

FRACTIONAL 2 Flute Drills

| Series 101 Fractional | Hardness | Vc (sfm) | DC • in | | | | | | | | |
|--|---|-----------------------------|------------------|------------|---------|--------|--------|--------|--------|--------|--------|
| | | | 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 | ≤ 175 Bhn or ≤ 7 HRc | 265 (212-318) | RPM | 64787 | 32394 | 16197 | 8098 | 4049 | 2699 | 2025 | |
| | | | Fr | 0.00021 | 0.0004 | 0.0008 | 0.0017 | 0.0033 | 0.0050 | 0.0067 | |
| | | | Feed (ipm) | 13.5 | 13.5 | 13.5 | 13.5 | 13.5 | 13.5 | 13.5 | |
| | ≤ 300 Bhn or ≤ 32 HRc | 125 (100-150) | RPM | 30560 | 15280 | 7640 | 3820 | 1910 | 1273 | 955 | |
| | | | Fr | 0.00020 | 0.0004 | 0.0008 | 0.0016 | 0.0031 | 0.0047 | 0.0063 | |
| | | | Feed (ipm) | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | |
| | ≤ 425 Bhn or ≤ 45 HRc | 85 (68-102) | RPM | 20781 | 10390 | 5195 | 2598 | 1299 | 866 | 649 | |
| | | | Fr | 0.00011 | 0.0002 | 0.0004 | 0.0008 | 0.0017 | 0.0025 | 0.0034 | |
| | | | Feed (ipm) | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | |
| | M ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100 | ≤ 275 Bhn or ≤ 28 HRc | 230 (184-276) | RPM | 56230 | 28115 | 14058 | 7029 | 3514 | 2343 | 1757 |
| | | | | Fr | 0.00019 | 0.0004 | 0.0007 | 0.0015 | 0.0030 | 0.0045 | 0.0060 |
| | | | | Feed (ipm) | 10.5 | 10.5 | 10.5 | 10.5 | 10.5 | 10.5 | 10.5 |
| ≤ 375 Bhn or ≤ 40 HRc | | 145 (116-174) | RPM | 35450 | 17725 | 8862 | 4431 | 2216 | 1477 | 1108 | |
| | | | Fr | 0.00019 | 0.0004 | 0.0007 | 0.0015 | 0.0030 | 0.0045 | 0.0060 | |
| | | | Feed (ipm) | 6.6 | 6.6 | 6.6 | 6.6 | 6.6 | 6.6 | 6.6 | |
| ≤ 450 Bhn or ≤ 48 HRc | | 60 (48-72) | RPM | 14669 | 7334 | 3667 | 1834 | 917 | 611 | 458 | |
| | | | Fr | 0.00008 | 0.0002 | 0.0003 | 0.0007 | 0.0013 | 0.0020 | 0.0026 | |
| | | | Feed (ipm) | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | |
| K STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F 440F | | ≤ 250 Bhn or ≤ 24 HRc | 210 (168-252) | RPM | 51341 | 25670 | 12835 | 6418 | 3209 | 2139 | 1604 |
| | | | | Fr | 0.00015 | 0.0003 | 0.0006 | 0.0012 | 0.0024 | 0.0036 | 0.0048 |
| | | | | Feed (ipm) | 7.7 | 7.7 | 7.7 | 7.7 | 7.7 | 7.7 | 7.7 |
| | ≤ 330 Bhn or ≤ 36 HRc | 110 (88-132) | RPM | 26893 | 13446 | 6723 | 3362 | 1681 | 1121 | 840 | |
| | | | Fr | 0.00009 | 0.0002 | 0.0004 | 0.0007 | 0.0015 | 0.0022 | 0.0030 | |
| | | | Feed (ipm) | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | |
| | K STAINLESS STEELS (DIFFICULT) 304, 316, 321, 13-8 PH, 15-5PH, 17-4 PH, Custom 450 | ≤ 275 Bhn or ≤ 28 HRc | 65 (52-78) | RPM | 15891 | 7946 | 3973 | 1986 | 993 | 662 | 497 |
| | | | | Fr | 0.00010 | 0.0002 | 0.0005 | 0.0009 | 0.0018 | 0.0025 | 0.0035 |
| | | | | Feed (ipm) | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 |
| | | ≤ 375 Bhn or ≤ 40 HRc | 55 (44-66) | RPM | 13446 | 6723 | 3362 | 1681 | 840 | 560 | 420 |
| | | | | Fr | 0.00010 | 0.0002 | 0.0004 | 0.0008 | 0.0015 | 0.0023 | 0.0031 |
| | | | | Feed (ipm) | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 |
| K CAST IRONS Gray, Malleable, Ductile | | ≤ 220 Bhn or ≤ 19 HRc | 280 (224-336) | RPM | 68454 | 34227 | 17114 | 8557 | 4278 | 2852 | 2139 |
| | | | | Fr | 0.00026 | 0.0005 | 0.0010 | 0.0020 | 0.0041 | 0.0061 | 0.0082 |
| | | | | Feed (ipm) | 17.5 | 17.5 | 17.5 | 17.5 | 17.5 | 17.5 | 17.5 |
| | | ≤ 330 Bhn or ≤ 36 HRc | 250 (200-300) | RPM | 61120 | 30560 | 15280 | 7640 | 3820 | 2547 | 1910 |
| | | | | Fr | 0.00025 | 0.0005 | 0.0010 | 0.0020 | 0.0041 | 0.0061 | 0.0081 |
| | | | | Feed (ipm) | 15.5 | 15.5 | 15.5 | 15.5 | 15.5 | 15.5 | 15.5 |

