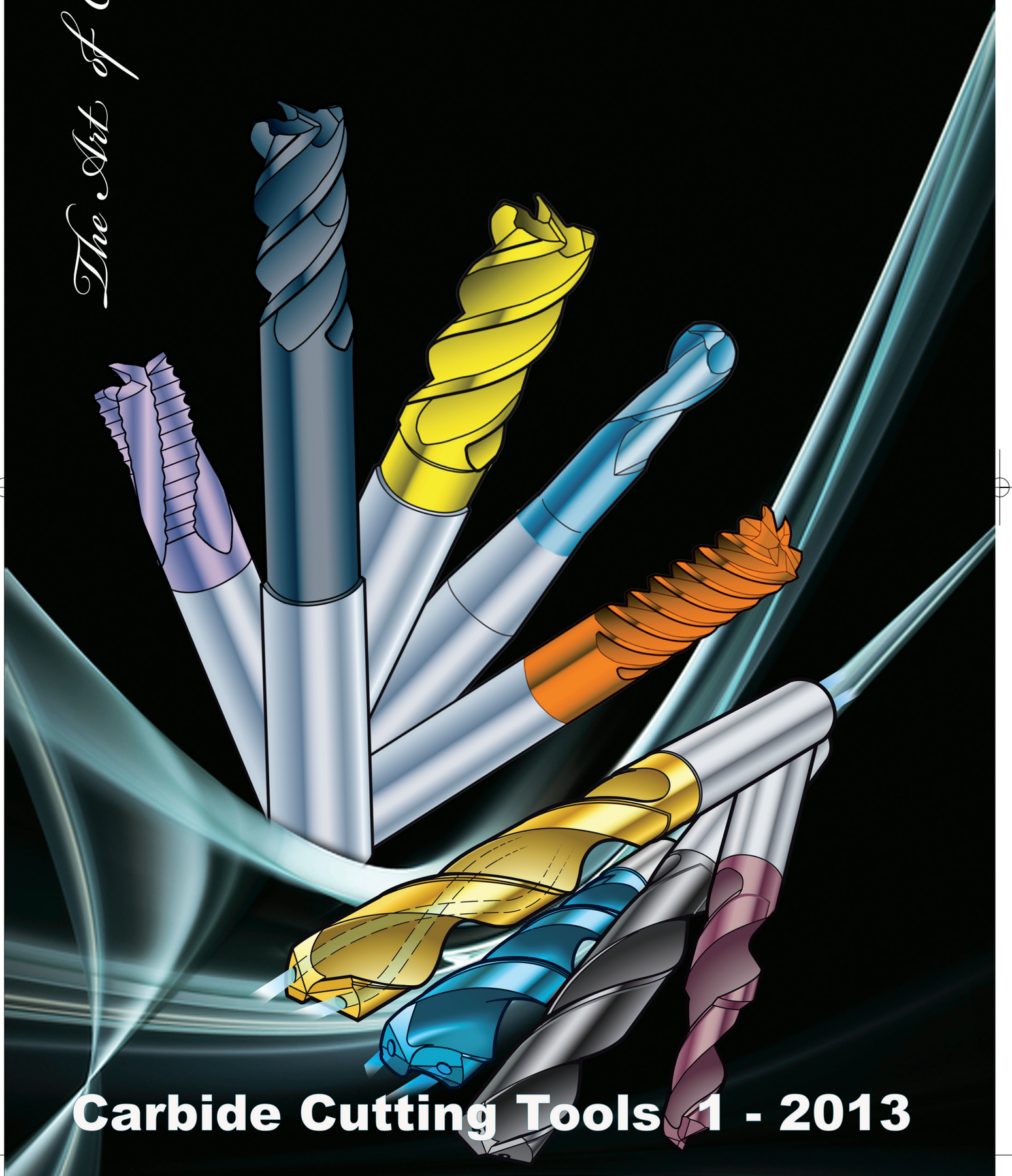
The Art of Cutting

H.S.G.

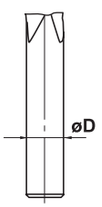


Carbide Cutting Tools 1 - 2013

1. When first using this tool, the feeding speed is suggested to set at 50% of the aforesaid data for test cutting. The feeding speed is allowed to gradually increase when the cutting condition becomes stable.
2. Please use high precision/rigidity and better balanced chucking sets. If the cutting precision is over 0.01mm, process the cutting after resetting.
3. Keeping the length of the cutting tool extending the chuck be shorter be better. If the length becomes much longer, please reduce the turning speed, feeding speed, and/or cutting volume.
4. Please reduce the turning speed of spindle, feeding speed, or cutting volume if abnormal vibration and noises occur during the cutting.
5. In order to avoid both breaking of the blade and over cutting, please use the smooth milling cutting method.
6. For better cooling of the steel materials, please use air or spraying types. For stainless steel, titanium alloy, and heat-resistant alloy, please use non-water solution cutting fluid.

Tolerance End Mills

Shank End Mills Ø D (6h)	Tolerance
Ø D 3 ~ Ø D 8	- 0 - 0.008
Ø D 10	- 0 - 0.009
Ø D 12 ~ Ø D16	- 0 - 0.011
Ø D 20	- 0 - 0.013



Square End Mills Flute Ø D	Tolerance
Ø D 1 ~ Ø D 5	+ 0 - 0.020
Ø D 6	+ 0 - 0.025
Ø D 8	+ 0 - 0.030
Ø D 10	+ 0 - 0.035
Ø D 12 ~ Ø D 20	+ 0 - 0.040

Ball Nose End Mills R	Tolerance
R 0.5 ~ R 5	+ 0.010 - 0.010
R 6	+ 0.015 - 0.015
R 8 ~ R 10	+ 0.020 - 0.020

Corner Radius End Mills Flute Ø D	R Tolerance
Ø D 1~ Ø D 5	+ 0.020 - 0
Ø D 6	+ 0.020 - 0
Ø D 8	+ 0.030 - 0
Ø D 10	+ 0.030 - 0
Ø D 12	+ 0.030 - 0
Ø D 16	+ 0.030 - 0

Quality Carbide and Coating

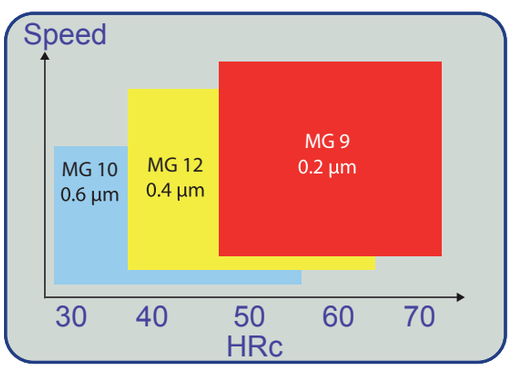
Carbide Grades		MG 10 0.6 µm HRc <60	MG 12 0.4 µm HRc <65	MG 9 0.2 µm HRc <70
ISO classification		K30-K40	K20-K30	K05-K10
CO	[%]	10.0	12.0	9.0
WC+C r_3C_2+VC	[%]	90.0	88.0	91.0
TiC/Ta/Nbc	[%]	0	0	0
Density	[g/cm ^{3}]	14.4	14.05	14.3
HV30	[kg/mm ^{2}]	1610	1680	1920
HRA	[ISO3738]	92.1	92.6	93.7
KIC	[MNm $^{-3/2}$]	10.5	10.0	9.3
Bending strength	[N/mm ^{2}]	>4000	>4000	3800
Porosity	A	<02	<02	<02
	B	00	00	00
	C	00	00	00
WC grain size	[µm]	0.6	0.4	0.2

Application

MG 10 0.6 µm — For titanium alloys, heat-resistant alloys austenitic steels, grey cast iron, fiberglass reinforced plastics.

MG 12 0.4 µm — Drill/milling application,e.g.for titanium alloys, heat-resistant alloys, stainless steels, hardned steels, grey cast iron, fiberglass reinforced plastics, composite materials.

MG 9 0.2 µm — Drill/milling application,e.g.for high wear resistance materials, for stainless steels, for composite materials like Kevlar and Graphite Reinforced Plastics. For PCB routers. For high speed cutting. For dry cutting.



Hard Coatiing Properties

Coating Type	Color	Nano Hardness (Gpa)	Thickness (µm)	Friction Coifficent	Max usage Temp(°C)
AlTiN	BLACK	34	1-4	0.70	900
AlTI	BLUE-GREY	34	1-4	0.55	850
CrN	METAL-SILVER	18	1-7	0.30	700
DIA	BLACK	20	0-0.5	0.50	200
DLC	BLACK	20	1-3	0.15	400
HELICA	COPPER	30	1-4	0.25	1000
NaC	SOFE GOLD	25	1-4	0.80	800
nACoB	VIOLET-BLUE	45	1-4	0.45	1200
TiAl	BURGUNDY-VIOLET	33	1-4	0.30	500
TIALN	VIOLET-BLACK	32	1-4	0.60	750
ZnR	WHITE-GOLD	20	1-4	0.45	600

Spindle Speed Table

Dia	V (mm/min)														
Ø	20	30	40	50	60	70	80	90	100	120	150	180	200	250	300
0.5	12740	19110	25480	31850	38220	44590	50960	57320	63690	76430	95540	114650	127390	159240	191080
0.6	10620	15920	21230	26540	31850	37150	42460	47770	53080	63690	79620	95540	106160	132700	159240
0.7	9100	13650	18200	22750	27300	31850	36400	40950	45500	54590	68240	81890	90990	113740	136490
0.8	7960	11940	15920	19900	23890	27870	31850	35830	39810	47770	59710	71660	79620	99520	119430
0.9	7080	10620	14150	17690	21230	24770	28310	31850	35390	42640	53080	63690	70770	88460	106160
1	6370	9550	12740	15920	19110	22290	25480	29660	31850	38220	47770	57320	63390	79620	95540
2	3180	4780	6370	7960	9550	11150	12740	14330	15920	19110	23890	28660	31850	39810	47770
3	2120	3180	4250	5310	6370	7430	8490	9550	10620	12740	15920	19110	21230	26540	31850
4	1590	3290	3180	3980	4780	5570	6370	7170	7960	9550	11940	14330	15920	19900	23890
5	1270	1910	2550	3180	3820	4460	5100	5730	6370	7640	9550	11460	12740	15920	19110
6	1060	1590	2120	2650	3180	3720	4250	4780	5310	6370	7960	9550	10620	13270	15920
8	800	1190	1590	1990	2390	2790	3180	3580	3980	4780	5970	7170	7960	9950	11940
10	640	960	1270	1590	1910	2230	2550	2870	3180	3820	4780	5730	6370	7960	9550
12	530	800	1060	1330	1590	1860	2120	2390	2650	3180	3980	4780	5310	6630	7960
14	450	680	910	1140	1360	1590	1820	2050	2270	2730	3410	4090	4550	5690	6820
15	420	640	850	1060	1270	1490	1700	1910	2120	2550	3180	3820	4250	5310	6370
16	400	600	800	1000	1190	1390	1590	1790	1990	2390	2990	3580	3980	4980	5970
20	320	480	640	800	960	1110	1270	1430	1590	1910	2390	2870	3180	3980	4780

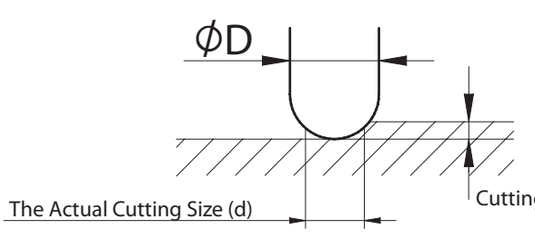
$$V = \frac{\pi * D * N}{1000}$$

$$F = N * Z * f$$

V = Cutting Speed (m/min)
π = Circular costant (3.14)
D = Diameter (mm)
N = Rpm (min)
Z = Cutting Speed (m/min)
f = Feed per Tooth (mm/tooth)
F = Feed (mm/min)

Ball Nose End Milling Diameter

		(Ad) Depth of Cut (mm)														
ØD	R	0.01	0.02	0.03	0.04	0.05	0.08	0.1	0.15	0.2	0.3	0.5	0.8	1.0	2.0	3.0
0.2	0.1	0.087	0.120	0.143	0.160	0.173	0.196	0.20								
0.4	0.2	0.125	0.174	0.211	0.240	0.265	0.32	0.35	0.39	0.40						
0.6	0.3	0.154	0.215	0.262	0.299	0.332	0.41	0.45	0.52	0.57	0.60					
0.8	0.4	0.178	0.250	0.304	0.349	0.387	0.48	0.53	0.62	0.69	0.77	0.77				
1	0.5	0.199	0.280	0.341	0.392	0.436	0.54	0.60	0.71	0.80	0.92	1.00				
2	1	0.282	0.398	0.486	0.560	0.624	0.78	0.87	1.05	1.20	1.43	1.73	1.96	2.00		
3	1.5	0.346	0.488	0.597	0.688	0.768	0.97	1.08	1.31	1.50	1.80	2.24	2.65	2.83	2.83	
4	2	0.399	0.564	0.690	0.796	0.889	1.12	1.25	1.52	1.74	2.11	2.65	3.20	3.46	4.00	
5	2.5	0.447	0.631	0.772	0.891	0.995	1.25	1.40	1.71	1.96	2.37	3.00	3.67	4.00	4.90	4.90
6	3	0.489	0.692	0.846	0.977	1.091	1.38	1.54	1.87	2.15	2.62	3.32	4.08	4.47	5.66	6.00
8	4	0.565	0.799	0.978	1.129	1.261	1.59	1.78	2.17	2.50	3.04	3.87	4.80	5.29	6.93	7.75
10	5	0.632	0.894	1.094	1.262	1.411	1.78	1.99	2.43	2.80	3.41	4.36	5.43	6.00	8.00	9.17
12	6	0.693	0.979	1.198	1.383	1.546	1.95	2.18	2.67	3.07	3.75	4.80	5.99	6.63	8.94	10.39
14	7	0.748	1.058	1.295	1.495	1.670	2.11	2.36	2.88	3.32	4.05	5.20	6.00	7.21	9.80	11.49
16	8	0.800	1.131	1.384	1.598	1.786	2.26	2.52	3.08	3.56	4.34	5.57	6.97	7.75	10.58	12.49
18	9	0.848	1.199	1.468	1.695	1.895	2.39	2.68	3.27	3.77	4.61	5.92	7.42	8.25	11.31	13.42
20	10	0.894	1.264	1.548	1.787	1.997	2.52	2.82	3.45	3.98	4.86	6.24	7.84	8.72	12.00	14.28



Calculation of Real Dia.

$$d = 2\sqrt{Ad\,(D - Ad)}$$

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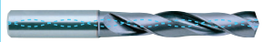
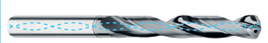
Shape	Code	Corner shape	Ø D1	Z	Angle Flutes	Workpiece material (Page 13) P	H	M	K	N	S	G	R	Page
	Guide for tool selection													
	H 900	140°	0.5-13	2	30°	◉	○	○	◉	○			○	14
	H 901	140°	0.4-13	2	30°	◉	○	○	◉	○			○	15
	H 1000	140°	0.4-20	2	30°	◉	○	○	◉	○	○		○	16
	H 2003	140°	3.0-20	2	30°	◉	○	○	◉	○	○		○	17
	H 2103	140°	3.0-20	2	30°	◉	○	○	◉	○	○		○	18
	H 2005	140°	0.5-2.9	2	30°	◉	○	○	◉	○	○		○	19
	H 2005	140°	3.0-20	2	30°	◉	○	○	◉	○	○		○	20
	H 2105	140°	3.0-20	2	30°	◉	○	○	◉	○	○		○	21
	I 2105	140°	1.0-2.9	2	30°	◉	○	◉	○	○	◉		○	22
	I 2105	140°	3.0-20	2	30°	◉	○	◉	○	○	◉		○	23
	Q 2105	140°	3.0-20	2	30°	◉	◉	○	◉	○			○	24
	F 2105	140°	3.0-20	2	30°	◉	◉	○	◉	○	○		○	25
	K 2105	140°	3.0-20	2	30°	◉	◉	○	◉	○	○		○	26
	A 2105	140°	3.0-20	2	30°					◉	○		◉	27
	H 1600	140°	3.0-14	2	15°		◉							28
	H 2108	140°	3.0-16	2	30°	◉	◉	○	◉	◉	○			29
	H 2112	140°	1.0-16	2	30°	◉	◉	○	◉	◉	○			30
	H 2115	140°	1.0-16	2	30°	◉	◉	○	◉	◉	○			31
	H 1700	140°	2.5-10.20	2+2	30°	◉	◉							32
	H 1701	140°	3.4-11	2+2	30°	◉	◉	○	◉	○			○	32
	H 1800	140°	0.8-6.3	2	7°	◉	◉	○	◉					33
	H 1803	140°	0.8-6.3	2	7°	◉	◉	○	◉					33
	1805	90°	3.3-17.5	3	0°		◉							34
	RA 10	90°	1.0-16	3/6	7°	◉	◉		◉		◉			35
	20 HC	90°	0.2-20	2	35°	◉	◉	○						38

◉ Recommended application ○ Possible application

Shape	Code	Corner shape	Ø D1	Z	Angle Flutes	Workpiece material (Page 13) P	H	M	K	N	S	G	R	Page
	20 HG	90°	1.0-3.0	2	35°	⦿			○				○	39
	20 HH	90°	1.0-3.0	2	35°	⦿	⦿		○				○	40
	20 HM	90°	1.0-4.0	2	35°	⦿			○				○	41
	20 HS	90°	1.0-20	2	35°	⦿			○				○	42
	20 HT	90°	1.0-20	2	35°	⦿	⦿		○				○	43
	20 HY	90°	6.0-20	2	35°	⦿			○				○	44
	20 NA	90°	6.0-20	2	35°	⦿	⦿		○				○	45
	20 NF	90°	2.0-12	2	35°	⦿			○				○	46
	21 HA	R	0.2-2.0	2	30°	⦿			○				○	47
	21 HC	R	0.2-2.0	2	30°	⦿	⦿		○				○	48
	21 HG	R	1.0-4.0	2	30°	⦿			○				○	49
	21 HH	R	0.5-4.0	2	30°	⦿	⦿		○				○	50
	21 HK	R	0.5-6.0	2	30°	⦿	⦿	⦿	○		⦿		○	51
	21 HL	R	0.3-2.0	2	30°	⦿	⦿	⦿	○		⦿		○	52
	21 HQ	R	1.0-4.0	2	30°	⦿			○				○	54
	21 HS	R	2.0-6.0	2	30°	⦿	⦿	○						55
	21 HV	R	1.0-12	2	30°	⦿	⦿	⦿	○		⦿		○	56
	21 HX	R	1.0-20	2	30°	⦿			○				○	57
	21 NA	R	1.0-20	2	30°	⦿	⦿	⦿						58
	21 NC	R	1.0-12	2	30°	⦿	⦿	⦿	⦿					59
	21 NF	R	1.0-16	2	30°	⦿	⦿	⦿						60
	21 NG	R	1.0-16	2	30°	⦿	⦿	⦿	○		⦿		○	61
	21 NK	R	1.0-12	2	30°	⦿	⦿	⦿	○		⦿		○	62
	21 NM	R	1.0-16	2	30°	⦿	⦿	⦿	○		⦿		○	63
	21 NN	R	1.0-20	2	30°	⦿	⦿	⦿	○		⦿		○	64

⦿ Recommended application ○ Possible application

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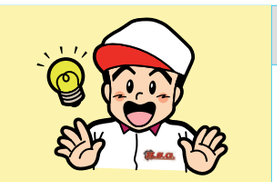


Shape	Code	Corner shape	Ø D1	Z	Angle Flutes	Workpiece material (Page 13) P	H	M	K	N	S	G	R	Page
	Guide for tool selection													
	21 NP	R	1.0-12	2	30°	⦿	⦿	⦿	○		⦿		○	65
	21 NS	R	1.0-12	2	30°	⦿	⦿	⦿	○		⦿		○	66
	21 NT	R	1.0-6.0	2	30°	⦿			○				○	67
	21 NU	R	2.0-12	2	30°	⦿			○				○	67
	21NX	R	6.0-12	2	30°	⦿			○				○	67
	21 NZ	R	16-20	2	30°	⦿			○				○	68
	21 PT	R	1.0-6.0	2	30°	⦿	⦿	⦿	○		⦿		○	68
	21 PN	R	2.0-12	2	30°	⦿	⦿	⦿	○		⦿		○	68
	21 PX	R	6.0-12	2	30°	⦿	⦿	⦿	○		⦿		○	68
	21 RL	R	2.0-8.0	2	30°	⦿	⦿	⦿	○		⦿		○	69
	21RM	R	6.0-12	2	30°	⦿	⦿	⦿	○		⦿		○	69
	21 RN	R	6.0-20	2	30°	⦿	⦿	⦿	○		⦿		○	69
	22HA	R	2.5-8.0	2	30°	⦿			○				○	70
	22HL	R	1.0-3.0	2	30°	⦿	⦿	⦿						71
	22HU	R	3.0-12	2	30°	⦿			○				○	72
	22NF	R	3.0-12	2	30°	⦿	⦿	⦿						73
	22NP	R	4.0-16	2	30°	⦿	⦿	⦿						74
	24NF	R	2.0-12	2	30°	⦿	⦿	○						75
	24YA	R	6.0-16	2	15°	⦿	⦿	○	⦿					76
	30HA	90°	1.0-20	3	45°	⦿		⦿	○		⦿		⦿	77
	30HD	90°	6.0-10	3	45°	⦿		⦿	○		⦿		⦿	78
	30NA	90°	3.0-20	3	45°		⦿	⦿						80
	30RA	45°	3.0-20	3	50°	⦿	⦿	⦿	○	⦿				81
	40HA	90°	1.0-20	4	35°	⦿			○		⦿		○	82
	40HK	90°	1.0-20	4	35°	⦿	⦿	⦿	○					84

⦿ Recommended application ○ Possible application

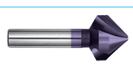
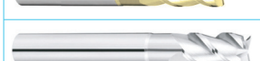
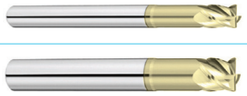
Shape	Code	Corner shape	Ø D1	Z	Angle Flutes	Workpiece material (Page 13) P	H	M	K	N	S	G	R	Page
						Guide for tool selection								
	40HS	90°	1.0-20	4	45°	⦿	⦿	⦿	○					85
	40NC	90°	3.0-20	4	45°						⦿			86
	40NM	90°	3.0-20	4	45°						⦿			87
	40NU	90°	3.0-20	4	45°	⦿	⦿	⦿	○		⦿		○	88
	40RD	90°	3.0-20	4	45°	⦿	⦿	⦿	○		⦿		○	89
	40RF	90°	3.0-20	4	45°	⦿	⦿	⦿	○		⦿		○	90
	40RM	90°	3.0-20	4	ENU	⦿								91
	40RS	90°	3.0-20	4	ENU	⦿	⦿							92
	40YA	90°	6.0-16	4	35°	⦿								93
	40YH	90°	6.0-16	4	35°	⦿	⦿							94
	40YQ	90°	2.0-20	4	45°	⦿								95
	41HA	R	1.0-12	4	30°	⦿			○				○	96
	41NB	R	1.0-16	4	30°	⦿		⦿						94
	41RD	R	5.0-16	4	15°	⦿	⦿	○	⦿		○			98
	42HA	R	3.0-12	4	35°	⦿			○				○	99
	42HG	R	3.0-12	4	35°	⦿	⦿	⦿						100
	42HM	R	1.0-12	4	35°	⦿	⦿	⦿	○		⦿		○	101
	42HP	R	3.0-12	4	35°	⦿	⦿	⦿						102
	42HQ	R	3.0-12	4	35°	⦿	⦿	⦿						103
	42HT	R	6.0-12	4	35°	⦿			○				○	104
	42NF	R	4.0-16	4	35°	⦿	⦿	⦿						105
	42NS	R	6.0-12	4	35°	⦿	⦿	⦿	○		⦿		○	106
	42NY	R	4.0-16	4	35°	⦿	⦿	⦿						107
	42RP	R	3.0-12	4	35°	⦿	⦿	⦿	○		⦿		○	108
	42YA	R	3.0-12	4	35°	⦿	⦿	⦿	○		⦿		○	109

⦿ Recommended application ○ Possible application

Index

Shape	Code	Corner shape	Ø D1	Z	Angle Flutes	Workpiece material Page. 13 P	H	M	K	N	S	G	R	Page
	43HA	45°	4.0-12	4	35°	⦿	⦿	⦿						110
	43NH	45°	4.0-20	4	35°	⦿	⦿	○	⦿		○			111
	44NF	R	6.0-12	4	5°	⦿	⦿	⦿						112
	44YA	R	6.0-12	4	15°	⦿	⦿	○	⦿		○			113
	50HA	90°	4.0-20	5	ENU	⦿	⦿	○	⦿					114
	50HD	90°	4.0-20	5	ENU	⦿	⦿	○	⦿					115
	52HA	R	4.0-20	5	ENU	⦿	⦿	○	⦿					116
	52HD	R	4.0-20	5	ENU	⦿	⦿	○	⦿					117
	60HA	90°	6.0-20	6	45°	⦿	⦿							118
	60HD	90°	6.0-16	6	45°	⦿	⦿							119
	60HG	90°	6.0-20	6	45°	⦿	⦿							120
	60HK	90°	12-20	6/8	50°	⦿	⦿	○	○					121
	62HA	R	6.0-16	6/8	50°	⦿	⦿	○	○					122
	62HD	R	8.0-16	6/8	50°	⦿	⦿	○	○					123
	62HH	R	6.0-16	6	45°	⦿	⦿							124
	62HP	R	6.0-12	6/8	45°	⦿	⦿	○	○					125
	65HA	90°	6.0-20	3	45°	⦿								126
	65NA	90°	6.0-20	4	45°	⦿								127
	65RA	90°	6.0-20	4/5/6	45°	⦿	⦿	⦿			⦿			128
	65YA	90°	6.0-20	4/5/6	45°	⦿	⦿	⦿			⦿			129
	70HG	90°	3.0-20	2	90°	⦿			⦿	⦿				130
	70HP	90°	3.0-20	2	90°	⦿			⦿	⦿				130
	70HX	120°	3.0-20	2	120°	⦿			⦿	⦿				130
	70NF	90°	6.0-20	2	90°	⦿			⦿	⦿				131
	70NM	120°	6.0-20	2	120°	⦿			⦿	⦿				131

⦿ Recommended application ○ Possible application

Shape	Code	Corner shape	Ø D1	Z	Angle Flutes	Workpiece material Page. 13								Page
						P	H	M	K	N	S	G	R	
	70NT	90°	4.0-16	2	90°	⦿			⦿	⦿				131
	70RC	142°	4.0-16	2	142°	⦿			⦿	⦿				131
	70RL	90°	1.0-2.0	4	90°	⦿			⦿	⦿				132
	70RM	60°	1.0-2.0	4	60°	⦿			⦿	⦿				132
	70RR	R	1.1-3.0	2	0°	⦿			⦿	⦿				133
	70RV	90°	1.8-15.8	4	0°	⦿			⦿	⦿			○	134
	70YC	R	8.0-10	4	0°	⦿			⦿	⦿			○	135
	70YT	90°	4.3-25	3	0°	⦿		○	⦿	⦿			○	136
	75AE	90°	0.5-20	2	45°	⦿				⦿			⦿	137
	75AH	90°	1.0-16	2	55°	⦿				⦿			⦿	138
	75AL	90°	1.0-16	2	55°	⦿				⦿			⦿	139
	75BA	R	1.0-12	2	45°	⦿				⦿			⦿	140
	75BD	R	1.0-12	2	45°	⦿				⦿			⦿	141
	75BH	R	1.0-20	2	30°	⦿				⦿			⦿	142
	75CB	90°	2.0-20	3	55°	⦿				⦿			⦿	143
	75CD	90°	2.0-20	3	45°	⦿				⦿			⦿	144
	75CF	90°	2.0-20	3	45°	⦿				⦿			⦿	145
	75CH	90°	2.0-20	3	55°	⦿				⦿			⦿	146
	75CK	90°	6.0-20	3	45°	⦿				⦿			⦿	147
	75CN	90°	2.0-20	3	45°	⦿				⦿			⦿	148
	75CP	90°	3.0-20	3	45°	⦿				⦿			⦿	149
	75CR	90°	5.0-20	3	45°	⦿				⦿			⦿	150
	75CU	90°	3.0-16	3	45°	⦿				⦿			⦿	151
	75KC	90°	3.0-20	3/4	45°	⦿				⦿			⦿	152
	75KM	R	3.0-20	4	45°	⦿				⦿			⦿	153

⦿ Recommended application ○ Possible application

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Shape	Code	Corner shape	Ø D1	Z	Angle Flutes	Workpiece material (Page. 13) P	H	M	K	N	S	G	R	Page
	75NK	90°	6.0-20	6	45°	⦿				⦿			⦿	154
	75PG	90°	6.0-16	3	38°	⦿				⦿			⦿	155
	75TE	90°	1.0-6.0	1	30°	⦿				⦿			⦿	156
	75TK	90°	1.0-16	1	30°	⦿				⦿			⦿	157
	75TQ	90°	1.0-16	1	30°	⦿				⦿			⦿	157
	81GA	R	0.4-6.0	2	30°								⦿	158
	81GD	R	0.2-3.0	2	30°								⦿	159
	81GH	R	4.0-12	2	30°								⦿	160
	82GD	R	0.2-3.0	2	30°								⦿	161
	82GH	R	4.0-12	2	30°								⦿	163
	84GA	R	3.0-16	4	30°								⦿	164
	84GL	R	3.0-16	4	30°								⦿	165
	85PA	90°	2.0-16	MUL	25°							⦿		166
	85PB	90°	2.0-16	MUL	25°							⦿		166
	85PE	90°	2.0-16	MUL	25°							⦿		167
	85PF	90°	2.0-16	MUL	25°							⦿		167
	85PK	90°	2.0-16	MUL	25°							⦿		168
	85PL	90°	2.0-16	MUL	25°							⦿		168
	85PO	135°	2.0-16	MUL	25°							⦿		169
	85PP	135°	2.0-16	MUL	25°							⦿		169

⦿ Recommended application ○ Possible application

Materials comparation table

MATERIALS GROUP

DIN ISO 513	MATERIAL	ALLOYS TYPE	STATE	HB [1] HRC [2] N/mm 2
P	NOT-ALLOY STEEL, CAST STEEL	C < 0,15 %	Annealed(soft)	125
		C < 0,15-0,55 %	Annealed(soft)	190
			Quenched and Tempered	250
		C > 0,55 %	Annealed(soft)	220
			Quenched and Tempered	300
	LOW-ALLOY STEEL		Annealed(soft)	180
			Quenched and Tempered	250/300
			Quenched and Tempered	350
	HIGH ALLOY STEEL, TOOL STEEL		Annealed(soft)	200
			Quenched and Tempered	325
	STAINLESS STEEL		Ferritic/ Martensitic	200
			Martensitic/ Precipitation Hardened	240
M	STAINLESS STEEL		Austenitic	180
			Duplex (Austenitic/Ferritic)	230-260
K	GRAY IRON	G, GG	Ferritic / Pearlitic	180
			Pearlitic	260
	NODULAR CAST IRON	GS, GGG	Ferritic	160
			Pearlitic	250
	MALLEABLE CAST IRON	GMN, GTS/GTW	Ferritic	130
			Pearlitic	230
N	ALUMINIUM ALLOYS		Cannot be aged	60
			Aged	100
	CAST ALUMINIUM ALLOYS	Si <= 12 %	Cannot be aged	75
			Aged	90
		Si > 12 %	Cannot be aged	130
	COPPER, COPPER ALLOYS	Pb>1% - Free cutting brass	-	110
		Brass, Bronze	-	90
		Bronze, Elctrolytic copper	-	100
	NONMETALLIC MATERIALS	Thermosetting, fiber reinf.	-	-
		Hard rubber, Ebanite	-	-
S	HIGH-TEMPERATURE ALLOYS	Fe-Basis	Annealed(soft)	200
			Aged	280
		Ni/Co-Basis	Annealed(soft)	250
			Aged	350
			Cast	320
	TITANIUM, TITANIUM ALLOYS	Pure titan		400 [2]
		Alpha+Beta alloys	Cast	1050 [2]
H	HARDENED STEEL		Hardened	45 [1]
			Hardened	55 [1]
			Hardened	60 [1]
			Hardened	> 62 [1]
	CHILL CAST IRON		Cast	400
			Cast	> 440
	HARDENED CAST IRON		Hardened	55 [1]
			Hardened	57 [1]
G	GRAPHITE			-
R	RESIN, WOOD			-

DIN 6535 Form HA | DIN 338 | DX | 118° | Un Coated | P | K | N

H900

Item code	Ø d1	Ø d2	L	L1
H0900-0050HA	0.50	0.5	26	6
H0900-0060HA	0.60	0.6	27	7
H0900-0070HA	0.70	0.7	28	9
H0900-0080HA	0.80	0.8	30	10
H0900-0090HA	0.90	0.9	32	11
H0900-0100HA	1.00	1.0	34	12
H0900-0110HA	1.10	1.1	36	14
H0900-0120HA	1.20	1.2	38	16
H0900-0130HA	1.30	1.3	38	16
H0900-0140HA	1.40	1.4	40	18
H0900-0150HA	1.50	1.5	40	18
H0900-0160HA	1.60	1.6	43	20
H0900-0170HA	1.70	1.7	43	20
H0900-0180HA	1.80	1.8	46	22
H0900-0190HA	1.90	1.9	46	22
H0900-0200HA	2.00	2.0	49	24
H0900-0210HA	2.10	2.1	49	24
H0900-0220HA	2.20	2.2	53	27
H0900-0230HA	2.30	2.3	53	27
H0900-0240HA	2.40	2.4	57	30
H0900-0250HA	2.50	2.5	57	30
H0900-0260HA	2.60	2.6	57	30
H0900-0270HA	2.70	2.7	61	33
H0900-0280HA	2.80	2.8	61	33
H0900-0290HA	2.90	2.9	61	33
H0900-0300HA	3.00	3.0	61	33
H0900-0310HA	3.10	3.1	65	36
H0900-0320HA	3.20	3.2	65	36
H0900-0330HA	3.30	3.3	65	36
H0900-0340HA	3.40	3.4	70	39
H0900-0350HA	3.50	3.5	70	39
H0900-0360HA	3.60	3.6	70	39
H0900-0370HA	3.70	3.7	75	43
H0900-0380HA	3.80	3.8	75	43
H0900-0390HA	3.90	3.9	75	43
H0900-0400HA	4.00	4.0	75	43
H0900-0410HA	4.10	4.1	75	43
H0900-0420HA	4.20	4.2	75	43
H0900-0430HA	4.30	4.3	80	47
H0900-0440HA	4.40	4.4	80	47
H0900-0450HA	4.50	4.5	80	47
H0900-0460HA	4.60	4.6	80	47
H0900-0470HA	4.70	4.7	80	47
H0900-0480HA	4.80	4.8	86	52
H0900-0490HA	4.90	4.9	86	52
H0900-0500HA	5.00	5.0	86	52
H0900-0510HA	5.10	5.1	86	52
H0900-0520HA	5.20	5.2	86	52
H0900-0530HA	5.30	5.3	86	52
H0900-0540HA	5.40	5.4	93	57
H0900-0550HA	5.50	5.5	93	57
H0900-0560HA	5.60	5.6	93	57

Item code	Ø d1	Ø d2	L	L1
H0900-0570HA	5.70	5.7	93	57
H0900-0580HA	5.80	5.8	93	57
H0900-0590HA	5.90	5.9	93	57
H0900-0600HA	6.00	6.0	93	57
H0900-0610HA	6.10	6.1	101	63
H0900-0620HA	6.20	6.2	101	63
H0900-0630HA	6.30	6.3	101	63
H0900-0640HA	6.40	6.4	101	63
H0900-0650HA	6.50	6.5	101	63
H0900-0660HA	6.60	6.6	101	63
H0900-0670HA	6.70	6.7	101	63
H0900-0680HA	6.80	6.8	109	69
h0900-0690HA	6.90	6.9	109	69
H0900-0700HA	7.00	7.0	109	69
H0900-0710HA	7.10	7.1	109	69
H0900-0720HA	7.20	7.2	109	69
H0900-0730HA	7.30	7.3	109	69
H0900-0740HA	7.40	7.4	109	69
H0900-0750HA	7.50	7.5	109	69
H0900-0760HA	7.60	7.6	117	75
H0900-0770HA	7.70	7.7	117	75
H0900-0780HA	7.80	7.8	117	75
H0900-0790HA	7.90	7.9	117	75
H0900-0800HA	8.00	8.0	117	75
H0900-0810HA	8.10	8.1	117	75
H0900-0820HA	8.20	8.2	117	75
H0900-0830HA	8.30	8.3	117	75
H0900-0840HA	8.40	8.4	117	75
H0900-0850HA	8.50	8.5	117	75
H0900-0860HA	8.60	8.6	125	81
H0900-0870HA	8.70	8.7	125	81
H0900-0880HA	8.80	8.8	125	81
H0900-0890HA	8.90	8.9	125	81
H0900-0900HA	9.00	9.0	125	81
H0900-0910HA	9.10	9.1	125	81
H0900-0920HA	9.20	9.2	125	81
H0900-0930HA	9.30	9.3	125	81
H0900-0940HA	9.40	9.4	125	81
H0900-0950HA	9.50	9.5	125	81
H0900-0960HA	9.60	9.6	133	87
H0900-0970HA	9.70	9.7	133	87
H0900-0980HA	9.80	9.8	133	87
H0900-0990HA	9.90	9.9	133	87
H0900-1000HA	10.0	10.0	133	87
H0900-1020HA	10.2	10.2	133	87
H0900-1050HA	10.5	10.5	133	87
H0900-1080HA	10.8	10.8	142	94
H0900-1100HA	11.0	11.0	142	94
H0900-1150HA	11.5	11.5	142	94
H0900-1200HA	12.0	12.0	151	101
H0900-1250HA	12.5	12.5	151	101
H0900-1300HA	13.0	13.0	151	101

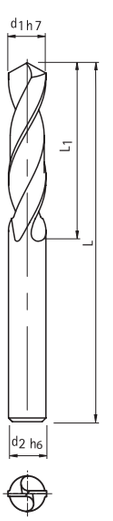
Cutting Conditions P.37

DIN 6535 Form HA | DIN 1897 | DX | 120° | Un Coated | P | K | N

H901

Item code	Ø d1	Ø d2	L	L1
H0901-0040HA	0.40	0.40	26	6
H0901-0050HA	0.50	0.50	26	6
H0901-0060HA	0.60	0.60	26	6
H0901-0070HA	0.70	0.70	26	6
H0901-0080HA	0.80	0.80	26	6
H0901-0090HA	0.90	0.90	26	6
H0901-0100HA	1.00	1.0	26	6
H0901-0110HA	1.10	1.1	28	7
H0901-0120HA	1.20	1.2	30	8
H0901-0130HA	1.30	1.3	30	8
H0901-0140HA	1.40	1.4	32	9
H0901-0150HA	1.50	1.5	32	9
H0901-0160HA	1.60	1.6	34	10
H0901-0170HA	1.70	1.7	34	10
H0901-0180HA	1.80	1.8	36	11
H0901-0190HA	1.90	1.9	36	11
H0901-0200HA	2.00	2.0	38	12
H0901-0210HA	2.10	2.1	38	12
H0901-0220HA	2.20	2.2	40	13
H0901-0230HA	2.30	2.3	40	13
H0901-0240HA	2.40	2.4	43	14
H0901-0250HA	2.50	2.5	43	14
H0901-0260HA	2.60	2.6	43	14
H0901-0270HA	2.70	2.7	46	16
H0901-0280HA	2.80	2.8	46	16
H0901-0290HA	2.90	2.9	46	16
H0901-0300HA	3.00	3.0	46	16
H0901-0310HA	3.10	3.1	49	18
H0901-0320HA	3.20	3.2	49	18
H0901-0330HA	3.30	3.3	49	18
H0901-0340HA	3.40	3.4	52	20
H0901-0350HA	3.50	3.5	52	20
H0901-0360HA	3.60	3.6	52	20
H0901-0370HA	3.70	3.7	52	20
H0901-0380HA	3.80	3.8	52	20
H0901-0390HA	3.90	3.9	55	22
H0901-0400HA	4.00	4.0	55	22
H0901-0410HA	4.10	4.1	55	22
H0901-0420HA	4.20	4.2	55	22
H0901-0430HA	4.30	4.3	58	24
H0901-0440HA	4.40	4.4	58	24
H0901-0450HA	4.50	4.5	58	24
H0901-0460HA	4.60	4.6	58	24
H0901-0470HA	4.70	4.7	58	24
H0901-0480HA	4.80	4.8	62	26
H0901-0490HA	4.90	4.9	62	26
H0901-0500HA	5.00	5.0	62	26
H0901-0510HA	5.10	5.1	62	26
H0901-0520HA	5.20	5.2	62	26
H0901-0530HA	5.30	5.3	62	26
H0901-0540HA	5.40	5.4	66	28
H0901-0550HA	5.50	5.5	66	28
H0901-0560HA	5.60	5.6	66	28

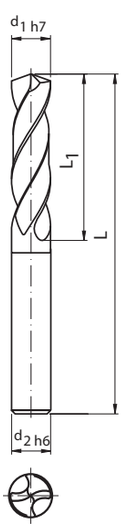
Item code	Ø d1	Ø d2	L	L1
H0901-0570HA	5.70	5.7	66	28
H0901-0580HA	5.80	5.8	66	28
H0901-0590HA	5.90	5.9	66	28
H0901-0600HA	6.00	6.0	66	28
H0901-0610HA	6.10	6.1	70	31
H0901-0620HA	6.20	6.2	70	31
H0901-0630HA	6.30	6.3	70	31
H0901-0640HA	6.40	6.4	70	31
H0901-0650HA	6.50	6.5	70	31
H0901-0660HA	6.60	6.6	70	31
H0901-0670HA	6.70	6.7	70	31
H0901-0680HA	6.80	6.8	74	34
H0901-0690HA	6.90	6.9	74	34
H0901-0700HA	7.00	7.0	74	34
H0901-0710HA	7.10	7.1	74	34
H0901-0720HA	7.20	7.2	74	34
H0901-0730HA	7.30	7.3	74	34
H0901-0740HA	7.40	7.4	74	34
H0901-0750HA	7.50	7.5	74	34
H0901-0760HA	7.60	7.6	79	37
H0901-0770HA	7.70	7.7	79	37
H0901-0780HA	7.80	7.8	79	37
H0901-0790HA	7.90	7.9	79	37
H0901-0800HA	8.00	8.0	79	37
H0901-0810HA	8.10	8.1	79	37
H0901-0820HA	8.20	8.2	79	37
H0901-0830HA	8.30	8.3	79	37
H0901-0840HA	8.40	8.4	79	37
H0901-0850HA	8.50	8.5	79	37
H0901-0860HA	8.60	8.6	84	40
H0901-0870HA	8.70	8.7	84	40
H0901-0880HA	8.80	8.8	84	40
H0901-0890HA	8.90	8.9	84	40
H0901-0900HA	9.00	9.0	84	40
H0901-0910HA	9.10	9.1	84	40
H0901-0920HA	9.20	9.2	84	40
H0901-0930HA	9.30	9.3	84	40
H0901-0940HA	9.40	9.4	84	40
H0901-0950HA	9.50	9.5	84	40
H0901-0960HA	9.60	9.6	89	43
H0901-0970HA	9.70	9.7	89	43
H0901-0980HA	9.80	9.8	89	43
H0901-0990HA	9.90	9.9	89	43
H0901-1000HA	10.00	10.0	89	43
H0901-1020HA	10.20	10.2	89	43
H0901-1050HA	10.50	10.5	89	43
H0901-1080HA	10.80	10.8	95	47
H0901-1110HA	11.00	11.0	95	47
H0901-1150HA	11.50	11.5	95	47
H0901-1200HA	12.00	12.0	102	51
H0901-1250HA	12.50	12.5	102	51
H0901-1300HA	13.00	13.0	102	51



Cutting Conditions P.37

DIN 6535 Form HA | DIN 6539 | 3 D | DX | 140° | 118° | TiALN | P | M | K

H1000



Item code	Ø d1	Ø d2	L	L1
H1000-0040HA	0.40	0.40	26	6
H1000-0050HA	0.50	0.50	26	6
H1000-0060HA	0.60	0.60	26	6
H1000-0070HA	0.70	0.70	26	6
H1000-0080HA	0.80	0.80	26	6
H1000-0090HA	0.90	0.90	26	6
H1000-0100HA	1.00	1.0	26	6
H1000-0110HA	1.10	1.1	28	7
H1000-0120HA	1.20	1.2	30	8
H1000-0130HA	1.30	1.3	30	8
H1000-0140HA	1.40	1.4	32	9
H1000-0150HA	1.50	1.5	32	9
H1000-0160HA	1.60	1.6	34	10
H1000-0170HA	1.70	1.7	34	10
H1000-0180HA	1.80	1.8	36	11
H1000-0190HA	1.90	1.9	36	11
H1000-0200HA	2.00	2.0	38	12
H1000-0210HA	2.10	2.1	38	12
H1000-0220HA	2.20	2.2	40	13
H1000-0230HA	2.30	2.3	40	13
H1000-0240HA	2.40	2.4	43	14
H1000-0250HA	2.50	2.5	43	14
H1000-0260HA	2.60	2.6	43	14
H1000-0270HA	2.70	2.7	46	16
H1000-0280HA	2.80	2.8	46	16
H1000-0290HA	2.90	2.9	46	16
H1000-0300HA	3.00	3.0	46	16
H1000-0310HA	3.10	3.1	49	18
H1000-0320HA	3.20	3.2	49	18
H1000-0330HA	3.30	3.3	49	18
H1000-0340HA	3.40	3.4	52	20
H1000-0350HA	3.50	3.5	52	20
H1000-0360HA	3.60	3.6	52	20
H1000-0370HA	3.70	3.7	52	20
H1000-0380HA	3.80	3.8	52	20
H1000-0390HA	3.90	3.9	55	22
H1000-0400HA	4.00	4.0	55	22
H1000-0410HA	4.10	4.1	55	22
H1000-0420HA	4.20	4.2	55	22
H1000-0430HA	4.30	4.3	58	24
H1000-0440HA	4.40	4.4	58	24
H1000-0450HA	4.50	4.5	58	24
H1000-0460HA	4.60	4.6	58	24
H1000-0470HA	4.70	4.7	58	24
H1000-0480HA	4.80	4.8	62	26
H1000-0490HA	4.90	4.9	62	26
H1000-0500HA	5.00	5.0	62	26
H1000-0510HA	5.10	5.1	62	26
H1000-0520HA	5.20	5.2	62	26
H1000-0530HA	5.30	5.3	62	26
H1000-0540HA	5.40	5.4	66	28
H1000-0550HA	5.50	5.5	66	28
H1000-0560HA	5.60	5.6	66	28
H1000-0570HA	5.70	5.7	66	28
H1000-0580HA	5.80	5.8	66	28
H1000-0590HA	5.90	5.9	66	28
H1000-0600HA	6.00	6.0	66	28
H1000-0610HA	6.10	6.1	70	31
H1000-0620HA	6.20	6.2	70	31
H1000-0630HA	6.30	6.3	70	31

Item code	Ø d1	Ø d2	L	L1
H1000-0640HA	6.40	6.4	70	31
H1000-0650HA	6.50	6.5	70	31
H1000-0660HA	6.60	6.6	70	31
H1000-0670HA	6.70	6.7	70	31
H1000-0680HA	6.80	6.8	74	34
H1000-0690HA	6.90	6.9	74	34
H1000-0700HA	7.00	7.0	74	34
H1000-0710HA	7.10	7.1	74	34
H1000-0720HA	7.20	7.2	74	34
H1000-0730HA	7.30	7.3	74	34
H1000-0740HA	7.40	7.4	74	34
H1000-0750HA	7.50	7.5	74	34
H1000-0760HA	7.60	7.6	79	37
H1000-0770HA	7.70	7.7	79	37
H1000-0780HA	7.80	7.8	79	37
H1000-0790HA	7.90	7.9	79	37
H1000-0800HA	8.00	8.0	79	37
H1000-0810HA	8.10	8.1	79	37
H1000-0820HA	8.20	8.2	79	37
H1000-0830HA	8.30	8.3	79	37
H1000-0840HA	8.40	8.4	79	37
H1000-0850HA	8.50	8.5	79	37
H1000-0860HA	8.60	8.6	84	40
H1000-0870HA	8.70	8.7	84	40
H1000-0880HA	8.80	8.8	84	40
H1000-0890HA	8.90	8.9	84	40
H1000-0900HA	9.00	9.0	84	40
H1000-0910HA	9.10	9.1	84	40
H1000-0920HA	9.20	9.2	84	40
H1000-0930HA	9.30	9.3	84	40
H1000-0940HA	9.40	9.4	84	40
H1000-0950HA	9.50	9.5	84	40
H1000-0960HA	9.60	9.6	89	43
H1000-0970HA	9.70	9.7	89	43
H1000-0980HA	9.80	9.8	89	43
H1000-0990HA	9.90	9.9	89	43
H1000-1000HA	10.00	10.0	89	43
H1000-1020HA	10.20	10.2	89	43
H1000-1050HA	10.50	10.5	89	43
H1000-1100HA	11.00	11.0	95	47
H1000-1150HA	11.50	11.5	95	47
H1000-1180HA	11.80	11.8	95	47
H1000-1200HA	12.00	12.0	102	51
H1000-1250HA	12.50	12.5	102	51
H1000-1300HA	13.00	13.0	102	51
H1000-1350HA	13.50	14.0	107	54
H1000-1400HA	14.00	14.0	107	54
H1000-1450HA	14.50	15.0	111	56
H1000-1500HA	15.00	15.0	111	56
H1000-1550HA	15.50	16.0	115	58
H1000-1600HA	16.00	16.0	115	58
H1000-1650HA	16.50	17.0	119	60
H1000-1700HA	17.00	17.0	119	60
H1000-1750HA	17.50	18.0	123	62
H1000-1800HA	18.00	18.0	123	62
H1000-1850HA	18.50	19.0	127	64
H1000-1900HA	19.00	19.0	127	64
H1000-1950HA	19.50	20.0	131	66
H1000-2000HA	20.00	20.0	131	66

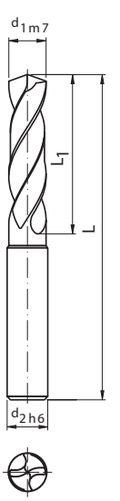
Cutting Conditions P.37

DIN 6535 Form HA | DIN 6537 | 3 D | DX | 140° | 90° | TiALN | P | M | K

H2003

Item code	Ø d1	Ø d2	L	L1
H2003-0300HA	3.00	6	62	20
H2003-0310HA	3.10	6	62	20
H2003-0320HA	3.20	6	62	20
H2003-0330HA	3.30	6	62	20
H2003-0340HA	3.40	6	62	20
H2003-0350HA	3.50	6	62	20
H2003-0360HA	3.60	6	62	20
H2003-0370HA	3.70	6	62	20
H2003-0380HA	3.80	6	66	24
H2003-0390HA	3.90	6	66	24
H2003-0400HA	4.00	6	66	24
H2003-0410HA	4.10	6	66	24
H2003-0420HA	4.20	6	66	24
H2003-0430HA	4.30	6	66	24
H2003-0440HA	4.40	6	66	24
H2003-0450HA	4.50	6	66	24
H2003-0460HA	4.60	6	66	24
H2003-0470HA	4.70	6	66	24
H2003-0480HA	4.80	6	66	28
H2003-0490HA	4.90	6	66	28
H2003-0500HA	5.00	6	66	28
H2003-0510HA	5.10	6	66	28
H2003-0520HA	5.20	6	66	28
H2003-0530HA	5.30	6	66	28
H2003-0540HA	5.40	6	66	28
H2003-0550HA	5.50	6	66	28
H2003-0560HA	5.60	6	66	28
H2003-0570HA	5.70	6	66	28
H2003-0580HA	5.80	6	66	28
H2003-0590HA	5.90	6	66	28
H2003-0600HA	6.00	6	66	28
H2003-0610HA	6.10	8	79	34
H2003-0620HA	6.20	8	79	34
H2003-0630HA	6.30	8	79	34
H2003-0640HA	6.40	8	79	34
H2003-0650HA	6.50	8	79	34
H2003-0660HA	6.60	8	79	34
H2003-0670HA	6.70	8	79	34
H2003-0680HA	6.80	8	79	34
H2003-0690HA	6.90	8	79	34
H2003-0700HA	7.00	8	79	34
H2003-0710HA	7.10	8	79	41
H2003-0720HA	7.20	8	79	41
H2003-0730HA	7.30	8	79	41
H2003-0740HA	7.40	8	79	41
H2003-0750HA	7.50	8	79	41
H2003-0760HA	7.60	8	79	41
H2003-0770HA	7.70	8	79	41
H2003-0780HA	7.80	8	79	41
H2003-0790HA	7.90	8	79	41
H2003-0800HA	8.00	8	79	41
H2003-0810HA	8.10	10	89	47
H2003-0820HA	8.20	10	89	47
H2003-0830HA	8.30	10	89	47
H2003-0840HA	8.40	10	89	47
H2003-0850HA	8.50	10	89	47
H2003-0860HA	8.60	10	89	47
H2003-0870HA	8.70	10	89	47

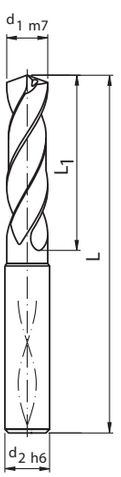
Item code	Ø d1	Ø d2	L	L1
H2003-0880HA	8.80	10	89	47
H2003-0890HA	8.90	10	89	47
H2003-0900HA	9.00	10	89	47
H2003-0910HA	9.10	10	89	47
H2003-0920HA	9.20	10	89	47
H2003-0930HA	9.30	10	89	47
H2003-0940HA	9.40	10	89	47
H2003-0950HA	9.50	10	89	47
H2003-0960HA	9.60	10	89	47
H2003-0970HA	9.70	10	89	47
H2003-0980HA	9.80	10	89	47
H2003-0990HA	9.90	10	89	47
H2003-1000HA	10.00	10	89	47
H2003-1010HA	10.10	12	102	55
H2003-1020HA	10.20	12	102	55
H2003-1030HA	10.30	12	102	55
H2003-1040HA	10.40	12	102	55
H2003-1050HA	10.50	12	102	55
H2003-1060HA	10.60	12	102	55
H2003-1070HA	10.70	12	102	55
H2003-1080HA	10.80	12	102	55
H2003-1090HA	10.90	12	102	55
H2003-1100HA	11.00	12	102	55
H2003-1110HA	11.10	12	102	55
H2003-1120HA	11.20	12	102	55
H2003-1130HA	11.30	12	102	55
H2003-1140HA	11.40	12	102	55
H2003-1150HA	11.50	12	102	55
H2003-1160HA	11.60	12	102	55
H2003-1170HA	11.70	12	102	55
H2003-1180HA	11.80	12	102	55
H2003-1190HA	11.90	12	102	55
H2003-1200HA	12.00	12	102	55
H2003-1230HA	12.30	14	107	60
H2003-1250HA	12.50	14	107	60
H2003-1280HA	12.80	14	109	60
H2003-1300HA	13.00	14	107	60
H2003-1350HA	13.50	14	107	60
H2003-1380HA	13.80	14	107	60
H2003-1400HA	14.00	14	107	60
H2003-1450HA	14.50	16	115	65
H2003-1480HA	14.80	16	115	65
H2003-1500HA	15.00	16	115	65
H2003-1550HA	15.50	16	115	65
H2003-1580HA	15.80	16	115	65
H2003-1600HA	16.00	16	115	65
H2003-1650HA	16.50	18	123	73
H2003-1680HA	16.80	18	123	73
H2003-1700HA	17.00	18	123	73
H2003-1750HA	17.50	18	123	73
H2003-1780HA	17.80	18	123	73
H2003-1800HA	18.00	18	123	73
H2003-1850HA	18.50	20	131	79
H2003-1900HA	19.00	20	131	79
H2003-1950HA	19.50	20	131	79
H2003-1980HA	19.80	20	131	79
H2003-2000HA	20.00	20	131	79



Cutting Conditions P.37

DIN 6535 Form HA | DIN 6537 | 3 D | DX | 140° | 90° | TiALN | P | M | K

H2103



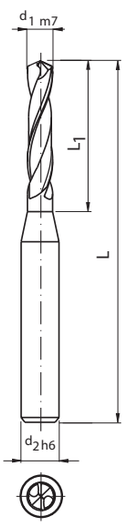
Item code	Ø d1	Ø d2	L	L1
H2103-0300HA	3.00	6	62	20
H2103-0310HA	3.10	6	62	20
H2103-0320HA	3.20	6	62	20
H2103-0330HA	3.30	6	62	20
H2103-0340HA	3.40	6	62	20
H2103-0350HA	3.50	6	62	20
H2103-0360HA	3.60	6	62	20
H2103-0370HA	3.70	6	62	20
H2103-0380HA	3.80	6	66	24
H2103-0390HA	3.90	6	66	24
H2103-0400HA	4.00	6	66	24
H2103-0410HA	4.10	6	66	24
H2103-0420HA	4.20	6	66	24
H2103-0430HA	4.30	6	66	24
H2103-0440HA	4.40	6	66	24
H2103-0450HA	4.50	6	66	24
H2103-0460HA	4.60	6	66	24
H2103-0470HA	4.70	6	66	24
H2103-0480HA	4.80	6	66	28
H2103-0490HA	4.90	6	66	28
H2103-0500HA	5.00	6	66	28
H2103-0510HA	5.10	6	66	28
H2103-0520HA	5.20	6	66	28
H2103-0530HA	5.30	6	66	28
H2103-0540HA	5.40	6	66	28
H2103-0550HA	5.50	6	66	28
H2103-0560HA	5.60	6	66	28
H2103-0570HA	5.70	6	66	28
H2103-0580HA	5.80	6	66	28
H2103-0590HA	5.90	6	66	28
H2103-0600HA	6.00	6	66	28
H2103-0610HA	6.10	8	79	34
H2103-0620HA	6.20	8	79	34
H2103-0630HA	6.30	8	79	34
H2103-0640HA	6.40	8	79	34
H2103-0650HA	6.50	8	79	34
H2103-0660HA	6.60	8	79	34
H2103-0670HA	6.70	8	79	34
H2103-0680HA	6.80	8	79	34
H2103-0690HA	6.90	8	79	34
H2103-0700HA	7.00	8	79	34
H2103-0710HA	7.10	8	79	41
H2103-0720HA	7.20	8	79	41
H2103-0730HA	7.30	8	79	41
H2103-0740HA	7.40	8	79	41
H2103-0750HA	7.50	8	79	41
H2103-0760HA	7.60	8	79	41
H2103-0770HA	7.70	8	79	41
H2103-0780HA	7.80	8	79	41
H2103-0790HA	7.90	8	79	41
H2103-0800HA	8.00	8	79	41
H2103-0810HA	8.10	10	89	47
H2103-0820HA	8.20	10	89	47
H2103-0830HA	8.30	10	89	47
H2103-0840HA	8.40	10	89	47
H2103-0850HA	8.50	10	89	47
H2103-0860HA	8.60	10	89	47
H2103-0870HA	8.70	10	89	47

Item code	Ø d1	Ø d2	L	L1
H2103-0880HA	8.80	10	89	47
H2103-0890HA	8.90	10	89	47
H2103-0900HA	9.00	10	89	47
H2103-0910HA	9.10	10	89	47
H2103-0920HA	9.20	10	89	47
H2103-0930HA	9.30	10	89	47
H2103-0940HA	9.40	10	89	47
H2103-0950HA	9.50	10	89	47
H2103-0960HA	9.60	10	89	47
H2103-0970HA	9.70	10	89	47
H2103-0980HA	9.80	10	89	47
H2103-0990HA	9.90	10	89	47
H2103-1000HA	10.00	10	89	47
H2103-1010HA	10.10	12	102	55
H2103-1020HA	10.20	12	102	55
H2103-1030HA	10.30	12	102	55
H2103-1040HA	10.40	12	102	55
H2103-1050HA	10.50	12	102	55
H2103-1060HA	10.60	12	102	55
H2103-1070HA	10.70	12	102	55
H2103-1080HA	10.80	12	102	55
H2103-1090HA	10.90	12	102	55
H2103-1100HA	11.00	12	102	55
H2103-1110HA	11.10	12	102	55
H2103-1120HA	11.20	12	102	55
H2103-1130HA	11.30	12	102	55
H2103-1140HA	11.40	12	102	55
H2103-1150HA	11.50	12	102	55
H2103-1160HA	11.60	12	102	55
H2103-1170HA	11.70	12	102	55
H2103-1180HA	11.80	12	102	55
H2103-1190HA	11.90	12	102	55
H2103-1200HA	12.00	12	102	55
H2103-1230HA	12.30	14	107	60
H2103-1250HA	12.50	14	107	60
H2103-1280HA	12.80	14	107	60
H2103-1300HA	13.00	14	107	60
H2103-1350HA	13.50	14	107	60
H2103-1380HA	13.80	14	107	60
H2103-1400HA	14.00	14	107	60
H2103-1450HA	14.50	16	115	65
H2103-1480HA	14.80	16	115	65
H2103-1500HA	15.00	16	115	65
H2103-1550HA	15.50	16	115	65
H2103-1580HA	15.80	16	115	65
H2103-1600HA	16.00	16	115	65
H2103-1650HA	16.50	18	123	73
H2103-1680HA	16.80	18	123	73
H2103-1700HA	17.00	18	123	73
H2103-1750HA	17.50	18	123	73
H2103-1780HA	17.80	18	123	73
H2103-1800HA	18.00	18	123	73
H2103-1850HA	18.50	20	131	79
H2103-1880HA	18.80	20	131	79
H2103-1900HA	19.00	20	131	79
H2103-1950HA	19.50	20	131	79
H2103-1980HA	19.80	20	131	79
H2103-2000HA	20.00	20	131	79

Cutting Conditions P.37

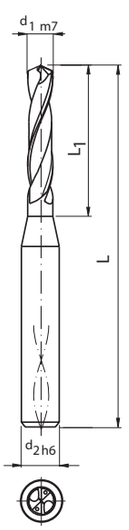
DIN 6535 Form HA | DIN 6537 | 5 D | DX | 140° | 90° | TiALN | P | M | K

H2005



Item code	Ø d1	Ø d2	L	L1
H2005-0050HA	0.50	3	50	10
H2005-0060HA	0.60	3	50	10
H2005-0070HA	0.70	3	50	10
H2005-0080HA	0.80	3	50	10
H2005-0090HA	0.90	3	50	10
H2005-0100HA	1.00	3	55	10
H2005-0110HA	1.10	3	55	12
H2005-0120HA	1.20	3	55	12
H2005-0130HA	1.30	3	55	12
H2005-0140HA	1.40	3	55	12
H2005-0150HA	1.50	3	55	12
H2005-0160HA	1.60	3	55	16
H2005-0170HA	1.70	3	55	16
H2005-0180HA	1.80	3	55	16
H2005-0190HA	1.90	3	55	16
H2005-0200HA	2.00	4	57	21
H2005-0210HA	2.10	4	57	21
H2005-0220HA	2.20	4	57	21
H2005-0230HA	2.30	4	57	21
H2005-0240HA	2.40	4	57	21
H2005-0250HA	2.50	4	57	21
H2005-0260HA	2.60	4	57	21
H2005-0270HA	2.70	4	57	21
H2005-0280HA	2.80	4	57	21
H2005-0290HA	2.90	4	57	21

H2105

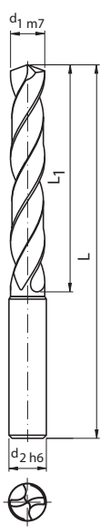


Item code	Ø d1	Ø d2	L	L1
H2105-0100HA	1.00	3	55	10
H2105-0110HA	1.10	3	55	12
H2105-0120HA	1.20	3	55	12
H2105-0130HA	1.30	3	55	12
H2105-0140HA	1.40	3	55	12
H2105-0150HA	1.50	3	55	12
H2105-0160HA	1.60	3	55	16
H2105-0170HA	1.70	3	55	16
H2105-0180HA	1.80	3	55	16
H2105-0190HA	1.90	3	55	16
H2105-0200HA	2.00	4	57	21
H2105-0210HA	2.10	4	57	21
H2105-0220HA	2.20	4	57	21
H2105-0230HA	2.30	4	57	21
H2105-0240HA	2.40	4	57	21
H2105-0250HA	2.50	4	57	21
H2105-0260HA	2.60	4	57	21
H2105-0270HA	2.70	4	57	21
H2105-0280HA	2.80	4	57	21
H2105-0290HA	2.90	4	57	21

Cutting Conditions P.36

DIN 6535 Form HA | DIN 6537 | 5 D | DX | 140° | 90° | TiALN | P | M | K

H2005



Item code	Ø d1	Ø d2	L	L1
H2005-0300HA	3.00	6	66	28
H2005-0310HA	3.10	6	66	28
H2005-0320HA	3.20	6	66	28
H2005-0330HA	3.30	6	66	28
H2005-0340HA	3.40	6	66	28
H2005-0350HA	3.50	6	66	28
H2005-0360HA	3.60	6	66	28
H2005-0370HA	3.70	6	66	28
H2005-0380HA	3.80	6	74	36
H2005-0390HA	3.90	6	74	36
H2005-0400HA	4.00	6	74	36
H2005-0410HA	4.10	6	74	36
H2005-0420HA	4.20	6	74	36
H2005-0430HA	4.30	6	74	36
H2005-0440HA	4.40	6	74	36
H2005-0450HA	4.50	6	74	36
H2005-0460HA	4.60	6	74	36
H2005-0470HA	4.70	6	74	36
H2005-0480HA	4.80	6	82	44
H2005-0490HA	4.90	6	82	44
H2005-0500HA	5.00	6	82	44
H2005-0510HA	5.10	6	82	44
H2005-0520HA	5.20	6	82	44
H2005-0530HA	5.30	6	82	44
H2005-0540HA	5.40	6	82	44
H2005-0550HA	5.50	6	82	44
H2005-0560HA	5.60	6	82	44
H2005-0570HA	5.70	6	82	44
H2005-0580HA	5.80	6	82	44
H2005-0590HA	5.90	6	82	44
H2005-0600HA	6.00	6	82	44
H2005-0610HA	6.10	8	91	53
H2005-0620HA	6.20	8	91	53
H2005-0630HA	6.30	8	91	53
H2005-0640HA	6.40	8	91	53
H2005-0650HA	6.50	8	91	53
H2005-0660HA	6.60	8	91	53
H2005-0670HA	6.70	8	91	53
H2005-0680HA	6.80	8	91	53
H2005-0690HA	6.90	8	91	53
H2005-0700HA	7.00	8	91	53
H2005-0710HA	7.10	8	91	53
H2005-0720HA	7.20	8	91	53
H2005-0730HA	7.30	8	91	53
H2005-0740HA	7.40	8	91	53
H2005-0750HA	7.50	8	91	53
H2005-0760HA	7.60	8	91	53
H2005-0770HA	7.70	8	91	53
H2005-0780HA	7.80	8	91	53
H2005-0790HA	7.90	8	91	53
H2005-0800HA	8.00	8	91	53
H2005-0810HA	8.10	10	103	61
H2005-0820HA	8.20	10	103	61
H2005-0830HA	8.30	10	103	61
H2005-0840HA	8.40	10	103	61
H2005-0850HA	8.50	10	103	61
H2005-0860HA	8.60	10	103	61

Item code	Ø d1	Ø d2	L	L1
H2005-0870HA	8.70	10	103	61
H2005-0880HA	8.80	10	103	61
H2005-0890HA	8.90	10	103	61
H2005-0900HA	9.00	10	103	61
H2005-0910HA	9.10	10	103	61
H2005-0920HA	9.20	10	103	61
H2005-0930HA	9.30	10	103	61
H2005-0940HA	9.40	10	103	61
H2005-0950HA	9.50	10	103	61
H2005-0960HA	9.60	10	103	61
H2005-0970HA	9.70	10	103	61
H2005-0980HA	9.80	10	103	61
H2005-0990HA	9.90	10	103	61
H2005-1000HA	10.00	10	103	61
H2005-1010HA	10.10	12	118	71
H2005-1020HA	10.20	12	118	71
H2005-1030HA	10.30	12	118	71
H2005-1040HA	10.40	12	118	71
H2005-1050HA	10.50	12	118	71
H2005-1060HA	10.60	12	118	71
H2005-1070HA	10.70	12	118	71
H2005-1080HA	10.80	12	118	71
H2005-1090HA	10.90	12	118	71
H2005-1100HA	11.00	12	118	71
H2005-1110HA	11.10	12	118	71
H2005-1120HA	11.20	12	118	71
H2005-1130HA	11.30	12	118	71
H2005-1140HA	11.40	12	118	71
H2005-1150HA	11.50	12	118	71
H2005-1160HA	11.60	12	118	71
H2005-1170HA	11.70	12	118	71
H2005-1180HA	11.80	12	118	71
H2005-1190HA	11.90	12	118	71
H2005-1200HA	12.00	12	118	71
H2005-1230HA	12.30	14	124	77
H2005-1250HA	12.50	14	124	77
H2005-1280HA	12.80	14	124	77
H2005-1300HA	13.00	14	124	77
H2005-1350HA	13.50	14	124	77
H2005-1380HA	13.80	14	124	77
H2005-1400HA	14.00	14	124	77
H2005-1450HA	14.50	16	133	83
H2005-1480HA	14.80	16	133	83
H2005-1500HA	15.00	16	133	83
H2005-1550HA	15.50	16	133	83
H2005-1580HA	15.80	16	133	83
H2005-1600HA	16.00	16	133	83
H2005-1650HA	16.50	18	143	93
H2005-1680HA	16.80	18	143	93
H2005-1700HA	17.00	18	143	93
H2005-1750HA	17.50	18	143	93
H2005-1780HA	17.80	18	143	93
H2005-1800HA	18.00	18	143	93
H2005-1850HA	18.50	20	153	101
H2005-1900HA	19.00	20	153	101
H2005-1950HA	19.50	20	153	101
H2005-2000HA	20.00	20	153	101

Cutting Conditions P.37

DIN 6535 Form HA | DIN 6537 | 5 D | DX | 140° | 35° | TiALN | P | M | K

H2105

Item code	Ø d1	Ø d2	L	L1
H2105-0300HA	3.00	6	66	28
H2105-0310HA	3.10	6	66	28
H2105-0320HA	3.20	6	66	28
H2105-0330HA	3.30	6	66	28
H2105-0340HA	3.40	6	66	28
H2105-0350HA	3.50	6	66	28
H2105-0360HA	3.60	6	66	28
H2105-0370HA	3.70	6	66	28
H2105-0380HA	3.80	6	74	36
H2105-0390HA	3.90	6	74	36
H2105-0400HA	4.00	6	74	36
H2105-0410HA	4.10	6	74	36
H2105-0420HA	4.20	6	74	36
H2105-0430HA	4.30	6	74	36
H2105-0440HA	4.40	6	74	36
H2105-0450HA	4.50	6	74	36
H2105-0460HA	4.60	6	74	36
H2105-0470HA	4.70	6	74	36
H2105-0480HA	4.80	6	82	44
H2105-0490HA	4.90	6	82	44
H2105-0500HA	5.00	6	82	44
H2105-0510HA	5.10	6	82	44
H2105-0520HA	5.20	6	82	44
H2105-0530HA	5.30	6	82	44
H2105-0540HA	5.40	6	82	44
H2105-0550HA	5.50	6	82	44
H2105-0560HA	5.60	6	82	44
H2105-0570HA	5.70	6	82	44
H2105-0580HA	5.80	6	82	44
H2105-0590HA	5.90	6	82	44
H2105-0600HA	6.00	6	82	44
H2105-0610HA	6.10	8	91	53
H2105-0620HA	6.20	8	91	53
H2105-0630HA	6.30	8	91	53
H2105-0640HA	6.40	8	91	53
H2105-0650HA	6.50	8	91	53
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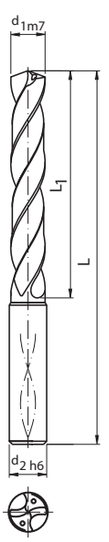
H2105-0670HA	6.70	8	91	53
H2105-0680HA	6.80	8	91	53
H2105-0690HA	6.90	8	91	53
H2105-0700HA	7.00	8	91	53
H2105-0710HA	7.10	8	91	53
H2105-0720HA	7.20	8	91	53
H2105-0730HA	7.30	8	91	53
H2105-0740HA	7.40	8	91	53
H2105-0750HA	7.50	8	91	53
H2105-0760HA	7.60	8	91	53
H2105-0770HA	7.70	8	91	53
H2105-0780HA	7.80	8	91	53
H2105-0790HA	7.90	8	91	53
H2105-0800HA	8.00	8	91	53
H2105-0810HA	8.10	10	103	61
H2105-0820HA	8.20	10	103	61
H2105-0830HA	8.30	10	103	61
H2105-0840HA	8.40	10	103	61
H2105-0850HA	8.50	10	103	61
H2105-0860HA	8.60	10	103	61

Item code	Ø d1	Ø d2	L	L1
H2105-0870HA	8.70	10	103	61
H2105-0880HA	8.80	10	103	61
H2105-0890HA	8.90	10	103	61
H2105-0900HA	9.00	10	103	61
H2105-0910HA	9.10	10	103	61
H2105-0920HA	9.20	10	103	61
H2105-0930HA	9.30	10	103	61
H2105-0940HA	9.40	10	103	61
H2105-0950HA	9.50	10	103	61
H2105-0960HA	9.60	10	103	61
H2105-0970HA	9.70	10	103	61
H2105-0980HA	9.80	10	103	61
H2105-0990HA	9.90	10	103	61
H2105-1000HA	10.00	10	103	61
H2105-1010HA	10.10	12	118	71
H2105-1020HA	10.20	12	118	71
H2105-1030HA	10.30	12	118	71
H2105-1040HA	10.40	12	118	71
H2105-1050HA	10.50	12	118	71
H2105-1060HA	10.60	12	118	71
H2105-1070HA	10.70	12	118	71
H2105-1080HA	10.80	12	118	71
H2105-1090HA	10.90	12	118	71
H2105-1100HA	11.00	12	118	71
H2105-1110HA	11.10	12	118	71
H2105-1120HA	11.20	12	118	71
H2105-1130HA	11.30	12	118	71
H2105-1140HA	11.40	12	118	71
H2105-1150HA	11.50	12	118	71
H2105-1160HA	11.60	12	118	71
H2105-1170HA	11.70	12	118	71
H2105-1180HA	11.80	12	118	71
H2105-1190HA	11.90	12	118	71
H2105-1200HA	12.00	12	118	71
H2105-1230HA	12.30	14	124	77
H2105-1250HA	12.50	14	124	77
H2105-1280HA	12.80	14	124	77
H2105-1300HA	13.00	14	124	77
H2105-1350HA	13.50	14	124	77
H2105-1380HA	13.80	14	124	77
H2105-1400HA	14.00	14	124	77
H2105-1450HA	14.50	16	133	83
H2105-1480HA	14.80	16	133	83
H2105-1500HA	15.00	16	133	83
H2105-1550HA	15.50	16	133	83
H2105-1580HA	15.80	16	133	83
H2105-1600HA	16.00	16	133	83
H2105-1650HA	16.50	18	143	93
H2105-1680HA	16.80	18	143	93
H2105-1700HA	17.00	18	143	93
H2105-1750HA	17.50	18	143	93
H2105-1780HA	17.80	18	143	93
H2105-1800HA	18.00	18	143	93
H2105-1850HA	18.50	20	153	101
H2105-1900HA	19.00	20	153	101
H2105-1950HA	19.50	20	153	101
H2105-2000HA	20.00	20	153	101



Cutting Conditions P.37

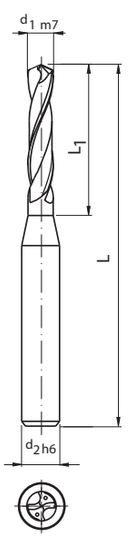
DIN 6535 Form HA | DIN 6537 | 5 D | DX | 140° | 35° | TiALN | M | K | N | S

