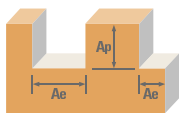


FRACTIONAL

**2 Flute: Square, Double, Stub, Long, Ball, Corner Radius**  
**3 Flute: Square, Ball, Tapered**  
**4 Flute: Square, Double, Stub, Ball, Corner Radius**  
**Tapered: Square, Radius**



Series  
 1, 3, 5, 14, 15, 16,  
 17, 23, 24, 59  
 Fractional

Material	Hardness	Flutes	Ae x DC	Ap x DC	Vc (sfm)	DC • in											
						1/64	1/32	1/16	1/8	1/4	3/8	1/2	3/4	1			
<b>CARBON STEELS</b> 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536	≤ 175 Bhn or ≤ 7 HRC	Profile	2	≤ 0.50	≤ 1.5	460	RPM	112461	56230	28115	14058	7029	4686	3514	2343	1757	
						Fz	0.00003	0.00006	0.00013	0.0003	0.0008	0.0015	0.0020	0.0024	0.0028		
						Feed (ipm)	6.7	6.7	7.3	8.4	11.2	14.1	14.1	16.9	14.8		
		Slot	2	1	≤ 1	335	RPM	81901	40950	20475	10238	5119	3413	2559	1706	1280	
						Fz	0.00003	0.00006	0.00013	0.0003	0.0008	0.0015	0.0020	0.0024	0.0028		
						Feed (ipm)	4.9	4.9	5.3	6.1	8.2	10.2	10.2	8.2	7.2		
	≤ 275 Bhn or ≤ 28 HRC	Profile	2	≤ 0.50	≤ 1.5	335	RPM	81901	40950	20475	10238	5119	3413	2559	1706	1280	
						Fz	0.00002	0.00005	0.00009	0.0002	0.0006	0.0011	0.0015	0.0018	0.0021		
						Feed (ipm)	3.3	4.1	3.7	4.1	6.1	7.5	7.7	6.1	5.4		
		Slot	2	1	≤ 1	245	RPM	59898	29949	14974	7487	3744	2496	1872	1248	936	
						Fz	0.00002	0.00005	0.00009	0.0002	0.0006	0.0011	0.0015	0.0018	0.0021		
						Feed (ipm)	2.4	3.0	2.7	3.0	4.5	5.5	5.6	4.5	3.9		
<b>STAINLESS STEELS (FREE MACHINING)</b> 303, 416, 420F, 430F 440F	≤ 275 Bhn or ≤ 28 HRC	Profile	2	≤ 0.50	≤ 1.5	370	RPM	90458	45229	22614	11307	5654	3769	2827	1885	1413	
						Fz	0.00002	0.00005	0.00009	0.0002	0.0006	0.0011	0.0015	0.0018	0.0021		
						Feed (ipm)	3.6	4.5	4.1	4.5	6.8	8.3	8.5	6.8	5.9		
		Slot	2	1	≤ 1	270	RPM	66010	33005	16502	8251	4126	2750	2063	1375	1031	
						Fz	0.00002	0.00005	0.00009	0.0002	0.0006	0.0011	0.0015	0.0018	0.0021		
						Feed (ipm)	2.6	3.3	3.0	3.3	5.0	6.1	6.2	5.0	4.3		
