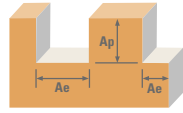


Series Z1MB	Metric	Hardness	Ae x DC	Ap x DC	Vc (m/min)	DC • mm									
						3	6	8	10	12	16	20	25		
P	CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536	≤ 275 Bhn or ≤ 28 HRc	Profile	≤ 0.5	≤ 1.5	169	RPM	17934	8967	6725	5380	4484	3363	2690	2152
						(135-203)	Fz	0.009	0.024	0.041	0.051	0.060	0.079	0.086	0.088
						Feed (mm/min)	654	861	1091	1090	1076	1067	927	753	
			Slot	1	≤ 1	134	RPM	14218	7109	5332	4265	3555	2666	2133	1706
						(107-161)	Fz	0.009	0.024	0.041	0.051	0.060	0.079	0.086	0.088
						Feed (mm/min)	519	682	865	864	853	846	735	597	
	ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100	≤ 375 Bhn or ≤ 40 HRc	Profile	≤ 0.5	≤ 1.5	96	RPM	10179	5089	3817	3054	2545	1909	1527	1221
						(77-115)	Fz	0.007	0.019	0.030	0.037	0.046	0.061	0.067	0.068
						Feed (mm/min)	274	391	456	456	464	469	407	330	
			Slot	1	≤ 1	76	RPM	8078	4039	3029	2424	2020	1515	1212	969
						(61-91)	Fz	0.007	0.019	0.030	0.037	0.046	0.061	0.067	0.068
						Feed (mm/min)	217	310	362	362	368	372	323	262	
M	STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F, 440F	≤ 275 Bhn or ≤ 28 HRc	Profile	≤ 0.5	≤ 1.5	149	RPM	15834	7917	5938	4750	3958	2969	2375	1900
						(119-179)	Fz	0.007	0.017	0.030	0.037	0.043	0.059	0.064	0.063
						Feed (mm/min)	456	532	709	709	684	699	608	475	
			Slot	1	≤ 1	119	RPM	12602	6301	4726	3781	3151	2363	1890	1512
						(95-143)	Fz	0.007	0.017	0.030	0.037	0.043	0.059	0.064	0.063
						Feed (mm/min)	363	423	565	565	544	557	484	378	
	STAINLESS STEELS (DIFFICULT) 304, 304L, 316, 316L	≤ 275 Bhn or ≤ 28 HRc	Profile	≤ 0.5	≤ 1.5	104	RPM	10987	5493	4120	3296	2747	2060	1648	1318
						(83-124)	Fz	0.005	0.014	0.023	0.029	0.034	0.046	0.051	0.050
						Feed (mm/min)	211	316	387	387	369	380	334	264	
			Slot	1	≤ 1	82	RPM	8725	4362	3272	2617	2181	1636	1309	1047
						(66-99)	Fz	0.005	0.014	0.023	0.029	0.034	0.046	0.051	0.050
						Feed (mm/min)	168	251	307	307	293	302	265	209	
STAINLESS STEELS (PH) 13-8 PH, 15-5 PH, 17-4 PH, Custom 450	≤ 325 Bhn or ≤ 35 HRc	Profile	≤ 0.5	≤ 1.5	94	RPM	10017	5009	3756	3005	2504	1878	1503	1202	
					(76-113)	Fz	0.005	0.014	0.023	0.029	0.034	0.046	0.051	0.050	
					Feed (mm/min)	192	288	353	353	337	346	305	240		
		Slot	1	≤ 1	76	RPM	8078	4039	3029	2424	2020	1515	1212	969	
					(61-91)	Fz	0.005	0.014	0.023	0.029	0.034	0.046	0.051	0.050	
					Feed (mm/min)	155	233	284	284	271	279	246	194		
K	CAST IRONS (LOW & MEDIUM ALLOY) Gray, Malleable, Ductile	≤ 220 Bhn or ≤ 19 HRc	Profile	≤ 0.5	≤ 1.5	136	RPM	14380	7190	5392	4314	3595	2696	2157	1726
						(109-163)	Fz	0.008	0.024	0.038	0.048	0.058	0.077	0.083	0.085
						Feed (mm/min)	483	690	828	828	828	828	713	587	
			Slot	1	≤ 1	108	RPM	11471	5736	4302	3441	2868	2151	1721	1377
						(87-130)	Fz	0.008	0.024	0.038	0.048	0.058	0.077	0.083	0.085
						Feed (mm/min)	385	551	661	661	661	661	569	468	

