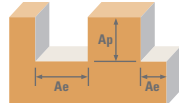
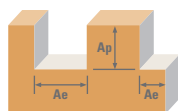


FRACTIONAL H-Carb



Series 77, 77CR Fractional		Hardness	Ae x DC		Vc (sfm)		DC • inch							
			Ae x DC	Ap x DC			1/4	3/8	1/2	5/8	3/4	1		
P	CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536	≤ 275 Bhn or ≤ 28 HRc		2.5xD		816 (653-979)	RPM	11552	7701	5776	4621	3851	2888	
				≤ 0.2	≤ APMX	Fz	0.0015	0.0024	0.0031	0.0035	0.0038	0.0042		
						Feed (ipm)	121	129	125	113	102	85		
				3xD		845 (676-1014)	Fz	0.0017	0.0027	0.0035	0.0040	0.0043	0.0047	
				≤ 0.15	≤ APMX	Feed (ipm)	136	146	140	129	116	95		
							4xD		756 (605-907)	Fz	0.0018	0.0028	0.0036	0.0041
		≤ 0.1	≤ APMX	Feed (ipm)	146		151	146	133	119	99			
				ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100	≤ 375 Bhn or ≤ 40 HRc			2.5xD		595 (476-714)	Fz	0.0009	0.0019	0.0026
		≤ 0.2	≤ APMX			Feed (ipm)		53	75	77	66	61	52	
								3xD		616 (493-739)	Fz	0.0010	0.0021	0.0030
		≤ 0.15	≤ APMX				Feed (ipm)	59	83	88	78	69	57	
								4xD		551 (441-661)	Fz	0.0011	0.0022	0.0031
	≤ 0.1	≤ APMX	Feed (ipm)			65		86	91	80	71	60		
			TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2	≤ 375 Bhn or ≤ 40 HRc		2.5xD		272 (218-326)	Fz	0.0006	0.0011	0.0014	0.0017	0.0020
	≤ 0.2	≤ APMX				Feed (ipm)	16	20	19	18	18	16		
							3xD		282 (226-338)	Fz	0.0007	0.0012	0.0016	0.0019
	≤ 0.15	≤ APMX			Feed (ipm)		19	22	22	20	20	18		
							4xD		252 (202-302)	Fz	0.0007	0.0013	0.0017	0.0020
	≤ 0.1	≤ APMX				Feed (ipm)	19	23	23	22	21	19		
				STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F, 440F		≤ 275 Bhn or ≤ 28 HRc		2.5xD		646 (517-775)	Fz	0.0009	0.0017	0.0023
	≤ 0.2	≤ APMX			Feed (ipm)			58	72	74	64	60	51	
								3xD		669 (535-803)	Fz	0.0010	0.0019	0.0026
	≤ 0.15	≤ APMX					Feed (ipm)	64	81	83	74	66	58	
								4xD		598 (478-718)	Fz	0.0011	0.0020	0.0027
≤ 0.1	≤ APMX	Feed (ipm)			70			85	86	77	70	59		
		STAINLESS STEELS (DIFFICULT) 304, 304L, 316, 316L	≤ 275 Bhn or ≤ 28 HRc			2.5xD		425 (340-510)	Fz	0.0007	0.0014	0.0019	0.0023	0.0026
≤ 0.2	≤ APMX					Feed (ipm)	29	39	40	39	37	32		
							3xD		440 (352-528)	Fz	0.0008	0.0016	0.0021	0.0025
≤ 0.15	≤ APMX				Feed (ipm)		34	45	44	42	41	36		
							4xD		394 (315-473)	Fz	0.0008	0.0016	0.0022	0.0026
≤ 0.1	≤ APMX					Feed (ipm)	34	45	46	44	42	37		
			STAINLESS STEELS (PH) 13-8 PH, 15-5PH, 17-4 PH, CUSTOM 450	≤ 325 Bhn or ≤ 35 HRc			2.5xD		408 (326-490)	Fz	0.0007	0.0014	0.0019	0.0023
≤ 0.2	≤ APMX				Feed (ipm)		28	38	38	37	35	30		
							3xD		422 (338-506)	Fz	0.0008	0.0016	0.0021	0.0025
≤ 0.15	≤ APMX					Feed (ipm)	32	43	42	40	39	34		
							4xD		378 (302-454)	Fz	0.0008	0.0016	0.0022	0.0026
≤ 0.1	≤ APMX				Feed (ipm)		32	43	44	42	40	35		

