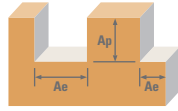


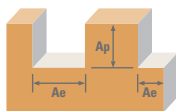
Series
51M, 51MCR,
51ML, 51MLC,
51MB, 51MLB
Metric



	Hardness	Ae x DC	Ap x DC	Vc (m/min)	DC • mm							
					6	8	10	12	16	20		
P	CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536	Profile 	≤ 0.1	≤ 1	219	RPM	11633	8725	6980	5816	4362	3490
					(176-263)	Fz	0.048	0.075	0.093	0.120	0.141	0.163
					Feed (mm/min)	3350	3909	3909	4188	3685	3406	
		HSM 	≤ 0.05	≤ 2	279	RPM	14784	11088	8870	7392	5544	4435
					(223-335)	Fz	0.067	0.113	0.141	0.168	0.197	0.227
					Feed (mm/min)	5960	7523	7522	7450	6557	6032	
	ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100	Profile 	≤ 0.1	≤ 1	149	RPM	7917	5938	4750	3958	2969	2375
					(119-179)	Fz	0.036	0.062	0.077	0.091	0.108	0.123
					Feed (mm/min)	1710	2204	2204	2166	1915	1748	
		HSM 	≤ 0.05	≤ 2	189	RPM	10017	7513	6010	5009	3756	3005
					(151-227)	Fz	0.050	0.083	0.104	0.125	0.146	0.165
					Feed (mm/min)	3029	3751	3750	3750	3289	2981	
TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2	Profile 	≤ 0.1	≤ 1	73	RPM	3878	2908	2327	1939	1454	1163	
				(59-88)	Fz	0.029	0.049	0.061	0.072	0.087	0.099	
				Feed (mm/min)	670	856	856	838	759	689		
	HSM 	≤ 0.05	≤ 2	93	RPM	4928	3696	2957	2464	1848	1478	
				(74-112)	Fz	0.041	0.068	0.085	0.101	0.118	0.133	
				Feed (mm/min)	1206	1514	1514	1490	1306	1183		
M	STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F, 440F	Profile 	≤ 0.1	≤ 1	155	RPM	8240	6180	4944	4120	3090	2472
					(140-171)	Fz	0.036	0.060	0.075	0.091	0.105	0.120
					Feed (mm/min)	1780	2215	2215	2254	1946	1780	
		HSM 	≤ 0.05	≤ 2	198	RPM	10502	7877	6301	5251	3938	3151
					(178-218)	Fz	0.050	0.081	0.101	0.122	0.143	0.163
					Feed (mm/min)	3176	3832	3831	3856	3387	3075	
	STAINLESS STEELS (DIFFICULT) 304, 304L, 316, 316L	Profile 	≤ 0.1	≤ 1	107	RPM	5655	4241	3393	2827	2121	1696
					(96-117)	Fz	0.029	0.049	0.061	0.072	0.084	0.096
					Feed (mm/min)	977	1249	1249	1221	1075	977	
		HSM 	≤ 0.05	≤ 2	137	RPM	7271	5453	4362	3635	2726	2181
					(123-151)	Fz	0.041	0.068	0.085	0.101	0.118	0.133
					Feed (mm/min)	1780	2234	2234	2198	1926	1745	
STAINLESS STEELS (PH) 13-8 PH, 15-5 PH, 17-4 PH, Custom 450	Profile 	≤ 0.1	≤ 1	99	RPM	5251	3938	3151	2626	1969	1575	
				(89-109)	Fz	0.029	0.049	0.061	0.072	0.084	0.096	
				Feed (mm/min)	907	1160	1159	1134	998	907		
	HSM 	≤ 0.05	≤ 2	125	RPM	6624	4968	3975	3312	2484	1987	
				(112-137)	Fz	0.041	0.068	0.085	0.101	0.118	0.133	
				Feed (mm/min)	1621	2035	2035	2003	1755	1590		

