KYOCERA

SGS Precision Tools

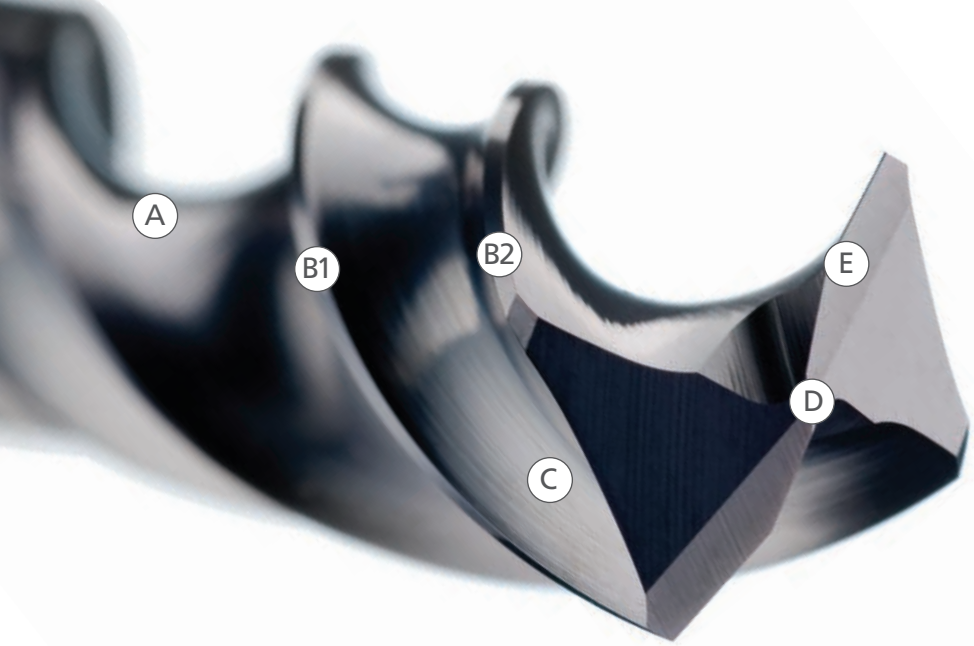
SGS®

Solid Carbide Tools

# Drilling Solutions

**www.kyocera-sgstool.com**

ISO 9001 Certified




# SERIES 135

HI-PERCARB®

## HIGH PERFORMANCE CARBIDE DRILLS

The key features designed into the Hi-PerCarb Series 135 Drill allow the product to offer application benefits not only beyond that of standard carbide drills, but also other High Performance drills. Each feature of the Hi-PerCarb Series 135 Drill was uniquely engineered as a solution towards addressing the issues commonly encountered during high production drilling.

### (A) HIGH PERFORMANCE FLUTE DESIGN

- efficiently transports chips
- increases strength for aggressive drilling

### Ti-NAMITE A COATING

- improves resistance to heat and wear
- enhances tool life

### (B1) (B2) DOUBLE MARGIN DESIGN

- improves accuracy and surface finish
- increases stability and rigidity

### (C) SECONDARY FLUTE

- improves coolant flow to point
- reduces friction along drill body
- assists in fine swarf evacuation

### (D) SPECIALIZED 145° NOTCHED POINT

- self centering eliminates need for spot drill
- improves chip control
- decreases drill thrust and deflection

### (E) ENGINEERED EDGE PROTECTION

- improves edge strength
- reduces edge fatigue
- allows increased feed rates

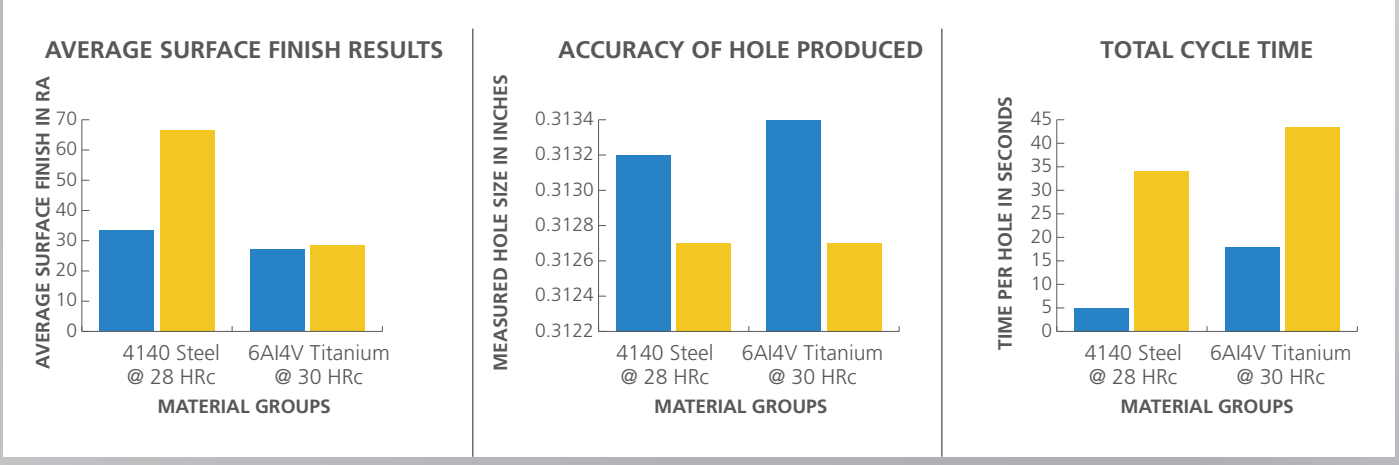
**PERFORMANCE. PRECISION. PASSION.**

HI-PER CARB SERIES 135 DRILLS

KYOCERA
SGS Precision Tools

# PERFORMANCE.

**MACHINING ENVIRONMENT:**
Haas VM-3 with 9% Water Soluble Oil Flood Coolant
5/16" (.3125) diameter hole:
4140 application – .650" deep
6Al-4V application – 1.125" deep




HI-PERCARB SERIES 135 SOLID CARBIDE DRILL AND REAMER

The second margin gives the Hi-PerCarb Series 135 Drill a burnishing effect and the flute form effectively controls and transports chips allowing the drill to offer superior surface finishes and hole size in high production environments saving cycle time by often avoiding the need for reaming in many applications.

# PRECISION.

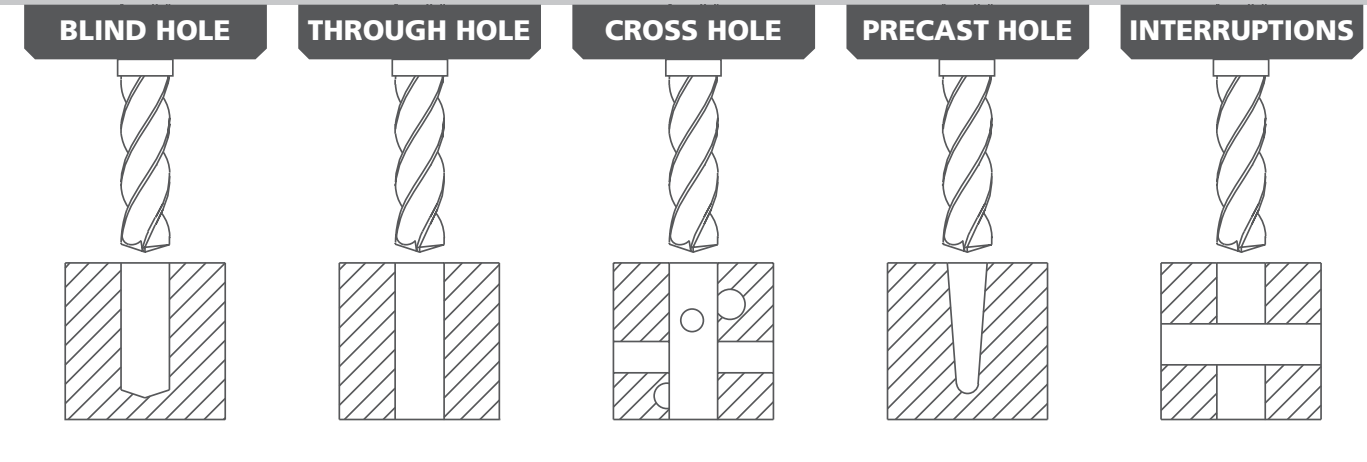
The stability of the double margin design and penetration capability of the point geometry allow the Hi-PerCarb Series 135 Drill to address demanding applications that would normally require reduced operating parameters or a two step process.

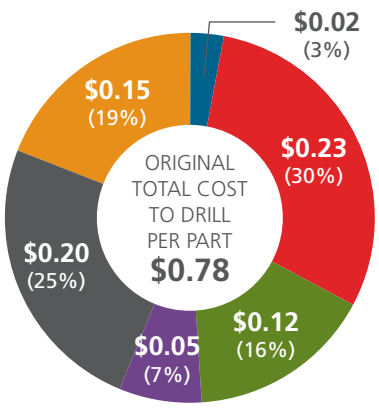
# PASSION.

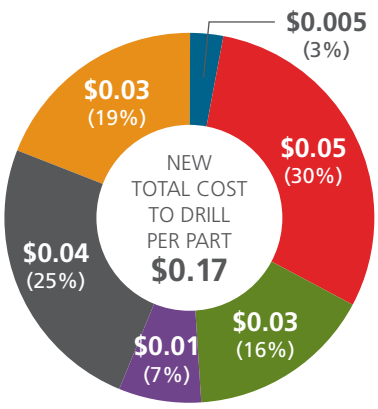
The secondary flute provides a channel for cooling capabilities normally not found in external coolant drills, this combined with the Ti-NAMITE A tool coating and the high strength edge design results in increased operating parameters with additional tool life.

**ACTUAL CUSTOMER APPLICATION USING A 6MM DRILL IN 17-4 PH STAINLESS STEEL**

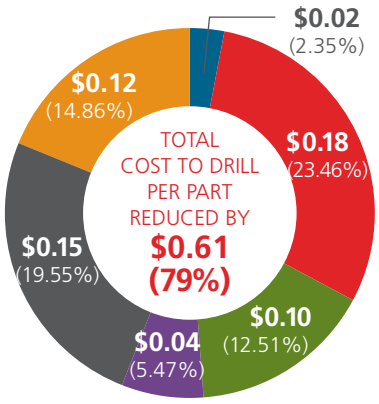
| | COMPETITOR | HI-PERCARB SERIES 135 |
|---|---|---|
| NUMBER OF PARTS TO PRODUCE | 50000 | 50000 |
| SURFACE FEET PER MINUTE (SFM) | 74 | 124 |
| SPEED IN REVOLUTIONS PER MINUTE (RPM) | 1200 | 2000 |
| FEED IN INCHES PER MINUTE (IPM) | 3.6 | 10 |
| NUMBER OF PARTS PRODUCED PER TOOL | 140 | 500 |
| DEPTH OF HOLE | 0.6800 | 0.6800 |
| NUMBER OF NEW TOOLS REQUIRED TO COMPLETE JOB | 358 | 100 |
| TOTAL HOURS OF MACHINING TIME | 157 | 57 |
| TOTAL MACHINING COST | $10,231.48 | $3,683.33 |
| TOOL CHANGE COST | $1,939.17 | $541.67 |
| TOTAL COST | $39,017.07 | $8,460.00 |
| COST PER PART | $0.78 | $0.17 |
| MATERIAL REMOVAL RATE ($IN^3$ / MIN) – DRILLING | 0.16 | 0.44 |
| CUTTING TIME PER PART – MINUTES | 0.19 | 0.07 |
| SAVINGS PER PART – DOLLARS | 0 | $0.61 |
| TOTAL COST SAVINGS / JOB – PERCENTAGE | 0 | 78.32% |
| TOTAL COST SAVINGS / JOB – DOLLARS | 0 | $30,557.07 |




- TOOL COST
- MACHINING COST
- COOLANT COST
- MACHINE DOWNTIME COST
- TOOL CHANGE COST
- ADMINISTRATIVE COST




- TOOL COST REDUCED BY
- MACHINING COST REDUCED BY
- COOLANT COST REDUCED BY
- MACHINE DOWNTIME COST REDUCED BY
- TOOL CHANGE COST REDUCED BY
- ADMINISTRATIVE COST REDUCED BY

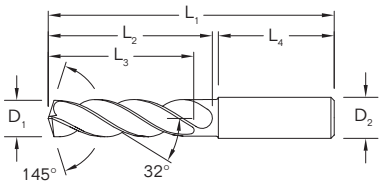
Using 100 tools per job compared to 358 means less inventory and fewer purchase orders to issue resulting in improved administrative cost and reduced tooling cost per job.

Increasing the feed by 278% has decreased the total hours of machine time by 100 hours gaining manufacturing capacity; this factored with the hourly shop rate has resulted in the largest portion of the savings.

With a tool life of 500 parts compared to 140 parts or a 357% improvement in tool life equates to less time dedicated to changing tools to keep the job running.

Increasing the material removal rate by .28 cubic inches or 275% requires less time in the cut and a reduced use of coolant.

HI-PERCARB®
HIGH PERFORMANCE CARBIDE DRILLS




**TOLERANCES (inch)**

| DIAMETER | $D_1$ | $D_2$ |
|---|---|---|
| ≤.1181 | +.00008/+.00047 | h6 |
| >.1181–.2362 | +.00016/+.00063 | h6 |
| >.2362–.3937 | +.00024/+.00083 | h6 |
| >.3937–.7087 | +.00028/+.00098 | h6 |
| >.7087–1.1811 | +.00031/+.00114 | h6 |

**TOLERANCES (mm)**

| DIAMETER | $D_1$ | $D_2$ |
|---|---|---|
| ≤ 3 | +0,002/+0,012 | h6 |
| > 3 - 6 | +0,004/+0,016 | h6 |
| > 6 - 10 | +0,006/+0,021 | h6 |
| > 10 - 18 | +0,007/+0,025 | h6 |
| > 18 - 30 | +0,008/+0,029 | h6 |



| Cutting Diameter $D_1$ | Decimal Equivalent | Metric Equivalent | Tap Size Reference Only | Shank Diameter $D_2$ | Overall Length $L_1$ | Flute Length $L_2$ | Min. Cleared Length $L_3$ | Shank Length $L_4$ | Ti-NAMITE-A (AlTiN) EDP No. |
|---|---|---|---|---|---|---|---|---|---|
| 1/64 | 0.0156 | 0.40 | | 1/8 | 1-1/2 | 1/8 | 5/64 | 1 | 51752* |
| 1/32 | 0.0312 | 0.79 | | 1/8 | 1-1/2 | 1/4 | 3/16 | 1 | 51269* |
| 3/64 | 0.0469 | 1.19 | 1/16-64 | 1/8 | 1-1/2 | 3/8 | 5/16 | 1 | 51270* |
| 1,25 mm | 0.0492 | | | 3,0 | 38,0 | 9,5 | 8,0 | 25,0 | 64500* |
| 1,45 mm | 0.0571 | | | 3,0 | 38,0 | 9,5 | 8,0 | 25,0 | 64501* |
| #53 | 0.0595 | 1.51 | | 1/8 | 1-1/2 | 3/8 | 5/16 | 1 | 64502* |
| 1/16 | 0.0625 | 1.59 | 5/64-60 | 1/8 | 2 | 7/16 | 3/8 | 1-1/4 | 51271* |
| 1,6 mm | 0.0630 | | | 3,0 | 50,0 | 11,0 | 9,0 | 32,0 | 64503* |
| 1,75 mm | 0.0689 | | | 3,0 | 50,0 | 11,0 | 9,0 | 32,0 | 64504* |
| #50 | 0.0700 | 1.78 | | 1/8 | 2 | 7/16 | 3/8 | 1-1/4 | 64505* |
| 5/64 | 0.0781 | 1.98 | | 1/8 | 2 | 1/2 | 7/16 | 1-1/4 | 51272* |
| #47 | 0.0785 | 1.99 | | 1/8 | 2 | 1/2 | 7/16 | 1-1/4 | 64506* |
| 2,05 mm | 0.0807 | | | 3,0 | 50,0 | 12,0 | 11,0 | 32,0 | 64507* |
| #46 | 0.0810 | 2.06 | | 1/8 | 2 | 1/2 | 7/16 | 1-1/4 | 64508* |
| #43 | 0.0890 | 2.26 | | 1/8 | 2 | 1/2 | 7/16 | 1-1/4 | 64509* |
| #42 | 0.0935 | 2.37 | | 1/8 | 2 | 1/2 | 7/16 | 1-1/4 | 64510* |
| 3/32 | 0.0938 | 2.38 | 1/8-32 | 1/8 | 2 | 1/2 | 7/16 | 1-1/4 | 51273 |
| #40 | 0.0980 | 2.49 | | 1/8 | 2 | 9/16 | 1/2 | 1-1/4 | 51274 |
| 2,5 mm | 0.0984 | | | 3,0 | 50,0 | 14,0 | 12,0 | 32,0 | 64511 |
| #39 | 0.0995 | 2.53 | | 1/8 | 2 | 9/16 | 1/2 | 1-1/4 | 51753 |
| #38 | 0.1015 | 2.58 | 5-40 | 1/8 | 2 | 9/16 | 1/2 | 1-1/4 | 51754 |
| #37 | 0.1040 | 2.64 | 5-44 | 1/8 | 2 | 9/16 | 1/2 | 1-1/4 | 51755 |
| #36 | 0.1065 | 2.71 | 6-32 | 1/8 | 2 | 9/16 | 1/2 | 1-1/4 | 51756 |
| 7/64 | 0.1094 | 2.78 | | 1/8 | 2 | 5/8 | 9/16 | 1-1/4 | 51275 |
| #35 | 0.1100 | 2.79 | | 1/8 | 2 | 5/8 | 9/16 | 1-1/4 | 51276 |
| #34 | 0.1110 | 2.82 | | 1/8 | 2 | 5/8 | 9/16 | 1-1/4 | 51277 |
| #33 | 0.1130 | 2.87 | 6-40 | 1/8 | 2 | 5/8 | 9/16 | 1-1/4 | 51757 |
| 2,9 mm | 0.1142 | | | 3,0 | 50,0 | 16,0 | 14,0 | 32,0 | 64512 |
| #32 | 0.1160 | 2.95 | | 1/8 | 2 | 5/8 | 9/16 | 1-1/4 | 51758 |
| 3,0 mm | 0.1181 | | | 6,0 | 62,0 | 20,0 | 17,0 | 36,0 | 63155 |
| #31 | 0.1200 | 3.05 | | 1/8 | 2 | 5/8 | 9/16 | 1-1/4 | 51759 |
| 3,1 mm | 0.1220 | | | 6,0 | 62,0 | 20,0 | 17,0 | 36,0 | 63741 |
| 1/8 | 0.1250 | 3.18 | | 1/4 | 2-1/2 | 3/4 | 21/32 | 1-7/16 | 51330 |
| 3,2 mm | 0.1260 | | M3,5 X 0,35 | 6,0 | 62,0 | 20,0 | 17,0 | 36,0 | 63156 |
| #30 | 0.1285 | 3.26 | | 1/4 | 2-1/2 | 3/4 | 21/32 | 1-7/16 | 51278 |
| 3,3 mm | 0.1299 | | M4 X 0,7 | 6,0 | 62,0 | 20,0 | 17,0 | 36,0 | 63157 |
| 3,4 mm | 0.1339 | | | 6,0 | 62,0 | 20,0 | 17,0 | 36,0 | 63158 |
| #29 | 0.1360 | 3.45 | 8-32,8-36 | 1/4 | 2-1/2 | 3/4 | 21/32 | 1-7/16 | 51331 |
| 3,5 mm | 0.1378 | | M4 X 0,5 | 6,0 | 62,0 | 20,0 | 17,0 | 36,0 | 63159 |
| #28 | 0.1405 | 3.57 | 8-40 | 1/4 | 2-1/2 | 3/4 | 21/32 | 1-7/16 | 51760 |
| 9/64 | 0.1406 | 3.57 | | 1/4 | 2-1/2 | 3/4 | 21/32 | 1-7/16 | 51332 |
| 3,6 mm | 0.1417 | | M4 X 0,35 | 6,0 | 62,0 | 20,0 | 17,0 | 36,0 | 63160 |

*Single Margin

*(continued on next page)*

Common
3xD Reach
Right Spiral
External Coolant
2 Flutes

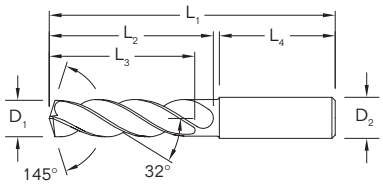
HI-PERCARB®
HIGH PERFORMANCE CARBIDE DRILLS

**TOLERANCES (inch)**

| DIAMETER | $D_1$ | $D_2$ |
|---|---|---|
| ≤.1181 | +.00008/+.00047 | h6 |
| >.1181–.2362 | +.00016/+.00063 | h6 |
| >.2362–.3937 | +.00024/+.00083 | h6 |
| >.3937–.7087 | +.00028/+.00098 | h6 |
| >.7087–1.1811 | +.00031/+.00114 | h6 |

**TOLERANCES (mm)**

| DIAMETER | $D_1$ | $D_2$ |
|---|---|---|
| ≤ 3 | +0,002/+0,012 | h6 |
| > 3 - 6 | +0,004/+0,016 | h6 |
| > 6 - 10 | +0,006/+0,021 | h6 |
| > 10 - 18 | +0,007/+0,025 | h6 |
| > 18 - 30 | +0,008/+0,029 | h6 |




Common

3xD
Reach

Right Spiral

External Coolant

2
Flutes

| Cutting Diameter $D_1$ | Decimal Equivalent | Metric Equivalent | Tap Size Reference Only | Shank Diameter $D_2$ | Overall Length $L_1$ | Flute Length $L_2$ | Min. Cleared Length $L_3$ | Shank Length $L_4$ | Ti-NAMITE-A (AlTiN) EDP No. |
|---|---|---|---|---|---|---|---|---|---|
| #27 | 0.1440 | 3.66 | | 1/4 | 2-1/2 | 3/4 | 21/32 | 1-7/16 | 51761 |
| 3,7 mm | 0.1457 | | M4.5 X 0,75 | 6,0 | 62,0 | 20,0 | 17,0 | 36,0 | 63161 |
| #26 | 0.1470 | 3.73 | 3/16-24 | 1/4 | 2-1/2 | 3/4 | 21/32 | 1-7/16 | 51762 |
| #25 | 0.1495 | 3.80 | 10-24 | 1/4 | 2-5/8 | 7/8 | 23/32 | 1-7/16 | 51333 |
| 3,8 mm | 0.1496 | | | 6,0 | 66,0 | 24,0 | 21,0 | 36,0 | 63742 |
| #24 | 0.1520 | 3.86 | 10-28 | 1/4 | 2-5/8 | 7/8 | 23/32 | 1-7/16 | 51763 |
| 3,9 mm | 0.1535 | | | 6,0 | 66,0 | 24,0 | 21,0 | 36,0 | 63743 |
| #23 | 0.1540 | 3.91 | | 1/4 | 2-5/8 | 7/8 | 23/32 | 1-7/16 | 51764 |
| 5/32 | 0.1562 | 3.97 | | 1/4 | 2-5/8 | 7/8 | 23/32 | 1-7/16 | 51334 |
| #22 | 0.1570 | 3.99 | 10-30 | 1/4 | 2-5/8 | 7/8 | 23/32 | 1-7/16 | 51765 |
| 4,0 mm | 0.1575 | | M4,5 X 0,5 | 6,0 | 66,0 | 24,0 | 21,0 | 36,0 | 63162 |
| #21 | 0.1590 | 4.04 | 10-32 | 1/4 | 2-5/8 | 7/8 | 23/32 | 1-7/16 | 51335 |
| #20 | 0.1610 | 4.09 | 13/64-24 | 1/4 | 2-5/8 | 7/8 | 23/32 | 1-7/16 | 51279 |
| 4,1 mm | 0.1614 | | | 6,0 | 66,0 | 24,0 | 21,0 | 36,0 | 63744 |
| 4,2 mm | 0.1654 | | M5 / M5 X 0,75 | 6,0 | 66,0 | 24,0 | 21,0 | 36,0 | 63163 |
| #19 | 0.1660 | 4.22 | | 1/4 | 2-5/8 | 7/8 | 23/32 | 1-7/16 | 51766 |
| 4,3 mm | 0.1693 | | | 6,0 | 66,0 | 24,0 | 21,0 | 36,0 | 63164 |
| #18 | 0.1695 | 4.31 | | 1/4 | 2-5/8 | 7/8 | 23/32 | 1-7/16 | 51767 |
| 11/64 | 0.1719 | 4.37 | | 1/4 | 2-5/8 | 7/8 | 23/32 | 1-7/16 | 51336 |
| #17 | 0.1730 | 4.39 | | 1/4 | 2-5/8 | 7/8 | 23/32 | 1-7/16 | 51768 |
| 4,4 mm | 0.1732 | | | 6,0 | 66,0 | 24,0 | 21,0 | 36,0 | 63745 |
| #16 | 0.1770 | 4.50 | 12-24 | 1/4 | 2-5/8 | 7/8 | 23/32 | 1-7/16 | 51769 |
| 4,5 mm | 0.1772 | | M5 X 0,5 | 6,0 | 66,0 | 24,0 | 21,0 | 36,0 | 63165 |
| #15 | 0.1800 | 4.57 | | 1/4 | 2-5/8 | 7/8 | 23/32 | 1-7/16 | 51770 |
| 4,6 mm | 0.1811 | | 12-28 | 6,0 | 66,0 | 24,0 | 21,0 | 36,0 | 63166 |
| #14 | 0.1820 | 4.62 | | 1/4 | 2-5/8 | 7/8 | 23/32 | 1-7/16 | 51771 |
| #13 | 0.1850 | 4.70 | 12-32 | 1/4 | 2-5/8 | 7/8 | 23/32 | 1-7/16 | 51772 |
| 4,7 mm | 0.1850 | | | 6,0 | 66,0 | 24,0 | 21,0 | 36,0 | 63746 |
| 3/16 | 0.1875 | 4.76 | | 1/4 | 2-5/8 | 1 | 53/64 | 1-7/16 | 51337 |
| #12 | 0.1890 | 4.80 | 7/32-32 | 1/4 | 2-5/8 | 1 | 53/64 | 1-7/16 | 51773 |
| 4,8 mm | 0.1890 | | | 6,0 | 66,0 | 28,0 | 24,0 | 36,0 | 63167 |
| #11 | 0.1910 | 4.85 | | 1/4 | 2-5/8 | 1 | 53/64 | 1-7/16 | 51774 |
| 4,9 mm | 0.1929 | | | 6,0 | 66,0 | 28,0 | 24,0 | 36,0 | 63747 |
| #10 | 0.1935 | 4.91 | 14-20 | 1/4 | 2-5/8 | 1 | 53/64 | 1-7/16 | 51775 |
| #9 | 0.1960 | 4.98 | | 1/4 | 2-5/8 | 1 | 53/64 | 1-7/16 | 51776 |
| 5,0 mm | 0.1969 | | M6 X 1 | 6,0 | 66,0 | 28,0 | 24,0 | 36,0 | 63168 |
| #8 | 0.1990 | 5.05 | | 1/4 | 2-5/8 | 1 | 53/64 | 1-7/16 | 51777 |
| 5,1 mm | 0.2008 | | | 6,0 | 66,0 | 28,0 | 24,0 | 36,0 | 63748 |
| #7 | 0.2010 | 5.11 | 1/4-20 | 1/4 | 2-5/8 | 1 | 53/64 | 1-7/16 | 51338 |
| 13/64 | 0.2031 | 5.16 | | 1/4 | 2-5/8 | 1 | 53/64 | 1-7/16 | 51339 |
| #6 | 0.2040 | 5.18 | | 1/4 | 2-5/8 | 1 | 53/64 | 1-7/16 | 51778 |
| 5,2 mm | 0.2047 | | M6 X 0,75 | 6,0 | 66,0 | 28,0 | 24,0 | 36,0 | 63749 |

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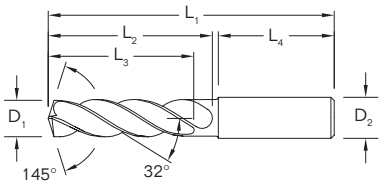
HI-PERCARB®
HIGH PERFORMANCE CARBIDE DRILLS




**TOLERANCES (inch)**

| DIAMETER | $D_1$ | $D_2$ |
|---|---|---|
| ≤.1181 | +.00008/+.00047 | h6 |
| >.1181–.2362 | +.00016/+.00063 | h6 |
| >.2362–.3937 | +.00024/+.00083 | h6 |
| >.3937–.7087 | +.00028/+.00098 | h6 |
| >.7087–1.1811 | +.00031/+.00114 | h6 |

**TOLERANCES (mm)**

| DIAMETER | $D_1$ | $D_2$ |
|---|---|---|
| ≤ 3 | +0,002/+0,012 | h6 |
| > 3 - 6 | +0,004/+0,016 | h6 |
| > 6 - 10 | +0,006/+0,021 | h6 |
| > 10 - 18 | +0,007/+0,025 | h6 |
| > 18 - 30 | +0,008/+0,029 | h6 |



| Cutting Diameter $D_1$ | Decimal Equivalent | Metric Equivalent | Tap Size Reference Only | Shank Diameter $D_2$ | Overall Length $L_1$ | Flute Length $L_2$ | Min. Cleared Length $L_3$ | Shank Length $L_4$ | Ti-NAMITE-A (AlTiN) EDP No. |
|---|---|---|---|---|---|---|---|---|---|
| #5 | 0.2055 | 5.22 | | 1/4 | 2-5/8 | 1 | 53/64 | 1-7/16 | 51779 |
| 5,25 mm | 0.2067 | | | 6,0 | 66,0 | 28,0 | 24,0 | 36,0 | 63169 |
| 5,3 mm | 0.2087 | | | 6,0 | 66,0 | 28,0 | 24,0 | 36,0 | 63170 |
| #4 | 0.2090 | 5.31 | 1/4-24 | 1/4 | 2-5/8 | 1 | 53/64 | 1-7/16 | 51780 |
| 5,4 mm | 0.2126 | | | 6,0 | 66,0 | 28,0 | 24,0 | 36,0 | 63750 |
| #3 | 0.2130 | 5.41 | 1/4-28 | 1/4 | 2-5/8 | 1 | 53/64 | 1-7/16 | 51340 |
| 5,5 mm | 0.2165 | | M6 X 0,5 | 6,0 | 66,0 | 28,0 | 24,0 | 36,0 | 63171 |
| 7/32 | 0.2188 | 5.56 | 1/4-32 | 1/4 | 2-5/8 | 1 | 53/64 | 1-7/16 | 51341 |
| 5,6 mm | 0.2205 | | | 6,0 | 66,0 | 28,0 | 24,0 | 36,0 | 63751 |
| #2 | 0.2210 | 5.61 | | 1/4 | 2-5/8 | 1 | 53/64 | 1-7/16 | 51781 |
| 5,7 mm | 0.2244 | | | 6,0 | 66,0 | 28,0 | 24,0 | 36,0 | 63752 |
| #1 | 0.2280 | 5.79 | | 1/4 | 2-5/8 | 1 | 53/64 | 1-7/16 | 51782 |
| 5,8 mm | 0.2283 | | | 6,0 | 66,0 | 28,0 | 24,0 | 36,0 | 63172 |
| 5,9 mm | 0.2323 | | | 6,0 | 66,0 | 28,0 | 24,0 | 36,0 | 63753 |
| A | 0.2340 | 5.94 | | 1/4 | 2-5/8 | 1 | 53/64 | 1-7/16 | 51601 |
| 15/64 | 0.2344 | 5.95 | | 1/4 | 2-5/8 | 1 | 53/64 | 1-7/16 | 51342 |
| 6,0 | 0.2362 | 6.00 | M7 X 1 | 6,0 | 66,0 | 28,0 | 24,0 | 36,0 | 63173 |
| B | 0.2380 | 6.05 | | 1/4 | 3-1/8 | 1-5/16 | 1-3/64 | 1-7/16 | 51602 |
| 6,1 mm | 0.2402 | | | 8,0 | 79,0 | 34,0 | 28,0 | 36,0 | 63754 |
| C | 0.2420 | 6.15 | | 1/4 | 3-1/8 | 1-5/16 | 1-3/64 | 1-7/16 | 51603 |
| 6,2 mm | 0.2441 | | | 8,0 | 79,0 | 34,0 | 28,0 | 36,0 | 63755 |
| D | 0.2460 | 6.25 | | 1/4 | 3-1/8 | 1-5/16 | 1-3/64 | 1-7/16 | 51604 |
| 6,25 mm | 0.2461 | | M7 X 0,75 | 8,0 | 79,0 | 34,0 | 28,0 | 36,0 | 63174 |
| 6,3 mm | 0.2480 | | | 8,0 | 79,0 | 34,0 | 28,0 | 36,0 | 63756 |
| 1/4 | 0.2500 | 6.35 | | 1/4 | 3-1/8 | 1-5/16 | 1-3/64 | 1-7/16 | 51343 |
| E | 0.2500 | 6.35 | | 1/4 | 3-1/8 | 1-5/16 | 1-3/64 | 1-7/16 | 51605 |
| 6,4 mm | 0.2520 | | | 8,0 | 79,0 | 34,0 | 28,0 | 36,0 | 63175 |
| 6,5 mm | 0.2559 | | | 8,0 | 79,0 | 34,0 | 28,0 | 36,0 | 63213 |
| F | 0.2570 | 6.53 | 5/16-18 | 5/16 | 3-1/8 | 1-5/16 | 1-3/64 | 1-7/16 | 51344 |
| 6,6 mm | 0.2598 | | | 8,0 | 79,0 | 34,0 | 28,0 | 36,0 | 63757 |
| G | 0.2610 | 6.63 | | 5/16 | 3-1/8 | 1-5/16 | 1-3/64 | 1-7/16 | 51606 |
| 6,7 mm | 0.2638 | | | 8,0 | 79,0 | 34,0 | 28,0 | 36,0 | 63758 |
| 17/64 | 0.2656 | 6.75 | 5/16-20 | 5/16 | 3-1/8 | 1-5/16 | 1-3/64 | 1-7/16 | 51345 |
| H | 0.2660 | 6.76 | | 5/16 | 3-1/8 | 1-5/16 | 1-3/64 | 1-7/16 | 51607 |
| 6,8 mm | 0.2677 | | M8 X 1,25 | 8,0 | 79,0 | 34,0 | 28,0 | 36,0 | 63176 |
| 6,9 mm | 0.2717 | | | 8,0 | 79,0 | 34,0 | 28,0 | 36,0 | 63759 |
| I | 0.2720 | 6.91 | 5/16-24 | 5/16 | 3-1/8 | 1-5/16 | 1-3/64 | 1-7/16 | 51346 |
| 7,0 mm | 0.2756 | | M8 X 1 | 8,0 | 79,0 | 34,0 | 28,0 | 36,0 | 63177 |
| J | 0.2770 | 7.04 | | 5/16 | 3-1/8 | 1-5/16 | 1-3/64 | 1-7/16 | 51608 |
| 7,1 mm | 0.2795 | | | 8,0 | 79,0 | 41,0 | 34,0 | 36,0 | 63760 |
| K | 0.2810 | 7.14 | | 5/16 | 3-1/8 | 1-9/16 | 1-3/16 | 1-7/16 | 51609 |
| 9/32 | 0.2812 | 7.14 | 5/16-32 | 5/16 | 3-1/8 | 1-9/16 | 1-3/16 | 1-7/16 | 51347 |

*(continued on next page)*

Common
3xD Reach
Right Spiral
External Coolant
2 Flutes

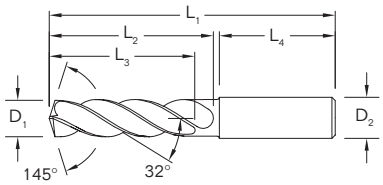
HI-PERCARB®
HIGH PERFORMANCE CARBIDE DRILLS

**TOLERANCES (inch)**

| DIAMETER | $D_1$ | $D_2$ |
|---|---|---|
| ≤.1181 | +.00008/+.00047 | h6 |
| >.1181–.2362 | +.00016/+.00063 | h6 |
| >.2362–.3937 | +.00024/+.00083 | h6 |
| >.3937–.7087 | +.00028/+.00098 | h6 |
| >.7087–1.1811 | +.00031/+.00114 | h6 |

**TOLERANCES (mm)**

| DIAMETER | $D_1$ | $D_2$ |
|---|---|---|
| ≤ 3 | +0,002/+0,012 | h6 |
| > 3 - 6 | +0,004/+0,016 | h6 |
| > 6 - 10 | +0,006/+0,021 | h6 |
| > 10 - 18 | +0,007/+0,025 | h6 |
| > 18 - 30 | +0,008/+0,029 | h6 |





