

Series 101 Fractional	Hardness BRINELL	Vc (SFM)		Diameter (D ₁) (inch)						
				1/64	1/32	1/16	1/8	1/4	3/8	1/2
P CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536	≤ 200	265 (212-318)	RPM	64787	32394	16197	8098	4049	2699	2025
			Fr	0.0002	0.0004	0.0009	0.0017	0.0034	0.0050	0.0070
			Feed (IPM)	13.0	13.0	14.6	13.8	13.8	13.5	14.2
	> 200 ≤ 300	125 (100-150)	RPM	30560	15280	7640	3820	1910	1273	955
			Fr	0.0002	0.0004	0.0008	0.0016	0.0031	0.0045	0.0060
			Feed (IPM)	6.1	6.1	6.1	6.1	5.9	5.7	5.7
	> 300 ≤ 420	85 (68-102)	RPM	20781	10390	5195	2598	1299	866	649
			Fz	0.0001	0.0002	0.0005	0.0009	0.0018	0.0025	0.0035
			Feed (IPM)	2.1	2.1	2.6	2.3	2.3	2.2	2.3
P ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100	≤ 275	230 (184-276)	RPM	56230	28115	14058	7029	3514	2343	1757
			Fz	0.0002	0.0004	0.0008	0.0016	0.0031	0.0045	0.0060
			Feed (IPM)	11.2	11.2	11.2	11.2	10.9	10.5	10.5
	> 275 ≤ 375	145 (116-174)	RPM	35450	17725	8862	4431	2216	1477	1108
			Fr	0.0002	0.0004	0.0008	0.0015	0.0030	0.0045	0.0060
			Feed (IPM)	7.1	7.1	7.1	6.6	6.6	6.6	6.6
	> 375 ≤ 450	60 (48-72)	RPM	14669	7334	3667	1834	917	611	458
			Fr	0.0001	0.0002	0.0004	0.0007	0.0013	0.0020	0.0025
			Feed (IPM)	1.5	1.5	1.5	1.3	1.2	1.2	1.1
P TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2	≤ 250	85 (68-102)	RPM	20781	10390	5195	2598	1299	866	649
			Fr	0.0001	0.0002	0.0005	0.0009	0.0018	0.0025	0.0035
			Feed (IPM)	2.1	2.1	2.6	2.3	2.3	2.2	2.3
	> 250 ≤ 330	55 (44-66)	RPM	13446	6723	3362	1681	840	560	420
			Fr	0.00005	0.0001	0.0002	0.0004	0.0008	0.0010	0.0015
			Feed (IPM)	0.7	0.7	0.7	0.7	0.7	0.6	0.6
	> 330 ≤ 450	40 (32-48)	RPM	9779	4890	2445	1222	611	407	306
			Fr	0.00005	0.0001	0.0002	0.0004	0.0008	0.0010	0.0015
			Feed (IPM)	0.5	0.5	0.5	0.5	0.5	0.4	0.5
K CAST IRONS Gray, Malleable, Ductile	≤ 200	280 (224-336)	RPM	68454	34227	17114	8557	4278	2852	2139
			Fr	0.00025	0.0005	0.0011	0.0021	0.0041	0.0060	0.0080
			Feed (IPM)	17.1	17.1	18.8	18.0	17.5	17.1	17.1
	> 200 ≤ 330	250 (200-300)	RPM	61120	30560	15280	7640	3820	2547	1910
			Fr	0.00025	0.0005	0.0011	0.0021	0.0041	0.0060	0.0080
			Feed (IPM)	15.3	15.3	16.8	16.0	15.7	15.3	15.3
M STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F 440F	< 250	210 (168-252)	RPM	51341	25670	12835	6418	3209	2139	1604
			Fr	0.00015	0.0003	0.0006	0.0012	0.0024	0.0035	0.0050
			Feed (IPM)	7.7	7.7	7.7	7.7	7.7	7.5	8.0
	> 250 ≤ 330	110 (88-132)	RPM	26893	13446	6723	3362	1681	1121	840
			Fr	0.0001	0.0002	0.0004	0.0007	0.0014	0.0020	0.0030
			Feed (IPM)	2.7	2.7	2.7	2.4	2.4	2.2	2.5

