# GARR TOOL®

## High Performance Solid Carbide



2024

GARR TOOL sets the standard when it comes to high performance tooling. From its beginning in a garage in 1944, GARR TOOL grew quickly due to its quality products and friendly, reliable service. For eighty years in the cutting tool industry, Garr Tool Company has maintained its commitment to manufacturing the highest quality carbide cutting tools, offering competitive prices and providing unequaled customer service.

Located in Alma, Michigan USA, our current facility of over 200,000 square feet contains clean, efficient production space. An ISO 9001:2015-certified company, GARR TOOL produces thousands of tools per day on our state-of-the-art CNC grinding equipment, run by experienced, conscientious operators. Our select distributors can be found in 35 countries, and end-users worldwide trust and take pride in products that come from GARR TOOL. Our quality tools ensure that individuals in industries such as aerospace, oil and gas, automotive, medical, mold-making, and mining can work efficiently, quickly, and as safely as possible. Garr Tool Company will continue to invest in new technology to meet the future needs of our customers. Adding to our efficiency and service, Oerlikon Balzers Coating USA manages our in-house coating facility.

With a continued focus on maintaining fast, reliable service, we operate an inventory and shipping center in England to better service our customers in the UK and throughout Europe. Quality carbide tooling backed by our ingenuity, integrity, sincerity, work ethic, and personal values is paramount at Garr Tool Company. It's why you can trust GARR TOOL each and every time. We are well-known for having a large inventory in stock, allowing standard catalog items to be shipped within 24 hours at a 99+% fill rate. GARR TOOL continues to introduce new series of standard tools to meet the demands of material specific machining. We also take pride in shipping custom tools within two weeks. To see our selection of tooling, or to learn more about GARR TOOL, we encourage you to visit our website, www.garrtool.com.

All of us at Garr Tool Company, as well as our trusted worldwide network of distributors, look forward to helping you with your solid carbide round tooling needs.





## HTD 12 Series Page 17

New series for High Performance drilling

## A3 Series Page 118

Built for High Efficiency Milling
on high RPM machines

## V4 Series Page 141

Expanded line of our popular V4 Series

# NEW

## *GARR Technical Advisor*

**Features ease of use, including an extensive material list and setup versatility**

**Uses a dynamic function based on spindle interface, toolholding, stability of workpiece and *most importantly*, specific material condition**

**Adaptability of the GARR Technical Advisor is beneficial when setup factors are sub-optimal**

***CHECK IT OUT ON OUR WEBSITE***

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## DRILLS - HIGH PERFORMANCE


| | | | | | | |
|---|---|---|---|---|---|---|
| | 1550H | 2 Flute | 3xD | 30° Helix | BALIQ® ALTINOS Coated (AlTiN-Based) | 25 |
| | 1580HD | 2 Flute | 3xD | 30° Helix | BALIQ® ALTINOS Coated (AlTiN-Based) | 31 |
| | 1580H | 2 Flute | 3xD | 30° Helix | BALIQ® ALTINOS Coated (AlTiN-Based) | 34 |
| NEW SIZES | 1580KD | 2 Flute | 3xD | 30° Helix | Coolant Fed, BALIQ® ALTINOS Coated (AlTiN-Based) | 39 |
| | 1580KH | 2 Flute | 3xD | 30° Helix | Coolant Fed, BALIQ® ALTINOS Coated (AlTiN-Based) | 49 |
| | 1250H | 2 Flute | 5xD | 30° Helix | BALIQ® ALTINOS Coated (AlTiN-Based) | 25 |
| | 1280H | 2 Flute | 5xD | 30° Helix | BALIQ® ALTINOS Coated (AlTiN-Based) | 34 |
| NEW SIZES | 1280KD | 2 Flute | 5xD | 30° Helix | Coolant Fed, BALIQ® ALTINOS Coated (AlTiN-Based) | 39 |
| | 1280KH | 2 Flute | 5xD | 30° Helix | Coolant Fed, BALIQ® ALTINOS Coated (AlTiN-Based) | 49 |
| NEW SIZES | 1880KD | 2 Flute | 7xD | 30° Helix | Coolant Fed, BALIQ® ALTINOS Coated (AlTiN-Based) | 39 |
| | 1880KH | 2 Flute | 7xD | 30° Helix | Coolant Fed, BALIQ® ALTINOS Coated (AlTiN-Based) | 49 |
| | 1850H | 2 Flute | 12xD | 30° Helix | BALIQ® ALTINOS Coated (AlTiN-Based) | 25 |
| NEW SERIES | HTD 12 | 2 Flute | 12xD | 30° Helix | BALIQ® ALTINOS Coated (AlTiN-Based) | 17 |
| NEW SIZE | 1160 | 3 Flute | 3xD | 30° Helix | ALUMASTAR® Coated | 20 |
| | 1180 | 3 Flute | 5xD | 30° Helix | ALUMASTAR® Coated | 20 |


## DRILLS - GENERAL PURPOSE


| | | | | | | |
|---|---|---|---|---|---|---|
| NEW SIZE | 1600 | 2 Flute | | 25° Helix | N/C Spotting, Bright Finish | 56 |
| | 1400 | 2 Flute | | 10° Helix | Combined Drill/Countersink, Bright Finish | 58 |
| | 1500 | 2 Flute | 3xD | Straight | Hard Metal, Bright Finish | 59 |
| | 1500H | 2 Flute | 3xD | Straight | Hard Metal, Durana Coated | 61 |
| | 1510 | 2 Flute | 3xD | 15° Helix | Slow Spiral, Bright Finish | 63 |
| NEW SIZE | 1510H | 2 Flute | 3xD | 15° Helix | Slow Spiral, Durana Coated | 66 |
| NEW SIZES | 1520 | 2 Flute | 3xD | 25° Helix | Bright Finish | 69 |
| NEW SIZES | 1520H | 2 Flute | 3xD | 25° Helix | Durana Coated | 75 |
| | 1205 | 2 Flute | 5xD | 25° Helix | Bright Finish | 69 |
| | 1205H | 2 Flute | 5xD | 25° Helix | Durana Coated | 75 |
| | 1200 | 2 Flute | 5xD | 25° Helix | Bright Finish | 85 |
| | 1200H | 2 Flute | 5xD | 25° Helix | Durana Coated | 88 |
| | 1800H | 2 Flute | 8xD | 35° Helix | Parabolic, Durana Coated | 92 |
| | 1100 | 3 Flute | 5xD | 25° Helix | Bright Finish | 90 |
| | 1100H | 3 Flute | 5xD | 25° Helix | Durana Coated | 81 |
| | 1120H | 3 Flute | 3xD | 25° Helix | Durana Coated | 81 |


## REAMERS


| | | | |
|---|---|---|---|
| 4100 | Standard | Bright Finish | 94 |
| 4100 | Standard Metric | Bright Finish | 106 |


## DRILL MILLS


| | | | |
|---|---|---|---|
| 152M | 2 Flute | Bright Finish - Included Angle to a Point | 108 |
| 152MA | 2 Flute | TiALN Coated - Included Angle to a Point | 109 |
| 152DA | 2 Flute | TiALN Coated - 120° Drill Point | 112 |
| 154M | 4 Flute | Bright Finish - Included Angle to a Point | 110 |
| 154MA | 4 Flute | TiALN Coated - Included Angle to a Point | 111 |


## ROUGHERS


| | | | | |
|---|---|---|---|---|
| ARC | 3 Flute | Chamfer | Staggered, Bright Finish | 114 |
| VHM | 4 Flute | Chamfer | Staggered, AlTiN Coated | 116 |


## END MILLS - HIGH PERFORMANCE - HEM


| | | | | | |
|---|---|---|---|---|---|
| | 142M | 2 Flute | Square | ALUMASTAR® Coated | 123 |
| | 142R | 2 Flute | Radius | ALUMASTAR® Coated | 124 |
| | 142B | 2 Flute | Ball | ALUMASTAR® Coated | 126 |
| NEW SIZES | A3 | 3 Flute | S, R, B | Bright Finish | 118 |
| | 143M | 3 Flute | Square | ALUMASTAR® Coated | 127 |
| | 143R | 3 Flute | Radius | ALUMASTAR® Coated | 130 |
| NEW SIZES | V4S | 4 Flute | Square | AlCrN Coated | 141 |
| NEW SIZES | V4R | 4 Flute | Radius | AlCrN Coated | 141 |
| NEW SIZES | V4B | 4 Flute | Ball | AlCrN Coated | 141 |
| NEW SIZES | VRX | 4 Flute | S, R, B | AlTiN Coated | 166 |
| NEW SIZES | V5 | 5 Flute | S, R | AlCrN Coated | 154 |
| | V5C (Chip Splitter) | 5 Flute | S, R | AlCrN Coated | 160 |
| | VRX-6 | 6 Flute | S, R | AlTiN Coated | 176 |
| NEW SIZES | VX-7 | 7 Flute | S, R | BALIQ® ALCRONOS Coated (AlCrN-Based) | 162 |
| | VX-7C (Chip Splitter) | 7 Flute | S, R | BALIQ® ALCRONOS Coated (AlCrN-Based) | 165 |
| | TMS | Multi-Flute | Square | AlCrN Coated | 134 |
| | TMR | Multi-Flute | Radius | AlCrN Coated | 136 |


## END MILLS - HIGH PERFORMANCE


| | | | | | |
|---|---|---|---|---|---|
| | 242M/842M | 2 Flute | Square | Bright Finish | 179 |
| | 350MX/950MX | 2 Flute | Ball | Durana Coated | 198 |
| | 253MA/853MA | 3 Flute | Square | AlTiN Coated | 180 |
| | 253M/853M | 3 Flute | Square | Bright Finish | 182 |
| | 253MC | 3 Flute | Square | TiCN Coated | 184 |
| | 263M | 3 Flute | Square | Bright Finish | 185 |
| | 263MC | 3 Flute | Square | TiCN Coated | 185 |
| | 263MA/863MA | 3 Flute | Square | AlTiN Coated | 185 |
| | 210D | 4 Flute | Square | DIAMOND Coated | 199 |
| | 210RD | 4 Flute | Radius | DIAMOND Coated | 200 |
| | 310D | 4 Flute | Ball | DIAMOND Coated | 201 |
| | 610D | 4 Flute | Square | DIAMOND Coated | 202 |
| | 710D | 4 Flute | Ball | DIAMOND Coated | 203 |
| | H-45 | 4 Flute | Radius | Durana Coated | 197 |
| | 545MA | 4/5 Flute | Square | Durana Coated | 194 |
| | 545RA | 4/5 Flute | Radius | Durana Coated | 195 |
| | 545BA | 4/5 Flute | Ball | Durana Coated | 196 |
| | 255MA/855MA | 5 Flute | Square | AlTiN Coated | 186 |
| | 255M/855M | 5 Flute | Square | Bright Finish | 188 |
| | 255MC | 5 Flute | Square | TiCN Coated | 190 |
| | 255RA/855RA | 5 Flute | Radius | AlTiN Coated | 191 |
| | 246M/846M | 6 Flute | Square | Bright Finish | 193 |
| | 246MC | 6 Flute | Square | TiCN Coated | 193 |
| NEW SIZES | 246MA/846MA | 6 Flute | Square | AlTiN Coated | 193 |


## END MILLS - STUB LENGTH - GENERAL PURPOSE


| | | | | |
|---|---|---|---|---|
| 160M/860M | 2 Flute | Square | Bright Finish | 209 |
| 160MA/860MA | 2 Flute | Square | TiAlN Coated | 211 |
| 180M/980M | 2 Flute | Ball | Bright Finish | 216 |
| 180MA/980MA | 2 Flute | Ball | TiAlN Coated | 217 |
| 170M/870M | 4 Flute | Square | Bright Finish | 209 |
| 170MA/870MA | 4 Flute | Square | TiAlN Coated | 211 |
| 170R/870R | 4 Flute | Radius | Bright Finish | 212 |
| 170RA/870RA | 4 Flute | Radius | TiAlN Coated | 214 |
| 190M/990M | 4 Flute | Ball | Bright Finish | 216 |
| 190MA/990MA | 4 Flute | Ball | TiAlN Coated | 217 |

| END MILLS - STANDARD LENGTH - GENERAL PURPOSE | | | | PAGE |
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| 220MT | 2 Flute | Square | TiN Coated | 220 |
| 220MC | 2 Flute | Square | TiCN Coated | 221 |
| 220MA/820MA | 2 Flute | Square | TiAlN Coated | 222 |
| 220R/820R | 2 Flute | Radius | Bright Finish | 224 |
| 220RA | 2 Flute | Radius | TiAlN Coated | 227 |
| 320M/920M | 2 Flute | Ball | Bright Finish | 230 |
| 320MT | 2 Flute | Ball | TiN Coated | 232 |
| 320MC | 2 Flute | Ball | TiCN Coated | 233 |
| 320MA/920MA | 2 Flute | Ball | TiAlN Coated | 234 |
| 222M | 2 Flute | Square | Straight Flute, Bright Finish | 236 |
| 280M | 2 Flute | Square | N/C Tolerance, Bright Finish | 260 |
| 380M | 2 Flute | Ball | N/C Tolerance, Bright Finish | 260 |
| 223M/823M | 3 Flute | Square | Bright Finish | 218 |
| 223MC | 3 Flute | Square | TiCN Coated | 221 |
| 223MA/823MA | 3 Flute | Square | TiAlN Coated | 222 |
| 223R/823R | 3 Flute | Radius | Bright Finish | 224 |
| 223RA/823RA | 3 Flute | Radius | TiAlN Coated | 227 |
| 323M/923M | 3 Flute | Ball | Bright Finish | 230 |
| 323MC | 3 Flute | Ball | TiCN Coated | 233 |
| 323MA/923MA | 3 Flute | Ball | TiAlN Coated | 234 |
| 273M | 3 Flute | Square | Tapered, Bright Finish | 237 |
| 373M | 3 Flute | Ball | Tapered, Bright Finish | 237 |
| 230M/830M | 4 Flute | Square | Bright Finish | 218 |
| 230MT | 4 Flute | Square | TiN Coated | 220 |
| 230MC | 4 Flute | Square | TiCN Coated | 221 |
| 230MA/830MA | 4 Flute | Square | TiAlN Coated | 222 |
| 230R/830R | 4 Flute | Radius | Bright Finish | 224 |
| 230RA/830RA | 4 Flute | Radius | TiAlN Coated | 227 |
| 330M/930M | 4 Flute | Ball | Bright Finish | 230 |
| 330MT | 4 Flute | Ball | TiN Coated | 232 |
| 330MC | 4 Flute | Ball | TiCN Coated | 233 |
| 330MA/930MA | 4 Flute | Ball | TiAlN Coated | 234 |
| 234M | 4 Flute | Square | Straight Flute, Bright Finish | 236 |
| 334MA | 4 Flute | Ball | Straight Flute, TiAlN Coated | 236 |
| 290M | 4 Flute | Square | N/C Tolerance, Bright Finish | 260 |
| 390M | 4 Flute | Ball | N/C Tolerance, Bright Finish | 260 |
| 435M | 4 Flute | Square | Double End, 3/8" Shank, Bright Finish | 254 |
| 435MA | 4 Flute | Square | Double End, 3/8" Shank, TiAlN Coated | 254 |
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| 535MA | 4 Flute | Ball | Double End, 3/8" Shank, TiAlN Coated | 255 |
| 430M | 4 Flute | Square | Double End, Bright Finish | 256 |
| 430MA/450MA | 4 Flute | Square | Double End, TiAlN Coated | 257 |
| 530M | 4 Flute | Ball | Double End, Bright Finish | 258 |
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| 620MC | 2 Flute | Square | TiCN Coated | 240 |
| 620MA/640MA | 2 Flute | Square | TiAlN Coated | 241 |
| 720M/740M | 2 Flute | Ball | Bright Finish | 249 |
| 720MC | 2 Flute | Ball | TiCN Coated | 251 |
| 720MA/740MA | 2 Flute | Ball | TiAlN Coated | 252 |
| 623M/643M | 3 Flute | Square | Bright Finish | 238 |
| 623MC | 3 Flute | Square | TiCN Coated | 240 |
| 623MA/643MA | 3 Flute | Square | TiAlN Coated | 241 |
| 723M/743M | 3 Flute | Ball | Bright Finish | 249 |
| 723MC | 3 Flute | Ball | TiCN Coated | 251 |
| 723MA/743MA | 3 Flute | Ball | TiAlN Coated | 252 |
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| 630MC | 4 Flute | Square | TiCN Coated | 240 |
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| 16**4 | 233 | 38**0 | 230 | 52**4 | 190 | 89**0, 89**5 | 69 |
| 16**7 | 234 | 38**7 | 234 | 52**7 | 186 | 89**1, 89**6 | 75 |
| 17**0 | 230 | 38**8 | 202 | 54**0 | 238 | 90**0, 90**5 | 90 |
| 17**4 | 233 | 39*** | 127 | 54**4 | 240 | 90**1, 90**6 | 81 |
| 17**7 | 234 | 39*** | 130 | 54**7 | 241 | 91*** | 56 |
| 18**0 | 230 | 39**0 | 59 | 55**0 | 249 | 92**0 | 238 |
| 18**3 | 232 | 39**1 | 61 | 55**4 | 251 | 92**7 | 241 |
| 18**4 | 233 | 39**2 | 124 | 55**7 | 252 | 93**0 | 238 |
| 18**7 | 234 | 40*** | 132 | 56**0, 56**5 | 85 | 93**7 | 241 |
| 19**0, 19**5 | 63 | 40**0 | 188 | 56**1, 56**6 | 88 | 94**0 | 238 |
| 19**1, 19**6 | 66 | 40**2 | 125 | 57*** | 110 | 94**7 | 241 |
| 20*** | 31 | 40**7 | 186 | 57*** | 112 | 94**8 | 202 |
| 20**0 | 243 | 40**8 | 203 | 57**0 | 108 | 95*** | 94 |
| 20**1, 20**6 | 34 | 41**0 | 238 | 57**7 | 109 | 96*** | 101 |
| 20**7 | 246 | 41**1 | 127 | 58*** | 110 | 97**0 | 249 |
| 21*** | 33 | 41**2 | 123 | 58*** | 111 | 97**7 | 252 |
| 21**0 | 246 | 41**3 | 127 | 58**0 | 58 | 98*** | 134 |
| 21**0 | 194 | 41**4 | 240 | 59**0, 59**5 | 59 | 98*** | 136 |
| 21**2 | 195 | 41**7 | 241 | 59**1, 59**6 | 61 | 98**0 | 249 |
| 21**4 | 196 | 42*** | 126 | 60*** | 176 | 98**7 | 252 |
| 21**1, 21**6 | 34 | 42**0 | 238 | 60*** | 262 | 99**0 | 249 |
| 21**7 | 247 | 42**2 | 123 | 61*** | 166 | 99**7 | 252 |
| 22**0, 22**5 | 49 | 42**2 | 126 | 61*** | 263 | 99**8 | 203 |
| 22**1, 22**6 | 92 | 42**3 | 128 | 62*** | 170 | | |
| 23**0 | 185 | 42**4 | 240 | 62*** | 264 | | |
| 23**4 | 185 | 42**7 | 241 | 62**7 | 170 | | |
| 23**7 | 185 | | | 63*** | 265 | | |

# *Recommended for:* **ALUMINUM**

## *ISO Material Group:* N

## *DRILLS*

| SERIES | | PAGE | COATING | DESCRIPTION |
|---|---|---|---|---|
| 1160, 1180 |  | 20 | ALUMASTAR | 3 flute, High performance |
| 1520, 1205 |  | 69 | BRIGHT | 2 flute, General purpose |
| 1520H, 1205H |  | 75 | DURANA | 2 flute, General purpose |
| 1800H |  | 92 | DURANA | 2 flute, Parabolic |

## *END MILLS*

| SERIES | | PAGE | COATING | DESCRIPTION |
|---|---|---|---|---|
| A3 |  | 118 | BRIGHT | High velocity, 3 flute, High metal removal rate |
| 143M, 143R |  | 127, 130 | ALUMASTAR | High velocity, 3 flute, High metal removal rate |
| 142B |  | 126 | ALUMASTAR | High velocity, 2 flute, High metal removal rate |
| 142M, 142R |  | 123, 124 | ALUMASTAR | High velocity, 2 flute, High metal removal rate |
| 242M, 842M |  | 179 | BRIGHT | High performance, 2 flute, For 3000-8000 RPM |
| ARC |  | 114 | BRIGHT | High performance, 3 flute, Staggered helix rougher |
| 253M, 853M |  | 182 | BRIGHT | High performance, 3 flute, Profiling and finishing |
| 253MC |  | 184 | TiCN | High performance, 3 flute, Profiling and finishing |
| 220M, 820M |  | 218 | BRIGHT | 2 flute, General purpose, Square end |
| 220MC |  | 221 | TiCN | 2 flute, General purpose, Square end |
| 320M, 920M |  | 230 | BRIGHT | 2 flute, General purpose, Ball end |
| 320MC |  | 233 | TiCN | 2 flute, General purpose, Ball end |

# *Recommended for:* **TITANIUM**

## *ISO Material Group:* **S**

## *DRILLS*

| SERIES | | PAGE | COATING | DESCRIPTION |
|---|---|---|---|---|
| 1510H |  | 66 | DURANA | 2 flute, General purpose, Slow spiral |
| 1550H, 1250H, 1850H |  | 25 | ALTINOS | 2 flute, High performance, Small diameter, 1/8" or 3mm shank |
| 1580HD |  | 31 | ALTINOS | 2 flute, High performance, Common shank |
| 1580H, 1280H |  | 34 | ALTINOS | 2 flute, High performance |
| 1580KD, 1280KD, 1880KD |  | 39 | ALTINOS | 2 flute, High performance, Coolant fed, Common shank |
| 1580KH, 1280KH, 1880KH |  | 49 | ALTINOS | 2 flute, High performance, Coolant fed |
| HTD 12 |  | 17 | ALTINOS | 2 flute, High performance, Coolant fed, Double margin, Common shank |
| 1520H, 1205H |  | 75 | DURANA | 2 flute, General purpose |
| 1160, 1180 |  | 20 | ALUMASTAR | 3 flute, High performance |

## *END MILLS*

| SERIES | | PAGE | COATING | DESCRIPTION |
|---|---|---|---|---|
| V4 |  | 141 | AlCrN | High performance, 4 flute, Variable helix |
| V5 |  | 154 | AlCrN | High performance, 5 flute, Variable helix |
| VX-7 |  | 162 | ALCRONOS | High performance, 7 flute, Staggered flute |
| VRX |  | 166 | AlTiN | High performance, 4 flute, Staggered flute |
| VRX-6 |  | 176 | AlTiN | High performance, 6 flute, Staggered flute |
| TMS, TMR |  | 134, 136 | AlCrN | High performance, Multiple flute finisher |
| VHM |  | 116 | AlTiN | High performance, 4 flute, Staggered flute rougher |
| 255MA, 855MA |  | 186 | AlTiN | High performance, 5 flute, Square end |
| 255RA, 855RA |  | 191 | AlTiN | High performance, 5 flute, Corner radius |
| 242M, 842M |  | 179 | BRIGHT | High performance, 2 flute, For 3000-8000 RPM |
| 246MA, 846MA |  | 193 | AlTiN | High performance, 6 flute, Finisher |
| 253MA, 853MA |  | 180 | AlTiN | High performance, 3 flute, Profiling and finishing |
| 223MA, 823MA |  | 222 | TiAlN | 3 flute, General purpose, Square end |
| 230MA, 830MA |  | 222 | TiAlN | 4 flute, General purpose, Square end |
| 230RA, 830RA |  | 227 | TiAlN | 4 flute, General purpose, Corner radius |
| 323MA, 923MA |  | 234 | TiAlN | 3 flute, General purpose, Ball end |
| 330MA, 930MA |  | 234 | TiAlN | 4 flute, General purpose, Ball end |

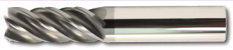
# *Recommended for:* **STAINLESS STEEL**

## *ISO Material Group:* **M**

## *DRILLS*

| SERIES | | PAGE | COATING | DESCRIPTION |
|---|---|---|---|---|
| 1510H |  | 66 | DURANA | 2 flute, General purpose, Slow spiral |
| 1550H, 1250H, 1850H |  | 25 | ALTINOS | 2 flute, High performance, Small diameter, 1/8" or 3mm shank |
| 1580HD |  | 31 | ALTINOS | 2 flute, High performance, Common shank |
| 1580H, 1280H |  | 34 | ALTINOS | 2 flute, High performance |
| 1580KD, 1280KD, 1880KD |  | 39 | ALTINOS | 2 flute, High performance, Coolant fed, Common shank |
| 1580KH, 1280KH, 1880KH |  | 49 | ALTINOS | 2 flute, High performance, Coolant fed |
| HTD 12 |  | 17 | ALTINOS | 2 flute, High performance, Coolant fed, Double margin, Common shank |
| 1520H, 1205H |  | 75 | DURANA | 2 flute, General purpose |

## *END MILLS*

| SERIES | | PAGE | COATING | DESCRIPTION |
|---|---|---|---|---|
| V4 |  | 141 | AlCrN | High performance, 4 flute, Variable helix |
| V5 |  | 154 | AlCrN | High performance, 5 flute, Variable helix |
| VX-7 |  | 162 | ALCRONOS | High performance, 7flute, Staggered flute |
| VRX |  | 166 | AlTiN | High performance, 4 flute, Staggered flute |
| VRX-6 |  | 176 | AlTiN | High performance, 6 flute, Staggered flute |
| 253MA, 853MA |  | 180 | AlTiN | High performance, 3 flute, Profiling and finishing |
| 255MA, 855MA |  | 186 | AlTiN | High performance, 5 flute, Square end |
| 255RA, 855RA |  | 191 | AlTiN | High performance, 5 flute, Corner radius |
| VHM |  | 116 | AlTiN | High performance, 4 flute, Staggered flute rougher |
| ARC |  | 114 | BRIGHT | High performance, 3 flute, Staggered helix rougher |
| TMS, TMR |  | 134, 136 | AlCrN | High performance, Multiple flute finisher |
| 253MC |  | 184 | TiCN | High performance, 3 flute, Profiling and finishing |
| 246MA, 846MA |  | 193 | AlTiN | High performance, 6 flute, Finisher, Square end |
| 223MA, 823MA |  | 222 | TiAlN | 3 flute, General purpose, Square end |
| 230MA, 830MA |  | 222 | TiAlN | 4 flute, General purpose, Square end |
| 230RA, 830RA |  | 227 | TiAlN | 4 flute, General purpose, Corner radius |
| 323MA, 923MA |  | 234 | TiAlN | 3 flute, General purpose, Ball end |
| 330MA, 930MA |  | 234 | TiAlN | 4 flute, General purpose, Ball end |

# *Recommended for:* INCONEL, HIGH NICKEL ALLOYS

## *ISO Material Group:* S

## *DRILLS*

| SERIES | | PAGE | COATING | DESCRIPTION |
|---|---|---|---|---|
| 1510H |  | 66 | DURANA | 2 flute, General purpose, Slow spiral |
| 1550H, 1250H, 1850H |  | 25 | ALTINOS | 2 flute, High performance, Small diameter, 1/8" or 3mm shank |
| 1580HD |  | 31 | ALTINOS | 2 flute, High performance, Common shank |
| 1580H, 1280H |  | 34 | ALTINOS | 2 flute, High performance |
| 1580KD, 1280KD, 1880KD |  | 39 | ALTINOS | 2 flute, High performance, Coolant fed, Common shank |
| 1580KH, 1280KH, 1880KH |  | 49 | ALTINOS | 2 flute, High performance, Coolant fed |
| HTD 12 |  | 17 | ALTINOS | 2 flute, High performance, Coolant fed, Double margin, Common shank |
| 1520H, 1205H |  | 75 | DURANA | 2 flute, General purpose |

## *END MILLS*

| SERIES | | PAGE | COATING | DESCRIPTION |
|---|---|---|---|---|
| V5 |  | 154 | AlCrN | High performance, 5 flute, Variable helix |
| V4 |  | 141 | AlCrN | High performance, 4 flute, Variable helix |
| VRX |  | 166 | AlTiN | High performance, 4 flute, Staggered flute |
| VRX-6 |  | 176 | AlTiN | High performance, 6 flute, Staggered flute |
| VX-7 |  | 162 | ALCRONOS | High performance, 7 flute, Staggered flute |
| VHM |  | 116 | AlTiN | High performance, 4 flute, Staggered flute rougher |
| 255MA, 855MA |  | 186 | AlTiN | High performance, 5 flute, Square end |
| 255RA, 855RA |  | 191 | AlTiN | High performance, 5 flute, Corner radius |
| 246MA, 846MA |  | 193 | AlTiN | High performance, 6 flute, Finisher, Square end |
| TMS, TMR |  | 134, 136 | AlCrN | High performance, Multiple flute finisher |
| 230MA, 830MA |  | 222 | TiAlN | 4 flute, General purpose, Square end |
| 230RA, 830RA |  | 227 | TiAlN | 4 flute, General purpose, Corner radius |
| 330MA, 930MA |  | 234 | TiAlN | 4 flute, General purpose, Ball end |

# *Recommended for:* BRASS, BRONZE, COPPER, MAGNESIUM

## *ISO Material Group:* N

## *DRILLS*

| SERIES | | PAGE | COATING | DESCRIPTION |
|---|---|---|---|---|
| 1160, 1180 |  | 20 | ALUMASTAR | 3 flute, High performance |
| 1510H |  | 66 | DURANA | 2 flute, General purpose, Slow spiral |
| 1520, 1205 |  | 69 | BRIGHT | 2 flute, General purpose |
| 1520H, 1205H |  | 75 | DURANA | 2 flute, General purpose |
| 1500H |  | 61 | DURANA | 2 flute, Straight flute |
| 1800H |  | 92 | DURANA | 2 flute, Parabolic |

## *END MILLS*

| SERIES | | PAGE | COATING | DESCRIPTION |
|---|---|---|---|---|
| 143M, 143R |  | 127, 130 | ALUMASTAR | High velocity, 3 flute, High metal removal rate |
| 142B |  | 126 | ALUMASTAR | High velocity, 2 flute, High metal removal rate |
| 142M, 142R |  | 123, 124 | ALUMASTAR | High velocity, 2 flute, High metal removal rate |
| ARC |  | 114 | BRIGHT | High performance, 3 flute, Staggered helix rougher |
| 242M, 842M |  | 179 | BRIGHT | High performance, 2 flute, For 3000-8000 RPM |
| 253M, 853M |  | 182 | BRIGHT | High performance, 3 flute, Profiling and finishing |
| 253MC |  | 184 | TiCN | High performance, 3 flute, Profiling and finishing |
| 220M, 820M |  | 218 | BRIGHT | 2 flute, General purpose, Square end |
| 220MC |  | 221 | TiCN | 2 flute, General purpose, Square end |
| 320M, 920M |  | 230 | BRIGHT | 2 flute, General purpose, Ball end |
| 320MC |  | 233 | TiCN | 2 flute, General purpose, Ball end |

# *Recommended for:* HARDENED TOOL STEELS
*(generally over 45 Rc)*

*ISO Material Group:* **P**

## *DRILLS*

| SERIES | | PAGE | COATING | DESCRIPTION |
|---|---|---|---|---|
| 1500H |  | 61 | DURANA | 2 flute, Straight flute |
| 1510H |  | 66 | DURANA | 2 flute, General purpose, Slow spiral |
| 1550H, 1250H, 1850H |  | 25 | ALTINOS | 2 flute, High performance, Small diameter, 1/8" or 3mm shank |
| 1580HD |  | 31 | ALTINOS | 2 flute, High performance, Common shank |
| 1580H, 1280H |  | 34 | ALTINOS | 2 flute, High performance |
| 1580KD, 1280KD, 1880KD |  | 39 | ALTINOS | 2 flute, High performance, Coolant fed, Common shank |
| 1580KH, 1280KH, 1880KH |  | 49 | ALTINOS | 2 flute, High performance, Coolant fed |
| HTD 12 |  | 17 | ALTINOS | 2 flute, High performance, Coolant fed, Double margin, Common shank |
| 1520H, 1205H |  | 75 | DURANA | 2 flute, General purpose |

## *END MILLS*

| SERIES | | PAGE | COATING | DESCRIPTION |
|---|---|---|---|---|
| H-45 |  | 197 | DURANA | High performance, High feed, Corner radius |
| 350MX, 950MX |  | 198 | DURANA | High performance, High Rc finisher, Die mold |
| 545MA |  | 194 | DURANA | High performance, High Rc finisher, Square end |
| 545RA |  | 195 | DURANA | High performance, High Rc finisher, Corner radius |
| 545BA |  | 196 | DURANA | High performance, High Rc finisher, Ball end |
| VRX |  | 166 | AlTiN | High performance, 4 flute, Staggered flute |
| VRX-6 |  | 176 | AlTiN | High performance, 6 flute, Staggered flute |
| 230MA, 830MA |  | 222 | TiAlN | 4 flute, General purpose, Square end |
| 230RA, 830RA |  | 227 | TiAlN | 4 flute, General purpose, Corner radius |
| 330MA, 930MA |  | 234 | TiAlN | 4 flute, General purpose, Ball end |

# Recommended for: COMPOSITE MATERIALS
*(Graphite, Plastics, Carbon Fiber)*

*ISO Material Group:* **O**

## DRILLS

| SERIES | | PAGE | COATING | DESCRIPTION |
|---|---|---|---|---|
| 1160, 1180 |  | 20 | ALUMASTAR | 3 flute, High performance |
| 154MA |  | 111 | TiAlN | 4 flute, Center cutting angle |
| 1510H |  | 66 | DURANA | 2 flute, General purpose, Slow spiral |
| 1520H, 1205H |  | 75 | DURANA | 2 flute, General purpose |
| 1800H |  | 92 | DURANA | 2 flute, Parabolic |
| 1500H |  | 61 | DURANA | 2 flute, Straight flute |

## END MILLS

| SERIES | | PAGE | COATING | DESCRIPTION |
|---|---|---|---|---|
| 210D |  | 199 | DIAMOND | 4 flute, Square end |
| 310D |  | 201 | DIAMOND | 4 flute, Ball end |
| 210RD |  | 200 | DIAMOND | 4 flute, Corner radius |
| 143M, 143R |  | 127, 130 | ALUMASTAR | High velocity, 3 flute, High metal removal rate |
| 142M, 142R |  | 123, 124 | ALUMASTAR | High velocity, 2 flute, High metal removal rate |
| 142B |  | 126 | ALUMASTAR | High velocity, 2 flute, High metal removal rate |
| 253M, 853M |  | 182 | BRIGHT | High performance, 3 flute, Profiling and finishing |
| 253MC |  | 184 | TiCN | High performance, 3 flute, Profiling and finishing |
| 255MC |  | 190 | TiCN | High performance, 5 flute, Profiling and finishing |
| 220MC |  | 221 | TiCN | 2 flute, General purpose, Square end |
| 320MC |  | 233 | TiCN | 2 flute, General purpose, Ball end |
| 154M, 154MA |  | 110, 111 | BRIGHT/TiAlN | 4 flute, Drill/Mill, Center cutting to a point |
| 152M, 152MA |  | 108, 109 | BRIGHT/TiAlN | 2 flute, Drill/Mill, Center cutting to a point |

# *Recommended for:* CARBON STEELS, MEDIUM ALLOY STEELS

*(generally under 45 Rc)*

*ISO Material Group:* **P**

## *DRILLS*

| SERIES | | PAGE | COATING | DESCRIPTION |
|---|---|---|---|---|
| 1580HD |  | 31 | ALTINOS | 2 flute, High performance, Common shank |
| 1550H, 1250H, 1850H |  | 25 | ALTINOS | 2 flute, High performance, Small diameter, 1/8" or 3mm shank |
| 1580H, 1280H |  | 34 | ALTINOS | 2 flute, High performance |
| 1580KD, 1280KD, 1880KD |  | 39 | ALTINOS | 2 flute, High performance, Coolant fed, Common shank |
| 1580KH, 1280KH, 1880KH |  | 49 | ALTINOS | 2 flute, High performance, Coolant fed |
| HTD 12 |  | 17 | ALTINOS | 2 flute, High performance, Coolant fed, Double margin, Common shank |
| 1510H |  | 66 | DURANA | 2 flute, General purpose, Slow spiral |
| 1520H, 1205H |  | 75 | DURANA | 2 flute, General purpose |

## *END MILLS*

| SERIES | | PAGE | COATING | DESCRIPTION |
|---|---|---|---|---|
| V4 |  | 141 | AlCrN | High performance, 4 flute, Variable helix |
| V5 |  | 154 | AlCrN | High performance, 5 flute, Variable helix |
| VX-7 |  | 162 | ALCRONOS | High performance, 7 flute, Staggered flute |
| VRX |  | 166 | AlTiN | High performance, 4 flute, Staggered flute |
| VRX-6 |  | 176 | AlTiN | High performance, 6 flute, Staggered flute |
| VHM |  | 116 | AlTiN | High performance, 4 flute, Staggered flute rougher |
| 255MA, 855MA |  | 186 | AlTiN | High performance, 5 flute, Square end |
| 255RA, 855RA |  | 191 | AlTiN | High performance, 5 flute, Corner radius |
| 253MA, 853MA |  | 180 | AlTiN | High performance, 3 flute, Profiling and finishing |
| 230MA, 830MA |  | 222 | TiAlN | 4 flute, General purpose, Square end |
| 230RA, 830RA |  | 227 | TiAlN | 4 flute, General purpose, Corner radius |
| 330MA, 930MA |  | 234 | TiAlN | 4 flute, General purpose, Ball end |

# *Recommended for:* **CAST IRON**

## *ISO Material Group:* K

## *DRILLS*

| SERIES | | PAGE | COATING | DESCRIPTION |
|---|---|---|---|---|
| 1120H, 1100H |  | 81 | DURANA | 3 flute, General purpose |
| 1520H, 1205H |  | 75 | DURANA | 2 flute, General purpose |
| 1510H |  | 66 | DURANA | 2 flute, General purpose, Slow spiral |
| 1580H, 1280H |  | 34 | ALTINOS | 2 flute, High performance |
| 1550H, 1250H, 1850H |  | 25 | ALTINOS | 2 flute, High performance, Small diameter, 1/8" or 3mm shank |
| 1580HD |  | 31 | ALTINOS | 2 flute, High performance, Common shank |
| 1580KH, 1280KH, 1880KH |  | 49 | ALTINOS | 2 flute, High performance, Coolant fed |
| 1580KD, 1280KD, 1880KD |  | 39 | ALTINOS | 2 flute, High performance, Coolant fed, Common shank |

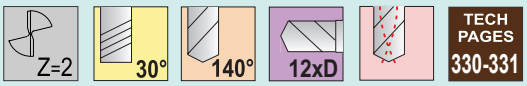
## *END MILLS*

| SERIES | | PAGE | COATING | DESCRIPTION |
|---|---|---|---|---|
| VRX |  | 166 | AlTiN | High performance, 4 flute, Staggered flute |
| VRX-6 |  | 176 | AlTiN | High performance, 6 flute, Staggered flute |
| V4 |  | 141 | AlCrN | High performance, 4 flute, Variable helix |
| V5 |  | 154 | AlCrN | High performance, 5 flute, Variable helix |
| VX-7 |  | 162 | ALCRONOS | High performance, 7 flute, Staggered flute |
| 255MA, 855MA |  | 186 | AlTiN | High performance, 5 flute, Square end |
| 255RA, 855RA |  | 191 | AlTiN | High performance, 5 flute, Corner radius |
| 143M, 143R |  | 127, 130 | ALUMASTAR | High velocity, 3 flute, High metal removal rate |
| 253MA, 853MA |  | 180 | AlTiN | High performance, 3 flute, Profiling and finishing |
| 230MC |  | 221 | TiCN | 4 flute, General purpose, Square end |
| 230MA, 830MA |  | 222 | TiAlN | 4 flute, General purpose, Square end |
| 230RA, 830RA |  | 227 | TiAlN | 4 flute, General purpose, Corner radius |

| TOLERANCES | |
|---|---|
| $d_1$ | h7 |
| $d_2$ | h6 |
| $l_1$ | +.1181" –.1181" (+3.00 –3.00mm) |
| $l_2$ | +.1181" –.1181" (+3.00 –3.00mm) |
| $l_4$ | +.0787" –.0000" (+2.00 –0.00mm) |

NEW SERIES

# Series HTD 12



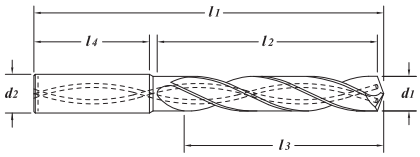

.1181" - .2188"
(3.000mm - 5.557mm)

Recommended for high nickel, high temperature alloys, cobalt-based alloys, stainless steels, and tool steels <52 Rc

**BALIQ® ALTINOS Coating (AlTiN-based)**

High performance solid submicron grain carbide drill with reinforced (HA) shank
h7 drill diameter tolerance
Double margin for true and cleaner holes
Coolant through
Polished flutes
140° Facet point
Pilot drill not required for most applications






| EDP# | $d_1$ Diameter Decimal | $d_1$ Diameter | $d_1$ Diameter Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | $l_3$ Max Drill Depth | $l_4$ Shank Length | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 69064 | .1181 | | 3.000 | 6.0 | 80 | 40 | 35 | 36 | 122.30 | 116.98 | 111.66 | 106.35 |
| 69066 | .1220 | | 3.100 | 6.0 | 80 | 40 | 35 | 36 | 122.30 | 116.98 | 111.66 | 106.35 |
| 69068 | .1250 | 1/8" | 3.175 | 6.0 | 82 | 42 | 37 | 36 | 122.30 | 116.98 | 111.66 | 106.35 |
| 69070 | .1260 | | 3.200 | 6.0 | 82 | 42 | 37 | 36 | 122.30 | 116.98 | 111.66 | 106.35 |
| 69072 | .1285 | #30 | 3.264 | 6.0 | 82 | 42 | 37 | 36 | 122.30 | 116.98 | 111.66 | 106.35 |
| 69074 | .1299 | | 3.300 | 6.0 | 82 | 42 | 37 | 36 | 122.30 | 116.98 | 111.66 | 106.35 |
| 69076 | .1360 | #29 | 3.454 | 6.0 | 85 | 45 | 40 | 36 | 122.30 | 116.98 | 111.66 | 106.35 |
| 69078 | .1378 | | 3.500 | 6.0 | 85 | 45 | 40 | 36 | 122.30 | 116.98 | 111.66 | 106.35 |
| 69080 | .1417 | | 3.600 | 6.0 | 85 | 45 | 40 | 36 | 122.30 | 116.98 | 111.66 | 106.35 |
| 69082 | .1457 | | 3.700 | 6.0 | 90 | 50 | 44 | 36 | 122.30 | 116.98 | 111.66 | 106.35 |
| 69084 | .1476 | | 3.750 | 6.0 | 90 | 50 | 44 | 36 | 122.30 | 116.98 | 111.66 | 106.35 |
| 69086 | .1496 | | 3.800 | 6.0 | 90 | 50 | 44 | 36 | 122.30 | 116.98 | 111.66 | 106.35 |
| 69088 | .1535 | | 3.900 | 6.0 | 90 | 50 | 44 | 36 | 122.30 | 116.98 | 111.66 | 106.35 |
| 69090 | .1562 | 5/32" | 3.967 | 6.0 | 90 | 50 | 44 | 36 | 122.30 | 116.98 | 111.66 | 106.35 |
| 69092 | .1575 | | 4.000 | 6.0 | 95 | 55 | 48 | 36 | 122.30 | 116.98 | 111.66 | 106.35 |
| 69094 | .1614 | | 4.100 | 6.0 | 95 | 55 | 48 | 36 | 122.30 | 116.98 | 111.66 | 106.35 |
| 69096 | .1654 | | 4.200 | 6.0 | 95 | 55 | 48 | 36 | 122.30 | 116.98 | 111.66 | 106.35 |
| 69098 | .1673 | | 4.250 | 6.0 | 95 | 55 | 48 | 36 | 122.30 | 116.98 | 111.66 | 106.35 |
| 69100 | .1693 | | 4.300 | 6.0 | 95 | 55 | 48 | 36 | 122.30 | 116.98 | 111.66 | 106.35 |
| 69102 | .1719 | 11/64" | 4.366 | 6.0 | 95 | 55 | 48 | 36 | 122.30 | 116.98 | 111.66 | 106.35 |
| 69104 | .1732 | | 4.400 | 6.0 | 95 | 55 | 48 | 36 | 122.30 | 116.98 | 111.66 | 106.35 |
| 69106 | .1772 | | 4.500 | 6.0 | 100 | 60 | 54 | 36 | 122.30 | 116.98 | 111.66 | 106.35 |
| 69108 | .1811 | | 4.600 | 6.0 | 100 | 60 | 54 | 36 | 122.30 | 116.98 | 111.66 | 106.35 |
| 69110 | .1831 | | 4.650 | 6.0 | 100 | 60 | 54 | 36 | 122.30 | 116.98 | 111.66 | 106.35 |
| 69112 | .1850 | | 4.700 | 6.0 | 100 | 60 | 54 | 36 | 122.30 | 116.98 | 111.66 | 106.35 |
| 69114 | .1875 | 3/16" | 4.762 | 6.0 | 100 | 60 | 54 | 36 | 122.30 | 116.98 | 111.66 | 106.35 |
| 69116 | .1890 | #12 | 4.800 | 6.0 | 100 | 60 | 54 | 36 | 122.30 | 116.98 | 111.66 | 106.35 |
| 69118 | .1929 | | 4.900 | 6.0 | 100 | 60 | 54 | 36 | 122.30 | 116.98 | 111.66 | 106.35 |
| 69120 | .1969 | | 5.000 | 6.0 | 105 | 65 | 58 | 36 | 122.30 | 116.98 | 111.66 | 106.35 |
| 69122 | .2010 | #7 | 5.105 | 6.0 | 105 | 65 | 58 | 36 | 122.30 | 116.98 | 111.66 | 106.35 |
| 69124 | .2028 | | 5.150 | 6.0 | 105 | 65 | 58 | 36 | 122.30 | 116.98 | 111.66 | 106.35 |
| 69126 | .2031 | 13/64" | 5.159 | 6.0 | 105 | 65 | 58 | 36 | 122.30 | 116.98 | 111.66 | 106.35 |
| 69128 | .2047 | | 5.200 | 6.0 | 110 | 70 | 63 | 36 | 122.30 | 116.98 | 111.66 | 106.35 |
| 69130 | .2087 | | 5.300 | 6.0 | 110 | 70 | 63 | 36 | 122.30 | 116.98 | 111.66 | 106.35 |
| 69132 | .2165 | | 5.500 | 6.0 | 110 | 70 | 63 | 36 | 122.30 | 116.98 | 111.66 | 106.35 |
| 69134 | .2188 | 7/32" | 5.557 | 6.0 | 110 | 70 | 63 | 36 | 122.30 | 116.98 | 111.66 | 106.35 |

*continued* →

## Series HTD 12 *(continued)*

.2205" - .3937"
(5.600mm - 10.000mm)

| EDP# | *d1* Diameter Decimal | | *d1* Diameter Metric | *d2* Shank Diameter | *l1* Overall Length | *l2* Flute Length | *l3* Max Drill Depth | *l4* Shank Length | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 69136 | .2205 | | 5.600 | 6.0 | 115 | 75 | 67 | 36 | 122.30 | 116.98 | 111.66 | 106.35 |
| 69138 | .2244 | | 5.700 | 6.0 | 115 | 75 | 67 | 36 | 122.30 | 116.98 | 111.66 | 106.35 |
| 69140 | .2283 | | 5.800 | 6.0 | 115 | 75 | 67 | 36 | 122.30 | 116.98 | 111.66 | 106.35 |
| 69142 | .2323 | | 5.900 | 6.0 | 115 | 75 | 67 | 36 | 122.30 | 116.98 | 111.66 | 106.35 |
| 69144 | .2344 | 15/64" | 5.954 | 6.0 | 120 | 80 | 72 | 36 | 122.30 | 116.98 | 111.66 | 106.35 |
| 69146 | .2362 | | 6.000 | 6.0 | 120 | 80 | 72 | 36 | 122.30 | 116.98 | 111.66 | 106.35 |
| 69148 | .2370 | | 6.020 | 8.0 | 120 | 80 | 72 | 36 | 167.44 | 160.16 | 152.88 | 145.60 |
| 69150 | .2402 | | 6.100 | 8.0 | 120 | 80 | 72 | 36 | 167.44 | 160.16 | 152.88 | 145.60 |
| 69152 | .2441 | | 6.200 | 8.0 | 120 | 80 | 72 | 36 | 167.44 | 160.16 | 152.88 | 145.60 |
| 69154 | .2480 | | 6.300 | 8.0 | 120 | 80 | 72 | 36 | 167.44 | 160.16 | 152.88 | 145.60 |
| 69156 | .2500 | 1/4" | 6.350 | 8.0 | 125 | 85 | 77 | 36 | 167.44 | 160.16 | 152.88 | 145.60 |
| 69158 | .2520 | | 6.400 | 8.0 | 125 | 85 | 77 | 36 | 167.44 | 160.16 | 152.88 | 145.60 |
| 69160 | .2559 | | 6.500 | 8.0 | 125 | 85 | 77 | 36 | 167.44 | 160.16 | 152.88 | 145.60 |
| 69162 | .2598 | | 6.600 | 8.0 | 125 | 85 | 77 | 36 | 167.44 | 160.16 | 152.88 | 145.60 |
| 69164 | .2638 | | 6.700 | 8.0 | 125 | 85 | 77 | 36 | 167.44 | 160.16 | 152.88 | 145.60 |
| 69166 | .2656 | 17/64" | 6.746 | 8.0 | 130 | 90 | 81 | 36 | 167.44 | 160.16 | 152.88 | 145.60 |
| 69168 | .2677 | | 6.800 | 8.0 | 130 | 90 | 81 | 36 | 167.44 | 160.16 | 152.88 | 145.60 |
| 69170 | .2717 | | 6.900 | 8.0 | 130 | 90 | 81 | 36 | 167.44 | 160.16 | 152.88 | 145.60 |
| 69172 | .2756 | | 7.000 | 8.0 | 130 | 90 | 81 | 36 | 167.44 | 160.16 | 152.88 | 145.60 |
| 69174 | .2795 | | 7.100 | 8.0 | 130 | 90 | 81 | 36 | 167.44 | 160.16 | 152.88 | 145.60 |
| 69176 | .2812 | 9/32" | 7.142 | 8.0 | 135 | 95 | 87 | 36 | 167.44 | 160.16 | 152.88 | 145.60 |
| 69178 | .2835 | | 7.200 | 8.0 | 135 | 95 | 87 | 36 | 167.44 | 160.16 | 152.88 | 145.60 |
| 69180 | .2874 | | 7.300 | 8.0 | 135 | 95 | 87 | 36 | 167.44 | 160.16 | 152.88 | 145.60 |
| 69182 | .2913 | | 7.400 | 8.0 | 135 | 95 | 87 | 36 | 167.44 | 160.16 | 152.88 | 145.60 |
| 69184 | .2953 | | 7.500 | 8.0 | 135 | 95 | 87 | 36 | 167.44 | 160.16 | 152.88 | 145.60 |
| 69186 | .2969 | 19/64" | 7.541 | 8.0 | 141 | 101 | 92 | 36 | 167.44 | 160.16 | 152.88 | 145.60 |
| 69188 | .2992 | | 7.600 | 8.0 | 141 | 101 | 92 | 36 | 167.44 | 160.16 | 152.88 | 145.60 |
| 69190 | .3031 | | 7.700 | 8.0 | 141 | 101 | 92 | 36 | 167.44 | 160.16 | 152.88 | 145.60 |
| 69192 | .3071 | | 7.800 | 8.0 | 141 | 101 | 92 | 36 | 167.44 | 160.16 | 152.88 | 145.60 |
| 69194 | .3125 | 5/16" | 7.937 | 8.0 | 141 | 101 | 92 | 36 | 167.44 | 160.16 | 152.88 | 145.60 |
| 69196 | .3150 | | 8.000 | 8.0 | 141 | 101 | 92 | 36 | 167.44 | 160.16 | 152.88 | 145.60 |
| 69198 | .3189 | | 8.100 | 10.0 | 152 | 108 | 97 | 40 | 254.45 | 243.39 | 232.32 | 221.26 |
| 69200 | .3228 | | 8.200 | 10.0 | 152 | 108 | 97 | 40 | 254.45 | 243.39 | 232.32 | 221.26 |
| 69202 | .3268 | | 8.300 | 10.0 | 152 | 108 | 97 | 40 | 254.45 | 243.39 | 232.32 | 221.26 |
| 69204 | .3287 | | 8.350 | 10.0 | 152 | 108 | 97 | 40 | 254.45 | 243.39 | 232.32 | 221.26 |
| 69206 | .3307 | | 8.400 | 10.0 | 152 | 108 | 97 | 40 | 254.45 | 243.39 | 232.32 | 221.26 |
| 69208 | .3346 | | 8.500 | 10.0 | 152 | 108 | 97 | 40 | 254.45 | 243.39 | 232.32 | 221.26 |
| 69210 | .3386 | | 8.600 | 10.0 | 158 | 114 | 104 | 40 | 254.45 | 243.39 | 232.32 | 221.26 |
| 69212 | .3425 | | 8.700 | 10.0 | 158 | 114 | 104 | 40 | 254.45 | 243.39 | 232.32 | 221.26 |
| 69214 | .3438 | 11/32" | 8.732 | 10.0 | 158 | 114 | 104 | 40 | 254.45 | 243.39 | 232.32 | 221.26 |
| 69216 | .3445 | | 8.750 | 10.0 | 158 | 114 | 104 | 40 | 254.45 | 243.39 | 232.32 | 221.26 |
| 69218 | .3465 | | 8.800 | 10.0 | 158 | 114 | 104 | 40 | 254.45 | 243.39 | 232.32 | 221.26 |
| 69220 | .3504 | | 8.900 | 10.0 | 158 | 114 | 104 | 40 | 254.45 | 243.39 | 232.32 | 221.26 |
| 69222 | .3543 | | 9.000 | 10.0 | 158 | 114 | 104 | 40 | 254.45 | 243.39 | 232.32 | 221.26 |
| 69224 | .3583 | | 9.100 | 10.0 | 163 | 119 | 108 | 40 | 254.45 | 243.39 | 232.32 | 221.26 |
| 69226 | .3602 | | 9.150 | 10.0 | 163 | 119 | 108 | 40 | 254.45 | 243.39 | 232.32 | 221.26 |
| 69228 | .3622 | | 9.200 | 10.0 | 163 | 119 | 108 | 40 | 254.45 | 243.39 | 232.32 | 221.26 |
| 69230 | .3661 | | 9.300 | 10.0 | 163 | 119 | 108 | 40 | 254.45 | 243.39 | 232.32 | 221.26 |
| 69232 | .3701 | | 9.400 | 10.0 | 163 | 119 | 108 | 40 | 254.45 | 243.39 | 232.32 | 221.26 |
| 69234 | .3740 | | 9.500 | 10.0 | 163 | 119 | 108 | 40 | 254.45 | 243.39 | 232.32 | 221.26 |
| 69236 | .3750 | 3/8" | 9.525 | 10.0 | 172 | 128 | 114 | 40 | 254.45 | 243.39 | 232.32 | 221.26 |
| 69238 | .3780 | | 9.600 | 10.0 | 172 | 128 | 114 | 40 | 254.45 | 243.39 | 232.32 | 221.26 |
| 69240 | .3819 | | 9.700 | 10.0 | 172 | 128 | 114 | 40 | 254.45 | 243.39 | 232.32 | 221.26 |
| 69242 | .3858 | | 9.800 | 10.0 | 172 | 128 | 114 | 40 | 254.45 | 243.39 | 232.32 | 221.26 |
| 69244 | .3898 | | 9.900 | 10.0 | 172 | 128 | 114 | 40 | 254.45 | 243.39 | 232.32 | 221.26 |
| 69246 | .3937 | | 10.000 | 10.0 | 172 | 128 | 114 | 40 | 254.45 | 243.39 | 232.32 | 221.26 |



† *Metric equivalents are for reference only*

| EDP# | *d1* Diameter Decimal | | Metric | *d2* Shank Diameter | *l1* Overall Length | *l2* Flute Length | *l3* Max Drill Depth | *l4* Shank Length | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 69248 | .3976 | | 10.100 | 12.0 | 185 | 136 | 124 | 45 | 333.76 | 319.25 | 304.74 | 290.23 |
| 69250 | .4016 | | 10.200 | 12.0 | 185 | 136 | 124 | 45 | 333.76 | 319.25 | 304.74 | 290.23 |
| 69252 | .4062 | 13/32" | 10.317 | 12.0 | 185 | 136 | 124 | 45 | 333.76 | 319.25 | 304.74 | 290.23 |
| 69254 | .4134 | | 10.500 | 12.0 | 185 | 136 | 124 | 45 | 333.76 | 319.25 | 304.74 | 290.23 |
| 69256 | .4213 | | 10.700 | 12.0 | 185 | 136 | 124 | 45 | 333.76 | 319.25 | 304.74 | 290.23 |
| 69258 | .4252 | | 10.800 | 12.0 | 185 | 136 | 124 | 45 | 333.76 | 319.25 | 304.74 | 290.23 |
| 69260 | .4331 | | 11.000 | 12.0 | 185 | 136 | 124 | 45 | 333.76 | 319.25 | 304.74 | 290.23 |
| 69262 | .4375 | 7/16" | 11.112 | 12.0 | 196 | 147 | 135 | 45 | 333.76 | 319.25 | 304.74 | 290.23 |
| 69264 | .4409 | | 11.200 | 12.0 | 196 | 147 | 135 | 45 | 333.76 | 319.25 | 304.74 | 290.23 |
| 69266 | .4488 | | 11.400 | 12.0 | 196 | 147 | 135 | 45 | 333.76 | 319.25 | 304.74 | 290.23 |
| 69268 | .4528 | | 11.500 | 12.0 | 196 | 147 | 135 | 45 | 333.76 | 319.25 | 304.74 | 290.23 |
| 69270 | .4688 | 15/32" | 11.907 | 12.0 | 202 | 153 | 140 | 45 | 333.76 | 319.25 | 304.74 | 290.23 |
| 69272 | .4724 | | 12.000 | 12.0 | 202 | 153 | 140 | 45 | 333.76 | 319.25 | 304.74 | 290.23 |



# Series 1160, 1180

NEW ITEM

.1562" - .1910"
(3.967mm - 4.851mm)

Z=3 | 30° | 140° | 3xD | 5xD | TECH PAGES 334

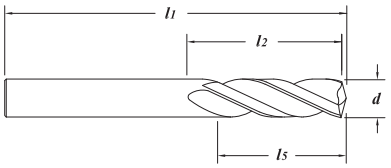
| TOLERANCES | |
|---|---|
| *d* | +.0000" –.0005" (+.0000 –.0127mm) |
| $l_1$ | +.125" –.125" (+3.175 –3.175mm) |
| $l_2$ | +.125" –.125" (+3.175 –3.175mm) |

**Recommended for aluminum and other soft materials <40 Rc**



## Alumastar Coated

High performance solid submicron grain carbide drill
No spot drilling required
Unique point geometry and coating for higher speeds and feeds
High performance drill point
Live tooling recommended on lathe processes




| 3xD (1160) EDP# | 5xD (1180) EDP# | Decimal | *d* † Diameter | Metric | $l_1$ Overall Length | $l_2$ Flute Length | $l_5$ Max Drill Depth | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 70631 | | .1562 | 5/32" | 3.967 | 2-1/16" | 9/16" | .497" | 42.99 | 41.12 | 39.25 | 37.38 |
| | 70161 | .1562 | 5/32" | 3.967 | 2-1/2" | 1" | .809" | 44.26 | 42.34 | 40.41 | 38.49 |
| 70633 | | .1570 | #22 | 3.988 | 2-1/8" | 5/8" | .500" | 43.39 | 41.50 | 39.62 | 37.73 |
| | 70163 | .1570 | #22 | 3.988 | 2-1/2" | 1" | .814" | 44.59 | 42.65 | 40.71 | 38.77 |
| 70635 | | .1575 | | 4.000 | 54 | 16 | 13 | 43.73 | 41.83 | 39.93 | 38.03 |
| | 70166 | .1575 | | 4.000 | 65 | 24 | 21 | 44.92 | 42.97 | 41.01 | 39.06 |
| 70637 | | .1590 | #21 | 4.039 | 2-1/8" | 5/8" | .506" | 44.11 | 42.20 | 40.28 | 38.36 |
| | 70177 | .1590 | #21 | 4.039 | 2-1/2" | 1" | .824" | 45.23 | 43.26 | 41.30 | 39.33 |
| 70639 | | .1610 | #20 | 4.089 | 2-1/8" | 5/8" | .512" | 44.49 | 42.56 | 40.62 | 38.69 |
| | 70179 | .1610 | #20 | 4.089 | 2-1/2" | 1" | .834" | 45.61 | 43.63 | 41.64 | 39.66 |
| 70641 | | .1660 | #19 | 4.216 | 2-1/8" | 5/8" | .528" | 44.87 | 42.92 | 40.97 | 39.02 |
| | 70181 | .1660 | #19 | 4.216 | 2-3/4" | 1-1/8" | .860" | 45.93 | 43.93 | 41.94 | 39.94 |
| 70643 | | .1695 | #18 | 4.305 | 2-1/8" | 5/8" | .539" | 45.22 | 43.25 | 41.29 | 39.32 |
| | 70183 | .1695 | #18 | 4.305 | 2-3/4" | 1-1/8" | .878" | 46.23 | 44.22 | 42.21 | 40.20 |
| 70645 | | .1719 | 11/64" | 4.366 | 2-1/8" | 5/8" | .547" | 45.61 | 43.63 | 41.64 | 39.66 |
| | 70185 | .1719 | 11/64" | 4.366 | 2-3/4" | 1-1/8" | .891" | 46.56 | 44.54 | 42.51 | 40.49 |
| 70647 | | .1730 | #17 | 4.394 | 2-3/16" | 11/16" | .551" | 45.98 | 43.98 | 41.98 | 39.98 |
| | 70187 | .1730 | #17 | 4.394 | 2-3/4" | 1-1/8" | .897" | 46.89 | 44.85 | 42.81 | 40.77 |
| 70649 | | .1770 | #16 | 4.496 | 2-3/16" | 11/16" | .563" | 46.30 | 44.29 | 42.27 | 40.26 |
| | 70189 | .1770 | #16 | 4.496 | 2-3/4" | 1-1/8" | .917" | 47.24 | 45.19 | 43.13 | 41.08 |
| 70651 | | .1772 | | 4.500 | 55 | 18 | 14 | 46.69 | 44.66 | 42.63 | 40.60 |
| | 70191 | .1772 | | 4.500 | 65 | 25 | 23 | 47.46 | 45.40 | 43.33 | 41.27 |
| 70653 | | .1800 | #15 | 4.572 | 2-3/16" | 11/16" | .573" | 47.00 | 44.96 | 42.91 | 40.87 |
| | 70196 | .1800 | #15 | 4.572 | 2-3/4" | 1-1/4" | .933" | 47.86 | 45.78 | 43.70 | 41.62 |
| 70655 | | .1820 | #14 | 4.623 | 2-3/16" | 11/16" | .579" | 47.44 | 45.38 | 43.31 | 41.25 |
| | 70201 | .1820 | #14 | 4.623 | 2-3/4" | 1-1/4" | .943" | 48.19 | 46.09 | 44.00 | 41.90 |
| 70657 | | .1850 | #13 | 4.700 | 2-3/16" | 11/16" | .589" | 47.78 | 45.71 | 43.63 | 41.55 |
| | 70206 | .1850 | #13 | 4.700 | 2-3/4" | 1-1/4" | .959" | 48.54 | 46.43 | 44.32 | 42.21 |
| 70659 | | .1875 | 3/16" | 4.763 | 2-3/16" | 11/16" | .597" | 48.16 | 46.07 | 43.97 | 41.88 |
| | 70211 | .1875 | 3/16" | 4.763 | 2-3/4" | 1-1/4" | .972" | 48.70 | 46.59 | 44.47 | 42.35 |
| 70661 | | .1890 | #12 | 4.801 | 2-1/4" | 3/4" | .601" | 49.74 | 47.58 | 45.41 | 43.25 |
| | 70216 | .1890 | #12 | 4.801 | 2-3/4" | 1-1/4" | .979" | 50.51 | 48.31 | 46.12 | 43.92 |
| 70663 | | .1910 | #11 | 4.851 | 2-1/4" | 3/4" | .608" | 50.20 | 48.02 | 45.83 | 43.65 |
| | 70221 | .1910 | #11 | 4.851 | 2-3/4" | 1-1/4" | .990" | 50.82 | 48.61 | 46.40 | 44.19 |



† *Metric equivalents are for reference only*

| 3xD (1160) EDP# | 5xD (1180) EDP# | Decimal | *d* † Diameter | Metric | *l1* Overall Length | *l2* Flute Length | *l5* Max Drill Depth | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 70665 | | .1935 | #10 | 4.914 | 2-1/4" | 3/4" | .616" | 50.50 | 48.30 | 46.11 | 43.91 |
| | 70226 | .1935 | #10 | 4.914 | 2-3/4" | 1-1/4" | 1.003" | 51.14 | 48.92 | 46.69 | 44.47 |
| 70667 | | .1960 | #9 | 4.978 | 2-1/4" | 3/4" | .624" | 50.85 | 48.64 | 46.43 | 44.22 |
| | 70229 | .1960 | #9 | 4.978 | 3" | 1-5/16" | 1.016" | 51.44 | 49.20 | 46.97 | 44.73 |
| 70669 | | .1969 | | 5.000 | 57 | 19 | 16 | 51.13 | 48.91 | 46.68 | 44.46 |
| | 70231 | .1969 | | 5.000 | 75 | 32 | 26 | 51.77 | 49.52 | 47.27 | 45.02 |
| 70671 | | .1990 | #8 | 5.055 | 2-1/4" | 3/4" | .633" | 51.61 | 49.37 | 47.12 | 44.88 |
| | 70236 | .1990 | #8 | 5.055 | 3" | 1-5/16" | 1.031" | 52.03 | 49.76 | 47.50 | 45.24 |
| 70673 | | .2010 | #7 | 5.105 | 2-1/4" | 3/4" | .640" | 51.76 | 49.51 | 47.26 | 45.01 |
| | 70241 | .2010 | #7 | 5.105 | 3" | 1-5/16" | 1.042" | 52.23 | 49.96 | 47.69 | 45.42 |
| 70675 | | .2031 | 13/64" | 5.159 | 2-1/4" | 3/4" | .646" | 52.11 | 49.84 | 47.58 | 45.31 |
| | 70246 | .2031 | 13/64" | 5.159 | 3" | 1-5/16" | 1.053" | 52.60 | 50.31 | 48.03 | 45.74 |
| 70677 | | .2040 | #6 | 5.182 | 2-3/8" | 7/8" | .649" | 52.46 | 50.18 | 47.90 | 45.62 |
| | 70251 | .2040 | #6 | 5.182 | 3" | 1-3/8" | 1.057" | 52.96 | 50.66 | 48.35 | 46.05 |
| 70679 | | .2055 | #5 | 5.220 | 2-3/8" | 7/8" | .654" | 52.85 | 50.56 | 48.26 | 45.96 |
| | 70256 | .2055 | #5 | 5.220 | 3" | 1-3/8" | 1.065" | 53.30 | 50.99 | 48.67 | 46.35 |
| 70681 | | .2090 | #4 | 5.309 | 2-3/8" | 7/8" | .665" | 53.16 | 50.85 | 48.54 | 46.23 |
| | 70261 | .2090 | #4 | 5.309 | 3" | 1-3/8" | 1.083" | 53.60 | 51.27 | 48.94 | 46.61 |
| 70683 | | .2130 | #3 | 5.410 | 2-3/8" | 7/8" | .678" | 53.52 | 51.19 | 48.87 | 46.54 |
| | 70266 | .2130 | #3 | 5.410 | 3" | 1-3/8" | 1.104" | 53.96 | 51.61 | 49.27 | 46.92 |
| 70685 | | .2165 | | 5.500 | 60 | 22 | 18 | 53.85 | 51.51 | 49.17 | 46.83 |
| | 70271 | .2165 | | 5.500 | 75 | 35 | 29 | 54.28 | 51.92 | 49.56 | 47.20 |
| 70687 | | .2188 | 7/32" | 5.558 | 2-3/8" | 7/8" | .696" | 54.30 | 51.94 | 49.58 | 47.22 |
| | 70276 | .2188 | 7/32" | 5.558 | 3" | 1-3/8" | 1.134" | 54.60 | 52.23 | 49.85 | 47.48 |
| 70689 | | .2210 | #2 | 5.613 | 2-7/16" | 15/16" | .703" | 54.69 | 52.32 | 49.94 | 47.56 |
| | 70281 | .2210 | #2 | 5.613 | 3" | 1-3/8" | 1.145" | 55.69 | 53.27 | 50.85 | 48.43 |
| 70691 | | .2280 | #1 | 5.791 | 2-7/16" | 15/16" | .726" | 55.11 | 52.71 | 50.32 | 47.92 |
| | 70286 | .2280 | #1 | 5.791 | 3" | 1-3/8" | 1.182" | 55.96 | 53.53 | 51.09 | 48.66 |
| 70693 | | .2340 | A | 5.944 | 2-7/16" | 15/16" | .745" | 55.49 | 53.08 | 50.66 | 48.25 |
| | 70294 | .2340 | A | 5.944 | 3-1/4" | 1-1/2" | 1.213" | 56.52 | 54.07 | 51.61 | 49.15 |
| 70695 | | .2344 | 15/64" | 5.954 | 2-7/16" | 15/16" | .746" | 55.91 | 53.48 | 51.05 | 48.62 |
| | 70296 | .2344 | 15/64" | 5.954 | 3-1/4" | 1-1/2" | 1.215" | 57.09 | 54.60 | 52.12 | 49.64 |
| 70697 | | .2362 | | 6.000 | 64 | 26 | 19 | 56.29 | 53.85 | 51.40 | 48.95 |
| | 70301 | .2362 | | 6.000 | 82 | 38 | 31 | 57.25 | 54.76 | 52.27 | 49.78 |
| 70699 | | .2380 | B | 6.045 | 2-1/2" | 1" | .757" | 56.68 | 54.22 | 51.75 | 49.29 |
| | 70306 | .2380 | B | 6.045 | 3-1/4" | 1-5/8" | 1.233" | 57.41 | 54.91 | 52.42 | 49.92 |
| 70701 | | .2420 | C | 6.147 | 2-1/2" | 1" | .770" | 57.14 | 54.66 | 52.17 | 49.69 |
| | 70311 | .2420 | C | 6.147 | 3-1/4" | 1-5/8" | 1.254" | 57.78 | 55.26 | 52.75 | 50.24 |
| 70703 | | .2460 | D | 6.248 | 2-1/2" | 1" | .783" | 57.45 | 54.96 | 52.46 | 49.96 |
| | 70316 | .2460 | D | 6.248 | 3-1/4" | 1-5/8" | 1.275" | 58.12 | 55.59 | 53.07 | 50.54 |
| 70705 | | .2500 | 1/4" / E | 6.350 | 2-1/2" | 1" | .796" | 57.95 | 55.43 | 52.91 | 50.39 |
| | 70321 | .2500 | 1/4" / E | 6.350 | 3-1/4" | 1-5/8" | 1.296" | 58.43 | 55.89 | 53.35 | 50.81 |
| 70707 | | .2510 | | 6.375 | 2-1/2" | 1" | .799" | 58.70 | 56.14 | 53.59 | 51.04 |
| | 70911 | .2510 | | 6.375 | 3-1/4" | 1-5/8" | 1.300" | 59.33 | 56.75 | 54.17 | 51.59 |
| 70709 | | .2559 | | 6.500 | 66 | 28 | 21 | 60.97 | 58.32 | 55.67 | 53.02 |
| | 70326 | .2559 | | 6.500 | 82 | 41 | 34 | 61.99 | 59.29 | 56.60 | 53.90 |
| 70711 | | .2570 | F | 6.528 | 2-5/8" | 1-1/8" | .818" | 61.94 | 59.25 | 56.55 | 53.86 |
| | 70331 | .2570 | F | 6.528 | 3-1/4" | 1-11/16" | 1.332" | 62.92 | 60.18 | 57.45 | 54.71 |

*continued* ⟶

# Series 1160, 1180 *(continued)*

.2610" - .3594"
(6.629mm - 9.129mm)

| 3xD (1160) EDP# | 5xD (1180) EDP# | Decimal | *d* † Diameter | Metric | *l*1 Overall Length | *l*2 Flute Length | *l*5 Max Drill Depth | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 70713 | | .2610 | G | 6.629 | 2-5/8" | 1-1/8" | .831" | 62.88 | 60.15 | 57.41 | 54.68 |
| | 70336 | .2610 | G | 6.629 | 3-1/2" | 1-11/16" | 1.353" | 63.88 | 61.11 | 58.33 | 55.55 |
| 70715 | | .2656 | 17/64" | 6.746 | 2-5/8" | 1-1/8" | .845" | 63.83 | 61.05 | 58.28 | 55.50 |
| | 70341 | .2656 | 17/64" | 6.746 | 3-1/2" | 1-11/16" | 1.376" | 64.83 | 62.01 | 59.19 | 56.37 |
| 70717 | | .2660 | H | 6.756 | 2-11/16" | 1-3/16" | .846" | 64.78 | 61.96 | 59.15 | 56.33 |
| | 70346 | .2660 | H | 6.756 | 3-1/2" | 1-11/16" | 1.378" | 65.81 | 62.95 | 60.09 | 57.23 |
| 70719 | | .2720 | I | 6.909 | 2-11/16" | 1-3/16" | .866" | 64.93 | 62.11 | 59.28 | 56.46 |
| | 70351 | .2720 | I | 6.909 | 3-1/2" | 1-11/16" | 1.410" | 66.76 | 63.86 | 60.95 | 58.05 |
| 70721 | | .2756 | | 7.000 | 68 | 30 | 22 | 65.87 | 63.01 | 60.14 | 57.28 |
| | 70356 | .2756 | | 7.000 | 88 | 43 | 36 | 67.70 | 64.76 | 61.81 | 58.87 |
| 70723 | | .2770 | J | 7.036 | 2-11/16" | 1-3/16" | .881" | 66.79 | 63.89 | 60.98 | 58.08 |
| | 70361 | .2770 | J | 7.036 | 3-1/2" | 1-11/16" | 1.435" | 68.67 | 65.68 | 62.70 | 59.71 |
| 70725 | | .2812 | 9/32" | 7.142 | 2-11/16" | 1-3/16" | .895" | 68.70 | 65.71 | 62.73 | 59.74 |
| | 70371 | .2812 | 9/32" | 7.142 | 3-1/2" | 1-3/4" | 1.457" | 70.60 | 67.53 | 64.46 | 61.39 |
| 70727 | | .2900 | L | 7.366 | 2-3/4" | 1-1/4" | .923" | 69.63 | 66.61 | 63.58 | 60.55 |
| | 70376 | .2900 | L | 7.366 | 3-1/2" | 1-3/4" | 1.503" | 71.48 | 68.38 | 65.27 | 62.16 |
| 70728 | | .2950 | M | 7.493 | 2-3/4" | 1-1/4" | .939" | 70.98 | 67.89 | 64.81 | 61.72 |
| | 70378 | .2950 | M | 7.493 | 3-3/4" | 1-7/8" | 1.529" | 72.42 | 69.27 | 66.12 | 62.97 |
| 70729 | | .2953 | | 7.500 | 70 | 32 | 24 | 70.98 | 67.89 | 64.81 | 61.72 |
| | 70381 | .2953 | | 7.500 | 95 | 44 | 39 | 72.42 | 69.27 | 66.12 | 62.97 |
| 70731 | | .2969 | 19/64" | 7.541 | 2-3/4" | 1-1/4" | .945" | 71.62 | 68.51 | 65.39 | 62.28 |
| | 70386 | .2969 | 19/64" | 7.541 | 3-3/4" | 1-7/8" | 1.539" | 73.05 | 69.87 | 66.70 | 63.52 |
| 70733 | | .3020 | N | 7.671 | 2-15/16" | 1-7/16" | .961" | 73.91 | 70.70 | 67.48 | 64.27 |
| | 70391 | .3020 | N | 7.671 | 3-3/4" | 1-7/8" | 1.565" | 75.70 | 72.41 | 69.12 | 65.83 |
| 70735 | | .3125 | 5/16" | 7.938 | 2-15/16" | 1-7/16" | .994" | 74.18 | 70.95 | 67.73 | 64.50 |
| | 70396 | .3125 | 5/16" | 7.938 | 3-3/4" | 1-7/8" | 1.619" | 75.90 | 72.60 | 69.30 | 66.00 |
| 70737 | | .3150 | | 8.000 | 76 | 36 | 25 | 78.29 | 74.89 | 71.48 | 68.08 |
| | 70401 | .3150 | | 8.000 | 95 | 48 | 41 | 80.10 | 76.62 | 73.13 | 69.65 |
| 70739 | | .3160 | O | 8.026 | 2-15/16" | 1-7/16" | 1.006" | 78.29 | 74.89 | 71.48 | 68.08 |
| | 70406 | .3160 | O | 8.026 | 3-3/4" | 1-7/8" | 1.638" | 80.10 | 76.62 | 73.13 | 69.65 |
| 70741 | | .3230 | P | 8.204 | 2-15/16" | 1-7/16" | 1.028" | 78.86 | 75.43 | 72.00 | 68.57 |
| | 70411 | .3230 | P | 8.204 | 3-3/4" | 2-3/32" | 1.674" | 80.36 | 76.87 | 73.37 | 69.88 |
| 70743 | | .3281 | 21/64" | 8.334 | 2-15/16" | 1-7/16" | 1.044" | 80.30 | 76.81 | 73.32 | 69.83 |
| | 70416 | .3281 | 21/64" | 8.334 | 4" | 2-3/32" | 1.700" | 81.05 | 77.53 | 74.00 | 70.48 |
| 70745 | | .3320 | Q | 8.433 | 3" | 1-7/16" | 1.056" | 81.74 | 78.19 | 74.63 | 71.08 |
| | 70421 | .3320 | Q | 8.433 | 4" | 2-3/32" | 1.720" | 82.54 | 78.95 | 75.36 | 71.77 |
| 70747 | | .3346 | | 8.500 | 76 | 36 | 27 | 82.10 | 78.53 | 74.96 | 71.39 |
| | 70426 | .3346 | | 8.500 | 100 | 53 | 44 | 83.10 | 79.49 | 75.87 | 72.26 |
| 70749 | | .3390 | R | 8.611 | 3" | 1-7/16" | 1.079" | 84.31 | 80.64 | 76.98 | 73.31 |
| | 70431 | .3390 | R | 8.611 | 4" | 2-3/32" | 1.757" | 85.17 | 81.47 | 77.76 | 74.06 |
| 70751 | | .3438 | 11/32" | 8.733 | 3" | 1-7/16" | 1.094" | 86.15 | 82.40 | 78.66 | 74.91 |
| | 70436 | .3438 | 11/32" | 8.733 | 4" | 2-3/16" | 1.782" | 87.95 | 84.13 | 80.30 | 76.48 |
| 70753 | | .3480 | S | 8.839 | 3-1/16" | 1-1/2" | 1.107" | 90.09 | 86.17 | 82.26 | 78.34 |
| | 70441 | .3480 | S | 8.839 | 4" | 2-3/16" | 1.803" | 93.01 | 88.97 | 84.92 | 80.88 |
| 70755 | | .3543 | | 9.000 | 78 | 38 | 29 | 92.38 | 88.36 | 84.35 | 80.33 |
| | 70446 | .3543 | | 9.000 | 100 | 55 | 47 | 93.52 | 89.45 | 85.39 | 81.32 |
| 70757 | | .3580 | T | 9.093 | 3-1/16" | 1-1/2" | 1.139" | 97.18 | 92.95 | 88.73 | 84.50 |
| | 70451 | .3580 | T | 9.093 | 4-1/4" | 2-9/32" | 1.855" | 98.54 | 94.26 | 89.97 | 85.69 |
| 70759 | | .3594 | 23/64" | 9.129 | 3-1/16" | 1-1/2" | 1.144" | 97.78 | 93.53 | 89.28 | 85.03 |
| | 70456 | .3594 | 23/64" | 9.129 | 4-1/4" | 2-9/32" | 1.862" | 99.06 | 94.75 | 90.45 | 86.14 |



† *Metric equivalents are for reference only*

| 3xD (1160) EDP# | 5xD (1180) EDP# | Decimal | *d* † Diameter | Metric | *l1* Overall Length | *l2* Flute Length | *l5* Max Drill Depth | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 70761 | | .3680 | U | 9.347 | 3-1/8" | 1-9/16" | 1.171" | 98.61 | 94.33 | 90.04 | 85.75 |
| | 70461 | .3680 | U | 9.347 | 4-1/4" | 2-9/32" | 1.907" | 103.72 | 99.21 | 94.70 | 90.19 |
| 70763 | | .3740 | | 9.500 | 79 | 39 | 30 | 99.43 | 95.11 | 90.78 | 86.46 |
| | 70466 | .3740 | | 9.500 | 108 | 58 | 49 | 104.64 | 100.09 | 95.54 | 90.99 |
| 70765 | | .3750 | 3/8" | 9.525 | 3-1/8" | 1-9/16" | 1.193" | 100.03 | 95.68 | 91.33 | 86.98 |
| | 70471 | .3750 | 3/8" | 9.525 | 4-1/4" | 2-3/8" | 1.943" | 105.57 | 100.98 | 96.39 | 91.80 |
| 70767 | | .3760 | | 9.550 | 3-1/8" | 1-9/16" | 1.196" | 101.94 | 97.50 | 93.07 | 88.64 |
| | 70913 | .3760 | | 9.550 | 4-1/4" | 2-3/8" | 1.948" | 106.98 | 102.33 | 97.68 | 93.03 |
| 70769 | | .3770 | V | 9.576 | 3-1/4" | 1-5/8" | 1.200" | 103.86 | 99.34 | 94.83 | 90.31 |
| | 70476 | .3770 | V | 9.576 | 4-1/4" | 2-3/8" | 1.954" | 108.38 | 103.66 | 98.95 | 94.24 |
| 70771 | | .3860 | W | 9.804 | 3-1/4" | 1-5/8" | 1.228" | 105.67 | 101.08 | 96.48 | 91.89 |
| | 70481 | .3860 | W | 9.804 | 4-1/2" | 2-3/8" | 2.000" | 110.10 | 105.31 | 100.53 | 95.74 |
| 70773 | | .3906 | 25/64" | 9.921 | 3-1/4" | 1-5/8" | 1.243" | 107.01 | 102.36 | 97.70 | 93.05 |
| | 70486 | .3906 | 25/64" | 9.921 | 4-1/2" | 2-3/8" | 2.024" | 111.33 | 106.49 | 101.65 | 96.81 |
| 70775 | | .3937 | | 10.000 | 84 | 43 | 32 | 110.25 | 105.46 | 100.66 | 95.87 |
| | 70491 | .3937 | | 10.000 | 114 | 60 | 52 | 114.34 | 109.37 | 104.40 | 99.43 |
| 70777 | | .3970 | X | 10.084 | 3-5/16" | 1-11/16" | 1.263" | 111.76 | 106.90 | 102.04 | 97.18 |
| | 70496 | .3970 | X | 10.084 | 4-1/2" | 2-1/2" | 2.057" | 115.52 | 110.50 | 105.47 | 100.45 |
| 70779 | | .4040 | Y | 10.262 | 3-5/16" | 1-11/16" | 1.286" | 112.48 | 107.59 | 102.70 | 97.81 |
| | 70501 | .4040 | Y | 10.262 | 4-1/2" | 2-9/16" | 2.094" | 118.71 | 113.55 | 108.39 | 103.23 |
| 70781 | | .4062 | 13/32" | 10.317 | 3-5/16" | 1-11/16" | 1.293" | 115.95 | 110.91 | 105.87 | 100.83 |
| | 70506 | .4062 | 13/32" | 10.317 | 4-1/2" | 2-9/16" | 2.105" | 119.63 | 114.43 | 109.23 | 104.03 |
| 70783 | | .4134 | | 10.500 | 85 | 43 | 33 | 117.02 | 111.94 | 106.85 | 101.76 |
| | 70511 | .4134 | | 10.500 | 114 | 67 | 54 | 120.64 | 115.39 | 110.15 | 104.90 |
| 70785 | | .4219 | 27/64" | 10.716 | 3-3/8" | 1-11/16" | 1.343" | 118.14 | 113.00 | 107.87 | 102.73 |
| | 70516 | .4219 | 27/64" | 10.716 | 4-1/2" | 2-11/16" | 2.186" | 121.65 | 116.36 | 111.07 | 105.78 |
| 70787 | | .4331 | | 11.000 | 87 | 45 | 35 | 126.45 | 120.96 | 115.46 | 109.96 |
| | 70521 | .4331 | | 11.000 | 114 | 68 | 57 | 129.79 | 124.15 | 118.50 | 112.86 |
| 70789 | | .4375 | 7/16" | 11.113 | 3-7/16" | 1-3/4" | 1.392" | 126.80 | 121.29 | 115.77 | 110.26 |
| | 70526 | .4375 | 7/16" | 11.113 | 4-3/4" | 2-13/16" | 2.267" | 130.27 | 124.61 | 118.94 | 113.28 |
| 70791 | | .4528 | | 11.500 | 90 | 47 | 37 | 134.47 | 128.62 | 122.78 | 116.93 |
| | 70531 | .4528 | | 11.500 | 120 | 70 | 60 | 138.53 | 132.51 | 126.48 | 120.46 |
| 70793 | | .4531 | 29/64" | 11.509 | 3-9/16" | 1-13/16" | 1.442" | 134.47 | 128.62 | 122.78 | 116.93 |
| | 70536 | .4531 | 29/64" | 11.509 | 4-3/4" | 2-7/8" | 2.348" | 138.53 | 132.51 | 126.48 | 120.46 |
| 70795 | | .4688 | 15/32" | 11.909 | 3-11/16" | 2-1/16" | 1.491" | 141.29 | 135.15 | 129.00 | 122.86 |
| | 70541 | .4688 | 15/32" | 11.909 | 4-3/4" | 2-7/8" | 2.429" | 144.99 | 138.69 | 132.38 | 126.08 |
| 70797 | | .4724 | | 12.000 | 93 | 53 | 38 | 141.70 | 135.54 | 129.38 | 123.22 |
| | 70546 | .4724 | | 12.000 | 120 | 73 | 62 | 145.37 | 139.05 | 132.73 | 126.41 |
| 70799 | | .4844 | 31/64" | 12.304 | 3-11/16" | 2-1/16" | 1.541" | 142.68 | 136.48 | 130.27 | 124.07 |
| | 70551 | .4844 | 31/64" | 12.304 | 5-5/16" | 3" | 2.510" | 147.95 | 141.52 | 135.08 | 128.65 |
| 70801 | | .4921 | | 12.500 | 95 | 53 | 40 | 144.10 | 137.83 | 131.57 | 125.30 |
| | 70556 | .4921 | | 12.500 | 135 | 75 | 65 | 149.59 | 143.09 | 136.58 | 130.08 |
| 70803 | | .5000 | 1/2" | 12.700 | 3-3/4" | 2-1/16" | 1.591" | 145.02 | 138.71 | 132.41 | 126.10 |
| | 70561 | .5000 | 1/2" | 12.700 | 5-3/8" | 3-1/16" | 2.591" | 149.88 | 143.36 | 136.85 | 130.33 |
| 70805 | | .5010 | | 12.725 | 3-3/4" | 2-1/16" | 1.594" | 146.56 | 140.18 | 133.81 | 127.44 |
| | 70915 | .5010 | | 12.725 | 5-3/8" | 3-1/16" | 2.596" | 151.56 | 144.97 | 138.38 | 131.79 |
| 70807 | | .5118 | | 13.000 | 107 | 55 | 41 | 158.95 | 152.04 | 145.13 | 138.22 |
| | 70566 | .5118 | | 13.000 | 136 | 78 | 67 | 164.91 | 157.74 | 150.57 | 143.40 |

*continued* ⟶

## Series 1160, 1180 *(continued)*

.5156" - .6299"
(13.096mm - 16.000mm)

| | 3xD (1160) EDP# | 5xD (1180) EDP# | Decimal | *d* † Diameter | Metric | *l1* Overall Length | *l2* Flute Length | *l5* Max Drill Depth | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 70809 | | .5156 | 33/64" | 13.096 | 4-1/4" | 2-3/16" | 1.641" | 162.71 | 155.64 | 148.56 | 141.49 |
| | | 70571 | .5156 | 33/64" | 13.096 | 5-3/8" | 3-1/8" | 2.672" | 168.43 | 161.11 | 153.78 | 146.46 |
| | 70811 | | .5312 | 17/32" | 13.492 | 4-1/4" | 2-1/4" | 1.690" | 166.46 | 159.23 | 151.99 | 144.75 |
| | | 70576 | .5312 | 17/32" | 13.492 | 5-11/16" | 3-5/16" | 2.753" | 172.06 | 164.58 | 157.10 | 149.62 |
| | 70813 | | .5469 | 35/64" | 13.891 | 4-1/4" | 2-1/4" | 1.740" | 173.95 | 166.39 | 158.82 | 151.26 |
| | | 70581 | .5469 | 35/64" | 13.891 | 5-13/16" | 3-3/8" | 2.834" | 179.07 | 171.28 | 163.50 | 155.71 |
| | 70815 | | .5512 | | 14.000 | 107 | 59 | 45 | 177.71 | 169.98 | 162.26 | 154.53 |
| | | 70586 | .5512 | | 14.000 | 148 | 86 | 73 | 182.62 | 174.68 | 166.74 | 158.80 |
| | 70817 | | .5625 | 9/16" | 14.287 | 4-1/2" | 2-3/8" | 1.790" | 189.03 | 180.81 | 172.59 | 164.37 |
| | | 70591 | .5625 | 9/16" | 14.287 | 5-15/16" | 3-1/2" | 2.915" | 195.16 | 186.67 | 178.19 | 169.70 |
| | 70819 | | .5781 | 37/64" | 14.683 | 4-1/2" | 2-1/2" | 1.840" | 196.03 | 187.51 | 178.98 | 170.46 |
| | | 70596 | .5781 | 37/64" | 14.683 | 6" | 3-1/2" | 2.996" | 201.78 | 193.01 | 184.23 | 175.46 |
| | 70821 | | .5906 | | 15.000 | 115 | 64 | 48 | 199.64 | 190.96 | 182.28 | 173.60 |
| | | 70601 | .5906 | | 15.000 | 152 | 90 | 78 | 205.30 | 196.37 | 187.45 | 178.52 |
| NEW | 70823 | | .5938 | 19/32" | 15.082 | 4-1/2" | 2-1/2" | 1.890" | 200.71 | 191.98 | 183.26 | 174.53 |
| | | 70606 | .5938 | 19/32" | 15.082 | 6" | 3-9/16" | 3.077" | 206.28 | 197.31 | 188.34 | 179.37 |
| | 70825 | | .6094 | 39/64" | 15.478 | 4-1/2" | 2-9/16" | 1.939" | 201.74 | 192.97 | 184.20 | 175.43 |
| | | 70611 | .6094 | 39/64" | 15.478 | 6-3/16" | 3-11/16" | 3.158" | 223.62 | 213.90 | 204.17 | 194.45 |
| | 70827 | | .6250 | 5/8" | 15.875 | 4-1/2" | 2-5/8" | 1.989" | 203.81 | 194.95 | 186.09 | 177.23 |
| | | 70616 | .6250 | 5/8" | 15.875 | 6-5/16" | 3-3/4" | 3.239" | 225.56 | 215.75 | 205.95 | 196.14 |
| | 70829 | | .6299 | | 16.000 | 115 | 66 | 51 | 208.73 | 199.65 | 190.58 | 181.50 |
| | | 70621 | .6299 | | 16.000 | 160 | 95 | 83 | 230.29 | 220.28 | 210.26 | 200.25 |



*1180 Series*
*High Performance Drill in aluminum*



† *Metric equivalents are for reference only*

| TOLERANCES | |
|---|---|
| $d_1$ | +.0000" –.0004" (+.000 –.010mm) |
| $d_2$ | h6 |
| $l_1$ | +.125" –.125" (+3.175 –3.175mm) |
| $l_2$ | +.125" –.125" (+3.175 –3.175mm) |

# Series 1550H,1250H,1850H

Z=2 | 30° | 140° | 3xD | 5xD | 12xD | TECH PAGES 328-329

.0312" - .0354"
(0.792mm - 0.900mm)

Recommended for high nickel, high temperature alloys, cobalt-based alloys, stainless steels, and tool steels >40 Rc

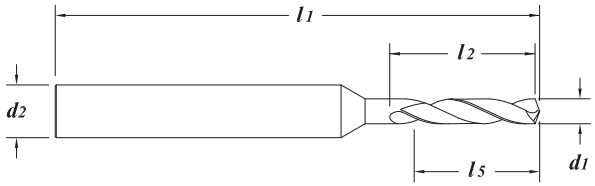
**BALIQ® ALTINOS Coating (AlTiN-based)**

High performance solid submicron grain carbide drill on 3mm or 1/8" diameter shank

30° helix for better chip evacuation

Live tooling recommended on lathe processes






| 3xD (1550H) EDP# | 5xD (1250H) EDP# | 12xD (1850H) EDP# | $d_1$ † Diameter Decimal | Diameter | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | $l_5$ Max Drill Depth | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 00100 | | | .0312 | 1/32" | 0.792 | 1/8" | 2" | 5/32" | .099" | 38.17 | 36.51 | 34.85 | 33.19 |
| | 00304 | | .0312 | 1/32" | 0.792 | 1/8" | 2" | 15/64" | .162" | 39.56 | 37.84 | 36.12 | 34.40 |
| | | 00510 | .0312 | 1/32" | 0.792 | 1/8" | 2" | 7/16" | .380" | 43.75 | 41.84 | 39.94 | 38.04 |
| | 00306 | | .0315 | | 0.800 | 3.0 | 50 | 6.0 | 4 | 39.01 | 37.31 | 35.62 | 33.92 |
| | | 00512 | .0315 | | 0.800 | 3.0 | 50 | 12.0 | 10 | 43.14 | 41.26 | 39.39 | 37.51 |
| | 00308 | | .0319 | | 0.810 | 3.0 | 50 | 6.0 | 4 | 39.01 | 37.31 | 35.62 | 33.92 |
| 00106 | | | .0320 | #67 | 0.812 | 1/8" | 2" | 11/64" | .102" | 38.17 | 36.51 | 34.85 | 33.19 |
| | 00310 | | .0320 | #67 | 0.812 | 1/8" | 2" | 15/64" | .166" | 39.56 | 37.84 | 36.12 | 34.40 |
| | | 00516 | .0320 | #67 | 0.812 | 1/8" | 2" | 7/16" | .390" | 43.75 | 41.84 | 39.94 | 38.04 |
| | | 00518 | .0323 | | 0.820 | 3.0 | 50 | 12.0 | 10 | 43.14 | 41.26 | 39.39 | 37.51 |
| 00112 | | | .0330 | #66 | 0.838 | 1/8" | 2" | 11/64" | .105" | 38.17 | 36.51 | 34.85 | 33.19 |
| | 00316 | | .0330 | #66 | 0.838 | 1/8" | 2" | 15/64" | .171" | 39.56 | 37.84 | 36.12 | 34.40. |
| | | 00522 | .0330 | #66 | 0.838 | 1/8" | 2" | 7/16" | .402" | 43.75 | 41.84 | 39.94 | 38.04 |
| | 00318 | | .0331 | | 0.840 | 3.0 | 50 | 6.0 | 4 | 39.01 | 37.31 | 35.62 | 33.92 |
| | | 00524 | .0331 | | 0.840 | 3.0 | 50 | 12.0 | 10 | 43.14 | 41.26 | 39.39 | 37.51 |
| 00116 | | | .0335 | | 0.850 | 3.0 | 50 | 4.5 | 3 | 37.54 | 35.90 | 34.27 | 32.64 |
| | | 00526 | .0335 | | 0.850 | 3.0 | 50 | 12.0 | 10 | 43.14 | 41.26 | 39.39 | 37.51 |
| | 00322 | | .0339 | | 0.860 | 3.0 | 50 | 6.5 | 4 | 39.01 | 37.31 | 35.62 | 33.92 |
| | | 00528 | .0339 | | 0.860 | 3.0 | 50 | 13.0 | 10 | 43.14 | 41.26 | 39.39 | 37.51 |
| 00120 | | | .0343 | | 0.870 | 3.0 | 50 | 4.5 | 3 | 37.54 | 35.90 | 34.27 | 32.64 |
| | | 00530 | .0343 | | 0.870 | 3.0 | 50 | 13.0 | 11 | 43.14 | 41.26 | 39.39 | 37.51 |
| 00122 | | | .0346 | | 0.880 | 3.0 | 50 | 4.5 | 3 | 37.54 | 35.90 | 34.27 | 32.64 |
| 00124 | | | .0350 | #65 | 0.890 | 3.0 | 50 | 4.5 | 3 | 37.54 | 35.90 | 34.27 | 32.64 |
| | 00328 | | .0350 | #65 | 0.890 | 3.0 | 50 | 6.5 | 5 | 39.01 | 37.31 | 35.62 | 33.92 |
| | | 00534 | .0350 | #65 | 0.890 | 3.0 | 50 | 13.0 | 11 | 43.14 | 41.26 | 39.39 | 37.51 |
| | 00330 | | .0354 | | 0.900 | 3.0 | 50 | 6.5 | 5 | 39.01 | 37.31 | 35.62 | 33.92 |
| | | 00536 | .0354 | | 0.900 | 3.0 | 50 | 13.0 | 11 | 43.14 | 41.26 | 39.39 | 37.51 |

*continued* →

# Series 1550H,1250H,1850H *(continued)*

.0358" - .0465"
(0.910mm - 1.181mm)

| 3xD (1550H) EDP# | 5xD (1250H) EDP# | 12xD (1850H) EDP# | $d_1$ † Diameter Decimal | | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | $l_5$ Max Drill Depth | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 00332 | | .0358 | | 0.910 | 3.0 | 50 | 6.5 | 5 | 39.01 | 37.31 | 35.62 | 33.92 |
| 00130 | | | .0360 | #64 | 0.914 | 1/8" | 2" | 3/16" | .115" | 38.17 | 36.51 | 34.85 | 33.19 |
| | 00334 | | .0360 | #64 | 0.914 | 1/8" | 2" | 1/4" | .187" | 39.56 | 37.84 | 36.12 | 34.40 |
| | | 00540 | .0360 | #64 | 0.914 | 1/8" | 2" | 1/2" | .439" | 43.75 | 41.84 | 39.94 | 38.04 |
| 00134 | | | .0366 | | 0.930 | 3.0 | 50 | 5.0 | 3 | 37.54 | 35.90 | 34.27 | 32.64 |
| 00136 | | | .0370 | #63 | 0.940 | 3.0 | 50 | 5.0 | 3 | 37.54 | 35.90 | 34.27 | 32.64 |
| | 00340 | | .0370 | #63 | 0.940 | 3.0 | 50 | 7.0 | 5 | 39.01 | 37.31 | 35.62 | 33.92 |
| | | 00546 | .0370 | #63 | 0.940 | 3.0 | 50 | 14.0 | 11 | 41.48 | 39.68 | 37.87 | 36.07 |
| 00138 | | | .0374 | | 0.950 | 3.0 | 50 | 5.0 | 3 | 37.54 | 35.90 | 34.27 | 32.64 |
| 00142 | | | .0380 | #62 | 0.965 | 1/8" | 2" | 3/16" | .120" | 38.17 | 36.51 | 34.85 | 33.19 |
| | 00346 | | .0380 | #62 | 0.965 | 1/8" | 2" | 17/64" | .197" | 39.56 | 37.84 | 36.12 | 34.40 |
| | | 00552 | .0380 | #62 | 0.965 | 1/8" | 2" | 9/16" | .463" | 43.75 | 41.84 | 39.94 | 38.04 |
| | | 00556 | .0386 | | 0.980 | 3.0 | 50 | 14.0 | 12 | 43.14 | 41.26 | 39.39 | 37.51 |
| 00148 | | | .0390 | #61 | 0.990 | 3.0 | 50 | 5.0 | 3 | 37.54 | 35.90 | 34.27 | 32.64 |
| | | 00558 | .0390 | #61 | 0.990 | 3.0 | 50 | 14.0 | 12 | 43.14 | 41.26 | 39.39 | 37.51 |
| 00150 | | | .0394 | | 1.000 | 3.0 | 50 | 5.0 | 3 | 37.54 | 35.90 | 34.27 | 32.64 |
| | 00354 | | .0394 | | 1.000 | 3.0 | 50 | 7.0 | 5 | 39.01 | 37.31 | 35.62 | 33.92 |
| | | 00560 | .0394 | | 1.000 | 3.0 | 50 | 14.0 | 12 | 43.14 | 41.26 | 39.39 | 37.51 |
| 00152 | | | .0400 | #60 | 1.016 | 1/8" | 2" | 13/64" | .127" | 37.80 | 36.16 | 34.51 | 32.87 |
| | 00356 | | .0400 | #60 | 1.016 | 1/8" | 2" | 9/32" | .207" | 39.20 | 37.50 | 35.79 | 34.09 |
| | | 00562 | .0400 | #60 | 1.016 | 1/8" | 2" | 9/16" | .487" | 43.34 | 41.46 | 39.57 | 37.69 |
| 00154 | | | .0410 | #59 | 1.041 | 1/8" | 2" | 13/64" | .131" | 37.80 | 36.16 | 34.51 | 32.87 |
| | 00358 | | .0410 | #59 | 1.041 | 1/8" | 2" | 9/32" | .213" | 39.20 | 37.50 | 35.79 | 34.09 |
| | | 00564 | .0410 | #59 | 1.041 | 1/8" | 2" | 9/16" | .500" | 43.34 | 41.46 | 39.57 | 37.69 |
| 00156 | | | .0413 | | 1.050 | 3.0 | 50 | 5.5 | 3 | 37.17 | 35.55 | 33.94 | 32.32 |
| | 00360 | | .0413 | | 1.050 | 3.0 | 50 | 7.5 | 5 | 37.20 | 35.59 | 33.97 | 32.35 |
| | | 00566 | .0413 | | 1.050 | 3.0 | 50 | 15.0 | 13 | 42.78 | 40.92 | 39.06 | 37.20 |
| 00158 | | | .0420 | #58 | 1.066 | 1/8" | 2" | 7/32" | .134" | 37.80 | 36.16 | 34.51 | 32.87 |
| | 00362 | | .0420 | #58 | 1.066 | 1/8" | 2" | 5/16" | .218" | 39.20 | 37.50 | 35.79 | 34.09 |
| 00160 | | | .0430 | #57 | 1.092 | 1/8" | 2" | 7/32" | .137" | 37.80 | 36.16 | 34.51 | 32.87 |
| | 00364 | | .0430 | #57 | 1.092 | 1/8" | 2" | 5/16" | .223" | 39.20 | 37.50 | 35.79 | 34.09 |
| | | 00570 | .0430 | #57 | 1.092 | 1/8" | 2" | 9/16" | .524" | 43.34 | 41.46 | 39.57 | 37.69 |
| 00162 | | | .0433 | | 1.100 | 3.0 | 50 | 5.5 | 4 | 37.17 | 35.55 | 33.94 | 32.32 |
| | 00366 | | .0433 | | 1.100 | 3.0 | 50 | 8.0 | 6 | 38.69 | 37.00 | 35.32 | 33.64 |
| | | 00572 | .0433 | | 1.100 | 3.0 | 50 | 16.0 | 13 | 42.78 | 40.92 | 39.06 | 37.20 |
| 00164 | | | .0453 | | 1.150 | 3.0 | 50 | 6.0 | 4 | 37.17 | 35.55 | 33.94 | 32.32 |
| | 00368 | | .0453 | | 1.150 | 3.0 | 50 | 8.0 | 6 | 38.69 | 37.00 | 35.32 | 33.64 |
| | | 00574 | .0453 | | 1.150 | 3.0 | 50 | 16.0 | 14 | 42.78 | 40.92 | 39.06 | 37.20 |
| 00166 | | | .0465 | #56 | 1.181 | 1/8" | 2" | 15/64" | .148" | 37.80 | 36.16 | 34.51 | 32.87 |
| | 00370 | | .0465 | #56 | 1.181 | 1/8" | 2" | 11/32" | .241" | 39.20 | 37.50 | 35.79 | 34.09 |
| | | 00576 | .0465 | #56 | 1.181 | 1/8" | 2" | 5/8" | .567" | 43.34 | 41.46 | 39.57 | 37.69 |



† *Metric equivalents are for reference only*

.0469" - .0689"
(1.191mm - 1.750mm)

| 3xD (1550H) EDP# | 5xD (1250H) EDP# | 12xD (1850H) EDP# | $d_1$ † Diameter Decimal | | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | $l_5$ Max Drill Depth | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 00168 | | | .0469 | 3/64" | 1.191 | 1/8" | 2" | 15/64" | .149" | 37.80 | 36.16 | 34.51 | 32.87 |
| | 00372 | | .0469 | 3/64" | 1.191 | 1/8" | 2" | 11/32" | .243" | 39.20 | 37.50 | 35.79 | 34.09 |
| | | 00578 | .0469 | 3/64" | 1.191 | 1/8" | 2" | 5/8" | .571" | 43.34 | 41.46 | 39.57 | 37.69 |
| 00170 | | | .0472 | | 1.200 | 3.0 | 50 | 6.0 | 4 | 37.17 | 35.55 | 33.94 | 32.32 |
| | 00374 | | .0472 | | 1.200 | 3.0 | 50 | 9.0 | 6 | 38.69 | 37.00 | 35.32 | 33.64 |
| | | 00580 | .0472 | | 1.200 | 3.0 | 50 | 18.0 | 15 | 42.78 | 40.92 | 39.06 | 37.20 |
| 00172 | | | .0492 | | 1.250 | 3.0 | 50 | 6.5 | 4 | 37.17 | 35.55 | 33.94 | 32.32 |
| | 00376 | | .0492 | | 1.250 | 3.0 | 50 | 9.0 | 6 | 38.69 | 37.00 | 35.32 | 33.64 |
| | | 00582 | .0492 | | 1.250 | 3.0 | 50 | 18.0 | 15 | 42.78 | 40.92 | 39.06 | 37.20 |
| 00174 | | | .0512 | | 1.300 | 3.0 | 50 | 6.5 | 4 | 36.81 | 35.21 | 33.61 | 32.01 |
| | 00378 | | .0512 | | 1.300 | 3.0 | 50 | 9.0 | 7 | 38.28 | 36.62 | 34.95 | 33.29 |
| | | 00584 | .0512 | | 1.300 | 3.0 | 50 | 18.0 | 16 | 42.33 | 40.49 | 38.65 | 36.81 |
| 00176 | | | .0520 | #55 | 1.320 | 1/8" | 2" | 17/64" | .166" | 37.09 | 35.48 | 33.86 | 32.25 |
| | 00380 | | .0520 | #55 | 1.320 | 1/8" | 2" | 3/8" | .270" | 38.85 | 37.16 | 35.47 | 33.78 |
| | | 00586 | .0520 | #55 | 1.320 | 1/8" | 2" | 3/4" | .634" | 42.94 | 41.07 | 39.21 | 37.34 |
| 00178 | | | .0531 | | 1.350 | 3.0 | 50 | 6.5 | 4 | 36.81 | 35.21 | 33.61 | 32.01 |
| | 00382 | | .0531 | | 1.350 | 3.0 | 50 | 9.5 | 7 | 38.28 | 36.62 | 34.95 | 33.29 |
| | | 00588 | .0531 | | 1.350 | 3.0 | 50 | 19.0 | 16 | 42.33 | 40.49 | 38.65 | 36.81 |
| 00180 | | | .0550 | #54 | 1.397 | 1/8" | 2" | 9/32" | .175" | 37.09 | 35.48 | 33.86 | 32.25 |
| | 00384 | | .0550 | #54 | 1.397 | 1/8" | 2" | 3/8" | .285" | 38.85 | 37.16 | 35.47 | 33.78 |
| | | 00590 | .0550 | #54 | 1.397 | 1/8" | 2" | 3/4" | .670" | 42.94 | 41.07 | 39.21 | 37.34 |
| 00182 | | | .0551 | | 1.400 | 3.0 | 50 | 7.0 | 4 | 36.81 | 35.21 | 33.61 | 32.01 |
| | 00386 | | .0551 | | 1.400 | 3.0 | 50 | 10.0 | 7 | 38.28 | 36.62 | 34.95 | 33.29 |
| | | 00592 | .0551 | | 1.400 | 3.0 | 65 | 20.0 | 17 | 44.26 | 42.34 | 40.41 | 38.49 |
| 00184 | | | .0571 | | 1.450 | 3.0 | 50 | 7.0 | 5 | 36.81 | 35.21 | 33.61 | 32.01 |
| | 00388 | | .0571 | | 1.450 | 3.0 | 50 | 10.5 | 8 | 38.28 | 36.62 | 34.95 | 33.29 |
| | | 00594 | .0571 | | 1.450 | 3.0 | 65 | 21.0 | 18 | 44.26 | 42.34 | 40.41 | 38.49 |
| 00186 | | | .0591 | | 1.500 | 3.0 | 50 | 7.5 | 5 | 36.81 | 35.21 | 33.61 | 32.01 |
| | 00390 | | .0591 | | 1.500 | 3.0 | 50 | 10.5 | 8 | 38.28 | 36.62 | 34.95 | 33.29 |
| | | 00596 | .0591 | | 1.500 | 3.0 | 65 | 21.0 | 18 | 44.26 | 42.34 | 40.41 | 38.49 |
| 00188 | | | .0595 | #53 | 1.511 | 1/8" | 2" | 19/64" | .189" | 37.09 | 35.48 | 33.86 | 32.25 |
| | 00392 | | .0595 | #53 | 1.511 | 1/8" | 2" | 7/16" | .308" | 38.85 | 37.16 | 35.47 | 33.78 |
| | | 00598 | .0595 | #53 | 1.511 | 1/8" | 2-1/2" | 13/16" | .725" | 44.91 | 42.96 | 41.00 | 39.05 |
| 00190 | | | .0610 | | 1.550 | 3.0 | 50 | 7.5 | 5 | 36.43 | 34.85 | 33.26 | 31.68 |
| | 00394 | | .0610 | | 1.550 | 3.0 | 50 | 11.0 | 8 | 37.93 | 36.28 | 34.63 | 32.98 |
| | | 00600 | .0610 | | 1.550 | 3.0 | 65 | 22.0 | 19 | 43.90 | 41.99 | 40.08 | 38.17 |
| 00192 | | | .0625 | 1/16" | 1.587 | 1/8" | 2" | 5/16" | .199" | 37.09 | 35.48 | 33.86 | 32.25 |
| | 00396 | | .0625 | 1/16" | 1.587 | 1/8" | 2" | 7/16" | .324" | 38.48 | 36.81 | 35.13 | 33.46 |
| | | 00602 | .0625 | 1/16" | 1.587 | 1/8" | 2-1/2" | 13/16" | .761" | 44.51 | 42.57 | 40.64 | 38.70 |
| 00194 | | | .0630 | | 1.600 | 3.0 | 50 | 7.5 | 6 | 36.43 | 34.85 | 33.26 | 31.68 |
| | 00398 | | .0630 | | 1.600 | 3.0 | 50 | 11.0 | 8 | 37.93 | 36.28 | 34.63 | 32.98 |
| | | 00604 | .0630 | | 1.600 | 3.0 | 65 | 22.0 | 19 | 43.90 | 41.99 | 40.08 | 38.17 |
| 00196 | | | .0635 | #52 | 1.613 | 1/8" | 2" | 5/16" | .202" | 37.09 | 35.48 | 33.86 | 32.25 |
| | 00400 | | .0635 | #52 | 1.613 | 1/8" | 2" | 15/32" | .329" | 38.48 | 36.81 | 35.13 | 33.46 |
| | | 00606 | .0635 | #52 | 1.613 | 1/8" | 2-1/2" | 7/8" | .774" | 44.51 | 42.57 | 40.64 | 38.70 |
| 00198 | | | .0650 | | 1.650 | 3.0 | 50 | 8.5 | 5 | 36.43 | 34.85 | 33.26 | 31.68 |
| | 00402 | | .0650 | | 1.650 | 3.0 | 50 | 11.5 | 9 | 37.93 | 36.28 | 34.63 | 32.98 |
| | | 00608 | .0650 | | 1.650 | 3.0 | 65 | 23.0 | 20 | 43.90 | 41.99 | 40.08 | 38.17 |
| 00200 | | | .0669 | | 1.700 | 3.0 | 50 | 8.5 | 5 | 36.43 | 34.85 | 33.26 | 31.68 |
| | 00404 | | .0669 | | 1.700 | 3.0 | 50 | 11.5 | 9 | 37.93 | 36.28 | 34.63 | 32.98 |
| | | 00610 | .0669 | | 1.700 | 3.0 | 65 | 23.0 | 21 | 43.90 | 41.99 | 40.08 | 38.17 |
| 00202 | | | .0670 | #51 | 1.702 | 1/8" | 2" | 11/32" | .213" | 37.09 | 35.48 | 33.86 | 32.25 |
| | 00406 | | .0670 | #51 | 1.702 | 1/8" | 2" | 15/32" | .347" | 38.48 | 36.81 | 35.13 | 33.46 |
| | | 00612 | .0670 | #51 | 1.702 | 1/8" | 2-1/2" | 7/8" | .816" | 44.51 | 42.57 | 40.64 | 38.70 |
| 00204 | | | .0689 | | 1.750 | 3.0 | 50 | 9.0 | 6 | 36.43 | 34.85 | 33.26 | 31.68 |
| | 00408 | | .0689 | | 1.750 | 3.0 | 50 | 12.0 | 9 | 37.93 | 36.28 | 34.63 | 32.98 |
| | | 00614 | .0689 | | 1.750 | 3.0 | 65 | 24.0 | 21 | 43.90 | 41.99 | 40.08 | 38.17 |

*continued* ⟶

# Series 1550H,1250H,1850H *(continued)*

.0700" - .0846"
(1.778mm - 2.150mm)




| TOLERANCES | |
|---|---|
| $d_1$ | +.0000" –.0004" (+.000 –.010mm) |
| $d_2$ | h6 |
| $l_1$ | +.125" –.125" (+3.175 –3.175mm) |
| $l_2$ | +.125" –.125" (+3.175 –3.175mm) |

Recommended for high nickel, high temperature alloys, cobalt-based alloys, stainless steels, and tool steels >40 Rc

**BALIQ® ALTINOS Coating (AlTiN-based)**

High performance solid submicron grain carbide drill on 3mm or 1/8" diameter shank



| 3xD (1550H) EDP# | 5xD (1250H) EDP# | 12xD (1850H) EDP# | $d_1$ † Diameter Decimal | | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | $l_5$ Max Drill Depth | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 00206 | | | .0700 | #50 | 1.778 | 1/8" | 2" | 23/64" | .223" | 36.72 | 35.12 | 33.53 | 31.93 |
| | 00410 | | .0700 | #50 | 1.778 | 1/8" | 2" | 1/2" | .363" | 38.10 | 36.44 | 34.79 | 33.13 |
| | | 00616 | .0700 | #50 | 1.778 | 1/8" | 2-1/2" | 1" | .853" | 44.06 | 42.14 | 40.23 | 38.31 |
| 00208 | | | .0709 | | 1.800 | 3.0 | 50 | 9.0 | 6 | 36.09 | 34.52 | 32.95 | 31.38 |
| | 00412 | | .0709 | | 1.800 | 3.0 | 50 | 13.0 | 9 | 37.57 | 35.94 | 34.30 | 32.67 |
| | | 00618 | .0709 | | 1.800 | 3.0 | 65 | 26.0 | 22 | 43.46 | 41.57 | 39.68 | 37.79 |
| 00210 | | | .0728 | | 1.850 | 3.0 | 50 | 9.5 | 6 | 36.09 | 34.52 | 32.95 | 31.38 |
| | | 00620 | .0728 | | 1.850 | 3.0 | 65 | 26.0 | 23 | 43.46 | 41.57 | 39.68 | 37.79 |
| 00212 | | | .0730 | #49 | 1.854 | 1/8" | 2" | 3/8" | .232" | 36.72 | 35.12 | 33.53 | 31.93 |
| | 00416 | | .0730 | #49 | 1.854 | 1/8" | 2" | 1/2" | .378" | 38.10 | 36.44 | 34.79 | 33.13 |
| | | 00622 | .0730 | #49 | 1.854 | 1/8" | 2-1/2" | 1" | .889" | 44.06 | 42.14 | 40.23 | 38.31 |
| 00214 | | | .0748 | | 1.900 | 3.0 | 50 | 9.5 | 6 | 36.09 | 34.52 | 32.95 | 31.38 |
| | 00418 | | .0748 | | 1.900 | 3.0 | 50 | 13.5 | 10 | 37.57 | 35.94 | 34.30 | 32.67 |
| | | 00624 | .0748 | | 1.900 | 3.0 | 65 | 27.0 | 23 | 43.46 | 41.57 | 39.68 | 37.79 |
| 00216 | | | .0760 | #48 | 1.930 | 1/8" | 2" | 3/8" | .242" | 36.72 | 35.12 | 33.53 | 31.93 |
| | 00420 | | .0760 | #48 | 1.930 | 1/8" | 2" | 17/32" | .394" | 38.10 | 36.44 | 34.79 | 33.13 |
| | | 00626 | .0760 | #48 | 1.930 | 1/8" | 2-1/2" | 1-1/8" | .926" | 46.43 | 44.41 | 42.39 | 40.37 |
| 00218 | | | .0768 | | 1.950 | 3.0 | 50 | 10.0 | 6 | 36.09 | 34.52 | 32.95 | 31.38 |
| | 00422 | | .0768 | | 1.950 | 3.0 | 50 | 14.0 | 10 | 37.57 | 35.94 | 34.30 | 32.67 |
| | | 00628 | .0768 | | 1.950 | 3.0 | 65 | 28.0 | 24 | 45.79 | 43.80 | 41.81 | 39.82 |
| 00220 | | | .0781 | 5/64" | 1.983 | 1/8" | 2" | 13/32" | .249" | 36.72 | 35.12 | 33.53 | 31.93 |
| | 00424 | | .0781 | 5/64" | 1.983 | 1/8" | 2" | 9/16" | .405" | 38.10 | 36.44 | 34.79 | 33.13 |
| | | 00630 | .0781 | 5/64" | 1.983 | 1/8" | 2-1/2" | 1-1/8" | .951" | 46.43 | 44.41 | 42.39 | 40.37 |
| 00222 | | | .0785 | #47 | 1.994 | 1/8" | 2" | 13/32" | .250" | 36.72 | 35.12 | 33.53 | 31.93 |
| | 00426 | | .0785 | #47 | 1.994 | 1/8" | 2" | 9/16" | .407" | 38.10 | 36.44 | 34.79 | 33.13 |
| | | 00632 | .0785 | #47 | 1.994 | 1/8" | 2-1/2" | 1-1/8" | .956" | 46.43 | 44.41 | 42.39 | 40.37 |
| 00224 | | | .0787 | | 2.000 | 3.0 | 50 | 10.0 | 6 | 36.09 | 34.52 | 32.95 | 31.38 |
| | 00428 | | .0787 | | 2.000 | 3.0 | 50 | 14.0 | 10 | 37.57 | 35.94 | 34.30 | 32.67 |
| | | 00634 | .0787 | | 2.000 | 3.0 | 65 | 28.0 | 24 | 45.79 | 43.80 | 41.81 | 39.82 |
| 00226 | | | .0807 | | 2.050 | 3.0 | 50 | 10.5 | 7 | 35.71 | 34.16 | 32.60 | 31.05 |
| | 00430 | | .0807 | | 2.050 | 3.0 | 50 | 14.0 | 11 | 37.19 | 35.57 | 33.96 | 32.34 |
| | | 00636 | .0807 | | 2.050 | 3.0 | 65 | 28.0 | 25 | 45.38 | 43.41 | 41.43 | 39.46 |
| 00228 | | | .0810 | #46 | 2.057 | 1/8" | 2" | 27/64" | .258" | 36.35 | 34.77 | 33.19 | 31.61 |
| | 00432 | | .0810 | #46 | 2.057 | 1/8" | 2" | 9/16" | .420" | 37.75 | 36.11 | 34.47 | 32.83 |
| | | 00638 | .0810 | #46 | 2.057 | 1/8" | 2-1/2" | 1-1/8" | .987" | 46.05 | 44.04 | 42.04 | 40.04 |
| 00230 | | | .0820 | #45 | 2.083 | 1/8" | 2" | 27/64" | .261" | 36.35 | 34.77 | 33.19 | 31.61 |
| | 00434 | | .0820 | #45 | 2.083 | 1/8" | 2" | 9/16" | .425" | 37.75 | 36.11 | 34.47 | 32.83 |
| | | 00640 | .0820 | #45 | 2.083 | 1/8" | 2-1/2" | 1-1/8" | .999" | 46.05 | 44.04 | 42.04 | 40.04 |
| 00232 | | | .0827 | | 2.100 | 3.0 | 50 | 10.5 | 7 | 35.71 | 34.16 | 32.60 | 31.05 |
| | 00436 | | .0827 | | 2.100 | 3.0 | 50 | 14.5 | 11 | 37.19 | 35.57 | 33.96 | 32.34 |
| | | 00642 | .0827 | | 2.100 | 3.0 | 65 | 29.0 | 26 | 45.38 | 43.41 | 41.43 | 39.46 |
| 00234 | | | .0846 | | 2.150 | 3.0 | 50 | 11.0 | 7 | 35.71 | 34.16 | 32.60 | 31.05 |
| | 00438 | | .0846 | | 2.150 | 3.0 | 50 | 14.5 | 11 | 37.19 | 35.57 | 33.96 | 32.34 |
| | | 00644 | .0846 | | 2.150 | 3.0 | 65 | 29.0 | 26 | 45.38 | 43.41 | 41.43 | 39.46 |



† *Metric equivalents are for reference only*

| 3xD (1550H) EDP# | 5xD (1250H) EDP# | 12xD (1850H) EDP# | $d_1$ † Diameter Decimal | #/Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | $l_5$ Max Drill Depth | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 00236 | | | .0860 | #44 2.184 | 1/8" | 2" | 7/16" | .274" | 36.35 | 34.77 | 33.19 | 31.61 |
| | 00440 | | .0860 | #44 2.184 | 1/8" | 2" | 19/32" | .446" | 37.75 | 36.11 | 34.47 | 32.83 |
| | | 00646 | .0860 | #44 2.184 | 1/8" | 2-1/2" | 1-3/16" | 1.048" | 46.05 | 44.04 | 42.04 | 40.04 |
| 00238 | | | .0866 | 2.200 | 3.0 | 50 | 11.0 | 7 | 35.71 | 34.16 | 32.60 | 31.05 |
| | 00442 | | .0866 | 2.200 | 3.0 | 50 | 15.5 | 11 | 37.19 | 35.57 | 33.96 | 32.34 |
| | | 00648 | .0866 | 2.200 | 3.0 | 65 | 31.0 | 27 | 45.38 | 43.41 | 41.43 | 39.46 |
| 00240 | | | .0886 | 2.250 | 3.0 | 50 | 11.5 | 7 | 35.71 | 34.16 | 32.60 | 31.05 |
| 00242 | | | .0890 | #43 2.260 | 1/8" | 2" | 29/64" | .283" | 36.35 | 34.77 | 33.19 | 31.61 |
| | 00446 | | .0890 | #43 2.260 | 1/8" | 2" | 5/8" | .461" | 37.75 | 36.11 | 34.47 | 32.83 |
| | | 00652 | .0890 | #43 2.260 | 1/8" | 2-1/2" | 1-1/4" | 1.084" | 46.05 | 44.04 | 42.04 | 40.04 |
| 00244 | | | .0906 | 2.300 | 3.0 | 50 | 11.5 | 7 | 35.35 | 33.81 | 32.28 | 30.74 |
| | 00448 | | .0906 | 2.300 | 3.0 | 50 | 16.0 | 12 | 36.83 | 35.23 | 33.63 | 32.03 |
| | | 00654 | .0906 | 2.300 | 3.0 | 65 | 32.0 | 28 | 44.94 | 42.99 | 41.03 | 39.08 |
| 00246 | | | .0925 | 2.350 | 3.0 | 50 | 12.0 | 7 | 35.35 | 33.81 | 32.28 | 30.74 |
| | 00450 | | .0925 | 2.350 | 3.0 | 50 | 16.0 | 12 | 35.42 | 33.88 | 32.34 | 30.80 |
| | | 00656 | .0925 | 2.350 | 3.0 | 65 | 32.0 | 29 | 44.94 | 42.99 | 41.03 | 39.08 |
| 00248 | | | .0935 | #42 2.375 | 1/8" | 2" | 31/64" | .298" | 35.97 | 34.41 | 32.84 | 31.28 |
| | 00452 | | .0935 | #42 2.375 | 1/8" | 2" | 21/32" | .485" | 37.38 | 35.75 | 34.13 | 32.50 |
| | | 00658 | .0935 | #42 2.375 | 1/8" | 3" | 1-5/16" | 1.139" | 45.61 | 43.63 | 41.64 | 39.66 |
| 00250 | | | .0938 | 3/32" 2.382 | 1/8" | 2" | 31/64" | .299" | 35.97 | 34.41 | 32.84 | 31.28 |
| | 00454 | | .0938 | 3/32" 2.382 | 1/8" | 2" | 21/32" | .486" | 37.38 | 35.75 | 34.13 | 32.50 |
| | | 00660 | .0938 | 3/32" 2.382 | 1/8" | 3" | 1-5/16" | 1.143" | 45.61 | 43.63 | 41.64 | 39.66 |
| 00252 | | | .0945 | 2.400 | 3.0 | 50 | 12.0 | 8 | 35.35 | 33.81 | 32.28 | 30.74 |
| | 00456 | | .0945 | 2.400 | 3.0 | 50 | 17.0 | 12 | 36.83 | 35.23 | 33.63 | 32.03 |
| | | 00662 | .0945 | 2.400 | 3.0 | 75 | 34.0 | 29 | 44.94 | 42.99 | 41.03 | 39.08 |
| 00254 | | | .0960 | #41 2.438 | 1/8" | 2" | 31/64" | .306" | 35.97 | 34.41 | 32.84 | 31.28 |
| | 00458 | | .0960 | #41 2.438 | 1/8" | 2" | 43/64" | .498" | 37.38 | 35.75 | 34.13 | 32.50 |
| | | 00664 | .0960 | #41 2.438 | 1/8" | 3" | 1-11/32" | 1.170" | 45.61 | 43.63 | 41.64 | 39.66 |
| 00256 | | | .0965 | 2.450 | 3.0 | 50 | 12.5 | 8 | 35.35 | 33.81 | 32.28 | 30.74 |
| 00258 | | | .0980 | #40 2.489 | 1/8" | 2" | 1/2" | .312" | 35.97 | 34.41 | 32.84 | 31.28 |
| | 00462 | | .0980 | #40 2.489 | 1/8" | 2" | 11/16" | .508" | 37.38 | 35.75 | 34.13 | 32.50 |
| | | 00668 | .0980 | #40 2.489 | 1/8" | 3" | 1-3/8" | 1.194" | 45.61 | 43.63 | 41.64 | 39.66 |
| 00260 | | | .0984 | 2.500 | 3.0 | 50 | 12.5 | 8 | 35.35 | 33.81 | 32.28 | 30.74 |
| | 00464 | | .0984 | 2.500 | 3.0 | 50 | 17.5 | 13 | 36.83 | 35.23 | 33.63 | 32.03 |
| | | 00670 | .0984 | 2.500 | 3.0 | 75 | 35.0 | 30 | 44.94 | 42.99 | 41.03 | 39.08 |
| 00262 | | | .0995 | #39 2.527 | 1/8" | 2" | 1/2" | .317" | 35.97 | 34.41 | 32.84 | 31.28 |
| | 00466 | | .0995 | #39 2.527 | 1/8" | 2" | 11/16" | .516" | 37.38 | 35.75 | 34.13 | 32.50 |
| | | 00672 | .0995 | #39 2.527 | 1/8" | 3" | 1-3/8" | 1.212" | 45.61 | 43.63 | 41.64 | 39.66 |
| 00264 | | | .1004 | 2.550 | 3.0 | 50 | 13.0 | 8 | 35.02 | 33.50 | 31.97 | 30.45 |
| | 00468 | | .1004 | 2.550 | 3.0 | 50 | 17.5 | 13 | 36.50 | 34.91 | 33.33 | 31.74 |
| | | 00674 | .1004 | 2.550 | 3.0 | 75 | 35.0 | 31 | 44.56 | 42.63 | 40.69 | 38.75 |
| 00266 | | | .1015 | #38 2.578 | 1/8" | 2" | 17/32" | .323" | 35.65 | 34.10 | 32.55 | 31.00 |
| | 00470 | | .1015 | #38 2.578 | 1/8" | 2" | 45/64" | .526" | 37.05 | 35.44 | 33.83 | 32.22 |
| | | 00676 | .1015 | #38 2.578 | 1/8" | 3" | 1-13/32" | 1.237" | 45.21 | 43.24 | 41.28 | 39.31 |
| 00268 | | | .1024 | 2.600 | 3.0 | 50 | 13.0 | 8 | 35.02 | 33.50 | 31.97 | 30.45 |
| | 00472 | | .1024 | 2.600 | 3.0 | 50 | 18.0 | 13 | 36.50 | 34.91 | 33.33 | 31.74 |
| | | 00678 | .1024 | 2.600 | 3.0 | 75 | 36.0 | 32 | 44.56 | 42.63 | 40.69 | 38.75 |
| 00270 | | | .1040 | #37 2.641 | 1/8" | 2" | 17/32" | .331" | 35.65 | 34.10 | 32.55 | 31.00 |
| | 00474 | | .1040 | #37 2.641 | 1/8" | 2" | 23/32" | .539" | 37.05 | 35.44 | 33.83 | 32.22 |
| | | 00680 | .1040 | #37 2.641 | 1/8" | 3" | 1-7/16" | 1.267" | 45.21 | 43.24 | 41.28 | 39.31 |
| 00272 | | | .1043 | 2.650 | 3.0 | 50 | 13.5 | 8 | 35.02 | 33.50 | 31.97 | 30.45 |
| | 00476 | | .1043 | 2.650 | 3.0 | 50 | 18.5 | 14 | 36.50 | 34.91 | 33.33 | 31.74 |
| | | 00682 | .1043 | 2.650 | 3.0 | 75 | 37.0 | 32 | 44.56 | 42.63 | 40.69 | 38.75 |

*continued* →

# Series 1550H,1250H,1850H *(continued)*

.1063" - .1250"
(2.700mm - 3.175mm)

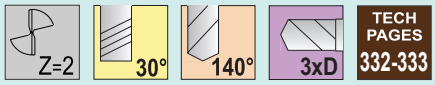
| 3xD (1550H) EDP# | 5xD (1250H) EDP# | 12xD (1850H) EDP# | $d_1$ † Diameter Decimal | | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | $l_5$ Max Drill Depth | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 00274 | | | .1063 | | 2.700 | 3.0 | 50 | 13.5 | 9 | 35.02 | 33.50 | 31.97 | 30.45 |
| | 00478 | | .1063 | | 2.700 | 3.0 | 50 | 19.0 | 14 | 36.50 | 34.91 | 33.33 | 31.74 |
| | | 00684 | .1063 | | 2.700 | 3.0 | 75 | 38.0 | 33 | 44.56 | 42.63 | 40.69 | 38.75 |
| 00276 | | | .1065 | #36 | 2.705 | 1/8" | 2" | 17/32" | .339" | 35.65 | 34.10 | 32.55 | 31.00 |
| | 00480 | | .1065 | #36 | 2.705 | 1/8" | 2" | 3/4" | .552" | 37.05 | 35.44 | 33.83 | 32.22 |
| | | 00686 | .1065 | #36 | 2.705 | 1/8" | 3" | 1-1/2" | 1.297" | 45.21 | 43.24 | 41.28 | 39.31 |
| 00278 | | | .1083 | | 2.750 | 3.0 | 50 | 14.0 | 9 | 35.02 | 33.50 | 31.97 | 30.45 |
| | 00482 | | .1083 | | 2.750 | 3.0 | 50 | 19.5 | 14 | 36.50 | 34.91 | 33.33 | 31.74 |
| | | 00688 | .1083 | | 2.750 | 3.0 | 75 | 39.0 | 34 | 44.56 | 42.63 | 40.69 | 38.75 |
| 00280 | | | .1094 | 7/64" | 2.778 | 1/8" | 2" | 9/16" | .348" | 35.65 | 34.10 | 32.55 | 31.00 |
| | 00484 | | .1094 | 7/64" | 2.778 | 1/8" | 2" | 49/64" | .567" | 37.05 | 35.44 | 33.83 | 32.22 |
| | | 00690 | .1094 | 7/64" | 2.778 | 1/8" | 3" | 1-9/16" | 1.333" | 45.21 | 43.24 | 41.28 | 39.31 |
| 00282 | | | .1100 | #35 | 2.794 | 1/8" | 2" | 9/16" | .350" | 35.65 | 34.10 | 32.55 | 31.00 |
| | 00486 | | .1100 | #35 | 2.794 | 1/8" | 2" | 49/64" | .570" | 37.05 | 35.44 | 33.83 | 32.22 |
| | | 00692 | .1100 | #35 | 2.794 | 1/8" | 3" | 1-9/16" | 1.340" | 45.21 | 43.24 | 41.28 | 39.31 |
| 00284 | | | .1102 | | 2.800 | 3.0 | 50 | 14.0 | 9 | 35.02 | 33.50 | 31.97 | 30.45 |
| | 00488 | | .1102 | | 2.800 | 3.0 | 50 | 19.5 | 15 | 36.50 | 34.91 | 33.33 | 31.74 |
| | | 00694 | .1102 | | 2.800 | 3.0 | 75 | 39.0 | 34 | 44.56 | 42.63 | 40.69 | 38.75 |
| 00286 | | | .1110 | #34 | 2.819 | 1/8" | 2" | 9/16" | .353" | 35.65 | 34.10 | 32.55 | 31.00 |
| | 00490 | | .1110 | #34 | 2.819 | 1/8" | 2" | 25/32" | .575" | 37.05 | 35.44 | 33.83 | 32.22 |
| | | 00696 | .1110 | #34 | 2.819 | 1/8" | 3" | 1-5/8" | 1.352" | 45.21 | 43.24 | 41.28 | 39.31 |
| 00288 | | | .1122 | | 2.850 | 3.0 | 50 | 14.5 | 9 | 35.02 | 33.50 | 31.97 | 30.45 |
| | | 00698 | .1122 | | 2.850 | 3.0 | 75 | 40.0 | 35 | 44.56 | 42.63 | 40.69 | 38.75 |
| 00290 | | | .1130 | #33 | 2.870 | 1/8" | 2" | 19/32" | .356" | 35.65 | 34.10 | 32.55 | 31.00 |
| | 00494 | | .1130 | #33 | 2.870 | 1/8" | 2" | 51/64" | .586" | 37.05 | 35.44 | 33.83 | 32.22 |
| | | 00700 | .1130 | #33 | 2.870 | 1/8" | 3" | 1-5/8" | 1.377" | 45.21 | 43.24 | 41.28 | 39.31 |
| 00292 | | | .1142 | | 2.900 | 3.0 | 50 | 14.5 | 9 | 35.02 | 33.50 | 31.97 | 30.45 |
| | 00496 | | .1142 | | 2.900 | 3.0 | 50 | 20.0 | 15 | 36.50 | 34.91 | 33.33 | 31.74 |
| | | 00702 | .1142 | | 2.900 | 3.0 | 75 | 40.0 | 35 | 44.56 | 42.63 | 40.69 | 38.75 |
| 00294 | | | .1160 | #32 | 2.946 | 1/8" | 2" | 19/32" | .369" | 35.65 | 34.10 | 32.55 | 31.00 |
| | 00498 | | .1160 | #32 | 2.946 | 1/8" | 2" | 13/16" | .601" | 37.05 | 35.44 | 33.83 | 32.22 |
| | | 00704 | .1160 | #32 | 2.946 | 1/8" | 3" | 1-5/8" | 1.413" | 45.21 | 43.24 | 41.28 | 39.31 |
| 00296 | | | .1161 | | 2.950 | 3.0 | 50 | 15.0 | 9 | 35.02 | 33.50 | 31.97 | 30.45 |
| | | 00706 | .1161 | | 2.950 | 3.0 | 75 | 42.0 | 36 | 44.56 | 42.63 | 40.69 | 38.75 |
| 00298 | | | .1181 | | 3.000 | 3.0 | 50 | 15.0 | 10 | 32.90 | 31.47 | 30.04 | 28.61 |
| | 00502 | | .1181 | | 3.000 | 3.0 | 50 | 21.0 | 16 | 34.37 | 32.88 | 31.38 | 29.89 |
| | | 00708 | .1181 | | 3.000 | 3.0 | 75 | 42.0 | 37 | 42.04 | 40.22 | 38.39 | 36.56 |
| 00300 | | | .1200 | #31 | 3.048 | 1/8" | 2" | 5/8" | .382" | 35.65 | 34.10 | 32.55 | 31.00 |
| | 00504 | | .1200 | #31 | 3.048 | 1/8" | 2" | 7/8" | .622" | 37.05 | 35.44 | 33.83 | 32.22 |
| | | 00710 | .1200 | #31 | 3.048 | 1/8" | 3" | 1-3/4" | 1.462" | 45.21 | 43.24 | 41.28 | 39.31 |
| 00302 | | | .1250 | 1/8" | 3.175 | 1/8" | 2" | 5/8" | .398" | 33.53 | 32.08 | 30.62 | 29.16 |
| | 00506 | | .1250 | 1/8" | 3.175 | 1/8" | 2" | 7/8" | .648" | 34.93 | 33.41 | 31.89 | 30.37 |
| | | 00712 | .1250 | 1/8" | 3.175 | 1/8" | 3" | 1-3/4" | 1.523" | 42.70 | 40.84 | 38.99 | 37.13 |



† *Metric equivalents are for reference only*

**TOLERANCES**

| | | |
|---|---|---|
| $d_1$* | 3mm - 6mm | +.016mm +.004mm (+.00063" +.00015") |
| | > 6mm - 10mm | +.021mm +.006mm (+.00082" +.00023") |
| | > 10mm - 18mm | +.025mm +.007mm (+.00098" +.00027") |
| | > 18mm - 20mm | +.029mm +.008mm (+.00114" +.00031") |
| $d_2$ | h6 | |
| $l_1$ | +3.175mm -3.175mm (+.125" -.125") | |
| $l_2$ | +3.175mm -3.175mm (+.125" -.125") | |
| $l_4$ | +1.980mm -.000mm (+.078" -.000") | |




TECH PAGES 332-333

# Series 1580HD

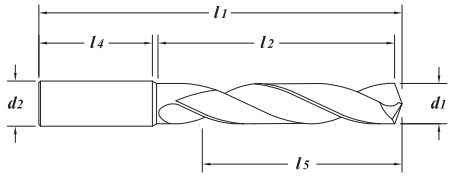
.1181" - .2342"
(3.000mm - 5.950mm)

Recommended for high nickel, high temperature alloys, cobalt-based alloys, stainless steels, and tool steels >40 Rc

## BALIQ® ALTINOS Coating (AlTiN-based)

High performance solid submicron grain carbide drill with reinforced shank
Up to 50% faster than standard carbide drills
30° helix for better chip evacuation
Honed cutting edge
Can be used as a pilot drill
Live tooling recommended on lathe processes






*Note - These drills are made to a plus/plus tolerance on the drill diameter. If you are in need of a minus tolerance drill, please refer to our other high performance drills.*

| EDP# | $d_1$ † Diameter Decimal | Diameter Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | $l_5$ Max Drill Depth | $l_4$ Shank Length | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 20085 | .1181 | 3.000 | 6.0 | 62 | 20 | 16 | 36 | 47.23 | 45.18 | 43.12 | 41.07 |
| 20095 | .1220 | 3.100 | 6.0 | 62 | 20 | 15 | 36 | 47.23 | 45.18 | 43.12 | 41.07 |
| 20105 | .1248 | 3.170 | 6.0 | 62 | 20 | 15 | 36 | 47.23 | 45.18 | 43.12 | 41.07 |
| 20115 | .1260 | 3.200 | 6.0 | 62 | 20 | 15 | 36 | 47.23 | 45.18 | 43.12 | 41.07 |
| 20125 | .1280 | 3.250 | 6.0 | 62 | 20 | 15 | 36 | 47.23 | 45.18 | 43.12 | 41.07 |
| 20135 | .1299 | 3.300 | 6.0 | 62 | 20 | 15 | 36 | 47.23 | 45.18 | 43.12 | 41.07 |
| 20145 | .1339 | 3.400 | 6.0 | 62 | 20 | 15 | 36 | 47.23 | 45.18 | 43.12 | 41.07 |
| 20155 | .1378 | 3.500 | 6.0 | 62 | 20 | 15 | 36 | 47.23 | 45.18 | 43.12 | 41.07 |
| 20165 | .1417 | 3.600 | 6.0 | 62 | 20 | 15 | 36 | 47.23 | 45.18 | 43.12 | 41.07 |
| 20175 | .1457 | 3.700 | 6.0 | 62 | 20 | 14 | 36 | 47.23 | 45.18 | 43.12 | 41.07 |
| 20185 | .1476 | 3.750 | 6.0 | 62 | 20 | 14 | 36 | 47.23 | 45.18 | 43.12 | 41.07 |
| 20195 | .1496 | 3.800 | 6.0 | 66 | 24 | 18 | 36 | 47.23 | 45.18 | 43.12 | 41.07 |
| 20205 | .1535 | 3.900 | 6.0 | 66 | 24 | 18 | 36 | 47.23 | 45.18 | 43.12 | 41.07 |
| 20215 | .1575 | 4.000 | 6.0 | 66 | 24 | 18 | 36 | 47.23 | 45.18 | 43.12 | 41.07 |
| 20225 | .1614 | 4.100 | 6.0 | 66 | 24 | 18 | 36 | 47.23 | 45.18 | 43.12 | 41.07 |
| 20235 | .1654 | 4.200 | 6.0 | 66 | 24 | 18 | 36 | 47.23 | 45.18 | 43.12 | 41.07 |
| 20245 | .1673 | 4.250 | 6.0 | 66 | 24 | 18 | 36 | 47.23 | 45.18 | 43.12 | 41.07 |
| 20255 | .1693 | 4.300 | 6.0 | 66 | 24 | 18 | 36 | 47.23 | 45.18 | 43.12 | 41.07 |
| 20265 | .1732 | 4.400 | 6.0 | 66 | 24 | 17 | 36 | 47.23 | 45.18 | 43.12 | 41.07 |
| 20275 | .1772 | 4.500 | 6.0 | 66 | 24 | 17 | 36 | 47.23 | 45.18 | 43.12 | 41.07 |
| 20285 | .1811 | 4.600 | 6.0 | 66 | 24 | 17 | 36 | 47.23 | 45.18 | 43.12 | 41.07 |
| 20295 | .1831 | 4.650 | 6.0 | 66 | 24 | 17 | 36 | 47.23 | 45.18 | 43.12 | 41.07 |
| 20305 | .1850 | 4.700 | 6.0 | 66 | 24 | 17 | 36 | 47.23 | 45.18 | 43.12 | 41.07 |
| 20315 | .1870 | 4.750 | 6.0 | 66 | 24 | 17 | 36 | 47.23 | 45.18 | 43.12 | 41.07 |
| 20325 | .1890 | 4.800 | 6.0 | 66 | 28 | 21 | 36 | 47.23 | 45.18 | 43.12 | 41.07 |
| 20335 | .1929 | 4.900 | 6.0 | 66 | 28 | 21 | 36 | 47.23 | 45.18 | 43.12 | 41.07 |
| 20345 | .1969 | 5.000 | 6.0 | 66 | 28 | 21 | 36 | 47.23 | 45.18 | 43.12 | 41.07 |
| 20355 | .2008 | 5.100 | 6.0 | 66 | 28 | 20 | 36 | 47.23 | 45.18 | 43.12 | 41.07 |
| 20365 | .2027 | 5.150 | 6.0 | 66 | 28 | 20 | 36 | 47.23 | 45.18 | 43.12 | 41.07 |
| 20375 | .2047 | 5.200 | 6.0 | 66 | 28 | 20 | 36 | 47.23 | 45.18 | 43.12 | 41.07 |
| 20385 | .2087 | 5.300 | 6.0 | 66 | 28 | 20 | 36 | 47.23 | 45.18 | 43.12 | 41.07 |
| 20395 | .2165 | 5.500 | 6.0 | 66 | 28 | 20 | 36 | 47.23 | 45.18 | 43.12 | 41.07 |
| 20405 | .2185 | 5.550 | 6.0 | 66 | 28 | 20 | 36 | 47.23 | 45.18 | 43.12 | 41.07 |
| 20408 | .2205 | 5.600 | 6.0 | 66 | 28 | 20 | 36 | 47.23 | 45.18 | 43.12 | 41.07 |
| 20412 | .2244 | 5.700 | 6.0 | 66 | 28 | 19 | 36 | 47.23 | 45.18 | 43.12 | 41.07 |
| 20415 | .2283 | 5.800 | 6.0 | 66 | 28 | 19 | 36 | 47.23 | 45.18 | 43.12 | 41.07 |
| 20425 | .2323 | 5.900 | 6.0 | 66 | 28 | 19 | 36 | 47.23 | 45.18 | 43.12 | 41.07 |
| 20435 | .2342 | 5.950 | 6.0 | 66 | 28 | 19 | 36 | 47.23 | 45.18 | 43.12 | 41.07 |

*continued* →

## Series 1580HD *(continued)*

.2362" - .4252"
(6.000mm - 10.800mm)

| EDP# | $d_1$ † Diameter Decimal | Diameter Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | $l_5$ Max Drill Depth | $l_4$ Shank Length | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 20445 | .2362 | 6.000 | 6.0 | 66 | 28 | 19 | 36 | 47.23 | 45.18 | 43.12 | 41.07 |
| 20448 | .2402 | 6.100 | 8.0 | 79 | 34 | 25 | 36 | 64.98 | 62.15 | 59.33 | 56.50 |
| 20452 | .2441 | 6.200 | 8.0 | 79 | 34 | 25 | 36 | 64.98 | 62.15 | 59.33 | 56.50 |
| 20454 | .2480 | 6.300 | 8.0 | 79 | 34 | 25 | 36 | 64.98 | 62.15 | 59.33 | 56.50 |
| 20455 | .2500 | 6.350 | 8.0 | 79 | 34 | 24 | 36 | 64.98 | 62.15 | 59.33 | 56.50 |
| 20462 | .2520 | 6.400 | 8.0 | 79 | 34 | 24 | 36 | 64.98 | 62.15 | 59.33 | 56.50 |
| 20465 | .2559 | 6.500 | 8.0 | 79 | 34 | 24 | 36 | 64.98 | 62.15 | 59.33 | 56.50 |
| 20468 | .2571 | 6.530 | 8.0 | 79 | 34 | 24 | 36 | 64.98 | 62.15 | 59.33 | 56.50 |
| 20472 | .2598 | 6.600 | 8.0 | 79 | 34 | 24 | 36 | 64.98 | 62.15 | 59.33 | 56.50 |
| 20473 | .2638 | 6.700 | 8.0 | 79 | 34 | 24 | 36 | 64.98 | 62.15 | 59.33 | 56.50 |
| 20475 | .2657 | 6.750 | 8.0 | 79 | 34 | 24 | 36 | 64.98 | 62.15 | 59.33 | 56.50 |
| 20485 | .2677 | 6.800 | 8.0 | 79 | 34 | 24 | 36 | 64.98 | 62.15 | 59.33 | 56.50 |
| 20495 | .2717 | 6.900 | 8.0 | 79 | 34 | 24 | 36 | 64.98 | 62.15 | 59.33 | 56.50 |
| 20505 | .2756 | 7.000 | 8.0 | 79 | 34 | 24 | 36 | 64.98 | 62.15 | 59.33 | 56.50 |
| 20515 | .2795 | 7.100 | 8.0 | 79 | 41 | 30 | 36 | 64.98 | 62.15 | 59.33 | 56.50 |
| 20525 | .2815 | 7.150 | 8.0 | 79 | 41 | 30 | 36 | 64.98 | 62.15 | 59.33 | 56.50 |
| 20535 | .2835 | 7.200 | 8.0 | 79 | 41 | 30 | 36 | 64.98 | 62.15 | 59.33 | 56.50 |
| 20542 | .2874 | 7.300 | 8.0 | 79 | 41 | 30 | 36 | 64.98 | 62.15 | 59.33 | 56.50 |
| 20545 | .2913 | 7.400 | 8.0 | 79 | 41 | 30 | 36 | 64.98 | 62.15 | 59.33 | 56.50 |
| 20555 | .2953 | 7.500 | 8.0 | 79 | 41 | 30 | 36 | 64.98 | 62.15 | 59.33 | 56.50 |
| 20565 | .2972 | 7.550 | 8.0 | 79 | 41 | 30 | 36 | 64.98 | 62.15 | 59.33 | 56.50 |
| 20575 | .2992 | 7.600 | 8.0 | 79 | 41 | 30 | 36 | 64.98 | 62.15 | 59.33 | 56.50 |
| 20585 | .3031 | 7.700 | 8.0 | 79 | 41 | 29 | 36 | 64.98 | 62.15 | 59.33 | 56.50 |
| 20595 | .3071 | 7.800 | 8.0 | 79 | 41 | 29 | 36 | 64.98 | 62.15 | 59.33 | 56.50 |
| 20605 | .3130 | 7.950 | 8.0 | 79 | 41 | 29 | 36 | 64.98 | 62.15 | 59.33 | 56.50 |
| 20615 | .3150 | 8.000 | 8.0 | 79 | 41 | 29 | 36 | 64.98 | 62.15 | 59.33 | 56.50 |
| 20622 | .3189 | 8.100 | 10.0 | 89 | 47 | 35 | 40 | 90.40 | 86.47 | 82.54 | 78.61 |
| 20625 | .3228 | 8.200 | 10.0 | 89 | 47 | 35 | 40 | 90.40 | 86.47 | 82.54 | 78.61 |
| 20635 | .3268 | 8.300 | 10.0 | 89 | 47 | 35 | 40 | 90.40 | 86.47 | 82.54 | 78.61 |
| 20645 | .3287 | 8.350 | 10.0 | 89 | 47 | 34 | 40 | 90.40 | 86.47 | 82.54 | 78.61 |
| 20652 | .3307 | 8.400 | 10.0 | 89 | 47 | 34 | 40 | 90.40 | 86.47 | 82.54 | 78.61 |
| 20655 | .3346 | 8.500 | 10.0 | 89 | 47 | 34 | 40 | 90.40 | 86.47 | 82.54 | 78.61 |
| 20665 | .3386 | 8.600 | 10.0 | 89 | 47 | 34 | 40 | 90.40 | 86.47 | 82.54 | 78.61 |
| 20675 | .3425 | 8.700 | 10.0 | 89 | 47 | 34 | 40 | 90.40 | 86.47 | 82.54 | 78.61 |
| 20685 | .3445 | 8.750 | 10.0 | 89 | 47 | 34 | 40 | 90.40 | 86.47 | 82.54 | 78.61 |
| 20695 | .3465 | 8.800 | 10.0 | 89 | 47 | 34 | 40 | 90.40 | 86.47 | 82.54 | 78.61 |
| 20705 | .3504 | 8.900 | 10.0 | 89 | 47 | 34 | 40 | 90.40 | 86.47 | 82.54 | 78.61 |
| 20715 | .3543 | 9.000 | 10.0 | 89 | 47 | 34 | 40 | 90.40 | 86.47 | 82.54 | 78.61 |
| 20725 | .3583 | 9.100 | 10.0 | 89 | 47 | 33 | 40 | 90.40 | 86.47 | 82.54 | 78.61 |
| 20735 | .3602 | 9.150 | 10.0 | 89 | 47 | 33 | 40 | 90.40 | 86.47 | 82.54 | 78.61 |
| 20745 | .3622 | 9.200 | 10.0 | 89 | 47 | 33 | 40 | 90.40 | 86.47 | 82.54 | 78.61 |
| 20755 | .3661 | 9.300 | 10.0 | 89 | 47 | 33 | 40 | 90.40 | 86.47 | 82.54 | 78.61 |
| 20762 | .3701 | 9.400 | 10.0 | 89 | 47 | 33 | 40 | 90.40 | 86.47 | 82.54 | 78.61 |
| 20765 | .3740 | 9.500 | 10.0 | 89 | 47 | 33 | 40 | 90.40 | 86.47 | 82.54 | 78.61 |
| 20775 | .3760 | 9.550 | 10.0 | 89 | 47 | 33 | 40 | 90.40 | 86.47 | 82.54 | 78.61 |
| 20778 | .3780 | 9.600 | 10.0 | 89 | 47 | 33 | 40 | 90.40 | 86.47 | 82.54 | 78.61 |
| 20782 | .3819 | 9.700 | 10.0 | 89 | 47 | 32 | 40 | 90.40 | 86.47 | 82.54 | 78.61 |
| 20785 | .3858 | 9.800 | 10.0 | 89 | 47 | 32 | 40 | 90.40 | 86.47 | 82.54 | 78.61 |
| 20795 | .3898 | 9.900 | 10.0 | 89 | 47 | 32 | 40 | 90.40 | 86.47 | 82.54 | 78.61 |
| 20805 | .3937 | 10.000 | 10.0 | 89 | 47 | 32 | 40 | 90.40 | 86.47 | 82.54 | 78.61 |
| 20812 | .3976 | 10.100 | 12.0 | 102 | 55 | 40 | 45 | 117.61 | 112.50 | 107.38 | 102.27 |
| 20815 | .4016 | 10.200 | 12.0 | 102 | 55 | 40 | 45 | 117.61 | 112.50 | 107.38 | 102.27 |
| 20825 | .4055 | 10.300 | 12.0 | 102 | 55 | 40 | 45 | 117.61 | 112.50 | 107.38 | 102.27 |
| 20835 | .4134 | 10.500 | 12.0 | 102 | 55 | 39 | 45 | 117.61 | 112.50 | 107.38 | 102.27 |
| 20842 | .4173 | 10.600 | 12.0 | 102 | 55 | 39 | 45 | 117.61 | 112.50 | 107.38 | 102.27 |
| 20845 | .4213 | 10.700 | 12.0 | 102 | 55 | 39 | 45 | 117.61 | 112.50 | 107.38 | 102.27 |
| 20855 | .4252 | 10.800 | 12.0 | 102 | 55 | 39 | 45 | 117.61 | 112.50 | 107.38 | 102.27 |



† *Metric equivalents are for reference only*

| EDP# | $d_1$ † Diameter Decimal | Diameter Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | $l_5$ Max Drill Depth | $l_4$ Shank Length | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 20865 | .4331 | 11.000 | 12.0 | 102 | 55 | 38 | 45 | 117.61 | 112.50 | 107.38 | 102.27 |
| 20875 | .4370 | 11.100 | 12.0 | 102 | 55 | 38 | 45 | 117.61 | 112.50 | 107.38 | 102.27 |
| 20885 | .4409 | 11.200 | 12.0 | 102 | 55 | 38 | 45 | 117.61 | 112.50 | 107.38 | 102.27 |
| 20892 | .4488 | 11.400 | 12.0 | 102 | 55 | 38 | 45 | 117.61 | 112.50 | 107.38 | 102.27 |
| 20895 | .4528 | 11.500 | 12.0 | 102 | 55 | 38 | 45 | 117.61 | 112.50 | 107.38 | 102.27 |
| 20905 | .4606 | 11.700 | 12.0 | 102 | 55 | 37 | 45 | 117.61 | 112.50 | 107.38 | 102.27 |
| 20915 | .4685 | 11.900 | 12.0 | 102 | 55 | 37 | 45 | 117.61 | 112.50 | 107.38 | 102.27 |
| 20925 | .4724 | 12.000 | 12.0 | 102 | 55 | 37 | 45 | 117.61 | 112.50 | 107.38 | 102.27 |
| 20935 | .4764 | 12.100 | 14.0 | 107 | 60 | 42 | 45 | 147.50 | 141.09 | 134.67 | 128.26 |
| 20941 | .4803 | 12.200 | 14.0 | 107 | 60 | 42 | 45 | 147.50 | 141.09 | 134.67 | 128.26 |
| 20945 | .4842 | 12.300 | 14.0 | 107 | 60 | 42 | 45 | 147.50 | 141.09 | 134.67 | 128.26 |
| 20955 | .4921 | 12.500 | 14.0 | 107 | 60 | 41 | 45 | 147.50 | 141.09 | 134.67 | 128.26 |
| 20961 | .4961 | 12.600 | 14.0 | 107 | 60 | 41 | 45 | 147.50 | 141.09 | 134.67 | 128.26 |
| 20965 | .5000 | 12.700 | 14.0 | 107 | 60 | 41 | 45 | 147.50 | 141.09 | 134.67 | 128.26 |
| 20975 | .5039 | 12.800 | 14.0 | 107 | 60 | 41 | 45 | 147.50 | 141.09 | 134.67 | 128.26 |
| 20978 | .5051 | 12.830 | 14.0 | 107 | 60 | 41 | 45 | 147.50 | 141.09 | 134.67 | 128.26 |
| 20981 | .5079 | 12.900 | 14.0 | 107 | 60 | 41 | 45 | 147.50 | 141.09 | 134.67 | 128.26 |
| 20982 | .5098 | 12.950 | 14.0 | 107 | 60 | 41 | 45 | 147.50 | 141.09 | 134.67 | 128.26 |
| 20985 | .5118 | 13.000 | 14.0 | 107 | 60 | 41 | 45 | 147.50 | 141.09 | 134.67 | 128.26 |
| 20995 | .5157 | 13.100 | 14.0 | 107 | 60 | 40 | 45 | 147.50 | 141.09 | 134.67 | 128.26 |
| 20998 | .5236 | 13.300 | 14.0 | 107 | 60 | 40 | 45 | 147.50 | 141.09 | 134.67 | 128.26 |
| 21005 | .5315 | 13.500 | 14.0 | 107 | 60 | 40 | 45 | 147.50 | 141.09 | 134.67 | 128.26 |
| 21015 | .5394 | 13.700 | 14.0 | 107 | 60 | 39 | 45 | 147.50 | 141.09 | 134.67 | 128.26 |
| 21025 | .5433 | 13.800 | 14.0 | 107 | 60 | 39 | 45 | 147.50 | 141.09 | 134.67 | 128.26 |
| 21035 | .5512 | 14.000 | 14.0 | 107 | 60 | 39 | 45 | 147.50 | 141.09 | 134.67 | 128.26 |
| 21045 | .5551 | 14.100 | 16.0 | 115 | 65 | 44 | 48 | 175.32 | 167.70 | 160.07 | 152.45 |
| 21053 | .5591 | 14.200 | 16.0 | 115 | 65 | 44 | 48 | 175.32 | 167.70 | 160.07 | 152.45 |
| 21055 | .5610 | 14.250 | 16.0 | 115 | 65 | 44 | 48 | 175.32 | 167.70 | 160.07 | 152.45 |
| 21065 | .5630 | 14.300 | 16.0 | 115 | 65 | 44 | 48 | 175.32 | 167.70 | 160.07 | 152.45 |
| 21075 | .5709 | 14.500 | 16.0 | 115 | 65 | 43 | 48 | 175.32 | 167.70 | 160.07 | 152.45 |
| 21085 | .5787 | 14.700 | 16.0 | 115 | 65 | 43 | 48 | 175.32 | 167.70 | 160.07 | 152.45 |
| 21105 | .5906 | 15.000 | 16.0 | 115 | 65 | 43 | 48 | 175.32 | 167.70 | 160.07 | 152.45 |
| 21115 | .5945 | 15.100 | 16.0 | 115 | 65 | 42 | 48 | 175.32 | 167.70 | 160.07 | 152.45 |
| 21125 | .6102 | 15.500 | 16.0 | 115 | 65 | 42 | 48 | 175.32 | 167.70 | 160.07 | 152.45 |
| 21135 | .6181 | 15.700 | 16.0 | 115 | 65 | 41 | 48 | 175.32 | 167.70 | 160.07 | 152.45 |
| 21145 | .6220 | 15.800 | 16.0 | 115 | 65 | 41 | 48 | 175.32 | 167.70 | 160.07 | 152.45 |
| 21155 | .6299 | 16.000 | 16.0 | 115 | 65 | 41 | 48 | 175.32 | 167.70 | 160.07 | 152.45 |
| 21159 | .6331 | 16.080 | 18.0 | 123 | 73 | 49 | 48 | 232.70 | 222.59 | 212.47 | 202.35 |
| 21175 | .6496 | 16.500 | 18.0 | 123 | 73 | 48 | 48 | 232.70 | 222.59 | 212.47 | 202.35 |
| 21185 | .6555 | 16.650 | 18.0 | 123 | 73 | 48 | 48 | 232.70 | 222.59 | 212.47 | 202.35 |
| 21195 | .6693 | 17.000 | 18.0 | 123 | 73 | 48 | 48 | 232.70 | 222.59 | 212.47 | 202.35 |
| 21215 | .6870 | 17.450 | 18.0 | 123 | 73 | 47 | 48 | 232.70 | 222.59 | 212.47 | 202.35 |
| 21225 | .6890 | 17.500 | 18.0 | 123 | 73 | 47 | 48 | 232.70 | 222.59 | 212.47 | 202.35 |
| 21235 | .7027 | 17.850 | 18.0 | 123 | 73 | 46 | 48 | 232.70 | 222.59 | 212.47 | 202.35 |
| 21245 | .7087 | 18.000 | 18.0 | 123 | 73 | 46 | 48 | 232.70 | 222.59 | 212.47 | 202.35 |
| 21255 | .7185 | 18.250 | 20.0 | 131 | 79 | 52 | 50 | 318.68 | 304.82 | 290.97 | 277.11 |
| 21265 | .7283 | 18.500 | 20.0 | 131 | 79 | 51 | 50 | 318.68 | 304.82 | 290.97 | 277.11 |
| 21275 | .7342 | 18.650 | 20.0 | 131 | 79 | 51 | 50 | 318.68 | 304.82 | 290.97 | 277.11 |
| 21295 | .7500 | 19.050 | 20.0 | 131 | 79 | 50 | 50 | 318.68 | 304.82 | 290.97 | 277.11 |
| 21304 | .7598 | 19.300 | 20.0 | 131 | 79 | 50 | 50 | 318.68 | 304.82 | 290.97 | 277.11 |
| 21315 | .7677 | 19.500 | 20.0 | 131 | 79 | 50 | 50 | 318.68 | 304.82 | 290.97 | 277.11 |
| 21325 | .7815 | 19.850 | 20.0 | 131 | 79 | 49 | 50 | 318.68 | 304.82 | 290.97 | 277.11 |
| 21335 | .7874 | 20.000 | 20.0 | 131 | 79 | 49 | 50 | 318.68 | 304.82 | 290.97 | 277.11 |

# Series 1580H, 1280H

.1181" - .1719"
(3.000mm - 4.366mm)

Z=2 | 30° | 140° | 3xD | 5xD | TECH PAGES 332-333

**TOLERANCES**

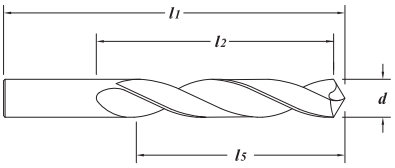
| | | |
|---|---|---|
| $d$ | +.0000" –.0005" (+.0000 –.0127mm) | |
| $l_1$ | ≤ 1/8" | +.125" –.062" (+3.175 –1.588mm) |
| | > 1/8" | +.125" –.125" (+3.175 –3.175mm) |
| $l_2$ | ≤ 1/8" | +.125" –.062" (+3.175 –1.588mm) |
| | >1/8" | +.125" –.125" (+3.175 –3.175mm) |

Recommended for high nickel, high temperature alloys, cobalt-based alloys, stainless steels, and tool steels >40 Rc

**BALIQ® ALTINOS Coating (AlTiN-based)**

High performance - high penetration solid submicron grain carbide drill
Extended tool life and greater surface finish through faster SFM rates
Up to 50% faster than standard carbide drills
30° helix for better chip evacuation
Honed cutting edge
Live tooling recommended on lathe processes






| 3xD (1580H) EDP# | 5xD (1280H) EDP# | $d$ † Diameter Decimal | | Metric | $l_1$ Overall Length | $l_2$ Flute Length | $l_5$ Max Drill Depth | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 20301 | | .1181 | | 3.000 | 46 | 16 | 10 | 32.90 | 31.47 | 30.04 | 28.61 |
| | 21301 | .1181 | | 3.000 | 50 | 19 | 16 | 34.39 | 32.89 | 31.40 | 29.90 |
| 20306 | | .1200 | #31 | 3.048 | 1-13/16" | 5/8" | .382" | 33.24 | 31.79 | 30.35 | 28.90 |
| | 21306 | .1200 | #31 | 3.048 | 2" | 3/4" | .622" | 34.66 | 33.15 | 31.65 | 30.14 |
| 20311 | | .1250 | 1/8" | 3.175 | 1-15/16" | 11/16" | .398" | 33.53 | 32.08 | 30.62 | 29.16 |
| | 21311 | .1250 | 1/8" | 3.175 | 2" | 3/4" | .648" | 34.94 | 33.42 | 31.90 | 30.38 |
| 20316 | | .1285 | #30 | 3.264 | 1-15/16" | 11/16" | .409" | 33.83 | 32.36 | 30.89 | 29.42 |
| | 21316 | .1285 | #30 | 3.264 | 2-1/4" | 3/4" | .666" | 35.25 | 33.72 | 32.18 | 30.65 |
| 20321 | | .1360 | #29 | 3.454 | 2-1/16" | 3/4" | .433" | 34.16 | 32.67 | 31.19 | 29.70 |
| | 21321 | .1360 | #29 | 3.454 | 2-1/4" | 7/8" | .705" | 35.51 | 33.97 | 32.42 | 30.88 |
| 20326 | | .1378 | | 3.500 | 52 | 19 | 11 | 34.49 | 32.99 | 31.49 | 29.99 |
| | 21326 | .1378 | | 3.500 | 57 | 22 | 18 | 35.80 | 34.24 | 32.69 | 31.13 |
| 20331 | | .1405 | #28 | 3.569 | 2-1/16" | 3/4" | .447" | 34.81 | 33.30 | 31.78 | 30.27 |
| | 21331 | .1405 | #28 | 3.569 | 2-1/4" | 7/8" | .728" | 36.09 | 34.52 | 32.95 | 31.38 |
| 20336 | | .1406 | 9/64" | 3.571 | 2-1/16" | 3/4" | .447" | 35.11 | 33.58 | 32.06 | 30.53 |
| | 21336 | .1406 | 9/64" | 3.571 | 2-1/4" | 7/8" | .729" | 36.40 | 34.82 | 33.23 | 31.65 |
| 20341 | | .1440 | #27 | 3.658 | 2-1/16" | 3/4" | .458" | 35.42 | 33.88 | 32.34 | 30.80 |
| | 21341 | .1440 | #27 | 3.658 | 2-1/4" | 7/8" | .746" | 36.64 | 35.05 | 33.45 | 31.86 |
| 20346 | | .1470 | #26 | 3.734 | 2-3/16" | 13/16" | .468" | 35.70 | 34.14 | 32.59 | 31.04 |
| | 21346 | .1470 | #26 | 3.734 | 2-1/4" | 7/8" | .762" | 36.94 | 35.33 | 33.73 | 32.12 |
| 20351 | | .1495 | #25 | 3.797 | 2-3/16" | 13/16" | .476" | 36.08 | 34.51 | 32.94 | 31.37 |
| | 21351 | .1495 | #25 | 3.797 | 2-1/4" | 15/16" | .775" | 37.21 | 35.60 | 33.98 | 32.36 |
| 20356 | | .1520 | #24 | 3.861 | 2-3/16" | 13/16" | .484" | 36.36 | 34.78 | 33.20 | 31.62 |
| | 21356 | .1520 | #24 | 3.861 | 2-1/4" | 15/16" | .788" | 37.48 | 35.85 | 34.22 | 32.59 |
| 20361 | | .1540 | #23 | 3.912 | 2-3/16" | 13/16" | .490" | 36.69 | 35.09 | 33.50 | 31.90 |
| | 21361 | .1540 | #23 | 3.912 | 2-1/4" | 15/16" | .798" | 37.80 | 36.16 | 34.51 | 32.87 |
| 20366 | | .1562 | 5/32" | 3.967 | 2-3/16" | 13/16" | .497" | 36.97 | 35.37 | 33.76 | 32.15 |
| | 21366 | .1562 | 5/32" | 3.967 | 2-1/2" | 15/16" | .809" | 38.07 | 36.41 | 34.76 | 33.10 |
| 20371 | | .1570 | #22 | 3.988 | 2-3/16" | 13/16" | .500" | 37.32 | 35.70 | 34.07 | 32.45 |
| | 21371 | .1570 | #22 | 3.988 | 2-1/2" | 15/16" | .814" | 38.34 | 36.67 | 35.01 | 33.34 |
| 20376 | | .1575 | | 4.000 | 56 | 21 | 13 | 37.62 | 35.98 | 34.35 | 32.71 |
| | 21376 | .1575 | | 4.000 | 65 | 24 | 21 | 38.63 | 36.95 | 35.27 | 33.59 |
| 20381 | | .1590 | #21 | 4.039 | 2-3/16" | 13/16" | .506" | 37.94 | 36.29 | 34.64 | 32.99 |
| | 21381 | .1590 | #21 | 4.039 | 2-1/2" | 15/16" | .824" | 38.90 | 37.21 | 35.52 | 33.83 |
| 20386 | | .1610 | #20 | 4.089 | 2-3/16" | 13/16" | .512" | 38.26 | 36.60 | 34.93 | 33.27 |
| | 21386 | .1610 | #20 | 4.089 | 2-1/2" | 15/16" | .834" | 39.22 | 37.51 | 35.81 | 34.10 |
| 20391 | | .1660 | #19 | 4.216 | 2-9/32" | 15/16" | .528" | 38.59 | 36.92 | 35.24 | 33.56 |
| | 21391 | .1660 | #19 | 4.216 | 2-1/2" | 1" | .860" | 39.49 | 37.77 | 36.06 | 34.34 |
| 20396 | | .1695 | #18 | 4.305 | 2-9/32" | 15/16" | .539" | 38.89 | 37.20 | 35.51 | 33.82 |
| | 21396 | .1695 | #18 | 4.305 | 2-1/2" | 1" | .878" | 39.76 | 38.03 | 36.30 | 34.57 |
| 20401 | | .1719 | 11/64" | 4.366 | 2-9/32" | 15/16" | .547" | 39.22 | 37.51 | 35.81 | 34.10 |
| | 21401 | .1719 | 11/64" | 4.366 | 2-1/2" | 1" | .891" | 40.04 | 38.30 | 36.56 | 34.82 |



† *Metric equivalents are for reference only*

.1730" - .2380"
(4.394mm - 6.045mm)

| 3xD (1580H) EDP# | 5xD (1280H) EDP# | Decimal | *d* † Diameter | Metric | *l1* Overall Length | *l2* Flute Length | *l5* Max Drill Depth | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 20406 | | .1730 | #17 | 4.394 | 2-9/32" | 15/16" | .551" | 39.54 | 37.82 | 36.10 | 34.38 |
| | 21406 | .1730 | #17 | 4.394 | 2-1/2" | 1" | .897" | 40.32 | 38.57 | 36.81 | 35.06 |
| 20411 | | .1770 | #16 | 4.496 | 2-9/32" | 15/16" | .563" | 39.81 | 38.08 | 36.35 | 34.62 |
| | 21411 | .1770 | #16 | 4.496 | 2-1/2" | 1" | .917" | 40.63 | 38.86 | 37.10 | 35.33 |
| 20416 | | .1772 | | 4.500 | 58 | 24 | 14 | 40.15 | 38.40 | 36.66 | 34.91 |
| | 21416 | .1772 | | 4.500 | 65 | 25 | 23 | 40.92 | 39.14 | 37.36 | 35.58 |
| 20421 | | .1800 | #15 | 4.572 | 2-9/32" | 15/16" | .573" | 40.42 | 38.67 | 36.91 | 35.15 |
| | 21421 | .1800 | #15 | 4.572 | 2-3/4" | 1" | .933" | 41.17 | 39.38 | 37.59 | 35.80 |
| 20426 | | .1820 | #14 | 4.623 | 2-9/32" | 15/16" | .579" | 40.79 | 39.02 | 37.24 | 35.47 |
| | 21426 | .1820 | #14 | 4.623 | 2-3/4" | 1" | .943" | 41.45 | 39.64 | 37.84 | 36.04 |
| 20431 | | .1850 | #13 | 4.700 | 2-9/32" | 15/16" | .589" | 41.09 | 39.30 | 37.52 | 35.73 |
| | 21431 | .1850 | #13 | 4.700 | 2-3/4" | 1-1/4" | .959" | 41.76 | 39.94 | 38.13 | 36.31 |
| 20436 | | .1875 | 3/16" | 4.763 | 2-13/32" | 1" | .597" | 41.42 | 39.62 | 37.82 | 36.02 |
| | 21436 | .1875 | 3/16" | 4.763 | 2-3/4" | 1-1/4" | .972" | 42.06 | 40.23 | 38.40 | 36.57 |
| 20441 | | .1890 | #12 | 4.801 | 2-13/32" | 1" | .601" | 41.73 | 39.92 | 38.10 | 36.29 |
| | 21441 | .1890 | #12 | 4.801 | 2-3/4" | 1-1/4" | .979" | 42.33 | 40.49 | 38.65 | 36.81 |
| 20446 | | .1910 | #11 | 4.851 | 2-13/32" | 1" | .608" | 42.11 | 40.28 | 38.45 | 36.62 |
| | 21446 | .1910 | #11 | 4.851 | 2-3/4" | 1-1/4" | .990" | 42.58 | 40.73 | 38.88 | 37.03 |
| 20451 | | .1935 | #10 | 4.915 | 2-13/32" | 1" | .616" | 42.37 | 40.52 | 38.68 | 36.84 |
| | 21451 | .1935 | #10 | 4.915 | 2-3/4" | 1-1/4" | 1.003" | 42.88 | 41.02 | 39.15 | 37.29 |
| 20456 | | .1960 | #9 | 4.978 | 2-13/32" | 1" | .624" | 42.67 | 40.81 | 38.96 | 37.10 |
| | 21456 | .1960 | #9 | 4.978 | 3" | 1-5/16" | 1.016" | 43.15 | 41.27 | 39.40 | 37.52 |
| 20461 | | .1969 | | 5.000 | 61 | 25 | 16 | 42.90 | 41.03 | 39.17 | 37.30 |
| | 21461 | .1969 | | 5.000 | 75 | 33 | 26 | 43.45 | 41.56 | 39.67 | 37.78 |
| 20466 | | .1990 | #8 | 5.055 | 2-13/32" | 1" | .633" | 43.30 | 41.42 | 39.53 | 37.65 |
| | 21466 | .1990 | #8 | 5.055 | 3" | 1-5/16" | 1.031" | 43.68 | 41.78 | 39.88 | 37.98 |
| 20471 | | .2010 | #7 | 5.105 | 2-13/32" | 1" | .640" | 43.42 | 41.54 | 39.65 | 37.76 |
| | 21471 | .2010 | #7 | 5.105 | 3" | 1-5/16" | 1.042" | 43.87 | 41.97 | 40.06 | 38.15 |
| 20476 | | .2031 | 13/64" | 5.159 | 2-13/32" | 1" | .646" | 43.71 | 41.81 | 39.91 | 38.01 |
| | 21476 | .2031 | 13/64" | 5.159 | 3" | 1-5/16" | 1.053" | 44.19 | 42.27 | 40.35 | 38.43 |
| 20481 | | .2040 | #6 | 5.182 | 2-13/32" | 1" | .649" | 44.01 | 42.10 | 40.18 | 38.27 |
| | 21481 | .2040 | #6 | 5.182 | 3" | 1-3/8" | 1.057" | 44.52 | 42.58 | 40.65 | 38.71 |
| 20486 | | .2055 | #5 | 5.220 | 2-13/32" | 1" | .654" | 44.33 | 42.41 | 40.48 | 38.55 |
| | 21486 | .2055 | #5 | 5.220 | 3" | 1-3/8" | 1.065" | 44.82 | 42.87 | 40.92 | 38.97 |
| 20491 | | .2090 | #4 | 5.309 | 2-13/32" | 1" | .665" | 44.60 | 42.66 | 40.72 | 38.78 |
| | 21491 | .2090 | #4 | 5.309 | 3" | 1-3/8" | 1.083" | 45.11 | 43.15 | 41.19 | 39.23 |
| 20496 | | .2130 | #3 | 5.410 | 2-5/8" | 1-3/32" | .678" | 44.90 | 42.94 | 40.99 | 39.04 |
| | 21496 | .2130 | #3 | 5.410 | 3" | 1-3/8" | 1.104" | 45.43 | 43.45 | 41.48 | 39.50 |
| 20501 | | .2165 | | 5.500 | 67 | 28 | 18 | 45.18 | 43.22 | 41.25 | 39.29 |
| | 21501 | .2165 | | 5.500 | 75 | 35 | 29 | 45.70 | 43.71 | 41.73 | 39.74 |
| 20506 | | .2188 | 7/32" | 5.558 | 2-5/8" | 1-3/32" | .696" | 45.55 | 43.57 | 41.59 | 39.61 |
| | 21506 | .2188 | 7/32" | 5.558 | 3" | 1-3/8" | 1.134" | 45.99 | 43.99 | 41.99 | 39.99 |
| 20511 | | .2210 | #2 | 5.613 | 2-5/8" | 1-3/32" | .703" | 45.89 | 43.89 | 41.90 | 39.90 |
| | 21511 | .2210 | #2 | 5.613 | 3" | 1-3/8" | 1.145" | 46.98 | 44.94 | 42.89 | 40.85 |
| 20516 | | .2280 | #1 | 5.791 | 2-5/8" | 1-3/32" | .726" | 46.24 | 44.23 | 42.22 | 40.21 |
| | 21516 | .2280 | #1 | 5.791 | 3" | 1-3/8" | 1.182" | 47.22 | 45.17 | 43.11 | 41.06 |
| 20521 | | .2340 | A | 5.944 | 2-5/8" | 1-3/32" | .745" | 46.55 | 44.53 | 42.50 | 40.48 |
| | 21521 | .2340 | A | 5.944 | 3-1/4" | 1-1/2" | 1.213" | 47.92 | 45.84 | 43.75 | 41.67 |
| 20526 | | .2344 | 15/64" | 5.954 | 2-5/8" | 1-3/32" | .746" | 46.91 | 44.87 | 42.83 | 40.79 |
| | 21526 | .2344 | 15/64" | 5.954 | 3-1/4" | 1-1/2" | 1.215" | 48.05 | 45.96 | 43.87 | 41.78 |
| 20531 | | .2362 | | 6.000 | 67 | 28 | 19 | 47.23 | 45.18 | 43.12 | 41.07 |
| | 21531 | .2362 | | 6.000 | 80 | 38 | 31 | 48.20 | 46.10 | 44.01 | 41.91 |
| 20536 | | .2380 | B | 6.045 | 2-3/4" | 1-7/32" | .757" | 47.55 | 45.49 | 43.42 | 41.35 |
| | 21536 | .2380 | B | 6.045 | 3-1/4" | 1-5/8" | 1.233" | 48.33 | 46.23 | 44.13 | 42.03 |

*continued* →

# Series 1580H, 1280H *(continued)*

.2420" - .3438"
(6.147mm - 8.733mm)

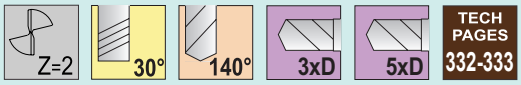
| 3xD (1580H) EDP# | 5xD (1280H) EDP# | Decimal | *d* † Diameter | Metric | *l1* Overall Length | *l2* Flute Length | *l5* Max Drill Depth | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 20541 | | .2420 | C | 6.147 | 2-3/4" | 1-7/32" | .770" | 47.93 | 45.85 | 43.76 | 41.68 |
| | 21541 | .2420 | C | 6.147 | 3-1/4" | 1-5/8" | 1.254" | 48.67 | 46.55 | 44.44 | 42.32 |
| 20546 | | .2460 | D | 6.248 | 2-3/4" | 1-7/32" | .783" | 48.20 | 46.10 | 44.01 | 41.91 |
| | 21546 | .2460 | D | 6.248 | 3-1/4" | 1-5/8" | 1.275" | 48.98 | 46.85 | 44.72 | 42.59 |
| 20551 | | .2500 | 1/4" / E | 6.350 | 2-3/4" | 1-7/32" | .796" | 48.62 | 46.51 | 44.39 | 42.28 |
| | 21551 | .2500 | 1/4" / E | 6.350 | 3-1/4" | 1-5/8" | 1.296" | 49.25 | 47.11 | 44.97 | 42.83 |
| 20556 | | .2559 | | 6.500 | 70 | 31 | 21 | 49.39 | 47.25 | 45.10 | 42.95 |
| | 21556 | .2559 | | 6.500 | 80 | 41 | 34 | 50.13 | 47.95 | 45.77 | 43.59 |
| 20561 | | .2570 | F | 6.528 | 2-3/4" | 1-7/32" | .818" | 50.17 | 47.99 | 45.81 | 43.63 |
| | 21561 | .2570 | F | 6.528 | 3-1/4" | 1-11/16" | 1.332" | 50.99 | 48.77 | 46.56 | 44.34 |
| 20566 | | .2610 | G | 6.629 | 2-3/4" | 1-7/32" | .831" | 50.93 | 48.72 | 46.50 | 44.29 |
| | 21566 | .2610 | G | 6.629 | 3-1/2" | 1-11/16" | 1.353" | 51.87 | 49.61 | 47.36 | 45.10 |
| 20571 | | .2656 | 17/64" | 6.746 | 2-15/16" | 1-11/32" | .845" | 51.70 | 49.46 | 47.21 | 44.96 |
| | 21571 | .2656 | 17/64" | 6.746 | 3-1/2" | 1-11/16" | 1.376" | 52.70 | 50.41 | 48.12 | 45.83 |
| 20576 | | .2660 | H | 6.756 | 2-15/16" | 1-11/32" | .846" | 52.46 | 50.18 | 47.90 | 45.62 |
| | 21576 | .2660 | H | 6.756 | 3-1/2" | 1-11/16" | 1.378" | 53.60 | 51.27 | 48.94 | 46.61 |
| 20581 | | .2720 | I | 6.909 | 2-15/16" | 1-11/32" | .866" | 53.25 | 50.93 | 48.62 | 46.30 |
| | 21581 | .2720 | I | 6.909 | 3-1/2" | 1-11/16" | 1.410" | 54.46 | 52.10 | 49.73 | 47.36 |
| 20586 | | .2756 | | 7.000 | 75 | 34 | 22 | 54.03 | 51.68 | 49.33 | 46.98 |
| | 21586 | .2756 | | 7.000 | 88 | 43 | 36 | 55.30 | 52.90 | 50.49 | 48.09 |
| 20591 | | .2770 | J | 7.036 | 2-15/16" | 1-11/32" | .881" | 54.77 | 52.39 | 50.01 | 47.63 |
| | 21591 | .2770 | J | 7.036 | 3-1/2" | 1-11/16" | 1.435" | 56.18 | 53.74 | 51.29 | 48.85 |
| 20596 | | .2810 | K | 7.137 | 2-15/16" | 1-11/32" | .894" | 55.56 | 53.14 | 50.73 | 48.31 |
| | 21596 | .2810 | K | 7.137 | 3-1/2" | 1-3/4" | 1.456" | 57.07 | 54.59 | 52.11 | 49.63 |
| 20601 | | .2812 | 9/32" | 7.142 | 2-15/16" | 1-11/32" | .895" | 56.33 | 53.88 | 51.43 | 48.98 |
| | 21601 | .2812 | 9/32" | 7.142 | 3-1/2" | 1-3/4" | 1.457" | 57.94 | 55.42 | 52.90 | 50.38 |
| 20606 | | .2900 | L | 7.366 | 2-15/16" | 1-11/32" | .923" | 57.10 | 54.62 | 52.13 | 49.65 |
| | 21606 | .2900 | L | 7.366 | 3-1/2" | 1-3/4" | 1.503" | 58.73 | 56.18 | 53.62 | 51.07 |
| 20611 | | .2950 | M | 7.493 | 2-15/16" | 1-11/32" | .939" | 58.21 | 55.68 | 53.15 | 50.62 |
| | 21611 | .2950 | M | 7.493 | 3-3/4" | 1-3/4" | 1.529" | 59.57 | 56.98 | 54.39 | 51.80 |
| 20616 | | .2953 | | 7.500 | 75 | 34 | 24 | 58.21 | 55.68 | 53.15 | 50.62 |
| | 21616 | .2953 | | 7.500 | 95 | 44 | 39 | 59.57 | 56.98 | 54.39 | 51.80 |
| 20621 | | .2969 | 19/64" | 7.541 | 3-3/32" | 1-15/32" | .945" | 58.72 | 56.17 | 53.61 | 51.06 |
| | 21621 | .2969 | 19/64" | 7.541 | 3-3/4" | 1-7/8" | 1.539" | 60.17 | 57.55 | 54.94 | 52.32 |
| 20626 | | .3020 | N | 7.671 | 3-3/32" | 1-15/32" | .961" | 61.35 | 58.69 | 56.02 | 53.35 |
| | 21626 | .3020 | N | 7.671 | 3-3/4" | 1-7/8" | 1.565" | 62.55 | 59.83 | 57.11 | 54.39 |
| 20631 | | .3125 | 5/16" | 7.938 | 3-3/32" | 1-15/32" | .994" | 61.57 | 58.89 | 56.22 | 53.54 |
| | 21631 | .3125 | 5/16" | 7.938 | 3-3/4" | 1-7/8" | 1.619" | 62.74 | 60.02 | 57.29 | 54.56 |
| 20636 | | .3150 | | 8.000 | 79 | 37 | 25 | 64.98 | 62.15 | 59.33 | 56.50 |
| | 21636 | .3150 | | 8.000 | 95 | 48 | 41 | 66.14 | 63.26 | 60.39 | 57.51 |
| 20641 | | .3160 | O | 8.026 | 3-3/32" | 1-15/32" | 1.006" | 64.98 | 62.15 | 59.33 | 56.50 |
| | 21641 | .3160 | O | 8.026 | 3-3/4" | 1-7/8" | 1.638" | 66.14 | 63.26 | 60.39 | 57.51 |
| 20646 | | .3230 | P | 8.204 | 3-3/32" | 1-15/32" | 1.028" | 65.45 | 62.60 | 59.76 | 56.91 |
| | 21646 | .3230 | P | 8.204 | 3-3/4" | 2-3/32" | 1.674" | 66.38 | 63.49 | 60.61 | 57.72 |
| 20651 | | .3281 | 21/64" | 8.334 | 3-3/32" | 1-15/32" | 1.044" | 66.65 | 63.76 | 60.86 | 57.96 |
| | 21651 | .3281 | 21/64" | 8.334 | 4" | 2-3/32" | 1.700" | 67.00 | 64.09 | 61.17 | 58.26 |
| 20656 | | .3320 | Q | 8.433 | 3-3/32" | 1-15/32" | 1.056" | 67.85 | 64.90 | 61.95 | 59.00 |
| | 21656 | .3320 | Q | 8.433 | 4" | 2-3/32" | 1.720" | 68.33 | 65.36 | 62.39 | 59.42 |
| 20661 | | .3346 | | 8.500 | 79 | 37 | 27 | 68.14 | 65.18 | 62.21 | 59.25 |
| | 21661 | .3346 | | 8.500 | 100 | 53 | 44 | 68.83 | 65.84 | 62.84 | 59.85 |
| 20666 | | .3390 | R | 8.611 | 3-5/16" | 1-9/16" | 1.079" | 69.98 | 66.94 | 63.89 | 60.85 |
| | 21666 | .3390 | R | 8.611 | 4" | 2-3/32" | 1.757" | 70.73 | 67.65 | 64.58 | 61.50 |
| 20671 | | .3438 | 11/32" | 8.733 | 3-5/16" | 1-9/16" | 1.094" | 71.51 | 68.40 | 65.29 | 62.18 |
| | 21671 | .3438 | 11/32" | 8.733 | 4" | 2-3/16" | 1.782" | 73.20 | 70.02 | 66.83 | 63.65 |



† *Metric equivalents are for reference only*

## Series 1580H, 1280H *(continued)*

| TOLERANCES | | |
|---|---|---|
| *d* | +.0000" –.0005" (+.0000 –.0127mm) | |
| $l_1$ | ≤ 1/8" | +.125" –.062" (+3.175 –1.588mm) |
| | > 1/8" | +.125" –.125" (+3.175 –3.175mm) |
| $l_2$ | ≤ 1/8" | +.125" –.062" (+3.175 –1.588mm) |
| | >1/8" | +.125" –.125" (+3.175 –3.175mm) |




.3480" - .4531"
(8.839mm - 11.509mm)

Recommended for high nickel, high temperature alloys, cobalt-based alloys, stainless steels, and tool steels >40 Rc

### BALIQ® ALTINOS Coating (AlTiN-based)

High performance - high penetration solid submicron grain carbide drill



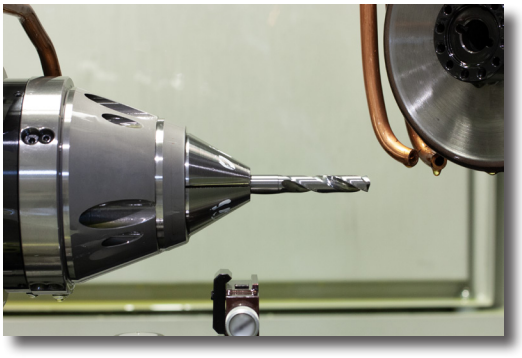
| 3xD (1580H) EDP# | 5xD (1280H) EDP# | *d* † Decimal | Diameter | Metric | $l_1$ Overall Length | $l_2$ Flute Length | $l_5$ Max Drill Depth | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 20676 | | .3480 | S | 8.839 | 3-5/16" | 1-9/16" | 1.107" | 73.88 | 70.66 | 67.45 | 64.24 |
| | 21676 | .3480 | S | 8.839 | 4" | 2-3/16" | 1.803" | 76.06 | 72.75 | 69.45 | 66.14 |
| 20681 | | .3543 | | 9.000 | 84 | 40 | 29 | 75.75 | 72.46 | 69.16 | 65.87 |
| | 21681 | .3543 | | 9.000 | 100 | 56 | 47 | 76.51 | 73.18 | 69.86 | 66.53 |
| 20686 | | .3580 | T | 9.093 | 3-5/16" | 1-9/16" | 1.139" | 78.72 | 75.30 | 71.87 | 68.45 |
| | 21686 | .3580 | T | 9.093 | 4-1/4" | 2-9/32" | 1.855" | 79.53 | 76.08 | 72.62 | 69.16 |
| 20691 | | .3594 | 23/64" | 9.129 | 3-5/16" | 1-9/16" | 1.144" | 79.21 | 75.77 | 72.32 | 68.88 |
| | 21691 | .3594 | 23/64" | 9.129 | 4-1/4" | 2-9/32" | 1.862" | 80.02 | 76.54 | 73.06 | 69.58 |
| 20696 | | .3680 | U | 9.347 | 3-5/16" | 1-9/16" | 1.171" | 80.86 | 77.34 | 73.83 | 70.31 |
| | 21696 | .3680 | U | 9.347 | 4-1/4" | 2-9/32" | 1.907" | 84.57 | 80.89 | 77.22 | 73.54 |
| 20701 | | .3740 | | 9.500 | 84 | 40 | 30 | 81.54 | 77.99 | 74.45 | 70.90 |
| | 21701 | .3740 | | 9.500 | 105 | 58 | 49 | 85.40 | 81.69 | 77.97 | 74.26 |
| 20706 | | .3750 | 3/8" | 9.525 | 3-1/2" | 1-11/16" | 1.193" | 82.02 | 78.45 | 74.89 | 71.32 |
| | 21706 | .3750 | 3/8" | 9.525 | 4-1/4" | 2-3/8" | 1.943" | 86.25 | 82.50 | 78.75 | 75.00 |
| 20711 | | .3770 | V | 9.576 | 3-1/2" | 1-11/16" | 1.200" | 85.17 | 81.47 | 77.76 | 74.06 |
| | 21711 | .3770 | V | 9.576 | 4-1/4" | 2-3/8" | 1.954" | 88.37 | 84.52 | 80.68 | 76.84 |
| 20716 | | .3860 | W | 9.804 | 3-1/2" | 1-11/16" | 1.228" | 86.66 | 82.90 | 79.13 | 75.36 |
| | 21716 | .3860 | W | 9.804 | 4-1/2" | 2-3/8" | 2.000" | 89.93 | 86.02 | 82.11 | 78.20 |
| 20721 | | .3906 | 25/64" | 9.921 | 3-1/2" | 1-11/16" | 1.243" | 87.75 | 83.93 | 80.12 | 76.30 |
| | 21721 | .3906 | 25/64" | 9.921 | 4-1/2" | 2-3/8" | 2.024" | 91.01 | 87.05 | 83.10 | 79.14 |
| 20726 | | .3937 | | 10.000 | 89 | 43 | 32 | 90.40 | 86.47 | 82.54 | 78.61 |
| | 21726 | .3937 | | 10.000 | 115 | 60 | 52 | 93.76 | 89.68 | 85.61 | 81.53 |
| 20731 | | .3970 | X | 10.084 | 3-1/2" | 1-11/16" | 1.263" | 91.63 | 87.65 | 83.66 | 79.68 |
| | 21731 | .3970 | X | 10.084 | 4-1/2" | 2-1/2" | 2.057" | 94.90 | 90.77 | 86.65 | 82.52 |
| 20736 | | .4040 | Y | 10.262 | 3-1/2" | 1-11/16" | 1.286" | 92.23 | 88.22 | 84.21 | 80.20 |
| | 21736 | .4040 | Y | 10.262 | 4-1/2" | 2-9/16" | 2.094" | 97.76 | 93.51 | 89.26 | 85.01 |
| 20741 | | .4062 | 13/32" | 10.317 | 3-1/2" | 1-11/16" | 1.293" | 95.08 | 90.95 | 86.81 | 82.68 |
| | 21741 | .4062 | 13/32" | 10.317 | 4-1/2" | 2-9/16" | 2.105" | 98.61 | 94.33 | 90.04 | 85.75 |
| 20746 | | .4130 | Z | 10.490 | 3-1/2" | 1-11/16" | 1.314" | 95.97 | 91.80 | 87.62 | 83.45 |
| | 21746 | .4130 | Z | 10.490 | 4-1/2" | 2-5/8" | 2.140" | 99.51 | 95.18 | 90.86 | 86.53 |
| 20751 | | .4134 | | 10.500 | 89 | 43 | 33 | 95.97 | 91.80 | 87.62 | 83.45 |
| | 21751 | .4134 | | 10.500 | 115 | 67 | 54 | 99.51 | 95.18 | 90.86 | 86.53 |
| 20756 | | .4219 | 27/64" | 10.716 | 3-3/4" | 1-13/16" | 1.343" | 96.88 | 92.66 | 88.45 | 84.24 |
| | 21756 | .4219 | 27/64" | 10.716 | 4-1/2" | 2-11/16" | 2.186" | 100.41 | 96.04 | 91.68 | 87.31 |
| 20761 | | .4331 | | 11.000 | 95 | 46 | 35 | 103.98 | 99.46 | 94.94 | 90.42 |
| | 21761 | .4331 | | 11.000 | 115 | 68 | 57 | 107.73 | 103.05 | 98.36 | 93.68 |
| 20766 | | .4375 | 7/16" | 11.113 | 3-3/4" | 1-13/16" | 1.392" | 103.98 | 99.46 | 94.94 | 90.42 |
| | 21766 | .4375 | 7/16" | 11.113 | 4-3/4" | 2-13/16" | 2.267" | 108.17 | 103.47 | 98.76 | 94.06 |
| 20771 | | .4528 | | 11.500 | 95 | 46 | 37 | 111.61 | 106.76 | 101.90 | 97.05 |
| | 21771 | .4528 | | 11.500 | 120 | 71 | 60 | 115.59 | 110.56 | 105.54 | 100.51 |
| 20776 | | .4531 | 29/64" | 11.509 | 3-3/4" | 1-13/16" | 1.442" | 111.61 | 106.76 | 101.90 | 97.05 |
| | 21776 | .4531 | 29/64" | 11.509 | 4-3/4" | 2-7/8" | 2.348" | 115.59 | 110.56 | 105.54 | 100.51 |

