

# 3 Flute Countersink

| Series<br>603<br>Fractional | Hardness                                                                                     | Vc<br>(sfm)                 | DC • in   |            |        |        |        |        |        |        |        |
|-----------------------------|----------------------------------------------------------------------------------------------|-----------------------------|-----------|------------|--------|--------|--------|--------|--------|--------|--------|
|                             |                                                                                              |                             | 1/8       | 3/16       | 1/4    | 3/8    | 1/2    | 3/4    | 1      |        |        |
| P                           | CARBON STEELS<br>1018, 1040, 1080, 1090,<br>10L50, 1140, 1212,<br>12L15, 1525, 1536          | ≤ 175 Bhn<br>or<br>≤ 7 HRc  | 125       | RPM        | 3820   | 2547   | 1910   | 1273   | 955    | 637    | 478    |
|                             |                                                                                              |                             | (100-150) | Fr         | 0.0008 | 0.0012 | 0.0016 | 0.0024 | 0.0031 | 0.0047 | 0.0063 |
|                             |                                                                                              |                             |           | Feed (ipm) | 3.0    | 3.0    | 3.0    | 3.0    | 3.0    | 3.0    | 3.0    |
|                             |                                                                                              | ≤ 300 Bhn<br>or<br>≤ 32 HRc | 60        | RPM        | 1834   | 1222   | 917    | 611    | 458    | 306    | 229    |
|                             |                                                                                              |                             | (48-72)   | Fr         | 0.0007 | 0.0011 | 0.0014 | 0.0021 | 0.0028 | 0.0043 | 0.0057 |
|                             |                                                                                              |                             |           | Feed (ipm) | 1.3    | 1.3    | 1.3    | 1.3    | 1.3    | 1.3    | 1.3    |
|                             |                                                                                              | ≤ 425 Bhn<br>or<br>≤ 45 HRc | 45        | RPM        | 1375   | 917    | 688    | 458    | 344    | 229    | 172    |
|                             |                                                                                              |                             | (36-54)   | Fr         | 0.0004 | 0.0007 | 0.0009 | 0.0013 | 0.0017 | 0.0026 | 0.0035 |
|                             |                                                                                              |                             |           | Feed (ipm) | 0.6    | 0.6    | 0.6    | 0.6    | 0.6    | 0.6    | 0.6    |
|                             | ALLOY STEELS<br>4140, 4150, 4320, 5120,<br>5150, 8630, 86L20, 50100                          | ≤ 275 Bhn<br>or<br>≤ 28 HRc | 95        | RPM        | 2903   | 1935   | 1452   | 968    | 726    | 484    | 363    |
|                             |                                                                                              |                             | (76-114)  | Fr         | 0.0007 | 0.0010 | 0.0014 | 0.0021 | 0.0028 | 0.0041 | 0.0055 |
|                             |                                                                                              |                             |           | Feed (ipm) | 2.0    | 2.0    | 2.0    | 2.0    | 2.0    | 2.0    | 2.0    |
|                             |                                                                                              | ≤ 375 Bhn<br>or<br>≤ 40 HRc | 60        | RPM        | 1834   | 1222   | 917    | 611    | 458    | 306    | 229    |
|                             |                                                                                              |                             | (48-72)   | Fr         | 0.0007 | 0.0010 | 0.0013 | 0.0020 | 0.0026 | 0.0039 | 0.0052 |
|                             |                                                                                              |                             |           | Feed (ipm) | 1.2    | 1.2    | 1.2    | 1.2    | 1.2    | 1.2    | 1.2    |
|                             |                                                                                              | ≤ 425 Bhn<br>or<br>≤ 45 HRc | 35        | RPM        | 1070   | 713    | 535    | 357    | 267    | 178    | 134    |
|                             |                                                                                              |                             | (28-42)   | Fr         | 0.0004 | 0.0006 | 0.0007 | 0.0011 | 0.0015 | 0.0022 | 0.0030 |
|                             |                                                                                              |                             |           | Feed (ipm) | 0.4    | 0.4    | 0.4    | 0.4    | 0.4    | 0.4    | 0.4    |
|                             | TOOL STEELS<br>A2, D2, H13, L2, M2,<br>P20, S7, T15, W2                                      | ≤ 250 Bhn<br>or<br>≤ 24 HRc | 35        | RPM        | 1070   | 713    | 535    | 357    | 267    | 178    | 134    |
