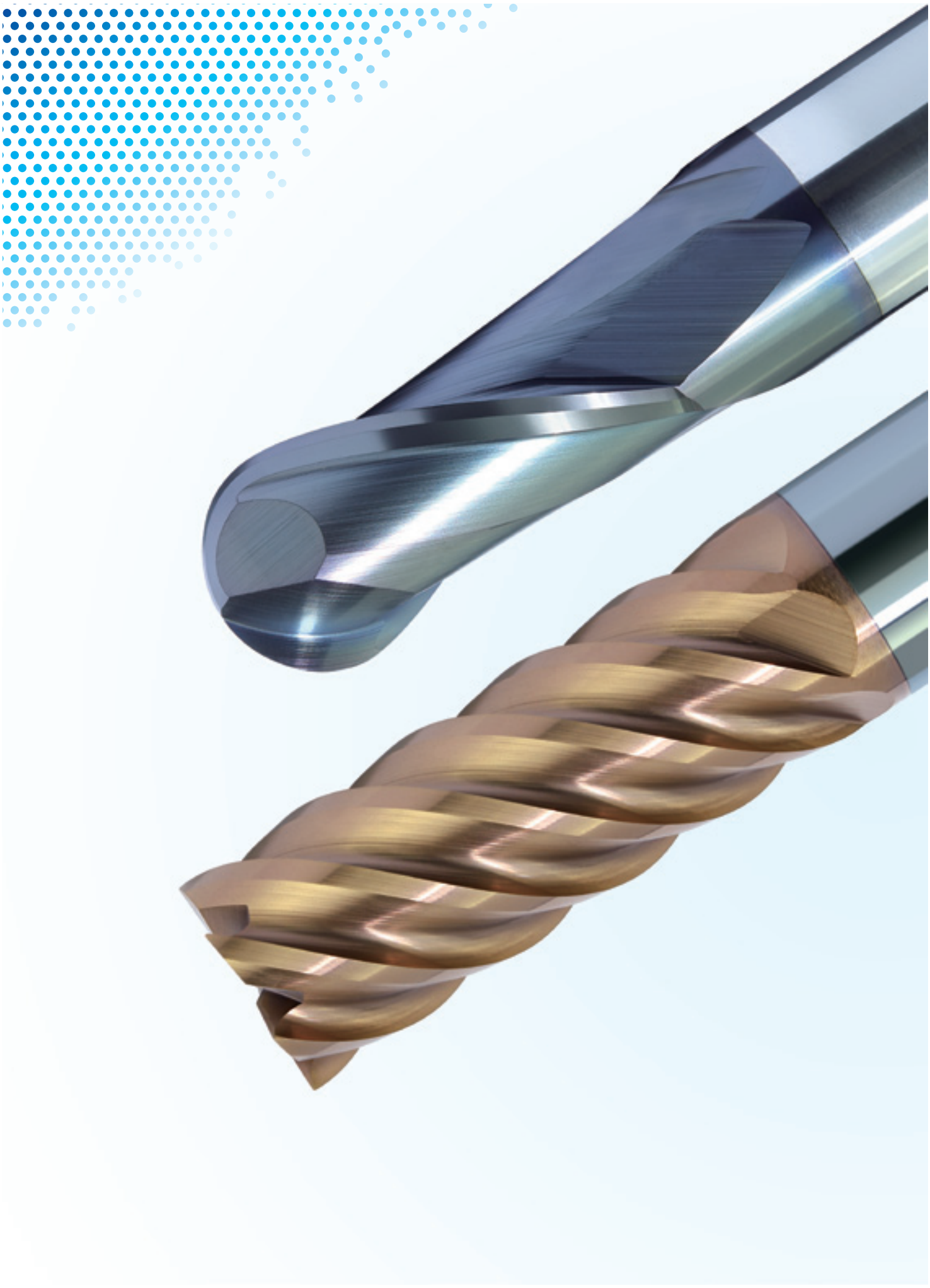
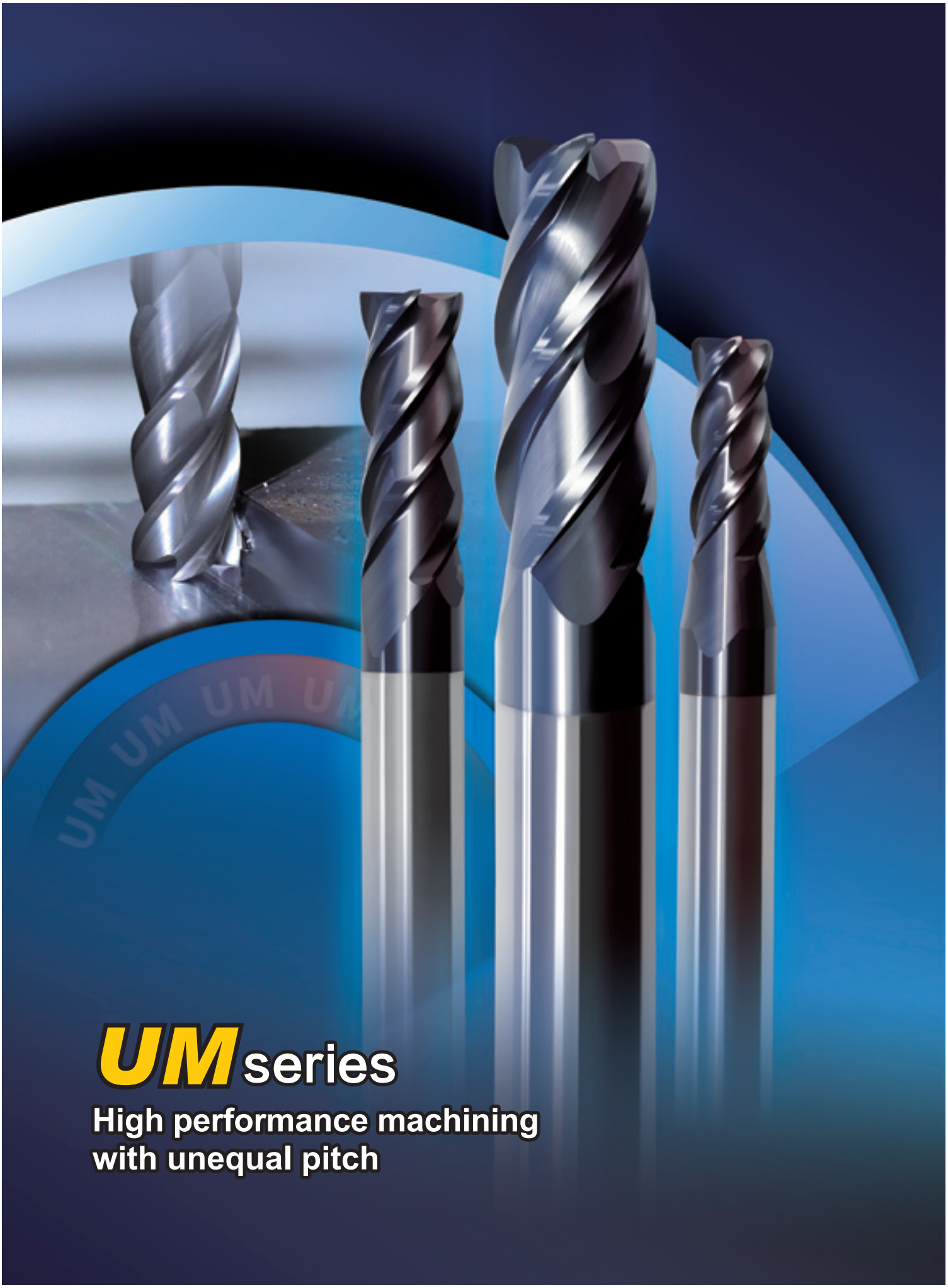




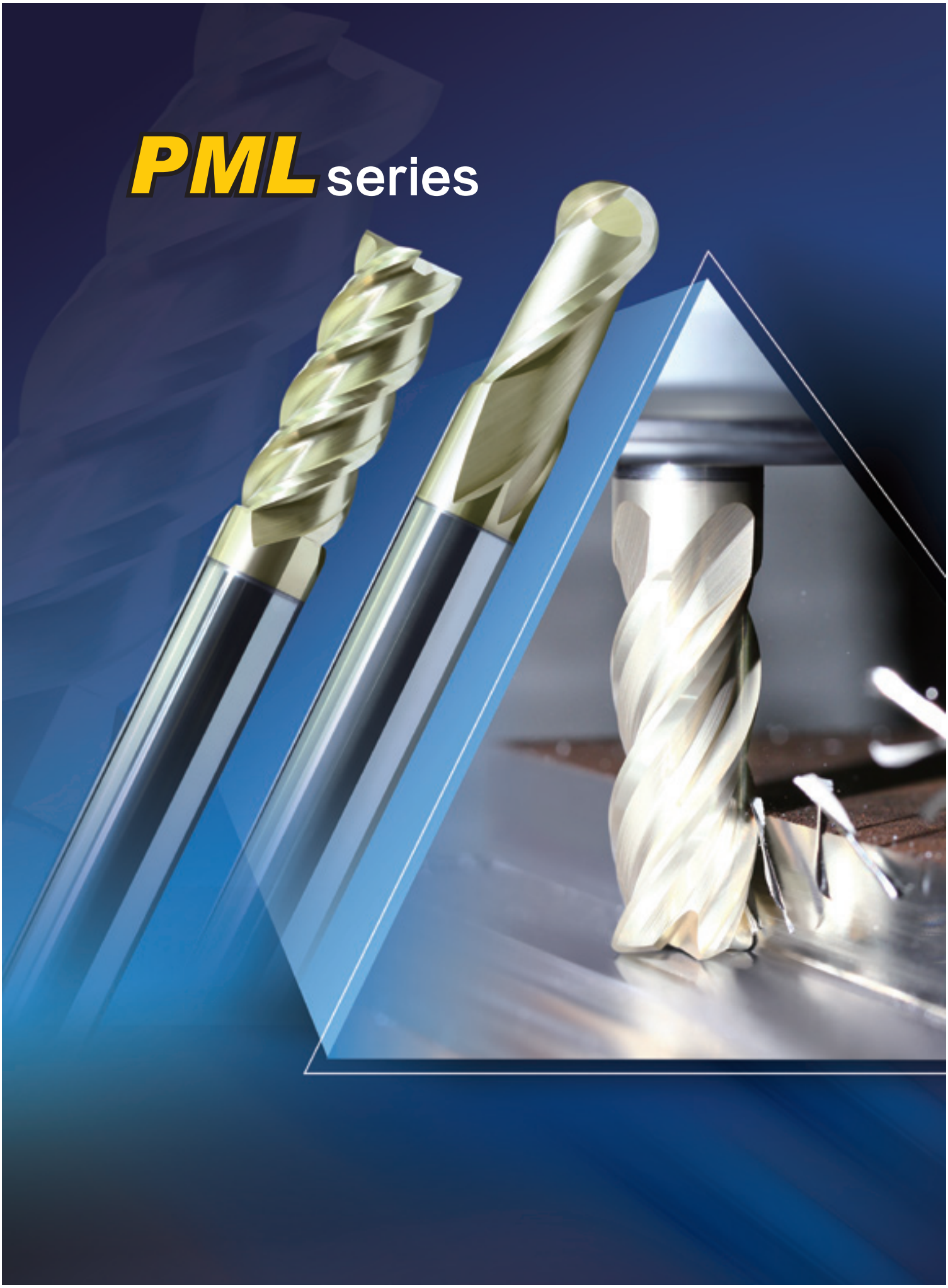


Milling Tools

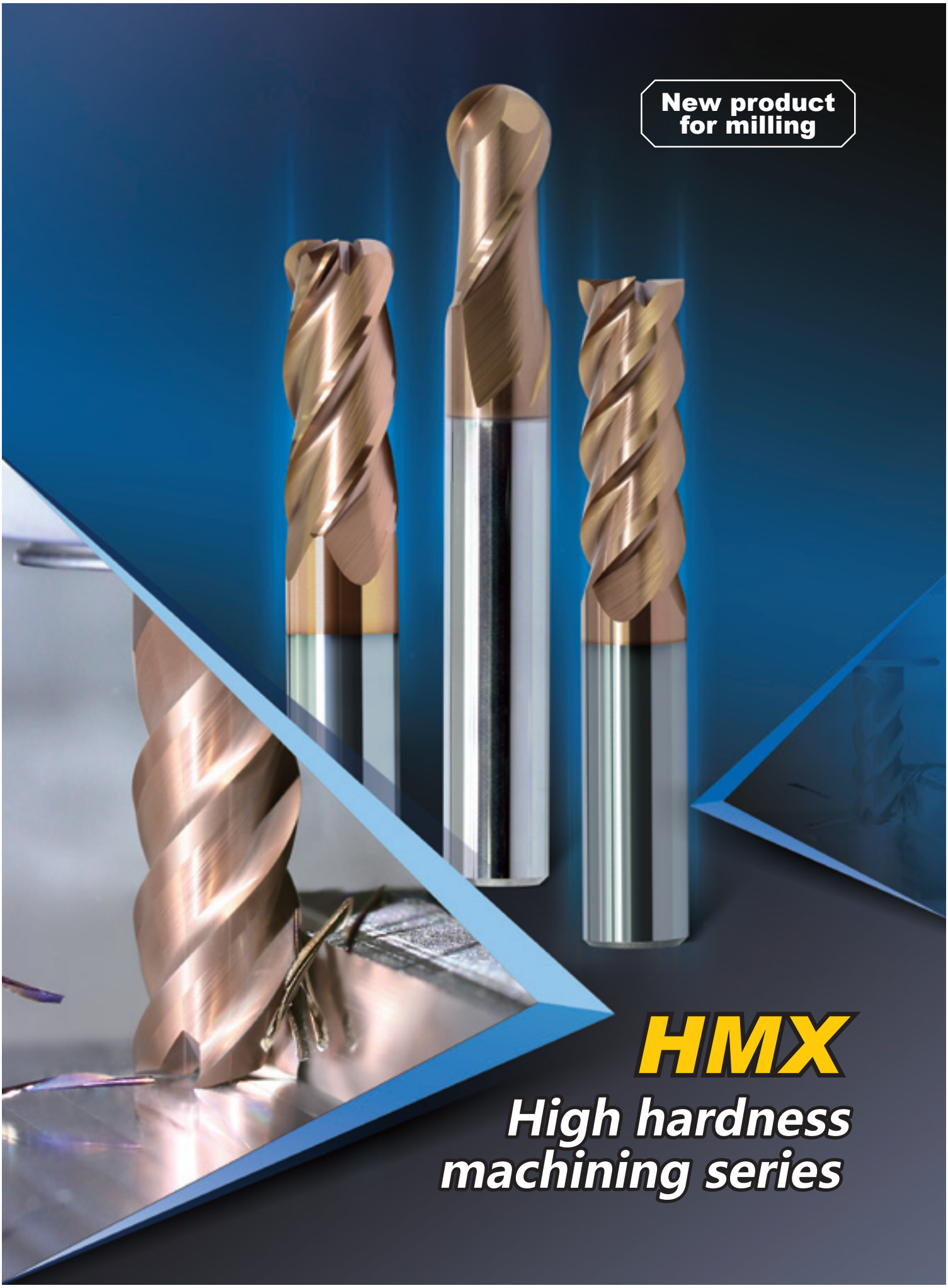
Solid carbide end mills


UM series
High performance machining
with unequal pitch

PML series




PM series


New product
for milling
HMX
High hardness
machining series

Selection guide for solid carbide end mills

Selection guide for solid carbide end mills

Tool shape

Tool type

Series of tools

Solid Carbide End Mills
PML series

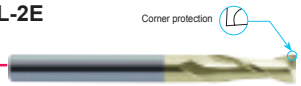
Machining application

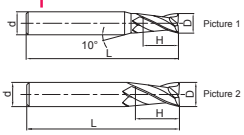
shape and size



2-flute flattened end mills with straight shank

PML-2E





● 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-D1.0	1.0	6	3	50	2	Picture 1	●
PML-2E-D1.5S	1.5	4	4	50	2	Picture 1	●
PML-2E-D1.5	1.5	6	4	50	2	Picture 1	●
PML-2E-D2.0S	2.0	4	6	50	2	Picture 1	●
PML-2E-D2.0	2.0	6	6	50	2	Picture 1	●
PML-2E-D2.5S	2.5	4	8	50	2	Picture 1	●
PML-2E-D2.5	2.5	6	8	50	2	Picture 1	●
PML-2E-D3.0S	3.0	4	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-D4.0S	4.0	4	11	50	2	Picture 2	●
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 B231 | Graphics category and identification B232 | Cutting parameters B402 | Non-standard customization B544–B545

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, Non-standard customization



MILLING B

Solid Carbide End Mills

Solid carbide end mills overview B250-B257
Solid carbide end mills code key B258
Graphics category and identification B259
Detail information of solid carbide end mills B260-B465
High-performance VPM series for general machining B260-B269
High-performance UM series for general machining B270-B276
High-performance PML Series for general machining B277-B305
High-performance PM Series for general machining B306-B352
GM series for general machining B353-B394
HMX series for machining high hardness steel B395-B423
TM series for machining titanium B424-B433
NM series for machining copper B434-B439
AL/ALG series for machining aluminum B440-B455
VSM/SM series for machining stainless steel, heat resistant alloy and hard-to-cut materials B456-B463
CM series for general chamfering B464-B465
Recommended cutting parameters B466-B564
Technical Information B565-B569
Customized non-standard order B570-B571
Interchangeable modular end mill series B572-B585
PM interchangeable modular end mills B574-B576
HMX interchangeable modular end mills B577-B579
XM interchangeable modular end mills B580-B585
Recommended cutting parameters for interchangeable modular end mills B590-B591
Technical information for Interchangeable modular end mills B592
Interchangeable straight shank B586-B587
Interchangeable taper milling shank B588
Interchangeable HSK shank B589







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	**VPM-4E** (Unequal pitch)		Ø3.0~Ø20.0	◎	◎		◎				◎		B262	B466
			VPM-4EBL/X (Unequal pitch)		Ø3.0~Ø20.0	◎	◎		◎				◎		B263	B466
			VPM-4EFP (Unequal pitch)		Ø3.0~Ø20.0	◎	◎		◎				◎		B264	B466
	Radius	4	**VPM-4R** (Unequal pitch)		Ø3.0~Ø12.0	◎	◎		◎				◎		B265 -266	B467
			VPM-4RBL/X (Unequal pitch)		Ø3.0~Ø12.0	◎	◎		◎				◎		B267 -268	B467
			VPM-4RFP (Unequal pitch)		Ø3.0~Ø12.0	◎	◎		◎				◎		B269	B467
	Flattened	4	**UM-4E** (Unequal pitch)		Ø4.0~Ø20.0	◎	◎	○	◎			○	◎		B271	B468 -469
			UM-4EL (Unequal pitch)		Ø4.0~Ø20.0	◎	◎	○	◎			○	◎		B272	B468 -469
			UM-4EFP (Unequal pitch)		Ø6.0~Ø20.0	◎	◎	○	◎			○	◎		B273	B470 -471
	Radius	4	**UM-4R** (Unequal pitch)		Ø4.0~Ø20.0	◎	◎	○	◎			○	◎		B274	B472 -473
			UM-4RL (Unequal pitch)		Ø6.0~Ø16.0	◎	◎	○	◎			○	◎		B275	B472 -473
			UM-4RFP (Unequal pitch)		Ø6.0~Ø16.0	◎	◎	○	◎			○	◎		B276	B474
	Flattened	2	**PML-2E** (Corner protection)		Ø1.0~ Ø20.0	◎	◎	○	◎			○			B278	B475
			PML-2F (Sharp)		Ø1.0~ Ø20.0	◎	◎	○	◎			○			B279	B476
			PML-2EL (Corner protection)		Ø3.0~ Ø20.0	◎	◎	○	◎			○			B280	B475
			PML-2FL (Sharp)		Ø3.0~ Ø20.0	◎	◎	○	◎			○			B281	B476
			PML-2EFP (Corner protection)		Ø6.0~ Ø20.0	◎	◎	○	◎			○			B282	B477
		3	**PML-3E-H** (Corner protection)		Ø3.0~ Ø20.0	◎	◎	○	◎			○			B283	B478
			PML-3EL-H (Corner protection)		Ø3.0~ Ø20.0	◎	◎	○	◎			○			B284	B478
		4	**PML-4E-G** (Corner protection)		Ø1.0~ Ø20.0	◎	◎	○	◎			○			B285	B479 -480
			PML-4F-G (Sharp)		Ø1.0~ Ø20.0	◎	◎	○	◎			○			B286	B481 -482
			PML-4EL-G (Corner protection)		Ø3.0~ Ø20.0	◎	◎	○	◎			○			B287	B479 -480
			PML-4FL-G (Sharp)		Ø3.0~ Ø20.0	◎	◎	○	◎			○			B288	B481 -482

◎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		Specification	Cutting parameters
													Below 55HRC	Above 55HRC		
High-performance general milling	Flattened	4	**PML-4EX-G** (Corner protection)		Ø3.0~ Ø20.0	◎	◎	○	◎			○			B289	B483
			PML-4E (Corner protection)		Ø1.0~ Ø20.0	◎	◎	○	◎			○			B290	B484 -485
			PML-4EL (Corner protection)		Ø3.0~ Ø20.0	◎	◎	○	◎			○			B291	B484 -485
			PML-4E-H (Corner protection)		Ø3.0~ Ø20.0	◎	◎	○	◎			○			B292	B479 -480
			PML-4EL-H (Corner protection)		Ø3.0~ Ø20.0	◎	◎	○	◎			○			B293	B479 -480
			PML-4EFP (Corner protection)		Ø6.0~ Ø20.0	◎	◎	○	◎			○			B294	B486 -487
		6	**PML-6E** (Corner protection)		Ø6.0~ Ø20.0	◎	◎	○	◎			○			B295	B488
			PML-6EL (Corner protection)		Ø6.0~ Ø20.0	◎	◎	○	◎			○			B296	B489
	Ball nose	2	**PML-2B**		R0.5~R10.0	◎	◎	○	◎			○			B297	B490 -491
			PML-2BL		R1.0~R10.0	◎	◎	○	◎			○			B298	B490 -491
			PML-2BFP		R0.5~R10.0	◎	◎	○	◎			○			B299	B490 -491
		4	**PML-4B**		R1.5~R10.0	◎	◎	○	◎			○			B300	B492
			PML-4BL		R1.5~R10.0	◎	◎	○	◎			○			B301	B492
	Radius	2	**PML-2R**		Ø1.0~ Ø12.0	◎	◎	○	◎			○			B302	B496
		4	**PML-4R**		Ø3.0~ Ø12.0	◎	◎	○	◎			○			B303	B497
			PML-4R-H		Ø3.0~ Ø12.0	◎	◎	○	◎			○			B304	B497
			PML-4RFP		Ø6.0~ Ø16.0	◎	◎	○	◎			○			B305	B497
	Flattened	2	**PM-2E** (Corner protection)		Ø1.0~ Ø20.0	◎	◎	○	◎			○	◎		B308	B475
			PM-2F (Sharp)		Ø1.0~ Ø20.0	◎	◎	○	◎			○	◎		B309	B476
			PM-2EL (Corner protection)		Ø3.0~ Ø20.0	◎	◎	○	◎			○	◎		B310	B475
			PM-2FL (Sharp)		Ø3.0~ Ø20.0	◎	◎	○	◎			○	◎		B311	B476
			PM-2EFP (Corner protection)		Ø6.0~ Ø20.0	◎	◎	○	◎			○	◎		B312	B477
			PM-2EBL/X (Corner protection)		Ø3.0~ Ø12.0	◎	◎	○	◎			○	◎		B313	B475

◎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	3	**PM-3E-H** (Corner protection)		Ø3.0~ Ø20.0	◎	◎	○	◎			○	◎		B314	B478
			PM-3EL-H (Corner protection)		Ø3.0~ Ø20.0	◎	◎	○	◎			○	◎		B315	B478
		4	**PM-4E-G** (Corner protection)		Ø1.0~ Ø20.0	◎	◎	○	◎			○	◎		B316 -317	B479 -480
			PM-4F-G (Sharp)		Ø1.0~ Ø20.0	◎	◎	○	◎			○	◎		B318	B481 -482
			PM-4EL-G (Corner protection)		Ø3.0~ Ø20.0	◎	◎	○	◎			○	◎		B319	B479 -480
			PM-4FL-G (Sharp)		Ø3.0~ Ø20.0	◎	◎	○	◎			○	◎		B320	B481 -482
			PM-4EX-G (Corner protection)		Ø3.0~ Ø20.0	◎	◎	○	◎			○	◎		B321	B483
			PM-4EBL/X-G (Corner protection)		Ø3.0~ Ø12.0	◎	◎	○	◎			○	◎		B322	B479 -480
			PM-4E (Corner protection)		Ø1.0~ Ø20.0	◎	◎	○	◎			○	◎		B323 -324	B484 -485
			PM-4EL (Corner protection)		Ø3.0~ Ø20.0	◎	◎	○	◎			○	◎		B325	B484 -485
			PM-4E-H (Corner protection)		Ø3.0~ Ø20.0	◎	◎	○	◎			○	◎		B326	B479 -480
			PM-4EL-H (Corner protection)		Ø3.0~ Ø20.0	◎	◎	○	◎			○	◎		B327	B479 -480
			PM-4EFP (Corner protection)		Ø6.0~ Ø20.0	◎	◎	○	◎			○	◎		B328	B486 -487
			PM-4EBL/X (Corner protection)		Ø3.0~ Ø12.0	◎	◎	○	◎			○	◎		B329	B484 -485
		6	**PM-6E** (Corner protection)		Ø6.0~ Ø20.0	◎	◎	○	◎			○	◎		B330	B488
			PM-6EL (Corner protection)		Ø6.0~ Ø20.0	◎	◎	○	◎			○	◎		B331	B489
	Ball nose	2	**PM-2B**		R0.5~R10.0	◎	◎	○	◎			○	◎		B332	B490 -491
			PM-2BL/M/X		R1.0~R10.0	◎	◎	○	◎			○	◎		B333	B490 -491
			PM-2BFP		R0.5~R10.0	◎	◎	○	◎			○	◎		B334	B490 -491
		4	**PM-4B**		R1.5~R10.0	◎	◎	○	◎			○	◎		B335	B492
			PM-4BL/M/X		R1.5~R10.0	◎	◎	○	◎			○	◎		B336	B492
	Taper neck ball nose	2	**PM-2BC**		R0.25~R2.0	◎	◎	○	◎			○	◎		B337 -340	B493 -495
	Radius		**PM-2R**		Ø1.0~ Ø12.0	◎	◎	○	◎			○	◎		B341 -342	B496

◎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	Specification	Cutting parameters
													High hardness steel: Above 55HRC		
High-performance general milling	Radius	4	PM-4R		Ø3.0~ Ø12.0	◎	◎	○	◎			○	◎	B343 -344	B497
			PM-4RBL/M/X		Ø4.0~ Ø12.0	◎	◎	○	◎			○	◎	B345 -346	B497
			PM-4R-H		Ø3.0~ Ø12.0	◎	◎	○	◎			○	◎	B347 -348	B497
			PM-4RBL/ M/X-H		Ø4.0~ Ø12.0	◎	◎	○	◎			○	◎	B349	B497
			PM-4RFP		Ø6.0~ Ø16.0	◎	◎	○	◎			○	◎	B350	B497
	High-feed-rate		PM-4H		Ø3.0~ Ø12.0	◎	◎	○	◎			○	◎	B351	B498 -499
			PM-4HL		Ø4.0~ Ø12.0	◎	◎	○	◎			○	◎	B352	B498 -499
General milling	Flattened	2	GM-2E (Corner protection)		Ø1.0~ Ø20.0	◎	◎	○	◎					B355	B500
			GM-2F (Sharp)		Ø1.0~ Ø20.0	◎	◎	○	◎					B356	B501
			GM-2EL (Corner protection)		Ø3.0~ Ø20.0	◎	◎	○	◎					B357	B500
			GM-2FL (Sharp)		Ø3.0~ Ø20.0	◎	◎	○	◎					B358	B501
			GM-2EX (Corner protection)		Ø3.0~ Ø20.0	◎	◎	○	◎					B359	B502
			GM-2EFP (Corner protection)		Ø6.0~ Ø20.0	◎	◎	○	◎					B360	B503
			GM-2EBL/X (Corner protection)		Ø3.0~ Ø12.0	◎	◎	○	◎					B361	B500
		3	GM-3E (Corner protection)		Ø1.0~ Ø20.0	◎	◎	○	◎					B362 -363	B504
			GM-3EL (Corner protection)		Ø3.0~ Ø20.0	◎	◎	○	◎					B364	B504
		4	GM-4E-G (Corner protection)		Ø1.0~ Ø20.0	◎	◎	○	◎					B365 -366	B505
			GM-4F-G (Sharp)		Ø1.0~ Ø20.0	◎	◎	○	◎					B367	B506
			GM-4EL-G (Corner protection)		Ø3.0~ Ø20.0	◎	◎	○	◎					B368	B505
			GM-4FL-G (Sharp)		Ø3.0~ Ø20.0	◎	◎	○	◎					B369	B506
			GM-4EX-G (Corner protection)		Ø3.0~ Ø20.0	◎	◎	○	◎					B370	B507
			GM-4EBL/X-G (Corner protection)		Ø3.0~ Ø12.0	◎	◎	○	◎					B371	B505
			GM-4E (Corner protection)		Ø1.0~ Ø20.0	◎	◎	○	◎					B372 -373	B508

◎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	Flattened	4	GM-4EL (Corner protection)		Ø3.0~ Ø20.0	◎	◎	○	◎						B374	B508
			GM-4EFP (Corner protection)		Ø6.0~ Ø20.0	◎	◎	○	◎						B375	B509
			GM-4EBL/X (Corner protection)		Ø3.0~ Ø12.0	◎	◎	○	◎						B376	B508
		6	GM-6E (Corner protection)		Ø6.0~ Ø20.0	◎	◎	○	◎						B377	B510
			GM-6EL (Corner protection)		Ø6.0~ Ø20.0	◎	◎	○	◎						B378	B511
	Long neck flattened	2	GM-2EP		Ø0.3~ Ø5.0	◎	◎	○	◎						B379 -380	B512 -513
	Tiny head flattened		GM-2ES		Ø0.3~ Ø3.0	◎	◎	○	◎						B381	B514
	Ball nose		GM-2B		R0.5~R10.0	◎	◎	○	◎						B382	B515
		2	GM-2BL/M/X		R1.0~R10.0	◎	◎	○	◎						B383	B515
			GM-2BFP		R0.5~R10.0	◎	◎	○	◎						B384	B515
		4	GM-4B		R1.5~R10.0	◎	◎	○	◎						B385	B516
			GM-4BL/M/X		R1.5~R10.0	◎	◎	○	◎						B386	B516
	Tiny ball nose	2	GM-2BS		R0.15~ R1.5	◎	◎	○	◎						B387	B517
	Long neck ball nose		GM-2BP		R0.15~R2.5	◎	◎	○	◎						B388 -389	B518 -519
	Radius		GM-2R		Ø1.0~Ø12.0	◎	◎	○	◎						B390	B520
		4	GM-4R		Ø1.0~Ø12.0	◎	◎	○	◎						B391	B521
			GM-4RL/M/X		Ø4.0~Ø16.0	◎	◎	○	◎						B392 -393	B521
	Corrugated edge		GM-4W		Ø6.0~Ø20.0	◎	◎	○	◎						B394	B522 -523
Machining high hardness steel	Flattened	2	HMX-2E (Corner protection)		Ø1.0~Ø20.0				○				◎	◎	B396 -397	B524
			HMX-2EFP (Corner protection)		Ø6.0~Ø20.0				○				◎	◎	B398	B525
			HMX-2EBL/X (Corner protection)		Ø3.0~Ø12.0				○				◎	◎	B399	B524
		4	HMX-4E (Corner protection)		Ø1.0~Ø20.0				○				◎	◎	B400 -401	B526

◎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		Specification	Cutting parameters
													Below 55HRC	Above 55HRC		
Machining high hardness steel	Flattened	4	HMX-4EL (Corner protection)		Ø3.0~Ø20.0				○				◎	◎	B402	B526
			HMX-4EFP (Corner protection)		Ø6.0~Ø20.0				○				◎	◎	B403	B527
			HMX-4EBL/X (Corner protection)		Ø3.0~Ø12.0				○				◎	◎	B404	B526
		6	HMX-6E (Corner protection)		Ø6.0~Ø20.0				○				◎	◎	B405	B528
			HMX-6EL (Corner protection)		Ø6.0~Ø20.0				○				◎	◎	B406	B529
	Long neck flattened	2	HMX-2EP		Ø0.3~Ø5.0				○				◎	◎	B407 -408	B530 -531
	Tiny head flattened		HMX-2ES		Ø0.3~Ø3.0				○				◎	◎	B409	B532
	Ball nose		HMX-2B		R0.5~R10.0				○				◎	◎	B410	B533
			HMX-2BL/M/X		R1.0~R10.0				○				◎	◎	B411	B533
			HMX-2BFP		R0.5~R10.0				○				◎	◎	B412	B533
	Ball nose	4	HMX-4B		R1.5~R10.0				○				◎	◎	B413	B534
			HMX-4BL		R1.5~R10.0				○				◎	◎	B414	B534
	Tiny ball nos	2	HMX-2BS		R0.15~R1.5				○				◎	◎	B415	B535
	Long neck ball nose		HMX-2BP		R0.15~R2.5				○				◎	◎	B416 -417	B536 -537
	Radius	4	HMX-4R		Ø1.0~Ø12.0				○				◎	◎	B418 -419	B538
			HMX-4RBL/M/X		Ø4.0~Ø12.0				○				◎	◎	B420	B538
			HMX-4RF		Ø6.0~Ø12.0				○				◎	◎	B421	B538
			HMX-4RP		Ø6.0~Ø16.0				○				◎	◎	B422	B538
		6	HMX-6R-MAX		Ø6.0~Ø20.0				○				◎	◎	B423	B539
Machining titanium	Flattened	4	TM-4E		Ø6.0~Ø25.0	○		○				◎			B425	B541
	Ball nose		TM-4B		R3.0~R10.0	○		○				◎			B426	B540
	Radius		TM-4R		Ø6.0~Ø25.0	○		○				◎			B427 -429	B540
			TM-4RP		Ø8.0~Ø25.0	○		○				◎			B430	B540

◎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		Specification	Cutting parameters
													Below 55HRC	Above 55HRC		
Machining titanium	Radius	5	**TM-5R**		Ø6.0~Ø25.0	○		○				◎			B431 -432	B542
		6	**TM-6R**		Ø10.0~Ø25.0	○		○				◎			B433	B543
Copper machining	Flattened	2	**NM-2E**		Ø1.0~Ø12.0					◎	○				B435	B544
		4	**NM-4E**		Ø3.0~Ø12.0					◎	○				B436	B545
	Long neck flattened	2	**NM-2EP**		Ø0.5~Ø5.0					◎	○				B437	B546
	Ball nose		**NM-2B**		R0.5~R6.0					◎	○				B438	B547
	Long neck Ball nose		**NM-2BP**		R0.25~R2.5					◎	○				B439	B548
Machining aluminum	Flattened	2	**AL-2E**		Ø1.0~Ø20.0						◎				B441	B549
			AL-2EL		Ø3.0~Ø20.0						◎				B442	B549
		3	**AL-3E**		Ø1.0~Ø20.0						◎				B443	B550
			AL-3EL		Ø3.0~Ø20.0						◎				B444	B550
	Ball nose	2	**AL-2B**		R1.0~R6.0						◎				B445	B551
	Corrugated edge	3	**AL-3W**		Ø6.0~Ø20.0						◎				B446	B552
	Radius (Super high speed)	2	**AL-2R-AIR**		Ø6.0~Ø20.0						◎				B447	B553
			AL-2RL-AIR		Ø6.0~Ø20.0						◎				B448	B553
		3	**AL-3R-AIR**		Ø12.0~Ø20.0						◎				B449	B554
			AL-3RL-AIR		Ø12.0~Ø20.0						◎				B450	B554
	Flattened (Sharp edge)	2	**ALG-2E**		Ø1.0~Ø20.0						◎				B452	B555
		3	**ALG-3E**		Ø1.0~Ø20.0						◎				B453	B556
	Radius	2	**ALG-2R**		Ø1.0~Ø12.0						◎				B454	B557
		3	**ALG-3R**		Ø1.0~Ø12.0						◎				B455	B558
Machining of hard-to-cut materials	Flattened		**SM-3E**		Ø3.0~Ø20.0	◎		◎				○			B458	B559
		4	**VSM-4E** (Unequal pitch)		Ø4.0~Ø20.0	◎		◎				◎			B459	B560

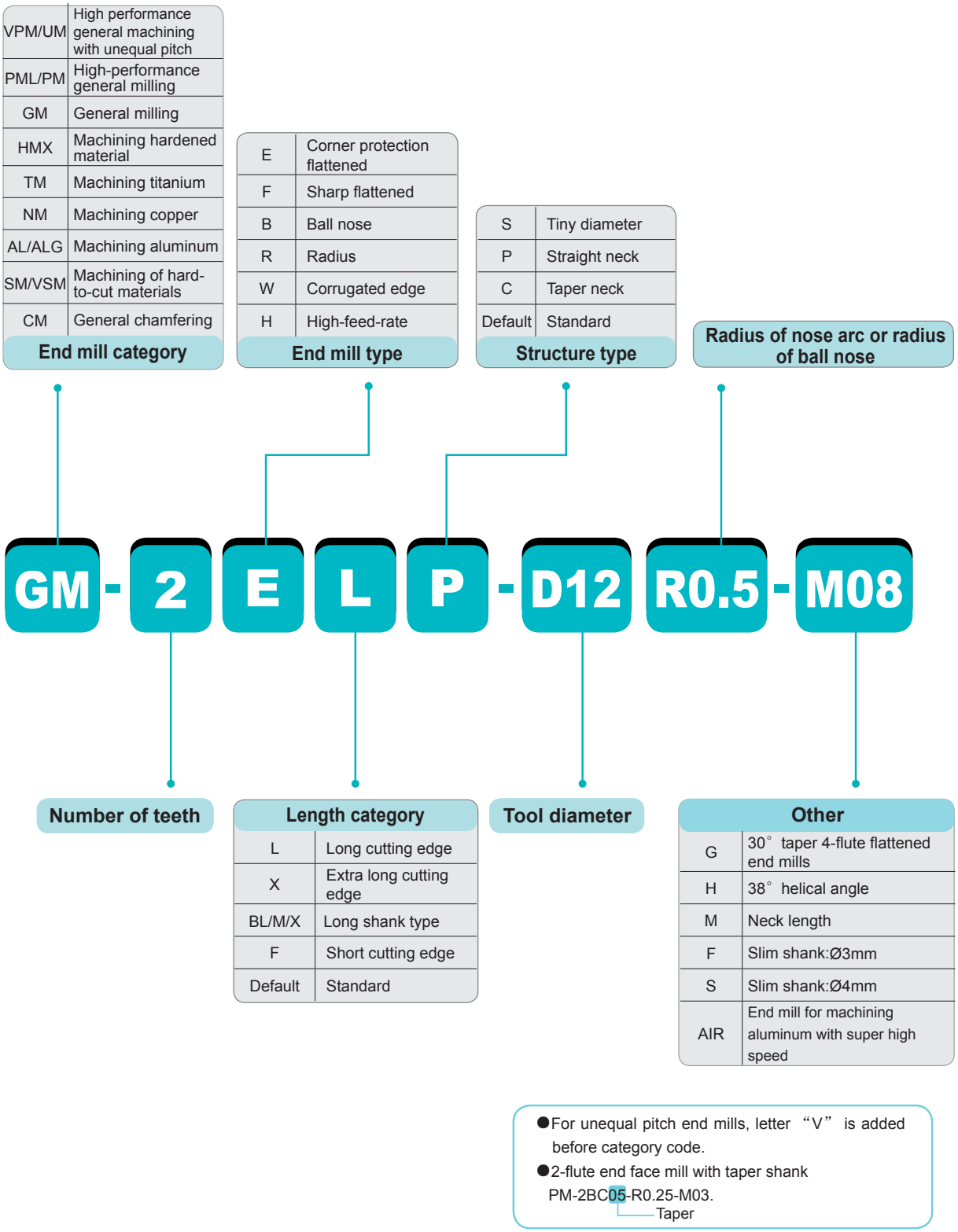
◎Very suitable ○Suitable

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	Specification	Cutting parameters
													Below 55HRC / Above 55HRC		
Machining of hard-to-cut materials	Flattened	4	**VSM-4EFP** (Unequal pitch)		Ø6.0~Ø16.0	◎		◎				◎		B460	B560
	Radius	4	**SM-4R**		Ø6.0~Ø12.0	◎		◎				○		B461	B561
		4	**VSM-4R** (Unequal pitch)		Ø6.0~Ø20.0	◎		◎				◎		B462	B562
		4	**VSM-4RFP** (Unequal pitch)		Ø6.0~Ø16.0	◎		◎				◎		B463	B562
Chamfering	Flattened	2	**CM-2E**		Ø3.0~Ø16.0	◎	◎	○	○	◎	◎	○	◎	B464	B563
		4	**CM-4E**		Ø3.0~Ø16.0	◎	◎	○	○	◎	◎	○	◎	B465	B564
High performance general milling	Flattened	4	**PM-4E**		Ø10~Ø32	◎	◎	○	◎			○	◎	B574	B590
	Ballnose	2/4	**PM-2B/4B**		R5.0~R16.0	◎	◎	○	◎			○	◎	B575	B590
	Radius	4	**PM-4R**		Ø10~Ø32	◎	◎	○	◎			○	◎	B576	B590
Machining high hardness steel	Flattened	4	**HMX-4E**		Ø10~Ø32				○				◎ ◎	B577	B590
	Ballnose	2/4	**HMX-2B/4B**		R5.0~R16.0				○				◎ ◎	B578	B590
	Radius	4	**HMX-4R**		Ø10~Ø32				○				◎ ◎	B579	B590
Economical general machining	Flattened	2	**XM-2E**		Ø10~Ø16	◎	◎	○	◎			○	◎	B580	B591
	Radius	2	**XM-2R**		Ø10~Ø16	◎	◎	○	◎			○	◎	B581	B591
	Ballnose	2	**XM-2B**		Ø5.0~Ø8.0	◎	◎	○	◎			○	◎	B582	B591
	Chamfer	2	**XM-2C**		Ø10~Ø16	◎	◎	○	◎			○	◎	B583	B591
	Arc chamfering	2	**XM-2CR**		Ø10~Ø16	◎	◎	○	◎			○	◎	B584	B591
	Deep-feed	2	**XM-2H**		Ø10~Ø16	◎	◎	○	◎			○	◎	B585	B591

◎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)

Coating of mills

Coating NaNo TiAlCrN	Super nanometer crystal TiAlCrN coating
Coating NaNo TiAlXN	Super crystal nano heat resistant TiAlN coatings
Coating NaNo TiAlN	Nano TiAlN coating
Coating TiAlN	TiAlN coating
Coating AlTiN	AlTiN coating
Coating CrN	CrN coating
Coating AlCrXN	AlCrXN coating
Coating NaNo ALCrXN	NaNo ALCrXN coating

End tooth type of mills

	2-flute flattened end mills		6-flute flattened end mills
	2-flute ball nose end mills		6-flute R end mills
	2-flute R end mills		2-flute flattened end mills
	3-flute flattened end mills		2-flute R end mills
	3-flute R end mills		2-flute ball mose end mills
	4-flute flattened end mills		2-flute chamfered end mills
	4-flute ball nose end mills		2-flute fillet end mills
	4-flute R end mills		2-flute high feed end mills
	5-flute R end mills		

Helical angle

β	β is helical angle: 30° ,35° ,38° ,45° ,55°

Cutting diameter tolerance

D D≤12 0~-0.020 12<D 0~-0.030	Cutting diameter tolerance

Radius tolerance of ball nose end mills

R R±0.01	Radius tolerance

Nose type

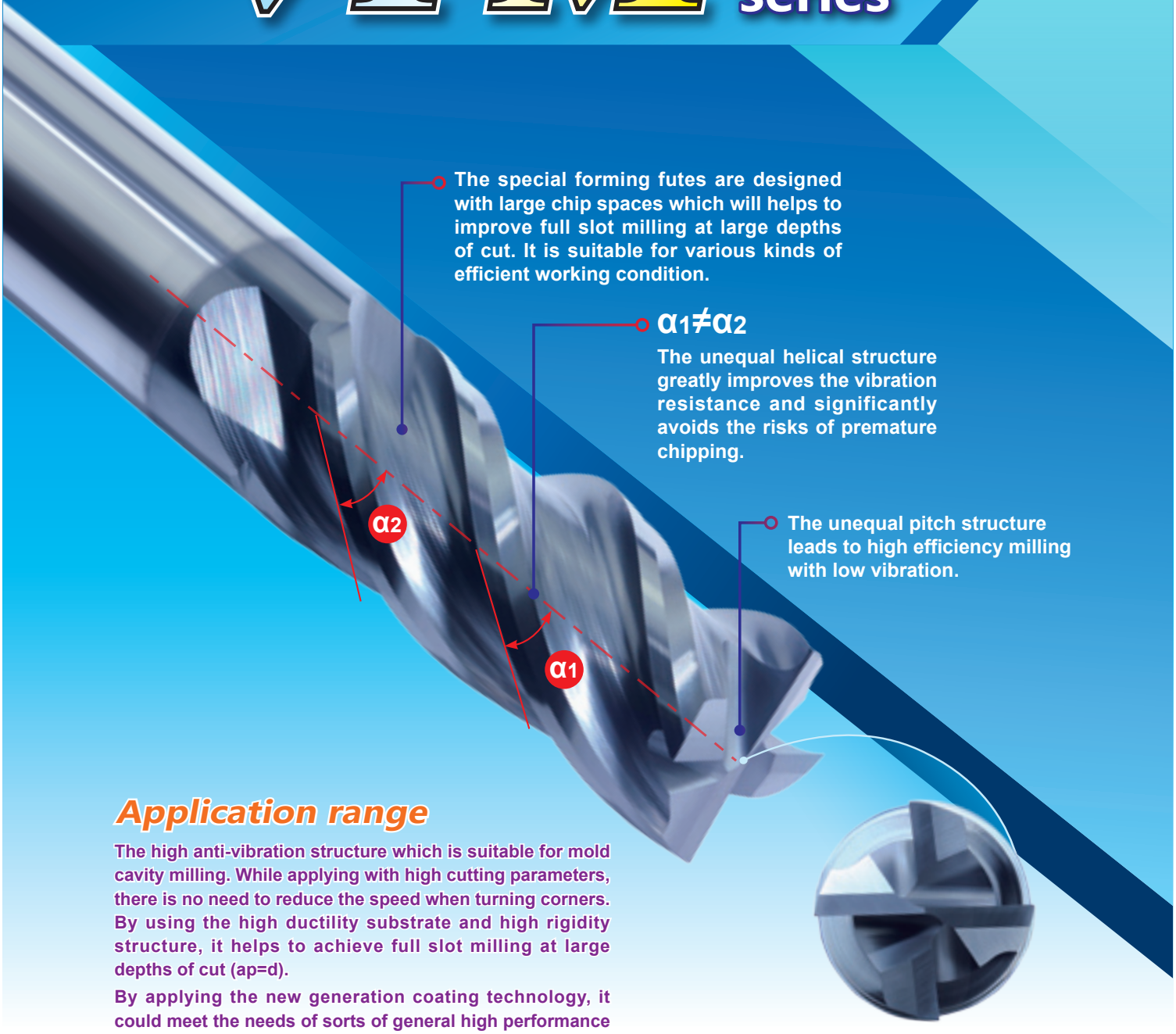
	Corner protection
	Sharp

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
Profiling	R end mills for profile machining
Chamfering	Chamfering
Centering hole processing	Centering hole processing

High Performance Endmills for General Machining

VPM series



The special forming futes are designed with large chip spaces which will helps to improve full slot milling at large depths of cut. It is suitable for various kinds of efficient working condition.

$\alpha_1 \neq \alpha_2$

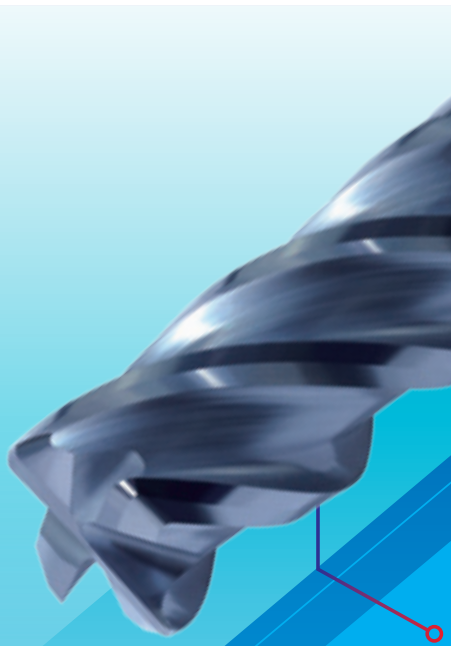
The unequal helical structure greatly improves the vibration resistance and significantly avoids the risks of premature chipping.

The unequal pitch structure leads to high efficiency milling with low vibration.

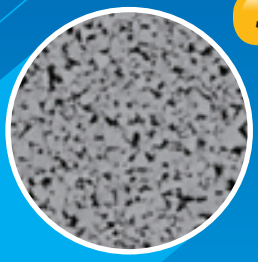
Application range

The high anti-vibration structure which is suitable for mold cavity milling. While applying with high cutting parameters, there is no need to reduce the speed when turning corners. By using the high ductility substrate and high rigidity structure, it helps to achieve full slot milling at large depths of cut (ap=d).

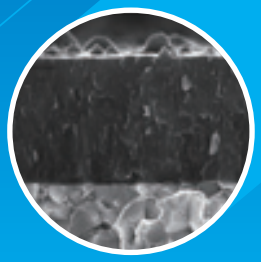
By applying the new generation coating technology, it could meet the needs of sorts of general high performance steel machining for dry and wet conditions.



Substrate and coating



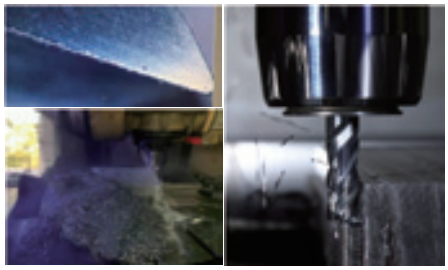
By selecting the substrate with high versatility and wear resistance, it offers better bending stiffness to meet efficient machining requirements.



Coating grades with lower friction coefficient, especially are suitable for machining carbon steel, mild steel, stainless steel and other viscous materials.

CASE 1

Cutting tool : VPM-4E-D8.0
Method: Side milling
Working piece material : 45#
Cutting parameters : Vc=190m/min , fz=0.08mm/z , ap=12mm , ae=2.4mm ,
CNC Machine type :
5-Axis Vertical Machining Center
Cooling method : Emulsion
Overhang : 24mm

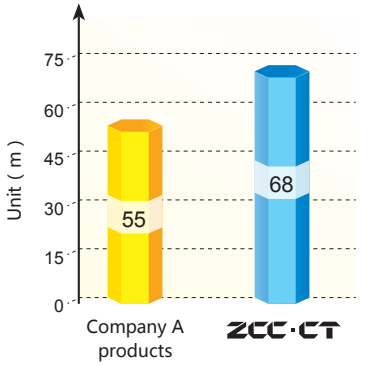


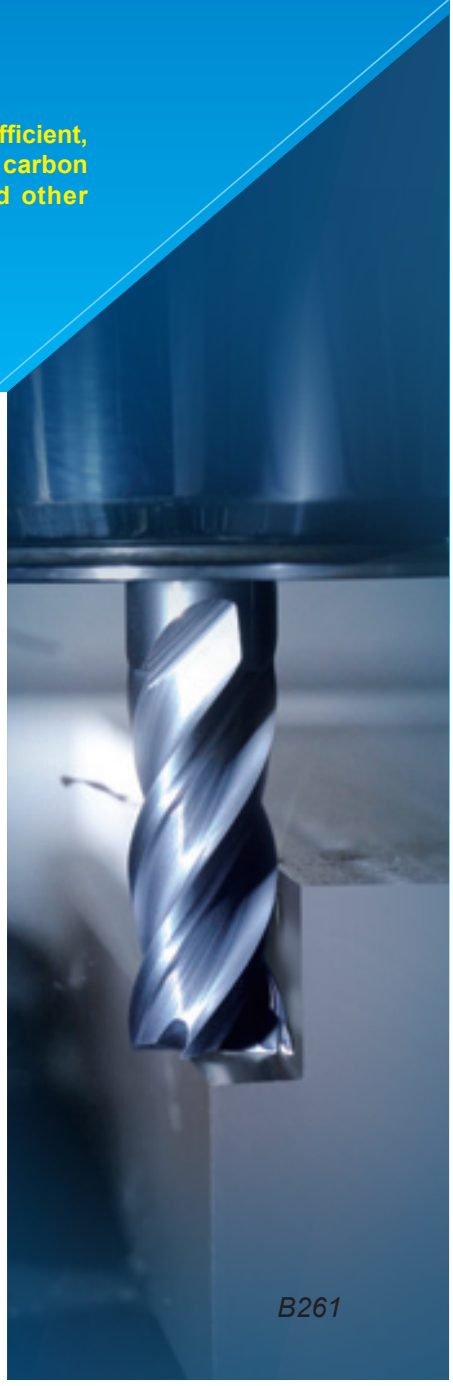
Test result: After processing 120 meters, the normal flank wear of our cutting tool reaches 0.039mm which can still work.

CASE 2

Cutting tool: VPM-4E-D8.0
Method: Slot milling
Working piece material: 45#
Cutting parameters: Vc=150m/min , fr=0.2mm/r , ap=8mm
CNC Machine type: 5-Axis Vertical Machining Center
Cooling method: Emulsion
Overhang : 24mm

Comparison on slot milling length





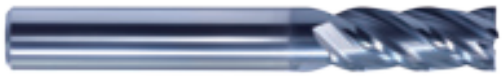
4-flute unequal pitch flattened end mill with straight shank


Side face

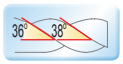

Step shoulder


Straight slot

VPM-4E



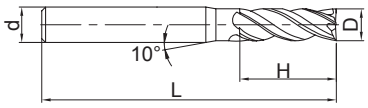
- Suitable for high-efficient machining of ordinary steel and cast iron.
- Differential helical angle and pitch design offer high vibration resistance.
- Suitable for machining of large depth and width of cut.



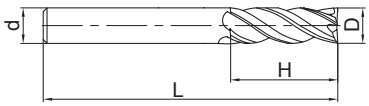








Picture 1



Picture 2

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

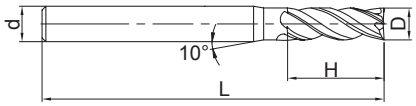
Code key B258
Graphics category and identification B259
Cutting parameters B466
Non-standard customization B570-B571

4-flute flattened endmills with long shank

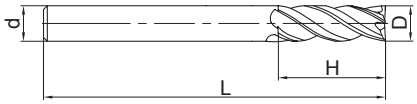


VPM-4EBL/X





Picture 1



Picture 2

● VPM-4E series with long shank.



Type	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	D	d	H	L			
VPM-4EBL-D3.0S	3.0	4	8	75	4	Picture 1	○
VPM-4EBL-D3.0	3.0	6	8	75	4	Picture 1	○
VPM-4EBL-D4.0S	4.0	4	11	75	4	Picture 2	○
VPM-4EBL-D4.0	4.0	6	11	75	4	Picture 1	○
VPM-4EBL-D5.0	5.0	6	13	75	4	Picture 1	○
VPM-4EBL-D6.0	6.0	6	16	75	4	Picture 2	○
VPM-4EBX-D6.0	6.0	6	16	100	4	Picture 2	○
VPM-4EBL-D8.0	8.0	8	20	75	4	Picture 2	○
VPM-4EBX-D8.0	8.0	8	20	100	4	Picture 2	○
VPM-4EBL-D10.0	10.0	10	25	100	4	Picture 2	○
VPM-4EBL-D12.0	12.0	12	30	100	4	Picture 2	○
VPM-4EBL-D16.0	16.0	16	45	150	4	Picture 2	○
VPM-4EBL-D20.0	20.0	20	45	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 B258
Graphics category and identification B259
Cutting parameters B466
Non-standard customization B570-B571

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

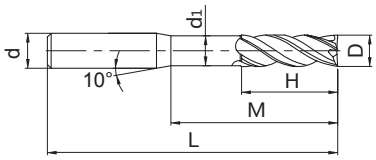

Side face


Step shoulder

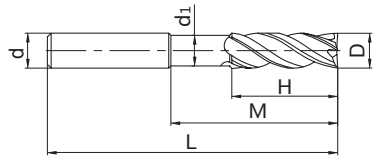

Straight slot

VPM-4EFP



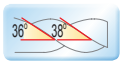


Picture 1



Picture 2

- Suitable for high-efficient machining of ordinary steel and cast iron.
- Differential helical angle and pitch design offer high vibration resistance.
- Suitable for machining of large depth and width of cut.









Type	Basic dimension(mm)						Number of teeth Z	Geometry	Stock
	D	d	H	M	d_1	L			
VPM-4EFP-D3.0S	3.0	4	4.5	15	2.8	75	4	Picture 1	○
VPM-4EFP-D3.0	3.0	6	4.5	15	2.8	75	4	Picture 1	○
VPM-4EFP-D4.0S	4.0	4	6.0	20	3.8	75	4	Picture 2	○
VPM-4EFP-D4.0	4.0	6	6.0	20	3.8	75	4	Picture 1	○
VPM-4EFP-D5.0	5.0	6	8.0	25	4.8	75	4	Picture 1	○
VPM-4EFP-D6.0	6.0	6	9.0	30	5.8	75	4	Picture 2	○
VPM-4EFP-D8.0	8.0	8	12.0	40	7.8	100	4	Picture 2	○
VPM-4EFP-D10.0	10.0	10	15.0	50	9.5	100	4	Picture 2	○
VPM-4EFP-D12.0	12.0	12	18.0	50	11.5	100	4	Picture 2	○
VPM-4EFP-D16.0	16.0	16	24.0	60	15.5	150	4	Picture 2	○
VPM-4EFP-D20.0	20.0	20	30.0	60	19.5	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						
◎	◎	◎	◎	○			◎				

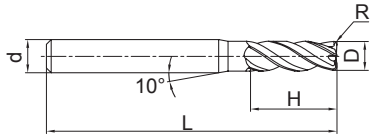
Code key B258
Graphics category and identification B259
Cutting parameters B466
Non-standard customization B570-B571

4-flute unequal pitch radius end mill with straight shank

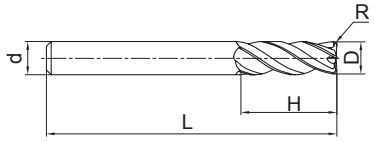
Radius shoulder Profile Radius corner slot

VPM-4R



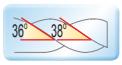


Picture 1



Picture 2

- Suitable for high-efficient machining of ordinary steel and cast iron.
- Differential helical angle and pitch design offer high vibration resistance.
- Suitable for machining of large depth and width of cut.









Type	Basic dimension(mm)					Number of teeth Z	Geometry	Stock
	D	R	d	H	L			
VPM-4R-D3.0R0.2S	3.0	0.2	4	8	50	4	Picture 1	●
VPM-4R-D3.0R0.2	3.0	0.2	6	8	50	4	Picture 1	●
VPM-4R-D3.0R0.3S	3.0	0.3	4	8	50	4	Picture 1	●
VPM-4R-D3.0R0.3	3.0	0.3	6	8	50	4	Picture 1	●
VPM-4R-D4.0R0.2S	4.0	0.2	4	11	50	4	Picture 2	●
VPM-4R-D4.0R0.2	4.0	0.2	6	11	50	4	Picture 1	●
VPM-4R-D4.0R0.3S	4.0	0.3	4	11	50	4	Picture 2	●
VPM-4R-D4.0R0.3	4.0	0.3	6	11	50	4	Picture 1	●
VPM-4R-D4.0R0.5S	4.0	0.5	4	11	50	4	Picture 2	●
VPM-4R-D4.0R0.5	4.0	0.5	6	11	50	4	Picture 1	●
VPM-4R-D5.0R0.3	5.0	0.3	6	13	50	4	Picture 1	●
VPM-4R-D5.0R0.5	5.0	0.5	6	13	50	4	Picture 1	●
VPM-4R-D5.0R1.0	5.0	1.0	6	13	50	4	Picture 1	●
VPM-4R-D6.0R0.3	6.0	0.3	6	16	50	4	Picture 2	●
VPM-4R-D6.0R0.5	6.0	0.5	6	16	50	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						
◎	◎	◎	◎	○			◎				

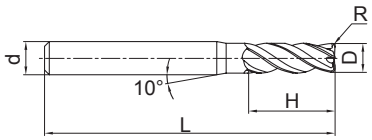
Code key B258 Graphics category and identification B259 Cutting parameters B467 Non-standard customization B570-B571

4-flute unequal pitch R end mill with straight shank

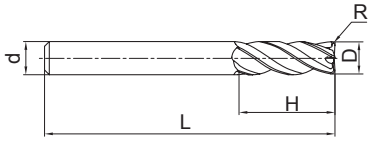
Radius shoulder | Profile | Radius corner slot

VPM-4R





Picture 1



Picture 2

- Suitable for high-efficient machining of ordinary steel and cast iron.
- Differential helical angle and pitch design offer high vibration resistance.
- Suitable for machining of large depth and width of cut.



Type	Basic dimension(mm)					Number of teeth Z	Geometry	Stock
	D	R	d	H	L			
VPM-4R-D6.0R1.0	6.0	1.0	6	16	50	4	Picture 2	●
VPM-4R-D8.0R0.3	8.0	0.3	8	20	60	4	Picture 2	●
VPM-4R-D8.0R0.5	8.0	0.5	8	20	60	4	Picture 2	●
VPM-4R-D8.0R1.0	8.0	1.0	8	20	60	4	Picture 2	●
VPM-4R-D10.0R0.3	10.0	0.3	10	25	75	4	Picture 2	●
VPM-4R-D10.0R0.5	10.0	0.5	10	25	75	4	Picture 2	●
VPM-4R-D10.0R1.0	10.0	1.0	10	25	75	4	Picture 2	●
VPM-4R-D10.0R1.5	10.0	1.5	10	25	75	4	Picture 2	●
VPM-4R-D10.0R2.0	10.0	2.0	10	25	75	4	Picture 2	●
VPM-4R-D12.0R0.3	12.0	0.3	12	30	75	4	Picture 2	●
VPM-4R-D12.0R0.5	12.0	0.5	12	30	75	4	Picture 2	●
VPM-4R-D12.0R1.0	12.0	1.0	12	30	75	4	Picture 2	●
VPM-4R-D12.0R1.5	12.0	1.5	12	30	75	4	Picture 2	●
VPM-4R-D12.0R2.0	12.0	2.0	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						
◎	◎	◎	◎	○			◎				

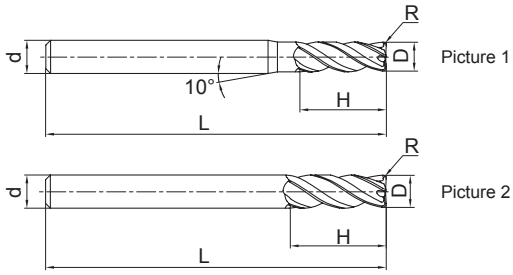
Code key B258 | Graphics category and identification B259 | Cutting parameters B467 | Non-standard customization B570-B571

4-flute radius endmills with long shank

Radius shoulder | Profile | Radius corner slot

VPM-4RBL/X





● VPM-4R series with long shank.



Type	Basic dimension(mm)					Number of teeth Z	Geometry	Stock
	D	R	d	H	L			
VPM-4RBL-D3.0R0.2S	3.0	0.2	4	8	75	4	Picture 1	○
VPM-4RBL-D3.0R0.2	3.0	0.2	6	8	75	4	Picture 1	○
VPM-4RBL-D3.0R0.3S	3.0	0.3	4	8	75	4	Picture 1	○
VPM-4RBL-D3.0R0.3	3.0	0.3	6	8	75	4	Picture 1	○
VPM-4RBL-D4.0R0.2S	4.0	0.2	4	11	75	4	Picture 2	○
VPM-4RBL-D4.0R0.2	4.0	0.2	6	11	75	4	Picture 1	○
VPM-4RBL-D4.0R0.3S	4.0	0.3	4	11	75	4	Picture 2	○
VPM-4RBL-D4.0R0.3	4.0	0.3	6	11	75	4	Picture 1	○
VPM-4RBL-D4.0R0.5S	4.0	0.5	4	11	75	4	Picture 2	○
VPM-4RBL-D4.0R0.5	4.0	0.5	6	11	75	4	Picture 1	○
VPM-4RBL-D6.0R0.3	6.0	0.3	6	16	75	4	Picture 2	○
VPM-4RBL-D6.0R0.5	6.0	0.5	6	16	75	4	Picture 2	○
VPM-4RBL-D6.0R1.0	6.0	1.0	6	16	75	4	Picture 2	○
VPM-4RBX-D6.0R0.3	6.0	0.3	6	16	100	4	Picture 2	○
VPM-4RBX-D6.0R0.5	6.0	0.5	6	16	100	4	Picture 2	○
VPM-4RBX-D6.0R1.0	6.0	1.0	6	16	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						
◎	◎	◎	◎	○			◎				

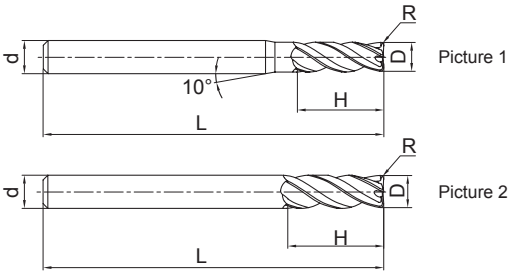
Code key B258 | Graphics category and identification B259 | Cutting parameters B467 | Non-standard customization B570-B571

4-flute radius endmills with long shank

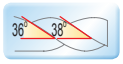
Radius shoulder Profile Radius corner slot

VPM-4RBL/X





● VPM-4R series with long shank.









Type	Basic dimension(mm)					Number of teeth Z	Geometry	Stock
	D	R	d	H	L			
VPM-4RBL-D8.0R0.3	8.0	0.3	8	20	75	4	Picture 2	○
VPM-4RBL-D8.0R0.5	8.0	0.5	8	20	75	4	Picture 2	○
VPM-4RBL-D8.0R1.0	8.0	1.0	8	20	75	4	Picture 2	○
VPM-4RBX-D8.0R0.3	8.0	0.3	8	20	100	4	Picture 2	○
VPM-4RBX-D8.0R0.5	8.0	0.5	8	20	100	4	Picture 2	○
VPM-4RBX-D8.0R1.0	8.0	1.0	8	20	100	4	Picture 2	○
VPM-4RBL-D10.0R0.3	10.0	0.3	10	25	100	4	Picture 2	○
VPM-4RBL-D10.0R0.5	10.0	0.5	10	25	100	4	Picture 2	○
VPM-4RBL-D10.0R1.0	10.0	1.0	10	25	100	4	Picture 2	○
VPM-4RBL-D10.0R1.5	10.0	1.5	10	25	100	4	Picture 2	○
VPM-4RBL-D10.0R2.0	10.0	2.0	10	25	100	4	Picture 2	○
VPM-4RBL-D12.0R0.3	12.0	0.3	12	30	100	4	Picture 2	○
VPM-4RBL-D12.0R0.5	12.0	0.5	12	30	100	4	Picture 2	○
VPM-4RBL-D12.0R1.0	12.0	1.0	12	30	100	4	Picture 2	○
VPM-4RBL-D12.0R1.5	12.0	1.5	12	30	100	4	Picture 2	○
VPM-4RBL-D12.0R2.0	12.0	2.0	12	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						
◎	◎	◎	◎	○			◎				

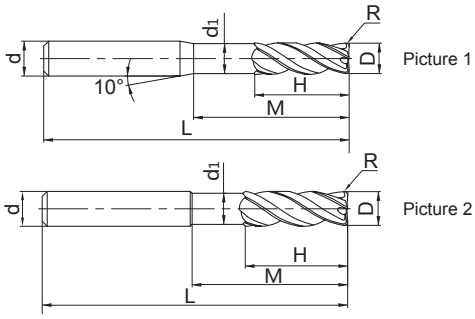
Code key B258 Graphics category and identification B259 Cutting parameters B467 Non-standard customization B570-B571

4-flute long neck and short cutting edge unequal pitch R end mill with straight shank

Radius shoulder Profile Radius corner slot

VPM-4RFP





- Suitable for high-efficient machining of ordinary steel and cast iron.
- Differential helical angle and pitch design offer high vibration resistance.
- Suitable for machining of large depth and width of cut.

36° 38° | Coated AlCrXN | D D≤12 0~-0.02 12<D 0~-0.03

Type	Basic dimension(mm)							Number of teeth Z	Geometry	Stock
	D	R	d	H	M	d_1	L			
VPM-4RFP-D3.0R0.2S	3.0	0.2	4	3	9	2.8	75	4	Picture 1	○
VPM-4RFP-D3.0R0.2	3.0	0.2	6	3	9	2.8	75	4	Picture 1	○
VPM-4RFP-D3.0R0.3S	3.0	0.3	4	3	9	2.8	75	4	Picture 1	○
VPM-4RFP-D3.0R0.3	3.0	0.3	6	3	9	2.8	75	4	Picture 1	○
VPM-4RFP-D4.0R0.2S	4.0	0.2	4	4	12	3.8	75	4	Picture 2	○
VPM-4RFP-D4.0R0.2	4.0	0.2	6	4	12	3.8	75	4	Picture 1	○
VPM-4RFP-D4.0R0.3S	4.0	0.3	4	4	12	3.8	75	4	Picture 2	○
VPM-4RFP-D4.0R0.3	4.0	0.3	6	4	12	3.8	75	4	Picture 1	○
VPM-4RFP-D4.0R0.5S	4.0	0.5	4	4	12	3.8	75	4	Picture 2	○
VPM-4RFP-D4.0R0.5	4.0	0.5	6	4	12	3.8	75	4	Picture 1	○
VPM-4RFP-D6.0R0.3	6.0	0.3	6	6	18	5.8	75	4	Picture 2	○
VPM-4RFP-D6.0R0.5	6.0	0.5	6	6	18	5.8	75	4	Picture 2	○
VPM-4RFP-D6.0R1.0	6.0	1.0	6	6	18	5.8	75	4	Picture 2	○
VPM-4RFP-D8.0R0.3	8.0	0.3	8	8	24	7.8	75	4	Picture 2	○
VPM-4RFP-D8.0R0.5	8.0	0.5	8	8	24	7.8	75	4	Picture 2	○
VPM-4RFP-D8.0R1.0	8.0	1.0	8	8	24	7.8	75	4	Picture 2	○
VPM-4RFP-D10.0R0.3	10.0	0.3	10	10	30	9.5	100	4	Picture 2	○
VPM-4RFP-D10.0R0.5	10.0	0.5	10	10	30	9.5	100	4	Picture 2	○
VPM-4RFP-D10.0R1.0	10.0	1.0	10	10	30	9.5	100	4	Picture 2	○
VPM-4RFP-D10.0R1.5	10.0	1.5	10	10	30	9.5	100	4	Picture 2	○
VPM-4RFP-D10.0R2.0	10.0	2.0	10	10	30	9.5	100	4	Picture 2	○
VPM-4RFP-D12.0R0.3	12.0	0.3	12	12	36	11.5	100	4	Picture 2	○
VPM-4RFP-D12.0R0.5	12.0	0.5	12	12	36	11.5	100	4	Picture 2	○
VPM-4RFP-D12.0R1.0	12.0	1.0	12	12	36	11.5	100	4	Picture 2	○
VPM-4RFP-D12.0R1.5	12.0	1.5	12	12	36	11.5	100	4	Picture 2	○
VPM-4RFP-D12.0R2.0	12.0	2.0	12	12	36	11.5	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 B258 Graphics category and identification B259 Cutting parameters B467 Non-standard customization B570-B571

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.



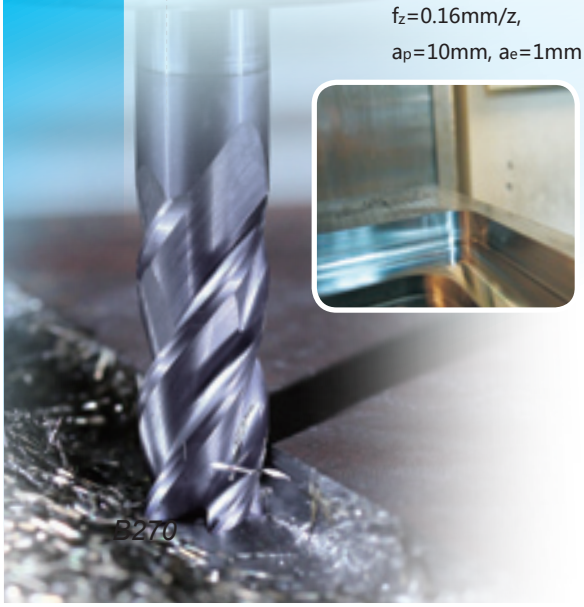
Application range:

Suitable for high effectively machining of cast iron, carbon, alloy steel, pre-hardened steel, quenched and tempered steel, hardened steel under HRC55, ect.

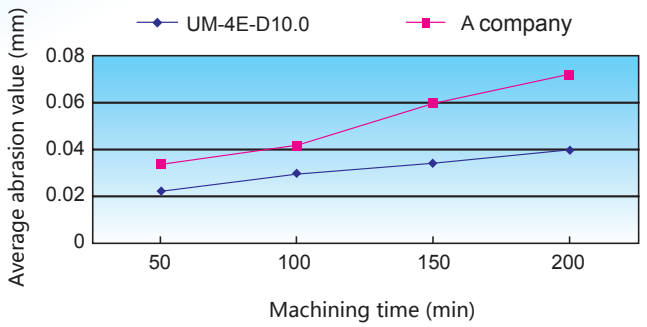
Excellent machining stability under weak rigidity working condition such as thin-walled parts, parts corner, large overhang, etc.

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

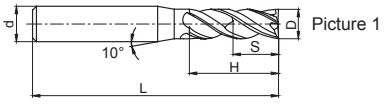


4-flute unequal pitch flattened end mill with straight shan

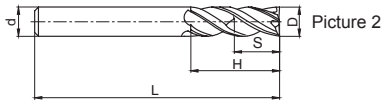
Side face | Step shoulder | Straight slot

UM-4E





Picture 1



Picture 2

38°,41° | Coated AlTiN | D D≤12 0~-0.020 12<D 0~-0.030

Type	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	10.50	60	4	Picture 1	○
UM-4E-D8.0	8.0	8	20	12.00	60	4	Picture 2	○
UM-4E-D9.0	9.0	10	22	13.50	75	4	Picture 1	○
UM-4E-D10.0	10.0	10	25	15.00	75	4	Picture 2	○
UM-4E-D11.0	11.0	12	26	16.50	75	4	Picture 1	○
UM-4E-D12.0	12.0	12	30	18.00	75	4	Picture 2	○
UM-4E-D14.0	14.0	14	32	21.00	75	4	Picture 2	○
UM-4E-D16.0	16.0	16	45	24.00	100	4	Picture 2	○
UM-4E-D18.0	18.0	18	45	27.00	100	4	Picture 2	○
UM-4E-D20.0	20.0	20	45	30.00	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						
◎	◎	◎	◎	◎		○	◎			○	○

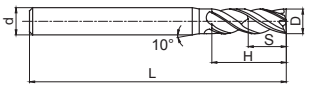
Code key B258 | Graphics category and identification B259 | Cutting parameters B468-B469 | Non-standard customization B570-B571

4-flute long cutting edge and unequal pitch flattened end mill with straight shank

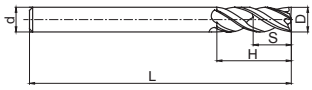


UM-4EL



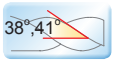


Picture 1



Picture 2

● UM-4E series with long cutting edge.









Type	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	12.00	100	4	Picture 2	○
UM-4EL-D10.0	10.0	10	30	15.00	100	4	Picture 2	○
UM-4EL-D12.0	12.0	12	35	18.00	100	4	Picture 2	○
UM-4EL-D14.0	14.0	14	40	21.00	100	4	Picture 2	○
UM-4EL-D16.0	16.0	16	50	24.00	150	4	Picture 2	○
UM-4EL-D20.0	20.0	20	55	30.00	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 B258
Graphics category and identification B259
Cutting parameters B468-B469
Non-standard customization B570-B571

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

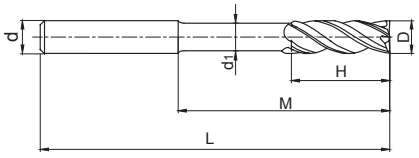

Side face

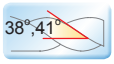

Step shoulder


Straight slot

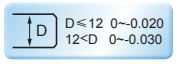
UM-4EFP













Type	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						
◎	◎	◎	◎	◎		○	◎			○	○

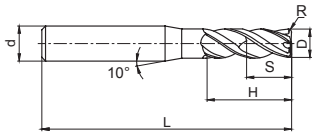
Code key B258 Graphics category and identification B259 Cutting parameters B470-B471 Non-standard customization B570-B571

4-flute unequal pitch R end mill with straight shank

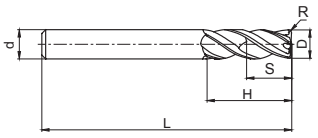
Radius shoulder | Profile | Radius corner slot

UM-4R





Picture 1



Picture 2

38°,41° | Coated AlTiN | D D≤12 0~-0.020 12<D 0~-0.030

Type	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	12.0	60	4	Picture 2	○
UM-4R-D8.0R1.0	8.0	1.0	8	20	12.0	60	4	Picture 2	○
UM-4R-D10.0R0.5	10.0	0.5	10	25	15.0	75	4	Picture 2	○
UM-4R-D10.0R1.0	10.0	1.0	10	25	15.0	75	4	Picture 2	○
UM-4R-D10.0R2.0	10.0	2.0	10	25	15.0	75	4	Picture 2	○
UM-4R-D10.0R3.0	10.0	3.0	10	25	15.0	75	4	Picture 2	○
UM-4R-D12.0R0.5	12.0	0.5	12	30	18.0	75	4	Picture 2	○
UM-4R-D12.0R1.0	12.0	1.0	12	30	18.0	75	4	Picture 2	○
UM-4R-D12.0R2.0	12.0	2.0	12	30	18.0	75	4	Picture 2	○
UM-4R-D12.0R3.0	12.0	3.0	12	30	18.0	75	4	Picture 2	○
UM-4R-D16.0R1.0	16.0	1.0	16	45	24.0	100	4	Picture 2	○
UM-4R-D16.0R2.0	16.0	2.0	16	45	24.0	100	4	Picture 2	○
UM-4R-D16.0R3.0	16.0	3.0	16	45	24.0	100	4	Picture 2	○
UM-4R-D20.0R1.0	20.0	1.0	20	45	30.0	100	4	Picture 2	○
UM-4R-D20.0R2.0	20.0	2.0	20	45	30.0	100	4	Picture 2	○
UM-4R-D20.0R3.0	20.0	3.0	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						
◎	◎	◎	◎	◎		○	◎			○	○

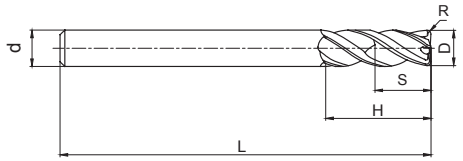
Code key B258 | Graphics category and identification B259 | Cutting parameters B472-B473 | Non-standard customization B570-B571

4-flute long cutting edge and unequal pitch R end mill with straight shank

Radius shoulder Profile Radius corner slot

UM-4RL





● UM-4R series with cutting edge.

38°,41° Coated AlTiN D D≤12 0~-0.020 12<D 0~-0.030

Type	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	9.0	75	4	○
UM-4RL-D6.0R1.0	6.0	1.0	6	16	9.0	75	4	○
UM-4RL-D8.0R0.5	8.0	0.5	8	20	12.0	100	4	○
UM-4RL-D8.0R1.0	8.0	1.0	8	20	12.0	100	4	○
UM-4RL-D10.0R0.5	10.0	0.5	10	25	15.0	100	4	○
UM-4RL-D10.0R1.0	10.0	1.0	10	25	15.0	100	4	○
UM-4RL-D10.0R2.0	10.0	2.0	10	25	15.0	100	4	○
UM-4RL-D12.0R0.5	12.0	0.5	12	30	18.0	100	4	○
UM-4RL-D12.0R1.0	12.0	1.0	12	30	18.0	100	4	○
UM-4RL-D12.0R2.0	12.0	2.0	12	30	18.0	100	4	○
UM-4RL-D16.0R1.0	16.0	1.0	16	45	24.0	150	4	○
UM-4RL-D16.0R2.0	16.0	2.0	16	45	24.0	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						
◎	◎	◎	◎	◎		○	◎			○	○

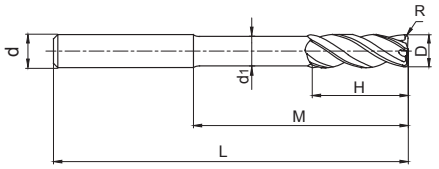
Code key B258 Graphics category and identification B259 Cutting parameters B472-B473 Non-standard customization B570-B571

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≤12 0~-0.020 12<D 0~-0.030

Type	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						
◎	◎	◎	◎	◎		○	◎			○	○

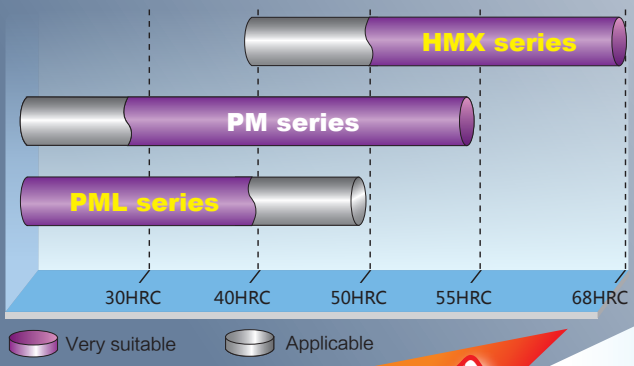
Code key B258 | Graphics category and identification B259 | Cutting parameters B474 | Non-standard customization B570-B571

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!

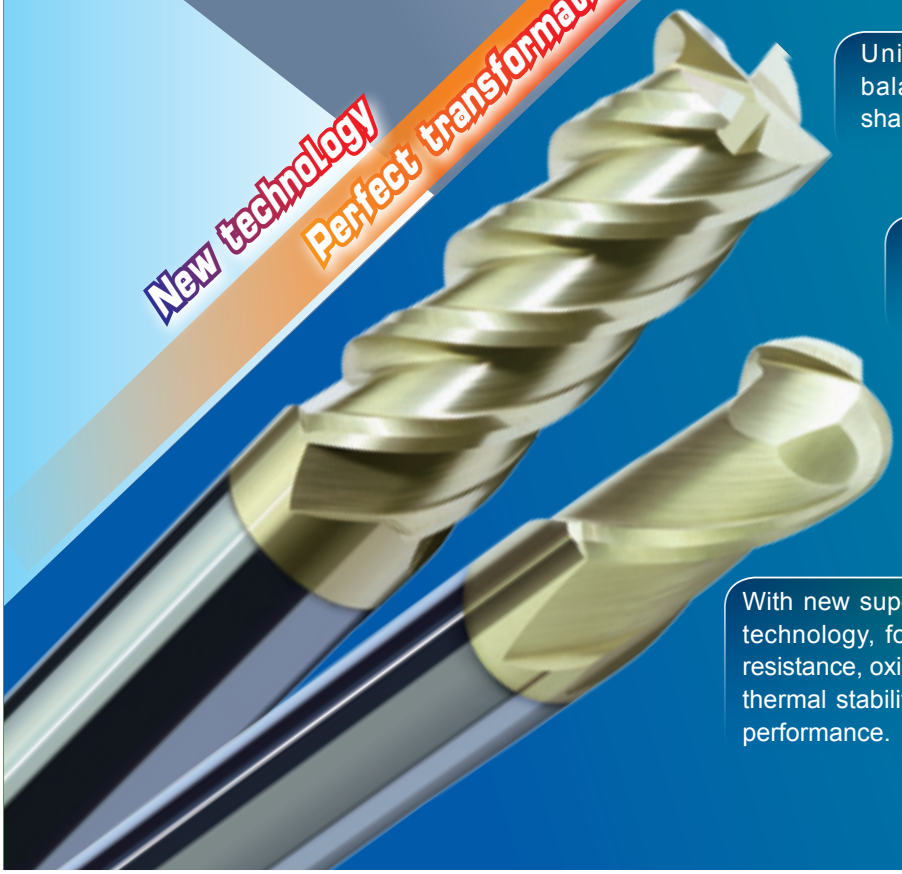
PML, **PM**, **HMX** high performance solid carbide endmills series
Recommendation for steel materials machining application



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.

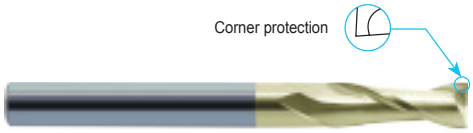
With new superlattice coatings technology, for excellent wear resistance, oxidation resistance, thermal stability and lubrication performance.

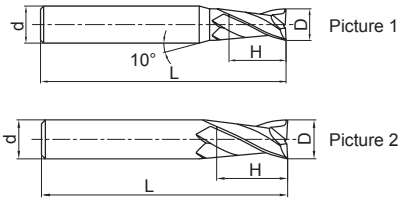


2-flute flattened end mills with straight shank



PML-2E





- Very suitable for slot milling.
- Wide application.



Type	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-D1.0	1.0	6	3	50	2	Picture 1	●
PML-2E-D1.5S	1.5	4	4	50	2	Picture 1	●
PML-2E-D1.5	1.5	6	4	50	2	Picture 1	●
PML-2E-D2.0S	2.0	4	6	50	2	Picture 1	●
PML-2E-D2.0	2.0	6	6	50	2	Picture 1	●
PML-2E-D2.5S	2.5	4	8	50	2	Picture 1	●
PML-2E-D2.5	2.5	6	8	50	2	Picture 1	●
PML-2E-D3.0S	3.0	4	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-D4.0S	4.0	4	11	50	2	Picture 2	●
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 B258
Graphics category and identification B259
Cutting parameters B475
Non-standard customization B570-B571

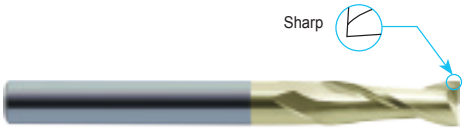
2-flute flattened end mills with straight shank

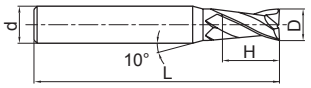

Side face


Step shoulder

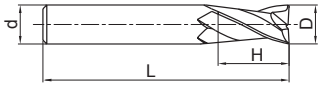

Straight slot

PML-2F



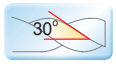


Picture 1



Picture 2

- Very suitable for slot milling.
- Wide application.









Type	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-D1.0	1.0	6	3	50	2	Picture 1	○
PML-2F-D1.5S	1.5	4	4	50	2	Picture 1	○
PML-2F-D1.5	1.5	6	4	50	2	Picture 1	○
PML-2F-D2.0S	2.0	4	6	50	2	Picture 1	○
PML-2F-D2.0	2.0	6	6	50	2	Picture 1	○
PML-2F-D2.5S	2.5	4	8	50	2	Picture 1	○
PML-2F-D2.5	2.5	6	8	50	2	Picture 1	○
PML-2F-D3.0S	3.0	4	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-D4.0S	4.0	4	11	50	2	Picture 2	○
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

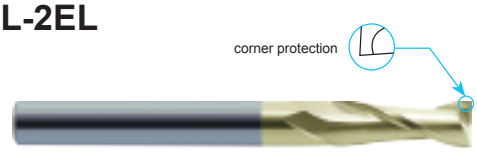
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	○			○	◎			○	○

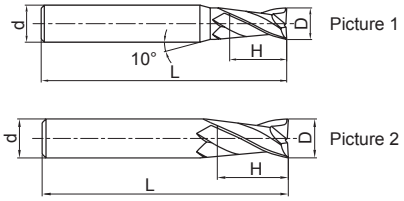
Code key B258 Graphics category and identification B259 Cutting parameters B476 Non-standard customization B570-B571

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



PML-2EL





● PML-2E series with long cutting edge.



Type	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 B258
Graphics category and identification B259
Cutting parameters B475
Non-standard customization B570-B571

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

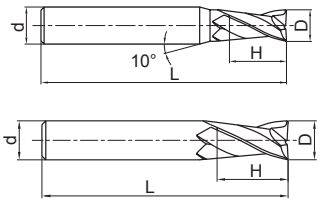

Side face

Step shoulder

Straight slot

PML-2FL





- PML-2F series with long cutting edge.



Type	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	○
PML-2FL-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 B258
Graphics category and identification B259
Cutting parameters B476
Non-standard customization B570-B571

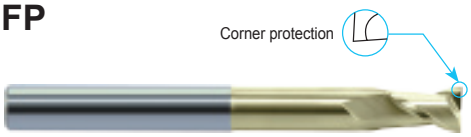
2-flute flattened end mills with straight shank, long neck and short cutting edge

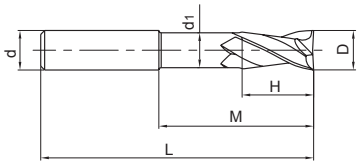

Side face


Step shoulder

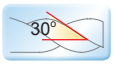

Straight slot

PML-2EFP





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









Type	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

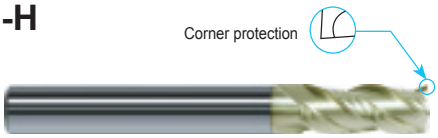
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	○			○	◎			○	○

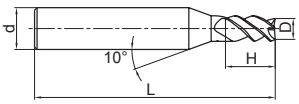
Code key B258
Graphics category and identification B259
Cutting parameters B477
Non-standard customization B570-B571

3-flute flattened end mills with straight shank

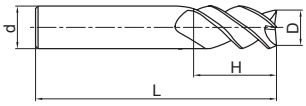


PML-3E-H



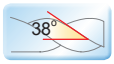


Picture 1



Picture 2

- Especially suitable for slot milling.
- Wide application.









Type	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-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-D4.0S-H	4.0	4	11	50	3	Picture 2	○
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 B258 Graphics category and identification B259 Cutting parameters B478 Non-standard customization B570-B571

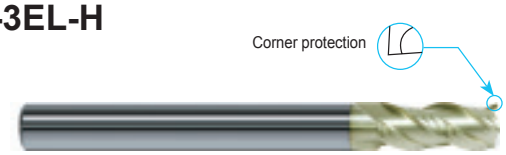
3-flute flattened end mills with straight shank and long cutting edge

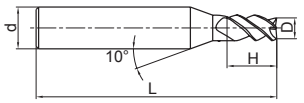

Side face


Step shoulder

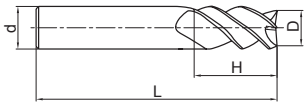

Straight slot

PML-3EL-H



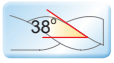


Picture 1

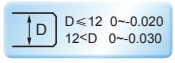


Picture 2

● PML-3E-H series with long shank.









Type	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 B258
Graphics category and identification B259
Cutting parameters B478
Non-standard customization B570-B571

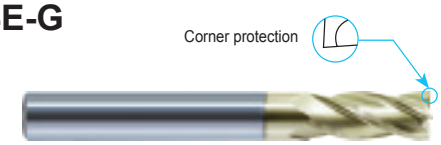
4-flute flattened end mills with straight shank

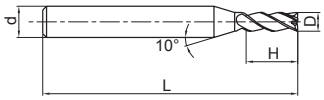

Side face


Step shoulder

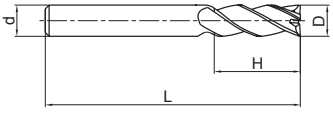

Straight slot

PML-4E-G



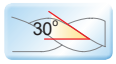


Picture 1



Picture 2

● Very suitable for side milling. ● Wide application.









Type	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-D1.0-G	1.0	6	3	50	4	Picture 1	●
PML-4E-D1.5S-G	1.5	4	4	50	4	Picture 1	●
PML-4E-D1.5-G	1.5	6	4	50	4	Picture 1	●
PML-4E-D2.0S-G	2.0	4	6	50	4	Picture 1	●
PML-4E-D2.0-G	2.0	6	6	50	4	Picture 1	●
PML-4E-D2.5S-G	2.5	4	8	50	4	Picture 1	●
PML-4E-D2.5-G	2.5	6	8	50	4	Picture 1	●
PML-4E-D3.0S-G	3.0	4	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-D4.0S-G	4.0	4	11	50	4	Picture 2	●
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

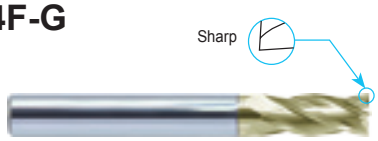
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	○			○	◎			○	○

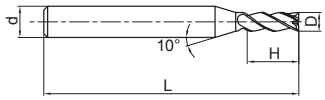
Code key B258 Graphics category and identification B259 Cutting parameters B479-B480 Non-standard customization B570-B571

4-flute flattened end mills with straight shank

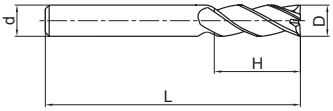


PML-4F-G



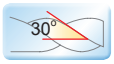


Picture 1

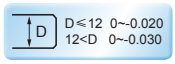


Picture 2

● Very suitable for side milling. ● Wide application.









Type	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-D1.0-G	1.0	6	3	50	4	Picture 1	○
PML-4F-D1.5S-G	1.5	4	4	50	4	Picture 1	○
PML-4F-D1.5-G	1.5	6	4	50	4	Picture 1	○
PML-4F-D2.0S-G	2.0	4	6	50	4	Picture 1	○
PML-4F-D2.0-G	2.0	6	6	50	4	Picture 1	○
PML-4F-D2.5S-G	2.5	4	8	50	4	Picture 1	○
PML-4F-D2.5-G	2.5	6	8	50	4	Picture 1	○
PML-4F-D3.0S-G	3.0	4	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-D4.0S-G	4.0	4	11	50	4	Picture 2	○
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

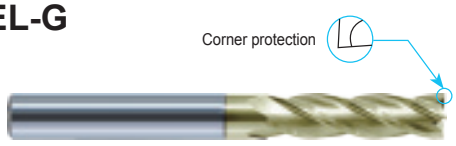
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	○			○	◎			○	○

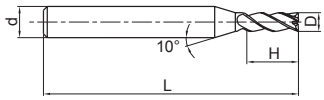
Code key B258
Graphics category and identification B259
Cutting parameters B481-B482
Non-standard customization B570-B571

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

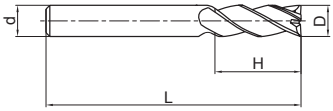
Side face | Step shoulder | Straight slot

PML-4EL-G



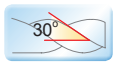


Picture 1



Picture 2

● PML-4E-G series with long cutting edge.









Type	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

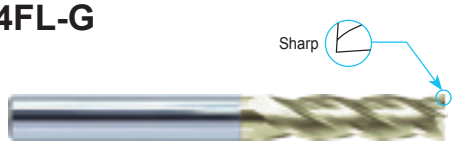
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	○			○	◎			○	○

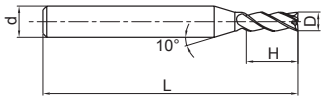
Code key B258 | Graphics category and identification B259 | Cutting parameters B479-B480 | Non-standard customization B570-B571

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

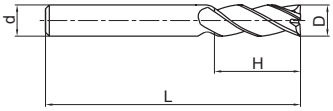


PML-4FL-G



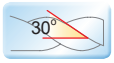


Picture 1

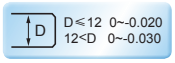


Picture 2

● PML-4F-G series with long cutting edge.









Type	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

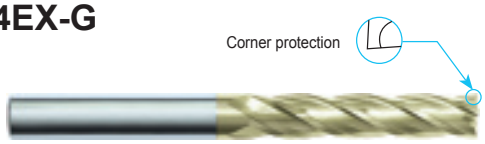
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	○			○	◎			○	○

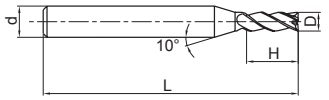
Code key B258
Graphics category and identification B259
Cutting parameters B481-B482
Non-standard customization B570-B571

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

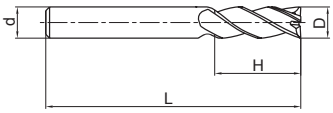


PML-4EX-G





Picture 1



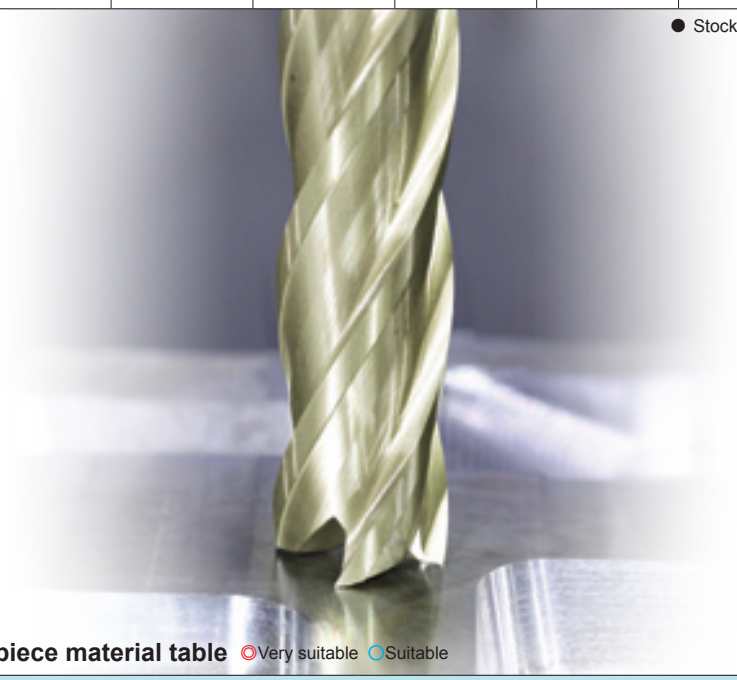
Picture 2

● Extra long cutting edge, for deep side wall machining.



Type	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 B258
Graphics category and identification B259
Cutting parameters B483
Non-standard customization B570-B571

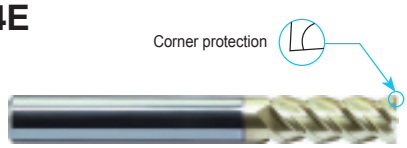
4-flute flattened end mills with straight shank

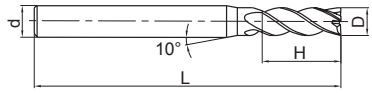

Side face


Step shoulder

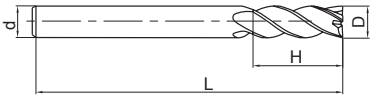

Straight slot

PML-4E



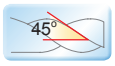


Picture 1



Picture 2

- Very suitable for side milling and shallow slot machining.
- Wide application.









Type	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-D1.0	1.0	6	3	50	4	Picture 1	○
PML-4E-D1.5S	1.5	4	4	50	4	Picture 1	○
PML-4E-D1.5	1.5	6	4	50	4	Picture 1	○
PML-4E-D2.0S	2.0	4	6	50	4	Picture 1	○
PML-4E-D2.0	2.0	6	6	50	4	Picture 1	○
PML-4E-D2.5S	2.5	4	8	50	4	Picture 1	○
PML-4E-D2.5	2.5	6	8	50	4	Picture 1	○
PML-4E-D3.0S	3.0	4	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-D4.0S	4.0	4	11	50	4	Picture 2	○
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

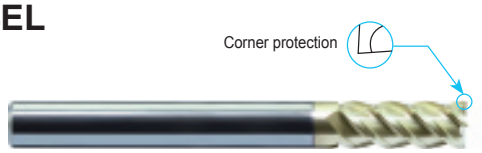
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	○			○	◎			○	○

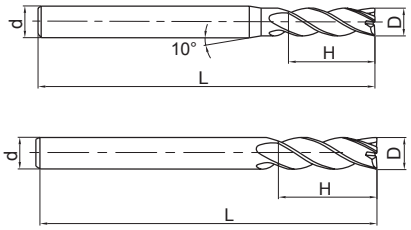
Code key B258
Graphics category and identification B259
Cutting parameters B484-B485
Non-standard customization B570-B571

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



PML-4EL





● PML-4E series with long cutting edge.



Type	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 B258
Graphics category and identification B259
Cutting parameters B484-B485
Non-standard customization B570-B571

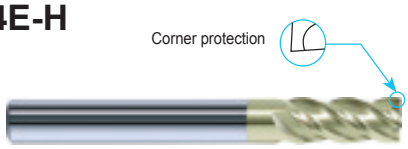
4-flute flattened end mills with straight shank

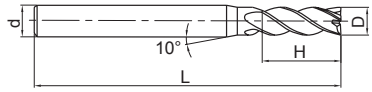

Side face

Step shoulder

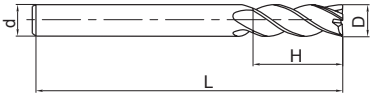
Straight slot

PML-4E-H



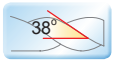


Picture 1



Picture 2

● Most suitable for slot milling. ● Wide application.









Type	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-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-D4.0S-H	4.0	4	11	50	4	Picture 2	○
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

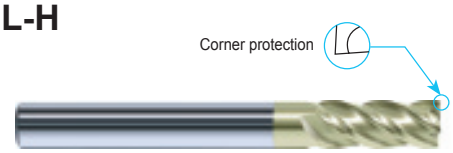
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	○			○	◎			○	○

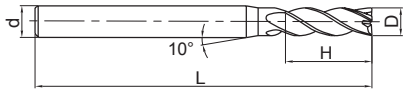
Code key B258 Graphics category and identification B259 Cutting parameters B479-B480 Non-standard customization B570-B571

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

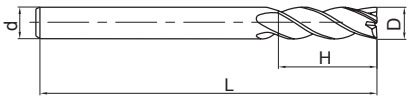


PML-4EL-H





Picture 1



Picture 2

● PML-4E-H series with long shank.



Type	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 B258
Graphics category and identification B259
Cutting parameters B479-B480
Non-standard customization B570-B571

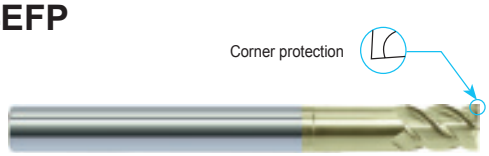
4-flute flattened end mills with straight shank, long neck and short cutting edge

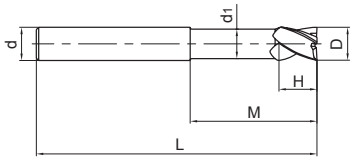

Side face


Step shoulder

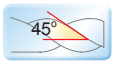

Straight slot

PML-4EFP





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









Type	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 B258
Graphics category and identification B259
Cutting parameters B486-B487
Non-standard customization B570-B571

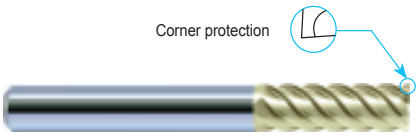
6-flute flattened end mills with straight shank

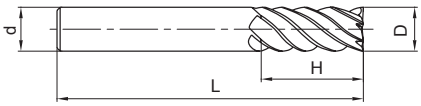

Side face


Step shoulder


Straight slot

PML-6E





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



Type	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

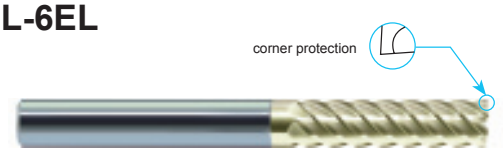
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	○			○	◎			○	○

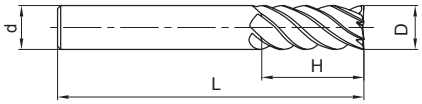
Code key B258 Graphics category and identification B259 Cutting parameters B488 Non-standard customization B570-B571

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



PML-6EL





● PML-6E series with long cutting edge.



