YBG202
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-PG	3.8	5.56	2.38	2.8	0.8	★
WCMX040208R-PG	4.3	6.35	2.38	3.1	0.8	★
WCMX050308R-PG	5.4	7.94	3.18	3.2	0.8	★
WCMX06T308R-PG	6.5	9.525	3.97	3.7	0.8	★
WCMX080412R-PG	8.7	12.7	4.76	4.3	1.2	★

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



-PG chipbreaker characteristics

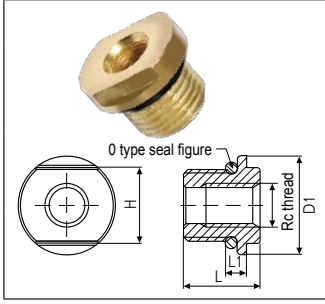
Unique design of corrugated edge ensures high edge strength and good chip breaking performance, for machining of carbon steel and alloy steel.

-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.

Optional accessories for ZTD drills (Ø13-Ø33)



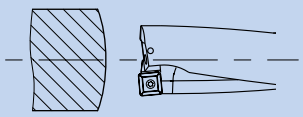
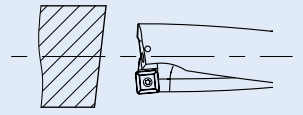
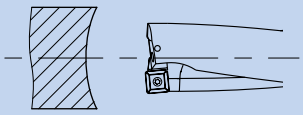
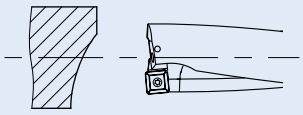
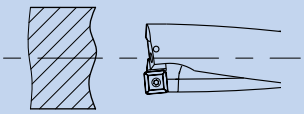
drill diameter	shank	adapter	D1	L1	L	H	Rc thread
Ø13-Ø16	XP20	ZTD-XP20-THIN	18	4.23	13	14	Rc 1/8
Ø17-Ø27	XP25	ZTD-XP25-THIN	22	4.65	17	17	Rc 1/8
Ø28-Ø33	XP32	ZTD-XP32-THIN	29	5.65	21	22	Rc 1/4

Note: As standard, ZTD drills do not include adapter. Please order separately if it is needed.

Technical information for shallow drills

■ 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 centre axis. In addition, an 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 centre 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 centre 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 shallow drilling

● 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 is1600 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 is1500 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

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

Tc (min): machining time
fr (mm/rev): feed rate per revolution
i: number of holes Id (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.

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

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

● 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 shallow 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)
	Hign 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 0.06-0.16 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 0.06-0.10 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	0.05-0.09 0.05-0.12 0.06-0.14 0.08-0.16 0.10-0.20	160(130-200)
N	Non ferrous meatals	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)

How to choose the right solid carbide reamers

Shape

Product type

Product name

Product category

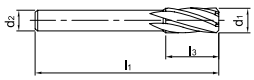
Reamers

Shape size

Solid carbide reamer with straight shank and right helical flute

3101H7





H7

Type	Basic dimension(mm)				Number of tooth	Recommended grade
	d_1	$d_{2(h7)}$	l_1	l_3		YK10F
3101H7-0400	4.0	3.55	56	20	4	☆
3101H7-0450	4.5	4.00	63	22	6	☆
3101H7-0500	5.0	4.00	63	22	6	☆
3101H7-0550	5.5	5.00	63	22	6	☆
3101H7-0600	6.0	5.00	63	22	6	☆
3101H7-0650	6.5	5.00	63	22	6	☆
3101H7-0700	7.0	6.30	71	25	6	☆
3101H7-0750	7.5	6.30	71	25	6	☆
3101H7-0800	8.0	6.30	71	25	6	☆
3101H7-0850	8.5	8.00	71	25	6	☆
3101H7-0900	9.0	8.00	71	25	6	☆
3101H7-0950	9.5	8.00	71	25	6	☆
3101H7-1000	10.0	8.00	71	25	6	☆
3101H7-1050	10.5	8.00	71	25	6	☆
3101H7-1100	11.0	10.00	80	28	6	☆
3101H7-1150	11.5	10.00	80	28	6	☆
3101H7-1200	12.0	10.00	80	28	6	☆
3101H7-1250	12.5	10.00	80	28	6	☆
3101H7-1300	13.0	10.00	80	28	6	☆
3101H7-1350	13.5	12.5	90	32	6	☆
3101H7-1400	14.0	12.5	90	32	6	☆
3101H7-1450	14.5	12.5	90	32	6	☆
3101H7-1500	15.0	12.5	90	32	6	☆
3101H7-1550	15.5	12.5	90	32	6	☆
3101H7-1600	16.0	12.5	90	32	6	☆
3101H7-1700	17.0	12.5	90	32	6	☆
3101H7-1800	18.0	16.00	100	36	6	☆
3101H7-1900	19.0	16.00	100	36	6	☆
3101H7-2000	20.0	16.00	100	36	6	☆

☆Recommended grade (produce according to order)

Applicable material table ◎Very suitable ○Suitable

Grade	Workpiece material										
	Mild steel HB≤180	Carbon steel, Alloy steel	Pre-hardened steel, Hardened steel ~40HRC	~50HRC	~60HRC	Stainless steel	Cast iron	Nodular cast iron	Aluminum alloy	Copper alloy	Heat resistant alloy
YK10F							◎	◎	◎	◎	

Code key C106 Cutting parameters C110 Technical information C111–C113

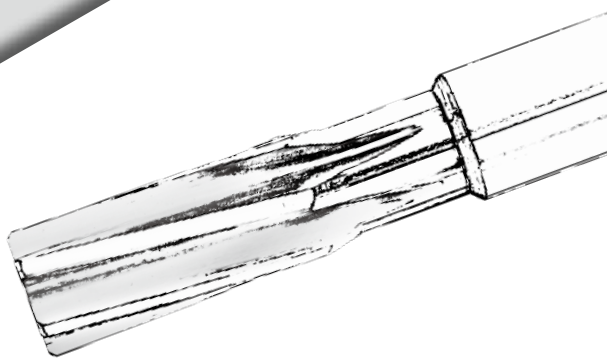
Applicable workpiece material range

Hole precision class and shank type

Specification
Type, basic dimensions ,number of tooth and grade.

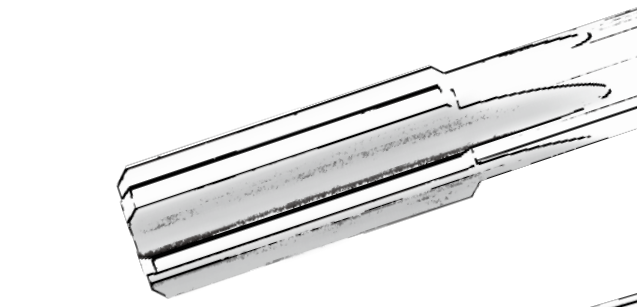
Code key, cutting parameter, technical information.

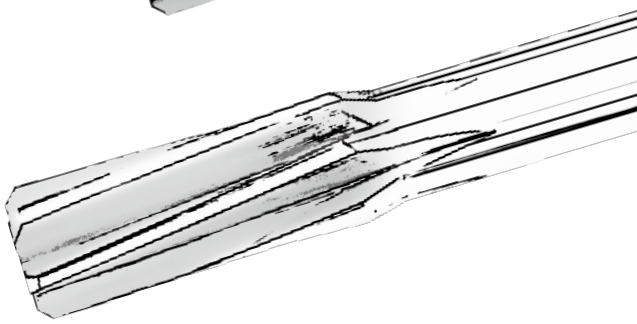
BORING TOOLS



Reamers

C106	Solid carbide reamers overview
C106	Icons information
C106	Solid carbide reamer code key
C107-C109	Detail information of solid carbide reamers
C110	Recommended cutting parameters for solid carbide reamers
C111-113	Technical information for solid carbide reamers





Solid carbide reamers overview

Solid carbide reamers overview

Name	Type	Shape	Diameter range	Workpiece material								Page	
				P		M	K	N		S	H		
				Mild steel	Common steel	Stainless steel	Cast iron	Aluminum alloy	Copper alloy	Heat resistant alloy	High hardness steel	Specification	Cutting parameters
Right helical flute reamer	3101H7		Ø4-Ø20				◎	◎	◎			C107	C110
Straight flute reamer	3102H7		Ø4-Ø20				◎	◎	◎			C108	C110
Left helical flute reamer	3103H7		Ø4-Ø20				◎	◎	◎			C109	C110

◎Very suitable ○Suitable

Solid carbide reamers icons information

Precision class of reamed hole

H7 — The precision class of reamed hole reaches H7 specified in GB/T1800-1804

Shank type

Straight shank

Solid carbide reamer code key

Code	Description
3	Reamer

Tool type

Code	Description
1	Right chip flute
2	Straight flute
3	Left chip flute

Type of flute

Code	Description
H7	The precision class of reamed hole reaches H7 specified in GB/T1800-1804

Precision class of reamed hole

3 1 0 1 H7 -0850

Shank type

Code	Description
1	Straight shank
2	Square straight shank as per DIN10
5	Straight shank as per DIN6535ha
9	Tapered shank

Mode of cooling

Code	Description
0	External coolant
1	Internal coolant

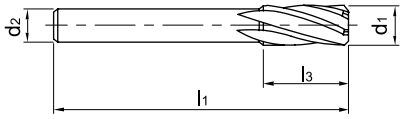
Specification

Code	Description
0850	Diameter is 8.5mm

Solid carbide reamer with straight shank and right helical flute

3101H7





H7

Type	Basic dimension(mm)				Number of tooth	Recommended grade
	d_1	$d_{2(h7)}$	l_1	l_3		YK10F
3101H7-0400	4.0	3.55	56	20	4	☆
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3101H7-0500	5.0	4.00	63	22	6	☆
3101H7-0550	5.5	5.00	63	22	6	☆
3101H7-0600	6.0	5.00	63	22	6	☆
3101H7-0650	6.5	5.00	63	22	6	☆
3101H7-0700	7.0	6.30	71	25	6	☆
3101H7-0750	7.5	6.30	71	25	6	☆
3101H7-0800	8.0	6.30	71	25	6	☆
3101H7-0850	8.5	8.00	71	25	6	☆
3101H7-0900	9.0	8.00	71	25	6	☆
3101H7-0950	9.5	8.00	71	25	6	☆
3101H7-1000	10.0	8.00	71	25	6	☆
3101H7-1050	10.5	8.00	71	25	6	☆
3101H7-1100	11.0	10.00	80	28	6	☆
3101H7-1150	11.5	10.00	80	28	6	☆
3101H7-1200	12.0	10.00	80	28	6	☆
3101H7-1250	12.5	10.00	80	28	6	☆
3101H7-1300	13.0	10.00	80	28	6	☆
3101H7-1350	13.5	12.5	90	32	6	☆
3101H7-1400	14.0	12.5	90	32	6	☆
3101H7-1450	14.5	12.5	90	32	6	☆
3101H7-1500	15.0	12.5	90	32	6	☆
3101H7-1550	15.5	12.5	90	32	6	☆
3101H7-1600	16.0	12.5	90	32	6	☆
3101H7-1700	17.0	12.5	90	32	6	☆
3101H7-1800	18.0	16.00	100	36	6	☆
3101H7-1900	19.0	16.00	100	36	6	☆
3101H7-2000	20.0	16.00	100	36	6	☆

☆Recommended grade (produce according to order)

Applicable material table

◎Very suitable ○Suitable

Grade	Workpiece material										
	Mild steel HB≤180	Carbon steel, Alloy steel	Pre-hardened steel, Hardened steel			Stainless steel	Cast iron	Nodular cast iron	Aluminum alloy	Copper alloy	Heat resistant alloy
			~40HRC	~50HRC	~60HRC						
YK10F							◎	◎	◎	◎	

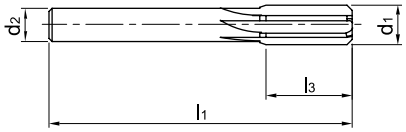
Code key C106
Cutting parameters C110
Technical information C111–C113

Solid carbide reamer with straight shank and right helical flute

Solid carbide reamer with straight shank and straight flute

3102H7





H7

Type	Basic dimension(mm)				Number of tooth	Recommended grade
	d_1	$d_{2(h7)}$	l_1	l_3		YK10F
3102H7-0400	4.0	3.55	56	20	4	☆
3102H7-0450	4.5	4.00	63	22	6	☆
3102H7-0500	5.0	4.00	63	22	6	☆
3102H7-0550	5.5	5.00	63	22	6	☆
3102H7-0600	6.0	5.00	63	22	6	☆
3102H7-0650	6.5	5.00	63	22	6	☆
3102H7-0700	7.0	6.30	71	25	6	☆
3102H7-0750	7.5	6.30	71	25	6	☆
3102H7-0800	8.0	6.30	71	25	6	☆
3102H7-0850	8.5	8.00	71	25	6	☆
3102H7-0900	9.0	8.00	71	25	6	☆
3102H7-0950	9.5	8.00	71	25	6	☆
3102H7-1000	10.0	8.00	71	25	6	☆
3102H7-1050	10.5	8.00	71	25	6	☆
3102H7-1100	11.0	10.00	80	28	6	☆
3102H7-1150	11.5	10.00	80	28	6	☆
3102H7-1200	12.0	10.00	80	28	6	☆
3102H7-1250	12.5	10.00	80	28	6	☆
3102H7-1300	13.0	10.00	80	28	6	☆
3102H7-1350	13.5	12.5	90	32	6	☆
3102H7-1400	14.0	12.5	90	32	6	☆
3102H7-1450	14.5	12.5	90	32	6	☆
3102H7-1500	15.0	12.5	90	32	6	☆
3102H7-1550	15.5	12.5	90	32	6	☆
3102H7-1600	16.0	12.5	90	32	6	☆
3102H7-1700	17.0	12.5	90	32	6	☆
3102H7-1800	18.0	16.00	100	36	6	☆
3102H7-1900	19.0	16.00	100	36	6	☆
3102H7-2000	20.0	16.00	100	36	6	☆

☆Recommended grade (produce according to order)

Applicable material table

◎Very suitable ○Suitable

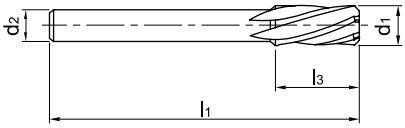
Grade	Workpiece material										
	Mild steel HB≤180	Carbon steel, Alloy steel	Pre-hardened steel, Hardened steel			Stainless steel	Cast iron	Nodular cast iron	Aluminum alloy	Copper alloy	Heat resistant alloy
			~40HRC	~50HRC	~60HRC						
YK10F							◎	◎	◎	◎	

Code key C106
Cutting parameters C110
Technical information C111–C113

Solid carbide reamer with straight shank and left helical flute

3103H7





H7

Type	Basic dimension(mm)				Number of tooth	Recommended grade
	d_1	$d_{2(h7)}$	l_1	l_3		YK10F
3103H7-0400	4.0	3.55	56	20	4	☆
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3103H7-0500	5.0	4.00	63	22	6	☆
3103H7-0550	5.5	5.00	63	22	6	☆
3103H7-0600	6.0	5.00	63	22	6	☆
3103H7-0650	6.5	5.00	63	22	6	☆
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3103H7-1000	10.0	8.00	71	25	6	☆
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3103H7-1250	12.5	10.00	80	28	6	☆
3103H7-1300	13.0	10.00	80	28	6	☆
3103H7-1350	13.5	12.5	90	32	6	☆
3103H7-1400	14.0	12.5	90	32	6	☆
3103H7-1450	14.5	12.5	90	32	6	☆
3103H7-1500	15.0	12.5	90	32	6	☆
3103H7-1550	15.5	12.5	90	32	6	☆
3103H7-1600	16.0	12.5	90	32	6	☆
3103H7-1700	17.0	12.5	90	32	6	☆
3103H7-1800	18.0	16.00	100	36	6	☆
3103H7-1900	19.0	16.00	100	36	6	☆
3103H7-2000	20.0	16.00	100	36	6	☆

☆Recommended grade (produce according to order)

Applicable material table

◎Very suitable ○Suitable

Grade	Workpiece material										
	Mild steel HB≤180	Carbon steel, Alloy steel	Pre-hardened steel, Hardened steel			Stainless steel	Cast iron	Nodular cast iron	Aluminum alloy	Copper alloy	Heat resistant alloy
			~40HRC	~50HRC	~60HRC						
YK10F							◎	◎	◎	◎	

Code key C106
Cutting parameters C110
Technical information C111–C113

Recommended cutting parameters

3101H7★3102H7★3103H7

Workpiece material	Cast iron Nodular cast iron			Copper alloy			Casting aluminium alloy		
Cutting speed	8~16m/min			10~25m/min			15~30 m/min		
Diameter (mm)	Rotating speed (min^{-1})	Feed rate (mm/r)	Allowance (mm)	Rotating speed (min^{-1})	Feed rate (mm/r)	Allowance (mm)	Rotating speed (min^{-1})	Feed rate (mm/r)	Allowance (mm)
4	950	0.04~0.06	0.1~0.2	1600	0.04~0.06	0.1~0.2	2000	0.04~0.06	0.1~0.2
5	760	0.05~0.09	0.1~0.2	1300	0.05~0.09	0.1~0.2	1600	0.05~0.09	0.1~0.2
6	640	0.06~0.12	0.1~0.2	1050	0.06~0.12	0.1~0.2	1300	0.06~0.12	0.1~0.2
7	550	0.07~0.14	0.1~0.2	910	0.07~0.14	0.1~0.2	1150	0.07~0.14	0.1~0.2
8	480	0.08~0.16	0.1~0.2	800	0.08~0.16	0.1~0.2	1000	0.08~0.16	0.1~0.2
9	430	0.09~0.18	0.1~0.2	710	0.09~0.18	0.1~0.2	890	0.09~0.18	0.1~0.2
10	380	0.10~0.20	0.1~0.2	640	0.10~0.20	0.1~0.2	800	0.10~0.20	0.1~0.2
11	350	0.11~0.22	0.1~0.2	580	0.11~0.22	0.1~0.2	720	0.11~0.22	0.1~0.2
12	320	0.12~0.24	0.1~0.2	530	0.12~0.24	0.1~0.2	660	0.12~0.24	0.1~0.2
13	290	0.13~0.26	0.1~0.2	490	0.13~0.26	0.1~0.2	610	0.13~0.26	0.1~0.2
14	270	0.14~0.28	0.1~0.2	460	0.14~0.28	0.1~0.2	570	0.14~0.28	0.1~0.2
15	250	0.15~0.30	0.1~0.2	430	0.15~0.30	0.1~0.2	530	0.15~0.30	0.1~0.2
16	240	0.16~0.32	0.1~0.2	400	0.16~0.32	0.1~0.2	500	0.16~0.32	0.1~0.2
17	225	0.18~0.34	0.1~0.2	380	0.18~0.34	0.1~0.2	470	0.18~0.34	0.1~0.2
18	210	0.20~0.36	0.1~0.2	350	0.20~0.36	0.1~0.2	440	0.20~0.36	0.1~0.2
19	200	0.22~0.38	0.1~0.2	340	0.22~0.38	0.1~0.2	420	0.22~0.38	0.1~0.2
20	190	0.24~0.40	0.1~0.2	320	0.24~0.40	0.1~0.2	400	0.24~0.40	0.1~0.2

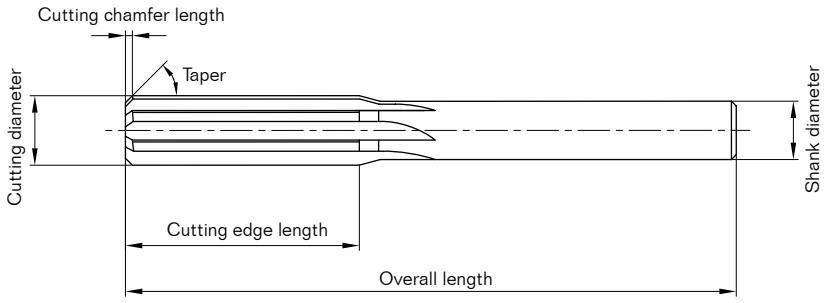
1.Please select the holder with high rigidity and high precision.

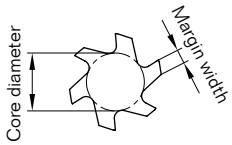
2.Make sure coolant supply is sufficient.

3.Please adjust cutting parameters according workpiece and machine rigidity.



Terminology of reamer

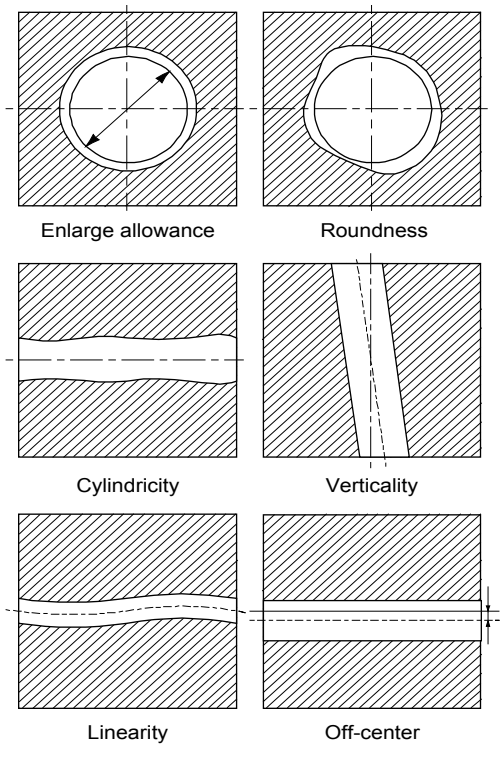




Reaming is the semi-finishing and finishing of an existing hole to achieve precise size, high surface quality, perfect roundness and cylindricity, etc.

In order to gain precise hole in reaming process, the reamer diameter must be defined correctly. Therefore, it is necessary to consider the allowance which is determined by workpiece material and machining conditions. It is also necessary to select the cutting conditions correctly in addition to using high precision reamer to achieve good surface quality.

The reaming precision is mainly determined by diameter and radial run-out. With respect to cutting condition, it is better to select low speed cutting to improve machining precision, but the upper limit should be considered carefully for higher machining efficiency.

