


GUHRING

- The GF 500 for machining tempered steel, stainless steel, high tensile aluminium and Titanium
- GF 300 for machining hardened steel and chilled cast iron wear parts
- Now with ultra-hard Signum Coating: 5500 HV
- Finely homogenised surfaces by cutting edges
- Long life through improved coating: SIGNUM



Longer tool life
thanks to improved
SIGNUM coating



Milling tools for the mould and die industry

GUHRING - YOUR WORLD-WIDE PARTNER

HSC

ADVANTAGES AT A GLANCE

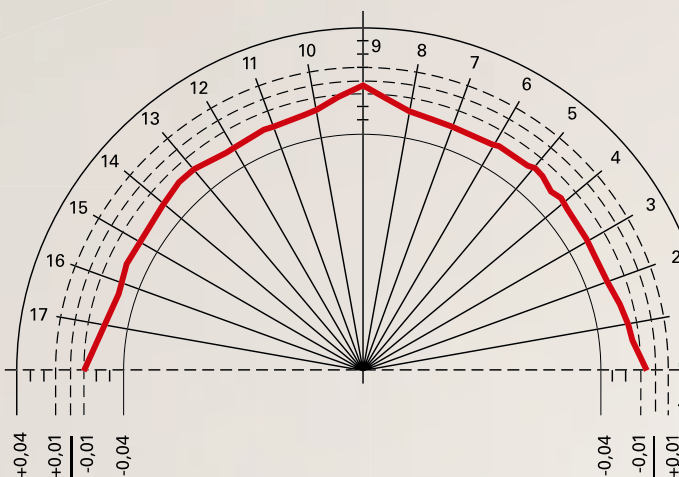
- absolutely precise diameter tolerances
- close radius tolerances
- radius point grind with constant helix correction
- cylinder and radius areas ground in one-pass process
- grinding procedure for highest surface qualities



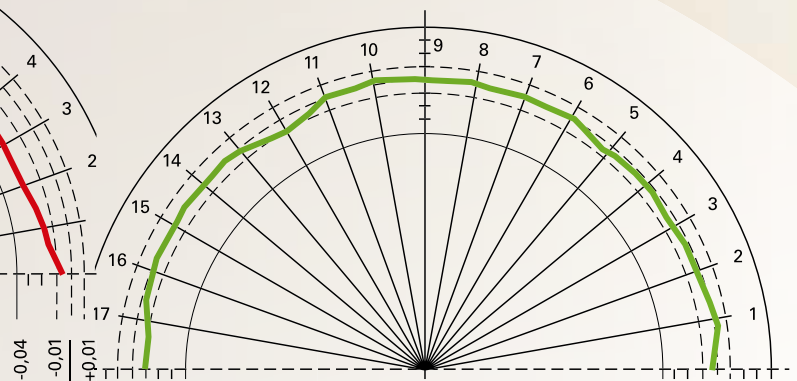
Seamless
radius area



Optimal
wear-protection



Radius accuracy of competitor milling cutter
(± 0.06 mm)



GF 500 radius in tolerance area
 ± 0.01 mm

HSC RADIUS MILLING CUTTERS



GF 500 copy milling cutters
for maximum accuracy
in tool and mould making



Guhring mould and die cutters

Hard shell protection of core



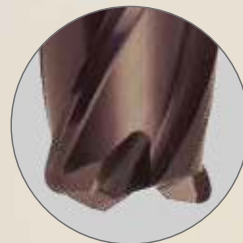
Summary of advantages

- The GF 500 for machining tempered steel, stainless steel, high tensile aluminium and Titanium
- GF 300 for machining hardened steel and chilled cast iron wear parts
- Now with ultra-hard Signum Coating: 5500 HV
- Finely homogenised surfaces by cutting edges
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Longer tool life
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SIGNUM coating



Torus cutter GF 500 T
roughing, finishing & copy
milling up to 54 HRC i.e.:
Guhring no. 3863



Radius cutter GF 500 B
copy milling up to 54 HRC
i.e.: Guhring no. 3866



Torus cutter GF 300 T
roughing, finishing & copy
milling from 40-63 HRC
i.e.: Guhring no. 3361

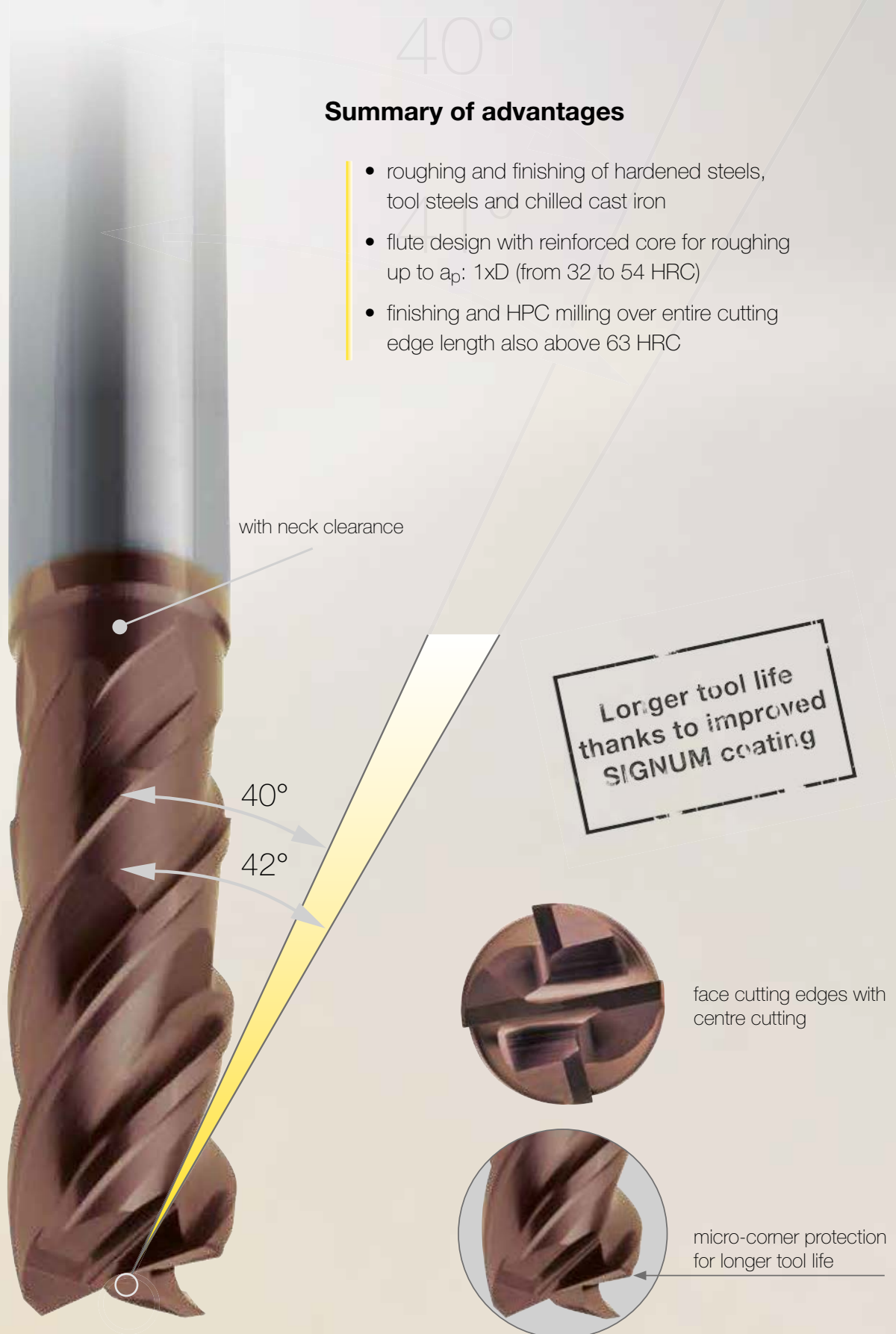
Radius cutter GF 300 B
copy milling from 50-63 HRC
i.e.: Guhring no. 3359

RF 100 H - High performance end mills for hardened steels also above 63 HRC

40°

Summary of advantages

- roughing and finishing of hardened steels, tool steels and chilled cast iron
- flute design with reinforced core for roughing up to $a_p: 1xD$ (from 32 to 54 HRC)
- finishing and HPC milling over entire cutting edge length also above 63 HRC













































































































Chapter break-down into material classes

On the price and programme pages you will find suitability recommendations for every tool for the following application groups:

Application group	Material examples	Chapter
P	Steel, high-alloyed steel	Steel
M	Stainless steel	Stainless
K	Grey cast iron, spher, graphite/mall. cast iron	Steel
N	Aluminium and other non-ferrous metals	Aluminium and diamond
S	Special, super and titanium alloys	Stainless
H	Hardened steel and chilled cast iron	Steel and radius cutters

Pictograms

Application	 Slotting	 Roughing	 Ramping	 Helix	 Drilling	 Finishing	 Copying								
Tool material hardness	 32 HRC	 48 HRC	 54 HRC	 63 HRC											
Tool material	 HSCM	 M42	 HSS-E-PM	 PKD	 VHM										
	High-speed steel			Polycrystalline diamond		Finest grain solid carbide (carbide-UF)									
Shank form	 HA	 -HA	 HB	 -HB	 A	 B	 MK	 SK							
	to DIN 6535				to DIN 1835		Morse taper	Taper shank							
Standard	 DIN 327	 DIN 844	 DIN 845	 DIN 850	 DIN 851	 DIN 885	 DIN 1833	 DIN 2328	 DIN 6518	 DIN 6527	 DIN 6528	 G			
	to DIN											to Guhring			
Type	 W	 N	 NH	 H	 HF	 NF	 WF	 WR	 NR	 NRf	 HR	 HRf			
	Application range similar to DIN 1836														
Length	 short (DIN)	 long (DIN)	 medium length	 extra length	 3xD	 4xD	 5xD								
No. of cutting edges	 2	 3	 3-6	 4	 4-5	 4-6	 4-8	 5	 5-6	 6	 6+				
	no. of major cutting edges														
Helix angle	 30° 29° 31°	 30° 32°	 35° 38°	 36° 38°	 36° 37°	 39° 40° 41°	 40° 42°	 41° 43° 45°	 44° 45° 46°	 0°	 2-4°	 20°	 30°	 45°	 55°
	Size of helix angle / no. of different helix angles														
Cutting edge form	 45°				 R±0,01	 R±0,02	 R±0,05	 R±0,01	 R±0,02	 R±0,05					
	Corner chamfer			Radius with tolerance						Chamfer end mill angles					
Feed	 for lateral feed				 for lateral feed and oblique plunging							 for lateral feed, oblique plunging and drilling			
Rake angle	 -15°	 -7°	 0°	 3°	 4°	 5°	 6°	 7°	 8°	 9°	 10°	 11°	 12°	 15°	 25°
	Rake angle of circumference cutting edges														

Tools for the mould industry

Helix	Z	Length	Feed	Hardness	Tool illustration	Tool material	Surface finish	Guhring no.	Discount group	Page
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Slot drills with corner radius (2-fluted) centre cutting

				32 HRC		Solid carbide	bright	3106	117	13
				48 HRC		Solid carbide	FIRE	3561	117	13

HSC-profile cutters with Torus form GF 500 T centre cutting

				54 HRC		Solid carbide	Signum	3863	106	14
				54 HRC		Solid carbide	Signum	3856	106	15
				54 HRC		Solid carbide	Signum	3865	106	16
				54 HRC		Solid carbide	Signum	3859	106	17
				54 HRC		Solid carbide	Signum	3860	106	18

RF 100 A centre cutting

						Solid carbide	bright	3599	106	19
						Solid carbide	bright	6729	106	19
























































End mills with corner radius (4-fluted) centre cutting

				32 HRC		Solid carbide	bright	3111	106	20
				48 HRC		Solid carbide	FIRE	3562	106	20

HSC-profile cutters with Torus form GF 500 T centre cutting

				54 HRC		Solid carbide	Signum	4268	106	21
				54 HRC		Solid carbide	Signum	4269	106	22

Tools for the mould industry

Helix	Z	Length	Feed	Hardness	Tool illustration	Tool material	Surface finish	Guhring no.	Discount group	Page
Standard Ratio end mills RF 100 U centre cutting										
				54 HRC		Solid carbide	FIRE	3872	106	23
				54 HRC		Solid carbide	FIRE	3873	106	23
Ratio end mills RF 100 H centre cutting										
				63 HRC		Solid carbide	Signum	3895	106	24
				63 HRC		Solid carbide	Signum	3896	106	24
Hard roughing end mills GS 100 H (fine teeth) centre cutting										
				54 HRC		Solid carbide	Signum	6704	106	25
				54 HRC		Solid carbide	Signum	6705	106	25
				54 HRC		Solid carbide	Signum	3682	117	26
Hard profile cutters with Torus grind GF 300 T centre cutting										
				63 HRC		Solid carbide	Signum	3361	106	27
				63 HRC		Solid carbide	Signum	3362	106	38
Multi-tooth end mills with corner radius GH 100 U centre cutting										
				54 HRC		Solid carbide	FIRE	3563	106	39
Hard multi-tooth end mills GH 100 H centre cutting										
				63 HRC		Solid carbide	Signum	4270	106	30

Tools for the mould industry

Helix	Z	Length	Feed	Hardness	Tool illustration	Tool material	Surface finish	Guhring no.	Discount group	Page
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Hard multi-tooth end mills corner radius GH 100 H centre cutting

						Solid carbide	Signum	3363	106	31
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Hard multi-tooth end mills GH 100 H centre cutting

						Solid carbide	Signum	3715	106	32
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						Solid carbide	Signum	3716	106	33
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Ball nose slot drills (2-fluted) centre cutting

						Solid carbide	FIRE	3679	117	34
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						Solid carbide	FIRE	3049	117	34
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						Solid carbide	bright	3024	117	35
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						Solid carbide	bright	3308	117	36
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Tools for the mould industry

Helix	Z	Length	Feed	Hard-ness	Tool illustration	Tool material	Surface finish	Guhring no.	Dis-count group	Page
XL ball nose slot drills (2-fluted) centre cutting										
				32 HRC		Solid carbide	bright	3014	117	37
				48 HRC		Solid carbide	FIRE	3030	117	37
Ball nose end mills (4-fluted) centre cutting										
				32 HRC		Solid carbide	bright	3306	117	38
				48 HRC		Solid carbide	FIRE	3727	117	38
				32 HRC		Solid carbide	bright	3026	117	39
				48 HRC		Solid carbide	FIRE	3050	117	39
Ratio end mills RF 100 VA centre cutting										
				48 HRC		Solid carbide	TiAlN-nanoA	6707	106	40
				48 HRC		Solid carbide	TiAlN-nanoA	6708	106	40
XL ball nose end mills (4-fluted) centre cutting										
				32 HRC		Solid carbide	bright	3015	117	41
				48 HRC		Solid carbide	FIRE	3043	117	41

Tools for the mould industry

Helix	Z	Length	Feed	Hardness	Tool illustration	Tool material	Surface finish	Guhring no.	Dis-count group	Page
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HSC-ball nose profile cutters GF 500 B centre cutting

				54 HRC		Solid carbide	Signum	3854	106	42
				54 HRC		Solid carbide	Signum	3866	106	43
				54 HRC		Solid carbide	Signum	3848	106	44
				54 HRC		Solid carbide	Signum	3855	106	45
				54 HRC		Solid carbide	Signum	3849	106	46
				54 HRC		Solid carbide	Signum	3853	106	47
				54 HRC		Solid carbide	Signum	4248	106	48
				54 HRC		Solid carbide	Signum	4249	106	49

Ball nose profile cutters GF 200 B centre cutting

				48 HRC		Solid carbide	FIRE	3045	106	50
				63 HRC		Solid carbide	FIRE	3044	106	51







Ball nose hard profile cutters GF 300 B centre cutting

				63 HRC		Solid carbide	Signum	3359	106	52
				63 HRC		Solid carbide	Signum	3360	106	53
				63 HRC		Solid carbide	Signum	4246	106	54
				63 HRC		Solid carbide	Signum	4247	106	54









Tools for the mould industry

Helix	Z	Length	Feed	Hardness	Tool illustration	Tool material	Surface finish	Guhring no.	Discount group	Page
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Die sinking cutter holder GF 200 WP

						nickel-plated		1941	140	56
						nickel-plated		1942	140	57

Indexable inserts round

					Cermet	bright	1947	141	58
					Solid carbide	FIRE	2520	141	58

Clamping screws for diesinking cutter holders

							1691	140	58
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Torx screwdriver

							1612	140	59
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Slot drills with corner radius (2-fluted)

centre cutting

DIN
6527

N



$R \pm 0,02$



HA

HA



48
HRC

Tool material
Surface finish
Discount group

Solid carbide

bright

FIRE

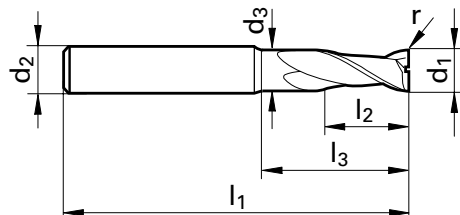
117

117

Guhring no.

3106

3561



Code no.	d1 h10	d2 h6	d3	l1	l2	l3	r	Z
	mm	mm	mm	mm	mm	mm	mm	
6.005	6.000	6.000	5.700	57.00	10.00	20.00	0.50	2
6.010	6.000	6.000	5.700	57.00	10.00	20.00	1.00	2
8.005	8.000	8.000	7.700	63.00	16.00	26.00	0.50	2
8.010	8.000	8.000	7.700	63.00	16.00	26.00	1.00	2
8.015	8.000	8.000	7.700	63.00	16.00	26.00	1.50	2
8.020	8.000	8.000	7.700	63.00	16.00	26.00	2.00	2
10.005	10.000	10.000	9.500	72.00	19.00	30.00	0.50	2
10.010	10.000	10.000	9.500	72.00	19.00	30.00	1.00	2
10.015	10.000	10.000	9.500	72.00	19.00	30.00	1.50	2
10.020	10.000	10.000	9.500	72.00	19.00	30.00	2.00	2
12.005	12.000	12.000	11.500	83.00	22.00	36.00	0.50	2
12.010	12.000	12.000	11.500	83.00	22.00	36.00	1.00	2
12.015	12.000	12.000	11.500	83.00	22.00	36.00	1.50	2
12.020	12.000	12.000	11.500	83.00	22.00	36.00	2.00	2
16.010	16.000	16.000	15.500	92.00	26.00	42.00	1.00	2
16.015	16.000	16.000	15.500	92.00	26.00	42.00	1.50	2
16.020	16.000	16.000	15.500	92.00	26.00	42.00	2.00	2
20.010	20.000	20.000	19.500	104.00	32.00	52.00	1.00	2
20.015	20.000	20.000	19.500	104.00	32.00	52.00	1.50	2
20.020	20.000	20.000	19.500	104.00	32.00	52.00	2.00	2

Availability	
●	●
●	●
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●	●
●	●
●	●
●	●
●	●
●	●

Cutting values: Slotting* and roughing

ISO Code	Hardness	Feed depth a_p	Feed width** a_e	Cutting speed v_c	fz (mm/z) with nom. Ø							
					2	4	6	8	10	12	16	20
P Steel	≤ 850 N/mm ²	0.5xd	1xd	125	0.013	0.018	0.025	0.032	0.042	0.049	0.063	0.07
	850 - 1400 N/mm ²	0.5xd	1xd	95	0.01	0.015	0.02	0.024	0.033	0.039	0.048	0.057
M Stainless Steel	≤ 750 N/mm ²	0.5xd	1xd	85	0.01	0.015	0.02	0.024	0.033	0.039	0.048	0.057
	≥ 750 N/mm ²	0.5xd	1xd	50	0.007	0.01	0.015	0.018	0.027	0.03	0.039	0.048
K Cast mat.	≥ 240 HB 30	0.5xd	1xd	100	0.01	0.015	0.02	0.024	0.033	0.039	0.048	0.057
N Aluminium	$\leq 7\%$ Si	1xd	1xd	160	0.013	0.018	0.025	0.032	0.042	0.049	0.063	0.07

* peripheral cooling „Guhrojet“ is recommended for optimal chip evacuation and tool life

** for finishing with $a_e = 0.02xd$ the cutting speed v_c can be increased by 50 %

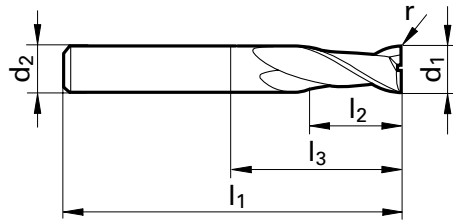
All recommendations are valid for coated tools. For bright milling cutters please v_c -40% and f_z -25% !

HSC-profile cutters with Torus form GF 500 T

centre cutting

54 HRC Tool material
 Surface finish
 Discount group
Guhring no.

HA
Solid carbide
Signum
106
3863



Code no.	d1 e8	d2 h6	l1	l2	l3	r	Z	Availability
	mm	mm	mm	mm	mm	mm		
4.000	4.000	4.000	80.00	8.00	52.00	0.50	2	●
6.000	6.000	6.000	100.00	12.00	64.00	1.00	2	●
8.000	8.000	8.000	100.00	16.00	64.00	1.00	2	●
10.000	10.000	10.000	100.00	20.00	60.00	1.00	2	●
12.000	12.000	12.000	120.00	24.00	75.00	1.50	2	●

Cutting values: HPC-roughing and HSC copy milling*

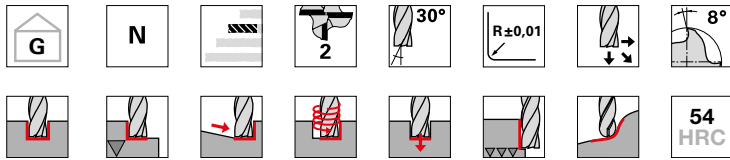
ISO Code	Hardness	Feed depth a _p	Feed width** a _e	Cutting speed v _c	fz (mm/z) with nom. Ø							
					2	3	4	6	8	10	12	16
P Steel	≤ 850 N/mm ²	0.2xd	0.5xd	200	0.03	0.04	0.045	0.05	0.07	0.1	0.12	0.15
	850 - 1400 N/mm ²	0.15xd	0.4xd	180	0.03	0.04	0.045	0.05	0.07	0.1	0.12	0.15
M Stainless Steel	≤ 750 N/mm ²	0.15xd	0.4xd	140	0.03	0.04	0.045	0.05	0.07	0.1	0.12	0.15
	≥ 750 N/mm ²	0.15xd	0.4xd	100	0.02	0.03	0.035	0.04	0.05	0.07	0.08	0.1
N Aluminium	≤ 7% Si	0.15xd	0.4xd	280	0.03	0.04	0.045	0.05	0.07	0.1	0.12	0.15
S Ti sp.alloys	≤ 1300 N/mm ²	0.1xd	0.4xd	90	0.02	0.03	0.035	0.04	0.05	0.07	0.08	0.15
H Hard. steel	up to 54 HRC	0.05xd	0.3xd	140	0.02	0.03	0.035	0.04	0.05	0.07	0.08	0.1

* peripheral cooling „Guhrojet“ is recommended for optimal chip evacuation and tool life, for hard machining air cooling is recommended

** for HSC copy milling and imachining with a_e = 0.1xd the cutting speed v_c can be increased by 50 %

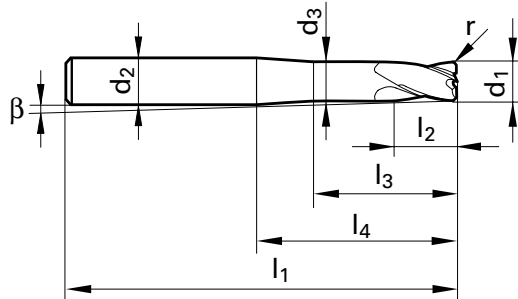
HSC-profile cutters with Torus form GF 500 T

centre cutting



Tool material
Surface finish
Discount group
Guhring no.

