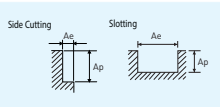


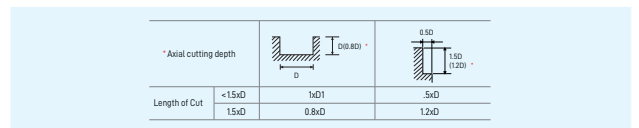
4FLUTE RECOMMENDED CUTTING CONDITIONS(INCH)

ISO Hardness (BHN)	Work Materials	Speed and Feed Recommendations			Diameter			
		Type of Cut	Ap x D1	Ae x D1	Parameters	1/8	5/32	3/16
P300	CARBON STEEL 10**, 11**, 12**, 12L**, 15**	Side Cutting	1.5(1.2)	0.5	RPM	499 (400-599)		
					Fz	15249	15249	15249
					FEED	0.0002	0.0002	0.0002
		SFM	12.01	12.01	12.01			
		Slotting	1 (0.8)	1	RPM	499 (400-599)		
					Fz	15249	15249	15249
FEED	0.0002				0.0002	0.0002		
SFM	12.01	12.01	12.01					
300(P380)	ALLOY STEEL 41**, 43**, 51**, 86**	Side Cutting	1.5(1.2)	0.5	RPM	351 (281-422)		
					Fz	10727	8581	7151
					FEED	0.0002	0.0003	0.0004
		SFM	8.45	10.81	12.39			
		Slotting	1 (0.8)	1	RPM	351 (281-422)		
					Fz	10727	8581	7151
FEED	0.0002				0.0003	0.0004		
SFM	8.45	10.81	12.39					
P380(P380)	TOOL STEEL A2, D2, H13, P20, T15	Side Cutting	1.5(1.2)	0.5	RPM	210 (168-252)		
					Fz	6418	5134	4278
					FEED	0.0001	0.0002	0.0003
		SFM	3.03	4.85	5.39			
		Slotting	1 (0.8)	1	RPM	210 (168-252)		
					Fz	6418	5134	4278
FEED	0.0001				0.0002	0.0003		
SFM	3.03	4.85	5.39					
K260	CAST IRON GRAY, MALLEABLE, DUCTILE	Side Cutting	1.5(1.2)	0.5	RPM	367 (294-440)		
					Fz	11216	8972	7477
					FEED	0.0002	0.0004	0.0006
		SFM	10.60	14.13	16.48			
		Slotting	1 (0.8)	1	RPM	367 (294-440)		
					Fz	11216	8972	7477
FEED	0.0002				0.0004	0.0006		
SFM	10.60	14.13	16.48					

Diameter										
7/32	1/4	9/32	5/16	11/32	3/8	7/16	1/2	5/8	3/4	1
499 (400-598)	499 (400-599)	499 (400-598)	499 (400-599)	525 (420-630)	551 (441-662)	551 (441-661)	551 (441-662)			
8714	7625	6778	6100	5834	5613	4811	4210	3368	2806	2105
0.0005	0.0006	0.0008	0.0011	0.0013	0.0015	0.0017	0.0019	0.0021	0.0026	0.0025
18.53	19.21	22.95	25.94	29.86	33.59	32.20	31.16	28.11	28.73	21.21
499 (400-598)	499 (400-599)	499 (400-598)	499 (400-599)	525 (420-630)	551 (441-662)	551 (441-661)	551 (441-662)			
8714	7625	6778	6100	5834	5613	4811	4210	3368	2806	2105
0.0005	0.0006	0.0008	0.0011	0.0013	0.0015	0.0017	0.0019	0.0021	0.0026	0.0025
18.53	19.21	22.95	25.94	29.86	33.59	32.20	31.16	28.11	28.73	21.21
351 (281-421)	351 (281-422)	351 (281-421)	351 (281-422)	351 (281-422)	368 (295-441)	384 (308-461)	384 (308-461)			
6129	5363	4767	4291	4089	3912	3353	2934	2347	1956	1467
0.0005	0.0006	0.0008	0.0011	0.0013	0.0015	0.0017	0.0019	0.0021	0.0026	0.0025
13.03	13.51	16.14	18.24	20.93	23.41	22.44	21.71	19.59	20.02	14.78
351 (281-421)	351 (281-422)	351 (281-421)	351 (281-422)	351 (281-422)	368 (295-441)	384 (308-461)	384 (308-461)			
6129	5363	4767	4291	4089	3912	3353	2934	2347	1956	1467
0.0005	0.0006	0.0008	0.0011	0.0013	0.0015	0.0017	0.0019	0.0021	0.0026	0.0025
13.03	13.51	16.14	18.24	20.93	23.41	22.44	21.71	19.59	20.02	14.78
210 (168-252)				220 (176-264)		230 (184-276)				
3667	3209	2852	2567	2445	2343	2008	1757	1406	1171	879
0.0004	0.0004	0.0006	0.0007	0.0009	0.0011	0.0012	0.0013	0.0015	0.0018	0.0018
5.49	5.56	6.74	7.68	8.86	9.96	9.33	8.86	8.19	8.30	6.23
210 (168-252)				220 (176-264)		230 (184-276)				
3667	3209	2852	2567	2445	2343	2008	1757	1406	1171	879
0.0004	0.0004	0.0006	0.0007	0.0009	0.0011	0.0012	0.0013	0.0015	0.0018	0.0018
5.49	5.56	6.74	7.68	8.86	9.96	9.33	8.86	8.19	8.30	6.23
367 (294-440)				386 (309-463)		404 (324-484)				
6409	5608	4985	4486	4290	4115	3527	3087	2469	2058	1543
0.0007	0.0008	0.0011	0.0013	0.0016	0.0019	0.0021	0.0023	0.0026	0.0032	0.0031
17.16	17.66	21.19	24.02	27.70	31.11	29.44	28.19	25.28	26.25	19.20
367 (294-440)				386 (309-463)		404 (324-484)				
6409	5608	4985	4486	4290	4115	3527	3087	2469	2058	1543
0.0007	0.0008	0.0011	0.0013	0.0016	0.0019	0.0021	0.0023	0.0026	0.0032	0.0031
17.16	17.66	21.19	24.02	27.70	31.11	29.44	28.19	25.28	26.25	19.20