I2105

Item code	Ø d1	Ø d2	L	L1
I2105-0100HA	1.00	3	55	8
I2105-0110HA	1.10	3	55	12
I2105-0120HA	1.20	3	55	12
I2105-0130HA	1.30	3	55	12
I2105-0140HA	1.40	3	55	12
I2105-0150HA	1.50	3	55	12
I2105-0160HA	1.60	3	55	16
I2105-0170HA	1.70	3	55	16
I2105-0180HA	1.80	3	55	16
I2105-0190HA	1.90	3	55	16
I2105-0200HA	2.00	4	57	21
I2105-0210HA	2.10	4	57	21
I2105-0220HA	2.20	4	57	21
I2105-0230HA	2.30	4	57	21
I2105-0240HA	2.40	4	57	21
I2105-0250HA	2.50	4	57	21
I2105-0260HA	2.60	4	57	21
I2105-0270HA	2.70	4	57	21
I2105-0280HA	2.80	4	57	21
I2105-0290HA	2.90	4	57	21

FOR INOX

New



Cutting Conditions P.36

DIN 6535 Form HA | DIN 6537 | 5 D | DX | 140° | 35° | TiALN | M | K | N | S

I2105

Item code	Ø d1	Ø d2	L	L1
I2105-0300HA	3.00	6	66	28
I2105-0310HA	3.10	6	66	28
I2105-0320HA	3.20	6	66	28
I2105-0330HA	3.30	6	66	28
I2105-0340HA	3.40	6	66	28
I2105-0350HA	3.50	6	66	28
I2105-0360HA	3.60	6	66	28
I2105-0370HA	3.70	6	66	28
I2105-0380HA	3.80	6	74	36
I2105-0390HA	3.90	6	74	36
I2105-0400HA	4.00	6	74	36
I2105-0410HA	4.10	6	74	36
I2105-0420HA	4.20	6	74	36
I2105-0430HA	4.30	6	74	36
I2105-0440HA	4.40	6	74	36
I2105-0450HA	4.50	6	74	36
I2105-0460HA	4.60	6	74	36
I2105-0470HA	4.70	6	74	36
I2105-0480HA	4.80	6	82	44
I2105-0490HA	4.90	6	82	44
I2105-0500HA	5.00	6	82	44
I2105-0510HA	5.10	6	82	44
I2105-0520HA	5.20	6	82	44
I2105-0530HA	5.30	6	82	44
I2105-0540HA	5.40	6	82	44
I2105-0550HA	5.50	6	82	44
I2105-0560HA	5.60	6	82	44
I2105-0570HA	5.70	6	82	44
I2105-0580HA	5.80	6	82	44
I2105-0590HA	5.90	6	82	44
I2105-0600HA	6.00	6	82	44
I2105-0610HA	6.10	8	91	53
I2105-0620HA	6.20	8	91	53
I2105-0630HA	6.30	8	91	53
I2105-0640HA	6.40	8	91	53
I2105-0650HA	6.50	8	91	53
I2105-0660HA	6.60	8	91	53
I2105-0670HA	6.70	8	91	53
I2105-0680HA	6.80	8	91	53
I2105-0690HA	6.90	8	91	53
I2105-0700HA	7.00	8	91	53
I2105-0710HA	7.10	8	91	53
I2105-0720HA	7.20	8	91	53
I2105-0730HA	7.30	8	91	53
I2105-0740HA	7.40	8	91	53
I2105-0750HA	7.50	8	91	53
I2105-0760HA	7.60	8	91	53
I2105-0770HA	7.70	8	91	53
I2105-0780HA	7.80	8	91	53
I2105-0790HA	7.90	8	91	53
I2105-0800HA	8.00	8	91	53
I2105-0810HA	8.10	10	103	61
I2105-0820HA	8.20	10	103	61
I2105-0830HA	8.30	10	103	61
I2105-0840HA	8.40	10	103	61
I2105-0850HA	8.50	10	103	61
I2105-0860HA	8.60	10	103	61

Item code	Ø d1	Ø d2	L	L1
I2105-0870HA	8.70	10	103	61
I2105-0880HA	8.80	10	103	61
I2105-0890HA	8.90	10	103	61
I2105-0900HA	9.00	10	103	61
I2105-0910HA	9.10	10	103	61
I2105-0920HA	9.20	10	103	61
I2105-0930HA	9.30	10	103	61
I2105-0940HA	9.40	10	103	61
I2105-0950HA	9.50	10	103	61
I2105-0960HA	9.60	10	103	61
I2105-0970HA	9.70	10	103	61
I2105-0980HA	9.80	10	103	61
I2105-0990HA	9.90	10	103	61
I2105-1000HA	10.00	10	103	61
I2105-1010HA	10.10	12	118	71
I2105-1020HA	10.20	12	118	71
I2105-1030HA	10.30	12	118	71
I2105-1040HA	10.40	12	118	71
I2105-1050HA	10.50	12	118	71
I2105-1060HA	10.60	12	118	71
I2105-1070HA	10.70	12	118	71
I2105-1080HA	10.80	12	118	71
I2105-1090HA	10.90	12	118	71
I2105-1100HA	11.00	12	118	71
I2105-1110HA	11.10	12	118	71
I2105-1120HA	11.20	12	118	71
I2105-1130HA	11.30	12	118	71
I2105-1140HA	11.40	12	118	71
I2105-1150HA	11.50	12	118	71
I2105-1160HA	11.60	12	118	71
I2105-1170HA	11.70	12	118	71
I2105-1180HA	11.80	12	118	71
I2105-1190HA	11.90	12	118	71
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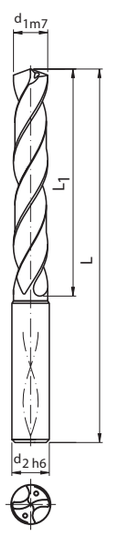
I2105-1250HA	12.50	14	124	77
I2105-1280HA	12.80	14	124	77
I2105-1300HA	13.00	14	124	77
I2105-1350HA	13.50	14	124	77
I2105-1380HA	13.80	14	124	77
I2105-1400HA	14.00	14	124	77
I2105-1450HA	14.50	16	133	83
I2105-1480HA	14.80	16	133	83
I2105-1500HA	15.00	16	133	83
I2105-1550HA	15.50	16	133	83
I2105-1580HA	15.80	16	133	83
I2105-1600HA	16.00	16	133	83
I2105-1650HA	16.50	18	143	93
I2105-1680HA	16.80	18	143	93
I2105-1700HA	17.00	18	143	93
I2105-1750HA	17.50	18	143	93
I2105-1780HA	17.80	18	143	93
I2105-1800HA	18.00	18	143	93
I2105-1850HA	18.50	20	153	101
I2105-1900HA	19.00	20	153	101
I2105-1950HA	19.50	20	153	101
I2105-2000HA	20.00	20	153	101

New

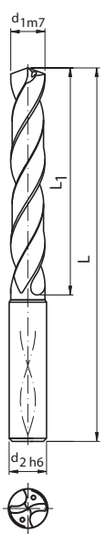


FOR INOX

Cutting Conditions P.37

DIN 6535 Form HA | DIN 6537 | 5 D | DX | 140° | 35° | nACoB | M | P | H | S

Q2105



UNEQUAL DIVISION

Item code	Ø d1	Ø d2	L	L1
Q2105-0300HA	3.00	6	66	28
Q2105-0310HA	3.10	6	66	28
Q2105-0320HA	3.20	6	66	28
Q2105-0330HA	3.30	6	66	28
Q2105-0340HA	3.40	6	66	28
Q2105-0350HA	3.50	6	66	28
Q2105-0360HA	3.60	6	66	28
Q2105-0370HA	3.70	6	66	28
Q2105-0380HA	3.80	6	74	36
Q2105-0390HA	3.90	6	74	36
Q2105-0400HA	4.00	6	74	36
Q2105-0410HA	4.10	6	74	36
Q2105-0420HA	4.20	6	74	36
Q2105-0430HA	4.30	6	74	36
Q2105-0440HA	4.40	6	74	36
Q2105-0450HA	4.50	6	74	36
Q2105-0460HA	4.60	6	74	36
Q2105-0470HA	4.70	6	74	36
Q2105-0480HA	4.80	6	82	44
Q2105-0490HA	4.90	6	82	44
Q2105-0500HA	5.00	6	82	44
Q2105-0510HA	5.10	6	82	44
Q2105-0520HA	5.20	6	82	44
Q2105-0530HA	5.30	6	82	44
Q2105-0540HA	5.40	6	82	44
Q2105-0550HA	5.50	6	82	44
Q2105-0560HA	5.60	6	82	44
Q2105-0570HA	5.70	6	82	44
Q2105-0580HA	5.80	6	82	44
Q2105-0590HA	5.90	6	82	44
Q2105-0600HA	6.00	6	82	44
Q2105-0610HA	6.10	8	91	53
Q2105-0620HA	6.20	8	91	53
Q2105-0630HA	6.30	8	91	53
Q2105-0640HA	6.40	8	91	53
Q2105-0650HA	6.50	8	91	53
Q2105-0660HA	6.60	8	91	53
Q2105-0670HA	6.70	8	91	53
Q2105-0680HA	6.80	8	91	53
Q2105-0690HA	6.90	8	91	53
Q2105-0700HA	7.00	8	91	53
Q2105-0710HA	7.10	8	91	53
Q2105-0720HA	7.20	8	91	53
Q2105-0730HA	7.30	8	91	53
Q2105-0740HA	7.40	8	91	53
Q2105-0750HA	7.50	8	91	53
Q2105-0760HA	7.60	8	91	53
Q2105-0770HA	7.70	8	91	53
Q2105-0780HA	7.80	8	91	53
Q2105-0790HA	7.90	8	91	53
Q2105-0800HA	8.00	8	91	53
Q2105-0810HA	8.10	10	103	61
Q2105-0820HA	8.20	10	103	61
Q2105-0830HA	8.30	10	103	61
Q2105-0840HA	8.40	10	103	61
Q2105-0850HA	8.50	10	103	61
Q2105-0860HA	8.60	10	103	61

Item code	Ø d1	Ø d2	L	L1
Q2105-0870HA	8.70	10	103	61
Q2105-0880HA	8.80	10	103	61
Q2105-0890HA	8.90	10	103	61
Q2105-0900HA	9.00	10	103	61
Q2105-0910HA	9.10	10	103	61
Q2105-0920HA	9.20	10	103	61
Q2105-0930HA	9.30	10	103	61
Q2105-0940HA	9.40	10	103	61
Q2105-0950HA	9.50	10	103	61
Q2105-0960HA	9.60	10	103	61
Q2105-0970HA	9.70	10	103	61
Q2105-0980HA	9.80	10	103	61
Q2105-0990HA	9.90	10	103	61
Q2105-1000HA	10.00	10	103	61
Q2105-1010HA	10.10	12	118	71
Q2105-1020HA	10.20	12	118	71
Q2105-1030HA	10.30	12	118	71
Q2105-1040HA	10.40	12	118	71
Q2105-1050HA	10.50	12	118	71
Q2105-1060HA	10.60	12	118	71
Q2105-1070HA	10.70	12	118	71
Q2105-1080HA	10.80	12	118	71
Q2105-1090HA	10.90	12	118	71
Q2105-1100HA	11.00	12	118	71
Q2105-1110HA	11.10	12	118	71
Q2105-1120HA	11.20	12	118	71
Q2105-1130HA	11.30	12	118	71
Q2105-1140HA	11.40	12	118	71
Q2105-1150HA	11.50	12	118	71
Q2105-1160HA	11.60	12	118	71
Q2105-1170HA	11.70	12	118	71
Q2105-1180HA	11.80	12	118	71
Q2105-1190HA	11.90	12	118	71
Q2105-1200HA	12.00	12	118	71
Q2105-1230HA	12.30	14	124	77
Q2105-1250HA	12.50	14	124	77
Q2105-1280HA	12.80	14	124	77
Q2105-1300HA	13.00	14	124	77
Q2105-1350HA	13.50	14	124	77
Q2105-1380HA	13.80	14	124	77
Q2105-1400HA	14.00	14	124	77
Q2105-1450HA	14.50	16	133	83
Q2105-1480HA	14.80	16	133	83
Q2105-1500HA	15.00	16	133	83
Q2105-1550HA	15.50	16	133	83
Q2105-1580HA	15.80	16	133	83
Q2105-1600HA	16.00	16	133	83
Q2105-1650HA	16.50	18	143	93
Q2105-1680HA	16.80	18	143	93
Q2105-1700HA	17.00	18	143	93
Q2105-1750HA	17.50	18	143	93
Q2105-1780HA	17.80	18	143	93
Q2105-1800HA	18.00	18	143	93
Q2105-1850HA	18.50	20	153	101
Q2105-1900HA	19.00	20	153	101
Q2105-1950HA	19.50	20	153	101
Q2105-2000HA	20.00	20	153	101

FOR INOX - INCONEL - TITAN - STEEL

New

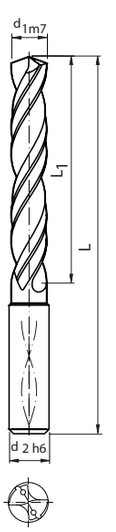
Cutting Conditions P.37

DIN 6535 Form HA | DIN 6537 | 5 D | DX | 140° | TiALN | P | M | K

F2105

Item code	Ø d1	Ø d2	L	L1
F2105-0300HA	3.00	6	66	28
F2105-0310HA	3.10	6	66	28
F2105-0320HA	3.20	6	66	28
F2105-0330HA	3.30	6	66	28
F2105-0340HA	3.40	6	66	28
F2105-0350HA	3.50	6	66	28
F2105-0360HA	3.60	6	66	28
F2105-0370HA	3.70	6	66	28
F2105-0380HA	3.80	6	74	36
F2105-0390HA	3.90	6	74	36
F2105-0400HA	4.00	6	74	36
F2105-0410HA	4.10	6	74	36
F2105-0420HA	4.20	6	74	36
F2105-0430HA	4.30	6	74	36
F2105-0440HA	4.40	6	74	36
F2105-0450HA	4.50	6	74	36
F2105-0460HA	4.60	6	74	36
F2105-0470HA	4.70	6	74	36
F2105-0480HA	4.80	6	82	44
F2105-0490HA	4.90	6	82	44
F2105-0500HA	5.00	6	82	44
F2105-0510HA	5.10	6	82	44
F2105-0520HA	5.20	6	82	44
F2105-0530HA	5.30	6	82	44
F2105-0540HA	5.40	6	82	44
F2105-0550HA	5.50	6	82	44
F2105-0560HA	5.60	6	82	44
F2105-0570HA	5.70	6	82	44
F2105-0580HA	5.80	6	82	44
F2105-0590HA	5.90	6	82	44
F2105-0600HA	6.00	6	82	44
F2105-0610HA	6.10	8	91	53
F2105-0620HA	6.20	8	91	53
F2105-0630HA	6.30	8	91	53
F2105-0640HA	6.40	8	91	53
F2105-0650HA	6.50	8	91	53
F2105-0660HA	6.60	8	91	53
F2105-0670HA	6.70	8	91	53
F2105-0680HA	6.80	8	91	53
F2105-0690HA	6.90	8	91	53
F2105-0700HA	7.00	8	91	53
F2105-0710HA	7.10	8	91	53
F2105-0720HA	7.20	8	91	53
F2105-0730HA	7.30	8	91	53
F2105-0740HA	7.40	8	91	53
F2105-0750HA	7.50	8	91	53
F2105-0760HA	7.60	8	91	53
F2105-0770HA	7.70	8	91	53
F2105-0780HA	7.80	8	91	53
F2105-0790HA	7.90	8	91	53
F2105-0800HA	8.00	8	91	53
F2105-0810HA	8.10	10	103	61
F2105-0820HA	8.20	10	103	61
F2105-0830HA	8.30	10	103	61
F2105-0840HA	8.40	10	103	61
F2105-0850HA	8.50	10	103	61
F2105-0860HA	8.60	10	103	61

Item code	Ø d1	Ø d2	L	L1
F2105-0870HA	8.70	10	103	61
F2105-0880HA	8.80	10	103	61
F2105-0890HA	8.90	10	103	61
F2105-0900HA	9.00	10	103	61
F2105-0910HA	9.10	10	103	61
F2105-0920HA	9.20	10	103	61
F2105-0930HA	9.30	10	103	61
F2105-0940HA	9.40	10	103	61
F2105-0950HA	9.50	10	103	61
F2105-0960HA	9.60	10	103	61
F2105-0970HA	9.70	10	103	61
F2105-0980HA	9.80	10	103	61
F2105-0990HA	9.90	10	103	61
F2105-1000HA	10.00	10	103	61
F2105-1010HA	10.10	12	118	71
F2105-1020HA	10.20	12	118	71
F2105-1030HA	10.30	12	118	71
F2105-1040HA	10.40	12	118	71
F2105-1050HA	10.50	12	118	71
F2105-1060HA	10.60	12	118	71
F2105-1070HA	10.70	12	118	71
F2105-1080HA	10.80	12	118	71
F2105-1090HA	10.90	12	118	71
F2105-1100HA	11.00	12	118	71
F2105-1110HA	11.10	12	118	71
F2105-1120HA	11.20	12	118	71
F2105-1130HA	11.30	12	118	71
F2105-1140HA	11.40	12	118	71
F2105-1150HA	11.50	12	118	71
F2105-1160HA	11.60	12	118	71
F2105-1170HA	11.70	12	118	71
F2105-1180HA	11.80	12	118	71
F2105-1190HA	11.90	12	118	71
F2105-1200HA	12.00	12	118	71
F2105-1230HA	12.30	14	124	77
F2105-1250HA	12.50	14	124	77
F2105-1280HA	12.80	14	124	77
F2105-1300HA	13.00	14	124	77
F2105-1350HA	13.50	14	124	77
F2105-1380HA	13.80	14	124	77
F2105-1400HA	14.00	14	124	77
F2105-1450HA	14.50	16	133	83
F2105-1480HA	14.80	16	133	83
F2105-1500HA	15.00	16	133	83
F2105-1550HA	15.50	16	133	83
F2105-1580HA	15.80	16	133	83
F2105-1600HA	16.00	16	133	83
F2105-1650HA	16.50	18	143	93
F2105-1680HA	16.80	18	143	93
F2105-1700HA	17.00	18	143	93
F2105-1750HA	17.50	18	143	93
F2105-1780HA	17.80	18	143	93
F2105-1800HA	18.00	18	143	93
F2105-1850HA	18.50	20	153	101
F2105-1900HA	19.00	20	153	101
F2105-1950HA	19.50	20	153	101
F2105-2000HA	20.00	20	153	101

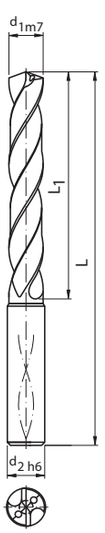


New

Cutting Conditions P.37

DIN 6535 Form HA | DIN 6537 | 5 D | DX | 140° | AlTiN | P | K

K2105



Item code	Ø d1	Ø d2	L	L1
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K2105-0310HA	3.10	6	66	28
K2105-0320HA	3.20	6	66	28
K2105-0330HA	3.30	6	66	28
K2105-0340HA	3.40	6	66	28
K2105-0350HA	3.50	6	66	28
K2105-0360HA	3.60	6	66	28
K2105-0370HA	3.70	6	66	28
K2105-0380HA	3.80	6	74	36
K2105-0390HA	3.90	6	74	36
K2105-0400HA	4.00	6	74	36
K2105-0410HA	4.10	6	74	36
K2105-0420HA	4.20	6	74	36
K2105-0430HA	4.30	6	74	36
K2105-0440HA	4.40	6	74	36
K2105-0450HA	4.50	6	74	36
K2105-0460HA	4.60	6	74	36
K2105-0470HA	4.70	6	74	36
K2105-0480HA	4.80	6	82	44
K2105-0490HA	4.90	6	82	44
K2105-0500HA	5.00	6	82	44
K2105-0510HA	5.10	6	82	44
K2105-0520HA	5.20	6	82	44
K2105-0530HA	5.30	6	82	44
K2105-0540HA	5.40	6	82	44
K2105-0550HA	5.50	6	82	44
K2105-0560HA	5.60	6	82	44
K2105-0570HA	5.70	6	82	44
K2105-0580HA	5.80	6	82	44
K2105-0590HA	5.90	6	82	44
K2105-0600HA	6.00	6	82	44
K2105-0610HA	6.10	8	91	53
K2105-0620HA	6.20	8	91	53
K2105-0630HA	6.30	8	91	53
K2105-0640HA	6.40	8	91	53
K2105-0650HA	6.50	8	91	53
K2105-0660HA	6.60	8	91	53
K2105-0670HA	6.70	8	91	53
K2105-0680HA	6.80	8	91	53
K2105-0690HA	6.90	8	91	53
K2105-0700HA	7.00	8	91	53
K2105-0710HA	7.10	8	91	53
K2105-0720HA	7.20	8	91	53
K2105-0730HA	7.30	8	91	53
K2105-0740HA	7.40	8	91	53
K2105-0750HA	7.50	8	91	53
K2105-0760HA	7.60	8	91	53
K2105-0770HA	7.70	8	91	53
K2105-0780HA	7.80	8	91	53
K2105-0790HA	7.90	8	91	53
K2105-0800HA	8.00	8	91	53
K2105-0810HA	8.10	10	103	61
K2105-0820HA	8.20	10	103	61
K2105-0830HA	8.30	10	103	61
K2105-0840HA	8.40	10	103	61
K2105-0850HA	8.50	10	103	61
K2105-0860HA	8.60	10	103	61

Item code	Ø d1	Ø d2	L	L1
K2105-0870HA	8.70	10	103	61
K2105-0880HA	8.80	10	103	61
K2105-0890HA	8.90	10	103	61
K2105-0900HA	9.00	10	103	61
K2105-0910HA	9.10	10	103	61
K2105-0920HA	9.20	10	103	61
K2105-0930HA	9.30	10	103	61
K2105-0940HA	9.40	10	103	61
K2105-0950HA	9.50	10	103	61
K2105-0960HA	9.60	10	103	61
K2105-0970HA	9.70	10	103	61
K2105-0980HA	9.80	10	103	61
K2105-0990HA	9.90	10	103	61
K2105-1000HA	10.00	10	103	61
K2105-1010HA	10.10	12	118	71
K2105-1020HA	10.20	12	118	71
K2105-1030HA	10.30	12	118	71
K2105-1040HA	10.40	12	118	71
K2105-1050HA	10.50	12	118	71
K2105-1060HA	10.60	12	118	71
K2105-1070HA	10.70	12	118	71
K2105-1080HA	10.80	12	118	71
K2105-1090HA	10.90	12	118	71
K2105-1100HA	11.00	12	118	71
K2105-1110HA	11.10	12	118	71
K2105-1120HA	11.20	12	118	71
K2105-1130HA	11.30	12	118	71
K2105-1140HA	11.40	12	118	71
K2105-1150HA	11.50	12	118	71
K2105-1160HA	11.60	12	118	71
K2105-1170HA	11.70	12	118	71
K2105-1180HA	11.80	12	118	71
K2105-1190HA	11.90	12	118	71
K2105-1200HA	12.00	12	118	71
K2105-1230HA	12.30	14	124	77
K2105-1250HA	12.50	14	124	77
K2105-1280HA	12.80	14	124	77
K2105-1300HA	13.00	14	124	77
K2105-1350HA	13.50	14	124	77
K2105-1380HA	13.80	14	124	77
K2105-1400HA	14.00	14	124	77
K2105-1450HA	14.50	16	133	83
K2105-1480HA	14.80	16	133	83
K2105-1500HA	15.00	16	133	83
K2105-1550HA	15.50	16	133	83
K2105-1580HA	15.80	16	133	83
K2105-1600HA	16.00	16	133	83
K2105-1650HA	16.50	18	143	93
K2105-1680HA	16.80	18	143	93
K2105-1700HA	17.00	18	143	93
K2105-1750HA	17.50	18	143	93
K2105-1780HA	17.80	18	143	93
K2105-1800HA	18.00	18	143	93
K2105-1850HA	18.50	20	153	101
K2105-1900HA	19.00	20	153	101
K2105-1950HA	19.50	20	153	101
K2105-2000HA	20.00	20	153	101

New

Cutting Conditions P.37

DIN 6535 Form HA | DIN 6537 | 5 D | DX | ZnR | N

A2105

Item code	Ø d1	Ø d2	L	L1
A2105-0300HA	3.00	6	66	28
A2105-0310HA	3.10	6	66	28
A2105-0320HA	3.20	6	66	28
A2105-0330HA	3.30	6	66	28
A2105-0340HA	3.40	6	66	28
A2105-0350HA	3.50	6	66	28
A2105-0360HA	3.60	6	66	28
A2105-0370HA	3.70	6	66	28
A2105-0380HA	3.80	6	74	36
A2105-0390HA	3.90	6	74	36
A2105-0400HA	4.00	6	74	36
A2105-0410HA	4.10	6	74	36
A2105-0420HA	4.20	6	74	36
A2105-0430HA	4.30	6	74	36
A2105-0440HA	4.40	6	74	36
A2105-0450HA	4.50	6	74	36
A2105-0460HA	4.60	6	74	36
A2105-0470HA	4.70	6	74	36
A2105-0480HA	4.80	6	82	44
A2105-0490HA	4.90	6	82	44
A2105-0500HA	5.00	6	82	44
A2105-0510HA	5.10	6	82	44
A2105-0520HA	5.20	6	82	44
A2105-0530HA	5.30	6	82	44
A2105-0540HA	5.40	6	82	44
A2105-0550HA	5.50	6	82	44
A2105-0560HA	5.60	6	82	44
A2105-0570HA	5.70	6	82	44
A2105-0580HA	5.80	6	82	44
A2105-0590HA	5.90	6	82	44
A2105-0600HA	6.00	6	82	44
A2105-0610HA	6.10	8	91	53
A2105-0620HA	6.20	8	91	53
A2105-0630HA	6.30	8	91	53
A2105-0640HA	6.40	8	91	53
A2105-0650HA	6.50	8	91	53
A2105-0660HA	6.60	8	91	53
A2105-0670HA	6.70	8	91	53
A2105-0680HA	6.80	8	91	53
A2105-0690HA	6.90	8	91	53
A2105-0700HA	7.00	8	91	53
A2105-0710HA	7.10	8	91	53
A2105-0720HA	7.20	8	91	53
A2105-0730HA	7.30	8	91	53
A2105-0740HA	7.40	8	91	53
A2105-0750HA	7.50	8	91	53
A2105-0760HA	7.60	8	91	53
A2105-0770HA	7.70	8	91	53
A2105-0780HA	7.80	8	91	53
A2105-0790HA	7.90	8	91	53
A2105-0800HA	8.00	8	91	53
A2105-0810HA	8.10	10	103	61
A2105-0820HA	8.20	10	103	61
A2105-0830HA	8.30	10	103	61
A2105-0840HA	8.40	10	103	61
A2105-0850HA	8.50	10	103	61
A2105-0860HA	8.60	10	103	61
A2105-0870HA	8.70	10	103	61
A2105-0880HA	8.80	10	103	61
A2105-0890HA	8.90	10	103	61
A2105-0900HA	9.00	10	103	61
A2105-0910HA	9.10	10	103	61
A2105-0920HA	9.20	10	103	61
A2105-0930HA	9.30	10	103	61
A2105-0940HA	9.40	10	103	61
A2105-0950HA	9.50	10	103	61
A2105-0960HA	9.60	10	103	61
A2105-0970HA	9.70	10	103	61
A2105-0980HA	9.80	10	103	61
A2105-0990HA	9.90	10	103	61
A2105-1000HA	10.00	10	103	61
A2105-1010HA	10.10	12	118	71
A2105-1020HA	10.20	12	118	71
A2105-1030HA	10.30	12	118	71
A2105-1040HA	10.40	12	118	71
A2105-1050HA	10.50	12	118	71
A2105-1060HA	10.60	12	118	71
A2105-1070HA	10.70	12	118	71
A2105-1080HA	10.80	12	118	71
A2105-1090HA	10.90	12	118	71
A2105-1100HA	11.00	12	118	71
A2105-1110HA	11.10	12	118	71
A2105-1120HA	11.20	12	118	71
A2105-1130HA	11.30	12	118	71
A2105-1140HA	11.40	12	118	71
A2105-1150HA	11.50	12	118	71
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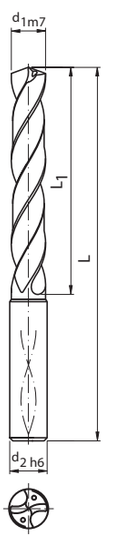
A2105-1170HA	11.70	12	118	71
A2105-1180HA	11.80	12	118	71
A2105-1190HA	11.90	12	118	71
A2105-1200HA	12.00	12	118	71
A2105-1230HA	12.30	14	124	77
A2105-1250HA	12.50	14	124	77
A2105-1280HA	12.80	14	124	77
A2105-1300HA	13.00	14	124	77
A2105-1350HA	13.50	14	124	77
A2105-1380HA	13.80	14	124	77
A2105-1400HA	14.00	14	124	77
A2105-1450HA	14.50	16	133	83
A2105-1480HA	14.80	16	133	83
A2105-1500HA	15.00	16	133	83
A2105-1550HA	15.50	16	133	83
A2105-1580HA	15.80	16	133	83
A2105-1600HA	16.00	16	133	83
A2105-1650HA	16.50	18	143	93
A2105-1680HA	16.80	18	143	93
A2105-1700HA	17.00	18	143	93
A2105-1750HA	17.50	18	143	93
A2105-1780HA	17.80	18	143	93
A2105-1800HA	18.00	18	143	93
A2105-1850HA	18.50	20	153	101
A2105-1900HA	19.00	20	153	101
A2105-1950HA	19.50	20	153	101
A2105-2000HA	20.00	20	153	101



Drills for Aluminum, Non-Ferrous & Non-Metallic Materials

New

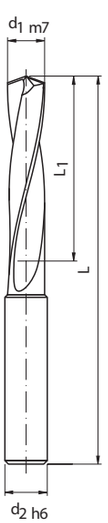
Cutting Conditions P.37

DIN 6535 Form HA | DIN 6539 | 4 D | DX | 140° | 35° | TiALN | H

H1600

Item code	Ø d1	Ø d2	L	L1
H1600-0300HA	3.00	3	46	16
H1600-0330HA	3.30	4	48	18
H1600-0340HA	3.40	4	50	20
H1600-0350HA	3.50	4	50	20
H1600-0400HA	4.00	4	52	22
H1600-0420HA	4.20	6	65	25
H1600-0430HA	4.30	6	68	28
H1600-0440HA	4.40	6	68	28
H1600-0450HA	4.50	6	68	28
H1600-0500HA	5.00	6	72	32
H1600-0510HA	5.10	6	72	32
H1600-0520HA	5.20	6	72	32
H1600-0550HA	5.50	6	75	35
H1600-0600HA	6.00	6	75	35
H1600-0650HA	6.50	8	80	40
H1600-0680HA	6.80	8	85	45
H1600-0690HA	6.90	8	85	45
H1600-0700HA	7.00	8	85	45
H1600-0750HA	7.50	8	85	45
H1600-0800HA	8.00	8	98	50
H1600-0850HA	8.50	10	98	50
H1600-0860HA	8.60	10	105	57
H1600-0880HA	8.80	10	105	57
H1600-0900HA	9.00	10	105	57
H1600-0950HA	9.50	10	105	57
H1600-1000HA	10.00	10	111	63
H1600-1020HA	10.20	12	111	63
H1600-1030HA	10.30	12	111	63
H1600-1050HA	10.50	12	111	63
H1600-1080HA	10.80	12	119	71
H1600-1100HA	11.00	12	119	71
H1600-1150HA	11.50	12	119	71
H1600-1200HA	12.00	12	119	71
H1600-1400HA	14.00	14	125	77

New



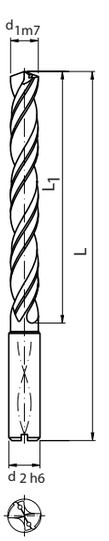
HRc 70

DIN 6535 Form HA | DIN 6537 | 8 D | DX | 140° | TiALN | P | M | K

H2108

Item code	Ø d1	Ø d2	L	L1
H2108-0100HA	1.00	3	55	11
H2108-0110HA	1.10	3	55	17
H2108-0120HA	1.20	3	55	17
H2108-0130HA	1.30	3	55	17
H2108-0140HA	1.40	3	55	17
H2108-0150HA	1.50	3	65	22
H2108-0160HA	1.60	3	65	22
H2108-0170HA	1.70	3	65	22
H2108-0180HA	1.80	3	65	22
H2108-0190HA	1.90	3	65	22
H2108-0200HA	2.00	3	74	28
H2108-0210HA	2.10	3	74	28
H2108-0220HA	2.20	3	74	28
H2108-0230HA	2.30	3	74	28
H2108-0240HA	2.40	3	74	28
H2108-0250HA	2.50	3	81	32
H2108-0260HA	2.60	3	81	32
H2108-0270HA	2.70	3	81	32
H2108-0280HA	2.80	3	81	32
H2108-0290HA	2.90	3	81	32
H2108-0300HA	3.00	6	72	34
H2108-0310HA	3.10	6	72	34
H2108-0320HA	3.20	6	72	34
H2108-0330HA	3.30	6	72	34
H2108-0340HA	3.40	6	72	34
H2108-0350HA	3.50	6	72	34
H2108-0360HA	3.60	6	72	34
H2108-0370HA	3.70	6	72	34
H2108-0380HA	3.80	6	81	43
H2108-0390HA	3.90	6	81	43
H2108-0400HA	4.00	6	81	43
H2108-0410HA	4.10	6	81	43
H2108-0420HA	4.20	6	81	43
H2108-0430HA	4.30	6	81	43
H2108-0440HA	4.40	6	81	43
H2108-0450HA	4.50	6	81	43
H2108-0460HA	4.60	6	81	43
H2108-0470HA	4.70	6	81	43
H2108-0480HA	4.80	6	95	57
H2108-0490HA	4.90	6	95	57
H2108-0500HA	5.00	6	95	57
H2108-0510HA	5.10	6	95	57
H2108-0520HA	5.20	6	95	57
H2108-0530HA	5.30	6	95	57
H2108-0540HA	5.40	6	95	57
H2108-0550HA	5.50	6	95	57
H2108-0560HA	5.60	6	95	57
H2108-0570HA	5.70	6	95	57
H2108-0580HA	5.80	6	95	57
H2108-0590HA	5.90	6	95	57
H2108-0600HA	6.00	6	95	57
H2108-0610HA	6.10	8	114	76
H2108-0620HA	6.20	8	114	76
H2108-0630HA	6.30	8	114	76
H2108-0640HA	6.40	8	114	76
H2108-0650HA	6.50	8	114	76
H2108-0660HA	6.60	8	114	76
H2108-0670HA	6.70	8	114	76
H2108-0680HA	6.80	8	114	76
H2108-0690HA	6.90	8	114	76

Item code	Ø d1	Ø d2	L	L1
H2108-0700HA	7.00	8	114	76
H2108-0710HA	7.10	8	114	76
H2108-0720HA	7.20	8	114	76
H2108-0730HA	7.30	8	114	76
H2108-0740HA	7.40	8	114	76
H2108-0750HA	7.50	8	114	76
H2108-0760HA	7.60	8	114	76
H2108-0770HA	7.70	8	114	76
H2108-0780HA	7.80	8	114	76
H2108-0790HA	7.90	8	114	76
H2108-0800HA	8.00	8	114	76
H2108-0810HA	8.10	10	142	95
H2108-0820HA	8.20	10	142	95
H2108-0830HA	8.30	10	142	95
H2108-0840HA	8.40	10	142	95
H2108-0850HA	8.50	10	142	95
H2108-0860HA	8.60	10	142	95
H2108-0870HA	8.70	10	142	95
H2108-0880HA	8.80	10	142	95
H2108-0890HA	8.90	10	142	95
H2108-0900HA	9.00	10	142	95
H2108-0910HA	9.10	10	142	95
H2108-0920HA	9.20	10	142	95
H2108-0930HA	9.30	10	142	95
H2108-0940HA	9.40	10	142	95
H2108-0950HA	9.50	10	142	95
H2108-0960HA	9.60	10	142	95
H2108-0970HA	9.70	10	142	95
H2108-0980HA	9.80	10	142	95
H2108-0990HA	9.90	10	142	95
H2108-1000HA	10.00	10	142	95
H2108-1010HA	10.10	12	162	114
H2108-1020HA	10.20	12	162	114
H2108-1030HA	10.30	12	162	114
H2108-1040HA	10.40	12	162	114
H2108-1050HA	10.50	12	162	114
H2108-1060HA	10.60	12	162	114
H2108-1070HA	10.70	12	162	114
H2108-1080HA	10.80	12	162	114
H2108-1090HA	10.90	12	162	114
H2108-1100HA	11.00	12	162	114
H2108-1110HA	11.10	12	162	114
H2108-1120HA	11.20	12	162	114
H2108-1130HA	11.30	12	162	114
H2108-1140HA	11.40	12	162	114
H2108-1150HA	11.50	12	162	114
H2108-1160HA	11.60	12	162	114
H2108-1170HA	11.70	12	162	114
H2108-1180HA	11.80	12	162	114
H2108-1190HA	11.90	12	162	114
H2108-1200HA	12.00	12	162	114
H2108-1250HA	12.50	14	178	133
H2108-1300HA	13.00	14	178	133
H2108-1350HA	13.50	14	178	133
H2108-1400HA	14.00	14	178	133
H2108-1450HA	14.50	16	203	152
H2108-1500HA	15.00	16	203	152
H2108-1550HA	15.50	16	203	152
H2108-1600HA	16.00	16	203	152

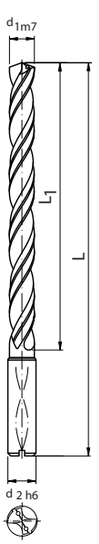


New

Cutting Conditions P.37

DIN 6535 Form HA | DIN | 12 D | DX | 140° | 90° | TiALN | P | M | K

H2112



Item code	Ø d1	Ø d2	L	L1
H2112-0100HA	1.00	3	15	55
H2112-0110HA	1.10	3	20	55
H2112-0120HA	1.20	3	20	55
H2112-0130HA	1.30	3	20	55
H2112-0140HA	1.40	3	20	55
H2112-0150HA	1.50	3	23	65
H2112-0160HA	1.60	3	30	65
H2112-0170HA	1.70	3	30	65
H2112-0180HA	1.80	3	30	65
H2112-0190HA	1.90	3	30	65
H2112-0200HA	2.00	3	30	74
H2112-0210HA	2.10	3	38	74
H2112-0220HA	2.20	3	38	74
H2112-0230HA	2.30	3	38	74
H2112-0240HA	2.40	3	38	74
H2112-0250HA	2.50	3	38	81
H2112-0260HA	2.60	3	44	81
H2112-0270HA	2.70	3	44	81
H2112-0280HA	2.80	3	44	81
H2112-0290HA	2.90	3	44	81
H2112-0300HA	3.00	6	54	92
H2112-0330HA	3.30	6	54	92
H2112-0350HA	3.50	6	54	92
H2112-0380HA	3.80	6	64	102
H2112-0400HA	4.00	6	64	102
H2112-0420HA	4.20	6	64	102
H2112-0450HA	4.50	6	64	102
H2112-0480HA	4.80	6	78	116
H2112-0500HA	5.00	6	78	116
H2112-0550HA	5.50	6	78	116

Item code	Ø d1	Ø d2	L	L1
H2112-0580HA	5.80	6	78	116
H2112-0600HA	6.00	6	78	116
H2112-0650HA	6.50	8	108	146
H2112-0680HA	6.80	8	108	146
H2112-0700HA	7.00	8	108	146
H2112-0750HA	7.50	8	108	146
H2112-0780HA	7.80	8	108	146
H2112-0800HA	8.00	8	108	146
H2112-0850HA	8.50	10	120	162
H2112-0880HA	8.80	10	120	162
H2112-0900HA	9.00	10	120	162
H2112-0950HA	9.50	10	120	162
H2112-0980HA	9.80	10	120	162
H2112-1000HA	10.00	10	120	162
H2112-1020HA	10.20	12	156	204
H2112-1050HA	10.50	12	156	204
H2112-1080HA	10.80	12	156	204
H2112-1100HA	11.00	12	156	204
H2112-1150HA	11.50	12	156	204
H2112-1180HA	11.80	12	156	204
H2112-1200HA	12.00	12	156	204
H2112-1250HA	12.50	14	182	230
H2112-1280HA	12.80	14	182	230
H2112-1300HA	13.00	14	182	230
H2112-1350HA	13.50	14	182	230
H2112-1400HA	14.00	14	182	230
H2112-1450HA	14.50	16	208	260
H2112-1500HA	15.00	16	208	260
H2112-1550HA	15.50	16	208	260
H2112-1600HA	16.00	16	208	260

New

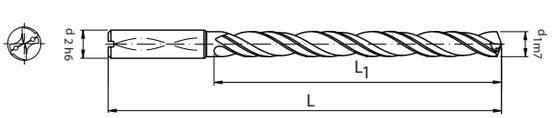
Cutting Conditions P.37

DIN 6535 Form HA | DIN | 15 D | DX | TiALN | P | M | K

H2115

Item code	Ø d1	Ø d2	L	L1
H2115-0100HA	1.00	3	20	60
H2115-0110HA	1.10	3	22	60
H2115-0120HA	1.20	3	24	60
H2115-0130HA	1.30	3	25	60
H2115-0140HA	1.40	3	27	60
H2115-0150HA	1.50	3	27	60
H2115-0160HA	1.60	3	32	65
H2115-0170HA	1.70	3	32	65
H2115-0180HA	1.80	3	35	65
H2115-0190HA	1.90	3	35	65
H2115-0200HA	2.00	3	35	65
H2115-0210HA	2.10	3	40	75
H2115-0220HA	2.20	3	40	75
H2115-0230HA	2.30	3	40	75
H2115-0240HA	2.40	3	45	75
H2115-0250HA	2.50	3	45	75
H2115-0260HA	2.60	3	48	80
H2115-0270HA	2.70	3	48	80
H2115-0280HA	2.80	3	50	80
H2115-0290HA	2.90	3	50	80
H2115-0300HA	3.00	6	60	100
H2115-0310HA	3.10	6	60	100
H2115-0320HA	3.20	6	60	100
H2115-0330HA	3.30	6	60	100
H2115-0340HA	3.40	6	60	100
H2115-0350HA	3.50	6	60	100
H2115-0360HA	3.60	6	68	108
H2115-0380HA	3.80	6	68	108
H2115-0390HA	3.90	6	68	108
H2115-0400HA	4.00	6	68	108
H2115-0410HA	4.10	6	78	115
H2115-0420HA	4.20	6	78	115
H2115-0430HA	4.30	6	78	115
H2115-0440HA	4.40	6	78	115
H2115-0450HA	4.50	6	78	115
H2115-0460HA	4.60	6	84	125
H2115-0470HA	4.70	6	84	125
H2115-0480HA	4.80	6	84	125
H2115-0490HA	4.90	6	84	125
H2115-0500HA	5.00	6	84	125
H2115-0510HA	5.10	6	92	130
H2115-0520HA	5.20	6	92	130
H2115-0530HA	5.30	6	92	130

Item code	Ø d1	Ø d2	L	L1
H2115-0540HA	5.40	6	92	130
H2115-0550HA	5.50	6	92	130
H2115-0560HA	5.60	6	100	140
H2115-0570HA	5.70	6	100	140
H2115-0580HA	5.80	6	100	140
H2115-0590HA	5.90	6	100	140
H2115-0600HA	6.00	6	100	140
H2115-0610HA	6.10	8	108	145
H2115-0620HA	6.20	8	108	145
H2115-0630HA	6.30	8	108	145
H2115-0640HA	6.40	8	108	145
H2115-0650HA	6.50	8	108	145
H2115-0660HA	6.60	8	130	170
H2115-0670HA	6.70	8	130	170
H2115-0680HA	6.80	8	130	170
H2115-0690HA	6.90	8	130	170
H2115-0700HA	7.00	8	130	170
H2115-0750HA	7.50	8	130	170
H2115-0780HA	7.80	8	130	170
H2115-0800HA	8.00	8	130	170
H2115-0850HA	8.50	10	163	208
H2115-0880HA	8.80	10	163	208
H2115-0900HA	9.00	10	163	208
H2115-0950HA	9.50	10	163	208
H2115-0980HA	9.80	10	163	208
H2115-1000HA	10.00	10	163	208
H2115-1020HA	10.20	12	195	245
H2115-1050HA	10.50	12	195	245
H2115-1080HA	10.80	12	195	245
H2115-1100HA	11.00	12	195	245
H2115-1150HA	11.50	12	195	245
H2115-1180HA	11.80	12	195	245
H2115-1200HA	12.00	12	195	245
H2115-1250HA	12.50	14	230	280
H2115-1280HA	12.80	14	230	280
H2115-1300HA	13.00	14	230	280
H2115-1350HA	13.50	14	230	280
H2115-1400HA	14.00	14	230	280
H2115-1450HA	14.50	16	260	310
H2115-1500HA	15.00	16	260	310
H2115-1550HA	15.50	16	260	310
H2115-1600HA	16.00	16	260	310



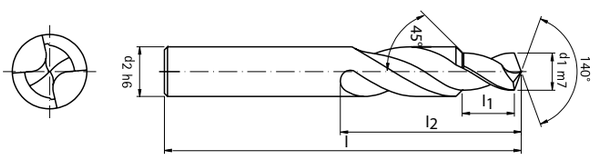
New

Cutting Conditions P.37

DIN 6535 Form HA | DIN | 2 D | DX | 140° | 90° | TiALN | P | K | K

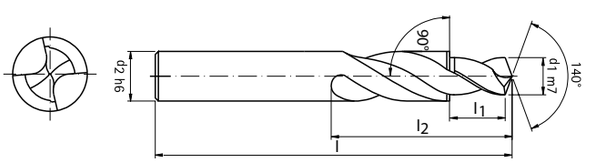
H1700 H1701

Item code	Ø d1	Ø d2	L	L1	L2
H1700-0250HA	2.50	6	66	8.8	28
H1700-0330HA	3.30	6	66	11.4	28
H1700-0420HA	4.20	6	66	13.6	28
H1700-0500HA	5.00	8	79	16.5	41
H1700-0680HA	6.80	10	89	21.0	47
H1700-0850HA	8.50	12	102	25.5	55
H1700-1020HA	10.20	14	107	30.0	60



New

Item code	Ø d1	Ø d2	L	L1	L2
H1701-0340HA	3.40	6	64	9	28
H1701-0450HA	4.50	8	79	11	37
H1701-0550HA	5.50	10	89	13	43
H1701-0660HA	6.60	11	102	15	55
H1701-0900HA	9.00	15	115	19	65
H1701-1100HA	11.00	18	123	23	65



DIN 333 | Type A | 60° | TiALN | P | M | K | N | S

H1800 H1803

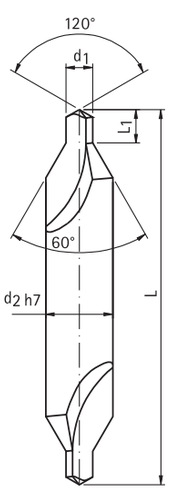
Un Coated

Item code	Ø d1	Ø d2	L	L1
H1800-008000	0.80	3.15	31.5	1.1
H1800-010000	1.00	3.15	31.5	1.3
H1800-012500	1.25	3.15	31.5	1.6
H1800-016000	1.60	4.0	35.5	2.0
H1800-020000	2.00	5.0	40.0	2.5
H1800-025000	2.50	6.0	45.0	3.1
H1800-031500	3.15	8.0	50.0	3.9
H1800-040000	4.00	10.0	56	5.0
H1800-050000	5.00	12.5	63	6.3
H1800-063000	6.30	16.0	71	8.0

TiALN

Item code	Ø d1	Ø d2	L	L1
H1803-008000	0.80	3.15	31.5	1.1
H1803-010000	1.00	3.15	31.5	1.3
H1803-012500	1.25	3.15	31.5	1.6
H1803-016000	1.60	4.0	35.5	2.0
H1803-020000	2.00	5.0	40.0	2.5
H1803-025000	2.50	6.0	45.0	3.1
H1803-031500	3.15	8.0	50.0	3.9
H1803-040000	4.00	10.0	56	5.0
H1803-050000	5.00	12.5	63	6.3
H1803-063000	6.30	16.0	71	8.0

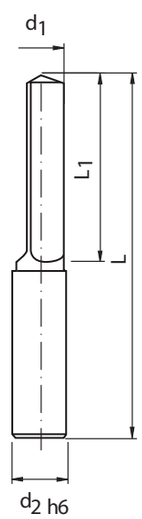
New



Ex hard drill for removing taps

H1805

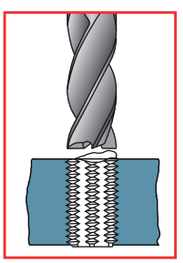
Item code	Ø d1	Thread	Ø d2	L	L1
H1805-033004	3.30	M4	6	50	15
H1805-042005	4.20	M5	6	50	15
H1805-050006	5.00	M6	6	50	15
H1805-068008	6.80	M8	8	60	20
H1805-085010	8.50	M10	10	70	25
H1805-102012	10.20	M12	12	75	30
H1805-120014	12.00	M14	12	75	30
H1805-140016	14.00	M16	14	100	40
H1805-155018	15.50	M18	16	100	40
H1805-175020	17.50	M20	18	100	50



Proces for removing damaged taps from the hole

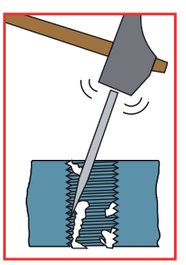
Damaged taps in the hole

New



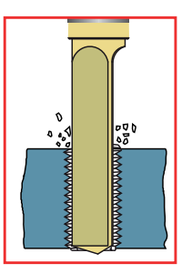
1

Make the damaged surface flat with a solid carbide plug mill or grindig with a micro grinder



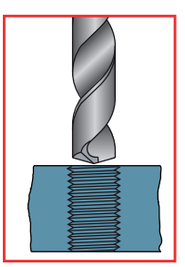
3

Drill the core of the tap at a fixed feed and speed, stopping the operation ocasionally to remove chip waste. In addition use plenty of cutting oil. Once the hole has been cleared, remove the remands of the tap easely.



2

At high speed (120-150m/min.) and low feed (0.03-0.05 mm/U.) make an initial centered approach by drilling lightly repeating the operation many times. For the operation can be used emulsion.



4

Make the damaged We recommend to re-drill the hole at the previous diameter with a solid carbide drill before tapping again

Un Coated | P | M | K

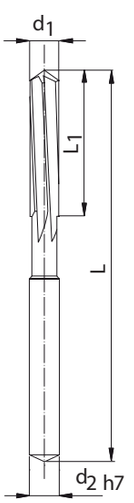
RA10

Item code	Ø d1	Ø d2	L	L1
RA10-0100HA	1.00		40	5
RA10-0110HA	1.10		40	7
RA10-0120HA	1.20		40	7
RA10-0130HA	1.30		40	7
RA10-0140HA	1.40		40	8
RA10-0150HA	1.50		40	8
RA10-0160HA	1.60		43	9
RA10-0170HA	1.70		46	10
RA10-0180HA	1.80		46	10
RA10-0190HA	1.90		46	10
RA10-0200HA	2.00		49	11
RA10-0210HA	2.10		49	11
RA10-0220HA	2.20		53	12
RA10-0230HA	2.30		53	12
RA10-0240HA	2.40		54	14
RA10-0250HA	2.50		57	14
RA10-0260HA	2.60		57	14
RA10-0270HA	2.70		61	15
RA10-0280HA	2.80		61	15
RA10-0290HA	2.90		61	15
RA10-0300HA	3.00		61	15
RA10-0310HA	3.10		65	16
RA10-0320HA	3.20		65	16
RA10-0330HA	3.30		65	16
RA10-0340HA	3.40		70	18
RA10-0350HA	3.50		70	18
RA10-0360HA	3.60		70	18
RA10-0370HA	3.70		70	18
RA10-0380HA	3.80		75	19
RA10-0390HA	3.90		75	19
RA10-0400HA	4.00		75	19
RA10-0410HA	4.10		75	19
RA10-0420HA	4.20		75	19

Item code	Ø d1	Ø d2	L	L1
RA10-0430HA	4.30		80	21
RA10-0440HA	4.40		80	21
RA10-0450HA	4.50		80	21
RA10-0460HA	4.60		80	21
RA10-0470HA	4.70		80	21
RA10-0480HA	4.80		86	23
RA10-0490HA	4.90		86	23
RA10-0500HA	5.00		86	23
RA10-0510HA	5.10		86	23
RA10-0520HA	5.20		86	23
RA10-0530HA	5.30		86	23
RA10-0540HA	5.40		93	26
RA10-0550HA	5.50		93	26
RA10-0560HA	5.60		93	26
RA10-0570HA	5.70		93	26
RA10-0580HA	5.80		93	26
RA10-0590HA	5.90		93	26
RA10-0600HA	6.00		93	26
RA10-0650HA	6.50		101	28
RA10-0700HA	7.00		109	31
RA10-0750HA	7.50		109	31
RA10-0800HA	8.00		117	33
RA10-0850HA	8.50		117	33
RA10-0900HA	9.00		125	36
RA10-0950HA	9.50		125	36
RA10-1000HA	10.00		133	38
RA10-1050HA	10.50		133	38
RA10-1100HA	11.00		142	41
RA10-1150HA	11.50		142	41
RA10-1200HA	12.00		151	44
RA10-1250HA	12.50		151	44
RA10-1300HA	13.00		151	44

For Bores with H7 tolerance

On demand we can supplier different sizes and different tolerance -0/+0.004 mm.



Cutting Conditions

	The machining values shown areguidelines. The best data for the machining task in question should becalculated during trials or during the machining operation.	Tensile strength (N/mm2) Hardness(HB)	Example	Cutting speed vc (m/min) Item code H 2105	Recommended feed f (mm/rev) for diameter ranges Da Ø 1 a Ø 1.5 mm	Da Ø 1.6 a Ø 2 mm	Da Ø 2.1 a Ø 3 mm		
Material									
P	Non-alloy steels. cast steel	up to 600 N/mm²	St37. St42. C22. GS38	30-90	0.03-0.05	0.04-0.07	0.05-0.09		
		up to 700 N/mm²	St50. St60. C35. GS52	30-80	0.03-0.05	0.04-0.07	0.05-0.09		
		over 700 N/mm²	St70. C45. GS62	30-70	0.03-0.05	0.04-0.07	0.05-0.09		
	Alloy steel	up to 900 N/mm²	16MnCr5. 42CrMo4	30-60	0.02-0.05	0.03-0.06	0.04-0.08		
		up to 1000 N/mm²	90MnCrV8. 100Cr6	30-55	0.02-0.04	0.03-0.06	0.04-0.08		
		over 1000 N/mm²	X210Cr12. 34CrAlNi7	30-50	0.02-0.04	0.03-0.05	0.04-0.07		
M	Inox		X5 CrNi 18 9 (V2A).	20-40	0.01-0.03	0.02-0.04	0.03-0.06		
	Stainless and acid-resistantsteels (Cr-Ni-alloys)		X10 CrNiMoTi 18 10.	20-40	0.01-0.03	0.02-0.04	0.03-0.06		
			G-X40 CrNi 27 4						
K	Grey cast iron. grey cast iron alloy	up to 200 HB	GG20. GG25. GTS45	30-100	0.03-0.06	0.04-0.07	0.05-0.10		
		up to 250 HB	GG30. GTW40	30-90	0.03-0.05	0.04-0.07	0.05-0.10		
		over 250 HB	GG40. GTS70	30-80	0.03-0.05	0.04-0.06	0.05-0.09		
	Spheroidal graphite cast iron.cast iron with vermicular graphite. malleable iron	up to 600 N/mm²	GGG40. GGG50	30-80	0.03-0.05	0.04-0.06	0.05-0.09		
		over 600 N/mm	GGG60. GGG70. GGV	30-70	0.02-0.04	0.03-0.05	0.04-0.08		
N	Aluminium (Si content<10%)		GD-AlS9Cu3. AlSi7Mg0.6	30-250	0.04-0.07	0.05-0.08	0.06-0.15		
	Aluminium (Si content> 10%)		GB-AlSi12(Cu).	30-250	0.03-0.06	0.05-0.08	0.05-0.12		
			AlSi17Cu4Mg/ALUSIL						
	Copper.brass.bronze			30-250	0.04-0.07	0.05-0.08	0.06-0.15		
S	Titanium alloys		Ti6Al4V. Ti-4Al-4Mo-2Sn	20-40	0.01-0.03	0.02-0.04	0.03-0.06		
	Nickel alloys		Inconel. Monel. Hasteloy	20-40	0.01-0.03	0.02-0.04	0.03-0.06		

Cutting Conditions

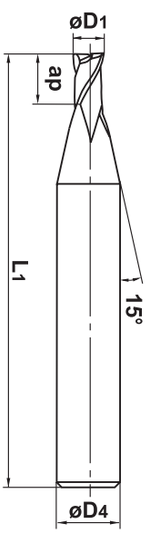
	The machining values shown areguidelines. The best data for the machining task in question should becalculated during trials or during the machining operation.			Cutting speed vc (m/min) Item code		Recommended feed f (mm/rev) for diameter ranges				
				H 1000	H 2103					
				H900	H 2105					
				H 901	H 2108					
		Tensile strength	Example	H 2003	H 2112	Da Ø 3	Da Ø 5.1	Da Ø 8.1	Da Ø 12.1	Da Ø 16.1
		(N/mm2)		H2005	H 2115	a Ø 5	a Ø 8	a Ø 12	a Ø 16	a Ø 20
		Hardness(HB)				mm	mm	mm	mm	mm
Material										
P	Non-alloy steels. cast steel	up to 600 N/mm²	St37. St42. C22. GS38	85-100	95-115	0.10-0.18	0.15-0.25	0.18-0.30	0.20-0.35	0.25-0.40
		up to 700 N/mm²	St50. St60. C35. GS52	75-90	85-105	0.10-0.18	0.15-0.25	0.18-0.30	0.20-0.35	0.25-0.40
		over 700 N/mm²	St70. C45. GS62	65-80	75-90	0.10-0.20	0.15-0.28	0.18-0.35	0.20-0.38	0.25-0.42
	Alloy steel	up to 900 N/mm²	16MnCr5. 42CrMo4	55-75	65-85	0.10-0.20	0.15-0.28	0.18-0.35	0.20-0.38	0.25-0.42
		up to 1000 N/mm²	90MnCrV8. 100Cr6	45-60	50-70	0.10-0.15	0.12-0.20	0.14-0.25	0.16-0.30	0.18-0.32
		over 1000 N/mm²	X210Cr12. 34CrAlNi7	35-50	40-60	0.10-0.15	0.12-0.20	0.14-0.25	0.16-0.30	0.18-0.32
M	Inox		X5 CrNi 18 9 (V2A).		30-50	0.06-0.12	0.08-0.15	0.10-0.20	0.10-0.20	0.15-0.25
	Stainless and acid-resistantsteels (Cr-Ni-alloys)		X10 CrNiMoTi 18 10.		30-40	0.06-0.12	0.08-0.15	0.10-0.20	0.10-0.20	0.15-0.25
			G-X40 CrNi 27 4							
K	Grey cast iron. grey cast iron alloy	up to 200 HB	GG20. GG25. GTS45	70-110	80-130	0.10-0.25	0.15-0.30	0.20-0.40	0.25-0.45	0.30-0.50
		up to 250 HB	GG30. GTW40	60-95	70-115	0.10-0.20	0.12-0.25	0.15-0.35	0.20-0.40	0.25-0.45
		over 250 HB	GG40. GTS70	50-80	60-100	0.10-0.20	0.12-0.25	0.15-0.35	0.20-0.40	0.25-0.45
	Spheroidal graphite cast iron.cast iron with vermicular graphite. malleable iron	up to 600 N/mm²	GGG40. GGG50	65-85	75-90	0.10-0.20	0.12-0.25	0.20-0.35	0.30-0.40	0.35-0.50
		over 600 N/mm²	GGG60. GGG70. GGV	55-70	65-80	0.08-0.15	0.10-0.20	0.18-0.30	0.25-0.35	0.30-0.40
N	Aluminium (Si content<10%)		GD-AlS9Cu3. AlSi7Mg0.6							
	Aluminium (Si content> 10%)		GB-AlSi12(Cu).							
			AlSi17Cu4Mg/ALUSIL							
	Copper.brass.bronze									
S	Titanium alloys		Ti6Al4V. Ti-4Al-4Mo-2Sn							
	Nickel alloys		Inconel. Monel. Hasteloy							
Item code H1600										
H	Hardened steel	50-55 HRC	X46Cr13. X90CrMoV15	25-30		0.03-0.05	0.04-0.08	0.06-0.10	0.08-0.12	0.10-0.15
		50-55 HRC	X105CrMo17. X100CrMoV15	20-25		0.03-0.05	0.04-0.08	0.06-0.10	0.08-0.12	0.10-0.15
		50-55 HRC	X155CrVMo121.100MnCrW4	15-20		0.03-0.05	0.04-0.08	0.06-0.10	0.08-0.12	0.10-0.15

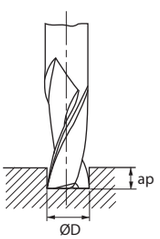
Micro Diameter Square End Mills

DIN 6535 Form HA | 135° | MG 12 0.4 µm | HRc 60 | AlTiN

20 HC

Item code	D1	R	β	ap	D5	L3	L1	D4
20HC 00204	0.2			0.4			50	4
20HC 00304	0.3			0.6			50	4
20HC 00404	0.4			0.8			50	4
20HC 00504	0.5			1.0			50	4
20HC 00604	0.6			1.2			50	4
20HC 00704	0.7			1.4			50	4
20HC 00804	0.8			1.6			50	4
20HC 00904	0.9			1.8			50	4
20HT 01004	1.0			3.0			50	4
20HC 01204	1.2			3.0			50	4
20HC 01404	1.4			3.0			50	4
20HT 01504	1.5			4.0			50	4
20HC 01604	1.6			4.0			50	4
20HC 01804	1.8			5.0			50	4
20HT 02004	2.0			6.0			50	4





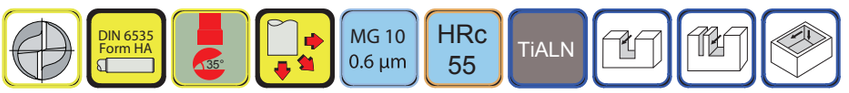
Max cutting depth	ap
D < Ø 1	0,1D
D Ø 1,1 < Ø 3	0,2D
D Ø 3,1 >	0,5D

	ap
D < Ø 1	0,02D
D Ø 1,1 < Ø 3	0,05D

	ap
D < Ø 1	0,01D
D Ø 1,1 < Ø 3	0,02D
D Ø 3,1 >	0,05D

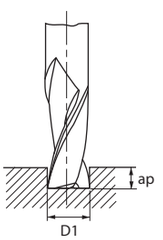
	C≤0.2% - GG			SCM - SKD			30~38 HRc			30~38 HRc			45~55 HRc -SUS			55~60 HRc		
	E24 ■ XC48 ■ FT25 750 N/mm2			350NCD16 ■ 40CMD8 ~30 HRc			35NCD16 30~38 HRc			35NCD16 30~38 HRc			Z38CDV5 45~55 HRc			Z160CDV12 55~60 HRc		
	150 (m/min)			130 (m/min)			110 (m/min)			80 (m/min)			60 (m/min)			30 (m/min)		
Ø	S (min-1)	F (mm/min)	AZ (mm)	S (min-1)	F (mm/min)	AZ (mm)	S (min-1)	F (mm/min)	AZ (mm)	S (min-1)	F (mm/min)	AZ (mm)	S (min-1)	F (mm/min)	AZ (mm)	S (min-1)	F (mm/min)	AZ (mm)
0.2	40000	113	0.0014	40000	113	0.0014	40000	94	0.0012	40000	44	0.0005	40000	38	0.0005	40000	40	0.0005
0.3	40000	144	0.0018	40000	144	0.0018	40000	100	0.0013	40000	69	0.0009	40000	52	0.0007	31885	48	0.0008
0.4	40000	156	0.0020	40000	156	0.0020	40000	113	0.0014	40000	87	0.0011	40000	69	0.0009	23885	48	0.0010
0.5	40000	156	0.0020	40000	169	0.0021	40000	144	0.0018	40000	109	0.0014	38217	82	0.0011	19108	48	0.0013
0.6	40000	156	0.0020	40000	204	0.0026	40000	171	0.0021	40000	130	0.0016	31847	83	0.0013	15924	47	0.0015
0.8	40000	204	0.0026	40000	270	0.0034	40000	232	0.0029	31847	153	0.0024	23885	82	0.0017	11924	47	0.0020
1.0	40000	267	0.0033	40000	345	0.0043	35032	252	0.0036	25478	151	0.0030	19108	82	0.0021	9554	47	0.0025
1.5	31847	296	0.0046	27601	329	0.0060	23355	236	0.0051	16985	139	0.0041	12739	101	0.0040	6369	45	0.0035
2.0	23885	293	0.0061	20701	308	0.0074	17516	225	0.0064	12739	140	0.0055	9554	97	0.0051	4777	43	0.0045

Long Neck Square End Mills

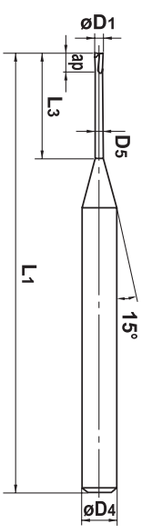


20 HG

Item code	D1	R	β	ap	D5	L3	L1	D4
20HG 01006	1.0			3	0.95	6	50	4
20HG 01008	1.0			3	0.95	8	50	4
20HG 01010	1.0			3	0.95	10	50	4
20HG 01012	1.0			3	0.95	12	50	4
20HG 01508	1.5			4	1.45	8	50	4
20HG 01510	1.5			4	1.45	10	50	4
20HG 01512	1.5			4	1.45	12	50	4
20HG 01516	1.5			4	1.45	16	50	4
20HG 02008	2.0			6	1.92	8	50	4
20HG 02010	2.0			6	1.92	10	50	4
20HG 02012	2.0			6	1.92	12	50	4
20HG 02016	2.0			6	1.92	16	50	4
20HG 02020	2.0			6	1.92	20	50	4
20HG 02510	2.5			8	2.40	10	50	4
20HG 02512	2.5			8	2.40	12	50	4
20HG 02516	2.5			8	2.40	16	50	4
20HG 02520	2.5			8	2.40	20	50	4
20HG 03010	3.0			8	2.90	10	50	6
20HG 03012	3.0			8	2.90	12	50	6
20HG 03016	3.0			8	2.90	16	50	6
20HG 03020	3.0			8	2.90	20	75	6
20HG 03025	3.0			8	2.90	25	75	6



Ø	L3	Cu			<32 HRc			33~41 HRc			42~50 Hrc		
		S (min-1)	F (mm/min)	ap (mm)	S (min-1)	F (mm/min)	ap (mm)	S (min-1)	F (mm/min)	ap (mm)	S (min-1)	F (mm/min)	ap (mm)
1	6	32000	1200	0.084	27000	1000	0.070	26000	900	0.060	20000	600	0.040
1	8	27500	960	0.048	23000	800	0.040	22000	700	0.040	18000	400	0.030
1	10	23000	720	0.036	19000	600	0.030	18000	500	0.028	15000	300	0.020
1	12	23000	720	0.024	19000	600	0.020	18000	500	0.019	15000	300	0.010
1.5	8	19000	960	0.120	16000	800	0.100	15000	700	0.080	12000	400	0.070
1.5	10	19000	960	0.096	16000	800	0.080	15000	700	0.070	12000	400	0.050
1.5	12	19000	960	0.072	16000	800	0.060	15000	700	0.050	12000	400	0.054
1.5	16	17000	720	0.060	14000	600	0.050	13000	500	0.040	1000	300	0.030
2	8	18000	1300	0.312	15000	1100	0.260	14000	1000	0.220	11000	700	0.190
2	10	15500	960	0.288	13000	800	0.240	12000	700	0.200	9000	500	0.160
2	12	15500	960	0.156	13000	800	0.130	12000	700	0.110	9000	500	0.090
2	16	15500	960	0.096	13000	800	0.080	12000	700	0.070	9000	500	0.060
2	20	13000	720	0.060	11000	600	0.050	10000	500	0.050	7000	400	0.040
2.5	10	14500	1300	0.396	12000	1100	0.330	11000	1000	0.290	9000	700	0.220
2.5	12	14500	1300	0.276	12000	1100	0.230	11000	1000	0.190	9000	700	0.150
2.5	16	12000	960	0.144	10000	900	0.120	9000	700	0.100	7000	500	0.080
2.5	20	12000	960	0.108	10000	900	0.090	9000	700	0.090	7000	500	0.060
3	10	12000	1300	0.348	10000	1100	0.290	10000	1000	0.240	8000	700	0.190
3	12	12000	1300	0.324	10000	1100	0.270	10000	1000	0.230	8000	700	0.190
3	16	12000	960	0.240	10000	900	0.200	9000	700	0.170	6000	500	0.100
3	20	12000	960	0.156	10000	900	0.130	9000	700	0.110	6000	500	0.080
3	25	12000	960	0.132	10000	900	0.110	9000	700	0.090	6000	500	0.070

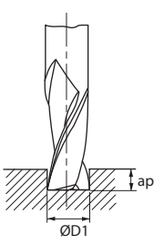


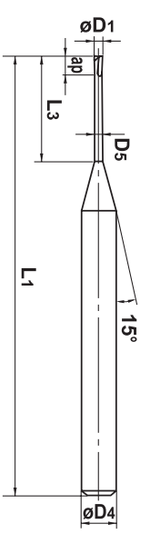
Long Neck Square End Mills

DIN 6535 Form HA | MG 12 0.4 µm | HRc 60 | AlTiN

20 HH

Item code	D1	R	β	ap	D5	L3	L1	D4
20HH 01006	1.0			3	0.95	6	50	4
20HH 01008	1.0			3	0.95	8	50	4
20HH 01010	1.0			3	0.95	10	50	4
20HH 01012	1.0			3	0.95	12	50	4
20HH 01508	1.5			4	1.45	8	50	4
20HH 01510	1.5			4	1.45	10	50	4
20HH 01512	1.5			4	1.45	12	50	4
20HH 01516	1.5			4	1.45	16	50	4
20HH 02008	2.0			6	1.92	8	50	4
20HH 02010	2.0			6	1.92	10	50	4
20HH 02012	2.0			6	1.92	12	50	4
20HH 02016	2.0			6	1.92	16	50	4
20HH 02020	2.0			6	1.92	20	50	4
20HH 02510	2.5			8	2.40	10	50	4
20HH 02512	2.5			8	2.40	12	50	4
20HH 02516	2.5			8	2.40	16	50	4
20HH 02520	2.5			8	2.40	20	50	4
20HH 03010	3.0			8	2.90	10	50	6
20HH 03012	3.0			8	2.90	12	50	6
20HH 03016	3.0			8	2.90	16	50	6
20HH 03020	3.0			8	2.90	20	75	6
20HH 03025	3.0			8	2.90	25	75	6



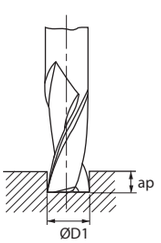


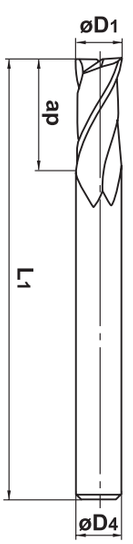
		Cu			<32 HRc			33~41 HRc			42~50 Hrc		
Ø	L3	S (min-1)	F (mm/min)	ap (mm)	S (min-1)	F (mm/min)	ap (mm)	S (min-1)	F (mm/min)	ap (mm)	S (min-1)	F (mm/min)	ap (mm)
1	6	32000	1200	0.084	27000	1000	0.070	26000	900	0.060	20000	600	0.040
1	8	27500	960	0.048	23000	800	0.040	22000	700	0.040	18000	400	0.030
1	10	23000	720	0.036	19000	600	0.030	18000	500	0.028	15000	300	0.020
1	12	23000	720	0.024	19000	600	0.020	18000	500	0.019	15000	300	0.010
1.5	8	19000	960	0.120	16000	800	0.100	15000	700	0.080	12000	400	0.070
1.5	10	19000	960	0.096	16000	800	0.080	15000	700	0.070	12000	400	0.050
1.5	12	19000	960	0.072	16000	800	0.060	15000	700	0.050	12000	400	0.054
1.5	16	17000	720	0.060	14000	600	0.050	13000	500	0.040	1000	300	0.030
2	8	18000	1300	0.312	15000	1100	0.260	14000	1000	0.220	11000	700	0.190
2	10	15500	960	0.288	13000	800	0.240	12000	700	0.200	9000	500	0.160
2	12	15500	960	0.156	13000	800	0.130	12000	700	0.110	9000	500	0.090
2	16	15500	960	0.096	13000	800	0.080	12000	700	0.070	9000	500	0.060
2	20	13000	720	0.060	11000	600	0.050	10000	500	0.050	7000	400	0.040
2.5	10	14500	1300	0.396	12000	1100	0.330	11000	1000	0.290	9000	700	0.220
2.5	12	14500	1300	0.276	12000	1100	0.230	11000	1000	0.190	9000	700	0.150
2.5	16	12000	960	0.144	10000	900	0.120	9000	700	0.100	7000	500	0.080
2.5	20	12000	960	0.108	10000	900	0.090	9000	700	0.090	7000	500	0.060
3	10	12000	1300	0.348	10000	1100	0.290	10000	1000	0.240	8000	700	0.190
3	12	12000	1300	0.324	10000	1100	0.270	10000	1000	0.230	8000	700	0.190
3	16	12000	960	0.240	10000	900	0.200	9000	700	0.170	6000	500	0.100
3	20	12000	960	0.156	10000	900	0.130	9000	700	0.110	6000	500	0.080
3	25	12000	960	0.132	10000	900	0.110	9000	700	0.090	6000	500	0.070

Small Shank Square End Mills

20 HM

Item code	D1	R	β	ap	D5	L3	L1	D4
20HM 01003	1.0			3			50	3
20HM 01503	1.5			4			50	3
20HM 02003	2.0			6			50	3
20HM 02503	2.5			8			50	3
20HM 03003	3.0			8			50	3
20HM 03053	3.0			8			75	3
20HM 03103	3.0			8			100	3
20HM 04004	4.0			11			75	4
20HM 04054	4.0			11			100	4



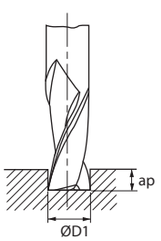


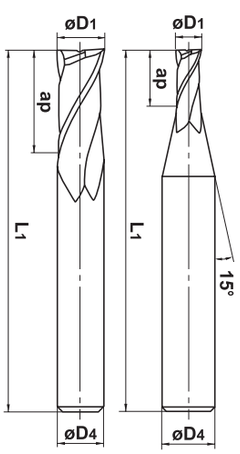
Max cutting depth		ap			ap			ap
	D < Ø 1	0,1D		D < Ø 1	0,02D	D < Ø 1	0,01D	
	D Ø 1,1 < Ø 3	0,2D		D Ø 1,1 < Ø 3	0,05D	D Ø 1,1 < Ø 3	0,02D	
	D Ø 3,1 >	0,5D				D Ø 3,1 >	0,05D	

	C≤0.2% - GG			SCM - SKD			30~38 HRc			30~38 HRc			45~55 HRc -SUS			55~60 HRc		
	E24 ■ XC48 ■ FT25			350NCD16 ■ 40CMD8			35NCD16			35NCD16			Z38CDV5			Z160CDV12		
	750 N/mm2			~30 HRc			30~38 HRc			30~38 HRc			45~55 HRc			55~60 HRc		
	150 (m/min)			130 (m/min)			110 (m/min)			80 (m/min)			60 (m/min)			30 (m/min)		
Ø	S (min-1)	F (mm/min)	AZ (mm)	S (min-1)	F (mm/min)	AZ (mm)	S (min-1)	F (mm/min)	AZ (mm)	S (min-1)	F (mm/min)	AZ (mm)	S (min-1)	F (mm/min)	AZ (mm)	S (min-1)	F (mm/min)	AZ (mm)
1.0	40000	267	0.0033	40000	345	0.0043	35032	252	0.0036	25478	151	0.0030	19108	82	0.0021	9554	47	0.0025
1.5	31847	296	0.0046	27601	329	0.0060	23355	236	0.0051	16985	139	0.0041	12739	101	0.0040	6369	45	0.0035
2.0	23885	293	0.0061	20701	308	0.0074	17516	225	0.0064	12739	140	0.0055	9554	97	0.0051	4777	43	0.0045
3.0	15924	430	0.0135	13800	326	0.0118	11677	220	0.0094	8493	143	0.0084	6369	104	0.0082	3185	48	0.0075
4.0	11943	472	0.0197	10350	391	0.0189	8758	258	0.0147	6369	164	0.0129	4777	109	0.0114	2389	46	0.0097