Type	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 B258
Graphics category and identification B259
Cutting parameters B489
Non-standard customization B570-B571

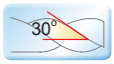
2-flute ball nose end mills with straight shank

Profile | Cavity | Ball nose slot

PML-2B

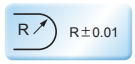


- For profile milling, high speed machining applicable.
- Wide application.

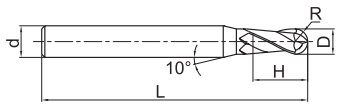




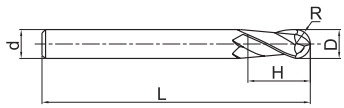








Picture 1



Picture 2

Type	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-R0.5	1.0	0.5	6	2	50	2	Picture 1	●
PML-2B-R0.75S	1.5	0.75	4	3	50	2	Picture 1	●
PML-2B-R0.75	1.5	0.75	6	3	50	2	Picture 1	●
PML-2B-R1.0S	2.0	1.0	4	4	50	2	Picture 1	●
PML-2B-R1.0	2.0	1.0	6	4	50	2	Picture 1	●
PML-2B-R1.25S	2.5	1.25	4	5	50	2	Picture 1	●
PML-2B-R1.25	2.5	1.25	6	5	50	2	Picture 1	●
PML-2B-R1.5S	3.0	1.5	4	6	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-R2.0S	4.0	2.0	4	8	50	2	Picture 2	●
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						
◎	◎	◎	○			○	◎			○	○

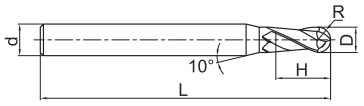
Code key B258 | Graphics category and identification B259 | Cutting parameters B490-B491 | Non-standard customization B570-B571

2-flute ball nose end mills with straight shank

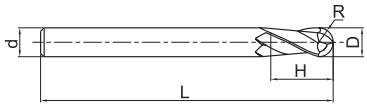
Profile | Cavity | Ball nose slot

PML-2BL





Picture 1



Picture 2

● PML-2B series with long shank.

30° | Coated NaNo TiAlCrN | D | D≤12 0~-0.020 12<D 0~-0.030 | R | R±0.01

Type	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 B258 | Graphics category and identification B259 | Cutting parameters B490-B491 | Non-standard customization B570-B571

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

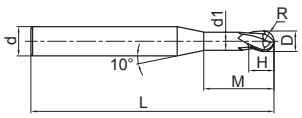

Profile


Cavity

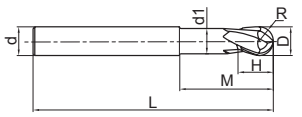

Ball nose slot

PML-2BFP



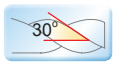


Picture 1



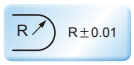
Picture 2

● High-rigidity short cutting edge, suitable for heavy cutting.











Type	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	0.95	2.5	6	75	2	Picture 1	○
PML-2BFP-R0.75	1.5	0.75	1.5	1.45	3.0	6	75	2	Picture 1	○
PML-2BFP-R1.0	2.0	1.0	2.0	1.95	4.0	6	75	2	Picture 1	○
PML-2BFP-R1.5	3.0	1.5	3.0	2.85	6.0	6	75	2	Picture 1	○
PML-2BFP-R2.0	4.0	2.0	4.0	3.85	8.0	6	75	2	Picture 1	○
PML-2BFP-R2.5	5.0	2.5	5.0	4.85	10.0	6	75	2	Picture 1	○
PML-2BFP-R3.0	6.0	3.0	6.0	5.8	12.0	6	75	2	Picture 2	○
PML-2BFP-R4.0	8.0	4.0	8.0	7.8	16.0	8	100	2	Picture 2	○
PML-2BFP-R5.0	10.0	5.0	10.0	9.6	20.0	10	100	2	Picture 2	○
PML-2BFP-R6.0	12.0	6.0	12.0	11.5	24.0	12	100	2	Picture 2	○
PML-2BFP-R8.0	16.0	8.0	16.0	15.5	32.0	16	150	2	Picture 2	○
PML-2BFP-R10.0	20.0	10.0	20.0	19.5	40.0	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						
◎	◎	◎	○			○	◎			○	○

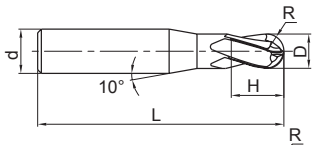
Code key B258
Graphics category and identification B259
Cutting parameters B490-B491
Non-standard customization B570-B571

4-flute ball nose end mills with straight shank

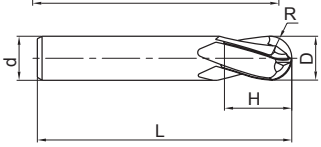
Profile | Cavity | Ball nose slot

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



Type	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 B258 | Graphics category and identification B259 | Cutting parameters B492 | Non-standard customization B570-B571

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

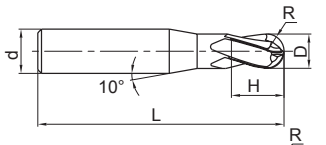
Profile Cavity Ball nose slot

PML-4BL

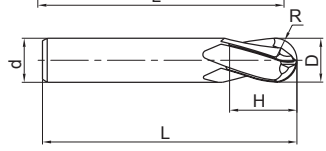


- PML-4B series with long shank.

30° Coated NaNo TiAlCrN D D≤12 0~-0.020 12<D 0~-0.030 R R±0.01



Picture 1



Picture 2

Type	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						
◎	◎	◎	○			○	◎			○	○

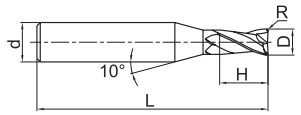
Code key B258 Graphics category and identification B259 Cutting parameters B492 Non-standard customization B570-B571

2-flute R end mills with straight shank

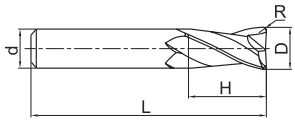
Radius shoulder | Profile | Radius corner slot

PML-2R





Picture 1



Picture 2

- Wide applications, applicable for several machining styles.



Type	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						
◎	◎	◎	○			○	◎			○	○

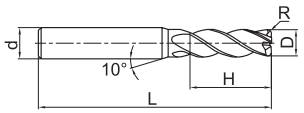
Code key B258 | Graphics category and identification B259 | Cutting parameters B496 | Non-standard customization B570-B571

4-flute R end mills with straight shank

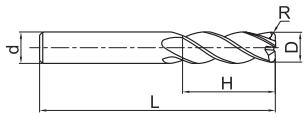
Radius shoulder | Profile | Radius corner slot

PML-4R



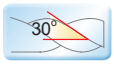


Picture 1



Picture 2

- Wide applications, applicable for several machining styles.









Type	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 1	●
PML-4R-D4.0R0.5	4.0	0.5	6	10	50	4	Picture 1	●
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						
◎	◎	◎	○			○	◎			○	○

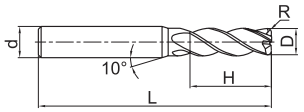
Code key B258 | Graphics category and identification B259 | Cutting parameters B497 | Non-standard customization B570-B571

4-flute R end mills with straight shank

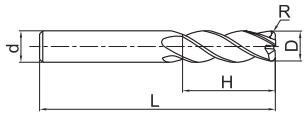
Radius shoulder | Profile | Radius corner slot

PML-4R-H





Picture 1



Picture 2

- Wide applications, applicable for several machining styles.



Type	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						
◎	◎	◎	○			○	◎			○	○

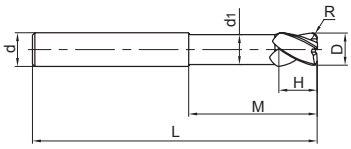
Code key B258 | Graphics category and identification B259 | Cutting parameters B497 | Non-standard customization B570-B571

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

Type	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						
◎	◎	◎	○			○	◎			○	○

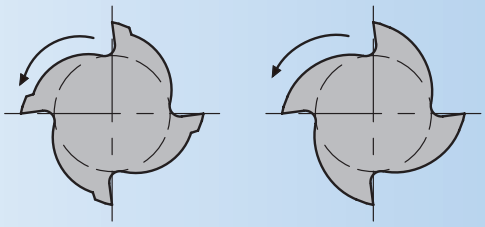
Code key B258 Graphics category and identification B259 Cutting parameters B497 Non-standard customization B570-B571

High performance universal machining

PM series



Optimized geometry, improves chip removal and chip forming with reduced cutting force.

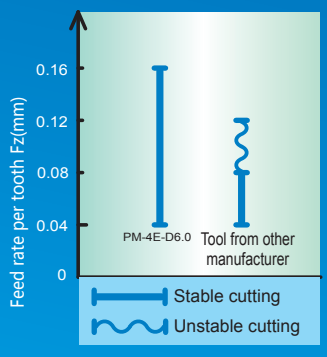


a) PM chipbreaker b) Conventional chipbreaker



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.

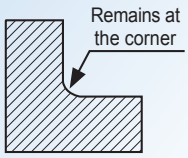
Updated flattened end mills

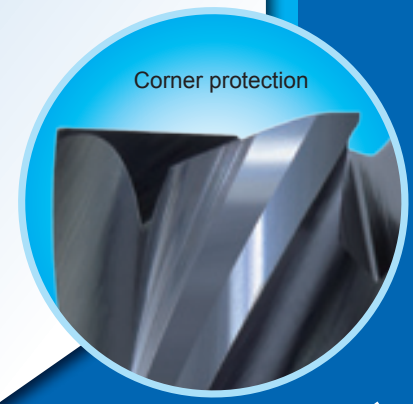
End mills series of sharp and corner protection type

The characteristic of corner protection end mill:

It's suitalbe for bad cutting condition or hardness material machining.

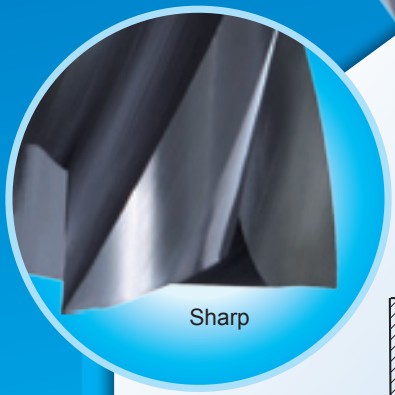
- It's not easy to break with high cutting edge strength.
- The sharpness of the corner is reduced, and there are residues in it.

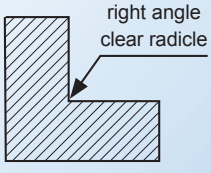




Corner protection

Sharp





The characteristic of sharp end mill:

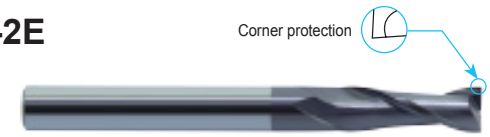
True 90 degree angle is obtained without material left in the corner.

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.

2-flute flattened end mills with straight shank

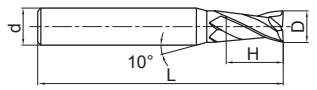


PM-2E

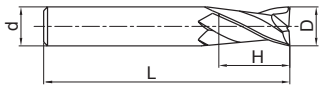


- Very suitable for slot milling.
- Wide application.





Picture 1



Picture 2

Type	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	D	d	H	L			
PM-2E-D1.0F	1.0	3	3	50	2	Picture 1	○
PM-2E-D1.0S	1.0	4	3	50	2	Picture 1	●
PM-2E-D1.0	1.0	6	3	50	2	Picture 1	●
PM-2E-D1.5S	1.5	4	4	50	2	Picture 1	●
PM-2E-D1.5	1.5	6	4	50	2	Picture 1	●
PM-2E-D2.0F	2.0	3	6	50	2	Picture 1	○
PM-2E-D2.0S	2.0	4	6	50	2	Picture 1	●
PM-2E-D2.0	2.0	6	6	50	2	Picture 1	●
PM-2E-D2.5S	2.5	4	8	50	2	Picture 1	●
PM-2E-D2.5	2.5	6	8	50	2	Picture 1	●
PM-2E-D3.0F	3.0	3	8	50	2	Picture 2	○
PM-2E-D3.0S	3.0	4	8	50	2	Picture 1	●
PM-2E-D3.0	3.0	6	8	50	2	Picture 1	●
PM-2E-D3.5S	3.5	4	10	50	2	Picture 1	○
PM-2E-D3.5	3.5	6	10	50	2	Picture 1	●
PM-2E-D4.0S	4.0	4	11	50	2	Picture 2	●
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 B258
Graphics category and identification B259
Cutting parameters B475
Non-standard customization B570-B571

2-flute flattened end mills with straight shank

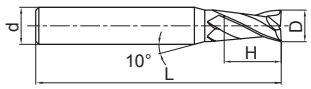

Side face

Step shoulder

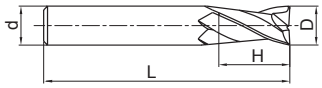
Straight slot

PM-2F



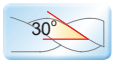


Picture 1



Picture 2

- Very suitable for slot milling.
- Wide application.









Type	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-D1.0	1.0	6	3	50	2	Picture 1	○
PM-2F-D1.5S	1.5	4	4	50	2	Picture 1	○
PM-2F-D1.5	1.5	6	4	50	2	Picture 1	○
PM-2F-D2.0S	2.0	4	6	50	2	Picture 1	○
PM-2F-D2.0	2.0	6	6	50	2	Picture 1	○
PM-2F-D2.5S	2.5	4	8	50	2	Picture 1	○
PM-2F-D2.5	2.5	6	8	50	2	Picture 1	○
PM-2F-D3.0S	3.0	4	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-D4.0S	4.0	4	11	50	2	Picture 2	○
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

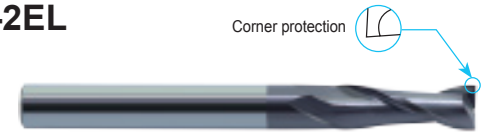
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	◎	◎		○	◎			○	○

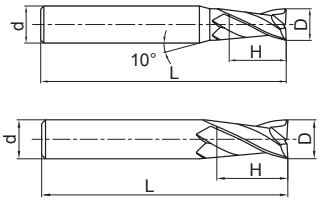
Code key B258
Graphics category and identification B259
Cutting parameters B476
Non-standard customization B570-B571

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



PM-2EL





- PM-2E series with long cutting edge.



Type	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						
◎	◎	◎	◎	◎		○	◎			○	○

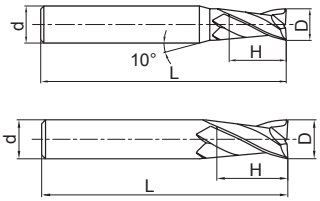
Code key B258
Graphics category and identification B259
Cutting parameters B475
Non-standard customization B570-B571

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



PM-2FL





● PM-2F series with long cutting edge.



Type	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

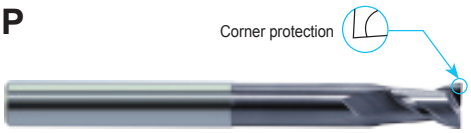
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	◎	◎		○	◎			○	○

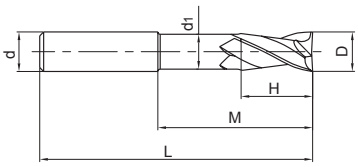
Code key B258
Graphics category and identification B259
Cutting parameters B476
Non-standard customization B570-B571

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.



Type	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 B258
Graphics category and identification B259
Cutting parameters B477
Non-standard customization B570-B571

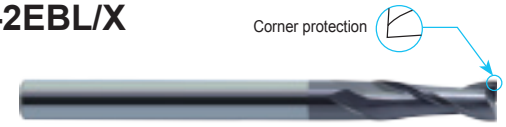
2-flute flattened endmills with long shank

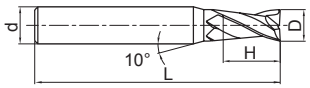

Side face


Step shoulder

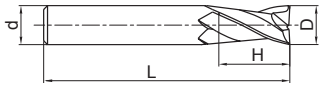

Straight slot

PM-2EBL/X



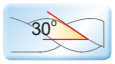


Picture 1

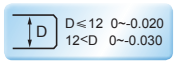


Picture 2

● PM-2E series with long shank.









Type	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	D	d	H	L			
PM-2EBL-D3.0S	3.0	4	8	75	2	Picture 1	○
PM-2EBL-D3.0	3.0	6	8	75	2	Picture 1	○
PM-2EBL-D4.0S	4.0	4	11	75	2	Picture 2	○
PM-2EBL-D4.0	4.0	6	11	75	2	Picture 1	○
PM-2EBL-D6.0	6.0	6	16	75	2	Picture 2	○
PM-2EBX-D6.0	6.0	6	16	100	2	Picture 2	○
PM-2EBL-D8.0	8.0	8	20	75	2	Picture 2	○
PM-2EBX-D8.0	8.0	8	20	100	2	Picture 2	○
PM-2EBL-D10.0	10.0	10	25	100	2	Picture 2	○
PM-2EBX-D10.0	10.0	10	25	150	2	Picture 2	○
PM-2EBL-D12.0	12.0	12	30	100	2	Picture 2	○
PM-2EBX-D12.0	12.0	12	30	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 B258 Graphics category and identification B259 Cutting parameters B475 Non-standard customization B570-B571

3-flute flattened end mills with straight shank


Side face

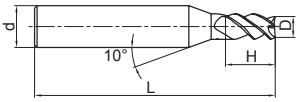

Step shoulder


Straight slot

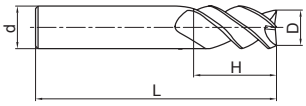
PM-3E-H

Corner protection



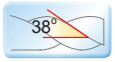


Picture 1

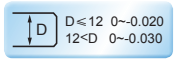


Picture 2

● Especially suitable for slot milling. ● Wide application.









Type	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	D	d	H	L			
PM-3E-D3.0F-H	3.0	3	8	5	3	Picture 2	○
PM-3E-D3.0S-H	3.0	4	8	50	3	Picture 1	○
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-D4.0S-H	4.0	4	11	50	3	Picture 2	○
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 B258 Graphics category and identification B259 Cutting parameters B478 Non-standard customization B570-B571

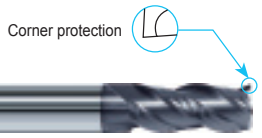
3-flute flattened end mills with straight shank and long cutting edge

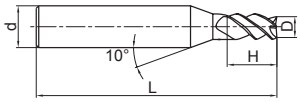

Side face


Step shoulder

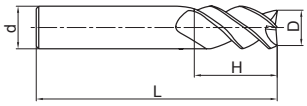

Straight slot

PM-3EL-H



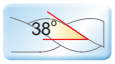


Picture 1

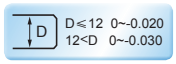


Picture 2

● PM-3E-H series with long shank.









Type	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 B258
Graphics category and identification B259
Cutting parameters B478
Non-standard customization B570-B571

4-flute flattened end mills with straight shank

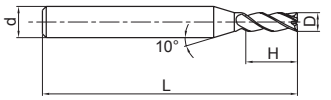

Side face


Step shoulder

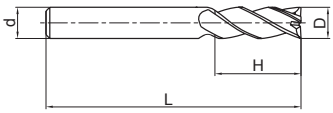

Straight slot

PM-4E-G



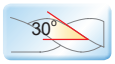


Picture 1

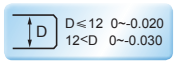


Picture 2

● Very suitable for side milling. ● Wide application.









Type	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	D	d	H	L			
PM-4E-D1.0F-G	1.0	3	3	50	4	Picture 1	○
PM-4E-D1.0S-G	1.0	4	3	50	4	Picture 1	●
PM-4E-D1.0-G	1.0	6	3	50	4	Picture 1	●
PM-4E-D1.5F-G	1.5	3	4	50	4	Picture 1	○
PM-4E-D1.5S-G	1.5	4	4	50	4	Picture 1	●
PM-4E-D1.5-G	1.5	6	4	50	4	Picture 1	●
PM-4E-D2.0F-G	2.0	3	6	50	4	Picture 1	○
PM-4E-D2.0S-G	2.0	4	6	50	4	Picture 1	●
PM-4E-D2.0-G	2.0	6	6	50	4	Picture 1	●
PM-4E-D2.5F-G	2.5	3	8	50	4	Picture 1	○
PM-4E-D2.5S-G	2.5	4	8	50	4	Picture 1	●
PM-4E-D2.5-G	2.5	6	8	50	4	Picture 1	●
PM-4E-D3.0F-G	3.0	3	8	50	4	Picture 2	○
PM-4E-D3.0S-G	3.0	4	8	50	4	Picture 1	●
PM-4E-D3.0-G	3.0	6	8	50	4	Picture 1	●
PM-4E-D3.5S-G	3.5	4	10	50	4	Picture 1	○
PM-4E-D3.5-G	3.5	6	10	50	4	Picture 1	●
PM-4E-D4.0S-G	4.0	4	11	50	4	Picture 2	●
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	●

● 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						
◎	◎	◎	◎	◎		○	◎			○	○

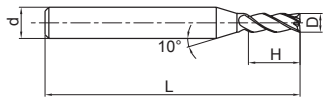
Code key B258
Graphics category and identification B259
Cutting parameters B479-B480
Non-standard customization B570-B571

4-flute flattened end mills with straight shank

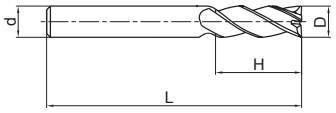
Side face | Step shoulder | Straight slot

PM-4E-G





Picture 1



Picture 2

● Very suitable for side milling. ● Wide application.



Type	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	D	d	H	L			
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-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 B258 | Graphics category and identification B259 | Cutting parameters B479-B480 | Non-standard customization B570-B571

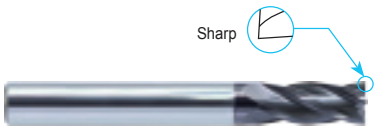
4-flute flattened end mills with straight shank

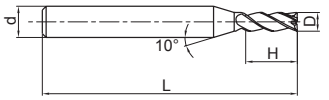

Side face


Step shoulder

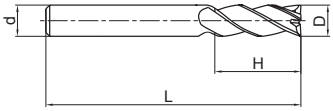

Straight slot

PM-4F-G



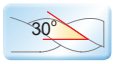


Picture 1



Picture 2

● Very suitable for side milling. ● Wide application.









Type	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-D1.0-G	1.0	6	3	50	4	Picture 1	○
PM-4F-D1.5S-G	1.5	4	4	50	4	Picture 1	○
PM-4F-D1.5-G	1.5	6	4	50	4	Picture 1	○
PM-4F-D2.0S-G	2.0	4	6	50	4	Picture 1	○
PM-4F-D2.0-G	2.0	6	6	50	4	Picture 1	○
PM-4F-D2.5S-G	2.5	4	8	50	4	Picture 1	○
PM-4F-D2.5-G	2.5	6	8	50	4	Picture 1	○
PM-4F-D3.0S-G	3.0	4	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-D4.0S-G	4.0	4	11	50	4	Picture 2	○
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						
◎	◎	◎	◎	◎		○	◎			○	○

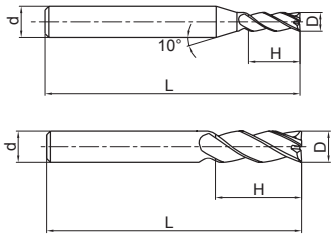
Code key B258 Graphics category and identification B259 Cutting parameters B481-B482 Non-standard customization B570-B571

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



PM-4EL-G





- PM-4E-G series with long cutting edge.



Type	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 B258
Graphics category and identification B259
Cutting parameters B479-B480
Non-standard customization B570-B571

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

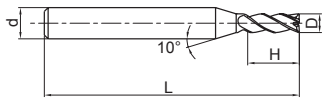

Side face


Step shoulder

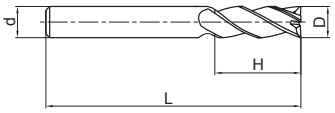

Straight slot

PM-4FL-G



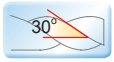


Picture 1

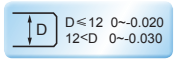


Picture 2

● PM-4F-G series with long cutting edge.









Type	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

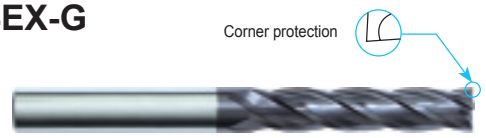
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	◎	◎		○	◎			○	○

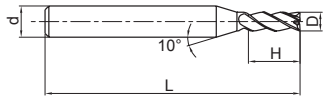
Code key B258
Graphics category and identification B259
Cutting parameters B481-B482
Non-standard customization B570-B571

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

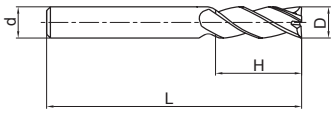


PM-4EX-G





Picture 1



Picture 2

- Extra long cutting edge, for deep side wall machining.



Type	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 B258
Graphics category and identification B259
Cutting parameters B483
Non-standard customization B570-B571

4-flute flattened endmills with long shank


Side face

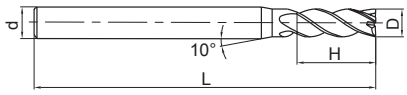
Step shoulder

Straight slot

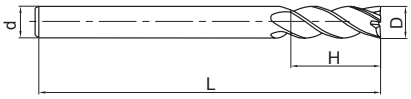
PM-4EBL/X-G

Corner protection



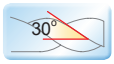


Picture 1



Picture 2

● PM-4E-G series with long shank.









Type	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	D	d	H	L			
PM-4EBL-D3.0S-G	3.0	4	8	75	4	Picture 1	○
PM-4EBL-D3.0-G	3.0	6	8	75	4	Picture 1	○
PM-4EBL-D4.0S-G	4.0	4	11	75	4	Picture 2	○
PM-4EBL-D4.0-G	4.0	6	11	75	4	Picture 1	○
PM-4EBL-D6.0-G	6.0	6	16	75	4	Picture 2	○
PM-4EBX-D6.0-G	6.0	6	16	100	4	Picture 2	○
PM-4EBL-D8.0-G	8.0	8	20	75	4	Picture 2	○
PM-4EBX-D8.0-G	8.0	8	20	100	4	Picture 2	○
PM-4EBL-D10.0-G	10.0	10	25	100	4	Picture 2	○
PM-4EBX-D10.0-G	10.0	10	25	150	4	Picture 2	○
PM-4EBL-D12.0-G	12.0	12	30	100	4	Picture 2	○
PM-4EBX-D12.0-G	12.0	12	30	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 B258
Graphics category and identification B259
Cutting parameters B479-B480
Non-standard customization B570-B571

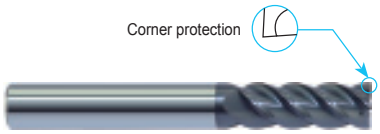
4-flute flattened end mills with straight shank

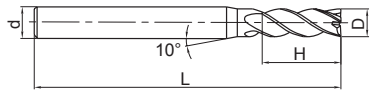

Side face


Step shoulder

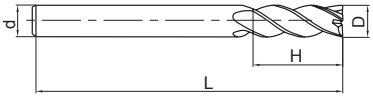

Straight slot

PM-4E



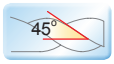


Picture 1

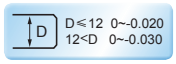


Picture 2

- Very suitable for side milling and shallow slot machining.
- Wide application.









Type	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	D	d	H	L			
PM-4E-D1.0F	1.0	3	3	50	4	Picture 1	○
PM-4E-D1.0S	1.0	4	3	50	4	Picture 1	○
PM-4E-D1.0	1.0	6	3	50	4	Picture 1	○
PM-4E-D1.5F	1.5	3	4	50	4	Picture 1	○
PM-4E-D1.5S	1.5	4	4	50	4	Picture 1	○
PM-4E-D1.5	1.5	6	4	50	4	Picture 1	○
PM-4E-D2.0F	2.0	3	6	50	4	Picture 1	○
PM-4E-D2.0S	2.0	4	6	50	4	Picture 1	○
PM-4E-D2.0	2.0	6	6	50	4	Picture 1	○
PM-4E-D2.5F	2.5	3	8	50	4	Picture 1	○
PM-4E-D2.5S	2.5	4	8	50	4	Picture 1	○
PM-4E-D2.5	2.5	6	8	50	4	Picture 1	○
PM-4E-D3.0F	3.0	3	8	50	4	Picture 2	○
PM-4E-D3.0S	3.0	4	8	50	4	Picture 1	○
PM-4E-D3.0	3.0	6	8	50	4	Picture 1	○
PM-4E-D3.5S	3.5	4	10	50	4	Picture 1	○
PM-4E-D4.0S	4.0	4	11	50	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 B258
Graphics category and identification B259
Cutting parameters B484-B485
Non-standard customization B570-B571

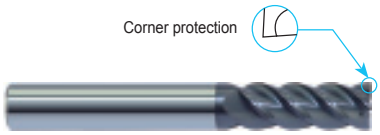
4-flute flattened end mills with straight shank

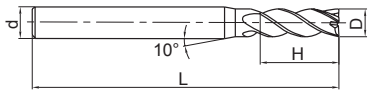

Side face


Step shoulder

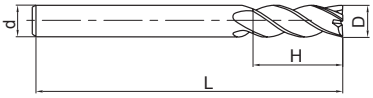

Straight slot

PM-4E



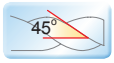


Picture 1



Picture 2

- Very suitable for side milling and shallow slot machining.
- Wide application.









Type	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	D	d	H	L			
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

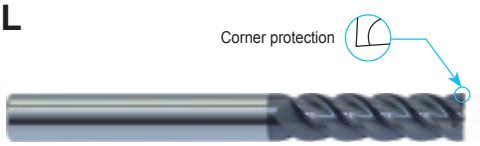
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	◎	◎		○	◎			○	○

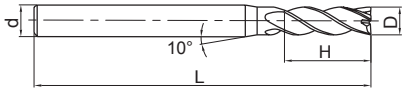
Code key B258
Graphics category and identification B259
Cutting parameters B484-B485
Non-standard customization B570-B571

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

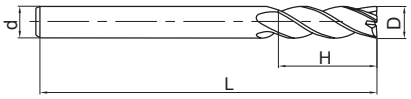


PM-4EL





Picture 1



Picture 2

● PM-4E series with long cutting edge.



Type	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 B258
Graphics category and identification B259
Cutting parameters B484-B485
Non-standard customization B570-B571

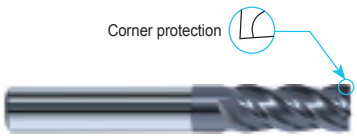
4-flute flattened end mills with straight shank

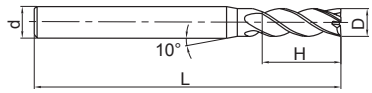

Side face


Step shoulder

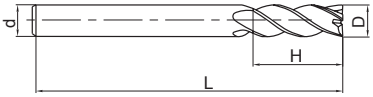

Straight slot

PM-4E-H



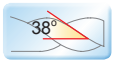


Picture 1



Picture 2

● Most suitable for slot milling. ● Wide application.









Type	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-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-D4.0S-H	4.0	4	11	50	4	Picture 2	○
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

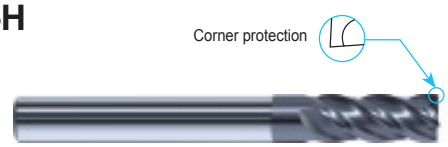
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	◎	◎		○	◎			○	○

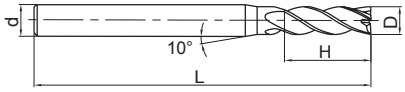
Code key B258
Graphics category and identification B259
Cutting parameters B479-B480
Non-standard customization B570-B571

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

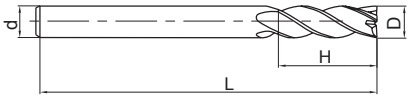


PM-4EL-H





Picture 1



Picture 2

● PM-4E-H series with long shank.



Type	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 B258
Graphics category and identification B259
Cutting parameters B479-B480
Non-standard customization B570-B571

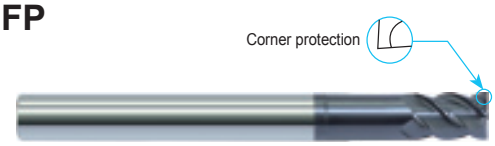
4-flute flattened end mills with straight shank, long neck and short cutting edge

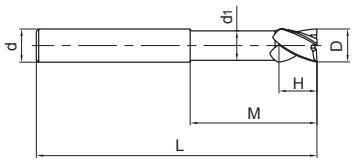

Side face


Step shoulder

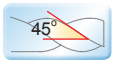

Straight slot

PM-4EFP

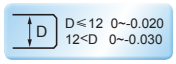




● High-rigidity short cutting edge, suitable for heavy cutting and also deep cavity milling.









Type	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 B258
Graphics category and identification B259
Cutting parameters B486-B487
Non-standard customization B570-B571

4-flute flattened endmills with long shank


Side face

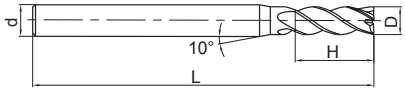
Step shoulder

Straight slot

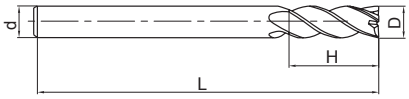
PM-4EBL/X

Corner protection



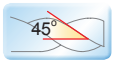


Picture 1



Picture 2

- PM-4E series with long shank.









Type	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	D	d	H	L			
PM-4EBL-D3.0S	3.0	4	8	75	4	Picture 1	○
PM-4EBL-D3.0	3.0	6	8	75	4	Picture 1	○
PM-4EBL-D4.0S	4.0	4	11	75	4	Picture 2	○
PM-4EBL-D4.0	4.0	6	11	75	4	Picture 1	○
PM-4EBL-D6.0	6.0	6	16	75	4	Picture 2	○
PM-4EBX-D6.0	6.0	6	16	100	4	Picture 2	○
PM-4EBL-D8.0	8.0	8	20	75	4	Picture 2	○
PM-4EBX-D8.0	8.0	8	20	100	4	Picture 2	○
PM-4EBL-D10.0	10.0	10	25	100	4	Picture 2	○
PM-4EBX-D10.0	10.0	10	25	150	4	Picture 2	○
PM-4EBL-D12.0	12.0	12	30	100	4	Picture 2	○
PM-4EBX-D12.0	12.0	12	30	150	4	Picture 2	○

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

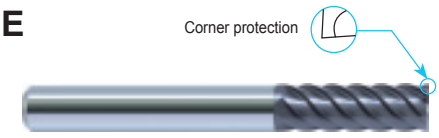
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	◎	◎		○	◎			○	○

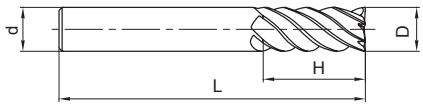
Code key B258 Graphics category and identification B259 Cutting parameters B484-B485 Non-standard customization B570-B571

6-flute flattened end mills with straight shank



PM-6E





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



Type	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

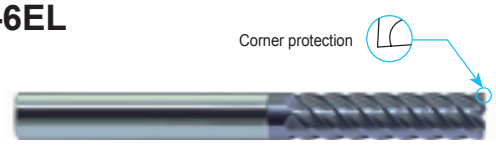
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	◎	◎		○	◎			○	○

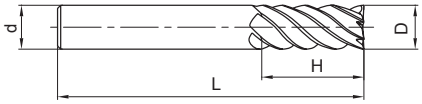
Code key B258
Graphics category and identification B259
Cutting parameters B488
Non-standard customization B570-B571

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



PM-6EL





- PM-6E series with long cutting edge.



Type	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 B258 Graphics category and identification B259 Cutting parameters B489 Non-standard customization B570-B571

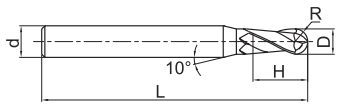
2-flute ball nose end mills with straight shank

Profile | Cavity | Ball nose slot

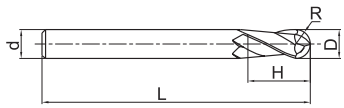
PM-2B



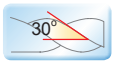
- For profile milling, high speed machining applicable.
- Wide application.



Picture 1

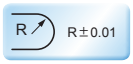


Picture 2











Type	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-R0.5	1.0	0.5	6	2	50	2	Picture 1	●
PM-2B-R0.75S	1.5	0.75	4	3	50	2	Picture 1	●
PM-2B-R0.75	1.5	0.75	6	3	50	2	Picture 1	●
PM-2B-R1.0F	2.0	1.0	3	4	50	2	Picture 1	●
PM-2B-R1.0S	2.0	1.0	4	4	50	2	Picture 1	●
PM-2B-R1.0	2.0	1.0	6	4	50	2	Picture 1	●
PM-2B-R1.25F	2.5	1.25	3	5	50	2	Picture 1	○
PM-2B-R1.25S	2.5	1.25	4	5	50	2	Picture 1	●
PM-2B-R1.25	2.5	1.25	6	5	50	2	Picture 1	●
PM-2B-R1.5F	3.0	1.5	3	6	50	2	Picture 2	○
PM-2B-R1.5S	3.0	1.5	4	6	50	2	Picture 1	●
PM-2B-R1.5	3.0	1.5	6	6	50	2	Picture 1	●
PM-2B-R1.75S	3.5	1.75	4	8	50	2	Picture 1	○
PM-2B-R1.75	3.5	1.75	6	8	50	2	Picture 1	●
PM-2B-R2.0S	4.0	2.0	4	8	50	2	Picture 2	●
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						
◎	◎	◎	◎	◎		○	◎			○	○

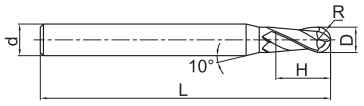
Code key B258 | Graphics category and identification B259 | Cutting parameters B490-B491 | Non-standard customization B570-B571

2-flute ball nose end mills with long shank

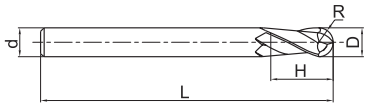
Profile Cavity Ball nose slot

PM-2BL/M/X





Picture 1



Picture 2

- PM-2B series with long shank.

30° Coated NaNo TiAlN D D≤12 0~-0.020 12<D 0~-0.030 R R±0.01

Type	Basic dimension(mm)					Number of teeth Z	Geometry	Stock
	D	R	d	H	L			
PM-2BL-R1.0S	2.0	1.0	4	4	75	2	Picture 1	○
PM-2BL-R1.0	2.0	1.0	6	4	75	2	Picture 1	○
PM-2BL-R1.25S	2.5	1.25	4	5	75	2	Picture 1	○
PM-2BL-R1.25	2.5	1.25	6	5	75	2	Picture 1	○
PM-2BL-R1.5S	3.0	1.5	4	6	75	2	Picture 1	○
PM-2BL-R1.5	3.0	1.5	6	6	75	2	Picture 1	○
PM-2BL-R1.75S	3.5	1.75	4	8	75	2	Picture 1	○
PM-2BL-R1.75	3.5	1.75	6	8	75	2	Picture 1	○
PM-2BL-R2.0S	4.0	2.0	4	8	75	2	Picture 2	○
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-2BX-R3.0	6.0	3.0	6	12	100	2	Picture 2	○
PM-2BL-R3.5	7.0	3.5	8	14	75	2	Picture 1	○
PM-2BM-R4.0	8.0	4.0	8	16	75	2	Picture 2	○
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-2BX-R5.0	10.0	5.0	10	20	150	2	Picture 2	○
PM-2BL-R6.0	12.0	6.0	12	24	100	2	Picture 2	○
PM-2BX-R6.0	12.0	6.0	12	24	150	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 B258 Graphics category and identification B259 Cutting parameters B490-B491 Non-standard customization B570-B571

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


Profile

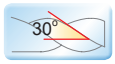

Cavity


Ball nose slot

PM-2BFP

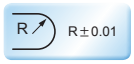


- High-rigidity short cutting edge, suitable for heavy cutting.

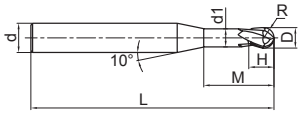




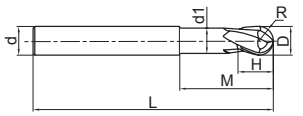








Picture 1



Picture 2

Type	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	0.95	2.5	6	75	2	Picture 1	○
PM-2BFP-R0.75	1.5	0.75	1.5	1.45	3.0	6	75	2	Picture 1	○
PM-2BFP-R1.0	2.0	1.0	2.0	1.95	4.0	6	75	2	Picture 1	○
PM-2BFP-R1.5	3.0	1.5	3.0	2.85	6.0	6	75	2	Picture 1	○
PM-2BFP-R2.0	4.0	2.0	4.0	3.85	8.0	6	75	2	Picture 1	○
PM-2BFP-R2.5	5.0	2.5	5.0	4.85	10.0	6	75	2	Picture 1	○
PM-2BFP-R3.0	6.0	3.0	6.0	5.8	12.0	6	75	2	Picture 2	○
PM-2BFP-R4.0	8.0	4.0	8.0	7.8	16.0	8	100	2	Picture 2	○
PM-2BFP-R5.0	10.0	5.0	10.0	9.6	20.0	10	100	2	Picture 2	○
PM-2BFP-R6.0	12.0	6.0	12.0	11.5	24.0	12	100	2	Picture 2	○
PM-2BFP-R8.0	16.0	8.0	16.0	15.5	32.0	16	150	2	Picture 2	○
PM-2BFP-R10.0	20.0	10.0	20.0	19.5	40.0	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						
◎	◎	◎	◎	◎		○	◎			○	○

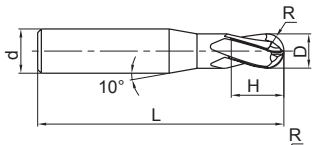
Code key B258
Graphics category and identification B259
Cutting parameters B490-B491
Non-standard customization B570-B571

4-flute ball nose end mills with straight shank

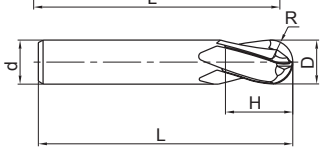
Profile | Cavity | Ball nose slot

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.



Type	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 B258 | Graphics category and identification B259 | Cutting parameters B492 | Non-standard customization B570-B571

4-flute ball nose end mills wit long shank


Profile

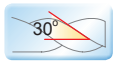

Cavity


Ball nose slot

PM-4BL/M/X

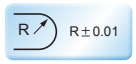


● PM-4B series with long shank.

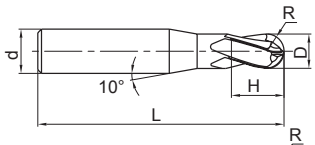




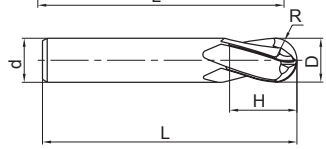








Picture 1



Picture 2

Type	Basic dimension(mm)					Number of teeth Z	Geometry	Stock
	D	R	d	H	L			
PM-4BL-R1.5S	3.0	1.5	4	6	75	4	Picture 1	○
PM-4BL-R1.5	3.0	1.5	6	6	75	4	Picture 1	○
PM-4BL-R2.0S	4.0	2.0	4	8	75	4	Picture 2	○
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-4BX-R3.0	6.0	3.0	6	12	100	4	Picture 2	○
PM-4BM-R4.0	8.0	4.0	8	16	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-4BX-R5.0	10.0	5.0	10	20	150	4	Picture 2	○
PM-4BL-R6.0	12.0	6.0	12	24	100	4	Picture 2	○
PM-4BX-R6.0	12.0	6.0	12	24	150	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						
◎	◎	◎	◎	◎		○	◎			○	○

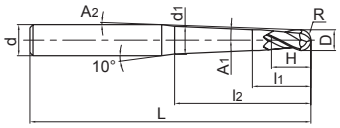
Code key B258
Graphics category and identification B259
Cutting parameters B492
Non-standard customization B570-B571

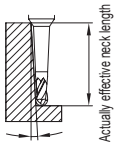
2-flute ball nose end mills with taper neck

Deep ball nose slot

PM-2BC

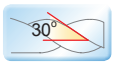






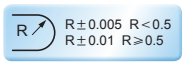
Degree of workpiece declining

- High-rigidity taper neck structure.











Type	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						
◎	◎	◎	◎	◎		○	◎			○	○

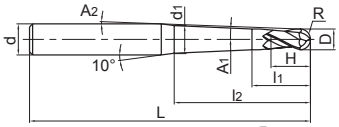
Code key B258 Graphics category and identification B259 Cutting parameters B493-B495 Non-standard customization B570-B571

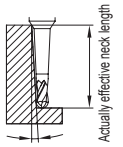

Deep ball nose slot

2-flute ball nose end mills with taper neck

PM-2BC

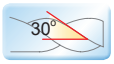






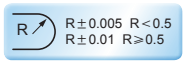
Degree of workpiece declining

- High-rigidity taper neck structure.











Type	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-R0.50-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

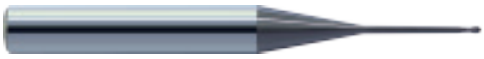
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	◎	◎		○	◎			○	○

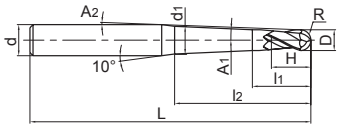
Code key B258 Graphics category and identification B259 Cutting parameters B493-B495 Non-standard customization B570-B571

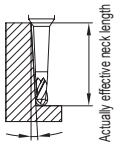
2-flute ball nose end mills with taper neck

Deep ball nose slot

PM-2BC

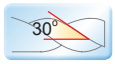




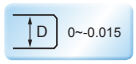


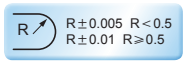
Degree of workpiece declining

- High-rigidity taper neck structure.











Type	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					20		4.2°	2.04	70		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°	1.5	10	3	6.1°	1.81	60	6	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			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	○

Applicable workpiece material table

◎Very suitable ○Suitable

● Stock available ○ Make-to-order

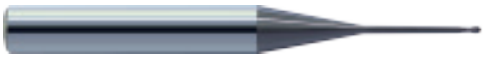
Workpiece material										
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	◎	◎		○	◎			○	○

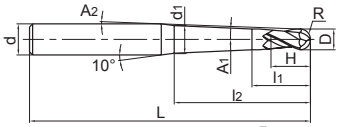
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Cutting parameters B493-B495
Non-standard customization B570-B571

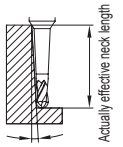

Deep ball nose slot

2-flute ball nose end mills with taper neck

PM-2BC

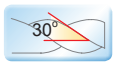






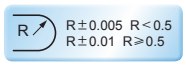
Degree of workpiece declining

- High-rigidity taper neck structure.











Type	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						
◎	◎	◎	◎	◎		○	◎			○	○

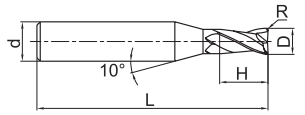
Code key B258 Graphics category and identification B259 Cutting parameters B493-B495 Non-standard customization B570-B571

2-flute R end mills with straight shank

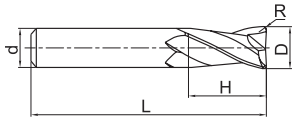
Radius shoulder | Profile | Radius corner slot

PM-2R





Picture 1



Picture 2

- Wide applications, applicable for several machining styles.



Type	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-D5.0R0.2	5.0	0.2	6	13	50	2	Picture 1	○
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-D6.0R0.2	6.0	0.2	6	16	50	2	Picture 2	○
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	○

● 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						
◎	◎	◎	◎	◎		○	◎			○	○

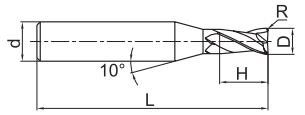
Code key B258 | Graphics category and identification B259 | Cutting parameters B496 | Non-standard customization B570-B571

2-flute R end mills with straight shank

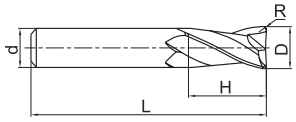
Radius shoulder Profile Radius corner slot

PM-2R





Picture 1



Picture 2

- Wide applications, applicable for several machining styles.

30° Coated NaNo TiAlN D 0~-0.020

Type	Basic dimension(mm)					Number of teeth Z	Geometry	Stock
	D	R	d	H	L			
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-D10.0R0.3	10.0	0.3	10	25	75	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-D12.0R0.3	12.0	0.3	12	30	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						
◎	◎	◎	◎	◎		○	◎			○	○

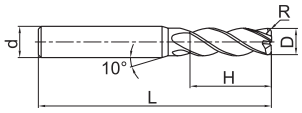
Code key B258 Graphics category and identification B259 Cutting parameters B496 Non-standard customization B570-B571

4-flute R end mills with straight shank

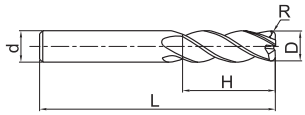
Radius shoulder | Profile | Radius corner slot

PM-4R



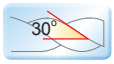


Picture 1

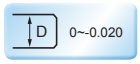


Picture 2

- Wide applications, applicable for several machining styles.









Type	Basic dimension(mm)					Number of teeth Z	Geometry	Stock
	D	R	d	H	L			
PM-4R-D1.0R0.2S	1.0	0.2	4	3	50	4	Picture 1	○
PM-4R-D1.5R0.2S	1.5	0.2	4	4	50	4	Picture 1	○
PM-4R-D2.0R0.2S	2.0	0.2	4	6	50	4	Picture 1	○
PM-4R-D2.0R0.2	2.0	0.2	6	6	50	4	Picture 1	○
PM-4R-D2.0R0.5S	2.0	0.5	4	6	50	4	Picture 1	○
PM-4R-D2.0R0.5	2.0	0.5	6	6	50	4	Picture 1	○
PM-4R-D2.5R0.2S	2.5	0.2	4	8	50	4	Picture 1	○
PM-4R-D2.5R0.2	2.5	0.2	6	8	50	4	Picture 1	○
PM-4R-D2.5R0.5S	2.5	0.5	4	8	50	4	Picture 1	○
PM-4R-D2.5R0.5	2.5	0.5	6	8	50	4	Picture 1	○
PM-4R-D3.0R0.2S	3.0	0.2	4	8	50	4	Picture 1	○
PM-4R-D3.0R0.2	3.0	0.2	6	8	50	4	Picture 1	●
PM-4R-D3.0R0.5S	3.0	0.5	4	8	50	4	Picture 1	○
PM-4R-D3.0R0.5	3.0	0.5	6	8	50	4	Picture 1	○
PM-4R-D4.0R0.2S	4.0	0.2	4	10	50	4	Picture 2	●
PM-4R-D4.0R0.2	4.0	0.2	6	10	50	4	Picture 1	○
PM-4R-D4.0R0.3S	4.0	0.3	4	10	50	4	Picture 2	●
PM-4R-D4.0R0.3	4.0	0.3	6	10	50	4	Picture 1	●
PM-4R-D4.0R0.5S	4.0	0.5	4	10	50	4	Picture 2	●
PM-4R-D4.0R0.5	4.0	0.5	6	10	50	4	Picture 1	●
PM-4R-D5.0R0.2	5.0	0.2	6	13	50	4	Picture 1	●
PM-4R-D5.0R0.3	5.0	0.3	6	13	50	4	Picture 1	●
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-D6.0R0.2	6.0	0.2	6	16	50	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						
◎	◎	◎	◎	◎		○	◎			○	○

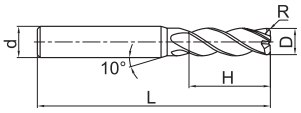
Code key B258 | Graphics category and identification B259 | Cutting parameters B497 | Non-standard customization B570-B571

4-flute R end mills with straight shank

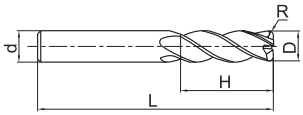
Radius shoulder | Profile | Radius corner slot

PM-4R



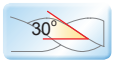


Picture 1

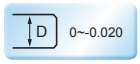


Picture 2

- Wide applications, applicable for several machining styles.









Type	Basic dimension(mm)					Number of teeth Z	Geometry	Stock
	D	R	d	H	L			
PM-4R-D6.0R0.3	6.0	0.3	6	16	50	4	Picture 2	●
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-D8.0R0.2	8.0	0.2	8	20	60	4	Picture 2	●
PM-4R-D8.0R0.3	8.0	0.3	8	20	60	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-D10.0R0.2	10.0	0.2	10	25	75	4	Picture 2	●
PM-4R-D10.0R0.3	10.0	0.3	10	25	75	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-D12.0R0.2	12.0	0.2	12	30	75	4	Picture 2	●
PM-4R-D12.0R0.3	12.0	0.3	12	30	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						
◎	◎	◎	◎	◎		○	◎			○	○

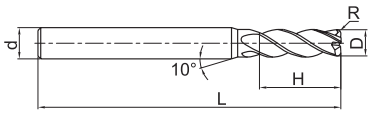
Code key B258 | Graphics category and identification B259 | Cutting parameters B497 | Non-standard customization B570-B571

4-flute R end mills with long shank

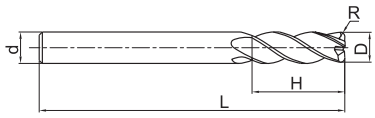
Radius shoulder | Profile | Radius corner slot

PM-4RBL/M/X



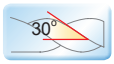


Picture 1



Picture 2

- PM-4R series with long shank.









Type	Basic dimension(mm)					Number of teeth Z	Geometry	Stock
	D	R	d	H	L			
PM-4RBL-D4.0R0.2S	4.0	0.2	4	10	75	4	Picture 2	●
PM-4RBL-D4.0R0.2	4.0	0.2	6	10	75	4	Picture 1	●
PM-4RBL-D4.0R0.5S	4.0	0.5	4	10	75	4	Picture 2	●
PM-4RBL-D4.0R0.5	4.0	0.5	6	10	75	4	Picture 1	●
PM-4RBL-D6.0R0.2	6.0	0.2	6	16	75	4	Picture 2	●
PM-4RBX-D6.0R0.2	6.0	0.2	6	16	100	4	Picture 2	●
PM-4RBL-D6.0R0.5	6.0	0.5	6	16	75	4	Picture 2	●
PM-4RBX-D6.0R0.5	6.0	0.5	6	16	100	4	Picture 2	●
PM-4RBL-D6.0R1.0	6.0	1.0	6	16	75	4	Picture 2	●
PM-4RBX-D6.0R1.0	6.0	1.0	6	16	100	4	Picture 2	●
PM-4RBM-D8.0R0.2	8.0	0.2	8	20	75	4	Picture 2	●
PM-4RBL-D8.0R0.2	8.0	0.2	8	20	100	4	Picture 2	●
PM-4RBM-D8.0R0.5	8.0	0.5	8	20	75	4	Picture 2	●
PM-4RBL-D8.0R0.5	8.0	0.5	8	20	100	4	Picture 2	●
PM-4RBM-D8.0R1.0	8.0	1.0	8	20	75	4	Picture 2	●
PM-4RBL-D8.0R1.0	8.0	1.0	8	20	100	4	Picture 2	●
PM-4RBL-D10.0R0.2	10.0	0.2	10	25	100	4	Picture 2	●
PM-4RBX-D10.0R0.2	10.0	0.2	10	25	150	4	Picture 2	●
PM-4RBL-D10.0R0.5	10.0	0.5	10	25	100	4	Picture 2	●
PM-4RBX-D10.0R0.5	10.0	0.5	10	25	150	4	Picture 2	●
PM-4RBL-D10.0R1.0	10.0	1.0	10	25	100	4	Picture 2	●
PM-4RBX-D10.0R1.0	10.0	1.0	10	25	150	4	Picture 2	●
PM-4RBL-D10.0R2.0	10.0	2.0	10	25	100	4	Picture 2	●
PM-4RBX-D10.0R2.0	10.0	2.0	10	25	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						
◎	◎	◎	◎	◎		○	◎			○	○

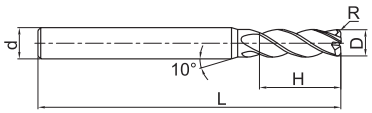
Code key B258 | Graphics category and identification B259 | Cutting parameters B497 | Non-standard customization B570-B571

4-flute R end mills with long shank

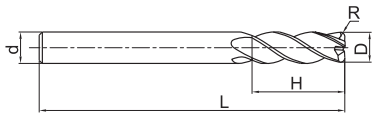
Radius shoulder | Profile | Radius corner slot

PM-4RBL/M/X





Picture 1



Picture 2

● PM-4R series with long shank.

30° | Coated NaNo TiAlN | D 0~-0.020

Type	Basic dimension(mm)					Number of teeth Z	Geometry	Stock
	D	R	d	H	L			
PM-4RBL-D12.0R0.2	12.0	0.2	12	30	100	4	Picture 2	●
PM-4RBX-D12.0R0.2	12.0	0.2	12	30	150	4	Picture 2	●
PM-4RBL-D12.0R0.5	12.0	0.5	12	30	100	4	Picture 2	●
PM-4RBX-D12.0R0.5	12.0	0.5	12	30	150	4	Picture 2	●
PM-4RBL-D12.0R1.0	12.0	1.0	12	30	100	4	Picture 2	●
PM-4RBX-D12.0R1.0	12.0	1.0	12	30	150	4	Picture 2	●
PM-4RBL-D12.0R2.0	12.0	2.0	12	30	100	4	Picture 2	●
PM-4RBX-D12.0R2.0	12.0	2.0	12	30	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						
◎	◎	◎	◎	◎		○	◎			○	○

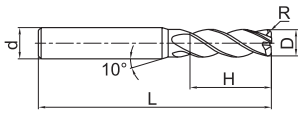
Code key B258 | Graphics category and identification B259 | Cutting parameters B497 | Non-standard customization B570-B571

4-flute R end mills with straight shank

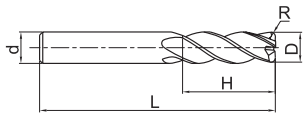
Radius shoulder | Profile | Radius corner slot

PM-4R-H



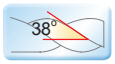


Picture 1



Picture 2

- Wide applications, applicable for several machining styles.









Type	Basic dimension(mm)					Number of teeth Z	Geometry	Stock
	D	R	d	H	L			
PM-4R-D3.0R0.2F-H	3.0	0.2	3	8	50	4	Picture 2	●
PM-4R-D3.0R0.2S-H	3.0	0.2	4	8	50	4	Picture 1	●
PM-4R-D3.0R0.5F-H	3.0	0.5	3	8	50	4	Picture 2	●
PM-4R-D3.0R0.5S-H	3.0	0.5	4	8	50	4	Picture 1	●
PM-4R-D3.5R0.2S-H	3.5	0.2	4	10	50	4	Picture 1	●
PM-4R-D3.5R0.5S-H	3.5	0.5	4	10	50	4	Picture 1	●
PM-4R-D4.0R0.2S-H	4.0	0.2	4	10	50	4	Picture 2	●
PM-4R-D4.0R0.2-H	4.0	0.2	6	10	50	4	Picture 1	●
PM-4R-D4.0R0.3S-H	4.0	0.3	4	10	50	4	Picture 2	●
PM-4R-D4.0R0.3-H	4.0	0.3	6	10	50	4	Picture 1	●
PM-4R-D4.0R0.5S-H	4.0	0.5	4	10	50	4	Picture 2	●
PM-4R-D4.0R0.5-H	4.0	0.5	6	10	50	4	Picture 1	●
PM-4R-D5.0R0.2-H	5.0	0.2	6	13	50	4	Picture 1	●
PM-4R-D5.0R0.3-H	5.0	0.3	6	13	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-D6.0R0.2-H	6.0	0.2	6	16	50	4	Picture 2	●
PM-4R-D6.0R0.3-H	6.0	0.3	6	16	50	4	Picture 2	●
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	●

● 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 B258 | Graphics category and identification B259 | Cutting parameters B497 | Non-standard customization B570-B571

4-flute R end mills with straight shank

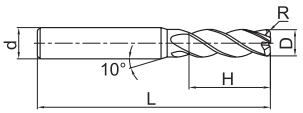

Radius shoulder


Profile

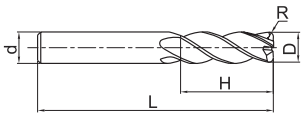

Radius corner slot

PM-4R-H



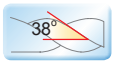


Picture 1



Picture 2

- Wide applications, applicable for several machining styles.









Type	Basic dimension(mm)					Number of teeth Z	Geometry	Stock
	D	R	d	H	L			
PM-4R-D8.0R0.3-H	8.0	0.3	8	20	60	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-D10.0R0.3-H	10.0	0.3	10	25	75	4	Picture 2	●
PM-4R-D10.0R0.5-H	10.0	0.5	10	25	75	4	Picture 2	●
PM-4R-D10.0R1.0-H	10.0	1.0	10	25	75	4	Picture 2	●
PM-4R-D10.0R2.0-H	10.0	2.0	10	25	75	4	Picture 2	●
PM-4R-D10.0R3.0-H	10.0	3.0	10	25	75	4	Picture 2	●
PM-4R-D12.0R0.3-H	12.0	0.3	12	30	75	4	Picture 2	●
PM-4R-D12.0R0.5-H	12.0	0.5	12	30	75	4	Picture 2	●
PM-4R-D12.0R1.0-H	12.0	1.0	12	30	75	4	Picture 2	●
PM-4R-D12.0R2.0-H	12.0	2.0	12	30	75	4	Picture 2	●
PM-4R-D12.0R3.0-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 B258
Graphics category and identification B259
Cutting parameters B497
Non-standard customization B570-B571

4-flute R end mills with long shank


Radius shoulder

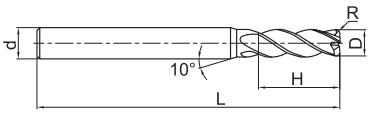

Profile


Radius corner slot

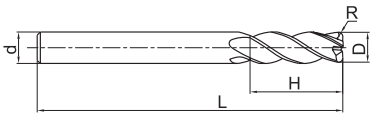
PM-4RBL/M/X-H



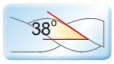
● PM-4R-H series with long shank.



Picture 1



Picture 2









Type	Basic dimension(mm)					Number of teeth Z	Geometry	Stock
	D	R	d	H	L			
PM-4RBL-D4.0R0.2S-H	4.0	0.2	4	10	75	4	Picture 2	●
PM-4RBL-D4.0R0.2-H	4.0	0.2	6	10	75	4	Picture 1	●
PM-4RBL-D4.0R0.5S-H	4.0	0.5	4	10	75	4	Picture 2	●
PM-4RBL-D4.0R0.5-H	4.0	0.5	6	10	75	4	Picture 1	●
PM-4RBL-D6.0R0.2-H	6.0	0.2	6	16	75	4	Picture 2	●
PM-4RBX-D6.0R0.2-H	6.0	0.2	6	16	100	4	Picture 2	●
PM-4RBL-D6.0R0.5-H	6.0	0.5	6	16	75	4	Picture 2	●
PM-4RBX-D6.0R0.5-H	6.0	0.5	6	16	100	4	Picture 2	●
PM-4RBL-D6.0R1.0-H	6.0	1.0	6	16	75	4	Picture 2	●
PM-4RBX-D6.0R1.0-H	6.0	1.0	6	16	100	4	Picture 2	●
PM-4RBM-D8.0R0.2-H	8.0	0.2	8	20	75	4	Picture 2	●
PM-4RBL-D8.0R0.2-H	8.0	0.2	8	20	100	4	Picture 2	●
PM-4RBM-D8.0R0.5-H	8.0	0.5	8	20	75	4	Picture 2	●
PM-4RBL-D8.0R0.5-H	8.0	0.5	8	20	100	4	Picture 2	●
PM-4RBM-D8.0R1.0-H	8.0	1.0	8	20	75	4	Picture 2	●
PM-4RBL-D8.0R1.0-H	8.0	1.0	8	20	100	4	Picture 2	●
PM-4RBL-D10.0R0.2-H	10.0	0.2	10	25	100	4	Picture 2	●
PM-4RBX-D10.0R0.2-H	10.0	0.2	10	25	150	4	Picture 2	●
PM-4RBL-D10.0R0.5-H	10.0	0.5	10	25	100	4	Picture 2	●
PM-4RBX-D10.0R0.5-H	10.0	0.5	10	25	150	4	Picture 2	●
PM-4RBL-D10.0R1.0-H	10.0	1.0	10	25	100	4	Picture 2	●
PM-4RBX-D10.0R1.0-H	10.0	1.0	10	25	150	4	Picture 2	●
PM-4RBL-D10.0R2.0-H	10.0	2.0	10	25	100	4	Picture 2	●
PM-4RBX-D10.0R2.0-H	10.0	2.0	10	25	150	4	Picture 2	●
PM-4RBL-D12.0R0.5-H	12.0	0.5	12	30	100	4	Picture 2	●
PM-4RBX-D12.0R0.5-H	12.0	0.5	12	30	150	4	Picture 2	●
PM-4RBL-D12.0R1.0-H	12.0	1.0	12	30	100	4	Picture 2	●
PM-4RBX-D12.0R1.0-H	12.0	1.0	12	30	150	4	Picture 2	●
PM-4RBL-D12.0R2.0-H	12.0	2.0	12	30	100	4	Picture 2	●
PM-4RBX-D12.0R2.0-H	12.0	2.0	12	30	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						
◎	◎	◎	◎	◎		○	◎			○	○

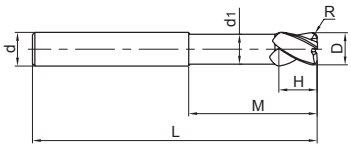
Code key B258
Graphics category and identification B259
Cutting parameters B497
Non-standard customization B570-B571

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

Type	Basic dimension(mm)							Number of teeth Z	Stock
	D	R	d	d_1	H	M	L		
PM-4RFP-D6.0R0.2	6.0	0.2	6	5.8	6	18	75	4	○
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-D8.0R0.2	8.0	0.2	8	7.8	8	24	100	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-D10.0R0.2	10.0	0.2	10	9.6	10	30	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-D12.0R0.2	12.0	0.2	12	11.5	12	36	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-D16.0R0.2	16.0	0.2	16	15.5	16	40	150	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						
◎	◎	◎	◎	◎		○	◎			○	○

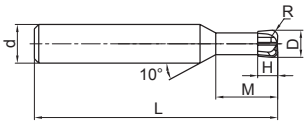
Code key B258 | Graphics category and identification B259 | Cutting parameters B497 | Non-standard customization B570-B571

4-flute end mills with high feed rate

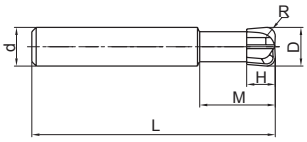
Radius shoulder | Profile | Radius corner slot

PM-4H





Picture 1



Picture 2

- High-rigidity short cutting edge, suitable for machining with high feed rate.

Coated NaNo TiAlN | D 0~-0.030

Type	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	8.0	50	4	Picture 1	○
PM-4H-D4.0R1.0	4.0	1.0	6	3.6	1.6	10.0	50	4	Picture 1	○
PM-4H-D5.0R1.2	5.0	1.2	6	4.5	2.0	12.5	50	4	Picture 1	○
PM-4H-D6.0R1.0	6.0	1.0	6	5.4	2.5	12.0	50	4	Picture 2	○
PM-4H-D6.0R1.5	6.0	1.5	6	5.4	2.5	12.0	50	4	Picture 2	○
PM-4H-D8.0R1.0	8.0	1.0	8	7.0	3.5	16.0	60	4	Picture 2	○
PM-4H-D8.0R2.0	8.0	2.0	8	7.0	3.5	16.0	60	4	Picture 2	○
PM-4H-D10.0R1.0	10.0	1.0	10	9.0	4.0	20.0	75	4	Picture 2	○
PM-4H-D10.0R2.0	10.0	2.0	10	9.0	4.0	20.0	75	4	Picture 2	○
PM-4H-D12.0R2.0	12.0	2.0	12	11.0	5.0	24.0	75	4	Picture 2	○
PM-4H-D12.0R3.0	12.0	3.0	12	11.0	5.0	24.0	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						
◎	◎	◎	◎	◎		○	◎			○	○

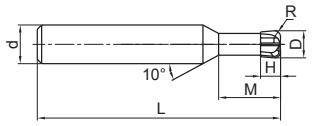
Code key B258 | Graphics category and identification B259 | Cutting parameters B498-B499 | Non-standard customization B570-B571

4-flute end mills with high feed rate

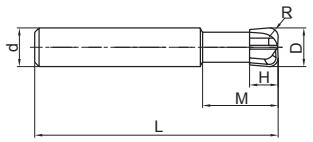
Radius shoulder | Profile | Radius corner slot

PM-4HL





Picture 1



Picture 2

- PM-4H series with long shank.

Coated NaNo TiAlN | D 0~-0.030

Type	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	10.0	75	4	Picture 1	○
PM-4HL-D5.0R1.2	5.0	1.2	6	4.5	2.0	12.5	75	4	Picture 1	○
PM-4HL-D6.0R1.0	6.0	1.0	6	5.4	2.5	12.0	75	4	Picture 2	○
PM-4HL-D6.0R1.5	6.0	1.5	6	5.4	2.5	12.0	75	4	Picture 2	○
PM-4HL-D8.0R1.0	8.0	1.0	8	7.0	3.5	16.0	100	4	Picture 2	○
PM-4HL-D8.0R2.0	8.0	2.0	8	7.0	3.5	16.0	100	4	Picture 2	○
PM-4HL-D10.0R1.0	10.0	1.0	10	9.0	4.0	20.0	100	4	Picture 2	○
PM-4HL-D10.0R2.0	10.0	2.0	10	9.0	4.0	20.0	100	4	Picture 2	○
PM-4HL-D12.0R2.0	12.0	2.0	12	11.0	5.0	24.0	100	4	Picture 2	○
PM-4HL-D12.0R3.0	12.0	3.0	12	11.0	5.0	24.0	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 B258 | Graphics category and identification B259 | Cutting parameters B498-B499 | Non-standard customization B570-B571



GM series general end mills

Wide application High efficiency machining can be achieved ranging from common steel to pre-hardened steel machining.

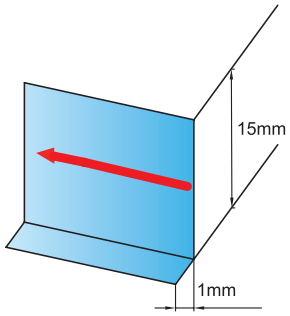
Optimized structure Appropriate combination of sharp cutting edge and tool strength makes cutting easier and faster, extending tool life.

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



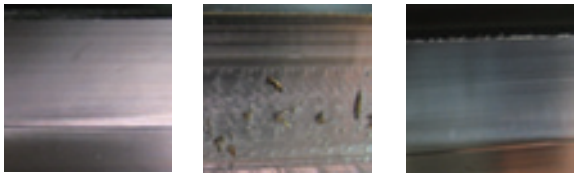
Cutting edge abrasion and workpiece surface quality

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



Excellent performance, super cost-effective !

The series are further completed specification, which better meet various machining needs.

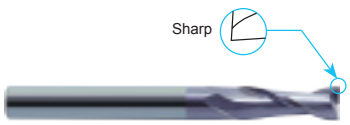
Flattened end mills series with sharp corner or corner protection

GM-2E(Corner protection)



GM-□E

GM-2F(Sharp)



GM-□F

4-flute unequal helical angle flattened end mills

(30° or 45° helical angle end mills for various work conditions and machined materials)



GM-4E-G



GM-4E

Super short flutes and long neck series

(provide various kinds neck length end mills for cavity, straight slot etc. work conditions)



GM-□EFP



GM-2BFP

Super long flutes series

(Only one step for high side wall machining, without cutting steps mark)



GM-2EX



GM-4EX－G

3-flute flattened end mills

(3-flute flattened end mills with excellent vibration resistance, which are available to realize sloting,side milling etc. various machining processing.)



GM-3E



GM-3EL

Long shank series

(suitable for deep cavity machining)



GM-2EBL/X

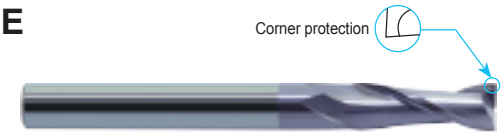


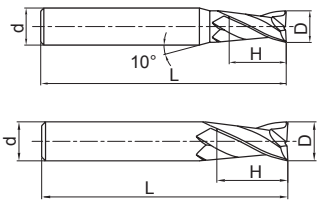
GM-4EBL/X

2-flute flattened end mills with straight shank



GM-2E





- Very suitable for slot milling.
- Wide application.



Type	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	D	d	H	L			
GM-2E-D1.0F	1.0	3	3	50	2	Picture 1	○
GM-2E-D1.0S	1.0	4	3	50	2	Picture 1	●
GM-2E-D1.0	1.0	6	3	50	2	Picture 1	●
GM-2E-D1.5F	1.5	3	4	50	2	Picture 1	○
GM-2E-D1.5S	1.5	4	4	50	2	Picture 1	●
GM-2E-D1.5	1.5	6	4	50	2	Picture 1	●
GM-2E-D2.0F	2.0	3	6	50	2	Picture 1	○
GM-2E-D2.0S	2.0	4	6	50	2	Picture 1	●
GM-2E-D2.0	2.0	6	6	50	2	Picture 1	●
GM-2E-D2.5S	2.5	4	8	50	2	Picture 1	●
GM-2E-D2.5	2.5	6	8	50	2	Picture 1	●
GM-2E-D3.0F	3.0	3	8	50	2	Picture 2	○
GM-2E-D3.0S	3.0	4	8	50	2	Picture 1	●
GM-2E-D3.0	3.0	6	8	50	2	Picture 1	●
GM-2E-D3.5S	3.5	4	10	50	2	Picture 1	○
GM-2E-D3.5	3.5	6	10	50	2	Picture 1	●
GM-2E-D4.0S	4.0	4	11	50	2	Picture 2	●
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

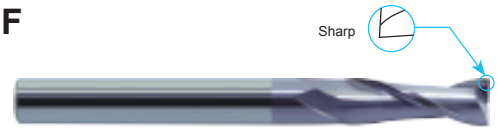
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	○			○	◎				

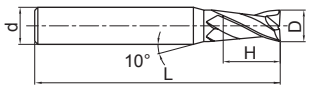
Code key B258
Graphics category and identification B259
Cutting parameters B500
Non-standard customization B570-B571

2-flute flattened end mills with straight shank

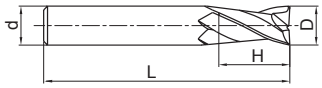
Side face | Step shoulder | Straight slot

GM-2F



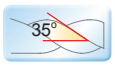


Picture 1



Picture 2

● Slot milling. ● Wide application.









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

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

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

Code key B258 | Graphics category and identification B259 | Cutting parameters B501 | Non-standard customization B570-B571

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

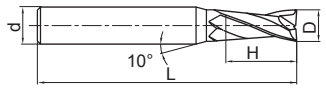

Side face


Step shoulder

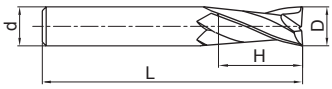

Straight slot

GM-2EL



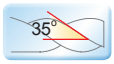


Picture 1



Picture 2

- GM-2E series with long cutting edge.









Type	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 B258
Graphics category and identification B259
Cutting parameters B500
Non-standard customization B570-B571

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

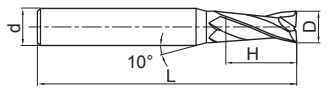

Side face


Step shoulder

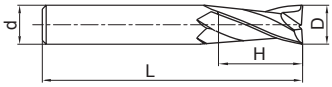

Straight slot

GM-2FL



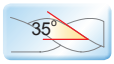


Picture 1



Picture 2

● GM-2F series with long cutting edge.









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

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

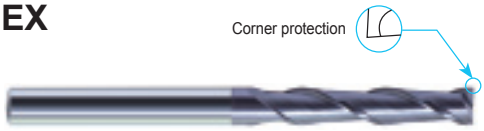
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	○			○	◎				

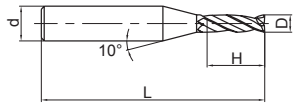
Code key B258
Graphics category and identification B259
Cutting parameters B501
Non-standard customization B570-B571

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

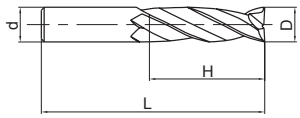


GM-2EX





Picture 1



Picture 2

● Extra long cutting edge, for deep side wall machining.



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

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

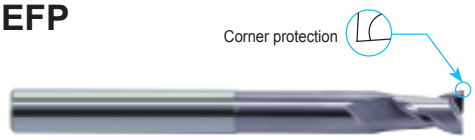
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	○			○	◎				

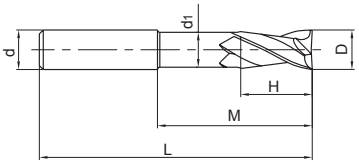
Code key B258 Graphics category and identification B259 Cutting parameters B502 Non-standard customization B570-B571

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



GM-2EFP





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



Type	Basic dimension(mm)						Number of teeth Z	Stock
	D	d	H	M	d_1	L		
GM-2EFP-D6.0	6.0	6	9	30	5.8	75	2	○
GM-2EFP-D8.0	8.0	8	12	40	7.8	100	2	○
GM-2EFP-D10.0	10.0	10	15	50	9.6	100	2	○
GM-2EFP-D12.0	12.0	12	18	50	11.5	100	2	○
GM-2EFP-D16.0	16.0	16	24	50	15.5	150	2	○
GM-2EFP-D20.0	20.0	20	30	60	19.5	150	2	○

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

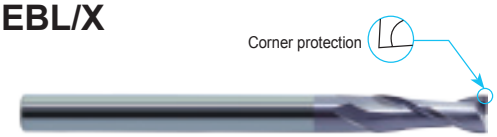
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	○			○	◎				

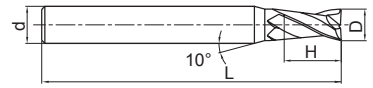
Code key B258
Graphics category and identification B259
Cutting parameters B503
Non-standard customization B570-B571

2-flute flattened end mills with long shank

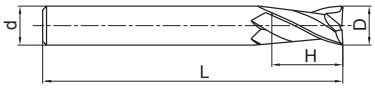
Side face | Step shoulder | Straight slot

GM-2EBL/X





Picture 1



Picture 2

- GM-2E series with long shank.

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

Type	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	D	d	H	L			
GM-2EBL-D3.0S	3.0	4	8	75	2	Picture 1	○
GM-2EBL-D3.0	3.0	6	8	75	2	Picture 1	○
GM-2EBL-D4.0S	4.0	4	11	75	2	Picture 2	○
GM-2EBL-D4.0	4.0	6	11	75	2	Picture 1	○
GM-2EBL-D6.0	6.0	6	16	75	2	Picture 2	○
GM-2EBX-D6.0	6.0	6	16	100	2	Picture 2	○
GM-2EBL-D8.0	8.0	8	20	75	2	Picture 2	○
GM-2EBX-D8.0	8.0	8	20	100	2	Picture 2	○
GM-2EBL-D10.0	10.0	10	25	100	2	Picture 2	○
GM-2EBX-D10.0	10.0	10	25	150	2	Picture 2	○
GM-2EBL-D12.0	12.0	12	30	100	2	Picture 2	○
GM-2EBX-D12.0	12.0	12	30	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 B258 | Graphics category and identification B259 | Cutting parameters B500 | Non-standard customization B570-B571

3-flute flattened end mills with straight shank

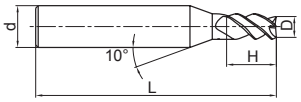

Side face


Step shoulder

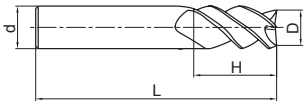

Straight slot

GM-3E



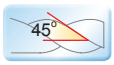


Picture 1

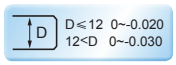


Picture 2

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









Type	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	D	d	H	L			
GM-3E-D1.0F	1.0	3	3	50	3	Picture 1	○
GM-3E-D1.0S	1.0	4	3	50	3	Picture 1	○
GM-3E-D1.0	1.0	6	3	50	3	Picture 1	○
GM-3E-D1.5F	1.5	3	4	50	3	Picture 1	○
GM-3E-D1.5S	1.5	4	4	50	3	Picture 1	○
GM-3E-D1.5	1.5	6	4	50	3	Picture 1	○
GM-3E-D2.0F	2.0	3	6	50	3	Picture 1	○
GM-3E-D2.0S	2.0	4	6	50	3	Picture 1	○
GM-3E-D2.0	2.0	6	6	50	3	Picture 1	○
GM-3E-D2.5F	2.5	3	8	50	3	Picture 1	○
GM-3E-D2.5S	2.5	4	8	50	3	Picture 1	○
GM-3E-D2.5	2.5	6	8	50	3	Picture 1	○
GM-3E-D3.0F	3.0	3	8	50	3	Picture 2	○
GM-3E-D3.0S	3.0	4	8	50	3	Picture 1	○
GM-3E-D3.0	3.0	6	8	50	3	Picture 1	○
GM-3E-D3.5S	3.5	4	10	50	3	Picture 1	○
GM-3E-D3.5	3.5	6	10	50	3	Picture 1	○
GM-3E-D4.0S	4.0	4	11	50	3	Picture 2	○
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	○

● 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						
◎	◎	◎	○			○	◎				

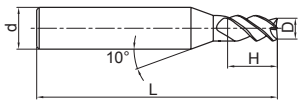
Code key B258
Graphics category and identification B259
Cutting parameters B504
Non-standard customization B570-B571

3-flute flattened end mills with straight shank

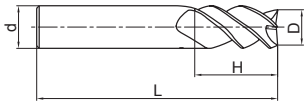


GM-3E





Picture 1



Picture 2

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



Type	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	D	d	H	L			
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

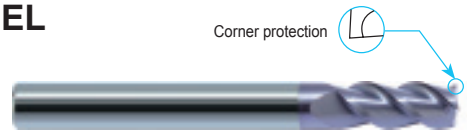
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	○			○	◎				

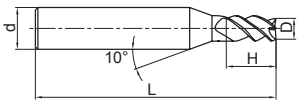
Code key B258
Graphics category and identification B259
Cutting parameters B504
Non-standard customization B570-B571

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

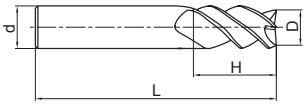


GM-3EL





Picture 1



Picture 2

- GM-3E series with long cutting edge.



Type	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

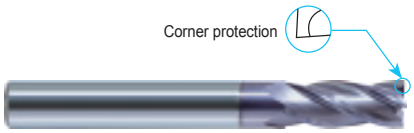
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	○			○	◎				

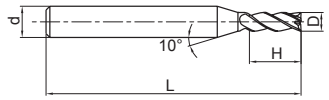
Code key B258
Graphics category and identification B259
Cutting parameters B504
Non-standard customization B570-B571

4-flute flattened end mills with straight shank

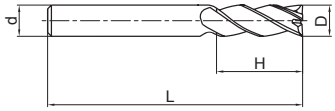
Side face | Step shoulder | Straight slot

GM-4E-G



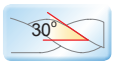


Picture 1

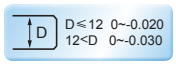


Picture 2

- Very suitable for side milling.
- Wide application.









Type	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	D	d	H	L			
GM-4E-D1.0F-G	1.0	3	3	50	4	Picture 1	○
GM-4E-D1.0S-G	1.0	4	3	50	4	Picture 1	●
GM-4E-D1.0-G	1.0	6	3	50	4	Picture 1	●
GM-4E-D1.5F-G	1.5	3	4	50	4	Picture 1	○
GM-4E-D1.5S-G	1.5	4	4	50	4	Picture 1	●
GM-4E-D1.5-G	1.5	6	4	50	4	Picture 1	●
GM-4E-D2.0F-G	2.0	3	6	50	4	Picture 1	○
GM-4E-D2.0S-G	2.0	4	6	50	4	Picture 1	●
GM-4E-D2.0-G	2.0	6	6	50	4	Picture 1	●
GM-4E-D2.5F-G	2.5	3	8	50	4	Picture 1	○
GM-4E-D2.5S-G	2.5	4	8	50	4	Picture 1	●
GM-4E-D2.5-G	2.5	6	8	50	4	Picture 1	●
GM-4E-D3.0F-G	3.0	3	8	50	4	Picture 2	○
GM-4E-D3.0S-G	3.0	4	8	50	4	Picture 1	●
GM-4E-D3.0-G	3.0	6	8	50	4	Picture 1	●
GM-4E-D3.5S-G	3.5	4	10	50	4	Picture 1	○
GM-4E-D3.5-G	3.5	6	10	50	4	Picture 1	●
GM-4E-D4.0S-G	4.0	4	11	50	4	Picture 2	●
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	●

● 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 B258 | Graphics category and identification B259 | Cutting parameters B505 | Non-standard customization B570-B571

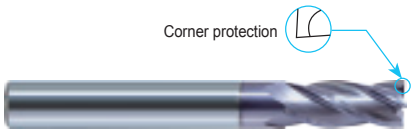
4-flute flattened end mills with straight shank

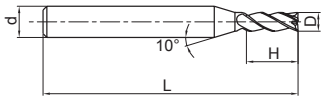

Side face


Step shoulder

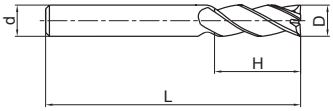

Straight slot

GM-4E-G



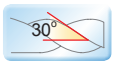


Picture 1

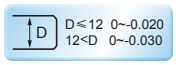


Picture 2

- Very suitable for side milling.
- Wide application.









Type	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	D	d	H	L			
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

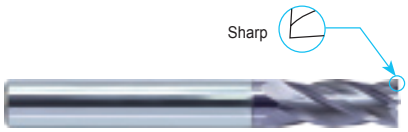
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	○			○	◎				

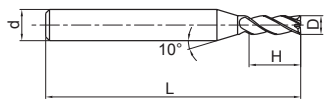
Code key B258
Graphics category and identification B259
Cutting parameters B505
Non-standard customization B570-B571

4-flute unequal pitch flattened end mill with straight shank

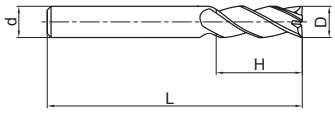
Side face | Step shoulder | Straight slot

GM-4F-G



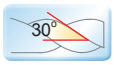


Picture 1

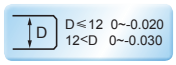


Picture 2

- Very suitable for side milling.
- Wide application.









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

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

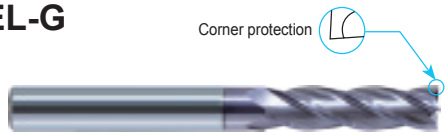
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	○			○	◎				

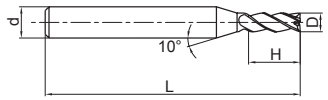
Code key B258 | Graphics category and identification B259 | Cutting parameters B506 | Non-standard customization B570-B571

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

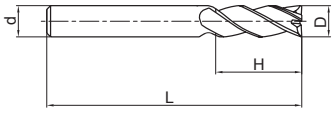


GM-4EL-G





Picture 1



Picture 2

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



Type	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

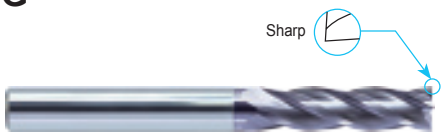
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	○			○	◎				

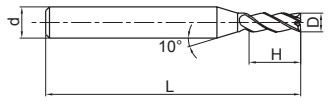
Code key B258
Graphics category and identification B259
Cutting parameters B505
Non-standard customization B570-B571

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

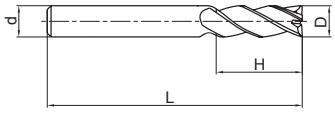
Side face Step shoulder Straight slot

GM-4FL-G



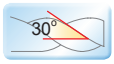


Picture 1



Picture 2

● GM-4FL-G series with long cutting edge.









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

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

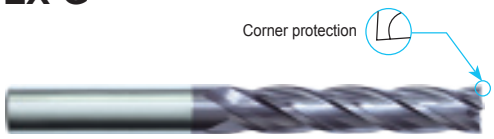
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	○			○	◎				

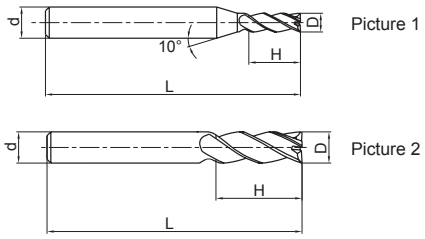
Code key B258 Graphics category and identification B259 Cutting parameters B506 Non-standard customization B570-B571

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



GM-4EX-G





- Extra long cutting edge, for deep side wall machining.



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

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

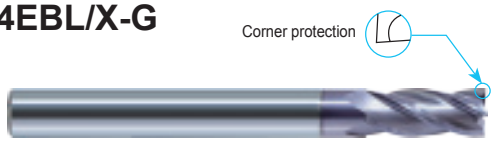
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	○			○	◎				

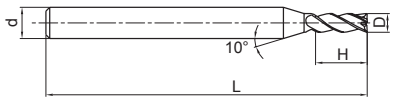
Code key B258
Graphics category and identification B259
Cutting parameters B507
Non-standard customization B570-B571

4-flute flattened end mills with long shank

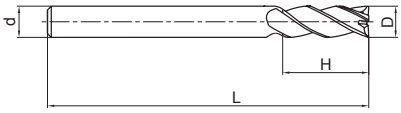


GM-4EBL/X-G





Picture 1



Picture 2

● GM-4E-G series with long shank.



Type	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	D	d	H	L			
GM-4EBL-D3.0S-G	3.0	4	8	75	4	Picture 1	○
GM-4EBL-D3.0-G	3.0	6	8	75	4	Picture 1	○
GM-4EBL-D4.0S-G	4.0	4	11	75	4	Picture 2	○
GM-4EBL-D4.0-G	4.0	6	11	75	4	Picture 1	○
GM-4EBL-D6.0-G	6.0	6	16	75	4	Picture 2	○
GM-4EBX-D6.0-G	6.0	6	16	100	4	Picture 2	○
GM-4EBL-D8.0-G	8.0	8	24	75	4	Picture 2	○
GM-4EBX-D8.0-G	8.0	8	24	100	4	Picture 2	○
GM-4EBL-D10.0-G	10.0	10	30	100	4	Picture 2	○
GM-4EBX-D10.0-G	10.0	10	30	150	4	Picture 2	○
GM-4EBL-D12.0-G	12.0	12	36	100	4	Picture 2	○
GM-4EBX-D12.0-G	12.0	12	36	150	4	Picture 2	○

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

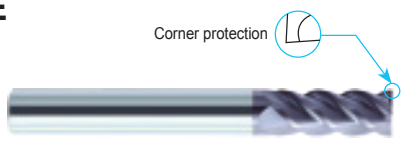
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	○			○	◎				

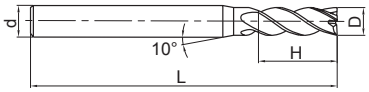
Code key B258
Graphics category and identification B259
Cutting parameters B505
Non-standard customization B570-B571

4-flute flattened end mills with straight shank

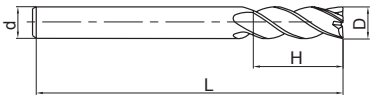


GM-4E



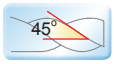


Picture 1



Picture 2

- Very suitable for side milling and shallow slot machining.
- Wide application.









Type	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	D	d	H	L			
GM-4E-D1.0F	1.0	3	3	50	4	Picture 1	○
GM-4E-D1.0S	1.0	4	3	50	4	Picture 1	●
GM-4E-D1.0	1.0	6	3	50	4	Picture 1	●
GM-4E-D1.5F	1.5	3	4	50	4	Picture 1	○
GM-4E-D1.5S	1.5	4	4	50	4	Picture 1	●
GM-4E-D1.5	1.5	6	4	50	4	Picture 1	●
GM-4E-D2.0F	2.0	3	6	50	4	Picture 1	○
GM-4E-D2.0S	2.0	4	6	50	4	Picture 1	●
GM-4E-D2.0	2.0	6	6	50	4	Picture 1	●
GM-4E-D2.5F	2.5	3	8	50	4	Picture 1	○
GM-4E-D2.5S	2.5	4	8	50	4	Picture 1	●
GM-4E-D2.5	2.5	6	8	50	4	Picture 1	●
GM-4E-D3.0F	3.0	3	8	50	4	Picture 2	○
GM-4E-D3.0S	3.0	4	8	50	4	Picture 1	●
GM-4E-D3.0	3.0	6	8	50	4	Picture 1	●
GM-4E-D3.5S	3.5	4	10	50	4	Picture 1	○
GM-4E-D3.5	3.5	6	10	50	4	Picture 1	●
GM-4E-D4.0S	4.0	4	11	50	4	Picture 2	●
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	●

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

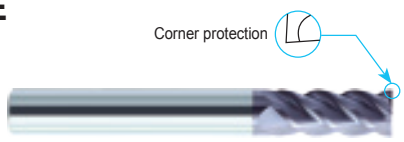
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	○			○	◎				

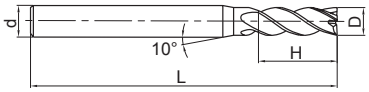
Code key B258
Graphics category and identification B259
Cutting parameters B508
Non-standard customization B570-B571

4-flute flattened end mills with straight shank

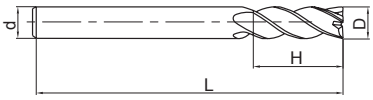


GM-4E





Picture 1



Picture 2

- Very suitable for side milling and shallow slot machining.
- Wide application.



Type	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	D	d	H	L			
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 B258
Graphics category and identification B259
Cutting parameters B508
Non-standard customization B570-B571

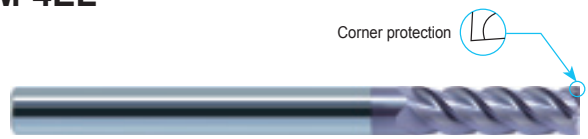
4-flute flattened end mills with straight shank and long cutting edge

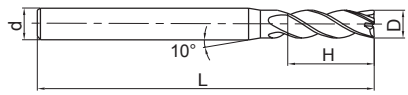

Side face


Step shoulder

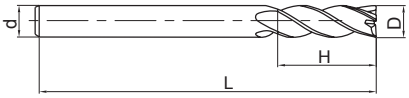

Straight slot

GM-4EL



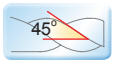


Picture 1



Picture 2

- GM-4E series with long cutting edge.









Type	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

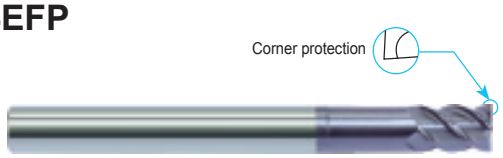
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	○			○	◎				

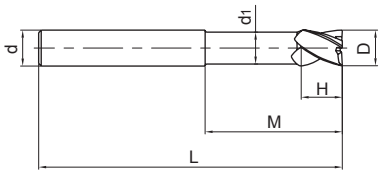
Code key B258
Graphics category and identification B259
Cutting parameters B508
Non-standard customization B570-B571

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



GM-4EFP





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



Type	Basic dimension(mm)						Number of teeth Z	Stock
	D	d	H	M	d_1	L		
GM-4EFP-D6.0	6.0	6	9	30	5.8	75	4	○
GM-4EFP-D8.0	8.0	8	12	40	7.8	100	4	○
GM-4EFP-D10.0	10.0	10	15	50	9.6	100	4	○
GM-4EFP-D12.0	12.0	12	18	50	11.5	100	4	○
GM-4EFP-D16.0	16.0	16	24	50	15.5	150	4	○
GM-4EFP-D20.0	20.0	20	30	60	19.5	150	4	○

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

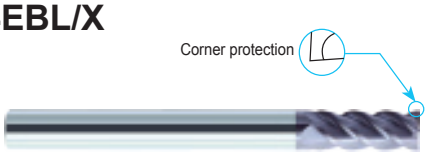
Workpiece material										
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	○			○	◎				

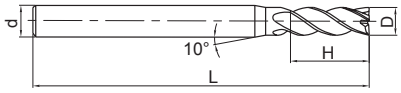
Code key B258
Graphics category and identification B259
Cutting parameters B509
Non-standard customization B570-B571



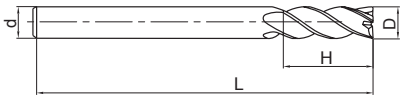
4-flute flattened end mills with long shank

GM-4EBL/X





Picture 1



Picture 2

● GM-4E series with long shank.



Type	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	D	d	H	L			
GM-4EBL-D3.0S	3.0	4	8	75	4	Picture 1	○
GM-4EBL-D3.0	3.0	6	8	75	4	Picture 1	○
GM-4EBL-D4.0S	4.0	4	11	75	4	Picture 2	○
GM-4EBL-D4.0	4.0	6	11	75	4	Picture 1	○
GM-4EBL-D6.0	6.0	6	16	75	4	Picture 2	○
GM-4EBX-D6.0	6.0	6	16	100	4	Picture 2	○
GM-4EBL-D8.0	8.0	8	24	75	4	Picture 2	○
GM-4EBX-D8.0	8.0	8	24	100	4	Picture 2	○
GM-4EBL-D10.0	10.0	10	30	100	4	Picture 2	○
GM-4EBX-D10.0	10.0	10	30	150	4	Picture 2	○
GM-4EBL-D12.0	12.0	12	36	100	4	Picture 2	○
GM-4EBX-D12.0	12.0	12	36	150	4	Picture 2	○

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

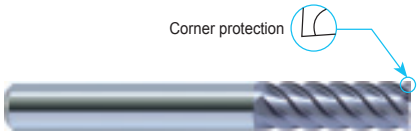
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	○			○	◎				

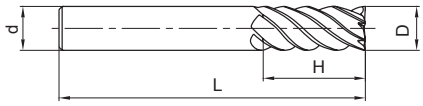
Code key B258
Graphics category and identification B259
Cutting parameters B508
Non-standard customization B570-B571

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.



Type	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

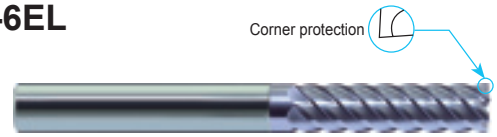
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	○			○	◎				

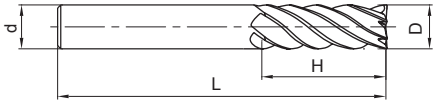
Code key B258
Graphics category and identification B259
Cutting parameters B510
Non-standard customization B570-B571

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



GM-6EL





● GM-6E series with long cutting edge.



Type	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						
◎	◎	◎	○			○	◎				

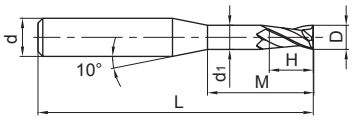
Code key B258
Graphics category and identification B259
Cutting parameters B511
Non-standard customization B570-B571

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

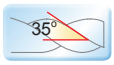
Deep flattened slot

GM-2EP

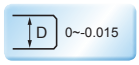




- Suitable for narrow slot milling or milling of fine parts that could generate interference.







D<1mm 1mm≤D



Type	Basic dimension(mm)						Number of teeth Z	Stock
	D	d	H	M	d_1	L		
GM-2EP-D0.3-M02	0.3	4	0.4	2	0.25	50	2	●
GM-2EP-D0.3-M04	0.3	4	0.4	4	0.25	50	2	●
GM-2EP-D0.4-M02	0.4	4	0.6	2	0.35	50	2	●
GM-2EP-D0.4-M04	0.4	4	0.6	4	0.35	50	2	●
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-D0.6-M04	0.6	4	0.9	4	0.55	50	2	●
GM-2EP-D0.6-M06	0.6	4	0.9	6	0.55	50	2	●
GM-2EP-D0.7-M04	0.7	4	1.0	4	0.65	50	2	●
GM-2EP-D0.7-M06	0.7	4	1.0	6	0.65	50	2	●
GM-2EP-D0.7-M08	0.7	4	1.0	8	0.65	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	●

● 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						
◎	◎	◎	○			○	◎				

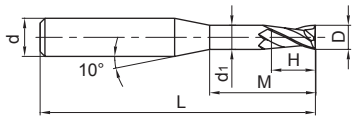
Code key B258 Graphics category and identification B259 Cutting parameters B512-B513 Non-standard customization B570-B571

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

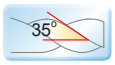
Deep flattened slot

GM-2EP

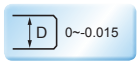




- Suitable for narrow slot milling or milling of fine parts that could generate interference.







D<1mm 1mm≤D



Type	Basic dimension(mm)						Number of teeth Z	Stock
	D	d	H	M	d_1	L		
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	●
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						
◎	◎	◎	○			○	◎				

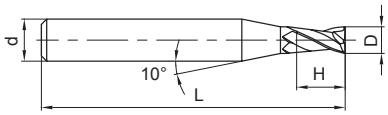
Code key B258 Graphics category and identification B259 Cutting parameters B512-B513 Non-standard customization B570-B571

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

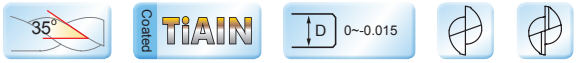


GM-2ES





● 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.



Type	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 B258 Graphics category and identification B259 Cutting parameters B514 Non-standard customization B570-B571


Profile

Cavity

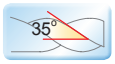
Ball nose slot

2-flute ball nose end mills with straight shank

GM-2B

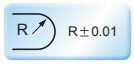


- For profile milling, high speed machining applicable.
- Wide application.

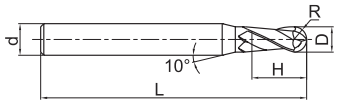




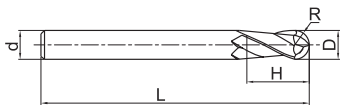








Picture 1



Picture 2

Type	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-R0.5	1.0	0.5	6	2	50	2	Picture 1	●
GM-2B-R0.75S	1.5	0.75	4	3	50	2	Picture 1	●
GM-2B-R0.75	1.5	0.75	6	3	50	2	Picture 1	●
GM-2B-R1.0F	2.0	1.0	3	4	50	2	Picture 1	●
GM-2B-R1.0S	2.0	1.0	4	4	50	2	Picture 1	●
GM-2B-R1.0	2.0	1.0	6	4	50	2	Picture 1	●
GM-2B-R1.25F	2.5	1.25	3	5	50	2	Picture 1	●
GM-2B-R1.25S	2.5	1.25	4	5	50	2	Picture 1	●
GM-2B-R1.25	2.5	1.25	6	5	50	2	Picture 1	●
GM-2B-R1.5F	3.0	1.5	3	6	50	2	Picture 2	●
GM-2B-R1.5S	3.0	1.5	4	6	50	2	Picture 1	●
GM-2B-R1.5	3.0	1.5	6	6	50	2	Picture 1	●
GM-2B-R1.75S	3.5	1.75	4	8	50	2	Picture 1	●
GM-2B-R1.75	3.5	1.75	6	8	50	2	Picture 1	●
GM-2B-R2.0S	4.0	2.0	4	8	50	2	Picture 2	●
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	10.0	5.0	10	20	75	2	Picture 2	●
GM-2B-R6.0	12.0	6.0	12	24	75	2	Picture 2	●
GM-2B-R7.0	14.0	7.0	14	28	75	2	Picture 2	●
GM-2B-R8.0	16.0	8.0	16	32	100	2	Picture 2	●
GM-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 B258
Graphics category and identification B259
Cutting parameters B515
Non-standard customization B570-B571

2-flute ball nose end mills with long shank

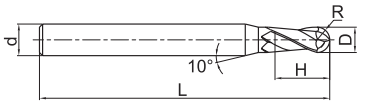

Profile


Cavity

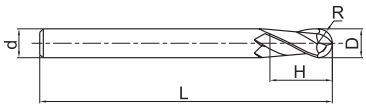

Ball nose slot

GM-2BL/M/X



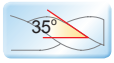


Picture 1



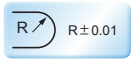
Picture 2

- GM-2B series with long shank.