NOTES: * Feed to be reduced by approximately 50% if L.O.C. (Length Of Cut) is over 2xD
 * The above recommendations are based on ideal conditions, for smaller taper machining centers or less rigid conditions please adjust parameters accordingly on diameters greater than 1/2"
 * In profile operations, engaging more than 2xD, reduce the radial depth of cut by 50%-60%
 * Finish cuts typically require reduced cutting feeds and speeds, also, it is recommended the radial width of cut (AE) should not exceed 2% x D1



4FLUTE RECOMMENDED CUTTING CONDITIONS(INCH)

ISO Hardness (BHN)	Work Materials	Speed and Feed Recommendations			Diameter			
		Type of Cut	Ap x D1	Ae x D1	Parameters	1/8	5/32	3/16
M	STAINLESS STEELS 300 304, 316, 304L, 316L	Side Cutting	1.5 (1.2)	0.5	SFM [Vc]	348 (279-417)		
					RPM	10635	8508	7090
					Fz	0.0002	0.0003	0.0005
		Slotting	1 (0.8)	1	SFM [Vc]	348 (279-417)		
					RPM	10635	8508	7090
					Fz	0.0002	0.0003	0.0005
M	416, 420F, 430F, 440F	Side Cutting	1.5 (1.2)	0.5	SFM [Vc]	486 (389-583)		
					RPM	14852	11882	9901
					Fz	0.0002	0.0002	0.0004
		Slotting	1 (0.8)	1	SFM [Vc]	486 (389-583)		
					RPM	14852	11882	9901
					Fz	0.0002	0.0002	0.0004
M	STAINLESS STEELS (PH) 17-PH, 15-SPH, 13-8PH	Side Cutting	1.5 (1.2)	0.5	SFM [Vc]	312 (250-374)		
					RPM	9535	7628	6356
					Fz	0.0002	0.0003	0.0005
		Slotting	1 (0.8)	1	SFM [Vc]	312 (250-374)		
					RPM	9535	7628	6356
					Fz	0.0002	0.0003	0.0005
S	TITANIUM Ti6Al4V, Ti5Al5V5Mo, Ti7Al4Mo	Side Cutting	1	0.35	SFM [Vc]	190 (152-228)		
					RPM	5806	4645	3871
					Fz	0.0002	0.0003	0.0004
		Slotting	0.5	1	SFM [Vc]	190 (152-228)		
					RPM	5806	4645	3871
					Fz	0.0002	0.0003	0.0004
S	HIGH-TEMPERATURE ALLOY INCONEL, HASTALLY, RENE	Side Cutting	1.5(1.2)	0.5	SFM [Vc]	85 (68-102)		
					RPM	2598	2078	1732
					Fz	0.0002	0.0003	0.0003
		Slotting	1 (0.8)	1	SFM [Vc]	85 (68-102)		
					RPM	2598	2078	1732
					Fz	0.0002	0.0003	0.0003

