

# GENERAL PURPOSE

## Solid Carbide Twist Drills



### FEATURES/DESCRIPTION

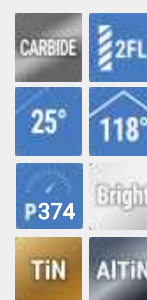
#### Twist Drills

- Sub-micrograin carbide substrate for wear resistance
- General purpose drilling operations
- 4-facet 118° split point



### APPLICATION

### FEATURES



| STEEL |    |    | STAINLESS |    | CAST IRON |    | NON-FERROUS |    | HSSA |    | HARDENED STEEL |    |
|-------|----|----|-----------|----|-----------|----|-------------|----|------|----|----------------|----|
| P1    | P2 | P3 | M1        | M2 | K1        | K2 | N1          | N2 | S1   | S2 | H1             | H2 |
| ●     | ●  | ○  |           |    | ●         | ●  | ○           | ○  |      |    | ○              |    |

● Best ○ Good

### Series 450 2FL | Jobber Length | Twist

| Diameter(D <sub>1</sub> ) |        | Flute Length(L <sub>1</sub> ) | OAL(L) | Bright     | TiN         | AlTiN       |
|---------------------------|--------|-------------------------------|--------|------------|-------------|-------------|
| Size                      | Dec.   |                               |        |            |             |             |
| #80                       | 0.0135 | 3/16                          | 1-1/4  | 450-300135 | 450-300135A | 450-300135B |
| #79                       | 0.0145 | 3/16                          | 1-1/4  | 450-300145 | 450-300145A | 450-300145B |
| 1/64                      | 0.0156 | 3/16                          | 1-1/4  | 450-100156 | 450-100156A | 450-100156B |
| #78                       | 0.0160 | 3/16                          | 1-1/4  | 450-300160 | 450-300160A | 450-300160B |
| #77                       | 0.0180 | 3/16                          | 1-1/4  | 450-300180 | 450-300180A | 450-300180B |
| #76                       | 0.0200 | 1/4                           | 1-1/4  | 450-300200 | 450-300200A | 450-300200B |
| #75                       | 0.0210 | 1/4                           | 1-1/4  | 450-300210 | 450-300210A | 450-300210B |
| #74                       | 0.0225 | 1/4                           | 1-1/4  | 450-300225 | 450-300225A | 450-300225B |
| #73                       | 0.0240 | 1/4                           | 1-1/4  | 450-300240 | 450-300240A | 450-300240B |
| #72                       | 0.0250 | 5/16                          | 1-1/4  | 450-300250 | 450-300250A | 450-300250B |
| #71                       | 0.0260 | 5/16                          | 1-1/4  | 450-300260 | 450-300260A | 450-300260B |
| #70                       | 0.0280 | 5/16                          | 1-1/4  | 450-300280 | 450-300280A | 450-300280B |
| #69                       | 0.0292 | 5/16                          | 1-1/4  | 450-300292 | 450-300292A | 450-300292B |
| #68                       | 0.0310 | 5/16                          | 1-1/4  | 450-300310 | 450-300310A | 450-300310B |
| 1/32                      | 0.0313 | 5/16                          | 1-1/4  | 450-100312 | 450-100312A | 450-100312B |
| #67                       | 0.0320 | 5/16                          | 1-1/4  | 450-300320 | 450-300320A | 450-300320B |
| #66                       | 0.0330 | 5/16                          | 1-1/4  | 450-300330 | 450-300330A | 450-300330B |
| #65                       | 0.0350 | 5/8                           | 1-3/8  | 450-300350 | 450-300350A | 450-300350B |