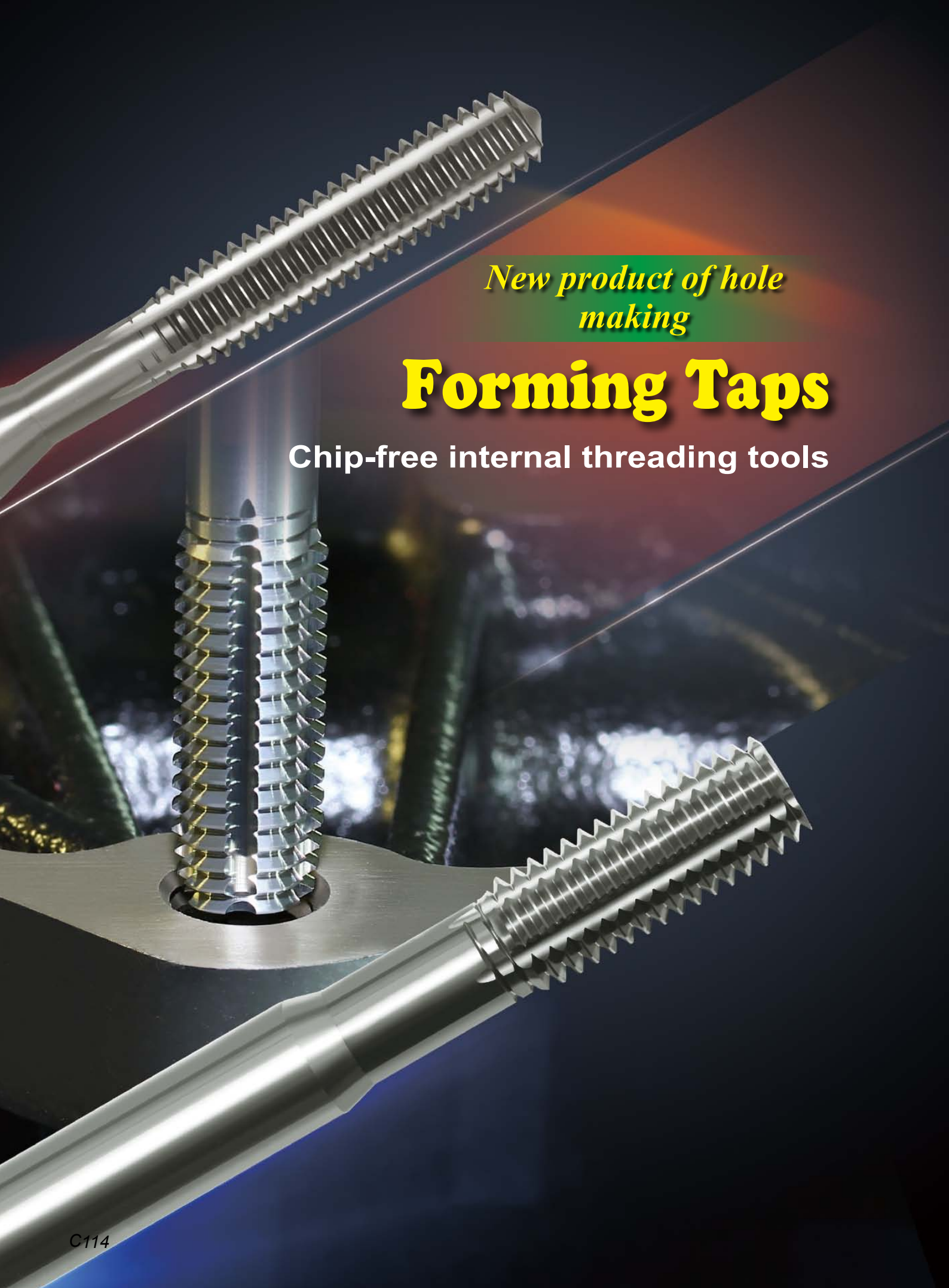


Common problems and solutions for reaming

Common problems	Solutions
Oversized holes	1.Reduce diameter of reamer. 2.The center of reamer is not in alignment with hole center. Adjust the concentricity of hole and reamer. 3.Radial run-out of reamer is too large. Good radial run-out is a key to successful reaming. 4.Scratches on reamer shank. 5.When using bushing and bushing, ensure shank is clean. 6.Select a suitable coolant. 7.Adjust cutting parameters.
Undersized holes	1.Increase diameter of reamer. 2.Reduce rotating speed. 3.Reduce the margin width. 4.Excessive tool abrasion, please conduct cutting after regrinding. 5.Thermal expansion coefficient of workpiece is too large. Please keep it cooled enough.
Poor hole roundness and linearity	1.Ensure better roundness of reamer chamfer. 2.Reamer rigidity is low. Make the overhang as short as possible in conditions of non-inference. 3.Check radial run-out after clamping reamer. 4.Adjust the concentricity of hole and reamer. 5.Ensure reaming allowance equality.
Poor hole surface quality	1.The hole surface roughness of entering part is bad. 2.Reduce rotating speed. 3.Ensure correct reaming allowance. The allowance being too large or too small would result in bad surface roughness. 4.Select the reamer with large chip pocket to avoid chip jamming. 5.Increase clearance angle of reamer entering part. 6.Check whether there is built-up on chamfer and margin land. 7.Increase the rigidity of machine, holder and reamer. 8.Check out whether the type of reamer head is suitable for the workpiece. 9.Increase the margin width and land width appropriately.
Hole precision is low	1.In return pass, the reamer should be pulled out of hole rotating at the same direction as before. Opposite rotation must be prohibited. 2.Reduce rotating speed. 3.Select the reamer with more lips. 4.Increase the margin width appropriately to enhance the guiding performance and extrusion effect. 5.Improve reamer lubricating property by surface treatment. 6.Select a suitable coolant.

Common problems and solutions for reaming

Common problems	Solutions
Reamer breakage, thermal damage	1.The guide hole is defective before reaming, for example, linearity is not good. 2.Adjust machining allowance to avoid tool breakage caused by too large allowance. 3.If the chip removal is obstructed, select a reamer with larger chip pocket. 4.Ensure sufficient coolant supply. 5.Adjust rotating speed and feed speed appropriately. 6.Increase the rigidity of machine, holder and reamer. 7.Improve the sharpness of reamer to make cutting easy and fast. 8.Excessive abrasion occurs on cutting edge, which means tool life has expired. It is recommended to change or regrind tool.
Damage on reamer shank	1.Check whether the shank hardness is enough. Too low hardness would cause deformation, and too high hardness may cause breakage. 2.Check the conjunction of holder and bushing. Do not use a defective holder.
Short tool life	1.Enhance the hardness of reamer cutting edge. 2.Select the reamer made by advanced material. 3.Check the coolant. 4.Use surface treatment for reamer such as nitride process. 5.Change the straight flute to helical flute. 6.Check all factors affecting machining precision.
Scratches on hole surface	1.Make sure no built-up is on the reamer surface. 2.Improve workpiece holding.
Trumpet-shaped entry hole	1.Improve workpiece holding. 2.Check radial run-out after clamping reamer. 3.The center of reamer is not in alignment with the hole center. Adjust the concentricity of hole and reamer.
Oversized holes	1.The center of reamer is not in alignment with hole center. Adjust the concentricity of hole and reamer. 2.Improve workpiece holding.



New product of hole making

Forming Taps

Chip-free internal threading tools



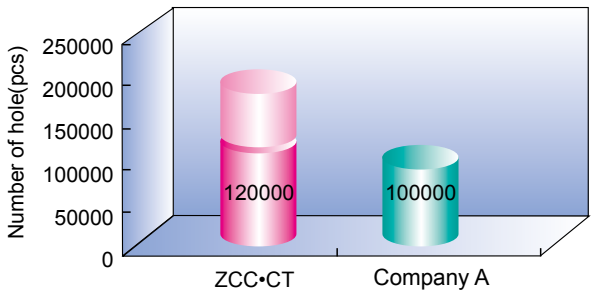
- Super micro grain cemented carbide with good toughness and abrasion resistance has long tool life.
- With particularly section-sharp design has good rigidity and strength.
- Thanks to the special technique treatment on cutting edge surface, threading quality is good and dimensional accuracy is high.

It is apply for high efficiency through-hole and blind-hole machining of high tensility material such as soft steel, stainless steel, Al alloys and cast Al alloy, etc.

Application case

Work piece: auto engine shell
Work piece material: Al alloy (HB90~120)
Tool type: 4222ACS-M10×1.25-6H
Cutting parameters: n=1300r/min
F=1625mm/min
h=29mm, through hole or blind hole machining
Machining tool: horizontal machining center
Cooling style: emulsified liquid cooling

Comparison of hole number



ZCC•CT: 120000 holes (still usable)
Company A: 100000 holes (failure)

How to choose the right solid carbide threading cutter

Shape

Product name

Product category

Solid carbide threading cutter

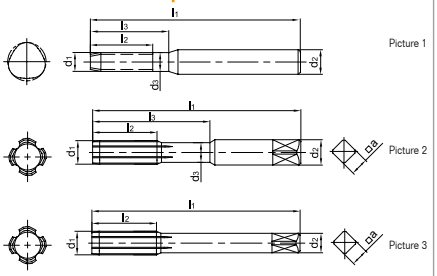
Application

Shape size

Forming taps · Al alloys machining







ISO 2 (6H)

Type	Cooling mode	Basic dimension(mm)											Grade	Pre-hole diameter
		Length of Forming taper	d_1	P	d_2	d_3	l_1	l_2	l_3	a×a	Thread profile	Geometry	Number of teeth	YK40F	d
4122A-M1*0.25-6H	External coolant	3P	M1	0.25	3		40	5			60°	Picture 1	3	●	0.9
4122AS-M1*0.25-6H		1.5P													
4122A-M1.2*0.25-6H		3P	M1.2	0.25	3		40	5				Picture 1	3	●	1.1
4122AS-M1.2*0.25-6H		1.5P													
4122A-M1.6*0.35-6H		3P	M1.6	0.35	3	1.1	40	5	11			Picture 1	3	●	1.47
4122AS-M1.6*0.35-6H		1.5P													
4122A-M2*0.4-6H		3P	M2	0.4	3	1.5	45	6	12			Picture 1	3	●	1.85
4122AS-M2*0.4-6H		1.5P													
4122A-M2.5*0.45-6H		3P	M2.5	0.45	3	1.9	50	6	14			Picture 1	3	●	2.33
4122AS-M2.5*0.45-6H		1.5P													
4222A-M3*0.5-6H		3P	M3	0.5	3.5	2.3	56	6	18	2.7		Picture 2	4	●	2.8
4222AS-M3*0.5-6H		1.5P													
4222A-M4*0.5-6H		3P	M4	0.5	4.5	3.1	63	8	21	3.4		Picture 2	4	●	3.8
4222AS-M4*0.5-6H		1.5P													
4222A-M4*0.7-6H		3P	M4	0.7	4.5	3.1	63	8	21	3.4		Picture 2	4	●	3.7
4222AS-M4*0.7-6H		1.5P													
4222A-M5*0.5-6H		3P	M5	0.5	6	4.3	70	10	25	4.9		Picture 2	4	●	4.8
4222AS-M5*0.5-6H		1.5P													

● Stock available ○ Make-to-order

Applicable material table ◎Very suitable ○Suitable

Grade	Workpiece material										
	Mild steel HB≤180	Carbon steel, Alloy steel	Pre-hardened steel, Hardened steel			Stainless steel	Cast iron	Nodular cast iron	Aluminum alloy	Copper alloy	Heat resistant alloy
			~40HRC	~50HRC	~60HRC						
YK40F									◎		

Code key C119 · Cutting parameters C134 · Technical information C135–C140

Applicable workpiece material range

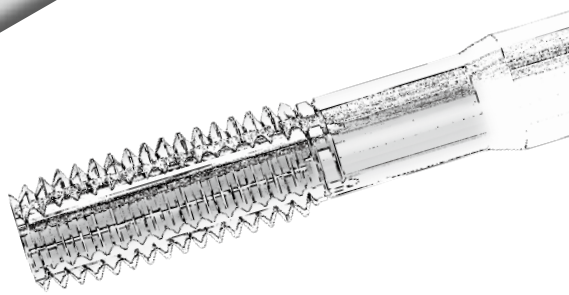
Thread profile angle, shank type, precision class

Specification

Type, basic dimensions ,number of tooth and grade.

Code key, cutting parameter, technical information.

BORING TOOLS



Threading cutter

C118 **Solid carbide threading tools overview**

C118 **Icons information of solid carbide threading tools**

C119 **Code key of solid carbide threading tools**

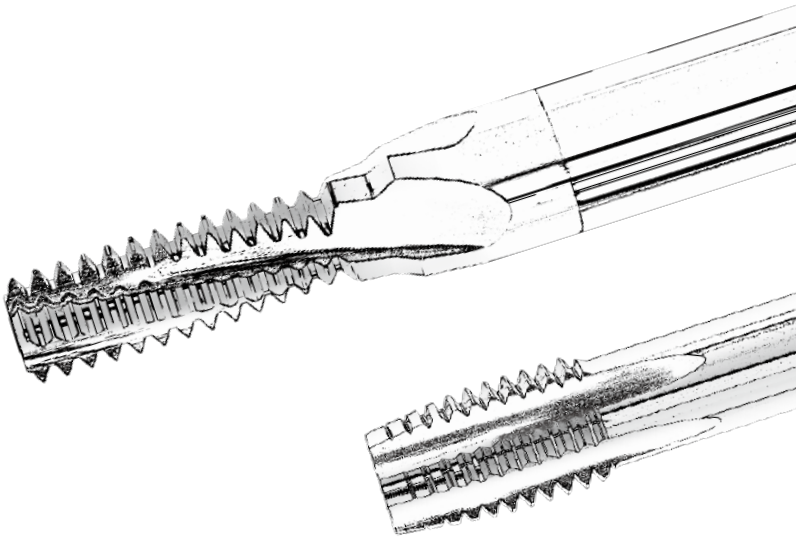
C120-C133 **Detail information of solid carbide threading tools**

C120-C131 Solid carbide threading cutters

C132-C133 Solid carbide threading end mills

C134 **Recommended cutting parameters of solid carbide threading tools**

C135-C140 **Technical information of solid carbide threading tools**



Threading cutter overview

Threading cutter overview

Name	Type	Shape	Diameter range	Workpiece material							Page	
				P		M	K	N	S	H	Specification	Cutting parameters
				Mild steel	Common steel	Stainless steel	Cast iron	Aluminum alloy	Heat resistant alloy	High hardness steel		
Forming tap	4122A		M1~M2.5					◎			C120	C134
	4222A		M3~M16					◎			C120-121	C134
	4122M		M1~M2.5	◎		◎		○			C122	C134
	4222M		M3~M16	◎		◎		○			C122-123	C134
Helical-flute cutting taps	4201C		M3~M16				◎				C124-125	C134
	4201A							◎			C128-129	C134
Straight-flute cutting tap	4202C		M3~M20				◎				C126-127	C134
	4202A							◎			C130-131	C134
Threading end mills	4111		M5-M20	○	◎		○	○			C133	C134

◎Very suitable ○Suitable

Icons information

Shank type

	Straight shank
	Square straight shank as per DIN10

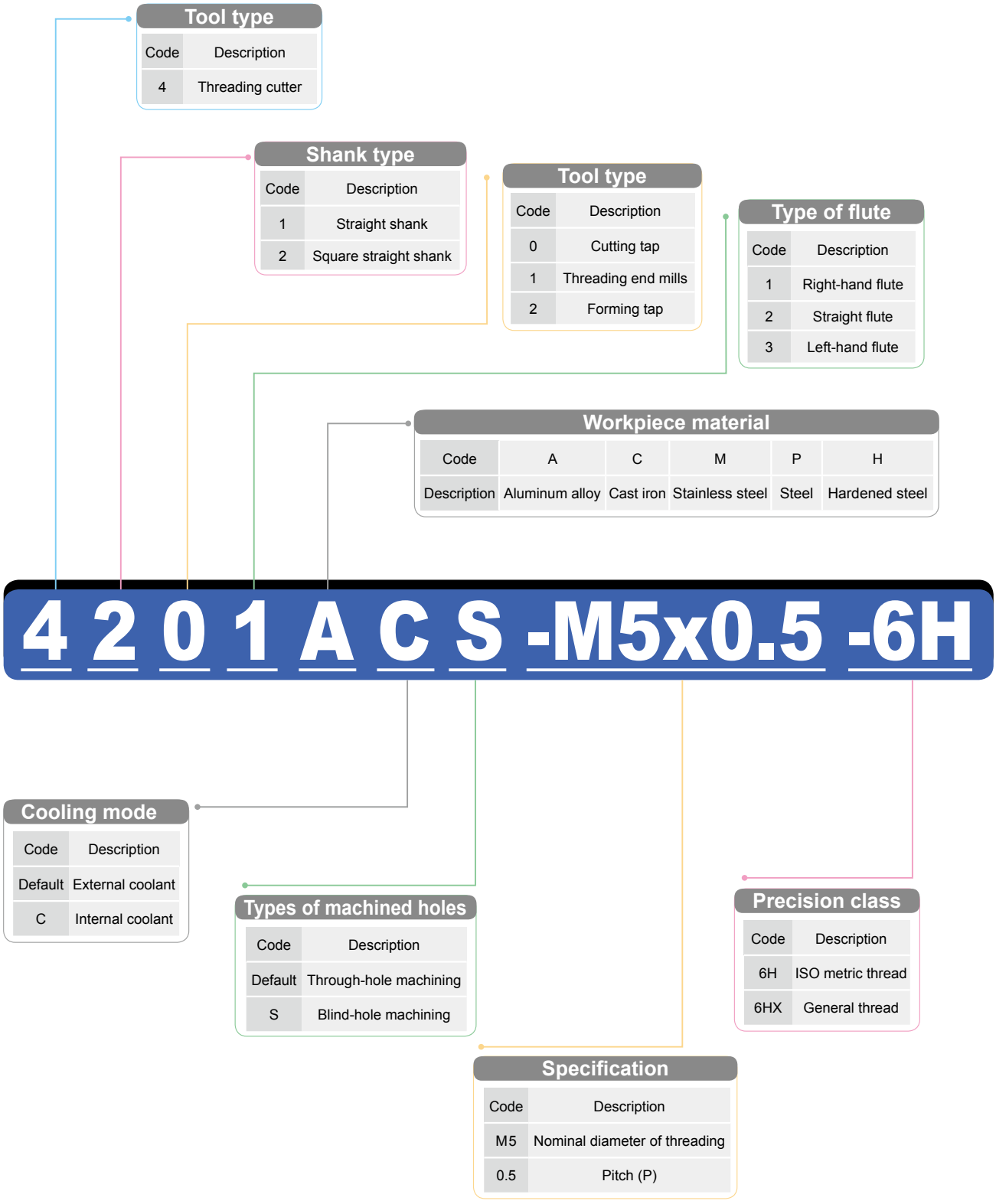
Thread profile angle of tap

	60° shown

Precision class of screw thread

ISO 2 (6H)	Precision class of screw thread
(6HX)	Precision class of screw thread

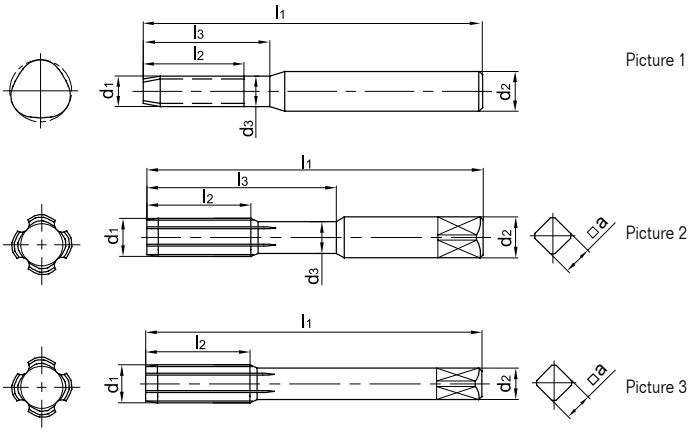
Threading cutter code key



Forming taps -Al alloys machining







Picture 1

Picture 2

Picture 3



Type	Cooling mode	Basic dimension(mm)											Grade	Pre-hole diameter
		Length of Forming taper	d_1	P	d_2	d_3	l_1	l_2	l_3	a×a	Thread profile	Geometry	Number of teeth	YK40F	d
4122A-M1*0.25-6H	External coolant	3P	M1	0.25	3		40	5			60°	Picture 1	3	●	0.9
4122AS-M1*0.25-6H		1.5P													
4122A-M1.2*0.25-6H		3P	M1.2	0.25	3		40	5				Picture 1	3	●	1.1
4122AS-M1.2*0.25-6H		1.5P													
4122A-M1.6*0.35-6H		3P	M1.6	0.35	3	1.1	40	5	11			Picture 1	3	●	1.47
4122AS-M1.6*0.35-6H		1.5P													
4122A-M2*0.4-6H		3P	M2	0.4	3	1.5	45	6	12			Picture 1	3	●	1.85
4122AS-M2*0.4-6H		1.5P													
4122A-M2.5*0.45-6H		3P	M2.5	0.45	3	1.9	50	6	14			Picture 1	3	●	2.33
4122AS-M2.5*0.45-6H		1.5P													
4222A-M3*0.5-6H		3P	M3	0.5	3.5	2.3	56	6	18	2.7		Picture 2	4	●	2.8
4222AS-M3*0.5-6H		1.5P													
4222A-M4*0.5-6H		3P	M4	0.5	4.5	3.1	63	8	21	3.4		Picture 2	4	●	3.8
4222AS-M4*0.5-6H		1.5P													
4222A-M4*0.7-6H		3P	M4	0.7	4.5	3.1	63	8	21	3.4		Picture 2	4	●	3.7
4222AS-M4*0.7-6H		1.5P													
4222A-M5*0.5-6H		3P	M5	0.5	6	4.3	70	10	25	4.9		Picture 2	4	●	4.8
4222AS-M5*0.5-6H		1.5P													
4222A-M5*0.8-6H		3P	M5	0.8	6	4	70	10	25	4.9		Picture 2	4	●	4.65
4222AS-M5*0.8-6H		1.5P													
4222A-M6*0.75-6H		3P	M6	0.75	6	5	80	12	30	4.9		Picture 2	4	●	5.7
4222AS-M6*0.75-6H		1.5P													
4222A-M6*1-6H		3P	M6	1	6	4.7	80	12	30	4.9		Picture 2	4	●	5.6
4222AS-M6*1-6H		1.5P													
4222A-M7*1-6H		3P	M7	1	7	5.7	80	14	30	5.5		Picture 2	4	●	6.6
4222AS-M7*1-6H		1.5P													