Common

3xD
Reach


Right Spiral


External Coolant

2
Flutes

| Cutting Diameter $D_1$ | Decimal Equivalent | Metric Equivalent | Tap Size Reference Only | Shank Diameter $D_2$ | Overall Length $L_1$ | Flute Length $L_2$ | Min. Cleared Length $L_3$ | Shank Length $L_4$ | Ti-NAMITE-A (AlTiN) EDP No. |
|---|---|---|---|---|---|---|---|---|---|
| 7,2 mm | 0.2835 | | | 8,0 | 79,0 | 41,0 | 34,0 | 36,0 | 63761 |
| 7,25 mm | 0.2854 | | M8 X 0,75 | 8,0 | 79,0 | 41,0 | 34,0 | 36,0 | 63178 |
| 7,3 mm | 0.2874 | | | 8,0 | 79,0 | 41,0 | 34,0 | 36,0 | 63762 |
| L | 0.2900 | 7.37 | | 5/16 | 3-1/8 | 1-9/16 | 1-3/16 | 1-7/16 | 51610 |
| 7,4 mm | 0.2913 | | | 8,0 | 79,0 | 41,0 | 34,0 | 36,0 | 63763 |
| M | 0.2950 | 7.49 | | 5/16 | 3-1/8 | 1-9/16 | 1-3/16 | 1-7/16 | 51611 |
| 7,5 mm | 0.2953 | | M8 X 0,5 | 8,0 | 79,0 | 41,0 | 34,0 | 36,0 | 63179 |
| 19/64 | 0.2969 | 7.54 | | 5/16 | 3-1/8 | 1-9/16 | 1-3/16 | 1-7/16 | 51348 |
| 7,6 mm | 0.2992 | | | 8,0 | 79,0 | 41,0 | 34,0 | 36,0 | 63764 |
| N | 0.3020 | 7.67 | | 5/16 | 3-1/8 | 1-9/16 | 1-3/16 | 1-7/16 | 51612 |
| 7,7 mm | 0.3031 | | | 8,0 | 79,0 | 41,0 | 34,0 | 36,0 | 63765 |
| 7,8 mm | 0.3071 | | M9 X 1,25 | 8,0 | 79,0 | 41,0 | 34,0 | 36,0 | 63180 |
| 7,9 mm | 0.3110 | | | 8,0 | 79,0 | 41,0 | 34,0 | 36,0 | 63766 |
| 5/16 | 0.3125 | 7.94 | 3/8-16 | 5/16 | 3-1/8 | 1-9/16 | 1-3/16 | 1-7/16 | 51349 |
| 8,0 mm | 0.3150 | | M9 x 1 | 8,0 | 79,0 | 41,0 | 34,0 | 36,0 | 63181 |
| O | 0.3160 | 8.03 | | 3/8 | 3-1/2 | 1-27/32 | 1-37/64 | 1-9/16 | 51613 |
| 8,1 mm | 0.3189 | | | 10,0 | 89,0 | 47,0 | 40,0 | 40,0 | 63767 |
| 8,2 mm | 0.3228 | | | 10,0 | 89,0 | 47,0 | 40,0 | 40,0 | 63768 |
| P | 0.3230 | 8.20 | | 3/8 | 3-1/2 | 1-27/32 | 1-37/64 | 1-9/16 | 51614 |
| 8,3 mm | 0.3268 | | | 10,0 | 89,0 | 47,0 | 40,0 | 40,0 | 63769 |
| 21/64 | 0.3281 | 8.33 | 3/8-20 | 3/8 | 3-1/2 | 1-27/32 | 1-37/64 | 1-9/16 | 51350 |
| 8,4 mm | 0.3307 | | | 10,0 | 89,0 | 47,0 | 40,0 | 40,0 | 63182 |
| Q | 0.3320 | 8.43 | 3/8-24 | 3/8 | 3-1/2 | 1-27/32 | 1-37/64 | 1-9/16 | 51351 |
| 8,5 mm | 0.3346 | | M10 X 1,5 | 10,0 | 89,0 | 47,0 | 40,0 | 40,0 | 63183 |
| 8,6 mm | 0.3386 | | | 10,0 | 89,0 | 47,0 | 40,0 | 40,0 | 63770 |
| R | 0.3390 | 8.61 | | 3/8 | 3-1/2 | 1-27/32 | 1-37/64 | 1-9/16 | 51615 |
| 8,7 mm | 0.3425 | | | 10,0 | 89,0 | 47,0 | 40,0 | 40,0 | 63771 |
| 11/32 | 0.3438 | 8.73 | 3/8-32 | 3/8 | 3-1/2 | 1-27/32 | 1-37/64 | 1-9/16 | 51352 |
| 8,8 mm | 0.3465 | | M10 X 1,25 | 10,0 | 89,0 | 47,0 | 40,0 | 40,0 | 63184 |
| S | 0.3480 | 8.84 | | 3/8 | 3-1/2 | 1-27/32 | 1-37/64 | 1-9/16 | 51616 |
| 8,9 mm | 0.3504 | | | 10,0 | 89,0 | 47,0 | 40,0 | 40,0 | 63772 |
| 9,0 mm | 0.3543 | | M10 X 1 | 10,0 | 89,0 | 47,0 | 40,0 | 40,0 | 63185 |
| T | 0.3580 | 9.09 | | 3/8 | 3-1/2 | 1-27/32 | 1-37/64 | 1-9/16 | 51617 |
| 9,1 mm | 0.3583 | | | 10,0 | 89,0 | 47,0 | 40,0 | 40,0 | 63773 |
| 23/64 | 0.3594 | 9.13 | | 3/8 | 3-1/2 | 1-27/32 | 1-37/64 | 1-9/16 | 51353 |
| 9,2 mm | 0.3622 | | M10 X 0,75 | 10,0 | 89,0 | 47,0 | 40,0 | 40,0 | 63774 |
| 9,25 mm | 0.3642 | 9.25 | | 10,0 | 89,0 | 47,0 | 40,0 | 40,0 | 63186 |
| 9,3 mm | 0.3661 | | | 10,0 | 89,0 | 47,0 | 40,0 | 40,0 | 63775 |
| U | 0.3680 | 9.35 | 7/16-14 | 3/8 | 3-1/2 | 1-27/32 | 1-37/64 | 1-9/16 | 51354 |
| 9,4 mm | 0.3701 | | | 10,0 | 89,0 | 47,0 | 40,0 | 40,0 | 63776 |
| 9,5 mm | 0.3740 | | M10 X 0,5 | 10,0 | 89,0 | 47,0 | 40,0 | 40,0 | 63187 |
| 3/8 | 0.3750 | 9.53 | | 3/8 | 3-1/2 | 1-27/32 | 1-37/64 | 1-9/16 | 51355 |

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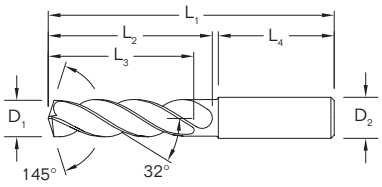
HI-PERCARB®
HIGH PERFORMANCE CARBIDE DRILLS




**TOLERANCES (inch)**

| DIAMETER | $D_1$ | $D_2$ |
|---|---|---|
| ≤.1181 | +.00008/+.00047 | h6 |
| >.1181–.2362 | +.00016/+.00063 | h6 |
| >.2362–.3937 | +.00024/+.00083 | h6 |
| >.3937–.7087 | +.00028/+.00098 | h6 |
| >.7087–1.1811 | +.00031/+.00114 | h6 |

**TOLERANCES (mm)**

| DIAMETER | $D_1$ | $D_2$ |
|---|---|---|
| ≤ 3 | +0,002/+0,012 | h6 |
| > 3 - 6 | +0,004/+0,016 | h6 |
| > 6 - 10 | +0,006/+0,021 | h6 |
| > 10 - 18 | +0,007/+0,025 | h6 |
| > 18 - 30 | +0,008/+0,029 | h6 |



| Cutting Diameter $D_1$ | Decimal Equivalent | Metric Equivalent | Tap Size Reference Only | Shank Diameter $D_2$ | Overall Length $L_1$ | Flute Length $L_2$ | Min. Cleared Length $L_3$ | Shank Length $L_4$ | Ti-NAMITE-A (AlTiN) EDP No. |
|---|---|---|---|---|---|---|---|---|---|
| V | 0.3770 | 9.58 | | 1/2 | 3-1/2 | 1-27/32 | 1-37/64 | 1-9/16 | 51618 |
| 9,6 mm | 0.3780 | | | 10,0 | 89,0 | 47,0 | 40,0 | 40,0 | 63777 |
| 9,7 mm | 0.3819 | | | 10,0 | 89,0 | 47,0 | 40,0 | 40,0 | 63778 |
| 9,8 mm | 0.3858 | | | 10,0 | 89,0 | 47,0 | 40,0 | 40,0 | 63779 |
| W | 0.3860 | | | 1/2 | 3-1/2 | 1-27/32 | 1-37/64 | 1-9/16 | 51619 |
| 9,9 mm | 0.3898 | | | 10,0 | 89,0 | 47,0 | 40,0 | 40,0 | 63780 |
| 25/64 | 0.3906 | 9.92 | 7/16-20 | 1/2 | 3-1/2 | 1-27/32 | 1-37/64 | 1-9/16 | 51356 |
| 10,0 mm | 0.3937 | | | 10,0 | 89,0 | 47,0 | 40,0 | 40,0 | 63188 |
| X | 0.3970 | 10.08 | 7/16-24 | 1/2 | 4-1/16 | 2-3/16 | 1-51/64 | 1-49/64 | 51620 |
| 10,1 mm | 0.3976 | | | 12,0 | 102,0 | 55,0 | 45,0 | 45,0 | 63781 |
| 10,2 mm | 0.4016 | | M12 X 1,75 | 12,0 | 102,0 | 55,0 | 45,0 | 45,0 | 63189 |
| Y | 0.4040 | 10.26 | 7/16-28 | 1/2 | 4-1/16 | 2-3/16 | 1-51/64 | 1-49/64 | 51621 |
| 10,3 mm | 0.4055 | | | 12,0 | 102,0 | 55,0 | 45,0 | 45,0 | 63782 |
| 13/32 | 0.4062 | 10.32 | | 1/2 | 4-1/16 | 2-3/16 | 1-51/64 | 1-49/64 | 51357 |
| 10,4 mm | 0.4094 | | | 12,0 | 102,0 | 55,0 | 45,0 | 45,0 | 63783 |
| Z | 0.4130 | 10.49 | | 1/2 | 4-1/16 | 2-3/16 | 1-51/64 | 1-49/64 | 51622 |
| 10,5 mm | 0.4134 | | M12 X 1,5 | 12,0 | 102,0 | 55,0 | 45,0 | 45,0 | 63190 |
| 10,6 mm | 0.4173 | | | 12,0 | 102,0 | 55,0 | 45,0 | 45,0 | 63784 |
| 10,7 mm | 0.4213 | | | 12,0 | 102,0 | 55,0 | 45,0 | 45,0 | 63785 |
| 27/64 | 0.4219 | 10.72 | 1/2-13 | 1/2 | 4-1/16 | 2-3/16 | 1-51/64 | 1-49/64 | 51358 |
| 10,8 mm | 0.4252 | | M12 X 1,25 | 12,0 | 102,0 | 55,0 | 45,0 | 45,0 | 63191 |
| 10,9 mm | 0.4291 | | | 12,0 | 102,0 | 55,0 | 45,0 | 45,0 | 63786 |
| 11,0 mm | 0.4331 | | M12 X 1 | 12,0 | 102,0 | 55,0 | 45,0 | 45,0 | 63192 |
| 11,1 mm | 0.4370 | | | 12,0 | 102,0 | 55,0 | 45,0 | 45,0 | 63787 |
| 7/16 | 0.4375 | 11.11 | 1/4-18 NPT | 1/2 | 4-1/16 | 2-3/16 | 1-51/64 | 1-49/64 | 51359 |
| 11,2 mm | 0.4409 | | | 12,0 | 102,0 | 55,0 | 45,0 | 45,0 | 63788 |
| 11,25 mm | 0.4429 | | | 12,0 | 102,0 | 55,0 | 45,0 | 45,0 | 63193 |
| 11,3 mm | 0.4449 | | | 12,0 | 102,0 | 55,0 | 45,0 | 45,0 | 63789 |
| 11,4 mm | 0.4488 | | | 12,0 | 102,0 | 55,0 | 45,0 | 45,0 | 63790 |
| 11,5 mm | 0.4528 | | M12 X 0,5 | 12,0 | 102,0 | 55,0 | 45,0 | 45,0 | 63194 |
| 29/64 | 0.4531 | 11.51 | 1/2-20 | 1/2 | 4-1/16 | 2-3/16 | 1-51/64 | 1-49/64 | 51360 |
| 11,6 mm | 0.4567 | | | 12,0 | 102,0 | 55,0 | 45,0 | 45,0 | 63791 |
| 11,7 mm | 0.4606 | | | 12,0 | 102,0 | 55,0 | 45,0 | 45,0 | 63792 |
| 11,8 mm | 0.4646 | | | 12,0 | 102,0 | 55,0 | 45,0 | 45,0 | 63793 |
| 11,9 mm | 0.4685 | | | 12,0 | 102,0 | 55,0 | 45,0 | 45,0 | 63794 |
| 15/32 | 0.4688 | 11.91 | 1/2-28 | 1/2 | 4-1/16 | 2-3/16 | 1-51/64 | 1-49/64 | 51361 |
| 12,0 mm | 0.4724 | | M14 X 2 | 12,0 | 102,0 | 55,0 | 45,0 | 45,0 | 63195 |
| 31/64 | 0.4844 | 12.30 | 9/16-12 | 1/2 | 4-1/4 | 2-5/16 | 1-7/8 | 1-49/64 | 51362 |
| 12,5 mm | 0.4921 | | M14 X 1,5 | 14,0 | 107,0 | 60,0 | 49,0 | 45,0 | 63196 |
| 1/2 | 0.5000 | 12.70 | | 1/2 | 4-1/4 | 2-5/16 | 1-7/8 | 1-49/64 | 51363 |
| 12,8 mm | 0.5039 | | M14 X 1,25 | 14,0 | 107,0 | 60,0 | 49,0 | 45,0 | 63197 |
| 13,0 mm | 0.5118 | | M14 X 1 | 14,0 | 107,0 | 60,0 | 49,0 | 45,0 | 63198 |


Common

3xD
Reach


Right Spiral


External Coolant

2
Flutes

*(continued on next page)*

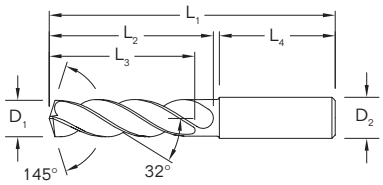
HI-PERCARB®
HIGH PERFORMANCE CARBIDE DRILLS

**TOLERANCES (inch)**

| DIAMETER | $D_1$ | $D_2$ |
|---|---|---|
| ≤.1181 | +.00008/+.00047 | h6 |
| >.1181–.2362 | +.00016/+.00063 | h6 |
| >.2362–.3937 | +.00024/+.00083 | h6 |
| >.3937–.7087 | +.00028/+.00098 | h6 |
| >.7087–1.1811 | +.00031/+.00114 | h6 |

**TOLERANCES (mm)**

| DIAMETER | $D_1$ | $D_2$ |
|---|---|---|
| ≤ 3 | +0,002/+0,012 | h6 |
| > 3 - 6 | +0,004/+0,016 | h6 |
| > 6 - 10 | +0,006/+0,021 | h6 |
| > 10 - 18 | +0,007/+0,025 | h6 |
| > 18 - 30 | +0,008/+0,029 | h6 |




Common

3xD
Reach

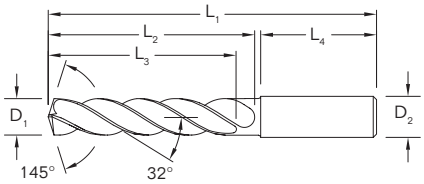
Right Spiral

External Coolant

2
Flutes

| Cutting Diameter $D_1$ | Decimal Equivalent | Metric Equivalent | Tap Size Reference Only | Shank Diameter $D_2$ | Overall Length $L_1$ | Flute Length $L_2$ | Min. Cleared Length $L_3$ | Shank Length $L_4$ | Ti-NAMITE-A (AlTiN) EDP No. |
|---|---|---|---|---|---|---|---|---|---|
| 33/64 | 0.5156 | 13.10 | 9/16-18 | 5/8 | 4-1/4 | 2-5/16 | 1-7/8 | 1-49/64 | 51364 |
| 17/32 | 0.5312 | 13.49 | 5/8-11 | 5/8 | 4-1/4 | 2-5/16 | 1-7/8 | 1-49/64 | 51365 |
| 13,5 mm | 0.5315 | | | 14,0 | 107,0 | 60,0 | 49,0 | 45,0 | 63199 |
| 35/64 | 0.5469 | 13.89 | 5/8-12 | 5/8 | 4-1/4 | 2-5/16 | 1-7/8 | 1-49/64 | 51783 |
| 14,0 mm | 0.5512 | | M16 X 2 | 14,0 | 107,0 | 60,0 | 49,0 | 45,0 | 63200 |
| 9/16 | 0.5625 | 14.29 | | 5/8 | 4-9/16 | 2-1/2 | 2 | 1-57/64 | 51366 |
| 14,5 mm | 0.5709 | | M16 X 1,5 | 16,0 | 115,0 | 65,0 | 51,0 | 48,0 | 63201 |
| 37/64 | 0.5781 | 14.68 | 5/8-18 | 5/8 | 4-9/16 | 2-1/2 | 2 | 1-57/64 | 51367 |
| 15,0 mm | 0.5906 | | M16 X 1 | 16,0 | 115,0 | 65,0 | 51,0 | 48,0 | 63202 |
| 19/32 | 0.5938 | 15.08 | 11/16-11 | 5/8 | 4-9/16 | 2-1/2 | 2 | 1-57/64 | 51784 |
| 39/64 | 0.6094 | 15.48 | 11/16-12 | 5/8 | 4-9/16 | 2-1/2 | 2 | 1-57/64 | 51785 |
| 15,5 mm | 0.6102 | | M18 X 2,5 | 16,0 | 115,0 | 65,0 | 51,0 | 48,0 | 63203 |
| 5/8 | 0.6250 | 15.88 | 11/16-16 | 5/8 | 4-9/16 | 2-1/2 | 2 | 1-57/64 | 51368 |
| 16,0 mm | 0.6299 | | | 16,0 | 115,0 | 65,0 | 51,0 | 48,0 | 63204 |
| 41/64 | 0.6406 | 16.27 | 11/16-24 | 3/4 | 4-7/8 | 2-3/4 | 2-5/16 | 1-57/64 | 51786 |
| 16,5 mm | 0.6496 | | M18 X 1,5 | 18,0 | 123,0 | 73,0 | 58,0 | 48,0 | 63205 |
| 21/32 | 0.6562 | 16.67 | 3/4-10 | 3/4 | 4-7/8 | 2-3/4 | 2-5/16 | 1-57/64 | 51369 |
| 17,0 mm | 0.6693 | | | 18,0 | 123,0 | 73,0 | 58,0 | 48,0 | 63206 |
| 43/64 | 0.6719 | 17.07 | 3/4-12 | 3/4 | 4-7/8 | 2-3/4 | 2-5/16 | 1-57/64 | 51787 |
| 11/16 | 0.6875 | 17.46 | 3/4-16 | 3/4 | 4-7/8 | 2-3/4 | 2-5/16 | 1-57/64 | 51370 |
| 17,5 mm | 0.6890 | | M20 X 2,5 | 18,0 | 123,0 | 73,0 | 58,0 | 48,0 | 63207 |
| 45/64 | 0.7031 | 17.86 | 3/4-20, 1/2-14 NPT | 3/4 | 4-7/8 | 2-3/4 | 2-5/16 | 1-57/64 | 51788 |
| 18,0 mm | 0.7087 | | | 18,0 | 123,0 | 73,0 | 58,0 | 48,0 | 63208 |
| 23/32 | 0.7188 | 18.26 | | 3/4 | 4-7/8 | 2-3/4 | 2-5/16 | 1-57/64 | 51789 |
| 18,5 mm | 0.7283 | | M20 X 1,5 | 20,0 | 131,0 | 79,0 | 63,0 | 50,0 | 63209 |
| 47/64 | 0.7344 | 18.65 | 13/16-12 | 3/4 | 4-7/8 | 2-3/4 | 2-5/16 | 1-57/64 | 51790 |
| 19,0 mm | 0.7480 | | | 20,0 | 131,0 | 79,0 | 63,0 | 50,0 | 63210 |
| 3/4 | 0.7500 | 19.05 | 13/16-16 | 3/4 | 5-1/4 | 3-1/16 | 2-7/16 | 1-31/32 | 51371 |
| 49/64 | 0.7656 | 19.45 | 7/8-9 | 7/8 | 5-1/4 | 3-1/16 | 2-7/16 | 1-31/32 | 51372 |
| 19,5 mm | 0.7677 | | M22 X 2,5 | 20,0 | 131,0 | 79,0 | 63,0 | 50,0 | 63211 |
| 25/32 | 0.7812 | 19.84 | | 7/8 | 6 | 3-11/16 | 2-11/16 | 2-1/8 | 51791 |
| 20,0 mm | 0.7874 | | | 20,0 | 131,0 | 79,0 | 63,0 | 50,0 | 63212 |
| 51/64 | 0.7969 | 20.24 | 7/8-12 | 7/8 | 6 | 3-11/16 | 2-11/16 | 2-1/8 | 51792 |
| 20,5 mm | 0.8071 | | | 22,0 | 150,0 | 93,0 | 73,0 | 53,0 | 64513 |
| 13/16 | 0.8125 | 20.64 | 7/8-14 | 7/8 | 6 | 3-11/16 | 2-11/16 | 2-1/8 | 51373 |
| 21,0 mm | 0.8268 | | | 22,0 | 150,0 | 93,0 | 73,0 | 53,0 | 64514 |
| 22,0 mm | 0.8661 | | | 22,0 | 150,0 | 93,0 | 73,0 | 53,0 | 64515 |
| 7/8 | 0.8750 | 22.23 | 15/16-16, 1-8 | 7/8 | 6 | 3-11/16 | 2-11/16 | 2-1/8 | 51374 |
| 59/64 | 0.9219 | 23.42 | 1-12 | 1 | 6 | 3-11/16 | 2-11/16 | 2-1/8 | 51375 |

HI-PERCARB®
HIGH PERFORMANCE CARBIDE DRILLS




**TOLERANCES (inch)**

| DIAMETER | $D_1$ | $D_2$ |
|---|---|---|
| ≤.1181 | +.00008/+.00047 | h6 |
| >.1181–.2362 | +.00016/+.00063 | h6 |
| >.2362–.3937 | +.00024/+.00083 | h6 |
| >.3937–.7087 | +.00028/+.00098 | h6 |
| >.7087–1.1811 | +.00031/+.00114 | h6 |

**TOLERANCES (mm)**

| DIAMETER | $D_1$ | $D_2$ |
|---|---|---|
| ≤ 3 | +0,002/+0,012 | h6 |
| > 3 - 6 | +0,004/+0,016 | h6 |
| > 6 - 10 | +0,006/+0,021 | h6 |
| > 10 - 18 | +0,007/+0,025 | h6 |
| > 18 - 30 | +0,008/+0,029 | h6 |



| Cutting Diameter $D_1$ | Decimal Equivalent | Metric Equivalent | Tap Size Reference Only | Shank Diameter $D_2$ | Overall Length $L_1$ | Flute Length $L_2$ | Min. Cleared Length $L_3$ | Shank Length $L_4$ | Ti-NAMITE-A (AlTiN) EDP No. |
|---|---|---|---|---|---|---|---|---|---|
| 1/64 | 0.0156 | 0.40 | | 1/8 | 1 1/2 | 5/32 | 7/64 | 1 | 52300* |
| 1/32 | 0.0312 | 0.79 | | 1/8 | 1 1/2 | 5/16 | 7/32 | 1 | 52301* |
| 3/64 | 0.0469 | 1.19 | 1/16-64 | 1/8 | 1 1/2 | 25/64 | 19/64 | 1 | 52302* |
| 1,25 mm | 0.0492 | | | 3,0 | 38,0 | 10,0 | 7,5 | 25,0 | 64520* |
| 1,45 mm | 0.0571 | | | 3,0 | 38,0 | 10,0 | 7,5 | 25,0 | 64521* |
| #53 | 0.0595 | 1.51 | | 1/8 | 1-1/2 | 25/64 | 19/64 | 1 | 64522* |
| 1/16 | 0.0625 | 1.59 | 5/64-60 | 1/8 | 2 | 15/32 | 23/64 | 1-1/4 | 52303* |
| 1,6 mm | 0.0630 | | | 3,0 | 50,0 | 12,0 | 9,0 | 32,0 | 64523* |
| 1,75 mm | 0.0689 | | | 3,0 | 50,0 | 12,0 | 9,0 | 32,0 | 64524* |
| #50 | 0.0700 | 1.78 | | 1/8 | 2 | 15/32 | 23/64 | 1-1/4 | 64525* |
| 5/64 | 0.0781 | 1.98 | | 1/8 | 2 | 35/64 | 27/64 | 1-1/4 | 52304* |
| #47 | 0.0785 | 1.99 | | 1/8 | 2 | 35/64 | 27/64 | 1-1/4 | 64526* |
| 2,05 mm | 0.0807 | | | 3,0 | 50,0 | 14,0 | 11,0 | 32,0 | 64527* |
| #46 | 0.0810 | 2.06 | | 1/8 | 2 | 35/64 | 27/64 | 1-1/4 | 64528* |
| #43 | 0.0890 | 2.26 | | 1/8 | 2 | 19/32 | 15/32 | 1-1/4 | 64529* |
| #42 | 0.0935 | 2.37 | | 1/8 | 2 | 5/8 | 1/2 | 1-1/4 | 64530* |
| 3/32 | 0.0938 | 2.38 | 1/8-32 | 1/8 | 2 | 5/8 | 1/2 | 1-1/4 | 52305 |
| #40 | 0.0980 | 2.49 | | 1/8 | 2 | 43/64 | 17/32 | 1-1/4 | 52306 |
| 2,5 mm | 0.0984 | | | 3,0 | 50,0 | 17,0 | 13,0 | 32,0 | 64531 |
| #39 | 0.0995 | 2.53 | | 1/8 | 2 | 43/64 | 17/32 | 1-1/4 | 52307 |
| #38 | 0.1015 | 2.58 | 5-40 | 1/8 | 2 | 43/64 | 17/32 | 1-1/4 | 52308 |
| #37 | 0.1040 | 2.64 | 5-44 | 1/8 | 2 | 45/64 | 9/16 | 1-1/4 | 52309 |
| #36 | 0.1065 | 2.71 | 6-32 | 1/8 | 2 | 45/64 | 9/16 | 1-1/4 | 52310 |
| 7/64 | 0.1094 | 2.78 | | 1/8 | 2 | 3/4 | 19/32 | 1-1/4 | 52311 |
| #35 | 0.1100 | 2.79 | | 1/8 | 2 | 3/4 | 19/32 | 1-1/4 | 52312 |
| #34 | 0.1110 | 2.82 | | 1/8 | 2 | 3/4 | 19/32 | 1-1/4 | 52313 |
| #33 | 0.1130 | 2.87 | 6-40 | 1/8 | 2 | 3/4 | 19/32 | 1-1/4 | 52314 |
| 2,9 mm | 0.1142 | | | 3,0 | 50,0 | 19,0 | 15,0 | 32,0 | 64532 |
| #32 | 0.1160 | 2.95 | | 1/8 | 2 | 3/4 | 39/64 | 1-1/4 | 52315 |
| 3,0 mm | 0.1181 | | | 6,0 | 66,0 | 28,0 | 23,0 | 36,0 | 64100 |
| #31 | 0.1200 | 3.05 | | 1/8 | 2 | 3/4 | 39/64 | 1-1/4 | 52316 |
| 3,1 mm | 0.1220 | | | 6,0 | 66,0 | 28,0 | 23,0 | 36,0 | 64101 |
| 1/8 | 0.1250 | 3.18 | | 1/4 | 3 | 1 | 53/64 | 1-7/16 | 51580 |
| 3,2 mm | 0.1260 | | M3,5 X 0,35 | 6,0 | 66,0 | 28,0 | 23,0 | 36,0 | 64102 |
| #30 | 0.1285 | 3.26 | | 1/4 | 3 | 1 | 53/64 | 1-7/16 | 51581 |
| 3,3 mm | 0.1299 | | M4 X 0,7 | 6,0 | 66,0 | 28,0 | 23,0 | 36,0 | 64103 |
| 3,4 mm | 0.1339 | | 8-32,8-36 | 6,0 | 66,0 | 28,0 | 23,0 | 36,0 | 64104 |
| #29 | 0.1360 | 3.45 | | 1/4 | 3 | 1 | 53/64 | 1-7/16 | 51582 |
| 3,5 mm | 0.1378 | | | 6,0 | 66,0 | 28,0 | 23,0 | 36,0 | 64105 |
| #28 | 0.1405 | 3.57 | 8-40 | 1/4 | 3 | 1 | 53/64 | 1- 7/16 | 52317 |
| 9/64 | 0.1406 | 3.57 | | 1/4 | 3 | 1 | 53/64 | 1-7/16 | 51583 |
| 3,6 mm | 0.1417 | | M4 X 0,35 | 6,0 | 66,0 | 28,0 | 23,0 | 36,0 | 64106 |

Common

5xD
Reach

Right Spiral

External Coolant

2
Flutes

*Single Margin

*(continued on next page)*

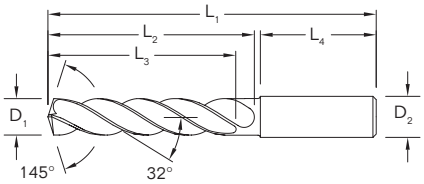
HI-PERCARB®
HIGH PERFORMANCE CARBIDE DRILLS

**TOLERANCES (inch)**

| DIAMETER | $D_1$ | $D_2$ |
|---|---|---|
| ≤.1181 | +.00008/+.00047 | h6 |
| >.1181–.2362 | +.00016/+.00063 | h6 |
| >.2362–.3937 | +.00024/+.00083 | h6 |
| >.3937–.7087 | +.00028/+.00098 | h6 |
| >.7087–1.1811 | +.00031/+.00114 | h6 |

**TOLERANCES (mm)**

| DIAMETER | $D_1$ | $D_2$ |
|---|---|---|
| ≤ 3 | +0,002/+0,012 | h6 |
| > 3 - 6 | +0,004/+0,016 | h6 |
| > 6 - 10 | +0,006/+0,021 | h6 |
| > 10 - 18 | +0,007/+0,025 | h6 |
| > 18 - 30 | +0,008/+0,029 | h6 |




Common

5xD
Reach

Right Spiral

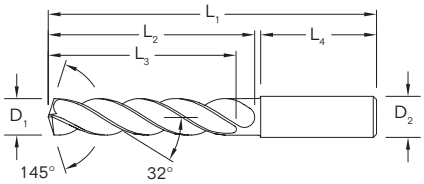
External Coolant

2
Flutes

| Cutting Diameter $D_1$ | Decimal Equivalent | Metric Equivalent | Tap Size Reference Only | Shank Diameter $D_2$ | Overall Length $L_1$ | Flute Length $L_2$ | Min. Cleared Length $L_3$ | Shank Length $L_4$ | Ti-NAMITE-A (AlTiN) EDP No. |
|---|---|---|---|---|---|---|---|---|---|
| #27 | 0.1440 | 3.66 | | 1/4 | 3 | 1 | 53/64 | 1-7/16 | 52318 |
| 3,7 mm | 0.1457 | | M4.5 X 0,75 | 6,0 | 66,0 | 28,0 | 23,0 | 36,0 | 64107 |
| #26 | 0.1470 | 3.73 | 3/16-24 | 1/4 | 3 | 1 | 53/64 | 1-7/16 | 52319 |
| #25 | 0.1495 | 3.80 | 10-24 | 1/4 | 3-1/4 | 1-1/4 | 1-5/64 | 1-7/16 | 51584 |
| 3,8 mm | 0.1496 | | | 6,0 | 74,0 | 36,0 | 29,0 | 36,0 | 64108 |
| #24 | 0.1520 | 3.86 | 10-28 | 1/4 | 3-1/4 | 1-1/4 | 1-5/64 | 1-7/16 | 52321 |
| 3,9 mm | 0.1535 | | | 6,0 | 74,0 | 36,0 | 29,0 | 36,0 | 64109 |
| #23 | 0.1540 | 3.91 | | 1/4 | 3-1/4 | 1-1/4 | 1-5/64 | 1-7/16 | 52322 |
| 5/32 | 0.1562 | 3.97 | | 1/4 | 3-1/4 | 1-1/4 | 1-5/64 | 1-7/16 | 51585 |
| #22 | 0.1570 | 3.99 | 10-30 | 1/4 | 3-1/4 | 1-1/4 | 1-5/64 | 1-7/16 | 52323 |
| 4,0 mm | 0.1575 | | M4,5 X 0,5 | 6,0 | 74,0 | 36,0 | 29,0 | 36,0 | 64110 |
| #21 | 0.1590 | 4.04 | 10-32 | 1/4 | 3-1/4 | 1-1/4 | 1-5/64 | 1-7/16 | 51586 |
| #20 | 0.1610 | 4.09 | 13/64-24 | 1/4 | 3-1/4 | 1-1/4 | 1-5/64 | 1-7/16 | 51587 |
| 4,1 mm | 0.1614 | | | 6,0 | 74,0 | 36,0 | 29,0 | 36,0 | 64111 |
| 4,2 mm | 0.1654 | | M5 / M5 X 0,75 | 6,0 | 74,0 | 36,0 | 29,0 | 36,0 | 64112 |
| #19 | 0.1660 | 4.22 | | 1/4 | 3-1/4 | 1-1/4 | 1-5/64 | 1-7/16 | 52324 |
| 4,3 mm | 0.1693 | | | 6,0 | 74,0 | 36,0 | 29,0 | 36,0 | 64113 |
| #18 | 0.1695 | 4.31 | | 1/4 | 3-1/4 | 1-1/4 | 1-5/64 | 1-7/16 | 52325 |
| 11/64 | 0.1719 | 4.37 | | 1/4 | 3-1/4 | 1-1/4 | 1-5/64 | 1-7/16 | 51588 |
| #17 | 0.1730 | 4.39 | | 1/4 | 3-1/4 | 1-1/4 | 1-5/64 | 1-7/16 | 52326 |
| 4,4 mm | 0.1732 | | | 6,0 | 74,0 | 36,0 | 29,0 | 36,0 | 64114 |
| 4,5 mm | 0.1772 | | M5 X 0,5 | 6,0 | 74,0 | 36,0 | 29,0 | 36,0 | 64115 |
| #15 | 0.1800 | 4.57 | | 1/4 | 3-1/4 | 1-1/4 | 1-5/64 | 1-7/16 | 52327 |
| 4,6 mm | 0.1811 | | 12-28 | 6,0 | 74,0 | 36,0 | 29,0 | 36,0 | 64116 |
| #14 | 0.1820 | 4.62 | | 1/4 | 3-1/4 | 1-1/4 | 1-5/64 | 1-7/16 | 52328 |
| #13 | 0.1850 | 4.70 | 12-32 | 1/4 | 3-1/4 | 1-1/4 | 1-5/64 | 1-7/16 | 52329 |
| 4,7 mm | 0.1850 | | | 6,0 | 74,0 | 36,0 | 29,0 | 36,0 | 64117 |
| 3/16 | 0.1875 | 4.76 | | 1/4 | 3-1/4 | 1-3/4 | 1-37/64 | 1-7/16 | 51589 |
| #12 | 0.1890 | 4.80 | 7/32-32 | 1/4 | 3-1/4 | 1-3/4 | 1-37/64 | 1-7/16 | 52330 |
| 4,8 mm | 0.1890 | | | 6,0 | 82,0 | 44,0 | 35,0 | 36,0 | 64118 |
| 4,9 mm | 0.1929 | | | 6,0 | 82,0 | 44,0 | 35,0 | 36,0 | 64119 |
| #10 | 0.1935 | 4.91 | 14-20 | 1/4 | 3-1/4 | 1-3/4 | 1-37/64 | 1-7/16 | 52331 |
| #9 | 0.1960 | 4.98 | | 1/4 | 3-1/4 | 1-3/4 | 1-37/64 | 1-7/16 | 52332 |
| 5,0 mm | 0.1969 | | M6 X 1 | 6,0 | 82,0 | 44,0 | 35,0 | 36,0 | 64120 |
| #8 | 0.1990 | 5.05 | | 1/4 | 3-1/4 | 1-3/4 | 1-37/64 | 1-7/16 | 52333 |
| 5,1 mm | 0.2008 | | | 6,0 | 82,0 | 44,0 | 35,0 | 36,0 | 64121 |
| #7 | 0.2010 | 5.11 | 1/4-20 | 1/4 | 3-1/4 | 1-3/4 | 1-37/64 | 1-7/16 | 51506 |
| 13/64 | 0.2031 | 5.16 | | 1/4 | 3-1/4 | 1-3/4 | 1-37/64 | 1-7/16 | 51507 |
| #6 | 0.2040 | 5.18 | | 1/4 | 3 1/4 | 1 3/4 | 1 37/64 | 1 7/16 | 52334 |
| 5,2 mm | 0.2047 | | M6 X 0,75 | 6,0 | 82,0 | 44,0 | 35,0 | 36,0 | 64122 |
| #5 | 0.2055 | 5.22 | | 1/4 | 3-1/4 | 1-3/4 | 1-37/64 | 1-7/16 | 51590 |
| 5,25 mm | 0.2067 | | | 6,0 | 82,0 | 44,0 | 35,0 | 36,0 | 64123 |