Solid carbide
Signum
106
3856



Code no.	d1 h8	d2 h6	d3	l1	l2	l3	l4	r	β	Z	Availability
	mm	mm	mm	mm	mm	mm	mm	mm	°		
0.501	0.500	4.000	0.480	50.00	1.00	3.00	22.00	0.10	4.60	2	●
1.002	1.000	4.000	0.950	50.00	2.00	6.00	22.00	0.20	4.00	2	●
2.000	2.000	6.000	1.900	57.00	3.00	8.00	21.00	0.50	5.60	2	●
2.002	2.000	6.000	1.900	57.00	3.00	8.00	21.00	0.20	5.50	2	●
3.000	3.000	6.000	2.800	57.00	3.50	9.00	21.00	0.50	4.20	2	●
3.003	3.000	6.000	2.800	57.00	3.50	9.00	21.00	0.30	4.20	2	●
4.000	4.000	6.000	3.800	57.00	4.00	9.40	21.00	1.00	2.90	2	●
4.003	4.000	6.000	3.800	57.00	4.00	9.40	21.00	0.30	2.80	2	●
4.005	4.000	6.000	3.800	57.00	4.00	9.40	21.00	0.50	2.80	2	●
5.005	5.000	6.000	4.800	57.00	5.00	11.90	21.00	0.50	1.40	2	●
5.010	5.000	6.000	4.800	57.00	5.00	11.90	21.00	1.00	1.50	2	●
6.000	6.000	6.000	5.700	57.00	6.00	20.00	21.00	2.00	-	2	●
6.005	6.000	6.000	5.700	57.00	6.00	20.00	21.00	0.50	-	2	●
6.010	6.000	6.000	5.700	57.00	6.00	20.00	21.00	1.00	-	2	●
6.015	6.000	6.000	5.700	57.00	6.00	20.00	21.00	1.50	-	2	●
8.000	8.000	8.000	7.700	63.00	8.00	26.00	27.00	2.00	-	2	●
8.005	8.000	8.000	7.700	63.00	8.00	26.00	27.00	0.50	-	2	●
8.010	8.000	8.000	7.700	63.00	8.00	26.00	27.00	1.00	-	2	●
8.015	8.000	8.000	7.700	63.00	8.00	26.00	27.00	1.50	-	2	●
10.000	10.000	10.000	9.500	72.00	10.00	30.00	32.00	3.00	-	2	●
10.005	10.000	10.000	9.500	72.00	10.00	30.00	32.00	0.50	-	2	●
10.010	10.000	10.000	9.500	72.00	10.00	30.00	32.00	1.00	-	2	●
10.015	10.000	10.000	9.500	72.00	10.00	30.00	32.00	1.50	-	2	●
10.020	10.000	10.000	9.500	72.00	10.00	30.00	32.00	2.00	-	2	●
12.000	12.000	12.000	11.500	83.00	12.00	36.00	38.00	4.00	-	2	●
12.020	12.000	12.000	11.500	83.00	12.00	36.00	38.00	2.00	-	2	●

Cutting values: HPC-roughing and HSC copy milling*

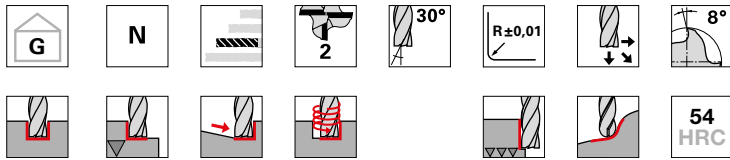
ISO Code	Hardness	Feed depth a _p	Feed width** a _e	Cutting speed v _c	fz (mm/z) with nom. Ø							
					2	3	4	6	8	10	12	16
P Steel	≤ 850 N/mm ²	0.2xd	0.5xd	200	0.03	0.04	0.045	0.05	0.07	0.1	0.12	0.15
	850 - 1400 N/mm ²	0.15xd	0.4xd	180	0.03	0.04	0.045	0.05	0.07	0.1	0.12	0.15
M Stainless Steel	≤ 750 N/mm ²	0.15xd	0.4xd	140	0.03	0.04	0.045	0.05	0.07	0.1	0.12	0.15
	≥ 750 N/mm ²	0.15xd	0.4xd	100	0.02	0.03	0.035	0.04	0.05	0.07	0.08	0.1
N Aluminium	≤ 7% Si	0.15xd	0.4xd	280	0.03	0.04	0.045	0.05	0.07	0.1	0.12	0.15
S Ti sp.alloys	≤ 1300 N/mm ²	0.1xd	0.4xd	90	0.02	0.03	0.035	0.04	0.05	0.07	0.08	0.15
H Hard. steel	up to 54 HRC	0.05xd	0.3xd	140	0.02	0.03	0.035	0.04	0.05	0.07	0.08	0.1

* peripheral cooling „Guhrojet“ is recommended for optimal chip evacuation and tool life, for hard machining air cooling is recommended

** for HSC copy milling and imachining with a_e = 0.1xd the cutting speed v_c can be increased by 50 %

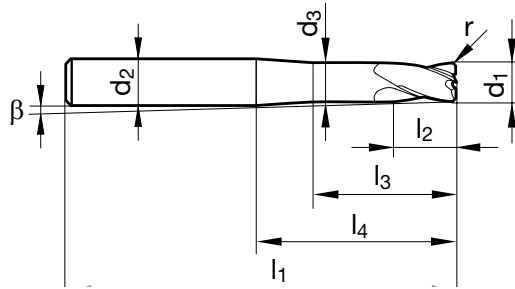
HSC-profile cutters with Torus form GF 500 T

centre cutting



Tool material
Surface finish
Discount group
Guhring no.

Solid carbide
Signum
106
3865



Code no.	d1 h8	d2 h6	d3	l1	l2	l3	l4	r	β	Z	Availability
	mm	mm	mm	mm	mm	mm	mm	mm	°		
0.500	0.500	4.000	0.480	50.00	1.00	6.00	20.00	0.10	5.10	2	●
1.002	1.000	4.000	0.950	50.00	2.00	12.00	20.00	0.20	4.40	2	●
2.002	2.000	6.000	1.900	80.00	3.00	18.00	40.00	0.20	2.90	2	●
2.005	2.000	6.000	1.900	80.00	3.00	18.00	40.00	0.50	2.90	2	●
3.003	3.000	6.000	2.800	80.00	3.50	25.00	40.00	0.30	2.20	2	●
3.005	3.000	6.000	2.800	80.00	3.50	25.00	40.00	0.50	2.20	2	●
4.003	4.000	6.000	3.800	80.00	4.00	32.00	40.00	0.30	1.50	2	●
4.005	4.000	6.000	3.800	80.00	4.00	32.00	40.00	0.50	1.50	2	●
4.010	4.000	6.000	3.800	80.00	4.00	32.00	40.00	1.00	1.50	2	●
5.005	5.000	6.000	4.800	80.00	5.00	39.00	40.00	0.50	0.80	2	●
5.010	5.000	6.000	4.800	80.00	5.00	39.00	40.00	1.00	0.80	2	●
6.000	6.000	6.000	5.600	80.00	6.00	39.00	44.00	2.00	-	2	●
6.005	6.000	6.000	5.700	80.00	6.00	39.00	44.00	0.50	-	2	●
6.010	6.000	6.000	5.700	80.00	6.00	39.00	44.00	1.00	-	2	●
6.015	6.000	6.000	5.700	80.00	6.00	39.00	44.00	1.50	-	2	●
8.000	8.000	8.000	7.600	100.00	7.00	59.00	64.00	2.00	-	2	●
8.005	8.000	8.000	7.700	100.00	8.00	59.00	64.00	0.50	-	2	●
8.010	8.000	8.000	7.700	100.00	8.00	59.00	64.00	1.00	-	2	●
8.015	8.000	8.000	7.700	100.00	8.00	59.00	64.00	1.50	-	2	●
10.000	10.000	10.000	9.600	120.00	8.00	73.00	80.00	3.00	-	2	●
10.005	10.000	10.000	9.500	120.00	10.00	73.00	80.00	0.50	-	2	●
10.010	10.000	10.000	9.500	120.00	10.00	73.00	80.00	1.00	-	2	●
10.015	10.000	10.000	9.500	120.00	10.00	73.00	80.00	1.50	-	2	●
10.020	10.000	10.000	9.500	120.00	10.00	73.00	80.00	2.00	-	2	●
12.000	12.000	12.000	11.500	120.00	10.00	68.00	75.00	4.00	-	2	●
12.020	12.000	12.000	11.500	120.00	12.00	68.00	75.00	2.00	-	2	●

Cutting values: HPC-roughing and HSC copy milling*

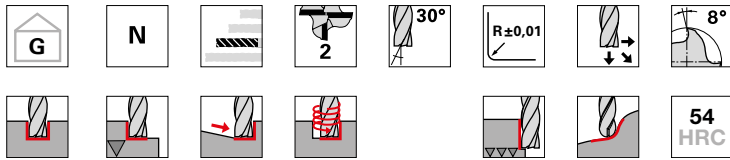
ISO Code	Hardness	Feed depth a _p	Feed width** a _e	Cutting speed v _c	fz (mm/z) with nom. Ø							
					2	3	4	6	8	10	12	16
P Steel	≤ 850 N/mm ²	0.2xd	0.5xd	200	0.03	0.04	0.045	0.05	0.07	0.1	0.12	0.15
	850 - 1400 N/mm ²	0.15xd	0.4xd	180	0.03	0.04	0.045	0.05	0.07	0.1	0.12	0.15
M Stainless Steel	≤ 750 N/mm ²	0.15xd	0.4xd	140	0.03	0.04	0.045	0.05	0.07	0.1	0.12	0.15
	≥ 750 N/mm ²	0.15xd	0.4xd	100	0.02	0.03	0.035	0.04	0.05	0.07	0.08	0.1
N Aluminium	≤ 7% Si	0.15xd	0.4xd	280	0.03	0.04	0.045	0.05	0.07	0.1	0.12	0.15
S Ti sp.alloys	≤ 1300 N/mm ²	0.1xd	0.4xd	90	0.02	0.03	0.035	0.04	0.05	0.07	0.08	0.15
H Hard. steel	up to 54 HRC	0.05xd	0.3xd	140	0.02	0.03	0.035	0.04	0.05	0.07	0.08	0.1

* peripheral cooling „Guhrojet“ is recommended for optimal chip evacuation and tool life, for hard machining air cooling is recommended

** for HSC copy milling and imachining with a_e = 0.1xd the cutting speed v_c can be increased by 50 %

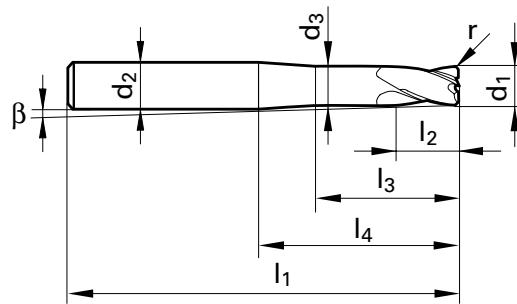
HSC-profile cutters with Torus form GF 500 T

centre cutting



Tool material
Surface finish
Discount group
Guhring no.

Solid carbide
Signum
106
3859



Code no.	d1 h8	d2 h6	d3	l1	l2	l3	l4	r	β	Z	Availability
	mm	mm	mm	mm	mm	mm	mm	mm	°		
2.000	2.000	6.000	1.800	80.00	3.00	8.00	40.00	0.50	2.90	2	●
3.000	3.000	6.000	2.800	80.00	3.50	12.00	40.00	0.50	2.20	2	●
4.000	4.000	6.000	3.800	80.00	4.00	20.00	40.00	1.00	1.50	2	●
6.000	6.000	8.000	5.600	100.00	6.00	59.00	60.00	2.00	1.00	2	●
8.000	8.000	10.000	7.600	120.00	7.00	74.00	75.00	2.00	0.80	2	●
10.000	10.000	12.000	9.600	120.00	8.00	68.00	70.00	3.00	0.90	2	●
12.000	12.000	16.000	11.500	150.00	10.00	95.80	100.00	4.00	1.20	2	●

Cutting values: HPC-roughing and HSC copy milling*

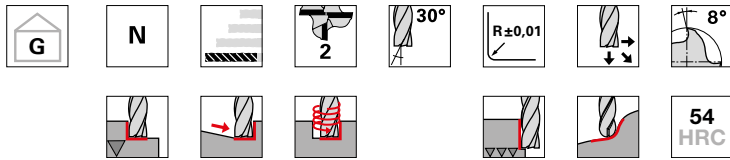
ISO Code	Hardness	Feed depth a_p	Feed width** a_e	Cutting speed v_c	fz (mm/z) with nom. Ø							
					2	3	4	6	8	10	12	16
P Steel	≤ 850 N/mm ²	0.2xd	0.5xd	200	0.03	0.04	0.045	0.05	0.07	0.1	0.12	0.15
	850 - 1400 N/mm ²	0.15xd	0.4xd	180	0.03	0.04	0.045	0.05	0.07	0.1	0.12	0.15
M Stainless Steel	≤ 750 N/mm ²	0.15xd	0.4xd	140	0.03	0.04	0.045	0.05	0.07	0.1	0.12	0.15
	≥ 750 N/mm ²	0.15xd	0.4xd	100	0.02	0.03	0.035	0.04	0.05	0.07	0.08	0.1
N Aluminium	≤ 7% Si	0.15xd	0.4xd	280	0.03	0.04	0.045	0.05	0.07	0.1	0.12	0.15
S Ti sp.alloys	≤ 1300 N/mm ²	0.1xd	0.4xd	90	0.02	0.03	0.035	0.04	0.05	0.07	0.08	0.15
H Hard. steel	up to 54 HRC	0.05xd	0.3xd	140	0.02	0.03	0.035	0.04	0.05	0.07	0.08	0.1

* peripheral cooling „Guhrojet“ is recommended for optimal chip evacuation and tool life, for hard machining air cooling is recommended

** for HSC copy milling and imachining with $a_e = 0.1xd$ the cutting speed v_c can be increased by 50 %

HSC-profile cutters with Torus form GF 500 T

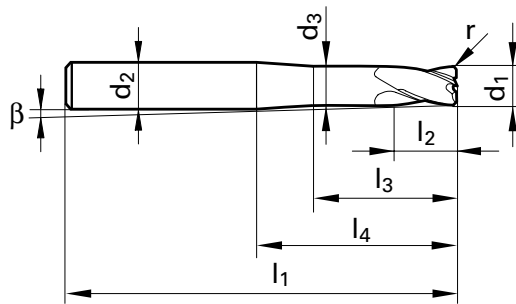
centre cutting



Tool material
Surface finish
Discount group
Guhring no.



Solid carbide
Signum
106
3860



Code no.	d1 h8	d2 h6	d3	l1	l2	l3	l4	r	β	Z	Availability
	mm	mm	mm	mm	mm	mm	mm	mm	°		
2.000	2.000	6.000	1.800	80.00	3.00	8.00	40.00	0.50	2.90	2	●
3.000	3.000	6.000	2.800	80.00	3.50	12.00	40.00	0.50	2.20	2	●
4.000	4.000	6.000	3.800	100.00	4.00	20.00	60.00	0.50	1.00	2	●
6.000	6.000	8.000	5.600	120.00	6.00	79.00	80.00	1.00	0.80	2	●
8.000	8.000	10.000	7.600	150.00	7.00	104.00	105.00	1.00	0.60	2	●

Cutting values: HPC-roughing and HSC copy milling*

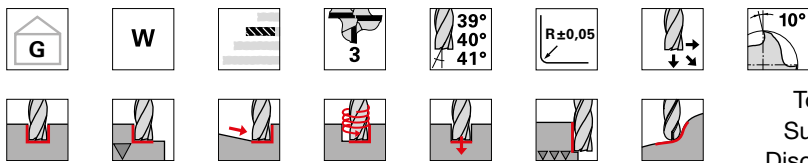
ISO Code	Hardness	Feed depth a_p	Feed width** a_e	Cutting speed v_c	fz (mm/z) with nom. Ø							
					2	3	4	6	8	10	12	16
P Steel	≤ 850 N/mm ²	0.2xd	0.5xd	200	0.03	0.04	0.045	0.05	0.07	0.1	0.12	0.15
	850 - 1400 N/mm ²	0.15xd	0.4xd	180	0.03	0.04	0.045	0.05	0.07	0.1	0.12	0.15
M Stainless Steel	≤ 750 N/mm ²	0.15xd	0.4xd	140	0.03	0.04	0.045	0.05	0.07	0.1	0.12	0.15
	≥ 750 N/mm ²	0.15xd	0.4xd	100	0.02	0.03	0.035	0.04	0.05	0.07	0.08	0.1
N Aluminium	≤ 7% Si	0.15xd	0.4xd	280	0.03	0.04	0.045	0.05	0.07	0.1	0.12	0.15
S Ti sp.alloys	≤ 1300 N/mm ²	0.1xd	0.4xd	90	0.02	0.03	0.035	0.04	0.05	0.07	0.08	0.15
H Hard. steel	up to 54 HRC	0.05xd	0.3xd	140	0.02	0.03	0.035	0.04	0.05	0.07	0.08	0.1

* peripheral cooling „Guhrojet“ is recommended for optimal chip evacuation and tool life, for hard machining air cooling is recommended

** for HSC copy milling and imachining with $a_e = 0.1xd$ the cutting speed v_c can be increased by 50 %

Ratio end mills Alu RF 100 A

centre cutting

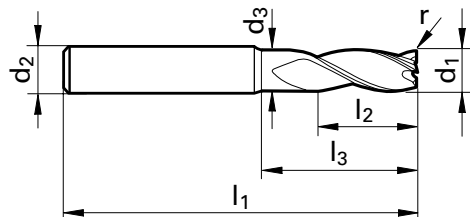


Tool material
Surface finish
Discount group
Guhring no.



Solid carbide

bright	bright
106	106
3599	6729



Code no.	d1 e8	d2 h6	d3	l1	l2	l3	r	Z	Availability	
	mm	mm	mm	mm	mm	mm	mm			
6.005	6.000	6.000	5.700	57.00	13.00	20.00	0.50	3	●	●
6.010	6.000	6.000	5.700	57.00	13.00	20.00	1.00	3	●	●
8.005	8.000	8.000	7.700	63.00	19.00	26.00	0.50	3	●	●
8.010	8.000	8.000	7.700	63.00	19.00	26.00	1.00	3	●	●
10.005	10.000	10.000	9.500	72.00	22.00	30.00	0.50	3	●	●
10.010	10.000	10.000	9.500	72.00	22.00	30.00	1.00	3	●	●
10.015	10.000	10.000	9.500	72.00	22.00	30.00	1.50	3	●	●
12.005	12.000	12.000	11.500	83.00	26.00	36.00	0.50	3	●	●
12.010	12.000	12.000	11.500	83.00	26.00	36.00	1.00	3	●	●
12.015	12.000	12.000	11.500	83.00	26.00	36.00	1.50	3	●	●
12.020	12.000	12.000	11.500	83.00	26.00	36.00	2.00	3	●	●
12.025	12.000	12.000	11.500	83.00	26.00	36.00	2.50	3	●	●
12.030	12.000	12.000	11.500	83.00	26.00	36.00	3.00	3	●	●
12.040	12.000	12.000	11.500	83.00	26.00	36.00	4.00	3	●	●
16.010	16.000	16.000	15.500	92.00	32.00	42.00	1.00	3	●	●
16.020	16.000	16.000	15.500	92.00	32.00	42.00	2.00	3	●	●
16.025	16.000	16.000	15.500	92.00	32.00	42.00	2.50	3	●	●
16.030	16.000	16.000	15.500	92.00	32.00	42.00	3.00	3	●	●
16.040	16.000	16.000	15.500	92.00	32.00	42.00	4.00	3	●	●
20.010	20.000	20.000	19.500	104.00	38.00	52.00	1.00	3	●	●
20.020	20.000	20.000	19.500	104.00	38.00	52.00	2.00	3	●	●
20.025	20.000	20.000	19.500	104.00	38.00	52.00	2.50	3	●	●
20.030	20.000	20.000	19.500	104.00	38.00	52.00	3.00	3	●	●
20.040	20.000	20.000	19.500	104.00	38.00	52.00	4.00	3	●	●

Cutting values: Slotting and HPC-roughing*

ISO Code	Hardness***	Feed depth a _p	Feed width** a _e	Cutting speed v _c	fz (mm/z) with nom. Ø							
					3	6	8	10	12	16	20	25
N Aluminium	≤ 3% Si	1xd	1xd	600	0.045	0.05	0.065	0.08	0.12	0.15	0.18	0.25
	≤ 7% Si	1xd	1xd	280	0.03	0.045	0.05	0.065	0.08	0.12	0.15	0.18

* peripheral cooling „Guhrojet“ is recommended for optimal chip evacuation and tool life

** for trochoidal milling and imachining with a_p 2xd and a_e 0.15xd the cutting speed and feed rate can be increased by 50 %

*** as an option we can provide our Carbo-coating as a special tool for soft and sticky aluminium alloys and plastics

End mills with corner radius (4-fluted)

centre cutting



Tool material
Surface finish
Discount group



Solid carbide

bright

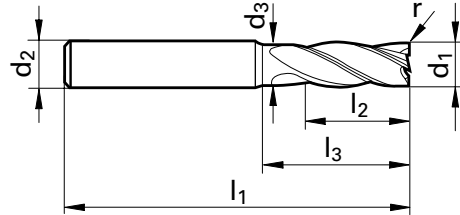
FIRE

117

117

3111

3562



Code no.	d1 h10	d2 h6	d3	l1	l2	l3	r	Z
	mm	mm	mm	mm	mm	mm	mm	
6.005	6.000	6.000	5.700	57.00	13.00	20.00	0.50	4
6.010	6.000	6.000	5.700	57.00	13.00	20.00	1.00	4
8.005	8.000	8.000	7.700	63.00	19.00	26.00	0.50	4
8.010	8.000	8.000	7.700	63.00	19.00	26.00	1.00	4
8.015	8.000	8.000	7.700	63.00	19.00	26.00	1.50	4
8.020	8.000	8.000	7.700	63.00	19.00	26.00	2.00	4
10.005	10.000	10.000	9.500	72.00	22.00	30.00	0.50	4
10.008	10.000	10.000	9.500	72.00	22.00	30.00	0.80	4
10.010	10.000	10.000	9.500	72.00	22.00	30.00	1.00	4
10.015	10.000	10.000	9.500	72.00	22.00	30.00	1.50	4
10.020	10.000	10.000	9.500	72.00	22.00	30.00	2.00	4
12.005	12.000	12.000	11.500	83.00	26.00	36.00	0.50	4
12.008	12.000	12.000	11.500	83.00	26.00	36.00	0.80	4
12.010	12.000	12.000	11.500	83.00	26.00	36.00	1.00	4
12.015	12.000	12.000	11.500	83.00	26.00	36.00	1.50	4
12.020	12.000	12.000	11.500	83.00	26.00	36.00	2.00	4
16.010	16.000	16.000	15.500	92.00	32.00	42.00	1.00	4
16.015	16.000	16.000	15.500	92.00	32.00	42.00	1.50	4
16.020	16.000	16.000	15.500	92.00	32.00	42.00	2.00	4
20.010	20.000	20.000	19.500	104.00	38.00	52.00	1.00	4
20.015	20.000	20.000	19.500	104.00	38.00	52.00	1.50	4
20.020	20.000	20.000	19.500	104.00	38.00	52.00	2.00	4

Availability	
●	●
●	●
●	●
●	●
●	●
●	●
●	●
●	●
●	●
●	●
●	●
●	●
●	●
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●	●
●	●
●	●
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●	●
●	●

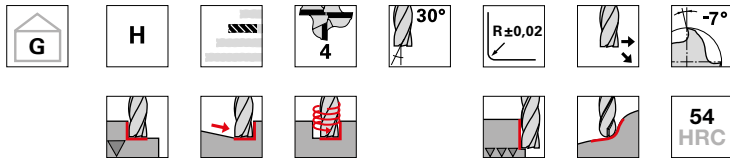
Cutting values: Roughing* and finishing

ISO Code	Hardness	Feed depth a_p	Feed width** a_e	Cutting speed v_c	fz (mm/z) with nom. Ø							
					2	4	6	8	10	12	16	20
P Steel	≤ 850 N/mm ²	1.5xd	0.5xd	125	0.013	0.018	0.025	0.032	0.042	0.049	0.063	0.07
	850 - 1400 N/mm ²	1.5xd	0.5xd	95	0.01	0.015	0.02	0.024	0.033	0.039	0.048	0.057
M Stainless Steel	≤ 750 N/mm ²	1.5xd	0.5xd	85	0.01	0.015	0.02	0.024	0.033	0.039	0.048	0.057
	≥ 750 N/mm ²	1.5xd	0.2xd	50	0.007	0.01	0.015	0.018	0.027	0.03	0.039	0.048
K Cast mat.	≥ 240 HB 30	1.5xd	0.5xd	100	0.01	0.015	0.02	0.024	0.033	0.039	0.048	0.057
N Aluminium	≤ 7% Si	1.5xd	0.3xd	160	0.013	0.018	0.025	0.032	0.042	0.049	0.063	0.07

* peripheral cooling „Guhrojet“ is recommended for optimal chip evacuation and tool life
 ** for finishing with $a_e = 0.02xd$ the cutting speed v_c can be increased by 50 %
 All recommendations are valid for coated tools. For bright milling cutters please v_c -40% and f_z -25% !

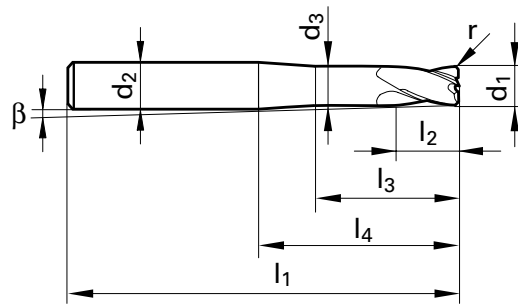
Hard profile cutters with Torus grind GF 500 T

centre cutting



Tool material
Surface finish
Discount group
Guhring no.