| #64                       | 0.0360 | 5/8                           | 1-3/8  | 450-300360 | 450-300360A | 450-300360B |
| #63                       | 0.0370 | 5/8                           | 1-3/8  | 450-300370 | 450-300370A | 450-300370B |
| #62                       | 0.0380 | 5/8                           | 1-3/8  | 450-300380 | 450-300380A | 450-300380B |
| #61                       | 0.0390 | 5/8                           | 1-3/8  | 450-300390 | 450-300390A | 450-300390B |
| 1mm                       | 0.0394 | 16mm                          | 38mm   | 450-400394 | 450-400394A | 450-400394B |
| #60                       | 0.0400 | 3/4                           | 1-1/2  | 450-300400 | 450-300400A | 450-300400B |
| #59                       | 0.0410 | 3/4                           | 1-1/2  | 450-300410 | 450-300410A | 450-300410B |
| #58                       | 0.0420 | 3/4                           | 1-1/2  | 450-300420 | 450-300420A | 450-300420B |
| #57                       | 0.0430 | 3/4                           | 1-1/2  | 450-300430 | 450-300430A | 450-300430B |
| #56                       | 0.0465 | 3/4                           | 1-1/2  | 450-300465 | 450-300465A | 450-300465B |
| 3/64                      | 0.0469 | 3/4                           | 1-1/2  | 450-100469 | 450-100469A | 450-100469B |
| #55                       | 0.0520 | 3/4                           | 1-1/2  | 450-300520 | 450-300520A | 450-300520B |
| #54                       | 0.0550 | 3/4                           | 1-1/2  | 450-300550 | 450-300550A | 450-300550B |
| 1.5mm                     | 0.0591 | 19mm                          | 38mm   | 450-400591 | 450-400591A | 450-400591B |
| #53                       | 0.0595 | 3/4                           | 1-1/2  | 450-300595 | 450-300595A | 450-300595B |
| 1/16                      | 0.0625 | 3/4                           | 1-1/2  | 450-100625 | 450-100625A | 450-100625B |
| #52                       | 0.0635 | 3/4                           | 1-1/2  | 450-300635 | 450-300635A | 450-300635B |
| #51                       | 0.0670 | 3/4                           | 1-1/2  | 450-300670 | 450-300670A | 450-300670B |
| #50                       | 0.0700 | 7/8                           | 1-3/4  | 450-300700 | 450-300700A | 450-300700B |
| #49                       | 0.0730 | 7/8                           | 1-3/4  | 450-300730 | 450-300730A | 450-300730B |
| #48                       | 0.0760 | 7/8                           | 1-3/4  | 450-300760 | 450-300760A | 450-300760B |
| 5/64                      | 0.0781 | 7/8                           | 1-3/4  | 450-100781 | 450-100781A | 450-100781B |
| #47                       | 0.0785 | 7/8                           | 1-3/4  | 450-300785 | 450-300785A | 450-300785B |
| 2mm                       | 0.0787 | 22mm                          | 45mm   | 450-400787 | 450-400787A | 450-400787B |
| #46                       | 0.0810 | 7/8                           | 1-3/4  | 450-300810 | 450-300810A | 450-300810B |
| #45                       | 0.0820 | 7/8                           | 1-3/4  | 450-300820 | 450-300820A | 450-300820B |
| #44                       | 0.0860 | 1                             | 2      | 450-300860 | 450-300860A | 450-300860B |