*continued* →

# Series 1580H, 1280H *(continued)*

.4688" - .6299"
(11.908mm - 16.000mm)

| 3xD (1580H) EDP# | 5xD (1280H) EDP# | Decimal | *d* † Diameter | Metric | *l1* Overall Length | *l2* Flute Length | *l5* Max Drill Depth | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 20781 | | .4688 | 15/32" | 11.908 | 4" | 1-15/16" | 1.492" | 117.27 | 112.17 | 107.07 | 101.97 |
| | 21781 | .4688 | 15/32" | 11.908 | 4-3/4" | 2-7/8" | 2.429" | 121.39 | 116.12 | 110.84 | 105.56 |
| 20786 | | .4724 | | 12.000 | 102 | 49 | 38 | 117.61 | 112.50 | 107.38 | 102.27 |
| | 21786 | .4724 | | 12.000 | 120 | 73 | 62 | 121.76 | 116.47 | 111.17 | 105.88 |
| 20791 | | .4844 | 31/64" | 12.304 | 4" | 1-15/16" | 1.541" | 118.43 | 113.28 | 108.13 | 102.98 |
| | 21791 | .4844 | 31/64" | 12.304 | 5-5/16" | 3" | 2.510" | 123.12 | 117.77 | 112.41 | 107.06 |
| 20796 | | .4921 | | 12.500 | 102 | 49 | 40 | 119.60 | 114.40 | 109.20 | 104.00 |
| | 21796 | .4921 | | 12.500 | 135 | 76 | 65 | 124.59 | 119.17 | 113.76 | 108.34 |
| 20801 | | .5000 | 1/2" | 12.700 | 4" | 1-15/16" | 1.591" | 120.37 | 115.14 | 109.90 | 104.67 |
| | 21801 | .5000 | 1/2" | 12.700 | 5-3/8" | 3-1/16" | 2.591" | 124.84 | 119.42 | 113.99 | 108.56 |
| 20806 | | .5118 | | 13.000 | 107 | 53 | 41 | 131.93 | 126.19 | 120.46 | 114.72 |
| | 21806 | .5118 | | 13.000 | 135 | 78 | 67 | 135.76 | 129.86 | 123.95 | 118.05 |
| 20811 | | .5156 | 33/64" | 13.096 | 4-7/32" | 2-3/32" | 1.641" | 135.06 | 129.18 | 123.31 | 117.44 |
| | 21811 | .5156 | 33/64" | 13.096 | 5-3/8" | 3-1/8" | 2.672" | 138.93 | 132.89 | 126.85 | 120.81 |
| 20816 | | .5312 | 17/32" | 13.492 | 4-7/32" | 2-3/32" | 1.690" | 138.16 | 132.15 | 126.15 | 120.14 |
| | 21816 | .5312 | 17/32" | 13.492 | 5-11/16" | 3-5/16" | 2.753" | 142.20 | 136.02 | 129.83 | 123.65 |
| 20821 | | .5315 | | 13.500 | 110 | 56 | 43 | 141.29 | 135.15 | 129.00 | 122.86 |
| | 21821 | .5315 | | 13.500 | 145 | 84 | 70 | 145.34 | 139.02 | 132.70 | 126.38 |
| 20826 | | .5469 | 35/64" | 13.891 | 4-5/16" | 2-7/32" | 1.740" | 144.38 | 138.11 | 131.83 | 125.55 |
| | 21826 | .5469 | 35/64" | 13.891 | 5-13/16" | 3-3/8" | 2.834" | 148.50 | 142.04 | 135.59 | 129.13 |
| 20831 | | .5512 | | 14.000 | 110 | 56 | 45 | 147.50 | 141.09 | 134.67 | 128.26 |
| | 21831 | .5512 | | 14.000 | 145 | 86 | 73 | 151.71 | 145.11 | 138.52 | 131.92 |
| 20836 | | .5625 | 9/16" | 14.288 | 4-9/16" | 2-15/32" | 1.790" | 158.78 | 151.88 | 144.97 | 138.07 |
| | 21836 | .5625 | 9/16" | 14.288 | 5-15/16" | 3-1/2" | 2.915" | 163.04 | 155.95 | 148.86 | 141.77 |
| 20841 | | .5709 | | 14.500 | 116 | 63 | 46 | 161.76 | 154.73 | 147.69 | 140.66 |
| | 21841 | .5709 | | 14.500 | 150 | 89 | 75 | 166.04 | 158.82 | 151.60 | 144.38 |
| 20846 | | .5781 | 37/64" | 14.684 | 4-15/16" | 2-9/16" | 1.840" | 164.66 | 157.50 | 150.34 | 143.18 |
| | 21846 | .5781 | 37/64" | 14.684 | 6" | 3-1/2" | 2.996" | 169.02 | 161.67 | 154.32 | 146.97 |
| 20851 | | .5906 | | 15.000 | 125 | 65 | 48 | 167.69 | 160.40 | 153.11 | 145.82 |
| | 21851 | .5906 | | 15.000 | 150 | 90 | 78 | 172.19 | 164.70 | 157.22 | 149.73 |
| 20856 | | .5938 | 19/32" | 15.083 | 4-15/16" | 2-9/16" | 1.890" | 168.60 | 161.27 | 153.94 | 146.61 |
| | 21856 | .5938 | 19/32" | 15.083 | 6" | 3-9/16" | 3.077" | 173.08 | 165.55 | 158.03 | 150.50 |
| 20861 | | .6094 | 39/64" | 15.479 | 5-1/16" | 2-13/16" | 1.939" | 169.46 | 162.10 | 154.73 | 147.36 |
| | 21861 | .6094 | 39/64" | 15.479 | 6-3/16" | 3-11/16" | 3.158" | 187.57 | 179.41 | 171.26 | 163.10 |
| 20866 | | .6102 | | 15.500 | 129 | 71 | 49 | 170.34 | 162.93 | 155.53 | 148.12 |
| | 21866 | .6102 | | 15.500 | 160 | 94 | 80 | 188.43 | 180.24 | 172.04 | 163.85 |
| 20871 | | .6250 | 5/8" | 15.875 | 5-1/4" | 3-1/8" | 1.989" | 171.20 | 163.76 | 156.31 | 148.87 |
| | 21871 | .6250 | 5/8" | 15.875 | 6-5/16" | 3-3/4" | 3.239" | 189.31 | 181.08 | 172.85 | 164.62 |
| 20876 | | .6299 | | 16.000 | 133 | 79 | 51 | 175.32 | 167.70 | 160.07 | 152.45 |
| | 21876 | .6299 | | 16.000 | 160 | 95 | 83 | 193.56 | 185.14 | 176.73 | 168.31 |





† *Metric equivalents are for reference only*

**TOLERANCES**

| | | |
|---|---|---|
| $d_1$ * | 3mm - 6mm | +.016mm +.004mm (+.00063" +.00015") |
| | > 6mm - 10mm | +.021mm +.006mm (+.00082" +.00023") |
| | > 10mm - 18mm | +.025mm +.007mm (+.00098" +.00027") |
| | > 18mm - 20mm | +.029mm +.008mm (+.00114" +.00031") |
| $d_2$ | h6 | |
| $l_1$ | +3.175mm –3.175mm (+.125" –.125") | |
| $l_2$ | +3.175mm –3.175mm (+.125" –.125") | |
| $l_4$ | +1.980mm –.000mm (+.078" –.000") | |

NEW ITEMS




# Series 1580KD, 1280KD, 1880KD

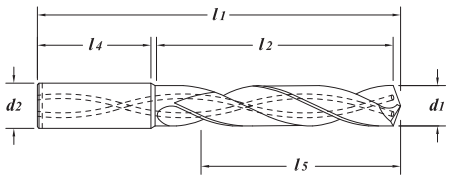
.1181" - .1470"
(3.000mm - 3.734mm)

Recommended for high nickel, high temperature alloys, cobalt-based alloys, stainless steels, and tool steels >40 Rc

## BALIQ® ALTINOS Coating (AlTiN-based)

High performance solid submicron grain carbide drill with reinforced shank
Coolant through capabilities for high pressure coolant systems
Up to 70% faster than standard carbide drills
30° helix for better chip evacuation
Honed cutting edge
Can be used as a pilot drill
Live tooling recommended on lathe processes






* *Note - These drills are made to a plus/plus tolerance on the drill diameter. If you are in need of a minus tolerance drill, please refer to our other high performance drills.*

| | 3xD (1580KD) EDP# | 5xD (1280KD) EDP# | 7xD (1880KD) EDP# | $d_1$ Diameter Decimal | $d_1$ Diameter | $d_1$ Diameter Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | $l_5$ Max Drill Depth | $l_4$ Shank Length | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 27995 | | | .1181 | | 3.000 | 6.0 | 62 | 20 | 16 | 36 | 60.57 | 57.94 | 55.30 | 52.67 |
| | | 25065 | | .1181 | | 3.000 | 6.0 | 66 | 28 | 24 | 36 | 71.50 | 68.39 | 65.28 | 62.17 |
| | | | 26942 | .1181 | | 3.000 | 6.0 | 70 | 30 | 26 | 36 | 85.82 | 82.09 | 78.36 | 74.63 |
| | 28005 | | | .1220 | | 3.100 | 6.0 | 62 | 20 | 15 | 36 | 60.57 | 57.94 | 55.30 | 52.67 |
| | | 25075 | | .1220 | | 3.100 | 6.0 | 66 | 28 | 23 | 36 | 71.50 | 68.39 | 65.28 | 62.17 |
| | 28015 | | | .1248 | | 3.170 | 6.0 | 62 | 20 | 15 | 36 | 60.57 | 57.94 | 55.30 | 52.67 |
| | | 25085 | | .1248 | | 3.170 | 6.0 | 66 | 28 | 23 | 36 | 71.50 | 68.39 | 65.28 | 62.17 |
| NEW | | | 26946 | .1248 | | 3.170 | 6.0 | 70 | 30 | 25 | 36 | 85.82 | 82.09 | 78.36 | 74.63 |
| | 28018 | | | .1250 | 1/8" | 3.175 | 6.0 | 62 | 20 | 15 | 36 | 60.57 | 57.94 | 55.30 | 52.67 |
| | | 25088 | | .1250 | 1/8" | 3.175 | 6.0 | 66 | 28 | 23 | 36 | 71.50 | 68.39 | 65.28 | 62.17 |
| | | | 26948 | .1250 | 1/8" | 3.175 | 6.0 | 70 | 30 | 25 | 36 | 85.82 | 82.09 | 78.36 | 74.63 |
| | 28025 | | | .1260 | | 3.200 | 6.0 | 62 | 20 | 15 | 36 | 60.57 | 57.94 | 55.30 | 52.67 |
| | | 25095 | | .1260 | | 3.200 | 6.0 | 66 | 28 | 23 | 36 | 71.50 | 68.39 | 65.28 | 62.17 |
| | | | 26950 | .1260 | | 3.200 | 6.0 | 70 | 30 | 25 | 36 | 85.82 | 82.09 | 78.36 | 74.63 |
| | 28035 | | | .1280 | | 3.250 | 6.0 | 62 | 20 | 15 | 36 | 60.57 | 57.94 | 55.30 | 52.67 |
| | | 25105 | | .1280 | | 3.250 | 6.0 | 66 | 28 | 23 | 36 | 71.50 | 68.39 | 65.28 | 62.17 |
| | | | 26952 | .1280 | | 3.250 | 6.0 | 70 | 30 | 25 | 36 | 85.82 | 82.09 | 78.36 | 74.63 |
| | 28038 | | | .1285 | #30 | 3.264 | 6.0 | 62 | 20 | 15 | 36 | 60.57 | 57.94 | 55.30 | 52.67 |
| | | 25108 | | .1285 | #30 | 3.264 | 6.0 | 66 | 28 | 23 | 36 | 71.50 | 68.39 | 65.28 | 62.17 |
| | | | 26954 | .1285 | #30 | 3.264 | 6.0 | 70 | 30 | 25 | 36 | 85.82 | 82.09 | 78.36 | 74.63 |
| | 28045 | | | .1299 | | 3.300 | 6.0 | 62 | 20 | 15 | 36 | 60.57 | 57.94 | 55.30 | 52.67 |
| | | 25115 | | .1299 | | 3.300 | 6.0 | 66 | 28 | 23 | 36 | 71.50 | 68.39 | 65.28 | 62.17 |
| | | | 26956 | .1299 | | 3.300 | 6.0 | 70 | 30 | 25 | 36 | 85.82 | 82.09 | 78.36 | 74.63 |
| | 28055 | | | .1339 | | 3.400 | 6.0 | 62 | 20 | 15 | 36 | 60.57 | 57.94 | 55.30 | 52.67 |
| | | 25125 | | .1339 | | 3.400 | 6.0 | 66 | 28 | 23 | 36 | 71.50 | 68.39 | 65.28 | 62.17 |
| | 28058 | | | .1360 | #29 | 3.454 | 6.0 | 62 | 20 | 15 | 36 | 60.57 | 57.94 | 55.30 | 52.67 |
| | | 25128 | | .1360 | #29 | 3.454 | 6.0 | 66 | 28 | 23 | 36 | 71.50 | 68.39 | 65.28 | 62.17 |
| | | | 26960 | .1360 | #29 | 3.454 | 6.0 | 70 | 30 | 25 | 36 | 85.82 | 82.09 | 78.36 | 74.63 |
| | 28065 | | | .1378 | | 3.500 | 6.0 | 62 | 20 | 15 | 36 | 60.57 | 57.94 | 55.30 | 52.67 |
| | | 25135 | | .1378 | | 3.500 | 6.0 | 66 | 28 | 23 | 36 | 71.50 | 68.39 | 65.28 | 62.17 |
| | | | 26962 | .1378 | | 3.500 | 6.0 | 75 | 37 | 32 | 36 | 85.82 | 82.09 | 78.36 | 74.63 |
| | 28075 | | | .1417 | | 3.600 | 6.0 | 62 | 20 | 15 | 36 | 60.57 | 57.94 | 55.30 | 52.67 |
| | | 25145 | | .1417 | | 3.600 | 6.0 | 66 | 28 | 23 | 36 | 71.50 | 68.39 | 65.28 | 62.17 |
| | 28085 | | | .1457 | | 3.700 | 6.0 | 62 | 20 | 14 | 36 | 60.57 | 57.94 | 55.30 | 52.67 |
| | | 25155 | | .1457 | | 3.700 | 6.0 | 66 | 28 | 22 | 36 | 71.50 | 68.39 | 65.28 | 62.17 |
| | 28088 | | | .1470 | #26 | 3.734 | 6.0 | 62 | 20 | 14 | 36 | 60.57 | 57.94 | 55.30 | 52.67 |
| | | 25158 | | .1470 | #26 | 3.734 | 6.0 | 66 | 28 | 22 | 36 | 71.50 | 68.39 | 65.28 | 62.17 |
| | | | 26968 | .1470 | #26 | 3.734 | 6.0 | 75 | 37 | 31 | 36 | 85.82 | 82.09 | 78.36 | 74.63 |

*continued* ⟶

# Series 1580KD, 1280KD, 1880KD *(continued)*

.1476" - .1811"
(3.750mm - 4.600mm)

| | 3xD (1580KD) EDP# | 5xD (1280KD) EDP# | 7xD (1880KD) EDP# | $d_1$ Diameter Decimal | | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | $l_5$ Max Drill Depth | $l_4$ Shank Length | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 28095 | | | .1476 | | 3.750 | 6.0 | 62 | 20 | 14 | 36 | 60.57 | 57.94 | 55.30 | 52.67 |
| | | 25165 | | .1476 | | 3.750 | 6.0 | 66 | 28 | 22 | 36 | 71.50 | 68.39 | 65.28 | 62.17 |
| NEW | | | 26972 | .1476 | | 3.750 | 6.0 | 75 | 37 | 31 | 36 | 85.82 | 82.09 | 78.36 | 74.63 |
| | 28098 | | | .1495 | #25 | 3.797 | 6.0 | 62 | 20 | 14 | 36 | 60.57 | 57.94 | 55.30 | 52.67 |
| | | 25172 | | .1495 | #25 | 3.797 | 6.0 | 66 | 28 | 22 | 36 | 71.50 | 68.39 | 65.28 | 62.17 |
| NEW | | | 26978 | .1495 | #25 | 3.797 | 6.0 | 75 | 37 | 31 | 36 | 85.82 | 82.09 | 78.36 | 74.63 |
| | 28105 | | | .1496 | | 3.800 | 6.0 | 66 | 24 | 18 | 36 | 60.57 | 57.94 | 55.30 | 52.67 |
| | | 25175 | | .1496 | | 3.800 | 6.0 | 74 | 36 | 30 | 36 | 71.50 | 68.39 | 65.28 | 62.17 |
| | 28115 | | | .1535 | | 3.900 | 6.0 | 66 | 24 | 18 | 36 | 60.57 | 57.94 | 55.30 | 52.67 |
| | | 25185 | | .1535 | | 3.900 | 6.0 | 74 | 36 | 30 | 36 | 71.50 | 68.39 | 65.28 | 62.17 |
| | | | 26982 | .1535 | | 3.900 | 6.0 | 75 | 37 | 31 | 36 | 85.82 | 82.09 | 78.36 | 74.63 |
| | 28118 | | | .1562 | 5/32" | 3.967 | 6.0 | 66 | 24 | 18 | 36 | 60.57 | 57.94 | 55.30 | 52.67 |
| | | 25192 | | .1562 | 5/32" | 3.967 | 6.0 | 74 | 36 | 30 | 36 | 71.50 | 68.39 | 65.28 | 62.17 |
| | | | 26984 | .1562 | 5/32" | 3.967 | 6.0 | 75 | 37 | 31 | 36 | 85.82 | 82.09 | 78.36 | 74.63 |
| | 28125 | | | .1563 | | 3.970 | 6.0 | 66 | 24 | 18 | 36 | 60.57 | 57.94 | 55.30 | 52.67 |
| | | 25195 | | .1563 | | 3.970 | 6.0 | 74 | 36 | 30 | 36 | 71.50 | 68.39 | 65.28 | 62.17 |
| | 28135 | | | .1575 | | 4.000 | 6.0 | 66 | 24 | 18 | 36 | 60.57 | 57.94 | 55.30 | 52.67 |
| | | 25205 | | .1575 | | 4.000 | 6.0 | 74 | 36 | 30 | 36 | 71.50 | 68.39 | 65.28 | 62.17 |
| | | | 26986 | .1575 | | 4.000 | 6.0 | 75 | 37 | 31 | 36 | 85.82 | 82.09 | 78.36 | 74.63 |
| | 28138 | | | .1590 | #21 | 4.038 | 6.0 | 66 | 24 | 18 | 36 | 60.57 | 57.94 | 55.30 | 52.67 |
| | | 25208 | | .1590 | #21 | 4.038 | 6.0 | 74 | 36 | 30 | 36 | 71.50 | 68.39 | 65.28 | 62.17 |
| | | | 26988 | .1590 | #21 | 4.038 | 6.0 | 75 | 37 | 31 | 36 | 85.82 | 82.09 | 78.36 | 74.63 |
| | 28140 | | | .1610 | #20 | 4.089 | 6.0 | 66 | 24 | 18 | 36 | 60.57 | 57.94 | 55.30 | 52.67 |
| | | 25212 | | .1610 | #20 | 4.089 | 6.0 | 74 | 36 | 30 | 36 | 71.50 | 68.39 | 65.28 | 62.17 |
| | | | 26990 | .1610 | #20 | 4.089 | 6.0 | 75 | 37 | 31 | 36 | 85.82 | 82.09 | 78.36 | 74.63 |
| | 28145 | | | .1614 | | 4.100 | 6.0 | 66 | 24 | 18 | 36 | 60.57 | 57.94 | 55.30 | 52.67 |
| | | 25215 | | .1614 | | 4.100 | 6.0 | 74 | 36 | 30 | 36 | 71.50 | 68.39 | 65.28 | 62.17 |
| | | | 26992 | .1614 | | 4.100 | 6.0 | 75 | 37 | 31 | 36 | 85.82 | 82.09 | 78.36 | 74.63 |
| | 28155 | | | .1654 | | 4.200 | 6.0 | 66 | 24 | 18 | 36 | 60.57 | 57.94 | 55.30 | 52.67 |
| | | 25225 | | .1654 | | 4.200 | 6.0 | 74 | 36 | 30 | 36 | 71.50 | 68.39 | 65.28 | 62.17 |
| | | | 26994 | .1654 | | 4.200 | 6.0 | 75 | 37 | 31 | 36 | 85.82 | 82.09 | 78.36 | 74.63 |
| | 28158 | | | .1660 | #19 | 4.216 | 6.0 | 66 | 24 | 18 | 36 | 60.57 | 57.94 | 55.30 | 52.67 |
| | | 25228 | | .1660 | #19 | 4.216 | 6.0 | 74 | 36 | 30 | 36 | 71.50 | 68.39 | 65.28 | 62.17 |
| | | | 26996 | .1660 | #19 | 4.216 | 6.0 | 85 | 45 | 39 | 36 | 85.82 | 82.09 | 78.36 | 74.63 |
| | 28165 | | | .1673 | | 4.250 | 6.0 | 66 | 24 | 18 | 36 | 60.57 | 57.94 | 55.30 | 52.67 |
| | | 25235 | | .1673 | | 4.250 | 6.0 | 74 | 36 | 30 | 36 | 71.50 | 68.39 | 65.28 | 62.17 |
| NEW | | | 26998 | .1673 | | 4.250 | 6.0 | 85 | 45 | 39 | 36 | 85.82 | 82.09 | 78.36 | 74.63 |
| | 28175 | | | .1693 | | 4.300 | 6.0 | 66 | 24 | 18 | 36 | 60.57 | 57.94 | 55.30 | 52.67 |
| | | 25245 | | .1693 | | 4.300 | 6.0 | 74 | 36 | 30 | 36 | 71.50 | 68.39 | 65.28 | 62.17 |
| | 28178 | | | .1719 | 11/64" | 4.366 | 6.0 | 66 | 24 | 17 | 36 | 60.57 | 57.94 | 55.30 | 52.67 |
| | | 25248 | | .1719 | 11/64" | 4.366 | 6.0 | 74 | 36 | 29 | 36 | 71.50 | 68.39 | 65.28 | 62.17 |
| | | | 27002 | .1719 | 11/64" | 4.366 | 6.0 | 85 | 45 | 38 | 36 | 85.82 | 82.09 | 78.36 | 74.63 |
| | 28185 | | | .1732 | | 4.400 | 6.0 | 66 | 24 | 17 | 36 | 60.57 | 57.94 | 55.30 | 52.67 |
| | | 25255 | | .1732 | | 4.400 | 6.0 | 74 | 36 | 29 | 36 | 71.50 | 68.39 | 65.28 | 62.17 |
| | | | 27004 | .1732 | | 4.400 | 6.0 | 85 | 45 | 38 | 36 | 85.82 | 82.09 | 78.36 | 74.63 |
| | 28188 | | | .1770 | #16 | 4.496 | 6.0 | 66 | 24 | 17 | 36 | 60.57 | 57.94 | 55.30 | 52.67 |
| | | 25262 | | .1770 | #16 | 4.496 | 6.0 | 74 | 36 | 29 | 36 | 71.50 | 68.39 | 65.28 | 62.17 |
| | | | 27006 | .1770 | #16 | 4.496 | 6.0 | 85 | 45 | 38 | 36 | 85.82 | 82.09 | 78.36 | 74.63 |
| | 28195 | | | .1772 | | 4.500 | 6.0 | 66 | 24 | 17 | 36 | 60.57 | 57.94 | 55.30 | 52.67 |
| | | 25265 | | .1772 | | 4.500 | 6.0 | 74 | 36 | 29 | 36 | 71.50 | 68.39 | 65.28 | 62.17 |
| | | | 27008 | .1772 | | 4.500 | 6.0 | 85 | 45 | 38 | 36 | 85.82 | 82.09 | 78.36 | 74.63 |
| | 28205 | | | .1811 | | 4.600 | 6.0 | 66 | 24 | 17 | 36 | 60.57 | 57.94 | 55.30 | 52.67 |
| | | 25275 | | .1811 | | 4.600 | 6.0 | 74 | 36 | 29 | 36 | 71.50 | 68.39 | 65.28 | 62.17 |
| | | | 27011 | .1811 | | 4.600 | 6.0 | 85 | 45 | 38 | 36 | 85.82 | 82.09 | 78.36 | 74.63 |
| | 28208 | | | .1820 | #14 | 4.622 | 6.0 | 66 | 24 | 17 | 36 | 60.57 | 57.94 | 55.30 | 52.67 |
| | | 25280 | | .1820 | #14 | 4.622 | 6.0 | 74 | 36 | 29 | 36 | 71.50 | 68.39 | 65.28 | 62.17 |
| NEW | | | 27012 | .1820 | #14 | 4.622 | 6.0 | 90 | 50 | 43 | 36 | 85.82 | 82.09 | 78.36 | 74.63 |



† *Metric equivalents are for reference only*

.1820" - .2283"
(4.622mm - 5.800mm)

| | 3xD (1580KD) EDP# | 5xD (1280KD) EDP# | 7xD (1880KD) EDP# | *d1* Diameter Decimal | *d1* Diameter | *d1* Diameter Metric | *d2* Shank Diameter | *l1* Overall Length | *l2* Flute Length | *l5* Max Drill Depth | *l4* Shank Length | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 25285 | | .1831 | | 4.650 | 6.0 | 74 | 36 | 29 | 36 | 71.50 | 68.39 | 65.28 | 62.17 |
| | | | 27014 | .1831 | | 4.650 | 6.0 | 90 | 50 | 43 | 36 | 85.82 | 82.09 | 78.36 | 74.63 |
| | 28225 | | | .1850 | | 4.700 | 6.0 | 66 | 24 | 17 | 36 | 60.57 | 57.94 | 55.30 | 52.67 |
| | | 25295 | | .1850 | | 4.700 | 6.0 | 74 | 36 | 29 | 36 | 71.50 | 68.39 | 65.28 | 62.17 |
| | 28235 | | | .1870 | | 4.750 | 6.0 | 66 | 24 | 17 | 36 | 60.57 | 57.94 | 55.30 | 52.67 |
| | | 25305 | | .1870 | | 4.750 | 6.0 | 74 | 36 | 29 | 36 | 71.50 | 68.39 | 65.28 | 62.17 |
| NEW | | | 27016 | .1870 | | 4.750 | 6.0 | 90 | 50 | 43 | 36 | 85.82 | 82.09 | 78.36 | 74.63 |
| | 28238 | | | .1875 | 3/16" | 4.762 | 6.0 | 66 | 28 | 21 | 36 | 60.57 | 57.94 | 55.30 | 52.67 |
| | | 25310 | | .1875 | 3/16" | 4.762 | 6.0 | 74 | 36 | 29 | 36 | 68.75 | 65.76 | 62.77 | 59.78 |
| | | | 27018 | .1875 | 3/16" | 4.762 | 6.0 | 90 | 50 | 43 | 36 | 85.82 | 82.09 | 78.36 | 74.63 |
| | 28245 | | | .1890 | #12 | 4.800 | 6.0 | 66 | 28 | 21 | 36 | 60.57 | 57.94 | 55.30 | 52.67 |
| | | 25315 | | .1890 | #12 | 4.800 | 6.0 | 82 | 44 | 37 | 36 | 71.50 | 68.39 | 65.28 | 62.17 |
| | | | 27021 | .1890 | #12 | 4.800 | 6.0 | 90 | 50 | 43 | 36 | 85.82 | 82.09 | 78.36 | 74.63 |
| | 28255 | | | .1929 | | 4.900 | 6.0 | 66 | 28 | 21 | 36 | 60.57 | 57.94 | 55.30 | 52.67 |
| | | 25325 | | .1929 | | 4.900 | 6.0 | 82 | 44 | 37 | 36 | 71.50 | 68.39 | 65.28 | 62.17 |
| | | | 27022 | .1929 | | 4.900 | 6.0 | 90 | 50 | 43 | 36 | 85.82 | 82.09 | 78.36 | 74.63 |
| | 28258 | | | .1960 | #9 | 4.978 | 6.0 | 66 | 28 | 21 | 36 | 60.57 | 57.94 | 55.30 | 52.67 |
| | | 25330 | | .1960 | #9 | 4.978 | 6.0 | 82 | 44 | 37 | 36 | 71.50 | 68.39 | 65.28 | 62.17 |
| NEW | | | 27024 | .1960 | #9 | 4.978 | 6.0 | 90 | 50 | 43 | 36 | 85.82 | 82.09 | 78.36 | 74.63 |
| | 28265 | | | .1969 | | 5.000 | 6.0 | 66 | 28 | 21 | 36 | 60.57 | 57.94 | 55.30 | 52.67 |
| | | 25335 | | .1969 | | 5.000 | 6.0 | 82 | 44 | 37 | 36 | 71.50 | 68.39 | 65.28 | 62.17 |
| | | | 27026 | .1969 | | 5.000 | 6.0 | 90 | 50 | 43 | 36 | 85.82 | 82.09 | 78.36 | 74.63 |
| | 28275 | | | .2008 | | 5.100 | 6.0 | 66 | 28 | 20 | 36 | 60.57 | 57.94 | 55.30 | 52.67 |
| | | 25345 | | .2008 | | 5.100 | 6.0 | 82 | 44 | 36 | 36 | 71.50 | 68.39 | 65.28 | 62.17 |
| | 28278 | | | .2010 | #7 | 5.105 | 6.0 | 66 | 28 | 20 | 36 | 60.57 | 57.94 | 55.30 | 52.67 |
| | | 25348 | | .2010 | #7 | 5.105 | 6.0 | 82 | 44 | 36 | 36 | 71.50 | 68.39 | 65.28 | 62.17 |
| | | | 27031 | .2010 | #7 | 5.105 | 6.0 | 97 | 57 | 49 | 36 | 85.82 | 82.09 | 78.36 | 74.63 |
| | 28285 | | | .2027 | | 5.150 | 6.0 | 66 | 28 | 20 | 36 | 60.57 | 57.94 | 55.30 | 52.67 |
| | | 25355 | | .2027 | | 5.150 | 6.0 | 82 | 44 | 36 | 36 | 71.50 | 68.39 | 65.28 | 62.17 |
| | 28295 | | | .2047 | | 5.200 | 6.0 | 66 | 28 | 20 | 36 | 60.57 | 57.94 | 55.30 | 52.67 |
| | | 25365 | | .2047 | | 5.200 | 6.0 | 82 | 44 | 36 | 36 | 71.50 | 68.39 | 65.28 | 62.17 |
| | 28305 | | | .2087 | | 5.300 | 6.0 | 66 | 28 | 20 | 36 | 60.57 | 57.94 | 55.30 | 52.67 |
| | | 25375 | | .2087 | | 5.300 | 6.0 | 82 | 44 | 36 | 36 | 71.50 | 68.39 | 65.28 | 62.17 |
| | 28308 | | | .2130 | #3 | 5.410 | 6.0 | 66 | 28 | 20 | 36 | 60.57 | 57.94 | 55.30 | 52.67 |
| | | 25380 | | .2130 | #3 | 5.410 | 6.0 | 82 | 44 | 36 | 36 | 71.50 | 68.39 | 65.28 | 62.17 |
| | | | 27036 | .2130 | #3 | 5.410 | 6.0 | 97 | 57 | 49 | 36 | 85.82 | 82.09 | 78.36 | 74.63 |
| | 28315 | | | .2165 | | 5.500 | 6.0 | 66 | 28 | 20 | 36 | 60.57 | 57.94 | 55.30 | 52.67 |
| | | 25385 | | .2165 | | 5.500 | 6.0 | 82 | 44 | 36 | 36 | 71.50 | 68.39 | 65.28 | 62.17 |
| | | | 27038 | .2165 | | 5.500 | 6.0 | 97 | 57 | 49 | 36 | 85.82 | 82.09 | 78.36 | 74.63 |
| | 28325 | | | .2185 | | 5.550 | 6.0 | 66 | 28 | 20 | 36 | 60.57 | 57.94 | 55.30 | 52.67 |
| | | 25395 | | .2185 | | 5.550 | 6.0 | 82 | 44 | 36 | 36 | 71.50 | 68.39 | 65.28 | 62.17 |
| | 28328 | | | .2188 | 7/32" | 5.557 | 6.0 | 66 | 28 | 20 | 36 | 60.57 | 57.94 | 55.30 | 52.67 |
| | | 25398 | | .2188 | 7/32" | 5.557 | 6.0 | 82 | 44 | 36 | 36 | 71.50 | 68.39 | 65.28 | 62.17 |
| | | | 27041 | .2188 | 7/32" | 5.557 | 6.0 | 97 | 57 | 49 | 36 | 85.82 | 82.09 | 78.36 | 74.63 |
| | 28335 | | | .2205 | | 5.600 | 6.0 | 66 | 28 | 20 | 36 | 60.57 | 57.94 | 55.30 | 52.67 |
| | | 25397 | | .2205 | | 5.600 | 6.0 | 82 | 44 | 36 | 36 | 71.50 | 68.39 | 65.28 | 62.17 |
| NEW | | | 27042 | .2205 | | 5.600 | 6.0 | 97 | 57 | 49 | 36 | 85.82 | 82.09 | 78.36 | 74.63 |
| | 28345 | | | .2244 | | 5.700 | 6.0 | 66 | 28 | 19 | 36 | 60.57 | 57.94 | 55.30 | 52.67 |
| | | 25400 | | .2244 | | 5.700 | 6.0 | 82 | 44 | 35 | 36 | 71.50 | 68.39 | 65.28 | 62.17 |
| | | | 27044 | .2244 | | 5.700 | 6.0 | 97 | 57 | 48 | 36 | 85.82 | 82.09 | 78.36 | 74.63 |
| | 28348 | | | .2280 | #1 | 5.791 | 6.0 | 66 | 28 | 19 | 36 | 60.57 | 57.94 | 55.30 | 52.67 |
| | | 25403 | | .2280 | #1 | 5.791 | 6.0 | 82 | 44 | 35 | 36 | 71.50 | 68.39 | 65.28 | 62.17 |
| | | | 27046 | .2280 | #1 | 5.791 | 6.0 | 97 | 57 | 48 | 36 | 85.82 | 82.09 | 78.36 | 74.63 |
| | 28355 | | | .2283 | | 5.800 | 6.0 | 66 | 28 | 19 | 36 | 60.57 | 57.94 | 55.30 | 52.67 |
| | | 25405 | | .2283 | | 5.800 | 6.0 | 82 | 44 | 35 | 36 | 71.50 | 68.39 | 65.28 | 62.17 |
| | | | 27048 | .2283 | | 5.800 | 6.0 | 97 | 57 | 48 | 36 | 85.82 | 82.09 | 78.36 | 74.63 |

*continued* ⟶

# Series 1580KD, 1280KD, 1880KD *(continued)*

.2323" - .2812"
(5.900mm - 7.142mm)

| | 3xD (1580KD) EDP# | 5xD (1280KD) EDP# | 7xD (1880KD) EDP# | *d1* Diameter Decimal | | Metric | *d2* Shank Diameter | *l1* Overall Length | *l2* Flute Length | *l5* Max Drill Depth | *l4* Shank Length | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 28365 | | | .2323 | | 5.900 | 6.0 | 66 | 28 | 19 | 36 | 60.57 | 57.94 | 55.30 | 52.67 |
| | | 25415 | | .2323 | | 5.900 | 6.0 | 82 | 44 | 35 | 36 | 71.50 | 68.39 | 65.28 | 62.17 |
| NEW | | | 27051 | .2323 | | 5.900 | 6.0 | 97 | 57 | 48 | 36 | 85.82 | 82.09 | 78.36 | 74.63 |
| | 28375 | | | .2342 | | 5.950 | 6.0 | 66 | 28 | 19 | 36 | 60.57 | 57.94 | 55.30 | 52.67 |
| | | 25425 | | .2342 | | 5.950 | 6.0 | 82 | 44 | 35 | 36 | 71.50 | 68.39 | 65.28 | 62.17 |
| NEW | | | 27052 | .2342 | | 5.950 | 6.0 | 97 | 57 | 48 | 36 | 85.82 | 82.09 | 78.36 | 74.63 |
| | 28385 | | | .2362 | | 6.000 | 6.0 | 66 | 28 | 19 | 36 | 60.57 | 57.94 | 55.30 | 52.67 |
| | | 25435 | | .2362 | | 6.000 | 6.0 | 82 | 44 | 35 | 36 | 71.50 | 68.39 | 65.28 | 62.17 |
| | | | 27054 | .2362 | | 6.000 | 6.0 | 97 | 57 | 48 | 36 | 85.82 | 82.09 | 78.36 | 74.63 |
| | 28395 | | | .2402 | | 6.100 | 8.0 | 79 | 34 | 25 | 36 | 84.39 | 80.72 | 77.05 | 73.38 |
| | | 25437 | | .2402 | | 6.100 | 8.0 | 91 | 53 | 44 | 36 | 100.53 | 96.16 | 91.79 | 87.42 |
| | 28405 | | | .2441 | | 6.200 | 8.0 | 79 | 34 | 25 | 36 | 84.39 | 80.72 | 77.05 | 73.38 |
| | | 25440 | | .2441 | | 6.200 | 8.0 | 91 | 53 | 44 | 36 | 100.53 | 96.16 | 91.79 | 87.42 |
| | 28415 | | | .2480 | | 6.300 | 8.0 | 79 | 34 | 25 | 36 | 84.39 | 80.72 | 77.05 | 73.38 |
| | | 25443 | | .2480 | | 6.300 | 8.0 | 91 | 53 | 44 | 36 | 100.53 | 96.16 | 91.79 | 87.42 |
| | 28425 | | | .2500 | 1/4" | 6.350 | 8.0 | 79 | 34 | 24 | 36 | 84.39 | 80.72 | 77.05 | 73.38 |
| | | 25445 | | .2500 | 1/4" | 6.350 | 8.0 | 91 | 53 | 43 | 36 | 100.53 | 96.16 | 91.79 | 87.42 |
| | | | 27056 | .2500 | 1/4" | 6.350 | 8.0 | 106 | 66 | 56 | 36 | 121.37 | 116.09 | 110.82 | 105.54 |
| | 28435 | | | .2520 | | 6.400 | 8.0 | 79 | 34 | 24 | 36 | 84.39 | 80.72 | 77.05 | 73.38 |
| | | 25450 | | .2520 | | 6.400 | 8.0 | 91 | 53 | 43 | 36 | 100.53 | 96.16 | 91.79 | 87.42 |
| | | | 27058 | .2520 | | 6.400 | 8.0 | 106 | 66 | 56 | 36 | 121.37 | 116.09 | 110.82 | 105.54 |
| | 28445 | | | .2559 | | 6.500 | 8.0 | 79 | 34 | 24 | 36 | 84.39 | 80.72 | 77.05 | 73.38 |
| | | 25455 | | .2559 | | 6.500 | 8.0 | 91 | 53 | 43 | 36 | 100.53 | 96.16 | 91.79 | 87.42 |
| | | | 27061 | .2559 | | 6.500 | 8.0 | 106 | 66 | 56 | 36 | 121.37 | 116.09 | 110.82 | 105.54 |
| | 28446 | | | .2571 | | 6.530 | 8.0 | 79 | 34 | 24 | 36 | 84.39 | 80.72 | 77.05 | 73.38 |
| | | 25457 | | .2571 | | 6.530 | 8.0 | 91 | 53 | 43 | 36 | 100.53 | 96.16 | 91.79 | 87.42 |
| | | | 27062 | .2571 | | 6.530 | 8.0 | 106 | 66 | 56 | 36 | 121.37 | 116.09 | 110.82 | 105.54 |
| | 28455 | | | .2598 | | 6.600 | 8.0 | 79 | 34 | 24 | 36 | 84.39 | 80.72 | 77.05 | 73.38 |
| | | 25460 | | .2598 | | 6.600 | 8.0 | 91 | 53 | 43 | 36 | 100.53 | 96.16 | 91.79 | 87.42 |
| | | | 27064 | .2598 | | 6.600 | 8.0 | 106 | 66 | 56 | 36 | 121.37 | 116.09 | 110.82 | 105.54 |
| | | 25463 | | .2638 | | 6.700 | 8.0 | 91 | 53 | 43 | 36 | 100.53 | 96.16 | 91.79 | 87.42 |
| | | | 27066 | .2638 | | 6.700 | 8.0 | 106 | 66 | 56 | 36 | 121.37 | 116.09 | 110.82 | 105.54 |
| | 28463 | | | .2656 | 17/64" | 6.746 | 8.0 | 79 | 34 | 24 | 36 | 84.39 | 80.72 | 77.05 | 73.38 |
| | | 25464 | | .2656 | 17/64" | 6.746 | 8.0 | 91 | 53 | 43 | 36 | 100.53 | 96.16 | 91.79 | 87.42 |
| | | | 27068 | .2656 | 17/64" | 6.746 | 8.0 | 106 | 66 | 56 | 36 | 121.37 | 116.09 | 110.82 | 105.54 |
| | 28465 | | | .2657 | | 6.750 | 8.0 | 79 | 34 | 24 | 36 | 84.39 | 80.72 | 77.05 | 73.38 |
| | | 25465 | | .2657 | | 6.750 | 8.0 | 91 | 53 | 43 | 36 | 100.53 | 96.16 | 91.79 | 87.42 |
| | 28475 | | | .2677 | | 6.800 | 8.0 | 79 | 34 | 24 | 36 | 84.39 | 80.72 | 77.05 | 73.38 |
| | | 25475 | | .2677 | | 6.800 | 8.0 | 91 | 53 | 43 | 36 | 100.53 | 96.16 | 91.79 | 87.42 |
| | | | 27071 | .2677 | | 6.800 | 8.0 | 106 | 66 | 56 | 36 | 121.37 | 116.09 | 110.82 | 105.54 |
| | 28485 | | | .2717 | | 6.900 | 8.0 | 79 | 34 | 24 | 36 | 84.39 | 80.72 | 77.05 | 73.38 |
| | | 25485 | | .2717 | | 6.900 | 8.0 | 91 | 53 | 43 | 36 | 100.53 | 96.16 | 91.79 | 87.42 |
| | | | 27072 | .2717 | | 6.900 | 8.0 | 116 | 76 | 66 | 36 | 121.37 | 116.09 | 110.82 | 105.54 |
| | 28495 | | | .2756 | | 7.000 | 8.0 | 79 | 34 | 24 | 36 | 84.39 | 80.72 | 77.05 | 73.38 |
| | | 25495 | | .2756 | | 7.000 | 8.0 | 91 | 53 | 43 | 36 | 100.53 | 96.16 | 91.79 | 87.42 |
| | | | 27074 | .2756 | | 7.000 | 8.0 | 116 | 76 | 66 | 36 | 121.37 | 116.09 | 110.82 | 105.54 |
| NEW | 28498 | | | .2770 | J | 7.035 | 8.0 | 79 | 41 | 30 | 36 | 84.39 | 80.72 | 77.05 | 73.38 |
| | | 25498 | | .2770 | J | 7.035 | 8.0 | 91 | 53 | 42 | 36 | 100.53 | 96.16 | 91.79 | 87.42 |
| NEW | | | 27076 | .2770 | J | 7.035 | 8.0 | 116 | 76 | 65 | 36 | 121.37 | 116.09 | 110.82 | 105.54 |
| | 28505 | | | .2795 | | 7.100 | 8.0 | 79 | 41 | 30 | 36 | 84.39 | 80.72 | 77.05 | 73.38 |
| | | 25505 | | .2795 | | 7.100 | 8.0 | 91 | 53 | 42 | 36 | 100.53 | 96.16 | 91.79 | 87.42 |
| | 28508 | | | .2812 | 9/32" | 7.142 | 8.0 | 79 | 41 | 30 | 36 | 84.39 | 80.72 | 77.05 | 73.38 |
| | | 25512 | | .2812 | 9/32" | 7.142 | 8.0 | 91 | 53 | 42 | 36 | 100.53 | 96.16 | 91.79 | 87.42 |
| | | | 27079 | .2812 | 9/32" | 7.142 | 8.0 | 116 | 76 | 65 | 36 | 121.37 | 116.09 | 110.82 | 105.54 |



† *Metric equivalents are for reference only*

| | 3xD (1580KD) EDP# | 5xD (1280KD) EDP# | 7xD (1880KD) EDP# | $d_1$ Diameter Decimal | | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | $l_5$ Max Drill Depth | $l_4$ Shank Length | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 28515 | | | .2815 | | 7.150 | 8.0 | 79 | 41 | 30 | 36 | 84.39 | 80.72 | 77.05 | 73.38 |
| | | 25515 | | .2815 | | 7.150 | 8.0 | 91 | 53 | 42 | 36 | 100.53 | 96.16 | 91.79 | 87.42 |
| NEW | | | 27082 | .2815 | | 7.150 | 8.0 | 116 | 76 | 65 | 36 | 121.37 | 116.09 | 110.82 | 105.54 |
| | 28525 | | | .2835 | | 7.200 | 8.0 | 79 | 41 | 30 | 36 | 84.39 | 80.72 | 77.05 | 73.38 |
| | | 25525 | | .2835 | | 7.200 | 8.0 | 91 | 53 | 42 | 36 | 100.53 | 96.16 | 91.79 | 87.42 |
| | 28535 | | | .2874 | | 7.300 | 8.0 | 79 | 41 | 30 | 36 | 84.39 | 80.72 | 77.05 | 73.38 |
| | | 25530 | | .2874 | | 7.300 | 8.0 | 91 | 53 | 42 | 36 | 100.53 | 96.16 | 91.79 | 87.42 |
| | 28545 | | | .2913 | | 7.400 | 8.0 | 79 | 41 | 30 | 36 | 84.39 | 80.72 | 77.05 | 73.38 |
| | | 25535 | | .2913 | | 7.400 | 8.0 | 91 | 53 | 42 | 36 | 100.53 | 96.16 | 91.79 | 87.42 |
| | 28555 | | | .2953 | | 7.500 | 8.0 | 79 | 41 | 30 | 36 | 84.39 | 80.72 | 77.05 | 73.38 |
| | | 25545 | | .2953 | | 7.500 | 8.0 | 91 | 53 | 42 | 36 | 100.53 | 96.16 | 91.79 | 87.42 |
| | | | 27086 | .2953 | | 7.500 | 8.0 | 116 | 76 | 65 | 36 | 121.37 | 116.09 | 110.82 | 105.54 |
| | 28565 | | | .2972 | | 7.550 | 8.0 | 79 | 41 | 30 | 36 | 84.39 | 80.72 | 77.05 | 73.38 |
| | | 25555 | | .2972 | | 7.550 | 8.0 | 91 | 53 | 42 | 36 | 100.53 | 96.16 | 91.79 | 87.42 |
| | | | 27088 | .2972 | | 7.550 | 8.0 | 116 | 76 | 65 | 36 | 121.37 | 116.09 | 110.82 | 105.54 |
| | 28575 | | | .2992 | | 7.600 | 8.0 | 79 | 41 | 30 | 36 | 84.39 | 80.72 | 77.05 | 73.38 |
| | | 25565 | | .2992 | | 7.600 | 8.0 | 91 | 53 | 42 | 36 | 100.53 | 96.16 | 91.79 | 87.42 |
| | 28578 | | | .3020 | N | 7.670 | 8.0 | 79 | 41 | 29 | 36 | 84.39 | 80.72 | 77.05 | 73.38 |
| | | 25570 | | .3020 | N | 7.670 | 8.0 | 91 | 53 | 41 | 36 | 100.53 | 96.16 | 91.79 | 87.42 |
| NEW | | | 27092 | .3020 | N | 7.670 | 8.0 | 116 | 76 | 64 | 36 | 121.37 | 116.09 | 110.82 | 105.54 |
| | 28585 | | | .3031 | | 7.700 | 8.0 | 79 | 41 | 29 | 36 | 84.39 | 80.72 | 77.05 | 73.38 |
| | | 25575 | | .3031 | | 7.700 | 8.0 | 91 | 53 | 41 | 36 | 100.53 | 96.16 | 91.79 | 87.42 |
| | 28595 | | | .3071 | | 7.800 | 8.0 | 79 | 41 | 29 | 36 | 84.39 | 80.72 | 77.05 | 73.38 |
| | | 25585 | | .3071 | | 7.800 | 8.0 | 91 | 53 | 41 | 36 | 100.53 | 96.16 | 91.79 | 87.42 |
| | | | 27096 | .3071 | | 7.800 | 8.0 | 116 | 76 | 64 | 36 | 121.37 | 116.09 | 110.82 | 105.54 |
| | 28602 | | | .3125 | 5/16" | 7.937 | 8.0 | 79 | 41 | 29 | 36 | 84.39 | 80.72 | 77.05 | 73.38 |
| | | 25593 | | .3125 | 5/16" | 7.937 | 8.0 | 91 | 53 | 41 | 36 | 100.53 | 96.16 | 91.79 | 87.42 |
| | | | 27101 | .3125 | 5/16" | 7.937 | 8.0 | 116 | 76 | 64 | 36 | 121.37 | 116.09 | 110.82 | 105.54 |
| | 28605 | | | .3130 | | 7.950 | 8.0 | 79 | 41 | 29 | 36 | 84.39 | 80.72 | 77.05 | 73.38 |
| | | 25595 | | .3130 | | 7.950 | 8.0 | 91 | 53 | 41 | 36 | 100.53 | 96.16 | 91.79 | 87.42 |
| | | | 27102 | .3130 | | 7.950 | 8.0 | 116 | 76 | 64 | 36 | 121.37 | 116.09 | 110.82 | 105.54 |
| | 28615 | | | .3150 | | 8.000 | 8.0 | 79 | 41 | 29 | 36 | 84.39 | 80.72 | 77.05 | 73.38 |
| | | 25605 | | .3150 | | 8.000 | 8.0 | 91 | 53 | 41 | 36 | 100.53 | 96.16 | 91.79 | 87.42 |
| | | | 27104 | .3150 | | 8.000 | 8.0 | 116 | 76 | 64 | 36 | 121.37 | 116.09 | 110.82 | 105.54 |
| | 28625 | | | .3189 | | 8.100 | 10.0 | 89 | 47 | 35 | 40 | 113.71 | 108.77 | 103.82 | 98.88 |
| | | 25610 | | .3189 | | 8.100 | 10.0 | 103 | 61 | 49 | 40 | 129.52 | 123.89 | 118.26 | 112.63 |
| | 28635 | | | .3228 | | 8.200 | 10.0 | 89 | 47 | 35 | 40 | 113.71 | 108.77 | 103.82 | 98.88 |
| | | 25615 | | .3228 | | 8.200 | 10.0 | 103 | 61 | 49 | 40 | 129.52 | 123.89 | 118.26 | 112.63 |
| | 28638 | | | .3230 | P | 8.204 | 10.0 | 89 | 47 | 35 | 40 | 113.71 | 108.77 | 103.82 | 98.88 |
| NEW | | 25618 | | .3230 | P | 8.204 | 10.0 | 103 | 61 | 49 | 40 | 129.52 | 123.89 | 118.26 | 112.63 |
| NEW | | | 27108 | .3230 | P | 8.204 | 10.0 | 131 | 87 | 75 | 40 | 165.51 | 158.31 | 151.12 | 143.92 |
| | 28645 | | | .3268 | | 8.300 | 10.0 | 89 | 47 | 35 | 40 | 113.71 | 108.77 | 103.82 | 98.88 |
| | | 25625 | | .3268 | | 8.300 | 10.0 | 103 | 61 | 49 | 40 | 129.52 | 123.89 | 118.26 | 112.63 |
| | 28648 | | | .3281 | 21/64" | 8.333 | 10.0 | 89 | 47 | 35 | 40 | 113.71 | 108.77 | 103.82 | 98.88 |
| | | 25628 | | .3281 | 21/64" | 8.333 | 10.0 | 103 | 61 | 49 | 40 | 129.52 | 123.89 | 118.26 | 112.63 |
| | | | 27112 | .3281 | 21/64" | 8.333 | 10.0 | 131 | 87 | 75 | 40 | 165.51 | 158.31 | 151.12 | 143.92 |
| | 28655 | | | .3287 | | 8.350 | 10.0 | 89 | 47 | 34 | 40 | 113.71 | 108.77 | 103.82 | 98.88 |
| | | 25635 | | .3287 | | 8.350 | 10.0 | 103 | 61 | 48 | 40 | 129.52 | 123.89 | 118.26 | 112.63 |
| | | | 27114 | .3287 | | 8.350 | 10.0 | 131 | 87 | 74 | 40 | 165.51 | 158.31 | 151.12 | 143.92 |
| | 28665 | | | .3307 | | 8.400 | 10.0 | 89 | 47 | 34 | 40 | 113.71 | 108.77 | 103.82 | 98.88 |
| | | 25640 | | .3307 | | 8.400 | 10.0 | 103 | 61 | 48 | 40 | 129.52 | 123.89 | 118.26 | 112.63 |
| | 28675 | | | .3346 | | 8.500 | 10.0 | 89 | 47 | 34 | 40 | 113.71 | 108.77 | 103.82 | 98.88 |
| | | 25645 | | .3346 | | 8.500 | 10.0 | 103 | 61 | 48 | 40 | 129.52 | 123.89 | 118.26 | 112.63 |
| | | | 27118 | .3346 | | 8.500 | 10.0 | 131 | 87 | 74 | 40 | 165.51 | 158.31 | 151.12 | 143.92 |
| | 28685 | | | .3386 | | 8.600 | 10.0 | 89 | 47 | 34 | 40 | 113.71 | 108.77 | 103.82 | 98.88 |
| | | 25655 | | .3386 | | 8.600 | 10.0 | 103 | 61 | 48 | 40 | 129.52 | 123.89 | 118.26 | 112.63 |
| | | | 27121 | .3386 | | 8.600 | 10.0 | 131 | 87 | 74 | 40 | 165.51 | 158.31 | 151.12 | 143.92 |

*continued* ⟶

# Series 1580KD, 1280KD, 1880KD *(continued)*

.3390" - .3906"
(8.610mm - 9.920mm)

| | 3xD (1580KD) EDP# | 5xD (1280KD) EDP# | 7xD (1880KD) EDP# | $d_1$ Diameter Decimal | | $d_1$ Diameter Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | $l_5$ Max Drill Depth | $l_4$ Shank Length | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 28688 | | | .3390 | R | 8.610 | 10.0 | 89 | 47 | 34 | 40 | 113.71 | 108.77 | 103.82 | 98.88 |
| | | 25658 | | .3390 | R | 8.610 | 10.0 | 103 | 61 | 48 | 40 | 129.52 | 123.89 | 118.26 | 112.63 |
| | | | 27122 | .3390 | R | 8.610 | 10.0 | 131 | 87 | 74 | 40 | 165.51 | 158.31 | 151.12 | 143.92 |
| | 28695 | | | .3425 | | 8.700 | 10.0 | 89 | 47 | 34 | 40 | 113.71 | 108.77 | 103.82 | 98.88 |
| | | 25665 | | .3425 | | 8.700 | 10.0 | 103 | 61 | 48 | 40 | 129.52 | 123.89 | 118.26 | 112.63 |
| | | | 27124 | .3425 | | 8.700 | 10.0 | 131 | 87 | 74 | 40 | 165.51 | 158.31 | 151.12 | 143.92 |
| | 28698 | | | .3438 | 11/32" | 8.732 | 10.0 | 89 | 47 | 34 | 40 | 113.71 | 108.77 | 103.82 | 98.88 |
| | | 25670 | | .3438 | 11/32" | 8.732 | 10.0 | 103 | 61 | 48 | 40 | 129.52 | 123.89 | 118.26 | 112.63 |
| | | | 27126 | .3438 | 11/32" | 8.732 | 10.0 | 131 | 87 | 74 | 40 | 165.51 | 158.31 | 151.12 | 143.92 |
| | 28725 | | | .3445 | | 8.750 | 10.0 | 89 | 47 | 34 | 40 | 113.71 | 108.77 | 103.82 | 98.88 |
| | | 25675 | | .3445 | | 8.750 | 10.0 | 103 | 61 | 48 | 40 | 129.52 | 123.89 | 118.26 | 112.63 |
| | | | 27128 | .3445 | | 8.750 | 10.0 | 131 | 87 | 74 | 40 | 165.51 | 158.31 | 151.12 | 143.92 |
| | 28735 | | | .3465 | | 8.800 | 10.0 | 89 | 47 | 34 | 40 | 113.71 | 108.77 | 103.82 | 98.88 |
| | | 25685 | | .3465 | | 8.800 | 10.0 | 103 | 61 | 48 | 40 | 129.52 | 123.89 | 118.26 | 112.63 |
| | | | 27130 | .3465 | | 8.800 | 10.0 | 131 | 87 | 74 | 40 | 165.51 | 158.31 | 151.12 | 143.92 |
| | 28745 | | | .3504 | | 8.900 | 10.0 | 89 | 47 | 34 | 40 | 113.71 | 108.77 | 103.82 | 98.88 |
| | | 25695 | | .3504 | | 8.900 | 10.0 | 103 | 61 | 48 | 40 | 129.52 | 123.89 | 118.26 | 112.63 |
| | 28755 | | | .3543 | | 9.000 | 10.0 | 89 | 47 | 34 | 40 | 113.71 | 108.77 | 103.82 | 98.88 |
| | | 25705 | | .3543 | | 9.000 | 10.0 | 103 | 61 | 48 | 40 | 129.52 | 123.89 | 118.26 | 112.63 |
| | | | 27134 | .3543 | | 9.000 | 10.0 | 131 | 87 | 74 | 40 | 165.51 | 158.31 | 151.12 | 143.92 |
| | 28765 | | | .3583 | | 9.100 | 10.0 | 89 | 47 | 33 | 40 | 113.71 | 108.77 | 103.82 | 98.88 |
| | | 25715 | | .3583 | | 9.100 | 10.0 | 103 | 61 | 47 | 40 | 129.52 | 123.89 | 118.26 | 112.63 |
| | 28768 | | | .3594 | 23/64" | 9.128 | 10.0 | 89 | 47 | 33 | 40 | 113.71 | 108.77 | 103.82 | 98.88 |
| | | 25720 | | .3594 | 23/64" | 9.128 | 10.0 | 103 | 61 | 47 | 40 | 129.52 | 123.89 | 118.26 | 112.63 |
| | | | 27138 | .3594 | 23/64" | 9.128 | 10.0 | 139 | 95 | 84 | 40 | 165.51 | 158.31 | 151.12 | 143.92 |
| | | 25725 | | .3602 | | 9.150 | 10.0 | 103 | 61 | 47 | 40 | 129.52 | 123.89 | 118.26 | 112.63 |
| NEW | | | 27140 | .3602 | | 9.150 | 10.0 | 139 | 95 | 81 | 40 | 165.51 | 158.31 | 151.12 | 143.92 |
| | 28815 | | | .3622 | | 9.200 | 10.0 | 89 | 47 | 33 | 40 | 113.71 | 108.77 | 103.82 | 98.88 |
| | | 25735 | | .3622 | | 9.200 | 10.0 | 103 | 61 | 47 | 40 | 129.52 | 123.89 | 118.26 | 112.63 |
| | 28825 | | | .3661 | | 9.300 | 10.0 | 89 | 47 | 33 | 40 | 113.71 | 108.77 | 103.82 | 98.88 |
| | | 25745 | | .3661 | | 9.300 | 10.0 | 103 | 61 | 47 | 40 | 129.52 | 123.89 | 118.26 | 112.63 |
| | 28845 | | | .3701 | | 9.400 | 10.0 | 89 | 47 | 33 | 40 | 113.71 | 108.77 | 103.82 | 98.88 |
| | | 25750 | | .3701 | | 9.400 | 10.0 | 103 | 61 | 47 | 40 | 129.52 | 123.89 | 118.26 | 112.63 |
| | 28855 | | | .3740 | | 9.500 | 10.0 | 89 | 47 | 33 | 40 | 113.71 | 108.77 | 103.82 | 98.88 |
| | | 25755 | | .3740 | | 9.500 | 10.0 | 103 | 61 | 47 | 40 | 129.52 | 123.89 | 118.26 | 112.63 |
| NEW | | | 27146 | .3740 | | 9.500 | 10.0 | 139 | 95 | 81 | 40 | 165.51 | 158.31 | 151.12 | 143.92 |
| | 28858 | | | .3750 | 3/8" | 9.525 | 10.0 | 89 | 47 | 33 | 40 | 113.71 | 108.77 | 103.82 | 98.88 |
| | | 25760 | | .3750 | 3/8" | 9.525 | 10.0 | 103 | 61 | 47 | 40 | 129.52 | 123.89 | 118.26 | 112.63 |
| | | | 27148 | .3750 | 3/8" | 9.525 | 10.0 | 139 | 95 | 81 | 40 | 165.51 | 158.31 | 151.12 | 143.92 |
| | 28875 | | | .3760 | | 9.550 | 10.0 | 89 | 47 | 33 | 40 | 113.71 | 108.77 | 103.82 | 98.88 |
| | | 25765 | | .3760 | | 9.550 | 10.0 | 103 | 61 | 47 | 40 | 129.52 | 123.89 | 118.26 | 112.63 |
| NEW | | | 27150 | .3760 | | 9.550 | 10.0 | 139 | 95 | 81 | 40 | 165.51 | 158.31 | 151.12 | 143.92 |
| | 28878 | | | .3780 | | 9.600 | 10.0 | 89 | 47 | 33 | 40 | 113.71 | 108.77 | 103.82 | 98.88 |
| | | 25767 | | .3780 | | 9.600 | 10.0 | 103 | 61 | 47 | 40 | 129.52 | 123.89 | 118.26 | 112.63 |
| | | | 27152 | .3780 | | 9.600 | 10.0 | 139 | 95 | 81 | 40 | 165.51 | 158.31 | 151.12 | 143.92 |
| | 28882 | | | .3819 | | 9.700 | 10.0 | 89 | 47 | 32 | 40 | 113.71 | 108.77 | 103.82 | 98.88 |
| | | 25770 | | .3819 | | 9.700 | 10.0 | 103 | 61 | 46 | 40 | 129.52 | 123.89 | 118.26 | 112.63 |
| | 28885 | | | .3858 | | 9.800 | 10.0 | 89 | 47 | 32 | 40 | 113.71 | 108.77 | 103.82 | 98.88 |
| | | 25775 | | .3858 | | 9.800 | 10.0 | 103 | 61 | 46 | 40 | 129.52 | 123.89 | 118.26 | 112.63 |
| | 28895 | | | .3898 | | 9.900 | 10.0 | 89 | 47 | 32 | 40 | 113.71 | 108.77 | 103.82 | 98.88 |
| | | 25785 | | .3898 | | 9.900 | 10.0 | 103 | 61 | 46 | 40 | 129.52 | 123.89 | 118.26 | 112.63 |
| | | | 27160 | .3898 | | 9.900 | 10.0 | 139 | 95 | 80 | 40 | 165.51 | 158.31 | 151.12 | 143.92 |
| | 28898 | | | .3906 | 25/64" | 9.920 | 10.0 | 89 | 47 | 32 | 40 | 113.71 | 108.77 | 103.82 | 98.88 |
| | | 25787 | | .3906 | 25/64" | 9.920 | 10.0 | 103 | 61 | 46 | 40 | 129.52 | 123.89 | 118.26 | 112.63 |
| | | | 27162 | .3906 | 25/64" | 9.920 | 10.0 | 139 | 95 | 80 | 40 | 165.51 | 158.31 | 151.12 | 143.92 |



† *Metric equivalents are for reference only*

# Series 1580KD, 1280KD, 1880KD *(continued)*

.3937" - .4688"
(10.000mm - 11.907mm)

| | 3xD (1580KD) EDP# | 5xD (1280KD) EDP# | 7xD (1880KD) EDP# | *d1* Diameter Decimal | *d1* Diameter | *d1* Diameter Metric | *d2* Shank Diameter | *l1* Overall Length | *l2* Flute Length | *l5* Max Drill Depth | *l4* Shank Length | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 28905 | | | .3937 | | 10.000 | 10.0 | 89 | 47 | 32 | 40 | 113.71 | 108.77 | 103.82 | 98.88 |
| | | 25795 | | .3937 | | 10.000 | 10.0 | 103 | 61 | 46 | 40 | 129.52 | 123.89 | 118.26 | 112.63 |
| | | | 27164 | .3937 | | 10.000 | 10.0 | 139 | 95 | 80 | 40 | 165.51 | 158.31 | 151.12 | 143.92 |
| | 28925 | | | .3976 | | 10.100 | 12.0 | 102 | 55 | 40 | 45 | 147.23 | 140.83 | 134.43 | 128.03 |
| | | 25800 | | .3976 | | 10.100 | 12.0 | 118 | 71 | 56 | 45 | 167.05 | 159.79 | 152.52 | 145.26 |
| | 28935 | | | .4016 | | 10.200 | 12.0 | 102 | 55 | 40 | 45 | 147.23 | 140.83 | 134.43 | 128.03 |
| | | 25805 | | .4016 | | 10.200 | 12.0 | 118 | 71 | 56 | 45 | 167.05 | 159.79 | 152.52 | 145.26 |
| | 28945 | | | .4055 | | 10.300 | 12.0 | 102 | 55 | 40 | 45 | 147.23 | 140.83 | 134.43 | 128.03 |
| | | 25815 | | .4055 | | 10.300 | 12.0 | 118 | 71 | 56 | 45 | 167.05 | 159.79 | 152.52 | 145.26 |
| NEW | | | 27170 | .4055 | | 10.300 | 12.0 | 155 | 106 | 91 | 45 | 215.11 | 205.76 | 196.40 | 187.05 |
| | 28948 | | | .4062 | 13/32" | 10.317 | 12.0 | 102 | 55 | 40 | 45 | 147.23 | 140.83 | 134.43 | 128.03 |
| | | 25817 | | .4062 | 13/32" | 10.317 | 12.0 | 118 | 71 | 56 | 45 | 167.05 | 159.79 | 152.52 | 145.26 |
| | | | 27172 | .4062 | 13/32" | 10.317 | 12.0 | 155 | 106 | 91 | 45 | 215.11 | 205.76 | 196.40 | 187.05 |
| | 28953 | | | .4130 | Z | 10.490 | 12.0 | 102 | 55 | 39 | 45 | 147.23 | 140.83 | 134.43 | 128.03 |
| | | 25823 | | .4130 | Z | 10.490 | 12.0 | 118 | 71 | 55 | 45 | 167.05 | 159.79 | 152.52 | 145.26 |
| | | | 27178 | .4130 | Z | 10.490 | 12.0 | 155 | 106 | 90 | 45 | 215.11 | 205.76 | 196.40 | 187.05 |
| | 28955 | | | .4134 | | 10.500 | 12.0 | 102 | 55 | 39 | 45 | 147.23 | 140.83 | 134.43 | 128.03 |
| | | 25825 | | .4134 | | 10.500 | 12.0 | 118 | 71 | 55 | 45 | 167.05 | 159.79 | 152.52 | 145.26 |
| | | | 27180 | .4134 | | 10.500 | 12.0 | 155 | 106 | 90 | 45 | 215.11 | 205.76 | 196.40 | 187.05 |
| | 28965 | | | .4173 | | 10.600 | 12.0 | 102 | 55 | 39 | 45 | 147.23 | 140.83 | 134.43 | 128.03 |
| | | 25830 | | .4173 | | 10.600 | 12.0 | 118 | 71 | 55 | 45 | 167.05 | 159.79 | 152.52 | 145.26 |
| NEW | | | 27182 | .4173 | | 10.600 | 12.0 | 155 | 106 | 90 | 45 | 215.11 | 205.76 | 196.40 | 187.05 |
| | 28975 | | | .4213 | | 10.700 | 12.0 | 102 | 55 | 39 | 45 | 147.23 | 140.83 | 134.43 | 128.03 |
| | | 25835 | | .4213 | | 10.700 | 12.0 | 118 | 71 | 55 | 45 | 167.05 | 159.79 | 152.52 | 145.26 |
| NEW | | | 27184 | .4213 | | 10.700 | 12.0 | 155 | 106 | 90 | 45 | 215.11 | 205.76 | 196.40 | 187.05 |
| | 28978 | | | .4219 | 27/64" | 10.716 | 12.0 | 102 | 55 | 39 | 45 | 147.23 | 140.83 | 134.43 | 128.03 |
| | | 25838 | | .4219 | 27/64" | 10.716 | 12.0 | 118 | 71 | 55 | 45 | 167.05 | 159.79 | 152.52 | 145.26 |
| | | | 27186 | .4219 | 27/64" | 10.716 | 12.0 | 155 | 106 | 90 | 45 | 215.11 | 205.76 | 196.40 | 187.05 |
| | 28985 | | | .4252 | | 10.800 | 12.0 | 102 | 55 | 39 | 45 | 147.23 | 140.83 | 134.43 | 128.03 |
| | | 25845 | | .4252 | | 10.800 | 12.0 | 118 | 71 | 55 | 45 | 167.05 | 159.79 | 152.52 | 145.26 |
| | 28995 | | | .4331 | | 11.000 | 12.0 | 102 | 55 | 39 | 45 | 147.23 | 140.83 | 134.43 | 128.03 |
| | | 25855 | | .4331 | | 11.000 | 12.0 | 118 | 71 | 55 | 45 | 167.05 | 159.79 | 152.52 | 145.26 |
| | | | 27190 | .4331 | | 11.000 | 12.0 | 163 | 114 | 98 | 45 | 215.11 | 205.76 | 196.40 | 187.05 |
| | 29005 | | | .4370 | | 11.100 | 12.0 | 102 | 55 | 38 | 45 | 147.23 | 140.83 | 134.43 | 128.03 |
| | | 25865 | | .4370 | | 11.100 | 12.0 | 118 | 71 | 54 | 45 | 167.05 | 159.79 | 152.52 | 145.26 |
| | 29008 | | | .4375 | 7/16" | 11.112 | 12.0 | 102 | 55 | 38 | 45 | 147.23 | 140.83 | 134.43 | 128.03 |
| | | 25868 | | .4375 | 7/16" | 11.112 | 12.0 | 118 | 71 | 54 | 45 | 167.05 | 159.79 | 152.52 | 145.26 |
| | | | 27194 | .4375 | 7/16" | 11.112 | 12.0 | 163 | 114 | 97 | 45 | 215.11 | 205.76 | 196.40 | 187.05 |
| | 29015 | | | .4409 | | 11.200 | 12.0 | 102 | 55 | 38 | 45 | 147.23 | 140.83 | 134.43 | 128.03 |
| | | 25875 | | .4409 | | 11.200 | 12.0 | 118 | 71 | 54 | 45 | 167.05 | 159.79 | 152.52 | 145.26 |
| | 29025 | | | .4488 | | 11.400 | 12.0 | 102 | 55 | 38 | 45 | 147.23 | 140.83 | 134.43 | 128.03 |
| | | 25880 | | .4488 | | 11.400 | 12.0 | 118 | 71 | 54 | 45 | 167.05 | 159.79 | 152.52 | 145.26 |
| | 29035 | | | .4528 | | 11.500 | 12.0 | 102 | 55 | 38 | 45 | 147.23 | 140.83 | 134.43 | 128.03 |
| | | 25885 | | .4528 | | 11.500 | 12.0 | 118 | 71 | 54 | 45 | 167.05 | 159.79 | 152.52 | 145.26 |
| NEW | 29038 | | | .4531 | 29/64" | 11.508 | 12.0 | 102 | 55 | 38 | 45 | 147.23 | 140.83 | 134.43 | 128.03 |
| | | 25888 | | .4531 | 29/64" | 11.508 | 12.0 | 118 | 71 | 54 | 45 | 167.05 | 159.79 | 152.52 | 145.26 |
| | | | 27200 | .4531 | 29/64" | 11.508 | 12.0 | 163 | 114 | 97 | 45 | 215.11 | 205.76 | 196.40 | 187.05 |
| | 29045 | | | .4606 | | 11.700 | 12.0 | 102 | 55 | 37 | 45 | 147.23 | 140.83 | 134.43 | 128.03 |
| | | 25895 | | .4606 | | 11.700 | 12.0 | 118 | 71 | 53 | 45 | 167.05 | 159.79 | 152.52 | 145.26 |
| | 29055 | | | .4685 | | 11.900 | 12.0 | 102 | 55 | 37 | 45 | 147.23 | 140.83 | 134.43 | 128.03 |
| | 29058 | | | .4688 | 15/32" | 11.907 | 12.0 | 102 | 55 | 37 | 45 | 147.23 | 140.83 | 134.43 | 128.03 |
| | | 25910 | | .4688 | 15/32" | 11.907 | 12.0 | 118 | 71 | 53 | 45 | 167.05 | 159.79 | 152.52 | 145.26 |
| | | | 27208 | .4688 | 15/32" | 11.907 | 12.0 | 163 | 114 | 96 | 45 | 215.11 | 205.76 | 196.40 | 187.05 |

*continued* ⟶

# Series 1580KD, 1280KD, 1880KD *(continued)*

.4724" - .5610"
(12.000mm - 14.250mm)

| | 3xD (1580KD) EDP# | 5xD (1280KD) EDP# | 7xD (1880KD) EDP# | $d_1$ Diameter Decimal | | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | $l_5$ Max Drill Depth | $l_4$ Shank Length | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 29065 | | | .4724 | | 12.000 | 12.0 | 102 | 55 | 37 | 45 | 147.23 | 140.83 | 134.43 | 128.03 |
| | | 25915 | | .4724 | | 12.000 | 12.0 | 118 | 71 | 53 | 45 | 167.05 | 159.79 | 152.52 | 145.26 |
| NEW | | | 27210 | .4724 | | 12.000 | 12.0 | 163 | 114 | 96 | 45 | 215.11 | 205.76 | 196.40 | 187.05 |
| | 29075 | | | .4764 | | 12.100 | 14.0 | 107 | 60 | 42 | 45 | 205.67 | 196.72 | 187.78 | 178.84 |
| | | 25925 | | .4764 | | 12.100 | 14.0 | 124 | 77 | 59 | 45 | 246.47 | 235.75 | 225.04 | 214.32 |
| | 29085 | | | .4803 | | 12.200 | 14.0 | 107 | 60 | 42 | 45 | 205.67 | 196.72 | 187.78 | 178.84 |
| | | 25930 | | .4803 | | 12.200 | 14.0 | 124 | 77 | 59 | 45 | 246.47 | 235.75 | 225.04 | 214.32 |
| | 29095 | | | .4842 | | 12.300 | 14.0 | 107 | 60 | 42 | 45 | 205.67 | 196.72 | 187.78 | 178.84 |
| | | 25935 | | .4842 | | 12.300 | 14.0 | 124 | 77 | 59 | 45 | 246.47 | 235.75 | 225.04 | 214.32 |
| | 29098 | | | .4844 | 31/64" | 12.303 | 14.0 | 107 | 60 | 42 | 45 | 205.67 | 196.72 | 187.78 | 178.84 |
| | | 25937 | | .4844 | 31/64" | 12.303 | 14.0 | 124 | 77 | 59 | 45 | 246.47 | 235.75 | 225.04 | 214.32 |
| | | | 27214 | .4844 | 31/64" | 12.303 | 14.0 | 182 | 133 | 115 | 45 | 287.20 | 274.71 | 262.23 | 249.74 |
| | 29115 | | | .4921 | | 12.500 | 14.0 | 107 | 60 | 41 | 45 | 205.67 | 196.72 | 187.78 | 178.84 |
| | | 25945 | | .4921 | | 12.500 | 14.0 | 124 | 77 | 58 | 45 | 246.47 | 235.75 | 225.04 | 214.32 |
| | | | 27218 | .4921 | | 12.500 | 14.0 | 182 | 133 | 114 | 45 | 287.20 | 274.71 | 262.23 | 249.74 |
| | 29125 | | | .4961 | | 12.600 | 14.0 | 107 | 60 | 41 | 45 | 205.67 | 196.72 | 187.78 | 178.84 |
| | | 25950 | | .4961 | | 12.600 | 14.0 | 124 | 77 | 58 | 45 | 246.47 | 235.75 | 225.04 | 214.32 |
| | 29135 | | | .5000 | 1/2" | 12.700 | 14.0 | 107 | 60 | 41 | 45 | 205.67 | 196.72 | 187.78 | 178.84 |
| | | 25955 | | .5000 | 1/2" | 12.700 | 14.0 | 124 | 77 | 58 | 45 | 246.47 | 235.75 | 225.04 | 214.32 |
| | | | 27220 | .5000 | 1/2" | 12.700 | 14.0 | 182 | 133 | 114 | 45 | 287.20 | 274.71 | 262.23 | 249.74 |
| | 29145 | | | .5039 | | 12.800 | 14.0 | 107 | 60 | 41 | 45 | 205.67 | 196.72 | 187.78 | 178.84 |
| | | 25960 | | .5039 | | 12.800 | 14.0 | 124 | 77 | 58 | 45 | 246.47 | 235.75 | 225.04 | 214.32 |
| | 29148 | | | .5051 | | 12.830 | 14.0 | 107 | 60 | 41 | 45 | 205.67 | 196.72 | 187.78 | 178.84 |
| | | 25961 | | .5051 | | 12.830 | 14.0 | 124 | 77 | 58 | 45 | 246.47 | 235.75 | 225.04 | 214.32 |
| NEW | | | 27224 | .5051 | | 12.830 | 14.0 | 182 | 133 | 114 | 45 | 287.20 | 274.71 | 262.23 | 249.74 |
| | 29155 | | | .5079 | | 12.900 | 14.0 | 107 | 60 | 41 | 45 | 205.67 | 196.72 | 187.78 | 178.84 |
| NEW | | | 27226 | .5079 | | 12.900 | 14.0 | 182 | 133 | 114 | 45 | 287.20 | 274.71 | 262.23 | 249.74 |
| | 29161 | | | .5098 | | 12.950 | 14.0 | 107 | 60 | 41 | 45 | 197.75 | 189.16 | 180.56 | 171.96 |
| NEW | | | 27228 | .5098 | | 12.950 | 14.0 | 182 | 133 | 114 | 45 | 287.20 | 274.71 | 262.23 | 249.74 |
| | 29165 | | | .5118 | | 13.000 | 14.0 | 107 | 60 | 41 | 45 | 205.67 | 196.72 | 187.78 | 178.84 |
| | | 25965 | | .5118 | | 13.000 | 14.0 | 124 | 77 | 58 | 45 | 246.47 | 235.75 | 225.04 | 214.32 |
| | | | 27230 | .5118 | | 13.000 | 14.0 | 182 | 133 | 114 | 45 | 287.20 | 274.71 | 262.23 | 249.74 |
| | 29175 | | | .5157 | | 13.100 | 14.0 | 107 | 60 | 40 | 45 | 205.67 | 196.72 | 187.78 | 178.84 |
| | | 25975 | | .5157 | | 13.100 | 14.0 | 124 | 77 | 57 | 45 | 246.47 | 235.75 | 225.04 | 214.32 |
| | 29181 | | | .5236 | | 13.300 | 14.0 | 107 | 60 | 40 | 45 | 205.67 | 196.72 | 187.78 | 178.84 |
| | 29184 | | | .5312 | 17/32" | 13.492 | 14.0 | 107 | 60 | 40 | 45 | 205.67 | 196.72 | 187.78 | 178.84 |
| | | 25983 | | .5312 | 17/32" | 13.492 | 14.0 | 124 | 77 | 57 | 45 | 246.47 | 235.75 | 225.04 | 214.32 |
| | | | 27238 | .5312 | 17/32" | 13.492 | 14.0 | 182 | 133 | 113 | 45 | 287.20 | 274.71 | 262.23 | 249.74 |
| | 29185 | | | .5315 | | 13.500 | 14.0 | 107 | 60 | 40 | 45 | 205.67 | 196.72 | 187.78 | 178.84 |
| | | 25985 | | .5315 | | 13.500 | 14.0 | 124 | 77 | 57 | 45 | 246.47 | 235.75 | 225.04 | 214.32 |
| NEW | | | 27240 | .5315 | | 13.500 | 14.0 | 182 | 133 | 113 | 45 | 287.20 | 274.71 | 262.23 | 249.74 |
| | 29195 | | | .5394 | | 13.700 | 14.0 | 107 | 60 | 39 | 45 | 205.67 | 196.72 | 187.78 | 178.84 |
| | | 25995 | | .5394 | | 13.700 | 14.0 | 124 | 77 | 56 | 45 | 246.47 | 235.75 | 225.04 | 214.32 |
| | 29205 | | | .5433 | | 13.800 | 14.0 | 107 | 60 | 39 | 45 | 205.67 | 196.72 | 187.78 | 178.84 |
| | | 26005 | | .5433 | | 13.800 | 14.0 | 124 | 77 | 56 | 45 | 246.47 | 235.75 | 225.04 | 214.32 |
| | 29215 | | | .5512 | | 14.000 | 14.0 | 107 | 60 | 39 | 45 | 205.67 | 196.72 | 187.78 | 178.84 |
| | | 26015 | | .5512 | | 14.000 | 14.0 | 124 | 77 | 56 | 45 | 246.47 | 235.75 | 225.04 | 214.32 |
| | | | 27250 | .5512 | | 14.000 | 14.0 | 182 | 133 | 112 | 45 | 287.20 | 274.71 | 262.23 | 249.74 |
| | 29225 | | | .5551 | | 14.100 | 16.0 | 115 | 65 | 44 | 48 | 251.39 | 240.46 | 229.53 | 218.60 |
| | | 26025 | | .5551 | | 14.100 | 16.0 | 133 | 83 | 62 | 48 | 327.73 | 313.48 | 299.23 | 284.98 |
| | 29235 | | | .5591 | | 14.200 | 16.0 | 115 | 65 | 44 | 48 | 251.39 | 240.46 | 229.53 | 218.60 |
| | | 26027 | | .5591 | | 14.200 | 16.0 | 133 | 83 | 62 | 48 | 327.73 | 313.48 | 299.23 | 284.98 |
| | 29245 | | | .5610 | | 14.250 | 16.0 | 115 | 65 | 44 | 48 | 251.39 | 240.46 | 229.53 | 218.60 |



† *Metric equivalents are for reference only*

# Series 1580KD, 1280KD, 1880KD *(continued)*

.5625" - .7283"
(14.287mm - 18.500mm)

| | 3xD (1580KD) EDP# | 5xD (1280KD) EDP# | 7xD (1880KD) EDP# | $d_1$ Diameter Decimal | $d_1$ Diameter | $d_1$ Diameter Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | $l_5$ Max Drill Depth | $l_4$ Shank Length | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 29250 | | | .5625 | 9/16" | 14.287 | 16.0 | 115 | 65 | 44 | 48 | 251.39 | 240.46 | 229.53 | 218.60 |
| | | 26042 | | .5625 | 9/16" | 14.287 | 16.0 | 133 | 83 | 62 | 48 | 327.73 | 313.48 | 299.23 | 284.98 |
| | | | 27254 | .5625 | 9/16" | 14.287 | 16.0 | 204 | 152 | 131 | 48 | 379.91 | 363.40 | 346.88 | 330.36 |
| | 29255 | | | .5630 | | 14.300 | 16.0 | 115 | 65 | 44 | 48 | 251.39 | 240.46 | 229.53 | 218.60 |
| | | 26045 | | .5630 | | 14.300 | 16.0 | 133 | 83 | 62 | 48 | 327.73 | 313.48 | 299.23 | 284.98 |
| | 29265 | | | .5709 | | 14.500 | 16.0 | 115 | 65 | 43 | 48 | 251.39 | 240.46 | 229.53 | 218.60 |
| | | 26055 | | .5709 | | 14.500 | 16.0 | 133 | 83 | 61 | 48 | 327.73 | 313.48 | 299.23 | 284.98 |
| NEW | | | 27258 | .5709 | | 14.500 | 16.0 | 204 | 152 | 130 | 48 | 379.91 | 363.40 | 346.88 | 330.36 |
| | 29275 | | | .5787 | | 14.700 | 16.0 | 115 | 65 | 43 | 48 | 251.39 | 240.46 | 229.53 | 218.60 |
| | | 26065 | | .5787 | | 14.700 | 16.0 | 133 | 83 | 61 | 48 | 327.73 | 313.48 | 299.23 | 284.98 |
| | 29285 | | | .5827 | | 14.800 | 16.0 | 115 | 65 | 43 | 48 | 251.39 | 240.46 | 229.53 | 218.60 |
| | | 26067 | | .5827 | | 14.800 | 16.0 | 133 | 83 | 61 | 48 | 327.73 | 313.48 | 299.23 | 284.98 |
| | 29305 | | | .5906 | | 15.000 | 16.0 | 115 | 65 | 43 | 48 | 251.39 | 240.46 | 229.53 | 218.60 |
| | | 26075 | | .5906 | | 15.000 | 16.0 | 133 | 83 | 61 | 48 | 327.73 | 313.48 | 299.23 | 284.98 |
| | | | 27264 | .5906 | | 15.000 | 16.0 | 204 | 152 | 130 | 48 | 379.91 | 363.40 | 346.88 | 330.36 |
| NEW | 29308 | | | .5938 | 19/32" | 15.082 | 16.0 | 115 | 65 | 42 | 48 | 251.39 | 240.46 | 229.53 | 218.60 |
| | | 26083 | | .5938 | 19/32" | 15.082 | 16.0 | 133 | 83 | 60 | 48 | 327.73 | 313.48 | 299.23 | 284.98 |
| | | | 27266 | .5938 | 19/32" | 15.082 | 16.0 | 204 | 152 | 129 | 48 | 379.91 | 363.40 | 346.88 | 330.36 |
| | 29315 | | | .5945 | | 15.100 | 16.0 | 115 | 65 | 42 | 48 | 251.39 | 240.46 | 229.53 | 218.60 |
| | | 26085 | | .5945 | | 15.100 | 16.0 | 133 | 83 | 60 | 48 | 327.73 | 313.48 | 299.23 | 284.98 |
| NEW | | | 27268 | .5945 | | 15.100 | 16.0 | 204 | 152 | 129 | 48 | 379.91 | 363.40 | 346.88 | 330.36 |
| | 29325 | | | .6102 | | 15.500 | 16.0 | 115 | 65 | 42 | 48 | 251.39 | 240.46 | 229.53 | 218.60 |
| | | 26095 | | .6102 | | 15.500 | 16.0 | 133 | 83 | 60 | 48 | 327.73 | 313.48 | 299.23 | 284.98 |
| | | 26105 | | .6181 | | 15.700 | 16.0 | 133 | 83 | 59 | 48 | 327.73 | 313.48 | 299.23 | 284.98 |
| | 29345 | | | .6220 | | 15.800 | 16.0 | 115 | 65 | 41 | 48 | 251.39 | 240.46 | 229.53 | 218.60 |
| | | 26107 | | .6220 | | 15.800 | 16.0 | 133 | 83 | 59 | 48 | 327.73 | 313.48 | 299.23 | 284.98 |
| NEW | | | 27276 | .6220 | | 15.800 | 16.0 | 204 | 152 | 128 | 48 | 379.91 | 363.40 | 346.88 | 330.36 |
| | 29348 | | | .6250 | 5/8" | 15.875 | 16.0 | 115 | 65 | 41 | 48 | 251.39 | 240.46 | 229.53 | 218.60 |
| | | 26108 | | .6250 | 5/8" | 15.875 | 16.0 | 133 | 83 | 59 | 48 | 327.73 | 313.48 | 299.23 | 284.98 |
| NEW | | | 27278 | .6250 | 5/8" | 15.875 | 16.0 | 204 | 152 | 128 | 48 | 379.91 | 363.40 | 346.88 | 330.36 |
| | | 26115 | | .6299 | | 16.000 | 16.0 | 133 | 83 | 59 | 48 | 327.73 | 313.48 | 299.23 | 284.98 |
| NEW | | | 27282 | .6299 | | 16.000 | 16.0 | 204 | 152 | 128 | 48 | 379.91 | 363.40 | 346.88 | 330.36 |
| | 29363 | | | .6331 | | 16.080 | 18.0 | 123 | 73 | 49 | 48 | 317.85 | 304.03 | 290.21 | 276.39 |
| | | 26118 | | .6331 | | 16.080 | 18.0 | 143 | 93 | 69 | 48 | 389.62 | 372.68 | 355.74 | 338.80 |
| | 29365 | | | .6339 | | 16.100 | 18.0 | 123 | 73 | 49 | 48 | 317.85 | 304.03 | 290.21 | 276.39 |
| | | 26119 | | .6339 | | 16.100 | 18.0 | 143 | 93 | 69 | 48 | 389.62 | 372.68 | 355.74 | 338.80 |
| | | 26123 | | .6378 | | 16.200 | 18.0 | 143 | 93 | 69 | 48 | 389.62 | 372.68 | 355.74 | 338.80 |
| | 29375 | | | .6398 | | 16.250 | 18.0 | 123 | 73 | 49 | 48 | 317.85 | 304.03 | 290.21 | 276.39 |
| | | 26125 | | .6398 | | 16.250 | 18.0 | 143 | 93 | 69 | 48 | 389.62 | 372.68 | 355.74 | 338.80 |
| | 29385 | | | .6496 | | 16.500 | 18.0 | 123 | 73 | 48 | 48 | 317.85 | 304.03 | 290.21 | 276.39 |
| | | 26135 | | .6496 | | 16.500 | 18.0 | 143 | 93 | 68 | 48 | 389.62 | 372.68 | 355.74 | 338.80 |
| | 29395 | | | .6555 | | 16.650 | 18.0 | 123 | 73 | 48 | 48 | 317.85 | 304.03 | 290.21 | 276.39 |
| | | 26145 | | .6555 | | 16.650 | 18.0 | 143 | 93 | 68 | 48 | 389.62 | 372.68 | 355.74 | 338.80 |
| | 29405 | | | .6693 | | 17.000 | 18.0 | 123 | 73 | 48 | 48 | 317.85 | 304.03 | 290.21 | 276.39 |
| | | 26155 | | .6693 | | 17.000 | 18.0 | 143 | 93 | 68 | 48 | 389.62 | 372.68 | 355.74 | 338.80 |
| | 29415 | | | .6713 | | 17.050 | 18.0 | 123 | 73 | 47 | 48 | 317.85 | 304.03 | 290.21 | 276.39 |
| | | 26165 | | .6713 | | 17.050 | 18.0 | 143 | 93 | 67 | 48 | 389.62 | 372.68 | 355.74 | 338.80 |
| | 29425 | | | .6870 | | 17.450 | 18.0 | 123 | 73 | 47 | 48 | 317.85 | 304.03 | 290.21 | 276.39 |
| | | 26175 | | .6870 | | 17.450 | 18.0 | 143 | 93 | 67 | 48 | 389.62 | 372.68 | 355.74 | 338.80 |
| | 29435 | | | .6890 | | 17.500 | 18.0 | 123 | 73 | 47 | 48 | 317.85 | 304.03 | 290.21 | 276.39 |
| | | 26185 | | .6890 | | 17.500 | 18.0 | 143 | 93 | 67 | 48 | 389.62 | 372.68 | 355.74 | 338.80 |
| | 29445 | | | .7027 | | 17.850 | 18.0 | 123 | 73 | 46 | 48 | 317.85 | 304.03 | 290.21 | 276.39 |
| | | 26195 | | .7027 | | 17.850 | 18.0 | 143 | 93 | 66 | 48 | 389.62 | 372.68 | 355.74 | 338.80 |
| | 29455 | | | .7087 | | 18.000 | 18.0 | 123 | 73 | 46 | 48 | 317.85 | 304.03 | 290.21 | 276.39 |
| | | 26205 | | .7087 | | 18.000 | 18.0 | 143 | 93 | 66 | 48 | 389.62 | 372.68 | 355.74 | 338.80 |
| | | 26215 | | .7185 | | 18.250 | 20.0 | 153 | 101 | 74 | 50 | 472.93 | 452.36 | 431.80 | 411.24 |
| | | 26225 | | .7283 | | 18.500 | 20.0 | 153 | 101 | 73 | 50 | 472.93 | 452.36 | 431.80 | 411.24 |

*continued* ⟶

# Series 1580KD, 1280KD, 1880KD *(continued)*

.7342" - .7874"
(18.650mm - 20.000mm)

| 3xD (1580KD) EDP# | 5xD (1280KD) EDP# | 7xD (1880KD) EDP# | *d1* Diameter Decimal | | Metric | *d2* Shank Diameter | *l1* Overall Length | *l2* Flute Length | *l5* Max Drill Depth | *l4* Shank Length | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 26235 | | .7342 | | 18.650 | 20.0 | 153 | 101 | 73 | 50 | 472.93 | 452.36 | 431.80 | 411.24 |
| | 26245 | | .7480 | | 19.000 | 20.0 | 153 | 101 | 73 | 50 | 472.93 | 452.36 | 431.80 | 411.24 |
| 29505 | | | .7500 | 3/4" | 19.050 | 20.0 | 131 | 79 | 50 | 50 | 419.91 | 401.65 | 383.40 | 365.14 |
| | 26255 | | .7500 | 3/4" | 19.050 | 20.0 | 153 | 101 | 72 | 50 | 472.93 | 452.36 | 431.80 | 411.24 |
| 29545 | | | .7579 | | 19.250 | 20.0 | 131 | 79 | 50 | 50 | 419.91 | 401.65 | 383.40 | 365.14 |
| 29546 | | | .7590 | | 19.280 | 20.0 | 131 | 79 | 50 | 50 | 419.91 | 401.65 | 383.40 | 365.14 |
| | 26260 | | .7590 | | 19.280 | 20.0 | 153 | 101 | 72 | 50 | 472.93 | 452.36 | 431.80 | 411.24 |
| 29551 | | | .7598 | | 19.300 | 20.0 | 131 | 79 | 50 | 50 | 419.91 | 401.65 | 383.40 | 365.14 |
| | 26261 | | .7598 | | 19.300 | 20.0 | 153 | 101 | 72 | 50 | 472.93 | 452.36 | 431.80 | 411.24 |
| 29565 | | | .7677 | | 19.500 | 20.0 | 131 | 79 | 50 | 50 | 419.91 | 401.65 | 383.40 | 365.14 |
| | 26281 | | .7795 | | 19.800 | 20.0 | 153 | 101 | 71 | 50 | 472.93 | 452.36 | 431.80 | 411.24 |
| 29595 | | | .7815 | | 19.850 | 20.0 | 131 | 79 | 49 | 50 | 419.91 | 401.65 | 383.40 | 365.14 |
| 29605 | | | .7874 | | 20.000 | 20.0 | 131 | 79 | 49 | 50 | 419.91 | 401.65 | 383.40 | 365.14 |









† *Metric equivalents are for reference only*

# Series 1580KH, 1280KH, 1880KH

| TOLERANCES | | |
|---|---|---|
| $d$ | +.0000" –.0005" (+.0000 –.0127mm) | |
| $l_1$ | ≤ 1/8" | +.125" –.062" (+3.175 –1.588mm) |
| | > 1/8" | +.125" –.125" (+3.175 –3.175mm) |
| $l_2$ | ≤ 1/8" | +.125" –.062" (+3.175 –1.588mm) |
| | >1/8" | +.125" –.125" (+3.175 –3.175mm) |



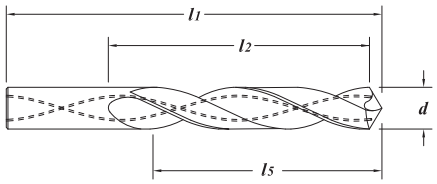

.1181" - .1540"
(3.000mm - 3.912mm)

Recommended for high nickel, high temperature alloys, cobalt-based alloys, stainless steels, and tool steels >40 Rc

**BALIQ® ALTINOS Coating (AlTiN-based)**

High performance - high penetration solid submicron grain carbide drill
Coolant through capabilities for high pressure coolant systems
Extended tool life and greater surface finish through faster SFM rates
Up to 70% faster than standard carbide drills
30° helix for better chip evacuation
Honed cutting edge
Live tooling recommended on lathe processes






| 3xD (1580KH) EDP# | 5xD (1280KH) EDP# | 7xD (1880KH) EDP# | $d$ † Diameter Decimal | Diameter | Metric | $l_1$ Overall Length | $l_2$ Flute Length | $l_5$ Max Drill Depth | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 22010 | | | .1181 | | 3.000 | 46 | 16 | 10 | 42.18 | 40.35 | 38.51 | 36.68 |
| | 25366 | | .1181 | | 3.000 | 50 | 19 | 16 | 46.66 | 44.63 | 42.60 | 40.57 |
| | | 26366 | .1181 | | 3.000 | 65 | 28 | 22 | 52.06 | 49.80 | 47.53 | 45.27 |
| 22015 | | | .1200 | #31 | 3.048 | 1-13/16" | 5/8" | .382" | 42.63 | 40.78 | 38.92 | 37.07 |
| | 25371 | | .1200 | #31 | 3.048 | 2" | 3/4" | .622" | 47.02 | 44.98 | 42.93 | 40.89 |
| | | 26371 | .1200 | #31 | 3.048 | 2-1/2" | 1-1/8" | .862" | 52.50 | 50.22 | 47.93 | 45.65 |
| 22020 | | | .1250 | 1/8" | 3.175 | 1-15/16" | 11/16" | .398" | 42.99 | 41.12 | 39.25 | 37.38 |
| | 25376 | | .1250 | 1/8" | 3.175 | 2" | 3/4" | .648" | 47.41 | 45.35 | 43.29 | 41.23 |
| | | 26376 | .1250 | 1/8" | 3.175 | 2-1/2" | 1-1/8" | .898" | 52.91 | 50.61 | 48.31 | 46.01 |
| 22025 | | | .1285 | #30 | 3.264 | 1-15/16" | 11/16" | .409" | 43.38 | 41.49 | 39.61 | 37.72 |
| | 25381 | | .1285 | #30 | 3.264 | 2-1/4" | 3/4" | .666" | 47.83 | 45.75 | 43.67 | 41.59 |
| | | 26381 | .1285 | #30 | 3.264 | 2-1/2" | 1-1/8" | .923" | 53.39 | 51.07 | 48.75 | 46.43 |
| 22030 | | | .1360 | #29 | 3.454 | 2-1/16" | 3/4" | .433" | 43.78 | 41.88 | 39.97 | 38.07 |
| | 25386 | | .1360 | #29 | 3.454 | 2-1/4" | 7/8" | .705" | 48.19 | 46.09 | 44.00 | 41.90 |
| | | 26386 | .1360 | #29 | 3.454 | 3" | 1-1/4" | .977" | 53.77 | 51.44 | 49.10 | 46.76 |
| 22035 | | | .1378 | | 3.500 | 52 | 19 | 11 | 44.23 | 42.31 | 40.38 | 38.46 |
| | 25391 | | .1378 | | 3.500 | 57 | 22 | 18 | 48.55 | 46.44 | 44.33 | 42.22 |
| | | 26391 | .1378 | | 3.500 | 75 | 32 | 25 | 54.20 | 51.84 | 49.49 | 47.13 |
| 22040 | | | .1405 | #28 | 3.569 | 2-1/16" | 3/4" | .447" | 44.63 | 42.69 | 40.75 | 38.81 |
| | 25396 | | .1405 | #28 | 3.569 | 2-1/4" | 7/8" | .728" | 48.96 | 46.83 | 44.70 | 42.57 |
| | | 26396 | .1405 | #28 | 3.569 | 3" | 1-1/4" | 1.009" | 54.64 | 52.26 | 49.89 | 47.51 |
| 22045 | | | .1406 | 9/64" | 3.571 | 2-1/16" | 3/4" | .447" | 45.02 | 43.07 | 41.11 | 39.15 |
| | 25401 | | .1406 | 9/64" | 3.571 | 2-1/4" | 7/8" | .729" | 49.38 | 47.23 | 45.09 | 42.94 |
| | | 26401 | .1406 | 9/64" | 3.571 | 3" | 1-1/4" | 1.010" | 55.10 | 52.70 | 50.31 | 47.91 |
| 22050 | | | .1440 | #27 | 3.658 | 2-1/16" | 3/4" | .458" | 45.43 | 43.45 | 41.48 | 39.50 |
| | 25406 | | .1440 | #27 | 3.658 | 2-1/4" | 7/8" | .746" | 49.70 | 47.54 | 45.38 | 43.22 |
| | | 26406 | .1440 | #27 | 3.658 | 3" | 1-3/8" | 1.034" | 55.48 | 53.06 | 50.65 | 48.24 |
| 22055 | | | .1470 | #26 | 3.734 | 2-3/16" | 13/16" | .468" | 45.77 | 43.78 | 41.79 | 39.80 |
| | 25411 | | .1470 | #26 | 3.734 | 2-1/4" | 7/8" | .762" | 50.13 | 47.95 | 45.77 | 43.59 |
| | | 26411 | .1470 | #26 | 3.734 | 3" | 1-3/8" | 1.056" | 55.94 | 53.50 | 51.07 | 48.64 |
| 22060 | | | .1495 | #25 | 3.797 | 2-3/16" | 13/16" | .476" | 46.24 | 44.23 | 42.22 | 40.21 |
| | 25416 | | .1495 | #25 | 3.797 | 2-1/4" | 15/16" | .775" | 50.51 | 48.31 | 46.12 | 43.92 |
| | | 26416 | .1495 | #25 | 3.797 | 3" | 1-3/8" | 1.074" | 56.37 | 53.92 | 51.47 | 49.02 |
| 22065 | | | .1520 | #24 | 3.861 | 2-3/16" | 13/16" | .484" | 46.62 | 44.59 | 42.57 | 40.54 |
| | 25421 | | .1520 | #24 | 3.861 | 2-1/4" | 15/16" | .788" | 50.86 | 48.65 | 46.44 | 44.23 |
| | | 26421 | .1520 | #24 | 3.861 | 3" | 1-1/2" | 1.092" | 56.76 | 54.30 | 51.83 | 49.36 |
| 22070 | | | .1540 | #23 | 3.912 | 2-3/16" | 13/16" | .490" | 47.02 | 44.98 | 42.93 | 40.89 |
| | 25426 | | .1540 | #23 | 3.912 | 2-1/4" | 15/16" | .798" | 51.29 | 49.06 | 46.83 | 44.60 |
| | | 26426 | .1540 | #23 | 3.912 | 3" | 1-1/2" | 1.106" | 57.24 | 54.75 | 52.26 | 49.77 |

*continued* ⟶

# Series 1580KH, 1280KH, 1880KH *(continued)*

.1562" - .1935"
(3.967mm - 4.915mm)

| 3xD (1580KH) EDP# | 5xD (1280KH) EDP# | 7xD (1880KH) EDP# | Decimal | *d* † Diameter | Metric | *l1* Overall Length | *l2* Flute Length | *l5* Max Drill Depth | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 22075 | | | .1562 | 5/32" | 3.967 | 2-3/16" | 13/16" | .497" | 47.40 | 45.34 | 43.28 | 41.22 |
| | 25431 | | .1562 | 5/32" | 3.967 | 2-1/2" | 15/16" | .809" | 51.66 | 49.41 | 47.17 | 44.92 |
| | | 26431 | .1562 | 5/32" | 3.967 | 3" | 1-1/2" | 1.122" | 57.65 | 55.14 | 52.64 | 50.13 |
| 22080 | | | .1570 | #22 | 3.988 | 2-3/16" | 13/16" | .500" | 47.83 | 45.75 | 43.67 | 41.59 |
| | 25436 | | .1570 | #22 | 3.988 | 2-1/2" | 15/16" | .814" | 52.01 | 49.75 | 47.49 | 45.23 |
| | | 26436 | .1570 | #22 | 3.988 | 3" | 1-1/2" | 1.128" | 58.05 | 55.53 | 53.00 | 50.48 |
| 22085 | | | .1575 | | 4.000 | 56 | 21 | 13 | 48.21 | 46.11 | 44.02 | 41.92 |
| | 25441 | | .1575 | | 4.000 | 65 | 24 | 21 | 52.43 | 50.15 | 47.87 | 45.59 |
| | | 26441 | .1575 | | 4.000 | 75 | 38 | 29 | 58.50 | 55.96 | 53.41 | 50.87 |
| 22090 | | | .1590 | #21 | 4.039 | 2-3/16" | 13/16" | .506" | 48.66 | 46.54 | 44.43 | 42.31 |
| | 25446 | | .1590 | #21 | 4.039 | 2-1/2" | 15/16" | .824" | 52.79 | 50.49 | 48.20 | 45.90 |
| | | 26446 | .1590 | #21 | 4.039 | 3" | 1-1/2" | 1.142" | 58.88 | 56.32 | 53.76 | 51.20 |
| 22095 | | | .1610 | #20 | 4.089 | 2-3/16" | 13/16" | .512" | 49.05 | 46.92 | 44.78 | 42.65 |
| | 25451 | | .1610 | #20 | 4.089 | 2-1/2" | 15/16" | .834" | 53.19 | 50.88 | 48.56 | 46.25 |
| | | 26451 | .1610 | #20 | 4.089 | 3" | 1-1/2" | 1.156" | 59.34 | 56.76 | 54.18 | 51.60 |
| 22100 | | | .1660 | #19 | 4.216 | 2-9/32" | 15/16" | .528" | 49.47 | 47.32 | 45.17 | 43.02 |
| | 25456 | | .1660 | #19 | 4.216 | 2-1/2" | 1" | .860" | 53.59 | 51.26 | 48.93 | 46.60 |
| | | 26456 | .1660 | #19 | 4.216 | 3" | 1-1/2" | 1.192" | 59.80 | 57.20 | 54.60 | 52.00 |
| 22105 | | | .1695 | #18 | 4.305 | 2-9/32" | 15/16" | .539" | 49.88 | 47.71 | 45.54 | 43.37 |
| | 25461 | | .1695 | #18 | 4.305 | 2-1/2" | 1" | .878" | 53.98 | 51.63 | 49.29 | 46.94 |
| | | 26461 | .1695 | #18 | 4.305 | 3-1/2" | 1-3/4" | 1.217" | 60.20 | 57.59 | 54.97 | 52.35 |
| 22110 | | | .1719 | 11/64" | 4.366 | 2-9/32" | 15/16" | .547" | 50.28 | 48.09 | 45.91 | 43.72 |
| | 25466 | | .1719 | 11/64" | 4.366 | 2-1/2" | 1" | .891" | 54.35 | 51.99 | 49.62 | 47.26 |
| | | 26466 | .1719 | 11/64" | 4.366 | 3-1/2" | 1-3/4" | 1.235" | 60.63 | 57.99 | 55.36 | 52.72 |
| 22115 | | | .1730 | #17 | 4.394 | 2-9/32" | 15/16" | .551" | 50.69 | 48.49 | 46.28 | 44.08 |
| | 25471 | | .1730 | #17 | 4.394 | 2-1/2" | 1" | .897" | 54.71 | 52.33 | 49.95 | 47.57 |
| | | 26471 | .1730 | #17 | 4.394 | 3-1/2" | 1-3/4" | 1.243" | 61.03 | 58.38 | 55.72 | 53.07 |
| 22120 | | | .1770 | #16 | 4.496 | 2-9/32" | 15/16" | .563" | 51.04 | 48.82 | 46.60 | 44.38 |
| | 25476 | | .1770 | #16 | 4.496 | 2-1/2" | 1" | .917" | 55.11 | 52.71 | 50.32 | 47.92 |
| | | 26476 | .1770 | #16 | 4.496 | 3-1/2" | 1-3/4" | 1.271" | 61.51 | 58.84 | 56.16 | 53.49 |
| 22125 | | | .1772 | | 4.500 | 58 | 24 | 14 | 51.49 | 49.25 | 47.01 | 44.77 |
| | 25481 | | .1772 | | 4.500 | 65 | 25 | 23 | 55.52 | 53.11 | 50.69 | 48.28 |
| | | 26481 | .1772 | | 4.500 | 88 | 45 | 32 | 61.95 | 59.26 | 56.56 | 53.87 |
| 22130 | | | .1800 | #15 | 4.572 | 2-9/32" | 15/16" | .573" | 51.81 | 49.56 | 47.30 | 45.05 |
| | 25486 | | .1800 | #15 | 4.572 | 2-3/4" | 1" | .933" | 55.89 | 53.46 | 51.03 | 48.60 |
| | | 26486 | .1800 | #15 | 4.572 | 3-1/2" | 1-3/4" | 1.293" | 62.35 | 59.64 | 56.93 | 54.22 |
| 22135 | | | .1820 | #14 | 4.623 | 2-9/32" | 15/16" | .579" | 52.31 | 50.04 | 47.76 | 45.49 |
| | 25491 | | .1820 | #14 | 4.623 | 2-3/4" | 1" | .913" | 56.25 | 53.80 | 51.36 | 48.91 |
| | | 26491 | .1820 | #14 | 4.623 | 3-1/2" | 1-3/4" | 1.307" | 62.76 | 60.03 | 57.30 | 54.57 |
| 22140 | | | .1850 | #13 | 4.699 | 2-9/32" | 15/16" | .589" | 52.68 | 50.39 | 48.10 | 45.81 |
| | 25496 | | .1850 | #13 | 4.699 | 2-3/4" | 1-1/4" | .959" | 56.65 | 54.19 | 51.72 | 49.26 |
| | | 26496 | .1850 | #13 | 4.699 | 3-1/2" | 1-3/4" | 1.329" | 63.20 | 60.46 | 57.71 | 54.96 |
| 22145 | | | .1875 | 3/16" | 4.763 | 2-13/32" | 1" | .597" | 53.11 | 50.80 | 48.49 | 46.18 |
| | 25501 | | .1875 | 3/16" | 4.763 | 2-3/4" | 1-1/4" | .972" | 57.06 | 54.58 | 52.10 | 49.62 |
| | | 26501 | .1875 | 3/16" | 4.763 | 4" | 2" | 1.347" | 63.69 | 60.92 | 58.15 | 55.38 |
| 22150 | | | .1890 | #12 | 4.801 | 2-13/32" | 1" | .601" | 53.49 | 51.16 | 48.84 | 46.51 |
| | 25506 | | .1890 | #12 | 4.801 | 2-3/4" | 1-1/4" | .979" | 57.42 | 54.92 | 52.43 | 49.93 |
| | | 26506 | .1890 | #12 | 4.801 | 4" | 2" | 1.357" | 64.07 | 61.28 | 58.50 | 55.71 |
| 22155 | | | .1910 | #11 | 4.851 | 2-13/32" | 1" | .608" | 53.98 | 51.63 | 49.29 | 46.94 |
| | 25511 | | .1910 | #11 | 4.851 | 2-3/4" | 1-1/4" | .990" | 57.79 | 55.28 | 52.76 | 50.25 |
| | | 26511 | .1910 | #11 | 4.851 | 4" | 2" | 1.372" | 64.49 | 61.69 | 58.88 | 56.08 |
| 22160 | | | .1935 | #10 | 4.915 | 2-13/32" | 1" | .616" | 54.29 | 51.93 | 49.57 | 47.21 |
| | 25516 | | .1935 | #10 | 4.915 | 2-3/4" | 1-1/4" | 1.003" | 58.22 | 55.69 | 53.16 | 50.63 |
| | | 26516 | .1935 | #10 | 4.915 | 4" | 2" | 1.390" | 64.94 | 62.12 | 59.29 | 56.47 |



† *Metric equivalents are for reference only*

.1960" - .2420"
(4.978mm - 6.147mm)

| 3xD (1580KH) EDP# | 5xD (1280KH) EDP# | 7xD (1880KH) EDP# | Decimal | *d* † Diameter | Metric | *l1* Overall Length | *l2* Flute Length | *l5* Max Drill Depth | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 22165 | | | .1960 | #9 | 4.978 | 2-13/32" | 1" | .624" | 54.69 | 52.32 | 49.94 | 47.56 |
| | 25521 | | .1960 | #9 | 4.978 | 3" | 1-5/16" | 1.016" | 58.56 | 56.01 | 53.47 | 50.92 |
| | | 26521 | .1960 | #9 | 4.978 | 4" | 2" | 1.408" | 65.32 | 62.48 | 59.64 | 56.80 |
| 22170 | | | .1969 | | 5.000 | 61 | 25 | 16 | 55.00 | 52.61 | 50.22 | 47.83 |
| | 25526 | | .1969 | | 5.000 | 75 | 33 | 26 | 58.96 | 56.40 | 53.83 | 51.27 |
| | | 26526 | .1969 | | 5.000 | 100 | 50 | 36 | 65.78 | 62.92 | 60.06 | 57.20 |
| 22175 | | | .1990 | #8 | 5.055 | 2-13/32" | 1" | .633" | 55.51 | 53.10 | 50.68 | 48.27 |
| | 25531 | | .1990 | #8 | 5.055 | 3" | 1-5/16" | 1.031" | 59.26 | 56.68 | 54.11 | 51.53 |
| | | 26531 | .1990 | #8 | 5.055 | 4" | 2" | 1.429" | 66.11 | 63.24 | 60.36 | 57.49 |
| 22180 | | | .2010 | #7 | 5.105 | 2-13/32" | 1" | .640" | 55.67 | 53.25 | 50.83 | 48.41 |
| | 25536 | | .2010 | #7 | 5.105 | 3" | 1-5/16" | 1.042" | 59.52 | 56.94 | 54.35 | 51.76 |
| | | 26536 | .2010 | #7 | 5.105 | 4" | 2" | 1.444" | 66.41 | 63.53 | 60.64 | 57.75 |
| 22185 | | | .2031 | 13/64" | 5.159 | 2-13/32" | 1" | .646" | 56.04 | 53.60 | 51.17 | 48.73 |
| | 25541 | | .2031 | 13/64" | 5.159 | 3" | 1-5/16" | 1.053" | 59.96 | 57.35 | 54.75 | 52.14 |
| | | 26541 | .2031 | 13/64" | 5.159 | 4" | 2" | 1.459" | 66.91 | 64.00 | 61.09 | 58.18 |
| 22190 | | | .2040 | #6 | 5.182 | 2-13/32" | 1" | .649" | 56.43 | 53.98 | 51.52 | 49.07 |
| | 25546 | | .2040 | #6 | 5.182 | 3" | 1-3/8" | 1.057" | 60.41 | 57.78 | 55.16 | 52.53 |
| | | 26546 | .2040 | #6 | 5.182 | 4" | 2" | 1.465" | 67.39 | 64.46 | 61.53 | 58.60 |
| 22195 | | | .2055 | #5 | 5.220 | 2-13/32" | 1" | .654" | 56.82 | 54.35 | 51.88 | 49.41 |
| | 25551 | | .2055 | #5 | 5.220 | 3" | 1-3/8" | 1.065" | 60.80 | 58.16 | 55.51 | 52.87 |
| | | 26551 | .2055 | #5 | 5.220 | 4" | 2" | 1.476" | 67.85 | 64.90 | 61.95 | 59.00 |
| 22200 | | | .2090 | #4 | 5.309 | 2-13/32" | 1" | .665" | 57.19 | 54.70 | 52.22 | 49.73 |
| | 25556 | | .2090 | #4 | 5.309 | 3" | 1-3/8" | 1.083" | 61.23 | 58.56 | 55.90 | 53.24 |
| | | 26556 | .2090 | #4 | 5.309 | 4" | 2" | 1.501" | 68.30 | 65.33 | 62.36 | 59.39 |
| 22205 | | | .2130 | #3 | 5.410 | 2-5/8" | 1-3/32" | .678" | 57.57 | 55.07 | 52.56 | 50.06 |
| | 25561 | | .2130 | #3 | 5.410 | 3" | 1-3/8" | 1.104" | 61.62 | 58.94 | 56.26 | 53.58 |
| | | 26561 | .2130 | #3 | 5.410 | 4" | 2" | 1.530" | 68.76 | 65.77 | 62.78 | 59.79 |
| 22210 | | | .2165 | | 5.500 | 67 | 28 | 18 | 57.94 | 55.42 | 52.90 | 50.38 |
| | 25566 | | .2165 | | 5.500 | 75 | 35 | 29 | 62.00 | 59.30 | 56.61 | 53.91 |
| | | 26566 | .2165 | | 5.500 | 100 | 50 | 40 | 69.17 | 66.17 | 63.16 | 60.15 |
| 22215 | | | .2188 | 7/32" | 5.558 | 2-5/8" | 1-3/32" | .696" | 58.42 | 55.88 | 53.34 | 50.80 |
| | 25571 | | .2188 | 7/32" | 5.558 | 3" | 1-3/8" | 1.134" | 62.13 | 59.43 | 56.73 | 54.03 |
| | | 26571 | .2188 | 7/32" | 5.558 | 4" | 2" | 1.571" | 69.59 | 66.56 | 63.54 | 60.51 |
| 22220 | | | .2210 | #2 | 5.613 | 2-5/8" | 1-3/32" | .703" | 58.83 | 56.28 | 53.72 | 51.16 |
| | 25576 | | .2210 | #2 | 5.613 | 3" | 1-3/8" | 1.145" | 63.19 | 60.45 | 57.70 | 54.95 |
| | | 26576 | .2210 | #2 | 5.613 | 4" | 2" | 1.587" | 70.68 | 67.61 | 64.53 | 61.46 |
| 22225 | | | .2280 | #1 | 5.791 | 2-5/8" | 1-3/32" | .726" | 59.27 | 56.69 | 54.12 | 51.54 |
| | 25581 | | .2280 | #1 | 5.791 | 3" | 1-3/8" | 1.182" | 63.42 | 60.67 | 57.91 | 55.15 |
| | | 26581 | .2280 | #1 | 5.791 | 4-1/8" | 2-1/8" | 1.638" | 80.98 | 77.46 | 73.94 | 70.42 |
| 22230 | | | .2340 | A | 5.944 | 2-5/8" | 1-3/32" | .745" | 59.70 | 57.10 | 54.51 | 51.91 |
| | 25586 | | .2340 | A | 5.944 | 3-1/4" | 1-1/2" | 1.213" | 71.17 | 68.08 | 64.98 | 61.89 |
| | | 26586 | .2340 | A | 5.944 | 4-1/8" | 2-1/8" | 1.681" | 85.50 | 81.79 | 78.07 | 74.35 |
| 22235 | | | .2344 | 15/64" | 5.954 | 2-5/8" | 1-3/32" | .746" | 60.13 | 57.52 | 54.90 | 52.29 |
| | 25591 | | .2344 | 15/64" | 5.954 | 3-1/4" | 1-1/2" | 1.215" | 71.30 | 68.20 | 65.10 | 62.00 |
| | | 26591 | .2344 | 15/64" | 5.954 | 4-1/8" | 2-1/8" | 1.684" | 85.63 | 81.91 | 78.18 | 74.46 |
| 22240 | | | .2362 | | 6.000 | 67 | 28 | 19 | 60.57 | 57.94 | 55.30 | 52.67 |
| | 25596 | | .2362 | | 6.000 | 80 | 38 | 31 | 71.50 | 68.39 | 65.28 | 62.17 |
| | | 26596 | .2362 | | 6.000 | 105 | 55 | 43 | 85.82 | 82.09 | 78.36 | 74.63 |
| 22245 | | | .2380 | B | 6.045 | 2-3/4" | 1-7/32" | .757" | 63.97 | 61.19 | 58.41 | 55.63 |
| | 25601 | | .2380 | B | 6.045 | 3-1/4" | 1-5/8" | 1.233" | 73.76 | 70.55 | 67.35 | 64.14 |
| | | 26601 | .2380 | B | 6.045 | 4-1/8" | 2-1/8" | 1.709" | 89.07 | 85.20 | 81.32 | 77.45 |
| 22250 | | | .2420 | C | 6.147 | 2-3/4" | 1-7/32" | .770" | 64.50 | 61.70 | 58.89 | 56.09 |
| | 25606 | | .2420 | C | 6.147 | 3-1/4" | 1-5/8" | 1.254" | 74.11 | 70.88 | 67.66 | 64.44 |
| | | 26606 | .2420 | C | 6.147 | 4-1/4" | 2-1/4" | 1.738" | 89.41 | 85.53 | 81.64 | 77.75 |

*continued* ⟶

# Series 1580KH, 1280KH, 1880KH *(continued)*

.2460" - .3125"
(6.248mm - 7.938mm)

| 3xD (1580KH) EDP# | 5xD (1280KH) EDP# | 7xD (1880KH) EDP# | Decimal | *d* † Diameter | Metric | *l1* Overall Length | *l2* Flute Length | *l5* Max Drill Depth | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 22255 | | | .2460 | D | 6.248 | 2-3/4" | 1-7/32" | .783" | 64.86 | 62.04 | 59.22 | 56.40 |
| | 25611 | | .2460 | D | 6.248 | 3-1/4" | 1-5/8" | 1.275" | 74.43 | 71.19 | 67.96 | 64.72 |
| | | 26611 | .2460 | D | 6.248 | 4-1/4" | 2-1/4" | 1.767" | 89.75 | 85.84 | 81.94 | 78.04 |
| 22260 | | | .2500 | 1/4" / E | 6.350 | 2-3/4" | 1-7/32" | .796" | 65.40 | 62.56 | 59.71 | 56.87 |
| | 25616 | | .2500 | 1/4" / E | 6.350 | 3-1/4" | 1-5/8" | 1.296" | 74.75 | 71.50 | 68.25 | 65.00 |
| | | 26616 | .2500 | 1/4" / E | 6.350 | 4-1/4" | 2-1/4" | 1.796" | 90.07 | 86.15 | 82.24 | 78.32 |
| 22265 | | | .2559 | | 6.500 | 70 | 31 | 21 | 66.47 | 63.58 | 60.69 | 57.80 |
| | 25621 | | .2559 | | 6.500 | 80 | 41 | 34 | 75.67 | 72.38 | 69.09 | 65.80 |
| | | 26621 | .2559 | | 6.500 | 105 | 58 | 47 | 91.01 | 87.05 | 83.10 | 79.14 |
| 22270 | | | .2570 | F | 6.528 | 2-3/4" | 1-7/32" | .818" | 67.49 | 64.56 | 61.62 | 58.69 |
| | 25626 | | .2570 | F | 6.528 | 3-1/4" | 1-11/16" | 1.332" | 77.42 | 74.05 | 70.69 | 67.32 |
| | | 26626 | .2570 | F | 6.528 | 4-3/8" | 2-3/8" | 1.846" | 94.51 | 90.40 | 86.29 | 82.18 |
| 22275 | | | .2610 | G | 6.629 | 2-3/4" | 1-7/32" | .831" | 68.52 | 65.54 | 62.56 | 59.58 |
| | 25631 | | .2610 | G | 6.629 | 3-1/2" | 1-11/16" | 1.353" | 78.37 | 74.97 | 71.56 | 68.15 |
| | | 26631 | .2610 | G | 6.629 | 4-3/8" | 2-3/8" | 1.875" | 95.48 | 91.33 | 87.18 | 83.03 |
| 22280 | | | .2656 | 17/64" | 6.746 | 2-15/16" | 1-11/32" | .845" | 69.58 | 66.55 | 63.53 | 60.50 |
| | 25636 | | .2656 | 17/64" | 6.746 | 3-1/2" | 1-11/16" | 1.376" | 79.28 | 75.83 | 72.39 | 68.94 |
| | | 26636 | .2656 | 17/64" | 6.746 | 4-3/8" | 2-3/8" | 1.908" | 96.40 | 92.21 | 88.02 | 83.83 |
| 22285 | | | .2660 | H | 6.756 | 2-15/16" | 1-11/32" | .846" | 70.60 | 67.53 | 64.46 | 61.39 |
| | 25641 | | .2660 | H | 6.756 | 3-1/2" | 1-11/16" | 1.378" | 80.22 | 76.74 | 73.25 | 69.76 |
| | | 26641 | .2660 | H | 6.756 | 4-3/8" | 2-3/8" | 1.910" | 97.42 | 93.18 | 88.95 | 84.71 |
| 22290 | | | .2720 | I | 6.909 | 2-15/16" | 1-11/32" | .866" | 71.63 | 68.52 | 65.40 | 62.29 |
| | 25646 | | .2720 | I | 6.909 | 3-1/2" | 1-11/16" | 1.410" | 80.33 | 76.84 | 73.34 | 69.85 |
| | | 26646 | .2720 | I | 6.909 | 4-3/8" | 2-3/8" | 1.954" | 97.51 | 93.27 | 89.03 | 84.79 |
| 22295 | | | .2756 | | 7.000 | 75 | 34 | 22 | 72.67 | 69.51 | 66.35 | 63.19 |
| | 25651 | | .2756 | | 7.000 | 88 | 43 | 36 | 81.24 | 77.70 | 74.17 | 70.64 |
| | | 26651 | .2756 | | 7.000 | 110 | 61 | 50 | 98.44 | 94.16 | 89.88 | 85.60 |
| 22300 | | | .2770 | J | 7.036 | 2-15/16" | 1-11/32" | .881" | 73.67 | 70.47 | 67.26 | 64.06 |
| | 25656 | | .2770 | J | 7.036 | 3-1/2" | 1-11/16" | 1.435" | 85.34 | 81.63 | 77.92 | 74.21 |
| | | 26656 | .2770 | J | 7.036 | 4-3/8" | 2-3/8" | 1.989" | 103.42 | 98.92 | 94.43 | 89.93 |
| 22305 | | | .2810 | K | 7.137 | 2-15/16" | 1-11/32" | .894" | 74.77 | 71.52 | 68.27 | 65.02 |
| | 25661 | | .2810 | K | 7.137 | 3-1/2" | 1-3/4" | 1.456" | 86.30 | 82.54 | 78.79 | 75.04 |
| | | 26661 | .2810 | K | 7.137 | 4-7/16" | 2-7/16" | 2.018" | 104.40 | 99.86 | 95.32 | 90.78 |
| 22310 | | | .2812 | 9/32" | 7.142 | 2-15/16" | 1-11/32" | .895" | 75.81 | 72.51 | 69.22 | 65.92 |
| | 25666 | | .2812 | 9/32" | 7.142 | 3-1/2" | 1-3/4" | 1.457" | 87.23 | 83.44 | 79.64 | 75.85 |
| | | 26666 | .2812 | 9/32" | 7.142 | 4-7/16" | 2-7/16" | 2.020" | 105.36 | 100.78 | 96.20 | 91.62 |
| 22315 | | | .2900 | L | 7.366 | 2-15/16" | 1-11/32" | .923" | 76.82 | 73.48 | 70.14 | 66.80 |
| | 25671 | | .2900 | L | 7.366 | 3-1/2" | 1-3/4" | 1.503" | 87.62 | 83.81 | 80.00 | 76.19 |
| | | 26671 | .2900 | L | 7.366 | 4-7/16" | 2-7/16" | 2.083" | 105.77 | 101.17 | 96.57 | 91.97 |
| 22320 | | | .2950 | M | 7.493 | 2-15/16" | 1-11/32" | .939" | 78.30 | 74.90 | 71.49 | 68.09 |
| | 25676 | | .2950 | M | 7.493 | 3-3/4" | 1-3/4" | 1.529" | 88.14 | 84.30 | 80.47 | 76.64 |
| | | 26676 | .2950 | M | 7.493 | 4-7/16" | 2-7/16" | 2.119" | 106.28 | 101.66 | 97.04 | 92.42 |
| 22325 | | | .2953 | | 7.500 | 75 | 34 | 24 | 78.30 | 74.90 | 71.49 | 68.09 |
| | 25681 | | .2953 | | 7.500 | 95 | 44 | 39 | 88.14 | 84.30 | 80.47 | 76.64 |
| | | 26681 | .2953 | | 7.500 | 115 | 66 | 54 | 106.28 | 101.66 | 97.04 | 92.42 |
| 22330 | | | .2969 | 19/64" | 7.541 | 3-3/32" | 1-15/32" | .945" | 78.97 | 75.54 | 72.10 | 68.67 |
| | 25686 | | .2969 | 19/64" | 7.541 | 3-3/4" | 1-7/8" | 1.539" | 94.15 | 90.06 | 85.96 | 81.87 |
| | | 26686 | .2969 | 19/64" | 7.541 | 4-9/16" | 2-9/16" | 2.132" | 114.75 | 109.76 | 104.77 | 99.78 |
| 22335 | | | .3020 | N | 7.671 | 3-3/32" | 1-15/32" | .961" | 82.55 | 78.96 | 75.37 | 71.78 |
| | 25691 | | .3020 | N | 7.671 | 3-3/4" | 1-7/8" | 1.565" | 96.27 | 92.08 | 87.90 | 83.71 |
| | | 26691 | .3020 | N | 7.671 | 4-9/16" | 2-9/16" | 2.169" | 116.97 | 111.88 | 106.80 | 101.71 |
| 22340 | | | .3125 | 5/16" | 7.938 | 3-3/32" | 1-15/32" | .994" | 82.83 | 79.23 | 75.63 | 72.03 |
| | 25696 | | .3125 | 5/16" | 7.938 | 3-3/4" | 1-7/8" | 1.619" | 96.49 | 92.29 | 88.10 | 83.90 |
| | | 26696 | .3125 | 5/16" | 7.938 | 4-11/16" | 2-9/16" | 2.244" | 117.17 | 112.08 | 106.98 | 101.89 |



† *Metric equivalents are for reference only*

# Series 1580KH, 1280KH, 1880KH *(continued)*

| TOLERANCES | | |
|---|---|---|
| *d* | +.0000" –.0005" (+.0000 –.0127mm) | |
| $l_1$ | ≤ 1/8" | +.125" –.062" (+3.175 –1.588mm) |
| | > 1/8" | +.125" –.125" (+3.175 –3.175mm) |
| $l_2$ | ≤ 1/8" | +.125" –.062" (+3.175 –1.588mm) |
| | >1/8" | +.125" –.125" (+3.175 –3.175mm) |




.3150" - .3750"
(8.000mm - 9.525mm)

Recommended for high nickel, high temperature alloys, cobalt-based alloys, stainless steels, and tool steels >40 Rc

## BALIQ® ALTINOS Coating (AlTiN-based)

High performance - high penetration solid submicron grain carbide drill



| 3xD (1580KH) EDP# | 5xD (1280KH) EDP# | 7xD (1880KH) EDP# | *d* † Diameter Decimal | Diameter | Metric | $l_1$ Overall Length | $l_2$ Flute Length | $l_5$ Max Drill Depth | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 22345 | | | .3150 | | 8.000 | 79 | 37 | 25 | 84.39 | 80.72 | 77.05 | 73.38 |
| | 25701 | | .3150 | | 8.000 | 95 | 48 | 41 | 100.54 | 96.17 | 91.80 | 87.43 |
| | | 26701 | .3150 | | 8.000 | 120 | 69 | 57 | 121.37 | 116.09 | 110.82 | 105.54 |
| 22350 | | | .3160 | O | 8.026 | 3-3/32" | 1-15/32" | 1.006" | 84.39 | 80.72 | 77.05 | 73.38 |
| | 25706 | | .3160 | O | 8.026 | 3-3/4" | 1-7/8" | 1.638" | 101.46 | 97.05 | 92.64 | 88.23 |
| | | 26706 | .3160 | O | 8.026 | 4-11/16" | 2-11/16" | 2.270" | 123.42 | 118.05 | 112.69 | 107.32 |
| 22355 | | | .3230 | P | 8.204 | 3-3/32" | 1-15/32" | 1.028" | 85.00 | 81.30 | 77.61 | 73.91 |
| | 25711 | | .3230 | P | 8.204 | 3-3/4" | 2-3/32" | 1.674" | 101.73 | 97.31 | 92.88 | 88.46 |
| | | 26711 | .3230 | P | 8.204 | 4-11/16" | 2-11/16" | 2.320" | 123.68 | 118.31 | 112.93 | 107.55 |
| 22360 | | | .3281 | 21/64" | 8.334 | 3-3/32" | 1-15/32" | 1.044" | 86.60 | 82.83 | 79.07 | 75.30 |
| | 25716 | | .3281 | 21/64" | 8.334 | 4" | 2-3/32" | 1.700" | 102.40 | 97.94 | 93.49 | 89.04 |
| | | 26716 | .3281 | 21/64" | 8.334 | 4-11/16" | 2-11/16" | 2.356" | 124.37 | 118.97 | 113.56 | 108.15 |
| 22365 | | | .3320 | Q | 8.433 | 3-3/32" | 1-15/32" | 1.056" | 88.14 | 84.30 | 80.47 | 76.64 |
| | 25721 | | .3320 | Q | 8.433 | 4" | 2-3/32" | 1.720" | 102.98 | 98.51 | 94.03 | 89.55 |
| | | 26721 | .3320 | Q | 8.433 | 4-15/16" | 2-15/16" | 2.384" | 124.99 | 119.56 | 114.12 | 108.69 |
| 22370 | | | .3346 | | 8.500 | 79 | 37 | 27 | 88.49 | 84.65 | 80.80 | 76.95 |
| | 25726 | | .3346 | | 8.500 | 100 | 53 | 44 | 103.52 | 99.02 | 94.52 | 90.02 |
| | | 26726 | .3346 | | 8.500 | 125 | 75 | 61 | 125.53 | 120.08 | 114.62 | 109.16 |
| 22375 | | | .3390 | R | 8.611 | 3-5/16" | 1-9/16" | 1.079" | 90.87 | 86.92 | 82.97 | 79.02 |
| | 25731 | | .3390 | R | 8.611 | 4" | 2-3/32" | 1.757" | 106.92 | 102.27 | 97.62 | 92.97 |
| | | 26731 | .3390 | R | 8.611 | 4-15/16" | 2-15/16" | 2.435" | 131.47 | 125.75 | 120.04 | 114.32 |
| 22380 | | | .3438 | 11/32" | 8.733 | 3-5/16" | 1-9/16" | 1.094" | 92.87 | 88.84 | 84.80 | 80.76 |
| | 25736 | | .3438 | 11/32" | 8.733 | 4" | 2-3/16" | 1.782" | 109.55 | 104.79 | 100.02 | 95.26 |
| | | 26736 | .3438 | 11/32" | 8.733 | 4-15/16" | 2-15/16" | 2.470" | 134.26 | 128.43 | 122.59 | 116.75 |
| 22385 | | | .3480 | S | 8.839 | 3-5/16" | 1-9/16" | 1.107" | 95.94 | 91.77 | 87.60 | 83.43 |
| | 25741 | | .3480 | S | 8.839 | 4" | 2-3/16" | 1.803" | 112.03 | 107.16 | 102.29 | 97.42 |
| | | 26741 | .3480 | S | 8.839 | 5" | 3" | 2.499" | 136.82 | 130.87 | 124.92 | 118.97 |
| 22390 | | | .3543 | | 9.000 | 84 | 40 | 29 | 98.39 | 94.12 | 89.84 | 85.56 |
| | 25746 | | .3543 | | 9.000 | 100 | 56 | 47 | 112.49 | 107.60 | 102.71 | 97.82 |
| | | 26746 | .3543 | | 9.000 | 125 | 77 | 65 | 137.32 | 131.35 | 125.38 | 119.41 |
| 22395 | | | .3580 | T | 9.093 | 3-5/16" | 1-9/16" | 1.139" | 102.26 | 97.81 | 93.37 | 88.92 |
| | 25751 | | .3580 | T | 9.093 | 4-1/4" | 2-9/32" | 1.855" | 114.62 | 109.64 | 104.65 | 99.67 |
| | | 26751 | .3580 | T | 9.093 | 5" | 3" | 2.571" | 144.35 | 138.07 | 131.80 | 125.52 |
| 22400 | | | .3594 | 23/64" | 9.129 | 3-5/16" | 1-9/16" | 1.144" | 102.88 | 98.41 | 93.93 | 89.46 |
| | 25756 | | .3594 | 23/64" | 9.129 | 4-1/4" | 2-9/32" | 1.862" | 115.06 | 110.06 | 105.05 | 100.05 |
| | | 26756 | .3594 | 23/64" | 9.129 | 5" | 3" | 2.581" | 144.85 | 138.56 | 132.26 | 125.96 |
| 22405 | | | .3680 | U | 9.347 | 3-5/16" | 1-9/16" | 1.171" | 104.43 | 99.89 | 95.35 | 90.81 |
| | 25761 | | .3680 | U | 9.347 | 4-1/4" | 2-9/32" | 1.907" | 121.96 | 116.66 | 111.35 | 106.05 |
| | | 26761 | .3680 | U | 9.347 | 5" | 3" | 2.643" | 153.26 | 146.60 | 139.93 | 133.27 |
| 22410 | | | .3740 | | 9.500 | 84 | 40 | 30 | 105.27 | 100.69 | 96.12 | 91.54 |
| | 25766 | | .3740 | | 9.500 | 105 | 58 | 49 | 122.56 | 117.23 | 111.90 | 106.57 |
| | | 26766 | .3740 | | 9.500 | 130 | 80 | 68 | 154.22 | 147.51 | 140.81 | 134.10 |
| 22415 | | | .3750 | 3/8" | 9.525 | 3-1/2" | 1-11/16" | 1.193" | 105.92 | 101.31 | 96.71 | 92.10 |
| | 25771 | | .3750 | 3/8" | 9.525 | 4-1/4" | 2-3/8" | 1.943" | 125.59 | 120.13 | 114.67 | 109.21 |
| | | 26771 | .3750 | 3/8" | 9.525 | 5-1/8" | 3-1/8" | 2.693" | 158.29 | 151.40 | 144.52 | 137.64 |

*continued* ⟶

# Series 1580KH, 1280KH, 1880KH *(continued)*

.3770" - .4921"
(9.576mm - 12.500mm)

| 3xD (1580KH) EDP# | 5xD (1280KH) EDP# | 7xD (1880KH) EDP# | Decimal | *d* † Diameter | Metric | *l1* Overall Length | *l2* Flute Length | *l5* Max Drill Depth | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 22420 | | | .3770 | V | 9.576 | 3-1/2" | 1-11/16" | 1.200" | 109.99 | 105.20 | 100.42 | 95.64 |
| | 25776 | | .3770 | V | 9.576 | 4-1/4" | 2-3/8" | 1.954" | 126.01 | 120.53 | 115.05 | 109.57 |
| | | 26776 | .3770 | V | 9.576 | 5-1/8" | 3-1/8" | 2.708" | 160.78 | 153.79 | 146.80 | 139.81 |
| 22425 | | | .3860 | W | 9.804 | 3-1/2" | 1-11/16" | 1.228" | 111.91 | 107.04 | 102.18 | 97.31 |
| | 25781 | | .3860 | W | 9.804 | 4-1/2" | 2-3/8" | 2.000" | 127.39 | 121.85 | 116.31 | 110.77 |
| | | 26781 | .3860 | W | 9.804 | 5-1/8" | 3-1/8" | 2.772" | 161.33 | 154.32 | 147.30 | 140.29 |
| 22430 | | | .3906 | 25/64" | 9.921 | 3-1/2" | 1-11/16" | 1.243" | 113.31 | 108.38 | 103.46 | 98.53 |
| | 25786 | | .3906 | 25/64" | 9.921 | 4-1/2" | 2-3/8" | 2.024" | 128.34 | 122.76 | 117.18 | 111.60 |
| | | 26786 | .3906 | 25/64" | 9.921 | 5-1/4" | 3-1/4" | 2.805" | 162.31 | 155.25 | 148.20 | 141.14 |
| 22435 | | | .3937 | | 10.000 | 89 | 43 | 32 | 113.71 | 108.77 | 103.82 | 98.88 |
| | 25791 | | .3937 | | 10.000 | 115 | 60 | 52 | 129.51 | 123.88 | 118.25 | 112.62 |
| | | 26791 | .3937 | | 10.000 | 135 | 83 | 72 | 165.51 | 158.31 | 151.12 | 143.92 |
| 22440 | | | .3970 | X | 10.084 | 3-1/2" | 1-11/16" | 1.263" | 114.71 | 109.73 | 104.74 | 99.75 |
| | 25796 | | .3970 | X | 10.084 | 4-1/2" | 2-1/2" | 2.057" | 133.92 | 128.10 | 122.27 | 116.45 |
| | | 26796 | .3970 | X | 10.084 | 5-1/4" | 3-1/4" | 2.851" | 169.20 | 161.84 | 154.49 | 147.13 |
| 22445 | | | .4040 | Y | 10.262 | 3-1/2" | 1-11/16" | 1.286" | 115.49 | 110.47 | 105.45 | 100.43 |
| | 25801 | | .4040 | Y | 10.262 | 4-1/2" | 2-9/16" | 2.094" | 134.52 | 128.67 | 122.82 | 116.97 |
| | | 26801 | .4040 | Y | 10.262 | 5-3/8" | 3-3/8" | 2.902" | 172.55 | 165.04 | 157.54 | 150.04 |
| 22450 | | | .4062 | 13/32" | 10.317 | 3-1/2" | 1-11/16" | 1.293" | 119.04 | 113.86 | 108.69 | 103.51 |
| | 25806 | | .4062 | 13/32" | 10.317 | 4-1/2" | 2-9/16" | 2.105" | 137.10 | 131.14 | 125.18 | 119.22 |
| | | 26806 | .4062 | 13/32" | 10.317 | 5-3/8" | 3-3/8" | 2.917" | 173.52 | 165.98 | 158.43 | 150.89 |
| 22455 | | | .4130 | Z | 10.490 | 3-1/2" | 1-11/16" | 1.314" | 120.14 | 114.92 | 109.69 | 104.47 |
| | 25811 | | .4130 | Z | 10.490 | 4-1/2" | 2-5/8" | 2.140" | 139.25 | 133.20 | 127.14 | 121.09 |
| | | 26811 | .4130 | Z | 10.490 | 5-3/8" | 3-3/8" | 2.966" | 176.40 | 168.73 | 161.06 | 153.39 |
| 22460 | | | .4134 | | 10.500 | 89 | 43 | 33 | 120.14 | 114.92 | 109.69 | 104.47 |
| | 25816 | | .4134 | | 10.500 | 115 | 67 | 54 | 139.25 | 133.20 | 127.14 | 121.09 |
| | | 26816 | .4134 | | 10.500 | 135 | 86 | 75 | 176.40 | 168.73 | 161.06 | 153.39 |
| 22465 | | | .4219 | 27/64" | 10.716 | 3-3/4" | 1-13/16" | 1.343" | 121.27 | 116.00 | 110.72 | 105.45 |
| | 25821 | | .4219 | 27/64" | 10.716 | 4-1/2" | 2-11/16" | 2.186" | 141.22 | 135.08 | 128.94 | 122.80 |
| | | 26821 | .4219 | 27/64" | 10.716 | 5-7/16" | 3-7/16" | 3.030" | 178.60 | 170.83 | 163.07 | 155.30 |
| 22470 | | | .4331 | | 11.000 | 95 | 46 | 35 | 130.16 | 124.50 | 118.84 | 113.18 |
| | 25826 | | .4331 | | 11.000 | 115 | 68 | 57 | 146.30 | 139.94 | 133.58 | 127.22 |
| | | 26826 | .4331 | | 11.000 | 135 | 88 | 79 | 185.51 | 177.44 | 169.38 | 161.31 |
| 22475 | | | .4375 | 7/16" | 11.113 | 3-3/4" | 1-13/16" | 1.392" | 130.16 | 124.50 | 118.84 | 113.18 |
| | 25831 | | .4375 | 7/16" | 11.113 | 4-3/4" | 2-13/16" | 2.267" | 149.26 | 142.77 | 136.28 | 129.79 |
| | | 26831 | .4375 | 7/16" | 11.113 | 5-7/16" | 3-7/16" | 3.142" | 189.47 | 181.24 | 173.00 | 164.76 |
| 22480 | | | .4528 | | 11.500 | 95 | 46 | 37 | 139.73 | 133.65 | 127.58 | 121.50 |
| | 25836 | | .4528 | | 11.500 | 120 | 71 | 60 | 154.59 | 147.87 | 141.15 | 134.43 |
| | | 26836 | .4528 | | 11.500 | 140 | 91 | 83 | 196.20 | 187.67 | 179.14 | 170.61 |
| 22485 | | | .4531 | 29/64" | 11.509 | 3-3/4" | 1-13/16" | 1.442" | 139.73 | 133.65 | 127.58 | 121.50 |
| | 25841 | | .4531 | 29/64" | 11.509 | 4-3/4" | 2-7/8" | 2.348" | 159.88 | 152.93 | 145.98 | 139.03 |
| | | 26841 | .4531 | 29/64" | 11.509 | 5-9/16" | 3-13/16" | 3.254" | 202.34 | 193.55 | 184.75 | 175.95 |
| 22490 | | | .4688 | 15/32" | 11.908 | 4" | 1-15/16" | 1.492" | 146.81 | 140.43 | 134.04 | 127.66 |
| | 25846 | | .4688 | 15/32" | 11.908 | 4-3/4" | 2-7/8" | 2.429" | 163.53 | 156.42 | 149.31 | 142.20 |
| | | 26846 | .4688 | 15/32" | 11.908 | 5-9/16" | 3-13/16" | 3.367" | 207.40 | 198.39 | 189.37 | 180.35 |
| 22495 | | | .4724 | | 12.000 | 102 | 49 | 38 | 147.25 | 140.84 | 134.44 | 128.04 |
| | 25851 | | .4724 | | 12.000 | 120 | 73 | 62 | 167.05 | 159.79 | 152.52 | 145.26 |
| | | 26851 | .4724 | | 12.000 | 140 | 98 | 86 | 212.73 | 203.48 | 194.23 | 184.98 |
| 22500 | | | .4844 | 31/64" | 12.304 | 4" | 1-15/16" | 1.541" | 156.25 | 149.46 | 142.66 | 135.87 |
| | 25856 | | .4844 | 31/64" | 12.304 | 5-5/16" | 3" | 2.510" | 174.28 | 166.71 | 159.13 | 151.55 |
| | | 26856 | .4844 | 31/64" | 12.304 | 5-9/16" | 3-13/16" | 3.479" | 218.26 | 208.77 | 199.28 | 189.79 |
| 22505 | | | .4921 | | 12.500 | 102 | 49 | 40 | 164.69 | 157.53 | 150.37 | 143.21 |
| | 25861 | | .4921 | | 12.500 | 135 | 76 | 65 | 187.07 | 178.94 | 170.80 | 162.67 |
| | | 26861 | .4921 | | 12.500 | 150 | 102 | 90 | 219.47 | 209.92 | 200.38 | 190.84 |



† *Metric equivalents are for reference only*

.5000" - .6299"
(12.700mm - 16.000mm)

| 3xD (1580KH) EDP# | 5xD (1280KH) EDP# | 7xD (1880KH) EDP# | *d* † Diameter Decimal | Diameter | Metric | *l1* Overall Length | *l2* Flute Length | *l5* Max Drill Depth | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 22510 | | | .5000 | 1/2" | 12.700 | 4" | 1-15/16" | 1.591" | 165.73 | 158.52 | 151.32 | 144.11 |
| | 25866 | | .5000 | 1/2" | 12.700 | 5-3/8" | 3-1/16" | 2.591" | 188.84 | 180.63 | 172.42 | 164.21 |
| | | 26866 | .5000 | 1/2" | 12.700 | 6" | 4" | 3.591" | 220.26 | 210.68 | 201.11 | 191.53 |
| 22515 | | | .5118 | | 13.000 | 107 | 53 | 41 | 183.95 | 175.96 | 167.96 | 159.96 |
| | 25871 | | .5118 | | 13.000 | 135 | 78 | 67 | 214.15 | 204.84 | 195.53 | 186.22 |
| | | 26871 | .5118 | | 13.000 | 150 | 102 | 93 | 230.59 | 220.56 | 210.54 | 200.51 |
| 22520 | | | .5156 | 33/64" | 13.096 | 4-7/32" | 2-3/32" | 1.641" | 188.31 | 180.13 | 171.94 | 163.75 |
| | 25876 | | .5156 | 33/64" | 13.096 | 5-3/8" | 3-1/8" | 2.672" | 223.22 | 213.51 | 203.81 | 194.10 |
| | | 26876 | .5156 | 33/64" | 13.096 | 6" | 4" | 3.703" | 240.29 | 229.85 | 219.40 | 208.95 |
| 22525 | | | .5312 | 17/32" | 13.492 | 4-7/32" | 2-3/32" | 1.690" | 192.63 | 184.25 | 175.88 | 167.50 |
| | 25881 | | .5312 | 17/32" | 13.492 | 5-11/16" | 3-5/16" | 2.753" | 226.81 | 216.95 | 207.09 | 197.23 |
| | | 26881 | .5312 | 17/32" | 13.492 | 6-1/8" | 4-1/8" | 3.815" | 244.19 | 233.57 | 222.96 | 212.34 |
| 22530 | | | .5315 | | 13.500 | 110 | 56 | 43 | 196.98 | 188.42 | 179.85 | 171.29 |
| | 25886 | | .5315 | | 13.500 | 145 | 84 | 70 | 230.31 | 220.30 | 210.28 | 200.27 |
| | | 26886 | .5315 | | 13.500 | 155 | 105 | 97 | 247.96 | 237.18 | 226.40 | 215.62 |
| 22535 | | | .5469 | 35/64" | 13.891 | 4-5/16" | 2-7/32" | 1.740" | 201.28 | 192.53 | 183.78 | 175.03 |
| | 25891 | | .5469 | 35/64" | 13.891 | 5-13/16" | 3-3/8" | 2.834" | 242.93 | 232.36 | 221.80 | 211.24 |
| | | 26891 | .5469 | 35/64" | 13.891 | 6-1/8" | 4-1/8" | 3.928" | 255.71 | 244.60 | 233.48 | 222.36 |
| 22540 | | | .5512 | | 14.000 | 110 | 56 | 45 | 205.65 | 196.71 | 187.77 | 178.83 |
| | 25896 | | .5512 | | 14.000 | 145 | 86 | 73 | 246.49 | 235.77 | 225.06 | 214.34 |
| | | 26896 | .5512 | | 14.000 | 155 | 105 | 101 | 259.49 | 248.20 | 236.92 | 225.64 |
| 22545 | | | .5625 | 9/16" | 14.288 | 4-9/16" | 2-15/32" | 1.790" | 227.68 | 217.78 | 207.88 | 197.98 |
| | 25901 | | .5625 | 9/16" | 14.288 | 5-15/16" | 3-1/2" | 2.915" | 265.56 | 254.01 | 242.47 | 230.92 |
| | | 26901 | .5625 | 9/16" | 14.288 | 6-1/4" | 4-3/8" | 4.040" | 280.15 | 267.97 | 255.79 | 243.61 |
| 22550 | | | .5709 | | 14.500 | 116 | 63 | 46 | 231.98 | 221.89 | 211.81 | 201.72 |
| | 25906 | | .5709 | | 14.500 | 150 | 89 | 75 | 267.66 | 256.03 | 244.39 | 232.75 |
| | | 26906 | .5709 | | 14.500 | 160 | 109 | 104 | 282.37 | 270.09 | 257.82 | 245.54 |
| 22555 | | | .5781 | 37/64" | 14.684 | 4-15/16" | 2-9/16" | 1.840" | 236.12 | 225.85 | 215.59 | 205.32 |
| | 25911 | | .5781 | 37/64" | 14.684 | 6" | 3-1/2" | 2.996" | 268.40 | 256.73 | 245.06 | 233.39 |
| | | 26911 | .5781 | 37/64" | 14.684 | 6-1/4" | 4-3/8" | 4.152" | 283.13 | 270.82 | 258.51 | 246.20 |
| 22560 | | | .5906 | | 15.000 | 125 | 65 | 48 | 240.45 | 230.00 | 219.54 | 209.09 |
| | 25916 | | .5906 | | 15.000 | 150 | 90 | 78 | 271.88 | 260.06 | 248.24 | 236.42 |
| | | 26916 | .5906 | | 15.000 | 160 | 112 | 108 | 286.81 | 274.34 | 261.87 | 249.40 |
| 22565 | | | .5938 | 19/32" | 15.083 | 4-15/16" | 2-9/16" | 1.890" | 241.78 | 231.26 | 220.75 | 210.24 |
| | 25921 | | .5938 | 19/32" | 15.083 | 6" | 3-9/16" | 3.077" | 278.97 | 266.84 | 254.71 | 242.58 |
| | | 26921 | .5938 | 19/32" | 15.083 | 6-3/8" | 4-3/8" | 4.265" | 294.26 | 281.47 | 268.67 | 255.88 |
| 22570 | | | .6094 | 39/64" | 15.479 | 5-1/16" | 2-13/16" | 1.939" | 242.97 | 232.41 | 221.84 | 211.28 |
| | 25926 | | .6094 | 39/64" | 15.479 | 6-3/16" | 3-11/16" | 3.158" | 313.95 | 300.30 | 286.65 | 273.00 |
| | | 26926 | .6094 | 39/64" | 15.479 | 6-7/16" | 4-7/16" | 4.377" | 331.13 | 316.73 | 302.34 | 287.94 |
| 22575 | | | .6102 | | 15.500 | 129 | 71 | 49 | 244.24 | 233.62 | 223.00 | 212.38 |
| | 25931 | | .6102 | | 15.500 | 160 | 94 | 80 | 314.81 | 301.13 | 287.44 | 273.75 |
| | | 26931 | .6102 | | 15.500 | 165 | 113 | 111 | 332.07 | 317.64 | 303.20 | 288.76 |
| 22580 | | | .6250 | 5/8" | 15.875 | 5-1/4" | 3-1/8" | 1.989" | 245.44 | 234.77 | 224.10 | 213.43 |
| | 25936 | | .6250 | 5/8" | 15.875 | 6-5/16" | 3-3/4" | 3.239" | 323.50 | 309.43 | 295.37 | 281.30 |
| | | 26936 | .6250 | 5/8" | 15.875 | 6-9/16" | 4-9/16" | 4.489" | 341.26 | 326.43 | 311.59 | 296.75 |
| 22585 | | | .6299 | | 16.000 | 133 | 79 | 51 | 251.39 | 240.46 | 229.53 | 218.60 |
| | 25941 | | .6299 | | 16.000 | 160 | 95 | 83 | 327.74 | 313.49 | 299.24 | 284.99 |
| | | 26941 | .6299 | | 16.000 | 165 | 117 | 115 | 345.74 | 330.70 | 315.67 | 300.64 |

# Series 1600

NEW ITEM

.0787" - .3750"
(2.000mm - 9.525mm)

Z=2 | 25° | 82° | 90° | 120° | 142°

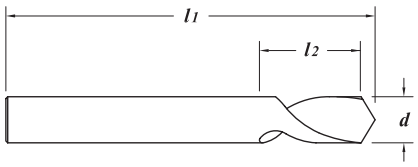
TECH PAGES 320-323

| TOLERANCES | | |
|---|---|---|
| $d$ | +.0000" –.0005" (+.0000 –.0127mm) | |
| $l_1$ | ≤ 1/8" | +.125" –.062" (+3.175 –1.588mm) |
| | > 1/8" | +.125" –.125" (+3.175 –3.175mm) |
| $l_2$ | ≤ 1/8" | +.125" –.062" (+3.175 –1.588mm) |
| | >1/8" | +.125" –.125" (+3.175 –3.175mm) |

## N/C Spotting

Solid submicron grain carbide drill
For spotting to stabilize long drills
Can be used for chamfering
Rough, angled or spherical surfaces
No O.D. clearance
For locating on true position
Live tooling recommended on lathe processes





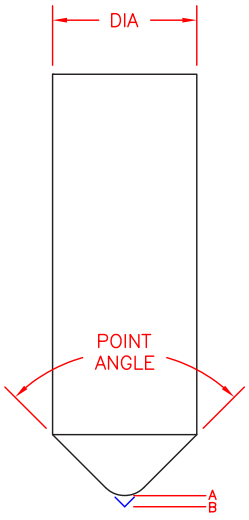

| 82° EDP# | 90° EDP# | 120° EDP# | 142° EDP# | $d$ † Diameter Decimal | $d$ † Diameter | $d$ † Diameter Metric | $l_1$ Overall Length | $l_2$ Flute Length | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 91650 | 91500 | 91572 | 91240 | .0787 | | 2.000 | 50 | 10 | 10.29 | 9.85 | 9.40 | 8.95 |
| 91652 | 91505 | 91575 | 91245 | .0938 | 3/32" | 2.383 | 2" | 3/8" | 11.66 | 11.15 | 10.65 | 10.14 |
| - | 91507 | - | - | .1181 | | 3.000 | 38 | 6 | 12.87 | 12.31 | 11.75 | 11.19 |
| - | 91510 | 91580 | 91250 | .1181 | | 3.000 | 50 | 10 | 13.74 | 13.15 | 12.55 | 11.95 |
| - | 91512 | - | - | .1181 | | 3.000 | 75 | 10 | 15.94 | 15.25 | 14.55 | 13.86 |
| - | 91514 | - | - | .1250 | 1/8" | 3.175 | 1-1/2" | 1/4" | 12.87 | 12.31 | 11.75 | 11.19 |
| 91656 | 91000 | 91100 | 91260 | .1250 | 1/8" | 3.175 | 2" | 3/8" | 13.74 | 13.15 | 12.55 | 11.95 |
| - | 91002 | - | - | .1250 | 1/8" | 3.175 | 3" | 3/8" | 15.94 | 15.25 | 14.55 | 13.86 |
| 91658 | 91520 | 91590 | 91270 | .1575 | | 4.000 | 50 | 12 | 15.87 | 15.18 | 14.49 | 13.80 |
| - | 91522 | - | - | .1875 | 3/16" | 4.763 | 2" | 3/8" | 15.87 | 15.18 | 14.49 | 13.80 |
| - | 91524 | - | - | .1875 | 3/16" | 4.763 | 2-1/2" | 1/2" | 16.43 | 15.72 | 15.00 | 14.29 |
| 91660 | 91010 | 91110 | 91280 | .1875 | 3/16" | 4.763 | 3" | 3/4" | 17.97 | 17.19 | 16.41 | 15.63 |
| - | 91012 | - | - | .1875 | 3/16" | 4.763 | 4" | 3/4" | 21.02 | 20.11 | 19.19 | 18.28 |
| - | 91014 | - | - | .1969 | | 5.000 | 50 | 10 | 17.26 | 16.51 | 15.76 | 15.01 |
| - | 91530 | 91600 | 91290 | .1969 | | 5.000 | 65 | 15 | 18.88 | 18.06 | 17.24 | 16.42 |
| - | 91532 | - | - | .1969 | | 5.000 | 75 | 15 | 20.34 | 19.46 | 18.57 | 17.69 |
| - | 91534 | - | - | .2362 | | 6.000 | 50 | 12 | 19.40 | 18.56 | 17.71 | 16.87 |
| 91664 | 91540 | 91610 | 91300 | .2362 | | 6.000 | 65 | 20 | 19.85 | 18.99 | 18.12 | 17.26 |
| - | 91542 | - | - | .2362 | | 6.000 | 75 | 20 | 21.33 | 20.41 | 19.48 | 18.55 |
| - | 91544 | - | - | .2362 | | 6.000 | 100 | 20 | 24.91 | 23.83 | 22.74 | 21.66 |
| - | 91546 | - | - | .2500 | 1/4" | 6.350 | 2" | 1/2" | 19.40 | 18.56 | 17.71 | 16.87 |
| - | 91547 | - | - | .2500 | 1/4" | 6.350 | 2-1/2" | 5/8" | 19.85 | 18.99 | 18.12 | 17.26 |
| 91666 | 91020 | 91120 | 91310 | .2500 | 1/4" | 6.350 | 3" | 3/4" | 21.33 | 20.41 | 19.48 | 18.55 |
| - | 91021 | - | - | .2500 | 1/4" | 6.350 | 4" | 3/4" | 24.91 | 23.83 | 22.74 | 21.66 |
| - | 91022 | - | - | .2500 | 1/4" | 6.350 | 6" | 3/4" | 36.86 | 35.26 | 33.65 | 32.05 |
| - | 91023 | - | - | .3125 | 5/16" | 7.938 | 2" | 1/2" | 23.51 | 22.48 | 21.46 | 20.44 |
| - | 91024 | - | - | .3125 | 5/16" | 7.938 | 2-1/2" | 5/8" | 24.08 | 23.03 | 21.99 | 20.94 |
| 91668 | 91025 | 91125 | 91315 | .3125 | 5/16" | 7.938 | 3" | 1" | 25.81 | 24.68 | 23.56 | 22.44 |
| - | 91026 | - | - | .3125 | 5/16" | 7.938 | 4" | 1" | 30.73 | 29.39 | 28.06 | 26.72 |
| - | 91548 | - | - | .3150 | | 8.000 | 50 | 12 | 23.51 | 22.48 | 21.46 | 20.44 |
| - | 91549 | - | - | .3150 | | 8.000 | 65 | 16 | 24.08 | 23.03 | 21.99 | 20.94 |
| 91670 | 91550 | 91620 | 91320 | .3150 | | 8.000 | 75 | 25 | 25.81 | 24.68 | 23.56 | 22.44 |
| - | 91551 | - | - | .3150 | | 8.000 | 100 | 25 | 30.73 | 29.39 | 28.06 | 26.72 |
| - | 91028 | - | - | .3750 | 3/8" | 9.525 | 2" | 1/2" | 25.15 | 24.06 | 22.96 | 21.87 |
| - | 91029 | - | - | .3750 | 3/8" | 9.525 | 2-1/2" | 5/8" | 26.07 | 24.94 | 23.80 | 22.67 |
| 91672 | 91030 | 91130 | 91330 | .3750 | 3/8" | 9.525 | 3" | 1" | 27.99 | 26.77 | 25.56 | 24.34 |
| - | 91031 | - | - | .3750 | 3/8" | 9.525 | 4" | 1" | 34.27 | 32.78 | 31.29 | 29.80 |
| - | 91032 | - | - | .3750 | 3/8" | 9.525 | 6" | 1" | 49.86 | 47.70 | 45.53 | 43.36 |



† *Metric equivalents are for reference only*

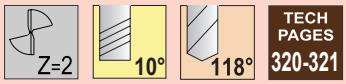
| 82° EDP# | 90° EDP# | 120° EDP# | 142° EDP# | Decimal | *d* † Diameter | Metric | *l1* Overall Length | *l2* Flute Length | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| - | 91558 | - | - | .3937 | | 10.000 | 65 | 16 | 33.32 | 31.87 | 30.42 | 28.97 |
| - | 91559 | - | - | .3937 | | 10.000 | 70 | 20 | 34.20 | 32.71 | 31.23 | 29.74 |
| - | 91560 | 91630 | 91340 | .3937 | | 10.000 | 88 | 25 | 38.62 | 36.94 | 35.26 | 33.58 |
| - | 91561 | - | - | .3937 | | 10.000 | 100 | 25 | 41.95 | 40.13 | 38.30 | 36.48 |
| - | 91564 | - | - | .4375 | 7/16" | 11.113 | 2-3/4" | 3/4" | 36.96 | 35.35 | 33.75 | 32.14 |
| 91676 | 91565 | 91635 | 91345 | .4375 | 7/16" | 11.113 | 4" | 1" | 43.11 | 41.24 | 39.36 | 37.49 |
| - | 91568 | - | - | .4724 | | 12.000 | 65 | 16 | 39.38 | 37.66 | 35.95 | 34.24 |
| - | 91569 | - | - | .4724 | | 12.000 | 75 | 20 | 40.08 | 38.34 | 36.59 | 34.85 |
| - | 91570 | 91640 | 91350 | .4724 | | 12.000 | 100 | 30 | 46.41 | 44.40 | 42.38 | 40.36 |
| - | 91038 | - | - | .5000 | 1/2" | 12.700 | 2-1/2" | 5/8" | 40.63 | 38.86 | 37.10 | 35.33 |
| - | 91039 | - | - | .5000 | 1/2" | 12.700 | 3" | 3/4" | 41.23 | 39.44 | 37.64 | 35.85 |
| 91680 | 91040 | 91140 | 91360 | .5000 | 1/2" | 12.700 | 4" | 1" | 48.27 | 46.17 | 44.07 | 41.97 |
| - | 91041 | - | - | .5000 | 1/2" | 12.700 | 6" | 1" | 72.94 | 69.77 | 66.60 | 63.43 |
| - | 91050 | 91170 | 91370 | .5512 | | 14.000 | 100 | 30 | 83.18 | 79.56 | 75.95 | 72.33 |
| 91684 | 91060 | 91180 | - | .5625 | 9/16" | 14.287 | 4" | 1" | 90.70 | 86.76 | 82.81 | 78.87 |
| - | 91067 | - | - | .6250 | 5/8" | 15.875 | 3" | 3/4" | 86.68 | 82.91 | 79.14 | 75.37 |
| - | 91068 | - | - | .6250 | 5/8" | 15.875 | 3-1/2" | 1" | 87.27 | 83.48 | 79.68 | 75.89 |
| - | 91069 | - | - | .6250 | 5/8" | 15.875 | 4" | 1" | 96.15 | 91.97 | 87.79 | 83.61 |
| 91686 | 91070 | 91190 | 91390 | .6250 | 5/8" | 15.875 | 5" | 1" | 111.29 | 106.45 | 101.61 | 96.77 |
| - | 91077 | - | - | .6299 | | 16.000 | 75 | 20 | 89.48 | 85.59 | 81.70 | 77.81 |
| - | 91078 | - | - | .6299 | | 16.000 | 88 | 25 | 90.14 | 86.22 | 82.30 | 78.38 |
| NEW - | 91079 | - | - | .6299 | | 16.000 | 100 | 25 | 98.24 | 93.97 | 89.70 | 85.43 |
| 91688 | 91080 | 91200 | 91400 | .6299 | | 16.000 | 125 | 30 | 114.26 | 109.30 | 104.33 | 99.36 |
| 91690 | 91090 | 91210 | - | .7087 | | 18.000 | 125 | 30 | 156.75 | 149.93 | 143.12 | 136.30 |
| - | 91148 | - | - | .7500 | 3/4" | 19.050 | 3" | 3/4" | 131.42 | 125.71 | 119.99 | 114.28 |
| - | 91149 | - | - | .7500 | 3/4" | 19.050 | 4" | 1" | 136.06 | 130.14 | 124.23 | 118.31 |
| 91692 | 91150 | 91220 | 91420 | .7500 | 3/4" | 19.050 | 5" | 1" | 161.00 | 154.00 | 147.00 | 140.00 |
| - | 91159 | - | - | .7874 | | 20.000 | 100 | 25 | 152.02 | 145.41 | 138.80 | 132.19 |
| - | 91160 | 91230 | 91430 | .7874 | | 20.000 | 125 | 30 | 174.32 | 166.74 | 159.16 | 151.58 |
| - | 91161 | - | - | .7874 | | 20.000 | 150 | 30 | 192.49 | 184.12 | 175.75 | 167.38 |

| DIAMETER | | DRILL POINT ANGLE | | | |
|---|---|---|---|---|---|
| | | 82° | 90° | 120° | 142° |
| 2mm | .0787 | .003 | .002 | .001 | .001 |
| 3/32" | .0938 | .003 | .003 | .002 | .001 |
| 3mm | .1181 | .004 | .004 | .002 | .001 |
| 1/8" | .1250 | .004 | .004 | .002 | .001 |
| 4mm | .1575 | .005 | .005 | .003 | .002 |
| 3/16" | .1875 | .006 | .006 | .003 | .002 |
| 5mm | .1969 | .007 | .006 | .003 | .002 |
| 6mm | .2362 | .008 | .007 | .004 | .003 |
| 1/4" | .2500 | .009 | .008 | .004 | .003 |
| 5/16" | .3125 | .011 | .009 | .005 | .003 |
| 8mm | .3150 | .011 | .009 | .005 | .003 |
| 3/8" | .3750 | .013 | .011 | .006 | .004 |
| 10mm | .3937 | .014 | .012 | .007 | .004 |
| 7/16" | .4375 | .015 | .013 | .008 | .005 |
| 12mm | .4724 | .016 | .014 | .008 | .005 |
| 1/2" | .5000 | .017 | .015 | .009 | .005 |
| 14mm | .5512 | .019 | .017 | .010 | .006 |
| 9/16" | .5625 | .019 | .017 | .010 | .006 |
| 5/8" | .6250 | .022 | .019 | .011 | .007 |
| 16mm | .6299 | .022 | .019 | .011 | .007 |
| 18mm | .7087 | .024 | .021 | .012 | .008 |
| 3/4" | .7500 | .026 | .023 | .013 | .008 |
| 20mm | .7874 | .027 | .024 | .014 | .009 |




Garr Tool series 1600 spotting drills are not only useful for starting holes, but also for leaving the desired chamfer when programmed to the correct depth. Because spotting drills do not come to a true point, but have a small "flat" as shown in the figure to the left, the length deviation from the chart must be taken into account to leave the correct chamfer length. This chart gives the distance from the theoretical drill point 'B' to the actual drill point 'A'. These values can be used to compensate for the "flat" on our spotting drills in your calculations.