Solid carbide
Signum
106
4268



Code no.	d1 h8	d2 h6	d3	l1	l2	l3	l4	r	β	Z	Availability
	mm	mm	mm	mm	mm	mm	mm	mm	°		
3.003	3.000	6.000	2.800	57.00	3.50	14.00	21.00	0.30	4.20	4	●
3.005	3.000	6.000	2.800	57.00	3.50	14.00	21.00	0.50	4.20	4	●
4.003	4.000	6.000	3.800	57.00	4.00	16.00	21.00	0.30	2.80	4	●
4.005	4.000	6.000	3.800	57.00	4.00	16.00	21.00	0.50	2.80	4	●
5.003	5.000	6.000	4.800	57.00	5.00	18.00	21.00	0.30	1.40	4	●
5.005	5.000	6.000	4.800	57.00	5.00	18.00	21.00	0.50	1.40	4	●
6.003	6.000	6.000	5.700	57.00	6.00	20.00	21.00	0.30	-	4	●
6.005	6.000	6.000	5.700	57.00	6.00	20.00	21.00	0.50	-	4	●
6.010	6.000	6.000	5.700	57.00	6.00	20.00	21.00	1.00	-	4	●
6.015	6.000	6.000	5.700	57.00	6.00	20.00	21.00	1.50	-	4	●
8.005	8.000	8.000	7.700	63.00	8.00	26.00	27.00	0.50	-	4	●
8.010	8.000	8.000	7.700	63.00	8.00	26.00	27.00	1.00	-	4	●
8.015	8.000	8.000	7.700	63.00	8.00	26.00	27.00	1.50	-	4	●
8.020	8.000	8.000	7.700	63.00	8.00	26.00	27.00	2.00	-	4	●
10.005	10.000	10.000	9.500	72.00	10.00	30.00	32.00	0.50	-	4	●
10.010	10.000	10.000	9.500	72.00	10.00	30.00	32.00	1.00	-	4	●
10.015	10.000	10.000	9.500	72.00	10.00	30.00	32.00	1.50	-	4	●
10.020	10.000	10.000	9.500	72.00	10.00	30.00	32.00	2.00	-	4	●
12.005	12.000	12.000	11.500	83.00	12.00	36.00	38.00	0.50	-	4	●
12.010	12.000	12.000	11.500	83.00	12.00	36.00	38.00	1.00	-	4	●
12.015	12.000	12.000	11.500	83.00	12.00	36.00	38.00	1.50	-	4	●
12.020	12.000	12.000	11.500	83.00	12.00	36.00	38.00	2.00	-	4	●
16.020	16.000	16.000	15.500	92.00	16.00	42.00	44.00	2.00	-	4	●
16.030	16.000	16.000	15.500	92.00	16.00	42.00	44.00	3.00	-	4	●

Cutting values: HPC-roughing and HSC copy milling*

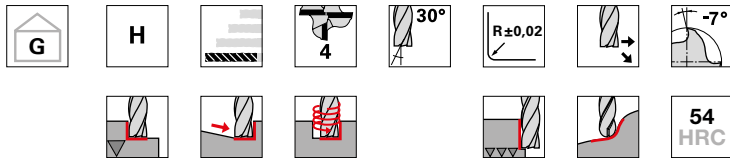
ISO Code	Hardness	Feed depth* a _p	Feed width** a _e	Cutting speed v _c	fz (mm/z) with nom. Ø							
					2	3	4	6	8	10	12	16
P Steel	≤ 850 N/mm ²	-	-	-	-	-	-	-	-	-	-	-
	850 - 1400 N/mm ²	0.2xd	0.5xd	200	0.03	0.04	0.045	0.05	0.07	0.1	0.12	0.15
K Cast mat.	≥ 240 HB 30	0.2xd	0.5xd	200	0.03	0.04	0.045	0.05	0.07	0.1	0.12	0.15
H Hardened Steel	≤ 54 HRC	0.1xd	0.5xd	140	0.02	0.03	0.035	0.04	0.05	0.07	0.08	0.1
	≤ 63 HRC	0.05xd	0.3xd	80	0.02	0.03	0.035	0.04	0.05	0.07	0.08	0.1

* Dry machining with air cooling is recommended for optimal chip evacuation and tool life.

** for HSC copy milling and imachining with a_e = 0.1xd the cutting speed v_c can be increased by 50 %

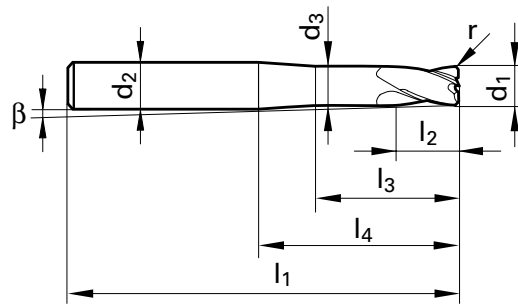
Hard profile cutters with Torus grind GF 500 T

centre cutting



Tool material
Surface finish
Discount group
Guhring no.

HA
Solid carbide
Signum
106
4269



Code no.	d1 h8	d2 h6	d3	l1	l2	l3	l4	r	β	Z	Availability
	mm	mm	mm	mm	mm	mm	mm	mm	°		
3.003	3.000	6.000	2.800	80.00	3.50	14.00	40.00	0.30	2.20	4	●
3.005	3.000	6.000	2.800	80.00	3.50	14.00	40.00	0.50	2.20	4	●
4.003	4.000	6.000	3.800	80.00	4.00	16.00	40.00	0.30	1.50	4	●
4.005	4.000	6.000	3.800	80.00	4.00	16.00	40.00	0.50	1.50	4	●
5.003	5.000	6.000	4.800	80.00	5.00	18.00	40.00	0.30	0.80	4	●
5.005	5.000	6.000	4.800	80.00	5.00	18.00	40.00	0.50	0.80	4	●
6.003	6.000	6.000	5.700	80.00	6.00	39.00	40.00	0.30	-	4	●
6.005	6.000	6.000	5.700	80.00	6.00	39.00	40.00	0.50	-	4	●
6.010	6.000	6.000	5.700	80.00	6.00	39.00	40.00	1.00	-	4	●
6.015	6.000	6.000	5.700	80.00	6.00	39.00	40.00	1.50	-	4	●
8.005	8.000	8.000	7.700	100.00	8.00	59.00	60.00	0.50	-	4	●
8.010	8.000	8.000	7.700	100.00	8.00	59.00	60.00	1.00	-	4	●
8.015	8.000	8.000	7.700	100.00	8.00	59.00	60.00	1.50	-	4	●
8.020	8.000	8.000	7.700	100.00	8.00	59.00	60.00	2.00	-	4	●
10.005	10.000	10.000	9.500	120.00	10.00	73.00	75.00	0.50	-	4	●
10.010	10.000	10.000	9.500	120.00	10.00	73.00	75.00	1.00	-	4	●
10.015	10.000	10.000	9.500	120.00	10.00	73.00	75.00	1.50	-	4	●
10.020	10.000	10.000	9.500	120.00	10.00	73.00	75.00	2.00	-	4	●
12.005	12.000	12.000	11.500	120.00	12.00	68.00	70.00	0.50	-	4	●
12.010	12.000	12.000	11.500	120.00	12.00	68.00	70.00	1.00	-	4	●
12.015	12.000	12.000	11.500	120.00	12.00	68.00	70.00	1.50	-	4	●
12.020	12.000	12.000	11.500	120.00	12.00	68.00	70.00	2.00	-	4	●
16.020	16.000	16.000	15.500	150.00	16.00	98.00	100.00	2.00	-	4	●
16.030	16.000	16.000	15.500	150.00	16.00	98.00	100.00	3.00	-	4	●

Cutting values: HPC-roughing and HSC copy milling*

ISO Code	Hardness	Feed depth* a _p	Feed width** a _e	Cutting speed v _c	fz (mm/z) with nom. Ø							
					2	3	4	6	8	10	12	16
P Steel	≤ 850 N/mm ²	-	-	-	-	-	-	-	-	-	-	-
	850 - 1400 N/mm ²	0.2xd	0.5xd	200	0.03	0.04	0.045	0.05	0.07	0.1	0.12	0.15
K Cast mat.	≥ 240 HB 30	0.2xd	0.5xd	200	0.03	0.04	0.045	0.05	0.07	0.1	0.12	0.15
H Hardened Steel	≤ 54 HRC	0.1xd	0.5xd	140	0.02	0.03	0.035	0.04	0.05	0.07	0.08	0.1
	≤ 63 HRC	0.05xd	0.3xd	80	0.02	0.03	0.035	0.04	0.05	0.07	0.08	0.1

* Dry machining with air cooling is recommended for optimal chip evacuation and tool life.

** for HSC copy milling and imachining with a_e = 0.1xd the cutting speed v_c can be increased by 50 %

Standard Ratio end mills RF 100 U

centre cutting



Tool material
Surface finish
Discount group



Solid carbide

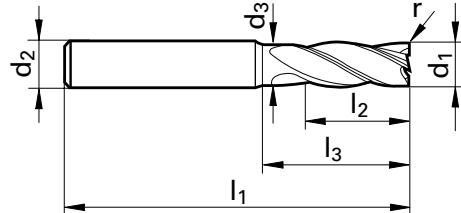
FIRE FIRE

106 106

Guhring no.

3872

3873



Code no.	d1 h10	d2 h6	d3	l1	l2	l3	r	Z	Availability	
	mm	mm	mm	mm	mm	mm	mm			
6.005	6.000	6.000	5.700	57.00	13.00	20.00	0.50	4	●	●
6.010	6.000	6.000	5.700	57.00	13.00	20.00	1.00	4	●	●
6.020	6.000	6.000	5.700	57.00	13.00	20.00	2.00	4	●	●
8.005	8.000	8.000	7.700	63.00	19.00	26.00	0.50	4	●	●
8.010	8.000	8.000	7.700	63.00	19.00	26.00	1.00	4	●	●
8.020	8.000	8.000	7.700	63.00	19.00	26.00	2.00	4	●	●
10.005	10.000	10.000	9.500	72.00	22.00	30.00	0.50	4	●	●
10.010	10.000	10.000	9.500	72.00	22.00	30.00	1.00	4	●	●
10.020	10.000	10.000	9.500	72.00	22.00	30.00	2.00	4	●	●
12.005	12.000	12.000	11.500	83.00	26.00	36.00	0.50	4	●	●
12.010	12.000	12.000	11.500	83.00	26.00	36.00	1.00	4	●	●
12.020	12.000	12.000	11.500	83.00	26.00	36.00	2.00	4	●	●
16.005	16.000	16.000	15.500	92.00	32.00	42.00	0.50	4	●	●
16.010	16.000	16.000	15.500	92.00	32.00	42.00	1.00	4	●	●
16.020	16.000	16.000	15.500	92.00	32.00	42.00	2.00	4	●	●
16.030	16.000	16.000	15.500	92.00	32.00	42.00	3.00	4	●	●
20.005	20.000	20.000	19.500	104.00	38.00	52.00	0.50	4	●	●
20.010	20.000	20.000	19.500	104.00	38.00	52.00	1.00	4	●	●
20.020	20.000	20.000	19.500	104.00	38.00	52.00	2.00	4	●	●
20.030	20.000	20.000	19.500	104.00	38.00	52.00	3.00	4	●	●
25.020	25.000	25.000	24.000	121.00	45.00	63.00	2.00	4	●	●
25.030	25.000	25.000	24.000	121.00	45.00	63.00	3.00	4	●	●

Cutting values: HPC-roughing*

ISO Code	Hardness	Feed depth a_p	Feed width** a_e	Cutting speed v_c	fz (mm/z) with nom. Ø							
					3	6	8	10	12	16	20	25
P Steel	≤ 850 N/mm ²	2xd	0.3xd	200	0.02	0.04	0.055	0.07	0.085	0.1	0.12	0.17
	850 - 1400 N/mm ²	2xd	0.3xd	180	0.02	0.04	0.055	0.07	0.085	0.1	0.12	0.17
K Cast mat.	≥ 240 HB 30	2xd	0.4xd	180	0.02	0.04	0.05	0.065	0.08	0.095	0.11	0.16

* peripheral cooling „Guhrojet“ is recommended for optimal chip evacuation and tool life

** for trochoidal milling and imachining with a_e 0.1-0.2xd the cutting speed and feed rate can be increased by 50 %.

Ratio end mills RF 100 H

centre cutting

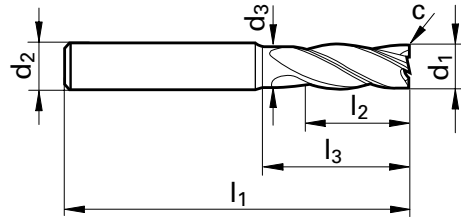


Tool material
Surface finish
Discount group
Guhring no.



Solid carbide

Signum	Signum
106	106
3895	3896



Code no.	d1 h10	d2 h6	d3	l1	l2	l3	c	Z
	mm	mm	mm	mm	mm	mm	mm x 45°	
6.000	6.000	6.000	5.700	57.00	13.00	20.00	0.15	4
8.000	8.000	8.000	7.700	63.00	19.00	26.00	0.15	4
10.000	10.000	10.000	9.500	72.00	22.00	30.00	0.20	4
12.000	12.000	12.000	11.500	83.00	26.00	36.00	0.20	4
16.000	16.000	16.000	15.500	92.00	32.00	42.00	0.35	4
20.000	20.000	20.000	19.500	104.00	38.00	52.00	0.45	4

Availability	
●	●
●	●
●	●
●	●
●	●
●	●
●	●
●	●
●	●

Cutting values: HPC-roughing* and hard finishing

ISO Code	Hardness	Feed depth a _p	Feed width** a _e	Cutting speed v _c	fz (mm/z) with nom. Ø						
					3	6	8	10	12	16	20
P Steel	≤ 850 N/mm ²	-	-	-	-	-	-	-	-	-	-
	850 - 1400 N/mm ²	1xd	-	140	0.02	0.04	0.05	0.065	0.08	0.095	0.11
K Cast mat.	≥ 240 HB 30	1xd	0.5xd	130	0.014	0.027	0.036	0.05	0.059	0.072	0.086
H Hardened Steel	≤ 54 HRC	1xD	0.15xD	110	0.015	0.03	0.04	0.05	0.06	0.07	0.09
	≤ 63 HRC	2xD	0.03xD	80	0.01	0.015	0.025	0.035	0.042	0.05	0.08

* air cooling is recommended for optimal chip evacuation and tool life.

** for slotting (up to 54 HRC) the cutting speed and feed rate should be reduced by 30 %.

Hard roughing end mills GS 100 H (fine teeth)

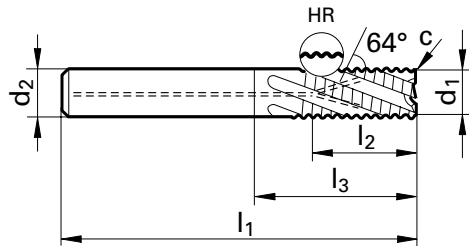
centre cutting



Tool material
Surface finish
Discount group
Guhring no.

Solid carbide

Signum	Signum
106	106
6704	6705



Code no.	d1 h10	d2 h6	l1	l2	l3	c	Z
	mm	mm	mm	mm	mm	mm x 45°	
6.000	6.000	6.000	57.00	13.00	21.00	0.30	4
8.000	8.000	8.000	63.00	19.00	27.00	0.30	4
10.000	10.000	10.000	72.00	22.00	32.00	0.30	4
12.000	12.000	12.000	83.00	26.00	38.00	0.50	4
16.000	16.000	16.000	92.00	32.00	44.00	0.50	4
20.000	20.000	20.000	104.00	38.00	54.00	0.50	4
25.000	25.000	25.000	121.00	45.00	65.00	0.60	4

Availability	
●	●
●	●
●	●
●	●
●	●
●	●
●	●
●	●
●	●

Cutting values: HPC-roughing*

ISO Code	Hardness	Feed depth* a _p	Feed width** a _e	Cutting speed v _c	Cutting speed						
					6	8	10	12	16	20	25
P Steel	≤ 850 N/mm ²	-	-	-	-	-	-	-	-	-	-
	850 - 1400 N/mm ²	1.5xd	0.4xd	130	0.016	0.032	0.041	0.054	0.063	0.081	0.09
K Cast mat.	≥ 240 HB 30	2xd	0.5xd	130	0.016	0.032	0.041	0.054	0.063	0.081	0.09
H Hardened Steel	≤ 54 HRC	1.5xd	0.25xd	90	0.014	0.022	0.027	0.036	0.045	0.054	0.063
	≤ 63 HRC	-	-	-	-	-	-	-	-	-	-

* peripheral cooling „Guhrojet“ is recommended for optimal chip evacuation and tool life

** for slotting the cutting speed and feed rate should be reduced by 30 %.

Hard roughing end mills GS 100 H (fine teeth)

centre cutting



Tool material
Surface finish
Discount group
Guhring no.

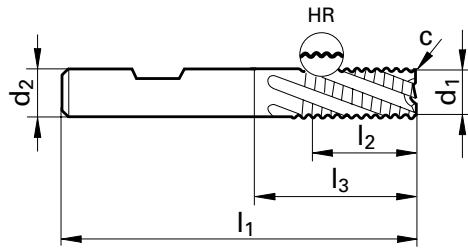


Solid carbide

Signum

117

3682



Code no.	d1 h10	d2 h6	l1	l2	l3	c	Z	Availability
	mm	mm	mm	mm	mm	mm x 45°		
6.000	6.000	6.000	57.00	13.00	21.00	0.30	4	●
8.000	8.000	8.000	63.00	19.00	27.00	0.30	4	●
10.000	10.000	10.000	72.00	22.00	32.00	0.30	4	●
12.000	12.000	12.000	83.00	26.00	38.00	0.50	4	●
16.000	16.000	16.000	92.00	32.00	44.00	0.50	4	●
20.000	20.000	20.000	104.00	38.00	54.00	0.50	4	●

Cutting values: HPC-roughing*

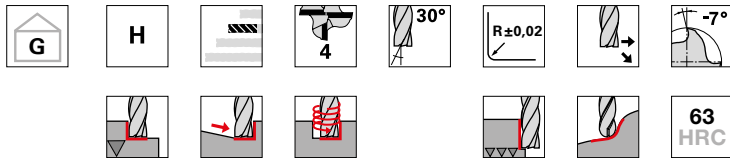
ISO Code	Hardness	Feed depth* a _p	Feed width** a _e	Cutting speed v _c	Cutting speed						
					6	8	10	12	16	20	25
P Steel	≤ 850 N/mm ²	-	-	-	-	-	-	-	-	-	-
	850 - 1400 N/mm ²	1.5xd	0.4xd	130	0.016	0.032	0.041	0.054	0.063	0.081	0.09
K Cast mat.	≥ 240 HB 30	2xd	0.5xd	130	0.016	0.032	0.041	0.054	0.063	0.081	0.09
H Hardened Steel	≤ 54 HRC	1.5xd	0.25xd	90	0.014	0.022	0.027	0.036	0.045	0.054	0.063
	≤ 63 HRC	-	-	-	-	-	-	-	-	-	-

* peripheral cooling „Guhrojet“ is recommended for optimal chip evacuation and tool life

** for slotting the cutting speed and feed rate should be reduced by 30 %.

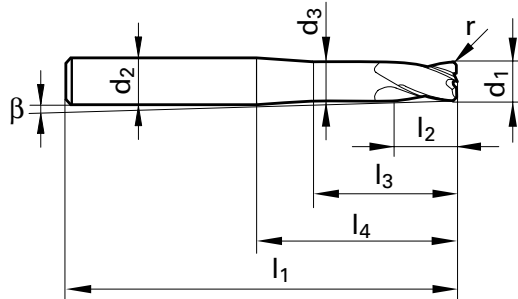
Hard profile cutters with Torus grind GF 300 T

centre cutting



Tool material
Surface finish
Discount group
Guhring no.

Solid carbide
Signum
106
3361



Code no.	d1 h8	d2 h6	d3	l1	l2	l3	l4	r	β	Z	Availability
	mm	mm	mm	mm	mm	mm	mm	mm	°		
0.501	0.500	4.000	0.480	50.00	1.00	3.00	22.00	0.10	4.60	2	●
1.002	1.000	4.000	0.950	50.00	2.00	6.00	22.00	0.20	4.00	2	●
2.002	2.000	6.000	1.900	57.00	3.00	10.00	21.00	0.20	5.50	2	●
2.005	2.000	6.000	1.900	57.00	3.00	10.00	21.00	0.50	5.60	2	●
3.000	3.000	6.000	2.800	57.00	5.00	10.00	21.00	0.50	4.20	4	●
3.003	3.000	6.000	2.800	57.00	5.00	10.00	21.00	0.30	4.20	4	●
4.000	4.000	6.000	3.800	57.00	6.00	13.40	21.00	0.50	2.80	4	●
4.003	4.000	6.000	3.800	57.00	6.00	13.40	21.00	0.30	2.80	4	●
5.000	5.000	6.000	4.800	57.00	8.00	15.90	21.00	0.50	1.40	4	●
5.003	5.000	6.000	4.800	57.00	8.00	15.90	21.00	0.30	1.40	4	●
6.000	6.000	6.000	5.700	57.00	9.00	20.00	21.00	1.00	-	4	●
6.003	6.000	6.000	5.700	57.00	9.00	20.00	21.00	0.30	-	4	●
6.005	6.000	6.000	5.700	57.00	9.00	20.00	21.00	0.50	-	4	●
6.015	6.000	6.000	5.700	57.00	9.00	20.00	21.00	1.50	-	4	●
8.000	8.000	8.000	7.700	63.00	12.00	26.00	27.00	1.00	-	4	●
8.005	8.000	8.000	7.700	63.00	12.00	26.00	27.00	0.50	-	4	●
8.015	8.000	8.000	7.700	63.00	12.00	26.00	27.00	1.50	-	4	●
8.020	8.000	8.000	7.700	63.00	12.00	26.00	27.00	2.00	-	4	●
10.000	10.000	10.000	9.500	72.00	15.00	30.00	32.00	1.50	-	4	●
10.005	10.000	10.000	9.500	72.00	15.00	30.00	32.00	0.50	-	4	●
10.010	10.000	10.000	9.500	72.00	15.00	30.00	32.00	1.00	-	4	●
10.020	10.000	10.000	9.500	72.00	15.00	30.00	32.00	2.00	-	4	●
12.000	12.000	12.000	11.500	83.00	18.00	36.00	38.00	1.50	-	4	●
12.005	12.000	12.000	11.500	83.00	18.00	36.00	38.00	0.50	-	4	●
12.010	12.000	12.000	11.500	83.00	18.00	36.00	38.00	1.00	-	4	●
12.020	12.000	12.000	11.500	83.00	18.00	36.00	38.00	2.00	-	4	●
16.000	16.000	16.000	15.500	92.00	24.00	42.00	44.00	2.00	-	4	●
16.030	16.000	16.000	15.500	92.00	24.00	42.00	44.00	3.00	-	4	●

Cutting values: HPC-roughing and HSC copy milling*

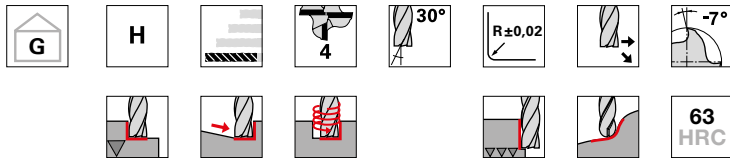
ISO Code	Hardness	Feed depth* a _p	Feed width** a _e	Cutting speed v _c	fz (mm/z) with nom. Ø							
					2	3	4	6	8	10	12	16
P Steel	≤ 850 N/mm ²	-	-	-	-	-	-	-	-	-	-	-
	850 - 1400 N/mm ²	0.2xd	0.5xd	200	0.03	0.04	0.045	0.05	0.07	0.1	0.12	0.15
K Cast mat.	≥ 240 HB 30	0.2xd	0.5xd	200	0.03	0.04	0.045	0.05	0.07	0.1	0.12	0.15
H Hardened Steel	≤ 54 HRC	0.1xd	0.5xd	140	0.02	0.03	0.035	0.04	0.05	0.07	0.08	0.1
	≤ 63 HRC	0.05xd	0.3xd	80	0.02	0.03	0.035	0.04	0.05	0.07	0.08	0.1

* Dry machining with air cooling is recommended for optimal chip evacuation and tool life.

** for HSC copy milling and imachining with a_e = 0.1xd the cutting speed v_c can be increased by 50 %

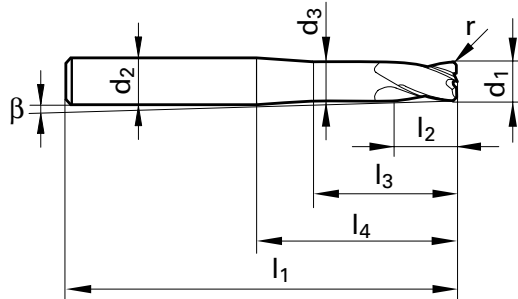
Hard profile cutters with Torus grind GF 300 T

centre cutting



Tool material
Surface finish
Discount group
Guhring no.

Solid carbide
Signum
106
3362



Code no.	d1 h8	d2 h6	d3	l1	l2	l3	l4	r	β	Z	Availability
	mm	mm	mm	mm	mm	mm	mm	mm	°		
0.501	0.500	4.000	0.480	50.00	1.00	6.00	20.00	0.10	5.10	2	●
1.002	1.000	4.000	0.950	50.00	2.00	12.00	20.00	0.20	4.40	2	●
2.002	2.000	6.000	1.900	75.00	3.00	18.00	39.00	0.20	3.00	2	●
2.005	2.000	6.000	1.900	75.00	3.00	18.00	39.00	0.50	3.00	2	●
3.003	3.000	6.000	2.800	75.00	5.00	25.00	39.00	0.30	2.30	4	●
3.005	3.000	6.000	2.800	75.00	5.00	25.00	39.00	0.50	2.30	4	●
4.003	4.000	6.000	3.800	75.00	6.00	32.00	39.00	0.30	1.50	4	●
4.005	4.000	6.000	3.800	75.00	6.00	32.00	39.00	0.50	1.50	4	●
5.003	5.000	6.000	4.800	75.00	8.00	38.00	39.00	0.30	0.80	4	●
5.005	5.000	6.000	4.800	75.00	8.00	38.00	39.00	0.50	0.80	4	●
6.000	6.000	6.000	5.700	75.00	9.00	38.00	39.00	1.00	-	4	●
6.003	6.000	6.000	5.700	75.00	9.00	38.00	39.00	0.30	-	4	●
6.005	6.000	6.000	5.700	75.00	9.00	38.00	39.00	0.50	-	4	●
6.015	6.000	6.000	5.700	75.00	9.00	38.00	39.00	1.50	-	4	●
8.000	8.000	8.000	7.700	100.00	12.00	63.00	64.00	1.00	-	4	●
8.005	8.000	8.000	7.700	100.00	12.00	63.00	64.00	0.50	-	4	●
8.015	8.000	8.000	7.700	100.00	12.00	63.00	64.00	1.50	-	4	●
8.020	8.000	8.000	7.700	100.00	12.00	63.00	64.00	2.00	-	4	●
10.000	10.000	10.000	9.500	100.00	15.00	58.00	60.00	1.50	-	4	●
10.005	10.000	10.000	9.500	100.00	15.00	58.00	60.00	0.50	-	4	●
10.010	10.000	10.000	9.500	100.00	15.00	58.00	60.00	1.00	-	4	●
10.020	10.000	10.000	9.500	100.00	15.00	58.00	60.00	2.00	-	4	●
12.000	12.000	12.000	11.500	150.00	18.00	103.00	105.00	1.50	-	4	●
12.005	12.000	12.000	11.500	150.00	18.00	103.00	105.00	0.50	-	4	●
12.010	12.000	12.000	11.500	150.00	18.00	103.00	105.00	1.00	-	4	●
12.020	12.000	12.000	11.500	150.00	18.00	103.00	105.00	2.00	-	4	●
16.000	16.000	16.000	15.500	150.00	24.00	100.00	102.00	2.00	-	4	●
16.030	16.000	16.000	15.500	150.00	24.00	100.00	102.00	3.00	-	4	●

Cutting values: HPC-roughing and HSC copy milling*

ISO Code	Hardness	Feed depth* a _p	Feed width** a _e	Cutting speed v _c	fz (mm/z) with nom. Ø							
					2	3	4	6	8	10	12	16
P Steel	≤ 850 N/mm ²	-	-	-	-	-	-	-	-	-	-	-
	850 - 1400 N/mm ²	0.2xd	0.5xd	200	0.03	0.04	0.045	0.05	0.07	0.1	0.12	0.15
K Cast mat.	≥ 240 HB 30	0.2xd	0.5xd	200	0.03	0.04	0.045	0.05	0.07	0.1	0.12	0.15
H Hardened Steel	≤ 54 HRC	0.1xd	0.5xd	140	0.02	0.03	0.035	0.04	0.05	0.07	0.08	0.1
	≤ 63 HRC	0.05xd	0.3xd	80	0.02	0.03	0.035	0.04	0.05	0.07	0.08	0.1

* Dry machining with air cooling is recommended for optimal chip evacuation and tool life.

