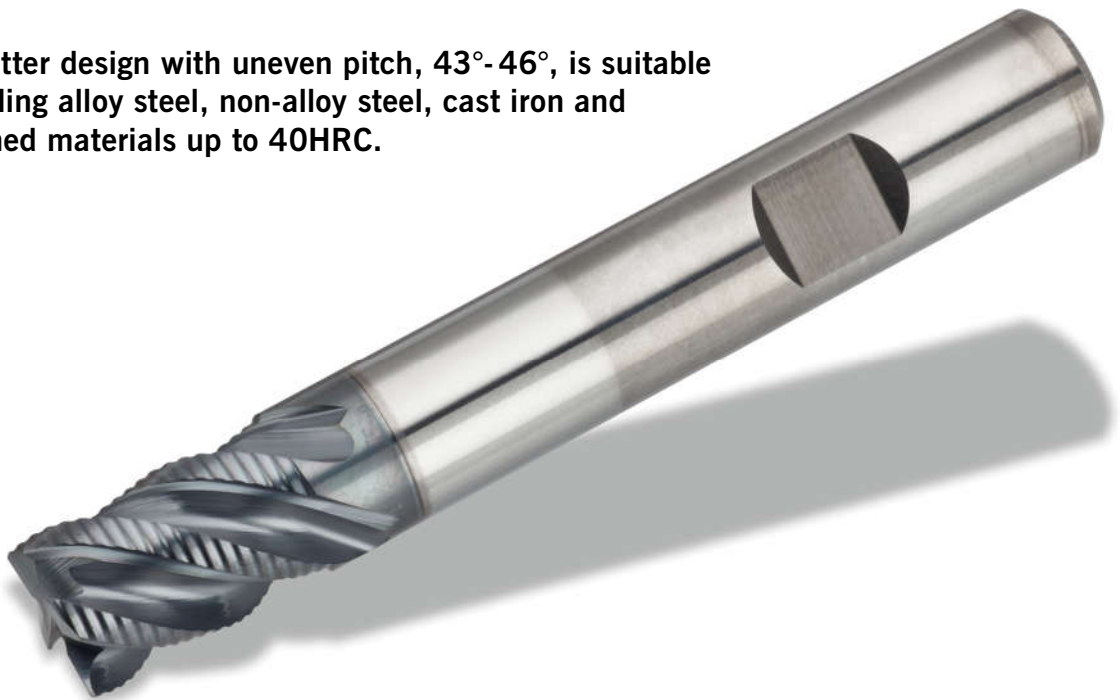


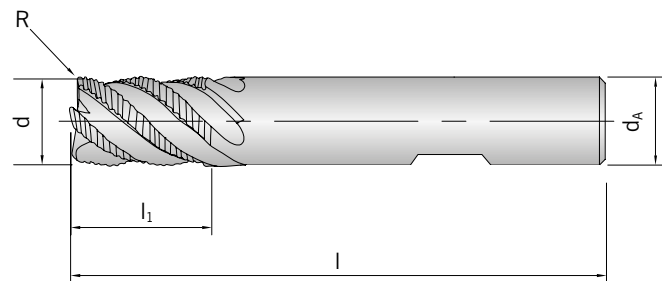
ROUGHING TO YOUR REQUIREMENTS.

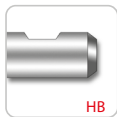
The cutter design with uneven pitch, 43° - 46° , is suitable for milling alloy steel, non-alloy steel, cast iron and hardened materials up to 40HRC.



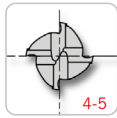
AFR619.0-...

4 - 5 flutes, short design

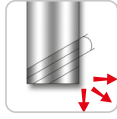





HB



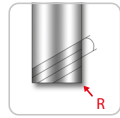
4-5



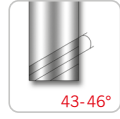
43-46°




i 203 - 205



R



Ultra micro granulation



Shank DIN 6535HB	d -0,05	d _A h6	L ₁	L	R	z	HC
							TAIN
AFR61940-060	6	6	9	57	0.5	4	◆
AFR61940-080	8	8	12	63	0.5	4	◆
AFR61940-100	10	10	15	72	0.5	4	◆
AFR61940-120	12	12	18	83	0.5	4	◆
AFR61950-160	16	16	24	92	1.0	5	◆
AFR61950-200	20	20	30	104	1.0	5	◆