# Series 1400

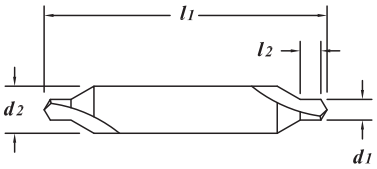



| TOLERANCES | |
|---|---|
| $d_1$ | +.003" –.000" (+.0762 –.0000mm) |
| $d_2$ | h6 |
| $l_1$ | +.125" –.125" (+3.175 –3.175mm) |
| $l_2$ | +.008" –.008" (+.203 –.203mm) |

## Combined Drill and Countersink

Solid submicron grain carbide drill
For center drilling applications
60° ±0°30' included countersink angle
Live tooling recommended on lathe processes
Drill length ($l_2$) is equal to drill diameter ($d_1$)
Not able to be altered






| EDP # | Number | $d_1$ † Diameter Decimal | Diameter | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Drill Length | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 58030 | 1 | .0469 | 3/64" | 1.191 | 1/8" | 1-1/2" | .0469 | 15.42 | 14.75 | 14.08 | 13.41 |
| 58040 | 2 | .0781 | 5/64" | 1.984 | 3/16" | 2" | .0781 | 24.28 | 23.22 | 22.17 | 21.11 |
| 58050 | 3 | .1094 | 7/64" | 2.779 | 1/4" | 2" | .1094 | 27.65 | 26.44 | 25.24 | 24.04 |
| 58060 | 4 | .1250 | 1/8" | 3.175 | 5/16" | 2-1/8" | .1250 | 38.70 | 37.02 | 35.33 | 33.65 |
| 58070 | 5 | .1875 | 3/16" | 4.763 | 7/16" | 2-3/4" | .1875 | 55.28 | 52.88 | 50.47 | 48.07 |
| 58080 | 6 | .2188 | 7/32" | 5.558 | 1/2" | 3" | .2188 | 73.59 | 70.39 | 67.19 | 63.99 |





† *Metric equivalents are for reference only*

**TOLERANCES**

| | | |
|---|---|---|
| *d* | +.0000" –.0005" (+.0000 –.0127mm) | |
| $l_1$ | ≤ 1/8" | +.125" –.062" (+3.175 –1.588mm) |
| | > 1/8" | +.125" –.125" (+3.175 –3.175mm) |
| $l_2$ | ≤ 1/8" | +.125" –.062" (+3.175 –1.588mm) |
| | >1/8" | +.125" –.125" (+3.175 –3.175mm) |

Z=2 | 0° | 135° | 3xD | TECH PAGES 320-323

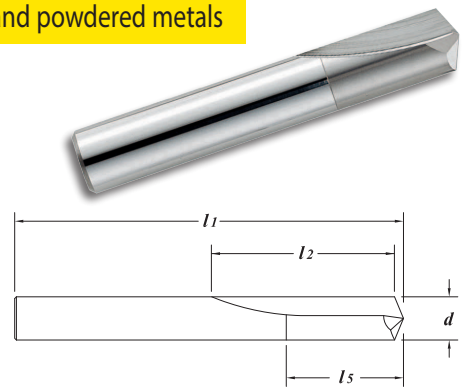
# Series 1500

.0625" - .1660"
(1.588mm - 4.216mm)

Recommended for high nickel, cobalt-based, and powdered metals

## Hard Metal

Solid submicron grain carbide drill
Straight flute design provides excellent rigidity
Materials 40 Rc and higher
Live tooling recommended on lathe processes
Durana Coating - page 61




| EDP# | *d* † Diameter Decimal | Diameter | Metric | $l_1$ Overall Length | $l_2$ Flute Length | $l_5$ Max Drill Depth | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|
| 59165 | .0625 | 1/16" | 1.588 | 1-3/4" | 5/8" | .200" | 10.60 | 10.14 | 9.68 | 9.22 |
| 59180 | .0700 | #50 | 1.778 | 1-3/4" | 3/4" | .224" | 10.60 | 10.14 | 9.68 | 9.22 |
| 59185 | .0730 | #49 | 1.854 | 1-3/4" | 3/4" | .234" | 10.60 | 10.14 | 9.68 | 9.22 |
| 59190 | .0760 | #48 | 1.930 | 1-3/4" | 3/4" | .244" | 10.60 | 10.14 | 9.68 | 9.22 |
| 59195 | .0781 | 5/64" | 1.984 | 1-3/4" | 3/4" | .250" | 10.60 | 10.14 | 9.68 | 9.22 |
| 59200 | .0785 | #47 | 1.994 | 1-3/4" | 7/8" | .252" | 10.60 | 10.14 | 9.68 | 9.22 |
| 39000 | .0787 | | 2.000 | 50 | 22 | 6 | 10.60 | 10.14 | 9.68 | 9.22 |
| 59210 | .0810 | #46 | 2.057 | 2" | 7/8" | .260" | 10.60 | 10.14 | 9.68 | 9.22 |
| 59215 | .0820 | #45 | 2.083 | 2" | 7/8" | .263" | 10.60 | 10.14 | 9.68 | 9.22 |
| 59220 | .0860 | #44 | 2.184 | 2" | 7/8" | .276" | 10.60 | 10.14 | 9.68 | 9.22 |
| 59225 | .0890 | #43 | 2.261 | 2" | 7/8" | .285" | 10.60 | 10.14 | 9.68 | 9.22 |
| 59230 | .0935 | #42 | 2.375 | 2" | 7/8" | .300" | 10.60 | 10.14 | 9.68 | 9.22 |
| 59235 | .0938 | 3/32" | 2.383 | 2" | 7/8" | .301" | 10.60 | 10.14 | 9.68 | 9.22 |
| 59240 | .0960 | #41 | 2.438 | 2" | 7/8" | .308" | 12.09 | 11.56 | 11.04 | 10.51 |
| 59245 | .0980 | #40 | 2.489 | 2" | 7/8" | .314" | 12.09 | 11.56 | 11.04 | 10.51 |
| 39050 | .0984 | | 2.500 | 50 | 22 | 8 | 12.09 | 11.56 | 11.04 | 10.51 |
| 59255 | .0995 | #39 | 2.527 | 2" | 7/8" | .319" | 12.09 | 11.56 | 11.04 | 10.51 |
| 59260 | .1015 | #38 | 2.578 | 2" | 7/8" | .326" | 12.09 | 11.56 | 11.04 | 10.51 |
| 59265 | .1040 | #37 | 2.642 | 2" | 7/8" | .334" | 12.09 | 11.56 | 11.04 | 10.51 |
| 59270 | .1065 | #36 | 2.705 | 2" | 7/8" | .342" | 12.09 | 11.56 | 11.04 | 10.51 |
| 59275 | .1094 | 7/64" | 2.779 | 2" | 1" | .351" | 12.09 | 11.56 | 11.04 | 10.51 |
| 59280 | .1100 | #35 | 2.794 | 2" | 1" | .353" | 12.57 | 12.02 | 11.48 | 10.93 |
| 59285 | .1110 | #34 | 2.819 | 2" | 1" | .356" | 12.57 | 12.02 | 11.48 | 10.93 |
| 59290 | .1130 | #33 | 2.870 | 2" | 1" | .362" | 12.57 | 12.02 | 11.48 | 10.93 |
| 59295 | .1160 | #32 | 2.946 | 2" | 1" | .372" | 12.57 | 12.02 | 11.48 | 10.93 |
| 39100 | .1181 | | 3.000 | 50 | 25 | 10 | 12.57 | 12.02 | 11.48 | 10.93 |
| 59305 | .1200 | #31 | 3.048 | 2" | 1" | .385" | 12.57 | 12.02 | 11.48 | 10.93 |
| 59310 | .1250 | 1/8" | 3.175 | 2" | 1" | .401" | 11.59 | 11.09 | 10.58 | 10.08 |
| 59315 | .1285 | #30 | 3.264 | 2" | 1" | .412" | 13.67 | 13.08 | 12.48 | 11.89 |
| 59320 | .1360 | #29 | 3.454 | 2" | 1" | .436" | 13.67 | 13.08 | 12.48 | 11.89 |
| 39150 | .1378 | | 3.500 | 50 | 25 | 11 | 13.67 | 13.08 | 12.48 | 11.89 |
| 59330 | .1405 | #28 | 3.569 | 2" | 1" | .451" | 13.67 | 13.08 | 12.48 | 11.89 |
| 59335 | .1406 | 9/64" | 3.571 | 2" | 1" | .451" | 13.67 | 13.08 | 12.48 | 11.89 |
| 59340 | .1440 | #27 | 3.658 | 2" | 1" | .462" | 14.04 | 13.43 | 12.82 | 12.21 |
| 59345 | .1470 | #26 | 3.734 | 2" | 1" | .471" | 14.75 | 14.11 | 13.47 | 12.83 |
| 59350 | .1495 | #25 | 3.797 | 2" | 1" | .479" | 14.75 | 14.11 | 13.47 | 12.83 |
| 59355 | .1520 | #24 | 3.861 | 2" | 1" | .487" | 14.75 | 14.11 | 13.47 | 12.83 |
| 59360 | .1540 | #23 | 3.912 | 2" | 1" | .494" | 14.75 | 14.11 | 13.47 | 12.83 |
| 59365 | .1562 | 5/32" | 3.967 | 2-1/2" | 1-1/8" | .501" | 14.75 | 14.11 | 13.47 | 12.83 |
| 59370 | .1570 | #22 | 3.988 | 2-1/2" | 1-1/8" | .504" | 15.99 | 15.29 | 14.60 | 13.90 |
| 39200 | .1575 | | 4.000 | 63 | 28 | 13 | 15.99 | 15.29 | 14.60 | 13.90 |
| 59380 | .1590 | #21 | 4.039 | 2-1/2" | 1-1/8" | .510" | 16.36 | 15.65 | 14.94 | 14.23 |
| 59385 | .1610 | #20 | 4.089 | 2-1/2" | 1-1/8" | .516" | 16.36 | 15.65 | 14.94 | 14.23 |
| 59390 | .1660 | #19 | 4.216 | 2-1/2" | 1-1/8" | .532" | 16.97 | 16.24 | 15.50 | 14.76 |

*continued* →

## Series 1500 *(continued)*

.1695" - .5000"
(4.305mm - 12.700mm)

| EDP# | $d$ † Diameter Decimal | Diameter | Metric | $l_1$ Overall Length | $l_2$ Flute Length | $l_5$ Max Drill Depth | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|
| 59395 | .1695 | #18 | 4.305 | 2-1/2" | 1-3/16" | .544" | 16.97 | 16.24 | 15.50 | 14.76 |
| 59400 | .1719 | 11/64" | 4.366 | 2-1/2" | 1-3/16" | .551" | 16.97 | 16.24 | 15.50 | 14.76 |
| 59405 | .1730 | #17 | 4.394 | 2-1/2" | 1-3/16" | .555" | 17.34 | 16.59 | 15.83 | 15.08 |
| 59410 | .1770 | #16 | 4.496 | 2-1/2" | 1-3/16" | .568" | 17.34 | 16.59 | 15.83 | 15.08 |
| 39250 | .1772 | | 4.500 | 63 | 28 | 14 | 17.34 | 16.59 | 15.83 | 15.08 |
| 59420 | .1800 | #15 | 4.572 | 2-1/2" | 1-3/16" | .577" | 17.34 | 16.59 | 15.83 | 15.08 |
| 59425 | .1820 | #14 | 4.623 | 2-1/2" | 1-3/16" | .584" | 18.31 | 17.51 | 16.72 | 15.92 |
| 59430 | .1850 | #13 | 4.700 | 2-1/2" | 1-3/16" | .593" | 18.31 | 17.51 | 16.72 | 15.92 |
| 59435 | .1875 | 3/16" | 4.763 | 2-1/2" | 1-3/16" | .601" | 17.60 | 16.83 | 16.07 | 15.30 |
| 59440 | .1890 | #12 | 4.801 | 2-1/2" | 1-3/16" | .606" | 18.18 | 17.39 | 16.60 | 15.81 |
| 59445 | .1910 | #11 | 4.851 | 2-1/2" | 1-3/16" | .613" | 18.18 | 17.39 | 16.60 | 15.81 |
| 59450 | .1935 | #10 | 4.915 | 2-1/2" | 1-1/4" | .621" | 19.26 | 18.43 | 17.59 | 16.75 |
| 59455 | .1960 | #9 | 4.978 | 2-1/2" | 1-1/4" | .629" | 19.26 | 18.43 | 17.59 | 16.75 |
| 39300 | .1969 | | 5.000 | 63 | 32 | 16 | 19.26 | 18.43 | 17.59 | 16.75 |
| 59465 | .1990 | #8 | 5.055 | 2-1/2" | 1-1/4" | .638" | 19.91 | 19.04 | 18.18 | 17.31 |
| 59470 | .2010 | #7 | 5.105 | 2-1/2" | 1-1/4" | .645" | 19.91 | 19.04 | 18.18 | 17.31 |
| 59475 | .2031 | 13/64" | 5.159 | 2-1/2" | 1-1/4" | .651" | 19.91 | 19.04 | 18.18 | 17.31 |
| 59480 | .2040 | #6 | 5.182 | 2-1/2" | 1-1/4" | .654" | 21.00 | 20.09 | 19.17 | 18.26 |
| 59485 | .2055 | #5 | 5.220 | 2-1/2" | 1-1/4" | .659" | 21.00 | 20.09 | 19.17 | 18.26 |
| 59490 | .2090 | #4 | 5.309 | 2-1/2" | 1-1/4" | .670" | 21.00 | 20.09 | 19.17 | 18.26 |
| 59495 | .2130 | #3 | 5.410 | 2-1/2" | 1-1/4" | .683" | 21.00 | 20.09 | 19.17 | 18.26 |
| 39350 | .2165 | | 5.500 | 63 | 32 | 18 | 21.00 | 20.09 | 19.17 | 18.26 |
| 59505 | .2188 | 7/32" | 5.558 | 2-1/2" | 1-1/2" | .702" | 21.00 | 20.09 | 19.17 | 18.26 |
| 59510 | .2210 | #2 | 5.613 | 2-1/2" | 1-1/2" | .709" | 22.46 | 21.48 | 20.51 | 19.53 |
| 59515 | .2280 | #1 | 5.791 | 2-1/2" | 1-1/2" | .731" | 22.46 | 21.48 | 20.51 | 19.53 |
| 59525 | .2344 | 15/64" | 5.954 | 2-1/2" | 1-1/2" | .752" | 25.04 | 23.95 | 22.86 | 21.77 |
| 39400 | .2362 | | 6.000 | 63 | 38 | 19 | 25.04 | 23.95 | 22.86 | 21.77 |
| 59550 | .2500 | 1/4" | 6.350 | 2-1/2" | 1-1/2" | .802" | 23.58 | 22.55 | 21.53 | 20.50 |
| 59570 | .2656 | 17/64" | 6.746 | 2-1/2" | 1-1/2" | .852" | 28.58 | 27.34 | 26.09 | 24.85 |
| 39500 | .2756 | | 7.000 | 63 | 38 | 22 | 29.29 | 28.02 | 26.74 | 25.47 |
| 59600 | .2812 | 9/32" | 7.142 | 2-1/2" | 1-1/2" | .902" | 29.29 | 28.02 | 26.74 | 25.47 |
| 39520 | .2953 | | 7.500 | 63 | 41 | 24 | 30.77 | 29.44 | 28.10 | 26.76 |
| 59620 | .2969 | 19/64" | 7.541 | 2-1/2" | 1-5/8" | .952" | 30.77 | 29.44 | 28.10 | 26.76 |
| 59630 | .3125 | 5/16" | 7.938 | 2-1/2" | 1-5/8" | 1.002" | 30.77 | 29.44 | 28.10 | 26.76 |
| 39540 | .3150 | | 8.000 | 63 | 41 | 26 | 32.36 | 30.95 | 29.55 | 28.14 |
| 59650 | .3281 | 21/64" | 8.334 | 3" | 1-5/8" | 1.052" | 33.32 | 31.87 | 30.42 | 28.97 |
| 39560 | .3346 | | 8.500 | 76 | 41 | 27 | 37.21 | 35.60 | 33.98 | 32.36 |
| 59670 | .3438 | 11/32" | 8.733 | 3" | 1-5/8" | 1.103" | 37.21 | 35.60 | 33.98 | 32.36 |
| 39580 | .3543 | | 9.000 | 76 | 41 | 29 | 40.41 | 38.65 | 36.90 | 35.14 |
| 59690 | .3594 | 23/64" | 9.129 | 3" | 1-3/4" | 1.153" | 40.41 | 38.65 | 36.90 | 35.14 |
| 59705 | .3750 | 3/8" | 9.525 | 3" | 1-3/4" | 1.203" | 44.06 | 42.14 | 40.23 | 38.31 |
| 59720 | .3906 | 25/64" | 9.921 | 3" | 1-3/4" | 1.253" | 49.80 | 47.63 | 45.47 | 43.30 |
| 39620 | .3937 | | 10.000 | 76 | 44 | 32 | 49.80 | 47.63 | 45.47 | 43.30 |
| 59740 | .4062 | 13/32" | 10.317 | 3" | 1-3/4" | 1.303" | 55.65 | 53.23 | 50.81 | 48.39 |
| 39640 | .4134 | | 10.500 | 76 | 44 | 34 | 58.24 | 55.70 | 53.17 | 50.64 |
| 59755 | .4219 | 27/64" | 10.716 | 3" | 1-3/4" | 1.353" | 61.27 | 58.61 | 55.94 | 53.28 |
| 39660 | .4331 | | 11.000 | 76 | 44 | 35 | 62.38 | 59.66 | 56.95 | 54.24 |
| 59765 | .4375 | 7/16" | 11.113 | 3" | 1-3/4" | 1.403" | 62.38 | 59.66 | 56.95 | 54.24 |
| 59775 | .4531 | 29/64" | 11.509 | 3" | 1-3/4" | 1.453" | 65.40 | 62.56 | 59.71 | 56.87 |
| 59780 | .4688 | 15/32" | 11.908 | 3" | 1-3/4" | 1.503" | 65.40 | 62.56 | 59.71 | 56.87 |
| 39700 | .4724 | | 12.000 | 76 | 44 | 38 | 65.40 | 62.56 | 59.71 | 56.87 |
| 59790 | .4844 | 31/64" | 12.304 | 3" | 1-3/4" | 1.554" | 65.40 | 62.56 | 59.71 | 56.87 |
| 39720 | .4921 | | 12.500 | 76 | 44 | 40 | 66.88 | 63.98 | 61.07 | 58.16 |
| 59800 | .5000 | 1/2" | 12.700 | 3" | 1-3/4" | 1.604" | 66.88 | 63.98 | 61.07 | 58.16 |



† *Metric equivalents are for reference only*

**TOLERANCES**

| | | |
|---|---|---|
| *d* | +.0000" –.0005" (+.0000 –.0127mm) | |
| $l_1$ | ≤ 1/8" | +.125" –.062" (+3.175 –1.588mm) |
| | > 1/8" | +.125" –.125" (+3.175 –3.175mm) |
| $l_2$ | ≤ 1/8" | +.125" –.062" (+3.175 –1.588mm) |
| | >1/8" | +.125" –.125" (+3.175 –3.175mm) |

Z=2 | 0° | 135° | 3xD | TECH PAGES 324-327

# Series 1500H

.0625" - .1660"
(1.588mm - 4.216mm)

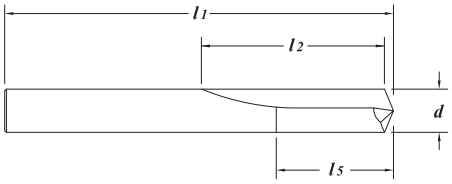
Recommended for high nickel, cobalt-based, and powdered metals

## Hard Metal

### BALINIT® Durana Coating

Solid submicron grain carbide drill
Straight flute design provides excellent rigidity
Materials 40 Rc and higher
Excellent heat resistance and lubricity
Live tooling recommended on lathe processes
Bright Finish - page 59






| EDP# | *d* † Diameter Decimal | Diameter | Metric | $l_1$ Overall Length | $l_2$ Flute Length | $l_5$ Max Drill Depth | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|
| 59166 | .0625 | 1/16" | 1.588 | 1-3/4" | 5/8" | .200" | 12.74 | 12.19 | 11.63 | 11.08 |
| 59181 | .0700 | #50 | 1.778 | 1-3/4" | 3/4" | .224" | 12.74 | 12.19 | 11.63 | 11.08 |
| 59186 | .0730 | #49 | 1.854 | 1-3/4" | 3/4" | .234" | 12.74 | 12.19 | 11.63 | 11.08 |
| 59191 | .0760 | #48 | 1.930 | 1-3/4" | 3/4" | .244" | 12.74 | 12.19 | 11.63 | 11.08 |
| 59196 | .0781 | 5/64" | 1.984 | 1-3/4" | 3/4" | .250" | 12.74 | 12.19 | 11.63 | 11.08 |
| 59201 | .0785 | #47 | 1.994 | 1-3/4" | 7/8" | .252" | 12.74 | 12.19 | 11.63 | 11.08 |
| 39001 | .0787 | | 2.000 | 50 | 22 | 6 | 12.74 | 12.19 | 11.63 | 11.08 |
| 59211 | .0810 | #46 | 2.057 | 2" | 7/8" | .260" | 12.74 | 12.19 | 11.63 | 11.08 |
| 59216 | .0820 | #45 | 2.083 | 2" | 7/8" | .263" | 12.74 | 12.19 | 11.63 | 11.08 |
| 59221 | .0860 | #44 | 2.184 | 2" | 7/8" | .276" | 12.74 | 12.19 | 11.63 | 11.08 |
| 59226 | .0890 | #43 | 2.261 | 2" | 7/8" | .285" | 12.74 | 12.19 | 11.63 | 11.08 |
| 59231 | .0935 | #42 | 2.375 | 2" | 7/8" | .300" | 12.74 | 12.19 | 11.63 | 11.08 |
| 59236 | .0938 | 3/32" | 2.383 | 2" | 7/8" | .301" | 12.74 | 12.19 | 11.63 | 11.08 |
| 59241 | .0960 | #41 | 2.438 | 2" | 7/8" | .308" | 14.17 | 13.55 | 12.94 | 12.32 |
| 59246 | .0980 | #40 | 2.489 | 2" | 7/8" | .314" | 14.17 | 13.55 | 12.94 | 12.32 |
| 39051 | .0984 | | 2.500 | 50 | 22 | 8 | 14.17 | 13.55 | 12.94 | 12.32 |
| 59256 | .0995 | #39 | 2.527 | 2" | 7/8" | .319" | 14.17 | 13.55 | 12.94 | 12.32 |
| 59261 | .1015 | #38 | 2.578 | 2" | 7/8" | .326" | 14.17 | 13.55 | 12.94 | 12.32 |
| 59266 | .1040 | #37 | 2.642 | 2" | 7/8" | .334" | 14.17 | 13.55 | 12.94 | 12.32 |
| 59271 | .1065 | #36 | 2.705 | 2" | 7/8" | .342" | 14.17 | 13.55 | 12.94 | 12.32 |
| 59276 | .1094 | 7/64" | 2.779 | 2" | 1" | .351" | 14.17 | 13.55 | 12.94 | 12.32 |
| 59281 | .1100 | #35 | 2.794 | 2" | 1" | .353" | 14.70 | 14.06 | 13.42 | 12.78 |
| 59286 | .1110 | #34 | 2.819 | 2" | 1" | .356" | 14.70 | 14.06 | 13.42 | 12.78 |
| 59291 | .1130 | #33 | 2.870 | 2" | 1" | .362" | 14.70 | 14.06 | 13.42 | 12.78 |
| 59296 | .1160 | #32 | 2.946 | 2" | 1" | .372" | 14.70 | 14.06 | 13.42 | 12.78 |
| 39101 | .1181 | | 3.000 | 50 | 25 | 10 | 14.70 | 14.06 | 13.42 | 12.78 |
| 59306 | .1200 | #31 | 3.048 | 2" | 1" | .385" | 14.70 | 14.06 | 13.42 | 12.78 |
| 59311 | .1250 | 1/8" | 3.175 | 2" | 1" | .401" | 13.70 | 13.10 | 12.51 | 11.91 |
| 59316 | .1285 | #30 | 3.264 | 2" | 1" | .412" | 15.78 | 15.09 | 14.41 | 13.72 |
| 59321 | .1360 | #29 | 3.454 | 2" | 1" | .436" | 15.78 | 15.09 | 14.41 | 13.72 |
| 39151 | .1378 | | 3.500 | 50 | 25 | 11 | 15.78 | 15.09 | 14.41 | 13.72 |
| 59331 | .1405 | #28 | 3.569 | 2" | 1" | .451" | 15.78 | 15.09 | 14.41 | 13.72 |
| 59336 | .1406 | 9/64" | 3.571 | 2" | 1" | .451" | 15.78 | 15.09 | 14.41 | 13.72 |
| 59341 | .1440 | #27 | 3.658 | 2" | 1" | .462" | 16.13 | 15.43 | 14.73 | 14.03 |
| 59346 | .1470 | #26 | 3.734 | 2" | 1" | .471" | 16.87 | 16.14 | 15.40 | 14.67 |
| 59351 | .1495 | #25 | 3.797 | 2" | 1" | .479" | 16.87 | 16.14 | 15.40 | 14.67 |
| 59356 | .1520 | #24 | 3.861 | 2" | 1" | .487" | 16.87 | 16.14 | 15.40 | 14.67 |
| 59361 | .1540 | #23 | 3.912 | 2" | 1" | .494" | 16.87 | 16.14 | 15.40 | 14.67 |
| 59366 | .1562 | 5/32" | 3.967 | 2-1/2" | 1-1/8" | .501" | 16.87 | 16.14 | 15.40 | 14.67 |
| 59371 | .1570 | #22 | 3.988 | 2-1/2" | 1-1/8" | .504" | 18.08 | 17.29 | 16.51 | 15.72 |
| 39201 | .1575 | | 4.000 | 63 | 28 | 13 | 18.08 | 17.29 | 16.51 | 15.72 |
| 59381 | .1590 | #21 | 4.039 | 2-1/2" | 1-1/8" | .510" | 18.47 | 17.67 | 16.86 | 16.06 |
| 59386 | .1610 | #20 | 4.089 | 2-1/2" | 1-1/8" | .516" | 18.47 | 17.67 | 16.86 | 16.06 |
| 59391 | .1660 | #19 | 4.216 | 2-1/2" | 1-1/8" | .532" | 19.08 | 18.25 | 17.42 | 16.59 |

*continued* →

## Series 1500H *(continued)*

.1695" - .5000"
(4.305mm - 12.700mm)

| EDP# | *d* † Diameter Decimal | | Metric | *l1* Overall Length | *l2* Flute Length | *l5* Max Drill Depth | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|
| 59396 | .1695 | #18 | 4.305 | 2-1/2" | 1-3/16" | .544" | 19.08 | 18.25 | 17.42 | 16.59 |
| 59401 | .1719 | 11/64" | 4.366 | 2-1/2" | 1-3/16" | .551" | 19.08 | 18.25 | 17.42 | 16.59 |
| 59406 | .1730 | #17 | 4.394 | 2-1/2" | 1-3/16" | .555" | 19.45 | 18.60 | 17.76 | 16.91 |
| 59411 | .1770 | #16 | 4.496 | 2-1/2" | 1-3/16" | .568" | 19.45 | 18.60 | 17.76 | 16.91 |
| 39251 | .1772 | | 4.500 | 63 | 28 | 14 | 19.45 | 18.60 | 17.76 | 16.91 |
| 59421 | .1800 | #15 | 4.572 | 2-1/2" | 1-3/16" | .577" | 19.45 | 18.60 | 17.76 | 16.91 |
| 59426 | .1820 | #14 | 4.623 | 2-1/2" | 1-3/16" | .584" | 20.39 | 19.50 | 18.62 | 17.73 |
| 59431 | .1850 | #13 | 4.700 | 2-1/2" | 1-3/16" | .593" | 20.39 | 19.50 | 18.62 | 17.73 |
| 59436 | .1875 | 3/16" | 4.763 | 2-1/2" | 1-3/16" | .601" | 19.68 | 18.82 | 17.97 | 17.11 |
| 59441 | .1890 | #12 | 4.801 | 2-1/2" | 1-3/16" | .606" | 21.78 | 20.83 | 19.89 | 18.94 |
| 59446 | .1910 | #11 | 4.851 | 2-1/2" | 1-3/16" | .613" | 21.78 | 20.83 | 19.89 | 18.94 |
| 59451 | .1935 | #10 | 4.915 | 2-1/2" | 1-1/4" | .621" | 22.89 | 21.89 | 20.90 | 19.90 |
| 59456 | .1960 | #9 | 4.978 | 2-1/2" | 1-1/4" | .629" | 22.89 | 21.89 | 20.90 | 19.90 |
| 39301 | .1969 | | 5.000 | 63 | 32 | 16 | 22.89 | 21.89 | 20.90 | 19.90 |
| 59466 | .1990 | #8 | 5.055 | 2-1/2" | 1-1/4" | .638" | 23.51 | 22.48 | 21.46 | 20.44 |
| 59471 | .2010 | #7 | 5.105 | 2-1/2" | 1-1/4" | .645" | 23.51 | 22.48 | 21.46 | 20.44 |
| 59476 | .2031 | 13/64" | 5.159 | 2-1/2" | 1-1/4" | .651" | 23.51 | 22.48 | 21.46 | 20.44 |
| 59481 | .2040 | #6 | 5.182 | 2-1/2" | 1-1/4" | .654" | 24.61 | 23.54 | 22.47 | 21.40 |
| 59486 | .2055 | #5 | 5.220 | 2-1/2" | 1-1/4" | .659" | 24.61 | 23.54 | 22.47 | 21.40 |
| 59491 | .2090 | #4 | 5.309 | 2-1/2" | 1-1/4" | .670" | 24.61 | 23.54 | 22.47 | 21.40 |
| 59496 | .2130 | #3 | 5.410 | 2-1/2" | 1-1/4" | .683" | 24.61 | 23.54 | 22.47 | 21.40 |
| 39351 | .2165 | | 5.500 | 63 | 32 | 18 | 24.61 | 23.54 | 22.47 | 21.40 |
| 59506 | .2188 | 7/32" | 5.558 | 2-1/2" | 1-1/2" | .702" | 24.61 | 23.54 | 22.47 | 21.40 |
| 59511 | .2210 | #2 | 5.613 | 2-1/2" | 1-1/2" | .709" | 26.08 | 24.95 | 23.81 | 22.68 |
| 59516 | .2280 | #1 | 5.791 | 2-1/2" | 1-1/2" | .731" | 26.08 | 24.95 | 23.81 | 22.68 |
| 59526 | .2344 | 15/64" | 5.954 | 2-1/2" | 1-1/2" | .752" | 28.62 | 27.38 | 26.13 | 24.89 |
| 39401 | .2362 | | 6.000 | 63 | 38 | 19 | 28.62 | 27.38 | 26.13 | 24.89 |
| 59551 | .2500 | 1/4" | 6.350 | 2-1/2" | 1-1/2" | .802" | 27.16 | 25.98 | 24.80 | 23.62 |
| 39451 | .2559 | | 6.500 | 63 | 38 | 21 | 34.98 | 33.46 | 31.94 | 30.42 |
| 59571 | .2656 | 17/64" | 6.746 | 2-1/2" | 1-1/2" | .852" | 34.98 | 33.46 | 31.94 | 30.42 |
| 39501 | .2756 | | 7.000 | 63 | 38 | 22 | 35.70 | 34.14 | 32.59 | 31.04 |
| 59601 | .2812 | 9/32" | 7.142 | 2-1/2" | 1-1/2" | .902" | 35.70 | 34.14 | 32.59 | 31.04 |
| 39521 | .2953 | | 7.500 | 63 | 41 | 24 | 37.18 | 35.56 | 33.95 | 32.33 |
| 59621 | .2969 | 19/64" | 7.541 | 2-1/2" | 1-5/8" | .952" | 37.18 | 35.56 | 33.95 | 32.33 |
| 59631 | .3125 | 5/16" | 7.938 | 2-1/2" | 1-5/8" | 1.002" | 37.18 | 35.56 | 33.95 | 32.33 |
| 39541 | .3150 | | 8.000 | 63 | 41 | 26 | 38.79 | 37.10 | 35.42 | 33.73 |
| 59651 | .3281 | 21/64" | 8.334 | 3" | 1-5/8" | 1.052" | 39.73 | 38.01 | 36.28 | 34.55 |
| 39561 | .3346 | | 8.500 | 76 | 41 | 27 | 43.64 | 41.75 | 39.85 | 37.95 |
| 59671 | .3438 | 11/32" | 8.733 | 3" | 1-5/8" | 1.103" | 43.64 | 41.75 | 39.85 | 37.95 |
| 39581 | .3543 | | 9.000 | 76 | 41 | 29 | 47.23 | 45.18 | 43.12 | 41.07 |
| 59691 | .3594 | 23/64" | 9.129 | 3" | 1-3/4" | 1.153" | 47.23 | 45.18 | 43.12 | 41.07 |
| 39601 | .3740 | | 9.500 | 76 | 41 | 30 | 50.91 | 48.70 | 46.48 | 44.27 |
| 59706 | .3750 | 3/8" | 9.525 | 3" | 1-3/4" | 1.203" | 50.91 | 48.70 | 46.48 | 44.27 |
| 59721 | .3906 | 25/64" | 9.921 | 3" | 1-3/4" | 1.253" | 57.19 | 54.70 | 52.22 | 49.73 |
| 39621 | .3937 | | 10.000 | 76 | 44 | 32 | 57.19 | 54.70 | 52.22 | 49.73 |
| 59741 | .4062 | 13/32" | 10.317 | 3" | 1-3/4" | 1.303" | 63.05 | 60.31 | 57.57 | 54.83 |
| 59756 | .4219 | 27/64" | 10.716 | 3" | 1-3/4" | 1.353" | 68.71 | 65.73 | 62.74 | 59.75 |
| 39661 | .4331 | | 11.000 | 76 | 44 | 35 | 69.78 | 66.75 | 63.71 | 60.68 |
| 59766 | .4375 | 7/16" | 11.113 | 3" | 1-3/4" | 1.403" | 69.78 | 66.75 | 63.71 | 60.68 |
| 39681 | .4528 | | 11.500 | 76 | 44 | 37 | 71.59 | 68.48 | 65.36 | 62.25 |
| 59776 | .4531 | 29/64" | 11.509 | 3" | 1-3/4" | 1.453" | 72.82 | 69.65 | 66.49 | 63.32 |
| 59781 | .4688 | 15/32" | 11.908 | 3" | 1-3/4" | 1.503" | 72.82 | 69.65 | 66.49 | 63.32 |
| 39701 | .4724 | | 12.000 | 76 | 44 | 38 | 72.82 | 69.65 | 66.49 | 63.32 |
| 59791 | .4844 | 31/64" | 12.304 | 3" | 1-3/4" | 1.554" | 72.82 | 69.65 | 66.49 | 63.32 |
| 39721 | .4921 | | 12.500 | 76 | 44 | 40 | 74.27 | 71.04 | 67.81 | 64.58 |
| 59801 | .5000 | 1/2" | 12.700 | 3" | 1-3/4" | 1.604" | 74.27 | 71.04 | 67.81 | 64.58 |



† *Metric equivalents are for reference only*

| TOLERANCES | | |
|---|---|---|
| $d$ | +.0000" –.0005" (+.0000 –.0127mm) | |
| $l_1$ | ≤ 1/8" | +.125" –.062" (+3.175 –1.588mm) |
| | > 1/8" | +.125" –.125" (+3.175 –3.175mm) |
| $l_2$ | ≤ 1/8" | +.125" –.062" (+3.175 –1.588mm) |
| | >1/8" | +.125" –.125" (+3.175 –3.175mm) |

Z=2 | 15° | 135° | 3xD | TECH PAGES 320-323

# Series 1510

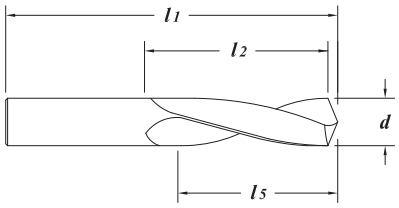
.0625" - .1575"
(1.588mm - 4.000mm)

Recommended for titanium, inconel, hastelloy, waspaloy, and stainless steel

## Slow Helix

Solid submicron grain carbide drill
Heavy web for extra rigidity and added strength
Thinned point
Live tooling recommended on lathe processes
Durana Coating - page 66






| EDP# | $d$ † Diameter Decimal | Diameter | Metric | $l_1$ Overall Length | $l_2$ Flute Length | $l_5$ Max Drill Depth | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|
| 19070 | .0625 | 1/16" | 1.588 | 1-3/4" | 5/8" | .200" | 7.81 | 7.47 | 7.13 | 6.79 |
| 19075 | .0635 | #52 | 1.613 | 1-3/4" | 11/16" | .204" | 7.94 | 7.59 | 7.25 | 6.90 |
| 19080 | .0670 | #51 | 1.702 | 1-3/4" | 11/16" | .215" | 8.05 | 7.70 | 7.35 | 7.00 |
| 19085 | .0700 | #50 | 1.778 | 1-3/4" | 11/16" | .224" | 8.26 | 7.90 | 7.54 | 7.18 |
| 19090 | .0730 | #49 | 1.854 | 1-3/4" | 11/16" | .234" | 8.44 | 8.07 | 7.71 | 7.34 |
| 19095 | .0760 | #48 | 1.930 | 1-3/4" | 11/16" | .244" | 8.73 | 8.35 | 7.97 | 7.59 |
| 19100 | .0781 | 5/64" | 1.984 | 1-3/4" | 11/16" | .250" | 9.05 | 8.66 | 8.26 | 7.87 |
| 19105 | .0785 | #47 | 1.994 | 1-3/4" | 3/4" | .252" | 9.35 | 8.94 | 8.54 | 8.13 |
| 19115 | .0787 | | 2.000 | 45 | 19 | 6 | 9.51 | 9.10 | 8.68 | 8.27 |
| 19120 | .0810 | #46 | 2.057 | 1-3/4" | 3/4" | .260" | 9.65 | 9.23 | 8.81 | 8.39 |
| 19125 | .0820 | #45 | 2.083 | 1-3/4" | 3/4" | .263" | 9.94 | 9.50 | 9.07 | 8.64 |
| 19130 | .0860 | #44 | 2.184 | 1-3/4" | 3/4" | .276" | 10.27 | 9.82 | 9.38 | 8.93 |
| 19135 | .0890 | #43 | 2.261 | 1-3/4" | 3/4" | .285" | 10.57 | 10.11 | 9.65 | 9.19 |
| 19140 | .0935 | #42 | 2.375 | 1-3/4" | 3/4" | .300" | 10.72 | 10.25 | 9.79 | 9.32 |
| 19145 | .0938 | 3/32" | 2.383 | 1-3/4" | 3/4" | .301" | 10.97 | 10.49 | 10.02 | 9.54 |
| 19150 | .0960 | #41 | 2.438 | 1-13/16" | 13/16" | .308" | 11.05 | 10.57 | 10.09 | 9.61 |
| 19155 | .0980 | #40 | 2.489 | 1-13/16" | 13/16" | .314" | 11.20 | 10.71 | 10.23 | 9.74 |
| 19160 | .0984 | | 2.500 | 46 | 21 | 8 | 11.28 | 10.79 | 10.30 | 9.81 |
| 19165 | .0995 | #39 | 2.527 | 1-13/16" | 13/16" | .319" | 11.33 | 10.84 | 10.34 | 9.85 |
| 19170 | .1015 | #38 | 2.578 | 1-13/16" | 13/16" | .326" | 11.43 | 10.93 | 10.44 | 9.94 |
| 19175 | .1040 | #37 | 2.642 | 1-13/16" | 13/16" | .334" | 11.53 | 11.03 | 10.53 | 10.03 |
| 19180 | .1065 | #36 | 2.705 | 1-13/16" | 13/16" | .342" | 11.62 | 11.11 | 10.61 | 10.10 |
| 19185 | .1094 | 7/64" | 2.779 | 1-13/16" | 13/16" | .351" | 11.66 | 11.15 | 10.65 | 10.14 |
| 19190 | .1100 | #35 | 2.794 | 1-7/8" | 7/8" | .353" | 11.74 | 11.23 | 10.72 | 10.21 |
| 19195 | .1110 | #34 | 2.819 | 1-7/8" | 7/8" | .356" | 11.88 | 11.36 | 10.85 | 10.33 |
| 19200 | .1130 | #33 | 2.870 | 1-7/8" | 7/8" | .362" | 11.97 | 11.45 | 10.93 | 10.41 |
| 19205 | .1160 | #32 | 2.946 | 1-7/8" | 7/8" | .372" | 12.05 | 11.53 | 11.00 | 10.48 |
| 19210 | .1181 | | 3.000 | 48 | 22 | 10 | 12.17 | 11.64 | 11.11 | 10.58 |
| 19215 | .1200 | #31 | 3.048 | 1-7/8" | 7/8" | .385" | 12.29 | 11.76 | 11.22 | 10.69 |
| 19220 | .1250 | 1/8" | 3.175 | 1-7/8" | 7/8" | .401" | 12.42 | 11.88 | 11.34 | 10.80 |
| 19225 | .1285 | #30 | 3.264 | 1-15/16" | 15/16" | .412" | 12.75 | 12.20 | 11.64 | 11.09 |
| 19230 | .1360 | #29 | 3.454 | 1-15/16" | 15/16" | .436" | 13.09 | 12.52 | 11.95 | 11.38 |
| 19235 | .1378 | | 3.500 | 49 | 24 | 11 | 13.50 | 12.91 | 12.33 | 11.74 |
| 19240 | .1405 | #28 | 3.569 | 1-15/16" | 15/16" | .451" | 13.67 | 13.08 | 12.48 | 11.89 |
| 19245 | .1406 | 9/64" | 3.571 | 1-15/16" | 15/16" | .451" | 13.82 | 13.22 | 12.62 | 12.02 |
| 19250 | .1440 | #27 | 3.658 | 2-1/16" | 1" | .462" | 15.04 | 14.39 | 13.73 | 13.08 |
| 19255 | .1470 | #26 | 3.734 | 2-1/16" | 1" | .471" | 15.20 | 14.54 | 13.88 | 13.22 |
| 19260 | .1495 | #25 | 3.797 | 2-1/16" | 1" | .479" | 15.39 | 14.72 | 14.05 | 13.38 |
| 19265 | .1520 | #24 | 3.861 | 2-1/16" | 1" | .487" | 15.42 | 14.75 | 14.08 | 13.41 |
| 19270 | .1540 | #23 | 3.912 | 2-1/16" | 1" | .494" | 15.53 | 14.85 | 14.18 | 13.50 |
| 19275 | .1562 | 5/32" | 3.967 | 2-1/16" | 1" | .501" | 15.62 | 14.94 | 14.26 | 13.58 |
| 19280 | .1570 | #22 | 3.988 | 2-1/8" | 1-1/16" | .504" | 16.58 | 15.86 | 15.14 | 14.42 |
| 19285 | .1575 | | 4.000 | 54 | 27 | 13 | 16.81 | 16.08 | 15.35 | 14.62 |

*continued* →

## Series 1510 *(continued)*

.1590" - .3346"
(4.039mm - 8.500mm)

| EDP# | *d* † Diameter Decimal | Diameter | Metric | *l1* Overall Length | *l2* Flute Length | *l5* Max Drill Depth | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|
| 19290 | .1590 | #21 | 4.039 | 2-1/8" | 1-1/16" | .510" | 17.02 | 16.28 | 15.54 | 14.80 |
| 19295 | .1610 | #20 | 4.089 | 2-1/8" | 1-1/16" | .516" | 17.15 | 16.40 | 15.66 | 14.91 |
| 19300 | .1660 | #19 | 4.216 | 2-1/8" | 1-1/16" | .532" | 17.85 | 17.07 | 16.30 | 15.52 |
| 19305 | .1695 | #18 | 4.305 | 2-1/8" | 1-1/16" | .544" | 18.06 | 17.27 | 16.49 | 15.70 |
| 19310 | .1719 | 11/64" | 4.366 | 2-1/8" | 1-1/16" | .551" | 18.41 | 17.61 | 16.81 | 16.01 |
| 19315 | .1730 | #17 | 4.394 | 2-3/16" | 1-1/8" | .555" | 18.68 | 17.86 | 17.05 | 16.24 |
| 19320 | .1770 | #16 | 4.496 | 2-3/16" | 1-1/8" | .568" | 18.88 | 18.06 | 17.24 | 16.42 |
| 19325 | .1772 |  | 4.500 | 56 | 29 | 14 | 19.00 | 18.17 | 17.35 | 16.52 |
| 19330 | .1800 | #15 | 4.572 | 2-3/16" | 1-1/8" | .577" | 19.08 | 18.25 | 17.42 | 16.59 |
| 19335 | .1820 | #14 | 4.623 | 2-3/16" | 1-1/8" | .584" | 19.50 | 18.66 | 17.81 | 16.96 |
| 19340 | .1850 | #13 | 4.700 | 2-3/16" | 1-1/8" | .593" | 19.65 | 18.80 | 17.94 | 17.09 |
| 19345 | .1875 | 3/16" | 4.763 | 2-3/16" | 1-1/8" | .601" | 19.73 | 18.88 | 18.02 | 17.16 |
| 19350 | .1890 | #12 | 4.801 | 2-1/4" | 1-3/16" | .606" | 20.38 | 19.49 | 18.61 | 17.72 |
| 19355 | .1910 | #11 | 4.851 | 2-1/4" | 1-3/16" | .613" | 20.62 | 19.72 | 18.83 | 17.93 |
| 19360 | .1935 | #10 | 4.915 | 2-1/4" | 1-3/16" | .621" | 21.56 | 20.63 | 19.69 | 18.75 |
| 19365 | .1960 | #9 | 4.978 | 2-1/4" | 1-3/16" | .629" | 22.13 | 21.16 | 20.20 | 19.24 |
| 19370 | .1969 |  | 5.000 | 57 | 30 | 16 | 22.24 | 21.27 | 20.31 | 19.34 |
| 19375 | .1990 | #8 | 5.055 | 2-1/4" | 1-3/16" | .638" | 22.41 | 21.44 | 20.46 | 19.49 |
| 19380 | .2010 | #7 | 5.105 | 2-1/4" | 1-3/16" | .645" | 23.07 | 22.07 | 21.06 | 20.06 |
| 19385 | .2031 | 13/64" | 5.159 | 2-1/4" | 1-3/16" | .651" | 23.24 | 22.23 | 21.22 | 20.21 |
| 19390 | .2040 | #6 | 5.182 | 2-3/8" | 1-1/4" | .654" | 23.70 | 22.67 | 21.64 | 20.61 |
| 19395 | .2055 | #5 | 5.220 | 2-3/8" | 1-1/4" | .659" | 24.18 | 23.13 | 22.08 | 21.03 |
| 19400 | .2090 | #4 | 5.309 | 2-3/8" | 1-1/4" | .670" | 24.63 | 23.56 | 22.49 | 21.42 |
| 19405 | .2130 | #3 | 5.410 | 2-3/8" | 1-1/4" | .683" | 25.07 | 23.98 | 22.89 | 21.80 |
| 19410 | .2165 |  | 5.500 | 60 | 32 | 18 | 25.24 | 24.15 | 23.05 | 21.95 |
| 19415 | .2188 | 7/32" | 5.558 | 2-3/8" | 1-1/4" | .702" | 25.44 | 24.33 | 23.23 | 22.12 |
| 19420 | .2210 | #2 | 5.613 | 2-7/16" | 1-5/16" | .709" | 26.04 | 24.90 | 23.77 | 22.64 |
| 19425 | .2280 | #1 | 5.791 | 2-7/16" | 1-5/16" | .731" | 26.22 | 25.08 | 23.94 | 22.80 |
| 19430 | .2340 | A | 5.944 | 2-7/16" | 1-5/16" | .750" | 26.28 | 25.14 | 23.99 | 22.85 |
| 19435 | .2344 | 15/64" | 5.954 | 2-7/16" | 1-5/16" | .752" | 26.32 | 25.18 | 24.03 | 22.89 |
| 19440 | .2362 |  | 6.000 | 64 | 35 | 19 | 26.39 | 25.25 | 24.10 | 22.95 |
| 19445 | .2380 | B | 6.045 | 2-1/2" | 1-3/8" | .763" | 26.52 | 25.37 | 24.21 | 23.06 |
| 19450 | .2420 | C | 6.147 | 2-1/2" | 1-3/8" | .776" | 26.69 | 25.53 | 24.37 | 23.21 |
| 19455 | .2460 | D | 6.248 | 2-1/2" | 1-3/8" | .789" | 26.92 | 25.75 | 24.58 | 23.41 |
| 19460 | .2500 | 1/4" / E | 6.350 | 2-1/2" | 1-3/8" | .802" | 27.08 | 25.91 | 24.73 | 23.55 |
| 19465 | .2559 |  | 6.500 | 67 | 37 | 21 | 27.74 | 26.53 | 25.33 | 24.12 |
| 19470 | .2570 | F | 6.528 | 2-5/8" | 1-7/16" | .824" | 28.32 | 27.09 | 25.86 | 24.63 |
| 19475 | .2610 | G | 6.629 | 2-5/8" | 1-7/16" | .837" | 28.90 | 27.64 | 26.39 | 25.13 |
| 19480 | .2656 | 17/64" | 6.746 | 2-5/8" | 1-7/16" | .852" | 29.49 | 28.20 | 26.92 | 25.64 |
| 19485 | .2660 | H | 6.756 | 2-11/16" | 1-1/2" | .853" | 30.33 | 29.01 | 27.69 | 26.37 |
| 19490 | .2720 | I | 6.909 | 2-11/16" | 1-1/2" | .872" | 30.68 | 29.35 | 28.01 | 26.68 |
| 19495 | .2756 |  | 7.000 | 68 | 38 | 22 | 30.92 | 29.58 | 28.23 | 26.89 |
| 19500 | .2770 | J | 7.036 | 2-11/16" | 1-1/2" | .888" | 31.20 | 29.84 | 28.49 | 27.13 |
| 19505 | .2810 | K | 7.137 | 2-11/16" | 1-1/2" | .901" | 31.48 | 30.11 | 28.74 | 27.37 |
| 19510 | .2812 | 9/32" | 7.142 | 2-11/16" | 1-1/2" | .902" | 31.65 | 30.27 | 28.90 | 27.52 |
| 19515 | .2900 | L | 7.366 | 2-3/4" | 1-9/16" | .930" | 32.82 | 31.39 | 29.97 | 28.54 |
| 19520 | .2950 | M | 7.493 | 2-3/4" | 1-9/16" | .946" | 35.12 | 33.59 | 32.07 | 30.54 |
| 19525 | .2953 |  | 7.500 | 70 | 40 | 24 | 35.12 | 33.59 | 32.07 | 30.54 |
| 19530 | .2969 | 19/64" | 7.541 | 2-3/4" | 1-9/16" | .952" | 35.32 | 33.78 | 32.25 | 30.71 |
| 19535 | .3020 | N | 7.671 | 2-15/16" | 1-5/8" | .969" | 37.19 | 35.57 | 33.96 | 32.34 |
| 19540 | .3125 | 5/16" | 7.938 | 2-15/16" | 1-5/8" | 1.002" | 37.34 | 35.72 | 34.09 | 32.47 |
| 19545 | .3150 |  | 8.000 | 75 | 43 | 26 | 40.07 | 38.32 | 36.58 | 34.84 |
| 19550 | .3160 | O | 8.026 | 2-15/16" | 1-11/16" | 1.013" | 40.07 | 38.32 | 36.58 | 34.84 |
| 19555 | .3230 | P | 8.204 | 2-15/16" | 1-11/16" | 1.036" | 40.41 | 38.65 | 36.90 | 35.14 |
| 19560 | .3281 | 21/64" | 8.334 | 2-15/16" | 1-11/16" | 1.052" | 40.65 | 38.89 | 37.12 | 35.35 |
| 19565 | .3320 | Q | 8.433 | 3" | 1-11/16" | 1.065" | 41.60 | 39.79 | 37.98 | 36.17 |
| 19570 | .3346 |  | 8.500 | 76 | 43 | 27 | 41.99 | 40.16 | 38.34 | 36.51 |



† *Metric equivalents are for reference only*

| EDP# | *d* † Diameter Decimal | Diameter | Metric | *l1* Overall Length | *l2* Flute Length | *l5* Max Drill Depth | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|
| 19575 | .3390 | R | 8.611 | 3" | 1-11/16" | 1.087" | 43.30 | 41.42 | 39.53 | 37.65 |
| 19580 | .3438 | 11/32" | 8.733 | 3" | 1-11/16" | 1.103" | 45.06 | 43.10 | 41.14 | 39.18 |
| 19585 | .3480 | S | 8.839 | 3-1/16" | 1-3/4" | 1.116" | 45.68 | 43.69 | 41.71 | 39.72 |
| 19590 | .3543 | | 9.000 | 78 | 44 | 29 | 45.95 | 43.96 | 41.96 | 39.96 |
| 19595 | .3580 | T | 9.093 | 3-1/16" | 1-3/4" | 1.148" | 46.13 | 44.12 | 42.12 | 40.11 |
| 19600 | .3594 | 23/64" | 9.129 | 3-1/16" | 1-3/4" | 1.153" | 46.44 | 44.42 | 42.40 | 40.38 |
| 19605 | .3680 | U | 9.347 | 3-1/8" | 1-13/16" | 1.180" | 50.86 | 48.65 | 46.44 | 44.23 |
| 19615 | .3750 | 3/8" | 9.525 | 3-1/8" | 1-13/16" | 1.203" | 51.74 | 49.49 | 47.24 | 44.99 |
| 19620 | .3770 | V | 9.576 | 3-1/4" | 1-7/8" | 1.209" | 52.74 | 50.45 | 48.15 | 45.86 |
| 19625 | .3860 | W | 9.804 | 3-1/4" | 1-7/8" | 1.238" | 53.84 | 51.50 | 49.16 | 46.82 |
| 19630 | .3906 | 25/64" | 9.921 | 3-1/4" | 1-7/8" | 1.253" | 54.67 | 52.29 | 49.92 | 47.54 |
| 19635 | .3937 | | 10.000 | 84 | 49 | 32 | 56.61 | 54.15 | 51.69 | 49.23 |
| 19640 | .3970 | X | 10.084 | 3-5/16" | 1-15/16" | 1.273" | 58.27 | 55.74 | 53.20 | 50.67 |
| 19645 | .4040 | Y | 10.262 | 3-5/16" | 1-15/16" | 1.296" | 58.73 | 56.18 | 53.62 | 51.07 |
| 19650 | .4062 | 13/32" | 10.317 | 3-5/16" | 1-15/16" | 1.303" | 60.87 | 58.22 | 55.58 | 52.93 |
| 19655 | .4130 | Z | 10.490 | 3-3/8" | 2" | 1.325" | 61.53 | 58.85 | 56.18 | 53.50 |
| 19660 | .4134 | | 10.500 | 86 | 51 | 34 | 61.53 | 58.85 | 56.18 | 53.50 |
| 19665 | .4219 | 27/64" | 10.716 | 3-3/8" | 2" | 1.353" | 62.20 | 59.50 | 56.79 | 54.09 |
| 19670 | .4331 | | 11.000 | 87 | 52 | 35 | 67.56 | 64.63 | 61.69 | 58.75 |
| 19675 | .4375 | 7/16" | 11.113 | 3-7/16" | 2-1/16" | 1.403" | 67.56 | 64.63 | 61.69 | 58.75 |
| 19685 | .4531 | 29/64" | 11.509 | 3-9/16" | 2-1/8" | 1.453" | 73.27 | 70.08 | 66.90 | 63.71 |
| 19690 | .4688 | 15/32" | 11.908 | 3-5/8" | 2-1/8" | 1.503" | 77.50 | 74.13 | 70.76 | 67.39 |
| 19695 | .4724 | | 12.000 | 94 | 56 | 38 | 77.77 | 74.39 | 71.01 | 67.63 |
| 19700 | .4844 | 31/64" | 12.304 | 3-11/16" | 2-3/16" | 1.554" | 78.38 | 74.98 | 71.57 | 68.16 |
| 19705 | .4921 | | 12.500 | 95 | 56 | 40 | 79.26 | 75.81 | 72.37 | 68.92 |
| 19710 | .5000 | 1/2" | 12.700 | 3-3/4" | 2-1/4" | 1.604" | 79.83 | 76.36 | 72.89 | 69.42 |
| 19720 | .5156 | 33/64" | 13.096 | 4-1/4" | 2-3/8" | 1.654" | 107.28 | 102.62 | 97.95 | 93.29 |
| 19725 | .5312 | 17/32" | 13.492 | 4-1/4" | 2-3/8" | 1.704" | 110.07 | 105.28 | 100.50 | 95.71 |
| 19730 | .5315 | | 13.500 | 107 | 60 | 43 | 112.91 | 108.00 | 103.09 | 98.18 |
| 19735 | .5469 | 35/64" | 13.891 | 4-1/4" | 2-3/8" | 1.754" | 115.69 | 110.66 | 105.63 | 100.60 |
| 19740 | .5512 | | 14.000 | 107 | 60 | 45 | 118.51 | 113.36 | 108.20 | 103.05 |
| 19745 | .5625 | 9/16" | 14.287 | 4-1/2" | 2-1/2" | 1.804" | 129.23 | 123.61 | 117.99 | 112.37 |
| 19755 | .5781 | 37/64" | 14.683 | 4-1/2" | 2-1/2" | 1.854" | 134.62 | 128.77 | 122.91 | 117.06 |
| 19760 | .5906 | | 15.000 | 115 | 65 | 48 | 137.36 | 131.38 | 125.41 | 119.44 |
| 19765 | .5938 | 19/32" | 15.082 | 4-1/2" | 2-1/2" | 1.904" | 138.15 | 132.14 | 126.14 | 120.13 |
| 19770 | .6094 | 39/64" | 15.478 | 4-1/2" | 2-1/2" | 1.954" | 138.92 | 132.88 | 126.84 | 120.80 |
| 19780 | .6250 | 5/8" | 15.875 | 4-1/2" | 2-1/2" | 2.004" | 140.48 | 134.38 | 128.27 | 122.16 |
| 19785 | .6299 | | 16.000 | 115 | 65 | 51 | 144.22 | 137.95 | 131.68 | 125.41 |

# Series 1510H

NEW ITEM

.0625" - .1575"
(1.588mm - 4.000mm)

Z=2 | 15° | 135° | 3xD | TECH PAGES 324-327

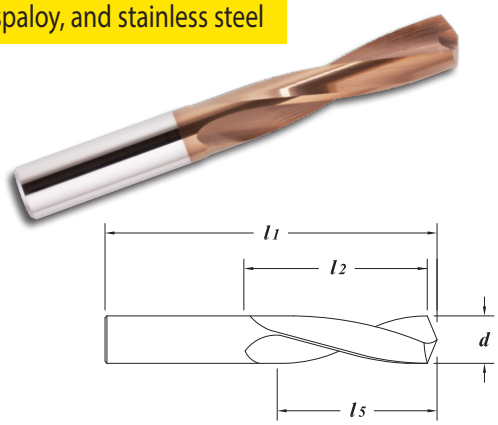
| TOLERANCES | | |
|---|---|---|
| $d$ | +.0000" –.0005" (+.0000 –.0127mm) | |
| $l_1$ | ≤ 1/8" | +.125" –.062" (+3.175 –1.588mm) |
| | > 1/8" | +.125" –.125" (+3.175 –3.175mm) |
| $l_2$ | ≤ 1/8" | +.125" –.062" (+3.175 –1.588mm) |
| | >1/8" | +.125" –.125" (+3.175 –3.175mm) |

Recommended for titanium, inconel, hastelloy, waspaloy, and stainless steel

## Slow Helix

### BALINIT® Durana Coating

Solid submicron grain carbide drill
Excellent heat resistance and lubricity
Heavy web for extra rigidity and added strength
Thinned point
Live tooling recommended on lathe processes
Bright Finish - page 63




| | EDP# | $d$ † Diameter Decimal | Diameter | Metric | $l_1$ Overall Length | $l_2$ Flute Length | $l_5$ Max Drill Depth | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 19071 | .0625 | 1/16" | 1.588 | 1-3/4" | 5/8" | .200" | 9.89 | 9.46 | 9.03 | 8.60 |
| | 19076 | .0635 | #52 | 1.613 | 1-3/4" | 11/16" | .204" | 10.03 | 9.59 | 9.16 | 8.72 |
| | 19081 | .0670 | #51 | 1.702 | 1-3/4" | 11/16" | .215" | 10.13 | 9.69 | 9.25 | 8.81 |
| | 19086 | .0700 | #50 | 1.778 | 1-3/4" | 11/16" | .224" | 10.34 | 9.89 | 9.44 | 8.99 |
| | 19091 | .0730 | #49 | 1.854 | 1-3/4" | 11/16" | .234" | 10.55 | 10.09 | 9.63 | 9.17 |
| | 19096 | .0760 | #48 | 1.930 | 1-3/4" | 11/16" | .244" | 10.81 | 10.34 | 9.87 | 9.40 |
| | 19101 | .0781 | 5/64" | 1.984 | 1-3/4" | 11/16" | .250" | 11.14 | 10.66 | 10.17 | 9.69 |
| | 19106 | .0785 | #47 | 1.994 | 1-3/4" | 3/4" | .252" | 11.44 | 10.95 | 10.45 | 9.95 |
| | 19116 | .0787 | | 2.000 | 45 | 19 | 6 | 11.59 | 11.09 | 10.58 | 10.08 |
| | 19121 | .0810 | #46 | 2.057 | 1-3/4" | 3/4" | .260' | 11.74 | 11.23 | 10.72 | 10.21 |
| | 19126 | .0820 | #45 | 2.083 | 1-3/4" | 3/4" | .263" | 12.04 | 11.52 | 10.99 | 10.47 |
| NEW | 19128 | .0827 | | 2.100 | 45 | 19 | 7 | 12.13 | 11.61 | 11.08 | 10.55 |
| | 19131 | .0860 | #44 | 2.184 | 1-3/4" | 3/4" | .276" | 12.35 | 11.81 | 11.28 | 10.74 |
| | 19136 | .0890 | #43 | 2.261 | 1-3/4" | 3/4" | .285" | 12.66 | 12.11 | 11.56 | 11.01 |
| | 19138 | .0906 | | 2.300 | 45 | 19 | 7 | 12.70 | 12.14 | 11.59 | 11.04 |
| | 19141 | .0935 | #42 | 2.375 | 1-3/4" | 3/4" | .300" | 12.80 | 12.24 | 11.69 | 11.13 |
| | 19146 | .0938 | 3/32" | 2.383 | 1-3/4" | 3/4" | .301" | 13.06 | 12.50 | 11.93 | 11.36 |
| | 19148 | .0945 | | 2.400 | 46 | 21 | 8 | 13.11 | 12.54 | 11.97 | 11.40 |
| | 19151 | .0960 | #41 | 2.438 | 1-13/16" | 13/16" | .308" | 13.14 | 12.57 | 12.00 | 11.43 |
| | 19156 | .0980 | #40 | 2.489 | 1-13/16" | 13/16" | .314" | 13.29 | 12.72 | 12.14 | 11.56 |
| | 19161 | .0984 | | 2.500 | 46 | 21 | 8 | 13.37 | 12.79 | 12.21 | 11.63 |
| | 19166 | .0995 | #39 | 2.527 | 1-13/16" | 13/16" | .319" | 13.44 | 12.86 | 12.27 | 11.69 |
| | 19171 | .1015 | #38 | 2.578 | 1-13/16" | 13/16" | .326" | 13.51 | 12.93 | 12.34 | 11.75 |
| | 19176 | .1040 | #37 | 2.642 | 1-13/16" | 13/16" | .334" | 13.59 | 13.00 | 12.41 | 11.82 |
| | 19181 | .1065 | #36 | 2.705 | 1-13/16" | 13/16" | .342" | 13.70 | 13.10 | 12.51 | 11.91 |
| | 19186 | .1094 | 7/64" | 2.779 | 1-13/16" | 13/16" | .351" | 13.78 | 13.18 | 12.58 | 11.98 |
| | 19191 | .1100 | #35 | 2.794 | 1-7/8" | 7/8" | .353" | 13.83 | 13.23 | 12.63 | 12.03 |
| | 19196 | .1110 | #34 | 2.819 | 1-7/8" | 7/8" | .356" | 13.97 | 13.37 | 12.76 | 12.15 |
| | 19201 | .1130 | #33 | 2.870 | 1-7/8" | 7/8" | .362" | 14.05 | 13.44 | 12.83 | 12.22 |
| | 19206 | .1160 | #32 | 2.946 | 1-7/8" | 7/8" | .372" | 14.15 | 13.53 | 12.92 | 12.30 |
| | 19211 | .1181 | | 3.000 | 48 | 22 | 10 | 14.27 | 13.65 | 13.03 | 12.41 |
| | 19216 | .1200 | #31 | 3.048 | 1-7/8" | 7/8" | .385" | 14.36 | 13.74 | 13.11 | 12.49 |
| | 19218 | .1220 | | 3.100 | 48 | 22 | 10 | 14.43 | 13.81 | 13.18 | 12.55 |
| | 19221 | .1250 | 1/8" | 3.175 | 1-7/8" | 7/8" | .401" | 14.52 | 13.89 | 13.26 | 12.63 |
| | 19226 | .1285 | #30 | 3.264 | 1-15/16" | 15/16" | .412" | 14.85 | 14.20 | 13.56 | 12.91 |
| | 19231 | .1360 | #29 | 3.454 | 1-15/16" | 15/16" | .436" | 15.17 | 14.51 | 13.85 | 13.19 |
| | 19236 | .1378 | | 3.500 | 49 | 24 | 11 | 15.59 | 14.92 | 14.24 | 13.56 |
| | 19241 | .1405 | #28 | 3.569 | 1-15/16" | 15/16" | .451" | 15.78 | 15.09 | 14.41 | 13.72 |
| | 19246 | .1406 | 9/64" | 3.571 | 1-15/16" | 15/16" | .451" | 15.89 | 15.20 | 14.51 | 13.82 |
| | 19251 | .1440 | #27 | 3.658 | 2-1/16" | 1" | .462" | 17.14 | 16.39 | 15.65 | 14.90 |
| | 19256 | .1470 | #26 | 3.734 | 2-1/16" | 1" | .471" | 17.30 | 16.54 | 15.79 | 15.04 |
| | 19261 | .1495 | #25 | 3.797 | 2-1/16" | 1" | .479" | 17.50 | 16.74 | 15.98 | 15.22 |
| | 19266 | .1520 | #24 | 3.861 | 2-1/16" | 1" | .487" | 17.53 | 16.76 | 16.00 | 15.24 |
| | 19271 | .1540 | #23 | 3.912 | 2-1/16" | 1" | .494" | 17.62 | 16.85 | 16.09 | 15.32 |
| | 19276 | .1562 | 5/32" | 3.967 | 2-1/16" | 1" | .501" | 17.71 | 16.94 | 16.17 | 15.40 |
| | 19281 | .1570 | #22 | 3.988 | 2-1/8" | 1-1/16" | .504" | 18.68 | 17.86 | 17.05 | 16.24 |
| | 19286 | .1575 | | 4.000 | 54 | 27 | 13 | 18.88 | 18.06 | 17.24 | 16.42 |



† *Metric equivalents are for reference only*

| EDP# | *d* † Diameter Decimal | Diameter | Metric | *l1* Overall Length | *l2* Flute Length | *l5* Max Drill Depth | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|
| 19291 | .1590 | #21 | 4.039 | 2-1/8" | 1-1/16" | .510" | 19.10 | 18.27 | 17.44 | 16.61 |
| 19296 | .1610 | #20 | 4.089 | 2-1/8" | 1-1/16" | .516" | 19.24 | 18.40 | 17.57 | 16.73 |
| 19301 | .1660 | #19 | 4.216 | 2-1/8" | 1-1/16" | .532" | 19.93 | 19.06 | 18.20 | 17.33 |
| 19306 | .1695 | #18 | 4.305 | 2-1/8" | 1-1/16" | .544" | 20.14 | 19.26 | 18.39 | 17.51 |
| 19311 | .1719 | 11/64" | 4.366 | 2-1/8" | 1-1/16" | .551" | 20.52 | 19.62 | 18.73 | 17.84 |
| 19316 | .1730 | #17 | 4.394 | 2-3/16" | 1-1/8" | .555" | 20.77 | 19.87 | 18.96 | 18.06 |
| 19321 | .1770 | #16 | 4.496 | 2-3/16" | 1-1/8" | .568" | 20.99 | 20.08 | 19.16 | 18.25 |
| 19326 | .1772 | | 4.500 | 56 | 29 | 14 | 21.07 | 20.15 | 19.24 | 18.32 |
| 19331 | .1800 | #15 | 4.572 | 2-3/16" | 1-1/8" | .577" | 21.16 | 20.24 | 19.32 | 18.40 |
| 19336 | .1820 | #14 | 4.623 | 2-3/16" | 1-1/8" | .584" | 21.60 | 20.66 | 19.72 | 18.78 |
| 19341 | .1850 | #13 | 4.700 | 2-3/16" | 1-1/8" | .593" | 21.76 | 20.81 | 19.87 | 18.92 |
| 19346 | .1875 | 3/16" | 4.763 | 2-3/16" | 1-1/8" | .601" | 21.82 | 20.87 | 19.92 | 18.97 |
| 19351 | .1890 | #12 | 4.801 | 2-1/4" | 1-3/16" | .606" | 23.99 | 22.95 | 21.90 | 20.86 |
| 19356 | .1910 | #11 | 4.851 | 2-1/4" | 1-3/16" | .613" | 24.24 | 23.19 | 22.13 | 21.08 |
| 19361 | .1935 | #10 | 4.915 | 2-1/4" | 1-3/16" | .621" | 25.19 | 24.09 | 23.00 | 21.90 |
| 19366 | .1960 | #9 | 4.978 | 2-1/4" | 1-3/16" | .629" | 25.75 | 24.63 | 23.51 | 22.39 |
| 19371 | .1969 | | 5.000 | 57 | 30 | 16 | 25.88 | 24.75 | 23.63 | 22.50 |
| 19376 | .1990 | #8 | 5.055 | 2-1/4" | 1-3/16" | .638" | 26.01 | 24.88 | 23.75 | 22.62 |
| 19381 | .2010 | #7 | 5.105 | 2-1/4" | 1-3/16" | .645" | 26.68 | 25.52 | 24.36 | 23.20 |
| 19386 | .2031 | 13/64" | 5.159 | 2-1/4" | 1-3/16" | .651" | 26.84 | 25.67 | 24.51 | 23.34 |
| 19391 | .2040 | #6 | 5.182 | 2-3/8" | 1-1/4" | .654" | 27.32 | 26.14 | 24.95 | 23.76 |
| 19396 | .2055 | #5 | 5.220 | 2-3/8" | 1-1/4" | .659" | 27.82 | 26.61 | 25.40 | 24.19 |
| 19401 | .2090 | #4 | 5.309 | 2-3/8" | 1-1/4" | .670" | 28.22 | 26.99 | 25.77 | 24.54 |
| 19406 | .2130 | #3 | 5.410 | 2-3/8" | 1-1/4" | .683" | 28.67 | 27.42 | 26.18 | 24.93 |
| 19411 | .2165 | | 5.500 | 60 | 32 | 18 | 28.88 | 27.62 | 26.37 | 25.11 |
| 19416 | .2188 | 7/32" | 5.558 | 2-3/8" | 1-1/4" | .702" | 29.05 | 27.79 | 26.52 | 25.26 |
| 19421 | .2210 | #2 | 5.613 | 2-7/16" | 1-5/16" | .709" | 29.66 | 28.37 | 27.08 | 25.79 |
| 19426 | .2280 | #1 | 5.791 | 2-7/16" | 1-5/16" | .731" | 29.83 | 28.53 | 27.24 | 25.94 |
| 19431 | .2340 | A | 5.944 | 2-7/16" | 1-5/16" | .750" | 29.90 | 28.60 | 27.30 | 26.00 |
| 19436 | .2344 | 15/64" | 5.954 | 2-7/16" | 1-5/16" | .752" | 29.93 | 28.63 | 27.33 | 26.03 |
| 19441 | .2362 | | 6.000 | 64 | 35 | 19 | 30.03 | 28.72 | 27.42 | 26.11 |
| 19446 | .2380 | B | 6.045 | 2-1/2" | 1-3/8" | .763" | 30.13 | 28.82 | 27.51 | 26.20 |
| 19451 | .2420 | C | 6.147 | 2-1/2" | 1-3/8" | .776" | 30.31 | 29.00 | 27.68 | 26.36 |
| 19456 | .2460 | D | 6.248 | 2-1/2" | 1-3/8" | .789" | 30.52 | 29.19 | 27.87 | 26.54 |
| 19461 | .2500 | 1/4" / E | 6.350 | 2-1/2" | 1-3/8" | .802" | 30.71 | 29.37 | 28.04 | 26.70 |
| 19466 | .2559 | | 6.500 | 67 | 37 | 21 | 34.16 | 32.67 | 31.19 | 29.70 |
| 19471 | .2570 | F | 6.528 | 2-5/8" | 1-7/16" | .824" | 34.74 | 33.23 | 31.72 | 30.21 |
| 19476 | .2610 | G | 6.629 | 2-5/8" | 1-7/16" | .837" | 35.32 | 33.78 | 32.25 | 30.71 |
| 19481 | .2656 | 17/64" | 6.746 | 2-5/8" | 1-7/16" | .852" | 35.90 | 34.34 | 32.78 | 31.22 |
| 19486 | .2660 | H | 6.756 | 2-11/16" | 1-1/2" | .853" | 36.74 | 35.15 | 33.55 | 31.95 |
| 19491 | .2720 | I | 6.909 | 2-11/16" | 1-1/2" | .872" | 37.09 | 35.48 | 33.86 | 32.25 |
| 19496 | .2756 | | 7.000 | 68 | 38 | 22 | 37.34 | 35.72 | 34.09 | 32.47 |
| 19501 | .2770 | J | 7.036 | 2-11/16" | 1-1/2" | .888" | 37.63 | 35.99 | 34.36 | 32.72 |
| 19506 | .2810 | K | 7.137 | 2-11/16" | 1-1/2" | .901" | 37.90 | 36.26 | 34.61 | 32.96 |
| 19511 | .2812 | 9/32" | 7.142 | 2-11/16" | 1-1/2" | .902" | 38.03 | 36.38 | 34.72 | 33.07 |
| 19516 | .2900 | L | 7.366 | 2-3/4" | 1-9/16" | .930" | 39.22 | 37.51 | 35.81 | 34.10 |
| 19521 | .2950 | M | 7.493 | 2-3/4" | 1-9/16" | .946" | 41.53 | 39.72 | 37.92 | 36.11 |
| 19526 | .2953 | | 7.500 | 70 | 40 | 24 | 41.53 | 39.72 | 37.92 | 36.11 |
| 19531 | .2969 | 19/64" | 7.541 | 2-3/4" | 1-9/16" | .952" | 41.70 | 39.89 | 38.07 | 36.26 |
| 19536 | .3020 | N | 7.671 | 2-15/16" | 1-5/8" | .989" | 43.62 | 41.72 | 39.83 | 37.93 |
| 19541 | .3125 | 5/16" | 7.938 | 2-15/16" | 1-5/8" | 1.002" | 43.76 | 41.86 | 39.95 | 38.05 |
| 19546 | .3150 | | 8.000 | 75 | 43 | 26 | 46.47 | 44.45 | 42.43 | 40.41 |
| 19551 | .3160 | O | 8.026 | 2-15/16" | 1-11/16" | 1.013" | 46.47 | 44.45 | 42.43 | 40.41 |
| 19556 | .3230 | P | 8.204 | 2-15/16" | 1-11/16" | 1.036" | 46.82 | 44.78 | 42.75 | 40.71 |
| 19561 | .3281 | 21/64" | 8.334 | 2-15/16" | 1-11/16" | 1.052" | 47.06 | 45.01 | 42.97 | 40.92 |
| 19566 | .3320 | Q | 8.433 | 3" | 1-11/16" | 1.065" | 48.01 | 45.93 | 43.84 | 41.75 |
| 19571 | .3346 | | 8.500 | 76 | 43 | 27 | 48.40 | 46.30 | 44.19 | 42.09 |

*continued* →

## Series 1510H *(continued)*

.3390" - .6299"
(8.611mm - 16.000mm)

| EDP# | *d* † Diameter Decimal | Diameter | Metric | *l1* Overall Length | *l2* Flute Length | *l5* Max Drill Depth | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|
| 19576 | .3390 | R | 8.611 | 3" | 1-11/16" | 1.087" | 49.70 | 47.54 | 45.38 | 43.22 |
| 19581 | .3438 | 11/32" | 8.733 | 3" | 1-11/16" | 1.103" | 51.47 | 49.24 | 47.00 | 44.76 |
| 19586 | .3480 | S | 8.839 | 3-1/16" | 1-3/4" | 1.116" | 54.36 | 52.00 | 49.63 | 47.27 |
| 19591 | .3543 | | 9.000 | 78 | 44 | 29 | 54.67 | 52.29 | 49.92 | 47.54 |
| 19596 | .3580 | T | 9.093 | 3-1/16" | 1-3/4" | 1.148" | 54.80 | 52.42 | 50.03 | 47.65 |
| 19601 | .3594 | 23/64" | 9.129 | 3-1/16" | 1-3/4" | 1.153" | 55.14 | 52.75 | 50.35 | 47.95 |
| 19606 | .3680 | U | 9.347 | 3-1/8" | 1-13/16" | 1.180" | 59.56 | 56.97 | 54.38 | 51.79 |
| 19611 | .3740 | | 9.500 | 79 | 46 | 30 | 60.04 | 57.43 | 54.82 | 52.21 |
| 19616 | .3750 | 3/8" | 9.525 | 3-1/8" | 1-13/16" | 1.203" | 60.44 | 57.82 | 55.19 | 52.56 |
| 19621 | .3770 | V | 9.576 | 3-1/4" | 1-7/8" | 1.209" | 62.71 | 59.98 | 57.26 | 54.53 |
| 19626 | .3860 | W | 9.804 | 3-1/4" | 1-7/8" | 1.238" | 63.80 | 61.03 | 58.25 | 55.48 |
| 19631 | .3906 | 25/64" | 9.921 | 3-1/4" | 1-7/8" | 1.253" | 64.60 | 61.79 | 58.98 | 56.17 |
| 19636 | .3937 | | 10.000 | 84 | 49 | 32 | 66.56 | 63.67 | 60.77 | 57.88 |
| 19641 | .3970 | X | 10.084 | 3-5/16" | 1-15/16" | 1.273" | 68.24 | 65.27 | 62.31 | 59.34 |
| 19646 | .4040 | Y | 10.262 | 3-5/16" | 1-15/16" | 1.296" | 68.71 | 65.73 | 62.74 | 59.75 |
| 19651 | .4062 | 13/32" | 10.317 | 3-5/16" | 1-15/16" | 1.303" | 70.81 | 67.73 | 64.65 | 61.57 |
| 19656 | .4130 | Z | 10.490 | 3-3/8" | 2" | 1.325" | 71.47 | 68.37 | 65.26 | 62.15 |
| 19661 | .4134 | | 10.500 | 86 | 51 | 34 | 71.47 | 68.37 | 65.26 | 62.15 |
| 19666 | .4219 | 27/64" | 10.716 | 3-3/8" | 2" | 1.353" | 72.14 | 69.00 | 65.87 | 62.73 |
| 19671 | .4331 | | 11.000 | 87 | 52 | 35 | 77.50 | 74.13 | 70.76 | 67.39 |
| 19676 | .4375 | 7/16" | 11.113 | 3-7/16" | 2-1/16" | 1.403" | 77.50 | 74.13 | 70.76 | 67.39 |
| 19681 | .4528 | | 11.500 | 91 | 54 | 37 | 83.21 | 79.60 | 75.98 | 72.36 |
| 19686 | .4531 | 29/64" | 11.509 | 3-9/16" | 2-1/8" | 1.453" | 83.21 | 79.60 | 75.98 | 72.36 |
| 19691 | .4688 | 15/32" | 11.908 | 3-5/8" | 2-1/8" | 1.503" | 87.43 | 83.63 | 79.83 | 76.03 |
| 19696 | .4724 | | 12.000 | 94 | 56 | 38 | 87.72 | 83.91 | 80.09 | 76.28 |
| 19701 | .4844 | 31/64" | 12.304 | 3-11/16" | 2-3/16" | 1.554" | 88.32 | 84.48 | 80.64 | 76.80 |
| 19706 | .4921 | | 12.500 | 95 | 56 | 40 | 89.22 | 85.34 | 81.46 | 77.58 |
| 19711 | .5000 | 1/2" | 12.700 | 3-3/4" | 2-1/4" | 1.604" | 89.79 | 85.89 | 81.98 | 78.08 |
| 19716 | .5118 | | 13.000 | 107 | 60 | 42 | 118.91 | 113.74 | 108.57 | 103.40 |
| 19721 | .5156 | 33/64" | 13.096 | 4-1/4" | 2-3/8" | 1.654" | 121.70 | 116.41 | 111.12 | 105.83 |
| 19726 | .5312 | 17/32" | 13.492 | 4-1/4" | 2-3/8" | 1.704" | 124.50 | 119.09 | 113.67 | 108.26 |
| 19731 | .5315 | | 13.500 | 107 | 60 | 43 | 127.31 | 121.77 | 116.24 | 110.70 |
| 19736 | .5469 | 35/64" | 13.891 | 4-1/4" | 2-3/8" | 1.754" | 130.09 | 124.43 | 118.78 | 113.12 |
| 19741 | .5512 | | 14.000 | 107 | 60 | 45 | 132.93 | 127.15 | 121.37 | 115.59 |
| 19746 | .5625 | 9/16" | 14.287 | 4-1/2" | 2-1/2" | 1.804" | 143.65 | 137.40 | 131.16 | 124.91 |
| 19751 | .5709 | | 14.500 | 115 | 65 | 47 | 146.34 | 139.98 | 133.61 | 127.25 |
| 19756 | .5781 | 37/64" | 14.683 | 4-1/2" | 2-1/2" | 1.854" | 149.03 | 142.55 | 136.07 | 129.59 |
| 19761 | .5906 | | 15.000 | 115 | 65 | 48 | 151.77 | 145.17 | 138.57 | 131.97 |
| 19766 | .5938 | 19/32" | 15.082 | 4-1/2" | 2-1/2" | 1.904" | 152.56 | 145.93 | 139.29 | 132.66 |
| 19771 | .6094 | 39/64" | 15.478 | 4-1/2" | 2-1/2" | 1.954" | 153.34 | 146.67 | 140.01 | 133.34 |
| 19776 | .6102 | | 15.500 | 115 | 65 | 50 | 154.12 | 147.42 | 140.72 | 134.02 |
| 19781 | .6250 | 5/8" | 15.875 | 4-1/2" | 2-1/2" | 2.004" | 154.92 | 148.18 | 141.45 | 134.71 |
| 19786 | .6299 | | 16.000 | 115 | 65 | 51 | 158.67 | 151.77 | 144.87 | 137.97 |



† *Metric equivalents are for reference only*

| TOLERANCES | | |
|---|---|---|
| $d$ | +.0000" –.0005" (+.0000 –.0127mm) | |
| $l_1$ | ≤ 1/8" | +.125" –.062" (+3.175 –1.588mm) |
| | > 1/8" | +.125" –.125" (+3.175 –3.175mm) |
| $l_2$ | ≤ 1/8" | +.125" –.062" (+3.175 –1.588mm) |
| | >1/8" | +.125" –.125" (+3.175 –3.175mm) |

NEW ITEMS

Z=2 | 25° | 135° | 3xD | 5xD | TECH PAGES 320-323

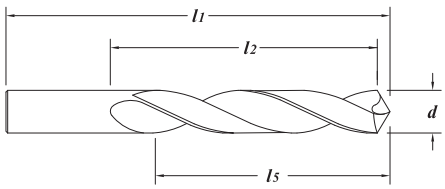
# Series 1520, 1205

.0625" - .1015"
(1.588mm - 2.578mm)

General purpose for all material groups



Solid submicron grain carbide drill
No spotting required in most applications
4-facet self-centering point
Live tooling recommended on lathe processes
Durana Coating - page 75




| 3xD (1520) EDP# | 5xD (1205) EDP# | $d$ † Diameter Decimal | Diameter | Metric | $l_1$ Overall Length | $l_2$ Flute Length | $l_5$ Max Drill Depth | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 77165 | | .0625 | 1/16" | 1.588 | 1-3/4" | 5/8" | .200" | 7.42 | 7.10 | 6.77 | 6.45 |
| | 89165 | .0625 | 1/16" | 1.588 | 1-3/4" | 3/4" | .325" | 7.42 | 7.10 | 6.77 | 6.45 |
| 77170 | | .0635 | #52 | 1.613 | 1-3/4" | 11/16" | .204" | 7.52 | 7.19 | 6.87 | 6.54 |
| | 89170 | .0635 | #52 | 1.613 | 1-3/4" | 3/4" | .331" | 7.52 | 7.19 | 6.87 | 6.54 |
| 77175 | | .0670 | #51 | 1.702 | 1-3/4" | 11/16" | .215" | 7.64 | 7.30 | 6.97 | 6.64 |
| | 89175 | .0670 | #51 | 1.702 | 1-3/4" | 3/4" | .349" | 7.64 | 7.30 | 6.97 | 6.64 |
| 77180 | | .0700 | #50 | 1.778 | 1-3/4" | 11/16" | .224" | 7.82 | 7.48 | 7.14 | 6.80 |
| | 89180 | .0700 | #50 | 1.778 | 1-3/4" | 7/8" | .364" | 7.82 | 7.48 | 7.14 | 6.80 |
| 77185 | | .0730 | #49 | 1.854 | 1-3/4" | 11/16" | .234" | 8.03 | 7.68 | 7.33 | 6.98 |
| | 89185 | .0730 | #49 | 1.854 | 1-3/4" | 7/8" | .380" | 8.03 | 7.68 | 7.33 | 6.98 |
| 77190 | | .0760 | #48 | 1.930 | 1-3/4" | 11/16" | .244" | 8.29 | 7.93 | 7.57 | 7.21 |
| | 89190 | .0760 | #48 | 1.930 | 1-3/4" | 7/8" | .396" | 8.29 | 7.93 | 7.57 | 7.21 |
| 77195 | | .0781 | 5/64" | 1.984 | 1-3/4" | 11/16" | .250" | 8.60 | 8.23 | 7.85 | 7.48 |
| | 89195 | .0781 | 5/64" | 1.984 | 1-3/4" | 7/8" | .407" | 8.60 | 8.23 | 7.85 | 7.48 |
| 77200 | | .0785 | #47 | 1.994 | 1-3/4" | 3/4" | .252" | 8.89 | 8.50 | 8.12 | 7.73 |
| | 89200 | .0785 | #47 | 1.994 | 1-3/4" | 7/8" | .409" | 8.89 | 8.50 | 8.12 | 7.73 |
| 77205 | | .0787 | | 2.000 | 44 | 19 | 6 | 9.03 | 8.64 | 8.24 | 7.85 |
| | 89205 | .0787 | | 2.000 | 44 | 22 | 10 | 9.03 | 8.64 | 8.24 | 7.85 |
| 77210 | | .0810 | #46 | 2.057 | 1-3/4" | 3/4" | .260" | 9.18 | 8.78 | 8.38 | 7.98 |
| | 89210 | .0810 | #46 | 2.057 | 1-3/4" | 7/8" | .422" | 9.18 | 8.78 | 8.38 | 7.98 |
| 77215 | | .0820 | #45 | 2.083 | 1-3/4" | 3/4" | .263" | 9.45 | 9.04 | 8.63 | 8.22 |
| | 89215 | .0820 | #45 | 2.083 | 1-3/4" | 7/8" | .427" | 9.45 | 9.04 | 8.63 | 8.22 |
| 77220 | | .0860 | #44 | 2.184 | 1-3/4" | 3/4" | .276" | 9.76 | 9.34 | 8.91 | 8.49 |
| | 89220 | .0860 | #44 | 2.184 | 2" | 1" | .448" | 9.76 | 9.34 | 8.91 | 8.49 |
| 77225 | | .0890 | #43 | 2.261 | 1-3/4" | 3/4" | .285" | 10.04 | 9.60 | 9.17 | 8.73 |
| | 89225 | .0890 | #43 | 2.261 | 2" | 1" | .463" | 10.04 | 9.60 | 9.17 | 8.73 |
| 77230 | | .0935 | #42 | 2.375 | 1-3/4" | 3/4" | .300" | 10.18 | 9.74 | 9.29 | 8.85 |
| | 89230 | .0935 | #42 | 2.375 | 2" | 1" | .487" | 10.18 | 9.74 | 9.29 | 8.85 |
| 77235 | | .0938 | 3/32" | 2.383 | 1-3/4" | 3/4" | .301" | 10.41 | 9.96 | 9.50 | 9.05 |
| | 89235 | .0938 | 3/32" | 2.383 | 2" | 1" | .488" | 10.41 | 9.96 | 9.50 | 9.05 |
| 77240 | | .0960 | #41 | 2.438 | 1-13/16" | 13/16" | .308" | 10.50 | 10.04 | 9.59 | 9.13 |
| | 89240 | .0960 | #41 | 2.438 | 2" | 1" | .500" | 10.50 | 10.04 | 9.59 | 9.13 |
| 77245 | | .0980 | #40 | 2.489 | 1-13/16" | 13/16" | .314" | 10.66 | 10.20 | 9.73 | 9.27 |
| | 89245 | .0980 | #40 | 2.489 | 2" | 1" | .510" | 10.66 | 10.20 | 9.73 | 9.27 |
| 77250 | | .0984 | | 2.500 | 46 | 21 | 8 | 10.72 | 10.25 | 9.79 | 9.32 |
| | 89250 | .0984 | | 2.500 | 57 | 32 | 13 | 10.72 | 10.25 | 9.79 | 9.32 |
| 77255 | | .0995 | #39 | 2.527 | 1-13/16" | 13/16" | .319" | 10.76 | 10.30 | 9.83 | 9.36 |
| | 89255 | .0995 | #39 | 2.527 | 2-1/4" | 1-1/4" | .518" | 10.76 | 10.30 | 9.83 | 9.36 |
| 77260 | | .1015 | #38 | 2.578 | 1-13/16" | 13/16" | .326" | 10.86 | 10.38 | 9.91 | 9.44 |
| | 89260 | .1015 | #38 | 2.578 | 2-1/4" | 1-1/4" | .529" | 10.89 | 10.42 | 9.94 | 9.47 |

*continued* →

# Series 1520, 1205 *(continued)*

.1040" - .1719"
(2.642mm - 4.366mm)

| 3xD (1520) EDP# | 5xD (1205) EDP# | *d* † Diameter Decimal | *d* † Diameter | *d* † Diameter Metric | *l1* Overall Length | *l2* Flute Length | *l5* Max Drill Depth | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 77265 | | .1040 | #37 | 2.642 | 1-13/16" | 13/16" | .334" | 10.95 | 10.47 | 10.00 | 9.52 |
| | 89265 | .1040 | #37 | 2.642 | 2-1/4" | 1-1/4" | .542" | 11.04 | 10.56 | 10.08 | 9.60 |
| 77270 | | .1065 | #36 | 2.705 | 1-13/16" | 13/16" | .342" | 11.02 | 10.54 | 10.06 | 9.58 |
| | 89270 | .1065 | #36 | 2.705 | 2-1/4" | 1-1/4" | .555" | 11.18 | 10.69 | 10.21 | 9.72 |
| 77275 | | .1094 | 7/64" | 2.779 | 1-13/16" | 13/16" | .351" | 11.09 | 10.60 | 10.12 | 9.64 |
| | 89275 | .1094 | 7/64" | 2.779 | 2-1/4" | 1-1/4" | .570" | 11.36 | 10.87 | 10.37 | 9.88 |
| 77280 | | .1100 | #35 | 2.794 | 1-7/8" | 7/8" | .353" | 11.16 | 10.67 | 10.19 | 9.70 |
| | 89280 | .1100 | #35 | 2.794 | 2-1/4" | 1-1/4" | .573" | 11.49 | 10.99 | 10.49 | 9.99 |
| 77285 | | .1110 | #34 | 2.819 | 1-7/8" | 7/8" | .356" | 11.29 | 10.80 | 10.31 | 9.82 |
| | 89285 | .1110 | #34 | 2.819 | 2-1/4" | 1-1/4" | .578" | 11.63 | 11.12 | 10.62 | 10.11 |
| 77290 | | .1130 | #33 | 2.870 | 1-7/8" | 7/8" | .362" | 11.36 | 10.87 | 10.37 | 9.88 |
| | 89290 | .1130 | #33 | 2.870 | 2-1/4" | 1-1/4" | .588" | 11.85 | 11.33 | 10.82 | 10.30 |
| 77295 | | .1160 | #32 | 2.946 | 1-7/8" | 7/8" | .372" | 11.44 | 10.95 | 10.45 | 9.95 |
| | 89295 | .1160 | #32 | 2.946 | 2-1/4" | 1-1/4" | .604" | 11.97 | 11.45 | 10.93 | 10.41 |
| 77300 | | .1181 | | 3.000 | 48 | 22 | 10 | 11.58 | 11.08 | 10.57 | 10.07 |
| | 89300 | .1181 | | 3.000 | 57 | 32 | 16 | 12.09 | 11.56 | 11.04 | 10.51 |
| 77305 | | .1200 | #31 | 3.048 | 1-7/8" | 7/8" | .385" | 11.65 | 11.14 | 10.64 | 10.13 |
| | 89305 | .1200 | #31 | 3.048 | 2-1/4" | 1-1/4" | .625" | 12.17 | 11.64 | 11.11 | 10.58 |
| 77310 | | .1250 | 1/8" | 3.175 | 1-7/8" | 7/8" | .401" | 11.78 | 11.26 | 10.75 | 10.24 |
| | 89310 | .1250 | 1/8" | 3.175 | 2-1/4" | 1-1/4" | .651" | 12.32 | 11.78 | 11.25 | 10.71 |
| 77315 | | .1285 | #30 | 3.264 | 1-15/16" | 15/16" | .412" | 12.10 | 11.57 | 11.05 | 10.52 |
| | 89315 | .1285 | #30 | 3.264 | 2-1/4" | 1-1/4" | .669" | 12.63 | 12.08 | 11.53 | 10.98 |
| 77320 | | .1360 | #29 | 3.454 | 1-15/16" | 15/16" | .436" | 12.42 | 11.88 | 11.34 | 10.80 |
| | 89320 | .1360 | #29 | 3.454 | 2-1/2" | 1-3/8" | .708" | 13.03 | 12.46 | 11.90 | 11.33 |
| 77325 | | .1378 | | 3.500 | 49 | 24 | 11 | 12.82 | 12.27 | 11.71 | 11.15 |
| | 89325 | .1378 | | 3.500 | 63 | 35 | 18 | 13.46 | 12.87 | 12.29 | 11.70 |
| 77330 | | .1405 | #28 | 3.569 | 1-15/16" | 15/16" | .451" | 13.00 | 12.43 | 11.87 | 11.30 |
| | 89330 | .1405 | #28 | 3.569 | 2-1/2" | 1-3/8" | .732" | 13.58 | 12.99 | 12.40 | 11.81 |
| 77335 | | .1406 | 9/64" | 3.571 | 1-15/16" | 15/16" | .451" | 13.12 | 12.55 | 11.98 | 11.41 |
| | 89335 | .1406 | 9/64" | 3.571 | 2-1/2" | 1-3/8" | .732" | 13.74 | 13.15 | 12.55 | 11.95 |
| 77340 | | .1440 | #27 | 3.658 | 2-1/16" | 1" | .462" | 14.28 | 13.66 | 13.04 | 12.42 |
| | 89340 | .1440 | #27 | 3.658 | 2-1/2" | 1-3/8" | .750" | 14.28 | 13.66 | 13.04 | 12.42 |
| 77345 | | .1470 | #26 | 3.734 | 2-1/16" | 1" | .471" | 14.42 | 13.79 | 13.17 | 12.54 |
| | 89345 | .1470 | #26 | 3.734 | 2-1/2" | 1-3/8" | .765" | 14.42 | 13.79 | 13.17 | 12.54 |
| 77350 | | .1495 | #25 | 3.797 | 2-1/16" | 1" | .479" | 14.62 | 13.98 | 13.35 | 12.71 |
| | 89350 | .1495 | #25 | 3.797 | 2-1/2" | 1-3/8" | .778" | 14.62 | 13.98 | 13.35 | 12.71 |
| 77355 | | .1520 | #24 | 3.861 | 2-1/16" | 1" | .487" | 14.64 | 14.00 | 13.37 | 12.73 |
| | 89355 | .1520 | #24 | 3.861 | 2-1/2" | 1-3/8" | .791" | 14.64 | 14.00 | 13.37 | 12.73 |
| 77360 | | .1540 | #23 | 3.912 | 2-1/16" | 1" | .494" | 14.74 | 14.10 | 13.46 | 12.82 |
| | 89360 | .1540 | #23 | 3.912 | 2-1/2" | 1-3/8" | .802" | 14.74 | 14.10 | 13.46 | 12.82 |
| 77365 | | .1562 | 5/32" | 3.967 | 2-1/16" | 1" | .501" | 14.85 | 14.20 | 13.56 | 12.91 |
| | 89365 | .1562 | 5/32" | 3.967 | 2-1/2" | 1-3/8" | .813" | 14.85 | 14.20 | 13.56 | 12.91 |
| 77370 | | .1570 | #22 | 3.988 | 2-1/8" | 1-1/16" | .504" | 15.78 | 15.09 | 14.41 | 13.72 |
| | 89370 | .1570 | #22 | 3.988 | 2-1/2" | 1-3/8" | .818" | 15.78 | 15.09 | 14.41 | 13.72 |
| 77375 | | .1575 | | 4.000 | 54 | 27 | 13 | 15.97 | 15.28 | 14.58 | 13.89 |
| | 89375 | .1575 | | 4.000 | 63 | 35 | 21 | 15.97 | 15.28 | 14.58 | 13.89 |
| 77380 | | .1590 | #21 | 4.039 | 2-1/8" | 1-1/16" | .510" | 16.16 | 15.46 | 14.75 | 14.05 |
| | 89380 | .1590 | #21 | 4.039 | 2-1/2" | 1-3/8" | .828" | 16.16 | 15.46 | 14.75 | 14.05 |
| 77385 | | .1610 | #20 | 4.089 | 2-1/8" | 1-1/16" | .516" | 16.27 | 15.57 | 14.86 | 14.15 |
| | 89385 | .1610 | #20 | 4.089 | 2-1/2" | 1-3/8" | .838" | 16.27 | 15.57 | 14.86 | 14.15 |
| 77390 | | .1660 | #19 | 4.216 | 2-1/8" | 1-1/16" | .532" | 16.94 | 16.20 | 15.47 | 14.73 |
| | 89390 | .1660 | #19 | 4.216 | 2-3/4" | 1-5/8" | .864" | 16.94 | 16.20 | 15.47 | 14.73 |
| 77395 | | .1695 | #18 | 4.305 | 2-1/8" | 1-1/16" | .544" | 17.15 | 16.40 | 15.66 | 14.91 |
| | 89395 | .1695 | #18 | 4.305 | 2-3/4" | 1-5/8" | .883" | 17.15 | 16.40 | 15.66 | 14.91 |
| 77400 | | .1719 | 11/64" | 4.366 | 2-1/8" | 1-1/16" | .551" | 17.51 | 16.75 | 15.99 | 15.23 |
| | 89400 | .1719 | 11/64" | 4.366 | 2-3/4" | 1-5/8" | .895" | 17.51 | 16.75 | 15.99 | 15.23 |



† *Metric equivalents are for reference only*

| 3xD (1520) EDP# | 5xD (1205) EDP# | *d* † Diameter Decimal | Diameter | Metric | *l1* Overall Length | *l2* Flute Length | *l5* Max Drill Depth | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 77405 | | .1730 | #17 | 4.394 | 2-3/16" | 1-1/8" | .555" | 17.74 | 16.97 | 16.20 | 15.43 |
| | 89405 | .1730 | #17 | 4.394 | 2-3/4" | 1-5/8" | .901" | 17.74 | 16.97 | 16.20 | 15.43 |
| 77410 | | .1770 | #16 | 4.496 | 2-3/16" | 1-1/8" | .568" | 17.94 | 17.16 | 16.38 | 15.60 |
| | 89410 | .1770 | #16 | 4.496 | 2-3/4" | 1-5/8" | .922" | 17.94 | 17.16 | 16.38 | 15.60 |
| 77415 | | .1772 | | 4.500 | 56 | 29 | 14 | 18.03 | 17.25 | 16.46 | 15.68 |
| | 89415 | .1772 | | 4.500 | 70 | 41 | 23 | 18.03 | 17.25 | 16.46 | 15.68 |
| 77420 | | .1800 | #15 | 4.572 | 2-3/16" | 1-1/8" | .577" | 18.11 | 17.33 | 16.54 | 15.75 |
| | 89420 | .1800 | #15 | 4.572 | 2-3/4" | 1-5/8" | .937" | 18.11 | 17.33 | 16.54 | 15.75 |
| 77425 | | .1820 | #14 | 4.623 | 2-3/16" | 1-1/8" | .584" | 18.53 | 17.72 | 16.92 | 16.11 |
| | 89425 | .1820 | #14 | 4.623 | 2-3/4" | 1-5/8" | .948" | 18.53 | 17.72 | 16.92 | 16.11 |
| 77430 | | .1850 | #13 | 4.700 | 2-3/16" | 1-1/8" | .593" | 18.66 | 17.85 | 17.04 | 16.23 |
| | 89430 | .1850 | #13 | 4.700 | 2-3/4" | 1-5/8" | .963" | 18.66 | 17.85 | 17.04 | 16.23 |
| 77435 | | .1875 | 3/16" | 4.763 | 2-3/16" | 1-1/8" | .601" | 18.76 | 17.94 | 17.13 | 16.31 |
| | 89435 | .1875 | 3/16" | 4.763 | 2-3/4" | 1-5/8" | .976" | 18.76 | 17.94 | 17.13 | 16.31 |
| 77440 | | .1890 | #12 | 4.801 | 2-1/4" | 1-3/16" | .606" | 19.37 | 18.52 | 17.68 | 16.84 |
| | 89440 | .1890 | #12 | 4.801 | 2-3/4" | 1-5/8" | .984" | 19.37 | 18.52 | 17.68 | 16.84 |
| 77445 | | .1910 | #11 | 4.851 | 2-1/4" | 1-3/16" | .613" | 19.57 | 18.72 | 17.87 | 17.02 |
| | 89445 | .1910 | #11 | 4.851 | 2-3/4" | 1-5/8" | .995" | 19.57 | 18.72 | 17.87 | 17.02 |
| 77450 | | .1935 | #10 | 4.915 | 2-1/4" | 1-3/16" | .621" | 20.52 | 19.62 | 18.73 | 17.84 |
| | 89450 | .1935 | #10 | 4.915 | 2-3/4" | 1-5/8" | 1.008" | 20.52 | 19.62 | 18.73 | 17.84 |
| 77455 | | .1960 | #9 | 4.978 | 2-1/4" | 1-3/16" | .629" | 21.02 | 20.11 | 19.19 | 18.28 |
| | 89455 | .1960 | #9 | 4.978 | 3" | 1-3/4" | 1.021" | 21.02 | 20.11 | 19.19 | 18.28 |
| 77460 | | .1969 | | 5.000 | 57 | 30 | 16 | 21.15 | 20.23 | 19.31 | 18.39 |
| | 89460 | .1969 | | 5.000 | 76 | 44 | 26 | 21.15 | 20.23 | 19.31 | 18.39 |
| 77465 | | .1990 | #8 | 5.055 | 2-1/4" | 1-3/16" | .638" | 21.29 | 20.36 | 19.44 | 18.51 |
| | 89465 | .1990 | #8 | 5.055 | 3" | 1-3/4" | 1.036" | 21.29 | 20.36 | 19.44 | 18.51 |
| 77470 | | .2010 | #7 | 5.105 | 2-1/4" | 1-3/16" | .645" | 21.91 | 20.96 | 20.00 | 19.05 |
| | 89470 | .2010 | #7 | 5.105 | 3" | 1-3/4" | 1.047" | 21.91 | 20.96 | 20.00 | 19.05 |
| 77475 | | .2031 | 13/64" | 5.159 | 2-1/4" | 1-3/16" | .651" | 22.08 | 21.12 | 20.16 | 19.20 |
| | 89475 | .2031 | 13/64" | 5.159 | 3" | 1-3/4" | 1.058" | 22.08 | 21.12 | 20.16 | 19.20 |
| 77480 | | .2040 | #6 | 5.182 | 2-3/8" | 1-1/4" | .654" | 22.53 | 21.55 | 20.57 | 19.59 |
| | 89480 | .2040 | #6 | 5.182 | 3" | 1-3/4" | 1.062" | 22.53 | 21.55 | 20.57 | 19.59 |
| 77485 | | .2055 | #5 | 5.220 | 2-3/8" | 1-1/4" | .659" | 23.00 | 22.00 | 21.00 | 20.00 |
| | 89485 | .2055 | #5 | 5.220 | 3" | 1-3/4" | 1.070" | 23.00 | 22.00 | 21.00 | 20.00 |
| 77490 | | .2090 | #4 | 5.309 | 2-3/8" | 1-1/4" | .670" | 23.39 | 22.37 | 21.36 | 20.34 |
| | 89490 | .2090 | #4 | 5.309 | 3" | 1-3/4" | 1.088" | 23.39 | 22.37 | 21.36 | 20.34 |
| 77495 | | .2130 | #3 | 5.410 | 2-3/8" | 1-1/4" | .683" | 23.81 | 22.77 | 21.74 | 20.70 |
| | 89495 | .2130 | #3 | 5.410 | 3" | 1-3/4" | 1.109" | 23.81 | 22.77 | 21.74 | 20.70 |
| 77500 | | .2165 | | 5.500 | 60 | 32 | 18 | 23.99 | 22.95 | 21.90 | 20.86 |
| | 89500 | .2165 | | 5.500 | 76 | 44 | 29 | 23.99 | 22.95 | 21.90 | 20.86 |
| 77505 | | .2188 | 7/32" | 5.558 | 2-3/8" | 1-1/4" | .702" | 24.16 | 23.11 | 22.06 | 21.01 |
| | 89505 | .2188 | 7/32" | 5.558 | 3" | 1-3/4" | 1.139" | 24.16 | 23.11 | 22.06 | 21.01 |
| 77510 | | .2210 | #2 | 5.613 | 2-7/16" | 1-5/16" | .709" | 24.76 | 23.68 | 22.61 | 21.53 |
| | 89510 | .2210 | #2 | 5.613 | 3" | 1-3/4" | 1.151" | 24.76 | 23.68 | 22.61 | 21.53 |
| 77515 | | .2280 | #1 | 5.791 | 2-7/16" | 1-5/16" | .731" | 24.90 | 23.82 | 22.73 | 21.65 |
| | 89515 | .2280 | #1 | 5.791 | 3" | 1-3/4" | 1.187" | 24.90 | 23.82 | 22.73 | 21.65 |
| 77520 | | .2340 | A | 5.944 | 2-7/16" | 1-5/16" | .750" | 24.94 | 23.86 | 22.77 | 21.69 |
| | 89520 | .2340 | A | 5.944 | 3-1/4" | 2" | 1.218" | 25.19 | 24.09 | 23.00 | 21.90 |
| 77525 | | .2344 | 15/64" | 5.954 | 2-7/16" | 1-5/16" | .752" | 25.02 | 23.94 | 22.85 | 21.76 |
| | 89525 | .2344 | 15/64" | 5.954 | 3-1/4" | 2" | 1.221" | 25.25 | 24.16 | 23.06 | 21.96 |
| 77530 | | .2362 | | 6.000 | 64 | 35 | 19 | 25.10 | 24.01 | 22.92 | 21.83 |
| | 89530 | .2362 | | 6.000 | 82 | 50 | 31 | 25.36 | 24.26 | 23.15 | 22.05 |
| 77535 | | .2380 | B | 6.045 | 2-1/2" | 1-3/8" | .763" | 25.19 | 24.09 | 23.00 | 21.90 |
| | 89535 | .2380 | B | 6.045 | 3-1/4" | 2" | 1.239" | 25.44 | 24.33 | 23.23 | 22.12 |
| 77540 | | .2420 | C | 6.147 | 2-1/2" | 1-3/8" | .776" | 25.38 | 24.28 | 23.17 | 22.07 |
| | 89540 | .2420 | C | 6.147 | 3-1/4" | 2" | 1.260" | 25.63 | 24.52 | 23.40 | 22.29 |

*continued* ⟶

# Series 1520, 1205 *(continued)*

.2460" - .3543"
(6.248mm - 9.000mm)

| 3xD (1520) EDP# | 5xD (1205) EDP# | *d* † Diameter Decimal | Diameter | Metric | *l1* Overall Length | *l2* Flute Length | *l5* Max Drill Depth | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 77545 | | .2460 | D | 6.248 | 2-1/2" | 1-3/8" | .789" | 25.58 | 24.46 | 23.35 | 22.24 |
| | 89545 | .2460 | D | 6.248 | 3-1/4" | 2" | 1.281" | 25.82 | 24.70 | 23.57 | 22.45 |
| 77550 | | .2500 | 1/4" / E | 6.350 | 2-1/2" | 1-3/8" | .802" | 25.75 | 24.63 | 23.51 | 22.39 |
| | 89550 | .2500 | 1/4" / E | 6.350 | 3-1/4" | 2" | 1.302" | 26.00 | 24.87 | 23.74 | 22.61 |
| 77555 | | .2559 | | 6.500 | 67 | 37 | 21 | 26.36 | 25.21 | 24.07 | 22.92 |
| | 89555 | .2559 | | 6.500 | 82 | 50 | 34 | 26.63 | 25.48 | 24.32 | 23.16 |
| 77560 | | .2570 | F | 6.528 | 2-5/8" | 1-7/16" | .824" | 26.92 | 25.75 | 24.58 | 23.41 |
| | 89560 | .2570 | F | 6.528 | 3-1/4" | 2" | 1.338" | 27.17 | 25.99 | 24.81 | 23.63 |
| 77565 | | .2610 | G | 6.629 | 2-5/8" | 1-7/16" | .837" | 27.44 | 26.25 | 25.05 | 23.86 |
| | 89565 | .2610 | G | 6.629 | 3-1/2" | 2-1/8" | 1.359" | 27.74 | 26.53 | 25.33 | 24.12 |
| 77570 | | .2656 | 17/64" | 6.746 | 2-5/8" | 1-7/16" | .852" | 28.03 | 26.81 | 25.59 | 24.37 |
| | 89570 | .2656 | 17/64" | 6.746 | 3-1/2" | 2-1/8" | 1.383" | 28.30 | 27.07 | 25.84 | 24.61 |
| 77575 | | .2660 | H | 6.756 | 2-11/16" | 1-1/2" | .853" | 28.81 | 27.56 | 26.30 | 25.05 |
| | 89575 | .2660 | H | 6.756 | 3-1/2" | 2-1/8" | 1.385" | 29.11 | 27.84 | 26.58 | 25.31 |
| 77580 | | .2720 | I | 6.909 | 2-11/16" | 1-1/2" | .872" | 29.14 | 27.87 | 26.61 | 25.34 |
| | 89580 | .2720 | I | 6.909 | 3-1/2" | 2-1/8" | 1.416" | 29.43 | 28.15 | 26.87 | 25.59 |
| 77585 | | .2756 | | 7.000 | 68 | 38 | 22 | 29.37 | 28.09 | 26.82 | 25.54 |
| | 89585 | .2756 | | 7.000 | 88 | 54 | 36 | 29.67 | 28.38 | 27.09 | 25.80 |
| 77590 | | .2770 | J | 7.036 | 2-11/16" | 1-1/2" | .888" | 29.66 | 28.37 | 27.08 | 25.79 |
| | 89590 | .2770 | J | 7.036 | 3-1/2" | 2-1/8" | 1.442" | 29.93 | 28.63 | 27.33 | 26.03 |
| 77595 | | .2810 | K | 7.137 | 2-11/16" | 1-1/2" | .901" | 29.92 | 28.62 | 27.32 | 26.02 |
| | 89595 | .2810 | K | 7.137 | 3-1/2" | 2-1/8" | 1.463" | 30.20 | 28.89 | 27.57 | 26.26 |
| 77600 | | .2812 | 9/32" | 7.142 | 2-11/16" | 1-1/2" | .902" | 30.07 | 28.77 | 27.46 | 26.15 |
| | 89600 | .2812 | 9/32" | 7.142 | 3-1/2" | 2-1/8" | 1.464" | 30.39 | 29.07 | 27.75 | 26.43 |
| 77605 | | .2900 | L | 7.366 | 2-3/4" | 1-9/16" | .930" | 31.18 | 29.82 | 28.47 | 27.11 |
| | 89605 | .2900 | L | 7.366 | 3-1/2" | 2-1/8" | 1.510" | 31.48 | 30.11 | 28.74 | 27.37 |
| 77610 | | .2950 | M | 7.493 | 2-3/4" | 1-9/16" | .946" | 33.37 | 31.92 | 30.47 | 29.02 |
| | 89610 | .2950 | M | 7.493 | 3-3/4" | 2-3/8" | 1.536" | 33.70 | 32.23 | 30.77 | 29.30 |
| 77615 | | .2953 | | 7.500 | 70 | 40 | 24 | 33.37 | 31.92 | 30.47 | 29.02 |
| | 89615 | .2953 | | 7.500 | 95 | 60 | 39 | 33.70 | 32.23 | 30.77 | 29.30 |
| 77620 | | .2969 | 19/64" | 7.541 | 2-3/4" | 1-9/16" | .952" | 33.53 | 32.08 | 30.62 | 29.16 |
| | 89620 | .2969 | 19/64" | 7.541 | 3-3/4" | 2-3/8" | 1.546" | 33.70 | 32.23 | 30.77 | 29.30 |
| 77625 | | .3020 | N | 7.671 | 2-15/16" | 1-5/8" | .969" | 35.34 | 33.80 | 32.27 | 30.73 |
| | 89625 | .3020 | N | 7.671 | 3-3/4" | 2-3/8" | 1.573" | 35.70 | 34.14 | 32.59 | 31.04 |
| 77630 | | .3125 | 5/16" | 7.938 | 2-15/16" | 1-5/8" | 1.002" | 35.47 | 33.92 | 32.38 | 30.84 |
| | 89630 | .3125 | 5/16" | 7.938 | 3-3/4" | 2-3/8" | 1.627" | 35.83 | 34.28 | 32.72 | 31.16 |
| 77635 | | .3150 | | 8.000 | 75 | 43 | 26 | 38.03 | 36.38 | 34.72 | 33.07 |
| | 89635 | .3150 | | 8.000 | 95 | 60 | 42 | 38.44 | 36.77 | 35.10 | 33.43 |
| 77640 | | .3160 | O | 8.026 | 2-15/16" | 1-11/16" | 1.013" | 38.03 | 36.38 | 34.72 | 33.07 |
| | 89640 | .3160 | O | 8.026 | 3-3/4" | 2-3/8" | 1.645" | 38.44 | 36.77 | 35.10 | 33.43 |
| 77645 | | .3230 | P | 8.204 | 2-15/16" | 1-11/16" | 1.036" | 38.38 | 36.71 | 35.04 | 33.37 |
| | 89645 | .3230 | P | 8.204 | 3-3/4" | 2-3/8" | 1.682" | 38.44 | 36.77 | 35.10 | 33.43 |
| 77650 | | .3281 | 21/64" | 8.334 | 2-15/16" | 1-11/16" | 1.052" | 38.62 | 36.94 | 35.26 | 33.58 |
| | 89650 | .3281 | 21/64" | 8.334 | 4" | 2-1/2" | 1.708" | 39.01 | 37.31 | 35.62 | 33.92 |
| 77655 | | .3320 | Q | 8.433 | 3" | 1-11/16" | 1.065" | 39.50 | 37.79 | 36.07 | 34.35 |
| | 89655 | .3320 | Q | 8.433 | 4" | 2-1/2" | 1.729" | 39.93 | 38.19 | 36.46 | 34.72 |
| 77660 | | .3346 | | 8.500 | 76 | 43 | 27 | 39.87 | 38.14 | 36.40 | 34.67 |
| | 89660 | .3346 | | 8.500 | 101 | 63 | 44 | 40.27 | 38.52 | 36.77 | 35.02 |
| 77665 | | .3390 | R | 8.611 | 3" | 1-11/16" | 1.087" | 41.15 | 39.36 | 37.57 | 35.78 |
| | 89665 | .3390 | R | 8.611 | 4" | 2-1/2" | 1.765" | 41.57 | 39.77 | 37.96 | 36.15 |
| 77670 | | .3438 | 11/32" | 8.733 | 3" | 1-11/16" | 1.103" | 42.83 | 40.96 | 39.10 | 37.24 |
| | 89670 | .3438 | 11/32" | 8.733 | 4" | 2-1/2" | 1.790" | 43.25 | 41.37 | 39.49 | 37.61 |
| 77675 | | .3480 | S | 8.839 | 3-1/16" | 1-3/4" | 1.116" | 43.40 | 41.51 | 39.63 | 37.74 |
| | 89675 | .3480 | S | 8.839 | 4" | 2-1/2" | 1.812" | 43.40 | 41.51 | 39.63 | 37.74 |
| 77680 | | .3543 | | 9.000 | 78 | 44 | 29 | 43.65 | 41.76 | 39.86 | 37.96 |
| | 89680 | .3543 | | 9.000 | 101 | 63 | 47 | 43.65 | 41.76 | 39.86 | 37.96 |



† *Metric equivalents are for reference only*

| 3xD (1520) EDP# | 5xD (1205) EDP# | Decimal | *d* † Diameter | Metric | *l1* Overall Length | *l2* Flute Length | *l5* Max Drill Depth | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 77685 | | .3580 | T | 9.093 | 3-1/16" | 1-3/4" | 1.148" | 43.84 | 41.93 | 40.03 | 38.12 |
| | 89685 | .3580 | T | 9.093 | 4-1/4" | 2-3/4" | 1.864" | 44.05 | 42.13 | 40.22 | 38.30 |
| 77690 | | .3594 | 23/64" | 9.129 | 3-1/16" | 1-3/4" | 1.153" | 44.14 | 42.22 | 40.30 | 38.38 |
| | 89690 | .3594 | 23/64" | 9.129 | 4-1/4" | 2-3/4" | 1.871" | 44.36 | 42.43 | 40.50 | 38.57 |
| 77695 | | .3680 | U | 9.347 | 3-1/8" | 1-13/16" | 1.180" | 48.33 | 46.23 | 44.13 | 42.03 |
| | 89695 | .3680 | U | 9.347 | 4-1/4" | 2-3/4" | 1.916" | 50.34 | 48.15 | 45.96 | 43.77 |
| 77700 | | .3740 | | 9.500 | 79 | 46 | 30 | 48.78 | 46.66 | 44.54 | 42.42 |
| | 89700 | .3740 | | 9.500 | 107 | 70 | 49 | 50.81 | 48.60 | 46.39 | 44.18 |
| 77705 | | .3750 | 3/8" | 9.525 | 3-1/8" | 1-13/16" | 1.203" | 49.16 | 47.03 | 44.89 | 42.75 |
| | 89705 | .3750 | 3/8" | 9.525 | 4-1/4" | 2-3/4" | 1.953" | 51.21 | 48.98 | 46.76 | 44.53 |
| 77710 | | .3770 | V | 9.576 | 3-1/4" | 1-7/8" | 1.209" | 50.09 | 47.92 | 45.74 | 43.56 |
| | 89710 | .3770 | V | 9.576 | 4-1/4" | 2-3/4" | 1.963" | 52.19 | 49.92 | 47.65 | 45.38 |
| 77715 | | .3860 | W | 9.804 | 3-1/4" | 1-7/8" | 1.238" | 51.15 | 48.93 | 46.70 | 44.48 |
| | 89715 | .3860 | W | 9.804 | 4-1/2" | 2-7/8" | 2.010" | 53.29 | 50.97 | 48.66 | 46.34 |
| 77720 | | .3906 | 25/64" | 9.921 | 3-1/4" | 1-7/8" | 1.253" | 51.92 | 49.67 | 47.41 | 45.15 |
| | 89720 | .3906 | 25/64" | 9.921 | 4-1/2" | 2-7/8" | 2.034" | 54.08 | 51.73 | 49.38 | 47.03 |
| 77725 | | .3937 | | 10.000 | 84 | 49 | 32 | 53.79 | 51.45 | 49.11 | 46.77 |
| | 89725 | .3937 | | 10.000 | 114 | 73 | 52 | 56.03 | 53.59 | 51.16 | 48.72 |
| 77730 | | .3970 | X | 10.084 | 3-5/16" | 1-15/16" | 1.273" | 55.35 | 52.94 | 50.54 | 48.13 |
| | 89730 | .3970 | X | 10.084 | 4-1/2" | 2-7/8" | 2.067" | 57.68 | 55.18 | 52.67 | 50.16 |
| | 89735 | .4040 | Y | 10.262 | 4-1/2" | 2-7/8" | 2.104" | 58.14 | 55.62 | 53.09 | 50.56 |
| 77740 | | .4062 | 13/32" | 10.317 | 3-5/16" | 1-15/16" | 1.303" | 57.82 | 55.31 | 52.79 | 50.28 |
| | 89740 | .4062 | 13/32" | 10.317 | 4-1/2" | 2-7/8" | 2.115" | 60.24 | 57.62 | 55.00 | 52.38 |
| 77745 | | .4130 | Z | 10.490 | 3-3/8" | 2" | 1.325" | 58.47 | 55.92 | 53.38 | 50.84 |
| | 89745 | .4130 | Z | 10.490 | 4-1/2" | 2-7/8" | 2.151" | 60.88 | 58.23 | 55.59 | 52.94 |
| 77750 | | .4134 | | 10.500 | 86 | 51 | 34 | 58.47 | 55.92 | 53.38 | 50.84 |
| | 89750 | .4134 | | 10.500 | 114 | 73 | 55 | 60.88 | 58.23 | 55.59 | 52.94 |
| 77755 | | .4219 | 27/64" | 10.716 | 3-3/8" | 2" | 1.353" | 59.09 | 56.52 | 53.95 | 51.38 |
| | 89755 | .4219 | 27/64" | 10.716 | 4-1/2" | 2-7/8" | 2.197" | 61.56 | 58.88 | 56.21 | 53.53 |
| 77760 | | .4331 | | 11.000 | 87 | 52 | 35 | 64.16 | 61.37 | 58.58 | 55.79 |
| | 89760 | .4331 | | 11.000 | 114 | 73 | 57 | 66.85 | 63.94 | 61.04 | 58.13 |
| 77765 | | .4375 | 7/16" | 11.113 | 3-7/16" | 2-1/16" | 1.403" | 64.16 | 61.37 | 58.58 | 55.79 |
| | 89765 | .4375 | 7/16" | 11.113 | 4-1/2" | 2-7/8" | 2.278" | 66.85 | 63.94 | 61.04 | 58.13 |
| 77770 | | .4528 | | 11.500 | 91 | 54 | 37 | 69.61 | 66.58 | 63.56 | 60.53 |
| | 89770 | .4528 | | 11.500 | 120 | 76 | 60 | 72.52 | 69.37 | 66.21 | 63.06 |
| 77775 | | .4531 | 29/64" | 11.509 | 3-9/16" | 2-1/8" | 1.453" | 69.61 | 66.58 | 63.56 | 60.53 |
| | 89775 | .4531 | 29/64" | 11.509 | 4-3/4" | 3" | 2.359" | 72.52 | 69.37 | 66.21 | 63.06 |
| 77780 | | .4688 | 15/32" | 11.908 | 3-5/8" | 2-1/8" | 1.503" | 73.62 | 70.42 | 67.22 | 64.02 |
| | 89780 | .4688 | 15/32" | 11.908 | 4-3/4" | 3" | 2.441" | 76.71 | 73.37 | 70.04 | 66.70 |
| 77785 | | .4724 | | 12.000 | 94 | 56 | 38 | 73.90 | 70.69 | 67.47 | 64.26 |
| | 89785 | .4724 | | 12.000 | 120 | 76 | 62 | 76.95 | 73.60 | 70.26 | 66.91 |
| 77790 | | .4844 | 31/64" | 12.304 | 3-11/16" | 2-3/16" | 1.554" | 74.45 | 71.21 | 67.98 | 64.74 |
| | 89790 | .4844 | 31/64" | 12.304 | 4-3/4" | 3" | 2.522" | 76.95 | 73.60 | 70.26 | 66.91 |
| 77795 | | .4921 | | 12.500 | 95 | 56 | 40 | 75.31 | 72.04 | 68.76 | 65.49 |
| | 89795 | .4921 | | 12.500 | 120 | 76 | 65 | 79.01 | 75.57 | 72.14 | 68.70 |
| 77800 | | .5000 | 1/2" | 12.700 | 3-3/4" | 2-1/4" | 1.604" | 75.85 | 72.56 | 69.26 | 65.96 |
| | 89800 | .5000 | 1/2" | 12.700 | 4-3/4" | 3" | 2.604" | 79.01 | 75.57 | 72.14 | 68.70 |
| 77805 | | .5118 | | 13.000 | 107 | 60 | 42 | 95.29 | 91.15 | 87.00 | 82.86 |
| | 89805 | .5118 | | 13.000 | 127 | 83 | 68 | 99.26 | 94.94 | 90.63 | 86.31 |
| 77810 | | .5156 | 33/64" | 13.096 | 4-1/4" | 2-3/8" | 1.654" | 97.84 | 93.59 | 89.33 | 85.08 |
| | 89810 | .5156 | 33/64" | 13.096 | 5" | 3-1/4" | 2.685" | 101.92 | 97.49 | 93.06 | 88.63 |
| 77815 | | .5312 | 17/32" | 13.492 | 4-1/4" | 2-3/8" | 1.704" | 100.40 | 96.03 | 91.67 | 87.30 |
| | 89815 | .5312 | 17/32" | 13.492 | 5" | 3-1/4" | 2.766" | 104.58 | 100.03 | 95.49 | 90.94 |
| 77820 | | .5315 | | 13.500 | 107 | 60 | 43 | 102.95 | 98.47 | 94.00 | 89.52 |
| | 89820 | .5315 | | 13.500 | 127 | 83 | 70 | 107.25 | 102.59 | 97.92 | 93.26 |

*continued* →

# Series 1520, 1205 *(continued)*

.5469" - .6299"
(13.891mm - 16.000mm)

| | 3xD (1520) EDP# | 5xD (1205) EDP# | *d* † Diameter Decimal | Diameter | Metric | *l1* Overall Length | *l2* Flute Length | *l5* Max Drill Depth | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 77825 | | .5469 | 35/64" | 13.891 | 4-1/4" | 2-3/8" | 1.754" | 105.51 | 100.93 | 96.34 | 91.75 |
| | | 89825 | .5469 | 35/64" | 13.891 | 5" | 3-1/4" | 2.848" | 109.92 | 105.14 | 100.36 | 95.58 |
| | 77830 | | .5512 | | 14.000 | 107 | 60 | 45 | 108.07 | 103.37 | 98.67 | 93.97 |
| | | 89830 | .5512 | | 14.000 | 127 | 83 | 73 | 112.59 | 107.69 | 102.80 | 97.90 |
| | 77835 | | .5625 | 9/16" | 14.287 | 4-1/2" | 2-1/2" | 1.804" | 117.85 | 112.73 | 107.60 | 102.48 |
| | | 89835 | .5625 | 9/16" | 14.287 | 5" | 3-1/4" | 2.929" | 122.77 | 117.44 | 112.10 | 106.76 |
| NEW | 77840 | | .5709 | | 14.500 | 115 | 65 | 47 | 120.31 | 115.08 | 109.85 | 104.62 |
| | | 89840 | .5709 | | 14.500 | 127 | 83 | 76 | 125.33 | 119.88 | 114.43 | 108.98 |
| | 77845 | | .5781 | 37/64" | 14.683 | 4-1/2" | 2-1/2" | 1.854" | 122.77 | 117.44 | 112.10 | 106.76 |
| | | 89845 | .5781 | 37/64" | 14.683 | 5-1/4" | 3-1/2" | 3.010" | 127.89 | 122.33 | 116.77 | 111.21 |
| | 77850 | | .5906 | | 15.000 | 115 | 65 | 48 | 125.28 | 119.83 | 114.39 | 108.94 |
| | | 89850 | .5906 | | 15.000 | 133 | 89 | 78 | 130.49 | 124.82 | 119.14 | 113.47 |
| | 77855 | | .5938 | 19/32" | 15.082 | 4-1/2" | 2-1/2" | 1.904" | 125.99 | 120.52 | 115.04 | 109.56 |
| | | 89855 | .5938 | 19/32" | 15.082 | 5-1/4" | 3-1/2" | 3.092" | 131.25 | 125.54 | 119.84 | 114.13 |
| NEW | 77860 | | .6094 | 39/64" | 15.478 | 4-1/2" | 2-1/2" | 1.954" | 126.70 | 121.19 | 115.68 | 110.17 |
| | | 89860 | .6094 | 39/64" | 15.478 | 5-1/4" | 3-1/2" | 3.173" | 131.96 | 126.23 | 120.49 | 114.75 |
| | 77865 | | .6102 | | 15.500 | 115 | 65 | 50 | 127.41 | 121.87 | 116.33 | 110.79 |
| | | 89865 | .6102 | | 15.500 | 133 | 89 | 81 | 132.72 | 126.95 | 121.18 | 115.41 |
| | 77870 | | .6250 | 5/8" | 15.875 | 4-1/2" | 2-1/2" | 2.004" | 128.11 | 122.54 | 116.97 | 111.40 |
| | | 89870 | .6250 | 5/8" | 15.875 | 5-1/4" | 3-1/2" | 3.254" | 133.45 | 127.64 | 121.84 | 116.04 |
| NEW | 77875 | | .6299 | | 16.000 | 115 | 65 | 51 | 131.54 | 125.82 | 120.10 | 114.38 |
| | | 89875 | .6299 | | 16.000 | 133 | 89 | 83 | 137.02 | 131.07 | 125.11 | 119.15 |

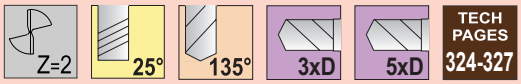


† *Metric equivalents are for reference only*

| TOLERANCES | | |
|---|---|---|
| $d$ | +.0000" –.0005" (+.0000 –.0127mm) | |
| $l_1$ | ≤ 1/8" | +.125" –.062" (+3.175 –1.588mm) |
| | > 1/8" | +.125" –.125" (+3.175 –3.175mm) |
| $l_2$ | ≤ 1/8" | +.125" –.062" (+3.175 –1.588mm) |
| | >1/8" | +.125" –.125" (+3.175 –3.175mm) |

NEW ITEMS

# Series 1520H, 1205H




TECH PAGES 324-327

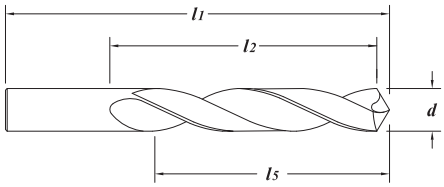
.0625" - .1015"
(1.588mm - 2.578mm)

General purpose for all material groups



**BALINIT® Durana Coating**

Solid submicron grain carbide drill
Excellent heat resistance and lubricity
No spotting required in most applications
4-facet self-centering point
Live tooling recommended on lathe processes
Bright Finish - page 69




| 3xD (1520H) EDP# | 5xD (1205H) EDP# | $d$ † Diameter Decimal | Diameter | Metric | $l_1$ Overall Length | $l_2$ Flute Length | $l_5$ Max Drill Depth | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 77166 | | .0625 | 1/16" | 1.588 | 1-3/4" | 5/8" | .200" | 9.51 | 9.10 | 8.68 | 8.27 |
| | 89166 | .0625 | 1/16" | 1.588 | 1-3/4" | 3/4" | .325" | 9.51 | 9.10 | 8.68 | 8.27 |
| 77171 | | .0635 | #52 | 1.613 | 1-3/4" | 11/16" | .204" | 9.63 | 9.21 | 8.79 | 8.37 |
| | 89171 | .0635 | #52 | 1.613 | 1-3/4" | 3/4" | .331" | 9.63 | 9.21 | 8.79 | 8.37 |
| 77176 | | .0670 | #51 | 1.702 | 1-3/4" | 11/16" | .215" | 9.75 | 9.33 | 8.90 | 8.48 |
| | 89176 | .0670 | #51 | 1.702 | 1-3/4" | 3/4" | .349" | 9.75 | 9.33 | 8.90 | 8.48 |
| 77181 | | .0700 | #50 | 1.778 | 1-3/4" | 11/16" | .224" | 9.90 | 9.47 | 9.04 | 8.61 |
| | 89181 | .0700 | #50 | 1.778 | 1-3/4" | 7/8" | .364" | 9.90 | 9.47 | 9.04 | 8.61 |
| 77186 | | .0730 | #49 | 1.854 | 1-3/4" | 11/16" | .234" | 10.12 | 9.68 | 9.24 | 8.80 |
| | 89186 | .0730 | #49 | 1.854 | 1-3/4" | 7/8" | .380" | 10.13 | 9.69 | 9.25 | 8.81 |
| 77191 | | .0760 | #48 | 1.930 | 1-3/4" | 11/16" | .244" | 10.38 | 9.93 | 9.48 | 9.03 |
| | 89191 | .0760 | #48 | 1.930 | 1-3/4" | 7/8" | .396" | 10.38 | 9.93 | 9.48 | 9.03 |
| 77196 | | .0781 | 5/64" | 1.984 | 1-3/4" | 11/16" | .250" | 10.70 | 10.23 | 9.77 | 9.30 |
| | 89196 | .0781 | 5/64" | 1.984 | 1-3/4" | 7/8" | .407" | 10.72 | 10.25 | 9.79 | 9.32 |
| 77201 | | .0785 | #47 | 1.994 | 1-3/4" | 3/4" | .252" | 10.98 | 10.51 | 10.03 | 9.55 |
| | 89201 | .0785 | #47 | 1.994 | 1-3/4" | 7/8" | .409" | 11.01 | 10.53 | 10.05 | 9.57 |
| 77206 | | .0787 | | 2.000 | 44 | 19 | 6 | 11.13 | 10.65 | 10.16 | 9.68 |
| | 89206 | .0787 | | 2.000 | 44 | 22 | 10 | 11.13 | 10.65 | 10.16 | 9.68 |
| 77211 | | .0810 | #46 | 2.057 | 1-3/4" | 3/4" | .260" | 11.27 | 10.78 | 10.29 | 9.80 |
| | 89211 | .0810 | #46 | 2.057 | 1-3/4" | 7/8" | .422" | 11.28 | 10.79 | 10.30 | 9.81 |
| 77216 | | .0820 | #45 | 2.083 | 1-3/4" | 3/4" | .263" | 11.55 | 11.04 | 10.54 | 10.04 |
| | 89216 | .0820 | #45 | 2.083 | 1-3/4" | 7/8" | .427" | 11.56 | 11.06 | 10.55 | 10.05 |
| 77221 | | .0860 | #44 | 2.184 | 1-3/4" | 3/4" | .276" | 11.86 | 11.34 | 10.83 | 10.31 |
| | 89221 | .0860 | #44 | 2.184 | 2" | 1" | .448" | 11.87 | 11.35 | 10.84 | 10.32 |
| 77226 | | .0890 | #43 | 2.261 | 1-3/4" | 3/4" | .285" | 12.12 | 11.59 | 11.07 | 10.54 |
| | 89226 | .0890 | #43 | 2.261 | 2" | 1" | .463" | 12.13 | 11.61 | 11.08 | 10.55 |
| 77231 | | .0935 | #42 | 2.375 | 1-3/4" | 3/4" | .300" | 12.28 | 11.75 | 11.21 | 10.68 |
| | 89231 | .0935 | #42 | 2.375 | 2" | 1" | .487" | 12.28 | 11.75 | 11.21 | 10.68 |
| 77236 | | .0938 | 3/32" | 2.383 | 1-3/4" | 3/4" | .301" | 12.51 | 11.97 | 11.42 | 10.88 |
| | 89236 | .0938 | 3/32" | 2.383 | 2" | 1" | .488" | 12.51 | 11.97 | 11.42 | 10.88 |
| 77241 | | .0960 | #41 | 2.438 | 1-13/16" | 13/16" | .308" | 12.59 | 12.05 | 11.50 | 10.95 |
| | 89241 | .0960 | #41 | 2.438 | 2" | 1" | .500" | 12.62 | 12.07 | 11.52 | 10.97 |
| 77246 | | .0980 | #40 | 2.489 | 1-13/16" | 13/16" | .314" | 12.75 | 12.20 | 11.64 | 11.09 |
| | 89246 | .0980 | #40 | 2.489 | 2" | 1" | .510" | 12.78 | 12.22 | 11.67 | 11.11 |
| 77251 | | .0984 | | 2.500 | 46 | 21 | 8 | 12.80 | 12.24 | 11.69 | 11.13 |
| | 89251 | .0984 | | 2.500 | 57 | 32 | 13 | 12.80 | 12.24 | 11.69 | 11.13 |
| 77256 | | .0995 | #39 | 2.527 | 1-13/16" | 13/16" | .319" | 12.86 | 12.30 | 11.74 | 11.18 |
| | 89256 | .0995 | #39 | 2.527 | 2-1/4" | 1-1/4" | .518" | 12.86 | 12.30 | 11.74 | 11.18 |
| 77261 | | .1015 | #38 | 2.578 | 1-13/16" | 13/16" | .326" | 12.97 | 12.41 | 11.84 | 11.28 |
| | 89261 | .1015 | #38 | 2.578 | 2-1/4" | 1-1/4" | .529" | 13.02 | 12.45 | 11.89 | 11.32 |

# Series 1520H, 1205H *(continued)*

.1040" - .1719"
(2.642mm - 4.366mm)

| 3xD (1520H) EDP# | 5xD (1205H) EDP# | *d* † Diameter Decimal | Diameter | Metric | *l*1 Overall Length | *l*2 Flute Length | *l*5 Max Drill Depth | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 77266 | | .1040 | #37 | 2.642 | 1-13/16" | 13/16" | .334" | 13.03 | 12.46 | 11.90 | 11.33 |
| | 89266 | .1040 | #37 | 2.642 | 2-1/4" | 1-1/4" | .542" | 13.12 | 12.55 | 11.98 | 11.41 |
| 77271 | | .1065 | #36 | 2.705 | 1-13/16" | 13/16" | .342" | 13.11 | 12.54 | 11.97 | 11.40 |
| | 89271 | .1065 | #36 | 2.705 | 2-1/4" | 1-1/4" | .555" | 13.27 | 12.69 | 12.12 | 11.54 |
| 77276 | | .1094 | 7/64" | 2.779 | 1-13/16" | 13/16" | .351" | 13.17 | 12.60 | 12.02 | 11.45 |
| | 89276 | .1094 | 7/64" | 2.779 | 2-1/4" | 1-1/4" | .570" | 13.48 | 12.89 | 12.31 | 11.72 |
| 77281 | | .1100 | #35 | 2.794 | 1-7/8" | 7/8" | .353" | 13.25 | 12.67 | 12.10 | 11.52 |
| | 89281 | .1100 | #35 | 2.794 | 2-1/4" | 1-1/4" | .573" | 13.58 | 12.99 | 12.40 | 11.81 |
| 77286 | | .1110 | #34 | 2.819 | 1-7/8" | 7/8" | .356" | 13.39 | 12.80 | 12.22 | 11.64 |
| | 89286 | .1110 | #34 | 2.819 | 2-1/4" | 1-1/4" | .578" | 13.73 | 13.13 | 12.54 | 11.94 |
| 77291 | | .1130 | #33 | 2.870 | 1-7/8" | 7/8" | .362" | 13.47 | 12.88 | 12.30 | 11.71 |
| | 89291 | .1130 | #33 | 2.870 | 2-1/4" | 1-1/4" | .588" | 13.95 | 13.34 | 12.74 | 12.13 |
| 77296 | | .1160 | #32 | 2.946 | 1-7/8" | 7/8" | .372" | 13.55 | 12.96 | 12.37 | 11.78 |
| | 89296 | .1160 | #32 | 2.946 | 2-1/4" | 1-1/4" | .604" | 14.05 | 13.44 | 12.83 | 12.22 |
| 77301 | | .1181 | | 3.000 | 48 | 22 | 10 | 13.66 | 13.07 | 12.47 | 11.88 |
| | 89301 | .1181 | | 3.000 | 57 | 32 | 16 | 14.17 | 13.55 | 12.94 | 12.32 |
| 77306 | | .1200 | #31 | 3.048 | 1-7/8" | 7/8" | .385" | 13.75 | 13.16 | 12.56 | 11.96 |
| | 89306 | .1200 | #31 | 3.048 | 2-1/4" | 1-1/4" | .625" | 14.28 | 13.66 | 13.04 | 12.42 |
| 77311 | | .1250 | 1/8" | 3.175 | 1-7/8" | 7/8" | .401" | 13.88 | 13.28 | 12.67 | 12.07 |
| | 89311 | .1250 | 1/8" | 3.175 | 2-1/4" | 1-1/4" | .651" | 14.40 | 13.77 | 13.15 | 12.52 |
| 77316 | | .1285 | #30 | 3.264 | 1-15/16" | 15/16" | .412" | 14.19 | 13.57 | 12.96 | 12.34 |
| | 89316 | .1285 | #30 | 3.264 | 2-1/4" | 1-1/4" | .669" | 14.73 | 14.09 | 13.45 | 12.81 |
| 77321 | | .1360 | #29 | 3.454 | 1-15/16" | 15/16" | .436" | 14.52 | 13.89 | 13.26 | 12.63 |
| | 89321 | .1360 | #29 | 3.454 | 2-1/2" | 1-3/8" | .708" | 15.12 | 14.47 | 13.81 | 13.15 |
| 77326 | | .1378 | | 3.500 | 49 | 24 | 11 | 14.93 | 14.28 | 13.63 | 12.98 |
| | 89326 | .1378 | | 3.500 | 63 | 35 | 18 | 15.54 | 14.86 | 14.19 | 13.51 |
| 77331 | | .1405 | #28 | 3.569 | 1-15/16" | 15/16" | .451" | 15.08 | 14.42 | 13.77 | 13.11 |
| | 89331 | .1405 | #28 | 3.569 | 2-1/2" | 1-3/8" | .732" | 15.71 | 15.03 | 14.34 | 13.66 |
| 77336 | | .1406 | 9/64" | 3.571 | 1-15/16" | 15/16" | .451" | 15.23 | 14.56 | 13.90 | 13.24 |
| | 89336 | .1406 | 9/64" | 3.571 | 2-1/2" | 1-3/8" | .732" | 15.85 | 15.16 | 14.47 | 13.78 |
| 77341 | | .1440 | #27 | 3.658 | 2-1/16" | 1" | .462" | 16.38 | 15.66 | 14.95 | 14.24 |
| | 89341 | .1440 | #27 | 3.658 | 2-1/2" | 1-3/8" | .750" | 16.39 | 15.68 | 14.96 | 14.25 |
| 77346 | | .1470 | #26 | 3.734 | 2-1/16" | 1" | .471" | 16.54 | 15.82 | 15.10 | 14.38 |
| | 89346 | .1470 | #26 | 3.734 | 2-1/2" | 1-3/8" | .765" | 16.54 | 15.82 | 15.10 | 14.38 |
| 77351 | | .1495 | #25 | 3.797 | 2-1/16" | 1" | .479" | 16.69 | 15.96 | 15.24 | 14.51 |
| | 89351 | .1495 | #25 | 3.797 | 2-1/2" | 1-3/8" | .778" | 16.69 | 15.96 | 15.24 | 14.51 |
| 77356 | | .1520 | #24 | 3.861 | 2-1/16" | 1" | .487" | 16.74 | 16.02 | 15.29 | 14.56 |
| | 89356 | .1520 | #24 | 3.861 | 2-1/2" | 1-3/8" | .791" | 16.77 | 16.04 | 15.31 | 14.58 |
| 77361 | | .1540 | #23 | 3.912 | 2-1/16" | 1" | .494" | 16.84 | 16.10 | 15.37 | 14.64 |
| | 89361 | .1540 | #23 | 3.912 | 2-1/2" | 1-3/8" | .802" | 16.85 | 16.12 | 15.38 | 14.65 |
| 77366 | | .1562 | 5/32" | 3.967 | 2-1/16" | 1" | .501" | 16.93 | 16.19 | 15.46 | 14.72 |
| | 89366 | .1562 | 5/32" | 3.967 | 2-1/2" | 1-3/8" | .813" | 16.93 | 16.19 | 15.46 | 14.72 |
| 77371 | | .1570 | #22 | 3.988 | 2-1/8" | 1-1/16" | .504" | 17.87 | 17.09 | 16.32 | 15.54 |
| | 89371 | .1570 | #22 | 3.988 | 2-1/2" | 1-3/8" | .818" | 17.87 | 17.09 | 16.32 | 15.54 |
| 77376 | | .1575 | | 4.000 | 54 | 27 | 13 | 18.06 | 17.27 | 16.49 | 15.70 |
| | 89376 | .1575 | | 4.000 | 63 | 35 | 21 | 18.07 | 17.28 | 16.50 | 15.71 |
| 77381 | | .1590 | #21 | 4.039 | 2-1/8" | 1-1/16" | .510" | 18.27 | 17.48 | 16.68 | 15.89 |
| | 89381 | .1590 | #21 | 4.039 | 2-1/2" | 1-3/8" | .828" | 18.27 | 17.48 | 16.68 | 15.89 |
| 77386 | | .1610 | #20 | 4.089 | 2-1/8" | 1-1/16" | .516" | 18.38 | 17.58 | 16.78 | 15.98 |
| | 89386 | .1610 | #20 | 4.089 | 2-1/2" | 1-3/8" | .838" | 18.38 | 17.58 | 16.78 | 15.98 |
| 77391 | | .1660 | #19 | 4.216 | 2-1/8" | 1-1/16" | .532" | 19.04 | 18.22 | 17.39 | 16.56 |
| | 89391 | .1660 | #19 | 4.216 | 2-3/4" | 1-5/8" | .864" | 19.06 | 18.23 | 17.40 | 16.57 |
| 77396 | | .1695 | #18 | 4.305 | 2-1/8" | 1-1/16" | .544" | 19.24 | 18.40 | 17.57 | 16.73 |
| | 89396 | .1695 | #18 | 4.305 | 2-3/4" | 1-5/8" | .883" | 19.24 | 18.40 | 17.57 | 16.73 |
| 77401 | | .1719 | 11/64" | 4.366 | 2-1/8" | 1-1/16" | .551" | 19.57 | 18.72 | 17.87 | 17.02 |
| | 89401 | .1719 | 11/64" | 4.366 | 2-3/4" | 1-5/8" | .895" | 19.57 | 18.72 | 17.87 | 17.02 |



† *Metric equivalents are for reference only*

| 3xD (1520H) EDP# | 5xD (1205H) EDP# | *d* † Diameter Decimal | Diameter | Metric | *l1* Overall Length | *l2* Flute Length | *l5* Max Drill Depth | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 77406 | | .1730 | #17 | 4.394 | 2-3/16" | 1-1/8" | .555" | 19.84 | 18.98 | 18.11 | 17.25 |
| | 89406 | .1730 | #17 | 4.394 | 2-3/4" | 1-5/8" | .901" | 19.86 | 19.00 | 18.13 | 17.27 |
| 77411 | | .1770 | #16 | 4.496 | 2-3/16" | 1-1/8" | .568" | 20.03 | 19.16 | 18.29 | 17.42 |
| | 89411 | .1770 | #16 | 4.496 | 2-3/4" | 1-5/8" | .922" | 20.03 | 19.16 | 18.29 | 17.42 |
| 77416 | | .1772 | | 4.500 | 56 | 29 | 14 | 20.13 | 19.25 | 18.38 | 17.50 |
| | 89416 | .1772 | | 4.500 | 70 | 41 | 23 | 20.14 | 19.26 | 18.39 | 17.51 |
| 77421 | | .1800 | #15 | 4.572 | 2-3/16" | 1-1/8" | .577" | 20.23 | 19.35 | 18.47 | 17.59 |
| | 89421 | .1800 | #15 | 4.572 | 2-3/4" | 1-5/8" | .937" | 20.23 | 19.35 | 18.47 | 17.59 |
| 77426 | | .1820 | #14 | 4.623 | 2-3/16" | 1-1/8" | .584" | 20.62 | 19.72 | 18.83 | 17.93 |
| | 89426 | .1820 | #14 | 4.623 | 2-3/4" | 1-5/8" | .948" | 20.62 | 19.72 | 18.83 | 17.93 |
| 77431 | | .1850 | #13 | 4.700 | 2-3/16" | 1-1/8" | .593" | 20.76 | 19.86 | 18.95 | 18.05 |
| | 89431 | .1850 | #13 | 4.700 | 2-3/4" | 1-5/8" | .963" | 20.77 | 19.87 | 18.96 | 18.06 |
| 77436 | | .1875 | 3/16" | 4.763 | 2-3/16" | 1-1/8" | .601" | 20.83 | 19.92 | 19.02 | 18.11 |
| | 89436 | .1875 | 3/16" | 4.763 | 2-3/4" | 1-5/8" | .976" | 20.86 | 19.95 | 19.05 | 18.14 |
| 77441 | | .1890 | #12 | 4.801 | 2-1/4" | 1-3/16" | .606" | 22.99 | 21.99 | 20.99 | 19.99 |
| | 89441 | .1890 | #12 | 4.801 | 2-3/4" | 1-5/8" | .984" | 22.99 | 21.99 | 20.99 | 19.99 |
| 77446 | | .1910 | #11 | 4.851 | 2-1/4" | 1-3/16" | .613" | 23.20 | 22.19 | 21.18 | 20.17 |
| | 89446 | .1910 | #11 | 4.851 | 2-3/4" | 1-5/8" | .995" | 23.20 | 22.19 | 21.18 | 20.17 |
| 77451 | | .1935 | #10 | 4.915 | 2-1/4" | 1-3/16" | .621" | 24.10 | 23.06 | 22.01 | 20.96 |
| | 89451 | .1935 | #10 | 4.915 | 2-3/4" | 1-5/8" | 1.008" | 24.10 | 23.06 | 22.01 | 20.96 |
| 77456 | | .1960 | #9 | 4.978 | 2-1/4" | 1-3/16" | .629" | 24.63 | 23.56 | 22.49 | 21.42 |
| | 89456 | .1960 | #9 | 4.978 | 3" | 1-3/4" | 1.021" | 24.63 | 23.56 | 22.49 | 21.42 |
| 77461 | | .1969 | | 5.000 | 57 | 30 | 16 | 24.76 | 23.68 | 22.61 | 21.53 |
| | 89461 | .1969 | | 5.000 | 76 | 44 | 26 | 24.76 | 23.68 | 22.61 | 21.53 |
| 77466 | | .1990 | #8 | 5.055 | 2-1/4" | 1-3/16" | .638" | 24.87 | 23.79 | 22.71 | 21.63 |
| | 89466 | .1990 | #8 | 5.055 | 3" | 1-3/4" | 1.036" | 24.86 | 23.78 | 22.70 | 21.62 |
| 77471 | | .2010 | #7 | 5.105 | 2-1/4" | 1-3/16" | .645" | 25.53 | 24.42 | 23.31 | 22.20 |
| | 89471 | .2010 | #7 | 5.105 | 3" | 1-3/4" | 1.047" | 25.52 | 24.41 | 23.30 | 22.19 |
| 77476 | | .2031 | 13/64" | 5.159 | 2-1/4" | 1-3/16" | .651" | 25.68 | 24.56 | 23.45 | 22.33 |
| | 89476 | .2031 | 13/64" | 5.159 | 3" | 1-3/4" | 1.058" | 25.68 | 24.56 | 23.45 | 22.33 |
| 77481 | | .2040 | #6 | 5.182 | 2-3/8" | 1-1/4" | .654" | 26.14 | 25.00 | 23.87 | 22.73 |
| | 89481 | .2040 | #6 | 5.182 | 3" | 1-3/4" | 1.062" | 26.14 | 25.00 | 23.87 | 22.73 |
| 77486 | | .2055 | #5 | 5.220 | 2-3/8" | 1-1/4" | .659" | 26.60 | 25.44 | 24.29 | 23.13 |
| | 89486 | .2055 | #5 | 5.220 | 3" | 1-3/4" | 1.070" | 26.60 | 25.44 | 24.29 | 23.13 |
| 77491 | | .2090 | #4 | 5.309 | 2-3/8" | 1-1/4" | .670" | 27.03 | 25.85 | 24.68 | 23.50 |
| | 89491 | .2090 | #4 | 5.309 | 3" | 1-3/4" | 1.088" | 27.03 | 25.85 | 24.68 | 23.50 |
| 77496 | | .2130 | #3 | 5.410 | 2-3/8" | 1-1/4" | .683" | 27.42 | 26.22 | 25.03 | 23.84 |
| | 89496 | .2130 | #3 | 5.410 | 3" | 1-3/4" | 1.109" | 27.42 | 26.22 | 25.03 | 23.84 |
| 77501 | | .2165 | | 5.500 | 60 | 32 | 18 | 27.61 | 26.41 | 25.21 | 24.01 |
| | 89501 | .2165 | | 5.500 | 76 | 44 | 29 | 27.59 | 26.39 | 25.19 | 23.99 |
| 77506 | | .2188 | 7/32" | 5.558 | 2-3/8" | 1-1/4" | .702" | 27.77 | 26.57 | 25.36 | 24.15 |
| | 89506 | .2188 | 7/32" | 5.558 | 3" | 1-3/4" | 1.139" | 27.76 | 26.55 | 25.35 | 24.14 |
| 77511 | | .2210 | #2 | 5.613 | 2-7/16" | 1-5/16" | .709" | 28.37 | 27.14 | 25.90 | 24.67 |
| | 89511 | .2210 | #2 | 5.613 | 3" | 1-3/4" | 1.151" | 28.34 | 27.10 | 25.87 | 24.64 |
| 77516 | | .2280 | #1 | 5.791 | 2-7/16" | 1-5/16" | .731" | 28.52 | 27.28 | 26.04 | 24.80 |
| | 89516 | .2280 | #1 | 5.791 | 3" | 1-3/4" | 1.187" | 28.51 | 27.27 | 26.03 | 24.79 |
| 77521 | | .2340 | A | 5.944 | 2-7/16" | 1-5/16" | .750" | 28.58 | 27.34 | 26.09 | 24.85 |
| | 89521 | .2340 | A | 5.944 | 3-1/4" | 2" | 1.218" | 28.91 | 27.65 | 26.40 | 25.14 |
| 77526 | | .2344 | 15/64" | 5.954 | 2-7/16" | 1-5/16" | .752" | 28.62 | 27.38 | 26.13 | 24.89 |
| | 89526 | .2344 | 15/64" | 5.954 | 3-1/4" | 2" | 1.221" | 28.99 | 27.73 | 26.47 | 25.21 |
| 77531 | | .2362 | | 6.000 | 64 | 35 | 19 | 28.69 | 27.45 | 26.20 | 24.95 |
| | 89531 | .2362 | | 6.000 | 82 | 50 | 31 | 29.08 | 27.82 | 26.55 | 25.29 |
| 77536 | | .2380 | B | 6.045 | 2-1/2" | 1-3/8" | .763" | 28.80 | 27.54 | 26.29 | 25.04 |
| | 89536 | .2380 | B | 6.045 | 3-1/4" | 2" | 1.239" | 29.18 | 27.91 | 26.64 | 25.37 |
| 77541 | | .2420 | C | 6.147 | 2-1/2" | 1-3/8" | .776" | 28.98 | 27.72 | 26.46 | 25.20 |
| | 89541 | .2420 | C | 6.147 | 3-1/4" | 2" | 1.260" | 29.36 | 28.08 | 26.81 | 25.53 |

*continued* →

# Series 1520H, 1205H *(continued)*

.2460" - .3543"
(6.248mm - 9.000mm)

| 3xD (1520H) EDP# | 5xD (1205H) EDP# | Decimal | *d* † Diameter | Metric | *l1* Overall Length | *l2* Flute Length | *l5* Max Drill Depth | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 77546 | | .2460 | D | 6.248 | 2-1/2" | 1-3/8" | .789" | 29.18 | 27.91 | 26.64 | 25.37 |
| | 89546 | .2460 | D | 6.248 | 3-1/4" | 2" | 1.281" | 29.57 | 28.28 | 27.00 | 25.71 |
| 77551 | | .2500 | 1/4" / E | 6.350 | 2-1/2" | 1-3/8" | .802" | 29.35 | 28.07 | 26.80 | 25.52 |
| | 89551 | .2500 | 1/4" / E | 6.350 | 3-1/4" | 2" | 1.302" | 29.72 | 28.42 | 27.13 | 25.84 |
| 77556 | | .2559 | | 6.500 | 67 | 37 | 21 | 32.76 | 31.34 | 29.91 | 28.49 |
| | 89556 | .2559 | | 6.500 | 82 | 50 | 34 | 33.47 | 32.01 | 30.56 | 29.10 |
| 77561 | | .2570 | F | 6.528 | 2-5/8" | 1-7/16" | .824" | 33.32 | 31.87 | 30.42 | 28.97 |
| | 89561 | .2570 | F | 6.528 | 3-1/4" | 2" | 1.338" | 34.05 | 32.57 | 31.09 | 29.61 |
| 77566 | | .2610 | G | 6.629 | 2-5/8" | 1-7/16" | .837" | 33.86 | 32.38 | 30.91 | 29.44 |
| | 89566 | .2610 | G | 6.629 | 3-1/2" | 2-1/8" | 1.359" | 34.57 | 33.07 | 31.56 | 30.06 |
| 77571 | | .2656 | 17/64" | 6.746 | 2-5/8" | 1-7/16" | .852" | 34.43 | 32.93 | 31.44 | 29.94 |
| | 89571 | .2656 | 17/64" | 6.746 | 3-1/2" | 2-1/8" | 1.383" | 35.14 | 33.62 | 32.09 | 30.56 |
| 77576 | | .2660 | H | 6.756 | 2-11/16" | 1-1/2" | .853" | 35.22 | 33.69 | 32.16 | 30.63 |
| | 89576 | .2660 | H | 6.756 | 3-1/2" | 2-1/8" | 1.385" | 35.94 | 34.38 | 32.81 | 31.25 |
| 77581 | | .2720 | I | 6.909 | 2-11/16" | 1-1/2" | .872" | 35.56 | 34.01 | 32.47 | 30.92 |
| | 89581 | .2720 | I | 6.909 | 3-1/2" | 2-1/8" | 1.416" | 36.27 | 34.69 | 33.12 | 31.54 |
| 77586 | | .2756 | | 7.000 | 68 | 38 | 22 | 35.80 | 34.24 | 32.69 | 31.13 |
| | 89586 | .2756 | | 7.000 | 88 | 54 | 36 | 36.50 | 34.91 | 33.33 | 31.74 |
| 77591 | | .2770 | J | 7.036 | 2-11/16" | 1-1/2" | .888" | 36.08 | 34.51 | 32.94 | 31.37 |
| | 89591 | .2770 | J | 7.036 | 3-1/2" | 2-1/8" | 1.442" | 36.77 | 35.17 | 33.57 | 31.97 |
| 77596 | | .2810 | K | 7.137 | 2-11/16" | 1-1/2" | .901" | 36.32 | 34.74 | 33.16 | 31.58 |
| | 89596 | .2810 | K | 7.137 | 3-1/2" | 2-1/8" | 1.463" | 37.05 | 35.44 | 33.83 | 32.22 |
| 77601 | | .2812 | 9/32" | 7.142 | 2-11/16" | 1-1/2" | .902" | 36.48 | 34.89 | 33.31 | 31.72 |
| | 89601 | .2812 | 9/32" | 7.142 | 3-1/2" | 2-1/8" | 1.464" | 37.19 | 35.57 | 33.96 | 32.34 |
| 77606 | | .2900 | L | 7.366 | 2-3/4" | 1-9/16" | .930" | 37.58 | 35.95 | 34.31 | 32.68 |
| | 89606 | .2900 | L | 7.366 | 3-1/2" | 2-1/8" | 1.510" | 38.33 | 36.66 | 35.00 | 33.33 |
| 77611 | | .2950 | M | 7.493 | 2-3/4" | 1-9/16" | .946" | 39.76 | 38.03 | 36.30 | 34.57 |
| | 89611 | .2950 | M | 7.493 | 3-3/4" | 2-3/8" | 1.536" | 40.53 | 38.76 | 37.00 | 35.24 |
| 77616 | | .2953 | | 7.500 | 70 | 40 | 24 | 39.76 | 38.03 | 36.30 | 34.57 |
| | 89616 | .2953 | | 7.500 | 95 | 60 | 39 | 40.53 | 38.76 | 37.00 | 35.24 |
| 77621 | | .2969 | 19/64" | 7.541 | 2-3/4" | 1-9/16" | .952" | 39.95 | 38.21 | 36.48 | 34.74 |
| | 89621 | .2969 | 19/64" | 7.541 | 3-3/4" | 2-3/8" | 1.546" | 40.53 | 38.76 | 37.00 | 35.24 |
| 77626 | | .3020 | N | 7.671 | 2-15/16" | 1-5/8" | .969" | 41.76 | 39.94 | 38.13 | 36.31 |
| | 89626 | .3020 | N | 7.671 | 3-3/4" | 2-3/8" | 1.573" | 42.53 | 40.68 | 38.83 | 36.98 |
| 77631 | | .3125 | 5/16" | 7.938 | 2-15/16" | 1-5/8" | 1.002" | 41.89 | 40.07 | 38.25 | 36.43 |
| | 89631 | .3125 | 5/16" | 7.938 | 3-3/4" | 2-3/8" | 1.627" | 42.69 | 40.83 | 38.98 | 37.12 |
| 77636 | | .3150 | | 8.000 | 75 | 43 | 26 | 44.46 | 42.53 | 40.59 | 38.66 |
| | 89636 | .3150 | | 8.000 | 95 | 60 | 42 | 45.26 | 43.30 | 41.33 | 39.36 |
| 77641 | | .3160 | O | 8.026 | 2-15/16" | 1-11/16" | 1.013" | 44.46 | 42.53 | 40.59 | 38.66 |
| | 89641 | .3160 | O | 8.026 | 3-3/4" | 2-3/8" | 1.645" | 45.26 | 43.30 | 41.33 | 39.36 |
| 77646 | | .3230 | P | 8.204 | 2-15/16" | 1-11/16" | 1.036" | 44.78 | 42.83 | 40.89 | 38.94 |
| | 89646 | .3230 | P | 8.204 | 3-3/4" | 2-3/8" | 1.682" | 45.26 | 43.30 | 41.33 | 39.36 |
| 77651 | | .3281 | 21/64" | 8.334 | 2-15/16" | 1-11/16" | 1.052" | 45.03 | 43.08 | 41.12 | 39.16 |
| | 89651 | .3281 | 21/64" | 8.334 | 4" | 2-1/2" | 1.708" | 45.84 | 43.85 | 41.85 | 39.86 |
| 77656 | | .3320 | Q | 8.433 | 3" | 1-11/16" | 1.065" | 45.93 | 43.93 | 41.94 | 39.94 |
| | 89656 | .3320 | Q | 8.433 | 4" | 2-1/2" | 1.729" | 46.76 | 44.73 | 42.69 | 40.66 |
| 77661 | | .3346 | | 8.500 | 76 | 43 | 27 | 46.29 | 44.28 | 42.26 | 40.25 |
| | 89661 | .3346 | | 8.500 | 101 | 63 | 44 | 47.10 | 45.06 | 43.01 | 40.96 |
| 77666 | | .3390 | R | 8.611 | 3" | 1-11/16" | 1.087" | 47.55 | 45.49 | 43.42 | 41.35 |
| | 89666 | .3390 | R | 8.611 | 4" | 2-1/2" | 1.765" | 48.39 | 46.29 | 44.18 | 42.08 |
| 77671 | | .3438 | 11/32" | 8.733 | 3" | 1-11/16" | 1.103" | 49.23 | 47.09 | 44.95 | 42.81 |
| | 89671 | .3438 | 11/32" | 8.733 | 4" | 2-1/2" | 1.790" | 50.07 | 47.89 | 45.72 | 43.54 |
| 77676 | | .3480 | S | 8.839 | 3-1/16" | 1-3/4" | 1.116" | 52.07 | 49.81 | 47.54 | 45.28 |
| | 89676 | .3480 | S | 8.839 | 4" | 2-1/2" | 1.812" | 52.06 | 49.80 | 47.53 | 45.27 |
| 77681 | | .3543 | | 9.000 | 78 | 44 | 29 | 52.34 | 50.06 | 47.79 | 45.51 |
| | 89681 | .3543 | | 9.000 | 101 | 63 | 47 | 52.35 | 50.07 | 47.80 | 45.52 |



† *Metric equivalents are for reference only*

| | 3xD (1520H) EDP# | 5xD (1205H) EDP# | *d* † Diameter Decimal | Diameter | Metric | *l1* Overall Length | *l2* Flute Length | *l5* Max Drill Depth | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 77686 | | .3580 | T | 9.093 | 3-1/16" | 1-3/4" | 1.148" | 52.51 | 50.23 | 47.94 | 45.66 |
| | | 89686 | .3580 | T | 9.093 | 4-1/4" | 2-3/4" | 1.864" | 54.43 | 52.06 | 49.70 | 47.33 |
| | 77691 | | .3594 | 23/64" | 9.129 | 3-1/16" | 1-3/4" | 1.153" | 52.83 | 50.53 | 48.24 | 45.94 |
| | | 89691 | .3594 | 23/64" | 9.129 | 4-1/4" | 2-3/4" | 1.871" | 54.76 | 52.38 | 50.00 | 47.62 |
| | 77696 | | .3680 | U | 9.347 | 3-1/8" | 1-13/16" | 1.180" | 57.02 | 54.54 | 52.06 | 49.58 |
| | | 89696 | .3680 | U | 9.347 | 4-1/4" | 2-3/4" | 1.916" | 60.75 | 58.11 | 55.47 | 52.83 |
| | 77701 | | .3740 | | 9.500 | 79 | 46 | 30 | 57.47 | 54.97 | 52.47 | 49.97 |
| | | 89701 | .3740 | | 9.500 | 107 | 70 | 49 | 61.20 | 58.54 | 55.88 | 53.22 |
| | 77706 | | .3750 | 3/8" | 9.525 | 3-1/8" | 1-13/16" | 1.203" | 57.83 | 55.32 | 52.80 | 50.29 |
| | | 89706 | .3750 | 3/8" | 9.525 | 4-1/4" | 2-3/4" | 1.953" | 61.61 | 58.93 | 56.25 | 53.57 |
| | 77711 | | .3770 | V | 9.576 | 3-1/4" | 1-7/8" | 1.209" | 60.06 | 57.45 | 54.84 | 52.23 |
| | | 89711 | .3770 | V | 9.576 | 4-1/4" | 2-3/4" | 1.963" | 63.11 | 60.37 | 57.62 | 54.88 |
| | 77716 | | .3860 | W | 9.804 | 3-1/4" | 1-7/8" | 1.238" | 61.11 | 58.45 | 55.80 | 53.14 |
| | | 89716 | .3860 | W | 9.804 | 4-1/2" | 2-7/8" | 2.010" | 64.24 | 61.45 | 58.65 | 55.86 |
| | 77721 | | .3906 | 25/64" | 9.921 | 3-1/4" | 1-7/8" | 1.253" | 61.87 | 59.18 | 56.49 | 53.80 |
| | | 89721 | .3906 | 25/64" | 9.921 | 4-1/2" | 2-7/8" | 2.034" | 65.01 | 62.18 | 59.36 | 56.53 |
| | 77726 | | .3937 | | 10.000 | 84 | 49 | 32 | 63.74 | 60.97 | 58.20 | 55.43 |
| | | 89726 | .3937 | | 10.000 | 114 | 73 | 52 | 66.98 | 64.06 | 61.15 | 58.24 |
| | 77731 | | .3970 | X | 10.084 | 3-5/16" | 1-15/16" | 1.273" | 65.30 | 62.46 | 59.62 | 56.78 |
| | | 89731 | .3970 | X | 10.084 | 4-1/2" | 2-7/8" | 2.067" | 68.60 | 65.62 | 62.63 | 59.65 |
| | 77736 | | .4040 | Y | 10.262 | 3-5/16" | 1-15/16" | 1.296" | 65.76 | 62.90 | 60.04 | 57.18 |
| | | 89736 | .4040 | Y | 10.262 | 4-1/2" | 2-7/8" | 2.104" | 69.07 | 66.07 | 63.06 | 60.06 |
| | 77741 | | .4062 | 13/32" | 10.317 | 3-5/16" | 1-15/16" | 1.303" | 67.79 | 64.85 | 61.90 | 58.95 |
| | | 89741 | .4062 | 13/32" | 10.317 | 4-1/2" | 2-7/8" | 2.115" | 71.17 | 68.08 | 64.98 | 61.89 |
| | 77746 | | .4130 | Z | 10.490 | 3-3/8" | 2" | 1.325" | 68.39 | 65.42 | 62.44 | 59.47 |
| | | 89746 | .4130 | Z | 10.490 | 4-1/2" | 2-7/8" | 2.151" | 71.83 | 68.71 | 65.58 | 62.46 |
| | 77751 | | .4134 | | 10.500 | 86 | 51 | 34 | 68.39 | 65.42 | 62.44 | 59.47 |
| | | 89751 | .4134 | | 10.500 | 114 | 73 | 55 | 71.83 | 68.71 | 65.58 | 62.46 |
| | 77756 | | .4219 | 27/64" | 10.716 | 3-3/8" | 2" | 1.353" | 69.05 | 66.04 | 63.04 | 60.04 |
| | | 89756 | .4219 | 27/64" | 10.716 | 4-1/2" | 2-7/8" | 2.197" | 72.50 | 69.34 | 66.19 | 63.04 |
| | 77761 | | .4331 | | 11.000 | 87 | 52 | 35 | 74.12 | 70.90 | 67.67 | 64.45 |
| | | 89761 | .4331 | | 11.000 | 114 | 73 | 57 | 77.77 | 74.39 | 71.01 | 67.63 |
| | 77766 | | .4375 | 7/16" | 11.113 | 3-7/16" | 2-1/16" | 1.403" | 74.12 | 70.90 | 67.67 | 64.45 |
| | | 89766 | .4375 | 7/16" | 11.113 | 4-1/2" | 2-7/8" | 2.278" | 77.77 | 74.39 | 71.01 | 67.63 |
| | 77771 | | .4528 | | 11.500 | 91 | 54 | 37 | 79.56 | 76.10 | 72.64 | 69.18 |
| | | 89771 | .4528 | | 11.500 | 120 | 76 | 60 | 83.44 | 79.82 | 76.19 | 72.56 |
| | 77776 | | .4531 | 29/64" | 11.509 | 3-9/16" | 2-1/8" | 1.453" | 79.56 | 76.10 | 72.64 | 69.18 |
| | | 89776 | .4531 | 29/64" | 11.509 | 4-3/4" | 3" | 2.359" | 83.44 | 79.82 | 76.19 | 72.56 |
| | 77781 | | .4688 | 15/32" | 11.908 | 3-5/8" | 2-1/8" | 1.503" | 83.59 | 79.96 | 76.32 | 72.69 |
| | | 89781 | .4688 | 15/32" | 11.908 | 4-3/4" | 3" | 2.441" | 87.63 | 83.82 | 80.01 | 76.20 |
| | 77786 | | .4724 | | 12.000 | 94 | 56 | 38 | 83.84 | 80.19 | 76.55 | 72.90 |
| | | 89786 | .4724 | | 12.000 | 120 | 76 | 62 | 87.89 | 84.07 | 80.25 | 76.43 |
| | 77791 | | .4844 | 31/64" | 12.304 | 3-11/16" | 2-3/16" | 1.554" | 84.41 | 80.74 | 77.07 | 73.40 |
| | | 89791 | .4844 | 31/64" | 12.304 | 4-3/4" | 3" | 2.522" | 87.89 | 84.07 | 80.25 | 76.43 |
| | 77796 | | .4921 | | 12.500 | 95 | 56 | 40 | 85.24 | 81.53 | 77.83 | 74.12 |
| | | 89796 | .4921 | | 12.500 | 120 | 76 | 65 | 89.94 | 86.03 | 82.12 | 78.21 |
| | 77801 | | .5000 | 1/2" | 12.700 | 3-3/4" | 2-1/4" | 1.604" | 85.79 | 82.06 | 78.33 | 74.60 |
| | | 89801 | .5000 | 1/2" | 12.700 | 4-3/4" | 3" | 2.604" | 89.94 | 86.03 | 82.12 | 78.21 |
| | 77806 | | .5118 | | 13.000 | 107 | 60 | 42 | 109.17 | 104.42 | 99.68 | 94.93 |
| | | 89806 | .5118 | | 13.000 | 127 | 83 | 68 | 113.19 | 108.27 | 103.35 | 98.43 |
| | 77811 | | .5156 | 33/64" | 13.096 | 4-1/4" | 2-3/8" | 1.654" | 111.73 | 106.88 | 102.02 | 97.16 |
| | | 89811 | .5156 | 33/64" | 13.096 | 5" | 3-1/4" | 2.685" | 115.84 | 110.80 | 105.77 | 100.73 |
| | 77816 | | .5312 | 17/32" | 13.492 | 4-1/4" | 2-3/8" | 1.704" | 114.28 | 109.31 | 104.34 | 99.37 |
| | | 89816 | .5312 | 17/32" | 13.492 | 5" | 3-1/4" | 2.766" | 118.51 | 113.36 | 108.20 | 103.05 |
| NEW | 77821 | | .5315 | | 13.500 | 107 | 60 | 43 | 116.84 | 111.76 | 106.68 | 101.60 |
| | | 89821 | .5315 | | 13.500 | 127 | 83 | 70 | 121.16 | 115.90 | 110.63 | 105.36 |

*continued* →

# Series 1520H, 1205H *(continued)*

.5469" - .6299"
(13.891mm - 16.000mm)

| | 3xD (1520H) EDP# | 5xD (1205H) EDP# | Decimal | *d* † Diameter | Metric | *l1* Overall Length | *l2* Flute Length | *l5* Max Drill Depth | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 77826 | | .5469 | 35/64" | 13.891 | 4-1/4" | 2-3/8" | 1.754" | 119.39 | 114.20 | 109.01 | 103.82 |
| | | 89826 | .5469 | 35/64" | 13.891 | 5" | 3-1/4" | 2.848" | 123.82 | 118.44 | 113.05 | 107.67 |
| | 77831 | | .5512 | | 14.000 | 107 | 60 | 45 | 121.96 | 116.66 | 111.35 | 106.05 |
| | | 89831 | .5512 | | 14.000 | 127 | 83 | 73 | 126.51 | 121.01 | 115.51 | 110.01 |
| | 77836 | | .5625 | 9/16" | 14.287 | 4-1/2" | 2-1/2" | 1.804" | 131.74 | 126.02 | 120.29 | 114.56 |
| | | 89836 | .5625 | 9/16" | 14.287 | 5" | 3-1/4" | 2.929" | 136.69 | 130.75 | 124.80 | 118.86 |
| | 77841 | | .5709 | | 14.500 | 115 | 65 | 47 | 134.21 | 128.37 | 122.54 | 116.70 |
| | | 89841 | .5709 | | 14.500 | 127 | 83 | 76 | 139.24 | 133.19 | 127.13 | 121.08 |
| | 77846 | | .5781 | 37/64" | 14.683 | 4-1/2" | 2-1/2" | 1.854" | 136.65 | 130.71 | 124.77 | 118.83 |
| | | 89846 | .5781 | 37/64" | 14.683 | 5-1/4" | 3-1/2" | 3.010" | 141.82 | 135.65 | 129.49 | 123.32 |
| | 77851 | | .5906 | | 15.000 | 115 | 65 | 48 | 139.16 | 133.11 | 127.06 | 121.01 |
| | | 89851 | .5906 | | 15.000 | 133 | 89 | 78 | 144.41 | 138.13 | 131.85 | 125.57 |
| | 77856 | | .5938 | 19/32" | 15.082 | 4-1/2" | 2-1/2" | 1.904" | 139.89 | 133.80 | 127.72 | 121.64 |
| | | 89856 | .5938 | 19/32" | 15.082 | 5-1/4" | 3-1/2" | 3.092" | 145.19 | 138.88 | 132.56 | 126.25 |
| NEW | 77861 | | .6094 | 39/64" | 15.478 | 4-1/2" | 2-1/2" | 1.954" | 140.58 | 134.46 | 128.35 | 122.24 |
| | | 89861 | .6094 | 39/64" | 15.478 | 5-1/4" | 3-1/2" | 3.173" | 145.90 | 139.56 | 133.21 | 126.87 |
| | 77866 | | .6102 | | 15.500 | 115 | 65 | 50 | 141.30 | 135.16 | 129.01 | 122.87 |
| | | 89866 | .6102 | | 15.500 | 133 | 89 | 81 | 146.65 | 140.27 | 133.90 | 127.52 |
| | 77871 | | .6250 | 5/8" | 15.875 | 4-1/2" | 2-1/2" | 2.004" | 142.00 | 135.83 | 129.65 | 123.48 |
| | | 89871 | .6250 | 5/8" | 15.875 | 5-1/4" | 3-1/2" | 3.254" | 147.40 | 140.99 | 134.58 | 128.17 |
| NEW | 77876 | | .6299 | | 16.000 | 115 | 65 | 51 | 145.42 | 139.10 | 132.77 | 126.45 |
| | | 89876 | .6299 | | 16.000 | 133 | 89 | 83 | 150.95 | 144.39 | 137.82 | 131.26 |





† *Metric equivalents are for reference only*

**TOLERANCES**

| | | |
|---|---|---|
| *d* | +.0000" –.0005" (+.0000 –.0127mm) | |
| $l_1$ | ≤ 1/8" | +.125" –.062" (+3.175 –1.588mm) |
| | > 1/8" | +.125" –.125" (+3.175 –3.175mm) |
| $l_2$ | ≤ 1/8" | +.125" –.062" (+3.175 –1.588mm) |
| | >1/8" | +.125" –.125" (+3.175 –3.175mm) |

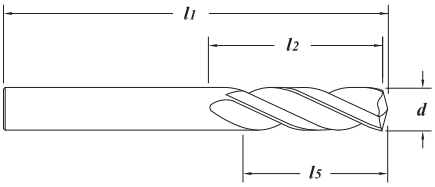
Z=3 | 25° | 150° | 3xD | 5xD | TECH PAGES 324-327

# Series 1120H, 1100H

.1094" - .1575"
(2.779mm - 4.000mm)

Recommended for cast iron, tungsten, and materials with high silicon content






**BALINIT® Durana Coating**

Solid submicron grain carbide drill
Self-centering drill point
Near reamer finishes
Can be used as a core drill
Excellent heat resistance and lubricity
Stub length reduces deflection and vibration
Tighter tolerance holes
Improved roundness and straightness
Live tooling recommended on lathe processes
Series 1100 Bright Finish - page 90

| 3xD (1120H) EDP# | 5xD (1100H) EDP# | *d* † Diameter Decimal | Diameter | Metric | $l_1$ Overall Length | $l_2$ Flute Length | $l_5$ Max Drill Depth | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 78276 | | .1094 | 7/64" | 2.779 | 1-13/16" | 13/16" | .343" | 15.38 | 14.71 | 14.04 | 13.37 |
| | 90276 | .1094 | 7/64" | 2.779 | 2-1/4" | 1-1/4" | .562" | 15.88 | 15.19 | 14.50 | 13.81 |
| 78281 | | .1100 | #35 | 2.794 | 1-7/8" | 7/8" | .345" | 15.51 | 14.84 | 14.16 | 13.49 |
| | 90281 | .1100 | #35 | 2.794 | 2-1/4" | 1-1/4" | .565" | 16.05 | 15.36 | 14.66 | 13.96 |
| 78286 | | .1110 | #34 | 2.819 | 1-7/8" | 7/8" | .348" | 15.67 | 14.99 | 14.31 | 13.63 |
| 78291 | | .1130 | #33 | 2.870 | 1-7/8" | 7/8" | .354" | 15.90 | 15.21 | 14.52 | 13.83 |
| | 90291 | .1130 | #33 | 2.870 | 2-1/4" | 1-1/4" | .580" | 16.47 | 15.75 | 15.04 | 14.32 |
| 78296 | | .1160 | #32 | 2.946 | 1-7/8" | 7/8" | .364" | 16.11 | 15.41 | 14.71 | 14.01 |
| | 90296 | .1160 | #32 | 2.946 | 2-1/4" | 1-1/4" | .596" | 16.63 | 15.91 | 15.18 | 14.46 |
| 78301 | | .1181 | | 3.000 | 48 | 22 | 9 | 16.24 | 15.53 | 14.83 | 14.12 |
| | 90301 | .1181 | | 3.000 | 57 | 32 | 15 | 16.77 | 16.04 | 15.31 | 14.58 |
| 78306 | | .1200 | #31 | 3.048 | 1-7/8" | 7/8" | .376" | 16.35 | 15.64 | 14.93 | 14.22 |
| | 90306 | .1200 | #31 | 3.048 | 2-1/4" | 1-1/4" | .616" | 16.87 | 16.14 | 15.40 | 14.67 |
| 78311 | | .1250 | 1/8" | 3.175 | 1-7/8" | 7/8" | .392" | 16.54 | 15.82 | 15.10 | 14.38 |
| | 90311 | .1250 | 1/8" | 3.175 | 2-1/4" | 1-1/4" | .642" | 17.04 | 16.30 | 15.56 | 14.82 |
| 78316 | | .1285 | #30 | 3.264 | 1-15/16" | 15/16" | .403" | 16.91 | 16.17 | 15.44 | 14.70 |
| | 90316 | .1285 | #30 | 3.264 | 2-1/4" | 1-1/4" | .660" | 17.41 | 16.65 | 15.90 | 15.14 |
| 78321 | | .1360 | #29 | 3.454 | 1-15/16" | 15/16" | .426" | 17.30 | 16.54 | 15.79 | 15.04 |
| | 90321 | .1360 | #29 | 3.454 | 2-1/2" | 1-3/8" | .698" | 17.92 | 17.14 | 16.36 | 15.58 |
| 78326 | | .1378 | | 3.500 | 49 | 24 | 11 | 17.80 | 17.03 | 16.25 | 15.48 |
| | 90326 | .1378 | | 3.500 | 63 | 35 | 18 | 18.41 | 17.61 | 16.81 | 16.01 |
| 78331 | | .1405 | #28 | 3.569 | 1-15/16" | 15/16" | .440" | 17.99 | 17.20 | 16.42 | 15.64 |
| | 90331 | .1405 | #28 | 3.569 | 2-1/2" | 1-3/8" | .721" | 18.61 | 17.80 | 16.99 | 16.18 |
| 78336 | | .1406 | 9/64" | 3.571 | 1-15/16" | 15/16" | .441" | 18.17 | 17.38 | 16.59 | 15.80 |
| | 90336 | .1406 | 9/64" | 3.571 | 2-1/2" | 1-3/8" | .722" | 18.78 | 17.96 | 17.15 | 16.33 |
| 78341 | | .1440 | #27 | 3.658 | 2-1/16" | 1" | .451" | 19.44 | 18.59 | 17.75 | 16.90 |
| | 90341 | .1440 | #27 | 3.658 | 2-1/2" | 1-3/8" | .739" | 19.45 | 18.60 | 17.76 | 16.91 |
| 78346 | | .1470 | #26 | 3.734 | 2-1/16" | 1" | .461" | 19.65 | 18.80 | 17.94 | 17.09 |
| | 90346 | .1470 | #26 | 3.734 | 2-1/2" | 1-3/8" | .755" | 19.67 | 18.81 | 17.96 | 17.10 |
| 78351 | | .1495 | #25 | 3.797 | 2-1/16" | 1" | .469" | 19.83 | 18.96 | 18.10 | 17.24 |
| | 90351 | .1495 | #25 | 3.797 | 2-1/2" | 1-3/8" | .768" | 19.84 | 18.98 | 18.11 | 17.25 |
| 78356 | | .1520 | #24 | 3.861 | 2-1/16" | 1" | .476" | 19.86 | 19.00 | 18.13 | 17.27 |
| | 90356 | .1520 | #24 | 3.861 | 2-1/2" | 1-3/8" | .780" | 19.86 | 19.00 | 18.13 | 17.27 |
| 78361 | | .1540 | #23 | 3.912 | 2-1/16" | 1" | .483" | 20.02 | 19.15 | 18.28 | 17.41 |
| | 90361 | .1540 | #23 | 3.912 | 2-1/2" | 1-3/8" | .791" | 20.03 | 19.16 | 18.29 | 17.42 |
| 78366 | | .1562 | 5/32" | 3.967 | 2-1/16" | 1" | .490" | 20.11 | 19.24 | 18.36 | 17.49 |
| | 90366 | .1562 | 5/32" | 3.967 | 2-1/2" | 1-3/8" | .802" | 20.11 | 19.24 | 18.36 | 17.49 |
| 78371 | | .1570 | #22 | 3.988 | 2-1/8" | 1-1/16" | .492" | 21.26 | 20.34 | 19.41 | 18.49 |
| | 90371 | .1570 | #22 | 3.988 | 2-1/2" | 1-3/8" | .806" | 21.26 | 20.34 | 19.41 | 18.49 |
| 78376 | | .1575 | | 4.000 | 54 | 27 | 13 | 21.26 | 20.34 | 19.41 | 18.49 |
| | 90376 | .1575 | | 4.000 | 63 | 35 | 21 | 21.26 | 20.34 | 19.41 | 18.49 |

*continued* →

# Series 1120H, 1100H *(continued)*

.1590" - .2362"
(4.039mm - 6.000mm)

| 3xD (1120H) EDP# | 5xD (1100H) EDP# | *d* † Diameter Decimal | *d* † Diameter | *d* † Diameter Metric | *l1* Overall Length | *l2* Flute Length | *l5* Max Drill Depth | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 78381 | | .1590 | #21 | 4.039 | 2-1/8" | 1-1/16" | .498" | 21.69 | 20.75 | 19.80 | 18.86 |
| | 90381 | .1590 | #21 | 4.039 | 2-1/2" | 1-3/8" | .816" | 21.74 | 20.79 | 19.85 | 18.90 |
| 78386 | | .1610 | #20 | 4.089 | 2-1/8" | 1-1/16" | .505" | 21.69 | 20.75 | 19.80 | 18.86 |
| | 90386 | .1610 | #20 | 4.089 | 2-1/2" | 1-3/8" | .827" | 21.74 | 20.79 | 19.85 | 18.90 |
| 78391 | | .1660 | #19 | 4.216 | 2-1/8" | 1-1/16" | .520" | 21.85 | 20.90 | 19.95 | 19.00 |
| | 90391 | .1660 | #19 | 4.216 | 2-3/4" | 1-5/8" | .852" | 21.86 | 20.91 | 19.96 | 19.01 |
| 78396 | | .1695 | #18 | 4.305 | 2-1/8" | 1-1/16" | .531" | 21.99 | 21.03 | 20.08 | 19.12 |
| | 90396 | .1695 | #18 | 4.305 | 2-3/4" | 1-5/8" | .870" | 22.00 | 21.04 | 20.09 | 19.13 |
| 78401 | | .1719 | 11/64" | 4.366 | 2-1/8" | 1-1/16" | .539" | 22.11 | 21.15 | 20.19 | 19.23 |
| | 90401 | .1719 | 11/64" | 4.366 | 2-3/4" | 1-5/8" | .883" | 22.11 | 21.15 | 20.19 | 19.23 |
| 78406 | | .1730 | #17 | 4.394 | 2-3/16" | 1-1/8" | .542" | 23.02 | 22.02 | 21.02 | 20.02 |
| | 90406 | .1730 | #17 | 4.394 | 2-3/4" | 1-5/8" | .888" | 23.02 | 22.02 | 21.02 | 20.02 |
| 78411 | | .1770 | #16 | 4.496 | 2-3/16" | 1-1/8" | .555" | 23.26 | 22.25 | 21.24 | 20.23 |
| | 90411 | .1770 | #16 | 4.496 | 2-3/4" | 1-5/8" | .909" | 23.28 | 22.26 | 21.25 | 20.24 |
| 78416 | | .1772 | | 4.500 | 56 | 29 | 14 | 23.36 | 22.34 | 21.33 | 20.31 |
| | 90416 | .1772 | | 4.500 | 70 | 41 | 23 | 23.37 | 22.35 | 21.34 | 20.32 |
| 78421 | | .1800 | #15 | 4.572 | 2-3/16" | 1-1/8" | .564" | 23.45 | 22.43 | 21.41 | 20.39 |
| | 90421 | .1800 | #15 | 4.572 | 2-3/4" | 1-5/8" | .924" | 23.49 | 22.47 | 21.45 | 20.43 |
| 78426 | | .1820 | #14 | 4.623 | 2-3/16" | 1-1/8" | .570" | 23.94 | 22.90 | 21.86 | 20.82 |
| | 90426 | .1820 | #14 | 4.623 | 2-3/4" | 1-5/8" | .934' | 23.95 | 22.91 | 21.87 | 20.83 |
| 78431 | | .1850 | #13 | 4.700 | 2-3/16" | 1-1/8" | .580" | 24.06 | 23.01 | 21.97 | 20.92 |
| | 90431 | .1850 | #13 | 4.700 | 2-3/4" | 1-5/8" | .950' | 24.06 | 23.01 | 21.97 | 20.92 |
| 78436 | | .1875 | 3/16" | 4.763 | 2-3/16" | 1-1/8" | .588" | 24.06 | 23.01 | 21.97 | 20.92 |
| | 90436 | .1875 | 3/16" | 4.763 | 2-3/4" | 1-5/8" | .963" | 24.06 | 23.01 | 21.97 | 20.92 |
| 78441 | | .1890 | #12 | 4.801 | 2-1/4" | 1-3/16" | .592" | 25.77 | 24.65 | 23.53 | 22.41 |
| | 90441 | .1890 | #12 | 4.801 | 2-3/4" | 1-5/8" | .970" | 25.75 | 24.63 | 23.51 | 22.39 |
| 78446 | | .1910 | #11 | 4.851 | 2-1/4" | 1-3/16" | .599" | 26.00 | 24.87 | 23.74 | 22.61 |
| | 90446 | .1910 | #11 | 4.851 | 2-3/4" | 1-5/8" | .981" | 25.98 | 24.85 | 23.72 | 22.59 |
| 78451 | | .1935 | #10 | 4.915 | 2-1/4" | 1-3/16" | .606" | 27.05 | 25.87 | 24.70 | 23.52 |
| | 90451 | .1935 | #10 | 4.915 | 2-3/4" | 1-5/8" | .993" | 27.05 | 25.87 | 24.70 | 23.52 |
| 78456 | | .1960 | #9 | 4.978 | 2-1/4" | 1-3/16" | .614" | 27.62 | 26.42 | 25.22 | 24.02 |
| | 90456 | .1960 | #9 | 4.978 | 3" | 1-3/4" | 1.006" | 27.62 | 26.42 | 25.22 | 24.02 |
| 78461 | | .1969 | | 5.000 | 57 | 30 | 16 | 27.77 | 26.57 | 25.36 | 24.15 |
| | 90461 | .1969 | | 5.000 | 76 | 44 | 26 | 27.76 | 26.55 | 25.35 | 24.14 |
| 78466 | | .1990 | #8 | 5.055 | 2-1/4" | 1-3/16" | .624" | 27.93 | 26.72 | 25.50 | 24.29 |
| | 90466 | .1990 | #8 | 5.055 | 3" | 1-3/4" | 1.022" | 27.92 | 26.71 | 25.49 | 24.28 |
| 78471 | | .2010 | #7 | 5.105 | 2-1/4" | 1-3/16" | .630" | 28.67 | 27.42 | 26.18 | 24.93 |
| | 90471 | .2010 | #7 | 5.105 | 3" | 1-3/4" | 1.032" | 28.67 | 27.42 | 26.18 | 24.93 |
| 78476 | | .2031 | 13/64" | 5.159 | 2-1/4" | 1-3/16" | .637" | 29.62 | 28.34 | 27.05 | 25.76 |
| | 90476 | .2031 | 13/64" | 5.159 | 3" | 1-3/4" | 1.043" | 29.61 | 28.33 | 27.04 | 25.75 |
| | 90481 | .2040 | #6 | 5.182 | 3" | 1-3/4" | 1.047" | 29.79 | 28.49 | 27.20 | 25.90 |
| 78486 | | .2055 | #5 | 5.220 | 2-3/8" | 1-1/4" | .644" | 29.91 | 28.61 | 27.31 | 26.01 |
| | 90486 | .2055 | #5 | 5.220 | 3" | 1-3/4" | 1.055" | 29.90 | 28.60 | 27.30 | 26.00 |
| 78491 | | .2090 | #4 | 5.309 | 2-3/8" | 1-1/4" | .655" | 30.36 | 29.04 | 27.72 | 26.40 |
| | 90491 | .2090 | #4 | 5.309 | 3" | 1-3/4" | 1.073" | 30.36 | 29.04 | 27.72 | 26.40 |
| 78496 | | .2130 | #3 | 5.410 | 2-3/8" | 1-1/4" | .668" | 30.82 | 29.48 | 28.14 | 26.80 |
| | 90496 | .2130 | #3 | 5.410 | 3" | 1-3/4" | 1.094" | 30.82 | 29.48 | 28.14 | 26.80 |
| 78501 | | .2165 | | 5.500 | 60 | 32 | 17 | 31.03 | 29.68 | 28.33 | 26.98 |
| | 90501 | .2165 | | 5.500 | 76 | 44 | 28 | 31.03 | 29.68 | 28.33 | 26.98 |
| 78506 | | .2188 | 7/32" | 5.558 | 2-3/8" | 1-1/4" | .686" | 31.22 | 29.87 | 28.51 | 27.15 |
| | 90506 | .2188 | 7/32" | 5.558 | 3" | 1-3/4" | 1.123" | 31.22 | 29.87 | 28.51 | 27.15 |
| 78511 | | .2210 | #2 | 5.613 | 2-7/16" | 1-5/16" | .693" | 31.92 | 30.54 | 29.15 | 27.76 |
| | 90511 | .2210 | #2 | 5.613 | 3" | 1-3/4" | 1.135" | 31.90 | 30.51 | 29.13 | 27.74 |
| 78516 | | .2280 | #1 | 5.791 | 2-7/16" | 1-5/16" | .715" | 32.05 | 30.66 | 29.26 | 27.87 |
| | 90516 | .2280 | #1 | 5.791 | 3" | 1-3/4" | 1.171" | 32.05 | 30.66 | 29.26 | 27.87 |
| 78521 | | .2340 | A | 5.944 | 2-7/16" | 1-5/16" | .733" | 32.22 | 30.82 | 29.42 | 28.02 |
| | 90521 | .2340 | A | 5.944 | 3-1/4" | 2" | 1.201" | 32.50 | 31.09 | 29.67 | 28.26 |
| 78526 | | .2344 | 15/64" | 5.954 | 2-7/16" | 1-5/16" | .735" | 32.35 | 30.94 | 29.54 | 28.13 |
| | 90526 | .2344 | 15/64" | 5.954 | 3-1/4" | 2" | 1.203" | 32.60 | 31.19 | 29.77 | 28.35 |
| 78531 | | .2362 | | 6.000 | 64 | 35 | 19 | 32.43 | 31.02 | 29.61 | 28.20 |
| | 90531 | .2362 | | 6.000 | 82 | 50 | 31 | 32.69 | 31.27 | 29.85 | 28.43 |



† *Metric equivalents are for reference only*

| 3xD (1120H) EDP# | 5xD (1100H) EDP# | Decimal | *d* † Diameter | Metric | *l1* Overall Length | *l2* Flute Length | *l5* Max Drill Depth | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 78536 | | .2380 | B | 6.045 | 2-1/2" | 1-3/8" | .746" | 32.56 | 31.14 | 29.73 | 28.31 |
| | 90536 | .2380 | B | 6.045 | 3-1/4" | 2" | 1.222" | 32.82 | 31.39 | 29.97 | 28.54 |
| 78541 | | .2420 | C | 6.147 | 2-1/2" | 1-3/8" | .758" | 32.76 | 31.34 | 29.91 | 28.49 |
| | 90541 | .2420 | C | 6.147 | 3-1/4" | 2" | 1.242" | 33.01 | 31.57 | 30.14 | 28.70 |
| 78546 | | .2460 | D | 6.248 | 2-1/2" | 1-3/8" | .771" | 32.95 | 31.52 | 30.08 | 28.65 |
| | 90546 | .2460 | D | 6.248 | 3-1/4" | 2" | 1.263" | 33.24 | 31.79 | 30.35 | 28.90 |
| 78551 | | .2500 | 1/4" / E | 6.350 | 2-1/2" | 1-3/8" | .783" | 33.15 | 31.71 | 30.27 | 28.83 |
| | 90551 | .2500 | 1/4" / E | 6.350 | 3-1/4" | 2" | 1.283" | 33.43 | 31.98 | 30.52 | 29.07 |
| 78556 | | .2559 | | 6.500 | 67 | 37 | 21 | 36.71 | 35.11 | 33.52 | 31.92 |
| | 90556 | .2559 | | 6.500 | 82 | 50 | 33 | 37.28 | 35.66 | 34.04 | 32.42 |
| 78561 | | .2570 | F | 6.528 | 2-5/8" | 1-7/16" | .805" | 37.33 | 35.71 | 34.08 | 32.46 |
| | 90561 | .2570 | F | 6.528 | 3-1/4" | 2" | 1.319" | 37.90 | 36.26 | 34.61 | 32.96 |
| 78566 | | .2610 | G | 6.629 | 2-5/8" | 1-7/16" | .818" | 37.80 | 36.16 | 34.51 | 32.87 |
| | 90566 | .2610 | G | 6.629 | 3-1/2" | 2-1/8" | 1.340" | 39.53 | 37.81 | 36.09 | 34.37 |
| 78571 | | .2656 | 17/64" | 6.746 | 2-5/8" | 1-7/16" | .832" | 38.41 | 36.74 | 35.07 | 33.40 |
| | 90571 | .2656 | 17/64" | 6.746 | 3-1/2" | 2-1/8" | 1.364" | 40.17 | 38.42 | 36.68 | 34.93 |
| 78576 | | .2660 | H | 6.756 | 2-11/16" | 1-1/2" | .834" | 39.36 | 37.65 | 35.94 | 34.23 |
| | 90576 | .2660 | H | 6.756 | 3-1/2" | 2-1/8" | 1.366" | 41.14 | 39.35 | 37.56 | 35.77 |
| 78581 | | .2720 | I | 6.909 | 2-11/16" | 1-1/2" | .852" | 39.74 | 38.02 | 36.29 | 34.56 |
| | 90581 | .2720 | I | 6.909 | 3-1/2" | 2-1/8" | 1.396" | 41.57 | 39.77 | 37.96 | 36.15 |
| 78586 | | .2756 | | 7.000 | 68 | 38 | 22 | 39.97 | 38.24 | 36.50 | 34.76 |
| | 90586 | .2756 | | 7.000 | 88 | 54 | 36 | 41.80 | 39.99 | 38.17 | 36.35 |
| 78591 | | .2770 | J | 7.036 | 2-11/16" | 1-1/2" | .868" | 40.27 | 38.52 | 36.77 | 35.02 |
| | 90591 | .2770 | J | 7.036 | 3-1/2" | 2-1/8" | 1.422" | 42.14 | 40.30 | 38.47 | 36.64 |
| 78596 | | .2810 | K | 7.137 | 2-11/16" | 1-1/2" | .881" | 40.61 | 38.84 | 37.08 | 35.31 |
| | 90596 | .2810 | K | 7.137 | 3-1/2" | 2-1/8" | 1.443" | 42.45 | 40.60 | 38.76 | 36.91 |
| 78601 | | .2812 | 9/32" | 7.142 | 2-11/16" | 1-1/2" | .881" | 41.79 | 39.97 | 38.16 | 36.34 |
| | 90601 | .2812 | 9/32" | 7.142 | 3-1/2" | 2-1/8" | 1.444" | 43.71 | 41.81 | 39.91 | 38.01 |
| 78606 | | .2900 | L | 7.366 | 2-3/4" | 1-9/16" | .909" | 43.11 | 41.24 | 39.36 | 37.49 |
| | 90606 | .2900 | L | 7.366 | 3-1/2" | 2-1/8" | 1.489" | 45.09 | 43.13 | 41.17 | 39.21 |
| 78611 | | .2950 | M | 7.493 | 2-3/4" | 1-9/16" | .925" | 44.18 | 42.26 | 40.34 | 38.42 |
| | 90611 | .2950 | M | 7.493 | 3-3/4" | 2-3/8" | 1.515" | 47.44 | 45.38 | 43.31 | 41.25 |
| 78616 | | .2953 | | 7.500 | 70 | 40 | 23 | 44.18 | 42.26 | 40.34 | 38.42 |
| | 90616 | .2953 | | 7.500 | 95 | 60 | 39 | 47.44 | 45.38 | 43.31 | 41.25 |
| 78621 | | .2969 | 19/64" | 7.541 | 2-3/4" | 1-9/16" | .930" | 44.18 | 42.26 | 40.34 | 38.42 |
| | 90621 | .2969 | 19/64" | 7.541 | 3-3/4" | 2-3/8" | 1.524" | 47.44 | 45.38 | 43.31 | 41.25 |
| 78626 | | .3020 | N | 7.671 | 2-15/16" | 1-5/8" | .946" | 45.68 | 43.69 | 41.71 | 39.72 |
| | 90626 | .3020 | N | 7.671 | 3-3/4" | 2-3/8" | 1.550" | 47.75 | 45.67 | 43.60 | 41.52 |
| 78631 | | .3125 | 5/16" | 7.938 | 2-15/16" | 1-5/8" | .979" | 45.84 | 43.85 | 41.85 | 39.86 |
| | 90631 | .3125 | 5/16" | 7.938 | 3-3/4" | 2-3/8" | 1.604" | 47.78 | 45.71 | 43.63 | 41.55 |
| 78636 | | .3150 | | 8.000 | 75 | 43 | 25 | 48.70 | 46.59 | 44.47 | 42.35 |
| | 90636 | .3150 | | 8.000 | 95 | 60 | 41 | 50.77 | 48.57 | 46.36 | 44.15 |
| 78641 | | .3160 | O | 8.026 | 2-15/16" | 1-11/16" | .990" | 48.70 | 46.59 | 44.47 | 42.35 |
| | 90641 | .3160 | O | 8.026 | 3-3/4" | 2-3/8" | 1.622" | 50.77 | 48.57 | 46.36 | 44.15 |
| 78646 | | .3230 | P | 8.204 | 2-15/16" | 1-11/16" | 1.012" | 48.70 | 46.59 | 44.47 | 42.35 |
| | 90646 | .3230 | P | 8.204 | 3-3/4" | 2-3/8" | 1.658" | 50.77 | 48.57 | 46.36 | 44.15 |
| 78651 | | .3281 | 21/64" | 8.334 | 2-15/16" | 1-11/16" | 1.028" | 50.54 | 48.35 | 46.15 | 43.95 |
| | 90651 | .3281 | 21/64" | 8.334 | 4" | 2-1/2" | 1.684" | 52.82 | 50.52 | 48.23 | 45.93 |
| 78656 | | .3320 | Q | 8.433 | 3" | 1-11/16" | 1.040" | 51.57 | 49.32 | 47.08 | 44.84 |
| | 90656 | .3320 | Q | 8.433 | 4" | 2-1/2" | 1.704" | 53.90 | 51.56 | 49.21 | 46.87 |
| 78661 | | .3346 | | 8.500 | 76 | 43 | 27 | 51.99 | 49.73 | 47.47 | 45.21 |
| | 90661 | .3346 | | 8.500 | 101 | 63 | 44 | 54.31 | 51.95 | 49.59 | 47.23 |
| 78666 | | .3390 | R | 8.611 | 3" | 1-11/16" | 1.062" | 53.41 | 51.08 | 48.76 | 46.44 |
| | 90666 | .3390 | R | 8.611 | 4" | 2-1/2" | 1.740" | 55.81 | 53.38 | 50.96 | 48.53 |
| 78671 | | .3438 | 11/32" | 8.733 | 3" | 1-11/16" | 1.077" | 55.34 | 52.93 | 50.53 | 48.12 |
| | 90671 | .3438 | 11/32" | 8.733 | 4" | 2-1/2" | 1.765" | 57.80 | 55.29 | 52.77 | 50.26 |
| 78676 | | .3480 | S | 8.839 | 3-1/16" | 1-3/4" | 1.091" | 62.63 | 59.91 | 57.18 | 54.46 |
| | 90676 | .3480 | S | 8.839 | 4" | 2-1/2" | 1.787" | 61.35 | 58.69 | 56.02 | 53.35 |
| 78681 | | .3543 | | 9.000 | 78 | 44 | 28 | 62.99 | 60.25 | 57.51 | 54.77 |
| | 90681 | .3543 | | 9.000 | 101 | 63 | 46 | 61.71 | 59.03 | 56.34 | 53.66 |

*continued* ⟶

# Series 1120H, 1100H *(continued)*

.3580" - .5000"
(9.093mm - 12.700mm)

| 3xD (1120H) EDP# | 5xD (1100H) EDP# | Decimal | *d* † Diameter | Metric | *l1* Overall Length | *l2* Flute Length | *l5* Max Drill Depth | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 78686 | | .3580 | T | 9.093 | 3-1/16" | 1-3/4" | 1.122" | 63.14 | 60.39 | 57.65 | 54.90 |
| 78691 | | .3594 | 23/64" | 9.129 | 3-1/16" | 1-3/4" | 1.126" | 63.57 | 60.81 | 58.04 | 55.28 |
| | 90691 | .3594 | 23/64" | 9.129 | 4-1/4" | 2-3/4" | 1.845" | 64.27 | 61.48 | 58.68 | 55.89 |
| 78696 | | .3680 | U | 9.347 | 3-1/8" | 1-13/16" | 1.153" | 67.22 | 64.30 | 61.37 | 58.45 |
| | 90696 | .3680 | U | 9.347 | 4-1/4" | 2-3/4" | 1.889" | 67.94 | 64.99 | 62.03 | 59.08 |
| 78701 | | .3740 | | 9.500 | 79 | 46 | 30 | 68.20 | 65.23 | 62.27 | 59.30 |
| | 90701 | .3740 | | 9.500 | 107 | 70 | 49 | 68.93 | 65.93 | 62.94 | 59.94 |
| 78706 | | .3750 | 3/8" | 9.525 | 3-1/8" | 1-13/16" | 1.175" | 68.20 | 65.23 | 62.27 | 59.30 |
| | 90706 | .3750 | 3/8" | 9.525 | 4-1/4" | 2-3/4" | 1.925" | 68.93 | 65.93 | 62.94 | 59.94 |
| 78711 | | .3770 | V | 9.576 | 3-1/4" | 1-7/8" | 1.182" | 68.86 | 65.87 | 62.87 | 59.88 |
| | 90711 | .3770 | V | 9.576 | 4-1/4" | 2-3/4" | 1.936" | 71.71 | 68.60 | 65.48 | 62.36 |
| 78716 | | .3860 | W | 9.804 | 3-1/4" | 1-7/8" | 1.210" | 72.73 | 69.56 | 66.40 | 63.24 |
| | 90716 | .3860 | W | 9.804 | 4-1/2" | 2-7/8" | 1.982" | 75.64 | 72.35 | 69.06 | 65.77 |
| 78721 | | .3906 | 25/64" | 9.921 | 3-1/4" | 1-7/8" | 1.224" | 73.62 | 70.42 | 67.22 | 64.02 |
| | 90721 | .3906 | 25/64" | 9.921 | 4-1/2" | 2-7/8" | 2.005" | 76.58 | 73.25 | 69.92 | 66.59 |
| 78726 | | .3937 | | 10.000 | 84 | 49 | 31 | 75.92 | 72.62 | 69.32 | 66.02 |
| | 90726 | .3937 | | 10.000 | 114 | 73 | 51 | 78.95 | 75.52 | 72.08 | 68.65 |
| 78736 | | .4040 | Y | 10.262 | 3-5/16" | 1-15/16" | 1.266" | 78.42 | 75.01 | 71.60 | 68.19 |
| | 90736 | .4040 | Y | 10.262 | 4-1/2" | 2-7/8" | 2.074" | 81.54 | 77.99 | 74.45 | 70.90 |
| 78741 | | .4062 | 13/32" | 10.317 | 3-5/16" | 1-15/16" | 1.273" | 80.90 | 77.39 | 73.87 | 70.35 |
| | 90741 | .4062 | 13/32" | 10.317 | 4-1/2" | 2-7/8" | 2.085" | 84.09 | 80.43 | 76.78 | 73.12 |
| 78746 | | .4130 | Z | 10.490 | 3-3/8" | 2" | 1.294" | 81.63 | 78.08 | 74.53 | 70.98 |
| | 90746 | .4130 | Z | 10.490 | 4-1/2" | 2-7/8" | 2.120" | 84.84 | 81.15 | 77.46 | 73.77 |
| 78751 | | .4134 | | 10.500 | 86 | 51 | 33 | 81.63 | 78.08 | 74.53 | 70.98 |
| | 90751 | .4134 | | 10.500 | 114 | 73 | 54 | 84.84 | 81.15 | 77.46 | 73.77 |
| 78756 | | .4219 | 27/64" | 10.716 | 3-3/8" | 2" | 1.322" | 82.47 | 78.88 | 75.30 | 71.71 |
| | 90756 | .4219 | 27/64" | 10.716 | 4-1/2" | 2-7/8" | 2.166" | 85.69 | 81.96 | 78.24 | 74.51 |
| 78761 | | .4331 | | 11.000 | 87 | 52 | 34 | 87.87 | 84.05 | 80.23 | 76.41 |
| | 90761 | .4331 | | 11.000 | 114 | 73 | 56 | 92.08 | 88.08 | 84.07 | 80.07 |
| 78766 | | .4375 | 7/16" | 11.113 | 3-7/16" | 2-1/16" | 1.371" | 87.87 | 84.05 | 80.23 | 76.41 |
| | 90766 | .4375 | 7/16" | 11.113 | 4-1/2" | 2-7/8" | 2.246" | 92.08 | 88.08 | 84.07 | 80.07 |
| | 90771 | .4528 | | 11.500 | 120 | 76 | 59 | 98.99 | 94.69 | 90.38 | 86.08 |
| 78776 | | .4531 | 29/64" | 11.509 | 3-9/16" | 2-1/8" | 1.420" | 94.48 | 90.38 | 86.27 | 82.16 |
| | 90776 | .4531 | 29/64" | 11.509 | 4-3/4" | 3" | 2.326" | 98.99 | 94.69 | 90.38 | 86.08 |
| 78781 | | .4688 | 15/32" | 11.908 | 3-5/8" | 2-1/8" | 1.469" | 99.38 | 95.06 | 90.74 | 86.42 |
| | 90781 | .4688 | 15/32" | 11.908 | 4-3/4" | 3" | 2.407" | 104.09 | 99.56 | 95.04 | 90.51 |
| 78786 | | .4724 | | 12.000 | 94 | 56 | 38 | 99.66 | 95.33 | 90.99 | 86.66 |
| | 90786 | .4724 | | 12.000 | 120 | 76 | 62 | 104.37 | 99.84 | 95.30 | 90.76 |
| 78791 | | .4844 | 31/64" | 12.304 | 3-11/16" | 2-3/16" | 1.518" | 99.96 | 95.61 | 91.27 | 86.92 |
| | 90791 | .4844 | 31/64" | 12.304 | 4-3/4" | 3" | 2.487" | 104.37 | 99.84 | 95.30 | 90.76 |
| 78796 | | .4921 | | 12.500 | 95 | 56 | 39 | 101.50 | 97.09 | 92.67 | 88.26 |
| | 90796 | .4921 | | 12.500 | 120 | 76 | 64 | 106.87 | 102.22 | 97.58 | 92.93 |
| 78801 | | .5000 | 1/2" | 12.700 | 3-3/4" | 2-1/4" | 1.567" | 102.03 | 97.59 | 93.16 | 88.72 |
| | 90801 | .5000 | 1/2" | 12.700 | 4-3/4" | 3" | 2.567" | 106.87 | 102.22 | 97.58 | 92.93 |



† *Metric equivalents are for reference only*

**TOLERANCES**

| | | |
|---|---|---|
| *d* | +.0000" –.0005" (+.0000 –.0127mm) | |
| $l_1$ | ≤ 1/8" | +.125" –.062" (+3.175 –1.588mm) |
| | > 1/8" | +.125" –.125" (+3.175 –3.175mm) |
| $l_2$ | ≤ 1/8" | +.125" –.062" (+3.175 –1.588mm) |
| | >1/8" | +.125" –.125" (+3.175 –3.175mm) |

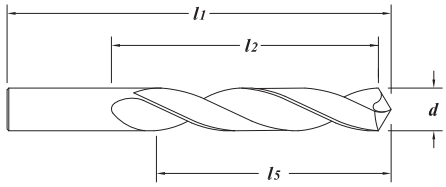
Z=2 | 25° | 118° | 5xD | TECH PAGES 320-323

# Series 1200

.0625" - .1575"
(1.588mm - 4.000mm)

