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THE EXPERTS OF DIFFICULT MACHINING



Solid End Mills

Solid Carbide End Mills

Series	Pictures	Category	Teeth	Helix angles	Application	Cutting edge tolerance (in)	Diameter (in)	Material	Information
M200-4ES		ECO line	Z=4	35°/38°		+0.00 -0.0028	0.125-1	Universal type	Used in carbon steel, tool steel, alloyed steel machining. 4 cutting edges can achieve better surface finishing. Differential helix and tooth distance eliminate vibration. The workpiece hardness is up to HRC45
M200-4RS		ECO line	Z=4	35°/38°		+0.00 -0.0028	0.125-1	Universal type	Used in carbon steel, tool steel, alloyed steel machining. The round corner can prevent edge breakage during high speed cutting. Differential helix and tooth distance eliminate vibration. With 4 cutting edge design. The workpiece hardness is up to HRC45
M200-2BS		ECO line	Z=2	30°		+0.00 -0.0028	0.125-1	Universal type	Used in carbon steel, tool steel, alloyed steel machining. For profile milling, good toughness. The workpiece hardness is up to HRC45
M245-2ES		ECO line	Z=2	45°		+0.00 -0.0028	0.125-1	Aluminium alloy	Design for vibration resistance. With special edge treatment. It can achieve better surface finish.

Icons Description

Icons	Description
	Slot milling and square shoulder milling
	Square shoulder rough milling
	Square shoulder finish milling
	High feed milling
	Dynamic milling cycloid milling
	Profile milling
	Chamfering and deburring

Icons	Description
	AlTiN Coating
	AlCrN Coating
	Uncoated
	30° Helix angle
	35° Helix angle
	35°/38° Helix angle
	45° Helix angle

Icons	Description
	Cylindrical shank
	Square
	Round corner
	Ball-nose
	Corner chamfer
	Chamfer
	Waved edge

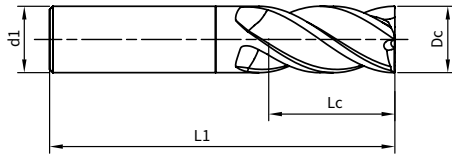
Solid Carbide end Mill Denomination

M	1	00	-	2	E	S	-	060	002	N
1	2	3	-	4	5	6	-	7	8	9
1-Tool category	2-Generations	3-Series				4-Number of teeth		5-Tool type		
M End mill	1	00-09 Universal end mills HRC45 10-19 Universal end mills HRC55 20-29 High performance end mills 30-39 Dedicated for steel 40-49 Dedicated for aluminium alloy 50-59 Dedicated for stainless steel 60-69 Dedicated for difficult machining material 70-79 Dedicated for hardened material 80-99 others				2,3,4,5,6.....		E Square B Ball nose R Round corner C Chamfer P With waved edges W Forming end mills T Taper end mill H High feed milling		
6-Length		7-Tool diameter		8-Chamfer / nose radius size		9-Structure type				
S Standard total length		0.125 in=1/8 in		R015=0.015 in		N Straight necking				
L Long version		0.188 in=3/16 in				C Conical necking				
XL Super long version						P Special shank				
XXL Extra long version						Default: No necking				
SN Short cutting edge										
SP Long cutting edge										

Solid Carbide End Mill M200

Eco line

Square shoulder mill with 4 cutting edges



Solid carbide end mill

Workpiece materials < HRC45

End Mill Tolerances			
Dc(in)	Tolerance(in)	d1	Tolerance
≤0.188	+0.00/-0.0008	all	h6
0.25-0.313	+0.00/-0.0011		
0.375-0.438	+0.00/-0.0019		
0.500-1.000	+0.00/-0.0028		

P	M	K	N	S	H	O
●●	●	●●				

●● 1st choice ● 2nd choice

Product code	Dc in No	Dc in	Dc mm	d1 in No	d1 in	Lc in	L1 in	Z	Stock
M200-4ES-0.125	1/8	0.125	3.175	1/8	0.125	0.500	2.250	4	●
M200-4ES-0.188	3/16	0.188	4.763	3/16	0.188	0.500	2.000	4	●
M200-4ES-0.250	1/4	0.250	6.350	1/4	0.250	0.750	2.500	4	●
M200-4ES-0.313	5/16	0.313	7.938	5/16	0.313	0.813	2.500	4	●
M200-4ES-0.375	3/8	0.375	9.525	3/8	0.375	1.125	3.000	4	●
M200-4ES-0.438	7/16	0.438	11.113	7/16	0.438	1.000	2.500	4	●
M200-4ES-0.500	1/2	0.500	12.700	1/2	0.500	1.000	3.000	4	●
M200-4ES-0.750	3/4	0.750	19.050	3/4	0.750	1.500	4.000	4	●
M200-4ES-1.000	1	1.000	25.400	1	1.000	2.000	4.000	4	●