continued on next page

METRIC Z-Carb



Series Z1MB Metric	Hardness	Ae x DC	Ap x DC	Vc (m/min)	DC • mm									
					3	6	8	10	12	16	20	25		
K	CAST IRONS (HIGH ALLOY) Gray, Malleable, Ductile ≤ 260 Bhn or ≤ 26 HRc	Profile 	≤ 0.5	≤ 1.5	104	RPM	10987	5493	4120	3296	2747	2060	1648	1318
					(83-124)	Fz	0.007	0.017	0.030	0.037	0.043	0.059	0.064	0.063
					Feed (mm/min)	316	369	492	492	475	485	422	330	
		Slot 	1	≤ 1	82	RPM	8725	4362	3272	2617	2181	1636	1309	1047
					(66-99)	Fz	0.007	0.017	0.030	0.037	0.043	0.059	0.064	0.063
					Feed (mm/min)	251	293	391	391	377	385	335	262	
S	SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy, Monel 400 ≤ 300 Bhn or ≤ 32 HRc	Profile 	≤ 0.5	≤ 1.5	24	RPM	2585	1293	969	776	646	485	388	310
					(20-29)	Fz	0.005	0.010	0.017	0.021	0.024	0.033	0.037	0.038
					Feed (mm/min)	55	50	66	53	62	65	58	47	
		Slot 	1	≤ 1	20	RPM	2100	1050	788	630	525	394	315	252
					(16-24)	Fz	0.005	0.010	0.017	0.021	0.024	0.033	0.037	0.038
					Feed (mm/min)	40	40	54	54	50	52	47	38	
S	SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 718, X-750, Incoloy, Waspaloy, Hastelloy, Rene ≤ 400 Bhn or ≤ 43 HRc	Profile 	≤ 0.5	≤ 1.5	19	RPM	2003	1002	751	601	501	376	301	240
					(15-23)	Fz	0.002	0.007	0.011	0.013	0.017	0.020	0.024	0.025
					Feed (mm/min)	19	29	32	32	34	31	29	24	
		Slot 	1	≤ 1	15	RPM	1583	792	594	475	396	297	238	190
					(12-18)	Fz	0.002	0.007	0.011	0.013	0.017	0.020	0.024	0.025
					Feed (mm/min)	15	23	25	25	27	24	23	19	
S	TITANIUM ALLOYS Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si ≤ 350 Bhn or ≤ 38 HRc	Profile 	≤ 0.5	≤ 1.5	66	RPM	6947	3474	2605	2084	1737	1303	1042	834
					(52-79)	Fz	0.005	0.012	0.021	0.027	0.031	0.041	0.045	0.045
					Feed (mm/min)	133	167	222	222	217	213	189	150	
		Slot 	1	≤ 1	52	RPM	5493	2747	2060	1648	1373	1030	824	659
					(41-62)	Fz	0.005	0.012	0.021	0.027	0.031	0.041	0.045	0.045
					Feed (mm/min)	105	132	176	176	171	169	149	119	
S	TITANIUM ALLOYS (DIFFICULT) Ti10Al2Fe3Al, Ti5Al5V5Mo3Cr, Ti7Al4Mo, Ti3Al8V6Cr4Zr4Mo, Ti6Al6V6Sn, Ti15V3 Cr3Sn3Al ≤ 440 Bhn or ≤ 47 HRc	Profile 	≤ 0.5	≤ 1.5	23	RPM	2424	1212	909	727	606	454	364	291
					(18-27)	Fz	0.005	0.012	0.021	0.027	0.031	0.041	0.045	0.045
					Feed (mm/min)	47	58	78	78	76	74	66	52	
		Slot 	1	≤ 1	18	RPM	1939	969	727	582	485	364	291	233
					(15-22)	Fz	0.005	0.012	0.021	0.027	0.031	0.041	0.045	0.045
					Feed (mm/min)	37	47	62	62	60	60	53	42	
H	TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2 ≤ 375 Bhn or ≤ 40 HRc	Profile 	≤ 0.5	≤ 1.5	56	RPM	5978	2989	2242	1793	1495	1121	897	717
					(45-68)	Fz	0.005	0.012	0.021	0.027	0.031	0.041	0.045	0.045
					Feed (mm/min)	115	143	191	191	186	184	163	129	
		Slot 	1	≤ 1	44	RPM	4686	2343	1757	1406	1171	879	703	562
					(35-53)	Fz	0.005	0.012	0.021	0.027	0.031	0.041	0.045	0.045
					Feed (mm/min)	90	112	150	150	146	144	127	101	

Bhn (Brinell) HRc (Rockwell C)
 $rpm = (Vc \times 1000) / (DC \times 3.14)$
 $mm/min = Fz \times 4 \times rpm$
 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)