

Series
51, 51CR, 51L,
51LC, 51B, 51LB
Fractional

Hardness

Ae x DC

Ap x DC

Vc
(sfm)

DC • in

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



≤ 0.1

≤ 1

720

RPM

11002

7334

5501

4401

3667

2750

Fz

0.0020

0.0035

0.0050

0.0055

0.0061

0.0071

Feed (ipm)

132

154

165

145

134

117



≤ 0.05

≤ 2

915

RPM

13981

9321

6991

5592

4660

3495

Fz

0.0028

0.0053

0.0070

0.0077

0.0085

0.0100

Feed (ipm)

235

296

294

258

238

210

ALLOY STEELS
4140, 4150, 4320,
5120, 5150, 8630,
86L20, 50100

≤ 375 Bhn
or
≤ 40 HRc



≤ 0.1

≤ 1

490

RPM

7487

4991

3744

2995

2496

1872

Fz

0.0015

0.0029

0.0038

0.0042

0.0046

0.0054

Feed (ipm)

67

87

85

75

69

61



≤ 0.05

≤ 2

620

RPM

9474

6316

4737

3789

3158

2368

Fz

0.0021

0.0039

0.0052

0.0057

0.0062

0.0073

Feed (ipm)

119

148

148

130

117

104

TOOL STEELS
A2, D2, H13, L2, M2,
P20, S7, T15, W2

≤ 375 Bhn
or
≤ 40 HRc



≤ 0.1

≤ 1

240

RPM

3667

2445

1834

1467

1222

917

Fz

0.0012

0.0023

0.0030

0.0034

0.0037

0.0043

Feed (ipm)

26

34

33

30

27

24



≤ 0.05

≤ 2

305

RPM

4660

3107

2330

1864

1553

1165

Fz

0.0017

0.0032

0.0042

0.0046

0.0050

0.0059

Feed (ipm)

48

60

59

51

47

41

M

**STAINLESS STEELS
(FREE MACHINING)**
303, 416, 420F,
430F, 440F

≤ 275 Bhn
or
≤ 28 HRc



≤ 0.1

≤ 1

510

RPM

7793

5195

3896

3117

2598

1948

Fz

0.0015

0.0028

0.0038

0.0041

0.0045

0.0053

Feed (ipm)

70

87

89

77

70

62



≤ 0.05

≤ 2

650

RPM

9932

6621

4966

3973

3311

2483

Fz

0.0021

0.0038

0.0051

0.0056

0.0061

0.0072

Feed (ipm)

125

151

152

133

121

107

**STAINLESS STEELS
(DIFFICULT)**
304, 304L, 316, 316L

≤ 275 Bhn
or
≤ 28 HRc



≤ 0.1

≤ 1

350

RPM

5348

3565

2674

2139

1783

1337

Fz

0.0012

0.0023

0.0030

0.0033

0.0036

0.0042

Feed (ipm)

39

49

48

42

39

34



≤ 0.05

≤ 2

450

RPM

6876

4584

3438

2750

2292

1719

Fz

0.0017

0.0032

0.0042

0.0046

0.0050

0.0059

Feed (ipm)

70

88

87

76

69

61

**STAINLESS STEELS
(PH)**
13-8 PH, 15-5 PH,
17-4 PH, Custom 450

≤ 325 Bhn
or
≤ 35 HRc



≤ 0.1

≤ 1

325

RPM

4966

3311

2483

1986

1655

1242

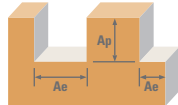
Fz

0.0012

0.0023

0.0030

0.0033



Series
51, 51CR, 51L,
51LC, 51B, 51LB
Fractional

Hardness

Ae x DC

Ap x DC

Vc
(sfm)