\*bold numbers are EDPs for ordering

# GENERAL PURPOSE

Solid Carbide Twist Drills



INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS

| Series 450                |        | 2FL   Jobber Length   Twist   |        |            |             |             |
|---------------------------|--------|-------------------------------|--------|------------|-------------|-------------|
| Diameter(D <sub>1</sub> ) |        | Flute Length(L <sub>1</sub> ) | OAL(L) | Bright     | TiN         | AlTiN       |
| Size                      | Dec.   |                               |        |            |             |             |
| #43                       | 0.0890 | 1                             | 2      | 450-300890 | 450-300890A | 450-300890B |
| #42                       | 0.0935 | 1                             | 2      | 450-300935 | 450-300935A | 450-300935B |
| 3/32                      | 0.0938 | 1                             | 2      | 450-100938 | 450-100938A | 450-100938B |
| #41                       | 0.0960 | 1                             | 2      | 450-300960 | 450-300960A | 450-300960B |
| #40                       | 0.0980 | 1                             | 2      | 450-300980 | 450-300980A | 450-300980B |
| 2.5mm                     | 0.0984 | 25mm                          | 51mm   | 450-400984 | 450-400984A | 450-400984B |
| #39                       | 0.0995 | 1-1/4                         | 2-1/4  | 450-300995 | 450-300995A | 450-300995B |
| #38                       | 0.1015 | 1-1/4                         | 2-1/4  | 450-301015 | 450-301015A | 450-301015B |
| #37                       | 0.1040 | 1-1/4                         | 2-1/4  | 450-301040 | 450-301040A | 450-301040B |
| #36                       | 0.1065 | 1-1/4                         | 2-1/4  | 450-301065 | 450-301065A | 450-301065B |
| 7/64                      | 0.1094 | 1-1/4                         | 2-1/4  | 450-101094 | 450-101094A | 450-101094B |
| #35                       | 0.1100 | 1-1/4                         | 2-1/4  | 450-301100 | 450-301100A | 450-301100B |
| #34                       | 0.1110 | 1-1/4                         | 2-1/4  | 450-301110 | 450-301110A | 450-301110B |
| #33                       | 0.1130 | 1-1/4                         | 2-1/4  | 450-301130 | 450-301130A | 450-301130B |
| #32                       | 0.1160 | 1-1/4                         | 2-1/4  | 450-301160 | 450-301160A | 450-301160B |
| 3mm                       | 0.1181 | 32mm                          | 57mm   | 450-401181 | 450-401181A | 450-401181B |
| #31                       | 0.1200 | 1-1/4                         | 2-1/4  | 450-301200 | 450-301200A | 450-301200B |
| 1/8                       | 0.1250 | 1-1/4                         | 2-1/4  | 450-101250 | 450-101250A | 450-101250B |
| #30                       | 0.1285 | 1-1/4                         | 2-1/4  | 450-301285 | 450-301285A | 450-301285B |
| #29                       | 0.1360 | 1-3/8                         | 2-1/2  | 450-301360 | 450-301360A | 450-301360B |
| 3.5mm                     | 0.1378 | 35mm                          | 64mm   | 450-401378 | 450-401378A | 450-401378B |
| #28                       | 0.1405 | 1-3/8                         | 2-1/2  | 450-301405 | 450-301405A | 450-301405B |
| 9/64                      | 0.1406 | 1-3/8                         | 2-1/2  | 450-101406 | 450-101406A | 450-101406B |
| #27                       | 0.1440 | 1-3/8                         | 2-1/2  | 450-301440 | 450-301440A | 450-301440B |
| #26                       | 0.1470 | 1-3/8                         | 2-1/2  | 450-301470 | 450-301470A | 450-301470B |
| #25                       | 0.1495 | 1-3/8                         | 2-1/2  | 450-301495 | 450-301495A | 450-301495B |
| #24                       | 0.1520 | 1-3/8                         | 2-1/2  | 450-301520 | 450-301520A | 450-301520B |
| #23                       | 0.1540 | 1-3/8                         | 2-1/2  | 450-301540 | 450-301540A | 450-301540B |
| 5/32                      | 0.1563 | 1-3/8                         | 2-1/2  | 450-101562 | 450-101562A | 450-101562B |
| #22                       | 0.1570 | 1-3/8                         | 2-1/2  | 450-301570 | 450-301570A | 450-301570B |
| 4mm                       | 0.1575 | 35mm                          | 64mm   | 450-401575 | 450-401575A | 450-401575B |
| #21                       | 0.1590 | 1-3/8                         | 2-1/2  | 450-301590 | 450-301590A | 450-301590B |
| #20                       | 0.1610 | 1-3/8                         | 2-1/2  | 450-301610 | 450-301610A | 450-301610B |
