

# Type A - Roughing

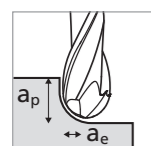
$v_c$  [m/min]  
 $f_z$  [mm]

RECOMMENDATION FOR USE  
● Excellent | ● Good | ○ Acceptable | ⊗ Not recommended



## MILLING WITH INTEGRATED COOLING | CUTTING DATA OVERVIEW

### Roughing

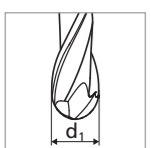
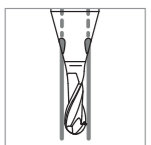


■  $a_p = 0.5 \times d_1$   
( $\varnothing d_1 < 0.5$  mm)

■  $a_p = 1 \times d_1$   
( $\varnothing d_1 > 0.5$  mm)

■  $a_e = 0.3 \times d_1$

Machining angle = 0°



Materials group	Material	Mat. no.	DIN	AISI/ASTM/UNS	0.3 mm–0.4 mm 1/64"		0.5 mm–0.8 mm 1/32"		1.0 mm–1.2 mm		Ød1 1.5 mm–1.8 mm 1/16"		2.0 mm–2.5 mm 3/32"		3.0 mm 1/8"		4.0 mm–6.0 mm 5/32–3/16–7/32–1/4"		8.0 mm																		
					$v_c$	$f_z$	$v_c$	$f_z$	$v_c$	$f_z$	$v_c$	$f_z$	$v_c$	$f_z$	$v_c$	$f_z$	$v_c$	$f_z$	$v_c$	$f_z$																	
P	Unalloyed carbon steel Rm < 800 N/mm²	1.0301	C10	AISI 1010	60	0.005–0.007	100	0.010–0.014	140	0.015–0.017	200	0.024–0.026	220	0.034–0.036	240	0.048	280	0.050	280	0.050																	
		1.0401	C15	AISI 1015																																	
		1.1191	C45E/CK45	AISI 1045																																	
		1.0044	S275JR	AISI 1020																																	
		1.0715	11SMn30	AISI 1215																																	
	Low alloyed steel Rm > 900 N/mm²	1.5752	15NiCr13	ASTM 3415 / AISI 3310	60	0.004–0.006	100	0.009–0.012	140	0.014–0.016	200	0.022–0.024	220	0.032–0.034	240	0.046	280	0.048	280	0.048																	
		1.7131	16MnCr5	AISI 5115																																	
		1.3505	100Cr6	AISI 52100																																	
		1.7225	42CrMo4	AISI 4140																																	
		1.2842	90MnCrV8	AISI O2																																	
	High alloyed tool steel Rm < 1200 N/mm²	1.2379	X153CrMoV12	AISI D2	60	0.004–0.006	100	0.008–0.011	140	0.011–0.013	200	0.020–0.022	220	0.030–0.032	240	0.042	280	0.044	280	0.044																	
		1.2436	X210CrW12	AISI D4/D6																																	
1.3343		HS6-5-2C	AISI M2 / UNS T11302																																		
1.3355		HS18-0-1	AISI T1 / UNS T12001																																		
M		Stainless steel ferritic	1.4016	X6Cr17																	AISI 430 / UNS S43000	60	0.005–0.007	100	0.010–0.014	140	0.016–0.018	200	0.024–0.026	220	0.034–0.036	240	0.046	280	0.048	280	0.048
	1.4105		X6CrMoS17	AISI 430F																																	
	1.4034		X46Cr13	AISI 420C																																	
	Stainless steel martensitic	1.4112	X90CrMoV18	AISI 440B	60	0.004–0.006	100	0.009–0.012	140	0.015–0.017	200	0.022–0.024	220	0.032–0.034	240	0.044	280	0.046	280	0.046																	
		1.4542	X5CrNiCuNb 16-4	AISI 630 / ASTM 17-4 PH																																	
		1.4545	X5CrNiCuNb 15-5	ASTM 15-5 PH																																	
	Stainless steel martensitic – PH	1.4301	X5CrNi 18-10	AISI 304	60	0.004–0.006	100	0.009–0.012	140	0.015–0.017	200	0.022–0.024	220	0.032–0.034	240	0.044	280	0.046	280	0.046																	
		1.4435	X2CrNiMo 18-14-3	AISI 316L																																	
		1.4441	X2CrNiMo 18-15-3	AISI 316LM																																	