Long version

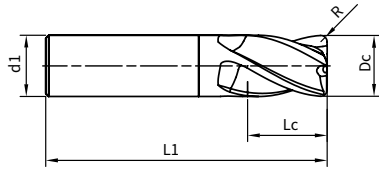
Product code	Dc in No	Dc in	Dc mm	d1 in No	d1 in	Lc in	L1 in	Z	Stock
M200-4EL-0.313	5/16	0.313	7.938	5/16	0.313	1.125	3.000	4	●
M200-4EL-0.375	3/8	0.375	9.525	3/8	0.375	1.500	3.500	4	●
M200-4EL-0.500	1/2	0.500	12.700	1/2	0.500	2.000	4.000	4	●
M200-4EL-0.625	5/8	0.625	15.875	5/8	0.625	1.250	3.500	4	●

Marked: ● Stocked ○ Limited-stock

Solid Carbide End Mill M200

Eco line

Round corner mill with 4 cutting edges



Solid carbide end mill

Workpiece materials < HRC45

End Mill Tolerances			
Dc(in)	Tolerance(in)	d1	Tolerance
≤0.188	+0.00/-0.0008	all	h6
0.25-0.313	+0.00/-0.0011		
0.375-0.438	+0.00/-0.0019		
0.500-1.000	+0.00/-0.0028		

P	M	K	N	S	H	O
●●	●	●●				

●● 1st choice ● 2nd choice

Product code	Dc in No	Dc in	Dc mm	d1 in No	d1 in	Lc in	L1 in	Re in Corner radius	Z	Stock
M200-4RS-0.125R015	1/8	0.125	3.175	1/8	0.125	0.500	2.250	0.015	4	●
M200-4RS-0.188R015	3/16	0.188	4.763	3/16	0.188	0.500	2.000	0.015	4	●
M200-4RS-0.250R015	1/4	0.250	6.350	1/4	0.250	0.750	2.500	0.015	4	●
M200-4RS-0.313R015	5/16	0.313	7.938	5/16	0.313	0.813	2.500	0.015	4	●
M200-4RS-0.375R015	3/8	0.375	9.525	3/8	0.375	1.125	3.000	0.015	4	●
M200-4RS-0.375R030	3/8	0.375	9.525	3/8	0.375	1.125	3.000	0.03	4	●
M200-4RS-0.438R015	7/16	0.438	11.113	7/16	0.438	1.000	2.500	0.015	4	●
M200-4RS-0.500R015	1/2	0.500	12.700	1/2	0.500	1.000	3.000	0.015	4	●
M200-4RS-0.500R030	1/2	0.500	12.700	1/2	0.500	1.000	3.000	0.03	4	●
M200-4RS-0.750R015	3/4	0.750	19.050	3/4	0.750	1.500	4.000	0.015	4	●
M200-4RS-0.750R030	3/4	0.750	19.050	3/4	0.750	1.500	4.000	0.03	4	●
M200-4RS-1.000R015	1	1.000	25.400	1	1.000	2.000	4.000	0.015	4	●
M200-4RS-1.000R030	1	1.000	25.400	1	1.000	2.000	4.000	0.03	4	●

Long version

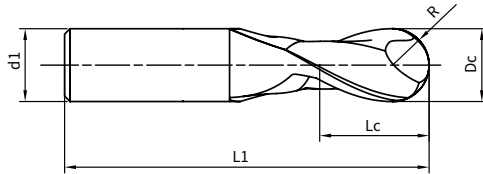
Product code	Dc in No	Dc in	Dc mm	d1 in No	d1 in	Lc in	L1 in	Re in Corner radius	Z	Stock
M200-4RL-0.313R015	5/16	0.313	7.938	5/16	0.313	1.125	3.000	0.015	4	●
M200-4RL-0.375R015	3/8	0.375	9.525	3/8	0.375	1.500	3.500	0.015	4	●
M200-4RL-0.375R030	3/8	0.375	9.525	3/8	0.375	1.500	3.500	0.03	4	●
M200-4RL-0.500R015	1/2	0.500	12.700	1/2	0.500	2.000	4.000	0.015	4	●
M200-4RL-0.500R030	1/2	0.500	12.700	1/2	0.500	2.000	4.000	0.03	4	●
M200-4RL-0.625R015	5/8	0.625	15.875	5/8	0.625	1.250	3.500	0.015	4	●
M200-4RL-0.625R030	5/8	0.625	15.875	5/8	0.625	1.250	3.500	0.03	4	●