** for HSC copy milling and imachining with a_e = 0.1xd the cutting speed v_c can be increased by 50 %

Multi-tooth end mills with corner radius GH 100 U

centre cutting



Tool material
Surface finish
Discount group
Guhring no.

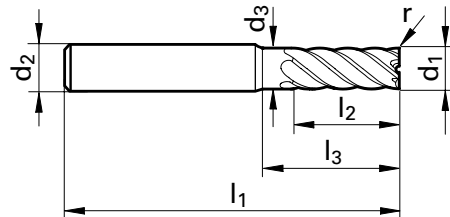


Solid carbide

FIRE

106

3563



Code no.	d1 h10	d2 h6	d3	l1	l2	l3	r	Z	Availability
	mm	mm	mm	mm	mm	mm	mm		
6.005	6.000	6.000	5.700	57.00	13.00	20.00	0.50	6	●
6.010	6.000	6.000	5.700	57.00	13.00	20.00	1.00	6	●
8.005	8.000	8.000	7.700	63.00	19.00	26.00	0.50	6	●
8.010	8.000	8.000	7.700	63.00	19.00	26.00	1.00	6	●
8.015	8.000	8.000	7.700	63.00	19.00	26.00	1.50	6	●
8.020	8.000	8.000	7.700	63.00	19.00	26.00	2.00	6	●
10.005	10.000	10.000	9.500	72.00	22.00	30.00	0.50	6	●
10.010	10.000	10.000	9.500	72.00	22.00	30.00	1.00	6	●
10.015	10.000	10.000	9.500	72.00	22.00	30.00	1.50	6	●
10.020	10.000	10.000	9.500	72.00	22.00	30.00	2.00	6	●
12.005	12.000	12.000	11.500	83.00	26.00	36.00	0.50	6	●
12.010	12.000	12.000	11.500	83.00	26.00	36.00	1.00	6	●
12.015	12.000	12.000	11.500	83.00	26.00	36.00	1.50	6	●
12.020	12.000	12.000	11.500	83.00	26.00	36.00	2.00	6	●
16.005	16.000	16.000	15.500	92.00	32.00	42.00	0.50	6	●
16.010	16.000	16.000	15.500	92.00	32.00	42.00	1.00	6	●
16.015	16.000	16.000	15.500	92.00	32.00	42.00	1.50	6	●
16.020	16.000	16.000	15.500	92.00	32.00	42.00	2.00	6	●
20.005	20.000	20.000	19.500	104.00	38.00	52.00	0.50	8	●
20.010	20.000	20.000	19.500	104.00	38.00	52.00	1.00	8	●
20.015	20.000	20.000	19.500	104.00	38.00	52.00	1.50	8	●
20.020	20.000	20.000	19.500	104.00	38.00	52.00	2.00	8	●

Cutting values: Finishing*** and HPC-roughing**

ISO Code	Hardness	Feed depth* a _p	Feed width** a _e	Cutting speed v _c	fz (mm/z) with nom. Ø							
					3	6	8	10	12	16	20	25
P Steel	≤ 850 N/mm ²	2xd	0.2xd	280	0.014	0.027	0.036	0.05	0.059	0.072	0.086	0.12
	850 - 1400 N/mm ²	2xd	0.15xd	180	0.012	0.024	0.032	0.04	0.048	0.056	0.072	0.104
M Stainless Steel	≤ 750 N/mm ²	2xd	0.15xd	150	0.014	0.027	0.036	0.045	0.054	0.063	0.081	0.11
	≥ 750 N/mm ²	2xd	0.1xd	100	0.014	0.027	0.036	0.045	0.054	0.063	0.081	0.11
K Cast mat.	≥ 240 HB 30	2xd	0.2xd	160	0.016	0.03	0.04	0.055	0.065	0.08	0.095	0.14
N Aluminium	≤ 7% Si	2xd	0.15xd	280	0.018	0.035	0.045	0.05	0.065	0.08	0.12	0.15

* peripheral cooling „Guhrojet“ is recommended for optimal chip evacuation and tool life

** for trochoidal milling and imachining with a_e 0.1-0.2xd the cutting speed and feed rate can be increased by 50 %.

*** for finishing with a_e 0.01xD the feed rate must be reduced to achieve optimal surfaces

Hard multi-tooth end mills corner radius GH 100 H

centre cutting



Tool material
Surface finish
Discount group
Guhring no.

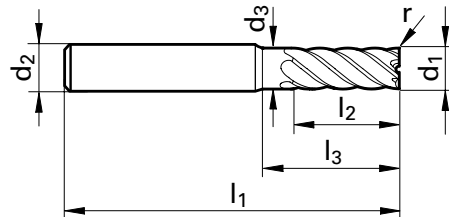


Solid carbide

Signum

106

4270



Code no.	d1 h10	d2 h6	d3	l1	l2	l3	r	Z	Availability
	mm	mm	mm	mm	mm	mm	mm		
3.003	3.000	6.000	2.800	57.00	8.00	11.40	0.30	6	●
4.004	4.000	6.000	3.800	57.00	11.00	15.90	0.40	6	●
5.005	5.000	6.000	4.800	57.00	13.00	17.90	0.50	6	●
6.005	6.000	6.000	5.700	57.00	13.00	20.00	0.50	6	●
6.010	6.000	6.000	5.700	57.00	13.00	20.00	1.00	6	●
8.005	8.000	8.000	7.700	63.00	19.00	26.00	0.50	6	●
8.010	8.000	8.000	7.700	63.00	19.00	26.00	1.00	6	●
8.015	8.000	8.000	7.700	63.00	19.00	26.00	1.50	6	●
10.005	10.000	10.000	9.500	72.00	22.00	30.00	0.50	6	●
10.010	10.000	10.000	9.500	72.00	22.00	30.00	1.00	6	●
10.015	10.000	10.000	9.500	72.00	22.00	30.00	1.50	6	●
12.005	12.000	12.000	11.500	83.00	26.00	36.00	0.50	6	●
12.010	12.000	12.000	11.500	83.00	26.00	36.00	1.00	6	●
12.015	12.000	12.000	11.500	83.00	26.00	36.00	1.50	6	●
16.010	16.000	16.000	15.500	92.00	32.00	42.00	1.00	6	●
16.020	16.000	16.000	15.500	92.00	32.00	42.00	2.00	6	●

Cutting values: Finishing*** and HPC-roughing**

ISO Code	Hardness	Feed depth* a _p	Feed width** a _e	Cutting speed v _c	fz (mm/z) with nom. Ø							
					3	6	8	10	12	16	20	25
P Steel	≤ 850 N/mm ²	-	-	-	-	-	-	-	-	-	-	-
	850 - 1400 N/mm ²	2xd	0.05xd	180	0.012	0.024	0.032	0.04	0.048	0.056	0.072	0.104
K Cast mat.	≥ 240 HB 30	2xd	0.05xd	160	0.016	0.03	0.04	0.055	0.065	0.08	0.095	0.14
H Hardened Steel	≤ 54 HRC	1.5xd	0.05xd	120	0.012	0.024	0.032	0.04	0.048	0.056	0.072	0.104
	≤ 63 HRC	1.5xd	0.02xd	90	0.01	0.015	0.025	0.035	0.042	0.05	0.08	0.09

* peripheral cooling „Guhrojet“ is recommended for optimal chip evacuation and tool life, for hard machining air cooling is recommended

** for trochoidal milling and imachining with a_e 0.1-0.2xd the cutting speed and feed rate can be increased by 50 %.

*** for finishing with a_e 0.01xd the feed rate must be reduced to achieve optimal surfaces

Hard multi-tooth end mills corner radius GH 100 H

centre cutting



Tool material
Surface finish
Discount group
Guhring no.

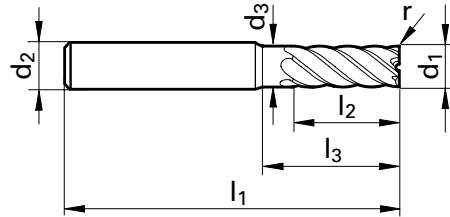


Solid carbide

Signum

106

3363



Code no.	d1 h10	d2 h6	d3	l1	l2	l3	r	Z	Availability
	mm	mm	mm	mm	mm	mm	mm		
6.000	6.000	6.000	5.700	75.00	13.00	38.00	0.50	6	●
8.000	8.000	8.000	7.700	100.00	19.00	63.00	0.50	6	●
10.000	10.000	10.000	9.500	100.00	22.00	58.00	0.50	6	●
12.000	12.000	12.000	11.500	150.00	26.00	103.00	1.00	6	●
16.000	16.000	16.000	15.500	150.00	32.00	100.00	1.00	6	●

Cutting values: Finishing*** and HPC-roughing**

ISO Code	Hardness	Feed depth* ap	Feed width** ae	Cutting speed vc	fz (mm/z) with nom. Ø								
					3	6	8	10	12	16	20	25	
P Steel	≤ 850 N/mm ²	-	-	-	-	-	-	-	-	-	-	-	-
	850 - 1400 N/mm ²	2xd	0.05xd	180	0.012	0.024	0.032	0.04	0.048	0.056	0.072	0.104	
K Cast mat.	≥ 240 HB 30	2xd	0.05xd	160	0.016	0.03	0.04	0.055	0.065	0.08	0.095	0.14	
H Hardened Steel	≤ 54 HRC	1.5xd	0.05xd	120	0.012	0.024	0.032	0.04	0.048	0.056	0.072	0.104	
	≤ 63 HRC	1.5xd	0.02xd	90	0.01	0.015	0.025	0.035	0.042	0.05	0.08	0.09	

* peripheral cooling „Guhrojet“ is recommended for optimal chip evacuation and tool life, for hard machining air cooling is recommended

** for trochoidal milling and imachining with ae 0.1-0.2xd the cutting speed and feed rate can be increased by 50 %.

*** for finishing with ae 0.01xD the feed rate must be reduced to achieve optimal surfaces

Hard multi-tooth end mills GH 100 H

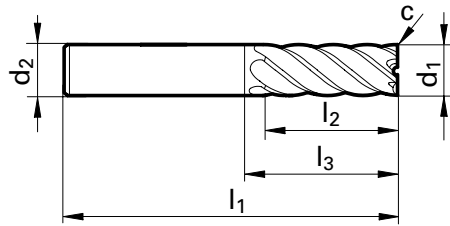
centre cutting



Tool material
Surface finish
Discount group
Guhring no.



Solid carbide
Signum
106
3715



Code no.	d1 h10	d2 h6	l1	l2	l3	c	Z	Availability
	mm	mm	mm	mm	mm	mm x 45°		
3.000	3.000	6.000	57.00	8.00	11.40	0.05	6	●
4.000	4.000	6.000	57.00	11.00	15.90	0.05	6	●
5.000	5.000	6.000	57.00	13.00	17.90	0.05	6	●
6.000	6.000	6.000	57.00	13.00	21.00	0.05	6	●
8.000	8.000	8.000	63.00	19.00	27.00	0.10	6	●
10.000	10.000	10.000	72.00	22.00	32.00	0.10	6	●
12.000	12.000	12.000	83.00	26.00	38.00	0.10	6	●
14.000	14.000	14.000	83.00	26.00	38.00	0.15	6	●
14.001	14.000	16.000	92.00	32.00	43.00	0.15	6	●
16.000	16.000	16.000	92.00	32.00	44.00	0.15	6	●
18.000	18.000	18.000	92.00	32.00	44.00	0.15	8	●
18.001	18.000	20.000	104.00	38.00	53.00	0.15	8	●
20.000	20.000	20.000	104.00	38.00	54.00	0.15	8	●

Cutting values: Finishing*** and HPC-roughing**

ISO Code	Hardness	Feed depth* ap	Feed width** ae	Cutting speed vc	fz (mm/z) with nom. Ø							
					3	6	8	10	12	16	20	25
P Steel	≤ 850 N/mm ²	-	-	-	-	-	-	-	-	-	-	-
	850 - 1400 N/mm ²	2xd	0.05xd	180	0.012	0.024	0.032	0.04	0.048	0.056	0.072	0.104
K Cast mat.	≥ 240 HB 30	2xd	0.05xd	160	0.016	0.03	0.04	0.055	0.065	0.08	0.095	0.14
H Hardened Steel	≤ 54 HRC	1.5xd	0.05xd	120	0.012	0.024	0.032	0.04	0.048	0.056	0.072	0.104
	≤ 63 HRC	1.5xd	0.02xd	90	0.01	0.015	0.025	0.035	0.042	0.05	0.08	0.09

* peripheral cooling „Guhrojet“ is recommended for optimal chip evacuation and tool life, for hard machining air cooling is recommended.

** for trochoidal milling and imachining with ae 0.1-0.2xd the cutting speed and feed rate can be increased by 50 %.

*** for finishing with ae 0.01xd the feed rate must be reduced by 25 % to achieve optimal surfaces.

Hard multi-tooth end mills GH 100 H

centre cutting



Tool material
Surface finish
Discount group
Guhring no.

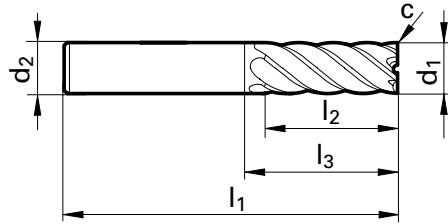


Solid carbide

Signum

106

3716



Code no.	d1 h10	d2 h6	l1	l2	l3	c	Z	Availability
	mm	mm	mm	mm	mm	mm x 45°		
6.000	6.000	6.000	75.00	30.00	39.00	0.05	6	●
8.000	8.000	8.000	100.00	40.00	64.00	0.10	6	●
10.000	10.000	10.000	100.00	40.00	60.00	0.10	6	●
12.000	12.000	12.000	150.00	45.00	105.00	0.10	6	●
16.000	16.000	16.000	150.00	65.00	102.00	0.15	6	●
20.000	20.000	20.000	150.00	65.00	100.00	0.15	8	●

Cutting values: Finishing* and HPC-roughing****

ISO Code	Hardness	Feed depth* ap	Feed width** ae	Cutting speed vc	fz (mm/z) with nom. Ø							
					3	6	8	10	12	16	20	25
P Steel	≤ 850 N/mm ²	-	-	-	-	-	-	-	-	-	-	-
	850 - 1400 N/mm ²	2xd	0.05xd	180	0.012	0.024	0.032	0.04	0.048	0.056	0.072	0.104
K Cast mat.	≥ 240 HB 30	2xd	0.05xd	160	0.016	0.03	0.04	0.055	0.065	0.08	0.095	0.14
H Hardened Steel	≤ 54 HRC	1.5xd	0.05xd	120	0.012	0.024	0.032	0.04	0.048	0.056	0.072	0.104
	≤ 63 HRC	1.5xd	0.02xd	90	0.01	0.015	0.025	0.035	0.042	0.05	0.08	0.09

* peripheral cooling „Guhrojet“ is recommended for optimal chip evacuation and tool life, for hard machining air cooling is recommended.

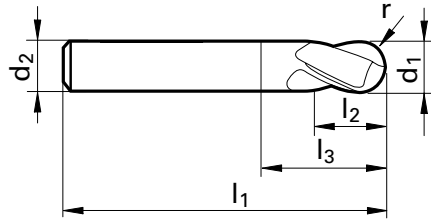
** for trochoidal milling and imachining with ae 0.1-0.2xd the cutting speed and feed rate can be increased by 50 %.

*** for finishing with ae 0.01xd the feed rate must be reduced by 25 % to achieve optimal surfaces.

Ball nose slot drills (2-fluted)

centre cutting

						48 HRC	Tool material Surface finish Discount group	Solid carbide	
								FIRE	FIRE
								117	117
								3679	3049



Code no.	d1 h10	d2 h6	l1	l2	l3	r	Z	Availability
	mm	mm	mm	mm	mm	mm		
0.500	0.500	3.000	38.00	1.00	2.10	0.25	2	●
0.800	0.800	3.000	38.00	1.00	2.10	0.40	2	●
1.000	1.000	3.000	38.00	2.00	3.90	0.50	2	●
1.500	1.500	3.000	38.00	3.00	6.40	0.75	2	●
2.000	2.000	6.000	57.00	6.00	9.40	1.00	2	●
3.000	3.000	6.000	57.00	7.00	11.90	1.50	2	● ●
4.000	4.000	6.000	57.00	8.00	13.40	2.00	2	● ●
5.000	5.000	6.000	57.00	10.00	16.90	2.50	2	● ●
6.000	6.000	6.000	57.00	10.00	21.00	3.00	2	● ●
8.000	8.000	8.000	63.00	16.00	27.00	4.00	2	● ●
10.000	10.000	10.000	72.00	19.00	32.00	5.00	2	● ●
12.000	12.000	12.000	83.00	22.00	38.00	6.00	2	● ●
14.000	14.000	14.000	83.00	22.00	38.00	7.00	2	● ●
14.001	14.000	16.000	92.00	26.00	43.00	7.00	2	● ●
16.000	16.000	16.000	92.00	26.00	44.00	8.00	2	● ●
18.000	18.000	18.000	92.00	26.00	44.00	9.00	2	● ●
18.001	18.000	20.000	104.00	32.00	53.00	9.00	2	● ●
20.000	20.000	20.000	104.00	32.00	54.00	10.00	2	● ●

Cutting values: Roughing and copy milling*

ISO Code	Hardness	Feed depth ap	Feed width** ae	Cutting speed vc	fz (mm/z) with nom. Ø							
					2	3	4	6	8	10	12	16
P Steel	≤ 850 N/mm ²	0.5xd	0.4xd	175	0.03	0.04	0.045	0.05	0.07	0.1	0.12	0.15
	850 - 1400 N/mm ²	0.5xd	0.3xd	140	0.03	0.04	0.045	0.05	0.07	0.1	0.12	0.15
M Stainless Steel	≤ 750 N/mm ²	1xd	0.1xd	126	0.03	0.04	0.045	0.05	0.07	0.1	0.12	0.15
	≥ 750 N/mm ²	1xd	0.1xd	56	0.02	0.03	0.035	0.04	0.05	0.07	0.08	0.1
N Aluminium	≤ 7% Si	1xd	0.3xd	196	0.03	0.04	0.045	0.05	0.07	0.1	0.12	0.15
S Ti sp.alloys	≤ 1300 N/mm ²	1xd	0.1xd	56	0.02	0.03	0.035	0.04	0.05	0.07	0.08	0.1
H Hard. steel	up to 54 HRC	0.05xd	0.05xd	70	0.02	0.03	0.035	0.04	0.05	0.07	0.08	0.1

* peripheral cooling „Guhrojet“ is recommended for optimal chip evacuation and tool life, for hard machining air cooling is recommended

** for HSC-finishing with ae = 0.02xd the cutting speed vc can be increased by 50 %

Ball nose slot drills (2-fluted)

centre cutting



Tool material
Surface finish
Discount group

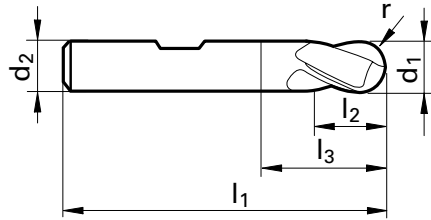
Solid carbide

bright

117

Guhring no.

3024



Code no.	d1 h10	d2 h6	l1	l2	l3	r	Z	Availability
	mm	mm	mm	mm	mm	mm		
3.000	3.000	6.000	57.00	7.00	11.90	1.50	2	●
4.000	4.000	6.000	57.00	8.00	13.40	2.00	2	●
5.000	5.000	6.000	57.00	10.00	16.90	2.50	2	●
6.000	6.000	6.000	57.00	10.00	21.00	3.00	2	●
8.000	8.000	8.000	63.00	16.00	27.00	4.00	2	●
10.000	10.000	10.000	72.00	19.00	32.00	5.00	2	●
12.000	12.000	12.000	83.00	22.00	38.00	6.00	2	●
14.000	14.000	14.000	83.00	22.00	38.00	7.00	2	●
16.000	16.000	16.000	92.00	26.00	44.00	8.00	2	●
18.000	18.000	18.000	92.00	26.00	44.00	9.00	2	●
20.000	20.000	20.000	104.00	32.00	54.00	10.00	2	●

Cutting values: Roughing and copy milling*

ISO Code	Hardness	Feed depth ap	Feed width** ae	Cutting speed vc	fz (mm/z) with nom. Ø							
					2	3	4	6	8	10	12	16
P Steel	≤ 850 N/mm ²	0.5xd	0.4xd	175	0.03	0.04	0.045	0.05	0.07	0.1	0.12	0.15
	850 - 1400 N/mm ²	0.5xd	0.3xd	140	0.03	0.04	0.045	0.05	0.07	0.1	0.12	0.15
M Stainless Steel	≤ 750 N/mm ²	1xd	0.1xd	126	0.03	0.04	0.045	0.05	0.07	0.1	0.12	0.15
	≥ 750 N/mm ²	1xd	0.1xd	56	0.02	0.03	0.035	0.04	0.05	0.07	0.08	0.1
N Aluminium	≤ 7% Si	1xd	0.3xd	196	0.03	0.04	0.045	0.05	0.07	0.1	0.12	0.15
S Ti sp.alloys	≤ 1300 N/mm ²	1xd	0.1xd	56	0.02	0.03	0.035	0.04	0.05	0.07	0.08	0.1
H Hard. steel	up to 54 HRC	0.05xd	0.05xd	70	0.02	0.03	0.035	0.04	0.05	0.07	0.08	0.1

* peripheral cooling „Guhrojet“ is recommended for optimal chip evacuation and tool life, for hard machining air cooling is recommended

** for HSC-finishing with ae = 0.02xd the cutting speed vc can be increased by 50 %

All recommendations are valid for coated tools. For bright milling cutters please vc -40% and fz -25% !

Ball nose slot drills (2-fluted)

centre cutting



Tool material
Surface finish
Discount group



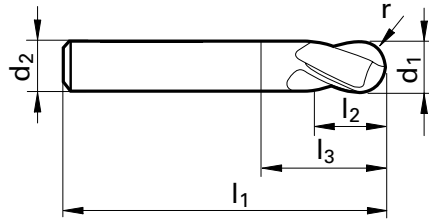
Solid carbide

bright

117

Guhring no.

3308



Code no.	d1 h10	d2 h6	l1	l2	l3	r	Z	Availability
	mm	mm	mm	mm	mm	mm		
0.500	0.500	3.000	38.00	1.00	2.10	0.25	2	●
0.800	0.800	3.000	38.00	1.00	2.10	0.40	2	●
1.000	1.000	3.000	38.00	2.00	3.90	0.50	2	●
1.500	1.500	3.000	38.00	3.00	6.40	0.75	2	●
2.000	2.000	6.000	57.00	6.00	9.40	1.00	2	●
3.000	3.000	6.000	57.00	7.00	11.90	1.50	2	●
4.000	4.000	6.000	57.00	8.00	13.40	2.00	2	●
5.000	5.000	6.000	57.00	10.00	16.90	2.50	2	●
6.000	6.000	6.000	57.00	10.00	21.00	3.00	2	●
8.000	8.000	8.000	63.00	16.00	27.00	4.00	2	●
10.000	10.000	10.000	72.00	19.00	32.00	5.00	2	●
12.000	12.000	12.000	83.00	22.00	38.00	6.00	2	●
14.000	14.000	14.000	83.00	22.00	38.00	7.00	2	●
14.001	14.000	16.000	92.00	26.00	43.00	7.00	2	●
16.000	16.000	16.000	92.00	26.00	44.00	8.00	2	●
18.000	18.000	18.000	92.00	26.00	44.00	9.00	2	●
18.001	18.000	20.000	104.00	32.00	53.00	9.00	2	●
20.000	20.000	20.000	104.00	32.00	54.00	10.00	2	●

Cutting values: Roughing and copy milling*

ISO Code	Hardness	Feed depth a_p	Feed width** a_e	Cutting speed v_c	fz (mm/z) with nom. Ø							
					2	3	4	6	8	10	12	16
P Steel	≤ 850 N/mm ²	0.5xd	0.4xd	175	0.03	0.04	0.045	0.05	0.07	0.1	0.12	0.15
	850 - 1400 N/mm ²	0.5xd	0.3xd	140	0.03	0.04	0.045	0.05	0.07	0.1	0.12	0.15
M Stainless Steel	≤ 750 N/mm ²	1xd	0.1xd	126	0.03	0.04	0.045	0.05	0.07	0.1	0.12	0.15
	≥ 750 N/mm ²	1xd	0.1xd	56	0.02	0.03	0.035	0.04	0.05	0.07	0.08	0.1
N Aluminium	≤ 7% Si	1xd	0.3xd	196	0.03	0.04	0.045	0.05	0.07	0.1	0.12	0.15
S Ti sp.alloys	≤ 1300 N/mm ²	1xd	0.1xd	56	0.02	0.03	0.035	0.04	0.05	0.07	0.08	0.1
H Hard. steel	up to 54 HRC	0.05xd	0.05xd	70	0.02	0.03	0.035	0.04	0.05	0.07	0.08	0.1

* peripheral cooling „Guhrojet“ is recommended for optimal chip evacuation and tool life, for hard machining air cooling is recommended

** for HSC-finishing with $a_e = 0.02xd$ the cutting speed v_c can be increased by 50 %

All recommendations are valid for coated tools. For bright milling cutters please v_c -40% and f_z -25% !