DC • in

1/4 3/8 1/2 5/8 3/4 1

						DC • in						
						1/4	3/8	1/2	5/8	3/4	1	
K	CAST IRONS (LOW & MEDIUM ALLOY) Gray, Malleable, Ductile	Profile 	≤ 0.25	≤ 1.5	575	RPM	8786	5857	4393	3514	2929	2197
					(460-690)	Fz	0.0018	0.0035	0.0045	0.0050	0.0055	0.0064
						Feed (ipm)	94.9	123.0	118.6	105.4	96.6	84.3
		HSM 	≤ 0.05	≤ 2	730	RPM	11154	7436	5577	4462	3718	2789
					(584-876)	Fz	0.0025	0.0047	0.0064	0.0070	0.0076	0.0089
						Feed (ipm)	167.3	209.7	214.2	187.4	169.5	148.9
	CAST IRONS (HIGH ALLOY) Gray, Malleable, Ductile	Profile 	≤ 0.25	≤ 1.5	430	RPM	6570	4380	3285	2628	2190	1643
					(344-516)	Fz	0.0018	0.0035	0.0045	0.0050	0.0055	0.0064
						Feed (ipm)	71.0	92.0	88.7	78.8	72.3	63.1
		HSM 	≤ 0.05	≤ 2	545	RPM	8328	5552	4164	3331	2776	2082
					(436-654)	Fz	0.0025	0.0047	0.0064	0.0070	0.0076	0.0089
						Feed (ipm)	124.9	156.6	159.9	139.9	126.6	111.2
S	HIGH TEMP ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy, Monel 400	Profile 	≤ 0.1	≤ 1	105	RPM	1604	1070	802	642	535	401
					(84-126)	Fz	0.0014	0.0027	0.0036	0.0039	0.0043	0.0050
						Feed (ipm)	13	17	17	15	14	12
		HSM 	≤ 0.05	≤ 2	130	RPM	1986	1324	993	795	662	497
					(104-156)	Fz	0.0016	0.0036	0.0048	0.0053	0.0058	0.0067
						Feed (ipm)	19	29	29	25	23	20
	HIGH TEMP ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 718, X-750, Incoloy, Waspaloy, Hastelloy, Rene	Profile 	≤ 0.1	≤ 1	80	RPM	1222	815	611	489	407	306
					(64-96)	Fz	0.0010	0.0018	0.0025	0.0027	0.0029	0.0034
						Feed (ipm)	7	9	9	8	7	6
		HSM 	≤ 0.05	≤ 2	100	RPM	1528	1019	764	611	509	382
					(80-120)	Fz	0.0013	0.0025	0.0034	0.0037	0.0041	0.0047
						Feed (ipm)	12	15	16	14	13	11
	TITANIUM ALLOYS Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si	Profile 	≤ 0.1	≤ 1	280	RPM	4278	2852	2139	1711	1426	1070
					(224-336)	Fz	0.0010	0.0018	0.0025	0.0027	0.0029	0.0034
						Feed (ipm)	26	31	32	28	25	22
		HSM 	≤ 0.05	≤ 2	355	RPM	5424	3616	2712	2170	1808	1356
					(284-426)	Fz	0.0013	0.0025	0.0034	0.0037	0.0041	0.0047
						Feed (ipm)	42	54	55	48	44	38
	TITANIUM ALLOYS (DIFFICULT) Ti10V2Fe3Al, Ti5Al5V5Mo3Cr, Ti7Al4Mo, Ti3Al8V6Cr4Zr4Mo, Ti6Al6V6Sn, Ti15V3 Cr3Sn3Al	Profile 	≤ 0.1	≤ 1	155	RPM	2368	1579	1184	947	789	592
					(124-186)	Fz	0.0010	0.0018	0.0025	0.0027	0.0029	0.0034
						Feed (ipm)	14	17	18	15	14	12
		HSM 	≤ 0.05	≤ 2	200	RPM	3056	2037	1528	1222	1019	764
					(160-240)	Fz	0.0013	0.0025	0.0034	0.0037	0.0041	0.0047
						Feed (ipm)	24	31	31	27	25	22

Bhn (Brinell) HRC (Rockwell C) HSM (High Speed Machining)

rpm = Vc x 3.82 / DC

ipm = Fz x 6 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)