*(continued on next page)*

HI-PERCARB®
HIGH PERFORMANCE CARBIDE DRILLS




**TOLERANCES (inch)**

| DIAMETER | $D_1$ | $D_2$ |
|---|---|---|
| ≤.1181 | +.00008/+.00047 | h6 |
| >.1181–.2362 | +.00016/+.00063 | h6 |
| >.2362–.3937 | +.00024/+.00083 | h6 |
| >.3937–.7087 | +.00028/+.00098 | h6 |
| >.7087–1.1811 | +.00031/+.00114 | h6 |

**TOLERANCES (mm)**

| DIAMETER | $D_1$ | $D_2$ |
|---|---|---|
| ≤ 3 | +0,002/+0,012 | h6 |
| > 3 - 6 | +0,004/+0,016 | h6 |
| > 6 - 10 | +0,006/+0,021 | h6 |
| > 10 - 18 | +0,007/+0,025 | h6 |
| > 18 - 30 | +0,008/+0,029 | h6 |



| Cutting Diameter $D_1$ | Decimal Equivalent | Metric Equivalent | Tap Size Reference Only | Shank Diameter $D_2$ | Overall Length $L_1$ | Flute Length $L_2$ | Min. Cleared Length $L_3$ | Shank Length $L_4$ | Ti-NAMITE-A (AlTiN) EDP No. |
|---|---|---|---|---|---|---|---|---|---|
| 5,3 mm | 0.2087 | | | 6,0 | 82,0 | 44,0 | 35,0 | 36,0 | 64124 |
| #4 | 0.2090 | 5.31 | 1/4-24 | 1/4 | 3-1/4 | 1-3/4 | 1-37/64 | 1-7/16 | 51508 |
| 5,4 mm | 0.2126 | | | 6,0 | 82,0 | 44,0 | 35,0 | 36,0 | 64125 |
| #3 | 0.2130 | 5.41 | 1/4-28 | 1/4 | 3-1/4 | 1-3/4 | 1-37/64 | 1-7/16 | 51509 |
| 5,5 mm | 0.2165 | | M6 X 0,5 | 6,0 | 82,0 | 44,0 | 35,0 | 36,0 | 64126 |
| 7/32 | 0.2188 | 5.56 | 1/4-32 | 1/4 | 3-1/4 | 1-3/4 | 1-37/64 | 1-7/16 | 51510 |
| 5,6 mm | 0.2205 | | | 6,0 | 82,0 | 44,0 | 35,0 | 36,0 | 64127 |
| #2 | 0.2210 | 5.61 | | 1/4 | 3-1/4 | 1-3/4 | 1-37/64 | 1-7/16 | 52335 |
| 5,7 mm | 0.2244 | | | 6,0 | 82,0 | 44,0 | 35,0 | 36,0 | 64128 |
| #1 | 0.2280 | 5.79 | | 1/4 | 3-1/4 | 1-3/4 | 1-37/64 | 1-7/16 | 52336 |
| 5,8 mm | 0.2283 | | | 6,0 | 82,0 | 44,0 | 35,0 | 36,0 | 64129 |
| 5,9 mm | 0.2323 | | | 6,0 | 82,0 | 44,0 | 35,0 | 36,0 | 64130 |
| A | 0.2340 | 5.94 | | 1/4 | 3-1/4 | 1-3/4 | 1-37/64 | 1-7/16 | 52337 |
| 15/64 | 0.2344 | 5.95 | | 1/4 | 3-1/4 | 1-3/4 | 1-37/64 | 1-7/16 | 51591 |
| 6,0 mm | 0.2362 | | M7 X 1 | 6,0 | 82,0 | 44,0 | 35,0 | 36,0 | 64131 |
| B | 0.2380 | 6.05 | | 1/4 | 3 5/8 | 2-5/64 | 1-51/64 | 1-7/16 | 52338 |
| 6,1 mm | 0.2402 | | | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 64132 |
| C | 0.2420 | 6.15 | | 1/4 | 3 5/8 | 2-5/64 | 1-51/64 | 1-7/16 | 52339 |
| 6,2 mm | 0.2441 | | | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 64133 |
| D | 0.2460 | 6.25 | | 1/4 | 3 5/8 | 2-5/64 | 1-51/64 | 1-7/16 | 52340 |
| 6,25 mm | 0.2461 | | M7 X 0,75 | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 64134 |
| 6,3 mm | 0.2480 | | | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 64135 |
| 1/4 | 0.2500 | 6.35 | | 1/4 | 3-5/8 | 2-5/64 | 1-51/64 | 1-7/16 | 51511 |
| 6,4 mm | 0.2520 | | | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 64136 |
| 6,5 mm | 0.2559 | | | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 64137 |
| F | 0.2570 | 6.53 | 5/16-18 | 5/16 | 3-5/8 | 2-5/64 | 1-51/64 | 1-7/16 | 51512 |
| 6,6 mm | 0.2598 | | | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 64138 |
| G | 0.2610 | 6.63 | | 5/16 | 3 5/8 | 2 5/64 | 1 51/64 | 1 7/16 | 52341 |
| 6,7 mm | 0.2638 | | | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 64139 |
| 17/64 | 0.2656 | 6.75 | 5/16-20 | 5/16 | 3-5/8 | 2-5/64 | 1-51/64 | 1-7/16 | 51513 |
| H | 0.2660 | 6.76 | | 5/16 | 3-5/8 | 2-5/64 | 1-51/64 | 1-7/16 | 52342 |
| 6,8 mm | 0.2677 | | M8 X 1,25 | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 64140 |
| 6,9 mm | 0.2717 | | | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 64141 |
| I | 0.2720 | 6.91 | 5/16-24 | 5/16 | 3-5/8 | 2-5/64 | 1-51/64 | 1-7/16 | 51514 |
| 7,0 mm | 0.2756 | | M8 X 1 | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 64142 |
| J | 0.2770 | 7.04 | | 5/16 | 3 5/8 | 2-5/64 | 1-51/64 | 1-7/16 | 52343 |
| 7,1 mm | 0.2795 | | | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 64143 |
| K | 0.2810 | 7.14 | | 5/16 | 3 5/8 | 2-5/64 | 1-51/64 | 1-7/16 | 52344 |
| 9/32 | 0.2812 | 7.14 | 5/16-32 | 5/16 | 3-5/8 | 2-5/64 | 1-51/64 | 1-7/16 | 51515 |
| 7,2 mm | 0.2835 | | | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 64144 |
| 7,25 mm | 0.2854 | | M8 X 0,75 | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 64145 |
| 7,3 mm | 0.2874 | | | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 64146 |


Common

5xD
Reach


Right Spiral


External Coolant

2
Flutes

*(continued on next page)*

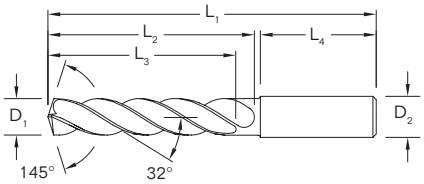
HI-PERCARB®
HIGH PERFORMANCE CARBIDE DRILLS

**TOLERANCES (inch)**

| DIAMETER | $D_1$ | $D_2$ |
|---|---|---|
| ≤.1181 | +.00008/+.00047 | h6 |
| >.1181–.2362 | +.00016/+.00063 | h6 |
| >.2362–.3937 | +.00024/+.00083 | h6 |
| >.3937–.7087 | +.00028/+.00098 | h6 |
| >.7087–1.1811 | +.00031/+.00114 | h6 |

**TOLERANCES (mm)**

| DIAMETER | $D_1$ | $D_2$ |
|---|---|---|
| ≤ 3 | +0,002/+0,012 | h6 |
| > 3 - 6 | +0,004/+0,016 | h6 |
| > 6 - 10 | +0,006/+0,021 | h6 |
| > 10 - 18 | +0,007/+0,025 | h6 |
| > 18 - 30 | +0,008/+0,029 | h6 |




Common

5xD
Reach

Right Spiral

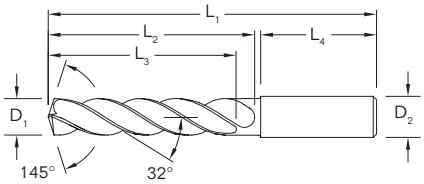
External Coolant

2
Flutes

| Cutting Diameter $D_1$ | Decimal Equivalent | Metric Equivalent | Tap Size Reference Only | Shank Diameter $D_2$ | Overall Length $L_1$ | Flute Length $L_2$ | Min. Cleared Length $L_3$ | Shank Length $L_4$ | Ti-NAMITE-A (AlTiN) EDP No. |
|---|---|---|---|---|---|---|---|---|---|
| L | 0.2900 | 7.37 | | 5/16 | 3-5/8 | 2-5/64 | 1-51/64 | 1-7/16 | 52345 |
| 7,4 mm | 0.2913 | | | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 64147 |
| M | 0.2950 | 7.49 | | 5/16 | 3-5/8 | 2-5/64 | 1-51/64 | 1-7/16 | 52346 |
| 7,5 mm | 0.2953 | | M8 X 0,5 | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 64148 |
| 19/64 | 0.2969 | 7.54 | | 5/16 | 3-5/8 | 2-5/64 | 1-51/64 | 1-7/16 | 51516 |
| 7,6 mm | 0.2992 | | | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 64149 |
| N | 0.3020 | 7.67 | | 5/16 | 3-5/8 | 2-5/64 | 1-51/64 | 1-7/16 | 52347 |
| 7,7 mm | 0.3031 | | | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 64150 |
| 7,8 mm | 0.3071 | | M9 X 1,25 | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 64151 |
| 7,9 mm | 0.3110 | | | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 64152 |
| 5/16 | 0.3125 | 7.94 | 3/8-16 | 5/16 | 3-5/8 | 2-5/64 | 1-51/64 | 1-7/16 | 51517 |
| 8,0 mm | 0.3150 | | M9 X 1 | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 64153 |
| O | 0.3160 | 8.03 | | 3/8 | 4 | 2-13/32 | 2-1/8 | 1-9/16 | 52348 |
| 8,1 mm | 0.3189 | | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 64154 |
| 8,2 mm | 0.3228 | | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 64155 |
| P | 0.3230 | 8.20 | | 3/8 | 4 | 2-13/32 | 2-1/8 | 1-9/16 | 51518 |
| 8,3 mm | 0.3268 | | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 64156 |
| 21/64 | 0.3281 | 8.33 | 3/8-20 | 3/8 | 4 | 2-13/32 | 2-1/8 | 1-9/16 | 51519 |
| 8,4 mm | 0.3307 | | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 64157 |
| Q | 0.3320 | 8.43 | 3/8-24 | 3/8 | 4 | 2-13/32 | 2-1/8 | 1-9/16 | 51520 |
| 8,5 mm | 0.3346 | | M10 X 1,5 | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 64158 |
| 8,6 mm | 0.3386 | | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 64159 |
| R | 0.3390 | 8.61 | 3/8-32 | 3/8 | 4 | 2-13/32 | 2-1/8 | 1-9/16 | 52349 |
| 8,7 mm | 0.3425 | | M10 X 1,25 | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 64160 |
| 11/32 | 0.3438 | 8.73 | | 3/8 | 4 | 2-13/32 | 2-1/8 | 1-9/16 | 51521 |
| 8,8 mm | 0.3465 | | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 64161 |
| S | 0.3480 | 8.84 | | 3/8 | 4 | 2-13/32 | 2-1/8 | 1-9/16 | 51522 |
| 8,9 mm | 0.3504 | | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 64162 |
| 9,0 mm | 0.3543 | | M10 X 1 | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 64163 |
| T | 0.3580 | 9.09 | | 3/8 | 4 | 2 13/32 | 2 1/8 | 1 9/16 | 52350 |
| 9,1 mm | 0.3583 | | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 64164 |
| 23/64 | 0.3594 | 9.13 | | 3/8 | 4 | 2-13/32 | 2-1/8 | 1-9/16 | 51523 |
| 9,2 mm | 0.3622 | | M10 X 0,75 | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 64165 |
| 9,25 mm | 0.3642 | | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 64166 |
| 9,3 mm | 0.3661 | | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 64167 |
| U | 0.3680 | 9.35 | 7/16-14 | 3/8 | 4 | 2-13/32 | 2-1/8 | 1-9/16 | 51524 |
| 9,4 mm | 0.3701 | | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 64168 |
| 9,5 mm | 0.3740 | | M10 X 0,5 | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 64169 |
| 3/8 | 0.3750 | 9.53 | | 3/8 | 4 | 2-13/32 | 2-1/8 | 1-9/16 | 51525 |
| V | 0.3770 | 9.58 | | 1/2 | 4 | 2-13/32 | 2-1/8 | 1-9/16 | 52351 |
| 9,6 mm | 0.3780 | | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 64170 |
| 9,7 mm | 0.3819 | | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 64171 |

*(continued on next page)*

HI-PERCARB®
HIGH PERFORMANCE CARBIDE DRILLS




**TOLERANCES (inch)**

| DIAMETER | $D_1$ | $D_2$ |
|---|---|---|
| ≤.1181 | +.00008/+.00047 | h6 |
| >.1181–.2362 | +.00016/+.00063 | h6 |
| >.2362–.3937 | +.00024/+.00083 | h6 |
| >.3937–.7087 | +.00028/+.00098 | h6 |
| >.7087–1.1811 | +.00031/+.00114 | h6 |

**TOLERANCES (mm)**

| DIAMETER | $D_1$ | $D_2$ |
|---|---|---|
| ≤ 3 | +0,002/+0,012 | h6 |
| > 3 - 6 | +0,004/+0,016 | h6 |
| > 6 - 10 | +0,006/+0,021 | h6 |
| > 10 - 18 | +0,007/+0,025 | h6 |
| > 18 - 30 | +0,008/+0,029 | h6 |



| Cutting Diameter $D_1$ | Decimal Equivalent | Metric Equivalent | Tap Size Reference Only | Shank Diameter $D_2$ | Overall Length $L_1$ | Flute Length $L_2$ | Min. Cleared Length $L_3$ | Shank Length $L_4$ | Ti-NAMITE-A (AlTiN) EDP No. |
|---|---|---|---|---|---|---|---|---|---|
| 9,8 mm | 0.3858 | | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 64172 |
| W | 0.3860 | 9.80 | | 1/2 | 4 | 2-13/32 | 2-1/8 | 1-9/16 | 51526 |
| 9,9 mm | 0.3898 | | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 64173 |
| 25/64 | 0.3906 | 9.92 | 7/16-20 | 1/2 | 4 | 2-13/32 | 2-1/8 | 1-9/16 | 51527 |
| 10,0 mm | 0.3937 | | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 64174 |
| X | 0.3970 | 10.08 | 7/16-24 | 1/2 | 4-11/16 | 2-3/4 | 2-23/64 | 1-49/64 | 52352 |
| 10,1 mm | 0.3976 | | | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 64175 |
| 10,2 mm | 0.4016 | | | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 64176 |
| Y | 0.4040 | 10.26 | 7/16-28 | 1/2 | 4-11/16 | 2-3/4 | 2-23/64 | 1-49/64 | 52353 |
| 10,3 mm | 0.4055 | | | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 64177 |
| 13/32 | 0.4062 | 10.32 | | 1/2 | 4-11/16 | 2-3/4 | 2-23/64 | 1-49/64 | 51528 |
| 10,4 mm | 0.4095 | | | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 64178 |
| Z | 0.4130 | 10.49 | | 1/2 | 4-11/16 | 2-3/4 | 2-23/64 | 1-49/64 | 52354 |
| 10,5 mm | 0.4134 | | M12 X 1,5 | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 64179 |
| 10,6 mm | 0.4173 | | | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 64180 |
| 10,7 mm | 0.4213 | | | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 64181 |
| 27/64 | 0.4219 | 10.72 | 1/2-13 | 1/2 | 4-11/16 | 2-3/4 | 2-23/64 | 1-49/64 | 51529 |
| 10,8 mm | 0.4252 | | M12 X 1,25 | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 64182 |
| 10,9 mm | 0.4291 | | | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 64183 |
| 11,0 mm | 0.4331 | | | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 64184 |
| 11,1 mm | 0.4370 | | M12 X 1 | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 64185 |
| 7/16 | 0.4375 | 11.11 | 1/4-18 NPT | 1/2 | 4-11/16 | 2-3/4 | 2-23/64 | 1-49/64 | 51530 |
| 11,2 mm | 0.4409 | | | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 64186 |
| 11,25 mm | 0.4429 | | | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 64187 |
| 11,3 mm | 0.4449 | | | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 64188 |
| 11,4 mm | 0.4488 | | | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 64189 |
| 11,5 mm | 0.4528 | | M12 X 0,5 | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 64190 |
| 29/64 | 0.4531 | 11.51 | 1/2-20 | 1/2 | 4-11/16 | 2-3/4 | 2-23/64 | 1-49/64 | 51531 |
| 11,6 mm | 0.4567 | | | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 64191 |
| 11,7 mm | 0.4606 | | | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 64192 |
| 11,8 mm | 0.4646 | | | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 64193 |
| 11,9 mm | 0.4685 | | | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 64194 |
| 15/32 | 0.4688 | 11.91 | 1/2-28 | 1/2 | 4-11/16 | 2-3/4 | 2-23/64 | 1-49/64 | 51532 |
| 12,0 mm | 0.4724 | | M14 X 2 | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 64195 |
| 31/64 | 0.4844 | 12.30 | 9/16-12 | 1/2 | 4-7/8 | 3-1/32 | 2-19/32 | 1-49/64 | 51533 |
| 12,5 mm | 0.4921 | | M14 X 1,5 | 14,0 | 124,0 | 77,0 | 60,0 | 45,0 | 64196 |
| 1/2 | 0.5000 | 12.70 | | 1/2 | 4-7/8 | 3-1/32 | 2-19/32 | 1-49/64 | 51534 |
| 12,8 mm | 0.5039 | | M14 X 1,25 | 14,0 | 124,0 | 77,0 | 60,0 | 45,0 | 64197 |
| 13,0 mm | 0.5118 | | M14 X 1 | 14,0 | 124,0 | 77,0 | 60,0 | 45,0 | 64198 |
| 33/64 | 0.5156 | 13.10 | 9/16-18 | 5/8 | 4-7/8 | 3-1/32 | 2-19/32 | 1-49/64 | 51535 |
| 17/32 | 0.5312 | 13.49 | 5/8-11 | 5/8 | 4-7/8 | 3-1/32 | 2-19/32 | 1-49/64 | 51536 |
| 13,5 mm | 0.5315 | | | 14,0 | 124,0 | 77,0 | 60,0 | 45,0 | 64199 |


Common

5xD
Reach


Right Spiral


External Coolant

2
Flutes

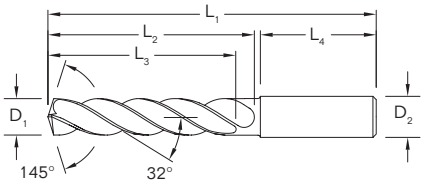
*(continued on next page)*

**TOLERANCES (inch)**

| DIAMETER | $D_1$ | $D_2$ |
|---|---|---|
| ≤.1181 | +.00008/+.00047 | h6 |
| >.1181–.2362 | +.00016/+.00063 | h6 |
| >.2362–.3937 | +.00024/+.00083 | h6 |
| >.3937–.7087 | +.00028/+.00098 | h6 |
| >.7087–1.1811 | +.00031/+.00114 | h6 |

**TOLERANCES (mm)**

| DIAMETER | $D_1$ | $D_2$ |
|---|---|---|
| ≤ 3 | +0,002/+0,012 | h6 |
| > 3 - 6 | +0,004/+0,016 | h6 |
| > 6 - 10 | +0,006/+0,021 | h6 |
| > 10 - 18 | +0,007/+0,025 | h6 |
| > 18 - 30 | +0,008/+0,029 | h6 |




Common

5xD
Reach

Right Spiral

External Coolant

2
Flutes

| Cutting Diameter $D_1$ | Decimal Equivalent | Metric Equivalent | Tap Size Reference Only | Shank Diameter $D_2$ | Overall Length $L_1$ | Flute Length $L_2$ | Min. Cleared Length $L_3$ | Shank Length $L_4$ | Ti-NAMITE-A (AlTiN) EDP No. |
|---|---|---|---|---|---|---|---|---|---|
| 35/64 | 0.5469 | 13.89 | 5/8-12 | 5/8 | 4-7/8 | 3-1/32 | 2-19/32 | 1-49/64 | 51537 |
| 14,0 mm | 0.5512 | | M16 X 2 | 14,0 | 124,0 | 77,0 | 60,0 | 45,0 | 64200 |
| 9/16 | 0.5625 | 14.29 | | 5/8 | 5-1/4 | 3-1/4 | 2-3/4 | 1-57/64 | 51538 |
| 14,5 mm | 0.5709 | | M16 X 1,5 | 16,0 | 133,0 | 83,0 | 63,0 | 48,0 | 64201 |
| 37/64 | 0.5781 | 14.68 | 5/8-18 | 5/8 | 5-1/4 | 3-1/4 | 2-3/4 | 1-57/64 | 51539 |
| 15,0 mm | 0.5906 | | M16 X 1 | 16,0 | 133,0 | 83,0 | 63,0 | 48,0 | 64202 |
| 19/32 | 0.5938 | 15.08 | 11/16-11 | 5/8 | 5-1/4 | 3-1/4 | 2-3/4 | 1-57/64 | 51592 |
| 39/64 | 0.6094 | 15.48 | 11/16-12 | 5/8 | 5-1/4 | 3-1/4 | 2-3/4 | 1-57/64 | 51593 |
| 15,5 mm | 0.6102 | | M18 X 2,5 | 16,0 | 133,0 | 83,0 | 63,0 | 48,0 | 64203 |
| 5/8 | 0.6250 | 15.88 | 11/16-16 | 5/8 | 5-1/4 | 3-1/4 | 2-3/4 | 1-57/64 | 51540 |
| 16,0 mm | 0.6299 | | | 16,0 | 133,0 | 83,0 | 63,0 | 48,0 | 64204 |
| 41/64 | 0.6406 | 16.27 | 11/16-24 | 3/4 | 5-5/8 | 3-5/8 | 3-3/16 | 1-57/64 | 51594 |
| 16,5 mm | 0.6496 | | M18 X 1,5 | 18,0 | 143,0 | 93,0 | 71,0 | 48,0 | 64205 |
| 21/32 | 0.6562 | 16.67 | 3/4-10 | 3/4 | 5-5/8 | 3-5/8 | 3-3/16 | 1-57/64 | 51541 |
| 17,0 mm | 0.6693 | | | 18,0 | 143,0 | 93,0 | 71,0 | 48,0 | 64206 |
| 43/64 | 0.6719 | 17.07 | 3/4-12 | 3/4 | 5-5/8 | 3-5/8 | 3-3/16 | 1-57/64 | 51595 |
| 11/16 | 0.6875 | 17.46 | 3/4-16 | 3/4 | 5-5/8 | 3-5/8 | 3-3/16 | 1-57/64 | 51542 |
| 17,5 mm | 0.6890 | | M20 X 2,5 | 18,0 | 143,0 | 93,0 | 71,0 | 48,0 | 64207 |
| 45/64 | 0.7031 | 17.86 | 3/4-20, 1/2-14 NPT | 3/4 | 5-5/8 | 3-5/8 | 3-3/16 | 1-57/64 | 51543 |
| 18,0 mm | 0.7087 | | | 18,0 | 143,0 | 93,0 | 71,0 | 48,0 | 64208 |
| 23/32 | 0.7188 | 18.26 | | 3/4 | 6 | 4 | 3-3/8 | 1-31/32 | 51596 |
| 18,5 mm | 0.7283 | | M20 X 1,5 | 20,0 | 153,0 | 101,0 | 77,0 | 50,0 | 64209 |
| 47/64 | 0.7344 | 18.65 | 13/16-12 | 3/4 | 6 | 4 | 3-3/8 | 1-31/32 | 51544 |
| 19,0 mm | 0.7480 | | | 20,0 | 153,0 | 101,0 | 77,0 | 50,0 | 64210 |
| 3/4 | 0.7500 | 19.05 | 13/16-16 | 3/4 | 6 | 4 | 3-3/8 | 1-31/32 | 51545 |
| 49/64 | 0.7656 | 19.45 | 7/8-9 | 7/8 | 6 | 4 | 3-3/8 | 1-31/32 | 52355 |
| 19,5 mm | 0.7677 | | M22 X 2,5 | 20,0 | 153,0 | 101,0 | 77,0 | 50,0 | 64211 |
| 25/32 | 0.7812 | 19.84 | | 7/8 | 6 | 4 | 3-3/8 | 1-31/32 | 52356 |
| 20,0 mm | 0.7874 | | | 20,0 | 153,0 | 101,0 | 77,0 | 50,0 | 64212 |
| 51/64 | 0.7969 | 20.24 | 7/8-12 | 7/8 | 6 | 4 | 3-3/8 | 1-31/32 | 52357 |
| 20,5 mm | 0.8071 | | | 22,0 | 153,0 | 101,0 | 77,0 | 50,0 | 64533 |
| 13/16 | 0.8125 | 20.64 | 7/8-14 | 7/8 | 6-1/2 | 4-1/2 | 3-7/8 | 1-31/32 | 52358 |
| 21,0 mm | 0.8268 | | | 22,0 | 153,0 | 101,0 | 77,0 | 50,0 | 64534 |
| 22,0 mm | 0.8661 | | | 22,0 | 178,0 | 127,0 | 108,0 | 50,0 | 64535 |
| 7/8 | 0.8750 | 22.23 | 15/16-16, 1-8 | 7/8 | 6-1/2 | 4-1/2 | 3-7/8 | 1-31/32 | 52359 |
| 59/64 | 0.9219 | 23.42 | 1-12 | 1 | 7 | 5 | 4-3/8 | 2-1/8 | 52360 |

| Series 135 3D Fractional | | Hardness | Vc (sfm) | | Diameter ($D_1$) (inch) 1/32 | 1/8 | 1/4 | 3/8 | 1/2 | 5/8 | 7/8 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| P | CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536 | ≤ 175 Bhn or ≤ 7 HRc | 385 | RPM | 47062 | 11766 | 5883 | 3922 | 2941 | 2353 | 1681 |
| | | | (308-462) | Fr | 0.0010 | 0.0038 | 0.0076 | 0.0115 | 0.0153 | 0.0191 | 0.0268 |
| | | | | Feed (ipm) | 45.0 | 45.0 | 45.0 | 45.0 | 45.0 | 45.0 | 45.0 |
| | | ≤ 275 Bhn or ≤ 28 HRc | 350 | RPM | 42784 | 10696 | 5348 | 3565 | 2674 | 2139 | 1528 |
| | | | (280-420) | Fr | 0.0009 | 0.0036 | 0.0071 | 0.0107 | 0.0142 | 0.0178 | 0.0249 |
| | | | | Feed (ipm) | 38.0 | 38.0 | 38.0 | 38.0 | 38.0 | 38.0 | 38.0 |
| | | ≤ 425 Bhn or ≤ 45 HRc | 200 | RPM | 24448 | 6112 | 3056 | 2037 | 1528 | 1222 | 873 |
| | | | (160-240) | Fr | 0.0007 | 0.0029 | 0.0059 | 0.0088 | 0.0118 | 0.0147 | 0.0206 |
| | | | | Feed (ipm) | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| | ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100 | ≤ 275 Bhn or ≤ 28 HRc | 300 | RPM | 36672 | 9168 | 4584 | 3056 | 2292 | 1834 | 1310 |
| | | | (240-360) | Fr | 0.0007 | 0.0029 | 0.0059 | 0.0088 | 0.0118 | 0.0147 | 0.0206 |
| | | | | Feed (ipm) | 27.0 | 27.0 | 27.0 | 27.0 | 27.0 | 27.0 | 27.0 |
| | | ≤ 375 Bhn or ≤ 40 HRc | 185 | RPM | 22614 | 5654 | 2827 | 1885 | 1413 | 1131 | 808 |
| | | | (148-222) | Fr | 0.0006 | 0.0026 | 0.0051 | 0.0077 | 0.0103 | 0.0128 | 0.0180 |
| | | | | Feed (ipm) | 14.5 | 14.5 | 14.5 | 14.5 | 14.5 | 14.5 | 14.5 |
| | | ≤ 450 Bhn or ≤ 48 HRc | 130 | RPM | 15891 | 3973 | 1986 | 1324 | 993 | 795 | 568 |
| | | | (104-156) | Fr | 0.0004 | 0.0018 | 0.0035 | 0.0053 | 0.0070 | 0.0088 | 0.0123 |
| | | | | Feed (ipm) | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 |
| H | TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2 | ≤ 200 Bhn or ≤ 13 HRc | 130 | RPM | 15891 | 3973 | 1986 | 1324 | 993 | 795 | 568 |
| | | | (104-156) | Fr | 0.0007 | 0.0026 | 0.0053 | 0.0079 | 0.0106 | 0.0132 | 0.0185 |
| | | | | Feed (ipm) | 10.5 | 10.5 | 10.5 | 10.5 | 10.5 | 10.5 | 10.5 |
| | | ≤ 375 Bhn or ≤ 40 HRc | 90 | RPM | 11002 | 2750 | 1375 | 917 | 688 | 550 | 393 |
| | | | (72-108) | Fr | 0.0003 | 0.0012 | 0.0023 | 0.0035 | 0.0047 | 0.0058 | 0.0081 |
| | | | | Feed (ipm) | 3.2 | 3.2 | 3.2 | 3.2 | 3.2 | 3.2 | 3.2 |
| | | ≤ 475 Bhn or ≤ 50 HRc | 75 | RPM | 9168 | 2292 | 1146 | 764 | 573 | 458 | 327 |
| | | | (60-90) | Fr | 0.0002 | 0.0008 | 0.0016 | 0.0024 | 0.0031 | 0.0039 | 0.0055 |
| | | | | Feed (ipm) | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 |
| K | CAST IRONS Gray, Malleable, Ductile | ≤ 220 Bhn or ≤ 19 HRc | 320 | RPM | 39117 | 9779 | 4890 | 3260 | 2445 | 1956 | 1397 |
| | | | (256-384) | Fr | 0.0012 | 0.0046 | 0.0092 | 0.0138 | 0.0184 | 0.0230 | 0.0322 |
| | | | | Feed (ipm) | 45.0 | 45.0 | 45.0 | 45.0 | 45.0 | 45.0 | 45.0 |
| | | ≤ 260 Bhn or ≤ 26 HRc | 285 | RPM | 34838 | 8710 | 4355 | 2903 | 2177 | 1742 | 1244 |
| | | | (228-342) | Fr | 0.0011 | 0.0046 | 0.0092 | 0.0138 | 0.0184 | 0.0230 | 0.0321 |
| | | | | Feed (ipm) | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 |
| M | STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F, 440F | ≤ 185 Bhn or ≤ 9 HRc | 275 | RPM | 33616 | 8404 | 4202 | 2801 | 2101 | 1681 | 1201 |
| | | | (220-330) | Fr | 0.0006 | 0.0026 | 0.0051 | 0.0077 | 0.0102 | 0.0128 | 0.0179 |
| | | | | Feed (ipm) | 21.5 | 21.5 | 21.5 | 21.5 | 21.5 | 21.5 | 21.5 |
| | | ≤ 275 Bhn or ≤ 28 HRc | 170 | RPM | 20781 | 5195 | 2598 | 1732 | 1299 | 1039 | 742 |
| | | | (136-204) | Fr | 0.0005 | 0.0020 | 0.0040 | 0.0061 | 0.0081 | 0.0101 | 0.0141 |
| | | | | Feed (ipm) | 10.5 | 10.5 | 10.5 | 10.5 | 10.5 | 10.5 | 10.5 |
| | STAINLESS STEELS (DIFFICULT) 304, 316, 321, 13-8 PH, 15-5PH, 17-4 PH, Custom 450 | ≤ 275 Bhn or ≤ 28 HRc | 90 | RPM | 11002 | 2750 | 1375 | 917 | 688 | 550 | 393 |
| | | | (72-108) | Fr | 0.0005 | 0.0020 | 0.0040 | 0.0060 | 0.0080 | 0.0100 | 0.0140 |
| | | | | Feed (ipm) | 5.5 | 5.5 | 5.5 | 5.5 | 5.5 | 5.5 | 5.5 |
| | | ≤ 375 Bhn or ≤ 40 HRc | 65 | RPM | 7946 | 1986 | 993 | 662 | 497 | 397 | 284 |
| | | | (52-78) | Fr | 0.0004 | 0.0018 | 0.0035 | 0.0053 | 0.0070 | 0.0088 | 0.0123 |
| | | | | Feed (ipm) | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 |

*(continued on next page)*

| | Series 135 3D Fractional | Hardness | Vc (sfm) | | Diameter ($D_1$) (inch) 1/32 | 1/8 | 1/4 | 3/8 | 1/2 | 5/8 | 7/8 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| S | **SUPER ALLOYS (NICKEL , COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy, Monel 400, Rene, Waspaloy** | ≤ 300 Bhn or ≤ 32 HRc | 55 | RPM | 6723 | 1681 | 840 | 560 | 420 | 336 | 240 |
| | | | (44-66) | Fr | 0.0002 | 0.0008 | 0.0015 | 0.0023 | 0.0031 | 0.0039 | 0.0054 |
| | | | | Feed (ipm) | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 |
| | | ≤ 400 Bhn or ≤ 43 HRc | 30 | RPM | 3667 | 917 | 458 | 306 | 229 | 183 | 131 |
| | | | (24-36) | Fr | 0.0002 | 0.0007 | 0.0013 | 0.0020 | 0.0026 | 0.0033 | 0.0046 |
| | | | | Feed (ipm) | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 |
| | **TITANIUM ALLOYS Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si, Ti-6Al4V** | ≤ 275 Bhn or ≤ 28 HRc | 135 | RPM | 16502 | 4126 | 2063 | 1375 | 1031 | 825 | 589 |
| | | | (108-162) | Fr | 0.0004 | 0.0018 | 0.0035 | 0.0053 | 0.0071 | 0.0088 | 0.0124 |
| | | | | Feed (ipm) | 7.3 | 7.3 | 7.3 | 7.3 | 7.3 | 7.3 | 7.3 |
| | | ≤ 350 Bhn or ≤ 38 HRc | 100 | RPM | 12224 | 3056 | 1528 | 1019 | 764 | 611 | 437 |
| | | | (80-120) | Fr | 0.0004 | 0.0016 | 0.0033 | 0.0049 | 0.0065 | 0.0082 | 0.0115 |
| | | | | Feed (ipm) | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 |
| | | ≤ 440 Bhn or ≤ 47 HRc | 55 | RPM | 6723 | 1681 | 840 | 560 | 420 | 336 | 240 |
| | | | (44-66) | Fr | 0.0003 | 0.0012 | 0.0024 | 0.0036 | 0.0048 | 0.0059 | 0.0083 |
| | | | | Feed (ipm) | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| N | **ALUMINUM ALLOYS 2017, 2024, 356, 6061, 7075** | ≤ 80 Bhn or ≤ 47 HRb | 700 | RPM | 85568 | 21392 | 10696 | 7131 | 5348 | 4278 | 3056 |
| | | | (560-840) | Fr | 0.0012 | 0.0049 | 0.0098 | 0.0147 | 0.0196 | 0.0245 | 0.0344 |
| | | | | Feed (ipm) | 105.0 | 105.0 | 105.0 | 105.0 | 105.0 | 105.0 | 105.0 |
| | | ≤ 150 Bhn or ≤ 7 HRc | 600 | RPM | 73344 | 18336 | 9168 | 6112 | 4584 | 3667 | 2619 |
| | | | (480-720) | Fr | 0.0012 | 0.0050 | 0.0099 | 0.0149 | 0.0199 | 0.0248 | 0.0347 |
| | | | | Feed (ipm) | 91.0 | 91.0 | 91.0 | 91.0 | 91.0 | 91.0 | 91.0 |
| | **COPPER ALLOYS Alum Bronze, C110, Muntz Brass** | ≤ 140 Bhn or ≤ 3 HRc | 500 | RPM | 61120 | 15280 | 7640 | 5093 | 3820 | 3056 | 2183 |
| | | | (400-600) | Fr | 0.0005 | 0.0020 | 0.0039 | 0.0059 | 0.0079 | 0.0098 | 0.0137 |
| | | | | Feed (ipm) | 30.0 | 30.0 | 30.0 | 30.0 | 30.0 | 30.0 | 30.0 |
| | | ≤ 200 Bhn or ≤ 23 HRc | 400 | RPM | 48896 | 12224 | 6112 | 4075 | 3056 | 2445 | 1746 |
| | | | (320-480) | Fr | 0.0005 | 0.0020 | 0.0040 | 0.0060 | 0.0080 | 0.0100 | 0.0140 |
| | | | | Feed (ipm) | 24.5 | 24.5 | 24.5 | 24.5 | 24.5 | 24.5 | 24.5 |