| #19                       | 0.1660 | 1-5/8                         | 2-3/4  | 450-301660 | 450-301660A | 450-301660B |
| #18                       | 0.1695 | 1-5/8                         | 2-3/4  | 450-301695 | 450-301695A | 450-301695B |
| 11/64                     | 0.1719 | 1-5/8                         | 2-3/4  | 450-101719 | 450-101719A | 450-101719B |
| #17                       | 0.1730 | 1-5/8                         | 2-3/4  | 450-301730 | 450-301730A | 450-301730B |
| #16                       | 0.1770 | 1-5/8                         | 2-3/4  | 450-301770 | 450-301770A | 450-301770B |
| 4.5mm                     | 0.1772 | 41mm                          | 70mm   | 450-401772 | 450-401772A | 450-401772B |
| #15                       | 0.1800 | 1-5/8                         | 2-3/4  | 450-301800 | 450-301800A | 450-301800B |
| #14                       | 0.1820 | 1-5/8                         | 2-3/4  | 450-301820 | 450-301820A | 450-301820B |
| #13                       | 0.1850 | 1-5/8                         | 2-3/4  | 450-301850 | 450-301850A | 450-301850B |
| 3/16                      | 0.1875 | 1-5/8                         | 2-3/4  | 450-101875 | 450-101875A | 450-101875B |
| #12                       | 0.1890 | 1-5/8                         | 2-3/4  | 450-301890 | 450-301890A | 450-301890B |
| #11                       | 0.1910 | 1-5/8                         | 2-3/4  | 450-301910 | 450-301910A | 450-301910B |
| #10                       | 0.1935 | 1-5/8                         | 2-3/4  | 450-301935 | 450-301935A | 450-301935B |
| #9                        | 0.1960 | 1-3/4                         | 3      | 450-301960 | 450-301960A | 450-301960B |
| 5mm                       | 0.1969 | 45mm                          | 76mm   | 450-401969 | 450-401969A | 450-401969B |
| #8                        | 0.1990 | 1-3/4                         | 3      | 450-301990 | 450-301990A | 450-301990B |
| #7                        | 0.2010 | 1-3/4                         | 3      | 450-302010 | 450-302010A | 450-302010B |
| 13/64                     | 0.2031 | 1-3/4                         | 3      | 450-102031 | 450-102031A | 450-102031B |
| #6                        | 0.2040 | 1-3/4                         | 3      | 450-302040 | 450-302040A | 450-302040B |
| #5                        | 0.2055 | 1-3/4                         | 3      | 450-302055 | 450-302055A | 450-302055B |
| #4                        | 0.2090 | 1-3/4                         | 3      | 450-302090 | 450-302090A | 450-302090B |
| #3                        | 0.2130 | 1-3/4                         | 3      | 450-302130 | 450-302130A | 450-302130B |
| 5.5mm                     | 0.2165 | 45mm                          | 76mm   | 450-402165 | 450-402165A | 450-402165B |
| 7/32                      | 0.2188 | 1-3/4                         | 3      | 450-102188 | 450-102188A | 450-102188B |
| #2                        | 0.2210 | 1-3/4                         | 3      | 450-302210 | 450-302210A | 450-302210B |
| #1                        | 0.2280 | 1-3/4                         | 3      | 450-302280 | 450-302280A | 450-302280B |
| A                         | 0.2340 | 2                             | 3-1/4  | 450-202340 | 450-202340A | 450-202340B |
| 15/64                     | 0.2344 | 2                             | 3-1/4  | 450-102344 | 450-102344A | 450-102344B |
| 6mm                       | 0.2362 | 51mm                          | 83mm   | 450-402362 | 450-402362A | 450-402362B |
| B                         | 0.2380 | 2                             | 3-1/4  | 450-202380 | 450-202380A | 450-202380B |
| C                         | 0.2420 | 2                             | 3-1/4  | 450-202420 | 450-202420A | 450-202420B |
| D                         | 0.2460 | 2                             | 3-1/4  | 450-202460 | 450-202460A | 450-202460B |
| 1/4                       | 0.2500 | 2                             | 3-1/4  | 450-102500 | 450-102500A | 450-102500B |
| E                         | 0.2500 | 2                             | 3-1/4  | 450-202500 | 450-202500A | 450-202500B |
| 6.5mm                     | 0.2559 | 51mm                          | 83mm   | 450-402559 | 450-402559A | 450-402559B |
| F                         | 0.2570 | 2                             | 3-1/4  | 450-202570 | 450-202570A | 450-202570B |
| G                         | 0.2610 | 2-1/8                         | 3-1/2  | 450-202610 | 450-202610A | 450-202610B |
| 17/64                     | 0.2656 | 2-1/8                         | 3-1/2  | 450-102656 | 450-102656A | 450-102656B |
| H                         | 0.2660 | 2-1/8                         | 3-1/2  | 450-202660 | 450-202660A | 450-202660B |