● Stock available ○ Make-to-order

Forming taps -Al alloys machining

Type	Cooling mode	Basic dimension(mm)											Grade	Pre-hole diameter
		Length of Forming taper	d_1	P	d_2	d_3	l_1	l_2	l_3	a×a	Thread profile	Geometry	Number of teeth	YK40F	d
4222A-M8*1-6H	External coolant	3P	M8	1	8	6.7	90	16	35	6.2		Picture 2	4	●	7.6
4222AS-M8*1-6H		1.5P													
4222A-M8*1.25-6H		3P	M8	1.25	8	6.4	90	16	35	6.2		Picture 2	4	●	7.45
4222AS-M8*1.25-6H		1.5P													
4222A-M10*1-6H		3P	M10	1	10	8.7	100	20	39	8		Picture 2	5	●	9.6
4222AS-M10*1-6H		1.5P													
4222A-M10*1.25-6H		3P	M10	1.25	10	8.4	100	20	39	8		Picture 2	5	●	9.45
4222AS-M10*1.25-6H		1.5P													
4222A-M10*1.5-6H		3P	M10	1.5	10	8.1	100	20	39	8		Picture 2	5	●	9.35
4222AS-M10*1.5-6H		1.5P													
4222AC-M10*1.5-6H	Internal coolant	3P													
4222ACS-M10*1.5-6H		1.5P													
4222A-M12*1.25-6H	External coolant	3P	M12	1.25	9		110	24		7		Picture 3	5	●	11.45
4222AS-M12*1.25-6H		1.5P													
4222A-M12*1.5-6H		3P	M12	1.5	9		110	24		7	60°	Picture 3	5	●	11.35
4222AS-M12*1.5-6H		1.5P													
4222A-M12*1.75-6H		3P	M12	1.75	9		110	24		7		Picture 3	5	●	11.25
4222AS-M12*1.75-6H		1.5P													
4222AC-M12*1.75-6H	Internal coolant	3P													
4222ACS-M12*1.75-6H		1.5P													
4222A-M14*1.5-6H	External coolant	3P	M14	1.5	11		110	26		9		Picture 3	6	●	13.35
4222AS-M14*1.5-6H		1.5P													
4222A-M14*2-6H		3P	M14	2	11		110	26		9		Picture 3	6	●	13.1
4222AS-M14*2-6H		1.5P													
4222A-M16*1.5-6H		3P	M16	1.5	12		110	27		9		Picture 3	6	●	15.35
4222AS-M16*1.5-6H		1.5P													
4222A-M16*2-6H		3P	M16	2	12		110	27		9		Picture 3	6	●	15.1
4222AS-M16*2-6H		1.5P													
4222AC-M16*2-6H	Internal coolant	3P													
4222ACS-M16*2-6H		1.5P													

● Stock available ○ Make-to-order

Applicable material table

◎Very suitable ○Suitable

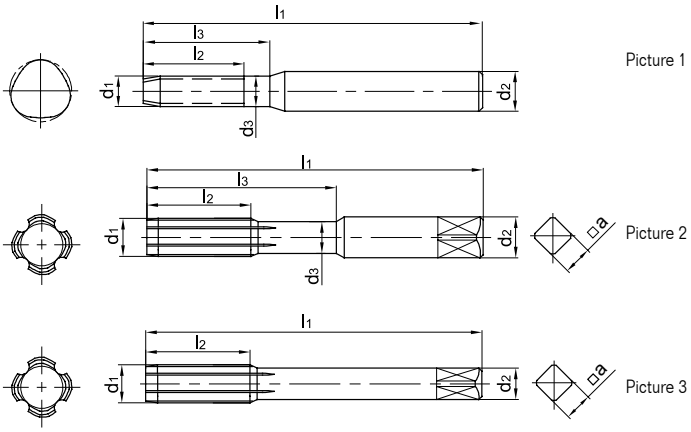
Grade	Workpiece material										
	Mild steel HB≤180	Carbon steel, Alloy steel	Pre-hardened steel, Hardened steel			Stainless steel	Cast iron	Nodular cast iron	Aluminum alloy	Copper alloy	Heat resistant alloy
			~40HRC	~50HRC	~60HRC						
YK40F									◎		

Code key C119 Cutting parameters C134 Technical information C135–C140

Forming taps -stainless steel machining







60° ISO 2 (6H)

Type	Cooling mode	Basic dimension(mm)											Grade		Pre-hole diameter
		Length of Forming taper	d_1	P	d_2	d_3	l_1	l_2	l_3	a×a	Thread profile	Geometry	Number of teeth	KTG402	YK40F	d
4122M-M1*0.25-6H	External coolant	3P	M1	0.25	3		40	5			60°	Picture 1	4	●	○	0.9
4122MS-M1*0.25-6H		2P														
4122M-M1.2*0.25-6H		3P	M1.2	0.25	3		40	5				Picture 1	4	●	○	1.1
4122MS-M1.2*0.25-6H		2P														
4122M-M1.6*0.35-6H		3P	M1.6	0.35	3	1.1	40	5	11			Picture 1	4	●	○	1.47
4122MS-M1.6*0.35-6H		2P														
4122M-M2*0.4-6H		3P	M2	0.4	3	1.5	45	6	12			Picture 1	4	●	○	1.85
4122MS-M2*0.4-6H		2P														
4122M-M2.5*0.45-6H		3P	M2.5	0.45	3	1.9	50	6	14			Picture 1	4	●	○	2.33
4122MS-M2.5*0.45-6H		2P														
4222M-M3*0.5-6H		3P	M3	0.5	3.5	2.3	56	6	18	2.7		Picture 2	4	●	○	2.8
4222MS-M3*0.5-6H		2P														
4222M-M4*0.5-6H		3P	M4	0.5	4.5	3.1	63	8	21	3.4		Picture 2	4	●	○	3.8
4222MS-M4*0.5-6H		2P														
4222M-M4*0.7-6H		3P	M4	0.7	4.5	3.1	63	8	21	3.4		Picture 2	4	●	○	3.7
4222MS-M4*0.7-6H		2P														
4222M-M5*0.5-6H		3P	M5	0.5	6	4.3	70	10	25	4.9		Picture 2	4	●	○	4.8
4222MS-M5*0.5-6H		2P														
4222M-M5*0.8-6H		3P	M5	0.8	6	4	70	10	25	4.9		Picture 2	4	●	○	4.65
4222MS-M5*0.8-6H		2P														
4222M-M6*0.75-6H		3P	M6	0.75	6	5	80	12	30	4.9		Picture 2	4	●	○	5.7
4222MS-M6*0.75-6H		2P														
4222M-M6*1-6H		3P	M6	1	6	4.7	80	12	30	4.9		Picture 2	4	●	○	5.6
4222MS-M6*1-6H		2P														
4222M-M7*1-6H		3P	M7	1	7	5.7	80	14	30	5.5		Picture 2	4	●	○	6.6
4222MS-M7*1-6H		2P														

● Stock available ○ Make-to-order

Forming taps -stainless steel machining

Type	Cooling mode	Basic dimension(mm)											Grade		Pre-hole diameter
		Length of Forming taper	d_1	P	d_2	d_3	l_1	l_2	l_3	a×a	Thread profile	Geometry	Number of teeth	KTG402	YK40F	d
4222M-M8*1-6H	External coolant	3P	M8	1	8	6.7	90	16	35	6.2		Picture 2	4	●	○	7.6
4222MS-M8*1-6H		2P														
4222M-M8*1.25-6H		3P	M8	1.25	8	6.4	90	16	35	6.2		Picture 2	4	●	○	7.45
4222MS-M8*1.25-6H		2P														
4222M-M10*1-6H		3P	M10	1	10	8.7	100	20	39	8		Picture 2	5	●	○	9.6
4222MS-M10*1-6H		2P														
4222M-M10*1.25-6H		3P	M10	1.25	10	8.4	100	20	39	8		Picture 2	5	●	○	9.45
4222MS-M10*1.25-6H		2P														
4222M-M10*1.5-6H		3P	M10	1.5	10	8.1	100	20	39	8		Picture 2	5	●	○	9.35
4222MS-M10*1.5-6H		2P														
4222MC-M10*1.5-6H	Internal coolant	3P														
4222MCS-M10*1.5-6H		2P														
4222M-M12*1.25-6H	External coolant	3P	M12	1.25	9		110	24		7		Picture 3	5	●	○	11.45
4222MS-M12*1.25-6H		2P														
4222M-M12*1.5-6H		3P	M12	1.5	9		110	24		7	60°	Picture 3	5	●	○	11.35
4222MS-M12*1.5-6H		2P														
4222M-M12*1.75-6H		3P	M12	1.75	9		110	24		7		Picture 3	5	●	○	11.25
4222MS-M12*1.75-6H		2P														
4222MC-M12*1.75-6H	Internal coolant	3P														
4222MCS-M12*1.75-6H		2P														
4222M-M14*1.5-6H	External coolant	3P	M14	1.5	11		110	26		9		Picture 3	6	●	○	13.35
4222MS-M14*1.5-6H		2P														
4222M-M14*2-6H		3P	M14	2	11		110	26		9		Picture 3	6	●	○	13.1
4222MS-M14*2-6H		2P														
4222M-M16*1.5-6H		3P	M16	1.5	12		110	27		9		Picture 3	6	●	○	15.35
4222MS-M16*1.5-6H		2P														
4222M-M16*2-6H		3P	M16	2	12		110	27		9		Picture 3	6	●	○	15.1
4222MS-M16*2-6H		2P														
4222MC-M16*2-6H	Internal coolant	3P														
4222MCS-M16*2-6H		2P														

● Stock available ○ Make-to-order

Applicable material table

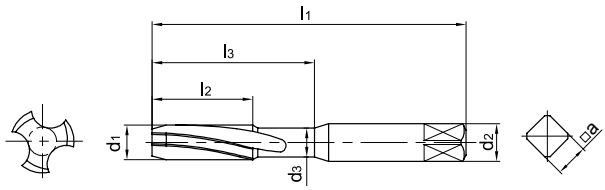
◎Very suitable ○Suitable

Grade	Workpiece material										
	Mild steel HB≤180	Carbon steel, Alloy steel	Pre-hardened steel, Hardened steel			Stainless steel	Cast iron	Nodular cast iron	Aluminum alloy	Copper alloy	Heat resistant alloy
			~40HRC	~50HRC	~60HRC						
KTG402	◎					◎					
YK40F	○					○			○		

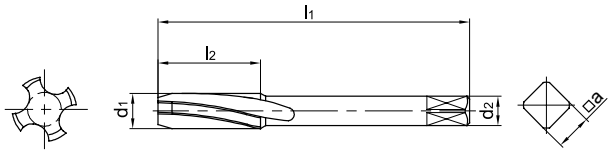
Code key C119 Cutting parameters C134 Technical information C135–C140

Helical-flute cutting taps - cast iron machining





Picture 1



Picture 2

60° ISO 2 (6H) (6HX)

Type	Basic dimension(mm)											Grade	Pre-hole diameter
	Length of Cutting tap	d1	P	d2	d3	l1	l2	l3	a×a	Thread profile	Geometry	Number of teeth	YK40F	d
4201C-M3*0.5-6H	3P	M3	0.5	3.5	2.3	56	11	18	2.7	60°	Picture 1	3	●	2.5
4201C-M3*0.5-6HX	3P													
4201CS-M3*0.5-6H	1.5P													
4201CS-M3*0.5-6HX	1.5P													
4201C-M4*0.7-6H	3P	M4	0.7	4.5	3.1	63	13	21	3.4		Picture 1	3	●	3.3
4201C-M4*0.7-6HX	3P													
4201CS-M4*0.7-6H	1.5P													
4201CS-M4*0.7-6HX	1.5P													
4201C-M5*0.8-6H	3P	M5	0.8	6	4	70	16	25	4.9		Picture 1	3	●	4.2
4201C-M5*0.8-6HX	3P													
4201CS-M5*0.8-6H	1.5P													
4201CS-M5*0.8-6HX	1.5P													
4201C-M6*0.75-6H	3P	M6	0.75	6	5	80	19	30	4.9		Picture 1	3	●	5.25
4201C-M6*0.75-6HX	3P													
4201CS-M6*0.75-6H	1.5P													
4201CS-M6*0.75-6HX	1.5P													
4201C-M6*1-6H	3P	M6	1	6	4.7	80	19	30	4.9		Picture 1	3	●	5
4201CC-M6*1-6H	3P													
4201C-M6*1-6HX	3P													
4201CS-M6*1-6H	1.5P													
4201CCS-M6*1-6H	1.5P													
4201CS-M6*1-6HX	1.5P													
4201C-M7*1-6H	3P	M7	1	7	5.7	80	19	30	5.5		Picture 1	3	●	6
4201CS-M7*1-6H	1.5P													
4201C-M8*1-6H	3P	M8	1	8	6.7	90	20	35	6.2		Picture 1	3	●	7
4201CS-M8*1-6H	1.5P													
4201C-M8*1.25-6H	3P	M8	1.25	8	6.4	90	22	35	6.2		Picture 1	3	●	6.75
4201CC-M8*1.25-6H	3P													
4201C-M8*1.25-6HX	3P													
4201CS-M8*1.25-6H	1.5P													
4201CCS-M8*1.25-6H	1.5P													
4201CS-M8*1.25-6HX	1.5P													

● Stock available ○ Make-to-order

Helical-flute cutting taps - cast iron machining

Type	Basic dimension(mm)											Grade	Pre-hole diameter
	Length of Cutting tap	d_1	P	d_2	d_3	l_1	l_2	l_3	a×a	Thread profile	Geometry	Number of teeth	YK40F	d
4201C-M10*1-6H	3P	M10	1	10	8.7	100	20	39	8		Picture 1	4	●	9
4201CS-M10*1-6H	1.5P													
4201C-M10*1.25-6H	3P	M10	1.25	10	8.4	100	24	39	8		Picture 1	4	●	8.75
4201CS-M10*1.25-6H	1.5P													
4201C-M10*1.5-6H	3P	M10	1.5	10	8.1	100	24	39	8		Picture 1	4	●	8.5
4201CC-M10*1.5-6H	3P													
4201C-M10*1.5-6HX	3P													
4201CS-M10*1.5-6H	1.5P													
4201CCS-M10*1.5-6H	1.5P													
4201CS-M10*1.5-6HX	1.5P													
4201C-M12*1.25-6H	3P	M12	1.25	9		110	29		7		Picture 2	4	●	10.75
4201CS-M12*1.25-6H	1.5P													
4201C-M12*1.5-6H	3P	M12	1.5	9		110	29		7			4	●	10.5
4201CS-M12*1.5-6H	1.5P													
4201C-M12*1.75-6H	3P	M12	1.75	9		110	29		7	60°	Picture 2	4	●	10.25
4201CC-M12*1.75-6H	3P													
4201C-M12*1.75-6HX	3P													
4201CS-M12*1.75-6H	1.5P													
4201CCS-M12*1.75-6H	1.5P													
4201CS-M12*1.75-6HX	1.5P													
4201C-M14*1.5-6H	3P	M14	1.5	11		110	30		9		Picture 2	4	●	12.5
4201CS-M14*1.5-6H	1.5P													
4201C-M14*2-6H	3P	M14	2	11		110	30		9		Picture 2	4	●	12
4201CS-M14*2-6H	1.5P													
4201C-M16*1.5-6H	3P	M16	1.5	12		110	32		9		Picture 2	4	●	14.5
4201CS-M16*1.5-6H	1.5P													
4201C-M16*2-6H	3P	M16	2	12		110	32		9		Picture 2	4	●	14
4201C-M16*2-6HX	3P													
4201CS-M16*2-6H	1.5P													
4201CS-M16*2-6HX	1.5P													

● Stock available ○ Make-to-order

Applicable material table

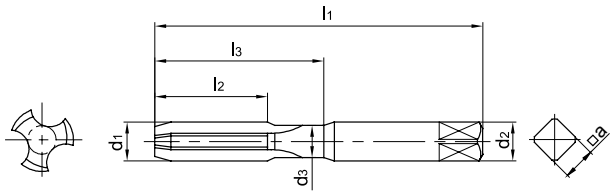
◎Very suitable ○Suitable

Grade	Workpiece material										
	Mild steel HB≤180	Carbon steel, Alloy steel	Pre-hardened steel, Hardened steel			Stainless steel	Cast iron	Nodular cast iron	Aluminum alloy	Copper alloy	Heat resistant alloy
			~40HRC	~50HRC	~60HRC						
YK40F							◎	◎			

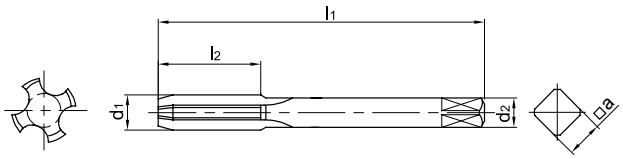
Code key C119 Cutting parameters C134 Technical information C135–C140

Straight-flute cutting tap - cast iron machining





Picture 1



Picture 2

60° ISO 2 (6H) (6HX)

Type	Basic dimension(mm)											Grade	Pre-hole diameter
	Length of Cutting tap	d1	P	d2	d3	l1	l2	l3	a×a	Thread profile	Geometry	Number of teeth	YK40F	d
4202C-M3*0.5-6H	3P	M3	0.5	3.5	2.3	56	11	18	2.7	60°	Picture 1	3	●	2.5
4202C-M3*0.5-6HX	3P													
4202CS-M3*0.5-6H	1.5P													
4202CS-M3*0.5-6HX	1.5P													
4202C-M4*0.7-6H	3P	M4	0.7	4.5	3.1	63	13	21	3.4		Picture 1	3	●	3.3
4202C-M4*0.7-6HX	3P													
4202CS-M4*0.7-6H	1.5P													
4202CS-M4*0.7-6HX	1.5P													
4202C-M5*0.8-6H	3P	M5	0.8	6	4	70	16	25	4.9		Picture 1	3	●	4.2
4202C-M5*0.8-6HX	3P													
4202CS-M5*0.8-6H	1.5P													
4202CS-M5*0.8-6HX	1.5P													
4202C-M6*0.75-6H	3P	M6	0.75	6	5	80	19	30	4.9		Picture 1	3	●	5.25
4202C-M6*0.75-6HX	3P													
4202CS-M6*0.75-6H	1.5P													
4202CS-M6*0.75-6HX	1.5P													
4202C-M6*1-6H	3P	M6	1	6	4.7	80	19	30	4.9		Picture 1	3	●	5
4202CC-M6*1-6H	3P													
4202C-M6*1-6HX	3P													
4202CS-M6*1-6H	1.5P													
4202CCS-M6*1-6H	1.5P													
4202CS-M6*1-6HX	1.5P													
4202C-M7*1-6H	3P	M7	1	7	5.7	80	19	30	5.5		Picture 1	3	●	6
4202CS-M7*1-6H	1.5P													
4202C-M8*1-6H	3P	M8	1	8	6.7	90	20	35	6.2		Picture 1	3	●	7
4202CS-M8*1-6H	1.5P													
4202C-M8*1.25-6H	3P	M8	1.25	8	6.4	90	22	35	6.2		Picture 1	3	●	6.75
4202CC-M8*1.25-6H	3P													
4202C-M8*1.25-6HX	3P													
4202CS-M8*1.25-6H	1.5P													
4202CCS-M8*1.25-6H	1.5P													
4202CS-M8*1.25-6HX	1.5P													

● Stock available ○ Make-to-order

Straight-flute cutting tap - cast iron machining

Type	Basic dimension(mm)											Grade	Pre-hole diameter
	Length of Cutting tap	d_1	P	d_2	d_3	l_1	l_2	l_3	a×a	Thread profile	Geometry	Number of teeth	YK40F	d
4202C-M10*1-6H	3P	M10	1	10	8.7	100	20	39	8		Picture 1	4	●	9
4202CS-M10*1-6H	1.5P													
4202C-M10*1.25-6H	3P	M10	1.25	10	8.4	100	24	39	8		Picture 1	4	●	8.75
4202CS-M10*1.25-6H	1.5P													
4202C-M10*1.5-6H	3P	M10	1.5	10	8.1	100	24	39	8		Picture 1	4	●	8.5
4202CC-M10*1.5-6H	3P													
4202C-M10*1.5-6HX	3P													
4202CS-M10*1.5-6H	1.5P													
4202CCS-M10*1.5-6H	1.5P													
4202CS-M10*1.5-6HX	1.5P													
4202C-M12*1.25-6H	3P	M12	1.25	9		110	29		7		Picture 2	4	●	10.75
4202CS-M12*1.25-6H	1.5P													
4202C-M12*1.5-6H	3P	M12	1.5	9		110	29		7			4	●	10.5
4202CS-M12*1.5-6H	1.5P													
4202C-M12*1.75-6H	3P	M12	1.75	9		110	29		7	60°	Picture 2	4	●	10.25
4202CC-M12*1.75-6H	3P													
4202C-M12*1.75-6HX	3P													
4202CS-M12*1.75-6H	1.5P													
4202CCS-M12*1.75-6H	1.5P													
4202CS-M12*1.75-6HX	1.5P													
4202C-M14*1.5-6H	3P	M14	1.5	11		110	30		9		Picture 2	4	●	12.5
4202CS-M14*1.5-6H	1.5P													
4202C-M14*2-6H	3P	M14	2	11		110	30		9		Picture 2	4	●	12
4202CS-M14*2-6H	1.5P													
4202C-M16*1.5-6H	3P	M16	1.5	12		110	32		9		Picture 2	4	●	14.5
4202CS-M16*1.5-6H	1.5P													
4202C-M16*2-6H	3P	M16	2	12		110	32		9		Picture 2	4	●	14
4202C-M16*2-6HX	3P													
4202CS-M16*2-6H	1.5P													
4202CS-M16*2-6HX	1.5P													

● Stock available ○ Make-to-order

Applicable material table

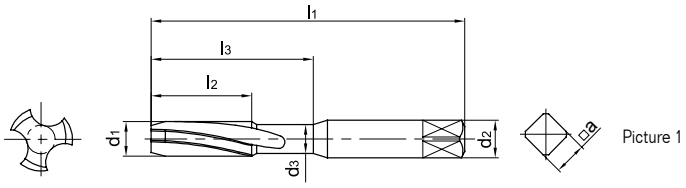
◎Very suitable ○Suitable

Grade	Workpiece material										
	Mild steel HB≤180	Carbon steel, Alloy steel	Pre-hardened steel, Hardened steel			Stainless steel	Cast iron	Nodular cast iron	Aluminum alloy	Copper alloy	Heat resistant alloy
			~40HRC	~50HRC	~60HRC						
YK40F							◎	◎			

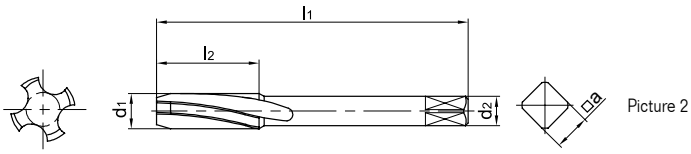
Code key C119 Cutting parameters C134 Technical information C135–C140

Helical-flute cutting taps - Al alloys machining





Picture 1



Picture 2



Type	Basic dimension(mm)											Grade	Pre-hole diameter
	Length of Cutting tap	d_1	P	d_2	d_3	l_1	l_2	l_3	a×a	Thread profile	Geometry	Number of teeth	YK40F	d
4201A-M3*0.5-6H	3P	M3	0.5	3.5	2.3	56	11	18	2.7	60°	Picture 1	3	●	2.5
4201A-M3*0.5-6HX	3P													
4201AS-M3*0.5-6H	1.5P													
4201AS-M3*0.5-6HX	1.5P													
4201A-M4*0.7-6H	3P	M4	0.7	4.5	3.1	63	13	21	3.4		Picture 1	3	●	3.3
4201A-M4*0.7-6HX	3P													
4201AS-M4*0.7-6H	1.5P													
4201AS-M4*0.7-6HX	1.5P													
4201A-M5*0.8-6H	3P	M5	0.8	6	4	70	16	25	4.9		Picture 1	3	●	4.2
4201A-M5*0.8-6HX	3P													
4201AS-M5*0.8-6H	1.5P													
4201AS-M5*0.8-6HX	1.5P													
4201A-M6*0.75-6H	3P	M6	0.75	6	5	80	19	30	4.9		Picture 1	3	●	5.25
4201A-M6*0.75-6HX	3P													
4201AS-M6*0.75-6H	1.5P													
4201AS-M6*0.75-6HX	1.5P													
4201A-M6*1-6H	3P	M6	1	6	4.7	80	19	30	4.9		Picture 1	3	●	5
4201AC-M6*1-6H	3P													
4201A-M6*1-6HX	3P													
4201AS-M6*1-6H	1.5P													
4201ACS-M6*1-6H	1.5P													
4201AS-M6*1-6HX	1.5P													
4201A-M7*1-6H	3P	M7	1	7	5.7	80	19	30	5.5		Picture 1	3	●	6
4201AS-M7*1-6H	1.5P													
4201A-M8*1-6H	3P	M8	1	8	6.7	90	20	35	6.2		Picture 1	3	●	7
4201AS-M8*1-6H	1.5P													