Solid submicron grain carbide drill
General purpose jobber style
Cam point (≤1/8" diameter - 4-facet point)
Live tooling recommended on lathe processes
Durana Coating - page 88






| EDP# | *d* † Diameter Decimal | Diameter | Metric | $l_1$ Overall Length | $l_2$ Flute Length | $l_5$ Max Drill Depth | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|
| 56165 | .0625 | 1/16" | 1.588 | 1-3/4" | 3/4" | .331" | 7.42 | 7.10 | 6.77 | 6.45 |
| 56170 | .0635 | #52 | 1.613 | 1-3/4" | 3/4" | .337" | 7.52 | 7.19 | 6.87 | 6.54 |
| 56175 | .0670 | #51 | 1.702 | 1-3/4" | 3/4" | .355" | 7.64 | 7.30 | 6.97 | 6.64 |
| 56180 | .0700 | #50 | 1.778 | 1-3/4" | 7/8" | .371" | 7.82 | 7.48 | 7.14 | 6.80 |
| 56185 | .0730 | #49 | 1.854 | 1-3/4" | 7/8" | .387" | 8.03 | 7.68 | 7.33 | 6.98 |
| 56190 | .0760 | #48 | 1.930 | 1-3/4" | 7/8" | .403" | 8.29 | 7.93 | 7.57 | 7.21 |
| 56195 | .0781 | 5/64" | 1.984 | 1-3/4" | 7/8" | .414" | 8.60 | 8.23 | 7.85 | 7.48 |
| 56200 | .0785 | #47 | 1.994 | 1-3/4" | 7/8" | .416" | 8.89 | 8.50 | 8.12 | 7.73 |
| 56205 | .0787 | | 2.000 | 44 | 22 | 11 | 9.03 | 8.64 | 8.24 | 7.85 |
| 56210 | .0810 | #46 | 2.057 | 1-3/4" | 7/8" | .429" | 9.18 | 8.78 | 8.38 | 7.98 |
| 56215 | .0820 | #45 | 2.083 | 1-3/4" | 7/8" | .435" | 9.45 | 9.04 | 8.63 | 8.22 |
| 56220 | .0860 | #44 | 2.184 | 2" | 1" | .456" | 9.76 | 9.34 | 8.91 | 8.49 |
| 56225 | .0890 | #43 | 2.261 | 2" | 1" | .472" | 10.04 | 9.60 | 9.17 | 8.73 |
| 56230 | .0935 | #42 | 2.375 | 2" | 1" | .496" | 10.18 | 9.74 | 9.29 | 8.85 |
| 56235 | .0938 | 3/32" | 2.383 | 2" | 1" | .497" | 10.41 | 9.96 | 9.50 | 9.05 |
| 56240 | .0960 | #41 | 2.438 | 2" | 1" | .509" | 10.50 | 10.04 | 9.59 | 9.13 |
| 56245 | .0980 | #40 | 2.489 | 2" | 1" | .519" | 10.66 | 10.20 | 9.73 | 9.27 |
| 56250 | .0984 | | 2.500 | 57 | 32 | 13 | 10.72 | 10.25 | 9.79 | 9.32 |
| 56255 | .0995 | #39 | 2.527 | 2-1/4" | 1-1/4" | .527" | 10.76 | 10.30 | 9.83 | 9.36 |
| 56260 | .1015 | #38 | 2.578 | 2-1/4" | 1-1/4" | .538" | 10.89 | 10.42 | 9.94 | 9.47 |
| 56265 | .1040 | #37 | 2.642 | 2-1/4" | 1-1/4" | .551" | 11.04 | 10.56 | 10.08 | 9.60 |
| 56270 | .1065 | #36 | 2.705 | 2-1/4" | 1-1/4" | .564" | 11.18 | 10.69 | 10.21 | 9.72 |
| 56275 | .1094 | 7/64" | 2.779 | 2-1/4" | 1-1/4" | .580" | 11.36 | 10.87 | 10.37 | 9.88 |
| 56280 | .1100 | #35 | 2.794 | 2-1/4" | 1-1/4" | .583" | 11.49 | 10.99 | 10.49 | 9.99 |
| 56285 | .1110 | #34 | 2.819 | 2-1/4" | 1-1/4" | .588" | 11.63 | 11.12 | 10.62 | 10.11 |
| 56290 | .1130 | #33 | 2.870 | 2-1/4" | 1-1/4" | .599" | 11.85 | 11.33 | 10.82 | 10.30 |
| 56295 | .1160 | #32 | 2.946 | 2-1/4" | 1-1/4" | .615" | 11.97 | 11.45 | 10.93 | 10.41 |
| 56300 | .1181 | | 3.000 | 57 | 32 | 16 | 12.09 | 11.56 | 11.04 | 10.51 |
| 56305 | .1200 | #31 | 3.048 | 2-1/4" | 1-1/4" | .636" | 12.17 | 11.64 | 11.11 | 10.58 |
| 56310 | .1250 | 1/8" | 3.175 | 2-1/4" | 1-1/4" | .663" | 12.32 | 11.78 | 11.25 | 10.71 |
| 56315 | .1285 | #30 | 3.264 | 2-1/4" | 1-1/4" | .681" | 12.63 | 12.08 | 11.53 | 10.98 |
| 56320 | .1360 | #29 | 3.454 | 2-1/2" | 1-3/8" | .721" | 13.03 | 12.46 | 11.90 | 11.33 |
| 56325 | .1378 | | 3.500 | 63 | 35 | 19 | 13.46 | 12.87 | 12.29 | 11.70 |
| 56330 | .1405 | #28 | 3.569 | 2-1/2" | 1-3/8" | .745" | 13.58 | 12.99 | 12.40 | 11.81 |
| 56335 | .1406 | 9/64" | 3.571 | 2-1/2" | 1-3/8" | .745" | 13.74 | 13.15 | 12.55 | 11.95 |
| 56340 | .1440 | #27 | 3.658 | 2-1/2" | 1-3/8" | .763" | 14.28 | 13.66 | 13.04 | 12.42 |
| 56345 | .1470 | #26 | 3.734 | 2-1/2" | 1-3/8" | .779" | 14.42 | 13.79 | 13.17 | 12.54 |
| 56350 | .1495 | #25 | 3.797 | 2-1/2" | 1-3/8" | .792" | 14.62 | 13.98 | 13.35 | 12.71 |
| 56355 | .1520 | #24 | 3.861 | 2-1/2" | 1-3/8" | .806" | 14.64 | 14.00 | 13.37 | 12.73 |
| 56360 | .1540 | #23 | 3.912 | 2-1/2" | 1-3/8" | .816" | 14.74 | 14.10 | 13.46 | 12.82 |
| 56365 | .1562 | 5/32" | 3.967 | 2-1/2" | 1-3/8" | .828" | 14.85 | 14.20 | 13.56 | 12.91 |
| 56370 | .1570 | #22 | 3.988 | 2-1/2" | 1-3/8" | .832" | 15.78 | 15.09 | 14.41 | 13.72 |
| 56375 | .1575 | | 4.000 | 63 | 35 | 21 | 15.97 | 15.28 | 14.58 | 13.89 |

*continued* →

## Series 1200 *(continued)*

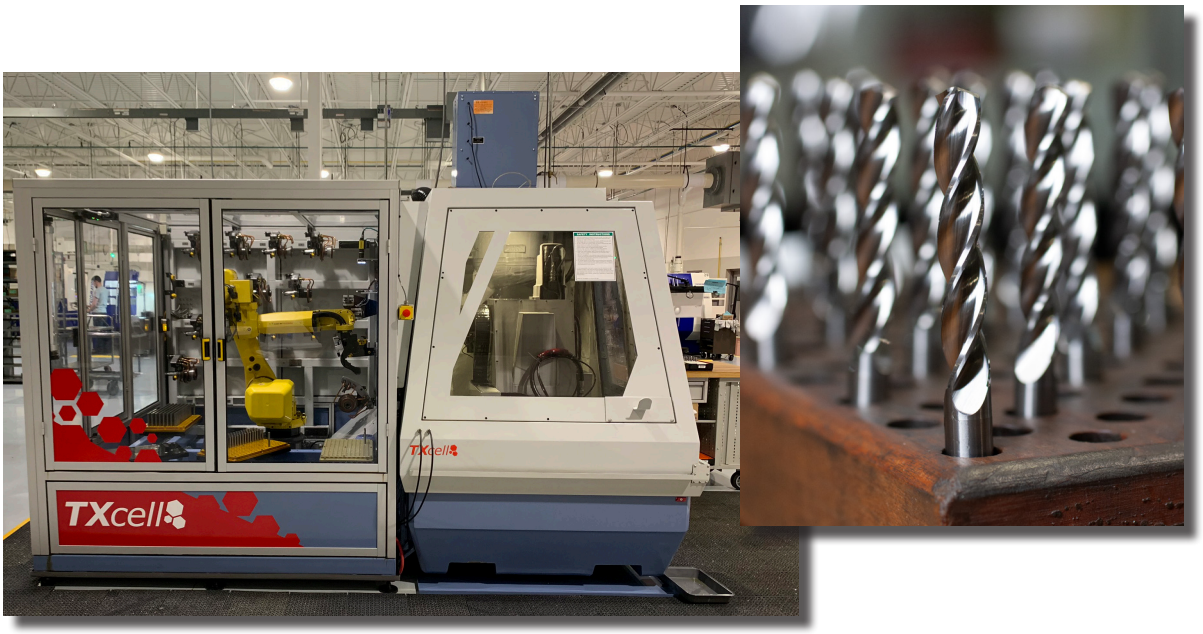
.1590" - .3346"
(4.039mm - 8.500mm)

| EDP# | *d* † Diameter Decimal | Diameter | Metric | *l1* Overall Length | *l2* Flute Length | *l5* Max Drill Depth | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|
| 56380 | .1590 | #21 | 4.039 | 2-1/2" | 1-3/8" | .843" | 16.16 | 15.46 | 14.75 | 14.05 |
| 56385 | .1610 | #20 | 4.089 | 2-1/2" | 1-3/8" | .853" | 16.27 | 15.57 | 14.86 | 14.15 |
| 56390 | .1660 | #19 | 4.216 | 2-3/4" | 1-5/8" | .880" | 16.94 | 16.20 | 15.47 | 14.73 |
| 56395 | .1695 | #18 | 4.305 | 2-3/4" | 1-5/8" | .898" | 17.15 | 16.40 | 15.66 | 14.91 |
| 56400 | .1719 | 11/64" | 4.366 | 2-3/4" | 1-5/8" | .911" | 17.51 | 16.75 | 15.99 | 15.23 |
| 56405 | .1730 | #17 | 4.394 | 2-3/4" | 1-5/8" | .917" | 17.74 | 16.97 | 16.20 | 15.43 |
| 56410 | .1770 | #16 | 4.496 | 2-3/4" | 1-5/8" | .938" | 17.94 | 17.16 | 16.38 | 15.60 |
| 56415 | .1772 |  | 4.500 | 70 | 41 | 24 | 18.03 | 17.25 | 16.46 | 15.68 |
| 56420 | .1800 | #15 | 4.572 | 2-3/4" | 1-5/8" | .954" | 18.11 | 17.33 | 16.54 | 15.75 |
| 56425 | .1820 | #14 | 4.623 | 2-3/4" | 1-5/8" | .965" | 18.53 | 17.72 | 16.92 | 16.11 |
| 56430 | .1850 | #13 | 4.700 | 2-3/4" | 1-5/8" | .981" | 18.66 | 17.85 | 17.04 | 16.23 |
| 56435 | .1875 | 3/16" | 4.763 | 2-3/4" | 1-5/8" | .994" | 18.76 | 17.94 | 17.13 | 16.31 |
| 56440 | .1890 | #12 | 4.801 | 2-3/4" | 1-5/8" | 1.002" | 19.37 | 18.52 | 17.68 | 16.84 |
| 56445 | .1910 | #11 | 4.851 | 2-3/4" | 1-5/8" | 1.012" | 19.57 | 18.72 | 17.87 | 17.02 |
| 56450 | .1935 | #10 | 4.915 | 2-3/4" | 1-5/8" | 1.026" | 20.52 | 19.62 | 18.73 | 17.84 |
| 56455 | .1960 | #9 | 4.978 | 3" | 1-3/4" | 1.039" | 21.02 | 20.11 | 19.19 | 18.28 |
| 56460 | .1969 |  | 5.000 | 76 | 44 | 26 | 21.15 | 20.23 | 19.31 | 18.39 |
| 56465 | .1990 | #8 | 5.055 | 3" | 1-3/4" | 1.055" | 21.29 | 20.36 | 19.44 | 18.51 |
| 56470 | .2010 | #7 | 5.105 | 3" | 1-3/4" | 1.065" | 21.91 | 20.96 | 20.00 | 19.05 |
| 56475 | .2031 | 13/64" | 5.159 | 3" | 1-3/4" | 1.077" | 22.08 | 21.12 | 20.16 | 19.20 |
| 56480 | .2040 | #6 | 5.182 | 3" | 1-3/4" | 1.081" | 22.53 | 21.55 | 20.57 | 19.59 |
| 56485 | .2055 | #5 | 5.220 | 3" | 1-3/4" | 1.089" | 23.00 | 22.00 | 21.00 | 20.00 |
| 56490 | .2090 | #4 | 5.309 | 3" | 1-3/4" | 1.108" | 23.39 | 22.37 | 21.36 | 20.34 |
| 56495 | .2130 | #3 | 5.410 | 3" | 1-3/4" | 1.129" | 23.81 | 22.77 | 21.74 | 20.70 |
| 56500 | .2165 |  | 5.500 | 76 | 44 | 29 | 23.99 | 22.95 | 21.90 | 20.86 |
| 56505 | .2188 | 7/32" | 5.558 | 3" | 1-3/4" | 1.160" | 24.16 | 23.11 | 22.06 | 21.01 |
| 56510 | .2210 | #2 | 5.613 | 3" | 1-3/4" | 1.171" | 24.76 | 23.68 | 22.61 | 21.53 |
| 56515 | .2280 | #1 | 5.791 | 3" | 1-3/4" | 1.208" | 24.90 | 23.82 | 22.73 | 21.65 |
| 56520 | .2340 | A | 5.944 | 3-1/4" | 2" | 1.240" | 25.19 | 24.09 | 23.00 | 21.90 |
| 56525 | .2344 | 15/64" | 5.954 | 3-1/4" | 2" | 1.242" | 25.25 | 24.16 | 23.06 | 21.96 |
| 56530 | .2362 |  | 6.000 | 82 | 50 | 32 | 25.36 | 24.26 | 23.15 | 22.05 |
| 56535 | .2380 | B | 6.045 | 3-1/4" | 2" | 1.262" | 25.44 | 24.33 | 23.23 | 22.12 |
| 56540 | .2420 | C | 6.147 | 3-1/4" | 2" | 1.283" | 25.63 | 24.52 | 23.40 | 22.29 |
| 56545 | .2460 | D | 6.248 | 3-1/4" | 2" | 1.304" | 25.82 | 24.70 | 23.57 | 22.45 |
| 56550 | .2500 | 1/4" / E | 6.350 | 3-1/4" | 2" | 1.325" | 26.00 | 24.87 | 23.74 | 22.61 |
| 56555 | .2559 |  | 6.500 | 82 | 50 | 34 | 26.63 | 25.48 | 24.32 | 23.16 |
| 56560 | .2570 | F | 6.528 | 3-1/4" | 2" | 1.362" | 27.17 | 25.99 | 24.81 | 23.63 |
| 56565 | .2610 | G | 6.629 | 3-1/2" | 2-1/8" | 1.383" | 27.74 | 26.53 | 25.33 | 24.12 |
| 56570 | .2656 | 17/64" | 6.746 | 3-1/2" | 2-1/8" | 1.408" | 28.30 | 27.07 | 25.84 | 24.61 |
| 56575 | .2660 | H | 6.756 | 3-1/2" | 2-1/8" | 1.410" | 29.11 | 27.84 | 26.58 | 25.31 |
| 56580 | .2720 | I | 6.909 | 3-1/2" | 2-1/8" | 1.442" | 29.43 | 28.15 | 26.87 | 25.59 |
| 56585 | .2756 |  | 7.000 | 88 | 54 | 37 | 29.67 | 28.38 | 27.09 | 25.80 |
| 56590 | .2770 | J | 7.036 | 3-1/2" | 2-1/8" | 1.468" | 29.93 | 28.63 | 27.33 | 26.03 |
| 56595 | .2810 | K | 7.137 | 3-1/2" | 2-1/8" | 1.489" | 30.20 | 28.89 | 27.57 | 26.26 |
| 56600 | .2812 | 9/32" | 7.142 | 3-1/2" | 2-1/8" | 1.490" | 30.39 | 29.07 | 27.75 | 26.43 |
| 56605 | .2900 | L | 7.366 | 3-1/2" | 2-1/8" | 1.537" | 31.48 | 30.11 | 28.74 | 27.37 |
| 56610 | .2950 | M | 7.493 | 3-3/4" | 2-3/8" | 1.564" | 33.70 | 32.23 | 30.77 | 29.30 |
| 56615 | .2953 |  | 7.500 | 95 | 60 | 40 | 33.70 | 32.23 | 30.77 | 29.30 |
| 56620 | .2969 | 19/64" | 7.541 | 3-3/4" | 2-3/8" | 1.574" | 33.70 | 32.23 | 30.77 | 29.30 |
| 56625 | .3020 | N | 7.671 | 3-3/4" | 2-3/8" | 1.601" | 35.70 | 34.14 | 32.59 | 31.04 |
| 56630 | .3125 | 5/16" | 7.938 | 3-3/4" | 2-3/8" | 1.656" | 35.83 | 34.28 | 32.72 | 31.16 |
| 56635 | .3150 |  | 8.000 | 95 | 60 | 42 | 38.44 | 36.77 | 35.10 | 33.43 |
| 56640 | .3160 | O | 8.026 | 3-3/4" | 2-3/8" | 1.675" | 38.44 | 36.77 | 35.10 | 33.43 |
| 56645 | .3230 | P | 8.204 | 3-3/4" | 2-3/8" | 1.712" | 38.44 | 36.77 | 35.10 | 33.43 |
| 56650 | .3281 | 21/64" | 8.334 | 4" | 2-1/2" | 1.739" | 39.01 | 37.31 | 35.62 | 33.92 |
| 56655 | .3320 | Q | 8.433 | 4" | 2-1/2" | 1.760" | 39.93 | 38.19 | 36.46 | 34.72 |
| 56660 | .3346 |  | 8.500 | 101 | 63 | 45 | 40.27 | 38.52 | 36.77 | 35.02 |



† *Metric equivalents are for reference only*

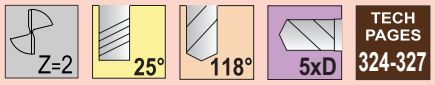
| EDP# | *d* † Diameter Decimal | Diameter | Metric | *l*1 Overall Length | *l*2 Flute Length | *l*5 Max Drill Depth | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|
| 56665 | .3390 | R | 8.611 | 4" | 2-1/2" | 1.797" | 41.57 | 39.77 | 37.96 | 36.15 |
| 56670 | .3438 | 11/32" | 8.733 | 4" | 2-1/2" | 1.822" | 43.25 | 41.37 | 39.49 | 37.61 |
| 56675 | .3480 | S | 8.839 | 4" | 2-1/2" | 1.845" | 43.40 | 41.51 | 39.63 | 37.74 |
| 56680 | .3543 | | 9.000 | 101 | 63 | 48 | 43.65 | 41.76 | 39.86 | 37.96 |
| 56685 | .3580 | T | 9.093 | 4-1/4" | 2-3/4" | 1.898" | 44.05 | 42.13 | 40.22 | 38.30 |
| 56690 | .3594 | 23/64" | 9.129 | 4-1/4" | 2-3/4" | 1.905" | 44.36 | 42.43 | 40.50 | 38.57 |
| 56695 | .3680 | U | 9.347 | 4-1/4" | 2-3/4" | 1.951" | 50.34 | 48.15 | 45.96 | 43.77 |
| 56700 | .3740 | | 9.500 | 107 | 70 | 50 | 50.81 | 48.60 | 46.39 | 44.18 |
| 56705 | .3750 | 3/8" | 9.525 | 4-1/4" | 2-3/4" | 1.988" | 51.21 | 48.98 | 46.76 | 44.53 |
| 56710 | .3770 | V | 9.576 | 4-1/4" | 2-3/4" | 1.998" | 52.19 | 49.92 | 47.65 | 45.38 |
| 56715 | .3860 | W | 9.804 | 4-1/2" | 2-7/8" | 2.046" | 53.29 | 50.97 | 48.66 | 46.34 |
| 56720 | .3906 | 25/64" | 9.921 | 4-1/2" | 2-7/8" | 2.070" | 54.08 | 51.73 | 49.38 | 47.03 |
| 56725 | .3937 | | 10.000 | 114 | 73 | 53 | 56.03 | 53.59 | 51.16 | 48.72 |
| 56730 | .3970 | X | 10.084 | 4-1/2" | 2-7/8" | 2.104" | 57.68 | 55.18 | 52.67 | 50.16 |
| 56735 | .4040 | Y | 10.262 | 4-1/2" | 2-7/8" | 2.141" | 58.14 | 55.62 | 53.09 | 50.56 |
| 56740 | .4062 | 13/32" | 10.317 | 4-1/2" | 2-7/8" | 2.153" | 60.24 | 57.62 | 55.00 | 52.38 |
| 56745 | .4130 | Z | 10.490 | 4-1/2" | 2-7/8" | 2.189" | 60.88 | 58.23 | 55.59 | 52.94 |
| 56750 | .4134 | | 10.500 | 114 | 73 | 56 | 60.88 | 58.23 | 55.59 | 52.94 |
| 56755 | .4219 | 27/64" | 10.716 | 4-1/2" | 2-7/8" | 2.236" | 61.56 | 58.88 | 56.21 | 53.53 |
| 56760 | .4331 | | 11.000 | 114 | 73 | 58 | 66.85 | 63.94 | 61.04 | 58.13 |
| 56765 | .4375 | 7/16" | 11.113 | 4-1/2" | 2-7/8" | 2.319" | 66.85 | 63.94 | 61.04 | 58.13 |
| 56770 | .4528 | | 11.500 | 120 | 76 | 61 | 72.52 | 69.37 | 66.21 | 63.06 |
| 56775 | .4531 | 29/64" | 11.509 | 4-3/4" | 3" | 2.402" | 72.52 | 69.37 | 66.21 | 63.06 |
| 56780 | .4688 | 15/32" | 11.908 | 4-3/4" | 3" | 2.485" | 76.71 | 73.37 | 70.04 | 66.70 |
| 56785 | .4724 | | 12.000 | 120 | 76 | 64 | 76.95 | 73.60 | 70.26 | 66.91 |
| 56790 | .4844 | 31/64" | 12.304 | 4-3/4" | 3" | 2.568" | 76.95 | 73.60 | 70.26 | 66.91 |
| 56795 | .4921 | | 12.500 | 120 | 76 | 2.608" | 79.01 | 75.57 | 72.14 | 68.70 |
| 56800 | .5000 | 1/2" | 12.700 | 4-3/4" | 3" | 2.650" | 79.01 | 75.57 | 72.14 | 68.70 |




*Drill Manufacturing*

# Series 1200H

.0625" - .1575"
(1.588mm - 4.000mm)

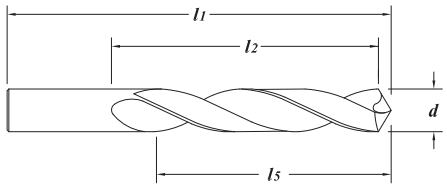



**TOLERANCES**

| | | |
|---|---|---|
| *d* | +.0000" –.0005" (+.0000 –.0127mm) | |
| *l1* | ≤ 1/8" | +.125" –.062" (+3.175 –1.588mm) |
| | > 1/8" | +.125" –.125" (+3.175 –3.175mm) |
| *l2* | ≤ 1/8" | +.125" –.062" (+3.175 –1.588mm) |
| | >1/8" | +.125" –.125" (+3.175 –3.175mm) |

**BALINIT® Durana Coating**
Solid submicron grain carbide drill
General purpose jobber style
Excellent heat resistance and lubricity
Cam point (≤1/8" diameter is with 4-facet point)
Live tooling recommended on lathe processes
Bright Finish - page 85






| EDP# | *d* † Diameter Decimal | Diameter | Metric | *l1* Overall Length | *l2* Flute Length | *l5* Max Drill Depth | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|
| 56166 | .0625 | 1/16" | 1.588 | 1-3/4" | 3/4" | .331" | 9.51 | 9.10 | 8.68 | 8.27 |
| 56171 | .0635 | #52 | 1.613 | 1-3/4" | 3/4" | .337" | 9.63 | 9.21 | 8.79 | 8.37 |
| 56181 | .0700 | #50 | 1.778 | 1-3/4" | 7/8" | .371" | 9.90 | 9.47 | 9.04 | 8.61 |
| 56186 | .0730 | #49 | 1.854 | 1-3/4" | 7/8" | .387" | 10.13 | 9.69 | 9.25 | 8.81 |
| 56191 | .0760 | #48 | 1.930 | 1-3/4" | 7/8" | .403" | 10.38 | 9.93 | 9.48 | 9.03 |
| 56196 | .0781 | 5/64" | 1.984 | 1-3/4" | 7/8" | .414" | 10.72 | 10.25 | 9.79 | 9.32 |
| 56206 | .0787 | | 2.000 | 44 | 22 | 11 | 11.13 | 10.65 | 10.16 | 9.68 |
| 56216 | .0820 | #45 | 2.083 | 1-3/4" | 7/8" | .435" | 11.56 | 11.06 | 10.55 | 10.05 |
| 56221 | .0860 | #44 | 2.184 | 2" | 1" | .456" | 11.87 | 11.35 | 10.84 | 10.32 |
| 56226 | .0890 | #43 | 2.261 | 2" | 1" | .472" | 12.13 | 11.61 | 11.08 | 10.55 |
| 56231 | .0935 | #42 | 2.375 | 2" | 1" | .496" | 12.28 | 11.75 | 11.21 | 10.68 |
| 56236 | .0938 | 3/32" | 2.383 | 2" | 1" | .497" | 12.51 | 11.97 | 11.42 | 10.88 |
| 56241 | .0960 | #41 | 2.438 | 2" | 1" | .509" | 12.62 | 12.07 | 11.52 | 10.97 |
| 56246 | .0980 | #40 | 2.489 | 2" | 1" | .519" | 12.78 | 12.22 | 11.67 | 11.11 |
| 56251 | .0984 | | 2.500 | 57 | 32 | 13 | 12.80 | 12.24 | 11.69 | 11.13 |
| 56256 | .0995 | #39 | 2.527 | 2-1/4" | 1-1/4" | .527" | 12.86 | 12.30 | 11.74 | 11.18 |
| 56261 | .1015 | #38 | 2.578 | 2-1/4" | 1-1/4" | .538" | 13.02 | 12.45 | 11.89 | 11.32 |
| 56266 | .1040 | #37 | 2.642 | 2-1/4" | 1-1/4" | .551" | 13.12 | 12.55 | 11.98 | 11.41 |
| 56271 | .1065 | #36 | 2.705 | 2-1/4" | 1-1/4" | .564" | 13.27 | 12.69 | 12.12 | 11.54 |
| 56276 | .1094 | 7/64" | 2.779 | 2-1/4" | 1-1/4" | .580" | 13.48 | 12.89 | 12.31 | 11.72 |
| 56281 | .1100 | #35 | 2.794 | 2-1/4" | 1-1/4" | .583" | 13.58 | 12.99 | 12.40 | 11.81 |
| 56286 | .1110 | #34 | 2.819 | 2-1/4" | 1-1/4" | .588" | 13.73 | 13.13 | 12.54 | 11.94 |
| 56291 | .1130 | #33 | 2.870 | 2-1/4" | 1-1/4" | .599" | 13.95 | 13.34 | 12.74 | 12.13 |
| 56296 | .1160 | #32 | 2.946 | 2-1/4" | 1-1/4" | .615" | 14.05 | 13.44 | 12.83 | 12.22 |
| 56301 | .1181 | | 3.000 | 57 | 32 | 16 | 14.17 | 13.55 | 12.94 | 12.32 |
| 56306 | .1200 | #31 | 3.048 | 2-1/4" | 1-1/4" | .636" | 14.28 | 13.66 | 13.04 | 12.42 |
| 56311 | .1250 | 1/8" | 3.175 | 2-1/4" | 1-1/4" | .663" | 14.40 | 13.77 | 13.15 | 12.52 |
| 56316 | .1285 | #30 | 3.264 | 2-1/4" | 1-1/4" | .681" | 14.73 | 14.09 | 13.45 | 12.81 |
| 56321 | .1360 | #29 | 3.454 | 2-1/2" | 1-3/8" | .721" | 15.12 | 14.47 | 13.81 | 13.15 |
| 56331 | .1405 | #28 | 3.569 | 2-1/2" | 1-3/8" | .745" | 15.71 | 15.03 | 14.34 | 13.66 |
| 56336 | .1406 | 9/64" | 3.571 | 2-1/2" | 1-3/8" | .745" | 15.85 | 15.16 | 14.47 | 13.78 |
| 56341 | .1440 | #27 | 3.658 | 2-1/2" | 1-3/8" | .763" | 16.39 | 15.68 | 14.96 | 14.25 |
| 56346 | .1470 | #26 | 3.734 | 2-1/2" | 1-3/8" | .779" | 16.54 | 15.82 | 15.10 | 14.38 |
| 56351 | .1495 | #25 | 3.797 | 2-1/2" | 1-3/8" | .792" | 16.69 | 15.96 | 15.24 | 14.51 |
| 56356 | .1520 | #24 | 3.861 | 2-1/2" | 1-3/8" | .806" | 16.77 | 16.04 | 15.31 | 14.58 |
| 56361 | .1540 | #23 | 3.912 | 2-1/2" | 1-3/8" | .816" | 16.85 | 16.12 | 15.38 | 14.65 |
| 56366 | .1562 | 5/32" | 3.967 | 2-1/2" | 1-3/8" | .828" | 16.93 | 16.19 | 15.46 | 14.72 |
| 56371 | .1570 | #22 | 3.988 | 2-1/2" | 1-3/8" | .832" | 17.87 | 17.09 | 16.32 | 15.54 |

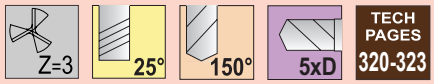


† *Metric equivalents are for reference only*

| EDP# | *d* † Diameter Decimal | Diameter | Metric | *l1* Overall Length | *l2* Flute Length | *l5* Max Drill Depth | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|
| 56381 | .1590 | #21 | 4.039 | 2-1/2" | 1-3/8" | .843" | 18.27 | 17.48 | 16.68 | 15.89 |
| 56386 | .1610 | #20 | 4.089 | 2-1/2" | 1-3/8" | .853" | 18.38 | 17.58 | 16.78 | 15.98 |
| 56391 | .1660 | #19 | 4.216 | 2-3/4" | 1-5/8" | .880" | 19.06 | 18.23 | 17.40 | 16.57 |
| 56396 | .1695 | #18 | 4.305 | 2-3/4" | 1-5/8" | .898" | 19.24 | 18.40 | 17.57 | 16.73 |
| 56401 | .1719 | 11/64" | 4.366 | 2-3/4" | 1-5/8" | .911" | 19.57 | 18.72 | 17.87 | 17.02 |
| 56411 | .1770 | #16 | 4.496 | 2-3/4" | 1-5/8" | .938" | 20.03 | 19.16 | 18.29 | 17.42 |
| 56421 | .1800 | #15 | 4.572 | 2-3/4" | 1-5/8" | .954" | 20.23 | 19.35 | 18.47 | 17.59 |
| 56426 | .1820 | #14 | 4.623 | 2-3/4" | 1-5/8" | .965" | 20.62 | 19.72 | 18.83 | 17.93 |
| 56436 | .1875 | 3/16" | 4.763 | 2-3/4" | 1-5/8" | .994" | 20.86 | 19.95 | 19.05 | 18.14 |
| 56441 | .1890 | #12 | 4.801 | 2-3/4" | 1-5/8" | 1.002" | 22.99 | 21.99 | 20.99 | 19.99 |
| 56446 | .1910 | #11 | 4.851 | 2-3/4" | 1-5/8" | 1.012" | 23.20 | 22.19 | 21.18 | 20.17 |
| 56451 | .1935 | #10 | 4.915 | 2-3/4" | 1-5/8" | 1.026" | 24.10 | 23.06 | 22.01 | 20.96 |
| 56471 | .2010 | #7 | 5.105 | 3" | 1-3/4" | 1.065" | 25.52 | 24.41 | 23.30 | 22.19 |
| 56481 | .2040 | #6 | 5.182 | 3" | 1-3/4" | 1.081" | 26.14 | 25.00 | 23.87 | 22.73 |
| 56486 | .2055 | #5 | 5.220 | 3" | 1-3/4" | 1.089" | 26.60 | 25.44 | 24.29 | 23.13 |
| 56491 | .2090 | #4 | 5.309 | 3" | 1-3/4" | 1.108" | 27.03 | 25.85 | 24.68 | 23.50 |
| 56496 | .2130 | #3 | 5.410 | 3" | 1-3/4" | 1.129" | 27.42 | 26.22 | 25.03 | 23.84 |
| 56506 | .2188 | 7/32" | 5.558 | 3" | 1-3/4" | 1.160" | 27.76 | 26.55 | 25.35 | 24.14 |
| 56516 | .2280 | #1 | 5.791 | 3" | 1-3/4" | 1.208" | 28.51 | 27.27 | 26.03 | 24.79 |
| 56526 | .2344 | 15/64" | 5.954 | 3-1/4" | 2" | 1.242" | 28.99 | 27.73 | 26.47 | 25.21 |
| 56541 | .2420 | C | 6.147 | 3-1/4" | 2" | 1.283" | 29.36 | 28.08 | 26.81 | 25.53 |
| 56551 | .2500 | 1/4" / E | 6.350 | 3-1/4" | 2" | 1.325" | 29.72 | 28.42 | 27.13 | 25.84 |
| 56561 | .2570 | F | 6.528 | 3-1/4" | 2" | 1.362" | 34.05 | 32.57 | 31.09 | 29.61 |
| 56566 | .2610 | G | 6.629 | 3-1/2" | 2-1/8" | 1.383" | 34.57 | 33.07 | 31.56 | 30.06 |
| 56571 | .2656 | 17/64" | 6.746 | 3-1/2" | 2-1/8" | 1.408" | 35.14 | 33.62 | 32.09 | 30.56 |
| 56601 | .2812 | 9/32" | 7.142 | 3-1/2" | 2-1/8" | 1.490" | 37.19 | 35.57 | 33.96 | 32.34 |
| 56606 | .2900 | L | 7.366 | 3-1/2" | 2-1/8" | 1.537" | 38.33 | 36.66 | 35.00 | 33.33 |
| 56626 | .3020 | N | 7.671 | 3-3/4" | 2-3/8" | 1.601" | 42.53 | 40.68 | 38.83 | 36.98 |
| 56631 | .3125 | 5/16" | 7.938 | 3-3/4" | 2-3/8" | 1.656" | 42.69 | 40.83 | 38.98 | 37.12 |
| 56646 | .3230 | P | 8.204 | 3-3/4" | 2-3/8" | 1.712" | 45.26 | 43.30 | 41.33 | 39.36 |
| 56651 | .3281 | 21/64" | 8.334 | 4" | 2-1/2" | 1.739" | 45.84 | 43.85 | 41.85 | 39.86 |
| 56671 | .3438 | 11/32" | 8.733 | 4" | 2-1/2" | 1.822" | 50.07 | 47.89 | 45.72 | 43.54 |
| 56696 | .3680 | U | 9.347 | 4-1/4" | 2-3/4" | 1.951" | 60.75 | 58.11 | 55.47 | 52.83 |
| 56706 | .3750 | 3/8" | 9.525 | 4-1/4" | 2-3/4" | 1.988" | 61.61 | 58.93 | 56.25 | 53.57 |
| 56731 | .3970 | X | 10.084 | 4-1/2" | 2-7/8" | 2.104" | 68.60 | 65.62 | 62.63 | 59.65 |
| 56741 | .4062 | 13/32" | 10.317 | 4-1/2" | 2-7/8" | 2.153" | 71.17 | 68.08 | 64.98 | 61.89 |
| 56756 | .4219 | 27/64" | 10.716 | 4-1/2" | 2-7/8" | 2.236" | 72.50 | 69.34 | 66.19 | 63.04 |
| 56766 | .4375 | 7/16" | 11.113 | 4-1/2" | 2-7/8" | 2.319" | 77.77 | 74.39 | 71.01 | 67.63 |
| 56801 | .5000 | 1/2" | 12.700 | 4-3/4" | 3" | 2.650" | 89.94 | 86.03 | 82.12 | 78.21 |

# Series 1100

.1094" - .2040"
(2.779mm - 5.182mm)



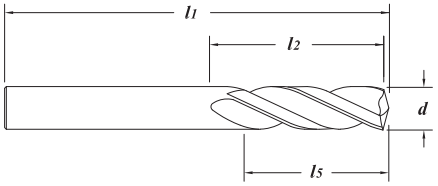

**TOLERANCES**

| | | |
|---|---|---|
| *d* | +.0000" –.0005" (+.0000 –.0127mm) | |
| $l_1$ | ≤ 1/8" | +.125" –.062" (+3.175 –1.588mm) |
| | > 1/8" | +.125" –.125" (+3.175 –3.175mm) |
| $l_2$ | ≤ 1/8" | +.125" –.062" (+3.175 –1.588mm) |
| | >1/8" | +.125" –.125" (+3.175 –3.175mm) |

**Recommended for cast iron, tungsten, and materials with high silicon content**



- Solid submicron grain carbide drill
- Self-centering drill point
- Near reamer finishes
- Can be used as a core drill
- Tighter tolerance holes
- Improved roundness and straightness
- Live tooling recommended on lathe processes
- Durana Coating - page 81




| EDP# | *d* † Diameter Decimal | Diameter | Metric | $l_1$ Overall Length | $l_2$ Flute Length | $l_5$ Max Drill Depth | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|
| 90275 | .1094 | 7/64" | 2.779 | 2-1/4" | 1-1/4" | .562" | 13.80 | 13.20 | 12.60 | 12.00 |
| 90280 | .1100 | #35 | 2.794 | 2-1/4" | 1-1/4" | .565" | 13.95 | 13.34 | 12.74 | 12.13 |
| 90285 | .1110 | #34 | 2.819 | 2-1/4" | 1-1/4" | .570" | 14.12 | 13.51 | 12.89 | 12.28 |
| 90290 | .1130 | #33 | 2.870 | 2-1/4" | 1-1/4" | .580" | 14.35 | 13.73 | 13.10 | 12.48 |
| 90295 | .1160 | #32 | 2.946 | 2-1/4" | 1-1/4" | .596" | 14.55 | 13.92 | 13.28 | 12.65 |
| 90300 | .1181 | | 3.000 | 57 | 32 | 15 | 14.65 | 14.01 | 13.38 | 12.74 |
| 90305 | .1200 | #31 | 3.048 | 2-1/4" | 1-1/4" | .616" | 14.75 | 14.11 | 13.47 | 12.83 |
| 90310 | .1250 | 1/8" | 3.175 | 2-1/4" | 1-1/4" | .642" | 14.96 | 14.31 | 13.66 | 13.01 |
| 90315 | .1285 | #30 | 3.264 | 2-1/4" | 1-1/4" | .660" | 15.32 | 14.65 | 13.99 | 13.32 |
| 90320 | .1360 | #29 | 3.454 | 2-1/2" | 1-3/8" | .698" | 15.80 | 15.11 | 14.43 | 13.74 |
| 90325 | .1378 | | 3.500 | 63 | 35 | 18 | 16.31 | 15.60 | 14.89 | 14.18 |
| 90330 | .1405 | #28 | 3.569 | 2-1/2" | 1-3/8" | .721" | 16.49 | 15.77 | 15.06 | 14.34 |
| 90335 | .1406 | 9/64" | 3.571 | 2-1/2" | 1-3/8" | .722" | 16.68 | 15.95 | 15.23 | 14.50 |
| 90340 | .1440 | #27 | 3.658 | 2-1/2" | 1-3/8" | .739" | 17.34 | 16.59 | 15.83 | 15.08 |
| 90345 | .1470 | #26 | 3.734 | 2-1/2" | 1-3/8" | .755" | 17.58 | 16.82 | 16.05 | 15.29 |
| 90350 | .1495 | #25 | 3.797 | 2-1/2" | 1-3/8" | .768" | 17.73 | 16.96 | 16.19 | 15.42 |
| 90355 | .1520 | #24 | 3.861 | 2-1/2" | 1-3/8" | .780" | 17.77 | 17.00 | 16.22 | 15.45 |
| 90365 | .1562 | 5/32" | 3.967 | 2-1/2" | 1-3/8" | .802" | 18.01 | 17.23 | 16.44 | 15.66 |
| 90375 | .1575 | | 4.000 | 63 | 35 | 21 | 19.15 | 18.32 | 17.48 | 16.65 |
| 90380 | .1590 | #21 | 4.039 | 2-1/2" | 1-3/8" | .816" | 19.61 | 18.76 | 17.90 | 17.05 |
| 90385 | .1610 | #20 | 4.089 | 2-1/2" | 1-3/8" | .827" | 19.61 | 18.76 | 17.90 | 17.05 |
| 90390 | .1660 | #19 | 4.216 | 2-3/4" | 1-5/8" | .852" | 19.77 | 18.91 | 18.05 | 17.19 |
| 90395 | .1695 | #18 | 4.305 | 2-3/4" | 1-5/8" | .870" | 19.90 | 19.03 | 18.17 | 17.30 |
| 90400 | .1719 | 11/64" | 4.366 | 2-3/4" | 1-5/8" | .883" | 20.02 | 19.15 | 18.28 | 17.41 |
| 90420 | .1800 | #15 | 4.572 | 2-3/4" | 1-5/8" | .924" | 21.37 | 20.44 | 19.51 | 18.58 |
| 90425 | .1820 | #14 | 4.623 | 2-3/4" | 1-5/8" | .934" | 21.85 | 20.90 | 19.95 | 19.00 |
| 90435 | .1875 | 3/16" | 4.763 | 2-3/4" | 1-5/8" | .963" | 21.99 | 21.03 | 20.08 | 19.12 |
| 90440 | .1890 | #12 | 4.801 | 2-3/4" | 1-5/8" | .970" | 22.14 | 21.18 | 20.21 | 19.25 |
| 90455 | .1960 | #9 | 4.978 | 3" | 1-3/4" | 1.006" | 24.01 | 22.97 | 21.92 | 20.88 |
| 90460 | .1969 | | 5.000 | 76 | 44 | 26 | 24.16 | 23.11 | 22.06 | 21.01 |
| 90470 | .2010 | #7 | 5.105 | 3" | 1-3/4" | 1.032" | 25.07 | 23.98 | 22.89 | 21.80 |
| 90475 | .2031 | 13/64" | 5.159 | 3" | 1-3/4" | 1.043" | 26.01 | 24.88 | 23.75 | 22.62 |
| 90480 | .2040 | #6 | 5.182 | 3" | 1-3/4" | 1.047" | 26.17 | 25.04 | 23.90 | 22.76 |



† *Metric equivalents are for reference only*

| EDP# | *d* † Diameter Decimal | Diameter | Metric | *l1* Overall Length | *l2* Flute Length | *l5* Max Drill Depth | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|
| 90485 | .2055 | #5 | 5.220 | 3" | 1-3/4" | 1.055" | 26.29 | 25.15 | 24.00 | 22.86 |
| 90500 | .2165 | | 5.500 | 76 | 44 | 28 | 27.42 | 26.22 | 25.03 | 23.84 |
| 90505 | .2188 | 7/32" | 5.558 | 3" | 1-3/4" | 1.123" | 27.63 | 26.43 | 25.23 | 24.03 |
| 90510 | .2210 | #2 | 5.613 | 3" | 1-3/4" | 1.135" | 28.31 | 27.08 | 25.85 | 24.62 |
| 90515 | .2280 | #1 | 5.791 | 3" | 1-3/4" | 1.171" | 28.45 | 27.21 | 25.98 | 24.74 |
| 90525 | .2344 | 15/64" | 5.954 | 3-1/4" | 2" | 1.203" | 28.89 | 27.63 | 26.38 | 25.12 |
| 90530 | .2362 | | 6.000 | 82 | 50 | 31 | 28.97 | 27.71 | 26.45 | 25.19 |
| 90550 | .2500 | 1/4" / E | 6.350 | 3-1/4" | 2" | 1.283" | 29.70 | 28.41 | 27.12 | 25.83 |
| 90555 | .2559 | | 6.500 | 82 | 50 | 33 | 30.44 | 29.12 | 27.79 | 26.47 |
| 90560 | .2570 | F | 6.528 | 3-1/4" | 2" | 1.319" | 31.08 | 29.73 | 28.38 | 27.03 |
| 90565 | .2610 | G | 6.629 | 3-1/2" | 2-1/8" | 1.340" | 32.69 | 31.27 | 29.85 | 28.43 |
| 90570 | .2656 | 17/64" | 6.746 | 3-1/2" | 2-1/8" | 1.364" | 33.35 | 31.90 | 30.45 | 29.00 |
| 90575 | .2660 | H | 6.756 | 3-1/2" | 2-1/8" | 1.366" | 34.30 | 32.81 | 31.32 | 29.83 |
| 90580 | .2720 | I | 6.909 | 3-1/2" | 2-1/8" | 1.396" | 34.72 | 33.21 | 31.70 | 30.19 |
| 90585 | .2756 | | 7.000 | 88 | 54 | 36 | 34.97 | 33.45 | 31.93 | 30.41 |
| 90600 | .2812 | 9/32" | 7.142 | 3-1/2" | 2-1/8" | 1.444" | 36.87 | 35.27 | 33.66 | 32.06 |
| 90605 | .2900 | L | 7.366 | 3-1/2" | 2-1/8" | 1.489" | 38.24 | 36.58 | 34.91 | 33.25 |
| 90620 | .2969 | 19/64" | 7.541 | 3-3/4" | 2-3/8" | 1.524" | 40.61 | 38.84 | 37.08 | 35.31 |
| 90625 | .3020 | N | 7.671 | 3-3/4" | 2-3/8" | 1.550" | 40.91 | 39.13 | 37.35 | 35.57 |
| 90630 | .3125 | 5/16" | 7.938 | 3-3/4" | 2-3/8" | 1.604" | 40.95 | 39.17 | 37.39 | 35.61 |
| 90635 | .3150 | | 8.000 | 95 | 60 | 41 | 43.94 | 42.03 | 40.12 | 38.21 |
| 90640 | .3160 | O | 8.026 | 3-3/4" | 2-3/8" | 1.622" | 43.94 | 42.03 | 40.12 | 38.21 |
| 90650 | .3281 | 21/64" | 8.334 | 4" | 2-1/2" | 1.684" | 45.97 | 43.97 | 41.97 | 39.97 |
| 90655 | .3320 | Q | 8.433 | 4" | 2-1/2" | 1.704" | 47.05 | 45.00 | 42.96 | 40.91 |
| 90660 | .3346 | | 8.500 | 101 | 63 | 44 | 47.47 | 45.41 | 43.34 | 41.28 |
| 90665 | .3390 | R | 8.611 | 4" | 2-1/2" | 1.740" | 48.94 | 46.82 | 44.69 | 42.56 |
| 90670 | .3438 | 11/32" | 8.733 | 4" | 2-1/2" | 1.765" | 50.99 | 48.77 | 46.56 | 44.34 |
| 90680 | .3543 | | 9.000 | 101 | 63 | 46 | 53.03 | 50.72 | 48.42 | 46.11 |
| 90690 | .3594 | 23/64" | 9.129 | 4-1/4" | 2-3/4" | 1.845" | 53.90 | 51.56 | 49.21 | 46.87 |
| 90705 | .3750 | 3/8" | 9.525 | 4-1/4" | 2-3/4" | 1.925" | 58.54 | 55.99 | 53.45 | 50.90 |
| 90725 | .3937 | | 10.000 | 114 | 73 | 51 | 68.05 | 65.09 | 62.13 | 59.17 |
| 90745 | .4130 | Z | 10.490 | 4-1/2" | 2-7/8" | 2.120" | 73.91 | 70.70 | 67.48 | 64.27 |
| 90755 | .4219 | 27/64" | 10.716 | 4-1/2" | 2-7/8" | 2.166" | 74.75 | 71.50 | 68.25 | 65.00 |
| 90760 | .4331 | | 11.000 | 114 | 73 | 56 | 81.16 | 77.63 | 74.10 | 70.57 |
| 90765 | .4375 | 7/16" | 11.113 | 4-1/2" | 2-7/8" | 2.246" | 81.16 | 77.63 | 74.10 | 70.57 |
| 90775 | .4531 | 29/64" | 11.509 | 4-3/4" | 3" | 2.326" | 88.08 | 84.25 | 80.42 | 76.59 |
| 90780 | .4688 | 15/32" | 11.908 | 4-3/4" | 3" | 2.407" | 93.17 | 89.12 | 85.07 | 81.02 |
| 90790 | .4844 | 31/64" | 12.304 | 4-3/4" | 3" | 2.487" | 93.46 | 89.40 | 85.33 | 81.27 |
| 90800 | .5000 | 1/2" | 12.700 | 4-3/4" | 3" | 2.567" | 95.92 | 91.75 | 87.58 | 83.41 |

# Series 1800H

.1875" - .3125"
(4.763mm - 7.938mm)

Z=2 | 35° | 135° | 8xD | TECH PAGES 324-327

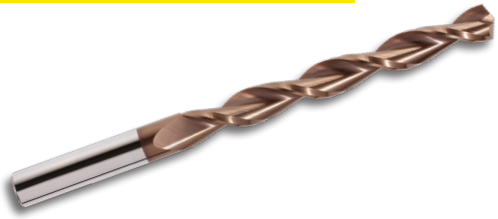
| TOLERANCES | |
|---|---|
| $d$ | +.0000" –.0005" (+.0000 –.0127mm) |
| $l_1$ | +.125" –.125" (+3.175 –3.175mm) |
| $l_2$ | +.125" –.125" (+3.175 –3.175mm) |

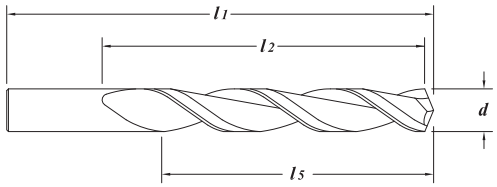
Recommended for deep holes in soft, non-ferrous materials (aluminum, brass, bronze)

## Parabolic

**BALINIT® Durana Coating**

Solid submicron grain carbide drill
Wide open flutes and high helix remove chips quickly
4-facet point
Live tooling recommended on lathe processes






| EDP# | $d$ † Diameter Decimal | Diameter | Metric | $l_1$ Overall Length | $l_2$ Flute Length | $l_5$ Max Drill Depth | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|
| 22436 | .1875 | 3/16" | 4.763 | 3-13/16" | 2-5/16" | 1.539" | 25.88 | 24.75 | 23.63 | 22.50 |
| 22441 | .1890 | #12 | 4.801 | 3-13/16" | 2-5/16" | 1.551" | 26.45 | 25.30 | 24.15 | 23.00 |
| 22456 | .1960 | #9 | 4.978 | 3-15/16" | 2-7/16" | 1.609" | 28.29 | 27.06 | 25.83 | 24.60 |
| 22461 | .1969 | | 5.000 | 100 | 62 | 41 | 28.89 | 27.63 | 26.38 | 25.12 |
| 22466 | .1990 | #8 | 5.055 | 3-15/16" | 2-7/16" | 1.633" | 29.37 | 28.09 | 26.82 | 25.54 |
| 22471 | .2010 | #7 | 5.105 | 3-15/16" | 2-7/16" | 1.650" | 29.90 | 28.60 | 27.30 | 26.00 |
| 22476 | .2031 | 13/64" | 5.159 | 3-15/16" | 2-7/16" | 1.667" | 29.22 | 27.95 | 26.68 | 25.41 |
| 22486 | .2055 | #5 | 5.220 | 4" | 2-1/2" | 1.687" | 31.40 | 30.03 | 28.67 | 27.30 |
| 22496 | .2130 | #3 | 5.410 | 4" | 2-1/2" | 1.748" | 32.37 | 30.97 | 29.56 | 28.15 |
| 22501 | .2165 | | 5.500 | 102 | 64 | 45 | 32.90 | 31.47 | 30.04 | 28.61 |
| 22506 | .2188 | 7/32" | 5.558 | 4" | 2-1/2" | 1.796" | 33.40 | 31.94 | 30.49 | 29.04 |
| 22511 | .2210 | #2 | 5.613 | 4" | 2-1/2" | 1.814" | 33.88 | 32.41 | 30.93 | 29.46 |
| 22516 | .2280 | #1 | 5.791 | 4-1/8" | 2-5/8" | 1.871" | 34.40 | 32.90 | 31.41 | 29.91 |
| 22531 | .2362 | | 6.000 | 105 | 67 | 49 | 35.96 | 34.40 | 32.83 | 31.27 |
| 22541 | .2420 | C | 6.147 | 4-1/4" | 2-3/4" | 1.986" | 36.36 | 34.78 | 33.20 | 31.62 |
| 22546 | .2460 | D | 6.248 | 4-1/4" | 2-3/4" | 2.019" | 36.51 | 34.93 | 33.34 | 31.75 |
| 22551 | .2500 | 1/4" / E | 6.350 | 4-1/4" | 2-3/4" | 2.052" | 36.71 | 35.11 | 33.52 | 31.92 |
| 22556 | .2559 | | 6.500 | 108 | 70 | 53 | 37.93 | 36.28 | 34.63 | 32.98 |
| 22561 | .2570 | F | 6.528 | 4-3/8" | 2-7/8" | 2.109" | 39.53 | 37.81 | 36.09 | 34.37 |
| 22566 | .2610 | G | 6.629 | 4-3/8" | 2-7/8" | 2.142" | 40.61 | 38.84 | 37.08 | 35.31 |
| 22571 | .2656 | 17/64" | 6.746 | 4-3/8" | 2-7/8" | 2.180" | 41.78 | 39.96 | 38.15 | 36.33 |
| 22576 | .2660 | H | 6.756 | 4-3/8" | 2-7/8" | 2.183" | 43.15 | 41.27 | 39.40 | 37.52 |
| 22581 | .2720 | I | 6.909 | 4-3/8" | 2-7/8" | 2.232" | 44.45 | 42.52 | 40.58 | 38.65 |
| 22586 | .2756 | | 7.000 | 111 | 73 | 57 | 45.78 | 43.79 | 41.80 | 39.81 |
| 22596 | .2810 | K | 7.137 | 4-7/16" | 2-15/16" | 2.306" | 47.78 | 45.71 | 43.63 | 41.55 |
| 22606 | .2900 | L | 7.366 | 4-7/16" | 2-15/16" | 2.380" | 49.90 | 47.73 | 45.56 | 43.39 |
| 22631 | .3125 | 5/16" | 7.938 | 4-11/16" | 3-3/16" | 2.565" | 52.16 | 49.90 | 47.63 | 45.36 |



† *Metric equivalents are for reference only*

| EDP# | *d* † Diameter Decimal | | Metric | *l1* Overall Length | *l2* Flute Length | *l5* Max Drill Depth | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|
| 22636 | .3150 | | 8.000 | 119 | 81 | 66 | 55.15 | 52.76 | 50.36 | 47.96 |
| 22646 | .3230 | P | 8.204 | 4-11/16" | 3-3/16" | 2.651" | 57.68 | 55.18 | 52.67 | 50.16 |
| 22656 | .3320 | Q | 8.433 | 4-15/16" | 3-7/16" | 2.725" | 60.24 | 57.62 | 55.00 | 52.38 |
| 22661 | .3346 | | 8.500 | 125 | 87 | 70 | 61.50 | 58.83 | 56.15 | 53.48 |
| 22666 | .3390 | R | 8.611 | 4-15/16" | 3-7/16" | 2.782" | 63.43 | 60.68 | 57.92 | 55.16 |
| 22696 | .3680 | U | 9.347 | 5" | 3-1/2" | 3.020" | 70.06 | 67.01 | 63.97 | 60.92 |
| 22706 | .3750 | 3/8" | 9.525 | 5-1/8" | 3-5/8" | 3.078" | 70.64 | 67.57 | 64.50 | 61.43 |
| 22721 | .3906 | 25/64" | 9.921 | 5-1/4" | 3-3/4" | 3.206" | 77.69 | 74.32 | 70.94 | 67.56 |
| 22726 | .3937 | | 10.000 | 133 | 95 | 82 | 80.02 | 76.54 | 73.06 | 69.58 |
| 22751 | .4134 | | 10.500 | 137 | 98 | 86 | 93.86 | 89.78 | 85.70 | 81.62 |
| 22761 | .4331 | | 11.000 | 138 | 100 | 90 | 101.17 | 96.77 | 92.37 | 87.97 |
| 22766 | .4375 | 7/16" | 11.113 | 5-7/16" | 3-15/16" | 3.591" | 101.17 | 96.77 | 92.37 | 87.97 |
| 22776 | .4531 | 29/64" | 11.509 | 5-9/16" | 4-5/16" | 3.719" | 102.60 | 98.14 | 93.68 | 89.22 |
| 22801 | .5000 | 1/2" | 12.700 | 6" | 4-1/2" | 4.104" | 107.92 | 103.22 | 98.53 | 93.84 |
| 22811 | .5156 | 33/64" | 13.096 | 6" | 4-1/2" | 4.232" | 136.40 | 130.47 | 124.54 | 118.61 |
| 22831 | .5512 | | 14.000 | 156 | 117 | 115 | 159.93 | 152.98 | 146.02 | 139.07 |



# Series 4100

.0590" - .0820"
(1.499mm - 2.083mm)

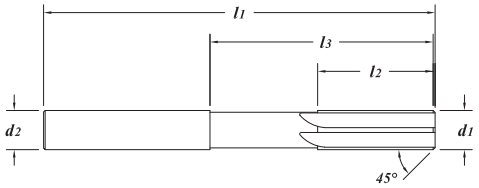



**TOLERANCES**

| | | |
|---|---|---|
| $d_1$ | .0590" – .2509" (1.498 – 6.372mm) | +.0002" –.0000" (+.0050 –.0000mm) |
| | .2510" – .5020" (6.375 – 12.750mm) | +.0003" –.0000" (+.0075 –.0000mm) |
| $d_2$ | .0590" – .2509" (1.498 – 6.372mm) | +.0002" –.0000" (+.0050 –.0000mm) |
| | .2510" – .5020" (6.375 – 12.750mm) | +.0003" –.0000" (+.0075 –.0000mm) |

Solid Carbide Submicron Grain
Straight - RHC Flutes
Standard 45° Lead Chamfer
Neck diameter is .010" ±.002" less than ($d_1$) fluted diameter






| EDP# | $d_1$ † Diameter Decimal | Diameter | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | $l_3$ Reach Length | Number Flutes | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 95066 | .0590 | | 1.499 | .0590" | 1-1/2" | 3/8" | 5/8" | 4 | 14.81 | 14.17 | 13.52 | 12.88 |
| 95069 | .0591 | | 1.500 | .0591" | 1-1/2" | 3/8" | 5/8" | 4 | 14.81 | 14.17 | 13.52 | 12.88 |
| 95072 | .0595 | #53 | 1.511 | .0595" | 1-1/2" | 3/8" | 5/8" | 4 | 14.81 | 14.17 | 13.52 | 12.88 |
| 95075 | .0600 | | 1.524 | .0600" | 1-1/2" | 3/8" | 5/8" | 4 | 14.81 | 14.17 | 13.52 | 12.88 |
| 95078 | .0605 | | 1.537 | .0605" | 1-1/2" | 3/8" | 5/8" | 4 | 14.81 | 14.17 | 13.52 | 12.88 |
| 95081 | .0610 | | 1.549 | .0610" | 1-1/2" | 3/8" | 5/8" | 4 | 14.81 | 14.17 | 13.52 | 12.88 |
| 95084 | .0615 | | 1.562 | .0615" | 1-1/2" | 3/8" | 5/8" | 4 | 14.81 | 14.17 | 13.52 | 12.88 |
| 95087 | .0620 | | 1.575 | .0620" | 1-1/2" | 3/8" | 5/8" | 4 | 14.81 | 14.17 | 13.52 | 12.88 |
| 95090 | .0625 | 1/16" | 1.588 | .0625" | 1-1/2" | 3/8" | 5/8" | 4 | 14.81 | 14.17 | 13.52 | 12.88 |
| 95093 | .0630 | | 1.600 | .0630" | 1-1/2" | 3/8" | 5/8" | 4 | 14.81 | 14.17 | 13.52 | 12.88 |
| 95096 | .0635 | #52 | 1.613 | .0635" | 1-1/2" | 3/8" | 5/8" | 4 | 14.81 | 14.17 | 13.52 | 12.88 |
| 95099 | .0640 | | 1.626 | .0640" | 1-1/2" | 3/8" | 5/8" | 4 | 14.81 | 14.17 | 13.52 | 12.88 |
| 95102 | .0645 | | 1.638 | .0645" | 1-1/2" | 3/8" | 5/8" | 4 | 14.81 | 14.17 | 13.52 | 12.88 |
| 95105 | .0650 | | 1.651 | .0650" | 1-1/2" | 3/8" | 5/8" | 4 | 14.81 | 14.17 | 13.52 | 12.88 |
| 95108 | .0660 | | 1.676 | .0660" | 1-3/4" | 1/2" | 3/4" | 4 | 14.81 | 14.17 | 13.52 | 12.88 |
| 95111 | .0670 | #51 | 1.702 | .0670" | 1-3/4" | 1/2" | 3/4" | 4 | 14.81 | 14.17 | 13.52 | 12.88 |
| 95114 | .0680 | | 1.727 | .0680" | 1-3/4" | 1/2" | 7/8" | 4 | 14.81 | 14.17 | 13.52 | 12.88 |
| 95117 | .0690 | | 1.753 | .0690" | 1-3/4" | 1/2" | 7/8" | 4 | 14.81 | 14.17 | 13.52 | 12.88 |
| 95120 | .0700 | #50 | 1.778 | .0700" | 1-3/4" | 1/2" | 7/8" | 4 | 14.81 | 14.17 | 13.52 | 12.88 |
| 95123 | .0710 | | 1.803 | .0710" | 1-3/4" | 1/2" | 7/8" | 4 | 14.81 | 14.17 | 13.52 | 12.88 |
| 95126 | .0720 | | 1.829 | .0720" | 1-3/4" | 1/2" | 7/8" | 4 | 14.81 | 14.17 | 13.52 | 12.88 |
| 95129 | .0730 | #49 | 1.854 | .0730" | 1-3/4" | 1/2" | 7/8" | 4 | 14.81 | 14.17 | 13.52 | 12.88 |
| 95132 | .0740 | | 1.880 | .0740" | 1-3/4" | 1/2" | 7/8" | 4 | 14.81 | 14.17 | 13.52 | 12.88 |
| 95135 | .0750 | | 1.905 | .0750" | 1-3/4" | 1/2" | 7/8" | 4 | 14.81 | 14.17 | 13.52 | 12.88 |
| 95138 | .0760 | #48 | 1.930 | .0760" | 1-3/4" | 1/2" | 7/8" | 4 | 14.81 | 14.17 | 13.52 | 12.88 |
| 95141 | .0770 | | 1.956 | .0770" | 1-3/4" | 1/2" | 7/8" | 4 | 14.81 | 14.17 | 13.52 | 12.88 |
| 95144 | .0780 | | 1.981 | .0780" | 1-3/4" | 1/2" | 7/8" | 4 | 14.81 | 14.17 | 13.52 | 12.88 |
| 95147 | .0781 | 5/64" | 1.984 | .0781" | 1-3/4" | 1/2" | 7/8" | 4 | 14.81 | 14.17 | 13.52 | 12.88 |
| 95150 | .0785 | #47 | 1.994 | .0785" | 1-3/4" | 1/2" | 7/8" | 4 | 14.81 | 14.17 | 13.52 | 12.88 |
| 95153 | .0787 | | 2.000 | .0787" | 1-3/4" | 1/2" | 7/8" | 4 | 14.81 | 14.17 | 13.52 | 12.88 |
| 95156 | .0790 | | 2.007 | .0790" | 1-3/4" | 1/2" | 7/8" | 4 | 14.81 | 14.17 | 13.52 | 12.88 |
| 95159 | .0800 | | 2.032 | .0800" | 1-3/4" | 1/2" | 7/8" | 4 | 14.81 | 14.17 | 13.52 | 12.88 |
| 95162 | .0810 | #46 | 2.057 | .0810" | 2" | 1/2" | 7/8" | 4 | 14.81 | 14.17 | 13.52 | 12.88 |
| 95165 | .0820 | #45 | 2.083 | .0820" | 2" | 1/2" | 7/8" | 4 | 14.81 | 14.17 | 13.52 | 12.88 |



† *Metric equivalents are for reference only*

| EDP# | *d1* † Diameter Decimal | | Metric | *d2* Shank Diameter | *l1* Overall Length | *l2* Flute Length | *l3* Reach Length | Number Flutes | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 95168 | .0830 | | 2.108 | .0830" | 2" | 1/2" | 7/8" | 4 | 14.81 | 14.17 | 13.52 | 12.88 |
| 95171 | .0840 | | 2.134 | .0840" | 2" | 1/2" | 7/8" | 4 | 14.81 | 14.17 | 13.52 | 12.88 |
| 95174 | .0850 | | 2.159 | .0850" | 2" | 1/2" | 7/8" | 4 | 14.81 | 14.17 | 13.52 | 12.88 |
| 95177 | .0860 | #44 | 2.184 | .0860" | 2" | 1/2" | 7/8" | 4 | 14.81 | 14.17 | 13.52 | 12.88 |
| 95180 | .0870 | | 2.210 | .0870" | 2" | 1/2" | 7/8" | 4 | 14.81 | 14.17 | 13.52 | 12.88 |
| 95183 | .0880 | | 2.235 | .0880" | 2" | 1/2" | 7/8" | 4 | 14.81 | 14.17 | 13.52 | 12.88 |
| 95186 | .0890 | #43 | 2.261 | .0890" | 2" | 1/2" | 7/8" | 4 | 14.81 | 14.17 | 13.52 | 12.88 |
| 95189 | .0900 | | 2.286 | .0900" | 2" | 1/2" | 7/8" | 4 | 14.81 | 14.17 | 13.52 | 12.88 |
| 95192 | .0910 | | 2.311 | .0910" | 2" | 1/2" | 7/8" | 4 | 14.81 | 14.17 | 13.52 | 12.88 |
| 95195 | .0915 | | 2.324 | .0915" | 2" | 1/2" | 7/8" | 4 | 14.81 | 14.17 | 13.52 | 12.88 |
| 95198 | .0920 | | 2.337 | .0920" | 2" | 1/2" | 7/8" | 4 | 14.81 | 14.17 | 13.52 | 12.88 |
| 95201 | .0925 | | 2.350 | .0925" | 2" | 1/2" | 7/8" | 4 | 14.81 | 14.17 | 13.52 | 12.88 |
| 95204 | .0930 | | 2.362 | .0930" | 2" | 1/2" | 7/8" | 4 | 14.81 | 14.17 | 13.52 | 12.88 |
| 95207 | .0935 | #42 | 2.375 | .0935" | 2" | 1/2" | 7/8" | 4 | 14.81 | 14.17 | 13.52 | 12.88 |
| 95210 | .0938 | 3/32" | 2.383 | .0938" | 2" | 1/2" | 7/8" | 4 | 14.81 | 14.17 | 13.52 | 12.88 |
| 95213 | .0940 | | 2.388 | .0940" | 2" | 1/2" | 7/8" | 4 | 14.81 | 14.17 | 13.52 | 12.88 |
| 95216 | .0945 | | 2.400 | .0945" | 2" | 1/2" | 7/8" | 4 | 14.81 | 14.17 | 13.52 | 12.88 |
| 95219 | .0950 | | 2.413 | .0950" | 2" | 1/2" | 7/8" | 4 | 14.81 | 14.17 | 13.52 | 12.88 |
| 95222 | .0960 | #41 | 2.438 | .0960" | 2-1/4" | 5/8" | 1" | 4 | 16.65 | 15.93 | 15.20 | 14.48 |
| 95225 | .0970 | | 2.464 | .0970" | 2-1/4" | 5/8" | 1" | 4 | 16.65 | 15.93 | 15.20 | 14.48 |
| 95228 | .0980 | #40 | 2.489 | .0980" | 2-1/4" | 5/8" | 1" | 4 | 16.65 | 15.93 | 15.20 | 14.48 |
| 95231 | .0984 | | 2.500 | .0984" | 2-1/4" | 5/8" | 1" | 4 | 16.65 | 15.93 | 15.20 | 14.48 |
| 95234 | .0990 | | 2.515 | .0990" | 2-1/4" | 5/8" | 1-1/8" | 4 | 16.65 | 15.93 | 15.20 | 14.48 |
| 95237 | .0995 | #39 | 2.527 | .0995" | 2-1/4" | 5/8" | 1-1/8" | 4 | 16.65 | 15.93 | 15.20 | 14.48 |
| 95240 | .1000 | | 2.540 | .1000" | 2-1/4" | 5/8" | 1-1/8" | 4 | 16.65 | 15.93 | 15.20 | 14.48 |
| 95243 | .1010 | | 2.565 | .1010" | 2-1/4" | 5/8" | 1-1/8" | 4 | 16.65 | 15.93 | 15.20 | 14.48 |
| 95246 | .1015 | #38 | 2.578 | .1015" | 2-1/4" | 5/8" | 1-1/8" | 4 | 16.65 | 15.93 | 15.20 | 14.48 |
| 95249 | .1020 | | 2.591 | .1020" | 2-1/4" | 5/8" | 1-1/8" | 4 | 16.65 | 15.93 | 15.20 | 14.48 |
| 95252 | .1030 | | 2.616 | .1030" | 2-1/4" | 5/8" | 1-1/8" | 4 | 16.65 | 15.93 | 15.20 | 14.48 |
| 95255 | .1040 | #37 | 2.642 | .1040" | 2-1/4" | 5/8" | 1-1/8" | 4 | 16.65 | 15.93 | 15.20 | 14.48 |
| 95258 | .1050 | | 2.667 | .1050" | 2-1/4" | 5/8" | 1-1/8" | 4 | 16.65 | 15.93 | 15.20 | 14.48 |
| 95261 | .1060 | | 2.692 | .1060" | 2-1/4" | 5/8" | 1-1/8" | 4 | 16.65 | 15.93 | 15.20 | 14.48 |
| 95264 | .1065 | #36 | 2.705 | .1065" | 2-1/4" | 5/8" | 1-1/8" | 4 | 16.65 | 15.93 | 15.20 | 14.48 |
| 95267 | .1070 | | 2.718 | .1070" | 2-1/4" | 5/8" | 1-1/8" | 4 | 16.65 | 15.93 | 15.20 | 14.48 |
| 95270 | .1080 | | 2.743 | .1080" | 2-1/4" | 5/8" | 1-1/8" | 4 | 16.65 | 15.93 | 15.20 | 14.48 |
| 95273 | .1090 | | 2.769 | .1090" | 2-1/4" | 5/8" | 1-1/8" | 4 | 16.65 | 15.93 | 15.20 | 14.48 |
| 95276 | .1094 | 7/64" | 2.779 | .1094" | 2-1/4" | 5/8" | 1-1/8" | 4 | 16.65 | 15.93 | 15.20 | 14.48 |
| 95279 | .1100 | #35 | 2.794 | .1100" | 2-1/4" | 5/8" | 1-1/8" | 4 | 16.78 | 16.05 | 15.32 | 14.59 |
| 95282 | .1110 | #34 | 2.819 | .1110" | 2-1/4" | 5/8" | 1-1/8" | 4 | 16.78 | 16.05 | 15.32 | 14.59 |
| 95285 | .1120 | | 2.845 | .1120" | 2-1/4" | 5/8" | 1-1/8" | 4 | 16.78 | 16.05 | 15.32 | 14.59 |
| 95288 | .1130 | #33 | 2.870 | .1130" | 2-1/4" | 5/8" | 1-1/8" | 4 | 16.78 | 16.05 | 15.32 | 14.59 |
| 95291 | .1140 | | 2.896 | .1140" | 2-1/4" | 5/8" | 1-1/8" | 4 | 16.78 | 16.05 | 15.32 | 14.59 |
| 95294 | .1150 | | 2.921 | .1150" | 2-1/4" | 5/8" | 1-1/8" | 4 | 16.78 | 16.05 | 15.32 | 14.59 |
| 95297 | .1160 | #32 | 2.946 | .1160" | 2-1/4" | 5/8" | 1-1/8" | 4 | 16.78 | 16.05 | 15.32 | 14.59 |
| 95300 | .1170 | | 2.972 | .1170" | 2-1/4" | 5/8" | 1-1/8" | 4 | 16.78 | 16.05 | 15.32 | 14.59 |
| 95303 | .1180 | | 2.997 | .1180" | 2-1/4" | 5/8" | 1-1/8" | 4 | 16.78 | 16.05 | 15.32 | 14.59 |
| 95306 | .1181 | | 3.000 | .1181" | 2-1/4" | 5/8" | 1-1/8" | 4 | 16.78 | 16.05 | 15.32 | 14.59 |
| 95309 | .1190 | | 3.023 | .1190" | 2-1/4" | 5/8" | 1-1/8" | 4 | 16.78 | 16.05 | 15.32 | 14.59 |

*continued* →

# Series 4100 *(continued)*

.1200" - .1550"
(3.048mm - 3.937mm)

| EDP# | $d_1$ † Diameter Decimal | Diameter | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | $l_3$ Reach Length | Number Flutes | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 95312 | .1200 | #31 | 3.048 | .1200" | 2-1/4" | 5/8" | 1-1/8" | 4 | 16.78 | 16.05 | 15.32 | 14.59 |
| 95315 | .1210 | | 3.073 | .1210" | 2-1/4" | 5/8" | 1-1/8" | 4 | 16.78 | 16.05 | 15.32 | 14.59 |
| 95318 | .1220 | | 3.099 | .1220" | 2-1/4" | 5/8" | 1-1/8" | 4 | 16.78 | 16.05 | 15.32 | 14.59 |
| 95321 | .1230 | | 3.124 | .1230" | 2-1/4" | 5/8" | 1-1/8" | 4 | 16.78 | 16.05 | 15.32 | 14.59 |
| 95324 | .1235 | | 3.137 | .1235" | 2-1/4" | 5/8" | 1-1/8" | 4 | 16.78 | 16.05 | 15.32 | 14.59 |
| 95327 | .1240 | | 3.150 | .1240" | 2-1/4" | 5/8" | 1-1/8" | 4 | 16.78 | 16.05 | 15.32 | 14.59 |
| 95330 | .1245 | | 3.162 | .1245" | 2-1/4" | 5/8" | 1-1/8" | 4 | 16.78 | 16.05 | 15.32 | 14.59 |
| 95333 | .1248 | | 3.170 | .1248" | 2-1/4" | 5/8" | 1-1/8" | 4 | 16.78 | 16.05 | 15.32 | 14.59 |
| 95336 | .1250 | 1/8" | 3.175 | .1250" | 2-1/4" | 5/8" | 1-1/8" | 4 | 16.78 | 16.05 | 15.32 | 14.59 |
| 95339 | .1255 | | 3.188 | .1255" | 2-1/4" | 5/8" | 1-1/8" | 4 | 17.46 | 16.70 | 15.94 | 15.18 |
| 95342 | .1260 | | 3.200 | .1260" | 2-1/4" | 5/8" | 1-1/8" | 4 | 17.46 | 16.70 | 15.94 | 15.18 |
| 95345 | .1265 | | 3.213 | .1265" | 2-1/4" | 5/8" | 1-1/8" | 4 | 17.46 | 16.70 | 15.94 | 15.18 |
| 95348 | .1270 | | 3.226 | .1270" | 2-1/4" | 5/8" | 1-1/8" | 4 | 17.46 | 16.70 | 15.94 | 15.18 |
| 95351 | .1275 | | 3.239 | .1275" | 2-1/4" | 5/8" | 1-1/8" | 4 | 17.46 | 16.70 | 15.94 | 15.18 |
| 95354 | .1280 | | 3.251 | .1280" | 2-1/4" | 5/8" | 1-1/8" | 4 | 17.46 | 16.70 | 15.94 | 15.18 |
| 95357 | .1285 | #30 | 3.264 | .1285" | 2-1/4" | 5/8" | 1-1/8" | 4 | 17.46 | 16.70 | 15.94 | 15.18 |
| 95360 | .1290 | | 3.277 | .1290" | 2-1/4" | 5/8" | 1-1/8" | 4 | 17.46 | 16.70 | 15.94 | 15.18 |
| 95363 | .1300 | | 3.302 | .1300" | 2-1/4" | 5/8" | 1-1/8" | 4 | 17.46 | 16.70 | 15.94 | 15.18 |
| 95366 | .1310 | | 3.327 | .1310" | 2-1/2" | 3/4" | 1-1/4" | 4 | 19.38 | 18.54 | 17.69 | 16.85 |
| 95369 | .1320 | | 3.353 | .1320" | 2-1/2" | 3/4" | 1-1/4" | 4 | 19.38 | 18.54 | 17.69 | 16.85 |
| 95372 | .1330 | | 3.378 | .1330" | 2-1/2" | 3/4" | 1-1/4" | 4 | 19.38 | 18.54 | 17.69 | 16.85 |
| 95375 | .1340 | | 3.404 | .1340" | 2-1/2" | 3/4" | 1-1/4" | 4 | 19.38 | 18.54 | 17.69 | 16.85 |
| 95378 | .1350 | | 3.429 | .1350" | 2-1/2" | 3/4" | 1-1/4" | 4 | 19.38 | 18.54 | 17.69 | 16.85 |
| 95381 | .1360 | #29 | 3.454 | .1360" | 2-1/2" | 3/4" | 1-1/4" | 4 | 19.38 | 18.54 | 17.69 | 16.85 |
| 95384 | .1370 | | 3.480 | .1370" | 2-1/2" | 3/4" | 1-1/4" | 4 | 19.38 | 18.54 | 17.69 | 16.85 |
| 95387 | .1378 | | 3.500 | .1378" | 2-1/2" | 3/4" | 1-1/4" | 4 | 19.38 | 18.54 | 17.69 | 16.85 |
| 95390 | .1380 | | 3.505 | .1380" | 2-1/2" | 3/4" | 1-1/4" | 4 | 19.38 | 18.54 | 17.69 | 16.85 |
| 95393 | .1390 | | 3.531 | .1390" | 2-1/2" | 3/4" | 1-1/4" | 4 | 19.38 | 18.54 | 17.69 | 16.85 |
| 95396 | .1400 | | 3.556 | .1400" | 2-1/2" | 3/4" | 1-1/4" | 4 | 19.38 | 18.54 | 17.69 | 16.85 |
| 95399 | .1405 | #28 | 3.569 | .1405" | 2-1/2" | 3/4" | 1-1/4" | 4 | 19.38 | 18.54 | 17.69 | 16.85 |
| 95402 | .1406 | 9/64" | 3.571 | .1406" | 2-1/2" | 3/4" | 1-1/4" | 4 | 19.38 | 18.54 | 17.69 | 16.85 |
| 95405 | .1410 | | 3.581 | .1410" | 2-1/2" | 3/4" | 1-1/4" | 4 | 20.98 | 20.06 | 19.15 | 18.24 |
| 95408 | .1420 | | 3.607 | .1420" | 2-1/2" | 3/4" | 1-1/4" | 4 | 20.98 | 20.06 | 19.15 | 18.24 |
| 95411 | .1430 | | 3.632 | .1430" | 2-1/2" | 3/4" | 1-1/4" | 4 | 20.98 | 20.06 | 19.15 | 18.24 |
| 95414 | .1440 | #27 | 3.658 | .1440" | 2-1/2" | 3/4" | 1-1/4" | 4 | 20.98 | 20.06 | 19.15 | 18.24 |
| 95417 | .1450 | | 3.683 | .1450" | 2-1/2" | 3/4" | 1-1/4" | 4 | 20.98 | 20.06 | 19.15 | 18.24 |
| 95420 | .1460 | | 3.708 | .1460" | 2-1/2" | 3/4" | 1-1/4" | 4 | 20.98 | 20.06 | 19.15 | 18.24 |
| 95423 | .1470 | #26 | 3.734 | .1470" | 2-1/2" | 3/4" | 1-1/4" | 4 | 20.98 | 20.06 | 19.15 | 18.24 |
| 95426 | .1480 | | 3.759 | .1480" | 2-1/2" | 3/4" | 1-1/4" | 4 | 20.98 | 20.06 | 19.15 | 18.24 |
| 95429 | .1490 | | 3.785 | .1490" | 2-1/2" | 3/4" | 1-1/4" | 4 | 20.98 | 20.06 | 19.15 | 18.24 |
| 95432 | .1495 | #25 | 3.797 | .1495" | 2-1/2" | 3/4" | 1-1/4" | 4 | 20.98 | 20.06 | 19.15 | 18.24 |
| 95435 | .1500 | | 3.810 | .1500" | 2-1/2" | 3/4" | 1-1/4" | 4 | 20.98 | 20.06 | 19.15 | 18.24 |
| 95438 | .1510 | | 3.835 | .1510" | 2-1/2" | 3/4" | 1-1/4" | 4 | 20.98 | 20.06 | 19.15 | 18.24 |
| 95441 | .1520 | #24 | 3.861 | .1520" | 2-1/2" | 3/4" | 1-1/4" | 4 | 20.98 | 20.06 | 19.15 | 18.24 |
| 95444 | .1530 | | 3.886 | .1530" | 2-1/2" | 3/4" | 1-1/4" | 4 | 20.98 | 20.06 | 19.15 | 18.24 |
| 95447 | .1540 | #23 | 3.912 | .1540" | 2-1/2" | 3/4" | 1-1/4" | 4 | 20.98 | 20.06 | 19.15 | 18.24 |
| 95450 | .1545 | | 3.924 | .1545" | 2-1/2" | 3/4" | 1-1/4" | 4 | 20.98 | 20.06 | 19.15 | 18.24 |
| 95453 | .1550 | | 3.937 | .1550" | 2-1/2" | 3/4" | 1-1/4" | 4 | 20.98 | 20.06 | 19.15 | 18.24 |



† *Metric equivalents are for reference only*

| EDP# | $d_1$ † Diameter Decimal | Diameter | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | $l_3$ Reach Length | Number Flutes | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 95456 | .1555 | | 3.950 | .1555" | 2-1/2" | 3/4" | 1-1/4" | 4 | 20.98 | 20.06 | 19.15 | 18.24 |
| 95459 | .1560 | | 3.962 | .1560" | 2-1/2" | 3/4" | 1-1/4" | 4 | 20.98 | 20.06 | 19.15 | 18.24 |
| 95462 | .1562 | 5/32" | 3.967 | .1562" | 2-1/2" | 3/4" | 1-1/4" | 4 | 20.98 | 20.06 | 19.15 | 18.24 |
| 95465 | .1565 | | 3.975 | .1565" | 2-1/2" | 3/4" | 1-1/4" | 4 | 20.98 | 20.06 | 19.15 | 18.24 |
| 95468 | .1570 | #22 | 3.988 | .1570" | 2-1/2" | 3/4" | 1-1/4" | 4 | 23.32 | 22.31 | 21.29 | 20.28 |
| 95471 | .1575 | | 4.000 | .1575" | 2-1/2" | 3/4" | 1-1/4" | 4 | 23.32 | 22.31 | 21.29 | 20.28 |
| 95474 | .1580 | | 4.013 | .1580" | 2-1/2" | 3/4" | 1-1/4" | 4 | 23.32 | 22.31 | 21.29 | 20.28 |
| 95477 | .1590 | #21 | 4.039 | .1590" | 2-1/2" | 3/4" | 1-1/4" | 4 | 23.32 | 22.31 | 21.29 | 20.28 |
| 95480 | .1600 | | 4.064 | .1600" | 2-3/4" | 7/8" | 1-1/2" | 4 | 23.32 | 22.31 | 21.29 | 20.28 |
| 95483 | .1610 | #20 | 4.089 | .1610" | 2-3/4" | 7/8" | 1-1/2" | 4 | 23.32 | 22.31 | 21.29 | 20.28 |
| 95486 | .1620 | | 4.115 | .1620" | 2-3/4" | 7/8" | 1-1/2" | 4 | 23.32 | 22.31 | 21.29 | 20.28 |
| 95489 | .1630 | | 4.140 | .1630" | 2-3/4" | 7/8" | 1-1/2" | 4 | 23.32 | 22.31 | 21.29 | 20.28 |
| 95492 | .1640 | | 4.166 | .1640" | 2-3/4" | 7/8" | 1-1/2" | 4 | 23.32 | 22.31 | 21.29 | 20.28 |
| 95495 | .1650 | | 4.191 | .1650" | 2-3/4" | 7/8" | 1-1/2" | 4 | 23.32 | 22.31 | 21.29 | 20.28 |
| 95498 | .1660 | #19 | 4.216 | .1660" | 2-3/4" | 7/8" | 1-1/2" | 4 | 23.32 | 22.31 | 21.29 | 20.28 |
| 95501 | .1670 | | 4.242 | .1670" | 2-3/4" | 7/8" | 1-1/2" | 4 | 23.32 | 22.31 | 21.29 | 20.28 |
| 95504 | .1680 | | 4.267 | .1680" | 2-3/4" | 7/8" | 1-1/2" | 4 | 23.32 | 22.31 | 21.29 | 20.28 |
| 95507 | .1690 | | 4.293 | .1690" | 2-3/4" | 7/8" | 1-1/2" | 4 | 23.32 | 22.31 | 21.29 | 20.28 |
| 95510 | .1695 | #18 | 4.305 | .1695" | 2-3/4" | 7/8" | 1-1/2" | 4 | 23.32 | 22.31 | 21.29 | 20.28 |
| 95513 | .1700 | | 4.318 | .1700" | 2-3/4" | 7/8" | 1-1/2" | 4 | 23.32 | 22.31 | 21.29 | 20.28 |
| 95516 | .1710 | | 4.343 | .1710" | 2-3/4" | 7/8" | 1-1/2" | 4 | 23.32 | 22.31 | 21.29 | 20.28 |
| 95519 | .1719 | 11/64" | 4.366 | .1719" | 2-3/4" | 7/8" | 1-1/2" | 4 | 23.32 | 22.31 | 21.29 | 20.28 |
| 95522 | .1720 | | 4.369 | .1720" | 2-3/4" | 7/8" | 1-1/2" | 4 | 23.32 | 22.31 | 21.29 | 20.28 |
| 95525 | .1730 | #17 | 4.394 | .1730" | 2-3/4" | 7/8" | 1-1/2" | 4 | 24.27 | 23.21 | 22.16 | 21.10 |
| 95528 | .1740 | | 4.420 | .1740" | 2-3/4" | 7/8" | 1-1/2" | 4 | 24.27 | 23.21 | 22.16 | 21.10 |
| 95531 | .1750 | | 4.445 | .1750" | 2-3/4" | 7/8" | 1-1/2" | 4 | 24.27 | 23.21 | 22.16 | 21.10 |
| 95534 | .1760 | | 4.470 | .1760" | 2-3/4" | 7/8" | 1-1/2" | 4 | 24.27 | 23.21 | 22.16 | 21.10 |
| 95537 | .1770 | #16 | 4.496 | .1770" | 2-3/4" | 7/8" | 1-1/2" | 4 | 24.27 | 23.21 | 22.16 | 21.10 |
| 95540 | .1772 | | 4.500 | .1772" | 2-3/4" | 7/8" | 1-1/2" | 4 | 24.27 | 23.21 | 22.16 | 21.10 |
| 95543 | .1780 | | 4.521 | .1780" | 2-3/4" | 7/8" | 1-1/2" | 4 | 24.27 | 23.21 | 22.16 | 21.10 |
| 95546 | .1790 | | 4.547 | .1790" | 2-3/4" | 7/8" | 1-1/2" | 4 | 24.27 | 23.21 | 22.16 | 21.10 |
| 95549 | .1800 | #15 | 4.572 | .1800" | 2-3/4" | 7/8" | 1-1/2" | 4 | 24.27 | 23.21 | 22.16 | 21.10 |
| 95552 | .1810 | | 4.597 | .1810" | 2-3/4" | 7/8" | 1-1/2" | 4 | 24.27 | 23.21 | 22.16 | 21.10 |
| 95555 | .1820 | #14 | 4.623 | .1820" | 2-3/4" | 7/8" | 1-1/2" | 4 | 24.27 | 23.21 | 22.16 | 21.10 |
| 95558 | .1830 | | 4.648 | .1830" | 2-3/4" | 7/8" | 1-1/2" | 4 | 24.27 | 23.21 | 22.16 | 21.10 |
| 95561 | .1840 | | 4.674 | .1840" | 2-3/4" | 7/8" | 1-1/2" | 4 | 24.27 | 23.21 | 22.16 | 21.10 |
| 95564 | .1850 | #13 | 4.699 | .1850" | 2-3/4" | 7/8" | 1-1/2" | 4 | 24.27 | 23.21 | 22.16 | 21.10 |
| 95567 | .1855 | | 4.712 | .1855" | 2-3/4" | 7/8" | 1-1/2" | 4 | 24.27 | 23.21 | 22.16 | 21.10 |
| 95570 | .1860 | | 4.724 | .1860" | 2-3/4" | 7/8" | 1-1/2" | 4 | 24.27 | 23.21 | 22.16 | 21.10 |
| 95573 | .1865 | | 4.737 | .1865" | 2-3/4" | 7/8" | 1-1/2" | 4 | 24.27 | 23.21 | 22.16 | 21.10 |
| 95576 | .1870 | | 4.750 | .1870" | 2-3/4" | 7/8" | 1-1/2" | 4 | 24.27 | 23.21 | 22.16 | 21.10 |
| 95577 | .1873 | | 4.757 | .1873" | 2-3/4" | 7/8" | 1-1/2" | 4 | 24.27 | 23.21 | 22.16 | 21.10 |
| 95579 | .1875 | 3/16" | 4.763 | .1875" | 2-3/4" | 7/8" | 1-1/2" | 4 | 24.27 | 23.21 | 22.16 | 21.10 |
| 95582 | .1880 | | 4.775 | .1880" | 2-3/4" | 7/8" | 1-1/2" | 4 | 24.78 | 23.71 | 22.63 | 21.55 |
| 95585 | .1885 | | 4.788 | .1885" | 2-3/4" | 7/8" | 1-1/2" | 4 | 24.78 | 23.71 | 22.63 | 21.55 |
| 95588 | .1890 | #12 | 4.801 | .1890" | 2-3/4" | 7/8" | 1-1/2" | 4 | 24.78 | 23.71 | 22.63 | 21.55 |
| 95591 | .1900 | | 4.826 | .1900" | 2-3/4" | 7/8" | 1-1/2" | 4 | 24.78 | 23.71 | 22.63 | 21.55 |
| 95594 | .1910 | #11 | 4.851 | .1910" | 2-3/4" | 7/8" | 1-1/2" | 4 | 24.78 | 23.71 | 22.63 | 21.55 |

*continued* ⟶

# Series 4100 *(continued)*

.1920" - .2250"
(4.877mm - 5.715mm)

Z=4 | Z=6 | 0° | 45° | TECH PAGES 314-315

**TOLERANCES**

| | | |
|---|---|---|
| $d_1$ | .0590" – .2509" (1.498 – 6.372mm) | +.0002" –.0000" (+.0050 –.0000mm) |
| | .2510" – .5020" (6.375 – 12.750mm) | +.0003" –.0000" (+.0075 –.0000mm) |
| $d_2$ | .0590" – .2509" (1.498 – 6.372mm) | +.0002" –.0000" (+.0050 –.0000mm) |
| | .2510" – .5020" (6.375 – 12.750mm) | +.0003" –.0000" (+.0075 –.0000mm) |



Solid Carbide Submicron Grain
Neck diameter is .010" ±.002" less than ($d_1$) fluted diameter

| EDP# | $d_1$ † Diameter Decimal | Diameter | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | $l_3$ Reach Length | Number Flutes | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 95597 | .1920 | | 4.877 | .1920" | 2-3/4" | 7/8" | 1-1/2" | 4 | 24.78 | 23.71 | 22.63 | 21.55 |
| 95600 | .1930 | | 4.902 | .1930" | 2-3/4" | 7/8" | 1-1/2" | 4 | 24.78 | 23.71 | 22.63 | 21.55 |
| 95603 | .1935 | #10 | 4.915 | .1935" | 2-3/4" | 7/8" | 1-1/2" | 4 | 24.78 | 23.71 | 22.63 | 21.55 |
| 95606 | .1940 | | 4.928 | .1940" | 2-3/4" | 7/8" | 1-1/2" | 4 | 24.78 | 23.71 | 22.63 | 21.55 |
| 95609 | .1950 | | 4.953 | .1950" | 2-3/4" | 7/8" | 1-1/2" | 4 | 24.78 | 23.71 | 22.63 | 21.55 |
| 95612 | .1960 | #9 | 4.978 | .1960" | 3" | 1" | 1-5/8" | 4 | 28.03 | 26.81 | 25.59 | 24.37 |
| 95615 | .1969 | | 5.000 | .1969" | 3" | 1" | 1-5/8" | 4 | 28.03 | 26.81 | 25.59 | 24.37 |
| 95618 | .1970 | | 5.004 | .1970" | 3" | 1" | 1-5/8" | 4 | 28.03 | 26.81 | 25.59 | 24.37 |
| 95621 | .1980 | | 5.029 | .1980" | 3" | 1" | 1-5/8" | 4 | 28.03 | 26.81 | 25.59 | 24.37 |
| 95624 | .1990 | #8 | 5.055 | .1990" | 3" | 1" | 1-5/8" | 4 | 28.03 | 26.81 | 25.59 | 24.37 |
| 95627 | .2000 | | 5.080 | .2000" | 3" | 1" | 1-5/8" | 4 | 28.03 | 26.81 | 25.59 | 24.37 |
| 95630 | .2010 | #7 | 5.105 | .2010" | 3" | 1" | 1-5/8" | 4 | 28.03 | 26.81 | 25.59 | 24.37 |
| 95633 | .2020 | | 5.131 | .2020" | 3" | 1" | 1-5/8" | 4 | 28.03 | 26.81 | 25.59 | 24.37 |
| 95636 | .2030 | | 5.156 | .2030" | 3" | 1" | 1-5/8" | 4 | 28.03 | 26.81 | 25.59 | 24.37 |
| 95639 | .2031 | 13/64" | 5.159 | .2031" | 3" | 1" | 1-5/8" | 4 | 28.03 | 26.81 | 25.59 | 24.37 |
| 95642 | .2040 | #6 | 5.182 | .2040" | 3" | 1" | 1-5/8" | 4 | 28.03 | 26.81 | 25.59 | 24.37 |
| 95645 | .2050 | | 5.207 | .2050" | 3" | 1" | 1-5/8" | 4 | 28.03 | 26.81 | 25.59 | 24.37 |
| 95648 | .2055 | #5 | 5.220 | .2055" | 3" | 1" | 1-5/8" | 4 | 28.03 | 26.81 | 25.59 | 24.37 |
| 95651 | .2060 | | 5.232 | .2060" | 3" | 1" | 1-5/8" | 4 | 28.03 | 26.81 | 25.59 | 24.37 |
| 95654 | .2070 | | 5.258 | .2070" | 3" | 1" | 1-5/8" | 4 | 28.03 | 26.81 | 25.59 | 24.37 |
| 95657 | .2080 | | 5.283 | .2080" | 3" | 1" | 1-5/8" | 4 | 28.03 | 26.81 | 25.59 | 24.37 |
| 95660 | .2090 | #4 | 5.309 | .2090" | 3" | 1" | 1-5/8" | 4 | 28.03 | 26.81 | 25.59 | 24.37 |
| 95663 | .2100 | | 5.334 | .2100" | 3" | 1" | 1-5/8" | 4 | 28.03 | 26.81 | 25.59 | 24.37 |
| 95666 | .2110 | | 5.359 | .2110" | 3" | 1" | 1-5/8" | 4 | 28.03 | 26.81 | 25.59 | 24.37 |
| 95669 | .2120 | | 5.385 | .2120" | 3" | 1" | 1-5/8" | 4 | 28.03 | 26.81 | 25.59 | 24.37 |
| 95672 | .2130 | #3 | 5.410 | .2130" | 3" | 1" | 1-5/8" | 4 | 28.03 | 26.81 | 25.59 | 24.37 |
| 95675 | .2140 | | 5.436 | .2140" | 3" | 1" | 1-5/8" | 4 | 28.03 | 26.81 | 25.59 | 24.37 |
| 95678 | .2150 | | 5.461 | .2150" | 3" | 1" | 1-5/8" | 4 | 28.03 | 26.81 | 25.59 | 24.37 |
| 95681 | .2160 | | 5.486 | .2160" | 3" | 1" | 1-5/8" | 4 | 28.03 | 26.81 | 25.59 | 24.37 |
| 95684 | .2165 | | 5.500 | .2165" | 3" | 1" | 1-5/8" | 4 | 28.03 | 26.81 | 25.59 | 24.37 |
| 95687 | .2170 | | 5.512 | .2170" | 3" | 1" | 1-5/8" | 4 | 28.03 | 26.81 | 25.59 | 24.37 |
| 95690 | .2180 | | 5.537 | .2180" | 3" | 1" | 1-5/8" | 4 | 28.03 | 26.81 | 25.59 | 24.37 |
| 95693 | .2188 | 7/32" | 5.558 | .2188" | 3" | 1" | 1-5/8" | 4 | 28.03 | 26.81 | 25.59 | 24.37 |
| 95696 | .2190 | | 5.563 | .2190" | 3" | 1" | 1-5/8" | 4 | 28.03 | 26.81 | 25.59 | 24.37 |
| 95699 | .2200 | | 5.588 | .2200" | 3" | 1" | 1-5/8" | 4 | 32.69 | 31.27 | 29.85 | 28.43 |
| 95702 | .2210 | #2 | 5.613 | .2210" | 3" | 1" | 1-5/8" | 4 | 32.69 | 31.27 | 29.85 | 28.43 |
| 95705 | .2220 | | 5.639 | .2220" | 3" | 1" | 1-5/8" | 4 | 32.69 | 31.27 | 29.85 | 28.43 |
| 95708 | .2230 | | 5.664 | .2230" | 3" | 1" | 1-5/8" | 4 | 32.69 | 31.27 | 29.85 | 28.43 |
| 95711 | .2240 | | 5.690 | .2240" | 3" | 1" | 1-5/8" | 4 | 32.69 | 31.27 | 29.85 | 28.43 |
| 95714 | .2250 | | 5.715 | .2250" | 3" | 1" | 1-5/8" | 4 | 32.69 | 31.27 | 29.85 | 28.43 |



† *Metric equivalents are for reference only*

| EDP# | $d_1$ † Diameter Decimal | Diameter | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | $l_3$ Reach Length | Number Flutes | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 95717 | .2260 | | 5.740 | .2260" | 3" | 1" | 1-5/8" | 4 | 32.69 | 31.27 | 29.85 | 28.43 |
| 95720 | .2270 | | 5.766 | .2270" | 3" | 1" | 1-5/8" | 4 | 32.69 | 31.27 | 29.85 | 28.43 |
| 95723 | .2280 | #1 | 5.791 | .2280" | 3" | 1" | 1-5/8" | 4 | 32.69 | 31.27 | 29.85 | 28.43 |
| 95726 | .2290 | | 5.817 | .2290" | 3" | 1" | 1-5/8" | 4 | 32.69 | 31.27 | 29.85 | 28.43 |
| 95729 | .2300 | | 5.842 | .2300" | 3" | 1" | 1-5/8" | 4 | 32.69 | 31.27 | 29.85 | 28.43 |
| 95732 | .2310 | | 5.867 | .2310" | 3" | 1" | 1-5/8" | 4 | 32.69 | 31.27 | 29.85 | 28.43 |
| 95735 | .2320 | | 5.893 | .2320" | 3" | 1" | 1-5/8" | 4 | 32.69 | 31.27 | 29.85 | 28.43 |
| 95738 | .2330 | | 5.918 | .2330" | 3" | 1" | 1-5/8" | 4 | 32.69 | 31.27 | 29.85 | 28.43 |
| 95741 | .2340 | A | 5.944 | .2340" | 3" | 1" | 1-5/8" | 4 | 32.69 | 31.27 | 29.85 | 28.43 |
| 95744 | .2344 | 15/64" | 5.954 | .2344" | 3" | 1" | 1-5/8" | 4 | 32.69 | 31.27 | 29.85 | 28.43 |
| 95747 | .2350 | | 5.969 | .2350" | 3" | 1" | 1-5/8" | 4 | 33.91 | 32.44 | 30.96 | 29.49 |
| 95750 | .2360 | | 5.994 | .2360" | 3" | 1" | 1-5/8" | 4 | 33.91 | 32.44 | 30.96 | 29.49 |
| 95753 | .2362 | | 6.000 | .2362" | 3" | 1" | 1-5/8" | 4 | 33.91 | 32.44 | 30.96 | 29.49 |
| 95756 | .2370 | | 6.020 | .2370" | 3" | 1" | 1-5/8" | 4 | 33.91 | 32.44 | 30.96 | 29.49 |
| 95759 | .2380 | B | 6.045 | .2380" | 3" | 1" | 1-5/8" | 4 | 33.91 | 32.44 | 30.96 | 29.49 |
| 95762 | .2390 | | 6.071 | .2390" | 3" | 1" | 1-5/8" | 4 | 33.91 | 32.44 | 30.96 | 29.49 |
| 95765 | .2400 | | 6.096 | .2400" | 3" | 1" | 1-5/8" | 4 | 33.91 | 32.44 | 30.96 | 29.49 |
| 95768 | .2410 | | 6.121 | .2410" | 3" | 1" | 1-5/8" | 4 | 33.91 | 32.44 | 30.96 | 29.49 |
| 95771 | .2420 | C | 6.147 | .2420" | 3" | 1" | 1-5/8" | 4 | 33.91 | 32.44 | 30.96 | 29.49 |
| 95774 | .2430 | | 6.172 | .2430" | 3" | 1" | 1-5/8" | 4 | 33.91 | 32.44 | 30.96 | 29.49 |
| 95777 | .2440 | | 6.198 | .2440" | 3" | 1" | 1-5/8" | 4 | 33.91 | 32.44 | 30.96 | 29.49 |
| 95780 | .2450 | | 6.223 | .2450" | 3" | 1" | 1-5/8" | 4 | 33.91 | 32.44 | 30.96 | 29.49 |
| 95783 | .2460 | D | 6.248 | .2460" | 3" | 1" | 1-5/8" | 4 | 33.91 | 32.44 | 30.96 | 29.49 |
| 95786 | .2470 | | 6.274 | .2470" | 3" | 1" | 1-5/8" | 4 | 33.91 | 32.44 | 30.96 | 29.49 |
| 95789 | .2480 | | 6.299 | .2480" | 3" | 1" | 1-5/8" | 4 | 33.91 | 32.44 | 30.96 | 29.49 |
| 95792 | .2485 | | 6.312 | .2485" | 3" | 1" | 1-5/8" | 4 | 33.91 | 32.44 | 30.96 | 29.49 |
| 95795 | .2490 | | 6.325 | .2490" | 3" | 1" | 1-5/8" | 4 | 33.91 | 32.44 | 30.96 | 29.49 |
| 95798 | .2495 | | 6.337 | .2495" | 3" | 1" | 1-5/8" | 4 | 33.91 | 32.44 | 30.96 | 29.49 |
| 95799 | .2498 | | 6.345 | .2498" | 3" | 1" | 1-5/8" | 4 | 33.91 | 32.44 | 30.96 | 29.49 |
| 95801 | .2500 | 1/4" / E | 6.350 | .2500" | 3" | 1" | 1-5/8" | 4 | 33.91 | 32.44 | 30.96 | 29.49 |
| 95802 | .2502 | | 6.355 | .2502" | 3" | 1" | 1-5/8" | 4 | 33.91 | 32.44 | 30.96 | 29.49 |
| 95804 | .2505 | | 6.363 | .2505" | 3" | 1" | 1-5/8" | 4 | 33.91 | 32.44 | 30.96 | 29.49 |
| 95807 | .2510 | | 6.375 | .2510" | 3" | 1" | 1-5/8" | 4 | 33.91 | 32.44 | 30.96 | 29.49 |
| 95810 | .2515 | | 6.388 | .2515" | 3" | 1" | 1-5/8" | 4 | 33.91 | 32.44 | 30.96 | 29.49 |
| 95813 | .2520 | | 6.401 | .2520" | 3" | 1" | 1-5/8" | 4 | 33.91 | 32.44 | 30.96 | 29.49 |
| 95816 | .2530 | | 6.426 | .2530" | 3" | 1" | 1-5/8" | 4 | 33.91 | 32.44 | 30.96 | 29.49 |
| 95819 | .2540 | | 6.452 | .2540" | 3" | 1" | 1-5/8" | 4 | 33.91 | 32.44 | 30.96 | 29.49 |
| 95822 | .2550 | | 6.477 | .2550" | 3-1/4" | 1-1/8" | 1-3/4" | 6 | 39.10 | 37.40 | 35.70 | 34.00 |
| 95825 | .2559 | | 6.500 | .2559" | 3-1/4" | 1-1/8" | 1-3/4" | 6 | 39.10 | 37.40 | 35.70 | 34.00 |
| 95828 | .2560 | | 6.502 | .2560" | 3-1/4" | 1-1/8" | 1-3/4" | 6 | 39.10 | 37.40 | 35.70 | 34.00 |
| 95831 | .2570 | F | 6.528 | .2570" | 3-1/4" | 1-1/8" | 1-3/4" | 6 | 39.10 | 37.40 | 35.70 | 34.00 |
| 95834 | .2580 | | 6.553 | .2580" | 3-1/4" | 1-1/8" | 1-3/4" | 6 | 39.10 | 37.40 | 35.70 | 34.00 |
| 95837 | .2590 | | 6.579 | .2590" | 3-1/4" | 1-1/8" | 1-3/4" | 6 | 39.10 | 37.40 | 35.70 | 34.00 |
| 95840 | .2600 | | 6.604 | .2600" | 3-1/4" | 1-1/8" | 1-3/4" | 6 | 39.10 | 37.40 | 35.70 | 34.00 |
| 95843 | .2610 | G | 6.629 | .2610" | 3-1/4" | 1-1/8" | 1-3/4" | 6 | 39.10 | 37.40 | 35.70 | 34.00 |
| 95846 | .2620 | | 6.655 | .2620" | 3-1/4" | 1-1/8" | 1-3/4" | 6 | 39.10 | 37.40 | 35.70 | 34.00 |
| 95849 | .2630 | | 6.680 | .2630" | 3-1/4" | 1-1/8" | 1-3/4" | 6 | 39.10 | 37.40 | 35.70 | 34.00 |
| 95852 | .2640 | | 6.706 | .2640" | 3-1/4" | 1-1/8" | 1-3/4" | 6 | 39.10 | 37.40 | 35.70 | 34.00 |

*continued* →

## Series 4100 *(continued)*

.2650" - .3070"
(6.731mm - 7.798mm)

| EDP# | $d_1$ † Diameter Decimal | Diameter | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | $l_3$ Reach Length | Number Flutes | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 95855 | .2650 | | 6.731 | .2650" | 3-1/4" | 1-1/8" | 1-3/4" | 6 | 39.10 | 37.40 | 35.70 | 34.00 |
| 95858 | .2656 | 17/64" | 6.746 | .2656" | 3-1/4" | 1-1/8" | 1-3/4" | 6 | 39.10 | 37.40 | 35.70 | 34.00 |
| 95861 | .2660 | H | 6.756 | .2660" | 3-1/4" | 1-1/8" | 1-3/4" | 6 | 39.10 | 37.40 | 35.70 | 34.00 |
| 95864 | .2670 | | 6.782 | .2670" | 3-1/4" | 1-1/8" | 1-3/4" | 6 | 39.10 | 37.40 | 35.70 | 34.00 |
| 95867 | .2680 | | 6.807 | .2680" | 3-1/4" | 1-1/8" | 1-3/4" | 6 | 39.10 | 37.40 | 35.70 | 34.00 |
| 95870 | .2690 | | 6.833 | .2690" | 3-1/4" | 1-1/8" | 1-3/4" | 6 | 39.10 | 37.40 | 35.70 | 34.00 |
| 95873 | .2700 | | 6.858 | .2700" | 3-1/4" | 1-1/8" | 1-3/4" | 6 | 39.10 | 37.40 | 35.70 | 34.00 |
| 95876 | .2710 | | 6.883 | .2710" | 3-1/4" | 1-1/8" | 1-3/4" | 6 | 39.10 | 37.40 | 35.70 | 34.00 |
| 95879 | .2720 | I | 6.909 | .2720" | 3-1/4" | 1-1/8" | 1-7/8" | 6 | 39.48 | 37.76 | 36.05 | 34.33 |
| 95882 | .2730 | | 6.934 | .2730" | 3-1/4" | 1-1/8" | 1-7/8" | 6 | 39.48 | 37.76 | 36.05 | 34.33 |
| 95885 | .2740 | | 6.960 | .2740" | 3-1/4" | 1-1/8" | 1-7/8" | 6 | 39.48 | 37.76 | 36.05 | 34.33 |
| 95888 | .2750 | | 6.985 | .2750" | 3-1/4" | 1-1/8" | 1-7/8" | 6 | 39.48 | 37.76 | 36.05 | 34.33 |
| 95891 | .2756 | | 7.000 | .2756" | 3-1/4" | 1-1/8" | 1-7/8" | 6 | 39.48 | 37.76 | 36.05 | 34.33 |
| 95894 | .2760 | | 7.010 | .2760" | 3-1/4" | 1-1/8" | 1-7/8" | 6 | 39.48 | 37.76 | 36.05 | 34.33 |
| 95897 | .2770 | J | 7.036 | .2770" | 3-1/4" | 1-1/8" | 1-7/8" | 6 | 39.48 | 37.76 | 36.05 | 34.33 |
| 95900 | .2780 | | 7.061 | .2780" | 3-1/4" | 1-1/8" | 1-7/8" | 6 | 39.48 | 37.76 | 36.05 | 34.33 |
| 95903 | .2790 | | 7.087 | .2790" | 3-1/4" | 1-1/8" | 1-7/8" | 6 | 39.48 | 37.76 | 36.05 | 34.33 |
| 95906 | .2800 | | 7.112 | .2800" | 3-1/4" | 1-1/8" | 1-7/8" | 6 | 39.48 | 37.76 | 36.05 | 34.33 |
| 95909 | .2810 | K | 7.137 | .2810" | 3-1/4" | 1-1/8" | 1-7/8" | 6 | 39.48 | 37.76 | 36.05 | 34.33 |
| 95912 | .2812 | 9/32" | 7.142 | .2812" | 3-1/4" | 1-1/8" | 1-7/8" | 6 | 39.48 | 37.76 | 36.05 | 34.33 |
| 95915 | .2820 | | 7.163 | .2820" | 3-1/4" | 1-1/8" | 1-7/8" | 6 | 42.73 | 40.88 | 39.02 | 37.16 |
| 95918 | .2830 | | 7.188 | .2830" | 3-1/4" | 1-1/8" | 1-7/8" | 6 | 42.73 | 40.88 | 39.02 | 37.16 |
| 95921 | .2840 | | 7.214 | .2840" | 3-1/4" | 1-1/8" | 1-7/8" | 6 | 42.73 | 40.88 | 39.02 | 37.16 |
| 95924 | .2850 | | 7.239 | .2850" | 3-1/4" | 1-1/8" | 1-7/8" | 6 | 42.73 | 40.88 | 39.02 | 37.16 |
| 95927 | .2860 | | 7.264 | .2860" | 3-1/4" | 1-1/8" | 1-7/8" | 6 | 42.73 | 40.88 | 39.02 | 37.16 |
| 95930 | .2870 | | 7.290 | .2870" | 3-1/4" | 1-1/8" | 1-7/8" | 6 | 42.73 | 40.88 | 39.02 | 37.16 |
| 95933 | .2880 | | 7.315 | .2880" | 3-1/4" | 1-1/8" | 1-7/8" | 6 | 42.73 | 40.88 | 39.02 | 37.16 |
| 95936 | .2890 | | 7.341 | .2890" | 3-1/4" | 1-1/8" | 1-7/8" | 6 | 43.06 | 41.18 | 39.31 | 37.44 |
| 95939 | .2900 | L | 7.366 | .2900" | 3-1/4" | 1-1/8" | 1-7/8" | 6 | 43.06 | 41.18 | 39.31 | 37.44 |
| 95942 | .2910 | | 7.391 | .2910" | 3-1/4" | 1-1/8" | 1-7/8" | 6 | 43.06 | 41.18 | 39.31 | 37.44 |
| 95945 | .2920 | | 7.417 | .2920" | 3-1/4" | 1-1/8" | 1-7/8" | 6 | 43.06 | 41.18 | 39.31 | 37.44 |
| 95948 | .2930 | | 7.442 | .2930" | 3-1/4" | 1-1/8" | 1-7/8" | 6 | 43.06 | 41.18 | 39.31 | 37.44 |
| 95951 | .2940 | | 7.468 | .2940" | 3-1/4" | 1-1/8" | 1-7/8" | 6 | 43.06 | 41.18 | 39.31 | 37.44 |
| 95954 | .2950 | M | 7.493 | .2950" | 3-1/4" | 1-1/8" | 1-7/8" | 6 | 43.06 | 41.18 | 39.31 | 37.44 |
| 95957 | .2953 | | 7.500 | .2953" | 3-1/4" | 1-1/8" | 1-7/8" | 6 | 43.06 | 41.18 | 39.31 | 37.44 |
| 95960 | .2960 | | 7.518 | .2960" | 3-1/4" | 1-1/8" | 1-7/8" | 6 | 43.06 | 41.18 | 39.31 | 37.44 |
| 95963 | .2969 | 19/64" | 7.541 | .2969" | 3-1/4" | 1-1/8" | 1-7/8" | 6 | 43.06 | 41.18 | 39.31 | 37.44 |
| 95966 | .2970 | | 7.544 | .2970" | 3-1/4" | 1-1/8" | 1-7/8" | 6 | 43.06 | 41.18 | 39.31 | 37.44 |
| 95969 | .2980 | | 7.569 | .2980" | 3-1/4" | 1-1/8" | 1-7/8" | 6 | 43.06 | 41.18 | 39.31 | 37.44 |
| 95972 | .2990 | | 7.595 | .2990" | 3-1/4" | 1-1/8" | 1-7/8" | 6 | 43.06 | 41.18 | 39.31 | 37.44 |
| 95975 | .3000 | | 7.620 | .3000" | 3-1/4" | 1-1/8" | 1-7/8" | 6 | 43.06 | 41.18 | 39.31 | 37.44 |
| 95978 | .3010 | | 7.645 | .3010" | 3-1/4" | 1-1/8" | 1-7/8" | 6 | 43.06 | 41.18 | 39.31 | 37.44 |
| 95981 | .3020 | N | 7.671 | .3020" | 3-1/4" | 1-1/8" | 1-7/8" | 6 | 43.06 | 41.18 | 39.31 | 37.44 |
| 95984 | .3030 | | 7.696 | .3030" | 3-1/4" | 1-1/8" | 1-7/8" | 6 | 43.06 | 41.18 | 39.31 | 37.44 |
| 95987 | .3040 | | 7.722 | .3040" | 3-1/4" | 1-1/8" | 1-7/8" | 6 | 43.06 | 41.18 | 39.31 | 37.44 |
| 95990 | .3050 | | 7.747 | .3050" | 3-1/4" | 1-1/8" | 1-7/8" | 6 | 43.06 | 41.18 | 39.31 | 37.44 |
| 95993 | .3060 | | 7.772 | .3060" | 3-1/4" | 1-1/8" | 1-7/8" | 6 | 43.06 | 41.18 | 39.31 | 37.44 |
| 95996 | .3070 | | 7.798 | .3070" | 3-1/4" | 1-1/8" | 1-7/8" | 6 | 43.06 | 41.18 | 39.31 | 37.44 |



† *Metric equivalents are for reference only*

| EDP# | $d_1$ † Diameter Decimal | Diameter | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | $l_3$ Reach Length | Number Flutes | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 95999 | .3080 | | 7.823 | .3080" | 3-1/4" | 1-1/8" | 1-7/8" | 6 | 43.06 | 41.18 | 39.31 | 37.44 |
| 96002 | .3090 | | 7.849 | .3090" | 3-1/4" | 1-1/8" | 1-7/8" | 6 | 43.06 | 41.18 | 39.31 | 37.44 |
| 96005 | .3100 | | 7.874 | .3100" | 3-1/4" | 1-1/8" | 1-7/8" | 6 | 43.06 | 41.18 | 39.31 | 37.44 |
| 96006 | .3105 | | 7.887 | .3105" | 3-1/4" | 1-1/8" | 1-7/8" | 6 | 43.06 | 41.18 | 39.31 | 37.44 |
| 96008 | .3110 | | 7.899 | .3110" | 3-1/4" | 1-1/8" | 1-7/8" | 6 | 43.06 | 41.18 | 39.31 | 37.44 |
| 96011 | .3115 | | 7.912 | .3115" | 3-1/4" | 1-1/8" | 1-7/8" | 6 | 43.06 | 41.18 | 39.31 | 37.44 |
| 96014 | .3120 | | 7.925 | .3120" | 3-1/4" | 1-1/8" | 1-7/8" | 6 | 43.06 | 41.18 | 39.31 | 37.44 |
| 96015 | .3123 | | 7.932 | .3123" | 3-1/4" | 1-1/8" | 1-7/8" | 6 | 43.06 | 41.18 | 39.31 | 37.44 |
| 96017 | .3125 | 5/16" | 7.938 | .3125" | 3-1/4" | 1-1/8" | 1-7/8" | 6 | 43.06 | 41.18 | 39.31 | 37.44 |
| 96021 | .3130 | | 7.950 | .3130" | 3-1/4" | 1-1/8" | 1-7/8" | 6 | 43.06 | 41.18 | 39.31 | 37.44 |
| 96023 | .3135 | | 7.963 | .3135" | 3-1/4" | 1-1/8" | 1-7/8" | 6 | 43.06 | 41.18 | 39.31 | 37.44 |
| 96026 | .3140 | | 7.976 | .3140" | 3-1/4" | 1-1/8" | 1-7/8" | 6 | 43.06 | 41.18 | 39.31 | 37.44 |
| 96029 | .3150 | | 8.000 | .3150" | 3-1/4" | 1-1/8" | 1-7/8" | 6 | 43.06 | 41.18 | 39.31 | 37.44 |
| 96032 | .3160 | O | 8.026 | .3160" | 3-1/4" | 1-1/8" | 1-7/8" | 6 | 43.06 | 41.18 | 39.31 | 37.44 |
| 96035 | .3170 | | 8.052 | .3170" | 3-1/4" | 1-1/8" | 1-7/8" | 6 | 43.06 | 41.18 | 39.31 | 37.44 |
| 96038 | .3180 | | 8.077 | .3180" | 3-1/4" | 1-1/8" | 1-7/8" | 6 | 43.06 | 41.18 | 39.31 | 37.44 |
| 96041 | .3190 | | 8.103 | .3190" | 3-1/2" | 1-1/4" | 2" | 6 | 53.05 | 50.74 | 48.44 | 46.13 |
| 96044 | .3200 | | 8.128 | .3200" | 3-1/2" | 1-1/4" | 2" | 6 | 53.05 | 50.74 | 48.44 | 46.13 |
| 96047 | .3210 | | 8.153 | .3210" | 3-1/2" | 1-1/4" | 2" | 6 | 53.05 | 50.74 | 48.44 | 46.13 |
| 96050 | .3220 | | 8.179 | .3220" | 3-1/2" | 1-1/4" | 2" | 6 | 53.05 | 50.74 | 48.44 | 46.13 |
| 96053 | .3230 | P | 8.204 | .3230" | 3-1/2" | 1-1/4" | 2" | 6 | 53.05 | 50.74 | 48.44 | 46.13 |
| 96056 | .3240 | | 8.230 | .3240" | 3-1/2" | 1-1/4" | 2" | 6 | 53.05 | 50.74 | 48.44 | 46.13 |
| 96059 | .3250 | | 8.255 | .3250" | 3-1/2" | 1-1/4" | 2" | 6 | 53.05 | 50.74 | 48.44 | 46.13 |
| 96062 | .3260 | | 8.280 | .3260" | 3-1/2" | 1-1/4" | 2" | 6 | 53.05 | 50.74 | 48.44 | 46.13 |
| 96065 | .3270 | | 8.306 | .3270" | 3-1/2" | 1-1/4" | 2" | 6 | 53.05 | 50.74 | 48.44 | 46.13 |
| 96068 | .3280 | | 8.331 | .3280" | 3-1/2" | 1-1/4" | 2" | 6 | 53.05 | 50.74 | 48.44 | 46.13 |
| 96071 | .3281 | 21/64" | 8.334 | .3281" | 3-1/2" | 1-1/4" | 2" | 6 | 53.05 | 50.74 | 48.44 | 46.13 |
| 96074 | .3290 | | 8.357 | .3290" | 3-1/2" | 1-1/4" | 2" | 6 | 53.05 | 50.74 | 48.44 | 46.13 |
| 96077 | .3300 | | 8.382 | .3300" | 3-1/2" | 1-1/4" | 2" | 6 | 53.05 | 50.74 | 48.44 | 46.13 |
| 96079 | .3310 | | 8.407 | .3310" | 3-1/2" | 1-1/4" | 2" | 6 | 53.05 | 50.74 | 48.44 | 46.13 |
| 96083 | .3320 | Q | 8.433 | .3320" | 3-1/2" | 1-1/4" | 2" | 6 | 53.05 | 50.74 | 48.44 | 46.13 |
| 96086 | .3330 | | 8.458 | .3330" | 3-1/2" | 1-1/4" | 2" | 6 | 53.05 | 50.74 | 48.44 | 46.13 |
| 96089 | .3340 | | 8.484 | .3340" | 3-1/2" | 1-1/4" | 2" | 6 | 53.05 | 50.74 | 48.44 | 46.13 |
| 96092 | .3346 | | 8.500 | .3346" | 3-1/2" | 1-1/4" | 2" | 6 | 53.05 | 50.74 | 48.44 | 46.13 |
| 96095 | .3350 | | 8.509 | .3350" | 3-1/2" | 1-1/4" | 2" | 6 | 53.05 | 50.74 | 48.44 | 46.13 |
| 96098 | .3360 | | 8.534 | .3360" | 3-1/2" | 1-1/4" | 2" | 6 | 53.05 | 50.74 | 48.44 | 46.13 |
| 96101 | .3370 | | 8.560 | .3370" | 3-1/2" | 1-1/4" | 2" | 6 | 53.05 | 50.74 | 48.44 | 46.13 |
| 96104 | .3380 | | 8.585 | .3380" | 3-1/2" | 1-1/4" | 2" | 6 | 53.05 | 50.74 | 48.44 | 46.13 |
| 96107 | .3390 | R | 8.611 | .3390" | 3-1/2" | 1-1/4" | 2" | 6 | 53.05 | 50.74 | 48.44 | 46.13 |
| 96110 | .3400 | | 8.636 | .3400" | 3-1/2" | 1-1/4" | 2" | 6 | 53.05 | 50.74 | 48.44 | 46.13 |
| 96113 | .3410 | | 8.661 | .3410" | 3-1/2" | 1-1/4" | 2" | 6 | 53.05 | 50.74 | 48.44 | 46.13 |
| 96116 | .3420 | | 8.687 | .3420" | 3-1/2" | 1-1/4" | 2" | 6 | 56.17 | 53.72 | 51.28 | 48.84 |
| 96119 | .3430 | | 8.712 | .3430" | 3-1/2" | 1-1/4" | 2" | 6 | 56.17 | 53.72 | 51.28 | 48.84 |
| 96122 | .3438 | 11/32" | 8.733 | .3438" | 3-1/2" | 1-1/4" | 2" | 6 | 56.17 | 53.72 | 51.28 | 48.84 |
| 96125 | .3440 | | 8.738 | .3440" | 3-1/2" | 1-1/4" | 2" | 6 | 56.17 | 53.72 | 51.28 | 48.84 |
| 96128 | .3450 | | 8.763 | .3450" | 3-1/2" | 1-1/4" | 2" | 6 | 56.17 | 53.72 | 51.28 | 48.84 |
| 96131 | .3460 | | 8.788 | .3460" | 3-1/2" | 1-1/4" | 2" | 6 | 56.17 | 53.72 | 51.28 | 48.84 |
| 96134 | .3470 | | 8.814 | .3470" | 3-1/2" | 1-1/4" | 2" | 6 | 56.17 | 53.72 | 51.28 | 48.84 |

*continued* →

# Series 4100 *(continued)*

.3480" - .3810"
(8.839mm - 9.677mm)










TECH PAGES 314-315

**TOLERANCES**

| | | |
|---|---|---|
| $d_1$ | .0590" – .2509" (1.498 – 6.372mm) | +.0002" –.0000" (+.0050 –.0000mm) |
| | .2510" – .5020" (6.375 – 12.750mm) | +.0003" –.0000" (+.0075 –.0000mm) |
| $d_2$ | .0590" – .2509" (1.498 – 6.372mm) | +.0002" –.0000" (+.0050 –.0000mm) |
| | .2510" – .5020" (6.375 – 12.750mm) | +.0003" –.0000" (+.0075 –.0000mm) |



Solid Carbide Submicron Grain
Neck diameter is .010" ±.002" less than ($d_1$) fluted diameter

| EDP# | $d_1$ † Diameter Decimal | Diameter | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | $l_3$ Reach Length | Number Flutes | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 96137 | .3480 | S | 8.839 | .3480" | 3-1/2" | 1-1/4" | 2" | 6 | 56.17 | 53.72 | 51.28 | 48.84 |
| 96141 | .3490 | | 8.865 | .3490" | 3-1/2" | 1-1/4" | 2" | 6 | 56.17 | 53.72 | 51.28 | 48.84 |
| 96143 | .3500 | | 8.890 | .3500" | 3-1/2" | 1-1/4" | 2" | 6 | 56.17 | 53.72 | 51.28 | 48.84 |
| 96146 | .3510 | | 8.915 | .3510" | 3-1/2" | 1-1/4" | 2" | 6 | 56.17 | 53.72 | 51.28 | 48.84 |
| 96149 | .3520 | | 8.941 | .3520" | 3-1/2" | 1-1/4" | 2" | 6 | 56.17 | 53.72 | 51.28 | 48.84 |
| 96152 | .3530 | | 8.966 | .3530" | 3-1/2" | 1-1/4" | 2" | 6 | 56.17 | 53.72 | 51.28 | 48.84 |
| 96155 | .3540 | | 8.992 | .3540" | 3-1/2" | 1-1/4" | 2" | 6 | 56.17 | 53.72 | 51.28 | 48.84 |
| 96158 | .3543 | | 9.000 | .3543" | 3-1/2" | 1-1/4" | 2" | 6 | 56.17 | 53.72 | 51.28 | 48.84 |
| 96161 | .3550 | | 9.017 | .3550" | 3-1/2" | 1-1/4" | 2" | 6 | 56.17 | 53.72 | 51.28 | 48.84 |
| 96164 | .3560 | | 9.042 | .3560" | 3-1/2" | 1-1/4" | 2" | 6 | 56.17 | 53.72 | 51.28 | 48.84 |
| 96167 | .3570 | | 9.068 | .3570" | 3-1/2" | 1-1/4" | 2" | 6 | 56.17 | 53.72 | 51.28 | 48.84 |
| 96170 | .3580 | T | 9.093 | .3580" | 3-1/2" | 1-1/4" | 2" | 6 | 56.17 | 53.72 | 51.28 | 48.84 |
| 96173 | .3590 | | 9.119 | .3590" | 3-1/2" | 1-1/4" | 2" | 6 | 56.17 | 53.72 | 51.28 | 48.84 |
| 96176 | .3594 | 23/64" | 9.129 | .3594" | 3-1/2" | 1-1/4" | 2" | 6 | 56.17 | 53.72 | 51.28 | 48.84 |
| 96179 | .3600 | | 9.144 | .3600" | 3-1/2" | 1-1/4" | 2" | 6 | 56.17 | 53.72 | 51.28 | 48.84 |
| 96182 | .3610 | | 9.169 | .3610" | 3-1/2" | 1-1/4" | 2" | 6 | 56.17 | 53.72 | 51.28 | 48.84 |
| 96185 | .3620 | | 9.195 | .3620" | 3-1/2" | 1-1/4" | 2" | 6 | 56.17 | 53.72 | 51.28 | 48.84 |
| 96191 | .3640 | | 9.246 | .3640" | 3-1/2" | 1-1/4" | 2" | 6 | 57.87 | 55.35 | 52.84 | 50.32 |
| 96194 | .3650 | | 9.271 | .3650" | 3-1/2" | 1-1/4" | 2" | 6 | 57.87 | 55.35 | 52.84 | 50.32 |
| 96197 | .3660 | | 9.296 | .3660" | 3-1/2" | 1-1/4" | 2" | 6 | 57.87 | 55.35 | 52.84 | 50.32 |
| 96199 | .3670 | | 9.322 | .3670" | 3-1/2" | 1-1/4" | 2" | 6 | 57.87 | 55.35 | 52.84 | 50.32 |
| 96203 | .3680 | U | 9.347 | .3680" | 3-1/2" | 1-1/4" | 2" | 6 | 57.87 | 55.35 | 52.84 | 50.32 |
| 96206 | .3690 | | 9.373 | .3690" | 3-1/2" | 1-1/4" | 2" | 6 | 57.87 | 55.35 | 52.84 | 50.32 |
| 96209 | .3700 | | 9.398 | .3700" | 3-1/2" | 1-1/4" | 2" | 6 | 57.87 | 55.35 | 52.84 | 50.32 |
| 96212 | .3710 | | 9.423 | .3710" | 3-1/2" | 1-1/4" | 2" | 6 | 57.87 | 55.35 | 52.84 | 50.32 |
| 96215 | .3720 | | 9.449 | .3720" | 3-1/2" | 1-1/4" | 2" | 6 | 57.87 | 55.35 | 52.84 | 50.32 |
| 96218 | .3730 | | 9.474 | .3730" | 3-1/2" | 1-1/4" | 2" | 6 | 57.87 | 55.35 | 52.84 | 50.32 |
| 96221 | .3740 | | 9.500 | .3740" | 3-1/2" | 1-1/4" | 2" | 6 | 57.87 | 55.35 | 52.84 | 50.32 |
| 96224 | .3745 | | 9.512 | .3745" | 3-1/2" | 1-1/4" | 2" | 6 | 57.87 | 55.35 | 52.84 | 50.32 |
| 96225 | .3748 | | 9.520 | .3748" | 3-1/2" | 1-1/4" | 2" | 6 | 57.87 | 55.35 | 52.84 | 50.32 |
| 96227 | .3750 | 3/8" | 9.525 | .3750" | 3-1/2" | 1-1/4" | 2" | 6 | 57.87 | 55.35 | 52.84 | 50.32 |
| 96230 | .3755 | | 9.538 | .3755" | 3-1/2" | 1-1/4" | 2" | 6 | 57.87 | 55.35 | 52.84 | 50.32 |
| 96233 | .3760 | | 9.550 | .3760" | 3-1/2" | 1-1/4" | 2" | 6 | 57.87 | 55.35 | 52.84 | 50.32 |
| 96236 | .3765 | | 9.563 | .3765" | 3-1/2" | 1-1/4" | 2" | 6 | 57.87 | 55.35 | 52.84 | 50.32 |
| 96239 | .3770 | V | 9.576 | .3770" | 3-1/2" | 1-1/4" | 2" | 6 | 57.87 | 55.35 | 52.84 | 50.32 |
| 96242 | .3780 | | 9.601 | .3780" | 3-1/2" | 1-1/4" | 2" | 6 | 67.86 | 64.91 | 61.96 | 59.01 |
| 96245 | .3790 | | 9.627 | .3790" | 3-1/2" | 1-1/4" | 2" | 6 | 67.86 | 64.91 | 61.96 | 59.01 |
| 96248 | .3800 | | 9.652 | .3800" | 3-1/2" | 1-1/4" | 2" | 6 | 67.86 | 64.91 | 61.96 | 59.01 |
| 96251 | .3810 | | 9.677 | .3810" | 3-1/2" | 1-1/4" | 2" | 6 | 67.86 | 64.91 | 61.96 | 59.01 |



† *Metric equivalents are for reference only*

| EDP# | $d_1$ † Diameter Decimal | Diameter | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | $l_3$ Reach Length | Number Flutes | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 96254 | .3820 | | 9.703 | .3820" | 3-1/2" | 1-1/4" | 2" | 6 | 67.86 | 64.91 | 61.96 | 59.01 |
| 96257 | .3830 | | 9.728 | .3830" | 3-1/2" | 1-1/4" | 2" | 6 | 67.86 | 64.91 | 61.96 | 59.01 |
| 96260 | .3840 | | 9.754 | .3840" | 3-1/2" | 1-1/4" | 2" | 6 | 67.86 | 64.91 | 61.96 | 59.01 |
| 96263 | .3850 | | 9.779 | .3850" | 3-1/2" | 1-1/4" | 2" | 6 | 67.86 | 64.91 | 61.96 | 59.01 |
| 96266 | .3860 | W | 9.804 | .3860" | 3-1/2" | 1-1/4" | 2" | 6 | 67.86 | 64.91 | 61.96 | 59.01 |
| 96269 | .3870 | | 9.830 | .3870" | 3-1/2" | 1-1/4" | 2" | 6 | 67.86 | 64.91 | 61.96 | 59.01 |
| 96272 | .3880 | | 9.855 | .3880" | 3-1/2" | 1-1/4" | 2" | 6 | 67.86 | 64.91 | 61.96 | 59.01 |
| 96275 | .3890 | | 9.881 | .3890" | 3-1/2" | 1-1/4" | 2" | 6 | 67.86 | 64.91 | 61.96 | 59.01 |
| 96278 | .3900 | | 9.906 | .3900" | 3-1/2" | 1-1/4" | 2" | 6 | 67.86 | 64.91 | 61.96 | 59.01 |
| 96281 | .3906 | 25/64" | 9.921 | .3906" | 3-1/2" | 1-1/4" | 2" | 6 | 67.86 | 64.91 | 61.96 | 59.01 |
| 96284 | .3910 | | 9.931 | .3910" | 3-1/2" | 1-1/4" | 2" | 6 | 67.86 | 64.91 | 61.96 | 59.01 |
| 96287 | .3920 | | 9.957 | .3920" | 3-1/2" | 1-1/4" | 2" | 6 | 67.86 | 64.91 | 61.96 | 59.01 |
| 96290 | .3930 | | 9.982 | .3930" | 3-1/2" | 1-1/4" | 2" | 6 | 67.86 | 64.91 | 61.96 | 59.01 |
| 96293 | .3937 | | 10.000 | .3937" | 3-1/2" | 1-1/4" | 2" | 6 | 70.27 | 67.21 | 64.16 | 61.10 |
| 96296 | .3940 | | 10.008 | .3940" | 3-1/2" | 1-1/4" | 2" | 6 | 70.27 | 67.21 | 64.16 | 61.10 |
| 96299 | .3950 | | 10.033 | .3950" | 3-1/2" | 1-1/4" | 2" | 6 | 70.27 | 67.21 | 64.16 | 61.10 |
| 96302 | .3960 | | 10.058 | .3960" | 3-1/2" | 1-1/4" | 2" | 6 | 70.27 | 67.21 | 64.16 | 61.10 |
| 96305 | .3970 | X | 10.084 | .3970" | 3-1/2" | 1-1/4" | 2" | 6 | 70.27 | 67.21 | 64.16 | 61.10 |
| 96308 | .3980 | | 10.109 | .3980" | 3-1/2" | 1-1/4" | 2" | 6 | 70.27 | 67.21 | 64.16 | 61.10 |
| 96311 | .3990 | | 10.135 | .3990" | 3-1/2" | 1-1/4" | 2" | 6 | 70.27 | 67.21 | 64.16 | 61.10 |
| 96314 | .4000 | | 10.160 | .4000" | 3-1/2" | 1-1/4" | 2" | 6 | 70.27 | 67.21 | 64.16 | 61.10 |
| 96317 | .4010 | | 10.185 | .4010" | 3-1/2" | 1-1/4" | 2" | 6 | 70.27 | 67.21 | 64.16 | 61.10 |
| 96319 | .4020 | | 10.211 | .4020" | 3-1/2" | 1-1/4" | 2" | 6 | 70.27 | 67.21 | 64.16 | 61.10 |
| 96323 | .4030 | | 10.236 | .4030" | 3-1/2" | 1-1/4" | 2" | 6 | 70.27 | 67.21 | 64.16 | 61.10 |
| 96326 | .4040 | Y | 10.262 | .4040" | 3-1/2" | 1-1/4" | 2" | 6 | 70.27 | 67.21 | 64.16 | 61.10 |
| 96329 | .4050 | | 10.287 | .4050" | 3-1/2" | 1-1/4" | 2" | 6 | 70.27 | 67.21 | 64.16 | 61.10 |
| 96332 | .4060 | | 10.312 | .4060" | 3-1/2" | 1-1/4" | 2" | 6 | 70.27 | 67.21 | 64.16 | 61.10 |
| 96335 | .4062 | 13/32" | 10.317 | .4062" | 3-1/2" | 1-1/4" | 2" | 6 | 70.27 | 67.21 | 64.16 | 61.10 |
| 96338 | .4070 | | 10.338 | .4070" | 3-1/2" | 1-1/4" | 2" | 6 | 70.27 | 67.21 | 64.16 | 61.10 |
| 96341 | .4080 | | 10.363 | .4080" | 3-1/2" | 1-1/4" | 2" | 6 | 70.27 | 67.21 | 64.16 | 61.10 |
| 96344 | .4090 | | 10.389 | .4090" | 3-1/2" | 1-1/4" | 2" | 6 | 70.27 | 67.21 | 64.16 | 61.10 |
| 96347 | .4100 | | 10.414 | .4100" | 3-1/2" | 1-1/4" | 2" | 6 | 70.27 | 67.21 | 64.16 | 61.10 |
| 96350 | .4110 | | 10.439 | .4110" | 3-1/2" | 1-1/4" | 2" | 6 | 72.73 | 69.56 | 66.40 | 63.24 |
| 96353 | .4120 | | 10.465 | .4120" | 3-1/2" | 1-1/4" | 2" | 6 | 72.73 | 69.56 | 66.40 | 63.24 |
| 96356 | .4130 | Z | 10.490 | .4130" | 3-1/2" | 1-1/4" | 2" | 6 | 72.73 | 69.56 | 66.40 | 63.24 |
| 96359 | .4134 | | 10.500 | .4134" | 3-1/2" | 1-1/4" | 2" | 6 | 72.73 | 69.56 | 66.40 | 63.24 |
| 96362 | .4140 | | 10.516 | .4140" | 3-1/2" | 1-1/4" | 2" | 6 | 72.73 | 69.56 | 66.40 | 63.24 |
| 96365 | .4150 | | 10.541 | .4150" | 3-1/2" | 1-1/4" | 2" | 6 | 72.73 | 69.56 | 66.40 | 63.24 |
| 96366 | .4160 | | 10.566 | .4160" | 4" | 1-3/8" | 2-1/8" | 6 | 72.73 | 69.56 | 66.40 | 63.24 |
| 96367 | .4170 | | 10.592 | .4170" | 4" | 1-3/8" | 2-1/8" | 6 | 72.73 | 69.56 | 66.40 | 63.24 |
| 96369 | .4190 | | 10.643 | .4190" | 4" | 1-3/8" | 2-1/8" | 6 | 72.73 | 69.56 | 66.40 | 63.24 |
| 96374 | .4210 | | 10.693 | .4210" | 4" | 1-3/8" | 2-1/8" | 6 | 72.73 | 69.56 | 66.40 | 63.24 |
| 96377 | .4219 | 27/64" | 10.716 | .4219" | 4" | 1-3/8" | 2-1/8" | 6 | 72.73 | 69.56 | 66.40 | 63.24 |
| 96380 | .4220 | | 10.719 | .4220" | 4" | 1-3/8" | 2-1/8" | 6 | 72.73 | 69.56 | 66.40 | 63.24 |
| 96383 | .4230 | | 10.744 | .4230" | 4" | 1-3/8" | 2-1/8" | 6 | 72.73 | 69.56 | 66.40 | 63.24 |
| 96386 | .4240 | | 10.770 | .4240" | 4" | 1-3/8" | 2-1/8" | 6 | 72.73 | 69.56 | 66.40 | 63.24 |

*continued* →

# Series 4100 *(continued)*

.4250" - .4724"
(10.795mm - 12.000mm)

| EDP# | $d_1$ † Diameter Decimal | | $d_1$ † Diameter Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | $l_3$ Reach Length | Number Flutes | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 96389 | .4250 | | 10.795 | .4250" | 4" | 1-3/8" | 2-1/8" | 6 | 72.73 | 69.56 | 66.40 | 63.24 |
| 96392 | .4260 | | 10.820 | .4260" | 4" | 1-3/8" | 2-1/8" | 6 | 72.73 | 69.56 | 66.40 | 63.24 |
| 96395 | .4270 | | 10.846 | .4270" | 4" | 1-3/8" | 2-1/8" | 6 | 72.73 | 69.56 | 66.40 | 63.24 |
| 96398 | .4280 | | 10.871 | .4280" | 4" | 1-3/8" | 2-1/8" | 6 | 72.73 | 69.56 | 66.40 | 63.24 |
| 96404 | .4300 | | 10.922 | .4300" | 4" | 1-3/8" | 2-1/8" | 6 | 72.73 | 69.56 | 66.40 | 63.24 |
| 96407 | .4310 | | 10.947 | .4310" | 4" | 1-3/8" | 2-1/8" | 6 | 72.73 | 69.56 | 66.40 | 63.24 |
| 96410 | .4320 | | 10.973 | .4320" | 4" | 1-3/8" | 2-1/8" | 6 | 72.73 | 69.56 | 66.40 | 63.24 |
| 96413 | .4330 | | 10.998 | .4330" | 4" | 1-3/8" | 2-1/8" | 6 | 72.73 | 69.56 | 66.40 | 63.24 |
| 96416 | .4331 | | 11.000 | .4331" | 4" | 1-3/8" | 2-1/8" | 6 | 72.73 | 69.56 | 66.40 | 63.24 |
| 96419 | .4340 | | 11.024 | .4340" | 4" | 1-3/8" | 2-1/8" | 6 | 72.73 | 69.56 | 66.40 | 63.24 |
| 96422 | .4350 | | 11.049 | .4350" | 4" | 1-3/8" | 2-1/8" | 6 | 72.73 | 69.56 | 66.40 | 63.24 |
| 96425 | .4360 | | 11.074 | .4360" | 4" | 1-3/8" | 2-1/8" | 6 | 72.73 | 69.56 | 66.40 | 63.24 |
| 96428 | .4365 | | 11.087 | .4365" | 4" | 1-3/8" | 2-1/8" | 6 | 72.73 | 69.56 | 66.40 | 63.24 |
| 96431 | .4370 | | 11.100 | .4370" | 4" | 1-3/8" | 2-1/8" | 6 | 72.73 | 69.56 | 66.40 | 63.24 |
| 96432 | .4373 | | 11.107 | .4373" | 4" | 1-3/8" | 2-1/8" | 6 | 72.73 | 69.56 | 66.40 | 63.24 |
| 96434 | .4375 | 7/16" | 11.113 | .4375" | 4" | 1-3/8" | 2-1/8" | 6 | 72.73 | 69.56 | 66.40 | 63.24 |
| 96437 | .4380 | | 11.125 | .4380" | 4" | 1-3/8" | 2-1/8" | 6 | 77.96 | 74.57 | 71.18 | 67.79 |
| 96440 | .4385 | | 11.138 | .4385" | 4" | 1-3/8" | 2-1/8" | 6 | 77.96 | 74.57 | 71.18 | 67.79 |
| 96443 | .4390 | | 11.151 | .4390" | 4" | 1-3/8" | 2-1/8" | 6 | 77.96 | 74.57 | 71.18 | 67.79 |
| 96446 | .4400 | | 11.176 | .4400" | 4" | 1-3/8" | 2-1/8" | 6 | 77.96 | 74.57 | 71.18 | 67.79 |
| 96449 | .4410 | | 11.201 | .4410" | 4" | 1-3/8" | 2-1/8" | 6 | 77.96 | 74.57 | 71.18 | 67.79 |
| 96455 | .4430 | | 11.252 | .4430" | 4" | 1-3/8" | 2-1/8" | 6 | 77.96 | 74.57 | 71.18 | 67.79 |
| 96458 | .4440 | | 11.278 | .4440" | 4" | 1-3/8" | 2-1/8" | 6 | 77.96 | 74.57 | 71.18 | 67.79 |
| 96461 | .4450 | | 11.303 | .4450" | 4" | 1-3/8" | 2-1/8" | 6 | 77.96 | 74.57 | 71.18 | 67.79 |
| 96467 | .4470 | | 11.354 | .4470" | 4" | 1-3/8" | 2-1/8" | 6 | 77.96 | 74.57 | 71.18 | 67.79 |
| 96470 | .4480 | | 11.379 | .4480" | 4" | 1-3/8" | 2-1/8" | 6 | 77.96 | 74.57 | 71.18 | 67.79 |
| 96473 | .4490 | | 11.405 | .4490" | 4" | 1-3/8" | 2-1/8" | 6 | 77.96 | 74.57 | 71.18 | 67.79 |
| 96476 | .4500 | | 11.430 | .4500" | 4" | 1-3/8" | 2-1/8" | 6 | 77.96 | 74.57 | 71.18 | 67.79 |
| 96479 | .4510 | | 11.455 | .4510" | 4" | 1-3/8" | 2-1/8" | 6 | 77.96 | 74.57 | 71.18 | 67.79 |
| 96485 | .4528 | | 11.500 | .4528" | 4" | 1-3/8" | 2-1/8" | 6 | 77.96 | 74.57 | 71.18 | 67.79 |
| 96488 | .4530 | | 11.506 | .4530" | 4" | 1-3/8" | 2-1/8" | 6 | 77.96 | 74.57 | 71.18 | 67.79 |
| 96491 | .4531 | 29/64" | 11.509 | .4531" | 4" | 1-3/8" | 2-1/8" | 6 | 77.96 | 74.57 | 71.18 | 67.79 |
| 96494 | .4540 | | 11.532 | .4540" | 4" | 1-3/8" | 2-1/8" | 6 | 77.96 | 74.57 | 71.18 | 67.79 |
| 96497 | .4550 | | 11.557 | .4550" | 4" | 1-3/8" | 2-1/8" | 6 | 77.96 | 74.57 | 71.18 | 67.79 |
| 96500 | .4560 | | 11.582 | .4560" | 4" | 1-3/8" | 2-1/8" | 6 | 77.96 | 74.57 | 71.18 | 67.79 |
| 96503 | .4570 | | 11.608 | .4570" | 4" | 1-3/8" | 2-1/8" | 6 | 77.96 | 74.57 | 71.18 | 67.79 |
| 96506 | .4580 | | 11.633 | .4580" | 4" | 1-3/8" | 2-1/8" | 6 | 77.96 | 74.57 | 71.18 | 67.79 |
| 96512 | .4600 | | 11.684 | .4600" | 4" | 1-3/8" | 2-1/8" | 6 | 77.96 | 74.57 | 71.18 | 67.79 |
| 96515 | .4610 | | 11.709 | .4610" | 4" | 1-3/8" | 2-1/8" | 6 | 80.30 | 76.81 | 73.32 | 69.83 |
| 96527 | .4650 | | 11.811 | .4650" | 4" | 1-3/8" | 2-1/8" | 6 | 80.30 | 76.81 | 73.32 | 69.83 |
| 96530 | .4660 | | 11.836 | .4660" | 4" | 1-3/8" | 2-1/8" | 6 | 80.30 | 76.81 | 73.32 | 69.83 |
| 96533 | .4670 | | 11.862 | .4670" | 4" | 1-3/8" | 2-1/8" | 6 | 80.30 | 76.81 | 73.32 | 69.83 |
| 96539 | .4688 | 15/32" | 11.908 | .4688" | 4" | 1-3/8" | 2-1/8" | 6 | 80.30 | 76.81 | 73.32 | 69.83 |
| 96542 | .4690 | | 11.913 | .4690" | 4" | 1-3/8" | 2-1/8" | 6 | 80.30 | 76.81 | 73.32 | 69.83 |
| 96545 | .4700 | | 11.938 | .4700" | 4" | 1-1/2" | 2-1/4" | 6 | 80.30 | 76.81 | 73.32 | 69.83 |
| 96548 | .4710 | | 11.963 | .4710" | 4" | 1-1/2" | 2-1/4" | 6 | 80.30 | 76.81 | 73.32 | 69.83 |
| 96551 | .4720 | | 11.989 | .4720" | 4" | 1-1/2" | 2-1/4" | 6 | 80.30 | 76.81 | 73.32 | 69.83 |
| 96554 | .4724 | | 12.000 | .4724" | 4" | 1-1/2" | 2-1/4" | 6 | 80.30 | 76.81 | 73.32 | 69.83 |



† *Metric equivalents are for reference only*

| EDP# | $d_1$ † Diameter Decimal | Diameter | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | $l_3$ Reach Length | Number Flutes | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 96557 | .4730 | | 12.014 | .4730" | 4" | 1-1/2" | 2-1/4" | 6 | 80.30 | 76.81 | 73.32 | 69.83 |
| 96561 | .4740 | | 12.040 | .4740" | 4" | 1-1/2" | 2-1/4" | 6 | 80.30 | 76.81 | 73.32 | 69.83 |
| 96563 | .4750 | | 12.065 | .4750" | 4" | 1-1/2" | 2-1/4" | 6 | 80.30 | 76.81 | 73.32 | 69.83 |
| 96566 | .4760 | | 12.090 | .4760" | 4" | 1-1/2" | 2-1/4" | 6 | 80.30 | 76.81 | 73.32 | 69.83 |
| 96569 | .4770 | | 12.116 | .4770" | 4" | 1-1/2" | 2-1/4" | 6 | 80.30 | 76.81 | 73.32 | 69.83 |
| 96572 | .4780 | | 12.141 | .4780" | 4" | 1-1/2" | 2-1/4" | 6 | 80.30 | 76.81 | 73.32 | 69.83 |
| 96578 | .4800 | | 12.192 | .4800" | 4" | 1-1/2" | 2-1/4" | 6 | 82.05 | 78.49 | 74.92 | 71.35 |
| 96581 | .4810 | | 12.217 | .4810" | 4" | 1-1/2" | 2-1/4" | 6 | 82.05 | 78.49 | 74.92 | 71.35 |
| 96584 | .4820 | | 12.243 | .4820" | 4" | 1-1/2" | 2-1/4" | 6 | 82.05 | 78.49 | 74.92 | 71.35 |
| 96590 | .4840 | | 12.294 | .4840" | 4" | 1-1/2" | 2-1/4" | 6 | 82.05 | 78.49 | 74.92 | 71.35 |
| 96593 | .4844 | 31/64" | 12.304 | .4844" | 4" | 1-1/2" | 2-1/4" | 6 | 82.05 | 78.49 | 74.92 | 71.35 |
| 96596 | .4850 | | 12.319 | .4850" | 4" | 1-1/2" | 2-1/4" | 6 | 82.05 | 78.49 | 74.92 | 71.35 |
| 96602 | .4870 | | 12.370 | .4870" | 4" | 1-1/2" | 2-1/4" | 6 | 82.05 | 78.49 | 74.92 | 71.35 |
| 96608 | .4890 | | 12.421 | .4890" | 4" | 1-1/2" | 2-1/4" | 6 | 82.05 | 78.49 | 74.92 | 71.35 |
| 96617 | .4920 | | 12.497 | .4920" | 4" | 1-1/2" | 2-1/4" | 6 | 82.05 | 78.49 | 74.92 | 71.35 |
| 96620 | .4921 | | 12.500 | .4921" | 4" | 1-1/2" | 2-1/4" | 6 | 82.05 | 78.49 | 74.92 | 71.35 |
| 96623 | .4930 | | 12.522 | .4930" | 4" | 1-1/2" | 2-1/4" | 6 | 82.05 | 78.49 | 74.92 | 71.35 |
| 96629 | .4950 | | 12.573 | .4950" | 4" | 1-1/2" | 2-1/4" | 6 | 82.05 | 78.49 | 74.92 | 71.35 |
| 96632 | .4960 | | 12.598 | .4960" | 4" | 1-1/2" | 2-1/4" | 6 | 82.05 | 78.49 | 74.92 | 71.35 |
| 96635 | .4970 | | 12.624 | .4970" | 4" | 1-1/2" | 2-1/4" | 6 | 82.05 | 78.49 | 74.92 | 71.35 |
| 96638 | .4980 | | 12.649 | .4980" | 4" | 1-1/2" | 2-1/4" | 6 | 82.05 | 78.49 | 74.92 | 71.35 |
| 96641 | .4990 | | 12.675 | .4990" | 4" | 1-1/2" | 2-1/4" | 6 | 82.05 | 78.49 | 74.92 | 71.35 |
| 96644 | .4995 | | 12.687 | .4995" | 4" | 1-1/2" | 2-1/4" | 6 | 82.05 | 78.49 | 74.92 | 71.35 |
| 96645 | .4998 | | 12.695 | .4998" | 4" | 1-1/2" | 2-1/4" | 6 | 82.05 | 78.49 | 74.92 | 71.35 |
| 96647 | .5000 | 1/2" | 12.700 | .5000" | 4" | 1-1/2" | 2-1/4" | 6 | 82.05 | 78.49 | 74.92 | 71.35 |
| 96650 | .5005 | | 12.713 | .5005" | 4" | 1-1/2" | 2-1/4" | 6 | 82.05 | 78.49 | 74.92 | 71.35 |
| 96653 | .5010 | | 12.725 | .5010" | 4" | 1-1/2" | 2-1/4" | 6 | 82.05 | 78.49 | 74.92 | 71.35 |
| 96656 | .5020 | | 12.751 | .5020" | 4" | 1-1/2" | 2-1/4" | 6 | 82.05 | 78.49 | 74.92 | 71.35 |

# Series **4100** (Metric)

1.990mm - 10.040mm
(.07835" - .39528")

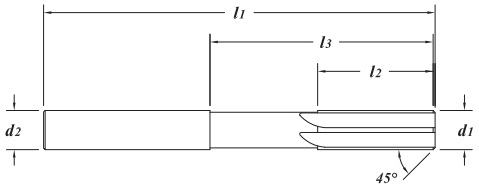
Z=4 | Z=6 | 0° | 45° | TECH PAGES 315

**TOLERANCES**

| | | |
|---|---|---|
| $d_1$ | 1.500 – 6.372mm | +.005mm –.000 |
| | 6.375 – 12.750mm | +.0075mm –.0000 |
| $d_2$ | 1.500 – 6.372mm | +.005mm –.000 |
| | 6.375 – 12.750mm | +.0075mm –.0000 |



Solid Carbide Submicron Grain
Straight - RHC Flutes
Standard 45° Lead Chamfer
Neck diameter is 0.25mm ±0.05 less than ($d_1$) fluted diameter




| EDP# | $d_1$ Decimal | $d_1$ Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | $l_3$ Reach Length | Number Flutes | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 96659 | .07835 | 1.990 | 1.990 | 50 | 12 | 32 | 4 | 15.27 | 14.61 | 13.94 | 13.28 |
| 96662 | .07874 | 2.000 | 2.000 | 50 | 12 | 32 | 4 | 15.27 | 14.61 | 13.94 | 13.28 |
| 96665 | .07913 | 2.010 | 2.010 | 50 | 12 | 32 | 4 | 15.27 | 14.61 | 13.94 | 13.28 |
| 96668 | .07953 | 2.020 | 2.020 | 50 | 12 | 32 | 4 | 15.27 | 14.61 | 13.94 | 13.28 |
| 96671 | .11772 | 2.990 | 2.990 | 65 | 16 | 36 | 4 | 18.76 | 17.94 | 17.13 | 16.31 |
| 96674 | .11811 | 3.000 | 3.000 | 65 | 16 | 36 | 4 | 18.76 | 17.94 | 17.13 | 16.31 |
| 96677 | .11850 | 3.010 | 3.010 | 65 | 16 | 36 | 4 | 18.76 | 17.94 | 17.13 | 16.31 |
| 96680 | .11890 | 3.020 | 3.020 | 65 | 16 | 36 | 4 | 18.76 | 17.94 | 17.13 | 16.31 |
| 96683 | .15709 | 3.990 | 3.990 | 75 | 20 | 45 | 4 | 25.35 | 24.24 | 23.14 | 22.04 |
| 96686 | .15748 | 4.000 | 4.000 | 75 | 20 | 45 | 4 | 25.35 | 24.24 | 23.14 | 22.04 |
| 96689 | .15787 | 4.010 | 4.010 | 75 | 20 | 45 | 4 | 25.35 | 24.24 | 23.14 | 22.04 |
| 96692 | .15827 | 4.020 | 4.020 | 75 | 20 | 45 | 4 | 25.35 | 24.24 | 23.14 | 22.04 |
| 96695 | .15866 | 4.030 | 4.030 | 75 | 20 | 45 | 4 | 25.35 | 24.24 | 23.14 | 22.04 |
| 96698 | .19646 | 4.990 | 4.990 | 100 | 25 | 60 | 4 | 32.45 | 31.04 | 29.63 | 28.22 |
| 96701 | .19685 | 5.000 | 5.000 | 100 | 25 | 60 | 4 | 32.45 | 31.04 | 29.63 | 28.22 |
| 96704 | .19724 | 5.010 | 5.010 | 100 | 25 | 60 | 4 | 32.45 | 31.04 | 29.63 | 28.22 |
| 96707 | .19764 | 5.020 | 5.020 | 100 | 25 | 60 | 4 | 32.45 | 31.04 | 29.63 | 28.22 |
| 96710 | .19803 | 5.030 | 5.030 | 100 | 25 | 60 | 4 | 32.45 | 31.04 | 29.63 | 28.22 |
| 96713 | .23583 | 5.990 | 5.990 | 100 | 25 | 60 | 4 | 39.41 | 37.70 | 35.98 | 34.27 |
| 96716 | .23622 | 6.000 | 6.000 | 100 | 25 | 60 | 4 | 39.41 | 37.70 | 35.98 | 34.27 |
| 96719 | .23661 | 6.010 | 6.010 | 100 | 25 | 60 | 4 | 39.41 | 37.70 | 35.98 | 34.27 |
| 96722 | .23701 | 6.020 | 6.020 | 100 | 25 | 60 | 4 | 39.41 | 37.70 | 35.98 | 34.27 |
| 96725 | .27559 | 7.000 | 7.000 | 100 | 25 | 60 | 6 | 45.47 | 43.49 | 41.52 | 39.54 |
| 96728 | .31457 | 7.990 | 7.990 | 120 | 32 | 75 | 6 | 54.68 | 52.31 | 49.93 | 47.55 |
| 96731 | .31496 | 8.000 | 8.000 | 120 | 32 | 75 | 6 | 54.68 | 52.31 | 49.93 | 47.55 |
| 96734 | .31535 | 8.010 | 8.010 | 120 | 32 | 75 | 6 | 54.68 | 52.31 | 49.93 | 47.55 |
| 96737 | .31575 | 8.020 | 8.020 | 120 | 32 | 75 | 6 | 54.68 | 52.31 | 49.93 | 47.55 |
| 96740 | .31614 | 8.030 | 8.030 | 120 | 32 | 75 | 6 | 54.68 | 52.31 | 49.93 | 47.55 |
| 96743 | .35433 | 9.000 | 9.000 | 120 | 32 | 75 | 6 | 68.84 | 65.85 | 62.85 | 59.86 |
| 96746 | .39291 | 9.980 | 9.980 | 130 | 32 | 75 | 6 | 80.83 | 77.32 | 73.80 | 70.29 |
| 96749 | .39331 | 9.990 | 9.990 | 130 | 32 | 75 | 6 | 80.83 | 77.32 | 73.80 | 70.29 |
| 96752 | .39370 | 10.000 | 10.000 | 130 | 32 | 75 | 6 | 85.05 | 81.36 | 77.66 | 73.96 |
| 96755 | .39409 | 10.010 | 10.010 | 130 | 32 | 75 | 6 | 85.05 | 81.36 | 77.66 | 73.96 |
| 96758 | .39449 | 10.020 | 10.020 | 130 | 32 | 75 | 6 | 85.05 | 81.36 | 77.66 | 73.96 |
| 96761 | .39488 | 10.030 | 10.030 | 130 | 32 | 75 | 6 | 85.05 | 81.36 | 77.66 | 73.96 |
| 96764 | .39528 | 10.040 | 10.040 | 130 | 32 | 75 | 6 | 85.05 | 81.36 | 77.66 | 73.96 |

| EDP# | $d_1$ Decimal | $d_1$ Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | $l_3$ Reach Length | Number Flutes | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 96767 | .47165 | 11.980 | 11.980 | 150 | 40 | 100 | 6 | 97.38 | 93.15 | 88.91 | 84.68 |
| 96770 | .47205 | 11.990 | 11.990 | 150 | 40 | 100 | 6 | 97.38 | 93.15 | 88.91 | 84.68 |
| 96773 | .47244 | 12.000 | 12.000 | 150 | 40 | 100 | 6 | 97.38 | 93.15 | 88.91 | 84.68 |
| 96776 | .47283 | 12.010 | 12.010 | 150 | 40 | 100 | 6 | 97.38 | 93.15 | 88.91 | 84.68 |
| 96779 | .47323 | 12.020 | 12.020 | 150 | 40 | 100 | 6 | 97.38 | 93.15 | 88.91 | 84.68 |
| 96782 | .47362 | 12.030 | 12.030 | 150 | 40 | 100 | 6 | 97.38 | 93.15 | 88.91 | 84.68 |



LHS / RHC

STR / RHC

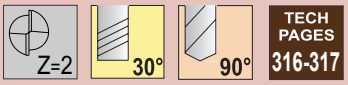
RHS / RHC

## Special Reamers - Solid Carbide - 2 Week Delivery

Solid Carbide Submicron Grain
All reamers furnished with a standard 45° Lead Chamfer
All reamers furnished with a standard neck for reach
Neck diameter is .010" ±.002" less than fluted diameter

| Diameter Decimal | Diameter Metric | Overall Length | Flute Length | No. of Flutes |
|---|---|---|---|---|
| .0590" - .0650" | 1.499 - 1.651 | 1-1/2" | 3/8" | 4 |
| .0660" - .0800" | 1.676 - 2.032 | 1-3/4" | 1/2" | 4 |
| .0810" - .0950" | 2.057 - 2.413 | 2" | 1/2" | 4 |
| .0960" - .1300" | 2.438 - 3.302 | 2-1/4" | 5/8" | 4 |
| .1310" - .1590" | 3.327 - 4.039 | 2-1/2" | 3/4" | 4 |
| .1600" - .1950" | 4.064 - 4.953 | 2-3/4" | 7/8" | 4 |
| .1960" - .2540" | 4.978 - 6.452 | 3" | 1" | 4 |
| .2550" - .3180" | 6.477 - 8.077 | 3-1/4" | 1-1/8" | 6 |
| .3190" - .4150" | 8.103 - 10.541 | 3-1/2" | 1-1/4" | 6 |
| .4160" - .4690" | 10.566 - 11.913 | 4" | 1-3/8" | 6 |
| .4700" - .5020" | 11.938 - 12.751 | 4" | 1-1/2" | 6 |
| .5030" - .5700" | 12.776 - 14.478 | 4" | 1-5/8" | 6 |
| .5710" - .7500" | 14.503 - 19.050 | 4" | 1-3/4" | 6 |

# Series 152M

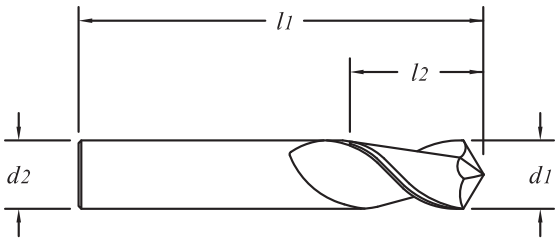



| TOLERANCES | |
|---|---|
| $d_1$ | +.000" –.002" (+.000 /–.050mm) |
| $d_2$ | h6 |

## Drill/End Mill

Solid submicron grain carbide
Included angle to a point - center cutting
Tools do not have drill point geometry
Extremely versatile
Point tolerance ±0°30'






MATERIAL HARDNESS (Rc)
70
35
0

| EDP# | $d_1$ † Diameter Decimal | Diameter | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|
| 57200 | .1250 | 1/8" | 3.175 | 1/8" | 1-1/2" | 1/2" | 11.63 | 11.12 | 10.62 | 10.11 |
| 57210 | .1875 | 3/16" | 4.763 | 3/16" | 2" | 5/8" | 15.32 | 14.65 | 13.99 | 13.32 |
| 57220 | .2500 | 1/4" | 6.350 | 1/4" | 2-1/2" | 3/4" | 19.03 | 18.21 | 17.38 | 16.55 |
| 57230 | .3125 | 5/16" | 7.938 | 5/16" | 2-1/2" | 7/8" | 24.94 | 23.86 | 22.77 | 21.69 |
| 57240 | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 7/8" | 30.53 | 29.21 | 27.88 | 26.55 |
| 57250 | .4375 | 7/16" | 11.113 | 7/16" | 2-3/4" | 1" | 37.58 | 35.95 | 34.31 | 32.68 |
| 57260 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1" | 56.83 | 54.36 | 51.89 | 49.42 |
| 57270 | .6250 | 5/8" | 15.875 | 5/8" | 3-1/2" | 1-1/4" | 91.92 | 87.92 | 83.93 | 79.93 |
| 57280 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-1/2" | 135.27 | 129.39 | 123.51 | 117.63 |

† *Metric equivalents are for reference only*

| TOLERANCES | |
|---|---|
| $d_1$ | +.000" –.002" (+.000 /–.050mm) |
| $d_2$ | h6 |

Z=2 | 30° | 90° | TECH PAGES 316-317

## Drill/End Mill

### TiALN Coating

Solid submicron grain carbide

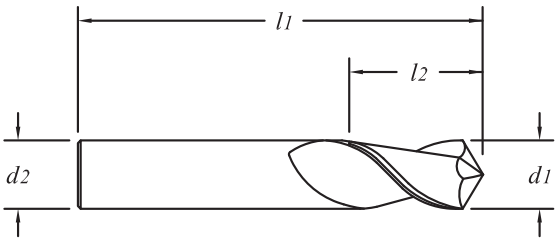
Included angle to a point - center cutting

Tools do not have drill point geometry

Extremely versatile

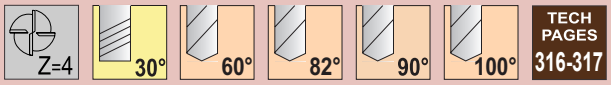
Point tolerance ±0°30'






| EDP# | $d_1$ † Diameter Decimal | Diameter | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|
| 57207 | .1250 | 1/8" | 3.175 | 1/8" | 1-1/2" | 1/2" | 14.32 | 13.70 | 13.07 | 12.45 |
| 57217 | .1875 | 3/16" | 4.763 | 3/16" | 2" | 5/8" | 18.01 | 17.23 | 16.44 | 15.66 |
| 57227 | .2500 | 1/4" | 6.350 | 1/4" | 2-1/2" | 3/4" | 24.56 | 23.50 | 22.43 | 21.36 |
| 57237 | .3125 | 5/16" | 7.938 | 5/16" | 2-1/2" | 7/8" | 33.29 | 31.85 | 30.40 | 28.95 |
| 57247 | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 7/8" | 38.88 | 37.19 | 35.50 | 33.81 |
| 57257 | .4375 | 7/16" | 11.113 | 7/16" | 2-3/4" | 1" | 47.01 | 44.97 | 42.92 | 40.88 |
| 57267 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1" | 66.32 | 63.44 | 60.55 | 57.67 |
| 57277 | .6250 | 5/8" | 15.875 | 5/8" | 3-1/2" | 1-1/4" | 105.58 | 100.99 | 96.40 | 91.81 |
| 57287 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-1/2" | 151.41 | 144.83 | 138.24 | 131.66 |

# Series 154M

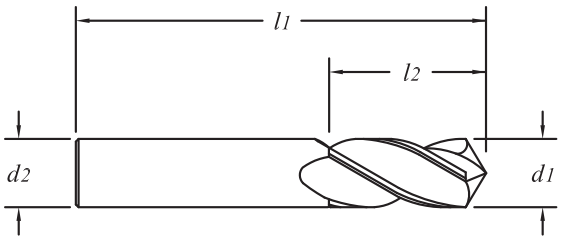



| TOLERANCES | |
|---|---|
| $d_1$ | +.000" –.002" (+.000 /–.050mm) |
| $d_2$ | h6 |

## Drill/End Mill

Solid submicron grain carbide
Included angle to a point - center cutting
Tools do not have drill point geometry
Extremely versatile
Point tolerance ±0°30'






MATERIAL HARDNESS (Rc)
70
35
0

| 60° EDP# | 82° EDP# | 90° EDP# | 100° EDP# | $d_1$ † Diameter Decimal | | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| - | - | 58198 | - | .1181 | | 3.000 | 3.0 | 38 | 12 | 12.22 | 11.69 | 11.16 | 10.63 |
| - | 57346 | 58200 | - | .1250 | 1/8" | 3.175 | 1/8" | 1-1/2" | 1/2" | 11.63 | 11.12 | 10.62 | 10.11 |
| - | - | 58202 | - | .1575 | | 4.000 | 4.0 | 50 | 14 | 16.09 | 15.39 | 14.69 | 13.99 |
| - | 57350 | 58210 | 57390 | .1875 | 3/16" | 4.763 | 3/16" | 2" | 5/8" | 15.32 | 14.65 | 13.99 | 13.32 |
| - | 57352 | 58212 | 57392 | .1969 | | 5.000 | 5.0 | 65 | 16 | 19.50 | 18.66 | 17.81 | 16.96 |
| 57314 | 57354 | 58214 | - | .2362 | | 6.000 | 6.0 | 65 | 19 | 20.00 | 19.13 | 18.26 | 17.39 |
| 57316 | 57356 | 58220 | 57396 | .2500 | 1/4" | 6.350 | 1/4" | 2-1/2" | 3/4" | 19.03 | 18.21 | 17.38 | 16.55 |
| 57318 | 57358 | 58230 | 57398 | .3125 | 5/16" | 7.938 | 5/16" | 2-1/2" | 7/8" | 24.94 | 23.86 | 22.77 | 21.69 |
| 57320 | - | 58232 | 57400 | .3150 | | 8.000 | 8.0 | 65 | 22 | 26.25 | 25.11 | 23.97 | 22.83 |
| 57322 | 57362 | 58240 | 57402 | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 7/8" | 30.53 | 29.21 | 27.88 | 26.55 |
| 57324 | - | 58242 | 57404 | .3937 | | 10.000 | 10.0 | 70 | 25 | 37.48 | 35.85 | 34.22 | 32.59 |
| - | - | 58252 | 57408 | .4724 | | 12.000 | 12.0 | 75 | 25 | 59.70 | 57.10 | 54.51 | 51.91 |
| 57330 | 57370 | 58260 | 57410 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1" | 56.83 | 54.36 | 51.89 | 49.42 |
| 57332 | 57372 | 58270 | 57412 | .6250 | 5/8" | 15.875 | 5/8" | 3-1/2" | 1-1/4" | 91.92 | 87.92 | 83.93 | 79.93 |
| - | - | 58272 | 57414 | .6299 | | 16.000 | 16.0 | 88 | 32 | 96.50 | 92.30 | 88.11 | 83.91 |
| 57336 | 57376 | 58280 | - | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-1/2" | 135.27 | 129.39 | 123.51 | 117.63 |



† *Metric equivalents are for reference only*

| TOLERANCES | |
|---|---|
| $d_1$ | +.000" –.002" (+.000 /–.050mm) |
| $d_2$ | h6 |

Z=4 | 30° | 60° | 82° | 90° | 100° | TECH PAGES 316-317

## Drill/End Mill

### TiALN Coating

Solid submicron grain carbide

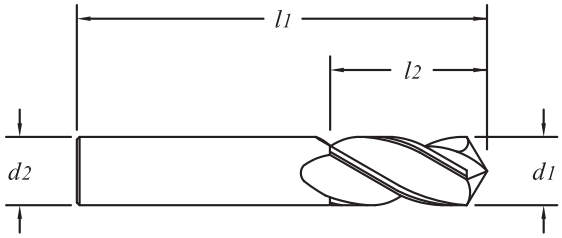
Included angle to a point - center cutting

Tools do not have drill point geometry

Extremely versatile

Point tolerance ±0°30'






| 60° EDP# | 82° EDP# | 90° EDP# | 100° EDP# | $d_1$ † Diameter Decimal | | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| - | - | 58205 | - | .1181 | | 3.000 | 3.0 | 38 | 12 | 14.90 | 14.26 | 13.61 | 12.96 |
| - | 58346 | 58207 | - | .1250 | 1/8" | 3.175 | 1/8" | 1-1/2" | 1/2" | 14.32 | 13.70 | 13.07 | 12.45 |
| - | 58348 | 58209 | 58388 | .1575 | | 4.000 | 4.0 | 50 | 14 | 18.78 | 17.96 | 17.15 | 16.33 |
| - | 58350 | 58217 | 58390 | .1875 | 3/16" | 4.763 | 3/16" | 2" | 5/8" | 18.01 | 17.23 | 16.44 | 15.66 |
| - | - | 58219 | - | .1969 | | 5.000 | 5.0 | 65 | 16 | 16.09 | 15.39 | 14.69 | 13.99 |
| 58314 | 58354 | 58221 | 58394 | .2362 | | 6.000 | 6.0 | 65 | 19 | 25.54 | 24.43 | 23.32 | 22.21 |
| 58316 | 58356 | 58227 | 58396 | .2500 | 1/4" | 6.350 | 1/4" | 2-1/2" | 3/4" | 24.56 | 23.50 | 22.43 | 21.36 |
| 58318 | 58358 | 58237 | 58398 | .3125 | 5/16" | 7.938 | 5/16" | 2-1/2" | 7/8" | 33.29 | 31.85 | 30.40 | 28.95 |
| 58320 | - | 58239 | 58400 | .3150 | | 8.000 | 8.0 | 65 | 22 | 34.55 | 33.04 | 31.54 | 30.04 |
| 58322 | 58362 | 58247 | 58402 | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 7/8" | 38.88 | 37.19 | 35.50 | 33.81 |
| 58324 | 58364 | 58249 | 58404 | .3937 | | 10.000 | 10.0 | 70 | 25 | 46.94 | 44.90 | 42.86 | 40.82 |
| 58326 | 58366 | 58257 | - | .4375 | 7/16" | 11.113 | 7/16" | 2-3/4" | 1" | 47.01 | 44.97 | 42.92 | 40.88 |
| 58328 | - | 58259 | 58408 | .4724 | | 12.000 | 12.0 | 75 | 25 | 69.13 | 66.12 | 63.12 | 60.11 |
| 58330 | 58370 | 58267 | 58410 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1" | 66.32 | 63.44 | 60.55 | 57.67 |
| 58332 | 58372 | 58277 | 58412 | .6250 | 5/8" | 15.875 | 5/8" | 3-1/2" | 1-1/4" | 105.58 | 100.99 | 96.40 | 91.81 |
| - | 58374 | 58279 | - | .6299 | | 16.000 | 16.0 | 88 | 32 | 110.17 | 105.38 | 100.59 | 95.80 |
| 58336 | 58376 | 58287 | 58416 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-1/2" | 151.41 | 144.83 | 138.24 | 131.66 |
| - | 58378 | 58289 | - | .7874 | | 20.000 | 20.0 | 100 | 38 | 214.29 | 204.97 | 195.66 | 186.34 |

MATERIAL HARDNESS (Rc)

70

35

0

# Series 152DA

| TOLERANCES | |
|---|---|
| $d_1$ | +.000" –.002" (+.000 /–.050mm) |
| $d_2$ | h6 |

Z=2 | 30° | 120° | TECH PAGES 318-319

Recommended for drilling and milling in mild steels and non-ferrous materials



## Drill/End Mill

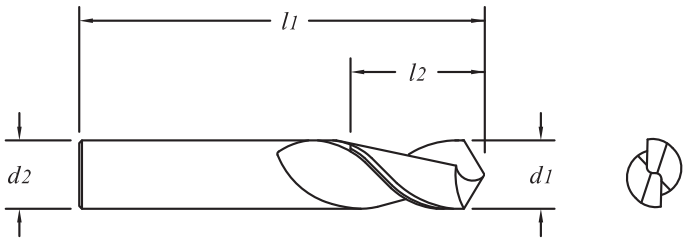
**TiALN Coating**

Solid submicron grain carbide

Four-facet drill point geometry (NOT to a true point - Reference page 57)

Extremely versatile

Point tolerance ±1°




MATERIAL HARDNESS (Rc)
70
35
0

| EDP# | $d_1$ † Diameter Decimal | Diameter | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|
| 57421 | .1181 | | 3.000 | 3.0 | 38 | 12 | 14.90 | 14.26 | 13.61 | 12.96 |
| 57423 | .1250 | 1/8" | 3.175 | 1/8" | 1-1/2" | 1/2" | 14.32 | 13.70 | 13.07 | 12.45 |
| 57425 | .1575 | | 4.000 | 4.0 | 50 | 14 | 18.78 | 17.96 | 17.15 | 16.33 |
| 57427 | .1875 | 3/16" | 4.762 | 3/16" | 2" | 5/8" | 18.01 | 17.23 | 16.44 | 15.66 |
| 57429 | .1969 | | 5.000 | 5.0 | 65 | 16 | 25.06 | 23.97 | 22.88 | 21.79 |
| 57431 | .2362 | | 6.000 | 6.0 | 65 | 19 | 25.54 | 24.43 | 23.32 | 22.21 |
| 57433 | .2500 | 1/4" | 6.350 | 1/4" | 2-1/2" | 3/4" | 24.56 | 23.50 | 22.43 | 21.36 |
| 57435 | .3125 | 5/16" | 7.937 | 5/16" | 2-1/2" | 7/8" | 33.29 | 31.85 | 30.40 | 28.95 |
| 57437 | .3150 | | 8.000 | 8.0 | 65 | 22 | 34.55 | 33.04 | 31.54 | 30.04 |
| 57439 | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 7/8" | 38.88 | 37.19 | 35.50 | 33.81 |
| 57441 | .3937 | | 10.000 | 10.0 | 70 | 25 | 46.94 | 44.90 | 42.86 | 40.82 |
| 57443 | .4375 | 7/16" | 11.112 | 7/16" | 2-3/4" | 1" | 47.01 | 44.97 | 42.92 | 40.88 |
| 57445 | .4724 | | 12.000 | 12.0 | 75 | 25 | 69.13 | 66.12 | 63.12 | 60.11 |
| 57447 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1" | 66.32 | 63.44 | 60.55 | 57.67 |
| 57449 | .6250 | 5/8" | 15.875 | 5/8" | 3-1/2" | 1-1/4" | 105.58 | 100.99 | 96.40 | 91.81 |
| 57451 | .6299 | | 16.000 | 16.0 | 88 | 32 | 110.17 | 105.38 | 100.59 | 95.80 |
| 57453 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-1/2" | 151.41 | 144.83 | 138.24 | 131.66 |
| 57455 | .7874 | | 20.000 | 20.0 | 100 | 38 | 214.29 | 204.97 | 195.66 | 186.34 |



† *Metric equivalents are for reference only*


Since 1927
Sfar
NTG 6RL


630XW
ROLLOMATIC


TXcell


MX7 LINEAR

# Series ARC

.1575" - .3750"
(4.000mm - 9.525mm)

Z=3 | VAR | 45° | TECH PAGES 291

| TOLERANCES | |
|---|---|
| $d_1$ | +.000" –.002" (+.000 –.050mm) |
| $d_2$ | h6 |
| $d_3$ | +.000" –.005" (+.000 –.127mm) |

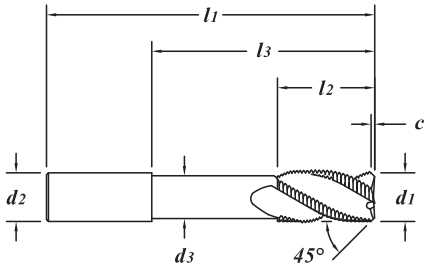
Recommended for aluminum and non-ferrous materials

## Aluminum Knuckle Rougher / Ripper

### Bright Finish

Solid submicron grain carbide end mill - center cutting
Wave knuckle design to break up chips
Each flute has individual helix angle to break up harmonics
Reduces tool pressure requiring less machine power
Designed for roughing Aluminum Alloys
Ideal for use in extruded Aluminum





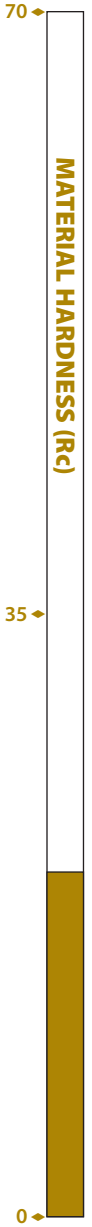

MATERIAL HARDNESS (Rc)
70
35
0

| EDP# | $d_1$ † Diameter Decimal | Diameter | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | $c$ Chamfer Length | $l_3$ Reach Length | $d_3$ Neck Diameter | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 46219 | .1575 | | 4.000 | 6.0 | 50 | 8 | 0.30 | - | - | 34.17 | 32.68 | 31.20 | 29.71 |
| 46222 | .1575 | | 4.000 | 6.0 | 50 | 12 | 0.30 | - | - | 34.17 | 32.68 | 31.20 | 29.71 |
| 46225 | .1575 | | 4.000 | 6.0 | 65 | 10 | 0.30 | 30 | 3.2 | 39.11 | 37.41 | 35.71 | 34.01 |
| 46228 | .1575 | | 4.000 | 6.0 | 75 | 15 | 0.30 | 40 | 3.2 | 51.47 | 49.24 | 47.00 | 44.76 |
| 46231 | .1875 | 3/16" | 4.763 | 3/16" | 2" | 5/16" | .015" | - | - | 28.99 | 27.73 | 26.47 | 25.21 |
| 46234 | .1875 | 3/16" | 4.763 | 3/16" | 2" | 9/16" | .015" | - | - | 28.99 | 27.73 | 26.47 | 25.21 |
| 46237 | .1875 | 3/16" | 4.763 | 3/16" | 3" | 1" | .015" | - | - | 40.57 | 38.81 | 37.04 | 35.28 |
| 46240 | .1875 | 3/16" | 4.763 | 3/16" | 3" | 1/2" | .015" | 1-1/2" | .160" | 44.15 | 42.23 | 40.31 | 38.39 |
| 46243 | .2362 | | 6.000 | 6.0 | 50 | 12 | 0.50 | - | - | 33.90 | 32.43 | 30.95 | 29.48 |
| 46246 | .2362 | | 6.000 | 6.0 | 65 | 19 | 0.50 | - | - | 36.72 | 35.12 | 33.53 | 31.93 |
| 46249 | .2362 | | 6.000 | 6.0 | 100 | 20 | 0.50 | 60 | 5.2 | 52.07 | 49.81 | 47.54 | 45.28 |
| 46252 | .2500 | 1/4" | 6.350 | 1/4" | 2" | 3/8" | .020" | - | - | 32.41 | 31.00 | 29.59 | 28.18 |
| 46255 | .2500 | 1/4" | 6.350 | 1/4" | 2-1/2" | 3/4" | .020" | - | - | 36.27 | 34.69 | 33.12 | 31.54 |
| 46258 | .2500 | 1/4" | 6.350 | 1/4" | 4" | 1-1/2" | .020" | - | - | 46.83 | 44.79 | 42.76 | 40.72 |
| 46261 | .2500 | 1/4" | 6.350 | 1/4" | 4" | 1" | .020" | 2" | .220" | 50.42 | 48.22 | 46.03 | 43.84 |
| 46264 | .3125 | 5/16" | 7.938 | 5/16" | 2" | 7/16" | .020" | - | - | 38.67 | 36.99 | 35.31 | 33.63 |
| 46267 | .3125 | 5/16" | 7.938 | 5/16" | 2-1/2" | 13/16" | .020" | - | - | 40.15 | 38.40 | 36.66 | 34.91 |
| 46270 | .3125 | 5/16" | 7.938 | 5/16" | 4" | 1-1/2" | .020" | - | - | 57.51 | 55.01 | 52.51 | 50.01 |
| 46273 | .3125 | 5/16" | 7.938 | 5/16" | 4" | 1" | .020" | 2" | .285" | 61.09 | 58.43 | 55.78 | 53.12 |
| 46276 | .3150 | | 8.000 | 8.0 | 50 | 12 | 0.50 | - | - | 39.61 | 37.88 | 36.16 | 34.44 |
| 46279 | .3150 | | 8.000 | 8.0 | 65 | 22 | 0.50 | - | - | 41.16 | 39.37 | 37.58 | 35.79 |
| 46282 | .3150 | | 8.000 | 8.0 | 100 | 40 | 0.50 | - | - | 59.54 | 56.95 | 54.36 | 51.77 |
| 46285 | .3150 | | 8.000 | 8.0 | 100 | 20 | 0.50 | 60 | 7.2 | 63.11 | 60.37 | 57.62 | 54.88 |
| 46288 | .3150 | | 8.000 | 8.0 | 150 | 40 | 0.50 | 100 | 7.2 | 83.77 | 80.12 | 76.48 | 72.84 |
| 46291 | .3750 | 3/8" | 9.525 | 3/8" | 2" | 1/2" | .025" | - | - | 45.14 | 43.18 | 41.21 | 39.25 |
| 46294 | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 7/8" | .025" | - | - | 50.15 | 47.97 | 45.79 | 43.61 |
| 46297 | .3750 | 3/8" | 9.525 | 3/8" | 3" | 1-1/4" | .025" | - | - | 58.60 | 56.06 | 53.51 | 50.96 |
| 46300 | .3750 | 3/8" | 9.525 | 3/8" | 4" | 1-5/8" | .025" | - | - | 63.01 | 60.27 | 57.53 | 54.79 |
| 46303 | .3750 | 3/8" | 9.525 | 3/8" | 4" | 1" | .025" | 2" | .345" | 66.59 | 63.69 | 60.80 | 57.90 |
| 46306 | .3750 | 3/8" | 9.525 | 3/8" | 6" | 1-1/2" | .025" | 4" | .345" | 85.50 | 81.79 | 78.07 | 74.35 |



† *Metric equivalents are for reference only*

| EDP# | $d_1$ † Diameter Decimal | Diameter | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | $c$ Chamfer Length | $l_3$ Reach Length | $d_3$ Neck Diameter | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 46309 | .3937 | | 10.000 | 10.0 | 50 | 16 | 0.50 | - | - | 55.81 | 53.38 | 50.96 | 48.53 |
| 46312 | .3937 | | 10.000 | 10.0 | 70 | 22 | 0.50 | - | - | 58.85 | 56.29 | 53.73 | 51.17 |
| 46315 | .3937 | | 10.000 | 10.0 | 100 | 40 | 0.50 | - | - | 73.30 | 70.11 | 66.93 | 63.74 |
| 46318 | .3937 | | 10.000 | 10.0 | 100 | 20 | 0.50 | 60 | 9.2 | 76.88 | 73.54 | 70.19 | 66.85 |
| 46321 | .3937 | | 10.000 | 10.0 | 150 | 40 | 0.50 | 100 | 9.2 | 96.42 | 92.22 | 88.03 | 83.84 |
| 46324 | .4724 | | 12.000 | 12.0 | 65 | 19 | 0.80 | - | - | 64.16 | 61.37 | 58.58 | 55.79 |
| 46327 | .4724 | | 12.000 | 12.0 | 75 | 32 | 0.80 | - | - | 72.54 | 69.39 | 66.23 | 63.08 |
| 46330 | .4724 | | 12.000 | 12.0 | 100 | 50 | 0.80 | - | - | 85.03 | 81.33 | 77.64 | 73.94 |
| 46333 | .4724 | | 12.000 | 12.0 | 100 | 25 | 0.80 | 60 | 11.2 | 88.61 | 84.76 | 80.90 | 77.05 |
| 46336 | .4724 | | 12.000 | 12.0 | 150 | 40 | 0.80 | 100 | 11.2 | 120.01 | 114.80 | 109.58 | 104.36 |
| 46339 | .5000 | 1/2" | 12.700 | 1/2" | 2-1/2" | 5/8" | .030" | - | - | 61.07 | 58.41 | 55.76 | 53.10 |
| 46342 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1-1/4" | .030" | - | - | 69.21 | 66.20 | 63.19 | 60.18 |
| 46345 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 2" | .030" | - | - | 80.93 | 77.41 | 73.89 | 70.37 |
| 46348 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 1" | .030" | 2" | .470" | 84.50 | 80.83 | 77.15 | 73.48 |
| 46351 | .5000 | 1/2" | 12.700 | 1/2" | 6" | 1-1/2" | .030" | 4" | .470" | 118.17 | 113.04 | 107.90 | 102.76 |
| 46354 | .6250 | 5/8" | 15.875 | 5/8" | 3" | 3/4" | .035" | - | - | 108.33 | 103.62 | 98.91 | 94.20 |
| 46357 | .6250 | 5/8" | 15.875 | 5/8" | 3-1/2" | 1-1/4" | .035" | - | - | 111.52 | 106.67 | 101.82 | 96.97 |
| 46360 | .6250 | 5/8" | 15.875 | 5/8" | 4" | 1-5/8" | .035" | - | - | 118.13 | 112.99 | 107.86 | 102.72 |
| 46363 | .6250 | 5/8" | 15.875 | 5/8" | 4" | 1" | .035" | 2" | .595" | 121.72 | 116.42 | 111.13 | 105.84 |
| 46366 | .6250 | 5/8" | 15.875 | 5/8" | 6" | 1-1/2" | .035" | 3" | .595" | 170.97 | 163.54 | 156.10 | 148.67 |
| 46369 | .6250 | 5/8" | 15.875 | 5/8" | 6" | 1-1/2" | .035" | 4" | .595" | 170.97 | 163.54 | 156.10 | 148.67 |
| 46372 | .6299 | | 16.000 | 16.0 | 75 | 19 | 1.00 | - | - | 114.01 | 109.05 | 104.10 | 99.14 |
| 46375 | .6299 | | 16.000 | 16.0 | 88 | 32 | 1.00 | - | - | 116.96 | 111.87 | 106.79 | 101.70 |
| 46378 | .6299 | | 16.000 | 16.0 | 100 | 50 | 1.00 | - | - | 125.21 | 119.77 | 114.32 | 108.88 |
| 46381 | .6299 | | 16.000 | 16.0 | 100 | 20 | 1.00 | 50 | 15.2 | 128.79 | 123.19 | 117.59 | 111.99 |
| 46384 | .6299 | | 16.000 | 16.0 | 150 | 40 | 1.00 | 100 | 15.2 | 172.80 | 165.29 | 157.77 | 150.26 |
| 46387 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-5/8" | .040" | - | - | 163.08 | 155.99 | 148.90 | 141.81 |
| 46390 | .7500 | 3/4" | 19.050 | 3/4" | 5" | 2-1/4" | .040" | - | - | 228.54 | 218.60 | 208.67 | 198.73 |
| 46393 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 7/8" | .040" | 2" | .720" | 166.67 | 159.42 | 152.18 | 144.93 |
| 46396 | .7500 | 3/4" | 19.050 | 3/4" | 6" | 1-1/2" | .040" | 3" | .720" | 275.16 | 263.20 | 251.23 | 239.27 |
| 46399 | .7500 | 3/4" | 19.050 | 3/4" | 6" | 1-1/2" | .040" | 4" | .720" | 275.16 | 263.20 | 251.23 | 239.27 |
| 46402 | .7874 | | 20.000 | 20.0 | 100 | 22 | 1.00 | - | - | 230.12 | 220.11 | 210.11 | 200.10 |
| 46405 | .7874 | | 20.000 | 20.0 | 100 | 40 | 1.00 | - | - | 230.12 | 220.11 | 210.11 | 200.10 |
| 46408 | .7874 | | 20.000 | 20.0 | 100 | 30 | 1.00 | 50 | 19.2 | 233.69 | 223.53 | 213.37 | 203.21 |
| 46411 | .7874 | | 20.000 | 20.0 | 150 | 40 | 1.00 | 100 | 19.2 | 285.43 | 273.02 | 260.61 | 248.20 |
| 46414 | 1.000 | 1" | 25.400 | 1" | 4" | 1-1/2" | .040" | - | - | 276.92 | 264.88 | 252.84 | 240.80 |
| 46417 | 1.000 | 1" | 25.400 | 1" | 5" | 2" | .040" | - | - | 342.67 | 327.77 | 312.87 | 297.97 |
| 46420 | 1.000 | 1" | 25.400 | 1" | 6" | 2" | .040" | 3-1/2" | .970" | 460.44 | 440.42 | 420.40 | 400.38 |
| 46423 | 1.000 | 1" | 25.400 | 1" | 7" | 2" | .040" | 4-1/2" | .970" | 605.50 | 579.17 | 552.85 | 526.52 |



# Series VHM

.1575" - .3543"
(4.000mm - 9.000mm)

Z=4 | 30° | 45° | TECH PAGES 292-293

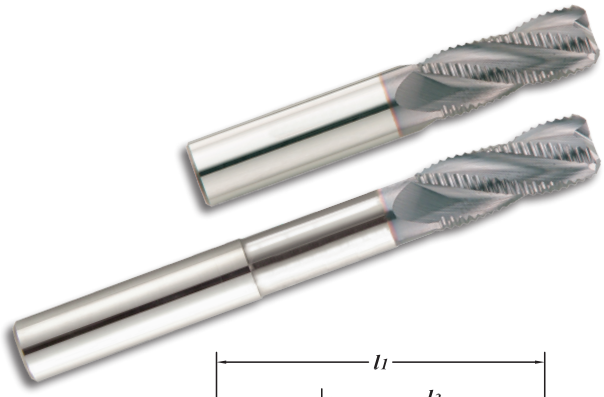
| TOLERANCES | |
|---|---|
| $d_1$ | +.000" –.002" (+.000 –.050mm) |
| $d_2$ | h6 |
| $d_3$ | +.000" –.005" (+.000 –.127mm) |