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# GENERAL PURPOSE

Solid Carbide Twist Drills



Series 450

2FL | Jobber Length | Twist

| Diameter(D <sub>1</sub> )<br>Size | Dec.   | Flute Length(L <sub>1</sub> ) | OAL(L) | Bright     | TiN         | AlTiN       |
|-----------------------------------|--------|-------------------------------|--------|------------|-------------|-------------|
| I                                 | 0.2720 | 2-1/8                         | 3-1/2  | 450-202720 | 450-202720A | 450-202720B |
| 7mm                               | 0.2756 | 54mm                          | 89mm   | 450-402756 | 450-402756A | 450-402756B |
| J                                 | 0.2770 | 2-1/8                         | 3-1/2  | 450-202770 | 450-202770A | 450-202770B |
| K                                 | 0.2810 | 2-1/8                         | 3-1/2  | 450-202810 | 450-202810A | 450-202810B |
| 9/32                              | 0.2813 | 2-1/8                         | 3-1/2  | 450-102812 | 450-102812A | 450-102812B |
| L                                 | 0.2900 | 2-1/8                         | 3-1/2  | 450-202900 | 450-202900A | 450-202900B |
| M                                 | 0.2950 | 2-3/8                         | 3-3/4  | 450-202950 | 450-202950A | 450-202950B |
| 7.5mm                             | 0.2953 | 60mm                          | 95mm   | 450-402953 | 450-402953A | 450-402953B |
| 19/64                             | 0.2969 | 2-3/8                         | 3-3/4  | 450-102969 | 450-102969A | 450-102969B |
| N                                 | 0.3020 | 2-3/8                         | 3-3/4  | 450-203020 | 450-203020A | 450-203020B |
| 5/16                              | 0.3125 | 2-3/8                         | 3-3/4  | 450-103125 | 450-103125A | 450-103125B |
| 8mm                               | 0.3150 | 60mm                          | 95mm   | 450-403150 | 450-403150A | 450-403150B |
| O                                 | 0.3160 | 2-3/8                         | 3-3/4  | 450-203160 | 450-203160A | 450-203160B |
| P                                 | 0.3230 | 2-3/8                         | 3-3/4  | 450-203230 | 450-203230A | 450-203230B |
| 21/64                             | 0.3281 | 2-1/2                         | 4      | 450-103281 | 450-103281A | 450-103281B |
| Q                                 | 0.3320 | 2-1/2                         | 4      | 450-203320 | 450-203320A | 450-203320B |
| 8.5mm                             | 0.3346 | 64mm                          | 102mm  | 450-403346 | 450-403346A | 450-403346B |
| R                                 | 0.3390 | 2-1/2                         | 4      | 450-203390 | 450-203390A | 450-203390B |
| 11/32                             | 0.3438 | 2-1/2                         | 4      | 450-103438 | 450-103438A | 450-103438B |
| S                                 | 0.3480 | 2-1/2                         | 4      | 450-203480 | 450-203480A | 450-203480B |
| 9mm                               | 0.3543 | 64mm                          | 102mm  | 450-403543 | 450-403543A | 450-403543B |
| T                                 | 0.3580 | 2-3/4                         | 4-1/4  | 450-203580 | 450-203580A | 450-203580B |
| 23/64                             | 0.3594 | 2-3/4                         | 4-1/4  | 450-103594 | 450-103594A | 450-103594B |
| U                                 | 0.3680 | 2-3/4                         | 4-1/4  | 450-203680 | 450-203680A | 450-203680B |
| 9.5mm                             | 0.3740 | 70mm                          | 108mm  | 450-403740 | 450-403740A | 450-403740B |
| 3/8                               | 0.3750 | 2-3/4                         | 4-1/4  | 450-103750 | 450-103750A | 450-103750B |
| V                                 | 0.3770 | 2-3/4                         | 4-1/4  | 450-203770 | 450-203770A | 450-203770B |
| W                                 | 0.3860 | 2-7/8                         | 4-1/2  | 450-203860 | 450-203860A | 450-203860B |
| 25/64                             | 0.3906 | 2-7/8                         | 4-1/2  | 450-103906 | 450-103906A | 450-103906B |
| 1mm                               | 0.3937 | 73mm                          | 114mm  | 450-403937 | 450-403937A | 450-403937B |
| X                                 | 0.3970 | 2-7/8                         | 4-1/2  | 450-203970 | 450-203970A | 450-203970B |
| Y                                 | 0.4040 | 2-7/8                         | 4-1/2  | 450-204040 | 450-204040A | 450-204040B |
| 13/32                             | 0.4063 | 2-7/8                         | 4-1/2  | 450-104062 | 450-104062A | 450-104062B |
| Z                                 | 0.4130 | 2-7/8                         | 4-1/2  | 450-204130 | 450-204130A | 450-204130B |
| 10.5mm                            | 0.4134 | 73mm                          | 114mm  | 450-404134 | 450-404134A | 450-404134B |
| 27/64                             | 0.4219 | 2-7/8                         | 4-1/2  | 450-104219 | 450-104219A | 450-104219B |
| 11mm                              | 0.4331 | 73mm                          | 114mm  | 450-404331 | 450-404331A | 450-404331B |
| 7/16                              | 0.4375 | 2-7/8                         | 4-1/2  | 450-104375 | 450-104375A | 450-104375B |
| 11.5mm                            | 0.4528 | 76mm                          | 121mm  | 450-404528 | 450-404528A | 450-404528B |
| 29/64                             | 0.4531 | 3                             | 4-3/4  | 450-104531 | 450-104531A | 450-104531B |
| 15/32                             | 0.4688 | 3                             | 4-3/4  | 450-104688 | 450-104688A | 450-104688B |
| 12mm                              | 0.4724 | 76mm                          | 121mm  | 450-404724 | 450-404724A | 450-404724B |
| 31/64                             | 0.4844 | 3                             | 4-3/4  | 450-104844 | 450-104844A | 450-104844B |
| 12.5mm                            | 0.4921 | 76mm                          | 121mm  | 450-404921 | 450-404921A | 450-404921B |
| 1/2                               | 0.5000 | 3                             | 4-3/4  | 450-105000 | 450-105000A | 450-105000B |