**Note:**
- Bhn (Brinell) HRc (Rockwell C) HRb (Rockwell B)
- rpm = Vc x 3.82 / $D_1$
- ipm = Fr x rpm
- reduce speed and feed for materials harder than listed
- refer to the KYOCERA SGS Tool Wizard for complete technical information (www.kyocera-sgstool.com)

SGSTOOLWIZARD2.0
www.sgstoolwizard.com

| Series 135 3D Metric | | Hardness | Vc (m/min) | | Diameter ($D_1$) (mm) 1.5 | 3 | 6 | 8 | 10 | 12 | 16 | 20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P | CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536 | ≤ 175 Bhn or ≤ 7 HRc | 117 | RPM | 24882 | 12441 | 6220 | 4665 | 3732 | 3110 | 2333 | 1866 |
| | | | (94-141) | Fr | 0.047 | 0.094 | 0.189 | 0.252 | 0.315 | 0.378 | 0.504 | 0.630 |
| | | | | Feed (mm/min) | 1175 | 1175 | 1175 | 1175 | 1175 | 1175 | 1175 | 1175 |
| | | ≤ 275 Bhn or ≤ 28 HRc | 107 | RPM | 22620 | 11310 | 5655 | 4241 | 3393 | 2827 | 2121 | 1696 |
| | | | (85-128) | Fr | 0.043 | 0.086 | 0.172 | 0.229 | 0.286 | 0.343 | 0.457 | 0.572 |
| | | | | Feed (mm/min) | 970 | 970 | 970 | 970 | 970 | 970 | 970 | 970 |
| | | ≤ 475 Bhn or ≤ 45 HRc | 61 | RPM | 12926 | 6463 | 3231 | 2424 | 1939 | 1616 | 1212 | 969 |
| | | | (49-73) | Fr | 0.036 | 0.071 | 0.142 | 0.190 | 0.237 | 0.285 | 0.380 | 0.475 |
| | | | | Feed (mm/min) | 460 | 460 | 460 | 460 | 460 | 460 | 460 | 460 |
| | ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100 | ≤ 275 Bhn or ≤ 28 HRc | 91 | RPM | 19388 | 9694 | 4847 | 3635 | 2908 | 2424 | 1818 | 1454 |
| | | | (73-110) | Fr | 0.036 | 0.071 | 0.142 | 0.190 | 0.237 | 0.285 | 0.380 | 0.475 |
| | | | | Feed (mm/min) | 690 | 690 | 690 | 690 | 690 | 690 | 690 | 690 |
| | | ≤ 375 Bhn or ≤ 40 HRc | 56 | RPM | 11956 | 5978 | 2989 | 2242 | 1793 | 1495 | 1121 | 897 |
| | | | (45-68) | Fr | 0.031 | 0.061 | 0.122 | 0.163 | 0.204 | 0.244 | 0.326 | 0.407 |
| | | | | Feed (mm/min) | 365 | 365 | 365 | 365 | 365 | 365 | 365 | 365 |
| | | ≤ 450 Bhn or ≤ 48 HRc | 40 | RPM | 8402 | 4201 | 2100 | 1575 | 1260 | 1050 | 788 | 630 |
| | | | (32-48) | Fr | 0.021 | 0.042 | 0.083 | 0.111 | 0.139 | 0.167 | 0.222 | 0.278 |
| | | | | Feed (mm/min) | 175 | 175 | 175 | 175 | 175 | 175 | 175 | 175 |
| H | TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2 | ≤ 200 Bhn or ≤ 13 HRc | 40 | RPM | 8402 | 4201 | 2100 | 1575 | 1260 | 1050 | 788 | 630 |
| | | | (32-48) | Fr | 0.032 | 0.063 | 0.126 | 0.168 | 0.210 | 0.252 | 0.336 | 0.421 |
| | | | | Feed (mm/min) | 265 | 265 | 265 | 265 | 265 | 265 | 265 | 265 |
| | | ≤ 375 Bhn or ≤ 40 HRc | 27 | RPM | 5816 | 2908 | 1454 | 1091 | 872 | 727 | 545 | 436 |
| | | | (22-33) | Fr | 0.014 | 0.028 | 0.055 | 0.073 | 0.092 | 0.110 | 0.147 | 0.183 |
| | | | | Feed (mm/min) | 80 | 80 | 80 | 80 | 80 | 80 | 80 | 80 |
| | | ≤ 475 Bhn or ≤ 50 HRc | 23 | RPM | 4847 | 2424 | 1212 | 909 | 727 | 606 | 454 | 364 |
| | | | (18-27) | Fr | 0.009 | 0.019 | 0.037 | 0.050 | 0.062 | 0.074 | 0.099 | 0.124 |
| | | | | Feed (mm/min) | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 |
| K | CAST IRONS Gray, Malleable, Ductile | ≤ 220 Bhn or ≤ 19 HRc | 98 | RPM | 20681 | 10340 | 5170 | 3878 | 3102 | 2585 | 1939 | 1551 |
| | | | (78-117) | Fr | 0.055 | 0.110 | 0.220 | 0.293 | 0.366 | 0.439 | 0.585 | 0.732 |
| | | | | Feed (mm/min) | 1135 | 1135 | 1135 | 1135 | 1135 | 1135 | 1135 | 1135 |
| | | ≤ 260 Bhn or ≤ 26 HRc | 87 | RPM | 18419 | 9209 | 4605 | 3454 | 2763 | 2302 | 1727 | 1381 |
| | | | (69-104) | Fr | 0.055 | 0.110 | 0.219 | 0.292 | 0.366 | 0.439 | 0.585 | 0.731 |
| | | | | Feed (mm/min) | 1010 | 1010 | 1010 | 1010 | 1010 | 1010 | 1010 | 1010 |
| M | STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F, 440F | ≤ 185 Bhn or ≤ 9 HRc | 84 | RPM | 17773 | 8886 | 4443 | 3332 | 2666 | 2222 | 1666 | 1333 |
| | | | (67-101) | Fr | 0.031 | 0.061 | 0.123 | 0.164 | 0.204 | 0.245 | 0.327 | 0.409 |
| | | | | Feed (mm/min) | 545 | 545 | 545 | 545 | 545 | 545 | 545 | 545 |
| | | ≤ 275 Bhn or ≤ 28 HRc | 52 | RPM | 10987 | 5493 | 2747 | 2060 | 1648 | 1373 | 1030 | 824 |
| | | | (41-62) | Fr | 0.024 | 0.047 | 0.095 | 0.126 | 0.158 | 0.189 | 0.252 | 0.316 |
| | | | | Feed (mm/min) | 260 | 260 | 260 | 260 | 260 | 260 | 260 | 260 |
| | STAINLESS STEELS (DIFFICULT) 304, 316, 321, 13-8 PH, 15-5PH, 17-4 PH, Custom 450 | ≤ 275 Bhn or ≤ 28 HRc | 27 | RPM | 5816 | 2908 | 1454 | 1091 | 872 | 727 | 545 | 436 |
| | | | (22-33) | Fr | 0.023 | 0.046 | 0.093 | 0.124 | 0.155 | 0.186 | 0.248 | 0.309 |
| | | | | Feed (mm/min) | 135 | 135 | 135 | 135 | 135 | 135 | 135 | 135 |
| | | ≤ 375 Bhn or ≤ 40 HRc | 20 | RPM | 4201 | 2100 | 1050 | 788 | 630 | 525 | 394 | 315 |
| | | | (16-24) | Fr | 0.020 | 0.040 | 0.081 | 0.108 | 0.135 | 0.162 | 0.216 | 0.270 |
| | | | | Feed (mm/min) | 85 | 85 | 85 | 85 | 85 | 85 | 85 | 85 |

*(continued on next page)*

| | Series 135 3D Metric | Hardness | Vc (m/min) | | Diameter ($D_1$) (mm) 1.5 | 3 | 6 | 8 | 10 | 12 | 16 | 20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S | **SUPER ALLOYS (NICKEL , COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy, Monel 400, Rene, Waspaloy** | ≤ 300 Bhn or ≤ 32 HRc | 17 | RPM | 3555 | 1777 | 889 | 666 | 533 | 444 | 333 | 267 |
| | | | (13-20) | Fr | 0.010 | 0.020 | 0.039 | 0.053 | 0.066 | 0.079 | 0.105 | 0.131 |
| | | | | Feed (mm/min) | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 |
| | | ≤ 400 Bhn or ≤ 43 HRc | 9 | RPM | 1939 | 969 | 485 | 364 | 291 | 242 | 182 | 145 |
| | | | (7-11) | Fr | 0.008 | 0.015 | 0.031 | 0.041 | 0.052 | 0.062 | 0.083 | 0.103 |
| | | | | Feed (mm/min) | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 |
| | **TITANIUM ALLOYS Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si, Ti-6Al4V** | ≤ 275 Bhn or ≤ 28 HRc | 41 | RPM | 8725 | 4362 | 2181 | 1636 | 1309 | 1091 | 818 | 654 |
| | | | (33-49) | Fr | 0.021 | 0.042 | 0.085 | 0.113 | 0.141 | 0.170 | 0.226 | 0.283 |
| | | | | Feed (mm/min) | 185 | 185 | 185 | 185 | 185 | 185 | 185 | 185 |
| | | ≤ 350 Bhn or ≤ 38 HRc | 30 | RPM | 6463 | 3231 | 1616 | 1212 | 969 | 808 | 606 | 485 |
| | | | (24-37) | Fr | 0.019 | 0.039 | 0.077 | 0.103 | 0.129 | 0.155 | 0.206 | 0.258 |
| | | | | Feed (mm/min) | 125 | 125 | 125 | 125 | 125 | 125 | 125 | 125 |
| | | ≤ 440 Bhn or ≤ 47 HRc | 17 | RPM | 3555 | 1777 | 889 | 666 | 533 | 444 | 333 | 267 |
| | | | (13-20) | Fr | 0.014 | 0.028 | 0.056 | 0.075 | 0.094 | 0.113 | 0.150 | 0.188 |
| | | | | Feed (mm/min) | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 |
| N | **ALUMINUM ALLOYS 2017, 2024, 356, 6061, 7075** | ≤ 80 Bhn or ≤ 47 HRb | 213 | RPM | 45239 | 22620 | 11310 | 8482 | 6786 | 5655 | 4241 | 3393 |
| | | | (171-256) | Fr | 0.059 | 0.119 | 0.238 | 0.317 | 0.396 | 0.476 | 0.634 | 0.793 |
| | | | | Feed (mm/min) | 2690 | 2690 | 2690 | 2690 | 2690 | 2690 | 2690 | 2690 |
| | | ≤ 150 Bhn or ≤ 7 HRc | 183 | RPM | 38777 | 19388 | 9694 | 7271 | 5816 | 4847 | 3635 | 2908 |
| | | | (146-219) | Fr | 0.060 | 0.120 | 0.240 | 0.320 | 0.400 | 0.480 | 0.640 | 0.799 |
| | | | | Feed (mm/min) | 2325 | 2325 | 2325 | 2325 | 2325 | 2325 | 2325 | 2325 |
| | **COPPER ALLOYS Alum Bronze, C110, Muntz Brass** | ≤ 140 Bhn or ≤ 3 HRc | 152 | RPM | 32314 | 16157 | 8078 | 6059 | 4847 | 4039 | 3029 | 2424 |
| | | | (122-183) | Fr | 0.024 | 0.048 | 0.096 | 0.128 | 0.160 | 0.192 | 0.256 | 0.320 |
| | | | | Feed (mm/min) | 776 | 776 | 776 | 776 | 776 | 776 | 776 | 776 |
| | | ≤ 200 Bhn or ≤ 23 HRc | 122 | RPM | 25851 | 12926 | 6463 | 4847 | 3878 | 3231 | 2424 | 1939 |
| | | | (98-146) | Fr | 0.024 | 0.049 | 0.097 | 0.130 | 0.162 | 0.195 | 0.260 | 0.325 |
| | | | | Feed (mm/min) | 630 | 630 | 630 | 630 | 630 | 630 | 630 | 630 |

**Note:**
- Bhn (Brinell) HRc (Rockwell C) HRb (Rockwell B)
- rpm = (Vc x 1000) / ($D_1$ x 3.14)
- mm/min = Fr x rpm
- reduce speed and feed for materials harder than listed
- refer to the KYOCERA SGS Tool Wizard for complete technical information (www.kyocera-sgstool.com)

SGSTOOLWIZARD2.0
www.sgstoolwizard.com

| Series 135 5D Fractional | | Hardness | Vc (sfm) | | Diameter ($D_1$) (inch) 1/32 | 1/8 | 1/4 | 3/8 | 1/2 | 5/8 | 7/8 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| P | CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536 | ≤ 175 Bhn or ≤ 7 HRc | 345 | RPM | 42173 | 10543 | 5272 | 3514 | 2636 | 2109 | 1506 |
| | | | (276-414) | Fr | 0.0010 | 0.0040 | 0.0080 | 0.0120 | 0.0159 | 0.0199 | 0.0279 |
| | | | | Feed (ipm) | 42.0 | 42.0 | 42.0 | 42.0 | 42.0 | 42.0 | 42.0 |
| | | ≤ 275 Bhn or ≤ 28 HRc | 310 | RPM | 37894 | 9474 | 4737 | 3158 | 2368 | 1895 | 1353 |
| | | | (248-372) | Fr | 0.0009 | 0.0036 | 0.0072 | 0.0108 | 0.0144 | 0.0179 | 0.0251 |
| | | | | Feed (ipm) | 34.0 | 34.0 | 34.0 | 34.0 | 34.0 | 34.0 | 34.0 |
| | | ≤ 425 Bhn or ≤ 45 HRc | 180 | RPM | 22003 | 5501 | 2750 | 1834 | 1375 | 1100 | 786 |
| | | | (144-216) | Fr | 0.0007 | 0.0030 | 0.0060 | 0.0090 | 0.0120 | 0.0150 | 0.0210 |
| | | | | Feed (ipm) | 16.5 | 16.5 | 16.5 | 16.5 | 16.5 | 16.5 | 16.5 |
| | ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100 | ≤ 275 Bhn or ≤ 28 HRc | 270 | RPM | 33005 | 8251 | 4126 | 2750 | 2063 | 1650 | 1179 |
| | | | (216-324) | Fr | 0.0008 | 0.0030 | 0.0061 | 0.0091 | 0.0121 | 0.0151 | 0.0212 |
| | | | | Feed (ipm) | 25.0 | 25.0 | 25.0 | 25.0 | 25.0 | 25.0 | 25.0 |
| | | ≤ 375 Bhn or ≤ 40 HRc | 165 | RPM | 20170 | 5042 | 2521 | 1681 | 1261 | 1008 | 720 |
| | | | (132-198) | Fr | 0.0006 | 0.0026 | 0.0052 | 0.0077 | 0.0103 | 0.0129 | 0.0180 |
| | | | | Feed (ipm) | 13.0 | 13.0 | 13.0 | 13.0 | 13.0 | 13.0 | 13.0 |
| | | ≤ 450 Bhn or ≤ 48 HRc | 115 | RPM | 14058 | 3514 | 1757 | 1171 | 879 | 703 | 502 |
| | | | (92-138) | Fr | 0.0004 | 0.0018 | 0.0035 | 0.0053 | 0.0071 | 0.0088 | 0.0123 |
| | | | | Feed (ipm) | 6.2 | 6.2 | 6.2 | 6.2 | 6.2 | 6.2 | 6.2 |
| H | TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2 | ≤ 200 Bhn or ≤ 13 HRc | 120 | RPM | 14669 | 3667 | 1834 | 1222 | 917 | 733 | 524 |
| | | | (96-144) | Fr | 0.0006 | 0.0026 | 0.0051 | 0.0077 | 0.0103 | 0.0128 | 0.0179 |
| | | | | Feed (ipm) | 9.4 | 9.4 | 9.4 | 9.4 | 9.4 | 9.4 | 9.4 |
| | | ≤ 375 Bhn or ≤ 40 HRc | 80 | RPM | 9779 | 2445 | 1222 | 815 | 611 | 489 | 349 |
| | | | (64-96) | Fr | 0.0003 | 0.0012 | 0.0024 | 0.0036 | 0.0047 | 0.0059 | 0.0083 |
| | | | | Feed (ipm) | 2.9 | 2.9 | 2.9 | 2.9 | 2.9 | 2.9 | 2.9 |
| | | ≤ 475 Bhn or ≤ 50 HRc | 70 | RPM | 8557 | 2139 | 1070 | 713 | 535 | 428 | 306 |
| | | | (56-84) | Fr | 0.0002 | 0.0008 | 0.0016 | 0.0024 | 0.0032 | 0.0040 | 0.0056 |
| | | | | Feed (ipm) | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 |
| K | CAST IRONS Gray, Malleable, Ductile | ≤ 220 Bhn or ≤ 19 HRc | 300 | RPM | 36672 | 9168 | 4584 | 3056 | 2292 | 1834 | 1310 |
| | | | (240-360) | Fr | 0.0011 | 0.0045 | 0.0089 | 0.0134 | 0.0179 | 0.0224 | 0.0313 |
| | | | | Feed (ipm) | 41.0 | 41.0 | 41.0 | 41.0 | 41.0 | 41.0 | 41.0 |
| | | ≤ 260 Bhn or ≤ 26 HRc | 265 | RPM | 32394 | 8098 | 4049 | 2699 | 2025 | 1620 | 1157 |
| | | | (212-318) | Fr | 0.0011 | 0.0046 | 0.0091 | 0.0137 | 0.0183 | 0.0228 | 0.0320 |
| | | | | Feed (ipm) | 37.0 | 37.0 | 37.0 | 37.0 | 37.0 | 37.0 | 37.0 |
| M | STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F, 440F | ≤ 185 Bhn or ≤ 9 HRc | 250 | RPM | 30560 | 7640 | 3820 | 2547 | 1910 | 1528 | 1091 |
| | | | (200-300) | Fr | 0.0006 | 0.0026 | 0.0051 | 0.0077 | 0.0102 | 0.0128 | 0.0179 |
| | | | | Feed (ipm) | 19.5 | 19.5 | 19.5 | 19.5 | 19.5 | 19.5 | 19.5 |
| | | ≤ 275 Bhn or ≤ 28 HRc | 150 | RPM | 18336 | 4584 | 2292 | 1528 | 1146 | 917 | 655 |
| | | | (120-180) | Fr | 0.0005 | 0.0020 | 0.0039 | 0.0059 | 0.0079 | 0.0098 | 0.0137 |
| | | | | Feed (ipm) | 9.0 | 9.0 | 9.0 | 9.0 | 9.0 | 9.0 | 9.0 |
| | STAINLESS STEELS (DIFFICULT) 304, 316, 321, 13-8 PH, 15-5PH, 17-4 PH, Custom 450 | ≤ 275 Bhn or ≤ 28 HRc | 80 | RPM | 9779 | 2445 | 1222 | 815 | 611 | 489 | 349 |
| | | | (64-96) | Fr | 0.0005 | 0.0020 | 0.0039 | 0.0059 | 0.0079 | 0.0098 | 0.0137 |
| | | | | Feed (ipm) | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 |
| | | ≤ 375 Bhn or ≤ 40 HRc | 55 | RPM | 6723 | 1681 | 840 | 560 | 420 | 336 | 240 |
| | | | (44-66) | Fr | 0.0004 | 0.0018 | 0.0036 | 0.0054 | 0.0071 | 0.0089 | 0.0125 |
| | | | | Feed (ipm) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |

*(continued on next page)*

| | Series 135 5D Fractional | Hardness | Vc (sfm) | | Diameter ($D_1$) (inch) 1/32 | 1/8 | 1/4 | 3/8 | 1/2 | 5/8 | 7/8 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| S | **SUPER ALLOYS (Nickel , Cobalt, Iron Base) Inconel 601, 617, 625, Incoloy, Monel 400, Rene, Waspaloy** | ≤ 300 Bhn or ≤ 32 HRc | 40 | RPM | 4890 | 1222 | 611 | 407 | 306 | 244 | 175 |
| | | | (32-48) | Fr | 0.0002 | 0.0008 | 0.0016 | 0.0025 | 0.0033 | 0.0041 | 0.0057 |
| | | | | Feed (ipm) | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| | | ≤ 400 Bhn or ≤ 43 HRc | 20 | RPM | 2445 | 611 | 306 | 204 | 153 | 122 | 87 |
| | | | (16-24) | Fr | 0.0002 | 0.0007 | 0.0013 | 0.0020 | 0.0026 | 0.0033 | 0.0046 |
| | | | | Feed (ipm) | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| | **TITANIUM ALLOYS Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si, Ti-6Al4V** | ≤ 275 Bhn or ≤ 28 HRc | 105 | RPM | 12835 | 3209 | 1604 | 1070 | 802 | 642 | 458 |
| | | | (84-126) | Fr | 0.0005 | 0.0018 | 0.0036 | 0.0054 | 0.0072 | 0.0090 | 0.0127 |
| | | | | Feed (ipm) | 5.8 | 5.8 | 5.8 | 5.8 | 5.8 | 5.8 | 5.8 |
| | | ≤ 350 Bhn or ≤ 38 HRc | 80 | RPM | 9779 | 2445 | 1222 | 815 | 611 | 489 | 349 |
| | | | (64-96) | Fr | 0.0004 | 0.0016 | 0.0032 | 0.0048 | 0.0064 | 0.0080 | 0.0112 |
| | | | | Feed (ipm) | 3.9 | 3.9 | 3.9 | 3.9 | 3.9 | 3.9 | 3.9 |
| | | ≤ 440 Bhn or ≤ 47 HRc | 42 | RPM | 5134 | 1284 | 642 | 428 | 321 | 257 | 183 |
| | | | (34-50) | Fr | 0.0003 | 0.0012 | 0.0025 | 0.0037 | 0.0050 | 0.0062 | 0.0087 |
| | | | | Feed (ipm) | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 |
| N | **ALUMINUM ALLOYS 2017, 2024, 356, 6061, 7075** | ≤ 80 Bhn or ≤ 47 HRb | 635 | RPM | 77622 | 19406 | 9703 | 6469 | 4851 | 3881 | 2772 |
| | | | (508-762) | Fr | 0.0012 | 0.0049 | 0.0099 | 0.0148 | 0.0198 | 0.0247 | 0.0346 |
| | | | | Feed (ipm) | 96.0 | 96.0 | 96.0 | 96.0 | 96.0 | 96.0 | 96.0 |
| | | ≤ 150 Bhn or ≤ 7 HRc | 540 | RPM | 66010 | 16502 | 8251 | 5501 | 4126 | 3300 | 2357 |
| | | | (432-648) | Fr | 0.0012 | 0.0050 | 0.0099 | 0.0149 | 0.0199 | 0.0248 | 0.0348 |
| | | | | Feed (ipm) | 82.0 | 82.0 | 82.0 | 82.0 | 82.0 | 82.0 | 82.0 |
| | **COPPER ALLOYS Alum Bronze, C110, Muntz Brass** | ≤ 140 Bhn or ≤ 3 HRc | 450 | RPM | 55008 | 13752 | 6876 | 4584 | 3438 | 2750 | 1965 |
| | | | (360-540) | Fr | 0.0005 | 0.0020 | 0.0040 | 0.0060 | 0.0080 | 0.0100 | 0.0140 |
| | | | | Feed (ipm) | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 |
| | | ≤ 200 Bhn or ≤ 23 HRc | 360 | RPM | 44006 | 11002 | 5501 | 3667 | 2750 | 2200 | 1572 |
| | | | (288-432) | Fr | 0.0005 | 0.0020 | 0.0040 | 0.0060 | 0.0080 | 0.0100 | 0.0140 |
| | | | | Feed (ipm) | 22.0 | 22.0 | 22.0 | 22.0 | 22.0 | 22.0 | 22.0 |

**Note:**
- Bhn (Brinell) HRc (Rockwell C) HRb (Rockwell B)
- rpm = Vc x 3.82 / $D_1$
- ipm = Fr x rpm
- reduce speed and feed for materials harder than listed
- refer to the KYOCERA SGS Tool Wizard for complete technical information (www.kyocera-sgstool.com)

SGSTOOLWIZARD2.0
www.sgstoolwizard.com

| Series 135M 5D Metric | | Hardness | Vc (m/min) | | Diameter ($D_1$) (mm) 1.5 | 3 | 6 | 8 | 10 | 12 | 16 | 20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P | CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536 | ≤ 175 Bhn or ≤ 7 HRc | 105 | RPM | 22297 | 11148 | 5574 | 4181 | 3344 | 2787 | 2090 | 1672 |
| | | | (84-126) | Fr | 0.048 | 0.095 | 0.190 | 0.254 | 0.317 | 0.380 | 0.507 | 0.634 |
| | | | | Feed (mm/min) | 1060 | 1060 | 1060 | 1060 | 1060 | 1060 | 1060 | 1060 |
| | | ≤ 275 Bhn or ≤ 28 HRc | 94 | RPM | 20035 | 10017 | 5009 | 3756 | 3005 | 2504 | 1878 | 1503 |
| | | | (76-113) | Fr | 0.043 | 0.085 | 0.171 | 0.228 | 0.285 | 0.341 | 0.455 | 0.569 |
| | | | | Feed (mm/min) | 855 | 855 | 855 | 855 | 855 | 855 | 855 | 855 |
| | | ≤ 425 Bhn or ≤ 45 HRc | 55 | RPM | 11633 | 5816 | 2908 | 2181 | 1745 | 1454 | 1091 | 872 |
| | | | (44-66) | Fr | 0.036 | 0.071 | 0.143 | 0.190 | 0.238 | 0.285 | 0.381 | 0.476 |
| | | | | Feed (mm/min) | 415 | 415 | 415 | 415 | 415 | 415 | 415 | 415 |
| | ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100 | ≤ 275 Bhn or ≤ 28 HRc | 82 | RPM | 17449 | 8725 | 4362 | 3272 | 2617 | 2181 | 1636 | 1309 |
| | | | (66-99) | Fr | 0.036 | 0.072 | 0.143 | 0.191 | 0.239 | 0.287 | 0.382 | 0.478 |
| | | | | Feed (mm/min) | 625 | 625 | 625 | 625 | 625 | 625 | 625 | 625 |
| | | ≤ 375 Bhn or ≤ 40 HRc | 50 | RPM | 10664 | 5332 | 2666 | 1999 | 1600 | 1333 | 1000 | 800 |
| | | | (40-60) | Fr | 0.031 | 0.062 | 0.124 | 0.165 | 0.206 | 0.248 | 0.330 | 0.413 |
| | | | | Feed (mm/min) | 330 | 330 | 330 | 330 | 330 | 330 | 330 | 330 |
| | | ≤ 450 Bhn or ≤ 48 HRc | 35 | RPM | 7432 | 3716 | 1858 | 1394 | 1115 | 929 | 697 | 557 |
| | | | (28-42) | Fr | 0.022 | 0.043 | 0.086 | 0.115 | 0.144 | 0.172 | 0.230 | 0.287 |
| | | | | Feed (mm/min) | 160 | 160 | 160 | 160 | 160 | 160 | 160 | 160 |
| H | TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2 | ≤ 200 Bhn or ≤ 13 HRc | 37 | RPM | 7755 | 3878 | 1939 | 1454 | 1163 | 969 | 727 | 582 |
| | | | (29-44) | Fr | 0.031 | 0.062 | 0.124 | 0.165 | 0.206 | 0.248 | 0.330 | 0.413 |
| | | | | Feed (mm/min) | 240 | 240 | 240 | 240 | 240 | 240 | 240 | 240 |
| | | ≤ 375 Bhn or ≤ 40 HRc | 24 | RPM | 5170 | 2585 | 1293 | 969 | 776 | 646 | 485 | 388 |
| | | | (20-29) | Fr | 0.015 | 0.029 | 0.058 | 0.077 | 0.097 | 0.116 | 0.155 | 0.193 |
| | | | | Feed (mm/min) | 75 | 75 | 75 | 75 | 75 | 75 | 75 | 75 |
| | | ≤ 475 Bhn or ≤ 50 HRc | 21 | RPM | 4524 | 2262 | 1131 | 848 | 679 | 565 | 424 | 339 |
| | | | (17-26) | Fr | 0.010 | 0.020 | 0.040 | 0.053 | 0.066 | 0.080 | 0.106 | 0.133 |
| | | | | Feed (mm/min) | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 |
| K | CAST IRONS Gray, Malleable, Ductile | ≤ 220 Bhn or ≤ 19 HRc | 91 | RPM | 19388 | 9694 | 4847 | 3635 | 2908 | 2424 | 1818 | 1454 |
| | | | (73-110) | Fr | 0.054 | 0.108 | 0.217 | 0.289 | 0.361 | 0.433 | 0.578 | 0.722 |
| | | | | Feed (mm/min) | 1050 | 1050 | 1050 | 1050 | 1050 | 1050 | 1050 | 1050 |
| | | ≤ 260 Bhn or ≤ 26 HRc | 81 | RPM | 17126 | 8563 | 4282 | 3211 | 2569 | 2141 | 1606 | 1284 |
| | | | (65-97) | Fr | 0.055 | 0.109 | 0.218 | 0.291 | 0.364 | 0.437 | 0.582 | 0.728 |
| | | | | Feed (mm/min) | 935 | 935 | 935 | 935 | 935 | 935 | 935 | 935 |
| M | STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F, 440F | ≤ 185 Bhn or ≤ 9 HRc | 76 | RPM | 16157 | 8078 | 4039 | 3029 | 2424 | 2020 | 1515 | 1212 |
| | | | (61-91) | Fr | 0.031 | 0.061 | 0.123 | 0.163 | 0.204 | 0.245 | 0.327 | 0.408 |
| | | | | Feed (mm/min) | 495 | 495 | 495 | 495 | 495 | 495 | 495 | 495 |
| | | ≤ 275 Bhn or ≤ 28 HRc | 46 | RPM | 9694 | 4847 | 2424 | 1818 | 1454 | 1212 | 909 | 727 |
| | | | (37-55) | Fr | 0.024 | 0.047 | 0.095 | 0.127 | 0.158 | 0.190 | 0.253 | 0.316 |
| | | | | Feed (mm/min) | 230 | 230 | 230 | 230 | 230 | 230 | 230 | 230 |
| | STAINLESS STEELS (DIFFICULT) 304, 316, 321, 13-8 PH, 15-5PH, 17-4 PH, Custom 450 | ≤ 275 Bhn or ≤ 28 HRc | 24 | RPM | 5170 | 2585 | 1293 | 969 | 776 | 646 | 485 | 388 |
| | | | (20-29) | Fr | 0.023 | 0.046 | 0.093 | 0.124 | 0.155 | 0.186 | 0.248 | 0.309 |
| | | | | Feed (mm/min) | 120 | 120 | 120 | 120 | 120 | 120 | 120 | 120 |
| | | ≤ 375 Bhn or ≤ 40 HRc | 17 | RPM | 3555 | 1777 | 889 | 666 | 533 | 444 | 333 | 267 |
| | | | (13-20) | Fr | 0.021 | 0.042 | 0.084 | 0.113 | 0.141 | 0.169 | 0.225 | 0.281 |
| | | | | Feed (mm/min) | 75 | 75 | 75 | 75 | 75 | 75 | 75 | 75 |

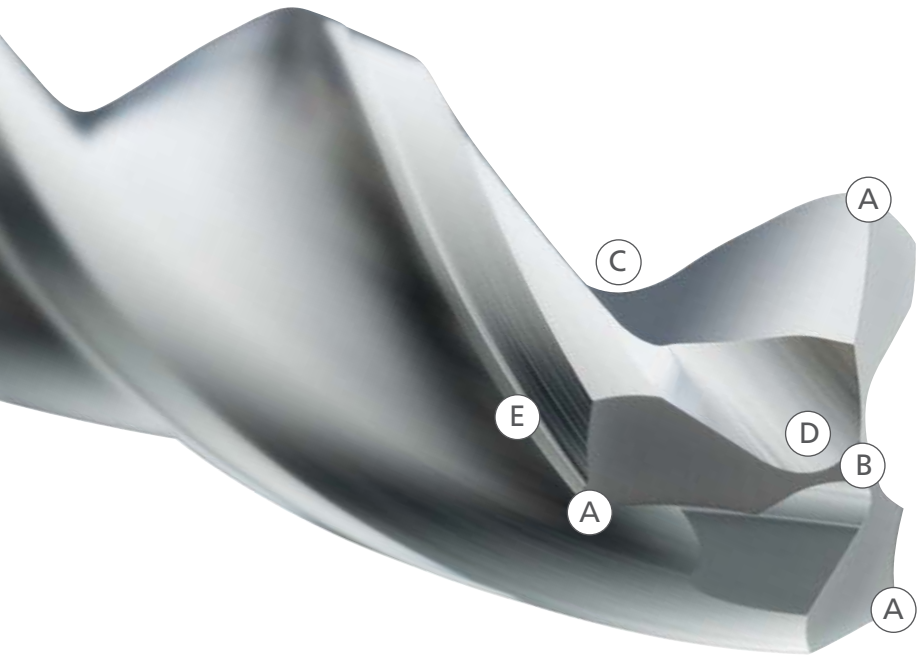
*continued on next page*

| | Series 135M 5D Metric | Hardness | Vc (m/min) | | Diameter ($D_1$) (mm) 1.5 | 3 | 6 | 8 | 10 | 12 | 16 | 20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S | **SUPER ALLOYS (Nickel , Cobalt, Iron Base) Inconel 601, 617, 625, Incoloy, Monel 400, Rene, Waspaloy** | ≤ 300 Bhn or ≤ 32 HRc | 12 | RPM | 2585 | 1293 | 646 | 485 | 388 | 323 | 242 | 194 |
| | | | (10-15) | Fr | 0.010 | 0.019 | 0.039 | 0.052 | 0.064 | 0.077 | 0.103 | 0.129 |
| | | | | Feed (mm/min) | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 |
| | | ≤ 400 Bhn or ≤ 43 HRc | 6 | RPM | 1293 | 646 | 323 | 242 | 194 | 162 | 121 | 97 |
| | | | (5-7) | Fr | 0.007 | 0.014 | 0.028 | 0.037 | 0.046 | 0.056 | 0.074 | 0.093 |
| | | | | Feed (mm/min) | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 |
| | **TITANIUM ALLOYS Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si, Ti-6Al4V** | ≤ 275 Bhn or ≤ 28 HRc | 32 | RPM | 6786 | 3393 | 1696 | 1272 | 1018 | 848 | 636 | 509 |
| | | | (26-38) | Fr | 0.021 | 0.043 | 0.085 | 0.114 | 0.142 | 0.171 | 0.228 | 0.285 |
| | | | | Feed (mm/min) | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 |
| | | ≤ 350 Bhn or ≤ 38 HRc | 24 | RPM | 5170 | 2585 | 1293 | 969 | 776 | 646 | 485 | 388 |
| | | | (20-29) | Fr | 0.019 | 0.039 | 0.077 | 0.103 | 0.129 | 0.155 | 0.206 | 0.258 |
| | | | | Feed (mm/min) | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| | | ≤ 440 Bhn or ≤ 47 HRc | 13 | RPM | 2714 | 1357 | 679 | 509 | 407 | 339 | 254 | 204 |
| | | | (10-15) | Fr | 0.015 | 0.029 | 0.059 | 0.079 | 0.098 | 0.118 | 0.157 | 0.196 |
| | | | | Feed (mm/min) | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 |
| N | **ALUMINUM ALLOYS 2017, 2024, 356, 6061, 7075** | ≤ 80 Bhn or ≤ 47 HRb | 194 | RPM | 41039 | 20519 | 10260 | 7695 | 6156 | 5130 | 3847 | 3078 |
| | | | (155-232) | Fr | 0.059 | 0.118 | 0.237 | 0.316 | 0.395 | 0.474 | 0.632 | 0.790 |
| | | | | Feed (mm/min) | 2430 | 2430 | 2430 | 2430 | 2430 | 2430 | 2430 | 2430 |
| | | ≤ 150 Bhn or ≤ 7 HRc | 165 | RPM | 34899 | 17449 | 8725 | 6544 | 5235 | 4362 | 3272 | 2617 |
| | | | (132-198) | Fr | 0.059 | 0.118 | 0.237 | 0.316 | 0.394 | 0.473 | 0.631 | 0.789 |
| | | | | Feed (mm/min) | 2065 | 2065 | 2065 | 2065 | 2065 | 2065 | 2065 | 2065 |
| | **Copper Alloys Alum Bronze, C110, Muntz Brass** | ≤ 140 Bhn or ≤ 3 HRc | 137 | RPM | 29082 | 14541 | 7271 | 5453 | 4362 | 3635 | 2726 | 2181 |
| | | | (110-165) | Fr | 0.027 | 0.053 | 0.107 | 0.142 | 0.178 | 0.213 | 0.284 | 0.355 |
| | | | | Feed (mm/min) | 775 | 775 | 775 | 775 | 775 | 775 | 775 | 775 |
| | | ≤ 200 Bhn or ≤ 23 HRc | 110 | RPM | 23266 | 11633 | 5816 | 4362 | 3490 | 2908 | 2181 | 1745 |
| | | | (88-132) | Fr | 0.027 | 0.054 | 0.108 | 0.144 | 0.181 | 0.217 | 0.289 | 0.361 |
| | | | | Feed (mm/min) | 630 | 630 | 630 | 630 | 630 | 630 | 630 | 630 |

**Note:**

- Bhn (Brinell) HRc (Rockwell C) HRb (Rockwell B)
- rpm = (1000 x m / min) / (3.14 x $D_1$)
- mm / min = (mm / revolution) x rpm
- reduce speed and feed for materials harder than listed
- refer to the KYOCERA SGS Tool Wizard for complete technical information (www.kyocera-sgstool.com)

SGSTOOLWIZARD2.0
www.sgstoolwizard.com




# SERIES 131N

HI-PERCARB®

## HIGH PERFORMANCE CARBIDE DRILLS

The key features designed into the Hi-PerCarb Series 131N Drill allow the product to offer application benefits not only beyond that of standard carbide drills, but also other High Performance drills. Each feature of the Hi-PerCarb Series 131N Drill was uniquely engineered as a solution towards addressing the issues commonly encountered during high production drilling.