Type	Basic dimension(mm)					Number of teeth Z	Geometry	Stock
	D	R	d	H	L			
GM-2BL-R1.0S	2.0	1.0	4	4	75	2	Picture 1	●
GM-2BL-R1.0	2.0	1.0	6	4	75	2	Picture 1	●
GM-2BL-R1.25F	2.5	1.25	3	5	50	2	Picture 1	●
GM-2BL-R1.25S	2.5	1.25	4	5	75	2	Picture 1	●
GM-2BL-R1.25	2.5	1.25	6	5	75	2	Picture 1	●
GM-2BL-R1.5F	3.0	1.5	3	6	50	2	Picture 2	●
GM-2BL-R1.5S	3.0	1.5	4	6	75	2	Picture 1	●
GM-2BL-R1.5	3.0	1.5	6	6	75	2	Picture 1	●
GM-2BL-R1.75S	3.5	1.75	4	8	75	2	Picture 1	●
GM-2BL-R1.75	3.5	1.75	6	8	75	2	Picture 1	●
GM-2BL-R2.0S	4.0	2.0	4	8	75	2	Picture 2	●
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-2BX-R3.0	6.0	3.0	6	12	100	2	Picture 2	●
GM-2BL-R3.5	7.0	3.5	8	14	75	2	Picture 1	●
GM-2BM-R4.0	8.0	4.0	8	16	75	2	Picture 2	●
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-2BX-R5.0	10.0	5.0	10	20	150	2	Picture 2	●
GM-2BL-R6.0	12.0	6.0	12	24	100	2	Picture 2	●
GM-2BX-R6.0	12.0	6.0	12	24	150	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						
◎	◎	◎	○			○	◎				

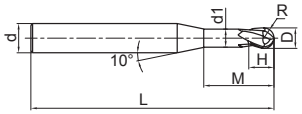
Code key B258 Graphics category and identification B259 Cutting parameters B515 Non-standard customization B570-B571

2-flute ballnose end mills with long neck and short cutting edge

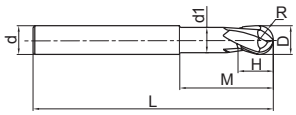
Profile Cavity Ball nose slot

GM-2BFP





Picture 1



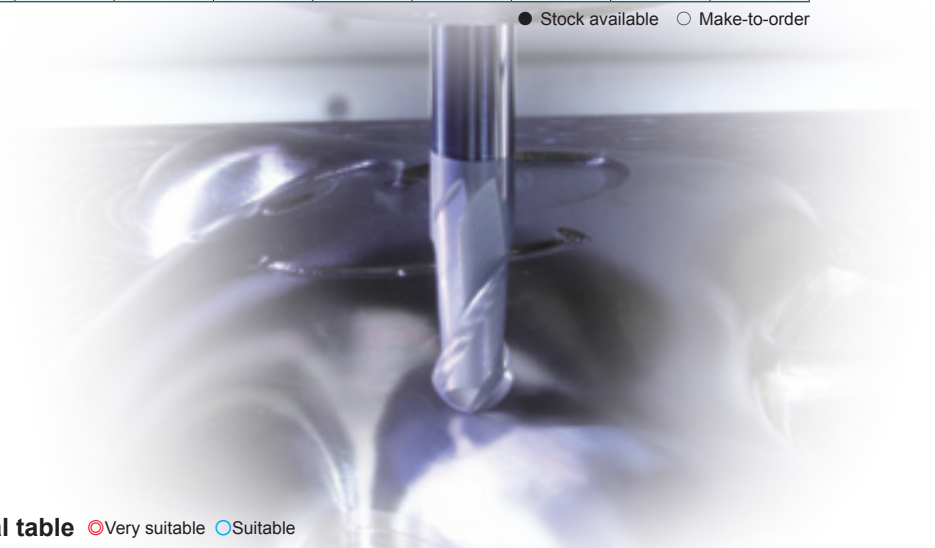
Picture 2

- High rigidity short cutting edge ,suitable for heavy cutting.

35° Coated TiAlN D D≤12 0~-0.020 12<D 0~-0.030 R R±0.01

Type	Basic dimension(mm)							Number of teeth Z	Geometry	Stock
	D	R	H	d_1	M	d	L			
GM-2BFP-R0.5	1.0	0.5	1	0.95	2.5	6	75	2	图一	○
GM-2BFP-R0.75	1.5	0.75	1	1.45	3.0	6	75	2	图一	○
GM-2BFP-R1.0	2.0	1.0	2	1.95	4.0	6	75	2	图一	○
GM-2BFP-R1.5	3.0	1.5	3	2.85	6.0	6	75	2	图一	○
GM-2BFP-R2.0	4.0	2.0	4	3.85	8.0	6	75	2	图一	○
GM-2BFP-R2.5	5.0	2.5	5	4.85	10.0	6	75	2	图一	○
GM-2BFP-R3.0	6.0	3.0	6	5.8	12.0	6	75	2	图二	○
GM-2BFP-R4.0	8.0	4.0	8	7.8	16.0	8	100	2	图二	○
GM-2BFP-R5.0	10.0	5.0	10	9.6	20.0	10	100	2	图二	○
GM-2BFP-R6.0	12.0	6.0	12	11.5	24.0	12	100	2	图二	○
GM-2BFP-R8.0	16.0	8.0	16	15.5	32.0	16	150	2	图二	○
GM-2BFP-R10.0	20.0	10.0	20	19.5	40.0	20	150	2	图二	○

● 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						
◎	◎	◎	○			○	◎				

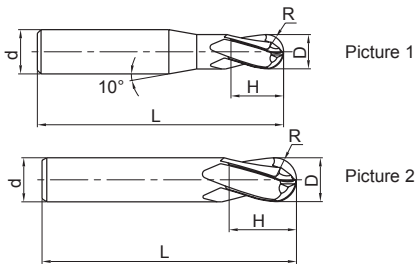
Code key B258 Graphics category and identification B259 Cutting parameters B515 Non-standard customization B570-B571

4-flute ball nose end mills with straight shank

Profile Cavity Ball nose slot

GM-4B





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

35° Coated TiAlN D D≤12 0~-0.020 12<D 0~-0.030 R R±0.01

Type	Basic dimension(mm)					Number of teeth Z	Geometry	Stock
	D	R	d	H	L			
GM-4B-R1.5S	3.0	1.5	4	6	50	4	Picture 1	●
GM-4B-R1.5	3.0	1.5	6	6	50	4	Picture 1	●
GM-4B-R2.0S	4.0	2.0	4	8	50	4	Picture 2	●
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 B258 Graphics category and identification B259 Cutting parameters B516 Non-standard customization B570-B571


Profile

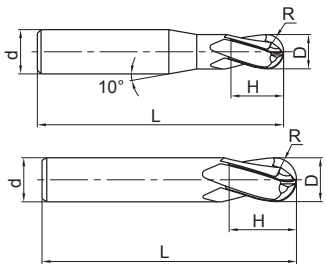
Cavity

Ball nose slot

4-flute ball nose end mills with long shank

GM-4BL/M/X

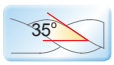




Picture 1

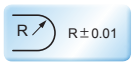
Picture 2

- GM-4B series with long shank.











Type	Basic dimension(mm)					Number of teeth Z	Geometry	Stock
	D	R	d	H	L			
GM-4BL-R1.5S	3.0	1.5	4	6	75	4	Picture 1	○
GM-4BL-R1.5	3.0	1.5	6	6	75	4	Picture 1	○
GM-4BL-R2.0S	4.0	2.0	4	8	75	4	Picture 2	○
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-4BX-R3.0	6.0	3.0	6	12	100	4	Picture 2	○
GM-4BM-R4.0	8.0	4.0	8	16	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-4BX-R5.0	10.0	5.0	10	20	150	4	Picture 2	○
GM-4BL-R6.0	12.0	6.0	12	24	100	4	Picture 2	○
GM-4BX-R6.0	12.0	6.0	12	24	150	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 B258
Graphics category and identification B259
Cutting parameters B516
Non-standard customization B570-B571

2-flute tiny ball nose end mills with straight shank

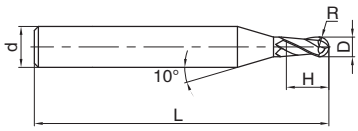

Profile


Cavity

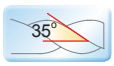

Ball nose slot

GM-2BS



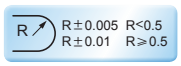


- Tiny diameter end mills can fully display high speed and high precision performances of machining center, often used for machining of precision components such as electronic part etc.











Type	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						
◎	◎	◎	○			○	◎				

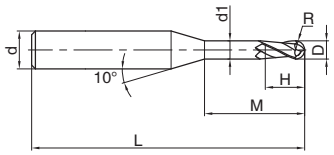
Code key B258
Graphics category and identification B259
Cutting parameters B517
Non-standard customization B570-B571

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 R±0.005 R<0.5 R±0.01 R≥0.5

Type	Basic dimension(mm)							Number of teeth Z	Stock
	D	R	H	d_1	M	d	L		
GM-2BP-R0.15-M02	0.3	0.15	0.4	0.25	2	4	50	2	●
GM-2BP-R0.15-M04	0.3	0.15	0.4	0.25	4	4	50	2	●
GM-2BP-R0.2-M02	0.4	0.2	0.6	0.35	2	4	50	2	●
GM-2BP-R0.2-M04	0.4	0.2	0.6	0.35	4	4	50	2	●
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	●

● 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						
◎	◎	◎	○			○	◎				

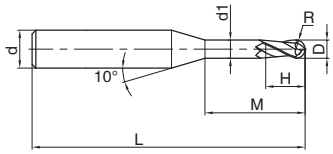
Code key B258 | Graphics category and identification B259 | Cutting parameters B518-B519 | Non-standard customization B570-B571

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 R±0.005 R<0.5 R±0.01 R≥0.5

Type	Basic dimension(mm)							Number of teeth Z	Stock
	D	R	H	d_1	M	d	L		
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	●
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 B258 | Graphics category and identification B259 | Cutting parameters B518-B519 | Non-standard customization B570-B571

2-flute R end mills with straight shank


Radius shoulder

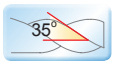

Profile


Radius corner slot

GM-2R



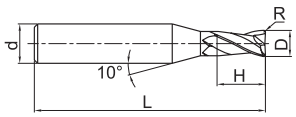
- Wide applications, applicable for several machining styles.



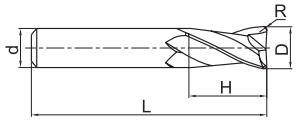








Picture 1



Picture 2

Type	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						
◎	◎	◎	○			○	◎				

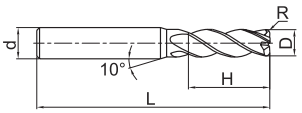
Code key B258
Graphics category and identification B259
Cutting parameters B520
Non-standard customization B570-B571

4-flute R end mills with straight shank

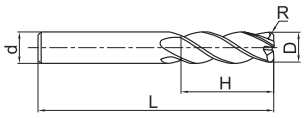
Radius shoulder | Profile | Radius corner slot

GM-4R





Picture 1



Picture 2

- Wide applications, applicable for several machining styles.

35° | Coated TiAlN | D 0~-0.020

Type	Basic dimension(mm)					Number of teeth Z	Geometry	Stock
	D	R	d	H	L			
GM-4R-D1.0R0.2	1.0	0.2	4	3	50	4	Picture 1	○
GM-4R-D1.5R0.2	1.5	0.2	4	4	50	4	Picture 1	○
GM-4R-D2.0R0.2	2.0	0.2	4	6	50	4	Picture 1	○
GM-4R-D2.0R0.5	2.0	0.5	4	6	50	4	Picture 1	○
GM-4R-D2.5R0.2	2.5	0.2	4	8	50	4	Picture 1	○
GM-4R-D2.5R0.5	2.5	0.5	4	8	50	4	Picture 1	○
GM-4R-D3.0R0.2	3.0	0.2	4	8	50	4	Picture 1	●
GM-4R-D3.0R0.5	3.0	0.5	4	8	50	4	Picture 1	○
GM-4R-D4.0R0.2	4.0	0.2	4	10	50	4	Picture 2	○
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-D5.0R0.2	5.0	0.2	6	13	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-D6.0R0.3	6.0	0.3	6	16	50	4	Picture 2	○
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-D8.0R0.3	8.0	0.3	8	20	60	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-D10.0R0.3	10.0	0.3	10	25	75	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-D12.0R0.3	12.0	0.3	12	30	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 B258 | Graphics category and identification B259 | Cutting parameters B521 | Non-standard customization B570-B571


Radius shoulder

Profile

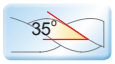
Radius corner slot

4-flute R end mills with long shank

GM-4RL/M/X



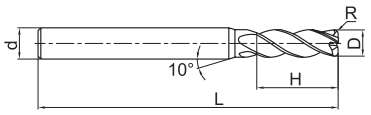
- GM-4R series with long shank.



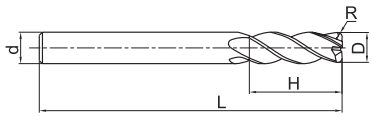








Picture 1



Picture 2

Type	Basic dimension(mm)					Number of teeth Z	Geometry	Stock
	D	R	d	H	L			
GM-4RL-D4.0R0.2S	4.0	0.2	4	10	75	4	Picture 2	●
GM-4RL-D4.0R0.2	4.0	0.2	6	10	75	4	Picture 1	●
GM-4RL-D4.0R0.5S	4.0	0.5	4	10	75	4	Picture 2	●
GM-4RL-D4.0R0.5	4.0	0.5	6	10	75	4	Picture 1	●
GM-4RL-D6.0R0.2	6.0	0.2	6	16	75	4	Picture 2	●
GM-4RX-D6.0R0.2	6.0	0.2	6	16	100	4	Picture 2	●
GM-4RL-D6.0R0.5	6.0	0.5	6	16	75	4	Picture 2	●
GM-4RX-D6.0R0.5	6.0	0.5	6	16	100	4	Picture 2	●
GM-4RL-D6.0R1.0	6.0	1.0	6	16	75	4	Picture 2	●
GM-4RX-D6.0R1.0	6.0	1.0	6	16	100	4	Picture 2	●
GM-4RM-D8.0R0.2	8.0	0.2	8	20	75	4	Picture 2	●
GM-4RL-D8.0R0.2	8.0	0.2	8	20	100	4	Picture 2	●
GM-4RM-D8.0R0.5	8.0	0.5	8	20	75	4	Picture 2	●
GM-4RL-D8.0R0.5	8.0	0.5	8	20	100	4	Picture 2	●
GM-4RM-D8.0R1.0	8.0	1.0	8	20	75	4	Picture 2	●
GM-4RL-D8.0R1.0	8.0	1.0	8	20	100	4	Picture 2	●
GM-4RL-D10.0R0.2	10.0	0.2	10	25	100	4	Picture 2	●
GM-4RX-D10.0R0.2	10.0	0.2	10	25	150	4	Picture 2	●
GM-4RL-D10.0R0.5	10.0	0.5	10	25	100	4	Picture 2	●
GM-4RX-D10.0R0.5	10.0	0.5	10	25	150	4	Picture 2	●
GM-4RL-D10.0R1.0	10.0	1.0	10	25	100	4	Picture 2	●
GM-4RX-D10.0R1.0	10.0	1.0	10	25	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 B258
Graphics category and identification B259
Cutting parameters B521
Non-standard customization B570-B571

4-flute R end mills with long shank

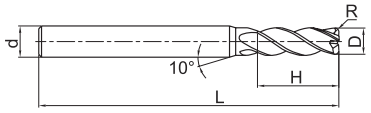
Radius shoulder Profile Radius corner slot

GM-4RL/M/X

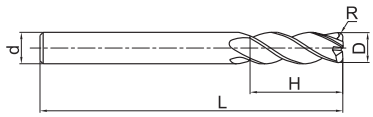


- GM-4R series with long shank.

35° Coated TiAlN D D≤12 0~-0.020 12<D 0~-0.030



Picture 1



Picture 2

Type	Basic dimension(mm)					Number of teeth Z	Geometry	Stock
	D	R	d	H	L			
GM-4RL-D10.0R2.0	10.0	2.0	10	25	100	4	Picture 2	●
GM-4RX-D10.0R2.0	10.0	2.0	10	25	150	4	Picture 2	●
GM-4RL-D12.0R0.2	12.0	0.2	12	30	100	4	Picture 2	●
GM-4RX-D12.0R0.2	12.0	0.2	12	30	150	4	Picture 2	●
GM-4RL-D12.0R0.5	12.0	0.5	12	30	100	4	Picture 2	●
GM-4RX-D12.0R0.5	12.0	0.5	12	30	150	4	Picture 2	●
GM-4RL-D12.0R1.0	12.0	1.0	12	30	100	4	Picture 2	●
GM-4RX-D12.0R1.0	12.0	1.0	12	30	150	4	Picture 2	●
GM-4RL-D12.0R2.0	12.0	2.0	12	30	100	4	Picture 2	●
GM-4RX-D12.0R2.0	12.0	2.0	12	30	150	4	Picture 2	●
GM-4RL-D16.0R1.0	16.0	1.0	16	45	150	4	Picture 2	●
GM-4RL-D16.0R2.0	16.0	2.0	16	45	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 B258 Graphics category and identification B259 Cutting parameters B521 Non-standard customization B570-B571

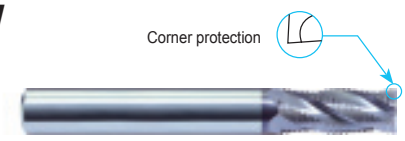
4-flute flattened end mills with straight shank and corrugated edges

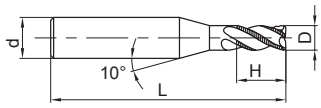

Side face


Step shoulder

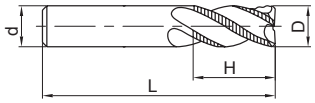

Straight slot

GM-4W



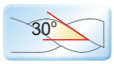


Picture 1

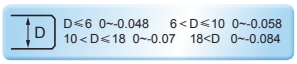


Picture 2

● Very suitable for high-efficiency rough machining.









Type	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

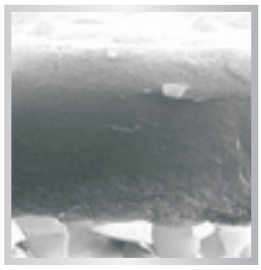
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	○			○	◎				

Code key B258
Graphics category and identification B259
Cutting parameters B522-B523
Non-standard customization B570-B571



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

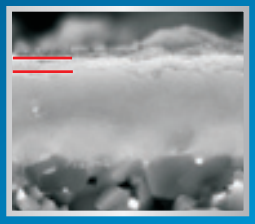
New technology
Breakthrough upgrading

- unique edge 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.

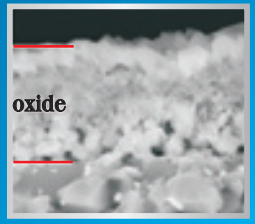


Perfect high temperature oxidation resistance:

After oxidation at 1100 °C, the coating of HMX series only has a very thin oxide layer, while the similar products of Company A has completely oxidized.



HMX series



A company


Side face

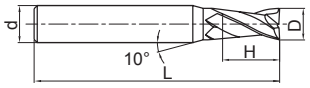
Step shoulder

Straight slot

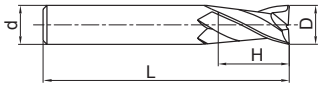
2-flute flattened end mills with straight shank

HMX-2E



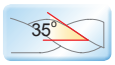


Picture 1

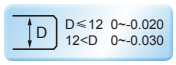


Picture 2

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









Type	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	D	d	H	L			
HMX-2E-D1.0F	1.0	3	3	50	2	Picture 1	●
HMX-2E-D1.0S	1.0	4	3	50	2	Picture 1	●
HMX-2E-D1.0	1.0	6	3	50	2	Picture 1	●
HMX-2E-D1.5S	1.5	4	4	50	2	Picture 1	●
HMX-2E-D1.5	1.5	6	4	50	2	Picture 1	●
HMX-2E-D2.0F	2.0	3	6	50	2	Picture 1	●
HMX-2E-D2.0S	2.0	4	6	50	2	Picture 1	●
HMX-2E-D2.0	2.0	6	6	50	2	Picture 1	●
HMX-2E-D2.5S	2.5	4	8	50	2	Picture 1	●
HMX-2E-D2.5	2.5	6	8	50	2	Picture 1	●
HMX-2E-D3.0F	3.0	3	8	50	2	Picture 2	●
HMX-2E-D3.0S	3.0	4	8	50	2	Picture 1	●
HMX-2E-D3.0	3.0	6	8	50	2	Picture 1	●
HMX-2E-D3.5S	3.5	4	10	50	2	Picture 1	●
HMX-2E-D3.5	3.5	6	10	50	2	Picture 1	●
HMX-2E-D4.0S	4.0	4	11	50	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 B258
Graphics category and identification B259
Cutting parameters B524
Non-standard customization B570-B571

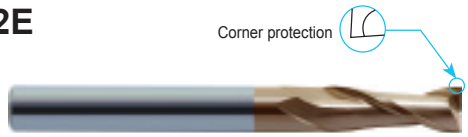
2-flute flattened end mills with straight shank

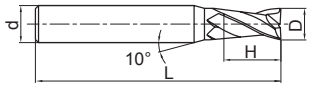

Side face


Step shoulder

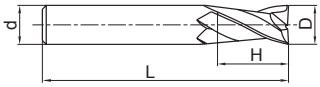

Straight slot

HMX-2E



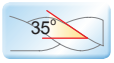


Picture 1



Picture 2

● For slot milling. ● Very suitable for high speed cutting and dry cutting.









Type	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	D	d	H	L			
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 B258 Graphics category and identification B259 Cutting parameters B524 Non-standard customization B570-B571

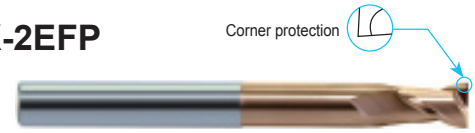
2-flute flattened end mills with long straight shank and short cutting edge

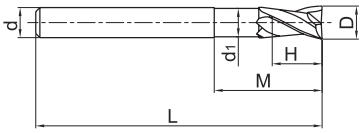

Side face


Step shoulder


Straight slot

HMX-2EFP





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

35° | Coated NaNo TiAlXN | D D≤12 0~-0.020 12<D 0~-0.030

Type	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 B258
Graphics category and identification B259
Cutting parameters B525
Non-standard customization B570-B571

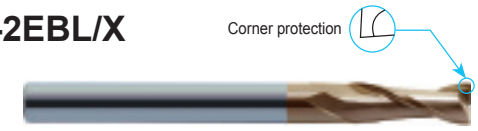
2-flute flattened end mills with straight shank

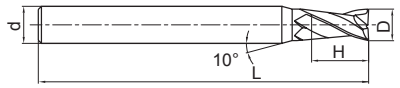

Side face


Step shoulder

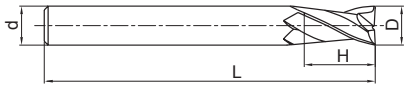

Straight slot

HMX-2EBL/X



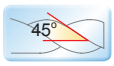


Picture 1



Picture 2

● HMX-2E series with long shank.









Type	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	D	d	H	L			
HMX-2EBL-D3.0	3.0	6	8	75	2	Picture 1	○
HMX-2EBL-D4.0S	4.0	4	11	75	2	Picture 2	○
HMX-2EBL-D4.0	4.0	6	11	75	2	Picture 1	○
HMX-2EBL-D6.0	6.0	6	16	75	2	Picture 2	○
HMX-2EBX-D6.0	6.0	6	16	100	2	Picture 2	○
HMX-2EBL-D8.0	8.0	8	20	75	2	Picture 2	○
HMX-2EBX-D8.0	8.0	8	20	100	2	Picture 2	○
HMX-2EBL-D10.0	10.0	10	25	100	2	Picture 2	○
HMX-2EBX-D10.0	10.0	10	25	150	2	Picture 2	○
HMX-2EBL-D12.0	12.0	12	30	100	2	Picture 2	○
HMX-2EBX-D12.0	12.0	12	30	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 B258 Graphics category and identification B259 Cutting parameters B524 Non-standard customization B570-B571

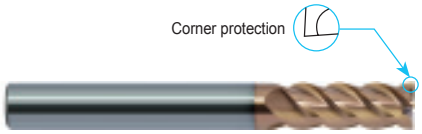

Side face

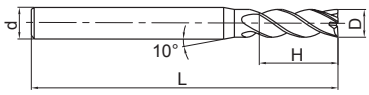
Step shoulder

Straight slot

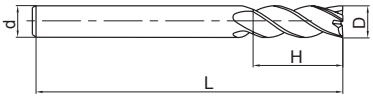
4-flute flattened end mills with straight shank

HMX-4E



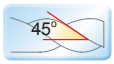


Picture 1



Picture 2

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









Type	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	D	d	H	L			
HMX-4E-D1.0F	1.0	3	3	50	4	Picture 1	●
HMX-4E-D1.0S	1.0	4	3	50	4	Picture 1	●
HMX-4E-D1.0	1.0	6	3	50	4	Picture 1	●
HMX-4E-D1.5F	1.5	3	4	50	4	Picture 1	●
HMX-4E-D1.5S	1.5	4	4	50	4	Picture 1	●
HMX-4E-D1.5	1.5	6	4	50	4	Picture 1	●
HMX-4E-D2.0F	2.0	3	6	50	4	Picture 1	●
HMX-4E-D2.0S	2.0	4	6	50	4	Picture 1	●
HMX-4E-D2.0	2.0	6	6	50	4	Picture 1	●
HMX-4E-D2.5F	2.5	3	8	50	4	Picture 1	●
HMX-4E-D2.5S	2.5	4	8	50	4	Picture 1	●
HMX-4E-D2.5	2.5	6	8	50	4	Picture 1	●
HMX-4E-D3.0F	3.0	3	8	50	4	Picture 2	●
HMX-4E-D3.0S	3.0	4	8	50	4	Picture 1	●
HMX-4E-D3.0	3.0	6	8	50	4	Picture 1	●
HMX-4E-D3.5S	3.5	4	10	50	4	Picture 1	●
HMX-4E-D4.0S	4.0	4	11	50	4	Picture 2	●

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

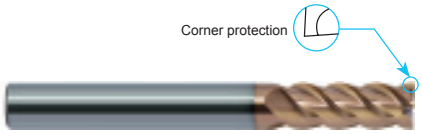
Workpiece material										
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
			○	◎	◎		○				

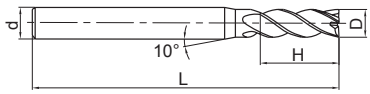
Code key B258
Graphics category and identification B259
Cutting parameters B526
Non-standard customization B570-B571

4-flute flattened end mills with straight shank

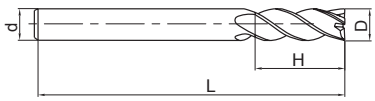
Side face | Step shoulder | Straight slot

HMX-4E





Picture 1



Picture 2

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



Type	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	D	d	H	L			
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 B258 | Graphics category and identification B259 | Cutting parameters B526 | Non-standard customization B570-B571

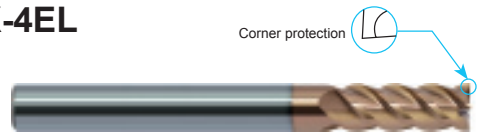
4-flute flattened end mills with straight shank and long cutting edge

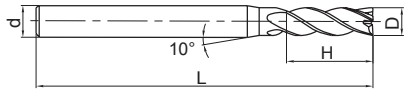

Side face


Step shoulder

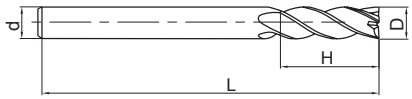

Straight slot

HMX-4EL



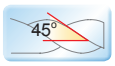


Picture 1



Picture 2

- HM-4E series with long cutting edge.









Type	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 B258
Graphics category and identification B259
Cutting parameters B526
Non-standard customization B570-B571

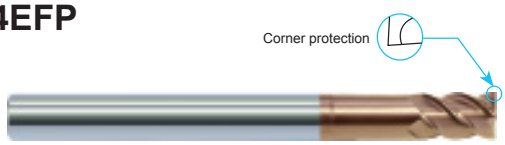
4-flute flattened end mills with straight shank, long neck and short cutting edge

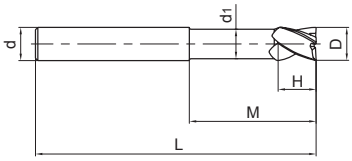

Side face


Step shoulder

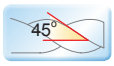

Straight slot

HMX-4EFP





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









Type	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

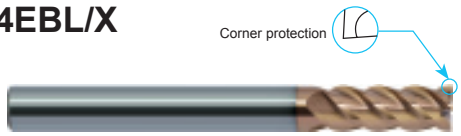
Workpiece material										
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
			○	◎	◎		○				

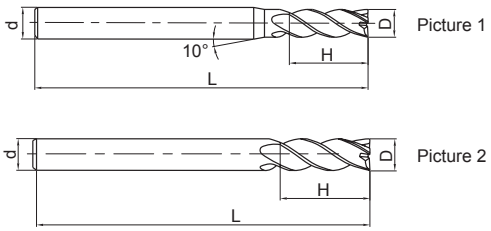
Code key B258 Graphics category and identification B259 Cutting parameters B527 Non-standard customization B570-B571



4-flute flattened end mills with long shank

HMX-4EBL/X





● HMX-4E series with long shank.



Type	Basic dimension(mm)				Number of teeth Z	Geometry	Stock
	D	d	H	L			
HMX-4EBL-D3.0S	3.0	4	8	75	4	Picture 1	●
HMX-4EBL-D3.0	3.0	6	8	75	4	Picture 1	●
HMX-4EBL-D4.0S	4.0	4	11	75	4	Picture 2	●
HMX-4EBL-D4.0	4.0	6	11	75	4	Picture 1	●
HMX-4EBL-D6.0	6.0	6	16	75	4	Picture 2	●
HMX-4EBX-D6.0	6.0	6	16	100	4	Picture 2	●
HMX-4EBL-D8.0	8.0	8	20	75	4	Picture 2	●
HMX-4EBX-D8.0	8.0	8	20	100	4	Picture 2	●
HMX-4EBL-D10.0	10.0	10	25	100	4	Picture 2	●
HMX-4EBX-D10.0	10.0	10	25	150	4	Picture 2	●
HMX-4EBL-D12.0	12.0	12	30	100	4	Picture 2	●
HMX-4EBX-D12.0	12.0	12	30	150	4	Picture 2	●

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

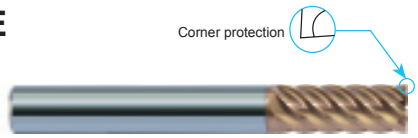
Workpiece material										
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
			○	◎	◎		○				

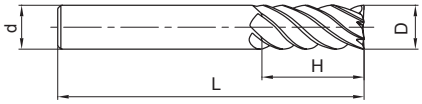
Code key B258
Graphics category and identification B259
Cutting parameters B526
Non-standard customization B570-B571

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.

45° | Coated NaNo TiAlXN | D D≤12 0~-0.020 12<D 0~-0.030

Type	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 B258 | Graphics category and identification B259 | Cutting parameters B528 | Non-standard customization B570-B571

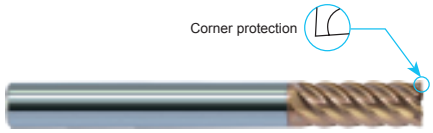
6-flute flattened end mills with straight shank and long cutting edge

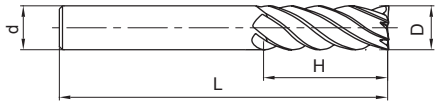

Side face


Step shoulder

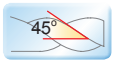

Straight slot

HMX-6EL





- HM-6E series with long cutting edge.









Type	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						
			○	◎	◎		○				

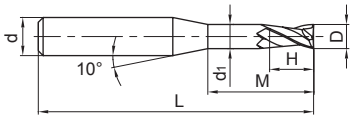
Code key B258
Graphics category and identification B259
Cutting parameters B529
Non-standard customization B570-B571

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

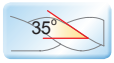

Deep flattened slot

HMX-2EP



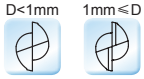


- Suitable for narrow slot milling or fine parts that could generate interference.









Type	Basic dimension(mm)						Number of teeth Z	Stock
	D	d	H	M	d_1	L		
HMX-2EP-D0.3-M02	0.3	4	0.4	2	0.25	50	2	●
HMX-2EP-D0.3-M04	0.3	4	0.4	4	0.25	50	2	●
HMX-2EP-D0.4-M02	0.4	4	0.6	2	0.35	50	2	●
HMX-2EP-D0.4-M04	0.4	4	0.6	4	0.35	50	2	●
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-D0.6-M04	0.6	4	0.9	4	0.55	50	2	●
HMX-2EP-D0.6-M06	0.6	4	0.9	6	0.55	50	2	●
HMX-2EP-D0.7-M04	0.7	4	1.0	4	0.65	50	2	●
HMX-2EP-D0.7-M06	0.7	4	1.0	6	0.65	50	2	●
HMX-2EP-D0.7-M08	0.7	4	1.0	8	0.65	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	●

● 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						
			○	◎	◎		○				

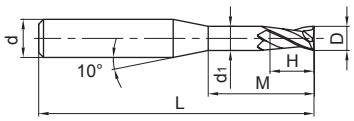
Code key B258 Graphics category and identification B259 Cutting parameters B530-B531 Non-standard customization B570-B571

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

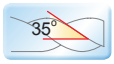

Deep flattened slot

HMX-2EP





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









Type	Basic dimension(mm)						Number of teeth Z	Stock
	D	d	H	M	d_1	L		
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	●
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 B258 Graphics category and identification B259 Cutting parameters B530-B531 Non-standard customization B570-B571

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


Side face

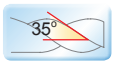

Step shoulder


Straight slot

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.

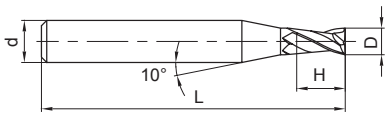












Type	Basic dimension(mm)				Number of teeth Z	Stock
	D	d	H	L		
HMX-2ES-D0.3	0.3	4	0.6	50	2	●
HMX-2ES-D0.4	0.4	4	0.8	50	2	●
HMX-2ES-D0.5	0.5	4	1.0	50	2	●
HMX-2ES-D0.6	0.6	4	1.2	50	2	●
HMX-2ES-D0.7	0.7	4	1.4	50	2	●
HMX-2ES-D0.8	0.8	4	1.6	50	2	●
HMX-2ES-D0.9	0.9	4	1.8	50	2	●
HMX-2ES-D1.0	1.0	4	2.0	50	2	●
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 B258 Graphics category and identification B259 Cutting parameters B532 Non-standard customization B570-B571

2-flute ball nose end mills with straight shank

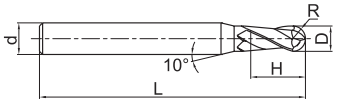

Profile


Cavity

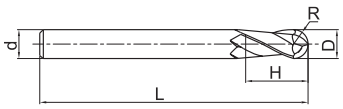

Ball nose slot

HMX-2B



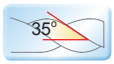


Picture 1



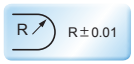
Picture 2

- For profile milling.
- Very suitable for high speed cutting and dry cutting.











Type	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-R0.5	1.0	0.5	6	2	50	2	Picture 1	●
HMX-2B-R0.75S	1.5	0.75	4	3	50	2	Picture 1	●
HMX-2B-R0.75	1.5	0.75	6	3	50	2	Picture 1	●
HMX-2B-R1.0S	2.0	1.0	4	4	50	2	Picture 1	●
HMX-2B-R1.0	2.0	1.0	6	4	50	2	Picture 1	●
HMX-2B-R1.25S	2.5	1.25	4	5	50	2	Picture 1	●
HMX-2B-R1.25	2.5	1.25	6	5	50	2	Picture 1	●
HMX-2B-R1.5S	3.0	1.5	4	6	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-R2.0S	4.0	2.0	4	8	50	2	Picture 2	●
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

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						
			○	◎	◎		○				

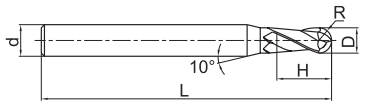
Code key B258
Graphics category and identification B259
Cutting parameters B533
Non-standard customization B570-B571

2-flute ball nose end mills with straight shank

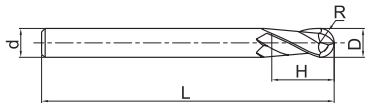
Profile | Cavity | Ball nose slot

HMX-2BL/M/X





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

Type	Basic dimension(mm)					Number of teeth Z	Geometry	Stock
	D	R	d	H	L			
HMX-2BL-R1.0S	2.0	1.0	4	4	75	2	Picture 1	●
HMX-2BL-R1.0	2.0	1.0	6	4	75	2	Picture 1	●
HMX-2BL-R1.25S	2.5	1.25	4	5	75	2	Picture 1	●
HMX-2BL-R1.25	2.5	1.25	6	6	75	2	Picture 1	●
HMX-2BL-R1.5S	3.0	1.5	4	6	75	2	Picture 1	●
HMX-2BL-R1.5	3.0	1.5	6	6	75	2	Picture 1	●
HMX-2BL-R1.75S	3.5	1.75	4	8	75	2	Picture 1	●
HMX-2BL-R1.75	3.5	1.75	6	8	75	2	Picture 1	●
HMX-2BL-R2.0S	4.0	2.0	4	8	75	2	Picture 2	●
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-2BX-R3.0	6.0	3.0	6	12	100	2	Picture 2	●
HMX-2BL-R3.5	7.0	3.5	8	14	75	2	Picture 1	●
HMX-2BM-R4.0	8.0	4.0	8	16	75	2	Picture 2	●
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-2BX-R5.0	10.0	5.0	10	20	150	2	Picture 2	●
HMX-2BL-R6.0	12.0	6.0	12	24	100	2	Picture 2	●
HMX-2BX-R6.0	12.0	6.0	12	24	150	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 B258 | Graphics category and identification B259 | Cutting parameters B533 | Non-standard customization B570-B571

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

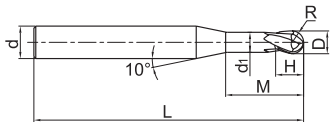

Profile


Cavity

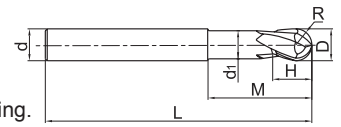

Ball nose slot

HMX-2BFP



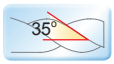


Picture 1

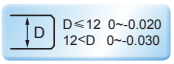


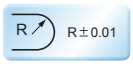
Picture 2

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











Type	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	3.0	6	75	2	Picture 1	●
HMX-2BFP-R1.0	2.0	1.0	2	1.95	4.0	6	75	2	Picture 1	●
HMX-2BFP-R1.5	3.0	1.5	3	2.85	6.0	6	75	2	Picture 1	●
HMX-2BFP-R2.0	4.0	2.0	4	3.85	8.0	6	75	2	Picture 1	●
HMX-2BFP-R2.5	5.0	2.5	5	4.85	10.0	6	75	2	Picture 1	●
HMX-2BFP-R3.0	6.0	3.0	6	5.8	12.0	6	75	2	Picture 2	●
HMX-2BFP-R4.0	8.0	4.0	8	7.8	16.0	8	100	2	Picture 2	●
HMX-2BFP-R5.0	10.0	5.0	10	9.6	20.0	10	100	2	Picture 2	●
HMX-2BFP-R6.0	12.0	6.0	12	11.5	24.0	12	100	2	Picture 2	●
HMX-2BFP-R8.0	16.0	8.0	16	15.5	32.0	16	150	2	Picture 2	●
HMX-2BFP-R10.0	20.0	10.0	20	19.5	40.0	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						
			○	◎	◎		○				

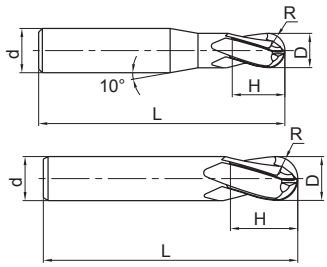
Code key B258
Graphics category and identification B259
Cutting parameters B533
Non-standard customization B570-B571

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.

35° | Coated NaNo TiAlXN | D D≤12 0~-0.020 12<D 0~-0.030 | R R±0.01

Type	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 B258 | Graphics category and identification B259 | Cutting parameters B534 | Non-standard customization B570-B571

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

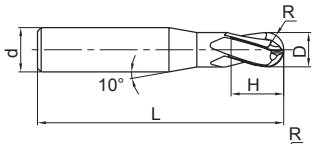

Profile

Cavity

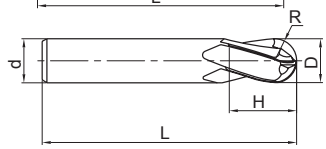
Ball nose slot

HMX-4BL



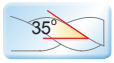


Picture 1



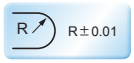
Picture 2

- HM-4B series with long shank.











Type	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						
			○	◎	◎		○				

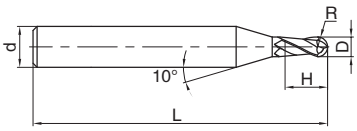
Code key B258
Graphics category and identification B259
Cutting parameters B534
Non-standard customization B570-B571

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..

35° | Coated NaNo TiAlXN | D 0~-0.015 | R R±0.005 R<0.5 R±0.01 R≥0.5

Type	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						
			○	◎	◎		○				

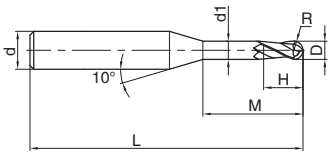
Code key B258 | Graphics category and identification B259 | Cutting parameters B535 | Non-standard customization B570-B571

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 R±0.005 R<0.5 R±0.01 R≥0.5

Type	Basic dimension(mm)							Number of teeth Z	Stock
	D	R	H	d_1	M	d	L		
HMX-2BP-R0.15-M02	0.3	0.15	0.4	0.25	2	4	50	2	●
HMX-2BP-R0.15-M04	0.3	0.15	0.4	0.25	4	4	50	2	●
HMX-2BP-R0.2-M02	0.4	0.2	0.6	0.35	2	4	50	2	●
HMX-2BP-R0.2-M04	0.4	0.2	0.6	0.35	4	4	50	2	●
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	●

● 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						
			○	◎	◎		○				

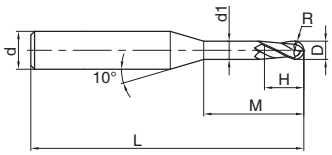
Code key B258 | Graphics category and identification B259 | Cutting parameters B536-B537 | Non-standard customization B570-B571

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

Deep ball nose slot

HMX-2BP





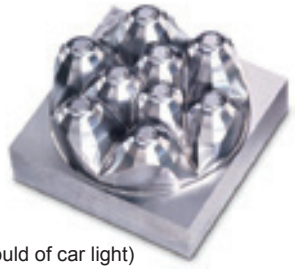
- Applicable for machining narrow slot and free-form surface

35° | Coated NaNo TiAlXN | D 0~-0.015 | R R±0.005 R<0.5 R±0.01 R≥0.5

Type	Basic dimension(mm)							Number of teeth Z	Stock
	D	R	H	d_1	M	d	L		
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	●
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	●

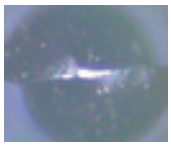
● Stock available ○ Make-to-order

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						
			○	◎	◎		○				

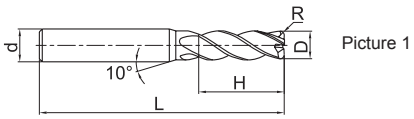
Code key B258 | Graphics category and identification B259 | Cutting parameters B536-B537 | Non-standard customization B570-B571

4-flute R end mills with straight shank

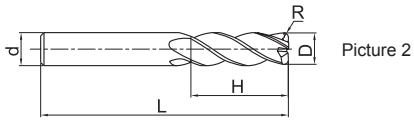
Radius shoulder | Profile | Radius corner slot

HMX-4R





Picture 1



Picture 2

- Wide applications, applicable for several machining conditions.

35° | Coated NaNo TiAlXN | D 0~-0.020

Type	Basic dimension(mm)					Number of teeth Z	Geometry	Stock
	D	R	d	H	L			
HMX-4R-D1.0R0.2	1.0	0.2	4	3	50	4	Picture 1	●
HMX-4R-D1.5R0.2	1.5	0.2	4	4	50	4	Picture 1	●
HMX-4R-D2.0R0.2	2.0	0.2	4	6	50	4	Picture 1	●
HMX-4R-D2.0R0.5	2.0	0.5	4	6	50	4	Picture 1	●
HMX-4R-D2.5R0.2	2.5	0.2	4	8	50	4	Picture 1	●
HMX-4R-D2.5R0.5	2.5	0.5	4	8	50	4	Picture 1	●
HMX-4R-D3.0R0.2	3.0	0.2	4	8	50	4	Picture 1	●
HMX-4R-D3.0R0.5	3.0	0.5	4	8	50	4	Picture 1	●
HMX-4R-D4.0R0.2	4.0	0.2	4	10	50	4	Picture 2	●
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-D5.0R0.2	5.0	0.2	6	13	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-D6.0R0.2	6.0	0.2	6	16	50	4	Picture 2	●
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	●

● 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						
			○	◎	◎		○				

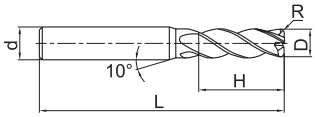
Code key B258 | Graphics category and identification B259 | Cutting parameters B538 | Non-standard customization B570-B571

4-flute R end mills with straight shank

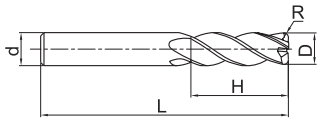
Radius shoulder | Profile | Radius corner slot

HMX-4R





Picture 1



Picture 2

- Wide applications, applicable for several machining conditions.

35° | Coated NaNo TiAlXN | D 0~-0.020

Type	Basic dimension(mm)					Number of teeth Z	Geometry	Stock
	D	R	d	H	L			
HMX-4R-D8.0R0.2	8.0	0.2	8	20	60	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-D10.0R0.2	10.0	0.2	10	25	75	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-D12.0R0.2	12.0	0.2	12	30	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 B258 | Graphics category and identification B259 | Cutting parameters B538 | Non-standard customization B570-B571


Radius shoulder

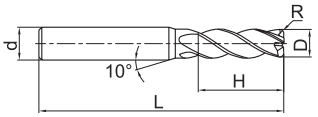

Profile


Radius corner slot

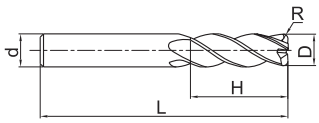
4-flute R end mills with long shank

HMX-4RBL/M/X



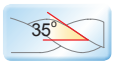


Picture 1



Picture 2

● HMX-4R series with long shank.









Type	Basic dimension(mm)					Number of teeth Z	Geometry	Stock
	D	R	d	H	L			
HMX-4RBL-D4.0R0.2S	4.0	0.2	4	10	75	4	Picture 2	●
HMX-4RBL-D4.0R0.2	4.0	0.2	6	10	75	4	Picture 1	●
HMX-4RBL-D4.0R0.5S	4.0	0.5	4	10	75	4	Picture 2	●
HMX-4RBL-D4.0R0.5	4.0	0.5	6	10	75	4	Picture 1	●
HMX-4RBL-D6.0R0.2	6.0	0.2	6	16	75	4	Picture 2	●
HMX-4RBX-D6.0R0.2	6.0	0.2	6	16	100	4	Picture 2	●
HMX-4RBL-D6.0R0.5	6.0	0.5	6	16	75	4	Picture 2	●
HMX-4RBX-D6.0R0.5	6.0	0.5	6	16	100	4	Picture 2	●
HMX-4RBL-D6.0R1.0	6.0	1.0	6	16	75	4	Picture 2	●
HMX-4RBX-D6.0R1.0	6.0	1.0	6	16	100	4	Picture 2	●
HMX-4RBM-D8.0R0.2	8.0	0.2	8	20	75	4	Picture 2	●
HMX-4RBL-D8.0R0.2	8.0	0.2	8	20	100	4	Picture 2	●
HMX-4RBM-D8.0R0.5	8.0	0.5	8	20	75	4	Picture 2	●
HMX-4RBL-D8.0R0.5	8.0	0.5	8	20	100	4	Picture 2	●
HMX-4RBM-D8.0R1.0	8.0	1.0	8	20	75	4	Picture 2	●
HMX-4RBL-D8.0R1.0	8.0	1.0	8	20	100	4	Picture 2	●
HMX-4RBL-D10.0R0.2	10.0	0.2	10	25	100	4	Picture 2	●
HMX-4RBX-D10.0R0.2	10.0	0.2	10	25	150	4	Picture 2	●
HMX-4RBL-D10.0R0.5	10.0	0.5	10	25	100	4	Picture 2	●
HMX-4RBX-D10.0R0.5	10.0	0.5	10	25	150	4	Picture 2	●
HMX-4RBL-D10.0R1.0	10.0	1.0	10	25	100	4	Picture 2	●
HMX-4RBX-D10.0R1.0	10.0	1.0	10	25	150	4	Picture 2	●
HMX-4RBL-D10.0R2.0	10.0	2.0	10	25	100	4	Picture 2	●
HMX-4RBX-D10.0R2.0	10.0	2.0	10	25	150	4	Picture 2	●
HMX-4RBL-D12.0R0.2	12.0	0.2	12	30	100	4	Picture 2	●
HMX-4RBX-D12.0R0.2	12.0	0.2	12	30	150	4	Picture 2	●
HMX-4RBL-D12.0R0.5	12.0	0.5	12	30	100	4	Picture 2	●
HMX-4RBX-D12.0R0.5	12.0	0.5	12	30	150	4	Picture 2	●
HMX-4RBL-D12.0R1.0	12.0	1.0	12	30	100	4	Picture 2	●
HMX-4RBX-D12.0R1.0	12.0	1.0	12	30	150	4	Picture 2	●
HMX-4RBL-D12.0R2.0	12.0	2.0	12	30	100	4	Picture 2	●
HMX-4RBX-D12.0R2.0	12.0	2.0	12	30	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 B258 Graphics category and identification B259 Cutting parameters B538 Non-standard customization B570-B571

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

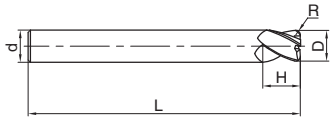

Radius shoulder


Profile

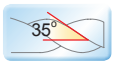

Radius corner slot

HMX-4RF





- High-rigidity short edge design, for cutting with high feed rate at high speed.



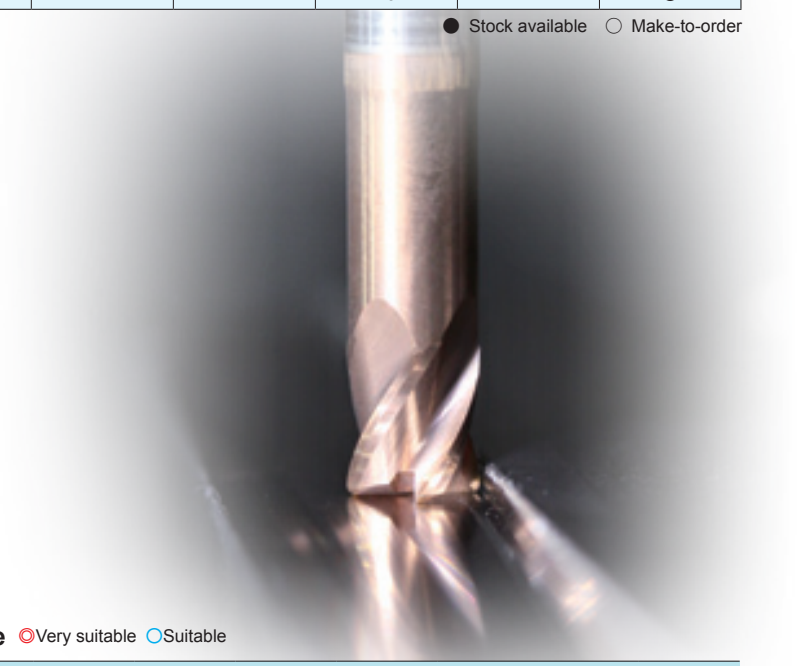






Type	Basic dimension(mm)					Number of teeth Z	Stock
	D	R	d	H	L		
HMX-4RF-D6.0R0.5	6.0	0.5	6	6	50	4	●
HMX-4RF-D6.0R1.0	6.0	1.0	6	6	50	4	●
HMX-4RF-D8.0R0.5	8.0	0.5	8	8	60	4	●
HMX-4RF-D8.0R1.0	8.0	1.0	8	8	60	4	●
HMX-4RF-10.0R0.5	10.0	0.5	10	10	75	4	●
HMX-4RF-D10.0R1.0	10.0	1.0	10	10	75	4	●
HMX-4RF-D10.0R2.0	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						
			○	◎	◎		○				

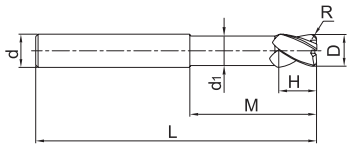
Code key B258 Graphics category and identification B259 Cutting parameters B538 Non-standard customization B570-B571

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

Type	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-D10.0R0.5	10.0	0.5	10	9.6	10	30	100	4	●
HMX-4RP-D10.0R1.0	10.0	1.0	10	9.6	10	30	100	4	●
HMX-4RP-D10.0R2.0	10.0	2.0	10	9.6	10	30	100	4	●
HMX-4RP-D12.0R0.5	12.0	0.5	12	11.5	12	36	100	4	●
HMX-4RP-D12.0R1.0	12.0	1.0	12	11.5	12	36	100	4	●
HMX-4RP-D12.0R2.0	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						
			○	◎	◎		○				

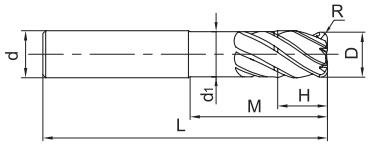
Code key B258 | Graphics category and identification B259 | Cutting parameters B538 | Non-standard customization B570-B571

6-flute R end mills with straight shank, long neck , short cutting edge and high rigidity

Radius shoulder | Profile | Radius corner slot

HMX-6R-MAX





- High rigidity short cutting edge designed for high cutting speed, high feed, high efficient machining

20° | Coated NaNo TiAlXN | D D≤12 0~-0.020 12<D 0~-0.030

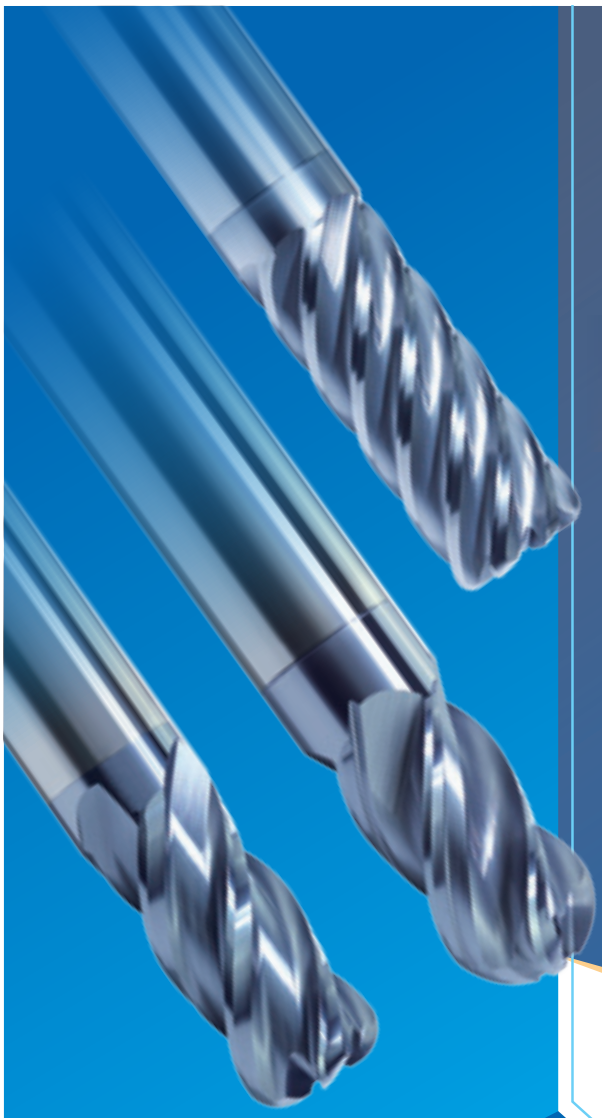
Type	Basic dimension(mm)							Number of teeth Z	Stock
	D	R	d	H	d_1	M	L		
HMX-6R-D6R0.5-MAX	6.0	0.5	6	6	5.8	16	50	6	○
HMX-6R-D8R1.0-MAX	8.0	1.0	8	8	7.8	24	60	6	○
HMX-6R-D10R1.0-MAX	10.0	1.0	10	10	9.8	30	75	6	○
HMX-6R-D12R1.0-MAX	12.0	1.0	12	12	11.5	36	75	6	○
HMX-6R-D16R1.0-MAX	16.0	1.0	16	16	15.5	48	100	6	○
HMX-6R-D20R1.0-MAX	20.0	1.0	20	20	19.5	50	100	6	○

● Stock available ○ Make-to-order

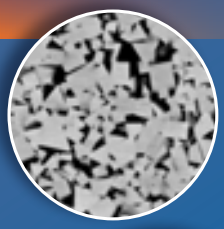
Applicable workpiece material table ◎Very suitable ○Suitable

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						
			○	◎	◎		○				

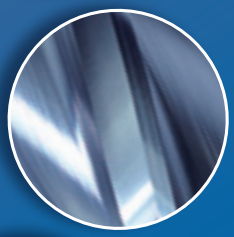
Code key B258 | Graphics category and identification B259 | Cutting parameters B539 | Non-standard customization B570-B571



TM series
end mills for titanium machining



- High flexural strength, can significantly avoids the risks of premature chipping, suitable for titanium alloy materials milling machining



- Polished finish for both flank and rake face improves the surface smoothness, reduces friction, reduces cutting force and temperature, reduces abrasive wear caused by smearing



- Adopted differential pitch structure leads to high-efficiency milling with low vibration.

$\alpha \neq \beta$

Application field

Suitable for Aerospace industries applications or machining titanium alloy parts, improve machining efficiency for the customers;

Suitable for finishing titanium alloy parts in Aerospace industries to improve the dimensional accuracy of the parts.



Longer tool life

Machining component: housings and casings

Workpiece material: TC4

Cutting tool: TM-5R-D16.0R0.5

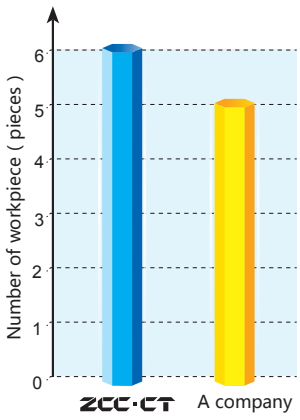
Cutting parameters: S=720r/min，
F=128~160mm/min，
ap=13~15.3mm，
ae=8~16mm

CNC Machine type: planomiller

Method: Slot milling, Side face milling

Cooling method：Emulsion





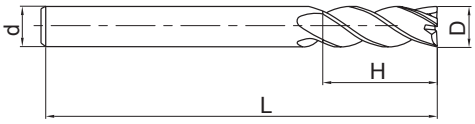
Test result: **ZCC·CT** product processed 6 components, product from A company only processed 5 components.

4-flute flattened end mills with straight shank

Side face | Step shoulder | Straight slot

TM-4E





● Long shank, short cutting edge design, suitable for deep cavity milling .

38° | Coated AlCrXN | D D≤12 0~-0.030 12<D 0~-0.040

Type	Basic dimension(mm)				Number of teeth Z	Stock
	D	d	H	L		
TM-4E-D6.0	6.0	6	16	50	4	●
TM-4E-D8.0	8.0	8	20	60	4	●
TM-4E-D10.0	10.0	10	25	75	4	●
TM-4E-D12.0	12.0	12	30	75	4	●
TM-4E-D14.0	14.0	14	35	90	4	●
TM-4E-D16.0	16.0	16	35	90	4	●
TM-4E-D20.0	20.0	20	45	100	4	●
TM-4E-D25.0	25.0	25	50	110	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 B258 | Graphics category and identification B259 | Cutting parameters B541 | Non-standard customization B570-B571

4-flute ball nose end mill

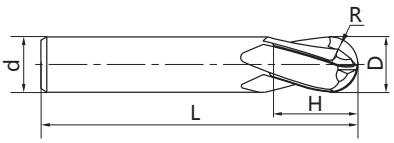

Profile

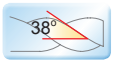

Cavity


Ball nose slot

TM-4B

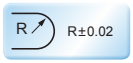














Type	Basic dimension(mm)					Number of teeth Z	Stock
	D	R	d	H	L		
TM-4B-R3.0	6.0	3.0	6	9	50	4	●
TM-4B-R4.0	8.0	4.0	8	12	60	4	●
TM-4B-R5.0	10.0	5.0	10	15	75	4	●
TM-4B-R6.0	12.0	6.0	12	18	75	4	●
TM-4B-R8.0	16.0	8.0	16	24	85	4	●
TM-4B-R10.0	20.0	10.0	20	30	100	4	●

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

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

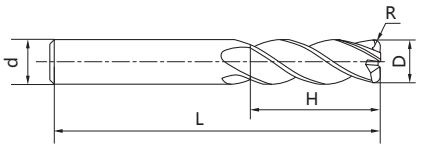
Code key B258
Graphics category and identification B259
Cutting parameters B540
Non-standard customization B570-B571

4-flute R end mills with straight shank

Radius shoulder | Profile | Radius corner slot

TM-4R





38° | Coated AlCrXN | D ≤12 0~-0.030 12<D 0~-0.040

Type	Basic dimension(mm)					Number of teeth Z	Stock
	D	R	d	H	L		
TM-4R-D6.0R0.2	6.0	0.2	6	16	50	4	●
TM-4R-D6.0R0.3	6.0	0.3	6	16	50	4	●
TM-4R-D6.0R0.5	6.0	0.5	6	16	50	4	●
TM-4R-D6.0R0.75	6.0	0.75	6	16	50	4	●
TM-4R-D6.0R1.0	6.0	1.0	6	16	50	4	●
TM-4R-D8.0R0.2	8.0	0.2	8	20	60	4	●
TM-4R-D8.0R0.3	8.0	0.3	8	20	60	4	●
TM-4R-D8.0R0.5	8.0	0.5	8	20	60	4	●
TM-4R-D8.0R0.75	8.0	0.75	8	20	60	4	●
TM-4R-D8.0R1.0	8.0	1.0	8	20	60	4	●
TM-4R-D8.0R2.0	8.0	2.0	8	20	60	4	●
TM-4R-D10.0R0.2	10.0	0.2	10	25	75	4	●
TM-4R-D10.0R0.3	10.0	0.3	10	25	75	4	●
TM-4R-D10.0R0.5	10.0	0.5	10	25	75	4	●
TM-4R-D10.0R0.75	10.0	0.75	10	25	75	4	●
TM-4R-D10.0R1.0	10.0	1.0	10	25	75	4	●
TM-4R-D10.0R1.5	10.0	1.5	10	25	75	4	●
TM-4R-D10.0R2.0	10.0	2.0	10	25	75	4	●
TM-4R-D12.0R0.2	12.0	0.2	12	30	75	4	●
TM-4R-D12.0R0.3	12.0	0.3	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						
○	○					○				◎	◎

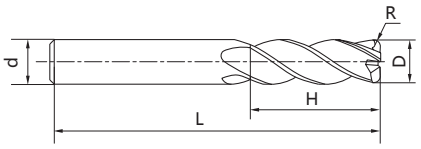
Code key B258 | Graphics category and identification B259 | Cutting parameters B540 | Non-standard customization B570-B571

4-flute R end mills with straight shank

Radius shoulder | Profile | Radius corner slot

TM-4R





38° | Coated AlCrXN | D ≤12 0~-0.030 12<D 0~-0.040

Type	Basic dimension(mm)					Number of teeth Z	Stock
	D	R	d	H	L		
TM-4R-D12.0R0.5	12.0	0.5	12	30	75	4	●
TM-4R-D12.0R0.75	12.0	0.75	12	30	75	4	●
TM-4R-D12.0R1.0	12.0	1.0	12	30	75	4	●
TM-4R-D12.0R1.5	12.0	1.5	12	30	75	4	●
TM-4R-D12.0R2.0	12.0	2.0	12	30	75	4	●
TM-4R-D12.0R2.5	12.0	2.5	12	30	75	4	●
TM-4R-D12.0R3.0	12.0	3.0	12	30	75	4	●
TM-4R-D14.0R0.2	14.0	0.2	14	35	90	4	●
TM-4R-D14.0R0.3	14.0	0.3	14	35	90	4	●
TM-4R-D14.0R0.5	14.0	0.5	14	35	90	4	●
TM-4R-D14.0R0.75	14.0	0.75	14	35	90	4	●
TM-4R-D14.0R1.0	14.0	1.0	14	35	90	4	●
TM-4R-D14.0R1.5	14.0	1.5	14	35	90	4	●
TM-4R-D14.0R2.0	14.0	2.0	14	35	90	4	●
TM-4R-D14.0R2.5	14.0	2.5	14	35	90	4	●
TM-4R-D14.0R3.0	14.0	3.0	14	35	90	4	●
TM-4R-D16.0R0.2	16.0	0.2	16	35	90	4	●
TM-4R-D16.0R0.3	16.0	0.3	16	35	90	4	●
TM-4R-D16.0R0.5	16.0	0.5	16	35	90	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						
○	○					○				◎	◎

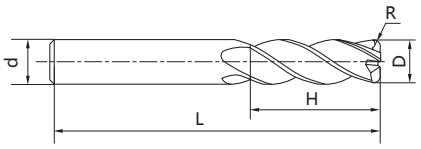
Code key B258 | Graphics category and identification B259 | Cutting parameters B540 | Non-standard customization B570-B571

4-flute R end mills with straight shank

Radius shoulder | Profile | Radius corner slot

TM-4R





38° | Coated AlCrXN | D ≤12 0~-0.030 12<D 0~-0.040

Type	Basic dimension(mm)					Number of teeth Z	Stock
	D	R	d	H	L		
TM-4R-D16.0R0.75	16.0	0.75	16	35	90	4	●
TM-4R-D16.0R1.0	16.0	1.0	16	35	90	4	●
TM-4R-D16.0R1.5	16.0	1.5	16	35	90	4	●
TM-4R-D16.0R2.0	16.0	2.0	16	35	90	4	●
TM-4R-D16.0R2.5	16.0	2.5	16	35	90	4	●
TM-4R-D16.0R3.0	16.0	3.0	16	35	90	4	●
TM-4R-D16.0R4.0	16.0	4.0	16	35	90	4	●
TM-4R-D20.0R0.2	20.0	0.2	20	45	100	4	●
TM-4R-D20.0R0.3	20.0	0.3	20	45	100	4	●
TM-4R-D20.0R0.5	20.0	0.5	20	45	100	4	●
TM-4R-D20.0R0.75	20.0	0.75	20	45	100	4	●
TM-4R-D20.0R1.0	20.0	1.0	20	45	100	4	●
TM-4R-D20.0R1.5	20.0	1.5	20	45	100	4	●
TM-4R-D20.0R2.0	20.0	2.0	20	45	100	4	●
TM-4R-D20.0R2.5	20.0	2.5	20	45	100	4	●
TM-4R-D20.0R3.0	20.0	3.0	20	45	100	4	●
TM-4R-D20.0R4.0	20.0	4.0	20	45	100	4	●
TM-4R-D25.0R1.0	25.0	1.0	25	50	110	4	●
TM-4R-D25.0R2.0	25.0	2.0	25	50	110	4	●
TM-4R-D25.0R3.0	25.0	3.0	25	50	110	4	●
TM-4R-D25.0R4.0	25.0	4.0	25	50	110	4	●
TM-4R-D25.0R5.0	25.0	5.0	25	50	110	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						
○	○					○				◎	◎

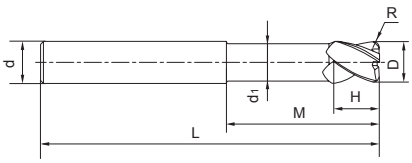
Code key B258 | Graphics category and identification B259 | Cutting parameters B540 | Non-standard customization B570-B571

4-flute R end mills with long neck, straight shank

Radius shoulder | Profile | Radius corner slot

TM-4RP





38° | Coated AlCrXN | D ≤12 0~-0.030 12<D 0~-0.040

Type	Basic dimension(mm)							Number of teeth Z	Stock
	D	R	d	d_1	H	M	L		
TM-4RP-D8.0R0.5	8.0	0.5	8	7.4	16	25	75	4	●
TM-4RP-D8.0R1.0	8.0	1.0	8	7.4	16	25	75	4	●
TM-4RP-D10.0R0.5	10.0	0.5	10	9.4	20	32	75	4	●
TM-4RP-D10.0R1.0	10.0	1.0	10	9.4	20	32	75	4	●
TM-4RP-D10.0R2.0	10.0	2.0	10	9.4	20	32	75	4	●
TM-4RP-D10.0R3.0	10.0	3.0	10	9.4	20	32	75	4	●
TM-4RP-D12.0R0.5	12.0	0.5	12	11.4	24	40	90	4	●
TM-4RP-D12.0R1.0	12.0	1.0	12	11.4	24	40	90	4	●
TM-4RP-D12.0R2.0	12.0	2.0	12	11.4	24	40	90	4	●
TM-4RP-D12.0R3.0	12.0	3.0	12	11.4	24	40	90	4	●
TM-4RP-D16.0R0.5	16.0	0.5	16	15.0	32	50	100	4	●
TM-4RP-D16.0R1.0	16.0	1.0	16	15.0	32	50	100	4	●
TM-4RP-D16.0R2.0	16.0	2.0	16	15.0	32	50	100	4	●
TM-4RP-D16.0R3.0	16.0	3.0	16	15.0	32	50	100	4	●
TM-4RP-D20.0R0.5	20.0	0.5	20	19.0	35	60	110	4	●
TM-4RP-D20.0R1.0	20.0	1.0	20	19.0	35	60	110	4	●
TM-4RP-D20.0R2.0	20.0	2.0	20	19.0	35	60	110	4	●
TM-4RP-D20.0R3.0	20.0	3.0	20	19.0	35	60	110	4	●
TM-4RP-D25.0R1.0	25.0	1.0	25	24.0	45	75	150	4	●
TM-4RP-D25.0R2.0	25.0	2.0	25	24.0	45	75	150	4	●
TM-4RP-D25.0R3.0	25.0	3.0	25	24.0	45	75	150	4	●
TM-4RP-D25.0R4.0	25.0	4.0	25	24.0	45	75	150	4	●
TM-4RP-D25.0R5.0	25.0	5.0	25	24.0	45	75	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						
○	○					○				◎	◎

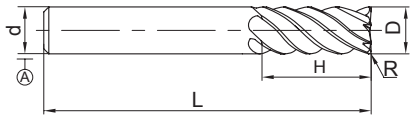
Code key B258 | Graphics category and identification B259 | Cutting parameters B540 | Non-standard customization B570-B571

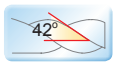
5-flute R end mills with straight shank

Radius shoulder | Profile | Radius corner slot

TM-5R













Type	Basic dimension(mm)					Number of teeth Z	Stock
	D	R	d	H	L		
TM-5R-D6.0R0.2	6.0	0.2	6	16	50	5	○
TM-5R-D6.0R0.3	6.0	0.3	6	16	50	5	○
TM-5R-D6.0R0.5	6.0	0.5	6	16	50	5	○
TM-5R-D6.0R0.75	6.0	0.75	6	16	50	5	○
TM-5R-D6.0R1.0	6.0	1.0	6	16	50	5	○
TM-5R-D8.0R0.2	8.0	0.2	8	20	60	5	○
TM-5R-D8.0R0.3	8.0	0.3	8	20	60	5	○
TM-5R-D8.0R0.5	8.0	0.5	8	20	60	5	○
TM-5R-D8.0R0.75	8.0	0.75	8	20	60	5	○
TM-5R-D8.0R1.0	8.0	1.0	8	20	60	5	○
TM-5R-D8.0R2.0	8.0	2.0	8	20	60	5	○
TM-5R-D10.0R0.2	10.0	0.2	10	25	75	5	○
TM-5R-D10.0R0.3	10.0	0.3	10	25	75	5	○
TM-5R-D10.0R0.5	10.0	0.5	10	25	75	5	○
TM-5R-D10.0R0.75	10.0	0.75	10	25	75	5	○
TM-5R-D10.0R1.0	10.0	1.0	10	25	75	5	○
TM-5R-D10.0R1.5	10.0	1.5	10	25	75	5	○
TM-5R-D10.0R2.0	10.0	2.0	10	25	75	5	○
TM-5R-D12.0R0.2	12.0	0.2	12	30	75	5	○
TM-5R-D12.0R0.3	12.0	0.3	12	30	75	5	○
TM-5R-D12.0R0.5	12.0	0.5	12	30	75	5	○
TM-5R-D12.0R0.75	12.0	0.75	12	30	75	5	○
TM-5R-D12.0R1.0	12.0	1.0	12	30	75	5	○
TM-5R-D12.0R1.5	12.0	1.5	12	30	75	5	○
TM-5R-D12.0R2.0	12.0	2.0	12	30	75	5	○
TM-5R-D12.0R2.5	12.0	2.5	12	30	75	5	○
TM-5R-D12.0R3.0	12.0	3.0	12	30	75	5	○
TM-5R-D14.0R0.2	14.0	0.2	14	35	90	5	○
TM-5R-D14.0R0.3	14.0	0.3	14	35	90	5	○
TM-5R-D14.0R0.5	14.0	0.5	14	35	90	5	○
TM-5R-D14.0R0.75	14.0	0.75	14	35	90	5	○

Applicable workpiece material table

◎Very suitable ○Suitable

● Stock available ○ Make-to-order

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						
○	○					○				◎	◎

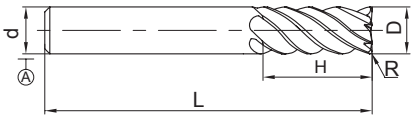
Code key B258 | Graphics category and identification B259 | Cutting parameters B542 | Non-standard customization B570-B571

5-flute R end mills with straight shank

Radius shoulder | Profile | Radius corner slot

TM-5R





42° | Coated AlCrXN | D D≤12 0~-0.030 12<D 0~-0.040

Type	Basic dimension(mm)					Number of teeth Z	Stock
	D	R	d	H	L		
TM-5R-D14.0R1.0	14.0	1.0	14	35	90	5	○
TM-5R-D14.0R1.5	14.0	1.5	14	35	90	5	○
TM-5R-D14.0R2.0	14.0	2.0	14	35	90	5	○
TM-5R-D14.0R2.5	14.0	2.5	14	35	90	5	○
TM-5R-D14.0R3.0	14.0	3.0	14	35	90	5	○
TM-5R-D16.0R0.2	16.0	0.2	16	35	90	5	○
TM-5R-D16.0R0.3	16.0	0.3	16	35	90	5	○
TM-5R-D16.0R0.5	16.0	0.5	16	35	90	5	○
TM-5R-D16.0R0.75	16.0	0.75	16	35	90	5	○
TM-5R-D16.0R1.0	16.0	1.0	16	35	90	5	○
TM-5R-D16.0R1.5	16.0	1.5	16	35	90	5	○
TM-5R-D16.0R2.0	16.0	2.0	16	35	90	5	○
TM-5R-D16.0R2.5	16.0	2.5	16	35	90	5	○
TM-5R-D16.0R3.0	16.0	3.0	16	35	90	5	○
TM-5R-D16.0R4.0	16.0	4.0	16	35	90	5	○
TM-5R-D20.0R0.2	20.0	0.2	20	45	100	5	○
TM-5R-D20.0R0.3	20.0	0.3	20	45	100	5	○
TM-5R-D20.0R0.5	20.0	0.5	20	45	100	5	○
TM-5R-D20.0R0.75	20.0	0.75	20	45	100	5	○
TM-5R-D20.0R1.0	20.0	1.0	20	45	100	5	○
TM-5R-D20.0R1.5	20.0	1.5	20	45	100	5	○
TM-5R-D20.0R2.0	20.0	2.0	20	45	100	5	○
TM-5R-D20.0R2.5	20.0	2.5	20	45	100	5	○
TM-5R-D20.0R3.0	20.0	3.0	20	45	100	5	○
TM-5R-D20.0R4.0	20.0	4.0	20	45	100	5	○
TM-5R-D25.0R1.0	25.0	1.0	25	50	110	5	○
TM-5R-D25.0R2.0	25.0	2.0	25	50	110	5	○
TM-5R-D25.0R3.0	25.0	3.0	25	50	110	5	○
TM-5R-D25.0R4.0	25.0	4.0	25	50	110	5	○
TM-5R-D25.0R5.0	25.0	5.0	25	50	110	5	○

● 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						
○	○					○				◎	◎

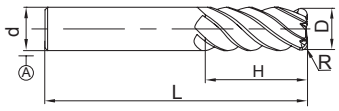
Code key B258 | Graphics category and identification B259 | Cutting parameters B542 | Non-standard customization B570-B571

6-flute R end mills with straight shank

Radius shoulder | Profile | Radius corner slot

TM-6R





39°,40°,41° | Coated AlCrXN | D D≤12 0~-0.030 12<D 0~-0.040

Type	Basic dimension(mm)					Number of teeth Z	Stock
	D	R	d	H	L		
TM-6R-D10.0R1.0	10.0	1.0	10	25	75	6	○
TM-6R-D10.0R2.0	10.0	2.0	10	25	75	6	○
TM-6R-D12.0R1.0	12.0	1.0	12	30	75	6	○
TM-6R-D12.0R2.0	12.0	2.0	12	30	75	6	○
TM-6R-D12.0R3.0	12.0	3.0	12	30	75	6	○
TM-6R-D14.0R1.0	14.0	1.0	14	35	90	6	○
TM-6R-D14.0R2.0	14.0	2.0	14	35	90	6	○
TM-6R-D14.0R3.0	14.0	3.0	14	35	90	6	○
TM-6R-D16.0R1.0	16.0	1.0	16	35	90	6	○
TM-6R-D16.0R2.5	16.0	2.5	16	35	90	6	○
TM-6R-D16.0R4.0	16.0	4.0	16	35	90	6	○
TM-6R-D20.0R1.0	20.0	1.0	20	45	100	6	○
TM-6R-D20.0R2.5	20.0	2.5	20	45	100	6	○
TM-6R-D20.0R4.0	20.0	4.0	20	45	100	6	○
TM-6R-D25.0R1.0	25.0	1.0	25	50	110	6	○
TM-6R-D25.0R2.5	25.0	2.5	25	50	110	6	○
TM-6R-D25.0R4.0	25.0	4.0	25	50	110	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 B258 | Graphics category and identification B259 | Cutting parameters B543 | Non-standard customization B570-B571

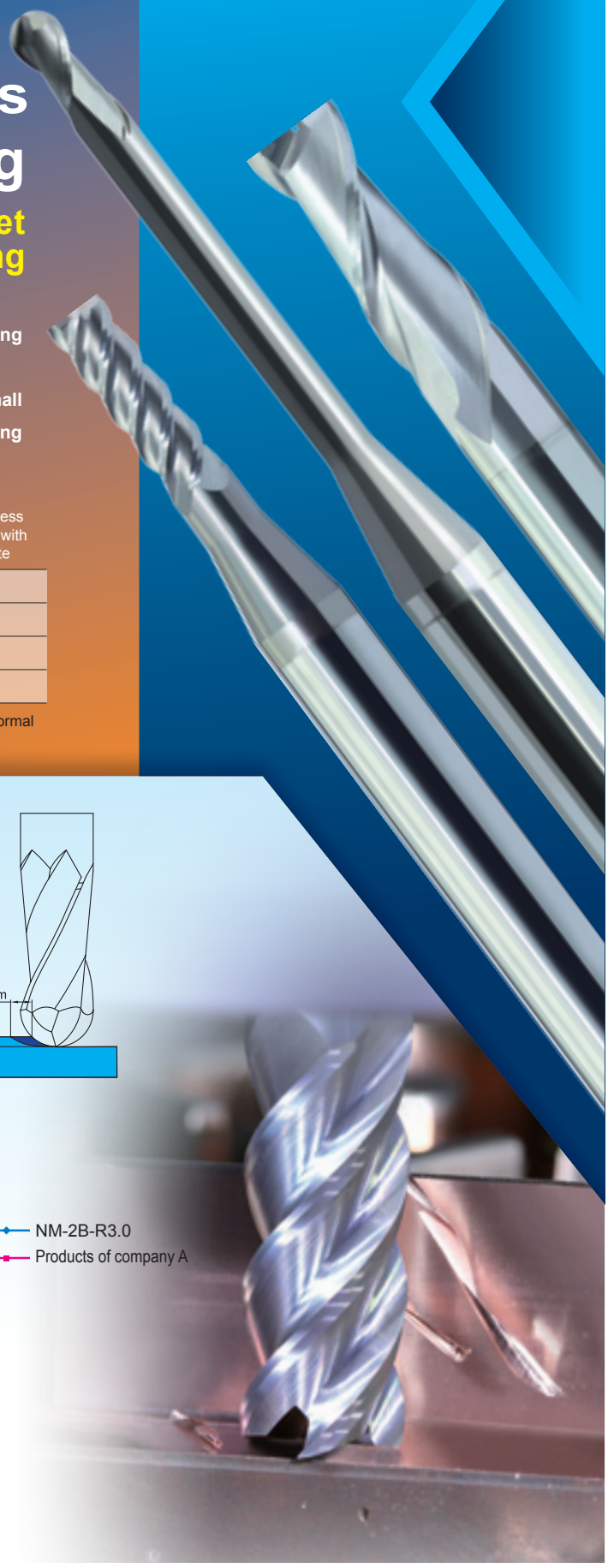
NM series for copper machining

Outstanding NM milling series, let copper&alloys of copper machining wonderful!

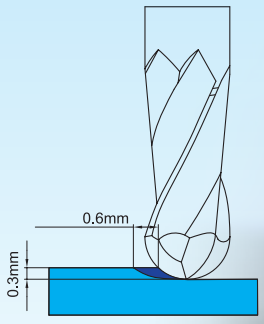
- With super sharp edge,most suitable for high precision machining of copper&alloy of copper.
- With CrN coating which own good lubricating property and small fiction coefficient,can realize light cutting processing circle, long tool life and high quality machined surface.

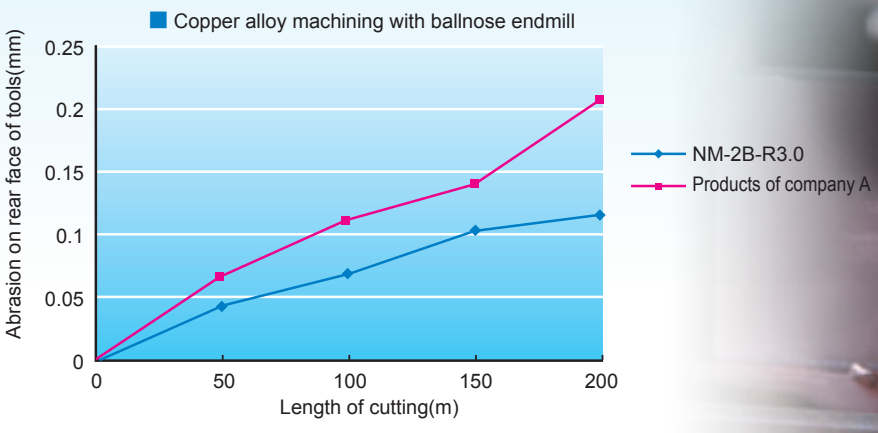
Coat	Hardness(HV)	Fiction coefficient	Oxidizing temperature(C°)	Strengthness combined with substrate
CrN	1800	0.25	700	◎
TiN	2200	0.4	500	◎
TiCN	2700	0.3	400	○
TiAlN	2800	0.3	800	◎

◎Excellent ○Normal



Tool：NM-2B-R3.0
Dimension：R3.0mm
workpiece material：C1100
Rotating speed：8000r/min (150m/min)
Feed speed：1200mm/min (0.15mm/r)
Axial cutting depth：a_p=0.3mm
Radial cutting depth ：a_e=0.6mm
Cutting style：face milling(down milling) Cooling system ： air cooling
Machine：MIKRON UCP 1000





2-flute flattened end mills with straight shank

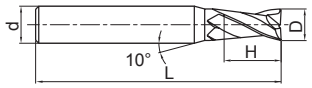

Side face


Step shoulder

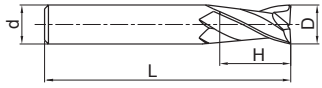

Straight slot

NM-2E



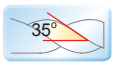


Picture 1

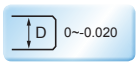


Picture 2

- Very suitable for slotting.
- Sharp edge,can realize high quality surface.









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

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

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

Code key B258
Graphics category and identification B259
Cutting parameters B544
Non-standard customization B570-B571

4-flute flattened end mills with straight shank

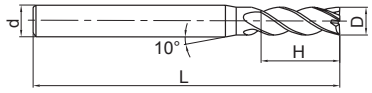

Side face


Step shoulder

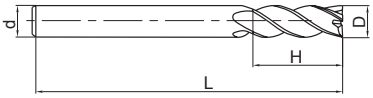

Straight slot

NM-4E





Picture 1



Picture 2

- Very suitable for slotting.
- Sharp edge,can realize high quality surface.



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

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

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

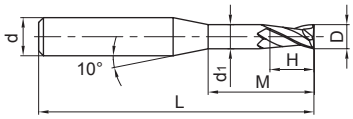
Code key B258
Graphics category and identification B259
Cutting parameters B545
Non-standard customization B570-B571

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

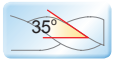

Deep flattened slot

NM-2EP

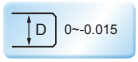




- Suitable for profile milling.
- Workpiece surface is excellent after machining.







D<1mm

1mm≤D


Type	Basic dimension(mm)						Number of teeth Z	Stock
	D	d	H	M	d_1	L		
NM-2EP-D0.5-M04	0.5	4	0.7	4	0.45	50	2	○
NM-2EP-D0.5-M06	0.5	4	0.7	6	0.45	50	2	○
NM-2EP-D0.5-M08	0.5	4	0.7	8	0.45	50	2	○
NM-2EP-D0.8-M04	0.8	4	1.2	4	0.75	50	2	○
NM-2EP-D0.8-M06	0.8	4	1.2	6	0.75	50	2	○
NM-2EP-D0.8-M08	0.8	4	1.2	8	0.75	50	2	○
NM-2EP-D0.8-M10	0.8	4	1.2	10	0.75	50	2	○
NM-2EP-D1.0-M04	1.0	4	1.5	4	0.95	50	2	○
NM-2EP-D1.0-M06	1.0	4	1.5	6	0.95	50	2	○
NM-2EP-D1.0-M08	1.0	4	1.5	8	0.95	50	2	○
NM-2EP-D1.0-M10	1.0	4	1.5	10	0.95	50	2	○
NM-2EP-D1.0-M12	1.0	4	1.5	12	0.95	50	2	○
NM-2EP-D1.0-M14	1.0	4	1.5	14	0.95	50	2	○
NM-2EP-D1.5-M08	1.5	4	2.3	8	1.45	50	2	○
NM-2EP-D1.5-M16	1.5	4	2.3	16	1.45	50	2	○
NM-2EP-D2.0-M06	2.0	4	3.0	6	1.95	50	2	○
NM-2EP-D2.0-M08	2.0	4	3.0	8	1.95	50	2	○
NM-2EP-D2.0-M10	2.0	4	3.0	10	1.95	50	2	○
NM-2EP-D2.0-M12	2.0	4	3.0	12	1.95	50	2	○
NM-2EP-D2.0-M14	2.0	4	3.0	14	1.95	50	2	○
NM-2EP-D2.0-M16	2.0	4	3.0	16	1.95	50	2	○
NM-2EP-D2.5-M10	2.5	4	3.7	10	2.4	50	2	○
NM-2EP-D2.5-M20	2.5	4	3.7	20	2.4	60	2	○
NM-2EP-D3.0-M10	3.0	6	4.5	10	2.85	50	2	○
NM-2EP-D3.0-M20	3.0	6	4.5	20	2.85	60	2	○
NM-2EP-D4.0-M16	4.0	6	6.0	16	3.85	60	2	○
NM-2EP-D4.0-M25	4.0	6	6.0	25	3.85	60	2	○
NM-2EP-D5.0-M16	5.0	6	7.5	16	4.85	60	2	○
NM-2EP-D5.0-M25	5.0	6	7.5	25	4.85	70	2	○

Applicable workpiece material table

◎Very suitable ○Suitable ● Stock available ○ Make-to-order

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 B258 Graphics category and identification B259 Cutting parameters B546 Non-standard customization B570-B571

2-flute ball nose end mills with straight shank


Profile

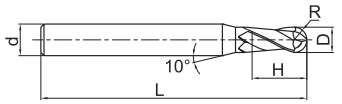

Cavity


Ball nose slot

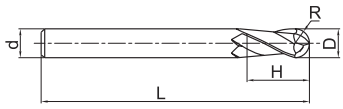
NM-2B



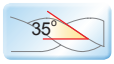
- Suitable for profile milling.
- Workpiece surface is excellent after machining.



Picture 1

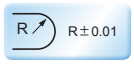


Picture 2











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

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

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

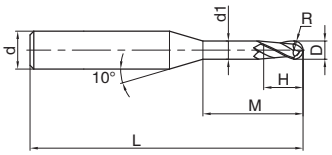
Code key B258
Graphics category and identification B259
Cutting parameters B547
Non-standard customization B570-B571

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

Deep ball nose slot

NM-2BP





- Very suitable for copper electrode three dimensional machining.

35° | Coated CrN | D 0~-0.015 | R ±0.005 R<0.5 ±0.01 R≥0.5

Type	Basic dimension(mm)							Number of teeth Z	Stock
	D	R	H	d_1	M	d	L		
NM-2BP-R0.25-M04	0.5	0.25	0.7	0.45	4	4	50	2	○
NM-2BP-R0.25-M06	0.5	0.25	0.7	0.45	6	4	50	2	○
NM-2BP-R0.3-M04	0.6	0.3	0.9	0.55	4	4	50	2	○
NM-2BP-R0.3-M06	0.6	0.3	0.9	0.55	6	4	50	2	○
NM-2BP-R0.3-M08	0.6	0.3	0.9	0.55	8	4	50	2	○
NM-2BP-R0.4-M04	0.8	0.4	1.2	0.75	4	4	50	2	○
NM-2BP-R0.4-M06	0.8	0.4	1.2	0.75	6	4	50	2	○
NM-2BP-R0.4-M08	0.8	0.4	1.2	0.75	8	4	50	2	○
NM-2BP-R0.4-M10	0.8	0.4	1.2	0.75	10	4	50	2	○
NM-2BP-R0.5-M04	1.0	0.5	1.5	0.95	4	4	50	2	○
NM-2BP-R0.5-M06	1.0	0.5	1.5	0.95	6	4	50	2	○
NM-2BP-R0.5-M08	1.0	0.5	1.5	0.95	8	4	50	2	○
NM-2BP-R0.5-M10	1.0	0.5	1.5	0.95	10	4	50	2	○
NM-2BP-R0.5-M12	1.0	0.5	1.5	0.95	12	4	50	2	○
NM-2BP-R0.75-M08	1.5	0.75	2.3	1.45	8	4	50	2	○
NM-2BP-R0.75-M16	1.5	0.75	2.3	1.45	16	4	50	2	○
NM-2BP-R1.0-M06	2.0	1.0	3.0	1.95	6	4	50	2	○
NM-2BP-R1.0-M08	2.0	1.0	3.0	1.95	8	4	50	2	○
NM-2BP-R1.0-M10	2.0	1.0	3.0	1.95	10	4	50	2	○
NM-2BP-R1.0-M12	2.0	1.0	3.0	1.95	12	4	50	2	○
NM-2BP-R1.0-M16	2.0	1.0	3.0	1.95	16	4	50	2	○
NM-2BP-R1.0-M20	2.0	1.0	3.0	1.95	20	4	60	2	○
NM-2BP-R1.5-M10	3.0	1.5	4.5	2.85	10	6	50	2	○
NM-2BP-R1.5-M20	3.0	1.5	4.5	2.85	20	6	60	2	○
NM-2BP-R2.0-M10	4.0	2.0	6.0	3.85	10	6	60	2	○
NM-2BP-R2.0-M16	4.0	2.0	6.0	3.85	16	6	60	2	○
NM-2BP-R2.0-M20	4.0	2.0	6.0	3.85	20	6	60	2	○
NM-2BP-R2.0-M25	4.0	2.0	6.0	3.85	25	6	60	2	○
NM-2BP-R2.5-M16	5.0	2.5	7.5	4.85	16	6	60	2	○
NM-2BP-R2.5-M25	5.0	2.5	7.5	4.85	25	6	70	2	○

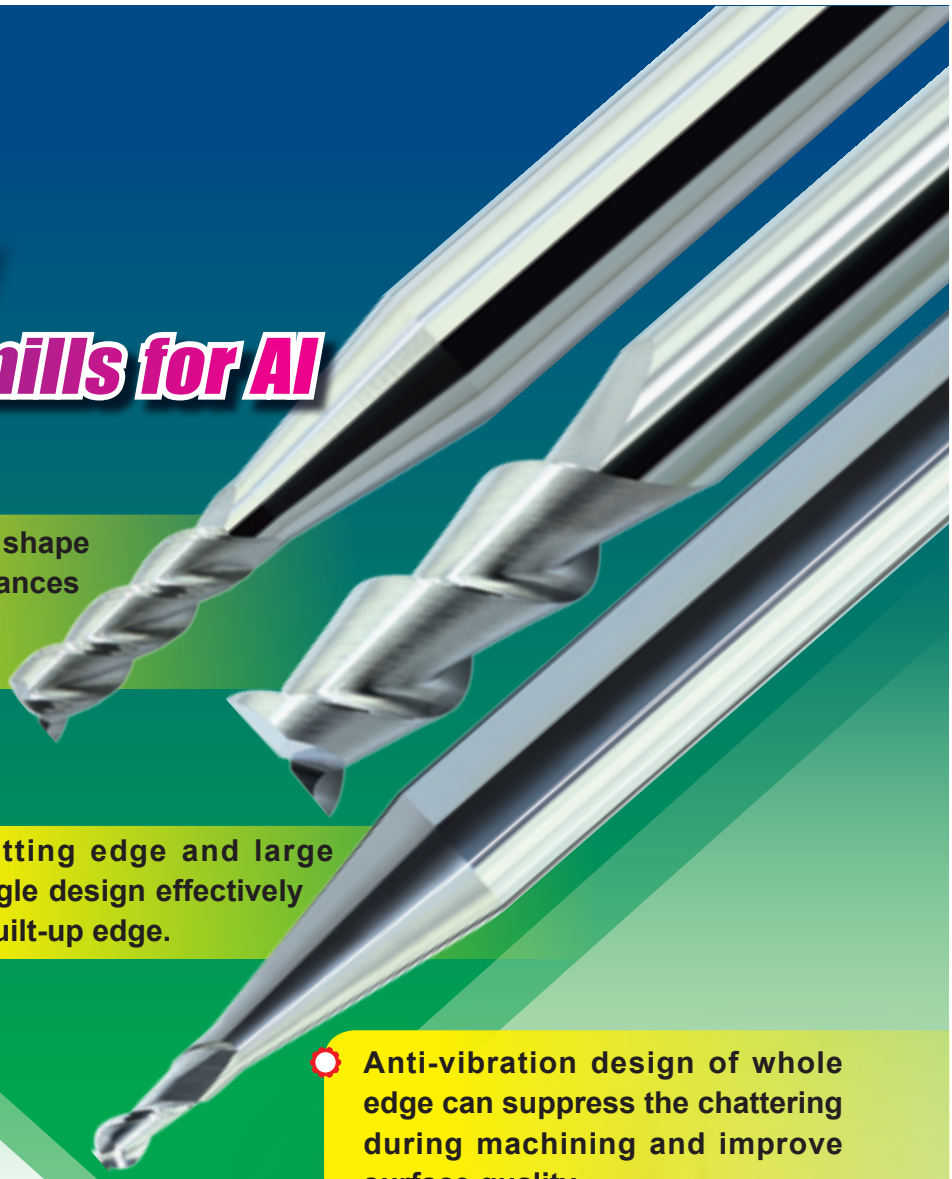
● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

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

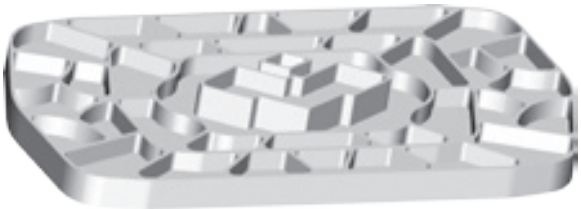
Code key B258 | Graphics category and identification B259 | Cutting parameters B548 | Non-standard customization B570-B571

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.

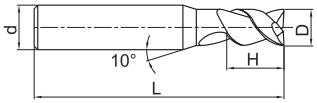


2-flute flattened end mills with straight shank

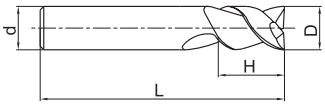
Side face | Step shoulder | Straight slot

AL-2E





Picture 1



Picture 2

- Good chip removal performance, high machining efficiency.

55° | D ⩽12 0~-0.020 12<D 0~-0.030

Type	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 B258 | Graphics category and identification B259 | Cutting parameters B549 | Non-standard customization B570-B571

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

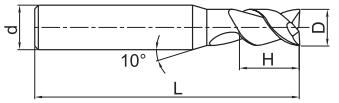

Side face


Step shoulder

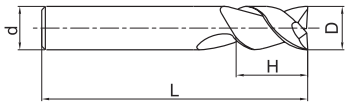

Straight slot

AL-2EL



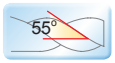


Picture 1



Picture 2

● AL-2E series with long cutting edge.







Type	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 B258
Graphics category and identification B259
Cutting parameters B549
Non-standard customization B570-B571

3-flute flattened end mills with straight shank

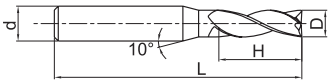

Side face


Step shoulder

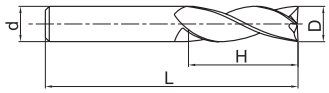

Straight slot

AL-3E



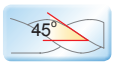


Picture 1



Picture 2

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







Type	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 B258
Graphics category and identification B259
Cutting parameters B550
Non-standard customization B570-B571

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

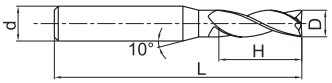

Side face


Step shoulder

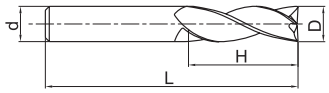

Straight slot

AL-3EL



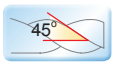


Picture 1



Picture 2

- AL-3E series with long cutting edge.







Type	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						
									◎		

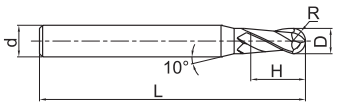
Code key B258
Graphics category and identification B259
Cutting parameters B550
Non-standard customization B570-B571

2-flute ball nose end mills with straight shank

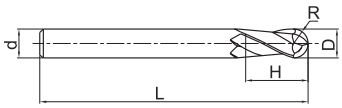
Profile Cavity Ball nose slot

AL-2B





Picture 1



Picture 2

● Suitable for profile milling aluminum alloy.

35° D 0~-0.020 R R±0.01

Type	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 B258 Graphics category and identification B259 Cutting parameters B551 Non-standard customization B570-B571

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

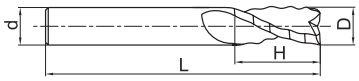

Side face


Step shoulder

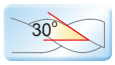

Straight slot

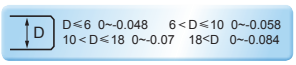
AL-3W





- For rough machining of Al alloy.

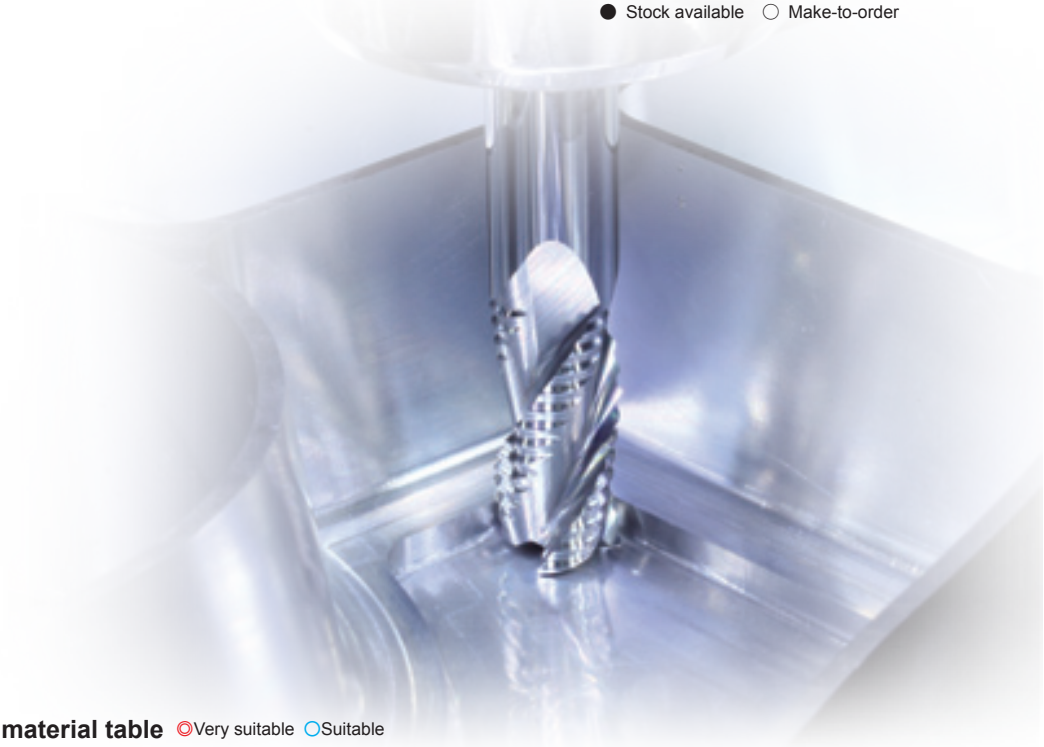






Type	Basic dimension(mm)				Number of teeth Z	Stock
	D	d	H	L		
AL-3W-D6.0	6.0	6	16	50	3	●
AL-3W-D8.0	8.0	8	20	60	3	●
AL-3W-D10.0	10.0	10	25	75	3	●
AL-3W-D12.0	12.0	12	30	75	3	●
AL-3W-D16.0	16.0	16	45	100	3	●
AL-3W-D20.0	20.0	20	45	100	3	●

● 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						
									◎		

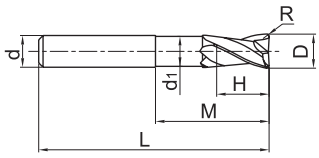
Code key B258 Graphics category and identification B259 Cutting parameters B552 Non-standard customization B570-B571

2-flute R end mills with straight shank

Radius shoulder | Profile | Radius corner slot

super high speed **AL-2R-AIR**





- Very suitable for super high speed milling of Al workpiece.