XL ball nose slot drills (2-fluted)

centre cutting



Tool material
Surface finish
Discount group
Guhring no.

Solid carbide

bright

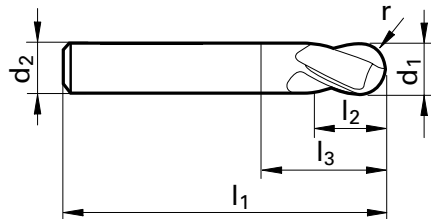
FIRE

117

117

3014

3030



Code no.	d1 h10	d2 h6	l1	l2	l3	r	Z
	mm	mm	mm	mm	mm	mm	
3.000	3.000	3.000	75.00	20.00	47.00	1.50	2
4.000	4.000	4.000	75.00	25.00	47.00	2.00	2
5.000	5.000	5.000	75.00	30.00	47.00	2.50	2
6.000	6.000	6.000	75.00	30.00	39.00	3.00	2
8.000	8.000	8.000	100.00	40.00	64.00	4.00	2
10.000	10.000	10.000	100.00	40.00	60.00	5.00	2
12.000	12.000	12.000	150.00	45.00	105.00	6.00	2

Availability	
●	●
●	●
●	●
●	●
●	●
●	●
●	●

Cutting values: Roughing and copy milling*

ISO Code	Hardness	Feed depth a_p	Feed width** a_e	Cutting speed v_c	fz (mm/z) with nom. Ø							
					2	3	4	6	8	10	12	16
P Steel	≤ 850 N/mm ²	0.5xd	0.4xd	175	0.03	0.04	0.045	0.05	0.07	0.1	0.12	0.15
	850 - 1400 N/mm ²	0.5xd	0.3xd	140	0.03	0.04	0.045	0.05	0.07	0.1	0.12	0.15
M Stainless Steel	≤ 750 N/mm ²	1xd	0.1xd	126	0.03	0.04	0.045	0.05	0.07	0.1	0.12	0.15
	≥ 750 N/mm ²	1xd	0.1xd	56	0.02	0.03	0.035	0.04	0.05	0.07	0.08	0.1
N Aluminium	≤ 7% Si	1xd	0.3xd	196	0.03	0.04	0.045	0.05	0.07	0.1	0.12	0.15
S Ti sp.alloys	≤ 1300 N/mm ²	1xd	0.1xd	56	0.02	0.03	0.035	0.04	0.05	0.07	0.08	0.1
H Hard. steel	up to 54 HRC	0.05xd	0.05xd	70	0.02	0.03	0.035	0.04	0.05	0.07	0.08	0.1

* peripheral cooling „Guhrojet“ is recommended for optimal chip evacuation and tool life, for hard machining air cooling is recommended

** for HSC-finishing with $a_e = 0.02xd$ the cutting speed v_c can be increased by 50 %

All recommendations are valid for coated tools. For bright milling cutters please v_c -40% and f_z -25% !

Ball nose end mills (4-fluted)

centre cutting



Tool material
Surface finish
Discount group
Guhring no.



Solid carbide

bright

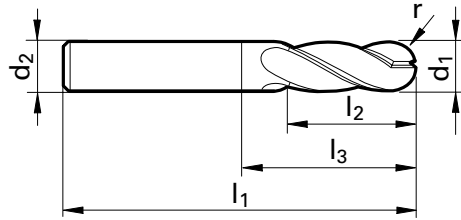
FIRE

117

117

3306

3727



Code no.	d1 h10	d2 h6	l1	l2	l3	r	Z
	mm	mm	mm	mm	mm	mm	
4.000	4.000	4.000	50.00	11.00	22.00	2.00	4
5.000	5.000	5.000	50.00	13.00	22.00	2.50	4
6.000	6.000	6.000	57.00	13.00	21.00	3.00	4
8.000	8.000	8.000	63.00	19.00	27.00	4.00	4
10.000	10.000	10.000	72.00	22.00	32.00	5.00	4
12.000	12.000	12.000	83.00	26.00	38.00	6.00	4
14.000	14.000	14.000	83.00	26.00	38.00	7.00	4
14.001	14.000	16.000	92.00	32.00	36.00	7.00	4
16.000	16.000	16.000	92.00	32.00	44.00	8.00	4
18.000	18.000	18.000	92.00	32.00	44.00	9.00	4
18.001	18.000	20.000	104.00	38.00	54.00	9.00	4
20.000	20.000	20.000	104.00	38.00	54.00	10.00	4

Availability	
●	●
●	●
●	●
●	●
●	●
●	●
●	●
●	●
●	●
●	●
●	●
●	●
●	●
●	●
●	●
●	●
●	●

Cutting values: Roughing and copy milling*

ISO Code	Hardness	Feed depth a _p	Feed width** a _e	Cutting speed v _c	fz (mm/z) with nom. Ø							
					2	3	4	6	8	10	12	16
P Steel	≤ 850 N/mm ²	0.5xd	0.4xd	175	0.03	0.04	0.045	0.05	0.07	0.1	0.12	0.15
	850 - 1400 N/mm ²	0.5xd	0.3xd	140	0.03	0.04	0.045	0.05	0.07	0.1	0.12	0.15
M Stainless Steel	≤ 750 N/mm ²	1xd	0.1xd	126	0.03	0.04	0.045	0.05	0.07	0.1	0.12	0.15
	≥ 750 N/mm ²	1xd	0.1xd	56	0.02	0.03	0.035	0.04	0.05	0.07	0.08	0.1
N Aluminium	≤ 7% Si	1xd	0.3xd	196	0.03	0.04	0.045	0.05	0.07	0.1	0.12	0.15
S Ti sp.alloys	≤ 1300 N/mm ²	1xd	0.1xd	56	0.02	0.03	0.035	0.04	0.05	0.07	0.08	0.1
H Hard. steel	up to 54 HRC	0.05xd	0.05xd	70	0.02	0.03	0.035	0.04	0.05	0.07	0.08	0.1

* peripheral cooling „Guhrojet“ is recommended for optimal chip evacuation and tool life, for hard machining air cooling is recommended

** for HSC-finishing with a_e = 0.02xd the cutting speed v_c can be increased by 50 %

All recommendations are valid for coated tools. For bright milling cutters please v_c -40% and f_z -25% !

Ball nose end mills (4-fluted)

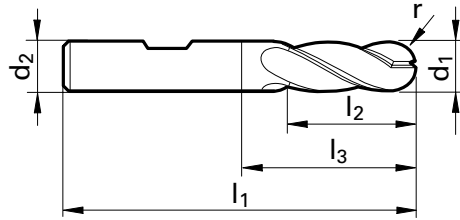
centre cutting



Tool material
Surface finish
Discount group
Guhring no.

Solid carbide

bright	FIRE
117	117
3026	3050



Code no.	d1 h10	d2 h6	l1	l2	l3	r	Z
	mm	mm	mm	mm	mm	mm	
3.000	3.000	6.000	57.00	8.00	12.90	1.50	4
4.000	4.000	6.000	57.00	11.00	16.90	2.00	4
5.000	5.000	6.000	57.00	13.00	19.90	2.50	4
6.000	6.000	6.000	57.00	13.00	21.00	3.00	4
8.000	8.000	8.000	63.00	19.00	27.00	4.00	4
10.000	10.000	10.000	72.00	22.00	32.00	5.00	4
12.000	12.000	12.000	83.00	26.00	38.00	6.00	4
14.000	14.000	14.000	83.00	26.00	38.00	7.00	4
16.000	16.000	16.000	92.00	32.00	44.00	8.00	4
18.000	18.000	18.000	92.00	32.00	44.00	9.00	4
20.000	20.000	20.000	104.00	38.00	54.00	10.00	4

Availability	
●	●
●	●
●	●
●	●
●	●
●	●
●	●
●	●
●	●
●	●
●	●
●	●
●	●
●	●
●	●
●	●
●	●
●	●
●	●
●	●
●	●

Cutting values: Roughing and copy milling*

ISO Code	Hardness	Feed depth ap	Feed width** ae	Cutting speed vc	fz (mm/z) with nom. Ø							
					2	3	4	6	8	10	12	16
P Steel	≤ 850 N/mm²	0.5xd	0.4xd	175	0.03	0.04	0.045	0.05	0.07	0.1	0.12	0.15
	850 - 1400 N/mm²	0.5xd	0.3xd	140	0.03	0.04	0.045	0.05	0.07	0.1	0.12	0.15
M Stainless Steel	≤ 750 N/mm²	1xd	0.1xd	126	0.03	0.04	0.045	0.05	0.07	0.1	0.12	0.15
	≥ 750 N/mm²	1xd	0.1xd	56	0.02	0.03	0.035	0.04	0.05	0.07	0.08	0.1
N Aluminium	≤ 7% Si	1xd	0.3xd	196	0.03	0.04	0.045	0.05	0.07	0.1	0.12	0.15
S Ti sp. alloys	≤ 1300 N/mm²	1xd	0.1xd	56	0.02	0.03	0.035	0.04	0.05	0.07	0.08	0.1
H Hard. steel	up to 54 HRC	0.05xd	0.05xd	70	0.02	0.03	0.035	0.04	0.05	0.07	0.08	0.1

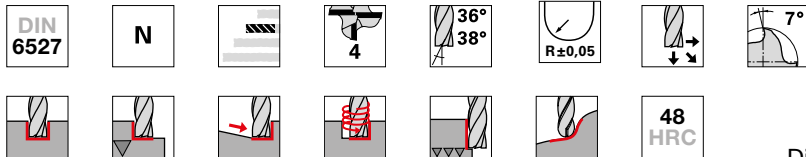
* peripheral cooling „Guhrojet“ is recommended for optimal chip evacuation and tool life, for hard machining air cooling is recommended

** for HSC-finishing with ae = 0.02xd the cutting speed vc can be increased by 50 %

All recommendations are valid for coated tools. For bright milling cutters please vc -40% and fz -25% !

Ratio end mills RF 100 VA

centre cutting

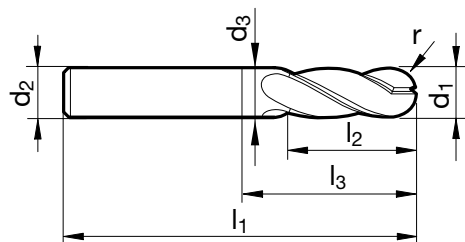


Tool material
Surface finish
Discount group
Guhring no.



Solid carbide

TiAlN-nanoA	TiAlN-nanoA
106	106
6707	6708



Code no.	d1 h10	d2 h6	d3	l1	l2	l3	r	Z
	mm	mm	mm	mm	mm	mm	mm	
4.000	4.000	6.000	3.800	57.00	11.00	18.00	2.00	4
5.000	5.000	6.000	4.800	57.00	13.00	18.00	2.50	4
6.000	6.000	6.000	5.700	57.00	13.00	20.00	3.00	4
8.000	8.000	8.000	7.700	63.00	19.00	26.00	4.00	4
10.000	10.000	10.000	9.500	72.00	22.00	30.00	5.00	4
12.000	12.000	12.000	11.500	83.00	26.00	36.00	6.00	4
16.000	16.000	16.000	15.500	92.00	32.00	42.00	8.00	4
20.000	20.000	20.000	19.500	104.00	38.00	52.00	10.00	4
25.000	25.000	25.000	24.000	121.00	45.00	63.00	12.50	4

Availability	
●	●
●	●
●	●
●	●
●	●
●	●
●	●
●	●
●	●
●	●
●	●

Cutting values: HPC-roughing*

ISO Code	Hardness	Feed depth a _p	Feed width** a _e	Cutting speed v _c	fz (mm/z) with nom. Ø							
					3	6	8	10	12	16	20	25
P Steel	≤ 850 N/mm ²	1xd	0.3xd	200	0.02	0.04	0.055	0.07	0.085	0.1	0.12	0.17
M Stainless Steel	≤ 750 N/mm ²	1xd	0.3xd	140	0.018	0.035	0.045	0.06	0.07	0.09	0.1	0.15
	≥ 750 N/mm ²	1xd	0.3xd	120	0.016	0.03	0.04	0.055	0.065	0.08	0.095	0.014
N Aluminium	≤ 7% Si	1xd	0.3xd	600	0.018	0.035	0.045	0.06	0.07	0.09	0.1	0.15
S Ti sp.alloys	≤ 1300 N/mm ²	1xd	0.2xd	130	0.02	0.03	0.04	0.06	0.07	0.08	0.09	0.12

* peripheral cooling „Guhrojet“ is recommended for optimal chip evacuation and tool life

** for trochoidal milling and imachining with a_e 0.1-0.2xd the cutting speed and feed rate can be increased by 50 %

XL ball nose end mills (4-fluted)

centre cutting



Tool material
Surface finish
Discount group
Guhring no.

Solid carbide

bright

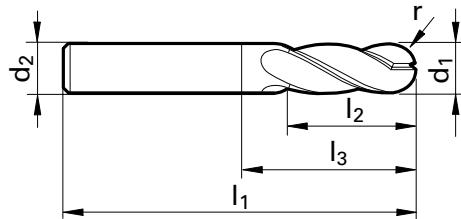
FIRE

117

117

3015

3043



Code no.	d1 h10	d2 h6	l1	l2	l3	r	Z
	mm	mm	mm	mm	mm	mm	
3.000	3.000	3.000	75.00	20.00	47.00	1.50	4
4.000	4.000	4.000	75.00	25.00	47.00	2.00	4
5.000	5.000	5.000	75.00	30.00	47.00	2.50	4
6.000	6.000	6.000	75.00	30.00	39.00	3.00	4
8.000	8.000	8.000	100.00	40.00	64.00	4.00	4
10.000	10.000	10.000	100.00	40.00	60.00	5.00	4
12.000	12.000	12.000	150.00	45.00	105.00	6.00	4

Availability	
●	●
●	●
●	●
●	●
●	●
●	●
●	●

Cutting values: Roughing and copy milling*

ISO Code	Hardness	Feed depth a_p	Feed width** a_e	Cutting speed v_c	fz (mm/z) with nom. Ø							
					2	3	4	6	8	10	12	16
P Steel	≤ 850 N/mm ²	0.5xd	0.4xd	175	0.03	0.04	0.045	0.05	0.07	0.1	0.12	0.15
	850 - 1400 N/mm ²	0.5xd	0.3xd	140	0.03	0.04	0.045	0.05	0.07	0.1	0.12	0.15
M Stainless Steel	≤ 750 N/mm ²	1xd	0.1xd	126	0.03	0.04	0.045	0.05	0.07	0.1	0.12	0.15
	≥ 750 N/mm ²	1xd	0.1xd	56	0.02	0.03	0.035	0.04	0.05	0.07	0.08	0.1
N Aluminium	≤ 7% Si	1xd	0.3xd	196	0.03	0.04	0.045	0.05	0.07	0.1	0.12	0.15
S Ti sp.alloys	≤ 1300 N/mm ²	1xd	0.1xd	56	0.02	0.03	0.035	0.04	0.05	0.07	0.08	0.1
H Hard. steel	up to 54 HRC	0.05xd	0.05xd	70	0.02	0.03	0.035	0.04	0.05	0.07	0.08	0.1

* peripheral cooling „Guhrojet“ is recommended for optimal chip evacuation and tool life, for hard machining air cooling is recommended

** for HSC-finishing with $a_e = 0.02xd$ the cutting speed v_c can be increased by 50 %

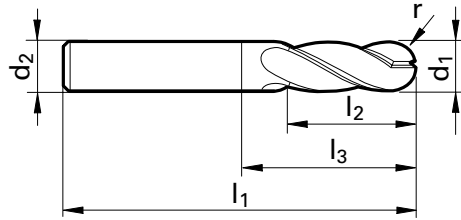
All recommendations are valid for coated tools. For bright milling cutters please v_c -40% and f_z -25% !

HSC-ball nose profile cutters GF 500 B

centre cutting

54 HRC Tool material
 Surface finish
 Discount group
Guhring no.

HA
Solid carbide
Signum
106
3854



Code no.	d1 h8	d2 h6	l1	l2	l3	r	Z	Availability
	mm	mm	mm	mm	mm	mm		
6.000	6.000	6.000	57.00	12.00	21.00	3.00	2	●
8.000	8.000	8.000	63.00	16.00	27.00	4.00	2	●
10.000	10.000	10.000	72.00	20.00	32.00	5.00	2	●
12.000	12.000	12.000	83.00	24.00	38.00	6.00	2	●

Cutting values: HSC copy milling*

ISO Code	Hardness	Feed depth a_p	Feed width** a_e	Cutting speed v_c	fz (mm/z) with nom. Ø							
					2	3	4	6	8	10	12	16
P Steel	≤ 850 N/mm ²	0.1xd	0.1xd	200	0.03	0.04	0.045	0.05	0.07	0.1	0.12	0.15
	850 - 1400 N/mm ²	0.1xd	0.1xd	180	0.03	0.04	0.045	0.05	0.07	0.1	0.12	0.15
M Stainless Steel	≤ 750 N/mm ²	0.1xd	0.1xd	140	0.03	0.04	0.045	0.05	0.07	0.1	0.12	0.15
	≥ 750 N/mm ²	0.05xd	0.1xd	100	0.02	0.03	0.035	0.04	0.05	0.07	0.08	0.1
N Aluminium	≤ 7% Si	0.15xd	0.1xd	280	0.03	0.04	0.045	0.05	0.07	0.1	0.12	0.15
S Ti sp.alloys	≤ 1300 N/mm ²	0.05xd	0.1xd	90	0.02	0.03	0.035	0.04	0.05	0.07	0.08	0.1
H Hard. steel	up to 54 HRC	0.05xd	0.05xd	140	0.02	0.03	0.035	0.04	0.05	0.07	0.08	0.1

* peripheral cooling „Guhrojet“ is recommended for optimal chip evacuation and tool life, for hard machining air cooling is recommended

** for HSC-finishing with $a_e = 0.02xd$ the cutting speed v_c can be increased by 50 %

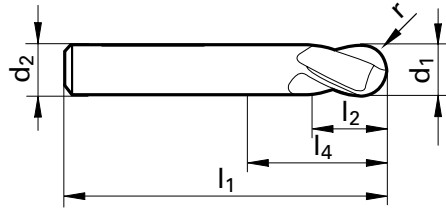
HSC-ball nose profile cutters GF 500 B

centre cutting



Tool material
Surface finish
Discount group
Guhring no.

Solid carbide
Signum
106
3866



Code no.	d1 h8	d2 h6	l1	l2	l3	r	Z	Availability
	mm	mm	mm	mm	mm	mm		
4.000	4.000	4.000	80.00	8.00	52.00	2.00	2	●
6.000	6.000	6.000	100.00	12.00	64.00	3.00	2	●
8.000	8.000	8.000	100.00	16.00	64.00	4.00	2	●
10.000	10.000	10.000	100.00	20.00	60.00	5.00	2	●
12.000	12.000	12.000	120.00	24.00	75.00	6.00	2	●

Cutting values: HSC copy milling*

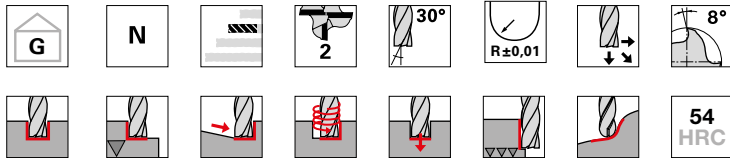
ISO Code	Hardness	Feed depth a_p	Feed width** a_e	Cutting speed v_c	fz (mm/z) with nom. Ø							
					2	3	4	6	8	10	12	16
P Steel	≤ 850 N/mm ²	0.1xd	0.1xd	200	0.03	0.04	0.045	0.05	0.07	0.1	0.12	0.15
	850 - 1400 N/mm ²	0.1xd	0.1xd	180	0.03	0.04	0.045	0.05	0.07	0.1	0.12	0.15
M Stainless Steel	≤ 750 N/mm ²	0.1xd	0.1xd	140	0.03	0.04	0.045	0.05	0.07	0.1	0.12	0.15
	≥ 750 N/mm ²	0.05xd	0.1xd	100	0.02	0.03	0.035	0.04	0.05	0.07	0.08	0.1
N Aluminium	≤ 7% Si	0.15xd	0.1xd	280	0.03	0.04	0.045	0.05	0.07	0.1	0.12	0.15
S Ti sp.alloys	≤ 1300 N/mm ²	0.05xd	0.1xd	90	0.02	0.03	0.035	0.04	0.05	0.07	0.08	0.1
H Hard. steel	up to 54 HRC	0.05xd	0.05xd	140	0.02	0.03	0.035	0.04	0.05	0.07	0.08	0.1

* peripheral cooling „Guhrojet“ is recommended for optimal chip evacuation and tool life, for hard machining air cooling is recommended

** for HSC-finishing with $a_e = 0.02xd$ the cutting speed v_c can be increased by 50 %

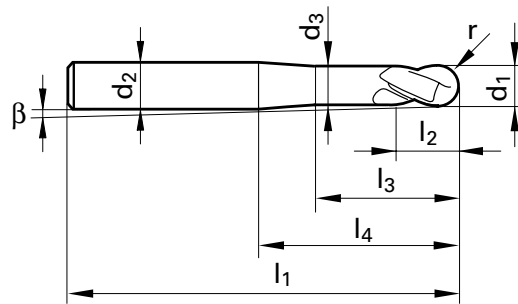
HSC-ball nose profile cutters GF 500 B

centre cutting



Tool material
Surface finish
Discount group
Guhring no.

Solid carbide
Signum
106
3848



Code no.	d1 h8	d2 h6	d3	l1	l2	l3	l4	r	β	Z	Availability
	mm	mm	mm	mm	mm	mm	mm	mm	°		
2.000	2.000	6.000	1.800	57.00	3.00	6.20	20.00	1.00	6.10	2	●
3.000	3.000	6.000	2.800	57.00	3.50	8.40	20.00	1.50	4.70	2	●
4.000	4.000	6.000	3.800	57.00	4.00	9.40	20.00	2.00	3.20	2	●
6.000	6.000	6.000	5.600	57.00	6.00	19.00	20.00	3.00	-	2	●
8.000	8.000	8.000	7.600	63.00	7.00	25.00	26.00	4.00	-	2	●
10.000	10.000	10.000	9.600	72.00	8.00	28.00	30.00	5.00	-	2	●
12.000	12.000	12.000	11.500	83.00	10.00	33.00	35.00	6.00	-	2	●

Cutting values: HSC copy milling*

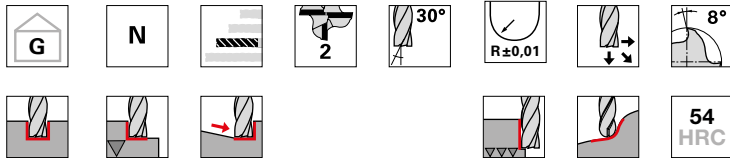
ISO Code	Hardness	Feed depth a _p	Feed width** a _e	Cutting speed v _c	fz (mm/z) with nom. Ø							
					2	3	4	6	8	10	12	16
P Steel	≤ 850 N/mm ²	0.1xd	0.1xd	200	0.03	0.04	0.045	0.05	0.07	0.1	0.12	0.15
	850 - 1400 N/mm ²	0.1xd	0.1xd	180	0.03	0.04	0.045	0.05	0.07	0.1	0.12	0.15
M Stainless Steel	≤ 750 N/mm ²	0.1xd	0.1xd	140	0.03	0.04	0.045	0.05	0.07	0.1	0.12	0.15
	≥ 750 N/mm ²	0.05xd	0.1xd	100	0.02	0.03	0.035	0.04	0.05	0.07	0.08	0.1
N Aluminium	≤ 7% Si	0.15xd	0.1xd	280	0.03	0.04	0.045	0.05	0.07	0.1	0.12	0.15
S Ti sp. alloys	≤ 1300 N/mm ²	0.05xd	0.1xd	90	0.02	0.03	0.035	0.04	0.05	0.07	0.08	0.1
H Hard. steel	up to 54 HRC	0.05xd	0.05xd	140	0.02	0.03	0.035	0.04	0.05	0.07	0.08	0.1

* peripheral cooling „Guhrojet“ is recommended for optimal chip evacuation and tool life, for hard machining air cooling is recommended

** for HSC-finishing with a_e = 0.02xd the cutting speed v_c can be increased by 50 %

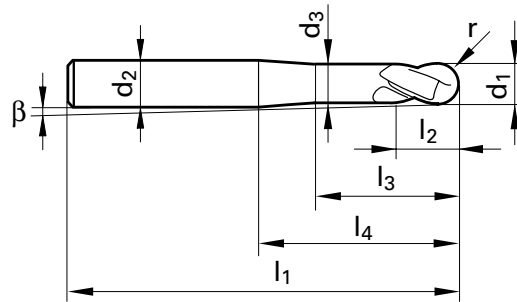
HSC-ball nose profile cutters GF 500 B

centre cutting



Tool material
Surface finish
Discount group
Guhring no.