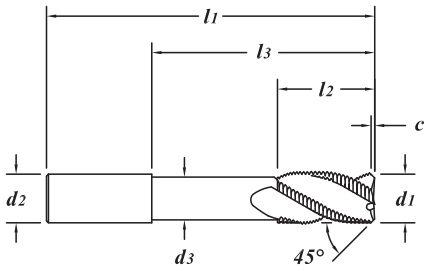
Recommended for stainless steel, inconel, pH materials, cold rolled steel, titanium, cast iron and tool steels under 40Rc

## Staggered Flute Knuckle Rougher / Ripper

### AlTiN Coating

Solid submicron grain carbide end mill - center cutting
State-of-the-art rougher using VRX technology
Reduces tool pressure for more aggressive machining
Recommended for pocket milling
Variable flute geometry





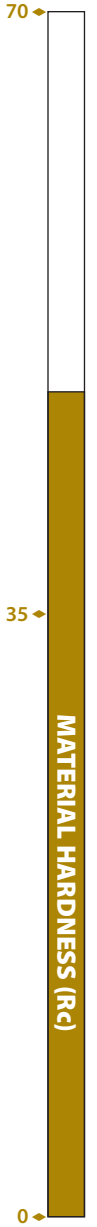

MATERIAL HARDNESS (Rc)
70
35
0

| EDP# | $d_1$ † Decimal | $d_1$ † Diameter | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | $c$ Chamfer Length | $l_3$ Reach Length | $d_3$ Neck Diameter | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 49450 | .1575 | | 4.000 | 6.0 | 50 | 8 | 0.30 | - | - | 37.81 | 36.17 | 34.52 | 32.88 |
| 49455 | .1575 | | 4.000 | 6.0 | 50 | 12 | 0.30 | - | - | 37.81 | 36.17 | 34.52 | 32.88 |
| 49460 | .1575 | | 4.000 | 6.0 | 65 | 10 | 0.30 | 30 | 3.4 | 43.96 | 42.05 | 40.14 | 38.23 |
| 49465 | .1575 | | 4.000 | 6.0 | 75 | 15 | 0.30 | 40 | 3.4 | 56.34 | 53.89 | 51.44 | 48.99 |
| 49470 | .1875 | 3/16" | 4.763 | 3/16" | 2" | 5/16" | .015" | - | - | 31.52 | 30.15 | 28.78 | 27.41 |
| 49475 | .1875 | 3/16" | 4.763 | 3/16" | 2" | 9/16" | .015" | - | - | 31.52 | 30.15 | 28.78 | 27.41 |
| 49480 | .1875 | 3/16" | 4.763 | 3/16" | 3" | 1" | .015" | - | - | 44.21 | 42.28 | 40.36 | 38.44 |
| 49485 | .1875 | 3/16" | 4.763 | 3/16" | 3" | 1/2" | .015" | 1-1/2" | .165" | 47.78 | 45.71 | 43.63 | 41.55 |
| 49490 | .2362 | | 6.000 | 6.0 | 50 | 12 | 0.50 | - | - | 37.56 | 35.93 | 34.29 | 32.66 |
| 49500 | .2362 | | 6.000 | 6.0 | 65 | 19 | 0.50 | - | - | 41.58 | 39.78 | 37.97 | 36.16 |
| 49505 | .2362 | | 6.000 | 6.0 | 100 | 15 | 0.50 | 40 | 5.4 | 57.73 | 55.22 | 52.71 | 50.20 |
| 49510 | .2362 | | 6.000 | 6.0 | 100 | 20 | 0.50 | 60 | 5.4 | 57.73 | 55.22 | 52.71 | 50.20 |
| 49520 | .2500 | 1/4" | 6.350 | 1/4" | 2" | 3/8" | .020" | - | - | 36.08 | 34.51 | 32.94 | 31.37 |
| 49540 | .2500 | 1/4" | 6.350 | 1/4" | 2-1/2" | 3/4" | .020" | - | - | 41.15 | 39.36 | 37.57 | 35.78 |
| 49543 | .2500 | 1/4" | 6.350 | 1/4" | 4" | 1-1/2" | .020" | - | - | 52.49 | 50.20 | 47.92 | 45.64 |
| 49547 | .2500 | 1/4" | 6.350 | 1/4" | 4" | 1" | .020" | 2" | .225" | 56.05 | 53.61 | 51.18 | 48.74 |
| 49550 | .2756 | | 7.000 | 8.0 | 50 | 12 | 0.50 | - | - | 51.08 | 48.86 | 46.64 | 44.42 |
| 49555 | .2756 | | 7.000 | 8.0 | 65 | 22 | 0.50 | - | - | 55.23 | 52.83 | 50.43 | 48.03 |
| 49570 | .2812 | 9/32" | 7.142 | 5/16" | 2" | 7/16" | .020" | - | - | 50.17 | 47.99 | 45.81 | 43.63 |
| 49575 | .2812 | 9/32" | 7.142 | 5/16" | 2-1/2" | 13/16" | .020" | - | - | 54.04 | 51.69 | 49.34 | 46.99 |
| 49580 | .3125 | 5/16" | 7.938 | 5/16" | 2" | 7/16" | .020" | - | - | 43.84 | 41.93 | 40.03 | 38.12 |
| 49600 | .3125 | 5/16" | 7.938 | 5/16" | 2-1/2" | 13/16" | .020" | - | - | 47.24 | 45.19 | 43.13 | 41.08 |
| 49603 | .3125 | 5/16" | 7.938 | 5/16" | 4" | 1-1/2" | .020" | - | - | 66.61 | 63.71 | 60.82 | 57.92 |
| 49605 | .3125 | 5/16" | 7.938 | 5/16" | 4" | 1" | .020" | 2" | .285" | 70.18 | 67.13 | 64.08 | 61.03 |
| 49610 | .3150 | | 8.000 | 8.0 | 50 | 12 | 0.50 | - | - | 44.76 | 42.81 | 40.87 | 38.92 |
| 49620 | .3150 | | 8.000 | 8.0 | 65 | 22 | 0.50 | - | - | 48.23 | 46.13 | 44.04 | 41.94 |
| 49622 | .3150 | | 8.000 | 8.0 | 100 | 40 | 0.50 | - | - | 68.63 | 65.65 | 62.66 | 59.68 |
| 49623 | .3150 | | 8.000 | 8.0 | 100 | 20 | 0.50 | 60 | 7.4 | 72.22 | 69.08 | 65.94 | 62.80 |
| 49624 | .3150 | | 8.000 | 8.0 | 150 | 40 | 0.50 | 100 | 7.4 | 96.08 | 91.91 | 87.73 | 83.55 |
| 49625 | .3438 | 11/32" | 8.733 | 3/8" | 2" | 1/2" | .025" | - | - | 56.90 | 54.43 | 51.95 | 49.48 |
| 49630 | .3438 | 11/32" | 8.733 | 3/8" | 2-1/2" | 7/8" | .025" | - | - | 64.75 | 61.93 | 59.12 | 56.30 |
| 49635 | .3543 | | 9.000 | 10.0 | 50 | 14 | 0.50 | - | - | 69.78 | 66.75 | 63.71 | 60.68 |
| 49637 | .3543 | | 9.000 | 10.0 | 65 | 22 | 0.50 | - | - | 75.85 | 72.56 | 69.26 | 65.96 |



† *Metric equivalents are for reference only*

| EDP# | $d_1$ † Diameter Decimal | Diameter | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | $c$ Chamfer Length | $l_3$ Reach Length | $d_3$ Neck Diameter | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 49640 | .3750 | 3/8" | 9.525 | 3/8" | 2" | 1/2" | .025" | - | - | 50.28 | 48.09 | 45.91 | 43.72 |
| 49660 | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 7/8" | .025" | - | - | 57.22 | 54.74 | 52.25 | 49.76 |
| 49662 | .3750 | 3/8" | 9.525 | 3/8" | 3" | 1-1/4" | .025" | - | - | 65.70 | 62.84 | 59.99 | 57.13 |
| 49664 | .3750 | 3/8" | 9.525 | 3/8" | 4" | 1-5/8" | .025" | - | - | 72.11 | 68.97 | 65.84 | 62.70 |
| 49667 | .3750 | 3/8" | 9.525 | 3/8" | 4" | 1" | .025" | 2" | .355" | 75.68 | 72.39 | 69.10 | 65.81 |
| 49670 | .3937 | | 10.000 | 10.0 | 50 | 16 | 0.50 | - | - | 61.67 | 58.99 | 56.31 | 53.63 |
| 49680 | .3937 | | 10.000 | 10.0 | 70 | 22 | 0.50 | - | - | 67.01 | 64.10 | 61.18 | 58.27 |
| 49682 | .3937 | | 10.000 | 10.0 | 100 | 40 | 0.50 | - | - | 83.82 | 80.18 | 76.53 | 72.89 |
| 49684 | .3937 | | 10.000 | 10.0 | 100 | 20 | 0.50 | 40 | 9.4 | 87.40 | 83.60 | 79.80 | 76.00 |
| 49686 | .3937 | | 10.000 | 10.0 | 100 | 30 | 0.50 | 60 | 9.4 | 87.40 | 83.60 | 79.80 | 76.00 |
| 49690 | .4375 | 7/16" | 11.113 | 7/16" | 2-1/2" | 5/8" | .025" | - | - | 67.33 | 64.41 | 61.48 | 58.55 |
| 49700 | .4375 | 7/16" | 11.113 | 7/16" | 2-3/4" | 1" | .025" | - | - | 67.33 | 64.41 | 61.48 | 58.55 |
| 49710 | .4724 | | 12.000 | 12.0 | 65 | 19 | 0.80 | - | - | 72.31 | 69.17 | 66.02 | 62.88 |
| 49720 | .4724 | | 12.000 | 12.0 | 75 | 32 | 0.80 | - | - | 80.68 | 77.18 | 73.67 | 70.16 |
| 49725 | .4724 | | 12.000 | 12.0 | 100 | 50 | 0.80 | - | - | 95.58 | 91.42 | 87.27 | 83.11 |
| 49730 | .4724 | | 12.000 | 12.0 | 100 | 25 | 0.80 | 60 | 11.4 | 99.15 | 94.84 | 90.53 | 86.22 |
| 49735 | .4724 | | 12.000 | 12.0 | 150 | 40 | 0.80 | 100 | 11.4 | 134.79 | 128.93 | 123.07 | 117.21 |
| * 49740 | .5000 | 1/2" | 12.700 | 1/2" | 2-1/2" | 5/8" | .030" | - | - | 69.24 | 66.23 | 63.22 | 60.21 |
| * 49760 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1-1/4" | .030" | - | - | 77.37 | 74.01 | 70.64 | 67.28 |
| * 49761 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 2" | .030" | - | - | 91.46 | 87.48 | 83.51 | 79.53 |
| * 49762 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 1" | .030" | 2" | .480" | 95.04 | 90.90 | 86.77 | 82.64 |
| * 49764 | .5000 | 1/2" | 12.700 | 1/2" | 6" | 1-1/2" | .030" | 4" | .480" | 132.93 | 127.15 | 121.37 | 115.59 |
| * 49765 | .5512 | | 14.000 | 14.0 | 75 | 19 | 0.80 | - | - | 114.46 | 109.48 | 104.51 | 99.53 |
| * 49770 | .5512 | | 14.000 | 14.0 | 88 | 32 | 0.80 | - | - | 117.63 | 112.52 | 107.40 | 102.29 |
| * 49780 | .6250 | 5/8" | 15.875 | 5/8" | 3" | 3/4" | .035" | - | - | 120.09 | 114.87 | 109.65 | 104.43 |
| * 49800 | .6250 | 5/8" | 15.875 | 5/8" | 3-1/2" | 1-1/4" | .035" | - | - | 123.27 | 117.91 | 112.55 | 107.19 |
| * 49820 | .6250 | 5/8" | 15.875 | 5/8" | 4" | 1-5/8" | .035" | - | - | 129.88 | 124.23 | 118.59 | 112.94 |
| * 49824 | .6250 | 5/8" | 15.875 | 5/8" | 4" | 1" | .035" | 2" | .605" | 133.46 | 127.66 | 121.85 | 116.05 |
| * 49826 | .6250 | 5/8" | 15.875 | 5/8" | 6" | 1-1/2" | .035" | 3" | .605" | 188.31 | 180.13 | 171.94 | 163.75 |
| * 49828 | .6250 | 5/8" | 15.875 | 5/8" | 6" | 1-1/2" | .035" | 4" | .605" | 188.31 | 180.13 | 171.94 | 163.75 |
| * 49830 | .6299 | | 16.000 | 16.0 | 75 | 19 | 1.00 | - | - | 125.38 | 119.93 | 114.48 | 109.03 |
| * 49840 | .6299 | | 16.000 | 16.0 | 88 | 32 | 1.00 | - | - | 128.69 | 123.09 | 117.50 | 111.90 |
| * 49842 | .6299 | | 16.000 | 16.0 | 100 | 50 | 1.00 | - | - | 136.94 | 130.99 | 125.03 | 119.08 |
| * 49843 | .6299 | | 16.000 | 16.0 | 100 | 20 | 1.00 | 50 | 15.4 | 140.53 | 134.42 | 128.31 | 122.20 |
| * 49844 | .6299 | | 16.000 | 16.0 | 150 | 40 | 1.00 | 100 | 15.4 | 190.14 | 181.87 | 173.61 | 165.34 |
| * 49850 | .7087 | | 18.000 | 18.0 | 100 | 38 | 1.00 | - | - | 185.01 | 176.97 | 168.92 | 160.88 |
| * 49860 | .7500 | 3/4" | 19.050 | 3/4" | 3" | 7/8" | .040" | - | - | 173.41 | 165.87 | 158.33 | 150.79 |
| * 49880 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-5/8" | .040" | - | - | 177.00 | 169.30 | 161.61 | 153.91 |
| * 49882 | .7500 | 3/4" | 19.050 | 3/4" | 5" | 2-1/4" | .040" | - | - | 245.53 | 234.85 | 224.18 | 213.50 |
| * 49886 | .7500 | 3/4" | 19.050 | 3/4" | 6" | 1-1/2" | .040" | 3" | .730" | 295.21 | 282.37 | 269.54 | 256.70 |
| * 49887 | .7500 | 3/4" | 19.050 | 3/4" | 6" | 1-1/2" | .040" | 4" | .730" | 295.21 | 282.37 | 269.54 | 256.70 |
| * 49890 | .7874 | | 20.000 | 20.0 | 75 | 22 | 1.00 | - | - | 245.12 | 234.47 | 223.81 | 213.15 |
| * 49900 | .7874 | | 20.000 | 20.0 | 100 | 38 | 1.00 | - | - | 250.48 | 239.59 | 228.70 | 217.81 |
| * 49902 | .7874 | | 20.000 | 20.0 | 100 | 30 | 1.00 | 50 | 19.4 | 254.07 | 243.02 | 231.98 | 220.93 |
| * 49904 | .7874 | | 20.000 | 20.0 | 150 | 40 | 1.00 | 100 | 19.4 | 311.52 | 297.98 | 284.43 | 270.89 |
| * 49915 | .9843 | | 25.000 | 25.0 | 100 | 25 | 1.00 | - | - | 287.27 | 274.78 | 262.29 | 249.80 |
| * 49920 | .9843 | | 25.000 | 25.0 | 100 | 38 | 1.00 | - | - | 287.27 | 274.78 | 262.29 | 249.80 |
| * 49925 | 1.000 | 1" | 25.400 | 1" | 4" | 1" | .040" | - | - | 297.29 | 284.36 | 271.44 | 258.51 |
| * 49930 | 1.000 | 1" | 25.400 | 1" | 4" | 1-1/2" | .040" | - | - | 297.29 | 284.36 | 271.44 | 258.51 |
| * 49940 | 1.000 | 1" | 25.400 | 1" | 5" | 2" | .040" | - | - | 366.03 | 350.12 | 334.20 | 318.29 |




* - Tools with weldon flats

# Series A3 NEW ITEMS HIGH EFFICIENCY MILLING

.1575" - .2500"
(4.000mm - 6.350mm)

Z=3 | VAR | TECH PAGES 288-290

| TOLERANCES | |
|---|---|
| $d_1$ | +.000" –.001" (+.000mm –.025mm) |
| $d_2$ | h6 |
| $r$ | +.001" –.001" (+.025 –.025mm) |

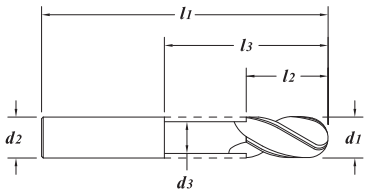
Recommended for aluminum

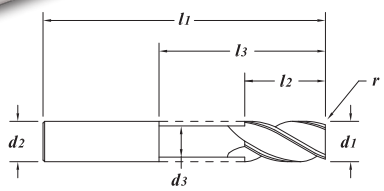
## Variable Helix End Mill

### Bright Finish

Solid submicron grain carbide end mill - center cutting
Engineered for High Efficiency Milling of Aluminum
Proprietary geometry with polished flutes breaks up harmonics
Improved end geometry provides superior floor finishes and increased plunge rates
Capable of running up to 40,000 RPM - reduces vibration and balance issues
Chip splitters and necks can be added within 48 hours





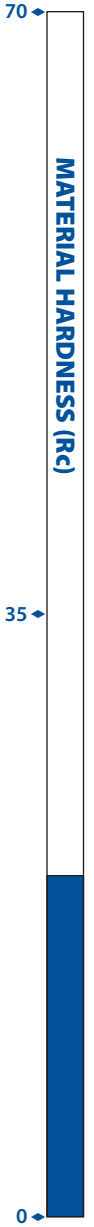

MATERIAL HARDNESS (Rc) 70 35 0

| | EDP# | Decimal | $d_1$ † Diameter | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | $r$ Corner Radius | $l_3$ Reach Length | $d_3$ Neck Diameter | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 07000 | .1575 | | 4.000 | 6.0 | 50 | 12 | - | 16 | 3.80 | 26.47 | 25.32 | 24.17 | 23.02 |
| | 07001 | .1575 | | 4.000 | 6.0 | 50 | 12 | 0.20 | 16 | 3.80 | 30.18 | 28.86 | 27.55 | 26.24 |
| | 07002 | .1575 | | 4.000 | 6.0 | 50 | 12 | 0.50 | 16 | 3.80 | 30.18 | 28.86 | 27.55 | 26.24 |
| | 07003 | .1575 | | 4.000 | 6.0 | 50 | 12 | 1.00 | 16 | 3.80 | 30.18 | 28.86 | 27.55 | 26.24 |
| | 07004 | .1875 | 3/16" | 4.763 | 3/16" | 2" | 1/2" | - | 5/8" | .179" | 19.17 | 18.34 | 17.50 | 16.67 |
| | 07005 | .1875 | 3/16" | 4.763 | 3/16" | 2" | 1/2" | .015" | 5/8" | .179" | 21.60 | 20.66 | 19.72 | 18.78 |
| | 07006 | .1875 | 3/16" | 4.763 | 3/16" | 2" | 1/2" | .030" | 5/8" | .179" | 21.60 | 20.66 | 19.72 | 18.78 |
| | 07007 | .1875 | 3/16" | 4.763 | 3/16" | 2" | 1/2" | .060" | 5/8" | .179" | 21.60 | 20.66 | 19.72 | 18.78 |
| | 07008 | .1875 | 3/16" | 4.763 | 3/16" | 2" | 1/2" | BALL | 5/8" | .179" | 21.60 | 20.66 | 19.72 | 18.78 |
| | 07009 | .1969 | | 5.000 | 6.0 | 65 | 16 | - | 26 | 4.70 | 26.88 | 25.71 | 24.54 | 23.37 |
| | 07010 | .1969 | | 5.000 | 6.0 | 65 | 16 | 0.20 | 26 | 4.70 | 32.06 | 30.67 | 29.27 | 27.88 |
| | 07011 | .1969 | | 5.000 | 6.0 | 65 | 16 | 0.50 | 26 | 4.70 | 32.06 | 30.67 | 29.27 | 27.88 |
| | 07012 | .1969 | | 5.000 | 6.0 | 65 | 16 | 1.00 | 26 | 4.70 | 32.06 | 30.67 | 29.27 | 27.88 |
| | 07013 | .2362 | | 6.000 | 6.0 | 65 | 19 | - | 26 | 5.70 | 25.79 | 24.67 | 23.55 | 22.43 |
| | 07014 | .2362 | | 6.000 | 6.0 | 65 | 19 | 0.20 | 26 | 5.70 | 30.74 | 29.40 | 28.07 | 26.73 |
| | 07015 | .2362 | | 6.000 | 6.0 | 65 | 19 | 0.50 | 26 | 5.70 | 30.74 | 29.40 | 28.07 | 26.73 |
| | 07016 | .2362 | | 6.000 | 6.0 | 65 | 19 | 1.00 | 26 | 5.70 | 30.74 | 29.40 | 28.07 | 26.73 |
| | 07017 | .2362 | | 6.000 | 6.0 | 65 | 19 | 1.50 | 26 | 5.70 | 30.74 | 29.40 | 28.07 | 26.73 |
| | 07018 | .2362 | | 6.000 | 6.0 | 65 | 19 | 2.00 | 26 | 5.70 | 30.74 | 29.40 | 28.07 | 26.73 |
| | 07019 | .2362 | | 6.000 | 6.0 | 65 | 19 | BALL | 26 | 5.70 | 30.74 | 29.40 | 28.07 | 26.73 |
| NEW | 07228 | .2500 | 1/4" | 6.350 | 1/4" | 2" | 3/8" | - | - | - | 18.48 | 17.68 | 16.87 | 16.07 |
| NEW | 07229 | .2500 | 1/4" | 6.350 | 1/4" | 2" | 1/2" | - | - | - | 18.48 | 17.68 | 16.87 | 16.07 |
| | 07020 | .2500 | 1/4" | 6.350 | 1/4" | 2-1/2" | 3/4" | - | - | - | 19.45 | 18.60 | 17.76 | 16.91 |
| | 07021 | .2500 | 1/4" | 6.350 | 1/4" | 2-1/2" | 3/4" | .015" | - | - | 24.15 | 23.10 | 22.05 | 21.00 |
| | 07022 | .2500 | 1/4" | 6.350 | 1/4" | 2-1/2" | 3/4" | .030" | - | - | 24.15 | 23.10 | 22.05 | 21.00 |
| | 07023 | .2500 | 1/4" | 6.350 | 1/4" | 2-1/2" | 3/4" | .060" | - | - | 24.15 | 23.10 | 22.05 | 21.00 |
| | 07024 | .2500 | 1/4" | 6.350 | 1/4" | 2-1/2" | 3/4" | .090" | - | - | 24.15 | 23.10 | 22.05 | 21.00 |
| | 07025 | .2500 | 1/4" | 6.350 | 1/4" | 2-1/2" | 3/4" | BALL | - | - | 24.15 | 23.10 | 22.05 | 21.00 |
| | 07026 | .2500 | 1/4" | 6.350 | 1/4" | 3" | 1" | - | - | - | 33.28 | 31.83 | 30.39 | 28.94 |
| | 07027 | .2500 | 1/4" | 6.350 | 1/4" | 3" | 1" | .030" | - | - | 39.11 | 37.41 | 35.71 | 34.01 |
| | 07028 | .2500 | 1/4" | 6.350 | 1/4" | 3" | 1" | .060" | - | - | 39.11 | 37.41 | 35.71 | 34.01 |
| | 07029 | .2500 | 1/4" | 6.350 | 1/4" | 3" | 3/8" | - | 1-1/8" | .235" | 38.66 | 36.98 | 35.30 | 33.62 |
| | 07030 | .2500 | 1/4" | 6.350 | 1/4" | 3" | 3/8" | .015" | 1-1/8" | .235". | 44.49 | 42.56 | 40.62 | 38.69 |
| | 07031 | .2500 | 1/4" | 6.350 | 1/4" | 3" | 3/8" | .030" | 1-1/8" | .235" | 44.49 | 42.56 | 40.62 | 38.69 |
| | 07032 | .2500 | 1/4" | 6.350 | 1/4" | 3" | 3/8" | .060" | 1-1/8" | .235" | 44.49 | 42.56 | 40.62 | 38.69 |



† *Metric equivalents are for reference only*

| EDP# | $d_1$ † Diameter Decimal | Diameter | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | $r$ Corner Radius | $l_3$ Reach Length | $d_3$ Neck Diameter | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 07033 | .3150 | | 8.000 | 8.0 | 65 | 19 | - | 26 | 7.40 | 34.49 | 32.99 | 31.49 | 29.99 |
| 07034 | .3150 | | 8.000 | 8.0 | 65 | 19 | 0.20 | 26 | 7.40 | 38.99 | 37.29 | 35.60 | 33.90 |
| 07035 | .3150 | | 8.000 | 8.0 | 65 | 19 | 0.50 | 26 | 7.40 | 38.99 | 37.29 | 35.60 | 33.90 |
| 07036 | .3150 | | 8.000 | 8.0 | 65 | 19 | 1.00 | 26 | 7.40 | 38.99 | 37.29 | 35.60 | 33.90 |
| 07037 | .3150 | | 8.000 | 8.0 | 65 | 19 | 1.50 | 26 | 7.40 | 38.99 | 37.29 | 35.60 | 33.90 |
| 07038 | .3150 | | 8.000 | 8.0 | 65 | 19 | 2.00 | 26 | 7.40 | 38.99 | 37.29 | 35.60 | 33.90 |
| 07039 | .3150 | | 8.000 | 8.0 | 65 | 19 | 3.00 | 26 | 7.40 | 38.99 | 37.29 | 35.60 | 33.90 |
| 07040 | .3150 | | 8.000 | 8.0 | 65 | 19 | BALL | 26 | 7.40 | 38.99 | 37.29 | 35.60 | 33.90 |
| 07041 | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 1" | - | - | - | 33.68 | 32.22 | 30.75 | 29.29 |
| 07042 | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 1" | .010" | - | - | 38.32 | 36.65 | 34.99 | 33.32 |
| 07043 | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 1" | .015" | - | - | 38.32 | 36.65 | 34.99 | 33.32 |
| 07044 | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 1" | .020" | - | - | 38.32 | 36.65 | 34.99 | 33.32 |
| 07045 | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 1" | .030" | - | - | 38.32 | 36.65 | 34.99 | 33.32 |
| 07046 | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 1" | .060" | - | - | 38.32 | 36.65 | 34.99 | 33.32 |
| 07047 | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 1" | .090" | - | - | 38.32 | 36.65 | 34.99 | 33.32 |
| 07048 | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 1" | .120" | - | - | 38.32 | 36.65 | 34.99 | 33.32 |
| 07049 | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 1" | BALL | - | - | 38.32 | 36.65 | 34.99 | 33.32 |
| 07050 | .3750 | 3/8" | 9.525 | 3/8" | 3" | 1-1/4" | - | - | - | 46.39 | 44.37 | 42.36 | 40.34 |
| 07051 | .3750 | 3/8" | 9.525 | 3/8" | 3" | 1-1/4" | .015" | - | - | 52.38 | 50.11 | 47.83 | 45.55 |
| 07052 | .3750 | 3/8" | 9.525 | 3/8" | 3" | 1-1/4" | .030" | - | - | 52.38 | 50.11 | 47.83 | 45.55 |
| 07053 | .3750 | 3/8" | 9.525 | 3/8" | 3" | 1-1/4" | .060" | - | - | 52.38 | 50.11 | 47.83 | 45.55 |
| 07054 | .3750 | 3/8" | 9.525 | 3/8" | 3" | 1-1/4" | .120" | - | - | 52.38 | 50.11 | 47.83 | 45.55 |
| 07055 | .3750 | 3/8" | 9.525 | 3/8" | 3" | 1/2" | - | 1-1/8" | .355" | 51.77 | 49.52 | 47.27 | 45.02 |
| 07056 | .3750 | 3/8" | 9.525 | 3/8" | 3" | 1/2" | .015" | 1-1/8" | .355" | 57.76 | 55.25 | 52.74 | 50.23 |
| 07057 | .3750 | 3/8" | 9.525 | 3/8" | 3" | 1/2" | .030" | 1-1/8" | .355" | 57.76 | 55.25 | 52.74 | 50.23 |
| 07058 | .3750 | 3/8" | 9.525 | 3/8" | 3" | 1/2" | .060" | 1-1/8" | .355" | 57.76 | 55.25 | 52.74 | 50.23 |
| 07059 | .3750 | 3/8" | 9.525 | 3/8" | 3" | 1/2" | .090" | 1-1/8" | .355" | 57.76 | 55.25 | 52.74 | 50.23 |
| 07060 | .3750 | 3/8" | 9.525 | 3/8" | 3" | 1/2" | .120" | 1-1/8" | .355" | 57.76 | 55.25 | 52.74 | 50.23 |
| 07061 | .3750 | 3/8" | 9.525 | 3/8" | 4" | 1/2" | - | 2-1/8" | .355" | 62.47 | 59.75 | 57.04 | 54.32 |
| 07062 | .3750 | 3/8" | 9.525 | 3/8" | 4" | 1/2" | .015" | 2-1/8" | .355" | 71.20 | 68.10 | 65.01 | 61.91 |
| 07063 | .3750 | 3/8" | 9.525 | 3/8" | 4" | 1/2" | .020" | 2-1/8" | .355" | 71.20 | 68.10 | 65.01 | 61.91 |
| 07064 | .3750 | 3/8" | 9.525 | 3/8" | 4" | 1/2" | .030" | 2-1/8" | .355" | 71.20 | 68.10 | 65.01 | 61.91 |
| 07065 | .3750 | 3/8" | 9.525 | 3/8" | 4" | 1/2" | .060" | 2-1/8" | .355" | 71.20 | 68.10 | 65.01 | 61.91 |
| 07066 | .3750 | 3/8" | 9.525 | 3/8" | 4" | 1/2" | .090" | 2-1/8" | .355" | 71.20 | 68.10 | 65.01 | 61.91 |
| 07067 | .3750 | 3/8" | 9.525 | 3/8" | 4" | 1/2" | .120" | 2-1/8" | .355" | 71.20 | 68.10 | 65.01 | 61.91 |
| 07068 | .3937 | | 10.000 | 10.0 | 70 | 22 | - | 30 | 9.40 | 56.49 | 54.03 | 51.58 | 49.12 |
| 07069 | .3937 | | 10.000 | 10.0 | 70 | 22 | 0.20 | 30 | 9.40 | 64.87 | 62.05 | 59.23 | 56.41 |
| 07070 | .3937 | | 10.000 | 10.0 | 70 | 22 | 0.50 | 30 | 9.40 | 64.87 | 62.05 | 59.23 | 56.41 |
| 07071 | .3937 | | 10.000 | 10.0 | 70 | 22 | 1.00 | 30 | 9.40 | 64.87 | 62.05 | 59.23 | 56.41 |
| 07072 | .3937 | | 10.000 | 10.0 | 70 | 22 | 1.50 | 30 | 9.40 | 64.87 | 62.05 | 59.23 | 56.41 |
| 07073 | .3937 | | 10.000 | 10.0 | 70 | 22 | 2.00 | 30 | 9.40 | 64.87 | 62.05 | 59.23 | 56.41 |
| 07074 | .3937 | | 10.000 | 10.0 | 70 | 22 | 3.00 | 30 | 9.40 | 64.87 | 62.05 | 59.23 | 56.41 |
| 07075 | .3937 | | 10.000 | 10.0 | 70 | 22 | BALL | 30 | 9.40 | 64.87 | 62.05 | 59.23 | 56.41 |
| 07076 | .3937 | | 10.000 | 10.0 | 100 | 40 | - | - | - | 65.50 | 62.66 | 59.81 | 56.96 |
| 07077 | .3937 | | 10.000 | 10.0 | 100 | 22 | - | 55 | 9.40 | 76.82 | 73.48 | 70.14 | 66.80 |
| 07078 | .4724 | | 12.000 | 12.0 | 88 | 26 | - | 38 | 11.40 | 83.40 | 79.77 | 76.15 | 72.52 |
| 07079 | .4724 | | 12.000 | 12.0 | 88 | 26 | 0.20 | 38 | 11.40 | 98.46 | 94.18 | 89.90 | 85.62 |
| 07212 | .4724 | | 12.000 | 12.0 | 88 | 26 | 0.50 | 38 | 11.40 | 98.46 | 94.18 | 89.90 | 85.62 |
| 07081 | .4724 | | 12.000 | 12.0 | 88 | 26 | 1.00 | 38 | 11.40 | 98.46 | 94.18 | 89.90 | 85.62 |
| 07082 | .4724 | | 12.000 | 12.0 | 88 | 26 | 1.50 | 38 | 11.40 | 98.46 | 94.18 | 89.90 | 85.62 |
| 07083 | .4724 | | 12.000 | 12.0 | 88 | 26 | 2.00 | 38 | 11.40 | 98.46 | 94.18 | 89.90 | 85.62 |
| 07084 | .4724 | | 12.000 | 12.0 | 88 | 26 | 3.00 | 38 | 11.40 | 98.46 | 94.18 | 89.90 | 85.62 |
| 07085 | .4724 | | 12.000 | 12.0 | 88 | 26 | 4.00 | 38 | 11.40 | 98.46 | 94.18 | 89.90 | 85.62 |
| 07086 | .4724 | | 12.000 | 12.0 | 88 | 26 | BALL | 38 | 11.40 | 98.46 | 94.18 | 89.90 | 85.62 |




*continued* ⟶

## Series A3 *(continued)*

.4724" - .6250"
(12.000mm - 15.875mm)



| | EDP# | $d_1$ † Diameter Decimal | | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | $r$ Corner Radius | $l_3$ Reach Length | $d_3$ Neck Diameter | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 07213 | .4724 | | 12.000 | 12.0 | 88 | 36 | - | - | - | 77.34 | 73.98 | 70.61 | 67.25 |
| | 07088 | .4724 | | 12.000 | 12.0 | 88 | 36 | 0.20 | - | - | 92.97 | 88.92 | 84.88 | 80.84 |
| | 07089 | .4724 | | 12.000 | 12.0 | 88 | 36 | 0.50 | - | - | 92.97 | 88.92 | 84.88 | 80.84 |
| | 07090 | .4724 | | 12.000 | 12.0 | 88 | 36 | 1.00 | - | - | 92.97 | 88.92 | 84.88 | 80.84 |
| | 07091 | .4724 | | 12.000 | 12.0 | 88 | 36 | 1.50 | - | - | 92.97 | 88.92 | 84.88 | 80.84 |
| | 07092 | .4724 | | 12.000 | 12.0 | 88 | 36 | 2.00 | - | - | 92.97 | 88.92 | 84.88 | 80.84 |
| | 07093 | .4724 | | 12.000 | 12.0 | 88 | 36 | 3.00 | - | - | 92.97 | 88.92 | 84.88 | 80.84 |
| | 07094 | .4724 | | 12.000 | 12.0 | 88 | 36 | 4.00 | - | - | 92.97 | 88.92 | 84.88 | 80.84 |
| | 07095 | .4724 | | 12.000 | 12.0 | 88 | 36 | BALL | - | - | 92.97 | 88.92 | 84.88 | 80.84 |
| | 07215 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1" | - | - | - | 55.26 | 52.86 | 50.45 | 48.05 |
| | 07216 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1" | .030" | - | - | 72.55 | 69.40 | 66.24 | 63.09 |
| | 07217 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1" | BALL | - | - | 72.55 | 69.40 | 66.24 | 63.09 |
| | 07096 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1-1/4" | - | - | - | 55.26 | 52.86 | 50.45 | 48.05 |
| | 07097 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1-1/4" | .010" | - | - | 72.55 | 69.40 | 66.24 | 63.09 |
| | 07098 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1-1/4" | .015" | - | - | 72.55 | 69.40 | 66.24 | 63.09 |
| | 07099 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1-1/4" | .020" | - | - | 72.55 | 69.40 | 66.24 | 63.09 |
| | 07100 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1-1/4" | .030" | - | - | 72.55 | 69.40 | 66.24 | 63.09 |
| | 07101 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1-1/4" | .060" | - | - | 72.55 | 69.40 | 66.24 | 63.09 |
| | 07102 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1-1/4" | .090" | - | - | 72.55 | 69.40 | 66.24 | 63.09 |
| | 07103 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1-1/4" | .120" | - | - | 72.55 | 69.40 | 66.24 | 63.09 |
| | 07218 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1-1/4" | .125" | - | - | 72.55 | 69.40 | 66.24 | 63.09 |
| | 07104 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1-1/4" | .190" | - | - | 72.55 | 69.40 | 66.24 | 63.09 |
| | 07105 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1-1/4" | BALL | - | - | 72.55 | 69.40 | 66.24 | 63.09 |
| | 07219 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1/2" | .030" | 1-1/2" | .470" | 77.94 | 74.55 | 71.16 | 67.77 |
| | 07220 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1/2" | .090" | 1-1/2" | .470" | 77.94 | 74.55 | 71.16 | 67.77 |
| NEW | 07230 | .5000 | 1/2" | 12.700 | 1/2" | 3-1/2" | 1-1/2" | - | - | - | 72.55 | 69.40 | 66.24 | 63.09 |
| | 07221 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 1-5/8" | - | - | - | 74.88 | 71.62 | 68.37 | 65.11 |
| | 07222 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 1-5/8" | .030" | - | - | 84.31 | 80.64 | 76.98 | 73.31 |
| | 07223 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 1-5/8" | BALL | - | - | 84.31 | 80.64 | 76.98 | 73.31 |
| | 07106 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 2-1/16" | - | - | - | 74.88 | 71.62 | 68.37 | 65.11 |
| | 07107 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 2-1/16" | .015" | - | - | 84.31 | 80.64 | 76.98 | 73.31 |
| | 07108 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 2-1/16" | .030" | - | - | 84.31 | 80.64 | 76.98 | 73.31 |
| | 07109 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 2-1/16" | .060" | - | - | 84.31 | 80.64 | 76.98 | 73.31 |
| | 07110 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 2-1/16" | .120" | - | - | 84.31 | 80.64 | 76.98 | 73.31 |
| | 07224 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 1/2" | .090" | 2" | .470" | 95.60 | 91.44 | 87.29 | 83.13 |
| | 07225 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 1/2" | .190" | 2" | .470" | 95.60 | 91.44 | 87.29 | 83.13 |
| | 07111 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 5/8" | - | 2-1/4" | .475" | 86.18 | 82.43 | 78.69 | 74.94 |
| | 07112 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 5/8" | .015" | 2-1/4" | .475" | 95.60 | 91.44 | 87.29 | 83.13 |
| | 07113 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 5/8" | .030" | 2-1/4" | .475" | 95.60 | 91.44 | 87.29 | 83.13 |
| | 07114 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 5/8" | .060" | 2-1/4" | .475" | 95.60 | 91.44 | 87.29 | 83.13 |
| | 07115 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 5/8" | BALL | 2-1/4" | .475" | 95.60 | 91.44 | 87.29 | 83.13 |
| | 07116 | .6250 | 5/8" | 15.875 | 5/8" | 4" | 1-5/8" | - | - | - | 118.96 | 113.78 | 108.61 | 103.44 |
| | 07214 | .6250 | 5/8" | 15.875 | 5/8" | 4" | 1-5/8" | .030" | - | - | 130.38 | 124.71 | 119.04 | 113.37 |
| | 07118 | .6250 | 5/8" | 15.875 | 5/8" | 4" | 1-5/8" | .060" | - | - | 130.38 | 124.71 | 119.04 | 113.37 |
| | 07119 | .6250 | 5/8" | 15.875 | 5/8" | 4" | 1-5/8" | .090" | - | - | 130.38 | 124.71 | 119.04 | 113.37 |
| | 07120 | .6250 | 5/8" | 15.875 | 5/8" | 4" | 1-5/8" | .120" | - | - | 130.38 | 124.71 | 119.04 | 113.37 |
| | 07121 | .6250 | 5/8" | 15.875 | 5/8" | 4" | 3/4" | - | 2-3/8" | .590" | 129.72 | 124.08 | 118.44 | 112.80 |
| | 07122 | .6250 | 5/8" | 15.875 | 5/8" | 4" | 3/4" | .030" | 2-3/8" | .590" | 141.14 | 135.00 | 128.87 | 122.73 |
| | 07123 | .6250 | 5/8" | 15.875 | 5/8" | 4" | 3/4" | .060" | 2-3/8" | .590" | 141.14 | 135.00 | 128.87 | 122.73 |
| | 07124 | .6250 | 5/8" | 15.875 | 5/8" | 4" | 3/4" | .120" | 2-3/8" | .590" | 141.14 | 135.00 | 128.87 | 122.73 |
| | 07125 | .6250 | 5/8" | 15.875 | 5/8" | 4" | 3/4" | .190" | 2-3/8" | .590" | 141.14 | 135.00 | 128.87 | 122.73 |



† *Metric equivalents are for reference only*

| | EDP# | $d_1$ † Diameter Decimal | | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | $r$ Corner Radius | $l_3$ Reach Length | $d_3$ Neck Diameter | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 07126 | .6299 | | 16.000 | 16.0 | 100 | 24 | - | 50 | 15.40 | 131.93 | 126.19 | 120.46 | 114.72 |
| | 07127 | .6299 | | 16.000 | 16.0 | 100 | 24 | 0.50 | 50 | 15.40 | 144.00 | 137.74 | 131.48 | 125.22 |
| | 07128 | .6299 | | 16.000 | 16.0 | 100 | 24 | 1.00 | 50 | 15.40 | 144.00 | 137.74 | 131.48 | 125.22 |
| | 07129 | .6299 | | 16.000 | 16.0 | 100 | 24 | 1.50 | 50 | 15.40 | 144.00 | 137.74 | 131.48 | 125.22 |
| | 07130 | .6299 | | 16.000 | 16.0 | 100 | 24 | 3.00 | 50 | 15.40 | 144.00 | 137.74 | 131.48 | 125.22 |
| NEW | 07131 | .6299 | | 16.000 | 16.0 | 100 | 24 | 6.00 | 50 | 15.40 | 144.00 | 137.74 | 131.48 | 125.22 |
| | 07132 | .6299 | | 16.000 | 16.0 | 100 | 32 | - | 50 | 15.40 | 131.93 | 126.19 | 120.46 | 114.72 |
| | 07133 | .6299 | | 16.000 | 16.0 | 100 | 32 | 0.50 | 50 | 15.40 | 144.00 | 137.74 | 131.48 | 125.22 |
| | 07134 | .6299 | | 16.000 | 16.0 | 100 | 32 | 1.00 | 50 | 15.40 | 144.00 | 137.74 | 131.48 | 125.22 |
| | 07135 | .6299 | | 16.000 | 16.0 | 100 | 32 | 1.50 | 50 | 15.40 | 144.00 | 137.74 | 131.48 | 125.22 |
| | 07136 | .6299 | | 16.000 | 16.0 | 100 | 32 | 3.00 | 50 | 15.40 | 144.00 | 137.74 | 131.48 | 125.22 |
| | 07137 | .6299 | | 16.000 | 16.0 | 100 | 32 | 6.00 | 50 | 15.40 | 144.00 | 137.74 | 131.48 | 125.22 |
| | 07138 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-3/4" | - | - | - | 153.73 | 147.05 | 140.36 | 133.68 |
| | 07139 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-3/4" | .015" | - | - | 171.15 | 163.71 | 156.27 | 148.83 |
| | 07140 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-3/4" | .030" | - | - | 171.15 | 163.71 | 156.27 | 148.83 |
| | 07141 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-3/4" | .060" | - | - | 171.15 | 163.71 | 156.27 | 148.83 |
| | 07142 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-3/4" | .078" | - | - | 171.15 | 163.71 | 156.27 | 148.83 |
| | 07143 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-3/4" | .094" | - | - | 171.15 | 163.71 | 156.27 | 148.83 |
| | 07144 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-3/4" | .120" | - | - | 171.15 | 163.71 | 156.27 | 148.83 |
| | 07145 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-3/4" | .156" | - | - | 171.15 | 163.71 | 156.27 | 148.83 |
| | 07146 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-3/4" | .190" | - | - | 171.15 | 163.71 | 156.27 | 148.83 |
| | 07147 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-3/4" | .250" | - | - | 171.15 | 163.71 | 156.27 | 148.83 |
| | 07148 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-3/4" | BALL | - | - | 171.15 | 163.71 | 156.27 | 148.83 |
| | 07149 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1" | - | 2" | .715" | 159.11 | 152.20 | 145.28 | 138.36 |
| | 07150 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1" | .030" | 2" | .715" | 176.54 | 168.86 | 161.19 | 153.51 |
| | 07151 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1" | .060" | 2" | .715" | 176.54 | 168.86 | 161.19 | 153.51 |
| | 07152 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1" | .090" | 2" | .715" | 176.54 | 168.86 | 161.19 | 153.51 |
| | 07153 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1" | .120" | 2" | .715" | 176.54 | 168.86 | 161.19 | 153.51 |
| | 07154 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1" | .125" | 2" | .715" | 176.54 | 168.86 | 161.19 | 153.51 |
| | 07155 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1" | .160" | 2" | .715" | 176.54 | 168.86 | 161.19 | 153.51 |
| | 07156 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1" | .190" | 2" | .715" | 176.54 | 168.86 | 161.19 | 153.51 |
| | 07157 | .7500 | 3/4" | 19.050 | 3/4" | 5" | 2-1/4" | - | - | - | 204.76 | 195.86 | 186.95 | 178.05 |
| | 07158 | .7500 | 3/4" | 19.050 | 3/4" | 5" | 2-1/4" | .030" | - | - | 237.72 | 227.38 | 217.05 | 206.71 |
| | 07159 | .7500 | 3/4" | 19.050 | 3/4" | 5" | 2-1/4" | .060" | - | - | 237.72 | 227.38 | 217.05 | 206.71 |
| | 07160 | .7500 | 3/4" | 19.050 | 3/4" | 5" | 2-1/4" | .120" | - | - | 237.72 | 227.38 | 217.05 | 206.71 |
| | 07161 | .7500 | 3/4" | 19.050 | 3/4" | 5" | 2-1/4" | .125" | - | - | 237.72 | 227.38 | 217.05 | 206.71 |
| | 07162 | .7500 | 3/4" | 19.050 | 3/4" | 5" | 2-1/4" | .190" | - | - | 237.72 | 227.38 | 217.05 | 206.71 |
| | 07163 | .7500 | 3/4" | 19.050 | 3/4" | 5" | 2-1/4" | .250" | - | - | 237.72 | 227.38 | 217.05 | 206.71 |
| | 07226 | .7500 | 3/4" | 19.050 | 3/4" | 6" | 3-1/4" | - | - | - | 208.14 | 199.09 | 190.04 | 180.99 |
| | 07164 | .7500 | 3/4" | 19.050 | 3/4" | 6" | 1" | - | 3-3/8" | .715" | 221.43 | 211.81 | 202.18 | 192.55 |
| | 07165 | .7500 | 3/4" | 19.050 | 3/4" | 6" | 1" | .030" | 3-3/8" | .715" | 257.04 | 245.86 | 234.69 | 223.51 |
| | 07166 | .7500 | 3/4" | 19.050 | 3/4" | 6" | 1" | .060" | 3-3/8" | .715" | 257.04 | 245.86 | 234.69 | 223.51 |
| | 07167 | .7500 | 3/4" | 19.050 | 3/4" | 6" | 1" | .090" | 3-3/8" | .715" | 257.04 | 245.86 | 234.69 | 223.51 |
| | 07168 | .7500 | 3/4" | 19.050 | 3/4" | 6" | 1" | .125" | 3-3/8" | .715" | 257.04 | 245.86 | 234.69 | 223.51 |
| | 07169 | .7500 | 3/4" | 19.050 | 3/4" | 6" | 1" | .250" | 3-3/8" | .715" | 257.04 | 245.86 | 234.69 | 223.51 |
| | 07170 | .7500 | 3/4" | 19.050 | 3/4" | 6" | 1" | BALL | 3-3/8" | .715" | 257.04 | 245.86 | 234.69 | 223.51 |



*continued* →

# Series A3 *(continued)*

.7874" - 1.000"
(20.000mm - 25.400mm)

| | EDP# | $d_1$ † Diameter Decimal | | $d_1$ † Diameter Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | $r$ Corner Radius | $l_3$ Reach Length | $d_3$ Neck Diameter | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 07171 | .7874 | | 20.000 | 20.0 | 100 | 30 | - | 50 | 19.4 | 211.11 | 201.93 | 192.75 | 183.57 |
| | 07172 | .7874 | | 20.000 | 20.0 | 100 | 30 | 0.50 | 50 | 19.4 | 246.50 | 235.79 | 225.07 | 214.35 |
| | 07173 | .7874 | | 20.000 | 20.0 | 100 | 30 | 1.00 | 50 | 19.4 | 246.50 | 235.79 | 225.07 | 214.35 |
| | 07174 | .7874 | | 20.000 | 20.0 | 100 | 30 | 1.50 | 50 | 19.4 | 246.50 | 235.79 | 225.07 | 214.35 |
| | 07175 | .7874 | | 20.000 | 20.0 | 100 | 30 | 3.00 | 50 | 19.4 | 246.50 | 235.79 | 225.07 | 214.35 |
| | 07176 | .7874 | | 20.000 | 20.0 | 100 | 30 | 4.00 | 50 | 19.4 | 246.50 | 235.79 | 225.07 | 214.35 |
| | 07177 | .7874 | | 20.000 | 20.0 | 100 | 30 | 5.00 | 50 | 19.4 | 246.50 | 235.79 | 225.07 | 214.35 |
| | 07178 | .7874 | | 20.000 | 20.0 | 100 | 30 | 6.00 | 50 | 19.4 | 246.50 | 235.79 | 225.07 | 214.35 |
| | 07179 | .7874 | | 20.000 | 20.0 | 100 | 30 | 8.00 | 50 | 19.4 | 246.50 | 235.79 | 225.07 | 214.35 |
| | 07180 | .7874 | | 20.000 | 20.0 | 150 | 30 | - | 100 | 19.40 | 264.83 | 253.32 | 241.80 | 230.29 |
| | 07181 | .7874 | | 20.000 | 20.0 | 150 | 30 | 0.50 | 100 | 19.40 | 328.35 | 314.07 | 299.80 | 285.52 |
| | 07182 | .7874 | | 20.000 | 20.0 | 150 | 30 | 1.00 | 100 | 19.40 | 328.35 | 314.07 | 299.80 | 285.52 |
| NEW | 07183 | .7874 | | 20.000 | 20.0 | 150 | 30 | 1.50 | 100 | 19.40 | 328.35 | 314.07 | 299.80 | 285.52 |
| | 07184 | .7874 | | 20.000 | 20.0 | 150 | 30 | 3.00 | 100 | 19.40 | 328.35 | 314.07 | 299.80 | 285.52 |
| | 07185 | .7874 | | 20.000 | 20.0 | 150 | 30 | 4.00 | 100 | 19.40 | 328.35 | 314.07 | 299.80 | 285.52 |
| | 07186 | .7874 | | 20.000 | 20.0 | 150 | 30 | 5.00 | 100 | 19.40 | 328.35 | 314.07 | 299.80 | 285.52 |
| NEW | 07187 | .7874 | | 20.000 | 20.0 | 150 | 30 | 6.00 | 100 | 19.40 | 328.35 | 314.07 | 299.80 | 285.52 |
| NEW | 07188 | .7874 | | 20.000 | 20.0 | 150 | 30 | 8.00 | 100 | 19.40 | 328.35 | 314.07 | 299.80 | 285.52 |
| | 07189 | 1.000 | 1" | 25.400 | 1" | 4" | 1-1/4" | - | 2" | .950" | 235.57 | 225.32 | 215.08 | 204.84 |
| | 07190 | 1.000 | 1" | 25.400 | 1" | 4" | 1-1/4" | .060" | 2" | .950" | 301.55 | 288.44 | 275.33 | 262.22 |
| | 07191 | 1.000 | 1" | 25.400 | 1" | 4-1/2" | 1-1/4" | - | 2-1/2" | .950" | 267.19 | 255.57 | 243.96 | 232.34 |
| | 07192 | 1.000 | 1" | 25.400 | 1" | 4-1/2" | 1-1/4" | .030" | 2-1/2" | .950" | 340.45 | 325.64 | 310.84 | 296.04 |
| | 07193 | 1.000 | 1" | 25.400 | 1" | 4-1/2" | 1-1/4" | .060" | 2-1/2" | .950" | 340.45 | 325.64 | 310.84 | 296.04 |
| | 07194 | 1.000 | 1" | 25.400 | 1" | 4-1/2" | 1-1/4" | .120" | 2-1/2" | .950" | 340.45 | 325.64 | 310.84 | 296.04 |
| | 07195 | 1.000 | 1" | 25.400 | 1" | 4-1/2" | 1-1/4" | .125" | 2-1/2" | .950" | 340.45 | 325.64 | 310.84 | 296.04 |
| | 07196 | 1.000 | 1" | 25.400 | 1" | 5" | 1" | - | 2-5/8" | .950" | 294.29 | 281.49 | 268.70 | 255.90 |
| | 07197 | 1.000 | 1" | 25.400 | 1" | 5" | 1" | .030" | 2-5/8" | .950" | 375.05 | 358.74 | 342.44 | 326.13 |
| | 07198 | 1.000 | 1" | 25.400 | 1" | 5" | 1" | .060" | 2-5/8" | .950" | 375.05 | 358.74 | 342.44 | 326.13 |
| | 07199 | 1.000 | 1" | 25.400 | 1" | 5" | 1" | .125" | 2-5/8" | .950" | 375.05 | 358.74 | 342.44 | 326.13 |
| | 07200 | 1.000 | 1" | 25.400 | 1" | 5" | 1" | .250" | 2-5/8" | .950" | 375.05 | 358.74 | 342.44 | 326.13 |
| | 07201 | 1.000 | 1" | 25.400 | 1" | 5" | 1" | BALL | 2-5/8" | .950" | 375.05 | 358.74 | 342.44 | 326.13 |
| | 07202 | 1.000 | 1" | 25.400 | 1" | 5" | 2-1/4" | - | - | - | 283.52 | 271.19 | 258.87 | 246.54 |
| | 07203 | 1.000 | 1" | 25.400 | 1" | 5" | 2-1/4" | .030" | - | - | 364.29 | 348.45 | 332.61 | 316.77 |
| | 07204 | 1.000 | 1" | 25.400 | 1" | 5" | 2-1/4" | .060" | - | - | 364.29 | 348.45 | 332.61 | 316.77 |
| | 07205 | 1.000 | 1" | 25.400 | 1" | 5" | 2-1/4" | .120" | - | - | 364.29 | 348.45 | 332.61 | 316.77 |
| | 07206 | 1.000 | 1" | 25.400 | 1" | 5" | 2-1/4" | .250" | - | - | 364.29 | 348.45 | 332.61 | 316.77 |
| | 07207 | 1.000 | 1" | 25.400 | 1" | 6" | 3-1/4" | - | - | - | 352.59 | 337.26 | 321.93 | 306.60 |
| | 07208 | 1.000 | 1" | 25.400 | 1" | 6" | 3-1/4" | .030" | - | - | 413.16 | 395.20 | 377.23 | 359.27 |
| | 07209 | 1.000 | 1" | 25.400 | 1" | 6" | 3-1/4" | .060" | - | - | 413.16 | 395.20 | 377.23 | 359.27 |
| NEW | 07210 | 1.000 | 1" | 25.400 | 1" | 6" | 3-1/4" | .120" | - | - | 413.16 | 395.20 | 377.23 | 359.27 |
| | 07211 | 1.000 | 1" | 25.400 | 1" | 6" | 3-1/4" | .250" | - | - | 413.16 | 395.20 | 377.23 | 359.27 |

MATERIAL HARDNESS (Rc)
70
35
0



† *Metric equivalents are for reference only*

| TOLERANCES | |
|---|---|
| $d_1$ | +.000" –.001" (+.000 –.025mm) |
| $d_2$ | h6 |

# HIGH EFFICIENCY MILLING

Series 142M

Z=2 | 41° | TECH PAGES 289

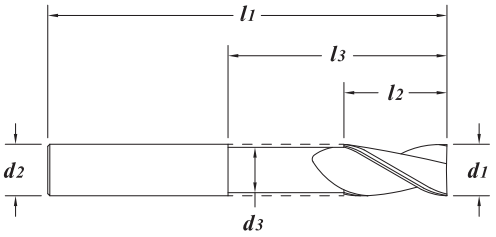
Recommended for aluminum

## HSAL End Mill - Square End

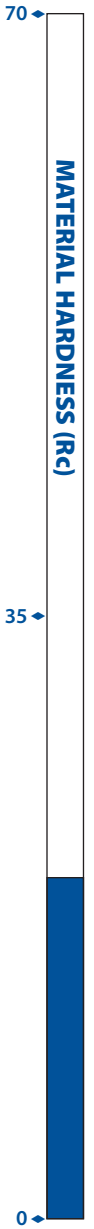
### ALUMASTAR Coating

Solid submicron grain carbide end mill - center cutting
Engineered for High Efficiency Milling
Specific coating engineered to repel aluminum
Engineered to run at 750-2500 SFM (225-750 M/Min.)
For high speed machining of aluminum
High velocity - high metal removal rate (for spindles 10,000 RPM and above)
Need to use properly balanced holders
Holds perpendicularity
Flats can be added within 48 hours






| EDP# | $d_1$ † Diameter Decimal | Diameter | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | $l_3$ Reach Length | $d_3$ Neck Diameter | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 41222 | .1575 | | 4.000 | 6.0 | 50 | 12 | - | - | 26.97 | 25.80 | 24.62 | 23.45 |
| 41232 | .1575 | | 4.000 | 6.0 | 65 | 6 | 20 | 3.7 | 33.76 | 32.30 | 30.83 | 29.36 |
| 41282 | .1875 | 3/16" | 4.763 | 3/16" | 2" | 9/16" | - | - | 20.33 | 19.45 | 18.56 | 17.68 |
| 41342 | .1969 | | 5.000 | 6.0 | 65 | 16 | - | - | 27.83 | 26.62 | 25.41 | 24.20 |
| 41352 | .1969 | | 5.000 | 6.0 | 75 | 8 | 20 | 4.7 | 47.32 | 45.27 | 43.21 | 41.15 |
| 41402 | .2362 | | 6.000 | 6.0 | 65 | 19 | - | - | 26.94 | 25.77 | 24.60 | 23.43 |
| 41412 | .2362 | | 6.000 | 6.0 | 75 | 10 | 25 | 5.7 | 45.80 | 43.81 | 41.82 | 39.83 |
| 41462 | .2500 | 1/4" | 6.350 | 1/4" | 2-1/2" | 3/4" | - | - | 25.60 | 24.49 | 23.37 | 22.26 |
| 41542 | .2756 | | 7.000 | 8.0 | 65 | 19 | - | - | 41.32 | 39.52 | 37.73 | 35.93 |
| 41602 | .3125 | 5/16" | 7.938 | 5/16" | 2-1/2" | 3/4" | - | - | 35.56 | 34.01 | 32.47 | 30.92 |
| 41662 | .3150 | | 8.000 | 8.0 | 65 | 19 | - | - | 37.43 | 35.81 | 34.18 | 32.55 |
| 41672 | .3150 | | 8.000 | 8.0 | 75 | 12 | 25 | 7.4 | 56.49 | 54.03 | 51.58 | 49.12 |
| 41722 | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 7/8" | - | - | 41.77 | 39.95 | 38.14 | 36.32 |
| 41802 | .3937 | | 10.000 | 10.0 | 70 | 24 | - | - | 62.85 | 60.12 | 57.38 | 54.65 |
| 41812 | .3937 | | 10.000 | 10.0 | 75 | 12 | 30 | 9.4 | 69.60 | 66.57 | 63.55 | 60.52 |
| 41822 | .3937 | | 10.000 | 10.0 | 100 | 12 | 35 | 9.4 | 83.79 | 80.15 | 76.50 | 72.86 |
| 41882 | .4724 | | 12.000 | 12.0 | 75 | 32 | - | - | 70.30 | 67.24 | 64.19 | 61.13 |
| 41892 | .4724 | | 12.000 | 12.0 | 75 | 16 | 30 | 11.4 | 75.67 | 72.38 | 69.09 | 65.80 |
| 41902 | .4724 | | 12.000 | 12.0 | 100 | 16 | 35 | 11.4 | 103.24 | 98.75 | 94.26 | 89.77 |
| 41912 | .4724 | | 12.000 | 12.0 | 100 | 16 | 40 | 11.4 | 103.24 | 98.75 | 94.26 | 89.77 |
| 41942 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1-1/4" | - | - | 66.79 | 63.89 | 60.98 | 58.08 |
| 42022 | .6250 | 5/8" | 15.875 | 5/8" | 4" | 1-5/8" | - | - | 133.12 | 127.34 | 121.55 | 115.76 |
| 42072 | .6299 | | 16.000 | 16.0 | 75 | 16 | 30 | 15.4 | 131.86 | 126.13 | 120.39 | 114.66 |
| 42082 | .6299 | | 16.000 | 16.0 | 100 | 40 | - | - | 140.12 | 134.02 | 127.93 | 121.84 |
| 42092 | .6299 | | 16.000 | 16.0 | 100 | 20 | 40 | 15.4 | 145.48 | 139.15 | 132.83 | 126.50 |
| 42102 | .6299 | | 16.000 | 16.0 | 125 | 20 | 60 | 15.4 | 185.90 | 177.82 | 169.73 | 161.65 |
| 42142 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-5/8" | - | - | 170.34 | 162.93 | 155.53 | 148.12 |
| 42212 | .7874 | | 20.000 | 20.0 | 100 | 32 | - | - | 228.69 | 218.75 | 208.80 | 198.86 |
| 42222 | .7874 | | 20.000 | 20.0 | 100 | 20 | 40 | 19 | 234.05 | 223.87 | 213.70 | 203.52 |
| 42232 | .7874 | | 20.000 | 20.0 | 125 | 20 | 60 | 19 | 271.02 | 259.24 | 247.45 | 235.67 |
| 42302 | 1.000 | 1" | 25.400 | 1" | 4" | 1-5/8" | - | - | 256.00 | 244.87 | 233.74 | 222.61 |



## Series 142R

.1575" - .4724"
(4.000mm - 12.000mm)

# HIGH EFFICIENCY MILLING




| TOLERANCES | |
|---|---|
| $d_1$ | +.000" –.001" (+.000 –.025mm) |
| $d_2$ | h6 |
| $r$ | +.0005" –.0005" (+.0127 –.0127mm) |

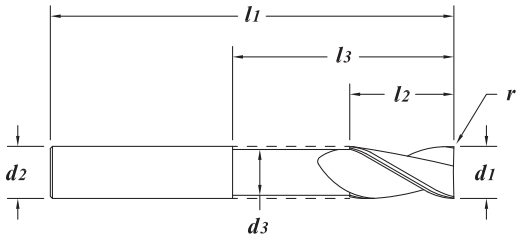
Recommended for aluminum

## HSAL End Mill - Corner Radius

### ALUMASTAR Coating

Solid submicron grain carbide end mill - center cutting
Engineered for High Efficiency Milling
Specific coating engineered to repel aluminum
Engineered to run at 750-2500 SFM (225-750 M/Min.)
For high speed machining of aluminum
High velocity - high metal removal rate (for spindles 10,000 RPM and above)
Need to use properly balanced holders
Holds perpendicularity
Flats can be added within 48 hours






MATERIAL HARDNESS (Rc)
70
35
0

| EDP# | $d_1$ † Decimal | Diameter | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | $r$ Corner Radius | $l_3$ Reach Length | $d_3$ Neck Diameter | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 39222 | .1575 | | 4.000 | 6.0 | 50 | 12 | 0.30 | - | - | 31.57 | 30.20 | 28.82 | 27.45 |
| 39232 | .1575 | | 4.000 | 6.0 | 65 | 6 | 0.50 | 20 | 3.7 | 38.59 | 36.92 | 35.24 | 33.56 |
| 39242 | .1575 | | 4.000 | 6.0 | 65 | 6 | 1.00 | 20 | 3.7 | 38.59 | 36.92 | 35.24 | 33.56 |
| 39282 | .1875 | 3/16" | 4.763 | 3/16" | 2" | 9/16" | .010" | - | - | 23.40 | 22.39 | 21.37 | 20.35 |
| 39342 | .1969 | | 5.000 | 6.0 | 65 | 16 | 0.30 | - | - | 32.57 | 31.15 | 29.74 | 28.32 |
| 39352 | .1969 | | 5.000 | 6.0 | 75 | 8 | 0.50 | 20 | 4.7 | 53.21 | 50.90 | 48.58 | 46.27 |
| 39362 | .1969 | | 5.000 | 6.0 | 75 | 8 | 1.00 | 20 | 4.7 | 53.21 | 50.90 | 48.58 | 46.27 |
| 39402 | .2362 | | 6.000 | 6.0 | 65 | 19 | 0.30 | - | - | 31.52 | 30.15 | 28.78 | 27.41 |
| 39412 | .2362 | | 6.000 | 6.0 | 75 | 10 | 0.50 | 25 | 5.7 | 51.50 | 49.26 | 47.02 | 44.78 |
| 39422 | .2362 | | 6.000 | 6.0 | 75 | 10 | 1.00 | 25 | 5.7 | 51.50 | 49.26 | 47.02 | 44.78 |
| 39432 | .2362 | | 6.000 | 6.0 | 75 | 10 | 1.50 | 25 | 5.7 | 51.50 | 49.26 | 47.02 | 44.78 |
| 39442 | .2362 | | 6.000 | 6.0 | 75 | 10 | 2.00 | 25 | 5.7 | 51.50 | 49.26 | 47.02 | 44.78 |
| 39462 | .2500 | 1/4" | 6.350 | 1/4" | 2-1/2" | 3/4" | .015" | - | - | 29.95 | 28.64 | 27.34 | 26.04 |
| 39602 | .3125 | 5/16" | 7.938 | 5/16" | 2-1/2" | 3/4" | .015" | - | - | 39.64 | 37.92 | 36.19 | 34.47 |
| 39662 | .3150 | | 8.000 | 8.0 | 65 | 19 | 0.50 | - | - | 41.70 | 39.89 | 38.07 | 36.26 |
| 39672 | .3150 | | 8.000 | 8.0 | 75 | 12 | 0.50 | 25 | 7.4 | 63.55 | 60.79 | 58.02 | 55.26 |
| 39682 | .3150 | | 8.000 | 8.0 | 75 | 12 | 1.00 | 25 | 7.4 | 63.55 | 60.79 | 58.02 | 55.26 |
| 39692 | .3150 | | 8.000 | 8.0 | 75 | 12 | 2.00 | 25 | 7.4 | 63.55 | 60.79 | 58.02 | 55.26 |
| 39702 | .3150 | | 8.000 | 8.0 | 75 | 12 | 3.00 | 25 | 7.4 | 63.55 | 60.79 | 58.02 | 55.26 |
| 39722 | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 7/8" | .030" | - | - | 46.18 | 44.18 | 42.17 | 40.16 |
| 39802 | .3937 | | 10.000 | 10.0 | 70 | 24 | 0.50 | - | - | 70.84 | 67.76 | 64.68 | 61.60 |
| 39812 | .3937 | | 10.000 | 10.0 | 100 | 12 | 1.00 | 35 | 9.4 | 95.22 | 91.08 | 86.94 | 82.80 |
| 39822 | .3937 | | 10.000 | 10.0 | 100 | 12 | 1.50 | 35 | 9.4 | 95.22 | 91.08 | 86.94 | 82.80 |
| 39832 | .3937 | | 10.000 | 10.0 | 100 | 12 | 2.00 | 35 | 9.4 | 95.22 | 91.08 | 86.94 | 82.80 |
| 39842 | .3937 | | 10.000 | 10.0 | 100 | 12 | 3.00 | 35 | 9.4 | 95.22 | 91.08 | 86.94 | 82.80 |
| 39882 | .4724 | | 12.000 | 12.0 | 75 | 32 | 0.50 | - | - | 87.62 | 83.81 | 80.00 | 76.19 |
| 39892 | .4724 | | 12.000 | 12.0 | 100 | 16 | 0.50 | 40 | 11.4 | 112.62 | 107.72 | 102.83 | 97.93 |
| 39902 | .4724 | | 12.000 | 12.0 | 100 | 16 | 1.00 | 40 | 11.4 | 112.62 | 107.72 | 102.83 | 97.93 |
| 39912 | .4724 | | 12.000 | 12.0 | 100 | 16 | 1.50 | 40 | 11.4 | 112.62 | 107.72 | 102.83 | 97.93 |
| 39922 | .4724 | | 12.000 | 12.0 | 100 | 16 | 2.00 | 40 | 11.4 | 112.62 | 107.72 | 102.83 | 97.93 |
| 39932 | .4724 | | 12.000 | 12.0 | 100 | 16 | 3.00 | 40 | 11.4 | 112.62 | 107.72 | 102.83 | 97.93 |



† *Metric equivalents are for reference only*

| EDP# | $d_1$ † Diameter Decimal | Diameter | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | $r$ Corner Radius | $l_3$ Reach Length | $d_3$ Neck Diameter | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 39942 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1-1/4" | .030" | - | - | 83.24 | 79.62 | 76.00 | 72.38 |
| 40022 | .6250 | 5/8" | 15.875 | 5/8" | 4" | 1-5/8" | .030" | - | - | 143.99 | 137.73 | 131.47 | 125.21 |
| 40082 | .6299 | | 16.000 | 16.0 | 100 | 40 | 1.00 | - | - | 151.58 | 144.99 | 138.40 | 131.81 |
| 40092 | .6299 | | 16.000 | 16.0 | 125 | 20 | 1.00 | 60 | 15.4 | 205.98 | 197.02 | 188.07 | 179.11 |
| 40102 | .6299 | | 16.000 | 16.0 | 125 | 20 | 2.00 | 60 | 15.4 | 205.98 | 197.02 | 188.07 | 179.11 |
| 40142 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-5/8" | .030" | - | - | 186.88 | 178.75 | 170.63 | 162.50 |
| 40182 | .7874 | | 20.000 | 20.0 | 100 | 40 | 1.00 | - | - | 262.32 | 250.91 | 239.51 | 228.10 |
| 40192 | .7874 | | 20.000 | 20.0 | 150 | 20 | 1.00 | 65 | 19.0 | 359.21 | 343.60 | 327.98 | 312.36 |
| 40202 | .7874 | | 20.000 | 20.0 | 150 | 20 | 2.00 | 65 | 19.0 | 359.21 | 343.60 | 327.98 | 312.36 |
| 40212 | .7874 | | 20.000 | 20.0 | 150 | 20 | 3.00 | 65 | 19.0 | 359.21 | 343.60 | 327.98 | 312.36 |

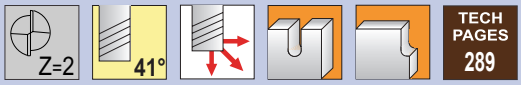





70
MATERIAL HARDNESS (Rc)
35
0

Series 142B

# HIGH EFFICIENCY MILLING




| TOLERANCES | |
|---|---|
| $d_1$ | +.000" –.001" (+.000 –.025mm) |
| $d_2$ | h6 |
| ball radius | +.0000" –.0005" (+.0000 –.0127mm) |

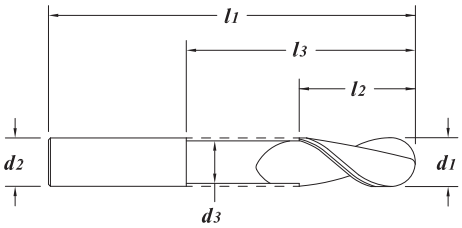
Recommended for aluminum

## HSAL End Mill - Ball End

### ALUMASTAR Coating



Solid submicron grain carbide end mill - center cutting
Engineered for High Efficiency Milling
Specific coating engineered to repel aluminum
Engineered to run at 750-2500 SFM (225-750 M/Min.)
For high speed machining of aluminum
High velocity - high metal removal rate (for spindles 10,000 RPM and above)
Need to use properly balanced holders
Holds perpendicularity
Honed edge on radius for improved finish
Flats can be added within 48 hours




MATERIAL HARDNESS (Rc)
70
35
0

| EDP# | $d_1$ † Diameter Decimal | Diameter | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | $l_3$ Reach Length | $d_3$ Neck Diameter | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 42522 | .1575 | | 4.000 | 6.0 | 50 | 12 | - | - | 31.57 | 30.20 | 28.82 | 27.45 |
| 42582 | .1875 | 3/16" | 4.763 | 3/16" | 2" | 9/16" | - | - | 23.40 | 22.39 | 21.37 | 20.35 |
| 42642 | .1969 | | 5.000 | 6.0 | 65 | 16 | - | - | 32.57 | 31.15 | 29.74 | 28.32 |
| 42702 | .2362 | | 6.000 | 6.0 | 65 | 19 | - | - | 31.52 | 30.15 | 28.78 | 27.41 |
| 42762 | .2500 | 1/4" | 6.350 | 1/4" | 2-1/2" | 3/4" | - | - | 29.95 | 28.64 | 27.34 | 26.04 |
| 42764 | .2500 | 1/4" | 6.350 | 1/4" | 4" | 3/8" | 1-1/8" | .235" | 51.89 | 49.63 | 47.38 | 45.12 |
| 42842 | .2756 | | 7.000 | 8.0 | 65 | 19 | - | - | 45.84 | 43.85 | 41.85 | 39.86 |
| 42902 | .3125 | 5/16" | 7.938 | 5/16" | 2-1/2" | 3/4" | - | - | 39.64 | 37.92 | 36.19 | 34.47 |
| 42962 | .3150 | | 8.000 | 8.0 | 65 | 19 | - | - | 41.70 | 39.89 | 38.07 | 36.26 |
| 43022 | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 7/8" | - | - | 46.18 | 44.18 | 42.17 | 40.16 |
| 43023 | .3750 | 3/8" | 9.525 | 3/8" | 4" | 1/2" | 1-1/8" | .355" | 78.88 | 75.45 | 72.02 | 68.59 |
| 43102 | .3937 | | 10.000 | 10.0 | 70 | 24 | - | - | 70.84 | 67.76 | 64.68 | 61.60 |
| 43182 | .4724 | | 12.000 | 12.0 | 75 | 32 | - | - | 87.62 | 83.81 | 80.00 | 76.19 |
| 43242 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1-1/4" | - | - | 83.24 | 79.62 | 76.00 | 72.38 |
| 43243 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 5/8" | 2-1/4" | .475" | 106.98 | 102.33 | 97.68 | 93.03 |
| 43322 | .6250 | 5/8" | 15.875 | 5/8" | 4" | 1-5/8" | - | - | 143.99 | 137.73 | 131.47 | 125.21 |
| 43382 | .6299 | | 16.000 | 16.0 | 100 | 40 | - | - | 151.58 | 144.99 | 138.40 | 131.81 |
| 43442 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-5/8" | - | - | 186.88 | 178.75 | 170.63 | 162.50 |
| 43444 | .7500 | 3/4" | 19.050 | 3/4" | 5" | 1" | 3-1/16" | .715" | 256.35 | 245.20 | 234.06 | 222.91 |
| 43482 | .7874 | | 20.000 | 20.0 | 100 | 32 | - | - | 262.32 | 250.91 | 239.51 | 228.10 |
| 43542 | .9843 | | 25.000 | 25.0 | 100 | 38 | - | - | 303.53 | 290.33 | 277.14 | 263.94 |
| 43602 | 1.000 | 1" | 25.400 | 1" | 4" | 1-5/8" | - | - | 318.70 | 304.84 | 290.99 | 277.13 |



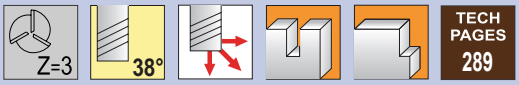
GARR TOOL®

† *Metric equivalents are for reference only*

| TOLERANCES | |
|---|---|
| $d_1$ | +.000" –.001" (+.000 –.025mm) |
| $d_2$ | h6 |

# HIGH EFFICIENCY MILLING

Series 143M




.1181" - .3150"
(3.000mm - 8.000mm)

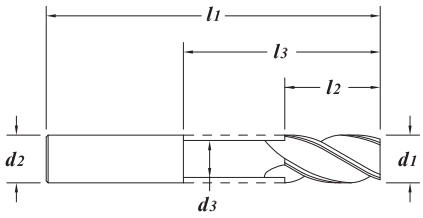
Recommended for aluminum

## HSAL End Mill - Square End

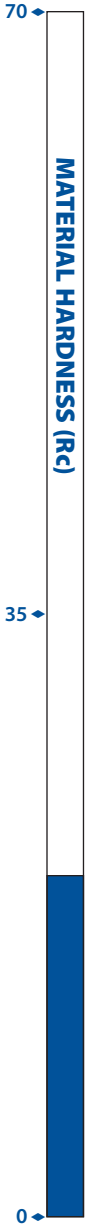
### ALUMASTAR Coating

Solid submicron grain carbide end mill - center cutting
Engineered for High Efficiency Milling
Specific coating engineered to repel aluminum
Engineered to run at 750-2500 SFM (225-750 M/Min.)
For high speed machining of aluminum
High velocity - high metal removal rate (for 5,000-20,000 RPM spindles)
Need to use properly balanced holders
Holds perpendicularity
Flats can be added within 48 hours






| EDP# | $d_1$ † Diameter Decimal | Diameter | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | $l_3$ Reach Length | $d_3$ Neck Diameter | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 41173 | .1181 | | 3.000 | 3.0 | 38 | 6 | - | - | 20.29 | 19.40 | 18.52 | 17.64 |
| 41183 | .1181 | | 3.000 | 3.0 | 38 | 12 | - | - | 20.29 | 19.40 | 18.52 | 17.64 |
| 41193 | .1250 | 1/8" | 3.175 | 1/8" | 1-1/2" | 1/4" | - | - | 19.76 | 18.90 | 18.04 | 17.18 |
| 41203 | .1250 | 1/8" | 3.175 | 1/8" | 1-1/2" | 1/2" | - | - | 19.76 | 18.90 | 18.04 | 17.18 |
| 41213 | .1575 | | 4.000 | 6.0 | 50 | 8 | - | - | 26.97 | 25.80 | 24.62 | 23.45 |
| 41223 | .1575 | | 4.000 | 6.0 | 50 | 12 | - | - | 26.97 | 25.80 | 24.62 | 23.45 |
| 41243 | .1575 | | 4.000 | 6.0 | 65 | 6 | 20 | 3.7 | 33.76 | 32.30 | 30.83 | 29.36 |
| 41273 | .1875 | 3/16" | 4.763 | 3/16" | 2" | 5/16" | - | - | 20.33 | 19.45 | 18.56 | 17.68 |
| 41283 | .1875 | 3/16" | 4.763 | 3/16" | 2" | 9/16" | - | - | 20.33 | 19.45 | 18.56 | 17.68 |
| 41303 | .1875 | 3/16" | 4.763 | 3/16" | 3" | 7/32" | 3/4" | .170" | 38.17 | 36.51 | 34.85 | 33.19 |
| 41313 | .1875 | 3/16" | 4.763 | 3/16" | 3" | 1" | - | - | 32.81 | 31.38 | 29.96 | 28.53 |
| 41343 | .1969 | | 5.000 | 6.0 | 65 | 16 | - | - | 27.83 | 26.62 | 25.41 | 24.20 |
| 41363 | .1969 | | 5.000 | 6.0 | 75 | 8 | 20 | 4.7 | 47.32 | 45.27 | 43.21 | 41.15 |
| 41403 | .2362 | | 6.000 | 6.0 | 65 | 19 | - | - | 26.94 | 25.77 | 24.60 | 23.43 |
| 41423 | .2362 | | 6.000 | 6.0 | 75 | 10 | 25 | 5.7 | 45.80 | 43.81 | 41.82 | 39.83 |
| 39735 | .2500 | 1/4" | 6.350 | 1/4" | 2" | 3/8" | - | - | 24.29 | 23.23 | 22.18 | 21.12 |
| 39737 | .2500 | 1/4" | 6.350 | 1/4" | 2" | 1/2" | - | - | 24.29 | 23.23 | 22.18 | 21.12 |
| 41453 | .2500 | 1/4" | 6.350 | 1/4" | 2-1/2" | 3/8" | - | - | 25.60 | 24.49 | 23.37 | 22.26 |
| 41463 | .2500 | 1/4" | 6.350 | 1/4" | 2-1/2" | 3/4" | - | - | 25.60 | 24.49 | 23.37 | 22.26 |
| 41473 | .2500 | 1/4" | 6.350 | 1/4" | 3" | 1" | - | - | 38.81 | 37.13 | 35.44 | 33.75 |
| 41475 | .2500 | 1/4" | 6.350 | 1/4" | 3" | 1-1/4" | - | - | 38.81 | 37.13 | 35.44 | 33.75 |
| 41493 | .2500 | 1/4" | 6.350 | 1/4" | 4" | 3/8" | 1-1/8" | .235" | 46.28 | 44.26 | 42.25 | 40.24 |
| 41503 | .2500 | 1/4" | 6.350 | 1/4" | 4" | 3/8" | 2-1/8" | .235" | 51.65 | 49.40 | 47.16 | 44.91 |
| 41511 | .2500 | 1/4" | 6.350 | 1/4" | 4" | 1-1/2" | - | - | 40.92 | 39.14 | 37.36 | 35.58 |
| 41513 | .2500 | 1/4" | 6.350 | 1/4" | 4" | 1-5/8" | - | - | 40.92 | 39.14 | 37.36 | 35.58 |
| 41543 | .2756 | | 7.000 | 8.0 | 65 | 19 | - | - | 41.32 | 39.52 | 37.73 | 35.93 |
| 41563 | .2756 | | 7.000 | 8.0 | 75 | 12 | 25 | 6.4 | 62.08 | 59.38 | 56.68 | 53.98 |
| 41593 | .3125 | 5/16" | 7.938 | 5/16" | 2-1/2" | 7/16" | - | - | 35.56 | 34.01 | 32.47 | 30.92 |
| 41603 | .3125 | 5/16" | 7.938 | 5/16" | 2-1/2" | 3/4" | - | - | 35.56 | 34.01 | 32.47 | 30.92 |
| 41623 | .3125 | 5/16" | 7.938 | 5/16" | 4" | 7/16" | 1-1/8" | .297" | 60.72 | 58.08 | 55.44 | 52.80 |
| 39739 | .3150 | | 8.000 | 8.0 | 50 | 12 | - | - | 33.60 | 32.14 | 30.68 | 29.22 |
| 41663 | .3150 | | 8.000 | 8.0 | 65 | 19 | - | - | 37.43 | 35.81 | 34.18 | 32.55 |
| 41683 | .3150 | | 8.000 | 8.0 | 75 | 12 | 25 | 7.4 | 56.49 | 54.03 | 51.58 | 49.12 |
| 41685 | .3150 | | 8.000 | 8.0 | 75 | 26 | - | - | 50.95 | 48.73 | 46.52 | 44.30 |
| 41687 | .3150 | | 8.000 | 8.0 | 75 | 30 | - | - | 50.95 | 48.73 | 46.52 | 44.30 |
| 41693 | .3150 | | 8.000 | 8.0 | 100 | 12 | 55 | 7.4 | 69.26 | 66.25 | 63.24 | 60.23 |




continued →

## Series 143M *(continued)*

.3750" - .6299"
(9.525mm - 16.000mm)

| EDP# | $d_1$ † Diameter Decimal | Diameter | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | $l_3$ Reach Length | $d_3$ Neck Diameter | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 39741 | .3750 | 3/8" | 9.525 | 3/8" | 2" | 1/2" | - | - | 37.41 | 35.78 | 34.16 | 32.53 |
| 41713 | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 1/2" | - | - | 41.77 | 39.95 | 38.14 | 36.32 |
| 39743 | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 3/4" | - | - | 41.77 | 39.95 | 38.14 | 36.32 |
| 41723 | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 7/8" | - | - | 41.77 | 39.95 | 38.14 | 36.32 |
| 41733 | .3750 | 3/8" | 9.525 | 3/8" | 3" | 1" | - | - | 53.84 | 51.50 | 49.16 | 46.82 |
| 41735 | .3750 | 3/8" | 9.525 | 3/8" | 3" | 1-1/4" | - | - | 53.84 | 51.50 | 49.16 | 46.82 |
| 41737 | .3750 | 3/8" | 9.525 | 3/8" | 3-1/2" | 1-1/2" | - | - | 57.78 | 55.26 | 52.75 | 50.24 |
| 41763 | .3750 | 3/8" | 9.525 | 3/8" | 4" | 1/2" | 2-1/8" | .355" | 70.59 | 67.52 | 64.45 | 61.38 |
| 41773 | .3750 | 3/8" | 9.525 | 3/8" | 4" | 1-5/8" | - | - | 59.86 | 57.26 | 54.65 | 52.05 |
| 42363 | .3750 | 3/8" | 9.525 | 3/8" | 4" | 2" | - | - | 59.86 | 57.26 | 54.65 | 52.05 |
| 41783 | .3750 | 3/8" | 9.525 | 3/8" | 6" | 1/2" | 4" | .355" | 106.95 | 102.30 | 97.65 | 93.00 |
| 39745 | .3937 | | 10.000 | 10.0 | 50 | 14 | - | - | 57.75 | 55.24 | 52.73 | 50.22 |
| 41803 | .3937 | | 10.000 | 10.0 | 70 | 24 | - | - | 62.85 | 60.12 | 57.38 | 54.65 |
| 41805 | .3937 | | 10.000 | 10.0 | 75 | 30 | - | - | 66.18 | 63.31 | 60.43 | 57.55 |
| 41843 | .3937 | | 10.000 | 10.0 | 100 | 12 | 35 | 9.4 | 83.79 | 80.15 | 76.50 | 72.86 |
| 41853 | .3937 | | 10.000 | 10.0 | 100 | 12 | 55 | 9.4 | 89.15 | 85.27 | 81.40 | 77.52 |
| 41863 | .3937 | | 10.000 | 10.0 | 150 | 12 | 110 | 9.4 | 124.92 | 119.49 | 114.06 | 108.63 |
| 39747 | .4724 | | 12.000 | 12.0 | 65 | 16 | - | - | 65.94 | 63.07 | 60.21 | 57.34 |
| 39749 | .4724 | | 12.000 | 12.0 | 75 | 26 | - | - | 70.30 | 67.24 | 64.19 | 61.13 |
| 41883 | .4724 | | 12.000 | 12.0 | 75 | 32 | - | - | 70.30 | 67.24 | 64.19 | 61.13 |
| 41893 | .4724 | | 12.000 | 12.0 | 100 | 50 | - | - | 91.92 | 87.92 | 83.93 | 79.93 |
| 41903 | .4724 | | 12.000 | 12.0 | 100 | 16 | 40 | 11.4 | 103.24 | 98.75 | 94.26 | 89.77 |
| 41913 | .4724 | | 12.000 | 12.0 | 100 | 16 | 55 | 11.4 | 103.24 | 98.75 | 94.26 | 89.77 |
| 41923 | .4724 | | 12.000 | 12.0 | 150 | 16 | 110 | 11.4 | 157.81 | 150.95 | 144.09 | 137.23 |
| 39751 | .5000 | 1/2" | 12.700 | 1/2" | 2-1/2" | 5/8" | - | - | 62.56 | 59.84 | 57.12 | 54.40 |
| 39753 | .5000 | 1/2" | 12.700 | 1/2" | 2-1/2" | 3/4" | - | - | 62.56 | 59.84 | 57.12 | 54.40 |
| 41933 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 5/8" | - | - | 66.79 | 63.89 | 60.98 | 58.08 |
| 39755 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1" | - | - | 66.79 | 63.89 | 60.98 | 58.08 |
| 41943 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1-1/4" | - | - | 66.79 | 63.89 | 60.98 | 58.08 |
| 41945 | .5000 | 1/2" | 12.700 | 1/2" | 3-1/2" | 1-1/2" | - | - | 85.26 | 81.55 | 77.85 | 74.14 |
| 41963 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 1-5/8" | - | - | 87.33 | 83.53 | 79.74 | 75.94 |
| 41965 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 1-3/4" | - | - | 87.33 | 83.53 | 79.74 | 75.94 |
| 41973 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 2" | - | - | 87.33 | 83.53 | 79.74 | 75.94 |
| 41983 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 5/8" | 2-1/8" | .475" | 98.06 | 93.80 | 89.53 | 85.27 |
| 41993 | .5000 | 1/2" | 12.700 | 1/2" | 6" | 5/8" | 4-1/8" | .475" | 149.93 | 143.41 | 136.89 | 130.37 |
| 42003 | .5000 | 1/2" | 12.700 | 1/2" | 6" | 3-1/8" | - | - | 128.48 | 122.89 | 117.31 | 111.72 |
| 39757 | .6250 | 5/8" | 15.875 | 5/8" | 3" | 3/4" | - | - | 123.76 | 118.38 | 113.00 | 107.62 |
| 42013 | .6250 | 5/8" | 15.875 | 5/8" | 3-1/2" | 3/4" | - | - | 127.33 | 121.79 | 116.26 | 110.72 |
| 39759 | .6250 | 5/8" | 15.875 | 5/8" | 3-1/2" | 1" | - | - | 127.33 | 121.79 | 116.26 | 110.72 |
| 42016 | .6250 | 5/8" | 15.875 | 5/8" | 3-1/2" | 1-1/4" | - | - | 127.33 | 121.79 | 116.26 | 110.72 |
| 42021 | .6250 | 5/8" | 15.875 | 5/8" | 4" | 1-1/2" | - | - | 133.12 | 127.34 | 121.55 | 115.76 |
| 42023 | .6250 | 5/8" | 15.875 | 5/8" | 4" | 1-5/8" | - | - | 133.12 | 127.34 | 121.55 | 115.76 |
| 42025 | .6250 | 5/8" | 15.875 | 5/8" | 4" | 1-3/4" | - | - | 133.12 | 127.34 | 121.55 | 115.76 |
| 42373 | .6250 | 5/8" | 15.875 | 5/8" | 4" | 2-1/8" | - | - | 133.12 | 127.34 | 121.55 | 115.76 |
| 42033 | .6250 | 5/8" | 15.875 | 5/8" | 6" | 3/4" | 2-3/8" | .590" | 185.81 | 177.73 | 169.65 | 161.57 |
| 42043 | .6250 | 5/8" | 15.875 | 5/8" | 6" | 3/4" | 4-3/8" | .590" | 196.54 | 187.99 | 179.45 | 170.90 |
| 42053 | .6250 | 5/8" | 15.875 | 5/8" | 6" | 3-1/4" | - | - | 175.08 | 167.46 | 159.85 | 152.24 |
| 42083 | .6299 | | 16.000 | 16.0 | 100 | 40 | - | - | 140.12 | 134.02 | 127.93 | 121.84 |
| 42103 | .6299 | | 16.000 | 16.0 | 100 | 20 | 40 | 15.4 | 145.48 | 139.15 | 132.83 | 126.50 |
| 42113 | .6299 | | 16.000 | 16.0 | 125 | 20 | 60 | 15.4 | 185.90 | 177.82 | 169.73 | 161.65 |
| 42123 | .6299 | | 16.000 | 16.0 | 150 | 20 | 110 | 15.4 | 206.90 | 197.90 | 188.91 | 179.91 |

MATERIAL HARDNESS (Rc)
70
35
0



† *Metric equivalents are for reference only*

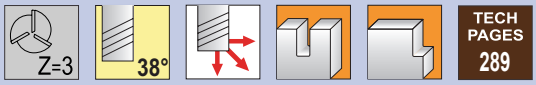
| EDP# | $d_1$ † Diameter Decimal | Diameter | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | $l_3$ Reach Length | $d_3$ Neck Diameter | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 42133 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1" | - | - | 170.34 | 162.93 | 155.53 | 148.12 |
| 42136 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-1/4" | - | - | 170.34 | 162.93 | 155.53 | 148.12 |
| 42141 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-1/2" | - | - | 170.34 | 162.93 | 155.53 | 148.12 |
| 42143 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-5/8" | - | - | 170.34 | 162.93 | 155.53 | 148.12 |
| 42145 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-3/4" | - | - | 170.34 | 162.93 | 155.53 | 148.12 |
| 42153 | .7500 | 3/4" | 19.050 | 3/4" | 5" | 2-1/4" | - | - | 224.92 | 215.14 | 205.36 | 195.58 |
| 42155 | .7500 | 3/4" | 19.050 | 3/4" | 5" | 2-1/2" | - | - | 224.92 | 215.14 | 205.36 | 195.58 |
| 42163 | .7500 | 3/4" | 19.050 | 3/4" | 6" | 1" | 2-1/2" | .715" | 244.67 | 234.04 | 223.40 | 212.76 |
| 42173 | .7500 | 3/4" | 19.050 | 3/4" | 6" | 1" | 4-3/8" | .715" | 252.25 | 241.29 | 230.32 | 219.35 |
| 42193 | .7500 | 3/4" | 19.050 | 3/4" | 6" | 3-1/4" | - | - | 237.16 | 226.85 | 216.54 | 206.23 |
| 42203 | .7874 | | 20.000 | 20.0 | 100 | 25 | - | - | 228.69 | 218.75 | 208.80 | 198.86 |
| 42213 | .7874 | | 20.000 | 20.0 | 100 | 32 | - | - | 228.69 | 218.75 | 208.80 | 198.86 |
| 42223 | .7874 | | 20.000 | 20.0 | 100 | 20 | 40 | 19.0 | 234.05 | 223.87 | 213.70 | 203.52 |
| 42226 | .7874 | | 20.000 | 20.0 | 125 | 20 | 60 | 19.0 | 271.02 | 259.24 | 247.45 | 235.67 |
| 42233 | .7874 | | 20.000 | 20.0 | 150 | 20 | 85 | 19.0 | 314.05 | 300.40 | 286.74 | 273.09 |
| 42236 | .7874 | | 20.000 | 20.0 | 150 | 20 | 110 | 19.0 | 319.44 | 305.55 | 291.66 | 277.77 |
| 42243 | .9843 | | 25.000 | 25.0 | 100 | 38 | - | - | 263.88 | 252.41 | 240.93 | 229.46 |
| 42283 | .9843 | | 25.000 | 25.0 | 100 | 25 | 50 | 24.0 | 269.22 | 257.51 | 245.81 | 234.10 |
| 42286 | .9843 | | 25.000 | 25.0 | 125 | 25 | 65 | 24.0 | 336.50 | 321.87 | 307.24 | 292.61 |
| 42291 | .9843 | | 25.000 | 25.0 | 150 | 25 | 90 | 24.0 | 422.12 | 403.77 | 385.41 | 367.06 |
| 42293 | 1.000 | 1" | 25.400 | 1" | 4" | 1" | - | - | 256.00 | 244.87 | 233.74 | 222.61 |
| 42303 | 1.000 | 1" | 25.400 | 1" | 4" | 1-5/8" | - | - | 256.00 | 244.87 | 233.74 | 222.61 |
| 42313 | 1.000 | 1" | 25.400 | 1" | 5" | 2" | - | - | 316.02 | 302.28 | 288.54 | 274.80 |
| 42343 | 1.000 | 1" | 25.400 | 1" | 6" | 1-1/4" | 3-3/8" | .960" | 409.45 | 391.64 | 373.84 | 356.04 |
| 42353 | 1.000 | 1" | 25.400 | 1" | 6" | 3-1/4" | - | - | 393.38 | 376.28 | 359.17 | 342.07 |



Series 143R

.1181" - .2362"
(3.000mm - 6.000mm)

# HIGH EFFICIENCY MILLING




TECH PAGES 289

| TOLERANCES | |
|---|---|
| $d_1$ | +.000" –.001" (+.000 –.025mm) |
| $d_2$ | h6 |
| $r$ | +.0005" –.0005" (+.0127 –.0127mm) |

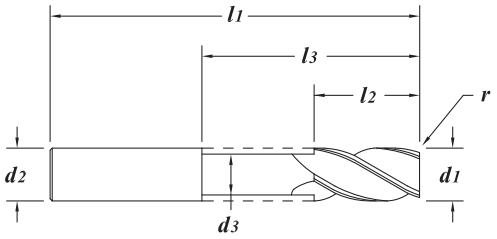
Recommended for aluminum

## HSAL End Mill - Corner Radius

### ALUMASTAR Coating

Solid submicron grain carbide end mill - center cutting
Engineered for High Efficiency Milling
Specific coating engineered to repel aluminum
Engineered to run at 750-2500 SFM (225-750 M/Min.)
For high speed machining of aluminum
High velocity - high metal removal rate (for 5,000-20,000 RPM spindles)
Need to use properly balanced holders
Holds perpendicularity
Flats can be added within 48 hours






MATERIAL HARDNESS (Rc)
70
35
0

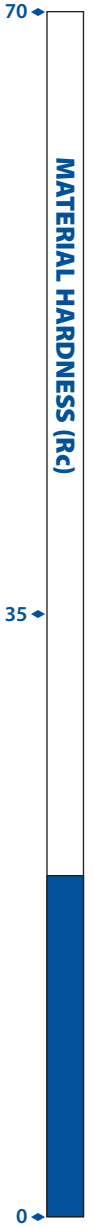
| EDP# | $d_1$ † Decimal | $d_1$ † Diameter | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | $r$ Corner Radius | $l_3$ Reach Length | $d_3$ Neck Diameter | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 39113 | .1181 | | 3.000 | 3.0 | 38 | 6 | 0.20 | - | - | 23.38 | 22.36 | 21.35 | 20.33 |
| 39123 | .1181 | | 3.000 | 3.0 | 38 | 6 | 0.50 | - | - | 23.38 | 22.36 | 21.35 | 20.33 |
| 39133 | .1181 | | 3.000 | 3.0 | 38 | 12 | 0.20 | - | - | 23.38 | 22.36 | 21.35 | 20.33 |
| 39143 | .1181 | | 3.000 | 3.0 | 38 | 12 | 0.50 | - | - | 23.38 | 22.36 | 21.35 | 20.33 |
| 39153 | .1250 | 1/8" | 3.175 | 1/8" | 1-1/2" | 1/4" | .010" | - | - | 22.69 | 21.70 | 20.72 | 19.73 |
| 39163 | .1250 | 1/8" | 3.175 | 1/8" | 1-1/2" | 1/4" | .020" | - | - | 22.69 | 21.70 | 20.72 | 19.73 |
| 39173 | .1250 | 1/8" | 3.175 | 1/8" | 1-1/2" | 1/2" | .010" | - | - | 22.69 | 21.70 | 20.72 | 19.73 |
| 39183 | .1250 | 1/8" | 3.175 | 1/8" | 1-1/2" | 1/2" | .020" | - | - | 22.69 | 21.70 | 20.72 | 19.73 |
| 39193 | .1575 | | 4.000 | 6.0 | 50 | 8 | 0.20 | - | - | 31.57 | 30.20 | 28.82 | 27.45 |
| 39203 | .1575 | | 4.000 | 6.0 | 50 | 8 | 0.50 | - | - | 31.57 | 30.20 | 28.82 | 27.45 |
| 39213 | .1575 | | 4.000 | 6.0 | 50 | 12 | 0.20 | - | - | 31.57 | 30.20 | 28.82 | 27.45 |
| 39223 | .1575 | | 4.000 | 6.0 | 50 | 12 | 0.30 | - | - | 31.57 | 30.20 | 28.82 | 27.45 |
| 39225 | .1575 | | 4.000 | 6.0 | 50 | 12 | 0.50 | - | - | 31.57 | 30.20 | 28.82 | 27.45 |
| 39243 | .1575 | | 4.000 | 6.0 | 65 | 6 | 0.30 | 20 | 3.7 | 38.59 | 36.92 | 35.24 | 33.56 |
| 39253 | .1575 | | 4.000 | 6.0 | 65 | 6 | 0.50 | 20 | 3.7 | 38.59 | 36.92 | 35.24 | 33.56 |
| 39263 | .1575 | | 4.000 | 6.0 | 65 | 6 | 1.00 | 20 | 3.7 | 38.59 | 36.92 | 35.24 | 33.56 |
| 39265 | .1875 | 3/16" | 4.763 | 3/16" | 2" | 5/16" | .010" | - | - | 23.40 | 22.39 | 21.37 | 20.35 |
| 39275 | .1875 | 3/16" | 4.763 | 3/16" | 2" | 5/16" | .020" | - | - | 23.40 | 22.39 | 21.37 | 20.35 |
| 39280 | .1875 | 3/16" | 4.763 | 3/16" | 2" | 5/16" | .030" | - | - | 23.40 | 22.39 | 21.37 | 20.35 |
| 39283 | .1875 | 3/16" | 4.763 | 3/16" | 2" | 9/16" | .010" | - | - | 23.40 | 22.39 | 21.37 | 20.35 |
| 39285 | .1875 | 3/16" | 4.763 | 3/16" | 2" | 9/16" | .020" | - | - | 23.40 | 22.39 | 21.37 | 20.35 |
| 39293 | .1875 | 3/16" | 4.763 | 3/16" | 2" | 9/16" | .030" | - | - | 23.40 | 22.39 | 21.37 | 20.35 |
| 39303 | .1875 | 3/16" | 4.763 | 3/16" | 3" | 7/32" | .010" | 3/4" | .170" | 42.85 | 40.99 | 39.12 | 37.26 |
| 39313 | .1875 | 3/16" | 4.763 | 3/16" | 3" | 7/32" | .030" | 3/4" | .170" | 42.85 | 40.99 | 39.12 | 37.26 |
| 39343 | .1969 | | 5.000 | 6.0 | 65 | 16 | 0.30 | - | - | 32.57 | 31.15 | 29.74 | 28.32 |
| 39363 | .1969 | | 5.000 | 6.0 | 75 | 8 | 0.30 | 20 | 4.7 | 53.21 | 50.90 | 48.58 | 46.27 |
| 39373 | .1969 | | 5.000 | 6.0 | 75 | 8 | 0.50 | 20 | 4.7 | 53.21 | 50.90 | 48.58 | 46.27 |
| 39383 | .1969 | | 5.000 | 6.0 | 75 | 8 | 1.00 | 20 | 4.7 | 53.21 | 50.90 | 48.58 | 46.27 |
| 39403 | .2362 | | 6.000 | 6.0 | 65 | 19 | 0.30 | - | - | 31.52 | 30.15 | 28.78 | 27.41 |
| 39423 | .2362 | | 6.000 | 6.0 | 75 | 10 | 0.30 | 25 | 5.7 | 51.50 | 49.26 | 47.02 | 44.78 |
| 39433 | .2362 | | 6.000 | 6.0 | 75 | 10 | 0.50 | 25 | 5.7 | 51.50 | 49.26 | 47.02 | 44.78 |
| 39436 | .2362 | | 6.000 | 6.0 | 75 | 10 | 1.00 | 25 | 5.7 | 51.50 | 49.26 | 47.02 | 44.78 |
| 39439 | .2362 | | 6.000 | 6.0 | 75 | 10 | 1.50 | 25 | 5.7 | 51.50 | 49.26 | 47.02 | 44.78 |
| 39443 | .2362 | | 6.000 | 6.0 | 75 | 10 | 2.00 | 25 | 5.7 | 51.50 | 49.26 | 47.02 | 44.78 |



GARR TOOL®

† *Metric equivalents are for reference only*

| EDP# | $d_1$ † Diameter Decimal | Diameter | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | $r$ Corner Radius | $l_3$ Reach Length | $d_3$ Neck Diameter | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 39314 | .2500 | 1/4" | 6.350 | 1/4" | 2" | 1/2" | .010" | - | - | 28.42 | 27.18 | 25.95 | 24.71 |
| 39316 | .2500 | 1/4" | 6.350 | 1/4" | 2" | 1/2" | .015" | - | - | 28.42 | 27.18 | 25.95 | 24.71 |
| 39318 | .2500 | 1/4" | 6.350 | 1/4" | 2" | 1/2" | .020" | - | - | 28.42 | 27.18 | 25.95 | 24.71 |
| 39453 | .2500 | 1/4" | 6.350 | 1/4" | 2-1/2" | 3/4" | .010" | - | - | 29.95 | 28.64 | 27.34 | 26.04 |
| 39463 | .2500 | 1/4" | 6.350 | 1/4" | 2-1/2" | 3/4" | .015" | - | - | 29.95 | 28.64 | 27.34 | 26.04 |
| 39320 | .2500 | 1/4" | 6.350 | 1/4" | 2-1/2" | 3/4" | .020" | - | - | 29.95 | 28.64 | 27.34 | 26.04 |
| 39473 | .2500 | 1/4" | 6.350 | 1/4" | 2-1/2" | 3/4" | .030" | - | - | 29.95 | 28.64 | 27.34 | 26.04 |
| 39483 | .2500 | 1/4" | 6.350 | 1/4" | 3" | 1-1/8" | .030" | - | - | 45.41 | 43.44 | 41.46 | 39.49 |
| 39493 | .2500 | 1/4" | 6.350 | 1/4" | 4" | 3/8" | .015" | 1-1/8" | .235" | 51.89 | 49.63 | 47.38 | 45.12 |
| 40403 | .2500 | 1/4" | 6.350 | 1/4" | 4" | 3/8" | .030" | 1-1/8" | .235" | 51.89 | 49.63 | 47.38 | 45.12 |
| 39503 | .2500 | 1/4" | 6.350 | 1/4" | 4" | 3/8" | .015" | 2-1/8" | .235" | 57.22 | 54.74 | 52.25 | 49.76 |
| 39543 | .2756 | | 7.000 | 8.0 | 65 | 19 | 0.30 | - | - | 45.84 | 43.85 | 41.85 | 39.86 |
| 39563 | .2756 | | 7.000 | 8.0 | 75 | 12 | 0.30 | 25 | 6.4 | 69.84 | 66.80 | 63.77 | 60.73 |
| 39322 | .3125 | 5/16" | 7.938 | 5/16" | 2" | 1/2" | .010" | - | - | 36.26 | 34.68 | 33.11 | 31.53 |
| 39324 | .3125 | 5/16" | 7.938 | 5/16" | 2" | 1/2" | .020" | - | - | 36.26 | 34.68 | 33.11 | 31.53 |
| 39593 | .3125 | 5/16" | 7.938 | 5/16" | 2-1/2" | 3/4" | .010" | - | - | 39.64 | 37.92 | 36.19 | 34.47 |
| 39603 | .3125 | 5/16" | 7.938 | 5/16" | 2-1/2" | 3/4" | .015" | - | - | 39.64 | 37.92 | 36.19 | 34.47 |
| 39326 | .3125 | 5/16" | 7.938 | 5/16" | 2-1/2" | 3/4" | .020" | - | - | 39.64 | 37.92 | 36.19 | 34.47 |
| 39613 | .3125 | 5/16" | 7.938 | 5/16" | 2-1/2" | 3/4" | .030" | - | - | 39.64 | 37.92 | 36.19 | 34.47 |
| 39623 | .3125 | 5/16" | 7.938 | 5/16" | 4" | 7/16" | .015" | 1-1/8" | .297" | 68.21 | 65.24 | 62.28 | 59.31 |
| 39633 | .3125 | 5/16" | 7.938 | 5/16" | 4" | 7/16" | .030" | 1-1/8" | .297" | 68.21 | 65.24 | 62.28 | 59.31 |
| 39328 | .3150 | | 8.000 | 8.0 | 50 | 12 | 0.50 | - | - | 37.95 | 36.30 | 34.65 | 33.00 |
| 39663 | .3150 | | 8.000 | 8.0 | 65 | 19 | 0.50 | - | - | 41.70 | 39.89 | 38.07 | 36.26 |
| 39683 | .3150 | | 8.000 | 8.0 | 75 | 12 | 0.50 | 25 | 7.4 | 63.55 | 60.79 | 58.02 | 55.26 |
| 39688 | .3150 | | 8.000 | 8.0 | 75 | 12 | 1.00 | 25 | 7.4 | 63.55 | 60.79 | 58.02 | 55.26 |
| 39693 | .3150 | | 8.000 | 8.0 | 75 | 12 | 2.00 | 25 | 7.4 | 63.55 | 60.79 | 58.02 | 55.26 |
| 39698 | .3150 | | 8.000 | 8.0 | 75 | 12 | 3.00 | 25 | 7.4 | 63.55 | 60.79 | 58.02 | 55.26 |
| 39330 | .3750 | 3/8" | 9.525 | 3/8" | 2" | 1/2" | .010" | - | - | 42.68 | 40.82 | 38.97 | 37.11 |
| 39332 | .3750 | 3/8" | 9.525 | 3/8" | 2" | 1/2" | .020" | - | - | 42.68 | 40.82 | 38.97 | 37.11 |
| 39703 | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 7/8" | .010" | - | - | 46.18 | 44.18 | 42.17 | 40.16 |
| 39713 | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 7/8" | .015" | - | - | 46.18 | 44.18 | 42.17 | 40.16 |
| 39334 | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 7/8" | .020" | - | - | 46.18 | 44.18 | 42.17 | 40.16 |
| 39723 | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 7/8" | .030" | - | - | 46.18 | 44.18 | 42.17 | 40.16 |
| 39733 | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 7/8" | .060" | - | - | 46.18 | 44.18 | 42.17 | 40.16 |
| 39734 | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 7/8" | .120" | - | - | 46.18 | 44.18 | 42.17 | 40.16 |
| 39738 | .3750 | 3/8" | 9.525 | 3/8" | 3" | 1-1/4" | .030" | - | - | 59.55 | 56.96 | 54.37 | 51.78 |
| 39763 | .3750 | 3/8" | 9.525 | 3/8" | 4" | 1/2" | .030" | 2-1/8" | .355" | 78.88 | 75.45 | 72.02 | 68.59 |
| 39773 | .3750 | 3/8" | 9.525 | 3/8" | 4" | 1/2" | .060" | 2-1/8" | .355" | 78.88 | 75.45 | 72.02 | 68.59 |
| 39783 | .3750 | 3/8" | 9.525 | 3/8" | 6" | 1/2" | .030" | 4" | .355" | 115.17 | 110.17 | 105.16 | 100.15 |
| 39336 | .3937 | | 10.000 | 10.0 | 50 | 14 | 0.50 | - | - | 64.17 | 61.38 | 58.59 | 55.80 |
| 39803 | .3937 | | 10.000 | 10.0 | 70 | 24 | 0.50 | - | - | 70.84 | 67.76 | 64.68 | 61.60 |
| 39843 | .3937 | | 10.000 | 10.0 | 100 | 12 | 0.50 | 35 | 9.4 | 95.22 | 91.08 | 86.94 | 82.80 |
| 39848 | .3937 | | 10.000 | 10.0 | 100 | 12 | 1.00 | 35 | 9.4 | 95.22 | 91.08 | 86.94 | 82.80 |
| 39853 | .3937 | | 10.000 | 10.0 | 100 | 12 | 1.50 | 35 | 9.4 | 95.22 | 91.08 | 86.94 | 82.80 |
| 39863 | .3937 | | 10.000 | 10.0 | 100 | 12 | 2.00 | 35 | 9.4 | 95.22 | 91.08 | 86.94 | 82.80 |
| 39873 | .3937 | | 10.000 | 10.0 | 100 | 12 | 3.00 | 35 | 9.4 | 95.22 | 91.08 | 86.94 | 82.80 |
| 39344 | .4724 | | 12.000 | 12.0 | 65 | 16 | 0.50 | - | - | 76.88 | 73.54 | 70.19 | 66.85 |
| 39883 | .4724 | | 12.000 | 12.0 | 75 | 32 | 0.50 | - | - | 87.62 | 83.81 | 80.00 | 76.19 |
| 39346 | .4724 | | 12.000 | 12.0 | 75 | 32 | 0.75 | - | - | 87.62 | 83.81 | 80.00 | 76.19 |
| 39348 | .4724 | | 12.000 | 12.0 | 75 | 32 | 1.00 | - | - | 87.62 | 83.81 | 80.00 | 76.19 |
| 39903 | .4724 | | 12.000 | 12.0 | 100 | 16 | 0.50 | 40 | 11.4 | 112.62 | 107.72 | 102.83 | 97.93 |
| 39907 | .4724 | | 12.000 | 12.0 | 100 | 16 | 1.00 | 40 | 11.4 | 112.62 | 107.72 | 102.83 | 97.93 |
| 39911 | .4724 | | 12.000 | 12.0 | 100 | 16 | 1.50 | 40 | 11.4 | 112.62 | 107.72 | 102.83 | 97.93 |
| 39915 | .4724 | | 12.000 | 12.0 | 100 | 16 | 2.00 | 40 | 11.4 | 112.62 | 107.72 | 102.83 | 97.93 |
| 39919 | .4724 | | 12.000 | 12.0 | 100 | 16 | 3.00 | 40 | 11.4 | 112.62 | 107.72 | 102.83 | 97.93 |




*continued* ⟶

# Series 143R *(continued)*

.5000" - 1.000"
(12.700mm - 25.400mm)

MATERIAL HARDNESS (Rc)
70
35
0

| EDP# | $d_1$ † Diameter Decimal | Diameter | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | $r$ Corner Radius | $l_3$ Reach Length | $d_3$ Neck Diameter | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 39353 | .5000 | 1/2" | 12.700 | 1/2" | 2-1/2" | 5/8" | .010" | - | - | 73.04 | 69.86 | 66.69 | 63.51 |
| 39355 | .5000 | 1/2" | 12.700 | 1/2" | 2-1/2" | 5/8" | .020" | - | - | 73.04 | 69.86 | 66.69 | 63.51 |
| 39923 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1-1/4" | .010" | - | - | 83.24 | 79.62 | 76.00 | 72.38 |
| 39933 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1-1/4" | .015" | - | - | 83.24 | 79.62 | 76.00 | 72.38 |
| 39356 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1-1/4" | .020" | - | - | 83.24 | 79.62 | 76.00 | 72.38 |
| 39943 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1-1/4" | .030" | - | - | 83.24 | 79.62 | 76.00 | 72.38 |
| 39953 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1-1/4" | .060" | - | - | 83.24 | 79.62 | 76.00 | 72.38 |
| 39963 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1-1/4" | .120" | - | - | 83.24 | 79.62 | 76.00 | 72.38 |
| 39965 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1-1/4" | .125" | - | - | 83.24 | 79.62 | 76.00 | 72.38 |
| 39967 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1-1/4" | .190" | - | - | 83.24 | 79.62 | 76.00 | 72.38 |
| 39972 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 1-5/8" | .015" | - | - | 96.26 | 92.07 | 87.89 | 83.70 |
| 39973 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 2" | .010" | - | - | 96.26 | 92.07 | 87.89 | 83.70 |
| 40413 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 2" | .030" | - | - | 96.26 | 92.07 | 87.89 | 83.70 |
| 40423 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 2" | .060" | - | - | 96.26 | 92.07 | 87.89 | 83.70 |
| 40433 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 5/8" | .010" | 2-1/8" | .475" | 106.98 | 102.33 | 97.68 | 93.03 |
| 39983 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 5/8" | .030" | 2-1/8" | .475" | 106.98 | 102.33 | 97.68 | 93.03 |
| 40443 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 5/8" | .060" | 2-1/8" | .475" | 106.98 | 102.33 | 97.68 | 93.03 |
| 40453 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 5/8" | .120" | 2-1/8" | .475" | 106.98 | 102.33 | 97.68 | 93.03 |
| 39993 | .5000 | 1/2" | 12.700 | 1/2" | 6" | 5/8" | .030" | 4-1/8" | .475" | 160.55 | 153.57 | 146.59 | 139.61 |
| 39366 | .6250 | 5/8" | 15.875 | 5/8" | 3" | 3/4" | .010" | - | - | 134.31 | 128.47 | 122.63 | 116.79 |
| 39368 | .6250 | 5/8" | 15.875 | 5/8" | 3" | 3/4" | .020" | - | - | 134.31 | 128.47 | 122.63 | 116.79 |
| 39369 | .6250 | 5/8" | 15.875 | 5/8" | 3-1/2" | 1-1/4" | .015" | - | - | 138.18 | 132.18 | 126.17 | 120.16 |
| 39370 | .6250 | 5/8" | 15.875 | 5/8" | 3-1/2" | 1-1/4" | .020" | - | - | 138.18 | 132.18 | 126.17 | 120.16 |
| 40463 | .6250 | 5/8" | 15.875 | 5/8" | 4" | 1-5/8" | .015" | - | - | 143.99 | 137.73 | 131.47 | 125.21 |
| 39372 | .6250 | 5/8" | 15.875 | 5/8" | 4" | 1-5/8" | .020" | - | - | 143.99 | 137.73 | 131.47 | 125.21 |
| 40023 | .6250 | 5/8" | 15.875 | 5/8" | 4" | 1-5/8" | .030" | - | - | 143.99 | 137.73 | 131.47 | 125.21 |
| 40473 | .6250 | 5/8" | 15.875 | 5/8" | 4" | 1-5/8" | .060" | - | - | 143.99 | 137.73 | 131.47 | 125.21 |
| 40483 | .6250 | 5/8" | 15.875 | 5/8" | 4" | 1-5/8" | .120" | - | - | 143.99 | 137.73 | 131.47 | 125.21 |
| 40485 | .6250 | 5/8" | 15.875 | 5/8" | 4" | 1-5/8" | .190" | - | - | 143.99 | 137.73 | 131.47 | 125.21 |
| 40033 | .6250 | 5/8" | 15.875 | 5/8" | 6" | 3/4" | .030" | 2-3/8" | .590" | 205.88 | 196.93 | 187.98 | 179.03 |
| 40043 | .6250 | 5/8" | 15.875 | 5/8" | 6" | 3/4" | .030" | 4-3/8" | .590" | 216.64 | 207.22 | 197.80 | 188.38 |
| 40083 | .6299 | | 16.000 | 16.0 | 100 | 40 | 1.00 | - | - | 151.58 | 144.99 | 138.40 | 131.81 |
| 40103 | .6299 | | 16.000 | 16.0 | 100 | 20 | 1.00 | 40 | 15.4 | 156.94 | 150.12 | 143.29 | 136.47 |
| 40113 | .6299 | | 16.000 | 16.0 | 125 | 20 | 2.00 | 60 | 15.4 | 205.98 | 197.02 | 188.07 | 179.11 |
| 40118 | .6299 | | 16.000 | 16.0 | 125 | 20 | 3.00 | 60 | 15.4 | 205.98 | 197.02 | 188.07 | 179.11 |
| 40123 | .6299 | | 16.000 | 16.0 | 125 | 20 | 4.00 | 60 | 15.4 | 205.98 | 197.02 | 188.07 | 179.11 |
| 39374 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-1/4" | .020" | - | - | 186.88 | 178.75 | 170.63 | 162.50 |
| 40133 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-5/8" | .015" | - | - | 186.88 | 178.75 | 170.63 | 162.50 |
| 39376 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-5/8" | .020" | - | - | 186.88 | 178.75 | 170.63 | 162.50 |
| 40143 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-5/8" | .030" | - | - | 186.88 | 178.75 | 170.63 | 162.50 |
| 40153 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-5/8" | .060" | - | - | 186.88 | 178.75 | 170.63 | 162.50 |
| 40493 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-5/8" | .120" | - | - | 186.88 | 178.75 | 170.63 | 162.50 |
| 40495 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-5/8" | .190" | - | - | 186.88 | 178.75 | 170.63 | 162.50 |
| 40497 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-5/8" | .250" | - | - | 186.88 | 178.75 | 170.63 | 162.50 |
| 40503 | .7500 | 3/4" | 19.050 | 3/4" | 6" | 1" | .015" | 2-1/2" | .715" | 278.50 | 266.39 | 254.28 | 242.17 |
| 40163 | .7500 | 3/4" | 19.050 | 3/4" | 6" | 1" | .030" | 2-1/2" | .715" | 278.50 | 266.39 | 254.28 | 242.17 |
| 40513 | .7500 | 3/4" | 19.050 | 3/4" | 6" | 1" | .060" | 2-1/2" | .715" | 278.50 | 266.39 | 254.28 | 242.17 |
| 40523 | .7500 | 3/4" | 19.050 | 3/4" | 6" | 1" | .120" | 2-1/2" | .715" | 278.50 | 266.39 | 254.28 | 242.17 |
| 40171 | .7500 | 3/4" | 19.050 | 3/4" | 6" | 1" | .015" | 4" | .715" | 286.06 | 273.63 | 261.19 | 248.75 |
| 40173 | .7500 | 3/4" | 19.050 | 3/4" | 6" | 1" | .030" | 4-3/8" | .715" | 286.06 | 273.63 | 261.19 | 248.75 |
| 40183 | .7874 | | 20.000 | 20.0 | 100 | 32 | 1.00 | - | - | 262.32 | 250.91 | 239.51 | 228.10 |
| 40223 | .7874 | | 20.000 | 20.0 | 100 | 20 | 1.00 | 40 | 19.0 | 267.67 | 256.04 | 244.40 | 232.76 |
| 40225 | .7874 | | 20.000 | 20.0 | 150 | 20 | 1.00 | 65 | 19.0 | 359.21 | 343.60 | 327.98 | 312.36 |
| 40226 | .7874 | | 20.000 | 20.0 | 150 | 20 | 2.00 | 65 | 19.0 | 359.21 | 343.60 | 327.98 | 312.36 |
| 40229 | .7874 | | 20.000 | 20.0 | 150 | 20 | 3.00 | 65 | 19.0 | 359.21 | 343.60 | 327.98 | 312.36 |
| 40231 | .7874 | | 20.000 | 20.0 | 150 | 20 | 4.00 | 65 | 19.0 | 359.21 | 343.60 | 327.98 | 312.36 |
| 40243 | .9843 | | 25.000 | 25.0 | 100 | 38 | 1.00 | - | - | 303.53 | 290.33 | 277.14 | 263.94 |
| 40293 | 1.000 | 1" | 25.400 | 1" | 4" | 1-5/8" | .030" | - | - | 318.70 | 304.84 | 290.99 | 277.13 |
| 40303 | 1.000 | 1" | 25.400 | 1" | 4" | 1-5/8" | .060" | - | - | 318.70 | 304.84 | 290.99 | 277.13 |
| 40313 | 1.000 | 1" | 25.400 | 1" | 4" | 1-5/8" | .120" | - | - | 318.70 | 304.84 | 290.99 | 277.13 |
| 40343 | 1.000 | 1" | 25.400 | 1" | 6" | 1-1/4" | .030" | 3-3/8" | .960" | 467.05 | 446.74 | 426.44 | 406.13 |
| 40353 | 1.000 | 1" | 25.400 | 1" | 6" | 1-1/4" | .060" | 3-3/8" | .960" | 467.05 | 446.74 | 426.44 | 406.13 |
| 40363 | 1.000 | 1" | 25.400 | 1" | 6" | 1-1/4" | .120" | 3-3/8" | .960" | 467.05 | 446.74 | 426.44 | 406.13 |
| NEW 40366 | 1.000 | 1" | 25.400 | 1" | 6" | 1-1/4" | .030" | 4" | .960" | 467.05 | 446.74 | 426.44 | 406.13 |



† *Metric equivalents are for reference only*

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## Series TMS

.2362" - .5000"
(6.000mm - 12.700mm)

# HIGH EFFICIENCY MILLING






TECH PAGES 304-305

| TOLERANCES | |
|---|---|
| $d_1$ | +.000" –.002" (+.000mm –.050mm) |
| $d_2$ | h6 |

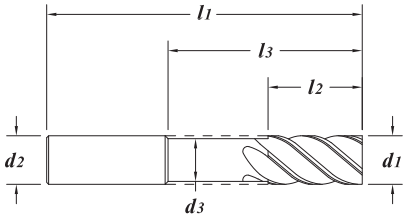
Recommended for titanium and steels under 40Rc

## Multi-Flute End Mill - Square End

### AlCrN Coating

Solid submicron grain carbide end mill - non-center cutting
Multiple flutes for increased feed rates
Odd number of flutes to naturally break up harmonics
Engineered for High Efficiency Milling
Up to 8% Radial (ap) engagement
Can be used to finish most steels under 40Rc, as well as aluminum
Conventional grind for better finish cutting and less push off when finishing
Regrindable






MATERIAL HARDNESS (Rc)
70
35
0

| EDP# | $d_1$ † Diameter Decimal | Diameter | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | $l_3$ Reach Length | $d_3$ Neck Diameter | Number Flutes | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 98390 | .2362 | | 6.000 | 6.0 | 50 | 12 | - | - | 7 | 25.67 | 24.55 | 23.44 | 22.32 |
| 98392 | .2362 | | 6.000 | 6.0 | 65 | 19 | - | - | 7 | 28.93 | 27.68 | 26.42 | 25.16 |
| 98394 | .2362 | | 6.000 | 6.0 | 100 | 38 | - | - | 7 | 48.21 | 46.11 | 44.02 | 41.92 |
| 98396 | .2362 | | 6.000 | 6.0 | 100 | 10 | 60 | 5.4 | 7 | 51.78 | 49.53 | 47.28 | 45.03 |
| 98398 | .2500 | 1/4" | 6.350 | 1/4" | 2" | 3/8" | - | - | 7 | 24.62 | 23.55 | 22.48 | 21.41 |
| 98400 | .2500 | 1/4" | 6.350 | 1/4" | 2-1/2" | 3/4" | - | - | 7 | 27.92 | 26.71 | 25.49 | 24.28 |
| 98402 | .2500 | 1/4" | 6.350 | 1/4" | 4" | 1-1/2" | - | - | 7 | 46.25 | 44.24 | 42.23 | 40.22 |
| 98404 | .3125 | 5/16" | 7.938 | 5/16" | 2" | 7/16" | - | - | 7 | 36.56 | 34.97 | 33.38 | 31.79 |
| 98406 | .3125 | 5/16" | 7.938 | 5/16" | 2-1/2" | 13/16" | - | - | 7 | 39.84 | 38.10 | 36.37 | 34.64 |
| 98408 | .3125 | 5/16" | 7.938 | 5/16" | 4" | 1-1/2" | - | - | 7 | 63.11 | 60.37 | 57.62 | 54.88 |
| 98410 | .3150 | | 8.000 | 8.0 | 50 | 12 | - | - | 7 | 37.05 | 35.44 | 33.83 | 32.22 |
| 98412 | .3150 | | 8.000 | 8.0 | 65 | 22 | - | - | 7 | 41.27 | 39.48 | 37.68 | 35.89 |
| 98414 | .3150 | | 8.000 | 8.0 | 100 | 38 | - | - | 7 | 65.71 | 62.85 | 60.00 | 57.14 |
| 98416 | .3150 | | 8.000 | 8.0 | 100 | 12 | 60 | 7.4 | 7 | 69.29 | 66.28 | 63.26 | 60.25 |
| 98418 | .3750 | 3/8" | 9.525 | 3/8" | 2" | 1/2" | - | - | 7 | 43.99 | 42.08 | 40.16 | 38.25 |
| 98420 | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 7/8" | - | - | 7 | 47.00 | 44.96 | 42.91 | 40.87 |
| 98422 | .3750 | 3/8" | 9.525 | 3/8" | 3" | 1-1/4" | - | - | 7 | 60.51 | 57.88 | 55.25 | 52.62 |
| 98424 | .3750 | 3/8" | 9.525 | 3/8" | 4" | 2" | - | - | 7 | 67.83 | 64.88 | 61.93 | 58.98 |
| 98426 | .3937 | | 10.000 | 10.0 | 50 | 16 | - | - | 7 | 51.23 | 49.01 | 46.78 | 44.55 |
| 98428 | .3937 | | 10.000 | 10.0 | 70 | 22 | - | - | 7 | 56.37 | 53.92 | 51.47 | 49.02 |
| 98430 | .3937 | | 10.000 | 10.0 | 100 | 38 | - | - | 7 | 85.46 | 81.74 | 78.03 | 74.31 |
| 98432 | .3937 | | 10.000 | 10.0 | 100 | 50 | - | - | 7 | 85.46 | 81.74 | 78.03 | 74.31 |
| 98434 | .3937 | | 10.000 | 10.0 | 100 | 16 | 60 | 9.4 | 7 | 89.04 | 85.17 | 81.30 | 77.43 |
| 98436 | .4724 | | 12.000 | 12.0 | 75 | 26 | - | - | 9 | 73.22 | 70.04 | 66.85 | 63.67 |
| 98438 | .4724 | | 12.000 | 12.0 | 75 | 32 | - | - | 9 | 73.22 | 70.04 | 66.85 | 63.67 |
| 98440 | .4724 | | 12.000 | 12.0 | 100 | 42 | - | - | 9 | 100.48 | 96.11 | 91.74 | 87.37 |
| 98442 | .4724 | | 12.000 | 12.0 | 100 | 52 | - | - | 9 | 100.48 | 96.11 | 91.74 | 87.37 |
| 98444 | .4724 | | 12.000 | 12.0 | 150 | 19 | 105 | 11.4 | 9 | 141.65 | 135.49 | 129.33 | 123.17 |
| 98446 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1" | - | - | 9 | 70.30 | 67.24 | 64.19 | 61.13 |
| 98448 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1-1/4" | - | - | 9 | 70.30 | 67.24 | 64.19 | 61.13 |
| 98450 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 5/8" | 2-1/8" | .470" | 9 | 98.70 | 94.41 | 90.12 | 85.83 |
| 98452 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 1-1/2" | - | - | 9 | 95.13 | 90.99 | 86.86 | 82.72 |
| 98454 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 2-1/8" | - | - | 9 | 95.13 | 90.99 | 86.86 | 82.72 |



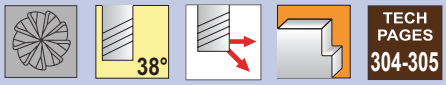
† *Metric equivalents are for reference only*

| EDP# | *d1* † Diameter Decimal | Diameter | Metric | *d2* Shank Diameter | *l1* Overall Length | *l2* Flute Length | *l3* Reach Length | *d3* Neck Diameter | Number Flutes | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 98456 | .6250 | 5/8" | 15.875 | 5/8" | 3-1/2" | 1-1/4" | - | - | 9 | 144.76 | 138.47 | 132.17 | 125.88 |
| 98458 | .6250 | 5/8" | 15.875 | 5/8" | 4" | 1-5/8" | - | - | 9 | 154.61 | 147.88 | 141.16 | 134.44 |
| 98460 | .6250 | 5/8" | 15.875 | 5/8" | 6" | 3-1/4" | - | - | 9 | 212.73 | 203.48 | 194.23 | 184.98 |
| 98462 | .6250 | 5/8" | 15.875 | 5/8" | 6" | 3/4" | 4-1/8" | .590" | 9 | 216.30 | 206.90 | 197.49 | 188.09 |
| 98464 | .6299 | | 16.000 | 16.0 | 88 | 32 | - | - | 9 | 151.02 | 144.45 | 137.89 | 131.32 |
| 98466 | .6299 | | 16.000 | 16.0 | 100 | 42 | - | - | 9 | 161.21 | 154.20 | 147.19 | 140.18 |
| 98468 | .6299 | | 16.000 | 16.0 | 150 | 60 | - | - | 9 | 221.82 | 212.18 | 202.53 | 192.89 |
| 98470 | .6299 | | 16.000 | 16.0 | 150 | 80 | - | - | 9 | 221.82 | 212.18 | 202.53 | 192.89 |
| 98472 | .6299 | | 16.000 | 16.0 | 150 | 22 | 102 | 15.4 | 9 | 225.40 | 215.60 | 205.80 | 196.00 |
| 98474 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-1/2" | - | - | 11 | 214.91 | 205.57 | 196.22 | 186.88 |
| 98476 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-5/8" | - | - | 11 | 214.91 | 205.57 | 196.22 | 186.88 |
| 98478 | .7500 | 3/4" | 19.050 | 3/4" | 5" | 2-1/8" | - | - | 11 | 288.48 | 275.94 | 263.39 | 250.85 |
| 98480 | .7500 | 3/4" | 19.050 | 3/4" | 6" | 3-1/4" | - | - | 11 | 337.56 | 322.88 | 308.21 | 293.53 |
| 98484 | .7874 | | 20.000 | 20.0 | 100 | 26 | - | - | 11 | 279.19 | 267.05 | 254.91 | 242.77 |
| 98486 | .7874 | | 20.000 | 20.0 | 100 | 38 | - | - | 11 | 279.19 | 267.05 | 254.91 | 242.77 |
| 98488 | .7874 | | 20.000 | 20.0 | 150 | 60 | - | - | 11 | 351.62 | 336.34 | 321.05 | 305.76 |
| 98490 | .7874 | | 20.000 | 20.0 | 150 | 80 | - | - | 11 | 351.62 | 336.34 | 321.05 | 305.76 |
| 98494 | 1.000 | 1" | 25.400 | 1" | 4" | 1-1/2" | - | - | 13 | 296.36 | 283.47 | 270.59 | 257.70 |
| 98496 | 1.000 | 1" | 25.400 | 1" | 5" | 2-1/4" | - | - | 13 | 396.68 | 379.43 | 362.19 | 344.94 |
| 98498 | 1.000 | 1" | 25.400 | 1" | 6" | 3-1/4" | - | - | 13 | 516.74 | 494.27 | 471.81 | 449.34 |
| 98500 | 1.000 | 1" | 25.400 | 1" | 7" | 4-1/4" | - | - | 13 | 694.86 | 664.65 | 634.44 | 604.23 |

## Series TMR

.4724"
(12.000mm)

# HIGH EFFICIENCY MILLING




| TOLERANCES | |
|---|---|
| $d_1$ | +.000" –.002" (+.000mm –.050mm) |
| $d_2$ | h6 |
| $r$ | +.001" –.001" (+.025mm –.025mm) |

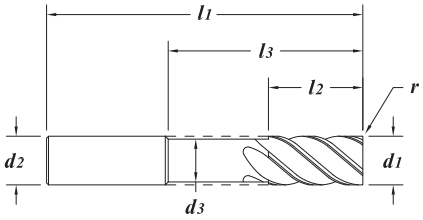
Recommended for titanium and steels under 40Rc



## Multi-Flute End Mill - Corner Radius

### AlCrN Coating

Solid submicron grain carbide end mill - non-center cutting
Multiple flutes for increased feed rates
Odd number of flutes to naturally break up harmonics
Engineered for High Efficiency Milling
Up to 8% Radial (ap) engagement
Can be used to finish most steels under 40Rc, as well as aluminum
Conventional grind for better finish cutting and less push off when finishing
Regrindable




MATERIAL HARDNESS (Rc)
70
35
0

| EDP# | $d_1$ † Diameter Decimal | Diameter Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | $r$ Corner Radius | $l_3$ Reach Length | $d_3$ Neck Diameter | Number Flutes | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 98502 | .4724 | 12.000 | 12.0 | 75 | 26 | 0.30 | - | - | 7 | 89.04 | 85.17 | 81.30 | 77.43 |
| 98504 | .4724 | 12.000 | 12.0 | 75 | 26 | 0.50 | - | - | 7 | 89.04 | 85.17 | 81.30 | 77.43 |
| 98508 | .4724 | 12.000 | 12.0 | 75 | 26 | 1.00 | - | - | 7 | 89.04 | 85.17 | 81.30 | 77.43 |
| 98516 | .4724 | 12.000 | 12.0 | 75 | 26 | 4.00 | - | - | 7 | 89.04 | 85.17 | 81.30 | 77.43 |
| 98518 | .4724 | 12.000 | 12.0 | 75 | 32 | 0.50 | - | - | 7 | 89.04 | 85.17 | 81.30 | 77.43 |
| 98522 | .4724 | 12.000 | 12.0 | 75 | 32 | 1.00 | - | - | 7 | 89.04 | 85.17 | 81.30 | 77.43 |
| 98524 | .4724 | 12.000 | 12.0 | 75 | 32 | 1.50 | - | - | 7 | 89.04 | 85.17 | 81.30 | 77.43 |
| 98528 | .4724 | 12.000 | 12.0 | 75 | 32 | 3.00 | - | - | 7 | 89.04 | 85.17 | 81.30 | 77.43 |
| 98532 | .4724 | 12.000 | 12.0 | 100 | 42 | 0.50 | - | - | 7 | 105.48 | 100.89 | 96.31 | 91.72 |
| 98538 | .4724 | 12.000 | 12.0 | 100 | 42 | 1.50 | - | - | 7 | 105.48 | 100.89 | 96.31 | 91.72 |
| 98544 | .4724 | 12.000 | 12.0 | 100 | 42 | 4.00 | - | - | 7 | 105.48 | 100.89 | 96.31 | 91.72 |
| 98546 | .4724 | 12.000 | 12.0 | 100 | 52 | 0.50 | - | - | 7 | 105.48 | 100.89 | 96.31 | 91.72 |
| 98550 | .4724 | 12.000 | 12.0 | 100 | 52 | 1.00 | - | - | 7 | 105.48 | 100.89 | 96.31 | 91.72 |
| 98552 | .4724 | 12.000 | 12.0 | 100 | 52 | 1.50 | - | - | 7 | 105.48 | 100.89 | 96.31 | 91.72 |
| 98556 | .4724 | 12.000 | 12.0 | 100 | 52 | 3.00 | - | - | 7 | 105.48 | 100.89 | 96.31 | 91.72 |
| 98560 | .4724 | 12.000 | 12.0 | 150 | 19 | 0.50 | 105 | 11.4 | 7 | 146.34 | 139.98 | 133.61 | 127.25 |
| 98564 | .4724 | 12.000 | 12.0 | 150 | 19 | 1.00 | 105 | 11.4 | 7 | 146.34 | 139.98 | 133.61 | 127.25 |
| 98570 | .4724 | 12.000 | 12.0 | 150 | 19 | 3.00 | 105 | 11.4 | 7 | 146.34 | 139.98 | 133.61 | 127.25 |



† *Metric equivalents are for reference only*

| EDP# | *d1* † Diameter Decimal | Diameter | Metric | *d2* Shank Diameter | *l1* Overall Length | *l2* Flute Length | *r* Corner Radius | *l3* Reach Length | *d3* Neck Diameter | Number Flutes | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 98574 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1" | .010" | - | - | 7 | 85.42 | 81.71 | 77.99 | 74.28 |
| 98576 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1" | .020" | - | - | 7 | 85.42 | 81.71 | 77.99 | 74.28 |
| 98578 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1" | .030" | - | - | 7 | 85.42 | 81.71 | 77.99 | 74.28 |
| 98580 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1" | .060" | - | - | 7 | 85.42 | 81.71 | 77.99 | 74.28 |
| 98582 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1" | .090" | - | - | 7 | 85.42 | 81.71 | 77.99 | 74.28 |
| 98584 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1" | .120" | - | - | 7 | 85.42 | 81.71 | 77.99 | 74.28 |
| 98586 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1" | .125" | - | - | 7 | 85.42 | 81.71 | 77.99 | 74.28 |
| 98588 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1-1/4" | .010" | - | - | 7 | 85.42 | 81.71 | 77.99 | 74.28 |
| 98590 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1-1/4" | .020" | - | - | 7 | 85.42 | 81.71 | 77.99 | 74.28 |
| 98592 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1-1/4" | .030" | - | - | 7 | 85.42 | 81.71 | 77.99 | 74.28 |
| 98594 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1-1/4" | .060" | - | - | 7 | 85.42 | 81.71 | 77.99 | 74.28 |
| 98598 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1-1/4" | .120" | - | - | 7 | 85.42 | 81.71 | 77.99 | 74.28 |
| 98600 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1-1/4" | .125" | - | - | 7 | 85.42 | 81.71 | 77.99 | 74.28 |
| 98602 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 5/8" | .010" | 2-1/8" | .470" | 7 | 104.52 | 99.98 | 95.43 | 90.89 |
| 98604 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 5/8" | .020" | 2-1/8" | .470" | 7 | 104.52 | 99.98 | 95.43 | 90.89 |
| 98606 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 5/8" | .030" | 2-1/8" | .470" | 7 | 104.52 | 99.98 | 95.43 | 90.89 |
| 98608 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 5/8" | .060" | 2-1/8" | .470" | 7 | 104.52 | 99.98 | 95.43 | 90.89 |
| 98610 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 5/8" | .120" | 2-1/8" | .470" | 7 | 104.52 | 99.98 | 95.43 | 90.89 |
| 98612 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 5/8" | .125" | 2-1/8" | .470" | 7 | 104.52 | 99.98 | 95.43 | 90.89 |
| 98614 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 1-1/2" | .010" | - | - | 7 | 100.95 | 96.56 | 92.17 | 87.78 |
| 98616 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 1-1/2" | .020" | - | - | 7 | 100.95 | 96.56 | 92.17 | 87.78 |
| 98618 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 1-1/2" | .030" | - | - | 7 | 100.95 | 96.56 | 92.17 | 87.78 |
| 98620 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 1-1/2" | .060" | - | - | 7 | 100.95 | 96.56 | 92.17 | 87.78 |
| 98622 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 2-1/8" | .010" | - | - | 7 | 100.95 | 96.56 | 92.17 | 87.78 |
| 98626 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 2-1/8" | .030" | - | - | 7 | 100.95 | 96.56 | 92.17 | 87.78 |
| 98628 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 2-1/8" | .060" | - | - | 7 | 100.95 | 96.56 | 92.17 | 87.78 |
| 98630 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 2-1/8" | .120" | - | - | 7 | 100.95 | 96.56 | 92.17 | 87.78 |
| 98632 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 2-1/8" | .125" | - | - | 7 | 100.95 | 96.56 | 92.17 | 87.78 |
| 98634 | .6250 | 5/8" | 15.875 | 5/8" | 3-1/2" | 1-1/4" | .010" | - | - | 7 | 151.78 | 145.18 | 138.58 | 131.98 |
| 98636 | .6250 | 5/8" | 15.875 | 5/8" | 3-1/2" | 1-1/4" | .020" | - | - | 7 | 151.78 | 145.18 | 138.58 | 131.98 |
| 98638 | .6250 | 5/8" | 15.875 | 5/8" | 3-1/2" | 1-1/4" | .030" | - | - | 7 | 151.78 | 145.18 | 138.58 | 131.98 |
| 98640 | .6250 | 5/8" | 15.875 | 5/8" | 3-1/2" | 1-1/4" | .060" | - | - | 7 | 151.78 | 145.18 | 138.58 | 131.98 |
| 98642 | .6250 | 5/8" | 15.875 | 5/8" | 3-1/2" | 1-1/4" | .120" | - | - | 7 | 151.78 | 145.18 | 138.58 | 131.98 |
| 98644 | .6250 | 5/8" | 15.875 | 5/8" | 3-1/2" | 1-1/4" | .125" | - | - | 7 | 151.78 | 145.18 | 138.58 | 131.98 |
| 98646 | .6250 | 5/8" | 15.875 | 5/8" | 4" | 1-5/8" | .010" | - | - | 7 | 164.98 | 157.81 | 150.63 | 143.46 |
| 98648 | .6250 | 5/8" | 15.875 | 5/8" | 4" | 1-5/8" | .020" | - | - | 7 | 164.98 | 157.81 | 150.63 | 143.46 |
| 98652 | .6250 | 5/8" | 15.875 | 5/8" | 4" | 1-5/8" | .060" | - | - | 7 | 164.98 | 157.81 | 150.63 | 143.46 |
| 98654 | .6250 | 5/8" | 15.875 | 5/8" | 4" | 1-5/8" | .120" | - | - | 7 | 164.98 | 157.81 | 150.63 | 143.46 |
| 98658 | .6250 | 5/8" | 15.875 | 5/8" | 6" | 3-1/4" | .010" | - | - | 7 | 227.11 | 217.24 | 207.36 | 197.49 |
| 98660 | .6250 | 5/8" | 15.875 | 5/8" | 6" | 3-1/4" | .020" | - | - | 7 | 227.11 | 217.24 | 207.36 | 197.49 |
| 98662 | .6250 | 5/8" | 15.875 | 5/8" | 6" | 3-1/4" | .030" | - | - | 7 | 227.11 | 217.24 | 207.36 | 197.49 |
| 98666 | .6250 | 5/8" | 15.875 | 5/8" | 6" | 3-1/4" | .120" | - | - | 7 | 227.11 | 217.24 | 207.36 | 197.49 |
| 98670 | .6250 | 5/8" | 15.875 | 5/8" | 6" | 3/4" | .010" | 4-1/8" | .590" | 7 | 230.71 | 220.68 | 210.65 | 200.62 |
| 98672 | .6250 | 5/8" | 15.875 | 5/8" | 6" | 3/4" | .020" | 4-1/8" | .590" | 7 | 230.71 | 220.68 | 210.65 | 200.62 |
| 98674 | .6250 | 5/8" | 15.875 | 5/8" | 6" | 3/4" | .030" | 4-1/8" | .590" | 7 | 230.71 | 220.68 | 210.65 | 200.62 |
| 98678 | .6250 | 5/8" | 15.875 | 5/8" | 6" | 3/4" | .120" | 4-1/8" | .590" | 7 | 230.71 | 220.68 | 210.65 | 200.62 |



*continued* →

## Series TMR *(continued)*

.6299" - .7874"
(16.000mm - 20.000mm)

| EDP# | $d_1$ † Diameter Decimal | Diameter | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | $r$ Corner Radius | $l_3$ Reach Length | $d_3$ Neck Diameter | Number Flutes | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 98680 | .6299 | | 16.000 | 16.0 | 88 | 32 | 0.50 | - | - | 7 | 158.38 | 151.49 | 144.61 | 137.72 |
| 98690 | .6299 | | 16.000 | 16.0 | 88 | 32 | 3.00 | - | - | 7 | 158.38 | 151.49 | 144.61 | 137.72 |
| 98696 | .6299 | | 16.000 | 16.0 | 100 | 42 | 0.50 | - | - | 7 | 168.42 | 161.10 | 153.77 | 146.45 |
| 98700 | .6299 | | 16.000 | 16.0 | 100 | 42 | 1.00 | - | - | 7 | 168.42 | 161.10 | 153.77 | 146.45 |
| 98704 | .6299 | | 16.000 | 16.0 | 100 | 42 | 2.00 | - | - | 7 | 168.42 | 161.10 | 153.77 | 146.45 |
| 98706 | .6299 | | 16.000 | 16.0 | 100 | 42 | 3.00 | - | - | 7 | 168.42 | 161.10 | 153.77 | 146.45 |
| 98708 | .6299 | | 16.000 | 16.0 | 100 | 42 | 4.00 | - | - | 7 | 168.42 | 161.10 | 153.77 | 146.45 |
| 98710 | .6299 | | 16.000 | 16.0 | 100 | 42 | 5.00 | - | - | 7 | 168.42 | 161.10 | 153.77 | 146.45 |
| 98712 | .6299 | | 16.000 | 16.0 | 150 | 60 | 0.50 | - | - | 7 | 236.19 | 225.92 | 215.65 | 205.38 |
| 98716 | .6299 | | 16.000 | 16.0 | 150 | 60 | 1.00 | - | - | 7 | 236.19 | 225.92 | 215.65 | 205.38 |
| 98720 | .6299 | | 16.000 | 16.0 | 150 | 60 | 2.00 | - | - | 7 | 236.19 | 225.92 | 215.65 | 205.38 |
| 98722 | .6299 | | 16.000 | 16.0 | 150 | 60 | 3.00 | - | - | 7 | 236.19 | 225.92 | 215.65 | 205.38 |
| 98724 | .6299 | | 16.000 | 16.0 | 150 | 60 | 4.00 | - | - | 7 | 236.19 | 225.92 | 215.65 | 205.38 |
| 98726 | .6299 | | 16.000 | 16.0 | 150 | 60 | 5.00 | - | - | 7 | 236.19 | 225.92 | 215.65 | 205.38 |
| 98732 | .6299 | | 16.000 | 16.0 | 150 | 80 | 1.00 | - | - | 7 | 236.19 | 225.92 | 215.65 | 205.38 |
| 98738 | .6299 | | 16.000 | 16.0 | 150 | 80 | 3.00 | - | - | 7 | 236.19 | 225.92 | 215.65 | 205.38 |
| 98744 | .6299 | | 16.000 | 16.0 | 150 | 22 | 0.50 | 102 | 15.4 | 7 | 239.78 | 229.35 | 218.93 | 208.50 |
| 98752 | .6299 | | 16.000 | 16.0 | 150 | 22 | 2.00 | 102 | 15.4 | 7 | 239.78 | 229.35 | 218.93 | 208.50 |
| 98754 | .6299 | | 16.000 | 16.0 | 150 | 22 | 3.00 | 102 | 15.4 | 7 | 239.78 | 229.35 | 218.93 | 208.50 |
| 98760 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-1/2" | .010" | - | - | 9 | 226.37 | 216.52 | 206.68 | 196.84 |
| 98764 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-1/2" | .030" | - | - | 9 | 226.37 | 216.52 | 206.68 | 196.84 |
| 98766 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-1/2" | .060" | - | - | 9 | 226.37 | 216.52 | 206.68 | 196.84 |
| 98770 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-1/2" | .190" | - | - | 9 | 226.37 | 216.52 | 206.68 | 196.84 |
| 98772 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-1/2" | .250" | - | - | 9 | 226.37 | 216.52 | 206.68 | 196.84 |
| 98774 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-5/8" | .010" | - | - | 9 | 226.37 | 216.52 | 206.68 | 196.84 |
| 98778 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-5/8" | .030" | - | - | 9 | 226.37 | 216.52 | 206.68 | 196.84 |
| 98784 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-5/8" | .190" | - | - | 9 | 226.37 | 216.52 | 206.68 | 196.84 |
| 98788 | .7500 | 3/4" | 19.050 | 3/4" | 5" | 2-1/8" | .010" | - | - | 9 | 313.98 | 300.33 | 286.68 | 273.03 |
| 98790 | .7500 | 3/4" | 19.050 | 3/4" | 5" | 2-1/8" | .020" | - | - | 9 | 313.98 | 300.33 | 286.68 | 273.03 |
| 98794 | .7500 | 3/4" | 19.050 | 3/4" | 5" | 2-1/8" | .060" | - | - | 9 | 313.98 | 300.33 | 286.68 | 273.03 |
| 98796 | .7500 | 3/4" | 19.050 | 3/4" | 5" | 2-1/8" | .120" | - | - | 9 | 313.98 | 300.33 | 286.68 | 273.03 |
| 98800 | .7500 | 3/4" | 19.050 | 3/4" | 5" | 2-1/8" | .250" | - | - | 9 | 313.98 | 300.33 | 286.68 | 273.03 |
| 98802 | .7500 | 3/4" | 19.050 | 3/4" | 6" | 3-1/4" | .010" | - | - | 9 | 372.96 | 356.74 | 340.53 | 324.31 |
| 98804 | .7500 | 3/4" | 19.050 | 3/4" | 6" | 3-1/4" | .020" | - | - | 9 | 372.96 | 356.74 | 340.53 | 324.31 |
| 98806 | .7500 | 3/4" | 19.050 | 3/4" | 6" | 3-1/4" | .030" | - | - | 9 | 372.96 | 356.74 | 340.53 | 324.31 |
| 98808 | .7500 | 3/4" | 19.050 | 3/4" | 6" | 3-1/4" | .060" | - | - | 9 | 372.96 | 356.74 | 340.53 | 324.31 |
| 98814 | .7500 | 3/4" | 19.050 | 3/4" | 6" | 3-1/4" | .250" | - | - | 9 | 372.96 | 356.74 | 340.53 | 324.31 |
| 98816 | .7500 | 3/4" | 19.050 | 3/4" | 6" | 1" | .010" | 4-1/8" | .720" | 9 | 376.54 | 360.17 | 343.80 | 327.43 |
| 98820 | .7500 | 3/4" | 19.050 | 3/4" | 6" | 1" | .030" | 4-1/8" | .720" | 9 | 376.54 | 360.17 | 343.80 | 327.43 |
| 98822 | .7500 | 3/4" | 19.050 | 3/4" | 6" | 1" | .060" | 4-1/8" | .720" | 9 | 376.54 | 360.17 | 343.80 | 327.43 |
| 98830 | .7874 | | 20.000 | 20.0 | 100 | 26 | 0.50 | - | - | 9 | 308.06 | 294.67 | 281.27 | 267.88 |
| 98834 | .7874 | | 20.000 | 20.0 | 100 | 26 | 1.00 | - | - | 9 | 308.06 | 294.67 | 281.27 | 267.88 |
| 98864 | .7874 | | 20.000 | 20.0 | 100 | 38 | 6.00 | - | - | 9 | 308.06 | 294.67 | 281.27 | 267.88 |
| 98866 | .7874 | | 20.000 | 20.0 | 150 | 60 | 0.50 | - | - | 9 | 378.70 | 362.23 | 345.77 | 329.30 |
| 98876 | .7874 | | 20.000 | 20.0 | 150 | 60 | 3.00 | - | - | 9 | 378.70 | 362.23 | 345.77 | 329.30 |
| 98882 | .7874 | | 20.000 | 20.0 | 150 | 60 | 6.00 | - | - | 9 | 378.70 | 362.23 | 345.77 | 329.30 |
| 98884 | .7874 | | 20.000 | 20.0 | 150 | 80 | 0.50 | - | - | 9 | 378.70 | 362.23 | 345.77 | 329.30 |

MATERIAL HARDNESS (Rc)
70
35
0

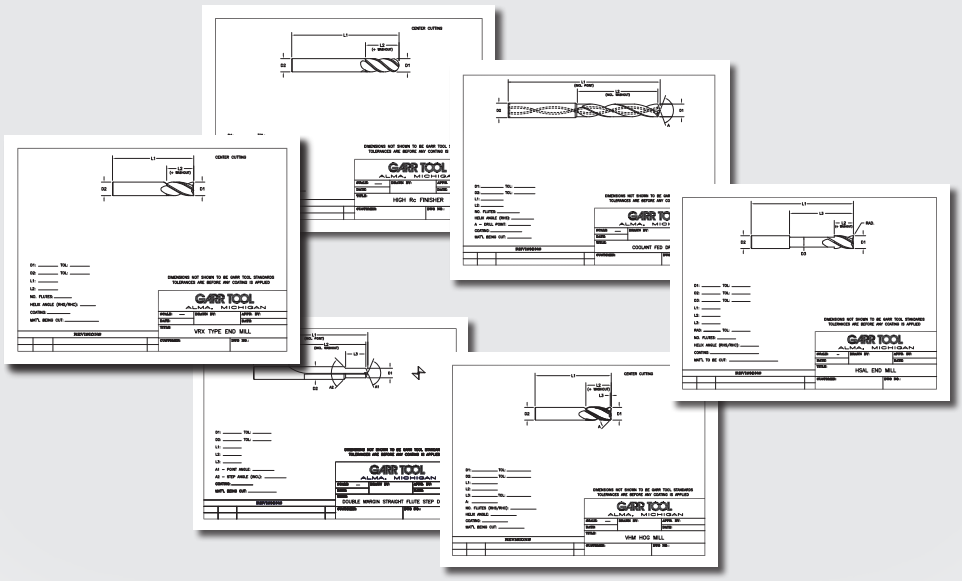


† *Metric equivalents are for reference only*

| EDP# | $d_1$ † Diameter Decimal | Diameter Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | $r$ Corner Radius | $l_3$ Reach Length | $d_3$ Neck Diameter | Number Flutes | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 98920 | 1.000 | 1" 25.400 | 1" | 4" | 1-1/2" | .015" | - | - | 11 | 356.72 | 341.21 | 325.70 | 310.19 |
| 98924 | 1.000 | 1" 25.400 | 1" | 4" | 1-1/2" | .060" | - | - | 11 | 356.72 | 341.21 | 325.70 | 310.19 |
| 98928 | 1.000 | 1" 25.400 | 1" | 4" | 1-1/2" | .120" | - | - | 11 | 356.72 | 341.21 | 325.70 | 310.19 |
| 98934 | 1.000 | 1" 25.400 | 1" | 5" | 2-1/4" | .015" | - | - | 11 | 438.92 | 419.84 | 400.75 | 381.67 |
| 98936 | 1.000 | 1" 25.400 | 1" | 5" | 2-1/4" | .030" | - | - | 11 | 438.92 | 419.84 | 400.75 | 381.67 |
| 98942 | 1.000 | 1" 25.400 | 1" | 5" | 2-1/4" | .120" | - | - | 11 | 438.92 | 419.84 | 400.75 | 381.67 |
| 98944 | 1.000 | 1" 25.400 | 1" | 5" | 2-1/4" | .190" | - | - | 11 | 438.92 | 419.84 | 400.75 | 381.67 |
| 98946 | 1.000 | 1" 25.400 | 1" | 5" | 2-1/4" | .250" | - | - | 11 | 438.92 | 419.84 | 400.75 | 381.67 |
| 98948 | 1.000 | 1" 25.400 | 1" | 6" | 3-1/4" | .030" | - | - | 11 | 572.46 | 547.57 | 522.68 | 497.79 |
| 98950 | 1.000 | 1" 25.400 | 1" | 6" | 3-1/4" | .060" | - | - | 11 | 572.46 | 547.57 | 522.68 | 497.79 |
| 98954 | 1.000 | 1" 25.400 | 1" | 6" | 3-1/4" | .190" | - | - | 11 | 572.46 | 547.57 | 522.68 | 497.79 |
| 98958 | 1.000 | 1" 25.400 | 1" | 7" | 4-1/4" | .030" | - | - | 11 | 750.54 | 717.90 | 685.27 | 652.64 |
| 98966 | 1.000 | 1" 25.400 | 1" | 7" | 4-1/4" | .250" | - | - | 11 | 750.54 | 717.90 | 685.27 | 652.64 |








***Access an assortment of 'fill-in-the-blank' prints from our website to aid in the quoting of custom tooling.***

***www.garrtool.com***

| TOLERANCES | |
|---|---|
| $d_1$ | +.000" –.002" (+.000mm –.050mm) |
| $d_2$ | h6 |
| $r$ | +.001" –.001" (+.025 –.025mm) |
| ball radius | +.000" –.001" (+.000 –.025mm) |

NEW ITEMS

# Series V4S, V4R, V4B

.1562" - .2188"
(3.967mm - 5.558mm)

Z=4 | VAR | TECH PAGES 296-297

Recommended for titanium, inconel, and stainless steel

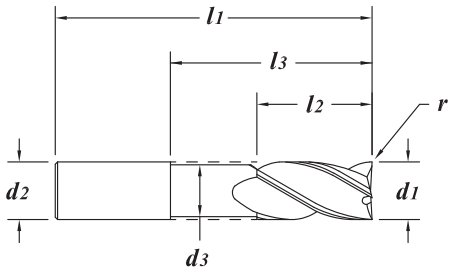


## Variable Helix End Mill

### AlCrN Coating

Solid submicron grain carbide end mill - center cutting
Engineered for High Efficiency Milling
Helix geometry varies over length of flutes
Variable flute design helps with chip evacuation in slots and pockets
Variable rake aids in chip formation
PCT (Polish Carbide Treatment) enhances tool life
Minimizes burr on part
Smaller diameters can be modified with a flat within 48 hours

*The combination of an extended flute length with a weldon flat may cause the flute washout to reach inside some end mill holders*




| | EDP# (plain) | EDP# (weldon) | d1 † Diameter Decimal | d1 † Diameter | Metric | d2 Shank Diameter | l1 Overall Length | l2 Flute Length | r Corner Radius | l3 Reach Length | d3 Neck Diameter | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 50171 | - | .1562 | 5/32" | 3.967 | 1/4" | 2" | 1/2" | - | - | - | 23.64 | 22.62 | 21.59 | 20.56 |
| | 50172 | - | .1562 | 5/32" | 3.967 | 1/4" | 2" | 1/2" | .010" | - | - | 25.70 | 24.59 | 23.47 | 22.35 |
| | 50173 | - | .1562 | 5/32" | 3.967 | 1/4" | 2" | 1/2" | .015" | - | - | 25.70 | 24.59 | 23.47 | 22.35 |
| | 50174 | - | .1562 | 5/32" | 3.967 | 1/4" | 2" | 1/2" | .020" | - | - | 25.70 | 24.59 | 23.47 | 22.35 |
| | 50175 | - | .1562 | 5/32" | 3.967 | 1/4" | 2" | 1/2" | .030" | - | - | 25.70 | 24.59 | 23.47 | 22.35 |
| | 50176 | - | .1562 | 5/32" | 3.967 | 1/4" | 2" | 1/2" | BALL | - | - | 25.70 | 24.59 | 23.47 | 22.35 |
| | 50177 | - | .1575 | | 4.000 | 6.0 | 50 | 12 | - | - | - | 26.32 | 25.18 | 24.03 | 22.89 |
| | 50178 | - | .1575 | | 4.000 | 6.0 | 50 | 12 | 0.20 | - | - | 26.74 | 25.58 | 24.41 | 23.25 |
| | 50179 | - | .1575 | | 4.000 | 6.0 | 50 | 12 | 0.30 | - | - | 26.74 | 25.58 | 24.41 | 23.25 |
| | 50180 | - | .1575 | | 4.000 | 6.0 | 50 | 12 | 0.50 | - | - | 26.74 | 25.58 | 24.41 | 23.25 |
| | 50181 | - | .1575 | | 4.000 | 6.0 | 50 | 12 | BALL | - | - | 26.74 | 25.58 | 24.41 | 23.25 |
| | 50182 | - | .1875 | 3/16" | 4.763 | 1/4" | 2" | 1/2" | - | - | - | 23.18 | 22.18 | 21.17 | 20.16 |
| | 50183 | - | .1875 | 3/16" | 4.763 | 1/4" | 2" | 1/2" | .010" | - | - | 25.20 | 24.10 | 23.01 | 21.91 |
| | 50184 | - | .1875 | 3/16" | 4.763 | 1/4" | 2" | 1/2" | .015" | - | - | 25.20 | 24.10 | 23.01 | 21.91 |
| | 50185 | - | .1875 | 3/16" | 4.763 | 1/4" | 2" | 1/2" | .020" | - | - | 25.20 | 24.10 | 23.01 | 21.91 |
| | 50186 | - | .1875 | 3/16" | 4.763 | 1/4" | 2" | 1/2" | .030" | - | - | 25.20 | 24.10 | 23.01 | 21.91 |
| | 50187 | - | .1875 | 3/16" | 4.763 | 1/4" | 2" | 1/2" | BALL | - | - | 25.20 | 24.10 | 23.01 | 21.91 |
| | 50188 | - | .1969 | | 5.000 | 6.0 | 65 | 20 | - | - | - | 28.16 | 26.94 | 25.71 | 24.49 |
| | 50189 | - | .1969 | | 5.000 | 6.0 | 65 | 20 | 0.20 | - | - | 29.03 | 27.76 | 26.50 | 25.24 |
| | 50190 | - | .1969 | | 5.000 | 6.0 | 65 | 20 | 0.30 | - | - | 29.03 | 27.76 | 26.50 | 25.24 |
| | 50191 | - | .1969 | | 5.000 | 6.0 | 65 | 20 | 0.50 | - | - | 29.03 | 27.76 | 26.50 | 25.24 |
| | 50192 | - | .1969 | | 5.000 | 6.0 | 65 | 20 | BALL | - | - | 29.03 | 27.76 | 26.50 | 25.24 |
| | 50193 | - | .2188 | 7/32" | 5.558 | 1/4" | 2-1/2" | 3/4" | - | - | - | 25.61 | 24.50 | 23.38 | 22.27 |
| NEW | 50194 | - | .2188 | 7/32" | 5.558 | 1/4" | 2-1/2" | 3/4" | .010" | - | - | 27.95 | 26.73 | 25.52 | 24.30 |
| NEW | 50195 | - | .2188 | 7/32" | 5.558 | 1/4" | 2-1/2" | 3/4" | .015" | - | - | 27.95 | 26.73 | 25.52 | 24.30 |
| NEW | 50196 | - | .2188 | 7/32" | 5.558 | 1/4" | 2-1/2" | 3/4" | .020" | - | - | 27.95 | 26.73 | 25.52 | 24.30 |
| | 50197 | - | .2188 | 7/32" | 5.558 | 1/4" | 2-1/2" | 3/4" | .030" | - | - | 27.95 | 26.73 | 25.52 | 24.30 |
| | 50198 | - | .2188 | 7/32" | 5.558 | 1/4" | 2-1/2" | 3/4" | BALL | - | - | 27.95 | 26.73 | 25.52 | 24.30 |

70
35
0
MATERIAL HARDNESS (Rc)

*continued* →

# Series V4S, V4R, V4B *(continued)*

.2362" - .2500"
(6.000mm - 6.350mm)

| EDP# (plain) | EDP# (weldon) | $d_1$ † Diameter Decimal | | $d_1$ † Diameter Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | $r$ Corner Radius | $l_3$ Reach Length | $d_3$ Neck Diameter | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 50236 | - | .2362 | | 6.000 | 6.0 | 65 | 12 | - | - | - | 24.73 | 23.65 | 22.58 | 21.50 |
| 50199 | - | .2362 | | 6.000 | 6.0 | 65 | 12 | 0.30 | - | - | 28.11 | 26.88 | 25.66 | 24.44 |
| 50200 | - | .2362 | | 6.000 | 6.0 | 65 | 12 | 0.50 | - | - | 28.11 | 26.88 | 25.66 | 24.44 |
| 50201 | - | .2362 | | 6.000 | 6.0 | 65 | 12 | 0.75 | - | - | 28.11 | 26.88 | 25.66 | 24.44 |
| 50202 | - | .2362 | | 6.000 | 6.0 | 65 | 12 | 1.00 | - | - | 28.11 | 26.88 | 25.66 | 24.44 |
| 50203 | - | .2362 | | 6.000 | 6.0 | 65 | 12 | 1.50 | - | - | 28.11 | 26.88 | 25.66 | 24.44 |
| 50252 | - | .2362 | | 6.000 | 6.0 | 65 | 12 | BALL | - | - | 28.11 | 26.88 | 25.66 | 24.44 |
| 50237 | - | .2362 | | 6.000 | 6.0 | 65 | 19 | - | - | - | 24.73 | 23.65 | 22.58 | 21.50 |
| 50204 | - | .2362 | | 6.000 | 6.0 | 65 | 19 | 0.30 | - | - | 28.11 | 26.88 | 25.66 | 24.44 |
| 50205 | - | .2362 | | 6.000 | 6.0 | 65 | 19 | 0.50 | - | - | 28.11 | 26.88 | 25.66 | 24.44 |
| 50206 | - | .2362 | | 6.000 | 6.0 | 65 | 19 | 1.00 | - | - | 28.11 | 26.88 | 25.66 | 24.44 |
| 50253 | - | .2362 | | 6.000 | 6.0 | 65 | 19 | BALL | - | - | 28.11 | 26.88 | 25.66 | 24.44 |
| 50540 | - | .2500 | 1/4" | 6.350 | 1/4" | 2" | 3/8" | - | - | - | 21.15 | 20.23 | 19.31 | 18.39 |
| 50489 | - | .2500 | 1/4" | 6.350 | 1/4" | 2" | 3/8" | .010" | - | - | 24.40 | 23.34 | 22.28 | 21.22 |
| 50490 | - | .2500 | 1/4" | 6.350 | 1/4" | 2" | 3/8" | .015" | - | - | 24.40 | 23.34 | 22.28 | 21.22 |
| 50491 | - | .2500 | 1/4" | 6.350 | 1/4" | 2" | 3/8" | .020" | - | - | 24.40 | 23.34 | 22.28 | 21.22 |
| 50708 | - | .2500 | 1/4" | 6.350 | 1/4" | 2" | 3/8" | .030" | - | - | 24.40 | 23.34 | 22.28 | 21.22 |
| 50709 | - | .2500 | 1/4" | 6.350 | 1/4" | 2" | 3/8" | .040" | - | - | 24.40 | 23.34 | 22.28 | 21.22 |
| 50710 | - | .2500 | 1/4" | 6.350 | 1/4" | 2" | 3/8" | .060" | - | - | 24.40 | 23.34 | 22.28 | 21.22 |
| 50711 | - | .2500 | 1/4" | 6.350 | 1/4" | 2" | 3/8" | .090" | - | - | 24.40 | 23.34 | 22.28 | 21.22 |
| 50560 | - | .2500 | 1/4" | 6.350 | 1/4" | 2" | 3/8" | BALL | - | - | 24.40 | 23.34 | 22.28 | 21.22 |
| 50645 | - | .2500 | 1/4" | 6.350 | 1/4" | 2" | 1/2" | - | - | - | 21.15 | 20.23 | 19.31 | 18.39 |
| 50614 | - | .2500 | 1/4" | 6.350 | 1/4" | 2" | 1/2" | .010" | - | - | 24.40 | 23.34 | 22.28 | 21.22 |
| 50616 | - | .2500 | 1/4" | 6.350 | 1/4" | 2" | 1/2" | .015" | - | - | 24.40 | 23.34 | 22.28 | 21.22 |
| 50618 | - | .2500 | 1/4" | 6.350 | 1/4" | 2" | 1/2" | .020" | - | - | 24.40 | 23.34 | 22.28 | 21.22 |
| 50712 | - | .2500 | 1/4" | 6.350 | 1/4" | 2" | 1/2" | .030" | - | - | 24.40 | 23.34 | 22.28 | 21.22 |
| 50713 | - | .2500 | 1/4" | 6.350 | 1/4" | 2" | 1/2" | .040" | - | - | 24.40 | 23.34 | 22.28 | 21.22 |
| 50714 | - | .2500 | 1/4" | 6.350 | 1/4" | 2" | 1/2" | .060" | - | - | 24.40 | 23.34 | 22.28 | 21.22 |
| 50715 | - | .2500 | 1/4" | 6.350 | 1/4" | 2" | 1/2" | .090" | - | - | 24.40 | 23.34 | 22.28 | 21.22 |
| 50238 | - | .2500 | 1/4" | 6.350 | 1/4" | 2-1/2" | 3/4" | - | - | - | 23.86 | 22.83 | 21.79 | 20.75 |
| 50207 | - | .2500 | 1/4" | 6.350 | 1/4" | 2-1/2" | 3/4" | .010" | - | - | 27.03 | 25.85 | 24.68 | 23.50 |
| 50208 | - | .2500 | 1/4" | 6.350 | 1/4" | 2-1/2" | 3/4" | .015" | - | - | 27.03 | 25.85 | 24.68 | 23.50 |
| 50620 | - | .2500 | 1/4" | 6.350 | 1/4" | 2-1/2" | 3/4" | .020" | - | - | 27.03 | 25.85 | 24.68 | 23.50 |
| 50209 | - | .2500 | 1/4" | 6.350 | 1/4" | 2-1/2" | 3/4" | .030" | - | - | 27.03 | 25.85 | 24.68 | 23.50 |
| 50716 | - | .2500 | 1/4" | 6.350 | 1/4" | 2-1/2" | 3/4" | .040" | - | - | 27.03 | 25.85 | 24.68 | 23.50 |
| 50210 | - | .2500 | 1/4" | 6.350 | 1/4" | 2-1/2" | 3/4" | .060" | - | - | 27.03 | 25.85 | 24.68 | 23.50 |
| 50717 | - | .2500 | 1/4" | 6.350 | 1/4" | 2-1/2" | 3/4" | .090" | - | - | 27.03 | 25.85 | 24.68 | 23.50 |
| 50254 | - | .2500 | 1/4" | 6.350 | 1/4" | 2-1/2" | 3/4" | BALL | - | - | 27.03 | 25.85 | 24.68 | 23.50 |
| 50653 | - | .2500 | 1/4" | 6.350 | 1/4" | 3" | 1-1/8" | - | - | - | 36.31 | 34.73 | 33.15 | 31.57 |
| 50493 | - | .2500 | 1/4" | 6.350 | 1/4" | 3" | 1-1/8" | .030" | - | - | 40.03 | 38.29 | 36.55 | 34.81 |
| 50677 | - | .2500 | 1/4" | 6.350 | 1/4" | 3" | 1-1/8" | BALL | - | - | 40.03 | 38.29 | 36.55 | 34.81 |

MATERIAL HARDNESS (Rc)
70
35
0



† *Metric equivalents are for reference only*

| | EDP# (plain) | EDP# (weldon) | $d_1$ † Diameter Decimal | $d_1$ † Diameter | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | $r$ Corner Radius | $l_3$ Reach Length | $d_3$ Neck Diameter | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 50654 | - | .2500 | 1/4" | 6.350 | 1/4" | 4" | 1-1/2" | - | - | - | 39.07 | 37.37 | 35.67 | 33.97 |
| | 50681 | - | .2500 | 1/4" | 6.350 | 1/4" | 4" | 1-1/2" | BALL | - | - | 42.86 | 41.00 | 39.13 | 37.27 |
| | 50655 | - | .2500 | 1/4" | 6.350 | 1/4" | 4" | 1-3/4" | - | - | - | 39.07 | 37.37 | 35.67 | 33.97 |
| | 50718 | - | .2500 | 1/4" | 6.350 | 1/4" | 4" | 1-3/4" | .020" | - | - | 42.86 | 41.00 | 39.13 | 37.27 |
| NEW | 50682 | - | .2500 | 1/4" | 6.350 | 1/4" | 4" | 1-3/4" | BALL | - | - | 42.86 | 41.00 | 39.13 | 37.27 |
| | 50656 | - | .2500 | 1/4" | 6.350 | 1/4" | 4" | 2" | - | - | - | 39.07 | 37.37 | 35.67 | 33.97 |
| | 50683 | - | .2500 | 1/4" | 6.350 | 1/4" | 4" | 2" | BALL | - | - | 42.86 | 41.00 | 39.13 | 37.27 |
| | 50651 | - | .2500 | 1/4" | 6.350 | 1/4" | 3" | 3/8" | - | 1-1/8" | .237" | 45.77 | 43.78 | 41.79 | 39.80 |
| | 50678 | - | .2500 | 1/4" | 6.350 | 1/4" | 3" | 3/8" | BALL | 1-1/8" | .237" | 49.54 | 47.39 | 45.23 | 43.08 |
| | 50600 | - | .2500 | 1/4" | 6.350 | 1/4" | 4" | 3/8" | - | 1-1/8" | .237" | 48.73 | 46.61 | 44.49 | 42.37 |
| | 50211 | - | .2500 | 1/4" | 6.350 | 1/4" | 4" | 3/8" | .015" | 1-1/4" | .230" | 52.37 | 50.09 | 47.82 | 45.54 |
| | 50474 | - | .2500 | 1/4" | 6.350 | 1/4" | 4" | 3/8" | BALL | 1-1/8" | .237" | 52.37 | 50.09 | 47.82 | 45.54 |
| | 50679 | - | .2500 | 1/4" | 6.350 | 1/4" | 4" | 3/8" | BALL | 1-1/2" | .237" | 52.37 | 50.09 | 47.82 | 45.54 |
| | 50652 | - | .2500 | 1/4" | 6.350 | 1/4" | 4" | 3/8" | - | 2" | .237" | 48.73 | 46.61 | 44.49 | 42.37 |
| | 50680 | - | .2500 | 1/4" | 6.350 | 1/4" | 4" | 3/8" | BALL | 2" | .237" | 52.37 | 50.09 | 47.82 | 45.54 |
| | 50719 | - | .2500 | 1/4" | 6.350 | 1/4" | 6" | 3/8" | .010" | 4" | .230" | 65.94 | 63.07 | 60.21 | 57.34 |
| | 50684 | - | .2500 | 1/4" | 6.350 | 1/4" | 6" | 3/8" | BALL | 4" | .230" | 65.94 | 63.07 | 60.21 | 57.34 |
| | 50720 | - | .3125 | 5/16" | 7.937 | 5/16" | 2" | 3/8" | .030" | - | - | 33.32 | 31.87 | 30.42 | 28.97 |
| | 50541 | - | .3125 | 5/16" | 7.937 | 5/16" | 2" | 7/16" | - | - | - | 29.21 | 27.94 | 26.67 | 25.40 |
| | 50622 | - | .3125 | 5/16" | 7.937 | 5/16" | 2" | 7/16" | .010" | - | - | 33.32 | 31.87 | 30.42 | 28.97 |
| | 50624 | - | .3125 | 5/16" | 7.937 | 5/16" | 2" | 7/16" | .015" | - | - | 33.32 | 31.87 | 30.42 | 28.97 |
| | 50492 | - | .3125 | 5/16" | 7.937 | 5/16" | 2" | 7/16" | .020" | - | - | 33.32 | 31.87 | 30.42 | 28.97 |
| | 50721 | - | .3125 | 5/16" | 7.937 | 5/16" | 2" | 7/16" | .125" | - | - | 33.32 | 31.87 | 30.42 | 28.97 |
| | 50561 | - | .3125 | 5/16" | 7.937 | 5/16" | 2" | 7/16" | BALL | - | - | 33.32 | 31.87 | 30.42 | 28.97 |
| | 50239 | - | .3125 | 5/16" | 7.937 | 5/16" | 2-1/2" | 13/16" | - | - | - | 34.02 | 32.54 | 31.06 | 29.58 |
| | 50626 | - | .3125 | 5/16" | 7.937 | 5/16" | 2-1/2" | 13/16" | .010" | - | - | 36.60 | 35.01 | 33.42 | 31.83 |
| | 50628 | - | .3125 | 5/16" | 7.937 | 5/16" | 2-1/2" | 13/16" | .015" | - | - | 36.60 | 35.01 | 33.42 | 31.83 |
| | 50212 | - | .3125 | 5/16" | 7.937 | 5/16" | 2-1/2" | 13/16" | .020" | - | - | 36.60 | 35.01 | 33.42 | 31.83 |
| | 50213 | - | .3125 | 5/16" | 7.937 | 5/16" | 2-1/2" | 13/16" | .030" | - | - | 36.60 | 35.01 | 33.42 | 31.83 |
| | 50722 | - | .3125 | 5/16" | 7.937 | 5/16" | 2-1/2" | 13/16" | .060" | - | - | 36.60 | 35.01 | 33.42 | 31.83 |
| | 50723 | - | .3125 | 5/16" | 7.937 | 5/16" | 2-1/2" | 13/16" | .125" | - | - | 36.60 | 35.01 | 33.42 | 31.83 |
| | 50255 | - | .3125 | 5/16" | 7.937 | 5/16" | 2-1/2" | 13/16" | BALL | - | - | 36.60 | 35.01 | 33.42 | 31.83 |
| | 50657 | - | .3125 | 5/16" | 7.937 | 5/16" | 3" | 1-1/4" | - | - | - | 46.43 | 44.41 | 42.39 | 40.37 |
| | 50724 | - | .3125 | 5/16" | 7.937 | 5/16" | 3" | 1-1/4" | .015" | - | - | 51.06 | 48.84 | 46.62 | 44.40 |
| | 50725 | - | .3125 | 5/16" | 7.937 | 5/16" | 3" | 1-1/4" | .030" | - | - | 51.06 | 48.84 | 46.62 | 44.40 |
| | 50726 | - | .3125 | 5/16" | 7.937 | 5/16" | 3" | 1-1/4" | .060" | - | - | 51.06 | 48.84 | 46.62 | 44.40 |
| | 50685 | - | .3125 | 5/16" | 7.937 | 5/16" | 3" | 1-1/4" | BALL | - | - | 51.06 | 48.84 | 46.62 | 44.40 |
| | 50658 | - | .3125 | 5/16" | 7.937 | 5/16" | 3" | 7/16" | - | 1-1/2" | .295" | 57.55 | 55.04 | 52.54 | 50.04 |
| | 50686 | - | .3125 | 5/16" | 7.937 | 5/16" | 3" | 7/16" | BALL | 1-1/2" | .295" | 62.18 | 59.48 | 56.77 | 54.07 |
| | 50602 | - | .3150 | | 8.000 | 8.0 | 50 | 12 | - | - | - | 30.27 | 28.95 | 27.64 | 26.32 |
| | 50630 | - | .3150 | | 8.000 | 8.0 | 50 | 12 | 0.50 | - | - | 34.56 | 33.06 | 31.55 | 30.05 |
| | 50240 | - | .3150 | | 8.000 | 8.0 | 65 | 22 | - | - | - | 35.25 | 33.72 | 32.18 | 30.65 |
| | 50214 | - | .3150 | | 8.000 | 8.0 | 65 | 22 | 0.50 | - | - | 37.98 | 36.33 | 34.68 | 33.03 |
| | 50356 | - | .3150 | | 8.000 | 8.0 | 65 | 22 | 0.75 | - | - | 37.98 | 36.33 | 34.68 | 33.03 |
| | 50215 | - | .3150 | | 8.000 | 8.0 | 65 | 22 | 1.00 | - | - | 37.98 | 36.33 | 34.68 | 33.03 |
| | 50727 | - | .3150 | | 8.000 | 8.0 | 65 | 22 | 1.20 | - | - | 37.98 | 36.33 | 34.68 | 33.03 |
| | 50357 | - | .3150 | | 8.000 | 8.0 | 65 | 22 | 1.50 | - | - | 37.98 | 36.33 | 34.68 | 33.03 |
| | 50358 | - | .3150 | | 8.000 | 8.0 | 65 | 22 | 2.00 | - | - | 37.98 | 36.33 | 34.68 | 33.03 |
| | 50728 | - | .3150 | | 8.000 | 8.0 | 65 | 22 | 3.00 | - | - | 37.98 | 36.33 | 34.68 | 33.03 |
| | 50256 | - | .3150 | | 8.000 | 8.0 | 65 | 22 | BALL | - | - | 37.98 | 36.33 | 34.68 | 33.03 |

70
35
0
MATERIAL HARDNESS (Rc)

*continued* ⟶

# Series V4S, V4R, V4B *(continued)*

.3150" - .3937"
(8.000mm - 10.000mm)

| EDP# (plain) | EDP# (weldon) | $d_1$ † Diameter Decimal | $d_1$ † Diameter | $d_1$ † Diameter Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | $r$ Corner Radius | $l_3$ Reach Length | $d_3$ Neck Diameter | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 50659 | - | .3150 | | 8.000 | 8.0 | 75 | 32 | - | - | - | 48.36 | 46.26 | 44.15 | 42.05 |
| 50687 | - | .3150 | | 8.000 | 8.0 | 75 | 32 | BALL | - | - | 53.23 | 50.92 | 48.60 | 46.29 |
| 50660 | - | .3150 | | 8.000 | 8.0 | 100 | 12 | - | 50 | 7.50 | 66.56 | 63.67 | 60.77 | 57.88 |
| 50688 | - | .3150 | | 8.000 | 8.0 | 100 | 12 | BALL | 50 | 7.50 | 71.93 | 68.81 | 65.68 | 62.55 |
| 50542 | - | .3750 | 3/8" | 9.525 | 3/8" | 2" | 1/2" | - | - | - | 34.45 | 32.96 | 31.46 | 29.96 |
| 50632 | - | .3750 | 3/8" | 9.525 | 3/8" | 2" | 1/2" | .010" | - | - | 39.34 | 37.63 | 35.92 | 34.21 |
| 50729 | - | .3750 | 3/8" | 9.525 | 3/8" | 2" | 1/2" | .015" | - | - | 39.34 | 37.63 | 35.92 | 34.21 |
| 50494 | - | .3750 | 3/8" | 9.525 | 3/8" | 2" | 1/2" | .020" | - | - | 39.34 | 37.63 | 35.92 | 34.21 |
| 50634 | - | .3750 | 3/8" | 9.525 | 3/8" | 2" | 1/2" | .030" | - | - | 39.34 | 37.63 | 35.92 | 34.21 |
| 50730 | - | .3750 | 3/8" | 9.525 | 3/8" | 2" | 1/2" | .060" | - | - | 39.34 | 37.63 | 35.92 | 34.21 |
| 50732 | - | .3750 | 3/8" | 9.525 | 3/8" | 2" | 1/2" | .090" | - | - | 39.34 | 37.63 | 35.92 | 34.21 |
| 50733 | - | .3750 | 3/8" | 9.525 | 3/8" | 2" | 1/2" | .120" | - | - | 39.34 | 37.63 | 35.92 | 34.21 |
| 50734 | - | .3750 | 3/8" | 9.525 | 3/8" | 2" | 1/2" | .125" | - | - | 39.34 | 37.63 | 35.92 | 34.21 |
| 50562 | - | .3750 | 3/8" | 9.525 | 3/8" | 2" | 1/2" | BALL | - | - | 39.34 | 37.63 | 35.92 | 34.21 |
| 50241 | - | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 1" | - | - | - | 40.15 | 38.40 | 36.66 | 34.91 |
| 50216 | - | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 1" | .010" | - | - | 42.76 | 40.90 | 39.04 | 37.18 |
| 50735 | - | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 1" | .015" | - | - | 42.76 | 40.90 | 39.04 | 37.18 |
| 50217 | - | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 1" | .020" | - | - | 42.76 | 40.90 | 39.04 | 37.18 |
| 50218 | - | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 1" | .030" | - | - | 42.76 | 40.90 | 39.04 | 37.18 |
| 50736 | - | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 1" | .040" | - | - | 42.76 | 40.90 | 39.04 | 37.18 |
| 50219 | - | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 1" | .060" | - | - | 42.76 | 40.90 | 39.04 | 37.18 |
| 50636 | - | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 1" | .090" | - | - | 42.76 | 40.90 | 39.04 | 37.18 |
| 50737 | - | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 1" | .120" | - | - | 42.76 | 40.90 | 39.04 | 37.18 |
| 50738 | - | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 1" | .125" | - | - | 42.76 | 40.90 | 39.04 | 37.18 |
| 50257 | - | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 1" | BALL | - | - | 42.76 | 40.90 | 39.04 | 37.18 |
| 50661 | - | .3750 | 3/8" | 9.525 | 3/8" | 3" | 1-1/4" | - | - | - | 51.21 | 48.98 | 46.76 | 44.53 |
| 50739 | - | .3750 | 3/8" | 9.525 | 3/8" | 3" | 1-1/4" | .015" | - | - | 56.28 | 53.83 | 51.39 | 48.94 |
| 50637 | - | .3750 | 3/8" | 9.525 | 3/8" | 3" | 1-1/4" | .030" | - | - | 56.28 | 53.83 | 51.39 | 48.94 |
| 50740 | - | .3750 | 3/8" | 9.525 | 3/8" | 3" | 1-1/4" | .060" | - | - | 56.28 | 53.83 | 51.39 | 48.94 |
| 50689 | - | .3750 | 3/8" | 9.525 | 3/8" | 3" | 1-1/4" | BALL | - | - | 56.28 | 53.83 | 51.39 | 48.94 |
| 50662 | - | .3750 | 3/8" | 9.525 | 3/8" | 4" | 1-1/2" | - | - | - | 57.87 | 55.35 | 52.84 | 50.32 |
| 50741 | - | .3750 | 3/8" | 9.525 | 3/8" | 4" | 1-1/2" | .015" | - | - | 63.33 | 60.58 | 57.82 | 55.07 |
| 50742 | - | .3750 | 3/8" | 9.525 | 3/8" | 4" | 1-1/2" | .030" | - | - | 63.33 | 60.58 | 57.82 | 55.07 |
| 50743 | - | .3750 | 3/8" | 9.525 | 3/8" | 4" | 1-1/2" | .060" | - | - | 63.33 | 60.58 | 57.82 | 55.07 |
| 50744 | - | .3750 | 3/8" | 9.525 | 3/8" | 4" | 1-1/2" | .120" | - | - | 63.33 | 60.58 | 57.82 | 55.07 |
| 50690 | - | .3750 | 3/8" | 9.525 | 3/8" | 4" | 1-1/2" | BALL | - | - | 63.33 | 60.58 | 57.82 | 55.07 |
| 50745 | - | .3750 | 3/8" | 9.525 | 3/8" | 6" | 2-1/2" | .060 | - | - | 87.69 | 83.88 | 80.06 | 76.25 |
| 50604 | - | .3750 | 3/8" | 9.525 | 3/8" | 4" | 1/2" | - | 1-1/8" | .355" | 70.27 | 67.21 | 64.16 | 61.10 |
| 50220 | - | .3750 | 3/8" | 9.525 | 3/8" | 4" | 1/2" | .020" | 1-7/8" | .350" | 75.58 | 72.29 | 69.01 | 65.72 |
| 50476 | - | .3750 | 3/8" | 9.525 | 3/8" | 4" | 1/2" | BALL | 1-1/8" | .355" | 75.58 | 72.29 | 69.01 | 65.72 |
| 50606 | - | .3937 | | 10.000 | 10.0 | 50 | 14 | - | - | - | 44.25 | 42.33 | 40.40 | 38.48 |
| 50638 | - | .3937 | | 10.000 | 10.0 | 50 | 14 | 0.50 | - | - | 47.48 | 45.42 | 43.35 | 41.29 |
| 50242 | - | .3937 | | 10.000 | 10.0 | 70 | 22 | - | - | - | 48.13 | 46.04 | 43.94 | 41.85 |
| 50746 | - | .3937 | | 10.000 | 10.0 | 70 | 22 | 0.25 | - | - | 51.64 | 49.39 | 47.15 | 44.90 |
| 50221 | - | .3937 | | 10.000 | 10.0 | 70 | 22 | 0.50 | - | - | 51.64 | 49.39 | 47.15 | 44.90 |
| 50359 | - | .3937 | | 10.000 | 10.0 | 70 | 22 | 0.75 | - | - | 51.64 | 49.39 | 47.15 | 44.90 |
| 50360 | - | .3937 | | 10.000 | 10.0 | 70 | 22 | 1.00 | - | - | 51.64 | 49.39 | 47.15 | 44.90 |
| 50361 | - | .3937 | | 10.000 | 10.0 | 70 | 22 | 1.50 | - | - | 51.64 | 49.39 | 47.15 | 44.90 |
| 50362 | - | .3937 | | 10.000 | 10.0 | 70 | 22 | 2.00 | - | - | 51.64 | 49.39 | 47.15 | 44.90 |
| 50747 | - | .3937 | | 10.000 | 10.0 | 70 | 22 | 3.00 | - | - | 51.64 | 49.39 | 47.15 | 44.90 |
| 50258 | - | .3937 | | 10.000 | 10.0 | 70 | 22 | BALL | - | - | 51.64 | 49.39 | 47.15 | 44.90 |
| 50608 | - | .3937 | | 10.000 | 10.0 | 70 | 26 | - | - | - | 48.13 | 46.04 | 43.94 | 41.85 |
| NEW 50748 | - | .3937 | | 10.000 | 10.0 | 70 | 26 | 1.50 | - | - | 51.64 | 49.39 | 47.15 | 44.90 |
| 50663 | - | .3937 | | 10.000 | 10.0 | 70 | 30 | - | - | - | 48.13 | 46.04 | 43.94 | 41.85 |
| 50691 | - | .3937 | | 10.000 | 10.0 | 70 | 30 | BALL | - | - | 51.64 | 49.39 | 47.15 | 44.90 |