|                             |                                                                                              |                             | (28-42)   | Fr         | 0.0004 | 0.0006 | 0.0007 | 0.0011 | 0.0015 | 0.0022 | 0.0030 |
|                             |                                                                                              |                             |           | Feed (ipm) | 0.4    | 0.4    | 0.4    | 0.4    | 0.4    | 0.4    | 0.4    |
|                             |                                                                                              | ≤ 375 Bhn<br>or<br>≤ 40 HRc | 25        | RPM        | 764    | 509    | 382    | 255    | 191    | 127    | 96     |
|                             |                                                                                              |                             | (20-30)   | Fr         | 0.0003 | 0.0004 | 0.0005 | 0.0008 | 0.0010 | 0.0016 | 0.0021 |
|                             |                                                                                              |                             |           | Feed (ipm) | 0.2    | 0.2    | 0.2    | 0.2    | 0.2    | 0.2    | 0.2    |
| M                           | STAINLESS STEELS<br>(FREE MACHINING)<br>303, 416, 420F, 430F 440F                            | ≤ 250 Bhn<br>or<br>≤ 24 HRc | 53        | RPM        | 1620   | 1080   | 810    | 540    | 405    | 270    | 202    |
|                             |                                                                                              |                             | (42-64)   | Fr         | 0.0004 | 0.0006 | 0.0009 | 0.0013 | 0.0017 | 0.0026 | 0.0035 |
|                             |                                                                                              |                             |           | Feed (ipm) | 0.7    | 0.7    | 0.7    | 0.7    | 0.7    | 0.7    | 0.7    |
|                             |                                                                                              | ≤ 330 Bhn<br>or<br>≤ 36 HRc | 46        | RPM        | 1406   | 937    | 703    | 469    | 351    | 234    | 176    |
|                             |                                                                                              |                             | (37-55)   | Fr         | 0.0004 | 0.0005 | 0.0007 | 0.0011 | 0.0014 | 0.0021 | 0.0028 |
|                             |                                                                                              |                             |           | Feed (ipm) | 0.5    | 0.5    | 0.5    | 0.5    | 0.5    | 0.5    | 0.5    |
|                             | STAINLESS STEELS<br>(DIFFICULT)<br>304, 316, 321, 13-8 PH,<br>15-5PH, 17-4 PH,<br>Custom 450 | ≤ 275 Bhn<br>or<br>≤ 28 HRc | 28        | RPM        | 856    | 570    | 428    | 285    | 214    | 143    | 107    |
|                             |                                                                                              |                             | (22-34)   | Fr         | 0.0005 | 0.0007 | 0.0009 | 0.0014 | 0.0019 | 0.0028 | 0.0037 |
|                             |                                                                                              |                             |           | Feed (ipm) | 0.4    | 0.4    | 0.4    | 0.4    | 0.4    | 0.4    | 0.4    |
|                             |                                                                                              | ≤ 375 Bhn<br>or<br>≤ 40 HRc | 21        | RPM        | 642    | 428    | 321    | 214    | 160    | 107    | 80     |
|                             |                                                                                              |                             | (17-25)   | Fr         | 0.0002 | 0.0002 | 0.0003 | 0.0005 | 0.0006 | 0.0009 | 0.0012 |
|                             |                                                                                              |                             |           | Feed (ipm) | 0.1    | 0.1    | 0.1    | 0.1    | 0.1    | 0.1    | 0.1    |
| K                           | CAST IRONS<br>Gray, Malleable,<br>Ductile                                                    | ≤ 220 Bhn<br>or<br>≤ 19 HRc | 105       | RPM        | 3209   | 2139   | 1604   | 1070   | 802    | 535    | 401    |
|                             |                                                                                              |                             | (84-126)  | Fr         | 0.0009 | 0.0014 | 0.0018 | 0.0027 | 0.0036 | 0.0054 | 0.0072 |
|                             |                                                                                              |                             |           | Feed (ipm) | 2.9    | 2.9    | 2.9    | 2.9    | 2.9    | 2.9    | 2.9    |
|                             |                                                                                              | ≤ 330 Bhn<br>or<br>≤ 36 HRc | 75        | RPM        | 2292   | 1528   | 1146   | 764    | 573    | 382    | 287    |
|                             |                                                                                              |                             | (60-90)   | Fr         | 0.0009 | 0.0014 | 0.0018 | 0.0027 | 0.0037 | 0.0055 | 0.0073 |
|                             |                                                                                              |                             |           | Feed (ipm) | 2.1    | 2.1    | 2.1    | 2.1    | 2.1    | 2.1    | 2.1    |