30° | D | D≤12 0~-0.020 12<D 0~-0.030

Type	Basic dimension(mm)							Number of teeth Z	Stock
	D	R	d	d_1	H	M	L		
AL-2R-D6.0R1.0- AIR	6.0	1.0	6	5.5	7	20	57	2	○
AL-2R-D8.0R1.0- AIR	8.0	1.0	8	7.4	9	26	63	2	○
AL-2R-D10.0R1.0- AIR	10.0	1.0	10	9.2	11	31	72	2	○
AL-2R-D10.0R2.0- AIR	10.0	2.0	10	9.2	11	31	72	2	○
AL-2R-D12.0R1.0- AIR	12.0	1.0	12	11.0	12	37	83	2	○
AL-2R-D12.0R2.0- AIR	12.0	2.0	12	11.0	12	37	83	2	○
AL-2R-D12.0R3.0- AIR	12.0	3.0	12	11.0	12	37	83	2	○
AL-2R-D16.0R1.0- AIR	16.0	1.0	16	15.0	16	43	92	2	○
AL-2R-D16.0R2.0- AIR	16.0	2.0	16	15.0	16	43	92	2	○
AL-2R-D16.0R3.0- AIR	16.0	3.0	16	15.0	16	43	92	2	○
AL-2R-D16.0R4.0- AIR	16.0	4.0	16	15.0	16	43	92	2	○
AL-2R-D20.0R1.0- AIR	20.0	1.0	20	19.0	20	53	104	2	○
AL-2R-D20.0R2.0- AIR	20.0	2.0	20	19.0	20	53	104	2	○
AL-2R-D20.0R3.0- AIR	20.0	3.0	20	19.0	20	53	104	2	○
AL-2R-D20.0R4.0- AIR	20.0	4.0	20	19.0	20	53	104	2	○
AL-2R-D20.0R5.0- AIR	20.0	5.0	20	19.0	20	53	104	2	○
AL-2R-D20.0R6.0- AIR	20.0	6.0	20	19.0	20	53	104	2	○

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

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

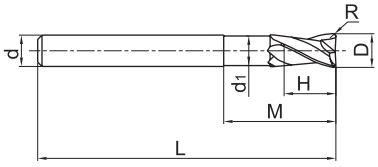
Code key B258 | Graphics category and identification B259 | Cutting parameters B553 | Non-standard customization B570-B571

2-flute R end mills with straight and long shank

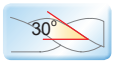
Radius shoulder | Profile | Radius corner slot

super high speed **AL-2RL-AIR**





- Very suitable for super high speed milling of Al workpiece.







Type	Basic dimension(mm)							Number of teeth Z	Stock
	D	R	d	d_1	H	M	L		
AL-2RL-D6.0R1.0- AIR	6.0	1.0	6	5.5	7	43	80	2	○
AL-2RL-D8.0R1.0- AIR	8.0	1.0	8	7.4	9	53	90	2	○
AL-2RL-D10.0R1.0- AIR	10.0	1.0	10	9.2	11	59	100	2	○
AL-2RL-D10.0R2.0- AIR	10.0	2.0	10	9.2	11	59	100	2	○
AL-2RL-D12.0R1.0- AIR	12.0	1.0	12	11.0	12	74	120	2	○
AL-2RL-D12.0R2.0- AIR	12.0	2.0	12	11.0	12	74	120	2	○
AL-2RL-D12.0R3.0- AIR	12.0	3.0	12	11.0	12	74	120	2	○
AL-2RL-D16.0R1.0- AIR	16.0	1.0	16	15.0	16	84	140	2	○
AL-2RL-D16.0R2.0- AIR	16.0	2.0	16	15.0	16	84	140	2	○
AL-2RL-D16.0R3.0- AIR	16.0	3.0	16	15.0	16	84	140	2	○
AL-2RL-D16.0R4.0- AIR	16.0	4.0	16	15.0	16	84	140	2	○
AL-2RL-D20.0R1.0- AIR	20.0	1.0	20	19.0	20	89	140	2	○
AL-2RL-D20.0R2.0- AIR	20.0	2.0	20	19.0	20	89	140	2	○
AL-2RL-D20.0R3.0- AIR	20.0	3.0	20	19.0	20	89	140	2	○
AL-2RL-D20.0R4.0- AIR	20.0	4.0	20	19.0	20	89	140	2	○
AL-2RL-D20.0R5.0- AIR	20.0	5.0	20	19.0	20	89	140	2	○
AL-2RL-D20.0R6.0- AIR	20.0	6.0	20	19.0	20	89	140	2	○

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

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

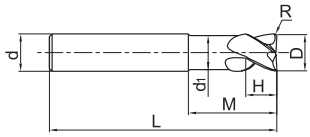
Code key B258 | Graphics category and identification B259 | Cutting parameters B553 | Non-standard customization B570-B571

3-flute R end mills with straight shank

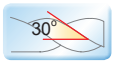
Radius shoulder | Profile | Radius corner slot

super high speed **AL-3R-AIR**





- Very suitable for super high speed milling of Al workpiece.







Type	Basic dimension(mm)							Number of teeth Z	Stock
	D	R	d	d_1	H	M	L		
AL-3R-D12.0R1.0- AIR	12.0	1.0	12	11.0	12	37	83	3	○
AL-3R-D12.0R2.0- AIR	12.0	2.0	12	11.0	12	37	83	3	○
AL-3R-D12.0R3.0- AIR	12.0	3.0	12	11.0	12	37	83	3	○
AL-3R-D16.0R1.0- AIR	16.0	1.0	16	15.0	16	43	92	3	○
AL-3R-D16.0R2.0- AIR	16.0	2.0	16	15.0	16	43	92	3	○
AL-3R-D16.0R3.0- AIR	16.0	3.0	16	15.0	16	43	92	3	○
AL-3R-D16.0R4.0- AIR	16.0	4.0	16	15.0	16	43	92	3	○
AL-3R-D20.0R1.0- AIR	20.0	1.0	20	19.0	20	53	104	3	○
AL-3R-D20.0R2.0- AIR	20.0	2.0	20	19.0	20	53	104	3	○
AL-3R-D20.0R3.0- AIR	20.0	3.0	20	19.0	20	53	104	3	○
AL-3R-D20.0R4.0- AIR	20.0	4.0	20	19.0	20	53	104	3	○
AL-3R-D20.0R5.0- AIR	20.0	5.0	20	19.0	20	53	104	3	○
AL-3R-D20.0R6.0- AIR	20.0	6.0	20	19.0	20	53	104	3	○

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

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

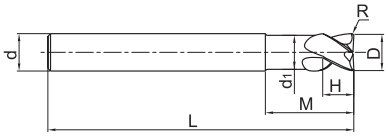
Code key B258 | Graphics category and identification B259 | Cutting parameters B554 | Non-standard customization B570-B571

3-flute R end mills with straight and long shank

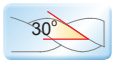
Radius shoulder | Profile | Radius corner slot

super high speed **AL-3RL-AIR**





- Very suitable for super high speed milling of Al workpiece.







Type	Basic dimension(mm)							Number of teeth Z	Stock
	D	R	d	d_1	H	M	L		
AL-3RL-D12.0R1.0- AIR	12.0	1.0	12	11.0	12	74	120	3	○
AL-3RL-D12.0R2.0- AIR	12.0	2.0	12	11.0	12	74	120	3	○
AL-3RL-D12.0R3.0- AIR	12.0	3.0	12	11.0	12	74	120	3	○
AL-3RL-D16.0R1.0- AIR	16.0	1.0	16	15.0	16	84	140	3	○
AL-3RL-D16.0R2.0- AIR	16.0	2.0	16	15.0	16	84	140	3	○
AL-3RL-D16.0R3.0- AIR	16.0	3.0	16	15.0	16	84	140	3	○
AL-3RL-D16.0R4.0- AIR	16.0	4.0	16	15.0	16	84	140	3	○
AL-3RL-D20.0R1.0- AIR	20.0	1.0	20	19.0	20	89	140	3	○
AL-3RL-D20.0R2.0- AIR	20.0	2.0	20	19.0	20	89	140	3	○
AL-3RL-D20.0R3.0- AIR	20.0	3.0	20	19.0	20	89	140	3	○
AL-3RL-D20.0R4.0- AIR	20.0	4.0	20	19.0	20	89	140	3	○
AL-3RL-D20.0R5.0- AIR	20.0	5.0	20	19.0	20	89	140	3	○
AL-3RL-D20.0R6.0- AIR	20.0	6.0	20	19.0	20	89	140	3	○

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

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

Code key B258 | Graphics category and identification B259 | Cutting parameters B554 | Non-standard customization B570-B571

ALG series

Aluminum machining end mills

ALG series aluminum machining end mills are highly versatile and can achieve efficient cutting of aluminum alloy in various working conditions, with sharp edge design, light and fast cutting, excellent anti-bonding wear performance and high surface quality.

- **Super fine grain carbide matrix, perfect combination of tool wear resistance and cutting edge strength;**
- **Special design of the chip tank realizes the perfect unification of tool strength and chip removal performance, which greatly improves the cutting stability;**
- **Large rake angle and sharp cutting edge design, effectively avoiding the generation of chip tumors;**
- **Optimized design of the flank surface and special surface treatment, the parts are machined with excellent surface quality.**



Two cutting edges



Three cutting edges

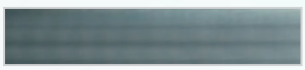
Application examples

Tool：ALG-3E-D8.0
Processing material: Aluminum alloy(HB110)
Machine: Machining center
Machining type: Side milling
Clamping type: Hydraulic toolholder
Cooling type: Emulsion
Cutting parameters：n=13000r/min，
f=900mm/min，a_p=8mm，a_e=0.5mm

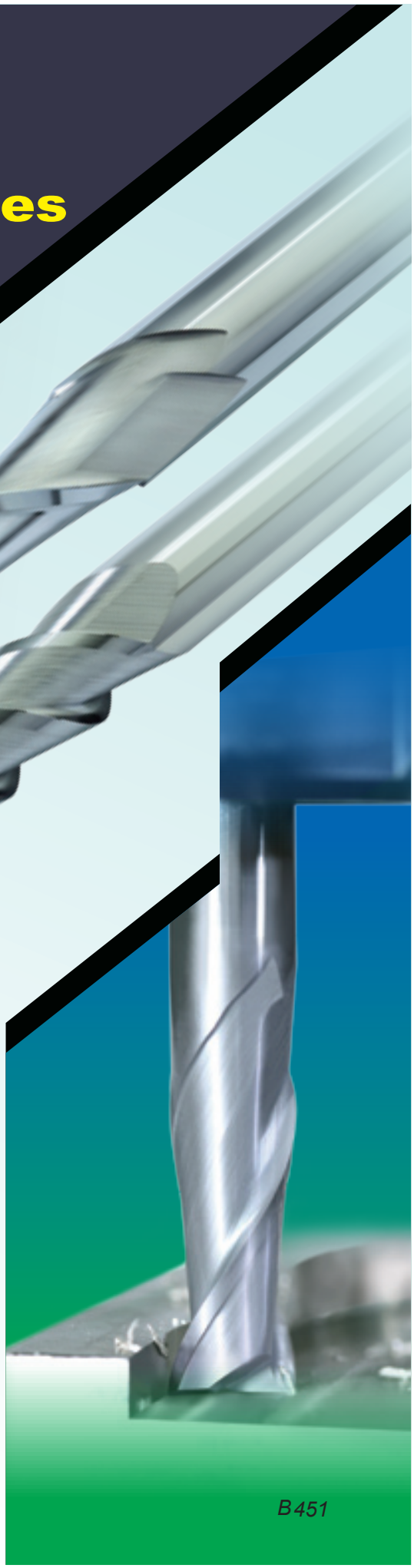
Machining surface quality comparison



ZCC•CT product



Company A's product



2-flute flattened end mills with straight shank


Side face

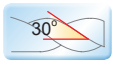

Step shoulder


Straight slot

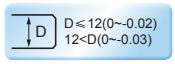
ALG-2E



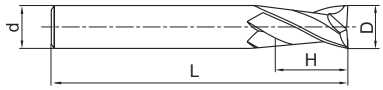
- Good chip removal performance, high machining efficiency.



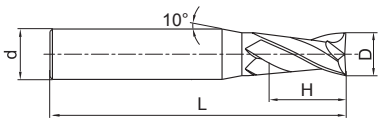








Picture 1



Picture 2

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

● 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 B258 Graphics category and identification B259 Cutting parameters B555 Non-standard customization B570-B571

3-flute flattened end mills with straight shank

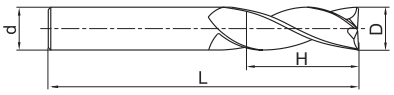

Side face


Step shoulder

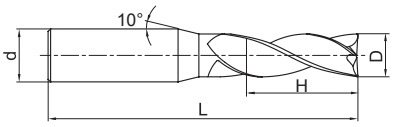

Straight slot

ALG-3E



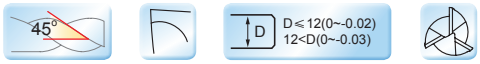


Picture 1



Picture 2

- Good chip removal performance, can achieve high-precision machining.



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

● 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 B258 Graphics category and identification B259 Cutting parameters B556 Non-standard customization B570-B571

2-flute R end mills with straight shank

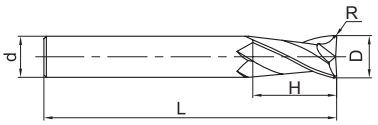
Radius shoulder Profile Radius corner slot

ALG-2R

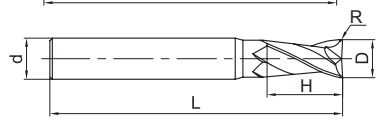


- very suitable for super high speed milling of Al workpiece.





Picture 1



Picture 2

Type	Basic dimension(mm)					Number of teeth Z	Geometry	Stock
	D	R	d	H	L			
ALG-2R-D1.0R0.2S	1.0	0.2	4	3	50	2	Picture 2	○
ALG-2R-D1.5R0.2S	1.5	0.2	4	4	50	2	Picture 2	○
ALG-2R-D2.0R0.2S	2.0	0.2	4	6	50	2	Picture 2	○
ALG-2R-D2.0R0.5S	2.0	0.5	4	6	50	2	Picture 2	○
ALG-2R-D2.5R0.2S	2.5	0.2	4	8	50	2	Picture 2	○
ALG-2R-D2.5R0.5S	2.5	0.5	4	8	50	2	Picture 2	○
ALG-2R-D3.0R0.2S	3.0	0.2	4	8	50	2	Picture 2	○
ALG-2R-D3.0R0.5S	3.0	0.5	4	8	50	2	Picture 2	○
ALG-2R-D3.5R0.2S	3.5	0.2	4	10	50	2	Picture 2	○
ALG-2R-D3.5R0.5S	3.5	0.5	4	10	50	2	Picture 2	○
ALG-2R-D4.0R0.2S	4.0	0.2	4	11	50	2	Picture 1	○
ALG-2R-D4.0R0.5S	4.0	0.5	4	11	50	2	Picture 1	○
ALG-2R-D4.0R1.0S	4.0	1.0	4	11	50	2	Picture 1	○
ALG-2R-D6.0R0.3	6.0	0.3	6	16	50	2	Picture 1	○
ALG-2R-D6.0R0.5	6.0	0.5	6	16	50	2	Picture 1	○
ALG-2R-D6.0R1.0	6.0	1.0	6	16	50	2	Picture 1	○
ALG-2R-D8.0R0.3	8.0	0.3	8	20	60	2	Picture 1	○
ALG-2R-D8.0R0.5	8.0	0.5	8	20	60	2	Picture 1	○
ALG-2R-D8.0R1.0	8.0	1.0	8	20	60	2	Picture 1	○
ALG-2R-D10.0R0.3	10.0	0.3	10	25	75	2	Picture 1	○
ALG-2R-D10.0R0.5	10.0	0.5	10	25	75	2	Picture 1	○
ALG-2R-D10.0R1.0	10.0	1.0	10	25	75	2	Picture 1	○
ALG-2R-D10.0R1.5	10.0	1.5	10	25	75	2	Picture 1	○
ALG-2R-D10.0R2.0	10.0	2.0	10	25	75	2	Picture 1	○
ALG-2R-D12.0R0.3	12.0	0.3	12	30	75	2	Picture 1	○
ALG-2R-D12.0R0.5	12.0	0.5	12	30	75	2	Picture 1	○
ALG-2R-D12.0R1.0	12.0	1.0	12	30	75	2	Picture 1	○
ALG-2R-D12.0R1.5	12.0	1.5	12	30	75	2	Picture 1	○
ALG-2R-D12.0R2.0	12.0	2.0	12	30	75	2	Picture 1	○

Applicable workpiece material table

◎Very suitable ○Suitable ● Stock available ○ Make-to-order

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 B258 Graphics category and identification B259 Cutting parameters B557 Non-standard customization B570-B571

3-flute R end mills with straight shank

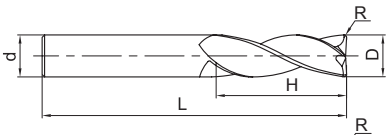
Radius shoulder | Profile | Radius corner slot

ALG-3R

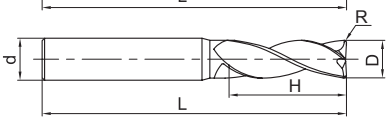


- very suitable for super high speed milling of Al workpiece.





Picture 1



Picture 2

Type	Basic dimension(mm)					Number of teeth Z	Geometry	Stock
	D	R	d	H	L			
ALG-3R-D1.0R0.2S	1.0	0.2	4	3	50	3	Picture 2	○
ALG-3R-D1.5R0.2S	1.5	0.2	4	4	50	3	Picture 2	○
ALG-3R-D2.0R0.2S	2.0	0.2	4	6	50	3	Picture 2	○
ALG-3R-D2.0R0.5S	2.0	0.5	4	6	50	3	Picture 2	○
ALG-3R-D2.5R0.2S	2.5	0.2	4	8	50	3	Picture 2	○
ALG-3R-D2.5R0.5S	2.5	0.5	4	8	50	3	Picture 2	○
ALG-3R-D3.0R0.2S	3.0	0.2	4	8	50	3	Picture 2	○
ALG-3R-D3.0R0.5S	3.0	0.5	4	8	50	3	Picture 2	○
ALG-3R-D3.5R0.2S	3.5	0.2	4	10	50	3	Picture 2	○
ALG-3R-D3.5R0.5S	3.5	0.5	4	10	50	3	Picture 2	○
ALG-3R-D4.0R0.2S	4.0	0.2	4	11	50	3	Picture 1	○
ALG-3R-D4.0R0.5S	4.0	0.5	4	11	50	3	Picture 1	○
ALG-3R-D4.0R1.0S	4.0	1.0	4	11	50	3	Picture 1	○
ALG-3R-D6.0R0.3	6.0	0.3	6	16	50	3	Picture 1	○
ALG-3R-D6.0R0.5	6.0	0.5	6	16	50	3	Picture 1	○
ALG-3R-D6.0R1.0	6.0	1.0	6	16	50	3	Picture 1	○
ALG-3R-D8.0R0.3	8.0	0.3	8	20	60	3	Picture 1	○
ALG-3R-D8.0R0.5	8.0	0.5	8	20	60	3	Picture 1	○
ALG-3R-D8.0R1.0	8.0	1.0	8	20	60	3	Picture 1	○
ALG-3R-D10.0R0.3	10.0	0.3	10	25	75	3	Picture 1	○
ALG-3R-D10.0R0.5	10.0	0.5	10	25	75	3	Picture 1	○
ALG-3R-D10.0R1.0	10.0	1.0	10	25	75	3	Picture 1	○
ALG-3R-D10.0R1.5	10.0	1.5	10	25	75	3	Picture 1	○
ALG-3R-D10.0R2.0	10.0	2.0	10	25	75	3	Picture 1	○
ALG-3R-D12.0R0.3	12.0	0.3	12	30	75	3	Picture 1	○
ALG-3R-D12.0R0.5	12.0	0.5	12	30	75	3	Picture 1	○
ALG-3R-D12.0R1.0	12.0	1.0	12	30	75	3	Picture 1	○
ALG-3R-D12.0R1.5	12.0	1.5	12	30	75	3	Picture 1	○
ALG-3R-D12.0R2.0	12.0	2.0	12	30	75	3	Picture 1	○

Applicable workpiece material table

◎Very suitable ○Suitable ● Stock available ○ Make-to-order

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 B258 | Graphics category and identification B259 | Cutting parameters B558 | Non-standard customization B570-B571

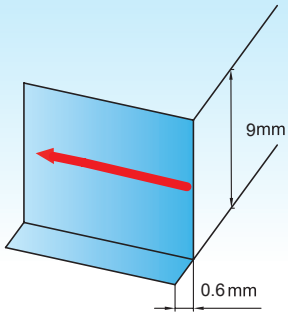


SM

series end mills for machining of hard-to-cut materials such as stainless steel, heat-resistant alloy, etc.

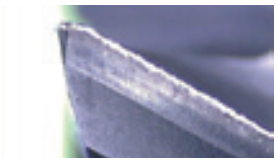
- Large helical and rake angle, sharp cutting edge, unique edge geometry can restrain cutting-heat's influence on tool nose, and greatly improve wear resistance and heat resistance.
- The coating with good heat resistance can achieve stable machining even at high temperature.
- Very suitable for machining 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

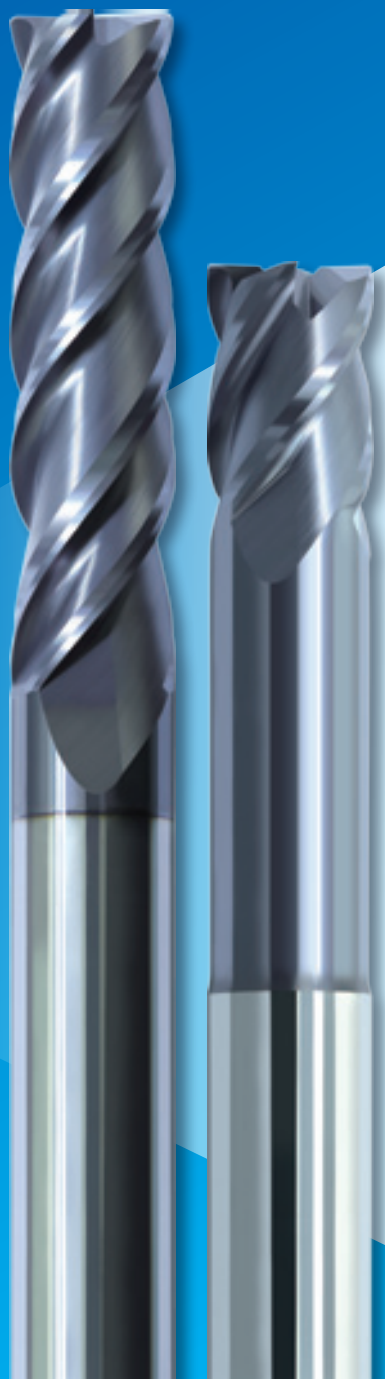
Abrasion condition of peripheral edge





VSM series

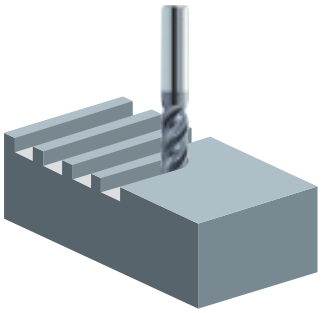
End mills with unequal pitch and variable inclined angle; Revolution on machining materials hard to cut: stainless steel, heat resistant alloy, etc.



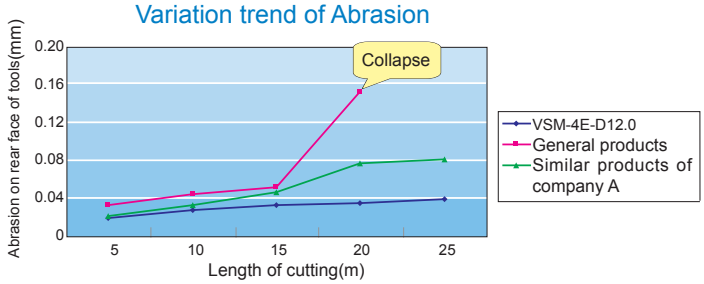
VSM-4E **VSM-4R**
VSM-4EFP **VSM-4RFP**

VSM-4E-D12.0 Slotting stainless steel

Machine：MIKRON UCP1000
Chuck：HSK63-A
Machined material：1Cr18Ni9Ti
Cutting speed：80m/min
Feed per tooth：0.05mm/z
Axial cutting depth：6mm
Radial cutting depth：12mm
Cooling system：air cooling
Cutting style：slotting
Overhang：35mm



Variation trend of Abrasion



Note: ◆Compared with competitor’s,VSM end mills can perform better on wear resistance and tool life.
◆Compared common tools,unequal pitch end mills perform stronger on resisting broken.

3-flute flattened end mills with straight shank

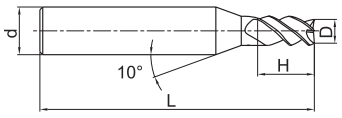

Side face


Step shoulder

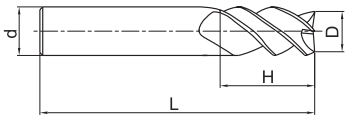

Straight slot

SM-3E



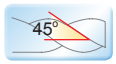


Picture 1



Picture 2

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









Type	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						
◎	◎					◎					

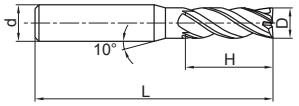
Code key B258 Graphics category and identification B259 Cutting parameters B559 Non-standard customization B570-B571

4-flutes unequal pitch end mills with straight shank

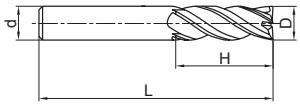
Side face | Step shoulder | Straight slot

VSM-4E





Picture 1



Picture 2

- With variable inclined angle design, greatly improving the anti vibration performance.
- Very suitable for machining materials hard to cut :such as stainless steel,heat resist alloy and Ti-base alloy.

38°,41° | Coated AlTiN | D D≤12 0~-0.020 12<D 0~-0.030

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

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

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

Code key B258 | Graphics category and identification B259 | Cutting parameters B560 | Non-standard customization B570-B571

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

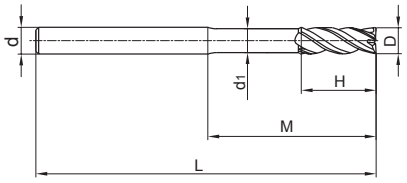

Side face


Step shoulder

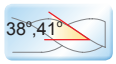

Straight slot

VSM-4EFP





- With variable inclined angle design, greatly improving the anti vibration performance.
- Very suitable for machining materials hard to cut :such as stainless steel,heat resist alloy and Ti-base alloy.









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

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

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

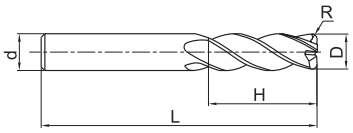
Code key B258
Graphics category and identification B259
Cutting parameters B560
Non-standard customization B570-B571

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

Type	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						
◎	◎					◎					

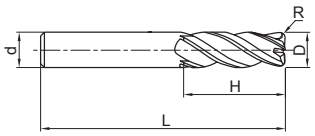
Code key B258 | Graphics category and identification B259 | Cutting parameters B561 | Non-standard customization B570-B571

4-flute R end mills with straight shank

Radius shoulder | Profile | Radius corner slot

VSM-4R





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

38°,41° | Coated AlTiN | D D≤12 0~-0.020 12<D 0~-0.030

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

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

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

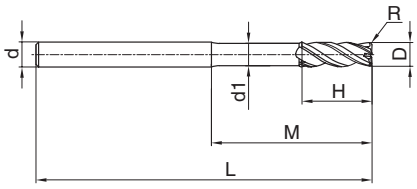
Code key B258 | Graphics category and identification B259 | Cutting parameters B562 | Non-standard customization B570-B571

4-flutes R end mills with straight shank,unequal pitch , long neck and short cutting edges

Radius shoulder Profile Radius corner slot

VSM-4RFP





- With high rigidity short cutting edges design,suitable for deep cavity machining.
- With variable helical angle design,great improved vibration resistance and surface quality after machining.

38°,41° Coated AlTiN D D≤12 0~-0.020 12<D 0~-0.030

Type	Basic dimension(mm)							Number of teeth Z	Stock
	D	R	d	d_1	H	M	L		
VSM-4RFP-D6.0R0.5	6.0	0.5	6	5.7	9	27	75	4	●
VSM-4RFP-D6.0R1.0	6.0	1.0	6	5.7	9	27	75	4	●
VSM-4RFP-D8.0R0.5	8.0	0.5	8	7.7	12	36	100	4	●
VSM-4RFP-D8.0R1.0	8.0	1.0	8	7.7	12	36	100	4	●
VSM-4RFP-D10.0R0.5	10.0	0.5	10	9.5	14	42	100	4	●
VSM-4RFP-D10.0R1.0	10.0	1.0	10	9.5	14	42	100	4	●
VSM-4RFP-D10.0R2.0	10.0	2.0	10	9.5	14	42	100	4	●
VSM-4RFP-D12.0R0.5	12.0	0.5	12	11.5	16	48	100	4	●
VSM-4RFP-D12.0R1.0	12.0	1.0	12	11.5	16	48	100	4	●
VSM-4RFP-D12.0R2.0	12.0	2.0	12	11.5	16	48	100	4	●
VSM-4RFP-D16.0R1.0	16.0	1.0	16	15.5	20	60	150	4	●
VSM-4RFP-D16.0R2.0	16.0	2.0	16	15.5	20	60	150	4	●

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

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

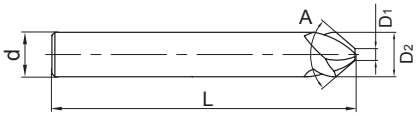
Code key B258 Graphics category and identification B259 Cutting parameters B562 Non-standard customization B570-B571

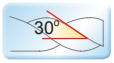
2-flute helical flute chamfer end mills with straight shank

Chamfering

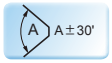
CM-2E













Type	Basic dimension(mm)					Number of teeth Z	Stock
	A	D1	D2	d	L		
CM-2E-D3.0-A60	60°	0.2	3	3	50	2	○
CM-2E-D4.0-A60	60°	0.2	4	4	50	2	○
CM-2E-D6.0-A60	60°	0.2	6	6	50	2	○
CM-2E-D8.0-A60	60°	0.5	8	8	60	2	○
CM-2E-D10.0-A60	60°	0.5	10	10	75	2	○
CM-2E-D12.0-A60	60°	0.5	12	12	75	2	○
CM-2E-D16.0-A60	60°	0.7	16	16	100	2	○
CM-2E-D3.0-A90	90°	0.2	3	3	50	2	○
CM-2E-D4.0-A90	90°	0.2	4	4	50	2	○
CM-2E-D6.0-A90	90°	0.2	6	6	50	2	○
CM-2E-D8.0-A90	90°	0.5	8	8	60	2	○
CM-2E-D10.0-A90	90°	0.5	10	10	75	2	○
CM-2E-D12.0-A90	90°	0.5	12	12	75	2	○
CM-2E-D16.0-A90	90°	0.7	16	16	100	2	○
CM-2E-D3.0-A120	120°	0.2	3	3	50	2	○
CM-2E-D4.0-A120	120°	0.2	4	4	50	2	○
CM-2E-D6.0-A120	120°	0.2	6	6	50	2	○
CM-2E-D8.0-A120	120°	0.5	8	8	60	2	○
CM-2E-D10.0-A120	120°	0.5	10	10	75	2	○
CM-2E-D12.0-A120	120°	0.5	12	12	75	2	○
CM-2E-D16.0-A120	120°	0.7	16	16	100	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						
◎	◎	◎	◎	○		○	◎	◎	◎	○	○

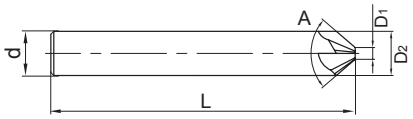
Code key B258 Graphics category and identification B259 Cutting parameters B563 Non-standard customization B570-B571

4-flute helical flute chamfer end mills with straight shank

Chamfering

CM-4E







Type	Basic dimension(mm)					Number of teeth Z	Stock
	A	D_1(±0.02)	D_2	d(h6)	L		
CM-4E-D3.0-B60	60°	0.2	3	3	50	4	○
CM-4E-D4.0-B60	60°	0.2	4	4	50	4	○
CM-4E-D6.0-B60	60°	0.2	6	6	50	4	○
CM-4E-D8.0-B60	60°	0.5	8	8	60	4	○
CM-4E-D10.0-B60	60°	0.5	10	10	75	4	○
CM-4E-D12.0-B60	60°	0.5	12	12	75	4	○
CM-4E-D16.0-B60	60°	0.7	16	16	100	4	○
CM-4E-D3.0-B90	90°	0.2	3	3	50	4	○
CM-4E-D4.0-B90	90°	0.2	4	4	50	4	○
CM-4E-D6.0-B90	90°	0.2	6	6	50	4	○
CM-4E-D8.0-B90	90°	0.5	8	8	60	4	○
CM-4E-D10.0-B90	90°	0.5	10	10	75	4	○
CM-4E-D12.0-B90	90°	0.5	12	12	75	4	○
CM-4E-D16.0-B90	90°	0.7	16	16	100	4	○
CM-4E-D3.0-B120	120°	0.2	3	3	50	4	○
CM-4E-D4.0-B120	120°	0.2	4	4	50	4	○
CM-4E-D6.0-B120	120°	0.2	6	6	50	4	○
CM-4E-D8.0-B120	120°	0.5	8	8	60	4	○
CM-4E-D10.0-B120	120°	0.5	10	10	75	4	○
CM-4E-D12.0-B120	120°	0.5	12	12	75	4	○
CM-4E-D16.0-B120	120°	0.7	16	16	100	4	○

● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

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

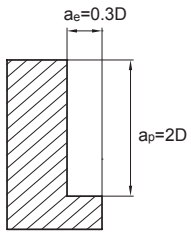
Code key B258 Graphics category and identification B259 Cutting parameters B564 Non-standard customization B570-B571

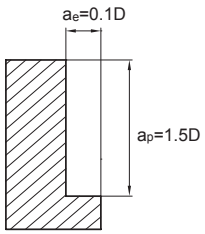
Cutting parameters for VPM series end mills

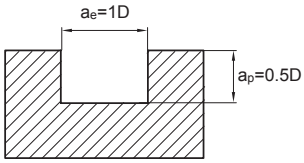
VPM-4E★VPM-4EBL/X★VPM-4EFP

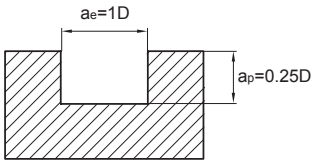
Workpiece material	Cast iron, Carbon steel, Alloy steel ~30HRC		Stainless steel		Carbon steel, Alloy steel ~40HRC		Carbon steel, Alloy steel ~50HRC		Hardened steel ~55HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
3	15900	1220	8500	180	13270	950	10600	630	7430	360
4	11900	1260	6370	190	9950	970	8000	645	570	370
5	9500	1350	5060	190	7960	1010	6400	675	4460	390
6	7900	1330	4250	210	6630	1030	5300	690	3710	390
8	5900	1330	3180	210	4970	1020	4000	680	2785	405
10	4700	1310	2550	210	3980	1010	3200	675	2230	375
12	4000	1310	2120	210	3310	1010	2650	675	1855	375
14	3400	1220	1820	180	2840	945	2300	630	1590	360
16	3000	1220	1590	180	2480	945	2000	630	1390	360
18	2600	1200	1410	160	2210	930	1800	620	1240	350
20	2400	1200	1270	160	1990	930	1600	620	1115	350

Maximum cutting depth







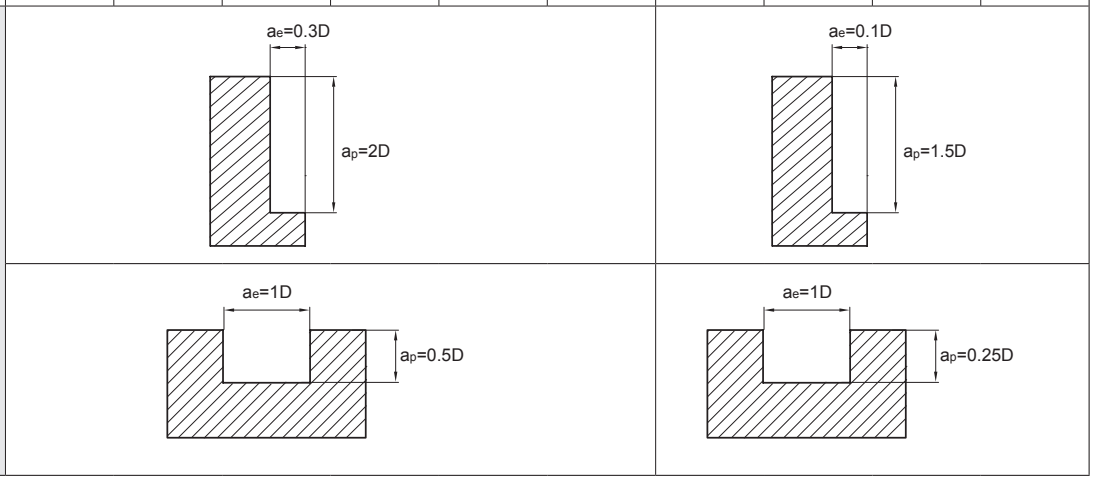


1.The above table shows the standard value of side milling. When milling slot, 60%~80% of rotating speed and 50%~70% of feed speed stated above are recommended as standard.
2.Please select high-precision machine and tool holder.
3.Please use air blow or cutting liquid with high mist retardant property.
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.

VPM-4R★VPM-4RBL/X★VPM-4RFP

Workpiece material	Cast iron, Carbon steel, Alloy steel ~30HRC		Stainless steel		Carbon steel, Alloy steel ~40HRC		Carbon steel, Alloy 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	15900	1460	8500	215	13270	1140	10600	755	7430	430
4	11900	1510	6370	225	9950	1160	8000	770	570	440
5	9500	1620	5060	225	7960	1210	6400	810	4460	465
6	7900	1590	4250	250	6630	1235	5300	825	3710	465
8	5900	1590	3180	250	4970	1220	4000	815	2785	485
10	4700	157	2550	250	3980	1210	3200	810	2230	450
12	4000	1570	2120	250	3310	1210	2650	810	1855	450
14	3400	1460	1820	215	2840	1130	2300	755	1590	430
16	3000	1460	1590	215	2480	1130	2000	755	1390	430
18	2600	1440	1410	190	2210	1115	1800	740	1240	420
20	2400	1440	1270	190	1990	1115	1600	740	1115	420

Maximum cutting depth



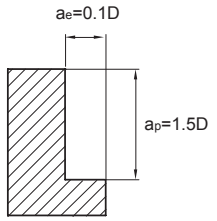
1.The above table shows the standard value of side milling. When milling slot, 60%~80% of rotating speed and 50%~70% of feed speed stated above are recommended as standard.
2.Please select high-precision machine and tool holder.
3.Please use air blow or cutting liquid with high mist retardant property.
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.

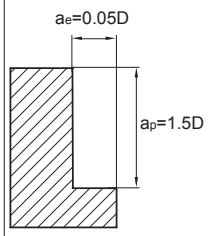
Cutting parameters for UM series end mills

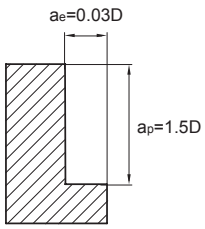
UM-4E★UM-4EL(general cutting)

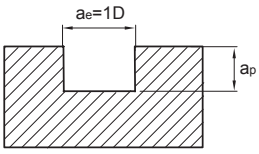
Workpiece material	Cast iron, Carbon steel, Alloy steel ~30HRC		Stainless steel		Pre-hardened steel, quenched and tempered steel ~40HRC		Pre-hardened steel, quenched and tempered steel ~50HRC		Hardened steel ~55HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	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







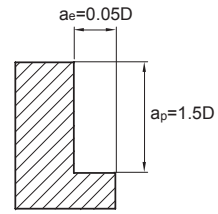
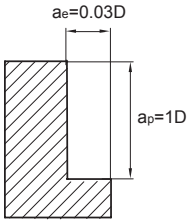


Diameter range	Cutting depth ap
Ø1⩽D<Ø3	0.15D
Ø3⩽D<Ø6	0.3D
Ø6⩽D⩽Ø20	0.5D

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.

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 ae=1.0mm						 Maximum ae=0.5mm			

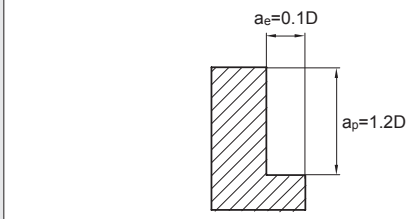
1.Please select high-precision machine and tool holder.
2.Please use air blow or MQL(minimum oil mist cooling).
3.Down milling is recommended in the case of side milling.
4.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the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

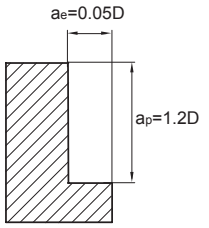
Cutting parameters for UM series end mills

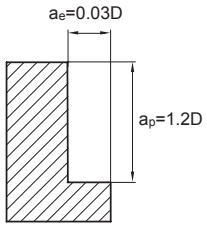
UM-4EFP(general cutting)

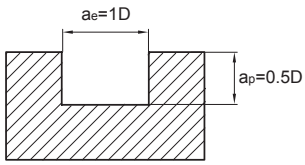
Workpiece material	Cast Iron, Nodular cast iron		Stainless steel		Carbon steel, Alloy steel ~40HRC		Carbon steel, Alloy steel ~50HRC		Hardened steel ~55HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	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

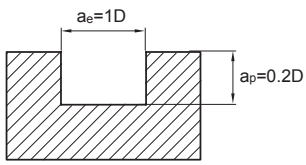
Maximum cutting depth





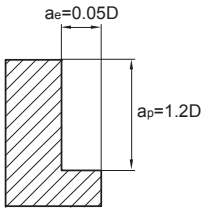
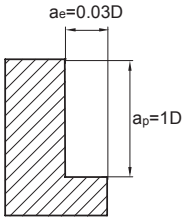






1.The above table shows the standard value of side milling. When milling slot, 50%~70% of rotating speed and 40%~60% of feed speed stated above are recommended as standard.
2.Please select high-precision machine and tool holder.
3.Please use air blow or cutting liquid with high mist retardant property.
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)

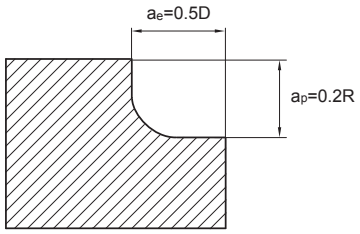
Workpiece material	Cast iron, Carbon steel, Alloy steel ~30HRC		Carbon steel, Alloy steel ~40HRC		Carbon steel, Alloy steel ~40HRC		Carbon steel, Alloy steel ~50HRC		Hardened steel ~55HRC	
Cutting speed	300m/min		250 m/min		200 m/min		150 m/min		100 m/min	
Diameter (mm)	Rotating speed (min^{-1})	Feed 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	



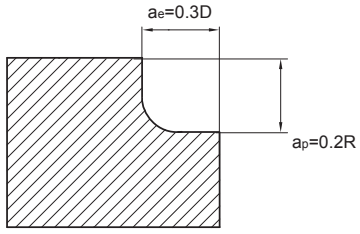
1.Please select high-precision machine and tool holder.
2.Please use air blow or cutting liquid with high mist retardant property.
3.Down milling is recommended.
4.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating 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:

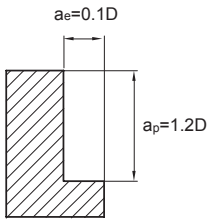
Ratio of neck length to diameter	Cutting speed(m/min)	Axial cutting depth(mm)	Feed speed (mm/min)
L/D ≤ 4	100%	100%	100%
L/D=5	60% ~ 80%	60% ~ 80%	60% ~ 80%
L/D=6	40% ~ 60%	40% ~ 60%	40% ~ 60%

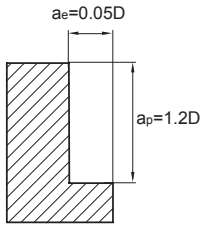
Cutting parameters for UM series end mills

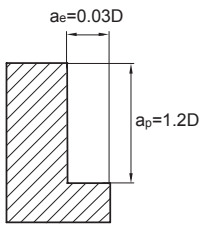
UM-4RFP

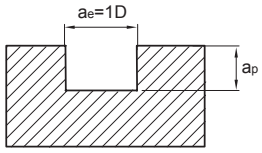
Workpiece material	Cast iron, Carbon steel, Alloy steel ~30HRC		Stainless steel		Pre-hardened steel, quenched and tempered steel ~40HRC		Pre-hardened steel, quenched and tempered steel ~50HRC		Hardened steel ~55HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	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

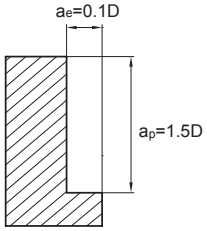
Diameter range	Cutting depth a_p
Ø1⩽D<Ø3	0.1D
Ø3⩽D	0.2D

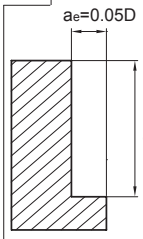
1.The above table shows the standard value of side milling. When milling slot, 50%~70% of rotating speed and 40%~60% of feed speed stated above are recommended as standard.
2.Please select high-precision machine and tool holder.
3.Please use air blow or cutting liquid with high mist retardant property.
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.

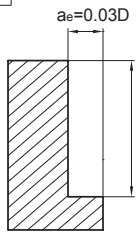
PML-2E★PM-2E★PML-2EL★PM-2EL★PM-2EBL/X

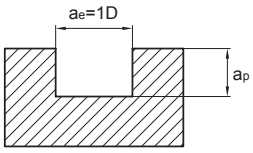
Workpiece material	Cast iron, Carbon steel, Alloy steel ~30HRC		Stainless steel		Pre-hardened steel, quenched and tempered steel ~40HRC		Pre-hardened steel, quenched and tempered steel ~50HRC		Hardened steel ~55HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	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

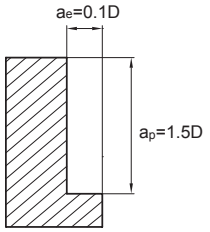
1.The above table shows the standard value of side milling. When milling slot, 50%~70% of rotating speed and 40%~60% of feed speed stated above are recommended as standard.
2.Please select high-precision machine and tool holder.
3.Please use air blow or cutting liquid with high mist retardant property.
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.

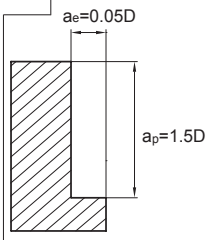
Cutting parameters for PML/PM series end mills

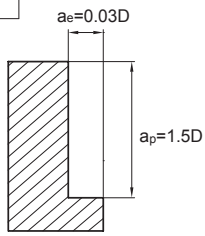
PML-2F★PM-2F★PML-2FL★PM-2FL

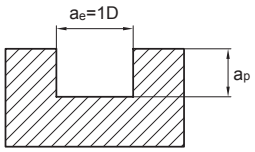
Workpiece material	Cast iron, Carbon steel, Alloy steel ~30HRC		Stainless steel		Pre-hardened steel, quenched and tempered steel ~40HRC		Pre-hardened steel, quenched and tempered steel ~50HRC		Hardened steel ~55HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	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 ap
Ø1⩽D<Ø3	0.15D
Ø3⩽D<Ø6	0.3D
Ø6⩽D<Ø20	0.5D

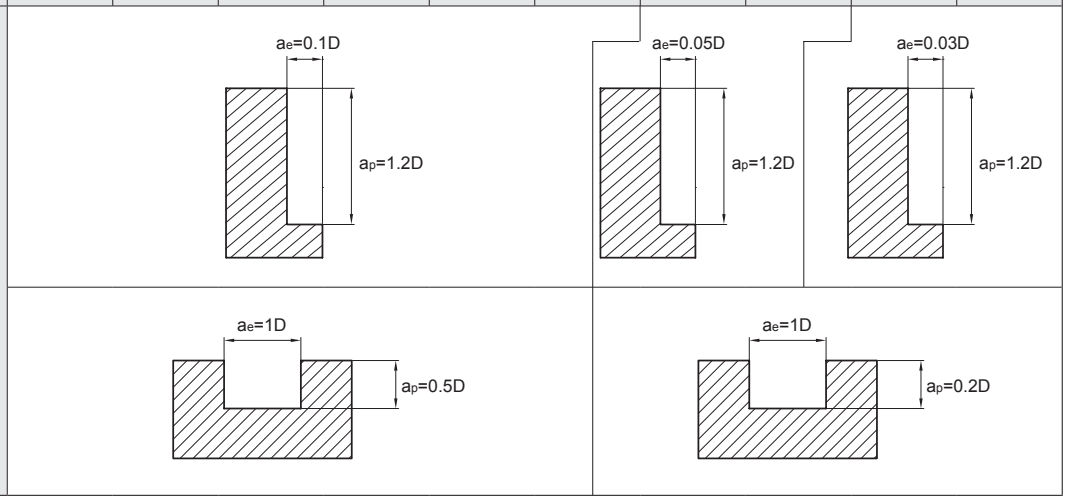
Diameter range	Cutting depth ap
Ø1⩽D<Ø3	0.1D
Ø3⩽D	0.2D

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.

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



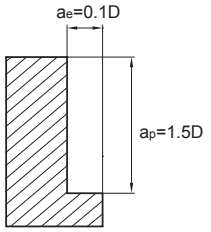
1.The above table shows the standard value of side milling. When milling slot, 50%~70% of rotating speed and 40%~60% of feed speed stated above are recommended as standard.
2.Please select high-precision machine and tool holder.
3.Please use air blow or cutting liquid with high mist retardant property.
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.

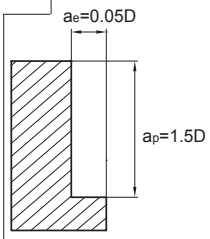
Cutting parameters for PML/PM series end mills

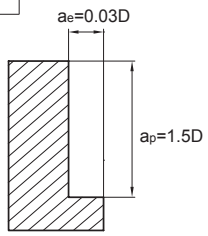
PML-3E-H★PM-3E-H★PML-3EL-H★PM-3EL-H

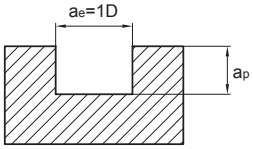
Workpiece material	Cast iron, Carbon steel, Alloy steel ~30HRC		Stainless steel		Pre-hardened steel, quenched and tempered steel ~40HRC		Pre-hardened steel, quenched and tempered steel ~50HRC		Hardened steel ~55HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	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 ap
Ø1⩽D<Ø3	0.15D
Ø3⩽D<Ø6	0.3D
Ø6⩽D<Ø20	0.5D

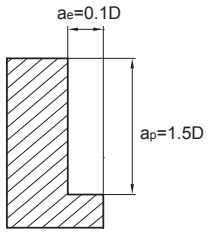
Diameter range	Cutting depth ap
Ø1⩽D<Ø3	0.1D
Ø3⩽D	0.2D

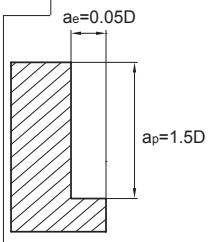
1.The above table shows the standard value of side milling. When milling slot, 50%~70% of rotating speed and 40%~60% of feed speed stated above are recommended as standard.
2.Please select high-precision machine and tool holder.
3.Please use air blow or cutting liquid with high mist retardant property.
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.

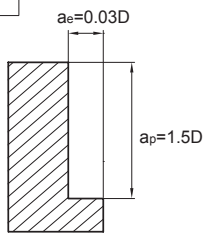
PML-4E-G★PM-4E-G★PML-4EL-G★PM-4EL-G★PM-4EBL/X-G
PML-4E-H★PM-4E-H★PML-4EL-H★PM-4EL-H(general cutting)

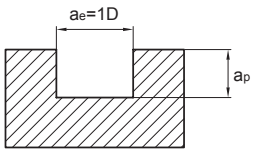
Workpiece material	Cast iron, Carbon steel, Alloy steel ~30HRC		Stainless steel		Pre-hardened steel, quenched and tempered steel ~40HRC		Pre-hardened steel, quenched and tempered steel ~50HRC		Hardened steel ~55HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	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









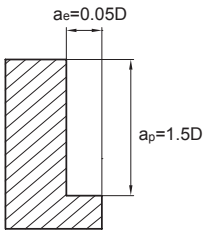
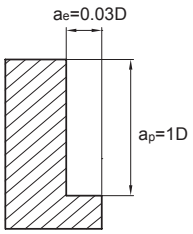
Diameter range	Cutting depth a_p
Ø1≤D<Ø3	0.15D
Ø3≤D<Ø6	0.3D
Ø6≤D<Ø20	0.5D

Diameter range	Cutting depth a_p
Ø1≤D<Ø3	0.1D
Ø3≤D	0.2D

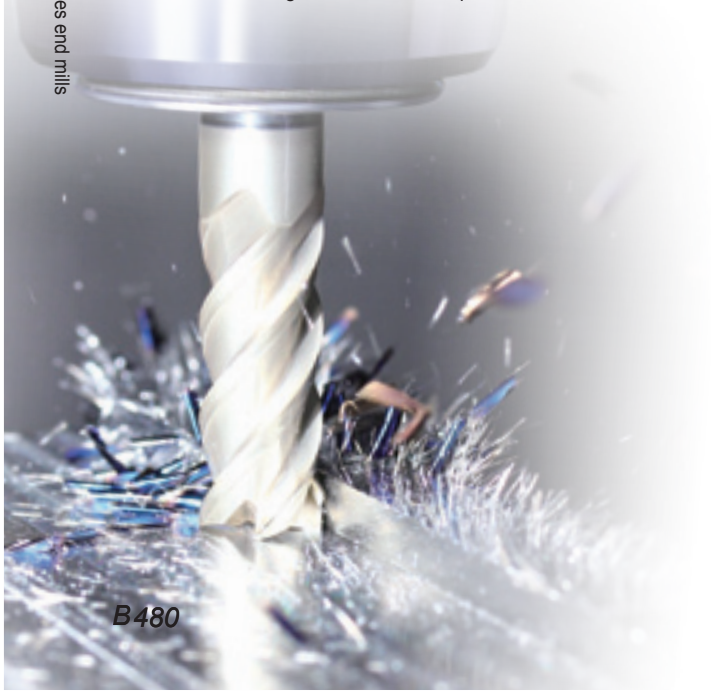
1.The above table shows the standard value of side milling. When milling slot, 50%~70% of rotating speed and 40%~60% of feed speed stated above are recommended as standard.
2.Please select high-precision machine and tool holder.
3.Please use air blow or cutting liquid with high mist retardant property.
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-4E-G★PM-4E-G★PML-4EL-G★PM-4EL-G★PM-4EBL/X-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			

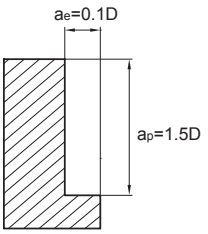
1.Please select high-precision machine and tool holder.
2.Please use air blow or MQL(minimum oil mist cooling).
3.Down milling is recommended in the case of side milling.
4.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the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

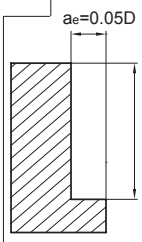


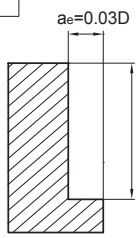
PML-4F-G★PM-4F-G★PML-4FL-G★PM-4FL-G(general cutting)

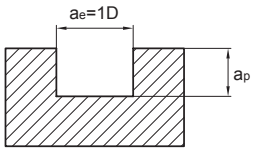
Workpiece material	Cast iron, Carbon steel, Alloy steel ~30HRC		Carbon steel, Alloy steel ~40HRC		Pre-hardened steel, quenched and tempered steel ~45HRC		Pre-hardened steel, quenched and tempered steel ~50HRC		Hardened steel ~55HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating 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)
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







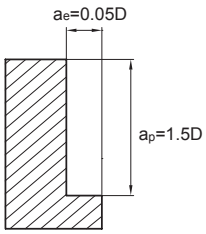
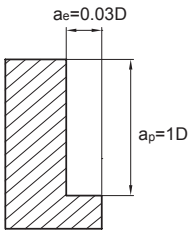


Diameter range	Cutting depth a_p
Ø1⩽D<Ø3	0.15D
Ø3⩽D<Ø6	0.3D
Ø6⩽D<Ø20	0.5D

Diameter range	Cutting depth a_p
Ø1⩽D<Ø3	0.1D
Ø3⩽D	0.2D

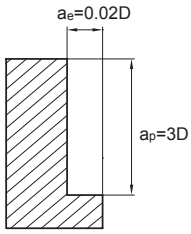
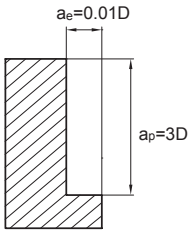
1.The above table shows the standard value of side milling. When milling slot, 50%~70% of rotating speed and 40%~60% of feed speed stated above are recommended as standard.
2.Please select high-precision machine and tool holder.
3.Please use air blow or cutting liquid with high mist retardant property.
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.

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										

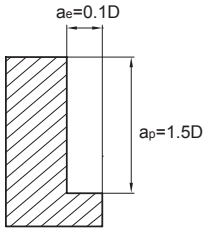
1.Please select high-precision machine and tool holder.
2.Please use air blow or cutting liquid with high mist retardant property.
3.Down milling is recommended in the case of side milling.
4.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. 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.

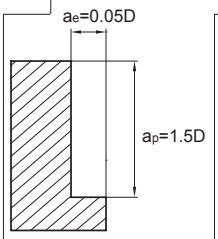
Cutting parameters for PML/PM series end mills

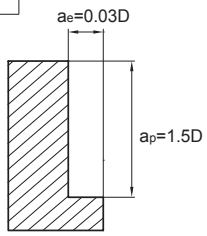
PML-4E★PM-4E★PML-4EL★PM-4EL★PM-4EBL/X(general cutting)

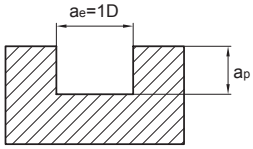
Workpiece material	Cast iron, Carbon steel, Alloy steel ~30HRC		Stainless steel		Pre-hardened steel, quenched and tempered steel ~40HRC		Pre-hardened steel, quenched and tempered steel ~50HRC		Hardened steel ~55HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	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







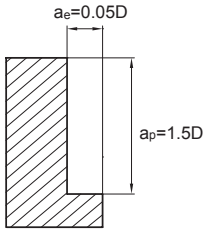
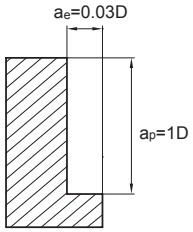


Diameter range	Cutting depth ap
Ø1⩽D<Ø3	0.15D
Ø3⩽D<Ø6	0.3D
Ø6⩽D<Ø20	0.5D

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.

PML-4E★PM-4E★PML-4EL★PM-4EL★PM-4EBL/X(high speed side milling)

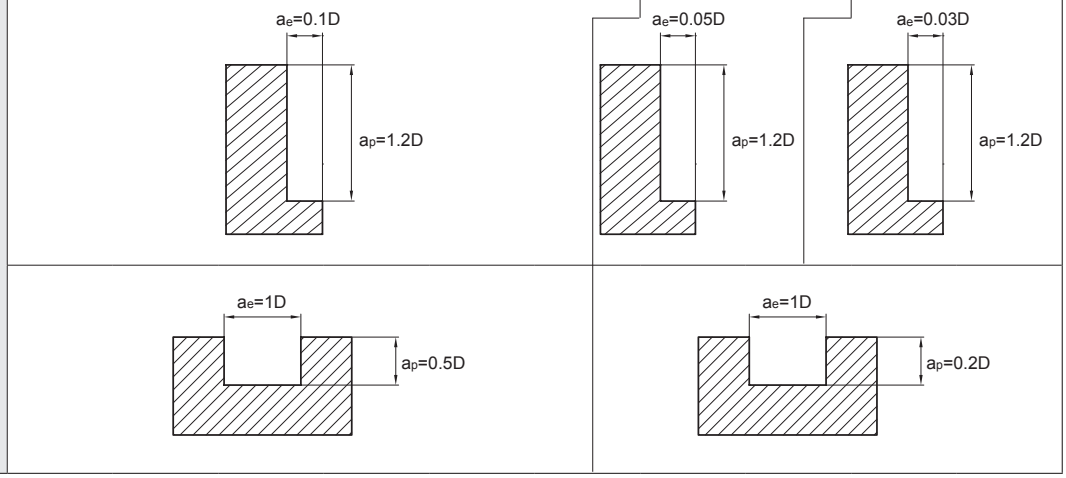
Workpiece material	Cast iron, Carbon steel, Alloy steel ~30HRC		Carbon steel, Alloy steel ~40HRC		Pre-hardened steel, quenched and tempered steel ~45HRC		Pre-hardened steel, quenched and tempered steel ~50HRC		Hardened steel ~55HRC	
Cutting speed	300m/min		250 m/min		200 m/min		150 m/min		100 m/min	
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 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-4EFP★PM-4EFP(general cutting)

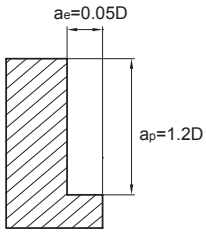
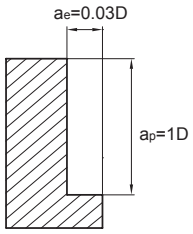
Workpiece material	Cast iron, Carbon steel, Alloy steel ~30HRC		Stainless steel		Pre-hardened steel, quenched and tempered steel ~40HRC		Pre-hardened steel, quenched and tempered steel ~50HRC		Hardened steel ~55HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	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.

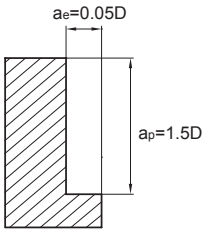
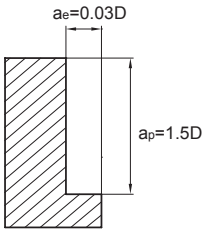
PML-4EFP★PM-4EFP(high speed side milling)

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.

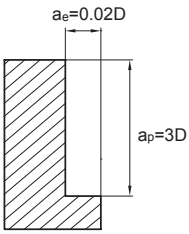
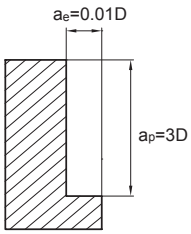
Cutting parameters for PML/PM series end mills

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 ae=1.0mm						 Maximum ae=0.5mm			

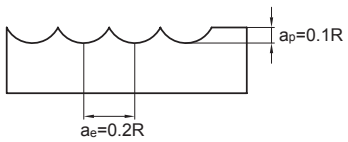
1.Please select high-precision machine and tool holder.
2.Please use air blow or cutting liquid with high mist retardant property.
3.Down milling is recommended in the case of side milling.
4.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. 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										

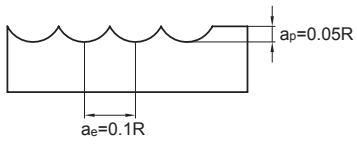
1.Please select high-precision machine and tool holder.
2.Please use air blow or cutting liquid with high mist retardant property.
3.Down milling is recommended in the case of side milling.
4.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. 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.

PML-2B★PM-2B★PML-2BL★PM-2BL/M/X★ PML-2BFP★PM-2BFP(general cutting)

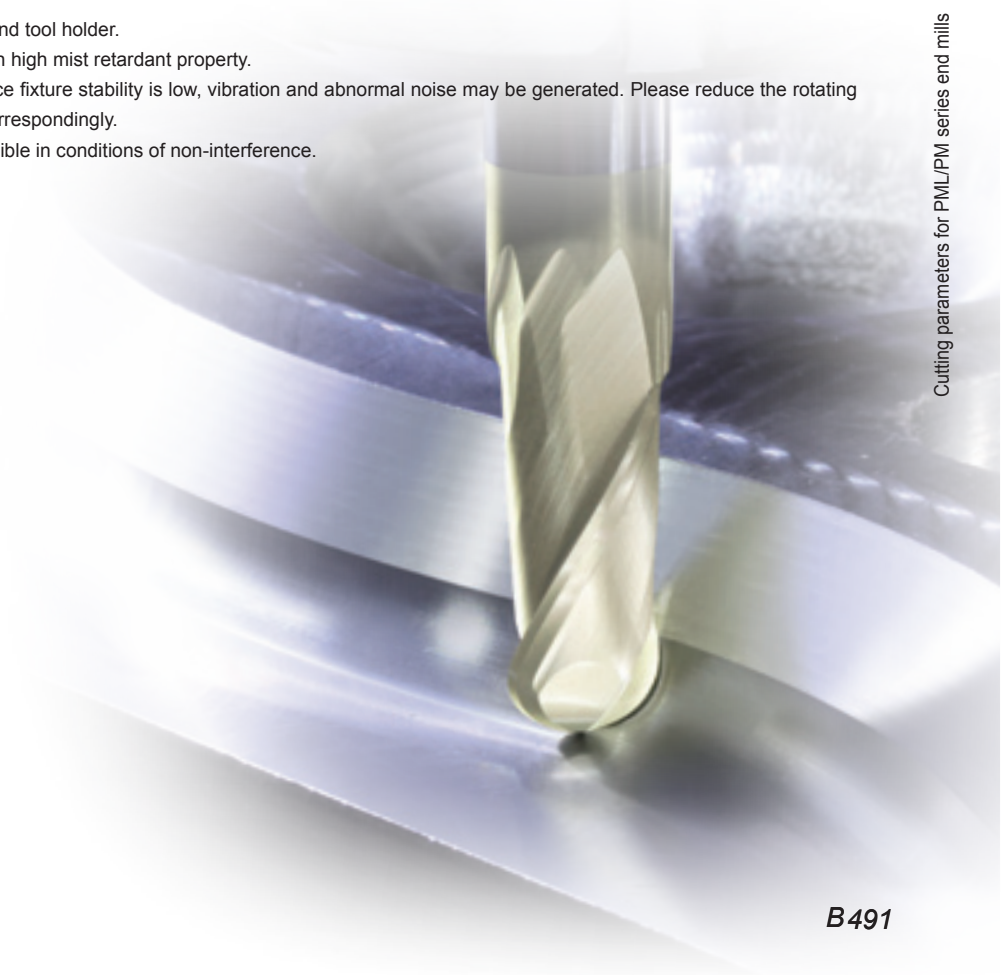
Workpiece material	Cast iron, Carbon steel, Alloy steel ~30HRC		Stainless steel		Pre-hardened steel, quenched and tempered steel ~40HRC		Pre-hardened steel, quenched and tempered steel ~50HRC		Hardened steel ~55HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	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.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.

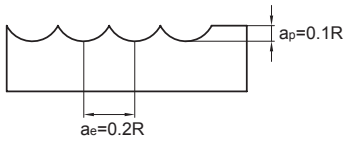
PML-2B★PM-2B★PML-2BL★PM-2BL/M/X★ PML-2BFP★PM-2BFP(high speed cutting)

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.

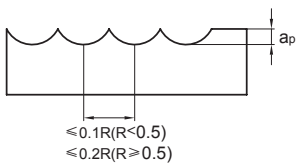


PML-4B★PM-4B★PML-4BL★PM-4BL/M/X

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										

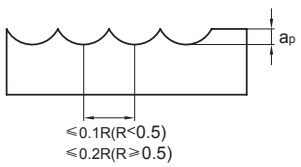
1.Please select high-precision machine and tool holder.
2.Please use air blow or cutting liquid with high mist retardant property.
3.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated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

PM-2BC

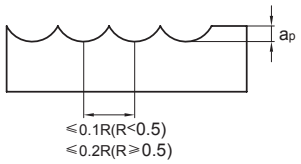
Workpiece material			Pre-hardened steel, quenched and tempered steel ~40HRC			Pre-hardened steel, quenched and tempered steel ~50HRC			Hardened steel ~55HRC		
Diameter (mm)	Taper half angle (°)	Effective length (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	a_p (mm)	Rotating speed (min^{-1})	Feed 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			 ≤0.1R(R<0.5) ≤0.2R(R≥0.5)								

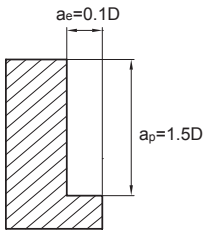
1.Please select high-precision machine and tool holder. When vibration and abnormal noise occur during machining, please reduce axial cutting depth ap.
2.Please use air blow or cutting liquid with high mist retardant property.
3.Reduce feed speed correspondingly when rotating speed is low.
4.Because machining conditions such as machine and allowance for machining may vary, please adjust the parameters based on actual requirements.

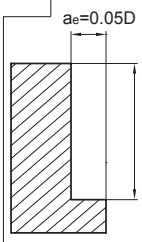
Cutting parameters for PML/PM series end mills

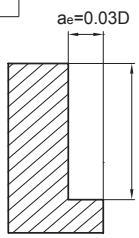
PML-2R★PM-2R

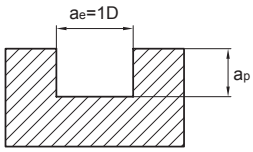
Workpiece material	Cast iron, Carbon steel, Alloy steel ~30HRC		Stainless steel		Pre-hardened steel, quenched and tempered steel ~40HRC		Pre-hardened steel, quenched and tempered steel ~50HRC		Hardened steel ~55HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	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

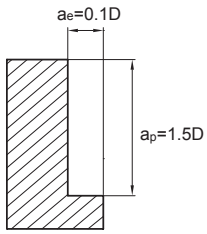
Diameter range	Cutting depth a_p
Ø1⩽D<Ø3	0.1D
Ø3⩽D	0.2D

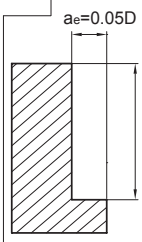
1.The above table shows the standard value of side milling. When milling slot, 50%~70% of rotating speed and 40%~60% of feed speed stated above are recommended as standard.
2.Please select high-precision machine and tool holder.
3.Please use air blow or cutting liquid with high mist retardant property.
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.

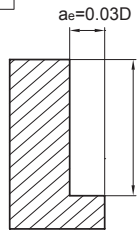
PML-4R★PML-4R-H★PM-4R★PM-4R-H★PML-4RFP
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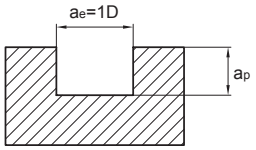
Workpiece material	Cast iron, Carbon steel, Alloy steel ~30HRC		Stainless steel		Pre-hardened steel, quenched and tempered steel ~40HRC		Pre-hardened steel, quenched and tempered steel ~50HRC		Hardened steel ~55HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	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

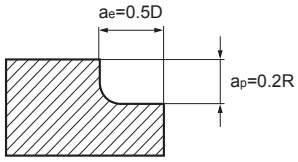
Diameter range	Cutting depth a_p
Ø1≤D<Ø3	0.1D
Ø3≤D	0.2D

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.

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	



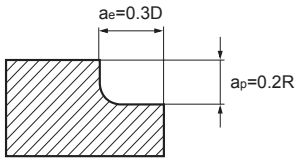
1.Please select high-precision machine and tool holder.
2.Please use air blow or cutting liquid with high mist retardant property.
3.Down milling is recommended.
4.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating 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:

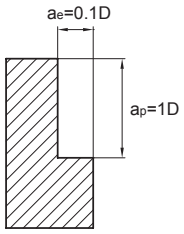
Ratio of neck length to diameter	Cutting speed(m/min)	Axial cutting depth(mm)	Feed speed (mm/min)
L/D≤4	100%	100%	100%
L/D=5	60%~80%	60%~80%	60%~80%
L/D=6	40%~60%	40%~60%	40%~60%

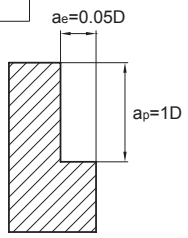
Cutting parameters for GM series end mills

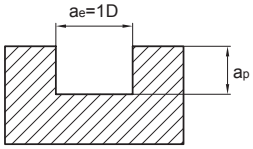
GM-2E★GM-2EL★GM-2EBL/X

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

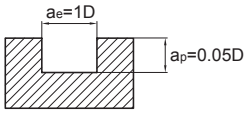
Maximum cutting depth







Diameter range	Cutting depth a_p
Ø1⩽D<Ø3	0.15D
Ø3⩽D	0.3D

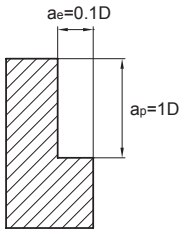


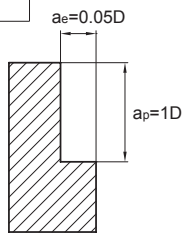
1.The above table shows the standard value of side milling. When milling slot, 50%~70% of rotating speed and 40%~60% of feed speed stated above are recommended as standard.
2.Please select high-precision machine and tool holder.
3.Please use air blow or cutting liquid with high mist retardant property.
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.

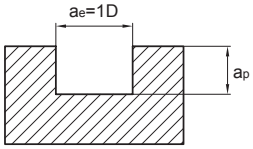
GM-2F★GM-2FL

Workpiece material	Cast iron, Nodular cast iron		Carbon steel, Alloy steel ~750N/mm²		Carbon steel, Alloy steel ~30HRC		Pre-hardened steel, quenched and tempered steel ~40HRC		Stainless steel		Pre-hardened steel, quenched and tempered steel ~50HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
1	20000	115	20000	115	20000	95	20000	95	20000	35	20000	70
2	15000	185	15000	185	15000	170	15000	165	11150	50	13000	105
3	14000	320	14000	320	13000	295	10600	245	7500	70	8500	190
4	10800	325	10800	325	10000	300	8000	250	5500	80	6500	195
5	8200	340	8200	340	7600	315	6400	260	4500	80	5000	205
6	7000	350	7000	350	6400	320	5300	270	3700	80	4200	210
8	5200	345	5200	345	4800	320	4000	265	2800	80	3200	210
10	4200	340	4200	340	3800	315	3200	260	2200	80	2500	200
12	3500	340	3500	340	3200	315	2650	260	1850	80	2100	200
14	3000	320	3000	320	2700	295	2300	245	1600	80	1800	190
16	2600	320	2600	320	2400	295	2000	245	1400	70	1600	190
18	2300	310	2300	310	2100	290	1800	240	1250	70	1400	190
20	2050	310	2050	310	1900	290	1600	240	1100	70	1250	190

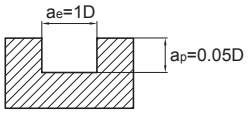
Maximum cutting depth







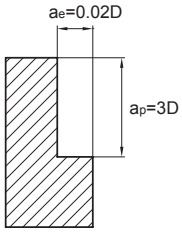
Diameter range	Cutting depth ap
Ø1≤D<Ø3	0.15D
Ø3≤D	0.3D



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

Cutting parameters for GM series end mills

GM-2EX

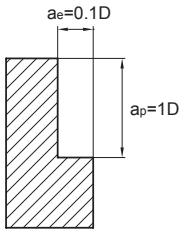
Workpiece material	Cast iron, Nodular cast iron		Carbon steel, Alloy steel ~750N/mm^2		Carbon steel, Alloy steel ~30HRC		Pre-hardened steel, quenched and tempered steel ~40HRC		Stainless steel		Pre-hardened steel, quenched and tempered steel ~50HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (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	375	5800	375	5300	345	4250	275	2650	60	3600	230
8	4400	375	4400	375	4000	345	3180	275	2000	60	2700	235
10	3500	365	3500	365	3200	330	2550	265	1600	60	2150	220
12	2900	365	2900	365	2650	330	2120	265	1350	60	1800	220
16	2200	345	2200	345	2000	315	1590	250	1000	50	1350	210
20	1750	340	1750	340	1600	310	1270	245	800	45	1050	205
Maximum cutting depth												

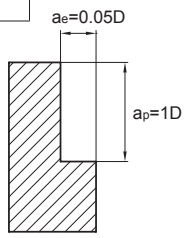
1.Please select high-precision machine and tool holder.
2.Please use air blow or cutting liquid with high mist retardant property.
3.Down milling is recommended in the case of side milling.
4.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated.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

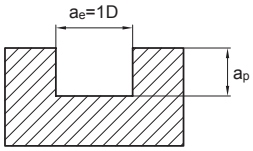
GM-2EFP

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

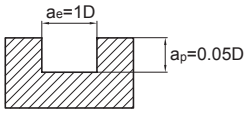
Maximum cutting depth







Diameter range	Cutting depth a_p
Ø1⩽D<Ø3	0.15D
Ø3⩽D	0.3D



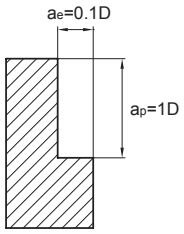
1.The above table shows the standard value of side milling. When milling slot, 50%~70% of rotating speed and 40%~60% of feed speed stated above are recommended as standard.
2.Please select high-precision machine and tool holder.
3.Please use air blow or cutting liquid with high mist retardant property.
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.

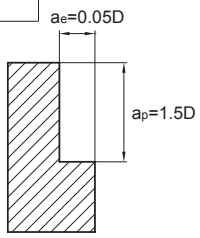
Cutting parameters for GM series end mills

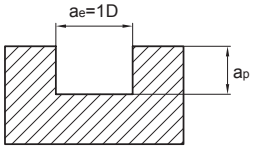
GM-3E★GM-3EL

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

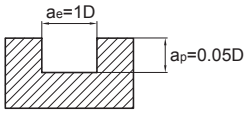
Maximum cutting depth







Diameter range	Cutting depth a_p
Ø1⩽D<Ø3	0.15D
Ø3⩽D	0.3D

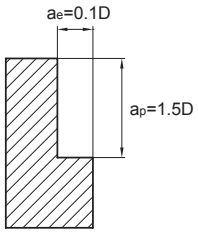


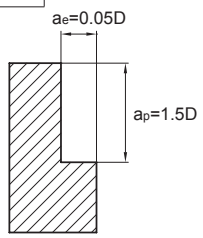
1.The above table shows the standard value of side milling. When milling slot, 50%~70% of rotating speed and 40%~60% of feed speed stated above are recommended as standard.
2.Please select high-precision machine and tool holder.
3.Please use air blow or cutting liquid with high mist retardant property.
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.

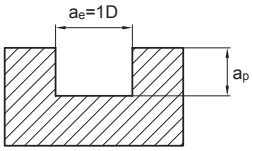
GM-4E-G★GM-4EL-G★GM-4EBL/X-G

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

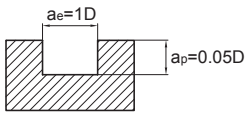
Maximum cutting depth







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



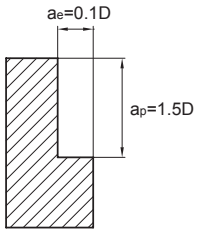
1.The above table shows the standard value of side milling. When milling slot, 50%~70% of rotating speed and 40%~60% of feed speed stated above are recommended as standard.
2.Please select high-precision machine and tool holder.
3.Please use air blow or cutting liquid with high mist retardant property.
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

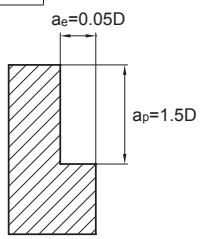
Cutting parameters for GM series end mills

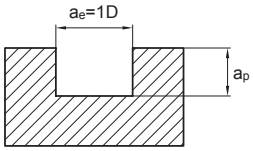
GM-4F-G★GM-4FL-G

Workpiece material	Cast iron, Nodular cast iron		Carbon steel, Alloy steel ~750N/mm²		Carbon steel, Alloy steel ~30HRC		Pre-hardened steel, quenched and tempered steel ~40HRC		Stainless steel		Pre-hardened steel, quenched and tempered steel ~50HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
1	20000	160	20000	160	20000	125	20000	125	20000	55	20000	95
2	15000	250	15000	250	15000	230	15000	220	11150	65	13000	140
3	14000	430	14000	430	13000	400	10600	330	7500	80	8500	260
4	10800	440	10800	440	10000	400	8000	335	5500	80	6500	265
5	8200	460	8200	460	7600	420	6400	355	4500	80	5000	280
6	7000	470	7000	470	6400	435	5300	360	3700	85	4200	285
8	5200	465	5200	465	4800	430	4000	360	2800	85	3200	290
10	4200	460	4200	460	3800	420	3200	355	2200	85	2500	275
12	3500	460	3500	460	3200	420	2650	355	1850	80	2100	275
14	3000	430	3000	430	2700	400	2300	330	1600	80	1800	260
16	2600	430	2600	430	2400	400	2000	330	1400	80	1600	260
18	2300	420	2300	420	2100	390	1800	325	1250	70	1400	255
20	2050	420	2050	420	1900	390	1600	325	1100	70	1250	255

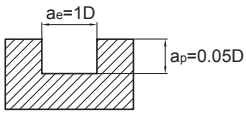
Maximum cutting depth





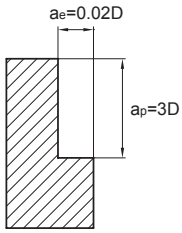


Diameter range	Cutting depth ap
Ø1⩽D<Ø3	0.15D
Ø3⩽D	0.3D



1.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-4EX-G

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	475	5800	475	5300	430	4250	340	2650	70	3600	290
8	4400	475	4400	475	4000	430	3180	340	2000	70	2700	290
10	3500	460	3500	460	3200	420	2550	330	1600	70	2150	280
12	2900	460	2900	460	2650	420	2120	330	1350	70	1800	280
16	2200	430	2200	430	2000	390	1590	315	1000	65	1350	260
20	1750	430	1750	430	1600	385	1270	310	800	60	1050	255
Maximum cutting depth												

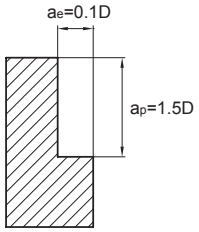
1.The above table shows the standard value of side milling. When milling slot, 50%~70% of rotating speed and 40%~60% of feed speed stated above are recommended as standard.
2.Please select high-precision machine and tool holder.
3.Please use air blow or cutting liquid with high mist retardant property.
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

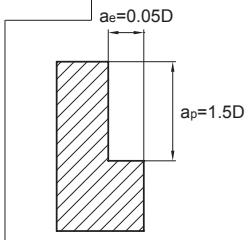
Cutting parameters for GM series end mills

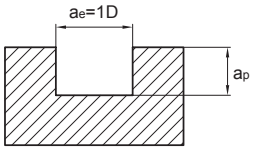
GM-4E★GM-4EL★GM-4EBL/X

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

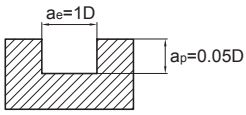
Maximum cutting depth







Diameter range	Cutting depth a_p
Ø1⩽D<Ø3	0.15D
Ø3⩽D	0.3D

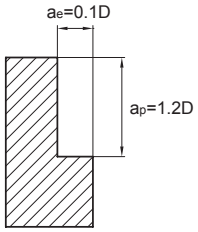


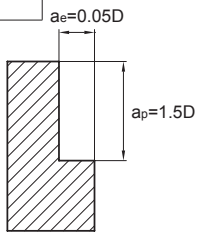
1.The above table shows the standard value of side milling. When milling slot, 50%~70% of rotating speed and 40%~60% of feed speed stated above are recommended as standard.
2.Please select high-precision machine and tool holder.
3.Please use air blow or cutting liquid with high mist retardant property.
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.

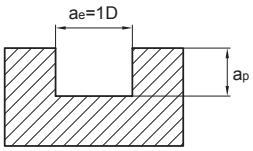
GM-4EFP

Workpiece material	Cast iron, Nodular cast iron		Carbon steel, Alloy steel ~750N/mm²		Carbon steel, Alloy steel ~30HRC		Pre-hardened steel, quenched and tempered steel ~40HRC		Stainless steel		Pre-hardened steel, quenched and tempered steel ~50HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
6	7000	975	7000	975	6400	900	5300	750	3700	175	4200	585
8	5200	960	5200	960	4800	995	4000	735	2800	175	3200	600
10	4200	950	4200	950	3800	970	3200	730	2200	175	2500	565
12	3500	950	3500	950	3200	970	2650	730	1850	175	2100	565
16	2600	885	2600	885	2400	820	2000	680	1400	155	1600	535
20	2050	870	2050	870	1900	805	1600	670	1100	135	1250	525

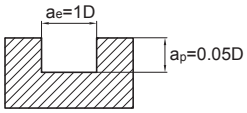
Maximum cutting depth







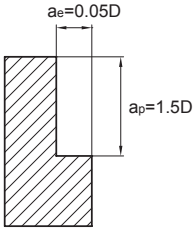
Diameter range	Cutting depth ap
Ø1⩽D<Ø3	0.15D
Ø3⩽D	0.3D



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

Cutting parameters for GM series end mills

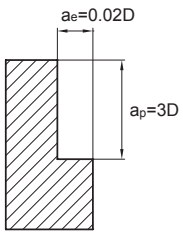
GM-6E

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.



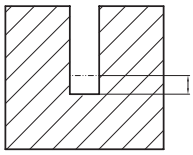
GM-6EL

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												

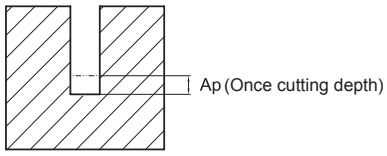
1.Please select high-precision machine and tool holder.
2.Please use air blow or cutting liquid with high mist retardant property.
3.Down milling is recommended in the case of side milling.
4.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. 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		 Ap (Once 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													

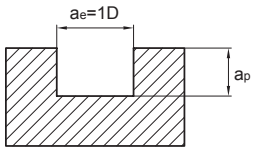
1.Please select high-precision machine and tool holder.
2.Please use air blow or cutting liquid with high mist retardant property.
3.Make overhang of tool as short as possible in conditions of non-interference.
4.Reduce feed speed correspondingly when rotating speed is low.

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

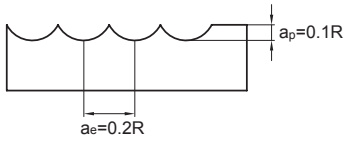
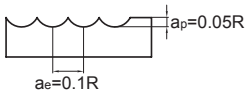
Maximum cutting depth



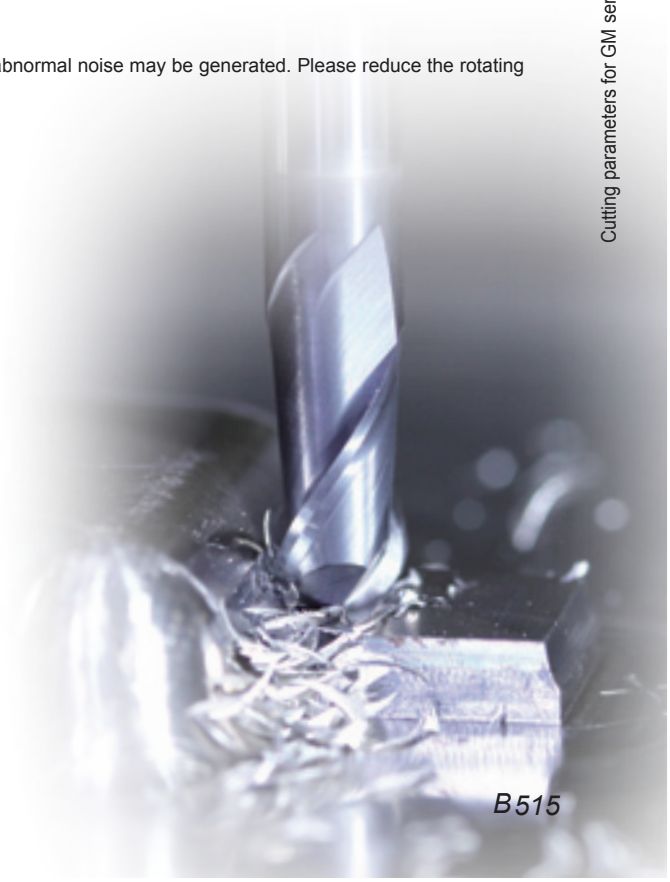
Diameter range	Cutting depth a_p
D<Ø1	0.05D
Ø1≤D≤Ø3	0.15D

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/M/X★GM-2BFP

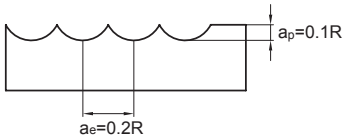
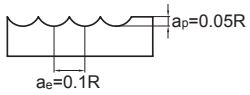
Workpiece material	Cast iron, Nodular cast iron		Carbon steel, Alloy steel ~750N/mm^2		Carbon steel, Alloy steel ~30HRC		Pre-hardened steel, quenched and tempered steel ~40HRC		Stainless steel		Pre-hardened steel, quenched and tempered steel ~50HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (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)
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/M/X

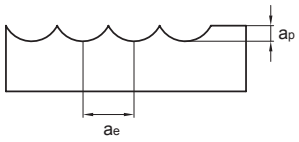
Workpiece material	Cast iron, Nodular cast iron		Carbon steel, Alloy steel ~750N/mm^2		Carbon steel, Alloy steel ~30HRC		Pre-hardened steel, quenched and tempered steel ~40HRC		Stainless steel		Pre-hardened steel, quenched and tempered steel ~50HRC	
Cutting speed	150 m/min		150m/min		120m/min		100m/min		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

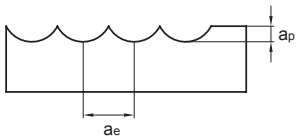


Diameter range	Cutting depth a_p	Cutting width a_e
D<Ø1	0.05R	0.2R
Ø1≤D≤Ø3	0.1R	0.2R

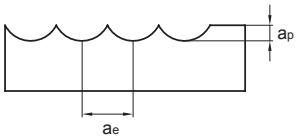
1.Please select high-precision machine and tool holder.
2.Please use air blow or cutting liquid with high mist retardant property.
3.Make overhang of tool as short as possible in conditions of non-interference.
4.Reduce feed speed correspondingly when rotating speed is low.

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.

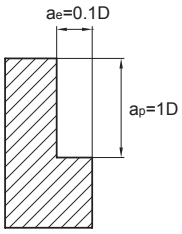


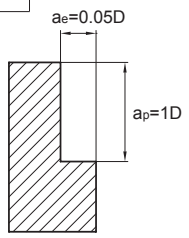
Cutting parameters for GM series end mills

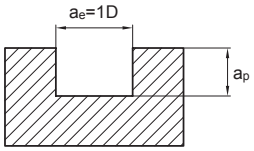
GM-2R

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

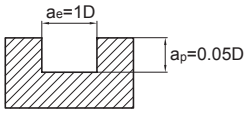
Maximum cutting depth







Diameter range	Cutting depth a_p
Ø1⩽D<Ø3	0.15D
Ø3⩽D	0.3D

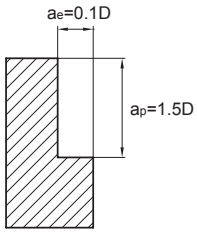


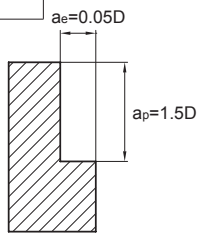
1.The above table shows the standard value of side milling. When milling slot, 50%~70% of rotating speed and 40%~60% of feed speed stated above are recommended as standard.
2.Please select high-precision machine and tool holder.
3.Please use air blow or cutting liquid with high mist retardant property.
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.

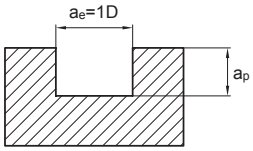
GM-4R★GM-4RL/M/X

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

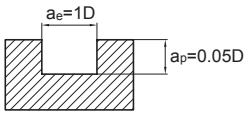
Maximum cutting depth







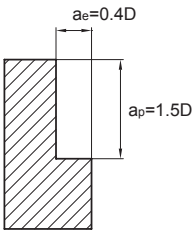
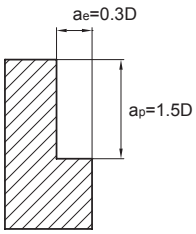
Diameter range	Cutting depth ap
Ø1⩽D<Ø3	0.15D
Ø3⩽D	0.3D



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.

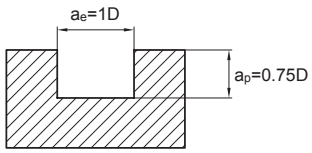
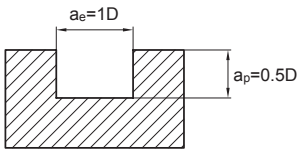
Cutting parameters for GM series end mills

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.

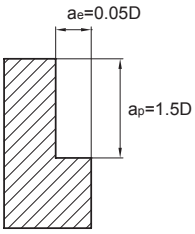
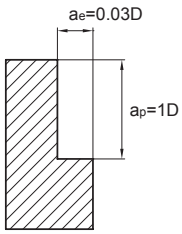
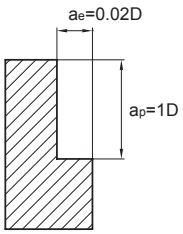
GM-4W—slot cutting

Workpiece material	Cast iron, Nodular cast iron		Carbon steel, Alloy steel ~750N/mm²		Carbon steel, Alloy steel ~30HRC		Pre-hardened steel, quenched and tempered steel ~40HRC		Stainless steel	
Cutting speed	80~120 m/min		70~100m/min		60~90m/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.

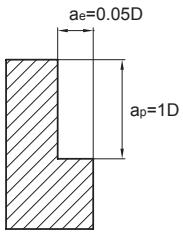
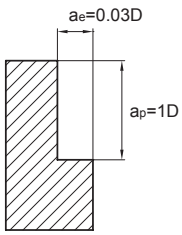
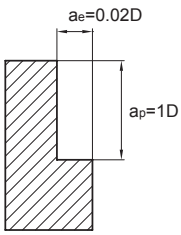
Cutting parameters for HMX series end mills

HMX-2E★HMX-2EBL/X

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 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.

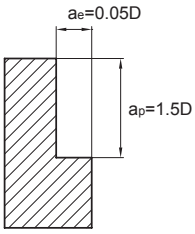
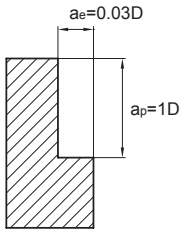
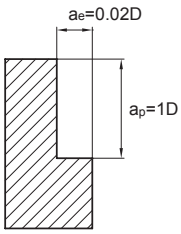
HMX-2EFP

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 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.

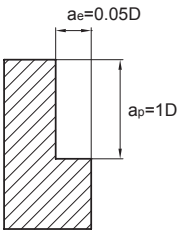
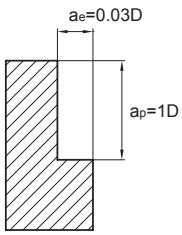
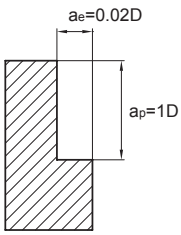
Cutting parameters for HMX series end mills

HMX-4E★HMX-4EL★HMX-4EBL/X

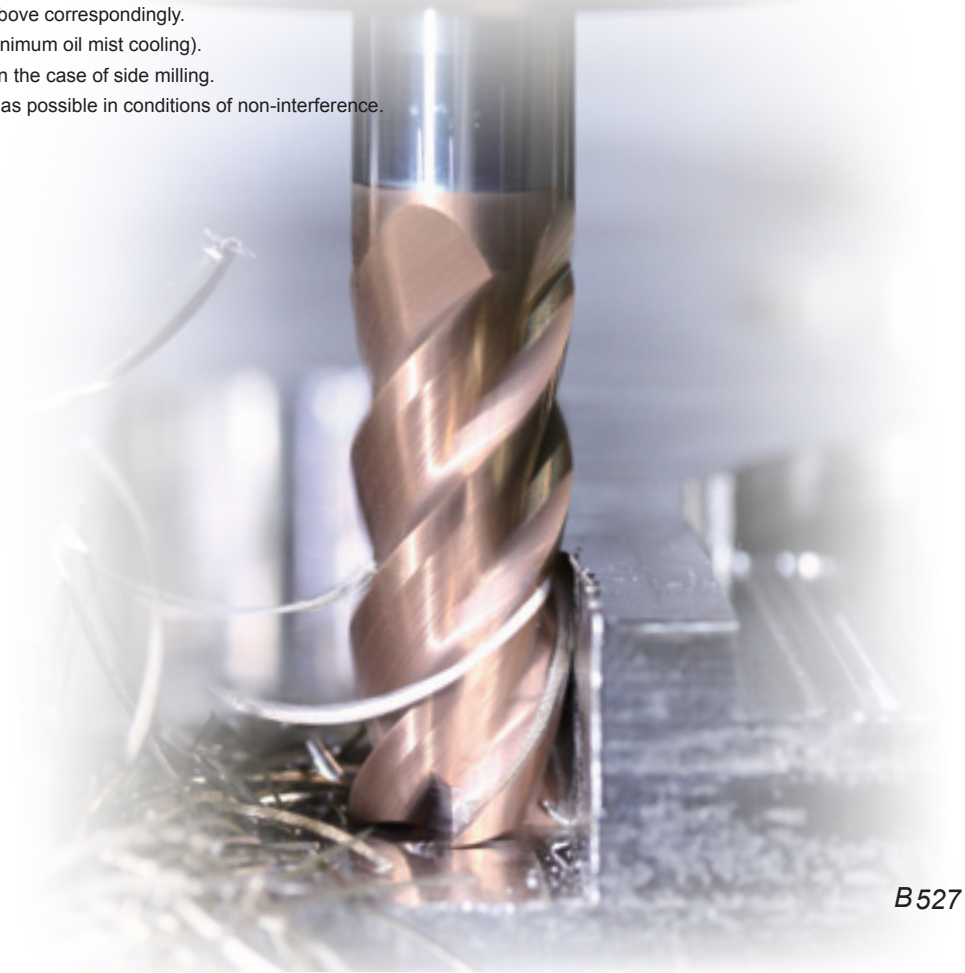
Workpiece material	Pre-hardened steel, Hardened steel 40~50HRC		Hardened steel 50~60HRC		Hardened steel 60~68HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
1	40000	320	40000	320	32000	260
2	40000	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 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.

HMX-4EFP

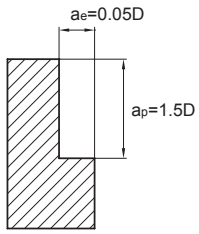
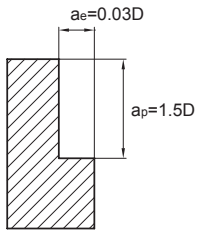
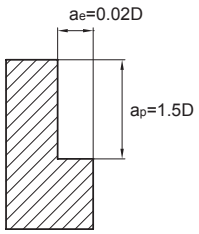
Workpiece material	Pre-hardened steel, Hardened steel 40~50HRC		Hardened steel 50~60HRC		Hardened steel 60~68HRC	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
6	16000	1730	8000	920	5300	610
8	12000	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.



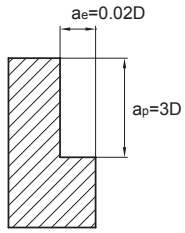
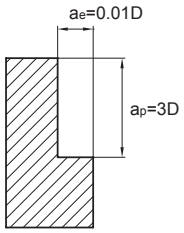
Cutting parameters for HMX series end mills

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 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.

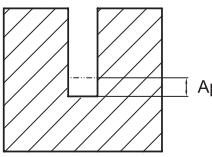
HMX-6EL

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 a_e=0.3mm					

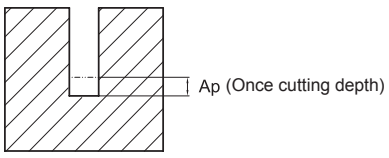
1.Please select high-precision and rigidity machine and tool holder.
2.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
3.Please use air blow or MQL(minimum oil 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.

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		 Ap (Once cutting depth)					

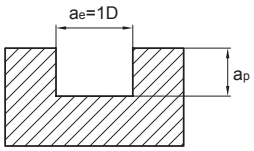
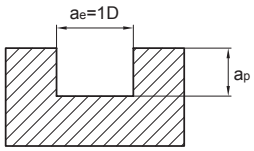
HMX-2EP

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.

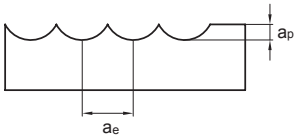
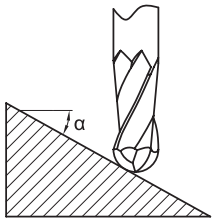
Cutting parameters for HMX series end mills

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/M/X★HMX-2BFP

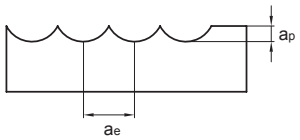
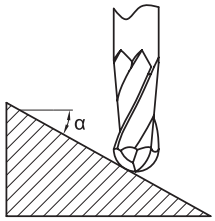
Workpiece material	Pre-hardened steel, Hardened steel 40~50HRC				Hardened steel 50~60HRC				Hardened steel 60~68HRC			
Radius of ball nose (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	a_p (mm)	a_e (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	a_p (mm)	a_e (mm)	Rotating speed (min^{-1})	Feed 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.

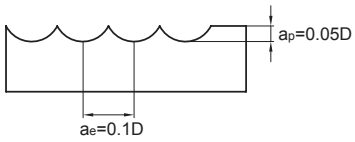
2.Above table shows the standard for operations with little change of machining load, such as contour machining .When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.

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.

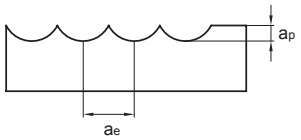
HMX-2BS

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				

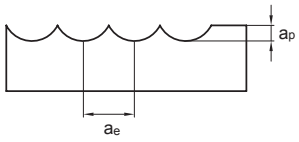
1.Please select high-precision machine and tool holder.
2.Please use air blow or cutting liquid with high mist retardant property.
3.Make overhang of tool as short as possible in conditions of non-interference.
4.Reduce feed speed correspondingly when rotating speed is low.

Cutting parameters for HMX series end mills

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									

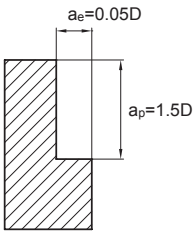
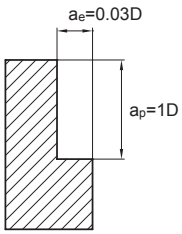
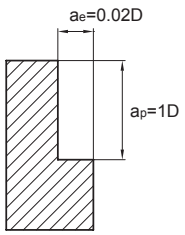
HMX-2BP

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.

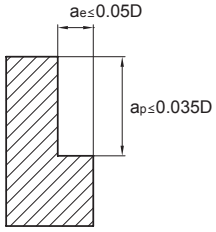
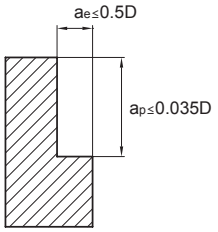
Cutting parameters for HMX series end mills

HMX-4R★HMX-4RBL/M/X★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.