HC = Carbide coated

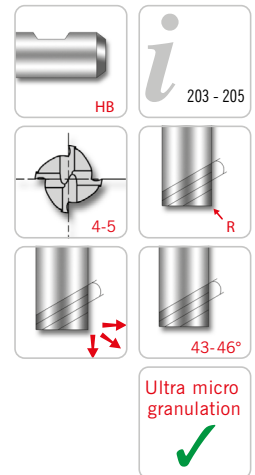
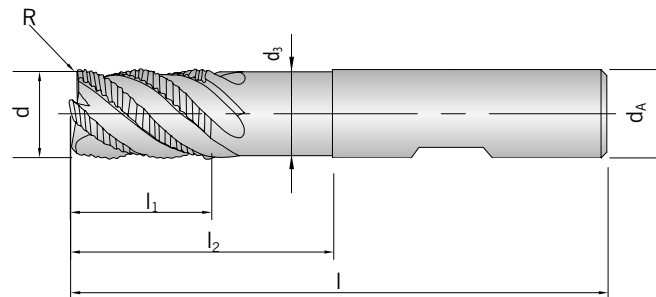
P	●
M	
K	●
N	
S	○
H	

● Main application
○ Secondary application

AFR

AFR619.1-...

4 - 5 flutes, extra long design



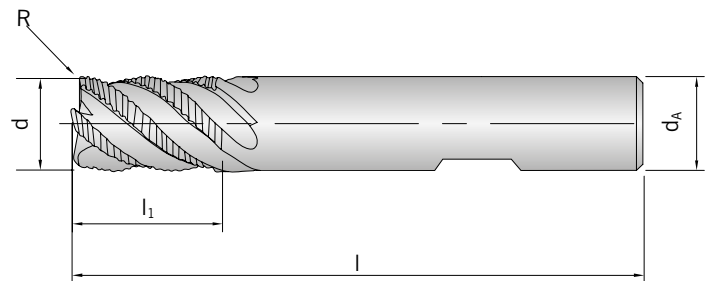
Shank DIN 6535HB	d -0,05	d _A h6	d ₃	l ₁	l ₂	l	R	z	HC	
									TAIN	
AFR61941-060	6	6	5.5	9	18	57	0.5	4	◆	
AFR61941-080	8	8	7.5	12	24	63	0.5	4	◆	
AFR61941-100	10	10	9.5	15	30	72	0.5	4	◆	
AFR61941-120	12	12	11.5	18	36	83	0.5	4	◆	
AFR61951-160	16	16	15.5	24	48	100	1.0	5	◆	
AFR61951-200	20	20	19.2	30	60	110	1.0	5	◆	

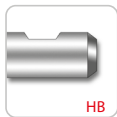
HC = Carbide coated

P	●
M	
K	●
N	
S	○
H	


● Main application
○ Secondary application

AFR619.2-...
4 - 5 flutes, long design

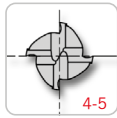




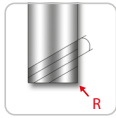
HB



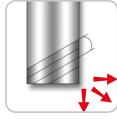
203 - 205



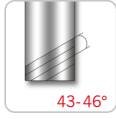
4-5



R



43-46°



Ultra micro granulation

Shank DIN 6535HB	d -0,05	d _A h6	l ₁	l	R	z	HC
							TAIN
AFR61942-060	6	6	12	57	0.5	4	◆
AFR61942-080	8	8	16	63	0.5	4	◆
AFR61942-100	10	10	20	72	0.5	4	◆
AFR61942-120	12	12	24	83	0.5	4	◆
AFR61952-160	16	16	32	92	1.0	5	◆
AFR61952-200	20	20	40	104	1.0	5	◆