continued on next page



Series	Hardness	Vc	Diameter (D ₁)									
			(inch)									
101 Fractional	BRINELL	(SFM)	1/64	1/32	1/16	1/8	1/4	3/8	1/2			
M	STAINLESS STEELS (DIFFICULT) 304, 316, 321, 13-8 PH, 15-5PH, 17-4 PH, Custom 450	65	RPM	15891	7946	3973	1986	993	662	497		
		> 270 ≤ 370	(52-78)	Fr	0.0001	0.0002	0.0005	0.0009	0.0018	0.0025	0.0035	
				Feed (IPM)	1.6	1.6	2.0	1.8	1.8	1.7	1.7	
		> 270 ≤ 370	55	(44-66)	RPM	13446	6723	3362	1681	840	560	420
					Fr	0.0001	0.0002	0.0004	0.0008	0.0015	0.0025	0.0030
					Feed (IPM)	1.3	1.3	1.3	1.3	1.3	1.4	1.3
RPM	9779				4890	2445	1222	611	407	306		
S	SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 601, 617, 625, Incoly 800, Monel 400, Rene, Waspaloy	40	RPM	9779	4890	2445	1222	611	407	306		
		≤ 220	(32-48)	Fr	0.0001	0.0002	0.0005	0.0009	0.0018	0.0025	0.0035	
				Feed (IPM)	1.0	1.0	1.2	1.1	1.1	1.0	1.1	
		> 220 ≤ 330	(20-30)	RPM	6112	3056	1528	764	382	255	191	
				Fr	0.0001	0.0002	0.0004	0.0008	0.0015	0.0025	0.0030	
				Feed (IPM)	0.6	0.6	0.6	0.6	0.6	0.6	0.6	
RPM	4890			2445	1222	611	306	204	153			
> 330 ≤ 420	(16-24)	Fr	0.00005	0.0001	0.0002	0.0004	0.0008	0.0010	0.0015			
		Feed (IPM)	0.2	0.2	0.2	0.2	0.2	0.2	0.2			
S	TITANIUM ALLOYS (DIFFICULT) Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si, Ti-6Al4V	85	RPM	20781	10390	5195	2598	1299	866	649		
		≤ 280	(68-102)	Fr	0.0002	0.0004	0.0008	0.0016	0.0032	0.0050	0.0065	
				Feed (IPM)	4.2	4.2	4.2	4.2	4.2	4.3	4.2	
		> 280 ≤ 350	(52-78)	RPM	15891	7946	3973	1986	993	662	497	
				Fr	0.0001	0.0002	0.0005	0.0009	0.0018	0.0025	0.0035	
				Feed (IPM)	1.6	1.6	2.0	1.8	1.8	1.7	1.7	
RPM	13446			6723	3362	1681	840	560	420			
> 350 ≤ 440	(44-66)	Fr	0.0001	0.0002	0.0004	0.0008	0.0015	0.0025	0.0030			
		Feed (IPM)	1.3	1.3	1.3	1.3	1.3	1.4	1.3			
N	ALUMINUM ALLOYS 2017, 2024, 356, 6061, 7075	540	RPM	132019	66010	33005	16502	8251	5501	4126		
		≤ 80	(432-648)	Fr	0.0003	0.0006	0.0013	0.0025	0.0050	0.0075	0.0100	
				Feed (IPM)	39.6	39.6	42.9	41.3	41.3	41.3	41.3	
		> 80	(364-546)	RPM	111238	55619	27810	13905	6952	4635	3476	
				Fr	0.0003	0.0006	0.0013	0.0025	0.0050	0.0075	0.0100	
				Feed (IPM)	33.4	33.4	36.2	34.8	34.8	34.8	34.8	
RPM	46451			23226	11613	5806	2903	1935	1452			
≤ 140	(152-228)	Fr	0.00015	0.0003	0.0006	0.0012	0.0024	0.0035	0.0050			
		Feed (IPM)	7.0	7.0	7.0	7.0	7.0	6.8	7.3			
		RPM	42784	21392	10696	5348	2674	1783	1337			
		Fr	0.00015	0.0003	0.0006	0.0012	0.0024	0.0035	0.0050			
> 140	(140-210)	Feed (IPM)	6.4	6.4	6.4	6.4	6.4	6.2	6.7			
		RPM	122240	61120	30560	15280	7640	5093	3820			
N	PLASTICS Polycarbonate, PVC	500	RPM	122240	61120	30560	15280	7640	5093	3820		
		(400-600)	Fr	0.0003	0.0006	0.0013	0.0025	0.0050	0.0075	0.0100		
			Feed (IPM)	36.7	36.7	39.7	38.2	38.2	38.2	38.2		

rpm = sfm x 3.82 / D₁
 ipm = (inch / revolution) x rpm
 reduce speed and feed rates shown by 30 percent when using uncoated drills
 reduce speed and feed for materials harder than listed
 refer to the SGS Tool Wizard for complete technical information (www.sgstool.com)