HMX-6R-MAX

Workpiece material	Pre-hardened steel, Hardened steel 40~50HRC		Hardened steel 50~60HRC	
Cutting speed	100m/min		80m/min	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
6	5300	3200	4200	2600
8	4000	3200	3200	2600
10	3200	3200	2600	2600
12	2600	3200	2200	2600
16	2000	3600	1600	2800
20	1600	3600	1300	2800
Maximum cutting depth				

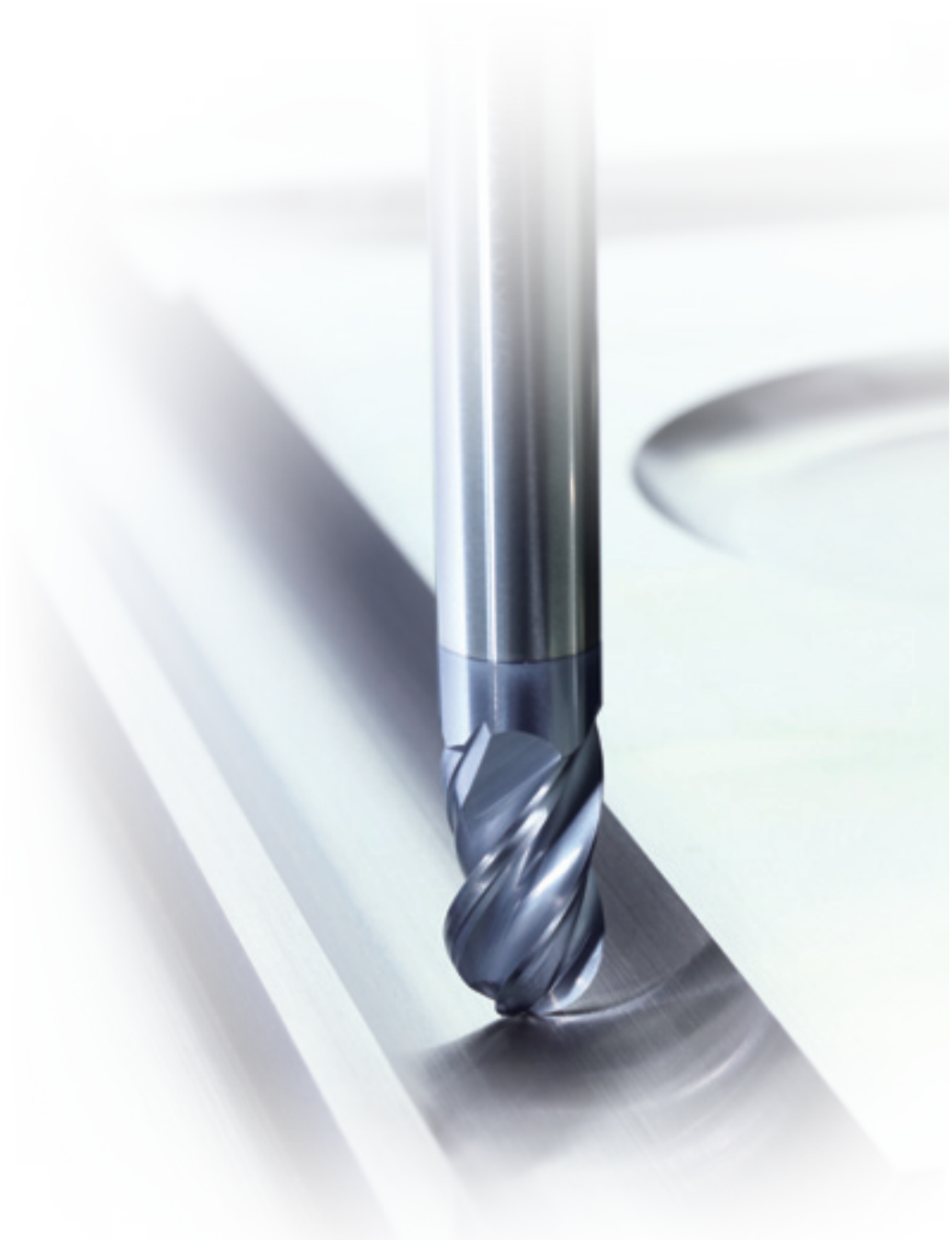
1.Please select high-precision and rigidity machine and tool holder.
2.When the machine rigidity and workpiece fixture stability is low, vibration and abnormal noise may be generated. Please reduce the rotating speed and feed speed stated above correspondingly.
3.Please use air blow or MQL(minimum oil mist cooling).
4.Make overhang of tool as short as possible in conditions of non-interference.

Cutting parameters for TM series end mills

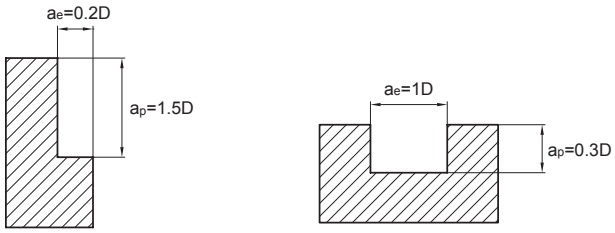
TM-4R★TM-4RP★TM-4B

Workpiece material	α phase titanium alloy(TA)		α+β phase titanium alloy(TC)		β phase titanium alloy(TB)	
Diameter (mm)	Cutting speed (m/min)	Feed （mm/r）	Cutting speed (m/min)	Feed （mm/r）	Cutting speed (m/min)	Feed （mm/r）
6.0-10.0	40~120	0.16~0.36	30~100	0.16~0.36	30~60	0.12~0.28
10.0-14.0		0.20~0.40		0.20~0.40		0.16~0.32
14.0-20.0		0.30~0.48		0.30~0.48		0.20~0.40
20.0-25.0		0.32~0.60		0.32~0.60		0.24~0.48

Note: High temperature alloy endmills' cutting data please referring to β phase titanium alloy recommended cutting data.



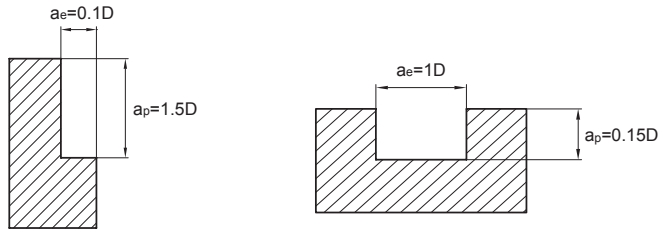
TM-4E

Workpiece material	Titanium alloy	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/z)
6	2654	0.03~0.05
8	1990	0.035~0.058
10	1592	0.036~0.061
12	1327	0.038~0.065
14	1137	0.038~0.065
16	995	0.04~0.072
20	796	0.041~0.09
25	637	0.043~0.10
Maximum cutting depth		

1.The above table shows the standard value of side milling. When milling slot, 80%~100% of rotating speed and 60%~80% of feed speed stated above are recommended as standard.
2.Please select high rigidity and precision machine and tool holder, please use non-water-soluble cutting liquid.
3.Please adjust rotating speed and feed speed according to the cutting depth and machine rigidity, down milling is recommended.
4.Make overhang of tool as short as possible in conditions of non-interference.

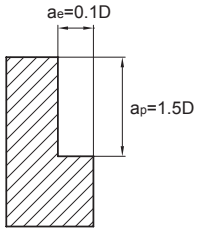
Cutting parameters for TM series end mills

TM-5R

Workpiece material	Titanium alloy	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/z)
6	4246	0.03~0.05
8	3185	0.035~0.058
10	2548	0.036~0.061
12	2123	0.038~0.065
14	1820	0.038~0.065
16	1592	0.04~0.072
20	1274	0.041~0.09
25	1019	0.043~0.10
Maximum cutting depth		

1.The above table shows the standard value of side milling. When milling slot, 80%~100% of rotating speed and 60%~80% of feed speed stated above are recommended as standard.
2.Please select high rigidity and precision machine and tool holder, please use non-water-soluble cutting liquid.
3.Please adjust rotating speed and feed speed according to the cutting depth and machine rigidity, down milling is recommended.
4.Make overhang of tool as short as possible in conditions of non-interference.

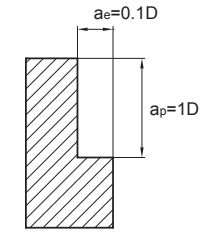
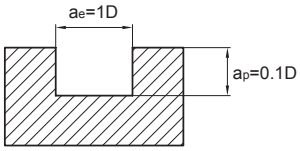
TM-6R

Workpiece material	Titanium alloy	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/z)
10	1273	0.02~0.045
12	1061	0.028~0.048
14	910	0.03~0.055
16	796	0.04~0.07
20	636	0.042~0.08
25	510	0.045~0.09
Maximum cutting depth		

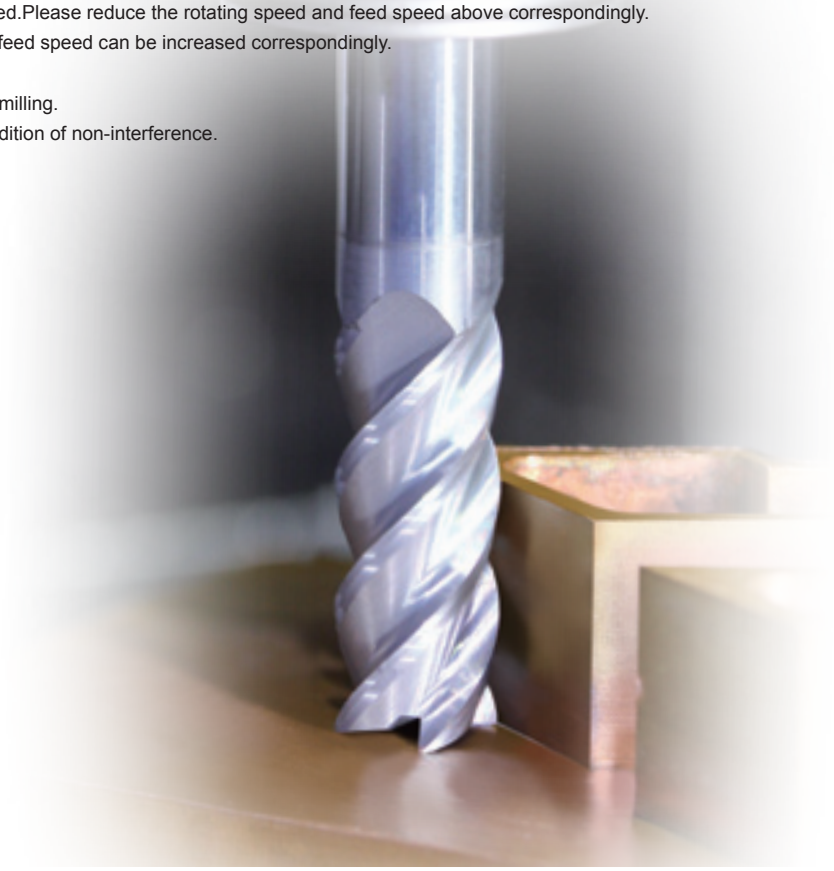
1.The above table shows the standard value of side milling. When milling slot, please apply end mills with 4 flutes or 5 flutes.
2.Please select high rigidity and precision machine and tool holder, please use non-water-soluble cutting liquid.
3.Please adjust rotating speed and feed speed according to the cutting depth and machine rigidity, down milling is recommended.
4.Make overhang of tool as short as possible in conditions of non-interference.

Cutting parameters for NM series end mills

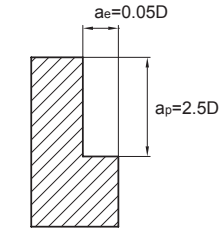
NM-2E

Workpiece material	Copper，Alloy of copper	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)
1	40000	1800
2	30000	2500
3	20000	2300
4	15000	2000
5	12000	1500
6	10000	1400
8	8000	1000
10	6500	900
12	5500	850
Maximum cutting depth	 Maximum a_e=1.0mm	 Maximum a_p=1.0mm

1.The above table shows the standard value of side milling.When milling slot,70% of feed speed stated above are recommend as standard.
2.Please select high-rigidity and high-precision machine and tool holder.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 above correspondingly.
3.When cutting depth is smaller,rotating speed and feed speed can be increased correspondingly.
4.Please select 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 condition of non-interference.



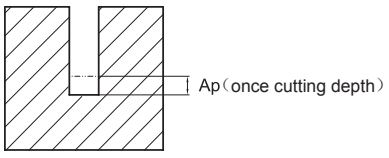
NM-4E

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

1.Please select high-precision and rigidity machine and tool holder.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 above correspondingly.
2.When cutting depth is small,rotating speed and feed speed can be increased correspondingly.
3.Please select water-soluble cutting liquid.
4.Down milling is recommended in the case of side milling.
5.Make overhang of tool as short as possible in condition of non-interference.

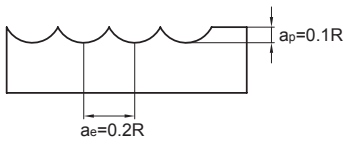
Cutting parameters for NM series end mills

NM-2EP

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

1.Please select high-precision machine and tool holder.
2.Please select water-soluble cutting liquid.
3.Make overhang of tool as short as possible in condition of non-interference.
4.Reduce feed speed correspondingly when rotating speed is low.

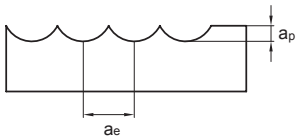
NM-2B

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

1.Please select high-precision and rigidity machine and tool holder.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 above correspondingly.
2.When cutting depth is small,rotating speed and feed speed can be increased correspondingly.
3.Please select water-soluble cutting liquid.
4.Make overhang of tool as short as possible in condition of non-interference.

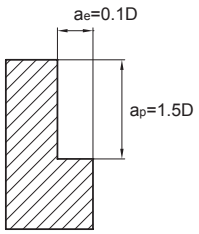
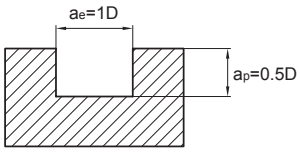
Cutting parameters for NM series end mills

NM-2BP

Workpiece material		Copper，Alloy of copper			
Diameter (mm)	Effective length(mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	a_p (mm)	a_e (mm)
R0.25	4	40000	750	0.01	0.025
	6	36000	500	0.008	0.02
R0.3	4	40000	900	0.012	0.03
	6	40000	750	0.010	0.02
	8	30000	400	0.008	0.01
R0.4	4	40000	1050	0.016	0.04
	6	40000	800	0.012	0.03
	8	40000	500	0.01	0.02
	10	30000	400	0.008	0.01
R0.5	4	40000	1050	0.02	0.05
	6	40000	800	0.016	0.04
	8	40000	500	0.014	0.03
	10	33000	400	0.012	0.02
	12	35000	300	0.010	0.010
R0.75	8	40000	900	0.03	0.075
	16	20000	400	0.015	0.04
R1.0	6	40000	1100	0.04	0.10
	8	40000	900	0.034	0.08
	10	40000	750	0.028	0.065
	12	40000	500	0.022	0.05
	16	30000	400	0.018	0.04
	20	20000	300	0.012	0.03
R1.5	10	40000	1100	0.06	0.15
	20	32000	600	0.03	0.08
R2.0	10	32000	1100	0.08	0.20
	16	32000	900	0.06	0.16
	20	32000	600	0.04	0.12
	25	20000	400	0.02	0.08
R2.5	16	25000	1250	0.10	0.25
	25	20000	900	0.06	0.12
Maximum cutting depth					

1.Please select high-precision machine and tool holder.
2.Please select water-soluble cutting liquid.
3.Make overhang of tool as short as possible in condition of non-interference.
4.Reduce feed speed correspondingly when rotating speed is low.

AL-2E★AL-2EL

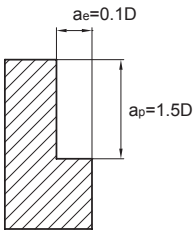
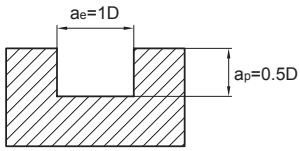
Workpiece material	Aluminum alloy		Silicon aluminum alloy Si≤10%	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
1	40000	650	40000	500
2	40000	950	32000	750
3	26500	1500	21000	1100
4	20000	1600	16000	1250
5	16000	1500	13000	1100
6	13000	1250	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.



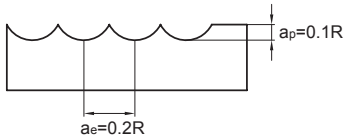
Cutting parameters for AL series end mills

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.

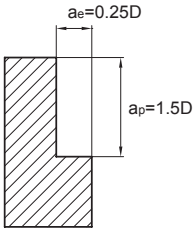
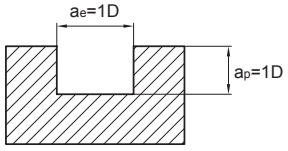
AL-2B

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.

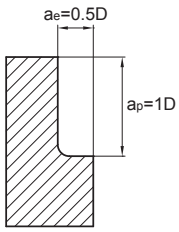
Cutting parameters for AL series end mills

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				

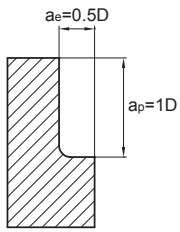
1.The above table shows the reference value of side milling. The feed speed in slot milling is 70% of the reference value stated in the table, and feed rate 50%.
2.Please select high rigidity and precision machine and tool holder. Vibration and abnormal noise may be generated if the machine rigidity 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.

AL-2R-AIR

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

1.Above cutting parameters are suitable for aluminium high speed machining specific CNC.
2.Please select cutting liquid or strong air cooling system for chip flowing out.
3.The sparkle by machining or heat caused by breakage might result in fire or conflagration.Please pay attention to fire prevention.
4.Dynamic balance detection should be done before machining.

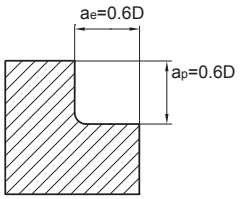
AL-2RL-AIR

Workpiece material	Aluminum alloy		Silicon aluminum alloy Si≤10%	
Cutting speed	500~800m/min		500~800m/min	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
6	30000	3000	30000	3000
8	24000	3200	24000	3200
10	20000	3500	20000	3500
12	16000	3800	16000	3800
16	12000	4000	12000	4000
20	10000	4600	10000	4600
Maximum cutting depth				

1.Above cutting parameters are suitable for aluminium high speed machining specific CNC.
2.Please select cutting liquid or strong air cooling system for chip flowing out.
3.The sparkle by machining or heat caused by breakage might result in fire or conflagration.Please pay attention to fire prevention.
4.Dynamic balance detection should be done before machining.

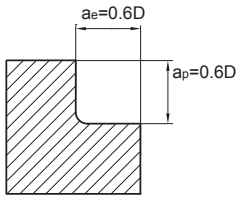
Cutting parameters for AL series end mills

AL-3R-AIR

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

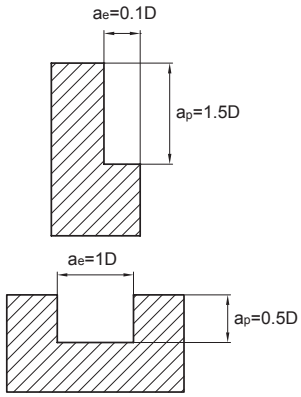
1.Above cutting parameters are suitable for aluminium high speed machining specific CNC.
2.Please select cutting liquid or strong air cooling system for chip flowing out.
3.The sparkle by machining or heat caused by breakage might result in fire or conflagration.Please pay attention to fire prevention.
4.Dynamic balance detection should be done before machining.

AL-3RL-AIR

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

1.Above cutting parameters are suitable for aluminium high speed machining specific CNC.
2.Please select cutting liquid or strong air cooling system for chip flowing out.
3.The sparkle by machining or heat caused by breakage might result in fire or conflagration.Please pay attention to fire prevention.
4.Dynamic balance detection should be done before machining.

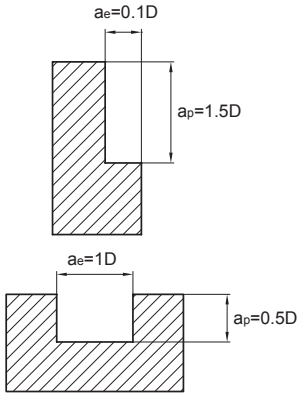
ALG-2E

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 standard value of side milling.When milling slot,70% of feed speed stated above are recommend as standard.
2.Please select high-rigidity and high-precision machine and tool holder.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 above correspondingly.
3.When cutting depth is smaller,rotating speed and feed speed can be increased correspondingly.
4.Please select 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 condition of non-interference.

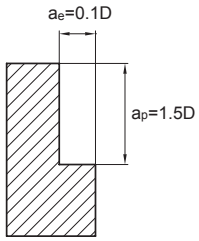
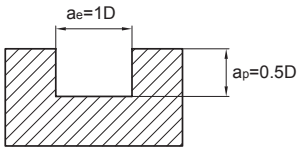
Cutting parameters for ALG Series end mills

ALG-3E

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 standard value of side milling.When milling slot,70% of feed speed stated above are recommend as standard.
2.Please select high-rigidity and high-precision machine and tool holder.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 above correspondingly.
3.When cutting depth is smaller,rotating speed and feed speed can be increased correspondingly.
4.Please select 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 condition of non-interference.

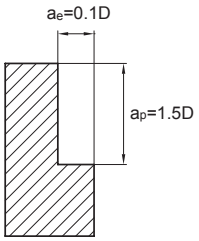
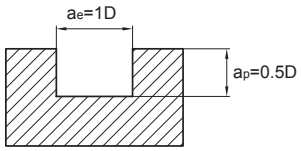
ALG-2R

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	710	40000	550
2	40000	1040	32000	820
3	26500	1650	21000	1210
4	20000	1760	16000	1370
6	13000	1370	10600	1100
8	10000	1540	8000	1210
10	8000	1760	6500	1370
12	6600	1810	5300	1430
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.

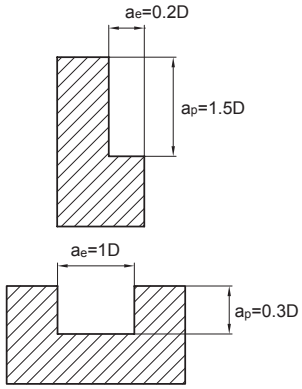
Cutting parameters for ALG Series end mills

ALG-3R

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	880	40000	660
2	40000	1320	32000	990
3	26500	1980	21000	1430
4	20000	2200	16000	1650
6	13000	1650	10600	1320
8	10000	1810	8000	1430
10	8000	2090	6500	1650
12	6600	2140	5300	1700
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.

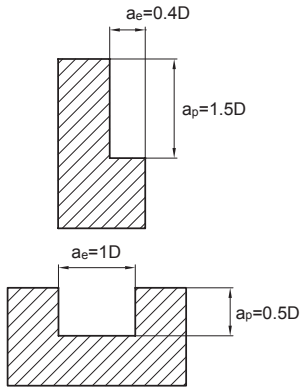
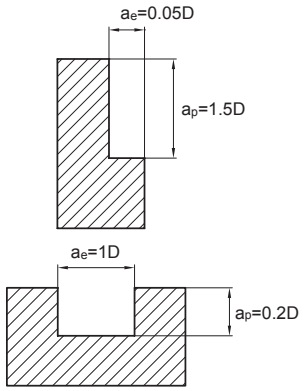
SM-3E

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				

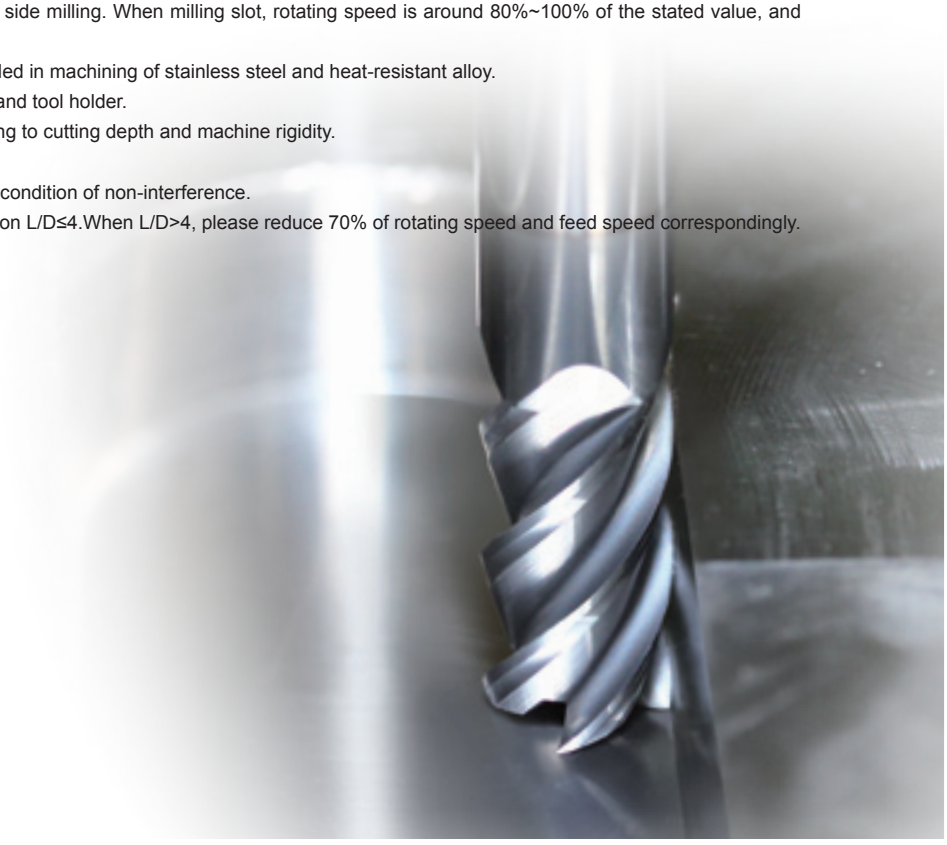
1.The above table shows the standard value of side milling. When milling slot, rotating speed is around 80%~100% of the stated value, and feed speed around 60%~80%.
2.Non water-soluble cutting liquid is recommended in machining of stainless steel and heat-resistant alloy.
3.Please select high rigid and 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/VSM series end mills

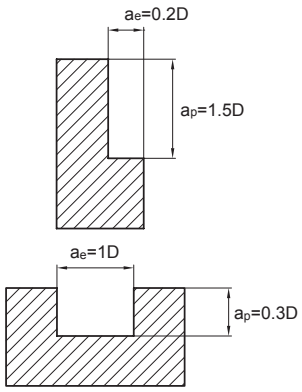
VSM-4E★VSM-4EFP

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

1.The above table shows the standard value of side milling. When milling slot, 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
6.Make overhang of tool as short as possible in condition of non-interference.
7.The above table is recommended data based on L/D≤4.When L/D>4, please reduce 70% of rotating speed and feed speed correspondingly.



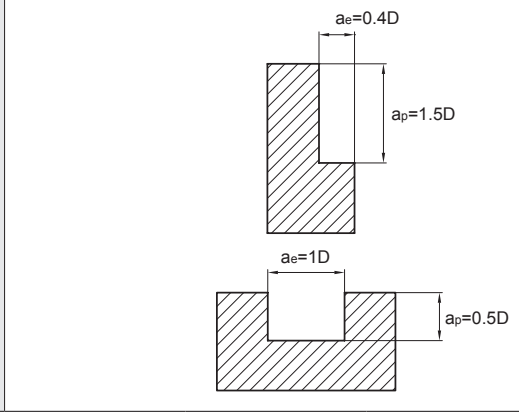
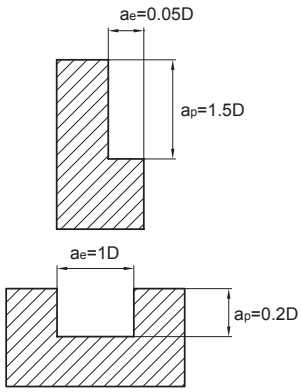
SM-4R

Workpiece material	Carbon steel、Alloy steel		Stainless steel	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
6	5300	900	2700	240
8	3900	840	2000	255
10	3100	770	1600	255
12	2600	720	1300	205
Maximum cutting depth				

1.The above table shows the standard value of side milling. When milling slot, 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/VSM series end mills

VSM-4R★VSM-4RFP

Workpiece material	Carbon steel、Alloy steel		Stainless steel		Heat resistant alloy、Titanium alloy	
Diameter (mm)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)	Rotating speed (min^{-1})	Feed speed (mm/min)
6	5300	900	2700	240	2470	145
8	3900	840	2000	255	1820	155
10	3100	770	1600	255	1430	155
12	2600	720	1300	205	1235	135
16	1900	625	1000	180	935	110
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
6.Make overhang of tool as short as possible in condition of non-interference.
7.The above table is recommended data based on L/D≤4.When L/D>4, please reduce 70% of rotating speed and feed speed correspondingly.

CM-2E

Workpiece material	Cast iron, Nodular cast iron		Carbon steel, Alloy steel		Pre-hardened steel		Stainless steel		Heat resistant alloy、Titanium alloy		Aluminum alloy	
Diameter (mm)	Rotating speed (min^{-1})	Feed (mm/r)	Rotating speed (min^{-1})	Feed (mm/r)	Rotating speed (min^{-1})	Feed (mm/r)	Rotating speed (min^{-1})	Feed (mm/r)	Rotating speed (min^{-1})	Feed (mm/r)	Rotating speed (min^{-1})	Feed (mm/r)
3	14000	0.017	14000	0.016	13000	0.017	7500	0.016	5308	0.016	20000	0.055
4	10800	0.02	10800	0.02	10000	0.02	5500	0.02	3980	0.02	15000	0.066
6	7000	0.024	7000	0.024	6400	0.024	3700	0.024	2654	0.024	10000	0.075
8	5200	0.03	5200	0.03	4800	0.03	2800	0.03	1990	0.03	8000	0.08
10	4200	0.05	4200	0.05	3800	0.05	2200	0.05	1592	0.05	6500	0.12
12	3500	0.065	3500	0.065	3200	0.065	1850	0.065	1326	0.06	5500	0.14
16	2600	0.09	2600	0.09	2400	0.09	1400	0.09	955	0.08	3180	0.16

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.

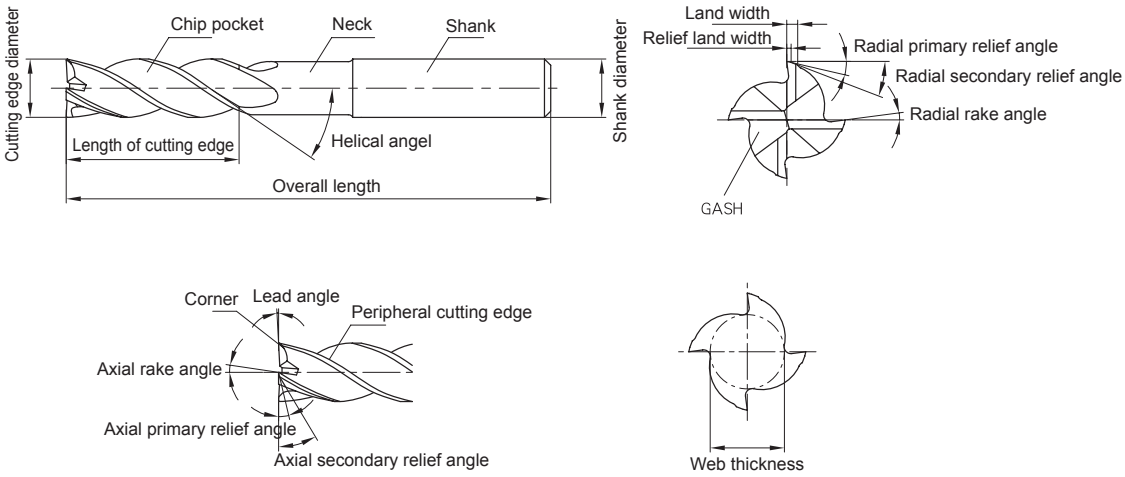
Cutting parameters for CM series end mills

CM-4E

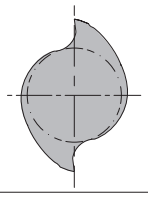
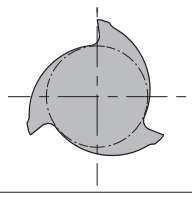
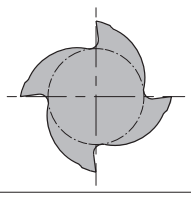
Workpiece material	Cast iron, Nodular cast iron		Carbon steel, Alloy steel		Pre-hardened steel		Stainless steel		Heat resistant alloy、Titanium alloy		Aluminum alloy	
Diameter (mm)	Rotating speed (min^{-1})	Feed (mm/r)	Rotating speed (min^{-1})	Feed (mm/r)	Rotating speed (min^{-1})	Feed (mm/r)	Rotating speed (min^{-1})	Feed (mm/r)	Rotating speed (min^{-1})	Feed (mm/r)	Rotating speed (min^{-1})	Feed (mm/r)
3	12700	0.032	14000	0.032	13000	0.034	7500	0.024	5308	0.024	10600	0.025
4	9550	0.04	10800	0.04	10000	0.04	5500	0.032	3980	0.032	6500	0.037
6	6370	0.048	7000	0.048	6400	0.048	3700	0.04	2654	0.04	5300	0.07
8	4770	0.06	5200	0.06	4800	0.06	2800	0.048	1990	0.048	4000	0.11
10	3820	0.10	4200	0.10	3800	0.10	2200	0.06	1592	0.06	3500	0.125
12	3180	0.128	3500	0.128	3200	0.125	1850	0.10	1326	0.10	3000	0.15
16	2380	0.164	2600	0.164	2400	0.16	1400	0.125	955	0.125	2200	0.18

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.

Parts terminology of end mill

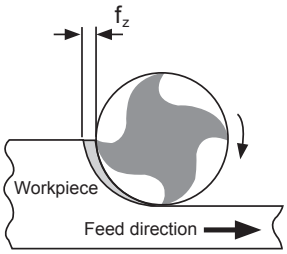


Number of teeth, chip pocket and tool rigidity

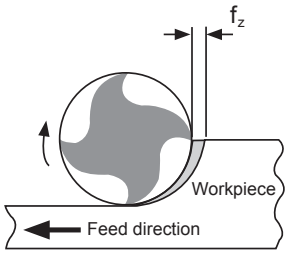
Number of teeth		2 Flutes	3 Flutes	4 Flutes
Profile of cross section				
Proportion of cross section		54%	56%	60%
Features	Advantages	● Large chip pocket ● Easy chip removal	● Easy chip removal ● Perfect surface finish	● Good rigidity ● Perfect surface finish
	Disadvantages	Low rigidity	Difficult to 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

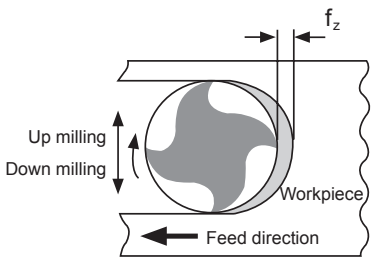


(a) up milling



(b) Down milling

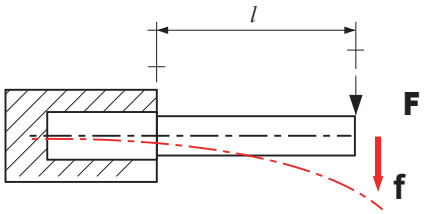
- Slot milling



Length of cutting edge (overhang) and cutting edge diameter

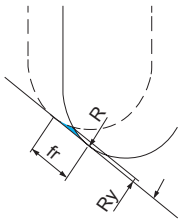
The shorter of overhang is, the higher the rigidity is. Thus it is not easy to bend or vibrate in the cutting process, and machining precision is improved. When length of cutting edge (overhang) doubles, the Deflection degree (f) will be 8 times of the original.

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



$$Ry=R\times\{1-\cos[\arcsin(fr/2R)]\}$$

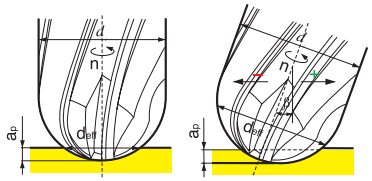
Ry：Theoretical value of surface roughness
fr：Feed rate
R：Ball nose radius or corner radius

Table of theoretical roughness formed by ball nose of end mill (corner radius of R end mill) and feed rate(mm)

Ry / R	Feed rate 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.															

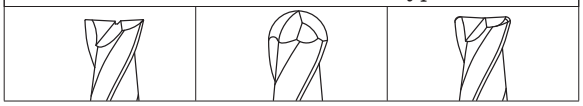
Customer name: Fax: Tel: E-MAIL:	ZCC·CT Huanghe south road, Tianyuan Zone, Zhuzhou, Hunan,P.R.China Fax: 0731-22882721 22885420 22887878 Post code: 412007 E-Mail:zccct@zccct.com

When the diameter specification or length specification on the catalogue cannot meet your requirements, we provide more professional and more accurate non-standard customization, you just need to choose the series the customization based on.

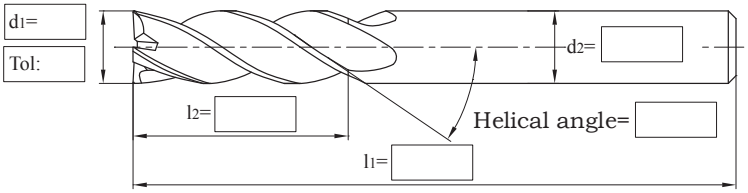
End mill series selection	
VPM series	
UM series	
PML series	
PM series	
GM series	
HMX series	
TM series	
NM series	
AL/ALG series	
SM/VSM series	
CM series	

Diameter specification	Ø0.3～20.0mm
Number of teeth	

Selection of end mill types



☐ Flattened end mill ☐ Ball nose end mill ☐ R end mill



Remark/Note:

Ordering quantities:	pieces	Expecting delivery date:
Quotation of supplier:		Buyer confirmation:
		Date:

Customer name: Fax: Tel: E-MAIL:	ZCC·CT Huanghe south road, Tianyuan Zone, Zhuzhou, Hunan,P.R.China Fax: 0731-22882721 22885420 22887878 Post code: 412007 E-Mail:zccct@zccct.com

Workpiece material information

☐ Carbon steel
☐ Alloy steel
☐ Pre-hardened steel
☐ Hardened steel
☐ Stainless steel
☐ Grey cast iron
☐ Nodular cast iron
☐ Copper alloy
☐ Aluminum alloy
☐ Titanium alloy
☐ Heat-resistant alloy

Workpiece material grade:

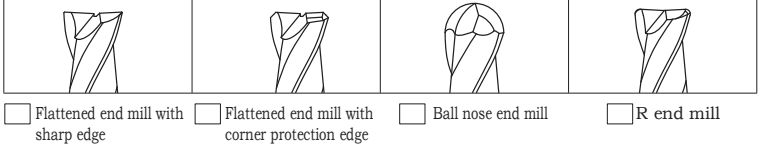
Tensile strength= N/mm²

Hardness= Unit: (HRC,HB etc)

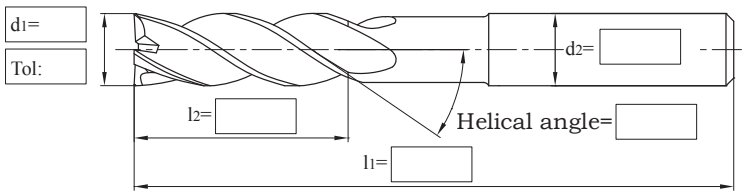
Diameter specification	Ø0.2～25.0mm	
Number of teeth		
Cutting edge cross the center of the end mill	☐ Yes	☐ No

End mill information

Selection of end mill types



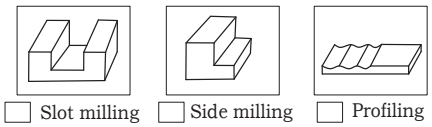
☐ Flattened end mill with sharp edge ☐ Flattened end mill with corner protection edge ☐ Ball nose end mill ☐ R end mill



DIN6535 Shank type

☐ Form HA
☐ Form HB
☐ Straight shank
Special design

Machining method



☐ Slot milling ☐ Side milling ☐ Profiling

Coating	
Yes	☐
No	☐

Remark/Note:

Ordering quantities: pieces Expecting delivery date:

Quotation of supplier: Buyer confirmation:

Date:

Interchangeable

modular endmills series



New series of interchangeable modular endmills combines the advantages of both solid carbide endmills and indexable toolholders together to achieve high-precision、high-rigidity、and high-efficiency machining.

- Solid carbide cutting head with high precision and consistency ;
- The self-centering screw thread ensures the quick replacement、high security and high strength ;
- Double positioning from both radial and axial direction guarantees the high rigidity、high stablity and high-precision coupling ;
- Quick mounting on the machine tool would reduce the non-cutting time which would increase the productivity significantly ;
- Three cutting head series could share the shanks with the indexable inserts type interchangeable series which could satisfy face milling、slot milling、shoulder milling、profile milling、ramping and plunging from roughing to finishing different working conditions.

Interchangeable milling cutter

G 16 - QCH - Q10 - 150 C - ZJ32

- **G** — Round shank
- **16** — Shank diameter: 10-32mm
- **QCH** — Interchangeable milling series
- **Q10** — Corresponding tool bit connector code

Q07	Q08
Q10	Q12
Q14	Q18

- **150** — Overall length
- **C** — Material

C	Cemented Carbide
S	Steel

- **ZJ32** — Length of taper

Interchangeable milling cutter

Q10 - XM - 2 E - D16.0 R3.0

- **Q10** — Connector code / Diameter

Connector code	Diameter
Q07	10mm
Q08	12mm
Q10	16mm
Q12	20mm
Q14	25mm
Q18	32mm

- **XM** — Chip breaker / Applications

Chip breaker	Applications
PM	General machining
HMX	High hardness machining
XM	Economical machining

- **2** — Number of flutes
- **E** — Nose shape code / Types of cutter

Nose shape code	Types of cutter
E	Flat
R	Circular
B	Ball
C	Chamfered
CR	Fillet
H	Deep-feed

Chamfer code	Chamfer angle
C60	60°
C90	90°
C120	120°

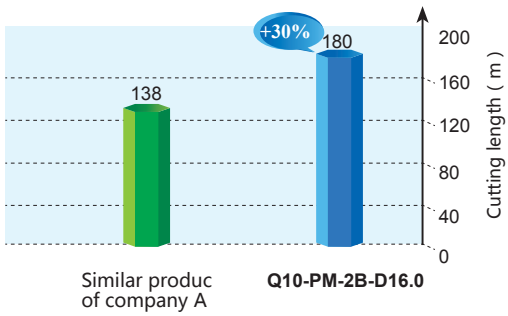
- **D16.0** — Bit diameter (10-32mm)
- **R3.0**

R	Radius
H	Length of chamfer



Good rigidity, longer tool life

Workpiece material : NAK80(HRC40)
Machining methods : Profile milling
Interchangeable head : Q10-PM-2B-D16.0
Toolholder : G16-QCH-Q10-150C
Cutting method: Down milling、wet cut
Machining requirement: Ra≤0.6μm ,
When Ra > 0.6μm tool failure.
Machine tool: Vertical Machining Center
Cutting parameters : Vc=250m/min , fz=0.06mm/z ,
ap=0.5mm , ae=0.5mm

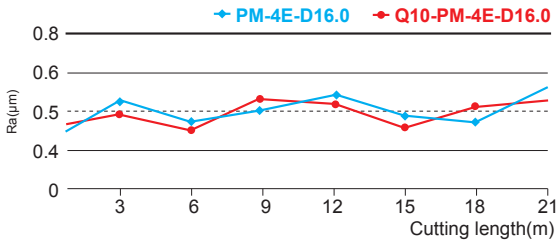


Result: The interchangeable modular endmills has good rigidity and anti-vibration performance. Comparing with the similar product from company A, it has longer tool life and better efficiency.

High-precision and extraodinary surface quality



Workpiece material : 718H(HRC35)
Machining methods : Side milling
Interchangeable head : Q10-PM-4E-D16.0
Toolholder : G16-QCH-Q10-120C
Cutting method: Down milling、wet cut
Machine tool: Vertical Machining Center
Cutting parameters : V_c=200m/min , f_z=0.06mm/z ,
a_p=8mm , a_e=0.4mm



New series of interchangeable modular endmills with high precision and surface quality which has almost the same performance as the solid carbide endmills.

4-flute unequal pitch flattened end mill with straight shank

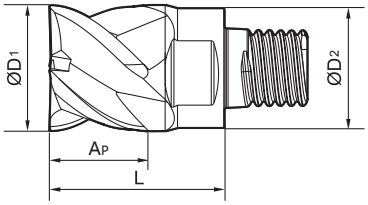

Side face

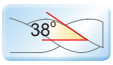

Step shoulder


Straight slot

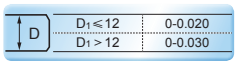
PM-4E













Type	Basic dimension(mm)				Interface	Number of teeth Z	Chamfering angle	Helical angle
	ØD1	ØD2	L	Ap				
Q07-PM-4E-D10.0	10	9.5	16.0	6.5	Q07	4	0.06×45°	38°
Q08-PM-4E-D12.0	12	11.5	17.0	7.0	Q08	4	0.10×45°	38°
Q10-PM-4E-D16.0	16	15.2	21.5	9.0	Q10	4	0.10×45°	38°
Q12-PM-4E-D20.0	20	19.0	25.5	11.0	Q12	4	0.15×45°	38°
Q14-PM-4E-D25.0	25	24.0	31.5	13.5	Q14	4	0.15×45°	38°
Q18-PM-4E-D32.0	32	30.0	36.0	17.0	Q18	4	0.15×45°	38°

Explain

1. Different ap、pitch、radius from the above table can be customized ;
2. When Ap less or equal to the above dimensions will have higher cost performance.

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						
◎	◎	◎	◎	◎		○	◎			○	○

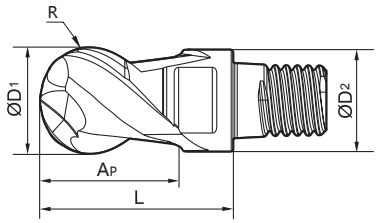
The corresponding toolholder B586-B589
Code key B572
Graphics category and identification B259
Cutting parameters B590

2/4-flute ball nose end mills with straight shank

Profile Cavity Ball nose slot

PM-2B/4B





38° 30° Coated NaNo TiAlN

D	D1≤12	0-0.020
	D1>12	0-0.030

R	D1≤20	±0.010
	D1>20	±0.020

Type	Basic dimension(mm)					Interface	Number of teeth Z	Helical angle
	ØD1	ØD2	L	Ap	R			
Q07-PM-2B-D10.0	10	9.5	16	6	5.0	Q07	2	38°
Q07-PM-4B-D10.0	10	9.5	16	6.5	5.0		4	30°
Q08-PM-2B-D12.0	12	11.5	17.0	7.0	6.0	Q08	2	38°
Q08-PM-4B-D12.0	12	11.5	17.0	7.0	6.0		4	30°
Q10-PM-2B-D16.0	16	15.2	21.5	9.0	8.0	Q10	2	38°
Q10-PM-4B-D16.0	16	15.2	21.5	9.0	8.0		4	30°
Q12-PM-2B-D20.0	20	19.0	25.5	11.0	10.0	Q12	2	38°
Q12-PM-4B-D20.0	20	19.0	25.5	11.0	10.0		4	30°
Q14-PM-2B-D25.0	25	24.0	31.5	13.5	12.5	Q14	2	38°
Q14-PM-4B-D25.0	25	24.0	31.5	13.5	12.5		4	30°
Q18-PM-2B-D32.0	32	30.0	36.0	17.0	16.0	Q18	2	38°
Q18-PM-4B-D32.0	32	30.0	36.0	17.0	16.0		4	30°

Explain

1. Different ap、pitch、radius from the above table can be customized ;
2. When Ap less or equal to the above dimensions will have higher cost performance.

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						
◎	◎	◎	◎	◎		○	◎			○	○

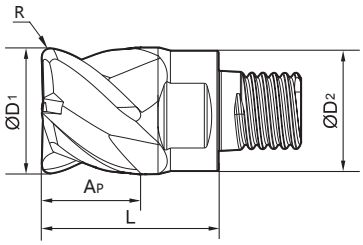
The corresponding toolholder B586-B589 Code key B572 Graphics category and identification B259 Cutting parameters B590

4-flute R end mills with straight shank

Radius shoulder | Profile | Radius corner slot

PM-4R





38° | Coated NaNo TiAlN | D: D1≤12 0-0.020, D1>12 0-0.030

Type	Basic dimension(mm)					Interface	Number of teeth Z	Helical angle
	ØD1	ØD2	L	Ap	R			
Q07-PM-4R-D12.0R0.5	10	9.5	16.0	6.5	0.5	Q07	4	38°
Q08-PM-4R-D12.0R1.0	12	11.5	17.0	7.0	1.0	Q08	4	38°
Q10-PM-4R-D16.0R1.5	16	15.2	21.5	9.0	1.5	Q10	4	38°
Q12-PM-4R-D20.0R2.0	20	19.0	25.5	11.0	2.0	Q12	4	38°
Q14-PM-4R-D25.0R2.5	25	24.0	31.5	13.5	2.5	Q14	4	38°
Q18-PM-4R-D32.0R3.0	32	30.0	36.0	17.0	3.0	Q18	4	38°

Explain

1. Different ap、pitch、radius from the above table can be customized ;
2. When Ap less or equal to the above dimensions will have higher cost performance.

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						
◎	◎	◎	◎	◎		○	◎			○	○

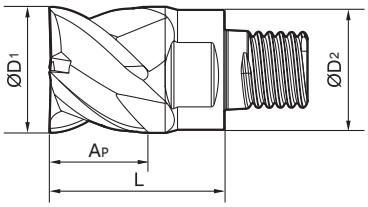
The corresponding toolholder B586-B589 | Code key B572 | Graphics category and identification B259 | Cutting parameters B590

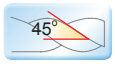
4-flute unequal pitch flattened end mill with straight shank

Side face | Step shoulder | Straight slot

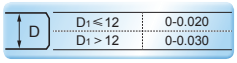
HMX-4E













Type	Basic dimension(mm)				Interface	Number of teeth Z	Chamfering angle	Helical angle
	ØD1	ØD2	L	Ap				
Q07-HMX-4E-D12.0	10	9.5	16.0	6.5	Q07	4	0.06×45°	45°
Q08-HMX-4E-D12.0	12	11.5	17.0	7.0	Q08	4	0.1×45°	45°
Q10-HMX-4E-D16.0	16	15.2	21.5	9.0	Q10	4	0.1×45°	45°
Q12-HMX-4E-D20.0	20	19.0	25.5	11.0	Q12	4	0.15×45°	45°
Q14-HMX-4E-D25.0	25	24.0	31.5	13.5	Q14	4	0.15×45°	45°
Q18-HMX-4E-D32.0	32	30.0	36.0	17.0	Q18	4	0.15×45°	45°

Explain

1. Different ap、pitch、radius from the above table can be customized ;
2. When Ap less or equal to the above dimensions will have higher cost performance.

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						
			○	◎	◎		○				

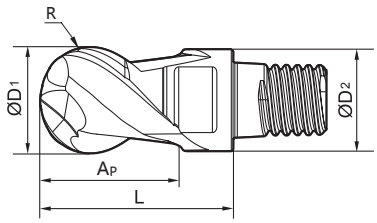
The corresponding toolholder B586-B589 | Code key B572 | Graphics category and identification B259 | Cutting parameters B590

2/4-flute ball nose end mills with straight shank

Profile Cavity Ball nose slot

HMX-2B/4B





35° Coated NaNo TiAlXN

D	D1≤12	0-0.020
	D1>12	0-0.030

R	D1≤20	±0.010
	D1>20	±0.020

Type	Basic dimension(mm)					Interface	Number of teeth Z	Helical angle
	ØD1	ØD2	L	Ap	R			
Q07-HMX-2B-D10.0	10	9.5	16	6.0	5.0	Q07	2	35°
Q07-HMX-4B-D10.0	10	9.5	16	6.5	5.0		4	35°
Q08-HMX-2B-D12.0	12	11.5	17.0	7.0	6.0	Q08	2	35°
Q08-HMX-4B-D12.0	12	11.5	17.0	7.0	6.0		4	35°
Q10-HMX-2B-D16.0	16	15.2	21.5	9.0	8.0	Q10	2	35°
Q10-HMX-4B-D16.0	16	15.2	21.5	9.0	8.0		4	35°
Q12-HMX-2B-D20.0	20	19.0	25.5	11.0	10.0	Q12	2	35°
Q12-HMX-4B-D20.0	20	19.0	25.5	11.0	10.0		4	35°
Q14-HMX-2B-D25.0	25	24.0	31.5	13.5	12.5	Q14	2	35°
Q14-HMX-4B-D25.0	25	24.0	31.5	13.5	12.5		4	35°
Q18-HMX-2B-D32.0	32	30.0	36.0	17.0	16.0	Q18	2	35°
Q18-HMX-4B-D32.0	32	30.0	36.0	17.0	16.0		4	35°

Explain

1. Different ap、pitch、radius from the above table can be customized ;
2. When Ap less or equal to the above dimensions will have higher cost performance.

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						
			○	◎	◎		○				

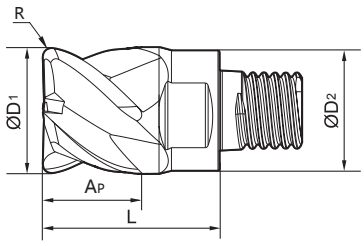
The corresponding toolholder B586-B589 Code key B572 Graphics category and identification B259 Cutting parameters B590

4-flute R end mills with straight shank

Radius shoulder | Profile | Radius corner slot

HMX-4R





35° | Coated NaNo TiAlXN | D: D1≤12 0-0.020, D1>12 0-0.030

Type	Basic dimension(mm)					Interface	Number of teeth Z	Helical angle
	ØD1	ØD2	L	Ap	R			
Q07-HMX-4R-D12.0R0.5	10	9.5	16.0	6.5	0.5	Q07	4	35°
Q08-HMX-4R-D12.0R1.0	12	11.5	17.0	7.0	1.0	Q08	4	35°
Q10-HMX-4R-D16.0R1.5	16	15.2	21.5	9.0	1.5	Q10	4	35°
Q12-HMX-4R-D20.0R2.0	20	19.0	25.5	11.0	2.0	Q12	4	35°
Q14-HMX-4R-D25.0R2.5	25	24.0	31.5	13.5	2.5	Q14	4	35°
Q18-HMX-4R-D32.0R3.0	32	30.0	36.0	17.0	3.0	Q18	4	35°

Explain

1. Different ap、pitch、radius from the above table can be customized ;
2. When Ap less or equal to the above dimensions will have higher cost performance.

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						
			○	◎	◎		○				

The corresponding toolholder B586-B589 | Code key B572 | Graphics category and identification B259 | Cutting parameters B590

XM series of interchangeable flat endmill

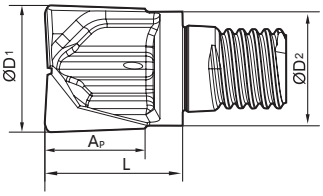

Side face


Step shoulder


Straight slot

XM-2E





Coated NaNo TiALN

D	D1≤12	0-0.020
	D1>12	0-0.030

Type	Basic dimension(mm)				Interface	Number of teeth Z	Stock
	ØD1	ØD2	L	Ap			
Q07-XM-2E-D10.0	10	9.5	12.5	9	Q07	2	●
Q08-XM-2E-D12.0	12	11.5	15.3	10	Q08	2	●
Q10-XM-2E-D16.0	16	15.2	18.0	14	Q10	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						
◎	◎	◎	◎	◎		○	◎			○	○

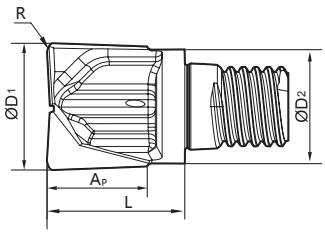
The corresponding toolholder B586-B589
Code key B572
Graphics category and identification B259
Cutting parameters B591

XM series of interchangeable R endmill

Radius shoulder | Profile | Radius corner slot

XM-2R





Coated NaNo ALCrXN

D	D1≤12	0-0.020
	D1>12	0-0.030

Type	Basic dimension(mm)					Interface	Number of teeth Z	Stock
	ØD1	ØD2	L	Ap	R			
Q07-XM-2R-D10.0R1.0	10	9.5	11.0	6	1.0	Q07	2	●
Q07-XM-2R-D10.0R2.0	10	9.5	11.0	6	2.0	Q07	2	●
Q08-XM-2R-D12.0R1.0	12	11.5	11.0	6	1.0	Q08	2	●
Q08-XM-2R-D12.0R2.0	12	11.5	11.0	6	2.0	Q08	2	●
Q08-XM-2R-D12.0R3.0	12	11.5	11.0	6	3.0	Q08	2	●
Q10-XM-2R-D16.0R1.0	16	15.2	13.5	7	1.0	Q10	2	●
Q10-XM-2R-D16.0R2.0	16	15.2	13.5	7	2.0	Q10	2	●
Q10-XM-2R-D16.0R3.0	16	15.2	13.5	7	3.0	Q10	2	●
Q10-XM-2R-D16.0R4.0	16	15.2	13.5	7	4.0	Q10	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						
◎	◎	◎	◎	◎		○	◎			○	○

The corresponding toolholder B586-B589 | Code key B572 | Graphics category and identification B259 | Cutting parameters B591

XM series of interchangeable ball nose endmill

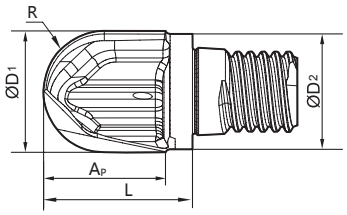

Profile

Cavity

Ball nose slot

XM-2B





Coated NaNo ALCrXN

D	D1≤12	0-0.020
	D1>12	0-0.030

Type	Basic dimension(mm)					Interface	Number of teeth Z	Stock
	ØD1	ØD2	L	Ap	R			
Q07-XM-2B-D10.0	10	9.5	12.5	10.2	5.0	Q07	2	●
Q08-XM-2B-D12.0	12	11.5	15.3	11.45	6.0	Q08	2	●
Q10-XM-2B-D16.0	16	15.2	18	14	8.0	Q10	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						
			○	◎	◎		○				

The corresponding toolholder B586-B589
Code key B572
Graphics category and identification B259
Cutting parameters B591

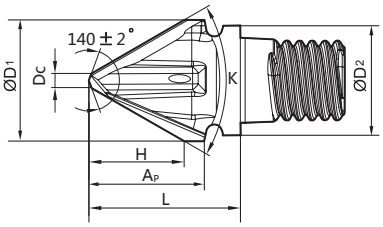
XM series of interchangeable chamfered endmill

Chamfering

Centering hole processing

XM-2C





Coated NaNo TiALN

D	D1≤12	0-0.020
	D1>12	0-0.030

Type	Basic dimension(mm)							Interface	Number of teeth Z	Stock
	ØD1	ØD2	Dc	L	Ap	H	K			
Q07-XM-2C60-D10H7.7	10	9.5	1.5	12	9.3	7.7	60°	Q07	2	●
Q07-XM-2C90-D10H4.6	10	9.5	1.5	12	9.3	4.6	90°	Q07	2	●
Q07-XM-2C120-D10H2.8	10	9.5	1.5	12	9.3	2.8	120°	Q07	2	●
Q08-XM-2C60-D12H9.4	12	11.5	1.5	16	11	9.4	60°	Q08	2	●
Q08-XM-2C90-D12H5.6	12	11.5	1.5	16	11	5.6	90°	Q08	2	●
Q08-XM-2C120-D12H3.5	12	11.5	1.5	16	11	3.5	120°	Q08	2	●
Q10-XM-2C60-D16H12.2	16	15.2	2.5	18	14	12.2	60°	Q10	2	●
Q10-XM-2C90-D16H7.6	16	15.2	1.5	18	14	7.6	90°	Q10	2	●
Q10-XM-2C120-D16H4.5	16	15.2	1.5	18	14	4.5	120°	Q10	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						
◎	◎	◎	◎	◎		○	◎			○	○

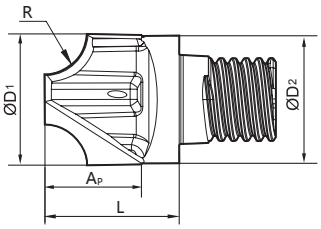
The corresponding toolholder B586-B589
Code key B572
Graphics category and identification B259
Cutting parameters B591

XM series of interchangeable fillet endmill

Fillet machining

XM-2CR





Coated NaNo TiALN

D D1≤12 0-0.020 D1>12 0-0.030

Type	Basic dimension(mm)					Interface	Number of teeth Z	Stock
	ØD1	ØD2	R	L	Ap			
Q07-XM-2CR-D10.0R1.0	10	9.5	1	14	9.5	Q07	2	●
Q07-XM-2CR-D10.0R2.0	10	9.5	2	14	9.5	Q07	2	●
Q08-XM-2CR-D12.0R1.0	12	11.5	1	16	11.5	Q07	2	●
Q08-XM-2CR-D12.0R3.0	12	11.5	3	16	11.5	Q07	2	●
Q08-XM-2CR-D12.0R4.0	12	11.5	4	16	11.5	Q08	2	●
Q10-XM-2CR-D16.0R1.0	16	15.2	1	18	13.0	Q08	2	●
Q10-XM-2CR-D16.0R3.0	16	15.2	3	18	13.0	Q08	2	●
Q10-XM-2CR-D16.0R4.0	16	15.2	4	18	13.0	Q10	2	●
Q10-XM-2CR-D16.0R5.0	16	15.2	5	18	13.0	Q10	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						
			○	◎	◎		○				

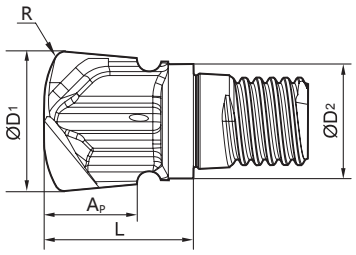
The corresponding toolholder B586-B589
Code key B572
Graphics category and identification B259
Cutting parameters B591

XM series of interchangeable high feed endmill

Profile | Radius corner slot | Side face | Step shoulder

XM-2H





Coated NaNo ALCrXN

D	
D1≤12	0-0.020
D1>12	0-0.030

Type	Basic dimension(mm)					Interface	Number of teeth Z	Stock
	ØD1	ØD2	L	Ap	R			
Q07-XM-2H-D10.0R1.5	10	9.5	11	6	1.5	Q07	2	●
Q08-XM-2H-D12.0R2.0	12	11.5	11	6	2.0	Q08	2	●
Q10-XM-2H-D16.0R2.5	16	15.2	13.5	7	2.5	Q10	2	●

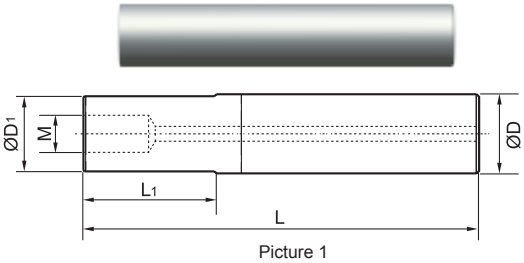
● Stock available ○ Make-to-order

Applicable workpiece material table ◎Very suitable ○Suitable

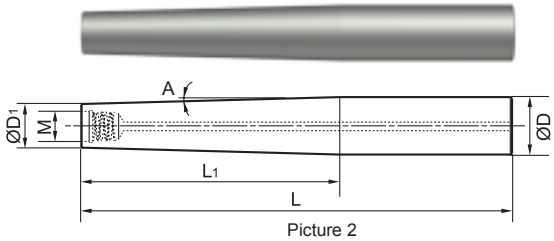
Workpiece material											
Carbon steel	Alloy steel	Pre-hardened steel、Hardened steel				Stainless steel	Cast iron, Nodular cast iron	Copper alloy	Aluminum alloy	Titanium alloy	Heat resistant alloy
		~40HRC	~50HRC	~55HRC	~68HRC						
◎	◎	◎	◎	◎		○	◎			○	○

The corresponding toolholder B586-B589 | Code key B572 | Graphics category and identification B259 | Cutting parameters B591

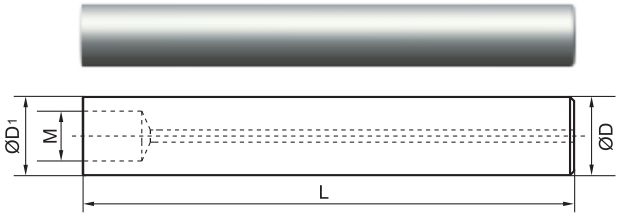
Selections of interchangeable straight shank



Picture 1



Picture 2



Picture 3

h6	12≤D4≤16	20≤D4≤25	25≤D4≤32
	0-0.011	0-0.013	0-0.016

Interface M	Type	Stock	Weight	Basic dimensions(mm) L	L1	ØD	ØD1	Angle A	Material	Picture
Q07	G10-QCH-Q07-65S	△	0.04	65	14	10	9.5	–	steel	Picture 1
	G10-QCH-Q07-75S	△	0.05	75	24					
	G10-QCH-Q07-85S	△	0.06	85	34					
	G10-QCH-Q07-55C	△	0.08	55	5				alloy	
	G10-QCH-Q07-75C	△	0.1	75	25					
	G10-QCH-Q07-85C	△	0.11	85	35					
	G10-QCH-Q07-105C	△	0.13	105	55					
	G10-QCH-Q07-125C	△	0.15	125	–		10			Picture 3
	G10-QCH-Q07-145C	△	0.17	145						
	G12-QCH-Q07-120C-ZJ70	△	0.18	120	70	12	9.5	1°		Pic2
Q08	G12-QCH-Q08-65S	△	0.05	65	20	12	11.5	–	steel	Picture 1
	G12-QCH-Q08-80S	△	0.06	80	35					
	G12-QCH-Q08-90S	△	0.07	90	45					
	G12-QCH-Q08-55C	△	0.08	55	5				alloy	
	G12-QCH-Q08-80C	△	0.11	80	30					
	G12-QCH-Q08-100C	△	0.14	100	50					

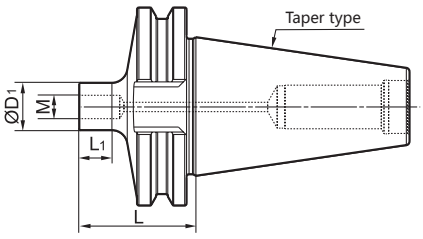
Interface M	Type	Stock	Weight	Basic dimensions(mm) L	L1	ØD	ØD1	Angle A	Material	Picture
Q08	G12-QCH-Q08-120C	△	0.17	120	70	12	11.5	–	alloy	Pic1
	G12-QCH-Q08-155C	△	0.21	155	–		12			Picture 3
	G12-QCH-Q08-165C	△	0.23	165						
	G16-QCH-Q08-60S	△	0.08	60	7	16	11.5		steel	Pic1
	G16-QCH-Q08-140C-ZJ90	△	0.25	140	90			1°	alloy	Pic2
Q10	G16-QCH-Q10-80S	△	0.11	80	26.5	16	15.2	–	steel	Picture 1
	G16-QCH-Q10-100S	△	0.14	100	42.5					
	G16-QCH-Q10-110S	△	0.15	110	58.5					
	G16-QCH-Q10-55C	△	0.13	55	5				alloy	
	G16-QCH-Q10-90C	△	0.22	90	40					
	G16-QCH-Q10-120C	△	0.3	120	70					
	G16-QCH-Q10-150C	△	0.37	150	100					
	G16-QCH-Q10-190C	△	0.47	190	–		16			Picture 3
	G16-QCH-Q10-205C	△	0.52	205						
	G20-QCH-Q10-65S	△	0.14	65	10.5	20	15.2		steel	Pic1
	G20-QCH-Q10-200C-ZJ140	△	0.69	200	140			0.8°	alloy	Pic2

Interchangeable straight shank modular end mills

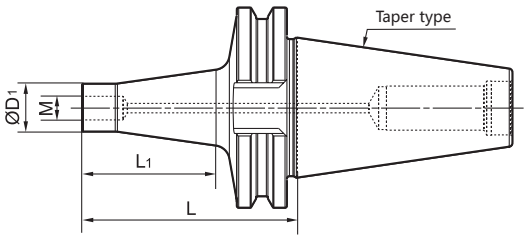
Interface M	Type	Stock	Weight	Basic dimensions(mm)					Material	Picture
				L	L_1	ØD	$ØD_1$	Angle A		
Q12	G20-QCH-Q12-90S	△	0.19	90	34.5	20	19	–	steel	Picture 1
	G20-QCH-Q12-110S	△	0.23	110	54.5					
	G20-QCH-Q12-125S	△	0.26	125	74.5					
	G20-QCH-Q12-65C	△	0.24	65	5				alloy	
	G20-QCH-Q12-100C	△	0.38	100	40					
	G20-QCH-Q12-140C	△	0.53	140	80					
	G20-QCH-Q12-180C	△	0.68	180	120					
	G20-QCH-Q12-235C	△	0.9	235	–		20			Picture 3
	G20-QCH-Q12-255C	△	0.98	255						
	G25-QCH-Q12-75S	△	0.24	75	14.5	25	19		steel	Pic1
	G25-QCH-Q12-250C-ZJ180	△	1.323	250	180			0.8°	alloy	Pic2
Q14	G25-QCH-Q14-100S	△	0.34	100	43.5	25	24	–	steel	Picture 1
	G25-QCH-Q14-125S	△	0.42	125	68.5					
	G25-QCH-Q14-150S	△	0.5	150	93.5					
	G25-QCH-Q14-75C	△	0.27	75	5				alloy	
	G25-QCH-Q14-120C	△	0.74	120	50					
	G25-QCH-Q14-170C	△	1.04	170	100					

Interface M	Type	Stock	Weight	Basic dimensions(mm)					Material	Picture
				L	L_1	ØD	$ØD_1$	Angle A		
Q14	G25-QCH-Q14-220C	△	1.35	220	150	25	24	–	alloy	Pic1
	G25-QCH-Q14-290C	△	1.77	290	–		25			Picture 3
	G25-QCH-Q14-310C	△	1.89	310						
	G32-QCH-Q14-80S	△	0.42	80	18.5	32	24		steel	Pic1
	G32-QCH-Q14-270C-ZJ200	△	2.38	270	200			0.8°	alloy	Pic2
Q18	G32-QCH-Q18-125S	△	0.69	125	60	32	30	–	steel	Picture 1
	G32-QCH-Q18-160S	△	0.88	160	92					
	G32-QCH-Q18-185S	△	1.01	185	124					
	G32-QCH-Q18-75C	△	0.82	75	5				alloy	
	G32-QCH-Q18-140C	△	1.39	140	70					
	G32-QCH-Q18-200C	△	1.96	200	130					
	G32-QCH-Q18-260C	△	2.55	260	190					
	G32-QCH-Q18-320C	△	3.13	320	250					
	G32-QCH-Q18-355C	△	3.42	355	–		32			Picture 3
	G32-QCH-Q18-385C	△	3.71	385						
	G40-QCH-Q18-100S	△	0.81	100	28	40	30		steel	Pic1

Selections of interchangeable taper shank



Picture 1

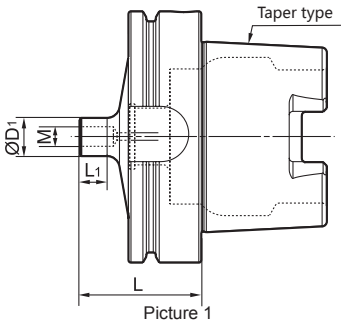


Picture 2

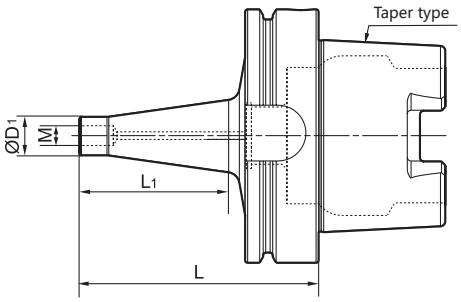
Inter face	Taper type	Specification	L	L1	Picture	Weight (Kg)
Q07	BT30	BT30-QCH-Q07-33S	33.63	5	Picture 1	0.32
	BT40	BT40-QCH-Q07-40S	40.13	5	Picture 1	0.92
	BT50	BT50-QCH-Q07-54S	54.3	5	Picture 1	3.76
	BT30	BT30-QCH-Q07-41S	41.66	14	Picture 2	0.31
	BT40	BT40-QCH-Q07-57S	57.86	24	Picture 2	0.94
	BT50	BT50-QCH-Q07-81S	81.73	34	Picture 2	3.81
Q08	BT30	BT30-QCH-Q08-35S	35.63	7	Picture 1	0.4
	BT40	BT40-QCH-Q08-42S	42.13	7	Picture 1	1.01
	BT50	BT50-QCH-Q08-56S	56.3	7	Picture 1	3.8
	BT30	BT30-QCH-Q08-46S	46.66	19	Picture 2	0.41
	BT40	BT40-QCH-Q08-64S	64.86	31	Picture 2	1.05
	BT50	BT50-QCH-Q08-90S	90.73	43	Picture 2	3.86
Q10	BT30	BT30-QCH-Q10-38S	38.8	10.5	Picture 1	0.41
	BT40	BT40-QCH-Q10-45S	45.3	10.5	Picture 1	1.02
	BT50	BT50-QCH-Q10-59S	59.48	10.5	Picture 1	3.8
	BT30	BT30-QCH-Q10-53S	53.73	26.5	Picture 2	0.44
	BT40	BT40-QCH-Q10-75S	75.83	42.5	Picture 2	1.1
	BT50	BT50-QCH-Q10-105S	105.61	58.5	Picture 2	3.96
Q12	BT30	BT30-QCH-Q12-42S	42.47	14.5	Picture 1	0.42
	BT40	BT40-QCH-Q12-48S	48.97	14.5	Picture 1	1.03
	BT50	BT50-QCH-Q12-63S	63.14	14.5	Picture 1	3.81
	BT30	BT30-QCH-Q12-61S	61.3	34.5	Picture 2	0.48
	BT40	BT40-QCH-Q12-87S	87.3	54.5	Picture 2	1.18
	BT50	BT50-QCH-Q12-120S	120.98	74.5	Picture 2	4.1
Q14	BT30	BT30-QCH-Q14-46S	46.03	18.5	Picture 1	0.45
	BT40	BT40-QCH-Q14-52S	52.53	18.5	Picture 1	1.06
	BT50	BT50-QCH-Q14-66S	66.7	18.5	Picture 1	3.84
	BT30	BT30-QCH-Q14-69S	69.8	43.5	Picture 2	0.57
	BT40	BT40-QCH-Q14-100S	100.61	68.5	Picture 2	1.37
	BT50	BT50-QCH-Q14-139S	139.16	93.5	Picture 2	4.41
Q18	BT40	BT40-QCH-Q18-61S	61.5	28	Picture 1	1.14
	BT50	BT50-QCH-Q18-75S	75.67	28	Picture 1	3.92
	BT40	BT40-QCH-Q18-122S	122.44	92	Picture 2	1.74
	BT50	BT50-QCH-Q18-168S	168.62	124	Picture 2	5.07

Inter face	Taper type	Specification	L	L1	Picture	Weight (Kg)
Q07	JT30	JT30-QCH-Q07-31S	31.26	5	Picture 1	0.32
	JT40	JT40-QCH-Q07-32S	32.49	5	Picture 1	0.83
	JT50	JT50-QCH-Q07-35S	35.32	5	Picture 1	3.38
	JT30	JT30-QCH-Q07-39S	39.28	14	Picture 2	0.31
	JT40	JT40-QCH-Q07-50S	50.22	24	Picture 2	0.85
	JT50	JT50-QCH-Q07-62S	62.74	34	Picture 2	3.43
Q08	JT30	JT30-QCH-Q08-33S	33.26	7	Picture 1	0.4
	JT40	JT40-QCH-Q08-34S	34.49	7	Picture 1	0.87
	JT50	JT50-QCH-Q08-37S	37.32	7	Picture 1	2.79
	JT30	JT30-QCH-Q08-44S	44.28	19	Picture 2	0.41
	JT40	JT40-QCH-Q08-57S	57.22	31	Picture 2	0.9
	JT50	JT50-QCH-Q08-71S	71.74	43	Picture 2	2.85
Q10	JT30	JT30-QCH-Q10-36S	36.43	10.5	Picture 1	0.41
	JT40	JT40-QCH-Q10-37S	37.67	10.5	Picture 1	0.88
	JT50	JT50-QCH-Q10-40S	40.49	10.5	Picture 1	2.79
	JT30	JT30-QCH-Q10-51S	51.36	26.5	Picture 2	0.43
	JT40	JT40-QCH-Q10-68S	68.2	42.5	Picture 2	0.96
	JT50	JT50-QCH-Q10-86S	86.62	58.5	Picture 2	2.95
Q12	JT30	JT30-QCH-Q12-40S	40.1	14.5	Picture 1	0.42
	JT40	JT40-QCH-Q12-41S	41.33	14.5	Picture 1	0.89
	JT50	JT50-QCH-Q12-44S	44.15	14.5	Picture 1	2.8
	JT30	JT30-QCH-Q12-58S	58.92	34.5	Picture 2	0.48
	JT40	JT40-QCH-Q12-79S	79.66	54.5	Picture 2	1.04
	JT50	JT50-QCH-Q12-101S	101.99	74.5	Picture 2	3.09
Q14	JT30	JT30-QCH-Q14-43S	43.66	18.5	Picture 1	0.45
	JT40	JT40-QCH-Q14-44S	44.89	18.5	Picture 1	0.92
	JT50	JT50-QCH-Q14-47S	47.71	18.5	Picture 1	2.84
	JT30	JT30-QCH-Q14-67S	67.36	43.5	Picture 2	0.57
	JT40	JT40-QCH-Q14-92S	92.97	68.5	Picture 2	1.22
	JT50	JT50-QCH-Q14-120S	120.18	93.5	Picture 2	3.4
Q18	JT40	JT40-QCH-Q18-53S	53.86	28	Picture 1	1.0
	JT50	JT50-QCH-Q18-56S	56.68	28	Picture 1	2.91
	JT40	JT40-QCH-Q18-115S	115.6	92	Picture 2	1.61
	JT50	JT50-QCH-Q18-149S	149.63	124	Picture 2	4.07

Selections of interchangeable HSK shank



Picture 1



Picture 2

Interface	Shank type	Specification	Basic dimensions(mm)			Picture	Weight
			L	L_1	D_1		
Q07	HSK63	HSK63-QCH-Q07-40S	38	5.0	9.5	Picture 1	0.60
	HSK63	HSK63-QCH-Q07-64S	57	24.0		Picture 2	0.66
	HSK100	HSK100-QCH-Q07-43S	41	5.0		Picture 1	1.82
	HSK100	HSK100-QCH-Q07-82S	73	34.0		Picture 2	2.01
Q08	HSK63	HSK63-QCH-Q08-40S	40	7	11.5	Picture 1	0.66
	HSK63	HSK63-QCH-Q08-64S	64	31		Picture 2	0.71
	HSK100	HSK100-QCH-Q08-43S	43	7		Picture 1	2.0
	HSK100	HSK100-QCH-Q08-82S	82	43		Picture 2	2.16
Q10	HSK63	HSK63-QCH-Q10-43S	43	10.5	15.2	Picture 1	0.64
	HSK63	HSK63-QCH-Q10-74S	74	42.5		Picture 2	0.75
	HSK100	HSK100-QCH-Q10-48S	48	10.5		Picture 1	2.05
	HSK100	HSK100-QCH-Q10-94S	94	58.5		Picture 2	2.2
Q12	HSK63	HSK63-QCH-Q12-46S	46	14.5	19	Picture 1	0.69
	HSK63	HSK63-QCH-Q12-86S	86	54.5		Picture 2	0.84
	HSK100	HSK100-QCH-Q12-48S	48	14.5		Picture 1	2.02
	HSK100	HSK100-QCH-Q12-112S	112	74.5		Picture 2	2.42
Q14	HSK63	HSK63-QCH-Q14-51S	51	18.5	24	Picture 1	0.74
	HSK63	HSK63-QCH-Q14-100S	100	68.5		Picture 2	1.03
	HSK100	HSK100-QCH-Q14-55S	55	18.5		Picture 1	2.13
	HSK100	HSK100-QCH-Q14-130S	130	93.5		Picture 2	2.73
Q18	HSK63	HSK63-QCH-Q18-59S	59	28	30	Picture 1	0.79
	HSK63	HSK63-QCH-Q18-120S	120	92		Picture 2	1.38
	HSK100	HSK100-QCH-Q18-60S	60	28		Picture 1	2.15
	HSK100	HSK100-QCH-Q18-155S	155	124		Picture 2	3.28

Recommended cutting parameters for interchangeable module endmills

PM-4E★PM-2B★PM-4B★PM-4R

Recommended cutting speed

Workpiece material / Cutting speed Vc	P	M	K	N	S	H
Vc(m/min)	70 ~ 280	60 ~ 160	80 ~ 280	270 ~ 840	20 ~ 70	30 ~ 80

Cutting parameters : (mm)

Machining methods / Edge diameter	Slotting			Side 、Face milling			Profiling		
	f_z(mm/z)	Cutting width a_e	Cutting depth a_p	f_z(mm/z)	Cutting width a_e	Cutting depth a_p	f_z(mm/z)	Cutting width a_e	Cutting depth a_p
10	0.03 ~ 0.09	1D	0.1 ~ 0.5D	0.02 ~ 0.1	0.03~ 0.05D	0.1 ~ 0.5D	0.02 ~ 0.1	0.1 ~ 0.3R	0.05 ~ 0.15R
12	0.04 ~ 0.10			0.03 ~ 0.11			0.03 ~ 0.11		
16	0.05 ~ 0.12			0.05 ~ 0.13			0.05 ~ 0.13		
20	0.05 ~ 0.15			0.05 ~ 0.17			0.05 ~ 0.17		
25	0.06 ~ 0.15			0.06 ~ 0.18			0.06 ~ 0.18		
32	0.06 ~ 0.18			0.06 ~ 0.22			0.06 ~ 0.22		

Adjustments of the cutting parameters for different xD shanks

Cutting parameters / Overhang xD	Cutting speed（%）	Feed rate（%）	Cutting width（%）
2	100	100	100
3	100	100	100
4	80	90	70
5	60	80	40
7	30	60	20
9	20	50	10

HMX-4E★HMX-2B★HMX-4B★HMX-4R

Recommended cutting speed

Workpiece material / cutting speed Vc	H		
	40 - 50HRC	50 - 60HRC	60 - 68HRC
Vc(m/min)	260 ~ 320	150 ~ 220	100 ~ 200

Cutting parameters : (mm)

Machining methods / Edge diameter	Side 、Face milling			Profiling		
	f_z(mm/z)	Cutting width a_e	Cutting depth a_p	f_z(mm/z)	Cutting width a_e	Cutting depth a_p
10	0.02 ~ 0.06	0.02 ~ 0.05D	0.1 ~ 0.5D	0.04 ~ 0.13	0.25R	0.1R
12	0.03 ~ 0.07			0.05 ~ 0.15	0.3R	0.1R
16	0.03 ~ 0.07			0.08 ~ 0.18	0.35R	0.1R
20	0.04 ~ 0.08			0.10 ~ 0.22	0.4R	0.1R
25	0.04 ~ 0.08			0.12 ~ 0.25	0.5R	0.12R
32	0.05 ~ 0.10			0.15 ~ 0.30	0.6R	0.12R

Adjustments of the cutting parameters for different xD shanks

Cutting parameters / Overhang xD	Cutting speed（%）	Feed rate（%）	Cutting width（%）
2	100	100	100
3	100	100	100
4	80	90	70
5	60	80	40
7	30	60	20
9	20	50	10

Recommended cutting parameters for interchangeable module endmills

XM-2B★XM-2H★XM-2C/2CR

Recommended cutting speed

Workpiece material / Cutting speed Vc	P	M	K	N	S	H
Vc(m/min)	70 ~ 280	60 ~ 160	80 ~ 280	270 ~ 840	20 ~ 70	30 ~ 80

Cutting parameters : (mm)

Machining methods / Edge diameter	XM-2B			XM-2H			XM-2C/2CR		
	f_z(mm/z)	Cutting width a_e	Cutting depth a_p	f_z(mm/z)	Cutting width a_e	Cutting depth a_p	f_z(mm/z)	Cutting width a_e	Cutting depth a_p
10	0.03 ~ 0.11	0.3R	0.1R	0.4 ~ 0.8	0.65D	0.25R	0.07 ~ 0.12	0.1D	0.1D
12	0.04 ~ 0.12			0.5 ~ 0.9			0.08 ~ 0.12		
16	0.05 ~ 0.13			0.6 ~ 1.0			0.1 ~ 0.12		

1. Please adopt high precision machining center and shank holder.
2. Climb milling is recommended on side milling.
3. Please reduce the rev and feed rate if there are vibrations and abnormal noise under the circumstances of the bad rigidity of machine.
4. In the condition of interference-free, the extended length of milling cutter should be short as much as possible.

Adjustments of the cutting parameters for different xD shanks

Cutting parameters / Overhang xD	Cutting speed（%）	Feed rate（%）	Cutting width（%）
2	100	100	100
3	100	100	100
4	80	90	70
5	60	80	40
7	30	60	20
9	20	50	10

XM-2E★XM-2R

Recommended cutting speed

Workpiece material / Cutting speed Vc	P	M	K	N	S	H
Vc(m/min)	70 ~ 280	60 ~ 160	80 ~ 280	270 ~ 840	20 ~ 70	30 ~ 80

Cutting parameters : (mm)

Machining methods / Edge diameter	Side 、 Face milling						Slotting					
	XM-2E			XM-2R			XM-2E			XM-2R		
	f_z(mm/z)	Cutting width a_e	Cutting depth a_p	f_z(mm/z)	Cutting width a_e	Cutting depth a_p	f_z(mm/z)	Cutting width a_e	Cutting depth a_p	f_z(mm/z)	Cutting width a_e	Cutting depth a_p
10	0.035-0.09	0.1-0.15D	0.75D	0.035-0.09	0.2D	0.4D	0.02-0.045	1D	0.3D	0.02-0.045	1D	0.3D
12	0.04-0.1			0.04-0.1			0.02-0.05			0.02-0.05		
16	0.05-0.12			0.05-0.12			0.025-0.06			0.025-0.06		

1.The cutting speed should be 50%~70% of above recommenddations when doing slot milling.
2. Please adopt high precision machining center and shank holder.
4. Climb milling is recommended on side milling.
4. Please reduce the rev and feed rate if there are vibrations and abnormal noise under the circumstances of the bad rigidity of machine.
5. In the condition of interference-free, the extended length of milling cutter should be short as much as possible.

Adjustments of the cutting parameters for different xD shanks

Cutting parameters / Overhang xD	Cutting speed（%）	Feed rate（%）	Cutting width（%）
2	100	100	100
3	100	100	100
4	80	90	70
5	60	80	40
7	30	60	20
9	20	50	10

Tolerance of shank (mm)

Diameter（mm）	12/16	20	25	32
radial runout	0.015	0.015	0.02	0.02
total runout	0.01	0.01	0.01	0.01

Wrench

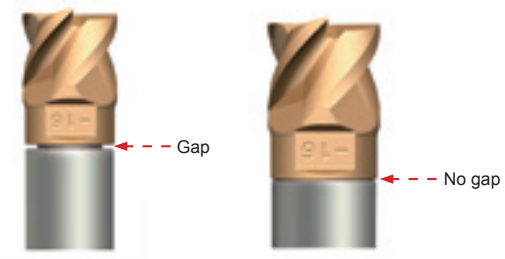
	Interface type	Applicative series	Wrench specifications	Installation torque
	Q07	PM/HMX	QCH-7.5×8	10N.M
	Q08		QCH-10×13	16N.M
	Q10			20N.M
	Q12		QCH-16×20	30N.M
	Q14			40N.M
	Q18		QCH-26	50N.M
	Q07	XM	QCH-5×6.5	10N.M
	Q08			15N.M
	Q10		QCH-7.5×8	20N.M

The wrench need to be purchased separately

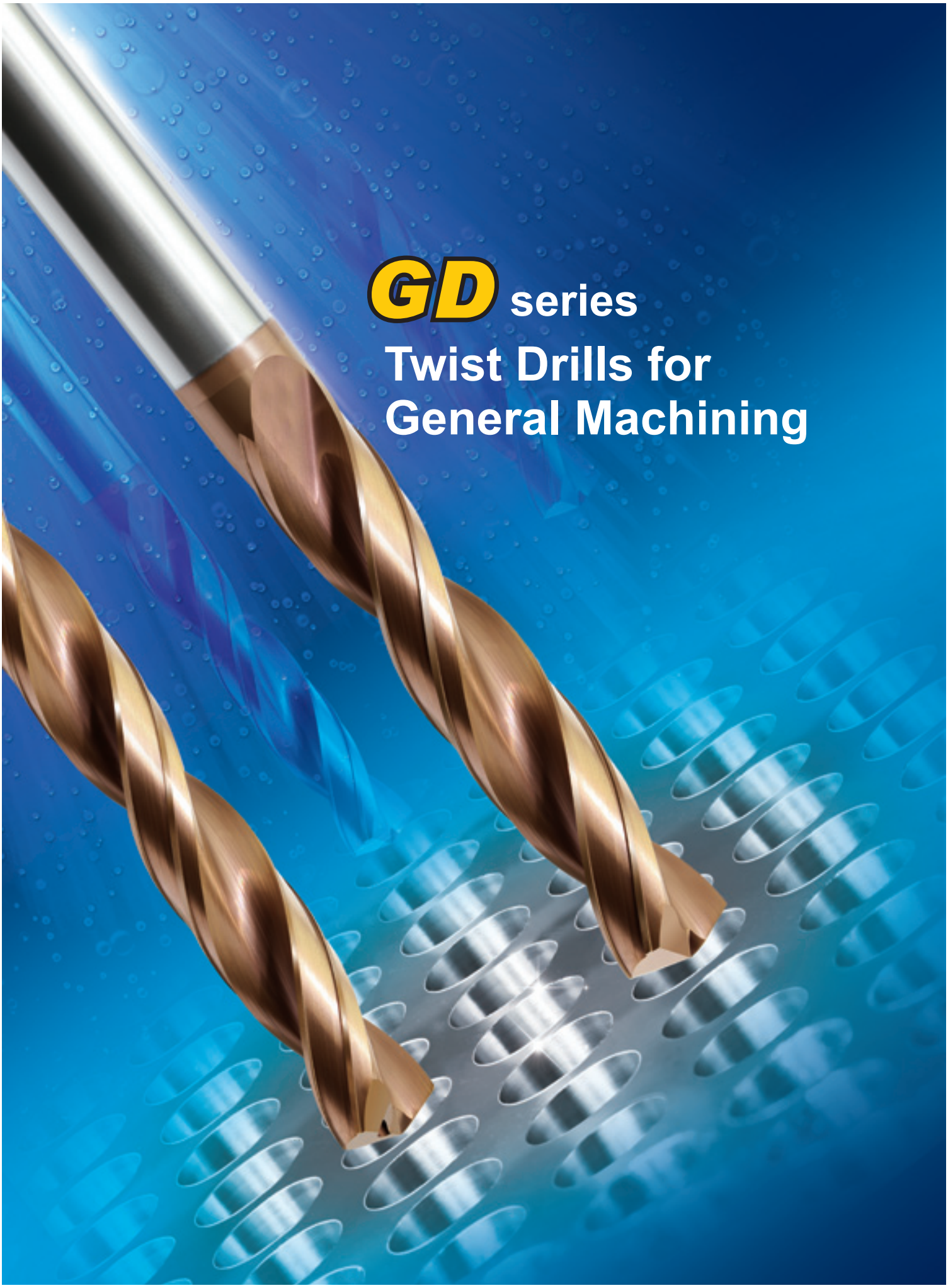
Cutting head installation instructions



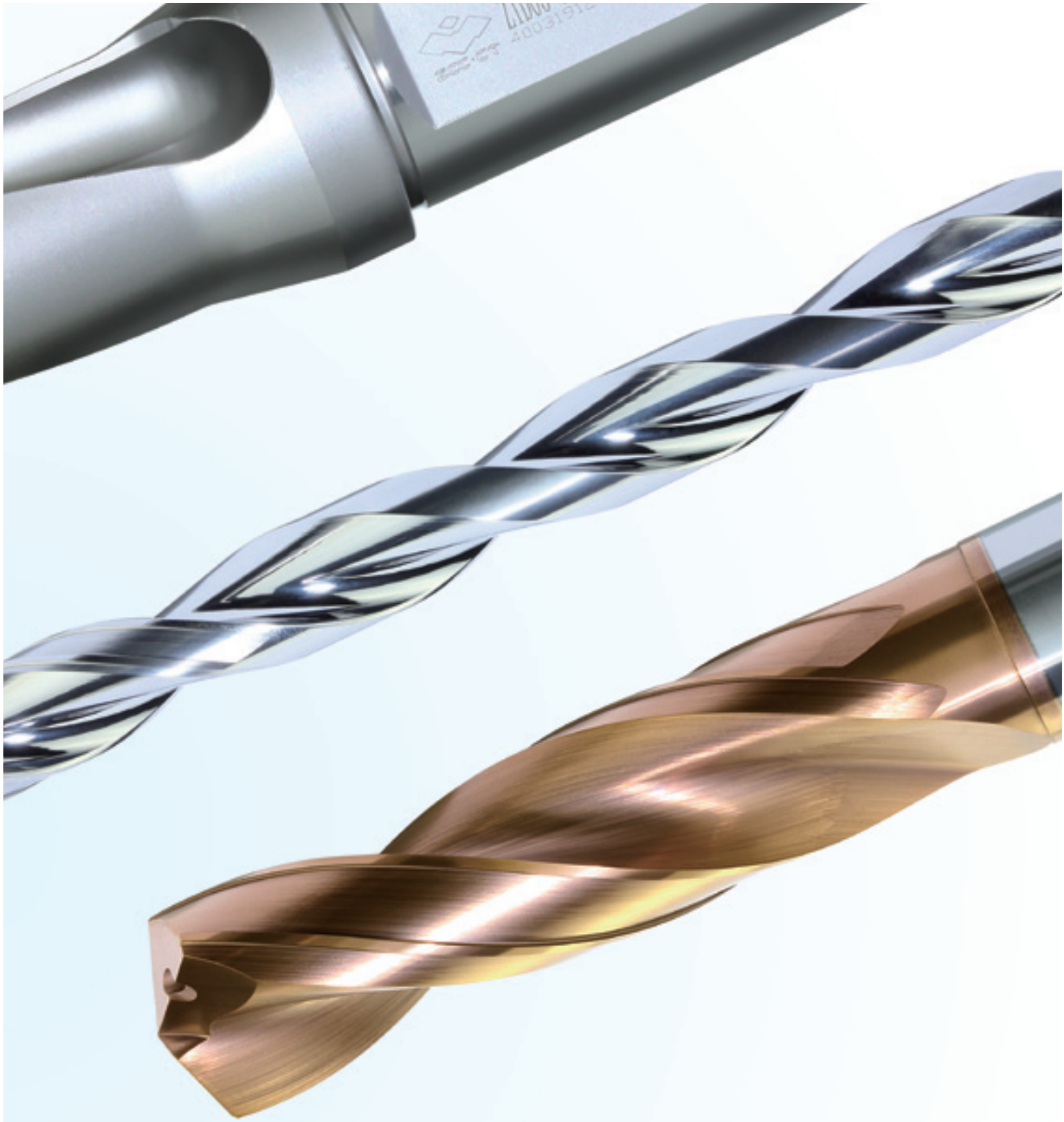
- 1.Use the clean cotton to remove the oil and dust on the interface cone, end face, and threads.
- 2.While you are using your hands directly contact the cutting edges during clamping. It may cause injury, please use protective equipment.
- 3.After installing the cutting head, if there is a gap between the cutting head and the end face of the shank, please use the wrench to tighten it until it fits completely.
- 4.For strict operation requirements, please use the recommended torque to install the cutting head.






GD series
Twist Drills for
General Machining





Boring Tools

Drills
Reamers
Threading tools


ZSD
U drill new series

Boring Tools

C



Drills C2-C143

Solid carbide drills C2-C98

Indexable U drill C99-C129

Interchangeable head drills C130-C143

Reamers C144-C155

Solid carbide reamers C144-C155

Threading tools C156-C184

Solid carbide threading cutters C162-C173

Solid carbide threading end mills C174-C175

Recommended cutting parameters of solid carbide threading tools C176

Technical information C177-C182

Non-standard customization for solid carbide taps C183

Non-standard customization for solid carbide thread milling cutters C184

How to choose the right solid carbide drills

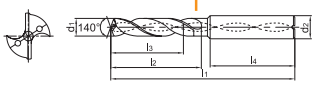
Shape

Product category

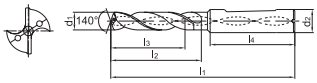
Shape size

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 d1(m7)	Drilling depth (l/d)	Cooling mode	Shank type	Type	Basic dimension(mm) Shank diameter d2(h6)	Overall length l1	Flute length l2	Recommended drilling depth l3	Shank length l4	Recommended grade 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: ~40HRC	~50HRC	~60HRC	Stainless steel	Cast iron	Nodular cast iron	Aluminum alloy	Copper alloy	Heat resistant alloy
KDG303	◎	○				◎					○

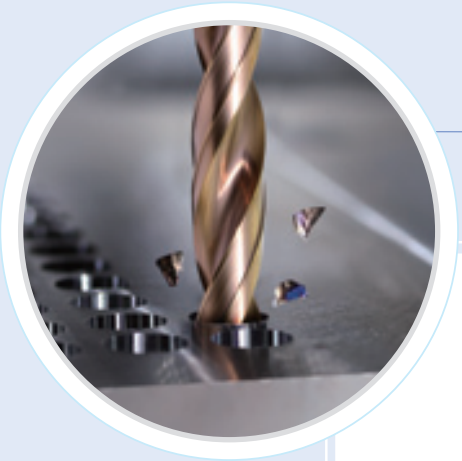
Code key C6 | Cutting parameters C83 | Cutting parameters C87–C93 | Non-standard customization C94–C98

Applicable workpiece material range

Product features

Specifications
Type, depth of drilling, cooling system, type of shank, basic dimensions and grade.