● Stock available ○ Make-to-order

Helical-flute cutting taps - Al alloys machining

Type	Basic dimension(mm)											Grade	Pre-hole diameter
	Length of Cutting tap	d_1	P	d_2	d_3	l_1	l_2	l_3	a×a	Thread profile	Geometry	Number of teeth	YK40F	d
4201A-M8*1.25-6H	3P	M8	1.25	8	6.4	90	22	35	6.2	60°	Picture 1	3	●	6.75
4201AC-M8*1.25-6H	3P													
4201A-M8*1.25-6HX	3P													
4201AS-M8*1.25-6H	1.5P													
4201ACS-M8*1.25-6H	1.5P													
4201AS-M8*1.25-6HX	1.5P													
4201A-M10*1-6H	3P	M10	1	10	8.7	100	20	39	8		Picture 1	4	●	9
4201AS-M10*1-6H	1.5P													
4201A-M10*1.25-6H	3P	M10	1.25	10	8.4	100	24	39	8		Picture 1	4	●	8.75
4201AS-M10*1.25-6H	1.5P													
4201A-M10*1.5-6H	3P	M10	1.5	10	8.1	100	24	39	8		Picture 1	4	●	8.5
4201AC-M10*1.5-6H	3P													
4201A-M10*1.5-6HX	3P													
4201AS-M10*1.5-6H	1.5P													
4201ACS-M10*1.5-6H	1.5P													
4201AS-M10*1.5-6HX	1.5P													
4201A-M12*1.25-6H	3P	M12	1.25	9		110	29		7		Picture 2	4	●	10.75
4201AS-M12*1.25-6H	1.5P													
4201A-M12*1.5-6H	3P	M12	1.5	9		110	29		7		Picture 2	4	●	10.5
4201AS-M12*1.5-6H	1.5P													
4201A-M12*1.75-6H	3P	M12	1.75	9		110	29		7		Picture 2	4	●	10.25
4201AC-M12*1.75-6H	3P													
4201A-M12*1.75-6HX	3P													
4201AS-M12*1.75-6H	1.5P													
4201ACS-M12*1.75-6H	1.5P													
4201AS-M12*1.75-6HX	1.5P													
4201A-M14*1.5-6H	3P	M14	1.5	11		110	30		9		Picture 2	4	●	12.5
4201AS-M14*1.5-6H	1.5P													
4201A-M14*2-6H	3P	M14	2	11		110	30		9		Picture 2	4	●	12
4201AS-M14*2-6H	1.5P													
4201A-M16*1.5-6H	3P	M16	1.5	12		110	32		9		Picture 2	4	●	14.5
4201AS-M16*1.5-6H	1.5P													
4201A-M16*2-6H	3P	M16	2	12		110	32		9		Picture 2	4	●	14
4201A-M16*2-6HX	3P													
4201AS-M16*2-6H	1.5P													
4201AS-M16*2-6HX	1.5P													

● Stock available ○ Make-to-order

Applicable material table

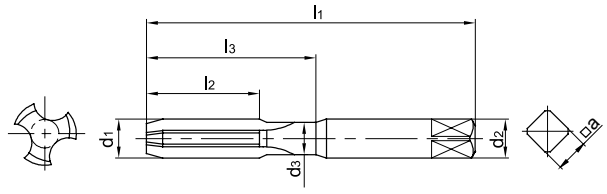
◎Very suitable ○Suitable

Grade	Workpiece material										
	Mild steel HB≤180	Carbon steel, Alloy steel	Pre-hardened steel, Hardened steel			Stainless steel	Cast iron	Nodular cast iron	Aluminum alloy	Copper alloy	Heat resistant alloy
			~40HRC	~50HRC	~60HRC						
YK40F									◎		

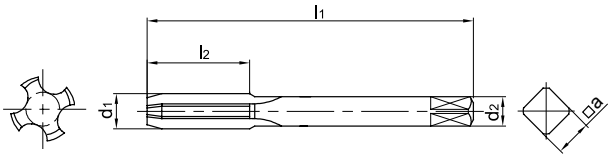
Code key C119 Cutting parameters C134 Technical information C135–C140

Straight-flute cutting tap - Al alloys machining





Picture 1



Picture 2

60° ISO 2 (6H) (6HX)

Type	Basic dimension(mm)											Grade	Pre-hole diameter
	Length of Cutting tap	d_1	P	d_2	d_3	l_1	l_2	l_3	a×a	Thread profile	Geometry	Number of teeth	YK40F	d
4202A-M3*0.5-6H	3P	M3	0.5	3.5	2.3	56	11	18	2.7	60°	Picture 1	3	●	2.5
4202A-M3*0.5-6HX	3P													
4202AS-M3*0.5-6H	1.5P													
4202AS-M3*0.5-6HX	1.5P													
4202A-M4*0.7-6H	3P	M4	0.7	4.5	3.1	63	13	21	3.4		Picture 1	3	●	3.3
4202A-M4*0.7-6HX	3P													
4202AS-M4*0.7-6H	1.5P													
4202AS-M4*0.7-6HX	1.5P													
4202A-M5*0.8-6H	3P	M5	0.8	6	4	70	16	25	4.9		Picture 1	3	●	4.2
4202A-M5*0.8-6HX	3P													
4202AS-M5*0.8-6H	1.5P													
4202AS-M5*0.8-6HX	1.5P													
4202A-M6*0.75-6H	3P	M6	0.75	6	5	80	19	30	4.9		Picture 1	3	●	5.25
4202A-M6*0.75-6HX	3P													
4202AS-M6*0.75-6H	1.5P													
4202AS-M6*0.75-6HX	1.5P													
4202A-M6*1-6H	3P	M6	1	6	4.7	80	19	30	4.9		Picture 1	3	●	5
4202AC-M6*1-6H	3P													
4202A-M6*1-6HX	3P													
4202AS-M6*1-6H	1.5P													
4202ACS-M6*1-6H	1.5P													
4202AS-M6*1-6HX	1.5P													
4202A-M7*1-6H	3P	M7	1	7	5.7	80	19	30	5.5		Picture 1	3	●	6
4202AS-M7*1-6H	1.5P													
4202A-M8*1-6H	3P	M8	1	8	6.7	90	20	35	6.2		Picture 1	3	●	7
4202AS-M8*1-6H	1.5P													

● Stock available ○ Make-to-order

Straight-flute cutting tap - Al alloys machining

Type	Basic dimension(mm)											Grade	Pre-hole diameter
	Length of Cutting tap	d_1	P	d_2	d_3	l_1	l_2	l_3	a×a	Thread profile	Geometry	Number of teeth	YK40F	d
4202A-M8*1.25-6H	3P	M8	1.25	8	6.4	90	22	35	6.2	60°	Picture 1	3	●	6.75
4202AC-M8*1.25-6H	3P													
4202A-M8*1.25-6HX	3P													
4202AS-M8*1.25-6H	1.5P													
4202ACS-M8*1.25-6H	1.5P													
4202AS-M8*1.25-6HX	1.5P													
4202A-M10*1-6H	3P	M10	1	10	8.7	100	20	39	8		Picture 1	4	●	9
4202AS-M10*1-6H	1.5P													
4202A-M10*1.25-6H	3P	M10	1.25	10	8.4	100	24	39	8		Picture 1	4	●	8.75
4202AS-M10*1.25-6H	1.5P													
4202A-M10*1.5-6H	3P	M10	1.5	10	8.1	100	24	39	8		Picture 1	4	●	8.5
4202AC-M10*1.5-6H	3P													
4202A-M10*1.5-6HX	3P													
4202AS-M10*1.5-6H	1.5P													
4202ACS-M10*1.5-6H	1.5P													
4202AS-M10*1.5-6HX	1.5P													
4202A-M12*1.25-6H	3P	M12	1.25	9		110	29		7		Picture 2	4	●	10.75
4202AS-M12*1.25-6H	1.5P													
4202A-M12*1.5-6H	3P	M12	1.5	9		110	29		7		Picture 2	4	●	10.5
4202AS-M12*1.5-6H	1.5P													
4202A-M12*1.75-6H	3P	M12	1.75	9		110	29		7		Picture 2	4	●	10.25
4202AC-M12*1.75-6H	3P													
4202A-M12*1.75-6HX	3P													
4202AS-M12*1.75-6H	1.5P													
4202ACS-M12*1.75-6H	1.5P													
4202AS-M12*1.75-6HX	1.5P													
4202A-M14*1.5-6H	3P	M14	1.5	11		110	30		9		Picture 2	4	●	12.5
4202AS-M14*1.5-6H	1.5P													
4202A-M14*2-6H	3P	M14	2	11		110	30		9		Picture 2	4	●	12
4202AS-M14*2-6H	1.5P													
4202A-M16*1.5-6H	3P	M16	1.5	12		110	32		9		Picture 2	4	●	14.5
4202AS-M16*1.5-6H	1.5P													
4202A-M16*2-6H	3P	M16	2	12		110	32		9		Picture 2	4	●	14
4202A-M16*2-6HX	3P													
4202AS-M16*2-6H	1.5P													
4202AS-M16*2-6HX	1.5P													

● Stock available ○ Make-to-order

Applicable material table

◎Very suitable ○Suitable

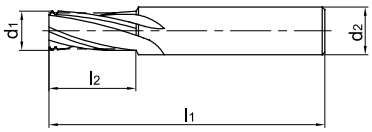
Grade	Workpiece material										
	Mild steel HB≤180	Carbon steel, Alloy steel	Pre-hardened steel, Hardened steel			Stainless steel	Cast iron	Nodular cast iron	Aluminum alloy	Copper alloy	Heat resistant alloy
			~40HRC	~50HRC	~60HRC						
YK40F									◎		

Code key C119 Cutting parameters C134 Technical information C135–C140


Solid carbide
Thread end mills
Newly upgraded!

Thread end mills









Type	Basic dimension(mm)							Recommended grade		Pre-hole diameter
	D	d_1	P	d_2	l_1	l_2	Number of teeth	KTG4015	YK40F	d
4111-M3*0.5	M3	2.35	0.5	4	50	6	3	●	○	2.5
4111-M4*0.7	M4	3.15	0.7	4	50	8	3	●	○	3.3
4111-M5*0.5	M5	4.3	0.5	6	50	10	3	●	○	4.5
4111-M5*0.8	M5	4	0.8	6	50	10	3	●	○	4.2
4111-M6*0.75	M6	5	0.75	6	60	12	4	●	○	5.25
4111-M6*1	M6	4.75	1	6	60	12	4	●	○	5
4111-M8*1	M8	6.65	1	8	60	16	4	●	○	7
4111-M8*1.25	M8	6.45	1.25	8	60	16	4	●	○	6.75
4111-M10*1	M10	8.55	1	10	75	20	4	●	○	9
4111-M10*1.5	M10	8.1	1.5	10	75	20	4	●	○	8.5
4111-M12*1.25	M12	10.25	1.25	12	75	24	4	●	○	10.75
4111-M12*1.75	M12	9.75	1.75	12	75	24	4	●	○	10.25
4111-M14*1	M14	12.35	1	14	75	20	4	●	○	13
4111-M14*1.5	M14	11.9	1.5	14	75	28	4	●	○	12.5
4111-M14*2	M14	11.4	2	14	75	28	4	●	○	12
4111-M16*2	M16	13.3	2	16	90	32	6	●	○	14
4111-M18*1	M18	16.15	1	18	90	20	6	●	○	17
4111-M18*2.5	M18	14.75	2.5	18	90	36	6	●	○	15.5
4111-M20*2	M20	17.1	2	18	100	40	6	●	○	18
4111-M20*2.5	M20	16.65	2.5	18	100	40	6	●	○	17.5

● Stock available ○ Make-to-order

Applicable material table

◎Very suitable ○Suitable

Grade	Workpiece material										
	Mild steel HB≤180	Carbon steel, Alloy steel	Pre-hardened steel, Hardened steel			Stainless steel	Cast iron	Nodular cast iron	Aluminum alloy	Copper alloy	Heat resistant alloy
			~40HRC	~50HRC	~60HRC						
KTG4015	○	◎	○				○	○			
YK40F							○		○	○	

Code key C119
Cutting parameters C134
Technical information C135–C140

Recommended cutting parameters

Forming tap

Workpiece material	Cutting speed (m/min)
Stainless steel / Mild steel	5~20
Aluminium alloy	20~50
Cast aluminium alloy(Si＜10%)	15~40

Cutting tap

Workpiece material	Cutting speed (m/min)
Grey cast iron	15~30
Nodular cast iron	10~20
Aluminium alloy	20~50
Cast aluminium alloy (Si < 10%)	20~45
Cast aluminium alloy (Si ≥ 10%)	15~40

Thread end mills

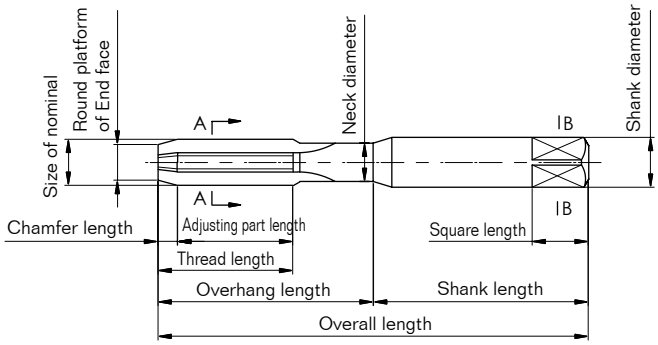
Workpiece material	Cutting speed (m/min)		Feed rate (mm/z)	
	Uncoated	Coated	D≤8	D>8
Alloy steel、Common steel	20~60	40~120	0.02~0.05	0.04~0.12
Aluminium alloy	100~250	---	0.05~0.2	

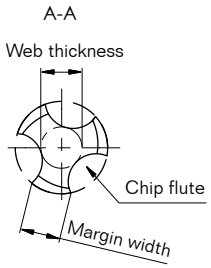
Note:

The tool entering feed is less than 70% of threading feed. It is in direct proportion to the diameter of the tap. The above cut parameters are suitable for thread cutters with helical flute. Please reduce feed rate and cutting speed by 20% ～ 40% if it is straight-flute tools.

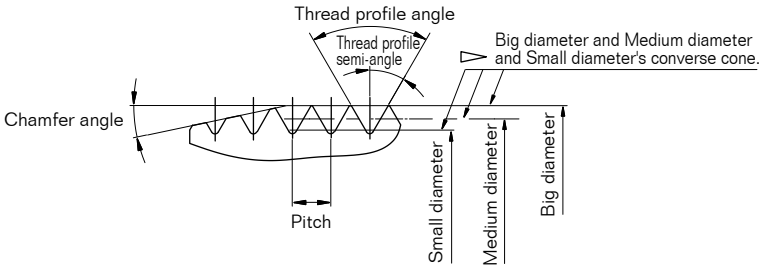
Tap

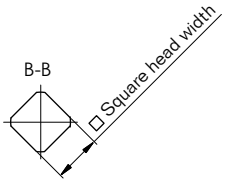
Parts terminology of cutting taps



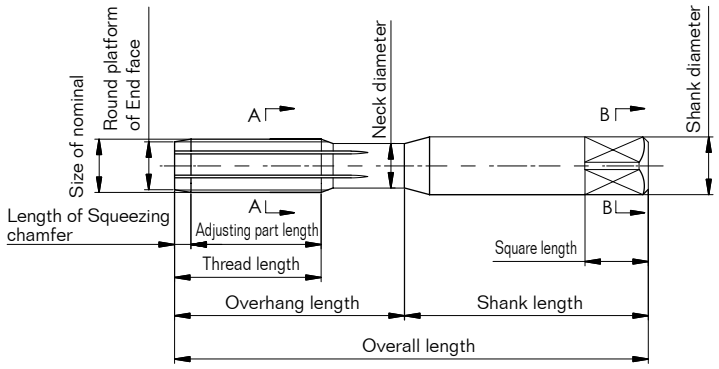


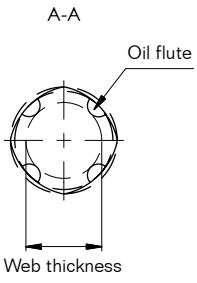
Magnifying fig of chamfer and thread profile



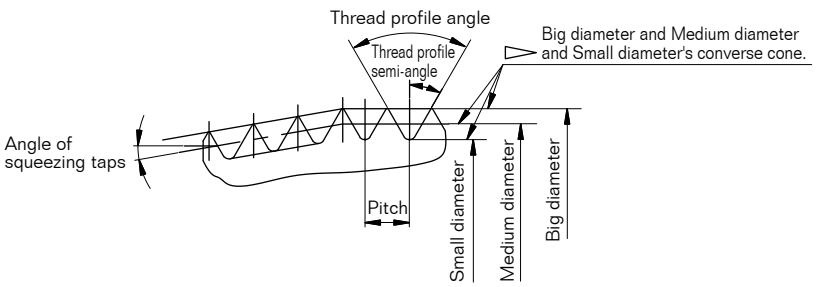


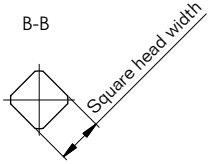
Parts terminology of forming taps



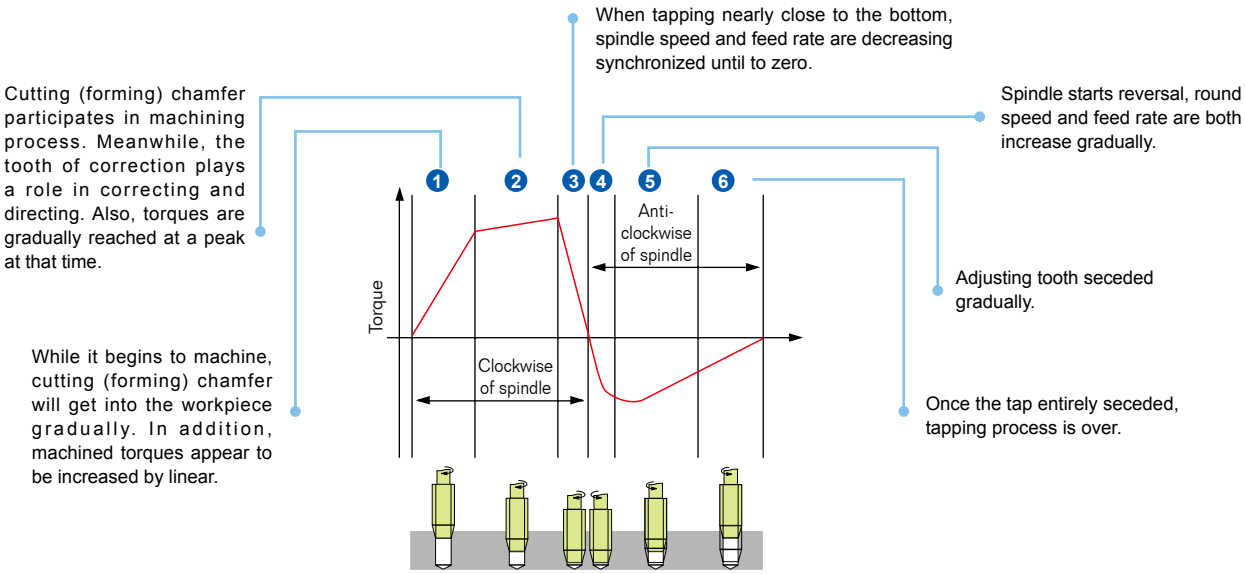


Magnifying fig of squeezing chamfer and guided threads

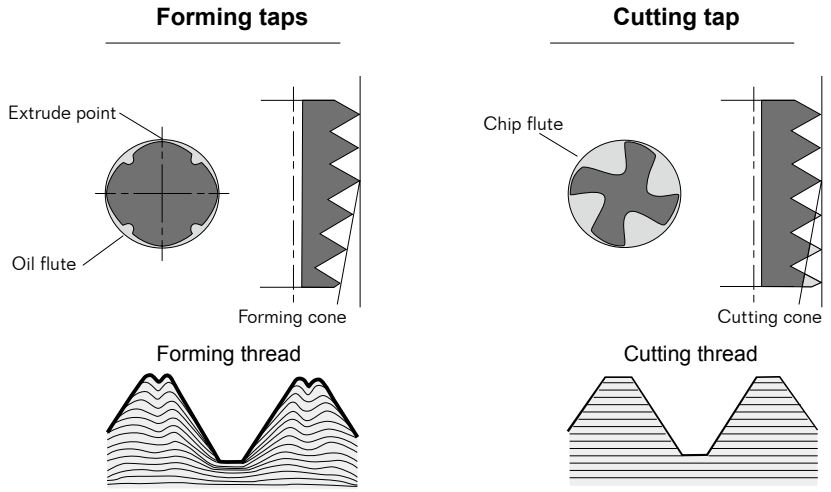




Process of tapping and tapping torques



Comparison of forming taps and cutting taps



Tapping types of cutting taps

Due to different machines, tapping types of cutting taps can be broadly divided into flexible tapping and rigid tapping. Due to different pre-hole, it can also be divided into through-hole tapping and blind-hole tapping.

Rigid tapping: Machine tool has good precision , the spindle feed rate is consistent with the tap pitch. Used general chunks.

Flexible tapping: Machine tool has poor precision, the spindle feed rate cannot be strictly in accordance with the pitch. Compensating floating chucks should be used to compensate the error between the tapping feed and the tap pitch, so that the tap can feed in accordance with the pitch.

Through-hole tapping: chip removal along the direction of tapping feed, so that the chip clogging and scratching and squeezing on the machined surface caused by chips can be reduced and the accuracy of thread processing can be improved.

Bind-hole tapping: chips removal along the direction of tap shank. Increase of cutting force, which is caused by chips blocked in the groove, can be prevented.