Marked: ● Stocked ○ Limited-stock

Solid Carbide End Mill M200

Eco line

Ball-nose mill with 2 cutting edges



Solid carbide end mill

Workpiece materials < HRC45

End Mill Tolerances			
Dc(in)	Tolerance(in)	d1	Tolerance
all	+0.00/-0.0008	all	h6

P	M	K	N	S	H	O
••	•	••				

•• 1st choice • 2nd choice

Product code	Dc in No	Dc in	Dc mm	d1 in No	d1 in	Lc in	L1 in	Z	Stock
M200-2BS-0.125	1/8	0.125	3.175	1/8	0.125	0.500	2.250	2	●
M200-2BS-0.188	3/16	0.188	4.763	3/16	0.188	0.500	2.000	2	●
M200-2BS-0.250	1/4	0.250	6.350	1/4	0.250	0.750	2.500	2	●
M200-2BS-0.313	5/16	0.313	7.938	5/16	0.313	0.813	2.500	2	●
M200-2BS-0.375	3/8	0.375	9.525	3/8	0.375	1.125	3.000	2	●
M200-2BS-0.438	7/16	0.438	11.113	7/16	0.438	1.000	2.500	2	●
M200-2BS-0.500	1/2	0.500	12.700	1/2	0.500	1.000	3.000	2	●
M200-2BS-0.750	3/4	0.750	19.050	3/4	0.750	1.500	4.000	2	●
M200-2BS-1.000	1	1.000	25.400	1	1.000	2.000	4.000	2	●

Long version

Product code	Dc in No	Dc in	Dc mm	d1 in No	d1 in	Lc in	L1 in	Z	Stock
M200-2BL-0.313	5/16	0.313	7.938	5/16	0.313	1.125	3.000	2	●
M200-2BL-0.375	3/8	0.375	9.525	3/8	0.375	1.500	3.500	2	●
M200-2BL-0.500	1/2	0.500	12.700	1/2	0.500	2.000	4.000	2	●
M200-2BL-0.625	5/8	0.625	15.875	5/8	0.625	1.250	3.500	2	●

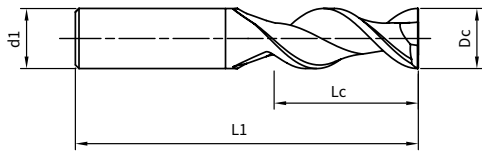
Marked: ● Stocked ○ Limited-stock

Solid Carbide End Mill M245

Solid carbide mill

Eco line

Square shoulder mill with 2 cutting edges dedicated for aluminum alloy



End Mill Tolerances			
Dc(in)	Tolerance(in)	d1	Tolerance
≤0.188	+0.00/-0.0008	all	h6
0.25-0.313	+0.00/-0.0011		
0.375-0.438	+0.00/-0.0019		
0.500-1.000	+0.00/-0.0028		

P	M	K	N	S	H	O
			●●			

●● 1st choice ● 2nd choice

Product code	Dc in No	Dc in	Dc mm	d1 in No	d1 in	Lc in	L1 in	Z	Stock
M245-2ES-0.125	1/8	0.125	3.175	1/8	0.125	0.500	2.250	2	●
M245-2ES-0.188	3/16	0.188	4.763	3/16	0.188	0.500	2.000	2	●
M245-2ES-0.250	1/4	0.250	6.350	1/4	0.250	0.750	2.500	2	●
M245-2ES-0.313	5/16	0.313	7.938	5/16	0.313	0.813	2.500	2	●
M245-2ES-0.375	3/8	0.375	9.525	3/8	0.375	1.125	3.000	2	●
M245-2ES-0.438	7/16	0.438	11.113	7/16	0.438	1.000	2.500	2	●
M245-2ES-0.500	1/2	0.500	12.700	1/2	0.500	1.000	3.000	2	●
M245-2ES-0.625	5/8	0.625	15.875	5/8	0.625	1.250	3.500	2	●
M245-2ES-0.750	3/4	0.750	19.050	3/4	0.750	1.500	4.000	2	●
M245-2ES-1.000	1	1.000	25.400	1	1.000	2.000	4.000	2	●