Code key, cutting parameters, technical information, non-standard customization



BORING TOOL C

Drills

Drilling tools overview C4

Solid carbide drills C5-C98

Grade introduction for solid carbide drills C5
Solid carbide drills code key C6
Solid carbide drills overview C9-C78
Recommended cutting parameters for solid carbide drills C79-C86
Technical information for solid carbide drills C87-C93
Non-standard customization tools C94-C98

Indexable U drill C99-C129

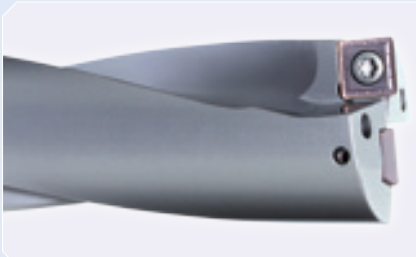
U drills code key C100
U drills overview C103-C121
U drills code key C122-C123
U drills inserts overview C124-C126
Technical information for U drills C127
Recommended cutting parameters for U drills C128-129

Interchangeable head drills C130-C143

Interchangeable head drills code key C131
Interchangeable head drill tool holders overview C132-C135
Interchangeable head drills overview C136-C140
Technical information for interchaneable head drills C141-C142
Recommended cutting parameters for interchaneable head drills C143







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	○	◎	○	◎	○	○		C9-C44	C79-C80
		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	○	◎	○	◎	○	○		C48-C51	C81
Guide hole drilling	Twist drill	**1534SP**		Internal cooling	Ø3-Ø14	○	◎	○	◎	○	○		C52-C53	C82
For soft steel, stainless steel	Twist drill	**1534ST03C**		Internal cooling	Ø3-Ø20	◎	○	◎			○		C55-C67	C83
		1536ST05C		Internal cooling	Ø3-Ø20	◎	○	◎			○			
		1736ST05C		Internal cooling	Ø3-Ø20	◎	○	◎			○			
For aluminum, cast iron	Twist drill	**1105SC03**		External cooling	Ø2-Ø16				◎	◎			C68-71	C83
		1101SC05		External cooling	Ø2-Ø16				◎	◎				
	Three flute drill	**1165PA03**		External cooling	Ø3-Ø20			○	◎	◎	○		C72-C75	C84
	Straight flute drill	**1576PC05**		External cooling	Ø4-Ø20				◎	◎			C76-C77	C85
		1579PC15C		Internal cooling	Ø5-Ø14				◎	◎				
	Centering drill	**1143SC90**		External cooling	Ø5-Ø20				◎	◎			C78	C86
		1143SC120		External cooling	Ø5-Ø20				◎	◎				
Indexable drills series	U drill	**ZSD 02/03/04/05**		Internal cooling	Ø12-Ø50	◎	◎	◎	◎	○	○		C103-C114	C130-C129
		ZTD 02/03/04/05		Internal cooling	Ø13-Ø50	◎	◎	○	◎	○			C118-C121	C130-C129
Interchangeable head drills drilling series	Interchangeable head drills	**ZTK 015/03/04/08**		Internal cooling	Ø12-Ø25	○	◎	○	◎	◎			C132-C135	C151

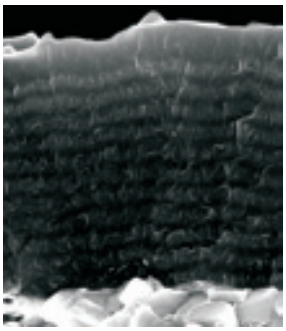
◎Very suitable ○Suitable

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



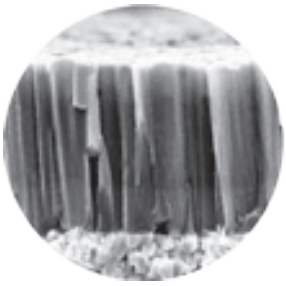
KDG3013



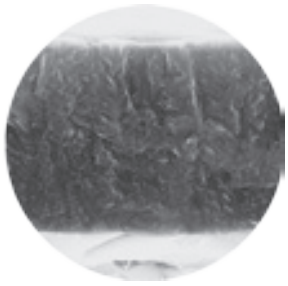
Conventional coating

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 ▶ Twist Drills for General Machining

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
SC	Twist drill for AL alloy and cast iron
PA	Three flute drill for AL alloy and cast iron
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		



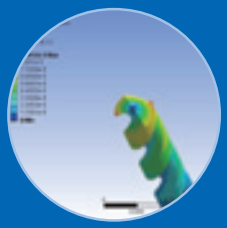
GD series
Twist Drills for General Machining

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.**



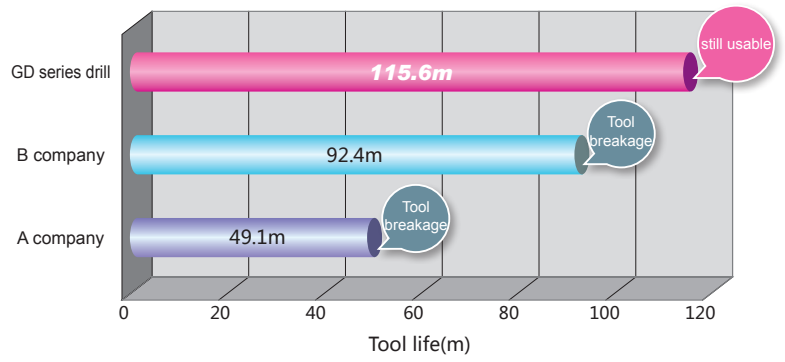
- **Professional after treatment for coating ensures low-resistance high-efficiency machining.**



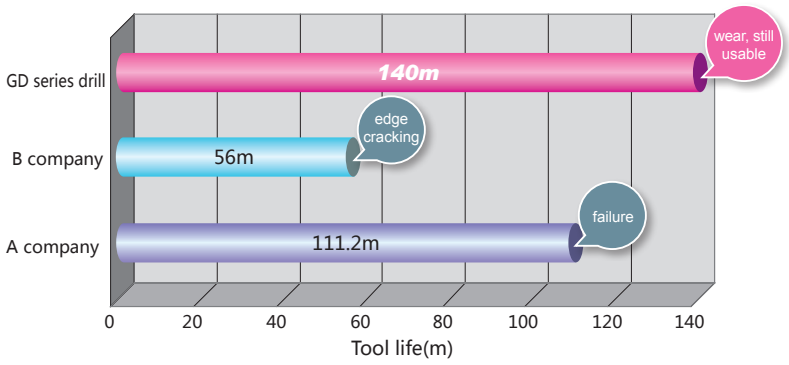
- **Double edge-line design for improved machining stability.**



Long and stable tool life



tool：GD05C-0560
workpiece material：C70S6(HRC30)
Vc=100m/min； f= 0.15mm/r； H=27mm
cooling system：water soluble cooling



tool：GD05C-1000
workpiece material：45#steel(HB180)
Vc=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)
Vc=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)
Vc=75m/min；f=0.2mm/r；H=30mm；
cooling system: water soluble cooling



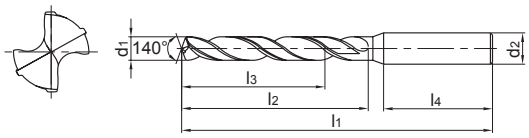
GD series drill



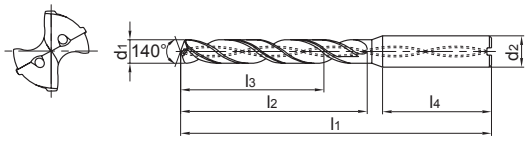
A company

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			●

● Stock available ○ Make-to-order

Applicable material table

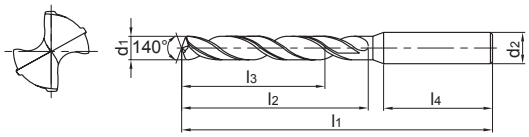
◎Very suitable ○Suitable

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	○	◎	◎			○	◎	◎			○

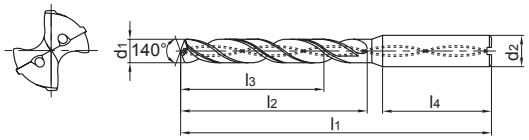
Code key C6
Cutting parameters C79–C80
Technical information C87–C93
Non-standard customization tools C94-C98

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			
2.35	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

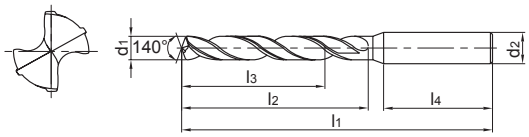
◎Very suitable ○Suitable

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	○	◎	◎			○	◎	◎			○

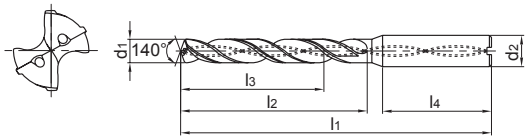
Code key C6
Cutting parameters C79–C80
Technical information C87–C93
Non-standard customization tools C94-C98

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			
3.3	3	External coolant	Straight shank	GD03-0330S	4	62	20	14	36	M4×0.7		●
	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	External coolant		GD03-0330	6	62	20	14	36			○
	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			○
3.4	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	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			GD08C-0340	6	72	34	29	36			○
3.5	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	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			○
3.6	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	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

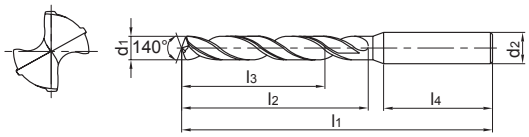
◎Very suitable ○Suitable

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	○	◎	◎			○	◎	◎			○

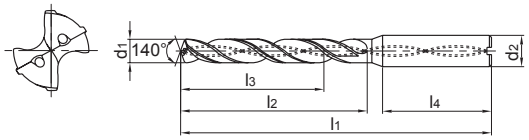
Code key C6 Cutting parameters C79–C80 Technical information C87–C93 Non-standard customization tools C94-C98

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			
3.9	3	External coolant	Straight shank	GD03-0390S	4	66	24	17	36	NO.10-24UNC		●
	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	External coolant		GD03-0390	6	66	24	17	36			○
	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			○
4.0	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			●
	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			GD08C-0400	6	81	43	36	36			○
4.1	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			○
	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			○
4.2	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			○
	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

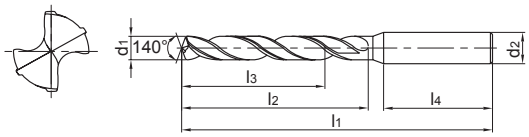
◎Very suitable ○Suitable

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	○	◎	◎			○	◎	◎			○

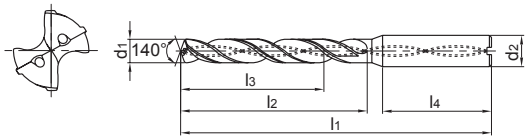
Code key C6 Cutting parameters C79–C80 Technical information C87–C93 Non-standard customization tools C94-C98

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

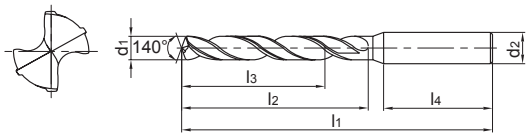
◎Very suitable ○Suitable

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	○	◎	◎			○	◎	◎			○

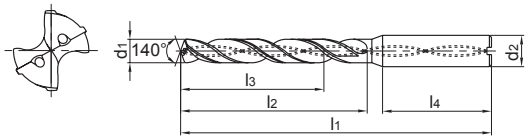
Code key C6
Cutting parameters C79–C80
Technical information C87–C93
Non-standard customization tools C94-C98

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

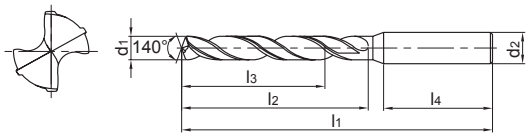
◎Very suitable ○Suitable

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	○	◎	◎			○	◎	◎			○

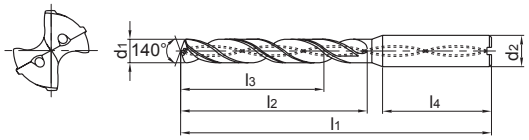
Code key C6
Cutting parameters C79–C80
Technical information C87–C93
Non-standard customization tools C94-C98

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

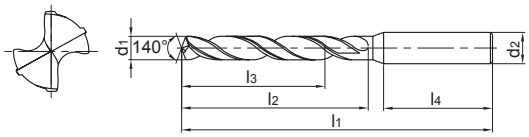
◎Very suitable ○Suitable

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	○	◎	◎			○	◎	◎			○

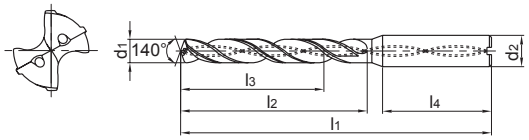
Code key C6
Cutting parameters C79–C80
Technical information C87–C93
Non-standard customization tools C94-C98

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			
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

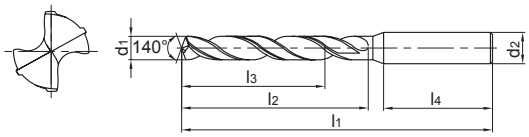
◎Very suitable ○Suitable

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	○	◎	◎			○	◎	◎			○

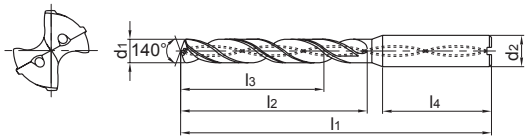
Code key C6 Cutting parameters C79–C80 Technical information C87–C93 Non-standard customization tools C94-C98

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

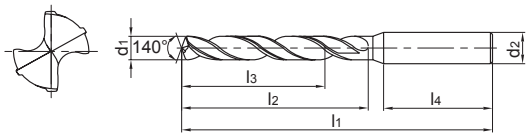
◎Very suitable ○Suitable

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	○	◎	◎			○	◎	◎			○

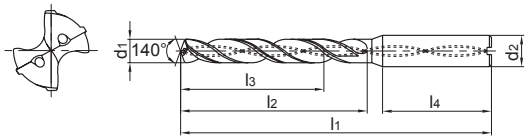
Code key C6 Cutting parameters C79–C80 Technical information C87–C93 Non-standard customization tools C94-C98

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

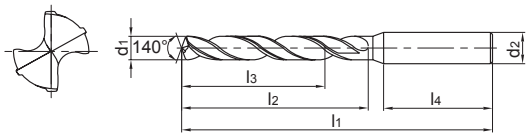
◎Very suitable ○Suitable

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	○	◎	◎			○	◎	◎			○

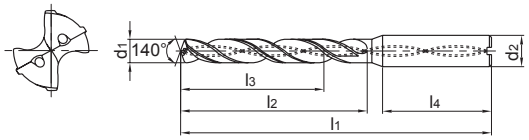
Code key C6
Cutting parameters C79–C80
Technical information C87–C93
Non-standard customization tools C94-C98

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		3/8-16UNC	○
	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			●
	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

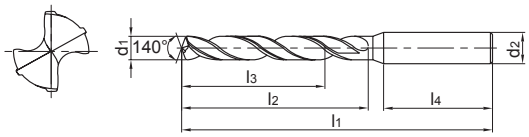
◎Very suitable ○Suitable

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	○	◎	◎			○	◎	◎			○

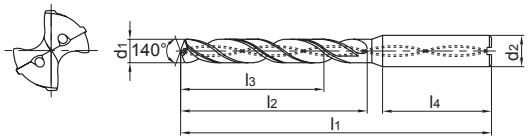
Code key C6 Cutting parameters C79–C80 Technical information C87–C93 Non-standard customization tools C94-C98

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

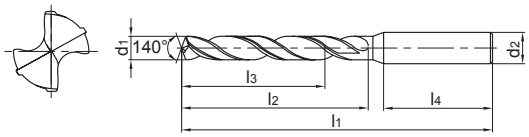
◎Very suitable ○Suitable

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	○	◎	◎			○	◎	◎			○

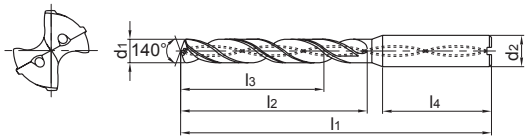
Code key C6 Cutting parameters C79–C80 Technical information C87–C93 Non-standard customization tools C94-C98

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		7/16-14UNC	○
	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			●
	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			
10.5	3	External coolant	Straight shank	GD03-1050S	11	102	55	40	45	M12×1.5	7/16-20UNF	○
	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			○
	3	External coolant		GD03-1050	12	102	55	40	45			●
	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			○
10.6	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			○
	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			GD08C-1060	12	162	114	99	45			○
10.7	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			○
	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			○
10.75	3	External coolant		GD03-1075S	11	102	55	40	45	M12×1.25		○
	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			○
	3	External coolant		GD03-1075	12	102	55	40	45			●
	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

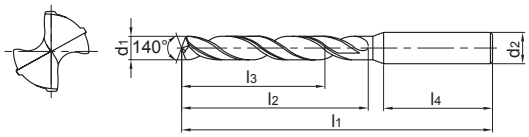
◎Very suitable ○Suitable

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	○	◎	◎			○	◎	◎			○

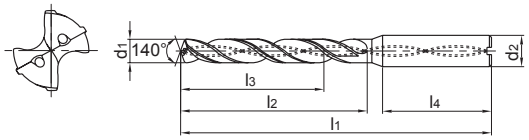
Code key C6
Cutting parameters C79–C80
Technical information C87–C93
Non-standard customization tools C94-C98

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			
10.8	3	External coolant	Straight shank	GD03-1080S	11	102	55	40	45	1/2-13UNC		○
	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			○
	3	External coolant		GD03-1080	12	102	55	40	45			●
	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			○
10.9	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			○
	3	External coolant		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			○
11.0	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			○
	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			●
	5			GD05-1135	12	118	71	56	45		M12×1.5	●
	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			●
	5			GD05-1145	12	118	71	56	45		M12×1.25	●
	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

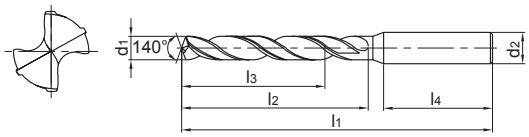
Grade	Workpiece material										
	Mild steel HB≤180	Carbon steel, Alloy steel	Pre-hardened steel, Hardened steel			Stainless steel	Cast iron	Nodular cast iron	Aluminum alloy	Copper alloy	Heat resistant alloy
			~40HRC	~50HRC	~60HRC						
KDG3013	○	◎	◎			○	◎	◎			○

Code key C6
Cutting parameters C79–C80
Technical information C87–C93
Non-standard customization tools C94-C98

GD series General machining

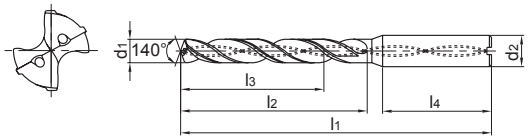


External coolant — Straight shank





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			●
	5			GD05-1180	12	118	71	56	45			●
	3	Internal coolant		GD03C-1180	12	102	55	40	45		1/2-13UNC	●
	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			●
	5			GD05-1200	12	118	71	56	45			●
	3	Internal coolant		GD03C-1200	12	102	55	40	45	M14×2		●
	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	M14×1.5		●
	5			GD05-1250	14	124	77	60	45			●
	3	Internal coolant		GD03C-1250	14	107	60	43	45			●
	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

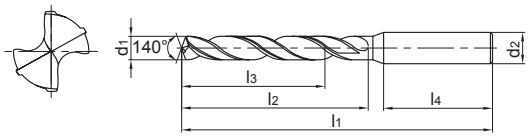
◎Very suitable ○Suitable

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	○	◎	◎			○	◎	◎			○

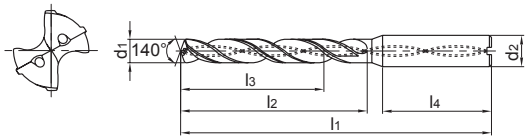
Code key C6
Cutting parameters C79–C80
Technical information C87–C93
Non-standard customization tools C94-C98

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

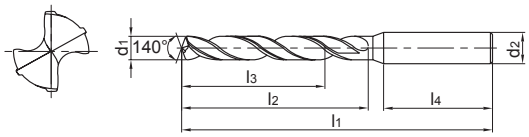
◎Very suitable ○Suitable

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	○	◎	◎			○	◎	◎			○

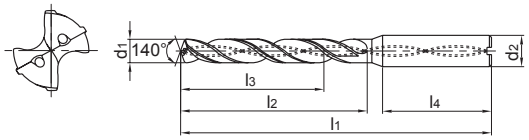
Code key C6
Cutting parameters C79–C80
Technical information C87–C93
Non-standard customization tools C94-C98

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	M18×2		●
	5			**GD05-1600**	16	133	83	63	48			●
	3	Internal coolant		**GD03C-1600**	16	115	65	45	48			●
	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

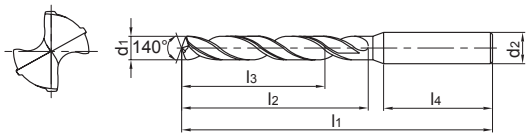
Grade	Workpiece material										
	Mild steel HB≤180	Carbon steel, Alloy steel	Pre-hardened steel, Hardened steel			Stainless steel	Cast iron	Nodular cast iron	Aluminum alloy	Copper alloy	Heat resistant alloy
			~40HRC	~50HRC	~60HRC						
KDG3013	○	◎	◎			○	◎	◎			○

Code key C6
Cutting parameters C79–C80
Technical information C87–C93
Non-standard customization tools C94-C98

GD series General machining

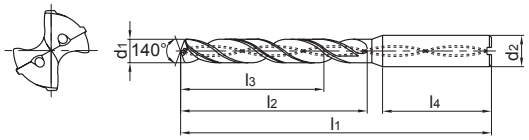


External coolant Straight shank





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

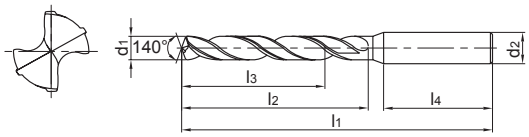
◎Very suitable ○Suitable

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	○	◎	◎			○	◎	◎			○

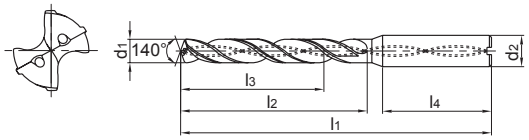
Code key C6 Cutting parameters C79–C80 Technical information C87–C93 Non-standard customization tools C94-C98

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

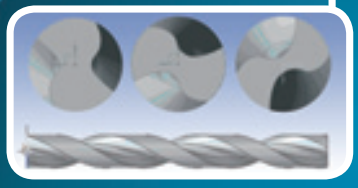
◎Very suitable ○Suitable

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 C79–C80 Technical information C87–C93 Non-standard customization tools C94-C98

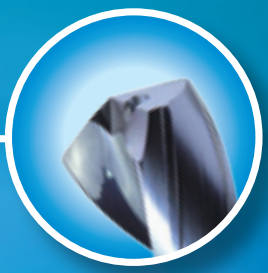
Achieving the optimization of tool structure through analysis of simulated cutting.





Design with change parameter helical flute, good rigidity and chip removal capability.

Double special guiding margin, more credible guiding and more stable machining.



Unique cutting edge design, good chip breaking capability even for sticky, softer materials, high versatility.



Special nano structure coating with better self lubricating capability and superb wear resistance.



1588SL series

deep hole twist drills

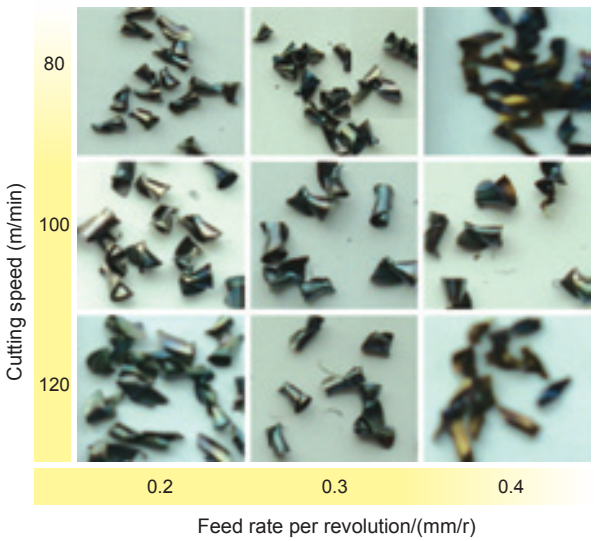
1588SL series deep hole twist drills

Outstandingly chip breaking capability



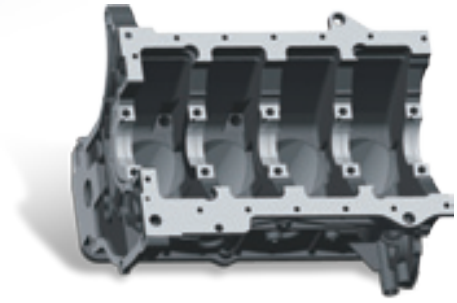


Work piece: crank shaft
Work piece material: 40Cr
Machining area: inclined oil hole
Tool type: 1588SL20C-0690/KDG303
Cutting parameters: V_c =80~120m/min
f_r=0.2~0.4mm/r
Cooling system: Water soluble liquid
Drilling depth: 105mm



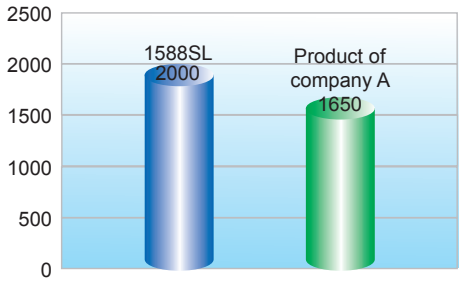
Good chip breaking capability and stable machining with different cutting speed and feed rate.

Extremely high efficiency and long tool life

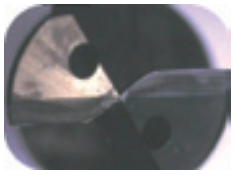


Work piece: cylinder
Work material: HT300
Machined area: crank shaft joint surface drilling
Drilling depth: 30mm
Tool type: 1588SL12C-0850/KDG303
Recommend parameters: Vc=80m/min f_r=0.2mm/r
Cooling system: water-soluble liquid

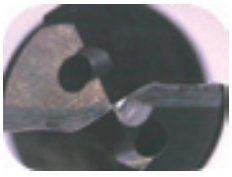
Comparison of tool life(number of machined holes)



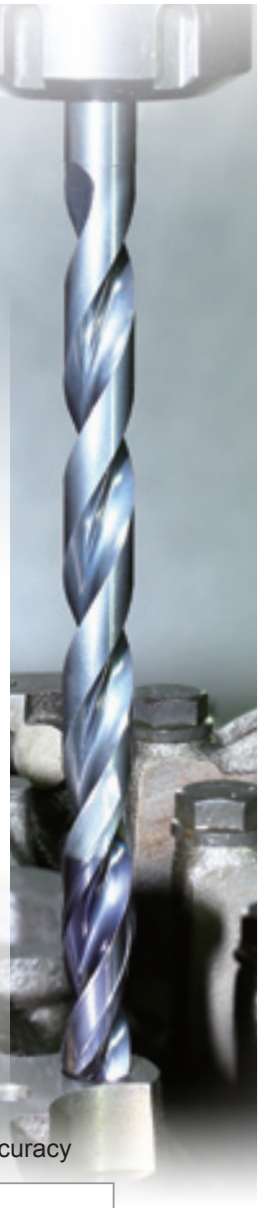
Comparison of tool life(tool wear)



1588SL(regular wear)

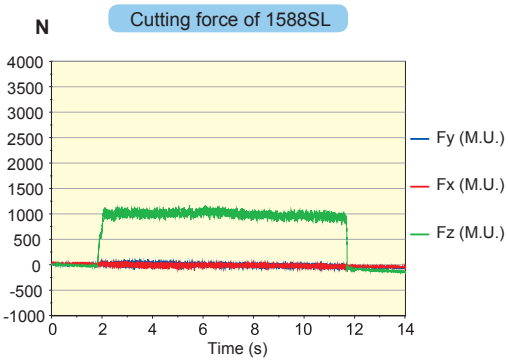


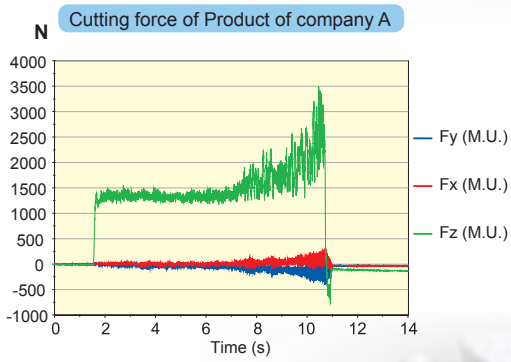
Product of company A(falling)



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



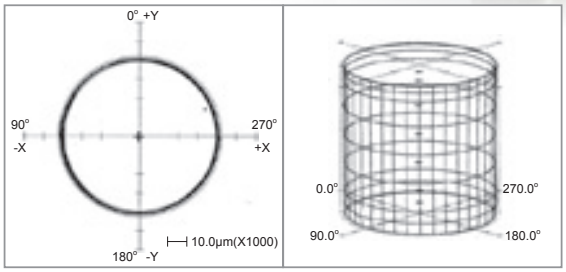


Stable machining precision

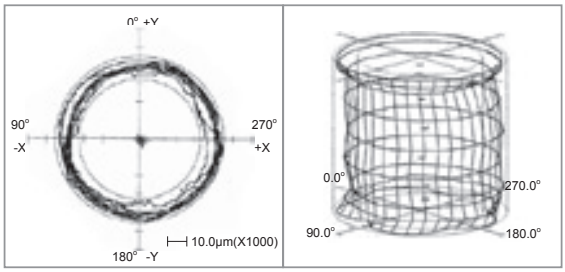


Workpiece: Die
Machined materials: 738H
Machined area: Hole of sidewall
Drilling depth: 70mm
Tool type: 1588SL12C-0600/KDG303
Recommended parameters: Vc=85m/min, f_r=0.2mm/r
Cooling system: Water-soluble liquid

Comparison of Machined Hole's Accuracy



1588SL

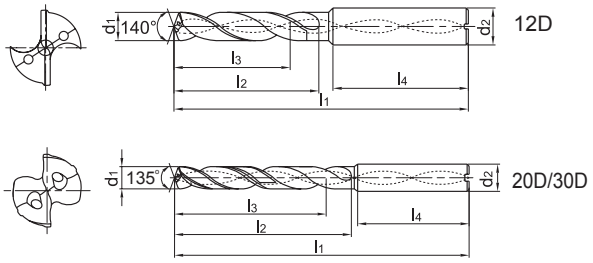


Product of company A

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
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

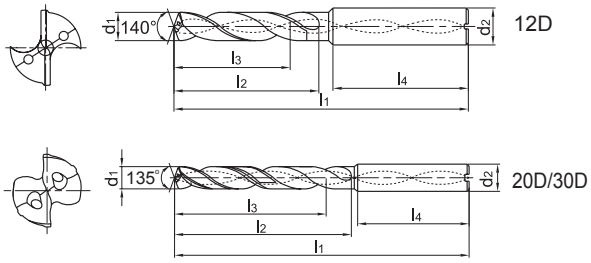
Grade	Workpiece material										
	Mild steel HB≤180	Carbon steel, Alloy steel	Pre-hardened steel, Hardened steel			Stainless steel	Cast iron	Nodular cast iron	Aluminum alloy	Copper alloy	Heat resistant alloy
			~40HRC	~50HRC	~60HRC						
KDG303	○	◎	◎			○	◎	◎	○		○

Code key C6
Cutting parameters C81
Technical information C80–C86
Non-standard customization tools C94-C98

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
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	○	◎	◎			○	◎	◎	○		○

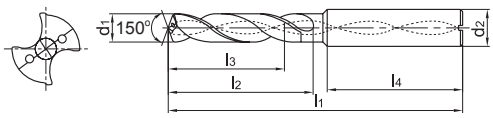
Code key C6
Cutting parameters C81
Technical information C80–C86
Non-standard customization tools C94-C98

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

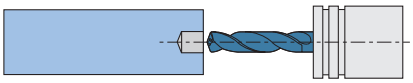
Drill diameter $d_1(h_7)$	Drilling depth (l/d)	Type	Basic dimension(mm)				
			Shank diameter	Overall length	Flute length	Recommended drilling depth	Shank length
			$d_2(h_5)$	l_1	l_2	l_3	l_4
6.63	3	**1534SP03C-0663**	8	79	34	24	36
6.73	3	**1534SP03C-0673**	8	79	34	24	36
6.83	3	**1534SP03C-0683**	8	79	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(h7)	Drilling depth (l/d)	Type	Basic dimension(mm)				
			Shank diameter	Overall length	Flute length	Recommended drilling depth	Shank length
			d_2(h5)	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(h7)	Drilling depth (l/d)	Type	Basic dimension(mm)				
			Shank diameter	Overall length	Flute length	Recommended drilling depth	Shank length
			d_2(h5)	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

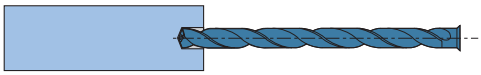
Recommended Machining Method of SL series Deep-hole Drills

1.Hole-guided Machining



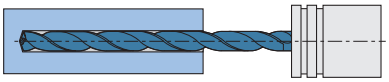
◆Apex angle of drills used for hole-guided machining has to be greater than the apex angle of deep-hole drills.
◆Diameter of drills used for hole-guided machining has to be respectively greater than the diameter of deep-hole drills. Generally the diameter range of deep-hole drills is between 0 and positive 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	○	◎	◎			○	◎	◎	○		○

Code key C6
Cutting parameters C82
Technical information C87–C93
Non-standard customization tools C94-C98

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.

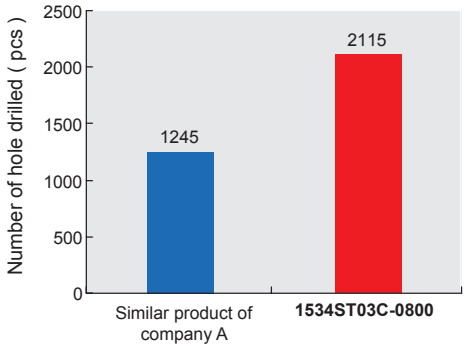
Nano-structured TiAlN coating, outstanding wear resistance and heat resistance.

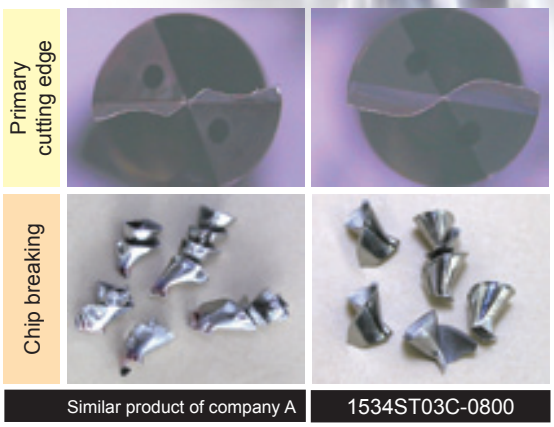
Special chipbreaker with large chip pocket ensures good chip evacuation and smooth drilling.



Application of st series twist drills

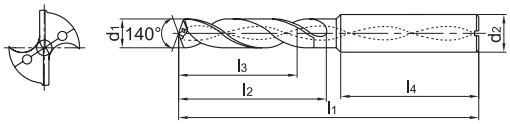
Tool type: 1534ST03C-0800
Workpiece material: 1Cr18Ni9Ti
Cooling system: oil water emulsion(internal cooling)
Cutting speed: Vc=85m/min
Feed rate: fr=0.16mm/r
Drilling depth: 24mm(blind hole)



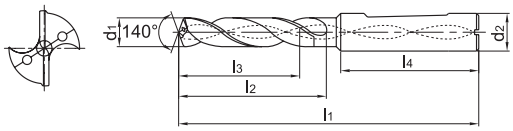


ST series for machining of soft steel, stainless steel


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

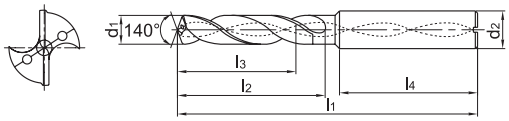
◎Very suitable ○Suitable

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	◎	○				◎					○

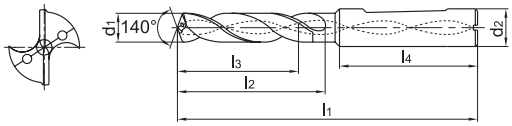
Code key C6 Cutting parameters C83 Technical information C87–C93 Non-standard customization tools C94-C98

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

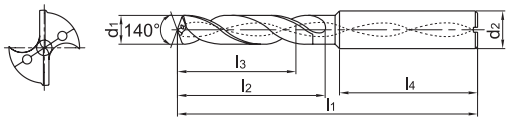
◎Very suitable ○Suitable

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	◎	○				◎					○

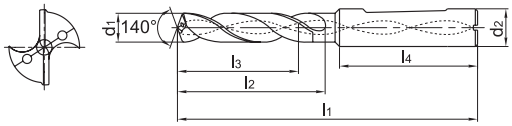
Code key C6
Cutting parameters C83
Technical information C87–C93
Non-standard customization tools C94-C98

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

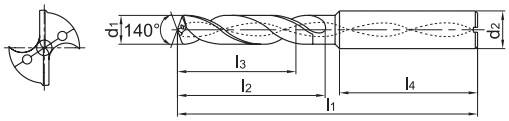
◎Very suitable ○Suitable

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	◎	○				◎					○

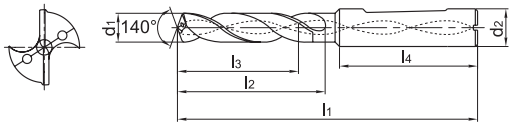
Code key C6
Cutting parameters C83
Technical information C87–C93
Non-standard customization tools C94-C98

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

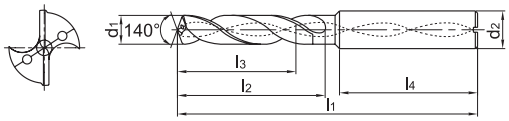
◎Very suitable ○Suitable

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	◎	○				◎					○

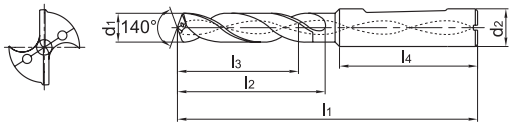
Code key C6
Cutting parameters C83
Technical information C87–C93
Non-standard customization tools C94-C98

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

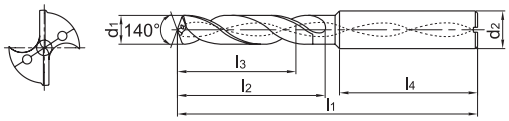
◎Very suitable ○Suitable

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	◎	○				◎					○

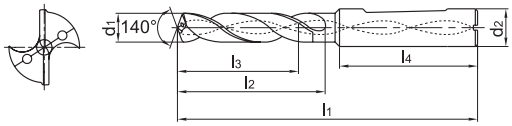
Code key C6
Cutting parameters C83
Technical information C87–C93
Non-standard customization tools C94-C98

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

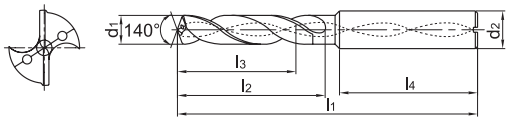
◎Very suitable ○Suitable

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	◎	○				◎					○

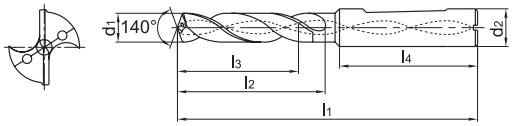
Code key C6
Cutting parameters C83
Technical information C87–C93
Non-standard customization tools C94-C98

ST series for machining of soft steel, stainless steel


Internal coolant Straight shank




Internal coolant Whistle notch shank



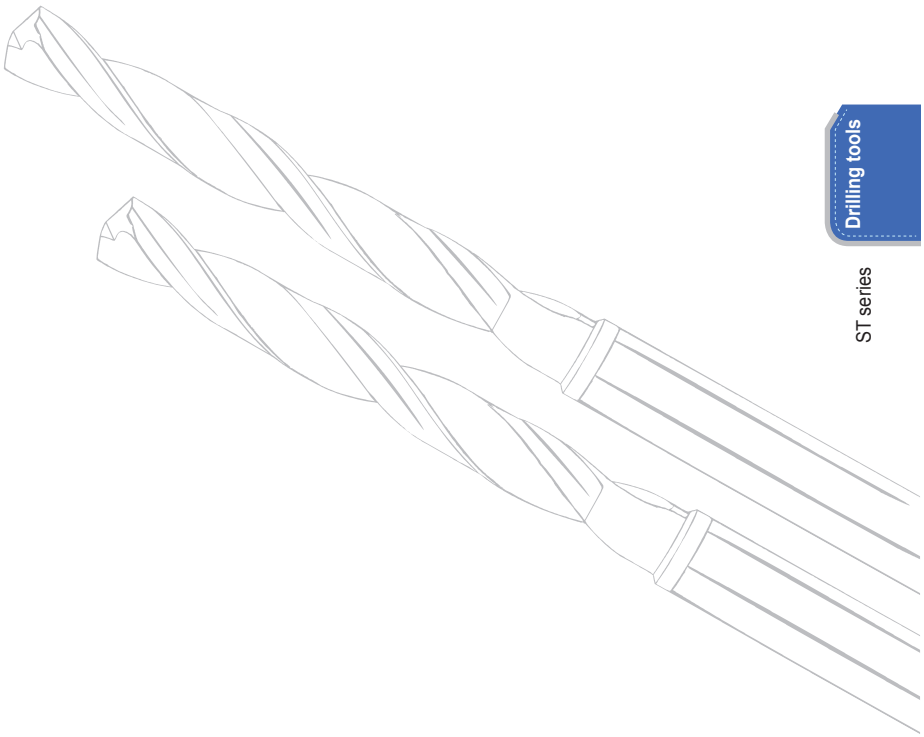
- First choice for drilling soft steel and stainless steel.
- Sharp cutting edge can avoid build--up edge, suitable for drilling hole with high performance.

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

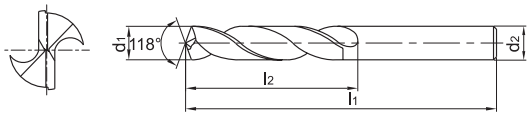
◎Very suitable ○Suitable

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 C83
Technical information C87–C93
Non-standard customization tools C94-C98

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

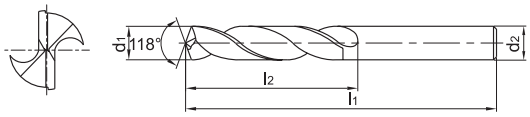
◎Very suitable ○Suitable

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 C83
Technical information C87–C93
Non-standard customization tools C94-C98

SC series(twist drill) for machining of cast iron, Al alloy


External coolant Straight shank



- 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 C83
Technical information C87–C93
Non-standard customization tools C94-C98

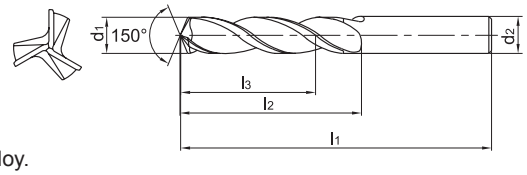
PA series(three flute drill) for maching of cast iron, AL alloy



External coolant



Straight shank



- Suitable for drilling solid workpieces such as cast iron and AL alloy.
- Three-flute construction for high feed rates and excellent centering capability.
- High machining reliability, suitable for harsh working conditions, such as intermittent cutting, etc.

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	Recommended drilling depth	KDG303	YK30F
					$d_2(h_7)$	l_1	l_2	l_3		
3.0	3	External coolant	Straight shank	**1165PA03-0300**	3.0	46	16	12	☆	☆
3.1	3			**1165PA03-0310**	3.1	49	18	14	☆	☆
3.2	3			**1165PA03-0320**	3.2	49	18	14	☆	☆
3.3	3			**1165PA03-0330**	3.3	49	18	14	☆	☆
3.4	3			**1165PA03-0340**	3.4	52	20	15	☆	☆
3.5	3			**1165PA03-0350**	3.5	52	20	15	☆	☆
3.6	3			**1165PA03-0360**	3.6	52	20	15	☆	☆
3.7	3			**1165PA03-0370**	3.7	52	20	15	☆	☆
3.8	3			**1165PA03-0380**	3.8	55	22	17	☆	☆
3.9	3			**1165PA03-0390**	3.9	55	22	17	☆	☆
4.0	3			**1165PA03-0400**	4.0	55	22	17	☆	☆
4.1	3			**1165PA03-0410**	4.1	55	22	17	☆	☆
4.2	3			**1165PA03-0420**	4.2	55	22	17	☆	☆
4.3	3			**1165PA03-0430**	4.3	58	24	18	☆	☆
4.4	3			**1165PA03-0440**	4.4	58	24	18	☆	☆
4.5	3			**1165PA03-0450**	4.5	58	24	18	☆	☆
4.6	3			**1165PA03-0460**	4.6	58	24	18	☆	☆
4.7	3			**1165PA03-0470**	4.7	58	24	18	☆	☆
4.8	3			**1165PA03-0480**	4.8	62	26	20	☆	☆
4.9	3			**1165PA03-0490**	4.9	62	26	20	☆	☆
5.0	3			**1165PA03-0500**	5.0	62	26	20	☆	☆
5.1	3			**1165PA03-0510**	5.1	62	26	20	☆	☆
5.2	3			**1165PA03-0520**	5.2	62	26	20	☆	☆
5.3	3			**1165PA03-0530**	5.3	62	26	20	☆	☆
5.4	3			**1165PA03-0540**	5.4	66	28	21	☆	☆
5.5	3			**1165PA03-0550**	5.5	66	28	21	☆	☆
5.6	3			**1165PA03-0560**	5.6	66	28	21	☆	☆
5.7	3			**1165PA03-0570**	5.7	66	28	21	☆	☆
5.8	3			**1165PA03-0580**	5.8	66	28	21	☆	☆

☆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	Recommended drilling depth	KDG303	YK30F
					$d_2(h_7)$	l_1	l_2	l_3		
5.9	3	External coolant	Straight shank	**1165PA03-0590**	5.9	66	28	21	☆	☆
6.0	3			**1165PA03-0600**	6.0	66	28	21	☆	☆
6.1	3			**1165PA03-0610**	6.1	70	31	23	☆	☆
6.2	3			**1165PA03-0620**	6.2	70	31	23	☆	☆
6.3	3			**1165PA03-0630**	6.3	70	31	23	☆	☆
6.4	3			**1165PA03-0640**	6.4	70	31	23	☆	☆
6.5	3			**1165PA03-0650**	6.5	70	31	23	☆	☆
6.6	3			**1165PA03-0660**	6.6	70	31	23	☆	☆
6.7	3			**1165PA03-0670**	6.7	70	31	23	☆	☆
6.8	3			**1165PA03-0680**	6.8	74	34	25	☆	☆
6.9	3			**1165PA03-0690**	6.9	74	34	25	☆	☆
7.0	3			**1165PA03-0700**	7.0	74	34	25	☆	☆
7.1	3			**1165PA03-0710**	7.1	74	34	25	☆	☆
7.2	3			**1165PA03-0720**	7.2	74	34	25	☆	☆
7.3	3			**1165PA03-0730**	7.3	74	34	25	☆	☆
7.4	3			**1165PA03-0740**	7.4	74	34	25	☆	☆
7.5	3			**1165PA03-0750**	7.5	74	34	25	☆	☆
7.6	3			**1165PA03-0760**	7.6	79	37	27	☆	☆
7.7	3			**1165PA03-0770**	7.7	79	37	27	☆	☆
7.8	3			**1165PA03-0780**	7.8	79	37	27	☆	☆
7.9	3			**1165PA03-0790**	7.9	79	37	27	☆	☆
8.0	3			**1165PA03-0800**	8.0	79	37	27	☆	☆
8.1	3			**1165PA03-0810**	8.1	79	37	27	☆	☆
8.2	3			**1165PA03-0820**	8.2	79	37	27	☆	☆
8.3	3			**1165PA03-0830**	8.3	79	37	27	☆	☆
8.4	3			**1165PA03-0840**	8.4	79	37	27	☆	☆
8.5	3			**1165PA03-0850**	8.5	79	37	27	☆	☆
8.6	3			**1165PA03-0860**	8.6	84	40	29	☆	☆
8.7	3			**1165PA03-0870**	8.7	84	40	29	☆	☆

☆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						○	◎	○	◎		○
YK30F						○	◎	○	◎		○

Code key C6
Cutting parameters C84
Technical information C87–C93
Non-standard customization tools C94-C98

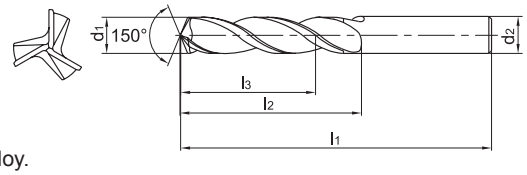
PA series(three flute drill) for maching of cast iron, AL alloy



External coolant



Straight shank



- Suitable for drilling solid workpieces such as cast iron and AL alloy.
- Three-flute construction for high feed rates and excellent centering capability.
- High machining reliability, suitable for harsh working conditions, such as intermittent cutting, etc.

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	Recommended drilling depth	KDG303	YK30F
					$d_2(h_7)$	l_1	l_2	l_3		
8.8	3	External coolant	Straight shank	**1165PA03-0880**	8.8	84	40	29	☆	☆
8.9	3			**1165PA03-0890**	8.9	84	40	29	☆	☆
9.0	3			**1165PA03-0900**	9.0	84	40	29	☆	☆
9.1	3			**1165PA03-0910**	9.1	84	40	29	☆	☆
9.2	3			**1165PA03-0920**	9.2	84	40	29	☆	☆
9.3	3			**1165PA03-0930**	9.3	84	40	29	☆	☆
9.4	3			**1165PA03-0940**	9.4	84	40	29	☆	☆
9.5	3			**1165PA03-0950**	9.5	84	40	29	☆	☆
9.6	3			**1165PA03-0960**	9.6	89	43	31	☆	☆
9.7	3			**1165PA03-0970**	9.7	89	43	31	☆	☆
9.8	3			**1165PA03-0980**	9.8	89	43	31	☆	☆
9.9	3			**1165PA03-0990**	9.9	89	43	31	☆	☆
10.0	3			**1165PA03-1000**	10.0	89	43	31	☆	☆
10.1	3			**1165PA03-1010**	10.1	89	43	31	☆	☆
10.2	3			**1165PA03-1020**	10.2	89	43	31	☆	☆
10.3	3			**1165PA03-1030**	10.3	89	43	31	☆	☆
10.5	3			**1165PA03-1050**	10.5	89	43	31	☆	☆
11.0	3			**1165PA03-1100**	11.0	95	47	33	☆	☆
11.2	3			**1165PA03-1120**	11.2	95	47	33	☆	☆
11.5	3			**1165PA03-1150**	11.5	95	47	33	☆	☆
11.8	3			**1165PA03-1180**	11.8	95	47	33	☆	☆
12.0	3			**1165PA03-1200**	12.0	102	51	35	☆	☆
12.1	3			**1165PA03-1210**	12.1	102	51	35	☆	☆
12.5	3			**1165PA03-1250**	12.5	102	51	35	☆	☆
13.0	3			**1165PA03-1300**	13.0	102	51	35	☆	☆
13.5	3			**1165PA03-1350**	13.5	107	54	37	☆	☆
14.0	3			**1165PA03-1400**	14.0	107	54	37	☆	☆
14.5	3			**1165PA03-1450**	14.5	111	56	38	☆	☆
15.0	3			**1165PA03-1500**	15.0	111	56	38	☆	☆

☆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	Recommended drilling depth	KDG303	YK30F
					$d_2(h_7)$	l_1	l_2	l_3		
15.5	3	External coolant	Straight shank	**1165PA03-1550**	15.5	115	58	38	☆	☆
16.0	3			**1165PA03-1600**	16.0	115	58	38	☆	☆
16.5	3			**1165PA03-1650**	16.5	119	60	39	☆	☆
17.0	3			**1165PA03-1700**	17.0	119	60	39	☆	☆
17.5	3			**1165PA03-1750**	17.5	123	62	40	☆	☆
18.0	3			**1165PA03-1800**	18.0	123	62	40	☆	☆
18.5	3			**1165PA03-1850**	18.5	127	64	41	☆	☆
19.0	3			**1165PA03-1900**	19.0	127	64	41	☆	☆
19.5	3			**1165PA03-1950**	19.5	131	66	42	☆	☆
20.0	3			**1165PA03-2000**	20.0	131	66	42	☆	☆

☆Recommended grade (produce according to order)

Applicable material table

◎Very suitable ○Suitable

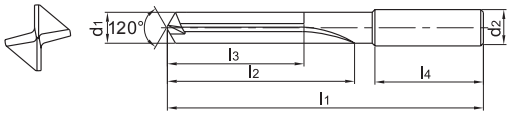
Grade	Workpiece material										
	Mild steel HB≤180	Carbon steel, Alloy steel	Pre-hardened steel, Hardened steel			Stainless steel	Cast iron	Nodular cast iron	Aluminum alloy	Copper alloy	Heat resistant alloy
			~40HRC	~50HRC	~60HRC						
KDG303						○	◎	○	◎		○
YK30F						○	◎	○	◎		○

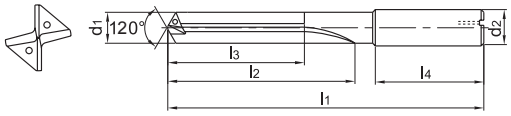
Code key C6
Cutting parameters C84
Technical information C87–C93
Non-standard customization tools C94-C98

PC series(straight flute drill) for machining of cast iron , Al alloy


External coolant Straight shank


Internal coolant Straight shank





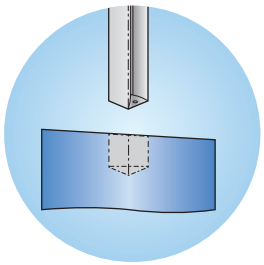
- For materials with short chips such as cast iron, silicon-aluminum alloy, etc.
- Excellent self centering capability, able to machine with high efficiency, the hole precision up to H7.
- High positional accuracy, high linearity and good surface finish can be obtained in the hole drilled.

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	☆

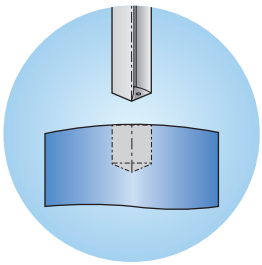
☆Recommended grade (produce according to order)

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	☆

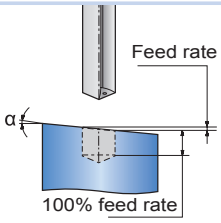
☆Recommended grade (produce according to order)



Inclined face drilling

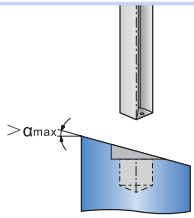


Curved face drilling



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

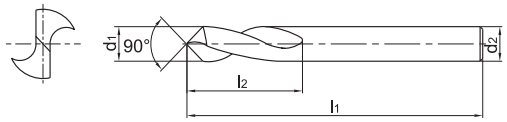
◎Very suitable ○Suitable

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							◎	○	◎		

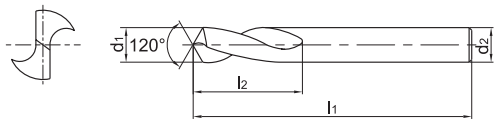
Code key C6
Cutting parameters C85
Technical information C87–C93
Non-standard customization tools C94-C98

SC series(centering drill) for machining of cast iron, AL alloy





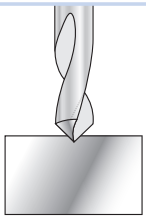


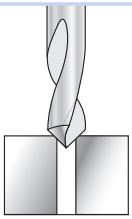


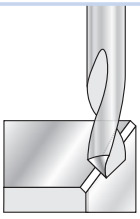
- Suitable for punching center holes and chamfering on CNC machines.
- Compared to conventional center drilling tools, centering drills are more stable and can be easily centered on sloping surfaces.

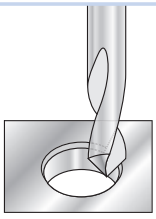
Drill diameter $d_1(m_7)$	Drilling depth (l/d)	Cooling mode	Shank type	Type	Basic dimension(mm)			Recommended grade
					Shank diameter	Overall length	Flute length	
					$d_2(h_6)$	l_1	l_2	YK20F
5	90°	External coolant	Straight shank	1143SC90-0500	5.00	62	10	☆
	120°			1143SC120-0500	5.00	62	10	☆
6	90°			1143SC90-0600	6.00	66	15	☆
	120°			1143SC120-0600	6.00	66	15	☆
8	90°			1143SC90-0800	8.00	79	17	☆
	120°			1143SC120-0800	8.00	79	17	☆
10	90°			1143SC90-1000	10.00	89	20	☆
	120°			1143SC120-1000	10.00	89	20	☆
12	90°			1143SC90-1200	12.00	102	25	☆
	120°			1143SC120-1200	12.00	102	25	☆
14	90°			1143SC90-1400	14.00	107	30	☆
	120°			1143SC120-1400	14.00	107	30	☆
16	90°			1143SC90-1600	16.00	115	35	☆
	120°			1143SC120-1600	16.00	115	35	☆
20	90°			1143SC90-2000	20.00	131	40	☆
	120°			1143SC120-2000	20.00	131	40	☆

☆Recommended grade (produce according to order)


Centering drilling machining


Hole chamfering machining


Chamfering machining


Hole chamfering machining

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 C86
Technical information C87–C93
Non-standard customization tools C94-C98

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		Heat resistant alloy	
Cutting speed	60~120m/min		60~120m/min		40~70m/min		25~40m/min		60~120m/min		50~100m/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)
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	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	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	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	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	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	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	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	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	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	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	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	320	0.16~0.28
25	1500	0.32~0.42	1500	0.32~0.42	900	0.32~0.42	700	0.17~0.32	1500	0.32~0.42	1100	0.32~0.42	250	0.17~0.3

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) 3D 5D

workpiece material	Mild steel HB≤180		Carbon steel, alloy steel ~30HRC		Pre-hardened steel ~40HRC		Stainless steel		Cast iron		Nodular cast iron		Heat resistant alloy	
Cutting speed	80~150m/min		80~150m/min		50~80m/min		50~80m/min		80~150m/min		60~120m/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)
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	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	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	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	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	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	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	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	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	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	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	320	0.16~0.28
25	1500	0.32~0.42	1500	0.32~0.42	900	0.32~0.42	700	0.17~0.32	1500	0.32~0.42	1100	0.32~0.42	250	0.17~0.3

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) 8D

Workpiece material	Mild steel HB≤180		Carbon steel, alloy steel ~30HRC		Pre-hardened steel ~40HRC		Stainless steel		Cast iron		Nodular cast iron		Heat resistant alloy	
Cutting speed	80~150m/min		80~150m/min		50~80m/min		40~60m/min		80~150m/min		60~120m/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)
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	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	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	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	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	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	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	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	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	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	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
16	2100	0.20~0.30	2100	0.20~0.30	1400	0.20~0.30	1050	0.14~0.25	2100	0.20~0.30	1800	0.20~0.30	2800	0.25~0.36	400	0.14~0.23
18	1800	0.22~0.32	1800	0.22~0.32	1200	0.22~0.32	950	0.15~0.28	1800	0.22~0.32	1600	0.22~0.32	2500	0.28~0.38	350	0.15~0.25
20	1600	0.25~0.35	1600	0.25~0.35	1100	0.25~0.35	800	0.16~0.30	1600	0.25~0.35	1400	0.25~0.35	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.

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	0.05~0.09
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.

SP series twist drills(internal coolant)

3D

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

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 cuting 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 3D.

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.

Recommended cutting parameters

PA series coated 3 flutes drill(external coolant) 3D

Workpiece material	Cast iron		Nodular cast iron		Silicon aluminium alloy Si≤10%		Silicon aluminium alloy Si>10%		Aluminum alloy		Heat resistant alloy	
Cutting speed	60~120m/min		50~100m/min		100~180m/min		80~140m/min		120~200m/min		20~40m/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)
3	9500	0.09~0.12	7400	0.09~0.12	14000	0.07~0.16	12700	0.07~0.16	16000	0.07~0.16	3200	0.03~0.06
4	7000	0.10~0.15	5600	0.10~0.15	10000	0.09~0.18	9600	0.09~0.18	12000	0.09~0.18	2400	0.04~0.07
5	5700	0.12~0.18	4500	0.12~0.18	9000	0.10~0.22	7600	0.10~0.22	10000	0.10~0.22	1900	0.05~0.09
6	4700	0.14~0.20	3700	0.14~0.20	7400	0.12~0.25	6400	0.12~0.25	8500	0.12~0.25	1600	0.06~0.11
8	3600	0.16~0.24	2800	0.16~0.24	5600	0.14~0.28	4800	0.14~0.28	6400	0.14~0.28	1200	0.08~0.14
10	2800	0.18~0.27	2200	0.18~0.27	4500	0.18~0.32	3800	0.18~0.32	5000	0.18~0.32	950	0.10~0.16
12	2400	0.20~0.30	1900	0.20~0.30	3700	0.22~0.36	3200	0.22~0.36	4200	0.22~0.36	800	0.12~0.18
14	2100	0.22~0.35	1600	0.22~0.35	3200	0.25~0.40	2700	0.25~0.40	3600	0.25~0.40	700	0.13~0.20
16	1800	0.25~0.36	1400	0.25~0.36	2800	0.27~0.44	2400	0.27~0.44	3200	0.27~0.44	600	0.14~0.23
18	1600	0.28~0.38	1200	0.28~0.38	2500	0.32~0.48	2100	0.32~0.48	2800	0.32~0.48	530	0.15~0.25
20	1400	0.30~0.40	1100	0.30~0.40	2300	0.36~0.54	1900	0.36~0.54	2550	0.36~0.54	480	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 cuting 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 3D.

PA series non-coated 3 flutes drill(external coolant) 3D

Workpiece material	Cast iron		Nodular cast iron		Silicon aluminium alloy Si≤10%		Silicon aluminium alloy Si>10%		Aluminum alloy		Heat resistant alloy	
Cutting speed	50~100m/min		40~70m/min		80~160m/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)
3	7400	0.09~0.12	5300	0.09~0.12	12700	0.07~0.16	10000	0.07~0.16	15000	0.07~0.16	2100	0.03~0.06
4	5600	0.10~0.15	4000	0.10~0.15	9600	0.09~0.18	8000	0.09~0.18	11000	0.09~0.18	1600	0.04~0.07
5	4500	0.12~0.18	3200	0.12~0.18	7600	0.10~0.22	6300	0.10~0.22	9000	0.10~0.22	1250	0.05~0.09
6	3700	0.14~0.20	2700	0.14~0.20	6400	0.12~0.25	5300	0.12~0.25	7400	0.12~0.25	1050	0.06~0.11
8	2800	0.16~0.24	2000	0.16~0.24	4800	0.14~0.28	4000	0.14~0.28	5600	0.14~0.28	800	0.08~0.14
10	2200	0.18~0.27	1600	0.18~0.27	3800	0.18~0.32	3200	0.18~0.32	4500	0.18~0.32	600	0.10~0.16
12	1900	0.20~0.30	1300	0.20~0.30	3200	0.22~0.36	2700	0.22~0.36	3700	0.22~0.36	500	0.12~0.18
14	1600	0.22~0.35	1100	0.22~0.35	2700	0.25~0.40	2300	0.25~0.40	3200	0.25~0.40	450	0.13~0.20
16	1400	0.25~0.36	1000	0.25~0.36	2400	0.27~0.44	2000	0.27~0.44	2800	0.27~0.44	400	0.14~0.23
18	1200	0.28~0.38	880	0.28~0.38	2100	0.32~0.48	1800	0.32~0.48	2500	0.32~0.48	350	0.15~0.25
20	1100	0.30~0.40	800	0.30~0.40	1900	0.36~0.54	1600	0.36~0.54	2300	0.36~0.54	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 cuting 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 3D.

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.

SC series centering drill(external coolant)

Centering drilling

Workpiece material	Cast iron		Nodular cast iron		Silicon aluminium alloy				Aluminum alloy	
					Si≤10%		Si＞10%			
Cutting speed	60~120m/min		50~100m/min		100~180m/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)
5	6400	0.09~0.14	5100	0.09~0.14	9000	0.12~0.25	7600	0.12~0.25	10000	0.12~0.25
6	5300	0.12~0.16	4200	0.12~0.16	7400	0.14~0.28	6400	0.14~0.28	8500	0.14~0.28
8	4000	0.13~0.20	3200	0.13~0.20	5600	0.18~0.32	4800	0.18~0.32	6400	0.18~0.32
10	3200	0.17~0.25	2500	0.17~0.25	4500	0.22~0.36	3800	0.22~0.36	5000	0.22~0.36
12	2700	0.20~0.30	2100	0.20~0.30	3700	0.25~0.40	3200	0.25~0.40	4200	0.25~0.40
14	2400	0.22~0.32	1800	0.22~0.32	3200	0.27~0.44	2700	0.27~0.44	3600	0.27~0.44
16	2000	0.24~0.34	1600	0.24~0.34	2800	0.32~0.48	2400	0.32~0.48	3200	0.32~0.48
20	1600	0.28~0. 40	1300	0.28~0. 40	2300	0.40~0.60	1900	0.40~0.60	2550	0.40~0.60

1. The cutting datas above are suitable for centering drilling machining.
2. 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 cuting conditions become stable, gradually increase the cutting speed and feed rate.
3. The cutting conditions above are applicable for drilling with emulsion.
4. When centering on bevels and toroidal surfaces, please reduce the feed speed.
5. When clamping drill, please use a collet without any defect or dust, and keep the radial run-out of drill under 0.02mm.

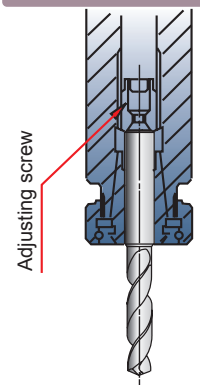
Chamfering

Workpiece material	Cast iron		Nodular cast iron		Silicon aluminium alloy				Aluminum alloy	
					Si≤10%		Si＞10%			
Cutting speed	90~180m/min		70~150m/min		150~270m/min		120~210m/min		180~300m/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	9600	0.09~0.20	7600	0.09~0.20	13500	0.12~0.30	11500	0.12~0.30	15000	0.12~0.30
6	8000	0.12~0.22	6400	0.12~0.22	11100	0.14~0.34	9600	0.14~0.34	12700	0.14~0.34
8	6000	0.13~0.28	4800	0.13~0.28	8400	0.18~0.40	7200	0.18~0.40	9600	0.18~0.40
10	4800	0.17~0.32	3800	0.17~0.32	6800	0.22~0.44	5700	0.22~0.44	7600	0.22~0.44
12	4000	0.20~0.38	3200	0.20~0.38	5600	0.25~0.50	4800	0.25~0.50	6400	0.25~0.50
14	3600	0.22~0.42	2700	0.22~0.42	4800	0.27~0.56	4000	0.27~0.56	5400	0.27~0.56
16	3000	0.24~0.46	2400	0.24~0.46	4200	0.32~0.60	3600	0.32~0.60	4800	0.32~0.60
20	2400	0.28~0.58	1900	0.28~0.58	3500	0.40~0.76	2850	0.40~0.76	3800	0.40~0.76

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 cuting conditions become stable, gradually increase the cutting speed and feed rate.
2. The cutting datas above are suitable for chamfering machining.
3. The cutting conditions above are applicable for drilling with emulsion.
4. When clamping drill, please use a collet without any defect or dust, and keep the radial run-out of drill under 0.02mm.

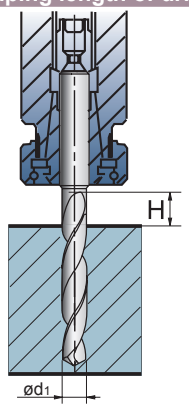
Application guide of drills

Drill clampling



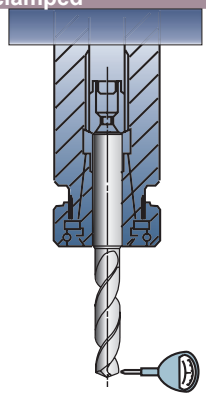
Guarantee tight clamping by using thrust bearing type collet chuck.

How to define the clamping length of drill



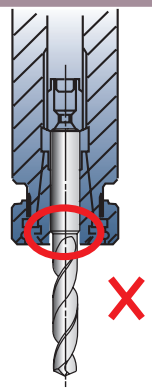
Ensure the size of H is over 1.5d1

Radial run-out of drill clamped



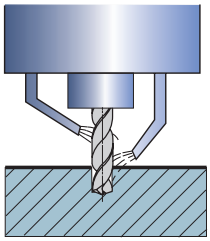
The Radial Run-out should be under 0.02mm.

Wrong drill clamping



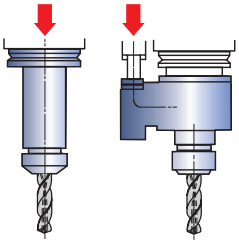
Do not clamp on the drill flutes.

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 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.

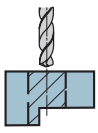
Cautions on coolant use

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.

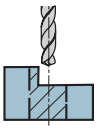
②Dirt and dust particles will adhere to the oil hole and lead to unsmooth coolant flow. Coolant change as early as possible is recommended.

Cautions on interrupted cutting



Can be drilled

Reduce the feed rate when drilling interrupted part.



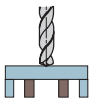
Pre-machining prior to drilling

Countersink with end mill prior to drilling.

Correct method for thin workpiece

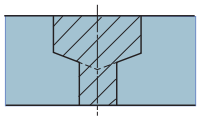


Bending occurs



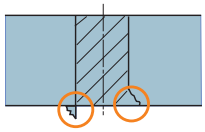
Add a supporter

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.

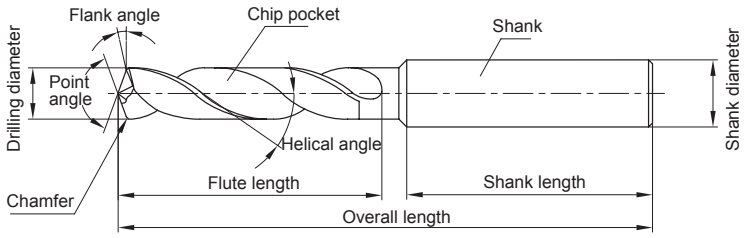
Burrs and workpiece chippings on exit

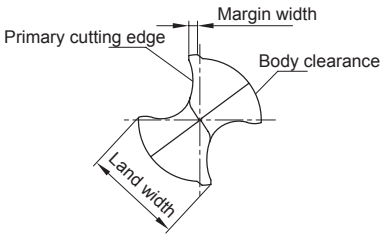


①Reduce the feed rate when approaching the exit.
②Machine chamfers at the point of exit.
③Change the point angle.

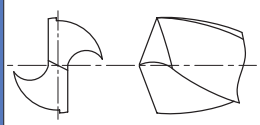
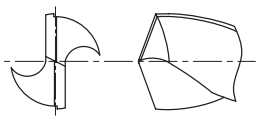
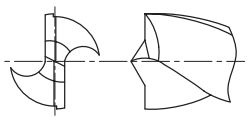
Parts terminology of drill

Terminology of drill





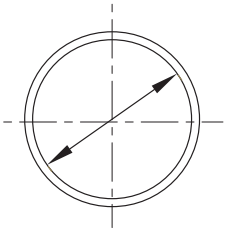
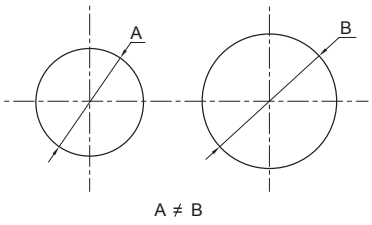
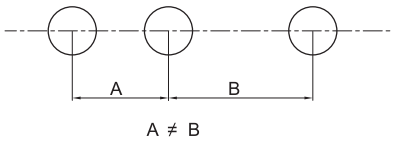
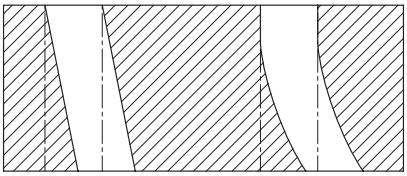
Representative cutting edge shapes

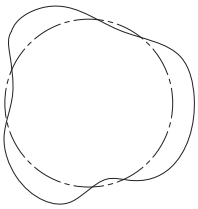
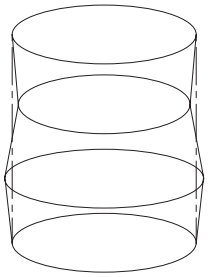
Shape	 (Conical)	 (Dual face)	 (Candler)
Features	● The flank face is conical and the clearance angel increases toward the center of drill. ● Wide applications, commonly used for both soft and hard materials	● Flank face with dual flats to facilitate cutting and initial entering. ● Often used for small-diameter 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

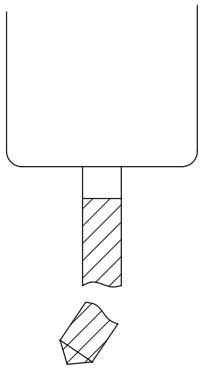
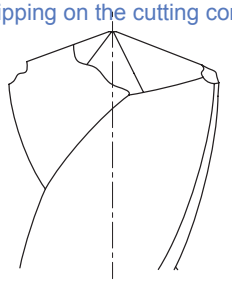
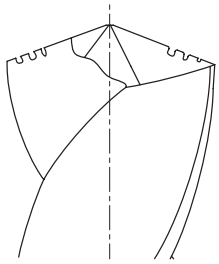
Chip pocket	The function of chip pocket is to remove the chips out of the hole. The larger the cross-sectional area is, the easier for chips to be evacuated.
Helical angle	The helical angle is the inclined angle of flute at the axial direction of a drill. It varies according to the different position 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.

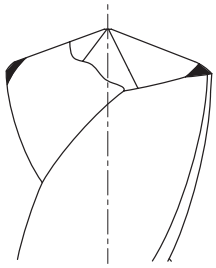
Common problems and solutions for drilling

	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

	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

	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

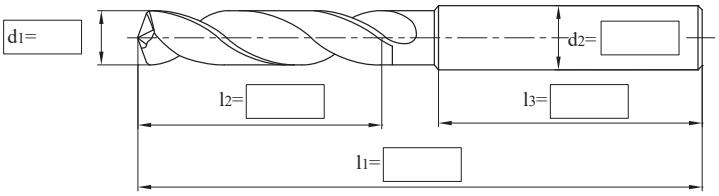
Company name： Fax： Tel： E-MAIL：	ZCC-CT Huanghe Southern Road, Tianyuan Zone, Zhuzhou. Hunan province Fax：0731-22882721 22885420 22887878 Zip code：412007 E-mail:zccct@zccct.com

When the diameter specification or length specification on the catalog does not meet your needs, we provide more professional, more precise non-standard customization, you just need to easily choose the series you need.

Diameter Range	External coolant	Ø2.0～Ø20.0mm
	Internal coolant	Ø3.0～Ø20.0mm

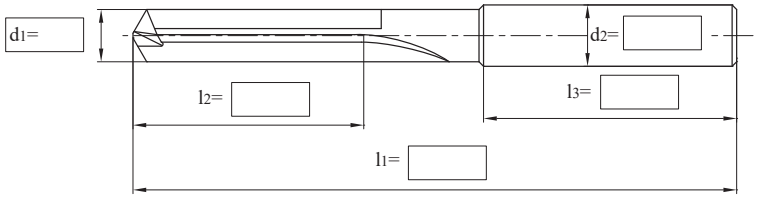
Coolant type
☐ External coolant
☐ Internal coolant

A. Twist drill



Twist drill bit series selection	
☐ GD series	☐ ST series
☐ SL series	☐ SC series

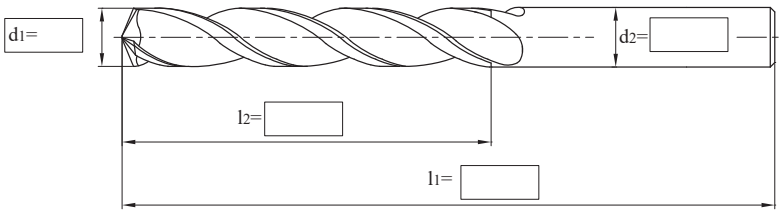
B. Straight groove drill



Straight groove drill bit series selection：

☐ PC series

C. Three flute drill



Three flute drill bit series selection：

☐ PA series

Note：

Order Quantity：	PCS	Expected delivery date：
Quotation：		Confirmation：
		Date：

Company name:	ZCC-CT
Fax:	Huanghe Southern Road, Tianyuan Zone, Zhuzhou. Hunan province
Tel:	Fax: 0731-22882721 22885420 22887878
E-MAIL:	Zip code: 412007 E-mail:zccct@zccct.com

Hole information and workpiece material

Size of processed hole= mm

Tolerance of processed hole=

Depth of processed hole= mm

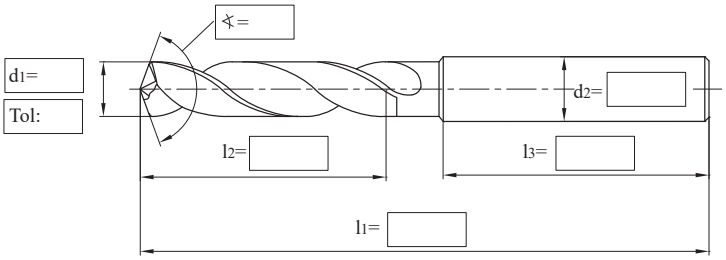
☐ Carbon Steel
☐ Alloy Steel
☐ Pre-hardened steel
☐ Hardened steel
☐ Stainless Steel
☐ Grey cast iron
☐ Ductile Iron
☐ Copper Alloy
☐ Aluminum alloy
☐ Titanium alloy
☐ Heat-resistant alloys

Material grade to be processed:

Tensile strength= N/mm^2

Hardness= Units:(HRC,HB,etc.)

Tool Information



Coolant type	
Internal coolant	
External coolant	

Coating	
Coated	☐
Non-Coated	☐

DIN6535 Shank form

☐ Form HA
☐ Form HB
☐ Form HE
☐ Ordinary straight handle
☐ With flat tail handle DIN 1809
☐ Morse Taper Shank MT ☐
Special shapes

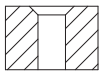
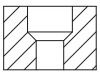
Note:

Order Quantity:	PCS	Expected delivery date:
Quotation:		Confirmation:
		Date:

Special non-standard tool customization(step twist drill)

Company name:	ZCC-CT
Fax:	Huanghe Southern Road, Tianyuan Zone, Zhuzhou. Hunan province
Tel:	Fax: 0731-22882721 22885420 22887878
E-MAIL:	Zip code: 412007 E-mail:zccct@zccct.com

Hole information and workpiece material

Hole shape to be machined: ☐  ☐ 

Small hole size= ☐ mm

Small hole tolerance= ☐

Large hole size= ☐ mm

Large hole tolerance= ☐

Depth of hole to be machined= ☐ mm

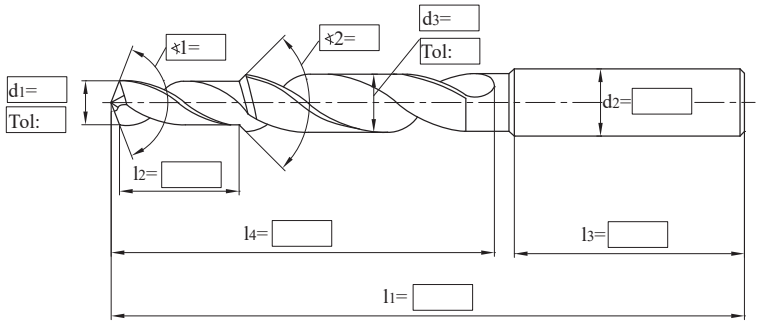
☐ Carbon Steel
☐ Alloy Steel
☐ Pre-hardened steel
☐ Hardened steel
☐ Stainless Steel
☐ Grey cast iron
☐ Ductile Iron
☐ Copper Alloy
☐ Aluminum alloy
☐ Titanium alloy
☐ Heat-resistant alloys

Material grade to be processed: ☐

Tensile strength= ☐ N/mm^2

Hardness= ☐ Units:(HRC,HB,etc.)

Tool Information



Coolant type	
Internal coolant	
External coolant	

Coating	
Coated	☐
Non-Coated	☐

Shank form

DIN6535

☐ Form HA
☐ Form HB
☐ Form HE
☐ Ordinary straight handle
☐ With flat tail handle DIN1809
☐ Morse Taper Shank MT ☐
Special shapes

Note:

Order Quantity: PCS	Expected delivery date:
Quotation:	Confirmation:
	Date:

Special non-standard tool customization(stepped straight groove drill)

Company name:	ZCC-CT
Fax:	Huanghe Southern Road, Tianyuan Zone, Zhuzhou. Hunan province
Tel:	Fax: 0731-22882721 22885420 22887878
E-MAIL:	Zip code: 412007 E-mail:zccct@zccct.com

Hole information and workpiece material

Size of processed hole= mm

Tolerance of processed hole=

Depth of processed hole= mm

Straight groove drills are widely used for cutting short cutting materials, from cast iron, common aluminum alloys, to high silicon aluminum alloys.

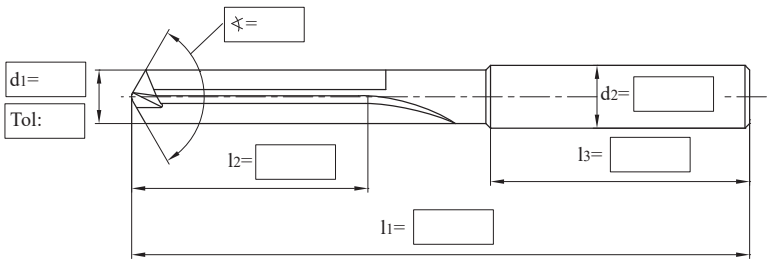
- ☐ Grey cast iron
- ☐ Ductile Iron
- ☐ Aluminum alloy
- ☐ Silicon Aluminum Alloy Si<10%
- ☐ Silicon Aluminum Alloy Si≥10%

Material grade to be processed:

Tensile strength= N/mm^2

Hardness= Units:(HRC,HB,etc.)

Tool Information



Coolant type	
Internal coolant	
External coolant	

Coating	
Coated	☐
Non-Coated	☐

Shank form	
DIN6535	☐ Form HA
	☐ Form HB
	☐ Form HE
☐ Ordinary straight handle	
☐ With flat tail handle DIN 1809	
☐ Morse Taper Shank MT☐	
Special shapes	

Note:

Order Quantity:	PCS	Expected delivery date:
Quotation:		Confirmation:
		Date:

Special non-standard tool customization(stepped straight groove drill)

Company name:	ZCC-CT Huanghe Southern Road, Tianyuan Zone, Zhuzhou. Hunan province
Fax:	Fax: 0731-22882721 22885420 22887878
Tel:	Zip code: 412007 E-mail:zccct@zccct.com
E-MAIL:	

Hole information and workpiece material

Hole shape to be machined: ☐ ☐

Small hole size= mm

Small hole tolerance=

Large hole size= mm

Large hole tolerance=

Depth of hole to be machined= mm

Straight groove drills are widely used for cutting short cutting materials, from cast iron, common aluminum alloys, to high silicon aluminum alloys.

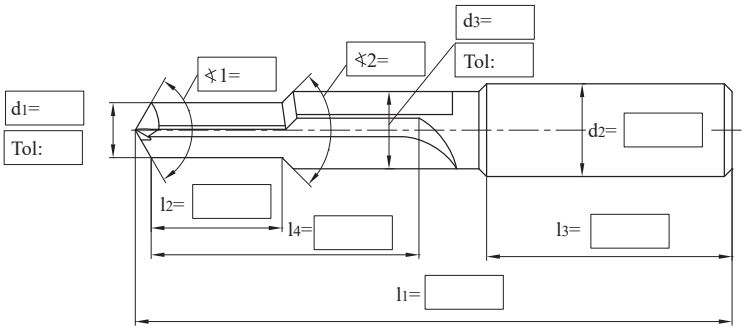
☐ Grey cast iron
☐ Ductile Iron
☐ Aluminum alloy
☐ Silicon Aluminum Alloy Si<10%
☐ Silicon Aluminum Alloy Si≥10%

Material grade to be processed:

Tensile strength= N/mm²

Hardness= Units:(HRC,HB,etc.)

Tool Information



DIN6535

Shank form

☐ Form HA
☐ Form HB
☐ Form HE
☐ Ordinary straight handle
☐ With flat tail handle DIN 1809
☐ Morse Taper Shank MT ☐
Special shapes

Coolant type	
Internal coolant	
External coolant	

Coating	
Coated	☐
Non-Coated	☐

Note:

Order Quantity:	PCS	Expected delivery date:
Quotation:		Confirmation:
		Date:

How to choose the right U drills

Shape

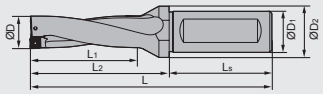
Product category

Inserts specification
Including type, dimension, grade and stock.

Indexable shallow drills ZSD02 2D

3D





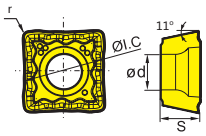
Type	Stock	Basic dimension(mm)							Applicable inserts	Insert screw	Wrench
		ØD	ØD1	ØD2	L1	L2	Ls	L			
ZSD02-120-XP20-SP04-02	▲	12.0	20	25	27	44	50	94	SPMX040203-XM/LM/EM/XR	I60M1.8×4	WT05IP
ZSD02-125-XP20-SP04-02	▲	12.5	20	25	28	45	50	95	SPMX040203-XM/LM/EM/XR	I60M1.8×4	WT05IP
ZSD02-130-XP20-SP04-02	▲	13.0	20	25	29	46	50	96	SPMX040203-XM/LM/EM/XR	I60M1.8×4	WT05IP
ZSD02-135-XP20-SP04-02	▲	13.5	20	25	30	47	50	97	SPMX040203-XM/LM/EM/XR	I60M1.8×4	WT05IP
ZSD02-140-XP20-SP04-02	▲	14.0	20	25	31	48	50	98	SPMX040203-XM/LM/EM/XR	I60M1.8×4	WT05IP
ZSD02-145-XP20-SP04-02	▲	14.5	20	25	32	49	50	99	SPMX040203-XM/LM/EM/XR	I60M1.8×4	WT05IP
ZSD02-150-XP20-SP05-02	▲	15.0	20	25	33	50	50	100	SPMX050204-XM/LM/EM/XR	I60M2×4.3	WT06P
ZSD02-155-XP20-SP05-02	▲	15.5	20	25	34	51	50	101	SPMX050204-XM/LM/EM/XR	I60M2×4.3	WT06P
ZSD02-160-XP20-SP05-02	▲	16.0	20	25	35	52	50	102	SPMX050204-XM/LM/EM/XR	I60M2×4.3	WT06P
ZSD02-165-XP20-SP05-02	▲	16.5	20	25	36	53	50	103	SPMX050204-XM/LM/EM/XR	I60M2×4.3	WT06P
ZSD02-170-XP20-SP05-02	▲	17.0	20	25	37	54	50	104	SPMX050204-XM/LM/EM/XR	I60M2×4.3	WT06P
ZSD02-175-XP20-SP05-02	▲	17.5	20	25	38	55	50	105	SPMX050204-XM/LM/EM/XR	I60M2×4.3	WT06P
ZSD02-180-XP25-SP06-02	▲	18.0	25	32	39	57	56	113	SPMX060204-XM/LM/EM/XR	I60M2.2×5.5	WT07IP
ZSD02-185-XP25-SP06-02	▲	18.5	25	32	40	58	56	114	SPMX060204-XM/LM/EM/XR	I60M2.2×5.5	WT07IP
ZSD02-190-XP25-SP06-02	▲	19.0	25	32	41	59	56	115	SPMX060204-XM/LM/EM/XR	I60M2.2×5.5	WT07IP
ZSD02-195-XP25-SP06-02	▲	19.5	25	32	42	60	56	116	SPMX060204-XM/LM/EM/XR	I60M2.2×5.5	WT07IP
ZSD02-200-XP25-SP06-02	▲	20.0	25	32	43	61	56	117	SPMX060204-XM/LM/EM/XR	I60M2.2×5.5	WT07IP
ZSD02-205-XP25-SP06-02	▲	20.5	25	32	44	62	56	118	SPMX060204-XM/LM/EM/XR	I60M2.2×5.5	WT07IP

▲Stock available △Make-to-order

ZSD applicable inserts

-EM





Type	Basic dimension(mm)				CVD grade	PVD grade		
	ØI.C	s	ød	r	YB6338(Peripheral edge)	YBM215(Inner/peripheral edge)	YBS203(Inner/peripheral edge)	YB9320(Inner/peripheral edge)
SPMX040203-EM	4.0	2.38	2.2	0.3	★	●	●	★
SPMX050204-EM	5.0	2.38	2.2	0.4	★	●	●	★
SPMX060204-EM	6.0	2.38	2.5	0.4	★	●	●	★
SPMX07T308-EM	7.94	3.97	2.8	0.8	★	●	●	★
SPMX090408-EM	9.8	4.3	4.1	0.8	★	●	●	★
SPMX110408-EM	11.5	4.76	4.4	0.8	★	●	●	★
SPMX140512-EM	14.3	5.2	5.5	1.2	★	●	●	★

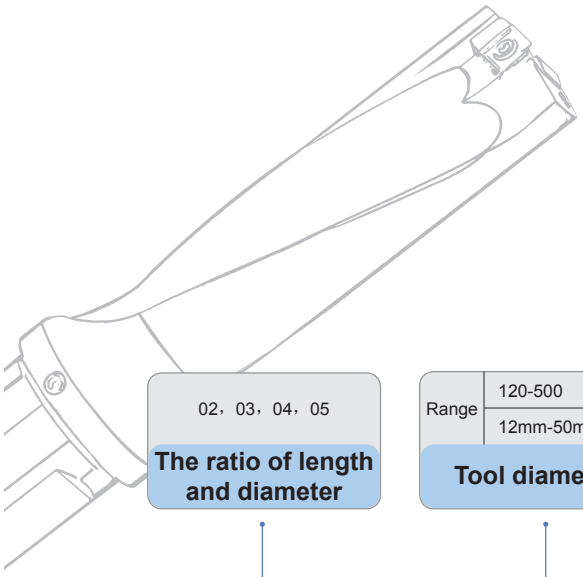
★ Recommended grade (always stock available) ● Available grade (always stock available) ○ Make-to-order

Shape

Product category

Inserts specification
Including type, dimension, grade and stock.

U drills code key



The ratio of length and diameter
02，03，04，05

Tool diameter	
Range	120-500
	12mm-50mm

Insert shape	
W	
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

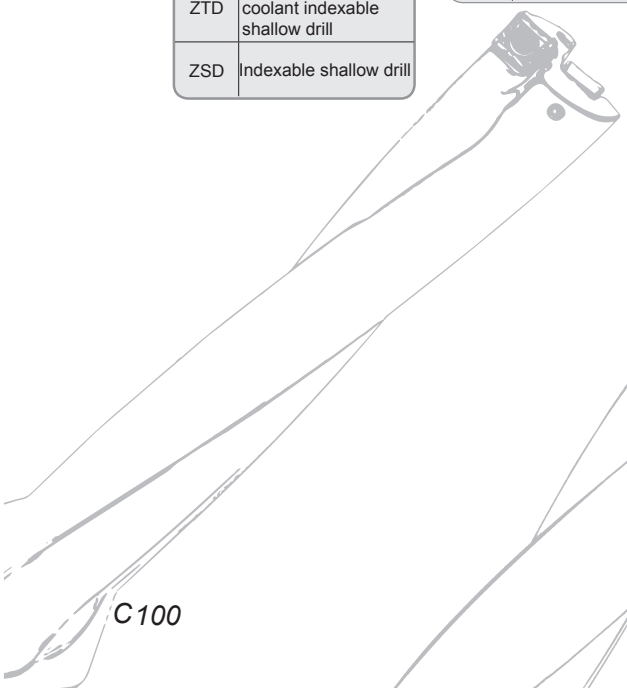
ZSD 02 - 120 - XP 20 - S P 04 - 02

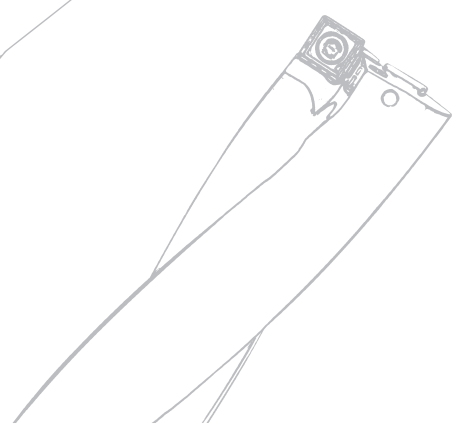
Tool type	
Code	Description
ZTD	Double helical inner coolant indexable shallow drill
ZSD	Indexable shallow drill

Coupling structure and type	
Code	Description
XP	Weldon shank

Coupling size(mm)
20，25，32，40

Number of tooth







High Efficiency Indexable Drill

ZSD series

2 Patents

- Unique waved-edge geometry structure produces steady cutting and smooth chip evacuation;
- Insert designed for double balanced radial run-out control for achieving high accuracy and precision even in long overhang applications;
- Wiper technology produces excellent surface quality and diameter dimension consistency;
- Strong impact-resistance and highly rigid design structure helps achieve high speed, high efficiency, and high stability machining;
- Economical four-edges insert, design suitable for Deep-hole drilling in 2D~5D.

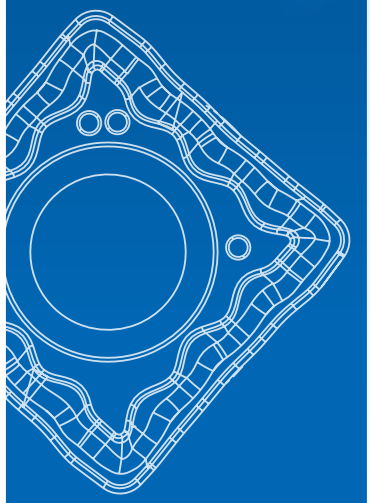


▲ -EM
Geometry for soft steels to prevent chip-wrapping.

▲ -XM
General-purpose geometry for stable machining operations.

▲ -LM
Geometry for Stainless steel and sticky chip materials.

▲ -XR
Machining of hard materials, strengthen cutting edges.

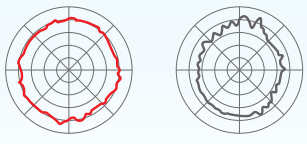


There are three types of geometry, suitable for high efficiency and stability machining in multiple materials.

Case study

Workpiece material: 45#steel (HB170-220)
Tool: ZSD05-160-XP20-SP05-02
Insert: SPMX050204-XM/YB9320
Cutting data: Vc=120m/min, f=0.07mm/r, ap=80mm
Cooling: Internal coolant supply

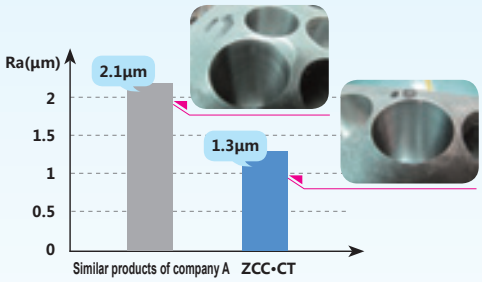
● Aperture cylindricity



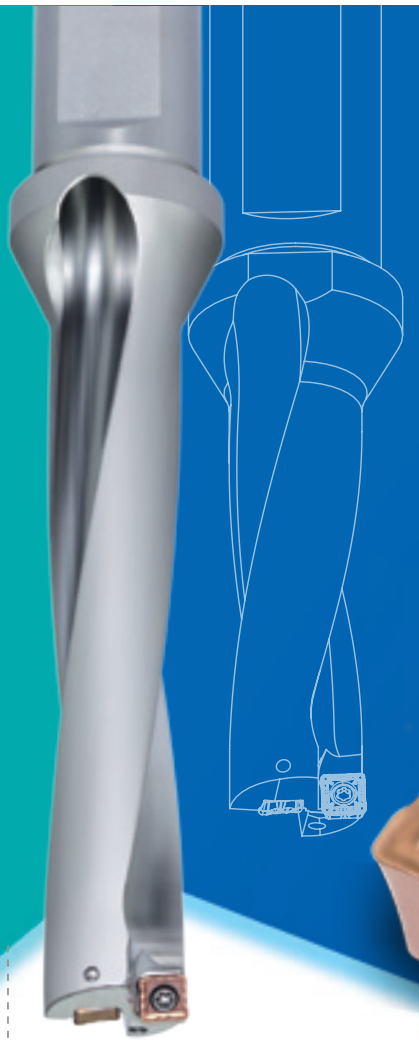
ZCC•CT | Similar products of company A

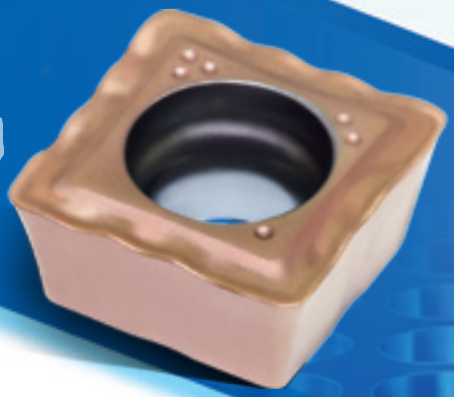
Cylindricity	0.03mm	0.15mm

● Hole surface quality



Conclusion: under the same working conditions,the machined hole surface quality by ZSD series indexable insert drill contributes to better hole precision than A company's similar products.





CVD coating grade

YB6338 (peripheral inserts)

- Substrate of a tough gradient cemented carbide, enriched with surface bonding phase, nano-dioxygen gradient transition layer, and crystal core pre-implantation coating technology, improves the inserts' wear and heat resistance.
- Suitable for high-speed, high-feed, and stable working conditions, it is the first choice for drilling of steel.

PVD coating grade

YB9315 (peripheral/central inserts)

Multilayer nano-coating PVD grade

- Significantly enhanced on wear resistance & heat resistance, adopting the gradient transition technology, effectively improvement on stress and interface states of the coating layers. Reducing stress concentration, increase the strengths between coating layer and substrate, improve the cutting tool's stability, suitable for M materials drilling machining.

YBS203 (peripheral/central inserts)

High performance grade for S materials

- Alloy toughness enhancement technology improves the tool's resistance to crack propagation and high temperature oxidation while ensuring high wear resistance.
- Adopting a new hard alloy matrix formula greatly improves the high-temperature performance and extends tool life.

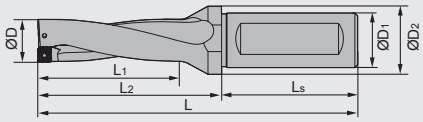
YB9320 (peripheral/central inserts)

General purpose for drilling in P, M, K, N materials

- The atomic rearrangement technology realizes the long-range orderly arrangement of different coating materials to achieve a perfect match between hardness and toughness, effectively solving the problem of high temperature instability at the interface of multiple coatings and improving the high temperature performance of the coating.
- High-toughness substrate and TiAlN-based nano multilayer coating, unique ion etching technology, strengthen the cutting edge, and improve the bonding strength between the coating and the substrate.
- Advanced surface treatment technology, optimized stress distribution, better overall performance.