Solid carbide
Signum
106
3855



Code no.	d1 h8	d2 h6	d3	l1	l2	l3	l4	r	β	Z	Availability
	mm	mm	mm	mm	mm	mm	mm	mm	°		
6.000	6.000	6.000	5.600	80.00	6.00	39.00	40.00	3.00	-	2	●
8.000	8.000	8.000	7.600	100.00	7.00	59.00	60.00	4.00	-	2	●
10.000	10.000	10.000	9.600	120.00	8.00	73.00	75.00	5.00	-	2	●
12.000	12.000	12.000	11.500	120.00	10.00	68.00	70.00	6.00	-	2	●

Cutting values: HSC copy milling*

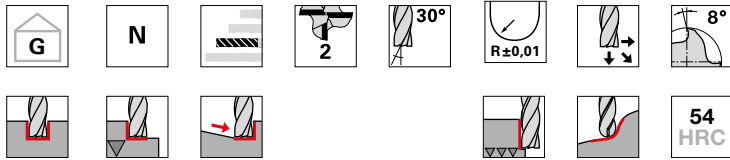
ISO Code	Hardness	Feed depth a_p	Feed width** a_e	Cutting speed v_c	fz (mm/z) with nom. Ø							
					2	3	4	6	8	10	12	16
P Steel	≤ 850 N/mm ²	0.1xd	0.1xd	200	0.03	0.04	0.045	0.05	0.07	0.1	0.12	0.15
	850 - 1400 N/mm ²	0.1xd	0.1xd	180	0.03	0.04	0.045	0.05	0.07	0.1	0.12	0.15
M Stainless Steel	≤ 750 N/mm ²	0.1xd	0.1xd	140	0.03	0.04	0.045	0.05	0.07	0.1	0.12	0.15
	≥ 750 N/mm ²	0.05xd	0.1xd	100	0.02	0.03	0.035	0.04	0.05	0.07	0.08	0.1
N Aluminium	≤ 7% Si	0.15xd	0.1xd	280	0.03	0.04	0.045	0.05	0.07	0.1	0.12	0.15
S Ti sp.alloys	≤ 1300 N/mm ²	0.05xd	0.1xd	90	0.02	0.03	0.035	0.04	0.05	0.07	0.08	0.1
H Hard. steel	up to 54 HRC	0.05xd	0.05xd	140	0.02	0.03	0.035	0.04	0.05	0.07	0.08	0.1

* peripheral cooling „Guhrojet“ is recommended for optimal chip evacuation and tool life, for hard machining air cooling is recommended

** for HSC-finishing with $a_e = 0.02xd$ the cutting speed v_c can be increased by 50 %

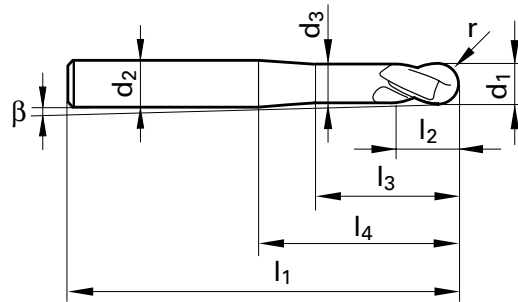
HSC-ball nose profile cutters GF 500 B

centre cutting



Tool material
Surface finish
Discount group
Guhring no.

Solid carbide
Signum
106
3849



Code no.	d1 h8	d2 h6	d3	l1	l2	l3	l4	r	β	Z	Availability
	mm	mm	mm	mm	mm	mm	mm	mm	°		
2.000	2.000	6.000	1.800	80.00	3.00	8.00	40.00	1.00	3.00	2	●
3.000	3.000	6.000	2.800	80.00	3.50	12.00	40.00	1.50	2.30	2	●
4.000	4.000	6.000	3.800	80.00	4.00	20.00	40.00	2.00	1.60	2	●
5.000	5.000	6.000	4.700	80.00	5.00	25.00	40.00	2.50	0.80	2	●
6.000	6.000	8.000	5.600	100.00	6.00	25.00	60.00	3.00	1.10	2	●
8.000	8.000	10.000	7.600	120.00	7.00	30.00	75.00	4.00	0.90	2	●
10.000	10.000	12.000	9.600	120.00	8.00	30.00	70.00	5.00	0.90	2	●
12.000	12.000	16.000	11.500	150.00	10.00	35.00	100.00	6.00	1.30	2	●

Cutting values: HSC copy milling*

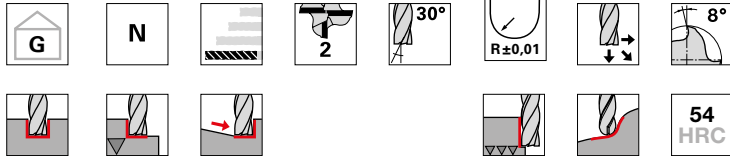
ISO Code	Hardness	Feed depth a _p	Feed width** a _e	Cutting speed v _c	fz (mm/z) with nom. Ø							
					2	3	4	6	8	10	12	16
P Steel	≤ 850 N/mm ²	0.1xd	0.1xd	200	0.03	0.04	0.045	0.05	0.07	0.1	0.12	0.15
	850 - 1400 N/mm ²	0.1xd	0.1xd	180	0.03	0.04	0.045	0.05	0.07	0.1	0.12	0.15
M Stainless Steel	≤ 750 N/mm ²	0.1xd	0.1xd	140	0.03	0.04	0.045	0.05	0.07	0.1	0.12	0.15
	≥ 750 N/mm ²	0.05xd	0.1xd	100	0.02	0.03	0.035	0.04	0.05	0.07	0.08	0.1
N Aluminium	≤ 7% Si	0.15xd	0.1xd	280	0.03	0.04	0.045	0.05	0.07	0.1	0.12	0.15
S Ti sp. alloys	≤ 1300 N/mm ²	0.05xd	0.1xd	90	0.02	0.03	0.035	0.04	0.05	0.07	0.08	0.1
H Hard. steel	up to 54 HRC	0.05xd	0.05xd	140	0.02	0.03	0.035	0.04	0.05	0.07	0.08	0.1

* peripheral cooling „Guhrojet“ is recommended for optimal chip evacuation and tool life, for hard machining air cooling is recommended

** for HSC-finishing with a_e = 0.02xd the cutting speed v_c can be increased by 50 %

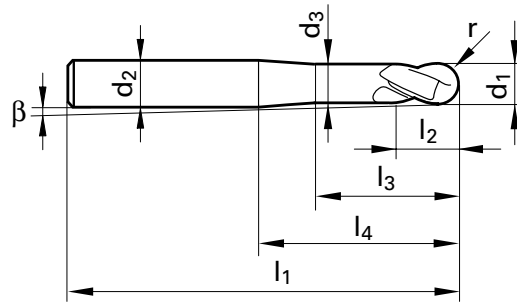
HSC-ball nose profile cutters GF 500 B

centre cutting



Tool material
Surface finish
Discount group
Guhring no.

Solid carbide
Signum
106
3853



Code no.	d1 h8	d2 h6	d3	l1	l2	l3	l4	r	β	Z	Availability
	mm	mm	mm	mm	mm	mm	mm	mm	°		
2.000	2.000	6.000	1.800	80.00	3.00	8.00	40.00	1.00	3.00	2	●
3.000	3.000	6.000	2.800	80.00	3.50	12.00	40.00	1.50	2.30	2	●
4.000	4.000	6.000	3.800	100.00	4.00	20.00	60.00	2.00	1.00	2	●
6.000	6.000	8.000	5.600	120.00	6.00	25.00	80.00	3.00	0.80	2	●
8.000	8.000	10.000	7.600	150.00	7.00	20.00	105.00	4.00	0.60	2	●

Cutting values: HSC copy milling*

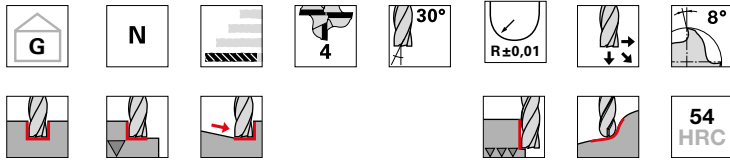
ISO Code	Hardness	Feed depth a _p	Feed width** a _e	Cutting speed v _c	fz (mm/z) with nom. Ø							
					2	3	4	6	8	10	12	16
P Steel	≤ 850 N/mm ²	0.1xd	0.1xd	200	0.03	0.04	0.045	0.05	0.07	0.1	0.12	0.15
	850 - 1400 N/mm ²	0.1xd	0.1xd	180	0.03	0.04	0.045	0.05	0.07	0.1	0.12	0.15
M Stainless Steel	≤ 750 N/mm ²	0.1xd	0.1xd	140	0.03	0.04	0.045	0.05	0.07	0.1	0.12	0.15
	≥ 750 N/mm ²	0.05xd	0.1xd	100	0.02	0.03	0.035	0.04	0.05	0.07	0.08	0.1
N Aluminium	≤ 7% Si	0.15xd	0.1xd	280	0.03	0.04	0.045	0.05	0.07	0.1	0.12	0.15
S Ti sp.alloys	≤ 1300 N/mm ²	0.05xd	0.1xd	90	0.02	0.03	0.035	0.04	0.05	0.07	0.08	0.1
H Hard. steel	up to 54 HRC	0.05xd	0.05xd	140	0.02	0.03	0.035	0.04	0.05	0.07	0.08	0.1

* peripheral cooling „Guhrojet“ is recommended for optimal chip evacuation and tool life, for hard machining air cooling is recommended

** for HSC-finishing with a_e = 0.02xd the cutting speed v_c can be increased by 50 %

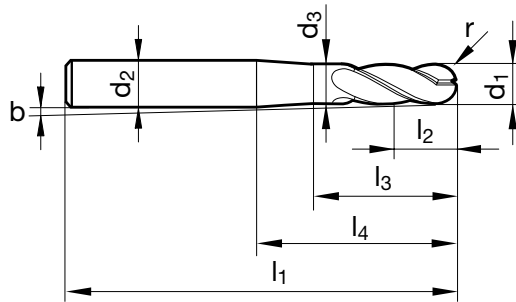
HSC-ball nose profile cutters GF 500 B

centre cutting



Tool material
Surface finish
Discount group
Guhring no.

Solid carbide
Signum
106
4248



Code no.	d1 h8	d2 h6	d3	l1	l2	l3	l4	r	β	Z	Availability
	mm	mm	mm	mm	mm	mm	mm	mm	°		
2.000	2.000	6.000	1.900	57.00	3.00	10.00	21.00	1.00	5.80	4	●
3.000	3.000	6.000	2.800	57.00	3.50	14.00	21.00	1.50	4.40	4	●
4.000	4.000	6.000	3.800	57.00	4.00	16.00	21.00	2.00	3.10	4	●
5.000	5.000	6.000	4.800	57.00	5.00	18.00	21.00	2.50	1.60	4	●
6.000	6.000	6.000	5.700	57.00	6.00	20.00	21.00	3.00	-	4	●
8.000	8.000	8.000	7.700	63.00	7.00	26.00	27.00	4.00	-	4	●
10.000	10.000	10.000	9.500	72.00	8.00	30.00	32.00	5.00	-	4	●
12.000	12.000	12.000	11.500	83.00	10.00	36.00	38.00	6.00	-	4	●

Cutting values: HSC copy milling*

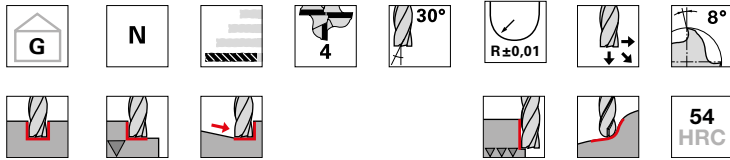
ISO Code	Hardness	Feed depth a _p	Feed width** a _e	Cutting speed v _c	fz (mm/z) with nom. Ø							
					2	3	4	6	8	10	12	16
P Steel	≤ 850 N/mm ²	0.1xd	0.1xd	200	0.03	0.04	0.045	0.05	0.07	0.1	0.12	0.15
	850 - 1400 N/mm ²	0.1xd	0.1xd	180	0.03	0.04	0.045	0.05	0.07	0.1	0.12	0.15
M Stainless Steel	≤ 750 N/mm ²	0.1xd	0.1xd	140	0.03	0.04	0.045	0.05	0.07	0.1	0.12	0.15
	≥ 750 N/mm ²	0.05xd	0.1xd	100	0.02	0.03	0.035	0.04	0.05	0.07	0.08	0.1
N Aluminium	≤ 7% Si	0.15xd	0.1xd	280	0.03	0.04	0.045	0.05	0.07	0.1	0.12	0.15
S Ti sp. alloys	≤ 1300 N/mm ²	0.05xd	0.1xd	90	0.02	0.03	0.035	0.04	0.05	0.07	0.08	0.1
H Hard. steel	up to 54 HRC	0.05xd	0.05xd	140	0.02	0.03	0.035	0.04	0.05	0.07	0.08	0.1

* peripheral cooling „Guhrojet“ is recommended for optimal chip evacuation and tool life, for hard machining air cooling is recommended

** for HSC-finishing with a_e = 0.02xd the cutting speed v_c can be increased by 50 %

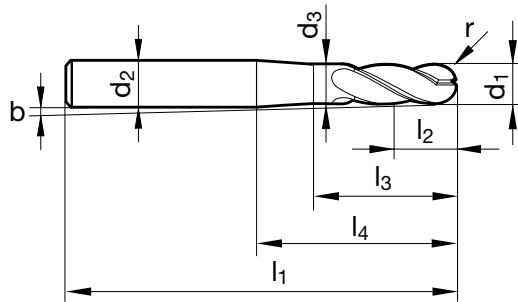
HSC-ball nose profile cutters GF 500 B

centre cutting



Tool material
Surface finish
Discount group
Guhring no.

Solid carbide
Signum
106
4249



Code no.	d1 h8	d2 h6	d3	l1	l2	l3	l4	r	β	Z	Availability
	mm	mm	mm	mm	mm	mm	mm	mm	°		
2.000	2.000	6.000	1.900	80.00	3.00	10.00	40.00	1.00	3.00	4	●
3.000	3.000	6.000	2.800	80.00	3.50	14.00	40.00	1.50	2.30	4	●
4.000	4.000	6.000	3.800	80.00	4.00	16.00	40.00	2.00	1.60	4	●
5.000	5.000	6.000	4.800	100.00	5.00	18.00	50.00	2.50	0.70	4	●
6.000	6.000	6.000	5.700	100.00	6.00	49.00	50.00	3.00	-	4	●
8.000	8.000	8.000	7.700	100.00	7.00	49.00	50.00	4.00	-	4	●
10.000	10.000	10.000	9.500	100.00	8.00	48.00	50.00	5.00	-	4	●
12.000	12.000	12.000	11.500	120.00	10.00	68.00	70.00	6.00	-	4	●

Cutting values: HSC copy milling*

ISO Code	Hardness	Feed depth a _p	Feed width** a _e	Cutting speed v _c	fz (mm/z) with nom. Ø							
					2	3	4	6	8	10	12	16
P Steel	≤ 850 N/mm ²	0.1xd	0.1xd	200	0.03	0.04	0.045	0.05	0.07	0.1	0.12	0.15
	850 - 1400 N/mm ²	0.1xd	0.1xd	180	0.03	0.04	0.045	0.05	0.07	0.1	0.12	0.15
M Stainless Steel	≤ 750 N/mm ²	0.1xd	0.1xd	140	0.03	0.04	0.045	0.05	0.07	0.1	0.12	0.15
	≥ 750 N/mm ²	0.05xd	0.1xd	100	0.02	0.03	0.035	0.04	0.05	0.07	0.08	0.1
N Aluminium	≤ 7% Si	0.15xd	0.1xd	280	0.03	0.04	0.045	0.05	0.07	0.1	0.12	0.15
S Ti sp. alloys	≤ 1300 N/mm ²	0.05xd	0.1xd	90	0.02	0.03	0.035	0.04	0.05	0.07	0.08	0.1
H Hard. steel	up to 54 HRC	0.05xd	0.05xd	140	0.02	0.03	0.035	0.04	0.05	0.07	0.08	0.1

* peripheral cooling „Guhrojet“ is recommended for optimal chip evacuation and tool life, for hard machining air cooling is recommended

** for HSC-finishing with a_e = 0.02xd the cutting speed v_c can be increased by 50 %

Ball nose profile cutters GF 200 B

centre cutting



Tool material
Surface finish
Discount group
Guhring no.

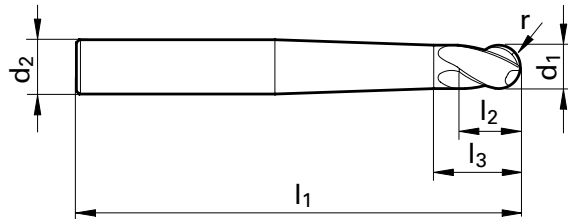


Solid carbide

FIRE

106

3045



Code no.	d1 h10	d2 h6	l1	l2	l3	r	Z	Availability
	mm	mm	mm	mm	mm	mm		
3.000	3.000	6.000	75.00	4.00	6.50	1.50	2	●
4.000	4.000	6.000	75.00	5.00	7.50	2.00	2	●
5.000	5.000	6.000	75.00	6.00	8.50	2.50	2	●
6.000	6.000	8.000	75.00	8.00	10.50	3.00	2	●
8.000	8.000	10.000	100.00	12.00	14.50	4.00	2	●
10.000	10.000	12.000	100.00	15.00	17.50	5.00	2	●

Cutting values: HSC copy milling*

ISO Code	Hardness	Feed depth a _p	Feed width** a _e	Cutting speed v _c	fz (mm/z) with nom. Ø							
					2	3	4	6	8	10	12	16
P Steel	≤ 850 N/mm ²	0.1xd	0.1xd	200	0.03	0.04	0.045	0.05	0.07	0.1	0.12	0.15
	850 - 1400 N/mm ²	0.1xd	0.1xd	180	0.03	0.04	0.045	0.05	0.07	0.1	0.12	0.15
M Stainless Steel	≤ 750 N/mm ²	0.1xd	0.1xd	140	0.03	0.04	0.045	0.05	0.07	0.1	0.12	0.15
	≥ 750 N/mm ²	0.05xd	0.1xd	100	0.02	0.03	0.035	0.04	0.05	0.07	0.08	0.1
N Aluminium	≤ 7% Si	0.15xd	0.1xd	280	0.03	0.04	0.045	0.05	0.07	0.1	0.12	0.15
S Ti sp.alloys	≤ 1300 N/mm ²	0.05xd	0.1xd	90	0.02	0.03	0.035	0.04	0.05	0.07	0.08	0.1
H Hard. steel	up to 54 HRC	0.05xd	0.05xd	140	0.02	0.03	0.035	0.04	0.05	0.07	0.08	0.1

* peripheral cooling „Guhrojet“ is recommended for optimal chip evacuation and tool life, for hard machining air cooling is recommended

** for HSC-finishing with a_ae = 0.02xd the cutting speed v_c can be increased by 50 %

Ball nose profile cutters GF 200 B

centre cutting



Tool material
Surface finish
Discount group
Guhring no.

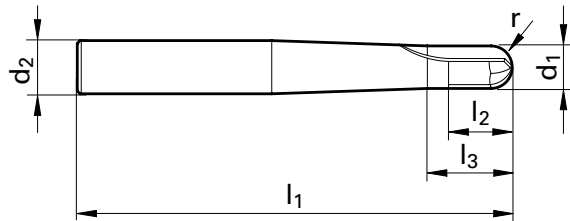


Solid carbide

FIRE

106

3044



Code no.	d1 h10	d2 h6	l1	l2	l3	r	Z	Availability
	mm	mm	mm	mm	mm	mm		
3.000	3.000	6.000	75.00	4.00	6.50	1.50	2	●
4.000	4.000	6.000	75.00	5.00	7.50	2.00	2	●
5.000	5.000	6.000	75.00	6.00	8.50	2.50	2	●
6.000	6.000	8.000	75.00	8.00	10.50	3.00	2	●
8.000	8.000	10.000	100.00	12.00	14.50	4.00	2	●
10.000	10.000	12.000	100.00	15.00	17.50	5.00	2	●

Cutting values: HSC copy milling*

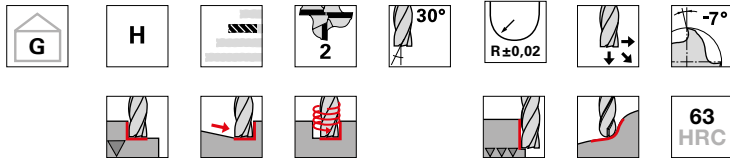
ISO Code	Hardness	Feed depth a_p	Feed width** a_e	Cutting speed v_c	fz (mm/z) with nom. Ø							
					2	3	4	6	8	10	12	16
P Steel	≤ 850 N/mm ²	0.1xd	0.1xd	200	0.03	0.04	0.045	0.05	0.07	0.1	0.12	0.15
	850 - 1400 N/mm ²	0.1xd	0.1xd	180	0.03	0.04	0.045	0.05	0.07	0.1	0.12	0.15
M Stainless Steel	≤ 750 N/mm ²	0.1xd	0.1xd	140	0.03	0.04	0.045	0.05	0.07	0.1	0.12	0.15
	≥ 750 N/mm ²	0.05xd	0.1xd	100	0.02	0.03	0.035	0.04	0.05	0.07	0.08	0.1
N Aluminium	≤ 7% Si	0.15xd	0.1xd	280	0.03	0.04	0.045	0.05	0.07	0.1	0.12	0.15
S Ti sp.alloys	≤ 1300 N/mm ²	0.05xd	0.1xd	90	0.02	0.03	0.035	0.04	0.05	0.07	0.08	0.1
H Hard. steel	up to 54 HRC	0.05xd	0.05xd	140	0.02	0.03	0.035	0.04	0.05	0.07	0.08	0.1

* peripheral cooling „Guhrojet“ is recommended for optimal chip evacuation and tool life, for hard machining air cooling is recommended

** for HSC-finishing with $a_e = 0.02xd$ the cutting speed v_c can be increased by 50 %

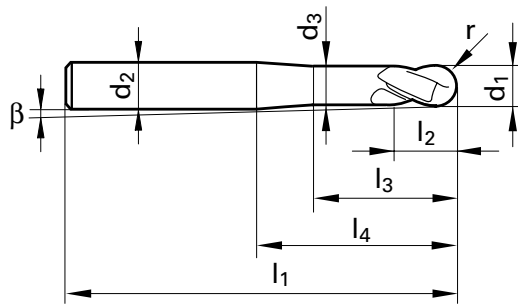
Ball nose hard profile cutters GF 300 B

centre cutting



Tool material
Surface finish
Discount group
Guhring no.

HA
Solid carbide
Signum
106
3359



Code no.	d1 h8	d2 h6	d3	l1	l2	l3	l4	r	β	Z	Availability
	mm	mm	mm	mm	mm	mm	mm	mm	°		
0.500	0.500	3.000	0.400	38.00	0.75	2.60	10.00	0.25	7.40	2	●
0.800	0.800	3.000	0.700	38.00	1.20	3.50	10.00	0.40	6.60	2	●
1.000	1.000	3.000	0.900	38.00	1.50	4.00	10.00	0.50	6.10	2	●
1.500	1.500	3.000	1.400	38.00	2.25	5.50	10.00	0.75	4.70	2	●
2.000	2.000	6.000	1.900	57.00	3.00	9.40	21.00	1.00	5.80	2	●
3.000	3.000	6.000	2.700	57.00	5.00	11.60	21.00	1.50	4.40	2	●
4.000	4.000	6.000	3.700	57.00	6.00	14.50	21.00	2.00	3.10	2	●
5.000	5.000	6.000	4.700	57.00	8.00	17.30	21.00	2.50	1.60	2	●
6.000	6.000	6.000	5.700	57.00	9.00	20.00	21.00	3.00	-	2	●
8.000	8.000	8.000	7.700	63.00	12.00	26.00	27.00	4.00	-	2	●
10.000	10.000	10.000	9.500	72.00	15.00	30.00	32.00	5.00	-	2	●
12.000	12.000	12.000	11.500	83.00	18.00	36.00	38.00	6.00	-	2	●
16.000	16.000	16.000	15.500	92.00	24.00	42.00	44.00	8.00	-	2	●

Cutting values: HSC copy milling*

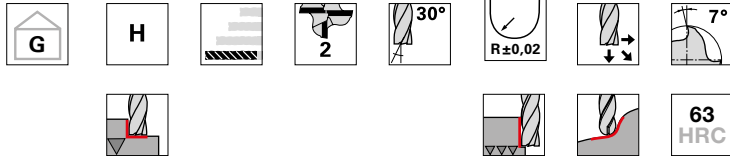
ISO Code	Hardness	Feed depth ap	Feed width** ae	Cutting speed vc	fz (mm/z) with nom. Ø							
					2	3	4	6	8	10	12	16
P Steel	≤ 850 N/mm ²	-	-	-	-	-	-	-	-	-	-	-
	850 - 1400 N/mm ²	0.1xd	0.1xd	200	0.03	0.04	0.045	0.05	0.07	0.1	0.12	0.15
K Cast mat.	≥ 240 HB 30	0.1xd	0.1xd	200	0.03	0.04	0.045	0.05	0.07	0.1	0.12	0.15
H Hardened Steel	≤ 54 HRC	0.05xd	0.1xd	140	0.02	0.03	0.035	0.04	0.05	0.07	0.08	0.1
	≤ 63 HRC	0.02xd	0.1xd	80	0.02	0.03	0.035	0.04	0.05	0.07	0.08	0.1

* Dry machining with air cooling is recommended for optimal chip evacuation and tool life.