20 HS

Item code	D1	R	β	ap	D5	L3	L1	D4
20HS 01004	1.0			3			50	4
20HS 01504	1.5			4			50	4
20HS 02004	2.0			6			50	4
20HS 02504	2.5			8			50	4
20HS 03004	3.0			8			50	4
20HS 03504	3.5			10			50	4
20HS 04004	4.0			11			50	4
20HS 04506	4.5			13			50	6
20HS 05006	5.0			13			50	6
20HS 05506	5.5			13			50	6
20HS 06006	6.0			16			50	6
20HS 06508	6.5			17			60	8
20HS 07008	7.0			17			60	8
20HS 07508	7.5			17			60	8
20HS 08008	8.0			20			60	8
20HS 08510	8.5			23			75	10
20HS 09010	9.0			23			75	10
20HS 10010	10.0			25			75	10
20HS 11012	11.0			28			75	12
20HS 12012	12.0			30			75	12
20HS 13016	13.0			33			100	16
20HS 14016	14.0			35			100	16
20HS 15016	15.0			38			100	16
20HS 16016	16.0			40			100	16
20HS 17020	17.0			40			100	20
20HS 18020	18.0			45			100	20
20HS 19020	19.0			45			100	20
20HS 20020	20.0			45			100	20



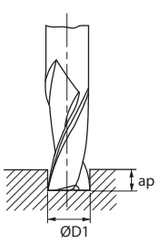


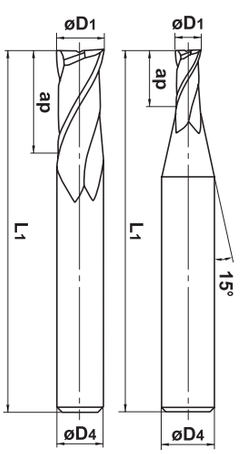
Max cutting depth		ap		ap		ap		ap		ap		ap
	D < Ø 1	0,1D							D < Ø 1	0,02D	D < Ø 1	0,01D
	D Ø 1,1 < Ø 3	0,2D							D Ø 1,1 < Ø 3	0,05D	D Ø 1,1 < Ø 3	0,02D
	D Ø 3,1 >	0,5D									D Ø 3,1 >	0,05D

	C≤0.2% - GG			SCM - SKD			30~38 HRc			30~38 HRc			45~55 HRc -SUS			55~60 HRc		
	E24 ■ XC48 ■ FT25 750 N/mm2			350NCD16 ■ 40CMD8 ~30 HRc			35NCD16 30~38 HRc			35NCD16 30~38 HRc			Z38CDV5 45~55 HRc			Z160CDV12 55~60 HRc		
	150 (m/min)			130 (m/min)			110 (m/min)			80 (m/min)			60 (m/min)			30 (m/min)		
Ø	S (min-1)	F (mm/min)	AZ (mm)	S (min-1)	F (mm/min)	AZ (mm)	S (min-1)	F (mm/min)	AZ (mm)	S (min-1)	F (mm/min)	AZ (mm)	S (min-1)	F (mm/min)	AZ (mm)	S (min-1)	F (mm/min)	AZ (mm)
1.0	40000	267	0.0033	40000	345	0.0043	35032	252	0.0036	25478	151	0.0030	19108	82	0.0021	9554	47	0.0025
1.5	31847	296	0.0046	27601	329	0.0060	23355	236	0.0051	16985	139	0.0041	12739	101	0.0040	6369	45	0.0035
2.0	23885	293	0.0061	20701	308	0.0074	17516	225	0.0064	12739	140	0.0055	9554	97	0.0051	4777	43	0.0045
3.0	15924	430	0.0135	13800	326	0.0118	11677	220	0.0094	8493	143	0.0084	6369	104	0.0082	3185	48	0.0075
4.0	11943	472	0.0197	10350	391	0.0189	8758	258	0.0147	6369	164	0.0129	4777	109	0.0114	2389	46	0.0097
5.0	9554	568	0.0297	8280	453	0.0273	7006	257	0.0183	5096	167	0.0164	3822	111	0.0145	1911	46	0.0120
6.0	7962	555	0.0348	6900	450	0.0326	5839	257	0.0220	4246	170	0.0200	3185	113	0.0177	1592	38	0.0119
8.0	5971	534	0.0447	5175	450	0.0435	4379	249	0.0284	3185	168	0.0263	2389	104	0.0217	1194	38	0.0157
10.0	4777	505	0.0528	4140	443	0.0535	3503	250	0.0357	2548	161	0.0317	1911	100	0.0262	955	38	0.0197
12.0	3981	507	0.0636	3450	441	0.0639	2919	252	0.0431	2123	161	0.0380	1592	90	0.0283	796	30	0.0189
14.0	3412	503	0.0737	2957	424	0.0717	2502	220	0.0440	1820	165	0.0452	1365	80	0.0294	682	27	0.0198
16.0	2986	470	0.0788	2588	383	0.0741	2189	199	0.0455	1592	142	0.0445	1194	70	0.0294	597	24	0.0203
18.0	2654	421	0.0793	2300	345	0.0750	1946	177	0.0455	1415	126	0.0444	1062	60	0.0283	531	21	0.0200
20.0	2389	377	0.0788	2070	306	0.0738	1752	157	0.0449	1274	109	0.0428	955	60	0.0316	478	20	0.0206

20 HT

Item code	D1	R	β	ap	D5	L3	L1	D4
20HT 01004	1.0			3			50	4
20HT 01504	1.5			4			50	4
20HT 02004	2.0			6			50	4
20HT 02504	2.5			8			50	4
20HT 03006	3.0			8			50	6
20HT 03506	3.5			10			50	6
20HT 04006	4.0			11			50	6
20HT 04506	4.5			13			50	6
20HT 05006	5.0			13			50	6
20HT 05506	5.5			13			50	6
20HT 06006	6.0			16			50	6
20HT 06508	6.5			17			60	8
20HT 07008	7.0			17			60	8
20HT 07508	7.5			17			60	8
20HT 08008	8.0			20			60	8
20HT 08508	8.5			20			60	8
20HT 09010	9.0			23			75	10
20HT 10010	10.0			25			75	10
20HT 11012	11.0			28			75	12
20HT 12012	12.0			30			75	12
20HT 13016	13.0			33			100	16
20HT 14016	14.0			35			100	16
20HT 15016	15.0			38			100	16
20HT 16016	16.0			40			100	16
20HT 17020	17.0			40			100	20
20HT 18020	18.0			40			100	20
20HT 19020	19.0			40			100	20
20HT 20020	20.0			45			100	20



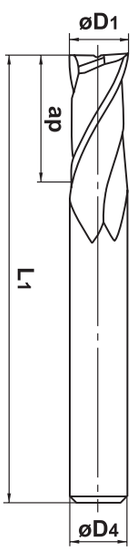


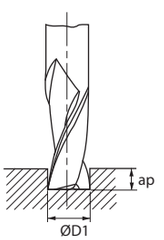
Max cutting depth	ap																	
	D < Ø 1	0,1D											D < Ø 1	0,02D		D < Ø 1	0,01D	
	D Ø 1,1 < Ø 3	0,2D											D Ø 1,1 < Ø 3	0,05D		D Ø 1,1 < Ø 3	0,02D	
	D Ø 3,1 >	0,5D														D Ø 3,1 >	0,05D	
	C≤0.2% - GG			SCM - SKD			30~38 HRc			30~38 HRc			45~55 HRc -SUS			55~60 HRc		
	E24 ■ XC48 ■ FT25			350NCD16 ■ 40CMD8			35NCD16			35NCD16			Z38CDV5			Z160CDV12		
	750 N/mm2			~30 HRc			30~38 HRc			30~38 HRc			45~55 HRc			55~60 HRc		
	150 (m/min)			130 (m/min)			110 (m/min)			80 (m/min)			60 (m/min)			30 (m/min)		
Ø	S (min-1)	F (mm/min)	AZ (mm)	S (min-1)	F (mm/min)	AZ (mm)	S (min-1)	F (mm/min)	AZ (mm)	S (min-1)	F (mm/min)	AZ (mm)	S (min-1)	F (mm/min)	AZ (mm)	S (min-1)	F (mm/min)	AZ (mm)
1.0	40000	267	0.0033	40000	345	0.0043	35032	252	0.0036	25478	151	0.0030	19108	82	0.0021	9554	47	0.0025
1.5	31847	296	0.0046	27601	329	0.0060	23355	236	0.0051	16985	139	0.0041	12739	101	0.0040	6369	45	0.0035
2.0	23885	293	0.0061	20701	308	0.0074	17516	225	0.0064	12739	140	0.0055	9554	97	0.0051	4777	43	0.0045
3.0	15924	430	0.0135	13800	326	0.0118	11677	220	0.0094	8493	143	0.0084	6369	104	0.0082	3185	48	0.0075
4.0	11943	472	0.0197	10350	391	0.0189	8758	258	0.0147	6369	164	0.0129	4777	109	0.0114	2389	46	0.0097
5.0	9554	568	0.0297	8280	453	0.0273	7006	257	0.0183	5096	167	0.0164	3822	111	0.0145	1911	46	0.0120
6.0	7962	555	0.0348	6900	450	0.0326	5839	257	0.0220	4246	170	0.0200	3185	113	0.0177	1592	38	0.0119
8.0	5971	534	0.0447	5175	450	0.0435	4379	249	0.0284	3185	168	0.0263	2389	104	0.0217	1194	38	0.0157
10.0	4777	505	0.0528	4140	443	0.0535	3503	250	0.0357	2548	161	0.0317	1911	100	0.0262	955	38	0.0197
12.0	3981	507	0.0636	3450	441	0.0639	2919	252	0.0431	2123	161	0.0380	1592	90	0.0283	796	30	0.0189
14.0	3412	503	0.0737	2957	424	0.0717	2502	220	0.0440	1820	165	0.0452	1365	80	0.0294	682	27	0.0198
16.0	2986	470	0.0788	2588	383	0.0741	2189	199	0.0455	1592	142	0.0445	1194	70	0.0294	597	24	0.0203
18.0	2654	421	0.0793	2300	345	0.0750	1946	177	0.0455	1415	126	0.0444	1062	60	0.0283	531	21	0.0200
20.0	2389	377	0.0788	2070	306	0.0738	1752	157	0.0449	1274	109	0.0428	955	60	0.0316	478	20	0.0206

Long Shank Square End Mills

20 HY

Item code	D1	R	β	ap	D5	L3	L1	D4
20HY 06006	6.0			15			75	6
20HY 06056	6.0			15			100	6
20HY 08008	8.0			20			100	8
20HY 08058	8.0			20			150	8
20HY 10010	10.0			25			100	10
20HY 10510	10.0			25			150	10
20HY 12012	12.0			30			100	12
20HY 12512	12.0			30			150	12



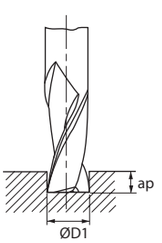


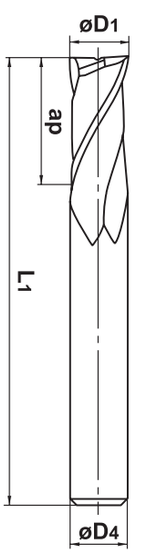
Max cutting depth		ap																
	D < Ø 1	0,1D											D < Ø 1	0,02D		D < Ø 1	0,01D	
	D Ø 1,1 < Ø 3	0,2D											D Ø 1,1 < Ø 3	0,05D		D Ø 1,1 < Ø 3	0,02D	
	D Ø 3,1 >	0,5D														D Ø 3,1 >	0,05D	
	C≤0.2% - GG			SCM - SKD			30~38 HRc			30~38 HRc			45~55 HRc -SUS			55~60 HRc		
	E24 ■ XC48 ■ FT25			350NCD16 ■ 40CMD8			35NCD16			35NCD16			Z38CDV5			Z160CDV12		
	750 N/mm2			~30 HRc			30~38 HRc			30~38 HRc			45~55 HRc			55~60 HRc		
	150 (m/min)			130 (m/min)			110 (m/min)			80 (m/min)			60 (m/min)			30 (m/min)		
Ø	S (min-1)	F (mm/min)	AZ (mm)	S (min-1)	F (mm/min)	AZ (mm)	S (min-1)	F (mm/min)	AZ (mm)	S (min-1)	F (mm/min)	AZ (mm)	S (min-1)	F (mm/min)	AZ (mm)	S (min-1)	F (mm/min)	AZ (mm)
6.0	7962	555	0.0348	6900	450	0.0326	5839	257	0.0220	4246	170	0.0200	3185	113	0.0177	1592	38	0.0119
8.0	5971	534	0.0447	5175	450	0.0435	4379	249	0.0284	3185	168	0.0263	2389	104	0.0217	1194	38	0.0157
10.0	4777	505	0.0528	4140	443	0.0535	3503	250	0.0357	2548	161	0.0317	1911	100	0.0262	955	38	0.0197
12.0	3981	507	0.0636	3450	441	0.0639	2919	252	0.0431	2123	161	0.0380	1592	90	0.0283	796	30	0.0189

Long Shank Square End Mills

20 NA

Item code	D1	R	β	ap	D5	L3	L1	D4
20NA 06006	6.0			15			75	6
20NA 06056	6.0			15			100	6
20NA 08008	8.0			20			100	8
20NA 08058	8.0			20			150	8
20NA 10010	10.0			25			100	10
20NA 10510	10.0			25			150	10
20NA 12012	12.0			30			100	12
20NA 12512	12.0			30			150	12



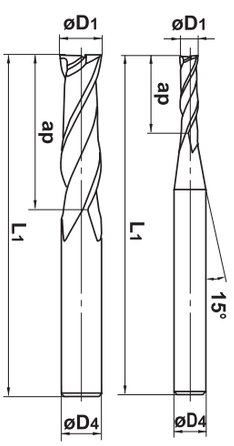


Max cutting depth	ap																	
	D < Ø 1	0,1D											D < Ø 1	0,02D	D < Ø 1	0,01D		
	D Ø 1,1 < Ø 3	0,2D											D Ø 1,1 < Ø 3	0,05D	D Ø 1,1 < Ø 3	0,02D		
	D Ø 3,1 >	0,5D													D Ø 3,1 >	0,05D		
	C≤0.2% - GG			SCM - SKD			30~38 HRc			30~38 HRc			45~55 HRc -SUS			55~60 HRc		
	E24 ■ XC48 ■ FT25			350NCD16 ■ 40CMD8			35NCD16			35NCD16			Z38CDV5			Z160CDV12		
	750 N/mm2			~30 HRc			30~38 HRc			30~38 HRc			45~55 HRc			55~60 HRc		
	150 (m/min)			130 (m/min)			110 (m/min)			80 (m/min)			60 (m/min)			30 (m/min)		
Ø	S (min-1)	F (mm/min)	AZ (mm)	S (min-1)	F (mm/min)	AZ (mm)	S (min-1)	F (mm/min)	AZ (mm)	S (min-1)	F (mm/min)	AZ (mm)	S (min-1)	F (mm/min)	AZ (mm)	S (min-1)	F (mm/min)	AZ (mm)
6.0	7962	555	0.0348	6900	450	0.0326	5839	257	0.0220	4246	170	0.0200	3185	113	0.0177	1592	38	0.0119
8.0	5971	534	0.0447	5175	450	0.0435	4379	249	0.0284	3185	168	0.0263	2389	104	0.0217	1194	38	0.0157
10.0	4777	505	0.0528	4140	443	0.0535	3503	250	0.0357	2548	161	0.0317	1911	100	0.0262	955	38	0.0197
12.0	3981	507	0.0636	3450	441	0.0639	2919	252	0.0431	2123	161	0.0380	1592	90	0.0283	796	30	0.0189

Long Flute Square End Mills

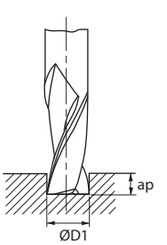
20 NF

Item code	D1	R	β	ap	D5	L3	L1	D4
20NF 02004	2.0			12			50	4
20NF 03004	3.0			20			50	4
20NF 04004	4.0			25			75	4
20NF 05006	5.0			30			75	6
20NF 06006	6.0			30			75	6
20NF 08008	8.0			40			100	8
20NF 10010	10.0			40			100	10
20NF 12012	12.0			45			100	12



Max cutting depth	ap		ap	
	D Ø 2 < Ø 3	0,10D	D Ø 2 < Ø 3	0,015D
	D Ø 3,1 >	0,15D	D Ø 3,1 >	0,02D

	30~38 HRc 35NCD16 30~38 HRc		45~55 HRc -SUS Z38CDV5 45~55 HRc		55~60 HRc Z160CDV12 55~60 HRc	
Ø	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)
2.0	3000	25	1700	20	1000	15
3.0	2300	35	1900	25	800	10
4.0	2000	45	1600	35	650	15
5.0	1800	40	1400	40	600	20
6.0	1700	60	1300	50	550	25
8.0	1300	60	1000	50	450	25
10.0	1000	60	800	50	350	25
12.0	800	60	700	50	300	25

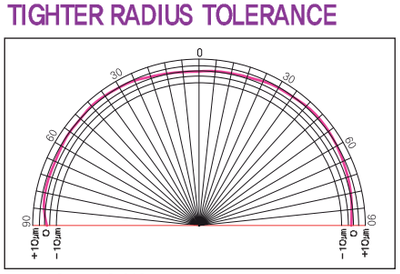


Micro Diameter Ball Nose End Mills

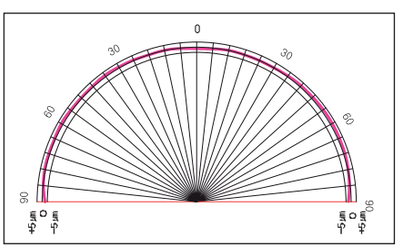
21 HA

Item code	D1	R	β	ap	D5	L3	L1	D4
21HA 00203	0.2	0.1		0.5			38	3
21HA 00253	0.25	0.125		0.5			38	3
21HA 00303	0.3	0.15		0.6			38	3
21HA 00404	0.4	0.2		0.8			50	4
21HA 00504	0.5	0.25		1.0			50	4
21HA 00604	0.6	0.3		1.2			50	4
21HA 00704	0.7	0.35		1.4			50	4
21HA 00804	0.8	0.4		1.6			50	4
21HA 00904	0.9	0.45		1.8			50	4
21HX 01004	1.0	0.5		2.0			50	4
21HA 01204	1.2	0.6		2.4			50	4
21HA 01404	1.4	0.7		2.8			50	4
21HX 01504	1.5	0.75		3.0			50	4
21HA 01604	1.6	0.8		3.2			50	4
21HA 01804	1.8	0.9		3.6			50	4
21HX 02004	2.0	1.0		4.0			50	4

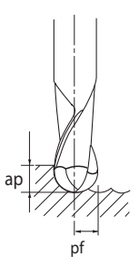
TIGHTER RADIUS TOLERANCE

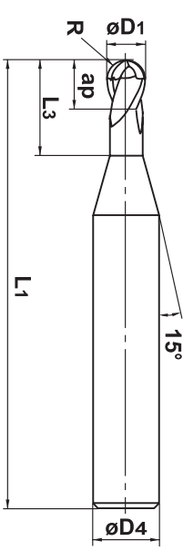


■BEFORE ±0.010mm



■IMPROVED ±0.005mm (Up to 6mm)





Max cutting depth	ap 0.02 D	pf 0.05 D										
	C≤0.2% - GG E24 ■ XC48 ■ FT25 750 N/mm2		SCM - SKD 350NCD16 ■ 40CMD8 ~30 HRc		30~38 HRc 35NCD16 30~38 HRc		30~38 HRc 35NCD16 30~38 HRc		45~55 HRc -SUS Z38CDV5 45~55 HRc		55~60 HRc Z160CDV12 55~60 HRc	
	150 (m/min)		130 (m/min)		110 (m/min)		80 (m/min)		60 (m/min)		30 (m/min)	
R	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)
0.10	50000	640	50000	560	50000	560	50000	490	32000	290	32000	290
0.15	50000	930	50000	840	50000	720	50000	720	32000	440	32000	440
0.20	50000	1200	50000	1100	50000	1100	50000	960	32000	585	32000	585
0.25	50000	1450	50000	1400	50000	1400	50000	1200	32000	735	32000	735
0.30	50000	1650	50000	1650	50000	1650	50000	1400	32000	880	32000	880
0.35	50000	1700	50000	1700	50000	1700	50000	1500	32000	900	32000	900
0.40	50000	2200	50000	2200	50000	2000	50000	1900	32000	1150	32000	1150
0.45	50000	2300	50000	2300	50000	2300	50000	2000	32000	1250	32000	1250
0.50	50000	2900	50000	2900	50000	2500	50000	2400	32000	1700	32000	1450

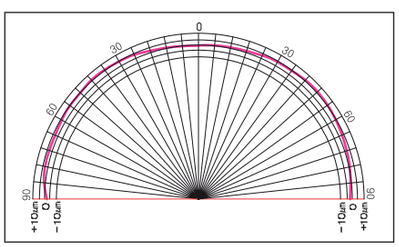
Micro Diameter Ball Nose End Mills

DIN 6535 Form HA | 35° | MG 12 0.4 µm | HRc 65 | AlTiN

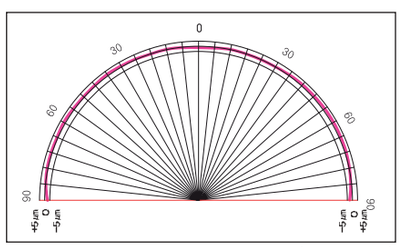
21 HC

Item code	D1	R	β	ap	D5	L3	L1	D4
21HC 00204	0.2	0.1		0.4			50	4
21HC 00304	0.3	0.15		0.6			50	4
21HC 00404	0.4	0.2		0.8			50	4
21HC 00504	0.5	0.25		1.0			50	4
21HC 00604	0.6	0.3		1.2			50	4
21HC 00704	0.7	0.35		1.4			50	4
21HC 00804	0.8	0.4		1.6			50	4
21HC 00904	0.9	0.45		1.8			50	4
21NA 01004	1.0	0.5		2.0			50	4
21HC 01204	1.2	0.6		2.4			50	4
21HC 01404	1.4	0.7		2.8			50	4
21NA 01504	1.5	0.75		3.0			50	4
21HC 01604	1.6	0.8		3.2			50	4
21HC 01804	1.8	0.9		3.6			50	4
21NA 02004	2.0	1.0		4.0			50	4

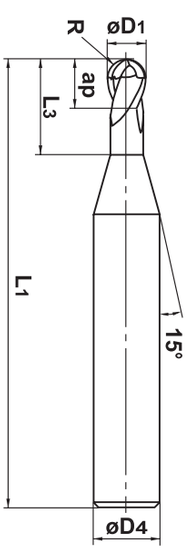
TIGHTER RADIUS TOLERANCE

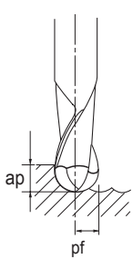


■BEFORE ±0.010mm



■IMPROVED ±0.005mm (Up to 6mm)



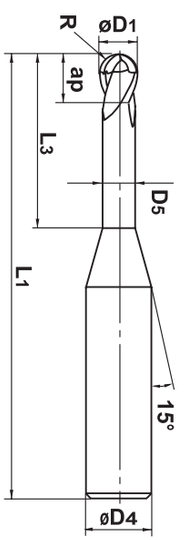


Max cutting depth	ap 0.02 D	pf 0.05 D										
	C≤0.2% - GG E24 ■ XC48 ■ FT25 750 N/mm2		SCM - SKD 350NCD16 ■ 40CMD8 ~30 HRc		30~38 HRc 35NCD16 30~38 HRc		30~38 HRc 35NCD16 30~38 HRc		45~55 HRc -SUS Z38CDV5 45~55 HRc		55~60 HRc Z160CDV12 55~60 HRc	
	150 (m/min)		130 (m/min)		110 (m/min)		80 (m/min)		60 (m/min)		30 (m/min)	
R	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)
0.10	50000	640	50000	560	50000	560	50000	490	32000	290	32000	290
0.15	50000	930	50000	840	50000	720	50000	720	32000	440	32000	440
0.20	50000	1200	50000	1100	50000	1100	50000	960	32000	585	32000	585
0.25	50000	1450	50000	1400	50000	1400	50000	1200	32000	735	32000	735
0.30	50000	1650	50000	1650	50000	1650	50000	1400	32000	880	32000	880
0.35	50000	1700	50000	1700	50000	1700	50000	1500	32000	900	32000	900
0.40	50000	2200	50000	2200	50000	2000	50000	1900	32000	1150	32000	1150
0.45	50000	2300	50000	2300	50000	2300	50000	2000	32000	1250	32000	1250
0.50	50000	2900	50000	2900	50000	2500	50000	2400	32000	1700	32000	1450

Long Neck Ball Nose End Mills

21 HG

Item code	D1	R	β	ap	D5	L3	L1	D4
21HG 01006	1.0	0.5		2	0.95	6	50	4
21HG 01008	1.0	0.5		2	0.95	8	50	4
21HG 01010	1.0	0.5		2	0.95	10	50	4
21HG 01012	1.0	0.5		2	0.95	12	50	4
21HG 01508	1.5	0.75		3	1.45	8	50	4
21HG 01510	1.5	0.75		3	1.45	10	50	4
21HG 01512	1.5	0.75		3	1.45	12	50	4
21HG 01516	1.5	0.75		3	1.45	16	50	4
21HG 01520	1.5	0.75		3	1.45	20	50	4
21HG 02008	2.0	1		4	1.92	8	50	4
21HG 02010	2.0	1		4	1.92	10	50	4
21HG 02012	2.0	1		4	1.92	12	50	4
21HG 02016	2.0	1		4	1.92	16	50	4
21HG 02020	2.0	1		4	1.92	20	50	4
21HG 03008	3.0	1.5		6	1.92	8	50	6
21HG 03010	3.0	1.5		6	2.90	10	50	6
21HG 03012	3.0	1.5		6	2.90	12	50	6
21HG 03016	3.0	1.5		6	2.90	16	50	6
21HG 03020	3.0	1.5		6	2.90	20	75	6
21HG 03025	3.0	1.5		6	2.90	25	75	6
21HG 04012	4.0	2		8	3.88	12	50	6
21HG 04016	4.0	2		8	3.88	16	50	6
21HG 04020	4.0	2		8	3.88	20	50	6
21HG 04025	4.0	2		8	3.88	25	75	6
21HG 04030	4.0	2		8	3.88	30	75	6



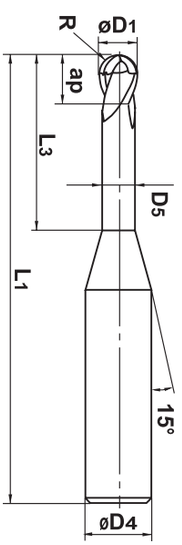
Cutting Conditions P.53

Long Neck Ball Nose End Mills

DIN 6535 Form HA | 30° | MG 12 0.4 µm | HRc 65 | AlTiN

21 HH

Item code	D1	R	β	ap	D5	L3	L1	D4
21HH 00504	0.5	0.25		1	0.46	4	50	4
21HH 00506	0.5	0.25		1	0.46	6	50	4
21HH 00604	0.6	0.3		1.2	0.56	4	50	4
21HH 00606	0.6	0.3		1.2	0.56	6	50	4
21HH 00806	0.8	0.4		1.2	0.76	6	50	4
21HH 00808	0.8	0.4		1.2	0.76	8	50	4
21HH 01006	1.0	0.5		1.5	0.95	6	50	4
21HH 01008	1.0	0.5		1.5	0.95	8	50	4
21HH 01010	1.0	0.5		1.5	0.95	10	50	4
21HH 01012	1.0	0.5		1.5	0.95	12	50	4
21HH 01208	1.2	0.6		2	1.15	8	50	4
21HH 01212	1.2	0.6		2	1.15	12	50	4
21HH 01508	1.5	0.75		2	1.45	8	50	4
21HH 01512	1.5	0.75		2	1.45	12	50	4
21HH 01516	1.5	0.75		2	1.45	16	50	4
21HH 01520	1.5	0.75		2	1.45	20	50	4
21HH 01608	1.6	0.8		2.5	1.54	8	50	4
21HH 01612	1.6	0.8		2.5	1.54	12	50	4
21HH 01616	1.6	0.8		2.5	1.54	16	50	4
21HH 02008	2.0	1		3	1.92	8	50	4
21HH 02012	2.0	1		3	1.92	12	50	4
21HH 02016	2.0	1		3	1.92	16	50	4
21HH 02020	2.0	1		3	1.92	20	50	4
21HH 03008	3.0	1.5		4	2.90	8	50	6
21HH 03010	3.0	1.5		4	2.90	10	50	6
21HH 03016	3.0	1.5		4	2.90	16	50	6
21HH 03020	3.0	1.5		4	2.90	20	75	6
21HH 03025	3.0	1.5		4	2.90	25	75	6
21HH 04010	4.0	2		5	3.88	10	75	6
21HH 04015	4.0	2		5	3.88	15	75	6
21HH 04020	4.0	2		5	3.88	20	75	6
21HH 04025	4.0	2		5	3.88	25	75	6
21HH 04030	4.0	2		5	3.88	30	75	6

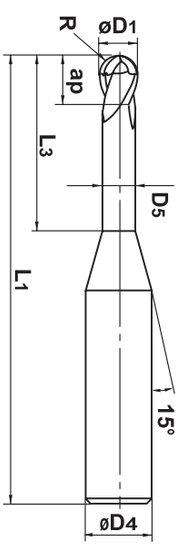


Cutting Conditions P.53

Long Neck Ball Nose End Mills

21 HK

Item code	D1	R	β	ap	D5	L3	L1	D4
21HK 00504	0.5	0.25		1.0	0.46	4	50	4
21HK 00506	0.5	0.25		1.0	0.46	6	50	4
21HK 00604	0.6	0.3		1.2	0.56	4	50	4
21HK 00606	0.6	0.3		1.2	0.56	6	50	4
21HK 00806	0.8	0.4		1.2	0.76	6	50	4
21HK 00808	0.8	0.4		1.2	0.76	8	50	4
21HK 01006	1.0	0.5		1.5	0.95	6	50	4
21HK 01008	1.0	0.5		1.5	0.95	8	50	4
21HK 01010	1.0	0.5		1.5	0.95	10	50	4
21HK 01012	1.0	0.5		1.5	0.95	12	50	4
21HK 01208	1.2	0.6		2.0	1.15	8	50	4
21HK 01212	1.2	0.6		2.0	1.15	12	50	4
21HK 01508	1.5	0.75		2.0	1.45	8	50	4
21HK 01512	1.5	0.75		2.0	1.45	12	50	4
21HK 01516	1.5	0.75		2.0	1.45	16	50	4
21HK 01520	1.5	0.75		2.0	1.45	20	50	4
21HK 01608	1.6	0.8		2.5	1.54	8	50	4
21HK 01612	1.6	0.8		2.5	1.54	12	50	4
21HK 01616	1.6	0.8		2.5	1.54	16	50	4
21HK 02008	2.0	1		3.0	1.92	8	50	4
21HK 02012	2.0	1		3.0	1.92	12	50	4
21HK 02016	2.0	1		3.0	1.92	16	50	4
21HK 02020	2.0	1		3.0	1.92	20	50	4
21HK 03008	3.0	1.5		4.0	2.90	8	50	6
21HK 03010	3.0	1.5		4.0	2.90	10	50	6
21HK 03016	3.0	1.5		4.0	2.90	16	50	6
21HK 03020	3.0	1.5		4.0	2.90	20	75	6
21HK 03025	3.0	1.5		4.0	2.90	25	75	6
21HK 03030	3.0	1.5		4.0	2.90	30	75	6
21HK 04010	4.0	2		5.0	3.88	10	75	6
21HK 04015	4.0	2		5.0	3.88	15	75	6
21HK 04020	4.0	2		5.0	3.88	20	75	6
21HK 04025	4.0	2		5.0	3.88	25	75	6
21HK 04030	4.0	2		5.0	3.88	30	75	6
21HK 05010	5.0	2.5		5.5	4.89	10	65	6
21HK 05015	5.0	2.5		5.5	4.89	15	65	6
21HK 05020	5.0	2.5		5.5	4.89	20	65	6
21HK 05025	5.0	2.5		5.5	4.89	25	70	6
21HK 05030	5.0	2.5		5.5	4.89	30	75	6
21HK 05040	5.0	2.5		5.5	4.89	40	90	6
21HK 06010	6.0	3		6.0	5.89	10	65	6
21HK 06015	6.0	3		6.0	5.89	15	65	6
21HK 06020	6.0	3		6.0	5.89	20	65	6
21HK 06025	6.0	3		6.0	5.89	25	70	6
21HK 06030	6.0	3		6.0	5.89	30	75	6
21HK 06040	6.0	3		6.0	5.89	40	90	6
21HK 06050	6.0	3		6.0	5.89	50	90	6



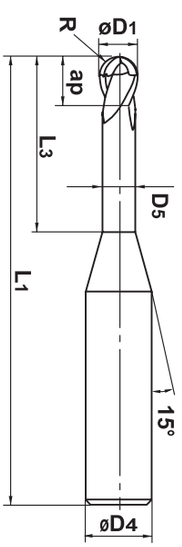
New

Cutting Conditions P.53

Long Neck Ball Nose End Mills

DIN 6535 Form HA | 30° | MG 9 0.2 µm | HRc 68 | AlTiN

21 HL



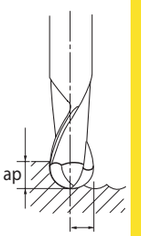
Item code	D1	R	β	ap	D5	L3	L1	D4
21HL 00301	0.3	0.15		0.25	0.28	1	55	6
21HL 00302	0.3	0.15		0.25	0.28	2	55	6
21HL 00303	0.3	0.15		0.25	0.28	3	55	6
21HL 00305	0.3	0.15		0.25	0.28	5	55	6
21HL 00402	0.4	0.2		0.30	0.38	2	55	6
21HL 00404	0.4	0.2		0.30	0.38	4	55	6
21HL 00406	0.4	0.2		0.30	0.38	6	55	6
21HL 00502	0.5	0.25		0.40	0.48	2	55	6
21HL 00504	0.5	0.25		0.40	0.48	4	55	6
21HL 00506	0.5	0.25		0.40	0.48	6	55	6
21HL 00602	0.6	0.3		0.50	0.58	2	55	6
21HL 00604	0.6	0.3		0.50	0.58	4	55	6
21HL 00606	0.6	0.3		0.50	0.58	6	55	6
21HL 00608	0.6	0.3		0.50	0.58	8	55	6
21HL 00804	0.8	0.4		0.60	0.77	4	55	6
21HL 00806	0.8	0.4		0.60	0.77	6	55	6
21HL 00808	0.8	0.4		0.60	0.77	8	55	6
21HL 00810	0.8	0.4		0.60	0.77	10	55	6
21HL 01004	1.0	0.5		0.80	0.95	4	55	6
21HL 01006	1.0	0.5		0.80	0.95	6	55	6
21HL 01008	1.0	0.5		0.80	0.95	8	55	6
21HL 01010	1.0	0.5		0.80	0.95	10	65	6
21HL 01012	1.0	0.5		0.80	0.95	12	65	6
21HL 01015	1.0	0.5		0.80	0.95	15	65	6
21HL 01020	1.0	0.5		0.80	0.95	20	65	6
21HL 01025	1.0	0.5		0.80	0.95	25	70	6
21HL 01030	1.0	0.5		0.80	0.95	30	75	6
21HL 01205	1.2	0.6		1.0	1.15	5	55	6
21HL 01206	1.2	0.6		1.0	1.15	6	55	6
21HL 01208	1.2	0.6		1.0	1.15	8	55	6
21HL 01210	1.2	0.6		1.0	1.15	10	65	6
21HL 01212	1.2	0.6		1.0	1.15	12	65	6
21HL 01215	1.2	0.6		1.0	1.15	15	65	6
21HL 01220	1.2	0.6		1.0	1.15	20	65	6
21HL 01225	1.2	0.6		1.0	1.15	25	70	6
21HL 01506	1.5	0.75		1.2	1.44	6	55	6
21HL 01508	1.5	0.75		1.2	1.44	8	55	6
21HL 01510	1.5	0.75		1.2	1.44	10	65	6
21HL 01512	1.5	0.75		1.2	1.44	12	65	6
21HL 01515	1.5	0.75		1.2	1.44	15	65	6
21HL 01520	1.5	0.75		1.2	1.44	20	65	6
21HL 01525	1.5	0.75		1.2	1.44	25	65	6
21HL 01530	1.5	0.75		1.2	1.44	30	70	6
21HL 02006	2.0	1		1.5	1.92	6	55	6
21HL 02008	2.0	1		1.5	1.92	8	55	6
21HL 02010	2.0	1		1.5	1.92	10	65	6
21HL 02012	2.0	1		1.5	1.92	12	65	6
21HL 02015	2.0	1		1.5	1.92	15	65	6
21HL 02020	2.0	1		1.5	1.92	20	65	6
21HL 02025	2.0	1		1.5	1.92	25	70	6
21HL 02030	2.0	1		1.5	1.92	30	75	6

New

Cutting Conditions P.53

21 HG 21 HH 21 HK 21 HL

		C≤0.2% - GG			SCM - SKD			30~38 HRc			30~38 HRc			45~55 HRc -SUS			55~60 HRc		
		E24 ■ XC48 ■ FT25 750 N/mm2			350NCD16 ■ 40CMD8 ~30 HRc			35NCD16 30~38 HRc			35NCD16 30~38 HRc			Z38CDV5 45~55 HRc			Z160CDV12 55~60 HRc		
Ratio to standard depth of cut		120%			100%			90%			80%			65%			60%		
D1	L3	S (min-1)	F (mm/min)	ap (mm)	S (min-1)	F (mm/min)	ap (mm)	S (min-1)	F (mm/min)	ap (mm)	S (min-1)	F (mm/min)	ap (mm)	S (min-1)	F (mm/min)	ap (mm)	S (min-1)	F (mm/min)	ap (mm)
0.3	1	48000	1440	0.050	40000	1200	0.050	36000	1080	0.050	34000	884	0.050	30000	720	0.050	28000	560	0.050
0.3	2	48000	1440	0.042	40000	1200	0.042	36000	1080	0.042	34000	884	0.042	30000	720	0.042	28000	560	0.042
0.3	3	48000	1440	0.034	40000	1200	0.034	36000	1080	0.034	34000	884	0.034	30000	720	0.034	28000	560	0.034
0.3	5	43200	1166	0.020	36000	972	0.020	32400	875	0.020	30600	716	0.020	27000	583	0.020	25200	454	0.020
0.4	2	48000	1728	0.080	40000	1440	0.080	36000	1296	0.080	34000	1088	0.080	30000	900	0.080	28000	784	0.080
0.4	4	48000	1728	0.056	40000	1440	0.056	36000	1296	0.056	34000	1088	0.056	30000	900	0.056	28000	784	0.056
0.4	6	43200	1400	0.032	36000	1166	0.032	32400	1050	0.032	30600	881	0.032	27000	729	0.032	25200	635	0.032
0.5	2	43200	1400	0.100	36000	1166	0.100	32400	1050	0.100	30600	881	0.100	27000	729	0.100	25200	635	0.100
0.5	4	43200	1400	0.070	36000	1166	0.070	32400	1050	0.070	30600	881	0.070	27000	729	0.070	25200	635	0.070
0.6	4	34560	1797	0.060	28800	1498	0.060	25920	1348	0.060	24480	1224	0.060	21600	950	0.060	20160	806	0.060
0.6	6	34560	1797	0.050	28800	1498	0.050	25920	1348	0.050	24480	1224	0.050	21600	950	0.050	20160	806	0.050
0.6	8	34560	1797	0.040	28800	1498	0.040	25920	1348	0.040	24480	1224	0.040	21600	950	0.040	20160	806	0.040
0.8	4	31200	2184	0.130	26000	1820	0.130	23400	1638	0.130	22100	1370	0.130	19500	1170	0.130	18200	1019	0.130
0.8	6	31200	2184	0.120	26000	1820	0.120	23400	1638	0.120	22100	1370	0.120	19500	1170	0.120	18200	1019	0.120
0.8	8	31200	2184	0.110	26000	1820	0.110	23400	1638	0.110	22100	1370	0.110	19500	1170	0.110	18200	1019	0.110
1.0	4	25200	2520	0.200	21000	2100	0.200	18900	1890	0.200	17850	1607	0.200	15750	1355	0.200	14700	1176	0.200
1.0	6	25200	2268	0.200	21000	1890	0.200	18900	1701	0.200	17850	1428	0.200	15750	1197	0.200	14700	1058	0.200
1.0	8	25200	2268	0.140	21000	1890	0.140	18900	1701	0.140	17850	1428	0.140	15750	1197	0.140	14700	1058	0.140
1.0	10	25200	2016	0.140	21000	1680	0.140	18900	1512	0.140	17850	1285	0.140	15750	1071	0.140	14700	941	0.140
1.0	12	22680	1814	0.080	18900	1512	0.080	17010	16361	0.080	16065	1157	0.080	14175	964	0.080	13230	847	0.080
1.0	15	22680	1633	0.080	18900	1361	0.080	17010	1225	0.080	16065	1041	0.080	14175	868	0.080	13230	762	0.080
1.0	20	22680	1633	0.050	18900	1361	0.050	17010	1225	0.050	16065	1041	0.050	14175	868	0.050	13230	762	0.050
1.0	25	20160	1371	0.050	16800	1142	0.050	15120	1028	0.050	14280	874	0.050	12600	728	0.050	11760	640	0.050
1.2	5	25200	2520	0.200	21000	2100	0.200	18900	1890	0.200	17850	1607	0.200	15750	1355	0.200	14700	1176	0.200
1.2	6	25200	2268	0.200	21000	1890	0.200	18900	1701	0.200	17850	1428	0.200	15750	1197	0.200	14700	1058	0.200
1.2	8	25200	2268	0.140	21000	1890	0.140	18900	1701	0.140	17850	1428	0.140	15750	1197	0.140	14700	1058	0.140
1.2	10	25200	2016	0.140	21000	1680	0.140	18900	1512	0.140	17850	1285	0.140	15750	1071	0.140	14700	941	0.140
1.2	12	22680	1814	0.080	18900	1512	0.080	17010	16361	0.080	16065	1157	0.080	14175	964	0.080	13230	847	0.080
1.2	15	22680	1633	0.080	18900	1361	0.080	17010	1225	0.080	16065	1041	0.080	14175	868	0.080	13230	762	0.080
1.2	20	22680	1633	0.050	18900	1361	0.050	17010	1225	0.050	16065	1041	0.050	14175	868	0.050	13230	762	0.050
1.2	25	20160	1371	0.050	16800	1142	0.050	15120	1028	0.050	14280	874	0.050	12600	728	0.050	11760	640	0.050
1.5	6	19200	2880	0.320	16000	2400	0.320	14400	2160	0.320	13600	1822	0.320	12000	1512	0.320	11200	1344	0.320
1.5	8	19200	2880	0.300	16000	2400	0.300	14400	2160	0.300	13600	1822	0.300	12000	1512	0.300	11200	1344	0.300
1.5	10	19200	2880	0.210	16000	2400	0.210	14400	2160	0.210	13600	1822	0.210	12000	1512	0.210	11200	1344	0.210
1.5	12	19200	2880	0.210	16000	2400	0.210	14400	2160	0.210	13600	1822	0.210	12000	1512	0.210	11200	1344	0.210
1.5	15	19200	2592	0.210	16000	2160	0.210	14400	1944	0.210	13600	1640	0.210	12000	1361	0.210	11200	1210	0.210
1.5	20	17280	2333	0.120	14400	1944	0.120	12960	1750	0.120	12240	1476	0.120	10800	1225	0.120	10080	1089	0.120
1.5	25	17280	2333	0.080	14400	1944	0.080	12960	1750	0.080	12240	1476	0.080	10800	1225	0.080	10080	1089	0.080
1.5	30	17280	2333	0.080	14400	1944	0.080	12960	1750	0.080	12240	1476	0.080	10800	1225	0.080	10080	1089	0.080
2.0	6	13800	2760	0.450	11500	2300	0.450	10350	2070	0.450	9775	1760	0.450	8625	1466	0.450	8050	1288	0.450
2.0	8	13800	2760	0.420	11500	2300	0.420	10350	2070	0.420	9775	1760	0.420	8625	1466	0.420	8050	1288	0.420
2.0	10	13800	2760	0.400	11500	2300	0.400	10350	2070	0.400	9775	1760	0.400	8625	1466	0.400	8050	1288	0.400
2.0	12	13800	2760	0.320	11500	2300	0.320	10350	2070	0.320	9775	1760	0.320	8625	1466	0.320	8050	1288	0.320
2.0	15	13800	2760	0.280	11500	2300	0.280	10350	2070	0.280	9775	1760	0.280	8625	1466	0.280	8050	1288	0.280
2.0	20	13800	2760	0.280	11500	2300	0.280	10350	2070	0.280	9775	1760	0.280	8625	1466	0.280	8050	1288	0.280
2.0	25	12420	2236	0.050	10350	1863	0.050	9315	1677	0.050	8798	1425	0.050	7763	1188	0.050	7245	1043	0.050
2.0	30	12420	2236	0.030	10350	1863	0.030	9315	1677	0.030	8798	1425	0.030	7763	1188	0.030	7245	1043	0.030
3.0	8	19200	2880	0.300	16000	2400	0.300	14400	2160	0.300	13600	1822	0.300	12000	1512	0.300	11200	1344	0.300
3.0	12	19200	2880	0.210	16000	2400	0.210	14400	2160	0.210	13600	1822	0.210	12000	1512	0.210	11200	1344	0.210
3.0	15	19200	2592	0.210	16000	2160	0.210	14400	1944	0.210	13600	1640	0.210	12000	1361	0.210	11200	1210	0.210
3.0	20	17280	2333	0.120	14400	1944	0.120	12960	1750	0.120	12240	1476	0.120	10800	1225	0.120	10080	1089	0.120
3.0	25	17280	2333	0.080	14400	1944	0.080	12960	1750	0.080	12240	1476	0.080	10800	1225	0.080	10080	1089	0.080
3.0	30	17280	2333	0.080	14400	1944	0.080	12960	1750	0.080	12240	1476	0.080	10800	1225	0.080	10080	1089	0.080
4.0	10	13800	2760	0.400	11500	2300	0.400	10350	2070	0.400	9775	1760	0.400	8625	1466	0.400	8050	1288	0.400
4.0	15	13800	2760	0.280	11500	2300	0.280	10350	2070	0.280	9775	1760	0.280	8625	1466	0.280	8050	1288	0.280
4.0	20	13800	2760	0.280	11500	2300	0.280	10350	2070	0.280	9775	1760	0.280	8625	1466	0.280	8050	1288	0.280
4.0	25	12420	2236	0.160	10350	1836	0.160	9315	1677	0.160	8798	1425	0.160	7763	1188	0.160	7245	1043	0.160
4.0	30	12420	2236	0.160	10350	1836	0.160	9315	1677	0.160	8798	1425	0.160	7763	1188	0.160	7245	1043	0.160
5.0	10	10800	2592	0.350	9000	2160	0.350	8100	1944	0.350	7650	1530	0.350	6750	1350	0.350	6300	1134	0.350
5.0	15	10800	2592	0.350	9000	2160	0.350	8100	1944	0.350	7650	1530	0.350	6750	1350	0.350	6300	1134	0.350
5.0	20	10800	2592	0.350	9000	2160	0.350	8100	1944	0.350	7650	1530	0.350	6750	1350	0.350	6300	1134	0.350
5.0	25	10800	2592	0.350	9000	2160	0.350	8100	1944	0.350	7650	1530	0.350	6750	1350	0.350	6300	1134	0.350
5.0	30	9720	2330	0.200	8100	1944	0.200	7290	1750	0.200	6885	1377	0.200	6075	1215	0.200	5670	1021	0.200
5.0	40	9720	2100	0.200	8100	1750	0.200	7290	1575	0.200	6885	1239	0.200	6075	1094	0.200	5670	919	0.200
6.0	10	9600	2304	0.420	8000	1920	0.420	7200	1728	0.420	6800	1360	0.420	6000	1200	0.420	5600	1008	0.420
6.0	15	9600	2304	0.420	8000	1920	0.420	7200	1728	0.420	6800	1360	0.420	6000	1200	0.420	5600	1008	0.420
6.0	20	9600	2304	0.420	8000	1920	0.420	7200	1728	0.420	6800	1360	0.420	6000	1200	0.420	5600	1008	0.420
6.0	25	9600	2304	0.420	8000	1920	0.420	7200	1728	0.420	6800	1360	0.420	6000	1200	0.420	5600	1008	0.420
6.0	30	9600	2304	0.420	8000	1920	0.420	7200	1728	0.420	6800	1360	0.420	6000	1200	0.420	5600	1008	0.420
6.0	40	8640	1866	0.150	7200	1555	0.150	6480	1400	0.150	6120	1102	0.150	5400	972	0.150	5040	816	0.150
6.0	50	8640	1866	0.150	7200	1555	0.150	6480	1400	0.150	6120	1102	0.150	5400	972	0.150	5040	816	0.150



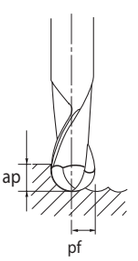
pf = < 0.1 R 1
pf = > 0.2 R 1

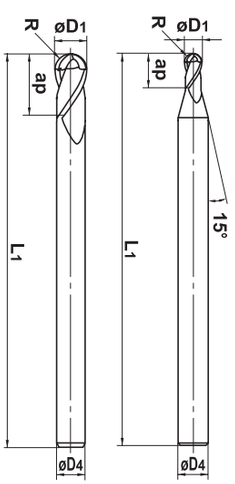
Small Shank Ball Nose End Mills

DIN 6535 Form HA | 30° | MG 10 0.6 µm | HRc 55 | TiALN

21 HQ

Item code	D1	R	β	ap	D5	L3	L1	D4
21HQ 01003	1. 0	0.5		2			50	3
21HQ 01503	1. 5	0.75		3			50	3
21HQ 02003	2. 0	1		4			50	3
21HQ 02503	2. 5	1.25		5			50	3
21HQ 03003	3. 0	1.5		6			50	3
21HQ 03053	3. 0	1.5		6			75	3
21HQ 03103	3. 0	1.5		6			100	3
21HQ 04004	4. 0	2		8			75	4
21HQ 04054	4. 0	2		8			100	4





Max cutting depth	ap	pf
R < 0.5	0.05D	0.2 D
R > 0.5	0.10D	0.2 D

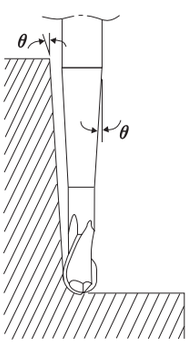
Max cutting depth	ap	pf
R < 0.5	0.05D	0.1 D
R > 0.5	0.08D	0.1 D

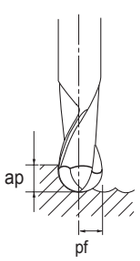
	C≤0.2% - GG E24 ■ XC48 ■ FT25 750 N/mm2		SCM - SKD 350NCD16 ■ 40CMD8 ~30 HRc		30~38 HRc 35NCD16 30~38 HRc		30~38 HRc 35NCD16 30~38 HRc		45~55 HRc -SUS Z38CDV5 45~55 HRc		55~60 HRc Z160CDV12 55~60 HRc	
D1	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)
1.0	19000	765	15500	620	12500	400	11000	290	9500	210	7150	140
1.5	12500	765	10500	630	8450	405	7400	290	6350	210	4750	140
2.0	9500	765	7950	630	6350	445	5550	370	4750	270	3550	175
2.5	7600	855	6350	635	5050	445	4450	370	3800	285	2850	175
3.0	6350	855	5300	670	4200	465	3700	390	3150	295	2350	185
4.0	4750	1050	3950	790	3150	555	2750	455	2350	325	1750	210

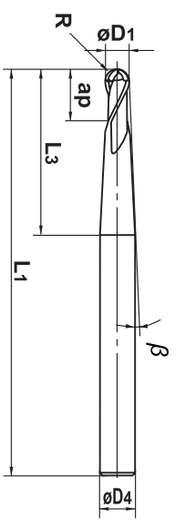
Taper Neck Ball Nose End Mills

21 HS

Item code	D1	R	β	ap	D5	L3	L1	D4
21HS 02016	2.0	1	3°	4		38	75	6
21HS 02026	2.0	1	5°	4		22.8	75	6
21HS 03016	3.0	1.5	1.5°	6		57	100	6
21HS 03026	3.0	1.5	3°	6		28.6	75	6
21HS 03036	3.0	1.5	5°	6		17	75	6
21HS 04016	4.0	2	1.5°	8		38	100	6
21HS 04026	4.0	2	3°	8		19	100	6
21HS 04036	4.0	2	5°	8		11.4	75	6
21HS 06018	6.0	3	1.5°	12		38	100	8
21HS 06028	6.0	3	3°	12		19	75	8
21HS 06038	6.0	3	5°	12		11.4	75	6







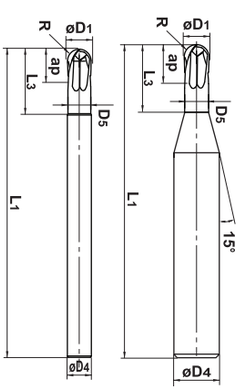
Max cutting depth	ap 0.02D, pf 0.05 D								ap R < 8: 0.02D, R > 8: 0.5D; pf 0.05 D			
	C≤0.2% - GG E24 ■ XC48 ■ FT25 750 N/mm2 350-500 (m/min)		SCM - SKD 350NCD16 ■ 40CMD8 ~30 HRc 300-450 (m/min)		30~38 HRc 35NCD16 30~38 HRc 250-400 (m/min)		30~38 HRc 35NCD16 30~38 HRc 150-300 (m/min)		45~55 HRc -SUS Z38CDV5 45~55 HRc 120-220 (m/min)		55~60 HRc Z160CDV12 55~60 HRc 80-150 (m/min)	
D1	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)
1.0	31500	3500	25000	2800	24500	2500	23500	2250	17000	1550	12500	1000
1.5	21000	3500	16500	2800	16000	2500	15500	2250	11000	1550	8450	1000
2.0	18000	3700	15500	3400	15000	2750	13500	2450	11000	1900	7950	1100
3.0	15000	4800	13500	4300	11500	2750	9500	2250	9500	2250	6600	1150

Power Ball Nose End Mills

DIN 6535 Form HA | 30° | MG 9 0.2 µm | HRc 68 | AlTiN

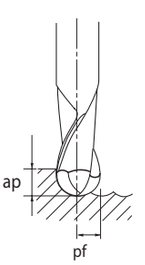
21 HV

Item code	D1	R	β	ap	D5	L3	L1	D4
21HV 01004	1.0	0.5		1	0.95	3	50	4
21HV 01504	1.5	0.75		2	1.45	5	50	4
21HV 02006	2.0	1		3	1.92	6	50	6
21HV 03016	3.0	1.5		4	2.90	8	50	6
21HV 03026	3.0	1.5		4	2.90	8	75	6
21HV 04016	4.0	2		5	3.88	10	50	6
21HV 04026	4.0	2		5	3.88	10	75	6
21HV 06016	6.0	3		6	5.80	12	50	6
21HV 06026	6.0	3		6	5.80	16	75	6
21HV 08008	8.0	4		8	7.70	16	60	8
21HV 08018	8.0	4		8	7.70	25	100	8
21HV 10110	10.0	5		10	9.60	20	75	10
21HV 10210	10.0	5		10	9.60	30	100	10
21HV 12120	12.0	6		12	11.50	25	75	12
21HV 12220	12.0	6		12	11.50	30	100	12



Max cutting depth	ap	pf
	D < Ø 0,2	0,6D

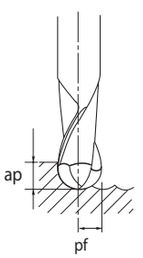
	C≤0.2% - GG			SCM - SKD			45~55 HRc -SUS			55~60 HRc		
	E24 ■ XC48 ■ FT25			350NCD16 ■ 40CMD8			Z38CDV5			Z160CDV12		
	750 N/mm2			~30 HRc			45~55 HRc			55~60 HRc		
	360 (m/min)			293 (m/min)			225 (m/min)			113 (m/min)		
Ø	S (min-1)	F (mm/min)	AZ (mm)	S (min-1)	F (mm/min)	AZ (mm)	S (min-1)	F (mm/min)	AZ (mm)	S (min-1)	F (mm/min)	AZ (mm)
2.0	57325	5811	0,051	46576	3790	0,041	35828	2199	0,031	17914	1099	0,031
3.0	32100	6100	0,082	42200	3820	0,078	20010	2310	0,060	13200	1199	0,052
4.0	28662	9109	0,159	23288	6470	0,139	17914	4260	0,119	8957	2130	0,119
6.0	19108	9172	0,240	15525	6831	0,220	11943	4777	0,200	5971	2389	0,200
8.0	14331	8528	0,298	11644	6463	0,278	8957	4614	0,258	4479	2307	0,258
10.0	11465	7846	0,342	9315	6002	0,322	7166	4330	0,302	3583	2165	0,302
12.0	7235	9554	0,379	7763	5568	0,359	5971	4044	0,339	2986	2022	0,339

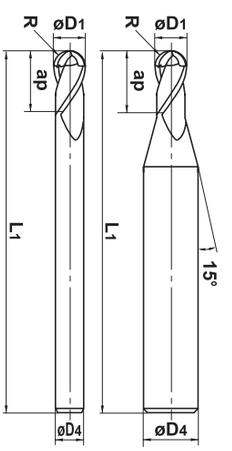


Ball Nose End Mills

21 HX

Item code	D1	R	β	ap	D5	L3	L1	D4
21HX 01004	1.0	0.5		2			50	4
21HX 01504	1.5	0.75		3			50	4
21HX 02004	2.0	1		4			50	4
21HX 02504	2.5	1.25		5			50	4
21HX 03004	3.0	1.5		6			50	4
21HX 03504	3.5	1.75		7			50	4
21HX 04004	4.0	2		8			50	4
21HX 04506	4.5	2.25		9			50	6
21HX 05006	5.0	2.5		10			50	6
21HX 05506	5.5	2.75		11			50	6
21HX 06006	6.0	3		12			50	6
21HX 07008	7.0	3.5		14			60	8
21HX 08008	8.0	4		16			60	8
21HX 09010	9.0	4.5		18			75	10
21HX 10010	10.0	5		20			75	10
21HX 12012	12.0	6		24			75	12
21HX 16016	16.0	8		32			100	16
21HX 20020	20.0	10		40			100	20





Max cutting depth	ap	pf
R < 0.5	0.05D	0.2 D
R > 0.5	0.10D	0.2 D

Max cutting depth	ap	pf
R < 0.5	0.05D	0.1 D
R > 0.5	0.08D	0.1 D

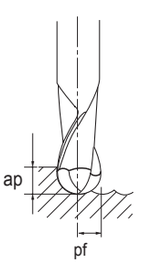
	C≤0.2% - GG E24 ■ XC48 ■ FT25 750 N/mm2		SCM - SKD 350NCD16 ■ 40CMD8 ~30 HRc		30~38 HRc 35NCD16 30~38 HRc		30~38 HRc 35NCD16 30~38 HRc		45~55 HRc -SUS Z38CDV5 45~55 HRc		55~60 HRc Z160CDV12 55~60 HRc	
R	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)
0.5	32000	765	31500	620	25000	400	22000	285	19000	210	14000	140
1.0	19000	765	15500	620	12500	400	11000	290	9500	210	7150	140
1.5	12500	765	10500	630	8450	405	7400	290	6350	210	4750	140
2.0	9500	765	7950	630	6350	445	5550	370	4750	270	3550	175
2.5	7600	855	6350	635	5050	445	4450	370	3800	285	2850	175
3.0	6350	855	5300	670	4200	465	3700	390	3150	295	2350	185
4.0	4750	1050	3950	790	3150		2750	455	2350	325	1750	210
5.0	3800	960	3150	745	2500	525	2200	430	1900	335	1400	210
6.0	3150	890	2650	700	2100	490	1850	430	1550	310	1150	195
7.0	2700	865	2250	675	1800	475	1550	390	1350	300	1000	190
8.0	2350	840	1950	645	1550	475	1350	380	1150	270	895	185
9.0	2100	795	1750	610	1400	475	1200	380	1050	260	795	175
10.0	1900	765	1550	570	12500	450	1100	370	955	250	715	170

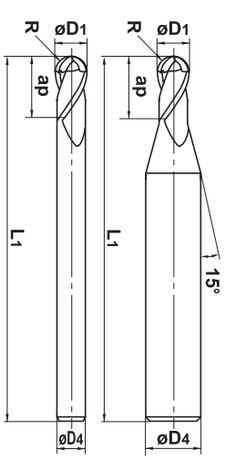
Ball Nose End Mills

DIN 6535 Form HA | 30° | MG 12 0.4 µm | HRc 65 | AlTiN

21 NA

Item code	D1	R	β	ap	D5	L3	L1	D4
21NA 01004	1.0	0.5		2			50	4
21NA 01006	1.0	0.5		2			50	6
21NA 01504	1.5	0.75		3			50	4
21NA 01506	1.5	0.75		3			50	6
21NA 02004	2.0	1		4			50	4
21NA 02006	2.0	1		4			50	6
21NA 02504	2.5	1.25		5			50	4
21NA 02506	2.5	1.25		5			50	6
21NA 03003	3.0	1.5		6			50	3
21NA 03004	3.0	1.5		6			50	4
21NA 03006	3.0	1.5		6			50	6
21NA 04004	4.0	2		8			50	4
21NA 04006	4.0	2		8			50	6
21NA 05006	5.0	2.5		10			50	6
21NA 06006	6.0	3		12			50	6
21NA 08008	8.0	4		16			60	8
21NA 10010	10.0	5		20			75	10
21NA 12012	12.0	6		24			75	12
21NA 16016	16.0	8		32			100	16
21NA 20020	20.0	10		40			100	20





Max cutting depth	ap	pf
	0.02D	0.05 D

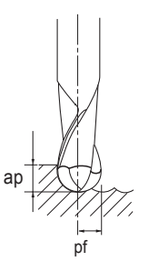
	ap	pf
R < 8	0.02D	0.05 D
R > 8	0.5D	0.05 D

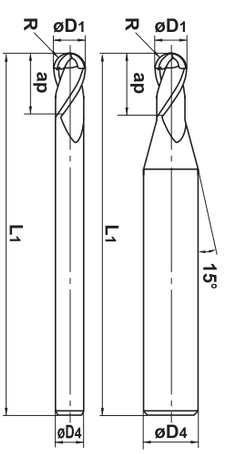
	C≤0.2% - GG		SCM - SKD		30~38 HRc		30~38 HRc		45~55 HRc -SUS		55~60 HRc	
	E24 ■ XC48 ■ FT25 750 N/mm2		350NCD16 ■ 40CMD8 ~30 HRc		35NCD16 30~38 HRc		35NCD16 30~38 HRc		Z38CDV5 45~55 HRc		Z160CDV12 55~60 HRc	
	350-500 (m/min)		300-450 (m/min)		250-400 (m/min)		150-300 (m/min)		120-220 (m/min)		80-150 (m/min)	
R	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)
0.5	50000	2800	50000	2800	50000	2500	47500	2250	32000	1450	25000	1000
1.0	31500	3500	25000	2800	24500	2500	23500	2250	17000	1550	12500	1000
1.5	21000	3500	16500	2800	16000	2500	15500	2250	11000	1550	8450	1000
2.0	18000	3700	15500	3400	15000	2750	13500	2450	11000	1900	7950	1100
2.5	15500	4000	15000	4050	14000	2900	11000	2300	10000	2100	7600	1200
3.0	15000	4800	13500	4300	11500	2750	9500	2250	9500	2250	6600	1150
4.0	11500	3650	10000	3200	8950	2100	7150	1700	7150	1700	4950	890
5.0	9500	3000	8250	2600	7150	1700	5700	1350	5700	1350	3950	710
6.0	7950	2500	6850	2150	5950	1400	4750	1100	4750	1100	3300	590
7.0	6800	2150	5900	1850	5100	1200	4050	970	4050	970	2800	500
8.0	5950	1900	5150	1600	4450	1050	3550	850	3550	850	2450	440
9.0	5300	1650	4550	1450	3950	945	3150	755	3150	755	2200	395
10.0	4750	1500	4100	1300	3550	850	2850	680	2850	680	1950	350

Ball Nose End Mills

21 NC

Item code	D1	R	β	ap	D5	L3	L1	D4
21NC 01004	1.0	0.5		2			50	4
21NC 01504	1.5	0.75		3			50	4
21NC 02004	2.0	1		4			50	4
21NC 03006	3.0	1.5		6			50	6
21NC 04006	4.0	2		8			50	6
21NC 05006	5.0	2.5		10			50	6
21NC 06006	6.0	3		12			50	6
21NC 08008	8.0	4		16			60	8
21NC 10010	10.0	5		20			75	10
21NC 12012	12.0	6		24			75	12





Max cutting depth	ap	pf
	0.02D	0.05 D

	ap	pf
R < 8	0.02D	0.05 D
R > 8	0.5D	0.05 D

	C≤0.2% - GG		SCM - SKD		30~38 HRc		30~38 HRc		45~55 HRc -SUS		55~60 HRc	
	E24 ■ XC48 ■ FT25 750 N/mm2		350NCD16 ■ 40CMD8 ~30 HRc		35NCD16 30~38 HRc		35NCD16 30~38 HRc		Z38CDV5 45~55 HRc		Z160CDV12 55~60 HRc	
	350-500 (m/min)		300-450 (m/min)		250-400 (m/min)		150-300 (m/min)		120-220 (m/min)		80-150 (m/min)	
R	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)
0.5	50000	2800	50000	2800	50000	2500	47500	2250	32000	1450	25000	1000
1.0	31500	3500	25000	2800	24500	2500	23500	2250	17000	1550	12500	1000
1.5	21000	3500	16500	2800	16000	2500	15500	2250	11000	1550	8450	1000
2.0	18000	3700	15500	3400	15000	2750	13500	2450	11000	1900	7950	1100
2.5	15500	4000	15000	4050	14000	2900	11000	2300	10000	2100	7600	1200
3.0	15000	4800	13500	4300	11500	2750	9500	2250	9500	2250	6600	1150
4.0	11500	3650	10000	3200	8950	2100	7150	1700	7150	1700	4950	890
5.0	9500	3000	8250	2600	7150	1700	5700	1350	5700	1350	3950	710
6.0	7950	2500	6850	2150	5950	1400	4750	1100	4750	1100	3300	590
7.0	6800	2150	5900	1850	5100	1200	4050	970	4050	970	2800	500
8.0	5950	1900	5150	1600	4450	1050	3550	850	3550	850	2450	440
9.0	5300	1650	4550	1450	3950	945	3150	755	3150	755	2200	395
10.0	4750	1500	4100	1300	3550	850	2850	680	2850	680	1950	350

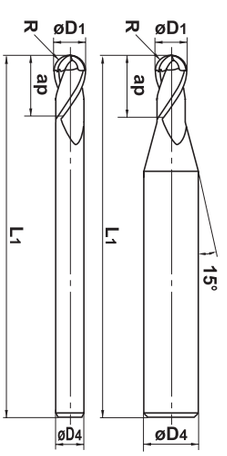
Ball Nose End Mills

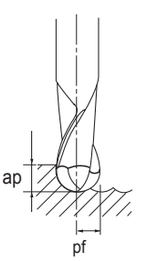
DIN 6535 Form HA | 30° | MG 12 0.4 µm | HRc 65 | TiAl

21 NF

Item code	D1	R	β	ap	D5	L3	L1	D4
21NF 01004	1.0	0.5		2			50	4
21NF 01006	1.0	0.5		2			50	6
21NF 01504	1.5	0.75		3			50	4
21NF 01506	1.5	0.75		3			50	6
21NF 02004	2.0	1		4			50	4
21NF 02006	2.0	1		4			50	6
21NF 02504	2.5	1.25		5			50	4
21NF 02506	2.5	1.25		5			50	6
21NF 03003	3.0	1.5		6			50	3
21NF 03004	3.0	1.5		6			50	4
21NF 03006	3.0	1.5		6			50	6
21NF 04004	4.0	2		8			50	4
21NF 04006	4.0	2		8			50	6
21NF 05006	5.0	2.5		10			50	6
21NF 06006	6.0	3		12			50	6
21NF 08008	8.0	4		16			60	8
21NF 10010	10.0	5		20			75	10
21NF 12012	12.0	6		24			75	12
21NF 16016	16.0	8		32			100	16

New



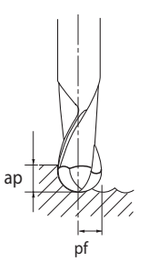


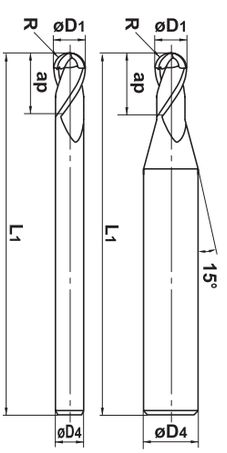
Max cutting depth	ap 0.02D, pf 0.05 D								ap R < 8: 0.02D, pf 0.05 D; ap R > 8: 0.5D, pf 0.05 D			
	C≤0.2% - GG E24 ■ XC48 ■ FT25 750 N/mm2		SCM - SKD 350NCD16 ■ 40CMD8 ~30 HRc		30~38 HRc 35NCD16 30~38 HRc		30~38 HRc 35NCD16 30~38 HRc		45~55 HRc -SUS Z38CDV5 45~55 HRc		55~60 HRc Z160CDV12 55~60 HRc	
	350-500 (m/min)		300-450 (m/min)		250-400 (m/min)		150-300 (m/min)		120-220 (m/min)		80-150 (m/min)	
R	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)
0.5	50000	2800	50000	2800	50000	2500	47500	2250	32000	1450	25000	1000
1.0	31500	3500	25000	2800	24500	2500	23500	2250	17000	1550	12500	1000
1.5	21000	3500	16500	2800	16000	2500	15500	2250	11000	1550	8450	1000
2.0	18000	3700	15500	3400	15000	2750	13500	2450	11000	1900	7950	1100
2.5	15500	4000	15000	4050	14000	2900	11000	2300	10000	2100	7600	1200
3.0	15000	4800	13500	4300	11500	2750	9500	2250	9500	2250	6600	1150
4.0	11500	3650	10000	3200	8950	2100	7150	1700	7150	1700	4950	890
5.0	9500	3000	8250	2600	7150	1700	5700	1350	5700	1350	3950	710
6.0	7950	2500	6850	2150	5950	1400	4750	1100	4750	1100	3300	590
7.0	6800	2150	5900	1850	5100	1200	4050	970	4050	970	2800	500
8.0	5950	1900	5150	1600	4450	1050	3550	850	3550	850	2450	440
9.0	5300	1650	4550	1450	3950	945	3150	755	3150	755	2200	395
10.0	4750	1500	4100	1300	3550	850	2850	680	2850	680	1950	350

Ball Nose End Mills

21 NG

Item code	D1	R	β	ap	D5	L3	L1	D4
21NG 01004	1.0	0.5		2			50	4
21NG 01006	1.0	0.5		2			50	6
21NG 01504	1.5	0.75		3			50	4
21NG 01506	1.5	0.75		3			50	6
21NG 02004	2.0	1		4			50	4
21NG 02006	2.0	1		4			50	6
21NG 03003	3.0	1.5		6			50	3
21NG 03004	3.0	1.5		6			50	4
21NG 03006	3.0	1.5		6			50	6
21NG 04004	4.0	2		8			50	4
21NG 04006	4.0	2		8			50	6
21NG 05006	5.0	2.5		10			50	6
21NG 06006	6.0	3		12			50	6
21NG 08008	8.0	4		16			60	8
21NG 10010	10.0	5		20			75	10
21NG 12012	12.0	6		24			75	12
21NG 16016	16.0	8		32			100	16





Max cutting depth	ap 0.02D, pf 0.05 D								ap R < 8: 0.02D, pf 0.05 D; ap R > 8: 0.5D, pf 0.05 D			
	C≤0.2% - GG E24 ■ XC48 ■ FT25 750 N/mm2 350-500 (m/min)		SCM - SKD 350NCD16 ■ 40CMD8 ~30 HRc 300-450 (m/min)		30~38 HRc 35NCD16 30~38 HRc 250-400 (m/min)		30~38 HRc 35NCD16 30~38 HRc 150-300 (m/min)		45~55 HRc -SUS Z38CDV5 45~55 HRc 120-220 (m/min)		55~60 HRc Z160CDV12 55~60 HRc 80-150 (m/min)	
R	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)
0.5	50000	2800	50000	2800	50000	2500	47500	2250	32000	1450	25000	1000
1.0	31500	3500	25000	2800	24500	2500	23500	2250	17000	1550	12500	1000
1.5	21000	3500	16500	2800	16000	2500	15500	2250	11000	1550	8450	1000
2.0	18000	3700	15500	3400	15000	2750	13500	2450	11000	1900	7950	1100
2.5	15500	4000	15000	4050	14000	2900	11000	2300	10000	2100	7600	1200
3.0	15000	4800	13500	4300	11500	2750	9500	2250	9500	2250	6600	1150
4.0	11500	3650	10000	3200	8950	2100	7150	1700	7150	1700	4950	890
5.0	9500	3000	8250	2600	7150	1700	5700	1350	5700	1350	3950	710
6.0	7950	2500	6850	2150	5950	1400	4750	1100	4750	1100	3300	590
7.0	6800	2150	5900	1850	5100	1200	4050	970	4050	970	2800	500
8.0	5950	1900	5150	1600	4450	1050	3550	850	3550	850	2450	440
9.0	5300	1650	4550	1450	3950	945	3150	755	3150	755	2200	395
10.0	4750	1500	4100	1300	3550	850	2850	680	2850	680	1950	350

Ball Nose End Mills

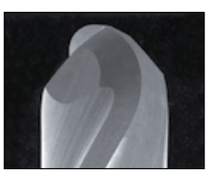
DIN 6535 Form HA | 30° | MG 9 0.2 µm | HRc 68 | AlTiN

21 NK

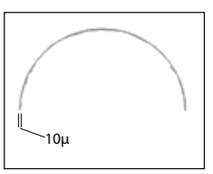
Item code	D1	R	β	ap	D5	L3	L1	D4
21NK 01004	1.0	0.5		2			50	4
21NK 01504	1.5	1.5		3			50	4
21NK 02004	2.0	1		4			50	4
21NK 03006	3.0	1.5		6			50	6
21NK 04006	4.0	2		8			50	6
21NK 05006	5.0	2.5		10			50	6
21NK 06006	6.0	3		12			50	6
21NK 08008	8.0	4		16			60	8
21NK 10010	10.0	5		20			75	10
21NK 12012	12.0	6		24			75	12

High Precision Ball End Mill Series

HSG's special point, cutting edge geometry, and ±5µm Radius Tolerance result in extremely fine surface finishes:



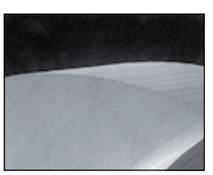
Tip



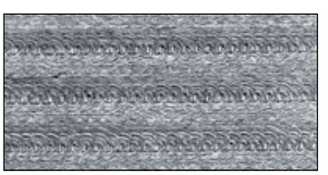
±5µm Radius Tolerance Surface Trace

Competition Surface Finish

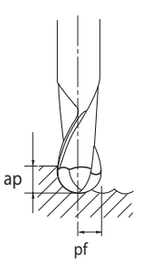
Point

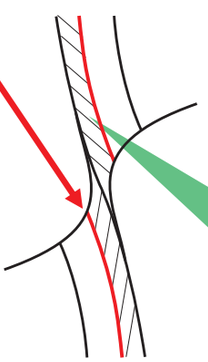


Cutting Edge



21 NK Surface Finish

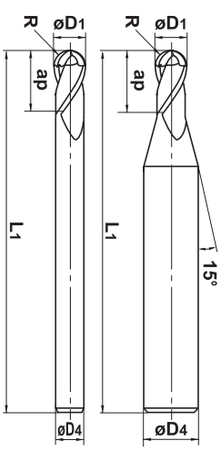




New

Double face Effect

The R cutting flute is formed in the shape of an S, which not only improves cutting performance but also creates two flanks to maintain rigidity.