**A** TRI-MARGIN DESIGN
- improved hole stability over two-flute designs
- superior surface finish, roundness and hole cylindricity
- unsurpassed hole size control

**B** SELF-STABILIZING POINT
- pyramid design stabilizes the drill on contact with the workpiece

**C** OPEN FLUTE STRUCTURE
- efficiently transports chips while maintaining strength at high feed rates

**D** SCULPTED GASH
- allows chips to easily flow away from the drill center
- reduced cutting forces over competitive three-flute designs

**E** MINIMAL MARGIN DESIGN
- reduces frictional heat generated by excessive margin contact with the workpiece
- parallel design maintains contact width as margin wears for performance consistency

**PERFORMANCE. PRECISION. PASSION.**

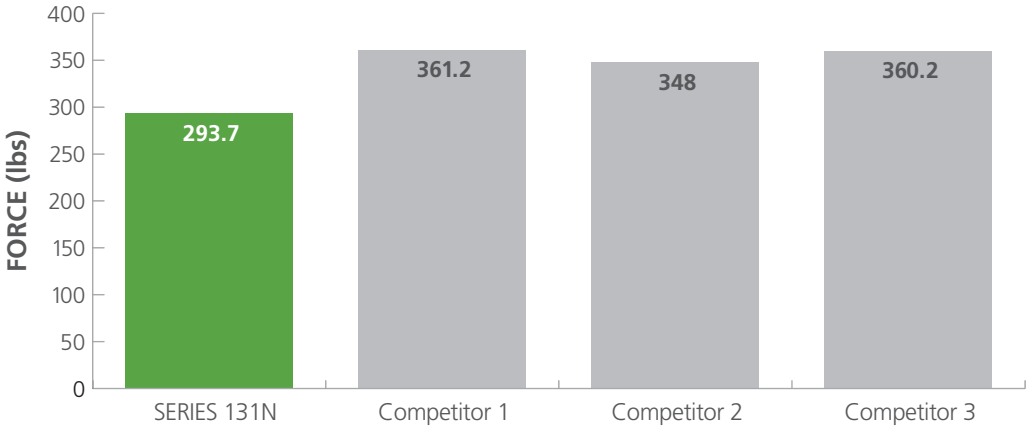
HI-PERCARB SERIES 131N ALUMINUM DRILLS

KYOCERA
SGS Precision Tools

# PERFORMANCE.

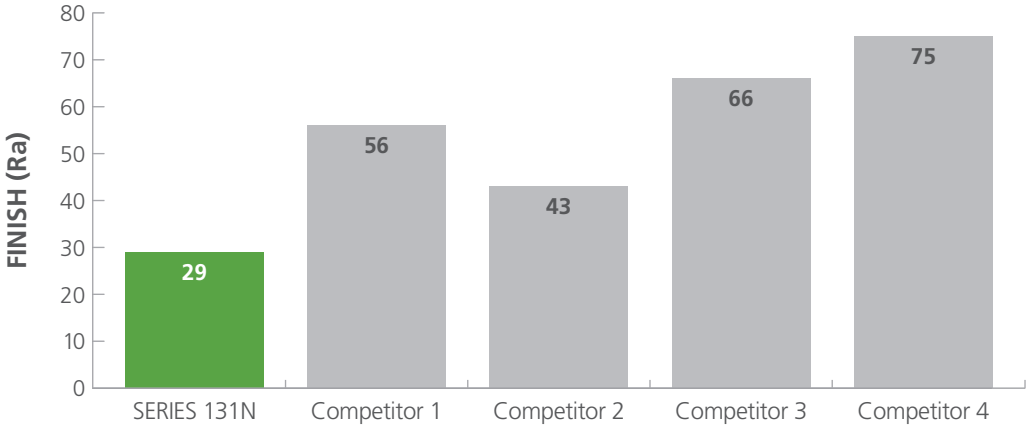
## FORCE COMPARISON

Series 131N drills with 15-20 percent less force than the top competitors



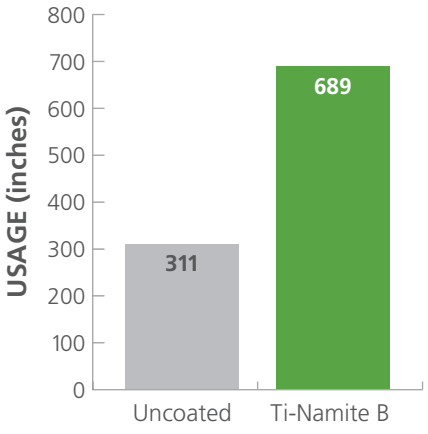

## SURFACE FINISH COMPARISON

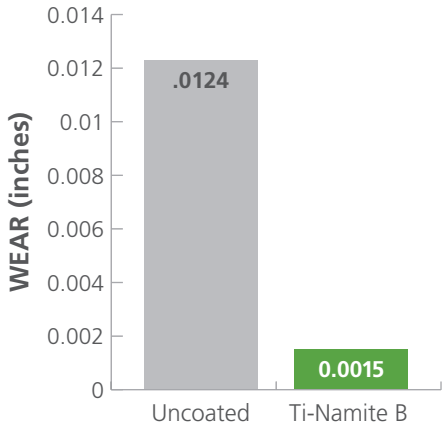
Series 131N results in improvement of hole finishes 30-60 percent over leading competitors




## USAGE & WEAR COMPARISONS

Ti-NAMITE B coating significantly improves wear resistance, which is particularly beneficial when drilling high silicon aluminum alloys

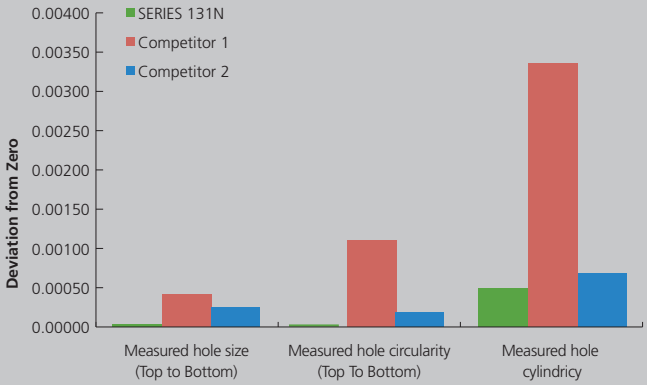


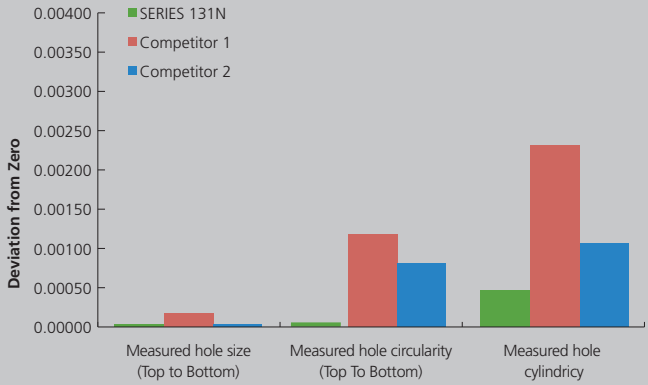
# PRECISION.

## SERIES 131N 3 Flute Drill vs. Competition 2 Flute Drill in 2024 Aluminum

### 4847 RPM
### 65 INCHES PER MINUTE




### 6786 RPM
### 100 INCHES PER MINUTE

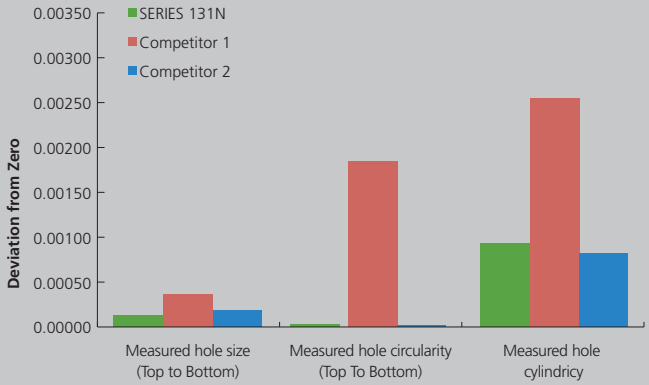



# PASSION.

Independent Lab Results Indicate the Hi-PerCarb Series 131N Drill outperforms the competition in measured hole quality at a variety of speed and feed rates.

KYOCERA
SGS Precision Tools

## 9530 RPM
## 200 INCHES PER MINUTE




# Ti-NAMITE-B

This ceramic based coating ensures a smooth surface and a low affinity to cold welding or edge build-up, which makes it optimal for aluminum and copper applications. It has high toughness and high hardness.

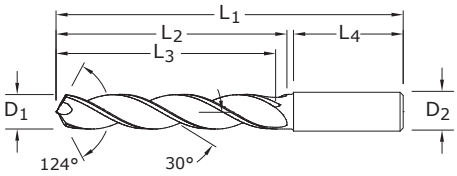
Microhardness: 4000 HV

Oxidation Temperature: 850°C / 1562°F

Coefficient of Friction: 0.45

Thickness: 1-2 Microns (based on tool diameter)

HI-PERCARB®
HIGH PERFORMANCE CARBIDE DRILLS




**TOLERANCES (inch)**

| DIAMETER | $D_1$ | $D_2$ |
|---|---|---|
| ≤.1181 | +.00008/+.00047 | h6 |
| >.1181–.2362 | +.00016/+.00063 | h6 |
| >.2362–.3937 | +.00024/+.00083 | h6 |
| >.3937–.7087 | +.00028/+.00098 | h6 |
| >.7087–1.1811 | +.00031/+.00114 | h6 |

**TOLERANCES (mm)**

| DIAMETER | $D_1$ | $D_2$ |
|---|---|---|
| ≤ 3 | +0,002/+0,012 | h6 |
| > 3 - 6 | +0,004/+0,016 | h6 |
| > 6 - 10 | +0,006/+0,021 | h6 |
| > 10 - 18 | +0,007/+0,025 | h6 |



| Cutting Diameter $D_1$ | Decimal Equivalent | Metric Equivalent | Tap Size Reference Only | Shank Diameter $D_2$ | Overall Length $L_1$ | Flute Length $L_2$ | Min. Cleared Length $L_3$ | Shank Length $L_4$ | Ti-NAMITE-B (TB) EDP No. |
|---|---|---|---|---|---|---|---|---|---|
| 3,0 mm | 0.1181 | | | 6,0 | 66,0 | 28,0 | 23,0 | 36,0 | 64800 |
| 3,1 mm | 0.1220 | | | 6,0 | 66,0 | 28,0 | 23,0 | 36,0 | 64801 |
| 1/8 | 0.1250 | 3.18 | | 6,0 | 66,0 | 28,0 | 23,0 | 36,0 | 54800 |
| 3,2 mm | 0.1260 | | M3,5 X 0,35 | 6,0 | 66,0 | 28,0 | 23,0 | 36,0 | 64802 |
| 3,3 mm | 0.1299 | | M4 X 0,7 | 6,0 | 66,0 | 28,0 | 23,0 | 36,0 | 64803 |
| 3,4 mm | 0.1339 | | | 6,0 | 66,0 | 28,0 | 23,0 | 36,0 | 64804 |
| #29 | 0.1360 | 3.45 | 8-32,8-36 | 6,0 | 66,0 | 28,0 | 23,0 | 36,0 | 54801 |
| 3,5 mm | 0.1378 | | M4 X 0,5 | 6,0 | 66,0 | 28,0 | 23,0 | 36,0 | 64805 |
| 9/64 | 0.1406 | 3.57 | | 6,0 | 66,0 | 28,0 | 23,0 | 36,0 | 54802 |
| 3,6 mm | 0.1417 | | M4 X 0,35 | 6,0 | 66,0 | 28,0 | 23,0 | 36,0 | 64806 |
| 3,7 mm | 0.1457 | | M4,5 X 0,75 | 6,0 | 66,0 | 28,0 | 23,0 | 36,0 | 64807 |
| 3,8 mm | 0.1496 | | 10-24 | 6,0 | 74,0 | 36,0 | 29,0 | 36,0 | 64808 |
| 3,9 mm | 0.1535 | | | 6,0 | 74,0 | 36,0 | 29,0 | 36,0 | 64809 |
| 5/32 | 0.1562 | 3.97 | | 6,0 | 74,0 | 36,0 | 29,0 | 36,0 | 54803 |
| 4,0 mm | 0.1575 | | M4,5 X 0,5 | 6,0 | 74,0 | 36,0 | 29,0 | 36,0 | 64810 |
| #21 | 0.1590 | 4.04 | 10-32 | 6,0 | 74,0 | 36,0 | 29,0 | 36,0 | 54804 |
| 4,1 mm | 0.1614 | | | 6,0 | 74,0 | 36,0 | 29,0 | 36,0 | 64811 |
| 4,2 mm | 0.1654 | | M5 / M5 x 0,75 | 6,0 | 74,0 | 36,0 | 29,0 | 36,0 | 64812 |
| 4,3 mm | 0.1693 | | | 6,0 | 74,0 | 36,0 | 29,0 | 36,0 | 64813 |
| 11/64 | 0.1719 | 4.37 | | 6,0 | 74,0 | 36,0 | 29,0 | 36,0 | 54805 |
| 4,4 mm | 0.1732 | | 12-24 | 6,0 | 74,0 | 36,0 | 29,0 | 36,0 | 64814 |
| 4,5 mm | 0.1772 | | M5 X 0,5 | 6,0 | 74,0 | 36,0 | 29,0 | 36,0 | 64815 |
| 4,6 mm | 0.1811 | | 12-28 | 6,0 | 74,0 | 36,0 | 29,0 | 36,0 | 64816 |
| 4,7 mm | 0.1850 | | 12-32 | 6,0 | 74,0 | 36,0 | 29,0 | 36,0 | 64817 |
| 3/16 | 0.1875 | 4.76 | | 6,0 | 82,0 | 44,0 | 35,0 | 36,0 | 54806 |
| 4,8 mm | 0.1890 | | 7/32-32 | 6,0 | 82,0 | 44,0 | 35,0 | 36,0 | 64818 |
| 4,9 mm | 0.1929 | | | 6,0 | 82,0 | 44,0 | 35,0 | 36,0 | 64819 |
| 5,0 mm | 0.1969 | | M6 X 1 | 6,0 | 82,0 | 44,0 | 35,0 | 36,0 | 64820 |
| 5,1 mm | 0.2008 | | 1/4-20 | 6,0 | 82,0 | 44,0 | 35,0 | 36,0 | 64821 |
| 13/64 | 0.2031 | 5.16 | | 6,0 | 82,0 | 44,0 | 35,0 | 36,0 | 54807 |
| 5,2 mm | 0.2047 | | M6 X 0,75 | 6,0 | 82,0 | 44,0 | 35,0 | 36,0 | 64822 |
| 5,3 mm | 0.2087 | | | 6,0 | 82,0 | 44,0 | 35,0 | 36,0 | 64823 |
| 5,4 mm | 0.2126 | | | 6,0 | 82,0 | 44,0 | 35,0 | 36,0 | 64824 |
| 5,5 mm | 0.2165 | | M6 X 0,5 | 6,0 | 82,0 | 44,0 | 35,0 | 36,0 | 64825 |
| 7/32 | 0.2188 | 5.56 | 1/4-32 | 6,0 | 82,0 | 44,0 | 35,0 | 36,0 | 54808 |
| 5,6 mm | 0.2205 | | | 6,0 | 82,0 | 44,0 | 35,0 | 36,0 | 64826 |
| 5,7 mm | 0.2244 | | | 6,0 | 82,0 | 44,0 | 35,0 | 36,0 | 64827 |
| 5,8 mm | 0.2283 | | | 6,0 | 82,0 | 44,0 | 35,0 | 36,0 | 64828 |
| 5,9 mm | 0.2323 | | | 6,0 | 82,0 | 44,0 | 35,0 | 36,0 | 64829 |
| 15/64 | 0.2344 | 5.95 | | 6,0 | 82,0 | 44,0 | 35,0 | 36,0 | 54809 |


Common

5xD
Reach


Right Spiral


External Coolant

Flutes

*(continued on next page)*

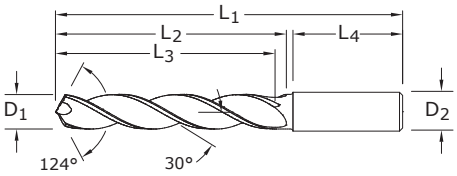
HI-PERCARB®
HIGH PERFORMANCE CARBIDE DRILLS

**TOLERANCES (inch)**

| DIAMETER | $D_1$ | $D_2$ |
|---|---|---|
| ≤.1181 | +.00008/+.00047 | h6 |
| >.1181–.2362 | +.00016/+.00063 | h6 |
| >.2362–.3937 | +.00024/+.00083 | h6 |
| >.3937–.7087 | +.00028/+.00098 | h6 |
| >.7087–1.1811 | +.00031/+.00114 | h6 |

**TOLERANCES (mm)**

| DIAMETER | $D_1$ | $D_2$ |
|---|---|---|
| ≤ 3 | +0,002/+0,012 | h6 |
| > 3 - 6 | +0,004/+0,016 | h6 |
| > 6 - 10 | +0,006/+0,021 | h6 |
| > 10 - 18 | +0,007/+0,025 | h6 |




Common

5xD
Reach

Right Spiral

External Coolant

3
Flutes

| Cutting Diameter $D_1$ | Decimal Equivalent | Metric Equivalent | Tap Size Reference Only | Shank Diameter $D_2$ | Overall Length $L_1$ | Flute Length $L_2$ | Min. Cleared Length $L_3$ | Shank Length $L_4$ | Ti-NAMITE-B (TB) EDP No. |
|---|---|---|---|---|---|---|---|---|---|
| 6,0 mm | 0.2362 | | M7 X 1 | 6,0 | 82,0 | 44,0 | 35,0 | 36,0 | 64830 |
| 6,1 mm | 0.2402 | | | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 64831 |
| 6,2 mm | 0.2441 | | M7 X 0,75 | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 64832 |
| 6,3 mm | 0.2480 | | | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 64833 |
| 1/4 | 0.2500 | 6.35 | | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 54810 |
| 6,4 mm | 0.2520 | | | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 64834 |
| 6,5 mm | 0.2559 | | | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 64835 |
| F | 0.2570 | 6.53 | 5/16-18 | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 54811 |
| 6,6 mm | 0.2598 | | | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 64836 |
| 6,7 mm | 0.2638 | | | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 64837 |
| 17/64 | 0.2656 | 6.75 | 5/16-20 | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 54812 |
| 6,8 mm | 0.2677 | | M8 X 1,25 | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 64838 |
| 6,9 mm | 0.2717 | | 5/16-24 | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 64839 |
| 7,0 mm | 0.2756 | | M8 X 1 | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 64840 |
| 7,1 mm | 0.2795 | | | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 64841 |
| 9/32 | 0.2812 | 7.14 | 5/16-32 | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 54813 |
| 7,2 mm | 0.2835 | | M8 X 0,75 | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 64842 |
| 7,3 mm | 0.2874 | | | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 64843 |
| 7,4 mm | 0.2913 | | | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 64844 |
| 7,5 mm | 0.2953 | | M8 X 0,5 | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 64845 |
| 19/64 | 0.2969 | 7.54 | | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 54814 |
| 7,6 mm | 0.2992 | | | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 64846 |
| 7,7 mm | 0.3031 | | | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 64847 |
| 7,8 mm | 0.3071 | | M9 X 1,25 | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 64848 |
| 7,9 mm | 0.3110 | | | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 64849 |
| 5/16 | 0.3125 | 7.94 | 3/8-16 | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 54815 |
| 8,0 mm | 0.3150 | | M9 X 1 | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 64850 |
| 8,1 mm | 0.3189 | | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 64851 |
| 8,2 mm | 0.3228 | | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 64852 |
| 8,3 mm | 0.3268 | | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 64853 |
| 21/64 | 0.3281 | 8.33 | 3/8-20 | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 54816 |
| 8,4 mm | 0.3307 | | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 64854 |
| Q | 0.3320 | 8.43 | 3/8-24 | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 54817 |
| 8,5 mm | 0.3346 | | M10 X 1,5 | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 64855 |
| 8,6 mm | 0.3386 | | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 64856 |
| 8,7 mm | 0.3425 | | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 64857 |
| 11/32 | 0.3438 | 8.73 | 3/8-32 | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 54818 |
| 8,8 mm | 0.3465 | | M10 X 1,25 | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 64858 |
| 8,9 mm | 0.3504 | | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 64859 |
| 9,0 mm | 0.3543 | | M10 X 1 | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 64860 |

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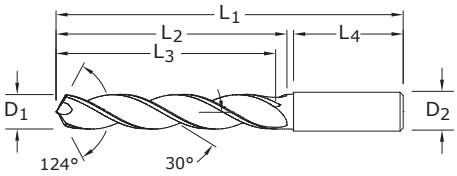
HI-PERCARB®
HIGH PERFORMANCE CARBIDE DRILLS




**TOLERANCES (inch)**

| DIAMETER | $D_1$ | $D_2$ |
|---|---|---|
| ≤.1181 | +.00008/+.00047 | h6 |
| >.1181–.2362 | +.00016/+.00063 | h6 |
| >.2362–.3937 | +.00024/+.00083 | h6 |
| >.3937–.7087 | +.00028/+.00098 | h6 |
| >.7087–1.1811 | +.00031/+.00114 | h6 |

**TOLERANCES (mm)**

| DIAMETER | $D_1$ | $D_2$ |
|---|---|---|
| ≤ 3 | +0,002/+0,012 | h6 |
| > 3 - 6 | +0,004/+0,016 | h6 |
| > 6 - 10 | +0,006/+0,021 | h6 |
| > 10 - 18 | +0,007/+0,025 | h6 |

| Cutting Diameter $D_1$ | Decimal Equivalent | Metric Equivalent | Tap Size Reference Only | Shank Diameter $D_2$ | Overall Length $L_1$ | Flute Length $L_2$ | Min. Cleared Length $L_3$ | Shank Length $L_4$ | Ti-NAMITE-B (TB) EDP No. |
|---|---|---|---|---|---|---|---|---|---|
| 9,1 mm | 0.3583 | | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 64861 |
| 23/64 | 0.3594 | 9.13 | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 54819 |
| 9,2 mm | 0.3622 | | M10 X 0,75 | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 64862 |
| 9,3 mm | 0.3661 | | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 64863 |
| U | 0.3680 | 9.35 | 7/16-14 | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 54820 |
| 9,4 mm | 0.3701 | | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 64864 |
| 9,5 mm | 0.3740 | | M11 / M10 X 0,5 | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 64865 |
| 3/8 | 0.3750 | 9.53 | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 54821 |
| 9,6 mm | 0.3780 | | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 64866 |
| 9,7 mm | 0.3819 | | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 64867 |
| 9,8 mm | 0.3858 | | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 64868 |
| 9,9 mm | 0.3898 | | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 64869 |
| 25/64 | 0.3906 | 9.92 | 7/16-20 | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 54822 |
| 10,0 mm | 0.3937 | | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 64870 |
| 10,1 mm | 0.3976 | | | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 64871 |
| 10,2 mm | 0.4016 | | M12 X 1,75 | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 64872 |
| 10,3 mm | 0.4055 | | | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 64873 |
| 13/32 | 0.4062 | 10.32 | | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 54823 |
| 10,4 mm | 0.4094 | | | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 64874 |
| 10,5 mm | 0.4134 | | M12 X 1,5 | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 64875 |
| 10,6 mm | 0.4173 | | | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 64876 |
| 10,7 mm | 0.4213 | | | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 64877 |
| 27/64 | 0.4219 | 10.72 | 1/2-13 | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 54824 |
| 10,8 mm | 0.4252 | | M12 X 1,25 | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 64878 |
| 10,9 mm | 0.4291 | | | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 64879 |
| 11,0 mm | 0.4331 | | M12 X 1 | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 64880 |
| 11,1 mm | 0.4370 | | | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 64881 |
| 7/16 | 0.4375 | 11.11 | 1/4-18NPT | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 54825 |
| 11,2 mm | 0.4409 | | | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 64882 |
| 11,3 mm | 0.4449 | | | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 64883 |
| 11,4 mm | 0.4488 | | | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 64884 |
| 11,5 mm | 0.4528 | | M12 X 0,5 | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 64885 |
| 11,6 mm | 0.4567 | | | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 64886 |
| 11,7 mm | 0.4606 | | | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 64887 |
| 11,8 mm | 0.4646 | | | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 64888 |
| 11,9 mm | 0.4685 | | | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 64889 |
| 15/32 | 0.4688 | 11.91 | 1/2-28 | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 54826 |
| 12,0 mm | 0.4724 | | M14 X 2 | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 64890 |
| 31/64 | 0.4844 | 12.30 | 9/16-12 | 14,0 | 124,0 | 77,0 | 60,0 | 45,0 | 54827 |
| 12,5 mm | 0.4921 | | M14 X 1,5 | 14,0 | 124,0 | 77,0 | 60,0 | 45,0 | 64891 |

*(continued on next page)*

Common
5xD Reach
Right Spiral
External Coolant
3 Flutes

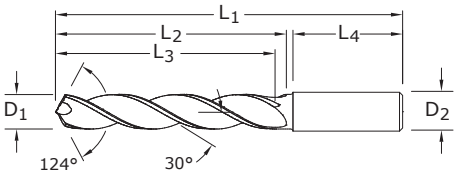
HI-PERCARB®
HIGH PERFORMANCE CARBIDE DRILLS

**TOLERANCES (inch)**

| DIAMETER | $D_1$ | $D_2$ |
|---|---|---|
| ≤.1181 | +.00008/+.00047 | h6 |
| >.1181–.2362 | +.00016/+.00063 | h6 |
| >.2362–.3937 | +.00024/+.00083 | h6 |
| >.3937–.7087 | +.00028/+.00098 | h6 |
| >.7087–1.1811 | +.00031/+.00114 | h6 |

**TOLERANCES (mm)**

| DIAMETER | $D_1$ | $D_2$ |
|---|---|---|
| ≤ 3 | +0,002/+0,012 | h6 |
| > 3 - 6 | +0,004/+0,016 | h6 |
| > 6 - 10 | +0,006/+0,021 | h6 |
| > 10 - 18 | +0,007/+0,025 | h6 |




Common

5xD
Reach

Right Spiral

External Coolant

3
Flutes

| Cutting Diameter $D_1$ | Decimal Equivalent | Metric Equivalent | Tap Size Reference Only | Shank Diameter $D_2$ | Overall Length $L_1$ | Flute Length $L_2$ | Min. Cleared Length $L_3$ | Shank Length $L_4$ | Ti-NAMITE-B (TB) EDP No. |
|---|---|---|---|---|---|---|---|---|---|
| 1/2 | 0.5000 | 12.70 | | 14,0 | 124,0 | 77,0 | 60,0 | 45,0 | 54828 |
| 12,8 mm | 0.5039 | | M14 X 1,25 | 14,0 | 124,0 | 77,0 | 60,0 | 45,0 | 64892 |
| 13,0 mm | 0.5118 | | M14 X 1 | 14,0 | 124,0 | 77,0 | 60,0 | 45,0 | 64893 |
| 33/64 | 0.5156 | 13.10 | 9/16-18 | 14,0 | 124,0 | 77,0 | 60,0 | 45,0 | 54829 |
| 13,5 mm | 0.5315 | | 5/8-11 | 14,0 | 124,0 | 77,0 | 60,0 | 45,0 | 64894 |
| 13,8 mm | 0.5433 | | | 14,0 | 124,0 | 77,0 | 60,0 | 45,0 | 64895 |
| 14,0 mm | 0.5512 | | M16 X 2 | 14,0 | 124,0 | 77,0 | 60,0 | 45,0 | 64896 |
| 9/16 | 0.5625 | 14.29 | | 16,0 | 133,0 | 83,0 | 63,0 | 48,0 | 54830 |
| 14,5 mm | 0.5709 | | M16 X 1,5 | 16,0 | 133,0 | 83,0 | 63,0 | 48,0 | 64897 |
| 37/64 | 0.5781 | 14.68 | 5/8-18 | 16,0 | 133,0 | 83,0 | 63,0 | 48,0 | 54831 |
| 14,8 mm | 0.5827 | | | 16,0 | 133,0 | 83,0 | 63,0 | 48,0 | 64898 |
| 15,0 mm | 0.5906 | | M16 X 1 | 16,0 | 133,0 | 83,0 | 63,0 | 48,0 | 64899 |
| 15,5 mm | 0.6102 | | M18 X 2,5 | 16,0 | 133,0 | 83,0 | 63,0 | 48,0 | 64900 |
| 15,8 mm | 0.6220 | | | 16,0 | 133,0 | 83,0 | 63,0 | 48,0 | 64901 |
| 5/8 | 0.6250 | 15.88 | 11/16-16 | 16,0 | 133,0 | 83,0 | 63,0 | 48,0 | 54832 |
| 16,0 mm | 0.6299 | | | 16,0 | 133,0 | 83,0 | 63,0 | 48,0 | 64902 |
| 21/32 | 0.6562 | 16.67 | 3/4-10 | 18,0 | 143,0 | 93,0 | 71,0 | 48,0 | 54833 |
| 11/16 | 0.6875 | 17.46 | 3/4-16 | 18,0 | 143,0 | 93,0 | 71,0 | 48,0 | 54834 |
| 3/4 | 0.7500 | 19.05 | 13/16-16 | 20,0 | 153,0 | 101,0 | 77,0 | 50,0 | 54835 |

| | Series 131N 5D Fractional | Hardness | Vc (sfm) | | Diameter ($D_1$) (inch) 1/8 | 3/16 | 1/4 | 3/8 | 1/2 | 5/8 | 3/4 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| N | **ALUMINUM ALLOYS < 12% SI 6061, 2024, 7075** | ≤ 150 Bhn or ≤ 7 HRc | 800 | RPM | 24448 | 16299 | 12224 | 8149 | 6112 | 4890 | 4075 |
| | | | (640-960) | Fr | 0.0055 | 0.0083 | 0.0110 | 0.0166 | 0.0221 | 0.0276 | 0.0331 |
| | | | | Feed (ipm) | 135 | 135 | 135 | 135 | 135 | 135 | 135 |
| | **ALUMINUM ALLOYS > 12% SI A356.0, 390.0, 319.0** | ≤ 125 Bhn or ≤ 77 HRb | 600 | RPM | 18336 | 12224 | 9168 | 6112 | 4584 | 3667 | 3056 |
| | | | (480-720) | Fr | 0.0055 | 0.0082 | 0.0109 | 0.0164 | 0.0218 | 0.0273 | 0.0327 |
| | | | | Feed (ipm) | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| | **COPPER ALLOYS Alum Bronze, Muntz Brass, Navel Brass** | ≤ 175 Bhn or ≤ 16 HRc | 550 | RPM | 16808 | 11205 | 8404 | 5603 | 4202 | 3362 | 2801 |
| | | | (440-660) | Fr | 0.0020 | 0.0030 | 0.0040 | 0.0061 | 0.0081 | 0.0101 | 0.0121 |
| | | | | Feed (ipm) | 34 | 34 | 34 | 34 | 34 | 34 | 34 |
| | **PLASTICS Acrylic, PVC, Polypropylene** | | 450 | RPM | 13752 | 9168 | 6876 | 4584 | 3438 | 2750 | 2292 |
| | | | (360-540) | Fr | 0.0025 | 0.0037 | 0.0049 | 0.0074 | 0.0099 | 0.0124 | 0.0148 |
| | | | | Feed (ipm) | 34 | 34 | 34 | 34 | 34 | 34 | 34 |

**Note:**
- Bhn (Brinell) HRc (Rockwell C) HRb (Rockwell B)
- rpm = Vc x 3.82 / $D_1$
- ipm = Fr x rpm
- reduce speed and feed for materials harder than listed
- refer to the KYOCERA SGS Tool Wizard for complete technical information (www.kyocera-sgstool.com)

SGSTOOLWIZARD2.0
www.sgstoolwizard.com

| | Series 131N 5D Metric | Hardness | Vc (m/min) | | Diameter ($D_1$) (mm) 3 | 6 | 8 | 10 | 12 | 14 | 16 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| N | **ALUMINUM ALLOYS < 12% SI 6061, 2024, 7075** | ≤ 150 Bhn or ≤ 7 HRc | 244 | RPM | 25851 | 12926 | 9694 | 7755 | 6463 | 5540 | 4847 |
| | | | (195-293) | Fr | 0.133 | 0.265 | 0.354 | 0.442 | 0.531 | 0.619 | 0.708 |
| | | | | Feed (mm/min) | 3430 | 3430 | 3430 | 3430 | 3430 | 3430 | 3430 |
| | **ALUMINUM ALLOYS > 12% SI A356.0, 390.0, 319.0** | ≤ 125 Bhn or ≤ 77 HRb | 183 | RPM | 19388 | 9694 | 7271 | 5816 | 4847 | 4155 | 3635 |
| | | | (146-219) | Fr | 0.131 | 0.262 | 0.349 | 0.437 | 0.524 | 0.611 | 0.699 |
| | | | | Feed (mm/min) | 2540 | 2540 | 2540 | 2540 | 2540 | 2540 | 2540 |
| | **COPPER ALLOYS Alum Bronze, Muntz Brass, Navel Brass** | ≤ 175 Bhn or ≤ 16 HRc | 168 | RPM | 17773 | 8886 | 6665 | 5332 | 4443 | 3808 | 3332 |
| | | | (134-201) | Fr | 0.049 | 0.097 | 0.130 | 0.162 | 0.194 | 0.227 | 0.259 |
| | | | | Feed (mm/min) | 864 | 864 | 864 | 864 | 864 | 864 | 864 |
| | **PLASTICS Acrylic, PVC, Polypropylene** | | 137 | RPM | 14541 | 7271 | 5453 | 4362 | 3635 | 3116 | 2726 |
| | | | (110-165) | Fr | 0.059 | 0.119 | 0.158 | 0.198 | 0.238 | 0.277 | 0.317 |
| | | | | Feed (mm/min) | 864 | 864 | 864 | 864 | 864 | 864 | 864 |

**Note:**
- Bhn (Brinell) HRc (Rockwell C) HRb (Rockwell B)
- rpm = (Vc x 1000) / ($D_1$ x 3.14)
- mm/min = Fr x rpm
- reduce speed and feed for materials harder than listed
- refer to the KYOCERA SGS Tool Wizard for complete technical information (www.kyocera-sgstool.com)

SGSTOOLWIZARD2.0
www.sgstoolwizard.com


ICe-Carb

## High Performance Internal Coolant Drills

The design of the ICe-Carb Series 140 was created to bring to the end user the ability to achieve high performance results with high production demands. The internal coolant design allows for better control of machining temperatures during these types of applications, while the geometry features provide effective and efficient chip creation and removal. The results of the ICe-Carb Series 140 design are reduced cutting loads, increased operating parameters and enhanced tool life.