MATERIAL HARDNESS (Rc)
70
35
0



† *Metric equivalents are for reference only*

| | EDP# (plain) | EDP# (weldon) | $d_1$ † Diameter Decimal | Diameter | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | $r$ Corner Radius | $l_3$ Reach Length | $d_3$ Neck Diameter | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 50749 | - | .3937 | | 10.000 | 10.0 | 70 | 22 | 0.50 | 30 | 9.40 | 62.76 | 60.03 | 57.30 | 54.57 |
| | 50750 | - | .3937 | | 10.000 | 10.0 | 100 | 12 | 0.30 | 50 | 9.40 | 91.31 | 87.34 | 83.37 | 79.40 |
| | 50692 | - | .3937 | | 10.000 | 10.0 | 100 | 14 | BALL | 50 | 9.40 | 91.31 | 87.34 | 83.37 | 79.40 |
| | 50450 | 50449 | .4724 | | 12.000 | 12.0 | 75 | 26 | - | - | - | 62.54 | 59.82 | 57.10 | 54.38 |
| | 50363 | 50369 | .4724 | | 12.000 | 12.0 | 75 | 26 | 0.30 | - | - | 76.05 | 72.74 | 69.44 | 66.13 |
| | 50364 | 50370 | .4724 | | 12.000 | 12.0 | 75 | 26 | 0.50 | - | - | 76.05 | 72.74 | 69.44 | 66.13 |
| | 50365 | 50366 | .4724 | | 12.000 | 12.0 | 75 | 26 | 0.75 | - | - | 76.05 | 72.74 | 69.44 | 66.13 |
| | 50367 | 50371 | .4724 | | 12.000 | 12.0 | 75 | 26 | 1.00 | - | - | 76.05 | 72.74 | 69.44 | 66.13 |
| | 50372 | 50373 | .4724 | | 12.000 | 12.0 | 75 | 26 | 1.50 | - | - | 76.05 | 72.74 | 69.44 | 66.13 |
| | 50374 | 50375 | .4724 | | 12.000 | 12.0 | 75 | 26 | 2.00 | - | - | 76.05 | 72.74 | 69.44 | 66.13 |
| | 50470 | - | .4724 | | 12.000 | 12.0 | 75 | 26 | BALL | - | - | 76.05 | 72.74 | 69.44 | 66.13 |
| | 50243 | 50283 | .4724 | | 12.000 | 12.0 | 75 | 32 | - | - | - | 62.54 | 59.82 | 57.10 | 54.38 |
| | 50222 | 50270 | .4724 | | 12.000 | 12.0 | 75 | 32 | 0.50 | - | - | 76.05 | 72.74 | 69.44 | 66.13 |
| | 50223 | 50271 | .4724 | | 12.000 | 12.0 | 75 | 32 | 1.00 | - | - | 76.05 | 72.74 | 69.44 | 66.13 |
| | 50259 | 50291 | .4724 | | 12.000 | 12.0 | 75 | 32 | BALL | - | - | 76.05 | 72.74 | 69.44 | 66.13 |
| | 50664 | - | .4724 | | 12.000 | 12.0 | 88 | 36 | - | - | - | 80.49 | 76.99 | 73.49 | 69.99 |
| | 50751 | - | .4724 | | 12.000 | 12.0 | 88 | 36 | 0.30 | - | - | 85.46 | 81.74 | 78.03 | 74.31 |
| | 50752 | - | .4724 | | 12.000 | 12.0 | 88 | 36 | 0.50 | - | - | 85.46 | 81.74 | 78.03 | 74.31 |
| | 50753 | - | .4724 | | 12.000 | 12.0 | 88 | 36 | 1.00 | - | - | 85.46 | 81.74 | 78.03 | 74.31 |
| | 50754 | - | .4724 | | 12.000 | 12.0 | 88 | 36 | 1.50 | - | - | 85.46 | 81.74 | 78.03 | 74.31 |
| | 50755 | - | .4724 | | 12.000 | 12.0 | 88 | 36 | 3.00 | - | - | 85.46 | 81.74 | 78.03 | 74.31 |
| | 50693 | - | .4724 | | 12.000 | 12.0 | 88 | 36 | BALL | - | - | 85.46 | 81.74 | 78.03 | 74.31 |
| | 50564 | - | .4724 | | 12.000 | 12.0 | 100 | 42 | - | - | - | 83.58 | 79.95 | 76.31 | 72.68 |
| | 50566 | - | .4724 | | 12.000 | 12.0 | 100 | 42 | 0.30 | - | - | 88.50 | 84.66 | 80.81 | 76.96 |
| | 50568 | - | .4724 | | 12.000 | 12.0 | 100 | 42 | 0.50 | - | - | 88.50 | 84.66 | 80.81 | 76.96 |
| | 50570 | - | .4724 | | 12.000 | 12.0 | 100 | 42 | 1.00 | - | - | 88.50 | 84.66 | 80.81 | 76.96 |
| | 50572 | - | .4724 | | 12.000 | 12.0 | 100 | 42 | 2.00 | - | - | 88.50 | 84.66 | 80.81 | 76.96 |
| | 50574 | - | .4724 | | 12.000 | 12.0 | 100 | 42 | 3.00 | - | - | 88.50 | 84.66 | 80.81 | 76.96 |
| | 50576 | - | .4724 | | 12.000 | 12.0 | 100 | 42 | BALL | - | - | 88.50 | 84.66 | 80.81 | 76.96 |
| | 50665 | - | .4724 | | 12.000 | 12.0 | 100 | 48 | - | - | - | 83.58 | 79.95 | 76.31 | 72.68 |
| | 50756 | - | .4724 | | 12.000 | 12.0 | 100 | 48 | 0.30 | - | - | 88.50 | 84.66 | 80.81 | 76.96 |
| | 50757 | - | .4724 | | 12.000 | 12.0 | 100 | 48 | 0.50 | - | - | 88.50 | 84.66 | 80.81 | 76.96 |
| NEW | 50758 | - | .4724 | | 12.000 | 12.0 | 100 | 48 | 1.00 | - | - | 88.50 | 84.66 | 80.81 | 76.96 |
| NEW | 50759 | - | .4724 | | 12.000 | 12.0 | 100 | 48 | 1.50 | - | - | 88.50 | 84.66 | 80.81 | 76.96 |
| NEW | 50760 | - | .4724 | | 12.000 | 12.0 | 100 | 48 | 3.00 | - | - | 88.50 | 84.66 | 80.81 | 76.96 |
| | 50761 | - | .4724 | | 12.000 | 12.0 | 100 | 48 | 4.00 | - | - | 88.50 | 84.66 | 80.81 | 76.96 |
| | 50694 | - | .4724 | | 12.000 | 12.0 | 100 | 48 | BALL | - | - | 88.50 | 84.66 | 80.81 | 76.96 |
| | 50695 | - | .4724 | | 12.000 | 12.0 | 100 | 14 | BALL | 50 | 11.40 | 100.73 | 96.35 | 91.97 | 87.59 |
| | 50543 | - | .5000 | 1/2" | 12.700 | 1/2" | 2-1/2" | 5/8" | - | - | - | 56.33 | 53.88 | 51.43 | 48.98 |
| | 50640 | - | .5000 | 1/2" | 12.700 | 1/2" | 2-1/2" | 5/8" | .010" | - | - | 65.35 | 62.51 | 59.67 | 56.83 |
| | 50762 | - | .5000 | 1/2" | 12.700 | 1/2" | 2-1/2" | 5/8" | .015" | - | - | 65.35 | 62.51 | 59.67 | 56.83 |
| | 50496 | 50497 | .5000 | 1/2" | 12.700 | 1/2" | 2-1/2" | 5/8" | .020" | - | - | 65.35 | 62.51 | 59.67 | 56.83 |
| | 50642 | - | .5000 | 1/2" | 12.700 | 1/2" | 2-1/2" | 5/8" | .030" | - | - | 65.35 | 62.51 | 59.67 | 56.83 |
| | 50763 | - | .5000 | 1/2" | 12.700 | 1/2" | 2-1/2" | 5/8" | .060" | - | - | 65.35 | 62.51 | 59.67 | 56.83 |
| | 50764 | - | .5000 | 1/2" | 12.700 | 1/2" | 2-1/2" | 5/8" | .090" | - | - | 65.35 | 62.51 | 59.67 | 56.83 |
| | 50765 | - | .5000 | 1/2" | 12.700 | 1/2" | 2-1/2" | 5/8" | .120" | - | - | 65.35 | 62.51 | 59.67 | 56.83 |
| | 50644 | - | .5000 | 1/2" | 12.700 | 1/2" | 2-1/2" | 5/8" | .125" | - | - | 65.35 | 62.51 | 59.67 | 56.83 |
| | 50766 | - | .5000 | 1/2" | 12.700 | 1/2" | 2-1/2" | 5/8" | .156" | - | - | 65.35 | 62.51 | 59.67 | 56.83 |
| | 50767 | - | .5000 | 1/2" | 12.700 | 1/2" | 2-1/2" | 5/8" | .190" | - | - | 65.35 | 62.51 | 59.67 | 56.83 |
| | 50563 | - | .5000 | 1/2" | 12.700 | 1/2" | 2-1/2" | 5/8" | BALL | - | - | 65.35 | 62.51 | 59.67 | 56.83 |

70
35
0
MATERIAL HARDNESS (Rc)

*continued* ⟶

# Series V4S, V4R, V4B *(continued)*

.5000"
(12.700mm)

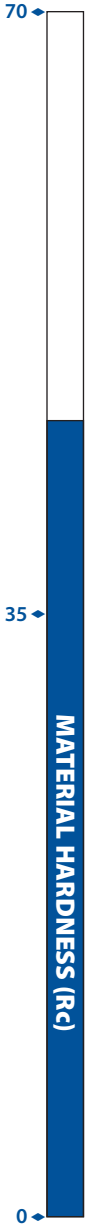
| EDP# (plain) | EDP# (weldon) | $d_1$ † Diameter Decimal | $d_1$ † Diameter | $d_1$ † Diameter Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | $r$ Corner Radius | $l_3$ Reach Length | $d_3$ Neck Diameter | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 50452 | 50453 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1" | - | - | - | 60.04 | 57.43 | 54.82 | 52.21 |
| 50379 | 50380 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1" | .010" | - | - | 72.94 | 69.77 | 66.60 | 63.43 |
| 50768 | - | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1" | .015" | - | - | 72.94 | 69.77 | 66.60 | 63.43 |
| 50381 | 50382 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1" | .020" | - | - | 72.94 | 69.77 | 66.60 | 63.43 |
| 50383 | 50384 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1" | .030" | - | - | 72.94 | 69.77 | 66.60 | 63.43 |
| 50385 | 50386 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1" | .060" | - | - | 72.94 | 69.77 | 66.60 | 63.43 |
| 50769 | - | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1" | .090" | - | - | 72.94 | 69.77 | 66.60 | 63.43 |
| 50770 | - | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1" | .120" | - | - | 72.94 | 69.77 | 66.60 | 63.43 |
| 50771 | - | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1" | .125" | - | - | 72.94 | 69.77 | 66.60 | 63.43 |
| 50772 | - | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1" | .190" | - | - | 72.94 | 69.77 | 66.60 | 63.43 |
| 50472 | 50473 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1" | BALL | - | - | 72.94 | 69.77 | 66.60 | 63.43 |
| 50244 | 50284 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1-1/4" | - | - | - | 60.04 | 57.43 | 54.82 | 52.21 |
| 50224 | 50272 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1-1/4" | .010" | - | - | 72.94 | 69.77 | 66.60 | 63.43 |
| 50773 | - | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1-1/4" | .015" | - | - | 72.94 | 69.77 | 66.60 | 63.43 |
| 50225 | 50273 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1-1/4" | .020" | - | - | 72.94 | 69.77 | 66.60 | 63.43 |
| 50226 | 50274 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1-1/4" | .030" | - | - | 72.94 | 69.77 | 66.60 | 63.43 |
| 50227 | 50275 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1-1/4" | .060" | - | - | 72.94 | 69.77 | 66.60 | 63.43 |
| 50774 | - | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1-1/4" | .090" | - | - | 72.94 | 69.77 | 66.60 | 63.43 |
| 50775 | - | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1-1/4" | .120" | - | - | 72.94 | 69.77 | 66.60 | 63.43 |
| 50776 | - | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1-1/4" | .125" | - | - | 72.94 | 69.77 | 66.60 | 63.43 |
| 50777 | - | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1-1/4" | .156" | - | - | 72.94 | 69.77 | 66.60 | 63.43 |
| 50778 | - | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1-1/4" | .190" | - | - | 72.94 | 69.77 | 66.60 | 63.43 |
| 50260 | 50292 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1-1/4" | BALL | - | - | 72.94 | 69.77 | 66.60 | 63.43 |
| 50666 | - | .5000 | 1/2" | 12.700 | 1/2" | 3-1/2" | 1-1/2" | - | - | - | 78.14 | 74.75 | 71.35 | 67.95 |
| 50779 | - | .5000 | 1/2" | 12.700 | 1/2" | 3-1/2" | 1-1/2" | .010" | - | - | 83.15 | 79.53 | 75.92 | 72.30 |
| 50780 | - | .5000 | 1/2" | 12.700 | 1/2" | 3-1/2" | 1-1/2" | .015" | - | - | 83.15 | 79.53 | 75.92 | 72.30 |
| 50781 | - | .5000 | 1/2" | 12.700 | 1/2" | 3-1/2" | 1-1/2" | .020" | - | - | 83.15 | 79.53 | 75.92 | 72.30 |
| 50782 | - | .5000 | 1/2" | 12.700 | 1/2" | 3-1/2" | 1-1/2" | .030" | - | - | 83.15 | 79.53 | 75.92 | 72.30 |
| 50783 | - | .5000 | 1/2" | 12.700 | 1/2" | 3-1/2" | 1-1/2" | .060" | - | - | 83.15 | 79.53 | 75.92 | 72.30 |
| 50784 | - | .5000 | 1/2" | 12.700 | 1/2" | 3-1/2" | 1-1/2" | .090" | - | - | 83.15 | 79.53 | 75.92 | 72.30 |
| 50785 | - | .5000 | 1/2" | 12.700 | 1/2" | 3-1/2" | 1-1/2" | .120" | - | - | 83.15 | 79.53 | 75.92 | 72.30 |
| 50696 | - | .5000 | 1/2" | 12.700 | 1/2" | 3-1/2" | 1-1/2" | BALL | - | - | 83.15 | 79.53 | 75.92 | 72.30 |
| 50578 | 50579 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 1-5/8" | - | - | - | 81.24 | 77.70 | 74.17 | 70.64 |
| 50580 | 50581 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 1-5/8" | .010" | - | - | 86.22 | 82.47 | 78.72 | 74.97 |
| 50582 | 50583 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 1-5/8" | .020" | - | - | 86.22 | 82.47 | 78.72 | 74.97 |
| 50584 | 50585 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 1-5/8" | .030" | - | - | 86.22 | 82.47 | 78.72 | 74.97 |
| 50586 | 50587 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 1-5/8" | .040" | - | - | 86.22 | 82.47 | 78.72 | 74.97 |
| 50588 | 50589 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 1-5/8" | .060" | - | - | 86.22 | 82.47 | 78.72 | 74.97 |
| 50590 | 50591 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 1-5/8" | .120" | - | - | 86.22 | 82.47 | 78.72 | 74.97 |
| 50592 | 50593 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 1-5/8" | BALL | - | - | 86.22 | 82.47 | 78.72 | 74.97 |
| 50646 | - | .5000 | 1/2" | 12.700 | 1/2" | 4" | 1-3/4" | - | - | - | 81.24 | 77.70 | 74.17 | 70.64 |
| 50647 | - | .5000 | 1/2" | 12.700 | 1/2" | 4" | 2" | - | - | - | 81.24 | 77.70 | 74.17 | 70.64 |
| 50245 | 50285 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 2-1/8" | - | - | - | 81.24 | 77.70 | 74.17 | 70.64 |
| 50786 | - | .5000 | 1/2" | 12.700 | 1/2" | 4" | 2-1/8" | .010" | - | - | 86.22 | 82.47 | 78.72 | 74.97 |
| 50787 | - | .5000 | 1/2" | 12.700 | 1/2" | 4" | 2-1/8" | .015" | - | - | 86.22 | 82.47 | 78.72 | 74.97 |
| 50788 | - | .5000 | 1/2" | 12.700 | 1/2" | 4" | 2-1/8" | .020" | - | - | 86.22 | 82.47 | 78.72 | 74.97 |
| 50789 | - | .5000 | 1/2" | 12.700 | 1/2" | 4" | 2-1/8" | .030" | - | - | 86.22 | 82.47 | 78.72 | 74.97 |
| 50790 | - | .5000 | 1/2" | 12.700 | 1/2" | 4" | 2-1/8" | .060" | - | - | 86.22 | 82.47 | 78.72 | 74.97 |
| 50791 | - | .5000 | 1/2" | 12.700 | 1/2" | 4" | 2-1/8" | .090" | - | - | 86.22 | 82.47 | 78.72 | 74.97 |
| 50792 | - | .5000 | 1/2" | 12.700 | 1/2" | 4" | 2-1/8" | .120" | - | - | 86.22 | 82.47 | 78.72 | 74.97 |
| 50793 | - | .5000 | 1/2" | 12.700 | 1/2" | 4" | 2-1/8" | .125" | - | - | 86.22 | 82.47 | 78.72 | 74.97 |
| 50794 | - | .5000 | 1/2" | 12.700 | 1/2" | 4" | 2-1/8" | .190" | - | - | 86.22 | 82.47 | 78.72 | 74.97 |
| 50261 | 50293 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 2-1/8" | BALL | - | - | 86.22 | 82.47 | 78.72 | 74.97 |

MATERIAL HARDNESS (Rc)
70
35
0



† *Metric equivalents are for reference only*

| | EDP# (plain) | EDP# (weldon) | $d_1$ † Diameter Decimal | $d_1$ † Diameter | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | $r$ Corner Radius | $l_3$ Reach Length | $d_3$ Neck Diameter | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 50668 | - | .5000 | 1/2" | 12.700 | 1/2" | 6" | 3" | - | - | - | 116.92 | 111.84 | 106.75 | 101.67 |
| | 50795 | - | .5000 | 1/2" | 12.700 | 1/2" | 6" | 3" | .020" | - | - | 121.92 | 116.62 | 111.32 | 106.02 |
| | 50796 | - | .5000 | 1/2" | 12.700 | 1/2" | 6" | 3" | .030" | - | - | 121.92 | 116.62 | 111.32 | 106.02 |
| | 50797 | - | .5000 | 1/2" | 12.700 | 1/2" | 6" | 3" | .060" | - | - | 121.92 | 116.62 | 111.32 | 106.02 |
| | 50798 | - | .5000 | 1/2" | 12.700 | 1/2" | 6" | 3" | .120" | - | - | 121.92 | 116.62 | 111.32 | 106.02 |
| | 50799 | - | .5000 | 1/2" | 12.700 | 1/2" | 6" | 3" | .190" | - | - | 121.92 | 116.62 | 111.32 | 106.02 |
| | 50699 | - | .5000 | 1/2" | 12.700 | 1/2" | 6" | 3" | BALL | | | 121.92 | 116.62 | 111.32 | 106.02 |
| | 50610 | - | .5000 | 1/2" | 12.700 | 1/2" | 4" | 5/8" | - | 2-1/4" | .475" | 93.38 | 89.32 | 85.26 | 81.20 |
| | 50228 | - | .5000 | 1/2" | 12.700 | 1/2" | 4" | 5/8" | .020" | 2-1/4" | .470" | 98.42 | 94.14 | 89.86 | 85.58 |
| | 50900 | - | .5000 | 1/2" | 12.700 | 1/2" | 4" | 5/8" | .030" | 2-1/4" | .470" | 98.42 | 94.14 | 89.86 | 85.58 |
| | 50901 | - | .5000 | 1/2" | 12.700 | 1/2" | 4" | 5/8" | .060" | 2-1/4" | .470" | 98.42 | 94.14 | 89.86 | 85.58 |
| | 50902 | - | .5000 | 1/2" | 12.700 | 1/2" | 4" | 5/8" | .120" | 2-1/4" | .470" | 98.42 | 94.14 | 89.86 | 85.58 |
| | 50478 | - | .5000 | 1/2" | 12.700 | 1/2" | 4" | 5/8" | BALL | 2-1/4" | .475" | 98.42 | 94.14 | 89.86 | 85.58 |
| | 50667 | - | .5000 | 1/2" | 12.700 | 1/2" | 6" | 5/8" | - | 3-1/8" | .475" | 129.16 | 123.54 | 117.93 | 112.31 |
| | 50235 | - | .5000 | 1/2" | 12.700 | 1/2" | 6" | 5/8" | - | 4-1/8" | .475" | 129.16 | 123.54 | 117.93 | 112.31 |
| | 50594 | - | .5000 | 1/2" | 12.700 | 1/2" | 6" | 5/8" | .020" | 4-1/8" | .470" | 134.15 | 128.32 | 122.48 | 116.65 |
| | 50596 | - | .5000 | 1/2" | 12.700 | 1/2" | 6" | 5/8" | .030" | 4-1/8" | .470" | 134.15 | 128.32 | 122.48 | 116.65 |
| NEW | 50697 | - | .5000 | 1/2" | 12.700 | 1/2" | 6" | 5/8" | BALL | 3-1/8" | .475" | 134.15 | 128.32 | 122.48 | 116.65 |
| | 50598 | - | .5000 | 1/2" | 12.700 | 1/2" | 6" | 5/8" | BALL | 4-1/8" | .475" | 134.15 | 128.32 | 122.48 | 116.65 |
| | 50698 | - | .5000 | 1/2" | 12.700 | 1/2" | 6" | 1" | BALL | 4-1/2" | .475" | 134.15 | 128.32 | 122.48 | 116.65 |
| | 50545 | 50546 | .6250 | 5/8" | 15.875 | 5/8" | 3" | 3/4" | - | - | - | 104.75 | 100.20 | 95.64 | 91.09 |
| | 50903 | - | .6250 | 5/8" | 15.875 | 5/8" | 3" | 3/4" | .010" | - | - | 113.00 | 108.09 | 103.17 | 98.26 |
| | 50904 | - | .6250 | 5/8" | 15.875 | 5/8" | 3" | 3/4" | .015" | - | - | 113.00 | 108.09 | 103.17 | 98.26 |
| | 50498 | 50499 | .6250 | 5/8" | 15.875 | 5/8" | 3" | 3/4" | .020" | - | - | 113.00 | 108.09 | 103.17 | 98.26 |
| | 50500 | 50501 | .6250 | 5/8" | 15.875 | 5/8" | 3" | 3/4" | .030" | - | - | 113.00 | 108.09 | 103.17 | 98.26 |
| | 50502 | 50503 | .6250 | 5/8" | 15.875 | 5/8" | 3" | 3/4" | .060" | - | - | 113.00 | 108.09 | 103.17 | 98.26 |
| NEW | 50905 | - | .6250 | 5/8" | 15.875 | 5/8" | 3" | 3/4" | .090" | - | - | 113.00 | 108.09 | 103.17 | 98.26 |
| | 50906 | - | .6250 | 5/8" | 15.875 | 5/8" | 3" | 3/4" | .120" | - | - | 113.00 | 108.09 | 103.17 | 98.26 |
| | 50907 | - | .6250 | 5/8" | 15.875 | 5/8" | 3" | 3/4" | .125" | - | - | 113.00 | 108.09 | 103.17 | 98.26 |
| NEW | 50908 | - | .6250 | 5/8" | 15.875 | 5/8" | 3" | 3/4" | .156" | - | - | 113.00 | 108.09 | 103.17 | 98.26 |
| | 50909 | - | .6250 | 5/8" | 15.875 | 5/8" | 3" | 3/4" | .190" | - | - | 113.00 | 108.09 | 103.17 | 98.26 |
| NEW | 50910 | - | .6250 | 5/8" | 15.875 | 5/8" | 3" | 3/4" | .250" | - | - | 113.00 | 108.09 | 103.17 | 98.26 |
| | 50246 | 50286 | .6250 | 5/8" | 15.875 | 5/8" | 3-1/2" | 1-1/4" | - | - | - | 110.77 | 105.95 | 101.14 | 96.32 |
| | 50911 | - | .6250 | 5/8" | 15.875 | 5/8" | 3-1/2" | 1-1/4" | .010" | - | - | 116.13 | 111.08 | 106.03 | 100.98 |
| | 50912 | - | .6250 | 5/8" | 15.875 | 5/8" | 3-1/2" | 1-1/4" | .015" | - | - | 116.13 | 111.08 | 106.03 | 100.98 |
| | 50229 | 50277 | .6250 | 5/8" | 15.875 | 5/8" | 3-1/2" | 1-1/4" | .020" | - | - | 116.13 | 111.08 | 106.03 | 100.98 |
| | 50534 | 50535 | .6250 | 5/8" | 15.875 | 5/8" | 3-1/2" | 1-1/4" | .030" | - | - | 116.13 | 111.08 | 106.03 | 100.98 |
| | 50536 | 50537 | .6250 | 5/8" | 15.875 | 5/8" | 3-1/2" | 1-1/4" | .040" | - | - | 116.13 | 111.08 | 106.03 | 100.98 |
| | 50538 | 50539 | .6250 | 5/8" | 15.875 | 5/8" | 3-1/2" | 1-1/4" | .060" | - | - | 116.13 | 111.08 | 106.03 | 100.98 |
| NEW | 50913 | - | .6250 | 5/8" | 15.875 | 5/8" | 3-1/2" | 1-1/4" | .090" | - | - | 116.13 | 111.08 | 106.03 | 100.98 |
| | 50230 | 50278 | .6250 | 5/8" | 15.875 | 5/8" | 3-1/2" | 1-1/4" | .120" | - | - | 116.13 | 111.08 | 106.03 | 100.98 |
| | 50914 | - | .6250 | 5/8" | 15.875 | 5/8" | 3-1/2" | 1-1/4" | .125" | - | - | 116.13 | 111.08 | 106.03 | 100.98 |
| NEW | 50915 | - | .6250 | 5/8" | 15.875 | 5/8" | 3-1/2" | 1-1/4" | .156" | - | - | 116.13 | 111.08 | 106.03 | 100.98 |
| | 50916 | - | .6250 | 5/8" | 15.875 | 5/8" | 3-1/2" | 1-1/4" | .190" | - | - | 116.13 | 111.08 | 106.03 | 100.98 |
| | 50917 | - | .6250 | 5/8" | 15.875 | 5/8" | 3-1/2" | 1-1/4" | .250" | - | - | 116.13 | 111.08 | 106.03 | 100.98 |
| | 50262 | 50294 | .6250 | 5/8" | 15.875 | 5/8" | 3-1/2" | 1-1/4" | BALL | - | - | 116.13 | 111.08 | 106.03 | 100.98 |




*continued* ⟶

# Series V4S, V4R, V4B *(continued)*

.6250" - .6299"
(15.875mm - 16.000mm)

| | EDP# (plain) | EDP# (weldon) | $d_1$ † Diameter Decimal | $d_1$ † Diameter | $d_1$ † Diameter Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | $r$ Corner Radius | $l_3$ Reach Length | $d_3$ Neck Diameter | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 50669 | - | .6250 | 5/8" | 15.875 | 5/8" | 4" | 1-1/2" | - | - | - | 118.30 | 113.16 | 108.01 | 102.87 |
| | 50918 | - | .6250 | 5/8" | 15.875 | 5/8" | 4" | 1-1/2" | .010" | - | - | 126.25 | 120.76 | 115.27 | 109.78 |
| | 50919 | - | .6250 | 5/8" | 15.875 | 5/8" | 4" | 1-1/2" | .015" | - | - | 126.25 | 120.76 | 115.27 | 109.78 |
| NEW | 50920 | - | .6250 | 5/8" | 15.875 | 5/8" | 4" | 1-1/2" | .020" | - | - | 126.25 | 120.76 | 115.27 | 109.78 |
| | 50921 | - | .6250 | 5/8" | 15.875 | 5/8" | 4" | 1-1/2" | .030" | - | - | 126.25 | 120.76 | 115.27 | 109.78 |
| | 50922 | - | .6250 | 5/8" | 15.875 | 5/8" | 4" | 1-1/2" | .060" | - | - | 126.25 | 120.76 | 115.27 | 109.78 |
| NEW | 50923 | - | .6250 | 5/8" | 15.875 | 5/8" | 4" | 1-1/2" | .090" | - | - | 126.25 | 120.76 | 115.27 | 109.78 |
| | 50924 | - | .6250 | 5/8" | 15.875 | 5/8" | 4" | 1-1/2" | .120" | - | - | 126.25 | 120.76 | 115.27 | 109.78 |
| NEW | 50925 | - | .6250 | 5/8" | 15.875 | 5/8" | 4" | 1-1/2" | .125" | - | - | 126.25 | 120.76 | 115.27 | 109.78 |
| NEW | 50926 | - | .6250 | 5/8" | 15.875 | 5/8" | 4" | 1-1/2" | .156" | - | - | 126.25 | 120.76 | 115.27 | 109.78 |
| | 50927 | - | .6250 | 5/8" | 15.875 | 5/8" | 4" | 1-1/2" | .190" | - | - | 126.25 | 120.76 | 115.27 | 109.78 |
| | 50928 | - | .6250 | 5/8" | 15.875 | 5/8" | 4" | 1-1/2" | .250" | - | - | 126.25 | 120.76 | 115.27 | 109.78 |
| | 50700 | - | .6250 | 5/8" | 15.875 | 5/8" | 4" | 1-1/2" | BALL | - | - | 126.25 | 120.76 | 115.27 | 109.78 |
| | 50612 | - | .6250 | 5/8" | 15.875 | 5/8" | 4" | 1-5/8" | - | - | - | 118.30 | 113.16 | 108.01 | 102.87 |
| | 50670 | - | .6250 | 5/8" | 15.875 | 5/8" | 4" | 1-3/4" | - | - | - | 118.30 | 113.16 | 108.01 | 102.87 |
| | 50701 | - | .6250 | 5/8" | 15.875 | 5/8" | 4" | 1-3/4" | BALL | - | - | 126.25 | 120.76 | 115.27 | 109.78 |
| | 50547 | - | .6299 | | 16.000 | 16.0 | 75 | 19 | - | - | - | 109.53 | 104.76 | 100.00 | 95.24 |
| | 50504 | - | .6299 | | 16.000 | 16.0 | 75 | 19 | 0.50 | - | - | 117.97 | 112.84 | 107.71 | 102.58 |
| | 50506 | - | .6299 | | 16.000 | 16.0 | 75 | 19 | 1.00 | - | - | 117.97 | 112.84 | 107.71 | 102.58 |
| | 50508 | - | .6299 | | 16.000 | 16.0 | 75 | 19 | 3.00 | - | - | 117.97 | 112.84 | 107.71 | 102.58 |
| NEW | 50929 | - | .6299 | | 16.000 | 16.0 | 75 | 19 | 4.00 | - | - | 117.97 | 112.84 | 107.71 | 102.58 |
| NEW | 50930 | - | .6299 | | 16.000 | 16.0 | 75 | 19 | 5.00 | - | - | 117.97 | 112.84 | 107.71 | 102.58 |
| NEW | 50931 | - | .6299 | | 16.000 | 16.0 | 75 | 19 | 6.00 | - | - | 117.97 | 112.84 | 107.71 | 102.58 |
| | 50247 | 50287 | .6299 | | 16.000 | 16.0 | 88 | 32 | - | - | - | 115.58 | 110.55 | 105.53 | 100.50 |
| | 50231 | 50279 | .6299 | | 16.000 | 16.0 | 88 | 32 | 0.50 | - | - | 121.20 | 115.93 | 110.66 | 105.39 |
| | 50409 | 50410 | .6299 | | 16.000 | 16.0 | 88 | 32 | 0.75 | - | - | 121.20 | 115.93 | 110.66 | 105.39 |
| | 50411 | 50412 | .6299 | | 16.000 | 16.0 | 88 | 32 | 1.00 | - | - | 121.20 | 115.93 | 110.66 | 105.39 |
| | 50413 | 50414 | .6299 | | 16.000 | 16.0 | 88 | 32 | 1.50 | - | - | 121.20 | 115.93 | 110.66 | 105.39 |
| | 50415 | 50416 | .6299 | | 16.000 | 16.0 | 88 | 32 | 2.00 | - | - | 121.20 | 115.93 | 110.66 | 105.39 |
| | 50932 | - | .6299 | | 16.000 | 16.0 | 88 | 32 | 2.50 | - | - | 121.20 | 115.93 | 110.66 | 105.39 |
| | 50417 | 50418 | .6299 | | 16.000 | 16.0 | 88 | 32 | 3.00 | - | - | 121.20 | 115.93 | 110.66 | 105.39 |
| | 50933 | - | .6299 | | 16.000 | 16.0 | 88 | 32 | 4.00 | - | - | 121.20 | 115.93 | 110.66 | 105.39 |
| | 50934 | - | .6299 | | 16.000 | 16.0 | 88 | 32 | 5.00 | - | - | 121.20 | 115.93 | 110.66 | 105.39 |
| NEW | 50935 | - | .6299 | | 16.000 | 16.0 | 88 | 32 | 6.00 | - | - | 121.20 | 115.93 | 110.66 | 105.39 |
| | 50263 | 50295 | .6299 | | 16.000 | 16.0 | 88 | 32 | BALL | - | - | 121.20 | 115.93 | 110.66 | 105.39 |
| | 50671 | - | .6299 | | 16.000 | 16.0 | 100 | 48 | - | - | - | 122.87 | 117.52 | 112.18 | 106.84 |
| | 50936 | - | .6299 | | 16.000 | 16.0 | 100 | 48 | 0.50 | - | - | 128.87 | 123.27 | 117.66 | 112.06 |
| | 50937 | - | .6299 | | 16.000 | 16.0 | 100 | 48 | 1.00 | - | - | 128.87 | 123.27 | 117.66 | 112.06 |
| | 50938 | - | .6299 | | 16.000 | 16.0 | 100 | 48 | 1.50 | - | - | 128.87 | 123.27 | 117.66 | 112.06 |
| | 50939 | - | .6299 | | 16.000 | 16.0 | 100 | 48 | 2.00 | - | - | 128.87 | 123.27 | 117.66 | 112.06 |
| | 50940 | - | .6299 | | 16.000 | 16.0 | 100 | 48 | 3.00 | - | - | 128.87 | 123.27 | 117.66 | 112.06 |
| | 50941 | - | .6299 | | 16.000 | 16.0 | 100 | 48 | 4.00 | - | - | 128.87 | 123.27 | 117.66 | 112.06 |
| | 50942 | - | .6299 | | 16.000 | 16.0 | 100 | 48 | 5.00 | - | - | 128.87 | 123.27 | 117.66 | 112.06 |
| | 50943 | - | .6299 | | 16.000 | 16.0 | 100 | 48 | 6.00 | - | - | 128.87 | 123.27 | 117.66 | 112.06 |
| | 50702 | - | .6299 | | 16.000 | 16.0 | 100 | 48 | BALL | - | - | 128.87 | 123.27 | 117.66 | 112.06 |

MATERIAL HARDNESS (Rc)
70
35
0



† *Metric equivalents are for reference only*

| | EDP# (plain) | EDP# (weldon) | $d_1$ † Diameter Decimal | $d_1$ † Diameter | $d_1$ † Diameter Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | $r$ Corner Radius | $l_3$ Reach Length | $d_3$ Neck Diameter | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 50548 | - | .7500 | 3/4" | 19.050 | 3/4" | 3" | 7/8" | - | - | - | 154.74 | 148.02 | 141.29 | 134.56 |
| NEW | 50944 | - | .7500 | 3/4" | 19.050 | 3/4" | 3" | 7/8" | .010" | - | - | 163.00 | 155.91 | 148.83 | 141.74 |
| NEW | 50945 | - | .7500 | 3/4" | 19.050 | 3/4" | 3" | 7/8" | .015" | - | - | 163.00 | 155.91 | 148.83 | 141.74 |
| NEW | 50946 | - | .7500 | 3/4" | 19.050 | 3/4" | 3" | 7/8" | .020" | - | - | 163.00 | 155.91 | 148.83 | 141.74 |
| | 50556 | - | .7500 | 3/4" | 19.050 | 3/4" | 3" | 7/8" | .030" | - | - | 163.00 | 155.91 | 148.83 | 141.74 |
| NEW | 50947 | - | .7500 | 3/4" | 19.050 | 3/4" | 3" | 7/8" | .060" | - | - | 163.00 | 155.91 | 148.83 | 141.74 |
| NEW | 50948 | - | .7500 | 3/4" | 19.050 | 3/4" | 3" | 7/8" | .120" | - | - | 163.00 | 155.91 | 148.83 | 141.74 |
| | 50549 | 50550 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1" | - | - | - | 158.13 | 151.25 | 144.38 | 137.50 |
| NEW | 50949 | - | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1" | .010" | - | - | 166.54 | 159.30 | 152.06 | 144.82 |
| NEW | 50950 | - | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1" | .015" | - | - | 166.54 | 159.30 | 152.06 | 144.82 |
| | 50510 | 50511 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1" | .020" | - | - | 166.54 | 159.30 | 152.06 | 144.82 |
| | 50512 | 50513 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1" | .030" | - | - | 166.54 | 159.30 | 152.06 | 144.82 |
| | 50514 | 50515 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1" | .060" | - | - | 166.54 | 159.30 | 152.06 | 144.82 |
| | 50951 | - | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1" | .090" | - | - | 166.54 | 159.30 | 152.06 | 144.82 |
| NEW | 50952 | - | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1" | .120" | - | - | 166.54 | 159.30 | 152.06 | 144.82 |
| | 50953 | - | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1" | .190" | - | - | 166.54 | 159.30 | 152.06 | 144.82 |
| NEW | 50954 | - | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1" | .250" | - | - | 166.54 | 159.30 | 152.06 | 144.82 |
| NEW | 50955 | - | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1" | .3125" | - | - | 166.54 | 159.30 | 152.06 | 144.82 |
| | 50248 | 50288 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-1/2" | - | - | - | 158.13 | 151.25 | 144.38 | 137.50 |
| | 50956 | - | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-1/2" | .010" | - | - | 166.54 | 159.30 | 152.06 | 144.82 |
| NEW | 50957 | - | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-1/2" | .015" | - | - | 166.54 | 159.30 | 152.06 | 144.82 |
| | 50516 | 50517 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-1/2" | .020" | - | - | 166.54 | 159.30 | 152.06 | 144.82 |
| | 50232 | 50280 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-1/2" | .030" | - | - | 166.54 | 159.30 | 152.06 | 144.82 |
| | 50518 | 50519 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-1/2" | .060" | - | - | 166.54 | 159.30 | 152.06 | 144.82 |
| | 50958 | - | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-1/2" | .090" | - | - | 166.54 | 159.30 | 152.06 | 144.82 |
| | 50520 | 50521 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-1/2" | .120" | - | - | 166.54 | 159.30 | 152.06 | 144.82 |
| | 50959 | - | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-1/2" | .125" | - | - | 166.54 | 159.30 | 152.06 | 144.82 |
| | 50960 | - | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-1/2" | .156" | - | - | 166.54 | 159.30 | 152.06 | 144.82 |
| | 50961 | - | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-1/2" | .190" | - | - | 166.54 | 159.30 | 152.06 | 144.82 |
| | 50962 | - | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-1/2" | .250" | - | - | 166.54 | 159.30 | 152.06 | 144.82 |
| NEW | 50963 | - | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-1/2" | .3125" | - | - | 166.54 | 159.30 | 152.06 | 144.82 |
| | 50264 | 50296 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-1/2" | BALL | - | - | 166.54 | 159.30 | 152.06 | 144.82 |
| | 50551 | 50552 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-3/4" | - | - | - | 158.13 | 151.25 | 144.38 | 137.50 |
| | 50964 | - | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-3/4" | .010" | - | - | 166.54 | 159.30 | 152.06 | 144.82 |
| | 50965 | - | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-3/4" | .015" | - | - | 166.54 | 159.30 | 152.06 | 144.82 |
| | 50522 | 50523 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-3/4" | .020" | - | - | 166.54 | 159.30 | 152.06 | 144.82 |
| | 50524 | 50525 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-3/4" | .030" | - | - | 166.54 | 159.30 | 152.06 | 144.82 |
| | 50526 | 50527 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-3/4" | .060" | - | - | 166.54 | 159.30 | 152.06 | 144.82 |
| | 50966 | - | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-3/4" | .090" | - | - | 166.54 | 159.30 | 152.06 | 144.82 |
| NEW | 50967 | - | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-3/4" | .120" | - | - | 166.54 | 159.30 | 152.06 | 144.82 |
| | 50968 | - | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-3/4" | .125" | - | - | 166.54 | 159.30 | 152.06 | 144.82 |
| | 50969 | - | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-3/4" | .156" | - | - | 166.54 | 159.30 | 152.06 | 144.82 |
| | 50970 | - | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-3/4" | .190" | - | - | 166.54 | 159.30 | 152.06 | 144.82 |
| | 50971 | - | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-3/4" | .250" | - | - | 166.54 | 159.30 | 152.06 | 144.82 |
| NEW | 50972 | - | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-3/4" | .3125" | - | - | 166.54 | 159.30 | 152.06 | 144.82 |



*continued* →

# Series V4S, V4R, V4B *(continued)*

.7500" - .7874"
(19.050mm - 20.000mm)

| | EDP# (plain) | EDP# (weldon) | $d_1$ † Diameter Decimal | $d_1$ † Diameter | $d_1$ † Diameter Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | $r$ Corner Radius | $l_3$ Reach Length | $d_3$ Neck Diameter | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 50553 | 50554 | .7500 | 3/4" | 19.050 | 3/4" | 5" | 2-1/8" | - | - | - | 212.23 | 203.01 | 193.78 | 184.55 |
| | 50973 | - | .7500 | 3/4" | 19.050 | 3/4" | 5" | 2-1/8" | .010" | - | - | 231.02 | 220.98 | 210.93 | 200.89 |
| NEW | 50974 | - | .7500 | 3/4" | 19.050 | 3/4" | 5" | 2-1/8" | .015" | - | - | 231.02 | 220.98 | 210.93 | 200.89 |
| | 50975 | - | .7500 | 3/4" | 19.050 | 3/4" | 5" | 2-1/8" | .020" | - | - | 231.02 | 220.98 | 210.93 | 200.89 |
| | 50976 | - | .7500 | 3/4" | 19.050 | 3/4" | 5" | 2-1/8" | .030" | - | - | 231.02 | 220.98 | 210.93 | 200.89 |
| | 50977 | - | .7500 | 3/4" | 19.050 | 3/4" | 5" | 2-1/8" | .060" | - | - | 231.02 | 220.98 | 210.93 | 200.89 |
| | 50978 | - | .7500 | 3/4" | 19.050 | 3/4" | 5" | 2-1/8" | .090" | - | - | 231.02 | 220.98 | 210.93 | 200.89 |
| NEW | 50979 | - | .7500 | 3/4" | 19.050 | 3/4" | 5" | 2-1/8" | .120" | - | - | 231.02 | 220.98 | 210.93 | 200.89 |
| | 50980 | - | .7500 | 3/4" | 19.050 | 3/4" | 5" | 2-1/8" | .125" | - | - | 231.02 | 220.98 | 210.93 | 200.89 |
| | 50981 | - | .7500 | 3/4" | 19.050 | 3/4" | 5" | 2-1/8" | .156" | - | - | 231.02 | 220.98 | 210.93 | 200.89 |
| 70 NEW | 50982 | - | .7500 | 3/4" | 19.050 | 3/4" | 5" | 2-1/8" | .190" | - | - | 231.02 | 220.98 | 210.93 | 200.89 |
| | 50983 | - | .7500 | 3/4" | 19.050 | 3/4" | 5" | 2-1/8" | .250" | - | - | 231.02 | 220.98 | 210.93 | 200.89 |
| NEW | 50984 | - | .7500 | 3/4" | 19.050 | 3/4" | 5" | 2-1/8" | .3125" | - | - | 231.02 | 220.98 | 210.93 | 200.89 |
| | 50672 | - | .7500 | 3/4" | 19.050 | 3/4" | 5" | 2-1/2" | - | - | - | 212.23 | 203.01 | 193.78 | 184.55 |
| | 50985 | - | .7500 | 3/4" | 19.050 | 3/4" | 5" | 2-1/2" | .010" | - | - | 231.02 | 220.98 | 210.93 | 200.89 |
| | 50986 | - | .7500 | 3/4" | 19.050 | 3/4" | 5" | 2-1/2" | .015" | - | - | 231.02 | 220.98 | 210.93 | 200.89 |
| | 50987 | - | .7500 | 3/4" | 19.050 | 3/4" | 5" | 2-1/2" | .020" | - | - | 231.02 | 220.98 | 210.93 | 200.89 |
| | 50988 | - | .7500 | 3/4" | 19.050 | 3/4" | 5" | 2-1/2" | .030" | - | - | 231.02 | 220.98 | 210.93 | 200.89 |
| | 50989 | - | .7500 | 3/4" | 19.050 | 3/4" | 5" | 2-1/2" | .060" | - | - | 231.02 | 220.98 | 210.93 | 200.89 |
| | 50990 | - | .7500 | 3/4" | 19.050 | 3/4" | 5" | 2-1/2" | .090" | - | - | 231.02 | 220.98 | 210.93 | 200.89 |
| NEW | 50991 | - | .7500 | 3/4" | 19.050 | 3/4" | 5" | 2-1/2" | .120" | - | - | 231.02 | 220.98 | 210.93 | 200.89 |
| | 50992 | - | .7500 | 3/4" | 19.050 | 3/4" | 5" | 2-1/2" | .125" | - | - | 231.02 | 220.98 | 210.93 | 200.89 |
| NEW | 50993 | - | .7500 | 3/4" | 19.050 | 3/4" | 5" | 2-1/2" | .156" | - | - | 231.02 | 220.98 | 210.93 | 200.89 |
| | 50994 | - | .7500 | 3/4" | 19.050 | 3/4" | 5" | 2-1/2" | .190" | - | - | 231.02 | 220.98 | 210.93 | 200.89 |
| | 50995 | - | .7500 | 3/4" | 19.050 | 3/4" | 5" | 2-1/2" | .250" | - | - | 231.02 | 220.98 | 210.93 | 200.89 |
| NEW | 50996 | - | .7500 | 3/4" | 19.050 | 3/4" | 5" | 2-1/2" | .3125" | - | - | 231.02 | 220.98 | 210.93 | 200.89 |
| | 50703 | - | .7500 | 3/4" | 19.050 | 3/4" | 5" | 2-1/2" | BALL | - | - | 231.02 | 220.98 | 210.93 | 200.89 |
| | 50555 | - | .7874 | | 20.000 | 20.0 | 100 | 25 | - | - | - | 213.65 | 204.36 | 195.07 | 185.78 |
| | 50249 | 50289 | .7874 | | 20.000 | 20.0 | 100 | 38 | - | - | - | 213.65 | 204.36 | 195.07 | 185.78 |
| NEW | 50997 | - | .7874 | | 20.000 | 20.0 | 100 | 38 | 0.50 | - | - | 235.72 | 225.47 | 215.22 | 204.97 |
| | 50528 | - | .7874 | | 20.000 | 20.0 | 100 | 38 | 1.00 | - | - | 235.72 | 225.47 | 215.22 | 204.97 |
| 35 | 50530 | - | .7874 | | 20.000 | 20.0 | 100 | 38 | 2.00 | - | - | 235.72 | 225.47 | 215.22 | 204.97 |
| | 50998 | - | .7874 | | 20.000 | 20.0 | 100 | 38 | 2.50 | - | - | 235.72 | 225.47 | 215.22 | 204.97 |
| | 50532 | - | .7874 | | 20.000 | 20.0 | 100 | 38 | 3.00 | - | - | 235.72 | 225.47 | 215.22 | 204.97 |
| | 50999 | - | .7874 | | 20.000 | 20.0 | 100 | 38 | 4.00 | - | - | 235.72 | 225.47 | 215.22 | 204.97 |
| | 50121 | - | .7874 | | 20.000 | 20.0 | 100 | 38 | 5.00 | - | - | 235.72 | 225.47 | 215.22 | 204.97 |
| NEW | 50122 | - | .7874 | | 20.000 | 20.0 | 100 | 38 | 6.00 | - | - | 235.72 | 225.47 | 215.22 | 204.97 |
| NEW | 50123 | - | .7874 | | 20.000 | 20.0 | 100 | 38 | 8.00 | - | - | 235.72 | 225.47 | 215.22 | 204.97 |
| | 50265 | 50297 | .7874 | | 20.000 | 20.0 | 100 | 38 | BALL | - | - | 235.72 | 225.47 | 215.22 | 204.97 |
| | 50673 | - | .7874 | | 20.000 | 20.0 | 100 | 48 | - | - | - | 213.65 | 204.36 | 195.07 | 185.78 |
| | 50124 | - | .7874 | | 20.000 | 20.0 | 100 | 48 | 0.50 | - | - | 235.72 | 225.47 | 215.22 | 204.97 |
| NEW | 50125 | - | .7874 | | 20.000 | 20.0 | 100 | 48 | 1.00 | - | - | 235.72 | 225.47 | 215.22 | 204.97 |
| | 50126 | - | .7874 | | 20.000 | 20.0 | 100 | 48 | 1.50 | - | - | 235.72 | 225.47 | 215.22 | 204.97 |
| | 50127 | - | .7874 | | 20.000 | 20.0 | 100 | 48 | 2.00 | - | - | 235.72 | 225.47 | 215.22 | 204.97 |
| | 50128 | - | .7874 | | 20.000 | 20.0 | 100 | 48 | 2.50 | - | - | 235.72 | 225.47 | 215.22 | 204.97 |
| | 50129 | - | .7874 | | 20.000 | 20.0 | 100 | 48 | 3.00 | - | - | 235.72 | 225.47 | 215.22 | 204.97 |
| | 50131 | - | .7874 | | 20.000 | 20.0 | 100 | 48 | 4.00 | - | - | 235.72 | 225.47 | 215.22 | 204.97 |
| | 50132 | - | .7874 | | 20.000 | 20.0 | 100 | 48 | 5.00 | - | - | 235.72 | 225.47 | 215.22 | 204.97 |
| NEW | 50133 | - | .7874 | | 20.000 | 20.0 | 100 | 48 | 6.00 | - | - | 235.72 | 225.47 | 215.22 | 204.97 |
| NEW | 50134 | - | .7874 | | 20.000 | 20.0 | 100 | 48 | 8.00 | - | - | 235.72 | 225.47 | 215.22 | 204.97 |
| | 50704 | - | .7874 | | 20.000 | 20.0 | 100 | 48 | BALL | - | - | 235.72 | 225.47 | 215.22 | 204.97 |

MATERIAL HARDNESS (Rc)
0



† *Metric equivalents are for reference only*

| | EDP# (plain) | EDP# (weldon) | $d_1$ † Diameter Decimal | Diameter | Diameter Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | $r$ Corner Radius | $l_3$ Reach Length | $d_3$ Neck Diameter | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 50674 | - | .7874 | | 20.000 | 20.0 | 150 | 60 | - | - | - | 268.07 | 256.41 | 244.76 | 233.10 |
| | 50135 | - | .7874 | | 20.000 | 20.0 | 150 | 60 | 0.50 | - | - | 289.78 | 277.18 | 264.58 | 251.98 |
| | 50136 | - | .7874 | | 20.000 | 20.0 | 150 | 60 | 1.00 | - | - | 289.78 | 277.18 | 264.58 | 251.98 |
| NEW | 50137 | - | .7874 | | 20.000 | 20.0 | 150 | 60 | 3.00 | - | - | 289.78 | 277.18 | 264.58 | 251.98 |
| | 50138 | - | .7874 | | 20.000 | 20.0 | 150 | 60 | 6.00 | - | - | 289.78 | 277.18 | 264.58 | 251.98 |
| NEW | 50705 | - | .7874 | | 20.000 | 20.0 | 150 | 60 | BALL | - | - | 289.78 | 277.18 | 264.58 | 251.98 |
| | 50250 | 50290 | 1.000 | 1" | 25.400 | 1" | 4" | 1-1/2" | - | - | - | 236.23 | 225.96 | 215.69 | 205.42 |
| NEW | 50139 | - | 1.000 | 1" | 25.400 | 1" | 4" | 1-1/2" | .020" | | | 284.34 | 271.98 | 259.61 | 247.25 |
| | 50233 | 50281 | 1.000 | 1" | 25.400 | 1" | 4" | 1-1/2" | .030" | - | - | 284.34 | 271.98 | 259.61 | 247.25 |
| NEW | 50141 | - | 1.000 | 1" | 25.400 | 1" | 4" | 1-1/2" | .060" | - | - | 284.34 | 271.98 | 259.61 | 247.25 |
| NEW | 50142 | - | 1.000 | 1" | 25.400 | 1" | 4" | 1-1/2" | .090" | - | - | 284.34 | 271.98 | 259.61 | 247.25 |
| NEW | 50143 | - | 1.000 | 1" | 25.400 | 1" | 4" | 1-1/2" | .120" | - | - | 284.34 | 271.98 | 259.61 | 247.25 |
| | 50557 | - | 1.000 | 1" | 25.400 | 1" | 4" | 1-1/2" | .125" | - | - | 284.34 | 271.98 | 259.61 | 247.25 |
| NEW | 50144 | - | 1.000 | 1" | 25.400 | 1" | 4" | 1-1/2" | .156" | - | - | 284.34 | 271.98 | 259.61 | 247.25 |
| | 50145 | - | 1.000 | 1" | 25.400 | 1" | 4" | 1-1/2" | .190" | - | - | 284.34 | 271.98 | 259.61 | 247.25 |
| | 50146 | - | 1.000 | 1" | 25.400 | 1" | 4" | 1-1/2" | .250" | - | - | 284.34 | 271.98 | 259.61 | 247.25 |
| NEW | 50147 | - | 1.000 | 1" | 25.400 | 1" | 4" | 1-1/2" | .3125" | - | - | 284.34 | 271.98 | 259.61 | 247.25 |
| | 50148 | - | 1.000 | 1" | 25.400 | 1" | 4" | 1-1/2" | .375" | - | - | 284.34 | 271.98 | 259.61 | 247.25 |
| | 50266 | 50298 | 1.000 | 1" | 25.400 | 1" | 4" | 1-1/2" | BALL | - | - | 284.34 | 271.98 | 259.61 | 247.25 |
| | 50675 | - | 1.000 | 1" | 25.400 | 1" | 4-1/2" | 2" | - | - | - | 277.83 | 265.75 | 253.67 | 241.59 |
| NEW | 50149 | - | 1.000 | 1" | 25.400 | 1" | 4-1/2" | 2" | .020" | | | 317.10 | 303.31 | 289.53 | 275.74 |
| | 50151 | - | 1.000 | 1" | 25.400 | 1" | 4-1/2" | 2" | .030" | - | - | 317.10 | 303.31 | 289.53 | 275.74 |
| NEW | 50152 | - | 1.000 | 1" | 25.400 | 1" | 4-1/2" | 2" | .060" | - | - | 317.10 | 303.31 | 289.53 | 275.74 |
| NEW | 50153 | - | 1.000 | 1" | 25.400 | 1" | 4-1/2" | 2" | .090" | - | - | 317.10 | 303.31 | 289.53 | 275.74 |
| NEW | 50154 | - | 1.000 | 1" | 25.400 | 1" | 4-1/2" | 2" | .120" | - | - | 317.10 | 303.31 | 289.53 | 275.74 |
| NEW | 50155 | - | 1.000 | 1" | 25.400 | 1" | 4-1/2" | 2" | .156" | - | - | 317.10 | 303.31 | 289.53 | 275.74 |
| NEW | 50156 | - | 1.000 | 1" | 25.400 | 1" | 4-1/2" | 2" | .190" | - | - | 317.10 | 303.31 | 289.53 | 275.74 |
| NEW | 50157 | - | 1.000 | 1" | 25.400 | 1" | 4-1/2" | 2" | .250" | - | - | 317.10 | 303.31 | 289.53 | 275.74 |
| NEW | 50158 | - | 1.000 | 1" | 25.400 | 1" | 4-1/2" | 2" | .3125" | - | - | 317.10 | 303.31 | 289.53 | 275.74 |
| | 50706 | - | 1.000 | 1" | 25.400 | 1" | 4-1/2" | 2" | BALL | - | - | 317.10 | 303.31 | 289.53 | 275.74 |
| | 50234 | 50282 | 1.000 | 1" | 25.400 | 1" | 5" | 2-1/8" | .030" | - | - | 349.85 | 334.64 | 319.43 | 304.22 |
| | 50676 | - | 1.000 | 1" | 25.400 | 1" | 5" | 2-1/2" | - | - | - | 316.23 | 302.48 | 288.73 | 274.98 |
| NEW | 50159 | - | 1.000 | 1" | 25.400 | 1" | 5" | 2-1/2" | .020" | - | - | 349.85 | 334.64 | 319.43 | 304.22 |
| NEW | 50161 | - | 1.000 | 1" | 25.400 | 1" | 5" | 2-1/2" | .030" | - | - | 349.85 | 334.64 | 319.43 | 304.22 |
| | 50162 | - | 1.000 | 1" | 25.400 | 1" | 5" | 2-1/2" | .060" | - | - | 349.85 | 334.64 | 319.43 | 304.22 |
| NEW | 50163 | - | 1.000 | 1" | 25.400 | 1" | 5" | 2-1/2" | .090" | - | - | 349.85 | 334.64 | 319.43 | 304.22 |
| NEW | 50164 | - | 1.000 | 1" | 25.400 | 1" | 5" | 2-1/2" | .120" | - | - | 349.85 | 334.64 | 319.43 | 304.22 |
| NEW | 50165 | - | 1.000 | 1" | 25.400 | 1" | 5" | 2-1/2" | .156" | - | - | 349.85 | 334.64 | 319.43 | 304.22 |
| NEW | 50166 | - | 1.000 | 1" | 25.400 | 1" | 5" | 2-1/2" | .190" | - | - | 349.85 | 334.64 | 319.43 | 304.22 |
| | 50167 | - | 1.000 | 1" | 25.400 | 1" | 5" | 2-1/2" | .250" | - | - | 349.85 | 334.64 | 319.43 | 304.22 |
| NEW | 50168 | - | 1.000 | 1" | 25.400 | 1" | 5" | 2-1/2" | .3125" | - | - | 349.85 | 334.64 | 319.43 | 304.22 |
| | 50707 | - | 1.000 | 1" | 25.400 | 1" | 5" | 2-1/2" | BALL | - | - | 349.85 | 334.64 | 319.43 | 304.22 |

# NOTES



*V4-S series in 1018 material*

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Series V5 NEW ITEMS

# HIGH EFFICIENCY MILLING

.2362" - .3125"
(6.000mm - 7.938mm)

Z=5 | VAR | TECH PAGES 298-299

| TOLERANCES | |
|---|---|
| $d_1$ | +.000" –.002" (+.000mm –.050mm) |
| $d_2$ | h6 |
| $r$ | +.001" –.001" (+.025 –.025mm) |

Recommended for titanium and tool steels under 45Rc

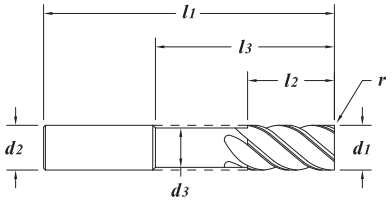


## Variable Helix End Mill

### AlCrN Coating

Solid submicron grain carbide end mill - center cutting
Engineered for High Efficiency Milling
Staggered flutes to control harmonics
Variable flute design helps with chip evacuation in slots and pockets
PCT (Polish Carbide Treatment) enhances tool life
12mm and larger tools offered with weldon flat
.375" and larger diameters can be modified within 48 hours

*The combination of an extended flute length with a weldon flat may cause the flute washout to reach inside some end mill holders*




MATERIAL HARDNESS (Rc) 70 35 0

| EDP# (plain) | EDP# (weldon) | $d_1$ † Diameter Decimal | Diameter | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | $r$ Corner Radius | $l_3$ Reach Length | $d_3$ Neck Diameter | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 50000 | - | .2362 | | 6.000 | 6.0 | 50 | 13 | - | - | - | 22.92 | 21.92 | 20.93 | 19.93 |
| 50001 | - | .2362 | | 6.000 | 6.0 | 50 | 13 | 0.5 | - | - | 26.51 | 25.36 | 24.20 | 23.05 |
| 50002 | - | .2362 | | 6.000 | 6.0 | 65 | 19 | - | - | - | 25.83 | 24.71 | 23.58 | 22.46 |
| 50003 | - | .2362 | | 6.000 | 6.0 | 65 | 19 | 0.5 | - | - | 29.37 | 28.09 | 26.82 | 25.54 |
| 50004 | - | .2362 | | 6.000 | 6.0 | 65 | 13 | - | 20 | 5.4 | 34.45 | 32.96 | 31.46 | 29.96 |
| 50005 | - | .2362 | | 6.000 | 6.0 | 65 | 13 | 0.5 | 20 | 5.4 | 38.00 | 36.34 | 34.69 | 33.04 |
| 50006 | - | .2362 | | 6.000 | 6.0 | 65 | 13 | 1.0 | 20 | 5.4 | 38.00 | 36.34 | 34.69 | 33.04 |
| 50007 | - | .2500 | 1/4" | 6.350 | 1/4" | 2" | 3/8" | - | - | - | 21.15 | 20.23 | 19.31 | 18.39 |
| 51000 | - | .2500 | 1/4" | 6.350 | 1/4" | 2" | 3/8" | .010" | - | - | 25.51 | 24.40 | 23.29 | 22.18 |
| 50008 | - | .2500 | 1/4" | 6.350 | 1/4" | 2" | 3/8" | .015" | - | - | 25.51 | 24.40 | 23.29 | 22.18 |
| 51001 | - | .2500 | 1/4" | 6.350 | 1/4" | 2" | 3/8" | .020" | - | - | 25.51 | 24.40 | 23.29 | 22.18 |
| 50009 | - | .2500 | 1/4" | 6.350 | 1/4" | 2" | 3/8" | .030" | - | - | 25.51 | 24.40 | 23.29 | 22.18 |
| 51002 | - | .2500 | 1/4" | 6.350 | 1/4" | 2" | 1/2" | - | - | - | 22.00 | 21.04 | 20.09 | 19.13 |
| 51003 | - | .2500 | 1/4" | 6.350 | 1/4" | 2" | 1/2" | .010" | - | - | 25.51 | 24.40 | 23.29 | 22.18 |
| 51004 | - | .2500 | 1/4" | 6.350 | 1/4" | 2" | 1/2" | .015" | - | - | 25.51 | 24.40 | 23.29 | 22.18 |
| 50011 | - | .2500 | 1/4" | 6.350 | 1/4" | 2-1/2" | 3/4" | - | - | - | 24.93 | 23.85 | 22.76 | 21.68 |
| 51005 | - | .2500 | 1/4" | 6.350 | 1/4" | 2-1/2" | 3/4" | .010" | - | - | 28.23 | 27.01 | 25.78 | 24.55 |
| 50012 | - | .2500 | 1/4" | 6.350 | 1/4" | 2-1/2" | 3/4" | .015" | - | - | 28.23 | 27.01 | 25.78 | 24.55 |
| 50013 | - | .2500 | 1/4" | 6.350 | 1/4" | 2-1/2" | 3/4" | .020" | - | - | 28.23 | 27.01 | 25.78 | 24.55 |
| 50014 | - | .2500 | 1/4" | 6.350 | 1/4" | 2-1/2" | 3/4" | .030" | - | - | 28.23 | 27.01 | 25.78 | 24.55 |
| 50015 | - | .2500 | 1/4" | 6.350 | 1/4" | 3" | 1" | - | - | - | 38.09 | 36.43 | 34.78 | 33.12 |
| 51006 | - | .2500 | 1/4" | 6.350 | 1/4" | 3" | 1" | .010" | - | - | 41.86 | 40.04 | 38.22 | 36.40 |
| 51007 | - | .2500 | 1/4" | 6.350 | 1/4" | 3" | 1" | .015" | - | - | 41.86 | 40.04 | 38.22 | 36.40 |
| 50016 | - | .2500 | 1/4" | 6.350 | 1/4" | 3" | 1" | .030" | - | - | 41.86 | 40.04 | 38.22 | 36.40 |
| 50113 | - | .2500 | 1/4" | 6.350 | 1/4" | 3" | 1-1/8" | .030" | - | - | 41.86 | 40.04 | 38.22 | 36.40 |
| 50017 | - | .2500 | 1/4" | 6.350 | 1/4" | 4" | 1/2" | .015" | 1-1/4" | .235" | 54.74 | 52.36 | 49.98 | 47.60 |
| 51008 | - | .2500 | 1/4" | 6.350 | 1/4" | 4" | 1/2" | .015" | 2-1/8" | .235" | 54.74 | 52.36 | 49.98 | 47.60 |
| 50023 | - | .2756 | | 7.000 | 8.0 | 65 | 22 | 0.2 | - | - | 45.46 | 43.48 | 41.51 | 39.53 |
| 50018 | - | .3125 | 5/16" | 7.938 | 5/16" | 2-1/2" | 13/16" | - | - | - | 35.57 | 34.02 | 32.48 | 30.93 |
| 50019 | - | .3125 | 5/16" | 7.938 | 5/16" | 2-1/2" | 13/16" | .015" | - | - | 38.28 | 36.62 | 34.95 | 33.29 |
| 50021 | - | .3125 | 5/16" | 7.938 | 5/16" | 2-1/2" | 13/16" | .020" | - | - | 38.28 | 36.62 | 34.95 | 33.29 |
| 50022 | - | .3125 | 5/16" | 7.938 | 5/16" | 2-1/2" | 13/16" | .030" | - | - | 38.28 | 36.62 | 34.95 | 33.29 |



† *Metric equivalents are for reference only*

| | EDP# (plain) | EDP# (weldon) | $d_1$ † Diameter Decimal | Diameter | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | $r$ Corner Radius | $l_3$ Reach Length | $d_3$ Neck Diameter | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 50024 | - | .3150 | | 8.000 | 8.0 | 65 | 22 | 0.2 | - | - | 39.72 | 37.99 | 36.27 | 34.54 |
| | 50025 | - | .3150 | | 8.000 | 8.0 | 65 | 22 | 0.5 | - | - | 39.72 | 37.99 | 36.27 | 34.54 |
| | 50026 | - | .3150 | | 8.000 | 8.0 | 75 | 19 | - | 26 | 7.2 | 61.67 | 58.99 | 56.31 | 53.63 |
| | 50027 | - | .3150 | | 8.000 | 8.0 | 75 | 19 | 0.5 | 26 | 7.2 | 66.73 | 63.83 | 60.93 | 58.03 |
| | 50028 | - | .3150 | | 8.000 | 8.0 | 75 | 19 | 1.0 | 26 | 7.2 | 66.73 | 63.83 | 60.93 | 58.03 |
| | 50029 | - | .3750 | 3/8" | 9.525 | 3/8" | 2" | 1/2" | - | - | - | 35.91 | 34.35 | 32.79 | 31.23 |
| | 50031 | - | .3750 | 3/8" | 9.525 | 3/8" | 2" | 1/2" | .015" | - | - | 41.12 | 39.34 | 37.55 | 35.76 |
| | 50032 | - | .3750 | 3/8" | 9.525 | 3/8" | 2" | 1/2" | .020" | - | - | 41.12 | 39.34 | 37.55 | 35.76 |
| | 50033 | - | .3750 | 3/8" | 9.525 | 3/8" | 2" | 1/2" | .030" | - | - | 41.12 | 39.34 | 37.55 | 35.76 |
| | 50034 | - | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 1" | - | - | - | 41.96 | 40.14 | 38.31 | 36.49 |
| | 50035 | - | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 1" | .015" | - | - | 44.71 | 42.77 | 40.82 | 38.88 |
| | 50036 | - | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 1" | .020" | - | - | 44.71 | 42.77 | 40.82 | 38.88 |
| | 50037 | - | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 1" | .030" | - | - | 44.71 | 42.77 | 40.82 | 38.88 |
| | 50038 | - | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 1" | .060" | - | - | 44.71 | 42.77 | 40.82 | 38.88 |
| | 51009 | - | .3750 | 3/8" | 9.525 | 3/8" | 3" | 1-1/4" | .015" | - | - | 58.83 | 56.28 | 53.72 | 51.16 |
| | 50114 | - | .3750 | 3/8" | 9.525 | 3/8" | 3" | 1-1/4" | .030" | - | - | 58.83 | 56.28 | 53.72 | 51.16 |
| | 51010 | - | .3750 | 3/8" | 9.525 | 3/8" | 4" | 1-1/2" | .015" | - | - | 66.22 | 63.34 | 60.46 | 57.58 |
| | 50039 | - | .3750 | 3/8" | 9.525 | 3/8" | 4" | 2" | - | - | - | 60.56 | 57.93 | 55.29 | 52.66 |
| | 50041 | - | .3750 | 3/8" | 9.525 | 3/8" | 4" | 2" | .030" | - | - | 66.22 | 63.34 | 60.46 | 57.58 |
| | 51011 | - | .3750 | 3/8" | 9.525 | 3/8" | 4" | 1/2" | .015" | 1-1/8" | .355" | 79.02 | 75.58 | 72.15 | 68.71 |
| | 50042 | - | .3750 | 3/8" | 9.525 | 3/8" | 4" | 7/8" | .015" | 1-7/8" | .355" | 79.02 | 75.58 | 72.15 | 68.71 |
| | 51012 | - | .3750 | 3/8" | 9.525 | 3/8" | 6" | 1/2" | .015" | 2-1/8" | .355" | 104.47 | 99.92 | 95.38 | 90.84 |
| | 51013 | - | .3750 | 3/8" | 9.525 | 3/8" | 6" | 1/2" | .015" | 3-1/8" | .355" | 104.47 | 99.92 | 95.38 | 90.84 |
| | 51014 | - | .3750 | 3/8" | 9.525 | 3/8" | 6" | 1/2" | .015" | 4-1/8" | .355" | 104.47 | 99.92 | 95.38 | 90.84 |
| | 50043 | - | .3937 | | 10.000 | 10.0 | 70 | 22 | - | - | - | 50.32 | 48.14 | 45.95 | 43.76 |
| | 51015 | - | .3937 | | 10.000 | 10.0 | 70 | 22 | 0.30 | - | - | 53.99 | 51.65 | 49.30 | 46.95 |
| | 50044 | - | .3937 | | 10.000 | 10.0 | 70 | 22 | 0.50 | - | - | 53.99 | 51.65 | 49.30 | 46.95 |
| | 51016 | - | .3937 | | 10.000 | 10.0 | 70 | 22 | 0.75 | - | - | 53.99 | 51.65 | 49.30 | 46.95 |
| | 51017 | - | .3937 | | 10.000 | 10.0 | 70 | 22 | 1.00 | - | - | 53.99 | 51.65 | 49.30 | 46.95 |
| | 50045 | - | .3937 | | 10.000 | 10.0 | 75 | 22 | - | 32 | 9.0 | 69.76 | 66.73 | 63.69 | 60.66 |
| | 50046 | - | .3937 | | 10.000 | 10.0 | 75 | 22 | 0.50 | 32 | 9.0 | 75.26 | 71.98 | 68.71 | 65.44 |
| NEW | 51018 | - | .3937 | | 10.000 | 10.0 | 75 | 22 | 0.75 | 32 | 9.0 | 75.26 | 71.98 | 68.71 | 65.44 |
| | 50047 | - | .3937 | | 10.000 | 10.0 | 75 | 22 | 1.00 | 32 | 9.0 | 75.26 | 71.98 | 68.71 | 65.44 |
| | 51019 | - | .4724 | | 12.000 | 12.0 | 65 | 19 | - | - | - | 61.26 | 58.60 | 55.93 | 53.27 |
| | 51020 | - | .4724 | | 12.000 | 12.0 | 65 | 19 | 0.50 | - | - | 71.25 | 68.16 | 65.06 | 61.96 |
| | 50484 | 50485 | .4724 | | 12.000 | 12.0 | 75 | 26 | - | - | - | 65.37 | 62.52 | 59.68 | 56.84 |
| | 51021 | - | .4724 | | 12.000 | 12.0 | 75 | 26 | 0.30 | - | - | 79.51 | 76.05 | 72.60 | 69.14 |
| | 50486 | 50487 | .4724 | | 12.000 | 12.0 | 75 | 26 | 0.50 | - | - | 79.51 | 76.05 | 72.60 | 69.14 |
| | 51022 | - | .4724 | | 12.000 | 12.0 | 75 | 26 | 0.75 | - | - | 79.51 | 76.05 | 72.60 | 69.14 |
| | 51023 | - | .4724 | | 12.000 | 12.0 | 75 | 26 | 1.00 | - | - | 79.51 | 76.05 | 72.60 | 69.14 |
| | 50112 | - | .4724 | | 12.000 | 12.0 | 75 | 26 | 2.00 | - | - | 79.51 | 76.05 | 72.60 | 69.14 |
| | 50115 | - | .4724 | | 12.000 | 12.0 | 75 | 26 | 2.50 | - | - | 79.51 | 76.05 | 72.60 | 69.14 |
| | 50048 | 50299 | .4724 | | 12.000 | 12.0 | 75 | 32 | - | - | - | 65.37 | 62.52 | 59.68 | 56.84 |
| | 51024 | - | .4724 | | 12.000 | 12.0 | 75 | 32 | 0.30 | - | - | 79.51 | 76.05 | 72.60 | 69.14 |
| | 50049 | 50300 | .4724 | | 12.000 | 12.0 | 75 | 32 | 0.50 | - | - | 79.51 | 76.05 | 72.60 | 69.14 |
| | 51025 | - | .4724 | | 12.000 | 12.0 | 75 | 32 | 0.75 | - | - | 79.51 | 76.05 | 72.60 | 69.14 |
| | 51026 | - | .4724 | | 12.000 | 12.0 | 75 | 32 | 1.00 | - | - | 79.51 | 76.05 | 72.60 | 69.14 |
| | 51027 | - | .4724 | | 12.000 | 12.0 | 100 | 38 | - | - | - | 87.37 | 83.57 | 79.77 | 75.97 |
| | 51028 | - | .4724 | | 12.000 | 12.0 | 100 | 38 | 0.50 | - | - | 92.52 | 88.50 | 84.47 | 80.45 |
| | 50423 | - | .4724 | | 12.000 | 12.0 | 100 | 42 | - | - | - | 87.37 | 83.57 | 79.77 | 75.97 |
| | 50425 | - | .4724 | | 12.000 | 12.0 | 100 | 42 | 0.30 | - | - | 92.52 | 88.50 | 84.47 | 80.45 |
| | 50427 | - | .4724 | | 12.000 | 12.0 | 100 | 42 | 0.50 | - | - | 92.52 | 88.50 | 84.47 | 80.45 |
| | 50429 | - | .4724 | | 12.000 | 12.0 | 100 | 42 | 1.00 | - | - | 92.52 | 88.50 | 84.47 | 80.45 |
| | 50431 | - | .4724 | | 12.000 | 12.0 | 100 | 42 | 2.00 | - | - | 92.52 | 88.50 | 84.47 | 80.45 |
| | 51029 | - | .4724 | | 12.000 | 12.0 | 100 | 52 | - | - | - | 87.37 | 83.57 | 79.77 | 75.97 |
| | 51030 | - | .4724 | | 12.000 | 12.0 | 100 | 52 | 0.50 | - | - | 92.52 | 88.50 | 84.47 | 80.45 |
| | 50051 | 50301 | .4724 | | 12.000 | 12.0 | 100 | 26 | - | 38 | 10.8 | 100.11 | 95.76 | 91.40 | 87.05 |
| | 50052 | 50302 | .4724 | | 12.000 | 12.0 | 100 | 26 | 0.50 | 38 | 10.8 | 105.26 | 100.68 | 96.11 | 91.53 |
| | 50053 | 50303 | .4724 | | 12.000 | 12.0 | 100 | 26 | 1.00 | 38 | 10.8 | 105.26 | 100.68 | 96.11 | 91.53 |

70
35
0
MATERIAL HARDNESS (Rc)

*continued* →

## Series V5 *(continued)*

.5000"
(12.700mm)

| EDP# (plain) | EDP# (weldon) | $d_1$ † Diameter Decimal | Diameter | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | $r$ Corner Radius | $l_3$ Reach Length | $d_3$ Neck Diameter | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 50054 | 50304 | .5000 | 1/2" | 12.700 | 1/2" | 2-1/2" | 5/8" | - | - | - | 58.74 | 56.19 | 53.63 | 51.08 |
| 50106 | 50305 | .5000 | 1/2" | 12.700 | 1/2" | 2-1/2" | 5/8" | .010" | - | - | 68.33 | 65.36 | 62.39 | 59.42 |
| 50055 | 50306 | .5000 | 1/2" | 12.700 | 1/2" | 2-1/2" | 5/8" | .020" | - | - | 68.33 | 65.36 | 62.39 | 59.42 |
| 50107 | 50307 | .5000 | 1/2" | 12.700 | 1/2" | 2-1/2" | 5/8" | .030" | - | - | 68.33 | 65.36 | 62.39 | 59.42 |
| 50056 | 50308 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1" | - | - | - | 62.77 | 60.04 | 57.31 | 54.58 |
| 50108 | 50309 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1" | .010" | - | - | 76.27 | 72.95 | 69.64 | 66.32 |
| 50057 | 50310 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1" | .020" | - | - | 76.27 | 72.95 | 69.64 | 66.32 |
| 50109 | 50311 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1" | .030" | - | - | 76.27 | 72.95 | 69.64 | 66.32 |
| 50058 | 50312 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1-1/4" | - | - | - | 62.77 | 60.04 | 57.31 | 54.58 |
| 50111 | 50313 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1-1/4" | .010" | - | - | 76.27 | 72.95 | 69.64 | 66.32 |
| 50059 | 50314 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1-1/4" | .015" | - | - | 76.27 | 72.95 | 69.64 | 66.32 |
| 50061 | 50315 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1-1/4" | .020" | - | - | 76.27 | 72.95 | 69.64 | 66.32 |
| 50062 | 50316 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1-1/4" | .030" | - | - | 76.27 | 72.95 | 69.64 | 66.32 |
| 50063 | 50317 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1-1/4" | .045" | - | - | 76.27 | 72.95 | 69.64 | 66.32 |
| 50064 | 50318 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1-1/4" | .060" | - | - | 76.27 | 72.95 | 69.64 | 66.32 |
| 50065 | 50319 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1-1/4" | .090" | - | - | 76.27 | 72.95 | 69.64 | 66.32 |
| 50433 | 50435 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 1-1/2" | .010" | - | - | 90.13 | 86.21 | 82.29 | 78.37 |
| 51031 | - | .5000 | 1/2" | 12.700 | 1/2" | 4" | 1-1/2" | .015" | - | - | 90.13 | 86.21 | 82.29 | 78.37 |
| 51032 | - | .5000 | 1/2" | 12.700 | 1/2" | 4" | 1-1/2" | .030" | - | - | 90.13 | 86.21 | 82.29 | 78.37 |
| 50436 | 50437 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 1-5/8" | - | - | - | 84.93 | 81.24 | 77.54 | 73.85 |
| 50438 | 50439 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 1-5/8" | .010" | - | - | 90.13 | 86.21 | 82.29 | 78.37 |
| 50440 | 50441 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 1-5/8" | .020" | - | - | 90.13 | 86.21 | 82.29 | 78.37 |
| 50442 | 50443 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 1-5/8" | .030" | - | - | 90.13 | 86.21 | 82.29 | 78.37 |
| 50444 | 50445 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 1-5/8" | .040" | - | - | 90.13 | 86.21 | 82.29 | 78.37 |
| 50446 | 50447 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 1-5/8" | .060" | - | - | 90.13 | 86.21 | 82.29 | 78.37 |
| 50067 | 50321 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 2-1/8" | - | - | - | 84.93 | 81.24 | 77.54 | 73.85 |
| 51033 | - | .5000 | 1/2" | 12.700 | 1/2" | 4" | 2-1/8" | .015" | - | - | 90.13 | 86.21 | 82.29 | 78.37 |
| 50068 | 50322 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 2-1/8" | .030" | - | - | 90.13 | 86.21 | 82.29 | 78.37 |
| 51034 | - | .5000 | 1/2" | 12.700 | 1/2" | 6" | 1" | .030" | - | - | 127.47 | 121.92 | 116.38 | 110.84 |
| 51035 | - | .5000 | 1/2" | 12.700 | 1/2" | 6" | 3-1/8" | - | - | - | 121.79 | 116.49 | 111.20 | 105.90 |
| 51036 | - | .5000 | 1/2" | 12.700 | 1/2" | 6" | 3-1/8" | .030" | - | - | 127.47 | 121.92 | 116.38 | 110.84 |
| 51037 | - | .5000 | 1/2" | 12.700 | 1/2" | 4" | 5/8" | .015" | 1-1/2" | .475" | 102.89 | 98.42 | 93.94 | 89.47 |
| 51038 | - | .5000 | 1/2" | 12.700 | 1/2" | 4" | 5/8" | .015" | 2-1/4" | .475" | 102.89 | 98.42 | 93.94 | 89.47 |
| 50066 | 50320 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 1-1/4" | .030" | 2-1/4" | .475" | 102.89 | 98.42 | 93.94 | 89.47 |
| 51039 | - | .5000 | 1/2" | 12.700 | 1/2" | 6" | 5/8" | .015" | 3-3/8" | .475" | 140.25 | 134.16 | 128.06 | 121.96 |
| 51040 | - | .5000 | 1/2" | 12.700 | 1/2" | 6" | 5/8" | .015" | 4-1/8" | .475" | 140.25 | 134.16 | 128.06 | 121.96 |

MATERIAL HARDNESS (Rc)
70
35
0



† *Metric equivalents are for reference only*

| EDP# (plain) | EDP# (weldon) | $d_1$ † Diameter Decimal | Diameter | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | $r$ Corner Radius | $l_3$ Reach Length | $d_3$ Neck Diameter | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 50069 | 50323 | .6250 | 5/8" | 15.875 | 5/8" | 3-1/2" | 1-1/4" | - | - | - | 115.81 | 110.77 | 105.74 | 100.70 |
| 51041 | - | .6250 | 5/8" | 15.875 | 5/8" | 3-1/2" | 1-1/4" | .020" | - | - | 121.42 | 116.14 | 110.86 | 105.58 |
| 50071 | 50324 | .6250 | 5/8" | 15.875 | 5/8" | 3-1/2" | 1-1/4" | .030" | - | - | 121.42 | 116.14 | 110.86 | 105.58 |
| 50072 | 50325 | .6250 | 5/8" | 15.875 | 5/8" | 3-1/2" | 1-1/4" | .060" | - | - | 121.42 | 116.14 | 110.86 | 105.58 |
| 50401 | 50402 | .6250 | 5/8" | 15.875 | 5/8" | 3-1/2" | 1-1/4" | .120" | - | - | 121.42 | 116.14 | 110.86 | 105.58 |
| 51042 | - | .6250 | 5/8" | 15.875 | 5/8" | 4" | 1-5/8" | - | - | - | 123.68 | 118.31 | 112.93 | 107.55 |
| 51043 | - | .6250 | 5/8" | 15.875 | 5/8" | 4" | 1-5/8" | .030" | - | - | 131.99 | 126.25 | 120.51 | 114.77 |
| 51044 | - | .6250 | 5/8" | 15.875 | 5/8" | 4" | 2-1/8" | - | - | - | 123.68 | 118.31 | 112.93 | 107.55 |
| 51045 | - | .6250 | 5/8" | 15.875 | 5/8" | 4" | 2-1/8" | .030" | - | - | 131.99 | 126.25 | 120.51 | 114.77 |
| 51046 | - | .6250 | 5/8" | 15.875 | 5/8" | 6" | 2-1/2" | .030" | - | - | 181.69 | 173.79 | 165.89 | 157.99 |
| 50403 | 50404 | .6250 | 5/8" | 15.875 | 5/8" | 6" | 3-1/8" | .030" | - | - | 181.69 | 173.79 | 165.89 | 157.99 |
| 51047 | - | .6250 | 5/8" | 15.875 | 5/8" | 6" | 3-1/8" | .060" | - | - | 181.69 | 173.79 | 165.89 | 157.99 |
| 51048 | - | .6250 | 5/8" | 15.875 | 5/8" | 6" | 3-1/2" | .030" | - | - | 181.69 | 173.79 | 165.89 | 157.99 |
| 51049 | - | .6250 | 5/8" | 15.875 | 5/8" | 4" | 3/4" | .030" | 1-5/8" | .590" | 143.09 | 136.87 | 130.65 | 124.43 |
| 50073 | 50326 | .6250 | 5/8" | 15.875 | 5/8" | 4" | 1-1/4" | .030" | 2-1/4" | .590" | 143.09 | 136.87 | 130.65 | 124.43 |
| 51050 | - | .6250 | 5/8" | 15.875 | 5/8" | 6" | 3/4" | .030" | 2-3/8" | .590" | 194.45 | 186.00 | 177.54 | 169.09 |
| 51051 | - | .6250 | 5/8" | 15.875 | 5/8" | 6" | 3/4" | .030" | 3-3/8" | .590" | 194.45 | 186.00 | 177.54 | 169.09 |
| 51052 | - | .6250 | 5/8" | 15.875 | 5/8" | 6" | 3/4" | .030" | 4-1/8" | .590" | 194.45 | 186.00 | 177.54 | 169.09 |
| 51053 | - | .6299 | | 16.000 | 16.0 | 75 | 19 | - | - | - | 117.59 | 112.48 | 107.36 | 102.25 |
| 51054 | - | .6299 | | 16.000 | 16.0 | 75 | 19 | 0.50 | - | - | 123.31 | 117.95 | 112.59 | 107.23 |
| 50074 | 50327 | .6299 | | 16.000 | 16.0 | 88 | 32 | - | - | - | 120.82 | 115.57 | 110.31 | 105.06 |
| 50075 | 50328 | .6299 | | 16.000 | 16.0 | 88 | 32 | 0.50 | - | - | 126.70 | 121.19 | 115.68 | 110.17 |
| 50420 | - | .6299 | | 16.000 | 16.0 | 88 | 32 | 1.00 | - | - | 126.70 | 121.19 | 115.68 | 110.17 |
| 51055 | - | .6299 | | 16.000 | 16.0 | 88 | 32 | 2.00 | - | - | 126.70 | 121.19 | 115.68 | 110.17 |
| 50422 | - | .6299 | | 16.000 | 16.0 | 88 | 32 | 3.00 | - | - | 126.70 | 121.19 | 115.68 | 110.17 |
| 50424 | - | .6299 | | 16.000 | 16.0 | 88 | 32 | 4.00 | - | - | 126.70 | 121.19 | 115.68 | 110.17 |
| 50430 | - | .6299 | | 16.000 | 16.0 | 100 | 40 | 0.50 | - | - | 134.72 | 128.87 | 123.01 | 117.15 |
| 50432 | - | .6299 | | 16.000 | 16.0 | 100 | 40 | 1.00 | - | - | 134.72 | 128.87 | 123.01 | 117.15 |
| 50434 | - | .6299 | | 16.000 | 16.0 | 100 | 40 | 3.00 | - | - | 134.72 | 128.87 | 123.01 | 117.15 |
| 50076 | 50329 | .6299 | | 16.000 | 16.0 | 100 | 32 | - | 50 | 14.4 | 139.62 | 133.55 | 127.48 | 121.41 |
| 50077 | - | .6299 | | 16.000 | 16.0 | 100 | 32 | 0.50 | 50 | 14.4 | 145.84 | 139.50 | 133.16 | 126.82 |
| 50426 | - | .6299 | | 16.000 | 16.0 | 100 | 32 | 1.00 | 50 | 14.4 | 145.84 | 139.50 | 133.16 | 126.82 |
| 51056 | - | .6299 | | 16.000 | 16.0 | 100 | 32 | 2.00 | 50 | 14.4 | 145.84 | 139.50 | 133.16 | 126.82 |
| 50428 | - | .6299 | | 16.000 | 16.0 | 100 | 32 | 3.00 | 50 | 14.4 | 145.84 | 139.50 | 133.16 | 126.82 |
| 50078 | - | .7087 | | 18.000 | 18.0 | 100 | 32 | 0.75 | - | - | 181.88 | 173.98 | 166.07 | 158.16 |



*continued* →

## Series V5 *(continued)*

.7500"
(19.050mm)

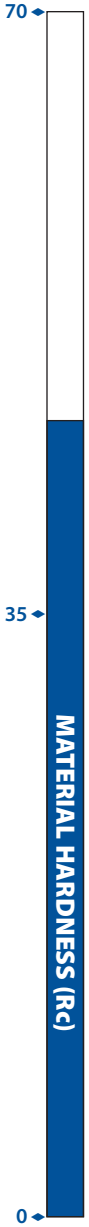
| EDP# (plain) | EDP# (weldon) | $d_1$ † Diameter Decimal | Diameter | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | $r$ Corner Radius | $l_3$ Reach Length | $d_3$ Neck Diameter | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 50079 | 50332 | .7500 | 3/4" | 19.050 | 3/4" | 3" | 7/8" | - | - | - | 161.60 | 154.57 | 147.55 | 140.52 |
| 51103 | - | .7500 | 3/4" | 19.050 | 3/4" | 3" | 7/8" | .015" | - | - | 170.43 | 163.02 | 155.61 | 148.20 |
| 50081 | 50333 | .7500 | 3/4" | 19.050 | 3/4" | 3" | 7/8" | .030" | - | - | 170.42 | 163.01 | 155.60 | 148.19 |
| 51057 | - | .7500 | 3/4" | 19.050 | 3/4" | 3" | 7/8" | .060" | - | - | 170.43 | 163.02 | 155.61 | 148.20 |
| 51105 | - | .7500 | 3/4" | 19.050 | 3/4" | 3" | 7/8" | .120" | - | - | 170.43 | 163.02 | 155.61 | 148.20 |
| 51107 | - | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-1/4" | .015" | - | - | 174.12 | 166.55 | 158.98 | 151.41 |
| 51058 | - | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-1/4" | .030" | - | - | 174.12 | 166.55 | 158.98 | 151.41 |
| 51109 | - | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-1/4" | .060" | - | - | 174.12 | 166.55 | 158.98 | 151.41 |
| 50082 | 50334 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-1/2" | - | - | - | 165.31 | 158.13 | 150.94 | 143.75 |
| 51111 | - | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-1/2" | .015" | - | - | 174.12 | 166.55 | 158.98 | 151.41 |
| 50083 | 50335 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-1/2" | .030" | - | - | 174.12 | 166.55 | 158.98 | 151.41 |
| 50084 | 50336 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-1/2" | .060" | - | - | 174.12 | 166.55 | 158.98 | 151.41 |
| 51059 | - | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-1/2" | .078" | - | - | 174.12 | 166.55 | 158.98 | 151.41 |
| 50085 | 50337 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-1/2" | .120" | - | - | 174.12 | 166.55 | 158.98 | 151.41 |
| 51113 | - | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-1/2" | .190" | - | - | 174.12 | 166.55 | 158.98 | 151.41 |
| 51060 | - | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-5/8" | - | - | - | 165.31 | 158.13 | 150.94 | 143.75 |
| 51115 | - | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-5/8" | .015" | - | - | 174.12 | 166.55 | 158.98 | 151.41 |
| 51061 | - | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-5/8" | .030" | - | - | 174.12 | 166.55 | 158.98 | 151.41 |
| 51119 | - | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-5/8" | .060" | - | - | 174.12 | 166.55 | 158.98 | 151.41 |
| 51062 | - | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-3/4" | - | - | - | 165.31 | 158.13 | 150.94 | 143.75 |
| 51121 | - | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-3/4" | .015" | - | - | 174.12 | 166.55 | 158.98 | 151.41 |
| 51063 | - | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-3/4" | .030" | - | - | 174.12 | 166.55 | 158.98 | 151.41 |
| 51123 | - | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-3/4" | .060" | - | - | 174.12 | 166.55 | 158.98 | 151.41 |
| 50086 | 50338 | .7500 | 3/4" | 19.050 | 3/4" | 5" | 2-1/8" | - | - | - | 221.88 | 212.23 | 202.59 | 192.94 |
| 51125 | - | .7500 | 3/4" | 19.050 | 3/4" | 5" | 2-1/8" | .015" | - | - | 241.53 | 231.03 | 220.53 | 210.03 |
| 50087 | 50339 | .7500 | 3/4" | 19.050 | 3/4" | 5" | 2-1/8" | .030" | - | - | 241.53 | 231.03 | 220.53 | 210.03 |
| 51064 | - | .7500 | 3/4" | 19.050 | 3/4" | 5" | 2-1/8" | .060" | - | - | 241.53 | 231.03 | 220.53 | 210.03 |
| 51065 | - | .7500 | 3/4" | 19.050 | 3/4" | 5" | 2-1/8" | .120" | - | - | 241.53 | 231.03 | 220.53 | 210.03 |
| 51127 | - | .7500 | 3/4" | 19.050 | 3/4" | 5" | 2-1/4" | .015" | - | - | 241.53 | 231.03 | 220.53 | 210.03 |
| 51066 | - | .7500 | 3/4" | 19.050 | 3/4" | 5" | 2-1/4" | .030" | - | - | 241.53 | 231.03 | 220.53 | 210.03 |
| 51129 | - | .7500 | 3/4" | 19.050 | 3/4" | 5" | 2-1/4" | .060" | - | - | 241.53 | 231.03 | 220.53 | 210.03 |
| 51131 | - | .7500 | 3/4" | 19.050 | 3/4" | 5" | 2-1/2" | .015" | - | - | 241.53 | 231.03 | 220.53 | 210.03 |
| 51067 | - | .7500 | 3/4" | 19.050 | 3/4" | 5" | 2-1/2" | .030" | - | - | 241.53 | 231.03 | 220.53 | 210.03 |
| 51133 | - | .7500 | 3/4" | 19.050 | 3/4" | 5" | 2-1/2" | .060" | - | - | 241.53 | 231.03 | 220.53 | 210.03 |
| 51135 | - | .7500 | 3/4" | 19.050 | 3/4" | 5" | 2-3/4" | .015" | - | - | 241.53 | 231.03 | 220.53 | 210.03 |
| 51068 | - | .7500 | 3/4" | 19.050 | 3/4" | 5" | 2-3/4" | .030" | - | - | 241.53 | 231.03 | 220.53 | 210.03 |
| 51137 | - | .7500 | 3/4" | 19.050 | 3/4" | 5" | 2-3/4" | .060" | - | - | 241.53 | 231.03 | 220.53 | 210.03 |
| 50089 | 50341 | .7500 | 3/4" | 19.050 | 3/4" | 6" | 3-1/4" | - | - | - | 259.66 | 248.37 | 237.08 | 225.79 |
| 51139 | - | .7500 | 3/4" | 19.050 | 3/4" | 6" | 3-1/4" | .015" | - | - | 286.90 | 274.43 | 261.95 | 249.48 |
| 50091 | 50342 | .7500 | 3/4" | 19.050 | 3/4" | 6" | 3-1/4" | .030" | - | - | 286.90 | 274.43 | 261.95 | 249.48 |
| 51141 | - | .7500 | 3/4" | 19.050 | 3/4" | 6" | 3-1/4" | .060" | - | - | 286.90 | 274.43 | 261.95 | 249.48 |
| 51143 | - | .7500 | 3/4" | 19.050 | 3/4" | 7" | 4-1/4" | .015" | - | - | 361.84 | 346.10 | 330.37 | 314.64 |
| 51145 | - | .7500 | 3/4" | 19.050 | 3/4" | 7" | 4-1/4" | .030" | - | - | 361.84 | 346.10 | 330.37 | 314.64 |
| 51147 | - | .7500 | 3/4" | 19.050 | 3/4" | 7" | 4-1/4" | .060" | - | - | 361.84 | 346.10 | 330.37 | 314.64 |
| 51069 | - | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1" | .030" | 2" | .705" | 186.91 | 178.78 | 170.66 | 162.53 |
| 51070 | - | .7500 | 3/4" | 19.050 | 3/4" | 5" | 1" | .030" | 2-1/2" | .705" | 254.33 | 243.28 | 232.22 | 221.16 |
| 50088 | 50340 | .7500 | 3/4" | 19.050 | 3/4" | 5-1/2" | 1-1/2" | .030" | 3-1/4" | .705" | 299.74 | 286.70 | 273.67 | 260.64 |
| 51071 | - | .7500 | 3/4" | 19.050 | 3/4" | 6" | 1" | .030" | 4-1/8" | .705" | 299.74 | 286.70 | 273.67 | 260.64 |

MATERIAL HARDNESS (Rc)
70
35
0



† *Metric equivalents are for reference only*

| | EDP# (plain) | EDP# (weldon) | $d_1$ † Diameter Decimal | Diameter | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | $r$ Corner Radius | $l_3$ Reach Length | $d_3$ Neck Diameter | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 50092 | 50343 | .7874 | | 20.000 | 20.0 | 100 | 38 | - | - | - | 223.34 | 213.63 | 203.92 | 194.21 |
| | 51072 | - | .7874 | | 20.000 | 20.0 | 100 | 38 | 0.50 | - | - | 246.43 | 235.72 | 225.00 | 214.29 |
| | 50093 | 50344 | .7874 | | 20.000 | 20.0 | 100 | 38 | 0.75 | - | - | 246.43 | 235.72 | 225.00 | 214.29 |
| | 51073 | - | .7874 | | 20.000 | 20.0 | 100 | 38 | 1.00 | - | - | 246.43 | 235.72 | 225.00 | 214.29 |
| | 51074 | - | .7874 | | 20.000 | 20.0 | 100 | 38 | 1.50 | - | - | 246.43 | 235.72 | 225.00 | 214.29 |
| | 51075 | - | .7874 | | 20.000 | 20.0 | 100 | 38 | 2.00 | - | - | 246.43 | 235.72 | 225.00 | 214.29 |
| | 51076 | - | .7874 | | 20.000 | 20.0 | 100 | 38 | 3.00 | - | - | 246.43 | 235.72 | 225.00 | 214.29 |
| | 51077 | - | .9843 | | 25.000 | 25.0 | 100 | 38 | - | - | - | 255.07 | 243.98 | 232.89 | 221.80 |
| | 51078 | - | .9843 | | 25.000 | 25.0 | 100 | 38 | 0.50 | - | - | 282.45 | 270.17 | 257.89 | 245.61 |
| NEW | 51079 | - | .9843 | | 25.000 | 25.0 | 100 | 38 | 0.75 | - | - | 282.45 | 270.17 | 257.89 | 245.61 |
| | 51080 | - | .9843 | | 25.000 | 25.0 | 100 | 38 | 1.50 | - | - | 282.45 | 270.17 | 257.89 | 245.61 |
| | 51081 | - | .9843 | | 25.000 | 25.0 | 100 | 38 | 3.00 | - | - | 282.45 | 270.17 | 257.89 | 245.61 |
| | 50094 | - | 1.000 | 1" | 25.400 | 1" | 4" | 1-1/4" | - | - | - | 246.96 | 236.23 | 225.49 | 214.75 |
| | 50095 | - | 1.000 | 1" | 25.400 | 1" | 4" | 1-1/4" | .030" | - | - | 297.28 | 284.35 | 271.43 | 258.50 |
| NEW | 51082 | - | 1.000 | 1" | 25.400 | 1" | 4" | 1-1/4" | .120" | - | - | 297.28 | 284.35 | 271.43 | 258.50 |
| | - | 50348 | 1.000 | 1" | 25.400 | 1" | 4" | 1-1/2" | - | - | - | 237.46 | 227.14 | 216.81 | 206.49 |
| | - | 50349 | 1.000 | 1" | 25.400 | 1" | 4" | 1-1/2" | .030" | - | - | 285.84 | 273.42 | 260.99 | 248.56 |
| | - | 50350 | 1.000 | 1" | 25.400 | 1" | 4" | 1-1/2" | .060" | - | - | 285.84 | 273.42 | 260.99 | 248.56 |
| | 51083 | - | 1.000 | 1" | 25.400 | 1" | 4" | 1-1/2" | .120" | - | - | 297.28 | 284.35 | 271.43 | 258.50 |
| NEW | 50116 | - | 1.000 | 1" | 25.400 | 1" | 4" | 1-1/2" | .125" | - | - | 297.28 | 284.35 | 271.43 | 258.50 |
| | 50097 | - | 1.000 | 1" | 25.400 | 1" | 4" | 1-3/4" | - | - | - | 246.96 | 236.23 | 225.49 | 214.75 |
| | 50098 | - | 1.000 | 1" | 25.400 | 1" | 4" | 1-3/4" | .030" | - | - | 297.28 | 284.35 | 271.43 | 258.50 |
| | 50099 | - | 1.000 | 1" | 25.400 | 1" | 4" | 1-3/4" | .060" | - | - | 297.28 | 284.35 | 271.43 | 258.50 |
| | 51084 | - | 1.000 | 1" | 25.400 | 1" | 4" | 1-3/4" | .120" | - | - | 297.28 | 284.35 | 271.43 | 258.50 |
| | 51085 | - | 1.000 | 1" | 25.400 | 1" | 4-1/2" | 2" | .030" | - | - | 331.51 | 317.10 | 302.68 | 288.27 |
| | 51086 | - | 1.000 | 1" | 25.400 | 1" | 4-1/2" | 2" | .060" | - | - | 331.51 | 317.10 | 302.68 | 288.27 |
| | 51087 | - | 1.000 | 1" | 25.400 | 1" | 4-1/2" | 2" | .120" | - | - | 331.51 | 317.10 | 302.68 | 288.27 |
| | 51088 | - | 1.000 | 1" | 25.400 | 1" | 4-1/2" | 2" | .250" | - | - | 331.51 | 317.10 | 302.68 | 288.27 |
| | 51089 | - | 1.000 | 1" | 25.400 | 1" | 5" | 2-1/2" | .030" | - | - | 365.75 | 349.84 | 333.94 | 318.04 |
| | 51090 | - | 1.000 | 1" | 25.400 | 1" | 5" | 2-5/8" | .030" | - | - | 365.75 | 349.84 | 333.94 | 318.04 |
| | 50104 | 50354 | 1.000 | 1" | 25.400 | 1" | 6" | 3-1/4" | - | - | - | 430.63 | 411.91 | 393.18 | 374.46 |
| | 50105 | - | 1.000 | 1" | 25.400 | 1" | 6" | 3-1/4" | .030" | - | - | 477.02 | 456.28 | 435.54 | 414.80 |
| | 51091 | - | 1.000 | 1" | 25.400 | 1" | 6" | 3-3/8" | .060" | - | - | 477.02 | 456.28 | 435.54 | 414.80 |
| | 51092 | - | 1.000 | 1" | 25.400 | 1" | 7" | 4-1/4" | .030" | - | - | 582.12 | 556.81 | 531.50 | 506.19 |
| | 51093 | - | 1.000 | 1" | 25.400 | 1" | 7" | 4-1/4" | .060" | - | - | 582.12 | 556.81 | 531.50 | 506.19 |
| | 51094 | - | 1.000 | 1" | 25.400 | 1" | 5" | 1-1/4" | .030" | 2-5/8" | .940" | 378.56 | 362.10 | 345.64 | 329.18 |
| | 50101 | - | 1.000 | 1" | 25.400 | 1" | 5-1/2" | 1-3/4" | .030" | 3-1/4" | .940" | 485.02 | 463.94 | 442.85 | 421.76 |
| | 50102 | 50352 | 1.000 | 1" | 25.400 | 1" | 5-1/2" | 1-3/4" | .060" | 3-1/4" | .940" | 485.02 | 463.94 | 442.85 | 421.76 |
| | 51095 | - | 1.000 | 1" | 25.400 | 1" | 6" | 1-1/4" | .030" | 3-3/8" | .940" | 489.82 | 468.52 | 447.23 | 425.93 |
| | 51096 | - | 1.000 | 1" | 25.400 | 1" | 7" | 1-1/4" | .030" | 4-1/4" | .940" | 595.15 | 569.27 | 543.40 | 517.52 |



## Series V5C - Chip Splitter

.4724" - .6299"
(12.000mm - 16.000mm)

# HIGH EFFICIENCY MILLING

Z=5 | VAR | TECH PAGES 298-299

**TOLERANCES**

| | |
|---|---|
| $d_1$ | +.000" –.002" (+.000mm –.050mm) |
| $d_2$ | h6 |
| $r$ | +.001" –.001" (+.025 –.025mm) |

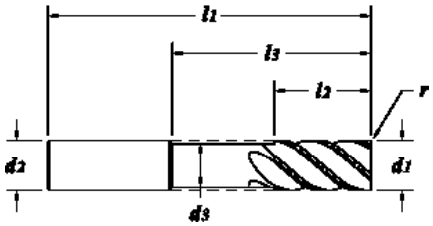
Recommended for titanium and tool steels under 45Rc



## Variable Helix End Mill

### AlCrN Coating

Solid submicron grain carbide end mill - center cutting
Chip splitter to help break long chips
Engineered for High Efficiency Milling
Staggered flutes to control harmonics
Variable flute design helps with chip evacuation in slots and pockets
PCT (Polish Carbide Treatment) enhances tool life




MATERIAL HARDNESS (Rc)
70
35
0

| EDP# | $d_1$ † Diameter Decimal | Diameter | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | $r$ Corner Radius | $l_3$ Reach Length | $d_3$ Neck Diameter | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 50801 | .4724 | | 12.000 | 12.0 | 100 | 42 | 0.30 | - | - | 98.80 | 94.50 | 90.21 | 85.91 |
| 50800 | .4724 | | 12.000 | 12.0 | 100 | 42 | 1.00 | - | - | 98.80 | 94.50 | 90.21 | 85.91 |
| 50803 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1" | - | - | - | 69.05 | 66.04 | 63.04 | 60.04 |
| 50807 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1" | .015" | - | - | 82.55 | 78.96 | 75.37 | 71.78 |
| 50805 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1" | .020" | - | - | 82.55 | 78.96 | 75.37 | 71.78 |
| 50809 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1" | .030" | - | - | 82.55 | 78.96 | 75.37 | 71.78 |
| 50811 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1-1/4" | .015" | - | - | 82.55 | 78.96 | 75.37 | 71.78 |
| 50810 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1-1/4" | .020" | - | - | 82.55 | 78.96 | 75.37 | 71.78 |
| 50815 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1-1/4" | .030" | - | - | 82.55 | 78.96 | 75.37 | 71.78 |
| 50813 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1-1/4" | .060" | - | - | 82.55 | 78.96 | 75.37 | 71.78 |
| 50820 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1-1/4" | .090" | - | - | 82.55 | 78.96 | 75.37 | 71.78 |
| 50825 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 1-1/2" | .010" | - | - | 96.40 | 92.21 | 88.02 | 83.83 |
| 50817 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 1-1/2" | .030" | - | - | 96.40 | 92.21 | 88.02 | 83.83 |
| 50830 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 1-5/8" | - | - | - | 91.21 | 87.24 | 83.28 | 79.31 |
| 50819 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 1-5/8" | .030" | - | - | 96.40 | 92.21 | 88.02 | 83.83 |
| 50835 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 2-1/8" | - | - | - | 91.21 | 87.24 | 83.28 | 79.31 |
| 50836 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 2-1/8" | .030" | - | - | 96.40 | 92.21 | 88.02 | 83.83 |
| 50821 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 5/8" | .015" | 1-1/2" | .475" | 109.17 | 104.42 | 99.68 | 94.93 |
| 50823 | .6250 | 5/8" | 15.875 | 5/8" | 3-1/2" | 1-1/4" | .020" | - | - | 128.95 | 123.34 | 117.74 | 112.13 |
| 50840 | .6250 | 5/8" | 15.875 | 5/8" | 3-1/2" | 1-1/4" | .030" | - | - | 128.95 | 123.34 | 117.74 | 112.13 |
| 50827 | .6250 | 5/8" | 15.875 | 5/8" | 4" | 1-5/8" | - | - | - | 131.22 | 125.51 | 119.81 | 114.10 |
| 50829 | .6250 | 5/8" | 15.875 | 5/8" | 4" | 1-5/8" | .030" | - | - | 139.53 | 133.46 | 127.40 | 121.33 |
| 50845 | .6250 | 5/8" | 15.875 | 5/8" | 4" | 2-1/8" | .030" | - | - | 139.53 | 133.46 | 127.40 | 121.33 |
| 50831 | .6250 | 5/8" | 15.875 | 5/8" | 6" | 2-1/2" | .030" | - | - | 189.22 | 180.99 | 172.77 | 164.54 |
| 50833 | .6299 | | 16.000 | 16.0 | 100 | 40 | 0.50 | - | - | 142.26 | 136.07 | 129.89 | 123.70 |
| 50837 | .6299 | | 16.000 | 16.0 | 100 | 40 | 1.00 | - | - | 142.26 | 136.07 | 129.89 | 123.70 |



† *Metric equivalents are for reference only*

| EDP# | $d_1$ † Diameter Decimal | Diameter | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | $r$ Corner Radius | $l_3$ Reach Length | $d_3$ Neck Diameter | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 50839 | .7500 | 3/4" | 19.050 | 3/4" | 3" | 7/8" | - | - | - | 169.46 | 162.10 | 154.73 | 147.36 |
| 50841 | .7500 | 3/4" | 19.050 | 3/4" | 3" | 7/8" | .030" | - | - | 178.27 | 170.52 | 162.77 | 155.02 |
| 50843 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-1/2" | .030" | - | - | 181.99 | 174.08 | 166.16 | 158.25 |
| 50847 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-1/2" | .060" | - | - | 181.99 | 174.08 | 166.16 | 158.25 |
| 50850 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-1/2" | .120" | - | - | 181.99 | 174.08 | 166.16 | 158.25 |
| 50849 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-3/4" | - | - | - | 173.17 | 165.64 | 158.11 | 150.58 |
| 50851 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-3/4" | .030" | - | - | 181.99 | 174.08 | 166.16 | 158.25 |
| 50855 | .7500 | 3/4" | 19.050 | 3/4" | 5" | 2-1/8" | .030" | - | - | 249.38 | 238.54 | 227.69 | 216.85 |
| 50853 | .7500 | 3/4" | 19.050 | 3/4" | 5" | 2-1/4" | .030" | - | - | 249.38 | 238.54 | 227.69 | 216.85 |
| 50857 | .7500 | 3/4" | 19.050 | 3/4" | 5" | 2-1/2" | .030" | - | - | 249.38 | 238.54 | 227.69 | 216.85 |
| 50859 | .7500 | 3/4" | 19.050 | 3/4" | 5" | 2-3/4" | .015" | - | - | 249.38 | 238.54 | 227.69 | 216.85 |
| 50861 | .7500 | 3/4" | 19.050 | 3/4" | 5" | 2-3/4" | .030" | - | - | 249.38 | 238.54 | 227.69 | 216.85 |
| 50863 | .7500 | 3/4" | 19.050 | 3/4" | 6" | 3-1/4" | - | - | - | 267.52 | 255.89 | 244.26 | 232.63 |
| 50860 | .7500 | 3/4" | 19.050 | 3/4" | 6" | 3-1/4" | .030" | - | - | 294.76 | 281.94 | 269.13 | 256.31 |
| 50867 | .7500 | 3/4" | 19.050 | 3/4" | 7" | 4-1/4" | .015" | - | - | 369.69 | 353.62 | 337.54 | 321.47 |
| 50869 | 1.000 | 1" | 25.400 | 1" | 5" | 2-1/2" | .030" | - | - | 373.61 | 357.37 | 341.12 | 324.88 |
| 50871 | 1.000 | 1" | 25.400 | 1" | 5" | 2-5/8" | .030" | - | - | 373.61 | 357.37 | 341.12 | 324.88 |
| 50873 | 1.000 | 1" | 25.400 | 1" | 6" | 3-1/4" | .030" | - | - | 484.89 | 463.80 | 442.72 | 421.64 |



# Series VX-7 NEW ITEMS HIGH EFFICIENCY MILLING

.3150" - .4724"
(8.000mm - 12.000mm)

Z=7 | 38° | TECH PAGES 302-303

| TOLERANCES | |
|---|---|
| $d_1$ | +.000" –.002" (+.000mm –.050mm) |
| $d_2$ | h6 |
| $r$ | +.001" –.001" (+.025 –.025mm) |

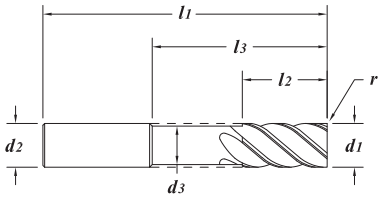
Recommended for titanium, stainless, and tool steels under 45Rc

## Seven-Flute End Mill

### BALIQ® ALCRONOS Coating (AlCrN-Based)

Solid submicron grain carbide end mill - non-center cutting
Engineered for High Efficiency Milling
Multiple flutes for increased feed rates
Staggered flute geometry
PCT (Polish Carbide Treatment) enhances tool life
Up to 15% Radial (ae) engagement





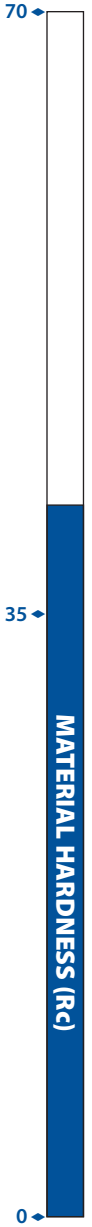

MATERIAL HARDNESS (Rc)
70
35
0

| | EDP# | $d_1$ † Diameter Decimal | Diameter | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | $r$ Corner Radius | $l_3$ Reach Length | $d_3$ Neck Diameter | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 64100 | .3150 | | 8.000 | 8.0 | 65 | 22 | - | - | - | 53.99 | 51.65 | 49.30 | 46.95 |
| | 64102 | .3150 | | 8.000 | 8.0 | 65 | 22 | 0.50 | - | - | 59.48 | 56.89 | 54.31 | 51.72 |
| | 64104 | .3150 | | 8.000 | 8.0 | 65 | 22 | 1.00 | - | - | 59.48 | 56.89 | 54.31 | 51.72 |
| | 64105 | .3150 | | 8.000 | 8.0 | 75 | 27 | 1.60 | - | - | 72.94 | 69.77 | 66.60 | 63.43 |
| | 64106 | .3150 | | 8.000 | 8.0 | 75 | 32 | - | - | - | 66.75 | 63.84 | 60.94 | 58.04 |
| | 64108 | .3150 | | 8.000 | 8.0 | 75 | 32 | 0.50 | - | - | 72.94 | 69.77 | 66.60 | 63.43 |
| | 64110 | .3150 | | 8.000 | 8.0 | 75 | 32 | 1.00 | - | - | 72.94 | 69.77 | 66.60 | 63.43 |
| NEW | 64267 | .3750 | 3/8" | 9.525 | 3/8" | 2" | 5/8" | - | - | - | 49.94 | 47.77 | 45.60 | 43.43 |
| NEW | 64268 | .3750 | 3/8" | 9.525 | 3/8" | 2" | 5/8" | .010" | - | - | 57.05 | 54.57 | 52.09 | 49.61 |
| NEW | 64269 | .3750 | 3/8" | 9.525 | 3/8" | 2" | 5/8" | .015" | - | - | 57.05 | 54.57 | 52.09 | 49.61 |
| NEW | 64270 | .3750 | 3/8" | 9.525 | 3/8" | 2" | 5/8" | .020" | - | - | 57.05 | 54.57 | 52.09 | 49.61 |
| NEW | 64271 | .3750 | 3/8" | 9.525 | 3/8" | 2" | 5/8" | .030" | - | - | 57.05 | 54.57 | 52.09 | 49.61 |
| | 64112 | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 1" | - | - | - | 58.67 | 56.12 | 53.57 | 51.02 |
| | 64114 | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 1" | .020" | - | - | 64.24 | 61.45 | 58.65 | 55.86 |
| | 64116 | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 1" | .030" | - | - | 64.24 | 61.45 | 58.65 | 55.86 |
| | 64117 | .3750 | 3/8" | 9.525 | 3/8" | 3" | 1" | .025" | - | - | 78.14 | 74.75 | 71.35 | 67.95 |
| | 64118 | .3750 | 3/8" | 9.525 | 3/8" | 3" | 1-1/2" | - | - | - | 70.76 | 67.68 | 64.61 | 61.53 |
| | 64120 | .3750 | 3/8" | 9.525 | 3/8" | 3" | 1-1/2" | .020" | - | - | 78.14 | 74.75 | 71.35 | 67.95 |
| | 64122 | .3750 | 3/8" | 9.525 | 3/8" | 3" | 1-1/2" | .030" | - | - | 78.14 | 74.75 | 71.35 | 67.95 |
| | 64123 | .3750 | 3/8" | 9.525 | 3/8" | 3" | 1-1/2" | .060" | - | - | 78.14 | 74.75 | 71.35 | 67.95 |
| | 64246 | .3750 | 3/8" | 9.525 | 3/8" | 4" | 7/8" | .015" | 1-7/8" | .355" | 101.71 | 97.28 | 92.86 | 88.44 |
| | 64124 | .3937 | | 10.000 | 10.0 | 70 | 25 | - | - | - | 68.70 | 65.71 | 62.73 | 59.74 |
| | 64126 | .3937 | | 10.000 | 10.0 | 70 | 25 | 0.50 | - | - | 75.83 | 72.53 | 69.24 | 65.94 |
| | 64128 | .3937 | | 10.000 | 10.0 | 70 | 25 | 1.00 | - | - | 75.83 | 72.53 | 69.24 | 65.94 |
| | 64130 | .4724 | | 12.000 | 12.0 | 75 | 26 | - | - | - | 82.48 | 78.89 | 75.31 | 71.72 |
| | 64132 | .4724 | | 12.000 | 12.0 | 75 | 26 | 0.50 | - | - | 100.42 | 96.05 | 91.69 | 87.32 |
| | 64134 | .4724 | | 12.000 | 12.0 | 75 | 26 | 1.00 | - | - | 100.42 | 96.05 | 91.69 | 87.32 |
| | 64136 | .4724 | | 12.000 | 12.0 | 75 | 32 | - | - | - | 82.48 | 78.89 | 75.31 | 71.72 |
| | 64138 | .4724 | | 12.000 | 12.0 | 75 | 32 | 0.50 | - | - | 100.42 | 96.05 | 91.69 | 87.32 |
| | 64140 | .4724 | | 12.000 | 12.0 | 75 | 32 | 1.00 | - | - | 100.42 | 96.05 | 91.69 | 87.32 |
| | 64141 | .4724 | | 12.000 | 12.0 | 100 | 42 | 1.00 | - | - | 121.80 | 116.50 | 111.21 | 105.91 |
| | 64142 | .4724 | | 12.000 | 12.0 | 100 | 50 | - | - | - | 110.76 | 105.94 | 101.13 | 96.31 |
| | 64144 | .4724 | | 12.000 | 12.0 | 100 | 50 | 0.50 | - | - | 121.80 | 116.50 | 111.21 | 105.91 |
| | 64146 | .4724 | | 12.000 | 12.0 | 100 | 50 | 1.00 | - | - | 121.80 | 116.50 | 111.21 | 105.91 |



† *Metric equivalents are for reference only*

| | EDP# | $d_1$ † Diameter Decimal | Diameter | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | $r$ Corner Radius | $l_3$ Reach Length | $d_3$ Neck Diameter | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 64218 | .5000 | 1/2" | 12.700 | 1/2" | 2-1/2" | 5/8" | - | - | - | 77.07 | 73.72 | 70.37 | 67.02 |
| | 64220 | .5000 | 1/2" | 12.700 | 1/2" | 2-1/2" | 5/8" | .015" | - | - | 89.80 | 85.90 | 81.99 | 78.09 |
| | 64222 | .5000 | 1/2" | 12.700 | 1/2" | 2-1/2" | 5/8" | .030" | - | - | 89.80 | 85.90 | 81.99 | 78.09 |
| | 64223 | .5000 | 1/2" | 12.700 | 1/2" | 2-1/2" | 5/8" | .060" | - | - | 89.80 | 85.90 | 81.99 | 78.09 |
| | 64224 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1" | - | - | - | 80.10 | 76.62 | 73.13 | 69.65 |
| | 64226 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1" | .015" | - | - | 97.27 | 93.04 | 88.81 | 84.58 |
| | 64228 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1" | .030" | - | - | 97.27 | 93.04 | 88.81 | 84.58 |
| | 64148 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1-1/4" | - | - | - | 80.10 | 76.62 | 73.13 | 69.65 |
| | 64150 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1-1/4" | .015" | - | - | 97.27 | 93.04 | 88.81 | 84.58 |
| | 64152 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1-1/4" | .020" | - | - | 97.27 | 93.04 | 88.81 | 84.58 |
| | 64154 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1-1/4" | .030" | - | - | 97.27 | 93.04 | 88.81 | 84.58 |
| | 64156 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1-1/4" | .060" | - | - | 97.27 | 93.04 | 88.81 | 84.58 |
| | 64157 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1-1/4" | .125" | - | - | 97.27 | 93.04 | 88.81 | 84.58 |
| | 64158 | .5000 | 1/2" | 12.700 | 1/2" | 3-1/2" | 1-1/2" | - | - | - | 104.17 | 99.64 | 95.11 | 90.58 |
| | 64160 | .5000 | 1/2" | 12.700 | 1/2" | 3-1/2" | 1-1/2" | .030" | - | - | 114.82 | 109.82 | 104.83 | 99.84 |
| | 64161 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 5/8" | .015" | 2-1/8" | .475" | 128.62 | 123.02 | 117.43 | 111.84 |
| | 64242 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 1-5/8" | - | - | - | 106.87 | 102.22 | 97.58 | 92.93 |
| | 64244 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 1-5/8" | .015" | - | - | 117.52 | 112.41 | 107.30 | 102.19 |
| | 64162 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 2" | - | - | - | 106.87 | 102.22 | 97.58 | 92.93 |
| | 64163 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 2" | .015" | - | - | 117.52 | 112.41 | 107.30 | 102.19 |
| | 64164 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 2" | .030" | - | - | 117.52 | 112.41 | 107.30 | 102.19 |
| | 64165 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 2" | .125" | - | - | 117.52 | 112.41 | 107.30 | 102.19 |
| NEW | 64248 | .5512 | | 14.000 | 14.0 | 88 | 32 | 0.50 | - | - | 143.31 | 137.08 | 130.85 | 124.62 |
| | 64166 | .6250 | 5/8" | 15.875 | 5/8" | 3-1/2" | 1-1/4" | - | - | - | 135.99 | 130.08 | 124.16 | 118.25 |
| | 64168 | .6250 | 5/8" | 15.875 | 5/8" | 3-1/2" | 1-1/4" | .030" | - | - | 148.65 | 142.19 | 135.72 | 129.26 |
| | 64170 | .6250 | 5/8" | 15.875 | 5/8" | 3-1/2" | 1-1/4" | .060" | - | - | 148.65 | 142.19 | 135.72 | 129.26 |
| NEW | 64171 | .6250 | 5/8" | 15.875 | 5/8" | 3-1/2" | 1-1/4" | .120" | - | - | 148.65 | 142.19 | 135.72 | 129.26 |
| | 64172 | .6250 | 5/8" | 15.875 | 5/8" | 4" | 1-3/4" | - | - | - | 143.18 | 136.95 | 130.73 | 124.50 |
| | 64174 | .6250 | 5/8" | 15.875 | 5/8" | 4" | 1-3/4" | .030" | - | - | 156.71 | 149.90 | 143.08 | 136.27 |
| | 64176 | .6250 | 5/8" | 15.875 | 5/8" | 4" | 1-3/4" | .060" | - | - | 156.71 | 149.90 | 143.08 | 136.27 |
| | 64177 | .6250 | 5/8" | 15.875 | 5/8" | 4" | 1-3/4" | .120" | - | - | 156.71 | 149.90 | 143.08 | 136.27 |
| | 64250 | .6250 | 5/8" | 15.875 | 5/8" | 4" | 2" | .120" | - | - | 156.71 | 149.90 | 143.08 | 136.27 |
| | 64178 | .6299 | | 16.000 | 16.0 | 88 | 32 | - | - | - | 145.51 | 139.18 | 132.86 | 126.53 |
| | 64180 | .6299 | | 16.000 | 16.0 | 88 | 32 | 0.50 | - | - | 158.64 | 151.75 | 144.85 | 137.95 |
| | 64182 | .6299 | | 16.000 | 16.0 | 88 | 32 | 1.00 | - | - | 158.64 | 151.75 | 144.85 | 137.95 |
| | 64230 | .6299 | | 16.000 | 16.0 | 88 | 32 | 2.00 | - | - | 158.64 | 151.75 | 144.85 | 137.95 |
| | 64231 | .6299 | | 16.000 | 16.0 | 100 | 40 | 1.00 | - | - | 166.49 | 159.25 | 152.01 | 144.77 |
| | 64232 | .6299 | | 16.000 | 16.0 | 100 | 40 | 1.50 | - | - | 166.49 | 159.25 | 152.01 | 144.77 |
| | 64234 | .6299 | | 16.000 | 16.0 | 125 | 65 | 0.50 | - | - | 209.33 | 200.23 | 191.13 | 182.03 |
| | 64236 | .6299 | | 16.000 | 16.0 | 125 | 65 | 3.00 | - | - | 209.33 | 200.23 | 191.13 | 182.03 |
| | 64252 | .7500 | 3/4" | 19.050 | 3/4" | 3" | 1" | - | - | - | 176.90 | 169.21 | 161.52 | 153.83 |
| | 64254 | .7500 | 3/4" | 19.050 | 3/4" | 3" | 1" | .030" | - | - | 195.07 | 186.59 | 178.11 | 169.63 |
| | 64184 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-1/2" | - | - | - | 186.22 | 178.12 | 170.03 | 161.93 |
| | 64186 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-1/2" | .030" | - | - | 204.72 | 195.82 | 186.92 | 178.02 |
| | 64188 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-1/2" | .060" | - | - | 204.72 | 195.82 | 186.92 | 178.02 |
| | 64190 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-1/2" | .120" | - | - | 204.72 | 195.82 | 186.92 | 178.02 |
| | 64256 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-3/4" | - | - | - | 186.23 | 178.13 | 170.04 | 161.94 |
| | 64258 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-3/4" | .030" | - | - | 204.72 | 195.82 | 186.92 | 178.02 |
| | 64260 | .7500 | 3/4" | 19.050 | 3/4" | 5" | 1" | .030" | 3" | .730" | 288.37 | 275.84 | 263.30 | 250.76 |




*continued* →

## Series VX-7 *(continued)*

.7500" - 1.0000"
(19.050mm - 25.400mm)

| | EDP# | $d_1$ † Diameter Decimal | Diameter | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | $r$ Corner Radius | $l_3$ Reach Length | $d_3$ Neck Diameter | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 64192 | .7500 | 3/4" | 19.050 | 3/4" | 5" | 2-1/4" | - | - | - | 245.23 | 234.56 | 223.90 | 213.24 |
| | 64194 | .7500 | 3/4" | 19.050 | 3/4" | 5" | 2-1/4" | .030" | - | - | 277.27 | 265.21 | 253.16 | 241.10 |
| | 64238 | .7500 | 3/4" | 19.050 | 3/4" | 5" | 2-1/4" | .060" | - | - | 277.27 | 265.21 | 253.16 | 241.10 |
| NEW | 64262 | .7500 | 3/4" | 19.050 | 3/4" | 5" | 2-1/4" | .120" | - | - | 277.27 | 265.21 | 253.16 | 241.10 |
| NEW | 64264 | .7500 | 3/4" | 19.050 | 3/4" | 5" | 2-1/2" | .060" | - | - | 277.27 | 265.21 | 253.16 | 241.10 |
| | 64266 | .7500 | 3/4" | 19.050 | 3/4" | 6" | 1-1/8" | .120" | 3-5/8" | .730" | 336.93 | 322.28 | 307.63 | 292.98 |
| | 64196 | .7500 | 3/4" | 19.050 | 3/4" | 6" | 3-1/4" | - | - | - | 287.04 | 274.56 | 262.08 | 249.60 |
| | 64198 | .7500 | 3/4" | 19.050 | 3/4" | 6" | 3-1/4" | .030" | - | - | 325.81 | 311.64 | 297.48 | 283.31 |
| | 64200 | .7874 | | 20.000 | 20.0 | 100 | 38 | - | - | - | 249.19 | 238.36 | 227.52 | 216.69 |
| | 64202 | .7874 | | 20.000 | 20.0 | 100 | 38 | 0.50 | - | - | 285.07 | 272.68 | 260.28 | 247.89 |
| | 64204 | .7874 | | 20.000 | 20.0 | 100 | 38 | 1.00 | - | - | 285.07 | 272.68 | 260.28 | 247.89 |
| | 64206 | 1.000 | 1" | 25.400 | 1" | 4" | 1-1/2" | - | - | - | 270.81 | 259.04 | 247.26 | 235.49 |
| | 64208 | 1.000 | 1" | 25.400 | 1" | 4" | 1-1/2" | .030" | - | - | 334.04 | 319.52 | 304.99 | 290.47 |
| | 64240 | 1.000 | 1" | 25.400 | 1" | 4" | 1-1/2" | .125" | - | - | 334.05 | 319.53 | 305.00 | 290.48 |
| | 64210 | 1.000 | 1" | 25.400 | 1" | 5" | 2" | - | - | - | 353.38 | 338.02 | 322.65 | 307.29 |
| | 64212 | 1.000 | 1" | 25.400 | 1" | 5" | 2-1/2" | - | - | - | 353.38 | 338.02 | 322.65 | 307.29 |
| | 64213 | 1.000 | 1" | 25.400 | 1" | 5" | 2-1/2" | .030" | - | - | 406.56 | 388.88 | 371.21 | 353.53 |
| | 64214 | 1.000 | 1" | 25.400 | 1" | 6" | 3-1/4" | - | - | - | 450.47 | 430.88 | 411.30 | 391.71 |
| | 64216 | 1.000 | 1" | 25.400 | 1" | 6" | 3-1/4" | .030" | - | - | 515.95 | 493.52 | 471.08 | 448.65 |



MATERIAL HARDNESS (Rc)
70
35
0

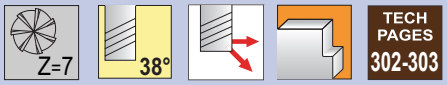


† *Metric equivalents are for reference only*

| TOLERANCES | |
|---|---|
| $d_1$ | +.000" –.002" (+.000mm –.050mm) |
| $d_2$ | h6 |
| $r$ | +.001" –.001" (+.025 –.025mm) |

# HIGH EFFICIENCY MILLING

## Series VX-7C - Chip Splitter



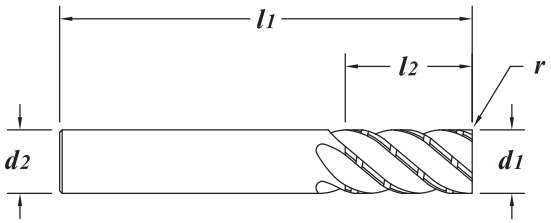

Recommended for titanium, stainless, and tool steels under 45Rc

## Seven-Flute End Mill

**BALIQ® ALCRONOS Coating (AlCrN-Based)**

Solid submicron grain carbide end mill - non-center cutting
Chip splitter to help break long chips
Engineered for High Efficiency Milling
Multiple flutes for increased feed rates
Staggered flute geometry
PCT (Polish Carbide Treatment) enhances tool life
Up to 15% Radial (ae) engagement






| EDP# | $d_1$ † Diameter Decimal | Diameter | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | $r$ Corner Radius | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 64300 | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 1" | - | 65.50 | 62.66 | 59.81 | 56.96 |
| 64302 | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 1" | .020" | 71.08 | 67.99 | 64.90 | 61.81 |
| 64304 | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 1" | .030" | 71.08 | 67.99 | 64.90 | 61.81 |
| 64310 | .4724 | | 12.000 | 12.0 | 100 | 50 | 0.50 | 130.35 | 124.69 | 119.02 | 113.35 |
| 64316 | .5000 | 1/2" | 12.700 | 1/2" | 2-1/2" | 5/8" | .030" | 98.35 | 94.07 | 89.80 | 85.52 |
| 64318 | .5000 | 1/2" | 12.700 | 1/2" | 2-1/2" | 5/8" | .060" | 98.35 | 94.07 | 89.80 | 85.52 |
| 64322 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1" | .030" | 105.81 | 101.21 | 96.61 | 92.01 |
| 64330 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1-1/4" | .030" | 105.81 | 101.21 | 96.61 | 92.01 |
| 64332 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1-1/4" | .060" | 105.81 | 101.21 | 96.61 | 92.01 |
| 64338 | .5000 | 1/2" | 12.700 | 1/2" | 3-1/2" | 1-1/2" | - | 112.71 | 107.81 | 102.91 | 98.01 |
| 64342 | .5000 | 1/2" | 12.700 | 1/2" | 3-1/2" | 1-1/2" | .030" | 123.36 | 118.00 | 112.63 | 107.27 |
| 64346 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 2" | - | 115.41 | 110.40 | 105.38 | 100.36 |
| 64348 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 2" | .030" | 126.06 | 120.58 | 115.10 | 109.62 |
| 64352 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 2" | .125" | 126.06 | 120.58 | 115.10 | 109.62 |
| 64360 | .6250 | 5/8" | 15.875 | 5/8" | 4" | 1-3/4" | - | 153.43 | 146.76 | 140.09 | 133.42 |
| 64364 | .6250 | 5/8" | 15.875 | 5/8" | 4" | 1-3/4" | .030" | 166.96 | 159.70 | 152.44 | 145.18 |
| 64368 | .6299 | | 16.000 | 16.0 | 100 | 40 | 0.75 | 176.73 | 169.05 | 161.36 | 153.68 |
| 64369 | .6299 | | 16.000 | 16.0 | 100 | 40 | 1.00 | 176.73 | 169.05 | 161.36 | 153.68 |
| 64372 | .6299 | | 16.000 | 16.0 | 100 | 50 | 1.00 | 176.73 | 169.05 | 161.36 | 153.68 |
| 64380 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-1/2" | .030" | 215.41 | 206.04 | 196.68 | 187.31 |
| 64386 | .7500 | 3/4" | 19.050 | 3/4" | 6" | 3-1/4" | .030" | 336.48 | 321.85 | 307.22 | 292.59 |
| 64389 | .7874 | | 20.000 | 20.0 | 100 | 38 | 0.50 | 297.88 | 284.93 | 271.98 | 259.03 |
| 64400 | 1.000 | 1" | 25.400 | 1" | 5" | 2-1/2" | .030" | 419.38 | 401.15 | 382.91 | 364.68 |

# Series VRX

NEW ITEMS

.0591" - .1181"
(1.500mm - 3.000mm)

Z=4 | 41° | TECH PAGES 294-295

| TOLERANCES | |
|---|---|
| $d_1$ | +.000" –.002" (+.000mm –.050mm) |
| $d_2$ | h6 |
| $r$ | +.001" –.001" (+.025 –.025mm) |

Recommended for inconel, pH materials, titanium and tool steels >40Rc



## Square End, Corner Radius, Ball End

### AlTiN Coating

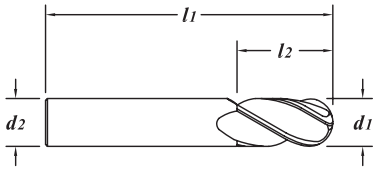
Solid submicron grain carbide end mill - center cutting

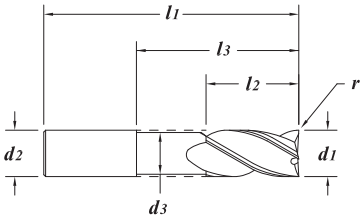
Excellent for High Efficiency Milling

Reduces vibration for more aggressive machining resulting in less cycle times and greater productivity

Staggered flute geometry

*The combination of an extended flute length with a weldon flat may cause the flute washout to reach inside some end mill holders*




MATERIAL HARDNESS (Rc)
70
35
0

| EDP# (plain) | EDP# (weldon) | $d_1$ † Diameter Decimal | Diameter | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | $r$ Corner Radius | $l_3$ Reach Length | $d_3$ Neck Diameter | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 61084 | - | .0591 | | 1.500 | 3.0 | 38 | 3.0 | - | - | - | 15.08 | 14.42 | 13.77 | 13.11 |
| 61086 | - | .0591 | | 1.500 | 3.0 | 38 | 3.0 | 0.20 | - | - | 17.10 | 16.36 | 15.61 | 14.87 |
| 61088 | - | .0591 | | 1.500 | 3.0 | 38 | 3.0 | BALL | - | - | 17.10 | 16.36 | 15.61 | 14.87 |
| 61090 | - | .0591 | | 1.500 | 3.0 | 38 | 6.0 | - | - | - | 15.08 | 14.42 | 13.77 | 13.11 |
| 61092 | - | .0591 | | 1.500 | 3.0 | 38 | 6.0 | 0.20 | - | - | 17.10 | 16.36 | 15.61 | 14.87 |
| 61094 | - | .0591 | | 1.500 | 3.0 | 38 | 6.0 | BALL | - | - | 17.10 | 16.36 | 15.61 | 14.87 |
| 61096 | - | .0625 | 1/16" | 1.588 | 1/8" | 1-1/2" | 1/8" | - | - | - | 14.21 | 13.60 | 12.98 | 12.36 |
| 61098 | - | .0625 | 1/16" | 1.588 | 1/8" | 1-1/2" | 1/8" | .010" | - | - | 16.11 | 15.41 | 14.71 | 14.01 |
| 61100 | - | .0625 | 1/16" | 1.588 | 1/8" | 1-1/2" | 1/8" | BALL | - | - | 16.11 | 15.41 | 14.71 | 14.01 |
| 61102 | - | .0625 | 1/16" | 1.588 | 1/8" | 1-1/2" | 1/4" | - | - | - | 14.21 | 13.60 | 12.98 | 12.36 |
| 61104 | - | .0625 | 1/16" | 1.588 | 1/8" | 1-1/2" | 1/4" | .010" | - | - | 16.11 | 15.41 | 14.71 | 14.01 |
| 61106 | - | .0625 | 1/16" | 1.588 | 1/8" | 1-1/2" | 1/4" | BALL | - | - | 16.11 | 15.41 | 14.71 | 14.01 |
| 61108 | - | .0787 | | 2.000 | 3.0 | 38 | 4.0 | - | - | - | 14.21 | 13.60 | 12.98 | 12.36 |
| 61110 | - | .0787 | | 2.000 | 3.0 | 38 | 4.0 | 0.20 | - | - | 16.11 | 15.41 | 14.71 | 14.01 |
| 61112 | - | .0787 | | 2.000 | 3.0 | 38 | 4.0 | BALL | - | - | 16.11 | 15.41 | 14.71 | 14.01 |
| 61114 | - | .0787 | | 2.000 | 3.0 | 38 | 8.0 | - | - | - | 14.21 | 13.60 | 12.98 | 12.36 |
| 61116 | - | .0787 | | 2.000 | 3.0 | 38 | 8.0 | 0.20 | - | - | 16.11 | 15.41 | 14.71 | 14.01 |
| 61118 | - | .0787 | | 2.000 | 3.0 | 38 | 8.0 | BALL | - | - | 16.11 | 15.41 | 14.71 | 14.01 |
| 61120 | - | .0938 | 3/32" | 2.383 | 1/8" | 1-1/2" | 3/16" | - | - | - | 13.57 | 12.98 | 12.39 | 11.80 |
| 61122 | - | .0938 | 3/32" | 2.383 | 1/8" | 1-1/2" | 3/16" | .010" | - | - | 15.53 | 14.85 | 14.18 | 13.50 |
| 61124 | - | .0938 | 3/32" | 2.383 | 1/8" | 1-1/2" | 3/16" | BALL | - | - | 15.53 | 14.85 | 14.18 | 13.50 |
| 61126 | - | .0938 | 3/32" | 2.383 | 1/8" | 1-1/2" | 3/8" | - | - | - | 13.57 | 12.98 | 12.39 | 11.80 |
| 61128 | - | .0938 | 3/32" | 2.383 | 1/8" | 1-1/2" | 3/8" | .010" | - | - | 15.53 | 14.85 | 14.18 | 13.50 |
| 61130 | - | .0938 | 3/32" | 2.383 | 1/8" | 1-1/2" | 3/8" | BALL | - | - | 15.53 | 14.85 | 14.18 | 13.50 |
| 61877 | - | .1181 | | 3.000 | 3.0 | 38 | 8 | - | - | - | 12.75 | 12.20 | 11.64 | 11.09 |
| 27420 | - | .1181 | | 3.000 | 3.0 | 50 | 8 | 0.20 | - | - | 14.34 | 13.72 | 13.09 | 12.47 |
| 61132 | - | .1181 | | 3.000 | 3.0 | 50 | 8 | 0.30 | - | - | 14.34 | 13.72 | 13.09 | 12.47 |
| 27425 | - | .1181 | | 3.000 | 3.0 | 50 | 8 | 0.50 | - | - | 14.34 | 13.72 | 13.09 | 12.47 |
| 61134 | - | .1181 | | 3.000 | 3.0 | 50 | 8 | BALL | - | - | 14.34 | 13.72 | 13.09 | 12.47 |
| 61887 | - | .1181 | | 3.000 | 3.0 | 38 | 12 | - | - | - | 12.75 | 12.20 | 11.64 | 11.09 |
| 27430 | - | .1181 | | 3.000 | 3.0 | 50 | 12 | 0.20 | - | - | 14.34 | 13.72 | 13.09 | 12.47 |
| 61136 | - | .1181 | | 3.000 | 3.0 | 50 | 12 | 0.30 | - | - | 14.34 | 13.72 | 13.09 | 12.47 |
| 27435 | - | .1181 | | 3.000 | 3.0 | 50 | 12 | 0.50 | - | - | 14.34 | 13.72 | 13.09 | 12.47 |
| 61138 | - | .1181 | | 3.000 | 3.0 | 50 | 12 | BALL | - | - | 14.34 | 13.72 | 13.09 | 12.47 |



† *Metric equivalents are for reference only*

| EDP# (plain) | EDP# (weldon) | *d1* † Diameter Decimal | *d1* † Diameter | Metric | *d2* Shank Diameter | *l1* Overall Length | *l2* Flute Length | *r* Corner Radius | *l3* Reach Length | *d3* Neck Diameter | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 61917 | - | .1250 | 1/8" | 3.175 | 1/8" | 1-1/2" | 1/4" | - | - | - | 12.75 | 12.20 | 11.64 | 11.09 |
| 27440 | - | .1250 | 1/8" | 3.175 | 1/8" | 1-1/2" | 1/4" | .010" | - | - | 14.34 | 13.72 | 13.09 | 12.47 |
| 61140 | - | .1250 | 1/8" | 3.175 | 1/8" | 1-1/2" | 1/4" | .015" | - | - | 14.34 | 13.72 | 13.09 | 12.47 |
| 61073 | | .1250 | 1/8" | 3.175 | 1/8" | 1-1/2" | 1/4" | .030" | - | - | 14.34 | 13.72 | 13.09 | 12.47 |
| 61142 | - | .1250 | 1/8" | 3.175 | 1/8" | 1-1/2" | 1/4" | BALL | - | - | 14.34 | 13.72 | 13.09 | 12.47 |
| 61144 | - | .1250 | 1/8" | 3.175 | 1/8" | 1-1/2" | 3/8" | - | - | - | 12.75 | 12.20 | 11.64 | 11.09 |
| 61146 | - | .1250 | 1/8" | 3.175 | 1/8" | 1-1/2" | 3/8" | .010" | - | - | 14.34 | 13.72 | 13.09 | 12.47 |
| 61148 | - | .1250 | 1/8" | 3.175 | 1/8" | 1-1/2" | 3/8" | .015" | - | - | 14.34 | 13.72 | 13.09 | 12.47 |
| 61074 | | .1250 | 1/8" | 3.175 | 1/8" | 1-1/2" | 3/8" | .030" | - | - | 14.34 | 13.72 | 13.09 | 12.47 |
| 61149 | - | .1250 | 1/8" | 3.175 | 1/8" | 1-1/2" | 3/8" | BALL | - | - | 14.34 | 13.72 | 13.09 | 12.47 |
| 61927 | - | .1250 | 1/8" | 3.175 | 1/8" | 1-1/2" | 1/2" | - | - | - | 12.75 | 12.20 | 11.64 | 11.09 |
| 27450 | - | .1250 | 1/8" | 3.175 | 1/8" | 1-1/2" | 1/2" | .010" | - | - | 14.34 | 13.72 | 13.09 | 12.47 |
| 61150 | - | .1250 | 1/8" | 3.175 | 1/8" | 1-1/2" | 1/2" | .015" | - | - | 14.34 | 13.72 | 13.09 | 12.47 |
| 27455 | - | .1250 | 1/8" | 3.175 | 1/8" | 1-1/2" | 1/2" | .020" | - | - | 14.34 | 13.72 | 13.09 | 12.47 |
| 61075 | | .1250 | 1/8" | 3.175 | 1/8" | 1-1/2" | 1/2" | .030" | - | - | 14.34 | 13.72 | 13.09 | 12.47 |
| 61152 | - | .1250 | 1/8" | 3.175 | 1/8" | 1-1/2" | 1/2" | BALL | - | - | 14.34 | 13.72 | 13.09 | 12.47 |
| 61154 | - | .1562 | 5/32" | 3.967 | 3/16" | 2" | 5/16" | - | - | - | 16.80 | 16.07 | 15.34 | 14.61 |
| 27460 | - | .1562 | 5/32" | 3.967 | 3/16" | 2" | 5/16" | .010" | - | - | 19.77 | 18.91 | 18.05 | 17.19 |
| 61156 | - | .1562 | 5/32" | 3.967 | 3/16" | 2" | 5/16" | .015" | - | - | 19.77 | 18.91 | 18.05 | 17.19 |
| 61076 | | .1562 | 5/32" | 3.967 | 3/16" | 2" | 5/16" | .030" | - | - | 19.77 | 18.91 | 18.05 | 17.19 |
| 61077 | | .1562 | 5/32" | 3.967 | 3/16" | 2" | 5/16" | BALL | - | - | 19.77 | 18.91 | 18.05 | 17.19 |
| 61158 | - | .1562 | 5/32" | 3.967 | 3/16" | 2" | 1/2" | - | - | - | 16.80 | 16.07 | 15.34 | 14.61 |
| 27470 | - | .1562 | 5/32" | 3.967 | 3/16" | 2" | 1/2" | .010" | - | - | 19.77 | 18.91 | 18.05 | 17.19 |
| 61160 | - | .1562 | 5/32" | 3.967 | 3/16" | 2" | 1/2" | .015" | - | - | 19.77 | 18.91 | 18.05 | 17.19 |
| 61078 | | .1562 | 5/32" | 3.967 | 3/16" | 2" | 1/2" | .030" | - | - | 19.77 | 18.91 | 18.05 | 17.19 |
| 61079 | | .1562 | 5/32" | 3.967 | 3/16" | 2" | 1/2" | BALL | - | - | 19.77 | 18.91 | 18.05 | 17.19 |
| 61162 | - | .1575 | | 4.000 | 6.0 | 50 | 8 | - | - | - | 23.93 | 22.89 | 21.85 | 20.81 |
| 27480 | - | .1575 | | 4.000 | 6.0 | 50 | 8 | 0.30 | - | - | 24.30 | 23.24 | 22.19 | 21.13 |
| 61164 | - | .1575 | | 4.000 | 6.0 | 50 | 8 | 0.50 | - | - | 24.30 | 23.24 | 22.19 | 21.13 |
| 28470 | - | .1575 | | 4.000 | 6.0 | 50 | 8 | BALL | - | - | 24.30 | 23.24 | 22.19 | 21.13 |
| 61977 | - | .1575 | | 4.000 | 6.0 | 50 | 12 | - | - | - | 23.93 | 22.89 | 21.85 | 20.81 |
| 27490 | - | .1575 | | 4.000 | 6.0 | 50 | 12 | 0.30 | - | - | 24.30 | 23.24 | 22.19 | 21.13 |
| 27495 | - | .1575 | | 4.000 | 6.0 | 50 | 12 | 0.50 | - | - | 24.30 | 23.24 | 22.19 | 21.13 |
| 28480 | - | .1575 | | 4.000 | 6.0 | 50 | 12 | BALL | - | - | 24.30 | 23.24 | 22.19 | 21.13 |
| 61166 | - | .1575 | | 4.000 | 6.0 | 65 | 19 | - | - | - | 26.54 | 25.39 | 24.23 | 23.08 |
| 61168 | - | .1575 | | 4.000 | 6.0 | 65 | 19 | 0.30 | - | - | 26.93 | 25.76 | 24.59 | 23.42 |
| 62007 | - | .1875 | 3/16" | 4.763 | 3/16" | 2" | 5/16" | - | - | - | 16.08 | 15.38 | 14.68 | 13.98 |
| 27500 | - | .1875 | 3/16" | 4.763 | 3/16" | 2" | 5/16" | .010" | - | - | 18.01 | 17.23 | 16.44 | 15.66 |
| 61170 | - | .1875 | 3/16" | 4.763 | 3/16" | 2" | 5/16" | .015" | - | - | 18.01 | 17.23 | 16.44 | 15.66 |
| 61172 | - | .1875 | 3/16" | 4.763 | 3/16" | 2" | 5/16" | .020" | - | - | 18.01 | 17.23 | 16.44 | 15.66 |
| 28490 | - | .1875 | 3/16" | 4.763 | 3/16" | 2" | 5/16" | BALL | - | - | 18.01 | 17.23 | 16.44 | 15.66 |
| 61174 | - | .1875 | 3/16" | 4.763 | 3/16" | 2" | 7/16" | - | - | - | 16.08 | 15.38 | 14.68 | 13.98 |
| 61176 | - | .1875 | 3/16" | 4.763 | 3/16" | 2" | 7/16" | .010" | - | - | 18.01 | 17.23 | 16.44 | 15.66 |
| 61178 | - | .1875 | 3/16" | 4.763 | 3/16" | 2" | 7/16" | .015" | - | - | 18.01 | 17.23 | 16.44 | 15.66 |
| 62017 | - | .1875 | 3/16" | 4.763 | 3/16" | 2" | 9/16" | - | - | - | 16.08 | 15.38 | 14.68 | 13.98 |
| 27520 | - | .1875 | 3/16" | 4.763 | 3/16" | 2" | 9/16" | .010" | - | - | 18.01 | 17.23 | 16.44 | 15.66 |
| 61180 | - | .1875 | 3/16" | 4.763 | 3/16" | 2" | 9/16" | .015" | - | - | 18.01 | 17.23 | 16.44 | 15.66 |
| 27521 | - | .1875 | 3/16" | 4.763 | 3/16" | 2" | 9/16" | .020" | - | - | 18.01 | 17.23 | 16.44 | 15.66 |
| 61182 | - | .1875 | 3/16" | 4.763 | 3/16" | 2" | 9/16" | .030" | - | - | 18.01 | 17.23 | 16.44 | 15.66 |
| 28500 | - | .1875 | 3/16" | 4.763 | 3/16" | 2" | 9/16" | BALL | - | - | 18.01 | 17.23 | 16.44 | 15.66 |
| 61184 | - | .1875 | 3/16" | 4.763 | 3/16" | 3" | 1" | .010" | - | - | 30.82 | 29.48 | 28.14 | 26.80 |
| 61186 | - | .1875 | 3/16" | 4.763 | 3/16" | 3" | 1-1/4" | .010" | - | - | 30.82 | 29.48 | 28.14 | 26.80 |
| 63100 | - | .1875 | 3/16" | 4.763 | 3/16" | 4" | 5/16" | .010" | - | - | 33.55 | 32.09 | 30.63 | 29.17 |
| 61188 | - | .1969 | | 5.000 | 6.0 | 50 | 10 | - | - | - | 23.44 | 22.42 | 21.40 | 20.38 |
| 27522 | - | .1969 | | 5.000 | 6.0 | 50 | 10 | 0.30 | - | - | 23.82 | 22.78 | 21.75 | 20.71 |
| 61190 | - | .1969 | | 5.000 | 6.0 | 50 | 10 | 0.50 | - | - | 23.82 | 22.78 | 21.75 | 20.71 |
| 28510 | - | .1969 | | 5.000 | 6.0 | 50 | 10 | BALL | - | - | 23.82 | 22.78 | 21.75 | 20.71 |

*continued* →

# Series VRX *(continued)*

.1969" - .2500"
(5.000mm - 6.350mm)

| EDP# (plain) | EDP# (weldon) | $d_1$ † Diameter Decimal | Diameter | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | $r$ Corner Radius | $l_3$ Reach Length | $d_3$ Neck Diameter | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 62057 | - | .1969 | | 5.000 | 6.0 | 65 | 15 | - | - | - | 25.60 | 24.49 | 23.37 | 22.26 |
| 27524 | - | .1969 | | 5.000 | 6.0 | 65 | 15 | 0.30 | - | - | 26.38 | 25.23 | 24.09 | 22.94 |
| 27526 | - | .1969 | | 5.000 | 6.0 | 65 | 15 | 0.50 | - | - | 26.38 | 25.23 | 24.09 | 22.94 |
| 27528 | - | .1969 | | 5.000 | 6.0 | 65 | 15 | 1.00 | - | - | 26.38 | 25.23 | 24.09 | 22.94 |
| 28520 | - | .1969 | | 5.000 | 6.0 | 65 | 15 | BALL | - | - | 26.38 | 25.23 | 24.09 | 22.94 |
| 63110 | - | .1969 | | 5.000 | 6.0 | 100 | 10 | 0.30 | - | - | 50.55 | 48.36 | 46.16 | 43.96 |
| 61192 | - | .1969 | | 5.000 | 6.0 | 100 | 10 | 0.30 | 55 | 4.70 | 59.20 | 56.63 | 54.05 | 51.48 |
| 61194 | - | .2188 | 7/32" | 5.558 | 1/4" | 2" | 3/8" | - | - | - | 19.76 | 18.90 | 18.04 | 17.18 |
| 61196 | - | .2188 | 7/32" | 5.558 | 1/4" | 2" | 3/8" | .010" | - | - | 22.91 | 21.91 | 20.92 | 19.92 |
| 27525 | - | .2188 | 7/32" | 5.558 | 1/4" | 2" | 3/8" | .015" | - | - | 22.91 | 21.91 | 20.92 | 19.92 |
| 61198 | - | .2188 | 7/32" | 5.558 | 1/4" | 2" | 3/8" | BALL | - | - | 22.91 | 21.91 | 20.92 | 19.92 |
| 61200 | - | .2188 | 7/32" | 5.558 | 1/4" | 2-1/2" | 3/4" | - | - | - | 22.43 | 21.45 | 20.48 | 19.50 |
| 61202 | - | .2188 | 7/32" | 5.558 | 1/4" | 2-1/2" | 3/4" | .010" | - | - | 25.40 | 24.30 | 23.19 | 22.09 |
| 27530 | - | .2188 | 7/32" | 5.558 | 1/4" | 2-1/2" | 3/4" | .015" | - | - | 25.40 | 24.30 | 23.19 | 22.09 |
| 61204 | - | .2188 | 7/32" | 5.558 | 1/4" | 2-1/2" | 3/4" | .020" | - | - | 25.40 | 24.30 | 23.19 | 22.09 |
| 61206 | - | .2188 | 7/32" | 5.558 | 1/4" | 2-1/2" | 3/4" | BALL | - | - | 25.40 | 24.30 | 23.19 | 22.09 |
| 61208 | - | .2188 | 7/32" | 5.558 | 1/4" | 3" | 1-1/4" | .015" | - | - | 37.65 | 36.01 | 34.38 | 32.74 |
| 63120 | - | .2188 | 7/32" | 5.558 | 1/4" | 4" | 3/8" | .015" | - | - | 48.82 | 46.70 | 44.57 | 42.45 |
| 61210 | - | .2188 | 7/32" | 5.558 | 1/4" | 4" | 3/8" | .015" | 2-1/4" | .205" | 57.47 | 54.97 | 52.47 | 49.97 |
| 62077 | - | .2362 | | 6.000 | 6.0 | 50 | 12 | - | - | - | 19.93 | 19.06 | 18.20 | 17.33 |
| 27535 | - | .2362 | | 6.000 | 6.0 | 50 | 12 | 0.30 | - | - | 23.05 | 22.04 | 21.04 | 20.04 |
| 61212 | - | .2362 | | 6.000 | 6.0 | 50 | 12 | 0.50 | - | - | 23.05 | 22.04 | 21.04 | 20.04 |
| 61214 | - | .2362 | | 6.000 | 6.0 | 50 | 12 | 0.75 | - | - | 23.05 | 22.04 | 21.04 | 20.04 |
| 28530 | - | .2362 | | 6.000 | 6.0 | 50 | 12 | BALL | - | - | 23.05 | 22.04 | 21.04 | 20.04 |
| 62087 | - | .2362 | | 6.000 | 6.0 | 65 | 19 | - | - | - | 22.46 | 21.48 | 20.51 | 19.53 |
| 61216 | - | .2362 | | 6.000 | 6.0 | 65 | 19 | 0.20 | - | - | 25.54 | 24.43 | 23.32 | 22.21 |
| 27540 | - | .2362 | | 6.000 | 6.0 | 65 | 19 | 0.30 | - | - | 25.54 | 24.43 | 23.32 | 22.21 |
| 27545 | - | .2362 | | 6.000 | 6.0 | 65 | 19 | 0.50 | - | - | 25.54 | 24.43 | 23.32 | 22.21 |
| 61218 | - | .2362 | | 6.000 | 6.0 | 65 | 19 | 0.75 | - | - | 25.54 | 24.43 | 23.32 | 22.21 |
| 27547 | - | .2362 | | 6.000 | 6.0 | 65 | 19 | 1.00 | - | - | 25.54 | 24.43 | 23.32 | 22.21 |
| 27548 | - | .2362 | | 6.000 | 6.0 | 65 | 19 | 1.50 | - | - | 25.54 | 24.43 | 23.32 | 22.21 |
| 28540 | - | .2362 | | 6.000 | 6.0 | 65 | 19 | BALL | - | - | 25.54 | 24.43 | 23.32 | 22.21 |
| 61220 | - | .2362 | | 6.000 | 6.0 | 75 | 26 | 0.30 | - | - | 38.00 | 36.34 | 34.69 | 33.04 |
| 61222 | - | .2362 | | 6.000 | 6.0 | 75 | 26 | 0.50 | - | - | 38.00 | 36.34 | 34.69 | 33.04 |
| 61224 | - | .2362 | | 6.000 | 6.0 | 75 | 38 | 0.30 | - | - | 38.00 | 36.34 | 34.69 | 33.04 |
| 61226 | - | .2362 | | 6.000 | 6.0 | 75 | 38 | 0.50 | - | - | 38.00 | 36.34 | 34.69 | 33.04 |
| 63130 | - | .2362 | | 6.000 | 6.0 | 100 | 12 | 0.30 | 32 | 5.70 | 49.29 | 47.15 | 45.00 | 42.86 |
| 62137 | - | .2500 | 1/4" | 6.350 | 1/4" | 2" | 3/8" | - | - | - | 19.12 | 18.29 | 17.46 | 16.63 |
| 61228 | - | .2500 | 1/4" | 6.350 | 1/4" | 2" | 3/8" | .010" | - | - | 21.32 | 20.39 | 19.47 | 18.54 |
| 27560 | - | .2500 | 1/4" | 6.350 | 1/4" | 2" | 3/8" | .015" | - | - | 22.17 | 21.21 | 20.24 | 19.28 |
| 61230 | - | .2500 | 1/4" | 6.350 | 1/4" | 2" | 3/8" | .020" | - | - | 22.17 | 21.21 | 20.24 | 19.28 |
| 28570 | - | .2500 | 1/4" | 6.350 | 1/4" | 2" | 3/8" | BALL | - | - | 22.17 | 21.21 | 20.24 | 19.28 |
| 61232 | - | .2500 | 1/4" | 6.350 | 1/4" | 2" | 1/2" | - | - | - | 19.12 | 18.29 | 17.46 | 16.63 |
| 61234 | - | .2500 | 1/4" | 6.350 | 1/4" | 2" | 1/2" | .015" | - | - | 22.17 | 21.21 | 20.24 | 19.28 |
| 62147 | - | .2500 | 1/4" | 6.350 | 1/4" | 2-1/2" | 3/4" | - | - | - | 21.69 | 20.75 | 19.80 | 18.86 |
| 27570 | - | .2500 | 1/4" | 6.350 | 1/4" | 2-1/2" | 3/4" | .010" | - | - | 24.56 | 23.50 | 22.43 | 21.36 |
| 27580 | - | .2500 | 1/4" | 6.350 | 1/4" | 2-1/2" | 3/4" | .015" | - | - | 24.56 | 23.50 | 22.43 | 21.36 |
| 61236 | - | .2500 | 1/4" | 6.350 | 1/4" | 2-1/2" | 3/4" | .020" | - | - | 24.56 | 23.50 | 22.43 | 21.36 |
| 27581 | - | .2500 | 1/4" | 6.350 | 1/4" | 2-1/2" | 3/4" | .030" | - | - | 24.56 | 23.50 | 22.43 | 21.36 |
| 61238 | - | .2500 | 1/4" | 6.350 | 1/4" | 2-1/2" | 3/4" | .040" | - | - | 24.56 | 23.50 | 22.43 | 21.36 |
| 27583 | - | .2500 | 1/4" | 6.350 | 1/4" | 2-1/2" | 3/4" | .060" | - | - | 24.56 | 23.50 | 22.43 | 21.36 |
| 28580 | - | .2500 | 1/4" | 6.350 | 1/4" | 2-1/2" | 3/4" | BALL | - | - | 24.56 | 23.50 | 22.43 | 21.36 |

MATERIAL HARDNESS (Rc)
70
35
0



† *Metric equivalents are for reference only*

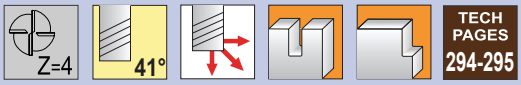
| EDP# (plain) | EDP# (weldon) | $d_1$ † Diameter Decimal | $d_1$ † Diameter | $d_1$ † Diameter Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | $r$ Corner Radius | $l_3$ Reach Length | $d_3$ Neck Diameter | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 61240 | - | .2500 | 1/4" | 6.350 | 1/4" | 3" | 1" | .015" | - | - | 36.40 | 34.82 | 33.23 | 31.65 |
| 61241 | - | .2500 | 1/4" | 6.350 | 1/4" | 3" | 1-1/8" | .030" | - | - | 36.40 | 34.82 | 33.23 | 31.65 |
| 61242 | - | .2500 | 1/4" | 6.350 | 1/4" | 3" | 1-1/2" | .015" | - | - | 36.40 | 34.82 | 33.23 | 31.65 |
| 61244 | - | .2500 | 1/4" | 6.350 | 1/4" | 4" | 3/8" | .015" | 3/4" | .240" | 47.60 | 45.53 | 43.46 | 41.39 |
| 63140 | - | .2500 | 1/4" | 6.350 | 1/4" | 4" | 3/8" | .015" | 1-1/4" | .240" | 47.60 | 45.53 | 43.46 | 41.39 |
| 61246 | - | .2500 | 1/4" | 6.350 | 1/4" | 4" | 3/8" | .015" | 2-1/8" | .240" | 47.60 | 45.53 | 43.46 | 41.39 |
| 27585 | - | .2756 | | 7.000 | 8.0 | 50 | 12 | 0.30 | - | - | 35.96 | 34.40 | 32.83 | 31.27 |
| 27590 | - | .2756 | | 7.000 | 8.0 | 65 | 22 | 0.30 | - | - | 39.53 | 37.81 | 36.09 | 34.37 |
| 61248 | - | .2812 | 9/32" | 7.142 | 5/16" | 2" | 7/16" | - | - | - | 30.25 | 28.93 | 27.62 | 26.30 |
| 27595 | - | .2812 | 9/32" | 7.142 | 5/16" | 2" | 7/16" | .015" | - | - | 34.66 | 33.15 | 31.65 | 30.14 |
| 61250 | - | .2812 | 9/32" | 7.142 | 5/16" | 2-1/2" | 13/16" | - | - | - | 35.40 | 33.86 | 32.32 | 30.78 |
| 61252 | - | .2812 | 9/32" | 7.142 | 5/16" | 2-1/2" | 13/16" | .010" | - | - | 38.10 | 36.44 | 34.79 | 33.13 |
| 27597 | - | .2812 | 9/32" | 7.142 | 5/16" | 2-1/2" | 13/16" | .015" | - | - | 38.10 | 36.44 | 34.79 | 33.13 |
| 61254 | - | .2812 | 9/32" | 7.142 | 5/16" | 2-1/2" | 13/16" | .020" | - | - | 38.10 | 36.44 | 34.79 | 33.13 |
| 63150 | - | .2812 | 9/32" | 7.142 | 5/16" | 4" | 7/16" | .015" | - | - | 65.83 | 62.96 | 60.10 | 57.24 |
| 62207 | - | .3125 | 5/16" | 7.938 | 5/16" | 2" | 7/16" | - | - | - | 26.43 | 25.28 | 24.13 | 22.98 |
| 61256 | - | .3125 | 5/16" | 7.938 | 5/16" | 2" | 7/16" | .010" | - | - | 30.29 | 28.97 | 27.66 | 26.34 |
| 61258 | - | .3125 | 5/16" | 7.938 | 5/16" | 2" | 7/16" | .015" | - | - | 30.29 | 28.97 | 27.66 | 26.34 |
| 27600 | - | .3125 | 5/16" | 7.938 | 5/16" | 2" | 7/16" | .020" | - | - | 30.29 | 28.97 | 27.66 | 26.34 |
| 61260 | - | .3125 | 5/16" | 7.938 | 5/16" | 2" | 7/16" | .030" | - | - | 30.29 | 28.97 | 27.66 | 26.34 |
| 28610 | - | .3125 | 5/16" | 7.938 | 5/16" | 2" | 7/16" | BALL | - | - | 30.29 | 28.97 | 27.66 | 26.34 |
| 62217 | - | .3125 | 5/16" | 7.938 | 5/16" | 2-1/2" | 13/16" | - | - | - | 30.92 | 29.58 | 28.23 | 26.89 |
| 27610 | - | .3125 | 5/16" | 7.938 | 5/16" | 2-1/2" | 13/16" | .010" | - | - | 33.29 | 31.85 | 30.40 | 28.95 |
| 61262 | - | .3125 | 5/16" | 7.938 | 5/16" | 2-1/2" | 13/16" | .015" | - | - | 33.29 | 31.85 | 30.40 | 28.95 |
| 27620 | - | .3125 | 5/16" | 7.938 | 5/16" | 2-1/2" | 13/16" | .020" | - | - | 33.29 | 31.85 | 30.40 | 28.95 |
| 27622 | - | .3125 | 5/16" | 7.938 | 5/16" | 2-1/2" | 13/16" | .030" | - | - | 33.29 | 31.85 | 30.40 | 28.95 |
| 61264 | - | .3125 | 5/16" | 7.938 | 5/16" | 2-1/2" | 13/16" | .040" | - | - | 33.29 | 31.85 | 30.40 | 28.95 |
| 27624 | - | .3125 | 5/16" | 7.938 | 5/16" | 2-1/2" | 13/16" | .060" | - | - | 33.29 | 31.85 | 30.40 | 28.95 |
| 28620 | - | .3125 | 5/16" | 7.938 | 5/16" | 2-1/2" | 13/16" | BALL | - | - | 33.29 | 31.85 | 30.40 | 28.95 |
| 61266 | - | .3125 | 5/16" | 7.938 | 5/16" | 3" | 1-1/4" | .015" | - | - | 46.41 | 44.40 | 42.38 | 40.36 |
| 63160 | - | .3125 | 5/16" | 7.938 | 5/16" | 4" | 7/16" | .020" | 1-7/8" | .300" | 64.19 | 61.40 | 58.61 | 55.82 |
| 62257 | - | .3150 | | 8.000 | 8.0 | 50 | 12 | - | - | - | 27.52 | 26.32 | 25.13 | 23.93 |
| 61268 | - | .3150 | | 8.000 | 8.0 | 50 | 12 | 0.30 | - | - | 31.41 | 30.04 | 28.68 | 27.31 |
| 27630 | - | .3150 | | 8.000 | 8.0 | 50 | 12 | 0.50 | - | - | 31.41 | 30.04 | 28.68 | 27.31 |
| 61270 | - | .3150 | | 8.000 | 8.0 | 50 | 12 | 0.75 | - | - | 31.41 | 30.04 | 28.68 | 27.31 |
| 28630 | - | .3150 | | 8.000 | 8.0 | 50 | 12 | BALL | - | - | 31.41 | 30.04 | 28.68 | 27.31 |
| 62267 | - | .3150 | | 8.000 | 8.0 | 65 | 22 | - | - | - | 32.05 | 30.66 | 29.26 | 27.87 |
| 27635 | - | .3150 | | 8.000 | 8.0 | 65 | 22 | 0.30 | - | - | 34.55 | 33.04 | 31.54 | 30.04 |
| 27640 | - | .3150 | | 8.000 | 8.0 | 65 | 22 | 0.50 | - | - | 34.55 | 33.04 | 31.54 | 30.04 |
| 61272 | - | .3150 | | 8.000 | 8.0 | 65 | 22 | 0.75 | - | - | 34.55 | 33.04 | 31.54 | 30.04 |
| 27642 | - | .3150 | | 8.000 | 8.0 | 65 | 22 | 1.00 | - | - | 34.55 | 33.04 | 31.54 | 30.04 |
| 27643 | - | .3150 | | 8.000 | 8.0 | 65 | 22 | 1.50 | - | - | 34.55 | 33.04 | 31.54 | 30.04 |
| 61274 | - | .3150 | | 8.000 | 8.0 | 65 | 22 | 2.00 | - | - | 34.55 | 33.04 | 31.54 | 30.04 |
| 28640 | - | .3150 | | 8.000 | 8.0 | 65 | 22 | BALL | - | - | 34.55 | 33.04 | 31.54 | 30.04 |
| 61276 | - | .3150 | | 8.000 | 8.0 | 75 | 38 | 0.50 | - | - | 48.39 | 46.29 | 44.18 | 42.08 |
| 61278 | - | .3150 | | 8.000 | 8.0 | 100 | 50 | 0.50 | - | - | 55.28 | 52.88 | 50.47 | 48.07 |
| 63170 | - | .3150 | | 8.000 | 8.0 | 100 | 12 | 0.50 | 47 | 7.60 | 66.40 | 63.51 | 60.63 | 57.74 |
| 61280 | - | .3438 | 11/32" | 8.733 | 3/8" | 2" | 1/2" | - | - | - | 35.34 | 33.80 | 32.27 | 30.73 |
| 27645 | - | .3438 | 11/32" | 8.733 | 3/8" | 2" | 1/2" | .020" | - | - | 40.45 | 38.69 | 36.93 | 35.17 |
| 61282 | - | .3438 | 11/32" | 8.733 | 3/8" | 2-1/2" | 7/8" | - | - | - | 41.29 | 39.49 | 37.70 | 35.90 |
| 27650 | - | .3438 | 11/32" | 8.733 | 3/8" | 2-1/2" | 7/8" | .020" | - | - | 43.98 | 42.06 | 40.15 | 38.24 |
| 61284 | - | .3438 | 11/32" | 8.733 | 3/8" | 3" | 1-1/4" | .015" | - | - | 57.88 | 55.36 | 52.85 | 50.33 |



*continued* →

# Series VRX *(continued)*

.3438" - .3937"
(8.733mm - 10.000mm)




| TOLERANCES | |
|---|---|
| $d_1$ | +.000" –.002" (+.000mm –.050mm) |
| $d_2$ | h6 |
| $r$ | +.001" –.001" (+.025 –.025mm) |

**Recommended for inconel, pH materials, titanium and tool steels >40Rc**



## AlTiN Coating

Solid submicron grain carbide end mill - center cutting

Excellent for High Efficiency Milling

Reduces vibration for more aggressive machining resulting in less cycle times and greater productivity

Staggered flute geometry

MATERIAL HARDNESS (Rc)

70

35

0

| | EDP# (plain) | EDP# (weldon) | $d_1$ † Diameter Decimal | Diameter | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | $r$ Corner Radius | $l_3$ Reach Length | $d_3$ Neck Diameter | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 63180 | - | .3438 | 11/32" | 8.733 | 3/8" | 4" | 1/2" | .020" | - | - | 70.48 | 67.42 | 64.35 | 61.29 |
| | 27655 | - | .3543 | | 9.000 | 10.0 | 50 | 14 | 0.50 | - | - | 48.83 | 46.71 | 44.58 | 42.46 |
| | 62287 | - | .3543 | | 9.000 | 10.0 | 65 | 22 | - | - | - | 49.50 | 47.34 | 45.19 | 43.04 |
| | 27657 | - | .3543 | | 9.000 | 10.0 | 65 | 22 | 0.50 | - | - | 53.08 | 50.78 | 48.47 | 46.16 |
| | 62317 | - | .3750 | 3/8" | 9.525 | 3/8" | 2" | 1/2" | - | - | - | 31.22 | 29.87 | 28.51 | 27.15 |
| | 27658 | - | .3750 | 3/8" | 9.525 | 3/8" | 2" | 1/2" | .010" | - | - | 35.75 | 34.20 | 32.64 | 31.09 |
| | 61286 | - | .3750 | 3/8" | 9.525 | 3/8" | 2" | 1/2" | .015" | - | - | 35.75 | 34.20 | 32.64 | 31.09 |
| | 27660 | - | .3750 | 3/8" | 9.525 | 3/8" | 2" | 1/2" | .020" | - | - | 35.75 | 34.20 | 32.64 | 31.09 |
| | 27662 | - | .3750 | 3/8" | 9.525 | 3/8" | 2" | 1/2" | .030" | - | - | 35.75 | 34.20 | 32.64 | 31.09 |
| | 61288 | - | .3750 | 3/8" | 9.525 | 3/8" | 2" | 1/2" | .060" | - | - | 35.75 | 34.20 | 32.64 | 31.09 |
| | 28670 | - | .3750 | 3/8" | 9.525 | 3/8" | 2" | 1/2" | BALL | - | - | 35.75 | 34.20 | 32.64 | 31.09 |
| NEW | 28676 | - | .3750 | 3/8" | 9.525 | 3/8" | 2" | 5/8" | .045" | - | - | 35.75 | 34.20 | 32.64 | 31.09 |
| | 62327 | - | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 7/8" | - | - | - | 36.49 | 34.90 | 33.32 | 31.73 |
| | 27670 | - | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 7/8" | .010" | - | - | 38.88 | 37.19 | 35.50 | 33.81 |
| | 61290 | - | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 7/8" | .015" | - | - | 38.88 | 37.19 | 35.50 | 33.81 |
| | 27680 | - | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 7/8" | .020" | - | - | 38.88 | 37.19 | 35.50 | 33.81 |
| | 27682 | - | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 7/8" | .030" | - | - | 38.88 | 37.19 | 35.50 | 33.81 |
| | 61292 | - | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 7/8" | .040" | - | - | 38.88 | 37.19 | 35.50 | 33.81 |
| | 61294 | - | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 7/8" | .050" | - | - | 38.88 | 37.19 | 35.50 | 33.81 |
| | 27684 | - | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 7/8" | .060" | - | - | 38.88 | 37.19 | 35.50 | 33.81 |
| | 61296 | - | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 7/8" | .094" | - | - | 38.88 | 37.19 | 35.50 | 33.81 |
| | 28680 | - | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 7/8" | BALL | - | - | 38.88 | 37.19 | 35.50 | 33.81 |
| | 61298 | - | .3750 | 3/8" | 9.525 | 3/8" | 3" | 1-1/4" | .015" | - | - | 51.16 | 48.94 | 46.71 | 44.49 |
| | 61299 | - | .3750 | 3/8" | 9.525 | 3/8" | 3" | 1-1/4" | .030" | - | - | 51.16 | 48.94 | 46.71 | 44.49 |
| | 61300 | - | .3750 | 3/8" | 9.525 | 3/8" | 4" | 1-1/2" | .015" | - | - | 57.58 | 55.08 | 52.57 | 50.07 |
| | 61302 | - | .3750 | 3/8" | 9.525 | 3/8" | 4" | 1-1/2" | BALL | - | - | 57.58 | 55.08 | 52.57 | 50.07 |
| | 61304 | - | .3750 | 3/8" | 9.525 | 3/8" | 4" | 2" | .015" | - | - | 57.58 | 55.08 | 52.57 | 50.07 |
| | 61306 | - | .3750 | 3/8" | 9.525 | 3/8" | 4" | 1/2" | .015" | 1-1/8" | .360" | 68.71 | 65.73 | 62.74 | 59.75 |
| | 63190 | - | .3750 | 3/8" | 9.525 | 3/8" | 4" | 1/2" | .020" | 1-7/8" | .360" | 68.71 | 65.73 | 62.74 | 59.75 |
| | 61308 | - | .3750 | 3/8" | 9.525 | 3/8" | 4" | 1/2" | .015" | 2-1/8" | .360" | 68.71 | 65.73 | 62.74 | 59.75 |
| | 61310 | - | .3750 | 3/8" | 9.525 | 3/8" | 6" | 1/2" | .015" | 3-1/8" | .360" | 90.85 | 86.90 | 82.95 | 79.00 |
| | 61312 | - | .3937 | | 10.000 | 10.0 | 50 | 16 | - | - | - | 40.24 | 38.49 | 36.74 | 34.99 |
| | 27690 | - | .3937 | | 10.000 | 10.0 | 50 | 16 | 0.50 | - | - | 43.16 | 41.28 | 39.41 | 37.53 |
| | 61314 | - | .3937 | | 10.000 | 10.0 | 50 | 16 | 1.00 | - | - | 43.16 | 41.28 | 39.41 | 37.53 |
| | 28690 | - | .3937 | | 10.000 | 10.0 | 50 | 16 | BALL | - | - | 43.16 | 41.28 | 39.41 | 37.53 |
| | 62397 | - | .3937 | | 10.000 | 10.0 | 70 | 22 | - | - | - | 43.76 | 41.86 | 39.95 | 38.05 |
| | 27698 | - | .3937 | | 10.000 | 10.0 | 70 | 22 | 0.30 | - | - | 46.94 | 44.90 | 42.86 | 40.82 |
| | 27700 | - | .3937 | | 10.000 | 10.0 | 70 | 22 | 0.50 | - | - | 46.94 | 44.90 | 42.86 | 40.82 |
| | 61316 | - | .3937 | | 10.000 | 10.0 | 70 | 22 | 0.75 | - | - | 46.94 | 44.90 | 42.86 | 40.82 |
| | 27702 | - | .3937 | | 10.000 | 10.0 | 70 | 22 | 1.00 | - | - | 46.94 | 44.90 | 42.86 | 40.82 |
| | 28700 | - | .3937 | | 10.000 | 10.0 | 70 | 22 | BALL | - | - | 46.94 | 44.90 | 42.86 | 40.82 |
| | 61318 | - | .3937 | | 10.000 | 10.0 | 70 | 32 | 0.50 | - | - | 46.94 | 44.90 | 42.86 | 40.82 |
| | 61320 | - | .3937 | | 10.000 | 10.0 | 100 | 38 | 0.50 | - | - | 72.90 | 69.73 | 66.56 | 63.39 |
| | 61322 | - | .3937 | | 10.000 | 10.0 | 100 | 50 | 0.50 | - | - | 72.90 | 69.73 | 66.56 | 63.39 |
| | 63200 | - | .3937 | | 10.000 | 10.0 | 100 | 14 | 0.50 | 47 | 9.50 | 84.03 | 80.38 | 76.72 | 73.07 |



† *Metric equivalents are for reference only*

| EDP# (plain) | EDP# (weldon) | $d_1$ † Diameter Decimal | $d_1$ † Diameter | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | $r$ Corner Radius | $l_3$ Reach Length | $d_3$ Neck Diameter | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 27705 | - | .4375 | 7/16" | 11.113 | 7/16" | 2-1/2" | 5/8" | .020" | - | - | 47.01 | 44.97 | 42.92 | 40.88 |
| 28705 | - | .4375 | 7/16" | 11.113 | 7/16" | 2-1/2" | 5/8" | BALL | - | - | 47.01 | 44.97 | 42.92 | 40.88 |
| 62437 | - | .4375 | 7/16" | 11.113 | 7/16" | 2-3/4" | 7/8" | - | - | - | 43.87 | 41.97 | 40.06 | 38.15 |
| 27708 | - | .4375 | 7/16" | 11.113 | 7/16" | 2-3/4" | 7/8" | .010" | - | - | 47.01 | 44.97 | 42.92 | 40.88 |
| 27710 | - | .4375 | 7/16" | 11.113 | 7/16" | 2-3/4" | 7/8" | .020" | - | - | 47.01 | 44.97 | 42.92 | 40.88 |
| 28710 | - | .4375 | 7/16" | 11.113 | 7/16" | 2-3/4" | 7/8" | BALL | - | - | 47.01 | 44.97 | 42.92 | 40.88 |
| 63210 | - | .4375 | 7/16" | 11.113 | 7/16" | 6" | 1" | .020" | - | - | 101.35 | 96.94 | 92.54 | 88.13 |
| 62475 | - | .4724 | | 12.000 | 12.0 | 65 | 19 | - | - | - | 53.27 | 50.95 | 48.64 | 46.32 |
| 27712 | - | .4724 | | 12.000 | 12.0 | 65 | 19 | 0.30 | - | - | 61.96 | 59.27 | 56.57 | 53.88 |
| 27715 | - | .4724 | | 12.000 | 12.0 | 65 | 19 | 0.50 | - | - | 61.96 | 59.27 | 56.57 | 53.88 |
| 28715 | - | .4724 | | 12.000 | 12.0 | 65 | 19 | BALL | - | - | 61.96 | 59.27 | 56.57 | 53.88 |
| 61324 | - | .4724 | | 12.000 | 12.0 | 75 | 26 | - | - | - | 56.83 | 54.36 | 51.89 | 49.42 |
| 61326 | - | .4724 | | 12.000 | 12.0 | 75 | 26 | 0.50 | - | - | 69.13 | 66.12 | 63.12 | 60.11 |
| 62485 | - | .4724 | | 12.000 | 12.0 | 75 | 32 | - | - | - | 56.83 | 54.36 | 51.89 | 49.42 |
| 27718 | - | .4724 | | 12.000 | 12.0 | 75 | 32 | 0.30 | - | - | 69.13 | 66.12 | 63.12 | 60.11 |
| 27720 | - | .4724 | | 12.000 | 12.0 | 75 | 32 | 0.50 | - | - | 69.13 | 66.12 | 63.12 | 60.11 |
| 61328 | - | .4724 | | 12.000 | 12.0 | 75 | 32 | 0.75 | - | - | 69.13 | 66.12 | 63.12 | 60.11 |
| 27722 | - | .4724 | | 12.000 | 12.0 | 75 | 32 | 1.00 | - | - | 69.13 | 66.12 | 63.12 | 60.11 |
| 27730 | - | .4724 | | 12.000 | 12.0 | 75 | 32 | 1.50 | - | - | 69.13 | 66.12 | 63.12 | 60.11 |
| 27735 | - | .4724 | | 12.000 | 12.0 | 75 | 32 | 2.00 | - | - | 69.13 | 66.12 | 63.12 | 60.11 |
| 61330 | - | .4724 | | 12.000 | 12.0 | 75 | 32 | 3.00 | - | - | 69.13 | 66.12 | 63.12 | 60.11 |
| 28720 | - | .4724 | | 12.000 | 12.0 | 75 | 32 | BALL | - | - | 69.13 | 66.12 | 63.12 | 60.11 |
| 61332 | - | .4724 | | 12.000 | 12.0 | 100 | 38 | - | - | - | 77.51 | 74.14 | 70.77 | 67.40 |
| 61334 | - | .4724 | | 12.000 | 12.0 | 100 | 38 | 0.50 | - | - | 81.89 | 78.33 | 74.77 | 71.21 |
| 61336 | - | .4724 | | 12.000 | 12.0 | 100 | 42 | - | - | - | 77.51 | 74.14 | 70.77 | 67.40 |
| 61338 | - | .4724 | | 12.000 | 12.0 | 100 | 42 | 0.50 | - | - | 81.89 | 78.33 | 74.77 | 71.21 |
| 61340 | - | .4724 | | 12.000 | 12.0 | 100 | 52 | - | - | - | 77.51 | 74.14 | 70.77 | 67.40 |
| 61342 | - | .4724 | | 12.000 | 12.0 | 100 | 52 | 0.50 | - | - | 81.89 | 78.33 | 74.77 | 71.21 |
| 63220 | - | .4724 | | 12.000 | 12.0 | 150 | 19 | 0.50 | 57 | 11.50 | 121.96 | 116.66 | 111.35 | 106.05 |
| 62525 | 62527 | .5000 | 1/2" | 12.700 | 1/2" | 2-1/2" | 5/8" | - | - | - | 51.08 | 48.86 | 46.64 | 44.42 |
| 27739 | 27738 | .5000 | 1/2" | 12.700 | 1/2" | 2-1/2" | 5/8" | .010" | - | - | 59.42 | 56.84 | 54.25 | 51.67 |
| 61344 | - | .5000 | 1/2" | 12.700 | 1/2" | 2-1/2" | 5/8" | .015" | - | - | 59.42 | 56.84 | 54.25 | 51.67 |
| 27741 | 27740 | .5000 | 1/2" | 12.700 | 1/2" | 2-1/2" | 5/8" | .020" | - | - | 59.42 | 56.84 | 54.25 | 51.67 |
| 27743 | 27742 | .5000 | 1/2" | 12.700 | 1/2" | 2-1/2" | 5/8" | .030" | - | - | 59.42 | 56.84 | 54.25 | 51.67 |
| 61346 | - | .5000 | 1/2" | 12.700 | 1/2" | 2-1/2" | 5/8" | .060" | - | - | 59.42 | 56.84 | 54.25 | 51.67 |
| 28751 | 28750 | .5000 | 1/2" | 12.700 | 1/2" | 2-1/2" | 5/8" | BALL | - | - | 59.42 | 56.84 | 54.25 | 51.67 |
| 61348 | - | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1" | - | - | - | 54.58 | 52.21 | 49.83 | 47.46 |
| 61350 | - | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1" | .015" | - | - | 66.32 | 63.44 | 60.55 | 57.67 |
| 61352 | - | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1" | .030" | - | - | 66.32 | 63.44 | 60.55 | 57.67 |
| 61354 | - | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1" | .060" | - | - | 66.32 | 63.44 | 60.55 | 57.67 |
| 61356 | - | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1" | .125" | - | - | 66.32 | 63.44 | 60.55 | 57.67 |
| 61358 | - | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1" | BALL | - | - | 66.32 | 63.44 | 60.55 | 57.67 |
| 62535 | 62537 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1-1/4" | - | - | - | 54.58 | 52.21 | 49.83 | 47.46 |
| 27751 | 27750 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1-1/4" | .010" | - | - | 66.32 | 63.44 | 60.55 | 57.67 |
| 61360 | - | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1-1/4" | .015" | - | - | 66.32 | 63.44 | 60.55 | 57.67 |
| 27761 | 27760 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1-1/4" | .020" | - | - | 66.32 | 63.44 | 60.55 | 57.67 |
| 27763 | 27762 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1-1/4" | .030" | - | - | 66.32 | 63.44 | 60.55 | 57.67 |
| 61362 | - | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1-1/4" | .040" | - | - | 66.32 | 63.44 | 60.55 | 57.67 |
| 61364 | - | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1-1/4" | .050" | - | - | 66.32 | 63.44 | 60.55 | 57.67 |
| 27767 | 27764 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1-1/4" | .060" | - | - | 66.32 | 63.44 | 60.55 | 57.67 |
| 61366 | - | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1-1/4" | .078" | - | - | 66.32 | 63.44 | 60.55 | 57.67 |
| 63398 | 63399 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1-1/4" | .090" | - | - | 66.32 | 63.44 | 60.55 | 57.67 |



*continued* →

# Series VRX *(continued)*

.5000" - .6250"
(12.700mm - 15.875mm)

| EDP# (plain) | EDP# (weldon) | $d_1$ † Diameter Decimal | Diameter | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | $r$ Corner Radius | $l_3$ Reach Length | $d_3$ Neck Diameter | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 61368 | - | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1-1/4" | .094" | - | - | 66.32 | 63.44 | 60.55 | 57.67 |
| 61370 | - | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1-1/4" | .100" | - | - | 66.32 | 63.44 | 60.55 | 57.67 |
| 27769 | 27768 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1-1/4" | .120" | - | - | 66.32 | 63.44 | 60.55 | 57.67 |
| 61372 | - | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1-1/4" | .125" | - | - | 66.32 | 63.44 | 60.55 | 57.67 |
| 28761 | 28760 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1-1/4" | BALL | - | - | 66.32 | 63.44 | 60.55 | 57.67 |
| 28771 | 28770 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 5/8" | BALL | - | - | 78.37 | 74.97 | 71.56 | 68.15 |
| 61374 | - | .5000 | 1/2" | 12.700 | 1/2" | 4" | 1-1/2" | - | - | - | 73.85 | 70.64 | 67.43 | 64.22 |
| 63401 | 63400 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 1-1/2" | .010" | - | - | 78.37 | 74.97 | 71.56 | 68.15 |
| 61376 | - | .5000 | 1/2" | 12.700 | 1/2" | 4" | 1-1/2" | .015" | - | - | 78.37 | 74.97 | 71.56 | 68.15 |
| 63411 | 63410 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 1-1/2" | .030" | - | - | 78.37 | 74.97 | 71.56 | 68.15 |
| 63421 | 63420 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 1-1/2" | .060" | - | - | 78.37 | 74.97 | 71.56 | 68.15 |
| 63424 | - | .5000 | 1/2" | 12.700 | 1/2" | 4" | 1-1/2" | .125" | - | - | 78.37 | 74.97 | 71.56 | 68.15 |
| 61378 | - | .5000 | 1/2" | 12.700 | 1/2" | 4" | 1-1/2" | BALL | - | - | 78.37 | 74.97 | 71.56 | 68.15 |
| 61380 | - | .5000 | 1/2" | 12.700 | 1/2" | 4" | 1-5/8" | .015" | - | - | 78.37 | 74.97 | 71.56 | 68.15 |
| 61382 | - | .5000 | 1/2" | 12.700 | 1/2" | 4" | 1-3/4" | .015" | - | - | 78.37 | 74.97 | 71.56 | 68.15 |
| 62565 | 62567 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 2" | - | - | - | 73.85 | 70.64 | 67.43 | 64.22 |
| 63431 | 63430 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 2" | .010" | - | - | 78.37 | 74.97 | 71.56 | 68.15 |
| 61384 | - | .5000 | 1/2" | 12.700 | 1/2" | 4" | 2" | .015" | - | - | 78.37 | 74.97 | 71.56 | 68.15 |
| 63441 | 63440 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 2" | .030" | - | - | 78.37 | 74.97 | 71.56 | 68.15 |
| 63451 | 63450 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 2" | .060" | - | - | 78.37 | 74.97 | 71.56 | 68.15 |
| 61386 | - | .5000 | 1/2" | 12.700 | 1/2" | 4" | 2-1/8" | .015" | - | - | 78.37 | 74.97 | 71.56 | 68.15 |
| 63241 | 63240 | .5000 | 1/2" | 12.700 | 1/2" | 6" | 2" | .020" | - | - | 110.84 | 106.02 | 101.20 | 96.38 |
| 61388 | - | .5000 | 1/2" | 12.700 | 1/2" | 6" | 2-1/2" | .015" | - | - | 110.84 | 106.02 | 101.20 | 96.38 |
| 61390 | - | .5000 | 1/2" | 12.700 | 1/2" | 6" | 2-1/2" | .030" | - | - | 110.84 | 106.02 | 101.20 | 96.38 |
| 61392 | - | .5000 | 1/2" | 12.700 | 1/2" | 6" | 3-1/4" | .030" | - | - | 110.84 | 106.02 | 101.20 | 96.38 |
| 61394 | - | .5000 | 1/2" | 12.700 | 1/2" | 4" | 5/8" | .015" | 1-1/2" | .480" | 89.46 | 85.57 | 81.68 | 77.79 |
| 61396 | - | .5000 | 1/2" | 12.700 | 1/2" | 4" | 5/8" | .015" | 2-1/4" | .480" | 89.46 | 85.57 | 81.68 | 77.79 |
| 63231 | 63230 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 5/8" | .020" | 2-1/4" | .480" | 89.46 | 85.57 | 81.68 | 77.79 |
| 61398 | - | .5000 | 1/2" | 12.700 | 1/2" | 6" | 5/8" | .015" | 3-3/8" | .480" | 121.92 | 116.62 | 111.32 | 106.02 |
| 61400 | - | .5000 | 1/2" | 12.700 | 1/2" | 6" | 5/8" | .015" | 4-1/8" | .480" | 121.92 | 116.62 | 111.32 | 106.02 |
| 27766 | 27765 | .5512 | | 14.000 | 14.0 | 75 | 19 | 0.50 | - | - | 97.85 | 93.60 | 89.34 | 85.09 |
| 28781 | 28780 | .5512 | | 14.000 | 14.0 | 75 | 19 | BALL | - | - | 97.85 | 93.60 | 89.34 | 85.09 |
| 27771 | 27770 | .5512 | | 14.000 | 14.0 | 88 | 32 | 0.50 | - | - | 100.57 | 96.20 | 91.82 | 87.45 |
| 28786 | 28785 | .5512 | | 14.000 | 14.0 | 88 | 32 | BALL | - | - | 100.57 | 96.20 | 91.82 | 87.45 |
| 63261 | 63260 | .5512 | | 14.000 | 14.0 | 150 | 50 | 0.50 | - | - | 145.16 | 138.85 | 132.54 | 126.23 |
| 63251 | - | .5512 | | 14.000 | 14.0 | 150 | 19 | 0.50 | 57 | 13.50 | 155.86 | 149.08 | 142.31 | 135.53 |
| 62625 | 62627 | .5625 | 9/16" | 14.288 | 9/16" | 3-1/2" | 1-1/4" | - | - | - | 90.76 | 86.81 | 82.87 | 78.92 |
| 61402 | - | .6250 | 5/8" | 15.875 | 5/8" | 3" | 3/4" | - | - | - | 97.84 | 93.59 | 89.33 | 85.08 |
| 63461 | 63460 | .6250 | 5/8" | 15.875 | 5/8" | 3" | 3/4" | .010" | - | - | 102.73 | 98.26 | 93.80 | 89.33 |
| 61404 | - | .6250 | 5/8" | 15.875 | 5/8" | 3" | 3/4" | .015" | - | - | 102.73 | 98.26 | 93.80 | 89.33 |
| 27781 | 27780 | .6250 | 5/8" | 15.875 | 5/8" | 3" | 3/4" | .025" | - | - | 102.73 | 98.26 | 93.80 | 89.33 |
| 61406 | - | .6250 | 5/8" | 15.875 | 5/8" | 3" | 3/4" | .060" | - | - | 102.73 | 98.26 | 93.80 | 89.33 |
| 28796 | 28795 | .6250 | 5/8" | 15.875 | 5/8" | 3" | 3/4" | BALL | - | - | 102.73 | 98.26 | 93.80 | 89.33 |
| 62655 | 62657 | .6250 | 5/8" | 15.875 | 5/8" | 3-1/2" | 1-1/4" | - | - | - | 100.71 | 96.33 | 91.95 | 87.57 |
| 27791 | 27790 | .6250 | 5/8" | 15.875 | 5/8" | 3-1/2" | 1-1/4" | .010" | - | - | 105.58 | 100.99 | 96.40 | 91.81 |
| 61408 | - | .6250 | 5/8" | 15.875 | 5/8" | 3-1/2" | 1-1/4" | .015" | - | - | 105.58 | 100.99 | 96.40 | 91.81 |
| 61410 | - | .6250 | 5/8" | 15.875 | 5/8" | 3-1/2" | 1-1/4" | .020" | - | - | 105.58 | 100.99 | 96.40 | 91.81 |
| 27801 | 27800 | .6250 | 5/8" | 15.875 | 5/8" | 3-1/2" | 1-1/4" | .025" | - | - | 105.58 | 100.99 | 96.40 | 91.81 |
| 61412 | - | .6250 | 5/8" | 15.875 | 5/8" | 3-1/2" | 1-1/4" | .030" | - | - | 105.58 | 100.99 | 96.40 | 91.81 |
| 61414 | - | .6250 | 5/8" | 15.875 | 5/8" | 3-1/2" | 1-1/4" | .040" | - | - | 105.58 | 100.99 | 96.40 | 91.81 |
| 27803 | 27802 | .6250 | 5/8" | 15.875 | 5/8" | 3-1/2" | 1-1/4" | .060" | - | - | 105.58 | 100.99 | 96.40 | 91.81 |
| 61416 | - | .6250 | 5/8" | 15.875 | 5/8" | 3-1/2" | 1-1/4" | .078" | - | - | 105.58 | 100.99 | 96.40 | 91.81 |
| 61418 | - | .6250 | 5/8" | 15.875 | 5/8" | 3-1/2" | 1-1/4" | .094" | - | - | 105.58 | 100.99 | 96.40 | 91.81 |
| 27805 | 27804 | .6250 | 5/8" | 15.875 | 5/8" | 3-1/2" | 1-1/4" | .120" | - | - | 105.58 | 100.99 | 96.40 | 91.81 |
| 61420 | - | .6250 | 5/8" | 15.875 | 5/8" | 3-1/2" | 1-1/4" | .125" | - | - | 105.58 | 100.99 | 96.40 | 91.81 |
| 28801 | 28800 | .6250 | 5/8" | 15.875 | 5/8" | 3-1/2" | 1-1/4" | BALL | - | - | 105.58 | 100.99 | 96.40 | 91.81 |