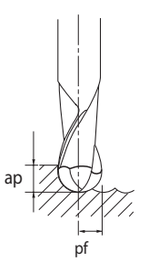


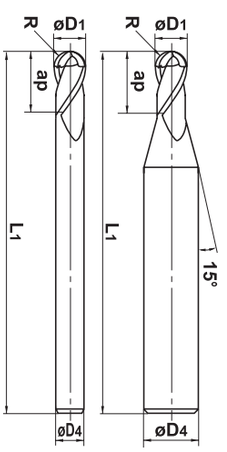
Max cutting depth	ap 0.02D, pf 0.05 D								ap, pf: R < 8: 0.02D, 0.05 D; R > 8: 0.5D, 0.05 D			
	C≤0.2% - GG		SCM - SKD		30~38 HRc		30~38 HRc		45~55 HRc -SUS		55~60 HRc	
	E24 ■ XC48 ■ FT25 750 N/mm2		350NCD16 ■ 40CMD8 ~30 HRc		35NCD16 30~38 HRc		35NCD16 30~38 HRc		Z38CDV5 45~55 HRc		Z160CDV12 55~60 HRc	
	350-500 (m/min)		300-450 (m/min)		250-400 (m/min)		150-300 (m/min)		120-220 (m/min)		80-150 (m/min)	
R	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)
0.5	50000	2800	50000	2800	50000	2500	47500	2250	32000	1450	25000	1000
1.0	31500	3500	25000	2800	24500	2500	23500	2250	17000	1550	12500	1000
1.5	21000	3500	16500	2800	16000	2500	15500	2250	11000	1550	8450	1000
2.0	18000	3700	15500	3400	15000	2750	13500	2450	11000	1900	7950	1100
2.5	15500	4000	15000	4050	14000	2900	11000	2300	10000	2100	7600	1200
3.0	15000	4800	13500	4300	11500	2750	9500	2250	9500	2250	6600	1150
4.0	11500	3650	10000	3200	8950	2100	7150	1700	7150	1700	4950	890
5.0	9500	3000	8250	2600	7150	1700	5700	1350	5700	1350	3950	710
6.0	7950	2500	6850	2150	5950	1400	4750	1100	4750	1100	3300	590
7.0	6800	2150	5900	1850	5100	1200	4050	970	4050	970	2800	500
8.0	5950	1900	5150	1600	4450	1050	3550	850	3550	850	2450	440
9.0	5300	1650	4550	1450	3950	945	3150	755	3150	755	2200	395
10.0	4750	1500	4100	1300	3550	850	2850	680	2850	680	1950	350

DIN 6535 Form HA | 30° | MG 9 0.2 µm | HRc 68 | nACoB

21 NM

Item code	D1	R	β	ap	D5	L3	L1	D4
21NM 01004	1.0	0.5		2			50	4
21NM 01006	1.0	0.5		2			50	6
21NM 01504	1.5	0.75		3			50	4
21NM 01506	1.5	0.75		3			50	6
21NM 02004	2.0	1		4			50	4
21NM 02006	2.0	1		4			50	6
21NM 03003	3.0	1.5		6			50	3
21NM 03004	3.0	1.5		6			50	4
21NM 03006	3.0	1.5		6			50	6
21NM 04004	4.0	2		8			50	4
21NM 04006	4.0	2		8			50	6
21NM 05006	5.0	2.5		10			50	6
21NM 06008	6.0	3		12			50	6
21NM 08008	8.0	4		16			60	8
21NM 10010	10.0	5		20			75	10
21NM 12012	12.0	6		24			75	12
21NM 16016	16.0	8		32			100	16





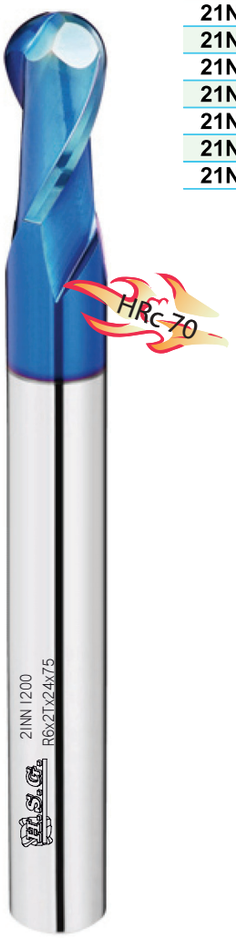
Max cutting depth	ap 0.02D, pf 0.05 D								ap R < 8: 0.02D, pf 0.05 D; R > 8: 0.5D, pf 0.05 D			
	C≤0.2% - GG E24 ■ XC48 ■ FT25 750 N/mm2		SCM - SKD 350NCD16 ■ 40CMD8 ~30 HRc		30~38 HRc 35NCD16 30~38 HRc		30~38 HRc 35NCD16 30~38 HRc		45~55 HRc -SUS Z38CDV5 45~55 HRc		55~60 HRc Z160CDV12 55~60 HRc	
	350-500 (m/min)		300-450 (m/min)		250-400 (m/min)		150-300 (m/min)		120-220 (m/min)		80-150 (m/min)	
R	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)
0.5	50000	2800	50000	2800	50000	2500	47500	2250	32000	1450	25000	1000
1.0	31500	3500	25000	2800	24500	2500	23500	2250	17000	1550	12500	1000
1.5	21000	3500	16500	2800	16000	2500	15500	2250	11000	1550	8450	1000
2.0	18000	3700	15500	3400	15000	2750	13500	2450	11000	1900	7950	1100
2.5	15500	4000	15000	4050	14000	2900	11000	2300	10000	2100	7600	1200
3.0	15000	4800	13500	4300	11500	2750	9500	2250	9500	2250	6600	1150
4.0	11500	3650	10000	3200	8950	2100	7150	1700	7150	1700	4950	890
5.0	9500	3000	8250	2600	7150	1700	5700	1350	5700	1350	3950	710
6.0	7950	2500	6850	2150	5950	1400	4750	1100	4750	1100	3300	590
7.0	6800	2150	5900	1850	5100	1200	4050	970	4050	970	2800	500
8.0	5950	1900	5150	1600	4450	1050	3550	850	3550	850	2450	440
9.0	5300	1650	4550	1450	3950	945	3150	755	3150	755	2200	395
10.0	4750	1500	4100	1300	3550	850	2850	680	2850	680	1950	350

Ball Nose End Mills

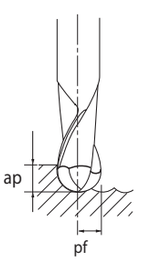
DIN 6535 Form HA | 30° | MG 9 0.2 µm | HRc 68 | nACoB

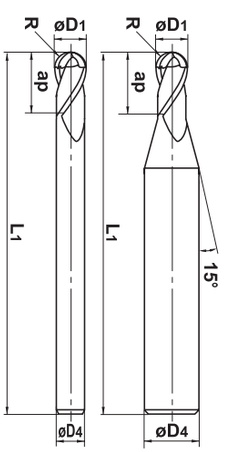
21 NN

Item code	D1	R	β	ap	D5	L3	L1	D4
21NN 03006	3.0	1.5		4			80	6
21NN 04006	4.0	2		7			80	6
21NN 05006	5.0	2.5		8			80	6
21NN 06006	6.0	3		9			100	6
21NN 08008	8.0	4		11			100	8
21NN 10010	10.0	5		13			100	10
21NN 12012	12.0	6		15			100	12
21NN 16016	16.0	8		20			150	16
21NN 20020	20.0	10		25			150	20



New

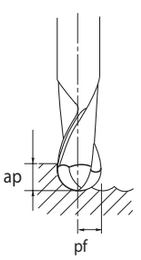


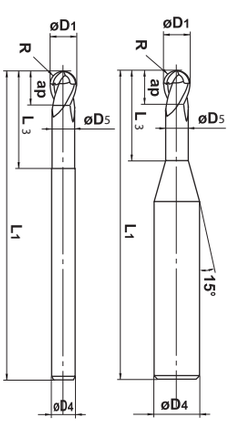


Max cutting depth	ap 0.02D, pf 0.05 D								ap R < 8: 0.02D, pf 0.05 D; ap R > 8: 0.5D, pf 0.05 D			
	C≤0.2% - GG E24 ■ XC48 ■ FT25 750 N/mm2		SCM - SKD 350NCD16 ■ 40CMD8 ~30 HRc		30~38 HRc 35NCD16 30~38 HRc		30~38 HRc 35NCD16 30~38 HRc		45~55 HRc -SUS Z38CDV5 45~55 HRc		55~60 HRc Z160CDV12 55~60 HRc	
	350-500 (m/min)		300-450 (m/min)		250-400 (m/min)		150-300 (m/min)		120-220 (m/min)		80-150 (m/min)	
R	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)
0.5	50000	2800	50000	2800	50000	2500	47500	2250	32000	1450	25000	1000
1.0	31500	3500	25000	2800	24500	2500	23500	2250	17000	1550	12500	1000
1.5	21000	3500	16500	2800	16000	2500	15500	2250	11000	1550	8450	1000
2.0	18000	3700	15500	3400	15000	2750	13500	2450	11000	1900	7950	1100
2.5	15500	4000	15000	4050	14000	2900	11000	2300	10000	2100	7600	1200
3.0	15000	4800	13500	4300	11500	2750	9500	2250	9500	2250	6600	1150
4.0	11500	3650	10000	3200	8950	2100	7150	1700	7150	1700	4950	890
5.0	9500	3000	8250	2600	7150	1700	5700	1350	5700	1350	3950	710
6.0	7950	2500	6850	2150	5950	1400	4750	1100	4750	1100	3300	590
7.0	6800	2150	5900	1850	5100	1200	4050	970	4050	970	2800	500
8.0	5950	1900	5150	1600	4450	1050	3550	850	3550	850	2450	440
9.0	5300	1650	4550	1450	3950	945	3150	755	3150	755	2200	395
10.0	4750	1500	4100	1300	3550	850	2850	680	2850	680	1950	350

21 NP

Item code	D1	R	β	ap	D5	L3	L1	D4
21NP 01004	1.0	0.5		1	0.95	3	50	4
21NP 01504	1.5	0.75		1	1.45	3	50	4
21NP 02004	2.0	1		2	1.92	5	50	4
21NP 03006	3.0	1.5		3	2.90	8	50	6
21NP 04006	4.0	2		4	3.88	10	50	6
21NP 05006	5.0	2.5		5	4.80	13	50	6
21NP 06006	6.0	3		6	5.80	15	50	6
21NP 08008	8.0	4		8	7.70	20	60	8
21NP 10010	10.0	5		10	9.60	25	75	10
21NP 12012	12.0	6		12	11.50	30	75	12





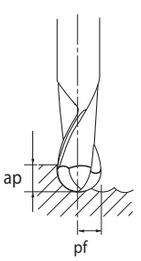
Max cutting depth	ap 0.02D, pf 0.05 D								ap R < 8: 0.02D, pf 0.05 D; ap R > 8: 0.5D, pf 0.05 D			
	C≤0.2% - GG		SCM - SKD		30~38 HRc		30~38 HRc		45~55 HRc -SUS		55~60 HRc	
	E24 ■ XC48 ■ FT25 750 N/mm2		350NCD16 ■ 40CMD8 ~30 HRc		35NCD16 30~38 HRc		35NCD16 30~38 HRc		Z38CDV5 45~55 HRc		Z160CDV12 55~60 HRc	
	350-500 (m/min)		300-450 (m/min)		250-400 (m/min)		150-300 (m/min)		120-220 (m/min)		80-150 (m/min)	
R	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)
0.5	50000	2800	50000	2800	50000	2500	47500	2250	32000	1450	25000	1000
1.0	31500	3500	25000	2800	24500	2500	23500	2250	17000	1550	12500	1000
1.5	21000	3500	16500	2800	16000	2500	15500	2250	11000	1550	8450	1000
2.0	18000	3700	15500	3400	15000	2750	13500	2450	11000	1900	7950	1100
2.5	15500	4000	15000	4050	14000	2900	11000	2300	10000	2100	7600	1200
3.0	15000	4800	13500	4300	11500	2750	9500	2250	9500	2250	6600	1150
4.0	11500	3650	10000	3200	8950	2100	7150	1700	7150	1700	4950	890
5.0	9500	3000	8250	2600	7150	1700	5700	1350	5700	1350	3950	710
6.0	7950	2500	6850	2150	5950	1400	4750	1100	4750	1100	3300	590
7.0	6800	2150	5900	1850	5100	1200	4050	970	4050	970	2800	500
8.0	5950	1900	5150	1600	4450	1050	3550	850	3550	850	2450	440
9.0	5300	1650	4550	1450	3950	945	3150	755	3150	755	2200	395
10.0	4750	1500	4100	1300	3550	850	2850	680	2850	680	1950	350

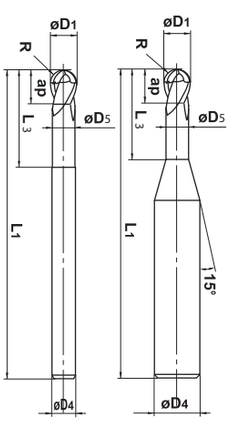
Ball Nose End Mills

DIN 6535 Form HA | 30° | MG 9 0.2 µm | HRc 68 | nACoB

21 NS

Item code	D1	R	β	ap	D5	L3	L1	D4
21NS 01004	1.0	0.5		1	0.95	3	50	4
21NS 01504	1.5	0.75		1	1.45	3	50	4
21NS 02004	2.0	1		1	1.92	5	50	4
21NS 03006	3.0	1.5		3	2.90	8	50	6
21NS 04006	4.0	1		4	3.88	10	50	6
21NS 05006	5.0	2.5		5	4.80	13	50	6
21NS 06006	6.0	3		6	5.80	15	50	6
21NS 08008	8.0	4		8	7.70	20	60	8
21NS 10010	10.0	5		10	9.60	25	75	10
21NS 12012	12.0	6		12	11.50	30	75	12



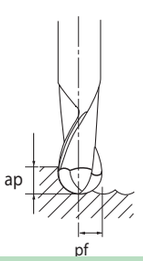


Max cutting depth	ap 0.02D, pf 0.05 D								ap R < 8: 0.02D, pf 0.05 D; ap R > 8: 0.5D, pf 0.05 D			
	C≤0.2% - GG E24 ■ XC48 ■ FT25 750 N/mm2		SCM - SKD 350NCD16 ■ 40CMD8 ~30 HRc		30~38 HRc 35NCD16 30~38 HRc		30~38 HRc 35NCD16 30~38 HRc		45~55 HRc -SUS Z38CDV5 45~55 HRc		55~60 HRc Z160CDV12 55~60 HRc	
	350-500 (m/min)		300-450 (m/min)		250-400 (m/min)		150-300 (m/min)		120-220 (m/min)		80-150 (m/min)	
R	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)
0.5	50000	2800	50000	2800	50000	2500	47500	2250	32000	1450	25000	1000
1.0	31500	3500	25000	2800	24500	2500	23500	2250	17000	1550	12500	1000
1.5	21000	3500	16500	2800	16000	2500	15500	2250	11000	1550	8450	1000
2.0	18000	3700	15500	3400	15000	2750	13500	2450	11000	1900	7950	1100
2.5	15500	4000	15000	4050	14000	2900	11000	2300	10000	2100	7600	1200
3.0	15000	4800	13500	4300	11500	2750	9500	2250	9500	2250	6600	1150
4.0	11500	3650	10000	3200	8950	2100	7150	1700	7150	1700	4950	890
5.0	9500	3000	8250	2600	7150	1700	5700	1350	5700	1350	3950	710
6.0	7950	2500	6850	2150	5950	1400	4750	1100	4750	1100	3300	590
7.0	6800	2150	5900	1850	5100	1200	4050	970	4050	970	2800	500
8.0	5950	1900	5150	1600	4450	1050	3550	850	3550	850	2450	440
9.0	5300	1650	4550	1450	3950	945	3150	755	3150	755	2200	395
10.0	4750	1500	4100	1300	3550	850	2850	680	2850	680	1950	350

Long Shank Ball Nose End Mills

21 NT NU NX NZ

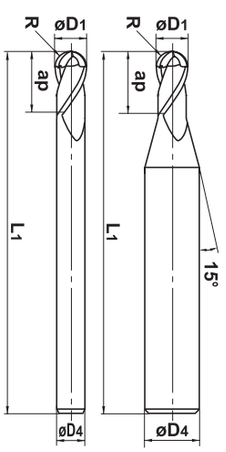
Item code	D1	R	β	ap	D5	L3	L1	D4
21NT 01004	1.0	0.5		2			75	4
21NT 01006	1.0	0.5		2			75	6
21NT 01504	1.5	0.75		3			75	4
21NT 01506	1.5	0.75		3			75	6
21NT 02006	2.0	1		4			75	6
21NT 02506	2.5	1.25		5			75	6
21NT 03006	3.0	1.5		6			75	6
21NT 04006	4.0	2		8			75	6
21NT 05006	5.0	2.5		10			75	6
21NT 06006	6.0	3		12			75	6
21NU 02006	2.0	1		4			100	6
21NU 03006	3.0	1.5		6			100	6
21NU 04006	4.0	2		8			100	6
21NU 06006	6.0	3		12			100	6
21NU 08008	8.0	4		16			100	8
21NU 10010	10.0	5		20			100	10
21NU 12012	12.0	6		24			100	12
21NX 06006	6.0	3		12			150	6
21NX 08008	8.0	4		16			150	8
21NX 10010	10.0	5		20			150	10
21NX 12012	12.0	6		24			150	12
21NZ 16016	16.0	8		60			310	16
21NZ 20020	20.0	10		60			310	20



Max cutting depth	ap	pf
R < 0.5	0.05D	0.2 D
R > 0.5	0.10D	0.2 D

	ap	pf
R < 0.5	0.05D	0.1 D
R > 0.5	0.08D	0.1 D

	C≤0.2% - GG		SCM - SKD		30~38 HRc		30~38 HRc		45~55 HRc -SUS		55~60 HRc	
	E24 ■ XC48 ■ FT25 750 N/mm2		350NCD16 ■ 40CMD8 ~30 HRc		35NCD16 30~38 HRc		35NCD16 30~38 HRc		Z38CDV5 45~55 HRc		Z160CDV12 55~60 HRc	
R	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)
0.5	32000	765	31500	620	25000	400	22000	285	19000	210	14000	140
1.0	19000	765	15500	620	12500	400	11000	290	9500	210	7150	140
1.5	12500	765	10500	630	8450	405	7400	290	6350	210	4750	140
2.0	9500	765	7950	630	6350	445	5550	370	4750	270	3550	175
2.5	7600	855	6350	635	5050	445	4450	370	3800	285	2850	175
3.0	6350	855	5300	670	4200	465	3700	390	3150	295	2350	185
4.0	4750	1050	3950	790	3150	555	2750	455	2350	325	1750	210
5.0	3800	960	3150	745	2500	525	2200	430	1900	335	1400	210
6.0	3150	890	2650	700	2100	490	1850	430	1550	310	1150	195
7.0	2700	865	2250	675	1800	475	1550	390	1350	300	1000	190
8.0	2350	840	1950	645	1550	475	1350	380	1150	270	895	185
9.0	2100	795	1750	610	1400	475	1200	380	1050	260	795	175
10.0	1900	765	1550	570	12500	450	1100	370	955	250	715	170

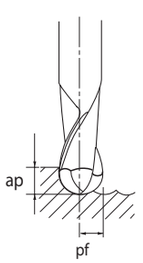


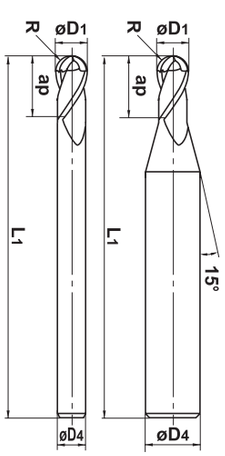
Long Shank Ball Nose End Mills

DIN 6535 Form HA | 30° | MG 12 0.4 µm | HRc 65 | AlTiN

21 PT PN PX

Item code	D1	R	β	ap	D5	L3	L1	D4
21PT 01004	1.0	0.5		2			75	4
21PT 01006	1.0	0.5		2			75	6
21PT 01504	1.5	0.75		3			75	4
21PT 01506	1.5	0.75		3			75	6
21PT 02006	2.0	1		4			75	6
21PT 02506	2.5	1.25		5			75	6
21PT 03003	3.0	1.5		6			75	3
21PT 03006	3.0	1.5		6			75	6
21PT 04004	4.0	2		8			75	4
21PT 04006	4.0	2		8			75	6
21PT 05006	5.0	2.5		10			75	6
21PT 06006	6.0	3		12			75	6
21PN 02006	2.0	1		4			100	6
21PN 03006	3.0	1.5		6			100	6
21PN 04006	4.0	2		8			100	6
21PN 06006	6.0	3		12			100	6
21PN 08008	8.0	4		16			100	8
21PN 10010	10.0	5		20			100	10
21PN 12012	12.0	6		24			100	12
21PX 06006	6.0	3		12			150	6
21PX 08008	8.0	4		16			150	8
21PX 10010	10.0	5		20			150	10
21PX 12012	12.0	6		24			150	12
21PX 16016	16.0	8		30			150	16
21PX 20020	20.0	10		38			150	20





Max cutting depth	ap	pf
R < 0.5	0.05D	0.2 D
R > 0.5	0.10D	0.2 D

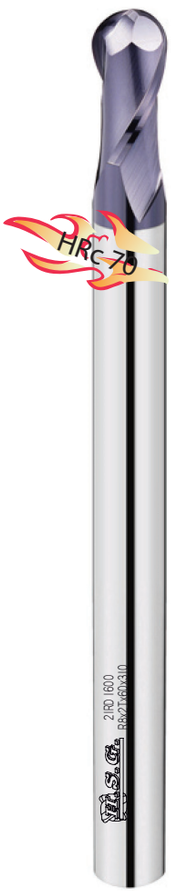
	ap	pf
R < 0.5	0.05D	0.1 D
R > 0.5	0.08D	0.1 D

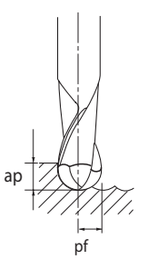
	C≤0.2% - GG		SCM - SKD		30~38 HRc		30~38 HRc		45~55 HRc -SUS		55~60 HRc	
	E24 ■ XC48 ■ FT25 750 N/mm2		350NCD16 ■ 40CMD8 ~30 HRc		35NCD16 30~38 HRc		35NCD16 30~38 HRc		Z38CDV5 45~55 HRc		Z160CDV12 55~60 HRc	
R	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)
0.5	32000	765	31500	620	25000	400	22000	285	19000	210	14000	140
1.0	19000	765	15500	620	12500	400	11000	290	9500	210	7150	140
1.5	12500	765	10500	630	8450	405	7400	290	6350	210	4750	140
2.0	9500	765	7950	630	6350	445	5550	370	4750	270	3550	175
2.5	7600	855	6350	635	5050	445	4450	370	3800	285	2850	175
3.0	6350	855	5300	670	4200	465	3700	390	3150	295	2350	185
4.0	4750	1050	3950	790	3150	555	2750	455	2350	325	1750	210
5.0	3800	960	3150	745	2500	525	2200	430	1900	335	1400	210
6.0	3150	890	2650	700	2100	490	1850	430	1550	310	1150	195
7.0	2700	865	2250	675	1800	475	1550	390	1350	300	1000	190
8.0	2350	840	1950	645	1550	475	1350	380	1150	270	895	185
9.0	2100	795	1750	610	1400	475	1200	380	1050	260	795	175
10.0	1900	765	1550	570	12500	450	1100	370	955	250	715	170

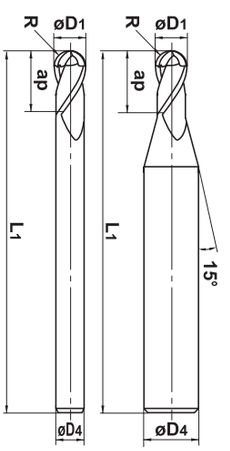
Long Shank Ball Nose End Mills

21 RL RM RN

Item code	D1	R	β	ap	D5	L3	L1	D4
21RL 02006	2.0	1		4			75	6
21RL 03006	3.0	1.5		6			75	6
21RL 04006	4.0	2		8			75	6
21RL 05006	5.0	2.5		10			75	6
21RL 06006	6.0	3		12			75	6
21RL 08008	8.0	4		16			75	8
21RM 06006	6.0	3		12			100	6
21RM 08008	8.0	4		16			100	8
21RM 10010	10.0	5		20			100	10
21RM 12012	12.0	6		24			100	12
21RN 12012	12.0	6		24			150	12
21RN 14014	14.0	7		26			150	14
21RN 16016	16.0	8		30			150	16
21RN 18018	18.0	9		34			150	18
21RN 20020	20.0	10		38			150	20







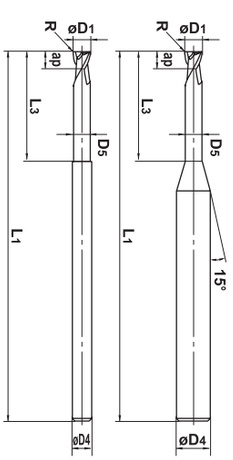
Max cutting depth	ap 0.02D, pf 0.05 D								ap R < 8: 0.02D, pf 0.05 D; ap R > 8: 0.5D, pf 0.05 D			
	C≤0.2% - GG E24 ■ XC48 ■ FT25 750 N/mm2		SCM - SKD 350NCD16 ■ 40CMD8 ~30 HRc		30~38 HRc 35NCD16 30~38 HRc		30~38 HRc 35NCD16 30~38 HRc		45~55 HRc -SUS Z38CDV5 45~55 HRc		55~60 HRc Z160CDV12 55~60 HRc	
	350-500 (m/min)		300-450 (m/min)		250-400 (m/min)		150-300 (m/min)		120-220 (m/min)		80-150 (m/min)	
R	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)
0.5	50000	2800	50000	2800	50000	2500	47500	2250	32000	1450	25000	1000
1.0	31500	3500	25000	2800	24500	2500	23500	2250	17000	1550	12500	1000
1.5	21000	3500	16500	2800	16000	2500	15500	2250	11000	1550	8450	1000
2.0	18000	3700	15500	3400	15000	2750	13500	2450	11000	1900	7950	1100
2.5	15500	4000	15000	4050	14000	2900	11000	2300	10000	2100	7600	1200
3.0	15000	4800	13500	4300	11500	2750	9500	2250	9500	2250	6600	1150
4.0	11500	3650	10000	3200	8950	2100	7150	1700	7150	1700	4950	890
5.0	9500	3000	8250	2600	7150	1700	5700	1350	5700	1350	3950	710
6.0	7950	2500	6850	2150	5950	1400	4750	1100	4750	1100	3300	590
7.0	6800	2150	5900	1850	5100	1200	4050	970	4050	970	2800	500
8.0	5950	1900	5150	1600	4450	1050	3550	850	3550	850	2450	440
9.0	5300	1650	4550	1450	3950	945	3150	755	3150	755	2200	395
10.0	4750	1500	4100	1300	3550	850	2850	680	2850	680	1950	350

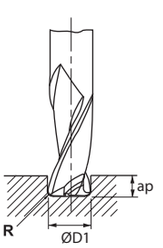
Long Neck Corner Radius End Mills

DIN 6535 Form HA | 30° | MG 10 0.6 µm | HRc 55 | TiALN

22 HA

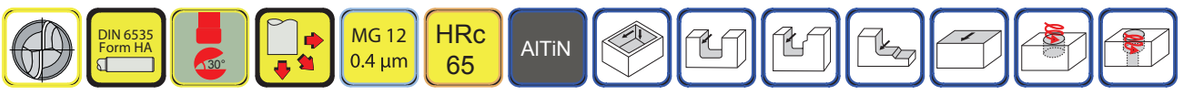
Item code	D1	R	β	ap	D5	L3	L1	D4
22HA 25054	2.5	0.5		2.5	2.40	16	75	4
22HA 25104	2.5	1.0		2.5	2.40	16	75	4
22HA 30056	3.0	0.5		3.0	2.90	16	100	6
22HA 30106	3.0	1.0		3.0	2.90	16	100	6
22HA 40056	4.0	0.5		4.0	3.80	20	100	6
22HA 40106	4.0	1.0		4.0	3.80	20	100	6
22HA 60056	6.0	0.5		6.0	5.80	25	100	6
22HA 60106	6.0	1.0		6.0	5.80	25	100	6
22HA 80058	8.0	0.5		8.0	7.70	30	100	8
22HA 80108	8.0	1.0		8.0	7.70	30	100	8
22HA 10011	10.0	1.0		10.0	9.60	30	100	10





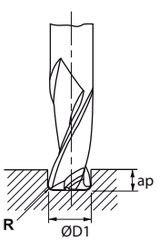
D1	L3	C≤0.2% - GG E24 ■ XC48 ■ FT25 750 N/mm2				SCM - SKD 350NCD16 ■ 40CMD8 ~30 HRc				30~38 HRc 35NCD16 30~38 HRc				45~55 HRc -SUS Z38CDV5 45~55 HRc				55~60 HRc Z160CDV12 55~60 HRc			
		S (min-1)	F (mm/min)	AZ m/m	ap m/m	S (min-1)	F (mm/min)	AZ m/m	ap m/m	S (min-1)	F (mm/min)	AZ m/m	ap m/m	S (min-1)	F (mm/min)	AZ m/m	ap m/m	S (min-1)	F (mm/min)	AZ m/m	ap m/m
2.5	16	19000	2300	0.060	0.060	17000	2000	0.060	0.040	16000	1900	0.060	0.060	14000	1500	0.050	0.050	13000	1200	0.045	0.040
3	16	16000	2100	0.060	0.120	14000	1900	0.060	0.010	13000	1700	0.065	0.160	12000	1300	0.055	0.070	11000	1000	0.045	0.160
4	20	11000	1900	0.090	0.200	11000	2100	0.100	0.200	9000	1600	0.090	0.120	8000	1150	0.070	0.100	7500	900	0.060	0.090
6	25	8000	2200	0.140	0.250	7000	2100	0.150	0.300	6000	1500	0.120	0.180	5500	1150	0.100	0.150	5000	900	0.090	0.140
8	30	7000	2000	0.140	0.250	6000	1900	0.150	0.300	5000	1300	0.120	0.180	5000	1000	0.100	0.150	4000	800	0.090	0.140

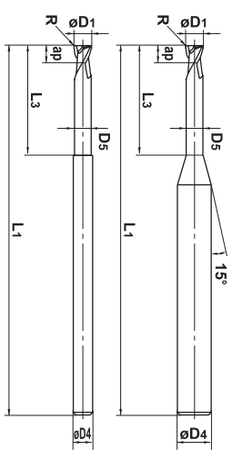
Long Neck Corner Radius End Mills



22 HL

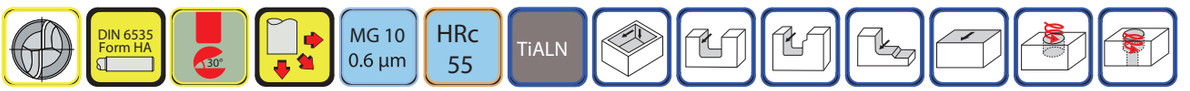
Item code	D1	R	β	ap	D5	L3	L1	D4
22HL 01004	1.0	0.1		1	0.95	4	50	4
22HL 01006	1.0	0.1		1	0.95	6	50	4
22HL 01008	1.0	0.1		1	0.95	8	50	4
22HL 01010	1.0	0.1		1	0.95	10	50	4
22HL 01504	1.5	0.2		1.5	1.45	4	50	4
22HL 01506	1.5	0.2		1.5	1.45	6	50	4
22HL 01508	1.5	0.2		1.5	1.45	8	50	4
22HL 01510	1.5	0.2		1.5	1.45	10	50	4
22HL 01512	1.5	0.2		1.5	1.45	12	50	4
22HL 02008	2.0	0.2		2	1.92	8	50	4
22HL 02010	2.0	0.2		2	1.92	10	50	4
22HL 02012	2.0	0.2		2	1.92	12	50	4
22HL 02016	2.0	0.2		3	1.92	16	50	4
22HL 03008	3.0	0.2		3	2.90	8	50	6
22HL 03010	3.0	0.2		3	2.90	10	50	6
22HL 03012	3.0	0.2		3	2.90	12	50	6
22HL 03016	3.0	0.2		3	2.90	16	50	6
22HL 03020	3.0	0.2		3	2.90	20	50	6





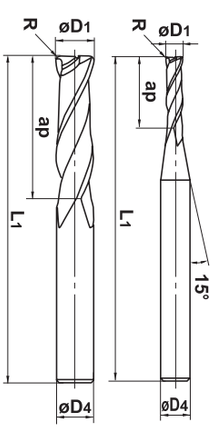
D1	L3	C≤0.2% - GG E24 ■ XC48 ■ FT25 750 N/mm2				SCM - SKD 350NCD16 ■ 40CMD8 ~30 HRc				30~38 HRc 35NCD16 30~38 HRc				45~55 HRc -SUS Z38CDV5 45~55 HRc				55~60 HRc Z160CDV12 55~60 HRc			
		S (min-1)	F (mm/min)	AZ m/m	ap m/m	S (min-1)	F (mm/min)	AZ m/m	ap m/m	S (min-1)	F (mm/min)	AZ m/m	ap m/m	S (min-1)	F (mm/min)	AZ m/m	ap m/m	S (min-1)	F (mm/min)	AZ m/m	ap m/m
1	4	36000	2500	0.035	0.065	32000	2300	0.035	0.060	30000	1900	0.030	0.050	27000	1500	0.028	0.045	25000	1300	0.025	0.040
1	6	32000	2100	0.032	0.040	29000	1900	0.030	0.035	27000	1700	0.030	0.030	24000	1400	0.028	0.025	22500	1100	0.025	0.020
1	8	32000	2100	0.032	0.040	29000	1900	0.030	0.035	27000	1700	0.030	0.030	24000	1400	0.028	0.020	22500	1100	0.025	0.020
1	10	32000	2100	0.030	0.025	29000	1900	0.025	0.022	27000	1700	0.030	0.020	24000	1400	0.028	0.015	22500	1100	0.025	0.015
1.5	4	27000	1600	0.030	0.060	23000	1400	0.030	0.050	21000	1300	0.030	0.050	19000	1000	0.030	0.040	17500	850	0.025	0.040
1.5	6	27000	1600	0.030	0.060	23000	1400	0.030	0.050	21000	1300	0.030	0.050	19000	1000	0.030	0.040	17500	850	0.025	0.040
1.5	8	26000	1600	0.030	0.060	23000	1400	0.030	0.050	21000	1300	0.030	0.045	19000	1000	0.028	0.035	17500	850	0.024	0.035
1.5	10	26000	1600	0.030	0.060	23000	1400	0.030	0.050	21000	1300	0.030	0.045	19000	1000	0.028	0.035	17500	850	0.024	0.032
1.5	12	26000	1600	0.030	0.060	23000	1400	0.030	0.050	21000	1300	0.030	0.045	19000	1000	0.028	0.035	17500	850	0.024	0.032
2	8	21000	2800	0.065	0.140	19000	2500	0.060	0.120	18000	2400	0.065	0.110	16000	1700	0.050	0.090	15000	1400	0.045	0.080
2	10	20000	2400	0.060	0.100	17000	2000	0.060	0.070	16000	2000	0.060	0.060	16000	1700	0.050	0.050	15000	1400	0.045	0.060
2	12	19000	2300	0.060	0.080	17000	2000	0.060	0.070	16000	2000	0.060	0.060	14000	1500	0.050	0.050	13000	1200	0.045	0.040
2	16	19000	2300	0.060	0.080	17000	2000	0.060	0.070	16000	1900	0.060	0.060	14000	1500	0.050	0.050	13000	1200	0.045	0.040
3	8	16000	2100	0.066	0.210	14000	1900	0.065	0.025	13000	1700	0.065	0.240	12000	1300	0.055	0.190	11000	1000	0.045	0.180
3	10	16000	2100	0.066	0.210	14000	1900	0.065	0.025	13000	1700	0.065	0.240	12000	1300	0.055	0.190	11000	1000	0.045	0.180
3	12	16000	2100	0.066	0.120	14000	1900	0.065	0.010	13000	1700	0.065	0.160	12000	1300	0.055	0.130	11000	1000	0.045	0.160
3	16	16000	2100	0.060	0.120	14000	1900	0.060	0.010	13000	1700	0.065	0.160	12000	1300	0.055	0.070	11000	1000	0.045	0.160
3	20	14000	1700	0.060	0.120	13000	1600	0.060	0.010	12000	1400	0.060	0.090	11000	1150	0.054	0.070	10000	950	0.045	0.070

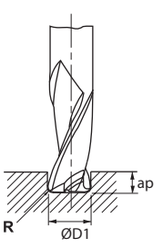
Corner Radius End Mills



22 HU

Item code	D1	R	β	ap	D5	L3	L1	D4
22HU 03023	3.0	0.2		6			50	3
22HU 03053	3.0	0.5		6			50	3
22HU 04024	4.0	0.2		8			50	4
22HU 04054	4.0	0.5		8			50	4
22HU 04104	4.0	1.0		8			50	4
22HU 06026	6.0	0.2		12			50	6
22HU 06056	6.0	0.5		12			50	6
22HU 06106	6.0	1.0		12			50	6
22HU 06156	6.0	1.5		12			50	6
22HU 06206	6.0	2.0		12			50	6
22HU 08038	8.0	0.3		16			60	8
22HU 08058	8.0	0.5		16			60	8
22HU 08108	8.0	1.0		16			60	8
22HU 08158	8.0	1.5		16			60	8
22HU 08208	8.0	2.0		16			60	8
22HU 10051	10.0	0.5		20			75	10
22HU 10101	10.0	1.0		20			75	10
22HU 10151	10.0	1.5		20			75	10
22HU 10201	10.0	2.0		20			75	10
22HU 10251	10.0	2.5		20			75	10
22HU 10301	10.0	3.0		20			75	10
22HU 12055	12.0	0.5		24			75	12
22HU 12105	12.0	1.0		24			75	12
22HU 12155	12.0	1.5		24			75	12
22HU 12205	12.0	2.0		24			75	12
22HU 12255	12.0	2.5		24			75	12
22HU 12305	12.0	3.0		24			75	12
22HU 12405	12.0	4.0		24			75	12





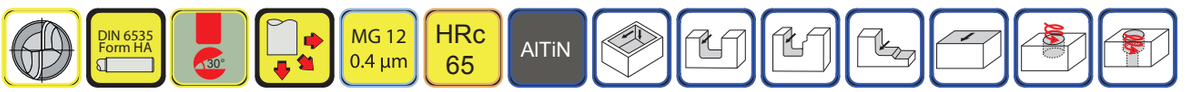
Max cutting depth	ap
D < Ø 1	0.1D
D Ø 1.1 < Ø 3	0.3D
D Ø 3.1 >	0.5D

	ap
D < Ø 1	0.02D
D Ø 1.1 < Ø 3	0.05D

	ap
D < Ø 1	0.01D
D Ø 1.1 < Ø 3	0.02D
D Ø 3.1 >	0.05D

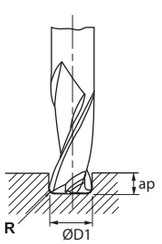
	C≤0.2% - GG			SCM - SKD			30~38 HRc			30~38 HRc			45~55 HRc -SUS			55~60 HRc		
	E24 ■ XC48 ■ FT25 750 N/mm2			350NCD16 ■ 40CMD8 ~30 HRc			35NCD16 30~38 HRc			35NCD16 30~38 HRc			Z38CDV5 45~55 HRc			Z160CDV12 55~60 HRc		
	150 (m/min)			130 (m/min)			110 (m/min)			80 (m/min)			60 (m/min)			30 (m/min)		
Ø	S (min-1)	F (mm/min)	AZ (mm)	S (min-1)	F (mm/min)	AZ (mm)	S (min-1)	F (mm/min)	AZ (mm)	S (min-1)	F (mm/min)	AZ (mm)	S (min-1)	F (mm/min)	AZ (mm)	S (min-1)	F (mm/min)	AZ (mm)
3.0	15924	430	0.0135	13800	326	0.0118	11677	220	0.0094	8493	143	0.0084	6369	104	0.0082	3185	48	0.0075
4.0	11943	472	0.0197	10350	391	0.0189	8758	258	0.0147	6369	164	0.0129	4777	109	0.0114	2389	46	0.0097
5.0	9554	568	0.0297	8280	453	0.0273	7006	257	0.0183	5096	167	0.0164	3822	111	0.0145	1911	46	0.0120
6.0	7962	555	0.0348	6900	450	0.0326	5839	257	0.0220	4246	170	0.0200	3185	113	0.0177	1592	38	0.0119
8.0	5971	534	0.0447	5175	450	0.0435	4379	249	0.0284	3185	168	0.0263	2389	104	0.0217	1194	38	0.0157
10.0	4777	505	0.0528	4140	443	0.0535	3503	250	0.0357	2548	161	0.0317	1911	100	0.0262	955	38	0.0197
12.0	3981	507	0.0636	3450	441	0.0639	2919	252	0.0431	2123	161	0.0380	1592	90	0.0283	796	30	0.0189
14.0	3412	503	0.0737	2957	424	0.0717	2502	220	0.0440	1820	165	0.0452	1365	80	0.0294	682	27	0.0198
16.0	2986	470	0.0788	2588	383	0.0741	2189	199	0.0455	1592	142	0.0445	1194	70	0.0294	597	24	0.0203
18.0	2654	421	0.0793	2300	345	0.0750	1946	177	0.0455	1415	126	0.0444	1062	60	0.0283	531	21	0.0200
20.0	2389	377	0.0788	2070	306	0.0738	1752	157	0.0449	1274	109	0.0428	955	60	0.0316	478	20	0.0206

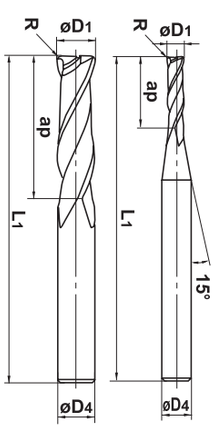
Corner Radius End Mills



22 NF

Item code	D1	R	β	ap	D5	L3	L1	D4
22NF 03023	3.0	0.2		6			50	3
22NF 03053	3.0	0.5		6			50	3
22NF 04024	4.0	0.2		8			50	4
22NF 04054	4.0	0.5		8			50	4
22NF 04104	4.0	1.0		8			50	4
22NF 06026	6.0	0.2		12			50	6
22NF 06056	6.0	0.5		12			50	6
22NF 06106	6.0	1.0		12			50	6
22NF 06156	6.0	1.5		12			50	6
22NF 06206	6.0	2.0		12			50	6
22NF 08038	8.0	0.3		16			60	8
22NF 08058	8.0	0.5		16			60	8
22NF 08108	8.0	1.0		16			60	8
22NF 08158	8.0	1.5		16			60	8
22NF 08208	8.0	2.0		16			60	8
22NF 10031	10.0	0.3		20			75	10
22NF 10051	10.0	0.5		20			75	10
22NF 10101	10.0	1.0		20			75	10
22NF 10151	10.0	1.5		20			75	10
22NF 10201	10.0	2.0		20			75	10
22NF 10301	10.0	3.0		20			75	10
22NF 12055	12.0	0.5		24			75	12
22NF 12105	12.0	1.0		24			75	12
22NF 12155	12.0	1.5		24			75	12
22NF 12205	12.0	2.0		24			75	12
22NF 12305	12.0	3.0		24			75	12





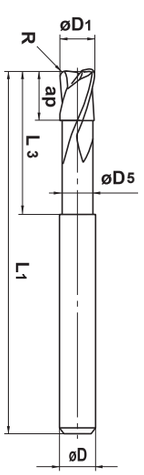
Max cutting depth		ap																
	D < Ø 1	0.1D											D < Ø 1	0.02D	D < Ø 1	0.01D		
	D Ø 1.1 < Ø 3	0.3D											D Ø 1.1 < Ø 3	0.05D	D Ø 1.1 < Ø 3	0.02D		
	D Ø 3.1 >	0.5D													D Ø 3.1 >	0.05D		
	C≤0.2% - GG			SCM - SKD			30~38 HRc			30~38 HRc			45~55 HRc -SUS			55~60 HRc		
	E24 ■ XC48 ■ FT25			350NCD16 ■ 40CMD8			35NCD16			35NCD16			Z38CDV5			Z160CDV12		
	750 N/mm2			~30 HRc			30~38 HRc			30~38 HRc			45~55 HRc			55~60 HRc		
	150 (m/min)			130 (m/min)			110 (m/min)			80 (m/min)			60 (m/min)			30 (m/min)		
Ø	S (min-1)	F (mm/min)	AZ (mm)	S (min-1)	F (mm/min)	AZ (mm)	S (min-1)	F (mm/min)	AZ (mm)	S (min-1)	F (mm/min)	AZ (mm)	S (min-1)	F (mm/min)	AZ (mm)	S (min-1)	F (mm/min)	AZ (mm)
3.0	15924	430	0.0135	13800	326	0.0118	11677	220	0.0094	8493	143	0.0084	6369	104	0.0082	3185	48	0.0075
4.0	11943	472	0.0197	10350	391	0.0189	8758	258	0.0147	6369	164	0.0129	4777	109	0.0114	2389	46	0.0097
5.0	9554	568	0.0297	8280	453	0.0273	7006	257	0.0183	5096	167	0.0164	3822	111	0.0145	1911	46	0.0120
6.0	7962	555	0.0348	6900	450	0.0326	5839	257	0.0220	4246	170	0.0200	3185	113	0.0177	1592	38	0.0119
8.0	5971	534	0.0447	5175	450	0.0435	4379	249	0.0284	3185	168	0.0263	2389	104	0.0217	1194	38	0.0157
10.0	4777	505	0.0528	4140	443	0.0535	3503	250	0.0357	2548	161	0.0317	1911	100	0.0262	955	38	0.0197
12.0	3981	507	0.0636	3450	441	0.0639	2919	252	0.0431	2123	161	0.0380	1592	90	0.0283	796	30	0.0189
14.0	3412	503	0.0737	2957	424	0.0717	2502	220	0.0440	1820	165	0.0452	1365	80	0.0294	682	27	0.0198
16.0	2986	470	0.0788	2588	383	0.0741	2189	199	0.0455	1592	142	0.0445	1194	70	0.0294	597	24	0.0203
18.0	2654	421	0.0793	2300	345	0.0750	1946	177	0.0455	1415	126	0.0444	1062	60	0.0283	531	21	0.0200
20.0	2389	377	0.0788	2070	306	0.0738	1752	157	0.0449	1274	109	0.0428	955	60	0.0316	478	20	0.0206

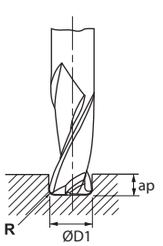
Corner Radius End Mills

DIN 6535 Form HA | 30° | MG 12 0.4 µm | HRc 65 | AlTiN

22 NP

Item code	D1	R	β	ap	D5	L3	L1	D4
22NP 04024	4	0.2		8	3.88	12	50	4
22NP 04054	4	0.5		8	3.88	12	50	4
22NP 04104	4	1.0		8	3.88	12	50	4
22NP 06026	6	0.2		12	5.80	18	50	6
22NP 06056	6	0.5		12	5.80	18	50	6
22NP 06106	6	1.0		12	5.80	18	50	6
22NP 08038	8	0.3		16	7.70	24	60	8
22NP 08058	8	0.5		16	7.70	24	60	8
22NP 08108	8	1.0		16	7.70	24	60	8
22NP 10031	10	0.3		20	9.60	30	75	10
22NP 10051	10	0.5		20	9.60	30	75	10
22NP 10101	10	1.0		20	9.60	30	75	10
22NP 10201	10	2.0		20	9.60	30	75	10
22NP 12105	12	1.0		24	11.50	36	75	12
22NP 12205	12	2.0		24	11.50	36	75	12
22NP 16056	16	0.5		30	15.40	40	100	16
22NP 16106	16	1.0		30	15.40	40	100	16





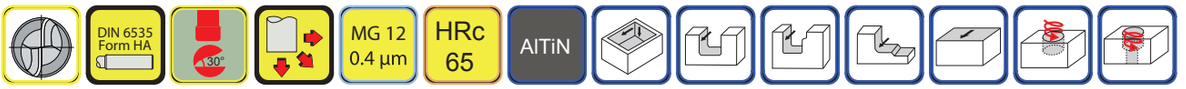
Max cutting depth	ap
D < Ø 1	0.1D
D Ø 1.1 < Ø 3	0.3D
D Ø 3.1 >	0.5D

	ap
D < Ø 1	0.02D
D Ø 1.1 < Ø 3	0.05D

	ap
D < Ø 1	0.01D
D Ø 1.1 < Ø 3	0.02D
D Ø 3.1 >	0.05D

	C≤0.2% - GG			SCM - SKD			30~38 HRc			30~38 HRc			45~55 HRc -SUS			55~60 HRc		
	E24 ■ XC48 ■ FT25 750 N/mm2			350NCD16 ■ 40CMD8 ~30 HRc			35NCD16 30~38 HRc			35NCD16 30~38 HRc			Z38CDV5 45~55 HRc			Z160CDV12 55~60 HRc		
	150 (m/min)			130 (m/min)			110 (m/min)			80 (m/min)			60 (m/min)			30 (m/min)		
Ø	S (min-1)	F (mm/min)	AZ (mm)	S (min-1)	F (mm/min)	AZ (mm)	S (min-1)	F (mm/min)	AZ (mm)	S (min-1)	F (mm/min)	AZ (mm)	S (min-1)	F (mm/min)	AZ (mm)	S (min-1)	F (mm/min)	AZ (mm)
3.0	15924	430	0.0135	13800	326	0.0118	11677	220	0.0094	8493	143	0.0084	6369	104	0.0082	3185	48	0.0075
4.0	11943	472	0.0197	10350	391	0.0189	8758	258	0.0147	6369	164	0.0129	4777	109	0.0114	2389	46	0.0097
5.0	9554	568	0.0297	8280	453	0.0273	7006	257	0.0183	5096	167	0.0164	3822	111	0.0145	1911	46	0.0120
6.0	7962	555	0.0348	6900	450	0.0326	5839	257	0.0220	4246	170	0.0200	3185	113	0.0177	1592	38	0.0119
8.0	5971	534	0.0447	5175	450	0.0435	4379	249	0.0284	3185	168	0.0263	2389	104	0.0217	1194	38	0.0157
10.0	4777	505	0.0528	4140	443	0.0535	3503	250	0.0357	2548	161	0.0317	1911	100	0.0262	955	38	0.0197
12.0	3981	507	0.0636	3450	441	0.0639	2919	252	0.0431	2123	161	0.0380	1592	90	0.0283	796	30	0.0189
14.0	3412	503	0.0737	2957	424	0.0717	2502	220	0.0440	1820	165	0.0452	1365	80	0.0294	682	27	0.0198
16.0	2986	470	0.0788	2588	383	0.0741	2189	199	0.0455	1592	142	0.0445	1194	70	0.0294	597	24	0.0203
18.0	2654	421	0.0793	2300	345	0.0750	1946	177	0.0455	1415	126	0.0444	1062	60	0.0283	531	21	0.0200
20.0	2389	377	0.0788	2070	306	0.0738	1752	157	0.0449	1274	109	0.0428	955	60	0.0316	478	20	0.0206

Power Corner Radius End Mills



24 NF

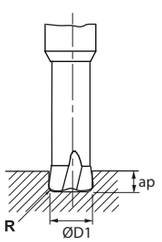
Item code	D1	R	β	ap	D5	L3	L1	D4
24NF 20006	2	0.5		3	1.92	40	80	6
24NF 30006	3	0.5		3.5	2.90	40	80	6
24NF 40006	4	1		4	3.88	40	80	6
24NF 60008	6	2		6	5.80	60	100	8
24NF 80008	8	2		7	7.70	60	100	8
24NF 80010	8	2		7	7.70	75	120	10
24NF 10010	10	3		8	9.60	75	120	10
24NF 10012	10	3		8	9.60	70	120	12
24NF 12012	12	4		10	11.50	70	120	12
24NF 12016	12	4		10	11.50	100	150	16

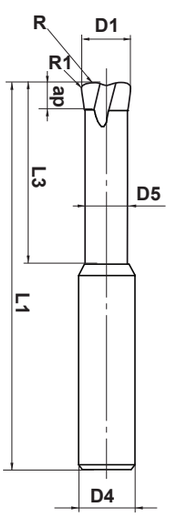
HOT NEWS

24 NF series
for High hardened Steels

Powerful and High Speed Milling

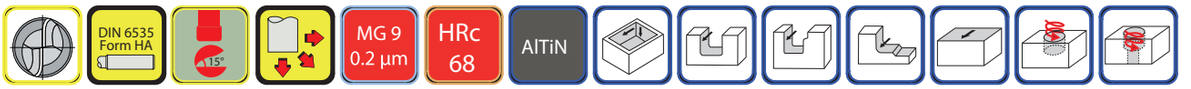
New





Max cutting depth		ap																
	D < Ø 1	0.1D											D < Ø 1	0.02D	D < Ø 1	0.01D		
	D Ø 1.1 < Ø 3	0.3D											D Ø 1.1 < Ø 3	0.05D	D Ø 1.1 < Ø 3	0.02D		
	D Ø 3.1 >	0.5D													D Ø 3.1 >	0.05D		
	C≤0.2% - GG			SCM - SKD			30~38 HRc			30~38 HRc			45~55 HRc -SUS			55~60 HRc		
	E24 ■ XC48 ■ FT25			350NCD16 ■ 40CMD8			35NCD16			35NCD16			Z38CDV5			Z160CDV12		
	750 N/mm2			~30 HRc			30~38 HRc			30~38 HRc			45~55 HRc			55~60 HRc		
	150 (m/min)			130 (m/min)			110 (m/min)			80 (m/min)			60 (m/min)			30 (m/min)		
Ø	S (min-1)	F (mm/min)	AZ (mm)	S (min-1)	F (mm/min)	AZ (mm)	S (min-1)	F (mm/min)	AZ (mm)	S (min-1)	F (mm/min)	AZ (mm)	S (min-1)	F (mm/min)	AZ (mm)	S (min-1)	F (mm/min)	AZ (mm)
3.0	15924	430	0.0135	13800	326	0.0118	11677	220	0.0094	8493	143	0.0084	6369	104	0.0082	3185	48	0.0075
4.0	11943	472	0.0197	10350	391	0.0189	8758	258	0.0147	6369	164	0.0129	4777	109	0.0114	2389	46	0.0097
5.0	9554	568	0.0297	8280	453	0.0273	7006	257	0.0183	5096	167	0.0164	3822	111	0.0145	1911	46	0.0120
6.0	7962	555	0.0348	6900	450	0.0326	5839	257	0.0220	4246	170	0.0200	3185	113	0.0177	1592	38	0.0119
8.0	5971	534	0.0447	5175	450	0.0435	4379	249	0.0284	3185	168	0.0263	2389	104	0.0217	1194	38	0.0157
10.0	4777	505	0.0528	4140	443	0.0535	3503	250	0.0357	2548	161	0.0317	1911	100	0.0262	955	38	0.0197
12.0	3981	507	0.0636	3450	441	0.0639	2919	252	0.0431	2123	161	0.0380	1592	90	0.0283	796	30	0.0189
14.0	3412	503	0.0737	2957	424	0.0717	2502	220	0.0440	1820	165	0.0452	1365	80	0.0294	682	27	0.0198
16.0	2986	470	0.0788	2588	383	0.0741	2189	199	0.0455	1592	142	0.0445	1194	70	0.0294	597	24	0.0203
18.0	2654	421	0.0793	2300	345	0.0750	1946	177	0.0455	1415	126	0.0444	1062	60	0.0283	531	21	0.0200
20.0	2389	377	0.0788	2070	306	0.0738	1752	157	0.0449	1274	109	0.0428	955	60	0.0316	478	20	0.0206

Power Frontal Toric End Mills



24 YA

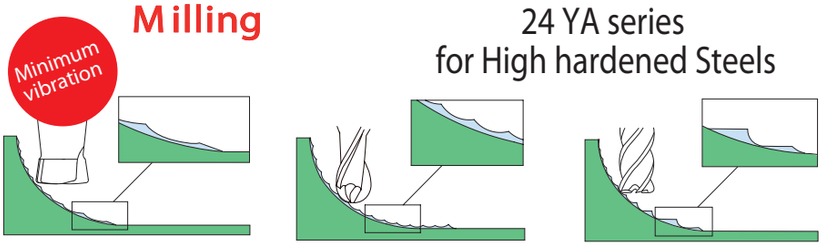
Item code	D1	R	β	ap	D5	L3	L1	D4
24YA 60106	6.0	10-0.42		4	5.20	25	55	6
24YA 60206	6.0	10-0.42		4	5.20	45	80	6
24YA 80108	8.0	10-0.52		4	6.71	25	60	8
24YA 80208	8.0	10-0.52		4	6.71	55	90	8
24YA 10110	10.0	15-0.64		6	8.72	35	70	10
24YA 10210	10.0	15-0.64		6	8.72	60	100	10
24YA 12112	12.0	15-0.75		6	10.20	40	80	12
24YA 12212	12.0	15-0.75		6	10.20	65	110	12
24YA 16116	16.0	25-1.06		8	14.20	45	90	16
24YA 16216	16.0	25-1.06		8	14.20	80	130	16

Semi-finished surface, ready for finishing.
Thin chips, less cutting forces
3D copy milling
Pocketing
Face Milling

Powerful and High Speed Milling

HOT NEWS

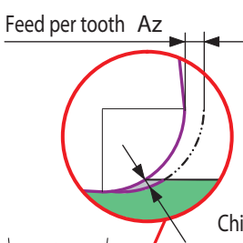
24 YA series
for High hardened Steels



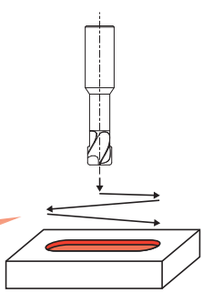
22 YA High feed end mill
low cutting resistance

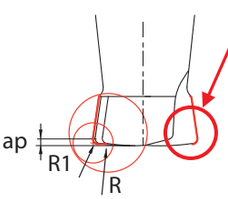
Cutter with ball ed mills
high cutting resistance

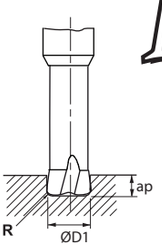
Cutter with corner radius
high cutting resistance



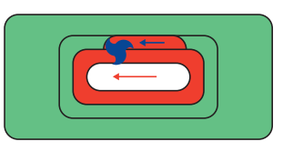
Even when high feed milling, the chip thickness is less than the feed per tooth and therefore reduces the cutting resistance at low depths of cut.

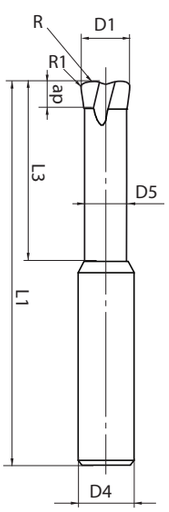




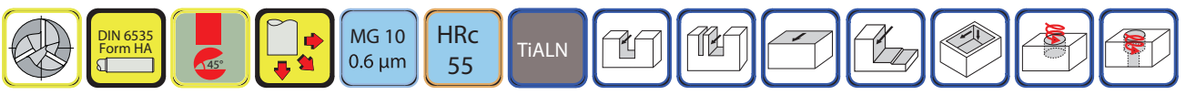


New



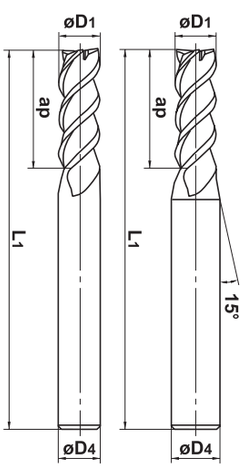


Ø	L1	C≤0.2% - GG E24 ■ XC48 ■ FT25 750 N/mm2 250 (m/min)				SCM - SKD 350NCD16 ■ 40CMD8 ~30 HRc 230 (m/min)				45~55 HRc -SUS Z38CDV5 45~55 HRc 200 (m/min)				55~60 HRc Z160CDV12 55~60 HRc 120 (m/min)			
		S (min-1)	F (mm/min)	ap (mm)	AZ (mm)	S (min-1)	F (mm/min)	ap (mm)	AZ	S (min-1)	F (mm/min)	ap (mm)	AZ	S (min-1)	F (mm/min)	ap (mm)	AZ (mm)
6.0	55	13300	20000	0.26	0.470	12200	17500	0.26	0.471	10600	14900	0.26	0.472	6400	2560	0.26	0.200
6.0	80	13300	12000	0.26	0.282	12200	10500	0.26	0.280	10600	8940	0.26	0.283	6400	1536	0.26	0.120
8.0	60	10000	18000	0.42	0.625	9150	14000	0.42	0.628	8000	11100	0.42	0.625	4800	1920	0.42	0.200
8.0	90	10000	10800	0.42	0.375	9150	8400	0.42	0.361	8000	6660	0.42	0.375	4800	1152	0.42	0.120
10.0	70	8000	16000	0.47	0.781	7320	12500	0.47	0.729	6400	8900	0.47	0.695	3800	1520	0.47	0.200
10.0	100	8000	9600	0.47	0.469	7320	7500	0.47	0.417	6400	5340	0.47	0.417	3800	912	0.47	0.120
12.0	80	6600	13300	0.66	0.947	6100	10500	0.66	0.750	5300	7400	0.66	0.698	3200	1280	0.66	0.200
12.0	110	6600	7980	0.66	0568	6100	6300	0.66	0.419	5300	4440	0.66	0.419	3200	768	0.66	0.120
16.0	90	5000	10000	0.73	1.000	4580	7500	0.73	0.755	4000	5600	0.73	0.700	2400	960	0.73	0.200
16.0	130	5000	6000	0.73	0.625	4580	4500	0.73	0.453	4000	3360	0.73	0.420	2400	576	0.73	0.120

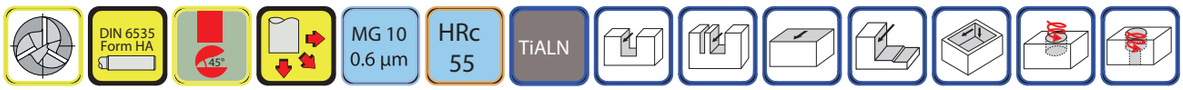


30 HA

Item code	D1	R	β	ap	D5	L3	L1	D4
30HA 01004	1.0			3			50	4
30HA 01006	1.0			3			50	6
30HA 01504	1.5			4			50	4
30HA 01506	1.5			4			50	6
30HA 02004	2.0			6			50	4
30HA 02006	2.0			6			50	6
30HA 02504	2.5			8			50	4
30HA 02506	2.5			8			50	6
30HA 03004	3.0			8			50	4
30HA 03006	3.0			8			50	6
30HA 03504	3.5			10			50	4
30HA 03506	3.5			10			50	6
30HA 04004	4.0			11			50	4
30HA 04006	4.0			11			50	6
30HA 04506	4.5			13			50	6
30HA 05006	5.0			13			50	6
30HA 05506	5.5			13			50	6
30HA 06006	6.0			16			50	6
30HA 06508	6.5			17			60	8
30HA 07008	7.0			17			60	8
30HA 07508	7.5			17			60	8
30HA 08008	8.0			20			60	8
30HA 08510	8.5			23			75	10
30HA 09010	9.0			23			75	10
30HA 10010	10.0			25			75	10
30HA 11012	11.0			28			75	12
30HA 12012	12.0			30			75	12
30HA 13016	13.0			33			100	16
30HA 14016	14.0			35			100	16
30HA 15016	15.0			38			100	16
30HA 16016	16.0			40			100	16
30HA 17020	17.0			40			100	20
30HA 18020	18.0			40			100	20
30HA 19020	19.0			40			100	20
30HA 20020	20.0			45			100	20

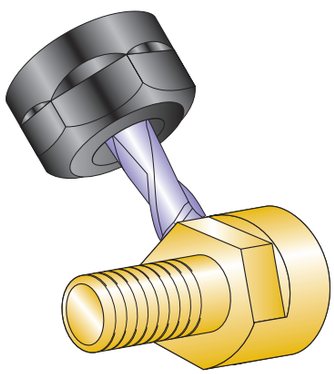


Cutting Conditions P.79

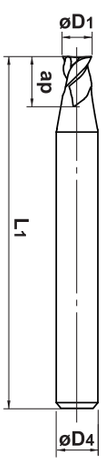


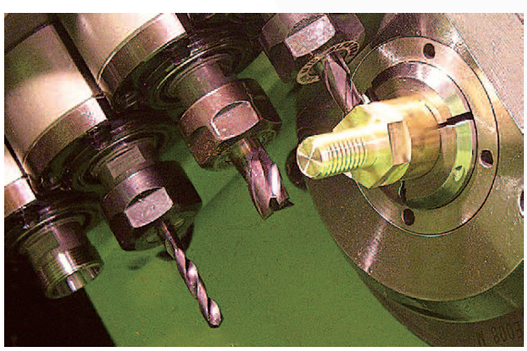
30 HD

Item code	D1	R	β	ap	D5	L3	L1	D4
30HD 03006	3.0			3			50	6
30HD 04006	4.0			4			50	6
30HD 05006	5.0			5			50	6
30HD 06008	6.0			6			60	8
30HD 08010	8.0			8			75	10
30HD 10012	10.0			10			75	12



End Mill for small automatic lathe



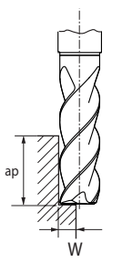


Cutting Conditions P.79

30 HA 30 HD

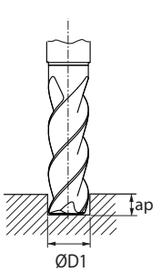
Max cutting depth	D1	W	ap	W	ap
	Ø < 3	0,1 D1	< 1	0,05 D1	1,5
	Ø > 3	0,2 D1	> 1,5		

	SCM - SKD 350NCD16 ■ 40CMD8 ~30 HRc		30~45 HRc 35NCD16 30~45 HRc		Stainless stell X5CrNi1810 X5NiMo 17122 Titanium alloy		Heat resistant alloy Inconel	
D1	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)
1	19000	600	13000	310	10000	200	9500	65
1,5	14000	600	9000	310	7500	210	6400	75
2	11000	600	7200	310	6000	210	4800	75
3	8500	770	5300	380	4400	220	3200	100
4	7200	850	4400	480	3700	250	2400	130
6	5300	940	3200	490	2700	270	1600	130
8	4000	1010	2400	560	2000	280	1200	120
10	3200	1000	1900	480	1600	300	950	110
12	2700	950	1600	440	1300	300	800	90
16	2000	720	1200	350	1000	260	600	70
20	1600	600	1000	290	800	240	480	60



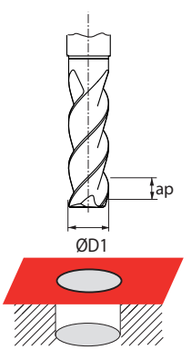
Max cutting depth	D1	ap	D1	ap	D1	ap
	Ø < 2	< 0,5	Ø < 2	< 0,2		0,2
	Ø > 2	> 1,0	Ø > 2	> 0,5		

	SCM - SKD 350NCD16 ■ 40CMD8 ~30 HRc		30~45 HRc 35NCD16 30~45 HRc		Stainless stell X5CrNi1810 X5NiMo 17122 Titanium alloy		Heat resistant alloy Inconel	
D1	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)
1	13000	130	10000	80	6000	30	5700	25
1,5	12000	250	8000	150	6000	60	3800	30
2	11000	500	7200	260	6000	130	2800	35
3	8500	640	5300	320	4200	130	1900	50
4	7200	650	4400	370	3300	140	1400	70
6	5300	720	3200	380	2200	140	950	70
8	4000	780	2400	430	1600	140	720	60
10	3200	770	1900	370	1300	150	570	50
12	2700	730	1600	340	1100	150	480	40
16	2000	600	1200	290	800	130	360	30
20	1600	500	1000	240	640	120	290	25



Max cutting depth	D1	ap	D1	ap
	Ø < 2	< 0,5	Ø < 2	< 0,2
	Ø > 2	> 1,0	Ø > 2	> 0,5

	SCM - SKD 350NCD16 ■ 40CMD8 ~30 HRc		30~45 HRc 35NCD16 30~45 HRc		Stainless stell X5CrNi1810 X5NiMo 17122 Titanium alloy		Heat resistant alloy Inconel	
D1	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)
1	13000	80	10000	50	6000	10		
1,5	12000	120	8000	80	6000	20		
2	11000	200	7200	140	6000	30		
3	8500	250	5300	180	4200	50		
4	7200	300	4400	210	3300	60		
6	5300	300	3200	210	2200	70		
8	4000	320	2400	220	1600	80		
10	3200	340	1900	240	1300	70		
12	2700	320	1600	220	1100	70		
16	2000	250	1200	180	800	55		
20	1600	200	1000	140	640	55		



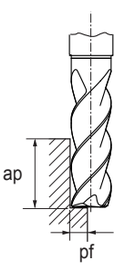
Square End Mills

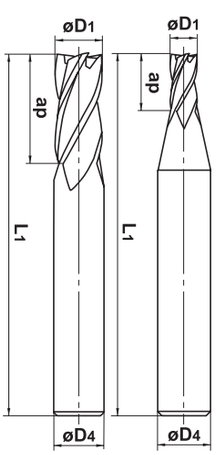
DIN 6535 Form HA | 45° | MG 12 0.4 µm | HRc 60 | Helica

30 NA

Item code	D1	R	β	ap	D5	L3	L1	D4
30NA 03006	3.0			8			50	6
30NA 04006	4.0			11			50	6
30NA 05006	5.0			13			50	6
30NA 06006	6.0			16			50	6
30NA 08008	8.0			20			60	8
30NA 10010	10.0			25			75	10
30NA 12012	12.0			30			75	12
30NA 16016	16.0			40			100	16
30NA 20020	20.0			45			100	20

New





Max cutting depth	ap	pf
D1 < 3	1.5 D	0.05 D
D1 > 3	1.5 D	0.1 D

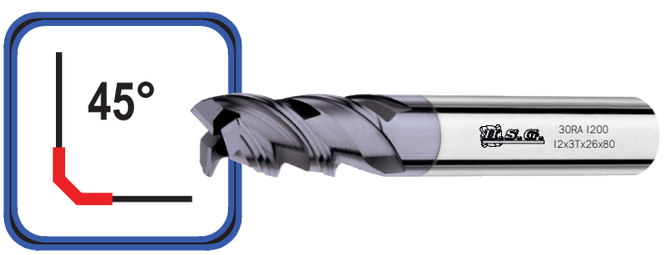
	ap	pf
D1 < 3	1 D	0.15 D
D1 > 3	1 D	0.02 D

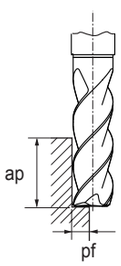
	C≤0.2% - GG E24 ■ XC48 ■ FT25 750 N/mm2		SCM - SKD 350NCD16 ■ 40CMD8 ~30 HRc		30~38 HRc 35NCD16 30~38 HRc		30~38 HRc 35NCD16 30~38 HRc		45~55 HRc -SUS Z38CDV5 45~55 HRc		55~60 HRc Z160CDV12 55~60 HRc	
D1	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)
3.0	8900	505	7400	355	5300	125	4750	110	2750	60	2000	45
4.0	6650	530	5550	370	4250	135	3700	115	2200	70	1550	45
5.0	5300	620	4450	425	3550	140	3150	125	1900	75	1250	40
6.0	4450	615	3700	425	2950	145	2650	130	1550	70	1050	40
8.0	3300	590	2750	420	2200	145	1950	130	1150	65	795	35
10.0	2650	590	2200	420	1750	145	1550	130	955	65	635	35
12.0	2200	590	1850	420	1450	145	1300	130	795	60	530	30
16.0	1650	550	1350	415	1100	130	995	115	595	45	395	20
20.0	1300	520	1100	370	890	105	795	95	475	35	315	19

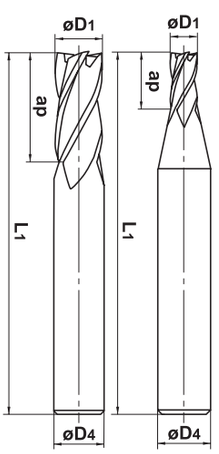
30 RA

Item code	D1	C	β	ap	D5	L3	L1	D4
30RA 03006	3.0	0.05		8			57	6
30RA 04006	4.0	0.05		11			57	6
30RA 05006	5.0	0.08		13			57	6
30RA 06006	6.0	0.08		13			57	6
30RA 07008	7.0	0.08		16			63	8
30RA 08008	8.0	0.10		19			63	8
30RA 09010	9.0	0.10		19			72	10
30RA 10010	10.0	0.10		22			72	10
30RA 12012	12.0	0.15		26			83	12
30RA 16016	16.0	0.20		32			92	16
30RA 20020	20.0	0.20		38			104	20

FOR INOX
INCONEL
TITAN







Max cutting depth		ap	pf
	D1 < 3	1.5 D	0.05 D
	D1 > 3	1.5 D	0.1 D

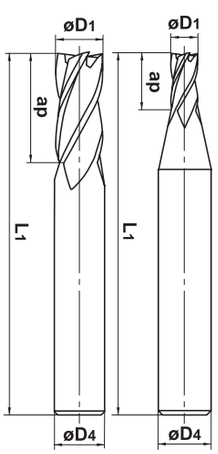
	ap	pf
D1 < 3	1 D	0.15 D
D1 > 3	1 D	0.02 D

	C≤0.2% - GG		SCM - SKD		30~38 HRc		30~38 HRc		45~55 HRc -SUS		55~60 HRc	
	E24 ■ XC48 ■ FT25 750 N/mm2		350NCD16 ■ 40CMD8 ~30 HRc		35NCD16 30~38 HRc		35NCD16 30~38 HRc		Z38CDV5 45~55 HRc		Z160CDV12 55~60 HRc	
D1	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)
3.0	8900	505	7400	355	5300	125	4750	110	2750	60	2000	45
4.0	6650	530	5550	370	4250	135	3700	115	2200	70	1550	45
5.0	5300	620	4450	425	3550	140	3150	125	1900	75	1250	40
6.0	4450	615	3700	425	2950	145	2650	130	1550	70	1050	40
8.0	3300	590	2750	420	2200	145	1950	130	1150	65	795	35
10.0	2650	590	2200	420	1750	145	1550	130	955	65	635	35
12.0	2200	590	1850	420	1450	145	1300	130	795	60	530	30
16.0	1650	550	1350	415	1100	130	995	115	595	45	395	20
20.0	1300	520	1100	370	890	105	795	95	475	35	315	19

DIN 6535 Form HA | 35° | MG 10 0.6 µm | HRc 55 | TiALN

40 HA

Item code	D1	R	β	ap	D5	L3	L1	D4
40HA 01004	1.0			3			50	4
40HA 01504	1.5			4			50	4
40HA 02004	2.0			6			50	4
40HA 02504	2.5			8			50	4
40HA 03004	3.0			8			50	4
40HA 03504	3.5			10			50	4
40HA 04004	4.0			11			50	4
40HA 04506	4.5			13			50	6
40HA 05006	5.0			13			50	6
40HA 05506	5.5			13			50	6
40HA 06006	6.0			16			50	6
40HA 06508	6.5			17			60	8
40HA 07008	7.0			17			60	8
40HA 07508	7.5			17			60	8
40HA 08008	8.0			20			60	8
40HA 08510	8.5			23			75	10
40HA 09010	9.0			23			75	10
40HA 10010	10.0			25			75	10
40HA 11012	11.0			28			75	12
40HA 12012	12.0			30			75	12
40HA 13016	13.0			33			100	16
40HA 14016	14.0			35			100	16
40HA 15016	15.0			38			100	16
40HA 16016	16.0			40			100	16
40HA 17020	17.0			40			100	20
40HA 18020	18.0			40			100	20
40HA 19020	19.0			40			100	20
40HA 20020	20.0			45			100	20



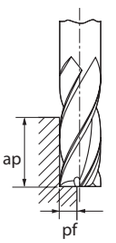
Cutting Conditions P.83

40 HA

Max cutting depth	ap	pf
D1 < 3	1.5 D	0.05 D
D1 > 3	1.5 D	0.1 D

	ap	pf
D1 < 3	1 D	0.15 D
D1 > 3	1 D	0.02 D

	C≤0.2% - GG		SCM - SKD		30~38 HRc		30~38 HRc		45~55 HRc -SUS		55~60 HRc	
	E24 ■ XC48 ■ FT25 750 N/mm2		350NCD16 ■ 40CMD8 ~30 HRc		35NCD16 30~38 HRc		35NCD16 30~38 HRc		Z38CDV5 45~55 HRc		Z160CDV12 55~60 HRc	
D1	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)
2.0	13000	310	11000	280	7000	110	6350	100	3950	60	2750	40
3.0	8900	505	7400	355	5300	125	4750	110	2750	60	2000	45
4.0	6650	530	5550	370	4250	135	3700	115	2200	70	1550	45
5.0	5300	620	4450	425	3550	140	3150	125	1900	75	1250	40
6.0	4450	615	3700	425	2950	145	2650	130	1550	70	1050	40
8.0	3300	590	2750	420	2200	145	1950	130	1150	65	795	35
10.0	2650	590	2200	420	1750	145	1550	130	955	65	635	35
12.0	2200	590	1850	420	1450	145	1300	130	795	60	530	30
14.0	1900	575	1550	415	1250	145	1100	125	680	50	455	25
16.0	1650	550	1350	415	1100	130	995	115	595	45	395	20
18.0	1450	540	1200	405	990	115	880	105	530	40	350	20
20.0	1300	520	1100	370	890	105	795	95	475	35	315	19

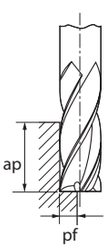


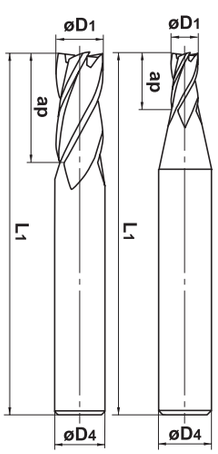
Square End Mills

DIN 6535 Form HA | 35° | MG 12 0.4 µm | HRc 60 | AlTiN

40 HK

Item code	D1	R	β	ap	D5	L3	L1	D4
40HK 01004	1.0			3			50	4
40HK 01504	1.5			4			50	4
40HK 02004	2.0			6			50	4
40HK 02504	2.5			8			50	4
40HK 03006	3.0			8			50	6
40HK 03506	3.5			10			50	6
40HK 04006	4.0			11			50	6
40HK 04506	4.5			13			50	6
40HK 05006	5.0			13			50	6
40HK 05506	5.5			13			50	6
40HK 06006	6.0			16			50	6
40HK 06508	6.5			17			60	8
40HK 07008	7.0			17			60	8
40HK 07508	7.5			17			60	8
40HK 08008	8.0			20			60	8
40HK 08508	8.5			20			60	8
40HK 09010	9.0			23			75	10
40HK 10010	10.0			25			75	10
40HK 11012	11.0			28			75	12
40HK 12012	12.0			30			75	12
40HK 13016	13.0			33			100	16
40HK 14016	14.0			35			100	16
40HK 15016	15.0			38			100	16
40HK 16016	16.0			40			100	16
40HK 17020	17.0			40			100	20
40HK 18020	18.0			40			100	20
40HK 19020	19.0			40			100	20
40HK 20020	20.0			45			100	20

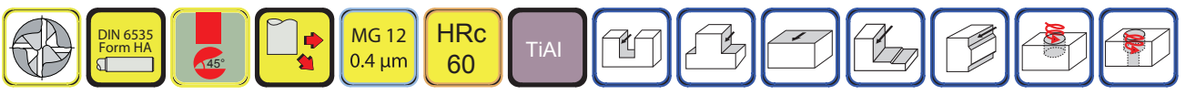




Max cutting depth	ap	pf
D1 < 3	1.5 D	0.05 D
D1 > 3	1.5 D	0.1 D

	ap	pf
D1 < 3	1 D	0.15 D
D1 > 3	1 D	0.02 D

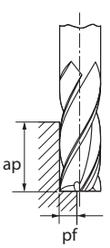
	C≤0.2% - GG		SCM - SKD		30~38 HRc		30~38 HRc		45~55 HRc -SUS		55~60 HRc	
	E24 ■ XC48 ■ FT25 750 N/mm2		350NCD16 ■ 40CMD8 ~30 HRc		35NCD16 30~38 HRc		35NCD16 30~38 HRc		Z38CDV5 45~55 HRc		Z160CDV12 55~60 HRc	
D1	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)
2.0	13000	310	11000	280	7000	110	6350	100	3950	60	2750	40
3.0	8900	505	7400	355	5300	125	4750	110	2750	60	2000	45
4.0	6650	530	5550	370	4250	135	3700	115	2200	70	1550	45
5.0	5300	620	4450	425	3550	140	3150	125	1900	75	1250	40
6.0	4450	615	3700	425	2950	145	2650	130	1550	70	1050	40
8.0	3300	590	2750	420	2200	145	1950	130	1150	65	795	35
10.0	2650	590	2200	420	1750	145	1550	130	955	65	635	35
12.0	2200	590	1850	420	1450	145	1300	130	795	60	530	30
14.0	1900	575	1550	415	1250	145	1100	125	680	50	455	25
16.0	1650	550	1350	415	1100	130	995	115	595	45	395	20
18.0	1450	540	1200	405	990	115	880	105	530	40	350	20
20.0	1300	520	1100	370	890	105	795	95	475	35	315	19

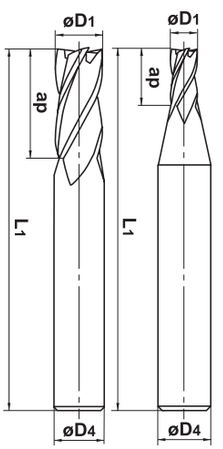


40 HS

Item code	D1	R	β	ap	D5	L3	L1	D4
40HS 01004	1.0			3			50	4
40HS 01504	1.5			4			50	4
40HS 02004	2.0			6			50	4
40HS 03006	3.0			8			50	6
40HS 04006	4.0			11			50	6
40HS 05006	5.0			13			50	6
40HS 06006	6.0			16			50	6
40HS 08008	8.0			20			60	8
40HS 10010	10.0			25			75	10
40HS 12012	12.0			30			75	12
40HS 16016	16.0			40			100	16
40HS 20020	20.0			45			100	20

New





Max cutting depth	ap	pf
D1 < 3	1.5 D	0.05 D
D1 > 3	1.5 D	0.1 D

	ap	pf
D1 < 3	1 D	0.15 D
D1 > 3	1 D	0.02 D

	C≤0.2% - GG		SCM - SKD		30~38 HRc		30~38 HRc		45~55 HRc -SUS		55~60 HRc	
	E24 ■ XC48 ■ FT25 750 N/mm2		350NCD16 ■ 40CMD8 ~30 HRc		35NCD16 30~38 HRc		35NCD16 30~38 HRc		Z38CDV5 45~55 HRc		Z160CDV12 55~60 HRc	
D1	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)
2.0	13000	310	11000	280	7000	110	6350	100	3950	60	2750	40
3.0	8900	505	7400	355	5300	125	4750	110	2750	60	2000	45
4.0	6650	530	5550	370	4250	135	3700	115	2200	70	1550	45
5.0	5300	620	4450	425	3550	140	3150	125	1900	75	1250	40
6.0	4450	615	3700	425	2950	145	2650	130	1550	70	1050	40
8.0	3300	590	2750	420	2200	145	1950	130	1150	65	795	35
10.0	2650	590	2200	420	1750	145	1550	130	955	65	635	35
12.0	2200	590	1850	420	1450	145	1300	130	795	60	530	30
14.0	1900	575	1550	415	1250	145	1100	125	680	50	455	25
16.0	1650	550	1350	415	1100	130	995	115	595	45	395	20
18.0	1450	540	1200	405	990	115	880	105	530	40	350	20
20.0	1300	520	1100	370	890	105	795	95	475	35	315	19

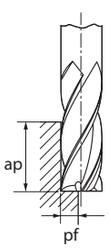
Square End Mills

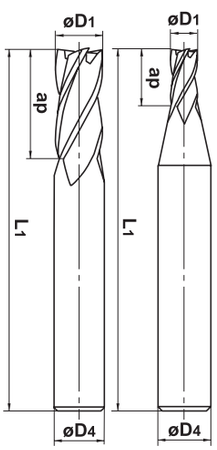
DIN 6535 Form HA | 45° | MG 12 0.4 µm | HRc 60 | NaC

40 NC

Item code	D1	R	β	ap	D5	L3	L1	D4
40NC 03006	3.0			8			50	6
40NC 04006	4.0			11			50	6
40NC 05006	5.0			13			50	6
40NC 06006	6.0			16			50	6
40NC 08008	8.0			20			60	8
40NC 10010	10.0			25			75	10
40NC 12012	12.0			30			75	12
40NC 16016	16.0			40			100	16
40NC 20020	20.0			45			100	20

New





Max cutting depth	ap	pf
D1 < 3	1.5 D	0.05 D
D1 > 3	1.5 D	0.1 D

	ap	pf
D1 < 3	1 D	0.15 D
D1 > 3	1 D	0.02 D

D1	C≤0.2% - GG E24 ■ XC48 ■ FT25 750 N/mm2		SCM - SKD 350NCD16 ■ 40CMD8 ~30 HRc		30~38 HRc 35NCD16 30~38 HRc		30~38 HRc 35NCD16 30~38 HRc		45~55 HRc -SUS Z38CDV5 45~55 HRc		55~60 HRc Z160CDV12 55~60 HRc	
	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)
2.0	13000	310	11000	280	7000	110	6350	100	3950	60	2750	40
3.0	8900	505	7400	355	5300	125	4750	110	2750	60	2000	45
4.0	6650	530	5550	370	4250	135	3700	115	2200	70	1550	45
5.0	5300	620	4450	425	3550	140	3150	125	1900	75	1250	40
6.0	4450	615	3700	425	2950	145	2650	130	1550	70	1050	40
8.0	3300	590	2750	420	2200	145	1950	130	1150	65	795	35
10.0	2650	590	2200	420	1750	145	1550	130	955	65	635	35
12.0	2200	590	1850	420	1450	145	1300	130	795	60	530	30
14.0	1900	575	1550	415	1250	145	1100	125	680	50	455	25
16.0	1650	550	1350	415	1100	130	995	115	595	45	395	20
18.0	1450	540	1200	405	990	115	880	105	530	40	350	20
20.0	1300	520	1100	370	890	105	795	95	475	35	315	19

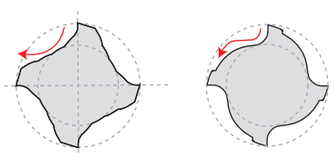
Power Square End Mills

40 NM

Item code	D1	R	β	ap	D5	L3	L1	D4
40NM 03006	3.0			8			50	6
40NM 04006	4.0			11			50	6
40NM 05006	5.0			13			50	6
40NM 06006	6.0			16			50	6
40NM 08008	8.0			20			60	8
40NM 10010	10.0			25			75	10
40NM 12012	12.0			30			75	12
40NM 16016	16.0			40			100	16
40NM 20020	20.0			45			100	20

HOT NEWS

40 NM series for High hardened Steels



40 NM — Competitor

40 NM End Mill Series for Hardened Steels

In the 40NM series designed for machining hardened steel, a new, high-reliability, high-performance power mill flute form has debuted!