Features and applications of tap flute

Classification	Advantages	Disadvantages	Recommend applications
Straight-flute taps 	● general performance is good ● high cutting edge strength ● easy to regrind	● large cutting torque by machining ● bad chip-breaking and chip removal ability ● cannot tapping to the bottom of blind holes	● for machining of high hardness material ● material generating powdered chips ● material easy to cause abrasion ● tap shot through and blind hole
Helical-flute taps 	● small cutting torque by machining ● better chip-breaking and chip removal ability ● available for tapping to the bottom of blind holes ● penetrate to pre-hole easily	● bad cutting edge strength ● easily fall in tooth when seceding	● tap long through and blind hole ● material generating long curling chips ● the hole with axial slot on inner wall
Forming taps 	● no chips ● high precision of internal thread ● high tool strength ● available for tapping to the bottom of blind holes	● only for machining of specific material ● high requirement of pre-hole ● high requirement of lubrication liquid	● for soft materials with good toughness and ductility ● tap through and blind hole

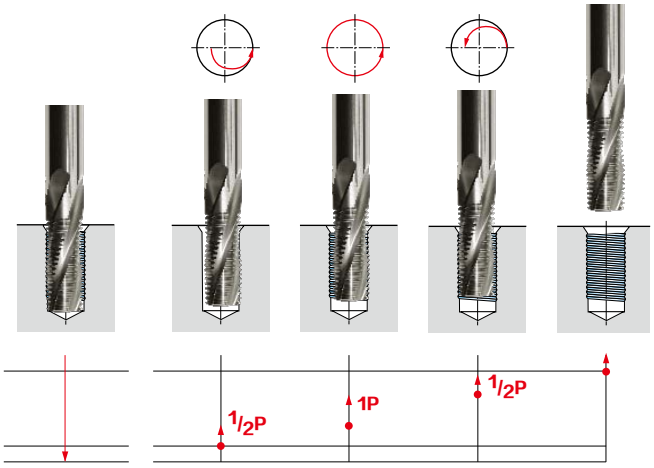


The common problems in tapping

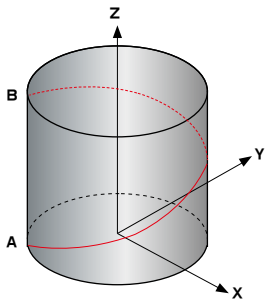
Common problems	Reasons	Solutions
Too large Internal thread	Wrong tap type selection	Selecting right tap according to work materials and requirement
	Pre-hole is too large	Select appropriate prehole drills
	Pre-hole is off center	Improve prehole quality
		Change to floated tapping method
	Axial feed not equable	Mechanical feed
		Use flexible tapping
	Build-up edge	Regrinding in time or change taps
		Adopt coated taps
		Fully lubricated
	Extremely high cutting speed	Lower cutting speed
	Insufficient lubrication or cooling	Check lubricating oil density
		Increase cooling liquid pressure and volume
	Wrong selection of tap tolerance level	Select taps with right tolerance
Too small internal thread	Wrong selection of tap tolerance level	Select taps with right tolerance
	Wrong tapping	Avoid taps bear higher axial stress in the process of tapping
	The rigidity of machine tool spindle is too well	Adopt axial floated chuck
Thread disorderly buckle	When starts tapping, force too much press on right helical taps	Decrease pressure when starts tapping
	When starts tapping, force too small press on left helical taps	increase pressure when starts tapping
	Unmatched of machine tool feed and thread pitch	Change to floated tapping
Unsmooth on internal thread surface	Wrong selection of taps	Selecting right tap according to work materials and requirement
	Too high Cutting speed	Lower cutting speed
	Insufficient cooling	Use right cooling liquid and enough volume or select taps with inner coolant
	Obstructed chip removal	Select helical flute taps
	Too small pre-hole diameter	Adjust pre-hole drill
	Build-up edge	Adopt coated taps
		Fully lubricated
Tap breakage	Too small pre-hole	Adjust pre-hole drill
	Torque is too large when tapping	Increase length of cutting chamfer
		Increase cutting edge
	Tap touch hole bottom	Check the depth of pre-hole
		Adopt floated tapping
	Pre-hole chamfer is too small, pre-hole location or angle error	Check pre-hole
		adopt floated tapping
	Cutting speed is too high	Lower cutting speed
		Select helical flute taps

Threading end mills

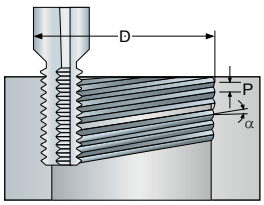
Thread end mills (graphic demonstration)



Thread milling is composed of tool rotation and helical interpolate mill of machine tool. In a circle interpolation process, required threads are machined by using the geometry shape of tool and moving axially with a pitch.



Picture A



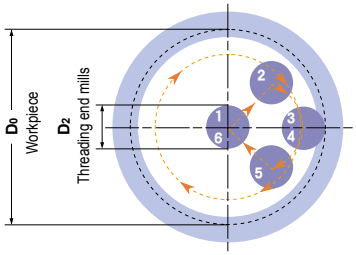
α: helical angle
D: large-diameter
p: pitch

Picture B

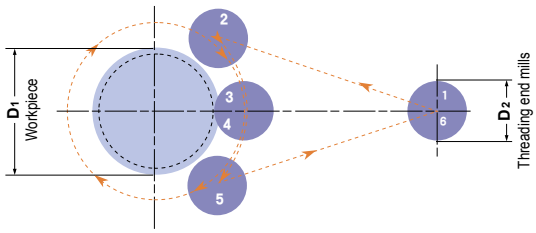
Arc entering method

Thread milling can use arc entering method and radial entering method.
Arc entering: placidly entering and out leads to almost no cutting traces or vibration, so that it is particularly suitable for materials difficult to be machined and precise threading.

Internal thread



External thread



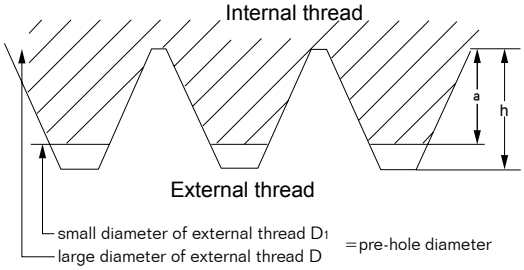
1-2 rapid positioning
2-3 entering by arc feed and interpolating along the Z axis at the same time
3-4 360 °full circle cutting interpolation and axial moving of one pitch
4-5 cutting-out by arc feed and interpolating along the Z axis at the same time
5-6 quick return

Thread overlap ratio

The thread overlap ratio is the ratio of effective chimeric height of external thread and internal thread and the height of standard tooth. It must be considered before machining of internal thread pre-hole.

$$\text{Thread overlap ratio} = \frac{\text{Reference dimension of large diameter of external thread} - \text{pre-hole diameter}}{2*(\text{height of standard tooth type})} \times 100\%$$

while external thread appears to be standardized tooth

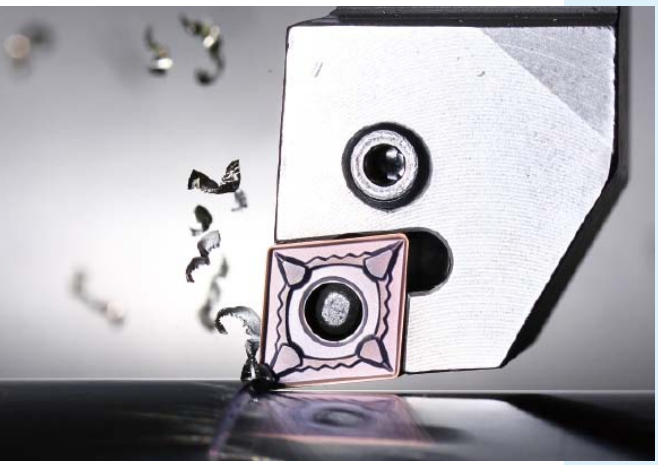


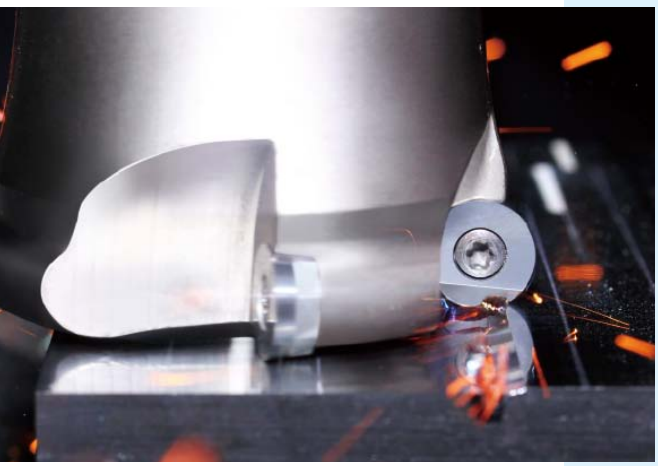
a=1/2×(D-D1)
h=height of standard tooth of external thread
chimerism ratio=a/h×100%

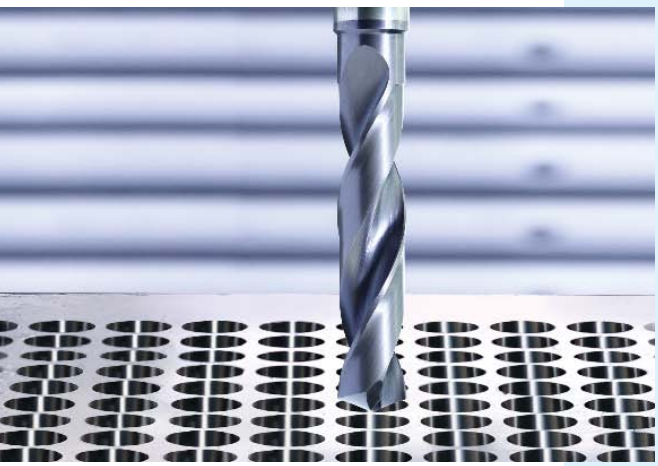
The solutions of common problems in thread milling

	Common problems	reasons	solutions
Thread milling cutter	Roughness on internal thread milling cutter surface	Too long overhang	Decrease the length of overhang
		Select wrong type	Select appropriate tool(e.g. tool with helix flute)
		Poor chip removal	Select helix flute tap
			Adopt inner cooling
		Too large cutting force	Decrease cutting force
		Unreasonable cutting parameter	Adjust cutting parameter
	Severe tool wear	Unreasonable cutting parameter	Lower cutting speed
			Increase the feed rate per tooth
		Unreasonable machining mode	Adopt down milling
			Adopt Arc cut-in milling.
		Uncoated tools/inappropriate coated	Adopt Coated tool/ instead coat
		Too large overhang	Decrease length of overhang
	Falling on cutting edge	Unreasonable cutting parameter	Decrease the feed rate per tooth
		Unreasonable machining mode	Adopt down milling
			Adopt Arc cut-in milling
		Uncoated tools/inappropriate coated	Adopt Coated tool/instead coat
		Too large overhang	Decrease length of overhang
	Thread is taper	Unreasonable cutting parameter	Decrease the feed rate per tooth
		Unreasonable machining mode	Adopt up milling
		Too large overhang	Decrease length of overhang
		Too large cutting force	Decrease cutting force

Cemented Carbide products safety standard







1、Safety responsibilities

Before using ZCCCT products, please provide necessary safety training for operators, and carefully read the 'NOTE' and 'CAUTION' contents on the product package. We are not liable for any responsibility caused by not complying with the request for operation.

2、Features of cemented carbide materials

Cemented carbide cutting tools are mainly composed of W, C, Co, N, Ti, Si, Al, O, etc elements and their chemical compound, and come into shape after sintering and a series of subsequent machining. Cemented carbide tool has good chemical stability and high strength. It is the ideal tool to cut most metals and high-strength nonmetals.

3、Cautions for safely using cemented carbide tools

1) Cemented carbide is hard and frangible material, liable to brittle rupture and breakage due to larger force or partial stress, which causes sharp edge.

2) Most cemented carbide is mainly composed of W and Co with high density. In the process of transport and storage, it should be treated as great heavy object and be handled with care.

3) Cemented carbide and steel have different thermal expansion coefficients. To avoid breakage caused by concentrated stress, welding should be conducted under suitable temperature.

4) Cemented carbide tools should be stored in dry environment, away from corrosive atmosphere.

5) In the cutting process, it is unavoidable to generate chips and brittle discs, etc. Please make sure necessary labor protection articles are prepared before machining.

6) If coolant is needed in the cutting process, please select correct coolant to prolong machine and tool life.

7) If cracks are generated in the machining process, please stop using the tool.

8) Long use of cemented carbide tool will lead to cutting edge passivation and lower strength. Please make sure it is regrinded by professionals

9) Please collect the broken tools and chips properly to avoid injury to other people.

Cautions for safely using cutting tools

Danger	Protective measure
Direct contact with the sharp cutting edges may cause injuries.	Please use labor protection articles such as gloves when assembling or disassembling cutting tools on machine.
Improper use of tools may cause tool breakage and expulsion from machine, causing injuries.	Please read catalogue and safety standard before operating.
	Please wear safeguard glasses and protective clothes.
Rapid increase of cutting resistance due to excessive abrasion and severe impact may lead to breakage of tool and spatter of chips, thus cause injuries to operator.	Change the tool with excessive abrasion without delay.
	Please wear safeguard glasses and protective clothes.
In the cutting process, hot chips may cause scald and scratch on operator.	Please use tools such as pliers to clear away the chips in time.
	Please wear safeguard glasses and protective clothes.
In cutting process, sparks and hot chips may cause fire and explosion hazard.	Clear away the Inflammable and explosive materials in the cutting area.
	Please make sure the fire extinguishers are ready for use.
At high speed, the machine will vibrate severely because of poor balance of holder, causing tool breakage.	Check whether the machine is loose or has any abnormal noise before cutting.
	Please wear safeguard glasses and protective clothes.
Burrs on workpiece are very sharp and likely to cause injuries.	Do not touch the burrs on the workpiece with bare hand.
	Please wear protective gloves and clothes.
Machining workpiece held infirmly will cause tool breakage and spatter of workpiece.	Make sure the workpiece is clamped firmly.
	Please wear safeguard glasses and protective clothes.
If inserts or spare parts are not clamped properly, they may become loose and fly off, causing risk of injuries.	Make sure the inserts and spare parts are clamped firmly before machining.
If Inserts and tool are clamped too tightly with screw and clamp, they face the risk of breakage and spatter.	Please do not clamp tools too tightly with bushing.
Inserts or spare parts may fly off due to inertial centrifugal force at high cutting speed.	Use the tools within recommended cutting conditions.
	Please wear safeguard glasses and protective clothes.
Milling cutters have sharp cutting edges and direct contact with them may cause injuries.	For your safety, please wear protective gloves if you need to touch inserts.
During rotary cutting, clothes, gloves, etc. are easily to get wringed in the machine at high speed, thus cause casualties.	The operator should not wear gloves during rotary cutting.
	Please pay attention that the clothes should not contact the operational parts of machine.
Off-center or poor balance of tools in rotating machining will cause vibration, breakage and splash of tool, thus will cause injuries.	Please use the tools within the range of recommended rotating speed.
	Check and adjust machine balance periodically.
During cutting at high speed, the chips flying off rapidly may cause injuries.	Safeguard articles such as protective cover, screen, etc. should be used.
	Please wear safeguard glasses, protective clothes and gloves.
Using the extremely small drill is likely to cause tool breakage and spatter, and it would be hard to take out the broken part.	Reduce tool vibration and conduct machining at suitable speed.
	Please wear safeguard glasses, protective clothes and gloves.
Machine and tools may be damaged if they are used beside the range of specified purposes, thus may cause other risks.	Please use them strictly according to instructions and specified purposes.

Note: We are not responsible for any accidents caused by private modified tools without our permission.

Threading pre-hole diameter

● Metric common thread

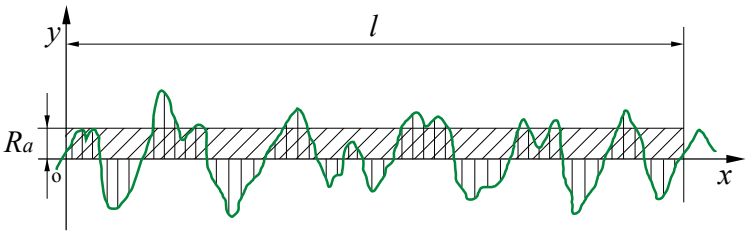
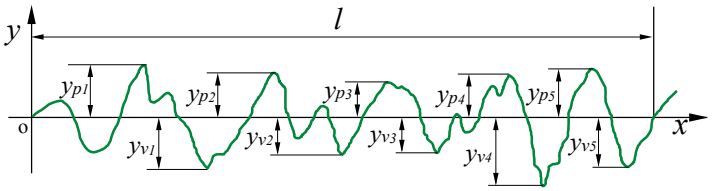
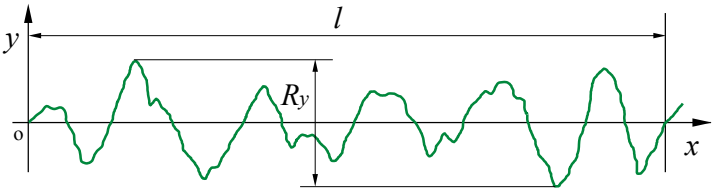
Thread code	Recommended hole diameter (mm)
M3×0.5	2.5
M3.5×0.6	2.9
M4×0.7	3.3
M5×0.8	4.2
M6×1.0	5.0
M7×1.0	6.0
M8×1.25	6.75
M9×1.25	7.75
M10×1.5	8.5
M11×1.5	9.5
M12×1.75	10.25
M14×2.0	12.0
M16×2.0	14.0
M18×2.5	15.5
M20×2.5	17.5
M24×3.0	21.0
M27×3.0	24.0
M30×3.5	26.5

● Metric fine screw

Thread code	Recommended hole diameter (mm)	Thread code	Recommended hole diameter (mm)
M3×0.35	2.65	M14×1.5	12.5
M3.5×0.35	3.15	M14×1.0	13.0
M4×0.5	3.5	M15×1.5	13.5
M4.5×0.5	4.0	M15×1.0	14.0
M5×0.5	4.5	M16×1.5	14.5
M5.5×0.5	5.0	M16×1.0	15.0
M6×0.75	5.25	M17×1.5	15.5
M7×0.75	6.25	M17×1.0	16.0
M8×1.0	7.0	M18×2.0	16.0
M8×0.75	7.25	M18×1.5	16.5
M9×1.0	8.0	M18×1.0	17.0
M9×0.75	8.25	M20×2.0	18.0
M10×1.25	8.75	M20×1.5	18.5
M10×1.0	9.0	M20×1.0	19.0
M10×0.75	9.25	M22×2.0	20.0
M11×1.0	10.0	M22×1.5	20.5
M11×0.75	10.25	M22×1.0	21.0
M12×1.5	10.5	M24×2.0	22.0
M12×1.25	10.75	M24×1.5	22.5
M12×1.0	11.0	M24×1.0	23.0

Surface roughness

The surface roughness refers to the small space and unevenness from peak to valley on workpiece surface.
Surface roughness has close relationship with the matching property of machine elements, wear resistance, machining precision and corrosion resistance. It influences the reliability and life of machine and instrument.

Type	Code	Calculation method	Calculation example (figure)
Arithmetic average deviation of profile	Ra	Within sampling length l, the arithmetic average absolute value of profile deviation is $Ra=\frac{1}{l}\int_0^l \lvert y(x)\rvert dx$ In the formula, the profile deviation y is the distance between profile points and reference line in the measuring direction. Reference line is the profile least-square average line O. This line divides the profile and makes the sum of squares of profile deviation to be the minimum within the sampling length.	
Irregularity Ten-point height	Rz	Within sampling length l, the sum of the average value of heights of five highest profile peak and the depths of five deepest profile valleys $Rz=\frac{\sum_{i=1}^{5} y_{pi}+\sum_{i=1}^{5} y_{vi}}{5}$ In the formula, ypi means the height of the 'i'th highest profile peak. In the formula, yvi means the depth of the 'i'th deepest profile valley. Maximum height of profile Ry: the distance between the top profile peak line and the bottom profile valley line in the longitudinal direction within the sampling length l.	
Maximum height of profile	Ry	The distance between the inner profile peak line and the bottom profile valley line in the longitudinal direction within the sampling length l. Top profile peak line is the line that parallels to the reference line and passes through the highest point of profile peak. Bottom profile line is the line that parallels to the reference line and passes through the lowest point of profile valley.	