** for HSC-finishing with $a_e = 0.02xd$ the cutting speed v_c can be increased by 50 %

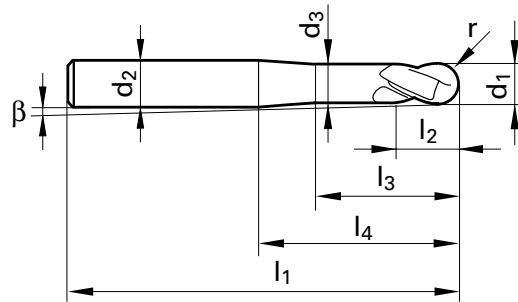
Ball nose hard profile cutters GF 300 B

centre cutting



Tool material
Surface finish
Discount group
Guhring no.

Solid carbide
Signum
106
3360



Code no.	d1 h8	d2 h6	d3	l1	l2	l3	l4	r	β	Z	Availability
	mm	mm	mm	mm	mm	mm	mm	mm	°		
3.000	3.000	6.000	2.700	75.00	5.00	20.00	39.00	1.50	2.30	2	●
4.000	4.000	6.000	3.700	75.00	6.00	20.00	39.00	2.00	1.60	2	●
5.000	5.000	6.000	4.700	75.00	8.00	20.00	39.00	2.50	0.80	2	●
6.000	6.000	6.000	5.700	75.00	9.00	38.00	39.00	3.00	-	2	●
8.000	8.000	8.000	7.700	100.00	12.00	63.00	64.00	4.00	-	2	●
10.000	10.000	10.000	9.500	100.00	15.00	58.00	60.00	5.00	-	2	●
12.000	12.000	12.000	11.500	150.00	18.00	103.00	105.00	6.00	-	2	●
16.000	16.000	16.000	15.500	150.00	24.00	100.00	102.00	8.00	-	2	●

Cutting values: HSC copy milling*

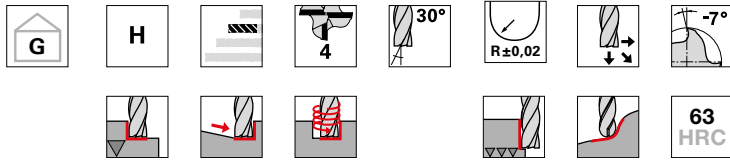
ISO Code	Hardness	Feed depth ap	Feed width** ae	Cutting speed vc	fz (mm/z) with nom. Ø							
					2	3	4	6	8	10	12	16
P Steel	≤ 850 N/mm ²	-	-	-	-	-	-	-	-	-	-	-
	850 - 1400 N/mm ²	0.1xd	0.1xd	200	0.03	0.04	0.045	0.05	0.07	0.1	0.12	0.15
K Cast mat.	≥ 240 HB 30	0.1xd	0.1xd	200	0.03	0.04	0.045	0.05	0.07	0.1	0.12	0.15
H Hardened Steel	≤ 54 HRC	0.05xd	0.1xd	140	0.02	0.03	0.035	0.04	0.05	0.07	0.08	0.1
	≤ 63 HRC	0.02xd	0.1xd	80	0.02	0.03	0.035	0.04	0.05	0.07	0.08	0.1

* Dry machining with air cooling is recommended for optimal chip evacuation and tool life.

** for HSC-finishing with $a_e = 0.02xd$ the cutting speed v_c can be increased by 50 %

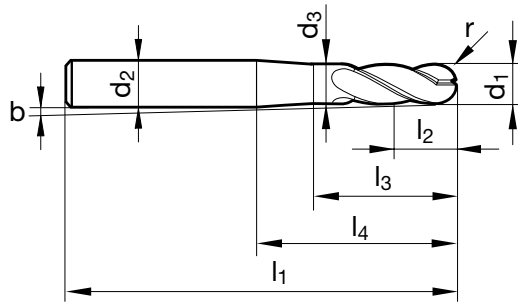
Ball nose hard profile cutters GF 300 B

centre cutting



Tool material
Surface finish
Discount group
Guhring no.

HA
Solid carbide
Signum
106
4246



Code no.	d1 h8	d2 h6	d3	l1	l2	l3	l4	r	β	Z	Availability
	mm	mm	mm	mm	mm	mm	mm	mm	°		
2.000	2.000	6.000	1.900	57.00	3.00	10.00	21.00	1.00	5.80	4	●
3.000	3.000	6.000	2.800	57.00	3.50	14.00	21.00	1.50	4.40	4	●
4.000	4.000	6.000	3.800	57.00	4.00	16.00	21.00	2.00	3.10	4	●
5.000	5.000	6.000	4.800	57.00	5.00	18.00	21.00	2.50	1.60	4	●
6.000	6.000	6.000	5.700	57.00	6.00	20.00	21.00	3.00	-	4	●
8.000	8.000	8.000	7.700	63.00	7.00	26.00	27.00	4.00	-	4	●
10.000	10.000	10.000	9.500	72.00	8.00	30.00	32.00	5.00	-	4	●
12.000	12.000	12.000	11.500	83.00	10.00	36.00	38.00	6.00	-	4	●

Cutting values: HSC copy milling*

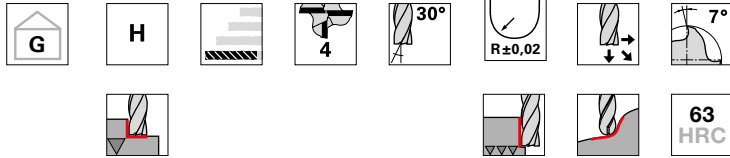
ISO Code	Hardness	Feed depth ap	Feed width** ae	Cutting speed vc	fz (mm/z) with nom. Ø							
					2	3	4	6	8	10	12	16
P Steel	≤ 850 N/mm ²	-	-	-	-	-	-	-	-	-	-	-
	850 - 1400 N/mm ²	0.1xd	0.1xd	200	0.03	0.04	0.045	0.05	0.07	0.1	0.12	0.15
K Cast mat.	≥ 240 HB 30	0.1xd	0.1xd	200	0.03	0.04	0.045	0.05	0.07	0.1	0.12	0.15
H Hardened Steel	≤ 54 HRC	0.05xd	0.1xd	140	0.02	0.03	0.035	0.04	0.05	0.07	0.08	0.1
	≤ 63 HRC	0.02xd	0.1xd	80	0.02	0.03	0.035	0.04	0.05	0.07	0.08	0.1

* Dry machining with air cooling is recommended for optimal chip evacuation and tool life.

** for HSC-finishing with $a_e = 0.02xd$ the cutting speed v_c can be increased by 50 %

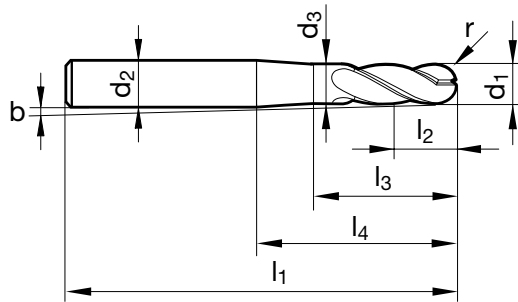
Ball nose hard profile cutters GF 300 B

centre cutting



Tool material
Surface finish
Discount group
Guhring no.

Solid carbide
Signum
106
4247



Code no.	d1 h8	d2 h6	d3	l1	l2	l3	l4	r	β	Z	Availability
	mm	mm	mm	mm	mm	mm	mm	mm	°		
2.000	2.000	6.000	1.900	80.00	3.00	10.00	40.00	1.00	3.00	4	●
3.000	3.000	6.000	2.800	80.00	3.50	14.00	40.00	1.50	2.30	4	●
4.000	4.000	6.000	3.800	80.00	4.00	16.00	40.00	2.00	1.60	4	●
5.000	5.000	6.000	4.800	100.00	5.00	18.00	50.00	2.50	0.70	4	●
6.000	6.000	6.000	5.700	100.00	6.00	49.00	50.00	3.00	-	4	●
8.000	8.000	8.000	7.700	100.00	7.00	49.00	50.00	4.00	-	4	●
10.000	10.000	10.000	9.500	100.00	8.00	48.00	50.00	5.00	-	4	●
12.000	12.000	12.000	11.500	120.00	10.00	68.00	70.00	6.00	-	4	●

Cutting values: HSC copy milling*

ISO Code	Hardness	Feed depth ap	Feed width** ae	Cutting speed vc	fz (mm/z) with nom. Ø							
					2	3	4	6	8	10	12	16
P Steel	≤ 850 N/mm ²	-	-	-	-	-	-	-	-	-	-	-
	850 - 1400 N/mm ²	0.1xd	0.1xd	200	0.03	0.04	0.045	0.05	0.07	0.1	0.12	0.15
K Cast mat.	≥ 240 HB 30	0.1xd	0.1xd	200	0.03	0.04	0.045	0.05	0.07	0.1	0.12	0.15
H Hardened Steel	≤ 54 HRC	0.05xd	0.1xd	140	0.02	0.03	0.035	0.04	0.05	0.07	0.08	0.1
	≤ 63 HRC	0.02xd	0.1xd	80	0.02	0.03	0.035	0.04	0.05	0.07	0.08	0.1

* Dry machining with air cooling is recommended for optimal chip evacuation and tool life.

** for HSC-finishing with $a_e = 0.02xd$ the cutting speed v_c can be increased by 50 %

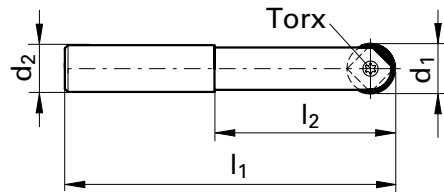
Die sinking cutter holder GF 200 WP



Tool material
Surface finish
Discount group
Guhring no.

nickel-plated
140
1941

Indexable
inserts no.
1947 or 2520
order
separately



Code no.	$d1 \pm 0.015$	$d2 h6$	$l1$	$l2$	Torx	Availability
	mm	mm	mm	mm		
10.000	10.000	10.000	95.20	45.00	T8	●
12.000	12.000	12.000	110.20	50.00	T15	●
16.000	16.000	16.000	125.00	65.00	T20	●
20.000	20.000	20.000	140.00	75.00	T20	●
25.000	25.000	25.000	165.00	90.00	T30	●
32.000	32.000	32.000	185.00	105.00	T30	●

Cutting values: HSC copy milling*

ISO Code	Hardness	Feed depth a_p	Feed width** a_e	Cutting speed v_c	fz (mm/z) with nom. \emptyset						
					8	10	12	16	20	25	32
P Steel	≤ 850 N/mm ²	0.04xd	0.05xd	200	0.07	0.1	0.12	0.15	0.15	0.18	0.22
	850 - 1400 N/mm ²	0.03xd	0.05xd	180	0.07	0.1	0.12	0.15	0.15	0.17	0.2
M Stainless Steel	≤ 750 N/mm ²	0.03xd	0.05xd	140	0.07	0.1	0.12	0.15	0.15	0.17	0.2
	≥ 750 N/mm ²	0.02xd	0.05xd	100	0.05	0.00	0.08	0.1	0.1	0.12	0.15
N Aluminium	$\leq 7\%$ Si	0.06xd	0.05xd	280	0.07	0.1	0.12	0.15	0.15	0.2	0.25
S Ti sp.alloys	≤ 1300 N/mm ²	0.02xd	0.05xd	90	0.05	0.07	0.08	0.1	0.1	0.12	0.15
H Hard. steel	up to 54 HRC	0.03xd	0.05xd	140	0.05	0.07	0.08	0.1	0.1	0.12	0.15

* peripheral cooling „Guhrojet“ is recommended for optimal chip evacuation and tool life, for hard machining air cooling is recommended

** for HSC-finishing with $a_e = 0.02xd$ the cutting speed v_c can be increased by 50 %

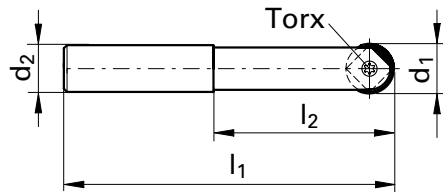
Die sinking cutter holder GF 200 WP



Tool material
Surface finish
Discount group
Guhring no.

nickel-plated
140
1942

Indexable
inserts no.
1947 or 2520
order
separately



Code no.	$d1 \pm 0.015$	$d2 h6$	$l1$	$l2$	Torx	Availability
	mm	mm	mm	mm		
10.000	10.000	12.000	150.20	35.00	T8	●
12.000	12.000	16.000	160.20	60.00	T15	●
16.000	16.000	20.000	174.50	70.00	T20	●
20.000	20.000	25.000	189.50	80.00	T20	●
25.000	25.000	32.000	210.00	100.00	T30	●
32.000	32.000	40.000	240.00	125.00	T30	●

Cutting values: HSC copy milling*

ISO Code	Hardness	Feed depth a_p	Feed width** a_e	Cutting speed v_c	fz (mm/z) with nom. \emptyset						
					8	10	12	16	20	25	32
P Steel	≤ 850 N/mm ²	0.04xd	0.05xd	200	0.07	0.1	0.12	0.15	0.15	0.18	0.22
	850 - 1400 N/mm ²	0.03xd	0.05xd	180	0.07	0.1	0.12	0.15	0.15	0.17	0.2
M Stainless Steel	≤ 750 N/mm ²	0.03xd	0.05xd	140	0.07	0.1	0.12	0.15	0.15	0.17	0.2
	≥ 750 N/mm ²	0.02xd	0.05xd	100	0.05	0.00	0.08	0.1	0.1	0.12	0.15
N Aluminium	$\leq 7\%$ Si	0.06xd	0.05xd	280	0.07	0.1	0.12	0.15	0.15	0.2	0.25
S Ti sp.alloys	≤ 1300 N/mm ²	0.02xd	0.05xd	90	0.05	0.07	0.08	0.1	0.1	0.12	0.15
H Hard. steel	up to 54 HRC	0.03xd	0.05xd	140	0.05	0.07	0.08	0.1	0.1	0.12	0.15

* peripheral cooling „Guhrojet“ is recommended for optimal chip evacuation and tool life, for hard machining air cooling is recommended

** for HSC-finishing with $a_e = 0.02xd$ the cutting speed v_c can be increased by 50 %

Indexable inserts round

Clamping screws f. diesinking cutter holders



48
HRC

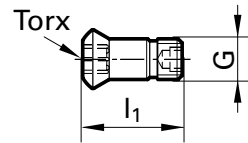
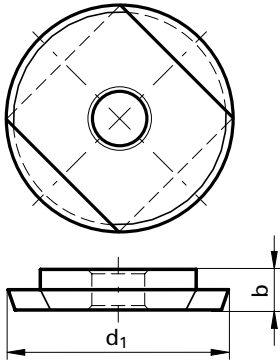
Tool material
Surface finish
Discount group
Guhring no.

Cermet	Sol. carb.
bright	FIRE
141	141
1947	2520



Tool material
Surface finish
Discount group
Guhring no.

140
1691



Code no.	d1 ±0.015	b	Availability		Code no.	G	l1	Torx	Availability
	mm	mm				mm	mm		
10.000	10.000	2.500	●	●	3.000	M 3	8.50	T8	●
12.000	12.000	2.500	●	●	4.000	M 4 X0.5	10.20	T15	●
16.000	16.000	3.200	●	●	5.000	M 5 X0.5	12.80	T20	●
20.000	20.000	4.000	●	●	5.001	M 5 X0.5	15.40	T20	●
25.000	25.000	4.600	●	●	6.000	M 6 X0.75	20.40	T30	●
32.000	32.000	5.000	●	●	8.000	M 8 X0.75	24.80	T30	●

Cutting values: HSC copy milling*

ISO Code	Hardness	Feed depth ap	Feed width** ae	Cutting speed vc	fz (mm/z) with nom. Ø						
					8	10	12	16	20	25	32
P Steel	≤ 850 N/mm ²	0.04xd	0.05xd	200	0.07	0.1	0.12	0.15	0.15	0.18	0.22
	850 - 1400 N/mm ²	0.03xd	0.05xd	180	0.07	0.1	0.12	0.15	0.15	0.17	0.2
M Stainless Steel	≤ 750 N/mm ²	0.03xd	0.05xd	140	0.07	0.1	0.12	0.15	0.15	0.17	0.2
	≥ 750 N/mm ²	0.02xd	0.05xd	100	0.05	0.00	0.08	0.1	0.1	0.12	0.15
N Aluminium	≤ 7% Si	0.06xd	0.05xd	280	0.07	0.1	0.12	0.15	0.15	0.2	0.25
S Ti sp.alloys	≤ 1300 N/mm ²	0.02xd	0.05xd	90	0.05	0.07	0.08	0.1	0.1	0.12	0.15
H Hard. steel	up to 54 HRC	0.03xd	0.05xd	140	0.05	0.07	0.08	0.1	0.1	0.12	0.15

* peripheral cooling „Guhrojet“ is recommended for optimal chip evacuation and tool life, for hard machining air cooling is recommended

** for HSC-finishing with $a_e = 0.02xd$ the cutting speed v_c can be increased by 50 %

Torx screwdriver

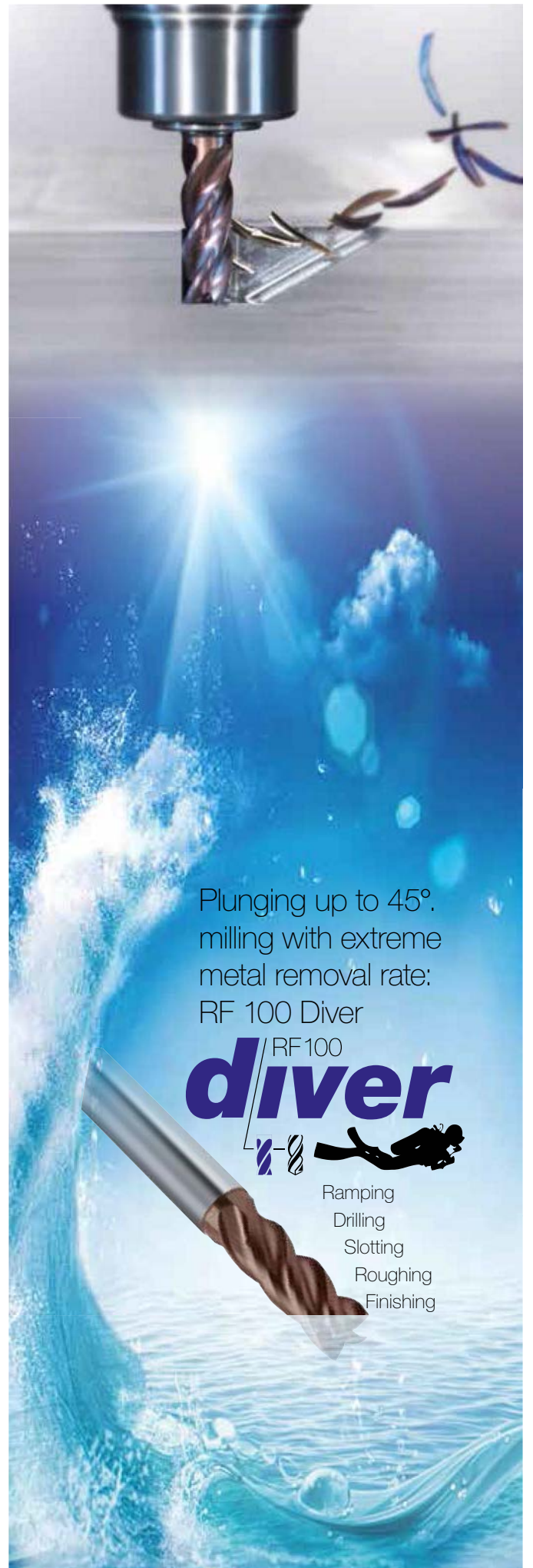


Tool material
Surface finish
Discount group
Guhring no.

140
1612



Code no.	Torx	Availability
5.001	T5	●
6.000	T6	●
7.000	T7	●
7.001	T7	●
8.000	T8	●
8.001	T8	●
9.001	T9	●
10.000	T10	●
10.001	T10	●
15.000	T15	●
15.001	T15	●
20.001	T20	●
25.000	T25	●
25.001	T25	●
30.001	T30	●



Plunging up to 45°
milling with extreme
metal removal rate:
RF 100 Diver

RF100
diver



- Ramping
- Drilling
- Slotting
- Roughing
- Finishing

Guhring GM 300 – HPC power clamp chucks

Well clamped is well milled!



Summary of advantages

- extreme clamping force thanks to mechanical clamping transmission
- ideal combination with HPC end mills and thread milling cutters
- for immense speeds with HPC and HSC milling
- maximum rigidity

|GÜHROJET|



TECHNICAL INFORMATION



HPC and HSC - milling strategies with solid carbide milling cutters

Objectives: Higher efficiency through greater metal removal rate



HPC = High Performance Cutting:

max. machining volume / time; stable conditions; short chip creation; high performance; good cooling

Milling with a tool contact angle of less than 70° and cutting depths of 2-3 x tool diameter

*i*machining, roughing, trochoid

- low cutting width (a_e): $<0.4 \times d$
- high depth of cut (a_p): up to 2-3 x d
- very high tooth feed rate (f_z)
- very high cutting speed (v_c)



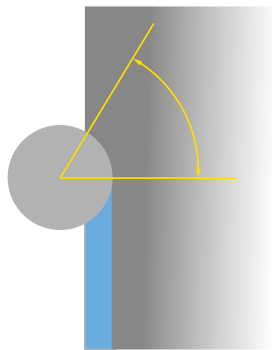
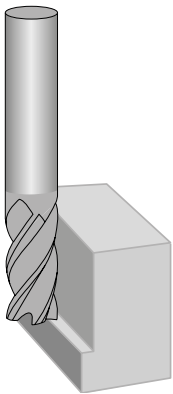
HSC = High Speed Cutting:

at higher cutting speed/ high feed; low power; low feed function

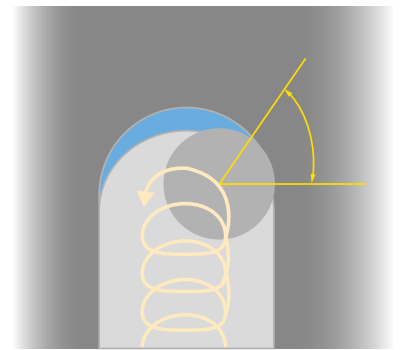
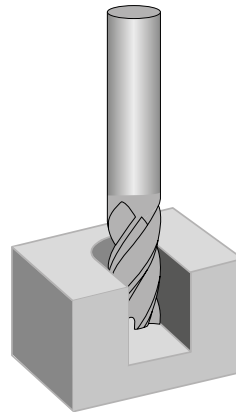
Milling with a tool contact angle of less than 37° and cutting depths up to 3x tool diameter

Semi roughing, finishing and fine-finishing

- minimum cutting width (a_e): $0.15 \times d$
- high depth of cut (a_p): up to 3 x d
- high tooth feed rate (f_z)
- maximum cutting speed (v_c)



Tool Contact Angle



Tool Contact Angle

HPC Linear Milling

Milling internal and external contours with high axial depth (a_p) and low radial widths (a_e). Increasing the cutting parameters due to the tool contact angle.

HPC Milling – Trochoid *i*machining

Machining of grooves or complex contours with long lengths (a_p) and small radial depths (a_e). Increasing the cutting parameters due to the limited angle of contact. Programming cycles or CAM-program.

Operating Principals

- reducing the contact time of tool and workpiece results in less stress and greater thermal efficiency on the cutting edge
- the reduction of the pressure angle between the tool and workpiece reduces the average chip thickness
- less force on the tool, workpiece and machine

Benefits

- extreme increase in cutting speed
- significant increase in the feed rate per tooth
- significant increase in the removal rate
- process-reliable for difficult-to-machine materials
- increase in tool life
- machinery is conserved

HPC and HSC milling strategies with solid carbide milling cutters

Benchmarks for increasing the cutting values

Application	Radial feed in% from	* f _z Factor	* v _c Factor	Contact Angle
slotting	100%	1	1	180°
HPC roughing	33%	1,3	1,5	70°
HPC roughing	25%	1,5	1,6	60°
HPC roughing	20%	1,6	1,7	53°
HPC roughing	15%	1,9	1,7	46°
HSC roughing	10%	2,3	1,8	37°
HSC roughing	5%	3,3	1,9	26°
HSC finishing	3%	1,1	2,0	20°
HSC finishing	2%	1,4	2,0	18°
HSC finishing	1%	2,0	2,1	11°
Fine finishing	<1%	1	2	target: min R _z

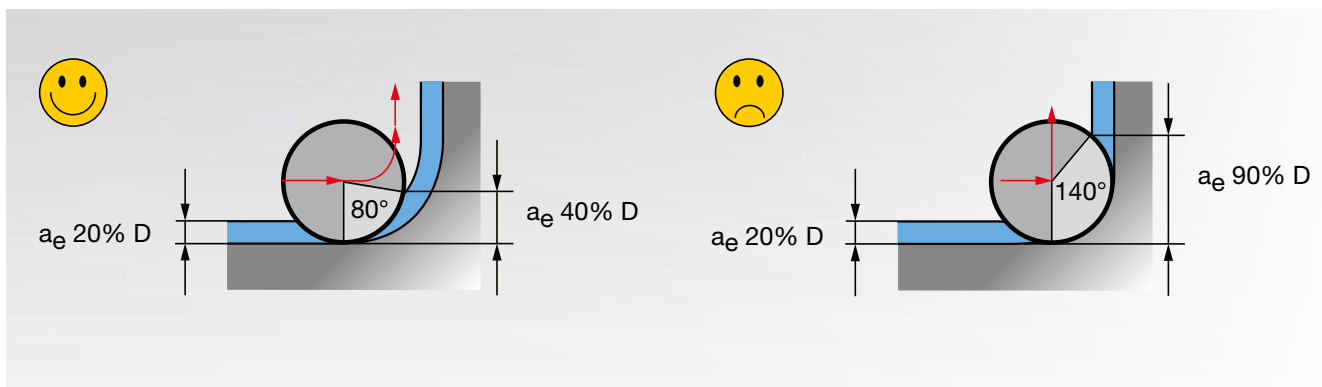
* Basis for the calculation with the v_c and f_z factors is provided within the Guhring Navigator section for „grooves“ in the appropriate material group.