High speed cutting of hardened steel is achievable.
The tool shows its performance in various materials especially from pre-hardened steels (35HRC) to hardened steels.

High Efficient

Tool-life is drastically improved.

Long Tool Life

The newly developed Helica coating with excellent oxidation resistant properties has been utilized. Especially for high speed cutting, this tool gives significantly longer tool-life than conventional coatings.

Efficient chip flow.

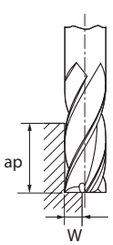
High Efficient

Power mill design gives efficient chip flow.

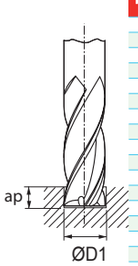
Highly accurate finish cutting is achievable.

High Accuracy

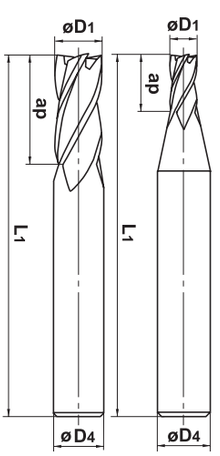
With the highly rigid design and thin coating layer highly accurate finish machining is achievable.

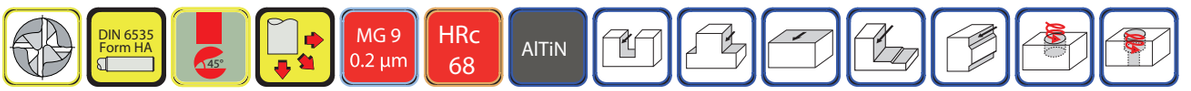


D1	Cutting Range	Alloy Steels 200~250 HB SKD61-SKD11				Alloy Steels 25~35 HRc SCM 440				Pre-Harden Steel 35~45 HRc CENA1-NAK 80				Hardened Steel 45~55 HRc SKD 61-SKT 4			
		S (min-1)	F (mm/min)	ap (min)	W (min)	S (min-1)	F (mm/min)	ap (min)	W (min)	S (min-1)	F (mm/min)	ap (min)	W (min)	S (min-1)	F (mm/min)	ap (min)	W (min)
3	High Speed	16000	1800	1.5 D1	0.1 D1	14000	1400	1.5 D1	0.05 D1	12000	1100	1.5 D1	0.05 D1	11000	860	1.5 D1	0.02 D1
3	General	9600	860	1.5 D1	0.15 D1	9600	770	1.5 D1	0.1 D1	8500	610	1.5 D1	0.07 D1	7400	460	1.5 D1	0.05 D1
4	High Speed	12000	1900	1.5 D1	0.1 D1	10000	1400	1.5 D1	0.05 D1	8800	1100	1.5 D1	0.05 D1	8000	900	1.5 D1	0.02 D1
4	General	7200	920	1.5 D1	0.15 D1	7200	830	1.5 D1	0.1 D1	6400	660	1.5 D1	0.07 D1	5600	500	1.5 D1	0.05 D1
5	High Speed	9600	2100	1.5 D1	0.1 D1	8300	1600	1.5 D1	0.05 D1	7000	1200	1.5 D1	0.05 D1	6400	990	1.5 D1	0.02 D1
5	General	5700	1000	1.5 D1	0.15 D1	5700	900	1.5 D1	0.1 D1	5100	720	1.5 D1	0.07 D1	4500	550	1.5 D1	0.05 D1
6	High Speed	8000	2200	1.5 D1	0.1 D1	6900	1700	1.5 D1	0.05 D1	5800	1300	1.5 D1	0.05 D1	5300	1040	1.5 D1	0.02 D1
6	General	4800	1080	1.5 D1	0.15 D1	4800	970	1.5 D1	0.1 D1	4200	750	1.5 D1	0.07 D1	3700	580	1.5 D1	0.05 D1
8	High Speed	6000	2400	1.5 D1	0.1 D1	5200	1900	1.5 D1	0.05 D1	4400	1400	1.5 D1	0.05 D1	4000	1120	1.5 D1	0.02 D1
8	General	3600	1150	1.5 D1	0.15 D1	3600	1040	1.5 D1	0.1 D1	3200	820	1.5 D1	0.07 D1	2800	630	1.5 D1	0.05 D1
10	High Speed	4800	2200	1.5 D1	0.1 D1	4100	1700	1.5 D1	0.05 D1	3500	1300	1.5 D1	0.05 D1	3200	1030	1.5 D1	0.02 D1
10	General	2900	1070	1.5 D1	0.15 D1	2900	960	1.5 D1	0.1 D1	2500	740	1.5 D1	0.07 D1	2200	570	1.5 D1	0.05 D1
12	High Speed	4000	2100	1.5 D1	0.1 D1	3500	1600	1.5 D1	0.05 D1	2900	1200	1.5 D1	0.05 D1	2700	980	1.5 D1	0.02 D1
12	General	2400	1000	1.5 D1	0.15 D1	2400	900	1.5 D1	0.1 D1	2100	700	1.5 D1	0.07 D1	1900	1400	1.5 D1	0.05 D1
16	High Speed	3000	1700	1.5 D1	0.1 D1	2600	1300	1.5 D1	0.05 D1	2200	1000	1.5 D1	0.05 D1	2000	780	1.5 D1	0.02 D1
16	General	1800	810	1.5 D1	0.15 D1	1800	730	1.5 D1	0.1 D1	1600	570	1.5 D1	0.07 D1	1400	440	1.5 D1	0.05 D1
20	High Speed	2400	1400	1.5 D1	0.1 D1	2100	1100	1.5 D1	0.05 D1	1800	860	1.5 D1	0.05 D1	1590	670	1.5 D1	0.02 D1
20	General	1400	670	1.5 D1	0.15 D1	1400	600	1.5 D1	0.1 D1	1300	500	1.5 D1	0.07 D1	1110	370	1.5 D1	0.05 D1



D1	Cutting Range	Alloy Steels 200~250 HB SKD61-SKD11				Alloy Steels 25~35 HRc SCM 440				Pre-Harden Steel 35~45 HRc CENA1-NAK 80				Hardened Steel 45~55 HRc SKD 61-SKT 4			
		S (min-1)	F (mm/min)	ap (min)	D1 (min)	S (min-1)	F (mm/min)	ap (min)	D1 (min)	S (min-1)	F (mm/min)	ap (min)	D1 (min)	S (min-1)	F (mm/min)	ap (min)	D1 (min)
3	High Speed	8500	820	0.5 D1	1.0 D1												
3	General	6400	490	1.0 D1	1.0 D1	6400	440	0.5 D1	1.0 D1	5800	360	0.5 D1	1.0 D1	5300	240	0.2 D1	1.0 D1
4	High Speed	6400	920	0.5 D1	1.0 D1												
4	General	4800	550	1.0 D1	1.0 D1	4800	500	0.5 D1	1.0 D1	4400	410	0.5 D1	1.0 D1	4000	280	0.2 D1	1.0 D1
5	High Speed	5100	980	0.5 D1	1.0 D1												
5	General	3800	580	1.0 D1	1.0 D1	3800	530	0.5 D1	1.0 D1	3500	430	0.5 D1	1.0 D1	3200	290	0.2 D1	1.0 D1
6	High Speed	4200	1010	0.5 D1	1.0 D1												
6	General	3200	610	1.0 D1	1.0 D1	3200	550	0.5 D1	1.0 D1	2900	450	0.5 D1	1.0 D1	2700	310	0.2 D1	1.0 D1
8	High Speed	3200	1090	0.5 D1	1.0 D1												
8	General	2400	650	1.0 D1	1.0 D1	2400	590	0.5 D1	1.0 D1	2200	480	0.5 D1	1.0 D1	2000	330	0.2 D1	1.0 D1
10	High Speed	2500	950	0.5 D1	1.0 D1												
10	General	1900	580	1.0 D1	1.0 D1	1900	520	0.5 D1	1.0 D1	1800	440	0.5 D1	1.0 D1	1600	290	0.2 D1	1.0 D1
12	High Speed	2100	880	0.5 D1	1.0 D1												
12	General	1600	540	1.0 D1	1.0 D1	1600	480	0.5 D1	1.0 D1	1500	400	0.5 D1	1.0 D1	1300	260	0.2 D1	1.0 D1
16	High Speed	1600	770	0.5 D1	1.0 D1												
16	General	1200	460	1.0 D1	1.0 D1	1200	410	0.5 D1	1.0 D1	1100	340	0.5 D1	1.0 D1	1000	230	0.2 D1	1.0 D1
20	High Speed	1300	750	0.5 D1	1.0 D1												
20	General	1000	460	1.0 D1	1.0 D1	1000	420	0.5 D1	1.0 D1	900	330	0.5 D1	1.0 D1	800	200	0.2 D1	1.0 D1

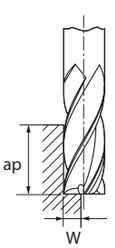


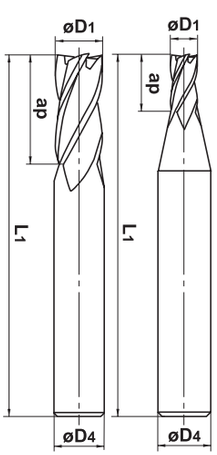


40 NU

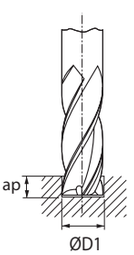
Item code	D1	R	β	ap	D5	L3	L1	D4
40NU 03004	3.0			8			50	4
40NU 03006	3.0			8			50	6
40NU 04004	4.0			11			50	4
40NU 04006	4.0			11			50	6
40NU 05006	5.0			13			50	6
40NU 06006	6.0			16			50	6
40NU 08008	8.0			20			60	8
40NU 10010	10.0			25			75	10
40NU 12012	12.0			30			75	12
40NU 16016	16.0			40			100	16
40NU 20020	20.0			45			100	20

D1	Cutting Range	Alloy Steels 200~250 HB SKD61-SKD11				Alloy Steels 25~35 HRc SCM 440				Pre-Harden Steel 35~45 HRc CENA1-NAK 80				Hardened Steel 45~55 HRc SKD 61-SKT 4			
		S (min-1)	F (mm/min)	ap (min)	W (min)	S (min-1)	F (mm/min)	ap (min)	W (min)	S (min-1)	F (mm/min)	ap (min)	W (min)	S (min-1)	F (mm/min)	ap (min)	W (min)
3	High Speed	16000	1800	1.5 D1	0.1 D1	14000	1400	1.5 D1	0.05 D1	12000	1100	1.5 D1	0.05 D1	11000	860	1.5 D1	0.02 D1
3	General	9600	860	1.5 D1	0.15 D1	9600	770	1.5 D1	0.1 D1	8500	610	1.5 D1	0.07 D1	7400	460	1.5 D1	0.05 D1
4	High Speed	12000	1900	1.5 D1	0.1 D1	10000	1400	1.5 D1	0.05 D1	8800	1100	1.5 D1	0.05 D1	8000	900	1.5 D1	0.02 D1
4	General	7200	920	1.5 D1	0.15 D1	7200	830	1.5 D1	0.1 D1	6400	660	1.5 D1	0.07 D1	5600	500	1.5 D1	0.05 D1
5	High Speed	9600	2100	1.5 D1	0.1 D1	8300	1600	1.5 D1	0.05 D1	7000	1200	1.5 D1	0.05 D1	6400	990	1.5 D1	0.02 D1
5	General	5700	1000	1.5 D1	0.15 D1	5700	900	1.5 D1	0.1 D1	5100	720	1.5 D1	0.07 D1	4500	550	1.5 D1	0.05 D1
6	High Speed	8000	2200	1.5 D1	0.1 D1	6900	1700	1.5 D1	0.05 D1	5800	1300	1.5 D1	0.05 D1	5300	1040	1.5 D1	0.02 D1
6	General	4800	1080	1.5 D1	0.15 D1	4800	970	1.5 D1	0.1 D1	4200	750	1.5 D1	0.07 D1	3700	580	1.5 D1	0.05 D1
8	High Speed	6000	2400	1.5 D1	0.1 D1	5200	1900	1.5 D1	0.05 D1	4400	1400	1.5 D1	0.05 D1	4000	1120	1.5 D1	0.02 D1
8	General	3600	1150	1.5 D1	0.15 D1	3600	1040	1.5 D1	0.1 D1	3200	820	1.5 D1	0.07 D1	2800	630	1.5 D1	0.05 D1
10	High Speed	4800	2200	1.5 D1	0.1 D1	4100	1700	1.5 D1	0.05 D1	3500	1300	1.5 D1	0.05 D1	3200	1030	1.5 D1	0.02 D1
10	General	2900	1070	1.5 D1	0.15 D1	2900	960	1.5 D1	0.1 D1	2500	740	1.5 D1	0.07 D1	2200	570	1.5 D1	0.05 D1
12	High Speed	4000	2100	1.5 D1	0.1 D1	3500	1600	1.5 D1	0.05 D1	2900	1200	1.5 D1	0.05 D1	2700	980	1.5 D1	0.02 D1
12	General	2400	1000	1.5 D1	0.15 D1	2400	900	1.5 D1	0.1 D1	2100	700	1.5 D1	0.07 D1	1900	1400	1.5 D1	0.05 D1
16	High Speed	3000	1700	1.5 D1	0.1 D1	2600	1300	1.5 D1	0.05 D1	2200	1000	1.5 D1	0.05 D1	2000	780	1.5 D1	0.02 D1
16	General	1800	810	1.5 D1	0.15 D1	1800	730	1.5 D1	0.1 D1	1600	570	1.5 D1	0.07 D1	1400	440	1.5 D1	0.05 D1
20	High Speed	2400	1400	1.5 D1	0.1 D1	2100	1100	1.5 D1	0.05 D1	1800	860	1.5 D1	0.05 D1	1590	670	1.5 D1	0.02 D1
20	General	1400	670	1.5 D1	0.15 D1	1400	600	1.5 D1	0.1 D1	1300	500	1.5 D1	0.07 D1	1110	370	1.5 D1	0.05 D1





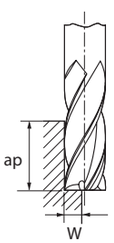
D1	Cutting Range	Alloy Steels 200~250 HB SKD61-SKD11				Alloy Steels 25~35 HRc SCM 440				Pre-Harden Steel 35~45 HRc CENA1-NAK 80				Hardened Steel 45~55 HRc SKD 61-SKT 4			
		S (min-1)	F (mm/min)	ap (min)	D1 (min)	S (min-1)	F (mm/min)	ap (min)	D1 (min)	S (min-1)	F (mm/min)	ap (min)	D1 (min)	S (min-1)	F (mm/min)	ap (min)	D1 (min)
3	High Speed	8500	820	0.5 D1	1.0 D1												
3	General	6400	490	1.0 D1	1.0 D1	6400	440	0.5 D1	1.0 D1	5800	360	0.5 D1	1.0 D1	5300	240	0.2 D1	1.0 D1
4	High Speed	6400	920	0.5 D1	1.0 D1												
4	General	4800	550	1.0 D1	1.0 D1	4800	500	0.5 D1	1.0 D1	4400	410	0.5 D1	1.0 D1	4000	280	0.2 D1	1.0 D1
5	High Speed	5100	980	0.5 D1	1.0 D1												
5	General	3800	580	1.0 D1	1.0 D1	3800	530	0.5 D1	1.0 D1	3500	430	0.5 D1	1.0 D1	3200	290	0.2 D1	1.0 D1
6	High Speed	4200	1010	0.5 D1	1.0 D1												
6	General	3200	610	1.0 D1	1.0 D1	3200	550	0.5 D1	1.0 D1	2900	450	0.5 D1	1.0 D1	2700	310	0.2 D1	1.0 D1
8	High Speed	3200	1090	0.5 D1	1.0 D1												
8	General	2400	650	1.0 D1	1.0 D1	2400	590	0.5 D1	1.0 D1	2200	480	0.5 D1	1.0 D1	2000	330	0.2 D1	1.0 D1
10	High Speed	2500	950	0.5 D1	1.0 D1												
10	General	1900	580	1.0 D1	1.0 D1	1900	520	0.5 D1	1.0 D1	1800	440	0.5 D1	1.0 D1	1600	290	0.2 D1	1.0 D1
12	High Speed	2100	880	0.5 D1	1.0 D1												
12	General	1600	540	1.0 D1	1.0 D1	1600	480	0.5 D1	1.0 D1	1500	400	0.5 D1	1.0 D1	1300	260	0.2 D1	1.0 D1
16	High Speed	1600	770	0.5 D1	1.0 D1												
16	General	1200	460	1.0 D1	1.0 D1	1200	410	0.5 D1	1.0 D1	1100	340	0.5 D1	1.0 D1	1000	230	0.2 D1	1.0 D1
20	High Speed	1300	750	0.5 D1	1.0 D1												
20	General	1000	460	1.0 D1	1.0 D1	1000	420	0.5 D1	1.0 D1	900	330	0.5 D1	1.0 D1	800	200	0.2 D1	1.0 D1



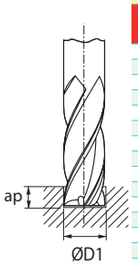
40 RD

Item code	D1	R	β	ap	D5	L3	L1	D4
40RD 03004	3.0			8			50	4
40RD 03006	3.0			8			50	6
40RD 04004	4.0			11			50	4
40RD 04006	4.0			11			50	6
40RD 05006	5.0			13			50	6
40RD 06006	6.0			16			50	6
40RD 08008	8.0			20			60	8
40RD 10010	10.0			25			75	10
40RD 12012	12.0			30			75	12
40RD 16016	16.0			40			100	16
40RD 20020	20.0			45			100	20

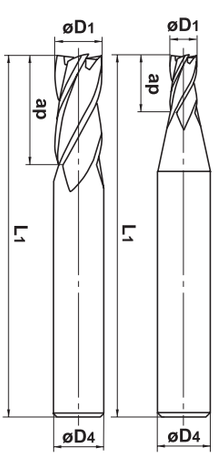
New



D1	Cutting Range	Alloy Steels 200~250 HB SKD61-SKD11				Alloy Steels 25~35 HRc SCM 440				Pre-Harden Steel 35~45 HRc CENA1-NAK 80				Hardened Steel 45~55 HRc SKD 61-SKT 4			
		S (min-1)	F (mm/min)	ap (min)	W (min)	S (min-1)	F (mm/min)	ap (min)	W (min)	S (min-1)	F (mm/min)	ap (min)	W (min)	S (min-1)	F (mm/min)	ap (min)	W (min)
3	High Speed	16000	1800	1.5 D1	0.1 D1	14000	1400	1.5 D1	0.05 D1	12000	1100	1.5 D1	0.05 D1	11000	860	1.5 D1	0.02 D1
3	General	9600	860	1.5 D1	0.15 D1	9600	770	1.5 D1	0.1 D1	8500	610	1.5 D1	0.07 D1	7400	460	1.5 D1	0.05 D1
4	High Speed	12000	1900	1.5 D1	0.1 D1	10000	1400	1.5 D1	0.05 D1	8800	1100	1.5 D1	0.05 D1	8000	900	1.5 D1	0.02 D1
4	General	7200	920	1.5 D1	0.15 D1	7200	830	1.5 D1	0.1 D1	6400	660	1.5 D1	0.07 D1	5600	500	1.5 D1	0.05 D1
5	High Speed	9600	2100	1.5 D1	0.1 D1	8300	1600	1.5 D1	0.05 D1	7000	1200	1.5 D1	0.05 D1	6400	990	1.5 D1	0.02 D1
5	General	5700	1000	1.5 D1	0.15 D1	5700	900	1.5 D1	0.1 D1	5100	720	1.5 D1	0.07 D1	4500	550	1.5 D1	0.05 D1
6	High Speed	8000	2200	1.5 D1	0.1 D1	6900	1700	1.5 D1	0.05 D1	5800	1300	1.5 D1	0.05 D1	5300	1040	1.5 D1	0.02 D1
6	General	4800	1080	1.5 D1	0.15 D1	4800	970	1.5 D1	0.1 D1	4200	750	1.5 D1	0.07 D1	3700	580	1.5 D1	0.05 D1
8	High Speed	6000	2400	1.5 D1	0.1 D1	5200	1900	1.5 D1	0.05 D1	4400	1400	1.5 D1	0.05 D1	4000	1120	1.5 D1	0.02 D1
8	General	3600	1150	1.5 D1	0.15 D1	3600	1040	1.5 D1	0.1 D1	3200	820	1.5 D1	0.07 D1	2800	630	1.5 D1	0.05 D1
10	High Speed	4800	2200	1.5 D1	0.1 D1	4100	1700	1.5 D1	0.05 D1	3500	1300	1.5 D1	0.05 D1	3200	1030	1.5 D1	0.02 D1
10	General	2900	1070	1.5 D1	0.15 D1	2900	960	1.5 D1	0.1 D1	2500	740	1.5 D1	0.07 D1	2200	570	1.5 D1	0.05 D1
12	High Speed	4000	2100	1.5 D1	0.1 D1	3500	1600	1.5 D1	0.05 D1	2900	1200	1.5 D1	0.05 D1	2700	980	1.5 D1	0.02 D1
12	General	2400	1000	1.5 D1	0.15 D1	2400	900	1.5 D1	0.1 D1	2100	700	1.5 D1	0.07 D1	1900	1400	1.5 D1	0.05 D1
16	High Speed	3000	1700	1.5 D1	0.1 D1	2600	1300	1.5 D1	0.05 D1	2200	1000	1.5 D1	0.05 D1	2000	780	1.5 D1	0.02 D1
16	General	1800	810	1.5 D1	0.15 D1	1800	730	1.5 D1	0.1 D1	1600	570	1.5 D1	0.07 D1	1400	440	1.5 D1	0.05 D1
20	High Speed	2400	1400	1.5 D1	0.1 D1	2100	1100	1.5 D1	0.05 D1	1800	860	1.5 D1	0.05 D1	1590	670	1.5 D1	0.02 D1
20	General	1400	670	1.5 D1	0.15 D1	1400	600	1.5 D1	0.1 D1	1300	500	1.5 D1	0.07 D1	1110	370	1.5 D1	0.05 D1



D1	Cutting Range	Alloy Steels 200~250 HB SKD61-SKD11				Alloy Steels 25~35 HRc SCM 440				Pre-Harden Steel 35~45 HRc CENA1-NAK 80				Hardened Steel 45~55 HRc SKD 61-SKT 4			
		S (min-1)	F (mm/min)	ap (min)	D1 (min)	S (min-1)	F (mm/min)	ap (min)	D1 (min)	S (min-1)	F (mm/min)	ap (min)	D1 (min)	S (min-1)	F (mm/min)	ap (min)	D1 (min)
3	High Speed	8500	820	0.5 D1	1.0 D1												
3	General	6400	490	1.0 D1	1.0 D1	6400	440	0.5 D1	1.0 D1	5800	360	0.5 D1	1.0 D1	5300	240	0.2 D1	1.0 D1
4	High Speed	6400	920	0.5 D1	1.0 D1												
4	General	4800	550	1.0 D1	1.0 D1	4800	500	0.5 D1	1.0 D1	4400	410	0.5 D1	1.0 D1	4000	280	0.2 D1	1.0 D1
5	High Speed	5100	980	0.5 D1	1.0 D1												
5	General	3800	580	1.0 D1	1.0 D1	3800	530	0.5 D1	1.0 D1	3500	430	0.5 D1	1.0 D1	3200	290	0.2 D1	1.0 D1
6	High Speed	4200	1010	0.5 D1	1.0 D1												
6	General	3200	610	1.0 D1	1.0 D1	3200	550	0.5 D1	1.0 D1	2900	450	0.5 D1	1.0 D1	2700	310	0.2 D1	1.0 D1
8	High Speed	3200	1090	0.5 D1	1.0 D1												
8	General	2400	650	1.0 D1	1.0 D1	2400	590	0.5 D1	1.0 D1	2200	480	0.5 D1	1.0 D1	2000	330	0.2 D1	1.0 D1
10	High Speed	2500	950	0.5 D1	1.0 D1												
10	General	1900	580	1.0 D1	1.0 D1	1900	520	0.5 D1	1.0 D1	1800	440	0.5 D1	1.0 D1	1600	290	0.2 D1	1.0 D1
12	High Speed	2100	880	0.5 D1	1.0 D1												
12	General	1600	540	1.0 D1	1.0 D1	1600	480	0.5 D1	1.0 D1	1500	400	0.5 D1	1.0 D1	1300	260	0.2 D1	1.0 D1
16	High Speed	1600	770	0.5 D1	1.0 D1												
16	General	1200	460	1.0 D1	1.0 D1	1200	410	0.5 D1	1.0 D1	1100	340	0.5 D1	1.0 D1	1000	230	0.2 D1	1.0 D1
20	High Speed	1300	750	0.5 D1	1.0 D1												
20	General	1000	460	1.0 D1	1.0 D1	1000	420	0.5 D1	1.0 D1	900	330	0.5 D1	1.0 D1	800	200	0.2 D1	1.0 D1

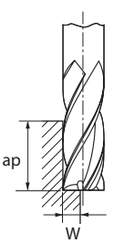


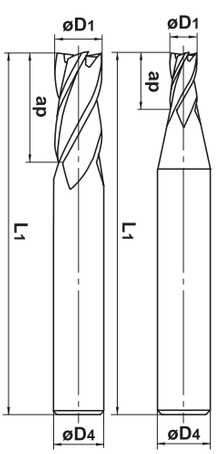
40 RF

Item code	D1	R	β	ap	D5	L3	L1	D4
40RF 03004	3.0			8			50	4
40RF 03006	3.0			8			50	6
40RF 04004	4.0			11			50	4
40RF 04006	4.0			11			50	6
40RF 05006	5.0			13			50	6
40RF 06006	6.0			16			50	6
40RF 08008	8.0			20			60	8
40RF 10010	10.0			25			75	10
40RF 12012	12.0			30			75	12
40RF 16016	16.0			40			100	16
40RF 20020	20.0			45			100	20

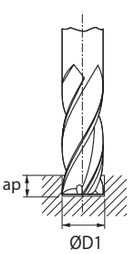
New

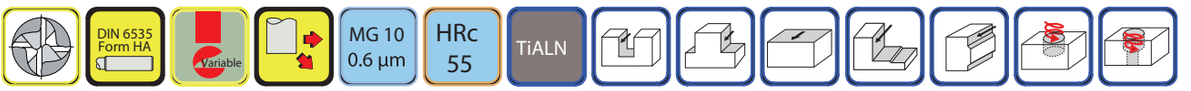
D1	Cutting Range	Alloy Steels 200~250 HB SKD61-SKD11				Alloy Steels 25~35 HRc SCM 440				Pre-Harden Steel 35~45 HRc CENA1-NAK 80				Hardened Steel 45~55 HRc SKD 61-SKT 4			
		S (min-1)	F (mm/min)	ap (min)	W (min)	S (min-1)	F (mm/min)	ap (min)	W (min)	S (min-1)	F (mm/min)	ap (min)	W (min)	S (min-1)	F (mm/min)	ap (min)	W (min)
3	High Speed	16000	1800	1.5 D1	0.1 D1	14000	1400	1.5 D1	0.05 D1	12000	1100	1.5 D1	0.05 D1	11000	860	1.5 D1	0.02 D1
3	General	9600	860	1.5 D1	0.15 D1	9600	770	1.5 D1	0.1 D1	8500	610	1.5 D1	0.07 D1	7400	460	1.5 D1	0.05 D1
4	High Speed	12000	1900	1.5 D1	0.1 D1	10000	1400	1.5 D1	0.05 D1	8800	1100	1.5 D1	0.05 D1	8000	900	1.5 D1	0.02 D1
4	General	7200	920	1.5 D1	0.15 D1	7200	830	1.5 D1	0.1 D1	6400	660	1.5 D1	0.07 D1	5600	500	1.5 D1	0.05 D1
5	High Speed	9600	2100	1.5 D1	0.1 D1	8300	1600	1.5 D1	0.05 D1	7000	1200	1.5 D1	0.05 D1	6400	990	1.5 D1	0.02 D1
5	General	5700	1000	1.5 D1	0.15 D1	5700	900	1.5 D1	0.1 D1	5100	720	1.5 D1	0.07 D1	4500	550	1.5 D1	0.05 D1
6	High Speed	8000	2200	1.5 D1	0.1 D1	6900	1700	1.5 D1	0.05 D1	5800	1300	1.5 D1	0.05 D1	5300	1040	1.5 D1	0.02 D1
6	General	4800	1080	1.5 D1	0.15 D1	4800	970	1.5 D1	0.1 D1	4200	750	1.5 D1	0.07 D1	3700	580	1.5 D1	0.05 D1
8	High Speed	6000	2400	1.5 D1	0.1 D1	5200	1900	1.5 D1	0.05 D1	4400	1400	1.5 D1	0.05 D1	4000	1120	1.5 D1	0.02 D1
8	General	3600	1150	1.5 D1	0.15 D1	3600	1040	1.5 D1	0.1 D1	3200	820	1.5 D1	0.07 D1	2800	630	1.5 D1	0.05 D1
10	High Speed	4800	2200	1.5 D1	0.1 D1	4100	1700	1.5 D1	0.05 D1	3500	1300	1.5 D1	0.05 D1	3200	1030	1.5 D1	0.02 D1
10	General	2900	1070	1.5 D1	0.15 D1	2900	960	1.5 D1	0.1 D1	2500	740	1.5 D1	0.07 D1	2200	570	1.5 D1	0.05 D1
12	High Speed	4000	2100	1.5 D1	0.1 D1	3500	1600	1.5 D1	0.05 D1	2900	1200	1.5 D1	0.05 D1	2700	980	1.5 D1	0.02 D1
12	General	2400	1000	1.5 D1	0.15 D1	2400	900	1.5 D1	0.1 D1	2100	700	1.5 D1	0.07 D1	1900	1400	1.5 D1	0.05 D1
16	High Speed	3000	1700	1.5 D1	0.1 D1	2600	1300	1.5 D1	0.05 D1	2200	1000	1.5 D1	0.05 D1	2000	780	1.5 D1	0.02 D1
16	General	1800	810	1.5 D1	0.15 D1	1800	730	1.5 D1	0.1 D1	1600	570	1.5 D1	0.07 D1	1400	440	1.5 D1	0.05 D1
20	High Speed	2400	1400	1.5 D1	0.1 D1	2100	1100	1.5 D1	0.05 D1	1800	860	1.5 D1	0.05 D1	1590	670	1.5 D1	0.02 D1
20	General	1400	670	1.5 D1	0.15 D1	1400	600	1.5 D1	0.1 D1	1300	500	1.5 D1	0.07 D1	1110	370	1.5 D1	0.05 D1





D1	Cutting Range	Alloy Steels 200~250 HB SKD61-SKD11				Alloy Steels 25~35 HRc SCM 440				Pre-Harden Steel 35~45 HRc CENA1-NAK 80				Hardened Steel 45~55 HRc SKD 61-SKT 4			
		S (min-1)	F (mm/min)	ap (min)	D1 (min)	S (min-1)	F (mm/min)	ap (min)	D1 (min)	S (min-1)	F (mm/min)	ap (min)	D1 (min)	S (min-1)	F (mm/min)	ap (min)	D1 (min)
3	High Speed	8500	820	0.5 D1	1.0 D1												
3	General	6400	490	1.0 D1	1.0 D1	6400	440	0.5 D1	1.0 D1	5800	360	0.5 D1	1.0 D1	5300	240	0.2 D1	1.0 D1
4	High Speed	6400	920	0.5 D1	1.0 D1												
4	General	4800	550	1.0 D1	1.0 D1	4800	500	0.5 D1	1.0 D1	4400	410	0.5 D1	1.0 D1	4000	280	0.2 D1	1.0 D1
5	High Speed	5100	980	0.5 D1	1.0 D1												
5	General	3800	580	1.0 D1	1.0 D1	3800	530	0.5 D1	1.0 D1	3500	430	0.5 D1	1.0 D1	3200	290	0.2 D1	1.0 D1
6	High Speed	4200	1010	0.5 D1	1.0 D1												
6	General	3200	610	1.0 D1	1.0 D1	3200	550	0.5 D1	1.0 D1	2900	450	0.5 D1	1.0 D1	2700	310	0.2 D1	1.0 D1
8	High Speed	3200	1090	0.5 D1	1.0 D1												
8	General	2400	650	1.0 D1	1.0 D1	2400	590	0.5 D1	1.0 D1	2200	480	0.5 D1	1.0 D1	2000	330	0.2 D1	1.0 D1
10	High Speed	2500	950	0.5 D1	1.0 D1												
10	General	1900	580	1.0 D1	1.0 D1	1900	520	0.5 D1	1.0 D1	1800	440	0.5 D1	1.0 D1	1600	290	0.2 D1	1.0 D1
12	High Speed	2100	880	0.5 D1	1.0 D1												
12	General	1600	540	1.0 D1	1.0 D1	1600	480	0.5 D1	1.0 D1	1500	400	0.5 D1	1.0 D1	1300	260	0.2 D1	1.0 D1
16	High Speed	1600	770	0.5 D1	1.0 D1												
16	General	1200	460	1.0 D1	1.0 D1	1200	410	0.5 D1	1.0 D1	1100	340	0.5 D1	1.0 D1	1000	230	0.2 D1	1.0 D1
20	High Speed	1300	750	0.5 D1	1.0 D1												
20	General	1000	460	1.0 D1	1.0 D1	1000	420	0.5 D1	1.0 D1	900	330	0.5 D1	1.0 D1	800	200	0.2 D1	1.0 D1

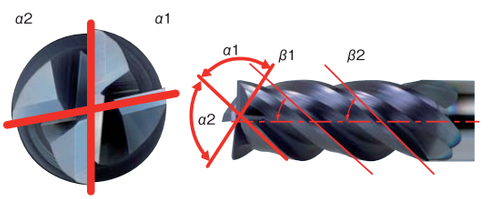


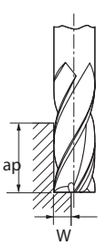


40 RM

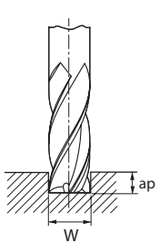
Item code	D1	R	β	ap	D5	L3	L1	D4
40RM 03006	3.0			8			50	6
40RM 04006	4.0			11			50	6
40RM 05006	5.0			13			50	6
40RM 06006	6.0			16			50	6
40RM 08008	8.0			20			60	8
40RM 10010	10.0			25			75	10
40RM 12012	12.0			30			75	12
40RM 14014	14.0			35			100	16
40RM 16016	16.0			40			100	16
40RM 18018	18.0			40			100	20
40RM 20020	20.0			45			100	20

Irregular Helix Flutes

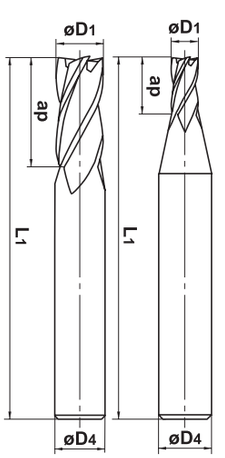




Max cutting depth	W 0,2 D1	ap 1,5			W 0,1 D1	ap 1,5	W 0,05 D1	ap 1,5		
	Cabon Steels, Alloy Steels S45C , FC , FCD, SCM , S50C , SKS ,. HRc 30		Alloy Steels, Tool Steels Sc , SNCM , SKD11 , SKD61 , NAK80 ,.. HRc 45		Austenic Stainless Steel Titanium alloy X5CrNi18-10 X5CrNiMo17-12-2		Hadened Steels SKD11 HRc 60		Heat Resitant Alloys Inconel	
D1	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)
3	15000	1250	15000	1250	10600	850	7400	380	4200	200
4	11000	1400	11000	1400	8000	960	5600	400	3200	220
5	9600	1920	9600	1920	6400	1020	4500	430	2500	250
6	8000	2240	8000	2240	5300	1060	3700	440	2100	250
8	6000	1680	6000	1680	4000	960	2800	450	1600	260
10	4800	1440	4800	1440	3200	770	2200	440	1300	210
12	4000	1250	4000	1250	2700	760	1900	380	1100	180
16	3000	1140	3000	1140	2000	560	1400	340	800	130
20	2400	860	2400	860	1600	510	1100	330	600	100



Max cutting depth	W D1	ap 1,0 D1			W D1	ap 0,5 D1	W D1	ap 0,2 D1		
	Cabon Steels, Alloy Steels S45C , FC , FCD, SCM , S50C , SKS ,. HRc 30		Alloy Steels, Tool Steels Sc , SNCM , SKD11 , SKD61 , NAK80 ,.. HRc 45		Austenic Stainless Steel Titanium alloy X5CrNi18-10 X5CrNiMo17-12-2		Hadened Steels SKD11 HRc 60		Heat Resitant Alloys Inconel	
D1	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)
3	12000	720	6900	410	7400	380	3200	140	2700	110
4	9200	810	5600	490	5600	400	2400	150	2000	120
5	7600	1060	4500	630	4500	410	1900	170	1600	130
6	6400	1280	3700	740	3700	440	1600	190	1300	160
8	4800	1150	2800	670	2800	390	1200	190	1000	130
10	3800	910	2200	530	2200	350	1000	160	800	130
12	3200	900	1900	530	1900	300	800	160	660	110
16	2400	670	1400	390	1400	280	600	120	500	80
20	1900	610	1100	350	1100	260	480	120	400	60



Square End Mills

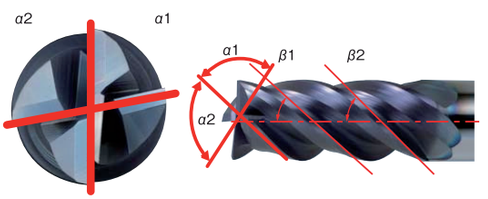
DIN 6535 Form HA | Variable | MG 12 0.4 µm | HRc 60 | NaC

40 RS

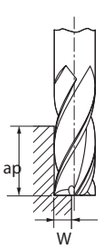
Item code	D1	R	β	ap	D5	L3	L1	D4
40RS 03006	3.0			8			50	6
40RS 04006	4.0			11			50	6
40RS 05006	5.0			13			50	6
40RS 06006	6.0			16			50	6
40RS 08008	8.0			20			60	8
40RS 10010	10.0			25			75	10
40RS 12012	12.0			30			75	12
40RS 16016	16.0			40			100	16
40RS 20020	20.0			45			100	20

New

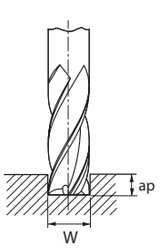
Irregular Helix Flutes

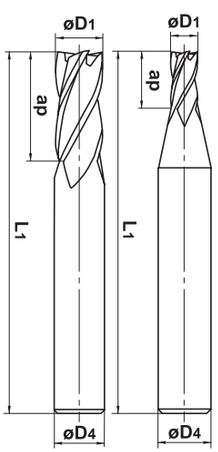


Max cutting depth	W 0,2 D1 / ap 1,5				W 0,1 D1 / ap 1,5		W 0,05 D1 / ap 1,5			
	Cabon Steels, Alloy Steels S45C , FC , FCD, SCM , S50C , SKS ,. HRc 30		Alloy Steels, Tool Steels Sc , SNCM , SKD11 , SKD61 , NAK80 ,.. HRc 45		Austenic Stainless Steel Titanium alloy X5CrNi18-10 X5CrNiMo17-12-2		Hadened Steels SKD11 HRc 60		Heat Resitant Alloys Inconel	
D1	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)
3	15000	1250	15000	1250	10600	850	7400	380	4200	200
4	11000	1400	11000	1400	8000	960	5600	400	3200	220
5	9600	1920	9600	1920	6400	1020	4500	430	2500	250
6	8000	2240	8000	2240	5300	1060	3700	440	2100	250
8	6000	1680	6000	1680	4000	960	2800	450	1600	260
10	4800	1440	4800	1440	3200	770	2200	440	1300	210
12	4000	1250	4000	1250	2700	760	1900	380	1100	180
16	3000	1140	3000	1140	2000	560	1400	340	800	130
20	2400	860	2400	860	1600	510	1100	330	600	100



Max cutting depth	W D1 / ap 1,0 D1				W D1 / ap 0,5 D1		W D1 / ap 0,2 D1			
	Cabon Steels, Alloy Steels S45C , FC , FCD, SCM , S50C , SKS ,. HRc 30		Alloy Steels, Tool Steels Sc , SNCM , SKD11 , SKD61 , NAK80 ,.. HRc 45		Austenic Stainless Steel Titanium alloy X5CrNi18-10 X5CrNiMo17-12-2		Hadened Steels SKD11 HRc 60		Heat Resitant Alloys Inconel	
D1	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)
3	12000	720	6900	410	7400	380	3200	140	2700	110
4	9200	810	5600	490	5600	400	2400	150	2000	120
5	7600	1060	4500	630	4500	410	1900	170	1600	130
6	6400	1280	3700	740	3700	440	1600	190	1300	160
8	4800	1150	2800	670	2800	390	1200	190	1000	130
10	3800	910	2200	530	2200	350	1000	160	800	130
12	3200	900	1900	530	1900	300	800	160	660	110
16	2400	670	1400	390	1400	280	600	120	500	80
20	1900	610	1100	350	1100	260	480	120	400	60



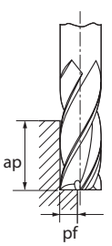


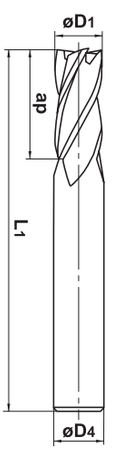
Long Shank Square End Mills

DIN 6535 Form HA | 35° | MG 10 0.6 µm | HRc 55 | TiALN

40 YA

Item code	D1	R	β	ap	D5	L3	L1	D4
40YA 06060	6.0			15			75	6
40YA 06062	6.0			15			100	6
40YA 08080	8.0			20			100	8
40YA 08082	8.0			20			150	8
40YA 10100	10.0			25			100	10
40YA 10102	10.0			25			150	10
40YA 12120	12.0			30			100	12
40YA 12122	12.0			30			150	12
40YA 16160	16.0			40			150	16





Max cutting depth	ap	pf
D1 < 3	1.5 D	0.05 D
D1 > 3	1.5 D	0.1 D

	ap	pf
D1 < 3	1 D	0.15 D
D1 > 3	1 D	0.02 D

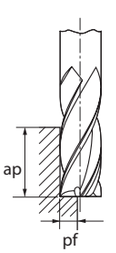
	C≤0.2% - GG E24 ■ XC48 ■ FT25 750 N/mm2		SCM - SKD 350NCD16 ■ 40CMD8 ~30 HRc		30~38 HRc 35NCD16 30~38 HRc		30~38 HRc 35NCD16 30~38 HRc		45~55 HRc -SUS Z38CDV5 45~55 HRc		55~60 HRc Z160CDV12 55~60 HRc	
D1	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)
2.0	13000	310	11000	280	7000	110	6350	100	3950	60	2750	40
3.0	8900	505	7400	355	5300	125	4750	110	2750	60	2000	45
4.0	6650	530	5550	370	4250	135	3700	115	2200	70	1550	45
5.0	5300	620	4450	425	3550	140	3150	125	1900	75	1250	40
6.0	4450	615	3700	425	2950	145	2650	130	1550	70	1050	40
8.0	3300	590	2750	420	2200	145	1950	130	1150	65	795	35
10.0	2650	590	2200	420	1750	145	1550	130	955	65	635	35
12.0	2200	590	1850	420	1450	145	1300	130	795	60	530	30
14.0	1900	575	1550	415	1250	145	1100	125	680	50	455	25
16.0	1650	550	1350	415	1100	130	995	115	595	45	395	20
18.0	1450	540	1200	405	990	115	880	105	530	40	350	20
20.0	1300	520	1100	370	890	105	795	95	475	35	315	19

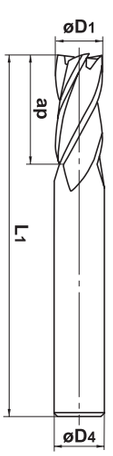
Long Shank Square End Mills

DIN 6535 Form HA | 35° | MG 12 0.4 µm | HRc 60 | AlTiN

40 YH

Item code	D1	R	β	ap	D5	L3	L1	D4
40YH 06060	6.0			15			75	6
40YH 06062	6.0			15			100	6
40YH 08080	8.0			20			100	8
40YH 08082	8.0			20			150	8
40YH 10100	10.0			25			100	10
40YH 10102	10.0			25			150	10
40YH 12120	12.0			30			100	12
40YH 12122	12.0			30			150	12
40YH 16160	16.0			40			150	16



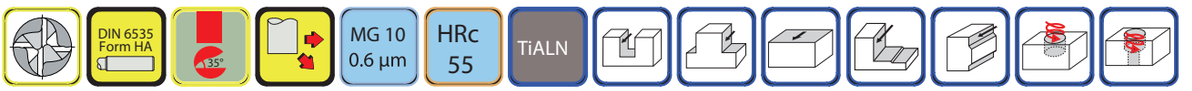


Max cutting depth	ap	pf
D1 < 3	1.5 D	0.05 D
D1 > 3	1.5 D	0.1 D

	ap	pf
D1 < 3	1 D	0.15 D
D1 > 3	1 D	0.02 D

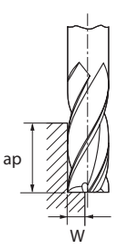
	C≤0.2% - GG E24 ■ XC48 ■ FT25 750 N/mm2		SCM - SKD 350NCD16 ■ 40CMD8 ~30 HRc		30~38 HRc 35NCD16 30~38 HRc		30~38 HRc 35NCD16 30~38 HRc		45~55 HRc -SUS Z38CDV5 45~55 HRc		55~60 HRc Z160CDV12 55~60 HRc	
D1	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)
2.0	13000	310	11000	280	7000	110	6350	100	3950	60	2750	40
3.0	8900	505	7400	355	5300	125	4750	110	2750	60	2000	45
4.0	6650	530	5550	370	4250	135	3700	115	2200	70	1550	45
5.0	5300	620	4450	425	3550	140	3150	125	1900	75	1250	40
6.0	4450	615	3700	425	2950	145	2650	130	1550	70	1050	40
8.0	3300	590	2750	420	2200	145	1950	130	1150	65	795	35
10.0	2650	590	2200	420	1750	145	1550	130	955	65	635	35
12.0	2200	590	1850	420	1450	145	1300	130	795	60	530	30
14.0	1900	575	1550	415	1250	145	1100	125	680	50	455	25
16.0	1650	550	1350	415	1100	130	995	115	595	45	395	20
18.0	1450	540	1200	405	990	115	880	105	530	40	350	20
20.0	1300	520	1100	370	890	105	795	95	475	35	315	19

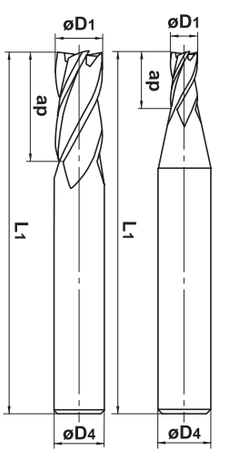
Long Shank Square End Mills



40 YQ

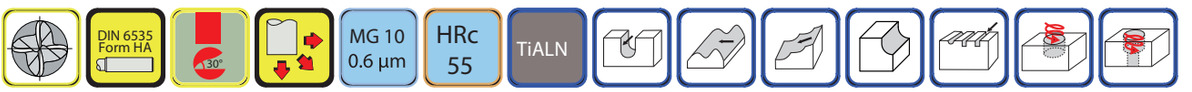
Item code	D1	R	β	ap	D5	L3	L1	D4
40YQ 02004	2.0			15			50	4
40YQ 03004	3.0			20			50	4
40YQ 04004	4.0			25			75	4
40YQ 05006	5.0			30			75	6
40YQ 06006	6.0			30			75	6
40YQ 08008	8.0			40			100	8
40YQ 10010	10.0			40			100	10
40YQ 12012	12.0			45			100	12
40YQ 16016	16.0			60			150	16
40YQ 20020	20.0			60			150	20





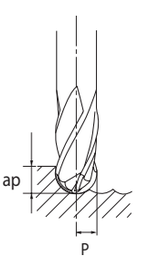
Max cutting depth	ap 2.5D1	W 0.05 D1	ap 2.0D1	W 0.02 D1		
	Cabon Steels. Alloy Steels S45C . FC . FCD. SCM . S50C . SKS ... HRc 30		Alloy Steels. Tool Steels Sc . SNCM . SKD11 . SKD61 . NAK80 ... HRc 50		Hadened Steels SKD11 HRc 60	
D1	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)
2	3000	50	2500	40	1000	15
3	2500	60	2000	50	800	20
4	2000	80	1700	70	700	30
5	1800	110	1500	85	600	40
6	1500	110	1400	75	550	50
8	1300	110	1100	75	450	50
10	1000	110	800	75	300	50
12	900	110	700	75	250	40
16	800	95	500	70	150	20
20	500	80	400	60	120	20

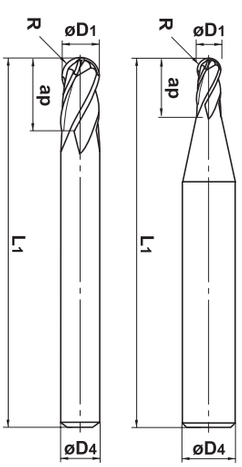
Ball Nose End Mills



41 HA

Item code	D1	R	β	ap	D5	L3	L1	D4
41HA 01004	1.0	0.5		2			50	4
41HA 01504	1.5	0.75		3			50	4
41HA 02004	2.0	1		4			50	4
41HA 02504	2.5	1.25		5			50	4
41HA 03004	3.0	1.5		6			50	4
41HA 04004	4.0	2		8			50	4
41HA 05006	5.0	2.5		10			50	6
41HA 06006	6.0	3		12			50	6
41HA 08008	8.0	4		16			60	8
41HA 10010	10.0	5		20			75	10
41HA 12012	12.0	6		24			75	12





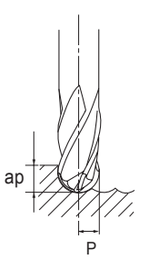
Max cutting depth	ap	P	ap	P
	0,15R	0.04 R	0,05D1	0.02 R

	Cabon Steels. Alloy Steels S45C . FC . FCD. SCM . S50C . SKS ... HRc 30		Alloy Steels. Tool Steels Sc . SNCM . SKD11 . SKD61 . NAK80 ... HRc 50		Hadened Steels SKD11 HRc 60	
D1	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)
1	45000	800	35000	600	20000	200
1,5	23000	800	18000	600	10000	200
2	23000	800	18000	600	10000	200
3	16000	1000	12000	600	6500	200
4	12000	1200	9500	900	5000	400
6	8000	1400	6000	900	3500	500
8	6000	1600	5000	1000	2500	600
10	5000	1400	4000	1000	2000	600
12	4000	1200	3000	900	1500	500
16	3000	1200	2500	900	1000	500
20	2500	1000	2000	600	900	300

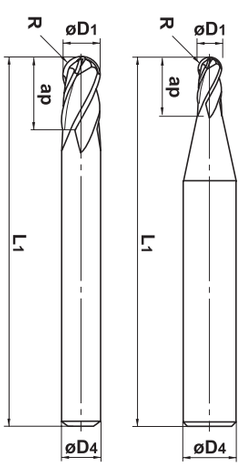
Ball Nose End Mills

41 NB

Item code	D1	R	β	ap	D5	L3	L1	D4
41NB 01004	1.0	0.5		2			50	4
41NB 01504	1.5	0.75		3			50	4
41NB 02004	2.0	1		4			50	4
41NB 02504	2.5	1.25		5			50	4
41NB 03004	3.0	1.5		6			50	4
41NB 04004	4.0	2		8			50	4
41NB 05006	5.0	2.5		10			50	6
41NB 06006	6.0	3		12			50	6
41NB 08008	8.0	4		16			60	8
41NB 10010	10.0	5		20			75	10
41NB 12012	12.0	6		24			75	12
41NB 16016	16.0	8		32			100	16



Max cutting depth	ap	P	ap	P		
	0,04R	0.06 R	0,02D1	0.03 R		
	Cabon Steels. Alloy Steels S45C . FC . FCD. SCM . S50C . SKS ... HRc 30		Alloy Steels. Tool Steels Sc . SNCM . SKD11 . SKD61 . NAK80 ... HRc 50		Hadened Steels SKD11 HRc 60	
D1	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)
1	45000	2000	45000	1800	28000	1000
1,5	23000	2000	22000	1800	16000	900
2	23000	2000	22000	1800	16000	900
3	16000	2000	15000	1800	11000	900
4	15000	3000	14000	2600	10000	1700
6	13000	4000	11000	2600	9000	1900
8	9000	2900	8000	1900	6200	1800
10	7500	2400	6500	1500	5200	1100
12	6300	2100	5500	1300	4300	1000
16	4500	1500	3800	1000	3300	900
20	3700	1200	3200	750	2600	600



Ball Nose End Mills

DIN 6535 Form HA | 15° | MG 9 0.2 µm | HRc 68 | AlTiN

41 RD

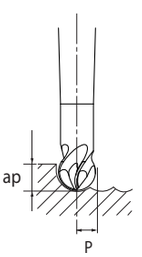
Item code	D1	R	β	ap	D5	L3	L1	D4
41RD 05006	5.0	2.5	6	25	4,72		80	6
41RD 06006	6.0	3	7	30	5,80		100	6
41RD 08008	8.0	4	9	40	7,70		100	8
41RD 10010	10.0	5	11	50	9,60		100	10
41RD 12012	12.0	6	13	50	11,50		100	12
41RD 16016	16,0	8	17	60	15,20		150	16

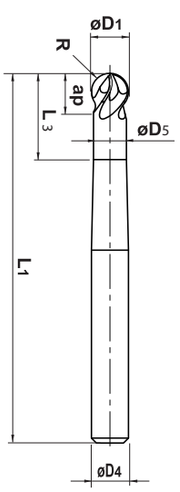
New

HOT NEWS

41 RD series
for High hardened Steels

Powerful and High Speed Milling

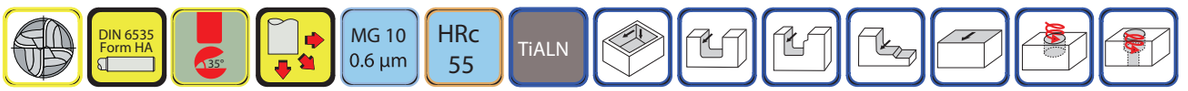




Max cutting depth	ap	P	ap	P
	0,04R	0.06 R	0,02D1	0.03 R

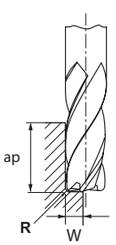
	Cabon Steels. Alloy Steels S45C . FC . FCD. SCM . S50C . SKS ... HRc 30		Alloy Steels. Tool Steels Sc . SNCM . SKD11 . SKD61 . NAK80 ... HRc 50		Hadened Steels SKD11 HRc 60	
D1	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)
1	45000	2000	45000	1800	28000	1000
1,5	23000	2000	22000	1800	16000	900
2	23000	2000	22000	1800	16000	900
3	16000	2000	15000	1800	11000	900
4	15000	3000	14000	2600	10000	1700
6	13000	4000	11000	2600	9000	1900
8	9000	2900	8000	1900	6200	1800
10	7500	2400	6500	1500	5200	1100
12	6300	2100	5500	1300	4300	1000
16	4500	1500	3800	1000	3300	900
20	3700	1200	3200	750	2600	600

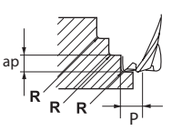
Corner Radius End Mills

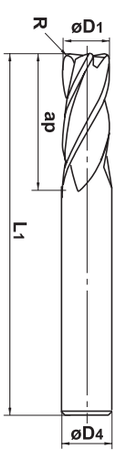


42 HA

Item code	D1	R	β	ap	D5	L3	L1	D4
42HA 03023	3.0	0.2		6			50	3
42HA 03053	3.0	0.5		6			50	3
42HA 04024	4.0	0.2		8			50	4
42HA 04054	4.0	0.5		8			50	4
42HA 04104	4.0	1.0		8			50	4
42HA 06026	6.0	0.2		12			50	6
42HA 06056	6.0	0.5		12			50	6
42HA 06106	6.0	1.0		12			50	6
42HA 06156	6.0	1.5		12			50	6
42HA 06206	6.0	2.0		12			50	6
42HA 08038	8.0	0.3		16			60	8
42HA 08058	8.0	0.5		16			60	8
42HA 08108	8.0	1.0		16			60	8
42HA 08158	8.0	1.5		16			60	8
42HA 08208	8.0	2.0		16			60	8
42HA 10051	10.0	0.5		20			75	10
42HA 10101	10.0	1.0		20			75	10
42HA 10151	10.0	1.5		20			75	10
42HA 10201	10.0	2.0		20			75	10
42HA 10301	10.0	3.0		20			75	10
42HA 12055	12.0	0.5		24			75	12
42HA 12105	12.0	1.0		24			75	12
42HA 12155	12.0	1.5		24			75	12
42HA 12205	12.0	2.0		24			75	12
42HA 12305	12.0	3.0		24			75	12







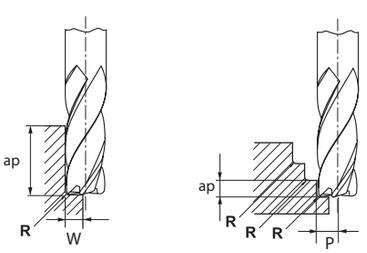
Max cutting depth	ap 0.02D1	P 0.02 D1			ap 1D1	W 0.02 D1
	Cabon Steels, Alloy Steels S45C , FC , FCD, SCM , S50C , SKS ,.. HRc 30		Alloy Steels, Tool Steels Sc , SNCM , SKD11 , SKD61 , NAK80 ,.. HRc 50		Hadened Steels SKD11 HRc 60	
D1	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)
3	9500	450	6000	290	3600	120
4	8000	800	5000	480	3200	160
5	6800	820	4000	500	2500	170
6	6000	900	3600	530	2300	220
8	4600	1000	2800	530	1800	250
10	3500	850	2200	420	1400	220
12	3000	720	1800	350	1200	200
16	2300	520	1400	250	900	150

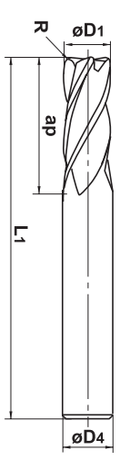
Corner Radius End Mills

DIN 6535 Form HA | 35° | MG 12 0.4 µm | HRc 65 | AlTiN

42 HG

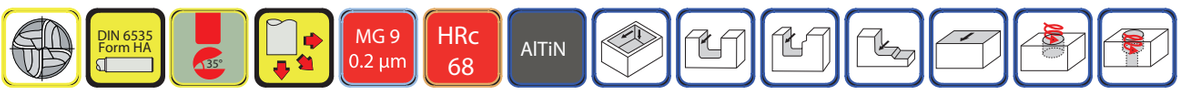
Item code	D1	R	β	ap	D5	L3	L1	D4
42HG 03023	3.0	0.2		6			50	3
42HG 03053	3.0	0.5		6			50	3
42HG 04024	4.0	0.2		8			50	4
42HG 04054	4.0	0.5		8			50	4
42HG 04104	4.0	1.0		8			50	4
42HG 06026	6.0	0.2		12			50	6
42HG 06056	6.0	0.5		12			50	6
42HG 06106	6.0	1.0		12			50	6
42HG 06156	6.0	1.5		12			50	6
42HG 06206	6.0	2.0		12			50	6
42HG 08038	8.0	0.3		16			60	8
42HG 08058	8.0	0.5		16			60	8
42HG 08108	8.0	1.0		16			60	8
42HG 08158	8.0	1.5		16			60	8
42HG 08208	8.0	2.0		16			60	8
42HG 10031	10.0	0.3		20			75	10
42HG 10051	10.0	0.5		20			75	10
42HG 10101	10.0	1.0		20			75	10
42HG 10151	10.0	1.5		20			75	10
42HG 10201	10.0	2.0		20			75	10
42HG 10301	10.0	3.0		20			75	10
42HG 12055	12.0	0.5		24			75	12
42HG 12105	12.0	1.0		24			75	12
42HG 12155	12.0	1.5		24			75	12
42HG 12205	12.0	2.0		24			75	12
42HG 12305	12.0	3.0		24			75	12





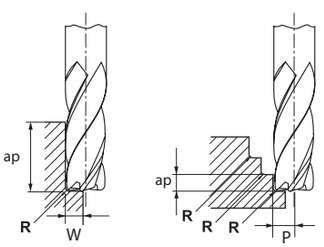
Max cutting depth	ap 0.02D1	P 0.02 D1			ap 1D1	W 0.02 D1
	Cabon Steels, Alloy Steels S45C , FC , FCD, SCM , S50C , SKS ,.. HRc 30		Alloy Steels, Tool Steels Sc , SNCM , SKD11 , SKD61 , NAK80 ,.. HRc 50		Hadened Steels SKD11 HRc 60	
D1	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)
2	26000	1600	16500	1000	7500	300
3	19000	1800	12000	1200	5400	360
4	16000	3200	10000	1900	4800	480
5	14000	3300	8000	2000	3800	500
6	12000	3600	7200	2200	3500	650
8	9600	4000	5600	2200	2700	750
10	7000	3400	4400	1700	2100	650
12	6000	2800	3600	1400	1800	600
16	4500	2000	2800	1000	1400	450

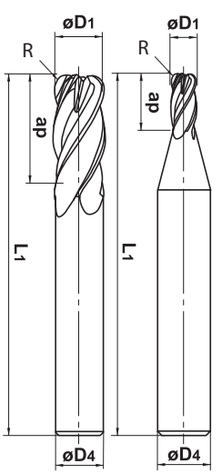
Corner Radius End Mills



42 HM

Item code	D1	R	β	ap	D5	L3	L1	D4
42HM 01024	1.0	0.2		2			50	4
42HM 01524	1.5	0.2		3			50	4
42HM 01534	1.5	0.3		3			50	4
42HM 02024	2.0	0.2		4			50	4
42HM 02034	2.0	0.3		4			50	4
42HM 02054	2.0	0.5		4			50	4
42HM 03023	3.0	0.2		6			50	3
42HM 03053	3.0	0.5		6			50	3
42HM 03024	3.0	0.2		6			50	4
42HM 03054	3.0	0.5		6			50	4
42HM 04024	4.0	0.2		8			50	4
42HM 04054	4.0	0.5		8			50	4
42HM 04104	4.0	1.0		8			50	4
42HM 06056	6.0	0.5		12			50	6
42HM 06106	6.0	1.0		12			50	6
42HM 08058	8.0	0.5		16			60	8
42HM 08108	8.0	1.0		16			60	8
42HM 10051	10.0	0.5		20			75	10
42HM 10101	10.0	1.0		20			75	10
42HM 10201	10.0	2.0		20			75	10
42HM 10301	10.0	3.0		20			75	10
42HM 12055	12.0	0.5		24			75	12
42HM 12105	12.0	1.0		24			75	12
42HM 12205	12.0	2.0		24			75	12
42HM 12305	12.0	3.0		24			75	12





Max cutting depth	ap	P			ap	W
	0.02D1	0.02 D1			1D1	0.02 D1
	Cabon Steels, Alloy Steels S45C , FC , FCD, SCM , S50C , SKS ,.. HRc 30		Alloy Steels, Tool Steels Sc , SNCM , SKD11 , SKD61 , NAK80 ,.. HRc 50		Hadened Steels SKD11 HRc 60	
D1	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)
2	26000	1600	16500	1000	7500	300
3	19000	1800	12000	1200	5400	360
4	16000	3200	10000	1900	4800	480
5	14000	3300	8000	2000	3800	500
6	12000	3600	7200	2200	3500	650
8	9600	4000	5600	2200	2700	750
10	7000	3400	4400	1700	2100	650
12	6000	2800	3600	1400	1800	600

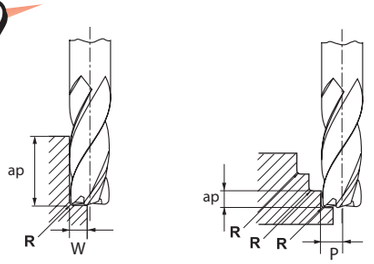
Corner Radius End Mills

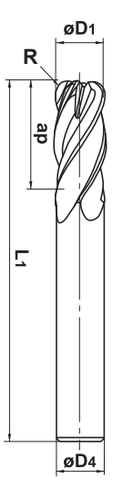
DIN 6535 Form HA | 35° | MG 12 0.4 µm | HRc 65 | TiAl

42 HP

Item code	D1	R	β	ap	D5	L3	L1	D4
42HP 03023	3.0	0.2		8			50	3
42HP 03053	3.0	0.5		8			50	3
42HP 04024	4.0	0.2		11			50	4
42HP 04054	4.0	0.5		11			50	4
42HP 04104	4.0	1.0		11			50	4
42HP 06026	6.0	0.2		16			50	6
42HP 06056	6.0	0.5		16			50	6
42HP 06106	6.0	1.0		16			50	6
42HP 06156	6.0	1.5		16			50	6
42HP 06206	6.0	2.0		16			50	6
42HP 08038	8.0	0.3		20			60	8
42HP 08058	8.0	0.5		20			60	8
42HP 08108	8.0	1.0		20			60	8
42HP 08158	8.0	1.5		20			60	8
42HP 08208	8.0	2.0		20			60	8
42HP 10031	10.0	0.3		25			75	10
42HP 10051	10.0	0.5		25			75	10
42HP 10101	10.0	1.0		25			75	10
42HP 10151	10.0	1.5		25			75	10
42HP 10201	10.0	2.0		25			75	10
42HP 10301	10.0	3.0		25			75	10
42HP 12055	12.0	0.5		30			75	12
42HP 12105	12.0	1.0		30			75	12
42HP 12155	12.0	1.5		30			75	12
42HP 12205	12.0	2.0		30			75	12
42HP 12305	12.0	3.0		30			75	12