Long version

Product code	Dc in No	Dc in	Dc mm	d1 in No	d1 in	Lc in	L1 in	Z	Stock
M245-2EL-0.313	5/16	0.313	7.938	5/16	0.313	1.125	3.000	2	●
M245-2EL-0.375	3/8	0.375	9.525	3/8	0.375	1.500	3.500	2	●
M245-2EL-0.500	1/2	0.500	12.700	1/2	0.500	2.000	4.000	2	●

Solid Endmill

Marked: ● Stocked ○ Limited-stock

Solid Carbide End Mill Eco Line Cutting Parameters

Materials								
ISO	Material classification			Brinell hardness (HB)	Tensile strength Rm(lbs/in²)	Cutting speed Vc(SFM)		
P	Unalloyed steel	C≤0.25%	Annealed	125	62000	150~260		
		0.25 < C≤0.55%	Annealed	190	92700	150~260		
		0.25 < C≤0.55%	Heat-treated	210	103000	150~260		
		C > 0.55%	Annealed	190	92700	150~260		
		C > 0.55%	Heat-treated	300	147000	130~200		
		Free cutting steel (short-chip)	Annealed	220	108000	150~210		
	Low-alloyed steel	Annealed			175	85700	150~250	
		Heat-treated			300	146900	130~200	
		Heat-treated			380	186000	130~200	
		Heat-treated			430	214200	100~130	
	High-alloyed steel and high-alloyed tool steel	Annealed			200	97900	150~250	
		Hardened and tempered			300	147000	130~200	
		Hardened and tempered			400	197000	130~200	
	Stainless steel	Ferritic/martensitic, annealed			200	97900	110~130	
		Martensitic, heat-treated			330	162000	100~110	
M	Stainless steel	Austenitic, quench hardened		200	97900	100~110		
		Austenitic, precipitation hardened (PH)		300	147000	100		
		Austenitic/ferritic, duplex		230	113000	100~110		
K	Malleable cast iron	Ferritic		200	58000	180~200		
		Pearlitic		260	101000	180~200		
	Grey cast iron	Low tensile strength		180	29000	180~200		
		High tensile strength/austenitic		245	50800	180~200		
	Nodular cast iron	Ferritic		155	58000	180~200		
		Pearlitic		265	101000	150~180		
	GGV(CGI)				230	58000	180~200	
N	Wrought aluminium alloys	Non-aging		30	-			
		Aged		100	49300			
	Cast aluminium alloys	≤ 12% Si, non-aging		75	37700			
		≤ 12% Si, aged		90	45000			
		> 12% Si, non-aging		130	65300			
	Magnesium alloys			70	36300			
	Copper and copper alloys	Unalloyed, electrolytic copper		100	49300			
		Brass, bronze, red brass		90	45000			
Cu alloys, short-chipping		110	55100					
High-tensile, Ampco alloy		300	146500					
S	Heat-resistant alloys	Fe-based	Annealed	200	98600			
			Hardened	280	136000			
		Ni or Co based	Annealed	250	122000			
			Hardened	350	171000			
			Cast	320	156600			
	Titanium alloys	Pure titanium		200	98600			
		α and β alloys, hardened		375	182700			
		β alloys		410	203000			
Tungsten alloys			300	146500				
Molybdenum alloys			300	146500				
H	Hardened steel	Hardened and tempered		50HRC	-			
		Hardened and tempered		55HRC	-			
		Hardened and tempered		60HRC	-			
	Chilled cast iron	Hardened and tempered		50HRC	-			

The cutting data are average recommended values. For special applications, adjustment is needed.