The value of sampling length l and evaluated length ln

Ra / μm	*Rz / μm*	*l/mm*	*ln=5l /mm*
≥0.008~0.02	≥0.025~0.10	0.08	0.4
＞0.02~0.1	＞0.1~0.50	0.25	1.25
＞0.1~0.2	＞0.50~10.0	0.8	4.0
＞0.2~10.0	＞10.0~50.0	2.5	12.5
＞10.0~80.0	＞50~320	8.0	40.0

Material cross comparison table

ISO	Country and Standard										
	China	USA	Germany		Great Britain		Sweden	France	Italy	Spain	Japan
	GB	AISI/SAE	W.-nr	DIN	BS	EN	SS	AFNOR	UNI	UNE	JIS
P	**Structural steel**										
	15	1015	1.0401	C15	080M15	-	1350	CC12	C15C16	F.111	-
	20	1020	1.0402	C22	050A20	2C	1450	CC20	C20C21	F.112	-
	35	1035	1.0501	C35	060A35	-	1550	CC35	C35	F.113	-
	45	1045	1.0503	C45	080M40	-	1650	CC45	C45	F.114	-
	55	1055	1.0535	C55	070M55	-	1655	-	C55	-	-
	60	1060	1.0601	C60	080A62	43D	-	CC55	C60	-	-
	Y15	1213	1.7015	9SMn28	230M07	-	1912	S250	CF9SMn28	11SMn28	SUM22
	-	12L13	1.0718	9SMnPb28	-	-	1914	S250Pb	CF9MnPb28	11SMnPb28	SUM22L
	-	-	1.0722	10SPb20	-	-	-	10PbF2	CF10Pb20	10SPb20	-
	-	1140	1.0726	35S20	212M36	8M	1957	35MF4	-	F210G	-
	Y13	1215	1.0736	9SMn36	240M07	1B	-	S300	CF9SMn36	12SMn35	-
	-	12L14	1.0737	9SMnPb36	-	-	1926	S300Pb	CF9SMnPb36	12SMnP35	-
	55Si2Mn	9255	1.0904	55Si9	250A53	45	2085	55S7	55Si8	56Si7	-
	-	9262	1.0961	60SiCr7	-	-	-	60SC7	60SiCr8	60SiCr8	-
	15	1015	1.1141	Ck15	080M15	32C	1370	XC12	C16	C15K	S15C
	40Mn	1039	1.1157	40Mn4	150M36	15	-	35M5	-	-	-
	25	1025	1.1158	Ck25	-	-	-	-	-	-	S25C
	35Mn2	1335	1.1167	36Mn5	-	-	2120	40Mn5	-	36Mn5	SMn438(H)
	30Mn	1330	1.1170	28Mn6	150M28	14A	-	20M5	C28Mn	-	SCMn1
	35Mn	1035	1.1183	Cf35	060A35	-	1572	XS38TS	C36	-	S35C
	Ck45	1045	1.1191	45	080M46	-	1672	XC42	C45	C45K	S45C
	55	1055	1.1203	Ck55	070M55	-	-	XC45	C50	C55K	S55C
	50	1050	1.1213	Cf53	060A52	-	1674	XC48TS	C53	-	S50C
	60Mn	1060	1.1221	Ck60	080A62	43D	1678	XC60	C60	-	S58C
	-	1095	1.1274	Ck101	060A96	-	1870	-	-	-	SUP4
	-	-	1.3401	X120Mn12	Z120M12	-	-	X120M12	XG120Mn12	X120Mn12	SCMnH/1
	Gr15;45Gr	52100	1.3505	100Cr6	534A99	31	2258	100C6	100Cr6	F.131	SUJ2
	-	ASTM A204Gr.A	1.5415	15Mo3	1501-240	-	2912	15D3	16Mo3KW	16Mo3	-
	-	4520	1.5426	16Mo5	1503-245-420	-	-	-	16Mo5	16Mo5	-
	-	ASTM A350LF5	1.5622	14Ni6	-	-	-	16N6	14Ni6	15Ni6	-
	-	ASTM A353	1.5662	X8Ni9	1501-509;510	-	-	-	X10Ni9	XBNi09	-

Material cross comparison table

ISO	Country and Standard										
	China	USA	Germany		Great Britain		Sweden	France	Italy	Spain	Japan
	GB	AISI/SAE	W.-nr	DIN	BS	EN	SS	AFNOR	UNI	UNE	JIS
P	**Structural steel**										
	-	2515	1.5680	12Ni19	-	-	-	Z18N5	-	-	-
	-	3135	1.5710	36NiCr6	640A35	111A	-	35NC6	-	-	SNC236
	-	3415	1.5732	14NiCr10	-	-	-	14NC11	16NiCr11	15NiCr11	SNC415(H)
	-	3415 3310	1.5752	14NiCr14	655M13 655A12	36A	-	12NC15	-	-	SNC815(H)
	-	9840	1.6511	36CrNiMo4	816M40	110	-	40NCD3	38CrNiMo4(KB)	35CrNiMo4	-
	-	8620	1.6523	21NiCrMo2	850M20	362	2503	20NCD2	20NiCrMo2	20NiCrMo2	SNCCM220(H)
	-	8740	1.6546	40NiCrMo2	311-Type7	-	-	-	40NiCrMo2(KB)	40NiCrMo2	SNC240
	40CrNiMoA	4340	1.6582	34CrNiMo6	817M40	24	2541	35NCD6	35CrNiMo6(KB)	-	-
	-	-	1.6587	17CrNiMo6	820A16	-	-	18NCD6	-	14CrNiMo13	-
	15Cr	5015	1.7015	15Cr3	523M15	-	-	12C3	-	-	SCr415(H)
	35Cr	5132	1.7033	34Cr4	530A32	18B	-	32C4	34Cr4(KB)	35Cr4	SCr430(H)
	40Cr	5140	1.7035	41Cr4	530M40	18	-	42C4	41Cr4	42Cr4	SCr440(H)
	40Cr	5140	1.7045	42Cr4	-	-	2245	-	-	42Cr4	SCr440
	18CrMn	5115	1.7131	16MnCr15	(527M20)	-	2511	16MC5	16MnCr15	16MnCr15	-
	20CrMn	5155	1.7176	55Cr3	527A60	48	-	55C3	-	-	SUP9(A)
	30CrMn	4130	1.7218	25CrMo4	1717CDS110	-	2225	25CD4	25CrMo4(KB)	55Cr3	SCM420; SCM430
	35CrMo	4137;4135	1.7220	34CrMo4	708A37	19B	2234	35CD4	35CrMo4	34CrMo4	SCM432; SCRRM3
	40CrMoA	4140;4142	1.7223	41CrMo4	708M40	19A	2244	42CD4TS	41CrMo4	41CrMo4	SCM440
	42CrMo 42CrMnMo	4140	1.7225	42CrMo4	708M40	19A	2244	42CD4	42CrMo4	42CrMo4	SCM440(H)
	-	-	1.7262	15CrMo5	-	-	2216	12CD4	-	12CrMo4	SCM415(H)
	-	ASTM A182 F11;F12	1.7335	13CrMo44	1501- 620Gr.27	-	-	15CD3.5; 15CD4.5	14CrMo44	14CrMo45	-
	-	-	1.7361	32CrMo12	722M24	40B	2240	30CD12	32CrMo12	F.124.A	-
	-	ASTM A182 F.22	1.7380	10CrMo910	1501- 622Gr.31;45	-	2218	12CD9;10	12CrMo9,10	TU.H	-
	-	-	1.7715	14MoV63	1503-660-440	-	-	-	-	13MoCrV6	-
	50CrVA	6150	1.8159	50CrV4	735A50	47	2230	50CV4	50CrV4	51CrV4	SUP10
	-	-	1.8509	41CrAlMo7	905M39	41B	2940	40CAD6,12	41CrAlMo7	41CrAlMo7	-
	-	-	1.8523	39CrMoV139	897M39	40C	-	-	36CrMoV12	-	-

Material cross comparison table

ISO	Country and Standard										
	China	USA	Germany		Great Britain		Sweden	France	Italy	Spain	Japan
	GB	AISI/ SAE	W.-nr	DIN	BS	EN	SS	AFNOR	UNI	UNE	JIS
P	**Tool steel**										
	T10	W.110	1.1545	C105W1	-	-	1880	Y1105	C98KU C100KU	F.515 F.516	-
	T12A	W.112	1.1663	C125W	-	-	-	Y2120	C120KU	(C120)	SK2
	CrV;9SiCr	L3	1.2067	100Cr6	BL3	-	-	Y100C6	-	100Cr6	-
	Cr12	D3	1.2080	X210Cr12	BD3	-	-	Z200Cr12	X210Cr13KU X250Cr12KU	X210Cr12	SKD1
	4Cr5MoVSi	H13	1.2344	X40CrMoV5 1	BH13	-	2242	Z40CDV5	X35CrMoV05KU X40CrMoV51KU	X40CrMoV5	SKD61
	Cr6WV	A2	1.2363	X100CrMoV5 1	BA2	-	2260	Z100CDV5	X100CrMoV51KU	X100CrMoV5	SKD12
	CrWMo	-	1.2419	105WCr6	-	-	2140	105WC13	10WCr6 107WCr5KU	105WCr5	SKS31 SKS2 SKS3
	Cr12W	-	1.2436	X210CrW12	-	-	2312	-	X215CrW12 1KU	X210CrW12	SKD2
	5CrNiMo	S1	1.2542	45WCrV7	BS1	-	2710	-	45WCrV8KU	45WCrSi8	-
	3Cr2W8V	H21	1.2581	X30WCrV9 3 X30WCrV93KU	BH21	-	-	Z30WCV9	X28W09KU X30WCrV9 3KU	X30WCrV9	SKD5
	Cr12MoV	-	1.2601	X165CrMoV 12	-	-	2310	-	X165CrMoW12KU	X160CrMoV12	SKD11
	5CrNiMo	L6	1.2713	55NiCrMoV6	-	-	-	55NCDV7	-	F.250.S	SKT4
	V	W210	1.2833	100V1	BW2	-	-	Y1105V	-	-	SKS43
	W6Mo5Cr4V2Co5	-	1.3243	S6-5-2-5	-	-	2723	Z85WDKCV	HS6-5-2-5	HS6-5-2-5	SKH55
	W18Cr4VCo5	T4	1.3255	S18-1-2-5	BT4	-	-	Z80WKCV 10-05-04-01	X78WCo1805KU	HS18-1-1-5	SKH3
	W6Mo5Cr4V2	M2	1.3343	S6-5-2	BM2	-	2722	Z85WDCV 06-05-04-02	X82WMo0605KU	HS6-5-2	SKH9
	-	M7	1.3348	S2-9-2	-	-Z-	2782	Z100WCWV 09-02-04-02	HS2-9-2	HS2-9-2	-
	W18Cr4V	T1	1.3355	S18-0-1	BT1	-	-	Z80WCV 18-04-01	X75W18KU	HS18-0-1	SKH2
	W6Mo5Cr4V3	M3	-	S6-5-3	-	-	-	-	-	-	SKH52
	-	M42	-	-	BM42	-	-	-	-	-	SKH59

Material cross comparison table

ISO	Country and Standard					Main application
	China	USA	Germany	Japan	Daido Steel Co., Ltd (Japan)	
	GB	AISI/SAE	DIN	JIS	DAIDO	
P	**Plastic die steel**					
	-	P20 mod.		-	PX5N	For mass production of large mirror dies. Automobile rear light, front fender of car, video camera, household electrical appliances etc
	-	-		-	NAK55	For high-precision mirror die. Video camera, music disc, cosmetic containers, transparent covers, transparent films etc
	-	-		-	NAK80	For high-precision mirror dies. Video camera, music disc, cosmetic containers, transparent covers, transparent films etc
	3Cr13	420 mod.		SUS420J2 mod.	S-STAR	For ultra-mirror corrosion resistant precise dies. Accessories of camera, CD, lens, watch case
	Cold-working die steel					
	-	02	-	SKS93	YK30	Stamping die, gauge calipers, paper cutter, auxiliary tools
	9CrWMn	01 mod.	-	SKS3 mod.	GOA	Blanking die, gauge calipers, drawing die, taps, Perforated punch
	Cr12MoV	D2	X165CrMoV12	SKD11	DC11	Blanking die, cold forming die, cold drawing die, forming roller, punch
	-	D2 mod.	-	SKD11 mod.	DC53	Blanking die, cold forming die, cold drawing die, forming roll, punch
	Hot-working die steel					
	4Cr5MoSiV1	H13	X40CrMoV51	SKD61	DHA1	Aluminum compression die, connecting parts of compression die, hot stamping die, hot extrusion die, thermal shear cutting blade
	-	-	-	-	DH21	Long life aluminum compression die
	-	-	-	-	DH31-S	Large compression die
	-	-	-	-	DH2F	Compression die, plastic die

Material cross comparison table

ISO	Country and Standard										
	China	USA	Germany		Great Britain		Sweden	France	Italy	Spain	Japan
	GB	AISI/ SAE	W.-nr	DIN	BS	EN	SS	AFNOR	UNI	UNE	JIS
M	**Stainless steel**										
	0Cr13; 1Cr12	403	1.4000	X6Cr13	403S17	-	2301	Z6C13	X6Cr13	F.3110	SUS403
	-	-	1.4001	X7Cr14	-	-	-	-	-	F.8401	-
	1Cr13	410	1.4006	X10Cr13	410S21	56A	2302	Z10C14	X12Cr13	F.3401	SUS410
	1Cr17	430	1.4016	X6Cr17	430S15	60	220	Z8C17	X8Cr17	F.3113	SUS430
	2Cr13	410	1.4021	X20Cr13	S62	56B; 56C	-	Z20C13	X20C13	F.3401	SUS410
	-	-	1.4027	G-X20Cr14	420C29	56B	-	Z20C13M	-	-	SCS2
	4Cr13	-	1.4034	X46Cr13	420S45	56D	2304	Z40CM Z38C13M	X40Cr14	F.3405	SUS420J2
	1Cr17Ni2	431	1.4057	X20CrNi172	431S29	57	2321	Z15CNi6.02	X16CNi16	F.3427	SUS431
	Y1Cr17	430F	1.4104	X12CrMoS17	-	-	2383	Z10CF17	X10CrS17	F.3117	SUS430F
	1Cr17Mo	434	1.4113	X6CrMo171	434S17	-	2325	Z8CD17.01	X8CrMo17	-	SUS434
	-	-	1.4313	X5CrNi134	425C11	-	-	Z4CND13.4M	-	-	SCS5
	-	-	1.4408	G-X6CrNiMo1810	316C16	-	-	-	-	F.8414	SCS14
	4Cr9Si2	HW3	1.4718	X45CrSi93	401S45	52	-	Z45CS9	X45CrSi8	F.322	SUH1
	0Cr13Al	405	1.4724	X10CrAl13	403S17	-	-	Z10C13	X10CrAl12	F.311	SUS405
	Cr17	430	1.4742	X10CrAl18	430S15	60	-	Z10CAS18	X8Cr17	F.3113	SUS430
	8Cr20Si2Ni	HNV6	1.4757	X80CrNiSi20	443S65	59	-	Z80CSN20.02	X80CrSiNi20	F.320V	SUH4
	2Cr25N	446	1.4762	X10CrAl24	-	-	2322	Z10CAS24	X16Cr26	-	SUH446
	Austenitic stainless steel										
	0Cr18Ni9	304	1.4301	X5CrNi1810	304S15	58E	2332	Z6CN18.09	X5CrNi1810	F.3551; F.3541; F.3504	SUS304
	1Cr18Ni9MoZr	303	1.4305	X10CrNiS189	303S21	58M	2346	Z10CNF18.09	X10CrNiS18.09	F.3508	SUS303
	0Cr19Ni10	304L	1.4306	X2CrNi1911	304S12	-	2352	Z2CN18.10	X2CrNi18.11	F.3503	SCS19
	-	-	1.4308	G-X6CrNi189	304C15	-	-	Z6CN18.10M	-	-	SCS13
	Cr17Ni7	301	1.4310	X12CrNi177	-	-	2331	Z12CN17.07	X12CrNi1707	F.3517	SUS301
	-	304LN	1.4311	X2CrNiN1810	304S62	-	2371	Z2CN18.10	-	-	SUS304LN
	0Cr19Ni9	304	1.4350	X5CrNi189	304S31	58E	-	Z6CN18.09	X5CrNi1810	-	SUS304
	0Cr17Ni11Mo2	316	1.4401	X5CrNiMo1712	316S16	Z6CND17.11	2347	1.4401	X5CrNiMo1712	F.3543	SUS316
	00Cr17Ni13Mo2	316LN	1.4429	X2CrNiMoN17133	-	-	2375	Z2CND17.13	-	-	SUS316LN
	0Cr27Ni12Mo3	316L	1.4435	X2CrNiMo18143	316S12	-	2353	Z2CDN17.13	X2CrNiMo1713	-	SCS16,
	00Cr19Ni13Mo3	317L	1.4438	X2CrNiMo17133	317S12	-	2367	Z2CND19.15	X2CrNiMo18.16	-	SUS317L
	-	329L	1.4460	X8CrNiMo275	-	-	2324	-	-	-	SUS329L; SCH11; SCS11
	1Cr18Ni9Ti	321	1.4541	X6CrNiTi1810	2337	321S12	58B	Z6CNT18.10	X6CrNiTi1811	F.3553	SUS321
	1Cr18Ni11Nb	347	1.4550	X6CrNiNb1810	347S17	58F	2338	Z6CNNb18.1	X6CrNiTi1811	F.3552	SUS347
	Cr18Ni12Mo2Ti	316Ti	1.4571	X6CrNiMoTi17122	320S17	58J	2350	Z6NDT17.12	X6CrNiMoTi17	F.3535	-

Material cross comparison table

ISO	Country and Standard										
	China	USA	Germany		Great Britain		Sweden	France	Italy	Spain	Japan
	GB	AISI/ SAE	W.-nr	DIN	BS	EN	SS	AFNOR	UNI	UNE	JIS
M	**Austenitic stainless steel**										
	-	-	1.4581	G-X5CrNiMoNb1810	318C7	-	-	Z4CNDNb1812M	XG8CrNiMo18	-	SCS22
	Cr17Ni12Mo3Nb	318	1.4583	X10CrNiMoNb1812	-	-	-	Z6CNDNb1713B	X6CrNiMoTiNb17	-	-
	1Cr23Ni13	309	1.4828	X15CrNiSi2012	309S24	-	-	Z15CNS20.1	-	-	SUH309
	0Cr25Ni20	310S	1.4845	X12CrNi2521	310S24	-	2361	Z12CN2520	X6CrNi2520	F.331	SUH310
	Cr15Ni36W3Ti	330	1.4864	X12NiCrSi3616	-	-	-	Z12CNS35.1	-	-	SUH330
	-	-	1.4865	G-X40NiCrSi3818	330C11	-	-	-	XG50NiCr3919	-	SCH15
	5Cr2Mn9Ni4N	EV8	1.4871	X53CrMnNiN219	349S54; 321S12	- 58B	-	Z52CMN21.0	X53CrMnNiN219	-	SUH35
	1Cr18Ni9Ti	321	1.4878	X12CrNiTi189	321S320	58C	-	Z6CNT18.12	X6CrNiTi1811	F.3523	SU321

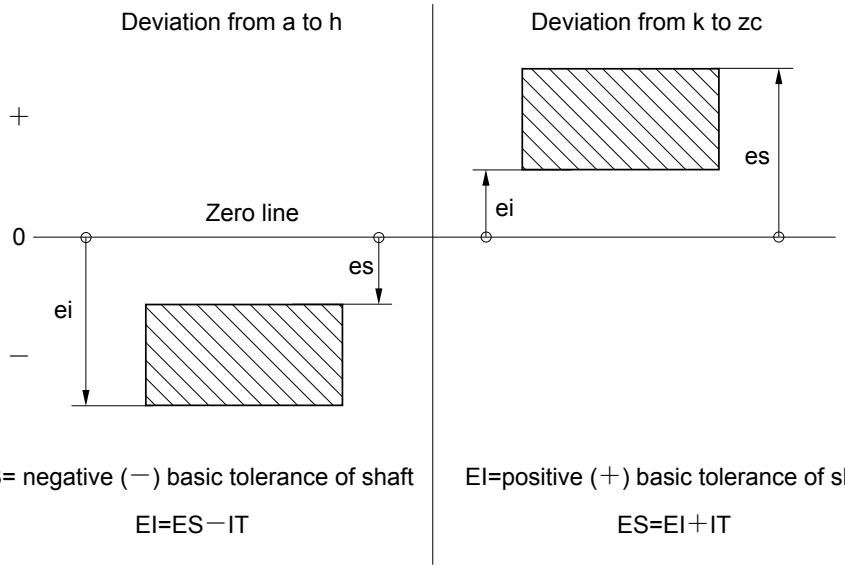
ISO	Country and Standard								
	China	USA	Germany	Great Britain	Sweden	France	Italy	Spain	Japan
K	**Nodular cast iron**								
	QT400-18	60-40-18	GGG40	400/17	0717-02	FGS370-17	GS370-17	FGE38-17	FCD400
	QT450-10	65-45-12	--	420/12	--	FGS400-12	GS400-12	FGE42-12	FCD450
	QT500-7	70-50-05	GGG50	500/7	0727-02	FGS500-7	GS500-7	FGE50-7	FCD500
	QT600-3	80-60-03	GGG60	600/7	0732-03	FGS600-2	GS600-2	FGE60-2	FCD600
	QT700-2	100-70-03	GGG70	700/2	0737-01	FGS700-2	GS700-2	FGE70-2	FCD700
	QT800-2	120-90-02	GGG80	800/2	0864-03	FGS800-2	GS800-2	FGE80-2	FCD800
	QT900-2	--	--	900/2	--	--	--	--	--
	Grey cast iron								
	--	NO.60	GG40	--	0140	FGL400	--	--	
	HT350	NO.50	GG35	350	0135	FGL350	G35	FG35	FC350
	HT300	NO.45	GG30	300	0130	FGL300	G30	FG30	FC300
	HT250	NO.35	GG25	250	0125	FGL250	G25	FG25	FC250
	HT200	NO.30	GG20	200	0120	FGL200	G20	FG20	FC200
	HT150	NO.20	GG15	150	0115	FGL150	G15	FG15	FC150
	HT100	--	--	100	0110	--	G10	--	FC100

Fitting tolerance

Basic dimensions (mm)		Standard tolerance class of holes																	
		IT1	IT2	IT3	IT4	IT5	IT6	IT7	IT8	IT9	IT10	IT11	IT12	IT13	IT14	IT15	IT16	IT17	IT18
>	≦	μm											mm						
---	3	0.8	1.2	2	3	4	6	10	14	25	40	60	0.1	0.14	0.25	0.4	0.6	1	1.4
3	6	1	1.5	2.5	4	5	8	12	18	30	48	75	0.12	0.18	0.3	0.48	0.75	1.2	1.8
6	10	1	1.5	2.5	4	6	9	15	22	36	58	90	0.15	0.22	0.36	0.58	0.9	1.5	2.2
10	18	1.2	2	3	5	8	11	18	27	43	70	110	0.18	0.27	0.43	0.7	1.1	1.8	2.7
18	30	1.5	2.5	4	6	9	13	21	33	52	84	130	0.21	0.33	0.52	0.84	1.3	2.1	3.3
30	50	1.5	2.5	4	7	11	16	25	39	62	100	160	0.25	0.39	0.62	1	1.6	2.5	3.9
50	80	2	3	5	8	13	19	30	46	74	120	190	0.3	0.46	0.74	1.2	1.9	3.	4.6
80	120	2.5	4	6	10	15	22	35	54	87	140	220	0.35	0.54	0.87	1.4	2.2	3.5	5.4
120	180	3.5	5	8	12	18	25	40	63	100	160	250	0.4	0.63	1	1.6	2.5	4	6.3
180	250	4.5	7	10	14	20	29	46	72	115	185	290	0.46	0.72	1.15	1.85	2.9	4.6	7.2
250	315	6	8	12	16	23	32	52	81	130	210	320	0.52	0.81	1.3	2.1	3.2	5.2	8.1
315	400	7	9	13	18	25	36	57	89	140	230	360	0.57	0.89	1.4	2.3	3.6	5.7	8.9
400	500	8	10	15	20	27	40	63	97	155	250	400	0.63	0.97	1.55	2.5	4	6.3	9.7
500	630	9	11	16	22	32	44	70	110	175	280	440	0.7	1.1	1.75	2.8	4.4	7	11
630	800	10	13	18	25	36	50	80	125	200	320	500	0.8	1.25	2	3.2	5	8	12.5
800	1000	11	15	21	28	40	56	90	140	230	360	560	0.9	1.4	2.3	3.6	5.6	9	14
1000	1250	13	18	24	33	47	66	105	165	260	420	660	1.05	1.65	2.6	4.2	6.6	10.5	16.5
1250	1600	15	21	29	39	55	78	125	195	310	500	780	1.25	1.95	3.1	5	7.8	12.5	19.5
1600	2000	18	25	35	46	65	92	150	230	370	600	920	1.5	2.3	3.7	6	9.2	15	23
2000	2500	22	30	41	55	78	110	175	280	440	700	1100	1.75	2.8	4.4	7	11	17.5	28
2500	3150	26	36	50	68	96	135	210	330	540	860	1350	2.1	3.3	5.4	8.6	13.5	21	33

Note:
1. From IT1 to IT5, the standard tolerance with basic dimension more than 500 mm is on trial.
2. When the basic dimension ≦1 mm, the tolerances from IT4 to IT8 are invalid.

The shaft lower deviation(ei) and upper deviation (es) can be obtained by basic tolerance and standard tolerance (IT) of shaft.