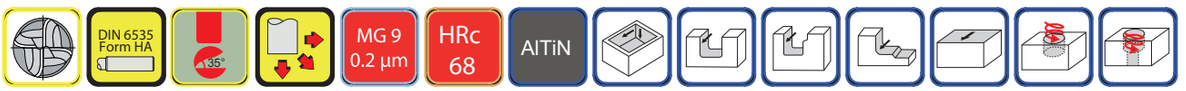
New





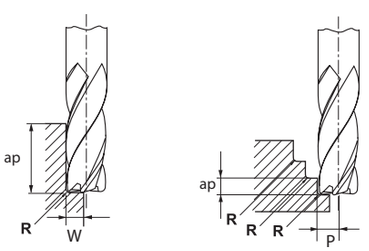
Max cutting depth	ap	P			ap	W
	0.02D1	0.02 D1			1D1	0.02 D1
	Cabon Steels, Alloy Steels S45C , FC , FCD, SCM , S50C , SKS ,.. HRc 30		Alloy Steels, Tool Steels Sc , SNCM , SKD11 , SKD61 , NAK80 ,.. HRc 50		Hadened Steels SKD11 HRc 60	
D1	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)
2	26000	1600	16500	1000	7500	300
3	19000	1800	12000	1200	5400	360
4	16000	3200	10000	1900	4800	480
5	14000	3300	8000	2000	3800	500
6	12000	3600	7200	2200	3500	650
8	9600	4000	5600	2200	2700	750
10	7000	3400	4400	1700	2100	650
12	6000	2800	3600	1400	1800	600
16	4500	2000	2800	1000	1400	450

Corner Radius End Mills



42 HQ

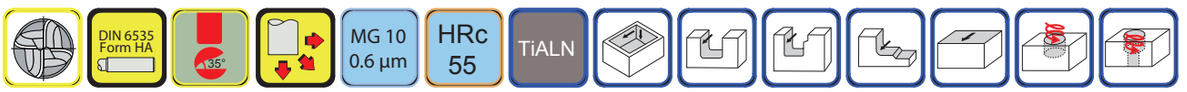
Item code	D1	R	β	ap	D5	L3	L1	D4
42HQ 06056	6.0	0.5		12			75	6
42HQ 06057	6.0	0.5		12			100	6
42HQ 06106	6.0	1.0		12			75	6
42HQ 06107	6.0	1.0		12			100	6
42HQ 08058	8.0	0.5		16			100	8
42HQ 08108	8.0	1.0		16			100	8
42HQ 10051	10.0	0.5		20			100	10
42HQ 10101	10.0	1.0		20			100	10
42HQ 10201	10.0	2.0		20			100	10
42HQ 12055	12.0	0.5		24			100	12
42HQ 12105	12.0	1.0		24			100	12
42HQ 12205	12.0	2.0		24			100	12



Max cutting depth	ap	P		ap	W
	0.02D1	0.02 D1		1D1	0.02 D1

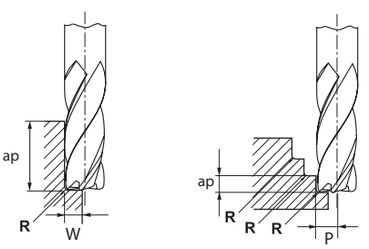
	Cabon Steels, Alloy Steels S45C , FC , FCD, SCM , S50C , SKS ,.. HRc 30		Alloy Steels, Tool Steels Sc , SNCM , SKD11 , SKD61 , NAK80 ,.. HRc 50		Hadened Steels SKD11 HRc 60	
D1	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)
2	26000	1600	16500	1000	7500	300
3	19000	1800	12000	1200	5400	360
4	16000	3200	10000	1900	4800	480
5	14000	3300	8000	2000	3800	500
6	12000	3600	7200	2200	3500	650
8	9600	4000	5600	2200	2700	750
10	7000	3400	4400	1700	2100	650
12	6000	2800	3600	1400	1800	600
16	4500	2000	2800	1000	1400	450

Long Shank Corner Radius End Mills



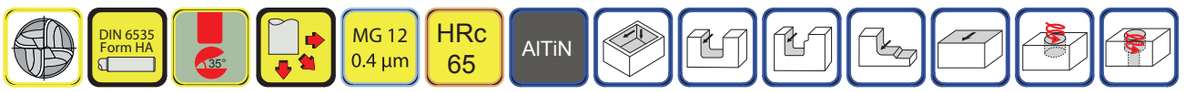
42 HT

Item code	D1	R	β	ap	D5	L3	L1	D4
42HT 06056	6.0	0.5		12			75	6
42HT 06057	6.0	0.5		12			100	6
42HT 06106	6.0	1.0		12			75	6
42HT 06107	6.0	1.0		12			100	6
42HT 08058	8.0	0.5		16			100	8
42HT 08108	8.0	1.0		16			100	8
42HT 10051	10.0	0.5		20			100	10
42HT 10101	10.0	1.0		20			100	10
42HT 10201	10.0	2.0		20			100	10
42HT 12055	12.0	0.5		24			100	12
42HT 12105	12.0	1.0		24			100	12
42HT 12205	12.0	2.0		24			100	12



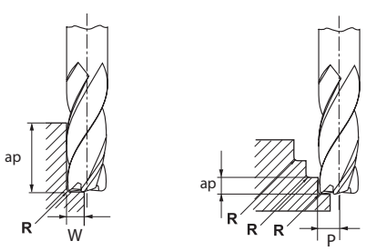
Max cutting depth	ap	P			ap	W
	0.02D1	0.02 D1			1D1	0.02 D1
	Cabon Steels, Alloy Steels S45C , FC , FCD, SCM , S50C , SKS ,.. HRc 30		Alloy Steels, Tool Steels Sc , SNCM , SKD11 , SKD61 , NAK80 ,.. HRc 50		Hadened Steels SKD11 HRc 60	
D1	**S** (min-1)	**F** (mm/min)	**S** (min-1)	**F** (mm/min)	**S** (min-1)	**F** (mm/min)
6	4800	560	2900	330	1800	140
8	3700	620	2200	330	1500	160
10	2900	530	1700	260	1100	140
12	2400	450	1400	220	1000	125

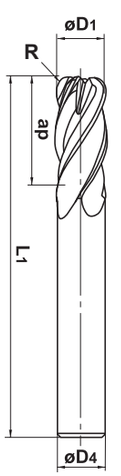
Long Shank Corner Radius End Mills



42 NF

Item code	D1	R	β	ap	D5	L3	L1	D4
42NF 06056	6.0	0.5		12			75	6
42NF 06057	6.0	0.5		12			100	6
42NF 06106	6.0	1.0		12			75	6
42NF 06107	6.0	1.0		12			100	6
42NF 08058	8.0	0.5		16			100	8
42NF 08108	8.0	1.0		16			100	8
42NF 10051	10.0	0.5		20			100	10
42NF 10101	10.0	1.0		20			100	10
42NF 10201	10.0	2.0		20			100	10
42NF 12055	12.0	0.5		24			100	12
42NF 12105	12.0	1.0		24			100	12
42NF 12205	12.0	2.0		24			100	12





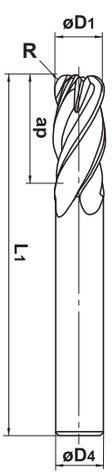
Max cutting depth	ap 0.02D1	P 0.02 D1			ap 1D1	W 0.02 D1
	Cabon Steels, Alloy Steels S45C , FC , FCD, SCM , S50C , SKS ,.. HRc 30		Alloy Steels, Tool Steels Sc , SNCM , SKD11 , SKD61 , NAK80 ,.. HRc 50		Hadened Steels SKD11 HRc 60	
D1	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)
2	26000	1600	16500	1000	7500	300
3	19000	1800	12000	1200	5400	360
4	16000	3200	10000	1900	4800	480
5	14000	3300	8000	2000	3800	500
6	12000	3600	7200	2200	3500	650
8	9600	4000	5600	2200	2700	750
10	7000	3400	4400	1700	2100	650
12	6000	2800	3600	1400	1800	600
16	4500	2000	2800	1000	1400	450

Long Shank Corner Radius End Mills

DIN 6535 Form HA | 35° | MG 9 0.2 µm | HRc 68 | AlTiN

42 NS

Item code	D1	R	β	ap	D5	L3	L1	D4
42NS 03033	3.0	0.3		6			70	3
42NS 03053	3.0	0.5		6			70	3
42NS 04034	4.0	0.3		8			80	4
42NS 04054	4.0	0.5		8			80	4
42NS 04104	4.0	1.0		8			80	4
42NS 04154	4.0	1.5		8			80	4
42NS 06036	6.0	0.3		12			100	6
42NS 06056	6.0	0.5		12			100	6
42NS 06106	6.0	1.0		12			100	6
42NS 06156	6.0	1.5		12			100	6
42NS 06206	6.0	2.0		12			100	6
42NS 06256	6.0	2.5		12			100	6
42NS 08038	8.0	0.3		16			100	8
42NS 08058	8.0	0.5		16			100	8
42NS 08108	8.0	1.0		16			100	8
42NS 08158	8.0	1.5		16			100	8
42NS 08208	8.0	2.0		16			100	8
42NS 08258	8.0	2.5		16			100	8
42NS 08308	8.0	3.0		16			100	8
42NS 10031	10.0	0.3		20			120	10
42NS 10051	10.0	0.5		20			120	10
42NS 10101	10.0	1.0		20			120	10
42NS 10151	10.0	1.5		20			120	10
42NS 10201	10.0	2.0		20			120	10
42NS 10251	10.0	2.5		20			120	10
42NS 10301	10.0	3.0		20			120	10
42NS 12055	12.0	0.5		24			120	12
42NS 12105	12.0	1.0		24			120	12
42NS 12155	12.0	1.5		24			120	12
42NS 12205	12.0	2.0		24			120	12
42NS 12255	12.0	2.5		24			120	12
42NS 12305	12.0	3.0		24			120	12
42NS 16106	16.0	1.0		32			120	16
42NS 16206	16.0	2.0		32			120	16
42NS 16306	16.0	3.0		32			120	16
42NS 20107	20.0	1.0		40			160	20
42NS 20207	20.0	2.0		40			160	20
42NS 20307	20.0	3.0		40			160	20

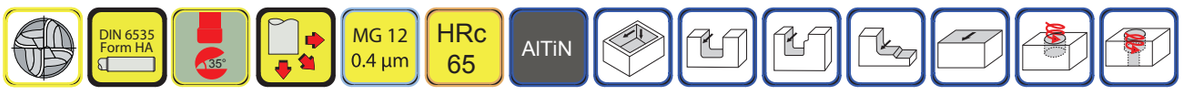


High Precision Rotation accuracy 0.005 mm

New

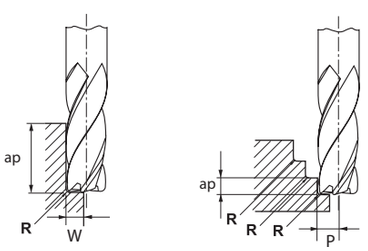
Cutting Conditions P.102

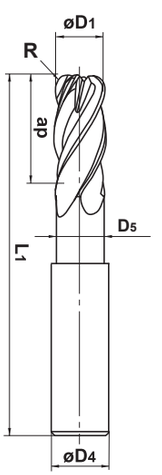
Corner Radius End Mills



42 NY

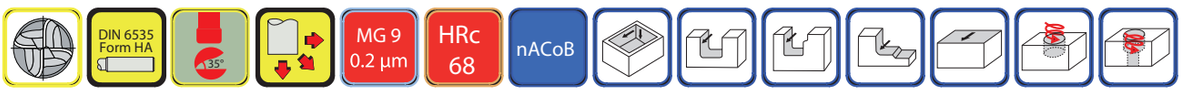
Item code	D1	R	β	ap	D5	L3	L1	D4
42NY 04024	4.0	0.2		8	3.88	12	50	4
42NY 04054	4.0	0.5		8	3.88	12	50	4
42NY 06026	6.0	0.2		12	5.80	18	50	6
42NY 06056	6.0	0.5		12	5.80	18	50	6
42NY 06106	6.0	1.0		12	5.80	18	50	6
42NY 08038	8.0	0.3		16	7.70	24	60	8
42NY 08058	8.0	0.5		16	7.70	24	60	8
42NY 08108	8.0	1.0		16	7.70	24	60	8
42NY 10031	10.0	0.3		20	9.60	30	75	10
42NY 10051	10.0	0.5		20	9.60	30	75	10
42NY 10101	10.0	1.0		20	9.60	30	75	10
42NY 10201	10.0	2.0		20	9.60	30	75	10
42NY 10301	10.0	3.0		20	9.60	30	75	10
42NY 12055	12.0	0.5		24	11.50	36	75	12
42NY 12105	12.0	1.0		24	11.50	36	75	12
42NY 12205	12.0	2.0		24	11.50	36	75	12
42NY 16056	16.0	0.5		30	15.40	40	100	16
42NY 16106	16.0	1.0		30	15.40	40	100	16





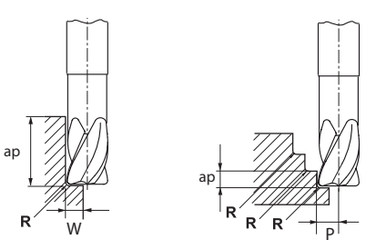
Max cutting depth	ap 0.02D1	P 0.02 D1			ap 1D1	W 0.02 D1
	Cabon Steels, Alloy Steels S45C , FC , FCD, SCM , S50C , SKS ,.. HRc 30		Alloy Steels, Tool Steels Sc , SNCM , SKD11 , SKD61 , NAK80 ,.. HRc 50		Hadened Steels SKD11 HRc 60	
D1	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)
2	26000	1600	16500	1000	7500	300
3	19000	1800	12000	1200	5400	360
4	16000	3200	10000	1900	4800	480
5	14000	3300	8000	2000	3800	500
6	12000	3600	7200	2200	3500	650
8	9600	4000	5600	2200	2700	750
10	7000	3400	4400	1700	2100	650
12	6000	2800	3600	1400	1800	600
16	4500	2000	2800	1000	1400	450

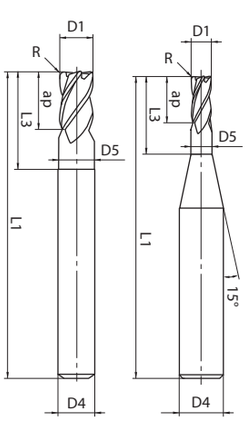
Corner Radius End Mills



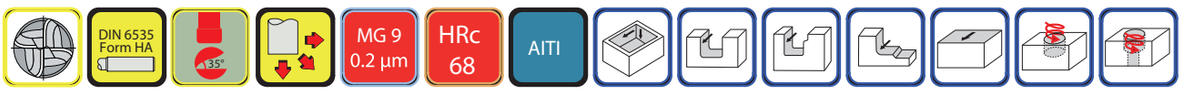
42 RP

Item code	D1	R	β	ap	D5	L3	L1	D4
42RP 03056	3.0	0.5		3	2.90	9	50	6
42RP 04056	4.0	0.5		4	3.90	12	50	6
42RP 06056	6.0	0.5		6	5.80	15	50	6
42RP 06106	6.0	1.0		6	5.80	15	50	6
42RP 08058	8.0	0.5		8	7.70	20	60	8
42RP 08108	8.0	1.0		8	7.70	20	60	8
42RP 08208	8.0	2.0		8	7.70	20	60	8
42RP 10101	10.0	1.0		10	9.60	25	75	10
42RP 10201	10.0	2.0		10	9.60	25	75	10
42RP 10301	10.0	3.0		10	9.60	25	75	10
42RP 12105	12.0	1.0		12	11.50	30	75	12
42RP 12125	12.0	2.0		12	11.50	30	75	12
42RP 12135	12.0	3.0		12	11.50	30	75	12





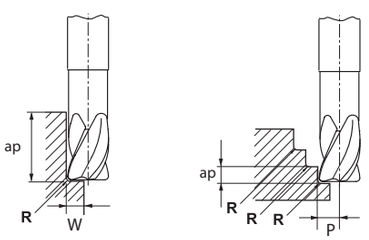
Max cutting depth	ap	P			ap	W
	0.02D1	0.02 D1			1D1	0.02 D1
	Cabon Steels, Alloy Steels S45C , FC , FCD, SCM , S50C , SKS ,.. HRc 30		Alloy Steels, Tool Steels Sc , SNCM , SKD11 , SKD61 , NAK80 ,.. HRc 50		Hadened Steels SKD11 HRc 60	
D1	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)
2	26000	1600	16500	1000	7500	300
3	19000	1800	12000	1200	5400	360
4	16000	3200	10000	1900	4800	480
5	14000	3300	8000	2000	3800	500
6	12000	3600	7200	2200	3500	650
8	9600	4000	5600	2200	2700	750
10	7000	3400	4400	1700	2100	650
12	6000	2800	3600	1400	1800	600
16	4500	2000	2800	1000	1400	450

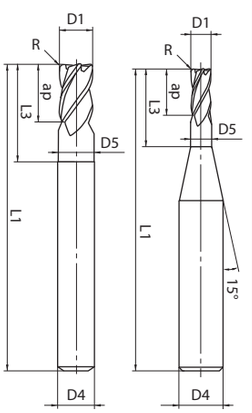


42 YA

Item code	D1	R	β	ap	D5	L3	L1	D4
42YA 03056	3.0	0.5		3	2.90	9	50	6
42YA 04056	4.0	0.5		4	3.90	12	50	6
42YA 06056	6.0	0.5		6	5.80	15	50	6
42YA 06106	6.0	1.0		6	5.80	15	50	6
42YA 08058	8.0	0.5		8	7.70	20	60	8
42YA 08108	8.0	1.0		8	7.70	20	60	8
42YA 10101	10.0	1.0		10	9.60	25	75	10
42YA 10201	10.0	2.0		10	9.60	25	75	10
42YA 10301	10.0	3.0		10	9.60	25	75	10
42YA 12105	12.0	1.0		12	11.50	30	75	12
42YA 12205	12.0	2.0		12	11.50	30	75	12

New





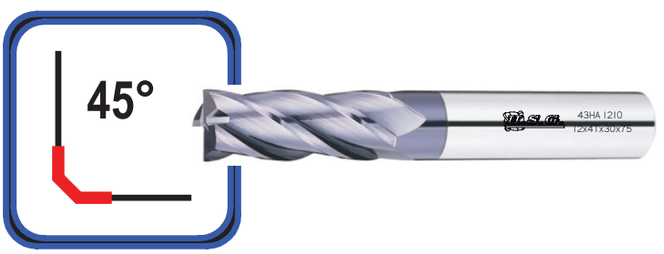
Max cutting depth	ap 0.02D1	P 0.02 D1			ap 1D1	W 0.02 D1
	Cabon Steels, Alloy Steels S45C , FC , FCD, SCM , S50C , SKS ,.. HRc 30		Alloy Steels, Tool Steels Sc , SNCM , SKD11 , SKD61 , NAK80 ,.. HRc 50		Hadened Steels SKD11 HRc 60	
D1	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)
2	26000	1600	16500	1000	7500	300
3	19000	1800	12000	1200	5400	360
4	16000	3200	10000	1900	4800	480
5	14000	3300	8000	2000	3800	500
6	12000	3600	7200	2200	3500	650
8	9600	4000	5600	2200	2700	750
10	7000	3400	4400	1700	2100	650
12	6000	2800	3600	1400	1800	600
16	4500	2000	2800	1000	1400	450

Chamfer Square End Mills

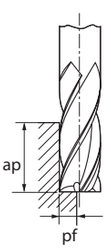
DIN 6535 Form HA | 35° | MG 12 0.4 µm | HRc 65 | AlTiN

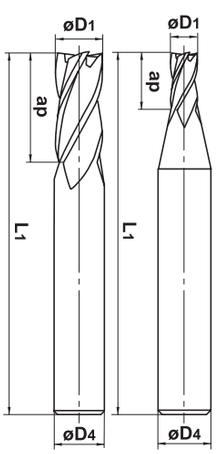
43 HA

Item code	D1	C	β	ap	D5	L3	L1	D4
43HA 04056	4.0	0.5				11	50	6
43HA 04106	4.0	1.0				11	50	6
43HA 06056	6.0	0.5				16	50	6
43HA 06106	6.0	1.0				16	50	6
43HA 08058	8.0	0.5				20	60	8
43HA 08108	8.0	1.0				20	60	8
43HA 10051	10.0	0.5				25	75	10
43HA 10101	10.0	1.0				25	75	10
43HA 10201	10.0	2.0				25	75	10
43HA 12055	12.0	0.5				30	75	12
43HA 12105	12.0	1.0				30	75	12
43HA 12205	12.0	2.0				30	75	12



New



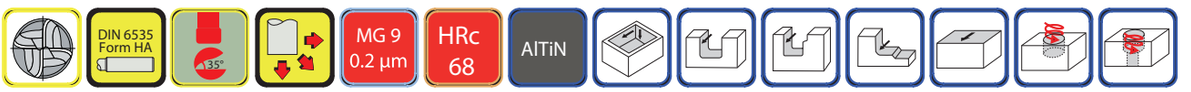


Max cutting depth	ap	pf
D1 < 3	1.5 D	0.05 D
D1 > 3	1.5 D	0.1 D

	ap	pf
D1 < 3	1 D	0.15 D
D1 > 3	1 D	0.02 D

D1	C≤0.2% - GG E24 ■ XC48 ■ FT25 750 N/mm2		SCM - SKD 350NCD16 ■ 40CMD8 ~30 HRc		30~38 HRc 35NCD16 30~38 HRc		30~38 HRc 35NCD16 30~38 HRc		45~55 HRc -SUS Z38CDV5 45~55 HRc		55~60 HRc Z160CDV12 55~60 HRc	
	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)
2.0	13000	310	11000	280	7000	110	6350	100	3950	60	2750	40
3.0	8900	505	7400	355	5300	125	4750	110	2750	60	2000	45
4.0	6650	530	5550	370	4250	135	3700	115	2200	70	1550	45
5.0	5300	620	4450	425	3550	140	3150	125	1900	75	1250	40
6.0	4450	615	3700	425	2950	145	2650	130	1550	70	1050	40
8.0	3300	590	2750	420	2200	145	1950	130	1150	65	795	35
10.0	2650	590	2200	420	1750	145	1550	130	955	65	635	35
12.0	2200	590	1850	420	1450	145	1300	130	795	60	530	30
14.0	1900	575	1550	415	1250	145	1100	125	680	50	455	25
16.0	1650	550	1350	415	1100	130	995	115	595	45	395	20
18.0	1450	540	1200	405	990	115	880	105	530	40	350	20
20.0	1300	520	1100	370	890	105	795	95	475	35	315	19

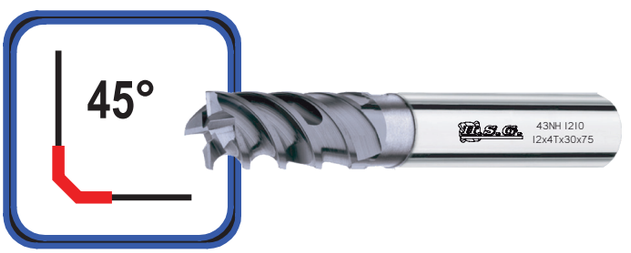
Chamfer Square End Mills

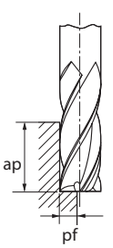


43 NH

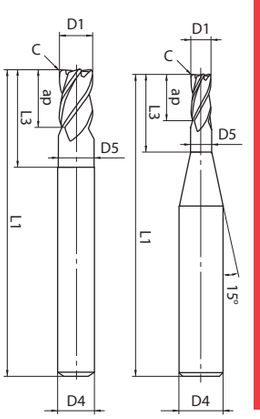
Item code	D1	C	β	ap	D5	L3	L1	D4
43NH 04010	4.0	0.10		11	3.8	21	60	6
43NH 05010	5.0	0.10		13	4.8	21	60	6
43NH 06010	6.0	0.10		13	5.8	21	60	6
43NH 08015	8.0	0.15		19	7.8	27	65	8
43NH 10015	10.0	0.15		22	9.8	32	70	10
43NH 12020	12.0	0.20		26	11.8	38	85	12
43NH 14020	14.0	0.20		26	13.8	42	85	14
43NH 16020	16.0	0.20		32	15.8	44	90	16
43NH 18030	18.0	0.30		32	17.8	44	90	18
43NH 20030	20.0	0.30		38	19.8	54	105	20

FOR INOX
INCONEL
TITAN





New

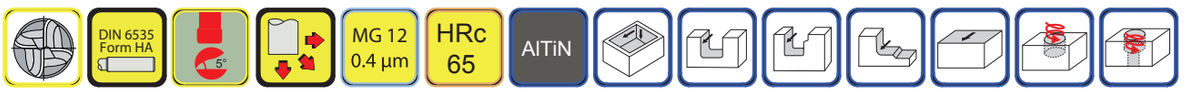


Max cutting depth	ap	pf
D1 < 3	1.5 D	0.05 D
D1 > 3	1.5 D	0.1 D

	ap	pf
D1 < 3	1 D	0.15 D
D1 > 3	1 D	0.02 D

	C≤0.2% - GG E24 ■ XC48 ■ FT25 750 N/mm2		SCM - SKD 350NCD16 ■ 40CMD8 ~30 HRc		30~38 HRc 35NCD16 30~38 HRc		30~38 HRc 35NCD16 30~38 HRc		45~55 HRc -SUS Z38CDV5 45~55 HRc		55~60 HRc Z160CDV12 55~60 HRc	
D1	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)
2.0	13000	310	11000	280	7000	110	6350	100	3950	60	2750	40
3.0	8900	505	7400	355	5300	125	4750	110	2750	60	2000	45
4.0	6650	530	5550	370	4250	135	3700	115	2200	70	1550	45
5.0	5300	620	4450	425	3550	140	3150	125	1900	75	1250	40
6.0	4450	615	3700	425	2950	145	2650	130	1550	70	1050	40
8.0	3300	590	2750	420	2200	145	1950	130	1150	65	795	35
10.0	2650	590	2200	420	1750	145	1550	130	955	65	635	35
12.0	2200	590	1850	420	1450	145	1300	130	795	60	530	30
14.0	1900	575	1550	415	1250	145	1100	125	680	50	455	25
16.0	1650	550	1350	415	1100	130	995	115	595	45	395	20
18.0	1450	540	1200	405	990	115	880	105	530	40	350	20
20.0	1300	520	1100	370	890	105	795	95	475	35	315	19

Power Corner Radius End Mills

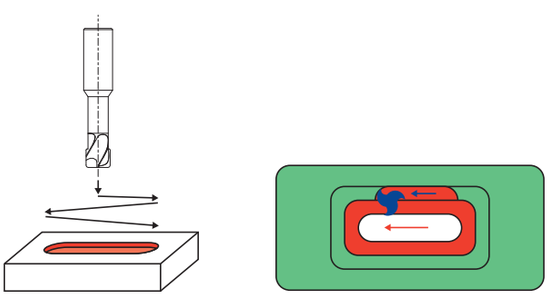


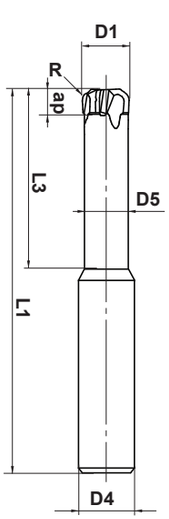
44 NF

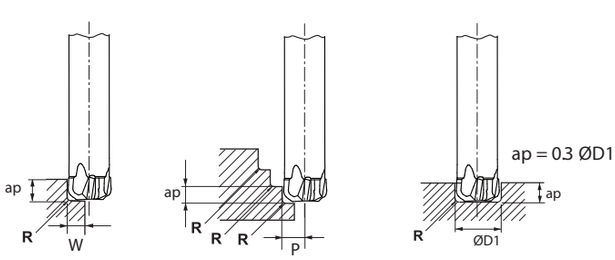
Item code	D1	R	β	ap	D5	L3	L1	D4
44NF 06060	6.0	1.5		3	5.40	18	50	6
44NF 06061	6.0	1.5		3	5.40	18	75	6
44NF 08080	8.0	2.0		4	7.20	24	60	8
44NF 08081	8.0	2.0		4	7.20	24	100	8
44NF 10100	10.0	2.0		5	9.00	30	75	10
44NF 10101	10.0	2.0		5	9.00	30	100	10
44NF 12120	12.0	3.0		6	11.0	36	75	12
44NF 12121	12.0	3.0		6	11.0	36	100	12

Semi-finished surface, ready for finishing.
Thin chips, less cutting forces
3D copy milling
Pocketing
Face Milling

Powerful and High Speed Milling

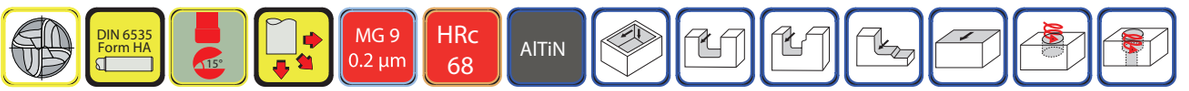






Max cutting depth	ap	P			ap	W
	0.02D1	0.02 D1			1D1	0.02 D1
	Cabon Steels, Alloy Steels S45C , FC , FCD, SCM , S50C , SKS ,.. HRc 30		Alloy Steels, Tool Steels Sc , SNCM , SKD11 , SKD61 , NAK80 ,.. HRc 50		Hadened Steels SKD11 HRc 60	
D1	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)
6	12000	3600	7200	2200	3500	650
8	9600	4000	5600	2200	2700	750
10	7000	3400	4400	1700	2100	650
12	6000	2800	3600	1400	1800	600

Power Corner Radius End Mills



44 YA

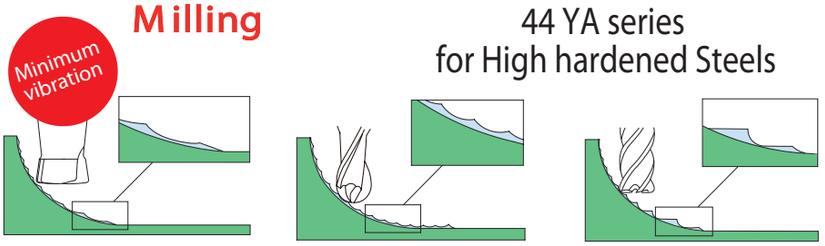
Item code	D1	R	β	ap	D5	L3	L1	D4
44YA 60106	6.0	10-0.42		4	5.20	25	55	6
44YA 60206	6.0	10-0.42		4	5.20	45	80	6
44YA 80108	8.0	10-0.52		4	6.71	25	60	8
44YA 80208	8.0	10-0.52		4	6.71	55	90	8
44YA 10110	10.0	15-0.64		6	8.72	35	70	10
44YA 10210	10.0	15-0.64		6	8.72	60	100	10
44YA 12112	12.0	15-0.75		6	10.20	40	80	12
44YA 12212	12.0	15-0.75		6	10.20	65	110	12
44YA 16116	16.0	25-1.06		8	14.20	45	90	16
44YA 16216	16.0	25-1.06		8	14.20	80	130	16

Semi-finished surface, ready for finishing.
Thin chips, less cutting forces
3D copy milling
Pocketing
Face Milling

Powerful and High Speed Milling

HOT NEWS

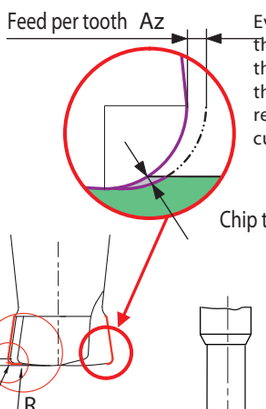
44 YA series
for High hardened Steels



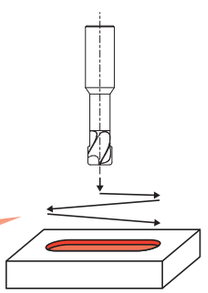
22 YA High feed end mill
low cutting resistance

Cutter with ball ed mills
high cutting resistance

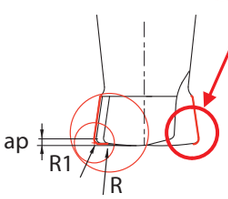
Cutter with corner radius
high cutting resistance

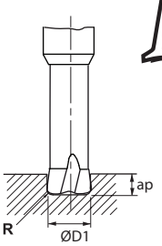


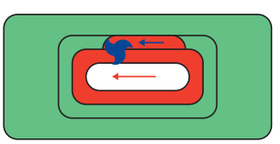
Even when high feed milling, the chip thickness is less than the feed per tooth and therefore reduces the cutting resistance at low depths of cut.

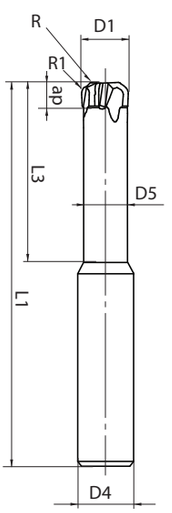


New









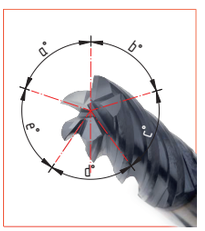
Ø	L1	C≤0.2% - GG E24 ■ XC48 ■ FT25 750 N/mm2 250 (m/min)				SCM - SKD 350NCD16 ■ 40CMD8 ~30 HRc 230 (m/min)				45~55 HRc -SUS Z38CDV5 45~55 HRc 200 (m/min)				55~60 HRc Z160CDV12 55~60 HRc 120 (m/min)			
		S (min-1)	F (mm/min)	ap (mm)	AZ (mm)	S (min-1)	F (mm/min)	ap (mm)	AZ	S (min-1)	F (mm/min)	ap (mm)	AZ	S (min-1)	F (mm/min)	ap (mm)	AZ (mm)
6.0	55	13300	25000	0.26	0.470	12200	23000	0.26	0.471	10600	20000	0.26	0.472	6400	10800	0.26	0.422
6.0	80	13300	15000	0.26	0.282	12200	13200	0.26	0.280	10600	12000	0.26	0.283	6400	6480	0.26	0.253
8.0	60	10000	25000	0.42	0.625	9150	23000	0.42	0.628	8000	20000	0.42	0.625	4800	7600	0.42	0.396
8.0	90	10000	15000	0.42	0.375	9150	13200	0.42	0.361	8000	12000	0.42	0.375	4800	4560	0.42	0.238
10.0	70	8000	25000	0.47	0.781	7320	21350	0.47	0.729	6400	17800	0.47	0.695	3800	6160	0.47	0.400
10.0	100	8000	15000	0.47	0.469	7320	12210	0.47	0.417	6400	10680	0.47	0.417	3800	3696	0.47	0.243
12.0	80	6600	25000	0.66	0.947	6100	18300	0.66	0.750	5300	14800	0.66	0.698	3200	5120	0.66	0.400
12.0	110	6600	15000	0.66	0.568	6100	10218	0.66	0.419	5300	8880	0.66	0.419	3200	3072	0.66	0.240
16.0	90	5000	20000	0.73	1.000	4580	13825	0.73	0.755	4000	11200	0.73	0.700	2400	3840	0.73	0.400
16.0	130	5000	12000	0.73	0.600	4580	8295	0.73	0.453	4000	6720	0.73	0.420	2400	2304	0.73	0.240

Power Square End Mills

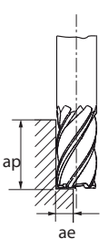
50 HA

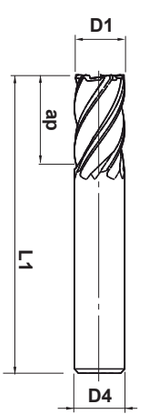
Item code	D1	R	β	ap	D5	L3	L1	D4
50HA 04006	4.0			8			50	6
50HA 06006	6.0			12			50	6
50HA 08008	8.0			16			60	8
50HA 10010	10.0			20			75	10
50HA 12012	12.0			24			75	12
50HA 16016	16.0			30			100	16
50HA 20020	20.0			40			100	20

High Performance End Mills

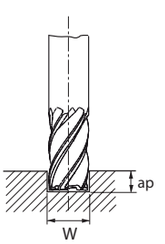


Max cutting depth	ap 1.5 D1 / ae 0.5 D1														
	Alloy Steels 200~250 HB SKD61-SKD11			Alloy Steels 25~35 HRc SCM 440			Pre-Harden Steel 35~50 HRc CENA1-NAK 80			Austenitic Stainless Steel SUS 316			Alpha-Beta Titanium alloys Ti64i4V		
D1	Cutting Range	S (min-1)	F (mm/min)	az (min)	S (min-1)	F (mm/min)	az (min)	S (min-1)	F (mm/min)	az (min)	S (min-1)	F (mm/min)	az (min)	S (min-1)	F (mm/min)	az (min)
4	High Speed	15915	200	0.03	14324	180	0.03	12732	160	0.02	6366	80	0.02	4775	60	0.02
4	General	12732	160	0.03	12732	160	0.03	11141	140	0.02	4775	60	0.02	3979	50	0.02
6	High Speed	10610	200	0.05	9549	180	0.04	8488	160	0.04	4244	80	0.03	3183	60	0.03
6	General	8488	160	0.05	8488	160	0.04	7427	140	0.04	3183	60	0.03	2653	50	0.03
8	High Speed	7958	200	0.06	7162	180	0.05	6366	160	0.04	3183	80	0.04	2387	60	0.04
8	General	6366	160	0.06	6366	160	0.05	5570	140	0.04	2387	60	0.04	1989	50	0.04
10	High Speed	6366	200	0.07	5730	180	0.06	5093	160	0.05	2546	80	0.05	1910	60	0.05
10	General	5093	160	0.07	5093	160	0.06	4456	140	0.05	1910	60	0.05	1592	50	0.05
12	High Speed	5305	200	0.07	4775	180	0.07	4244	160	0.06	2122	80	0.06	1592	60	0.06
12	General	4244	160	0.07	4244	160	0.07	3714	140	0.06	1592	60	0.06	1326	50	0.06
16	High Speed	3979	200	0.08	3581	180	0.08	180	160	0.07	1592	80	0.07	1194	60	0.07
16	General	3183	160	0.08	3183	160	0.08	2785	140	0.07	1194	60	0.07	995	50	0.07
20	High Speed	3183	200	0.10	2865	180	0.09	2865	160	0.08	1273	80	0.08	955	60	0.08
20	General	2546	160	0.10	2546	160	0.09	2228	140	0.08	955	60	0.08	796	50	0.08





Max cutting depth	ap 1.0 D1 / W 1.0 D1														
	Alloy Steels 200~250 HB SKD61-SKD11			Alloy Steels 25~35 HRc SCM 440			Pre-Harden Steel 35~50 HRc CENA1-NAK 80			Austenitic Stainless Steel SUS 316			Alpha-Beta Titanium alloys Ti64i4V		
D1	Cutting Range	S (min-1)	F (mm/min)	az (min)	S (min-1)	F (mm/min)	az (min)	S (min-1)	F (mm/min)	az (min)	S (min-1)	F (mm/min)	az (min)	S (min-1)	F (mm/min)	az (min)
4	High Speed	15915	200	0.03	14324	180	0.03	12732	160	0.02	6366	80	0.02	4775	60	0.02
4	General	12732	160	0.03	12732	160	0.03	11141	140	0.02	4775	60	0.02	3979	50	0.02
6	High Speed	10610	200	0.05	9549	180	0.04	8488	160	0.04	4244	80	0.03	3183	60	0.03
6	General	8488	160	0.05	8488	160	0.04	7427	140	0.04	3183	60	0.03	2653	50	0.03
8	High Speed	7958	200	0.06	7162	180	0.05	6366	160	0.04	3183	80	0.04	2387	60	0.04
8	General	6366	160	0.06	6366	160	0.05	5570	140	0.04	2387	60	0.04	1989	50	0.04
10	High Speed	6366	200	0.07	5730	180	0.06	5093	160	0.05	2546	80	0.05	1910	60	0.05
10	General	5093	160	0.07	5093	160	0.06	4456	140	0.05	1910	60	0.05	1592	50	0.05
12	High Speed	5305	200	0.07	4775	180	0.07	4244	160	0.06	2122	80	0.06	1592	60	0.06
12	General	4244	160	0.07	4244	160	0.07	3714	140	0.06	1592	60	0.06	1326	50	0.06
16	High Speed	3979	200	0.08	3581	180	0.08	180	160	0.07	1592	80	0.07	1194	60	0.07
16	General	3183	160	0.08	3183	160	0.08	2785	140	0.07	1194	60	0.07	995	50	0.07
20	High Speed	3183	200	0.10	2865	180	0.09	2865	160	0.08	1273	80	0.08	955	60	0.08
20	General	2546	160	0.10	2546	160	0.09	2228	140	0.08	955	60	0.08	796	50	0.08



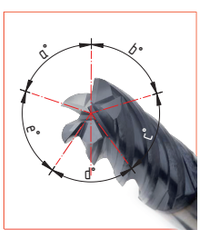
Power Square End Mills

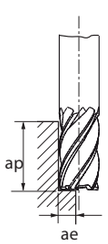
50 HD

Item code	D1	R	β	ap	D5	L3	L1	D4
50HD 04006	4.0			8	3,88	12	50	6
50HD 06006	6.0			12	5,80	18	50	6
50HD 08008	8.0			16	7,70	24	60	8
50HD 10010	10.0			20	9,60	30	75	10
50HD 12012	12.0			24	11,50	36	75	12
50HD 16016	16.0			30	15,40	40	100	16
50HD 20020	20.0			40	19,30	50	100	20

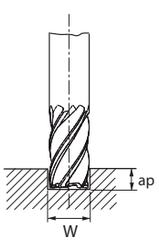
High Performance End Mills

Irregular Helix Flutes

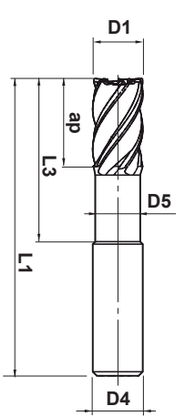




Max cutting depth	ap 1.5 D1 / ae 0.5 D1														
	Alloy Steels 200~250 HB SKD61-SKD11			Alloy Steels 25~35 HRc SCM 440			Pre-Harden Steel 35~50 HRc CENA1-NAK 80			Austenitic Stainless Steel SUS 316			Alpha-Beta Titanium alloys Ti64i4V		
D1	Cutting Range	S (min-1)	F (mm/min)	az (min)	S (min-1)	F (mm/min)	az (min)	S (min-1)	F (mm/min)	az (min)	S (min-1)	F (mm/min)	az (min)	S (min-1)	F (mm/min)	az (min)
4	High Speed	15915	200	0.03	14324	180	0.03	12732	160	0.02	6366	80	0.02	4775	60	0.02
4	General	12732	160	0.03	12732	160	0.03	11141	140	0.02	4775	60	0.02	3979	50	0.02
6	High Speed	10610	200	0.05	9549	180	0.04	8488	160	0.04	4244	80	0.03	3183	60	0.03
6	General	8488	160	0.05	8488	160	0.04	7427	140	0.04	3183	60	0.03	2653	50	0.03
8	High Speed	7958	200	0.06	7162	180	0.05	6366	160	0.04	3183	80	0.04	2387	60	0.04
8	General	6366	160	0.06	6366	160	0.05	5570	140	0.04	2387	60	0.04	1989	50	0.04
10	High Speed	6366	200	0.07	5730	180	0.06	5093	160	0.05	2546	80	0.05	1910	60	0.05
10	General	5093	160	0.07	5093	160	0.06	4456	140	0.05	1910	60	0.05	1592	50	0.05
12	High Speed	5305	200	0.07	4775	180	0.07	4244	160	0.06	2122	80	0.06	1592	60	0.06
12	General	4244	160	0.07	4244	160	0.07	3714	140	0.06	1592	60	0.06	1326	50	0.06
16	High Speed	3979	200	0.08	3581	180	0.08	180	160	0.07	1592	80	0.07	1194	60	0.07
16	General	3183	160	0.08	3183	160	0.08	2785	140	0.07	1194	60	0.07	995	50	0.07
20	High Speed	3183	200	0.10	2865	180	0.09	2865	160	0.08	1273	80	0.08	955	60	0.08
20	General	2546	160	0.10	2546	160	0.09	2228	140	0.08	955	60	0.08	796	50	0.08



Max cutting depth	ap 1.0 D1 / W 1.0 D1														
	Alloy Steels 200~250 HB SKD61-SKD11			Alloy Steels 25~35 HRc SCM 440			Pre-Harden Steel 35~50 HRc CENA1-NAK 80			Austenitic Stainless Steel SUS 316			Alpha-Beta Titanium alloys Ti64i4V		
D1	Cutting Range	S (min-1)	F (mm/min)	az (min)	S (min-1)	F (mm/min)	az (min)	S (min-1)	F (mm/min)	az (min)	S (min-1)	F (mm/min)	az (min)	S (min-1)	F (mm/min)	az (min)
4	High Speed	15915	200	0.03	14324	180	0.03	12732	160	0.02	6366	80	0.02	4775	60	0.02
4	General	12732	160	0.03	12732	160	0.03	11141	140	0.02	4775	60	0.02	3979	50	0.02
6	High Speed	10610	200	0.05	9549	180	0.04	8488	160	0.04	4244	80	0.03	3183	60	0.03
6	General	8488	160	0.05	8488	160	0.04	7427	140	0.04	3183	60	0.03	2653	50	0.03
8	High Speed	7958	200	0.06	7162	180	0.05	6366	160	0.04	3183	80	0.04	2387	60	0.04
8	General	6366	160	0.06	6366	160	0.05	5570	140	0.04	2387	60	0.04	1989	50	0.04
10	High Speed	6366	200	0.07	5730	180	0.06	5093	160	0.05	2546	80	0.05	1910	60	0.05
10	General	5093	160	0.07	5093	160	0.06	4456	140	0.05	1910	60	0.05	1592	50	0.05
12	High Speed	5305	200	0.07	4775	180	0.07	4244	160	0.06	2122	80	0.06	1592	60	0.06
12	General	4244	160	0.07	4244	160	0.07	3714	140	0.06	1592	60	0.06	1326	50	0.06
16	High Speed	3979	200	0.08	3581	180	0.08	180	160	0.07	1592	80	0.07	1194	60	0.07
16	General	3183	160	0.08	3183	160	0.08	2785	140	0.07	1194	60	0.07	995	50	0.07
20	High Speed	3183	200	0.10	2865	180	0.09	2865	160	0.08	1273	80	0.08	955	60	0.08
20	General	2546	160	0.10	2546	160	0.09	2228	140	0.08	955	60	0.08	796	50	0.08



Power Corner Radius End Mills

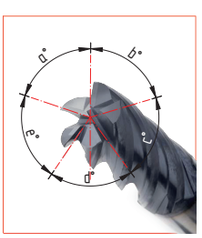
DIN 6535 Form HA | 35° | MG 12 0.4 µm | HRc 60 | AlTiN

52 HA

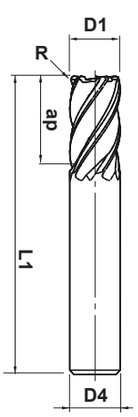
Item code	D1	R	β	ap	D5	L3	L1	D4
52HA 04056	4.0	0,5		8		12	50	6
52HA 04106	4.0	1,0		8		12	50	6
52HA 06056	6.0	0,5		12		18	50	6
52HA 06106	6.0	1,0		12		18	50	6
52HA 08058	8.0	0,5		16		24	60	8
52HA 08108	8.0	1,0		16		24	60	8
52HA 10051	10.0	0,5		20		30	75	10
52HA 10101	10.0	1,0		20		30	75	10
52HA 12055	12.0	0,5		24		36	75	12
52HA 12105	12.0	1,0		24		36	75	12
52HA 16056	16.0	0,5		30		40	100	16
52HA 16106	16.0	1,0		30		40	100	16
52HA 20057	20.0	0,5		40		50	100	20
52HA 20107	20.0	1,0		40		50	100	20

High Performance End Mills

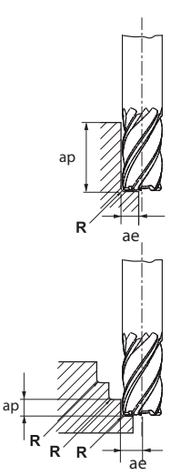
Irregular Helix Flutes



New



Max cutting depth	ap 1.5 D1 / ae 0.5 D1														
	Alloy Steels 200~250 HB SKD61-SKD11			Alloy Steels 25~35 HRc SCM 440			Pre-Harden Steel 35~50 HRc CENA1-NAK 80			Austenitic Stainless Steel SUS 316			Alpha-Beta Titanium alloys Ti64i4V		
D1	Cutting Range	S (min-1)	F (mm/min)	az (min)	S (min-1)	F (mm/min)	az (min)	S (min-1)	F (mm/min)	az (min)	S (min-1)	F (mm/min)	az (min)	S (min-1)	F (mm/min)	az (min)
4	High Speed	15915	200	0.03	14324	180	0.03	12732	160	0.02	6366	80	0.02	4775	60	0.02
4	General	12732	160	0.03	12732	160	0.03	11141	140	0.02	4775	60	0.02	3979	50	0.02
6	High Speed	10610	200	0.05	9549	180	0.04	8488	160	0.04	4244	80	0.03	3183	60	0.03
6	General	8488	160	0.05	8488	160	0.04	7427	140	0.04	3183	60	0.03	2653	50	0.03
8	High Speed	7958	200	0.06	7162	180	0.05	6366	160	0.04	3183	80	0.04	2387	60	0.04
8	General	6366	160	0.06	6366	160	0.05	5570	140	0.04	2387	60	0.04	1989	50	0.04
10	High Speed	6366	200	0.07	5730	180	0.06	5093	160	0.05	2546	80	0.05	1910	60	0.05
10	General	5093	160	0.07	5093	160	0.06	4456	140	0.05	1910	60	0.05	1592	50	0.05
12	High Speed	5305	200	0.07	4775	180	0.07	4244	160	0.06	2122	80	0.06	1592	60	0.06
12	General	4244	160	0.07	4244	160	0.07	3714	140	0.06	1592	60	0.06	1326	50	0.06
16	High Speed	3979	200	0.08	3581	180	0.08	180	160	0.07	1592	80	0.07	1194	60	0.07
16	General	3183	160	0.08	3183	160	0.08	2785	140	0.07	1194	60	0.07	995	50	0.07
20	High Speed	3183	200	0.10	2865	180	0.09	2865	160	0.08	1273	80	0.08	955	60	0.08
20	General	2546	160	0.10	2546	160	0.09	2228	140	0.08	955	60	0.08	796	50	0.08



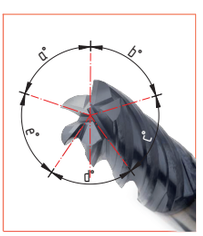
Power Corner Radius End Mills

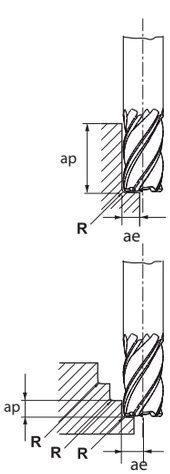
52 HD

Item code	D1	R	β	ap	D5	L3	L1	D4
52HD 04056	4.0	0,5		8	3,88	12	50	6
52HD 04106	4.0	1,0		8	3,88	12	50	6
52HD 06056	6.0	0,5		12	5,80	18	50	6
52HD 06106	6.0	1,0		12	5,80	18	50	6
52HD 08058	8.0	0,5		16	7,70	24	60	8
52HD 08108	8.0	1,0		16	7,70	24	60	8
52HD 10051	10.0	0,5		20	9,60	30	75	10
52HD 10101	10.0	1,0		20	9,60	30	75	10
52HD 12055	12.0	0,5		24	11,50	36	75	12
52HD 12105	12.0	1,0		24	11,50	36	75	12
52HD 16056	16.0	0,5		30	15,40	40	100	16
52HD 16106	16.0	1,0		30	15,40	40	100	16
52HD 20057	20.0	0,5		40	19,30	50	100	20
52HD 20107	20.0	1,0		40	19,30	50	100	20

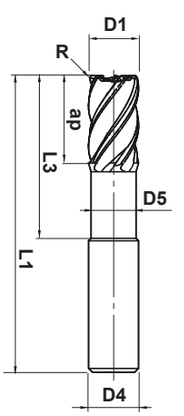
High Performance End Mills

Irregular Helix Flutes





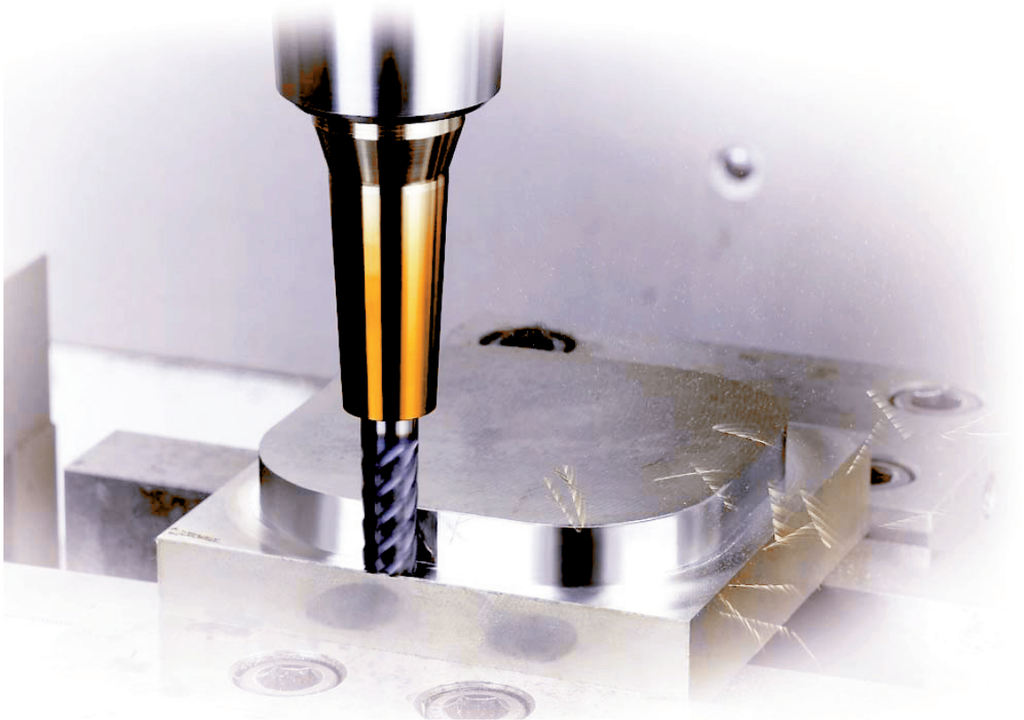
Max cutting depth	ap 1.5 D1 / ae 0.5 D1														
	Alloy Steels 200~250 HB SKD61-SKD11			Alloy Steels 25~35 HRc SCM 440			Pre-Harden Steel 35~50 HRc CENA1-NAK 80			Austenitic Stainless Steel SUS 316			Alpha-Beta Titanium alloys Ti64i4V		
D1	Cutting Range	S (min-1)	F (mm/min)	az (min)	S (min-1)	F (mm/min)	az (min)	S (min-1)	F (mm/min)	az (min)	S (min-1)	F (mm/min)	az (min)	S (min-1)	F (mm/min)	az (min)
4	High Speed	15915	200	0.03	14324	180	0.03	12732	160	0.02	6366	80	0.02	4775	60	0.02
4	General	12732	160	0.03	12732	160	0.03	11141	140	0.02	4775	60	0.02	3979	50	0.02
6	High Speed	10610	200	0.05	9549	180	0.04	8488	160	0.04	4244	80	0.03	3183	60	0.03
6	General	8488	160	0.05	8488	160	0.04	7427	140	0.04	3183	60	0.03	2653	50	0.03
8	High Speed	7958	200	0.06	7162	180	0.05	6366	160	0.04	3183	80	0.04	2387	60	0.04
8	General	6366	160	0.06	6366	160	0.05	5570	140	0.04	2387	60	0.04	1989	50	0.04
10	High Speed	6366	200	0.07	5730	180	0.06	5093	160	0.05	2546	80	0.05	1910	60	0.05
10	General	5093	160	0.07	5093	160	0.06	4456	140	0.05	1910	60	0.05	1592	50	0.05
12	High Speed	5305	200	0.07	4775	180	0.07	4244	160	0.06	2122	80	0.06	1592	60	0.06
12	General	4244	160	0.07	4244	160	0.07	3714	140	0.06	1592	60	0.06	1326	50	0.06
16	High Speed	3979	200	0.08	3581	180	0.08	180	160	0.07	1592	80	0.07	1194	60	0.07
16	General	3183	160	0.08	3183	160	0.08	2785	140	0.07	1194	60	0.07	995	50	0.07
20	High Speed	3183	200	0.10	2865	180	0.09	2865	160	0.08	1273	80	0.08	955	60	0.08
20	General	2546	160	0.10	2546	160	0.09	2228	140	0.08	955	60	0.08	796	50	0.08

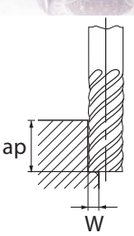


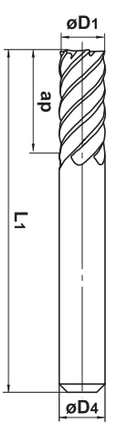
Square End Mills

60 HA

Item code	D1	R	β	ap	D5	L3	L1	D4
60HA 06006	6.0			16			50	6
60HA 08008	8.0			20			60	8
60HA 10010	10.0			25			75	10
60HA 12012	12.0			30			75	12
60HA 16016	16.0			40			100	16
60HA 20020	20.0			45			100	20







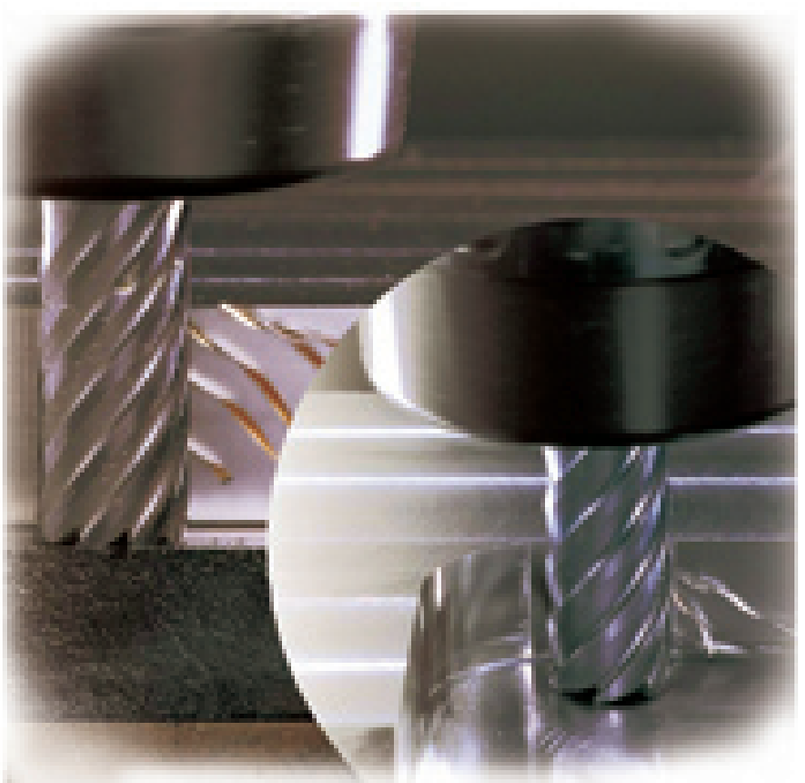
Max cutting depth	ap 1.5 D1	W 0.1 D1			ap 1D1	W 0.05 D1
	Cabon Steels. Alloy Steels S45C . FC . FCD. SCM . S50C . SKS ... HRc 30		Alloy Steels. Tool Steels Sc . SNCM . SKD11 . SKD61 . NAK80 ... HRc 50		Hadened Steels SKD11 HRc 60	
D1	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)
6	5500	1000	4500	850	3800	650
8	4000	1000	3500	850	3000	650
10	3300	1000	3100	850	2400	650
12	3000	900	2500	700	2000	600
16	2500	700	2000	550	1500	450
20	1800	550	1500	420	1200	380

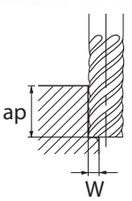
High Hardness Square End Mills

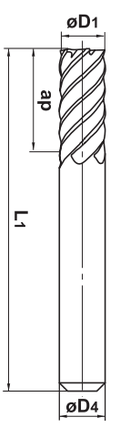
DIN 6535 Form HA | 45° | MG 12 0.4 µm | HRc 68 | AlTiN

60 HD

Item code	D1	R	β	ap	D5	L3	L1	D4
60HD 06006	6.0			16			50	6
60HD 08008	8.0			20			60	8
60HD 10010	10.0			25			75	10
60HD 12012	12.0			30			75	12
60HD 16016	16.0			40			100	16





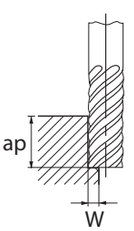


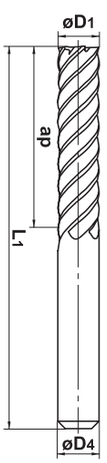
Max cutting depth	ap 1.0 D1	W 0.02 D1	ap 1.0 D1	W 0.15 D1	ap 1D1	W 0.2 D1
	Cabon Steels. Alloy Steels S45C . FC . FCD. SCM . S50C . SKS ... HRc 30		Alloy Steels. Tool Steels Sc . SNCM . SKD11 . SKD61 . NAK80 ... HRc 50		Hadened Steels SKD11 HRc 60	
D1	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)
6	12000	3000	8000	2000	5600	1400
8	9000	2400	6700	1900	3600	1200
10	6900	2100	5000	1600	3000	900
12	6000	2400	4300	1700	2400	1000
16	4500	2100	2500	1000	1600	700

Long Flute Square End Mills

60 HG

Item code	D1	R	β	ap	D5	L3	L1	D4
60HG 06006	6.0			24			75	6
60HG 08008	8.0			32			75	8
60HG 10010	10.0			40			100	10
60HG 12012	12.0			45			100	12
60HG 16016	16.0			64			150	16
60HG 20020	20.0			75			150	20





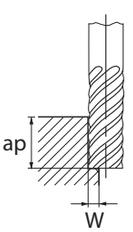
Max cutting depth	ap 3.0 D1	W 0.01 D1			ap 3.0 D1	W 0.005 D1
	Cabon Steels. Alloy Steels S45C . FC . FCD. SCM . S50C . SKS ... HRc 30		Alloy Steels. Tool Steels Sc . SNCM . SKD11 . SKD61 . NAK80 ... HRc 50		Hadened Steels SKD11 HRc 60	
D1	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)
6	1900	400	1500	300	1200	220
8	1500	380	1100	280	900	200
10	1200	360	850	260	750	190
12	1000	340	700	230	650	180
16	750	280	550	200	450	150
20	600	240	450	170	350	120

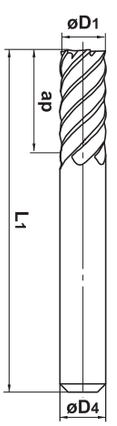
Long Shank Square End Mills

60 HK

Item code	D1	R	β	ap	D5	L3	L1	D4
60HK 12012	12.0			36		75	150	12
60HK 16016	16.0			65		80	150	16
60HK 20020	20.0			65		100	150	20

New





Max cutting depth	ap	W			ap	W
	3.0 D1	0.01 D1			3.0 D1	0.005 D1
	Cabon Steels. Alloy Steels S45C . FC . FCD. SCM . S50C . SKS ... HRc 30		Alloy Steels. Tool Steels Sc . SNCM . SKD11 . SKD61 . NAK80 ... HRc 50		Hadened Steels SKD11 HRc 60	
D1	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)
12	1000	340	700	230	650	180
16	750	280	550	200	450	150
20	600	240	450	170	350	120

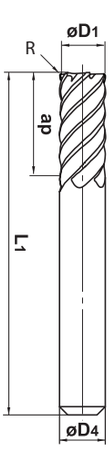
Corner Radius End Mills

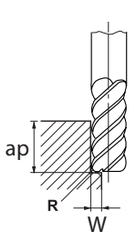
DIN 6535 Form HA | 50° | MG 9 0.2 µm | HRc 68 | AlTiN

62 HA

Item code	D1	R	β	ap	D5	L3	L1	D4
62HA 06056	6.0	0.5		13			55	6
62HA 06106	6.0	1.0		13			55	6
62HA 08058	8.0	0.5		19			60	8
62HA 08108	8.0	1.0		19			60	8
62HA 10051	10.0	0.5		22			70	10
62HA 10101	10.0	1.0		22			70	10
62HA 12055	12.0	0.5		26			80	12
62HA 12105	12.0	1.0		26			80	12
62HA 12155	12.0	1.5		26			80	12
62HA 12205	12.0	2.0		26			80	12
62HA 12255	12.0	2.5		26			80	12
62HA 16056	16.0	0.5		32			90	16
62HA 16106	16.0	1.0		32			90	16
62HA 16156	16.0	1.5		32			90	16
62HA 16206	16.0	2.0		32			90	16
62HA 16256	16.0	2.5		32			90	16
62HA 16306	16.0	3.0		32			90	16

New





Max cutting depth	ap 1.0 D1	W 0.02 D1	ap 1.0 D1	W 0.15 D1	ap 1D1	W 0.2 D1
	Cabon Steels. Alloy Steels S45C . FC . FCD. SCM . S50C . SKS ... HRc 30		Alloy Steels. Tool Steels Sc . SNCM . SKD11 . SKD61 . NAK80 ... HRc 50		Hadened Steels SKD11 HRc 60	
D1	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)
6	12000	3000	8000	2000	5600	1400
8	9000	2400	6700	1900	3600	1200
10	6900	2100	5000	1600	3000	900
12	6000	2400	4300	1700	2400	1000
16	4500	2100	2500	1000	1600	700

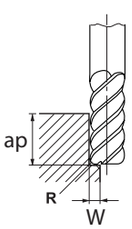
Corner Radius End Mills

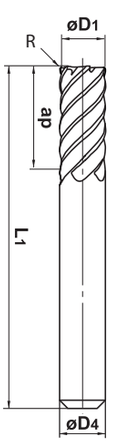
DIN 6535 Form HA | 50° | MG 9 0.2 µm | HRc 68 | AlTiN

62 HD

Item code	D1	R	β	ap	D5	L3	L1	D4
62HD 08058	8.0	0.5				24	70	8
62HD 08108	8.0	1.0				24	70	8
62HD 10051	10.0	0.5				30	80	10
62HD 10101	10.0	1.0				30	80	10
62HD 10151	10.0	1.5				30	80	10
62HD 12055	12.0	0.5				36	95	12
62HD 12105	12.0	1.0				36	95	12
62HD 12155	12.0	1.5				36	95	12
62HD 12205	12.0	2.0				36	95	12
62HD 16056	16.0	0.5				48	110	16
62HD 16106	16.0	1.0				48	110	16
62HD 16156	16.0	1.5				48	110	16
62HD 16206	16.0	2.0				48	110	16

New





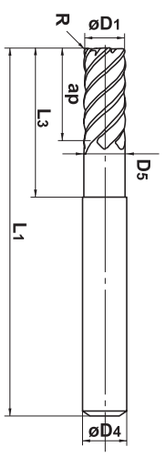
Max cutting depth	ap 1.0 D1	W 0.02 D1	ap 1.0 D1	W 0.15 D1	ap 1D1	W 0.2 D1
	Cabon Steels. Alloy Steels S45C . FC . FCD. SCM . S50C . SKS ... HRc 30		Alloy Steels. Tool Steels Sc . SNCM . SKD11 . SKD61 . NAK80 ... HRc 50		Hadened Steels SKD11 HRc 60	
D1	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)
6	12000	3000	8000	2000	5600	1400
8	9000	2400	6700	1900	3600	1200
10	6900	2100	5000	1600	3000	900
12	6000	2400	4300	1700	2400	1000
16	4500	2100	2500	1000	1600	700

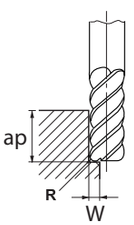
High Hardness Corner Radius End Mills

DIN 6535 Form HA | 45° | MG 12 0.4 µm | HRc 65 | AlTiN

62 HH

Item code	D1	R	β	ap	D5	L3	L1	D4
62HH 06006	6.0	0.3		8	5.80		50	6
62HH 08008	8.0	0.3		10	7.70		50	8
62HH 10010	10.0	0.5		12	9.60		75	10
62HH 12012	12.0	0.5		15	11.50		75	12
62HH 16016	16.0	1.0		24	15.40		100	16





Max cutting depth	ap 1.0 D1	W 0.02 D1	ap 1.0 D1	W 0.015 D1	ap 1.0 D1	W 0.01 D1
	Cabon Steels. Alloy Steels S45C . FC . FCD. SCM . S50C . SKS ... HRc 30		Alloy Steels. Tool Steels Sc . SNCM . SKD11 . SKD61 . NAK80 ... HRc 50		Hadened Steels SKD11 HRc 60	
D1	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)
6	15000	4000	9500	2500	6800	1800
8	11000	3000	8000	2300	4400	1500
10	8500	2500	6000	2000	3600	1100
12	7200	2800	5200	2000	2900	1200
16	5500	2500	3000	1200	2000	900

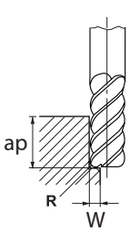
High Hardness Corner Radius End Mills

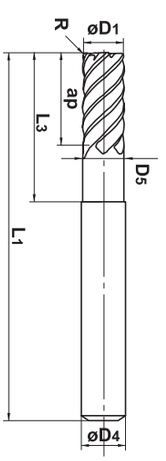
DIN 6535 Form HA | 45° | MG 9 0.2 µm | HRc 68 | AlTiN

62 HP

Item code	D1	R	β	ap	D5	L3	L1	D4
62HP 06056	6.0	0.5		7	5.50	21	65	6
62HP 06106	6.0	1.0		7	5.50	21	65	6
62HP 08058	8.0	0.5		9	7.40	27	70	8
62HP 08108	8.0	1.0		9	7.40	27	70	8
62HP 10051	10.0	0.5		11	9.20	32	80	10
62HP 10101	10.0	1.0		11	9.20	32	80	10
62HP 10151	10.0	1.5		11	9.20	32	80	10
62HP 10201	10.0	2.0		11	9.20	32	80	10
62HP 12055	12.0	0.5		12	11.00	38	95	12
62HP 12105	12.0	1.0		12	11.00	38	95	12
62HP 12155	12.0	1.5		12	11.00	38	95	12
62HP 12205	12.0	2.0		12	11.00	38	95	12

New





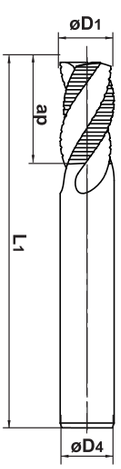
Max cutting depth	ap 1.0 D1	W 0.02 D1	ap 1.0 D1	W 0.015 D1	ap 1.0 D1	W 0.01 D1
	Cabon Steels. Alloy Steels S45C . FC . FCD. SCM . S50C . SKS ... HRc 30		Alloy Steels. Tool Steels Sc . SNCM . SKD11 . SKD61 . NAK80 ... HRc 50		Hadened Steels SKD11 HRc 60	
D1	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)
6	15000	4000	9500	2500	6800	1800
8	11000	3000	8000	2300	4400	1500
10	8500	2500	6000	2000	3600	1100
12	7200	2800	5200	2000	2900	1200
16	5500	2500	3000	1200	2000	900

Roughing Square End Mills

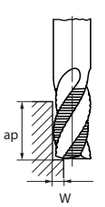
DIN 6535 Form HA | 35° | MG 10 0.6 µm | HRc 60 | TiALN

65 HA

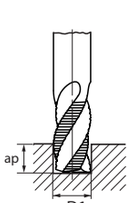
Item code	D1	R	β	ap	D5	L3	L1	D4
65HA 06006	6.0			16			50	6
65HA 08008	8.0			20			60	8
65HA 10010	10.0			25			75	10
65HA 12012	12.0			30			75	12
65HA 16016	16.0			40			100	16
65HA 20020	20.0			45			100	20



Max cutting depth	W	ap					W	ap		
	0,5 D1	1,5 D1					0,3 D1	1,0 D1		
	Cabon Steels, Alloy Steels S45C , FC , FCD, SCM , S50C , SKS ,. HRc 30		Alloy Steels, Tool Steels Sc , SNCM , SKD11 , SKD61 , NAK80 ,.. HRc 45		Austenic Stainless Steel Titanium alloy X5CrNi18-10 X5CrNiMo17-12-2		Hadened Steels SKD11 HRc 60		Heat Resitant Alloys Inconel	
D1	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)
6	8000	960	6400	680	3200	290	2700	340	2100	75
8	6000	1050	4800	760	2400	340	2000	400	1600	95
10	4800	1050	3800	760	1900	340	1600	400	1300	105
12	4000	960	3200	700	1600	320	1300	400	1100	110
16	3000	840	2400	620	1200	300	1000	360	800	110
20	2400	760	1900	560	1000	300	800	320	600	100



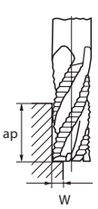
Max cutting depth	W	ap					W	ap		
	D1	1,0 D1					D1	0,5 D1		
	Cabon Steels, Alloy Steels S45C , FC , FCD, SCM , S50C , SKS ,. HRc 30		Alloy Steels, Tool Steels Sc , SNCM , SKD11 , SKD61 , NAK80 ,.. HRc 45		Austenic Stainless Steel Titanium alloy X5CrNi18-10 X5CrNiMo17-12-2		Hadened Steels SKD11 HRc 60		Heat Resitant Alloys Inconel	
D1	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)
6	6400	720	5300	480	2700	200	1600	200	1100	30
8	4800	800	4000	520	2000	220	1200	220	800	35
10	3800	800	3200	520	1600	220	1000	220	600	35
12	3200	750	2700	520	1300	210	800	210	500	40
16	2400	620	2000	450	1000	180	600	180	400	45
20	1900	540	1600	400	800	160	500	160	300	40



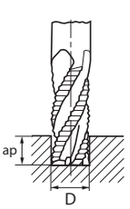
Roughing Square End Mills

65 NA

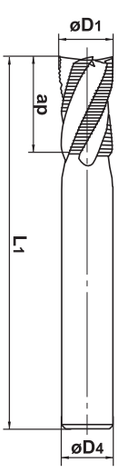
Item code	D1	R	β	ap	D5	L3	L1	D4
65NA 06006	6.0			16			50	6
65NA 08008	8.0			20			60	8
65NA 10010	10.0			25			75	10
65NA 12012	12.0			30			75	12
65NA 16016	16.0			40			100	16
65NA 20020	20.0			45			100	20



Max cutting depth	W 0,5 D1 / ap 1,5 D1						W 0,3 D1 / ap 1,0 D1			
	Cabon Steels, Alloy Steels S45C , FC , FCD, SCM , S50C , SKS ,. HRc 30		Alloy Steels, Tool Steels Sc , SNCM , SKD11 , SKD61 , NAK80 ,.. HRc 45		Austenic Stainless Steel Titanium alloy X5CrNi18-10 X5CrNiMo17-12-2		Hadened Steels SKD11 HRc 60		Heat Resitant Alloys Inconel	
D1	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)
6	8000	960	6400	680	3200	290	2700	340	2100	75
8	6000	1050	4800	760	2400	340	2000	400	1600	95
10	4800	1050	3800	760	1900	340	1600	400	1300	105
12	4000	960	3200	700	1600	320	1300	400	1100	110
16	3000	840	2400	620	1200	300	1000	360	800	110
20	2400	760	1900	560	1000	300	800	320	600	100