U drills ZSD02 2D



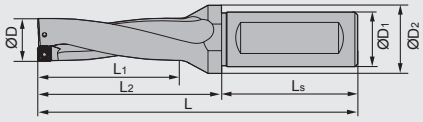


Type	Stock	Basic dimension(mm)							Applicable inserts	Insert screw	Wrench
		ØD	ØD1	ØD2	L1	L2	Ls	L			
ZSD02-120-XP20-SP04-02	▲	12.0	20	25	27	44	50	94	SPMX040203-XM/LM/EM/XR	I60M1.8×4.5	WT05IP
ZSD02-125-XP20-SP04-02	▲	12.5	20	25	28	45	50	95	SPMX040203-XM/LM/EM/XR	I60M1.8×4.5	WT05IP
ZSD02-130-XP20-SP04-02	▲	13.0	20	25	29	46	50	96	SPMX040203-XM/LM/EM/XR	I60M1.8×4.5	WT05IP
ZSD02-135-XP20-SP04-02	▲	13.5	20	25	30	47	50	97	SPMX040203-XM/LM/EM/XR	I60M1.8×4.5	WT05IP
ZSD02-140-XP20-SP04-02	▲	14.0	20	25	31	48	50	98	SPMX040203-XM/LM/EM/XR	I60M1.8×4.5	WT05IP
ZSD02-145-XP20-SP04-02	▲	14.5	20	25	32	49	50	99	SPMX040203-XM/LM/EM/XR	I60M1.8×4.5	WT05IP
ZSD02-150-XP20-SP05-02	▲	15.0	20	25	33	50	50	100	SPMX050204-XM/LM/EM/XR	I60M2×4.3	WT06P
ZSD02-155-XP20-SP05-02	▲	15.5	20	25	34	51	50	101	SPMX050204-XM/LM/EM/XR	I60M2×4.3	WT06P
ZSD02-160-XP20-SP05-02	▲	16.0	20	25	35	52	50	102	SPMX050204-XM/LM/EM/XR	I60M2×4.3	WT06P
ZSD02-165-XP20-SP05-02	▲	16.5	20	25	36	53	50	103	SPMX050204-XM/LM/EM/XR	I60M2×4.3	WT06P
ZSD02-170-XP20-SP05-02	▲	17.0	20	25	37	54	50	104	SPMX050204-XM/LM/EM/XR	I60M2×4.3	WT06P
ZSD02-175-XP20-SP05-02	▲	17.5	20	25	38	55	50	105	SPMX050204-XM/LM/EM/XR	I60M2×4.3	WT06P
ZSD02-180-XP25-SP06-02	▲	18.0	25	32	39	57	56	113	SPMX060204-XM/LM/EM/XR	I60M2.2×5.5	WT07IP
ZSD02-185-XP25-SP06-02	▲	18.5	25	32	40	58	56	114	SPMX060204-XM/LM/EM/XR	I60M2.2×5.5	WT07IP
ZSD02-190-XP25-SP06-02	▲	19.0	25	32	41	59	56	115	SPMX060204-XM/LM/EM/XR	I60M2.2×5.5	WT07IP
ZSD02-195-XP25-SP06-02	▲	19.5	25	32	42	60	56	116	SPMX060204-XM/LM/EM/XR	I60M2.2×5.5	WT07IP
ZSD02-200-XP25-SP06-02	▲	20.0	25	32	43	61	56	117	SPMX060204-XM/LM/EM/XR	I60M2.2×5.5	WT07IP
ZSD02-205-XP25-SP06-02	▲	20.5	25	32	44	62	56	118	SPMX060204-XM/LM/EM/XR	I60M2.2×5.5	WT07IP
ZSD02-210-XP25-SP06-02	▲	21.0	25	32	45	63	56	119	SPMX060204-XM/LM/EM/XR	I60M2.2×5.5	WT07IP
ZSD02-215-XP25-SP06-02	▲	21.5	25	32	46	64	56	120	SPMX060204-XM/LM/EM/XR	I60M2.2×5.5	WT07IP
ZSD02-220-XP25-SP06-02	▲	22.0	25	32	47	65	56	121	SPMX060204-XM/LM/EM/XR	I60M2.2×5.5	WT07IP
ZSD02-225-XP25-SP07-02	▲	22.5	25	32	48	66	56	122	SPMX07T308-XM/LM/EM/XR	I60M2.5×6.5	WT07IP
ZSD02-230-XP25-SP07-02	▲	23.0	25	32	49	67	56	123	SPMX07T308-XM/LM/EM/XR	I60M2.5×6.5	WT07IP
ZSD02-235-XP25-SP07-02	▲	23.5	25	32	50	68	56	124	SPMX07T308-XM/LM/EM/XR	I60M2.5×6.5	WT07IP
ZSD02-240-XP25-SP07-02	▲	24.0	25	32	51	69	56	125	SPMX07T308-XM/LM/EM/XR	I60M2.5×6.5	WT07IP
ZSD02-245-XP25-SP07-02	▲	24.5	25	32	52	70	56	126	SPMX07T308-XM/LM/EM/XR	I60M2.5×6.5	WT07IP
ZSD02-250-XP25-SP07-02	▲	25.0	25	32	53	71	56	127	SPMX07T308-XM/LM/EM/XR	I60M2.5×6.5	WT07IP
ZSD02-255-XP25-SP07-02	▲	25.5	25	32	54	72	56	128	SPMX07T308-XM/LM/EM/XR	I60M2.5×6.5	WT07IP
ZSD02-260-XP25-SP07-02	▲	26.0	25	32	55	73	56	129	SPMX07T308-XM/LM/EM/XR	I60M2.5×6.5	WT07IP
ZSD02-265-XP25-SP07-02	▲	26.5	25	32	56	74	56	130	SPMX07T308-XM/LM/EM/XR	I60M2.5×6.5	WT07IP
ZSD02-270-XP25-SP07-02	▲	27.0	25	32	57	75	56	131	SPMX07T308-XM/LM/EM/XR	I60M2.5×6.5	WT07IP

▲Stock available △Make-to-order

U drills ZSD02 2D





Type	Stock	Basic dimension(mm)							Applicable inserts	Insert screw	Wrench
		ØD	ØD1	ØD2	L1	L2	Ls	L			
ZSD02-275-XP25-SP07-02	▲	27.5	25	32	58	76	56	132	SPMX07T308- XM/LM/EM/XR	I60M2.5×6.5	WT07IP
ZSD02-280-XP32-SP09-02	▲	28.0	32	37	59	79	60	139	SPMX090408- XM/LM/EM/XR	I60M3.5×8	WT15IP
ZSD02-285-XP32-SP09-02	▲	28.5	32	37	60	80	60	140	SPMX090408- XM/LM/EM/XR	I60M3.5×8	WT15IP
ZSD02-290-XP32-SP09-02	▲	29.0	32	37	61	81	60	141	SPMX090408- XM/LM/EM/XR	I60M3.5×8	WT15IP
ZSD02-295-XP32-SP09-02	▲	29.5	32	37	62	82	60	142	SPMX090408- XM/LM/EM/XR	I60M3.5×8	WT15IP
ZSD02-300-XP32-SP09-02	▲	30.0	32	37	63	83	60	143	SPMX090408- XM/LM/EM/XR	I60M3.5×8	WT15IP
ZSD02-305-XP32-SP09-02	▲	30.5	32	37	64	84	60	144	SPMX090408- XM/LM/EM/XR	I60M3.5×8	WT15IP
ZSD02-310-XP32-SP09-02	▲	31.0	32	37	65	85	60	145	SPMX090408- XM/LM/EM/XR	I60M3.5×8	WT15IP
ZSD02-315-XP32-SP09-02	▲	31.5	32	37	66	86	60	146	SPMX090408- XM/LM/EM/XR	I60M3.5×8	WT15IP
ZSD02-320-XP32-SP09-02	▲	32.0	32	37	67	87	60	147	SPMX090408- XM/LM/EM/XR	I60M3.5×8	WT15IP
ZSD02-325-XP32-SP09-02	▲	32.5	32	37	68	88	60	148	SPMX090408- XM/LM/EM/XR	I60M3.5×8	WT15IP
ZSD02-330-XP32-SP09-02	▲	33.0	32	37	69	89	60	149	SPMX090408- XM/LM/EM/XR	I60M3.5×8	WT15IP
ZSD02-335-XP32-SP09-02	▲	33.5	32	37	70	90	60	150	SPMX090408- XM/LM/EM/XR	I60M3.5×8	WT15IP
ZSD02-340-XP40-SP11-02	▲	34.0	40	47	71	96	70	166	SPMX110408- XM/LM/EM/XR	I60M4×10	WT15IP
ZSD02-345-XP40-SP11-02	△	34.5	40	47	72	97	70	167	SPMX110408- XM/LM/EM/XR	I60M4×10	WT15IP
ZSD02-350-XP40-SP11-02	▲	35.0	40	47	73	98	70	168	SPMX110408- XM/LM/EM/XR	I60M4×10	WT15IP
ZSD02-355-XP40-SP11-02	△	35.5	40	47	74	99	70	169	SPMX110408- XM/LM/EM/XR	I60M4×10	WT15IP
ZSD02-360-XP40-SP11-02	▲	36.0	40	47	75	100	70	170	SPMX110408- XM/LM/EM/XR	I60M4×10	WT15IP
ZSD02-365-XP40-SP11-02	△	36.5	40	47	76	101	70	171	SPMX110408- XM/LM/EM/XR	I60M4×10	WT15IP
ZSD02-370-XP40-SP11-02	▲	37.0	40	47	77	102	70	172	SPMX110408- XM/LM/EM/XR	I60M4×10	WT15IP
ZSD02-375-XP40-SP11-02	△	37.5	40	47	78	103	70	173	SPMX110408- XM/LM/EM/XR	I60M4×10	WT15IP
ZSD02-380-XP40-SP11-02	▲	38.0	40	47	79	104	70	174	SPMX110408- XM/LM/EM/XR	I60M4×10	WT15IP
ZSD02-385-XP40-SP11-02	△	38.5	40	47	80	105	70	175	SPMX110408- XM/LM/EM/XR	I60M4×10	WT15IP
ZSD02-390-XP40-SP11-02	▲	39.0	40	47	81	106	70	176	SPMX110408- XM/LM/EM/XR	I60M4×10	WT15IP
ZSD02-395-XP40-SP11-02	△	39.5	40	47	82	107	70	177	SPMX110408- XM/LM/EM/XR	I60M4×10	WT15IP
ZSD02-400-XP40-SP11-02	▲	40.0	40	47	83	108	70	178	SPMX110408- XM/LM/EM/XR	I60M4×10	WT15IP
ZSD02-405-XP40-SP11-02	△	40.5	40	47	84	109	70	179	SPMX110408- XM/LM/EM/XR	I60M4×10	WT15IP
ZSD02-410-XP40-SP11-02	▲	41.0	40	47	85	110	70	180	SPMX110408- XM/LM/EM/XR	I60M4×10	WT15IP
ZSD02-415-XP40-SP11-02	△	41.5	40	47	86	111	70	181	SPMX110408- XM/LM/EM/XR	I60M4×10	WT15IP
ZSD02-420-XP40-SP11-02	▲	42.0	40	52	87	119	70	189	SPMX110408- XM/LM/EM/XR	I60M4×10	WT15IP
ZSD02-425-XP40-SP14-02	△	42.5	40	52	88	120	70	190	SPMX140512- XM/LM/EM/XR	I60M5×13	WT20IP

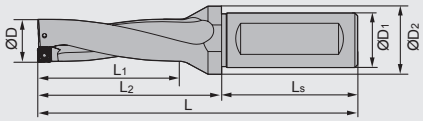
▲Stock available △Make-to-order

Type	Stock	Basic dimension(mm)							Applicable inserts	Insert screw	Wrench
		ØD	$ØD_1$	$ØD_2$	L_1	L_2	L_S	L			
ZSD02-430-XP40-SP14-02	▲	43.0	40	52	89	121	70	191	SPMX140512- XM/LM/EM/XR	I60M5×13	WT20IP
ZSD02-435-XP40-SP14-02	△	43.5	40	52	90	122	70	192	SPMX140512- XM/LM/EM/XR	I60M5×13	WT20IP
ZSD02-440-XP40-SP14-02	▲	44.0	40	52	91	123	70	193	SPMX140512- XM/LM/EM/XR	I60M5×13	WT20IP
ZSD02-445-XP40-SP14-02	△	44.5	40	52	92	124	70	194	SPMX140512- XM/LM/EM/XR	I60M5×13	WT20IP
ZSD02-450-XP40-SP14-02	▲	45.0	40	52	93	125	70	195	SPMX140512- XM/LM/EM/XR	I60M5×13	WT20IP
ZSD02-455-XP40-SP14-02	△	45.5	40	52	94	126	70	196	SPMX140512- XM/LM/EM/XR	I60M5×13	WT20IP
ZSD02-460-XP40-SP14-02	▲	46.0	40	52	95	127	70	197	SPMX140512- XM/LM/EM/XR	I60M5×13	WT20IP
ZSD02-465-XP40-SP14-02	△	46.5	40	52	96	128	70	198	SPMX140512- XM/LM/EM/XR	I60M5×13	WT20IP
ZSD02-470-XP40-SP14-02	▲	47.0	40	52	97	129	70	199	SPMX140512- XM/LM/EM/XR	I60M5×13	WT20IP
ZSD02-475-XP40-SP14-02	△	47.5	40	52	98	130	70	200	SPMX140512- XM/LM/EM/XR	I60M5×13	WT20IP
ZSD02-480-XP40-SP14-02	▲	48.0	40	52	99	131	70	201	SPMX140512- XM/LM/EM/XR	I60M5×13	WT20IP
ZSD02-485-XP40-SP14-02	△	48.5	40	52	100	132	70	202	SPMX140512- XM/LM/EM/XR	I60M5×13	WT20IP
ZSD02-490-XP40-SP14-02	▲	49.0	40	52	101	133	70	203	SPMX140512- XM/LM/EM/XR	I60M5×13	WT20IP
ZSD02-495-XP40-SP14-02	△	49.5	40	52	102	134	70	204	SPMX140512- XM/LM/EM/XR	I60M5×13	WT20IP
ZSD02-500-XP40-SP14-02	▲	50.0	40	52	103	135	70	205	SPMX140512- XM/LM/EM/XR	I60M5×13	WT20IP

▲Stock available △Make-to-order

U drills ZSD03 3D





Type	Stock	Basic dimension(mm)							Applicable inserts	Insert screw	Wrench
		ØD	ØD1	ØD2	L1	L2	Ls	L			
ZSD03-120-XP20-SP04-02	▲	12.0	20	25	39	55	50	105	SPMX040203-XM/LM/EM/XR	I60M1.8×4.5	WT05IP
ZSD03-125-XP20-SP04-02	▲	12.5	20	25	41	57	50	107	SPMX040203-XM/LM/EM/XR	I60M1.8×4.5	WT05IP
ZSD03-130-XP20-SP04-02	▲	13.0	20	25	42	58	50	108	SPMX040203-XM/LM/EM/XR	I60M1.8×4.5	WT05IP
ZSD03-135-XP20-SP04-02	▲	13.5	20	25	44	60	50	110	SPMX040203-XM/LM/EM/XR	I60M1.8×4.5	WT05IP
ZSD03-140-XP20-SP04-02	▲	14.0	20	25	45	61	50	111	SPMX040203-XM/LM/EM/XR	I60M1.8×4.5	WT05IP
ZSD03-145-XP20-SP04-02	▲	14.5	20	25	47	63	50	113	SPMX040203-XM/LM/EM/XR	I60M1.8×4.5	WT05IP
ZSD03-150-XP20-SP05-02	▲	15.0	20	25	48	64	50	114	SPMX050204-XM/LM/EM/XR	I60M2×4.3	WT06P
ZSD03-155-XP20-SP05-02	▲	15.5	20	25	50	66	50	116	SPMX050204-XM/LM/EM/XR	I60M2×4.3	WT06P
ZSD03-160-XP20-SP05-02	▲	16.0	20	25	51	67	50	117	SPMX050204-XM/LM/EM/XR	I60M2×4.3	WT06P
ZSD03-165-XP20-SP05-02	▲	16.5	20	25	53	69	50	119	SPMX050204-XM/LM/EM/XR	I60M2×4.3	WT06P
ZSD03-170-XP20-SP05-02	▲	17.0	20	25	54	70	50	120	SPMX050204-XM/LM/EM/XR	I60M2×4.3	WT06P
ZSD03-175-XP20-SP05-02	▲	17.5	20	25	56	72	50	122	SPMX050204-XM/LM/EM/XR	I60M2×4.3	WT06P
ZSD03-180-XP25-SP06-02	▲	18.0	25	32	57	75	56	131	SPMX060204- XM/LM/EM/XR	I60M2.2×5.5	WT07IP
ZSD03-185-XP25-SP06-02	▲	18.5	25	32	59	77	56	133	SPMX060204- XM/LM/EM/XR	I60M2.2×5.5	WT07IP
ZSD03-190-XP25-SP06-02	▲	19.0	25	32	60	78	56	134	SPMX060204- XM/LM/EM/XR	I60M2.2×5.5	WT07IP
ZSD03-195-XP25-SP06-02	▲	19.5	25	32	62	80	56	136	SPMX060204- XM/LM/EM/XR	I60M2.2×5.5	WT07IP
ZSD03-200-XP25-SP06-02	▲	20.0	25	32	63	81	56	137	SPMX060204- XM/LM/EM/XR	I60M2.2×5.5	WT07IP
ZSD03-205-XP25-SP06-02	▲	20.5	25	32	65	83	56	139	SPMX060204- XM/LM/EM/XR	I60M2.2×5.5	WT07IP
ZSD03-210-XP25-SP06-02	▲	21.0	25	32	66	84	56	140	SPMX060204- XM/LM/EM/XR	I60M2.2×5.5	WT07IP
ZSD03-215-XP25-SP06-02	▲	21.5	25	32	68	86	56	142	SPMX060204- XM/LM/EM/XR	I60M2.2×5.5	WT07IP
ZSD03-220-XP25-SP06-02	▲	22.0	25	32	69	87	56	143	SPMX060204- XM/LM/EM/XR	I60M2.2×5.5	WT07IP
ZSD03-225-XP25-SP07-02	▲	22.5	25	32	71	89	56	145	SPMX07T308- XM/LM/EM/XR	I60M2.5×6.5	WT07IP
ZSD03-230-XP25-SP07-02	▲	23.0	25	32	72	91	56	147	SPMX07T308- XM/LM/EM/XR	I60M2.5×6.5	WT07IP
ZSD03-235-XP25-SP07-02	▲	23.5	25	32	74	93	56	149	SPMX07T308- XM/LM/EM/XR	I60M2.5×6.5	WT07IP
ZSD03-240-XP25-SP07-02	▲	24.0	25	32	75	94	56	150	SPMX07T308- XM/LM/EM/XR	I60M2.5×6.5	WT07IP
ZSD03-245-XP25-SP07-02	▲	24.5	25	32	77	96	56	152	SPMX07T308- XM/LM/EM/XR	I60M2.5×6.5	WT07IP

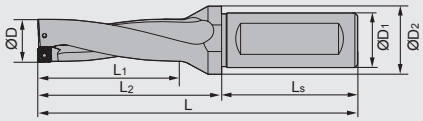
▲Stock available △Make-to-order

Type	Stock	Basic dimension(mm)							Applicable inserts	Insert screw	Wrench
		ØD	ØD1	ØD2	L1	L2	Ls	L			
ZSD03-250-XP25-SP07-02	▲	25.0	25	32	78	97	56	153	SPMX07T308- XM/LM/EM/XR	I60M2.5×6.5	WT07IP
ZSD03-255-XP25-SP07-02	▲	25.5	25	32	80	99	56	155	SPMX07T308- XM/LM/EM/XR	I60M2.5×6.5	WT07IP
ZSD03-260-XP25-SP07-02	▲	26.0	25	32	81	100	56	156	SPMX07T308- XM/LM/EM/XR	I60M2.5×6.5	WT07IP
ZSD03-265-XP25-SP07-02	▲	26.5	25	32	83	102	56	158	SPMX07T308- XM/LM/EM/XR	I60M2.5×6.5	WT07IP
ZSD03-270-XP25-SP07-02	▲	27.0	25	32	84	104	56	160	SPMX07T308- XM/LM/EM/XR	I60M2.5×6.5	WT07IP
ZSD03-275-XP25-SP07-02	▲	27.5	25	32	86	106	56	162	SPMX07T308- XM/LM/EM/XR	I60M2.5×6.5	WT07IP
ZSD03-280-XP32-SP09-02	▲	28.0	32	37	87	109	60	169	SPMX090408- XM/LM/EM/XR	I60M3.5×8	WT15IP
ZSD03-285-XP32-SP09-02	▲	28.5	32	37	89	111	60	171	SPMX090408- XM/LM/EM/XR	I60M3.5×8	WT15IP
ZSD03-290-XP32-SP09-02	▲	29.0	32	37	90	112	60	172	SPMX090408- XM/LM/EM/XR	I60M3.5×8	WT15IP
ZSD03-295-XP32-SP09-02	▲	29.5	32	37	92	114	60	174	SPMX090408- XM/LM/EM/XR	I60M3.5×8	WT15IP
ZSD03-300-XP32-SP09-02	▲	30.0	32	37	93	115	60	175	SPMX090408- XM/LM/EM/XR	I60M3.5×8	WT15IP
ZSD03-305-XP32-SP09-02	▲	30.5	32	37	95	117	60	177	SPMX090408- XM/LM/EM/XR	I60M3.5×8	WT15IP
ZSD03-310-XP32-SP09-02	▲	31.0	32	37	96	118	60	178	SPMX090408- XM/LM/EM/XR	I60M3.5×8	WT15IP
ZSD03-315-XP32-SP09-02	▲	31.5	32	37	98	120	60	180	SPMX090408- XM/LM/EM/XR	I60M3.5×8	WT15IP
ZSD03-320-XP32-SP09-02	▲	32.0	32	37	99	121	60	181	SPMX090408- XM/LM/EM/XR	I60M3.5×8	WT15IP
ZSD03-325-XP32-SP09-02	▲	32.5	32	37	101	123	60	183	SPMX090408- XM/LM/EM/XR	I60M3.5×8	WT15IP
ZSD03-330-XP32-SP09-02	▲	33.0	32	37	102	124	60	184	SPMX090408- XM/LM/EM/XR	I60M3.5×8	WT15IP
ZSD03-335-XP32-SP09-02	▲	33.5	32	37	104	126	60	186	SPMX090408- XM/LM/EM/XR	I60M3.5×8	WT15IP
ZSD03-340-XP40-SP11-02	▲	34.0	40	47	105	130	70	200	SPMX110408- XM/LM/EM/XR	I60M4×10	WT15IP
ZSD03-345-XP40-SP11-02	△	34.5	40	47	107	132	70	202	SPMX110408- XM/LM/EM/XR	I60M4×10	WT15IP
ZSD03-350-XP40-SP11-02	▲	35.0	40	47	108	133	70	203	SPMX110408- XM/LM/EM/XR	I60M4×10	WT15IP
ZSD03-355-XP40-SP11-02	△	35.5	40	47	100	135	70	205	SPMX110408- XM/LM/EM/XR	I60M4×10	WT15IP
ZSD03-360-XP40-SP11-02	▲	36.0	40	47	111	136	70	206	SPMX110408- XM/LM/EM/XR	I60M4×10	WT15IP
ZSD03-365-XP40-SP11-02	△	36.5	40	47	113	138	70	208	SPMX110408- XM/LM/EM/XR	I60M4×10	WT15IP
ZSD03-370-XP40-SP11-02	▲	37.0	40	47	114	139	70	209	SPMX110408- XM/LM/EM/XR	I60M4×10	WT15IP
ZSD03-375-XP40-SP11-02	△	37.5	40	47	116	141	70	211	SPMX110408- XM/LM/EM/XR	I60M4×10	WT15IP
ZSD03-380-XP40-SP11-02	▲	38.0	40	47	117	142	70	212	SPMX110408- XM/LM/EM/XR	I60M4×10	WT15IP
ZSD03-385-XP40-SP11-02	△	38.5	40	47	119	144	70	214	SPMX110408- XM/LM/EM/XR	I60M4×10	WT15IP
ZSD03-390-XP40-SP11-02	▲	39.0	40	47	120	145	70	215	SPMX110408- XM/LM/EM/XR	I60M4×10	WT15IP
ZSD03-395-XP40-SP11-02	△	39.5	40	47	122	147	70	217	SPMX110408- XM/LM/EM/XR	I60M4×10	WT15IP
ZSD03-400-XP40-SP11-02	▲	40.0	40	47	123	148	70	218	SPMX110408- XM/LM/EM/XR	I60M4×10	WT15IP
ZSD03-405-XP40-SP11-02	△	40.5	40	47	125	150	70	220	SPMX110408- XM/LM/EM/XR	I60M4×10	WT15IP
ZSD03-410-XP40-SP11-02	▲	41.0	40	47	126	151	70	221	SPMX110408- XM/LM/EM/XR	I60M4×10	WT15IP
ZSD03-415-XP40-SP11-02	△	41.5	40	47	128	153	70	223	SPMX110408- XM/LM/EM/XR	I60M4×10	WT15IP
ZSD03-420-XP40-SP11-02	▲	42.0	40	52	129	161	70	231	SPMX110408- XM/LM/EM/XR	I60M4×10	WT15IP

▲Stock available △Make-to-order

U drills ZSD03 3D



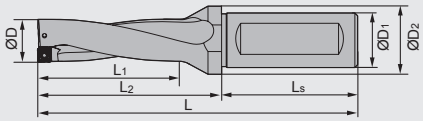


Type	Stock	Basic dimension(mm)							Applicable inserts	Insert screw	Wrench
		ØD	ØD1	ØD2	L1	L2	Ls	L			
ZSD03-425-XP40-SP14-02	△	42.5	40	52	131	163	70	233	SPMX140512- XM/LM/EM/XR	I60M5×13	WT20IP
ZSD03-430-XP40-SP14-02	▲	43.0	40	52	132	164	70	234	SPMX140512- XM/LM/EM/XR	I60M5×13	WT20IP
ZSD03-435-XP40-SP14-02	△	43.5	40	52	134	166	70	236	SPMX140512- XM/LM/EM/XR	I60M5×13	WT20IP
ZSD03-440-XP40-SP14-02	▲	44.0	40	52	135	167	70	237	SPMX140512- XM/LM/EM/XR	I60M5×13	WT20IP
ZSD03-445-XP40-SP14-02	△	44.5	40	52	137	169	70	239	SPMX140512- XM/LM/EM/XR	I60M5×13	WT20IP
ZSD03-450-XP40-SP14-02	▲	45.0	40	52	138	170	70	240	SPMX140512- XM/LM/EM/XR	I60M5×13	WT20IP
ZSD03-455-XP40-SP14-02	△	45.5	40	52	140	172	70	242	SPMX140512- XM/LM/EM/XR	I60M5×13	WT20IP
ZSD03-460-XP40-SP14-02	▲	46.0	40	52	141	173	70	243	SPMX140512- XM/LM/EM/XR	I60M5×13	WT20IP
ZSD03-465-XP40-SP14-02	△	46.5	40	52	142	175	70	245	SPMX140512- XM/LM/EM/XR	I60M5×13	WT20IP
ZSD03-470-XP40-SP14-02	▲	47.0	40	52	144	176	70	246	SPMX140512- XM/LM/EM/XR	I60M5×13	WT20IP
ZSD03-475-XP40-SP14-02	△	47.5	40	52	146	178	70	248	SPMX140512- XM/LM/EM/XR	I60M5×13	WT20IP
ZSD03-480-XP40-SP14-02	▲	48.0	40	52	147	179	70	249	SPMX140512- XM/LM/EM/XR	I60M5×13	WT20IP
ZSD03-485-XP40-SP14-02	△	48.5	40	52	149	181	70	251	SPMX140512- XM/LM/EM/XR	I60M5×13	WT20IP
ZSD03-490-XP40-SP14-02	▲	49.0	40	52	150	182	70	252	SPMX140512- XM/LM/EM/XR	I60M5×13	WT20IP
ZSD03-495-XP40-SP14-02	△	49.5	40	52	152	184	70	254	SPMX140512- XM/LM/EM/XR	I60M5×13	WT20IP
ZSD03-500-XP40-SP14-02	▲	50.0	40	52	153	185	70	255	SPMX140512- XM/LM/EM/XR	I60M5×13	WT20IP

▲Stock available △Make-to-order

U drills ZSD04 4D



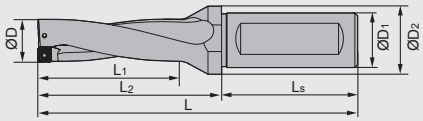


Type	Stock	Basic dimension(mm)							Applicable inserts	Insert screw	Wrench
		ØD	ØD1	ØD2	L1	L2	Ls	L			
ZSD04-120-XP20-SP04-02	▲	12.0	20	25	51	67	50	117	SPMX040203-XM/LM/EM/XR	I60M1.8×4.5	WT05IP
ZSD04-125-XP20-SP04-02	▲	12.5	20	25	53	69	50	119	SPMX040203-XM/LM/EM/XR	I60M1.8×4.5	WT05IP
ZSD04-130-XP20-SP04-02	▲	13.0	20	25	55	71	50	121	SPMX040203-XM/LM/EM/XR	I60M1.8×4.5	WT05IP
ZSD04-135-XP20-SP04-02	▲	13.5	20	25	57	73	50	123	SPMX040203-XM/LM/EM/XR	I60M1.8×4.5	WT05IP
ZSD04-140-XP20-SP04-02	▲	14.0	20	25	59	75	50	125	SPMX040203-XM/LM/EM/XR	I60M1.8×4.5	WT05IP
ZSD04-145-XP20-SP04-02	▲	14.5	20	25	61	77	50	127	SPMX040203-XM/LM/EM/XR	I60M1.8×4.5	WT05IP
ZSD04-150-XP20-SP05-02	▲	15.0	20	25	63	79	50	129	SPMX050204-XM/LM/EM/XR	I60M2×4.3	WT06P
ZSD04-155-XP20-SP05-02	▲	15.5	20	25	65	81	50	131	SPMX050204-XM/LM/EM/XR	I60M2×4.3	WT06P
ZSD04-160-XP20-SP05-02	▲	16.0	20	25	67	83	50	133	SPMX050204-XM/LM/EM/XR	I60M2×4.3	WT06P
ZSD04-165-XP20-SP05-02	▲	16.5	20	25	69	85	50	135	SPMX050204-XM/LM/EM/XR	I60M2×4.3	WT06P
ZSD04-170-XP20-SP05-02	▲	17.0	20	25	71	87	50	137	SPMX050204-XM/LM/EM/XR	I60M2×4.3	WT06P
ZSD04-175-XP20-SP05-02	▲	17.5	20	25	73	89	50	139	SPMX050204-XM/LM/EM/XR	I60M2×4.3	WT06P
ZSD04-180-XP25-SP06-02	▲	18.0	25	32	75	93	56	149	SPMX060204- XM/LM/EM/XR	I60M2.2×5.5	WT07IP
ZSD04-185-XP25-SP06-02	▲	18.5	25	32	77	95	56	151	SPMX060204- XM/LM/EM/XR	I60M2.2×5.5	WT07IP
ZSD04-190-XP25-SP06-02	▲	19.0	25	32	79	97	56	153	SPMX060204- XM/LM/EM/XR	I60M2.2×5.5	WT07IP
ZSD04-195-XP25-SP06-02	▲	19.5	25	32	81	99	56	155	SPMX060204- XM/LM/EM/XR	I60M2.2×5.5	WT07IP
ZSD04-200-XP25-SP06-02	▲	20.0	25	32	83	101	56	157	SPMX060204- XM/LM/EM/XR	I60M2.2×5.5	WT07IP
ZSD04-205-XP25-SP06-02	▲	20.5	25	32	85	103	56	159	SPMX060204- XM/LM/EM/XR	I60M2.2×5.5	WT07IP
ZSD04-210-XP25-SP06-02	▲	21.0	25	32	87	105	56	161	SPMX060204- XM/LM/EM/XR	I60M2.2×5.5	WT07IP
ZSD04-215-XP25-SP06-02	▲	21.5	25	32	89	107	56	163	SPMX060204- XM/LM/EM/XR	I60M2.2×5.5	WT07IP
ZSD04-220-XP25-SP06-02	▲	22.0	25	32	91	109	56	165	SPMX060204- XM/LM/EM/XR	I60M2.2×5.5	WT07IP
ZSD04-225-XP25-SP07-02	▲	22.5	25	32	93	111	56	167	SPMX07T308- XM/LM/EM/XR	I60M2.5×6.5	WT07IP
ZSD04-230-XP25-SP07-02	▲	23.0	25	32	95	114	56	170	SPMX07T308- XM/LM/EM/XR	I60M2.5×6.5	WT07IP
ZSD04-235-XP25-SP07-02	▲	23.5	25	32	97	116	56	172	SPMX07T308- XM/LM/EM/XR	I60M2.5×6.5	WT07IP
ZSD04-240-XP25-SP07-02	▲	24.0	25	32	99	118	56	174	SPMX07T308- XM/LM/EM/XR	I60M2.5×6.5	WT07IP
ZSD04-245-XP25-SP07-02	▲	24.5	25	32	101	120	56	176	SPMX07T308- XM/LM/EM/XR	I60M2.5×6.5	WT07IP
ZSD04-250-XP25-SP07-02	▲	25.0	25	32	103	122	56	178	SPMX07T308- XM/LM/EM/XR	I60M2.5×6.5	WT07IP
ZSD04-250-XP32-SP07-02	▲	25.0	32	37	103	122	60	182	SPMX07T308- XM/LM/EM/XR	I60M2.5×6.5	WT07IP
ZSD04-255-XP25-SP07-02	▲	25.5	25	32	105	125	56	181	SPMX07T308- XM/LM/EM/XR	I60M2.5×6.5	WT07IP
ZSD04-255-XP32-SP07-02	▲	25.5	32	37	105	125	60	185	SPMX07T308- XM/LM/EM/XR	I60M2.5×6.5	WT07IP
ZSD04-260-XP25-SP07-02	▲	26.0	25	32	107	126	56	182	SPMX07T308- XM/LM/EM/XR	I60M2.5×6.5	WT07IP

▲Stock available △Make-to-order

U drills ZSD04 4D





Type	Stock	Basic dimension(mm)							Applicable inserts	Insert screw	Wrench
		ØD	ØD1	ØD2	L1	L2	Ls	L			
ZSD04-260-XP32-SP07-02	▲	26.0	32	37	107	126	60	186	SPMX07T308- XM/LM/EM/XR	I60M2.5×6.5	WT07IP
ZSD04-265-XP25-SP07-02	▲	26.5	25	32	109	128	56	184	SPMX07T308- XM/LM/EM/XR	I60M2.5×6.5	WT07IP
ZSD04-265-XP32-SP07-02	▲	26.5	32	37	109	128	60	188	SPMX07T308- XM/LM/EM/XR	I60M2.5×6.5	WT07IP
ZSD04-270-XP25-SP07-02	▲	27.0	25	32	111	131	56	187	SPMX07T308- XM/LM/EM/XR	I60M2.5×6.5	WT07IP
ZSD04-270-XP32-SP07-02	▲	27.0	32	37	111	131	60	191	SPMX07T308- XM/LM/EM/XR	I60M2.5×6.5	WT07IP
ZSD04-275-XP25-SP07-02	▲	27.5	25	32	113	134	56	190	SPMX07T308- XM/LM/EM/XR	I60M2.5×6.5	WT07IP
ZSD04-275-XP32-SP07-02	▲	27.5	32	37	113	134	60	194	SPMX07T308- XM/LM/EM/XR	I60M2.5×6.5	WT07IP
ZSD04-280-XP32-SP09-02	▲	28.0	32	37	115	139	60	199	SPMX090408- XM/LM/EM/XR	I60M3.5×8	WT15IP
ZSD04-285-XP32-SP09-02	▲	28.5	32	37	117	141	60	201	SPMX090408- XM/LM/EM/XR	I60M3.5×8	WT15IP
ZSD04-290-XP32-SP09-02	▲	29.0	32	37	119	143	60	203	SPMX090408- XM/LM/EM/XR	I60M3.5×8	WT15IP
ZSD04-295-XP32-SP09-02	▲	29.5	32	37	121	145	60	205	SPMX090408- XM/LM/EM/XR	I60M3.5×8	WT15IP
ZSD04-300-XP32-SP09-02	▲	30.0	32	37	123	147	60	207	SPMX090408- XM/LM/EM/XR	I60M3.5×8	WT15IP
ZSD04-305-XP32-SP09-02	▲	30.5	32	37	125	149	60	209	SPMX090408- XM/LM/EM/XR	I60M3.5×8	WT15IP
ZSD04-310-XP32-SP09-02	▲	31.0	32	37	127	151	60	211	SPMX090408- XM/LM/EM/XR	I60M3.5×8	WT15IP
ZSD04-315-XP32-SP09-02	▲	31.5	32	37	129	153	60	213	SPMX090408- XM/LM/EM/XR	I60M3.5×8	WT15IP
ZSD04-320-XP32-SP09-02	▲	32.0	32	37	131	155	60	215	SPMX090408- XM/LM/EM/XR	I60M3.5×8	WT15IP
ZSD04-320-XP40-SP09-02	▲	32.0	40	47	131	155	70	225	SPMX090408- XM/LM/EM/XR	I60M3.5×8	WT15IP
ZSD04-325-XP32-SP09-02	▲	32.5	32	37	133	157	60	217	SPMX090408- XM/LM/EM/XR	I60M3.5×8	WT15IP
ZSD04-325-XP40-SP09-02	▲	32.5	40	47	133	157	70	227	SPMX090408- XM/LM/EM/XR	I60M3.5×8	WT15IP
ZSD04-330-XP32-SP09-02	▲	33.0	32	37	135	159	60	219	SPMX090408- XM/LM/EM/XR	I60M3.5×8	WT15IP
ZSD04-330-XP40-SP09-02	▲	33.0	40	47	135	159	70	229	SPMX090408- XM/LM/EM/XR	I60M3.5×8	WT15IP
ZSD04-335-XP32-SP09-02	▲	33.5	32	37	137	161	60	221	SPMX090408- XM/LM/EM/XR	I60M3.5×8	WT15IP
ZSD04-335-XP40-SP09-02	▲	33.5	40	47	137	161	70	231	SPMX090408- XM/LM/EM/XR	I60M3.5×8	WT15IP
ZSD04-340-XP40-SP11-02	▲	34.0	40	47	139	164	70	234	SPMX110408- XM/LM/EM/XR	I60M4×10	WT15IP
ZSD04-345-XP40-SP11-02	△	34.5	40	47	141	166	70	236	SPMX110408- XM/LM/EM/XR	I60M4×10	WT15IP
ZSD04-350-XP40-SP11-02	▲	35.0	40	47	143	168	70	238	SPMX110408- XM/LM/EM/XR	I60M4×10	WT15IP
ZSD04-355-XP40-SP11-02	△	35.5	40	47	145	170	70	240	SPMX110408- XM/LM/EM/XR	I60M4×10	WT15IP
ZSD04-360-XP40-SP11-02	▲	36.0	40	47	147	172	70	242	SPMX110408- XM/LM/EM/XR	I60M4×10	WT15IP
ZSD04-365-XP40-SP11-02	△	36.5	40	47	149	174	70	244	SPMX110408- XM/LM/EM/XR	I60M4×10	WT15IP
ZSD04-370-XP40-SP11-02	▲	37.0	40	47	151	176	70	246	SPMX110408- XM/LM/EM/XR	I60M4×10	WT15IP
ZSD04-375-XP40-SP11-02	△	37.5	40	47	153	178	70	248	SPMX110408- XM/LM/EM/XR	I60M4×10	WT15IP

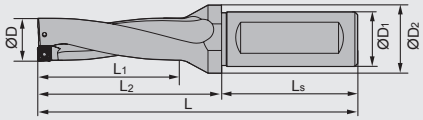
▲Stock available △Make-to-order

Type	Stock	Basic dimension(mm)							Applicable inserts	Insert screw	Wrench
		ØD	ØD1	ØD2	L1	L2	Ls	L			
ZSD04-380-XP40-SP11-02	▲	38.0	40	47	155	180	70	250	SPMX110408-XM/LM/EM/XR	I60M4×10	WT15IP
ZSD04-385-XP40-SP11-02	△	38.5	40	47	157	182	70	252	SPMX110408-XM/LM/EM/XR	I60M4×10	WT15IP
ZSD04-390-XP40-SP11-02	▲	39.0	40	47	159	184	70	254	SPMX110408-XM/LM/EM/XR	I60M4×10	WT15IP
ZSD04-395-XP40-SP11-02	△	39.5	40	47	161	186	70	256	SPMX110408-XM/LM/EM/XR	I60M4×10	WT15IP
ZSD04-400-XP40-SP11-02	▲	40.0	40	47	163	188	70	258	SPMX110408-XM/LM/EM/XR	I60M4×10	WT15IP
ZSD04-405-XP40-SP11-02	△	40.5	40	47	165	190	70	260	SPMX110408-XM/LM/EM/XR	I60M4×10	WT15IP
ZSD04-410-XP40-SP11-02	▲	41.0	40	47	167	192	70	262	SPMX110408-XM/LM/EM/XR	I60M4×10	WT15IP
ZSD04-415-XP40-SP11-02	△	41.5	40	47	169	194	70	264	SPMX110408-XM/LM/EM/XR	I60M4×10	WT15IP
ZSD04-420-XP40-SP11-02	▲	42.0	40	52	171	203	70	273	SPMX110408-XM/LM/EM/XR	I60M4×10	WT15IP
ZSD04-420-XP50-SP11-02	△	42.0	50	57	171	203	80	283	SPMX110408-XM/LM/EM/XR	I60M4×10	WT15IP
ZSD04-425-XP40-SP14-02	△	42.5	40	52	173	205	70	275	SPMX140512-XM/LM/EM/XR	I60M5×13	WT20IP
ZSD04-425-XP50-SP14-02	△	42.5	50	57	173	205	80	285	SPMX140512-XM/LM/EM/XR	I60M5×13	WT20IP
ZSD04-430-XP40-SP14-02	▲	43.0	40	52	175	207	70	277	SPMX140512-XM/LM/EM/XR	I60M5×13	WT20IP
ZSD04-430-XP50-SP14-02	△	43.0	50	57	175	207	80	287	SPMX140512-XM/LM/EM/XR	I60M5×13	WT20IP
ZSD04-435-XP40-SP14-02	△	43.5	40	52	177	209	70	279	SPMX140512-XM/LM/EM/XR	I60M5×13	WT20IP
ZSD04-435-XP50-SP14-02	△	43.5	50	57	177	209	80	289	SPMX140512-XM/LM/EM/XR	I60M5×13	WT20IP
ZSD04-440-XP40-SP14-02	▲	44.0	40	52	179	211	70	281	SPMX140512-XM/LM/EM/XR	I60M5×13	WT20IP
ZSD04-440-XP50-SP14-02	△	44.0	50	57	179	211	80	291	SPMX140512-XM/LM/EM/XR	I60M5×13	WT20IP
ZSD04-445-XP40-SP14-02	△	44.5	40	52	181	213	70	283	SPMX140512-XM/LM/EM/XR	I60M5×13	WT20IP
ZSD04-445-XP50-SP14-02	△	44.5	50	57	181	213	80	293	SPMX140512-XM/LM/EM/XR	I60M5×13	WT20IP
ZSD04-450-XP40-SP14-02	▲	45.0	40	52	183	215	70	285	SPMX140512-XM/LM/EM/XR	I60M5×13	WT20IP
ZSD04-450-XP50-SP14-02	△	45.0	50	57	183	225	80	295	SPMX140512-XM/LM/EM/XR	I60M5×13	WT20IP
ZSD04-455-XP40-SP14-02	△	45.5	40	52	185	217	70	287	SPMX140512-XM/LM/EM/XR	I60M5×13	WT20IP
ZSD04-455-XP50-SP14-02	△	45.5	50	57	185	217	80	297	SPMX140512-XM/LM/EM/XR	I60M5×13	WT20IP
ZSD04-460-XP40-SP14-02	▲	46.0	40	52	187	219	70	289	SPMX140512-XM/LM/EM/XR	I60M5×13	WT20IP
ZSD04-460-XP50-SP14-02	△	46.0	50	57	187	219	80	299	SPMX140512-XM/LM/EM/XR	I60M5×13	WT20IP
ZSD04-465-XP40-SP14-02	△	46.5	40	52	189	221	70	291	SPMX140512-XM/LM/EM/XR	I60M5×13	WT20IP
ZSD04-465-XP50-SP14-02	△	46.5	50	57	189	221	80	301	SPMX140512-XM/LM/EM/XR	I60M5×13	WT20IP
ZSD04-470-XP40-SP14-02	▲	47.0	40	52	191	223	70	293	SPMX140512-XM/LM/EM/XR	I60M5×13	WT20IP
ZSD04-470-XP50-SP14-02	△	47.0	50	57	191	223	80	303	SPMX140512-XM/LM/EM/XR	I60M5×13	WT20IP
ZSD04-475-XP40-SP14-02	△	47.5	40	52	193	225	70	295	SPMX140512-XM/LM/EM/XR	I60M5×13	WT20IP
ZSD04-475-XP50-SP14-02	△	47.5	50	57	193	225	80	305	SPMX140512-XM/LM/EM/XR	I60M5×13	WT20IP
ZSD04-480-XP40-SP14-02	▲	48.0	40	52	195	227	70	297	SPMX140512-XM/LM/EM/XR	I60M5×13	WT20IP
ZSD04-480-XP50-SP14-02	△	48.0	50	57	195	227	80	307	SPMX140512-XM/LM/EM/XR	I60M5×13	WT20IP
ZSD04-485-XP40-SP14-02	△	48.5	40	52	197	229	70	299	SPMX140512-XM/LM/EM/XR	I60M5×13	WT20IP
ZSD04-485-XP50-SP14-02	△	48.5	50	57	197	229	80	309	SPMX140512-XM/LM/EM/XR	I60M5×13	WT20IP
ZSD04-490-XP40-SP14-02	▲	49.0	40	52	199	231	70	301	SPMX140512-XM/LM/EM/XR	I60M5×13	WT20IP
ZSD04-490-XP50-SP14-02	△	49.0	50	57	199	231	80	311	SPMX140512-XM/LM/EM/XR	I60M5×13	WT20IP
ZSD04-495-XP40-SP14-02	△	49.5	40	52	201	233	70	303	SPMX140512-XM/LM/EM/XR	I60M5×13	WT20IP
ZSD04-495-XP50-SP14-02	△	49.5	50	57	201	233	80	313	SPMX140512-XM/LM/EM/XR	I60M5×13	WT20IP
ZSD04-500-XP40-SP14-02	▲	50.0	40	52	203	235	70	305	SPMX140512-XM/LM/EM/XR	I60M5×13	WT20IP
ZSD04-500-XP50-SP14-02	△	50.0	50	57	203	235	80	315	SPMX140512-XM/LM/EM/XR	I60M5×13	WT20IP

▲Stock available △Make-to-order

U drills ZSD05 5D





Type	Stock	Basic dimension(mm)							Applicable inserts	Insert screw	Wrench
		ØD	ØD1	ØD2	L1	L2	Ls	L			
ZSD05-120-XP20-SP04-02	▲	12.0	20	25	63	79	50	129	SPMX040203-XM/LM/EM/XR	I60M1.8×4.5	WT05IP
ZSD05-125-XP20-SP04-02	▲	12.5	20	25	66	82	50	132	SPMX040203-XM/LM/EM/XR	I60M1.8×4.5	WT05IP
ZSD05-130-XP20-SP04-02	▲	13.0	20	25	68	84	50	134	SPMX040203-XM/LM/EM/XR	I60M1.8×4.5	WT05IP
ZSD05-135-XP20-SP04-02	▲	13.5	20	25	71	87	50	137	SPMX040203-XM/LM/EM/XR	I60M1.8×4.5	WT05IP
ZSD05-140-XP20-SP04-02	▲	14.0	20	25	73	89	50	139	SPMX040203-XM/LM/EM/XR	I60M1.8×4.5	WT05IP
ZSD05-145-XP20-SP04-02	▲	14.5	20	25	76	91	50	141	SPMX040203-XM/LM/EM/XR	I60M1.8×4.5	WT05IP
ZSD05-150-XP20-SP05-02	▲	15.0	20	25	78	94	50	144	SPMX050204-XM/LM/EM/XR	I60M2×4.3	WT06P
ZSD05-155-XP20-SP05-02	▲	15.5	20	25	81	97	50	147	SPMX050204-XM/LM/EM/XR	I60M2×4.3	WT06P
ZSD05-160-XP20-SP05-02	▲	16.0	20	25	83	99	50	149	SPMX050204-XM/LM/EM/XR	I60M2×4.3	WT06P
ZSD05-165-XP20-SP05-02	▲	16.5	20	25	86	102	50	152	SPMX050204-XM/LM/EM/XR	I60M2×4.3	WT06P
ZSD05-170-XP20-SP05-02	▲	17.0	20	25	88	104	50	154	SPMX050204-XM/LM/EM/XR	I60M2×4.3	WT06P
ZSD05-175-XP20-SP05-02	▲	17.5	20	25	91	107	50	157	SPMX050204-XM/LM/EM/XR	I60M2×4.3	WT06P
ZSD05-180-XP25-SP06-02	▲	18.0	25	32	93	112	56	167	SPMX060204-XM/LM/EM/XR	I60M2.2×5.5	WT07IP
ZSD05-185-XP25-SP06-02	▲	18.5	25	32	96	114	56	170	SPMX060204-XM/LM/EM/XR	I60M2.2×5.5	WT07IP
ZSD05-190-XP25-SP06-02	▲	19.0	25	32	98	116	56	172	SPMX060204-XM/LM/EM/XR	I60M2.2×5.5	WT07IP
ZSD05-195-XP25-SP06-02	▲	19.5	25	32	101	119	56	175	SPMX060204-XM/LM/EM/XR	I60M2.2×5.5	WT07IP
ZSD05-200-XP25-SP06-02	▲	20.0	25	32	103	121	56	177	SPMX060204-XM/LM/EM/XR	I60M2.2×5.5	WT07IP
ZSD05-205-XP25-SP06-02	▲	20.5	25	32	106	124	56	180	SPMX060204-XM/LM/EM/XR	I60M2.2×5.5	WT07IP
ZSD05-210-XP25-SP06-02	▲	21.0	25	32	108	126	56	182	SPMX060204-XM/LM/EM/XR	I60M2.2×5.5	WT07IP
ZSD05-215-XP25-SP06-02	▲	21.5	25	32	111	129	56	185	SPMX060204-XM/LM/EM/XR	I60M2.2×5.5	WT07IP
ZSD05-220-XP25-SP06-02	▲	22.0	25	32	113	131	56	187	SPMX060204-XM/LM/EM/XR	I60M2.2×5.5	WT07IP
ZSD05-225-XP25-SP07-02	▲	22.5	25	32	116	134	56	190	SPMX07T308-XM/LM/EM/XR	I60M2.5×6.5	WT07IP
ZSD05-230-XP25-SP07-02	▲	23.0	25	32	118	138	56	194	SPMX07T308-XM/LM/EM/XR	I60M2.5×6.5	WT07IP
ZSD05-235-XP25-SP07-02	▲	23.5	25	32	121	141	56	197	SPMX07T308-XM/LM/EM/XR	I60M2.5×6.5	WT07IP
ZSD05-240-XP25-SP07-02	▲	24.0	25	32	123	143	56	199	SPMX07T308-XM/LM/EM/XR	I60M2.5×6.5	WT07IP
ZSD05-245-XP25-SP07-02	▲	24.5	25	32	126	146	56	202	SPMX07T308-XM/LM/EM/XR	I60M2.5×6.5	WT07IP
ZSD05-250-XP25-SP07-02	▲	25.0	25	32	128	148	56	204	SPMX07T308-XM/LM/EM/XR	I60M2.5×6.5	WT07IP
ZSD05-250-XP32-SP07-02	▲	25.0	32	37	128	148	60	208	SPMX07T308-XM/LM/EM/XR	I60M2.5×6.5	WT07IP
ZSD05-255-XP25-SP07-02	▲	25.5	25	32	131	151	56	207	SPMX07T308-XM/LM/EM/XR	I60M2.5×6.5	WT07IP
ZSD05-255-XP32-SP07-02	▲	25.5	32	37	131	151	60	211	SPMX07T308-XM/LM/EM/XR	I60M2.5×6.5	WT07IP
ZSD05-260-XP25-SP07-02	▲	26.0	25	32	133	153	56	209	SPMX07T308-XM/LM/EM/XR	I60M2.5×6.5	WT07IP
ZSD05-260-XP32-SP07-02	▲	26.0	32	37	133	153	60	213	SPMX07T308-XM/LM/EM/XR	I60M2.5×6.5	WT07IP

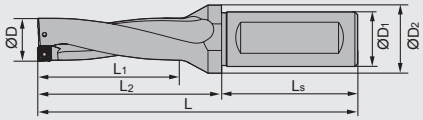
▲Stock available △Make-to-order

Type	Stock	Basic dimension(mm)							Applicable inserts	Insert screw	Wrench
		ØD	ØD1	ØD2	L1	L2	Ls	L			
ZSD05-265-XP25-SP07-02	▲	26.5	25	32	136	156	56	212	SPMX07T308- XM/LM/EM/XR	I60M2.5×6.5	WT07IP
ZSD05-265-XP32-SP07-02	▲	26.5	32	37	136	156	60	216	SPMX07T308- XM/LM/EM/XR	I60M2.5×6.5	WT07IP
ZSD05-270-XP25-SP07-02	▲	27.0	25	32	138	158	56	214	SPMX07T308- XM/LM/EM/XR	I60M2.5×6.5	WT07IP
ZSD05-270-XP32-SP07-02	▲	27.0	32	37	138	158	60	218	SPMX07T308- XM/LM/EM/XR	I60M2.5×6.5	WT07IP
ZSD05-275-XP25-SP07-02	▲	27.5	25	32	141	161	56	217	SPMX07T308- XM/LM/EM/XR	I60M2.5×6.5	WT07IP
ZSD05-275-XP32-SP07-02	▲	27.5	32	37	141	161	60	221	SPMX07T308- XM/LM/EM/XR	I60M2.5×6.5	WT07IP
ZSD05-280-XP32-SP09-02	▲	28.0	32	37	143	163	60	223	SPMX090408- XM/LM/EM/XR	I60M3.5×8	WT15IP
ZSD05-285-XP32-SP09-02	▲	28.5	32	37	146	166	60	226	SPMX090408- XM/LM/EM/XR	I60M3.5×8	WT15IP
ZSD05-290-XP32-SP09-02	▲	29.0	32	37	148	168	60	228	SPMX090408- XM/LM/EM/XR	I60M3.5×8	WT15IP
ZSD05-295-XP32-SP09-02	▲	29.5	32	37	151	171	60	231	SPMX090408- XM/LM/EM/XR	I60M3.5×8	WT15IP
ZSD05-300-XP32-SP09-02	▲	30.0	32	37	153	173	60	233	SPMX090408- XM/LM/EM/XR	I60M3.5×8	WT15IP
ZSD05-305-XP32-SP09-02	▲	30.5	32	37	156	176	60	236	SPMX090408- XM/LM/EM/XR	I60M3.5×8	WT15IP
ZSD05-310-XP32-SP09-02	▲	31.0	32	37	158	178	60	238	SPMX090408- XM/LM/EM/XR	I60M3.5×8	WT15IP
ZSD05-315-XP32-SP09-02	▲	31.5	32	37	161	181	60	241	SPMX090408- XM/LM/EM/XR	I60M3.5×8	WT15IP
ZSD05-320-XP32-SP09-02	▲	32.0	32	37	163	183	60	243	SPMX090408- XM/LM/EM/XR	I60M3.5×8	WT15IP
ZSD05-320-XP40-SP09-02	▲	32.0	40	47	163	183	70	253	SPMX090408- XM/LM/EM/XR	I60M3.5×8	WT15IP
ZSD05-325-XP32-SP09-02	▲	32.5	32	37	166	186	60	246	SPMX090408- XM/LM/EM/XR	I60M3.5×8	WT15IP
ZSD05-325-XP40-SP09-02	▲	32.5	40	47	166	186	70	256	SPMX090408- XM/LM/EM/XR	I60M3.5×8	WT15IP
ZSD05-330-XP32-SP09-02	▲	33.0	32	37	168	189	60	249	SPMX090408- XM/LM/EM/XR	I60M3.5×8	WT15IP
ZSD05-330-XP40-SP09-02	▲	33.0	40	47	168	189	70	259	SPMX090408- XM/LM/EM/XR	I60M3.5×8	WT15IP
ZSD05-335-XP32-SP09-02	▲	33.5	32	37	171	193	60	253	SPMX090408- XM/LM/EM/XR	I60M3.5×8	WT15IP
ZSD05-335-XP40-SP09-02	▲	33.5	40	47	171	193	70	263	SPMX090408- XM/LM/EM/XR	I60M3.5×8	WT15IP
ZSD05-340-XP40-SP11-02	▲	34.0	40	47	173	198	70	268	SPMX110408- XM/LM/EM/XR	I60M4×10	WT15IP
ZSD05-345-XP40-SP11-02	△	34.5	40	47	176	201	70	271	SPMX110408- XM/LM/EM/XR	I60M4×10	WT15IP
ZSD05-350-XP40-SP11-02	▲	35.0	40	47	178	203	70	273	SPMX110408- XM/LM/EM/XR	I60M4×10	WT15IP
ZSD05-355-XP40-SP11-02	△	35.5	40	47	181	206	70	276	SPMX110408- XM/LM/EM/XR	I60M4×10	WT15IP
ZSD05-360-XP40-SP11-02	▲	36.0	40	47	183	208	70	278	SPMX110408- XM/LM/EM/XR	I60M4×10	WT15IP
ZSD05-365-XP40-SP11-02	△	36.5	40	47	186	211	70	281	SPMX110408- XM/LM/EM/XR	I60M4×10	WT15IP
ZSD05-370-XP40-SP11-02	▲	37.0	40	47	188	213	70	283	SPMX110408- XM/LM/EM/XR	I60M4×10	WT15IP
ZSD05-375-XP40-SP11-02	△	37.5	40	47	191	216	70	286	SPMX110408- XM/LM/EM/XR	I60M4×10	WT15IP
ZSD05-380-XP40-SP11-02	▲	38.0	40	47	193	218	70	288	SPMX110408- XM/LM/EM/XR	I60M4×10	WT15IP
ZSD05-385-XP40-SP11-02	△	38.5	40	47	196	221	70	291	SPMX110408- XM/LM/EM/XR	I60M4×10	WT15IP
ZSD05-390-XP40-SP11-02	▲	39.0	40	47	198	223	70	293	SPMX110408- XM/LM/EM/XR	I60M4×10	WT15IP
ZSD05-395-XP40-SP11-02	△	39.5	40	47	201	226	70	296	SPMX110408- XM/LM/EM/XR	I60M4×10	WT15IP
ZSD05-400-XP40-SP11-02	▲	40.0	40	47	203	228	70	298	SPMX110408- XM/LM/EM/XR	I60M4×10	WT15IP
ZSD05-405-XP40-SP11-02	△	40.5	40	47	206	231	70	301	SPMX110408- XM/LM/EM/XR	I60M4×10	WT15IP
ZSD05-410-XP40-SP11-02	▲	41.0	40	47	208	233	70	303	SPMX110408- XM/LM/EM/XR	I60M4×10	WT15IP
ZSD05-415-XP40-SP11-02	△	41.5	40	47	211	236	70	306	SPMX110408- XM/LM/EM/XR	I60M4×10	WT15IP
ZSD05-420-XP40-SP11-02	▲	42.0	40	52	213	245	70	315	SPMX110408- XM/LM/EM/XR	I60M4×10	WT15IP
ZSD05-420-XP50-SP11-02	△	42.0	50	57	213	245	80	325	SPMX110408- XM/LM/EM/XR	I60M4×10	WT15IP
ZSD05-425-XP40-SP14-02	△	42.5	40	52	216	248	70	318	SPMX140512- XM/LM/EM/XR	I60M5×13	WT20IP

▲Stock available △Make-to-order

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Type	Stock	Basic dimension(mm)							Applicable inserts	Insert screw	Wrench
		ØD	ØD1	ØD2	L1	L2	Ls	L			
ZSD05-425-XP50-SP14-02	△	42.5	50	57	216	248	80	328	SPMX140512-XM/LM/EM/XR	I60M5×13	WT20IP
ZSD05-430-XP40-SP14-02	▲	43.0	40	52	218	250	70	320	SPMX140512-XM/LM/EM/XR	I60M5×13	WT20IP
ZSD05-430-XP50-SP14-02	△	43.0	50	57	218	250	80	330	SPMX140512-XM/LM/EM/XR	I60M5×13	WT20IP
ZSD05-435-XP40-SP14-02	△	43.5	40	52	221	253	70	323	SPMX140512-XM/LM/EM/XR	I60M5×13	WT20IP
ZSD05-435-XP50-SP14-02	△	43.5	50	57	221	253	80	333	SPMX140512-XM/LM/EM/XR	I60M5×13	WT20IP
ZSD05-440-XP40-SP14-02	▲	44.0	40	52	223	255	70	325	SPMX140512-XM/LM/EM/XR	I60M5×13	WT20IP
ZSD05-440-XP50-SP14-02	△	44.0	50	57	223	255	80	335	SPMX140512-XM/LM/EM/XR	I60M5×13	WT20IP
ZSD05-445-XP40-SP14-02	△	44.5	40	52	226	258	70	328	SPMX140512-XM/LM/EM/XR	I60M5×13	WT20IP
ZSD05-445-XP50-SP14-02	△	45.5	50	57	226	258	80	338	SPMX140512-XM/LM/EM/XR	I60M5×13	WT20IP
ZSD05-450-XP40-SP14-02	▲	45.0	40	52	228	260	70	330	SPMX140512-XM/LM/EM/XR	I60M5×13	WT20IP
ZSD05-450-XP50-SP14-02	△	45.0	50	57	228	260	80	340	SPMX140512-XM/LM/EM/XR	I60M5×13	WT20IP
ZSD05-455-XP40-SP14-02	△	45.5	40	52	231	263	70	333	SPMX140512-XM/LM/EM/XR	I60M5×13	WT20IP
ZSD05-455-XP50-SP14-02	△	45.5	50	57	231	263	80	343	SPMX140512-XM/LM/EM/XR	I60M5×13	WT20IP
ZSD05-460-XP40-SP14-02	▲	46.0	40	52	233	265	70	335	SPMX140512-XM/LM/EM/XR	I60M5×13	WT20IP
ZSD05-460-XP50-SP14-02	△	46.0	50	57	233	265	80	345	SPMX140512-XM/LM/EM/XR	I60M5×13	WT20IP
ZSD05-465-XP40-SP14-02	△	46.5	40	52	236	268	70	338	SPMX140512-XM/LM/EM/XR	I60M5×13	WT20IP
ZSD05-465-XP50-SP14-02	△	46.5	50	57	236	268	80	348	SPMX140512-XM/LM/EM/XR	I60M5×13	WT20IP
ZSD05-470-XP40-SP14-02	▲	47.0	40	52	238	270	70	340	SPMX140512-XM/LM/EM/XR	I60M5×13	WT20IP
ZSD05-470-XP50-SP14-02	△	47.0	50	57	238	270	80	350	SPMX140512-XM/LM/EM/XR	I60M5×13	WT20IP
ZSD05-475-XP40-SP14-02	△	47.5	40	52	241	273	70	343	SPMX140512-XM/LM/EM/XR	I60M5×13	WT20IP
ZSD05-475-XP50-SP14-02	△	47.5	50	57	241	273	80	353	SPMX140512-XM/LM/EM/XR	I60M5×13	WT20IP
ZSD05-480-XP40-SP14-02	▲	48.0	40	52	243	275	70	345	SPMX140512-XM/LM/EM/XR	I60M5×13	WT20IP
ZSD05-480-XP50-SP14-02	△	48.0	50	57	246	275	80	355	SPMX140512-XM/LM/EM/XR	I60M5×13	WT20IP
ZSD05-485-XP40-SP14-02	△	48.5	40	52	246	278	70	348	SPMX140512-XM/LM/EM/XR	I60M5×13	WT20IP
ZSD05-485-XP50-SP14-02	△	48.5	50	57	246	278	80	358	SPMX140512-XM/LM/EM/XR	I60M5×13	WT20IP
ZSD05-490-XP40-SP14-02	▲	49.0	40	52	248	280	70	350	SPMX140512-XM/LM/EM/XR	I60M5×13	WT20IP
ZSD05-490-XP50-SP14-02	△	49.0	50	57	248	280	80	360	SPMX140512-XM/LM/EM/XR	I60M5×13	WT20IP
ZSD05-495-XP40-SP14-02	△	49.5	40	52	251	283	70	353	SPMX140512-XM/LM/EM/XR	I60M5×13	WT20IP
ZSD05-495-XP50-SP14-02	△	49.5	50	57	251	283	80	363	SPMX140512-XM/LM/EM/XR	I60M5×13	WT20IP
ZSD05-500-XP40-SP14-02	▲	50.0	40	52	253	285	70	355	SPMX140512-XM/LM/EM/XR	I60M5×13	WT20IP
ZSD05-500-XP50-SP14-02	△	50.0	50	57	253	285	80	365	SPMX140512-XM/LM/EM/XR	I60M5×13	WT20IP

▲Stock available △Make-to-order

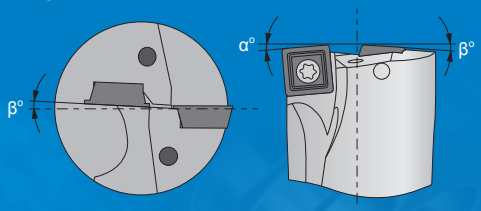
Silver fox -New indexable drills for shallow holes



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.

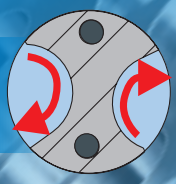


Innovative technology fully upgrading

Optimized flutes and double spiraled internal coolant holes for high efficient drilling.

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.



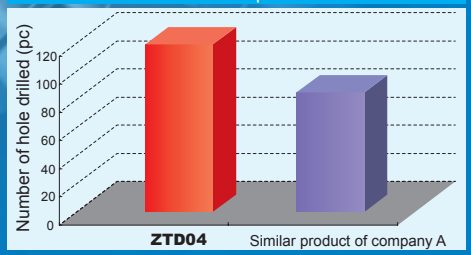
Case

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: Vc=130m/min; f=210mm/min; ap=90mm



Machining situation

Tool life comparison

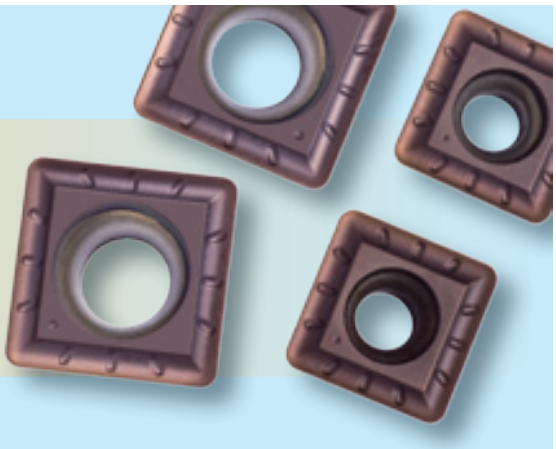


Chips



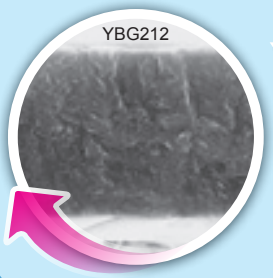
ZTD04-260-XP25-SP07-02 Similar product of company A

- 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

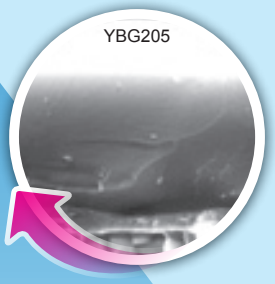


YBG212

- 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.

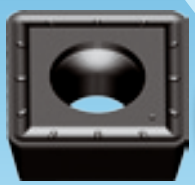


Peripheral edge insert



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.



Peripheral edge insert



YB6338

The tool life can increase over 50% for machining P material under steady working condition.

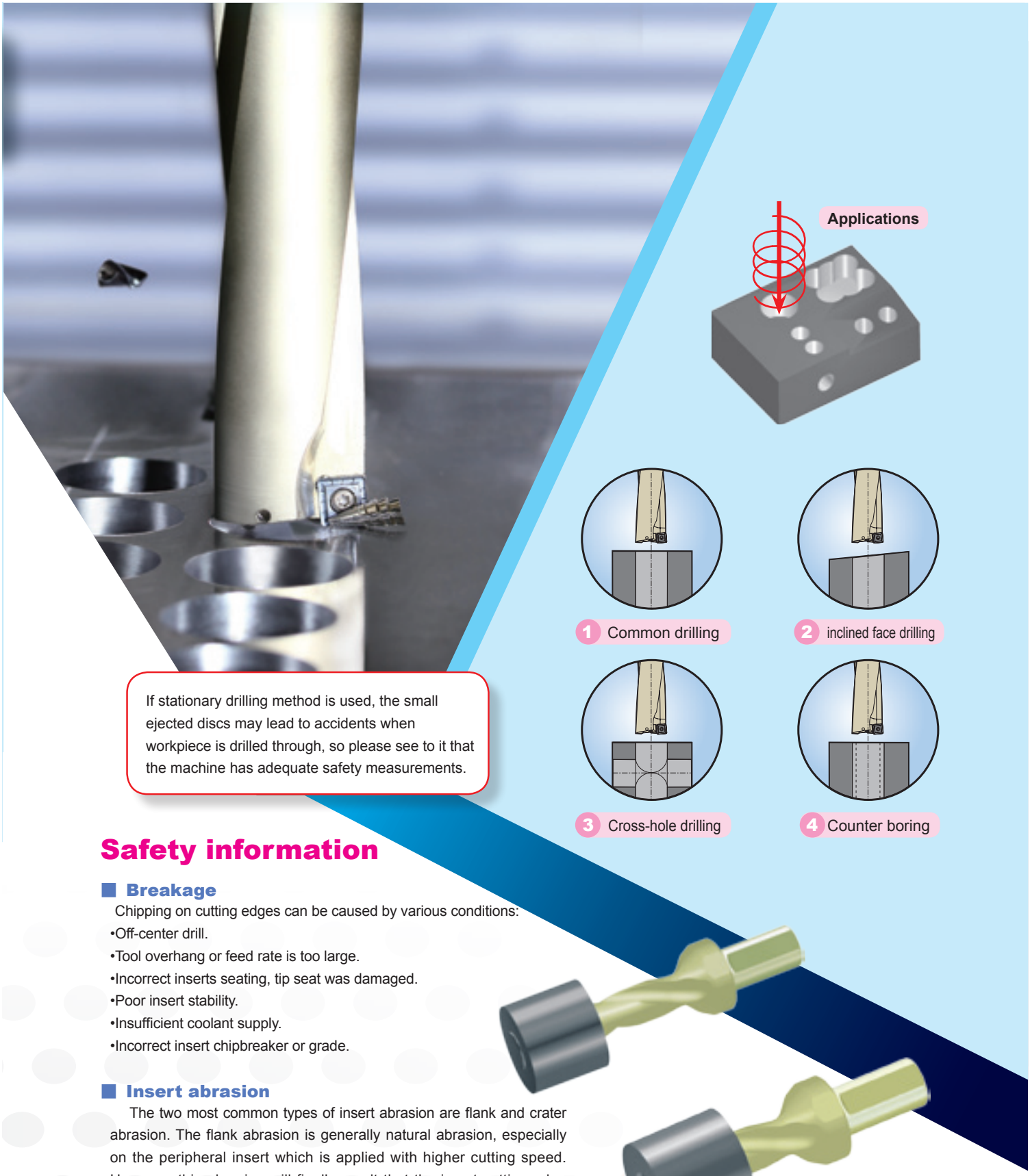
- Substrate of a tough gradient cemented carbide, enriched with surface bonding phase, nano-dioxygen gradient transition layer, and crystal core pre-implantation coating technology, improves the inserts' wear and heat resistance.
- Suitable for high-speed, high-feed, and stable working conditions, it is the first choice for drilling of steel.



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.

Safety information

Breakage

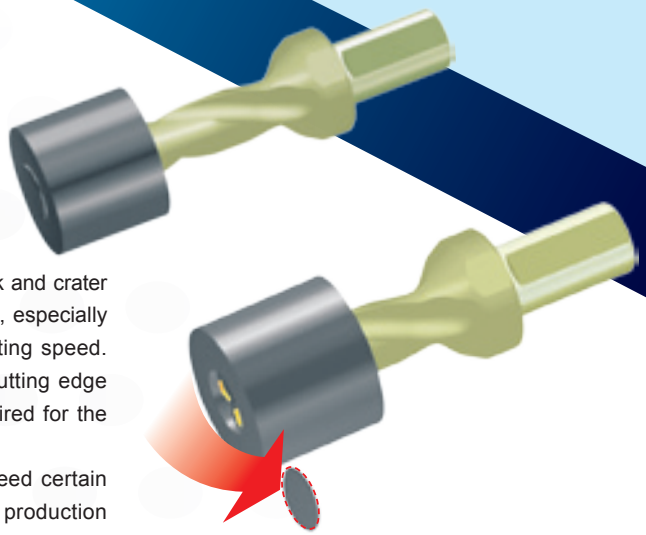
Chipping on cutting edges can be caused by various conditions:

- 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

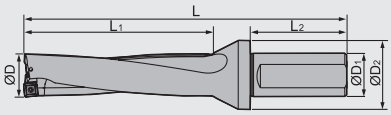
The two most common types of insert abrasion are flank and crater abrasion. The flank abrasion is generally natural abrasion, especially on the peripheral insert which is applied with higher cutting speed. However, this abrasion will finally result that the insert cutting edge cannot achieve the tolerance 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.



U drills ZTD02 2D



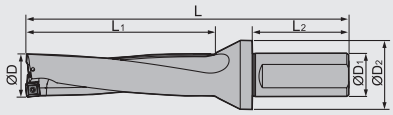


Type	Stock	Basic dimension(mm)						Applicable inserts	Insert screw	Wrench
		ØD	ØD1	ØD2	L1	L2	L			
ZTD02-130-XP20-SP04-02	▲	13	20	25	31	50	98	SPGT04T102-PM/EM	I60M1.8×4	WT05IP
ZTD02-140-XP20-SP04-02	▲	14	20	25	33	50	100	SPGT04T102-PM/EM	I60M1.8×4	WT05IP
ZTD02-150-XP20-SP05-02	▲	15	20	25	35	50	102	SPGT050204-PM/EM	I60M2×4.3	WT06P
ZTD02-160-XP20-SP05-02	▲	16	20	25	37	50	104	SPGT050204-PM/EM	I60M2×4.3	WT06P
ZTD02-170-XP25-SP05-02	▲	17	25	32	39	56	117	SPGT050204-PM/EM	I60M2×4.3	WT06P
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
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
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
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

U drills ZTD03 3D



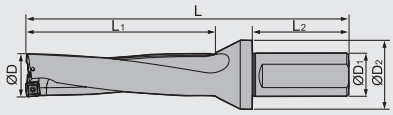


Type	Stock	Basic dimension(mm)						Applicable inserts	Insert screw	Wrench
		ØD	ØD1	ØD2	L1	L2	L			
ZTD03-130-XP20-SP04-02	▲	13	20	25	44	50	111	SPGT04T102-PM/EM	I60M1.8×4	WT05IP
ZTD03-140-XP20-SP04-02	▲	14	20	25	47	50	114	SPGT04T102-PM/EM	I60M1.8×4	WT05IP
ZTD03-150-XP20-SP05-02	▲	15	20	25	50	50	117	SPGT050204-PM/EM	I60M2×4.3	WT06P
ZTD03-160-XP20-SP05-02	▲	16	20	25	53	50	120	SPGT050204-PM/EM	I60M2×4.3	WT06P
ZTD03-170-XP25-SP05-02	▲	17	25	32	56	56	134	SPGT050204-PM/EM	I60M2×4.3	WT06P
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
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
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
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

U drills ZTD04 4D



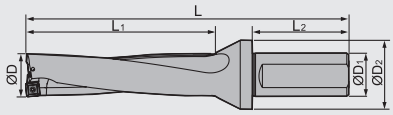


Type	Stock	Basic dimension(mm)						Applicable inserts	Insert screw	Wrench
		ØD	ØD1	ØD2	L1	L2	L			
ZTD04-130-XP20-SP04-02	▲	13	20	25	57	50	124	SPGT04T102-PM/EM	I60M1.8×4	WT05IP
ZTD04-140-XP20-SP04-02	▲	14	20	25	61	50	128	SPGT04T102-PM/EM	I60M1.8×4	WT05IP
ZTD04-150-XP20-SP05-02	▲	15	20	25	65	50	132	SPGT050204-PM/EM	I60M2×4.3	WT06P
ZTD04-160-XP20-SP05-02	▲	16	20	25	69	50	136	SPGT050204-PM/EM	I60M2×4.3	WT06P
ZTD04-170-XP25-SP05-02	▲	17	25	32	73	56	151	SPGT050204-PM/EM	I60M2×4.3	WT06P
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
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
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
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

U drills ZTD05 5D





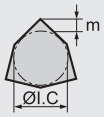
Type	Stock	Basic dimension(mm)						Applicable inserts	Insert screw	Wrench
		ØD	ØD1	ØD2	L1	L2	L			
ZTD05-130-XP20-SP04-02	▲	13	20	25	70	50	137	SPGT04T102-PM/EM	I60M1.8×4	WT05IP
ZTD05-140-XP20-SP04-02	▲	14	20	25	75	50	142	SPGT04T102-PM/EM	I60M1.8×4	WT05IP
ZTD05-150-XP20-SP05-02	▲	15	20	25	80	50	147	SPGT050204-PM/EM	I60M2×4.3	WT06P
ZTD05-160-XP20-SP05-02	▲	16	20	25	85	50	152	SPGT050204-PM/EM	I60M2×4.3	WT06P
ZTD05-170-XP25-SP05-02	▲	17	25	32	90	56	168	SPGT050204-PM/EM	I60M2×4.3	WT06P
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
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
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
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

U drills code key

Code	Insert shap
S	
W	

Insert shape / code

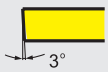
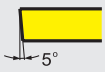
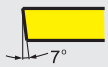
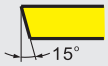
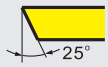
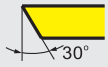


Code	Nose Height m Tolerance(mm)	Inscribed Circle ØI.C Tolerance(mm)	Thickness S Tolerance(mm)	Code	Nose Height m Tolerance(mm)	Inscribed Circle ØI.C Tolerance(mm)	Thickness S Tolerance(mm)
A	±0.005	±0.025	±0.025	J	±0.005	±0.05-±0.13	±0.025
F	±0.005	±0.013	±0.025	K	±0.013	±0.05-±0.13	±0.025
C	±0.013	±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

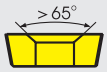
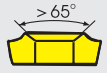
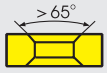
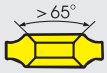
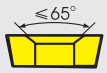
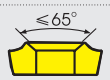
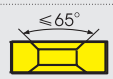
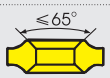
W C M X

Clearance angle of main cutting edge

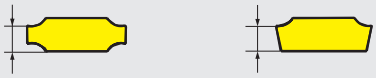
Code	Clearance angle	Code	Clearance angle
A	 3°	B	 5°
C	 7°	D	 15°
E	 20°	F	 25°
G	 30°	N	 0°
P	 11°	O	Other clearance angle

Chipbreaker and clamping system

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°				

U drills code key



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

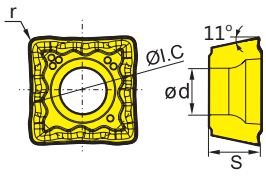
Code	Description
R	Right hand
L	Left hand
N	Neutral

Chipbreaker code

ZSD applicable inserts

-EM



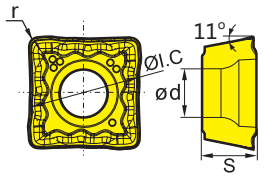


Type	Basic dimension(mm)				CVD grade	PVD grade		
	ØI.C	s	ød	r	YB6338 (Peripheral edge)	YB9315 (Inner/ peripheral edge)	YBS203 (Inner/ peripheral edge)	YB9320 (Inner/ peripheral edge)
SPMX040203-EM	4.0	2.38	2.2	0.3	★	●	●	★
SPMX050204-EM	5.0	2.38	2.2	0.4	★	●	●	★
SPMX060204-EM	6.0	2.38	2.5	0.4	★	●	●	★
SPMX07T308-EM	7.94	3.97	2.8	0.8	★	●	●	★
SPMX090408-EM	9.8	4.3	4.1	0.8	★	●	●	★
SPMX110408-EM	11.5	4.76	4.4	0.8	★	●	●	★
SPMX140512-EM	14.3	5.2	5.5	1.2	★	●	●	★

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

-LM



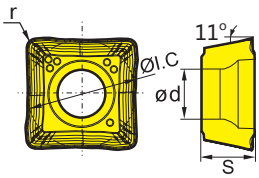


Type	Basic dimension(mm)				CVD grade	PVD grade		
	ØI.C	s	ød	r	YB6338 (Peripheral edge)	YB9315 (Inner/ peripheral edge)	YBS203 (Inner/ peripheral edge)	YB9320 (Inner/ peripheral edge)
SPMX040203-LM	4.0	2.38	2.2	0.3	★	●	●	★
SPMX050204-LM	5.0	2.38	2.2	0.4	★	●	●	★
SPMX060204-LM	6.0	2.38	2.5	0.4	★	●	●	★
SPMX07T308-LM	7.94	3.97	2.8	0.8	★	●	●	★
SPMX090408-LM	9.8	4.3	4.1	0.8	★	●	●	★
SPMX110408-LM	11.5	4.76	4.4	0.8	★	●	●	★
SPMX140512-LM	14.3	5.2	5.5	1.2	★	●	●	★

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

-XM

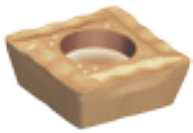


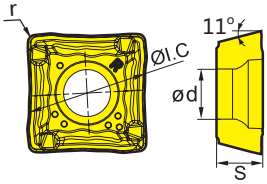


Type	Basic dimension(mm)				CVD grade	PVD grade		
	ØI.C	s	ød	r	YB6338 (Peripheral edge)	YB9315 (Inner/ peripheral edge)	YBS203 (Inner/ peripheral edge)	YB9320 (Inner/ peripheral edge)
SPMX040203-XM	4.0	2.38	2.2	0.3	★	●	●	★
SPMX050204-XM	5.0	2.38	2.2	0.4	★	●	●	★
SPMX060204-XM	6.0	2.38	2.5	0.4	★	●	●	★
SPMX07T308-XM	7.94	3.97	2.8	0.8	★	●	●	★
SPMX090408-XM	9.8	4.3	4.1	0.8	★	●	●	★
SPMX110408-XM	11.5	4.76	4.4	0.8	★	●	●	★
SPMX140512-XM	14.3	5.2	5.5	1.2	★	●	●	★

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

-XR



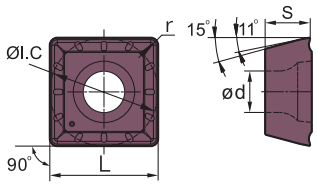


Type	Basic dimension(mm)				CVD grade	PVD grade		
	ØI.C	s	ød	r	YB6338 (Peripheral edge)	YB9315 (Inner/ peripheral edge)	YBS203 (Inner/ peripheral edge)	YB9320 (Inner/ peripheral edge)
SPMX040203-XR	4.0	2.38	2.2	0.3	★	●	●	★
SPMX050204-XR	5.0	2.38	2.2	0.4	★	●	●	★
SPMX060204-XR	6.0	2.38	2.5	0.4	★	●	●	★
SPMX07T308-XR	7.94	3.97	2.8	0.8	★	●	●	★
SPMX090408-XR	9.8	4.3	4.1	0.8	★	●	●	★
SPMX110408-XR	11.5	4.76	4.4	0.8	★	●	●	★
SPMX140512-XR	14.3	5.2	5.5	1.2	★	●	●	★

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

ZTD applicable inserts

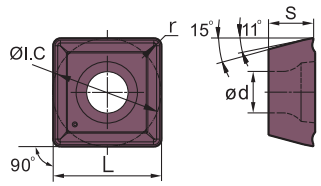




Type	Basic dimension(mm)					Grade		
	L	ØI.C	s	ød	r	YB6338 (peripheral edge)	YBG205 (peripheral edge)	YBG212 (inner edge)
SPGT050204-PM	5	5	2.38	2.2	0.4	★	★	★
SPGT060204-PM	6	6	2.38	2.6	0.4	★	★	★
SPGT07T308-PM	7.94	7.94	3.97	2.8	0.8	★	★	★
SPGT090408-PM	9.8	9.8	4.3	4.2	0.8	★	★	★
SPGT110408-PM	11.5	11.5	4.76	4.4	0.8	★	★	★
SPGT140512-PM	14.3	14.3	5.2	5.75	1.2	★	★	★

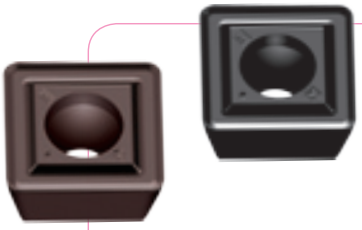
★ Recommended grade (always stock available) ● Available grade (always stock available) ○ Make-to-order





Type	Basic dimension(mm)					Grade		
	L	ØI.C	s	ød	r	YB6338 (peripheral edge)	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.

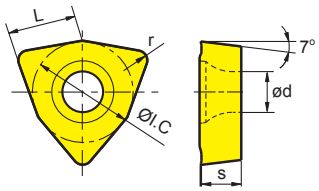
ZTD03 applicable inserts

-53



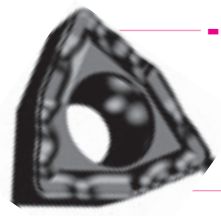
-PG





Type	Basic dimension(mm)					Grade	
	L	ØI.C	s	d	r	YBG202	YB6338
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.

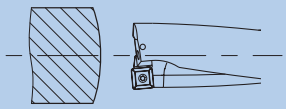
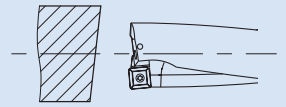
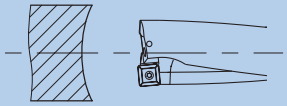
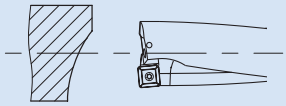
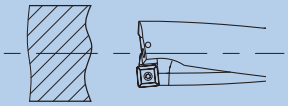
-53 chipbreaker characteristics



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

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 ZSD

ISO	Materials	Hardness HB	Diameter Dc mm	Feed rate fn mm/r	Cutting speed Vc m/min
P	Carbon steel	80-200	12.0-21.5 22.0-33.5 34.0-41.5 42.0-50.0	0.04-0.09 0.05-0.09 0.06-0.10 0.07-0.11	200(170-240)
	Low alloy steel	150-260	12.0-21.5 22.0-33.5 34.0-41.5 42.0-50.0	0.04-0.09 0.05-0.12 0.06-0.14 0.08-0.16	170(140-220)
	Hign alloy steel	150-320	12.0-21.5 22.0-33.5 34.0-41.5 42.0-50.0	0.04-0.09 0.05-0.12 0.06-0.16 0.08-0.18	150(120-180)
	Cast steel	180-250	12.0-21.5 22.0-33.5 34.0-41.5 42.0-50.0	0.04-0.08 0.05-0.08 0.06-0.10 0.07-0.11	140(120-170)
M	Stainless steel Ferrite Martensite	150-270	12.0-21.5 22.0-33.5 34.0-41.5 42.0-50.0	0.04-0.09 0.05-0.12 0.06-0.16 0.08-0.18	160(110-230)
	Austenite	150-275	12.0-21.5 22.0-33.5 34.0-41.5 42.0-50.0	0.04-0.09 0.05-0.11 0.06-0.13 0.08-0.14	140(110-220)
K	Malleable cast iron	150-230	12.0-21.5 22.0-33.5 34.0-41.5 42.0-50.0	0.04-0.10 0.05-0.14 0.08-0.16 0.10-0.20	160(120-220)
	Gray cast iron	150-220	12.0-21.5 22.0-33.5 34.0-41.5 42.0-50.0	0.04-0.10 0.05-0.14 0.08-0.16 0.10-0.20	200(170-240)
	Nodular cast iron	160-250	12.0-21.5 22.0-33.5 34.0-41.5 42.0-50.0	0.04-0.09 0.05-0.12 0.06-0.14 0.08-0.16	160(130-200)
N	Non ferrous meatals	60-110	12.0-21.5 22.0-33.5 34.0-41.5 42.0-50.0	0.04-0.10 0.05-0.14 0.08-0.16 0.10-0.20	300(250-350)

Recommended cutting parameters for ZTD

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)

ZTK series

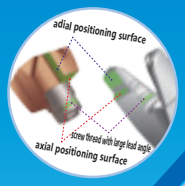
3 Patents

Interchangeable head drill

High-performance Interchangeable head drill with unique structure design, can reduce machining cost and improve production efficiency, Achieve high precision and high efficiency cutting.

Double helical internal coolant holes, provide accurate cooling supply and good chip control during machining;

Double clamping
Both axial, radial positioning surface and thread interface coordinately clamping to ensure stable and reliable tool head assembly;



Unique cutting edge design, with good versatility can ensure smooth cutting, achieve low resistance and efficient machining.





General-purpose machining-GD
The combination of curve and straight cutting edge generates good universality

For Cast iron-KD
Enhanced cutting edge prolong tool life

For AL-LD
Low resistance design, achieve high efficiency cutting

Three types of drill-head, able to meet requirements for various materials, prolong tool life, achieve machining stability.

Case study

Excellent machining accuracy

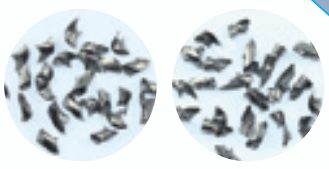
Tool holder specification :
ZTK03-ED125-G16C
Tool head specification :
EDC1260-060-GD
Workpiece material: 42CrMo (HRC30)
Cutting data: Vc=100m/min ;
f=0.20mm/r ; ap=30mm
Cooling type: internal coolant supply



ZTK Similar products of company A

Excellent chip-breaking performance

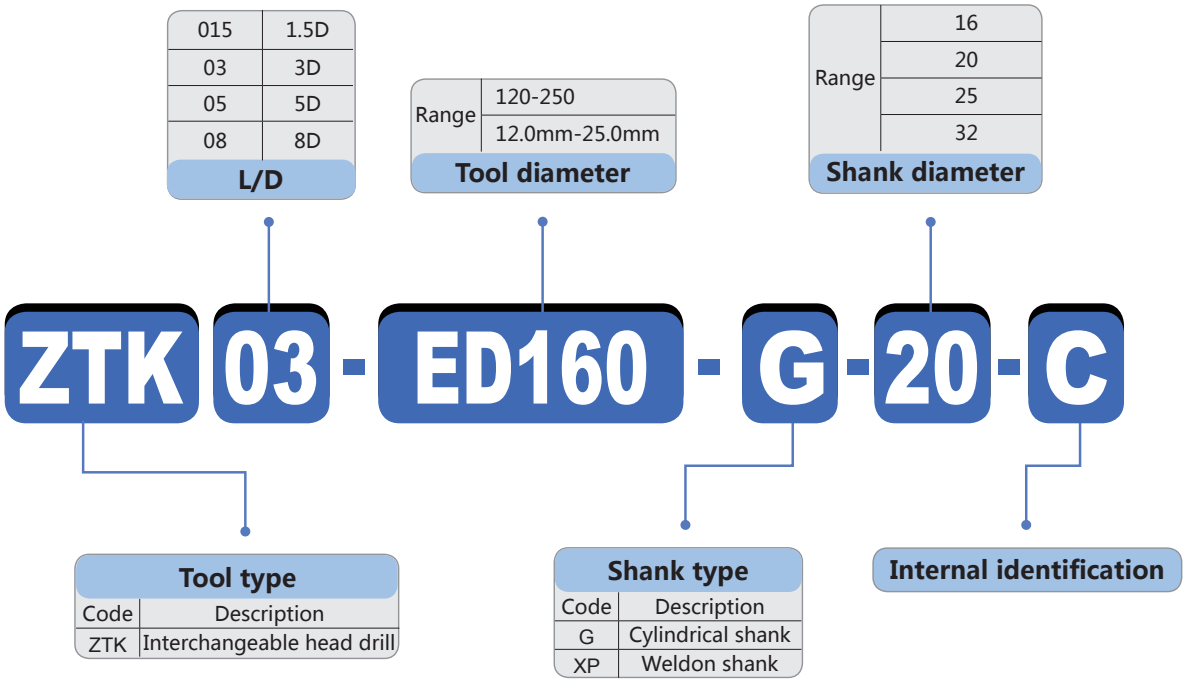
Tool holder specification: ZTK03-ED160-G20C
Tool head specification:
EDC1630-080-GD
Workpiece material: 50Mn (HB240)
Cutting data: Vc=120m/min ;
f=0.30mm/r ;
ap=30mm
Cooling type: internal coolant supply



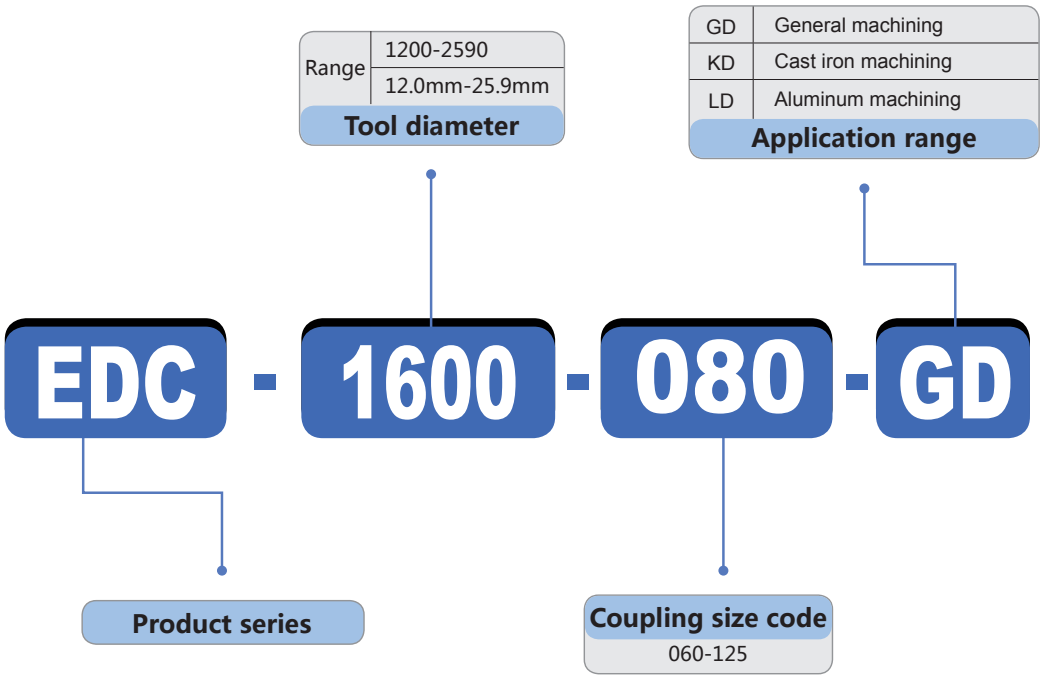
ZTK Similar products of company A

Conclusion: Under the same working conditions, the surface accuracy, verticality and chip breaking performance of our ZTK series interchangeable drill holes are better than similar products of Company A.

Code key of Interchangeable head drill tool holder



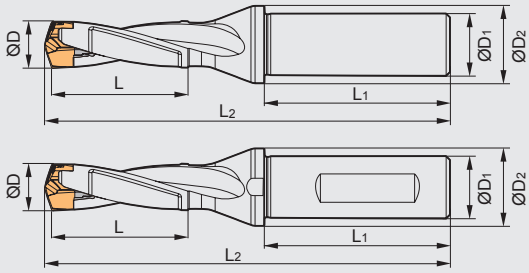
Code key of Interchangeable head drill head



Interchangeable head drill ZTK015 1.5D

Used for shanks with 12.0mm – 25.9mm diameter drill head





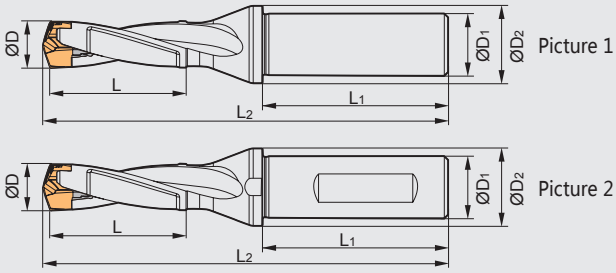
Type		Stock	Basic dimension(mm)						Coupling	Shank form	Wrench
			ØD	L	ØD1	ØD2	L1	L2			
ZTK015 Cylindrical shank	**-ED120-G16C**	▲	12-12.9	18.0	16	20	48	83.0	060	Picture 1	ZTK12-15.9
	-ED130-G16C	▲	13-13.9	19.5	16	20	48	85.5	065	Picture 1	ZTK12-15.9
	-ED140-G20C	▲	14-14.9	21.0	20	25	50	91.0	070	Picture 1	ZTK12-15.9
	-ED150-G20C	▲	15-15.9	22.5	20	25	50	96.5	075	Picture 1	ZTK12-15.9
	-ED160-G20C	▲	16-16.9	24.0	20	25	50	100.0	080	Picture 1	ZTK16-20.9
	-ED170-G20C	▲	17-17.9	25.5	20	25	50	102.5	085	Picture 1	ZTK16-20.9
	-ED180-G25C	▲	18-18.9	27.0	25	32	56	112.0	090	Picture 1	ZTK16-20.9
	-ED190-G25C	▲	19-19.9	28.5	25	32	56	114.5	095	Picture 1	ZTK16-20.9
	-ED200-G25C	▲	20-20.9	30.0	25	32	56	116.0	100	Picture 1	ZTK16-20.9
	-ED210-G25C	▲	21-21.9	31.5	25	32	56	125.5	105	Picture 1	ZTK21-25.9
	-ED220-G25C	▲	22-22.9	33.0	25	32	56	128.0	110	Picture 1	ZTK21-25.9
	-ED230-G32C	▲	23-23.9	34.5	32	42	60	131.5	115	Picture 1	ZTK21-25.9
	-ED240-G32C	▲	24-24.9	36.0	32	42	60	134.0	120	Picture 1	ZTK21-25.9
	-ED250-G32C	▲	25-25.9	37.5	32	42	60	137.5	125	Picture 1	ZTK21-25.9
Weldon shank	**-ED120-XP16C**	▲	12-12.9	18.0	16	20	48	83.0	060	Picture 2	ZTK12-15.9
	-ED130-XP16C	▲	13-13.9	19.5	16	20	48	85.5	065	Picture 2	ZTK12-15.9
	-ED140-XP20C	▲	14-14.9	21.0	20	25	50	91.0	070	Picture 2	ZTK12-15.9
	-ED150-XP20C	▲	15-15.9	22.5	20	25	50	96.5	075	Picture 2	ZTK12-15.9
	-ED160-XP20C	▲	16-16.9	24.0	20	25	50	100.0	080	Picture 2	ZTK16-20.9
	-ED170-XP20C	▲	17-17.9	25.5	20	25	50	102.5	085	Picture 2	ZTK16-20.9
	-ED180-XP25C	▲	18-18.9	27.0	25	32	56	112.0	090	Picture 2	ZTK16-20.9
	-ED190-XP25C	▲	19-19.9	28.5	25	32	56	114.5	095	Picture 2	ZTK16-20.9
	-ED200-XP25C	▲	20-20.9	30.0	25	32	56	116.0	100	Picture 2	ZTK16-20.9
	-ED210-XP25C	▲	21-21.9	31.5	25	32	56	125.5	105	Picture 2	ZTK21-25.9
	-ED220-XP25C	▲	22-22.9	33.0	25	32	56	128.0	110	Picture 2	ZTK21-25.9
	-ED230-XP32C	▲	23-23.9	34.5	32	42	60	131.5	115	Picture 2	ZTK21-25.9
	-ED240-XP32C	▲	24-24.9	36.0	32	42	60	134.0	120	Picture 2	ZTK21-25.9
	-ED250-XP32C	▲	25-25.9	37.5	32	42	60	137.5	125	Picture 2	ZTK21-25.9

▲Regular Stock △Made-to-order

Interchangeable head drill ZTK03 3D

Used for shanks with 12.0mm – 25.9mm diameter drill head





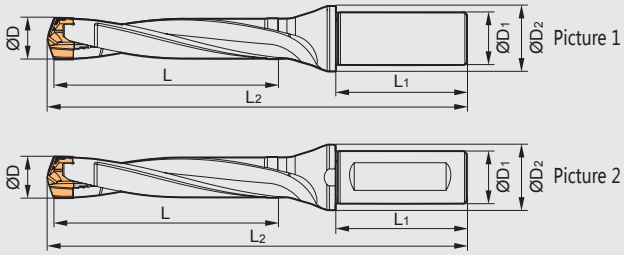
Type		Stock	Basic dimension(mm)						Coupling	Shank form	Wrench
			ØD	L	ØD1	ØD2	L1	L2			
ZTK03 Cylindrical shank	**-ED120-G16C**	▲	12-12.4	36.0	16	20	48	101.0	060	Picture 1	ZTK12-15.9
	-ED125-G16C	▲	12.5-12.9	37.0	16	20	48	103.0	060	Picture 1	ZTK12-15.9
	-ED130-G16C	▲	13-13.4	39.0	16	20	48	105.0	065	Picture 1	ZTK12-15.9
	-ED135-G16C	▲	13.5-13.9	41.0	16	20	48	107.0	065	Picture 1	ZTK12-15.9
	-ED140-G20C	▲	14-14.4	42.0	20	25	50	112.0	070	Picture 1	ZTK12-15.9
	-ED145-G20C	▲	14.5-14.9	44.0	20	25	50	114.0	070	Picture 1	ZTK12-15.9
	-ED150-G20C	▲	15-15.9	45.0	20	25	50	119.0	075	Picture 1	ZTK12-15.9
	-ED160-G20C	▲	16-16.9	48.0	20	25	50	124.0	080	Picture 1	ZTK16-20.9
	-ED170-G20C	▲	17-17.9	51.0	20	25	50	128.0	085	Picture 1	ZTK16-20.9
	-ED180-G25C	▲	18-18.9	54.0	25	32	56	139.0	090	Picture 1	ZTK16-20.9
	-ED190-G25C	▲	19-19.9	57.0	25	32	56	143.0	095	Picture 1	ZTK16-20.9
	-ED200-G25C	▲	20-20.9	60.0	25	32	56	146.0	100	Picture 1	ZTK16-20.9
	-ED210-G25C	▲	21-21.9	63.0	25	32	56	157.0	105	Picture 1	ZTK21-25.9
	-ED220-G25C	▲	22-22.9	66.0	25	32	56	161.0	110	Picture 1	ZTK21-25.9
	-ED230-G32C	▲	23-23.9	69.0	32	42	60	166.0	115	Picture 1	ZTK21-25.9
	-ED240-G32C	▲	24-24.9	72.0	32	42	60	170.0	120	Picture 1	ZTK21-25.9
	-ED250-G32C	▲	25-25.9	75.0	32	42	60	175.0	125	Picture 1	ZTK21-25.9
Weldon shank	**-ED120-XP16C**	▲	12-12.4	36.0	16	20	48	101.0	060	Picture 2	ZTK12-15.9
	-ED125-XP16C	▲	12.5-12.9	37.0	16	20	48	103.0	060	Picture 2	ZTK12-15.9
	-ED130-XP16C	▲	13-13.4	39.0	16	20	48	105.0	065	Picture 2	ZTK12-15.9
	-ED135-XP16C	▲	13.5-13.9	41.0	16	20	48	107.0	065	Picture 2	ZTK12-15.9
	-ED140-XP20C	▲	14-14.4	42.0	20	25	50	112.0	070	Picture 2	ZTK12-15.9
	-ED145-XP20C	▲	14.5-14.9	44.0	20	25	50	114.0	070	Picture 2	ZTK12-15.9
	-ED150-XP20C	▲	15-15.9	45.0	20	25	50	119.0	075	Picture 2	ZTK12-15.9
	-ED160-XP20C	▲	16-16.9	48.0	20	25	50	124.0	080	Picture 2	ZTK16-20.9
	-ED170-XP20C	▲	17-17.9	51.0	20	25	50	128.0	085	Picture 2	ZTK16-20.9
	-ED180-XP25C	▲	18-18.9	54.0	25	32	56	139.0	090	Picture 2	ZTK16-20.9
	-ED190-XP25C	▲	19-19.9	57.0	25	32	56	143.0	095	Picture 2	ZTK16-20.9
	-ED200-XP25C	▲	20-20.9	60.0	25	32	56	146.0	100	Picture 2	ZTK16-20.9
	-ED210-XP25C	▲	21-21.9	63.0	25	32	56	157.0	105	Picture 2	ZTK21-25.9
	-ED220-XP25C	▲	22-22.9	66.0	25	32	56	161.0	110	Picture 2	ZTK21-25.9
	-ED230-XP32C	▲	23-23.9	69.0	32	42	60	166.0	115	Picture 2	ZTK21-25.9
	-ED240-XP32C	▲	24-24.9	72.0	32	42	60	170.0	120	Picture 2	ZTK21-25.9
	-ED250-XP32C	▲	25-25.9	75.0	32	42	60	175.0	125	Picture 2	ZTK21-25.9

▲Regular Stock △Made-to-order

Interchangeable head drill ZTK05 5D

Used for shanks with 12.0mm – 25.9mm diameter drill head





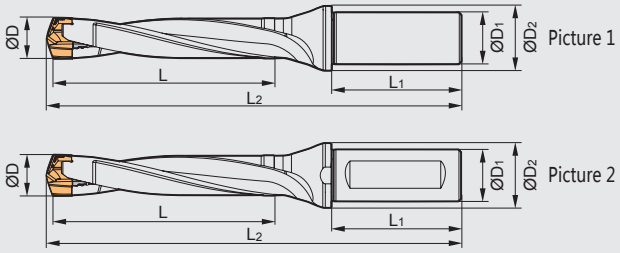
Type		Stock	Basic dimension(mm)						Coupling	Shank form	Wrench
			ØD	L	ØD1	ØD2	L1	L2			
ZTK05 Cylindrical shank	**-ED120-G16C**	▲	12-12.4	60.0	16	20	48	125.0	060	Picture 1	ZTK12-15.9
	-ED125-G16C	▲	12.5-12.9	62.0	16	20	48	128.0	060	Picture 1	ZTK12-15.9
	-ED130-G16C	▲	13-13.4	65.0	16	20	48	131.0	065	Picture 1	ZTK12-15.9
	-ED135-G16C	▲	13.5-13.9	68.0	16	20	48	134.0	065	Picture 1	ZTK12-15.9
	-ED140-G20C	▲	14-14.4	70.0	20	25	50	141.0	070	Picture 1	ZTK12-15.9
	-ED145-G20C	▲	14.5-14.9	73.0	20	25	50	143.0	070	Picture 1	ZTK12-15.9
	-ED150-G20C	▲	15-15.9	75.0	20	25	50	149.0	075	Picture 1	ZTK12-15.9
	-ED160-G20C	▲	16-16.9	80.0	20	25	50	156.0	080	Picture 1	ZTK16-20.9
	-ED170-G20C	▲	17-17.9	85.0	20	25	50	162.0	085	Picture 1	ZTK16-20.9
	-ED180-G25C	▲	18-18.9	90.0	25	32	56	175.0	090	Picture 1	ZTK16-20.9
	-ED190-G25C	▲	19-19.9	95.0	25	32	56	181.0	095	Picture 1	ZTK16-20.9
	-ED200-G25C	▲	20-20.9	100.0	25	32	56	188.0	100	Picture 1	ZTK16-20.9
	-ED210-G25C	▲	21-21.9	105.0	25	32	56	199.0	105	Picture 1	ZTK21-25.9
	-ED220-G25C	▲	22-22.9	110.0	25	32	56	205.0	110	Picture 1	ZTK21-25.9
	-ED230-G32C	▲	23-23.9	115.0	32	42	60	212.0	115	Picture 1	ZTK21-25.9
	-ED240-G32C	▲	24-24.9	120.0	32	42	60	218.0	120	Picture 1	ZTK21-25.9
	-ED250-G32C	▲	25-25.9	125.0	32	42	60	225.0	125	Picture 1	ZTK21-25.9
Weldon shank	**-ED120-XP16C**	▲	12-12.4	60.0	16	20	48	125.0	060	Picture 2	ZTK12-15.9
	-ED125-XP16C	▲	12.5-12.9	62.0	16	20	48	128.0	060	Picture 2	ZTK12-15.9
	-ED130-XP16C	▲	13-13.4	65.0	16	20	48	131.0	065	Picture 2	ZTK12-15.9
	-ED135-XP16C	▲	13.5-13.9	68.0	16	20	48	134.0	065	Picture 2	ZTK12-15.9
	-ED140-XP20C	▲	14-14.4	70.0	20	25	50	141.0	070	Picture 2	ZTK12-15.9
	-ED145-XP20C	▲	14.5-14.9	73.0	20	25	50	143.0	070	Picture 2	ZTK12-15.9
	-ED150-XP20C	▲	15-15.9	75.0	20	25	50	149.0	075	Picture 2	ZTK12-15.9
	-ED160-XP20C	▲	16-16.9	80.0	20	25	50	156.0	080	Picture 2	ZTK16-20.9
	-ED170-XP20C	▲	17-17.9	85.0	20	25	50	162.0	085	Picture 2	ZTK16-20.9
	-ED180-XP25C	▲	18-18.9	90.0	25	32	56	175.0	090	Picture 2	ZTK16-20.9
	-ED190-XP25C	▲	19-19.9	95.0	25	32	56	181.0	095	Picture 2	ZTK16-20.9
	-ED200-XP25C	▲	20-20.9	100.0	25	32	56	188.0	100	Picture 2	ZTK16-20.9
	-ED210-XP25C	▲	21-21.9	105.0	25	32	56	199.0	105	Picture 2	ZTK21-25.9
	-ED220-XP25C	▲	22-22.9	110.0	25	32	56	205.0	110	Picture 2	ZTK21-25.9
	-ED230-XP32C	▲	23-23.9	115.0	32	42	60	212.0	115	Picture 2	ZTK21-25.9
	-ED240-XP32C	▲	24-24.9	120.0	32	42	60	218.0	120	Picture 2	ZTK21-25.9
	-ED250-XP32C	▲	25-25.9	125.0	32	42	60	225.0	125	Picture 2	ZTK21-25.9

▲Regular Stock △Made-to-order

Interchangeable head drill ZTK08 8D

Used for shanks with 12.0mm – 25.9mm diameter drill head





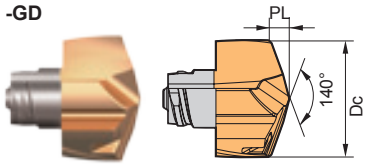
Type		Stock	Basic dimension(mm)						Coupling	Shank form	Wrench
			ØD	L	ØD1	ØD2	L1	L2			
ZTK08 Cylindrical shank	**-ED120-G16C**	▲	12-12.4	96.0	16	20	48	161.0	060	Picture 1	ZTK12-15.9
	-ED125-G16C	▲	12.5-12.9	99.5	16	20	48	165.5	060	Picture 1	ZTK12-15.9
	-ED130-G16C	▲	13-13.4	104.0	16	20	48	170.0	065	Picture 1	ZTK12-15.9
	-ED135-G16C	▲	13.5-13.9	108.5	16	20	48	174.5	065	Picture 1	ZTK12-15.9
	-ED140-G20C	▲	14-14.4	112.0	20	25	50	183.0	070	Picture 1	ZTK12-15.9
	-ED145-G20C	▲	14.5-14.9	116.5	20	25	50	186.5	070	Picture 1	ZTK12-15.9
	-ED150-G20C	▲	15-15.9	120.0	20	25	50	194.0	075	Picture 1	ZTK12-15.9
	-ED160-G20C	▲	16-16.9	128.0	20	25	50	204.0	080	Picture 1	ZTK16-20.9
	-ED170-G20C	▲	17-17.9	136.0	20	25	50	213.0	085	Picture 1	ZTK16-20.9
	-ED180-G25C	▲	18-18.9	144.0	25	32	56	229.0	090	Picture 1	ZTK16-20.9
	-ED190-G25C	▲	19-19.9	152.0	25	32	56	238.0	095	Picture 1	ZTK16-20.9
	-ED200-G25C	▲	20-20.9	160.0	25	32	56	248.0	100	Picture 1	ZTK16-20.9
	-ED210-G25C	▲	21-21.9	168.0	25	32	56	262.0	105	Picture 1	ZTK21-25.9
	-ED220-G25C	▲	22-22.9	176.0	25	32	56	271.0	110	Picture 1	ZTK21-25.9
	-ED230-G32C	▲	23-23.9	184.0	32	42	60	281.0	115	Picture 1	ZTK21-25.9
	-ED240-G32C	▲	24-24.9	192.0	32	42	60	290.0	120	Picture 1	ZTK21-25.9
	-ED250-G32C	▲	25-25.9	200.0	32	42	60	300.0	125	Picture 1	ZTK21-25.9
Weldon shank	**-ED120-XP16C**	▲	12-12.4	96.0	16	20	48	161.0	060	Picture 2	ZTK12-15.9
	-ED125-XP16C	▲	12.5-12.9	99.5	16	20	48	165.5	060	Picture 2	ZTK12-15.9
	-ED130-XP16C	▲	13-13.4	104.0	16	20	48	170.0	065	Picture 2	ZTK12-15.9
	-ED135-XP16C	▲	13.5-13.9	108.5	16	20	48	174.5	065	Picture 2	ZTK12-15.9
	-ED140-XP20C	▲	14-14.4	112.0	20	25	50	183.8	070	Picture 2	ZTK12-15.9
	-ED145-XP20C	▲	14.5-14.9	116.5	20	25	50	186.5	070	Picture 2	ZTK12-15.9
	-ED150-XP20C	▲	15-15.9	120.0	20	25	50	194.0	075	Picture 2	ZTK12-15.9
	-ED160-XP20C	▲	16-16.9	128.0	20	25	50	204.0	080	Picture 2	ZTK16-20.9
	-ED170-XP20C	▲	17-17.9	136.0	20	25	50	213.0	085	Picture 2	ZTK16-20.9
	-ED180-XP25C	▲	18-18.9	144.0	25	32	56	229.0	090	Picture 2	ZTK16-20.9
	-ED190-XP25C	▲	19-19.9	152.0	25	32	56	238.0	095	Picture 2	ZTK16-20.9
	-ED200-XP25C	▲	20-20.9	160.0	25	32	56	248.0	100	Picture 2	ZTK16-20.9
	-ED210-XP25C	▲	21-21.9	168.0	25	32	56	262.0	105	Picture 2	ZTK21-25.9
	-ED220-XP25C	▲	22-22.9	176.0	25	32	56	271.0	110	Picture 2	ZTK21-25.9
	-ED230-XP32C	▲	23-23.9	184.0	32	42	60	281.0	115	Picture 2	ZTK21-25.9
	-ED240-XP32C	▲	24-24.9	192.0	32	42	60	290.0	120	Picture 2	ZTK21-25.9
	-ED250-XP32C	▲	25-25.9	200.0	32	42	60	300.0	125	Picture 2	ZTK21-25.9