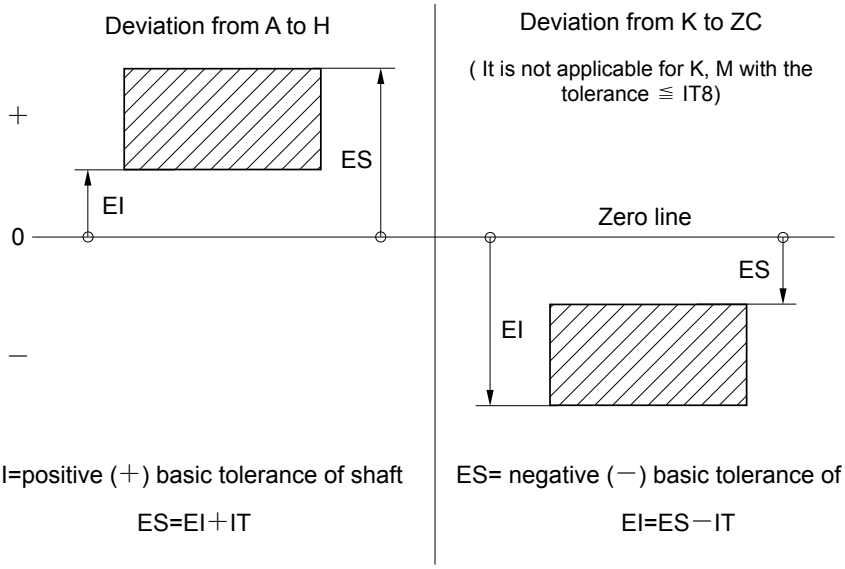
ES= negative (−) basic tolerance of shaft

EI=ES−IT

EI=positive (+) basic tolerance of shaft

ES=EI+IT

The hole lower deviation(EI) and upper deviation (ES) can be obtained by basic tolerance and standard tolerance (IT) of hole.



EI=positive (+) basic tolerance of shaft

ES=EI+IT

ES= negative (−) basic tolerance of shaft

EI=ES−IT

For example: for a hole with diameter 3 mm and tolerance H7, we can find that the lower deviation EI=0 in relation to H7 from the basic tolerance table, and the standard tolerance IT=10μm corresponding to H7, thus the upper deviation ES=EI+IT=10 μm. Therefore the hole fitting dimension is $Ø3^{+0.01}_{0}$ mm.

● Basic deviations value of shaft

Dimensions (mm)		Basic deviation value											
		Upper deviation es											
		Standard tolerance class											
>	≦	a	b	c	cd	d	e	ef	f	fg	g	h	js
---	3	-270	-140	-60	-34	-20	-14	-10	-6	-4	-2	0	In the formula Deviation $=\pm\frac{IT_n}{2}$, ITn is the IT value corresponding to 'n'.
3	6	-270	-140	-70	-46	-30	-20	-14	-10	-6	-4	0	
6	10	-280	-150	-80	-56	-40	-25	-18	-13	-8	-5	0	
10	14	-290	-150	-95		-50	-32		-16		-6	0	
14	18												
18	24	-300	-160	-110		-65	-40		-20		-7	0	
24	30												
30	40	-310	-170	-120		-80	-50		-25		-9	0	
40	50	-320	-180	-130									
50	65	-340	-190	-140		-100	-60		-30		-10	0	
65	80	-360	-200	-150									
80	100	-380	-220	-170		-120	-72		-36		-12	0	
100	120	-410	-240	-180									
120	140	-460	-260	-200		-145	-85		-43		-14	0	
140	160	-520	-280	-210									
160	180	-580	-310	-230									
180	200	-660	-340	-240		-170	-100		-50		-15	0	
200	225	-740	-380	-260									
225	250	-820	-420	-280									
250	280	-920	-480	-300		-190	-110		-56		-17	0	
280	315	-1050	-540	-330									
315	355	-1200	-600	-360		-210	-125		-62		-18	0	
355	400	-1350	-680	-400									
400	450	-1500	-760	-440		-230	-135		-68		-20	0	
450	500	-1650	-840	-480									
500	560					-260	-145		-76		-22	0	
560	630												
630	710					-290	-160		-80		-24	0	
710	800												
800	900					-320	-170		-86		-26	0	
900	1000												
1000	1120					-350	-195		-98		-28	0	
1120	1250												
1250	1400					-390	-220		-110		-30	0	
1400	1600												
1600	1800					-430	-240		-120		-32	0	
1800	2000												
2000	2240					-480	-260		-130		-34	0	
2240	2500												
2500	2800					-520	-290		-145		-38	0	
2800	3150												

Note: 1. If basic dimension ≤1mm, the basic deviation a and b are not adopted.

2. Within the range from js7 to js11, if the value of ITn is odd number, then the final deviation=$\pm\frac{IT_n-1}{2}$.

Fitting dimension tolerance

μm

Basic deviation value																		
Lower deviationei																		
IT5 IT6	IT7	IT8	IT4 IT7	≤IT3 >IT7	Standard tolerance class													
j			k		m	n	p	r	s	t	u	v	x	y	z	zn	zb	zc
-2	-4	-6	0	0	+2	+4	+6	+10	+14		+18		+20		+26	+32	+40	+60
-2	-4		+1	0	+4	+8	+12	+15	+19		+23		+28		+35	+42	+50	+80
-2	-5		+1	0	+6	+10	+15	+19	+23		+28		+34		+42	+52	+67	+97
-3	-6		+1	0	+7	+12	+18	+23	+28		+33		+40		+50	+64	+90	+130
												+39	+45		+60	+77	+108	+150
-4	-8		+2	0	+8	+15	+22	+28	+35		+41	+47	+54	+63	+73	+98	+136	+188
										+41	+48	+55	+64	+75	+88	+118	+160	+218
-5	-10		+2	0	+9	+17	+26	+34	+43	+48	+60	+68	+80	+94	+112	+148	+200	+274
										+54	+70	+81	+97	+114	+136	+180	+242	+325
-7	-12		+2	0	+11	+20	+32	+41	+53	+66	+87	+102	+122	+144	+172	+226	+300	+405
								+43	+59	+75	+102	+120	+146	+174	+210	+274	+360	+480
-9	-15		+3	0	+13	+23	+37	+51	+71	+91	+124	+146	+178	+214	+258	+335	+445	+585
								+54	+79	+104	+144	+172	+210	+254	+310	+400	+525	+690
-11	-18		+3	0	+15	+27	+43	+63	+92	+122	+170	+202	+248	+300	+365	+470	+620	+800
								+65	+100	+134	+190	+228	+280	+340	+415	+535	+700	+900
								+68	+108	+146	+210	+252	+310	+380	+465	+600	+780	+1000
-13	-21		+4	0	+17	+31	+50	+77	+122	+166	+236	+284	+350	+425	+520	+670	+880	+1150
								+80	+130	+180	+258	+310	+385	+470	+575	+740	+960	+1250
								+84	+140	+196	+284	+340	+425	+520	+640	+820	+1050	+1350
-16	-26		+4	0	+20	+34	+56	+94	+158	+218	+315	+385	+475	+580	+710	+920	+1200	+1550
								+98	+170	+240	+350	+425	+525	+650	+790	+1000	+1300	+1700
-18	-28		+4	0	+21	+37	+62	+108	+190	+268	+390	+475	+590	+730	+900	+1150	+1500	+1900
								+114	+208	+294	+435	+530	+660	+820	+1000	+1300	+1650	+2100
-20	-32		+5	0	+23	+40	+68	+126	+232	+330	+490	+595	+740	+920	+1100	+1450	+1850	+2400
								+132	+252	+360	+540	+660	+820	+1000	+1250	+1600	+2100	+2600
			0	0	+26	+44	+78	+150	+280	+400	+600							
								+155	+310	+450	+660							
			0	0	+30	+50	+88	+175	+340	+500	+740							
								+185	+380	+560	+840							
			0	0	+34	+56	+100	+210	+430	+620	+940							
								+220	+470	+680	+1050							
			0	0	+40	+66	+120	+250	+520	+780	+1150							
								+260	+580	+840	+1300							
			0	0	+48	+78	+140	+300	+640	+960	+1450							
								+330	+720	+1050	+1600							
			0	0	+58	+92	+170	+370	+820	+1200	+1850							
								+400	+920	+1350	+2000							
			0	0	+68	+110	+195	+440	+1000	+1500	+2300							
								+460	+1100	+1650	+2500							
			0	0	+76	+135	+240	+550	+1250	+1900	+2900							
								+580	+1400	+2100	+3200							

Basic deviations value of hole

Dimensions (mm)		Basic deviation value																				
		Lower deviation EI											Upper deviation ES									
		Standard tolerance class											IT6	IT7	IT8	≤IT8	>IT8	≤IT8	>IT8	≤IT8	>IT8	≤IT7
>	≦	A	B	C	CD	D	E	EF	F	FG	G	H	JS	J			K		M		N		P to ZC
---	3	+270	+140	+60	+34	+20	+14	+10	+6	+4	+2	0	In the formula Deviation $=\pm\frac{IT_n}{2}$, ITn is the IT value corresponding to 'n'.	+2	+4	+6	0	0	-2	-2	-4	-4	If IT ≥IT7, add a △ value to the relevant value
3	6	+270	+140	+70	+46	+30	+20	+14	+10	+6	+4	0		+5	+6	+10	-1+Δ		-4+Δ	-4	-8+Δ	0	
6	10	+280	+150	+80	+56	+40	+25	+18	+13	+8	+5	0		+5	+8	+12	-1+Δ		-6+Δ	-6	-10+Δ	0	
10	14	+290	+150	+95		+50	+32		+16		+6	0		+6	+10	+15	-1+Δ		-7+Δ	-7	-12+Δ	0	
14	18																						
18	24	+300	+160	+110		+65	+40		+20		+7	0		+8	+12	+20	-2+Δ		-8+Δ	-8	-15+Δ	0	
24	30																						
30	40	+310	+170	+120		+80	+50		+25		+9	0		+10	+14	+24	-2+Δ		-9+Δ	-9	-17+Δ	0	
40	50	+320	+180	+130																			
50	65	+340	+190	+140		+100	+60		+30		+10	0		+13	+18	+28	-2+Δ		-11+Δ	-11	-20+Δ	0	
65	80	+360	+200	+150																			
80	100	+380	+220	+170		+120	+72		+36		+12	0		+16	+22	+34	-3+Δ		-13+Δ	-13	-23+Δ	0	
100	120	+410	+240	+180																			
120	140	+460	+260	+200		+145	+85		+43		+14	0		+18	+26	+41	-3+Δ		-15+Δ	-15	-27+Δ	0	
140	160	+520	+280	+210																			
160	180	+580	+310	+230																			
180	200	+660	+340	+240		+170	+100		+50		+15	0		+22	+30	+47	-4+Δ		-17+Δ	-17	-31+Δ	0	
200	225	+740	+380	+260																			
225	260	+820	+420	+280																			
260	280	+920	+480	+300		+190	+110		+56		+17	0		+25	+36	+55	-4+Δ		-20+Δ	-20	-34+Δ	0	
280	315	+1050	+540	+330																			
315	355	+1200	+600	+360		+210	+125		+62		+18	0		+29	+39	+60	-4+Δ		-21+Δ	-21	-37+Δ	0	
355	400	+1350	+680	+400																			
400	450	+1500	+760	+440		+230	+135		+68		+20	0		+33	+43	+66	-5+Δ		-23+Δ	-23	-40+Δ	0	
450	500	+1650	+840	+480																			
500	560					+260	+145		+76		+22	0					0		-26		-44		
560	630																						
630	710					+290	+160		+80		+24	0					0		-30		-50		
710	800																						
800	900					+320	+170		+86		+26	0					0		-34		-56		
900	1000																						
1000	1120					+350	+195		+98		+28	0					0		-40		-66		
1120	1250																						
1250	1400					+390	+220		+110		+30	0					0		-48		-78		
1400	1600																						
1600	1800					+430	+240		+120		+32	0					0		-58		-92		
1800	2000																						
2000	2240					+480	+260		+130		+34	0					0		-68		-110		
2240	2500																						
2500	2800					+520	+290		+145		+38	0					0		-76		-135		
2800	3150																						

Note: 1. If basic dimension ≤1mm, the basic deviation A and B are not adopted, so is the N when IT≥IT8.

2. Within the range from JS7 to JS11, if the value of ITn is odd number, then the final deviation=$\pm\frac{IT_n-1}{2}$.

3.Regarding to the K,M, N with IT≤IT8 or the P to ZC with IT≤IT7, the Δ value can be selected from the right-side sheet.

For example,: within the range 8~30mm of K7, Δ=8μm, therefore ES=-2+8=+6μm within the range 18~30mm of S6:Δ=4μm, therefore ES=-35+4=-31μm.

4. Special cases: within the range 250~315mm of M5, ES=-9μm (instead -11μm).

Fitting dimension tolerance

μm

Basic deviation value												Δ					
Upper deviationES																	
Standard tolerance class >IT7												Standard tolerance class					
P	R	S	T	U	V	X	Y	Z	ZA	ZB	ZC	IT3	IT4	IT5	IT6	IT7	IT8
-6	-10	-14		-18		-20		-26	-32	-40	-60	0	0	0	0	0	0
-12	-15	-19		-23		-28		-35	-42	-50	-80	1	1.5	1	3	4	6
-15	-19	-23		-28		-34		-42	-52	-67	-97	1	1.5	2	3	6	7
-18	-23	-28		-33		-40		-50	-64	-90	-130	1	2	3	3	7	9
					-39	-45		-60	-77	-108	-150						
-22	-28	-35		-41	-47	-54	-63	-73	-98	-136	-188	1.5	2	3	4	8	12
			-41	-48	-55	-64	-75	-88	-118	-160	-218						
-26	-34	-43	-48	-60	-68	-80	-94	-112	-148	-200	-274	1.5	3	4	5	9	14
			-54	-70	-81	-97	-114	-136	-180	-242	-325						
-32	-41	-53	-66	-87	-102	-122	-144	-172	-226	-300	-405	2	3	5	6	11	16
	-43	-59	-75	-102	-120	-146	-174	-210	-274	-360	-480						
-37	-51	-71	-91	-124	-146	-178	-214	-258	-335	-445	-585	2	4	5	7	13	19
	-54	-79	-104	-144	-172	-210	-254	-310	-400	-525	-690						
-43	-63	-92	-122	-170	-202	-248	-300	-365	-470	-620	-800	3	4	6	7	15	23
	-65	-100	-134	-190	-228	-280	-340	-415	-535	-700	-900						
	-68	-108	-146	-210	-252	-310	-380	-465	-600	-780	-1000						
-50	-77	-122	-166	-236	-284	-350	-425	-520	-670	-880	-1150	3	4	6	9	17	26
	-80	-130	-180	-258	-310	-385	-470	-575	-740	-960	-1250						
	-84	-140	-196	-284	-340	-425	-520	-640	-820	-1050	-1350						
-56	-94	-158	-218	-315	-385	-475	-580	-710	-920	-1200	-1550	4	4	7	9	20	29
	-98	-170	-240	-350	-425	-525	-650	-790	-1000	-1300	-1700						
-62	-108	-190	-268	-390	-475	-590	-730	-900	-1150	-1500	-1900	4	5	7	11	21	32
	-114	-208	-294	-435	-530	-660	-820	-1000	-1300	-1650	-2100						
-68	-126	-232	-330	-490	-595	-740	-920	-1100	-1450	-1850	-2400	5	5	7	13	23	34
	-132	-252	-360	-540	-660	-820	-1000	-1250	-1600	-2100	-2600						
-78	-150	-280	-400	-600													
	-155	-310	-450	-660													
-88	-175	-340	-500	-740													
	-185	-380	-560	-840													
100	-210 -220	-430 -470	-620 -680	-940 -1050													
-120	-250 -260	-520 -580	-780 -840	-1150 -1300													
-140	-300 -330	-640 -720	-960 -1050	-1450 -1600													
-170	-370	-820	-1200	-1850													
	-400	-920	-1350	-2000													
-195	-440 -460	-1000 -1100	-1500 -1650	-2300 -2500													
-240	-550 -580	-1250 -1400	-1900 -2100	-2900 -3200													

Hardness reference table(conversion of hardness and strength for ferrous metal)

Hardness				Tensile strength N/mm²
Rockwell hardness		Vickers hardness	Brinell hardness	
HRC	HRA	HV	HB	
70.0	86.6	1037	—	—
69.5	86.3	1017	—	—
69.0	86.1	997	—	—
68.5	85.8	978	—	—
68.0	85.5	959	—	—
67.5	85.2	941	—	—
67.0	85.0	923	—	—
66.5	84.7	906	—	—
66.0	84.4	889	—	—
65.5	84.1	872	—	—
65.0	83.9	856	—	—
64.5	83.6	840	—	—
64.0	83.3	825	—	—
63.5	83.1	810	—	—
63.0	82.8	795	—	—
62.5	82.5	780	—	—
62.0	82.2	766	—	—
61.5	82.0	752	—	—
61.0	81.7	739	—	—
60.5	81.4	726	—	—
60.0	81.2	713	—	2555
59.5	80.9	700	—	2500
59.0	80.6	688	—	2450
58.5	80.3	676	—	2395
58.0	80.1	664	—	2345
57.5	79.8	653	—	2295
57.0	79.5	642	—	2250
56.5	79.3	631	—	2205
56.0	79.0	620	—	2160
55.5	78.7	609	—	2115
55.0	78.5	599	—	2075
54.5	78.2	589	—	2035
54.0	77.9	579	—	1995
53.5	77.7	570	—	1955
53.0	77.4	561	—	1920
52.5	77.1	551	—	1885
52.0	76.9	543	—	1850
51.5	76.6	534	—	1815

Hardness				Tensile strength N/mm²
Rockwell hardness		Vickers hardness	Brinell hardness	
HRC	HRA	HV	HB	
51.0	76.3	525	501	1780
50.5	76.1	517	494	1750
50.0	75.8	509	488	1720
49.5	75.5	501	481	1690
49.0	75.3	493	474	1660
48.5	75.0	485	468	1630
48.0	74.7	478	461	1605
47.5	74.5	470	455	1575
47.0	74.2	463	449	1550
46.5	73.9	456	442	1525
46.0	73.7	449	436	1500
45.5	73.4	443	430	1475
45.0	73.2	436	424	1450
44.5	72.9	429	418	1430
44.0	72.6	423	413	1405
43.5	72.4	417	407	1385
43.0	72.1	411	401	1360
42.5	71.8	405	396	1340
42.0	71.6	399	391	1320
41.5	71.3	393	385	1300
41.0	71.1	388	380	1280
40.0	70.8	382	375	1260
40.0	70.5	377	370	1245
39.5	70.3	372	365	1225
39.0	70.0	367	360	1210
38.5	—	362	355	1190
38.0	—	357	350	1175
37.5	—	352	345	1160
37.0	—	347	341	1140
36.5	—	342	336	1125
36.0	—	338	332	1110
35.5	—	333	327	1095
35.0	—	329	323	1080
34.5	—	324	318	1065
34.0	—	320	314	1050
33.5	—	316	310	1035
33.0	—	312	306	1020
32.5	—	308	302	1010

Hardness reference table

Hardness				Tensile strength N/mm²		Hardness				Tensile strength N/mm²
Rockwell hardness		Vickers hardness	Brinell hardness			Rockwell hardness		Vickers hardness	Brinell hardness	
HRC	HRA	HV	HB			HRC	HRA	HV	HB	
32.0	—	304	298	995		24.0	—	249	245	820
31.5	—	300	294	980		23.5	—	246	242	810
31.0	—	296	291	970		23.0	—	243	240	800
30.5	—	292	287	960		22.5	—	240	237	790
30.0	—	289	283	950		22.0	—	237	234	785
29.5	—	285	280	935		21.5	—	234	232	775
29.0	—	281	276	920		21.0	—	231	229	765
28.5	—	278	273	910		20.5	—	229	227	760
28.0	—	274	269	900		20.0	—	226	225	750
27.5	—	271	266	890		19.5	—	223	222	745
27.0	—	268	263	880		19.0	—	221	220	735
26.5	—	264	260	870		18.5	—	218	218	730
26.0	—	261	257	860		18.0	—	216	216	725
25.5	—	258	254	850		17.5	—	214	214	715
25.0	—	255	251	835		17.0	—	211	211	710
24.5	—	252	248	830						

Note: The conversion values for steel in the table are commonly applicable for the steels with low and high carbon content.
The tensile strength in the table are applicable for the steels without high conversion precision requirement 1N/mm2=1Mpa.
This table is selected from GB1172-74.