MATERIAL HARDNESS (Rc)
70
35
0



† *Metric equivalents are for reference only*

| EDP# (plain) | EDP# (weldon) | $d_1$ † Diameter Decimal | Diameter | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | $r$ Corner Radius | $l_3$ Reach Length | $d_3$ Neck Diameter | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 61422 | - | .6250 | 5/8" | 15.875 | 5/8" | 4" | 1-1/2" | - | - | - | 107.55 | 102.87 | 98.20 | 93.52 |
| 63501 | 63500 | .6250 | 5/8" | 15.875 | 5/8" | 4" | 1-1/2" | .010" | - | - | 114.77 | 109.78 | 104.79 | 99.80 |
| 61424 | - | .6250 | 5/8" | 15.875 | 5/8" | 4" | 1-1/2" | .015" | - | - | 114.77 | 109.78 | 104.79 | 99.80 |
| 63511 | 63510 | .6250 | 5/8" | 15.875 | 5/8" | 4" | 1-1/2" | .030" | - | - | 114.77 | 109.78 | 104.79 | 99.80 |
| 63521 | 63520 | .6250 | 5/8" | 15.875 | 5/8" | 4" | 1-1/2" | .060" | - | - | 114.77 | 109.78 | 104.79 | 99.80 |
| 61426 | - | .6250 | 5/8" | 15.875 | 5/8" | 4" | 1-5/8" | - | - | - | 107.55 | 102.87 | 98.20 | 93.52 |
| 61428 | - | .6250 | 5/8" | 15.875 | 5/8" | 4" | 1-5/8" | .015" | - | - | 114.77 | 109.78 | 104.79 | 99.80 |
| 61430 | - | .6250 | 5/8" | 15.875 | 5/8" | 4" | 1-5/8" | .030" | - | - | 114.77 | 109.78 | 104.79 | 99.80 |
| 61432 | - | .6250 | 5/8" | 15.875 | 5/8" | 4" | 1-5/8" | .060" | - | - | 114.77 | 109.78 | 104.79 | 99.80 |
| 62675 | 62677 | .6250 | 5/8" | 15.875 | 5/8" | 4" | 1-3/4" | - | - | - | 107.55 | 102.87 | 98.20 | 93.52 |
| 63531 | 63530 | .6250 | 5/8" | 15.875 | 5/8" | 4" | 1-3/4" | .010" | - | - | 114.77 | 109.78 | 104.79 | 99.80 |
| 63541 | 63540 | .6250 | 5/8" | 15.875 | 5/8" | 4" | 1-3/4" | .030" | - | - | 114.77 | 109.78 | 104.79 | 99.80 |
| 63551 | 63550 | .6250 | 5/8" | 15.875 | 5/8" | 4" | 1-3/4" | .060" | - | - | 114.77 | 109.78 | 104.79 | 99.80 |
| 63281 | 63280 | .6250 | 5/8" | 15.875 | 5/8" | 6" | 2" | .025" | - | - | 157.99 | 151.12 | 144.25 | 137.38 |
| 63283 | - | .6250 | 5/8" | 15.875 | 5/8" | 6" | 2" | .090" | - | - | 157.99 | 151.12 | 144.25 | 137.38 |
| 63285 | - | .6250 | 5/8" | 15.875 | 5/8" | 6" | 2" | .125" | - | - | 157.99 | 151.12 | 144.25 | 137.38 |
| 28806 | 28805 | .6250 | 5/8" | 15.875 | 5/8" | 6" | 2" | BALL | - | - | 157.99 | 151.12 | 144.25 | 137.38 |
| 61434 | - | .6250 | 5/8" | 15.875 | 5/8" | 6" | 2-1/2" | .030" | - | - | 157.99 | 151.12 | 144.25 | 137.38 |
| 61436 | - | .6250 | 5/8" | 15.875 | 5/8" | 6" | 3-1/4" | .030" | - | - | 157.99 | 151.12 | 144.25 | 137.38 |
| 61438 | - | .6250 | 5/8" | 15.875 | 5/8" | 4" | 3/4" | .030" | 1-5/8" | .600" | 125.87 | 120.40 | 114.92 | 109.45 |
| 61440 | - | .6250 | 5/8" | 15.875 | 5/8" | 6" | 3/4" | .030" | 2-3/8" | .600" | 169.10 | 161.74 | 154.39 | 147.04 |
| 63271 | 63270 | .6250 | 5/8" | 15.875 | 5/8" | 6" | 3/4" | .025" | 3-1/4" | .600" | 169.10 | 161.74 | 154.39 | 147.04 |
| 61442 | - | .6250 | 5/8" | 15.875 | 5/8" | 6" | 3/4" | .030" | 4-1/8" | .600" | 169.10 | 161.74 | 154.39 | 147.04 |
| 61444 | - | .6299 | | 16.000 | 16.0 | 75 | 19 | - | - | - | 102.26 | 97.81 | 93.37 | 88.92 |
| 27809 | - | .6299 | | 16.000 | 16.0 | 75 | 19 | 0.30 | - | - | 107.24 | 102.58 | 97.91 | 93.25 |
| 27811 | 27810 | .6299 | | 16.000 | 16.0 | 75 | 19 | 0.50 | - | - | 107.24 | 102.58 | 97.91 | 93.25 |
| 61446 | - | .6299 | | 16.000 | 16.0 | 75 | 19 | 1.00 | - | - | 107.24 | 102.58 | 97.91 | 93.25 |
| 28811 | 28810 | .6299 | | 16.000 | 16.0 | 75 | 19 | BALL | - | - | 107.24 | 102.58 | 97.91 | 93.25 |
| 62715 | 62717 | .6299 | | 16.000 | 16.0 | 88 | 32 | - | - | - | 105.05 | 100.49 | 95.92 | 91.35 |
| 27819 | 27818 | .6299 | | 16.000 | 16.0 | 88 | 32 | 0.30 | - | - | 110.17 | 105.38 | 100.59 | 95.80 |
| 27821 | 27820 | .6299 | | 16.000 | 16.0 | 88 | 32 | 0.50 | - | - | 110.17 | 105.38 | 100.59 | 95.80 |
| 61448 | - | .6299 | | 16.000 | 16.0 | 88 | 32 | 0.75 | - | - | 110.17 | 105.38 | 100.59 | 95.80 |
| 27823 | 27822 | .6299 | | 16.000 | 16.0 | 88 | 32 | 1.00 | - | - | 110.17 | 105.38 | 100.59 | 95.80 |
| 61450 | - | .6299 | | 16.000 | 16.0 | 88 | 32 | 1.50 | - | - | 110.17 | 105.38 | 100.59 | 95.80 |
| 27825 | 27824 | .6299 | | 16.000 | 16.0 | 88 | 32 | 2.00 | - | - | 110.17 | 105.38 | 100.59 | 95.80 |
| 61452 | - | .6299 | | 16.000 | 16.0 | 88 | 32 | 3.00 | - | - | 110.17 | 105.38 | 100.59 | 95.80 |
| 28821 | 28820 | .6299 | | 16.000 | 16.0 | 88 | 32 | BALL | - | - | 110.17 | 105.38 | 100.59 | 95.80 |
| 63581 | 63580 | .6299 | | 16.000 | 16.0 | 100 | 38 | 0.30 | - | - | 117.15 | 112.06 | 106.96 | 101.87 |
| 61454 | - | .6299 | | 16.000 | 16.0 | 100 | 38 | 0.50 | - | - | 117.15 | 112.06 | 106.96 | 101.87 |
| 61456 | - | .6299 | | 16.000 | 16.0 | 100 | 42 | 0.50 | - | - | 117.15 | 112.06 | 106.96 | 101.87 |
| 63291 | 63290 | .6299 | | 16.000 | 16.0 | 150 | 19 | 0.50 | 82 | 15.25 | 169.10 | 161.74 | 154.39 | 147.04 |
| 27831 | - | .7087 | | 18.000 | 18.0 | 75 | 22 | 0.80 | - | - | 154.69 | 147.96 | 141.24 | 134.51 |
| 28831 | - | .7087 | | 18.000 | 18.0 | 75 | 22 | BALL | - | - | 154.69 | 147.96 | 141.24 | 134.51 |
| 27836 | 27835 | .7087 | | 18.000 | 18.0 | 100 | 38 | 0.80 | - | - | 158.17 | 151.29 | 144.42 | 137.54 |
| 28836 | 28835 | .7087 | | 18.000 | 18.0 | 100 | 38 | BALL | - | - | 158.17 | 151.29 | 144.42 | 137.54 |
| 63301 | - | .7087 | | 18.000 | 18.0 | 150 | 25 | 0.80 | 82 | 17.25 | 246.48 | 235.76 | 225.05 | 214.33 |
| 61458 | - | .7500 | 3/4" | 19.050 | 3/4" | 3" | 7/8" | - | - | - | 140.67 | 134.55 | 128.44 | 122.32 |
| 27841 | 27840 | .7500 | 3/4" | 19.050 | 3/4" | 3" | 7/8" | .030" | - | - | 148.19 | 141.75 | 135.30 | 128.86 |
| 61460 | - | .7500 | 3/4" | 19.050 | 3/4" | 3" | 7/8" | .060" | - | - | 148.19 | 141.75 | 135.30 | 128.86 |
| 28841 | 28840 | .7500 | 3/4" | 19.050 | 3/4" | 3" | 7/8" | BALL | - | - | 148.19 | 141.75 | 135.30 | 128.86 |
| 61462 | - | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-1/4" | - | - | - | 143.75 | 137.50 | 131.25 | 125.00 |
| 61464 | - | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-1/4" | .030" | - | - | 151.41 | 144.83 | 138.24 | 131.66 |
| 62775 | 62777 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-1/2" | - | - | - | 143.75 | 137.50 | 131.25 | 125.00 |
| 27851 | 27850 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-1/2" | .015" | - | - | 151.41 | 144.83 | 138.24 | 131.66 |
| 27861 | 27860 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-1/2" | .030" | - | - | 151.41 | 144.83 | 138.24 | 131.66 |
| 27865 | 27864 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-1/2" | .060" | - | - | 151.41 | 144.83 | 138.24 | 131.66 |
| 27867 | 27866 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-1/2" | .120" | - | - | 151.41 | 144.83 | 138.24 | 131.66 |
| 28861 | 28860 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-1/2" | BALL | - | - | 151.41 | 144.83 | 138.24 | 131.66 |

*continued* →

# Series VRX *(continued)*

.7500" - .8661"
(19.050mm - 22.000mm)

| | EDP# (plain) | EDP# (weldon) | $d_1$ † Diameter Decimal | $d_1$ † Diameter | $d_1$ † Diameter Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | $r$ Corner Radius | $l_3$ Reach Length | $d_3$ Neck Diameter | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 61466 | - | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-5/8" | - | - | - | 143.75 | 137.50 | 131.25 | 125.00 |
| | 61468 | - | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-5/8" | .015" | - | - | 151.41 | 144.83 | 138.24 | 131.66 |
| | 61470 | - | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-5/8" | .030" | - | - | 151.41 | 144.83 | 138.24 | 131.66 |
| | 61472 | - | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-5/8" | .060" | - | - | 151.41 | 144.83 | 138.24 | 131.66 |
| | 61474 | - | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-5/8" | BALL | - | - | 151.41 | 144.83 | 138.24 | 131.66 |
| | 62785 | 62787 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-3/4" | - | - | - | 143.75 | 137.50 | 131.25 | 125.00 |
| | 63601 | 63600 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-3/4" | .015" | - | - | 151.41 | 144.83 | 138.24 | 131.66 |
| | 27869 | 27868 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-3/4" | .030" | - | - | 151.41 | 144.83 | 138.24 | 131.66 |
| | 63611 | 63610 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-3/4" | .060" | - | - | 151.41 | 144.83 | 138.24 | 131.66 |
| | 61476 | - | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-3/4" | .094" | - | - | 151.41 | 144.83 | 138.24 | 131.66 |
| | 63621 | 63620 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-3/4" | .120" | - | - | 151.41 | 144.83 | 138.24 | 131.66 |
| | 61478 | - | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-3/4" | .190" | - | - | 151.41 | 144.83 | 138.24 | 131.66 |
| | 61480 | - | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-3/4" | BALL | - | - | 151.41 | 144.83 | 138.24 | 131.66 |
| | 62795 | 62797 | .7500 | 3/4" | 19.050 | 3/4" | 5" | 2" | - | - | - | 192.94 | 184.55 | 176.16 | 167.77 |
| | 63631 | 63630 | .7500 | 3/4" | 19.050 | 3/4" | 5" | 2" | .015" | - | - | 210.01 | 200.88 | 191.75 | 182.62 |
| | 63311 | 63310 | .7500 | 3/4" | 19.050 | 3/4" | 5" | 2" | .030" | - | - | 210.01 | 200.88 | 191.75 | 182.62 |
| | 63641 | 63640 | .7500 | 3/4" | 19.050 | 3/4" | 5" | 2" | .060" | - | - | 210.01 | 200.88 | 191.75 | 182.62 |
| | 61482 | - | .7500 | 3/4" | 19.050 | 3/4" | 5" | 2" | .094" | - | - | 210.01 | 200.88 | 191.75 | 182.62 |
| | 61484 | - | .7500 | 3/4" | 19.050 | 3/4" | 5" | 2" | .125" | - | - | 210.01 | 200.88 | 191.75 | 182.62 |
| | 28866 | 28865 | .7500 | 3/4" | 19.050 | 3/4" | 5" | 2" | BALL | - | - | 210.01 | 200.88 | 191.75 | 182.62 |
| | 61486 | - | .7500 | 3/4" | 19.050 | 3/4" | 5" | 2-1/2" | - | - | - | 192.94 | 184.55 | 176.16 | 167.77 |
| | 61488 | - | .7500 | 3/4" | 19.050 | 3/4" | 5" | 2-1/2" | .030" | - | - | 210.01 | 200.88 | 191.75 | 182.62 |
| | 62805 | 62807 | .7500 | 3/4" | 19.050 | 3/4" | 6" | 3" | - | - | - | 225.79 | 215.97 | 206.16 | 196.34 |
| | 63651 | 63650 | .7500 | 3/4" | 19.050 | 3/4" | 6" | 3" | .015" | - | - | 249.47 | 238.62 | 227.78 | 216.93 |
| | 63661 | 63660 | .7500 | 3/4" | 19.050 | 3/4" | 6" | 3" | .030" | - | - | 249.47 | 238.62 | 227.78 | 216.93 |
| | 63671 | 63670 | .7500 | 3/4" | 19.050 | 3/4" | 6" | 3" | .060" | - | - | 249.47 | 238.62 | 227.78 | 216.93 |
| | 61490 | - | .7500 | 3/4" | 19.050 | 3/4" | 6" | 3-1/4" | - | - | - | 225.79 | 215.97 | 206.16 | 196.34 |
| | 61492 | - | .7500 | 3/4" | 19.050 | 3/4" | 6" | 3-1/4" | .030" | - | - | 249.47 | 238.62 | 227.78 | 216.93 |
| | 61494 | - | .7500 | 3/4" | 19.050 | 3/4" | 7" | 4-1/4" | - | - | - | 283.58 | 271.25 | 258.92 | 246.59 |
| | 61496 | - | .7500 | 3/4" | 19.050 | 3/4" | 7" | 4-1/4" | .030" | - | - | 314.64 | 300.96 | 287.28 | 273.60 |
| | 63321 | 63320 | .7500 | 3/4" | 19.050 | 3/4" | 6" | 1" | .030" | 3-1/4" | .730" | 260.66 | 249.33 | 237.99 | 226.66 |
| | 63323 | - | .7500 | 3/4" | 19.050 | 3/4" | 6" | 1" | .060" | 3-1/4" | .730" | 260.66 | 249.33 | 237.99 | 226.66 |
| | 63325 | - | .7500 | 3/4" | 19.050 | 3/4" | 6" | 1" | .090" | 3-1/4" | .730" | 260.66 | 249.33 | 237.99 | 226.66 |
| | 63327 | - | .7500 | 3/4" | 19.050 | 3/4" | 6" | 1" | .125" | 3-1/4" | .730" | 260.66 | 249.33 | 237.99 | 226.66 |
| NEW | 63329 | - | .7500 | 3/4" | 19.050 | 3/4" | 6" | 1" | .190" | 3-1/4" | .730" | 260.66 | 249.33 | 237.99 | 226.66 |
| | 61498 | - | .7874 | | 20.000 | 20.0 | 75 | 22 | - | - | - | 189.92 | 181.67 | 173.41 | 165.15 |
| | 61500 | - | .7874 | | 20.000 | 20.0 | 75 | 22 | 0.50 | - | - | 209.56 | 200.45 | 191.34 | 182.23 |
| | 27871 | 27870 | .7874 | | 20.000 | 20.0 | 75 | 22 | 1.00 | - | - | 209.56 | 200.45 | 191.34 | 182.23 |
| | 28871 | 28870 | .7874 | | 20.000 | 20.0 | 75 | 22 | BALL | - | - | 209.56 | 200.45 | 191.34 | 182.23 |
| | 62825 | 62827 | .7874 | | 20.000 | 20.0 | 100 | 38 | - | - | - | 194.21 | 185.77 | 177.32 | 168.88 |
| | 27879 | 27878 | .7874 | | 20.000 | 20.0 | 100 | 38 | 0.50 | - | - | 214.29 | 204.97 | 195.66 | 186.34 |
| | 61502 | - | .7874 | | 20.000 | 20.0 | 100 | 38 | 0.75 | - | - | 214.29 | 204.97 | 195.66 | 186.34 |
| | 27881 | 27880 | .7874 | | 20.000 | 20.0 | 100 | 38 | 1.00 | - | - | 214.29 | 204.97 | 195.66 | 186.34 |
| | 27891 | 27890 | .7874 | | 20.000 | 20.0 | 100 | 38 | 1.50 | - | - | 214.29 | 204.97 | 195.66 | 186.34 |
| | 61504 | - | .7874 | | 20.000 | 20.0 | 100 | 38 | 3.00 | - | - | 214.29 | 204.97 | 195.66 | 186.34 |
| | 28881 | 28880 | .7874 | | 20.000 | 20.0 | 100 | 38 | BALL | - | - | 214.29 | 204.97 | 195.66 | 186.34 |
| | 61506 | - | .7874 | | 20.000 | 20.0 | 100 | 42 | 0.50 | - | - | 214.29 | 204.97 | 195.66 | 186.34 |
| | 61508 | - | .7874 | | 20.000 | 20.0 | 125 | 52 | 0.50 | - | - | 237.57 | 227.24 | 216.91 | 206.58 |
| | 63331 | 63330 | .7874 | | 20.000 | 20.0 | 150 | 25 | 1.00 | 82 | 19.30 | 274.52 | 262.58 | 250.65 | 238.71 |
| | 27911 | - | .8661 | | 22.000 | 22.0 | 100 | 38 | 1.00 | - | - | 235.39 | 225.16 | 214.92 | 204.69 |





† *Metric equivalents are for reference only*

| | EDP# (plain) | EDP# (weldon) | *d1* † Diameter Decimal | | Diameter Metric | *d2* Shank Diameter | *l1* Overall Length | *l2* Flute Length | *r* Corner Radius | *l3* Reach Length | *d3* Neck Diameter | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 61510 | - | .9843 | | 25.000 | 25.0 | 100 | 26 | - | - | - | 221.79 | 212.15 | 202.50 | 192.86 |
| | 61512 | - | .9843 | | 25.000 | 25.0 | 100 | 26 | 0.50 | - | - | 245.59 | 234.92 | 224.24 | 213.56 |
| | 62855 | 62857 | .9843 | | 25.000 | 25.0 | 100 | 38 | - | - | - | 221.79 | 212.15 | 202.50 | 192.86 |
| | 61514 | - | .9843 | | 25.000 | 25.0 | 100 | 38 | 0.50 | - | - | 245.59 | 234.92 | 224.24 | 213.56 |
| | 27941 | 27940 | .9843 | | 25.000 | 25.0 | 100 | 38 | 1.00 | - | - | 245.59 | 234.92 | 224.24 | 213.56 |
| | 27951 | - | .9843 | | 25.000 | 25.0 | 100 | 38 | 1.50 | - | - | 245.59 | 234.92 | 224.24 | 213.56 |
| | 61516 | - | .9843 | | 25.000 | 25.0 | 100 | 38 | 3.00 | - | - | 245.59 | 234.92 | 224.24 | 213.56 |
| | 28901 | 28900 | .9843 | | 25.000 | 25.0 | 100 | 38 | BALL | - | - | 245.59 | 234.92 | 224.24 | 213.56 |
| | 61518 | - | .9843 | | 25.000 | 25.0 | 100 | 42 | - | - | - | 221.79 | 212.15 | 202.50 | 192.86 |
| NEW | 61520 | - | .9843 | | 25.000 | 25.0 | 100 | 42 | 0.50 | - | - | 245.59 | 234.92 | 224.24 | 213.56 |
| | 61522 | - | .9843 | | 25.000 | 25.0 | 125 | 50 | 0.50 | - | - | 306.61 | 293.28 | 279.95 | 266.62 |
| | 63351 | 63350 | .9843 | | 25.000 | 25.0 | 125 | 50 | 1.00 | - | - | 306.61 | 293.28 | 279.95 | 266.62 |
| | 63361 | 63360 | .9843 | | 25.000 | 25.0 | 150 | 32 | 1.00 | 82 | 24.40 | 411.17 | 393.29 | 375.42 | 357.54 |
| | 61524 | - | 1.000 | 1" | 25.400 | 1" | 4" | 1" | - | - | - | 214.75 | 205.41 | 196.08 | 186.74 |
| | 27959 | 27958 | 1.000 | 1" | 25.400 | 1" | 4" | 1" | .015" | - | - | 258.50 | 247.26 | 236.02 | 224.78 |
| | 27961 | 27960 | 1.000 | 1" | 25.400 | 1" | 4" | 1" | .035" | - | - | 258.50 | 247.26 | 236.02 | 224.78 |
| | - | 27962 | 1.000 | 1" | 25.400 | 1" | 4" | 1" | .060" | - | - | 258.50 | 247.26 | 236.02 | 224.78 |
| | 28911 | 28910 | 1.000 | 1" | 25.400 | 1" | 4" | 1" | BALL | - | - | 258.50 | 247.26 | 236.02 | 224.78 |
| | 62885 | 62887 | 1.000 | 1" | 25.400 | 1" | 4" | 1-1/2" | - | - | - | 214.75 | 205.41 | 196.08 | 186.74 |
| | 27967 | 27966 | 1.000 | 1" | 25.400 | 1" | 4" | 1-1/2" | .015" | - | - | 258.50 | 247.26 | 236.02 | 224.78 |
| | 61526 | - | 1.000 | 1" | 25.400 | 1" | 4" | 1-1/2" | .025" | - | - | 258.50 | 247.26 | 236.02 | 224.78 |
| | 27971 | 27970 | 1.000 | 1" | 25.400 | 1" | 4" | 1-1/2" | .035" | - | - | 258.50 | 247.26 | 236.02 | 224.78 |
| | 27981 | 27980 | 1.000 | 1" | 25.400 | 1" | 4" | 1-1/2" | .060" | - | - | 258.50 | 247.26 | 236.02 | 224.78 |
| | 27991 | - | 1.000 | 1" | 25.400 | 1" | 4" | 1-1/2" | .090" | - | - | 258.50 | 247.26 | 236.02 | 224.78 |
| | 61528 | - | 1.000 | 1" | 25.400 | 1" | 4" | 1-1/2" | .125" | - | - | 258.50 | 247.26 | 236.02 | 224.78 |
| | 61530 | - | 1.000 | 1" | 25.400 | 1" | 4" | 1-1/2" | .190" | - | - | 258.50 | 247.26 | 236.02 | 224.78 |
| | 61532 | - | 1.000 | 1" | 25.400 | 1" | 4" | 1-1/2" | .250" | - | - | 258.50 | 247.26 | 236.02 | 224.78 |
| | 28916 | 28915 | 1.000 | 1" | 25.400 | 1" | 4" | 1-1/2" | BALL | - | - | 258.50 | 247.26 | 236.02 | 224.78 |
| | 61534 | - | 1.000 | 1" | 25.400 | 1" | 4" | 1-5/8" | .030" | - | - | 258.50 | 247.26 | 236.02 | 224.78 |
| | 62895 | 62897 | 1.000 | 1" | 25.400 | 1" | 4" | 1-3/4" | - | - | - | 214.75 | 205.41 | 196.08 | 186.74 |
| | 28001 | 28000 | 1.000 | 1" | 25.400 | 1" | 4" | 1-3/4" | .015" | - | - | 258.50 | 247.26 | 236.02 | 224.78 |
| | 61536 | - | 1.000 | 1" | 25.400 | 1" | 4" | 1-3/4" | .030" | - | - | 258.50 | 247.26 | 236.02 | 224.78 |
| | 28011 | 28012 | 1.000 | 1" | 25.400 | 1" | 4" | 1-3/4" | .060" | - | - | 258.50 | 247.26 | 236.02 | 224.78 |
| | 28021 | - | 1.000 | 1" | 25.400 | 1" | 4" | 1-3/4" | .090" | - | - | 258.50 | 247.26 | 236.02 | 224.78 |
| | 61538 | - | 1.000 | 1" | 25.400 | 1" | 4" | 1-3/4" | .125" | - | - | 258.50 | 247.26 | 236.02 | 224.78 |
| | 61540 | - | 1.000 | 1" | 25.400 | 1" | 4" | 1-3/4" | .190" | - | - | 258.50 | 247.26 | 236.02 | 224.78 |
| | 61542 | - | 1.000 | 1" | 25.400 | 1" | 4" | 1-3/4" | .250" | - | - | 258.50 | 247.26 | 236.02 | 224.78 |
| | 62905 | 62907 | 1.000 | 1" | 25.400 | 1" | 5" | 2" | - | - | - | 287.47 | 274.97 | 262.47 | 249.97 |
| | 63369 | 63368 | 1.000 | 1" | 25.400 | 1" | 5" | 2" | .015" | - | - | 318.04 | 304.22 | 290.39 | 276.56 |
| | 63371 | 63370 | 1.000 | 1" | 25.400 | 1" | 5" | 2" | .035" | - | - | 318.04 | 304.22 | 290.39 | 276.56 |
| | 63373 | 63372 | 1.000 | 1" | 25.400 | 1" | 5" | 2" | .060" | - | - | 318.04 | 304.22 | 290.39 | 276.56 |
| | 63375 | 63374 | 1.000 | 1" | 25.400 | 1" | 5" | 2" | .090" | - | - | 318.04 | 304.22 | 290.39 | 276.56 |
| | 61544 | - | 1.000 | 1" | 25.400 | 1" | 5" | 2" | .125" | - | - | 318.04 | 304.22 | 290.39 | 276.56 |
| | 61546 | - | 1.000 | 1" | 25.400 | 1" | 5" | 2" | .250" | - | - | 318.04 | 304.22 | 290.39 | 276.56 |
| | 28931 | 28930 | 1.000 | 1" | 25.400 | 1" | 5" | 2" | BALL | - | - | 318.04 | 304.22 | 290.39 | 276.56 |
| | 61548 | - | 1.000 | 1" | 25.400 | 1" | 5" | 2-1/2" | - | - | - | 287.47 | 274.97 | 262.47 | 249.97 |
| | 61550 | - | 1.000 | 1" | 25.400 | 1" | 5" | 2-1/2" | .030" | - | - | 318.04 | 304.22 | 290.39 | 276.56 |
| | 62915 | 62917 | 1.000 | 1" | 25.400 | 1" | 6" | 3" | - | - | - | 374.44 | 358.16 | 341.88 | 325.60 |
| | 61552 | - | 1.000 | 1" | 25.400 | 1" | 6" | 3-1/4" | .030" | - | - | 414.81 | 396.77 | 378.74 | 360.70 |
| | 61554 | - | 1.000 | 1" | 25.400 | 1" | 7" | 4-1/4" | .030" | - | - | 506.18 | 484.18 | 462.17 | 440.16 |
| | 61556 | - | 1.000 | 1" | 25.400 | 1" | 7" | 4-1/4" | .060" | - | - | 506.18 | 484.18 | 462.17 | 440.16 |
| | 61558 | - | 1.000 | 1" | 25.400 | 1" | 6" | 1-1/4" | .030" | 2-5/8" | .980" | 429.63 | 410.95 | 392.27 | 373.59 |
| | 63381 | 63380 | 1.000 | 1" | 25.400 | 1" | 6" | 1-1/4" | .035" | 3-1/4" | .980" | 429.63 | 410.95 | 392.27 | 373.59 |
| | 61560 | - | 1.000 | 1" | 25.400 | 1" | 6" | 1-1/4" | .060" | 3-1/4" | .980" | 429.63 | 410.95 | 392.27 | 373.59 |
| | 61562 | - | 1.000 | 1" | 25.400 | 1" | 7" | 1-1/4" | .030" | 4-1/4" | .980" | 521.00 | 498.34 | 475.69 | 453.04 |

## Series VRX-6

.2362" - .4724"
(6.000mm - 12.000mm)

# HIGH EFFICIENCY MILLING




| TOLERANCES | |
|---|---|
| $d_1$ | +.000" –.002" (+.000mm –.050mm) |
| $d_2$ | h6 |
| $r$ | +.001" –.001" (+.025 –.025mm) |

Recommended for inconel, pH materials, titanium and tool steels >40Rc

## Square End, Corner Radius

### AlTiN Coating

Solid submicron grain carbide end mill - center cutting

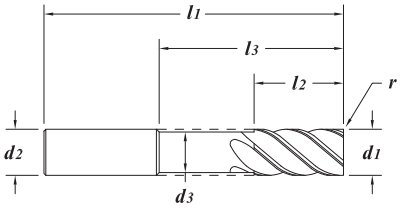
6 flutes for better finish and longer tool life

Reduces vibration for more aggressive machining resulting in less cycle times and greater productivity

Staggered flute geometry

Engineered for High Efficiency Milling






| EDP# | $d_1$ † Diameter Decimal | | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | $r$ Corner Radius | $l_3$ Reach Length | $d_3$ Neck Diameter | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 60101 | .2362 | | 6.000 | 6.0 | 65 | 20 | - | - | - | 22.46 | 21.48 | 20.51 | 19.53 |
| 60103 | .2362 | | 6.000 | 6.0 | 65 | 20 | 0.50 | - | - | 27.54 | 26.35 | 25.15 | 23.95 |
| 60100 | .2500 | 1/4" | 6.350 | 1/4" | 2-1/2" | 3/4" | - | - | - | 21.69 | 20.75 | 19.80 | 18.86 |
| 60102 | .2500 | 1/4" | 6.350 | 1/4" | 2-1/2" | 3/4" | .010" | - | - | 26.54 | 25.39 | 24.23 | 23.08 |
| 60104 | .2500 | 1/4" | 6.350 | 1/4" | 2-1/2" | 3/4" | .015" | - | - | 26.54 | 25.39 | 24.23 | 23.08 |
| 60105 | .2500 | 1/4" | 6.350 | 1/4" | 2-1/2" | 3/4" | .020" | - | - | 26.54 | 25.39 | 24.23 | 23.08 |
| 60106 | .2500 | 1/4" | 6.350 | 1/4" | 2-1/2" | 3/4" | .030" | - | - | 26.54 | 25.39 | 24.23 | 23.08 |
| 60162 | .3150 | | 8.000 | 8.0 | 65 | 22 | - | - | - | 32.05 | 30.66 | 29.26 | 27.87 |
| 60107 | .3150 | | 8.000 | 8.0 | 65 | 22 | 0.50 | - | - | 37.27 | 35.65 | 34.03 | 32.41 |
| 60109 | .3750 | 3/8" | 9.525 | 3/8" | 2" | 1/2" | - | - | - | 31.22 | 29.87 | 28.51 | 27.15 |
| 60111 | .3750 | 3/8" | 9.525 | 3/8" | 2" | 1/2" | .020" | - | - | 38.00 | 36.34 | 34.69 | 33.04 |
| 60108 | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 7/8" | - | - | - | 36.49 | 34.90 | 33.32 | 31.73 |
| 60110 | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 7/8" | .015" | - | - | 41.79 | 39.97 | 38.16 | 36.34 |
| 60113 | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 7/8" | .020" | - | - | 41.79 | 39.97 | 38.16 | 36.34 |
| 60112 | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 7/8" | .030" | - | - | 41.79 | 39.97 | 38.16 | 36.34 |
| 60114 | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 7/8" | .060" | - | - | 41.79 | 39.97 | 38.16 | 36.34 |
| 60184 | .3750 | 3/8" | 9.525 | 3/8" | 3" | 1-1/4" | .030" | - | - | 54.99 | 52.60 | 50.21 | 47.82 |
| 60164 | .3937 | | 10.000 | 10.0 | 70 | 22 | - | - | - | 43.76 | 41.86 | 39.95 | 38.05 |
| 60115 | .3937 | | 10.000 | 10.0 | 70 | 22 | 0.50 | - | - | 50.52 | 48.32 | 46.13 | 43.93 |
| 60117 | .3937 | | 10.000 | 10.0 | 70 | 22 | 1.00 | - | - | 50.52 | 48.32 | 46.13 | 43.93 |
| 60119 | .4724 | | 12.000 | 12.0 | 65 | 20 | - | - | - | 53.27 | 50.95 | 48.64 | 46.32 |
| 60121 | .4724 | | 12.000 | 12.0 | 65 | 20 | 0.50 | - | - | 66.22 | 63.34 | 60.46 | 57.58 |
| 60123 | .4724 | | 12.000 | 12.0 | 75 | 26 | - | - | - | 56.83 | 54.36 | 51.89 | 49.42 |
| 60125 | .4724 | | 12.000 | 12.0 | 75 | 26 | 0.75 | - | - | 73.88 | 70.66 | 67.45 | 64.24 |
| 60166 | .4724 | | 12.000 | 12.0 | 75 | 32 | - | - | - | 56.83 | 54.36 | 51.89 | 49.42 |
| 60127 | .4724 | | 12.000 | 12.0 | 75 | 32 | 0.50 | - | - | 73.88 | 70.66 | 67.45 | 64.24 |
| 60129 | .4724 | | 12.000 | 12.0 | 75 | 32 | 1.00 | - | - | 73.88 | 70.66 | 67.45 | 64.24 |





† *Metric equivalents are for reference only*

| EDP# | $d_1$ † Diameter Decimal | Diameter | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | $r$ Corner Radius | $l_3$ Reach Length | $d_3$ Neck Diameter | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 60131 | .5000 | 1/2" | 12.700 | 1/2" | 2-1/2" | 5/8" | - | - | - | 51.08 | 48.86 | 46.64 | 44.42 |
| 60185 | .5000 | 1/2" | 12.700 | 1/2" | 2-1/2" | 5/8" | .010" | - | - | 63.50 | 60.74 | 57.98 | 55.22 |
| 60157 | .5000 | 1/2" | 12.700 | 1/2" | 2-1/2" | 5/8" | .015" | - | - | 63.50 | 60.74 | 57.98 | 55.22 |
| 60133 | .5000 | 1/2" | 12.700 | 1/2" | 2-1/2" | 5/8" | .020" | - | - | 63.50 | 60.74 | 57.98 | 55.22 |
| 60159 | .5000 | 1/2" | 12.700 | 1/2" | 2-1/2" | 5/8" | .030" | - | - | 63.50 | 60.74 | 57.98 | 55.22 |
| 60189 | .5000 | 1/2" | 12.700 | 1/2" | 2-1/2" | 5/8" | .060" | - | - | 63.50 | 60.74 | 57.98 | 55.22 |
| 60186 | .5000 | 1/2" | 12.700 | 1/2" | 2-1/2" | 5/8" | .125" | - | - | 63.50 | 60.74 | 57.98 | 55.22 |
| 60135 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1" | - | - | - | 54.58 | 52.21 | 49.83 | 47.46 |
| 60201 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1" | .030" | - | - | 70.89 | 67.80 | 64.72 | 61.64 |
| 60116 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1-1/4" | - | - | - | 54.58 | 52.21 | 49.83 | 47.46 |
| 60118 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1-1/4" | .010" | - | - | 70.89 | 67.80 | 64.72 | 61.64 |
| 60120 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1-1/4" | .015" | - | - | 70.89 | 67.80 | 64.72 | 61.64 |
| 60122 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1-1/4" | .020" | - | - | 70.89 | 67.80 | 64.72 | 61.64 |
| 60124 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1-1/4" | .030" | - | - | 70.89 | 67.80 | 64.72 | 61.64 |
| 60126 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1-1/4" | .060" | - | - | 70.89 | 67.80 | 64.72 | 61.64 |
| 60128 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1-1/4" | .125" | - | - | 70.89 | 67.80 | 64.72 | 61.64 |
| 60137 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 1-1/2" | - | - | - | 73.85 | 70.64 | 67.43 | 64.22 |
| 60139 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 1-1/2" | .030" | - | - | 83.97 | 80.32 | 76.67 | 73.02 |
| 60190 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 1-5/8" | - | - | - | 73.85 | 70.64 | 67.43 | 64.22 |
| 60194 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 1-5/8" | .030" | - | - | 83.97 | 80.32 | 76.67 | 73.02 |
| 60196 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 1-5/8" | .060" | - | - | 83.97 | 80.32 | 76.67 | 73.02 |
| 60130 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 2-1/8" | - | - | - | 73.85 | 70.64 | 67.43 | 64.22 |
| 60132 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 2-1/8" | .010" | - | - | 83.97 | 80.32 | 76.67 | 73.02 |
| 60134 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 2-1/8" | .020" | - | - | 83.97 | 80.32 | 76.67 | 73.02 |
| 60136 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 2-1/8" | .030" | - | - | 83.97 | 80.32 | 76.67 | 73.02 |
| 60200 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 2-1/8" | .060" | - | - | 83.97 | 80.32 | 76.67 | 73.02 |
| 60141 | .6250 | 5/8" | 15.875 | 5/8" | 3" | 3/4" | - | - | - | 97.84 | 93.59 | 89.33 | 85.08 |
| 60143 | .6250 | 5/8" | 15.875 | 5/8" | 3" | 3/4" | .020" | - | - | 109.68 | 104.91 | 100.14 | 95.37 |
| 60138 | .6250 | 5/8" | 15.875 | 5/8" | 3-1/2" | 1-1/4" | - | - | - | 100.71 | 96.33 | 91.95 | 87.57 |
| 60140 | .6250 | 5/8" | 15.875 | 5/8" | 3-1/2" | 1-1/4" | .015" | - | - | 112.73 | 107.83 | 102.93 | 98.03 |
| 60145 | .6250 | 5/8" | 15.875 | 5/8" | 3-1/2" | 1-1/4" | .020" | - | - | 112.73 | 107.83 | 102.93 | 98.03 |
| 60142 | .6250 | 5/8" | 15.875 | 5/8" | 3-1/2" | 1-1/4" | .030" | - | - | 112.73 | 107.83 | 102.93 | 98.03 |
| 60144 | .6250 | 5/8" | 15.875 | 5/8" | 3-1/2" | 1-1/4" | .060" | - | - | 112.73 | 107.83 | 102.93 | 98.03 |
| 60146 | .6250 | 5/8" | 15.875 | 5/8" | 3-1/2" | 1-1/4" | .125" | - | - | 112.73 | 107.83 | 102.93 | 98.03 |
| 60148 | .6250 | 5/8" | 15.875 | 5/8" | 4" | 1-5/8" | - | - | - | 107.55 | 102.87 | 98.20 | 93.52 |
| 60150 | .6250 | 5/8" | 15.875 | 5/8" | 4" | 1-5/8" | .030" | - | - | 120.39 | 115.16 | 109.92 | 104.69 |
| 60168 | .6299 | | 16.000 | 16.0 | 88 | 32 | - | - | - | 105.05 | 100.49 | 95.92 | 91.35 |
| 60170 | .6299 | | 16.000 | 16.0 | 88 | 32 | 0.50 | - | - | 117.55 | 112.44 | 107.33 | 102.22 |
| 60174 | .6299 | | 16.000 | 16.0 | 100 | 40 | - | - | - | 111.71 | 106.85 | 102.00 | 97.14 |
| 60176 | .6299 | | 16.000 | 16.0 | 100 | 40 | 0.50 | - | - | 124.99 | 119.56 | 114.12 | 108.69 |
| 60180 | .6299 | | 16.000 | 16.0 | 100 | 32 | - | 50 | 14.50 | 122.29 | 116.97 | 111.66 | 106.34 |
| 60182 | .6299 | | 16.000 | 16.0 | 100 | 32 | 0.50 | 50 | 14.50 | 135.57 | 129.68 | 123.78 | 117.89 |
| 60152 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-1/2" | - | - | - | 143.75 | 137.50 | 131.25 | 125.00 |
| 60154 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-1/2" | .015" | - | - | 161.33 | 154.32 | 147.30 | 140.29 |
| 60147 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-1/2" | .020" | - | - | 161.33 | 154.32 | 147.30 | 140.29 |
| 60156 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-1/2" | .030" | - | - | 161.33 | 154.32 | 147.30 | 140.29 |
| 60158 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-1/2" | .060" | - | - | 161.33 | 154.32 | 147.30 | 140.29 |
| 60160 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-1/2" | .125" | - | - | 161.33 | 154.32 | 147.30 | 140.29 |
| 60149 | .7500 | 3/4" | 19.050 | 3/4" | 6" | 3" | - | - | - | 225.79 | 215.97 | 206.16 | 196.34 |
| 60151 | .7500 | 3/4" | 19.050 | 3/4" | 6" | 3" | .030" | - | - | 262.61 | 251.20 | 239.78 | 228.36 |
| 60188 | 1.000 | 1" | 25.400 | 1" | 4" | 1-1/2" | .125" | - | - | 274.83 | 262.88 | 250.93 | 238.98 |
| 60153 | 1.000 | 1" | 25.400 | 1" | 6" | 3" | .030" | - | - | 436.63 | 417.65 | 398.66 | 379.68 |
| 60155 | 1.000 | 1" | 25.400 | 1" | 7" | 1-1/4" | - | 4-1/8" | .980" | 471.50 | 451.00 | 430.50 | 410.00 |

# CAM Tool Libraries

## Download Tool Libraries Now

Mastercam

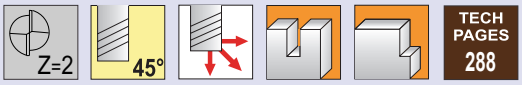
AUTODESK® FUSION 360™

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Smart Manufacturing

| TOLERANCES | |
|---|---|
| $d_1$ | +.000" –.001" (+.000 –.025mm) |
| $d_2$ | h6 |

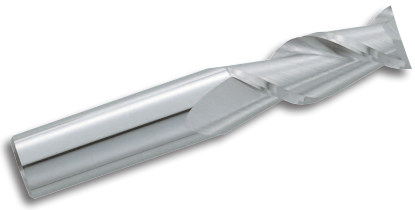


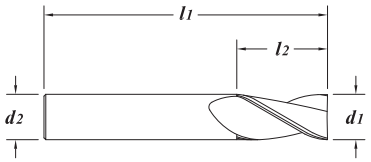

TECH PAGES 288

Recommended for aluminum and titanium

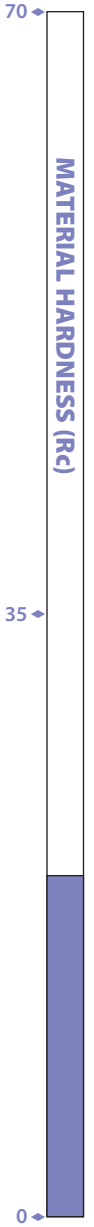
## Square End

Solid submicron grain carbide end mill - center cutting
High performance machining
Rigid work holding, machine stability and part integrity are critical!
Excellent choice for slotting
Polished cylindrical O.D. margin reduces chatter
Sharp corners (Can be modified with a corner radius)
Designed for spindles between 3,000-8,000 RPM, 1% diameter for chip load



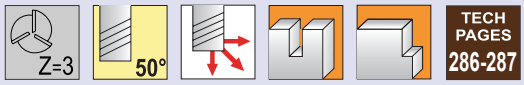



| EDP# | $d_1$ † Diameter Decimal | Diameter | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|
| 08910 | .1181 | | 3.000 | 3.0 | 38 | 8 | 12.09 | 11.56 | 11.04 | 10.51 |
| 08920 | .1181 | | 3.000 | 3.0 | 50 | 12 | 14.57 | 13.94 | 13.30 | 12.67 |
| 85160 | .1250 | 1/8" | 3.175 | 1/8" | 1-1/2" | 1/4" | 11.35 | 10.86 | 10.36 | 9.87 |
| 85170 | .1250 | 1/8" | 3.175 | 1/8" | 2" | 1/2" | 13.67 | 13.08 | 12.48 | 11.89 |
| 08950 | .1575 | | 4.000 | 6.0 | 50 | 8 | 19.65 | 18.80 | 17.94 | 17.09 |
| 08960 | .1575 | | 4.000 | 6.0 | 50 | 12 | 19.65 | 18.80 | 17.94 | 17.09 |
| 85180 | .1875 | 3/16" | 4.763 | 3/16" | 2" | 5/16" | 14.17 | 13.55 | 12.94 | 12.32 |
| 85190 | .1875 | 3/16" | 4.763 | 3/16" | 2" | 9/16" | 14.17 | 13.55 | 12.94 | 12.32 |
| 08990 | .1969 | | 5.000 | 6.0 | 50 | 10 | 18.50 | 17.70 | 16.89 | 16.09 |
| 09000 | .1969 | | 5.000 | 6.0 | 65 | 15 | 20.57 | 19.68 | 18.78 | 17.89 |
| 09010 | .2362 | | 6.000 | 6.0 | 50 | 12 | 15.76 | 15.07 | 14.39 | 13.70 |
| 09020 | .2362 | | 6.000 | 6.0 | 65 | 25 | 16.93 | 16.19 | 15.46 | 14.72 |
| 09030 | .2362 | | 6.000 | 6.0 | 100 | 50 | 30.68 | 29.35 | 28.01 | 26.68 |
| 85200 | .2500 | 1/4" | 6.350 | 1/4" | 2" | 1/2" | 14.93 | 14.28 | 13.63 | 12.98 |
| 85220 | .2500 | 1/4" | 6.350 | 1/4" | 2-1/2" | 1" | 16.13 | 15.43 | 14.73 | 14.03 |
| 85240 | .2500 | 1/4" | 6.350 | 1/4" | 4" | 2" | 29.14 | 27.87 | 26.61 | 25.34 |
| 85300 | .3125 | 5/16" | 7.938 | 5/16" | 3" | 1-1/8" | 34.06 | 32.58 | 31.10 | 29.62 |
| 09240 | .3150 | | 8.000 | 8.0 | 65 | 20 | 23.76 | 22.73 | 21.69 | 20.66 |
| 09040 | .3150 | | 8.000 | 8.0 | 75 | 30 | 35.89 | 34.33 | 32.77 | 31.21 |
| 09050 | .3150 | | 8.000 | 8.0 | 100 | 50 | 40.03 | 38.29 | 36.55 | 34.81 |
| 85400 | .3750 | 3/8" | 9.525 | 3/8" | 2" | 5/8" | 25.22 | 24.12 | 23.03 | 21.93 |
| 85420 | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 1" | 28.18 | 26.95 | 25.73 | 24.50 |
| 85440 | .3750 | 3/8" | 9.525 | 3/8" | 4" | 2" | 42.10 | 40.27 | 38.44 | 36.61 |
| 09060 | .3937 | | 10.000 | 10.0 | 50 | 16 | 29.35 | 28.07 | 26.80 | 25.52 |
| 09070 | .3937 | | 10.000 | 10.0 | 70 | 25 | 34.30 | 32.81 | 31.32 | 29.83 |
| 09080 | .3937 | | 10.000 | 10.0 | 100 | 50 | 53.65 | 51.32 | 48.98 | 46.65 |
| 09090 | .4724 | | 12.000 | 12.0 | 65 | 20 | 43.84 | 41.93 | 40.03 | 38.12 |
| 09100 | .4724 | | 12.000 | 12.0 | 75 | 32 | 47.40 | 45.34 | 43.28 | 41.22 |
| 09110 | .4724 | | 12.000 | 12.0 | 100 | 50 | 65.30 | 62.46 | 59.62 | 56.78 |
| 85500 | .5000 | 1/2" | 12.700 | 1/2" | 2-1/2" | 3/4" | 41.40 | 39.60 | 37.80 | 36.00 |
| 85520 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1-1/4" | 45.14 | 43.18 | 41.21 | 39.25 |
| 85540 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 2" | 61.61 | 58.93 | 56.25 | 53.57 |
| 85600 | .6250 | 5/8" | 15.875 | 5/8" | 3-1/2" | 1-5/8" | 87.04 | 83.26 | 79.47 | 75.69 |
| 85620 | .6250 | 5/8" | 15.875 | 5/8" | 6" | 3" | 126.98 | 121.46 | 115.94 | 110.42 |
| 09120 | .6299 | | 16.000 | 16.0 | 88 | 40 | 91.39 | 87.42 | 83.44 | 79.47 |
| 09130 | .6299 | | 16.000 | 16.0 | 150 | 75 | 126.98 | 121.46 | 115.94 | 110.42 |
| 09140 | .7087 | | 18.000 | 18.0 | 100 | 45 | 134.02 | 128.19 | 122.37 | 116.54 |
| 85700 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-3/4" | 127.63 | 122.08 | 116.53 | 110.98 |
| 85720 | .7500 | 3/4" | 19.050 | 3/4" | 6" | 3" | 202.29 | 193.49 | 184.70 | 175.90 |
| 09350 | .7874 | | 20.000 | 20.0 | 100 | 38 | 170.38 | 162.98 | 155.57 | 148.16 |
| 09150 | .7874 | | 20.000 | 20.0 | 150 | 75 | 213.10 | 203.83 | 194.57 | 185.30 |
| 09160 | .9843 | | 25.000 | 25.0 | 100 | 45 | 197.94 | 189.33 | 180.73 | 172.12 |
| 09170 | .9843 | | 25.000 | 25.0 | 150 | 75 | 328.37 | 314.09 | 299.82 | 285.54 |
| 85800 | 1.000 | 1" | 25.400 | 1" | 4" | 1-3/4" | 190.90 | 182.60 | 174.30 | 166.00 |
| 85820 | 1.000 | 1" | 25.400 | 1" | 6" | 3" | 343.91 | 328.96 | 314.00 | 299.05 |



# Series 253MA, 853MA

.1181" - .5512"
(3.000mm - 14.000mm)




| TOLERANCES | |
|---|---|
| $d_1$ | +.000" –.002" (+.000 –.050mm) |
| $d_2$ | h6 |

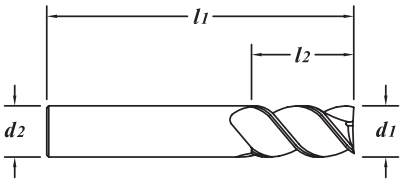
Recommended for stainless steel



## Square End

### AlTiN Coating

Solid submicron grain carbide end mill - center cutting
High performance machining
Rigid work holding, machine stability and part integrity are critical!
Dry or semi-dry machining
Slots stainless steel at an axial depth of 25% of diameter
Sharp corners (Can be modified with a corner radius)
Bright Finish - page 182
TiCN Coated - page 184






| EDP# | $d_1$ † Diameter Decimal | Diameter | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|
| 10347 | .1181 | | 3.000 | 3.0 | 38 | 8 | 14.81 | 14.17 | 13.52 | 12.88 |
| 10357 | .1181 | | 3.000 | 3.0 | 50 | 12 | 17.85 | 17.07 | 16.30 | 15.52 |
| 86137 | .1250 | 1/8" | 3.175 | 1/8" | 1-1/2" | 1/4" | 14.06 | 13.45 | 12.84 | 12.23 |
| 86147 | .1250 | 1/8" | 3.175 | 1/8" | 2" | 1/2" | 16.96 | 16.23 | 15.49 | 14.75 |
| 10387 | .1575 | | 4.000 | 6.0 | 50 | 8 | 23.93 | 22.89 | 21.85 | 20.81 |
| 10397 | .1575 | | 4.000 | 6.0 | 50 | 12 | 23.93 | 22.89 | 21.85 | 20.81 |
| 86157 | .1875 | 3/16" | 4.763 | 3/16" | 2" | 5/16" | 16.08 | 15.38 | 14.68 | 13.98 |
| 86167 | .1875 | 3/16" | 4.763 | 3/16" | 2" | 9/16" | 16.08 | 15.38 | 14.68 | 13.98 |
| 86187 | .1875 | 3/16" | 4.763 | 3/16" | 3" | 1" | 28.04 | 26.82 | 25.60 | 24.38 |
| 10407 | .1969 | | 5.000 | 5.0 | 50 | 8 | 19.06 | 18.23 | 17.40 | 16.57 |
| 10417 | .1969 | | 5.000 | 5.0 | 50 | 14 | 19.06 | 18.23 | 17.40 | 16.57 |
| 10507 | .1969 | | 5.000 | 6.0 | 50 | 8 | 23.44 | 22.42 | 21.40 | 20.38 |
| 10517 | .1969 | | 5.000 | 6.0 | 65 | 16 | 25.60 | 24.49 | 23.37 | 22.26 |
| 10017 | .2362 | | 6.000 | 6.0 | 50 | 12 | 19.93 | 19.06 | 18.20 | 17.33 |
| 10027 | .2362 | | 6.000 | 6.0 | 65 | 19 | 22.46 | 21.48 | 20.51 | 19.53 |
| 10037 | .2362 | | 6.000 | 6.0 | 75 | 32 | 34.63 | 33.12 | 31.62 | 30.11 |
| 86207 | .2500 | 1/4" | 6.350 | 1/4" | 2" | 1/2" | 19.12 | 18.29 | 17.46 | 16.63 |
| 86227 | .2500 | 1/4" | 6.350 | 1/4" | 2-1/2" | 3/4" | 21.69 | 20.75 | 19.80 | 18.86 |
| 86247 | .2500 | 1/4" | 6.350 | 1/4" | 3" | 1-1/4" | 33.15 | 31.71 | 30.27 | 28.83 |
| 86267 | .3125 | 5/16" | 7.938 | 5/16" | 2" | 7/16" | 26.43 | 25.28 | 24.13 | 22.98 |
| 86277 | .3125 | 5/16" | 7.938 | 5/16" | 2-1/2" | 13/16" | 30.92 | 29.58 | 28.23 | 26.89 |
| 86287 | .3125 | 5/16" | 7.938 | 5/16" | 4" | 1-1/4" | 48.58 | 46.46 | 44.35 | 42.24 |
| 10427 | .3150 | | 8.000 | 8.0 | 50 | 11 | 27.52 | 26.32 | 25.13 | 23.93 |
| 10047 | .3150 | | 8.000 | 8.0 | 65 | 20 | 32.05 | 30.66 | 29.26 | 27.87 |
| 10057 | .3150 | | 8.000 | 8.0 | 75 | 32 | 44.18 | 42.26 | 40.34 | 38.42 |
| 86307 | .3750 | 3/8" | 9.525 | 3/8" | 2" | 1/2" | 31.22 | 29.87 | 28.51 | 27.15 |
| 86327 | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 1" | 36.49 | 34.90 | 33.32 | 31.73 |
| 86347 | .3750 | 3/8" | 9.525 | 3/8" | 3-1/2" | 1-1/2" | 52.66 | 50.37 | 48.08 | 45.79 |
| 10067 | .3937 | | 10.000 | 10.0 | 50 | 12 | 36.14 | 34.57 | 33.00 | 31.43 |
| 10077 | .3937 | | 10.000 | 10.0 | 75 | 25 | 51.05 | 48.83 | 46.61 | 44.39 |
| 10087 | .3937 | | 10.000 | 10.0 | 88 | 38 | 64.63 | 61.82 | 59.01 | 56.20 |
| 86367 | .4375 | 7/16" | 11.113 | 7/16" | 2-1/2" | 9/16" | 43.87 | 41.97 | 40.06 | 38.15 |
| 86377 | .4375 | 7/16" | 11.113 | 7/16" | 2-3/4" | 1" | 43.87 | 41.97 | 40.06 | 38.15 |
| 86387 | .4375 | 7/16" | 11.113 | 7/16" | 4" | 2" | 70.15 | 67.10 | 64.05 | 61.00 |
| 10097 | .4724 | | 12.000 | 12.0 | 65 | 16 | 53.27 | 50.95 | 48.64 | 46.32 |
| 10107 | .4724 | | 12.000 | 12.0 | 75 | 26 | 56.83 | 54.36 | 51.89 | 49.42 |
| 10117 | .4724 | | 12.000 | 12.0 | 100 | 50 | 77.57 | 74.20 | 70.82 | 67.45 |
| 86407 | .5000 | 1/2" | 12.700 | 1/2" | 2-1/2" | 5/8" | 51.08 | 48.86 | 46.64 | 44.42 |
| 86427 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1" | 54.58 | 52.21 | 49.83 | 47.46 |
| 86447 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 2" | 73.85 | 70.64 | 67.43 | 64.22 |
| 10437 | .5512 | | 14.000 | 14.0 | 65 | 16 | 79.55 | 76.09 | 72.63 | 69.17 |
| 10447 | .5512 | | 14.000 | 14.0 | 75 | 25 | 85.17 | 81.47 | 77.76 | 74.06 |
| 10457 | .5512 | | 14.000 | 14.0 | 100 | 50 | 103.37 | 98.88 | 94.38 | 89.89 |

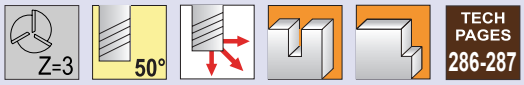


† *Metric equivalents are for reference only*

| EDP# | $d_1$ † Diameter Decimal | Diameter | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|
| 86467 | .5625 | 9/16" | 14.288 | 9/16" | 3" | 7/8" | 85.41 | 81.70 | 77.98 | 74.27 |
| 86477 | .5625 | 9/16" | 14.288 | 9/16" | 3-1/2" | 1-1/4" | 90.76 | 86.81 | 82.87 | 78.92 |
| 86507 | .6250 | 5/8" | 15.875 | 5/8" | 3" | 7/8" | 90.56 | 86.63 | 82.69 | 78.75 |
| 86527 | .6250 | 5/8" | 15.875 | 5/8" | 3-1/2" | 1-1/4" | 100.71 | 96.33 | 91.95 | 87.57 |
| 86547 | .6250 | 5/8" | 15.875 | 5/8" | 6" | 2-1/2" | 147.28 | 140.88 | 134.47 | 128.07 |
| 10137 | .6299 | | 16.000 | 16.0 | 88 | 32 | 60.81 | 58.17 | 55.52 | 52.88 |
| 10147 | .6299 | | 16.000 | 16.0 | 150 | 65 | 147.28 | 140.88 | 134.47 | 128.07 |
| 10167 | .7087 | | 18.000 | 18.0 | 100 | 38 | 150.12 | 143.59 | 137.07 | 130.54 |
| 86607 | .7500 | 3/4" | 19.050 | 3/4" | 3-1/2" | 1" | 143.75 | 137.50 | 131.25 | 125.00 |
| 86627 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-1/2" | 143.75 | 137.50 | 131.25 | 125.00 |
| 86647 | .7500 | 3/4" | 19.050 | 3/4" | 6" | 3" | 225.79 | 215.97 | 206.16 | 196.34 |
| 10187 | .7874 | | 20.000 | 20.0 | 100 | 38 | 194.21 | 185.77 | 177.32 | 168.88 |
| 10197 | .7874 | | 20.000 | 20.0 | 150 | 75 | 243.62 | 233.02 | 222.43 | 211.84 |
| 86697 | 1.000 | 1" | 25.400 | 1" | 4" | 1-1/8" | 214.75 | 205.41 | 196.08 | 186.74 |
| 86727 | 1.000 | 1" | 25.400 | 1" | 4" | 2" | 214.75 | 205.41 | 196.08 | 186.74 |
| 86747 | 1.000 | 1" | 25.400 | 1" | 6" | 3-1/4" | 374.44 | 358.16 | 341.88 | 325.60 |

# Series 253M, 853M

.1181" - .5512"
(3.000mm - 14.000mm)




| TOLERANCES | |
|---|---|
| $d_1$ | +.000" –.002" (+.000 –.050mm) |
| $d_2$ | h6 |

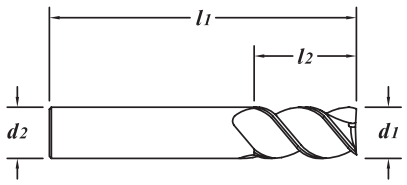
Recommended for aluminum and stainless steel



## Square End

### Bright Finish

Solid submicron grain carbide end mill - center cutting
High performance machining
Rigid work holding, machine stability and part integrity are critical!
Slots aluminum at an axial depth of 25% of diameter
Sharp corners (Can be modified with a corner radius)
AlTiN Coating - page 180
TiCN Coated - page 184




MATERIAL HARDNESS (Rc)
70
35
0

| EDP# | $d_1$ † Diameter Decimal | Diameter | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|
| 10340 | .1181 | | 3.000 | 3.0 | 38 | 8 | 12.09 | 11.56 | 11.04 | 10.51 |
| 10350 | .1181 | | 3.000 | 3.0 | 50 | 12 | 14.57 | 13.94 | 13.30 | 12.67 |
| 86130 | .1250 | 1/8" | 3.175 | 1/8" | 1-1/2" | 1/4" | 11.35 | 10.86 | 10.36 | 9.87 |
| 86140 | .1250 | 1/8" | 3.175 | 1/8" | 2" | 1/2" | 13.67 | 13.08 | 12.48 | 11.89 |
| 10380 | .1575 | | 4.000 | 6.0 | 50 | 8 | 19.65 | 18.80 | 17.94 | 17.09 |
| 10390 | .1575 | | 4.000 | 6.0 | 50 | 12 | 19.65 | 18.80 | 17.94 | 17.09 |
| 86150 | .1875 | 3/16" | 4.763 | 3/16" | 2" | 5/16" | 13.37 | 12.79 | 12.21 | 11.63 |
| 86160 | .1875 | 3/16" | 4.763 | 3/16" | 2" | 9/16" | 13.37 | 12.79 | 12.21 | 11.63 |
| 86180 | .1875 | 3/16" | 4.763 | 3/16" | 3" | 1" | 23.84 | 22.80 | 21.77 | 20.73 |
| 10400 | .1969 | | 5.000 | 5.0 | 50 | 8 | 14.86 | 14.21 | 13.57 | 12.92 |
| 10410 | .1969 | | 5.000 | 5.0 | 50 | 14 | 14.86 | 14.21 | 13.57 | 12.92 |
| 10010 | .2362 | | 6.000 | 6.0 | 50 | 12 | 15.76 | 15.07 | 14.39 | 13.70 |
| 10020 | .2362 | | 6.000 | 6.0 | 65 | 19 | 16.93 | 16.19 | 15.46 | 14.72 |
| 10030 | .2362 | | 6.000 | 6.0 | 75 | 32 | 29.06 | 27.80 | 26.53 | 25.27 |
| 86200 | .2500 | 1/4" | 6.350 | 1/4" | 2" | 1/2" | 14.93 | 14.28 | 13.63 | 12.98 |
| 86220 | .2500 | 1/4" | 6.350 | 1/4" | 2-1/2" | 3/4" | 16.13 | 15.43 | 14.73 | 14.03 |
| 86240 | .2500 | 1/4" | 6.350 | 1/4" | 3" | 1-1/4" | 27.62 | 26.42 | 25.22 | 24.02 |
| 86260 | .3125 | 5/16" | 7.938 | 5/16" | 2" | 7/16" | 20.41 | 19.53 | 18.64 | 17.75 |
| 86270 | .3125 | 5/16" | 7.938 | 5/16" | 2-1/2" | 13/16" | 22.63 | 21.65 | 20.66 | 19.68 |
| 86280 | .3125 | 5/16" | 7.938 | 5/16" | 4" | 1-1/4" | 38.01 | 36.36 | 34.70 | 33.05 |
| 10420 | .3150 | | 8.000 | 8.0 | 50 | 11 | 21.53 | 20.59 | 19.66 | 18.72 |
| 10040 | .3150 | | 8.000 | 8.0 | 65 | 20 | 23.76 | 22.73 | 21.69 | 20.66 |
| 10050 | .3150 | | 8.000 | 8.0 | 75 | 32 | 35.89 | 34.33 | 32.77 | 31.21 |
| 86300 | .3750 | 3/8" | 9.525 | 3/8" | 2" | 1/2" | 25.22 | 24.12 | 23.03 | 21.93 |
| 86320 | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 1" | 28.18 | 26.95 | 25.73 | 24.50 |
| 86340 | .3750 | 3/8" | 9.525 | 3/8" | 3-1/2" | 1-1/2" | 42.10 | 40.27 | 38.44 | 36.61 |
| 10060 | .3937 | | 10.000 | 10.0 | 50 | 12 | 29.35 | 28.07 | 26.80 | 25.52 |
| 10070 | .3937 | | 10.000 | 10.0 | 75 | 25 | 41.61 | 39.80 | 37.99 | 36.18 |
| 10080 | .3937 | | 10.000 | 10.0 | 88 | 38 | 52.41 | 50.13 | 47.85 | 45.57 |
| 86360 | .4375 | 7/16" | 11.113 | 7/16" | 2-1/2" | 9/16" | 34.40 | 32.90 | 31.41 | 29.91 |
| 86370 | .4375 | 7/16" | 11.113 | 7/16" | 2-3/4" | 1" | 34.40 | 32.90 | 31.41 | 29.91 |
| 86380 | .4375 | 7/16" | 11.113 | 7/16" | 4" | 2" | 57.93 | 55.41 | 52.89 | 50.37 |
| 10090 | .4724 | | 12.000 | 12.0 | 65 | 16 | 43.84 | 41.93 | 40.03 | 38.12 |
| 10100 | .4724 | | 12.000 | 12.0 | 75 | 26 | 47.40 | 45.34 | 43.28 | 41.22 |
| 10110 | .4724 | | 12.000 | 12.0 | 100 | 50 | 65.30 | 62.46 | 59.62 | 56.78 |
| 86400 | .5000 | 1/2" | 12.700 | 1/2" | 2-1/2" | 5/8" | 41.63 | 39.82 | 38.01 | 36.20 |
| 86420 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1" | 45.14 | 43.18 | 41.21 | 39.25 |
| 86440 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 2" | 61.61 | 58.93 | 56.25 | 53.57 |
| 10430 | .5512 | | 14.000 | 14.0 | 65 | 16 | 68.57 | 65.59 | 62.61 | 59.63 |
| 10440 | .5512 | | 14.000 | 14.0 | 75 | 25 | 74.19 | 70.96 | 67.74 | 64.51 |
| 10450 | .5512 | | 14.000 | 14.0 | 100 | 50 | 89.70 | 85.80 | 81.90 | 78.00 |

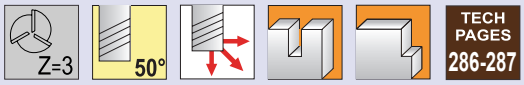


† *Metric equivalents are for reference only*

| EDP# | $d_1$ † Diameter Decimal | Diameter | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|
| 86460 | .5625 | 9/16" | 14.288 | 9/16" | 3" | 7/8" | 74.45 | 71.21 | 67.98 | 64.74 |
| 86470 | .5625 | 9/16" | 14.288 | 9/16" | 3-1/2" | 1-1/4" | 77.08 | 73.73 | 70.38 | 67.03 |
| 86480 | .5625 | 9/16" | 14.288 | 9/16" | 6" | 2-1/2" | 116.96 | 111.87 | 106.79 | 101.70 |
| 86500 | .6250 | 5/8" | 15.875 | 5/8" | 3" | 7/8" | 79.60 | 76.14 | 72.68 | 69.22 |
| 86520 | .6250 | 5/8" | 15.875 | 5/8" | 3-1/2" | 1-1/4" | 87.04 | 83.26 | 79.47 | 75.69 |
| 86540 | .6250 | 5/8" | 15.875 | 5/8" | 6" | 2-1/2" | 126.98 | 121.46 | 115.94 | 110.42 |
| 10120 | .6299 | | 16.000 | 16.0 | 75 | 20 | 83.78 | 80.14 | 76.49 | 72.85 |
| 10130 | .6299 | | 16.000 | 16.0 | 88 | 32 | 91.39 | 87.42 | 83.44 | 79.47 |
| 10140 | .6299 | | 16.000 | 16.0 | 150 | 65 | 126.98 | 121.46 | 115.94 | 110.42 |
| 10160 | .7087 | | 18.000 | 18.0 | 100 | 38 | 134.00 | 128.17 | 122.35 | 116.52 |
| 10170 | .7087 | | 18.000 | 18.0 | 150 | 75 | 190.90 | 182.60 | 174.30 | 166.00 |
| 86600 | .7500 | 3/4" | 19.050 | 3/4" | 3-1/2" | 1" | 127.63 | 122.08 | 116.53 | 110.98 |
| 86620 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-1/2" | 127.63 | 122.08 | 116.53 | 110.98 |
| 86640 | .7500 | 3/4" | 19.050 | 3/4" | 6" | 3" | 202.29 | 193.49 | 184.70 | 175.90 |
| 10460 | .7874 | | 20.000 | 20.0 | 75 | 22 | 155.25 | 148.50 | 141.75 | 135.00 |
| 10180 | .7874 | | 20.000 | 20.0 | 100 | 38 | 170.38 | 162.98 | 155.57 | 148.16 |
| 10190 | .7874 | | 20.000 | 20.0 | 150 | 75 | 213.10 | 203.83 | 194.57 | 185.30 |
| 10480 | .9843 | | 25.000 | 25.0 | 100 | 50 | 197.94 | 189.33 | 180.73 | 172.12 |
| 10490 | .9843 | | 25.000 | 25.0 | 150 | 82 | 328.37 | 314.09 | 299.82 | 285.54 |
| 86690 | 1.000 | 1" | 25.400 | 1" | 4" | 1-1/8" | 190.90 | 182.60 | 174.30 | 166.00 |
| 86720 | 1.000 | 1" | 25.400 | 1" | 4" | 2" | 190.90 | 182.60 | 174.30 | 166.00 |
| 86740 | 1.000 | 1" | 25.400 | 1" | 6" | 3-1/4" | 343.91 | 328.96 | 314.00 | 299.05 |

# Series 253MC

| TOLERANCES | |
|---|---|
| $d_1$ | +.000" –.002" (+.000 –.050mm) |
| $d_2$ | h6 |



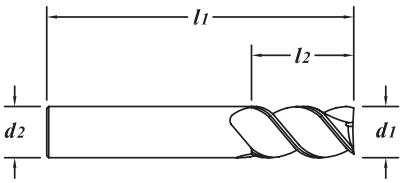

Recommended for aluminum and 303 stainless steel

## Square End

### TiCN Coated

Solid submicron grain carbide end mill - center cutting
High performance machining
Rigid work holding, machine stability and part integrity are critical!
Improved abrasion resistance and lubricity
Slots aluminum and stainless steel at an axial depth of 25% of diameter
Sharp corners (Can be modified with a corner radius)
AlTiN Coating - page 180
Bright Finish - page 182







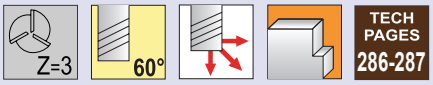

| EDP# | $d_1$ † Diameter Decimal | Diameter | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|
| 86154 | .1875 | 3/16" | 4.763 | 3/16" | 2" | 5/16" | 15.76 | 15.07 | 14.39 | 13.70 |
| 86164 | .1875 | 3/16" | 4.763 | 3/16" | 2" | 9/16" | 15.76 | 15.07 | 14.39 | 13.70 |
| 86184 | .1875 | 3/16" | 4.763 | 3/16" | 3" | 1" | 27.16 | 25.98 | 24.80 | 23.62 |
| 86204 | .2500 | 1/4" | 6.350 | 1/4" | 2" | 1/2" | 18.27 | 17.48 | 16.68 | 15.89 |
| 86224 | .2500 | 1/4" | 6.350 | 1/4" | 2-1/2" | 3/4" | 20.95 | 20.04 | 19.13 | 18.22 |
| 86244 | .2500 | 1/4" | 6.350 | 1/4" | 3" | 1-1/4" | 32.42 | 31.01 | 29.60 | 28.19 |
| 86264 | .3125 | 5/16" | 7.938 | 5/16" | 2" | 7/16" | 25.63 | 24.52 | 23.40 | 22.29 |
| 86274 | .3125 | 5/16" | 7.938 | 5/16" | 2-1/2" | 13/16" | 29.06 | 27.80 | 26.53 | 25.27 |
| 86284 | .3125 | 5/16" | 7.938 | 5/16" | 4" | 1-1/4" | 46.02 | 44.02 | 42.02 | 40.02 |
| 86304 | .3750 | 3/8" | 9.525 | 3/8" | 2" | 1/2" | 30.44 | 29.12 | 27.79 | 26.47 |
| 86324 | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 1" | 33.40 | 31.94 | 30.49 | 29.04 |
| 86344 | .3750 | 3/8" | 9.525 | 3/8" | 3-1/2" | 1-1/2" | 50.07 | 47.89 | 45.72 | 43.54 |
| 86364 | .4375 | 7/16" | 11.113 | 7/16" | 2-1/2" | 9/16" | 42.14 | 40.30 | 38.47 | 36.64 |
| 86374 | .4375 | 7/16" | 11.113 | 7/16" | 2-3/4" | 1" | 42.14 | 40.30 | 38.47 | 36.64 |
| 86384 | .4375 | 7/16" | 11.113 | 7/16" | 4" | 2" | 67.56 | 64.63 | 61.69 | 58.75 |
| 86404 | .5000 | 1/2" | 12.700 | 1/2" | 2-1/2" | 5/8" | 49.36 | 47.21 | 45.07 | 42.92 |
| 86424 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1" | 52.85 | 50.56 | 48.26 | 45.96 |
| 86444 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 2" | 71.27 | 68.17 | 65.07 | 61.97 |
| 86464 | .5625 | 9/16 | 14.288 | 9/16" | 3" | 7/8" | 84.84 | 81.15 | 77.46 | 73.77 |
| 86474 | .5625 | 9/16 | 14.288 | 9/16" | 3-1/2" | 1-1/4" | 89.13 | 85.25 | 81.38 | 77.50 |
| 86484 | .5625 | 9/16 | 14.288 | 9/16" | 6" | 2-1/2" | 133.83 | 128.01 | 122.19 | 116.37 |
| 86504 | .6250 | 5/8" | 15.875 | 5/8" | 3" | 7/8" | 89.98 | 86.06 | 82.15 | 78.24 |
| 86524 | .6250 | 5/8" | 15.875 | 5/8" | 3-1/2" | 1-1/4" | 99.06 | 94.75 | 90.45 | 86.14 |
| 86544 | .6250 | 5/8" | 15.875 | 5/8" | 6" | 2-1/2" | 143.85 | 137.60 | 131.34 | 125.09 |
| 86604 | .7500 | 3/4" | 19.050 | 3/4" | 3-1/2" | 1" | 141.40 | 135.26 | 129.11 | 122.96 |
| 86624 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-1/2" | 141.40 | 135.26 | 129.11 | 122.96 |
| 86644 | .7500 | 3/4" | 19.050 | 3/4" | 6" | 3" | 221.55 | 211.92 | 202.28 | 192.65 |
| 86694 | 1.000 | 1" | 25.400 | 1" | 4" | 1-1/8" | 211.62 | 202.42 | 193.22 | 184.02 |
| 86724 | 1.000 | 1" | 25.400 | 1" | 4" | 2" | 211.62 | 202.42 | 193.22 | 184.02 |
| 86744 | 1.000 | 1" | 25.400 | 1" | 6" | 3-1/4" | 371.15 | 355.01 | 338.88 | 322.74 |



† *Metric equivalents are for reference only*

| TOLERANCES | |
|---|---|
| $d_1$ | +.000" –.002" (+.000 –.050mm) |
| $d_2$ | h6 |

# Series 263M, 263MC, 263MA, 863MA




TECH PAGES 286-287

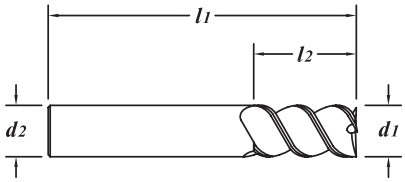
Recommended for steels, stainless steel, high-temperature alloys



## Square End

### Bright Finish, TiCN, or AlTiN Coating

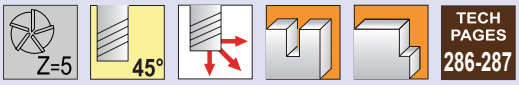
Solid submicron grain carbide end mill - center cutting
High performance profiling
Rigid work holding, machine stability and part integrity are critical!
Modified end gash - will not cut square corner
Can be modified with a corner radius




| (263M) BRIGHT EDP# | (263MC) TiCN EDP# | (263MA/863MA) AlTiN EDP# | $d_1$ † Diameter Decimal | $d_1$ † Diameter | $d_1$ † Diameter Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 23010 | - | - | .2500 | 1/4" | 6.350 | 1/4" | 2-1/2" | 3/4" | 16.13 | 15.43 | 14.73 | 14.03 |
| 23020 | - | - | .3125 | 5/16" | 7.938 | 5/16" | 2-1/2" | 7/8" | 22.63 | 21.65 | 20.66 | 19.68 |
| 23030 | - | - | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 7/8" | 28.18 | 26.95 | 25.73 | 24.50 |
| 23040 | - | - | .4375 | 7/16" | 11.113 | 7/16" | 2-3/4" | 1" | 34.40 | 32.90 | 31.41 | 29.91 |
| 23050 | - | - | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1" | 45.14 | 43.18 | 41.21 | 39.25 |
| 23060 | - | - | .6250 | 5/8" | 15.875 | 5/8" | 3-1/2" | 1-1/4" | 87.04 | 83.26 | 79.47 | 75.69 |
| 23070 | - | - | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-1/2" | 127.63 | 122.08 | 116.53 | 110.98 |
| 23080 | - | - | 1.000 | 1" | 25.400 | 1" | 4" | 1-1/2" | 190.90 | 182.60 | 174.30 | 166.00 |
| - | 23014 | - | .2500 | 1/4" | 6.350 | 1/4" | 2-1/2" | 3/4" | 20.95 | 20.04 | 19.13 | 18.22 |
| - | 23024 | - | .3125 | 5/16" | 7.938 | 5/16" | 2-1/2" | 7/8" | 29.06 | 27.80 | 26.53 | 25.27 |
| - | 23034 | - | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 7/8" | 34.63 | 33.12 | 31.62 | 30.11 |
| - | 23044 | - | .4375 | 7/16" | 11.113 | 7/16" | 2-3/4" | 1" | 42.14 | 40.30 | 38.47 | 36.64 |
| - | 23054 | - | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1" | 52.85 | 50.56 | 48.26 | 45.96 |
| - | 23064 | - | .6250 | 5/8" | 15.875 | 5/8" | 3-1/2" | 1-1/4" | 99.06 | 94.75 | 90.45 | 86.14 |
| - | 23074 | - | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-1/2" | 141.40 | 135.26 | 129.11 | 122.96 |
| - | 23084 | - | 1.000 | 1" | 25.400 | 1" | 4" | 1-1/2" | 211.62 | 202.42 | 193.22 | 184.02 |
| - | - | 23517 | .2362 | | 6.000 | 6.0 | 65 | 13 | 22.46 | 21.48 | 20.51 | 19.53 |
| - | - | 23017 | .2500 | 1/4" | 6.350 | 1/4" | 2-1/2" | 3/4" | 21.69 | 20.75 | 19.80 | 18.86 |
| - | - | 23027 | .3125 | 5/16" | 7.938 | 5/16" | 2-1/2" | 7/8" | 30.92 | 29.58 | 28.23 | 26.89 |
| - | - | 23527 | .3150 | | 8.000 | 8.0 | 65 | 19 | 32.05 | 30.66 | 29.26 | 27.87 |
| - | - | 23037 | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 7/8" | 36.49 | 34.90 | 33.32 | 31.73 |
| - | - | 23537 | .3937 | | 10.000 | 10.0 | 70 | 22 | 43.76 | 41.86 | 39.95 | 38.05 |
| - | - | 23047 | .4375 | 7/16" | 11.113 | 7/16" | 2-3/4" | 1" | 43.87 | 41.97 | 40.06 | 38.15 |
| - | - | 23547 | .4724 | | 12.000 | 12.0 | 75 | 26 | 56.83 | 54.36 | 51.89 | 49.42 |
| - | - | 23057 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1" | 54.58 | 52.21 | 49.83 | 47.46 |
| - | - | 23067 | .6250 | 5/8" | 15.875 | 5/8" | 3-1/2" | 1-1/4" | 100.71 | 96.33 | 91.95 | 87.57 |
| - | - | 23557 | .6299 | | 16.000 | 16.0 | 88 | 32 | 105.05 | 100.49 | 95.92 | 91.35 |
| - | - | 23077 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-1/2" | 143.75 | 137.50 | 131.25 | 125.00 |
| - | - | 23087 | 1.000 | 1" | 25.400 | 1" | 4" | 1-1/2" | 214.75 | 205.41 | 196.08 | 186.74 |

# Series 255MA, 855MA

.1181" - .4724"
(3.000mm - 12.000mm)




| TOLERANCES | |
|---|---|
| $d_1$ | +.000" –.002" (+.000 –.050mm) |
| $d_2$ | h6 |

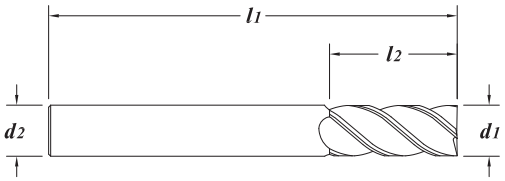
Recommended for steels, stainless steel, and exotics

## Square End

### AlTiN Coating

Solid submicron grain carbide end mill - center cutting
High performance milling
Rigid work holding, machine stability and part integrity are critical!
Dry or semi-dry machining
Improved finishes in titanium
Heavy core, Sharp corners
Bright Finish - page 188
TiCN Coated - page 190






MATERIAL HARDNESS (Rc)
70
35
0

| EDP# | $d_1$ † Diameter Decimal | Diameter | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|
| 40047 | .1181 | | 3.000 | 3.0 | 38 | 8 | 14.81 | 14.17 | 13.52 | 12.88 |
| 40057 | .1181 | | 3.000 | 3.0 | 50 | 12 | 17.85 | 17.07 | 16.30 | 15.52 |
| 52087 | .1250 | 1/8" | 3.175 | 1/8" | 1-1/2" | 1/4" | 14.06 | 13.45 | 12.84 | 12.23 |
| 52097 | .1250 | 1/8" | 3.175 | 1/8" | 2" | 1/2" | 16.96 | 16.23 | 15.49 | 14.75 |
| 40087 | .1575 | | 4.000 | 6.0 | 50 | 8 | 23.93 | 22.89 | 21.85 | 20.81 |
| 40097 | .1575 | | 4.000 | 6.0 | 50 | 12 | 23.93 | 22.89 | 21.85 | 20.81 |
| 52107 | .1875 | 3/16" | 4.763 | 3/16" | 2" | 5/16" | 16.08 | 15.38 | 14.68 | 13.98 |
| 52127 | .1875 | 3/16" | 4.763 | 3/16" | 2" | 9/16" | 16.08 | 15.38 | 14.68 | 13.98 |
| 40107 | .1969 | | 5.000 | 5.0 | 50 | 8 | 19.06 | 18.23 | 17.40 | 16.57 |
| 40127 | .1969 | | 5.000 | 5.0 | 50 | 14 | 19.06 | 18.23 | 17.40 | 16.57 |
| 40117 | .1969 | | 5.000 | 6.0 | 50 | 8 | 23.44 | 22.42 | 21.40 | 20.38 |
| 40137 | .1969 | | 5.000 | 6.0 | 65 | 16 | 25.60 | 24.49 | 23.37 | 22.26 |
| 40207 | .2362 | | 6.000 | 6.0 | 50 | 10 | 19.93 | 19.06 | 18.20 | 17.33 |
| 40227 | .2362 | | 6.000 | 6.0 | 65 | 20 | 22.46 | 21.48 | 20.51 | 19.53 |
| 40247 | .2362 | | 6.000 | 6.0 | 100 | 32 | 37.18 | 35.56 | 33.95 | 32.33 |
| 52207 | .2500 | 1/4" | 6.350 | 1/4" | 2" | 3/8" | 19.12 | 18.29 | 17.46 | 16.63 |
| 52227 | .2500 | 1/4" | 6.350 | 1/4" | 2-1/2" | 3/4" | 21.69 | 20.75 | 19.80 | 18.86 |
| 52237 | .2500 | 1/4" | 6.350 | 1/4" | 3" | 1-1/8" | 33.15 | 31.71 | 30.27 | 28.83 |
| 52247 | .2500 | 1/4" | 6.350 | 1/4" | 4" | 1-1/4" | 35.65 | 34.10 | 32.55 | 31.00 |
| 52307 | .3125 | 5/16" | 7.938 | 5/16" | 2" | 7/16" | 26.43 | 25.28 | 24.13 | 22.98 |
| 52327 | .3125 | 5/16" | 7.938 | 5/16" | 2-1/2" | 13/16" | 30.92 | 29.58 | 28.23 | 26.89 |
| 52347 | .3125 | 5/16" | 7.938 | 5/16" | 4" | 1-1/4" | 48.58 | 46.46 | 44.35 | 42.24 |
| 40307 | .3150 | | 8.000 | 8.0 | 50 | 11 | 27.52 | 26.32 | 25.13 | 23.93 |
| 40327 | .3150 | | 8.000 | 8.0 | 65 | 21 | 32.05 | 30.66 | 29.26 | 27.87 |
| 40347 | .3150 | | 8.000 | 8.0 | 100 | 32 | 50.58 | 48.38 | 46.18 | 43.98 |
| 40367 | .3543 | | 9.000 | 10.0 | 65 | 22 | 49.50 | 47.34 | 45.19 | 43.04 |
| 52407 | .3750 | 3/8" | 9.525 | 3/8" | 2" | 1/2" | 31.22 | 29.87 | 28.51 | 27.15 |
| 52427 | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 7/8" | 36.49 | 34.90 | 33.32 | 31.73 |
| 52437 | .3750 | 3/8" | 9.525 | 3/8" | 3" | 1-1/4" | 46.58 | 44.55 | 42.53 | 40.50 |
| 52447 | .3750 | 3/8" | 9.525 | 3/8" | 3-1/2" | 1-1/2" | 52.66 | 50.37 | 48.08 | 45.79 |
| 40407 | .3937 | | 10.000 | 10.0 | 50 | 12 | 36.14 | 34.57 | 33.00 | 31.43 |
| 40427 | .3937 | | 10.000 | 10.0 | 70 | 22 | 43.76 | 41.86 | 39.95 | 38.05 |
| 40447 | .3937 | | 10.000 | 10.0 | 88 | 38 | 64.63 | 61.82 | 59.01 | 56.20 |
| 52507 | .4375 | 7/16" | 11.113 | 7/16" | 2-1/2" | 9/16" | 43.87 | 41.97 | 40.06 | 38.15 |
| 52527 | .4375 | 7/16" | 11.113 | 7/16" | 2-3/4" | 1" | 43.87 | 41.97 | 40.06 | 38.15 |
| 52547 | .4375 | 7/16" | 11.113 | 7/16" | 4" | 2" | 70.15 | 67.10 | 64.05 | 61.00 |
| 40507 | .4724 | | 12.000 | 12.0 | 65 | 16 | 53.27 | 50.95 | 48.64 | 46.32 |
| 40527 | .4724 | | 12.000 | 12.0 | 75 | 32 | 56.83 | 54.36 | 51.89 | 49.42 |
| 40547 | .4724 | | 12.000 | 12.0 | 100 | 50 | 77.57 | 74.20 | 70.82 | 67.45 |



† Metric equivalents are for reference only

| EDP# | $d_1$ † Diameter Decimal | Diameter | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|
| 52607 | .5000 | 1/2" | 12.700 | 1/2" | 2-1/2" | 5/8" | 51.08 | 48.86 | 46.64 | 44.42 |
| 52627 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1-1/4" | 54.58 | 52.21 | 49.83 | 47.46 |
| 52647 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 2" | 73.85 | 70.64 | 67.43 | 64.22 |
| 52707 | .6250 | 5/8" | 15.875 | 5/8" | 3" | 3/4" | 90.56 | 86.63 | 82.69 | 78.75 |
| 52727 | .6250 | 5/8" | 15.875 | 5/8" | 3-1/2" | 1-5/8" | 100.71 | 96.33 | 91.95 | 87.57 |
| 52747 | .6250 | 5/8" | 15.875 | 5/8" | 6" | 2-1/2" | 147.28 | 140.88 | 134.47 | 128.07 |
| 40607 | .6299 | | 16.000 | 16.0 | 75 | 20 | 94.73 | 90.61 | 86.49 | 82.37 |
| 40627 | .6299 | | 16.000 | 16.0 | 88 | 41 | 105.05 | 100.49 | 95.92 | 91.35 |
| 40647 | .6299 | | 16.000 | 16.0 | 150 | 63 | 147.28 | 140.88 | 134.47 | 128.07 |
| 52807 | .7500 | 3/4" | 19.050 | 3/4" | 3" | 7/8" | 127.59 | 122.05 | 116.50 | 110.95 |
| 52827 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-5/8" | 143.75 | 137.50 | 131.25 | 125.00 |
| 52837 | .7500 | 3/4" | 19.050 | 3/4" | 5" | 2" | 192.94 | 184.55 | 176.16 | 167.77 |
| 52847 | .7500 | 3/4" | 19.050 | 3/4" | 6" | 3-1/4" | 225.79 | 215.97 | 206.16 | 196.34 |
| 40727 | .7874 | | 20.000 | 20.0 | 100 | 41 | 194.21 | 185.77 | 177.32 | 168.88 |
| 40747 | .7874 | | 20.000 | 20.0 | 150 | 82 | 243.62 | 233.02 | 222.43 | 211.84 |
| 40787 | .9843 | | 25.000 | 25.0 | 100 | 28 | 221.79 | 212.15 | 202.50 | 192.86 |
| 40827 | .9843 | | 25.000 | 25.0 | 100 | 50 | 221.79 | 212.15 | 202.50 | 192.86 |
| 40847 | .9843 | | 25.000 | 25.0 | 150 | 82 | 358.89 | 343.29 | 327.68 | 312.08 |
| 52897 | 1.000 | 1" | 25.400 | 1" | 4" | 1-1/8" | 214.75 | 205.41 | 196.08 | 186.74 |
| 52927 | 1.000 | 1" | 25.400 | 1" | 4" | 2" | 214.75 | 205.41 | 196.08 | 186.74 |
| 52947 | 1.000 | 1" | 25.400 | 1" | 6" | 3-1/4" | 374.44 | 358.16 | 341.88 | 325.60 |




*End Mill Manufacturing*

# Series 255M, 855M

.1181" - .5000"
(3.000mm - 12.700mm)

Z=5 | 45° | TECH PAGES 286-287

| TOLERANCES | |
|---|---|
| $d_1$ | +.000" –.002" (+.000 –.050mm) |
| $d_2$ | h6 |

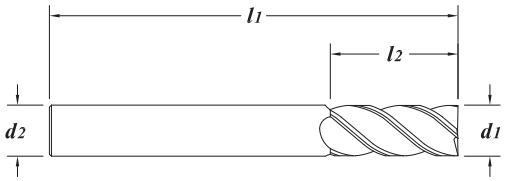
Recommended for steels, stainless steel, and exotics



## Square End

### Bright Finish

Solid submicron grain carbide end mill - center cutting
High performance milling
Rigid work holding, machine stability and part integrity are critical!
Improved finishes in titanium
Heavy core
Sharp corners
AlTiN Coating - page 186
TiCN Coated - page 190



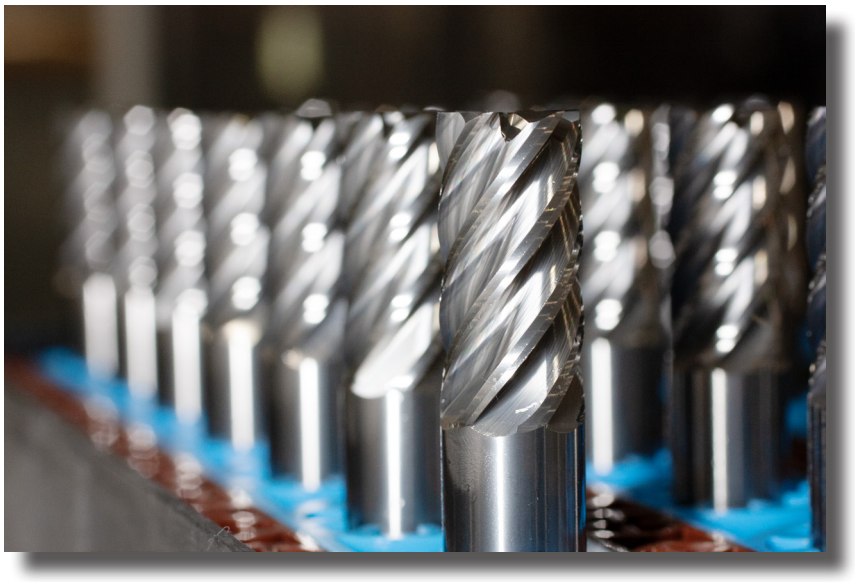

MATERIAL HARDNESS (Rc)
70
35
0

| EDP# | $d_1$ † Diameter Decimal | Diameter | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|
| 40040 | .1181 | | 3.000 | 3.0 | 38 | 8 | 12.09 | 11.56 | 11.04 | 10.51 |
| 40050 | .1181 | | 3.000 | 3.0 | 50 | 12 | 14.57 | 13.94 | 13.30 | 12.67 |
| 52080 | .1250 | 1/8" | 3.175 | 1/8" | 1-1/2" | 1/4" | 11.35 | 10.86 | 10.36 | 9.87 |
| 52090 | .1250 | 1/8" | 3.175 | 1/8" | 2" | 1/2" | 13.67 | 13.08 | 12.48 | 11.89 |
| 40080 | .1575 | | 4.000 | 6.0 | 50 | 8 | 19.65 | 18.80 | 17.94 | 17.09 |
| 40090 | .1575 | | 4.000 | 6.0 | 50 | 12 | 19.65 | 18.80 | 17.94 | 17.09 |
| 52100 | .1875 | 3/16" | 4.763 | 3/16" | 2" | 5/16" | 13.37 | 12.79 | 12.21 | 11.63 |
| 52120 | .1875 | 3/16" | 4.763 | 3/16" | 2" | 9/16" | 13.37 | 12.79 | 12.21 | 11.63 |
| 40100 | .1969 | | 5.000 | 5.0 | 50 | 8 | 14.86 | 14.21 | 13.57 | 12.92 |
| 40120 | .1969 | | 5.000 | 5.0 | 50 | 14 | 14.86 | 14.21 | 13.57 | 12.92 |
| 40200 | .2362 | | 6.000 | 6.0 | 50 | 10 | 15.76 | 15.07 | 14.39 | 13.70 |
| 40220 | .2362 | | 6.000 | 6.0 | 65 | 20 | 16.93 | 16.19 | 15.46 | 14.72 |
| 40240 | .2362 | | 6.000 | 6.0 | 100 | 32 | 30.68 | 29.35 | 28.01 | 26.68 |
| 52200 | .2500 | 1/4" | 6.350 | 1/4" | 2" | 3/8" | 14.93 | 14.28 | 13.63 | 12.98 |
| 52220 | .2500 | 1/4" | 6.350 | 1/4" | 2-1/2" | 3/4" | 16.13 | 15.43 | 14.73 | 14.03 |
| 52240 | .2500 | 1/4" | 6.350 | 1/4" | 4" | 1-1/4" | 29.14 | 27.87 | 26.61 | 25.34 |
| 52300 | .3125 | 5/16" | 7.938 | 5/16" | 2" | 7/16" | 20.41 | 19.53 | 18.64 | 17.75 |
| 52320 | .3125 | 5/16" | 7.938 | 5/16" | 2-1/2" | 13/16" | 22.63 | 21.65 | 20.66 | 19.68 |
| 52340 | .3125 | 5/16" | 7.938 | 5/16" | 4" | 1-1/4" | 38.01 | 36.36 | 34.70 | 33.05 |
| 40320 | .3150 | | 8.000 | 8.0 | 65 | 21 | 23.76 | 22.73 | 21.69 | 20.66 |
| 40340 | .3150 | | 8.000 | 8.0 | 100 | 32 | 40.03 | 38.29 | 36.55 | 34.81 |
| 52400 | .3750 | 3/8" | 9.525 | 3/8" | 2" | 1/2" | 25.22 | 24.12 | 23.03 | 21.93 |
| 52420 | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 7/8" | 28.18 | 26.95 | 25.73 | 24.50 |
| 52440 | .3750 | 3/8" | 9.525 | 3/8" | 3-1/2" | 1-1/2" | 42.10 | 40.27 | 38.44 | 36.61 |
| 40420 | .3937 | | 10.000 | 10.0 | 70 | 22 | 34.30 | 32.81 | 31.32 | 29.83 |
| 40440 | .3937 | | 10.000 | 10.0 | 88 | 38 | 52.41 | 50.13 | 47.85 | 45.57 |
| 52500 | .4375 | 7/16" | 11.113 | 7/16" | 2-1/2" | 9/16" | 34.40 | 32.90 | 31.41 | 29.91 |
| 52520 | .4375 | 7/16" | 11.113 | 7/16" | 2-3/4" | 1" | 34.40 | 32.90 | 31.41 | 29.91 |
| 52540 | .4375 | 7/16" | 11.113 | 7/16" | 4" | 2" | 57.93 | 55.41 | 52.89 | 50.37 |
| 40520 | .4724 | | 12.000 | 12.0 | 75 | 32 | 47.40 | 45.34 | 43.28 | 41.22 |
| 40540 | .4724 | | 12.000 | 12.0 | 100 | 50 | 65.30 | 62.46 | 59.62 | 56.78 |
| 52600 | .5000 | 1/2" | 12.700 | 1/2" | 2-1/2" | 5/8" | 41.63 | 39.82 | 38.01 | 36.20 |
| 52620 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1-1/4" | 45.14 | 43.18 | 41.21 | 39.25 |
| 52640 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 2" | 61.61 | 58.93 | 56.25 | 53.57 |



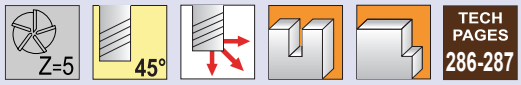
† *Metric equivalents are for reference only*

| EDP# | $d_1$ † Diameter Decimal | Diameter | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|
| 52700 | .6250 | 5/8" | 15.875 | 5/8" | 3" | 3/4" | 79.60 | 76.14 | 72.68 | 69.22 |
| 52720 | .6250 | 5/8" | 15.875 | 5/8" | 3-1/2" | 1-5/8" | 87.04 | 83.26 | 79.47 | 75.69 |
| 52740 | .6250 | 5/8" | 15.875 | 5/8" | 6" | 2-1/2" | 126.98 | 121.46 | 115.94 | 110.42 |
| 40600 | .6299 | | 16.000 | 16.0 | 75 | 20 | 83.78 | 80.14 | 76.49 | 72.85 |
| 40620 | .6299 | | 16.000 | 16.0 | 88 | 41 | 91.39 | 87.42 | 83.44 | 79.47 |
| 40640 | .6299 | | 16.000 | 16.0 | 150 | 63 | 126.98 | 121.46 | 115.94 | 110.42 |
| 52800 | .7500 | 3/4" | 19.050 | 3/4" | 3" | 7/8" | 114.47 | 109.49 | 104.52 | 99.54 |
| 52820 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-5/8" | 127.63 | 122.08 | 116.53 | 110.98 |
| 52830 | .7500 | 3/4" | 19.050 | 3/4" | 5" | 2" | 172.76 | 165.25 | 157.74 | 150.23 |
| 52840 | .7500 | 3/4" | 19.050 | 3/4" | 6" | 3-1/4" | 202.29 | 193.49 | 184.70 | 175.90 |
| 40700 | .7874 | | 20.000 | 20.0 | 75 | 22 | 155.25 | 148.50 | 141.75 | 135.00 |
| 40720 | .7874 | | 20.000 | 20.0 | 100 | 41 | 170.38 | 162.98 | 155.57 | 148.16 |
| 40740 | .7874 | | 20.000 | 20.0 | 150 | 82 | 213.10 | 203.83 | 194.57 | 185.30 |
| 40780 | .9843 | | 25.000 | 25.0 | 100 | 28 | 197.94 | 189.33 | 180.73 | 172.12 |
| 40820 | .9843 | | 25.000 | 25.0 | 100 | 50 | 197.94 | 189.33 | 180.73 | 172.12 |
| 40840 | .9843 | | 25.000 | 25.0 | 150 | 82 | 328.37 | 314.09 | 299.82 | 285.54 |
| 52890 | 1.000 | 1" | 25.400 | 1" | 4" | 1-1/8" | 190.90 | 182.60 | 174.30 | 166.00 |
| 52920 | 1.000 | 1" | 25.400 | 1" | 4" | 2" | 190.90 | 182.60 | 174.30 | 166.00 |
| 52940 | 1.000 | 1" | 25.400 | 1" | 6" | 3-1/4" | 343.91 | 328.96 | 314.00 | 299.05 |



# Series 255MC

.1875" - 1.000"
(4.763mm - 25.400mm)




| TOLERANCES | |
|---|---|
| $d_1$ | +.000" –.002" (+.000 –.050mm) |
| $d_2$ | h6 |

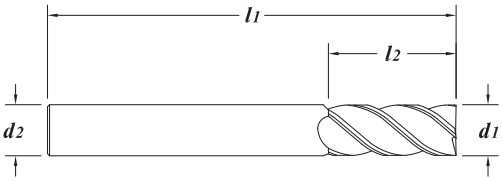
Recommended for steels, stainless steel, and exotics

## Square End

### TiCN Coated

Solid submicron grain carbide end mill - center cutting
High performance milling
Rigid work holding, machine stability and part integrity are critical!
Improved abrasion resistance and lubricity
Improved finishes in titanium
Heavy core
Sharp corners
AlTiN Coating - page 186
Bright Finsh - page 188







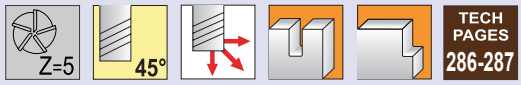

| EDP# | $d_1$ † Diameter Decimal | Diameter | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|
| 52104 | .1875 | 3/16" | 4.763 | 3/16" | 2" | 5/16" | 15.76 | 15.07 | 14.39 | 13.70 |
| 52124 | .1875 | 3/16" | 4.763 | 3/16" | 2" | 9/16" | 15.76 | 15.07 | 14.39 | 13.70 |
| 52204 | .2500 | 1/4" | 6.350 | 1/4" | 2" | 3/8" | 18.27 | 17.48 | 16.68 | 15.89 |
| 52224 | .2500 | 1/4" | 6.350 | 1/4" | 2-1/2" | 3/4" | 20.95 | 20.04 | 19.13 | 18.22 |
| 52244 | .2500 | 1/4" | 6.350 | 1/4" | 4" | 1-1/4" | 34.35 | 32.86 | 31.36 | 29.87 |
| 52304 | .3125 | 5/16" | 7.938 | 5/16" | 2" | 7/16" | 25.63 | 24.52 | 23.40 | 22.29 |
| 52324 | .3125 | 5/16" | 7.938 | 5/16" | 2-1/2" | 13/16" | 29.06 | 27.80 | 26.53 | 25.27 |
| 52344 | .3125 | 5/16" | 7.938 | 5/16" | 4" | 1-1/4" | 46.02 | 44.02 | 42.02 | 40.02 |
| 52404 | .3750 | 3/8" | 9.525 | 3/8" | 2" | 1/2" | 30.44 | 29.12 | 27.79 | 26.47 |
| 52424 | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 7/8" | 34.63 | 33.12 | 31.62 | 30.11 |
| 52444 | .3750 | 3/8" | 9.525 | 3/8" | 3-1/2" | 1-1/2" | 50.07 | 47.89 | 45.72 | 43.54 |
| 52504 | .4375 | 7/16" | 11.113 | 7/16" | 2-1/2" | 9/16" | 42.14 | 40.30 | 38.47 | 36.64 |
| 52524 | .4375 | 7/16" | 11.113 | 7/16" | 2-3/4" | 1" | 42.14 | 40.30 | 38.47 | 36.64 |
| 52544 | .4375 | 7/16" | 11.113 | 7/16" | 4" | 2" | 67.56 | 64.63 | 61.69 | 58.75 |
| 52604 | .5000 | 1/2" | 12.700 | 1/2" | 2-1/2" | 5/8" | 49.36 | 47.21 | 45.07 | 42.92 |
| 52624 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1-1/4" | 52.85 | 50.56 | 48.26 | 45.96 |
| 52644 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 2" | 71.27 | 68.17 | 65.07 | 61.97 |
| 52704 | .6250 | 5/8" | 15.875 | 5/8" | 3" | 3/4" | 89.98 | 86.06 | 82.15 | 78.24 |
| 52724 | .6250 | 5/8" | 15.875 | 5/8" | 3-1/2" | 1-5/8" | 99.06 | 94.75 | 90.45 | 86.14 |
| 52744 | .6250 | 5/8" | 15.875 | 5/8" | 6" | 2-1/2" | 143.85 | 137.60 | 131.34 | 125.09 |
| 52804 | .7500 | 3/4" | 19.050 | 3/4" | 3" | 7/8" | 127.25 | 121.72 | 116.18 | 110.65 |
| 52824 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-5/8" | 141.40 | 135.26 | 129.11 | 122.96 |
| 52844 | .7500 | 3/4" | 19.050 | 3/4" | 6" | 3-1/4" | 221.55 | 211.92 | 202.28 | 192.65 |
| 52894 | 1.000 | 1" | 25.400 | 1" | 4" | 1-1/8" | 211.62 | 202.42 | 193.22 | 184.02 |
| 52924 | 1.000 | 1" | 25.400 | 1" | 4" | 2" | 211.62 | 202.42 | 193.22 | 184.02 |
| 52944 | 1.000 | 1" | 25.400 | 1" | 6" | 3-1/4" | 371.15 | 355.01 | 338.88 | 322.74 |



† *Metric equivalents are for reference only*

| TOLERANCES | |
|---|---|
| $d_1$ | +.000" –.002" (+.000 –.050mm) |
| $d_2$ | h6 |
| $r$ | +.001" –.001" (+.025 –.025mm) |

# Series 255RA, 855RA




.1181" - .3125"
(3.000mm - 7.938mm)

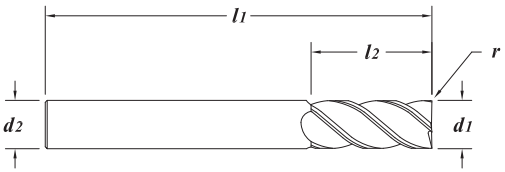
Recommended for steels, stainless steel, and exotics

## Corner Radius

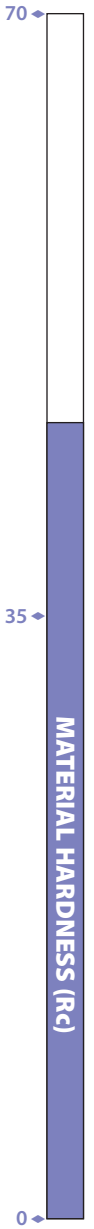
### AlTiN Coating

Solid submicron grain carbide end mill - center cutting
High performance milling
Rigid work holding, machine stability and part integrity are critical!
Dry or semi-dry machining
Improved finishes in titanium
Heavy core






| EDP# | $d_1$ † Diameter Decimal | Diameter | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | $r$ Corner Radius | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 83527 | .1181 | | 3.000 | 3.0 | 38 | 8 | 0.20 | 16.17 | 15.47 | 14.76 | 14.06 |
| 83537 | .1181 | | 3.000 | 3.0 | 38 | 8 | 0.50 | 16.17 | 15.47 | 14.76 | 14.06 |
| 83547 | .1181 | | 3.000 | 3.0 | 50 | 12 | 0.20 | 19.38 | 18.54 | 17.69 | 16.85 |
| 83550 | .1181 | | 3.000 | 3.0 | 50 | 12 | 0.30 | 19.38 | 18.54 | 17.69 | 16.85 |
| 83557 | .1181 | | 3.000 | 3.0 | 50 | 12 | 0.50 | 19.38 | 18.54 | 17.69 | 16.85 |
| 83567 | .1250 | 1/8" | 3.175 | 1/8" | 1-1/2" | 1/4" | .010" | 15.36 | 14.70 | 14.03 | 13.36 |
| 83577 | .1250 | 1/8" | 3.175 | 1/8" | 1-1/2" | 1/4" | .020" | 15.36 | 14.70 | 14.03 | 13.36 |
| 83587 | .1250 | 1/8" | 3.175 | 1/8" | 2" | 1/2" | .010" | 18.88 | 18.06 | 17.24 | 16.42 |
| 83597 | .1250 | 1/8" | 3.175 | 1/8" | 2" | 1/2" | .020" | 18.88 | 18.06 | 17.24 | 16.42 |
| 83600 | .1250 | 1/8" | 3.175 | 1/8" | 2" | 1/2" | .030" | 18.88 | 18.06 | 17.24 | 16.42 |
| 83607 | .1575 | | 4.000 | 6.0 | 50 | 8 | 0.30 | 26.07 | 24.94 | 23.80 | 22.67 |
| 83617 | .1575 | | 4.000 | 6.0 | 50 | 8 | 0.50 | 26.07 | 24.94 | 23.80 | 22.67 |
| 83627 | .1575 | | 4.000 | 6.0 | 50 | 12 | 0.30 | 26.07 | 24.94 | 23.80 | 22.67 |
| 83637 | .1575 | | 4.000 | 6.0 | 50 | 12 | 0.50 | 26.07 | 24.94 | 23.80 | 22.67 |
| 83647 | .1875 | 3/16" | 4.763 | 3/16" | 2" | 5/16" | .010" | 19.32 | 18.48 | 17.64 | 16.80 |
| 83657 | .1875 | 3/16" | 4.763 | 3/16" | 2" | 5/16" | .020" | 19.32 | 18.48 | 17.64 | 16.80 |
| 83667 | .1875 | 3/16" | 4.763 | 3/16" | 2" | 9/16" | .010" | 19.32 | 18.48 | 17.64 | 16.80 |
| 83677 | .1875 | 3/16" | 4.763 | 3/16" | 2" | 9/16" | .020" | 19.32 | 18.48 | 17.64 | 16.80 |
| 83680 | .1875 | 3/16" | 4.763 | 3/16" | 2" | 9/16" | .030" | 19.32 | 18.48 | 17.64 | 16.80 |
| 83707 | .1969 | | 5.000 | 6.0 | 65 | 15 | 0.30 | 28.43 | 27.19 | 25.96 | 24.72 |
| 83717 | .1969 | | 5.000 | 6.0 | 65 | 15 | 0.50 | 28.43 | 27.19 | 25.96 | 24.72 |
| 83767 | .2362 | | 6.000 | 6.0 | 50 | 12 | 0.30 | 24.53 | 23.46 | 22.40 | 21.33 |
| 83777 | .2362 | | 6.000 | 6.0 | 50 | 12 | 0.50 | 24.53 | 23.46 | 22.40 | 21.33 |
| 83780 | .2362 | | 6.000 | 6.0 | 65 | 19 | 0.20 | 27.54 | 26.35 | 25.15 | 23.95 |
| 83787 | .2362 | | 6.000 | 6.0 | 65 | 19 | 0.30 | 27.54 | 26.35 | 25.15 | 23.95 |
| 83797 | .2362 | | 6.000 | 6.0 | 65 | 19 | 0.50 | 27.54 | 26.35 | 25.15 | 23.95 |
| 83807 | .2362 | | 6.000 | 6.0 | 65 | 19 | 1.00 | 27.54 | 26.35 | 25.15 | 23.95 |
| 83827 | .2500 | 1/4" | 6.350 | 1/4" | 2" | 3/8" | .015" | 23.61 | 22.58 | 21.56 | 20.53 |
| 83837 | .2500 | 1/4" | 6.350 | 1/4" | 2" | 3/8" | .030" | 23.61 | 22.58 | 21.56 | 20.53 |
| 83845 | .2500 | 1/4" | 6.350 | 1/4" | 2-1/2" | 3/4" | .010" | 26.54 | 25.39 | 24.23 | 23.08 |
| 83847 | .2500 | 1/4" | 6.350 | 1/4" | 2-1/2" | 3/4" | .015" | 26.54 | 25.39 | 24.23 | 23.08 |
| 83857 | .2500 | 1/4" | 6.350 | 1/4" | 2-1/2" | 3/4" | .030" | 26.54 | 25.39 | 24.23 | 23.08 |
| 83877 | .2500 | 1/4" | 6.350 | 1/4" | 2-1/2" | 3/4" | .060" | 26.54 | 25.39 | 24.23 | 23.08 |
| 83907 | .2500 | 1/4" | 6.350 | 1/4" | 3" | 1-1/8" | .030" | 38.11 | 36.45 | 34.80 | 33.14 |
| 83927 | .3125 | 5/16" | 7.938 | 5/16" | 2" | 7/16" | .020" | 32.23 | 30.83 | 29.43 | 28.03 |
| 83937 | .3125 | 5/16" | 7.938 | 5/16" | 2" | 7/16" | .030" | 32.23 | 30.83 | 29.43 | 28.03 |
| 83940 | .3125 | 5/16" | 7.938 | 5/16" | 2-1/2" | 13/16" | .010" | 35.93 | 34.36 | 32.80 | 31.24 |
| 83947 | .3125 | 5/16" | 7.938 | 5/16" | 2-1/2" | 13/16" | .020" | 35.93 | 34.36 | 32.80 | 31.24 |
| 83957 | .3125 | 5/16" | 7.938 | 5/16" | 2-1/2" | 13/16" | .030" | 35.93 | 34.36 | 32.80 | 31.24 |
| 83977 | .3125 | 5/16" | 7.938 | 5/16" | 2-1/2" | 13/16" | .060" | 35.93 | 34.36 | 32.80 | 31.24 |




continued →

# Series 255RA, 855RA *(continued)*

.3150" - 1.000"
(8.000mm - 25.400mm)

| EDP# | $d_1$ † Diameter Decimal | Diameter | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | $r$ Corner Radius | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 83987 | .3150 | | 8.000 | 8.0 | 50 | 12 | 0.50 | 33.42 | 31.97 | 30.51 | 29.06 |
| 83997 | .3150 | | 8.000 | 8.0 | 50 | 12 | 1.00 | 33.42 | 31.97 | 30.51 | 29.06 |
| 84000 | .3150 | | 8.000 | 8.0 | 65 | 22 | 0.30 | 37.27 | 35.65 | 34.03 | 32.41 |
| 84007 | .3150 | | 8.000 | 8.0 | 65 | 22 | 0.50 | 37.27 | 35.65 | 34.03 | 32.41 |
| 84017 | .3150 | | 8.000 | 8.0 | 65 | 22 | 1.00 | 37.27 | 35.65 | 34.03 | 32.41 |
| 84027 | .3150 | | 8.000 | 8.0 | 65 | 22 | 1.50 | 37.27 | 35.65 | 34.03 | 32.41 |
| 84087 | .3750 | 3/8" | 9.525 | 3/8" | 2" | 1/2" | .020" | 38.00 | 36.34 | 34.69 | 33.04 |
| 84097 | .3750 | 3/8" | 9.525 | 3/8" | 2" | 1/2" | .030" | 38.00 | 36.34 | 34.69 | 33.04 |
| 84100 | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 7/8" | .010" | 41.79 | 39.97 | 38.16 | 36.34 |
| 84107 | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 7/8" | .020" | 41.79 | 39.97 | 38.16 | 36.34 |
| 84117 | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 7/8" | .030" | 41.79 | 39.97 | 38.16 | 36.34 |
| 84137 | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 7/8" | .060" | 41.79 | 39.97 | 38.16 | 36.34 |
| 84147 | .3750 | 3/8" | 9.525 | 3/8" | 3" | 1-1/4" | .030" | 54.99 | 52.60 | 50.21 | 47.82 |
| 84167 | .3937 | | 10.000 | 10.0 | 70 | 22 | 0.50 | 50.52 | 48.32 | 46.13 | 43.93 |
| 84177 | .3937 | | 10.000 | 10.0 | 70 | 22 | 1.00 | 50.52 | 48.32 | 46.13 | 43.93 |
| 84257 | .4724 | | 12.000 | 12.0 | 75 | 32 | 0.30 | 73.88 | 70.66 | 67.45 | 64.24 |
| 84267 | .4724 | | 12.000 | 12.0 | 75 | 32 | 0.50 | 73.88 | 70.66 | 67.45 | 64.24 |
| 84277 | .4724 | | 12.000 | 12.0 | 75 | 32 | 1.00 | 73.88 | 70.66 | 67.45 | 64.24 |
| 84287 | .4724 | | 12.000 | 12.0 | 75 | 32 | 1.50 | 73.88 | 70.66 | 67.45 | 64.24 |
| 84307 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1-1/4" | .010" | 70.89 | 67.80 | 64.72 | 61.64 |
| 84317 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1-1/4" | .020" | 70.89 | 67.80 | 64.72 | 61.64 |
| 84327 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1-1/4" | .030" | 70.89 | 67.80 | 64.72 | 61.64 |
| 84337 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1-1/4" | .060" | 70.89 | 67.80 | 64.72 | 61.64 |
| 84357 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1-1/4" | .120" | 70.89 | 67.80 | 64.72 | 61.64 |
| 84367 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 2" | .030" | 83.97 | 80.32 | 76.67 | 73.02 |
| 84377 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 2" | .060" | 83.97 | 80.32 | 76.67 | 73.02 |
| 84397 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 2" | .120" | 83.97 | 80.32 | 76.67 | 73.02 |
| 84467 | .6250 | 5/8" | 15.875 | 5/8" | 3-1/2" | 1-1/4" | .015" | 112.73 | 107.83 | 102.93 | 98.03 |
| 84487 | .6250 | 5/8" | 15.875 | 5/8" | 3-1/2" | 1-1/4" | .030" | 112.73 | 107.83 | 102.93 | 98.03 |
| 84497 | .6250 | 5/8" | 15.875 | 5/8" | 3-1/2" | 1-1/4" | .060" | 112.73 | 107.83 | 102.93 | 98.03 |
| 84507 | .6250 | 5/8" | 15.875 | 5/8" | 3-1/2" | 1-1/4" | .120" | 112.73 | 107.83 | 102.93 | 98.03 |
| 84567 | .6299 | | 16.000 | 16.0 | 88 | 32 | 1.00 | 117.55 | 112.44 | 107.33 | 102.22 |
| 84577 | .6299 | | 16.000 | 16.0 | 88 | 32 | 2.00 | 117.55 | 112.44 | 107.33 | 102.22 |
| 84587 | .6299 | | 16.000 | 16.0 | 150 | 65 | 1.00 | 175.55 | 167.92 | 160.28 | 152.65 |
| 84597 | .6299 | | 16.000 | 16.0 | 150 | 65 | 2.00 | 175.55 | 167.92 | 160.28 | 152.65 |
| 84667 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-1/2" | .015" | 161.33 | 154.32 | 147.30 | 140.29 |
| 84687 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-1/2" | .030" | 161.33 | 154.32 | 147.30 | 140.29 |
| 84697 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-1/2" | .060" | 161.33 | 154.32 | 147.30 | 140.29 |
| 84700 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-1/2" | .120" | 161.33 | 154.32 | 147.30 | 140.29 |
| 84707 | .7500 | 3/4" | 19.050 | 3/4" | 5" | 2" | .030" | 223.38 | 213.66 | 203.95 | 194.24 |
| 84717 | .7500 | 3/4" | 19.050 | 3/4" | 5" | 2" | .060" | 223.38 | 213.66 | 203.95 | 194.24 |
| 84747 | .7500 | 3/4" | 19.050 | 3/4" | 5" | 2" | .120" | 223.38 | 213.66 | 203.95 | 194.24 |
| 84757 | .7500 | 3/4" | 19.050 | 3/4" | 5" | 2" | .190" | 223.38 | 213.66 | 203.95 | 194.24 |
| 84767 | .7874 | | 20.000 | 20.0 | 100 | 38 | 1.00 | 228.31 | 218.38 | 208.46 | 198.53 |
| 84777 | .7874 | | 20.000 | 20.0 | 100 | 38 | 3.00 | 228.31 | 218.38 | 208.46 | 198.53 |
| 84887 | .9843 | | 25.000 | 25.0 | 100 | 38 | 1.00 | 261.27 | 249.91 | 238.55 | 227.19 |
| 84897 | .9843 | | 25.000 | 25.0 | 100 | 38 | 3.00 | 261.27 | 249.91 | 238.55 | 227.19 |
| 84957 | 1.000 | 1" | 25.400 | 1" | 4" | 1-1/2" | .015" | 274.83 | 262.88 | 250.93 | 238.98 |
| 84967 | 1.000 | 1" | 25.400 | 1" | 4" | 1-1/2" | .030" | 274.83 | 262.88 | 250.93 | 238.98 |
| 84970 | 1.000 | 1" | 25.400 | 1" | 4" | 1-1/2" | .060" | 274.83 | 262.88 | 250.93 | 238.98 |
| 84977 | 1.000 | 1" | 25.400 | 1" | 4" | 1-1/2" | .120" | 274.83 | 262.88 | 250.93 | 238.98 |
| 84987 | 1.000 | 1" | 25.400 | 1" | 5" | 2" | .030" | 337.97 | 323.28 | 308.58 | 293.89 |
| 84990 | 1.000 | 1" | 25.400 | 1" | 5" | 2" | .060" | 337.97 | 323.28 | 308.58 | 293.89 |
| 84997 | 1.000 | 1" | 25.400 | 1" | 5" | 2" | .120" | 337.97 | 323.28 | 308.58 | 293.89 |
| 85007 | 1.000 | 1" | 25.400 | 1" | 5" | 2" | .190" | 337.97 | 323.28 | 308.58 | 293.89 |





† *Metric equivalents are for reference only*

| TOLERANCES | |
|---|---|
| $d_1$ | +.000" –.002" (+.000 –.050mm) |
| $d_2$ | h6 |

NEW ITEM

# Series 246M, 246MC, 246MA, 846M, 846MA

Z=6 | 40° | TECH PAGES 286-287

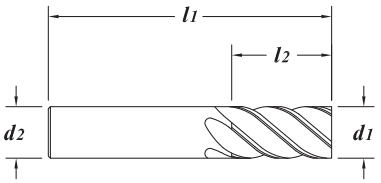
Recommended for steels

## Square End

### Bright Finish, TiCN, or AlTiN Coating

Solid submicron grain carbide end mill - center cutting
High performance finishing in a variety of steels
Rigid work holding, machine stability and part integrity are critical!
Excellent durability



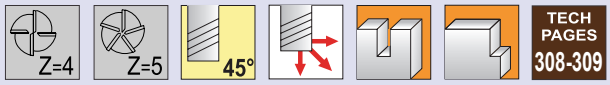



| (246M/846M) BRIGHT EDP# | (246MC) TiCN EDP# | (246MA/846MA) AlTiN EDP# | $d_1$ † Diameter Decimal | $d_1$ † Diameter | $d_1$ † Diameter Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 51110 | - | - | .1875 | 3/16" | 4.763 | 3/16" | 2" | 5/8" | 13.37 | 12.79 | 12.21 | 11.63 |
| 51510 | - | - | .1969 | | 5.000 | 5.0 | 50 | 16 | 14.86 | 14.21 | 13.57 | 12.92 |
| 51520 | - | - | .2362 | | 6.000 | 6.0 | 65 | 20 | 16.93 | 16.19 | 15.46 | 14.72 |
| 51150 | - | - | .2500 | 1/4" | 6.350 | 1/4" | 2-1/2" | 3/4" | 16.13 | 15.43 | 14.73 | 14.03 |
| 51190 | - | - | .3125 | 5/16" | 7.938 | 5/16" | 2-1/2" | 7/8" | 22.63 | 21.65 | 20.66 | 19.68 |
| 51530 | - | - | .3150 | | 8.000 | 8.0 | 65 | 22 | 23.76 | 22.73 | 21.69 | 20.66 |
| 51230 | - | - | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 7/8" | 28.18 | 26.95 | 25.73 | 24.50 |
| 51540 | - | - | .3937 | | 10.000 | 10.0 | 70 | 25 | 34.30 | 32.81 | 31.32 | 29.83 |
| 51270 | - | - | .4375 | 7/16" | 11.113 | 7/16" | 2-3/4" | 1" | 34.40 | 32.90 | 31.41 | 29.91 |
| 51310 | - | - | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1" | 45.14 | 43.18 | 41.21 | 39.25 |
| 51330 | - | - | .6250 | 5/8" | 15.875 | 5/8" | 3-1/2" | 1-1/4" | 87.04 | 83.26 | 79.47 | 75.69 |
| 51560 | - | - | .6299 | | 16.000 | 16.0 | 88 | 32 | 91.39 | 87.42 | 83.44 | 79.47 |
| 51350 | - | - | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-1/2" | 127.63 | 122.08 | 116.53 | 110.98 |
| 51370 | - | - | 1.000 | 1" | 25.400 | 1" | 4" | 1-1/2" | 190.90 | 182.60 | 174.30 | 166.00 |
| 51400 | - | - | 1.250 | 1-1/4" | 31.750 | 1-1/4" | 4-1/2" | 2" | 557.35 | 533.12 | 508.88 | 484.65 |
| 51430 | - | - | 1.250 | 1-1/4" | 31.750 | 1-1/4" | 6" | 3" | 729.58 | 697.86 | 666.14 | 634.42 |
| - | 51114 | - | .1875 | 3/16" | 4.763 | 3/16" | 2" | 5/8" | 15.76 | 15.07 | 14.39 | 13.70 |
| - | 51154 | - | .2500 | 1/4" | 6.350 | 1/4" | 2-1/2" | 3/4" | 20.95 | 20.04 | 19.13 | 18.22 |
| - | 51194 | - | .3125 | 5/16" | 7.938 | 5/16" | 2-1/2" | 7/8" | 29.06 | 27.80 | 26.53 | 25.27 |
| - | 51234 | - | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 7/8" | 34.63 | 33.12 | 31.62 | 30.11 |
| - | 51274 | - | .4375 | 7/16" | 11.113 | 7/16" | 2-3/4" | 1" | 42.14 | 40.30 | 38.47 | 36.64 |
| - | 51314 | - | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1" | 52.85 | 50.56 | 48.26 | 45.96 |
| - | 51334 | - | .6250 | 5/8" | 15.875 | 5/8" | 3-1/2" | 1-1/4" | 99.06 | 94.75 | 90.45 | 86.14 |
| - | 51354 | - | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-1/2" | 141.40 | 135.26 | 129.11 | 122.96 |
| - | 51374 | - | 1.000 | 1" | 25.400 | 1" | 4" | 1-1/2" | 211.58 | 202.38 | 193.18 | 183.98 |
| - | 51404 | - | 1.250 | 1-1/4" | 31.750 | 1-1/4" | 4-1/2" | 2" | 590.76 | 565.07 | 539.39 | 513.70 |
| - | 51434 | - | 1.250 | 1-1/4" | 31.750 | 1-1/4" | 6" | 3" | 767.36 | 734.00 | 700.63 | 667.27 |
| - | - | 51117 | .1875 | 3/16" | 4.763 | 3/16" | 2" | 5/8" | 16.08 | 15.38 | 14.68 | 13.98 |
| - | - | 51517 | .1969 | | 5.000 | 5.0 | 50 | 16 | 19.06 | 18.23 | 17.40 | 16.57 |
| NEW | - | - | 51597 | .1969 | | 5.000 | 6.0 | 65 | 16 | 25.60 | 24.49 | 23.37 |
| - | - | 51527 | .2362 | | 6.000 | 6.0 | 65 | 20 | 22.46 | 21.48 | 20.51 | 19.53 |
| - | - | 51157 | .2500 | 1/4" | 6.350 | 1/4" | 2-1/2" | 3/4" | 21.69 | 20.75 | 19.80 | 18.86 |
| - | - | 51197 | .3125 | 5/16" | 7.938 | 5/16" | 2-1/2" | 7/8" | 30.92 | 29.58 | 28.23 | 26.89 |
| - | - | 51537 | .3150 | | 8.000 | 8.0 | 65 | 22 | 32.05 | 30.66 | 29.26 | 27.87 |
| - | - | 51237 | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 7/8" | 36.49 | 34.90 | 33.32 | 31.73 |
| - | - | 51547 | .3937 | | 10.000 | 10.0 | 70 | 25 | 43.76 | 41.86 | 39.95 | 38.05 |
| - | - | 51277 | .4375 | 7/16" | 11.113 | 7/16" | 2-3/4" | 1" | 43.87 | 41.97 | 40.06 | 38.15 |
| - | - | 51557 | .4724 | | 12.000 | 12.0 | 75 | 26 | 56.83 | 54.36 | 51.89 | 49.42 |
| - | - | 51317 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1" | 54.58 | 52.21 | 49.83 | 47.46 |
| - | - | 51337 | .6250 | 5/8" | 15.875 | 5/8" | 3-1/2" | 1-1/4" | 100.71 | 96.33 | 91.95 | 87.57 |
| - | - | 51567 | .6299 | | 16.000 | 16.0 | 88 | 32 | 105.05 | 100.49 | 95.92 | 91.35 |
| - | - | 51357 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-1/2" | 143.75 | 137.50 | 131.25 | 125.00 |
| - | - | 51577 | .7874 | | 20.000 | 20.0 | 100 | 38 | 194.21 | 185.77 | 177.32 | 168.88 |
| - | - | 51587 | .9843 | | 25.000 | 25.0 | 100 | 38 | 221.79 | 212.15 | 202.50 | 192.86 |
| - | - | 51377 | 1.000 | 1" | 25.400 | 1" | 4" | 1-1/2" | 214.75 | 205.41 | 196.08 | 186.74 |
| - | - | 51407 | 1.250 | 1-1/4" | 31.750 | 1-1/4" | 4-1/2" | 2" | 596.45 | 570.52 | 544.58 | 518.65 |
| - | - | 51437 | 1.250 | 1-1/4" | 31.750 | 1-1/4" | 6" | 3" | 768.68 | 735.26 | 701.84 | 668.42 |

Series 545MA

# HIGH ROCKWELL END MILLS

| TOLERANCES | |
|---|---|
| $d_1$ | +.000" –.002" (+.000 –.050mm) |
| $d_2$ | h6 |




Recommended for inconel, tool steels, hardened die mold >40Rc

## Square End

**BALINIT® Durana Coating**

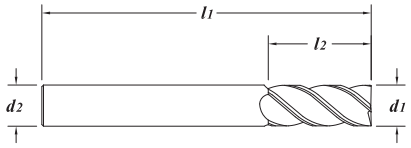
Solid submicron grain carbide end mill - center cutting

High performance tool for use in high Rockwell and difficult to machine materials

Corner Radius - page 195

Ball End - page 196






MATERIAL HARDNESS (Rc)

70

35

0

| EDP# | $d_1$ † Diameter Decimal | Diameter | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | Number of Flutes | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 21200 | .1181 | | 3.000 | 3.0 | 38 | 12 | 4 | 15.63 | 14.95 | 14.27 | 13.59 |
| 21230 | .1250 | 1/8" | 3.175 | 1/8" | 1-1/2" | 1/2" | 4 | 14.86 | 14.21 | 13.57 | 12.92 |
| 21260 | .1575 | | 4.000 | 6.0 | 50 | 12 | 4 | 25.25 | 24.16 | 23.06 | 21.96 |
| 21290 | .1875 | 3/16" | 4.763 | 3/16" | 2" | 9/16" | 4 | 18.66 | 17.85 | 17.04 | 16.23 |
| 21320 | .1969 | | 5.000 | 6.0 | 65 | 15 | 4 | 27.67 | 26.47 | 25.26 | 24.06 |
| 21350 | .2362 | | 6.000 | 6.0 | 65 | 19 | 4 | 26.83 | 25.66 | 24.50 | 23.33 |
| 21380 | .2500 | 1/4" | 6.350 | 1/4" | 2-1/2" | 3/4" | 4 | 25.85 | 24.73 | 23.60 | 22.48 |
| 21410 | .2756 | | 7.000 | 8.0 | 65 | 22 | 5 | 40.50 | 38.74 | 36.98 | 35.22 |
| 21440 | .3125 | 5/16" | 7.938 | 5/16" | 2-1/2" | 13/16" | 5 | 35.10 | 33.57 | 32.05 | 30.52 |
| 21470 | .3150 | | 8.000 | 8.0 | 65 | 22 | 5 | 36.89 | 35.29 | 33.68 | 32.08 |
| 21500 | .3543 | | 9.000 | 10.0 | 65 | 22 | 5 | 54.20 | 51.84 | 49.49 | 47.13 |
| 21530 | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 7/8" | 5 | 40.69 | 38.92 | 37.15 | 35.38 |
| 21560 | .3937 | | 10.000 | 10.0 | 70 | 22 | 5 | 49.11 | 46.97 | 44.84 | 42.70 |
| 21620 | .4724 | | 12.000 | 12.0 | 75 | 32 | 5 | 72.00 | 68.87 | 65.74 | 62.61 |
| 21660 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1-1/4" | 5 | 68.46 | 65.48 | 62.51 | 59.53 |
| 21710 | .6250 | 5/8" | 15.875 | 5/8" | 3-1/2" | 1-1/4" | 5 | 108.70 | 103.97 | 99.25 | 94.52 |
| 21740 | .6299 | | 16.000 | 16.0 | 88 | 32 | 5 | 114.31 | 109.34 | 104.37 | 99.40 |
| 21800 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-1/2" | 5 | 155.69 | 148.92 | 142.15 | 135.38 |
| 21830 | .7874 | | 20.000 | 20.0 | 100 | 38 | 5 | 220.09 | 210.52 | 200.95 | 191.38 |
| 21890 | .9843 | | 25.000 | 25.0 | 100 | 38 | 5 | 275.17 | 263.21 | 251.24 | 239.28 |
| 21920 | 1.000 | 1" | 25.400 | 1" | 4" | 1-1/2" | 5 | 266.05 | 254.49 | 242.92 | 231.35 |



GARR TOOL®

† *Metric equivalents are for reference only*

| TOLERANCES | |
|---|---|
| $d_1$ | +.000" –.002" (+.000mm –.050mm) |
| $d_2$ | h6 |
| $r$ | +.001" –.001" (+.025 –.025mm) |

# HIGH ROCKWELL END MILLS

Series 545RA

Z=4 | Z=5 | 45° | TECH PAGES 308-309

Recommended for inconel, tool steels, hardened die mold >40Rc

## Corner Radius

### BALINIT® Durana Coating

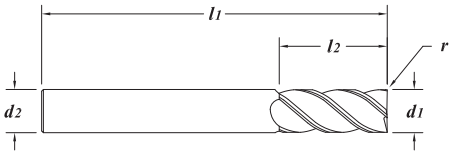
Solid submicron grain carbide end mill - center cutting

High performance tool for use in high Rockwell and difficult to machine materials

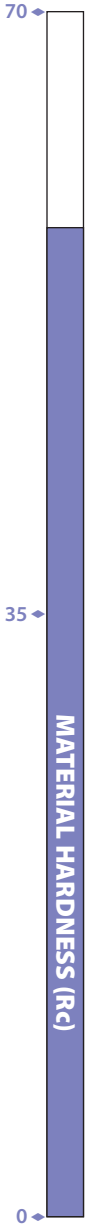
Square End - page 194

Ball End - page 196



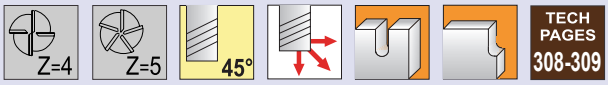



| EDP# | $d_1$ † Diameter Decimal | Diameter | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | $r$ Corner Radius | Number of Flutes | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 21202 | .1181 | | 3.000 | 3.0 | 38 | 12 | 0.20 | 4 | 17.07 | 16.32 | 15.58 | 14.84 |
| 21212 | .1181 | | 3.000 | 3.0 | 38 | 12 | 0.50 | 4 | 17.07 | 16.32 | 15.58 | 14.84 |
| 21232 | .1250 | 1/8" | 3.175 | 1/8" | 1-1/2" | 1/2" | .010" | 4 | 16.22 | 15.51 | 14.81 | 14.10 |
| 21242 | .1250 | 1/8" | 3.175 | 1/8" | 1-1/2" | 1/2" | .020" | 4 | 16.22 | 15.51 | 14.81 | 14.10 |
| 21262 | .1575 | | 4.000 | 6.0 | 50 | 12 | 0.30 | 4 | 27.52 | 26.32 | 25.13 | 23.93 |
| 21292 | .1875 | 3/16" | 4.763 | 3/16" | 2" | 9/16" | .010" | 4 | 20.38 | 19.49 | 18.61 | 17.72 |
| 21302 | .1875 | 3/16" | 4.763 | 3/16" | 2" | 9/16" | .020" | 4 | 20.38 | 19.49 | 18.61 | 17.72 |
| 21322 | .1969 | | 5.000 | 6.0 | 65 | 15 | 0.30 | 4 | 30.02 | 28.71 | 27.41 | 26.10 |
| 21342 | .2362 | | 6.000 | 6.0 | 65 | 19 | 0.20 | 4 | 29.07 | 27.81 | 26.54 | 25.28 |
| 21352 | .2362 | | 6.000 | 6.0 | 65 | 19 | 0.50 | 4 | 29.07 | 27.81 | 26.54 | 25.28 |
| 21372 | .2500 | 1/4" | 6.350 | 1/4" | 2-1/2" | 3/4" | .010" | 4 | 28.01 | 26.80 | 25.58 | 24.36 |
| 21382 | .2500 | 1/4" | 6.350 | 1/4" | 2-1/2" | 3/4" | .015" | 4 | 28.01 | 26.80 | 25.58 | 24.36 |
| 21392 | .2500 | 1/4" | 6.350 | 1/4" | 2-1/2" | 3/4" | .030" | 4 | 28.01 | 26.80 | 25.58 | 24.36 |
| 21412 | .2756 | | 7.000 | 8.0 | 65 | 22 | 0.50 | 5 | 43.93 | 42.02 | 40.11 | 38.20 |
| 21432 | .3125 | 5/16" | 7.938 | 5/16" | 2-1/2" | 13/16" | .010" | 5 | 37.93 | 36.28 | 34.63 | 32.98 |
| 21442 | .3125 | 5/16" | 7.938 | 5/16" | 2-1/2" | 13/16" | .015" | 5 | 37.93 | 36.28 | 34.63 | 32.98 |
| 21452 | .3125 | 5/16" | 7.938 | 5/16" | 2-1/2" | 13/16" | .030" | 5 | 37.93 | 36.28 | 34.63 | 32.98 |
| 21462 | .3150 | | 8.000 | 8.0 | 65 | 22 | 0.20 | 5 | 39.93 | 38.19 | 36.46 | 34.72 |
| 21472 | .3150 | | 8.000 | 8.0 | 65 | 22 | 0.50 | 5 | 39.93 | 38.19 | 36.46 | 34.72 |
| 21502 | .3543 | | 9.000 | 10.0 | 65 | 22 | 0.50 | 5 | 59.00 | 56.43 | 53.87 | 51.30 |
| 21522 | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 7/8" | .010" | 5 | 44.14 | 42.22 | 40.30 | 38.38 |
| 21532 | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 7/8" | .015" | 5 | 44.14 | 42.22 | 40.30 | 38.38 |
| 21542 | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 7/8" | .030" | 5 | 44.14 | 42.22 | 40.30 | 38.38 |
| 21552 | .3937 | | 10.000 | 10.0 | 70 | 22 | 0.20 | 5 | 53.31 | 51.00 | 48.68 | 46.36 |
| 21562 | .3937 | | 10.000 | 10.0 | 70 | 22 | 0.50 | 5 | 53.31 | 51.00 | 48.68 | 46.36 |
| 21612 | .4724 | | 12.000 | 12.0 | 75 | 32 | 0.50 | 5 | 78.76 | 75.34 | 71.91 | 68.49 |
| 21622 | .4724 | | 12.000 | 12.0 | 75 | 32 | 1.00 | 5 | 78.76 | 75.34 | 71.91 | 68.49 |
| 21642 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1-1/4" | .010" | 5 | 74.82 | 71.57 | 68.31 | 65.06 |
| 21652 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1-1/4" | .015" | 5 | 74.82 | 71.57 | 68.31 | 65.06 |
| 21662 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1-1/4" | .030" | 5 | 74.82 | 71.57 | 68.31 | 65.06 |
| 21672 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1-1/4" | .060" | 5 | 74.82 | 71.57 | 68.31 | 65.06 |
| 21692 | .6250 | 5/8" | 15.875 | 5/8" | 3-1/2" | 1-1/4" | .010" | 5 | 119.00 | 113.83 | 108.65 | 103.48 |
| 21702 | .6250 | 5/8" | 15.875 | 5/8" | 3-1/2" | 1-1/4" | .015" | 5 | 119.00 | 113.83 | 108.65 | 103.48 |
| 21712 | .6250 | 5/8" | 15.875 | 5/8" | 3-1/2" | 1-1/4" | .030" | 5 | 119.00 | 113.83 | 108.65 | 103.48 |
| 21722 | .6250 | 5/8" | 15.875 | 5/8" | 3-1/2" | 1-1/4" | .060" | 5 | 119.00 | 113.83 | 108.65 | 103.48 |
| 21732 | .6299 | | 16.000 | 16.0 | 88 | 32 | 0.50 | 5 | 125.27 | 119.82 | 114.38 | 108.93 |
| 21742 | .6299 | | 16.000 | 16.0 | 88 | 32 | 1.00 | 5 | 125.27 | 119.82 | 114.38 | 108.93 |
| 21772 | .7087 | | 18.000 | 18.0 | 100 | 38 | 0.50 | 5 | 178.78 | 171.01 | 163.23 | 155.46 |
| 21802 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-1/2" | .015" | 5 | 171.07 | 163.64 | 156.20 | 148.76 |
| 21812 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-1/2" | .030" | 5 | 171.07 | 163.64 | 156.20 | 148.76 |
| 21822 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-1/2" | .060" | 5 | 171.07 | 163.64 | 156.20 | 148.76 |
| 21832 | .7874 | | 20.000 | 20.0 | 100 | 38 | 0.50 | 5 | 241.86 | 231.34 | 220.83 | 210.31 |
| 21922 | 1.000 | 1" | 25.400 | 1" | 4" | 1-1/2" | .015" | 5 | 292.38 | 279.66 | 266.95 | 254.24 |
| 21932 | 1.000 | 1" | 25.400 | 1" | 4" | 1-1/2" | .030" | 5 | 292.38 | 279.66 | 266.95 | 254.24 |
| 21942 | 1.000 | 1" | 25.400 | 1" | 4" | 1-1/2" | .060" | 5 | 292.38 | 279.66 | 266.95 | 254.24 |



Series 545BA

# HIGH ROCKWELL END MILLS




| TOLERANCES | |
|---|---|
| $d_1$ | +.000" –.002" (+.000 –.050mm) |
| $d_2$ | h6 |
| ball radius | +.000" –.001" (+.000 –.025mm) |

Recommended for inconel, tool steels, hardened die mold >40Rc

## Ball End

**BALINIT® Durana Coating**

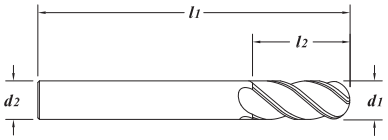
Solid submicron grain carbide end mill - center cutting

High performance tool for use in high Rockwell and difficult to machine materials

Square End - page 194

Corner Radius - page 195






MATERIAL HARDNESS (Rc) 70 35 0

| EDP# | $d_1$ † Diameter Decimal | Diameter | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | Number of Flutes | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 21204 | .1181 | | 3.000 | 3.0 | 38 | 12 | 4 | 17.07 | 16.32 | 15.58 | 14.84 |
| 21234 | .1250 | 1/8" | 3.175 | 1/8" | 1-1/2" | 1/2" | 4 | 16.22 | 15.51 | 14.81 | 14.10 |
| 21264 | .1575 | | 4.000 | 6.0 | 50 | 12 | 4 | 27.52 | 26.32 | 25.13 | 23.93 |
| 21294 | .1875 | 3/16" | 4.763 | 3/16" | 2" | 9/16" | 4 | 20.38 | 19.49 | 18.61 | 17.72 |
| 21324 | .1969 | | 5.000 | 6.0 | 65 | 15 | 4 | 30.02 | 28.71 | 27.41 | 26.10 |
| 21354 | .2362 | | 6.000 | 6.0 | 65 | 19 | 4 | 29.07 | 27.81 | 26.54 | 25.28 |
| 21384 | .2500 | 1/4" | 6.353 | 1/4" | 2-1/2" | 3/4" | 4 | 28.01 | 26.80 | 25.58 | 24.36 |
| 21414 | .2756 | | 7.000 | 8.0 | 65 | 22 | 5 | 43.93 | 42.02 | 40.11 | 38.20 |
| 21444 | .3125 | 5/16" | 7.938 | 5/16" | 2-1/2" | 13/16" | 5 | 37.93 | 36.28 | 34.63 | 32.98 |
| 21474 | .3150 | | 8.000 | 8.0 | 65 | 22 | 5 | 39.93 | 38.19 | 36.46 | 34.72 |
| 21504 | .3543 | | 9.000 | 10.0 | 65 | 22 | 5 | 59.00 | 56.43 | 53.87 | 51.30 |
| 21534 | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 7/8" | 5 | 44.14 | 42.22 | 40.30 | 38.38 |
| 21564 | .3937 | | 10.000 | 10.0 | 70 | 22 | 5 | 53.31 | 51.00 | 48.68 | 46.36 |
| 21624 | .4724 | | 12.000 | 12.0 | 75 | 32 | 5 | 78.76 | 75.34 | 71.91 | 68.49 |
| 21664 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1-1/4" | 5 | 74.82 | 71.57 | 68.31 | 65.06 |
| 21714 | .6250 | 5/8" | 15.875 | 5/8" | 3-1/2" | 1-1/4" | 5 | 119.00 | 113.83 | 108.65 | 103.48 |
| 21744 | .6299 | | 16.000 | 16.0 | 88 | 32 | 5 | 125.27 | 119.82 | 114.38 | 108.93 |
| 21774 | .7087 | | 18.000 | 18.0 | 100 | 38 | 5 | 178.78 | 171.01 | 163.23 | 155.46 |
| 21804 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-1/2" | 5 | 171.07 | 163.64 | 156.20 | 148.76 |
| 21924 | 1.000 | 1" | 25.400 | 1" | 4" | 1-1/2" | 5 | 292.38 | 279.66 | 266.95 | 254.24 |



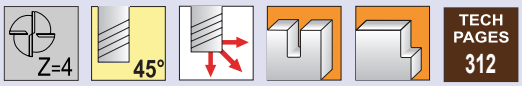
GARR TOOL®

† *Metric equivalents are for reference only*

| TOLERANCES | |
|---|---|
| $d_1$ | +.000" –.002" (+.000mm –.050mm) |
| $d_2$ | h6 |
| $r$ | +.001" –.001" (+.025 –.025mm) |

# HIGH FEED END MILLS

Series H-45




TECH PAGES 312

Recommended for die mold applications

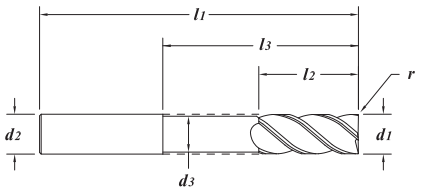
## Corner Radius

### BALINIT® Durana Coating

Solid submicron grain carbide end mill - center cutting
For light axial / radial depths of cut
Rigid work holding, machine stability and part integrity are critical!
Recommended for high Rockwell materials
Modified reach lengths available within 48 hours

* - tool has 3° per side blend angle to shank
* - tool has reduced diameter shank

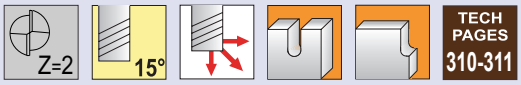





| | EDP# | $d_1$ † Diameter Decimal | Diameter | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | $r$ Corner Radius | $l_3$ Reach Length | $d_3$ Neck Diameter | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 48300 | .1181 | | 3.000 | 6.0 | 65 | 3 | 0.75 | 15.0 | 2.80 | 38.63 | 36.95 | 35.27 | 33.59 |
| | 48305 | .1250 | 1/8" | 3.175 | 1/8" | 3" | 1/8" | .015" | - | - | 29.19 | 27.92 | 26.65 | 25.38 |
| | 48310 | .1250 | 1/8" | 3.175 | 1/8" | 3" | 1/8" | .030" | - | - | 29.19 | 27.92 | 26.65 | 25.38 |
| | 48315 | .1250 | 1/8" | 3.175 | 3/16" | 2-1/2" | 1/8" | .010" | 3/4" | .115" | 34.29 | 32.80 | 31.31 | 29.82 |
| | 48320 | .1250 | 1/8" | 3.175 | 3/16" | 2-1/2" | 1/8" | .015" | 3/4" | .115" | 34.29 | 32.80 | 31.31 | 29.82 |
| | 48325 | .1250 | 1/8" | 3.175 | 3/16" | 2-1/2" | 1/8" | .020" | 3/4" | .115" | 34.29 | 32.80 | 31.31 | 29.82 |
| * | 48330 | .1250 | 1/8" | 3.175 | 3/16" | 3" | 1/8" | .030" | * | - | 31.29 | 29.93 | 28.57 | 27.21 |
| | 48335 | .1575 | | 4.000 | 6.0 | 65 | 4 | 1.00 | 20.0 | 3.70 | 37.09 | 35.48 | 33.86 | 32.25 |
| | 48340 | .1875 | 3/16" | 4.763 | 3/16" | 3" | 3/16" | .015" | - | - | 33.66 | 32.20 | 30.73 | 29.27 |
| | 48345 | .1875 | 3/16" | 4.763 | 3/16" | 3" | 3/16" | .030" | - | - | 33.66 | 32.20 | 30.73 | 29.27 |
| | 48350 | .1875 | 3/16" | 4.763 | 3/16" | 3" | 3/16" | .060" | - | - | 33.66 | 32.20 | 30.73 | 29.27 |
| | 48355 | .1875 | 3/16" | 4.763 | 1/4" | 2-1/2" | 3/16" | .020" | 7/8" | .175" | 36.02 | 34.45 | 32.89 | 31.32 |
| | 48360 | .1875 | 3/16" | 4.763 | 1/4" | 2-1/2" | 3/16" | .030" | 7/8" | .175" | 36.02 | 34.45 | 32.89 | 31.32 |
| | 48365 | .1875 | 3/16" | 4.763 | 1/4" | 2-1/2" | 3/16" | .060" | 7/8" | .175" | 36.02 | 34.45 | 32.89 | 31.32 |
| | 48370 | .1875 | 3/16" | 4.763 | 1/4" | 4" | 3/16" | .020" | 1-1/2" | .175" | 52.07 | 49.81 | 47.54 | 45.28 |
| | 48375 | .1875 | 3/16" | 4.763 | 1/4" | 4" | 3/16" | .030" | 1-1/2" | .175" | 52.07 | 49.81 | 47.54 | 45.28 |
| * | 48380 | .1875 | 3/16" | 4.763 | 1/4" | 4" | 3/16" | .030" | * | - | 52.07 | 49.81 | 47.54 | 45.28 |
| * | 48385 | .1969 | | 5.000 | 6.0 | 100 | 5 | 1.20 | * 10.0 | 4.90 | 53.98 | 51.63 | 49.29 | 46.94 |
| | 48390 | .2362 | | 6.000 | 6.0 | 100 | 6 | 1.50 | 30.0 | 5.70 | 51.20 | 48.97 | 46.75 | 44.52 |
| | 48395 | .2500 | 1/4" | 6.350 | 1/4" | 3" | 1/4" | .015" | - | - | 38.89 | 37.20 | 35.51 | 33.82 |
| | 48400 | .2500 | 1/4" | 6.350 | 1/4" | 3" | 1/4" | .030" | - | - | 38.89 | 37.20 | 35.51 | 33.82 |
| | 48405 | .2500 | 1/4" | 6.350 | 1/4" | 3" | 1/4" | .060" | - | - | 38.89 | 37.20 | 35.51 | 33.82 |
| * | 48410 | .2756 | | 7.000 | 6.0 | 100 | 7 | 1.50 | * | - | 81.01 | 77.48 | 73.96 | 70.44 |
| | 48415 | .3125 | 5/16" | 7.938 | 5/16" | 2-1/2" | 5/16" | .020" | - | - | 35.93 | 34.36 | 32.80 | 31.24 |
| | 48420 | .3125 | 5/16" | 7.938 | 5/16" | 3" | 5/16" | .078" | 1-5/8" | .300" | 57.34 | 54.85 | 52.35 | 49.86 |
| | 48425 | .3125 | 5/16" | 7.938 | 5/16" | 3" | 5/16" | .094" | 1-5/8" | .300" | 57.34 | 54.85 | 52.35 | 49.86 |
| | 48430 | .3150 | | 8.000 | 8.0 | 75 | 8 | 2.00 | - | - | 51.62 | 49.38 | 47.13 | 44.89 |
| | 48435 | .3150 | | 8.000 | 8.0 | 100 | 8 | 2.00 | 40.0 | 7.70 | 66.95 | 64.04 | 61.13 | 58.22 |
| | 48440 | .3750 | 3/8" | 9.525 | 3/8" | 3" | 3/8" | .015" | - | - | 54.53 | 52.16 | 49.79 | 47.42 |
| | 48445 | .3750 | 3/8" | 9.525 | 3/8" | 3" | 3/8" | .030" | - | - | 54.53 | 52.16 | 49.79 | 47.42 |
| | 48450 | .3750 | 3/8" | 9.525 | 3/8" | 3" | 3/8" | .060" | - | - | 54.53 | 52.16 | 49.79 | 47.42 |
| | 48455 | .3750 | 3/8" | 9.525 | 3/8" | 3" | 3/8" | .094" | 2.00" | .365" | 62.32 | 59.61 | 56.90 | 54.19 |
| | 48460 | .3750 | 3/8" | 9.525 | 3/8" | 4" | 3/8" | .030" | 2-1/2" | .365" | 69.37 | 66.35 | 63.34 | 60.32 |
| | 48465 | .3750 | 3/8" | 9.525 | 3/8" | 4" | 3/8" | .094" | 2-1/2" | .365" | 69.37 | 66.35 | 63.34 | 60.32 |
| | 48470 | .3937 | | 10.000 | 10.0 | 100 | 10 | 2.00 | 50.0 | 9.70 | 85.64 | 81.92 | 78.19 | 74.47 |
| | 48475 | .4724 | | 12.000 | 12.0 | 100 | 12 | 3.00 | 60.0 | 11.70 | 95.12 | 90.98 | 86.85 | 82.71 |
| | 48480 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1/2" | .015" | - | - | 70.89 | 67.80 | 64.72 | 61.64 |
| | 48485 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1/2" | .030" | - | - | 70.89 | 67.80 | 64.72 | 61.64 |
| | 48490 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1/2" | .060" | - | - | 70.89 | 67.80 | 64.72 | 61.64 |
| | 48495 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1/2" | .125" | - | - | 70.89 | 67.80 | 64.72 | 61.64 |
| | 48500 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 1/2" | .125" | - | - | 83.97 | 80.32 | 76.67 | 73.02 |

Series 350MX, 950MX

# DIE MOLD CUTTERS




| TOLERANCES | |
|---|---|
| $d_1$ | +.000" –.001" (+.000 –.025mm) |
| $d_2$ | h6 |
| ball radius | +.0000" –.0005" (+.0000 –.0127mm) |

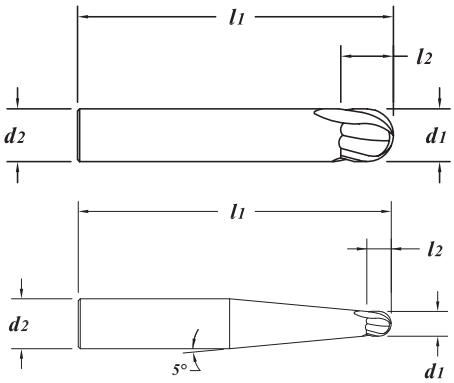
Recommended for die mold applications

## Die Mold Cutter - Ball End

### BALINIT® Durana Coating

Solid submicron grain carbide end mill - center cutting
High performance machining in the die mold industry
Rigid work holding, machine stability and part integrity are critical!
≤5mm (.1969") diameter have 5° per side taper to shank
Recommended for high Rockwell materials
Can be modified with a neck in 48 hours






| EDP# | $d_1$ † Diameter Decimal | Diameter | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|
| 14210 | .0312 | 1/32" | 0.792 | 1/4" | 3" | 1/32" | 60.36 | 57.74 | 55.11 | 52.49 |
| 15210 | .0394 | | 1.000 | 6.0 | 75 | 1 | 60.36 | 57.74 | 55.11 | 52.49 |
| 15220 | .0591 | | 1.500 | 6.0 | 75 | 1.5 | 60.36 | 57.74 | 55.11 | 52.49 |
| 14220 | .0625 | 1/16" | 1.588 | 1/4" | 3" | 1/16" | 60.36 | 57.74 | 55.11 | 52.49 |
| 15230 | .0787 | | 2.000 | 6.0 | 75 | 2 | 60.36 | 57.74 | 55.11 | 52.49 |
| 14230 | .0938 | 3/32" | 2.383 | 1/4" | 3" | 3/32" | 60.36 | 57.74 | 55.11 | 52.49 |
| 15240 | .1181 | | 3.000 | 6.0 | 75 | 3 | 58.98 | 56.42 | 53.85 | 51.29 |
| 14240 | .1250 | 1/8" | 3.175 | 1/4" | 3" | 1/8" | 58.98 | 56.42 | 53.85 | 51.29 |
| 15250 | .1575 | | 4.000 | 6.0 | 75 | 4 | 58.12 | 55.59 | 53.07 | 50.54 |
| 14250 | .1875 | 3/16" | 4.763 | 1/4" | 3" | 3/16" | 58.12 | 55.59 | 53.07 | 50.54 |
| 15260 | .1969 | | 5.000 | 6.0 | 75 | 5 | 58.12 | 55.59 | 53.07 | 50.54 |
| 15270 | .2362 | | 6.000 | 6.0 | 75 | 6 | 56.91 | 54.44 | 51.96 | 49.49 |
| 14260 | .2500 | 1/4" | 6.350 | 1/4" | 3" | 1/4" | 56.91 | 54.44 | 51.96 | 49.49 |
| 14270 | .3125 | 5/16" | 7.938 | 5/16" | 4" | 5/16" | 69.70 | 66.67 | 63.64 | 60.61 |
| 15280 | .3150 | | 8.000 | 8.0 | 100 | 8 | 69.70 | 66.67 | 63.64 | 60.61 |
| 14280 | .3750 | 3/8" | 9.525 | 3/8" | 4" | 3/8" | 77.12 | 73.77 | 70.41 | 67.06 |
| 15290 | .3937 | | 10.000 | 10.0 | 100 | 10 | 83.43 | 79.81 | 76.18 | 72.55 |
| 15300 | .4724 | | 12.000 | 12.0 | 100 | 12 | 101.05 | 96.66 | 92.26 | 87.87 |
| 14290 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 1/2" | 112.53 | 107.64 | 102.74 | 97.85 |





† *Metric equivalents are for reference only*

| TOLERANCES | |
|---|---|
| $d_1$ | +.000" –.002" (+.000 –.050mm) |
| $d_2$ | h6 |

Z=4 | 30° | TECH PAGES 286, 287, 313

Recommended for graphite, fiber-reinforced plastics, carbon fiber

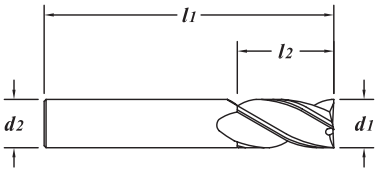


## Square End

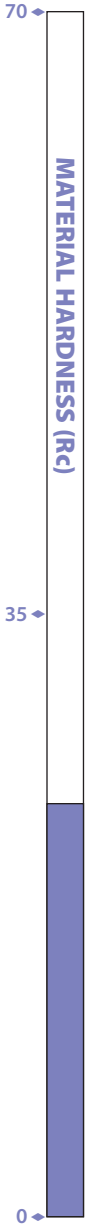
### Diamond Coating

Solid grade C-2 carbide end mill - center cutting

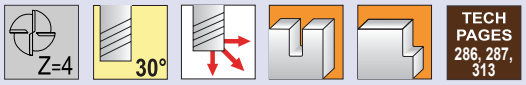
Crystalline diamond coating




| EDP# | $d_1$ † Diameter Decimal | Diameter | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|
| 10018 | .0312 | 1/32" | 0.792 | 1/8" | 1-1/2" | 3/32" | 73.26 | 70.07 | 66.89 | 63.70 |
| 46018 | .0394 | | 1.000 | 3.0 | 38 | 4 | 77.11 | 73.76 | 70.40 | 67.05 |
| 10028 | .0469 | 3/64" | 1.191 | 1/8" | 1-1/2" | 1/8" | 73.26 | 70.07 | 66.89 | 63.70 |
| 46028 | .0591 | | 1.500 | 3.0 | 38 | 6 | 77.11 | 73.76 | 70.40 | 67.05 |
| 10038 | .0625 | 1/16" | 1.588 | 1/8" | 1-1/2" | 1/4" | 70.92 | 67.84 | 64.75 | 61.67 |
| 46038 | .0787 | | 2.000 | 3.0 | 38 | 8 | 74.67 | 71.42 | 68.18 | 64.93 |
| 10058 | .0938 | 3/32" | 2.383 | 1/8" | 1-1/2" | 3/8" | 69.67 | 66.64 | 63.61 | 60.58 |
| 46058 | .1181 | | 3.000 | 3.0 | 38 | 12 | 69.30 | 66.29 | 63.27 | 60.26 |
| 10078 | .1250 | 1/8" | 3.175 | 1/8" | 1-1/2" | 1/2" | 65.81 | 62.95 | 60.09 | 57.23 |
| 46078 | .1575 | | 4.000 | 4.0 | 50 | 14 | 110.73 | 105.92 | 101.10 | 96.29 |
| 10118 | .1875 | 3/16" | 4.763 | 3/16" | 2" | 5/8" | 105.20 | 100.63 | 96.05 | 91.48 |
| 46098 | .1969 | | 5.000 | 5.0 | 50 | 16 | 127.64 | 122.09 | 116.54 | 110.99 |
| 46108 | .2362 | | 6.000 | 6.0 | 65 | 20 | 130.17 | 124.51 | 118.85 | 113.19 |
| 10158 | .2500 | 1/4" | 6.350 | 1/4" | 2-1/2" | 3/4" | 123.66 | 118.28 | 112.91 | 107.53 |
| 10198 | .3125 | 5/16" | 7.938 | 5/16" | 2-1/2" | 7/8" | 147.95 | 141.52 | 135.08 | 128.65 |
| 46128 | .3150 | | 8.000 | 8.0 | 65 | 20 | 174.64 | 167.05 | 159.45 | 151.86 |
| 10238 | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 7/8" | 165.78 | 158.58 | 151.37 | 144.16 |
| 46148 | .3937 | | 10.000 | 10.0 | 70 | 25 | 193.42 | 185.01 | 176.60 | 168.19 |
| 46168 | .4724 | | 12.000 | 12.0 | 75 | 25 | 212.04 | 202.82 | 193.60 | 184.38 |
| 10318 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1" | 201.43 | 192.68 | 183.92 | 175.16 |
| 13338 | .6250 | 5/8" | 15.875 | 5/8" | 3-1/2" | 1-1/4" | 291.12 | 278.47 | 265.81 | 253.15 |
| 46188 | .6299 | | 16.000 | 16.0 | 88 | 32 | 354.48 | 339.06 | 323.65 | 308.24 |
| 13358 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-1/2" | 550.79 | 526.85 | 502.90 | 478.95 |
| 13378 | 1.000 | 1" | 25.400 | 1" | 4" | 1-1/2" | 865.35 | 827.73 | 790.10 | 752.48 |



# Series 210RD




| TOLERANCES | |
|---|---|
| $d_1$ | +.000" –.002" (+.000 –.050mm) |
| $d_2$ | h6 |
| $r$ | +.001" –.001" (+.025 –.025mm) |

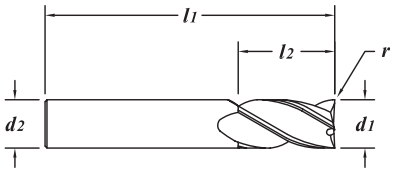
Recommended for graphite, fiber-reinforced plastics, carbon fiber



## Corner Radius

### Diamond Coating

Solid grade C-2 carbide end mill - center cutting
Crystalline diamond coating
For stronger corners and part radius



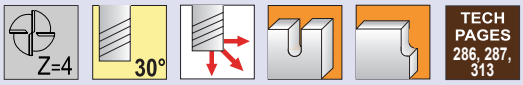

MATERIAL HARDNESS (Rc)
70
35
0

| EDP# | $d_1$ † Diameter Decimal | Diameter | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | $r$ Corner Radius | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 24118 | .1181 | | 3.000 | 3.0 | 38 | 12 | 0.50 | 96.00 | 91.83 | 87.65 | 83.48 |
| 80018 | .1250 | 1/8" | 3.175 | 1/8" | 1-1/2" | 1/2" | .015" | 91.20 | 87.23 | 83.27 | 79.30 |
| 80028 | .1250 | 1/8" | 3.175 | 1/8" | 1-1/2" | 1/2" | .020" | 91.20 | 87.23 | 83.27 | 79.30 |
| 24148 | .1575 | | 4.000 | 4.0 | 50 | 14 | 0.30 | 138.72 | 132.69 | 126.66 | 120.63 |
| 24158 | .1575 | | 4.000 | 4.0 | 50 | 14 | 0.50 | 138.72 | 132.69 | 126.66 | 120.63 |
| 80058 | .1875 | 3/16" | 4.763 | 3/16" | 2" | 5/8" | .015" | 131.80 | 126.07 | 120.34 | 114.61 |
| 80068 | .1875 | 3/16" | 4.763 | 3/16" | 2" | 5/8" | .020" | 131.80 | 126.07 | 120.34 | 114.61 |
| 24178 | .2362 | | 6.000 | 6.0 | 65 | 20 | 0.50 | 148.03 | 141.59 | 135.16 | 128.72 |
| 24208 | .2362 | | 6.000 | 6.0 | 65 | 20 | 1.50 | 148.03 | 141.59 | 135.16 | 128.72 |
| 80108 | .2500 | 1/4" | 6.350 | 1/4" | 2-1/2" | 3/4" | .015" | 140.63 | 134.52 | 128.40 | 122.29 |
| 80118 | .2500 | 1/4" | 6.350 | 1/4" | 2-1/2" | 3/4" | .020" | 140.63 | 134.52 | 128.40 | 122.29 |
| 80128 | .2500 | 1/4" | 6.350 | 1/4" | 2-1/2" | 3/4" | .030" | 140.63 | 134.52 | 128.40 | 122.29 |
| 24248 | .3150 | | 8.000 | 8.0 | 65 | 20 | 1.00 | 185.64 | 177.57 | 169.50 | 161.43 |
| 80248 | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 7/8" | .020" | 176.88 | 169.19 | 161.50 | 153.81 |
| 80258 | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 7/8" | .030" | 176.88 | 169.19 | 161.50 | 153.81 |
| 24318 | .3937 | | 10.000 | 10.0 | 70 | 25 | 1.00 | 206.21 | 197.24 | 188.28 | 179.31 |
| 24378 | .4724 | | 12.000 | 12.0 | 75 | 25 | 0.50 | 226.75 | 216.89 | 207.03 | 197.17 |
| 24398 | .4724 | | 12.000 | 12.0 | 75 | 25 | 1.00 | 226.75 | 216.89 | 207.03 | 197.17 |
| 80328 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1" | .030" | 215.41 | 206.04 | 196.68 | 187.31 |
| 80348 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1" | .060" | 215.41 | 206.04 | 196.68 | 187.31 |



† *Metric equivalents are for reference only*

| TOLERANCES | |
|---|---|
| $d_1$ | +.000" –.002" (+.000 –.050mm) |
| $d_2$ | h6 |
| *ball radius* | +.000" –.001" (+.000 –.025mm) |




Recommended for graphite, fiber-reinforced plastics, carbon fiber

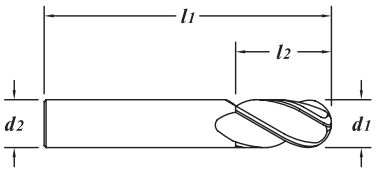


## Ball End

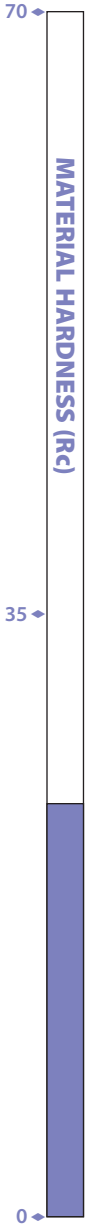
### Diamond Coating

Solid grade C-2 carbide end mill - center cutting

Crystalline diamond coating




| EDP# | $d_1$ † Diameter Decimal | Diameter | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|
| 15018 | .0312 | 1/32" | 0.792 | 1/8" | 1-1/2" | 3/32" | 99.04 | 94.73 | 90.43 | 86.12 |
| 48018 | .0394 | | 1.000 | 3.0 | 38 | 4 | 104.26 | 99.73 | 95.19 | 90.66 |
| 15028 | .0469 | 3/64" | 1.191 | 1/8" | 1-1/2" | 1/8" | 99.04 | 94.73 | 90.43 | 86.12 |
| 48028 | .0591 | | 1.500 | 3.0 | 38 | 6 | 104.26 | 99.73 | 95.19 | 90.66 |
| 15038 | .0625 | 1/16" | 1.588 | 1/8" | 1-1/2" | 1/4" | 96.72 | 92.51 | 88.31 | 84.10 |
| 48038 | .0787 | | 2.000 | 3.0 | 38 | 8 | 101.79 | 97.36 | 92.94 | 88.51 |
| 15058 | .0938 | 3/32" | 2.383 | 1/8" | 1-1/2" | 3/8" | 95.04 | 90.90 | 86.77 | 82.64 |
| 48058 | .1181 | | 3.000 | 3.0 | 38 | 12 | 96.00 | 91.83 | 87.65 | 83.48 |
| 15078 | .1250 | 1/8" | 3.175 | 1/8" | 1-1/2" | 1/2" | 91.20 | 87.23 | 83.27 | 79.30 |
| 48078 | .1575 | | 4.000 | 4.0 | 50 | 14 | 138.72 | 132.69 | 126.66 | 120.63 |
| 15118 | .1875 | 3/16" | 4.763 | 3/16" | 2" | 5/8" | 131.80 | 126.07 | 120.34 | 114.61 |
| 48098 | .1969 | | 5.000 | 5.0 | 50 | 16 | 144.96 | 138.66 | 132.35 | 126.05 |
| 48108 | .2362 | | 6.000 | 6.0 | 65 | 20 | 148.03 | 141.59 | 135.16 | 128.72 |
| 15158 | .2500 | 1/4" | 6.350 | 1/4" | 2-1/2" | 3/4" | 140.63 | 134.52 | 128.40 | 122.29 |
| 15198 | .3125 | 5/16" | 7.938 | 5/16" | 2-1/2" | 7/8" | 158.40 | 151.51 | 144.63 | 137.74 |
| 48128 | .3150 | | 8.000 | 8.0 | 65 | 20 | 185.64 | 177.57 | 169.50 | 161.43 |
| 15238 | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 7/8" | 176.88 | 169.19 | 161.50 | 153.81 |
| 48168 | .4724 | | 12.000 | 12.0 | 75 | 25 | 226.75 | 216.89 | 207.03 | 197.17 |
| 15318 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1" | 215.41 | 206.04 | 196.68 | 187.31 |



# Series 610D

| TOLERANCES | |
|---|---|
| $d_1$ | +.000" –.002" (+.000 –.050mm) |
| $d_2$ | h6 |

Z=4 | 30° | TECH PAGES 286, 287, 313

Recommended for graphite, fiber-reinforced plastics, carbon fiber

## Extra Length - Square End

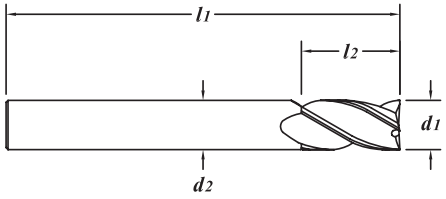
### Diamond Coating

Solid grade C-2 carbide end mill - center cutting

Crystalline diamond coating

Can be modified with a neck in 48 hours






MATERIAL HARDNESS (Rc)

70

35

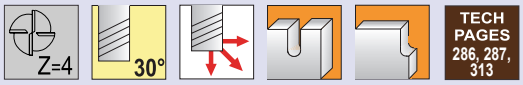
0

| EDP# | $d_1$ † Diameter Decimal | Diameter | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|
| 94028 | .1181 | | 3.000 | 3.0 | 75 | 20 | 106.18 | 101.56 | 96.95 | 92.33 |
| 38038 | .1250 | 1/8" | 3.175 | 1/8" | 3" | 1" | 100.88 | 96.49 | 92.11 | 87.72 |
| 94068 | .1575 | | 4.000 | 4.0 | 75 | 25 | 142.07 | 135.89 | 129.72 | 123.54 |
| 38048 | .1875 | 3/16" | 4.763 | 3/16" | 4" | 1" | 134.95 | 129.09 | 123.22 | 117.35 |
| 38058 | .2500 | 1/4" | 6.350 | 1/4" | 3" | 1" | 144.60 | 138.31 | 132.03 | 125.74 |
| 38068 | .2500 | 1/4" | 6.350 | 1/4" | 4" | 1" | 150.17 | 143.64 | 137.11 | 130.58 |
| 38078 | .2500 | 1/4" | 6.350 | 1/4" | 6" | 1-1/2" | 171.87 | 164.40 | 156.92 | 149.45 |
| 38098 | .3125 | 5/16" | 7.938 | 5/16" | 4" | 1" | 176.05 | 168.40 | 160.74 | 153.09 |
| 94168 | .3150 | | 8.000 | 8.0 | 100 | 25 | 210.58 | 201.42 | 192.27 | 183.11 |
| 38128 | .3750 | 3/8" | 9.525 | 3/8" | 4" | 1" | 196.05 | 187.53 | 179.00 | 170.48 |
| 38138 | .3750 | 3/8" | 9.525 | 3/8" | 6" | 1-1/2" | 216.67 | 207.25 | 197.83 | 188.41 |
| 94208 | .3937 | | 10.000 | 10.0 | 100 | 25 | 235.09 | 224.87 | 214.65 | 204.43 |
| 94248 | .4724 | | 12.000 | 12.0 | 100 | 25 | 259.60 | 248.31 | 237.03 | 225.74 |
| 38168 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 1" | 246.64 | 235.92 | 225.19 | 214.47 |
| 38178 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 2" | 246.64 | 235.92 | 225.19 | 214.47 |



† *Metric equivalents are for reference only*

| TOLERANCES | |
|---|---|
| $d_1$ | +.000" –.002" (+.000 –.050mm) |
| $d_2$ | h6 |
| *ball radius* | +.000" –.001" (+.000 –.025mm) |




Recommended for graphite, fiber-reinforced plastics, carbon fiber

## Extra Length - Ball End

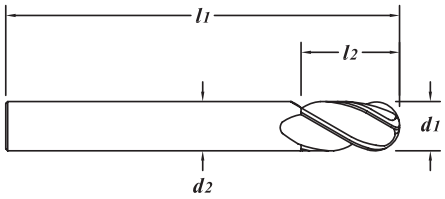
### Diamond Coating

Solid grade C-2 carbide end mill - center cutting

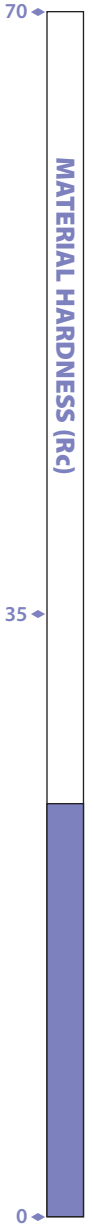
Crystalline diamond coating

Can be modified with a neck in 48 hours






| EDP# | $d_1$ † Diameter Decimal | Diameter | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|
| 99028 | .1181 | | 3.000 | 3.0 | 75 | 20 | 129.69 | 124.05 | 118.41 | 112.77 |
| 40038 | .1250 | 1/8" | 3.175 | 1/8" | 3" | 1" | 123.21 | 117.85 | 112.50 | 107.14 |
| 99068 | .1575 | | 4.000 | 4.0 | 75 | 25 | 161.36 | 154.34 | 147.33 | 140.31 |
| 40048 | .1875 | 3/16" | 4.763 | 3/16" | 4" | 1" | 153.28 | 146.62 | 139.95 | 133.29 |
| 99108 | .2362 | | 6.000 | 6.0 | 100 | 25 | 177.34 | 169.63 | 161.92 | 154.21 |
| 99128 | .2362 | | 6.000 | 6.0 | 150 | 38 | 196.91 | 188.35 | 179.79 | 171.23 |
| 40058 | .2500 | 1/4" | 6.350 | 1/4" | 3" | 1" | 162.92 | 155.84 | 148.75 | 141.67 |
| 40068 | .2500 | 1/4" | 6.350 | 1/4" | 4" | 1" | 168.50 | 161.17 | 153.85 | 146.52 |
| 40078 | .2500 | 1/4" | 6.350 | 1/4" | 6" | 1-1/2" | 187.07 | 178.94 | 170.80 | 162.67 |
| 40098 | .3125 | 5/16" | 7.938 | 5/16" | 4" | 1" | 194.37 | 185.92 | 177.47 | 169.02 |
| 99168 | .3150 | | 8.000 | 8.0 | 100 | 25 | 226.55 | 216.70 | 206.85 | 197.00 |
| 40128 | .3750 | 3/8" | 9.525 | 3/8" | 4" | 1" | 214.38 | 205.06 | 195.74 | 186.42 |
| 40138 | .3750 | 3/8" | 9.525 | 3/8" | 6" | 1-1/2" | 226.83 | 216.96 | 207.10 | 197.24 |
| 99208 | .3937 | | 10.000 | 10.0 | 100 | 25 | 251.08 | 240.16 | 229.25 | 218.33 |
| 40168 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 1" | 261.84 | 250.46 | 239.07 | 227.69 |
| 40178 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 2" | 261.84 | 250.46 | 239.07 | 227.69 |



# INTRODUCING . . .

# GARR Technical Advisor

**Features ease of use, including an extensive material list and setup versatility**

**Uses a dynamic function based on spindle interface, toolholding, stability of workpiece and *most importantly*, specific material condition**

**Adaptability of the GARR Technical Advisor is beneficial when setup factors are sub-optimal**

*CHECK IT OUT ON OUR WEBSITE*

Solid micrograin carbide tested for drilling of carbon fiber and glass-filled composites

These specials are built to order uncoated in two weeks

Having a quality dust collection system helps prolong tool life and quality of parts

'Clamping' of part to table can cause stress fractures in material



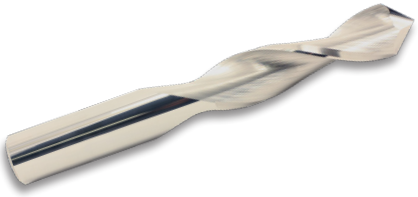
## SERIES 780 - 8-FACET POINT

Double angle drill point geometry reduces cutting forces to eliminate exit burrs

Works well in carbon fiber especially when the honeycomb core is either titanium or aluminum

Works in glass-filled epoxy, harder plastics, softer steels, CFRP (Carbon Fiber Reinforced Plastic), and aluminum

Can be coated with a variety of coatings depending on your application



## SERIES 805 - CARBON FIBER

Designed for drilling CFRP and plastics

Good in both multidirectional fibers and unidirectional fibers

90° center cutting point for better entry and exit hole with little to no delamination

Parabolic flute shape for less tool pressure on the material, and also for better chip flow in soft plastics

Add BALINIT® MAYURA coating for longer tool life than uncoated tools, and shorter lead times than Diamond Coating

# ROUTERS

Solid micrograin carbide tested for milling of carbon fiber and glass-filled composites

These specials are built to order uncoated in two weeks

There are many challenges to machining composite materials. Keeping the material from delaminating is key. Our tools have higher rake angles and combinations of left hand and/or right hand spirals to help eliminate 'fraying' of the laminate.

Please specify what type of end cut your job requires (*i.e. - no end cut, burr type, end mill type, or drill point*)

Having a quality dust collection system helps prolong tool life and quality of parts

'Clamping' of part to table can cause stress fractures in material

Please specify what coating, if any, your job requires:

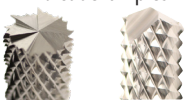
- Polycrystalline Diamond
- Amorphous Diamond / BALINIT® MAYURA
- AlCrN Coated



## SERIES 700 - FIBERGLASS ROUTER

For cutting glass-filled epoxies

End cut examples



Burr Type | Drill Point



## SERIES 701 - KEVLAR ROUTER

Gives a clean edge when trimming Aramid Fibers (Kevlar)

End cut examples



Burr Type | Drill Point



## SERIES 702 - CARBON FIBER ROUTER

For trim milling of single-layer panels



## SERIES 703 - CARBON FIBER ROUTER

For rough cutting of stacked panels with or without honeycomb cores

Solid micrograin carbide tested for milling of carbon fiber and glass-filled composites

These specials are built to order uncoated in two weeks

There are many challenges to machining composite materials. Keeping the material from delaminating is key. Our tools have higher rake angles and combinations of left hand and/or right hand spirals to help eliminate 'fraying' of the laminate.