Stainless steel austenitic	1.4539	X1NiCrMoCu 25-20-5	AISI 904L	60	0.004–0.006	100	0.008–0.011	140	0.012–0.014	200	0.016–0.018	220	0.030–0.032	240	0.042	280	0.044	280	0.044																		
	K	Cast iron	0.6020																	GG20	ASTM 30	60	0.003–0.005	100	0.006–0.009	120	0.011–0.022	140	0.024–0.026	160	0.028–0.036	180	0.042–0.048	200	0.052–0.057	200	0.052–0.057
			0.6030																	GG30	ASTM 40B																
0.7040			GGG40	ASTM 60-40-18																																	
0.7060			GGG60	ASTM 80-60-03																																	
N	Aluminium alloy wrought	3.2315	AlMgSi1	ASTM 6351	60	0.006–0.008	100	0.012–0.016	140	0.018–0.020	200	0.026–0.028	220	0.036–0.040	240	0.058	280	0.060	280	0.060																	
		3.4365	AlZnMgCu1.5	ASTM 7075																																	
	Aluminium alloy cast	3.2163	GD-AlSi9Cu3	ASTM A380	60	0.006–0.008	100	0.012–0.016	140	0.018–0.020	200	0.026–0.028	220	0.036–0.040	240	0.058	280	0.060	280	0.060																	
		3.2381	GD-AlSi10Mg	UNS A03590																																	
	Copper	2.004	Cu-OF / CW008A	UNS C10100	60	0.006–0.008	100	0.014–0.018	140	0.020–0.022	200	0.026–0.028	220	0.036–0.040	240	0.058	280	0.060	280	0.060																	
		2.0065	Cu-ETP / CW004A	UNS C11000																																	
	Brass lead free	2.0321	CuZn37 CW508L	UNS C27400	60	0.006–0.008	100	0.014–0.018	140	0.020–0.022	200	0.026–0.028	220	0.036–0.040	240	0.058	280	0.060	280	0.060																	
		2.036	CuZn40 CW509L	UNS C28000																																	
	Brass, Bronze Rm < 400 N/mm²	2.0401	CuZn39Pb3 / CW614N	UNS C38500	60	0.006–0.008	100	0.014–0.018	140	0.020–0.022	200	0.026–0.028	220	0.036–0.040	240	0.058	280	0.060	280	0.060																	
		2.102	CuSn6	UNS C51900																																	
Bronze Rm < 600 N/mm²	2.0966	CuAl10Ni5Fe4	UNS C63000	60	0.006–0.008	100	0.012–0.016	140	0.018–0.020	200	0.026–0.028	220	0.036–0.040	240	0.058	280	0.060	280	0.060																		
	2.096	CuAl9Mn2	UNS C63200																																		
S1	Super alloys	2.4856		Inconel 625	60	0.003–0.004	100	0.004–0.006	120	0.007–0.008	130	0.009–0.010	140	0.010–0.012	150	0.015	170	0.020	170	0.020																	
		2.4668		Inconel 718																																	
		2.4617	NiMo28	Hastelloy B-2																																	
		2.4665	NiCr22Fe18Mo	Hastelloy X																																	
S2	Titanium pure	3.7035	Gr.2	ASTM B348 / F67	60	0.004–0.006	100	0.008–0.011	120	0.016–0.018	130	0.020–0.022	140	0.028–0.030	150	0.042	170	0.044	170	0.044																	
		3.7065	Gr.4	ASTM B348 / F68																																	
S2	Titanium alloys	3.7165	TiAl6V4	ASTM B348 / F136	60	0.004–0.006	100	0.008–0.011	120	0.016–0.018	130	0.020–0.022	140	0.028–0.030	150	0.042	170	0.044	170	0.044																	
		9.9367	TiAl6Nb7	ASTM F1295																																	
S3	CrCo alloys	2.4964	CoCr20W15Ni CrCoMo28	Haynes 25 ASTM F1537	60	0.003–0.004	100	0.004–0.006	140	0.007–0.008	180	0.009–0.010	200	0.010–0.012	220	0.015	240	0.020	240	0.020																	
H1	Hardened steel < 55 HRC	1.2510	100MnCrMoW4	AISI O1	60	0.004–0.006	80	0.007–0.009	100	0.010–0.012	140	0.014–0.018	180	0.020–0.026	200	0.035	240	0.040	240	0.040																	
H2	Hardened steel ≥ 55 HRC	1.2379	X153CrMoV12	AISI D2																																	