Example: steel C45

- Tools: Milling cutter Ø12 mm
- Feed: Radial feed (a_e) 3 mm
- % Calculation : a_e 3 mm = 25% of Ø 12 mm
- Standard values: v_c slotting = 180 m/min, f_z slotting = 0.07 mm
- Conversion: v_c factor = 1.6 → v_c: 180 m/min x 1,6 = v_c 288 m/min
f_z factor = 1.5 → f_z: 0.07 mm x 1.5 = f_z 0.105 mm
- Increased Values: v_c 288 m/min / f_z 0.105 mm
S: 7640 min⁻¹ / vf: 4580 mm/min
a_p: 24 mm a_e: 3 mm → Q: 330 cm³/min

$$Q(\text{cm}^3/\text{min}) = a_p (\text{mm}) \times a_e (\text{mm}) \times V_f (\text{m}/\text{min})$$

The increase in the corner contact angle overloads the milling cutters. Solution: the pocket radius must be much larger than the milling cutter radius to keep the contact angle less than 80° (max load).



General notes

All the cutting rate recommendations specified in this catalogue are standard values valid exclusively for new tools or tools re-ground to Guhring specifications. Pre-requisites are stable machines, optimal cooling, optimal tool clamping and maximum concentricity of the tool and the machine spindle.

Our recommended cutting rates must be reduced if the conditions deviate. The values may also be adjusted to influence surface quality, machining rate or tool life.

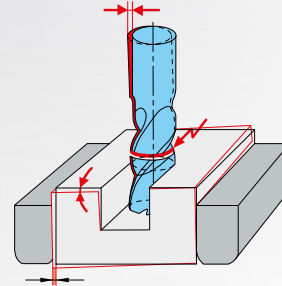
1. Workpiece clamping

Loss of tool life or tool breakage through unstable clamping

- improve workpiece clamping

Alternative:

- reduce feed
- reduce cutting width or depth



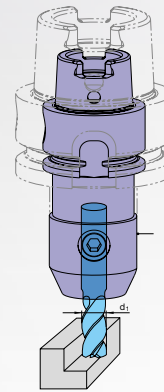
2. Tool clamping

Loss of tool life or tool breakage through unstable, worn or too small/long/thin tool holder

- apply new or larger tool holder or holder with increased clamping force and increased concentricity

Alternative:

- reduce cutting rates
- reduce clamping length
- apply tool with smaller diameter
- check clamping screws for wear



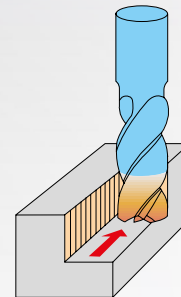
3. Surface quality

Excessive peak-to-valley height Ra/Rz at the tool surface through excessive feed and feed rates or vibrations

- improve workpiece clamping and tool clamping (see points 1 and 2)

Alternative:

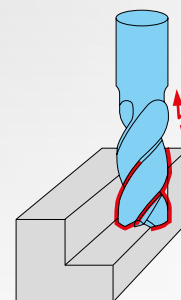
- reduce feed and feed rate
- increase cutting speed



4. Vibrations

High tool wear, insufficient workpiece surface quality and insufficient dimensional accuracy through vibration

- improve workpiece and tool clamping (see points 1 and 2)
- increase tooth feed, because the chip centre thickness is too small
- modify speed
- modify milling strategy, i.e. select alternative cutting distribution
- change tool selection, i.e. reduce no. of teeth or spiral



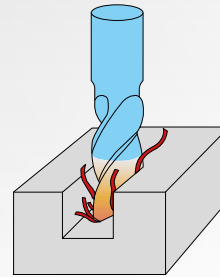
5. Chip congestion/cooling

Significant reduction in tool life, crumbling on cutting lips, edge build-up or conglutination of flutes through insufficient chip evacuation

- select milling cutters with internal cooling

Alternative:

- peripheral cooling via GM 300 chuck
- increase volume flow
- adjust coolant flow
- apply compressed air cooling (according to tool and material)
- reduce feed rate
- modify cutting distribution



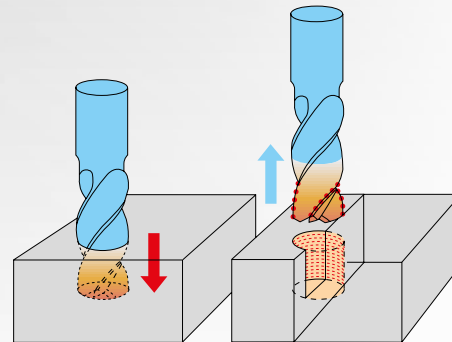
6. Pecking when drilling

Significant reduction in tool life as well as crumbling of cutting lips through insufficient chip evacuation and thermal stresses

- select milling cutter with internal cooling
- with drilling depths $> 0.5 \times D$ pecking in stages

Alternative:

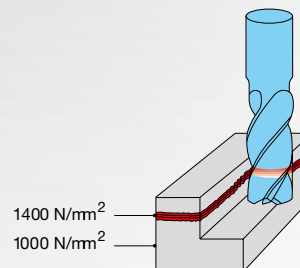
- peripheral cooling via GM 300 chuck
- increase volume flow
- adjust coolant flow
- reduce feed rate



7. Thermal influence on materials

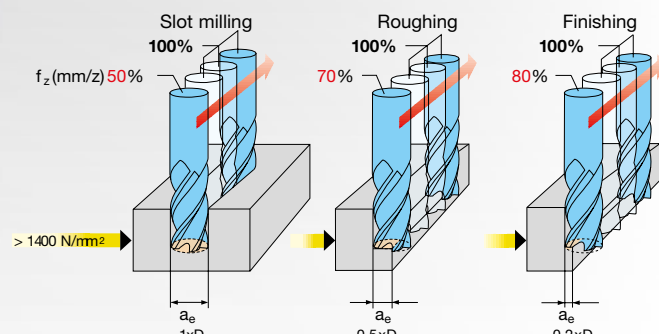
Through welding or torch cutting, the material characteristics at the parting line do not correspond with the specified material class

- reduce cutting rates
- select tool for materials with a higher tensile strength



8. Entry in hardened materials

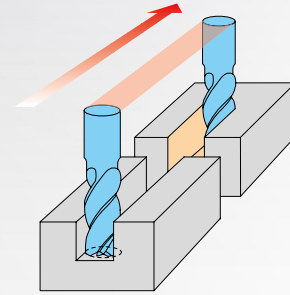
For entering materials over 1400 N/mm^2 (44HRC), reduce the feed rate v_f (mm/min) in accordance with the illustration on the right



9. Loss in tool life with interrupted cutting

Significant loss in tool life through interrupted cutting (especially with milling angles of 90°)

- modify cutting distribution
- reduce feed rate for entry and exit
- reduce approach angle



10. Feed rate adjustment: Modifying the cutting width

- when modifying the cutting width a_e , the feed rate must be reduced in accordance with the illustration on the right
- cutting speed or revolutions remain unchanged
- double reduction applies when also modifying the cutting depth a_p !



$a_e = 1 \times D$
 $f_z = 25 \%$



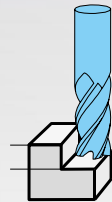
$a_e = 0.5 \times D$
 $f_z = 50 \%$



$a_e = 0.25 \times D$
 $f_z = 100 \%$

11. Feed rate adjustment: Modifying the cutting depth

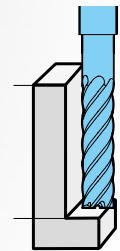
- when modifying the cutting depth a_p , the feed rate must be reduced in accordance with the illustration on the right
- cutting speed or revolutions remain unchanged up to cutting depths of $3 \times D$, must only be adapted over $3 \times D$
- double reduction applies when also modifying the cutting width a_e !



$a_p = 1 \times D$
 $f_z = 100 \%$



$a_p = 2 \times D$
 $f_z = 50 \%$



$a_p = 3 \times D$
 $f_z = 25 \%$

12. Plunging strategies

for drilling:

- reduce feed rate v_f (mm/min.)
 - additional pecking for drilling depths $> 0.5 \times D$ or transition to radial machining
- Attention: Danger of breakage through abrupt load increase!

Oblique plunging up to 15° (preferred):

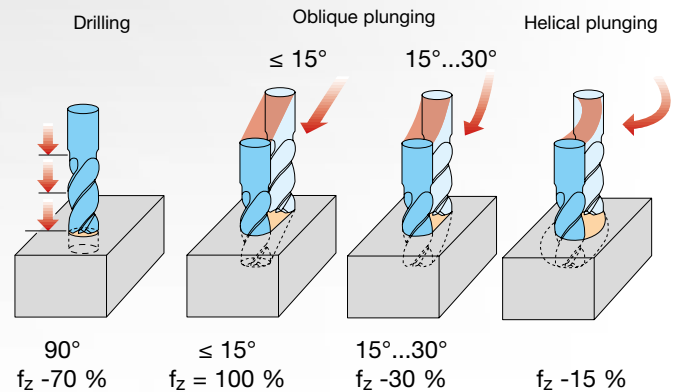
- reduction in feed rate v_f (mm/min.) not required

Oblique plunging between 15° and 30°:

- reduce feed rate v_f (mm/min.) in accordance with the illustration on the right

Helical plunging:

- for helical plunging on a milling cycle, we recommend a feed of 0.1 to 0.2 per cycle
- reduce feed rate v_f (mm/min.) in accordance with the illustration on the right
- select preferred hole diameter $1.8 \times D$



13. HSC milling with ball nosed copy milling cutters



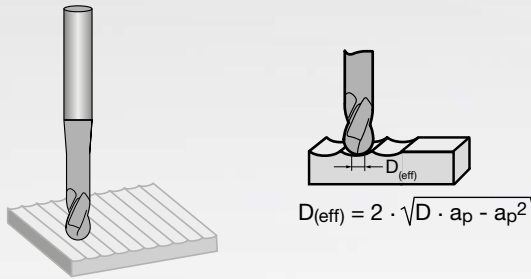
HSC = High Speed Cutting:

Milling operations with very low metal removal but with consideration of the effective tool diameter.

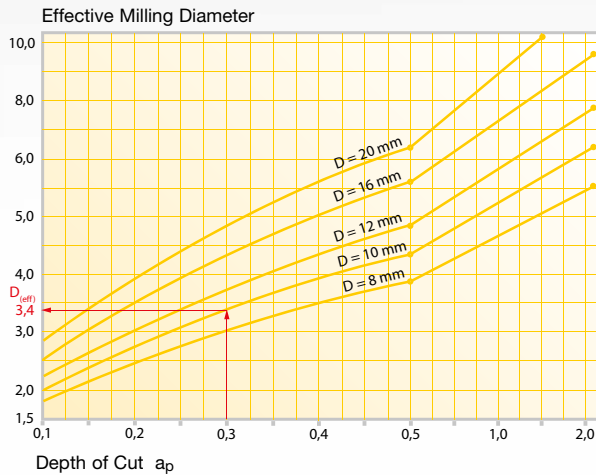
3D machining with ball or Torus milling.

- low cutting width (a_e)
- low cutting depth (a_p)
- high feed rate per tooth (f_z)
- very high cutting speed (V_C)

At cutting depths $a_p < 0.2 \cdot D$ the actual engaged effective diameter $D_{(eff)}$ must be used to calculate the speed. It is derived from the graphic below with the spindle not engaged. To increase the tool life, we recommend machining with a tilted spindle.



The ball-nosed milling cutter is perpendicular to the machining surface. In the centre of the tool is the cutting speed = 0. Tool life and surface quality are not optimal.



Example: For a full copy milling radius \varnothing 10 mm and a depth of cut a_p of 0.3 mm results in an effective diameter $D_{(eff)} = 3.4$ mm. This $D_{(eff)}$ shall be used to calculate the cutting speed V_C .

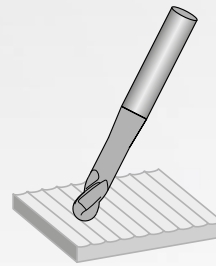
Function and Advantages

Calculation of the effective tool diameter

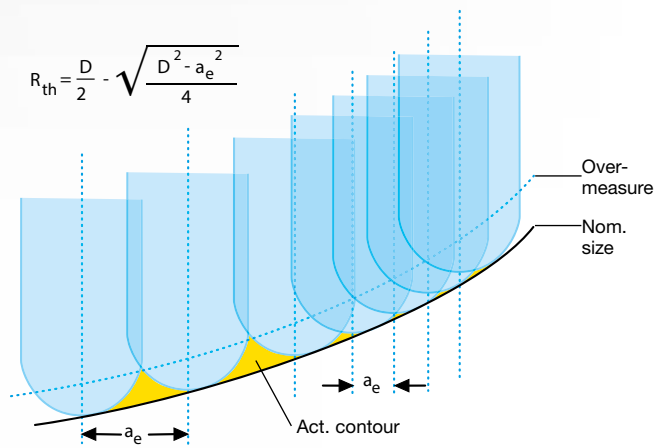
- adjusting speed to effective tool diameter
- Increasing the overall feed rate
- Improving the surface quality

Consideration of the pressure angle / width

- adjusting the tooth feed to achieve the required surface quality

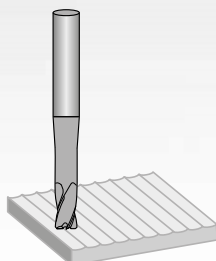


The ball-nosed milling cutter is oblique to the machining surface. The centre of the tool is not engaged. Tool life and surface quality are improved.



The reduction of the cutting width, a_e , leads to an improvement of the surface quality of the workpiece (reduced peak-to-valley height).

14. HSC milling with corner radius - copy milling cutters / Torus milling



HSC milling & Torus milling

3D-machining with Torus milling cutters. Engagement of the tool predominantly on the corner radius. Improves the surface quality and the tool life. Of advantage when 3D-machining flat contour areas on 3-axis machines.

Comparison of Hardness

	HRC	HB30	HV10
240		71	75
255		76	80
270		81	85
285		86	90
305		90	95
320		95	100
335		100	105
350		105	110
370		109	115
385		114	120
400		119	125
415		124	130
430		128	135
450		133	140
465		138	145
480		143	150
495		147	155
510		152	160
530		157	165
545		162	170
560		166	175
575		171	180
595		176	185
610		181	190
625		185	195
640		190	200
660		195	205
675		199	210
690		204	215
705		209	220
720		214	225
740		219	230
755		223	235
770		228	240
785		233	245
800	22	238	250
820	23	242	255
835	24	247	260
860	25	255	268
870	26	258	272
900	27	266	280
920	28	273	287
940	29	278	293
970	30	287	302
995	31	295	310
1020	32	301	317
1050	33	311	327
1080	34	319	336
1110	35	328	345
1140	36	337	355
1170	37	346	364

Tens. strength (N/mm ²)	HRC	HB30	HV10
1200	38	354	373
1230	39	363	382
1260	40	372	392
1300	41	383	403
1330	42	393	413
1360	43	402	423
1400	44	413	434
1440	45	424	446
1480	46	435	458
1530	47	449	473
1570	48	460	484
1620	49	472	497
1680	50	488	514
1730	51	501	527
1790	52	517	544
1845	53	532	560
1910	54	549	578
1980	55	567	596
2050	56	584	615
2140	57	607	639
2180	58	622	655
	59		675
	60		698
	61		720
	62		745
	63		773
	64		800
	65		829
	66		864
	67		900
	68		940

Formulae

Symbol	Description	metric	Formula
z	No. of teeth		
D	Milling cutter diameter	mm	
a_p	Depth of cut	mm	
a_e	Width of cut	mm	
l_f	Milling length	mm	
n	Revolution per min.	U/min	$n = \frac{v_c \cdot 1000}{\pi \cdot D}$
v_c	Cutting speed	m/min	$v_c = \frac{\pi \cdot D \cdot n}{1000}$
v_f	Feed per min.	mm	$v_f = n \cdot z \cdot f_z$
f_z	Feed per tooth	mm	$f_z = \frac{v_f}{n \cdot z}$
f/U	Feed per revolution	mm	$f/U = \frac{v_f}{n}$
f/U	Feed per revolution	mm	$f/U = f_z \cdot z$
Q	Chip volume	cm ³ /min	$Q = \frac{a_p \cdot a_e \cdot v_f}{1000}$
T	Milling time	min	$T = \frac{l_f}{v_f}$
hm	Average chip thickness	mm	$hm = f_z \cdot \sqrt{\frac{a_e}{D}}$
D_(eff)	Effective diameter	mm	$D_{(eff)} = 2 \cdot \sqrt{D \cdot a_p - a_p^2}$
	Effective diameter with approach angle	mm	$D_{(eff)} = D \cdot \sin \left[\beta + \arccos \left(\frac{D - 2a_p}{D} \right) \right]$
R_{th}	Peak-to-valley height	mm	$R_{th} = \frac{D}{2} = \sqrt{\frac{D^2 - a_e^2}{4}}$
Z_b	Optimal step over for torus milling	mm	$Z_b = \frac{D - 2 \times R}{2}$

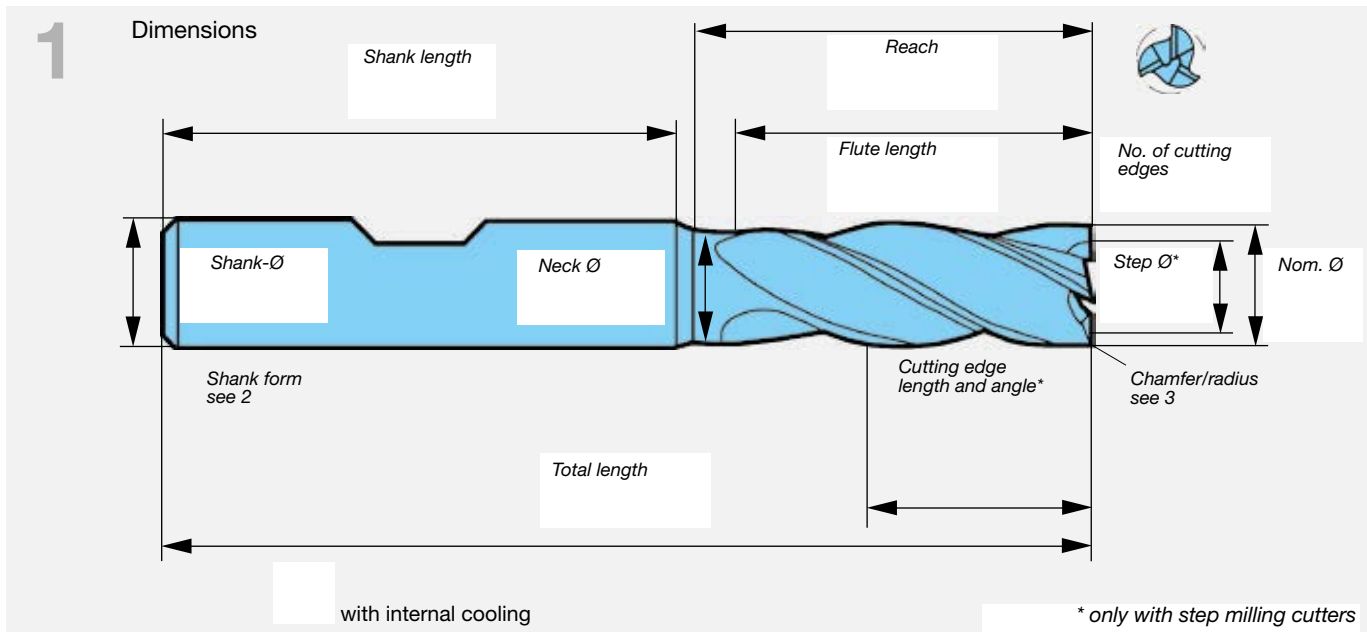
Questionnaire special milling cutters

Customer number	New cust.	RFQ/P.O. Number
Company	Contact	
Street	Postcode	Contact at Guhring
Telephone	Fax	
Date	Signature	

Enquiry Order

(Please enter the required parameters into the boxes)

Reference tool / basic tool (Art.-No.)



2 Shank form

<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>	
	Plain shank		Flatted shank		Whistle Notch

3 Chamfer/radius

<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>	Size
	Chamfer		Corner radius		Ball nose		

4 Geometry

<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>	
	Type N, W, H		Type NF		Type NRf, HR		Type WR

5 Material Coating

<input type="checkbox"/>	Solid carbide	<input type="checkbox"/>	HSS M42	<input type="checkbox"/>	HSS-PM	<input type="checkbox"/>	other: _____
<input type="checkbox"/>	Bright	<input type="checkbox"/>	SuperA-coated	<input type="checkbox"/>	A-coated	<input type="checkbox"/>	FIRE-coated

6 Operation

<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		Depth of cut: _____
	Slotting		Roughing		Finishing		Tracing	Width of cut: _____

7 Application

Workpiece material: _____

Hardness: _____

8 Required quantity: _____

Guhring GM 300 | GÜHROJET

Tool holders with peripheral cooling



Summary of advantages

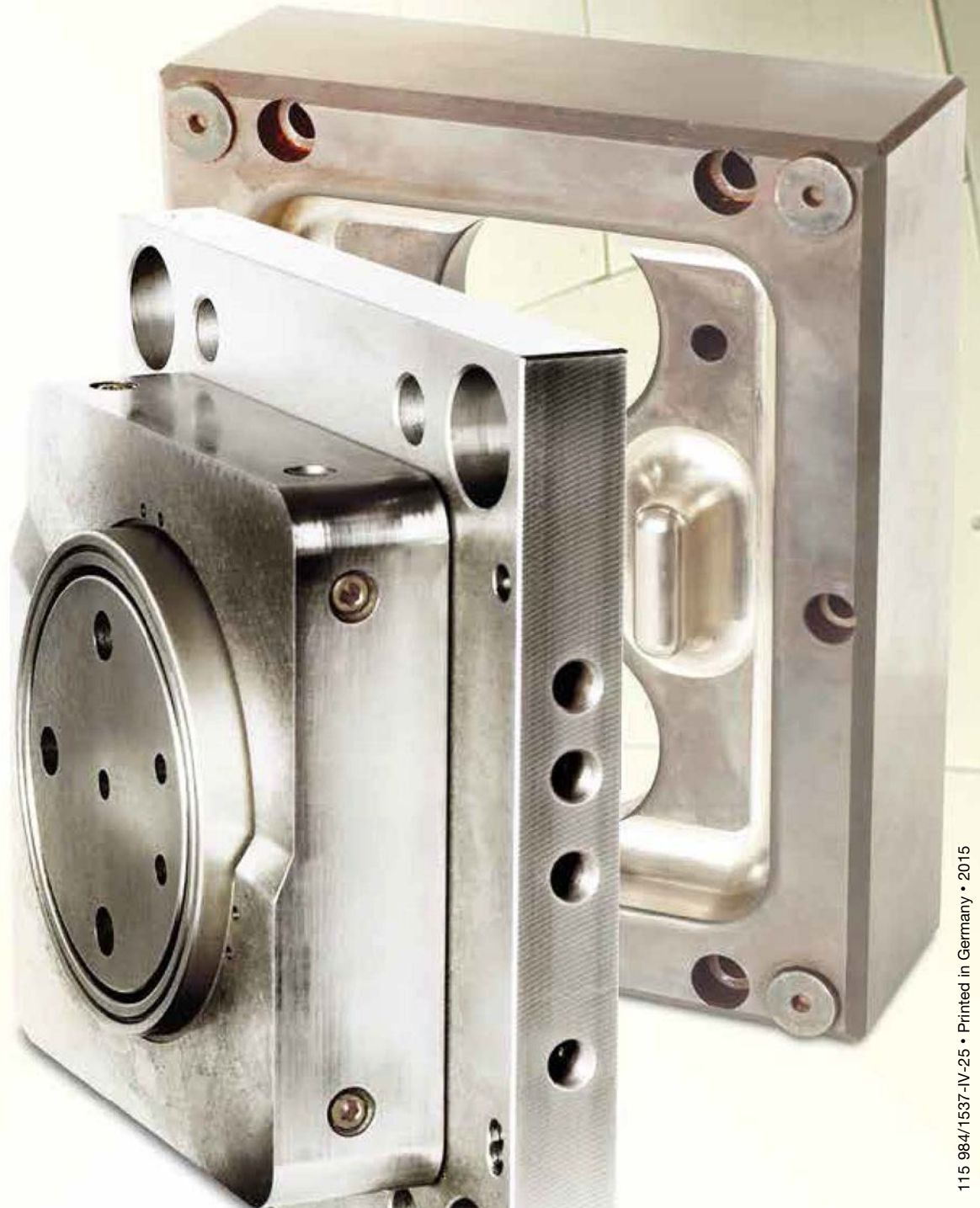
- high process reliability thanks to good chip evacuation
- improved cooling lubrication for tools without internal cooling
- GühroJet peripheral cooling for perfect chip evacuation during milling operations
- short and rigid straight shank holders "Weldon" for HPC roughing operations
- HSC milling with precisely concentric shrink fit chucks



Further tool holders can be found in our GM 300 catalogue.



GUHRING



115 984/1537-IV-25 • Printed in Germany • 2015

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