Max cutting depth	W D1 / ap 1,0 D1						W D1 / ap 0,5 D1			
	Cabon Steels, Alloy Steels S45C , FC , FCD, SCM , S50C , SKS ,. HRc 30		Alloy Steels, Tool Steels Sc , SNCM , SKD11 , SKD61 , NAK80 ,.. HRc 45		Austenic Stainless Steel Titanium alloy X5CrNi18-10 X5CrNiMo17-12-2		Hadened Steels SKD11 HRc 60		Heat Resitant Alloys Inconel	
D1	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)
6	6400	720	5300	480	2700	200	1600	200	1100	30
8	4800	800	4000	520	2000	220	1200	220	800	35
10	3800	800	3200	520	1600	220	1000	220	600	35
12	3200	750	2700	520	1300	210	800	210	500	40
16	2400	620	2000	450	1000	180	600	180	400	45
20	1900	540	1600	400	800	160	500	160	300	40



Roughing Square End Mills

DIN 6535 Form HA | 45° | MG 9 0.2 µm | HRc 68 | AlTiN

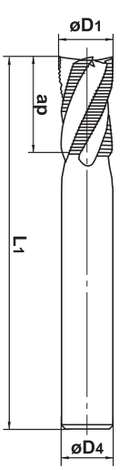
65 RA

Item code	D1	R	β	ap	D5	L3	L1	D4
65RA 06006	6.0			16			60	6
65RA 08008	8.0			16			65	8
65RA 10010	10.0			22			70	10
65RA 12012	12.0			26			85	12
65RA 14014	14.0			26			85	14
65RA 16016	16.0			32			90	16
65RA 20020	20.0			38			105	20

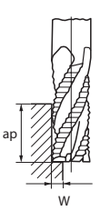
Z4 = < Ø 12
Z5 = Ø 14 Ø 16
Z6 = Ø 20

FOR INOX INCONEL TITAN

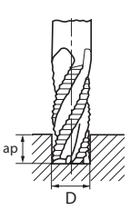
New



Max cutting depth	W 0,5 D1 / ap 1,5 D1						W 0,3 D1 / ap 1,0 D1			
	Cabon Steels, Alloy Steels S45C , FC , FCD, SCM , S50C , SKS ,. HRc 30		Alloy Steels, Tool Steels Sc , SNCM , SKD11 , SKD61 , NAK80 ,.. HRc 45		Austenic Stainless Steel Titanium alloy X5CrNi18-10 X5CrNiMo17-12-2		Hadened Steels SKD11 HRc 60		Heat Resitant Alloys Inconel	
D1	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)
6	8000	960	6400	680	3200	290	2700	340	2100	75
8	6000	1050	4800	760	2400	340	2000	400	1600	95
10	4800	1050	3800	760	1900	340	1600	400	1300	105
12	4000	960	3200	700	1600	320	1300	400	1100	110
16	3000	840	2400	620	1200	300	1000	360	800	110
20	2400	760	1900	560	1000	300	800	320	600	100



Max cutting depth	W D1 / ap 1,0 D1						W D1 / ap 0,5 D1			
	Cabon Steels, Alloy Steels S45C , FC , FCD, SCM , S50C , SKS ,. HRc 30		Alloy Steels, Tool Steels Sc , SNCM , SKD11 , SKD61 , NAK80 ,.. HRc 45		Austenic Stainless Steel Titanium alloy X5CrNi18-10 X5CrNiMo17-12-2		Hadened Steels SKD11 HRc 60		Heat Resitant Alloys Inconel	
D1	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)
6	6400	720	5300	480	2700	200	1600	200	1100	30
8	4800	800	4000	520	2000	220	1200	220	800	35
10	3800	800	3200	520	1600	220	1000	220	600	35
12	3200	750	2700	520	1300	210	800	210	500	40
16	2400	620	2000	450	1000	180	600	180	400	45
20	1900	540	1600	400	800	160	500	160	300	40



Roughing Square End Mills

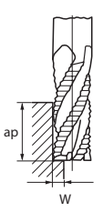
65 YA

Item code	D1	R	β	ap	D5	L3	L1	D4
65YA 06006	6.0			16	5,80	20	60	6
65YA 08008	8.0			16	7,70	26	65	8
65YA 10010	10.0			22	9,60	31	70	10
65YA 12012	12.0			26	11,50	37	85	12
65YA 16016	16.0			32	15,50	51	100	16
65YA 20020	20.0			38	19,20	59	110	20

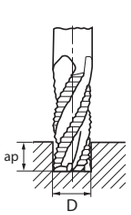
Z4 = < Ø 12
Z5 = Ø 14 Ø 16
Z6 = Ø 20

FOR INOX
INCONEL
TITAN

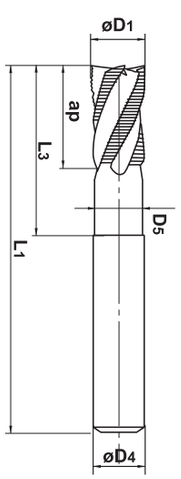
New



Max cutting depth	W 0,5 D1 / ap 1,5 D1						W 0,3 D1 / ap 1,0 D1			
	Cabon Steels, Alloy Steels S45C , FC , FCD, SCM , S50C , SKS ,. HRc 30		Alloy Steels, Tool Steels Sc , SNCM , SKD11 , SKD61 , NAK80 ,.. HRc 45		Austenic Stainless Steel Titanium alloy X5CrNi18-10 X5CrNiMo17-12-2		Hadened Steels SKD11 HRc 60		Heat Resitant Alloys Inconel	
D1	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)
6	8000	960	6400	680	3200	290	2700	340	2100	75
8	6000	1050	4800	760	2400	340	2000	400	1600	95
10	4800	1050	3800	760	1900	340	1600	400	1300	105
12	4000	960	3200	700	1600	320	1300	400	1100	110
16	3000	840	2400	620	1200	300	1000	360	800	110
20	2400	760	1900	560	1000	300	800	320	600	100



Max cutting depth	W D1 / ap 1,0 D1						W D1 / ap 0,5 D1			
	Cabon Steels, Alloy Steels S45C , FC , FCD, SCM , S50C , SKS ,. HRc 30		Alloy Steels, Tool Steels Sc , SNCM , SKD11 , SKD61 , NAK80 ,.. HRc 45		Austenic Stainless Steel Titanium alloy X5CrNi18-10 X5CrNiMo17-12-2		Hadened Steels SKD11 HRc 60		Heat Resitant Alloys Inconel	
D1	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)
6	6400	720	5300	480	2700	200	1600	200	1100	30
8	4800	800	4000	520	2000	220	1200	220	800	35
10	3800	800	3200	520	1600	220	1000	220	600	35
12	3200	750	2700	520	1300	210	800	210	500	40
16	2400	620	2000	450	1000	180	600	180	400	45
20	1900	540	1600	400	800	160	500	160	300	40



Spot drill

DIN 6535 Form HA | 30° | MG 10 0.6 µm | HRc 55 | Un Coated | TiALN

70 HG HP HX

Item code	D1	R	β	ap	D5	L3	L1	D4
70HG 03003	3.0		90°	6			50	3
70HG 04004	4.0		90°	8			50	4
70HG 06006	6.0		90°	12			50	6
70HG 08008	8.0		90°	16			60	8
70HG 10010	10.0		90°	20			75	10
70HG 12012	12.0		90°	24			75	12
70HG 16016	16.0		90°	30			100	16
70HG 20020	20.0		90°	30			100	20

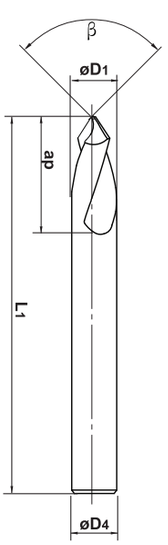
Un Coated

Item code	D1	R	β	ap	D5	L3	L1	D4
70HP 03003	3.0		90°	6			50	3
70HP 04004	4.0		90°	8			50	4
70HP 06006	6.0		90°	12			50	6
70HP 08008	8.0		90°	16			60	8
70HP 10010	10.0		90°	20			75	10
70HP 12012	12.0		90°	24			75	12
70HP 16016	16.0		90°	30			100	16
70HP 20020	20.0		90°	30			100	20

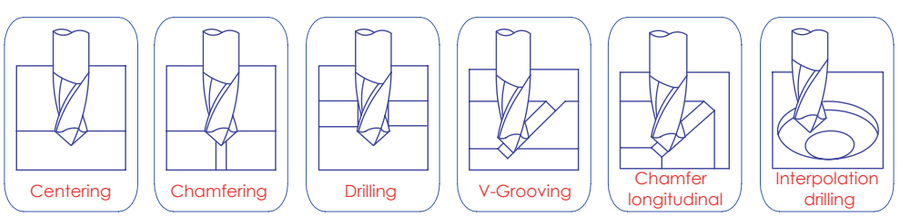
TiALN

Item code	D1	R	β	ap	D5	L3	L1	D4
70HX 03003	3.0		120°	6			50	3
70HX 04004	4.0		120°	8			50	4
70HX 06006	6.0		120°	12			50	6
70HX 08008	8.0		120°	16			60	8
70HX 10010	10.0		120°	20			75	10
70HX 12012	12.0		120°	24			75	12
70HX 16016	16.0		120°	30			100	16
70HX 20020	20.0		120°	30			100	20

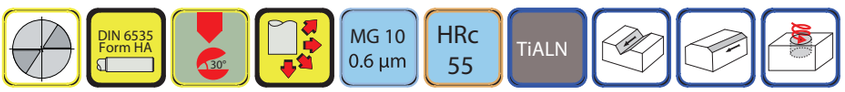
TiALN



New



Long Shank Spot Drills

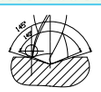


70 NF NM NT RC

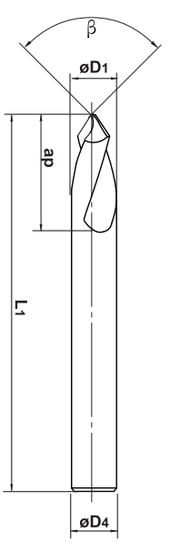
Item code	D1	R	β	ap	D5	L3	L1	D4
70NF 06006	6.0		90°	12			100	6
70NF 08008	8.0		90°	16			100	8
70NF 10010	10.0		90°	20			100	10
70NF 12012	12.0		90°	24			100	12
70NF 16016	16.0		90°	30			150	16
70NF 20020	20.0		90°	30			150	20

Item code	D1	R	β	ap	D5	L3	L1	D4
70NM 06006	6.0		120°	12			100	6
70NM 08008	8.0		120°	16			100	8
70NM 10010	10.0		120°	20			100	10
70NM 12012	12.0		120°	24			100	12
70NM 16016	16.0		120°	30			150	16
70NM 20020	20.0		120°	30			150	20

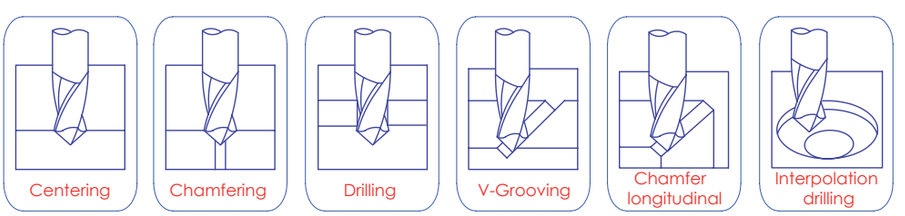
Item code	D1	R	β	ap	D5	L3	L1	D4
70NT 04004	4.0		90°	10			120	4
70NT 06006	6.0		90°	15			140	6
70NT 08008	8.0		90°	17			165	8
70NT 10010	10.0		90°	20			185	10
70NT 12012	12.0		90°	25			205	12
70NT 16016	16.0		90°	30			230	16



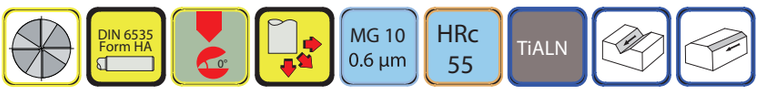
Item code	D1	R	β	ap	D5	L3	L1	D4
70RC 04004	4.0		142°	10			120	4
70RC 06006	6.0		142°	15			140	6
70RC 08008	8.0		142°	17			165	8
70RC 10010	10.0		142°	20			185	10
70RC 12012	12.0		142°	25			205	12
70RC 16016	16.0		142°	30			230	16



New



Chamfering End Mills

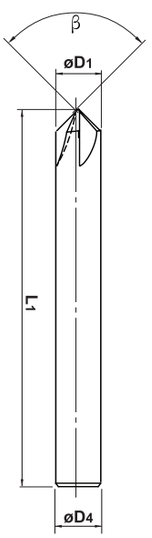


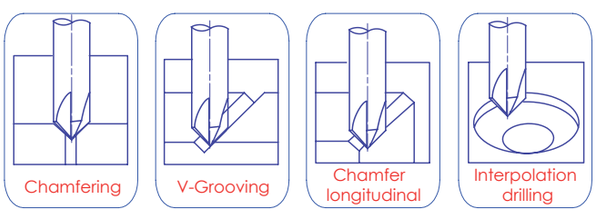
70 RL RM

Item code	D1	R	β	ap	D5	L3	L1	D4
70RL 01004	1.0		90°	1.5			50	4
70RL 02006	2.0		90°	2.0			50	6
70RL 02008	2.0		90°	3.0			50	8
70RL 02010	2.0		90°	4.0			75	10
70RL 02012	2.0		90°	5.0			75	12

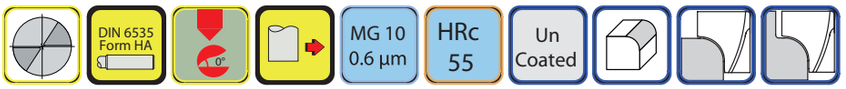
Item code	D1	R	β	ap	D5	L3	L1	D4
70RM 01004	1.0		60°	1.5			50	4
70RM 02006	2.0		60°	2.0			50	6
70RM 02008	2.0		60°	3.0			50	8
70RM 02010	2.0		60°	4.0			75	10
70RM 02012	2.0		60°	5.0			75	12

New





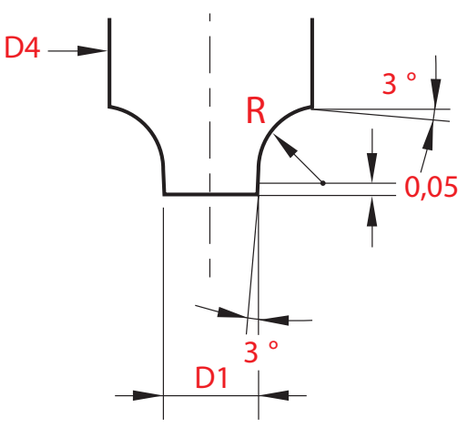
Corner Rounding End Mills

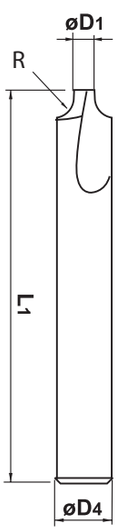


70 RR

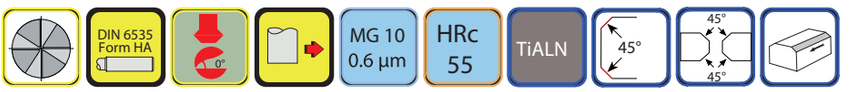
Item code	D1	R	β	ap	D5	L3	L1	D4
70RR 00504	1.1	0.25					50	4
70RR 00604	1.2	0.30					50	4
70RR 00704	1.3	0.35					50	4
70RR 00804	1.4	0.40					50	4
70RR 00904	1.5	0.45					50	4
70RR 01004	1.5	0.50					50	4
70RR 01504	1.5	0.75					50	4
70RR 02004	1.5	1.0					50	4
70RR 02506	1.5	1.25					50	6
70RR 03006	1.5	1.5					50	6
70RR 03506	1.5	1.75					50	6
70RR 04006	1.5	2.0					50	6
70RR 05008	1.5	2.5					60	8
70RR 06008	1.5	3.0					60	8
70RR 08012	2.0	4.0					75	12
70RR 10016	3.0	5.0					100	16
70RR 12016	3.0	6.0					100	16

New





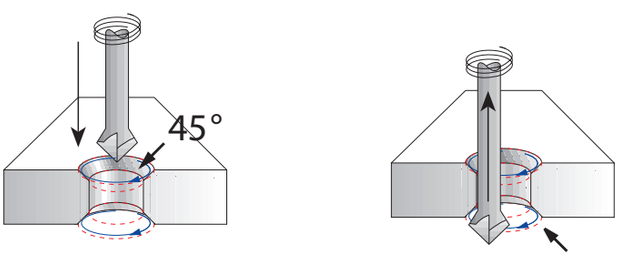
Deburring and Chamfering End Mills

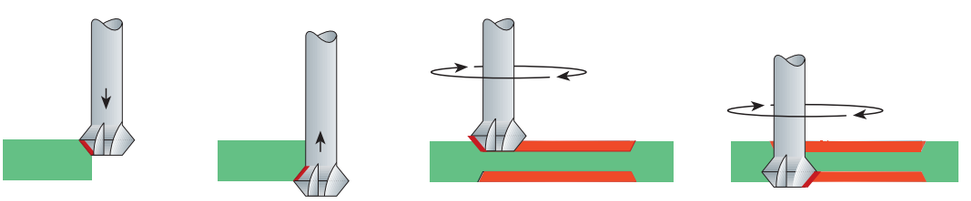


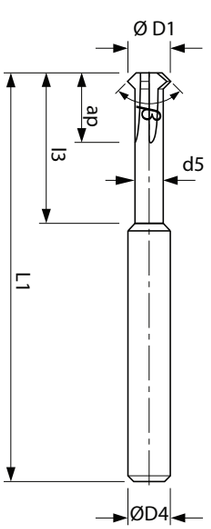
70 RV

Item code	D1	R	β	ap	D5	L3	L1	D4
70RV 01806	1.8		45°	1.2	1.4	8	100	6
70RV 02806	2.8		45°	1.8	2.2	8	100	6
70RV 03806	3.8		45°	2.0	2.9	10	100	6
70RV 05806	5.8		45°	2.0	3.9	15	100	6
70RV 07806	7.8		45°	2.0			100	6
70RV 09806	9.8		45°	4.0			100	6
70RV 11806	11.8		45°	4.0			100	6
70RV 13808	13.8		45°	5.0			100	8
70RV 15810	15.8		45°	5.0			100	10

New

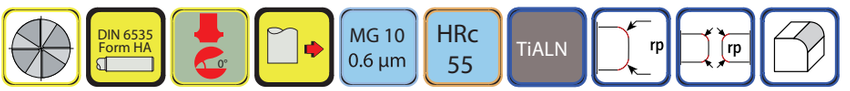






Material	cutting speed Vc (m/min)	feed f (mm/U) for countersinker Ø	
		3 – 10	12
Steel up to 500 N/mm2	45 - 75	0,03 - 0,08	0,08 - 0,10
Steel up to 800 N/mm2	45 - 75	0,03 - 0,08	0,08 - 0,10
Steel over 800 N/mm2	30 - 45	0,02 - 0,05	0,04 - 0,08
Stainless steel	22 - 40	0,02 - 0,05	0,04 - 0,08
Heat resisting steel	12 - 24	0,02 - 0,04	0,03 - 0,06
Cast iron, malleable cast iron	22 - 45	0,04 - 0,08	0,08 - 0,12
HHC < 65 HRC	25 - 45	0,03 - 0,07	0,05 - 0,10
Aluminium, alu. alloy over 80 HB	75 - 150	0,04 - 0,10	0,10 - 0,20
Brass, bronze, copper, leaded bronze all	38 - 75	0,04 - 0,08	0,08 - 0,12
Plastics	38 - 75	0,03 - 0,08	0,08 - 0,12

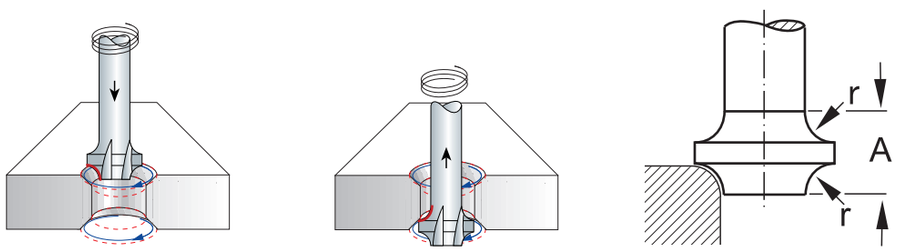
Deburring and Chamfering End Mills

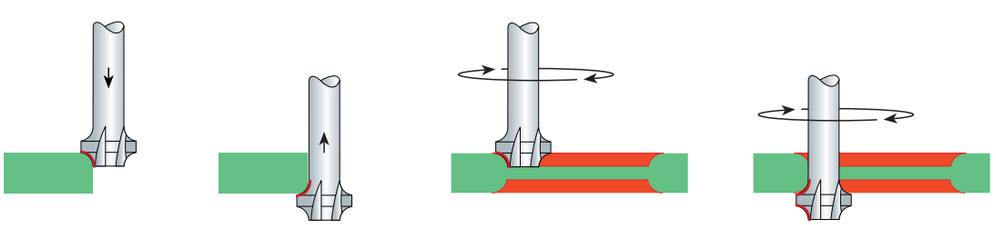


70 YC

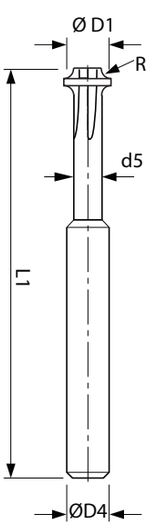
Item code	D1	R	β	ap	D Mini	L3	L1	D4
70YC 08026	8.0	0.2			7.6		100	6
70YC 08036	8.0	0.3			7.4		100	6
70YC 08046	8.0	0.4			7.2		100	6
70YC 08056	8.0	0.5			7.0		100	6
70YC 10086	10.0	0.8			8.4		100	6
70YC 10106	10.0	1.0			8.0		100	6
70YC 10126	10.0	1.2			7.6		100	6
70YC 10156	10.0	1.5			7.0		100	6

New





Material	cutting speed Vc (m/min)	feed f (mm/U) for countersinker Ø	
		3 – 10	12
Steel up to 500 N/mm2	45 - 75	0,03 - 0,08	0,08 - 0,10
Steel up to 800 N/mm2	45 - 75	0,03 - 0,08	0,08 - 0,10
Steel over 800 N/mm2	30 - 45	0,02 - 0,05	0,04 - 0,08
Stainless steel	22 - 40	0,02 - 0,05	0,04 - 0,08
Heat resisting steel	12 - 24	0,02 - 0,04	0,03 - 0,06
Cast iron, malleable cast iron	22 - 45	0,04 - 0,08	0,08 - 0,12
HHC < 65 HRC	25 - 45	0,03 - 0,07	0,05 - 0,10
Aluminium, alu. alloy over 80 HB	75 - 150	0,04 - 0,10	0,10 - 0,20
Brass, bronze, copper, leaded bronze all	38 - 75	0,04 - 0,08	0,08 - 0,12
Plastics	38 - 75	0,03 - 0,08	0,08 - 0,12



Counter sinker End Mills

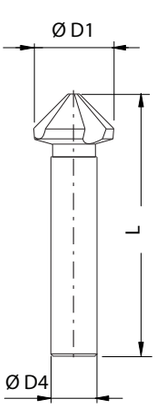
70 YT

Item code	D1	R	β	ap	D Mini	L3	L1	D4
70YT 05304	5.3		90°				40	4
70YT 06305	6.3		90°				45	5
70YT 08306	8.3		90°				50	6
70YT 10406	10.4		90°				50	6
70YT 12408	12.4		90°				56	8
70YT 16510	16.5		90°				60	10
70YT 20510	20.5		90°				63	10
70YT 25010	25.0		90°				67	10

CBN Fully Ground
* A better and sharper cutting edge is achieved-without burrs

New

Big Round Grooves
* Professional-cutting angle at the cutting edge
* Outstanding chip formation
* Outstanding flawless chip removal



Material	High carbon struc. steel up to 700 N/mm²	High carbon struc. steel up to 700 N/mm²	Alloyed steel up to 1000 N/mm²	Cast iron up to 250 N/mm²	Cast iron over 250 N/mm²	CuZn alloy brittle	CuZn alloy tough	Aluminium alloy up to 11% Si	Thermo-plastics	Duro-plastics
Vc = m/min	20	15	10	10	8	40	20	20	15	10
Cooling lubricant	Cutting spray	Cutting spray	Cutting spray	Compressed air	Compressed air	Compressed air	Compressed air	Cutting spray	Water	Compressed air
Ø mm	r.p.m.	r.p.m.	r.p.m.	r.p.m.	r.p.m.	r.p.m.	r.p.m.	r.p.m.	r.p.m.	r.p.m.
4,3	1481	1111	741	741	593	2963	1481	1481	1111	741
5,0	1274	955	637	637	510	2548	1274	1274	955	637
6,0	1062	796	531	531	425	2123	1062	1062	796	531
6,3	1011	758	506	506	404	2022	1011	1011	758	506
7,0	910	682	455	455	364	1820	910	910	682	455
8,0	796	597	398	398	318	1592	796	796	597	398
8,3	767	576	384	384	307	1535	767	767	576	384
10,0	637	478	318	318	255	1274	637	637	478	318
10,4	612	459	306	306	245	1225	612	612	459	306
11,5	554	415	277	277	222	1108	554	554	415	277
12,4	514	385	257	257	205	1027	514	514	385	257
15,0	425	318	212	212	170	849	425	425	318	212
16,5	386	290	193	193	154	772	386	386	290	193
19,0	335	251	168	168	134	670	335	335	251	168
20, 5	311	233	155	155	124	621	311	311	233	155
23,0	277	208	138	138	111	554	277	277	208	138
25,0	255	191	127	127	102	510	255	255	191	127
31,0	205	154	103	103	82	411	205	205	154	103

Micro Diameter Square End Mills

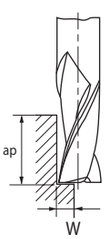
DIN 6535 Form HA | 45° | MG 10 0.6 µm | HRc 40 | DLC

75 AE

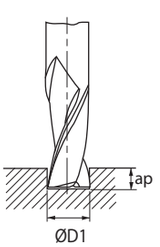
Item code	D1	R	β	ap	D5	L3	L1	D4
75AE 00504	0.50			1.5			50	4
75AE 00604	0.60			1.5			50	4
75AE 00804	0.80			2			50	4
75AE 01006	1.0			3			50	6
75AE 01206	1.2			4			50	6
75AE 01506	1.5			4			50	6
75AE 01806	1.8			5			50	6
75AE 02006	2.0			6			50	6
75AE 03006	3.0			9			50	6
75AE 04006	4.0			12			50	6
75AE 05006	5.0			15			50	6
75AE 06006	6.0			18			50	6
75AE 08008	8.0			20			60	8
75AE 10010	10.0			25			75	10
75AE 12012	12.0			30			75	12
75AE 16016	16.0			45			100	16
75AE 20020	20.0			45			100	20

FOR ALUMINIUM , NON FERROUS NON METALIC MATERIALS

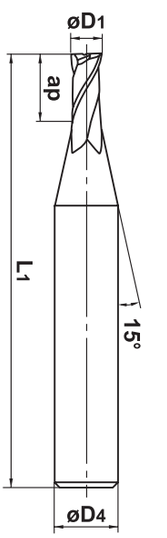
New



Max cutting depth	ap 1.5D	W 0.1D				
	Aluminium 1070		Aluminium alloy 2014-4032-5052-6061-7075		Aluminium alloy AC85	
Ø	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)
2	37000	2000	16000	850	20000	1100
3	35000	2000	14000	850	18000	1100
4	26000	2000	11000	850	13000	1100
5	21000	2000	9000	850	10000	1100
6	17000	2000	7000	850	9000	1100
8	13000	2000	5500	850	7000	1100
10	11000	2000	7000	850	5500	1100
12	8800	2000	3600	850	4500	1100
16	6500	2000	3000	850	3500	1100
20	5300	2000	2200	850	2500	1100



Max cutting depth	ap 0.1D					
	Aluminium 1070		Aluminium alloy 2014-4032-5052-6061-7075		Aluminium alloy AC85	
Ø	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)
2	37000	800	16000	350	20000	450
3	35000	900	14000	450	18000	550
4	26000	1100	11000	550	13000	660
5	21000	1100	9000	550	10000	660
6	17000	1100	7000	550	9000	660
8	13000	1100	5500	650	7000	800
10	11000	1300	7000	650	5500	800
12	8800	1300	3600	800	4500	800
16	6500	1100	3000	550	3500	900
20	5300	1100	2200	550	2500	650

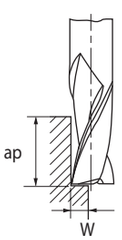


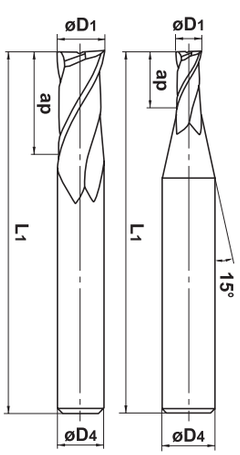
75 AH

Item code	D1	R	β	ap	D5	L3	L1	D4
75AH 01006	1.0			3			50	6
75AH 02006	2.0			6			50	6
75AH 03006	3.0			9			50	6
75AH 04006	4.0			12			50	6
75AH 05006	5.0			15			50	6
75AH 06006	6.0			18			50	6
75AH 08008	8.0			20			60	8
75AH 10010	10.0			30			75	10
75AH 12012	12.0			30			75	12
75AH 16016	16.0			45			100	16

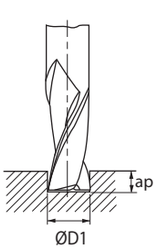
FOR ALUMINIUM , NON FERROUS NON METALIC MATERIALS

Max cutting depth	ap 1.5D	W 0.1D				
	Aluminium 1070		Aluminium alloy 2014-4032-5052-6061-7075		Aluminium alloy AC85	
Ø	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)
2	37000	2000	16000	850	20000	1100
3	35000	2000	14000	850	18000	1100
4	26000	2000	11000	850	13000	1100
5	21000	2000	9000	850	10000	1100
6	17000	2000	7000	850	9000	1100
8	13000	2000	5500	850	7000	1100
10	11000	2000	7000	850	5500	1100
12	8800	2000	3600	850	4500	1100
16	6500	2000	3000	850	3500	1100
20	5300	2000	2200	850	2500	1100





Max cutting depth	ap 0.1D					
	Aluminium 1070		Aluminium alloy 2014-4032-5052-6061-7075		Aluminium alloy AC85	
Ø	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)
2	37000	800	16000	350	20000	450
3	35000	900	14000	450	18000	550
4	26000	1100	11000	550	13000	660
5	21000	1100	9000	550	10000	660
6	17000	1100	7000	550	9000	660
8	13000	1100	5500	650	7000	800
10	11000	1300	7000	650	5500	800
12	8800	1300	3600	800	4500	800
16	6500	1100	3000	550	3500	900
20	5300	1100	2200	550	2500	650

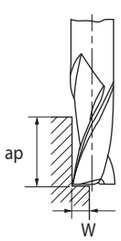


75 AL

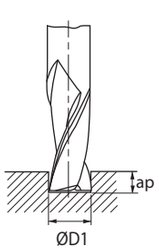
Item code	D1	R	β	ap	D5	L3	L1	D4
75AL 01006	1,0			3			50	6
75AL 02006	2.0			6			50	6
75AL 03006	3.0			9			50	6
75AL 04006	4.0			12			50	6
75AL 05006	5.0			15			50	6
75AL 06006	6.0			18			50	6
75AL 08008	8.0			20			60	8
75AL 10010	10.0			30			75	10
75AL 12012	12.0			30			75	12
75AL 16016	16.0			45			100	16

FOR ALUMINIUM , NON FERROUS NON METALIC MATERIALS

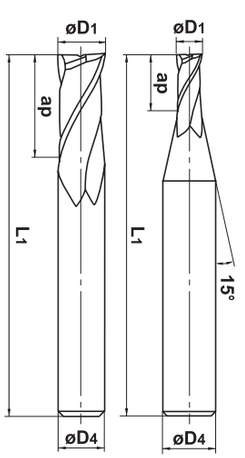
New



Max cutting depth	ap 1.5D	W 0.1D				
	Aluminium 1070		Aluminium alloy 2014-4032-5052-6061-7075		Aluminium alloy AC85	
Ø	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)
2	37000	2000	16000	850	20000	1100
3	35000	2000	14000	850	18000	1100
4	26000	2000	11000	850	13000	1100
5	21000	2000	9000	850	10000	1100
6	17000	2000	7000	850	9000	1100
8	13000	2000	5500	850	7000	1100
10	11000	2000	7000	850	5500	1100
12	8800	2000	3600	850	4500	1100
16	6500	2000	3000	850	3500	1100
20	5300	2000	2200	850	2500	1100



Max cutting depth	ap 0.1D					
	Aluminium 1070		Aluminium alloy 2014-4032-5052-6061-7075		Aluminium alloy AC85	
Ø	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)
2	37000	800	16000	350	20000	450
3	35000	900	14000	450	18000	550
4	26000	1100	11000	550	13000	660
5	21000	1100	9000	550	10000	660
6	17000	1100	7000	550	9000	660
8	13000	1100	5500	650	7000	800
10	11000	1300	7000	650	5500	800
12	8800	1300	3600	800	4500	800
16	6500	1100	3000	550	3500	900
20	5300	1100	2200	550	2500	650



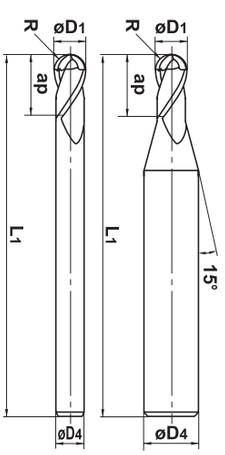
Ball Nose End Mills

DIN 6535 Form HA | 45° | MG 10 0.6 µm | HRc 40 | Un Coated

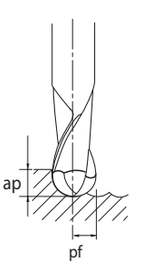
75 BA

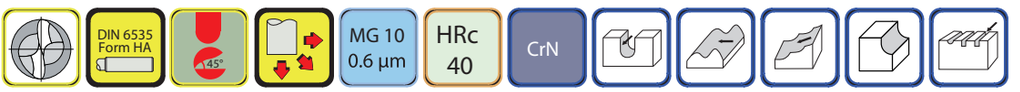
Item code	D1	R	β	ap	D5	L3	L1	D4
75BA 01004	1.0	0.5		3			50	4
75BA 01504	1.5	0.75		4			50	4
75BA 02004	2.0	1		6			50	4
75BA 03003	3.0	1.5		6			50	3
75BA 03004	3.0	1.5		6			50	4
75BA 04004	4.0	2		8			50	4
75BA 06006	6.0	3		12			50	6
75BA 08008	8.0	4		16			60	8
75BA 10010	10.0	5		20			75	10
75BA 12012	12.0	6		24			75	12

FOR ALUMINIUM , NON FERROUS NON METALIC MATERIALS



Max cutting depth	ap 0.1D	pf 0.2R				
	Aluminium 1070		Aluminium alloy 2014-4032-5052-6061-7075		Aluminium alloy AC85	
Ø	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)
1	50000	2300	37000	2000	50000	1400
1.5	50000	3000	28000	2000	50000	1800
2	44000	4000	18500	2000	44000	2500
3	28000	4000	11500	2000	28000	2500
4	22000	4000	8800	2000	22000	2500
6	16000	4000	6400	2000	16000	2500
8	12000	4000	4800	2000	12000	2500
10	10000	4000	4000	2000	10000	2500
12	8000	4000	3200	2000	8000	2500

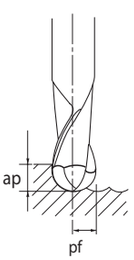




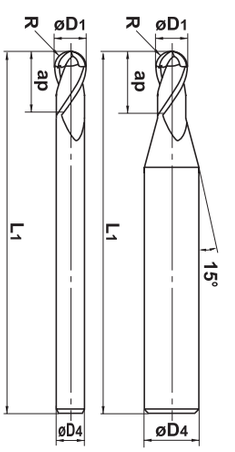
75 BD

Item code	D1	R	β	ap	D5	L3	L1	D4
75BD 01004	1.0	0.5		3			50	4
75BD 01504	1.5	0.75		4			50	4
75BD 02004	2.0	1		6			50	4
75BD 03003	3.0	1.5		6			50	3
75BD 03004	3.0	1.5		6			50	4
75BD 04004	4.0	2		8			50	4
75BD 06006	6.0	3		12			50	6
75BD 08008	8.0	4		16			60	8
75BD 10010	10.0	5		20			75	10
75BD 12012	12.0	6		24			75	12

FOR ALUMINIUM , NON FERROUS NON METALIC MATERIALS



Max cutting depth	ap 0.1D	pf 0.2R				
	Aluminium 1070		Aluminium alloy 2014-4032-5052-6061-7075		Aluminium alloy AC85	
Ø	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)
1	50000	2300	37000	2000	50000	1400
1.5	50000	3000	28000	2000	50000	1800
2	44000	4000	18500	2000	44000	2500
3	28000	4000	11500	2000	28000	2500
4	22000	4000	8800	2000	22000	2500
6	16000	4000	6400	2000	16000	2500
8	12000	4000	4800	2000	12000	2500
10	10000	4000	4000	2000	10000	2500
12	8000	4000	3200	2000	8000	2500



Long Shank Ball Nose End Mills

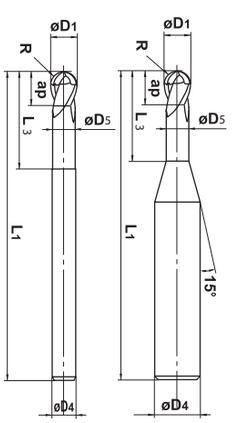
DIN 6535 Form HA | 30° | MG 10 0.6 µm | HRc 40 | ZnR

75 BH

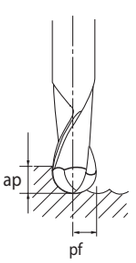
Item code	D1	R	β	ap	D5	L3	L1	D4
75BH 01006	1.0	0.5		2	0.95	15	60	6
75BH 02006	2.0	1		4	1.92	20	60	6
75BH 03006	3.0	1.5		6	2.90	25	70	6
75BH 04006	4.0	2		8	3.88	25	70	6
75BH 05006	5.0	2.5		10	4.80	25	70	6
75BH 06006	6.0	3		12	5.80	35	80	6
75BH 08008	8.0	4		16	7.70	35	80	8
75BH 10010	10.0	5		20	9.60	45	90	10
75BH 12012	12.0	6		24	11.50	50	100	12
75BH 14014	14.0	7		26	13.20	60	100	14
75BH 16016	16.0	8		30	15.0	92	150	16
75BH 20020	20.0	10		40	19.0	92	150	20

FOR ALUMINIUM , NON FERROUS NON METALIC MATERIALS

New



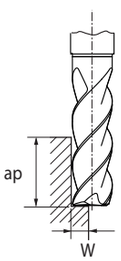
Max cutting depth	ap 0.1D	pf 0.2R				
	Aluminium 1070		Aluminium alloy 2014-4032-5052-6061-7075		Aluminium alloy AC85	
Ø	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)
1	50000	2300	37000	2000	50000	1400
1.5	50000	3000	28000	2000	50000	1800
2	44000	4000	18500	2000	44000	2500
3	28000	4000	11500	2000	28000	2500
4	22000	4000	8800	2000	22000	2500
6	16000	4000	6400	2000	16000	2500
8	12000	4000	4800	2000	12000	2500
10	10000	4000	4000	2000	10000	2500
12	8000	4000	3200	2000	8000	2500



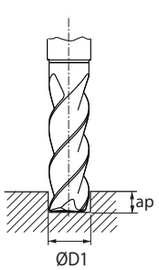
75 CB

Item code	D1	R	β	ap	D5	L3	L1	D4
75CB 02006	2.0			6			50	6
75CB 03006	3.0			9			50	6
75CB 04006	4.0			12			50	6
75CB 05006	5.0			15			50	6
75CB 06006	6.0			18			50	6
75CB 08008	8.0			20			60	8
75CB 10010	10.0			30			75	10
75CB 12012	12.0			30			75	12
75CB 16016	16.0			45			100	16
75CB 20020	20.0			45			100	20

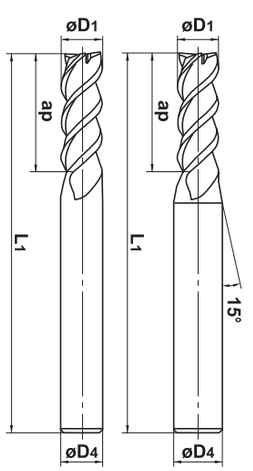
FOR ALUMINIUM , NON FERROUS NON METALIC MATERIALS



Max cutting depth	ap 1.5D	W 0.1D				
	Aluminium 1070		Aluminium alloy 2014-4032-5052-6061-7075		Aluminium alloy AC85	
Ø	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)
2	37000	2400	16000	1000	20000	1300
3	35000	2400	14000	1000	18000	1300
4	26000	2400	11000	1000	13000	1300
5	21000	2400	9000	1000	10000	1300
6	17000	2400	7000	1000	9000	1300
8	13000	2400	5500	1000	7000	1300
10	11000	2400	7000	1000	5500	1300
12	8800	2400	3600	1000	4500	1300
16	6500	2400	3000	1000	3500	1300
20	5300	2400	2200	1000	2500	1300



Max cutting depth	ap 0.1D					
	Aluminium 1070		Aluminium alloy 2014-4032-5052-6061-7075		Aluminium alloy AC85	
Ø	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)
2	37000	950	16000	380	20000	500
3	35000	1050	14000	500	18000	600
4	26000	1200	11000	600	13000	720
5	21000	1200	9000	600	10000	720
6	17000	1200	7000	600	9000	720
8	13000	1200	5500	700	7000	880
10	11000	1400	7000	700	5500	880
12	8800	1400	3600	880	4500	880
16	6500	1200	3000	600	3500	1000
20	5300	1200	2200	600	2500	700

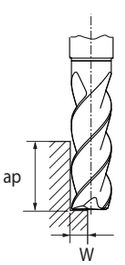


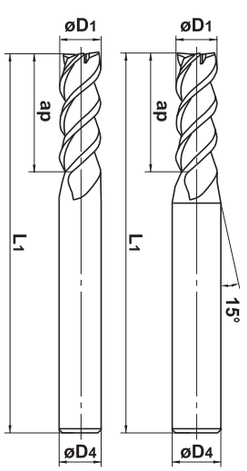
75 CD

Item code	D1	R	β	ap	D5	L3	L1	D4
75CD 02006	2.0			6			50	6
75CD 03006	3.0			9			50	6
75CD 04006	4.0			12			50	6
75CD 05006	5.0			15			50	6
75CD 06006	6.0			18			50	6
75CD 08008	8.0			20			60	8
75CD 10010	10.0			30			75	10
75CD 12012	12.0			30			75	12
75CD 16016	16.0			45			100	16
75CD 20020	20.0			45			100	20

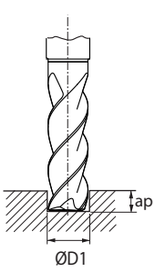
FOR ALUMINIUM , NON FERROUS NON METALIC MATERIALS

Max cutting depth	ap 1.5D	W 0.1D				
	Aluminium 1070		Aluminium alloy 2014-4032-5052-6061-7075		Aluminium alloy AC85	
Ø	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)
2	37000	2400	16000	1000	20000	1300
3	35000	2400	14000	1000	18000	1300
4	26000	2400	11000	1000	13000	1300
5	21000	2400	9000	1000	10000	1300
6	17000	2400	7000	1000	9000	1300
8	13000	2400	5500	1000	7000	1300
10	11000	2400	7000	1000	5500	1300
12	8800	2400	3600	1000	4500	1300
16	6500	2400	3000	1000	3500	1300
20	5300	2400	2200	1000	2500	1300





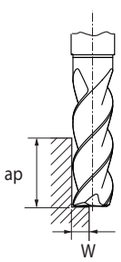
Max cutting depth	ap 0.1D					
	Aluminium 1070		Aluminium alloy 2014-4032-5052-6061-7075		Aluminium alloy AC85	
Ø	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)
2	37000	950	16000	380	20000	500
3	35000	1050	14000	500	18000	600
4	26000	1200	11000	600	13000	720
5	21000	1200	9000	600	10000	720
6	17000	1200	7000	600	9000	720
8	13000	1200	5500	700	7000	880
10	11000	1400	7000	700	5500	880
12	8800	1400	3600	880	4500	880
16	6500	1200	3000	600	3500	1000
20	5300	1200	2200	600	2500	700



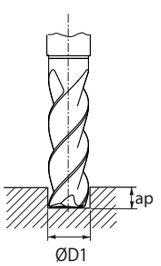
75 CF

Item code	D1	R	β	ap	D5	L3	L1	D4
75CF 02006	2.0			6			50	6
75CF 03006	3.0			9			50	6
75CF 04006	4.0			12			50	6
75CF 05006	5.0			15			50	6
75CF 06006	6.0			18			50	6
75CF 08008	8.0			20			60	8
75CF 10010	10.0			30			75	10
75CF 12012	12.0			30			75	12
75CF 16016	16.0			45			100	16
75CF 20020	20.0			45			100	20

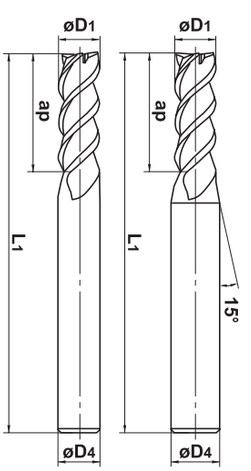
FOR ALUMINIUM , NON FERROUS NON METALIC MATERIALS



Max cutting depth	ap 1.5D	W 0.1D				
	Aluminium 1070		Aluminium alloy 2014-4032-5052-6061-7075		Aluminium alloy AC85	
Ø	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)
2	37000	2400	16000	1000	20000	1300
3	35000	2400	14000	1000	18000	1300
4	26000	2400	11000	1000	13000	1300
5	21000	2400	9000	1000	10000	1300
6	17000	2400	7000	1000	9000	1300
8	13000	2400	5500	1000	7000	1300
10	11000	2400	7000	1000	5500	1300
12	8800	2400	3600	1000	4500	1300
16	6500	2400	3000	1000	3500	1300
20	5300	2400	2200	1000	2500	1300



Max cutting depth	ap 0.1D					
	Aluminium 1070		Aluminium alloy 2014-4032-5052-6061-7075		Aluminium alloy AC85	
Ø	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)
2	37000	950	16000	380	20000	500
3	35000	1050	14000	500	18000	600
4	26000	1200	11000	600	13000	720
5	21000	1200	9000	600	10000	720
6	17000	1200	7000	600	9000	720
8	13000	1200	5500	700	7000	880
10	11000	1400	7000	700	5500	880
12	8800	1400	3600	880	4500	880
16	6500	1200	3000	600	3500	1000
20	5300	1200	2200	600	2500	700



Long Flute Square End Mills

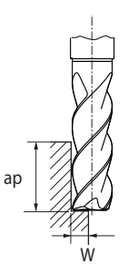
DIN 6535 Form HA | 55° | MG 10 0.6 µm | HRc 40 | Un Coated

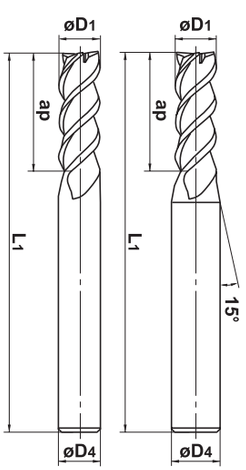
75 CH

Item code	D1	R	β	ap	D5	L3	L1	D4
75CH 02006	2.0			9			75	6
75CH 03006	3.0			12			75	6
75CH 04006	4.0			16			75	6
75CH 05006	5.0			20			75	6
75CH 06006	6.0			25			75	6
75CH 08008	8.0			32			75	8
75CH 10010	10.0			50			100	10
75CH 12012	12.0			50			100	12
75CH 16016	16.0			65			150	16
75CH 20020	20.0			75			150	20

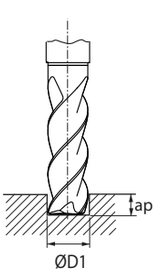
FOR ALUMINIUM , NON FERROUS NON METALIC MATERIALS

Max cutting depth	ap 2.5D1	W 0.15D1				
	Aluminium 1070		Aluminium alloy 2014-4032-5052-6061-7075		Aluminium alloy AC85	
Ø	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)
2	30000	600	15000	250	18000	300
3	26000	600	11000	250	13500	300
4	20000	600	8500	250	10000	300
5	15600	600	6700	250	8000	300
	13500	600	5500	250	6700	300
8	10000	600	4200	250	5000	300
10	7500	600	3300	250	4000	300
12	6700	600	2700	250	3400	300
16	5000	600	2300	250	2500	300
20	4000	600	1700	250	2000	300





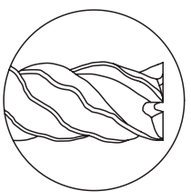
Max cutting depth	ap 0.6D1					
	Aluminium 1070		Aluminium alloy 2014-4032-5052-6061-7075		Aluminium alloy AC85	
Ø	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)
2	30000	500	15000	250	18000	300
3	26000	500	11000	250	13500	250
4	20000	550	8500	250	10000	250
5	15600	550	6700	200	8000	250
	13500	550	5500	200	6700	250
8	10000	600	4200	200	5000	250
10	7500	600	3300	200	4000	250
12	6700	600	2700	200	3400	250
16	5000	500	2300	200	2500	250
20	4000	500	1700	200	2000	250



75 CK

Item code	D1	R	β	ap	D5	L3	L1	D4
75CK 06006	6.0					16	50	6
75CK 08008	8.0					20	60	8
75CK 10010	10.0					25	75	10
75CK 12012	12.0					30	75	12
75CK 16016	16.0					40	100	16
75CK 20020	20.0					45	100	20

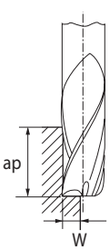
Square End Mills for Ultra-High Efficiency
Roughing and Semi-Finishing



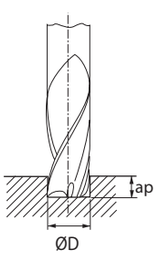
FOR ALUMINIUM , NON FERROUS NON METALIC MATERIALS

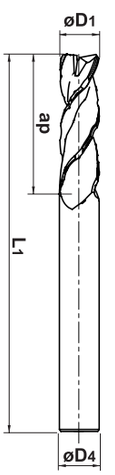
New

Max cutting depth	ap 1.5D	W 0.1D				
	Aluminium 1070		Aluminium alloy 2014-4032-5052-6061-7075		Aluminium alloy AC85	
Ø	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)
2	37000	2400	16000	1000	20000	1300
3	35000	2400	14000	1000	18000	1300
4	26000	2400	11000	1000	13000	1300
5	21000	2400	9000	1000	10000	1300
6	17000	2400	7000	1000	9000	1300
8	13000	2400	5500	1000	7000	1300
10	11000	2400	7000	1000	5500	1300
12	8800	2400	3600	1000	4500	1300
16	6500	2400	3000	1000	3500	1300
20	5300	2400	2200	1000	2500	1300



Max cutting depth	ap 0.1D					
	Aluminium 1070		Aluminium alloy 2014-4032-5052-6061-7075		Aluminium alloy AC85	
Ø	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)
2	37000	950	16000	380	20000	500
3	35000	1050	14000	500	18000	600
4	26000	1200	11000	600	13000	720
5	21000	1200	9000	600	10000	720
6	17000	1200	7000	600	9000	720
8	13000	1200	5500	700	7000	880
10	11000	1400	7000	700	5500	880
12	8800	1400	3600	880	4500	880
16	6500	1200	3000	600	3500	1000
20	5300	1200	2200	600	2500	700





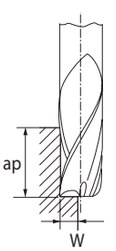
75 CN

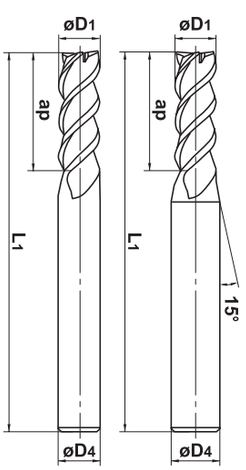
Item code	D1	R	β	ap	D5	L3	L1	D4
75CN 02006	2.0			6			50	6
75CN 03006	3.0			9			50	6
75CN 04006	4.0			12			50	6
75CN 05006	5.0			15			50	6
75CN 06006	6.0			18			50	6
75CN 08008	8.0			20			60	8
75CN 10010	10.0			30			75	10
75CN 12012	12.0			30			75	12
75CN 16016	16.0			45			100	16
75CN 20020	20.0			45			100	20

FOR ALUMINIUM , NON FERROUS NON METALIC MATERIALS

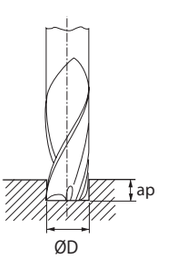
New

Max cutting depth	ap 1.5D	W 0.1D				
	Aluminium 1070		Aluminium alloy 2014-4032-5052-6061-7075		Aluminium alloy AC85	
Ø	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)
2	37000	2400	16000	1000	20000	1300
3	35000	2400	14000	1000	18000	1300
4	26000	2400	11000	1000	13000	1300
5	21000	2400	9000	1000	10000	1300
6	17000	2400	7000	1000	9000	1300
8	13000	2400	5500	1000	7000	1300
10	11000	2400	7000	1000	5500	1300
12	8800	2400	3600	1000	4500	1300
16	6500	2400	3000	1000	3500	1300
20	5300	2400	2200	1000	2500	1300





Max cutting depth	ap 0.1D					
	Aluminium 1070		Aluminium alloy 2014-4032-5052-6061-7075		Aluminium alloy AC85	
Ø	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)
2	37000	950	16000	380	20000	500
3	35000	1050	14000	500	18000	600
4	26000	1200	11000	600	13000	720
5	21000	1200	9000	600	10000	720
6	17000	1200	7000	600	9000	720
8	13000	1200	5500	700	7000	880
10	11000	1400	7000	700	5500	880
12	8800	1400	3600	880	4500	880
16	6500	1200	3000	600	3500	1000
20	5300	1200	2200	600	2500	700



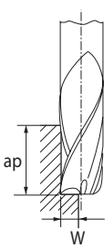
DIN 6535 Form HA | 45° | MG 10 0.6 µm | HRc 40 | ZnR

75 CP

Item code	D1	C	β	ap	D5	L3	L1	D4
75CP 03001	3.0	0.1		8	2.8	12	60	6
75CP 04001	4.0	0.1		11	3.8	18	60	6
75CP 05001	5.0	0.1		13	4.8	18	60	6
75CP 06002	6.0	0.2		13	5.8	18	60	6
75CP 06052	6.0	0.2		13	5.8	42	80	6
75CP 08002	8.0	0.2		21	7.8	25	65	8
75CP 08052	8.0	0.2		21	7.8	62	100	8
75CP 10002	10.0	0.2		22	9.7	30	70	10
75CP 10052	10.0	0.2		22	9.7	58	100	10
75CP 12002	12.0	0.2		26	11.7	36	85	12
75CP 12052	12.0	0.2		26	11.7	73	120	12
75CP 16002	16.0	0.2		36	15.7	42	90	16
75CP 16052	16.0	0.2		36	15.7	100	150	16
75CP 18002	18.0	0.2		36	17.6	42	90	18
75CP 18052	18.0	0.2		36	17.6	100	150	18
75CP 20002	20.0	0.2		41	19.5	52	90	20
75CP 20052	20.0	0.2		41	19.5	98	150	20

End Mills for Aluminum, Non-Ferrous & Non-Metallic Materials

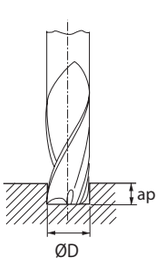
45°



Max cutting depth	ap	W
	1.5D	0.1D

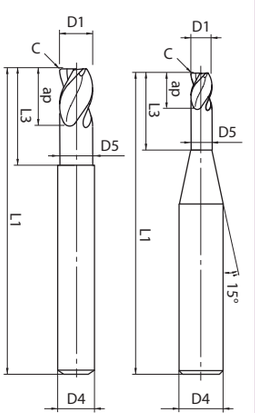
Ø	Aluminium 1070 S (min-1)	Aluminium 1070 F (mm/min)	Aluminium alloy 2014-4032-5052-6061-7075 S (min-1)	Aluminium alloy 2014-4032-5052-6061-7075 F (mm/min)	Aluminium alloy AC85 S (min-1)	Aluminium alloy AC85 F (mm/min)
2	37000	2400	16000	1000	20000	1300
3	35000	2400	14000	1000	18000	1300
4	26000	2400	11000	1000	13000	1300
5	21000	2400	9000	1000	10000	1300
6	17000	2400	7000	1000	9000	1300
8	13000	2400	5500	1000	7000	1300
10	11000	2400	7000	1000	5500	1300
12	8800	2400	3600	1000	4500	1300
16	6500	2400	3000	1000	3500	1300
20	5300	2400	2200	1000	2500	1300

New



Max cutting depth	ap
	0.1D

Ø	Aluminium 1070 S (min-1)	Aluminium 1070 F (mm/min)	Aluminium alloy 2014-4032-5052-6061-7075 S (min-1)	Aluminium alloy 2014-4032-5052-6061-7075 F (mm/min)	Aluminium alloy AC85 S (min-1)	Aluminium alloy AC85 F (mm/min)
2	37000	950	16000	380	20000	500
3	35000	1050	14000	500	18000	600
4	26000	1200	11000	600	13000	720
5	21000	1200	9000	600	10000	720
6	17000	1200	7000	600	9000	720
8	13000	1200	5500	700	7000	880
10	11000	1400	7000	700	5500	880
12	8800	1400	3600	880	4500	880
16	6500	1200	3000	600	3500	1000
20	5300	1200	2200	600	2500	700



Corner Radius End Mills

DIN 6535 Form HA | 45° | MG 10 0.6 µm | HRc 40 | ZnR

75 CR

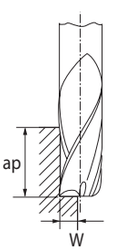
Item code	D1	R	β	ap	D5	L3	L1	D4
75CR 05056	5.0	0.5		13	4.8	18	55	6
75CR 05106	5.0	1.0		13	4.8	18	55	6
75CR 06056	6.0	0.5		13	5.8	18	55	6
75CR 06106	6.0	1.0		13	5.8	18	55	6
75CR 08058	8.0	0.5		21	7.8	25	65	8
75CR 08108	8.0	1.0		21	7.8	25	65	8
75CR 10051	10.0	0.5		22	9.7	30	70	10
75CR 10101	10.0	1.0		22	9.7	30	70	10
75CR 12055	12.0	0.5		26	11.7	36	85	12
75CR 12105	12.0	1.0		26	11.7	36	85	12
75CR 16206	16.0	2.0		36	15.7	42	90	16
75CR 16406	16.0	4.0		36	15.7	42	90	16
75CR 20407	20.0	4.0		41	19.5	52	105	20

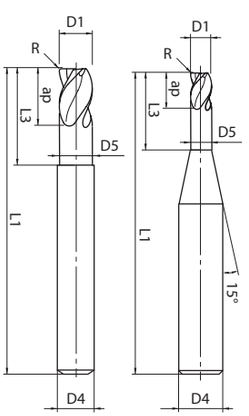
FOR ALUMINIUM , NON FERROUS NON METALIC MATERIALS

New

Max cutting depth	ap	W
	1.5D	0.1D

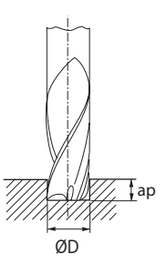
Ø	Aluminium 1070		Aluminium alloy 2014-4032-5052-6061-7075		Aluminium alloy AC85	
	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)
2	37000	2400	16000	1000	20000	1300
3	35000	2400	14000	1000	18000	1300
4	26000	2400	11000	1000	13000	1300
5	21000	2400	9000	1000	10000	1300
6	17000	2400	7000	1000	9000	1300
8	13000	2400	5500	1000	7000	1300
10	11000	2400	7000	1000	5500	1300
12	8800	2400	3600	1000	4500	1300
16	6500	2400	3000	1000	3500	1300
20	5300	2400	2200	1000	2500	1300





Max cutting depth	ap
	0.1D

Ø	Aluminium 1070		Aluminium alloy 2014-4032-5052-6061-7075		Aluminium alloy AC85	
	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)
2	37000	950	16000	380	20000	500
3	35000	1050	14000	500	18000	600
4	26000	1200	11000	600	13000	720
5	21000	1200	9000	600	10000	720
6	17000	1200	7000	600	9000	720
8	13000	1200	5500	700	7000	880
10	11000	1400	7000	700	5500	880
12	8800	1400	3600	880	4500	880
16	6500	1200	3000	600	3500	1000
20	5300	1200	2200	600	2500	700



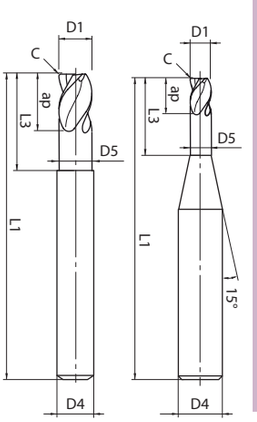
Corner Radius End Mills

DIN 6535 Form HA | 45° | MG 10 0.6 µm | HRc 40 | Un Coated

75 CU

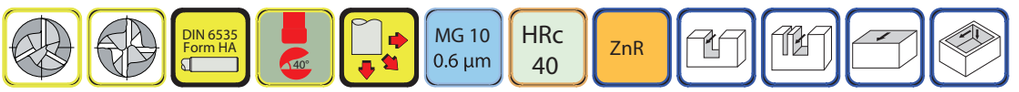
Item code	D1	R	β	ap	D5	L3	L1	D4
75CU 03056	3.0	0.5		6	2.90	9	50	6
75CU 04056	4.0	0.5		8	3.88	12	50	6
75CU 04106	4.0	1.0		8	3.88	12	50	6
75CU 06056	6.0	0.5		12	5.80	18	50	6
75CU 06106	6.0	1.0		12	5.80	18	50	6
75CU 06156	6.0	1.5		12	5.80	18	50	6
75CU 06206	6.0	2.0		12	5.80	18	50	6
75CU 08058	8.0	0.5		16	7.70	24	60	8
75CU 08108	8.0	1.0		16	7.70	24	60	8
75CU 08158	8.0	1.5		16	7.70	24	60	8
75CU 08208	8.0	2.0		16	7.70	24	60	8
75CU 10021	10.0	0.2		20	9.60	30	75	10
75CU 10051	10.0	0.5		20	9.60	30	75	10
75CU 10101	10.0	1.0		20	9.60	30	75	10
75CU 10151	10.0	1.5		20	9.60	30	75	10
75CU 10201	10.0	2.0		20	9.60	30	75	10
75CU 10251	10.0	2.5		20	9.60	30	75	10
75CU 10301	10.0	3.0		20	9.60	30	75	10
75CU 12022	12.0	0.2		24	11.50	36	75	12
75CU 12052	12.0	0.5		24	11.50	36	75	12
75CU 12102	12.0	1.0		24	11.50	36	75	12
75CU 12152	12.0	1.5		24	11.50	36	75	12
75CU 12202	12.0	2.0		24	11.50	36	75	12
75CU 12252	12.0	2.5		24	11.50	36	75	12
75CU 12302	12.0	3.0		24	11.50	36	75	12
75CU 12402	12.0	4.0		24	11.50	36	75	12
75CU 16035	16.0	0.3		30	15.40	40	100	16
75CU 16055	16.0	0.5		30	15.40	40	100	16
75CU 16105	16.0	1.0		30	15.40	40	100	16
75CU 16155	16.0	1.5		30	15.40	40	100	16
75CU 16205	16.0	2.0		30	15.40	40	100	16
75CU 16255	16.0	2.5		30	15.40	40	100	16
75CU 16305	16.0	3.0		30	15.40	40	100	16
75CU 16405	16.0	4.0		30	15.40	40	100	16

FOR ALUMINIUM , NON FERROUS NON METALIC MATERIALS



New

Cutting Conditions P.150



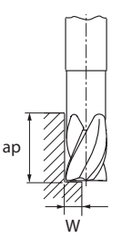
75 KC

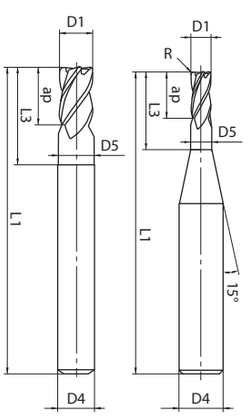
Item code	D1	R	β	ap	D5	L3	L1	D4
75KC 03006	3.0			8	2.8	20	70	6
75KC 04006	4.0			11	3.8	25	70	6
75KC 05006	5.0			13	4.8	30	70	6
75KC 06006	6.0			13	5.8	30	70	6
75KC 08008	8.0			20	7.8	35	80	8
75KC 10010	10.0			22	9.7	45	90	10
75KC 12012	12.0			26	11.7	55	100	12
75KC 16016	16.0			36	15.7	65	115	16
75KC 20020	20.0			41	19.5	75	125	20

FOR ALUMINIUM , NON FERROUS NON METALIC MATERIALS

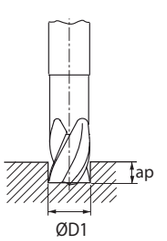
New

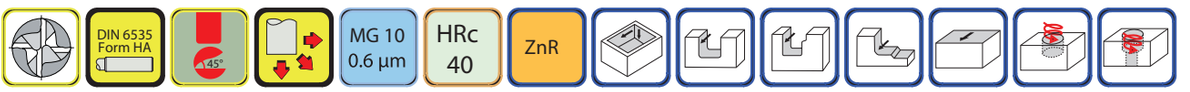
Max cutting depth	ap 1.5D	W 0.1D				
	Aluminium 1070		Aluminium alloy 2014-4032-5052-6061-7075		Aluminium alloy AC85	
Ø	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)
2	37000	2400	16000	1000	20000	1300
3	35000	2400	14000	1000	18000	1300
4	26000	2400	11000	1000	13000	1300
5	21000	2400	9000	1000	10000	1300
6	17000	2400	7000	1000	9000	1300
8	13000	2400	5500	1000	7000	1300
10	11000	2400	7000	1000	5500	1300
12	8800	2400	3600	1000	4500	1300
16	6500	2400	3000	1000	3500	1300
20	5300	2400	2200	1000	2500	1300





Max cutting depth	ap 0.1D					
	Aluminium 1070		Aluminium alloy 2014-4032-5052-6061-7075		Aluminium alloy AC85	
Ø	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)
2	37000	950	16000	380	20000	500
3	35000	1050	14000	500	18000	600
4	26000	1200	11000	600	13000	720
5	21000	1200	9000	600	10000	720
6	17000	1200	7000	600	9000	720
8	13000	1200	5500	700	7000	880
10	11000	1400	7000	700	5500	880
12	8800	1400	3600	880	4500	880
16	6500	1200	3000	600	3500	1000
20	5300	1200	2200	600	2500	700





75 KM

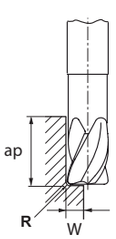
Item code	D1	R	β	ap	D5	L3	L1	D4
75KM 03016	3.0	0.1		8	2.8	12	55	6
75KM 04016	4.0	0.1		11	3.8	18	55	6
75KM 05016	5.0	0.1		13	4.8	18	55	6
75KM 06026	6.0	0.2		13	5.8	18	55	6
75KM 06027	6.0	0.2		13	5.8	42	80	6
75KM 08028	8.0	0.2		21	7.8	25	65	8
75KM 08029	8.0	0.2		21	7.8	62	100	8
75KM 10021	10.0	0.2		22	9.7	30	70	10
75KM 10022	10.0	0.2		22	9.7	58	100	10
75KM 12022	12.0	0.2		26	11.7	36	85	12
75KM 12023	12.0	0.2		26	11.7	73	120	12
75KM 16024	16.0	0.2		36	15.7	42	90	16
75KM 16025	16.0	0.2		36	15.7	100	150	16
75KM 18025	18.0	0.2		36	17.6	42	90	18
75KM 18026	18.0	0.2		36	17.6	100	150	18
75KM 20026	20.0	0.2		41	19.5	52	105	20
75KM 20027	20.0	0.2		41	19.5	98	150	20

End Mills for Aluminum, Non-Ferrous & Non-Metallic Materials

New

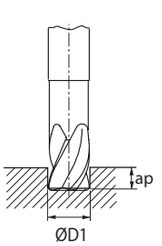
Max cutting depth	ap	W
	1.5D	0.1D

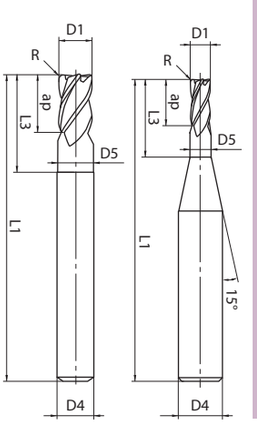
Ø	Aluminium 1070		Aluminium alloy 2014-4032-5052-6061-7075		Aluminium alloy AC85	
	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)
2	37000	2400	16000	1000	20000	1300
3	35000	2400	14000	1000	18000	1300
4	26000	2400	11000	1000	13000	1300
5	21000	2400	9000	1000	10000	1300
6	17000	2400	7000	1000	9000	1300
8	13000	2400	5500	1000	7000	1300
10	11000	2400	7000	1000	5500	1300
12	8800	2400	3600	1000	4500	1300
16	6500	2400	3000	1000	3500	1300
20	5300	2400	2200	1000	2500	1300



Max cutting depth	ap
	0.1D

Ø	Aluminium 1070		Aluminium alloy 2014-4032-5052-6061-7075		Aluminium alloy AC85	
	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)
2	37000	950	16000	380	20000	500
3	35000	1050	14000	500	18000	600
4	26000	1200	11000	600	13000	720
5	21000	1200	9000	600	10000	720
6	17000	1200	7000	600	9000	720
8	13000	1200	5500	700	7000	880
10	11000	1400	7000	700	5500	880
12	8800	1400	3600	880	4500	880
16	6500	1200	3000	600	3500	1000
20	5300	1200	2200	600	2500	700





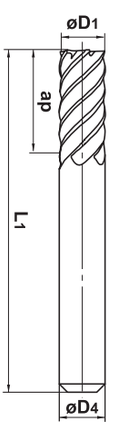
DIN 6535 Form HA | 45° | MG 10 0.6 µm | HRc 40 | ZnR

75 NK

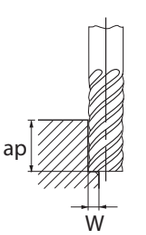
Item code	D1	R	β	ap	D5	L3	L1	D4
75NK 06006	6.0			15	5.7	43	80	6
75NK 08008	8.0			20	7.4	62	100	8
75NK 10010	10.0			25	9.2	58	100	10
75NK 12012	12.0			30	11	73	120	12
75NK 16016	16.0			40	15	100	150	16
75NK 20020	20.0			50	19	100	150	20

FOR ALUMINIUM , NON FERROUS NON METALIC MATERIALS

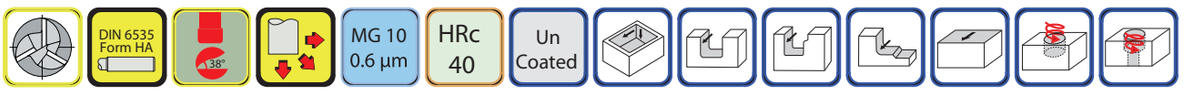
New



Max cutting depth	ap 1.5D	W 0.1D				
	Aluminium 1070		Aluminium alloy 2014-4032-5052-6061-7075		Aluminium alloy AC85	
Ø	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)
6	17000	2400	7000	1000	9000	1300
8	13000	2400	5500	1000	7000	1300
10	11000	2400	7000	1000	5500	1300
12	8800	2400	3600	1000	4500	1300
16	6500	2400	3000	1000	3500	1300
20	5300	2400	2200	1000	2500	1300



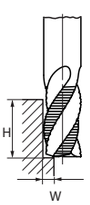
Roughing Cut Square End Mills



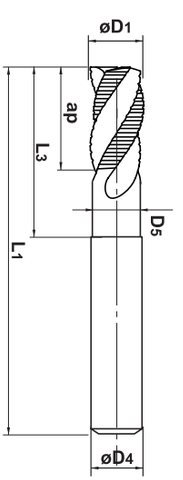
75 PG

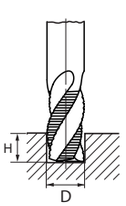
Item code	D1	R	β	ap	D5	L3	L1	D4
75PG 06006	6.0			12	5.80	18	50	6
75PG 08008	8.0			16	7.70	24	60	8
75PG 10010	10.0			20	9.60	30	75	10
75PG 12012	12.0			24	11.50	36	75	12
75PG 16016	16.0			32	15.40	45	100	16

FOR ALUMINIUM , NON FERROUS NON METALIC MATERIALS



Max cutting depth	ap <1.5 D1	pf <0.25 D1		
	Aluminium Alloy		Aluminium Cast	
D1	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)
6.0	27000	6100	13000	2300
8.0	20000	6000	10000	2400
10.0	16000	5800	8000	2300
12.0	13000	5300	6500	2100
16.0	10000	5100	5000	2000





Max cutting depth	ap <1.0 D1	pf < Ø D1		
	Aluminium Alloy		Aluminium Cast	
D1	S (min-1)	F (mm/min)	S (min-1)	F (mm/min)
6.0	16000	2400	8000	1000
8.0	12000	2500	6000	1000
10.0	9500	2600	5000	1100

DIN 6535 Form HA | 30° | MG 10 0.6 µm | HRc 40 | Un Coated

75 TE

Item code	D1	R	β	ap	D5	L3	L1	D4
75TE 01004	1.0			5			40	4
75TE 01006	1.0			5			40	6
75TE 01504	1.5			7			40	4
75TE 01506	1.5			7			40	6
75TE 02004	2.0			8			40	4
75TE 02006	2.0			8			40	6
75TE 02504	2.5			8			40	4
75TE 02506	2.5			8			40	6
75TE 03004	3.0			8			40	4
75TE 03006	3.0			8			40	6
75TE 03504	3.5			10			40	4
75TE 03506	3.5			10			40	6
75TE 04004	4.0			10			40	4
75TE 04006	4.0			10			40	6
75TE 04506	4.5			12			50	6
75TE 05006	5.0			12			50	6
75TE 05506	5.5			14			50	6
75TE 06006	6.0			14			50	6

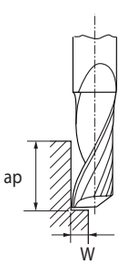
Right hand helix

FOR ALUMINIUM , NON FERROUS NON METALIC MATERIALS

New

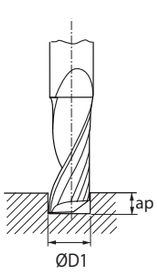
Max cutting depth: ap 1.5 D1 | ae 0.2 D1

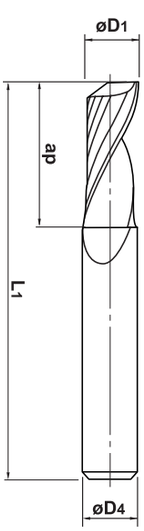
D1	Alu- alloys < 6% Si 792(m/min)			Alu- alloys > 6% Si 297(m/min)			Copper Alloys 495(m/min)			Thermo Plastics 594(m/min)		
	S (min-1)	F (mm/min)	az (min)	S (min-1)	F (mm/min)	az (min)	S (min-1)	F (mm/min)	az (min)	S (min-1)	F (mm/min)	az (min)
4	63057	1542	0.024	23646	578	0.024	39411	964	0.024	47293	1156	0.024
6	42038	2732	0.065	15764	1025	0.065	26274	1708	0.065	31529	2049	0.065
8	31529	2956	0.094	11823	1109	0.094	19705	1848	0.094	23646	2217	0.094
10	25223	2928	0.116	9459	1098	0.116	15764	1830	0.116	18917	2196	0.116
12	21019	2823	0.134	7882	1059	0.134	13137	1764	0.134	15764	2117	0.134
16	15764	2571	0.163	5912	964	0.163	9853	1607	0.163	11823	1928	0.163