Diameter										
7/32	1/4	9/32	5/16	11/32	3/8	7/16	1/2	5/8	3/4	1
348 (279-417)										
6077	5317	4727	4254	3867	3545	3039	2659	2127	1772	1329
0.0006	0.0007	0.0009	0.0011	0.0015	0.0019	0.0020	0.0022	0.0024	0.0030	0.0030
14.83	15.07	17.12	18.76	23.14	26.80	24.64	23.03	20.77	21.49	16.12
348 (279-417)										
6077	5317	4727	4254	3867	3545	3039	2659	2127	1772	1329
0.0006	0.0007	0.0009	0.0011	0.0015	0.0019	0.0020	0.0022	0.0024	0.0030	0.0030
14.83	15.07	17.12	18.76	23.14	26.80	24.64	23.03	20.77	21.49	16.12
486 (389-583)										
8487	7426	6601	5941	5401	4951	4243	3713	2970	2475	1857
0.0004	0.0005	0.0007	0.0009	0.0011	0.0013	0.0014	0.0015	0.0018	0.0022	0.0022
14.70	15.20	18.48	20.58	23.81	26.51	24.39	22.80	21.05	21.44	16.08
486 (389-583)										
8487	7426	6601	5941	5401	4951	4243	3713	2970	2475	1857
0.0004	0.0005	0.0007	0.0009	0.0011	0.0013	0.0014	0.0015	0.0018	0.0022	0.0022
14.70	15.20	18.48	20.58	23.81	26.51	24.39	22.80	21.05	21.44	16.08
312 (250-374)										
5448	4767	4238	3814	3467	3178	2724	2384	1907	1589	1192
0.0006	0.0007	0.0009	0.0011	0.0015	0.0019	0.0020	0.0022	0.0024	0.0030	0.0030
13.30	13.51	15.35	16.82	20.75	24.02	22.09	20.65	18.62	19.02	14.26
312 (250-374)										
5448	4767	4238	3814	3467	3178	2724	2384	1907	1589	1192
0.0006	0.0007	0.0009	0.0011	0.0015	0.0019	0.0020	0.0022	0.0024	0.0030	0.0030
13.30	13.51	15.35	16.82	20.75	24.02	22.09	20.65	18.62	19.02	14.26
190 (152-228)										
3318	2903	2581	2323	2111	1935	1659	1452	1161	968	726
0.0005	0.0006	0.0008	0.0010	0.0013	0.0017	0.0018	0.0020	0.0022	0.0027	0.0027
7.05	7.32	8.33	9.14	11.14	12.80	12.02	11.43	10.06	10.36	7.89
190 (152-228)										
3318	2903	2581	2323	2111	1935	1659	1452	1161	968	726
0.0005	0.0006	0.0008	0.0010	0.0013	0.0017	0.0018	0.0020	0.0022	0.0027	0.0027
7.05	7.32	8.33	9.14	11.14	12.80	12.02	11.43	10.06	10.36	7.89
85 (68-102)										
1484	1299	1154	1039	945	866	742	649	520	433	325
0.0004	0.0005	0.0006	0.0007	0.0010	0.0013	0.0014	0.0015	0.0017	0.0021	0.0020
2.34	2.45	2.82	3.11	3.87	4.50	4.15	3.89	3.52	3.68	2.66
85 (68-102)										
1484	1299	1154	1039	945	866	742	649	520	433	325
0.0004	0.0005	0.0006	0.0007	0.0010	0.0013	0.0014	0.0015	0.0017	0.0021	0.0020
2.34	2.45	2.82	3.11	3.87	4.50	4.15	3.89	3.52	3.68	2.66

4FLUTE RECOMMENDED CUTTING CONDITIONS(INCH)