	≤ 275 Bhn or ≤ 28 HRC	Profile	2	≤ 0.50	≤ 1.5	255	RPM	62342	31171	15586	7793	3896	2598	1948	1299	974	
						Fz	0.00002	0.00004	0.00008	0.0002	0.0005	0.0009	0.0012	0.0014	0.0017		
						Feed (ipm)	2.5	2.5	2.5	2.6	3.9	4.7	4.7	3.6	3.3		
		Slot	2	1	≤ 1	185	RPM	45229	22614	11307	5654	2827	1885	1413	942	707	
						Fz	0.00002	0.00004	0.00008	0.0002	0.0005	0.0009	0.0012	0.0014	0.0017		
						Feed (ipm)	1.8	1.8	1.8	1.9	2.8	3.4	3.4	2.6	2.4		
<b>CAST IRONS</b> Gray, Malleable, Ductile	≤ 220 Bhn or ≤ 19 HRC	Profile	2	≤ 0.50	≤ 1.5	335	RPM	81901	40950	20475	10238	5119	3413	2559	1706	1280	
						Fz	0.00003	0.00006	0.00013	0.0003	0.0008	0.0015	0.0020	0.0024	0.0028		
						Feed (ipm)	4.9	4.9	5.3	6.1	8.2	10.2	10.2	8.2	7.2		
		Slot	2	1	≤ 1	245	RPM	59898	29949	14974	7487	3744	2496	1872	1248	936	
						Fz	0.00003	0.00006	0.00013	0.0003	0.0008	0.0015	0.0020	0.0024	0.0028		
						Feed (ipm)	7.4	7.4	8.0	9.2	12.3	15.4	15.4	12.3	10.7		
	<b>ALUMINUM ALLOYS</b> 2017, 2024, 356, 6061, 7075	≤ 150 Bhn or ≤ 7 HRC	Profile	2	≤ 0.50	≤ 1.5	880	RPM	215142	107571	53786	26893	13446	8964	6723	4482	3362
							Fz	0.00006	0.00013	0.00025	0.0006	0.0016	0.0030	0.0040	0.0048	0.0056	
							Feed (ipm)	25.8	28.0	26.9	32.3	43.0	53.8	53.8	43.0	37.6	
			Slot	2	1	≤ 1	640	RPM	156467	78234	39117	19558	9779	6519	4890	3260	2445
							Fz	0.00006	0.00013	0.00025	0.0006	0.0016	0.0030	0.0040	0.0048	0.0056	
							Feed (ipm)	18.8	20.3	19.6	23.5	31.3	39.1	39.1	31.3	27.4	
≤ 140 Bhn or ≤ 3 HRC		Profile	2	≤ 0.50	≤ 1.5	485	RPM	118573	59286	29643	14822	7411	4941	3705	2470	1853	
						Fz	0.00003	0.00006	0.00013	0.0003	0.0008	0.0015	0.0020	0.0024	0.0028		
						Feed (ipm)	7.1	7.1	7.7	8.9	11.9	14.8	14.8	11.9	10.4		
		Slot	2	1	≤ 1	350	RPM	85568	42784	21392	10696	5348	3565	2674	1783	1337	
						Fz	0.00003	0.00006	0.00013	0.0003	0.0008	0.0015	0.0020	0.0024	0.0028		
						Feed (ipm)	5.1	5.1	5.6	6.4	8.6	10.7	10.7	8.6	7.5		