continued on next page

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| Series 101 Fractional | Hardness | Vc (sfm) | | DC • in | | | | | | | |
|--------------------------------|---|-----------------------------|------------|---------|---------|--------|--------|--------|--------|--------|--------|
| | | | | 1/64 | 1/32 | 1/16 | 1/8 | 1/4 | 3/8 | 1/2 | |
| N | ALUMINUM ALLOYS 2017, 2024, 356, 6061, 7075 | ≤ 80 Bhn or ≤ 47 HRb | 540 | RPM | 132019 | 66010 | 33005 | 16502 | 8251 | 5501 | 4126 |
| | | | (432-648) | Fr | 0.00030 | 0.0006 | 0.0012 | 0.0024 | 0.0048 | 0.0073 | 0.0097 |
| | | | Feed (ipm) | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 | |
| | | ≤ 150 Bhn or ≤ 7 HRc | 455 | RPM | 111238 | 55619 | 27810 | 13905 | 6952 | 4635 | 3476 |
| | | | (364-546) | Fr | 0.00031 | 0.0006 | 0.0013 | 0.0025 | 0.0050 | 0.0076 | 0.0101 |
| | | | Feed (ipm) | 35.0 | 35.0 | 35.0 | 35.0 | 35.0 | 35.0 | 35.0 | 35.0 |
| | COPPER ALLOYS Alum Bronze, C110, Muntz Brass | ≤ 140 Bhn or ≤ 3 HRc | 190 | RPM | 46451 | 23226 | 11613 | 5806 | 2903 | 1935 | 1452 |
| | | | (152-228) | Fr | 0.00015 | 0.0003 | 0.0006 | 0.0012 | 0.0024 | 0.0036 | 0.0048 |
| | | | Feed (ipm) | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 |
| | | ≤ 200 Bhn or ≤ 23 HRc | 175 | RPM | 42784 | 21392 | 10696 | 5348 | 2674 | 1783 | 1337 |
| | | | (140-210) | Fr | 0.00015 | 0.0003 | 0.0006 | 0.0012 | 0.0024 | 0.0036 | 0.0048 |
| | | | Feed (ipm) | 6.4 | 6.4 | 6.4 | 6.4 | 6.4 | 6.4 | 6.4 | 6.4 |
| PLASTICS Polycarbonate, PVC | 500 (400-600) | RPM | 122240 | 61120 | 30560 | 15280 | 7640 | 5093 | 3820 | | |
| | | Fr | 0.00031 | 0.0006 | 0.0012 | 0.0025 | 0.0050 | 0.0075 | 0.0099 | | |
| | | Feed (ipm) | 38.0 | 38.0 | 38.0 | 38.0 | 38.0 | 38.0 | 38.0 | 38.0 | |
| S | SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy 800, Monel 400, Rene, Waspaloy | ≤ 220 Bhn or ≤ 19 HRc | 40 | RPM | 9779 | 4890 | 2445 | 1222 | 611 | 407 | 306 |
| | | | (32-48) | Fr | 0.00010 | 0.0002 | 0.0004 | 0.0008 | 0.0016 | 0.0025 | 0.0033 |
| | | | Feed (ipm) | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| | | ≤ 320 Bhn or ≤ 34 HRc | 25 | RPM | 6112 | 3056 | 1528 | 764 | 382 | 255 | 191 |