continued on next page



Series 77, 77CR						DC • inch							
Fractional	Hardness			Vc		1/4	3/8	1/2	5/8	3/4	1		
		Ae x DC	Ap x DC	(sfm)									
K	CAST IRONS (LOW & MEDIUM ALLOY) Gray, Malleable, Ductile	≤ 220 Bhn or ≤ 19 HRc		2.5xD		714 (571-857)	RPM	10100	6733	5050	4040	3367	2525
							Fz	0.0010	0.0018	0.0024	0.0028	0.0033	0.0037
				3xD		739 (591-887)	Fz	0.0011	0.0020	0.0027	0.0033	0.0037	0.0042
							Feed (ipm)	71	85	85	79	78	65
				4xD		661 (529-793)	Fz	0.0012	0.0021	0.0028	0.0034	0.0039	0.0043
							Feed (ipm)	78	94	95	93	87	73
	CAST IRONS (HIGH ALLOY) Gray, Malleable, Ductile	≤ 260 Bhn or ≤ 26 HRc		2.5xD		425 (340-510)	Fz	0.0007	0.0014	0.0019	0.0023	0.0026	0.0030
							Feed (ipm)	29	39	40	39	37	32
				3xD		440 (352-528)	Fz	0.0008	0.0016	0.0021	0.0025	0.0029	0.0037
							Feed (ipm)	34	45	44	42	41	39
				4xD		394 (315-473)	Fz	0.0008	0.0016	0.0022	0.0026	0.0030	0.0035
							Feed (ipm)	34	45	46	44	42	37
S	HIGH TEMP ALLOYS (NICKEL , COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy, Monel 400	≤ 300 Bhn or ≤ 32 HRc		2.5xD		136 (109-163)	RPM	1925	1284	963	770	642	481
							Fz	0.0006	0.0011	0.0016	0.0018	0.0021	0.0025
				3xD		141 (113-169)	Fz	0.0007	0.0012	0.0018	0.0021	0.0024	0.0028
							Feed (ipm)	8	10	11	10	9	8
				4xD		126 (101-151)	Fz	0.0007	0.0013	0.0018	0.0022	0.0025	0.0029
							Feed (ipm)	9	11	12	11	11	9
	HIGH TEMP ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 718, X-750, Incoloy, Waspaloy, Hastelloy, Rene	≤ 400 Bhn or ≤ 43 HRc		2.5xD		85 (68-102)	Fz	0.0005	0.0009	0.0013	0.0015	0.0018	0.0022
							Feed (ipm)	4	5	5	5	5	5
				3xD		88 (70-106)	Fz	0.0005	0.0010	0.0015	0.0018	0.0020	0.0025
							Feed (ipm)	4	6	6	6	6	5
				4xD		79 (63-95)	Fz	0.0006	0.0011	0.0015	0.0018	0.0021	0.0026
							Feed (ipm)	4	6	6	6	6	5
TITANIUM ALLOYS Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si	≤ 350 Bhn or ≤ 38 HRc		2.5xD		289 (231-347)	RPM	4095	2730	2048	1638	1365	1024	
						Fz	0.0008	0.0015	0.0021	0.0024	0.0028	0.0032	
			3xD		299 (239-359)	Fz	0.0009	0.0017	0.0023	0.0025	0.0028	0.0036	
						Feed (ipm)	23	29	30	28	27	23	
			4xD		268 (214-322)	Fz	0.0009	0.0018	0.0024	0.0029	0.0033	0.0037	
						Feed (ipm)	26	32	33	29	27	26	
TITANIUM ALLOYS (DIFFICULT) Ti10V2Fe3Al, Ti5Al5V5Mo3Cr, Ti7Al4Mo, Ti3Al8V6Cr4Zr4Mo, Ti6Al6V6Sn, Ti15V3 Cr3Sn3Al	≤ 420 Bhn or ≤ 45 HRc		2.5xD		170 (136-204)	Fz	0.0008	0.0015	0.0021	0.0024	0.0028	0.0032	
						Feed (ipm)	13	17	18	16	16	13	
			3xD		176 (141-211)	Fz	0.0009	0.0017	0.0023	0.0025	0.0028	0.0036	
						Feed (ipm)	15	19	19	17	16	15	
			4xD		157 (126-188)	Fz	0.0009	0.0018	0.0024	0.0029	0.0033	0.0037	
						Feed (ipm)	15	20	20	19	18	16	

Bhn (Brinell) HRc (Rockwell C) HSM (High Speed Machining)
 rpm = Vc x 3.82 / DC
 ipm = Fz x 7 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)