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INTRO

MILLING

SPECIALTY

HOLEMAKING

THREADING

INSERTS

## Series 450, 453, 460, 470

General Purpose Drills | 2 & 3 FL | Twist | Straight

|          |                  |                                                                                        |            |     | (IPR) Cutting Tool Diameter |        |        |        |        |        |        |        |
|----------|------------------|----------------------------------------------------------------------------------------|------------|-----|-----------------------------|--------|--------|--------|--------|--------|--------|--------|
| Material |                  |                                                                                        | Hardness   | SFM | 1/32                        | 1/16   | 1/8    | 1/4    | 3/8    | 1/2    | 5/8    | 3/4    |
| P        | Steel            | Free Machining & Low Carbon: 10XX, 11XX, 12XX, A36                                     | ≤ 28 Rc    | 175 |                             |        |        |        |        |        |        |        |
|          | Steel            | Medium/High Carbon Steels, Alloy Steels: 13XX, 41XX, 43XX, 86XX                        | 28-38 Rc   | 165 | 0.0010                      | 0.0020 | 0.0030 | 0.0060 | 0.0080 | 0.0100 | 0.0110 | 0.0120 |
|          | Die Steels       | A2, H13, L6, P20, S7                                                                   | 28-44 Rc   | 150 |                             |        |        |        |        |        |        |        |
| M        | Stainless Steels | Easy to Machine, 430F, 301, 303, 410, 416 Annealed, 420F, 430, 430F                    | ≤ 28 Rc    | 140 | 0.0010                      | 0.0020 | 0.0030 | 0.0060 | 0.0080 | 0.0100 | 0.0110 | 0.0120 |
|          | Stainless Steels | Moderately Difficult to Machine, Nitronic 50, 301, 303, 304, 304L, 316, 316L, 321, 347 | ≤ 28 Rc    | 60  | 0.0003                      | 0.0005 | 0.0020 | 0.0040 | 0.0050 | 0.0060 | 0.0080 | 0.0100 |
| S        | Super Alloys     | High Temp, Nimonics, Inconel, Monel, Hastelloy                                         | ≤ 42 Rc    | 60  |                             |        |        |        |        |        |        |        |
|          | Super Alloys     | Titanium: Ti 3Al-2.5V, Ti 6Al-4V Ti 10V-2Fe-3Al                                        | ≤ 42 Rc    | 80  | 0.0003                      | 0.0005 | 0.0020 | 0.0040 | 0.0050 | 0.0060 | 0.0080 | 0.0100 |
| H        | Hardened Steels  | 4140H, P20, H13                                                                        | 35-45 Rc   | 50  | 0.0003                      | 0.0010 | 0.0010 | 0.0010 | 0.0020 | 0.0020 | 0.0020 | 0.0030 |
| K        | Cast Iron        | Gray: SAE J431, ASTM A48                                                               | 160-200 HB | 175 |                             |        |        |        |        |        |        |        |
|          | Cast Iron        | Ductile & Malleable, ASTM A536, ASTM 897, ASTM A47, ASTM A220                          | 200-250 HB | 175 | 0.0010                      | 0.0020 | 0.0030 | 0.0060 | 0.0080 | 0.0100 | 0.0110 | 0.0120 |
| N        | Non-Ferrous      | Aluminum, Brass, Bronze, Copper, Plastics                                              | -          | 300 |                             |        |        |        |        |        |        |        |
|          | Non-Ferrous      | Kevlar/Graphite                                                                        | -          | 375 | 0.0003                      | 0.0005 | 0.0020 | 0.0040 | 0.0050 | 0.0060 | 0.0080 | 0.0100 |