[illegible]

Solid Carbide End Mill Eco Line Cutting Parameters

Materials								
ISO	Material classification			Brinell hardness (HB)	Tensile strength Rm(lbs/in²)	Cutting speed Vc(SFM)		
P	Unalloyed steel	C≤0.25%	Annealed	125	62000	260~330		
		0.25 < C≤0.55%	Annealed	190	92700	250~300		
		0.25 < C≤0.55%	Heat-treated	210	103000	250~300		
		C > 0.55%	Annealed	190	92700	250~300		
		C > 0.55%	Heat-treated	300	147000	200~230		
		Free cutting steel (short-chip)	Annealed	220	108000	250~300		
	Low-alloyed steel	Annealed			175	85700	250~300	
		Heat-treated			300	146900	200~230	
		Heat-treated			380	186000	200~230	
		Heat-treated			430	214200	180~200	
	High-alloyed steel and high-alloyed tool steel	Annealed			200	97900	250~280	
		Hardened and tempered			300	147000	200~230	
		Hardened and tempered			400	197000	180~200	
	Stainless steel	Ferritic/martensitic, annealed			200	97900	160~230	
		Martensitic, heat-treated			330	162000	130~160	
M	Stainless steel	Austenitic, quench hardened		200	97900	130~160		
		Austenitic, precipitation hardened (PH)		300	147000	130		
		Austenitic/ferritic, duplex		230	113000	130~160		
K	Malleable cast iron	Ferritic		200	58000	230~260		
		Pearlitic		260	101000	230~260		
	Grey cast iron	Low tensile strength		180	29000	230~260		
		High tensile strength/austenitic		245	50800	230~260		
	Nodular cast iron	Ferritic		155	58000	230~260		
		Pearlitic		265	101000	220~250		
	GGV(CGI)				230	58000	230~260	
N	Wrought aluminium alloys	Non-aging		30	-			
		Aged		100	49300			
	Cast aluminium alloys	≤ 12% Si, non-aging		75	37700			
		≤ 12% Si, aged		90	45000			
		> 12% Si, non-aging		130	65300			
	Magnesium alloys			70	36300			
	Copper and copper alloys	Unalloyed, electrolytic copper		100	49300			
		Brass, bronze, red brass		90	45000			
Cu alloys, short-chipping		110	55100					
High-tensile, Ampco alloy		300	146500					
S	Heat-resistant alloys	Fe-based	Annealed	200	98600			
			Hardened	280	136000			
		Ni or Co based	Annealed	250	122000			
			Hardened	350	171000			
			Cast	320	156600			
	Titanium alloys	Pure titanium		200	98600			
		α and β alloys, hardened		375	182700			
		β alloys		410	203000			
	Tungsten alloys			300	146500			
Molybdenum alloys			300	146500				
H	Hardened steel	Hardened and tempered		50HRC	-			
		Hardened and tempered		55HRC	-			
		Hardened and tempered		60HRC	-			
	Chilled cast iron	Hardened and tempered		50HRC	-			

The cutting data are average recommended values. For special applications, adjustment is needed.

[illegible]

Solid Carbide End Mill Eco Line Cutting Parameters

Materials								
ISO	Material classification			Brinell hardness (HB)	Tensile strength Rm((lbs/in²)	Cutting speed Vc(SFM)		
P	Unalloyed steel	C≤0.25%	Annealed	125	62000	300~330		
		0.25 < C≤0.55%	Annealed	190	92700	300~330		
		0.25 < C≤0.55%	Heat-treated	210	103000	300~330		
		C > 0.55%	Annealed	190	92700	300~330		
		C > 0.55%	Heat-treated	300	147000	260~300		
		Free cutting steel (short-chip)	Annealed	220	108000	300~330		
	Low-alloyed steel	Annealed			175	85700	300~330	
		Heat-treated			300	146900	260~300	
		Heat-treated			380	186000	260~300	
		Heat-treated			430	214200	260~300	
	High-alloyed steel and high-alloyed tool steel	Annealed			200	97900	300~330	
		Hardened and tempered			300	147000	260~300	
		Hardened and tempered			400	197000	260~300	
	Stainless steel	Ferritic/martensitic, annealed			200	97900	300~330	
		Martensitic, heat-treated			330	162000	260~300	
M	Stainless steel	Austenitic, quench hardened		200	97900	300~330		
		Austenitic, precipitation hardened (PH)		300	147000	260~300		
		Austenitic/ferritic, duplex		230	113000	260~300		
K	Malleable cast iron	Ferritic		200	58000	300~330		
		Pearlitic		260	101000	300~330		
	Grey cast iron	Low tensile strength		180	29000	300~330		
		High tensile strength/austenitic		245	50800	300~330		
	Nodular cast iron	Ferritic		155	58000	300~330		
		Pearlitic		265	101000	300~330		
	GGV(CGI)			230	58000	300~330		
N	Wrought aluminium alloys	Non-aging		30	-			
		Aged		100	49300			
	Cast aluminium alloys	≤ 12% Si, non-aging		75	37700			
		≤ 12% Si, aged		90	45000			
		> 12% Si, non-aging		130	65300			
	Magnesium alloys			70	36300			
	Copper and copper alloys	Unalloyed, electrolytic copper		100	49300			
		Brass, bronze, red brass		90	45000			
Cu alloys, short-chipping		110	55100					
High-tensile, Ampco alloy		300	146500					
S	Heat-resistant alloys	Fe-based	Annealed	200	98600			
			Hardened	280	136000			
		Ni or Co based	Annealed	250	122000			
			Hardened	350	171000			
			Cast	320	156600			
	Titanium alloys	Pure titanium		200	98600			
		α and β alloys, hardened		375	182700			
		β alloys		410	203000			
	Tungsten alloys			300	146500			
Molybdenum alloys			300	146500				
H	Hardened steel	Hardened and tempered		50HRC	-			
		Hardened and tempered		55HRC	-			
		Hardened and tempered		60HRC	-			
	Chilled cast iron	Hardened and tempered		50HRC	-			