ISO Hardness (BHN)	Work Materials	Speed and Feed Recommendations			Diameter	
		Type of Cut	Ap x D1	Ae x D1	1/8	3/16
P<300	CARBON STEEL 10** 11** 12** 12L** 15**	Side Cutting	1	0.5	RPM	531 (425-637)
					Fz	16227 10818
					FEED	0.0010 0.0011
					SFM	63.89 46.00
300<P<380	ALLOY STEEL 41** 43** 51** 86**	Side Cutting	1	0.5	RPM	371 (297-445)
					Fz	11338 7559
					FEED	0.0010 0.0011
					SFM	44.64 32.14
P<300	TOOL STEEL A2, D2, H13, P20, T15	Side Cutting	1	0.5	RPM	223 (178-268)
					Fz	6815 4543
					FEED	0.0007 0.0007
					SFM	18.24 13.59
K<-260	CAST IRON Gray, Malleable, Ductile	Side Cutting	1	0.5	RPM	390 (312-468)
					Fz	11918 7946
					FEED	0.0012 0.0013
					SFM	58.18 41.29
M	STAINLESS STEELS 300 304, 316, 304L 316L, SUS316	Side Cutting	1	0.5	RPM	279 (223-335)
					Fz	8526 5684
					FEED	0.0008 0.0008
					SFM	26.85 17.90
M	STAINLESS STEELS 400 416, 420F, 430F, 440F	Side Cutting	1	0.5	RPM	253 (202-304)
					Fz	7732 5154
					FEED	0.0006 0.0006
					SFM	18.26 12.18
M	STAINLESS STEELS (PH) 17-4PH, 15-5PH, 13-8PH	Side Cutting	1	0.5	RPM	253 (202-304)
					Fz	7732 5154
					FEED	0.0008 0.0008
					SFM	24.35 16.23
S	TITANIUM Ti6Al4V, Ti6Al5V5Mo, Ti7Al4Mo	Side Cutting	0.3	0.5	RPM	154 (123-185)
					Fz	4706 3137
					FEED	0.0007 0.0007
					SFM	13.34 8.89
S	HIGH-TEMPERATURE ALLOY INCONEL, HASTALLOY, RENE	Side Cutting	0.3	0.2	RPM	69 (55-83)
					Fz	2109 1406
					FEED	0.0006 0.0006
					SFM	4.65 3.10

Diameter								
13/64	1/4	5/16	3/8	1/2	5/8	11/16	3/4	1
531 (425-637)								
9986	8114	6491	5409	4057	3245	2950	2705	2028
0.0012	0.0016	0.0024	0.0026	0.0028	0.0030	0.0031	0.0035	0.0039
47.18	51.11	61.33	55.37	44.72	38.33	37.17	38.33	31.62
371 (297-445)								
6977	5669	4535	3779	2834	2268	2061	1890	1417
0.0012	0.0016	0.0024	0.0026	0.0028	0.0029	0.0031	0.0035	0.0039
32.96	35.71	42.85	38.69	31.25	26.43	25.65	26.78	22.10
223 (178-268)								
4194	3407	2726	2272	1704	1363	1239	1136	852
0.0008	0.0011	0.0017	0.0018	0.0019	0.0020	0.0022	0.0025	0.0028
13.87	15.02	18.03	16.10	13.15	11.16	10.93	11.27	9.39
390 (312-468)								
7334	5959	4767	3973	2980	2384	2167	1986	1490
0.0015	0.0020	0.0029	0.0032	0.0034	0.0037	0.0039	0.0044	0.0049
42.74	46.92	55.56	50.68	40.82	34.91	33.78	35.04	29.09
279 (223-335)								
5247	4263	3410	2842	2132	1705	1550	1421	1066
0.0010	0.0016	0.0018	0.0020	0.0022	0.0024	0.0025	0.0026	0.0027
20.66	27.53	24.17	22.38	18.46	16.11	15.62	14.55	11.41
253 (202-304)								
4758	3866	3093	2577	1933	1546	1406	1289	966
0.0010	0.0012	0.0016	0.0018	0.0020	0.0021	0.0023	0.0023	0.0023
18.73	18.26	19.48	18.26	15.22	13.15	13.06	11.77	8.98
253 (202-304)								
4758	3866	3093	2577	1933	1546	1406	1289	966
0.0010	0.0016	0.0018	0.0020	0.0022	0.0024	0.0025	0.0026	0.0027
18.73	24.96	21.92	20.29	16.74	14.61	14.17	13.19	10.35
154 (123-185)								
2896	2353	1882	1569	1177	941	856	784	588
0.0009	0.0015	0.0016	0.0018	0.0019	0.0021	0.0023	0.0023	0.0024
10.03	13.71	11.86	11.12	9.08	8.00	7.82	7.16	5.65
69 (55-83)								
1298	1054	843	703	527	422	383	351	264
0.0007	0.0011	0.0012	0.0014	0.0015	0.0017	0.0018	0.0018	0.0019
3.47	4.65	4.12	3.87	3.15	2.79	2.72	2.49	1.99

