

FRACTIONAL Hi-PerCarb®

Series 135 3D Fractional	Hardness	Vc (sfm)	DC • in								
			1/32	1/8	1/4	3/8	1/2	5/8	7/8		
P CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536	≤ 175 Bhn or ≤ 7 HRc	385	RPM	47062	11766	5883	3922	2941	2353	1681	
		(308-462)	Fr	0.0010	0.0038	0.0076	0.0115	0.0153	0.0191	0.0268	
			Feed (ipm)	45.0	45.0	45.0	45.0	45.0	45.0	45.0	
	≤ 275 Bhn or ≤ 28 HRc	350	RPM	42784	10696	5348	3565	2674	2139	1528	
		(280-420)	Fr	0.0009	0.0036	0.0071	0.0107	0.0142	0.0178	0.0249	
			Feed (ipm)	38.0	38.0	38.0	38.0	38.0	38.0	38.0	
	≤ 425 Bhn or ≤ 45 HRc	200	RPM	24448	6112	3056	2037	1528	1222	873	
		(160-240)	Fr	0.0007	0.0029	0.0059	0.0088	0.0118	0.0147	0.0206	
			Feed (ipm)	18.0	18.0	18.0	18.0	18.0	18.0	18.0	
	M ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100	≤ 275 Bhn or ≤ 28 HRc	300	RPM	36672	9168	4584	3056	2292	1834	1310
			(240-360)	Fr	0.0007	0.0029	0.0059	0.0088	0.0118	0.0147	0.0206
				Feed (ipm)	27.0	27.0	27.0	27.0	27.0	27.0	27.0
≤ 375 Bhn or ≤ 40 HRc		185	RPM	22614	5654	2827	1885	1413	1131	808	
		(148-222)	Fr	0.0006	0.0026	0.0051	0.0077	0.0103	0.0128	0.0180	
			Feed (ipm)	14.5	14.5	14.5	14.5	14.5	14.5	14.5	
≤ 450 Bhn or ≤ 48 HRc		130	RPM	15891	3973	1986	1324	993	795	568	
		(104-156)	Fr	0.0004	0.0018	0.0035	0.0053	0.0070	0.0088	0.0123	
			Feed (ipm)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	
K STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F, 440F		≤ 185 Bhn or ≤ 9 HRc	275	RPM	33616	8404	4202	2801	2101	1681	1201
			(220-330)	Fr	0.0006	0.0026	0.0051	0.0077	0.0102	0.0128	0.0179
				Feed (ipm)	21.5	21.5	21.5	21.5	21.5	21.5	21.5
	≤ 275 Bhn or ≤ 28 HRc	170	RPM	20781	5195	2598	1732	1299	1039	742	
		(136-204)	Fr	0.0005	0.0020	0.0040	0.0061	0.0081	0.0101	0.0141	
			Feed (ipm)	10.5	10.5	10.5	10.5	10.5	10.5	10.5	
K STAINLESS STEELS (DIFFICULT) 304, 316, 321, 13-8 PH, 15-5PH, 17-4 PH, Custom 450	≤ 275 Bhn or ≤ 28 HRc	90	RPM	11002	2750	1375	917	688	550	393	
		(72-108)	Fr	0.0005	0.0020	0.0040	0.0060	0.0080	0.0100	0.0140	
			Feed (ipm)	5.5	5.5	5.5	5.5	5.5	5.5	5.5	
	≤ 375 Bhn or ≤ 40 HRc	65	RPM	7946	1986	993	662	497	397	284	
		(52-78)	Fr	0.0004	0.0018	0.0035	0.0053	0.0070	0.0088	0.0123	
			Feed (ipm)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	
K CAST IRONS Gray, Malleable, Ductile	≤ 220 Bhn or ≤ 19 HRc	320	RPM	39117	9779	4890	3260	2445	1956	1397	
		(256-384)	Fr	0.0012	0.0046	0.0092	0.0138	0.0184	0.0230	0.0322	
			Feed (ipm)	45.0	45.0	45.0	45.0	45.0	45.0	45.0	
	≤ 260 Bhn or ≤ 26 HRc	285	RPM	34838	8710	4355	2903	2177	1742	1244	
		(228-342)	Fr	0.0011	0.0046	0.0092	0.0138	0.0184	0.0230	0.0321	
			Feed (ipm)	40.0	40.0	40.0	40.0	40.0	40.0	40.0	