HC = Carbide coated

P	●
M	
K	●
N	
S	○
H	

● Main application
○ Secondary application

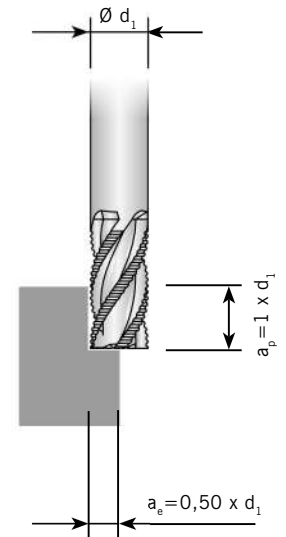
Material group	Structure of the material groups and identification letters		Brinell hardness HB	Tensile strength Rm (N/mm ²)	Chipping group	Correction factor	Cutting speed V _c (m/min)
							VHM A/C/N
P	Unalloyed steel	C ≤ 0.25 % annealed	125	428	P1	1,2	150 - 175 - 200
		C > 0.25 ... ≤ 0.55 % annealed	190	639	P2	1,2	140 - 165 - 190
		C > 0.25 ... ≤ 0.55 % hardened and tempered	210	708	P3	1,2	140 - 165 - 190
		C > 0.55 % annealed	190	639	P4	1,2	140 - 165 - 190
		C > 0.55 % hardened and tempered	300	1013	P5	1,0	120 - 140 - 160
		Machining steel (short-chipping) tempered	220	745	P6	1,2	170 - 195 - 220
	Low alloyed steel	annealed	175	591	P7	1,2	100 - 135 - 170
		hardened and tempered	300	1013	P8	1,0	100 - 135 - 170
		hardened and tempered	380	1282	P9	0,8	100 - 130 - 160
		hardened and tempered	430	1477	P10	0,8	100 - 130 - 160
	High alloyed steel and high alloyed tool steel	annealed	200	675	P11	1,2	100 - 135 - 170
		hardened	300	1013	P12	-	-
		hardened	400	1361	P13	0,8	80 - 115 - 150
	Stainless steel	ferritic / martensitic, annealed	200	675	P14	-	-
		martensitic, hardened and tempered	330	1114	P15	-	-
M	Stainless steel	austenitic, chilled	200	675	M1	-	-
		austenitic, precipitation-hardened (PH)	300	1013	M2	-	-
		austenitic-ferritic, Duplex	230	778	M3	-	-
K	Malleable cast iron	ferritic	200	675	K1	1,0	100 - 120 - 140
		pearlitic	260	867	K2	0,8	80 - 100 - 120
	Cast iron	low tensile strength	180	602	K3	1,0	100 - 125 - 150
		high tensile strength / austenitic	245	825	K4	1,0	100 - 120 - 140
	Cast iron with nodular graphite	ferritic	155	518	K5	1,0	100 - 120 - 140
		pearlitic	265	885	K6	1,0	80 - 100 - 120
	GGV (CGI)		200	675	K7	1,0	100 - 120 - 140
N	Aluminium alloys long chipping	not heat treatable	30	-	N1	-	-
		heat treatable, heat treated	100	343	N2	-	-
		≤ 12 % Si, not heat treatable	75	260	N3	-	-
	Casted aluminium alloys	≤ 12 % Si, aushärtbar, ausgehärtet	90	314	N4	-	-
		> 12 % Si, not heat treatable	130	447	N5	-	-
	Magnesium alloys		70	250	N6	-	-
	Copper and copper alloys (Brass / Bronze)	Unalloyed, elektrolyte copper	100	343	N7	-	-
		Brass, Bronze	90	314	N8	-	-
		Cu-alloys, short-chipping	110	382	N9	-	-
		High-tensile, Ampco	300	1013	N10	-	-
	Non-ferrous materials	Lead alloys (without abrasive filling material)	-	-	N11	-	-
		Duroplastic (without abrasive filling material)	-	-	N12	-	-
		Plastic glas fibre reinforced GFRP	-	-	N13	-	-
		Plastic carbon fibre reinforced CFRP	-	-	N14	-	-
		Plastic aramid fibre reinforced AFRP	-	-	N15	-	-
		Graphite (tech.)	80 Shore	-	N16	-	-
S	High temperature resistant alloys	Fe-Basis annealed	200	675	S1	0,7	30 - 60 - 90
			280	943	S2	0,7	30 - 60 - 90
		Ni- or Co-alloyed annealed	250	839	S3	0,9	30 - 50 - 70
			350	1177	S4	0,7	30 - 55 - 80
			320	1076	S5	0,7	30 - 50 - 70
	Titanium alloys	Pure titan	200	675	S6	1,0	50 - 85 - 120
		α- and β-alloys, heat treated	375	1262	S7	1,0	40 - 75 - 110
		β-alloys	410	1396	S8	1,0	40 - 75 - 110
	Wolfram alloys		300	1013	S9	-	-
	Molybdän alloys		300	1013	S10	-	-
H	Hardened steel	hardened	50 HRC	-	H1	-	-
		hardened	55 HRC	-	H2	-	-
		hardened	60 HRC	-	H3	-	-
	Hardened cast iron	hardened	55 HRC	-	H4	-	-

The recommended cutting data are only approximate values. It may be necessary to adjust them to each individual machining application.

