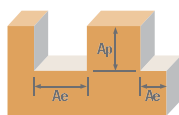
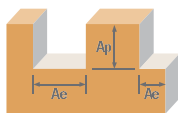


# METRIC V-Carb



Series 55M, 55MCR, 55MB Metric	Hardness	Ae x D <sub>1</sub>	Ap x D <sub>1</sub>	Vc (m/min)	Diameter (D <sub>1</sub> ) (mm)							
					6	8	10	12	16	20		
<b>P</b>	<b>CARBON STEELS</b> 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536	Profile 	≤ 0.25	≤ 1.5	117	RPM	6220	4665	3732	3110	2333	1866
					(94-141)	Fz	0.022	0.036	0.061	0.070	0.072	0.085
					Feed (mm/min)	672	846	1145	1082	836	796	
		HSM 	≤ 0.05	≤ 2	192	RPM	10179	7634	6107	5089	3817	3054
					(154-230)	Fz	0.043	0.073	0.123	0.137	0.141	0.154
					Feed (mm/min)	2198	2769	3746	3481	2687	2345	
	<b>ALLOY STEELS</b> 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100	Profile 	≤ 0.25	≤ 1.5	99	RPM	5251	3938	3151	2626	1969	1575
					(79-119)	Fz	0.017	0.028	0.045	0.053	0.054	0.064
					Feed (mm/min)	441	546	571	693	529	504	
		HSM 	≤ 0.05	≤ 2	162	RPM	8563	6422	5138	4282	3211	2569
					(129-194)	Fz	0.034	0.055	0.091	0.103	0.105	0.128
					Feed (mm/min)	1438	1781	2329	2209	1685	1644	
<b>H</b>	<b>TOOL STEELS</b> A2, D2, H13, L2, M2, P20, S7, T15, W2	Profile 	≤ 0.25	≤ 1.5	53	RPM	2827	2121	1696	1414	1060	848
					(43-64)	Fz	0.012	0.021	0.035	0.038	0.044	0.048
					Feed (mm/min)	170	226	294	271	231	204	
		HSM 	≤ 0.05	≤ 2	88	RPM	4686	3514	2811	2343	1757	1406
					(71-106)	Fz	0.024	0.041	0.067	0.077	0.084	0.093
					Feed (mm/min)	562	712	937	900	742	656	
<b>K</b>	<b>CAST IRONS (LOW &amp; MEDIUM ALLOY)</b> Gray, Malleable, Ductile	Profile 	≤ 0.25	≤ 1.5	143	RPM	7594	5695	4556	3797	2848	2278
					(115-172)	Fz	0.022	0.036	0.061	0.070	0.077	0.085
					Feed (mm/min)	820	1033	1397	1321	1093	972	
		HSM 	≤ 0.05	≤ 2	215	RPM	11391	8543	6834	5695	4271	3417
					(172-258)	Fz	0.043	0.073	0.123	0.137	0.151	0.171
					Feed (mm/min)	2460	3099	4192	3895	3226	2916	
	<b>CAST IRONS (HIGH ALLOY)</b> Gray, Malleable, Ductile	Profile 	≤ 0.25	≤ 1.5	110	RPM	5816	4362	3490	2908	2181	1745
					(88-132)	Fz	0.017	0.028	0.045	0.053	0.059	0.064
					Feed (mm/min)	489	605	791	768	642	558	
		HSM 	≤ 0.05	≤ 2	165	RPM	8725	6544	5235	4362	3272	2617
					(132-198)	Fz	0.034	0.055	0.091	0.103	0.113	0.128
					Feed (mm/min)	1466	1815	2373	2251	1843	1675	