### (A) COOLANT THROUGH DESIGN

- promotes controlled and consistent operating temperatures
- improves coolant flow to the cut while maintaining strength
- increases tool life at increased operating parameters

### (B) HIGH PERFORMANCE FLUTE DESIGN

- optimized open fluting
- improved surface finish through effective chip evacuation

### (C) POLISHED Ti-NAMITE A COATING

- reduces friction between the chip and tool preventing the impediment of chip flow
- decreased machine loads associated with chip clogging
- reduced friction reduces heat and abrasion wear

### (D) HIGH PENETRATION 140° POINT GEOMETRY

- split point geometry for improved drill penetration and accuracy
- cam relief drill point
- self centering design with high penetration capabilities

### (E) ENGINEERED CUTTING EDGES

- precisely ground with a curvature that allows efficient chip creation and control
- controlled edge honing for longevity
- negative corner position strengthens and protects

**PERFORMANCE. PRECISION. PASSION.**

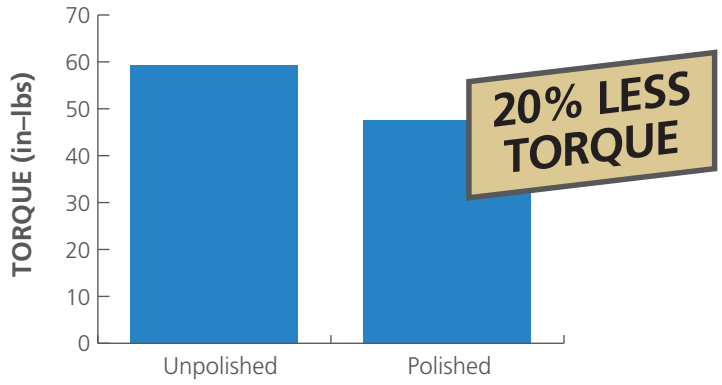
ICe-CARB SERIES 140 INTERNAL COOLANT DRILLS

KYOCERA
SGS Precision Tools

# PERFORMANCE.

The cutting edges of the ICe-Carb Series 140 are designed to allow the tool to achieve high penetration rates, while the highly polished Ti-NAMITE A tool coating allows the chips to move smoothly along the flute and out of the cut. This helps to avoid chip clogging often associated with elevated penetration rates. Through efficient chip creation and movement, the drill operates at lower loads under identical conditions.

**TORQUE COMPARISON**
8620 Carbon Steel @ 175 BHN
3/8" Diameter 1.125" Deep
350 sfm / 29 ipm



# PRECISION.

The more efficient a drill can function, the more precise the results it can produce. The symmetrical grind of the cam relieved point ensures balanced pressure during cutting, while the split point design ensures fast and accurate engagement into the material. Precision must be maintained throughout the life of the drill, so the ICe-Carb Series 140 specialized hone, strong margin design and negative corner position help to delay the wear that often causes a drill to lose precision in the cut and prematurely end tool life.

**ICe-CARB SERIES 140 VS. 2 COMPETITORS**

| | |
|---|---|
| DRILL SIZE | 3/8" (.3750) |
| DEPTH OF HOLE | 1.875" |
| MATERIAL | 316 STAINLESS STEEL @ 140 BHN |
| SPEED | 1430 RPM (140 sfm) |
| FEED | 8.5 IPM (.0059 ipr) |
| COOLANT | 8% WATER SOLUBLE @ 700 psi |
| MACHINE | HAAS VF-3 VMC |
| TYPE OF HOLE | BLIND |

# PASSION.

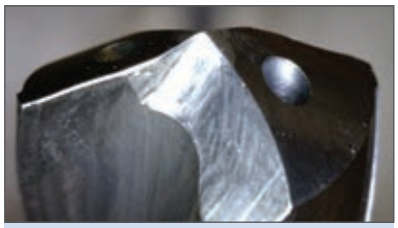
Controlling temperatures during the cutting process certainly helps to improve the operating parameters and tool life a tool is capable of achieving. All of the high performance features of the ICe-Carb Series 140 are engineered to work together to create the most efficient total cutting performance beyond what simply having coolant through the tool can offer. The flute profile compliments the coolant through design of the ICe-Carb Series 140 to create a strong cutting tool that effectively transports the chips being created, while the cutting edges offer a balance of strength and shear.

**ACTUAL CUSTOMER TEST IN 17-4 PH STAINLESS STEEL @ 36 HRc**
**ICe-CARB SERIES 140 8xD VS. COMPETITOR 1**

| | |
|---|---|
| SPEED (RPM) | 1600 |
| FEED (IPM) | 9.6 |
| HOLE DIAMETER | 9.1mm (.3583) |
| HOLE DEPTH | 3.3" |
| COOLANT PRESSURE | 60 psi (BELOW RECOMMENDATIONS) |
| TYPE OF COOLANT | WATER SOLUBLE |
| TYPE OF MACHINE | CNC LATHE – LIVE PART |

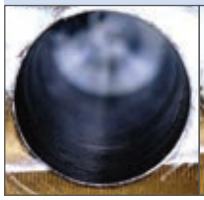
## CONDITION OF DRILLS AFTER 175 HOLES

### ICe-CARB SERIES 140



No damage found, good condition to continue using; .375" Ø throughout depth with good finish

FIRST HOLE



LAST HOLE

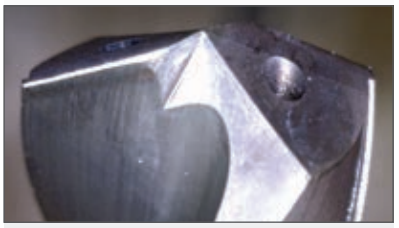
### COMPETITOR 1

Point severely chipped with wear on margins; Coating loss below cutting lips; .375" Ø held but surface finish deteriorating

FIRST HOLE

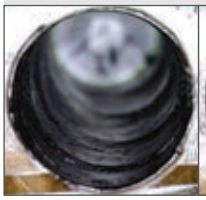
LAST HOLE

### COMPETITOR 2

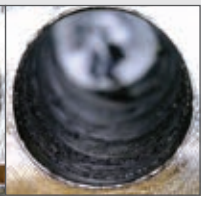


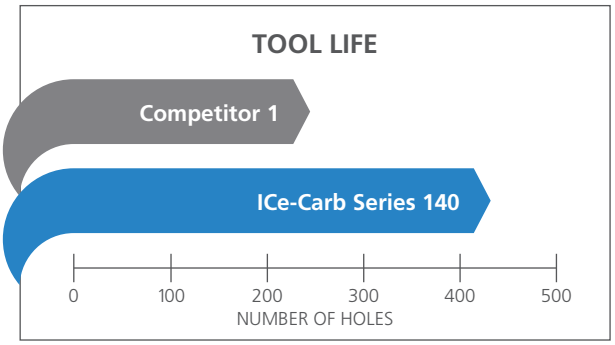
Better condition than Competitor 1 but unacceptable holes; Holes out of round, oversized to .385" Ø and tapered to .392" Ø with heavy swirl marks

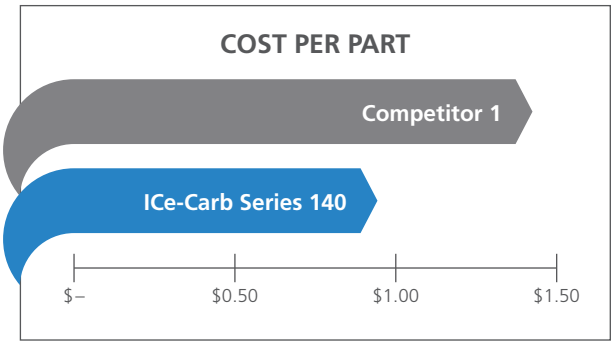
FIRST HOLE



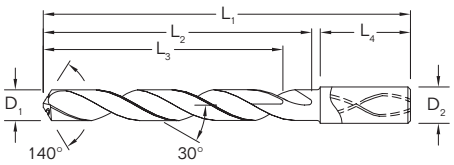
LAST HOLE





IC-Carb
High Performance Internal Coolant Drills




**TOLERANCES (inch)**

| DIAMETER | $D_1$ | $D_2$ |
|---|---|---|
| ≤.1181 | +.00008/+.00047 | h6 |
| >.1181–.2362 | +.00016/+.00063 | h6 |
| >.2362–.3937 | +.00024/+.00083 | h6 |
| >.3937–.7087 | +.00028/+.00098 | h6 |
| >.7087–1.1811 | +.00031/+.00114 | h6 |

**TOLERANCES (mm)**

| DIAMETER | $D_1$ | $D_2$ |
|---|---|---|
| ≤ 3 | +0,002/+0,012 | h6 |
| > 3 - 6 | +0,004/+0,016 | h6 |
| > 6 - 10 | +0,006/+0,021 | h6 |
| > 10 - 18 | +0,007/+0,025 | h6 |

| Cutting Diameter $D_1$ | Decimal Equivalent | Metric Equivalent | Tap Size Reference Only | Shank Diameter $D_2$ | Overall Length $L_1$ | Flute Length $L_2$ | Min. Cleared Length $L_3$ | Shank Length $L_4$ | Ti-NAMITE-A (AlTiN) EDP No. |
|---|---|---|---|---|---|---|---|---|---|
| 3,0 mm | 0.1181 | | | 6,0 | 66,0 | 28,0 | 23,0 | 36,0 | 63901 |
| 3,1 mm | 0.1220 | | | 6,0 | 66,0 | 28,0 | 23,0 | 36,0 | 63902 |
| 1/8 | 0.1250 | 3.18 | | 6,0 | 66,0 | 28,0 | 23,0 | 36,0 | 51901 |
| 3,2 mm | 0.1260 | | M3,5 X 0,35 | 6,0 | 66,0 | 28,0 | 23,0 | 36,0 | 63903 |
| 3,3 mm | 0.1299 | | M4 X 0,7 | 6,0 | 66,0 | 28,0 | 23,0 | 36,0 | 63904 |
| 3,4 mm | 0.1339 | | | 6,0 | 66,0 | 28,0 | 23,0 | 36,0 | 63905 |
| #29 | 0.1360 | 3.45 | 8-32,8-36 | 6,0 | 66,0 | 28,0 | 23,0 | 36,0 | 51902 |
| 3,5 mm | 0.1378 | | M4 X 0,5 | 6,0 | 66,0 | 28,0 | 23,0 | 36,0 | 63906 |
| 9/64 | 0.1406 | 3.57 | | 6,0 | 66,0 | 28,0 | 23,0 | 36,0 | 51903 |
| 3,6 mm | 0.1417 | | M4 X 0,35 | 6,0 | 66,0 | 28,0 | 23,0 | 36,0 | 63907 |
| 3,7 mm | 0.1457 | | M4,5 X 0,75 | 6,0 | 66,0 | 28,0 | 23,0 | 36,0 | 63908 |
| 3,8 mm | 0.1496 | | 10-24 | 6,0 | 74,0 | 36,0 | 29,0 | 36,0 | 51904 |
| 3,9 mm | 0.1535 | | | 6,0 | 74,0 | 36,0 | 29,0 | 36,0 | 63909 |
| 5/32 | 0.1562 | 3.97 | | 6,0 | 74,0 | 36,0 | 29,0 | 36,0 | 51905 |
| 4,0 mm | 0.1575 | | M4,5 X 0,5 | 6,0 | 74,0 | 36,0 | 29,0 | 36,0 | 63910 |
| #21 | 0.1590 | 4.04 | 10-32 | 6,0 | 74,0 | 36,0 | 29,0 | 36,0 | 51906 |
| 4,1 mm | 0.1614 | | | 6,0 | 74,0 | 36,0 | 29,0 | 36,0 | 63911 |
| 4,2 mm | 0.1654 | | M5 / M5 x 0,75 | 6,0 | 74,0 | 36,0 | 29,0 | 36,0 | 63912 |
| 4,3 mm | 0.1693 | | | 6,0 | 74,0 | 36,0 | 29,0 | 36,0 | 63913 |
| 11/64 | 0.1719 | 4.37 | | 6,0 | 74,0 | 36,0 | 29,0 | 36,0 | 51907 |
| 4,4 mm | 0.1732 | | 12-24 | 6,0 | 74,0 | 36,0 | 29,0 | 36,0 | 63914 |
| 4,5 mm | 0.1772 | | M5 X 0,5 | 6,0 | 74,0 | 36,0 | 29,0 | 36,0 | 63915 |
| 4,6 mm | 0.1811 | | 12-28 | 6,0 | 74,0 | 36,0 | 29,0 | 36,0 | 63916 |
| 4,7 mm | 0.1850 | | 12-32 | 6,0 | 74,0 | 36,0 | 29,0 | 36,0 | 63917 |
| 3/16 | 0.1875 | 4.76 | | 6,0 | 82,0 | 44,0 | 35,0 | 36,0 | 51908 |
| 4,8 mm | 0.1890 | | 7/32-32 | 6,0 | 82,0 | 44,0 | 35,0 | 36,0 | 63918 |
| 4,9 mm | 0.1929 | | | 6,0 | 82,0 | 44,0 | 35,0 | 36,0 | 63919 |
| 5,0 mm | 0.1969 | | M6 X 1 | 6,0 | 82,0 | 44,0 | 35,0 | 36,0 | 63920 |
| 5,1 mm | 0.2008 | | 1/4-20 | 6,0 | 82,0 | 44,0 | 35,0 | 36,0 | 63900 |
| 13/64 | 0.2031 | 5.16 | | 6,0 | 82,0 | 44,0 | 35,0 | 36,0 | 51910 |
| 5,2 mm | 0.2047 | | M6 X 0,75 | 6,0 | 82,0 | 44,0 | 35,0 | 36,0 | 63921 |
| 5,3 mm | 0.2087 | | | 6,0 | 82,0 | 44,0 | 35,0 | 36,0 | 63922 |
| 5,4 mm | 0.2126 | | | 6,0 | 82,0 | 44,0 | 35,0 | 36,0 | 63998 |
| 5,5 mm | 0.2165 | | M6 X 0,5 | 6,0 | 82,0 | 44,0 | 35,0 | 36,0 | 63923 |
| 7/32 | 0.2188 | 5.56 | 1/4-32 | 6,0 | 82,0 | 44,0 | 35,0 | 36,0 | 51912 |
| 5,6 mm | 0.2205 | | | 6,0 | 82,0 | 44,0 | 35,0 | 36,0 | 63924 |
| 5,7 mm | 0.2244 | | | 6,0 | 82,0 | 44,0 | 35,0 | 36,0 | 63925 |
| 5,8 mm | 0.2283 | | | 6,0 | 82,0 | 44,0 | 35,0 | 36,0 | 63926 |
| 5,9 mm | 0.2323 | | | 6,0 | 82,0 | 44,0 | 35,0 | 36,0 | 63927 |
| 15/64 | 0.2344 | 5.95 | | 6,0 | 82,0 | 44,0 | 35,0 | 36,0 | 51913 |

Common
5xD Reach
Right Spiral
Internal Coolant
2 Flutes

*(continued on next page)*

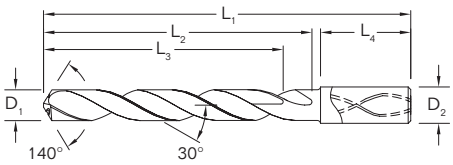
IC Carb
High Performance Internal Coolant Drills

**TOLERANCES (inch)**

| DIAMETER | $D_1$ | $D_2$ |
|---|---|---|
| ≤.1181 | +.00008/+.00047 | h6 |
| >.1181–.2362 | +.00016/+.00063 | h6 |
| >.2362–.3937 | +.00024/+.00083 | h6 |
| >.3937–.7087 | +.00028/+.00098 | h6 |
| >.7087–1.1811 | +.00031/+.00114 | h6 |

**TOLERANCES (mm)**

| DIAMETER | $D_1$ | $D_2$ |
|---|---|---|
| ≤ 3 | +0,002/+0,012 | h6 |
| > 3 - 6 | +0,004/+0,016 | h6 |
| > 6 - 10 | +0,006/+0,021 | h6 |
| > 10 - 18 | +0,007/+0,025 | h6 |




Common

5xD
Reach

Right Spiral

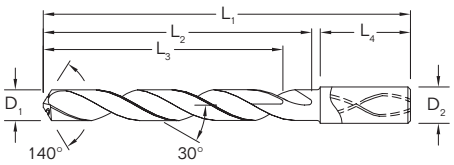
Internal Coolant

2
Flutes

| Cutting Diameter $D_1$ | Decimal Equivalent | Metric Equivalent | Tap Size Reference Only | Shank Diameter $D_2$ | Overall Length $L_1$ | Flute Length $L_2$ | Min. Cleared Length $L_3$ | Shank Length $L_4$ | Ti-NAMITE-A (AlTiN) EDP No. |
|---|---|---|---|---|---|---|---|---|---|
| 6,0 mm | 0.2362 | | M7 X 1 | 6,0 | 82,0 | 44,0 | 35,0 | 36,0 | 63928 |
| 6,1 mm | 0.2402 | | | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 63929 |
| 6,2 mm | 0.2441 | | M7 X 0,75 | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 63930 |
| 6,3 mm | 0.2480 | | | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 63931 |
| 1/4 | 0.2500 | 6.35 | | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 51914 |
| 6,4 mm | 0.2520 | | | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 63932 |
| 6,5 mm | 0.2559 | | | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 63933 |
| F | 0.2570 | 6.53 | 5/16-18 | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 51915 |
| 6,6 mm | 0.2598 | | | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 63934 |
| 6,7 mm | 0.2638 | | | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 63935 |
| 17/64 | 0.2656 | 6.75 | 5/16-20 | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 51916 |
| 6,8 mm | 0.2677 | | M8 X 1,25 | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 63936 |
| 6,9 mm | 0.2717 | | 5/16-24 | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 63999 |
| 7,0 mm | 0.2756 | | M8 X 1 | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 63937 |
| 7,1 mm | 0.2795 | | | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 63938 |
| 9/32 | 0.2812 | 7.14 | 5/16-32 | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 51918 |
| 7,2 mm | 0.2835 | | M8 X 0,75 | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 63939 |
| 7,3 mm | 0.2874 | | | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 63940 |
| 7,4 mm | 0.2913 | | | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 63941 |
| 7,5 mm | 0.2953 | | M8 X 0,5 | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 63942 |
| 19/64 | 0.2969 | 7.54 | | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 51919 |
| 7,6 mm | 0.2992 | | | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 63943 |
| 7,7 mm | 0.3031 | | | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 63944 |
| 7,8 mm | 0.3071 | | M9 X 1,25 | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 63945 |
| 7,9 mm | 0.3110 | | | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 63946 |
| 5/16 | 0.3125 | 7.94 | 3/8-16 | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 51920 |
| 8,0 mm | 0.3150 | | M9 X 1 | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 63947 |
| 8,1 mm | 0.3189 | | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 63948 |
| 8,2 mm | 0.3228 | | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 63949 |
| 8,3 mm | 0.3268 | | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 63950 |
| 21/64 | 0.3281 | 8.33 | 3/8-20 | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 51921 |
| 8,4 mm | 0.3307 | | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 63951 |
| Q | 0.3320 | 8.43 | 3/8-24 | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 51922 |
| 8,5 mm | 0.3346 | | M10 X 1,5 | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 63952 |
| 8,6 mm | 0.3386 | | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 63953 |
| 8,7 mm | 0.3425 | | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 63954 |
| 11/32 | 0.3438 | 8.73 | 3/8-32 | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 51923 |
| 8,8 mm | 0.3465 | | M10 X 1,25 | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 63955 |
| 8,9 mm | 0.3504 | | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 63956 |
| 9,0 mm | 0.3543 | | M10 X 1 | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 63957 |

*(continued on next page)*

IC-Carb
High Performance Internal Coolant Drills




**TOLERANCES (inch)**

| DIAMETER | $D_1$ | $D_2$ |
|---|---|---|
| ≤.1181 | +.00008/+.00047 | h6 |
| >.1181–.2362 | +.00016/+.00063 | h6 |
| >.2362–.3937 | +.00024/+.00083 | h6 |
| >.3937–.7087 | +.00028/+.00098 | h6 |
| >.7087–1.1811 | +.00031/+.00114 | h6 |

**TOLERANCES (mm)**

| DIAMETER | $D_1$ | $D_2$ |
|---|---|---|
| ≤ 3 | +0,002/+0,012 | h6 |
| > 3 - 6 | +0,004/+0,016 | h6 |
| > 6 - 10 | +0,006/+0,021 | h6 |
| > 10 - 18 | +0,007/+0,025 | h6 |

| Cutting Diameter $D_1$ | Decimal Equivalent | Metric Equivalent | Tap Size Reference Only | Shank Diameter $D_2$ | Overall Length $L_1$ | Flute Length $L_2$ | Min. Cleared Length $L_3$ | Shank Length $L_4$ | Ti-NAMITE-A (AlTiN) EDP No. |
|---|---|---|---|---|---|---|---|---|---|
| 9,1 mm | 0.3583 | | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 63958 |
| 23/64 | 0.3594 | 9.13 | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 51924 |
| 9,2 mm | 0.3622 | | M10 X 0,75 | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 63959 |
| 9,3 mm | 0.3661 | | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 63960 |
| U | 0.3680 | 9.35 | 7/16-14 | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 51925 |
| 9,4 mm | 0.3701 | | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 63961 |
| 9,5 mm | 0.3740 | | M11 / M10 X 0,5 | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 63962 |
| 3/8 | 0.3750 | 9.53 | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 51926 |
| 9,6 mm | 0.3780 | | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 63963 |
| 9,7 mm | 0.3819 | | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 63964 |
| 9,8 mm | 0.3858 | | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 63965 |
| 9,9 mm | 0.3898 | | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 63966 |
| 25/64 | 0.3906 | 9.92 | 7/16-20 | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 51927 |
| 10,0 mm | 0.3937 | | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 63967 |
| 10,1 mm | 0.3976 | | | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 63968 |
| 10,2 mm | 0.4016 | | M12 X 1,75 | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 63969 |
| 10,3 mm | 0.4055 | | | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 63970 |
| 13/32 | 0.4062 | 10.32 | | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 51928 |
| 10,4 mm | 0.4094 | | | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 63971 |
| 10,5 mm | 0.4134 | | M12 X 1,5 | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 63972 |
| 10,6 mm | 0.4173 | | | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 63973 |
| 10,7 mm | 0.4213 | | | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 63974 |
| 27/64 | 0.4219 | 10.72 | 1/2-13 | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 51929 |
| 10,8 mm | 0.4252 | | M12 X 1,25 | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 63975 |
| 10,9 mm | 0.4291 | | | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 63976 |
| 11,0 mm | 0.4331 | | M12 X 1 | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 63977 |
| 11,1 mm | 0.4370 | | | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 63978 |
| 7/16 | 0.4375 | 11.11 | 1/4-18NPT | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 51930 |
| 11,2 mm | 0.4409 | | | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 63979 |
| 11,3 mm | 0.4449 | | | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 63980 |
| 11,4 mm | 0.4488 | | | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 63981 |
| 11,5 mm | 0.4528 | | M12 X 0,5 | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 64000 |
| 11,6 mm | 0.4567 | | | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 63982 |
| 11,7 mm | 0.4606 | | | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 63983 |
| 11,8 mm | 0.4646 | | | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 63984 |
| 11,9 mm | 0.4685 | | | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 63985 |
| 15/32 | 0.4688 | 11.91 | 1/2-28 | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 51932 |
| 12,0 mm | 0.4724 | | M14 X 2 | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 63986 |
| 31/64 | 0.4844 | 12.30 | 9/16-12 | 14,0 | 124,0 | 77,0 | 60,0 | 45,0 | 51933 |
| 12,5 mm | 0.4921 | | M14 X 1,5 | 14,0 | 124,0 | 77,0 | 60,0 | 45,0 | 63987 |

Common
5xD Reach
Right Spiral
Internal Coolant
2 Flutes

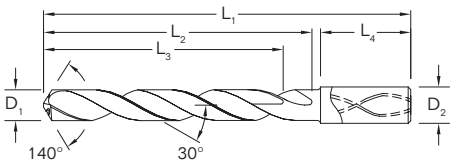
*(continued on next page)*

**TOLERANCES (inch)**

| DIAMETER | $D_1$ | $D_2$ |
|---|---|---|
| ≤.1181 | +.00008/+.00047 | h6 |
| >.1181–.2362 | +.00016/+.00063 | h6 |
| >.2362–.3937 | +.00024/+.00083 | h6 |
| >.3937–.7087 | +.00028/+.00098 | h6 |
| >.7087–1.1811 | +.00031/+.00114 | h6 |

**TOLERANCES (mm)**

| DIAMETER | $D_1$ | $D_2$ |
|---|---|---|
| ≤ 3 | +0,002/+0,012 | h6 |
| > 3 - 6 | +0,004/+0,016 | h6 |
| > 6 - 10 | +0,006/+0,021 | h6 |
| > 10 - 18 | +0,007/+0,025 | h6 |




Common

5xD
Reach

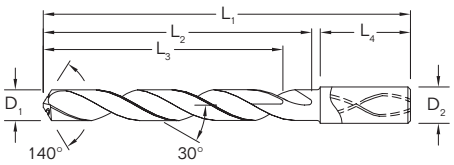
Right Spiral

Internal Coolant

2
Flutes

| Cutting Diameter $D_1$ | Decimal Equivalent | Metric Equivalent | Tap Size Reference Only | Shank Diameter $D_2$ | Overall Length $L_1$ | Flute Length $L_2$ | Min. Cleared Length $L_3$ | Shank Length $L_4$ | Ti-NAMITE-A (AlTiN) EDP No. |
|---|---|---|---|---|---|---|---|---|---|
| 1/2 | 0.5000 | 12.70 | | 14,0 | 124,0 | 77,0 | 60,0 | 45,0 | 51934 |
| 12,8 mm | 0.5039 | | M14 X 1,25 | 14,0 | 124,0 | 77,0 | 60,0 | 45,0 | 63988 |
| 13,0 mm | 0.5118 | | M14 X 1 | 14,0 | 124,0 | 77,0 | 60,0 | 45,0 | 63989 |
| 33/64 | 0.5156 | 13.10 | 9/16-18 | 14,0 | 124,0 | 77,0 | 60,0 | 45,0 | 51935 |
| 13,5 mm | 0.5315 | | 5/8-11 | 14,0 | 124,0 | 77,0 | 60,0 | 45,0 | 64001 |
| 13,8 mm | 0.5433 | | | 14,0 | 124,0 | 77,0 | 60,0 | 45,0 | 63990 |
| 14,0 mm | 0.5512 | | M16 X 2 | 14,0 | 124,0 | 77,0 | 60,0 | 45,0 | 63991 |
| 9/16 | 0.5625 | 14.29 | | 16,0 | 133,0 | 83,0 | 63,0 | 48,0 | 51937 |
| 14,5 mm | 0.5709 | | M16 X 1,5 | 16,0 | 133,0 | 83,0 | 63,0 | 48,0 | 63992 |
| 37/64 | 0.5781 | 14.68 | 5/8-18 | 16,0 | 133,0 | 83,0 | 63,0 | 48,0 | 51938 |
| 14,8 mm | 0.5827 | | | 16,0 | 133,0 | 83,0 | 63,0 | 48,0 | 63993 |
| 15,0 mm | 0.5906 | | M16 X 1 | 16,0 | 133,0 | 83,0 | 63,0 | 48,0 | 63994 |
| 15,5 mm | 0.6102 | | M18 X 2,5 | 16,0 | 133,0 | 83,0 | 63,0 | 48,0 | 63995 |
| 15,8 mm | 0.6220 | | | 16,0 | 133,0 | 83,0 | 63,0 | 48,0 | 63996 |
| 5/8 | 0.6250 | 15.88 | 11/16-16 | 16,0 | 133,0 | 83,0 | 63,0 | 48,0 | 51939 |
| 16,0 mm | 0.6299 | | | 16,0 | 133,0 | 83,0 | 63,0 | 48,0 | 63997 |
| 21/32 | 0.6562 | 16.67 | 3/4-10 | 18,0 | 143,0 | 93,0 | 71,0 | 48,0 | 51940 |
| 11/16 | 0.6875 | 17.46 | 3/4-16 | 18,0 | 143,0 | 93,0 | 71,0 | 48,0 | 51941 |
| 3/4 | 0.7500 | 19.05 | 13/16-16 | 20,0 | 153,0 | 101,0 | 77,0 | 50,0 | 51942 |

IC-Carb
High Performance Internal Coolant Drills




**TOLERANCES (inch)**

| DIAMETER | $D_1$ | $D_2$ |
|---|---|---|
| ≤.1181 | +.00008/+.00047 | h6 |
| >.1181–.2362 | +.00016/+.00063 | h6 |
| >.2362–.3937 | +.00024/+.00083 | h6 |
| >.3937–.7087 | +.00028/+.00098 | h6 |
| >.7087–1.1811 | +.00031/+.00114 | h6 |

**TOLERANCES (mm)**

| DIAMETER | $D_1$ | $D_2$ |
|---|---|---|
| ≤ 3 | +0,002/+0,012 | h6 |
| > 3 - 6 | +0,004/+0,016 | h6 |
| > 6 - 10 | +0,006/+0,021 | h6 |
| > 10 - 18 | +0,007/+0,025 | h6 |

| Cutting Diameter $D_1$ | Decimal Equivalent | Metric Equivalent | Tap Size Reference Only | Shank Diameter $D_2$ | Overall Length $L_1$ | Flute Length $L_2$ | Min. Cleared Length $L_3$ | Shank Length $L_4$ | Ti-NAMITE-A (AlTiN) EDP No. |
|---|---|---|---|---|---|---|---|---|---|
| 3,0 mm | 0.1181 | | | 6,0 | 72,0 | 34,0 | 29,0 | 36,0 | 63575 |
| 3,1 mm | 0.1220 | | | 6,0 | 72,0 | 34,0 | 29,0 | 36,0 | 63576 |
| 1/8 | 0.1250 | 3.18 | | 6,0 | 72,0 | 34,0 | 29,0 | 36,0 | 51801 |
| 3,2 mm | 0.1260 | | M3,5 X 0,35 | 6,0 | 72,0 | 34,0 | 29,0 | 36,0 | 63577 |
| 3,3 mm | 0.1299 | | M4 X 0,7 | 6,0 | 72,0 | 34,0 | 29,0 | 36,0 | 63578 |
| 3,4 mm | 0.1339 | | | 6,0 | 72,0 | 34,0 | 29,0 | 36,0 | 63579 |
| #29 | 0.1360 | 3.45 | 8-32,8-36 | 6,0 | 72,0 | 34,0 | 29,0 | 36,0 | 51802 |
| 3,5 mm | 0.1378 | | M4 X 0,5 | 6,0 | 72,0 | 34,0 | 29,0 | 36,0 | 63580 |
| 9/64 | 0.1406 | 3.57 | | 6,0 | 72,0 | 34,0 | 29,0 | 36,0 | 51803 |
| 3,6 mm | 0.1417 | | M4 X 0,35 | 6,0 | 72,0 | 34,0 | 29,0 | 36,0 | 63581 |
| 3,7 mm | 0.1457 | | M4,5 X 0,75 | 6,0 | 72,0 | 34,0 | 29,0 | 36,0 | 63582 |
| 3,8 mm | 0.1496 | | 10-24 | 6,0 | 81,0 | 43,0 | 36,0 | 36,0 | 63583 |
| 3,9 mm | 0.1535 | | | 6,0 | 81,0 | 43,0 | 36,0 | 36,0 | 63584 |
| 5/32 | 0.1562 | 3.97 | | 6,0 | 81,0 | 43,0 | 36,0 | 36,0 | 51804 |
| 4,0 mm | 0.1575 | | M4,5 X 0,5 | 6,0 | 81,0 | 43,0 | 36,0 | 36,0 | 63585 |
| #21 | 0.1590 | 4.04 | 10-32 | 6,0 | 81,0 | 43,0 | 36,0 | 36,0 | 51805 |
| 4,1 mm | 0.1614 | | | 6,0 | 81,0 | 43,0 | 36,0 | 36,0 | 63586 |
| 4,2 mm | 0.1654 | | M5 / M5 X 0,75 | 6,0 | 81,0 | 43,0 | 36,0 | 36,0 | 63587 |
| 4,3 mm | 0.1693 | | | 6,0 | 81,0 | 43,0 | 36,0 | 36,0 | 63588 |
| 11/64 | 0.1719 | 4.37 | | 6,0 | 81,0 | 43,0 | 36,0 | 36,0 | 51806 |
| 4,4 mm | 0.1732 | | 12-24 | 6,0 | 81,0 | 43,0 | 36,0 | 36,0 | 63589 |
| 4,5 mm | 0.1772 | | M5 X 0,5 | 6,0 | 81,0 | 43,0 | 36,0 | 36,0 | 63590 |
| 4,6 mm | 0.1811 | | 12-28 | 6,0 | 81,0 | 43,0 | 36,0 | 36,0 | 63591 |
| 4,7 mm | 0.1850 | | 12-32 | 6,0 | 81,0 | 43,0 | 36,0 | 36,0 | 63592 |
| 3/16 | 0.1875 | 4.76 | | 6,0 | 95,0 | 57,0 | 48,0 | 36,0 | 51807 |
| 4,8 mm | 0.1890 | | 7/32-32 | 6,0 | 95,0 | 57,0 | 48,0 | 36,0 | 63593 |
| 4,9 mm | 0.1929 | | | 6,0 | 95,0 | 57,0 | 48,0 | 36,0 | 63594 |
| 5,0 mm | 0.1969 | | M6 X 1 | 6,0 | 95,0 | 57,0 | 48,0 | 36,0 | 63595 |
| 5,1 mm | 0.2008 | | 1/4-20 | 6,0 | 95,0 | 57,0 | 48,0 | 36,0 | 63596 |
| 13/64 | 0.2031 | 5.16 | | 6,0 | 95,0 | 57,0 | 48,0 | 36,0 | 51808 |
| 5,2 mm | 0.2047 | | M6 X 0,75 | 6,0 | 95,0 | 57,0 | 48,0 | 36,0 | 63597 |
| 5,3 mm | 0.2087 | | | 6,0 | 95,0 | 57,0 | 48,0 | 36,0 | 63598 |
| 5,4 mm | 0.2126 | | | 6,0 | 95,0 | 57,0 | 48,0 | 36,0 | 63599 |
| 5,5 mm | 0.2165 | | M6 X 0,5 | 6,0 | 95,0 | 57,0 | 48,0 | 36,0 | 63600 |
| 7/32 | 0.2188 | 5.56 | 1/4-32 | 6,0 | 95,0 | 57,0 | 48,0 | 36,0 | 51809 |
| 5,6 mm | 0.2205 | | | 6,0 | 95,0 | 57,0 | 48,0 | 36,0 | 63601 |
| 5,7 mm | 0.2244 | | | 6,0 | 95,0 | 57,0 | 48,0 | 36,0 | 63602 |
| 5,8 mm | 0.2283 | | | 6,0 | 95,0 | 57,0 | 48,0 | 36,0 | 63603 |
| 5,9 mm | 0.2323 | | | 6,0 | 95,0 | 57,0 | 48,0 | 36,0 | 63604 |
| 15/64 | 0.2344 | 5.95 | | 6,0 | 95,0 | 57,0 | 48,0 | 36,0 | 51810 |

Common
8xD Reach
Right Spiral
Internal Coolant
2 Flutes

*(continued on next page)*

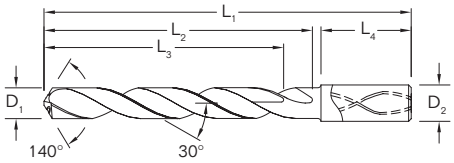
IC Carb
High Performance Internal Coolant Drills

**TOLERANCES (inch)**

| DIAMETER | $D_1$ | $D_2$ |
|---|---|---|
| ≤.1181 | +.00008/+.00047 | h6 |
| >.1181–.2362 | +.00016/+.00063 | h6 |
| >.2362–.3937 | +.00024/+.00083 | h6 |
| >.3937–.7087 | +.00028/+.00098 | h6 |
| >.7087–1.1811 | +.00031/+.00114 | h6 |

**TOLERANCES (mm)**

| DIAMETER | $D_1$ | $D_2$ |
|---|---|---|
| ≤ 3 | +0,002/+0,012 | h6 |
| > 3 - 6 | +0,004/+0,016 | h6 |
| > 6 - 10 | +0,006/+0,021 | h6 |
| > 10 - 18 | +0,007/+0,025 | h6 |