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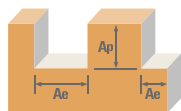
FRACTIONAL

2 Flute: Square, Double, Stub, Long, Ball, Corner Radius

3 Flute: Square, Ball, Tapered

4 Flute: Square, Double, Stub, Ball, Corner Radius

Tapered: Square, Radius



Series  
1, 3, 5, 14, 15, 16,  
17, 23, 24, 59  
Fractional

Material	Hardness	Flutes	Ae x DC	Ap x DC	Vc (sfm)	DC • in										
						1/64	1/32	1/16	1/8	1/4	3/8	1/2	3/4	1		
N PLASTICS Polycarbonate, PVC, Polypropylene	Profile	2	≤ 0.50	≤ 1.5	(704-1056)	RPM	880	215142	107571	53786	26893	13446	8964	6723	4482	3362
						Fz	0.00006	0.00013	0.00025	0.0006	0.0016	0.0030	0.0040	0.0048	0.0056	
						Feed (ipm)	25.8	28.0	26.9	32.3	43.0	53.8	53.8	43.0	37.6	
		3	≤ 0.25	≤ 1.5		RPM	640	156467	78234	39117	19558	9779	6519	4890	3260	2445
						Fz	0.00006	0.00013	0.00025	0.0006	0.0016	0.0030	0.0040	0.0048	0.0056	
						Feed (ipm)	18.8	20.3	19.6	23.5	31.3	39.1	39.1	31.3	27.4	
	Slot	2	1	≤ 1	(512-768)	RPM	660	161357	80678	40339	20170	10085	6723	5042	3362	2521
						Fz	0.00006	0.00013	0.00025	0.0006	0.0016	0.0030	0.0040	0.0048	0.0056	
						Feed (ipm)	19.4	21.0	20.2	24.2	32.3	40.3	40.3	32.3	28.2	
		3	1	≤ 0.5		RPM	480	117350	58675	29338	14669	7334	4890	3667	2445	1834
						Fz	0.00006	0.00013	0.00025	0.0006	0.0016	0.0030	0.0040	0.0048	0.0056	
						Feed (ipm)	21.1	22.9	22.0	26.4	35.2	44.0	44.0	35.2	30.8	
GRAPHITE	2	1	≤ 1	(384-576)	RPM	65	15891	7946	3973	1986	993	662	497	331	248	
					Fz	0.00002	0.00003	0.00006	0.0002	0.0004	0.0008	0.0010	0.0012	0.0014		
					Feed (ipm)	0.6	0.5	0.5	0.7	0.7	1.1	1.0	0.8	0.7		
	3	1	≤ 0.5		RPM	45	11002	5501	2750	1375	688	458	344	229	172	
					Fz	0.00002	0.00003	0.00006	0.0002	0.0004	0.0008	0.0010	0.0012	0.0014		
					Feed (ipm)	0.7	0.5	0.5	0.7	0.7	1.1	1.0	0.8	0.7		
SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 601, 617, 625, 718, Incoloy 800, Monel 400, Rene, Waspalloy	2	1	≤ 1	(36-54)	RPM	180	44006	22003	11002	5501	2750	1834	1375	917	688	
					Fz	0.00002	0.00004	0.00008	0.0002	0.0005	0.0009	0.0012	0.0014	0.0017		
					Feed (ipm)	1.8	1.8	1.8	2.2	2.8	3.3	3.3	2.6	2.3		
	3	1	≤ 0.5		RPM	130	31782	15891	7946	3973	1986	1324	993	662	497	
					Fz	0.00002	0.00004	0.00008	0.0002	0.0005	0.0009	0.0012	0.0014	0.0017		
					Feed (ipm)	1.3	1.3	1.3	1.6	2.0	2.4	2.4	1.9	1.7		
TITANIUM ALLOYS Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si, Ti10Al2Fe3Al, Ti5Al53Mo3Cr, Ti7Al4Mo, Ti3Al8V6Cr4Zr4Mo, Ti6Al6V6Sn, Ti152 Cr3Sn3Al	2	1	≤ 1	(104-156)	RPM	315	77011	38506	19253	9626	4813	3209	2407	1604	1203	
					Fz	0.00002	0.00005	0.00009	0.0002	0.0006	0.0011	0.0015	0.0018	0.0021		
					Feed (ipm)	3.1	3.9	3.5	3.9	5.8	7.1	7.2	5.8	5.1		
	3	1	≤ 0.5		RPM	230	56230	28115	14058	7029	3514	2343	1757	1171	879	
					Fz	0.00002	0.00005	0.00009	0.0002	0.0006	0.0011	0.0015	0.0018	0.0021		
					Feed (ipm)	2.2	2.8	2.5	2.8	4.2	5.2	5.3	4.2	3.7		
TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2	2	1	≤ 1	(184-276)	RPM	315	77011	38506	19253	9626	4813	3209	2407	1604	1203	
					Fz	0.00002	0.00005	0.00009	0.0002	0.0006	0.0011	0.0015	0.0018	0.0021		
					Feed (ipm)	3.1	3.9	3.5	3.9	5.8	7.1	7.2	5.8	5.1		
	3	1	≤ 0.5		RPM	230	56230	28115	14058	7029	3514	2343	1757	1171	879	
					Fz	0.00002	0.00005	0.00009	0.0002	0.0006	0.0011	0.0015	0.0018	0.0021		
					Feed (ipm)	2.2	2.8	2.5	2.8	4.2	5.2	5.3	4.2	3.7		
H	2	1	≤ 1	(184-276)	RPM	230	56230	28115	14058	7029	3514	2343	1757	1171	879	
					Fz	0.00002	0.00005	0.00009	0.0002	0.0006	0.0011	0.0015	0.0018	0.0021		
					Feed (ipm)	2.2	2.8	2.5	2.8	4.2	5.2	5.3	4.2	3.7		

Bhn (Brinell)    HRC (Rockwell C)

rpm = (Vc x 3.82) / DC

ipm = Fz x number of flutes x rpm

reduce speed and feed for materials harder than listed

for tapered end mills, base the speed on the largest diameter contacting

the workpiece and the feed on the smallest diameter

limit cut depths of long and extra long flute mills to .05 x DC when slotting

or profiling

reduce feed and Ae when finish milling (.02 x DC maximum)

refer to the SGS Tool Wizard® for complete technical information

(www.kyocera-sgstool.com)