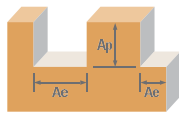
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Series	Hardness	Ae x D <sub>1</sub>	Ap x D <sub>1</sub>	Vc (m/min)	Diameter (D <sub>1</sub> ) (mm)									
					6	8	10	12	16	20				
55M, 55MCR, 55MB Metric	≤ 275 Bhn or ≤ 28 HRc	≤ 0.25	≤ 1.5	113	RPM	5978	4484	3587	2989	2242	1793			
					Fz	0.017	0.028	0.045	0.053	0.059	0.064			
					Feed (mm/min)	502	622	813	789	660	574			
					Profile	HSM	171	RPM	9048	6786	5429	4524	3393	2714
								Fz	0.034	0.055	0.091	0.103	0.113	0.128
								Feed (mm/min)	1520	1882	2461	2334	1911	1737
STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F, 440F	≤ 275 Bhn or ≤ 28 HRc	≤ 0.25	≤ 1.5	78	RPM	4120	3090	2472	2060	1545	1236			
					Fz	0.014	0.026	0.043	0.048	0.054	0.061			
					Feed (mm/min)	297	396	527	494	415	379			
					Profile	HSM	117	RPM	6220	4665	3732	3110	2333	1866
								Fz	0.031	0.051	0.085	0.096	0.105	0.120
								Feed (mm/min)	970	1194	1592	1493	1224	1120
STAINLESS STEELS (DIFFICULT) 304, 304L, 316, 316L	≤ 275 Bhn or ≤ 28 HRc	≤ 0.25	≤ 1.5	72	RPM	3797	2848	2278	1898	1424	1139			
					Fz	0.014	0.021	0.037	0.041	0.046	0.051			
					Feed (mm/min)	273	13260	425	387	328	289			
					Profile	HSM	108	RPM	5736	4302	3441	2868	2151	1721
								Fz	0.026	0.045	0.075	0.082	0.092	0.104
								Feed (mm/min)	757	14850	1285	1170	991	895
STAINLESS STEELS (PH) 13-8 PH, 15-5 PH, 17-4 PH, Custom 450	≤ 325 Bhn or ≤ 35 HRc	≤ 0.25	≤ 1.5	21	RPM	1131	848	679	565	424	339			
					Fz	0.014	0.021	0.037	0.041	0.046	0.051			
					Feed (mm/min)	81	16530	196792	115	98	86			
					Profile	HSM	33	RPM	1729	1297	1037	864	648	519
								Fz	0.026	0.045	0.075	0.082	0.092	0.104
								Feed (mm/min)	228	290	387	353	299	270
SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy, Monel 400	≤ 300 Bhn or ≤ 32 HRc	≤ 0.25	≤ 1.5	17	RPM	889	666	533	444	333	267			
					Fz	0.010	0.017	0.027	0.031	0.036	0.040			
					Feed (mm/min)	43	57	71	69	60	53			
					Profile	HSM	26	RPM	1373	1030	824	687	515	412
								Fz	0.019	0.032	0.056	0.062	0.069	0.077
								Feed (mm/min)	132	165	231	214	178	159
SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 718, X-750, Incoloy, Waspaloy, Hastelloy, Rene	≤ 400 Bhn or ≤ 43 HRc	≤ 0.25	≤ 1.5	26	RPM	1373	1030	824	687	515	412			
					Fz	0.019	0.032	0.056	0.062	0.069	0.077			
					Feed (mm/min)	132	165	231	214	178	159			

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# METRIC V-Carb



Series 55M, 55MCR, 55MB Metric	Hardness	Ae x D <sub>1</sub>	Ap x D <sub>1</sub>	Vc (m/min)	Diameter (D <sub>1</sub> ) (mm)							
					6	8	10	12	16	20		
S	TITANIUM ALLOYS Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si ≤ 350 Bhn or ≤ 38 HRc	Profile 	≤ 0.25	≤ 1.5	72	RPM	3797	2848	2278	1898	1424	1139
					(57-86)	Fz	0.014	0.026	0.043	0.048	0.054	0.061
					Feed (mm/min)	273	365	486	456	383	349	
					119	RPM	6301	4726	3781	3151	2363	1890
					(95-143)	Fz	0.031	0.051	0.085	0.096	0.105	0.120
					Feed (mm/min)	983	1210	1613	1512	1240	1134	
	TITANIUM ALLOYS (DIFFICULT) Ti10Al2Fe3Al, Ti5Al5V5Mo3Cr, Ti7Al4Mo, Ti3Al8V6Cr4Zr4Mo, Ti6Al6V6Sn, Ti15V3 Cr3Sn3Al ≤ 440 Bhn or ≤ 47 HRc	Profile 	≤ 0.25	≤ 1.5	26	RPM	1373	1030	824	687	515	412
					(21-31)	Fz	0.014	0.026	0.043	0.048	0.054	0.061
					Feed (mm/min)	99	132	176	165	138	126	
					43	RPM	2262	1696	1357	1131	848	679
					(34-51)	Fz	0.031	0.051	0.085	0.096	0.108	0.120
					Feed (mm/min)	353	434	579	543	456	407	

Bhn (Brinell)    HRc (Rockwell C)    HSM (High Speed Machining)  
 $rpm = (Vc \times 1000) / (D_1 \times 3.14)$   
 $mm/min = Fz \times 5 \times rpm$   
 reduce speed and feed for materials harder than listed  
 reduce feed and Ae when finish milling (.02 x D<sub>1</sub> maximum)  
 reduce Ap to 1 x D<sub>1</sub> (maximum) when profile milling with long or extra long flute length tools  
 refer to the KYOCERA SGS Tool Wizard® for complete technical information ([www.kyocera-sgstool.com](http://www.kyocera-sgstool.com))