Common

8xD
Reach

Right Spiral

Internal Coolant

2
Flutes

| Cutting Diameter $D_1$ | Decimal Equivalent | Metric Equivalent | Tap Size Reference Only | Shank Diameter $D_2$ | Overall Length $L_1$ | Flute Length $L_2$ | Min. Cleared Length $L_3$ | Shank Length $L_4$ | Ti-NAMITE-A (AlTiN) EDP No. |
|---|---|---|---|---|---|---|---|---|---|
| 6,0 mm | 0.2362 | | M7 X 1 | 6,0 | 95,0 | 57,0 | 48,0 | 36,0 | 63605 |
| 6,1 mm | 0.2402 | | | 8,0 | 114,0 | 76,0 | 64,0 | 36,0 | 63606 |
| 6,2 mm | 0.2441 | | M7 X 0,75 | 8,0 | 114,0 | 76,0 | 64,0 | 36,0 | 63607 |
| 6,3 mm | 0.2480 | | | 8,0 | 114,0 | 76,0 | 64,0 | 36,0 | 63608 |
| 1/4 | 0.2500 | 6.35 | | 8,0 | 114,0 | 76,0 | 64,0 | 36,0 | 51811 |
| 6,4 mm | 0.2520 | | | 8,0 | 114,0 | 76,0 | 64,0 | 36,0 | 63609 |
| 6,5 mm | 0.2559 | | | 8,0 | 114,0 | 76,0 | 64,0 | 36,0 | 63610 |
| F | 0.2570 | 6.53 | 5/16-18 | 8,0 | 114,0 | 76,0 | 64,0 | 36,0 | 51812 |
| 6,6 mm | 0.2598 | | | 8,0 | 114,0 | 76,0 | 64,0 | 36,0 | 63611 |
| 6,7 mm | 0.2638 | | | 8,0 | 114,0 | 76,0 | 64,0 | 36,0 | 63612 |
| 17/64 | 0.2656 | 6.75 | 5/16-20 | 8,0 | 114,0 | 76,0 | 64,0 | 36,0 | 51813 |
| 6,8 mm | 0.2677 | | M8 X 1,25 | 8,0 | 114,0 | 76,0 | 64,0 | 36,0 | 63613 |
| 6,9 mm | 0.2717 | | | 8,0 | 114,0 | 76,0 | 64,0 | 36,0 | 63614 |
| 7,0 mm | 0.2756 | | M8 X 1 | 8,0 | 114,0 | 76,0 | 64,0 | 36,0 | 63615 |
| 7,1 mm | 0.2795 | | | 8,0 | 114,0 | 76,0 | 64,0 | 36,0 | 63616 |
| 9/32 | 0.2812 | 7.14 | 5/16-32 | 8,0 | 114,0 | 76,0 | 64,0 | 36,0 | 51814 |
| 7,2 mm | 0.2835 | | M8 X 0,75 | 8,0 | 114,0 | 76,0 | 64,0 | 36,0 | 63617 |
| 7,3 mm | 0.2874 | | | 8,0 | 114,0 | 76,0 | 64,0 | 36,0 | 63618 |
| 7,4 mm | 0.2913 | | | 8,0 | 114,0 | 76,0 | 64,0 | 36,0 | 63619 |
| 7,5 mm | 0.2953 | | M8 X 0,5 | 8,0 | 114,0 | 76,0 | 64,0 | 36,0 | 63620 |
| 19/64 | 0.2969 | 7.54 | | 8,0 | 114,0 | 76,0 | 64,0 | 36,0 | 51815 |
| 7,6 mm | 0.2992 | | | 8,0 | 114,0 | 76,0 | 64,0 | 36,0 | 63621 |
| 7,7 mm | 0.3031 | | | 8,0 | 114,0 | 76,0 | 64,0 | 36,0 | 63622 |
| 7,8 mm | 0.3071 | | M9 X 1,25 | 8,0 | 114,0 | 76,0 | 64,0 | 36,0 | 63623 |
| 7,9 mm | 0.3110 | | | 8,0 | 114,0 | 76,0 | 64,0 | 36,0 | 63624 |
| 5/16 | 0.3125 | 7.94 | 3/8-16 | 8,0 | 114,0 | 76,0 | 64,0 | 36,0 | 51816 |
| 8,0 mm | 0.3150 | | M9 X 1 | 8,0 | 114,0 | 76,0 | 64,0 | 36,0 | 63625 |
| 8,1 mm | 0.3189 | | | 10,0 | 142,0 | 95,0 | 80,0 | 40,0 | 63626 |
| 8,2 mm | 0.3228 | | | 10,0 | 142,0 | 95,0 | 80,0 | 40,0 | 63627 |
| 8,3 mm | 0.3268 | | | 10,0 | 142,0 | 95,0 | 80,0 | 40,0 | 63628 |
| 21/64 | 0.3281 | 8.33 | 3/8-20 | 10,0 | 142,0 | 95,0 | 80,0 | 40,0 | 51817 |
| 8,4 mm | 0.3307 | | | 10,0 | 142,0 | 95,0 | 80,0 | 40,0 | 63629 |
| Q | 0.3320 | 8.43 | 3/8-24 | 10,0 | 142,0 | 95,0 | 80,0 | 40,0 | 51818 |
| 8,5 mm | 0.3346 | | M10 X 1,5 | 10,0 | 142,0 | 95,0 | 80,0 | 40,0 | 63630 |
| 8,6 mm | 0.3386 | | | 10,0 | 142,0 | 95,0 | 80,0 | 40,0 | 63631 |
| 8,7 mm | 0.3425 | | | 10,0 | 142,0 | 95,0 | 80,0 | 40,0 | 63632 |
| 11/32 | 0.3438 | 8.73 | 3/8-32 | 10,0 | 142,0 | 95,0 | 80,0 | 40,0 | 51819 |
| 8,8 mm | 0.3465 | | M10 X 1,25 | 10,0 | 142,0 | 95,0 | 80,0 | 40,0 | 63633 |
| 8,9 mm | 0.3504 | | | 10,0 | 142,0 | 95,0 | 80,0 | 40,0 | 63634 |
| 9,0 mm | 0.3543 | | M10 X 1 | 10,0 | 142,0 | 95,0 | 80,0 | 40,0 | 63635 |

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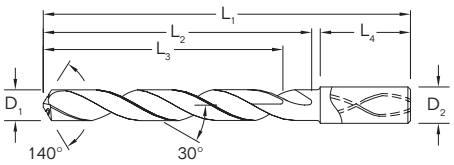
IC-Carb
High Performance Internal Coolant Drills




**TOLERANCES (inch)**

| DIAMETER | $D_1$ | $D_2$ |
|---|---|---|
| ≤.1181 | +.00008/+.00047 | h6 |
| >.1181–.2362 | +.00016/+.00063 | h6 |
| >.2362–.3937 | +.00024/+.00083 | h6 |
| >.3937–.7087 | +.00028/+.00098 | h6 |
| >.7087–1.1811 | +.00031/+.00114 | h6 |

**TOLERANCES (mm)**

| DIAMETER | $D_1$ | $D_2$ |
|---|---|---|
| ≤ 3 | +0,002/+0,012 | h6 |
| > 3 - 6 | +0,004/+0,016 | h6 |
| > 6 - 10 | +0,006/+0,021 | h6 |
| > 10 - 18 | +0,007/+0,025 | h6 |

| Cutting Diameter $D_1$ | Decimal Equivalent | Metric Equivalent | Tap Size Reference Only | Shank Diameter $D_2$ | Overall Length $L_1$ | Flute Length $L_2$ | Min. Cleared Length $L_3$ | Shank Length $L_4$ | Ti-NAMITE-A (AlTiN) EDP No. |
|---|---|---|---|---|---|---|---|---|---|
| 9,1 mm | 0.3583 | | | 10,0 | 142,0 | 95,0 | 80,0 | 40,0 | 63636 |
| 23/64 | 0.3594 | 9.13 | | 10,0 | 142,0 | 95,0 | 80,0 | 40,0 | 51820 |
| 9,2 mm | 0.3622 | | M10 X 0,75 | 10,0 | 142,0 | 95,0 | 80,0 | 40,0 | 63637 |
| 9,3 mm | 0.3661 | | | 10,0 | 142,0 | 95,0 | 80,0 | 40,0 | 63638 |
| U | 0.3680 | 9.35 | 7/16-14 | 10,0 | 142,0 | 95,0 | 80,0 | 40,0 | 51821 |
| 9,4 mm | 0.3701 | | | 10,0 | 142,0 | 95,0 | 80,0 | 40,0 | 63639 |
| 9,5 mm | 0.3740 | | M11 / M10 X 0,5 | 10,0 | 142,0 | 95,0 | 80,0 | 40,0 | 63640 |
| 3/8 | 0.3750 | 9.53 | | 10,0 | 142,0 | 95,0 | 80,0 | 40,0 | 51822 |
| 9,6 mm | 0.3780 | | | 10,0 | 142,0 | 95,0 | 80,0 | 40,0 | 63641 |
| 9,7 mm | 0.3819 | | | 10,0 | 142,0 | 95,0 | 80,0 | 40,0 | 63642 |
| 9,8 mm | 0.3858 | | | 10,0 | 142,0 | 95,0 | 80,0 | 40,0 | 63643 |
| 9,9 mm | 0.3898 | | | 10,0 | 142,0 | 95,0 | 80,0 | 40,0 | 63644 |
| 25/64 | 0.3906 | 9.92 | 7/16-20 | 10,0 | 142,0 | 95,0 | 80,0 | 40,0 | 51823 |
| 10,0 mm | 0.3937 | | | 10,0 | 142,0 | 95,0 | 80,0 | 40,0 | 63645 |
| 10,1 mm | 0.3976 | | | 12,0 | 162,0 | 114,0 | 96,0 | 45,0 | 63646 |
| 10,2 mm | 0.4016 | | M12 X 1,75 | 12,0 | 162,0 | 114,0 | 96,0 | 45,0 | 63647 |
| 10,3 mm | 0.4055 | | | 12,0 | 162,0 | 114,0 | 96,0 | 45,0 | 63648 |
| 13/32 | 0.4062 | 10.32 | | 12,0 | 162,0 | 114,0 | 96,0 | 45,0 | 51824 |
| 10,4 mm | 0.4094 | | | 12,0 | 162,0 | 114,0 | 96,0 | 45,0 | 63649 |
| 10,5 mm | 0.4134 | | M12 X 1,5 | 12,0 | 162,0 | 114,0 | 96,0 | 45,0 | 63650 |
| 10,6 mm | 0.4173 | | | 12,0 | 162,0 | 114,0 | 96,0 | 45,0 | 63651 |
| 10,7 mm | 0.4213 | | | 12,0 | 162,0 | 114,0 | 96,0 | 45,0 | 63652 |
| 27/64 | 0.4219 | 10.72 | 1/2-13 | 12,0 | 162,0 | 114,0 | 96,0 | 45,0 | 51825 |
| 10,8 mm | 0.4252 | | M12 X 1,25 | 12,0 | 162,0 | 114,0 | 96,0 | 45,0 | 63653 |
| 10,9 mm | 0.4291 | | | 12,0 | 162,0 | 114,0 | 96,0 | 45,0 | 63654 |
| 11,0 mm | 0.4331 | | M12 X 1 | 12,0 | 162,0 | 114,0 | 96,0 | 45,0 | 63655 |
| 11,1 mm | 0.4370 | | | 12,0 | 162,0 | 114,0 | 96,0 | 45,0 | 63656 |
| 7/16 | 0.4375 | 11.11 | 1/4-18NPT | 12,0 | 162,0 | 114,0 | 96,0 | 45,0 | 51826 |
| 11,2 mm | 0.4409 | | | 12,0 | 162,0 | 114,0 | 96,0 | 45,0 | 63657 |
| 11,3 mm | 0.4449 | | | 12,0 | 162,0 | 114,0 | 96,0 | 45,0 | 63658 |
| 11,4 mm | 0.4488 | | | 12,0 | 162,0 | 114,0 | 96,0 | 45,0 | 63659 |
| 11,5 mm | 0.4528 | | M12 X 0,5 | 12,0 | 162,0 | 114,0 | 96,0 | 45,0 | 63660 |
| 11,6 mm | 0.4567 | | | 12,0 | 162,0 | 114,0 | 96,0 | 45,0 | 63661 |
| 11,7 mm | 0.4606 | | | 12,0 | 162,0 | 114,0 | 96,0 | 45,0 | 63662 |
| 11,8 mm | 0.4646 | | | 12,0 | 162,0 | 114,0 | 96,0 | 45,0 | 63663 |
| 11,9 mm | 0.4685 | | | 12,0 | 162,0 | 114,0 | 96,0 | 45,0 | 63664 |
| 15/32 | 0.4688 | 11.91 | 1/2-28 | 12,0 | 162,0 | 114,0 | 96,0 | 45,0 | 51827 |
| 12,0 mm | 0.4724 | | M14 X 2 | 12,0 | 162,0 | 114,0 | 96,0 | 45,0 | 63665 |
| 31/64 | 0.4844 | 12.30 | 9/16-12 | 14,0 | 178,0 | 133,0 | 112,0 | 45,0 | 51828 |
| 12,5 mm | 0.4921 | | M14 X 1,5 | 14,0 | 178,0 | 133,0 | 112,0 | 45,0 | 63666 |

*(continued on next page)*

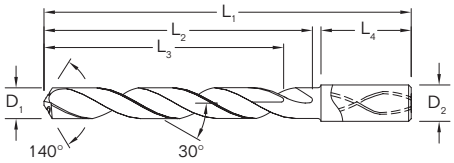
Common
8xD Reach
Right Spiral
Internal Coolant
2 Flutes

**TOLERANCES (inch)**

| DIAMETER | $D_1$ | $D_2$ |
|---|---|---|
| ≤.1181 | +.00008/+.00047 | h6 |
| >.1181–.2362 | +.00016/+.00063 | h6 |
| >.2362–.3937 | +.00024/+.00083 | h6 |
| >.3937–.7087 | +.00028/+.00098 | h6 |
| >.7087–1.1811 | +.00031/+.00114 | h6 |

**TOLERANCES (mm)**

| DIAMETER | $D_1$ | $D_2$ |
|---|---|---|
| ≤ 3 | +0,002/+0,012 | h6 |
| > 3 - 6 | +0,004/+0,016 | h6 |
| > 6 - 10 | +0,006/+0,021 | h6 |
| > 10 - 18 | +0,007/+0,025 | h6 |




Common

8xD
Reach

Right Spiral

Internal Coolant

2
Flutes

| Cutting Diameter $D_1$ | Decimal Equivalent | Metric Equivalent | Tap Size Reference Only | Shank Diameter $D_2$ | Overall Length $L_1$ | Flute Length $L_2$ | Min. Cleared Length $L_3$ | Shank Length $L_4$ | Ti-NAMITE-A (AlTiN) EDP No. |
|---|---|---|---|---|---|---|---|---|---|
| 1/2 | 0.5000 | 12.70 | | 14,0 | 178,0 | 133,0 | 112,0 | 45,0 | 51829 |
| 12,8 mm | 0.5039 | | M14 X 1,25 | 14,0 | 178,0 | 133,0 | 112,0 | 45,0 | 63667 |
| 13,0 mm | 0.5118 | | M14 X 1 | 14,0 | 178,0 | 133,0 | 112,0 | 45,0 | 63668 |
| 33/64 | 0.5156 | 13.10 | 9/16-18 | 14,0 | 178,0 | 133,0 | 112,0 | 45,0 | 51830 |
| 13,5 mm | 0.5315 | | 5/8-11 | 14,0 | 178,0 | 133,0 | 112,0 | 45,0 | 63669 |
| 13,8 mm | 0.5433 | | | 14,0 | 178,0 | 133,0 | 112,0 | 45,0 | 63670 |
| 14,0 mm | 0.5512 | | M16 X 2 | 14,0 | 178,0 | 133,0 | 112,0 | 45,0 | 63671 |
| 9/16 | 0.5625 | 14.29 | | 16,0 | 203,0 | 152,0 | 128,0 | 48,0 | 51831 |
| 14,5 mm | 0.5709 | | M16 X 1,5 | 16,0 | 203,0 | 152,0 | 128,0 | 48,0 | 63672 |
| 37/64 | 0.5781 | 14.68 | 5/8-18 | 16,0 | 203,0 | 152,0 | 128,0 | 48,0 | 51832 |
| 14,8 mm | 0.5827 | | | 16,0 | 203,0 | 152,0 | 128,0 | 48,0 | 63673 |
| 15,0 mm | 0.5906 | | M16 X 1 | 16,0 | 203,0 | 152,0 | 128,0 | 48,0 | 63674 |
| 15,5 mm | 0.6102 | | M18 X 2,5 | 16,0 | 203,0 | 152,0 | 128,0 | 48,0 | 63675 |
| 15,8 mm | 0.6220 | | | 16,0 | 203,0 | 152,0 | 128,0 | 48,0 | 63676 |
| 5/8 | 0.6250 | 15.88 | 11/16-16 | 16,0 | 203,0 | 152,0 | 128,0 | 48,0 | 51833 |
| 16,0 mm | 0.6299 | | | 16,0 | 203,0 | 152,0 | 128,0 | 48,0 | 63677 |
| 21/32 | 0.6562 | 16.67 | 3/4-10 | 18,0 | 222,0 | 171,0 | 144,0 | 48,0 | 51834 |
| 11/16 | 0.6875 | 17.46 | 3/4-16 | 18,0 | 222,0 | 171,0 | 144,0 | 48,0 | 51835 |
| 3/4 | 0.7500 | 19.05 | 13/16-16 | 20,0 | 243,0 | 190,0 | 160,0 | 50,0 | 51836 |

IC-Carb
High Performance Internal Coolant Drills

| | Series 140 5D Fractional | Hardness | Vc (sfm) | | Diameter ($D_1$) (inch) 1/8 | 3/16 | 1/4 | 3/8 | 1/2 | 5/8 | 3/4 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| P | CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536 | ≤ 175 Bhn or ≤ 7 HRc | 425 | RPM | 12988 | 8659 | 6494 | 4329 | 3247 | 2598 | 2165 |
| | | | (340-510) | Fr | 0.0039 | 0.0059 | 0.0079 | 0.0118 | 0.0157 | 0.0196 | 0.0236 |
| | | | | Feed (ipm) | 51.0 | 51.0 | 51.0 | 51.0 | 51.0 | 51.0 | 51.0 |
| | | ≤ 275 Bhn or ≤ 28 HRc | 380 | RPM | 11613 | 7742 | 5806 | 3871 | 2903 | 2323 | 1935 |
| | | | (304-456) | Fr | 0.0035 | 0.0053 | 0.0071 | 0.0106 | 0.0141 | 0.0177 | 0.0212 |
| | | | | Feed (ipm) | 41.0 | 41.0 | 41.0 | 41.0 | 41.0 | 41.0 | 41.0 |
| | | ≤ 425 Bhn or ≤ 45 HRc | 220 | RPM | 6723 | 4482 | 3362 | 2241 | 1681 | 1345 | 1121 |
| | | | (176-264) | Fr | 0.0030 | 0.0045 | 0.0059 | 0.0089 | 0.0119 | 0.0149 | 0.0178 |
| | | | | Feed (ipm) | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 |
| | ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100 | ≤ 275 Bhn or ≤ 28 HRc | 330 | RPM | 10085 | 6723 | 5042 | 3362 | 2521 | 2017 | 1681 |
| | | | (264-396) | Fr | 0.0030 | 0.0045 | 0.0059 | 0.0089 | 0.0119 | 0.0149 | 0.0178 |
| | | | | Feed (ipm) | 30.0 | 30.0 | 30.0 | 30.0 | 30.0 | 30.0 | 30.0 |
| | | ≤ 375 Bhn or ≤ 40 HRc | 200 | RPM | 6112 | 4075 | 3056 | 2037 | 1528 | 1222 | 1019 |
| | | | (160-240) | Fr | 0.0025 | 0.0038 | 0.0051 | 0.0076 | 0.0101 | 0.0127 | 0.0152 |
| | | | | Feed (ipm) | 15.5 | 15.5 | 15.5 | 15.5 | 15.5 | 15.5 | 15.5 |
| | | ≤ 450 Bhn or ≤ 48 HRc | 140 | RPM | 4278 | 2852 | 2139 | 1426 | 1070 | 856 | 713 |
| | | | (112-168) | Fr | 0.0018 | 0.0027 | 0.0036 | 0.0054 | 0.0072 | 0.0090 | 0.0108 |
| | | | | Feed (ipm) | 7.7 | 7.7 | 7.7 | 7.7 | 7.7 | 7.7 | 7.7 |
| H | TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2 | ≤ 200 Bhn or ≤ 13 HRc | 145 | RPM | 4431 | 2954 | 2216 | 1477 | 1108 | 886 | 739 |
| | | | (116-174) | Fr | 0.0026 | 0.0039 | 0.0052 | 0.0078 | 0.0104 | 0.0130 | 0.0156 |
| | | | | Feed (ipm) | 11.5 | 11.5 | 11.5 | 11.5 | 11.5 | 11.5 | 11.5 |
| | | ≤ 375 Bhn or ≤ 40 HRc | 95 | RPM | 2903 | 1935 | 1452 | 968 | 726 | 581 | 484 |
| | | | (76-114) | Fr | 0.0012 | 0.0018 | 0.0024 | 0.0036 | 0.0048 | 0.0060 | 0.0072 |
| | | | | Feed (ipm) | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 |
| | | ≤ 475 Bhn or ≤ 50 HRc | 85 | RPM | 2598 | 1732 | 1299 | 866 | 649 | 520 | 433 |
| | | | (68-102) | Fr | 0.0008 | 0.0012 | 0.0015 | 0.0023 | 0.0031 | 0.0038 | 0.0046 |
| | | | | Feed (ipm) | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| K | CAST IRONS Gray, Malleable, Ductile | ≤ 220 Bhn or ≤ 19 HRc | 360 | RPM | 11002 | 7334 | 5501 | 3667 | 2750 | 2200 | 1834 |
| | | | (288-432) | Fr | 0.0045 | 0.0068 | 0.0091 | 0.0136 | 0.0182 | 0.0227 | 0.0273 |
| | | | | Feed (ipm) | 50.0 | 50.0 | 50.0 | 50.0 | 50.0 | 50.0 | 50.0 |
| | | ≤ 260 Bhn or ≤ 26 HRc | 335 | RPM | 10238 | 6825 | 5119 | 3413 | 2559 | 2048 | 1706 |
| | | | (268-402) | Fr | 0.0045 | 0.0068 | 0.0091 | 0.0136 | 0.0182 | 0.0227 | 0.0273 |
| | | | | Feed (ipm) | 46.5 | 46.5 | 46.5 | 46.5 | 46.5 | 46.5 | 46.5 |
| M | STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F, 440F | ≤ 185 Bhn or ≤ 9 HRc | 305 | RPM | 9321 | 6214 | 4660 | 3107 | 2330 | 1864 | 1553 |
| | | | (244-366) | Fr | 0.0026 | 0.0039 | 0.0051 | 0.0077 | 0.0103 | 0.0129 | 0.0154 |
| | | | | Feed (ipm) | 24.0 | 24.0 | 24.0 | 24.0 | 24.0 | 24.0 | 24.0 |
| | | ≤ 275 Bhn or ≤ 28 HRc | 195 | RPM | 5959 | 3973 | 2980 | 1986 | 1490 | 1192 | 993 |
| | | | (156-234) | Fr | 0.0020 | 0.0030 | 0.0040 | 0.0060 | 0.0081 | 0.0101 | 0.0121 |
| | | | | Feed (ipm) | 12.0 | 12.0 | 12.0 | 12.0 | 12.0 | 12.0 | 12.0 |
| | STAINLESS STEELS (DIFFICULT) 304, 316, 321, 13-8 PH, 15-5PH, 17-4 PH, Custom 450 | ≤ 275 Bhn or ≤ 28 HRc | 150 | RPM | 4584 | 3056 | 2292 | 1528 | 1146 | 917 | 764 |
| | | | (120-180) | Fr | 0.0020 | 0.0030 | 0.0040 | 0.0060 | 0.0079 | 0.0099 | 0.0119 |
| | | | | Feed (ipm) | 9.1 | 9.1 | 9.1 | 9.1 | 9.1 | 9.1 | 9.1 |
| | | ≤ 375 Bhn or ≤ 40 HRc | 110 | RPM | 3362 | 2241 | 1681 | 1121 | 840 | 672 | 560 |
| | | | (88-132) | Fr | 0.0018 | 0.0027 | 0.0036 | 0.0054 | 0.0071 | 0.0089 | 0.0107 |
| | | | | Feed (ipm) | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 |

*continued on next page*

| | Series 140 5D Fractional | Hardness | Vc (sfm) | | Diameter ($D_1$) (inch) 1/8 | 3/16 | 1/4 | 3/8 | 1/2 | 5/8 | 3/4 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| S | **SUPER ALLOYS (NICKEL , COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy, Monel 400, Rene, Waspaloy** | ≤ 300 Bhn or ≤ 32 HRc | 95 | RPM | 2903 | 1935 | 1452 | 968 | 726 | 581 | 484 |
| | | | (76-114) | Fr | 0.0008 | 0.0012 | 0.0016 | 0.0024 | 0.0032 | 0.0040 | 0.0048 |
| | | | | Feed (ipm) | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 |
| | | ≤ 400 Bhn or ≤ 43 HRc | 50 | RPM | 1528 | 1019 | 764 | 509 | 382 | 306 | 255 |
| | | | (40-60) | Fr | 0.0007 | 0.0010 | 0.0013 | 0.0020 | 0.0026 | 0.0033 | 0.0039 |
| | | | | Feed (ipm) | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| | **TITANIUM ALLOYS Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si, Ti-6Al4V** | ≤ 275 Bhn or ≤ 28 HRc | 215 | RPM | 6570 | 4380 | 3285 | 2190 | 1643 | 1314 | 1095 |
| | | | (172-258) | Fr | 0.0018 | 0.0026 | 0.0035 | 0.0053 | 0.0070 | 0.0088 | 0.0105 |
| | | | | Feed (ipm) | 11.5 | 11.5 | 11.5 | 11.5 | 11.5 | 11.5 | 11.5 |
| | | ≤ 350 Bhn or ≤ 38 HRc | 160 | RPM | 4890 | 3260 | 2445 | 1630 | 1222 | 978 | 815 |
| | | | (128-192) | Fr | 0.0016 | 0.0024 | 0.0032 | 0.0048 | 0.0064 | 0.0080 | 0.0096 |
| | | | | Feed (ipm) | 7.8 | 7.8 | 7.8 | 7.8 | 7.8 | 7.8 | 7.8 |
| | | ≤ 440 Bhn or ≤ 47 HRc | 85 | RPM | 2598 | 1732 | 1299 | 866 | 649 | 520 | 433 |
| | | | (68-102) | Fr | 0.0012 | 0.0018 | 0.0024 | 0.0036 | 0.0048 | 0.0060 | 0.0072 |
| | | | | Feed (ipm) | 3.1 | 3.1 | 3.1 | 3.1 | 3.1 | 3.1 | 3.1 |
| N | **ALUMINUM ALLOYS 2017, 2024, 356, 6061, 7075** | ≤ 80 Bhn or ≤ 47 HRb | 770 | RPM | 23531 | 15687 | 11766 | 7844 | 5883 | 4706 | 3922 |
| | | | (616-924) | Fr | 0.0049 | 0.0073 | 0.0098 | 0.0147 | 0.0195 | 0.0244 | 0.0293 |
| | | | | Feed (ipm) | 115.0 | 115.0 | 115.0 | 115.0 | 115.0 | 115.0 | 115.0 |
| | | ≤ 150 Bhn or ≤ 7 HRc | 660 | RPM | 20170 | 13446 | 10085 | 6723 | 5042 | 4034 | 3362 |
| | | | (528-792) | Fr | 0.0050 | 0.0074 | 0.0099 | 0.0149 | 0.0198 | 0.0248 | 0.0297 |
| | | | | Feed (ipm) | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| | **COPPER ALLOYS Alum Bronze, C110, Muntz Brass** | ≤ 140 Bhn or ≤ 3 HRc | 550 | RPM | 16808 | 11205 | 8404 | 5603 | 4202 | 3362 | 2801 |
| | | | (440-660) | Fr | 0.0020 | 0.0030 | 0.0040 | 0.0060 | 0.0080 | 0.0100 | 0.0120 |
| | | | | Feed (ipm) | 33.5 | 33.5 | 33.5 | 33.5 | 33.5 | 33.5 | 33.5 |
| | | ≤ 200 Bhn or ≤ 23 HRc | 440 | RPM | 13446 | 8964 | 6723 | 4482 | 3362 | 2689 | 2241 |
| | | | (352-528) | Fr | 0.0020 | 0.0030 | 0.0040 | 0.0060 | 0.0080 | 0.0100 | 0.0120 |
| | | | | Feed (ipm) | 27.0 | 27.0 | 27.0 | 27.0 | 27.0 | 27.0 | 27.0 |

**Note:**

- Bhn (Brinell) HRc (Rockwell C) HRb (Rockwell B)
- rpm = sfm x 3.82 / $D_1$
- ipm = (inch / revolution) x rpm
- reduce speed and feed for materials harder than listed
- refer to the KYOCERA SGS Tool Wizard for complete technical information (www.kyocera-sgstool.com)

SGSTOOLWIZARD2.0
www.sgstoolwizard.com

| Series 140M 5D Metric | | Hardness | Vc (m/min) | | Diameter ($D_1$) (mm) 3 | 6 | 8 | 10 | 12 | 14 | 16 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| P | CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536 | ≤ 175 Bhn or ≤ 7 HRc | 130 | RPM | 13733 | 6867 | 5150 | 4120 | 3433 | 2943 | 2575 |
| | | | (104-155) | Fr | 0.095 | 0.189 | 0.252 | 0.316 | 0.379 | 0.442 | 0.505 |
| | | | | Feed (mm/min) | 1300 | 1300 | 1300 | 1300 | 1300 | 1300 | 1300 |
| | | ≤ 275 Bhn or ≤ 28 HRc | 116 | RPM | 12279 | 6140 | 4605 | 3684 | 3070 | 2631 | 2302 |
| | | | (93-139) | Fr | 0.086 | 0.171 | 0.228 | 0.285 | 0.342 | 0.399 | 0.456 |
| | | | | Feed (mm/min) | 1050 | 1050 | 1050 | 1050 | 1050 | 1050 | 1050 |
| | | ≤ 425 Bhn or ≤ 45 HRc | 67 | RPM | 7109 | 3555 | 2666 | 2133 | 1777 | 1523 | 1333 |
| | | | (54-80) | Fr | 0.071 | 0.142 | 0.189 | 0.237 | 0.284 | 0.332 | 0.379 |
| | | | | Feed (mm/min) | 505 | 505 | 505 | 505 | 505 | 505 | 505 |
| | ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100 | ≤ 275 Bhn or ≤ 28 HRc | 101 | RPM | 10664 | 5332 | 3999 | 3199 | 2666 | 2285 | 1999 |
| | | | (80-121) | Fr | 0.071 | 0.143 | 0.190 | 0.238 | 0.285 | 0.333 | 0.380 |
| | | | | Feed (mm/min) | 760 | 760 | 760 | 760 | 760 | 760 | 760 |
| | | ≤ 375 Bhn or ≤ 40 HRc | 61 | RPM | 6463 | 3231 | 2424 | 1939 | 1616 | 1385 | 1212 |
| | | | (49-73) | Fr | 0.062 | 0.124 | 0.165 | 0.206 | 0.248 | 0.289 | 0.330 |
| | | | | Feed (mm/min) | 400 | 400 | 400 | 400 | 400 | 400 | 400 |
| | | ≤ 450 Bhn or ≤ 48 HRc | 43 | RPM | 4524 | 2262 | 1696 | 1357 | 1131 | 969 | 848 |
| | | | (34-51) | Fr | 0.043 | 0.086 | 0.115 | 0.144 | 0.172 | 0.201 | 0.230 |
| | | | | Feed (mm/min) | 195 | 195 | 195 | 195 | 195 | 195 | 195 |
| H | TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2 | ≤ 200 Bhn or ≤ 13 HRc | 44 | RPM | 4686 | 2343 | 1757 | 1406 | 1171 | 1004 | 879 |
| | | | (35-53) | Fr | 0.061 | 0.122 | 0.162 | 0.203 | 0.243 | 0.284 | 0.324 |
| | | | | Feed (mm/min) | 285 | 285 | 285 | 285 | 285 | 285 | 285 |
| | | ≤ 375 Bhn or ≤ 40 HRc | 29 | RPM | 3070 | 1535 | 1151 | 921 | 767 | 658 | 576 |
| | | | (23-35) | Fr | 0.029 | 0.059 | 0.078 | 0.098 | 0.117 | 0.137 | 0.156 |
| | | | | Feed (mm/min) | 90 | 90 | 90 | 90 | 90 | 90 | 90 |
| | | ≤ 475 Bhn or ≤ 50 HRc | 26 | RPM | 2747 | 1373 | 1030 | 824 | 687 | 589 | 515 |
| | | | (21-31) | Fr | 0.018 | 0.036 | 0.049 | 0.061 | 0.073 | 0.085 | 0.097 |
| | | | | Feed (mm/min) | 50 | 50 | 50 | 50 | 50 | 50 | 50 |
| K | CAST IRONS Gray, Malleable, Ductile | ≤ 220 Bhn or ≤ 19 HRc | 110 | RPM | 11633 | 5816 | 4362 | 3490 | 2908 | 2493 | 2181 |
| | | | (88-132) | Fr | 0.109 | 0.218 | 0.291 | 0.364 | 0.437 | 0.509 | 0.582 |
| | | | | Feed (mm/min) | 1270 | 1270 | 1270 | 1270 | 1270 | 1270 | 1270 |
| | | ≤ 260 Bhn or ≤ 26 HRc | 102 | RPM | 10825 | 5413 | 4059 | 3248 | 2706 | 2320 | 2030 |
| | | | (82-123) | Fr | 0.109 | 0.218 | 0.291 | 0.363 | 0.436 | 0.509 | 0.581 |
| | | | | Feed (mm/min) | 1180 | 1180 | 1180 | 1180 | 1180 | 1180 | 1180 |
| M | STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F, 440F | ≤ 185 Bhn or ≤ 9 HRc | 93 | RPM | 9856 | 4928 | 3696 | 2957 | 2464 | 2112 | 1848 |
| | | | (74-112) | Fr | 0.061 | 0.123 | 0.164 | 0.205 | 0.246 | 0.286 | 0.327 |
| | | | | Feed (mm/min) | 605 | 605 | 605 | 605 | 605 | 605 | 605 |
| | | ≤ 275 Bhn or ≤ 28 HRc | 59 | RPM | 6301 | 3151 | 2363 | 1890 | 1575 | 1350 | 1181 |
| | | | (48-71) | Fr | 0.048 | 0.095 | 0.127 | 0.159 | 0.190 | 0.222 | 0.254 |
| | | | | Feed (mm/min) | 300 | 300 | 300 | 300 | 300 | 300 | 300 |
| | STAINLESS STEELS (DIFFICULT) 304, 316, 321, 13-8 PH, 15-5PH, 17-4 PH, Custom 450 | ≤ 275 Bhn or ≤ 28 HRc | 46 | RPM | 4847 | 2424 | 1818 | 1454 | 1212 | 1039 | 909 |
| | | | (37-55) | Fr | 0.047 | 0.095 | 0.127 | 0.158 | 0.190 | 0.221 | 0.253 |
| | | | | Feed (mm/min) | 230 | 230 | 230 | 230 | 230 | 230 | 230 |
| | | ≤ 375 Bhn or ≤ 40 HRc | 34 | RPM | 3555 | 1777 | 1333 | 1066 | 889 | 762 | 666 |
| | | | (27-40) | Fr | 0.042 | 0.084 | 0.113 | 0.141 | 0.169 | 0.197 | 0.225 |
| | | | | Feed (mm/min) | 150 | 150 | 150 | 150 | 150 | 150 | 150 |

*continued on next page*

| | Series 140M 5D Metric | Hardness | Vc (m/min) | | Diameter ($D_1$) (mm) 3 | 6 | 8 | 10 | 12 | 14 | 16 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| S | **SUPER ALLOYS (NICKEL , COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy, Monel 400, Rene, Waspaloy** | ≤ 300 Bhn or ≤ 32 HRc | 29 | RPM | 3070 | 1535 | 1151 | 921 | 767 | 658 | 576 |
| | | | (23-35) | Fr | 0.020 | 0.039 | 0.052 | 0.065 | 0.078 | 0.091 | 0.104 |
| | | | | Feed (mm/min) | 60 | 60 | 60 | 60 | 60 | 60 | 60 |
| | | ≤ 400 Bhn or ≤ 43 HRc | 15 | RPM | 1616 | 808 | 606 | 485 | 404 | 346 | 303 |
| | | | (12-18) | Fr | 0.015 | 0.031 | 0.041 | 0.052 | 0.062 | 0.072 | 0.083 |
| | | | | Feed (mm/min) | 25 | 25 | 25 | 25 | 25 | 25 | 25 |
| | **TITANIUM ALLOYS Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si, Ti-6Al4V** | ≤ 275 Bhn or ≤ 28 HRc | 66 | RPM | 6947 | 3474 | 2605 | 2084 | 1737 | 1489 | 1303 |
| | | | (52-79) | Fr | 0.040 | 0.079 | 0.106 | 0.132 | 0.158 | 0.185 | 0.211 |
| | | | | Feed (mm/min) | 275 | 275 | 275 | 275 | 275 | 275 | 275 |
| | | ≤ 350 Bhn or ≤ 38 HRc | 49 | RPM | 5170 | 2585 | 1939 | 1551 | 1293 | 1108 | 969 |
| | | | (39-59) | Fr | 0.039 | 0.077 | 0.103 | 0.129 | 0.155 | 0.181 | 0.206 |
| | | | | Feed (mm/min) | 200 | 200 | 200 | 200 | 200 | 200 | 200 |
| | | ≤ 440 Bhn or ≤ 47 HRc | 26 | RPM | 2747 | 1373 | 1030 | 824 | 687 | 589 | 515 |
| | | | (21-31) | Fr | 0.029 | 0.058 | 0.078 | 0.097 | 0.117 | 0.136 | 0.155 |
| | | | | Feed (mm/min) | 80 | 80 | 80 | 80 | 80 | 80 | 80 |
| N | **ALUMINUM ALLOYS 2017, 2024, 356, 6061, 7075** | ≤ 80 Bhn or ≤ 47 HRb | 235 | RPM | 24882 | 12441 | 9331 | 7465 | 6220 | 5332 | 4665 |
| | | | (188-282) | Fr | 0.118 | 0.237 | 0.316 | 0.395 | 0.473 | 0.552 | 0.631 |
| | | | | Feed (mm/min) | 2945 | 2945 | 2945 | 2945 | 2945 | 2945 | 2945 |
| | | ≤ 150 Bhn or ≤ 7 HRc | 201 | RPM | 21327 | 10664 | 7998 | 6398 | 5332 | 4570 | 3999 |
| | | | (161-241) | Fr | 0.119 | 0.238 | 0.318 | 0.397 | 0.476 | 0.556 | 0.635 |
| | | | | Feed (mm/min) | 2540 | 2540 | 2540 | 2540 | 2540 | 2540 | 2540 |
| | **COPPER ALLOYS Alum Bronze, C110, Muntz Brass** | ≤ 140 Bhn or ≤ 3 HRc | 168 | RPM | 17773 | 8886 | 6665 | 5332 | 4443 | 3808 | 3332 |
| | | | (134-201) | Fr | 0.048 | 0.096 | 0.128 | 0.159 | 0.191 | 0.223 | 0.255 |
| | | | | Feed (mm/min) | 850 | 850 | 850 | 850 | 850 | 850 | 850 |
| | | ≤ 200 Bhn or ≤ 23 HRc | 134 | RPM | 14218 | 7109 | 5332 | 4265 | 3555 | 3047 | 2666 |
| | | | (107-161) | Fr | 0.048 | 0.096 | 0.128 | 0.161 | 0.193 | 0.225 | 0.257 |
| | | | | Feed (mm/min) | 685 | 685 | 685 | 685 | 685 | 685 | 685 |