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Series 135 3D Fractional	Hardness	Vc (sfm)		DC • in							
				1/32	1/8	1/4	3/8	1/2	5/8	7/8	
N ALUMINUM ALLOYS 2017, 2024, 356, 6061, 7075	≤ 80 Bhn or ≤ 47 HRb	700 (560-840)	RPM	85568	21392	10696	7131	5348	4278	3056	
			Fr	0.0012	0.0049	0.0098	0.0147	0.0196	0.0245	0.0344	
			Feed (ipm)	105.0	105.0	105.0	105.0	105.0	105.0	105.0	
	≤ 150 Bhn or ≤ 7 HRc	600 (480-720)	RPM	73344	18336	9168	6112	4584	3667	2619	
			Fr	0.0012	0.0050	0.0099	0.0149	0.0199	0.0248	0.0347	
			Feed (ipm)	91.0	91.0	91.0	91.0	91.0	91.0	91.0	
	COPPER ALLOYS Alum Bronze, C110, Muntz Brass	≤ 140 Bhn or ≤ 3 HRc	500 (400-600)	RPM	61120	15280	7640	5093	3820	3056	2183
				Fr	0.0005	0.0020	0.0039	0.0059	0.0079	0.0098	0.0137
				Feed (ipm)	30.0	30.0	30.0	30.0	30.0	30.0	30.0
		≤ 200 Bhn or ≤ 23 HRc	400 (320-480)	RPM	48896	12224	6112	4075	3056	2445	1746
				Fr	0.0005	0.0020	0.0040	0.0060	0.0080	0.0100	0.0140
				Feed (ipm)	24.5	24.5	24.5	24.5	24.5	24.5	24.5
S SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy, Monel 400, Rene, Waspaloy	≤ 300 Bhn or ≤ 32 HRc	55 (44-66)	RPM	6723	1681	840	560	420	336	240	
			Fr	0.0002	0.0008	0.0015	0.0023	0.0031	0.0039	0.0054	
			Feed (ipm)	1.3	1.3	1.3	1.3	1.3	1.3	1.3	
	≤ 400 Bhn or ≤ 43 HRc	30 (24-36)	RPM	3667	917	458	306	229	183	131	
			Fr	0.0002	0.0007	0.0013	0.0020	0.0026	0.0033	0.0046	
			Feed (ipm)	0.6	0.6	0.6	0.6	0.6	0.6	0.6	
	TITANIUM ALLOYS Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si, Ti-6Al4V	≤ 275 Bhn or ≤ 28 HRc	135 (108-162)	RPM	16502	4126	2063	1375	1031	825	589
				Fr	0.0004	0.0018	0.0035	0.0053	0.0071	0.0088	0.0124
				Feed (ipm)	7.3	7.3	7.3	7.3	7.3	7.3	7.3
		≤ 350 Bhn or ≤ 38 HRc	100 (80-120)	RPM	12224	3056	1528	1019	764	611	437
				Fr	0.0004	0.0016	0.0033	0.0049	0.0065	0.0082	0.0115
				Feed (ipm)	5.0	5.0	5.0	5.0	5.0	5.0	5.0
≤ 440 Bhn or ≤ 47 HRc	55 (44-66)	RPM	6723	1681	840	560	420	336	240		
		Fr	0.0003	0.0012	0.0024	0.0036	0.0048	0.0059	0.0083		
		Feed (ipm)	2.0	2.0	2.0	2.0	2.0	2.0	2.0		
H TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2	≤ 200 Bhn or ≤ 13 HRc	130 (104-156)	RPM	15891	3973	1986	1324	993	795	568	
			Fr	0.0007	0.0026	0.0053	0.0079	0.0106	0.0132	0.0185	
			Feed (ipm)	10.5	10.5	10.5	10.5	10.5	10.5	10.5	
	≤ 375 Bhn or ≤ 40 HRc	90 (72-108)	RPM	11002	2750	1375	917	688	550	393	
			Fr	0.0003	0.0012	0.0023	0.0035	0.0047	0.0058	0.0081	
			Feed (ipm)	3.2	3.2	3.2	3.2	3.2	3.2	3.2	
	≤ 475 Bhn or ≤ 50 HRc	75 (60-90)	RPM	9168	2292	1146	764	573	458	327	
			Fr	0.0002	0.0008	0.0016	0.0024	0.0031	0.0039	0.0055	
			Feed (ipm)	1.8	1.8	1.8	1.8	1.8	1.8	1.8	

Bhn (Brinell) HRc (Rockwell C) HRb (Rockwell B)
 $rpm = Vc \times 3.82 / DC$
 $ipm = Fr \times rpm$
 reduce speed and feed for materials harder than listed
 refer to the SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)