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| Series<br>603<br>Fractional | Hardness                                                                                                                  | Vc<br>(sfm)      |            | DC • in |        |        |        |        |        |        |
|-----------------------------|---------------------------------------------------------------------------------------------------------------------------|------------------|------------|---------|--------|--------|--------|--------|--------|--------|
|                             |                                                                                                                           |                  |            | 1/8     | 3/16   | 1/4    | 3/8    | 1/2    | 3/4    | 1      |
| N                           | ALUMINUM ALLOYS<br>2017, 2024, 356,<br>6061, 7075                                                                         | 225<br>(180-270) | RPM        | 6876    | 4584   | 3438   | 2292   | 1719   | 1146   | 860    |
|                             |                                                                                                                           |                  | Fr         | 0.0011  | 0.0017 | 0.0023 | 0.0034 | 0.0045 | 0.0068 | 0.0091 |
|                             |                                                                                                                           |                  | Feed (ipm) | 7.8     | 7.8    | 7.8    | 7.8    | 7.8    | 7.8    | 7.8    |
|                             |                                                                                                                           | 190<br>(152-228) | RPM        | 5806    | 3871   | 2903   | 1935   | 1452   | 968    | 726    |
|                             |                                                                                                                           |                  | Fr         | 0.0011  | 0.0017 | 0.0022 | 0.0034 | 0.0045 | 0.0067 | 0.0090 |
|                             |                                                                                                                           |                  | Feed (ipm) | 6.5     | 6.5    | 6.5    | 6.5    | 6.5    | 6.5    | 6.5    |
|                             | COPPER ALLOYS<br>Alum Bronze, C110,<br>Muntz Brass                                                                        | 95<br>(76-114)   | RPM        | 2903    | 1935   | 1452   | 968    | 726    | 484    | 363    |
|                             |                                                                                                                           |                  | Fr         | 0.0006  | 0.0009 | 0.0012 | 0.0018 | 0.0023 | 0.0035 | 0.0047 |
|                             |                                                                                                                           |                  | Feed (ipm) | 1.7     | 1.7    | 1.7    | 1.7    | 1.7    | 1.7    | 1.7    |
|                             |                                                                                                                           | 80<br>(64-96)    | RPM        | 2445    | 1630   | 1222   | 815    | 611    | 407    | 306    |
|                             |                                                                                                                           |                  | Fr         | 0.0006  | 0.0009 | 0.0011 | 0.0017 | 0.0023 | 0.0034 | 0.0046 |
|                             |                                                                                                                           |                  | Feed (ipm) | 1.4     | 1.4    | 1.4    | 1.4    | 1.4    | 1.4    | 1.4    |
| S                           | HIGH TEMP ALLOYS<br>(NICKEL, COBALT,<br>IRON BASE)<br>Inconel 601, 617, 625,<br>Incoloy 800, Monel 400,<br>Rene, Waspaloy | 18<br>(14-22)    | RPM        | 550     | 367    | 275    | 183    | 138    | 92     | 69     |
|                             |                                                                                                                           |                  | Fr         | 0.0004  | 0.0005 | 0.0007 | 0.0011 | 0.0015 | 0.0022 | 0.0029 |
|                             |                                                                                                                           |                  | Feed (ipm) | 0.2     | 0.2    | 0.2    | 0.2    | 0.2    | 0.2    | 0.2    |
|                             |                                                                                                                           | 14<br>(11-17)    | RPM        | 428     | 285    | 214    | 143    | 107    | 71     | 53     |
|                             |                                                                                                                           |                  | Fr         | 0.0002  | 0.0004 | 0.0005 | 0.0007 | 0.0009 | 0.0014 | 0.0019 |
|                             |                                                                                                                           |                  | Feed (ipm) | 0.1     | 0.1    | 0.1    | 0.1    | 0.1    | 0.1    | 0.1    |
|                             |                                                                                                                           | 12<br>(10-14)    | RPM        | 367     | 244    | 183    | 122    | 92     | 61     | 46     |
|                             |                                                                                                                           |                  | Fr         | 0.0003  | 0.0004 | 0.0005 | 0.0008 | 0.0011 | 0.0016 | 0.0022 |
|                             |                                                                                                                           |                  | Feed (ipm) | 0.1     | 0.1    | 0.1    | 0.1    | 0.1    | 0.1    | 0.1    |
|                             | TITANIUM ALLOYS<br>Pure Titanium, Ti6Al4V,<br>Ti6Al2Sn4Zr2Mo,<br>Ti4Al4Mo2Sn0.5Si,<br>Ti-6Al4V                            | 36<br>(29-43)    | RPM        | 1100    | 733    | 550    | 367    | 275    | 183    | 138    |
|                             |                                                                                                                           |                  | Fr         | 0.0007  | 0.0011 | 0.0015 | 0.0022 | 0.0029 | 0.0044 | 0.0058 |
|                             |                                                                                                                           |                  | Feed (ipm) | 0.8     | 0.8    | 0.8    | 0.8    | 0.8    | 0.8    | 0.8    |
|                             |                                                                                                                           | 28<br>(22-34)    | RPM        | 856     | 570    | 428    | 285    | 214    | 143    | 107    |
|                             |                                                                                                                           |                  | Fr         | 0.0006  | 0.0009 | 0.0012 | 0.0018 | 0.0023 | 0.0035 | 0.0047 |
|                             |                                                                                                                           |                  | Feed (ipm) | 0.5     | 0.5    | 0.5    | 0.5    | 0.5    | 0.5    | 0.5    |
| H                           | TOOL STEELS<br>A2, D2, H13, L2, M2,<br>P20, S7, T15, W2                                                                   | 20<br>(16-24)    | RPM        | 611     | 407    | 306    | 204    | 153    | 102    | 76     |
|                             |                                                                                                                           |                  | Fr         | 0.0002  | 0.0002 | 0.0003 | 0.0005 | 0.0007 | 0.0010 | 0.0013 |
|                             |                                                                                                                           |                  | Feed (ipm) | 0.1     | 0.1    | 0.1    | 0.1    | 0.1    | 0.1    | 0.1    |

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

rpm = Vc x 3.82 / DC

ipm = Fr x rpm

reduce speed and feed for materials harder than listed

refer to the SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)