**Note:**
- Bhn (Brinell) HRc (Rockwell C) HRb (Rockwell B)
- rpm = (1000 x m / min) / (3.14 x $D_1$)
- mm / min = (mm / revolution) x rpm
- reduce speed and feed for materials harder than listed
- refer to the KYOCERA SGS Tool Wizard for complete technical information (www.kyocera-sgstool.com)

SGSTOOLWIZARD2.0
www.sgstoolwizard.com

IC Carb
High Performance Internal Coolant Drills

| | Series 140 8D Fractional | Hardness | Vc (sfm) | | Diameter ($D_1$) (inch) 1/8 | 3/16 | 1/4 | 3/8 | 1/2 | 5/8 | 3/4 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| P | CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536 | ≤ 175 Bhn or ≤ 7 HRc | 405 | RPM | 12377 | 8251 | 6188 | 4126 | 3094 | 2475 | 2063 |
| | | | (324-486) | Fr | 0.0036 | 0.0053 | 0.0071 | 0.0107 | 0.0142 | 0.0178 | 0.0213 |
| | | | | Feed (ipm) | 44.0 | 44.0 | 44.0 | 44.0 | 44.0 | 44.0 | 44.0 |
| | | ≤ 275 Bhn or ≤ 28 HRc | 370 | RPM | 11307 | 7538 | 5654 | 3769 | 2827 | 2261 | 1885 |
| | | | (296-444) | Fr | 0.0030 | 0.0045 | 0.0060 | 0.0090 | 0.0120 | 0.0150 | 0.0180 |
| | | | | Feed (ipm) | 34.0 | 34.0 | 34.0 | 34.0 | 34.0 | 34.0 | 34.0 |
| | | ≤ 425 Bhn or ≤ 45 HRc | 210 | RPM | 6418 | 4278 | 3209 | 2139 | 1604 | 1284 | 1070 |
| | | | (168-252) | Fr | 0.0026 | 0.0039 | 0.0051 | 0.0077 | 0.0103 | 0.0129 | 0.0154 |
| | | | | Feed (ipm) | 16.5 | 16.5 | 16.5 | 16.5 | 16.5 | 16.5 | 16.5 |
| | ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100 | ≤ 275 Bhn or ≤ 28 HRc | 320 | RPM | 9779 | 6519 | 4890 | 3260 | 2445 | 1956 | 1630 |
| | | | (256-384) | Fr | 0.0026 | 0.0038 | 0.0051 | 0.0077 | 0.0102 | 0.0128 | 0.0153 |
| | | | | Feed (ipm) | 25.0 | 25.0 | 25.0 | 25.0 | 25.0 | 25.0 | 25.0 |
| | | ≤ 375 Bhn or ≤ 40 HRc | 190 | RPM | 5806 | 3871 | 2903 | 1935 | 1452 | 1161 | 968 |
| | | | (152-228) | Fr | 0.0020 | 0.0030 | 0.0040 | 0.0059 | 0.0079 | 0.0099 | 0.0119 |
| | | | | Feed (ipm) | 11.5 | 11.5 | 11.5 | 11.5 | 11.5 | 11.5 | 11.5 |
| | | ≤ 450 Bhn or ≤ 48 HRc | 135 | RPM | 4126 | 2750 | 2063 | 1375 | 1031 | 825 | 688 |
| | | | (108-162) | Fr | 0.0016 | 0.0024 | 0.0032 | 0.0047 | 0.0063 | 0.0079 | 0.0095 |
| | | | | Feed (ipm) | 6.5 | 6.5 | 6.5 | 6.5 | 6.5 | 6.5 | 6.5 |
| H | TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2 | ≤ 200 Bhn or ≤ 13 HRc | 140 | RPM | 4278 | 2852 | 2139 | 1426 | 1070 | 856 | 713 |
| | | | (112-168) | Fr | 0.0020 | 0.0030 | 0.0040 | 0.0060 | 0.0079 | 0.0099 | 0.0119 |
| | | | | Feed (ipm) | 8.5 | 8.5 | 8.5 | 8.5 | 8.5 | 8.5 | 8.5 |
| | | ≤ 375 Bhn or ≤ 40 HRc | 90 | RPM | 2750 | 1834 | 1375 | 917 | 688 | 550 | 458 |
| | | | (72-108) | Fr | 0.0011 | 0.0016 | 0.0022 | 0.0033 | 0.0044 | 0.0055 | 0.0065 |
| | | | | Feed (ipm) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |
| | | ≤ 475 Bhn or ≤ 50 HRc | 80 | RPM | 2445 | 1630 | 1222 | 815 | 611 | 489 | 407 |
| | | | (64-96) | Fr | 0.0006 | 0.0009 | 0.0012 | 0.0018 | 0.0025 | 0.0031 | 0.0037 |
| | | | | Feed (ipm) | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 |
| K | CAST IRONS Gray, Malleable, Ductile | ≤ 220 Bhn or ≤ 19 HRc | 350 | RPM | 10696 | 7131 | 5348 | 3565 | 2674 | 2139 | 1783 |
| | | | (280-420) | Fr | 0.0037 | 0.0056 | 0.0075 | 0.0112 | 0.0150 | 0.0187 | 0.0224 |
| | | | | Feed (ipm) | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 |
| | | ≤ 260 Bhn or ≤ 26 HRc | 310 | RPM | 9474 | 6316 | 4737 | 3158 | 2368 | 1895 | 1579 |
| | | | (248-372) | Fr | 0.0039 | 0.0059 | 0.0078 | 0.0117 | 0.0156 | 0.0195 | 0.0234 |
| | | | | Feed (ipm) | 37.0 | 37.0 | 37.0 | 37.0 | 37.0 | 37.0 | 37.0 |
| M | STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F, 440F | ≤ 185 Bhn or ≤ 9 HRc | 290 | RPM | 8862 | 5908 | 4431 | 2954 | 2216 | 1772 | 1477 |
| | | | (232-348) | Fr | 0.0020 | 0.0030 | 0.0039 | 0.0059 | 0.0079 | 0.0099 | 0.0118 |
| | | | | Feed (ipm) | 17.5 | 17.5 | 17.5 | 17.5 | 17.5 | 17.5 | 17.5 |
| | | ≤ 275 Bhn or ≤ 28 HRc | 180 | RPM | 5501 | 3667 | 2750 | 1834 | 1375 | 1100 | 917 |
| | | | (144-216) | Fr | 0.0018 | 0.0027 | 0.0036 | 0.0055 | 0.0073 | 0.0091 | 0.0109 |
| | | | | Feed (ipm) | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 |
| | STAINLESS STEELS (DIFFICULT) 304, 316, 321, 13-8 PH, 15-5PH, 17-4 PH, Custom 450 | ≤ 275 Bhn or ≤ 28 HRc | 130 | RPM | 3973 | 2649 | 1986 | 1324 | 993 | 795 | 662 |
| | | | (104-156) | Fr | 0.0018 | 0.0026 | 0.0035 | 0.0053 | 0.0070 | 0.0088 | 0.0106 |
| | | | | Feed (ipm) | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 |
| | | ≤ 375 Bhn or ≤ 40 HRc | 95 | RPM | 2903 | 1935 | 1452 | 968 | 726 | 581 | 484 |
| | | | (76-114) | Fr | 0.0016 | 0.0023 | 0.0031 | 0.0047 | 0.0062 | 0.0078 | 0.0093 |
| | | | | Feed (ipm) | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 |

*(continued on next page)*

| | Series 140 8D Fractional | Hardness | Vc (sfm) | | Diameter ($D_1$) (inch) 1/8 | 3/16 | 1/4 | 3/8 | 1/2 | 5/8 | 3/4 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| S | **SUPER ALLOYS (NICKEL , COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy, Monel 400, Rene, Waspaloy** | ≤ 300 Bhn or ≤ 32 HRc | 65 | RPM | 1986 | 1324 | 993 | 662 | 497 | 397 | 331 |
| | | | (52-78) | Fr | 0.0009 | 0.0013 | 0.0017 | 0.0026 | 0.0034 | 0.0043 | 0.0051 |
| | | | | Feed (ipm) | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 |
| | | ≤ 400 Bhn or ≤ 43 HRc | 35 | RPM | 1070 | 713 | 535 | 357 | 267 | 214 | 178 |
| | | | (28-42) | Fr | 0.0006 | 0.0008 | 0.0011 | 0.0017 | 0.0022 | 0.0028 | 0.0034 |
| | | | | Feed (ipm) | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 |
| | **TITANIUM ALLOYS Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si, Ti-6Al4V** | ≤ 275 Bhn or ≤ 28 HRc | 185 | RPM | 5654 | 3769 | 2827 | 1885 | 1413 | 1131 | 942 |
| | | | (148-222) | Fr | 0.0016 | 0.0024 | 0.0032 | 0.0048 | 0.0064 | 0.0080 | 0.0096 |
| | | | | Feed (ipm) | 9.0 | 9.0 | 9.0 | 9.0 | 9.0 | 9.0 | 9.0 |
| | | ≤ 350 Bhn or ≤ 38 HRc | 140 | RPM | 4278 | 2852 | 2139 | 1426 | 1070 | 856 | 713 |
| | | | (112-168) | Fr | 0.0012 | 0.0018 | 0.0023 | 0.0035 | 0.0047 | 0.0058 | 0.0070 |
| | | | | Feed (ipm) | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 |
| | | ≤ 440 Bhn or ≤ 47 HRc | 75 | RPM | 2292 | 1528 | 1146 | 764 | 573 | 458 | 382 |
| | | | (60-90) | Fr | 0.0010 | 0.0015 | 0.0020 | 0.0030 | 0.0040 | 0.0050 | 0.0060 |
| | | | | Feed (ipm) | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 |
| N | **ALUMINUM ALLOYS 2017, 2024, 356, 6061, 7075** | ≤ 80 Bhn or ≤ 47 HRb | 730 | RPM | 22309 | 14873 | 11154 | 7436 | 5577 | 4462 | 3718 |
| | | | (584-876) | Fr | 0.0045 | 0.0067 | 0.0090 | 0.0134 | 0.0179 | 0.0224 | 0.0269 |
| | | | | Feed (ipm) | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| | | ≤ 150 Bhn or ≤ 7 HRc | 635 | RPM | 19406 | 12937 | 9703 | 6469 | 4851 | 3881 | 3234 |
| | | | (508-762) | Fr | 0.0046 | 0.0070 | 0.0093 | 0.0139 | 0.0186 | 0.0232 | 0.0278 |
| | | | | Feed (ipm) | 90.0 | 90.0 | 90.0 | 90.0 | 90.0 | 90.0 | 90.0 |
| | **COPPER ALLOYS Alum Bronze, C110, Muntz Brass** | ≤ 140 Bhn or ≤ 3 HRc | 255 | RPM | 7793 | 5195 | 3896 | 2598 | 1948 | 1559 | 1299 |
| | | | (204-306) | Fr | 0.0018 | 0.0027 | 0.0036 | 0.0054 | 0.0072 | 0.0090 | 0.0108 |
| | | | | Feed (ipm) | 14.0 | 14.0 | 14.0 | 14.0 | 14.0 | 14.0 | 14.0 |
| | | ≤ 200 Bhn or ≤ 23 HRc | 235 | RPM | 7182 | 4788 | 3591 | 2394 | 1795 | 1436 | 1197 |
| | | | (188-282) | Fr | 0.0018 | 0.0027 | 0.0036 | 0.0054 | 0.0072 | 0.0091 | 0.0109 |
| | | | | Feed (ipm) | 13.0 | 13.0 | 13.0 | 13.0 | 13.0 | 13.0 | 13.0 |

**Note:**
- Bhn (Brinell) HRc (Rockwell C) HRb (Rockwell B)
- rpm = Vc x 3.82 / $D_1$
- ipm = Fr x rpm
- reduce speed and feed for materials harder than listed
- refer to the KYOCERA SGS Tool Wizard for complete technical information (www.kyocera-sgstool.com)

SGSTOOLWIZARD2.0
www.sgstoolwizard.com

IC-Carb
High Performance Internal Coolant Drills

| | Series 140M 8D Metric | Hardness | Vc (m/min) | | Diameter ($D_1$) (mm) 3 | 6 | 8 | 10 | 12 | 14 | 16 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| P | CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536 | ≤ 175 Bhn or ≤ 7 HRc | 123 | RPM | 13087 | 6544 | 4908 | 3926 | 3272 | 2804 | 2454 |
| | | | (100-170) | Fr | 0.085 | 0.171 | 0.228 | 0.285 | 0.342 | 0.399 | 0.455 |
| | | | | Feed (mm/min) | 1118 | 1118 | 1118 | 1118 | 1118 | 1118 | 1118 |
| | | ≤ 275 Bhn or ≤ 28 HRc | 113 | RPM | 11956 | 5978 | 4484 | 3587 | 2989 | 2562 | 2242 |
| | | | (90-135) | Fr | 0.072 | 0.144 | 0.193 | 0.241 | 0.289 | 0.337 | 0.385 |
| | | | | Feed (mm/min) | 864 | 864 | 864 | 864 | 864 | 864 | 864 |
| | | ≤ 425 Bhn or ≤ 45 HRc | 64 | RPM | 6786 | 3393 | 2545 | 2036 | 1696 | 1454 | 1272 |
| | | | (51-77) | Fr | 0.062 | 0.124 | 0.165 | 0.206 | 0.247 | 0.288 | 0.329 |
| | | | | Feed (mm/min) | 419 | 419 | 419 | 419 | 419 | 419 | 419 |
| | ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100 | ≤ 275 Bhn or ≤ 28 HRc | 98 | RPM | 10340 | 5170 | 3878 | 3102 | 2585 | 2216 | 1939 |
| | | | (78-117) | Fr | 0.061 | 0.123 | 0.164 | 0.205 | 0.246 | 0.287 | 0.328 |
| | | | | Feed (mm/min) | 635 | 635 | 635 | 635 | 635 | 635 | 635 |
| | | ≤ 375 Bhn or ≤ 40 HRc | 58 | RPM | 6140 | 3070 | 2302 | 1842 | 1535 | 1316 | 1151 |
| | | | (46-69) | Fr | 0.048 | 0.095 | 0.127 | 0.159 | 0.190 | 0.222 | 0.254 |
| | | | | Feed (mm/min) | 292 | 292 | 292 | 292 | 292 | 292 | 292 |
| | | ≤ 450 Bhn or ≤ 48 HRc | 41 | RPM | 4362 | 2181 | 1636 | 1309 | 1091 | 935 | 818 |
| | | | (33-49) | Fr | 0.038 | 0.076 | 0.101 | 0.126 | 0.151 | 0.177 | 0.202 |
| | | | | Feed (mm/min) | 165 | 165 | 165 | 165 | 165 | 165 | 165 |
| H | TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2 | ≤ 200 Bhn or ≤ 13 HRc | 43 | RPM | 4524 | 2262 | 1696 | 1357 | 1131 | 969 | 848 |
| | | | (34-51) | Fr | 0.048 | 0.095 | 0.127 | 0.159 | 0.191 | 0.223 | 0.255 |
| | | | | Feed (mm/min) | 216 | 216 | 216 | 216 | 216 | 216 | 216 |
| | | ≤ 375 Bhn or ≤ 40 HRc | 27 | RPM | 2908 | 1454 | 1091 | 872 | 727 | 623 | 545 |
| | | | (22-33) | Fr | 0.026 | 0.052 | 0.070 | 0.087 | 0.105 | 0.122 | 0.140 |
| | | | | Feed (mm/min) | 76 | 76 | 76 | 76 | 76 | 76 | 76 |
| | | ≤ 475 Bhn or ≤ 50 HRc | 24 | RPM | 2585 | 1293 | 969 | 776 | 646 | 554 | 485 |
| | | | (20-29) | Fr | 0.015 | 0.029 | 0.039 | 0.049 | 0.059 | 0.069 | 0.079 |
| | | | | Feed (mm/min) | 38 | 38 | 38 | 38 | 38 | 38 | 38 |
| K | CAST IRONS Gray, Malleable, Ductile | ≤ 220 Bhn or ≤ 19 HRc | 107 | RPM | 11310 | 5655 | 4241 | 3393 | 2827 | 2424 | 2121 |
| | | | (85-128) | Fr | 0.090 | 0.180 | 0.240 | 0.299 | 0.359 | 0.419 | 0.479 |
| | | | | Feed (mm/min) | 1016 | 1016 | 1016 | 1016 | 1016 | 1016 | 1016 |
| | | ≤ 260 Bhn or ≤ 26 HRc | 94 | RPM | 10017 | 5009 | 3756 | 3005 | 2504 | 2147 | 1878 |
| | | | (76-113) | Fr | 0.094 | 0.188 | 0.250 | 0.313 | 0.375 | 0.438 | 0.500 |
| | | | | Feed (mm/min) | 940 | 940 | 940 | 940 | 940 | 940 | 940 |
| M | STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F, 440F | ≤ 185 Bhn or ≤ 9 HRc | 88 | RPM | 9371 | 4686 | 3514 | 2811 | 2343 | 2008 | 1757 |
| | | | (71-106) | Fr | 0.047 | 0.095 | 0.126 | 0.158 | 0.190 | 0.221 | 0.253 |
| | | | | Feed (mm/min) | 445 | 445 | 445 | 445 | 445 | 445 | 445 |
| | | ≤ 275 Bhn or ≤ 28 HRc | 55 | RPM | 5816 | 2908 | 2181 | 1745 | 1454 | 1246 | 1091 |
| | | | (44-66) | Fr | 0.044 | 0.087 | 0.116 | 0.146 | 0.175 | 0.204 | 0.233 |
| | | | | Feed (mm/min) | 254 | 254 | 254 | 254 | 254 | 254 | 254 |
| | STAINLESS STEELS (DIFFICULT) 304, 316, 321, 13-8 PH, 15-5PH, 17-4 PH, Custom 450 | ≤ 275 Bhn or ≤ 28 HRc | 40 | RPM | 4201 | 2100 | 1575 | 1260 | 1050 | 900 | 788 |
| | | | (32-48) | Fr | 0.042 | 0.085 | 0.113 | 0.141 | 0.169 | 0.198 | 0.226 |
| | | | | Feed (mm/min) | 178 | 178 | 178 | 178 | 178 | 178 | 178 |
| | | ≤ 375 Bhn or ≤ 40 HRc | 29 | RPM | 3070 | 1535 | 1151 | 921 | 767 | 658 | 576 |
| | | | (23-35) | Fr | 0.037 | 0.074 | 0.099 | 0.124 | 0.149 | 0.174 | 0.199 |
| | | | | Feed (mm/min) | 114 | 114 | 114 | 114 | 114 | 114 | 114 |

*(continued on next page)*

| | Series 140M 8D Metric | Hardness | Vc (m/min) | | Diameter ($D_1$) (mm) 3 | 6 | 8 | 10 | 12 | 14 | 16 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| S | **SUPER ALLOYS (NICKEL , COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy, Monel 400, Rene, Waspaloy** | ≤ 300 Bhn or ≤ 32 HRc | 20 | RPM | 2100 | 1050 | 788 | 630 | 525 | 450 | 394 |
| | | | (16-24) | Fr | 0.021 | 0.041 | 0.055 | 0.069 | 0.082 | 0.096 | 0.110 |
| | | | | Feed (mm/min) | 43 | 43 | 43 | 43 | 43 | 43 | 43 |
| | | ≤ 400 Bhn or ≤ 43 HRc | 11 | RPM | 1131 | 565 | 424 | 339 | 283 | 242 | 212 |
| | | | (9-13) | Fr | 0.013 | 0.027 | 0.036 | 0.045 | 0.054 | 0.063 | 0.072 |
| | | | | Feed (mm/min) | 15 | 15 | 15 | 15 | 15 | 15 | 15 |
| | **TITANIUM ALLOYS Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si, Ti-6Al4V** | ≤ 275 Bhn or ≤ 28 HRc | 56 | RPM | 5978 | 2989 | 2242 | 1793 | 1495 | 1281 | 1121 |
| | | | (45-68) | Fr | 0.038 | 0.076 | 0.102 | 0.127 | 0.153 | 0.178 | 0.204 |
| | | | | Feed (mm/min) | 229 | 229 | 229 | 229 | 229 | 229 | 229 |
| | | ≤ 350 Bhn or ≤ 38 HRc | 43 | RPM | 4524 | 2262 | 1696 | 1357 | 1131 | 969 | 848 |
| | | | (34-51) | Fr | 0.028 | 0.056 | 0.075 | 0.094 | 0.112 | 0.131 | 0.150 |
| | | | | Feed (mm/min) | 127 | 127 | 127 | 127 | 127 | 127 | 127 |
| | | ≤ 440 Bhn or ≤ 47 HRc | 23 | RPM | 2424 | 1212 | 909 | 727 | 606 | 519 | 454 |
| | | | (18-27) | Fr | 0.024 | 0.048 | 0.064 | 0.080 | 0.096 | 0.112 | 0.129 |
| | | | | Feed (mm/min) | 58 | 58 | 58 | 58 | 58 | 58 | 58 |
| N | **ALUMINUM ALLOYS 2017, 2024, 356, 6061, 7075** | ≤ 80 Bhn or ≤ 47 HRb | 223 | RPM | 23589 | 11795 | 8846 | 7077 | 5897 | 5055 | 4423 |
| | | | (178-267) | Fr | 0.108 | 0.215 | 0.287 | 0.359 | 0.431 | 0.502 | 0.574 |
| | | | | Feed (mm/min) | 2540 | 2540 | 2540 | 2540 | 2540 | 2540 | 2540 |
| | | ≤ 150 Bhn or ≤ 7 HRc | 194 | RPM | 20519 | 10260 | 7695 | 6156 | 5130 | 4397 | 3847 |
| | | | (155-232) | Fr | 0.111 | 0.223 | 0.297 | 0.371 | 0.446 | 0.520 | 0.594 |
| | | | | Feed (mm/min) | 2286 | 2286 | 2286 | 2286 | 2286 | 2286 | 2286 |
| | **COPPER ALLOYS Alum Bronze, C110, Muntz Brass** | ≤ 140 Bhn or ≤ 3 HRc | 78 | RPM | 8240 | 4120 | 3090 | 2472 | 2060 | 1766 | 1545 |
| | | | (62-93) | Fr | 0.043 | 0.086 | 0.115 | 0.144 | 0.173 | 0.201 | 0.230 |
| | | | | Feed (mm/min) | 356 | 356 | 356 | 356 | 356 | 356 | 356 |
| | | ≤ 200 Bhn or ≤ 23 HRc | 72 | RPM | 7594 | 3797 | 2848 | 2278 | 1898 | 1627 | 1424 |
| | | | (57-86) | Fr | 0.043 | 0.087 | 0.116 | 0.145 | 0.174 | 0.203 | 0.232 |
| | | | | Feed (mm/min) | 330 | 330 | 330 | 330 | 330 | 330 | 330 |

**Note:**
- Bhn (Brinell) HRc (Rockwell C) HRb (Rockwell B)
- rpm = (Vc x 1000) / ($D_1$ x 3.14)
- mm/min = Fr x rpm
- reduce speed and feed for materials harder than listed
- refer to the KYOCERA SGS Tool Wizard for complete technical information (www.kyocera-sgstool.com)

SGSTOOLWIZARD2.0
www.sgstoolwizard.com


KYOCERA
SGS Precision Tools

## SERIES 120 COMPOSITE DRILL

The key features of the 8 Facet Double Angle Series 120 drill design offers application benefits beyond that of other high performance drills in its category. Each feature of this 8 facet design was engineered as a solution towards addressing the issues commonly encountered during Composite drilling. This unique High Performance design successfully creates an accurate hole without splintering or delamination.

### A DOUBLE MARGIN CONSTRUCTION

- improves drill stability for better hole finish and size control
- allows coolant to reach the point for improved hole quality and extended tool life

### B DOUBLE ANGLE POINT

- minimizes workpiece delamination on drill entry and exit
- redistributes loads along multiple cutting edges for improved performance

### C NOTCHED POINT

- reduces cutting forces at the drill center for enhanced performance and tool life
- manufactured exclusively with Di-NAMITE coating for even wear, extended tool life, and improved finishes.

**PERFORMANCE. PRECISION. PASSION.**

SERIES 120 COMPOSITE DRILL

KYOCERA
SGS Precision Tools

# PERFORMANCE.

- Double margin construction design stabilized the drill for greater hole accuracy and improved surface finish in final hole.
- Minimized delamination at hole entry/exit.
- Manufactured exclusively with Di-NAMITE coating for even wear, extended tool life and improved finishes.

# PRECISION.

A test was conducted of our CFRP drill to determine the necessity of coating when drilling Carbon Fiber material. Fifty holes were drilled using a special size .190" CFRP drill. The tool's design produces acceptable quality holes; but as shown in the photos, early edge wear on the uncoated drill resulted in holes with frayed edges. The diamond coated drill produced all 50 holes with little to no fraying and edge wear was 38% less than the uncoated drills.
The geometry of the 8 Facet drill with the Di-NAMITE coating is a necessity for additional tool life and productivity when manufacturing Carbon Fiber material.

| SPEED | FEED | DIAMETER | HOLE DEPTH | WORKPIECE | MACHINE TYPE | COOLANT |
|---|---|---|---|---|---|---|
| 5,000 rpm | 5.0 ipm | .190" | .240" | CFRP | Vertical Machining Center | none |

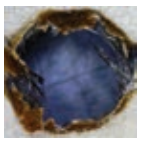
| TOOL NO. | TYPE DESCRIPTION | TIR IN MACHINE | USAGE |
|---|---|---|---|
| 1 | .190" CFRP drill uncoated | .0001" | 50 holes |

**INSPECTION NOTES** Good hole quality for 1st 3 holes. fraying starting by 3rd hole, .0021" wear

1ST HOLE

3RD HOLE

50TH HOLE



AFTER 50 HOLES

| TOOL NO. | TYPE DESCRIPTION | TIR IN MACHINE | USAGE |
|---|---|---|---|
| 2 | .190" CFRP drill diamond | .0002" | 50 holes |

**INSPECTION NOTES** Good hole quality all 50 holes slight fraying, .0013" wear

1ST HOLE

25TH HOLE

50TH HOLE

AFTER 50 HOLES

Di-NAMITE® CRYSTALLINE DIAMOND COATING

# PASSION.

- The compound angle creates 4 cutting edges along the drill point.
- Distinct double angle prevents abrasiveness of the Composite from localizing along the point and diminishing tool life.

www.kyocera-sgstool.com

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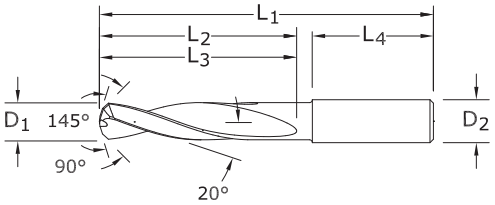
SGS Precision Tools




**TOLERANCES (inch)**

| DIAMETER | $D_1$ | $D_2$ |
|---|---|---|
| #40-1/2 | +0.0000 / –0.0005 | h6 |

**TOLERANCES (mm)**

| DIAMETER | $D_1$ | $D_2$ |
|---|---|---|
| 2,7-12 | +0,000 / –0,013 | h6 |



| Cutting Diameter $D_1$ | Decimal Equivalent | Metric Equivalent | Shank Diameter $D_2$ | Overall Length $L_1$ | Flute Length $L_2$ / $L_3$ | Shank Length $L_4$ | Di-NAMITE (TD) EDP No. |
|---|---|---|---|---|---|---|---|
| #40 | 0.0980 | 2.49 | 1/8 | 2 | 9/16 | 1-1/4 | 50000 |
| 2,7 mm | 0.1063 | | 6,0 | 63,0 | 20,0 | 32,0 | 50001 |
| 3,0 mm | 0.1181 | | 6,0 | 63,0 | 20,0 | 36,0 | 50002 |
| 1/8 | 0.1250 | 3.18 | 1/4 | 2-1/2 | 3/4 | 1-7/16 | 50003 |
| 3,2 mm | 0.1260 | | 6,0 | 63,0 | 20,0 | 36,0 | 50004 |
| #30 | 0.1285 | 3.26 | 1/4 | 2-1/2 | 3/4 | 1-7/16 | 50005 |
| #28 | 0.1405 | 3.57 | 1/4 | 2-1/2 | 3/4 | 1-7/16 | 50006 |
| #22 | 0.1570 | 3.99 | 1/4 | 2-5/8 | 7/8 | 1-7/16 | 50007 |
| #21 | 0.1590 | 4.04 | 1/4 | 2-5/8 | 7/8 | 1-7/16 | 50008 |
| 4,1 mm | 0.1614 | | 6,0 | 66,0 | 24,0 | 36,0 | 50009 |
| #19 | 0.1660 | 4.22 | 1/4 | 2-5/8 | 7/8 | 1-7/16 | 50010 |
| 11/64 | 0.1719 | 4.37 | 1/4 | 2-5/8 | 7/8 | 1-7/16 | 50011 |
| 3/16 | 0.1875 | 4.76 | 1/4 | 2-5/8 | 1 | 1-7/16 | 50012 |
| #11 | 0.1910 | 4.85 | 1/4 | 2-5/8 | 1 | 1-7/16 | 50013 |
| #8 | 0.1990 | 5.05 | 1/4 | 2-5/8 | 1 | 1-7/16 | 50014 |
| #7 | 0.2010 | 5.11 | 1/4 | 2-5/8 | 1 | 1-7/16 | 50015 |
| #2 | 0.2210 | 5.61 | 1/4 | 2-5/8 | 1 | 1-7/16 | 50016 |
| 6,0 mm | 0.2362 | | 6,0 | 66,0 | 28,0 | 36,0 | 50017 |
| 1/4 | 0.2500 | 6.35 | 1/4 | 3-1/8 | 1-5/16 | 1-7/16 | 50018 |
| .2510 | 0.2510 | 6.38 | 5/16 | 3-1/8 | 1-5/16 | 1-7/16 | 50019 |
| F | 0.2570 | 6.53 | 5/16 | 3-1/8 | 1-5/16 | 1-7/16 | 50020 |
| I | 0.2720 | 6.91 | 5/16 | 3-1/8 | 1-5/16 | 1-7/16 | 50021 |
| J | 0.2770 | 7.04 | 5/16 | 3-1/8 | 1-5/16 | 1-7/16 | 50022 |
| K | 0.2810 | 7.14 | 5/16 | 3-1/8 | 1-9/16 | 1-7/16 | 50023 |
| 5/16 | 0.3125 | 7.94 | 5/16 | 3-1/8 | 1-9/16 | 1-7/16 | 50024 |
| 8,0 mm | 0.3150 | | 8,0 | 79,0 | 41,0 | 36,0 | 50025 |
| 3/8 | 0.3750 | 9.53 | 3/8 | 3-1/2 | 1-27/32 | 1-9/16 | 50026 |
| V | 0.3770 | 9.58 | 1/2 | 3-1/2 | 1-27/32 | 1-9/16 | 50027 |
| 10,0 mm | 0.3937 | | 10,0 | 89,0 | 47,0 | 40,0 | 50028 |
| 7/16 | 0.4375 | 11.11 | 1/2 | 4-1/16 | 2-3/16 | 1-9/16 | 50029 |
| 12,0 mm | 0.4724 | | 12,0 | 102,0 | 55,0 | 45,0 | 50030 |
| 1/2 | 0.5000 | 12.70 | 1/2 | 4-1/4 | 2-5/16 | 1-3/4 | 50031 |


Common

3xD
Reach


Right Spiral


External Coolant

2
Flutes

| | Series 120 Fractional | Vc (sfm) | | Diameter ($D_1$) (inch) 1/8 | 3/16 | 1/4 | 5/16 | 3/8 | 7/16 | 1/2 |
|---|---|---|---|---|---|---|---|---|---|---|
| N | CFRP, AFRP (Carbon Fiber, Aramid Fiber) | 320 | RPM | 9779 | 6519 | 4890 | 3912 | 3260 | 2794 | 2445 |
| | | (256-384) | Fr | 0.0006 | 0.0009 | 0.0012 | 0.0015 | 0.0018 | 0.0021 | 0.0024 |
| | | | Feed (ipm) | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 |
| | GFRP (Fiberglass) | 240 | RPM | 7334 | 4890 | 3667 | 2934 | 2445 | 2096 | 1834 |
| | | (192-288) | Fr | 0.0006 | 0.0009 | 0.0012 | 0.0015 | 0.0018 | 0.0021 | 0.0024 |
| | | | Feed (ipm) | 4.4 | 4.4 | 4.4 | 4.4 | 4.4 | 4.4 | 4.4 |
| | CARBON, GRAPHITE | 400 | RPM | 12224 | 8149 | 6112 | 4890 | 4075 | 3493 | 3056 |
| | | (320-480) | Fr | 0.0008 | 0.0012 | 0.0016 | 0.0020 | 0.0024 | 0.0028 | 0.0032 |
| | | | Feed (ipm) | 9.8 | 9.8 | 9.8 | 9.8 | 9.8 | 9.8 | 9.8 |

**Note:**
- rpm = Vc x 3.82 / $D_1$
- ipm = Fr x rpm
- adjust speed and / or feed based on resin type and / or fiber structure
- refer to the KYOCERA SGS Tool Wizard for complete technical information (www.kyocera-sgstool.com)

SGSTOOLWIZARD2.0
www.sgstoolwizard.com

| | Series 120 Metric | Vc (m/min) | | Diameter ($D_1$) (mm) 2.5 | 3 | 4 | 6 | 8 | 10 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|
| N | CFRP, AFRP (Carbon Fiber, Aramid Fiber) | 100 | RPM | 12722 | 10602 | 7951 | 5301 | 3976 | 3181 | 2650 |
| | | (80-120) | Fr | 0.012 | 0.014 | 0.019 | 0.028 | 0.038 | 0.047 | 0.057 |
| | | | Feed (mm/min) | 150 | 150 | 150 | 150 | 150 | 150 | 150 |
| | GFRP (Fiberglass) | 75 | RPM | 9542 | 7951 | 5963 | 3976 | 2982 | 2385 | 1988 |
| | | (65-90) | Fr | 0.012 | 0.014 | 0.019 | 0.029 | 0.039 | 0.048 | 0.058 |
| | | | Feed (mm/min) | 115 | 115 | 115 | 115 | 115 | 115 | 115 |
| | CARBON, GRAPHITE | 120 | RPM | 15266 | 12722 | 9542 | 6361 | 4771 | 3817 | 3181 |
| | | (96-144) | Fr | 0.015 | 0.018 | 0.025 | 0.037 | 0.049 | 0.062 | 0.074 |
| | | | Feed (mm/min) | 235 | 235 | 235 | 235 | 235 | 235 | 235 |

**Note:**
- rpm = (Vc x 1000) / ($D_1$ x 3.14)
- mm/min = Fr x rpm
- adjust speed and / or feed based on resin type and / or fiber structure
- refer to the KYOCERA SGS Tool Wizard for complete technical information (www.kyocera-sgstool.com)

SGSTOOLWIZARD2.0
www.sgstoolwizard.com

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KYOCERA SGS Precision Tools is an ISO-certified leader of round solid carbide cutting tool technology for the aerospace, metalworking, and automotive industries with manufacturing sites in the United States and United Kingdom. Our global network of Sales Representatives, Industrial Distributors, and Agents blanket the world selling into more than 60 countries.

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