The cutting data are average recommended values. For special applications, adjustment is needed.



Solid Endmill

Solid Carbide End Mill Eco Line Cutting Parameters

Materials								
ISO	Material classification			Brinell hardness (HB)	Tensile strength Rm(lbs/in²)	Cutting speed Vc(SFM)		
P	Unalloyed steel	C≤0.25%	Annealed	125	62000			
		0.25 < C≤0.55%	Annealed	190	92700			
		0.25 < C≤0.55%	Heat-treated	210	103000			
		C > 0.55%	Annealed	190	92700			
		C > 0.55%	Heat-treated	300	147000			
		Free cutting steel (short-chip)	Annealed	220	108000			
	Low-alloyed steel	Annealed			175	85700		
		Heat-treated			300	146900		
		Heat-treated			380	186000		
		Heat-treated			430	214200		
	High-alloyed steel and high-alloyed tool steel	Annealed			200	97900		
		Hardened and tempered			300	147000		
		Hardened and tempered			400	197000		
	Stainless steel	Ferritic/martensitic, annealed			200	97900		
		Martensitic, heat-treated			330	162000		
M	Stainless steel	Austenitic, quench hardened		200	97900			
		Austenitic, precipitation hardened (PH)		300	147000			
		Austenitic/ferritic, duplex		230	113000			
K	Malleable cast iron	Ferritic		200	58000			
		Pearlitic		260	101000			
	Grey cast iron	Low tensile strength		180	29000			
		High tensile strength/austenitic		245	50800			
	Nodular cast iron	Ferritic		155	58000			
		Pearlitic		265	101000			
	GGV(CGI)			230	58000			
N	Wrought aluminium alloys	Non-aging		30	-	490~660		
		Aged		100	49300	390~490		
	Cast aluminium alloys	≤ 12% Si, non-aging		75	37700	490~660		
		≤ 12% Si, aged		90	45000	430~490		
		> 12% Si, non-aging		130	65300	390~430		
	Magnesium alloys			70	36300	490~660		
	Copper and copper alloys	Unalloyed, electrolytic copper		100	49300	390~490		
		Brass, bronze, red brass		90	45000	390~490		
Cu alloys, short-chipping		110	55100	390~490				
High-tensile, Ampco alloy		300	146500					
S	Heat-resistant alloys	Fe-based	Annealed	200	98600			
			Hardened	280	136000			
		Ni or Co based	Annealed	250	122000			
			Hardened	350	171000			
			Cast	320	156600			
	Titanium alloys	Pure titanium		200	98600			
		α and β alloys, hardened		375	182700			
		β alloys		410	203000			
Tungsten alloys			300	146500				
Molybdenum alloys			300	146500				
H	Hardened steel	Hardened and tempered		50HRC	-			
		Hardened and tempered		55HRC	-			
		Hardened and tempered		60HRC	-			
	Chilled cast iron	Hardened and tempered		50HRC	-			

The cutting data are average recommended values. For special applications, adjustment is needed.

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