continued on next page

Series
51M, 51MCR,
51ML, 51MLC,
51MB, 51MLB
Metric



Series	Hardness	Ae x DC	Ap x DC	Vc (m/min)	DC • mm								
					6	8	10	12	16	20			
K CAST IRONS (LOW & MEDIUM ALLOY) Gray, Malleable, Ductile	≤ 220 Bhn or ≤ 19 HRc	Profile 	≤ 0.25	≤ 1.5	575	RPM	9290	6968	5574	4645	3484	2787	
						Fz	0.043	0.075	0.093	0.108	0.128	0.147	
						Feed (mm/min)	2408	3122	3122	3010	2675	2453	
		HSM 	≤ 0.05	≤ 2	730	RPM	11795	8846	7077	5897	4423	3538	
						Fz	0.060	0.100	0.125	0.154	0.179	0.203	
						Feed (mm/min)	4246	5322	5322	5434	4755	4303	
	CAST IRONS (HIGH ALLOY) Gray, Malleable, Ductile	≤ 260 Bhn or ≤ 26 HRc	Profile 	≤ 0.25	≤ 1.5	430	RPM	6947	5211	4168	3474	2605	2084
							Fz	0.043	0.075	0.093	0.108	0.128	0.147
							Feed (mm/min)	1801	2335	2334	2251	2001	1834
			HSM 	≤ 0.05	≤ 2	545	RPM	8806	6604	5283	4403	3302	2642
							Fz	0.060	0.100	0.125	0.154	0.179	0.203
							Feed (mm/min)	3170	3974	3973	4057	3550	3212
S HIGH TEMP ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy, Monel 400	≤ 300 Bhn or ≤ 32 HRc	Profile 	≤ 0.1	≤ 1	32	RPM	1696	1272	1018	848	636	509	
						Fz	0.034	0.058	0.072	0.086	0.100	0.115	
						Feed (mm/min)	342	440	440	440	381	350	
		HSM 	≤ 0.05	≤ 2	40	RPM	2100	1575	1260	1050	788	630	
						Fz	0.038	0.077	0.096	0.115	0.136	0.155	
						Feed (mm/min)	484	726	726	726	641	585	
	HIGH TEMP ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 718, X-750, Incoloy, Waspaloy, Hastelloy, Rene	≤ 400 Bhn or ≤ 43 HRc	Profile 	≤ 0.1	≤ 1	24	RPM	1293	969	776	646	485	388
							Fz	0.024	0.038	0.048	0.060	0.069	0.077
							Feed (mm/min)	186	223	223	233	201	180
			HSM 	≤ 0.05	≤ 2	30	RPM	1616	1212	969	808	606	485
							Fz	0.031	0.053	0.067	0.082	0.095	0.109
							Feed (mm/min)	302	388	388	395	344	318
TITANIUM ALLOYS Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si	≤ 350 Bhn or ≤ 38 HRc	Profile 	≤ 0.1	≤ 1	85	RPM	4524	3393	2714	2262	1696	1357	
						Fz	0.024	0.038	0.048	0.060	0.069	0.077	
						Feed (mm/min)	651	782	782	814	704	630	
		HSM 	≤ 0.05	≤ 2	108	RPM	5736	4302	3441	2868	2151	1721	
						Fz	0.031	0.053	0.067	0.082	0.095	0.109	
						Feed (mm/min)	1074	1377	1377	1404	1222	1129	
TITANIUM ALLOYS (DIFFICULT) Ti10V2Fe3Al, Ti5Al5V5Mo3Cr, Ti7Al4Mo, Ti3Al8V6Cr4Zr4Mo, Ti6Al6V6Sn, Ti15V3 Cr3Sn3Al	≤ 420 Bhn or ≤ 45 HRc	Profile 	≤ 0.1	≤ 1	47	RPM	2504	1878	1503	1252	939	751	
						Fz	0.024	0.038	0.048	0.060	0.069	0.077	
						Feed (mm/min)	361	433	433	451	389	349	
		HSM 	≤ 0.05	≤ 2	61	RPM	3231	2424	1939	1616	1212	969	
						Fz	0.031	0.053	0.067	0.082	0.095	0.109	
						Feed (mm/min)	605	776	776	791	689	636	

Bhn (Brinell) HRc (Rockwell C) HSM (High Speed Machining)
 rpm = (Vc x 1000) / (DC x 3.14)
 mm/min = Fz x 6 x rpm
 reduce speed and feed for materials harder than listed
 reduce feed and Ae when finish milling (.02 x DC maximum)
 feed rates listed have chip thinning adjustments included where applicable
 refer to the SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)