Solid carbide end-mill

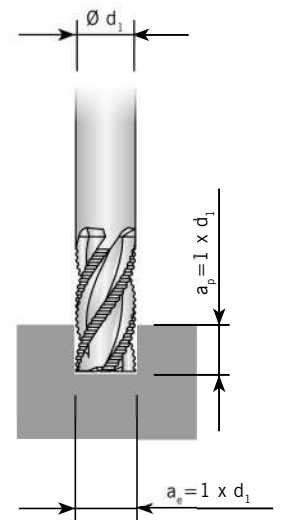
Feed per tooth with radial depth of cut of 50 % of the cutter ($\emptyset d_1$)

$\emptyset d_1$ [mm]	1	0,7	0,8	Correction factor				1,5
				0,9	1,1	1,2		
6	0,030	0,021	0,024	0,027	0,033	0,036		0,045
8	0,050	0,035	0,040	0,045	0,055	0,060		0,075
10	0,060	0,042	0,045	0,055	0,066	0,072		0,090
12	0,070	0,049	0,056	0,063	0,077	0,084		0,105
16	0,090	0,034	0,072	0,081	0,099	0,108		0,135
20	0,120	0,084	0,090	0,108	0,132	0,144		0,180



Feed per tooth when full slot milling $\rightarrow a_p = 1 \times d_1$

$\emptyset d_1$ [mm]	1	0,7	0,8	Correction factor				1,5
				0,9	1,1	1,2		
6	0,028	0,020	0,022	0,025	0,031	0,035		0,042
8	0,040	0,028	0,032	0,036	0,044	0,048		0,060
10	0,050	0,035	0,040	0,045	0,055	0,060		0,075
12	0,060	0,042	0,048	0,054	0,066	0,072		0,090
16	0,080	0,056	0,064	0,072	0,088	0,096		0,120
20	0,100	0,070	0,089	0,090	0,110	0,120		0,150

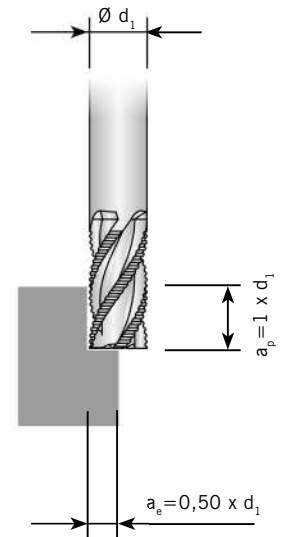


Attention:
Take the correction factor from the table "Cutting speeds".
Correction factor \rightarrow 1,1 with $a_p = 1 \times d_1$ \rightarrow 1,2 with $a_p = 0,5 \times d_1$

PM-HSS end-mill

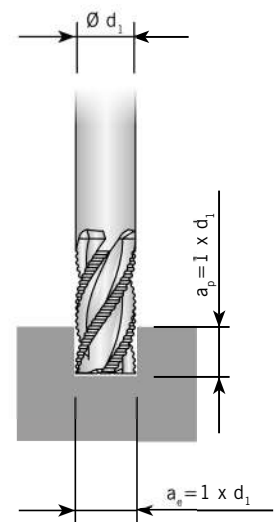
Feed per tooth with radial depth of cut of 50 % of the cutter ($\emptyset d_1$)

$\emptyset d_1$ [mm]	1	0,7	0,8	Correction factor				1,1	1,2	1,5
				0,9						
6	0,022	0,015	0,018	0,020	0,024	0,026	0,033			
8	0,030	0,021	0,024	0,027	0,030	0,035	0,045			
10	0,039	0,027	0,030	0,035	0,042	0,047	0,060			
12	0,047	0,033	0,037	0,042	0,050	0,056	0,070			
16	0,066	0,046	0,052	0,060	0,070	0,080	0,100			
20	0,084	0,059	0,067	0,075	0,092	0,100	0,130			



Feed per tooth when full slot milling $\rightarrow a_p = 1 \times d_1$

$\emptyset d_1$ [mm]	1	0,7	0,8	Correction factor				1,1	1,2	1,5
				0,9						
6	0,019	0,013	0,015	0,017	0,020	0,023	0,025			
8	0,026	0,018	0,020	0,023	0,028	0,031	0,040			
10	0,034	0,029	0,028	0,030	0,037	0,041	0,050			
12	0,041	0,029	0,033	0,037	0,045	0,049	0,060			
16	0,057	0,040	0,046	0,050	0,063	0,070	0,080			
20	0,073	0,050	0,060	0,065	0,080	0,090	0,110			



AFR

Attention:

Take the correction factor from the table "Cutting speeds".

Correction factor \rightarrow 1,1 with $a_p = 1 \times d_1$ \rightarrow 1,2 with $a_p = 0,5 \times d_1$