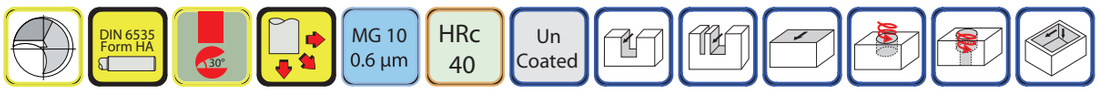


Max cutting depth: ap 0.25 D1 | ae 1.0 D1

D1	Alu- alloys < 6% Si 792(m/min)			Alu- alloys > 6% Si 297(m/min)			Copper Alloys 495(m/min)			Thermo Plastics 594(m/min)		
	S (min-1)	F (mm/min)	az (min)	S (min-1)	F (mm/min)	az (min)	S (min-1)	F (mm/min)	az (min)	S (min-1)	F (mm/min)	az (min)
4	47771	1168	0.024	17914	438	0.024	29857	730	0.024	35828	876	0.024
6	31847	2070	0.065	11943	776	0.065	19904	1294	0.065	23885	1553	0.065
8	23885	2240	0.094	8957	840	0.094	14928	1400	0.094	17914	1680	0.094
10	19108	2218	0.116	7166	832	0.116	11943	1386	0.116	14331	1664	0.116
12	15924	2139	0.134	5971	802	0.134	9952	1337	0.134	11943	1604	0.134
16	11943	1948	0.163	4479	730	0.163	7464	1217	0.163	8957	1461	0.163







75 TK TQ

Item code	D1	R	β	ap	D5	L3	L1	D4
75TK 01003	1.0			4			38	3
75TK 01503	1.5			5			38	3
75TK 02003	2.0			10			38	3
75TK 02503	2.5			12			38	3
75TK 03003	3.0			12			38	3
75TK 04004	4.0			15			40	4
75TK 05005	5.0			16			50	5
75TK 06006	6.0			18			50	6
75TK 06016	6.0			25			60	6
75TK 08008	8.0			22			63	8
75TK 08018	8.0			40			80	8
75TK 10010	10.0			30			72	10
75TK 12012	12.0			30			73	12
75TK 14014	14.0			30			75	14
75TK 16016	16.0			35			82	16

Right hand helix

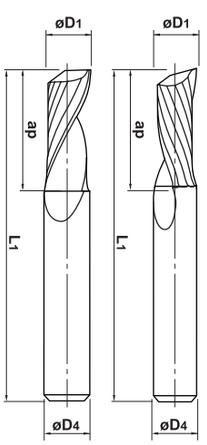
Right

Left

New

Item code	D1	R	β	ap	D5	L3	L1	D4
75TQ 01003	1.0			4			38	3
75TQ 01503	1.5			5			38	3
75TQ 02003	2.0			10			38	3
75TQ 02503	2.5			12			38	3
75TQ 03003	3.0			12			38	3
75TQ 04004	4.0			15			40	4
75TQ 05005	5.0			16			50	5
75TQ 06006	6.0			18			50	6
75TQ 06016	6.0			25			60	6
75TQ 08008	8.0			22			63	8
75TQ 08018	8.0			40			80	8
75TQ 10010	10.0			30			72	10
75TQ 12012	12.0			30			73	12
75TQ 14014	14.0			30			75	14
75TQ 16016	16.0			35			82	16

Left hand helix



FOR ALUMINIUM , NON FERROUS NON METALIC MATERIALS

Cutting Conditions P.156

Long Neck Ball Nose End Mills

DIN 6535 Form HA | 30° | MG 10 0.6 µm

81 GA

Item code	D1	R	β	ap	D5	L3	L1	D4
81GA 04043	0.4	0.20		0.4	0.35	4	55	3
81GA 04063	0.4	0.20		0.4	0.35	6	55	3
81GA 05053	0.5	0.25		0.5	0.45	5	55	3
81GA 05103	0.5	0.25		0.5	0.45	10	55	3
81GA 06063	0.6	0.30		0.8	0.45	6	55	3
81GA 08043	0.8	0.40		1.0	0.75	8	55	3
81GA 08103	0.8	0.40		1.0	0.75	12	55	3
81GA 10053	1.0	0.50		1.0	0.95	5	55	3
81GA 10103	1.0	0.50		1.0	0.95	10	55	3
81GA 10153	1.0	0.50		1.0	0.95	15	55	3
81GA 10203	1.0	0.50		1.0	0.95	20	55	3
81GA 15103	1.5	0.75		2.0	1.45	10	55	3
81GA 15553	1.5	0.75		2.0	1.45	15	55	3
81GA 15253	1.5	0.75		2.0	1.45	25	55	3
81GA 20103	2.0	1.00		2.0	1.92	10	65	3
81GA 20153	2.0	1.00		2.0	1.92	15	65	3
81GA 20203	2.0	1.00		2.0	1.92	20	65	3
81GA 20253	2.0	1.00		2.0	1.92	25	65	3
81GA 20303	2.0	1.00		2.0	1.92	30	65	3
81GA 30154	3.0	1.50		3.0	2.90	15	65	4
81GA 30254	3.0	1.50		3.0	2.90	30	75	4
81GA 40205	4.0	2.00		4.0	3.88	20	65	5
81GA 40305	4.0	2.00		4.0	3.88	30	75	5
81GA 60306	6.0	3.00		6.0	5.90	30	75	6
81GA 60506	6.0	3.00		6.0	5.90	50	90	6

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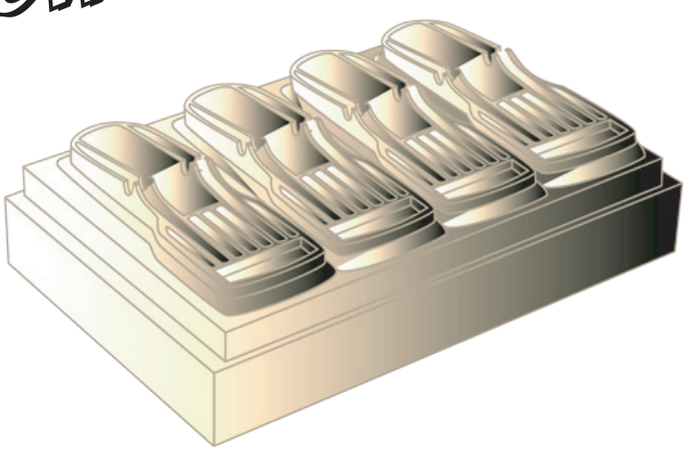
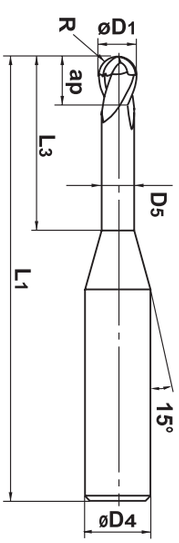
New



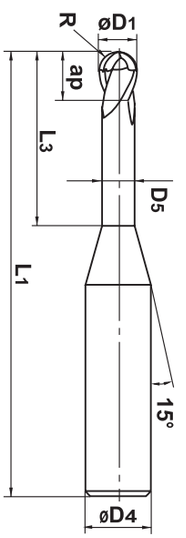


Cutting Conditions P.160

Long Neck Ball Nose End Mills

81 GD

Item code	D1	R	β	ap	D5	L3	L1	D4
81GD 02014	0.2	0.10		0.2	0.18	1	55	4
81GD 03014	0.3	0.15		0.3	0.27	1	55	4
81GD 03034	0.3	0.15		0.3	0.27	3	55	4
81GD 03054	0.3	0.15		0.3	0.27	5	55	4
81GD 03084	0.3	0.15		0.3	0.27	8	55	4
81GD 04044	0.4	0.20		0.4	0.35	4	55	4
81GD 04064	0.4	0.20		0.4	0.35	6	55	4
81GD 04084	0.4	0.20		0.4	0.35	8	55	4
81GD 05054	0.5	0.25		0.5	0.45	5	55	4
81GD 05104	0.5	0.25		0.5	0.45	10	55	4
81GD 06064	0.6	0.30		0.8	0.56	6	55	4
81GD 06084	0.6	0.30		0.8	0.56	8	55	4
81GD 06124	0.6	0.30		0.8	0.56	12	55	4
81GD 08084	0.8	0.40		1.0	0.75	8	55	4
81GD 08124	0.8	0.40		1.0	0.75	12	55	4
81GD 08164	0.8	0.40		1.0	0.75	16	55	4
81GD 10054	1.0	0.50		1.0	0.95	5	55	4
81GD 10104	1.0	0.50		1.0	0.95	10	55	4
81GD 10154	1.0	0.50		1.0	0.95	15	55	4
81GD 10204	1.0	0.50		1.0	0.95	20	55	4
81GD 10254	1.0	0.50		1.0	0.95	25	55	4
81GD 10304	1.0	0.50		1.0	0.95	30	55	4
81GD 12054	1.2	0.60		1.5	0.95	5	55	4
81GD 12104	1.2	0.60		1.5	0.95	10	55	4
81GD 12154	1.2	0.60		1.5	0.95	15	55	4
81GD 15054	1.5	0.75		2.0	1.45	5	55	4
81GD 15104	1.5	0.75		2.0	1.45	10	55	4
81GD 15154	1.5	0.75		2.0	1.45	15	55	4
81GD 15204	1.5	0.75		2.0	1.45	20	55	4
81GD 15254	1.5	0.75		2.0	1.45	25	55	4
81GD 20104	2.0	1.00		2.0	1.92	10	65	4
81GD 20154	2.0	1.00		2.0	1.92	15	65	4
81GD 20204	2.0	1.00		2.0	1.92	20	65	4
81GD 20254	2.0	1.00		2.0	1.92	25	65	4
81GD 20304	2.0	1.00		2.0	1.92	30	65	4
81GD 30104	3.0	1.50		3.0	2.90	10	65	4
81GD 30154	3.0	1.50		3.0	2.90	15	75	4
81GD 31204	3.0	1.50		3.0	2.90	20	65	4
81GD 31254	3.0	1.50		3.0	2.90	25	65	4
81GD 31304	3.0	1.50		3.0	2.90	30	65	4



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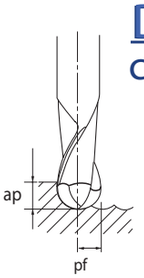
Cutting Conditions P.160

DIN 6535 Form HA | 30° | MG 12 0.4 µm

81 GH

Item code	D1	R	β	ap	D5	L3	L1	D4
81GH 40206	4.0	2.0		4	3.88	20	65	6
81GH 40306	4.0	2.0		4	3.88	30	75	6
81GH 40406	4.0	2.0		4	3.88	40	90	6
81GH 50206	5.0	2.5		5	4.90	20	65	6
81GH 50306	5.0	2.5		5	4.90	30	75	6
81GH 50406	5.0	2.5		5	4.90	40	90	6
81GH 50506	5.0	2.5		5	4.90	50	90	6
81GH 60306	6.0	3.0		6	5.80	30	75	6
81GH 60406	6.0	3.0		6	5.80	40	90	6
81GH 60506	6.0	3.0		6	5.80	50	90	6
81GH 60606	6.0	3.0		6	5.80	60	100	6
81GH 80308	8.0	4.0		8	7.70	30	80	8
81GH 80608	8.0	4.0		8	7.70	60	100	8
81GH 10301	10.0	5.0		10	9.60	30	80	10
81GH 10601	10.0	5.0		10	9.60	60	100	10
81GH 12302	12.0	6.0		12	11.50	30	80	12
81GH 12602	12.0	6.0		12	11.50	60	100	12



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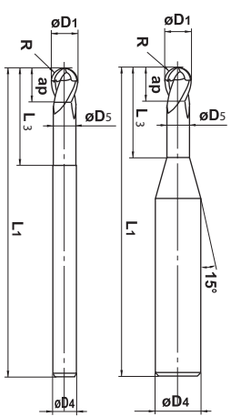
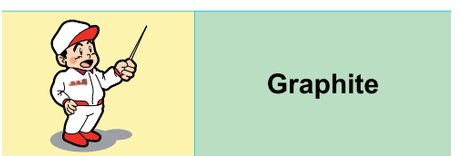
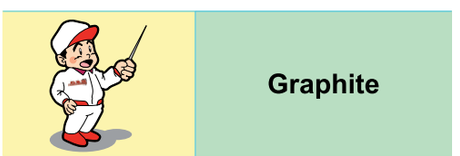
New



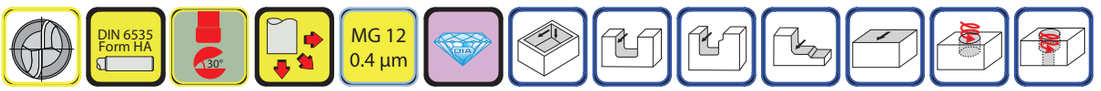


R	Neck (mm)	S (min-1)	F (mm/min)	ap (mm)	pf (mm)
		Graphite			
0.2	4	40000	1300	0.04	0.10
0.2	6	35000	1000	0.03	0.10
0.2	8	30000	800	0.03	0.10
0.2	12	20000	450	0.03	0.08
0.25	5	30000	800	0.03	0.10
0.25	10	20000	450	0.03	0.08
0.3	6	40000	1500	0.06	0.15
0.3	8	35000	1000	0.05	0.15
0.3	12	25000	650	0.04	0.12
0.4	4	40000	1700	0.08	0.20
0.4	6	40000	1700	0.08	0.20
0.4	8	40000	1700	0.08	0.15
0.5	5	40000	2500	0.11	0.30
0.5	10	40000	2000	0.10	0.20
0.5	15	35000	1500	0.10	0.20
0.5	20	30000	1100	0.08	0.20
0.5	25	25000	900	0.07	0.18
0.5	30	20000	600	0.06	0.15
0.6	5	40000	2500	0.11	0.30
0.6	10	40000	2000	0.10	0.20
0.6	15	35000	1500	0.10	0.20
0.75	5	40000	2800	0.15	0.45
0.75	10	40000	2800	0.15	0.45
0.75	15	35000	2000	0.15	0.30
0.75	20	30000	1500	0.15	0.30
0.75	25	27000	1000	0.10	0.30



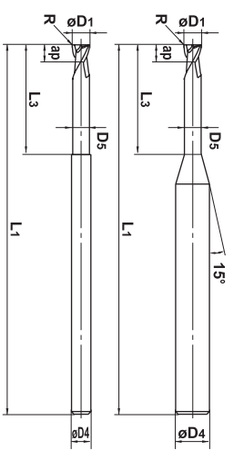
R	Neck (mm)	S (min-1)	F (mm/min)	ap (mm)	pf (mm)
		Graphite			
1	10	40000	3000	0.20	0.60
1	15	30000	2000	0.20	0.50
1	20	30000	2000	0.20	0.50
1	25	25000	1500	0.18	0.45
1	30	20000	1000	0.15	0.40
1.5	10	28000	3000	0.30	0.90
1.5	15	28000	3000	0.30	0.90
1.5	20	28000	3000	0.30	0.90
1.5	25	20000	2000	0.25	0.75
1.5	30	16000	1500	0.20	0.60
2	20	21000	3300	0.50	1.50
2	30	15000	2000	0.40	1.20
2	40	13000	1600	0.35	1.00
2.5	20	20000	1800	0.60	1.50
2.5	30	14000	1300	0.50	1.20
2.5	40	12000	1100	0.40	1.10
2.5	50	10000	1000	0.30	1.00
3	30	20000	1800	0.60	1.50
3	40	14000	1300	0.50	1.20
3	50	12000	1100	0.40	1.10
3	60	10000	1000	0.30	1.00
4	30	16000	3900	0.80	2.40
4	60	7500	1800	0.70	2.00
5	30	12500	3000	1.00	3.00
5	60	5700	1350	1.00	3.00
6	30	10500	2550	1.20	3.60
6	60	4800	1100	1.20	3.60

Long Neck Corner Radius End Mills



82 GD

Item code	D1	R	β	ap	D5	L3	L1	D4
82GD 02014	0.2	0.05		0.2	0.20	1	55	4
82GD 03014	0.3	0.05		0.3	0.27	1	55	4
82GD 03034	0.3	0.05		0.3	0.27	3	55	4
82GD 04024	0.4	0.05		0.4	0.35	2	55	4
82GD 04044	0.4	0.05		0.4	0.35	4	55	4
82GD 04084	0.4	0.05		0.4	0.35	8	55	4
82GD 05024	0.5	0.05		0.5	0.45	2	55	4
82GD 05054	0.5	0.05		0.5	0.45	5	55	4
82GD 05104	0.5	0.05		0.5	0.45	10	55	4
82GD 06034	0.6	0.06		0.8	0.56	3	55	4
82GD 06064	0.6	0.06		0.8	0.56	6	55	4
82GD 06084	0.6	0.06		0.8	0.56	8	55	4
82GD 06124	0.6	0.06		0.8	0.56	12	55	4
82GD 08044	0.8	0.08		1.0	0.75	4	55	4
82GD 08084	0.8	0.08		1.0	0.75	8	55	4
82GD 08124	0.8	0.08		1.0	0.75	12	55	4
82GD 08164	0.8	0.08		1.0	0.75	16	55	4
82GD 10054	1.0	0.10		1.0	0.95	5	55	4
82GD 10104	1.0	0.10		1.0	0.95	10	55	4
82GD 10154	1.0	0.10		1.0	0.95	15	55	4
82GD 10204	1.0	0.10		1.0	0.95	20	55	4
82GD 10254	1.0	0.10		1.0	0.95	25	55	4
82GD 12054	1.2	0.12		1.5	0.95	5	55	4
82GD 12104	1.2	0.12		1.5	0.95	10	55	4
82GD 12154	1.2	0.12		1.5	0.95	15	55	4
82GD 15054	1.5	0.15		2.0	1.45	5	55	4
82GD 15104	1.5	0.15		2.0	1.45	10	55	4
82GD 15154	1.5	0.15		2.0	1.45	15	55	4
82GD 15204	1.5	0.15		2.0	1.45	20	55	4
82GD 15254	1.5	0.15		2.0	1.45	25	55	4
82GD 20104	2.0	0.20		2.0	1.92	10	65	4
82GD 20154	2.0	0.20		2.0	1.92	15	65	4
82GD 20204	2.0	0.20		2.0	1.92	20	65	4
82GD 20254	2.0	0.20		2.0	1.92	25	65	4
82GD 21104	2.0	0.50		2.0	1.92	10	65	4
82GD 21154	2.0	0.50		2.0	1.92	15	65	4
82GD 21204	2.0	0.50		2.0	1.92	20	65	4
82GD 21254	2.0	0.50		2.0	1.92	25	65	4
82GD 30154	3.0	0.30		3.0	2.90	15	65	4
82GD 30254	3.0	0.30		3.0	2.90	25	75	4
82GD 31104	3.0	0.50		3.0	2.90	10	65	4
82GD 31154	3.0	0.50		3.0	2.90	15	65	4
82GD 31204	3.0	0.50		3.0	2.90	20	65	4
82GD 31254	3.0	0.50		3.0	2.90	25	75	4
82GD 31304	3.0	0.50		3.0	2.90	30	75	4



DIAMONDGRAPHITE
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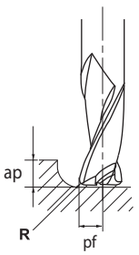
New

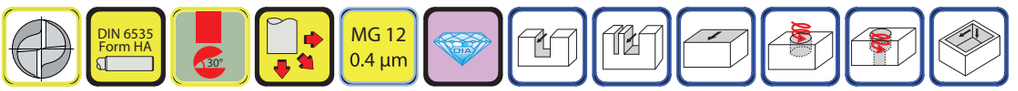
Cutting Conditions P.162

82 GD



			Graphite			
D1	R	Neck (mm)	S (min-1)	F (mm/min)	ap (mm)	pf (mm)
0.5	0.05	2	30000	1100	0.05	0.23
0.5	0.05	5	28000	960	0.05	0.23
0.5	0.05	10	22000	600	0.04	0.21
0.6	0.06	3	30000	1100	0.05	0.23
0.6	0.06	6	28000	960	0.05	0.23
0.6	0.06	8	22000	600	0.04	0.21
0.6	0.06	12	20000	400	0.04	0.21
0.8	0.08	4	28000	1300	0.08	0.45
0.8	0.08	8	22000	900	0.08	0.45
0.8	0.08	12	18000	700	0.07	0.35
0.8	0.08	16	15000	500	0.06	0.25
1.0	0.10	5	25000	1500	0.10	0.60
1.0	0.10	10	22000	1300	0.10	0.45
1.0	0.10	15	18000	1000	0.08	0.40
1.0	0.10	20	15000	800	0.08	0.40
1.0	0.10	25	12000	600	0.07	0.35
1.2	0.12	5	25000	1500	0.10	0.60
1.2	0.12	10	22000	1300	0.10	0.45
1.2	0.12	15	18000	1000	0.08	0.40
1.5	0.15	5	25000	2100	0.15	0.80
1.5	0.15	10	25000	2100	0.15	0.80
1.5	0.15	15	25000	1800	0.15	0.80
1.5	0.15	20	18000	1400	0.15	0.80
1.5	0.15	25	18000	1100	0.15	0.80
2.0	0.20	10	22000	3000	0.20	1.20
2.0	0.20	15	19000	2500	0.20	1.20
2.0	0.20	20	16000	2000	0.20	1.20
2.0	0.20	25	13000	1600	0.16	1.00

			Graphite			
D1	R	Neck (mm)	S (min-1)	F (mm/min)	ap (mm)	pf (mm)
3.0	0.30	15	18000	3000	0.30	2.00
3.0	0.30	25	15000	2200	0.25	1.70
3.0	0.50	10	18000	3000	0.30	1.70
3.0	0.50	15	18000	3000	0.30	1.60
3.0	0.50	20	18000	3000	0.30	1.50
3.0	0.50	25	15000	2500	0.30	1.30
3.0	0.50	30	12000	2000	0.30	1.10
4.0	0.30	15	18000	4200	0.40	2.70
4.0	0.40	15	18000	4200	0.40	2.40
4.0	0.40	25	16000	2900	0.40	2.00
4.0	0.50	20	18000	4200	0.40	2.30
4.0	0.50	30	16000	2900	0.40	1.50
4.0	0.50	40	13000	2800	0.40	2.30
5.0	0.50	30	16000	2900	0.40	1.00
5.0	0.50	40	13000	2800	0.40	1.70
5.0	0.50	50	11000	2000	0.40	1.50
6.0	0.50	30	14000	4600	0.60	3.80
6.0	1.00	30	14000	4600	0.60	3.00
8.0	0.50	30	10500	4000	0.80	5.30
8.0	1.00	30	10500	4000	0.80	4.50
10.0	0.50	30	9000	3500	1.00	6.80
10.0	1.00	30	9000	3500	1.00	6.00
12.0	0.50	30	7200	3000	1.00	8.00

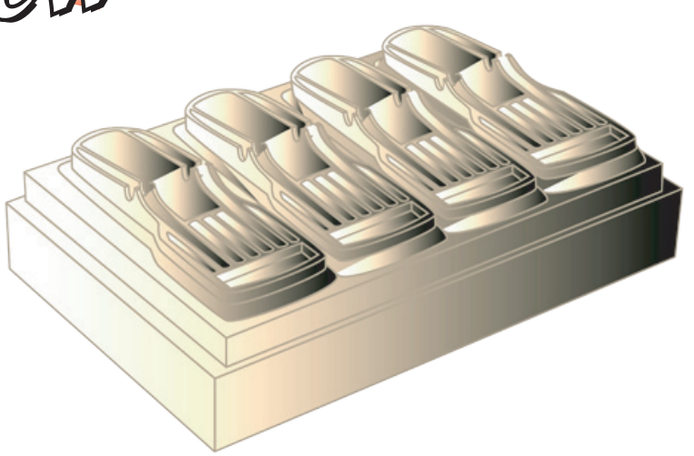


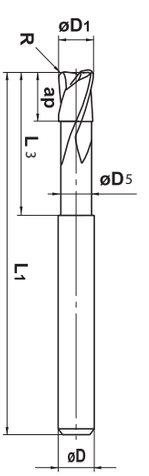
82 GH

Item code	D1	R	β	ap	D5	L3	L1	D4
82GH 40156	4.0	0.30		4	3.88	15	65	6
82GH 41156	4.0	0.40		4	3.88	15	65	6
82GH 41256	4.0	0.40		4	3.88	25	75	6
82GH 42206	4.0	0.50		4	3.88	20	65	6
82GH 42306	4.0	0.50		4	3.88	30	75	6
82GH 42406	4.0	0.50		4	3.88	40	90	6
82GH 50206	5.0	0.50		5	4.90	20	75	6
82GH 50306	5.0	0.50		5	4.90	30	75	6
82GH 50406	5.0	0.50		5	4.90	40	90	6
82GH 50506	5.0	0.50		5	4.90	50	90	6
82GH 60306	6.0	0.30		6	5.80	30	75	6
82GH 62306	6.0	0.50		6	5.80	30	75	6
82GH 62406	6.0	0.50		6	5.80	40	90	6
82GH 62506	6.0	0.50		6	5.80	50	90	6
82GH 62606	6.0	0.50		6	5.80	60	100	6
82GH 63306	6.0	1.00		6	5.80	30	75	6
82GH 63406	6.0	1.00		6	5.80	40	90	6
82GH 82308	8.0	0.50		8	7.70	30	80	8
82GH 82608	8.0	0.50		8	7.70	60	100	8
82GH 83308	8.0	1.00		8	7.70	30	80	8
82GH 83608	8.0	1.00		8	7.70	60	100	8
82GH 10301	10.0	0.50		10	9.60	30	80	10
82GH 10501	10.0	0.50		10	9.60	60	100	10
82GH 10701	10.0	1.00		10	9.60	30	80	10
82GH 10901	10.0	1.00		10	9.60	60	100	10
82GH 12302	12.0	0.50		12	11.50	30	80	12
82GH 12602	12.0	0.50		12	11.50	60	100	12
82GH 12312	12.0	1.00		12	11.50	30	80	12
82GH 12612	12.0	1.00		12	11.50	60	100	12

DIAMONDGRAPHITE
coating, specifically designed for
GRAPHITE

New





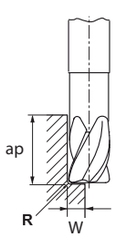
Cutting Conditions P.162

Radius Square End Mills

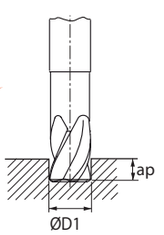
DIN 6535 Form HA | 35° | MG 12 0.4 µm | DIA

84 GA

Item code	D1	R	β	ap	D5	L3	L1	D4
84GA 03033	3.0	0.30		6.0	2.90	14	50	3
84GA 03053	3.0	0.50		6.0	2.90	14	50	3
84GA 03103	3.0	1.00		6.0	2.90	14	50	3
84GA 04054	4.0	0.50		8.0	3.88	16	50	4
84GA 04104	4.0	1.00		8.0	3.88	16	50	4
84GA 05055	5.0	0.50		10.0	4.59	18	55	5
84GA 05105	5.0	1.00		10.0	4.59	18	55	5
84GA 06056	6.0	0.50		13.0	5.80	21	60	6
84GA 06106	6.0	1.00		13.0	5.80	21	60	6
84GA 06156	6.0	1.50		13.0	5.80	21	60	6
84GA 08058	8.0	0.50		15.0	7.70	27	65	8
84GA 08108	8.0	1.00		15.0	7.70	27	65	8
84GA 08158	8.0	1.50		15.0	7.70	27	65	8
84GA 08208	8.0	2.00		15.0	7.70	27	65	8
84GA 10051	10.0	0.50		18.0	9.60	32	70	10
84GA 10101	10.0	1.00		18.0	9.60	32	70	10
84GA 10151	10.0	1.50		18.0	9.60	32	70	10
84GA 10201	10.0	2.00		18.0	9.60	32	70	10
84GA 12051	12.0	0.50		26.0	11.50	38	80	12
84GA 12102	12.0	1.00		26.0	11.50	38	80	12
84GA 12152	12.0	1.50		26.0	11.50	38	80	12
84GA 12202	12.0	2.00		26.0	11.50	38	80	12
84GA 16052	16.0	0.50		32.0	15.40	50	90	16
84GA 16102	16.0	1.00		32.0	15.40	50	90	16
84GA 16152	16.0	1.50		32.0	15.40	50	90	16
84GA 16202	16.0	2.00		32.0	15.40	50	90	16



New



DIAMONDGRAPHITE coating, specifically designed for GRAPHITE

Max cutting depth	ap	P
	1.0 D1	<0.05 D1 Ø 4
	1.0 D1	>0.10 D1 Ø 4

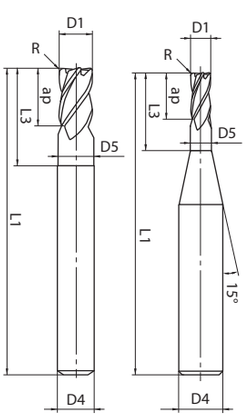
Graphite

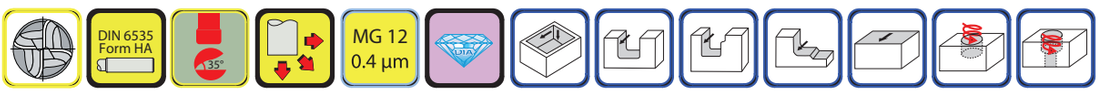
D1	Neck (mm)	S (min-1)	F (mm/min)
3.0	14	21000	1900
3.0	32	14000	1000
4.0	16	18000	2400
4.0	36	13000	1500
5.0	18	15000	3500
5.0	40	12000	2500
6.0	21	15000	3500
6.0	44	12000	2500
8.0	27	10500	2900
8.0	54	8700	2100
10.0	32	8700	2600
10.0	60	7500	2000
12.0	38	7200	2200
12.0	75	6000	1100

Max cutting depth	

Graphite

D1	Neck (mm)	S (min-1)	F (mm/min)	ap (m/m)
3.0	14	21000	1400	0.30
3.0	32	14000	700	0.20
4.0	16	18000	1800	0.50
4.0	36	13000	900	0.40
5.0	18	15000	3000	1.00
5.0	40	12000	2000	0.90
6.0	21	15000	2500	1.20
6.0	44	12000	2000	1.00
8.0	27	10500	2000	2.00
8.0	54	8700	1500	1.50
10.0	32	8700	1900	3.00
10.0	60	7500	1500	2.50
12.0	38	7200	1500	4.00
12.0	75	6000	800	3.00

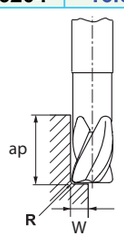




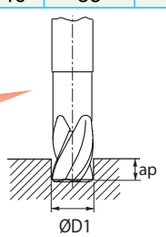
84 GL

Item code	D1	R	β	ap	D5	L3	L1	D4
84GL 03033	3.0	0.30		6.0	2.90	32	80	3
84GL 03053	3.0	0.50		6.0	2.90	32	80	3
84GL 03103	3.0	1.00		6.0	2.90	32	80	3
84GL 04054	4.0	0.50		8.0	3.88	36	80	4
84GL 04104	4.0	1.00		8.0	3.88	36	80	4
84GL 05055	5.0	0.50		10.0	4.59	40	80	5
84GL 05105	5.0	1.00		10.0	4.59	40	80	5
84GL 06056	6.0	0.50		13.0	5.80	44	90	6
84GL 06106	6.0	1.00		13.0	5.80	44	90	6
84GL 06156	6.0	1.50		13.0	5.80	44	90	6
84GL 08058	8.0	0.50		15.0	7.70	54	100	8
84GL 08108	8.0	1.00		15.0	7.70	54	100	8
84GL 08158	8.0	1.50		15.0	7.70	54	100	8
84GL 08208	8.0	2.00		15.0	7.70	54	100	8
84GL 10051	10.0	0.50		18.0	9.60	60	100	10
84GL 10101	10.0	1.00		18.0	9.60	60	100	10
84GL 10151	10.0	1.50		18.0	9.60	60	100	10
84GL 10201	10.0	2.00		18.0	9.60	60	100	10
84GL 12052	12.0	0.50		26.0	11.50	75	120	12
84GL 12102	12.0	1.00		26.0	11.50	75	120	12
84GL 12152	12.0	1.50		26.0	11.50	75	120	12
84GL 12202	12.0	2.00		26.0	11.50	75	120	12
84GL 16054	16.0	0.50		32.0	15.40	85	120	16
84GL 16104	16.0	1.00		32.0	15.40	85	120	16
84GL 16154	16.0	1.50		32.0	15.40	85	120	16
84GL 16204	16.0	2.00		32.0	15.40	85	120	16

DIAMONDGRAPHITE coating, specifically designed for GRAPHITE



New



Max cutting depth	ap	P
	1.0 D1	<0.05 D1 Ø 4
	1.0 D1	>0.10 D1 Ø 4

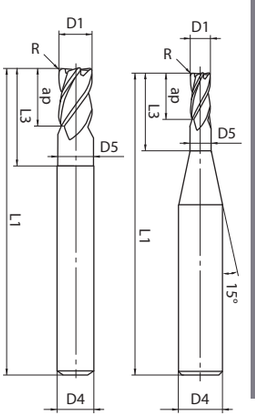
Graphite

D1	Neck (mm)	S (min-1)	F (mm/min)
3.0	14	21000	1900
3.0	32	14000	1000
4.0	16	18000	2400
4.0	36	13000	1500
5.0	18	15000	3500
5.0	40	12000	2500
6.0	21	15000	3500
6.0	44	12000	2500
8.0	27	10500	2900
8.0	54	8700	2100
10.0	32	8700	2600
10.0	60	7500	2000
12.0	38	7200	2200
12.0	75	6000	1100

Max cutting depth	

Graphite

D1	Neck (mm)	S (min-1)	F (mm/min)	ap (m/m)
3.0	14	21000	1400	0.30
3.0	32	14000	700	0.20
4.0	16	18000	1800	0.50
4.0	36	13000	900	0.40
5.0	18	15000	3000	1.00
5.0	40	12000	2000	0.90
6.0	21	15000	2500	1.20
6.0	44	12000	2000	1.00
8.0	27	10500	2000	2.00
8.0	54	8700	1500	1.50
10.0	32	8700	1900	3.00
10.0	60	7500	1500	2.50
12.0	38	7200	1500	4.00
12.0	75	6000	800	3.00



DIN 6535 Form HA | 25° | MG 10 0.6 µm | Un Coated | TiALN

85 PA PB

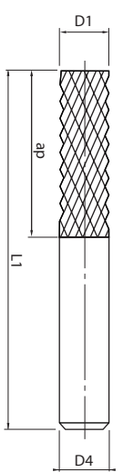
Item code	D1	R	β	ap	D5	L3	L1	D4
85PA 02002	2.0			10			38	2
85PA 03003	3.0			12			38	3
85PA 04004	4.0			15			40	4
85PA 05005	5.0			16			50	5
85PA 06006	6.0			18			50	6
85PA 06016	6.0			25			60	6
85PA 08008	8.0			25			63	8
85PA 08018	8.0			40			80	8
85PA 10010	10.0			30			72	10
85PA 12012	12.0			30			73	12
85PA 14014	14.0			32			75	14
85PA 16016	16.0			36			82	16

Un Coated

MULTI-FLUTE CARBON-FIBER COMPOSITE ROUTERS

Item code	D1	R	β	ap	D5	L3	L1	D4
85PB 02002	2.0			10			38	2
85PB 03003	3.0			12			38	3
85PB 04004	4.0			15			40	4
85PB 05005	5.0			16			50	5
85PB 06006	6.0			18			50	6
85PB 06016	6.0			25			60	6
85PB 08008	8.0			25			63	8
85PB 08018	8.0			40			80	8
85PB 10010	10.0			30			72	10
85PB 12012	12.0			30			73	12
85PB 14014	14.0			32			75	14
85PB 16016	16.0			36			82	16

TiALN



New

85 PE PF

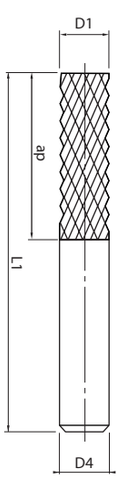
Item code	D1	R	β	ap	D5	L3	L1	D4
85PE 02002	2.0			10			38	2
85PE 03003	3.0			12			38	3
85PE 04004	4.0			15			40	4
85PE 05005	5.0			16			50	5
85PE 06006	6.0			18			50	6
85PE 06016	6.0			25			60	6
85PE 08008	8.0			25			63	8
85PE 08018	8.0			40			80	8
85PE 10010	10.0			30			72	10
85PE 12012	12.0			30			73	12
85PE 14014	14.0			32			75	14
85PE 16016	16.0			36			82	16

Un Coated

MULTI-FLUTE CARBON-FIBER COMPOSITE ROUTERS

Item code	D1	R	β	ap	D5	L3	L1	D4
85PF 02002	2.0			10			38	2
85PF 03003	3.0			12			38	3
85PF 04004	4.0			15			40	4
85PF 05005	5.0			16			50	5
85PF 06006	6.0			18			50	6
85PF 06016	6.0			25			60	6
85PF 08008	8.0			25			63	8
85PF 08018	8.0			40			80	8
85PF 10010	10.0			30			72	10
85PF 12012	12.0			30			73	12
85PF 14014	14.0			32			75	14
85PF 16016	16.0			36			82	16

TiALN



New

DIN 6535 Form HA | 25° | MG 10 0.6 µm | Un Coated | TiALN

85 PK PL

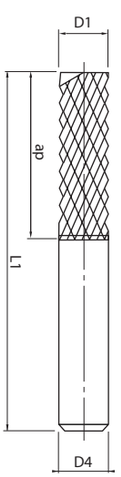
Item code	D1	R	β	ap	D5	L3	L1	D4
85PK 02002	2.0			10			38	2
85PK 03003	3.0			12			38	3
85PK 04004	4.0			15			40	4
85PK 05005	5.0			16			50	5
85PK 06006	6.0			18			50	6
85PK 06016	6.0			25			60	6
85PK 08008	8.0			25			63	8
85PK 08018	8.0			40			80	8
85PK 10010	10.0			30			72	10
85PK 12012	12.0			30			73	12
85PK 14014	14.0			32			75	14
85PK 16016	16.0			36			82	16

Un Coated

MULTI-FLUTE CARBON-FIBER COMPOSITE ROUTERS

Item code	D1	R	β	ap	D5	L3	L1	D4
85PL 02002	2.0			10			38	2
85PL 03003	3.0			12			38	3
85PL 04004	4.0			15			40	4
85PL 05005	5.0			16			50	5
85PL 06006	6.0			18			50	6
85PL 06016	6.0			25			60	6
85PL 08008	8.0			25			63	8
85PL 08018	8.0			40			80	8
85PL 10010	10.0			30			72	10
85PL 12012	12.0			30			73	12
85PL 14014	14.0			32			75	14
85PL 16016	16.0			36			82	16

TiALN



New

85 PO PP

Item code	D1	R	β	ap	D5	L3	L1	D4
85PO 02002	2.0			10			38	2
85PO 03003	3.0			12			38	3
85PO 04004	4.0			15			40	4
85PO 05005	5.0			16			50	5
85PO 06006	6.0			18			50	6
85PO 06016	6.0			25			60	6
85PO 08008	8.0			25			63	8
85PO 08018	8.0			40			80	8
85PO 10010	10.0			30			72	10
85PO 12012	12.0			30			73	12
85PO 14014	14.0			32			75	14
85PO 16016	16.0			36			82	16

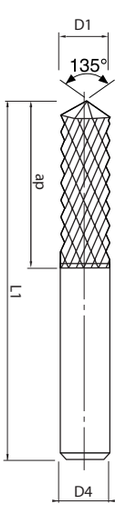
Un Coated

MULTI-FLUTE CARBON-FIBER COMPOSITE ROUTERS

Item code	D1	R	β	ap	D5	L3	L1	D4
85PP 02002	2.0			10			38	2
85PP 03003	3.0			12			38	3
85PP 04004	4.0			15			40	4
85PP 05005	5.0			16			50	5
85PP 06006	6.0			18			50	6
85PP 06016	6.0			25			60	6
85PP 08008	8.0			25			63	8
85PP 08018	8.0			40			80	8
85PP 10010	10.0			30			72	10
85PP 12012	12.0			30			73	12
85PP 14014	14.0			32			75	14
85PP 16016	16.0			36			82	16

TiALN

New



Special End Mills Inquiry Form

Customers _____ Date: Y M /D

Tel _____ Fax _____

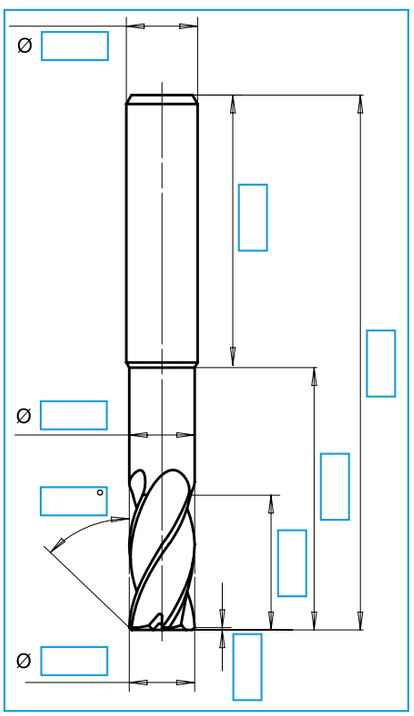
material to be cut _____ Hardened _____

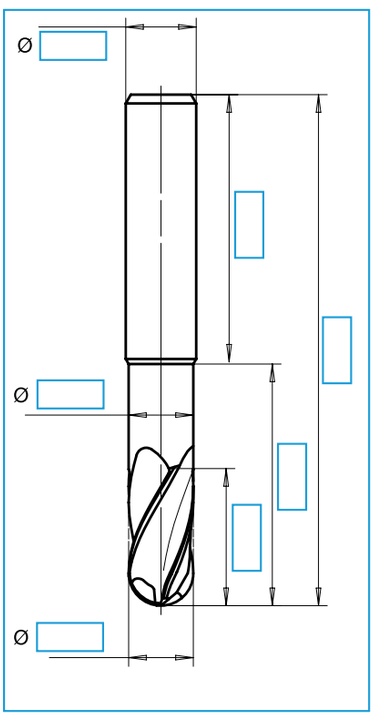
contatc _____ Ext _____

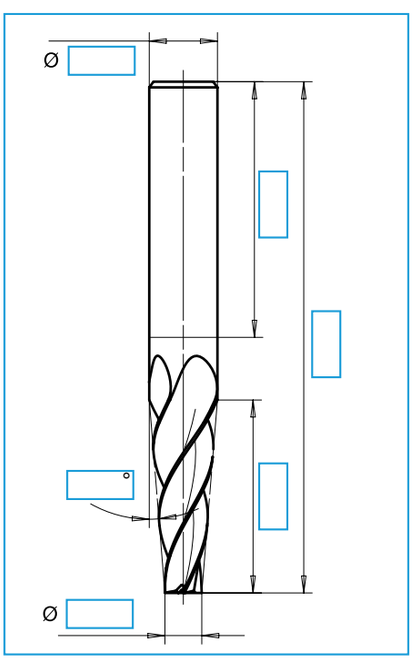
Works Type Ap: ☐ mm Ae: ☐ mm

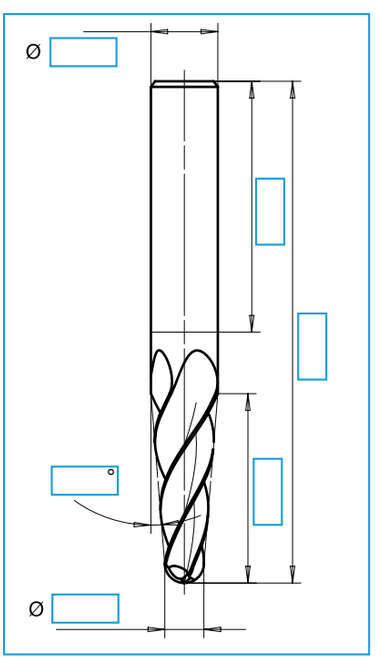
E-maill: _____

Quantities,pcs _____ conting ☐ Coating ☐ Uncoating









corner of cutting angle

☐ 90° ☐ R

☐ ☐ 0.05-0.15 45°

teeth

☐ 2 ☐ 3 ☐ 4

☐ 5 ☐ 6 Other _____

Helix Angle

☐ 0° ☐ 15° ☐ 30°

☐ 35° ☐ 45° Other _____

Remarks _____

Special Drills Inquiry form

Customers _____ Date: Y M D

Tel _____ Fax _____

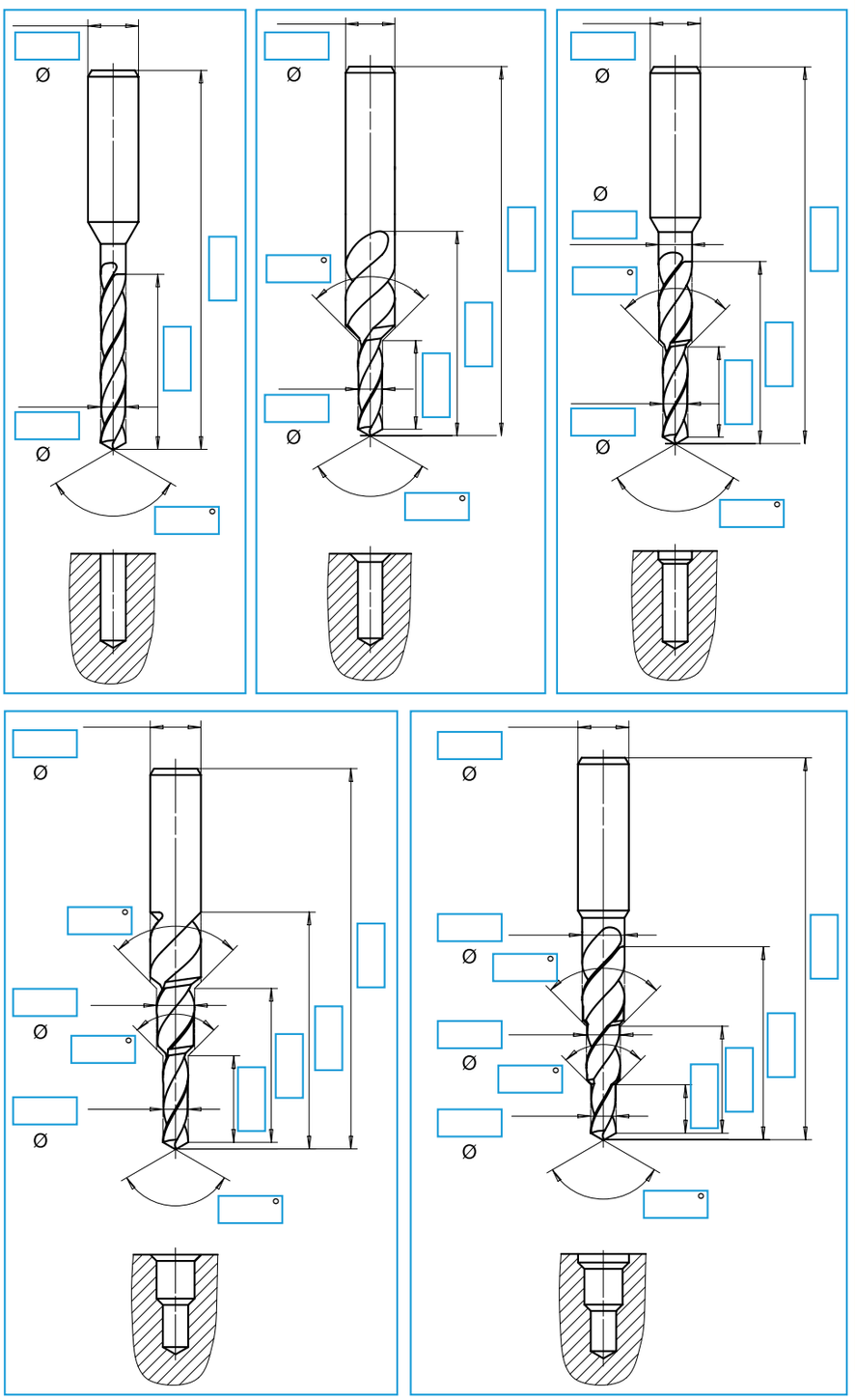
material to be cut _____ Hardened _____

contact _____ Ext _____

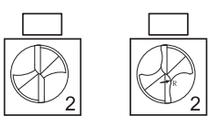
Works Type Dp: ☐ mm coolant holes: ☐ yes ☐ no

E-mail : _____

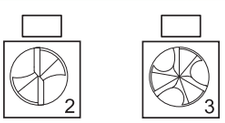
Quantities,pcs _____ conting ☐ Coating ☐ Uncoating



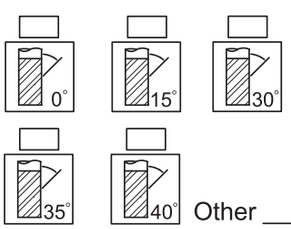
Point Type



eeth



Helix Angle



Other _____

emarks

_____

_____

_____

_____

Special Reamers Inquiry Form

Customers _____

Tel _____ Fax _____

contatc _____ Ext _____

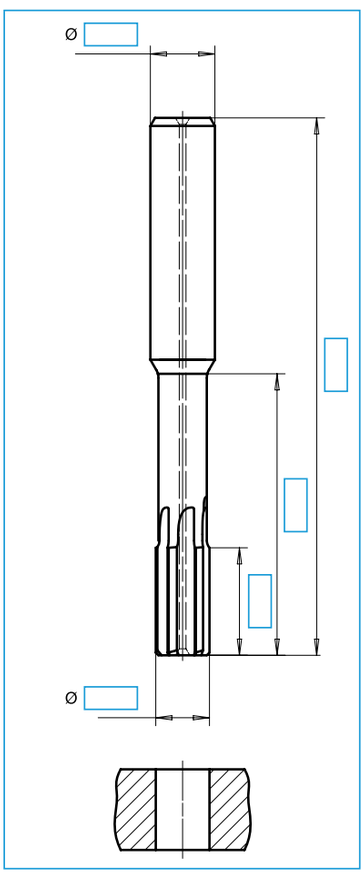
E-maill: _____

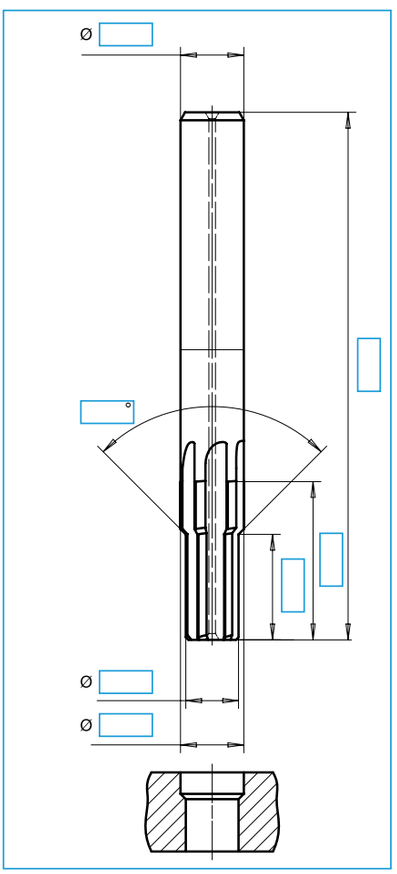
Date: Y M D

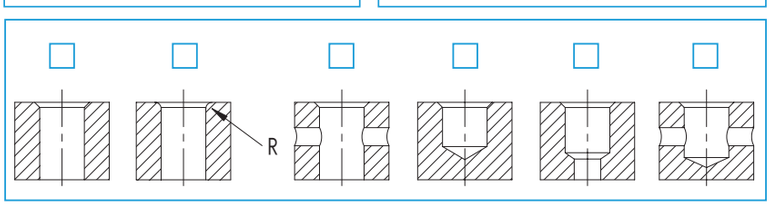
material to be cut _____ Hardened _____

Works Type Dp: ☐ mm

Quantities,pcs _____ conting ☐ Coating ☐ Uncoating



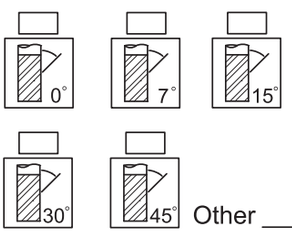




teeth

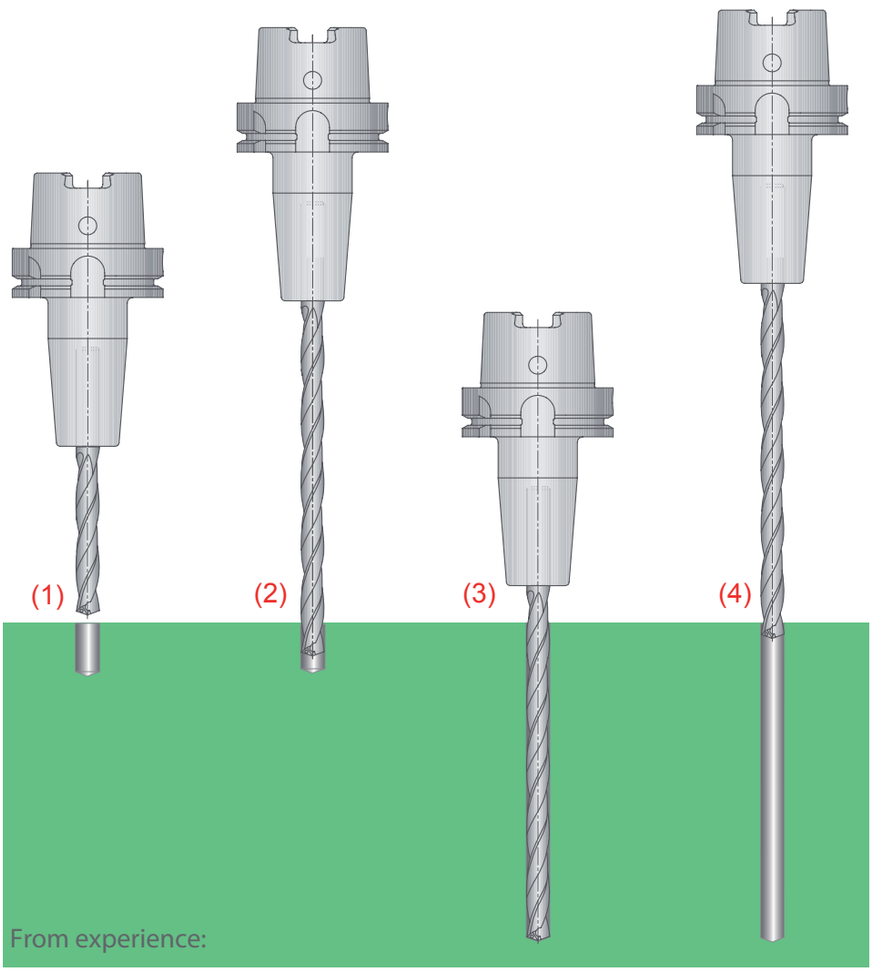
Other _____

Helix Angle



Other _____

Remarks _____



1. Pilot hole
Drilling depth 2 – 3 × D

2. Start with deep-hole drill
For entering the pilot hole (starting) using a low speed
(n = 300 rpm) and a low feed rate (vf = 400 mm/min).
Just before reaching the bottom of the pilot hole, stop feeding and increase the speed to the cycle speed without stopping.

3. Increase the deep-hole drilling
Feed rate to the cycle speed. Drill to the required hole depth without pecking. When drilling a through hole, reduce the feed rate by 50 % when the drill tip exits at through holes – risk of chipping.

4. Back out of the hole
During the retraction movement with the deep-hole drill to the centre of the pilot hole, reduce the speed without stopping until approx. 300 rpm to back out of the hole with a normal feed rate (vf = 400 mm/min).

STRUCTURAL AND CONSTRUCTIONAL STEEL

Country										
USA	Germany		U. K.		Sweden	France	Belgium	Italy	Spain	Japan
Standard										
AIS/SAE	W.-Nr.	DIN	BS	EN	SS	AFNOR	NBN	UNI	UNF	JIS
1015	1.0401	C15	080M15	–	1350	CC12	–	C15C16	F.111	–
1020	1.0402	C22	050A20	2C	1450	CC20	C25-1	C20C21	F.112	–
1035	1.0501	C35	060A35	–	1550	CC35	C35-1	C35	F.113	–
1045	1.0503	C45	080M46	–	1650	CC45	C45-1	C45	F.114	–
1055	1.0535	C55	070M55	–	1655	–	C55-1	C55	–	–
1060	1.0601	C60	080A62	43D	–	CC55	C60-1	C60	–	–
1213	1.0715	9SMn28	230M07	–	1912	S250	–	CF9SMn28	11SMn28	SUM22
12L13	1.0718	9SMnPb28	–	–	1914	S250Pb	–	CF9SMnPb28	11SMnPb28	SUM22L
–	1.0722	10SPb20	–	–	–	10PbF2	–	CF10PB20	10SPb20	–
1140	1.0726	35S20	212M36	8M	1957	35MF4	–	–	F.210.G	–
1215	1.0736	9SMn36	240M07	1B	–	S300	–	CF9SMn36	12SMN35	–
12L14	1.0737	9SMnPb36	–	–	1926	S300Pb	–	CF9SMnPb36	12SMnP35	–
9255	1.0904	55Si7	250A53	45	2085	55S7	55Si7	55Si8	56Si7	–
9262	1.0961	60SiCr7	–	–	–	60SC7	60SiCr8	60SiCr8	60SiCr8	–
1015	1.1141	Ck15	080M15	32C	1370	XC12	C16-2	C16	C15K	S15C
1039	1.1157	40Mn4	150M36	15	–	35M5	–	–	–	–
1025	1.1158	Ck25	–	–	–	–	C25-2	–	–	S25C
1335	1.1167	36Mn5	–	–	2120	40M5	–	–	36Mn5	SMn438(H)
1330	1.1170	28Mn6	150M28	14A	–	20M5	28Mn6	C28Mn	–	SCMn1
1035	1.1183	Cf35	060A35	–	1572	XC38TS	C36	C36	–	S35C
1045	1.1191	Ck45	080M46	–	1672	XC42	C45-2	C45	C45K	S45C
1055	1.1203	Ck55	070M55	–	–	XC55	C55-2	C50	C55K	S55C
1050	1.1213	Cf53	060A52	–	1674	XC48TS	C53	C53	–	S50C
1060	1.1221	Ck60	080A62	43D	1678	XC60	C60-2	C60	–	S58C
1095	1.1274	Ck101	060A96	–	1870	–	–	–	–	SUP4
–	1.3401	G-X120Mn12	Z120M12	–	–	Z120M12	–	XG120Mn12	X120MN12	SCMnH/1
52100	1.3505	100Cr6	534A99	31	2258	100C6	–	100Cr6	F.131	SUJ2
ASTM A204Gr.A	1.5415	15Mo3	1501-240	–	2912	15D3	16Mo3	16Mo3KW	16Mo3	–
4520	1.5423	16Mo5	1503-245-420	–	–	–	16Mo5	16Mo5	16Mo5	–
ASTM A350LF5	1.5622	14Ni6	–	–	–	16N6	18Ni6	14Ni6	15Ni6	–
ASTM A353	1.5662	X8Ni9	1501-509;510	–	–	–	10Ni36	X10Ni9	XBNi09	–
2515	1.5680	12Ni19	–	–	–	Z18N5	12Ni20	–	–	–
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	13NiCr12	–	–	SNC815(H)
9840	1.6511	36CrNiMo4	816M40	110	–	40NCD3	–	38NiCrMo4(KB)	35NiCrMo4	–
8620	1.6523	21NiCrMo2	805M20	362	2506	20NCD2	–	20NiCrMo2	20NiCrMo2	SNCM220(H)
8740	1.6546	40NiCrMo22	311-Type 7	–	–	–	40NiCrMo2	40NiCrMo2(KB)	40NiCrMo2	SNCM240
4340	1.6582	34CrNiMo6	817M40	24	2541	35NCD6	35CrNiMo6	35NiCrMo6(KB)	–	–
–	1.6587	17CrNiMo6	820A16	–	–	18NCD6	17CrNiMo7	–	14NiCrMo13	–
–	1.6657	14NiCrMo134	832M13	36C	–	–	14NiCrMo13	15NiCrMo13	14NiCrMo131	–
5015	1.7015	15Cr3	523M15	–	–	12C3	15Cr2	–	–	SCr415(H)
5132	1.7033	34Cr4	530A32	18B	–	32C4	34Cr4	34Cr4(KB)	35Cr4	SCr430(H)
5140	1.7035	41Cr4	530M40	18	–	42C4	41Cr4	41Cr4	42Cr4	SCr440(H)
5140	1.7045	42Cr4	–	–	2245	–	–	–	42Cr4	SCr440
5115	1.7131	16MnCr5	(527M20)	–	2511	16MC5	16MnCr5	16MnCr5	16MnCr5	–
5155	1.7176	55Cr3	527A60	48	–	55C3	55Cr3	–	–	SUP9(A)
4130	1.7218	25CrMo4	1717CDS110	–	2225	25CD4	25CrMo4	25CrMo4(KB)	55Cr3 AM26CrMo4	SCM420;SCM430

STRUCTURAL AND CONSTRUCTIONAL STEEL

Country										
USA	Germany		U. K.		Sweden	France	Belgium	Italy	Spain	Japan
Standard										
AIS/SAE	W.-Nr.	DIN	BS	EN	SS	AFNOR	NBN	UNI	UNF	JIS
4137;4135	1.7220	34CrMo4	708A37	19B	2234	35CD4	34CrMo4	35CrMo4	34CrMo4	SCM432;SCCRM3
4140;4142	1.7223	41CrMo4	708M40	19A	2244	42CD4TS	41CrMo4	41CrMo4	42CrMo4	SCM 440
4140	1.7225	42CrMo4	708M40	19A	2244	42CD4	42CrMo4	42CrMo4	42CrMo4	SCM440(H)
–	1.7262	15CrMo5	–	–	2216	12CD4	–	–	12CrMo4	SCM415(H)
ASTM A182 F11;F12	1.7335	13CrMo4 4	1501-620Gr27	–	–	15CD3.5 15CD4.5	14CrMo45	14CrMo45	14CrMo45	–
–	1.7361	32CrMo12	722M24	40B	2240	30CD12	32CrMo12	32CrMo12	F.124.A	–
ASTM A182	1.7380	10CrMo9 10	1501-622	–	2218	12CD9,10	–	12CrMo9,10	TU.H	–
F.22			Gr31;45	–		–			–	–
–	1.7715	14MoV6 3	1503-660-440	–	–	–	13MoCrV6	–	13MoCrV6	–
6150	1.8159	50CrV4	735A50	47	2230	50CV4	50CrV4	50CrV4	51CrV4	SUP10
–	1.8509	41CrAlMo7	905M39	41B	2940	40CAD6,12	41CrAlMo7	41CrAlMo7	41CrAlMo7	–
–	1.8523	39CrMoV13 9	897M39	40C	–	–	39CrMoV13	36CrMoV12	–	–

TOOL STEELS

Country										
USA	Germany		U. K.		Sweden	France	Belgium	Italy	Spain	Japan
Standard										
AIS/SAE	W.-Nr.	DIN	BS	EN	SS	AFNOR	NBN	UNI	UNF	JIS
W.110	1.1545	C105W1	–	–	1880	$Y_1$105	–	C98KU C100KU	F.515 F.516	–
W.112	1.663	C125W	–	–	–	$Y_2$120	–	C120KU	(C120)	SK2
L3	1.2067	100Cr6	BL3	–	–	Y100C6	–	–	100Cr6	–
D3	1.2080	X210Cr12	BD3	–	–	Z200C12	–	X210Cr13KU X250Cr12KU	X210Cr12	SKD1
H13	1.2344	X40CrMoV5 1	BH13	–	2242	Z40CDV5	–	X35CrMoV05KU X40CrMoV511KU	X40CrMoV5	SKD61
A2	1.2363	X100CrMoV5 1	BA2	–	2260	Z100CDV5	–	X100CrMoV51KU	X100CrMoV5	SKD12
–	1.2419	105WCr6	–	–	2140	105WC13	–	100WCr6 107WCr5KU	105WCr5	SKS31 SKS2;SKS3
–	1.2436	X210CrW12	–	–	2312	–	–	X215CrW12 1KU	X210CrW12	SKD2
S1	1.2542	45WCrV7	BS1	–	2710	–	–	45WCrV8KU	45WCrSi8	–
H21	1.2581	X30WCrV9 3 X30WCrV9 3KU	BH21	–	–	Z30WCV9	– –	X28W09KU X30WCrV9 3KU	X30WCrV9	SKD5
–	1.2601	X165CrMo V12	–	–	2310	–	–	X165CrMoW12KU	X160CrMoV12	–
L6	1.2713	55NiCrMoV6	–	–	–	55NCDV7	–	–	F.520.S	SKT4
W210	1.2833	100V1	BW2	–	–	$Y_1$105V	C98KU 102V2KU	–	–	SKS43
–	1.3243	S 6-5-2-5	–	–	2723	Z85WDKCV 06-05-05-04-02	–	HS 6-5-2-5	HS 6-5-2-5	SKH55
T4	1.3255	S 18-1-2-5	BT4	–	–	Z80WKCV 18-05-04-01	–	X78WCo1805KU	HS 18-1-1-5	SKH3
M2	1.3343	S 6-5-2	BM2	–	2722	Z85WDCV 06-05-04-02	–	X82WMo0605KU	HS 6-5-2	SKH9
M7	1.3348	S 2-9-2	–	–	2782	Z100WCWV 09-04-02-02	–	HS 2-9-2	HS 2-9-2	–
T1	1.3355	S 18-0-1	BT1	–	–	Z80WCV 18-04-01	–	X75W18KU	HS18-0-1	SKH2

STAINLESS AND HEAT RESISTANT MATERIALS

Country										
USA	Germany		U. K.		Sweden	France	Belgium	Italy	Spain	Japan
Standard										
AIS/SAE	W.-Nr.	DIN	BS	EN	SS	AFNOR	NBN	UNI	UNF	JIS
403	1.4000	X7Cr13	403S17	–	2301	Z6C13	–	X6Cr13	F.3110	SUS403
	1.4001	X7Cr14							F.8401	
410	1.4006	X10Cr13	410S21	56A	2302	Z10C14	–	X12Cr13	F.3401	SUS410
430	1.4016	X8Cr17	430S15	60	2320	Z8C17	–	X8Cr17	F.3113	SUS430
–	1.4027	G-X20Cr14	420C29	56B	–	Z20C13M	–	–	–	SCS2
–	1.4034	X46Cr13	420S45	56D	2304	Z40CM Z38C13M	–	X40Cr14	F.3405	SUS420J2
431	1.4057	X22CrNi17	431S29	57	2321	Z15CNI6.02	–	X16CrNi6	F.3427	SUS431
430F	1.4104	X12CrMoS17	–	–	2383	Z10CF17	–	X10CrS17	F.3117	SUS430F
434	1.4113	X6CrMo17	434S17	–	2325	Z8CD17.01	–	X8CrMo17	–	SUS434
304	1.4301	X5CrNi189	304S15	58E	2332	Z6CN18.09	–	X5CrNi18 10	F.3551 F.3541 F.3504	SUS304
303	1.4305	X12CrNiS18 8	303S21	58M	2346	Z10CNF 18.09	–	X10CrNiS 18 09	F.3508	SUS303
304L	1.4306	X2CrNi18 9	304S12 304C12	–	2352 2333	Z2CN18.10 Z3CN19.10	–	X2CrNi18 11	F.3503	SCS19 SUS304L
–	1.4308	G-X6CrNi18 9	304C15	–	–	Z6CN18.10M	–	–	–	SCS13
301	1.4310	X12CrNi17 7	–	–	2331	Z12CN17.07	–	X12CrNi17 07	F.3517	SUS301
304LN	1.4311	X2CrNiN 18 10	304S62	–	2371	Z2CN18.10	–	–	–	SUS304LN
–	1.4313	X5CrNi13 4	425C11	–	–	Z4CND13.4M	–	–	–	SCS5
316	1.4401	X5CrNiMo 18 10	316S16	58J	2347	Z6CND17.11	–	X5CrNiMo17 12	F.3543	SUS316
–	1.4408	G-X6CrNiMo 18 10	316C16	–	–	–	–	–	F.8414	SCS14
316LN	1.4429	X2CrNiMoN 18 13	–	–	2375	Z2CND17.13	–	–	–	SUS316LN
316L	1.4435	X2CrNiMo 18 12	316S12	–	2353	Z2CND17.13 –	–	X2CrNiMo17 13 –	– –	SCS16 SUS316L
317L	1.4438	X2CrNiMo 18 16	317S12	–	2367	Z2CND19.15	–	X2CrNiMo18 16	–	SUS317L
329	1.4460	X8CrNiMo 27 5	–	–	2324	– –	– –	– –	– –	SUS329JL SCH11;SCS11
321	1.4541	X10CrNiTi 18 9	2337	321S12	58B	Z6CNT18.10	–	X6CrNiTi18 11	F.3553 F.3523	SUS321
347	1.4550	X10CrNiNb 18 9	347S17	58F	2338	Z6CNNb18.10	–	X6CrNiNb18 11	F.3552 F.3524	SUS347
316Ti	1.4571	x10CrNiMoTi 18 10	320S17	58J	2350	Z6CNDT17.12	–	X6CrNiMoTi 17 12	F.3535	–
–	1.4581	G-X5CrNi MoNb 18 10	318C17	–	–	Z4CNDNb 18 12M	–	XG8CrNiMo 18 11	–	SCS22
318	1.4583	X10CrNi MoNb 18 12	–	–	–	Z6CNDNb 17 13B	–	X6CrNiMoNb 17 13	–	–
HW3	1.4718	X45CrSi 93	401S45	52	–	Z45CS 9	–	X45CrSi8	F.322	SUH1
405	1.4724	X10CrA113	403S17	–	–	Z10C13	–	X10CrA112	F.311	SUS405
430	1.4742	X10CrA118	430S15	60	–	Z10CAS18	–	X8Cr17	F.3113	SUS430
HNV6	1.4747	X80CrNiSi20	443S65	59	–	Z80CSN20.02	–	X80CrSiNi20	F.320B	SUH4
446	1.4762	X10CrA124	–	–	2322	Z10CAS24	–	X16Cr26	–	SUH446
309	1.4828	X15CrNiSi 20 12	309S24	–	–	Z15CNS20.12	–	–	–	SUH309
310S	1.4845	X12CrNi25 21	310S24	–	2361	Z12CN25 20	–	X6CrNi25 20	F.331	SUH310
330	1.4864	X12NiCrSi 36 16	–	–	–	Z12NCS35.16	–	–	–	SUH330
–	1.4865	G-X40NiCrSi 38 18	330C11	–	–	–	–	XG50NiCr 39 19	–	SCH15
EV8	1.4871	X53CrMnNiN 21 9	349S54	–	–	Z52CMN21.09	–	X53CrMnNiN219	–	SUH35;SUH36
321	1.4878	X12CrNiTi 18 9	321S12 321S20	58B, 58C	–	Z6CNT18.12B	–	X6CrNiTi18 11	F.3523	SU321

GREY CAST IRON (unalloyed)

Country										
USA	Germany		U. K.		Sweden	France	Belgium	Italy	Spain	Japan
Standard										
AIS/SAE	W.-Nr.	DIN	BS	EN	SS	AFNOR	NBN	UNI	UNF	JIS
ASTM	–	–	–	–	–	–	–	–	–	–
A48-76	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	01 00	–	–	–	–	–
No 20 B	–	GG 10	–	–	01 10	Ft 10 D	–	–	–	FC100
No 25 B	0.6015	GG 15	Grade 150	–	01 15	Ft 15 D	–	G15	FG15	FC150
No 30 B	0.6020	GG 20	Grade 220	–	01 20	Ft 20 D	–	G20	–	FC200
No 35 B	0.6025	GG 25	Grade 260	–	01 25	Ft 25 D	–	G25	FG25	FC250
No 40 B	–	–	–	–	–	–	–	–	–	–
No 45 B	0.6030	GG 30	Grade 300	–	01 30	Ft 30 D	–	G30	FG30	FC300
No 50 B	0.6035	GG 35	Grade 350	–	01 35	Ft 35 D	–	G35	FG35	FC350
No 55 B	0.6040	GG 40	Grade 400	–	01 40	Ft 40 D	–	–	–	–

GREY CAST IRON (alloyed)

Country										
USA	Germany		U. K.		Sweden	France	Belgium	Italy	Spain	Japan
Standard										
AIS/SAE	W.-Nr.	DIN	BS	EN	SS	AFNOR	NBN	UNI	UNF	JIS
ASTM	–	DIN4694	3468: 1974	–	MB	–	–	–	–	–
A436-72	–	GGL-	–	–	ISO-215	A32-301	–	–	–	–
Type 2	–	NiCr 20 2	L-NiCr 20 2	–	05 23	L-NC 20 2	–	–	–	–

NODULAR CAST IRON (unalloyed)

Country										
USA	Germany		U. K.		Sweden	France	Belgium	Italy	Spain	Japan
Standard										
AIS/SAE	W.-Nr.	DIN	BS	EN	SS	AFNOR	NBN	UNI	UNF	JIS
A536-72	–	–	2789; 1973	–	–	NF A32-201	–	–	–	–
60-40-18	0.7040	GGG 40	SNG 420/12	–	07 17-02	FCS 400-12	–	GS 370-17	FGE 38-17	FCD400
–	–	GGG 40.3	SNG 370/17	–	07 17-12	FGS 370-17	–	–	–	–
–	0.7033	GGG 35.3	–	–	07 17-15	–	–	–	–	–
80-55-06	0.7050	GGG 50	SNG 500/7	–	07 27-02	FGS 500-7	–	GS 500	FGE 50-7	FCD500
–	–	GGG 60	SNG 600/3	–	07 32-03	FGS 600-3	–	–	–	FCD600
100-70-03	0.7070	GGG 70	SNG 700/2	–	07 37-01	FGS 700-2	–	GS 700-2	FGS 70-2	FCD700

ALLOYED CAST IRON

Country										
USA	Germany		U. K.		Sweden	France	Belgium	Italy	Spain	Japan
Standard										
AIS/SAE	W.-Nr.	DIN	BS	EN	SS	AFNOR	NBN	UNI	UNF	JIS
–	–	DIN 1694	–	–	–	–	–	–	–	–
–	–	GGGNiMn 13 7	L-NiMn 13 7	–	07 72	L-MN 13 7	–	–	–	–
Type 2	–	GGG NiCr 20 2	L-NiMn 20 2	–	07 76	L-NC 20 2	–	–	–	–

MALLEABLE CAST IRON

Country										
USA	Germany		U. K.		Sweden	France	Belgium	Italy	Spain	Japan
Standard										
AIS/SAE	W.-Nr.	DIN	BS	EN	SS	AFNOR	NBN	UNI	UNF	JIS
ASTM	–	–	–	–	–	–	–	–	–	–
A47-74	–	–	–	–	–	–	–	–	–	–
A 220-76 2)	–	–	–	–	–	–	–	–	–	–
–	–	–	8 290/6	–	08 14	MN 32-8	–	–	–	–
32510	–	GTS-35	B 340/12	–	08 15	MN 35-10	–	–	–	FCMW330
40010	0.8145	GTS-45	P 440/7	–	08 52	MN 450	–	GMN45	–	FCMW370
50005	0.8155	GTS-55	P 510/4	–	08 54	MP 50-5	–	GMN55	–	FCMP490
70003	–	GTS-65	P 570/3	–	08 58	MP 60-3	–	–	–	FCMP540
A 220-80002	–	GTS-70	P 690/2	–	08 62	MN700-2	–	–	–	FCMP690

Note

Photos, drawings, measurements and listed in this catalog may be changed without giving notice.

Safe use of cutting tools

- Use safety cover, safety glasses and safety shoes during operation.
- Do not touch cutting edges with bare hands.
- Do not touch cutting chips with bare hands. Chips will be hot after cutting.
- Stop cutting when the tool becomes dull.
- Stop cutting operation immediately if you hear any strange cutting sounds.
- Do not modify tools.
- Please use correct tools for the operation.Check dimensions to ensure proper selection.

安全にお使いいただくために

- 工具を使用する時は、破損する危険があるので、必ずカバー・保護メガネ・安全靴等を使用してください。
- 切れ刃は素手でさわらないで下さい。
- 切りくずは素手でさわらないで下さい。
- 工具の切れ味が悪くなったら使用を中止して下さい。
- 異常音・異常振動が発生したら、直ちに使用を中止して下さい。
- 工具には手を加えないで下さい。
- 加工前に工具の寸法確認を行って下さい。

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hsg.cuttingtools@gmail.com