| | | | (20-30) | Fr | 0.00010 | 0.0002 | 0.0004 | 0.0008 | 0.0016 | 0.0024 | 0.0031 |
| | | | Feed (ipm) | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 |
| | ≤ 425 Bhn or ≤ 45 HRc | 20 | RPM | 4890 | 2445 | 1222 | 611 | 306 | 204 | 153 | |
| | | (16-24) | Fr | 0.00004 | 0.0001 | 0.0002 | 0.0003 | 0.0007 | 0.0010 | 0.0013 | |
| | | Feed (ipm) | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | |
| | TITANIUM ALLOYS (DIFFICULT) Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si, Ti-6Al4V | ≤ 275 Bhn or ≤ 28 HRc | 85 | RPM | 20781 | 10390 | 5195 | 2598 | 1299 | 866 | 649 |
| | | | (68-102) | Fr | 0.00020 | 0.0004 | 0.0008 | 0.0016 | 0.0032 | 0.0049 | 0.0065 |
| | | | Feed (ipm) | 4.2 | 4.2 | 4.2 | 4.2 | 4.2 | 4.2 | 4.2 | 4.2 |
| ≤ 350 Bhn or ≤ 38 HRc | | 65 | RPM | 15891 | 7946 | 3973 | 1986 | 993 | 662 | 497 | |
| | | (52-78) | Fr | 0.00011 | 0.0002 | 0.0004 | 0.0009 | 0.0017 | 0.0026 | 0.0034 | |
| | | Feed (ipm) | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | |
| ≤ 440 Bhn or ≤ 47 HRc | 55 | RPM | 13446 | 6723 | 3362 | 1681 | 840 | 560 | 420 | | |
| | (44-66) | Fr | 0.00010 | 0.0002 | 0.0004 | 0.0008 | 0.0015 | 0.0023 | 0.0031 | | |
| | Feed (ipm) | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | | |
| H | TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2 | ≤ 250 Bhn or ≤ 24 HRc | 85 | RPM | 20781 | 10390 | 5195 | 2598 | 1299 | 866 | 649 |
| | | | (68-102) | Fr | 0.00011 | 0.0002 | 0.0004 | 0.0009 | 0.0018 | 0.0027 | 0.0035 |
| | | | Feed (ipm) | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 |
| | | ≤ 375 Bhn or ≤ 40 HRc | 55 | RPM | 13446 | 6723 | 3362 | 1681 | 840 | 560 | 420 |
| | | | (44-66) | Fr | 0.00005 | 0.0001 | 0.0002 | 0.0004 | 0.0008 | 0.0012 | 0.0017 |
| | | | Feed (ipm) | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 |
| | | ≤ 475 Bhn or ≤ 50 HRc | 40 | RPM | 9779 | 4890 | 2445 | 1222 | 611 | 407 | 306 |
| | | | (32-48) | Fr | 0.00005 | 0.0001 | 0.0002 | 0.0004 | 0.0008 | 0.0012 | 0.0016 |
| | | | Feed (ipm) | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 |

Bhn (Brinell) HRC (Rockwell C) HRb (Rockwell B)

rpm = Vc x 3.82 / DC

ipm = Fr x rpm

reduce speed and feed 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.kyocera-sgstoool.com)