▲Regular Stock △Made-to-order

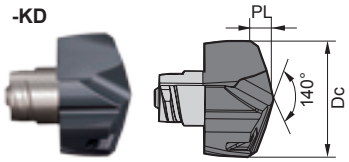
EDC Interchangeable head drill

Diameter 12.0mm – 25.9mm

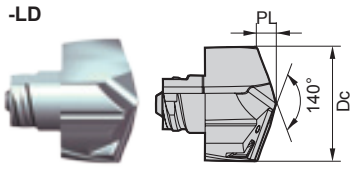
-GD



-KD



-LD



Type	Grade	Basic dimension(mm)		Compatible tool holder	Coupling	Wrench
	KDG3013	Dc	PL			
EDC1200-060-GD/KD/LD	▲	12.0	2.18	ZTK015-ED120-□□ ZTK03-ED120-□□ ZTK05-ED120-□□ ZTK08-ED120-□□	060	ZTK12-15.9
EDC1210-060-GD/KD/LD	△	12.1	2.20			
EDC1220-060-GD/KD/LD	△	12.2	2.22			
EDC1230-060-GD/KD/LD	△	12.3	2.24			
EDC1240-060-GD/KD/LD	△	12.4	2.26			
EDC1250-060-GD/KD/LD	▲	12.5	2.27	ZTK015-ED120-□□ ZTK03-ED125-□□ ZTK05-ED125-□□ ZTK08-ED125-□□		
EDC1260-060-GD/KD/LD	△	12.6	2.29			
EDC1270-060-GD/KD/LD	△	12.7	2.31			
EDC1280-060-GD/KD/LD	△	12.8	2.33			
EDC1290-060-GD/KD/LD	△	12.9	2.35			
EDC1300-065-GD/KD/LD	▲	13.0	2.36	ZTK015-ED130-□□ ZTK03-ED130-□□ ZTK05-ED130-□□ ZTK08-ED130-□□	065	
EDC1310-065-GD/KD/LD	△	13.1	2.38			
EDC1320-065-GD/KD/LD	△	13.2	2.40			
EDC1330-065-GD/KD/LD	△	13.3	2.42			
EDC1340-065-GD/KD/LD	△	13.4	2.44			
EDC1350-065-GD/KD/LD	▲	13.5	2.46	ZTK015-ED130-□□ ZTK03-ED135-□□ ZTK05-ED135-□□ ZTK08-ED135-□□		
EDC1360-065-GD/KD/LD	△	13.6	2.47			
EDC1370-065-GD/KD/LD	△	13.7	2.49			
EDC1380-065-GD/KD/LD	△	13.8	2.51			
EDC1390-065-GD/KD/LD	△	13.9	2.53			
EDC1400-070-GD/KD/LD	▲	14.0	2.55	ZTK015-ED140-□□ ZTK03-ED140-□□ ZTK05-ED140-□□ ZTK08-ED140-□□	070	
EDC1410-070-GD/KD/LD	△	14.1	2.56			
EDC1420-070-GD/KD/LD	△	14.2	2.58			
EDC1430-070-GD/KD/LD	△	14.3	2.60			
EDC1440-070-GD/KD/LD	△	14.4	2.62			
EDC1450-070-GD/KD/LD	▲	14.5	2.64	ZTK015-ED140-□□ ZTK03-ED145-□□ ZTK05-ED145-□□ ZTK08-ED145 -□□		
EDC1460-070-GD/KD/LD	△	14.6	2.66			
EDC1470-070-GD/KD/LD	△	14.7	2.67			
EDC1480-070-GD/KD/LD	△	14.8	2.69			
EDC1490-070-GD/KD/LD	△	14.9	2.71			

▲Regular Stock △Made-to-order

Type	Grade	Basic dimension(mm)		Compatible tool holder	Coupling	Wrench
	KDG3013	Dc	PL			
EDC1500-075-GD/KD/LD	▲	15.0	2.73	ZTK015-ED150-□□ ZTK03-ED150-□□ ZTK05-ED150-□□ ZTK08-ED150-□□	075	ZTK12-15.9
EDC1510-075-GD/KD/LD	△	15.1	2.75			
EDC1520-075-GD/KD/LD	△	15.2	2.76			
EDC1530-075-GD/KD/LD	△	15.3	2.78			
EDC1540-075-GD/KD/LD	△	15.4	2.80			
EDC1550-075-GD/KD/LD	▲	15.5	2.82			
EDC1560-075-GD/KD/LD	△	15.6	2.84			
EDC1570-075-GD/KD/LD	△	15.7	2.86			
EDC1580-075-GD/KD/LD	△	15.8	2.87			
EDC1590-075-GD/KD/LD	△	15.9	2.89			
EDC1600-080-GD/KD/LD	▲	16.0	2.91	ZTK015-ED160-□□ ZTK03-ED160-□□ ZTK05-ED160-□□ ZTK08-ED160-□□	080	ZTK16-20.9
EDC1610-080-GD/KD/LD	△	16.1	2.93			
EDC1620-080-GD/KD/LD	△	16.2	2.95			
EDC1630-080-GD/KD/LD	△	16.3	2.96			
EDC1640-080-GD/KD/LD	△	16.4	2.98			
EDC1650-080-GD/KD/LD	▲	16.5	3.00			
EDC1660-080-GD/KD/LD	△	16.6	3.02			
EDC1670-080-GD/KD/LD	△	16.7	3.04			
EDC1680-080-GD/KD/LD	△	16.8	3.06			
EDC1690-080-GD/KD/LD	△	16.9	3.07			
EDC1700-085-GD/KD/LD	▲	17.0	3.09	ZTK015-ED170-□□ ZTK03-ED170-□□ ZTK05-ED170-□□ ZTK08-ED170-□□	085	
EDC1710-085-GD/KD/LD	△	17.1	3.11			
EDC1720-085-GD/KD/LD	△	17.2	3.13			
EDC1730-085-GD/KD/LD	△	17.3	3.15			
EDC1740-085-GD/KD/LD	△	17.4	3.16			
EDC1750-085-GD/KD/LD	▲	17.5	3.18			
EDC1760-085-GD/KD/LD	△	17.6	3.20			
EDC1770-085-GD/KD/LD	△	17.7	3.22			
EDC1780-085-GD/KD/LD	△	17.8	3.24			
EDC1790-085-GD/KD/LD	△	17.9	3.26			
EDC1800-090-GD/KD/LD	▲	18.0	3.27	ZTK015-ED180-□□ ZTK03-ED180-□□ ZTK05-ED180-□□ ZTK08-ED180-□□	090	
EDC1810-090-GD/KD/LD	△	18.1	3.29			
EDC1820-090-GD/KD/LD	△	18.2	3.31			
EDC1830-090-GD/KD/LD	△	18.3	3.33			

▲Regular Stock △Made-to-order

Applicable material table

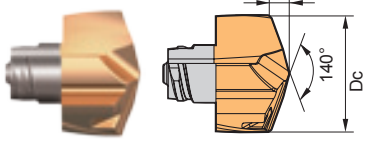
◎Very suitable ○Suitable

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						
○	◎	◎			○	◎	◎	◎		

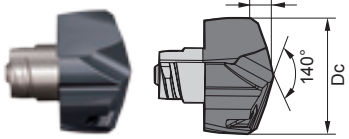
EDC Interchangeable head drill

Diameter 12.0mm – 25.9mm

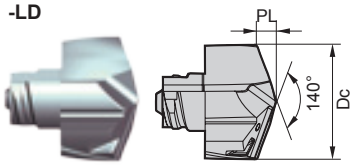
-GD



-KD



-LD



Type	Grade	Basic dimension(mm)		Compatible tool holder	Coupling	Wrench
	KDG3013	Dc	PL			
EDC1840-090-GD/KD/LD	△	18.4	3.35	ZTK015-ED180-□□ ZTK03-ED180-□□ ZTK05-ED180-□□ ZTK08-ED180-□□	090	ZTK16-20.9
EDC1850-090-GD/KD/LD	▲	18.5	3.36			
EDC1860-090-GD/KD/LD	△	18.6	3.38			
EDC1870-090-GD/KD/LD	△	18.7	3.40			
EDC1880-090-GD/KD/LD	△	18.8	3.42			
EDC1890-090-GD/KD/LD	△	18.9	3.44			
EDC1900-095-GD/KD/LD	▲	19.0	3.46	ZTK015-ED190-□□ ZTK03-ED190-□□ ZTK05-ED190-□□ ZTK08-ED190-□□	095	
EDC1910-095-GD/KD/LD	△	19.1	3.47			
EDC1920-095-GD/KD/LD	△	19.2	3.49			
EDC1930-095-GD/KD/LD	△	19.3	3.51			
EDC1940-095-GD/KD/LD	△	19.4	3.53			
EDC1950-095-GD/KD/LD	▲	19.5	3.55			
EDC1960-095-GD/KD/LD	△	19.6	3.56			
EDC1970-095-GD/KD/LD	△	19.7	3.58			
EDC1980-095-GD/KD/LD	△	19.8	3.60			
EDC1990-095-GD/KD/LD	△	19.9	3.62			
EDC2000-100-GD/KD/LD	▲	20.0	3.64	ZTK015-ED200-□□ ZTK03-ED200-□□ ZTK05-ED200-□□ ZTK08-ED200-□□	100	
EDC2010-100-GD/KD/LD	△	20.1	3.66			
EDC2020-100-GD/KD/LD	△	20.2	3.67			
EDC2030-100-GD/KD/LD	△	20.3	3.69			
EDC2040-100-GD/KD/LD	△	20.4	3.71			
EDC2050-100-GD/KD/LD	▲	20.5	3.73			
EDC2060-100-GD/KD/LD	△	20.6	3.75			
EDC2070-100-GD/KD/LD	△	20.7	3.77			
EDC2080-100-GD/KD/LD	△	20.8	3.78			
EDC2090-100-GD/KD/LD	△	20.9	3.80			
EDC2100-105-GD/KD/LD	▲	21.0	3.82	ZTK015-ED210-□□ ZTK03-ED210-□□ ZTK05-ED210-□□ ZTK08-ED210-□□	105	
EDC2110-105-GD/KD/LD	△	21.1	3.84			
EDC2120-105-GD/KD/LD	△	21.2	3.86			
EDC2130-105-GD/KD/LD	△	21.3	3.88			
EDC2140-105-GD/KD/LD	△	21.4	3.89			

▲Regular Stock △Made-to-order

Type	Grade	Basic dimension(mm)		Compatible tool holder	Coupling	Wrench
	KDG3013	Dc	PL			
EDC2150-105-GD/KD/LD	▲	21.5	3.91	ZTK015-ED210-□□ ZTK03-ED210-□□ ZTK05-ED210-□□ ZTK08-ED210-□□	105	ZTK21-25.9
EDC2160-105-GD/KD/LD	△	21.6	3.93			
EDC2170-105-GD/KD/LD	△	21.7	3.95			
EDC2180-105-GD/KD/LD	△	21.8	3.97			
EDC2190-105-GD/KD/LD	△	21.9	3.98			
EDC2200-110-GD/KD/LD	▲	22.0	4.00	ZTK015-ED220-□□ ZTK03-ED220-□□ ZTK05-ED220-□□ ZTK08-ED220-□□	110	
EDC2210-110-GD/KD/LD	△	22.1	4.02			
EDC2220-110-GD/KD/LD	△	22.2	4.04			
EDC2230-110-GD/KD/LD	△	22.3	4.06			
EDC2240-110-GD/KD/LD	△	22.4	4.08			
EDC2250-110-GD/KD/LD	▲	22.5	4.09			
EDC2260-110-GD/KD/LD	△	22.6	4.11			
EDC2270-110-GD/KD/LD	△	22.7	4.13			
EDC2280-110-GD/KD/LD	△	22.8	4.15			
EDC2290-110-GD/KD/LD	△	22.9	4.17			
EDC2300-115-GD/KD/LD	▲	23.0	4.18	ZTK015-ED230-□□ ZTK03-ED230-□□ ZTK05-ED230-□□ ZTK08-ED230-□□	115	
EDC2310-115-GD/KD/LD	△	23.1	4.20			
EDC2320-115-GD/KD/LD	△	23.2	4.22			
EDC2330-115-GD/KD/LD	△	23.3	4.24			
EDC2340-115-GD/KD/LD	△	23.4	4.26			
EDC2350-115-GD/KD/LD	▲	23.5	4.27			
EDC2360-115-GD/KD/LD	△	23.6	4.29			
EDC2370-115-GD/KD/LD	△	23.7	4.31			
EDC2380-115-GD/KD/LD	△	23.8	4.33			
EDC2390-115-GD/KD/LD	△	23.9	4.35			

▲Regular Stock △Made-to-order

Applicable material table

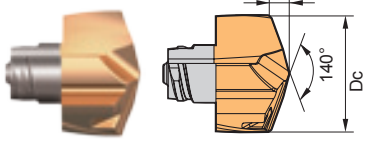
◎Very suitable ○Suitable

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						
○	◎	◎			○	◎	◎	◎		

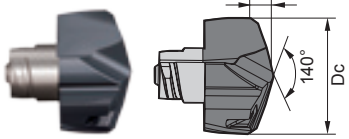
EDC Interchangeable head drill

Diameter 12.0mm – 25.9mm

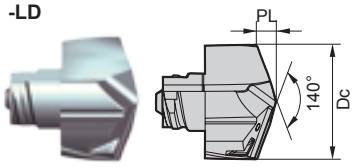
-GD



-KD



-LD



Type	Grade	Basic dimension(mm)		Compatible tool holder	Coupling	Wrench
	KDG3013	Dc	PL			
EDC2400-120-GD/KD/LD	▲	24.0	4.37	ZTK015-ED240-□□ ZTK03-ED240-□□ ZTK05-ED240-□□ ZTK08-ED240-□□	120	ZTK21-25.9
EDC2410-120-GD/KD/LD	△	24.1	4.38			
EDC2420-120-GD/KD/LD	△	24.2	4.40			
EDC2430-120-GD/KD/LD	△	24.3	4.42			
EDC2440-120-GD/KD/LD	△	24.4	4.44			
EDC2450-120-GD/KD/LD	▲	24.5	4.46			
EDC2460-120-GD/KD/LD	△	24.6	4.48			
EDC2470-120-GD/KD/LD	△	24.7	4.49			
EDC2480-120-GD/KD/LD	△	24.8	4.51			
EDC2490-120-GD/KD/LD	△	24.9	4.53			
EDC2500-125-GD/KD/LD	▲	25.0	4.55	ZTK015-ED250-□□ ZTK03-ED250-□□ ZTK05-ED250-□□ ZTK08-ED250-□□	125	
EDC2510-125-GD/KD/LD	△	25.1	4.57			
EDC2520-125-GD/KD/LD	△	25.2	4.58			
EDC2530-125-GD/KD/LD	△	25.3	4.60			
EDC2540-125-GD/KD/LD	△	25.4	4.62			
EDC2550-125-GD/KD/LD	▲	25.5	4.64			
EDC2560-125-GD/KD/LD	△	25.6	4.66			
EDC2570-125-GD/KD/LD	△	25.7	4.68			
EDC2580-125-GD/KD/LD	△	25.8	4.69			
EDC2590-125-GD/KD/LD	△	25.9	4.70			

▲Regular Stock △Made-to-order

Applicable material table

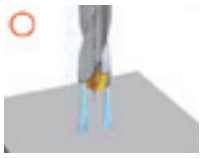
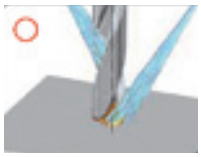
◎Very suitable ○Suitable

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						
○	◎	◎			○	◎	◎	◎		

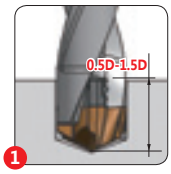
Geometry selection and hole tolerance

Geometry	-GD				-KD				-LD			
Workpeice materials application ranges	P M K				K				N			
L/D	1.5D、3D、5D		8D		1.5D、3D、5D		8D		1.5D、3D、5D		8D	
	12-18mm	18-26mm	12-18mm	18-26mm	12-18mm	18-26mm	12-18mm	18-26mm	12-18mm	18-26mm	12-18mm	18-26mm
Tolerance of hole	0/+0.043	0/+0.052	0/+0.070	0/+0.084	0/+0.043	0/+0.052	0/+0.070	0/+0.084	0/+0.043	0/+0.052	0/+0.070	0/+0.084

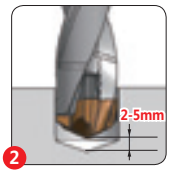
Cooling requirements

Internal coolant supply	External coolant supply (Drilling depth < 2D)	No dry cutting
		

User guide for drills with 8D shanks



1 Pre-drilling with standard 1.5xD drills, hole depth: 0.5D~1.5D;



2 Drill to 2~5mm below the bottom of the pre-bored hold with slow feed, start driling with normal parameters, turn on the internal coolant and hovering for 2~3 seconds ;

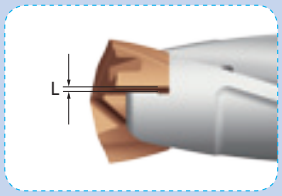


3 Strat drilling with normal parameters.

Assembly instructions :



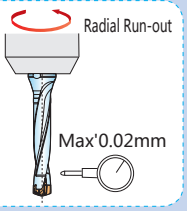


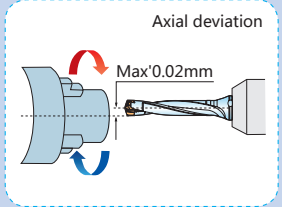


There will be a gap on radial direction after tightening with wrench L=0.05～0.1mm(the gap will be eliminated in cutting automatically).

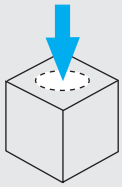
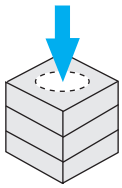
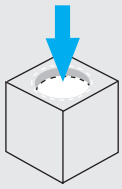
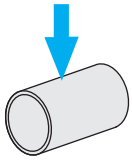
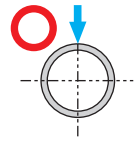
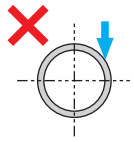
After inserting the tip into the shanks, tighten it with a wrench.
When removing, turn the wrench in the opposite direction.

Maximum deviation in assembly :

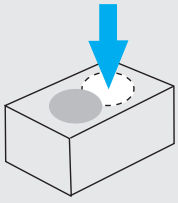
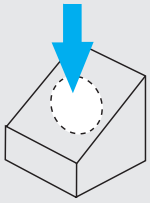
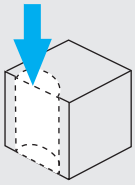
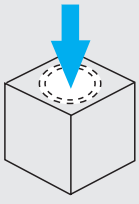




Suitable workpiece shape

Processing content	Workpiece	Points for attention during processing
Plane surface		1、For Stainless steel machining, suggest set up feed rate below 0.15mm/rev from entrance to 0.5D depth position; 2、In order to removal chip, suggest internal cooling, Recommend internal coolant for better chip control, combine internal and external coolant when machining stainless steel materials.
Overlapping plate		1、In order to prevent dislocation, when processing the overlapping plate, The workpieces needed to be fixed.
Concave hole		1、There could be interrupted cuts, suggest to set feed rate under half of the recommended cutting parameters before peripheral edges fully entering the hole; 2、Fine adjustment are recommened when long chips apearing at entrence.
Cylindrical surface hole		1、It can be used for hole machining on the central axis of the shaft. 2、The curve part not recommend.  Center part machining  Curve part machining

Workpiece shape not recommend

Processing content	Overlapped hole	Slope	Half-section	Reaming
workpiece shape				

Recommended cutting parameters of Interchangeable drills

Workpiece materials		Cutting speed (m/min)	Diameter (mm)											
			12		14		16		18		20		25	
			Revolution speed min^{-1}	Feed rate mm/r	Revolution speed min^{-1}	Feed rate mm/r	Revolution speed min^{-1}	Feed rate mm/r	Revolution speed min^{-1}	Feed rate mm/r	Revolution speed min^{-1}	Feed rate mm/r	Revolution speed min^{-1}	Feed rate mm/r
P	Soft steel HB≤180	80-150	3200	0.20~0.30	2700	0.22~0.35	2400	0.25~0.36	2100	0.28~0.38	1900	0.30~0.40	1500	0.32~0.42
P	Carbon steel Alloy steel ~30HRC	80-150	3200	0.20~0.30	2700	0.22~0.35	2400	0.25~0.36	2100	0.28~0.38	1900	0.30~0.40	1500	0.32~0.42
P	Pre-hardened steel ~40HRC	50-80	1900	0.20~0.30	1600	0.22~0.35	1400	0.25~0.36	1200	0.28~0.38	1100	0.30~0.40	900	0.32~0.42
M	Stainless steel	50-80	1600	0.12~0.20	1300	0.13~0.22	1200	0.14~0.25	1050	0.15~0.28	950	0.16~0.30	700	0.17~0.32
K	Cast iron	80-150	3200	0.20~0.30	2700	0.22~0.35	2400	0.25~0.36	2100	0.28~0.38	1900	0.30~0.40	1500	0.32~0.42
K	Nodular cast iron	60-120	2400	0.20~0.30	2100	0.22~0.35	1800	0.25~0.36	1600	0.28~0.38	1400	0.30~0.40	1100	0.32~0.42
N	Aluminum alloy	90-200	4000	0.25~0.35	3400	0.28~0.38	3000	0.30~0.40	2600	0.33~0.43	2400	0.35~0.45	2000	0.40~0.50

Note: please set feed rate below to the recommendation parameter referring to the drill head diameters increasing(1.5D→3D→5D→8D).
Criteria: for 1.5D, 3D, 5D=80% or below, 8D=60% or below.
Cooling: adopt internal cooling or external cooling drilling no more than 2D, dry cutting is prohibited!

How to choose the right solid carbide reamers

- Shape
- Product type
- Product name
- Product category

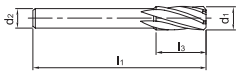
Reamers

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			Stainless steel	Cast iron	Nodular cast iron	Aluminum alloy	Copper alloy	Heat resistant alloy
			~40HRC	~50HRC	~60HRC						
YK10F							◎	◎	◎	◎	

Code key C147 | Cutting parameters C151 | Technical information C152–C154 | Non-standard customization C155

- 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, non-standard customization



BORING TOOLS C

Reamers

Solid carbide reamers overview C146

Icons information C146

Solid carbide reamer code key C147

Detail information of solid carbide reamers C148-C150

Recommended cutting parameters for solid carbide reamers C151

Technical information for solid carbide reamers C152-154

Non-standard customized solid carbide reamers C155







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				◎	◎	◎			C148	C151
Straight flute reamer	**3102H7**		Ø4-Ø20				◎	◎	◎			C149	C151
Left helical flute reamer	**3103H7**		Ø4-Ø20				◎	◎	◎			C150	C151

◎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

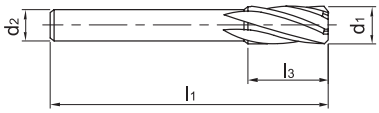


Solid carbide reamer with straight shank and right helical flute

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			Stainless steel	Cast iron	Nodular cast iron	Aluminum alloy	Copper alloy	Heat resistant alloy
			~40HRC	~50HRC	~60HRC						
YK10F							◎	◎	◎	◎	

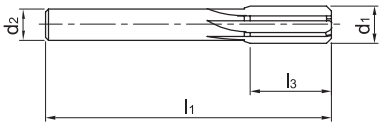
Code key C147 Cutting parameters C151 Technical information C152–C154 Non-standard customization tools C155

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							◎	◎	◎	◎	

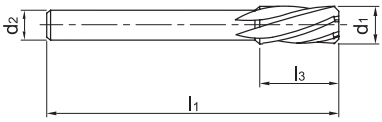
Code key C147 Cutting parameters C151 Technical information C152–C154 Non-standard customization tools C155

Solid carbide reamer with straight shank and right helical flute

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	☆
3103H7-0450	4.5	4.00	63	22	6	☆
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	☆
3103H7-0700	7.0	6.30	71	25	6	☆
3103H7-0750	7.5	6.30	71	25	6	☆
3103H7-0800	8.0	6.30	71	25	6	☆
3103H7-0850	8.5	8.00	71	25	6	☆
3103H7-0900	9.0	8.00	71	25	6	☆
3103H7-0950	9.5	8.00	71	25	6	☆
3103H7-1000	10.0	8.00	71	25	6	☆
3103H7-1050	10.5	8.00	71	25	6	☆
3103H7-1100	11.0	10.00	80	28	6	☆
3103H7-1150	11.5	10.00	80	28	6	☆
3103H7-1200	12.0	10.00	80	28	6	☆
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 C147 Cutting parameters C151 Technical information C152–C154 Non-standard customization tools C155

Recommended cutting parameters

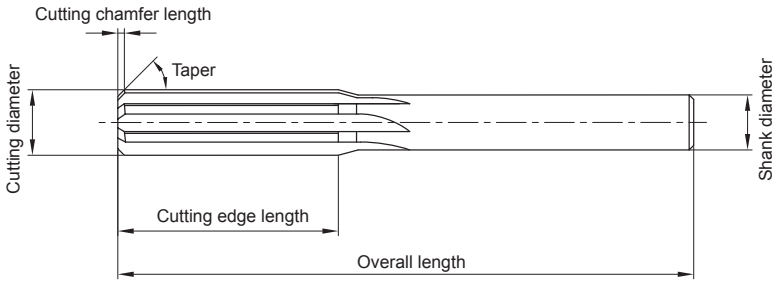
3101H7★3102H7★3103H7

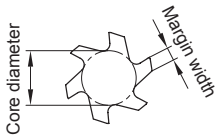
Workpiece material	Cast iron Nodular cast iron			Copper alloy			Casting aluminium alloy		
Cutting speed	8~16m/min			10~25m/min			15~30 m/min		
Diameter (mm)	Rotating speed (min^{-1})	Feed rate (mm/r)	Allowance (mm)	Rotating speed (min^{-1})	Feed rate (mm/r)	Allowance (mm)	Rotating speed (min^{-1})	Feed 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

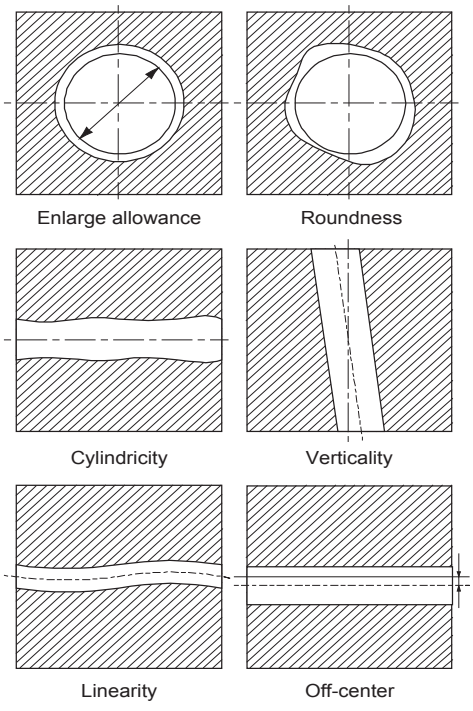




Reaming is the semi-finishing and finishing of an existing hole to achieve precise size, high surface quality, perfect roundness and cylindricity, etc.

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.

Company name:	ZCC-CT
Fax:	Huanghe Southern Road, Tianyuan Zone, Zhuzhou. Hunan province
Tel:	Fax: 0731-22882721 22885420 22887878
E-MAIL:	Zip code: 412007 E-mail:zccct@zccct.com

Hole information and workpiece material

Hole shape to be machined: ☐ Through hole ☐ Blind hole

Size of processed hole= mm

Tolerance of processed hole=

Depth of processed hole= mm

☐ Grey cast iron
☐ Ductile Iron
☐ Aluminum alloy
☐ Silicon Aluminum Alloy Si < 10%
☐ Silicon Aluminum Alloy Si ≥ 10%

Material grade to be processed:

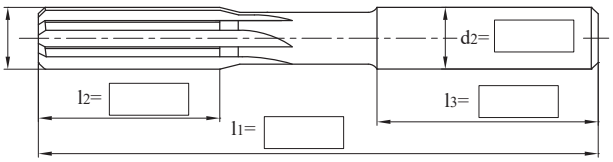
Tensile strength= N/mm^2

Hardness= Units:(HRC,HB,etc.)

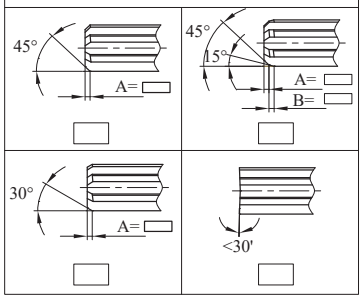
Tool Information

Direction of cutting tools' rotation	
Right-handed rotation	☐
Straight flute	☐
Left-handed rotation	☐

d1=
Tol:



Lead angle forms



Coolant type	
Internal coolant	
External coolant	

Coating	
Coated	☐
Non-Coated	☐

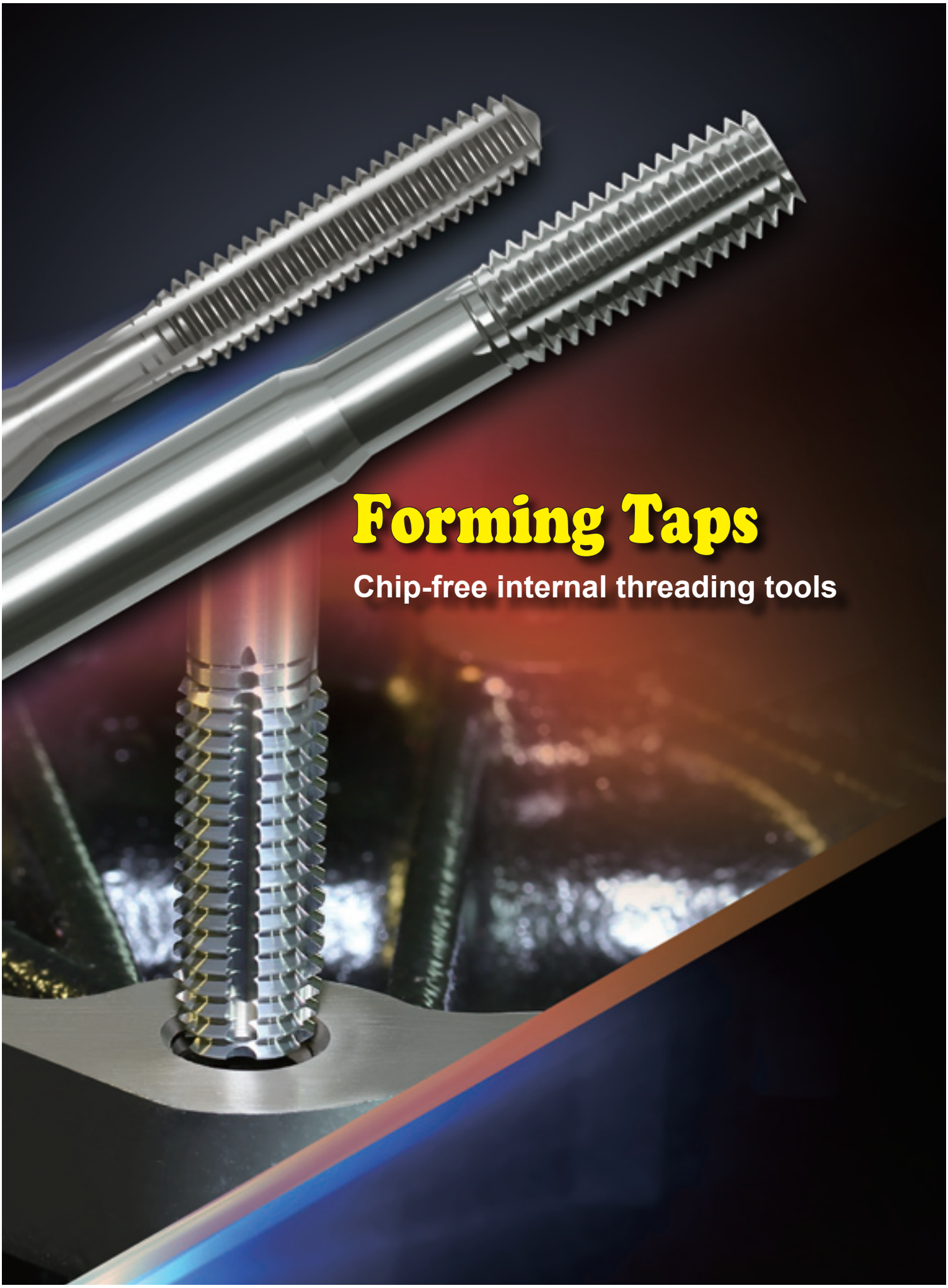
Shank form

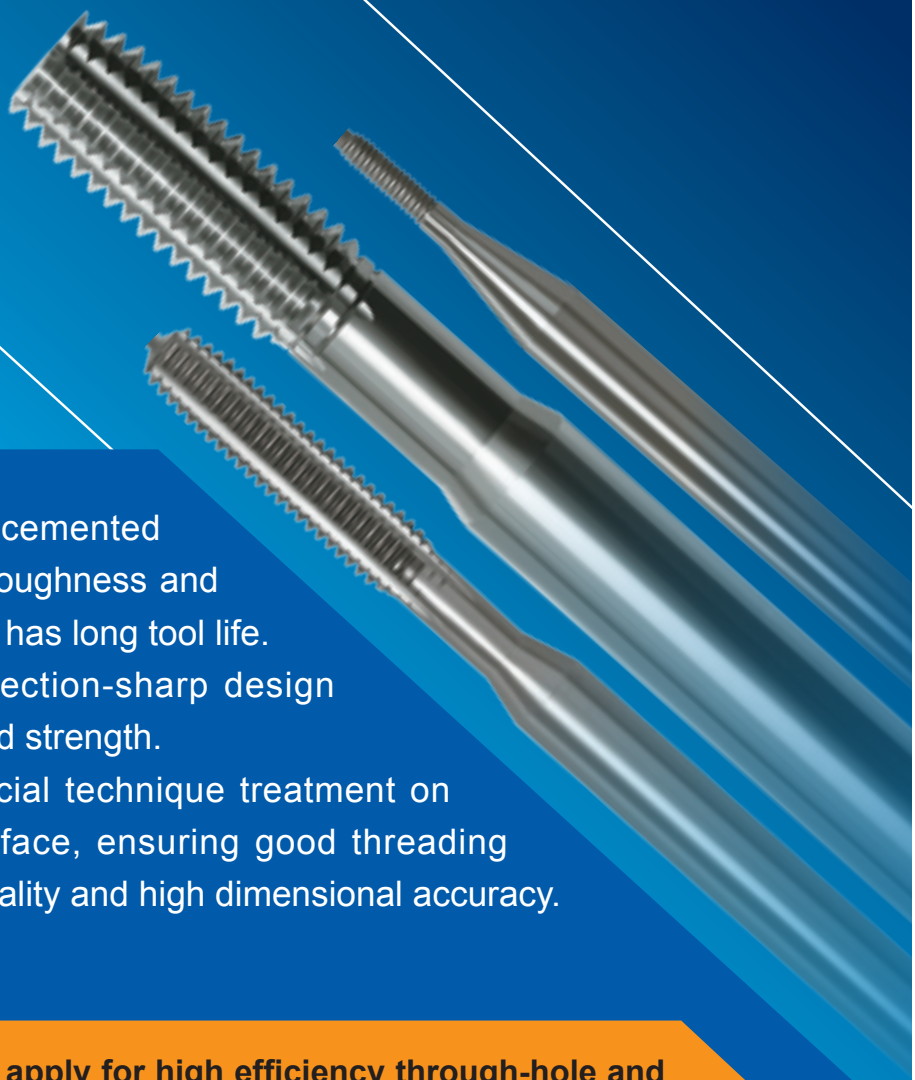
DIN6535

☐ Form HA
☐ Form HB
☐ Form HE
☐ Ordinary straight handle
☐ With flat tail handle DIN 1809
☐ Morse Taper Shank MT ☐
Special shapes

Note:

Order Quantity:	PCS	Expected delivery date:
Quotation:		Confirmation:
		Date:


Forming Taps
Chip-free internal threading tools



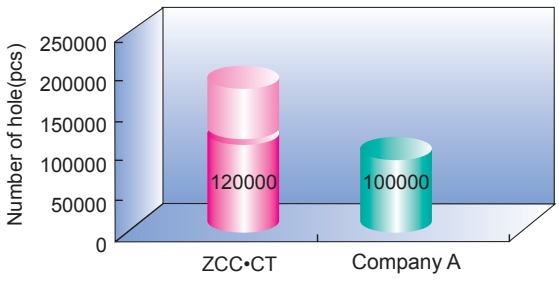
- Super micro grain cemented carbide with good toughness and abrasion resistance has long tool life.
- With particularly section-sharp design has good rigidity and strength.
- Thanks to the special technique treatment on cutting edge surface, ensuring good threading machining quality and high dimensional accuracy.

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 tools

Shape

Product name

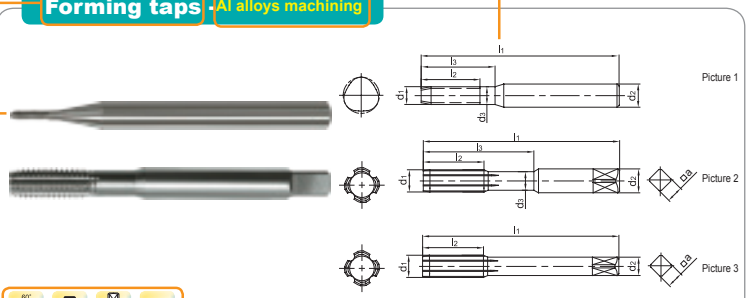
Product category

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	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	M1	0.25	3		40	5			60°		4	●	○	0.9
4122M-M1.2*0.25-6H		3P	M1.2	0.25	3		40	5			60°	Picture 1	4	●	○	1.1
4122MS-M1.2*0.25-6H		2P	M1.2	0.25	3		40	5			60°		4	●	○	1.1
4122M-M1.6*0.35-6H		3P	M1.6	0.35	3	1.1	40	5	11		60°	Picture 1	4	●	○	1.47
4122MS-M1.6*0.35-6H		2P	M1.6	0.35	3	1.1	40	5	11		60°		4	●	○	1.47
4122M-M2*0.4-6H		3P	M2	0.4	3	1.5	45	6	12		60°	Picture 1	4	●	○	1.85
4122MS-M2*0.4-6H		2P	M2	0.4	3	1.5	45	6	12		60°		4	●	○	1.85
4122M-M2.5*0.45-6H		3P	M2.5	0.45	3	1.9	50	6	14		60°	Picture 1	4	●	○	2.33
4122MS-M2.5*0.45-6H		2P	M2.5	0.45	3	1.9	50	6	14		60°		4	●	○	2.33
4222M-M3*0.5-6H		3P	M3	0.5	3.5	2.3	56	6	18	2.7	60°	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	60°	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	60°	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	60°	Picture 2	4	●	○	4.8
4222MS-M5*0.5-6H		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 C161 Cutting parameters C176 Technical information C177–C182 Non-standard customization C183

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, Non-standard customization



BORING TOOL C

Threading tools

Solid carbide threading tools overview C160

Icons information of solid carbide threading tools C160

Code key of solid carbide threading tools C161

Detail information of solid carbide threading tools C162-C175

Solid carbide threading cutters C162-C173

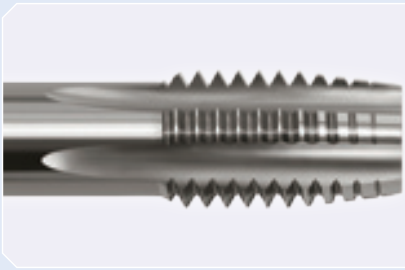
Solid carbide threading end mills C174-C175

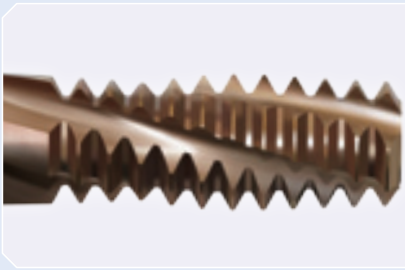
Recommended cutting parameters of solid carbide threading tools C176

Technical information of solid carbide threading tools C177-C182

Non-standard customization for threading tools C183-C184







Threading tools 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					◎			C162	C176
	4222A		M3~M16					◎			C163	C176
	4122M		M1~M2.5	◎		◎		○			C164	C176
	4222M		M3~M16	◎		◎		○			C165	C176
Helical-flute cutting taps	4201C		M3~M16				◎				C166-C167	C176
	4201A							◎			C170-C171	C176
Straight-flute cutting tap	4202C		M3~M16				◎				C168-C169	C176
	4202A							◎			C172-C173	C176
Threading end mills	4111		M3~M20	○	◎		○	○			C175	C176

◎Very suitable ○Suitable

Icons information

Shank type

	Straight shank
	Square straight shank as per DIN10

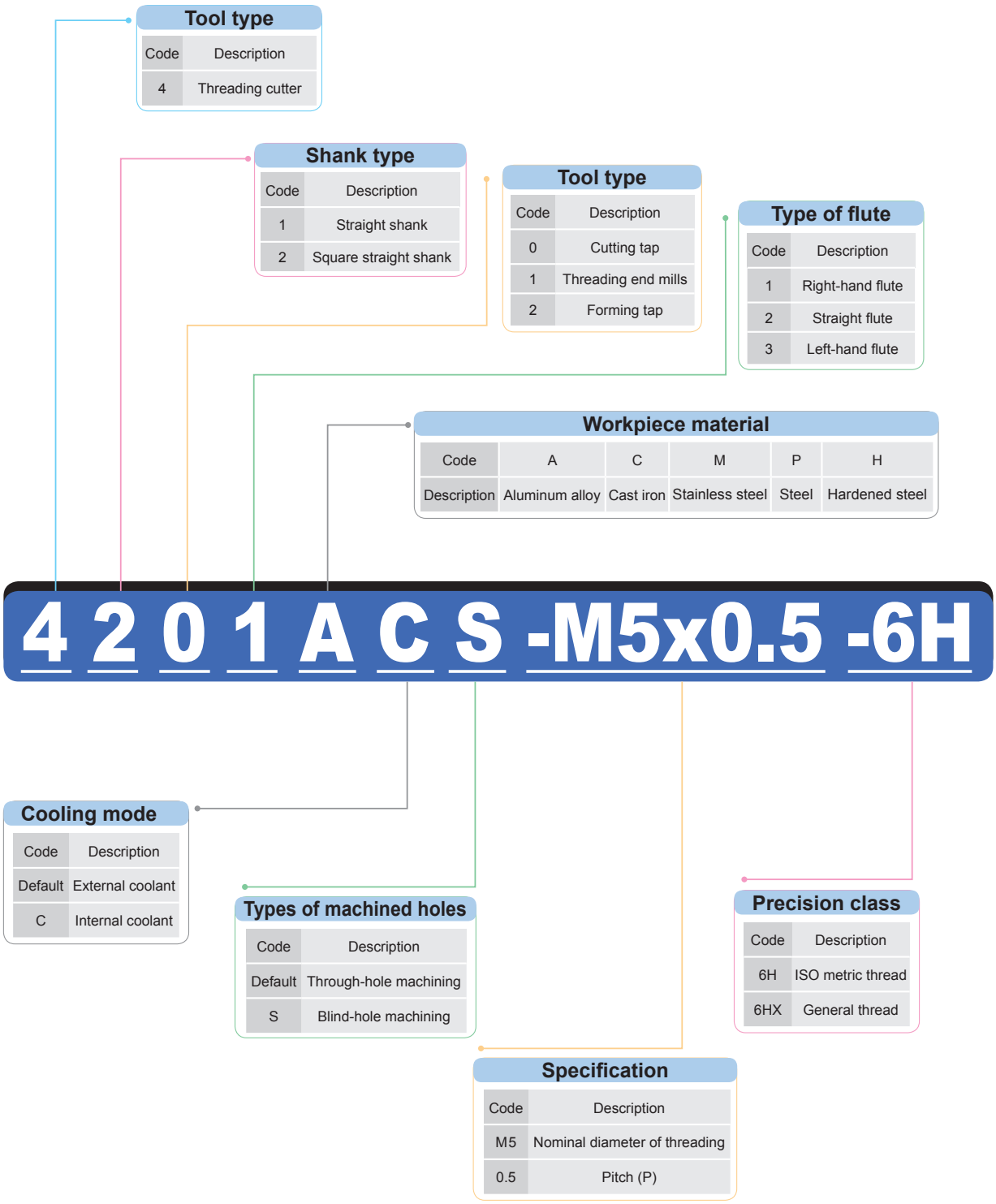
Precision class of screw thread

ISO 2 (6H)	Precision class of screw thread
(6HX)	Precision class of screw thread

Thread profile angle of tap

	60° shown

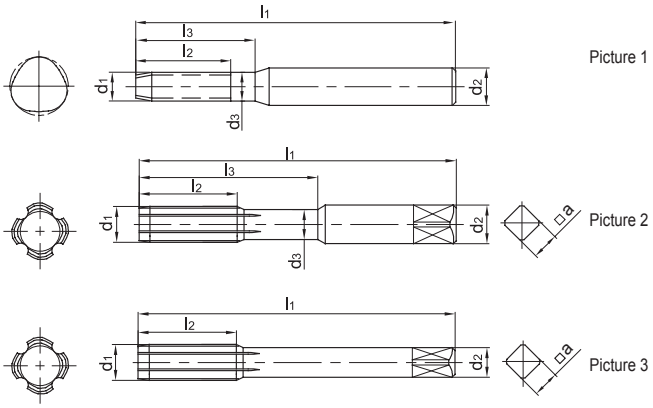
Threading tools code key



Forming taps -Al alloys 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	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	M1	0.25	3		40	5					3	●	0.9
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	M1.2	0.25	3		40	5					3	●	1.1
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	M1.6	0.35	3	1.1	40	5	11				3	●	1.47
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	M2	0.4	3	1.5	45	6	12				3	●	1.85
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	M2.5	0.45	3	1.9	50	6	14				3	●	2.33
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

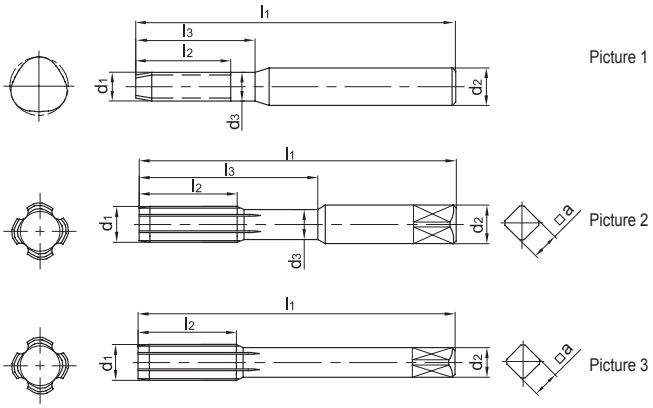
Grade	Workpiece material										
	Mild steel HB≤180	Carbon steel, Alloy steel	Pre-hardened steel, Hardened steel			Stainless steel	Cast iron	Nodular cast iron	Aluminum alloy	Copper alloy	Heat resistant alloy
			~40HRC	~50HRC	~60HRC						
YK40F									◎		

Code key C161 Cutting parameters C176 Technical information C177–C182 Non-standard customization C183

Forming taps -stainless steel machining







Picture 1

Picture 2

Picture 3

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	M1	0.25	3		40	5					4	●	○	0.9
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	M1.2	0.25	3		40	5					4	●	○	1.1
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	M1.6	0.35	3	1.1	40	5	11				4	●	○	1.47
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	M2	0.4	3	1.5	45	6	12				4	●	○	1.85
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	M2.5	0.45	3	1.9	50	6	14				4	●	○	2.33
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	60°	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		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

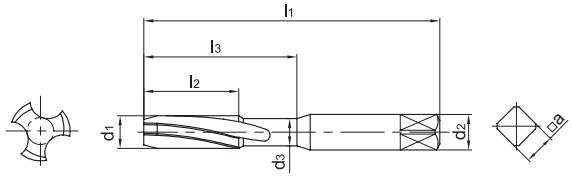
◎Very suitable ○Suitable

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	○					○			○		

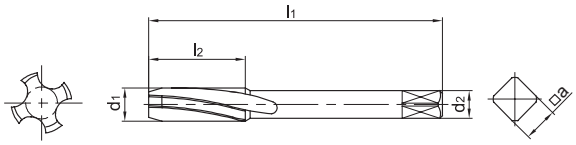
Code key C161 Cutting parameters C176 Technical information C177–C182 Non-standard customization C183

Helical-flute cutting taps - cast iron machining





Picture 1



Picture 2

60° ISO 2 (6H) (6HX)

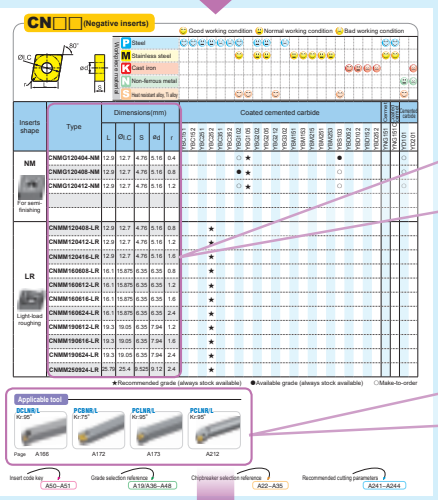
Type	Basic dimension(mm)											Grade	Pre-hole diameter
	Length of Cutting tap	d_1	P	d_2	d_3	l_1	l_2	l_3	a×a	Thread profile	Geometry	Number of teeth	YK40F	d
4201C-M3*0.5-6H	3P	M3	0.5	3.5	2.3	56	11	18	2.7	60°	Picture 1	3	●	2.5
4201C-M3*0.5-6HX	3P													
4201CS-M3*0.5-6H	1.5P													
4201CS-M3*0.5-6HX	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													

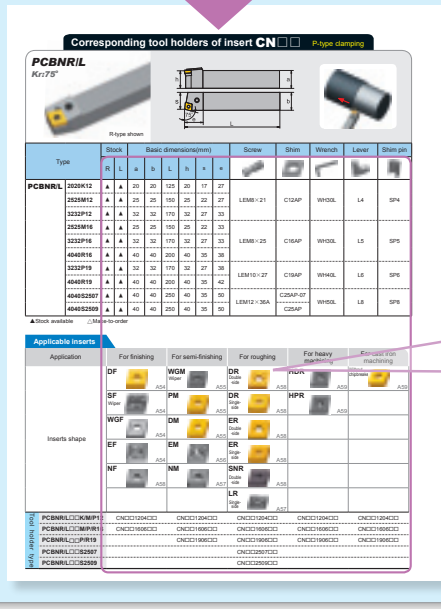
● Stock available ○ Make-to-order

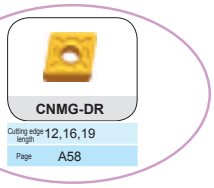
Guide to selecting general turning tools

Selection A





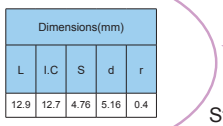






Step **1** : **I want to order inserts**

•Shape, •Size, •Chipbreaker



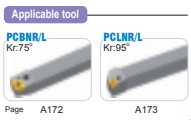
Dimensions(mm)				
L	I.C	S	d	r
12.9	12.7	4.76	5.16	0.4

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 gener, •Applicable inserts



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

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

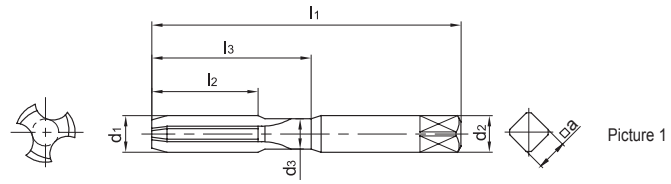
◎Very suitable ○Suitable

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							◎	◎			

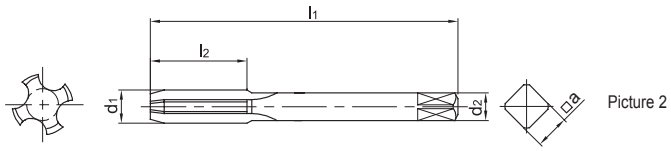
Code key C161 Cutting parameters C176 Technical information C177–C182 Non-standard customization C183

Straight-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	d_1	P	d_2	d_3	l_1	l_2	l_3	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 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
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

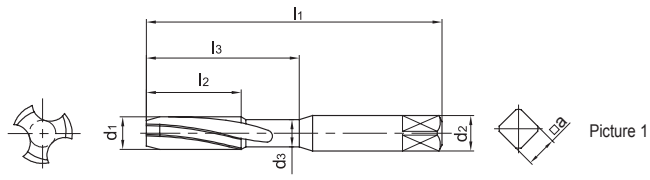
◎Very suitable ○Suitable

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							◎	◎			

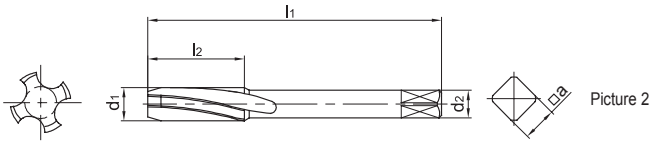
Code key C161 Cutting parameters C176 Technical information C177–C182 Non-standard customization C183

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

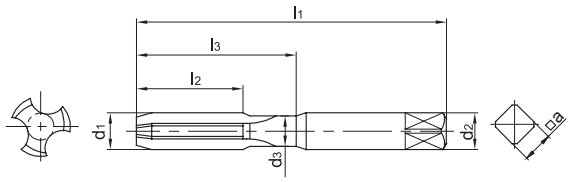
◎Very suitable ○Suitable

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									◎		

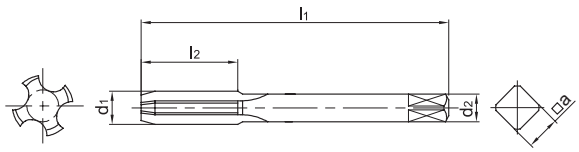
Code key C161 Cutting parameters C176 Technical information C177–C182 Non-standard customization C183

Straight-flute cutting taps - 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 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
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

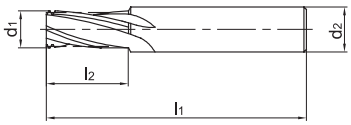
Grade	Workpiece material										
	Mild steel HB≤180	Carbon steel, Alloy steel	Pre-hardened steel, Hardened steel			Stainless steel	Cast iron	Nodular cast iron	Aluminum alloy	Copper alloy	Heat resistant alloy
			~40HRC	~50HRC	~60HRC						
YK40F									◎		

Code key C161 Cutting parameters C176 Technical information C177–C182 Non-standard customization C183


Newly upgraded!
Solid carbide
Thread mills

Thread 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 C161
Cutting parameters C176
Technical information C177–C182
Non-standard customization C184

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 mills

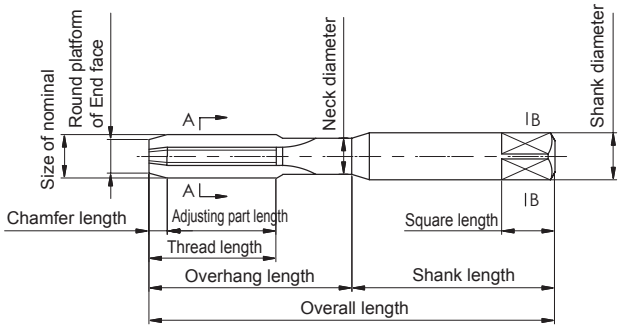
Workpiece material	Cutting speed (m/min)		Feed rate (mm/z)	
	Uncoated	Coated	D≤8	D>8
Alloy steel、Common steel	20~60	40~120	0.02~0.05	0.04~0.12
Aluminium alloy	100~250	---	0.05~0.2	

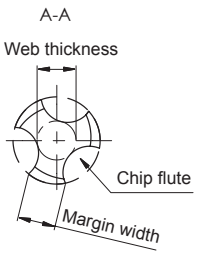
Note:

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.

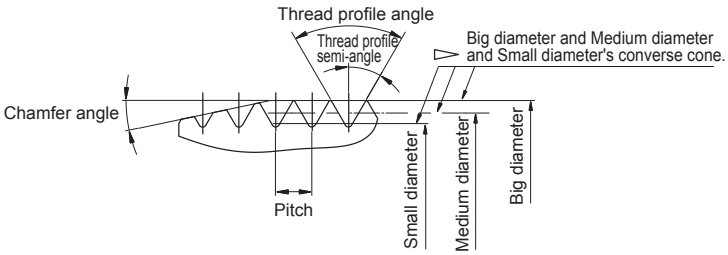
Tap

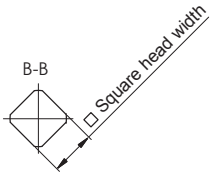
Parts terminology of cutting taps



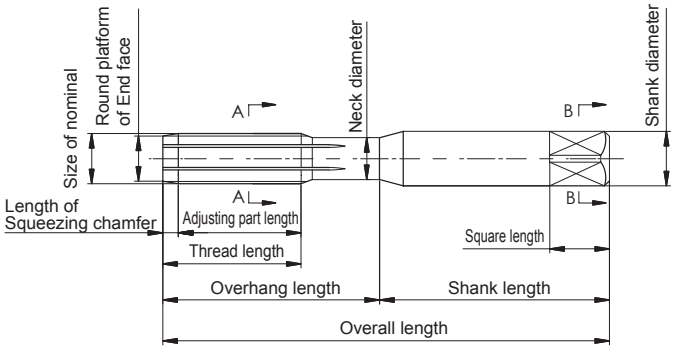


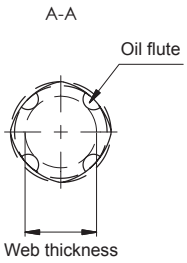
Magnifying fig of chamfer and thread profile



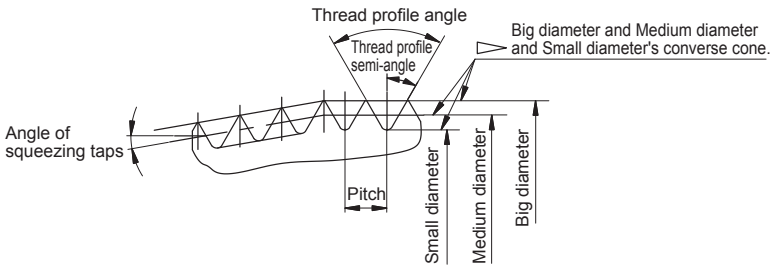


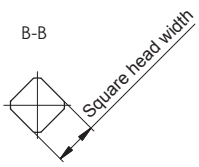
Parts terminology of forming taps



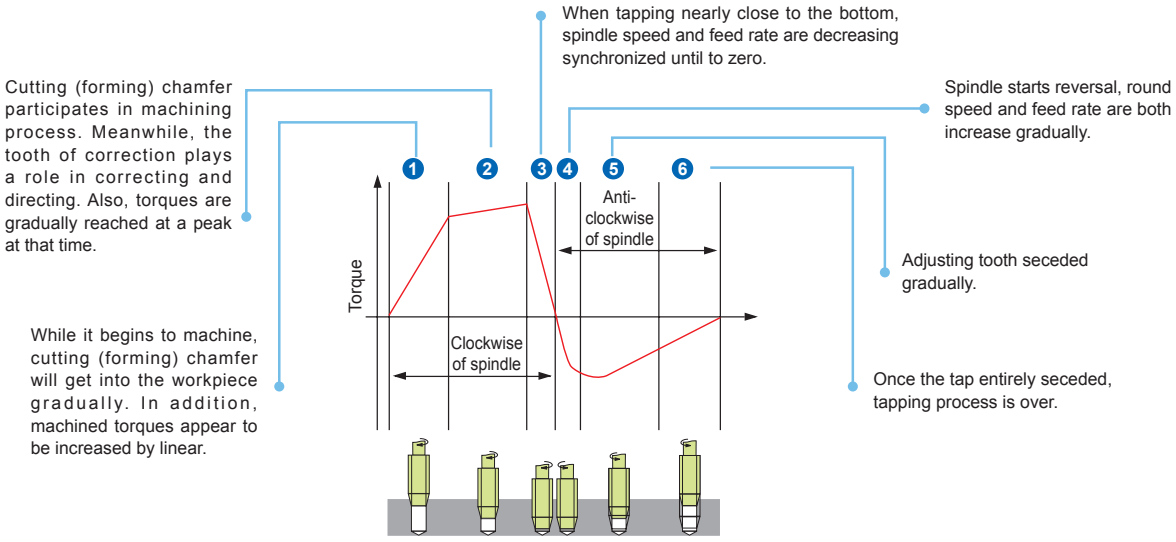


Magnifying fig of squeezing chamfer and guided threads

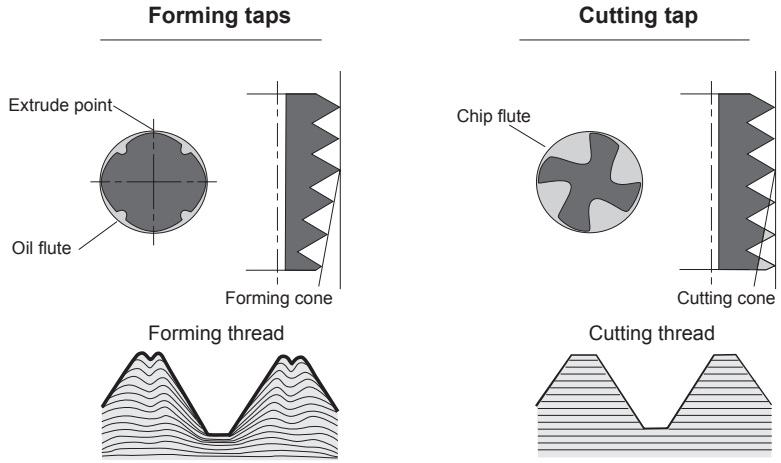




Process of tapping and tapping torques



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

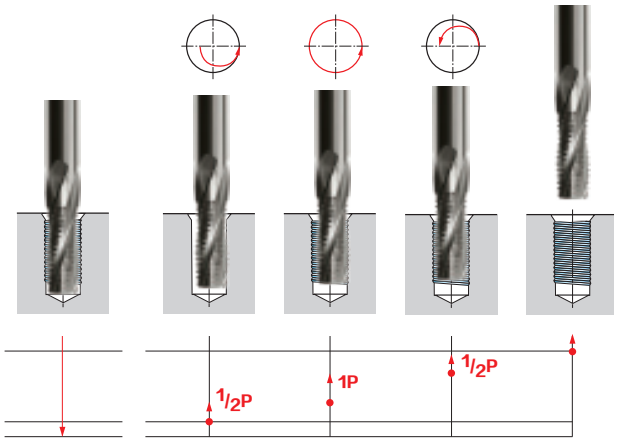


The common problems in tapping

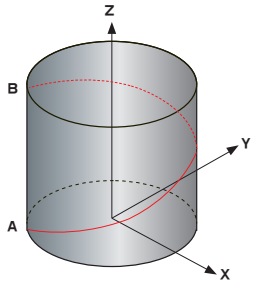
Common problems	Reasons	Solutions
Too large Internal thread	Wrong tap type selection	Selecting right tap according to work materials and requirement
	Pre-hole is too large	Select appropriate prehole drills
	Pre-hole is off center	Improve prehole quality
		Change to floated tapping method
	Axial feed 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

Thread mills

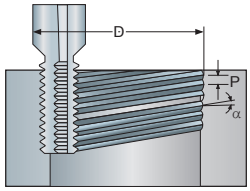
Thread mills (graphic demonstration)



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



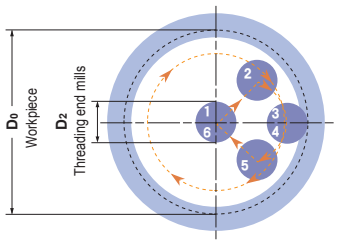
α: helical angle
D: large-diameter
p: pitch

Picture B

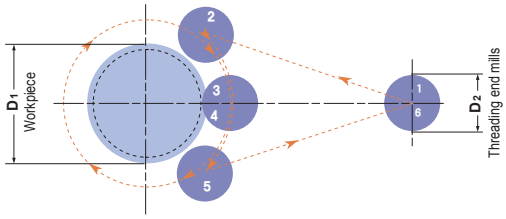
Arc entering method

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



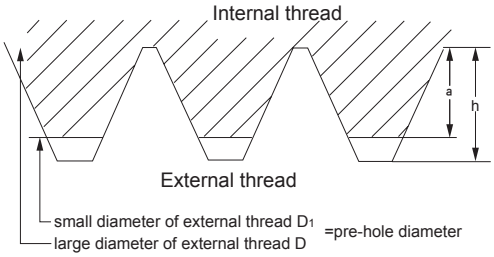
1-2 rapid positioning
2-3 entering by arc feed and interpolating along the Z axis at the same time
3-4 360 °full circle cutting interpolation and axial moving of one pitch
4-5 cutting-out by arc feed and interpolating along the Z axis at the same time
5-6 quick return

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

Company name:

Fax:

Tel:

E-MAIL:

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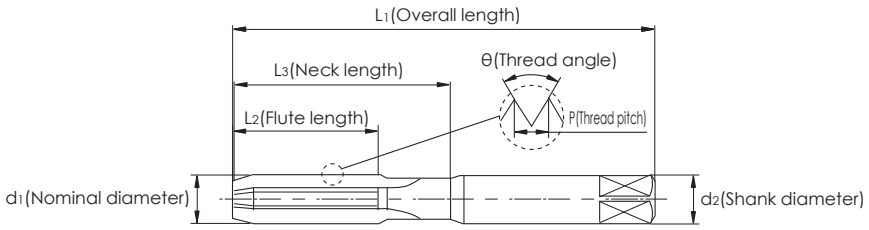
Huanghe Southern Road, Tianyuan Zone, Zhuzhou. Hunan province

Fax: 0731-22882721 22885420 22887878

Zip code: 412007 E-mail:zccct@zccct.com

Workpiece materials			Hole Form			
Grey cast iron			Through hole		Blind hole	
Ductile Iron						
Aluminum alloy						
Silicon Aluminum Alloy(Si≤10%)						
Silicon Aluminum Alloy(Si>10%)			Bottom hole diameter			
Stainless Stee			Bottom hole depth			
Soft steel			Thread form			
Hardened steel (HRC48~63)			Threading precision			
Other materials	Workpiece material grade		Tapping depth			
			Threading rotation speed			
	Hardness		Tapping form			
			Rigid tapping		Flexible tapping	
Tool Information (attachment)						
Shank form			Chip pocket form			
Square shank			Straight flute			
Round shank			Right handed flute		Left handed flute	
Coolant form			Coating			
External coolant			Coated			
Internal coolant			Non-Coated			

Unit: mm ; Check mark for copy to fill the form: √



Applying tools: Cutting tap Thread forming tap _____

Nominal diameter d1= _____ Shank diameter d2= _____ Thread pitch P= _____ Thread angle θ= _____

Overall length l1= _____ Flute length l2= _____ Neck length l3= _____

Note:

Order Quantity: PCS Expected delivery date:

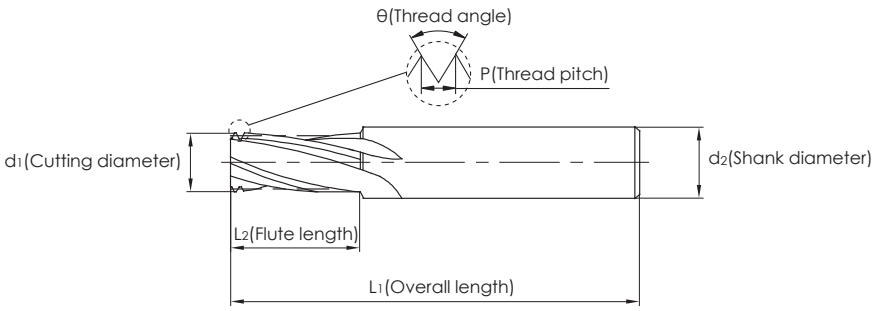
Quotation: Confirmation:

Date:

Company name: Fax: Tel: E-MAIL:	ZCC-CT Huanghe Southern Road, Tianyuan Zone, Zhuzhou. Hunan province Fax: 0731-22882721 22885420 22887878 Zip code: 412007 E-mail:zccct@zccct.com

Workpiece materials			Hole Form			
Grey cast iron			Through hole		Blind hole	
Ductile Iron						
Aluminum alloy						
Silicon Aluminum Alloy(Si≤10%)						
Silicon Aluminum Alloy(Si>10%)			Bottom hole diameter			
Stainless Stee			Bottom hole depth			
Soft steel			Thread form			
Ordinary steel			Threading precision			
Other materials	Workpiece material grade		Tapping depth			
			Threading rotation speed			
	Hardness		Thread form			
			External threading		Internal threading	
Tool Information (attachment)						
Chip pocket	Right handed flute		Left handed flute		Straight flute	
Coating	Coated		Non-Coated			
Coolant type	External coolant		Internal coolant			

Unit: mm ; Check mark for copy to fill the form: ✓

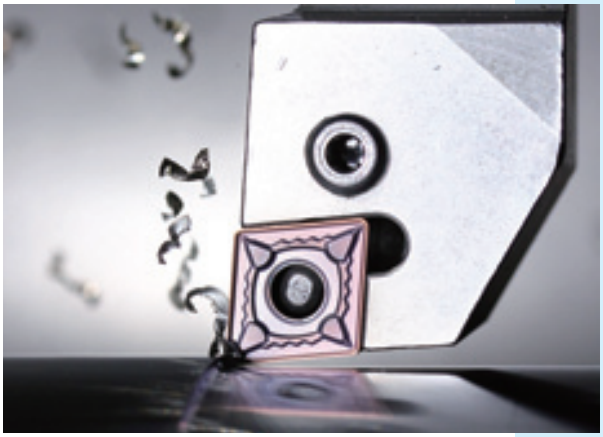


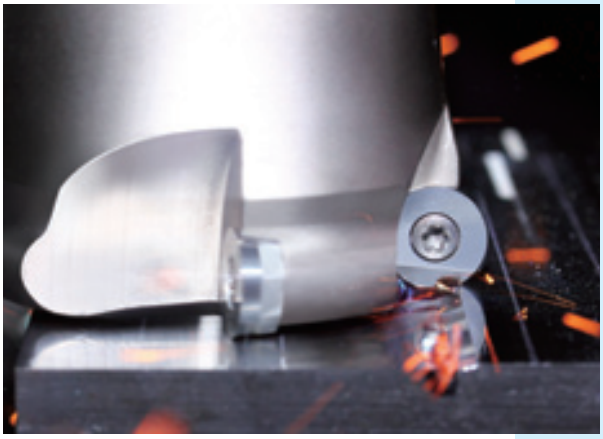
Thread specification= _____ Cutting diameter d1= _____ Shank diameter d2= _____ Thread angle θ= _____
Overall length l1= _____ Flute length l2= _____ Thread pitch P= _____

Note:

Order Quantity:	PCS	Expected delivery date:
Quotation:		Confirmation:
		Date:

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

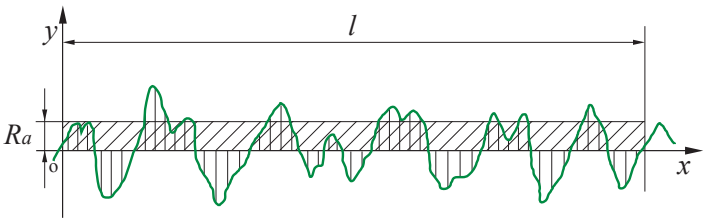
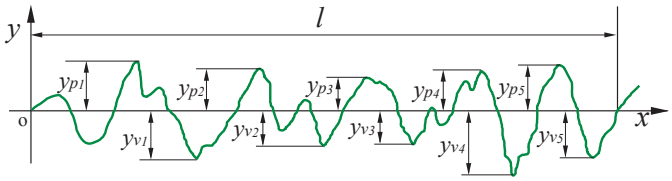
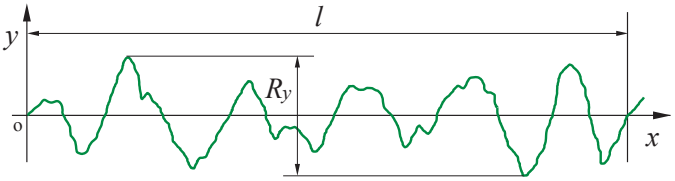
Thread code	Recommended hole diameter (mm)
M3×0.5	2.5
M3.5×0.6	2.9
M4×0.7	3.3
M5×0.8	4.2
M6×1.0	5.0
M7×1.0	6.0
M8×1.25	6.75
M9×1.25	7.75
M10×1.5	8.5
M11×1.5	9.5
M12×1.75	10.25
M14×2.0	12.0
M16×2.0	14.0
M18×2.5	15.5
M20×2.5	17.5
M24×3.0	21.0
M27×3.0	24.0
M30×3.5	26.5

● 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	$Y_1$105	C98KU C100KU	F.515 F.516	-
	T12A	W.112	1.1663	C125W	-	-	-	$Y_2$120	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	-	-	$Y_1$105V	-	-	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

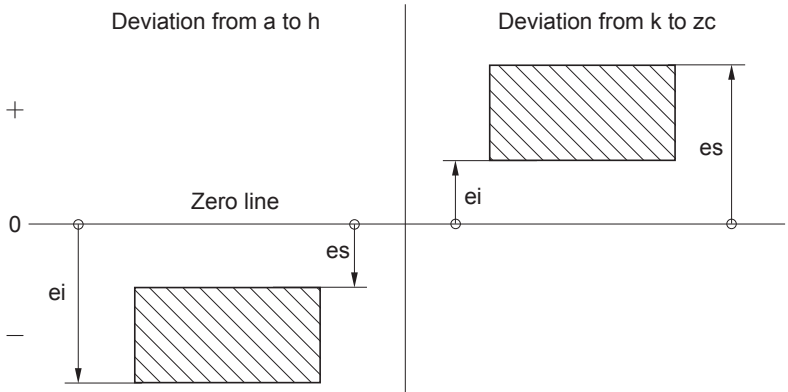
Fitting tolerance

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.

Fitting tolerance

The shaft lower deviation(ei) and upper deviation (es) can be obtained by basic tolerance and standard tolerance (IT) of shaft.



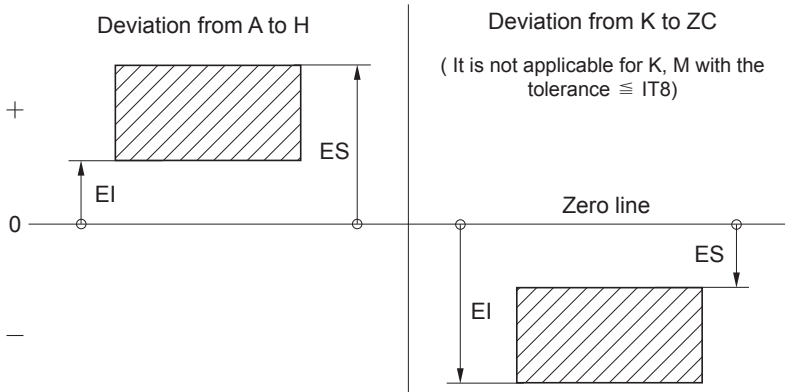
ES= negative (−) basic tolerance of shaft

ES=EI−IT

EI=positive (+) basic tolerance of shaft

EI=ES+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

EI=ES+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=10μm. Therefore the hole fitting dimension is $\varnothing 3^{+0.01}_{0}$ 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 =±$\frac{IT_n}{2}$, 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=±$\frac{IT_n-1}{2}$.

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		GC4305 GC4205		TT8115	WPP01 WPP05 WPP05S	UE6105	AC810P AC700G	T9105	CA510 CA5505	JC110V	HG8010	KCP05B KCP05 KC9105	TP0501 TP0500 TP1501 TP1500	IC9150 IC8150 IC428
		P10	YBC152 YBC151	GC4315 GC4215 GC4325	NC310 NC3015	TT8115	WPP05 WPP10 WAK20 WPP05S WPP10S	UE6105 MC6015 UE6110 MY5015	AC8015P AC810P AC700G AC820P AC2000	T9105 T9115	CA510 CA5505 CA515 CA5515 CA025P	JC110V JC215V	HG8010 HG8025 GM8020	KCP10B KCP10 KCP25 KC9110	TP1501 TP1500 TP2501 TP2500	IC9150 IC8150 IC8250
		P20	YBC251 YBC252	GC4315 GC4215 GC4325 GC4225	NC3020	TT8125 TT5100	WPP20 WPP20S	MC6015 UE6110 MC6025 UE6020 MY5015	AC820P AC2000 AC8025P AC830P	T9115 T9125	CA515 CA5515 CA525 CA5525 CR9025 CA025P	JC110V JC215V	HG8025 GM8020 GM25	KCP25B KCP30B KCP25 KC9125	TP2501 TP2500	IC8250 IC9250 IC8350
		P30	YBC252 YBC351 YBC352	GC4335 GC4325 GC4225 GC4025 GC4235	NC330	TT8125 TT5100 TT8135	WPP30 WAK30 WPP30S	MC6025 UE6020 MC6035 UE6035 UH6400	AC8035P AC830P AC630M	T9125 T9135 T6130	CA525 CA5525 CA530 CA5535 CR9025	JC325V JC215V	GM25 GM8035	KCP30B KCP30	TP3501 TP3500 TP3000	IC8350 IC9250 IC9350
		P40	YBC351 YBC352	GC4335 GC4235		TT7100 TT8135	WPP30 WAK30 WPP30S	MC6035 UE6035 UH6400	AC8035P AC630M	T9135 T6130	CA530 CA5535	JC325V	GM8035 GX30	KCP40B KCP40 KC9140 KC9240	TP3501 TP3500 TP3000	IC9350
	M	M10		GC2015 GC2220		TT9215		MC7015 US7020	AC610M AC6020M	T9115	CA6515	JX605X JC110V		KCM15B KCM15	TM2000	IC6015 IC8250
		M20	YBM151 YBM153	GC2220 GC2015	NC9020	TT9215 TT9225		MC7015 US7020 MC7025	AC6020M AC610M AC6030M AC630M	T6120 T9125	CA6515 CA6525	JC110V	HG8025 GM25	KCM15 KC9225 KCM25B	TM2000	IC6015
		M30	YBM151 YBM251	GC2025	NC330	TT9225 TT9235		MC7025 US735	AC6030M AC630M	T6130	CA6525	JX525X	GM8035 GX30	KCM25 KC9230 KCM35B	TM4000	IC6025
		M40	YBM253	GC2025		TT9235		US735	AC6030M AC630M			JX525X	GX30	KCM35B KCM35 KC9240 KC9245	TM4000	IC6025
	K	K01	YBD052	GC3205 GC3210			WAK10 WPP01	MC5005 UC5015	AC405K AC410K	T5105	CA4505 CA4010 CA310	JC050W JC105V	HX3505	KCK05B KCK05	TK0501 TH1500	IC5005
		K10	YBD102	GC3205 GC3210	N305K	TT7005	WPP10 WAK10 WKK10S	MC5015 UC5115 MY5015	AC405K AC410K AC415K AC420K AC700G	T5105 T515 T5115	CA315 CA4515 CA4010 CA4115	JC108W JC050W JC105V JC110V	HX3515 HG8010	KCK15B KCK15 KCK20 KC9315 KCK20B	TK0501 TH1501	IC5005 IC5010 IC428
		K20	YBD152 YBD252	GC3225 GC3215	N315K	TT7310	WPP20 WAK20 WKK20S	MC5015 UC5115 UE6110 MY5015	AC415K AC420K AC700G AC820P	T515 T5115 T5125	CA320 CA4515 CA4115 CA4120	JC108W JC110V JC215V	HG8025 GM8020	KCK20B KCK20 KC9325 KCPK05	TK1501	IC5010 IC8150
		K30		GC3225			WAK30 WKP30S	UE6110	AC820P	T9115 T5125		JC215	HG8025 GM8020	KCPK05		
	S	S01		S05F				US905			CA6515 CA6525 CA6535		HS9105 HS9115			

CVD coating

Application	ISO Code		ZCC.CT	SANDVIK	KORLOY	TaeguTec	WALTER	MiTSUBiSHi	SUMITOMO	TUNGALOY	KYOCERA	DIJET	HITACHI	KENNAMETAL	SECO	ISCAR
Milling	P	P10					WKP25					JC730U			MP1500	IC9080 IC4100 IC9015
		P20	YBC301 YBM251	GC4220		TT7800	WKP25 WKP35 WKP35S	F7030 MC7020	ACP100	T3225		JC730U	GX2140		MP1500 MP2500	IC5500 IC5100 IC520M
		P30	YBM351	GC4230	NCM335	TT7800	WKP25 WKP35 WKP35S	F7030 MC7020	ACP100	T3130 T3225			GX2140 GX2160	KCPK30 KC930M	MP2500	IC5500 IC4050
		P40	YBC302	GC4240		TT7800	WKP35 WKP35S						GX2030 GX30 GX2160	KC935M KC530M		
	M	M10														IC9250
		M20	YBM251 YBM253			TT7800		F7030 MC7020	ACP100 ACM200	T3225	CA6535	JC730U	AX2040 GX2140	KC925M	MP2500 MM4500	IC520M IC9350
		M30	YBC302	GC2040	NCM335	TT7800		F7030 MC7020	ACP100	T3130 T3225	CA6535		AX2040 GX2140 GX2160 GX30	KC930M	MP2500 MM4500	IC9350 IC4050
		M40	YBM351										GX2030 GX2160 GX30	KC930M KC935M		IC635
	K	K01					WKP15					JC600				
		K10	YBD152		NCM310	TT6800	WKP15 WKP25	MC5020	ACK100	T1215 T1115	CA420M	JC600				
		K20	YBD252	GC3220 GC3330 K20W	NCM320	TT6800	WKP15 WKP25 WKP35 WKP35S	MC5020	ACK200	T1215		JC610		KC915M	MK1500 MK2000	IC5100 IC9150
		K30	YBD252	GC3330 GC3040			WKP25 WKP35 WKP35S					JC610	GX30	KC920M KC925M KCPK30 KC930M KC935M	MK2000 MK3000	IC4100 IC4050 IC520M

PVD coating

Application	ISO Code		ZCC.CT	SANDVIK	KORLOY	TaeguTec	WALTER	MiTSUBiSHi	SUMITOMO	TUNGALOY	KYOCERA	DIJET	HITACHI	KENNAMETAL	SECO	ISCAR
Turning	P	P01					WXN10				PR1005					
		P10	YBG102	GC1125			WSM10 WSM21	VP10MF MS6015		AH710	PR1005 PR930 PR1025 PR115 PR1225 PR1425			KCU10 KC5010 KC5510 KU10T	CP200 TS2000	IC250 IC507 IC570 IC807 IC907 IC908
		P20	YBG202	GC1125 GC15	PC230	TT9030	WSM21 WSM20	VP10RT VP20RT VP15TF VP20MF MS6015	AC520U	AH120 AH730 AH725 SH725 SH730 J740	PR930 PR1025 PR1115 PR1225 PR1425 PR1535		IP2000	KCU10 KC5025 KC5525 KU25T	TS2500	IC1007 IC250 IC308 IC507 IC807 IC808 IC907 IC908 IC1008 IC1028 IC3028
		P30	YBG202	GC1125		TT9030 TT8020	WSM30	VP10RT VP20RT VP15TF VP20MF	AC1030U AC530U	AH725 AH120 AH730 SH730 GH330 GH730 J740 SH725	PR1025 PR1225 PR1425 PR1535 PR1625		IP3000	KCU25 KC5525 KU25T	CP500	IC228 IC250 IC328 IC330 IC354 IC528 IC1008 IC1028 IC3028
		P40			PC240	TT8020				AH120 AH725 AH645	PR1535				CP500 CP600	IC228 IC328 IC528 IC928 IC1008 IC1028 IC3028
	M	M10	YBG202 YBG205	GC1115 GC15 GC1105			WSM10 WSM10S	VP10MF MS6015		AH630	PR1025 PR1225 PR1425	JC5003 JC8015	IP050S	KCU10 KC5010 KC5510	CP200 TS2000	IC354 IC507 IC520 IC807 IC907 IC1007 IC5080T
		M20	YBG202 YBG205	GC1115 GC15 GC1125	PC9030	TT9030 TT8010	WSM20 WSM21 WSM20S	VP10RT VP20RT VP15TF VP20MF	AC520U	AH725 AH120 SH730 AH630 SH725	PR1025 PR1125 PR1225 PR1425 PR915 PR930 PR1535	JC5003 JC5015 JC8015 JC5118	IP100S	KCU10 KC5010 KC5510	TS2500 CP500	IC354 IC808 IC908 IC1008 IC1028 IC3028 IC5080T
		M30		GC1125 GC2035	PC9030	TT8020	WSM30 WSM30S	VP10RT VP20RT VP15TF VP20MF MP7035	AC520U AC530U AC1030U AC6040U	AH725 AH120 SH730 J740 AH645 SH725	PR1125 PR1425 PR1535	JC5015 JC8015 JC5118		KCU25 KC5525 KU25T	CP500 CP600	IC228 IC250 IC328 IC330 IC1008 IC1028 IC9080T
		M40		GC2035				MP7035	AC530U AC6040U	AH645	PR1535	JC5118				IC328 IC928 IC1008 IC1028 IC3028 IC9080T

Grades comparison table

PVD coating

Application	ISO Code	ZCC.CT	SANDVIK	KORLOY	TaeguTec	WALTER	MiTSUBiSHi	SUMITOMO	TUNGALOY	KYOCERA	DIJET	HITACHI	KENNAMETAL	SECO	ISCAR
Turning	K	K01							AH110						
		K10		GC15	PC205K	TT9030			AC510U	GH110 AH110				KCU10 KC5010 KC5510	CP200 TS2000	IC350 IC910 IC1008
		K20		PC215K	TT9030		VP10RT VP20RT VP15TF		AH120				KCU15 KCU25	CP200 TS2000 TS2500	IC228 IC350 IC808 IC830 IC908 IC1007 IC1008
		K30			TT9030		VP10RT VP20RT VP15TF		AH120 GH130				KCU25 KC5525 KU25T	CP500	IC228 IC350 IC808 IC830 IC908 IC1007 IC1008
	S	S01				WSM10	MP9005 VP05RT		AH8005	PR005S PR1305	JC5003 JC8015	JP9105		TH1000	IC507 IC807 IC903 IC806 IC5080T
		S10	GC1105 GC15		TT8010	WSM10 WSM10S	MP9005 MP9015 VP10RT	AC510U	AH8005 AH8015	PR005S PR1310 PR015S	JC5003 JC5015 JC8015	JP9115	KCU10 KC5010 KC5410 KC5510	CP200 CP250 TS2000 TS2050 TS2500 TH1000	IC228 IC300 IC328 IC808 IC908 IC928 IC3028 IC806 IC9080T
		S20	GC1125		TT8020	WSM20 WSM20S WSM21	MP9005 MT9015	AC510U AC520U	AH8015	PR015S PR1125 PR1325	JC5015 JC8015 JC5118		KCU10 KCU25 KC5025 KC5525	TS2500 CP500	IC928 IC830
		S30	GC1125			WSM30 WSM30S	VP15TF MP9025 VP20RT	AC1030U	AH630 AH7025	PR1125 PR1535	JC5118		KC5525	CP600	

PVD coating

Application	ISO Code		ZCC.CT	SANDVIK	KORLOY	TaeguTec	WALTER	MiTSUBiSHi	SUMITOMO	TUNGALOY	KYOCERA	DIJET	HITACHI	KENNAMETAL	SECO	ISCAR
Milling	P	P01				TT2510 TT5505				AH110 AH710		JC8003	ATH80D ATH08M TH308 PN208 JP4105 PN15M			IC903
		P10	YBG252	GC1010 GC1130		TT2510 TT5505 TT5515 TT7080	WXH15 WXM15		ACP200	AH120 AH725	PR830 PR1225	JC8003 JC8015 JC5015 JC5118	PN15M PN215 PCA12M JP4115	KC505M KC715M KC510M KC515M		IC250 IC350 IC808 IC810 IC900 IC903 IC908 IC910 IC950
		P20	YBG205 YBG202 YBG9320 YBG252	GC1010 GC1030 GC1130 GC2030	PC230	TT2510 TT5505 TT5525 TT7080 TT9030 TT9080	WHH15 WXM15	MP6120 VP15TF	ACP200	AH725 AH120 AH3135 AH9030	PR830 PR1225 PR1230 PR1525	JC5015 JC5040 JC6235 JC8015 JC5118 JC6235 JC7560P JC8118P	CY9020 JP4120 CY150	KC522M KC525M KC527M KC610M KC620M KC635M KC715M KC720M KC730M KTPK20	F25M MP3000	IC250 IC300 IC328 IC330 IC350 IC808 IC810 IC830 IC900 IC908 IC910 IC928 IC950 IC1008
		P30	YBG302	GC1010 GC1030 GC1130 GC2030	PC3530 PC130	TT5525 TT7080 TT8020 TT8080 TT9030 TT9080	WSP45 WSP46	MP6120 VP15TF MP6130 VP30RT	ACP200 ACP300	AH725 AH120 AH130 AH3135 AH6030	PR1230 PR1525	JC6235 JC7560 JC8050 JC7560P JC5015 JC8118 JC5040 JC8118P JC8015 JC5118	JS4045 CY250 CY250V CY25 HC844	KC735M KC725M KC530M KC537M KCPM40	F25M MP3000 F30M	IC250 IC300 IC328 IC330 IC350 IC830 IC845 IC900 IC928 IC950 IC1008
		P40	YBG302	GC1030 GC1130 GC2030		TT8020	WSP45 WSP46	VP30RT	ACP300	AH140	PR1525	JC6235 JC7560 JC8050 JC7560P JC5040 JC8118 JC5118 JC8118P JC5118	JS4060 PTH30E PTH40H JX1060 JS4060	KC735M KC537M KCPM40	F40M T60M	IC300 IC328 IC330 IC830 IC928 IC1008

PVD coating

Application	ISO Code		ZCC.CT	SANDVIK	KORLOY	TaeguTec	WALTER	MiTSUBiSHi	SUMITOMO	TUNGALOY	KYOCERA	DIJET	HITACHI	KENNAMETAL	SECO	ISCAR
Milling	M	M01											PN08M PN208			IC907
		M10	YBG252	GC1025 GC1130 GC1030 GC1010		TT5525 TT9030 TT9080	WXM15		ACM100	AH725	PR1225		PN15M PN215	KC735M KC515M		IC903
		M20	YBG205 YBG202 YBG9320 YBG252	GC1025 GC1030 GC1040 GC2030 S30T		TT8020 TT8080	WXM15 WSM35 WSM36	VP15TF MP7130 MP7030 VP20RT	ACP200	AH725 AH130 AH6030 AH3135	PR1025 PR1225	JC5015 JC5118 JC8015	JP4120	KC610M KC5635M KC730M KC720M KC522M KC525M KCPM40 KCPK20	F25M MP3000	IC250 IC300 IC808 IC830 IC900 IC908 IC928 IC1008
		M30	YBG302	S30T GC1040 GC2030	PC9530	TT8020 TT8080	WSM35 WSM36 WSP45 WSP46	VP15TF MP7130 MP7030 VP20RT MP7140 VP30RT	ACP200 ACP300 ACM300	AH130 AH3135	PR830 PR1225 PR1525 PR1535	JC5015 JC7560 JC8015 JC7560P JC8050 JC8118 JC5118 JC8118P	JS4045 CY250 HC844	KC537M KC725M KC735M KCPM40 KC530M	F30M F40M MP3000	IC250 IC300 IC328 IC330 IC830 IC928 IC1008 IC380 IC882
		M40	YBG302			TT8020	WSM35 WSM36 WSP45 WSP46	MP7140 VP30RT	ACP300 ACM300	AH140	PR1525 PR1535	JC5015 JC7560 JC5118 JC7560P JC8050 JC8118 JC8118P	PTH30E PTH40H JM4160		F40M	IC250 IC300 IC328I C330 IC1008 IC882

PVD coating

Application	ISO Code		ZCC.CT	SANDVIK	KORLOY	TaeguTec	WALTER	MiTSUBiSHi	SUMITOMO	TUNGALOY	KYOCERA	DIJET	HITACHI	KENNAMETAL	SECO	ISCAR
Milling	K	K01				TT6080		MP8010		AH110		JC8003	ATH80D ATH08M TH308			
		K10	YBG102 YBG252	GC1010	PC205K	TT6080	WHH15 WXM15 WKK25	MP8010		AH110 AH120	PR1210 PR1510	JC8015	ATH10E TH315 CY100H	KC514M KC515M KC527M KC635M	MK2050	IC350 IC810 IC830 IC900 IC910 IC928 IC950 IC380 IC1008
		K20	YBG152	GC1010 GC1020	PC215K		WHH15 WXM15 WKK25	VP15TF VP20RT	ACK300	AH120 AH9030	PR1210 PR1510	JC5015 JC8015 JC6235	CY150 JP4120 CY9020 PTH13S	KTPK20 KC514M KC610M KC520M KC620M KC524M	MK2000 MK2050	IC350 IC808 IC810 IC830 IC900 IC908 IC910 IC928 IC950 IC1008
		K30		GC1020			WKK25	VP15TF VP20RT	ACK300	AH120		JC6235 JC5015 JC8015 JC8118 JC8118P	CY250 JS4045	KC522M KC725M KC524M KC735M KC537M	MK2050	IC350 IC808 IC830 IC908 IC928 IC950 IC1008
	S	S01								AH110 AH710	PR1210	JC8003 JC8015 JC5118	PN08M PN208			IC907 IC908 IC808 IC903
		S10	YBG202 YBS205	GC1130 GC1010 GC1030 GC2030		TT9030 TT9080 TT8080		MP9120 VP15TF	EH520Z EH20Z ACM100	AH120 AH725	PR1210	JC8003 JC8015 JC5118 JC5015	JS1025 JP4120	KC510M	MS2050	IC903 IC907 IC908 IC840 IC910 IC808
		S20	YBS203 YBS303	S30T GC2030 GC1030 GC1130		TT8020 TT8080	WSM35 WSM36	MP9120 VP15TF MP9130 MP9030	EH520Z EH20Z ACK300 ACP300	AH725 AH130 AH6030	PR1535	JC8050 JC8015 JC5118 JC5015	PTH30H	KC522M KC525M KCSM30 KCPM40	MS2050	IC300 IC908 IC808 IC900 IC830 IC928 IC328 IC330 IC840 IC882 IC380
		S30	YBS303	GC2030 GC1040		TT8020	WSM35 WSM36 WSP45 WSP46		ACM300 ACP300	AH130	PR1535	JC8050 JC7560 JC5118	JM4160	KC725M KCPM40	MS2050 F40M KCSM40	IC830 IC882 IC928
	H	H01				TT2510 TT5505		MP8010 VP05HT		AH110		JC8003 DH103 JC8008 DH102				IC903
		H10		GC1130 GC1010 GC1030		TT5515 TT6080	WHH15	VP15TF VP10H		AH120		JC8003 JC8008 JC8015 JC5118 JC8118P	JP4105 TH308 TH303 PTH08M ATH08M ATH80D	KC505M KC510M	MH1000 F15M	IC900 IC808 IC907 IC905
		H20		GC1030 GC1130		TT5515 TT6080	WHH15	VP15TF		AH120 AH725 AH9030		JC8015 JC5118 JC8118P	JP4115 TH315		F15M	IC900 IC808 IC908 IC380 IC1008
		H30											JP4120		MP3000 F30M	IC380 IC900 IC1008

Cermet

Application	ISO Code		ZCC.CT	SANDVIK	KORLOY	TaeguTec	WALTER	MiTSUBiSHi	SUMITOMO	TUNGALOY	KYOCERA	DIJET	HITACHI	KENNAMETAL	SECO	ISCAR
Turning	P	P01			CC105 CN100	PV3010 CT3000		AP25N* VP25N*	T110A T1000A	NS520	TN30 TN610 PV710* PV30* TN6010 PV7010*	LN10 CX50				IC20N IC520N*
		P10	YNG151 YNG151C	CT5015 GC1525*	CC15 CN200 CT10	PV3010 CT3000	WCE10	NX2525 AP25N* VP25N*	T1200A T2000Z* T1500A T1500Z*	GT9530* J9530	TN60TN610 PV710* PV60* TN6010 PV7010*	CX50 CX75 PX75*	CZ25*	KT315 KT125	TP1020 TP1030* CM CMP*	IC20N IC520N* IC530N*
		P20		GC1525*		PV3010 CT3000	WCE10	NX2525 AP25N* VP25N* NX3035 MP3025*	T1200A T2500A T2000Z* T3000Z* T1500A T1500Z*	GT9530* NS9530 J9530	TN60 PV60* TN620 PV720* TN6020 PV7020* PV7025*	CX75 PX75* PX90*	CH550	KT325 KT1120 KT5020*	TP1020 TP1030*	IC20N IC520N* IC30N IC530N* IC75T
		P30						MP3025* VP45N*	T3000Z*	NS9530	PV7025* PV90*	PX90*				IC75T
	M	M10	YNG151 YNG151C	GC1525*		PV3010 CT3000		NX2525 AP25N VP25N	T110A T1000A T2000Z T1500Z	NS520	TN60 PV60* TN620 PV720* TN6020 PV7020*	LN10 CX50		KT125	TP1020 TP1030* CM CMP*	
		M20				PV3010 CT3000		NX2525 AP25N* VP25N*	T1200A T2000Z T1500A T1500Z	GT9530 NS9530 J9530	TN90 TN6020 TN620 PV720* PV90* PV7020* PV7025*	CX50 CX75 PX75	CH550			
		M30								NS9530						
		M40														
	K	K01			CC105 CN100	PV3010 CT3000		NX2525 AP25N*	T110A T1000A T2000Z* T1500Z*	NS520	TN30 PV30* PV7005* TN610 PV710* TN6010 PV7010*	LN10				
		K10	YNG151 YNG151C	CT5015	CC115	CT3000		NX2525 AP25N*	T1200A T2000Z* T1500A T1500Z*	GT9530 NS9530 J9530	TN60 PV60* TN6020 TN620 PV720* PV7020* PV7025*	LN10		KT325 KT125		
		K20						NX2525 AP25N*	T3000Z*	NS9530		CX75				
		K30														

Cermet

Application	ISO Code		ZCC.CT	SANDVIK	KORLOY	TaeguTec	WALTER	MiTSUBiSHi	SUMITOMO	TUNGALOY	KYOCERA	DIJET	HITACHI	KENNAMETAL	SECO	ISCAR
Milling	P	P01				CT3000										
		P10	YNG151 YNG151C		CN100	CT3000 CT7000		NX2525		NS740	TN60	CX75	MZ1000*		C15M	IC30N
		P20		CT530	CN20	CT3000 CT7000		NX2525 MX3020	T250A	NS740	TN100M TN60	CX75 CX90	CH550 CH7030 MZ1000* MZ2000*	KT530M HT7 KT605M	C15M MP1020	IC30N
		P30			CN30	CT7000		MX3030 NX4545	T250A T4500A			CX90 CX99	MZ3000* CH7035			IC30N
	M	M01														
		M10	YNG151 YNG151C			CT3000 CT7000		NX2525		NS740	TN60					IC30N
		M20		CT530		CT7000		NX2525 MX3020		NS740	TN100M	CX75	CH550 CH7030 MZ1000* MZ2000*	KT530M HT7 KT605M	C15M	IC30N
		M30						MX3030 NX4545	T250A			CX90 CX99	MZ3000* CH7035			
		M40														
	K	K01														
		K10	YNG151 YNG151C			CT7000		NX2525		NS740	TN60					
		K20						NX2525				CX75		KT530M HT7		
		K30														

PCBN grade

Application	ISO Code		ZCC.CT	SUMITOMO	TUNGALOY	KYOCERA	SECO	SANDVIK
Turning	K	K01-K10	BK1011 BK1021	BN7000 BN500	BX910 BX930	KBN475 KBN60M	CBN200	CB50 CB7525
		K20	BK2511 BK2541	BN7000 BNS800	BX480 BX90S	KBN900	CBN300 CBN350	CB7925
		K25						
	H	H01	BH0121	BNC2010 BNC100	KBN05M KBN510	BXM10 BX310	CH0550 CBN050C	CB7105
		H10	BH1020	BNC2020 BNC160 BN1000	KBN10M KBN525	BX330 BXC30	CBN060K CBN100	CB7115 CB7025 CB7015
		H20-H25	BH2011 BH2511	BNC200 BN2000	KBN25M	BXA20 BXM20 BX360	CH2540 CBN150	CB7125
		H35	BH3511	BNC300 BN350	KBN35M	BXC50 BX380	CH3515	CB7135 CB7525
	S	S10	BS1011	BN7000	BX940 BX950	KBN475 KBN60M	CBN200	CB7525
		S20	BS2011	BN500	BX470 BX480	KBN900	CBN300 CBN350	CB7925
		S30	BS3011	BNS800	BXC90			

PCD grade

Application	ISO Code		ZCC.CT	SANDVIK	KORLOY	TaeguTec	WALTER	Element Six
Turning	N	N01	DN0121	DA1000 DA90	DX180 DX160	KPD001	PCD05	CD05
		N10	DN1011 DN0511	DA1000 DA150	DX110 DX140	KPD010	PCD10	CD10
		N20	DN1031	DA1000 DA2200	DX110 DX120	KPD230	PCD20	CD1810
		N30	DN3021		DX110		PCD30	

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		ST10	P10			ST10P	TH10		SRT				IC70
		P20		SMA	ST20	P20		UTI20T	ST20E	KS20		SRT DX30	EX35			IC70 IC50M
		P30		SM30	ST30A	P30		UTI20T	A30	KS15F UX30	PW30	SR30 DX30	EX35			IC50M IC54
		P40	YC40			P40			ST40E	TX40		SR30	EX45			IC54
	M	M10		H10A	U10	M10			EH510 U10E	TH10		UMN	WA10B	KU10 K313 K68	890	IC07
		M20		H13A	U20	M20		UTI20T	EH520 U2	KS20		DX25 UMS	EX35	KU10 K313 K68	HX	IC07 IC08 IC20
		M30		H10F SM30	ST30A			UTI20T	A30	UX30		DX25 UMS	EX45		883	IC08 IC20 IC28
		M40			U40	M40				TU40		UM40	EX45			IC28
	K	K01	YD051		H02	UF1		HTI05T	H1 H2	KS05F		KG03	WH05	KU10 K313 K68		
		K10	YD201	H10 HM	H01	K10		HTi10	EH10 EH510	TH10	KW10 GW15	KG10 KT9	WH10	KU10 K313 K68	890	IC20
		K20	YD201	H13A	G10	K20		UTI20T	G10E EH20 EH520	KS15F KS20	GW25	CR1 KG20		KU10 K313 K68	HX	IC20
		K30			G3	K30		UTI20T	G10E			KG30			883	
	N	N01		H10 H13A					H1 H2	KS05F	KW10					
		N10	YD101		H01	K10	WK1 WK10	HTI10	EH10 EH510	TH10	KW10 GW15	KT9	WH10	KU10 K313 K68	H15	IC08 IC20
		N20				K20	WK1 WK10		G10E EH20 EH520	KS15F		CR1	WH20	KU10 K313 K68	HX	IC08 IC20
		N30					WK40 WMG40					KG30			H25	
	S	S01						RT9005			SW05	KG03				
		S10	YD101	H10 H10A H10F H13A	H01	K10	WK1	RT9005 RT9010 MT9015	EH10 EH510	KS05F TH10	SW10	FZ05 KG10	WH135	KU10 K313 K68	HX	IC07 IC08
		S20				K20	WK1 WMG40	RT9010 TF15	EH20 EH520	KS15F KS20	SW25	FZ15 KG20		KU10 K313 K68	H25	IC07 IC08
		S30					WMG40	TF15				KG30				

Cemented carbide material

Application	ISO Code		ZCC.CT	SANDVIK	KORLOY	TaeguTec	WALTER	MiTSUBiSHi	SUMITOMO	TUNGALOY	KYOCERA	DIJET	HITACHI	KENNAMETAL	SECO	ISCAR
Milling	P	P10		S1P								SRT				
		P20			ST20	P30		UTI20T	A30N			SRT DX30	EX35	K125M		IC50M IC28
		P30			ST30A	P30		UTI20T	A30N	UX30	PW30	SR30 DX30	EX35	GX		IC50M IC28
		P40	YC30S		ST40						PW30	SR30	EX45			IC28
	M	M10			U10	M10										
		M20			U20	M20						UMN				
		M30	YC30S					UTI20T	A30N			DX25 UMS	EX35			IC08 IC20
		M40		SM30	U40	M40		UTI20T	A30N			DX25 UMS	EX35			IC08 IC28
	K	K01	YD051		H01	K10		HTI05T				KG03		K115M K313		
		K10	YD051		H05 H10	K10	WK10	HTI10	G10E	TH10	KW10 GW25	KG10	WH10	K115M K313		IC20
		K20	YD201	H13A	G10			UTI20T	G10E		GW25	KT9 CR1 KG20			HX	IC20
		K30						UTI20T				KG30				

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