CVD coating

Application	ISO Code		ZCC.CT	SANDVIK	KORLOY	TaeguTec	WALTER	MiTSUBiSHi	SUMITOMO	TUNGALOY	KYOCERA	DIJET	HITACHI	KENNAMETAL	SECO	ISCAR
Turning	P	P01		GC4005 GC4205	NC3010		WAP01	UE6005	AC700G	T9005	CA5505	JC110V	HG3305	KC910	TP1000 TX100	IC9015, IC9150 IC9080, IC4100
		P10	YBC152 YBC151	GC4215 GC4015	NC3010 NC3015	TT1300	WAP10	UE6005, UE6010 UE6020, UC6010	AC700G AC820P AC2000	T9005 T9015	CA5505 CA5515	JC110V JC215V JC730U	HG8010 GM8015 GM10	KC9110 KC9010	TP1000 TP100 TX150	IC9150, IC9250 IC9015, IC9025 IC520M, IC4050
		P20	YBC251 YBC252	GC4015 GC4225 GC4025 GC4215 LC25	NC3015 NC3020 NC500H	TT1500	WAP20	UC6010 UE6110 UE6020 F7030	AC2000 AC3000 AC820P	T9015 T9025	CA5515 CA5525 CA5025 CR9025	JC110V JC215V JC730U	HG8025 GM8020	KC8050 KC9025 KC9125	TP2000 TP2500 TK2000 MP2500 T250M	IC9015, IC9025 IC9150, IC9250 IC9350, IC4050
		P30	YBC252 YBC351	GC4225 GC4235 GC4025 GC4035 GC2135	NC3020 NC3030 NC500H	TT3500 TT5100	WAP30	UE6035 UH6400 F7030	AC830P AC630M AC3000	T9025 T9035 T3130	CA5525 CA5535 CR9025	JC215V JC325V	GM25	KC5025 KC9040 KC9140	TP2000 TP2500 TP3000 MK3000 T350M	IC9025, IC9250 IC9350, IC635 IC656, IC4050
		P40	YBC351	GC4235 GC4035 GC235		TT450		UE6035 UH6400 US735	AC630M AC830P	T9035	CA5535	JC325V JC450V	GM8035 GX30 GF30	KC9240 KC9045	TP3000 TP400 TP40 T350M	IC9350 IC635
	M	M10		GC2015	NC9020		WAM10	US7020	AC610M	T9015	CA6515 CA6015	JC110V	GM10	KC5010, KC9010 KC9110, KC9215	TP200	IC9250 IC9350
		M20	YBM151 YBM153	GC2025	NC9020 PC9030	TT2500	WAM20	US7020 F7030	AC610M AC630M	T6020 T9025	CA6525 CA6015	JC110V JC1341 JC215V JC730U	GM8020	KC9225 KC9025 KC8050 KC9125	TP200 TP3000 T250M TM2000	IC9250, IC9025 IC9350, IC9054
		M30	YBM151 YBM251	GC2135 GC235	PC9030 NC3030	TT3500	WAM30	US735 F7030	AC630M	T6030 T3130		JC215V JC325V	HG8025 GM25	KC9040 KC9240	TP3000 TP400 TP40 T350M T25M	IC9025 IC635 IC656
		M40	YBM253	GC2025		TT5100		US735				JC325V JC450V	GX30 GF30	KC9045 KC9245	TP400 TP40	IC656 IC635
	K	K01	YBD052	GC3205 GC3210	NC305K			UC5005 UC5015	AC300G	T5105	CA4505 CA5505	JC105V JC600	GM3005	KC5410, KC9315 KC910	TK1000	IC9150
		K10	YBD102 YBD151	GC3205 GC3210 GC3215	NC305K NC6010 NC315K	TT1300	WAK10	UC5015 UC5115 UE6010	AC410K AC700G	T5105 T5115 T5010 T1015	CA4505 CA4515 CA5505	JC105V JC110V JC600 JC610	HG8010 GM8015	KC5010 KC7310 KC9010	TK1000 TK2000 MK1500	IC9150, IC9015 IC4100, IC418 IC428, IC9080
		K20	YBD152 YBD252	GC3215 GC3020 K20W	NC315K	TT1500	WAK20	UE6010	AC700G AC820P	T5115 T5125 T5020	CA4515	JC110V JC215V JC610	HG8025 GM8020	KC8050, KC9025 KC9120, KC9325	TK2000 TP200 T150M T200M	IC9015, IC9150 IC418, IC520M

CVD coating

Application	ISO Code		ZCC.CT	SANDVIK	KORLOY	TaeguTec	WALTER	MiTSUBiSHi	SUMITOMO	TUNGALOY	KYOCERA	DIJET	HITACHI	KENNAMETAL	SECO	ISCAR
Milling	P	P01														
		P10							ACP100			JC730U		TN2510 TN25M		IC9080 IC4100
		P20	YBM251	GC4020 GC4220			WAP25	FH7020 F7030	ACP100			JC730U		TN7525	T200M T250M	IC520M
		P30	YBM351	GC4030 GC4230	NCM335	TT7300	WAP35	F7030	AC230	T3030				KC930M	T250M T350M T25M	IC4050
		P40	YBC302	GC4240 GC4040					AC230				GF30 GX2030 GX30	KC935M TN7535	T350M	
	M	M01														
		M10												TN25M		
		M20	YBM251 YBM253					F7030				JC730U		TN7525	T350M T25M	IC520M
		M30	YBM351	GC2040	NCM335		WTP35	F7030		T3030				KC930M TN7535	T250M T25M	IC4050
		M40	YBC302										GF30 GX30			
	K	K01										JC600				IC9080
		K10	YBD152		NCM310		WAK15	F5010	ACK200 AC211	T1015		JC600		TN5505 TN5515		IC4100
		K20	YBD252	GC3220 GC3020 K20D K20W	NCM320		WAK25	F5020	ACK200	T1015		JC610		KC915M TN5520	T150M T200M	C520M DT7150
		K30	YBC302	GC3040								JC610		KC930M KC935M	T200M	IC4050

PVD coating

Application	ISO Code		ZCC.CT	SANDVIK	KORLOY	TaeguTec	WALTER	MiTSUBiSHi	SUMITOMO	TUNGALOY	KYOCERA	DIJET	HITACHI	KENNAMETAL	SECO	ISCAR
Turning	P	P01									PR915 PR1005	JC5003				
		P10	YBG102	GC1525 GC1025				VP10MF		AH710	PR915 PR930 PR1025 RR1115	JC5003		KC5010 KC5510 KU10T	CP200 TS2000	IC250 IC507 IC570
		P20	YBG202	GC1525 GC1020 GC1025 GC1125	PC230			VP15TF VP20MF		AH710 AH330	PR630 PR915 PR930 PR660 PR1025 RR1225	JC5015		KC5025 KU25T	CP250 TS2500	IC908 IC928 IC1008 IC1028 IC3028
		P30	YBG202	GC1025 GC1125				VP15TF VP20RT		GH330 GH730 AH120 AH330 AH740	PR630 PR660	JC5015		KC7015 KC7020 KC7235	CP500	IC928 IC1008 IC1028 IC3028
		P40	YBG302	GC1020 GC2145	PC240			VP15TF VP20RT		AH120	PR660			KC7040	CP500	IC928 IC1008 IC1028
	M	M01									PR915 PR1025					
		M10	YBG102	GC1005 GC1025 GC1125				VP10MF	AC510N		PR915 PR930 PR1125 PR1225	JC5003		KC5010 KC5510	CP200 TS2000	IC330 IC354 IC507 IC907 IC3028
		M20	YBG202 YBG205	GC1020 C1025 GC4125	PC9030			VP15TF VP20MF	AC520U	GH330 GH730	PR630 PR915 PR930	JC5015		KC5025 KC730 KC5525	CP200 CP500 TS2500	IC228 IC250 IC354 IC3028
		M30	YBG302	GC1020 GC2035	PC9030			VP15TF VP20MF	AC520U AC530U	AH120	PR630 PR660	JC5015		KC5025 KC5525	CP500	IC908 IC928 IC1008 IC1028
		M40		GC2035 GC2145					AC530U		PR660					IC228 IC328
	K	K01							EH10Z	AH110		JC5003				
		K10	YBG102		PC205K				EH10Z	GH110 AH110		JC5003 JC5015		KC5010 KC5510	CP200 TS2000	
		K20	YBG202	GC1020	PC215K			VP10RT VP15TF VP20RT	EH20Z	AH120		JC5015		KC7015 KC7020	CP200 CP250	IC928 IC1008 IC908 IC22
		K30		GC4125				VP15TF						KC7225	CP500	IC928 IC1008 IC908 IC22
	S	S01		GC1105				VP05RT		AH110	PR915	JC5003				IC507
		S10	YBG102 YBG105	GC1005 GC1025 GC1125				VP05RT VP10RT	AC510U	AH120	PR915 PR1125	JC5015		KC5410 KC5010	CP200 CP250	IC903
		S20		GC4125				VP10RT VP15TF	AC510U AC520U		PR915			KC5025 KC5525	CP250 CP500	IC300 IC808 IC928
		S30		GC1125 GC2145				VP15TF	AC520U		PR1125					

PVD coating

Application	ISO Code		ZCC.CT	SANDVIK	KORLOY	TaeguTec	WALTER	MiTSUBiSHi	SUMITOMO	TUNGALOY	KYOCERA	DIJET	HITACHI	KENNAMETAL	SECO	ISCAR
Milling	P	P01							ACP100			JC5003	PTH08M PCA08M PCS08M TB6005 JX1005			
		P10		GC1010 GC1025			WXH15 WXM15		ACZ310 ACP100 ACP200		PR730 PR830 PR1025 PR1225	JC5003 JC5030	CY9020 PCA12M TB6005 JX1020 PC20M	KC715M		IC250 IC903 IC950
		P20	YBG202	GC1025 GC1010 GC2030	PC230			VP15TF	ACZ310 ACZ330 ACP200		PR630 PR730 PR830 PR660 PR1025 PR1225	JC5015 JC5030 JC5040	TB6020 CY150 JX1015	KC522M KC525M	F25M MP3000	IC950 IC900 IC908 IC910
		P30	YBG302	GC1010 GC1030 GC2030	PC3530 PC130	TT7030 TT7070 TT9030	WXM35	VP15TF VP30RT	ACZ300 ACZ350 ACZ200	GH330 AH330 AH120 AH740	PR630 PR660 PR730 PR830 PR1230	JC5015 JC5040	TB6045 CY250 CY25 HC844 JX1045 PTH30E	KC725M	F25M, F30M MP3000	IC900 IC928 IC300 IC328 IC1008
		P40		GC1030		TT8020 TT8030	WXP45	VP30RT	ACZ350 ACP300	AH120	PR660 PR1230	JC5040	PTH30E TB6060 PTH40H	KC735M	F40M, T60M	IC900 IC928 IC300 IC328
	M	M01											PCS08M			
		M10		GC1025 GC1030			WXM15		ACP200		PR630 PR730 PR830	JC5003	CY9020 JX1020	KC715M		IC903
		M20	YBG205 YBG202	GC1025 GC2030 GC1040		TT8020 TT9030		VP15TF VP20RT	ACZ310 EH20Z ACP300	GH330	PR630 PR730 PR830 PR660	JC5015 JC5030 JC5040	TB6020 CY150 JC1015	KC730 KC522M KC525M	F25M	IC900 IC903 IC908 IC928
		M30	YBG302	GC1040 GC2030	PC9530	TT8030	WXM35	VP15TF VP20RT VP30RT	ACZ330 EH20Z ACZ350	AH120	PR630 PR660 PR730 PR830 PR1225	JC5015 JC5030 JC5040	TB6045 CY250 HC844	KC725M KC735M	F30M F40M	IC928 IC328 IC1008
		M40						VP30RT	ACZ350 ACP300	AH140	PR660	JC5015	TB6060 PTH40H JX1060			IC928 IC328

PVD coating

Application	ISO Code		ZCC.CT	SANDVIK	KORLOY	TaeguTec	WALTER	MiTSUBiSHi	SUMITOMO	TUNGALOY	KYOCERA	DIJET	HITACHI	KENNAMETAL	SECO	ISCAR
Milling	K	K01								AH110	PR510 PR905	JC5003	PTH08M PCA08M PCS08M			
		K10	YBG102	GC1010	PC205K		WXH15 WXM15		ACZ310 ACK200	AH110 GH110	PR510 PR905	JC5003	CY9020 TB6005 CY100H	KC510M		IC900 IC910
		K20	YBG202 YBG152	GC1010 GC1020	PC215K	TT6030		VP15TF VP20RT	ACZ310 ACK200	AH120	PR510 PR905	JC5015	TB6020 CY150 PTH13S	KC520M KC525M	MK2000	IC910 IC950
		K30		GC1020				VP15TF VP20RT	ACZ330 ACK300			JC5015	TB6045 CY250 PTH40H	KC725M KC735M		IC908 IC950 IC928
	S	S01										JC5003				
		S10	YBG102	GC1025		TT6030		VP15TF	EH520Z	AH120	PR660	JC5015	PCS08M	KC510M		IC908
		S20		GC1025		TT8020	WXM35	VP15TF	EH520Z EH20Z		PR660		CY100H CY10H	KC522M KC525M		IC908
		S30		GC2030 S30T		TT8030 TT9030			ACK300		PR660			KC725M	F40M	IC328 IC928
	H	H01										JC5003				IC903
		H10		GC1010 GC1030			WXH15	VP15TF				JC5015	PTH08M PCA08M JX1005	KC635M	MH1000 F15M	IC900
		H20		GC1010			WXP45	VP15TF						KC635M	F15M	IC1008 IC808
		H30		GC1030										KC530M	F30M MP3000	IC1008 IC908

Cermet

Application	ISO Code		ZCC.CT	SANDVIK	KORLOY	TaeguTec	WALTE	MiTSUBiSHi	SUMITOMO	TUNGALOY	KYOCERA	DIJET	HITACHI	KENNAMETAL	SECO	ISCAR
Turning	P	P01			CC105 CN100			AP25N	T110A T2000Z	NS520 AT520 GT520 GT720	TN30 PV30	LN10 CX50				IC20N IC520N
		P10	YNG151 YNG151C	CT5015 GC1525	CC15 CN200 CT10	PV3010		AP25N NX2525	T1200A T2000Z	NS520 AT530 GT720 GT730	TN60 TN6020 PV60 PV7020	CX50 CX75	CZ25	KT125 KT315	CM CMP	IC20N IC520N IC530N
		P20		GC1525		CT3000		AP25N UP35N NX2525 NX3035	T1200A T2000Z T3000Z	NS530 GT530 GT730 NS730	TN10 TN6020 PV90 PV7020	CX75	CH550	KT5020 KT325 KT1120		IC20N IC75T IC30N IC520N IC530N
		P30						VP45N	T3000Z	NS530 NS730						IC75T IC30N
	M	M01														
		M10	YNG151 YNG151C	GC1525		PV3010		NX2525 AP25N	T110A T2000Z	NS520 AT530 GT530 GT720	TN60 TN6020 PV60 PV7020	LN10 CX50		KT125	CM CMP	
		M20				CT3000		NX2525, AP25N NX3035	T1200A T2000Z	NS530 GT730 NS730	TN90 TN6020 PV90 PV7020	CX50 CX75	CH550			
		M30							T3000Z							
	K	K01			CC105 CN100			AP25N NX2525	T110A T2000Z	NS520 AT520 GT520 GT720	TN30 PV30	LN10				
		K10	YNG151 YNG151C	CT5015	CC115	CT3000		AP25N NX2525	T1200A T2000Z	NS520 GT530 GT730 NS730	TN60 TN6020 PV60 PV7020	LN10		KT325 KT125		
		K20						AP25 NX2525	T3000Z			CX75				

Cermet

Application	ISO Code		ZCC.CT	SANDVIK	KORLOY	TaeguTec	WALTE	MiTSUBiSHi	SUMITOMO	TUNGALOY	KYOCERA	DIJET	HITACHI	KENNAMETAL	SECO	ISCAR
Milling	P	P01														
		P10	YNG151 YNG151C		CN100	CT3000		NX2525			TN60	CX75			C15M	IC30N
		P20		CT530	CN20	CT520		NX2525		NS530	TN100M	CX75 CX90	CH550 CH7030 MZ1000 MZ2000	KT530M HT7 KT605M	C15M	IC30N
		P30			CN30			NX4545	T250A	NS530 NS540 NS740		CX90 CX99	MZ3000 CH7035			IC30N
	M	M01														
		M10	YNG151 YNG151C			CT3000		NX2525			TN60					IC30N
		M20		CT530		CT520		NX2525		NS530	TN100M	CX75	CH550 CH7030 MZ1000 MZ2000	KT530M HT7 KT605M	C15M	IC30N
		M30						NX4545	T250A	NS540 NS740		CX90 CX99	MZ3000 CH7035			
	K	K01														
		K10	YNG151 YNG151C			CT520		NX2525		NS530	TN60					
		K20						NX2525				CX75		KT530M HT7		
		K30														

PCBN grade

Application	ISO Code		ZCC.CT	SANDVIK	KORLOY	TaeguTec	WALTER	MiTSUBiSHi	SUMITOMO	TUNGALOY	KYOCERA	DIJET	SECO	Element Six
Turning	H	H01					WCB30	MBC010 MB810	BNX10 BNC30	BXM10 BX310 BXC30			CBN050C CBN100	
		H10	YCB012	CB7015 CB7020 CB20	KB320 KB330 KB420	KB90 KB90A	WCB50	MBC020 MB8025 MB820	BNC80 BNX20 BNC160	BXM20 BX330 BXA30	KBN510	JBN300	CBN10 CBN200	DBC50
		H20		CB7025 CB7050 CB50				MBC020 MB8025 MB825	BN250 BNC200 BNX25	BXC50	KBN525	JBN245	CBN150 CBN200	DBN45
		H30						MBC020 MB835	BNC300 BN350	BX380			CBN300 CBN350	
	S	S01	YCB011					MB730	BN600 BN700	BX450 BX950 BX480				
		S10												
		S20												
		S30												
	K	K01						MB710	BN500	BX930			CBN300 CBN300P	
		K10	YCB011	CB50 CB7050	KB350 KB360	KB90 KB90A	WCB50	MB710 MB730	BN700	BX480 BX950	KBN65B	JBN795	CBN200	DBA80
		K20						MB730 MBS140	BN700 BNS800	BXC90	KBN900	JBN330	CBN300	
		K30						MBS140	BNS800	BXC90			CBN350	

PCD grade

Application	ISO Code		ZCC.CT	SANDVIK	KORLOY	TaeguTec	WALTER	MiTSUBiSHi	SUMITOMO	TUNGALOY	KYOCERA	DIJET	SECO	Element Six
Turning	N	N01						MD205	DA90	DX180	KPD001 KPD025	JDA735	1700 1800	CTH025
		N10	YCD011	CD10	DP90 DP150 DP200	KP500	WCD10	MD205 MD220	DA150	DX160	KPD010	JDA745	1500	CTB010
		N20						MD220 MD230	DA200 DA2200	DX140 DX120	KPD002 KPD230	JDA715 JDA10	1300	CTB002
		N30						MD230	DA1000 DA2200		KPD001		1600	

Cemented carbide material

Application	ISO Code		ZCC.CT	SANDVIK	KORLOY	TaeguTec	WALTER	MiTSUBiSHi	SUMITOMO	TUNGALOY	KYOCERA	DIJET	HITACHI	KENNAMETAL	SECO	ISCAR
Turning	P	P01			ST05											
		P10	YC10	S1P	ST10	P10			ST10P	TX10S		SRT	WS10	P10		IC70
		P20		SMA	ST20	P20		UTi20T	ST20E	TX20 TX25		SRT DX30	EX35	K125M TTM		IC70 IC50M
		P30		SM30	ST30A	P30		UTi20T	A30 A30N	TX30 UX30	PW30	SR30 DX30	EX35 EX40	GK K600 TTR		IC50M IC54
		P40	YC40	S6					ST40E	TX40		SR30 DX35	EX45	G13		IC54
	M	M10	YC10	H10A	U10	M10			EH510 U10E	TU10		UMN	WA10B	K313	890	
		M20		H13A	U20	M20		UTi20T	EH520 U2	TU20 UX30		DX25 UMS	EX35	K68 KMF K125M TTM	HX 883	IC08
		M30	YC40	H10F SM30	ST30A			UTi20T	A30 A30N	UX30		DX25 UMS	EX40 EX45	K600 TTR		IC08 IC28
		M40		S6	U40	M40				TU40		UM40	EX45	G13		IC128
	K	K01	YD051	H1P	H02			UTi05T	H1 H2	TH03 KS05F		KG03	WH05	K605		
		K10	YD101	H1P H10 HM	H01	K10		HTi10	EH10 EH510	G1F TH10	KW10	KG10 KT9	WH10	K313 K110M THM THM-U	890	IC20
		K20	YD201	H13A	G10	K20		UTi20T	G10E EH20 EH520	G2F KS15F G2 KS20	GW10	CR1 KG20	WH20	K715 KMF K600	890 HX 883	IC20 IC10
		K30			G3			UTi20T	G10E	G3		KG30		THR	883	IC10 IC28
	N	N01		H10 H13A					H1 H2	KS05F		KG03		K605		
		N10	YD101		H01	K10	WK10	HTi10	EH10 EH510	TH10 H10T		KG10 KT9		K313 K110M THM THM-U	890 H15	
		N20	YD201			K20			G10E EH20 EH520	KS15F		CR1 KG20		K715 KMF K600	HX KX 883 H15 H25	
		N30										KG30		G13 THR	H25	
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		S10	YD101	H10 H10A H10F H13A	H01	K10		RT9005 RT9010	EH10 EH510	KS05F TH10		FZ05 KG10		K10 K313 THM	890	
		S20						RT9010 TF15	EH20 EH520	KS15F KS20		FZ15 KG20		K715 KMF	890 883 HX H25	
		S30						TF15				KG30		G13 K600 THR		

Cemented carbide material

Application	ISO Code		ZCC.CT	SANDVIK	KORLOY	TaeguTec	WALTER	MiTSUBiSHi	SUMITOMO	TUNGALOY	KYOCERA	DIJET	HITACHI	KENNAMETAL	SECO	ISCAR
Milling	P	P10	YC10	S1P								SRT				
		P20			ST20	P10		UTi20T	A30N	TX25		SRT DX30	EX35	K125		IC50M IC28
		P30			ST30A	P20		UTi20T	A30N	UX30	PW30	SR30 DX30	EX35 EX40	GX K600		IC50M IC28
		P40	YC40		ST40	P30					PW30	SR30	EX45			IC28
	M	M10	YC10		U10	M10						UMN		K110M		
		M20			U20	M20		UTi20T	A30N			DX25 UMS	EX35	K313		
		M30	YC40					UTi20T	A30N	UX30		DX25 UMS	EX40 EX45	KFM K600		IC28
		M40			U40	M40				TU40			EX45			IC28
	K	K01	YD051		H01			UTi05T				KG03				
		K10	YD101	H1P	H05 H10	K10	WK10	HTi10	G10E	TH10	KW10	KG10	WH10	K110M K313		IC20
		K20	YD201		G10	K20		UTi20T	G10E			KT9 CR1 KG20	WH20	KFM	HX	IC20 IC10
		K30						UTi20T				KG30				IC10 IC28

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Safety & environmental protection

Cemented carbide products are hard and fragile, which are easily damaged due to improper carrying or clamping, so please be careful with them.

Spattering of chips may occur and a lot of cooling liquid is used during the machining process, so protective measures should be used, such as ventilating equipment, machine protective shield, safeguard glasses, protective clothes, and so on. Please take care to protect hand when clamping inserts with sharp edge.











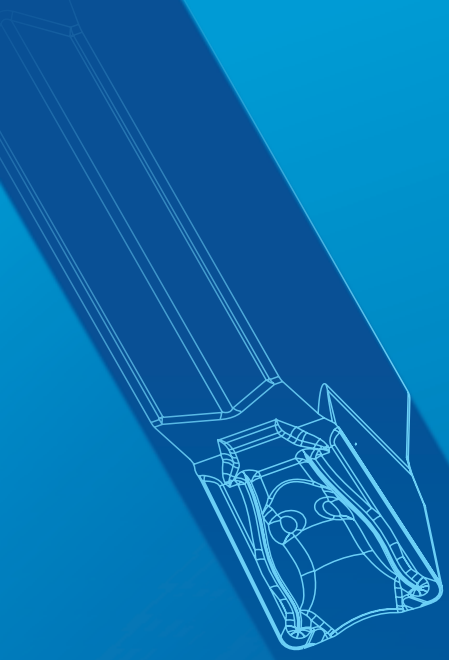


Quality guarantee

We have been awarded GB/T19001-ISO9001 Quality System Certificate.

All our products are inspected strictly.

Welcome to call our technical service hotline: 4008815915





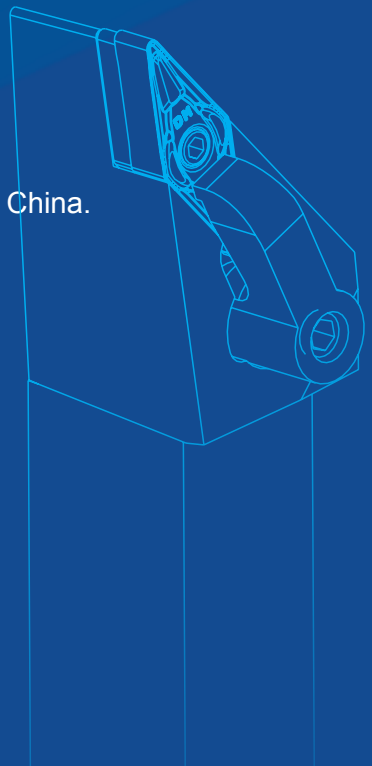
ZCC·CT

Zhuzhou Cemented Carbide Cutting Tool Co.Ltd(ZCCCT) is the research, production and sales base of CNC cutting tools with large production scale, advanced equipments and leading technology strength in China.

——Starting from the very beginning of material selection, we strictly control each procedure and implement refined management to guarantee the stable quality of products.

——Our research and application experts constantly pay close attention to the latest development of materials and cutting technology to provide high-quality and high-efficiency cutting tools and complete solutions to our customers.

——Our sales and service network can be found all over China and spanning the globe. We offer considerate and professional technology services regarding orders of standard or non-standard tailor-made products.



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