Please specify what type of end cut your job requires (*i.e. - no end cut, burr type, end mill type, or drill point*)

Having a quality dust collection system helps prolong tool life and quality of parts

'Clamping' of part to table can cause stress fractures in material

Please specify what coating, if any, your job requires:

- Polycrystalline Diamond
- Amorphous Diamond / BALINIT® MAYURA
- AlCrN Coated



## SERIES 704 - COMPRESSION ROUTER - 4 FLUTE

For profile milling of carbon fiber





## SERIES 705 - COMPRESSION ROUTER - 2 FLUTE

For slotting of carbon fiber





## SERIES 706 - SINGLE FLUTE ROUTER

For aluminum and soft plastics









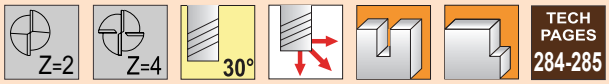
*Blank Prep*



**TOLERANCES**

| | | |
|---|---|---|
| $d_1$ | ≤ .030" | +.000" –.001" (+.000 –.025mm) |
| | ≥ 1/32" | +.000" –.002" (+.000 –.050mm) |
| $d_2$ | h6 | |

# Series 160M, 170M, 860M, 870M



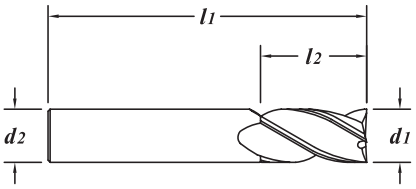

TECH PAGES 284-285

.0200" - .2362"
(0.508mm - 6.000mm)

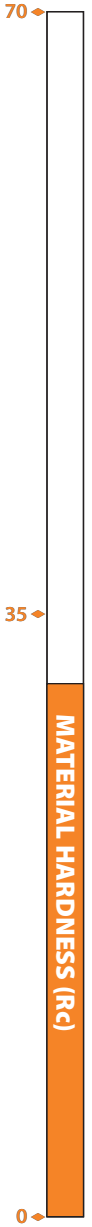
## Stub Length - Square End

Solid submicron grain carbide end mill - center cutting
Shorter flute length for rigidity
Extremely versatile
TiALN Coated - page 211
Standard Length - page 218
Extended length - page 238






| (160M/860M) 2 Flute EDP# | (170M/870M) 4 Flute EDP# | $d_1$ † Diameter Decimal | $d_1$ † Diameter | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 01350 | - | .0200 | .0200" | 0.508 | 1/8" | 1-1/2" | .030" | 18.40 | 17.60 | 16.80 | 16.00 |
| 01360 | - | .0210 | .0210" | 0.533 | 1/8" | 1-1/2" | .032" | 18.40 | 17.60 | 16.80 | 16.00 |
| 01370 | - | .0220 | .0220" | 0.559 | 1/8" | 1-1/2" | .033" | 18.18 | 17.39 | 16.60 | 15.81 |
| 01380 | - | .0230 | .0230" | 0.584 | 1/8" | 1-1/2" | .035" | 18.18 | 17.39 | 16.60 | 15.81 |
| 01390 | - | .0240 | .0240" | 0.610 | 1/8" | 1-1/2" | .036" | 18.18 | 17.39 | 16.60 | 15.81 |
| 01400 | - | .0250 | .0250" | 0.635 | 1/8" | 1-1/2" | .038" | 17.15 | 16.40 | 15.66 | 14.91 |
| 01410 | - | .0260 | .0260" | 0.660 | 1/8" | 1-1/2" | .039" | 17.15 | 16.40 | 15.66 | 14.91 |
| 01420 | - | .0270 | .0270" | 0.686 | 1/8" | 1-1/2" | .041" | 15.38 | 14.71 | 14.04 | 13.37 |
| 01430 | - | .0280 | .0280" | 0.711 | 1/8" | 1-1/2" | .042" | 15.38 | 14.71 | 14.04 | 13.37 |
| 01440 | - | .0290 | .0290" | 0.737 | 1/8" | 1-1/2" | .044" | 15.38 | 14.71 | 14.04 | 13.37 |
| 01450 | - | .0300 | .0300" | 0.762 | 1/8" | 1-1/2" | .045" | 15.38 | 14.71 | 14.04 | 13.37 |
| 01010 | 02010 | .0312 | 1/32" | 0.792 | 1/8" | 1-1/2" | 1/16" | 11.19 | 10.70 | 10.22 | 9.73 |
| 01510 | 02510 | .0394 | | 1.000 | 3.0 | 38 | 2 | 11.75 | 11.24 | 10.73 | 10.22 |
| 01020 | 02020 | .0469 | 3/64" | 1.191 | 1/8" | 1-1/2" | 3/32" | 11.19 | 10.70 | 10.22 | 9.73 |
| 01520 | 02520 | .0591 | | 1.500 | 3.0 | 38 | 3 | 11.75 | 11.24 | 10.73 | 10.22 |
| 01030 | 02030 | .0625 | 1/16" | 1.588 | 1/8" | 1-1/2" | 1/8" | 8.88 | 8.49 | 8.11 | 7.72 |
| 01530 | 02530 | .0787 | | 2.000 | 3.0 | 38 | 4 | 9.34 | 8.93 | 8.53 | 8.12 |
| 01040 | 02040 | .0938 | 3/32" | 2.383 | 1/8" | 1-1/2" | 3/16" | 8.40 | 8.03 | 7.67 | 7.30 |
| 01540 | 02540 | .0984 | | 2.500 | 3.0 | 38 | 5 | 8.84 | 8.46 | 8.07 | 7.69 |
| 01550 | 02550 | .1181 | | 3.000 | 3.0 | 38 | 6 | 8.63 | 8.25 | 7.88 | 7.50 |
| 01050 | 02050 | .1250 | 1/8" | 3.175 | 1/8" | 1-1/2" | 1/4" | 8.18 | 7.82 | 7.47 | 7.11 |
| 01560 | 02560 | .1378 | | 3.500 | 4.0 | 50 | 7 | 12.06 | 11.54 | 11.01 | 10.49 |
| 01060 | 02060 | .1562 | 5/32" | 3.967 | 3/16" | 2" | 5/16" | 11.48 | 10.98 | 10.48 | 9.98 |
| 01570 | 02570 | .1575 | | 4.000 | 4.0 | 50 | 8 | 11.41 | 10.91 | 10.42 | 9.92 |
| 01580 | 02580 | .1772 | | 4.500 | 5.0 | 50 | 9.5 | 15.15 | 14.49 | 13.83 | 13.17 |
| 01070 | 02070 | .1875 | 3/16" | 4.763 | 3/16" | 2" | 3/8" | 10.86 | 10.38 | 9.91 | 9.44 |
| 01590 | 02590 | .1969 | | 5.000 | 5.0 | 50 | 10 | 14.12 | 13.51 | 12.89 | 12.28 |
| 01080 | 02080 | .2188 | 7/32" | 5.558 | 1/4" | 2" | 7/16" | 14.40 | 13.77 | 13.15 | 12.52 |
| 01600 | 02600 | .2362 | | 6.000 | 6.0 | 50 | 12 | 14.96 | 14.31 | 13.66 | 13.01 |




*continued* →

# Series 160M, 170M, 860M, 870M *(continued)*

.2500" - 1.000"
(6.350mm - 25.400mm)

| (160M/860M) 2 Flute EDP# | (170M/870M) 4 Flute EDP# | $d_1$ † Diameter Decimal | Diameter | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 01090 | 02090 | .2500 | 1/4" | 6.350 | 1/4" | 2" | 1/2" | 14.19 | 13.57 | 12.96 | 12.34 |
| 01610 | 02610 | .2756 | | 7.000 | 7.0 | 50 | 12 | 19.45 | 18.60 | 17.76 | 16.91 |
| 01100 | 02100 | .3125 | 5/16" | 7.938 | 5/16" | 2" | 1/2" | 19.42 | 18.58 | 17.73 | 16.89 |
| 01620 | 02620 | .3150 | | 8.000 | 8.0 | 50 | 12 | 20.41 | 19.53 | 18.64 | 17.75 |
| 01630 | 02630 | .3543 | | 9.000 | 9.0 | 50 | 14 | 25.22 | 24.12 | 23.03 | 21.93 |
| 01110 | 02110 | .3750 | 3/8" | 9.525 | 3/8" | 2" | 5/8" | 23.99 | 22.95 | 21.90 | 20.86 |
| 01640 | 02640 | .3937 | | 10.000 | 10.0 | 50 | 16 | 27.88 | 26.66 | 25.45 | 24.24 |
| 01650 | 02650 | .4331 | | 11.000 | 11.0 | 65 | 19 | 32.58 | 31.16 | 29.75 | 28.33 |
| 01120 | 02120 | .4375 | 7/16" | 11.113 | 7/16" | 2-1/2" | 5/8" | 29.66 | 28.37 | 27.08 | 25.79 |
| 01660 | 02660 | .4724 | | 12.000 | 12.0 | 65 | 19 | 41.63 | 39.82 | 38.01 | 36.20 |
| 01130 | 02130 | .5000 | 1/2" | 12.700 | 1/2" | 2-1/2" | 5/8" | 39.56 | 37.84 | 36.12 | 34.40 |
| 01140 | 02140 | .6250 | 5/8" | 15.875 | 5/8" | 3" | 3/4" | 75.61 | 72.33 | 69.04 | 65.75 |
| - | 02670 | .6299 | | 16.000 | 16.0 | 75 | 19 | 79.58 | 76.12 | 72.66 | 69.20 |
| 01150 | 02150 | .7500 | 3/4" | 19.050 | 3/4" | 3" | 1" | 108.76 | 104.03 | 99.30 | 94.57 |
| - | 02680 | .7874 | | 20.000 | 20.0 | 75 | 25 | 147.49 | 141.08 | 134.66 | 128.25 |
| - | 02160 | 1.000 | 1" | 25.400 | 1" | 3" | 1" | 187.14 | 179.00 | 170.87 | 162.73 |






*Micro Tool Manufacturing*

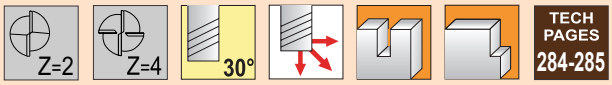
MATERIAL HARDNESS (Rc)
70
35
0



† *Metric equivalents are for reference only*

| TOLERANCES | |
|---|---|
| $d_1$ | +.000" –.002" (+.000 –.050mm) |
| $d_2$ | h6 |





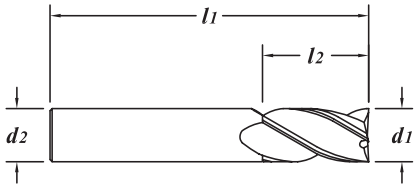

TECH PAGES 284-285

## Stub Length - Square End

### TiALN Coating

Solid submicron grain carbide end mill - center cutting
Shorter flute length for rigidity
Dry or semi-dry machining
Extremely versatile
Bright Finish - page 209
Standard Length - page 222
Extended length - page 241

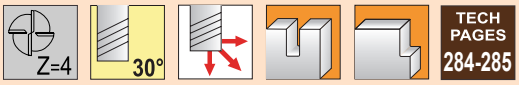





| (160MA/860MA) 2 Flute EDP# | (170MA/870MA) 4 Flute EDP# | $d_1$ † Diameter Decimal | Diameter | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 01017 | 02017 | .0312 | 1/32" | 0.792 | 1/8" | 1-1/2" | 1/16" | 13.88 | 13.28 | 12.67 | 12.07 |
| 01517 | 02517 | .0394 | | 1.000 | 3.0 | 38 | 2 | 14.47 | 13.84 | 13.21 | 12.58 |
| 01027 | 02027 | .0469 | 3/64" | 1.191 | 1/8" | 1-1/2" | 3/32" | 13.88 | 13.28 | 12.67 | 12.07 |
| 01527 | 02527 | .0591 | | 1.500 | 3.0 | 38 | 3 | 14.47 | 13.84 | 13.21 | 12.58 |
| 01037 | 02037 | .0625 | 1/16" | 1.588 | 1/8" | 1-1/2" | 1/8" | 11.58 | 11.08 | 10.57 | 10.07 |
| 01537 | 02537 | .0787 | | 2.000 | 3.0 | 38 | 4 | 12.04 | 11.52 | 10.99 | 10.47 |
| 01047 | 02047 | .0938 | 3/32" | 2.383 | 1/8" | 1-1/2" | 3/16" | 11.10 | 10.62 | 10.13 | 9.65 |
| 01547 | 02547 | .0984 | | 2.500 | 3.0 | 38 | 5 | 11.53 | 11.03 | 10.53 | 10.03 |
| 01557 | 02557 | .1181 | | 3.000 | 3.0 | 38 | 6 | 11.30 | 10.81 | 10.32 | 9.83 |
| 01057 | 02057 | .1250 | 1/8" | 3.175 | 1/8" | 1-1/2" | 1/4" | 10.86 | 10.38 | 9.91 | 9.44 |
| 01567 | 02567 | .1378 | | 3.500 | 4.0 | 50 | 7 | 14.75 | 14.11 | 13.47 | 12.83 |
| 01067 | 02067 | .1562 | 5/32" | 3.967 | 3/16" | 2" | 5/16" | 14.16 | 13.54 | 12.93 | 12.31 |
| 01577 | 02577 | .1575 | | 4.000 | 4.0 | 50 | 8 | 14.12 | 13.51 | 12.89 | 12.28 |
| 01587 | 02587 | .1772 | | 4.500 | 5.0 | 50 | 9.5 | 19.35 | 18.51 | 17.67 | 16.83 |
| 01077 | 02077 | .1875 | 3/16" | 4.763 | 3/16" | 2" | 3/8" | 13.56 | 12.97 | 12.38 | 11.79 |
| 01597 | 02597 | .1969 | | 5.000 | 5.0 | 50 | 10 | 18.31 | 17.51 | 16.72 | 15.92 |
| 01087 | 02087 | .2188 | 7/32" | 5.558 | 1/4" | 2" | 7/16" | 18.61 | 17.80 | 16.99 | 16.18 |
| 01607 | 02607 | .2362 | | 6.000 | 6.0 | 50 | 12 | 19.15 | 18.32 | 17.48 | 16.65 |
| 01097 | 02097 | .2500 | 1/4" | 6.350 | 1/4" | 2" | 1/2" | 18.40 | 17.60 | 16.80 | 16.00 |
| 01617 | 02617 | .2756 | | 7.000 | 7.0 | 50 | 12 | 25.44 | 24.33 | 23.23 | 22.12 |
| 01107 | 02107 | .3125 | 5/16" | 7.938 | 5/16" | 2" | 1/2" | 25.42 | 24.31 | 23.21 | 22.10 |
| 01627 | 02627 | .3150 | | 8.000 | 8.0 | 50 | 12 | 26.43 | 25.28 | 24.13 | 22.98 |
| 01637 | 02637 | .3543 | | 9.000 | 9.0 | 50 | 14 | 31.21 | 29.85 | 28.50 | 27.14 |
| 01117 | 02117 | .3750 | 3/8" | 9.525 | 3/8" | 2" | 5/8" | 29.97 | 28.67 | 27.36 | 26.06 |
| 01647 | 02647 | .3937 | | 10.000 | 10.0 | 50 | 16 | 34.67 | 33.17 | 31.66 | 30.15 |
| 01657 | 02657 | .4331 | | 11.000 | 11.0 | 65 | 19 | 42.03 | 40.21 | 38.38 | 36.55 |
| 01127 | 02127 | .4375 | 7/16" | 11.113 | 7/16" | 2-1/2" | 5/8" | 39.11 | 37.41 | 35.71 | 34.01 |
| 01667 | 02667 | .4724 | | 12.000 | 12.0 | 65 | 19 | 51.08 | 48.86 | 46.64 | 44.42 |
| 01137 | 02137 | .5000 | 1/2" | 12.700 | 1/2" | 2-1/2" | 5/8" | 49.01 | 46.88 | 44.75 | 42.62 |
| 01147 | 02147 | .6250 | 5/8" | 15.875 | 5/8" | 3" | 3/4" | 86.58 | 82.82 | 79.05 | 75.29 |
| - | 02677 | .6299 | | 16.000 | 16.0 | 75 | 19 | 90.52 | 86.58 | 82.65 | 78.71 |
| 01157 | 02157 | .7500 | 3/4" | 19.050 | 3/4" | 3" | 1" | 121.88 | 116.58 | 111.28 | 105.98 |
| - | 02687 | .7874 | | 20.000 | 20.0 | 75 | 25 | 168.16 | 160.85 | 153.54 | 146.23 |
| - | 02167 | 1.000 | 1" | 25.400 | 1" | 3" | 1" | 207.82 | 198.78 | 189.75 | 180.71 |

# Series 170R, 870R

.0625" - .3150"
(1.588mm - 8.000mm)

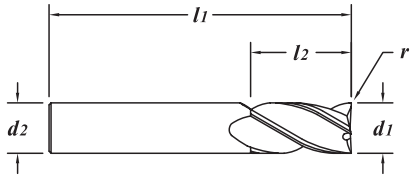



| TOLERANCES | |
|---|---|
| $d_1$ | +.000" –.002" (+.000 –.050mm) |
| $d_2$ | h6 |
| $r$ | +.001" –.001" (+.025 –.025mm) |

## Stub Length - Corner Radius

Solid submicron grain carbide end mill - center cutting
For stronger corners and part radius
Extremely versatile
TiALN Coating - page 214
Standard Length - page 224
Extended Length - page 243






| EDP# | $d_1$ † Decimal | $d_1$ † Diameter | $d_1$ † Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | $r$ Corner Radius | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 30701 | .0625 | 1/16" | 1.588 | 1/8" | 1-1/2" | 1/8" | .010" | 10.47 | 10.01 | 9.56 | 9.10 |
| 30703 | .0625 | 1/16" | 1.588 | 1/8" | 1-1/2" | 1/8" | .015" | 10.47 | 10.01 | 9.56 | 9.10 |
| 30705 | .0938 | 3/32" | 2.383 | 1/8" | 1-1/2" | 3/16" | .010" | 9.88 | 9.45 | 9.02 | 8.59 |
| 30707 | .0938 | 3/32" | 2.383 | 1/8" | 1-1/2" | 3/16" | .015" | 9.88 | 9.45 | 9.02 | 8.59 |
| 30709 | .0938 | 3/32" | 2.383 | 1/8" | 1-1/2" | 3/16" | .020" | 9.88 | 9.45 | 9.02 | 8.59 |
| 30711 | .1181 | | 3.000 | 3.0 | 38 | 6 | 0.20 | 10.12 | 9.68 | 9.24 | 8.80 |
| 30713 | .1181 | | 3.000 | 3.0 | 38 | 6 | 0.50 | 10.12 | 9.68 | 9.24 | 8.80 |
| 30715 | .1250 | 1/8" | 3.175 | 1/8" | 1-1/2" | 1/4" | .010" | 9.63 | 9.21 | 8.79 | 8.37 |
| 30717 | .1250 | 1/8" | 3.175 | 1/8" | 1-1/2" | 1/4" | .015" | 9.63 | 9.21 | 8.79 | 8.37 |
| 30719 | .1250 | 1/8" | 3.175 | 1/8" | 1-1/2" | 1/4" | .020" | 9.63 | 9.21 | 8.79 | 8.37 |
| 30721 | .1250 | 1/8" | 3.175 | 1/8" | 1-1/2" | 1/4" | .030" | 9.63 | 9.21 | 8.79 | 8.37 |
| 30904 | .1250 | 1/8" | 3.175 | 1/8" | 1-1/2" | 1/4" | .040" | 9.63 | 9.21 | 8.79 | 8.37 |
| 30909 | .1562 | 5/32" | 3.967 | 3/16" | 2" | 5/16" | .015" | 13.48 | 12.89 | 12.31 | 11.72 |
| 30911 | .1562 | 5/32" | 3.967 | 3/16" | 2" | 5/16" | .030" | 13.48 | 12.89 | 12.31 | 11.72 |
| 30913 | .1562 | 5/32" | 3.967 | 3/16" | 2" | 5/16" | .060" | 13.48 | 12.89 | 12.31 | 11.72 |
| 30723 | .1575 | | 4.000 | 4.0 | 50 | 8 | 0.30 | 13.47 | 12.88 | 12.30 | 11.71 |
| 30725 | .1575 | | 4.000 | 4.0 | 50 | 8 | 0.50 | 13.47 | 12.88 | 12.30 | 11.71 |
| 30727 | .1875 | 3/16" | 4.763 | 3/16" | 2" | 3/8" | .010" | 12.79 | 12.23 | 11.68 | 11.12 |
| 30729 | .1875 | 3/16" | 4.763 | 3/16" | 2" | 3/8" | .015" | 12.79 | 12.23 | 11.68 | 11.12 |
| 30731 | .1875 | 3/16" | 4.763 | 3/16" | 2" | 3/8" | .020" | 12.79 | 12.23 | 11.68 | 11.12 |
| 30733 | .1875 | 3/16" | 4.763 | 3/16" | 2" | 3/8" | .030" | 12.79 | 12.23 | 11.68 | 11.12 |
| 30735 | .1969 | | 5.000 | 5.0 | 50 | 10 | 0.30 | 16.77 | 16.04 | 15.31 | 14.58 |
| 30737 | .1969 | | 5.000 | 5.0 | 50 | 10 | 0.50 | 16.77 | 16.04 | 15.31 | 14.58 |
| 30739 | .2362 | | 6.000 | 6.0 | 50 | 12 | 0.50 | 17.61 | 16.84 | 16.08 | 15.31 |
| 30741 | .2362 | | 6.000 | 6.0 | 50 | 12 | 0.80 | 17.61 | 16.84 | 16.08 | 15.31 |
| 30743 | .2362 | | 6.000 | 6.0 | 50 | 12 | 1.00 | 17.61 | 16.84 | 16.08 | 15.31 |
| 30745 | .2362 | | 6.000 | 6.0 | 50 | 12 | 1.50 | 17.61 | 16.84 | 16.08 | 15.31 |
| 30747 | .2362 | | 6.000 | 6.0 | 50 | 12 | 2.00 | 17.61 | 16.84 | 16.08 | 15.31 |
| 30749 | .2500 | 1/4" | 6.350 | 1/4" | 2" | 1/2" | .010" | 16.69 | 15.96 | 15.24 | 14.51 |
| 30751 | .2500 | 1/4" | 6.350 | 1/4" | 2" | 1/2" | .015" | 16.69 | 15.96 | 15.24 | 14.51 |
| 30753 | .2500 | 1/4" | 6.350 | 1/4" | 2" | 1/2" | .020" | 16.69 | 15.96 | 15.24 | 14.51 |
| 30755 | .2500 | 1/4" | 6.350 | 1/4" | 2" | 1/2" | .030" | 16.69 | 15.96 | 15.24 | 14.51 |
| 30757 | .2500 | 1/4" | 6.350 | 1/4" | 2" | 1/2" | .045" | 16.69 | 15.96 | 15.24 | 14.51 |
| 30759 | .2500 | 1/4" | 6.350 | 1/4" | 2" | 1/2" | .060" | 16.69 | 15.96 | 15.24 | 14.51 |
| 30761 | .3125 | 5/16" | 7.938 | 5/16" | 2" | 1/2" | .015" | 22.83 | 21.84 | 20.84 | 19.85 |
| 30763 | .3125 | 5/16" | 7.938 | 5/16" | 2" | 1/2" | .020" | 22.83 | 21.84 | 20.84 | 19.85 |
| 30765 | .3125 | 5/16" | 7.938 | 5/16" | 2" | 1/2" | .030" | 22.83 | 21.84 | 20.84 | 19.85 |
| 30767 | .3125 | 5/16" | 7.938 | 5/16" | 2" | 1/2" | .045" | 22.83 | 21.84 | 20.84 | 19.85 |
| 30769 | .3125 | 5/16" | 7.938 | 5/16" | 2" | 1/2" | .060" | 22.83 | 21.84 | 20.84 | 19.85 |
| 30771 | .3150 | | 8.000 | 8.0 | 50 | 12 | 0.50 | 24.04 | 22.99 | 21.95 | 20.90 |
| 30773 | .3150 | | 8.000 | 8.0 | 50 | 12 | 0.80 | 24.04 | 22.99 | 21.95 | 20.90 |
| 30775 | .3150 | | 8.000 | 8.0 | 50 | 12 | 1.00 | 24.04 | 22.99 | 21.95 | 20.90 |
| 30777 | .3150 | | 8.000 | 8.0 | 50 | 12 | 1.50 | 24.04 | 22.99 | 21.95 | 20.90 |
| 30779 | .3150 | | 8.000 | 8.0 | 50 | 12 | 2.00 | 24.04 | 22.99 | 21.95 | 20.90 |
| 30781 | .3150 | | 8.000 | 8.0 | 50 | 12 | 2.50 | 24.04 | 22.99 | 21.95 | 20.90 |
| 30783 | .3150 | | 8.000 | 8.0 | 50 | 12 | 3.00 | 24.04 | 22.99 | 21.95 | 20.90 |

MATERIAL HARDNESS (Rc)
70
35
0



† Metric equivalents are for reference only

| EDP# | $d_1$ † Diameter Decimal | Diameter | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | $r$ Corner Radius | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 30785 | .3750 | 3/8" | 9.525 | 3/8" | 2" | 5/8" | .010" | 28.20 | 26.97 | 25.75 | 24.52 |
| 30787 | .3750 | 3/8" | 9.525 | 3/8" | 2" | 5/8" | .015" | 28.20 | 26.97 | 25.75 | 24.52 |
| 30789 | .3750 | 3/8" | 9.525 | 3/8" | 2" | 5/8" | .020" | 28.20 | 26.97 | 25.75 | 24.52 |
| 30791 | .3750 | 3/8" | 9.525 | 3/8" | 2" | 5/8" | .030" | 28.20 | 26.97 | 25.75 | 24.52 |
| 30793 | .3750 | 3/8" | 9.525 | 3/8" | 2" | 5/8" | .045" | 28.20 | 26.97 | 25.75 | 24.52 |
| 30795 | .3750 | 3/8" | 9.525 | 3/8" | 2" | 5/8" | .060" | 28.20 | 26.97 | 25.75 | 24.52 |
| 30797 | .3937 | | 10.000 | 10.0 | 50 | 16 | 0.50 | 32.81 | 31.38 | 29.96 | 28.53 |
| 30799 | .3937 | | 10.000 | 10.0 | 50 | 16 | 0.80 | 32.81 | 31.38 | 29.96 | 28.53 |
| 30801 | .3937 | | 10.000 | 10.0 | 50 | 16 | 1.00 | 32.81 | 31.38 | 29.96 | 28.53 |
| 30803 | .3937 | | 10.000 | 10.0 | 50 | 16 | 1.50 | 32.81 | 31.38 | 29.96 | 28.53 |
| 30805 | .3937 | | 10.000 | 10.0 | 50 | 16 | 2.00 | 32.81 | 31.38 | 29.96 | 28.53 |
| 30807 | .3937 | | 10.000 | 10.0 | 50 | 16 | 2.50 | 32.81 | 31.38 | 29.96 | 28.53 |
| 30809 | .3937 | | 10.000 | 10.0 | 50 | 16 | 3.00 | 32.81 | 31.38 | 29.96 | 28.53 |
| 30811 | .3937 | | 10.000 | 10.0 | 50 | 16 | 3.20 | 32.81 | 31.38 | 29.96 | 28.53 |
| 30813 | .4375 | 7/16" | 11.113 | 7/16" | 2-1/2" | 5/8" | .010" | 34.89 | 33.37 | 31.86 | 30.34 |
| 30815 | .4375 | 7/16" | 11.113 | 7/16" | 2-1/2" | 5/8" | .015" | 34.89 | 33.37 | 31.86 | 30.34 |
| 30817 | .4375 | 7/16" | 11.113 | 7/16" | 2-1/2" | 5/8" | .020" | 34.89 | 33.37 | 31.86 | 30.34 |
| 30819 | .4375 | 7/16" | 11.113 | 7/16" | 2-1/2" | 5/8" | .030" | 34.89 | 33.37 | 31.86 | 30.34 |
| 30821 | .4375 | 7/16" | 11.113 | 7/16" | 2-1/2" | 5/8" | .045" | 34.89 | 33.37 | 31.86 | 30.34 |
| 30823 | .4375 | 7/16" | 11.113 | 7/16" | 2-1/2" | 5/8" | .060" | 34.89 | 33.37 | 31.86 | 30.34 |
| 30825 | .4375 | 7/16" | 11.113 | 7/16" | 2-1/2" | 5/8" | .090" | 34.89 | 33.37 | 31.86 | 30.34 |
| 30827 | .4375 | 7/16" | 11.113 | 7/16" | 2-1/2" | 5/8" | .125" | 34.89 | 33.37 | 31.86 | 30.34 |
| 30829 | .4724 | | 12.000 | 12.0 | 65 | 19 | 0.50 | 48.94 | 46.82 | 44.69 | 42.56 |
| 30831 | .4724 | | 12.000 | 12.0 | 65 | 19 | 0.80 | 48.94 | 46.82 | 44.69 | 42.56 |
| 30833 | .4724 | | 12.000 | 12.0 | 65 | 19 | 1.00 | 48.94 | 46.82 | 44.69 | 42.56 |
| 30835 | .4724 | | 12.000 | 12.0 | 65 | 19 | 1.50 | 48.94 | 46.82 | 44.69 | 42.56 |
| 30837 | .4724 | | 12.000 | 12.0 | 65 | 19 | 2.00 | 48.94 | 46.82 | 44.69 | 42.56 |
| 30839 | .4724 | | 12.000 | 12.0 | 65 | 19 | 2.50 | 48.94 | 46.82 | 44.69 | 42.56 |
| 30841 | .4724 | | 12.000 | 12.0 | 65 | 19 | 3.00 | 48.94 | 46.82 | 44.69 | 42.56 |
| 30843 | .4724 | | 12.000 | 12.0 | 65 | 19 | 3.20 | 48.94 | 46.82 | 44.69 | 42.56 |
| 30845 | .5000 | 1/2" | 12.700 | 1/2" | 2-1/2" | 5/8" | .010" | 46.52 | 44.50 | 42.47 | 40.45 |
| 30847 | .5000 | 1/2" | 12.700 | 1/2" | 2-1/2" | 5/8" | .015" | 46.52 | 44.50 | 42.47 | 40.45 |
| 30849 | .5000 | 1/2" | 12.700 | 1/2" | 2-1/2" | 5/8" | .020" | 46.52 | 44.50 | 42.47 | 40.45 |
| 30851 | .5000 | 1/2" | 12.700 | 1/2" | 2-1/2" | 5/8" | .030" | 46.52 | 44.50 | 42.47 | 40.45 |
| 30853 | .5000 | 1/2" | 12.700 | 1/2" | 2-1/2" | 5/8" | .045" | 46.52 | 44.50 | 42.47 | 40.45 |
| 30855 | .5000 | 1/2" | 12.700 | 1/2" | 2-1/2" | 5/8" | .060" | 46.52 | 44.50 | 42.47 | 40.45 |
| 30857 | .5000 | 1/2" | 12.700 | 1/2" | 2-1/2" | 5/8" | .090" | 46.52 | 44.50 | 42.47 | 40.45 |
| 30859 | .5000 | 1/2" | 12.700 | 1/2" | 2-1/2" | 5/8" | .125" | 46.52 | 44.50 | 42.47 | 40.45 |
| 30861 | .6250 | 5/8" | 15.875 | 5/8" | 3" | 3/4" | .015" | 88.99 | 85.12 | 81.25 | 77.38 |
| 30863 | .6250 | 5/8" | 15.875 | 5/8" | 3" | 3/4" | .020" | 88.99 | 85.12 | 81.25 | 77.38 |
| 30865 | .6250 | 5/8" | 15.875 | 5/8" | 3" | 3/4" | .030" | 88.99 | 85.12 | 81.25 | 77.38 |
| 30867 | .6250 | 5/8" | 15.875 | 5/8" | 3" | 3/4" | .045" | 88.99 | 85.12 | 81.25 | 77.38 |
| 30869 | .6250 | 5/8" | 15.875 | 5/8" | 3" | 3/4" | .060" | 88.99 | 85.12 | 81.25 | 77.38 |
| 30871 | .6250 | 5/8" | 15.875 | 5/8" | 3" | 3/4" | .090" | 88.99 | 85.12 | 81.25 | 77.38 |
| 30873 | .6299 | | 16.000 | 16.0 | 75 | 19 | 0.50 | 93.62 | 89.55 | 85.48 | 81.41 |
| 30875 | .6299 | | 16.000 | 16.0 | 75 | 19 | 1.00 | 93.62 | 89.55 | 85.48 | 81.41 |
| 30877 | .6299 | | 16.000 | 16.0 | 75 | 19 | 2.00 | 93.62 | 89.55 | 85.48 | 81.41 |
| 30879 | .6299 | | 16.000 | 16.0 | 75 | 19 | 2.50 | 93.62 | 89.55 | 85.48 | 81.41 |
| 30881 | .6299 | | 16.000 | 16.0 | 75 | 19 | 3.00 | 93.62 | 89.55 | 85.48 | 81.41 |
| 30883 | .6299 | | 16.000 | 16.0 | 75 | 19 | 4.00 | 93.62 | 89.55 | 85.48 | 81.41 |
| 30885 | .6299 | | 16.000 | 16.0 | 75 | 19 | 5.00 | 93.62 | 89.55 | 85.48 | 81.41 |
| 30887 | .7500 | 3/4" | 19.050 | 3/4" | 3" | 1" | .015" | 127.97 | 122.41 | 116.84 | 111.28 |
| 30889 | .7500 | 3/4" | 19.050 | 3/4" | 3" | 1" | .020" | 127.97 | 122.41 | 116.84 | 111.28 |
| 30891 | .7500 | 3/4" | 19.050 | 3/4" | 3" | 1" | .030" | 127.97 | 122.41 | 116.84 | 111.28 |
| 30893 | .7500 | 3/4" | 19.050 | 3/4" | 3" | 1" | .045" | 127.97 | 122.41 | 116.84 | 111.28 |
| 30895 | .7500 | 3/4" | 19.050 | 3/4" | 3" | 1" | .060" | 127.97 | 122.41 | 116.84 | 111.28 |
| 30897 | .7500 | 3/4" | 19.050 | 3/4" | 3" | 1" | .090" | 127.97 | 122.41 | 116.84 | 111.28 |
| 30899 | .7500 | 3/4" | 19.050 | 3/4" | 3" | 1" | .125" | 127.97 | 122.41 | 116.84 | 111.28 |
| 30901 | .7500 | 3/4" | 19.050 | 3/4" | 3" | 1" | .250" | 127.97 | 122.41 | 116.84 | 111.28 |



# Series 170RA, 870RA

.0625" - .3150"
(1.588mm - 8.000mm)

Z=4 | 30° | TECH PAGES 284-285

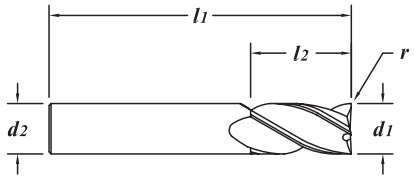
| TOLERANCES | |
|---|---|
| $d_1$ | +.000" –.002" (+.000 –.050mm) |
| $d_2$ | h6 |
| $r$ | +.001" –.001" (+.025 –.025mm) |



## Stub Length - Corner Radius

### TiALN Coating

Solid submicron grain carbide end mill - center cutting
Dry or semi-dry machining
For stronger corners and part radius
Extremely versatile
Bright Finish - page 212
Standard Length - page 227
Extended Length - page 246




| EDP# | $d_1$ † Diameter Decimal | Diameter | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | $r$ Corner Radius | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 30702 | .0625 | 1/16" | 1.588 | 1/8" | 1-1/2" | 1/8" | .010" | 13.14 | 12.57 | 12.00 | 11.43 |
| 30704 | .0625 | 1/16" | 1.588 | 1/8" | 1-1/2" | 1/8" | .015" | 13.14 | 12.57 | 12.00 | 11.43 |
| 30706 | .0938 | 3/32" | 2.383 | 1/8" | 1-1/2" | 3/16" | .010" | 12.57 | 12.02 | 11.48 | 10.93 |
| 30708 | .0938 | 3/32" | 2.383 | 1/8" | 1-1/2" | 3/16" | .015" | 12.57 | 12.02 | 11.48 | 10.93 |
| 30710 | .0938 | 3/32" | 2.383 | 1/8" | 1-1/2" | 3/16" | .020" | 12.57 | 12.02 | 11.48 | 10.93 |
| 30712 | .1181 | | 3.000 | 3.0 | 38 | 6 | 0.20 | 12.81 | 12.25 | 11.70 | 11.14 |
| 30714 | .1181 | | 3.000 | 3.0 | 38 | 6 | 0.50 | 12.81 | 12.25 | 11.70 | 11.14 |
| 30716 | .1250 | 1/8" | 3.175 | 1/8" | 1-1/2" | 1/4" | .010" | 12.32 | 11.78 | 11.25 | 10.71 |
| 30718 | .1250 | 1/8" | 3.175 | 1/8" | 1-1/2" | 1/4" | .015" | 12.32 | 11.78 | 11.25 | 10.71 |
| 30720 | .1250 | 1/8" | 3.175 | 1/8" | 1-1/2" | 1/4" | .020" | 12.32 | 11.78 | 11.25 | 10.71 |
| 30722 | .1250 | 1/8" | 3.175 | 1/8" | 1-1/2" | 1/4" | .030" | 12.32 | 11.78 | 11.25 | 10.71 |
| 30906 | .1250 | 1/8" | 3.175 | 1/8" | 1-1/2" | 1/4" | .040" | 12.32 | 11.78 | 11.25 | 10.71 |
| 30910 | .1562 | 5/32" | 3.967 | 3/16" | 2" | 5/16" | .015" | 16.16 | 15.46 | 14.75 | 14.05 |
| 30912 | .1562 | 5/32" | 3.967 | 3/16" | 2" | 5/16" | .030" | 16.16 | 15.46 | 14.75 | 14.05 |
| 30914 | .1562 | 5/32" | 3.967 | 3/16" | 2" | 5/16" | .060" | 16.16 | 15.46 | 14.75 | 14.05 |
| 30724 | .1575 | | 4.000 | 4.0 | 50 | 8 | 0.30 | 16.15 | 15.44 | 14.74 | 14.04 |
| 30726 | .1575 | | 4.000 | 4.0 | 50 | 8 | 0.50 | 16.15 | 15.44 | 14.74 | 14.04 |
| 30728 | .1875 | 3/16" | 4.763 | 3/16" | 2" | 3/8" | .010" | 15.48 | 14.81 | 14.13 | 13.46 |
| 30730 | .1875 | 3/16" | 4.763 | 3/16" | 2" | 3/8" | .015" | 15.48 | 14.81 | 14.13 | 13.46 |
| 30732 | .1875 | 3/16" | 4.763 | 3/16" | 2" | 3/8" | .020" | 15.48 | 14.81 | 14.13 | 13.46 |
| 30734 | .1875 | 3/16" | 4.763 | 3/16" | 2" | 3/8" | .030" | 15.48 | 14.81 | 14.13 | 13.46 |
| 30736 | .1969 | | 5.000 | 5.0 | 50 | 10 | 0.30 | 20.95 | 20.04 | 19.13 | 18.22 |
| 30738 | .1969 | | 5.000 | 5.0 | 50 | 10 | 0.50 | 20.95 | 20.04 | 19.13 | 18.22 |
| 24117 | .1969 | | 5.000 | 5.0 | 50 | 16 | 0.30 | 25.05 | 23.97 | 22.88 | 21.79 |
| 30740 | .2362 | | 6.000 | 6.0 | 50 | 12 | 0.50 | 21.79 | 20.85 | 19.90 | 18.95 |
| 30742 | .2362 | | 6.000 | 6.0 | 50 | 12 | 0.80 | 21.79 | 20.85 | 19.90 | 18.95 |
| 30744 | .2362 | | 6.000 | 6.0 | 50 | 12 | 1.00 | 21.79 | 20.85 | 19.90 | 18.95 |
| 30746 | .2362 | | 6.000 | 6.0 | 50 | 12 | 1.50 | 21.79 | 20.85 | 19.90 | 18.95 |
| 30748 | .2362 | | 6.000 | 6.0 | 50 | 12 | 2.00 | 21.79 | 20.85 | 19.90 | 18.95 |
| 30750 | .2500 | 1/4" | 6.350 | 1/4" | 2" | 1/2" | .010" | 20.91 | 20.00 | 19.09 | 18.18 |
| 30752 | .2500 | 1/4" | 6.350 | 1/4" | 2" | 1/2" | .015" | 20.91 | 20.00 | 19.09 | 18.18 |
| 30754 | .2500 | 1/4" | 6.350 | 1/4" | 2" | 1/2" | .020" | 20.91 | 20.00 | 19.09 | 18.18 |
| 30756 | .2500 | 1/4" | 6.350 | 1/4" | 2" | 1/2" | .030" | 20.91 | 20.00 | 19.09 | 18.18 |
| 30758 | .2500 | 1/4" | 6.350 | 1/4" | 2" | 1/2" | .045" | 20.91 | 20.00 | 19.09 | 18.18 |
| 30760 | .2500 | 1/4" | 6.350 | 1/4" | 2" | 1/2" | .060" | 20.91 | 20.00 | 19.09 | 18.18 |
| 30762 | .3125 | 5/16" | 7.938 | 5/16" | 2" | 1/2" | .015" | 28.82 | 27.57 | 26.31 | 25.06 |
| 30764 | .3125 | 5/16" | 7.938 | 5/16" | 2" | 1/2" | .020" | 28.82 | 27.57 | 26.31 | 25.06 |
| 30766 | .3125 | 5/16" | 7.938 | 5/16" | 2" | 1/2" | .030" | 28.82 | 27.57 | 26.31 | 25.06 |
| 30768 | .3125 | 5/16" | 7.938 | 5/16" | 2" | 1/2" | .045" | 28.82 | 27.57 | 26.31 | 25.06 |
| 30770 | .3125 | 5/16" | 7.938 | 5/16" | 2" | 1/2" | .060" | 28.82 | 27.57 | 26.31 | 25.06 |
| 30772 | .3150 | | 8.000 | 8.0 | 50 | 12 | 0.50 | 30.03 | 28.72 | 27.42 | 26.11 |
| 30774 | .3150 | | 8.000 | 8.0 | 50 | 12 | 0.80 | 30.03 | 28.72 | 27.42 | 26.11 |
| 30776 | .3150 | | 8.000 | 8.0 | 50 | 12 | 1.00 | 30.03 | 28.72 | 27.42 | 26.11 |
| 30778 | .3150 | | 8.000 | 8.0 | 50 | 12 | 1.50 | 30.03 | 28.72 | 27.42 | 26.11 |
| 30780 | .3150 | | 8.000 | 8.0 | 50 | 12 | 2.00 | 30.03 | 28.72 | 27.42 | 26.11 |
| 30782 | .3150 | | 8.000 | 8.0 | 50 | 12 | 2.50 | 30.03 | 28.72 | 27.42 | 26.11 |
| 30784 | .3150 | | 8.000 | 8.0 | 50 | 12 | 3.00 | 30.03 | 28.72 | 27.42 | 26.11 |

MATERIAL HARDNESS (Rc)
70
35
0

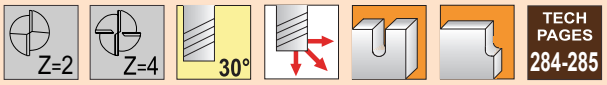


† Metric equivalents are for reference only

| EDP# | $d_1$ † Diameter Decimal | Diameter | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | $r$ Corner Radius | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 30786 | .3750 | 3/8" | 9.525 | 3/8" | 2" | 5/8" | .010" | 34.19 | 32.70 | 31.22 | 29.73 |
| 30788 | .3750 | 3/8" | 9.525 | 3/8" | 2" | 5/8" | .015" | 34.19 | 32.70 | 31.22 | 29.73 |
| 30790 | .3750 | 3/8" | 9.525 | 3/8" | 2" | 5/8" | .020" | 34.19 | 32.70 | 31.22 | 29.73 |
| 30792 | .3750 | 3/8" | 9.525 | 3/8" | 2" | 5/8" | .030" | 34.19 | 32.70 | 31.22 | 29.73 |
| 30794 | .3750 | 3/8" | 9.525 | 3/8" | 2" | 5/8" | .045" | 34.19 | 32.70 | 31.22 | 29.73 |
| 30796 | .3750 | 3/8" | 9.525 | 3/8" | 2" | 5/8" | .060" | 34.19 | 32.70 | 31.22 | 29.73 |
| 30798 | .3937 | | 10.000 | 10.0 | 50 | 16 | 0.50 | 39.59 | 37.87 | 36.15 | 34.43 |
| 30800 | .3937 | | 10.000 | 10.0 | 50 | 16 | 0.80 | 39.59 | 37.87 | 36.15 | 34.43 |
| 30802 | .3937 | | 10.000 | 10.0 | 50 | 16 | 1.00 | 39.59 | 37.87 | 36.15 | 34.43 |
| 30804 | .3937 | | 10.000 | 10.0 | 50 | 16 | 1.50 | 39.59 | 37.87 | 36.15 | 34.43 |
| 30806 | .3937 | | 10.000 | 10.0 | 50 | 16 | 2.00 | 39.59 | 37.87 | 36.15 | 34.43 |
| 30808 | .3937 | | 10.000 | 10.0 | 50 | 16 | 2.50 | 39.59 | 37.87 | 36.15 | 34.43 |
| 30810 | .3937 | | 10.000 | 10.0 | 50 | 16 | 3.00 | 39.59 | 37.87 | 36.15 | 34.43 |
| 30812 | .3937 | | 10.000 | 10.0 | 50 | 16 | 3.20 | 39.59 | 37.87 | 36.15 | 34.43 |
| 30814 | .4375 | 7/16" | 11.113 | 7/16" | 2-1/2" | 5/8" | .010" | 44.34 | 42.42 | 40.49 | 38.56 |
| 30816 | .4375 | 7/16" | 11.113 | 7/16" | 2-1/2" | 5/8" | .015" | 44.34 | 42.42 | 40.49 | 38.56 |
| 30818 | .4375 | 7/16" | 11.113 | 7/16" | 2-1/2" | 5/8" | .020" | 44.34 | 42.42 | 40.49 | 38.56 |
| 30820 | .4375 | 7/16" | 11.113 | 7/16" | 2-1/2" | 5/8" | .030" | 44.34 | 42.42 | 40.49 | 38.56 |
| 30822 | .4375 | 7/16" | 11.113 | 7/16" | 2-1/2" | 5/8" | .045" | 44.34 | 42.42 | 40.49 | 38.56 |
| 30824 | .4375 | 7/16" | 11.113 | 7/16" | 2-1/2" | 5/8" | .060" | 44.34 | 42.42 | 40.49 | 38.56 |
| 30826 | .4375 | 7/16" | 11.113 | 7/16" | 2-1/2" | 5/8" | .090" | 44.34 | 42.42 | 40.49 | 38.56 |
| 30828 | .4375 | 7/16" | 11.113 | 7/16" | 2-1/2" | 5/8" | .125" | 44.34 | 42.42 | 40.49 | 38.56 |
| 30830 | .4724 | | 12.000 | 12.0 | 65 | 19 | 0.50 | 58.41 | 55.87 | 53.33 | 50.79 |
| 30832 | .4724 | | 12.000 | 12.0 | 65 | 19 | 0.80 | 58.41 | 55.87 | 53.33 | 50.79 |
| 30834 | .4724 | | 12.000 | 12.0 | 65 | 19 | 1.00 | 58.41 | 55.87 | 53.33 | 50.79 |
| 30836 | .4724 | | 12.000 | 12.0 | 65 | 19 | 1.50 | 58.41 | 55.87 | 53.33 | 50.79 |
| 30838 | .4724 | | 12.000 | 12.0 | 65 | 19 | 2.00 | 58.41 | 55.87 | 53.33 | 50.79 |
| 30840 | .4724 | | 12.000 | 12.0 | 65 | 19 | 2.50 | 58.41 | 55.87 | 53.33 | 50.79 |
| 30842 | .4724 | | 12.000 | 12.0 | 65 | 19 | 3.00 | 58.41 | 55.87 | 53.33 | 50.79 |
| 30844 | .4724 | | 12.000 | 12.0 | 65 | 19 | 3.20 | 58.41 | 55.87 | 53.33 | 50.79 |
| 30846 | .5000 | 1/2" | 12.700 | 1/2" | 2-1/2" | 5/8" | .010" | 55.96 | 53.53 | 51.09 | 48.66 |
| 30848 | .5000 | 1/2" | 12.700 | 1/2" | 2-1/2" | 5/8" | .015" | 55.96 | 53.53 | 51.09 | 48.66 |
| 30850 | .5000 | 1/2" | 12.700 | 1/2" | 2-1/2" | 5/8" | .020" | 55.96 | 53.53 | 51.09 | 48.66 |
| 30852 | .5000 | 1/2" | 12.700 | 1/2" | 2-1/2" | 5/8" | .030" | 55.96 | 53.53 | 51.09 | 48.66 |
| 30854 | .5000 | 1/2" | 12.700 | 1/2" | 2-1/2" | 5/8" | .045" | 55.96 | 53.53 | 51.09 | 48.66 |
| 30856 | .5000 | 1/2" | 12.700 | 1/2" | 2-1/2" | 5/8" | .060" | 55.96 | 53.53 | 51.09 | 48.66 |
| 30858 | .5000 | 1/2" | 12.700 | 1/2" | 2-1/2" | 5/8" | .090" | 55.96 | 53.53 | 51.09 | 48.66 |
| 30860 | .5000 | 1/2" | 12.700 | 1/2" | 2-1/2" | 5/8" | .125" | 55.96 | 53.53 | 51.09 | 48.66 |
| 30862 | .6250 | 5/8" | 15.875 | 5/8" | 3" | 3/4" | .015" | 99.94 | 95.59 | 91.25 | 86.90 |
| 30864 | .6250 | 5/8" | 15.875 | 5/8" | 3" | 3/4" | .020" | 99.94 | 95.59 | 91.25 | 86.90 |
| 30866 | .6250 | 5/8" | 15.875 | 5/8" | 3" | 3/4" | .030" | 99.94 | 95.59 | 91.25 | 86.90 |
| 30868 | .6250 | 5/8" | 15.875 | 5/8" | 3" | 3/4" | .045" | 99.94 | 95.59 | 91.25 | 86.90 |
| 30870 | .6250 | 5/8" | 15.875 | 5/8" | 3" | 3/4" | .060" | 99.94 | 95.59 | 91.25 | 86.90 |
| 30872 | .6250 | 5/8" | 15.875 | 5/8" | 3" | 3/4" | .090" | 99.94 | 95.59 | 91.25 | 86.90 |
| 30874 | .6299 | | 16.000 | 16.0 | 75 | 19 | 0.50 | 104.56 | 100.01 | 95.47 | 90.92 |
| 30876 | .6299 | | 16.000 | 16.0 | 75 | 19 | 1.00 | 104.56 | 100.01 | 95.47 | 90.92 |
| 30878 | .6299 | | 16.000 | 16.0 | 75 | 19 | 2.00 | 104.56 | 100.01 | 95.47 | 90.92 |
| 30880 | .6299 | | 16.000 | 16.0 | 75 | 19 | 2.50 | 104.56 | 100.01 | 95.47 | 90.92 |
| 30882 | .6299 | | 16.000 | 16.0 | 75 | 19 | 3.00 | 104.56 | 100.01 | 95.47 | 90.92 |
| 30884 | .6299 | | 16.000 | 16.0 | 75 | 19 | 4.00 | 104.56 | 100.01 | 95.47 | 90.92 |
| 30886 | .6299 | | 16.000 | 16.0 | 75 | 19 | 5.00 | 104.56 | 100.01 | 95.47 | 90.92 |
| 30888 | .7500 | 3/4" | 19.050 | 3/4" | 3" | 1" | .015" | 141.11 | 134.97 | 128.84 | 122.70 |
| 30890 | .7500 | 3/4" | 19.050 | 3/4" | 3" | 1" | .020" | 141.11 | 134.97 | 128.84 | 122.70 |
| 30892 | .7500 | 3/4" | 19.050 | 3/4" | 3" | 1" | .030" | 141.11 | 134.97 | 128.84 | 122.70 |
| 30894 | .7500 | 3/4" | 19.050 | 3/4" | 3" | 1" | .045" | 141.11 | 134.97 | 128.84 | 122.70 |
| 30896 | .7500 | 3/4" | 19.050 | 3/4" | 3" | 1" | .060" | 141.11 | 134.97 | 128.84 | 122.70 |
| 30898 | .7500 | 3/4" | 19.050 | 3/4" | 3" | 1" | .090" | 141.11 | 134.97 | 128.84 | 122.70 |
| 30900 | .7500 | 3/4" | 19.050 | 3/4" | 3" | 1" | .125" | 141.11 | 134.97 | 128.84 | 122.70 |
| 30902 | .7500 | 3/4" | 19.050 | 3/4" | 3" | 1" | .250" | 141.11 | 134.97 | 128.84 | 122.70 |



# Series 180M, 190M, 980M, 990M




TECH PAGES 284-285

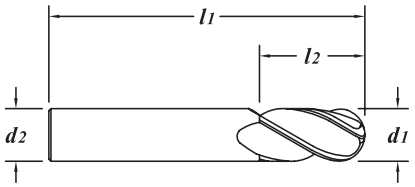
**TOLERANCES**

| | | |
|---|---|---|
| $d_1$ | ≤ .030" | +.000" –.001" (+.000 –.025mm) |
| | ≥ 1/32" | +.000" –.002" (+.000 –.050mm) |
| $d_2$ | h6 | |
| ball radius | +.000" –.001" (+.000 –.025mm) | |

## Stub Length - Ball End

Solid submicron grain carbide end mill - center cutting
Shorter flute length for rigidity
Extremely versatile
TiALN Coating - page 217
Standard Length - page 230
Extended length - page 249






MATERIAL HARDNESS (Rc)
70
35
0

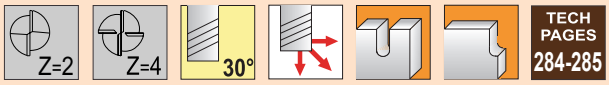
| (180M/980M) 2 Flute EDP# | (190M/990M) 4 Flute EDP# | Decimal | $d_1$ † Diameter | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 03350 | - | .0200 | .0200" | 0.508 | 1/8" | 1-1/2" | .030" | 22.99 | 21.99 | 20.99 | 19.99 |
| 03400 | - | .0250 | .0250" | 0.635 | 1/8" | 1-1/2" | .038" | 22.21 | 21.24 | 20.28 | 19.31 |
| 03450 | - | .0300 | .0300" | 0.762 | 1/8" | 1-1/2" | .045" | 19.14 | 18.30 | 17.47 | 16.64 |
| 03010 | 04010 | .0312 | 1/32" | 0.792 | 1/8" | 1-1/2" | 1/16" | 14.19 | 13.57 | 12.96 | 12.34 |
| 03510 | 04510 | .0394 | | 1.000 | 3.0 | 38 | 2 | 14.90 | 14.26 | 13.61 | 12.96 |
| 03020 | 04020 | .0469 | 3/64" | 1.191 | 1/8" | 1-1/2" | 3/32" | 14.19 | 13.57 | 12.96 | 12.34 |
| 03520 | - | .0591 | | 1.500 | 3.0 | 38 | 3 | 14.90 | 14.26 | 13.61 | 12.96 |
| 03030 | 04030 | .0625 | 1/16" | 1.588 | 1/8" | 1-1/2" | 1/8" | 10.47 | 10.01 | 9.56 | 9.10 |
| 03530 | 04530 | .0787 | | 2.000 | 3.0 | 38 | 4 | 11.01 | 10.53 | 10.05 | 9.57 |
| 03040 | 04040 | .0938 | 3/32" | 2.383 | 1/8" | 1-1/2" | 3/16" | 9.88 | 9.45 | 9.02 | 8.59 |
| 03540 | 04540 | .0984 | | 2.500 | 3.0 | 38 | 5 | 10.38 | 9.93 | 9.48 | 9.03 |
| 03550 | 04550 | .1181 | | 3.000 | 3.0 | 38 | 6 | 10.12 | 9.68 | 9.24 | 8.80 |
| 03050 | 04050 | .1250 | 1/8" | 3.175 | 1/8" | 1-1/2" | 1/4" | 9.63 | 9.21 | 8.79 | 8.37 |
| 03560 | 04560 | .1378 | | 3.500 | 4.0 | 50 | 7 | 14.17 | 13.55 | 12.94 | 12.32 |
| 03060 | 04060 | .1562 | 5/32" | 3.967 | 3/16" | 2" | 5/16" | 13.48 | 12.89 | 12.31 | 11.72 |
| 03570 | 04570 | .1575 | | 4.000 | 4.0 | 50 | 8 | 13.47 | 12.88 | 12.30 | 11.71 |
| 03580 | 04580 | .1772 | | 4.500 | 5.0 | 50 | 9.5 | 17.80 | 17.03 | 16.25 | 15.48 |
| 03070 | 04070 | .1875 | 3/16" | 4.763 | 3/16" | 2" | 3/8" | 12.79 | 12.23 | 11.68 | 11.12 |
| 03590 | 04590 | .1969 | | 5.000 | 5.0 | 50 | 10 | 16.77 | 16.04 | 15.31 | 14.58 |
| 03080 | 04080 | .2188 | 7/32" | 5.558 | 1/4" | 2" | 7/16" | 16.96 | 16.23 | 15.49 | 14.75 |
| 03600 | 04600 | .2362 | | 6.000 | 6.0 | 50 | 12 | 17.61 | 16.84 | 16.08 | 15.31 |
| 03090 | 04090 | .2500 | 1/4" | 6.350 | 1/4" | 2" | 1/2" | 16.69 | 15.96 | 15.24 | 14.51 |
| 03610 | 04610 | .2756 | | 7.000 | 7.0 | 50 | 12 | 23.03 | 22.03 | 21.03 | 20.03 |
| 03100 | 04100 | .3125 | 5/16" | 7.938 | 5/16" | 2" | 1/2" | 22.83 | 21.84 | 20.84 | 19.85 |
| 03620 | 04620 | .3150 | | 8.000 | 8.0 | 50 | 12 | 24.04 | 22.99 | 21.95 | 20.90 |
| 03630 | 04630 | .3543 | | 9.000 | 9.0 | 50 | 14 | 29.68 | 28.39 | 27.10 | 25.81 |
| 03110 | 04110 | .3750 | 3/8" | 9.525 | 3/8" | 2" | 5/8" | 28.20 | 26.97 | 25.75 | 24.52 |
| 03640 | 04640 | .3937 | | 10.000 | 10.0 | 50 | 16 | 32.81 | 31.38 | 29.96 | 28.53 |
| 03120 | 04120 | .4375 | 7/16" | 11.113 | 7/16" | 2-1/2" | 5/8" | 34.89 | 33.37 | 31.86 | 30.34 |
| 03660 | 04660 | .4724 | | 12.000 | 12.0 | 65 | 19 | 48.94 | 46.82 | 44.69 | 42.56 |
| 03130 | 04130 | .5000 | 1/2" | 12.700 | 1/2" | 2-1/2" | 5/8" | 46.52 | 44.50 | 42.47 | 40.45 |
| 03150 | 04150 | .7500 | 3/4" | 19.050 | 3/4" | 3" | 1" | 127.97 | 122.41 | 116.84 | 111.28 |



† *Metric equivalents are for reference only*

| TOLERANCES | |
|---|---|
| $d_1$ | +.000" –.002" (+.000 –.050mm) |
| $d_2$ | h6 |
| ball radius | +.000" –.001" (+.000 –.025mm) |





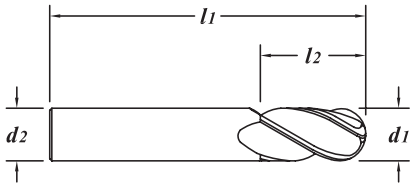

TECH PAGES 284-285

## Stub Length - Ball End

### TiALN Coating

Solid submicron grain carbide end mill - center cutting
Shorter flute length for rigidity
Dry or semi-dry machining
Extremely versatile
Bright Finish - page 216
Standard Length - page 234
Extended length - page 252






| (180MA/980MA) 2 Flute EDP# | (190MA/990MA) 4 Flute EDP# | $d_1$ † Diameter Decimal | $d_1$ † Diameter | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 03017 | 04017 | .0312 | 1/32" | 0.792 | 1/8" | 1-1/2" | 1/16" | 16.91 | 16.17 | 15.44 | 14.70 |
| 03517 | 04517 | .0394 | | 1.000 | 3.0 | 38 | 2 | 17.61 | 16.84 | 16.08 | 15.31 |
| 03027 | 04027 | .0469 | 3/64" | 1.191 | 1/8" | 1-1/2" | 3/32" | 16.91 | 16.17 | 15.44 | 14.70 |
| 03527 | 04527 | .0591 | | 1.500 | 3.0 | 38 | 3 | 17.61 | 16.84 | 16.08 | 15.31 |
| 03037 | 04037 | .0625 | 1/16" | 1.588 | 1/8" | 1-1/2" | 1/8" | 13.14 | 12.57 | 12.00 | 11.43 |
| 03537 | 04537 | .0787 | | 2.000 | 3.0 | 38 | 4 | 13.70 | 13.10 | 12.51 | 11.91 |
| 03047 | 04047 | .0938 | 3/32" | 2.383 | 1/8" | 1-1/2" | 3/16" | 12.57 | 12.02 | 11.48 | 10.93 |
| 03547 | 04547 | .0984 | | 2.500 | 3.0 | 38 | 5 | 13.09 | 12.52 | 11.95 | 11.38 |
| 03557 | 04557 | .1181 | | 3.000 | 3.0 | 38 | 6 | 12.81 | 12.25 | 11.70 | 11.14 |
| 03057 | 04057 | .1250 | 1/8" | 3.175 | 1/8" | 1-1/2" | 1/4" | 12.32 | 11.78 | 11.25 | 10.71 |
| 03567 | 04567 | .1378 | | 3.500 | 4.0 | 50 | 7 | 16.87 | 16.14 | 15.40 | 14.67 |
| 03067 | 04067 | .1562 | 5/32" | 3.967 | 3/16" | 2" | 5/16" | 16.16 | 15.46 | 14.75 | 14.05 |
| 03577 | 04577 | .1575 | | 4.000 | 4.0 | 50 | 8 | 16.15 | 15.44 | 14.74 | 14.04 |
| 03587 | 04587 | .1772 | | 4.500 | 5.0 | 50 | 9.5 | 22.00 | 21.04 | 20.09 | 19.13 |
| 03077 | 04077 | .1875 | 3/16" | 4.763 | 3/16" | 2" | 3/8" | 15.48 | 14.81 | 14.13 | 13.46 |
| 03597 | 04597 | .1969 | | 5.000 | 5.0 | 50 | 10 | 20.95 | 20.04 | 19.13 | 18.22 |
| 03087 | 04087 | .2188 | 7/32" | 5.558 | 1/4" | 2" | 7/16" | 21.16 | 20.24 | 19.32 | 18.40 |
| 03607 | 04607 | .2362 | | 6.000 | 6.0 | 50 | 12 | 21.79 | 20.85 | 19.90 | 18.95 |
| 03097 | 04097 | .2500 | 1/4" | 6.350 | 1/4" | 2" | 1/2" | 20.91 | 20.00 | 19.09 | 18.18 |
| 03617 | 04617 | .2756 | | 7.000 | 7.0 | 50 | 12 | 29.04 | 27.78 | 26.51 | 25.25 |
| 03107 | 04107 | .3125 | 5/16" | 7.938 | 5/16" | 2" | 1/2" | 28.82 | 27.57 | 26.31 | 25.06 |
| 03627 | 04627 | .3150 | | 8.000 | 8.0 | 50 | 12 | 30.03 | 28.72 | 27.42 | 26.11 |
| 03637 | 04637 | .3543 | | 9.000 | 9.0 | 50 | 14 | 35.68 | 34.13 | 32.58 | 31.03 |
| 03117 | 04117 | .3750 | 3/8" | 9.525 | 3/8" | 2" | 5/8" | 34.19 | 32.70 | 31.22 | 29.73 |
| 03647 | 04647 | .3937 | | 10.000 | 10.0 | 50 | 16 | 39.59 | 37.87 | 36.15 | 34.43 |
| 03657 | 04657 | .4331 | | 11.000 | 11.0 | 65 | 19 | 47.18 | 45.13 | 43.08 | 41.03 |
| 03127 | 04127 | .4375 | 7/16" | 11.113 | 7/16" | 2-1/2" | 5/8" | 44.34 | 42.42 | 40.49 | 38.56 |
| 03667 | 04667 | .4724 | | 12.000 | 12.0 | 65 | 19 | 58.41 | 55.87 | 53.33 | 50.79 |
| 03137 | 04137 | .5000 | 1/2" | 12.700 | 1/2" | 2-1/2" | 5/8" | 55.96 | 53.53 | 51.09 | 48.66 |
| - | 04147 | .6250 | 5/8" | 15.875 | 5/8" | 3" | 3/4" | 99.94 | 95.59 | 91.25 | 86.90 |
| - | 04157 | .7500 | 3/4" | 19.050 | 3/4" | 3" | 1" | 141.11 | 134.97 | 128.84 | 122.70 |
| - | 04687 | .7874 | | 20.000 | 20.0 | 75 | 25 | 194.18 | 185.74 | 177.29 | 168.85 |

# Series 220M, 223M, 230M, 820M, 823M, 830M

.0200" - .2362"
(0.508mm - 6.000mm)

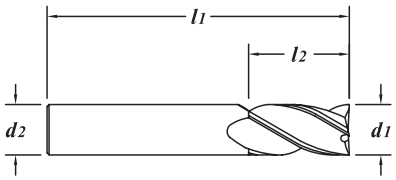
Z=2 | Z=3 | Z=4 | 30° | TECH PAGES 284-285

| TOLERANCES | | |
|---|---|---|
| $d_1$ | ≤ .030" | +.000" –.001" (+.000 –.025mm) |
| | ≥ 1/32" | +.000" –.002" (+.000 –.050mm) |
| $d_2$ | h6 | |

## Standard Length - Square End

Solid submicron grain carbide end mill - center cutting
Extremely versatile
TiN Coating - page 220
TiCN Coating - page 221
TiALN Coating - page 222
Stub Length - page 209
Extended length - page 238






MATERIAL HARDNESS (Rc): 70 – 35 – 0

| (220M/820M) 2 Flute EDP# | (223M/823M) 3 Flute EDP# | (230M/830M) 4 Flute EDP# | $d_1$ † Diameter Decimal | $d_1$ † Diameter | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 11650 | - | 13650 | .0200 | .0200" | 0.508 | 1/8" | 1-1/2" | .060" | 18.40 | 17.60 | 16.80 | 16.00 |
| 11660 | - | - | .0210 | .0210" | 0.533 | 1/8" | 1-1/2" | .063" | 18.40 | 17.60 | 16.80 | 16.00 |
| 11670 | - | - | .0220 | .0220" | 0.559 | 1/8" | 1-1/2" | .066" | 18.18 | 17.39 | 16.60 | 15.81 |
| 11680 | - | - | .0230 | .0230" | 0.584 | 1/8" | 1-1/2" | .069" | 18.18 | 17.39 | 16.60 | 15.81 |
| 11690 | - | - | .0240 | .0240" | 0.610 | 1/8" | 1-1/2" | .072" | 18.18 | 17.39 | 16.60 | 15.81 |
| 11700 | - | 13700 | .0250 | .0250" | 0.635 | 1/8" | 1-1/2" | .075" | 17.15 | 16.40 | 15.66 | 14.91 |
| 11710 | - | - | .0260 | .0260" | 0.660 | 1/8" | 1-1/2" | .078" | 17.15 | 16.40 | 15.66 | 14.91 |
| 11720 | - | - | .0270 | .0270" | 0.686 | 1/8" | 1-1/2" | .081" | 15.38 | 14.71 | 14.04 | 13.37 |
| 11730 | - | - | .0280 | .0280" | 0.711 | 1/8" | 1-1/2" | .084" | 15.38 | 14.71 | 14.04 | 13.37 |
| 11740 | - | - | .0290 | .0290" | 0.737 | 1/8" | 1-1/2" | .087" | 15.38 | 14.71 | 14.04 | 13.37 |
| 11750 | - | 13750 | .0300 | .0300" | 0.762 | 1/8" | 1-1/2" | .090" | 15.38 | 14.71 | 14.04 | 13.37 |
| 11010 | 12010 | 13010 | .0312 | 1/32" | 0.792 | 1/8" | 1-1/2" | 3/32" | 11.19 | 10.70 | 10.22 | 9.73 |
| 45010 | 37010 | 46010 | .0394 | | 1.000 | 3.0 | 38 | 4 | 11.75 | 11.24 | 10.73 | 10.22 |
| 11020 | 12020 | 13020 | .0469 | 3/64" | 1.191 | 1/8" | 1-1/2" | 1/8" | 11.19 | 10.70 | 10.22 | 9.73 |
| 45020 | 37020 | 46020 | .0591 | | 1.500 | 3.0 | 38 | 6 | 11.75 | 11.24 | 10.73 | 10.22 |
| 11030 | 12030 | 13030 | .0625 | 1/16" | 1.588 | 1/8" | 1-1/2" | 1/4" | 10.38 | 9.93 | 9.48 | 9.03 |
| 11040 | 12040 | 13040 | .0781 | 5/64" | 1.984 | 1/8" | 1-1/2" | 1/4" | 10.38 | 9.93 | 9.48 | 9.03 |
| 45030 | 37030 | 46030 | .0787 | | 2.000 | 3.0 | 38 | 8 | 10.89 | 10.42 | 9.94 | 9.47 |
| 11050 | 12050 | 13050 | .0938 | 3/32" | 2.383 | 1/8" | 1-1/2" | 3/8" | 9.82 | 9.39 | 8.97 | 8.54 |
| 45040 | 37040 | 46040 | .0984 | | 2.500 | 3.0 | 38 | 12 | 10.30 | 9.86 | 9.41 | 8.96 |
| 11060 | 12060 | 13060 | .1094 | 7/64" | 2.779 | 1/8" | 1-1/2" | 3/8" | 9.82 | 9.39 | 8.97 | 8.54 |
| 45050 | 37050 | 46050 | .1181 | | 3.000 | 3.0 | 38 | 12 | 9.52 | 9.11 | 8.69 | 8.28 |
| 11070 | 12070 | 13070 | .1250 | 1/8" | 3.175 | 1/8" | 1-1/2" | 1/2" | 9.06 | 8.67 | 8.27 | 7.88 |
| 45060 | 37060 | 46060 | .1378 | | 3.500 | 4.0 | 50 | 12 | 14.09 | 13.48 | 12.86 | 12.25 |
| 11080 | 12080 | 13080 | .1406 | 9/64" | 3.571 | 3/16" | 2" | 9/16" | 13.40 | 12.82 | 12.23 | 11.65 |
| 11090 | 12090 | 13090 | .1562 | 5/32" | 3.967 | 3/16" | 2" | 9/16" | 13.40 | 12.82 | 12.23 | 11.65 |
| 45070 | 37070 | 46070 | .1575 | | 4.000 | 4.0 | 50 | 14 | 13.36 | 12.78 | 12.20 | 11.62 |
| 11100 | 12100 | 13100 | .1719 | 11/64" | 4.366 | 3/16" | 2" | 9/16" | 13.40 | 12.82 | 12.23 | 11.65 |
| 45080 | 37080 | 46080 | .1772 | | 4.500 | 5.0 | 50 | 14 | 16.35 | 15.64 | 14.93 | 14.22 |
| 11110 | 12110 | 13110 | .1875 | 3/16" | 4.763 | 3/16" | 2" | 5/8" | 12.72 | 12.17 | 11.61 | 11.06 |
| 92070 | 93070 | 94070 | .1969 | | 5.000 | 5.0 | 50 | 16 | 15.30 | 14.63 | 13.97 | 13.30 |
| 45090 | 37090 | 46090 | .1969 | | 5.000 | 5.0 | 65 | 16 | 15.59 | 14.92 | 14.24 | 13.56 |
| 11120 | 12120 | 13120 | .2031 | 13/64" | 5.159 | 1/4" | 2-1/2" | 5/8" | 16.84 | 16.10 | 15.37 | 14.64 |
| 11130 | 12130 | 13130 | .2188 | 7/32" | 5.558 | 1/4" | 2-1/2" | 5/8" | 16.84 | 16.10 | 15.37 | 14.64 |
| 11140 | 12140 | 13140 | .2344 | 15/64" | 5.954 | 1/4" | 2-1/2" | 3/4" | 16.84 | 16.10 | 15.37 | 14.64 |
| 45100 | 37100 | 46100 | .2362 | | 6.000 | 6.0 | 65 | 19 | 16.09 | 15.39 | 14.69 | 13.99 |



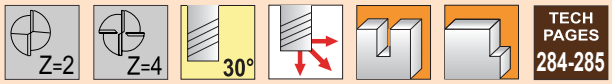
† *Metric equivalents are for reference only*

.2500" - 1.250"
(6.350mm - 31.750mm)

| (220M/820M) 2 Flute EDP# | (223M/823M) 3 Flute EDP# | (230M/830M) 4 Flute EDP# | $d_1$ † Diameter Decimal | $d_1$ † Diameter | $d_1$ † Diameter Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 11150 | 12150 | 13150 | .2500 | 1/4" | 6.350 | 1/4" | 2-1/2" | 3/4" | 15.32 | 14.65 | 13.99 | 13.32 |
| 11160 | 12160 | 13160 | .2656 | 17/64" | 6.746 | 5/16" | 2-1/2" | 7/8" | 26.88 | 25.71 | 24.54 | 23.37 |
| 45110 | 37110 | 46110 | .2756 | | 7.000 | 7.0 | 65 | 22 | 22.10 | 21.14 | 20.18 | 19.22 |
| 11170 | 12170 | 13170 | .2812 | 9/32" | 7.142 | 5/16" | 2-1/2" | 7/8" | 26.88 | 25.71 | 24.54 | 23.37 |
| 11180 | 12180 | 13180 | .2969 | 19/64" | 7.541 | 5/16" | 2-1/2" | 7/8" | 26.88 | 25.71 | 24.54 | 23.37 |
| 11190 | 12190 | 13190 | .3125 | 5/16" | 7.938 | 5/16" | 2-1/2" | 7/8" | 21.49 | 20.56 | 19.62 | 18.69 |
| 45120 | 37120 | 46120 | .3150 | | 8.000 | 8.0 | 65 | 22 | 22.56 | 21.58 | 20.60 | 19.62 |
| 11200 | 12200 | 13200 | .3281 | 21/64" | 8.334 | 3/8" | 2-1/2" | 7/8" | 31.83 | 30.45 | 29.06 | 27.68 |
| 11210 | 12210 | 13210 | .3438 | 11/32" | 8.733 | 3/8" | 2-1/2" | 7/8" | 31.83 | 30.45 | 29.06 | 27.68 |
| 45130 | 37130 | 46130 | .3543 | | 9.000 | 9.0 | 65 | 22 | 28.11 | 26.88 | 25.66 | 24.44 |
| 11220 | 12220 | 13220 | .3594 | 23/64" | 9.129 | 3/8" | 2-1/2" | 7/8" | 31.83 | 30.45 | 29.06 | 27.68 |
| 11230 | 12230 | 13230 | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 7/8" | 26.78 | 25.62 | 24.45 | 23.29 |
| 11240 | 12240 | 13240 | .3906 | 25/64" | 9.921 | 7/16" | 2-3/4" | 7/8" | 38.07 | 36.41 | 34.76 | 33.10 |
| 45140 | 37140 | 46140 | .3937 | | 10.000 | 10.0 | 70 | 25 | 32.58 | 31.16 | 29.75 | 28.33 |
| 11250 | 12250 | 13250 | .4062 | 13/32" | 10.317 | 7/16" | 2-3/4" | 7/8" | 38.07 | 36.41 | 34.76 | 33.10 |
| 11260 | 12260 | 13260 | .4219 | 27/64" | 10.716 | 7/16" | 2-3/4" | 7/8" | 38.07 | 36.41 | 34.76 | 33.10 |
| 45150 | 37150 | 46150 | .4331 | | 11.000 | 11.0 | 75 | 25 | 34.30 | 32.81 | 31.32 | 29.83 |
| 11270 | 12270 | 13270 | .4375 | 7/16" | 11.113 | 7/16" | 2-3/4" | 1" | 32.66 | 31.24 | 29.82 | 28.40 |
| 11280 | 12280 | 13280 | .4531 | 29/64" | 11.509 | 1/2" | 3" | 1" | 51.27 | 49.04 | 46.81 | 44.58 |
| 11290 | - | 13290 | .4688 | 15/32" | 11.908 | 1/2" | 3" | 1" | 51.27 | 49.04 | 46.81 | 44.58 |
| 45160 | 37160 | 46160 | .4724 | | 12.000 | 12.0 | 75 | 25 | 45.03 | 43.08 | 41.12 | 39.16 |
| 11300 | 12300 | 13300 | .4844 | 31/64" | 12.304 | 1/2" | 3" | 1" | 51.27 | 49.04 | 46.81 | 44.58 |
| 11310 | 12310 | 13310 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1" | 42.87 | 41.01 | 39.14 | 37.28 |
| 45170 | 37170 | 46170 | .5512 | | 14.000 | 14.0 | 88 | 32 | 76.89 | 73.55 | 70.20 | 66.86 |
| 11320 | 12320 | 13320 | .5625 | 9/16" | 14.288 | 9/16" | 3-1/2" | 1-1/4" | 73.24 | 70.06 | 66.87 | 63.69 |
| 11330 | 12330 | 13330 | .6250 | 5/8" | 15.875 | 5/8" | 3-1/2" | 1-1/4" | 82.69 | 79.09 | 75.50 | 71.90 |
| 45180 | 37180 | 46180 | .6299 | | 16.000 | 16.0 | 88 | 38 | 86.83 | 83.05 | 79.28 | 75.50 |
| 11340 | 12340 | 13340 | .6875 | 11/16" | 17.463 | 3/4" | 4" | 1-1/2" | 137.70 | 131.71 | 125.73 | 119.74 |
| 45190 | 37190 | 46190 | .7087 | | 18.000 | 18.0 | 100 | 38 | 127.31 | 121.77 | 116.24 | 110.70 |
| 11350 | 12350 | 13350 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-1/2" | 121.22 | 115.95 | 110.68 | 105.41 |
| 45200 | 37200 | 46200 | .7874 | | 20.000 | 20.0 | 100 | 38 | 161.85 | 154.81 | 147.78 | 140.74 |
| 45210 | 37210 | 46210 | .8661 | | 22.000 | 22.0 | 100 | 38 | 179.86 | 172.04 | 164.22 | 156.40 |
| 11360 | 12360 | 13360 | .8750 | 7/8" | 22.225 | 7/8" | 4" | 1-1/2" | 174.46 | 166.87 | 159.29 | 151.70 |
| 45220 | 37220 | 46220 | .9843 | | 25.000 | 25.0 | 100 | 38 | 188.05 | 179.87 | 171.70 | 163.52 |
| 11370 | 12370 | 13370 | 1.000 | 1" | 25.400 | 1" | 4" | 1-1/2" | 181.37 | 173.48 | 165.60 | 157.71 |
| - | - | 13390 | 1.250 | 1-1/4" | 31.750 | 1-1/4" | 4-1/2" | 2" | 529.49 | 506.47 | 483.45 | 460.43 |



# Series 220MT, 230MT



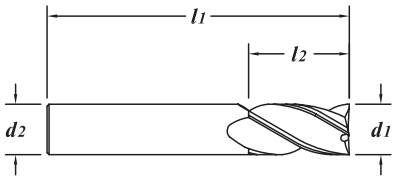

| TOLERANCES | |
|---|---|
| $d_1$ | +.000" –.002" (+.000 –.050mm) |
| $d_2$ | h6 |

## Standard Length - Square End

### TiN Coating

Solid submicron grain carbide end mill - center cutting
Improved lubricity
Extremely versatile
Bright Finish - page 218
TiCN Coating - page 221
TiALN Coating - page 222






| (220MT) 2 Flute EDP# | (230MT) 4 Flute EDP# | $d_1$ † Diameter Decimal | $d_1$ † Diameter | $d_1$ † Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 11073 | 13073 | .1250 | 1/8" | 3.175 | 1/8" | 1-1/2" | 1/2" | 10.66 | 10.20 | 9.73 | 9.27 |
| 11113 | 13113 | .1875 | 3/16" | 4.763 | 3/16" | 2" | 5/8" | 14.28 | 13.66 | 13.04 | 12.42 |
| 11153 | 13153 | .2500 | 1/4" | 6.350 | 1/4" | 2-1/2" | 3/4" | 18.53 | 17.72 | 16.92 | 16.11 |
| 11193 | 13193 | .3125 | 5/16" | 7.938 | 5/16" | 2-1/2" | 7/8" | 25.79 | 24.67 | 23.55 | 22.43 |
| 11233 | 13233 | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 7/8" | 31.08 | 29.73 | 28.38 | 27.03 |
| 11273 | 13273 | .4375 | 7/16" | 11.113 | 7/16" | 2-3/4" | 1" | 37.88 | 36.23 | 34.59 | 32.94 |
| 11313 | 13313 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1" | 48.10 | 46.01 | 43.92 | 41.83 |
| 11333 | 13333 | .6250 | 5/8" | 15.875 | 5/8" | 3-1/2" | 1-1/4" | 90.70 | 86.76 | 82.81 | 78.87 |
| 11353 | 13353 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-1/2" | 130.41 | 124.74 | 119.07 | 113.40 |
| - | 13373 | 1.000 | 1" | 25.400 | 1" | 4" | 1-1/2" | 197.40 | 188.82 | 180.23 | 171.65 |

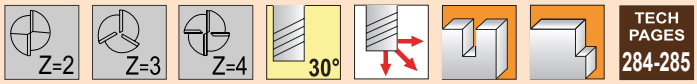







† *Metric equivalents are for reference only*

| TOLERANCES | |
|---|---|
| $d_1$ | +.000" –.002" (+.000 –.050mm) |
| $d_2$ | h6 |



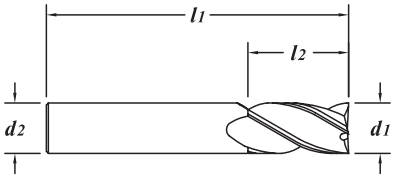

TECH PAGES 284-285

## Standard Length - Square End

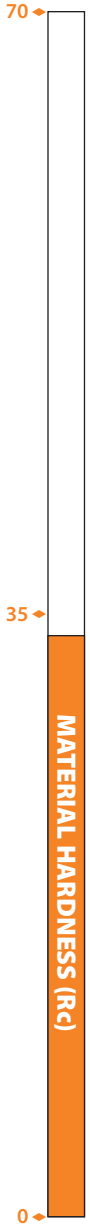
### TiCN Coating

Solid submicron grain carbide end mill - center cutting
Improved abrasion resistance and lubricity
Extremely versatile
Bright Finish - page 218
TiN Coating - page 220
TiALN Coating - page 222
Extended length - page 240






| (220MC) 2 Flute EDP# | (223MC) 3 Flute EDP# | (230MC) 4 Flute EDP# | $d_1$ † Diameter Decimal | $d_1$ † Diameter | $d_1$ † Diameter Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 11014 | 12014 | 13014 | .0312 | 1/32" | 0.792 | 1/8" | 1-1/2" | 3/32" | 13.57 | 12.98 | 12.39 | 11.80 |
| 11024 | 12024 | 13024 | .0469 | 3/64" | 1.191 | 1/8" | 1-1/2" | 1/8" | 13.57 | 12.98 | 12.39 | 11.80 |
| 11034 | 12034 | 13034 | .0625 | 1/16" | 1.588 | 1/8" | 1-1/2" | 1/4" | 12.78 | 12.22 | 11.67 | 11.11 |
| 11044 | 12044 | 13044 | .0781 | 5/64" | 1.984 | 1/8" | 1-1/2" | 1/4" | 12.78 | 12.22 | 11.67 | 11.11 |
| 11054 | 12054 | 13054 | .0938 | 3/32" | 2.383 | 1/8" | 1-1/2" | 3/8" | 12.20 | 11.67 | 11.14 | 10.61 |
| 11064 | 12064 | 13064 | .1094 | 7/64" | 2.779 | 1/8" | 1-1/2" | 3/8" | 12.20 | 11.67 | 11.14 | 10.61 |
| 11074 | 12074 | 13074 | .1250 | 1/8" | 3.175 | 1/8" | 1-1/2" | 1/2" | 11.44 | 10.95 | 10.45 | 9.95 |
| 11084 | 12084 | 13084 | .1406 | 9/64" | 3.571 | 3/16" | 2" | 9/16" | 15.78 | 15.09 | 14.41 | 13.72 |
| 11094 | 12094 | 13094 | .1562 | 5/32" | 3.967 | 3/16" | 2" | 9/16" | 15.78 | 15.09 | 14.41 | 13.72 |
| 11104 | 12104 | 13104 | .1719 | 11/64" | 4.366 | 3/16" | 2" | 9/16" | 15.78 | 15.09 | 14.41 | 13.72 |
| 11114 | 12114 | 13114 | .1875 | 3/16" | 4.763 | 3/16" | 2" | 5/8" | 15.08 | 14.42 | 13.77 | 13.11 |
| 11124 | 12124 | 13124 | .2031 | 13/64" | 5.159 | 1/4" | 2-1/2" | 5/8" | 21.65 | 20.71 | 19.77 | 18.83 |
| 11134 | 12134 | 13134 | .2188 | 7/32" | 5.558 | 1/4" | 2-1/2" | 5/8" | 21.65 | 20.71 | 19.77 | 18.83 |
| 11144 | 12144 | 13144 | .2344 | 15/64" | 5.954 | 1/4" | 2-1/2" | 3/4" | 21.65 | 20.71 | 19.77 | 18.83 |
| 11154 | 12154 | 13154 | .2500 | 1/4" | 6.350 | 1/4" | 2-1/2" | 3/4" | 20.14 | 19.26 | 18.39 | 17.51 |
| 11164 | 12164 | 13164 | .2656 | 17/64" | 6.746 | 5/16" | 2-1/2" | 7/8" | 33.32 | 31.87 | 30.42 | 28.97 |
| 11174 | 12174 | 13174 | .2812 | 9/32" | 7.142 | 5/16" | 2-1/2" | 7/8" | 33.32 | 31.87 | 30.42 | 28.97 |
| 11184 | 12184 | 13184 | .2969 | 19/64" | 7.541 | 5/16" | 2-1/2" | 7/8" | 33.32 | 31.87 | 30.42 | 28.97 |
| 11194 | 12194 | 13194 | .3125 | 5/16" | 7.938 | 5/16" | 2-1/2" | 7/8" | 27.92 | 26.71 | 25.49 | 24.28 |
| 11204 | 12204 | 13204 | .3281 | 21/64" | 8.334 | 3/8" | 2-1/2" | 7/8" | 38.27 | 36.61 | 34.94 | 33.28 |
| 11214 | 12214 | 13214 | .3438 | 11/32" | 8.733 | 3/8" | 2-1/2" | 7/8" | 38.27 | 36.61 | 34.94 | 33.28 |
| 11224 | 12224 | 13224 | .3594 | 23/64" | 9.129 | 3/8" | 2-1/2" | 7/8" | 38.27 | 36.61 | 34.94 | 33.28 |
| 11234 | 12234 | 13234 | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 7/8" | 33.20 | 31.76 | 30.31 | 28.87 |
| 11244 | 12244 | 13244 | .3906 | 25/64" | 9.921 | 7/16" | 2-3/4" | 7/8" | 45.79 | 43.80 | 41.81 | 39.82 |
| 11254 | 12254 | 13254 | .4062 | 13/32" | 10.317 | 7/16" | 2-3/4" | 7/8" | 45.79 | 43.80 | 41.81 | 39.82 |
| 11264 | - | 13264 | .4219 | 27/64" | 10.716 | 7/16" | 2-3/4" | 7/8" | 45.79 | 43.80 | 41.81 | 39.82 |
| 11274 | 12274 | 13274 | .4375 | 7/16" | 11.113 | 7/16" | 2-3/4" | 1" | 40.41 | 38.65 | 36.90 | 35.14 |
| 11284 | - | 13284 | .4531 | 29/64" | 11.509 | 1/2" | 3" | 1" | 59.00 | 56.43 | 53.87 | 51.30 |
| 11294 | 12294 | 13294 | .4688 | 15/32" | 11.908 | 1/2" | 3" | 1" | 59.00 | 56.43 | 53.87 | 51.30 |
| - | 12304 | 13304 | .4844 | 31/64" | 12.304 | 1/2" | 3" | 1" | 59.00 | 56.43 | 53.87 | 51.30 |
| 11314 | 12314 | 13314 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1" | 50.62 | 48.42 | 46.22 | 44.02 |
| 11324 | 12324 | 13324 | .5625 | 9/16" | 14.288 | 9/16" | 3-1/2" | 1-1/4" | 85.28 | 81.58 | 77.87 | 74.16 |
| 11334 | 12334 | 13334 | .6250 | 5/8" | 15.875 | 5/8" | 3-1/2" | 1-1/4" | 94.73 | 90.61 | 86.49 | 82.37 |
| 11344 | - | 13344 | .6875 | 11/16" | 17.463 | 3/4" | 4" | 1-1/2" | 151.46 | 144.87 | 138.29 | 131.70 |
| 11354 | 12354 | 13354 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-1/2" | 135.01 | 129.14 | 123.27 | 117.40 |
| 11364 | - | 13364 | .8750 | 7/8" | 22.225 | 7/8" | 4" | 1-1/2" | 195.14 | 186.66 | 178.17 | 169.69 |
| 11374 | 12374 | 13374 | 1.000 | 1" | 25.400 | 1" | 4" | 1-1/2" | 202.04 | 193.26 | 184.47 | 175.69 |
| - | - | 13394 | 1.250 | 1-1/4" | 31.750 | 1-1/4" | 4-1/2" | 2" | 562.93 | 538.45 | 513.98 | 489.50 |



# Series 220MA, 223MA, 230MA, 820MA, 823MA, 830MA

.0312" - .3594"
(0.792mm - 9.129mm)

Z=2 Z=3 Z=4 30°

TECH PAGES 284-285

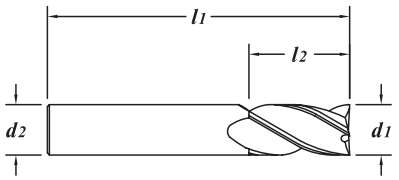
| TOLERANCES | |
|---|---|
| $d_1$ | +.000" –.002" (+.000 –.050mm) |
| $d_2$ | h6 |

## Standard Length - Square End

### TiALN Coating

Solid submicron grain carbide end mill - center cutting
Dry or semi-dry machining
Extremely versatile
Bright Finish - page 218
TiN Coating - page 220
TiCN Coating - page 221
Stub Length - page 211
Extended Length - page 241






MATERIAL HARDNESS (Rc) 70 35 0

| (220MA/820MA) 2 Flute EDP# | (223MA/823MA) 3 Flute EDP# | (230MA/830MA) 4 Flute EDP# | $d_1$ † Diameter Decimal | $d_1$ † Diameter | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 11017 | 12017 | 13017 | .0312 | 1/32" | 0.792 | 1/8" | 1-1/2" | 3/32" | 13.88 | 13.28 | 12.67 | 12.07 |
| 45017 | 37017 | 46017 | .0394 | | 1.000 | 3.0 | 38 | 4 | 14.44 | 13.82 | 13.19 | 12.56 |
| 11027 | 12027 | 13027 | .0469 | 3/64" | 1.191 | 1/8" | 1-1/2" | 1/8" | 13.88 | 13.28 | 12.67 | 12.07 |
| 45027 | 37027 | 46027 | .0591 | | 1.500 | 3.0 | 38 | 6 | 14.44 | 13.82 | 13.19 | 12.56 |
| 11037 | 12037 | 13037 | .0625 | 1/16" | 1.588 | 1/8" | 1-1/2" | 1/4" | 13.09 | 12.52 | 11.95 | 11.38 |
| 11047 | 12047 | 13047 | .0781 | 5/64" | 1.984 | 1/8" | 1-1/2" | 1/4" | 13.09 | 12.52 | 11.95 | 11.38 |
| 45037 | 37037 | 46037 | .0787 | | 2.000 | 3.0 | 38 | 8 | 13.58 | 12.99 | 12.40 | 11.81 |
| 11057 | 12057 | 13057 | .0938 | 3/32" | 2.383 | 1/8" | 1-1/2" | 3/8" | 12.51 | 11.97 | 11.42 | 10.88 |
| 45047 | 37047 | 46047 | .0984 | | 2.500 | 3.0 | 38 | 12 | 13.02 | 12.45 | 11.89 | 11.32 |
| 11067 | 12067 | 13067 | .1094 | 7/64" | 2.779 | 1/8" | 1-1/2" | 3/8" | 12.51 | 11.97 | 11.42 | 10.88 |
| 45057 | 37057 | 46057 | .1181 | | 3.000 | 3.0 | 38 | 12 | 12.22 | 11.69 | 11.16 | 10.63 |
| 11077 | 12077 | 13077 | .1250 | 1/8" | 3.175 | 1/8" | 1-1/2" | 1/2" | 11.75 | 11.24 | 10.73 | 10.22 |
| 45067 | 37067 | 46067 | .1378 | | 3.500 | 4.0 | 50 | 12 | 16.78 | 16.05 | 15.32 | 14.59 |
| 11087 | 12087 | 13087 | .1406 | 9/64" | 3.571 | 3/16" | 2" | 9/16" | 16.09 | 15.39 | 14.69 | 13.99 |
| 11097 | 12097 | 13097 | .1562 | 5/32" | 3.967 | 3/16" | 2" | 9/16" | 16.09 | 15.39 | 14.69 | 13.99 |
| 45077 | 37077 | 46077 | .1575 | | 4.000 | 4.0 | 50 | 14 | 16.05 | 15.36 | 14.66 | 13.96 |
| 11107 | 12107 | 13107 | .1719 | 11/64" | 4.366 | 3/16" | 2" | 9/16" | 16.09 | 15.39 | 14.69 | 13.99 |
| 45087 | 37087 | 46087 | .1772 | | 4.500 | 5.0 | 50 | 14 | 20.55 | 19.66 | 18.76 | 17.87 |
| 11117 | 12117 | 13117 | .1875 | 3/16" | 4.763 | 3/16" | 2" | 5/8" | 15.39 | 14.72 | 14.05 | 13.38 |
| 92077 | 93077 | 94077 | .1969 | | 5.000 | 5.0 | 50 | 16 | 19.90 | 19.03 | 18.17 | 17.30 |
| 45097 | 37097 | 46097 | .1969 | | 5.000 | 5.0 | 65 | 16 | 21.15 | 20.23 | 19.31 | 18.39 |
| 11127 | 12127 | 13127 | .2031 | 13/64" | 5.159 | 1/4" | 2-1/2" | 5/8" | 22.41 | 21.44 | 20.46 | 19.49 |
| 11137 | 12137 | 13137 | .2188 | 7/32" | 5.558 | 1/4" | 2-1/2" | 5/8" | 22.41 | 21.44 | 20.46 | 19.49 |
| 11147 | 12147 | 13147 | .2344 | 15/64" | 5.954 | 1/4" | 2-1/2" | 3/4" | 22.41 | 21.44 | 20.46 | 19.49 |
| 45107 | 37107 | 46107 | .2362 | | 6.000 | 6.0 | 65 | 19 | 21.64 | 20.70 | 19.76 | 18.82 |
| 11157 | 12157 | 13157 | .2500 | 1/4" | 6.350 | 1/4" | 2-1/2" | 3/4" | 20.88 | 19.98 | 19.07 | 18.16 |
| 11167 | 12167 | 13167 | .2656 | 17/64" | 6.746 | 5/16" | 2-1/2" | 7/8" | 35.20 | 33.67 | 32.14 | 30.61 |
| 45117 | 37117 | 46117 | .2756 | | 7.000 | 7.0 | 65 | 22 | 30.41 | 29.08 | 27.76 | 26.44 |
| 11177 | 12177 | 13177 | .2812 | 9/32" | 7.142 | 5/16" | 2-1/2" | 7/8" | 35.20 | 33.67 | 32.14 | 30.61 |
| 11187 | 12187 | 13187 | .2969 | 19/64" | 7.541 | 5/16" | 2-1/2" | 7/8" | 35.20 | 33.67 | 32.14 | 30.61 |
| 11197 | 12197 | 13197 | .3125 | 5/16" | 7.938 | 5/16" | 2-1/2" | 7/8" | 29.82 | 28.52 | 27.23 | 25.93 |
| 45127 | 37127 | 46127 | .3150 | | 8.000 | 8.0 | 65 | 22 | 30.89 | 29.55 | 28.20 | 26.86 |
| 11207 | 12207 | 13207 | .3281 | 21/64" | 8.334 | 3/8" | 2-1/2" | 7/8" | 40.15 | 38.40 | 36.66 | 34.91 |
| 11217 | 12217 | 13217 | .3438 | 11/32" | 8.733 | 3/8" | 2-1/2" | 7/8" | 40.15 | 38.40 | 36.66 | 34.91 |
| 45137 | 37137 | 46137 | .3543 | | 9.000 | 9.0 | 65 | 22 | 36.42 | 34.84 | 33.25 | 31.67 |
| 11227 | 12227 | 13227 | .3594 | 23/64" | 9.129 | 3/8" | 2-1/2" | 7/8" | 40.15 | 38.40 | 36.66 | 34.91 |



GARR TOOL®

† *Metric equivalents are for reference only*

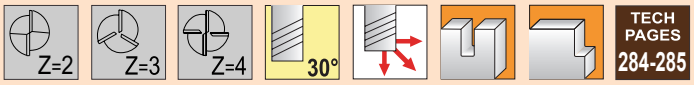
| (220MA/820MA) 2 Flute EDP# | (223MA/823MA) 3 Flute EDP# | (230MA/830MA) 4 Flute EDP# | $d_1$ † Diameter Decimal | $d_1$ † Diameter | $d_1$ † Diameter Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 11237 | 12237 | 13237 | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 7/8" | 35.08 | 33.55 | 32.03 | 30.50 |
| 11247 | 12247 | 13247 | .3906 | 25/64" | 9.921 | 7/16" | 2-3/4" | 7/8" | 47.53 | 45.46 | 43.40 | 41.33 |
| 45147 | 37147 | 46147 | .3937 | | 10.000 | 10.0 | 70 | 25 | 42.03 | 40.21 | 38.38 | 36.55 |
| 11257 | 12257 | 13257 | .4062 | 13/32" | 10.317 | 7/16" | 2-3/4" | 7/8" | 47.53 | 45.46 | 43.40 | 41.33 |
| 11267 | 12267 | 13267 | .4219 | 27/64" | 10.716 | 7/16" | 2-3/4" | 7/8" | 47.53 | 45.46 | 43.40 | 41.33 |
| 45157 | 37157 | 46157 | .4331 | | 11.000 | 11.0 | 75 | 25 | 43.76 | 41.86 | 39.95 | 38.05 |
| 11277 | 12277 | 13277 | .4375 | 7/16" | 11.113 | 7/16" | 2-3/4" | 1" | 42.14 | 40.30 | 38.47 | 36.64 |
| 11287 | 12287 | 13287 | .4531 | 29/64" | 11.509 | 1/2" | 3" | 1" | 60.73 | 58.09 | 55.45 | 52.81 |
| 11297 | 12297 | 13297 | .4688 | 15/32" | 11.908 | 1/2" | 3" | 1" | 60.73 | 58.09 | 55.45 | 52.81 |
| 45167 | 37167 | 46167 | .4724 | | 12.000 | 12.0 | 75 | 25 | 54.48 | 52.11 | 49.74 | 47.37 |
| 11307 | 12307 | 13307 | .4844 | 31/64" | 12.304 | 1/2" | 3" | 1" | 60.73 | 58.09 | 55.45 | 52.81 |
| 11317 | 12317 | 13317 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1" | 52.34 | 50.06 | 47.79 | 45.51 |
| 45177 | 37177 | 46177 | .5512 | | 14.000 | 14.0 | 88 | 32 | 90.56 | 86.63 | 82.69 | 78.75 |
| 11327 | 12327 | 13327 | .5625 | 9/16" | 14.288 | 9/16" | 3-1/2" | 1-1/4" | 86.91 | 83.13 | 79.35 | 75.57 |
| 11337 | 12337 | 13337 | .6250 | 5/8" | 15.875 | 5/8" | 3-1/2" | 1-1/4" | 96.37 | 92.18 | 87.99 | 83.80 |
| 45187 | 37187 | 46187 | .6299 | | 16.000 | 16.0 | 88 | 38 | 100.51 | 96.14 | 91.77 | 87.40 |
| 11347 | 12347 | 13347 | .6875 | 11/16" | 17.463 | 3/4" | 4" | 1-1/2" | 153.85 | 147.16 | 140.47 | 133.78 |
| 45197 | 37197 | 46197 | .7087 | | 18.000 | 18.0 | 100 | 38 | 143.44 | 137.20 | 130.97 | 124.73 |
| 11357 | 12357 | 13357 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-1/2" | 137.37 | 131.40 | 125.42 | 119.45 |
| 45207 | 37207 | 46207 | .7874 | | 20.000 | 20.0 | 100 | 38 | 185.70 | 177.63 | 169.55 | 161.48 |
| 45217 | 37217 | 46217 | .8661 | | 22.000 | 22.0 | 100 | 38 | 203.69 | 194.83 | 185.98 | 177.12 |
| 11367 | 12367 | 13367 | .8750 | 7/8" | 22.225 | 7/8" | 4" | 1-1/2" | 198.29 | 189.67 | 181.05 | 172.43 |
| 45227 | 37227 | 46227 | .9843 | | 25.000 | 25.0 | 100 | 38 | 211.89 | 202.68 | 193.46 | 184.25 |
| 11377 | 12377 | 13377 | 1.000 | 1" | 25.400 | 1" | 4" | 1-1/2" | 205.18 | 196.26 | 187.34 | 178.42 |
| - | - | 13397 | 1.250 | 1-1/4" | 31.750 | 1-1/4" | 4-1/2" | 2" | 564.03 | 539.51 | 514.98 | 490.46 |



*End Mill Manufacturing*

# Series 220R, 223R, 230R, 820R, 823R, 830R

.0625" - .3125"
(1.588mm - 7.938mm)




TECH PAGES 284-285

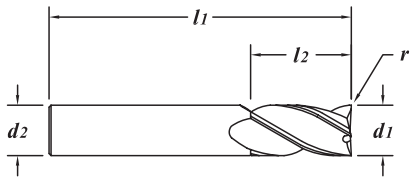
**TOLERANCES**

| | |
|---|---|
| $d_1$ | +.000" –.002" (+.000 –.050mm) |
| $d_2$ | h6 |
| $r$ | +.001" –.001" (+.025 –.025mm) |

## Standard Length - Corner Radius

Solid submicron grain carbide end mill - center cutting
For stronger corners and part radius
Extremely versatile
TiALN Coating - page 227
Stub Length - page 212
Extended Length - page 243






MATERIAL HARDNESS (Rc)
70
35
0

| (220R/820R) 2 Flute EDP# | (223R/823R) 3 Flute EDP# | (230R/830R) 4 Flute EDP# | $d_1$ † Diameter Decimal | $d_1$ † Diameter | $d_1$ † Diameter Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | $r$ Corner Radius | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 79580 | 36100 | 80580 | .0625 | 1/16" | 1.588 | 1/8" | 1-1/2" | 1/4" | .010" | 13.40 | 12.82 | 12.23 | 11.65 |
| 79590 | 36102 | 80590 | .0625 | 1/16" | 1.588 | 1/8" | 1-1/2" | 1/4" | .015" | 13.40 | 12.82 | 12.23 | 11.65 |
| 79600 | 36104 | 80600 | .0938 | 3/32" | 2.383 | 1/8" | 1-1/2" | 3/8" | .010" | 12.81 | 12.25 | 11.70 | 11.14 |
| 79610 | 36106 | 80610 | .0938 | 3/32" | 2.383 | 1/8" | 1-1/2" | 3/8" | .015" | 12.81 | 12.25 | 11.70 | 11.14 |
| 79620 | 36108 | 80620 | .0938 | 3/32" | 2.383 | 1/8" | 1-1/2" | 3/8" | .020" | 12.81 | 12.25 | 11.70 | 11.14 |
| 36500 | 36110 | 24070 | .1181 | | 3.000 | 3.0 | 38 | 12 | 0.20 | 12.22 | 11.69 | 11.16 | 10.63 |
| 36502 | 36112 | 24080 | .1181 | | 3.000 | 3.0 | 38 | 12 | 0.50 | 12.22 | 11.69 | 11.16 | 10.63 |
| 79000 | 36114 | 80000 | .1250 | 1/8" | 3.175 | 1/8" | 1-1/2" | 1/2" | .010" | 11.63 | 11.12 | 10.62 | 10.11 |
| 79010 | 36116 | 80010 | .1250 | 1/8" | 3.175 | 1/8" | 1-1/2" | 1/2" | .015" | 11.63 | 11.12 | 10.62 | 10.11 |
| 79020 | 36118 | 80020 | .1250 | 1/8" | 3.175 | 1/8" | 1-1/2" | 1/2" | .020" | 11.63 | 11.12 | 10.62 | 10.11 |
| 79030 | 36120 | 80030 | .1250 | 1/8" | 3.175 | 1/8" | 1-1/2" | 1/2" | .030" | 11.63 | 11.12 | 10.62 | 10.11 |
| - | - | 80035 | .1250 | 1/8" | 3.175 | 1/8" | 1-1/2" | 1/2" | .040" | 11.63 | 11.12 | 10.62 | 10.11 |
| 36504 | 36122 | 24090 | .1575 | | 4.000 | 4.0 | 50 | 14 | 0.30 | 16.09 | 15.39 | 14.69 | 13.99 |
| 36506 | 36124 | 24100 | .1575 | | 4.000 | 4.0 | 50 | 14 | 0.50 | 16.09 | 15.39 | 14.69 | 13.99 |
| 79040 | 36126 | 80040 | .1875 | 3/16" | 4.763 | 3/16" | 2" | 5/8" | .010" | 15.32 | 14.65 | 13.99 | 13.32 |
| 79050 | 36128 | 80050 | .1875 | 3/16" | 4.763 | 3/16" | 2" | 5/8" | .015" | 15.32 | 14.65 | 13.99 | 13.32 |
| 79060 | 36130 | 80060 | .1875 | 3/16" | 4.763 | 3/16" | 2" | 5/8" | .020" | 15.32 | 14.65 | 13.99 | 13.32 |
| 79070 | 36132 | 80070 | .1875 | 3/16" | 4.763 | 3/16" | 2" | 5/8" | .030" | 15.32 | 14.65 | 13.99 | 13.32 |
| - | - | 80080 | .1875 | 3/16" | 4.763 | 3/16" | 2" | 5/8" | .060" | 15.32 | 14.65 | 13.99 | 13.32 |
| 36508 | 36134 | 24110 | .1969 | | 5.000 | 5.0 | 65 | 16 | 0.30 | 19.50 | 18.66 | 17.81 | 16.96 |
| 36510 | 36136 | 24120 | .1969 | | 5.000 | 5.0 | 65 | 16 | 0.50 | 19.50 | 18.66 | 17.81 | 16.96 |
| 36512 | 36138 | 24170 | .2362 | | 6.000 | 6.0 | 65 | 19 | 0.50 | 20.00 | 19.13 | 18.26 | 17.39 |
| 36514 | 36140 | 24180 | .2362 | | 6.000 | 6.0 | 65 | 19 | 0.80 | 20.00 | 19.13 | 18.26 | 17.39 |
| 36516 | 36142 | 24190 | .2362 | | 6.000 | 6.0 | 65 | 19 | 1.00 | 20.00 | 19.13 | 18.26 | 17.39 |
| 36518 | 36144 | 24200 | .2362 | | 6.000 | 6.0 | 65 | 19 | 1.50 | 20.00 | 19.13 | 18.26 | 17.39 |
| 36520 | 36146 | 24210 | .2362 | | 6.000 | 6.0 | 65 | 19 | 2.00 | 20.00 | 19.13 | 18.26 | 17.39 |
| 36522 | 36148 | 80090 | .2500 | 1/4" | 6.350 | 1/4" | 2-1/2" | 3/4" | .010" | 19.03 | 18.21 | 17.38 | 16.55 |
| 79100 | 36150 | 80100 | .2500 | 1/4" | 6.350 | 1/4" | 2-1/2" | 3/4" | .015" | 19.03 | 18.21 | 17.38 | 16.55 |
| 79110 | 36152 | 80110 | .2500 | 1/4" | 6.350 | 1/4" | 2-1/2" | 3/4" | .020" | 19.03 | 18.21 | 17.38 | 16.55 |
| 79120 | 36154 | 80120 | .2500 | 1/4" | 6.350 | 1/4" | 2-1/2" | 3/4" | .030" | 19.03 | 18.21 | 17.38 | 16.55 |
| 79130 | 36156 | 80130 | .2500 | 1/4" | 6.350 | 1/4" | 2-1/2" | 3/4" | .045" | 19.03 | 18.21 | 17.38 | 16.55 |
| 79140 | 36158 | 80140 | .2500 | 1/4" | 6.350 | 1/4" | 2-1/2" | 3/4" | .060" | 19.03 | 18.21 | 17.38 | 16.55 |
| 79160 | 36160 | 80160 | .3125 | 5/16" | 7.938 | 5/16" | 2-1/2" | 7/8" | .015" | 24.94 | 23.86 | 22.77 | 21.69 |
| 79170 | 36162 | 80170 | .3125 | 5/16" | 7.938 | 5/16" | 2-1/2" | 7/8" | .020" | 24.94 | 23.86 | 22.77 | 21.69 |
| 79180 | 36164 | 80180 | .3125 | 5/16" | 7.938 | 5/16" | 2-1/2" | 7/8" | .030" | 24.94 | 23.86 | 22.77 | 21.69 |
| 79190 | 36166 | 80190 | .3125 | 5/16" | 7.938 | 5/16" | 2-1/2" | 7/8" | .045" | 24.94 | 23.86 | 22.77 | 21.69 |
| 79200 | 36168 | 80200 | .3125 | 5/16" | 7.938 | 5/16" | 2-1/2" | 7/8" | .060" | 24.94 | 23.86 | 22.77 | 21.69 |



† *Metric equivalents are for reference only*

| (220R/820R) 2 Flute EDP# | (223R/823R) 3 Flute EDP# | (230R/830R) 4 Flute EDP# | $d_1$ † Diameter Decimal | $d_1$ † Diameter | $d_1$ † Diameter Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | $r$ Corner Radius | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 36524 | 36170 | 24220 | .3150 | | 8.000 | 8.0 | 65 | 22 | 0.50 | 26.25 | 25.11 | 23.97 | 22.83 |
| 36526 | 36172 | 24230 | .3150 | | 8.000 | 8.0 | 65 | 22 | 0.80 | 26.25 | 25.11 | 23.97 | 22.83 |
| 36528 | 36174 | 24240 | .3150 | | 8.000 | 8.0 | 65 | 22 | 1.00 | 26.25 | 25.11 | 23.97 | 22.83 |
| 36530 | 36176 | 24250 | .3150 | | 8.000 | 8.0 | 65 | 22 | 1.50 | 26.25 | 25.11 | 23.97 | 22.83 |
| 36532 | 36178 | 24260 | .3150 | | 8.000 | 8.0 | 65 | 22 | 2.00 | 26.25 | 25.11 | 23.97 | 22.83 |
| 36534 | 36180 | 24270 | .3150 | | 8.000 | 8.0 | 65 | 22 | 2.50 | 26.25 | 25.11 | 23.97 | 22.83 |
| 36536 | 36182 | 24280 | .3150 | | 8.000 | 8.0 | 65 | 22 | 3.00 | 26.25 | 25.11 | 23.97 | 22.83 |
| 36538 | 36184 | 80220 | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 7/8" | .010" | 30.53 | 29.21 | 27.88 | 26.55 |
| 79230 | 36186 | 80230 | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 7/8" | .015" | 30.53 | 29.21 | 27.88 | 26.55 |
| 79240 | 36188 | 80240 | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 7/8" | .020" | 30.53 | 29.21 | 27.88 | 26.55 |
| 79250 | 36190 | 80250 | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 7/8" | .030" | 30.53 | 29.21 | 27.88 | 26.55 |
| 79260 | 36192 | 80260 | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 7/8" | .045" | 30.53 | 29.21 | 27.88 | 26.55 |
| 79270 | 36194 | 80270 | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 7/8" | .060" | 30.53 | 29.21 | 27.88 | 26.55 |
| 36540 | 36196 | 24290 | .3937 | | 10.000 | 10.0 | 70 | 25 | 0.50 | 37.48 | 35.85 | 34.22 | 32.59 |
| 36542 | 36198 | 24300 | .3937 | | 10.000 | 10.0 | 70 | 25 | 0.80 | 37.48 | 35.85 | 34.22 | 32.59 |
| 36544 | 36200 | 24310 | .3937 | | 10.000 | 10.0 | 70 | 25 | 1.00 | 37.48 | 35.85 | 34.22 | 32.59 |
| 36546 | 36202 | 24320 | .3937 | | 10.000 | 10.0 | 70 | 25 | 1.50 | 37.48 | 35.85 | 34.22 | 32.59 |
| 36548 | 36204 | 24330 | .3937 | | 10.000 | 10.0 | 70 | 25 | 2.00 | 37.48 | 35.85 | 34.22 | 32.59 |
| 36550 | 36206 | 24340 | .3937 | | 10.000 | 10.0 | 70 | 25 | 2.50 | 37.48 | 35.85 | 34.22 | 32.59 |
| 36552 | 36208 | 24350 | .3937 | | 10.000 | 10.0 | 70 | 25 | 3.00 | 37.48 | 35.85 | 34.22 | 32.59 |
| 36554 | 36210 | 24360 | .3937 | | 10.000 | 10.0 | 70 | 25 | 3.20 | 37.48 | 35.85 | 34.22 | 32.59 |
| 36556 | 36212 | 80700 | .4375 | 7/16" | 11.113 | 7/16" | 2-3/4" | 1" | .010" | 37.58 | 35.95 | 34.31 | 32.68 |
| 36558 | 36214 | 80705 | .4375 | 7/16" | 11.113 | 7/16" | 2-3/4" | 1" | .015" | 37.58 | 35.95 | 34.31 | 32.68 |
| 36560 | 36216 | 80710 | .4375 | 7/16" | 11.113 | 7/16" | 2-3/4" | 1" | .020" | 37.58 | 35.95 | 34.31 | 32.68 |
| 36562 | 36218 | 80715 | .4375 | 7/16" | 11.113 | 7/16" | 2-3/4" | 1" | .030" | 37.58 | 35.95 | 34.31 | 32.68 |
| 36564 | 36220 | 80720 | .4375 | 7/16" | 11.113 | 7/16" | 2-3/4" | 1" | .045" | 37.58 | 35.95 | 34.31 | 32.68 |
| 36566 | 36222 | 80725 | .4375 | 7/16" | 11.113 | 7/16" | 2-3/4" | 1" | .060" | 37.58 | 35.95 | 34.31 | 32.68 |
| 36568 | 36224 | 80730 | .4375 | 7/16" | 11.113 | 7/16" | 2-3/4" | 1" | .090" | 37.58 | 35.95 | 34.31 | 32.68 |
| 36570 | 36226 | 80735 | .4375 | 7/16" | 11.113 | 7/16" | 2-3/4" | 1" | .125" | 37.58 | 35.95 | 34.31 | 32.68 |
| 36572 | 36228 | 24370 | .4724 | | 12.000 | 12.0 | 75 | 25 | 0.50 | 59.70 | 57.10 | 54.51 | 51.91 |
| 36574 | 36230 | 24380 | .4724 | | 12.000 | 12.0 | 75 | 25 | 0.80 | 59.70 | 57.10 | 54.51 | 51.91 |
| 36576 | 36232 | 24390 | .4724 | | 12.000 | 12.0 | 75 | 25 | 1.00 | 59.70 | 57.10 | 54.51 | 51.91 |
| 36578 | 36234 | 24400 | .4724 | | 12.000 | 12.0 | 75 | 25 | 1.50 | 59.70 | 57.10 | 54.51 | 51.91 |
| 36580 | 36236 | 24410 | .4724 | | 12.000 | 12.0 | 75 | 25 | 2.00 | 59.70 | 57.10 | 54.51 | 51.91 |
| 36582 | 36238 | 24420 | .4724 | | 12.000 | 12.0 | 75 | 25 | 2.50 | 59.70 | 57.10 | 54.51 | 51.91 |
| 36584 | 36240 | 24430 | .4724 | | 12.000 | 12.0 | 75 | 25 | 3.00 | 59.70 | 57.10 | 54.51 | 51.91 |
| 36586 | 36242 | 24440 | .4724 | | 12.000 | 12.0 | 75 | 25 | 3.20 | 59.70 | 57.10 | 54.51 | 51.91 |
| 36588 | 36244 | 80290 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1" | .010" | 56.83 | 54.36 | 51.89 | 49.42 |
| 79300 | 36246 | 80300 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1" | .015" | 56.83 | 54.36 | 51.89 | 49.42 |
| 79310 | 36248 | 80310 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1" | .020" | 56.83 | 54.36 | 51.89 | 49.42 |
| 79320 | 36250 | 80320 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1" | .030" | 56.83 | 54.36 | 51.89 | 49.42 |
| 79330 | 36252 | 80330 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1" | .045" | 56.83 | 54.36 | 51.89 | 49.42 |
| 79340 | 36254 | 80340 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1" | .060" | 56.83 | 54.36 | 51.89 | 49.42 |
| 79350 | 36256 | 80350 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1" | .090" | 56.83 | 54.36 | 51.89 | 49.42 |
| 79360 | 36258 | 80360 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1" | .125" | 56.83 | 54.36 | 51.89 | 49.42 |
| 79370 | 36260 | 80370 | .6250 | 5/8" | 15.875 | 5/8" | 3-1/2" | 1-1/4" | .015" | 91.92 | 87.92 | 83.93 | 79.93 |
| 79380 | 36262 | 80380 | .6250 | 5/8" | 15.875 | 5/8" | 3-1/2" | 1-1/4" | .020" | 91.92 | 87.92 | 83.93 | 79.93 |
| 79390 | 36264 | 80390 | .6250 | 5/8" | 15.875 | 5/8" | 3-1/2" | 1-1/4" | .030" | 91.92 | 87.92 | 83.93 | 79.93 |
| 79400 | 36266 | 80400 | .6250 | 5/8" | 15.875 | 5/8" | 3-1/2" | 1-1/4" | .045" | 91.92 | 87.92 | 83.93 | 79.93 |
| 79410 | 36268 | 80410 | .6250 | 5/8" | 15.875 | 5/8" | 3-1/2" | 1-1/4" | .060" | 91.92 | 87.92 | 83.93 | 79.93 |
| 79420 | 36270 | 80420 | .6250 | 5/8" | 15.875 | 5/8" | 3-1/2" | 1-1/4" | .090" | 91.92 | 87.92 | 83.93 | 79.93 |



*continued* ⟶

# Series 220R, 223R, 230R, 820R, 823R, 830R *(continued)*

.6299" - 1.000"
(16.000mm - 25.400mm)

| (220R/820R) 2 Flute EDP# | (223R/823R) 3 Flute EDP# | (230R/830R) 4 Flute EDP# | $d_1$ † Diameter Decimal | | $d_1$ † Diameter Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | $r$ Corner Radius | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 36590 | 36272 | 24450 | .6299 | | 16.000 | 16.0 | 88 | 38 | 0.50 | 96.50 | 92.30 | 88.11 | 83.91 |
| 36592 | 36274 | 24460 | .6299 | | 16.000 | 16.0 | 88 | 38 | 1.00 | 96.50 | 92.30 | 88.11 | 83.91 |
| 36594 | 36276 | 24470 | .6299 | | 16.000 | 16.0 | 88 | 38 | 2.00 | 96.50 | 92.30 | 88.11 | 83.91 |
| 36596 | 36278 | 24480 | .6299 | | 16.000 | 16.0 | 88 | 38 | 2.50 | 96.50 | 92.30 | 88.11 | 83.91 |
| 36598 | 36280 | 24490 | .6299 | | 16.000 | 16.0 | 88 | 38 | 3.00 | 96.50 | 92.30 | 88.11 | 83.91 |
| 36600 | 36282 | 24500 | .6299 | | 16.000 | 16.0 | 88 | 38 | 4.00 | 96.50 | 92.30 | 88.11 | 83.91 |
| 36602 | 36284 | 24510 | .6299 | | 16.000 | 16.0 | 88 | 38 | 5.00 | 96.50 | 92.30 | 88.11 | 83.91 |
| 79440 | 36286 | 80440 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-1/2" | .015" | 135.27 | 129.39 | 123.51 | 117.63 |
| 79450 | 36288 | 80450 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-1/2" | .020" | 135.27 | 129.39 | 123.51 | 117.63 |
| 79460 | 36290 | 80460 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-1/2" | .030" | 135.27 | 129.39 | 123.51 | 117.63 |
| 79470 | 36292 | 80470 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-1/2" | .045" | 135.27 | 129.39 | 123.51 | 117.63 |
| 79480 | 36294 | 80480 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-1/2" | .060" | 135.27 | 129.39 | 123.51 | 117.63 |
| 79490 | 36296 | 80490 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-1/2" | .090" | 135.27 | 129.39 | 123.51 | 117.63 |
| 79500 | 36298 | 80500 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-1/2" | .125" | 135.27 | 129.39 | 123.51 | 117.63 |
| 79630 | 36300 | 80630 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-1/2" | .250" | 135.27 | 129.39 | 123.51 | 117.63 |
| 36604 | 36302 | 24520 | .7874 | | 20.000 | 20.0 | 100 | 38 | 0.50 | 190.44 | 182.16 | 173.88 | 165.60 |
| 36606 | 36304 | 24530 | .7874 | | 20.000 | 20.0 | 100 | 38 | 1.00 | 190.44 | 182.16 | 173.88 | 165.60 |
| 36608 | 36306 | 24540 | .7874 | | 20.000 | 20.0 | 100 | 38 | 2.00 | 190.44 | 182.16 | 173.88 | 165.60 |
| 36610 | 36308 | 24550 | .7874 | | 20.000 | 20.0 | 100 | 38 | 3.00 | 190.44 | 182.16 | 173.88 | 165.60 |
| 36612 | 36310 | 24560 | .7874 | | 20.000 | 20.0 | 100 | 38 | 5.00 | 190.44 | 182.16 | 173.88 | 165.60 |
| 79510 | 36312 | 80510 | 1.000 | 1" | 25.400 | 1" | 4" | 1-1/2" | .015" | 234.65 | 224.44 | 214.24 | 204.04 |
| 79520 | 36314 | 80520 | 1.000 | 1" | 25.400 | 1" | 4" | 1-1/2" | .020" | 234.65 | 224.44 | 214.24 | 204.04 |
| 79530 | 36316 | 80530 | 1.000 | 1" | 25.400 | 1" | 4" | 1-1/2" | .030" | 234.65 | 224.44 | 214.24 | 204.04 |
| 79540 | 36318 | 80540 | 1.000 | 1" | 25.400 | 1" | 4" | 1-1/2" | .045" | 234.65 | 224.44 | 214.24 | 204.04 |
| 79550 | 36320 | 80550 | 1.000 | 1" | 25.400 | 1" | 4" | 1-1/2" | .060" | 234.65 | 224.44 | 214.24 | 204.04 |
| 79560 | 36322 | 80560 | 1.000 | 1" | 25.400 | 1" | 4" | 1-1/2" | .090" | 234.65 | 224.44 | 214.24 | 204.04 |
| 79570 | 36324 | 80570 | 1.000 | 1" | 25.400 | 1" | 4" | 1-1/2" | .125" | 234.65 | 224.44 | 214.24 | 204.04 |
| 79640 | 36326 | 80640 | 1.000 | 1" | 25.400 | 1" | 4" | 1-1/2" | .250" | 234.65 | 224.44 | 214.24 | 204.04 |

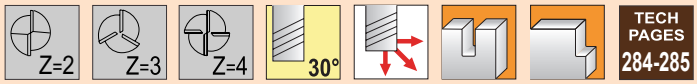




† *Metric equivalents are for reference only*

| TOLERANCES | |
|---|---|
| $d_1$ | +.000" –.002" (+.000 –.050mm) |
| $d_2$ | h6 |
| $r$ | +.001" –.001" (+.025 –.025mm) |

# Series 220RA, 223RA, 230RA, 823RA, 830RA




TECH PAGES 284-285

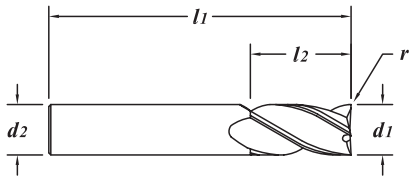
.0625" - .3125"
(1.588mm - 7.938mm)

## Standard Length - Corner Radius

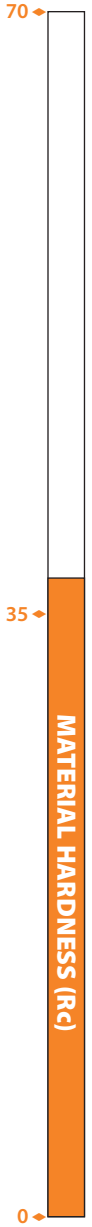
### TiALN Coating

Solid submicron grain carbide end mill - center cutting
Dry or semi-dry machining
For stronger corners and part radius
Extremely versatile
Bright Finish - page 224
Stub Length - page 214
Extended Length - page 246






| (220RA) 2 Flute EDP# | (223RA/823RA) 3 Flute EDP# | (230RA/830RA) 4 Flute EDP# | $d_1$ † Diameter Decimal | $d_1$ † Diameter | $d_1$ † Diameter Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | $r$ Corner Radius | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 79587 | 36101 | 80587 | .0625 | 1/16" | 1.588 | 1/8" | 1-1/2" | 1/4" | .010" | 16.09 | 15.39 | 14.69 | 13.99 |
| 79597 | 36103 | 80597 | .0625 | 1/16" | 1.588 | 1/8" | 1-1/2" | 1/4" | .015" | 16.09 | 15.39 | 14.69 | 13.99 |
| 79607 | 36105 | 80607 | .0938 | 3/32" | 2.383 | 1/8" | 1-1/2" | 3/8" | .010" | 15.50 | 14.83 | 14.15 | 13.48 |
| 79617 | 36107 | 80617 | .0938 | 3/32" | 2.383 | 1/8" | 1-1/2" | 3/8" | .015" | 15.50 | 14.83 | 14.15 | 13.48 |
| 79627 | 36109 | 80627 | .0938 | 3/32" | 2.383 | 1/8" | 1-1/2" | 3/8" | .020" | 15.50 | 14.83 | 14.15 | 13.48 |
| - | 36111 | 24077 | .1181 | | 3.000 | 3.0 | 38 | 12 | 0.20 | 14.34 | 13.72 | 13.09 | 12.47 |
| - | 36113 | 24087 | .1181 | | 3.000 | 3.0 | 38 | 12 | 0.50 | 14.34 | 13.72 | 13.09 | 12.47 |
| 79007 | 36115 | 80007 | .1250 | 1/8" | 3.175 | 1/8" | 1-1/2" | 1/2" | .010" | 14.32 | 13.70 | 13.07 | 12.45 |
| 79017 | 36117 | 80017 | .1250 | 1/8" | 3.175 | 1/8" | 1-1/2" | 1/2" | .015" | 14.32 | 13.70 | 13.07 | 12.45 |
| 79027 | 36119 | 80027 | .1250 | 1/8" | 3.175 | 1/8" | 1-1/2" | 1/2" | .020" | 14.32 | 13.70 | 13.07 | 12.45 |
| 79037 | 36121 | 80037 | .1250 | 1/8" | 3.175 | 1/8" | 1-1/2" | 1/2" | .030" | 14.32 | 13.70 | 13.07 | 12.45 |
| - | - | 80038 | .1250 | 1/8" | 3.175 | 1/8" | 1-1/2" | 1/2" | .040" | 14.32 | 13.70 | 13.07 | 12.45 |
| - | 36123 | 24097 | .1575 | | 4.000 | 4.0 | 50 | 14 | 0.30 | 18.78 | 17.96 | 17.15 | 16.33 |
| - | 36125 | 24107 | .1575 | | 4.000 | 4.0 | 50 | 14 | 0.50 | 18.78 | 17.96 | 17.15 | 16.33 |
| 79047 | 36127 | 80047 | .1875 | 3/16" | 4.763 | 3/16" | 2" | 5/8" | .010" | 18.01 | 17.23 | 16.44 | 15.66 |
| 79057 | 36129 | 80057 | .1875 | 3/16" | 4.763 | 3/16" | 2" | 5/8" | .015" | 18.01 | 17.23 | 16.44 | 15.66 |
| 79067 | 36131 | 80067 | .1875 | 3/16" | 4.763 | 3/16" | 2" | 5/8" | .020" | 18.01 | 17.23 | 16.44 | 15.66 |
| 79077 | 36133 | 80077 | .1875 | 3/16" | 4.763 | 3/16" | 2" | 5/8" | .030" | 18.01 | 17.23 | 16.44 | 15.66 |
| - | - | 80087 | .1875 | 3/16" | 4.763 | 3/16" | 2" | 5/8" | .060" | 18.01 | 17.23 | 16.44 | 15.66 |
| - | - | 24117 | .1969 | | 5.000 | 5.0 | 50 | 16 | 0.30 | 25.06 | 23.97 | 22.88 | 21.79 |
| - | 36135 | 24119 | .1969 | | 5.000 | 5.0 | 65 | 16 | 0.30 | 25.06 | 23.97 | 22.88 | 21.79 |
| - | 36137 | 24127 | .1969 | | 5.000 | 5.0 | 65 | 16 | 0.50 | 25.06 | 23.97 | 22.88 | 21.79 |
| - | 36139 | 24177 | .2362 | | 6.000 | 6.0 | 65 | 19 | 0.50 | 25.54 | 24.43 | 23.32 | 22.21 |
| - | 36141 | 24187 | .2362 | | 6.000 | 6.0 | 65 | 19 | 0.80 | 25.54 | 24.43 | 23.32 | 22.21 |
| - | 36143 | 24197 | .2362 | | 6.000 | 6.0 | 65 | 19 | 1.00 | 25.54 | 24.43 | 23.32 | 22.21 |
| - | 36145 | 24207 | .2362 | | 6.000 | 6.0 | 65 | 19 | 1.50 | 25.54 | 24.43 | 23.32 | 22.21 |
| - | 36147 | 24217 | .2362 | | 6.000 | 6.0 | 65 | 19 | 2.00 | 25.54 | 24.43 | 23.32 | 22.21 |
| - | 36149 | 80097 | .2500 | 1/4" | 6.350 | 1/4" | 2-1/2" | 3/4" | .010" | 24.56 | 23.50 | 22.43 | 21.36 |
| 79107 | 36151 | 80107 | .2500 | 1/4" | 6.350 | 1/4" | 2-1/2" | 3/4" | .015" | 24.56 | 23.50 | 22.43 | 21.36 |
| 79117 | 36153 | 80117 | .2500 | 1/4" | 6.350 | 1/4" | 2-1/2" | 3/4" | .020" | 24.56 | 23.50 | 22.43 | 21.36 |
| 79127 | 36155 | 80127 | .2500 | 1/4" | 6.350 | 1/4" | 2-1/2" | 3/4" | .030" | 24.56 | 23.50 | 22.43 | 21.36 |
| 79137 | 36157 | 80137 | .2500 | 1/4" | 6.350 | 1/4" | 2-1/2" | 3/4" | .045" | 24.56 | 23.50 | 22.43 | 21.36 |
| 79147 | 36159 | 80147 | .2500 | 1/4" | 6.350 | 1/4" | 2-1/2" | 3/4" | .060" | 24.56 | 23.50 | 22.43 | 21.36 |
| 79167 | 36161 | 80167 | .3125 | 5/16" | 7.938 | 5/16" | 2-1/2" | 7/8" | .015" | 33.29 | 31.85 | 30.40 | 28.95 |
| 79177 | 36163 | 80177 | .3125 | 5/16" | 7.938 | 5/16" | 2-1/2" | 7/8" | .020" | 33.29 | 31.85 | 30.40 | 28.95 |
| 79187 | 36165 | 80187 | .3125 | 5/16" | 7.938 | 5/16" | 2-1/2" | 7/8" | .030" | 33.29 | 31.85 | 30.40 | 28.95 |
| 79197 | 36167 | 80197 | .3125 | 5/16" | 7.938 | 5/16" | 2-1/2" | 7/8" | .045" | 33.29 | 31.85 | 30.40 | 28.95 |
| 79207 | 36169 | 80207 | .3125 | 5/16" | 7.938 | 5/16" | 2-1/2" | 7/8" | .060" | 33.29 | 31.85 | 30.40 | 28.95 |




continued →

# Series 220RA, 223RA, 230RA, 823RA, 830RA *(continued)*

.3150" - .6299"
(8.000mm - 16.000mm)

| (220RA) 2 Flute EDP# | (223RA/823RA) 3 Flute EDP# | (230RA/830RA) 4 Flute EDP# | $d_1$ † Diameter Decimal | | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | $r$ Corner Radius | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| - | 36171 | 24227 | .3150 | | 8.000 | 8.0 | 65 | 22 | 0.50 | 34.55 | 33.04 | 31.54 | 30.04 |
| - | 36173 | 24237 | .3150 | | 8.000 | 8.0 | 65 | 22 | 0.80 | 34.55 | 33.04 | 31.54 | 30.04 |
| - | 36175 | 24247 | .3150 | | 8.000 | 8.0 | 65 | 22 | 1.00 | 34.55 | 33.04 | 31.54 | 30.04 |
| - | 36177 | 24257 | .3150 | | 8.000 | 8.0 | 65 | 22 | 1.50 | 34.55 | 33.04 | 31.54 | 30.04 |
| - | 36179 | 24267 | .3150 | | 8.000 | 8.0 | 65 | 22 | 2.00 | 34.55 | 33.04 | 31.54 | 30.04 |
| - | 36181 | 24277 | .3150 | | 8.000 | 8.0 | 65 | 22 | 2.50 | 34.55 | 33.04 | 31.54 | 30.04 |
| - | 36183 | 24287 | .3150 | | 8.000 | 8.0 | 65 | 22 | 3.00 | 34.55 | 33.04 | 31.54 | 30.04 |
| - | 36185 | 80227 | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 7/8" | .010" | 38.88 | 37.19 | 35.50 | 33.81 |
| 79237 | 36187 | 80237 | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 7/8" | .015" | 38.88 | 37.19 | 35.50 | 33.81 |
| 79247 | 36189 | 80247 | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 7/8" | .020" | 38.88 | 37.19 | 35.50 | 33.81 |
| 79257 | 36191 | 80257 | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 7/8" | .030" | 38.88 | 37.19 | 35.50 | 33.81 |
| 79267 | 36193 | 80267 | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 7/8" | .045" | 38.88 | 37.19 | 35.50 | 33.81 |
| 79277 | 36195 | 80277 | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 7/8" | .060" | 38.88 | 37.19 | 35.50 | 33.81 |
| - | 36197 | 24297 | .3937 | | 10.000 | 10.0 | 70 | 25 | 0.50 | 46.94 | 44.90 | 42.86 | 40.82 |
| - | 36199 | 24307 | .3937 | | 10.000 | 10.0 | 70 | 25 | 0.80 | 46.94 | 44.90 | 42.86 | 40.82 |
| - | 36201 | 24317 | .3937 | | 10.000 | 10.0 | 70 | 25 | 1.00 | 46.94 | 44.90 | 42.86 | 40.82 |
| - | 36203 | 24327 | .3937 | | 10.000 | 10.0 | 70 | 25 | 1.50 | 46.94 | 44.90 | 42.86 | 40.82 |
| - | 36205 | 24337 | .3937 | | 10.000 | 10.0 | 70 | 25 | 2.00 | 46.94 | 44.90 | 42.86 | 40.82 |
| - | 36207 | 24347 | .3937 | | 10.000 | 10.0 | 70 | 25 | 2.50 | 46.94 | 44.90 | 42.86 | 40.82 |
| - | 36209 | 24357 | .3937 | | 10.000 | 10.0 | 70 | 25 | 3.00 | 46.94 | 44.90 | 42.86 | 40.82 |
| - | 36211 | 24367 | .3937 | | 10.000 | 10.0 | 70 | 25 | 3.20 | 46.94 | 44.90 | 42.86 | 40.82 |
| - | 36213 | 80279 | .4375 | 7/16" | 11.113 | 7/16" | 2-3/4" | 1" | .010" | 47.01 | 44.97 | 42.92 | 40.88 |
| - | 36215 | 80281 | .4375 | 7/16" | 11.113 | 7/16" | 2-3/4" | 1" | .015" | 47.01 | 44.97 | 42.92 | 40.88 |
| - | 36217 | 80283 | .4375 | 7/16" | 11.113 | 7/16" | 2-3/4" | 1" | .020" | 47.01 | 44.97 | 42.92 | 40.88 |
| - | 36219 | 80285 | .4375 | 7/16" | 11.113 | 7/16" | 2-3/4" | 1" | .030" | 47.01 | 44.97 | 42.92 | 40.88 |
| - | 36221 | 80287 | .4375 | 7/16" | 11.113 | 7/16" | 2-3/4" | 1" | .045" | 47.01 | 44.97 | 42.92 | 40.88 |
| - | 36223 | 80289 | .4375 | 7/16" | 11.113 | 7/16" | 2-3/4" | 1" | .060" | 47.01 | 44.97 | 42.92 | 40.88 |
| - | 36225 | 80291 | .4375 | 7/16" | 11.113 | 7/16" | 2-3/4" | 1" | .090" | 47.01 | 44.97 | 42.92 | 40.88 |
| - | 36227 | 80293 | .4375 | 7/16" | 11.113 | 7/16" | 2-3/4" | 1" | .125" | 47.01 | 44.97 | 42.92 | 40.88 |
| - | 36229 | 24377 | .4724 | | 12.000 | 12.0 | 75 | 25 | 0.50 | 69.13 | 66.12 | 63.12 | 60.11 |
| - | 36231 | 24387 | .4724 | | 12.000 | 12.0 | 75 | 25 | 0.80 | 69.13 | 66.12 | 63.12 | 60.11 |
| - | 36233 | 24397 | .4724 | | 12.000 | 12.0 | 75 | 25 | 1.00 | 69.13 | 66.12 | 63.12 | 60.11 |
| - | 36235 | 24407 | .4724 | | 12.000 | 12.0 | 75 | 25 | 1.50 | 69.13 | 66.12 | 63.12 | 60.11 |
| - | 36237 | 24417 | .4724 | | 12.000 | 12.0 | 75 | 25 | 2.00 | 69.13 | 66.12 | 63.12 | 60.11 |
| - | 36239 | 24427 | .4724 | | 12.000 | 12.0 | 75 | 25 | 2.50 | 69.13 | 66.12 | 63.12 | 60.11 |
| - | 36241 | 24437 | .4724 | | 12.000 | 12.0 | 75 | 25 | 3.00 | 69.13 | 66.12 | 63.12 | 60.11 |
| - | 36243 | 24447 | .4724 | | 12.000 | 12.0 | 75 | 25 | 3.20 | 69.13 | 66.12 | 63.12 | 60.11 |
| - | 36245 | 80297 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1" | .010" | 66.32 | 63.44 | 60.55 | 57.67 |
| 79307 | 36247 | 80307 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1" | .015" | 66.32 | 63.44 | 60.55 | 57.67 |
| 79317 | 36249 | 80317 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1" | .020" | 66.32 | 63.44 | 60.55 | 57.67 |
| 79327 | 36251 | 80327 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1" | .030" | 66.32 | 63.44 | 60.55 | 57.67 |
| 79337 | 36253 | 80337 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1" | .045" | 66.32 | 63.44 | 60.55 | 57.67 |
| 79347 | 36255 | 80347 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1" | .060" | 66.32 | 63.44 | 60.55 | 57.67 |
| 79357 | 36257 | 80357 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1" | .090" | 66.32 | 63.44 | 60.55 | 57.67 |
| 79367 | 36259 | 80367 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1" | .125" | 66.32 | 63.44 | 60.55 | 57.67 |
| 79377 | 36261 | 80377 | .6250 | 5/8" | 15.875 | 5/8" | 3-1/2" | 1-1/4" | .015" | 105.58 | 100.99 | 96.40 | 91.81 |
| - | 36263 | 80387 | .6250 | 5/8" | 15.875 | 5/8" | 3-1/2" | 1-1/4" | .020" | 105.58 | 100.99 | 96.40 | 91.81 |
| 79397 | 36265 | 80397 | .6250 | 5/8" | 15.875 | 5/8" | 3-1/2" | 1-1/4" | .030" | 105.58 | 100.99 | 96.40 | 91.81 |
| 79407 | 36267 | 80407 | .6250 | 5/8" | 15.875 | 5/8" | 3-1/2" | 1-1/4" | .045" | 105.58 | 100.99 | 96.40 | 91.81 |
| 79417 | 36269 | 80417 | .6250 | 5/8" | 15.875 | 5/8" | 3-1/2" | 1-1/4" | .060" | 105.58 | 100.99 | 96.40 | 91.81 |
| 79427 | 36271 | 80427 | .6250 | 5/8" | 15.875 | 5/8" | 3-1/2" | 1-1/4" | .090" | 105.58 | 100.99 | 96.40 | 91.81 |
| - | 36273 | 24457 | .6299 | | 16.000 | 16.0 | 88 | 38 | 0.50 | 110.17 | 105.38 | 100.59 | 95.80 |
| - | 36275 | 24467 | .6299 | | 16.000 | 16.0 | 88 | 38 | 1.00 | 110.17 | 105.38 | 100.59 | 95.80 |
| - | 36277 | 24477 | .6299 | | 16.000 | 16.0 | 88 | 38 | 2.00 | 110.17 | 105.38 | 100.59 | 95.80 |
| - | 36279 | 24487 | .6299 | | 16.000 | 16.0 | 88 | 38 | 2.50 | 110.17 | 105.38 | 100.59 | 95.80 |
| - | 36281 | 24497 | .6299 | | 16.000 | 16.0 | 88 | 38 | 3.00 | 110.17 | 105.38 | 100.59 | 95.80 |
| - | 36283 | 24507 | .6299 | | 16.000 | 16.0 | 88 | 38 | 4.00 | 110.17 | 105.38 | 100.59 | 95.80 |
| - | 36285 | 24517 | .6299 | | 16.000 | 16.0 | 88 | 38 | 5.00 | 110.17 | 105.38 | 100.59 | 95.80 |





† *Metric equivalents are for reference only*

| (220RA) 2 Flute EDP# | (223RA/823RA) 3 Flute EDP# | (230RA/830RA) 4 Flute EDP# | $d_1$ † Diameter Decimal | $d_1$ † Diameter | $d_1$ † Diameter Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | $r$ Corner Radius | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 79447 | 36287 | 80447 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-1/2" | .015" | 151.41 | 144.83 | 138.24 | 131.66 |
| 79457 | 36289 | 80457 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-1/2" | .020" | 151.41 | 144.83 | 138.24 | 131.66 |
| 79467 | 36291 | 80467 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-1/2" | .030" | 151.41 | 144.83 | 138.24 | 131.66 |
| 79477 | 36293 | 80477 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-1/2" | .045" | 151.41 | 144.83 | 138.24 | 131.66 |
| 79487 | 36295 | 80487 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-1/2" | .060" | 151.41 | 144.83 | 138.24 | 131.66 |
| 79497 | 36297 | 80497 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-1/2" | .090" | 151.41 | 144.83 | 138.24 | 131.66 |
| 79507 | 36299 | 80507 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-1/2" | .125" | 151.41 | 144.83 | 138.24 | 131.66 |
| 79637 | 36301 | 80637 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-1/2" | .250" | 151.41 | 144.83 | 138.24 | 131.66 |
| - | 36303 | 24527 | .7874 | | 20.000 | 20.0 | 100 | 38 | 0.50 | 214.29 | 204.97 | 195.66 | 186.34 |
| - | 36305 | 24537 | .7874 | | 20.000 | 20.0 | 100 | 38 | 1.00 | 214.29 | 204.97 | 195.66 | 186.34 |
| - | 36307 | 24547 | .7874 | | 20.000 | 20.0 | 100 | 38 | 2.00 | 214.29 | 204.97 | 195.66 | 186.34 |
| - | 36309 | 24557 | .7874 | | 20.000 | 20.0 | 100 | 38 | 3.00 | 214.29 | 204.97 | 195.66 | 186.34 |
| - | 36311 | 24567 | .7874 | | 20.000 | 20.0 | 100 | 38 | 5.00 | 214.29 | 204.97 | 195.66 | 186.34 |
| - | 36313 | 80517 | 1.000 | 1" | 25.400 | 1" | 4" | 1-1/2" | .015" | 258.50 | 247.26 | 236.02 | 224.78 |
| - | 36315 | 80527 | 1.000 | 1" | 25.400 | 1" | 4" | 1-1/2" | .020" | 258.50 | 247.26 | 236.02 | 224.78 |
| 79537 | 36317 | 80537 | 1.000 | 1" | 25.400 | 1" | 4" | 1-1/2" | .030" | 258.50 | 247.26 | 236.02 | 224.78 |
| - | 36319 | 80547 | 1.000 | 1" | 25.400 | 1" | 4" | 1-1/2" | .045" | 258.50 | 247.26 | 236.02 | 224.78 |
| 79557 | 36321 | 80557 | 1.000 | 1" | 25.400 | 1" | 4" | 1-1/2" | .060" | 258.50 | 247.26 | 236.02 | 224.78 |
| - | 36323 | 80567 | 1.000 | 1" | 25.400 | 1" | 4" | 1-1/2" | .090" | 258.50 | 247.26 | 236.02 | 224.78 |
| 79577 | 36325 | 80577 | 1.000 | 1" | 25.400 | 1" | 4" | 1-1/2" | .125" | 258.50 | 247.26 | 236.02 | 224.78 |
| 79647 | 36327 | 80647 | 1.000 | 1" | 25.400 | 1" | 4" | 1-1/2" | .250" | 258.50 | 247.26 | 236.02 | 224.78 |

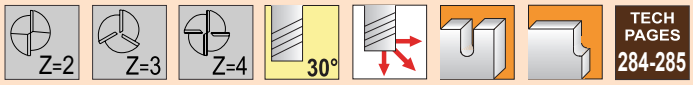



*End Mill Manufacturing*

70
35
0
MATERIAL HARDNESS (Rc)

# Series 320M, 323M, 330M, 920M, 923M, 930M

.0200" - .2656"
(0.508mm - 6.746mm)




TECH PAGES 284-285

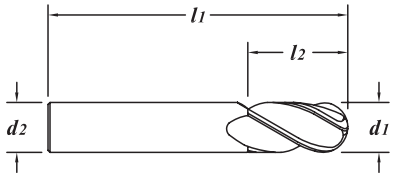
**TOLERANCES**

| | | |
|---|---|---|
| $d_1$ | ≤ .030" | +.000" –.001" (+.000 –.025mm) |
| | ≥ 1/32" | +.000" –.002" (+.000 –.050mm) |
| $d_2$ | h6 | |
| *ball radius* | +.000" –.001" (+.000 –.025mm) | |

## Standard Length - Ball End

Solid submicron grain carbide end mill - center cutting
Extremely versatile
TiN Coating - page 232
TiCN Coating - page 233
TiALN Coating - page 234
Stub Length - page 216
Extended length - page 249






70
35
0

MATERIAL HARDNESS (Rc)

| (320M/920M) 2 Flute EDP# | (323M/923M) 3 Flute EDP# | (330M/930M) 4 Flute EDP# | Decimal | $d_1$ † Diameter | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 16650 | - | - | .0200 | .0200" | 0.508 | 1/8" | 1-1/2" | .060" | 22.99 | 21.99 | 20.99 | 19.99 |
| 16700 | - | - | .0250 | .0250" | 0.635 | 1/8" | 1-1/2" | .075" | 22.21 | 21.24 | 20.28 | 19.31 |
| 16750 | - | - | .0300 | .0300" | 0.762 | 1/8" | 1-1/2" | .090" | 19.14 | 18.30 | 17.47 | 16.64 |
| 16010 | 17010 | 18010 | .0312 | 1/32" | 0.792 | 1/8" | 1-1/2" | 3/32" | 14.19 | 13.57 | 12.96 | 12.34 |
| 47010 | 38010 | 48010 | .0394 | | 1.000 | 3.0 | 38 | 4 | 14.90 | 14.26 | 13.61 | 12.96 |
| 16020 | 17020 | 18020 | .0469 | 3/64" | 1.191 | 1/8" | 1-1/2" | 1/8" | 14.19 | 13.57 | 12.96 | 12.34 |
| 47020 | 38020 | 48020 | .0591 | | 1.500 | 3.0 | 38 | 6 | 14.90 | 14.26 | 13.61 | 12.96 |
| 16030 | 17030 | 18030 | .0625 | 1/16" | 1.588 | 1/8" | 1-1/2" | 1/4" | 13.40 | 12.82 | 12.23 | 11.65 |
| 16040 | 17040 | 18040 | .0781 | 5/64" | 1.984 | 1/8" | 1-1/2" | 1/4" | 13.40 | 12.82 | 12.23 | 11.65 |
| 47030 | 38030 | 48030 | .0787 | | 2.000 | 3.0 | 38 | 8 | 14.05 | 13.44 | 12.83 | 12.22 |
| 16050 | 17050 | 18050 | .0938 | 3/32" | 2.383 | 1/8" | 1-1/2" | 3/8" | 12.81 | 12.25 | 11.70 | 11.14 |
| 47040 | 38040 | 48040 | .0984 | | 2.500 | 3.0 | 38 | 12 | 13.47 | 12.88 | 12.30 | 11.71 |
| 16060 | 17060 | 18060 | .1094 | 7/64" | 2.779 | 1/8" | 1-1/2" | 3/8" | 12.81 | 12.25 | 11.70 | 11.14 |
| 47050 | 38050 | 48050 | .1181 | | 3.000 | 3.0 | 38 | 12 | 12.22 | 11.69 | 11.16 | 10.63 |
| 16070 | 17070 | 18070 | .1250 | 1/8" | 3.175 | 1/8" | 1-1/2" | 1/2" | 11.63 | 11.12 | 10.62 | 10.11 |
| 47060 | 38060 | 48060 | .1378 | | 3.500 | 4.0 | 50 | 12 | 17.94 | 17.16 | 16.38 | 15.60 |
| 16080 | 17080 | 18080 | .1406 | 9/64" | 3.571 | 3/16" | 2" | 9/16" | 17.05 | 16.31 | 15.57 | 14.83 |
| 16090 | 17090 | 18090 | .1562 | 5/32" | 3.967 | 3/16" | 2" | 9/16" | 17.05 | 16.31 | 15.57 | 14.83 |
| 47070 | 38070 | 48070 | .1575 | | 4.000 | 4.0 | 50 | 14 | 16.09 | 15.39 | 14.69 | 13.99 |
| 16100 | 17100 | 18100 | .1719 | 11/64" | 4.366 | 3/16" | 2" | 9/16" | 17.05 | 16.31 | 15.57 | 14.83 |
| 47080 | 38080 | 48080 | .1772 | | 4.500 | 5.0 | 50 | 14 | 20.25 | 19.37 | 18.49 | 17.61 |
| 16110 | 17110 | 18110 | .1875 | 3/16" | 4.763 | 3/16" | 2" | 5/8" | 15.32 | 14.65 | 13.99 | 13.32 |
| 97070 | 98070 | 99070 | .1969 | | 5.000 | 5.0 | 50 | 16 | 18.61 | 17.80 | 16.99 | 16.18 |
| 47090 | 38090 | 48090 | .1969 | | 5.000 | 5.0 | 65 | 16 | 19.50 | 18.66 | 17.81 | 16.96 |
| 16120 | 17120 | 18120 | .2031 | 13/64" | 5.159 | 1/4" | 2-1/2" | 5/8" | 19.84 | 18.98 | 18.11 | 17.25 |
| 16130 | 17130 | 18130 | .2188 | 7/32" | 5.558 | 1/4" | 2-1/2" | 5/8" | 19.84 | 18.98 | 18.11 | 17.25 |
| 16140 | 17140 | 18140 | .2344 | 15/64" | 5.954 | 1/4" | 2-1/2" | 3/4" | 19.84 | 18.98 | 18.11 | 17.25 |
| 47100 | 38100 | 48100 | .2362 | | 6.000 | 6.0 | 65 | 19 | 20.00 | 19.13 | 18.26 | 17.39 |
| 16150 | 17150 | 18150 | .2500 | 1/4" | 6.350 | 1/4" | 2-1/2" | 3/4" | 19.03 | 18.21 | 17.38 | 16.55 |
| 16160 | 17160 | 18160 | .2656 | 17/64" | 6.746 | 5/16" | 2-1/2" | 7/8" | 29.79 | 28.49 | 27.20 | 25.90 |



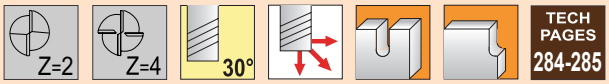
GARR TOOL®

† *Metric equivalents are for reference only*

| (320M/920M) 2 Flute EDP# | (323M/923M) 3 Flute EDP# | (330M/930M) 4 Flute EDP# | $d_1$ † Diameter Decimal | $d_1$ † Diameter | $d_1$ † Diameter Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 47110 | 38110 | 48110 | .2756 | | 7.000 | 7.0 | 65 | 22 | 25.67 | 24.55 | 23.44 | 22.32 |
| 16170 | 17170 | 18170 | .2812 | 9/32" | 7.142 | 5/16" | 2-1/2" | 7/8" | 29.79 | 28.49 | 27.20 | 25.90 |
| 16180 | - | 18180 | .2969 | 19/64" | 7.541 | 5/16" | 2-1/2" | 7/8" | 29.79 | 28.49 | 27.20 | 25.90 |
| 16190 | 17190 | 18190 | .3125 | 5/16" | 7.938 | 5/16" | 2-1/2" | 7/8" | 24.94 | 23.86 | 22.77 | 21.69 |
| 47120 | 38120 | 48120 | .3150 | | 8.000 | 8.0 | 65 | 22 | 26.25 | 25.11 | 23.97 | 22.83 |
| 16200 | 17200 | 18200 | .3281 | 21/64" | 8.334 | 3/8" | 2-1/2" | 7/8" | 35.65 | 34.10 | 32.55 | 31.00 |
| 16210 | 17210 | 18210 | .3438 | 11/32" | 8.733 | 3/8" | 2-1/2" | 7/8" | 35.65 | 34.10 | 32.55 | 31.00 |
| 47130 | 38130 | 48130 | .3543 | | 9.000 | 9.0 | 65 | 22 | 32.07 | 30.68 | 29.28 | 27.89 |
| 16220 | - | 18220 | .3594 | 23/64" | 9.129 | 3/8" | 2-1/2" | 7/8" | 35.65 | 34.10 | 32.55 | 31.00 |
| 16230 | 17230 | 18230 | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 7/8" | 30.53 | 29.21 | 27.88 | 26.55 |
| 16240 | 17240 | 18240 | .3906 | 25/64" | 9.921 | 7/16" | 2-3/4" | 7/8" | 43.87 | 41.97 | 40.06 | 38.15 |
| 47140 | 38140 | 48140 | .3937 | | 10.000 | 10.0 | 70 | 25 | 37.48 | 35.85 | 34.22 | 32.59 |
| 16250 | 17250 | 18250 | .4062 | 13/32" | 10.317 | 7/16" | 2-3/4" | 7/8" | 43.87 | 41.97 | 40.06 | 38.15 |
| 16260 | 17260 | 18260 | .4219 | 27/64" | 10.716 | 7/16" | 2-3/4" | 7/8" | 43.87 | 41.97 | 40.06 | 38.15 |
| 47150 | 38150 | 48150 | .4331 | | 11.000 | 11.0 | 75 | 25 | 39.46 | 37.74 | 36.03 | 34.31 |
| 16270 | 17270 | 18270 | .4375 | 7/16" | 11.113 | 7/16" | 2-3/4" | 1" | 37.58 | 35.95 | 34.31 | 32.68 |
| 16280 | - | 18280 | .4531 | 29/64" | 11.509 | 1/2" | 3" | 1" | 62.84 | 60.10 | 57.37 | 54.64 |
| 16290 | 17290 | 18290 | .4688 | 15/32" | 11.908 | 1/2" | 3" | 1" | 62.84 | 60.10 | 57.37 | 54.64 |
| 47160 | 38160 | 48160 | .4724 | | 12.000 | 12.0 | 75 | 25 | 59.70 | 57.10 | 54.51 | 51.91 |
| 16300 | - | 18300 | .4844 | 31/64" | 12.304 | 1/2" | 3" | 1" | 62.84 | 60.10 | 57.37 | 54.64 |
| 16310 | 17310 | 18310 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1" | 56.83 | 54.36 | 51.89 | 49.42 |
| 47170 | 38170 | 48170 | .5512 | | 14.000 | 14.0 | 88 | 32 | 86.91 | 83.13 | 79.35 | 75.57 |
| 16320 | 17320 | 18320 | .5625 | 9/16" | 14.288 | 9/16" | 3-1/2" | 1-1/4" | 82.78 | 79.18 | 75.58 | 71.98 |
| 16330 | 17330 | 18330 | .6250 | 5/8" | 15.875 | 5/8" | 3-1/2" | 1-1/4" | 91.92 | 87.92 | 83.93 | 79.93 |
| 47180 | 38180 | 48180 | .6299 | | 16.000 | 16.0 | 88 | 38 | 96.50 | 92.30 | 88.11 | 83.91 |
| 16340 | 17340 | 18340 | .6875 | 11/16" | 17.463 | 3/4" | 4" | 1-1/2" | 153.02 | 146.37 | 139.71 | 133.06 |
| 47190 | - | 48190 | .7087 | | 18.000 | 18.0 | 100 | 38 | 142.01 | 135.84 | 129.66 | 123.49 |
| 16350 | 17350 | 18350 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-1/2" | 135.27 | 129.39 | 123.51 | 117.63 |
| 47200 | 38200 | 48200 | .7874 | | 20.000 | 20.0 | 100 | 38 | 190.44 | 182.16 | 173.88 | 165.60 |
| 47210 | - | 48210 | .8661 | | 22.000 | 22.0 | 100 | 38 | 211.55 | 202.36 | 193.16 | 183.96 |
| 16360 | 17360 | 18360 | .8750 | 7/8" | 22.225 | 7/8" | 4" | 1-1/2" | 216.72 | 207.30 | 197.87 | 188.45 |
| 47220 | - | - | .9843 | | 25.000 | 25.0 | 100 | 38 | 221.77 | 212.12 | 202.48 | 192.84 |
| 16370 | 17370 | 18370 | 1.000 | 1" | 25.400 | 1" | 4" | 1-1/2" | 234.65 | 224.44 | 214.24 | 204.04 |



# Series 320MT, 330MT



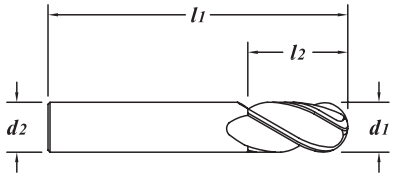

| TOLERANCES | |
|---|---|
| $d_1$ | +.000" –.002" (+.000 –.050mm) |
| $d_2$ | h6 |
| *ball radius* | +.000" –.001" (+.000 –.025mm) |

## Standard Length - Ball End

### TiN Coating

Solid submicron grain carbide end mill - center cutting
Improved lubricity
Extremely versatile
Bright Finish - page 230
TiCN Coating - page 233
TiALN Coating - page 234








| (320MT) 2 Flute EDP# | (330MT) 4 Flute EDP# | $d_1$ † Decimal | | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 16073 | 18073 | .1250 | 1/8" | 3.175 | 1/8" | 1-1/2" | 1/2" | 13.20 | 12.63 | 12.05 | 11.48 |
| 16113 | 18113 | .1875 | 3/16" | 4.763 | 3/16" | 2" | 5/8" | 16.92 | 16.18 | 15.45 | 14.71 |
| 16153 | 18153 | .2500 | 1/4" | 6.350 | 1/4" | 2-1/2" | 3/4" | 22.23 | 21.26 | 20.30 | 19.33 |
| 16193 | 18193 | .3125 | 5/16" | 7.938 | 5/16" | 2-1/2" | 7/8" | 29.27 | 28.00 | 26.72 | 25.45 |
| 16233 | 18233 | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 7/8" | 34.86 | 33.34 | 31.83 | 30.31 |
| 16273 | 18273 | .4375 | 7/16" | 11.113 | 7/16" | 2-3/4" | 1" | 42.78 | 40.92 | 39.06 | 37.20 |
| 16313 | 18313 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1" | 62.07 | 59.37 | 56.67 | 53.97 |
| 16333 | 18333 | .6250 | 5/8" | 15.875 | 5/8" | 3-1/2" | 1-1/4" | 99.94 | 95.59 | 91.25 | 86.90 |
| 16353 | 18353 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-1/2" | 144.44 | 138.16 | 131.88 | 125.60 |
| 16373 | 18373 | 1.000 | 1" | 25.400 | 1" | 4" | 1-1/2" | 250.69 | 239.79 | 228.89 | 217.99 |



† *Metric equivalents are for reference only*

| TOLERANCES | |
|---|---|
| $d_1$ | +.000" –.002" (+.000 –.050mm) |
| $d_2$ | h6 |
| *ball radius* | +.000" –.001" (+.000 –.025mm) |













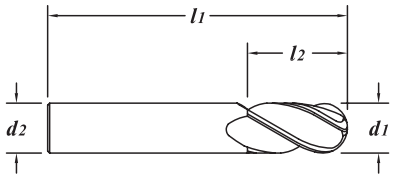

TECH PAGES 284-285

## Standard Length - Ball End

### TiCN Coating

Solid submicron grain carbide end mill - center cutting
Improved abrasion resistance and lubricity
Extremely versatile
Bright Finish - page 230
TiN Coating - page 232
TiALN Coating - page 234
Extended length - page 251






| (320MC) 2 Flute EDP# | (323MC) 3 Flute EDP# | (330MC) 4 Flute EDP# | $d_1$ † Diameter Decimal | $d_1$ † Diameter | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 16014 | 17014 | 18014 | .0312 | 1/32" | 0.792 | 1/8" | 1-1/2" | 3/32" | 16.56 | 15.84 | 15.12 | 14.40 |
| 16024 | 17024 | 18024 | .0469 | 3/64" | 1.191 | 1/8" | 1-1/2" | 1/8" | 16.56 | 15.84 | 15.12 | 14.40 |
| 16034 | 17034 | 18034 | .0625 | 1/16" | 1.588 | 1/8" | 1-1/2" | 1/4" | 15.78 | 15.09 | 14.41 | 13.72 |
| 16044 | 17044 | 18044 | .0781 | 5/64" | 1.984 | 1/8" | 1-1/2" | 1/4" | 15.78 | 15.09 | 14.41 | 13.72 |
| 16054 | 17054 | 18054 | .0938 | 3/32" | 2.383 | 1/8" | 1-1/2" | 3/8" | 15.18 | 14.52 | 13.86 | 13.20 |
| 16064 | 17064 | 18064 | .1094 | 7/64" | 2.779 | 1/8" | 1-1/2" | 3/8" | 15.18 | 14.52 | 13.86 | 13.20 |
| 16074 | 17074 | 18074 | .1250 | 1/8" | 3.175 | 1/8" | 1-1/2" | 1/2" | 14.00 | 13.39 | 12.78 | 12.17 |
| 16084 | 17084 | 18084 | .1406 | 9/64" | 3.571 | 3/16" | 2" | 9/16" | 19.45 | 18.60 | 17.76 | 16.91 |
| 16094 | 17094 | 18094 | .1562 | 5/32" | 3.967 | 3/16" | 2" | 9/16" | 19.45 | 18.60 | 17.76 | 16.91 |
| 16104 | - | 18104 | .1719 | 11/64" | 4.366 | 3/16" | 2" | 9/16" | 19.45 | 18.60 | 17.76 | 16.91 |
| 16114 | 17114 | 18114 | .1875 | 3/16" | 4.763 | 3/16" | 2" | 5/8" | 17.69 | 16.92 | 16.15 | 15.38 |
| 16124 | 17124 | 18124 | .2031 | 13/64" | 5.159 | 1/4" | 2-1/2" | 5/8" | 24.64 | 23.57 | 22.50 | 21.43 |
| 16134 | 17134 | 18134 | .2188 | 7/32" | 5.558 | 1/4" | 2-1/2" | 5/8" | 24.64 | 23.57 | 22.50 | 21.43 |
| 16144 | 17144 | 18144 | .2344 | 15/64" | 5.954 | 1/4" | 2-1/2" | 3/4" | 24.64 | 23.57 | 22.50 | 21.43 |
| 16154 | 17154 | 18154 | .2500 | 1/4" | 6.350 | 1/4" | 2-1/2" | 3/4" | 23.84 | 22.80 | 21.77 | 20.73 |
| - | 17164 | 18164 | .2656 | 17/64" | 6.746 | 5/16" | 2-1/2" | 7/8" | 36.21 | 34.64 | 33.06 | 31.49 |
| 16174 | 17174 | 18174 | .2812 | 9/32" | 7.142 | 5/16" | 2-1/2" | 7/8" | 36.21 | 34.64 | 33.06 | 31.49 |
| - | - | 18184 | .2969 | 19/64" | 7.541 | 5/16" | 2-1/2" | 7/8" | 36.21 | 34.64 | 33.06 | 31.49 |
| 16194 | 17194 | 18194 | .3125 | 5/16" | 7.938 | 5/16" | 2-1/2" | 7/8" | 31.42 | 30.05 | 28.69 | 27.32 |
| 16204 | - | - | .3281 | 21/64" | 8.334 | 3/8" | 2-1/2" | 7/8" | 42.10 | 40.27 | 38.44 | 36.61 |
| - | 17214 | 18214 | .3438 | 11/32" | 8.733 | 3/8" | 2-1/2" | 7/8" | 42.10 | 40.27 | 38.44 | 36.61 |
| 16224 | - | 18224 | .3594 | 23/64" | 9.129 | 3/8" | 2-1/2" | 7/8" | 42.10 | 40.27 | 38.44 | 36.61 |
| 16234 | 17234 | 18234 | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 7/8" | 36.97 | 35.37 | 33.76 | 32.15 |
| 16244 | - | 18244 | .3906 | 25/64" | 9.921 | 7/16" | 2-3/4" | 7/8" | 51.57 | 49.32 | 47.08 | 44.84 |
| 16254 | 17254 | 18254 | .4062 | 13/32" | 10.317 | 7/16" | 2-3/4" | 7/8" | 51.57 | 49.32 | 47.08 | 44.84 |
| - | - | 18264 | .4219 | 27/64" | 10.716 | 7/16" | 2-3/4" | 7/8" | 51.57 | 49.32 | 47.08 | 44.84 |
| 16274 | 17274 | 18274 | .4375 | 7/16" | 11.113 | 7/16" | 2-3/4" | 1" | 45.31 | 43.34 | 41.37 | 39.40 |
| - | - | 18284 | .4531 | 29/64" | 11.509 | 1/2" | 3" | 1" | 70.58 | 67.51 | 64.44 | 61.37 |
| - | 17294 | 18294 | .4688 | 15/32" | 11.908 | 1/2" | 3" | 1" | 70.58 | 67.51 | 64.44 | 61.37 |
| 16304 | 17304 | 18304 | .4844 | 31/64" | 12.304 | 1/2" | 3" | 1" | 70.58 | 67.51 | 64.44 | 61.37 |
| 16314 | 17314 | 18314 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1" | 64.58 | 61.78 | 58.97 | 56.16 |
| 16324 | 17324 | 18324 | .5625 | 9/16" | 14.288 | 9/16" | 3-1/2" | 1-1/4" | 94.79 | 90.67 | 86.55 | 82.43 |
| 16334 | 17334 | 18334 | .6250 | 5/8" | 15.875 | 5/8" | 3-1/2" | 1-1/4" | 103.97 | 99.45 | 94.93 | 90.41 |
| - | 17344 | - | .6875 | 11/16" | 17.463 | 3/4" | 4" | 1-1/2" | 166.77 | 159.52 | 152.27 | 145.02 |
| 16354 | 17354 | 18354 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-1/2" | 149.03 | 142.55 | 136.07 | 129.59 |
| 16364 | 17364 | 18364 | .8750 | 7/8" | 22.225 | 7/8" | 4" | 1-1/2" | 237.39 | 227.07 | 216.75 | 206.43 |
| 16374 | 17374 | 18374 | 1.000 | 1" | 25.400 | 1" | 4" | 1-1/2" | 255.33 | 244.23 | 233.13 | 222.03 |

# Series 320MA, 323MA, 330MA, 920MA, 923MA, 930MA

.0312" - .3150"
(0.792mm - 8.000mm)

Z=2 Z=3 Z=4 30°

TECH PAGES 284-285

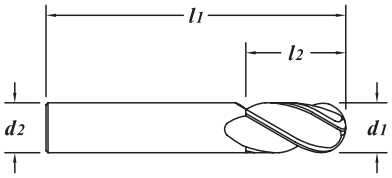
| TOLERANCES | |
|---|---|
| $d_1$ | +.000" –.002" (+.000 –.050mm) |
| $d_2$ | h6 |
| ball radius | +.000" –.001" (+.000 –.025mm) |



## Standard Length - Ball End

### TiALN Coating

Solid submicron grain carbide end mill - center cutting
Dry or semi-dry machining
Extremely versatile
Bright Finish - page 230
TiN Coating - page 232
TiCN Coating - page 233
Stub Length - page 217
Extended length - page 252




MATERIAL HARDNESS (Rc): 70 – 35 – 0

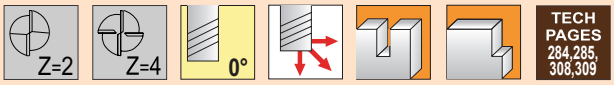
| (320MA/920MA) 2 Flute EDP# | (323MA/923MA) 3 Flute EDP# | (330MA/930MA) 4 Flute EDP# | $d_1$ † Diameter Decimal | $d_1$ † Diameter | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 16017 | 17017 | 18017 | .0312 | 1/32" | 0.792 | 1/8" | 1-1/2" | 3/32" | 16.87 | 16.14 | 15.40 | 14.67 |
| 47017 | 38017 | 48017 | .0394 | | 1.000 | 3.0 | 38 | 4 | 17.60 | 16.83 | 16.07 | 15.30 |
| 16027 | 17027 | 18027 | .0469 | 3/64" | 1.191 | 1/8" | 1-1/2" | 1/8" | 16.87 | 16.14 | 15.40 | 14.67 |
| 47027 | 38027 | 48027 | .0591 | | 1.500 | 3.0 | 38 | 6 | 17.60 | 16.83 | 16.07 | 15.30 |
| 16037 | 17037 | 18037 | .0625 | 1/16" | 1.588 | 1/8" | 1-1/2" | 1/4" | 16.09 | 15.39 | 14.69 | 13.99 |
| 16047 | 17047 | 18047 | .0781 | 5/64" | 1.984 | 1/8" | 1-1/2" | 1/4" | 16.09 | 15.39 | 14.69 | 13.99 |
| 47037 | 38037 | 48037 | .0787 | | 2.000 | 3.0 | 38 | 8 | 16.76 | 16.03 | 15.30 | 14.57 |
| 16057 | 17057 | 18057 | .0938 | 3/32" | 2.383 | 1/8" | 1-1/2" | 3/8" | 15.50 | 14.83 | 14.15 | 13.48 |
| 47047 | 38047 | 48047 | .0984 | | 2.500 | 3.0 | 38 | 12 | 16.15 | 15.44 | 14.74 | 14.04 |
| 16067 | 17067 | 18067 | .1094 | 7/64" | 2.779 | 1/8" | 1-1/2" | 3/8" | 15.50 | 14.83 | 14.15 | 13.48 |
| 47057 | 38057 | 48057 | .1181 | | 3.000 | 3.0 | 38 | 12 | 14.90 | 14.26 | 13.61 | 12.96 |
| 16077 | 17077 | 18077 | .1250 | 1/8" | 3.175 | 1/8" | 1-1/2" | 1/2" | 14.32 | 13.70 | 13.07 | 12.45 |
| 47067 | 38067 | 48067 | .1378 | | 3.500 | 4.0 | 50 | 12 | 20.62 | 19.72 | 18.83 | 17.93 |
| 16087 | 17087 | 18087 | .1406 | 9/64" | 3.571 | 3/16" | 2" | 9/16" | 19.77 | 18.91 | 18.05 | 17.19 |
| 16097 | 17097 | 18097 | .1562 | 5/32" | 3.967 | 3/16" | 2" | 9/16" | 19.77 | 18.91 | 18.05 | 17.19 |
| 47077 | 38077 | 48077 | .1575 | | 4.000 | 4.0 | 50 | 14 | 18.78 | 17.96 | 17.15 | 16.33 |
| 16107 | 17107 | 18107 | .1719 | 11/64" | 4.366 | 3/16" | 2" | 9/16" | 19.77 | 18.91 | 18.05 | 17.19 |
| 47087 | 38087 | 48087 | .1772 | | 4.500 | 5.0 | 50 | 14 | 24.45 | 23.39 | 22.32 | 21.26 |
| 16117 | 17117 | 18117 | .1875 | 3/16" | 4.763 | 3/16" | 2" | 5/8" | 18.01 | 17.23 | 16.44 | 15.66 |
| 97077 | 98077 | 99077 | .1969 | | 5.000 | 5.0 | 50 | 16 | 22.80 | 21.81 | 20.82 | 19.83 |
| 47097 | 38097 | 48097 | .1969 | | 5.000 | 5.0 | 65 | 16 | 25.06 | 23.97 | 22.88 | 21.79 |
| 16127 | 17127 | 18127 | .2031 | 13/64" | 5.159 | 1/4" | 2-1/2" | 5/8" | 25.40 | 24.30 | 23.19 | 22.09 |
| 16137 | 17137 | 18137 | .2188 | 7/32" | 5.558 | 1/4" | 2-1/2" | 5/8" | 25.40 | 24.30 | 23.19 | 22.09 |
| 16147 | 17147 | 18147 | .2344 | 15/64" | 5.954 | 1/4" | 2-1/2" | 3/4" | 25.40 | 24.30 | 23.19 | 22.09 |
| 47107 | 38107 | 48107 | .2362 | | 6.000 | 6.0 | 65 | 19 | 25.54 | 24.43 | 23.32 | 22.21 |
| 16157 | 17157 | 18157 | .2500 | 1/4" | 6.350 | 1/4" | 2-1/2" | 3/4" | 24.56 | 23.50 | 22.43 | 21.36 |
| 16167 | 17167 | 18167 | .2656 | 17/64" | 6.746 | 5/16" | 2-1/2" | 7/8" | 38.10 | 36.44 | 34.79 | 33.13 |
| 47117 | 38117 | 48117 | .2756 | | 7.000 | 7.0 | 65 | 22 | 33.96 | 32.48 | 31.01 | 29.53 |
| 16177 | 17177 | 18177 | .2812 | 9/32" | 7.142 | 5/16" | 2-1/2" | 7/8" | 38.10 | 36.44 | 34.79 | 33.13 |
| 16187 | 17187 | 18187 | .2969 | 19/64" | 7.541 | 5/16" | 2-1/2" | 7/8" | 38.10 | 36.44 | 34.79 | 33.13 |
| 16197 | 17197 | 18197 | .3125 | 5/16" | 7.938 | 5/16" | 2-1/2" | 7/8" | 33.29 | 31.85 | 30.40 | 28.95 |
| 47127 | 38127 | 48127 | .3150 | | 8.000 | 8.0 | 65 | 22 | 34.55 | 33.04 | 31.54 | 30.04 |



† *Metric equivalents are for reference only*

| (320MA/920MA) 2 Flute EDP# | (323MA/923MA) 3 Flute EDP# | (330MA/930MA) 4 Flute EDP# | $d_1$ † Diameter Decimal | $d_1$ † Diameter | $d_1$ † Diameter Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 16207 | 17207 | 18207 | .3281 | 21/64" | 8.334 | 3/8" | 2-1/2" | 7/8" | 43.98 | 42.06 | 40.15 | 38.24 |
| 16217 | 17217 | 18217 | .3438 | 11/32" | 8.733 | 3/8" | 2-1/2" | 7/8" | 43.98 | 42.06 | 40.15 | 38.24 |
| 47137 | 38137 | 48137 | .3543 | | 9.000 | 9.0 | 65 | 22 | 40.38 | 38.62 | 36.87 | 35.11 |
| 16227 | 17227 | 18227 | .3594 | 23/64" | 9.129 | 3/8" | 2-1/2" | 7/8" | 43.98 | 42.06 | 40.15 | 38.24 |
| 16237 | 17237 | 18237 | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 7/8" | 38.88 | 37.19 | 35.50 | 33.81 |
| 16247 | 17247 | 18247 | .3906 | 25/64" | 9.921 | 7/16" | 2-3/4" | 7/8" | 53.30 | 50.99 | 48.67 | 46.35 |
| 47147 | 38147 | 48147 | .3937 | | 10.000 | 10.0 | 70 | 25 | 46.94 | 44.90 | 42.86 | 40.82 |
| 16257 | 17257 | 18257 | .4062 | 13/32" | 10.317 | 7/16" | 2-3/4" | 7/8" | 53.30 | 50.99 | 48.67 | 46.35 |
| 16267 | - | 18267 | .4219 | 27/64" | 10.716 | 7/16" | 2-3/4" | 7/8" | 53.30 | 50.99 | 48.67 | 46.35 |
| 47157 | 38157 | 48157 | .4331 | | 11.000 | 11.0 | 75 | 25 | 48.91 | 46.78 | 44.66 | 42.53 |
| 16277 | 17277 | 18277 | .4375 | 7/16" | 11.113 | 7/16" | 2-3/4" | 1" | 47.01 | 44.97 | 42.92 | 40.88 |
| 16287 | 17287 | 18287 | .4531 | 29/64" | 11.509 | 1/2" | 3" | 1" | 72.31 | 69.17 | 66.02 | 62.88 |
| 16297 | 17297 | 18297 | .4688 | 15/32" | 11.908 | 1/2" | 3" | 1" | 72.31 | 69.17 | 66.02 | 62.88 |
| 47167 | 38167 | 48167 | .4724 | | 12.000 | 12.0 | 75 | 25 | 69.13 | 66.12 | 63.12 | 60.11 |
| 16307 | 17307 | 18307 | .4844 | 31/64" | 12.304 | 1/2" | 3" | 1" | 72.31 | 69.17 | 66.02 | 62.88 |
| 16317 | 17317 | 18317 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1" | 66.32 | 63.44 | 60.55 | 57.67 |
| 47177 | 38177 | 48177 | .5512 | | 14.000 | 14.0 | 88 | 32 | 100.57 | 96.20 | 91.82 | 87.45 |
| 16327 | 17327 | 18327 | .5625 | 9/16" | 14.288 | 9/16" | 3-1/2" | 1-1/4" | 96.44 | 92.25 | 88.05 | 83.86 |
| 16337 | 17337 | 18337 | .6250 | 5/8" | 15.875 | 5/8" | 3-1/2" | 1-1/4" | 105.58 | 100.99 | 96.40 | 91.81 |
| 47187 | 38187 | 48187 | .6299 | | 16.000 | 16.0 | 88 | 38 | 110.17 | 105.38 | 100.59 | 95.80 |
| 16347 | 17347 | 18347 | .6875 | 11/16" | 17.463 | 3/4" | 4" | 1-1/2" | 169.14 | 161.79 | 154.43 | 147.08 |
| 47197 | 38197 | 48197 | .7087 | | 18.000 | 18.0 | 100 | 38 | 158.17 | 151.29 | 144.42 | 137.54 |
| 16357 | 17357 | 18357 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-1/2" | 151.41 | 144.83 | 138.24 | 131.66 |
| 47207 | 38207 | 48207 | .7874 | | 20.000 | 20.0 | 100 | 38 | 214.29 | 204.97 | 195.66 | 186.34 |
| 47217 | 38217 | 48217 | .8661 | | 22.000 | 22.0 | 100 | 38 | 235.39 | 225.16 | 214.92 | 204.69 |
| - | 17367 | 18367 | .8750 | 7/8" | 22.225 | 7/8" | 4" | 1-1/2" | 240.57 | 230.11 | 219.65 | 209.19 |
| 47227 | 38227 | 48227 | .9843 | | 25.000 | 25.0 | 100 | 38 | 245.59 | 234.92 | 224.24 | 213.56 |
| 16377 | 17377 | 18377 | 1.000 | 1" | 25.400 | 1" | 4" | 1-1/2" | 258.50 | 247.26 | 236.02 | 224.78 |

# Series 222M, 234M, 334MA

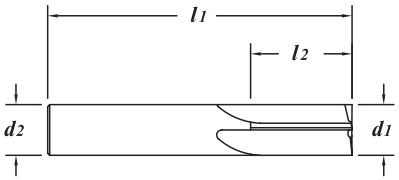



| TOLERANCES | |
|---|---|
| $d_1$ | +.000" –.002" (+.000 –.050mm) |
| $d_2$ | h6 |
| ball radius | +.000" –.001" (+.000 –.025mm) |

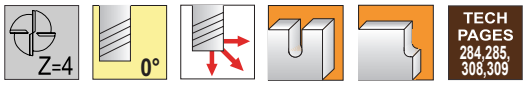
## Standard Length - Straight Flute - Square End

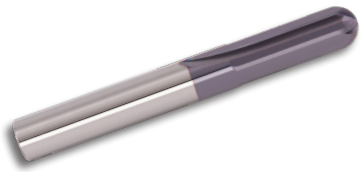
Solid submicron grain carbide end mill - center cutting
For cutting high Rc materials
Helps to hold perpendicularity






| (222M) 2 Flute EDP# | (234M) 4 Flute EDP# | $d_1$ † Diameter Decimal | Diameter | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 81070 | 82070 | .1250 | 1/8" | 3.175 | 1/8" | 1-1/2" | 1/2" | 10.07 | 9.64 | 9.20 | 8.76 |
| 81110 | 82110 | .1875 | 3/16" | 4.763 | 3/16" | 2" | 5/8" | 14.12 | 13.51 | 12.89 | 12.28 |
| 81150 | 82150 | .2500 | 1/4" | 6.350 | 1/4" | 2-1/2" | 3/4" | 17.03 | 16.29 | 15.55 | 14.81 |
| 81190 | 82190 | .3125 | 5/16" | 7.938 | 5/16" | 2-1/2" | 7/8" | 23.87 | 22.84 | 21.80 | 20.76 |
| 81230 | 82230 | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 7/8" | 29.74 | 28.45 | 27.15 | 25.86 |
| 81270 | 82270 | .4375 | 7/16" | 11.113 | 7/16" | 2-3/4" | 1" | 36.29 | 34.72 | 33.14 | 31.56 |
| 81310 | 82310 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1" | 47.60 | 45.53 | 43.46 | 41.39 |
| 81330 | 82330 | .6250 | 5/8" | 15.875 | 5/8" | 3-1/2" | 1-1/4" | 91.87 | 87.88 | 83.88 | 79.89 |
| 81350 | 82350 | .7500 | 3/4" | 19.050 | 3/4" | 4" | 1-1/2" | 134.69 | 128.83 | 122.98 | 117.12 |
| 81370 | 82370 | 1.000 | 1" | 25.400 | 1" | 4" | 1-1/2" | 221.62 | 211.98 | 202.35 | 192.71 |

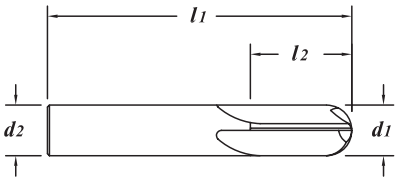


## Standard Length - Straight Flute - Ball End

**TiALN Coating**

Solid submicron grain carbide end mill - center cutting
For cutting high Rc materials
Helps to hold perpendicularity



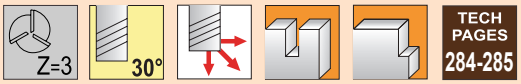

| (334MA) 4 Flute EDP# | $d_1$ † Diameter Decimal | Diameter | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|
| 84077 | .1250 | 1/8" | 3.175 | 1/8" | 1-1/2" | 1/2" | 14.89 | 14.25 | 13.60 | 12.95 |
| 84115 | .1875 | 3/16" | 4.763 | 3/16" | 2" | 5/8" | 19.02 | 18.19 | 17.37 | 16.54 |
| 84157 | .2500 | 1/4" | 6.350 | 1/4" | 2-1/2" | 3/4" | 25.19 | 24.09 | 23.00 | 21.90 |
| 84237 | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 7/8" | 40.01 | 38.27 | 36.53 | 34.79 |





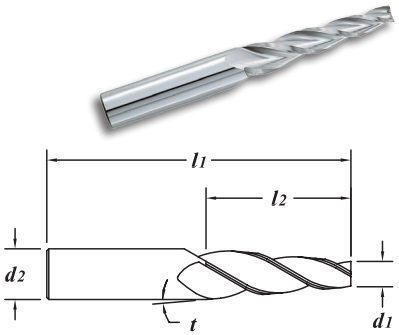
† *Metric equivalents are for reference only*

| TOLERANCES | |
|---|---|
| $d_1$ | +.003" –.000" (+.075 –.000mm) |
| $d_2$ | h6 |

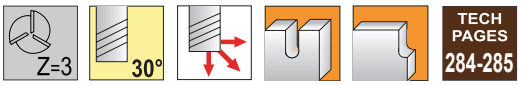



## Standard Length - Tapered - Square End

Solid submicron grain carbide end mill - center cutting
Excellent for holding draft angles in mold and die applications



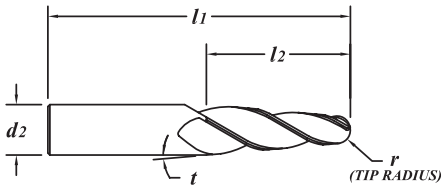

| (273M) EDP# | $d_2$ Shank Diameter | $t$ Taper Per Side | $d_1$ † Tip Diameter Decimal | Tip Diameter Metric | $l_1$ Overall Length | $l_2$ Flute Length | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|
| 49010 | 1/4" | 1° | .1250 | 3.175 | 3" | 1-1/2" | 33.01 | 31.57 | 30.14 | 28.70 |
| 49020 | 1/4" | 1° 30′ | .1250 | 3.175 | 3" | 1-1/2" | 33.01 | 31.57 | 30.14 | 28.70 |
| 49030 | 1/4" | 2° | .1250 | 3.175 | 3" | 1" | 33.01 | 31.57 | 30.14 | 28.70 |
| 49040 | 1/4" | 3° | .1250 | 3.175 | 3" | 1-1/4" | 33.01 | 31.57 | 30.14 | 28.70 |
| 49050 | 1/4" | 5° | .1250 | 3.175 | 3" | 3/4" | 33.01 | 31.57 | 30.14 | 28.70 |
| 49060 | 1/4" | 7° | .1250 | 3.175 | 3" | 1/2" | 33.01 | 31.57 | 30.14 | 28.70 |
| 49070 | 3/8" | 1° | .1875 | 4.763 | 3-1/2" | 1-3/4" | 49.58 | 47.42 | 45.27 | 43.11 |
| 49080 | 3/8" | 1° 30′ | .1875 | 4.763 | 3-1/2" | 1-3/4" | 49.58 | 47.42 | 45.27 | 43.11 |
| 49090 | 3/8" | 2° | .1875 | 4.763 | 3-1/2" | 1-3/4" | 49.58 | 47.42 | 45.27 | 43.11 |
| 49100 | 3/8" | 3° | .1562 | 3.967 | 3-1/2" | 1-3/4" | 49.58 | 47.42 | 45.27 | 43.11 |
| 49110 | 3/8" | 5° | .1250 | 3.175 | 3-1/2" | 1-1/2" | 49.58 | 47.42 | 45.27 | 43.11 |
| 49120 | 3/8" | 7° | .1562 | 3.967 | 3-1/2" | 1" | 49.58 | 47.42 | 45.27 | 43.11 |
| 49130 | 1/2" | 3° | .2500 | 6.350 | 4" | 2" | 68.29 | 65.32 | 62.35 | 59.38 |
| 49140 | 1/2" | 5° | .2500 | 6.350 | 4" | 1-1/2" | 68.29 | 65.32 | 62.35 | 59.38 |
| 49150 | 1/2" | 7° | .1875 | 4.763 | 4" | 1-5/16" | 68.29 | 65.32 | 62.35 | 59.38 |




## Standard Length - Tapered - Ball End

Solid submicron grain carbide end mill - center cutting
Excellent for holding draft angles in mold and die applications
Radius tolerance +.003" –.000" (+.075mm –.000mm)

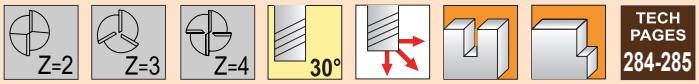





| (373M) EDP# | $d_2$ Shank Diameter | $t$ Taper Per Side | $r$ † Tip Radius Decimal | Tip Radius Metric | $l_1$ Overall Length | $l_2$ Flute Length | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|
| 50010 | 1/4" | 1° | .0620 | 1.575 | 3" | 1-1/2" | 36.62 | 35.02 | 33.43 | 31.84 |
| 50020 | 1/4" | 1° 30′ | .0620 | 1.575 | 3" | 1-1/2" | 36.62 | 35.02 | 33.43 | 31.84 |
| 50030 | 1/4" | 2° | .0620 | 1.575 | 3" | 1" | 36.62 | 35.02 | 33.43 | 31.84 |
| 50040 | 1/4" | 3° | .0620 | 1.575 | 3" | 1-1/4" | 36.62 | 35.02 | 33.43 | 31.84 |
| 50050 | 1/4" | 5° | .0620 | 1.575 | 3" | 3/4" | 36.62 | 35.02 | 33.43 | 31.84 |
| 50060 | 1/4" | 7° | .0620 | 1.575 | 3" | 1/2" | 36.62 | 35.02 | 33.43 | 31.84 |
| 50070 | 3/8" | 1° | .0930 | 2.362 | 3-1/2" | 1-3/4" | 55.05 | 52.66 | 50.26 | 47.87 |
| 50080 | 3/8" | 1° 30′ | .0930 | 2.362 | 3-1/2" | 1-3/4" | 55.05 | 52.66 | 50.26 | 47.87 |
| 50090 | 3/8" | 2° | .0930 | 2.362 | 3-1/2" | 1-3/4" | 55.05 | 52.66 | 50.26 | 47.87 |
| 50100 | 3/8" | 3° | .0780 | 1.981 | 3-1/2" | 1-3/4" | 55.05 | 52.66 | 50.26 | 47.87 |
| 50110 | 3/8" | 5° | .0620 | 1.575 | 3-1/2" | 1-1/2" | 55.05 | 52.66 | 50.26 | 47.87 |
| 50120 | 3/8" | 7° | .0780 | 1.981 | 3-1/2" | 1" | 55.05 | 52.66 | 50.26 | 47.87 |
| 50130 | 1/2" | 3° | .1250 | 3.175 | 4" | 2" | 78.50 | 75.09 | 71.67 | 68.26 |
| 50140 | 1/2" | 5° | .1250 | 3.175 | 4" | 1-1/2" | 78.50 | 75.09 | 71.67 | 68.26 |
| 50150 | 1/2" | 7° | .0930 | 2.362 | 4" | 1-5/16" | 78.50 | 75.09 | 71.67 | 68.26 |

# Series 620M, 623M, 630M, 640M, 643M, 650M

.1181" - .3150"
(3.000mm - 8.000mm)




TECH PAGES 284-285

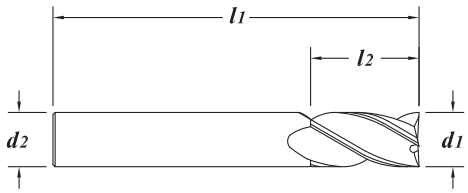
**TOLERANCES**

| | |
|---|---|
| $d_1$ | +.000" –.002" (+.000 –.050mm) |
| $d_2$ | h6 |

## Extra Length

Solid submicron grain carbide end mill - center cutting
Extended reach
Can be modified with a neck within 48 hours
Extremely versatile
TiCN Coating - page 240
TiALN Coating - page 241
Stub Length - page 209
Standard length - page 218






MATERIAL HARDNESS (Rc)
70
35
0

| (620M/640M) 2 Flute EDP# | (623M/643M) 3 Flute EDP# | (630M/650M) 4 Flute EDP# | $d_1$ † Diameter Decimal | $d_1$ † Diameter | $d_1$ † Diameter Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 92010 | 93010 | 94010 | .1181 | | 3.000 | 3.0 | 50 | 16 | 12.72 | 12.17 | 11.61 | 11.06 |
| 92020 | 93020 | 94020 | .1181 | | 3.000 | 3.0 | 75 | 20 | 21.60 | 20.66 | 19.72 | 18.78 |
| 92030 | 93030 | 94030 | .1181 | | 3.000 | 3.0 | 75 | 25 | 21.60 | 20.66 | 19.72 | 18.78 |
| 41010 | 54510 | 42010 | .1250 | 1/8" | 3.175 | 1/8" | 2" | 5/8" | 13.29 | 12.72 | 12.14 | 11.56 |
| 41020 | 54520 | 42020 | .1250 | 1/8" | 3.175 | 1/8" | 3" | 3/4" | 20.53 | 19.64 | 18.74 | 17.85 |
| 41030 | 54530 | 42030 | .1250 | 1/8" | 3.175 | 1/8" | 3" | 1" | 20.53 | 19.64 | 18.74 | 17.85 |
| 92040 | 93040 | 94040 | .1575 | | 4.000 | 4.0 | 50 | 16 | 13.36 | 12.78 | 12.20 | 11.62 |
| 92050 | 93050 | 94050 | .1575 | | 4.000 | 4.0 | 75 | 20 | 22.10 | 21.14 | 20.18 | 19.22 |
| 92060 | 93060 | 94060 | .1575 | | 4.000 | 4.0 | 75 | 25 | 22.10 | 21.14 | 20.18 | 19.22 |
| 41040 | 54540 | 42040 | .1875 | 3/16" | 4.763 | 3/16" | 3" | 1" | 22.64 | 21.66 | 20.67 | 19.69 |
| 41050 | 54550 | 42050 | .1875 | 3/16" | 4.763 | 3/16" | 3" | 1-1/8" | 22.64 | 21.66 | 20.67 | 19.69 |
| 41060 | 54560 | 42060 | .1875 | 3/16" | 4.763 | 3/16" | 4" | 1" | 25.01 | 23.93 | 22.84 | 21.75 |
| 92080 | 93080 | 94080 | .1969 | | 5.000 | 5.0 | 75 | 20 | 23.84 | 22.80 | 21.77 | 20.73 |
| 92090 | 93090 | 94090 | .1969 | | 5.000 | 5.0 | 75 | 25 | 23.84 | 22.80 | 21.77 | 20.73 |
| 92100 | 93100 | 94100 | .2362 | | 6.000 | 6.0 | 75 | 25 | 27.62 | 26.42 | 25.22 | 24.02 |
| 92110 | 93110 | 94110 | .2362 | | 6.000 | 6.0 | 100 | 25 | 29.14 | 27.87 | 26.61 | 25.34 |
| 92120 | 93120 | 94120 | .2362 | | 6.000 | 6.0 | 100 | 32 | 29.14 | 27.87 | 26.61 | 25.34 |
| 92130 | 93130 | 94130 | .2362 | | 6.000 | 6.0 | 150 | 38 | 39.43 | 37.72 | 36.00 | 34.29 |
| 41070 | 54570 | 42070 | .2500 | 1/4" | 6.350 | 1/4" | 3" | 1" | 26.22 | 25.08 | 23.94 | 22.80 |
| 41080 | 54580 | 42080 | .2500 | 1/4" | 6.350 | 1/4" | 4" | 1" | 27.69 | 26.49 | 25.28 | 24.08 |
| 41090 | 54590 | 42090 | .2500 | 1/4" | 6.350 | 1/4" | 4" | 1-1/2" | 27.69 | 26.49 | 25.28 | 24.08 |
| 41100 | 54600 | 42100 | .2500 | 1/4" | 6.350 | 1/4" | 6" | 1-1/2" | 37.44 | 35.82 | 34.19 | 32.56 |
| 41110 | 54610 | 42110 | .3125 | 5/16" | 7.938 | 5/16" | 3" | 1" | 32.36 | 30.95 | 29.55 | 28.14 |
| 41120 | 54620 | 42120 | .3125 | 5/16" | 7.938 | 5/16" | 4" | 1" | 36.13 | 34.56 | 32.99 | 31.42 |
| 41130 | 54630 | 42130 | .3125 | 5/16" | 7.938 | 5/16" | 4" | 1-5/8" | 36.13 | 34.56 | 32.99 | 31.42 |
| 41140 | 54640 | 42140 | .3125 | 5/16" | 7.938 | 5/16" | 6" | 1-1/2" | 53.58 | 51.25 | 48.92 | 46.59 |
| 92140 | 93140 | 94140 | .3150 | | 8.000 | 8.0 | 75 | 25 | 34.09 | 32.60 | 31.12 | 29.64 |
| 92150 | 93150 | 94150 | .3150 | | 8.000 | 8.0 | 100 | 25 | 38.01 | 36.36 | 34.70 | 33.05 |
| 92160 | 93160 | 94160 | .3150 | | 8.000 | 8.0 | 100 | 41 | 38.01 | 36.36 | 34.70 | 33.05 |
| 92170 | 93170 | 94170 | .3150 | | 8.000 | 8.0 | 150 | 50 | 54.95 | 52.56 | 50.17 | 47.78 |



† *Metric equivalents are for reference only*

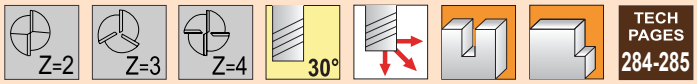
.3750" - 1.250"
(9.525mm - 31.750mm)

| (620M/640M) 2 Flute EDP# | (623M/643M) 3 Flute EDP# | (630M/650M) 4 Flute EDP# | $d_1$ † Diameter Decimal | $d_1$ † Diameter | $d_1$ † Diameter Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 41150 | 54650 | 42150 | .3750 | 3/8" | 9.525 | 3/8" | 3" | 1" | 36.41 | 34.83 | 33.24 | 31.66 |
| 41160 | 54660 | 42160 | .3750 | 3/8" | 9.525 | 3/8" | 4" | 1" | 39.97 | 38.24 | 36.50 | 34.76 |
| 41170 | 54670 | 42170 | .3750 | 3/8" | 9.525 | 3/8" | 4" | 2" | 39.97 | 38.24 | 36.50 | 34.76 |
| 41180 | 54680 | 42180 | .3750 | 3/8" | 9.525 | 3/8" | 6" | 1-1/2" | 58.26 | 55.73 | 53.19 | 50.66 |
| 41190 | 54690 | 42190 | .3750 | 3/8" | 9.525 | 3/8" | 6" | 3" | 58.26 | 55.73 | 53.19 | 50.66 |
| 92180 | 93180 | 94180 | .3937 | | 10.000 | 10.0 | 75 | 25 | 39.53 | 37.81 | 36.09 | 34.37 |
| 92190 | 93190 | 94190 | .3937 | | 10.000 | 10.0 | 100 | 25 | 50.96 | 48.74 | 46.53 | 44.31 |
| 92200 | 93200 | 94200 | .3937 | | 10.000 | 10.0 | 100 | 50 | 50.96 | 48.74 | 46.53 | 44.31 |
| 92210 | 93210 | 94210 | .3937 | | 10.000 | 10.0 | 150 | 38 | 67.03 | 64.12 | 61.20 | 58.29 |
| 92220 | 93220 | 94220 | .3937 | | 10.000 | 10.0 | 150 | 75 | 67.03 | 64.12 | 61.20 | 58.29 |
| 41200 | 54700 | 42200 | .4375 | 7/16" | 11.113 | 7/16" | 4" | 1" | 55.03 | 52.64 | 50.24 | 47.85 |
| 41210 | 54710 | 42210 | .4375 | 7/16" | 11.113 | 7/16" | 4" | 2" | 55.03 | 52.64 | 50.24 | 47.85 |
| 41220 | 54720 | 42220 | .4375 | 7/16" | 11.113 | 7/16" | 6" | 1-1/2" | 73.15 | 69.97 | 66.79 | 63.61 |
| 41230 | 54730 | 42230 | .4375 | 7/16" | 11.113 | 7/16" | 6" | 3" | 73.15 | 69.97 | 66.79 | 63.61 |
| 92230 | 93230 | 94230 | .4724 | | 12.000 | 12.0 | 100 | 25 | 62.07 | 59.37 | 56.67 | 53.97 |
| 92240 | 93240 | 94240 | .4724 | | 12.000 | 12.0 | 100 | 50 | 62.07 | 59.37 | 56.67 | 53.97 |
| 92250 | 93250 | 94250 | .4724 | | 12.000 | 12.0 | 150 | 50 | 84.63 | 80.95 | 77.27 | 73.59 |
| 92260 | 93260 | 94260 | .4724 | | 12.000 | 12.0 | 150 | 75 | 84.63 | 80.95 | 77.27 | 73.59 |
| 41240 | 54740 | 42240 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 1" | 58.54 | 55.99 | 53.45 | 50.90 |
| 41250 | 54750 | 42250 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 2" | 58.54 | 55.99 | 53.45 | 50.90 |
| 41260 | 54760 | 42260 | .5000 | 1/2" | 12.700 | 1/2" | 6" | 1-1/2" | 84.63 | 80.95 | 77.27 | 73.59 |
| 41270 | 54770 | 42270 | .5000 | 1/2" | 12.700 | 1/2" | 6" | 3" | 84.63 | 80.95 | 77.27 | 73.59 |
| 92270 | 93270 | 94270 | .5512 | | 14.000 | 14.0 | 100 | 25 | 85.20 | 81.50 | 77.79 | 74.09 |
| 92280 | 93280 | 94280 | .5512 | | 14.000 | 14.0 | 100 | 50 | 85.20 | 81.50 | 77.79 | 74.09 |
| 92290 | 93290 | 94290 | .5512 | | 14.000 | 14.0 | 150 | 50 | 111.09 | 106.26 | 101.43 | 96.60 |
| 92300 | 93300 | 94300 | .5512 | | 14.000 | 14.0 | 150 | 75 | 111.09 | 106.26 | 101.43 | 96.60 |
| 41280 | 54780 | 42280 | .5625 | 9/16" | 14.288 | 9/16" | 6" | 2" | 111.10 | 106.27 | 101.44 | 96.61 |
| 41290 | 54790 | 42290 | .5625 | 9/16" | 14.288 | 9/16" | 6" | 3" | 111.10 | 106.27 | 101.44 | 96.61 |
| 41300 | 54800 | 42300 | .6250 | 5/8" | 15.875 | 5/8" | 6" | 2" | 120.62 | 115.38 | 110.13 | 104.89 |
| 41310 | 54810 | 42310 | .6250 | 5/8" | 15.875 | 5/8" | 6" | 3" | 120.62 | 115.38 | 110.13 | 104.89 |
| 92310 | 93310 | 94310 | .6299 | | 16.000 | 16.0 | 150 | 50 | 120.62 | 115.38 | 110.13 | 104.89 |
| 92320 | 93320 | 94320 | .6299 | | 16.000 | 16.0 | 150 | 75 | 120.62 | 115.38 | 110.13 | 104.89 |
| 92330 | 93330 | 94330 | .7087 | | 18.000 | 18.0 | 150 | 50 | 181.37 | 173.48 | 165.60 | 157.71 |
| 92340 | 93340 | 94340 | .7087 | | 18.000 | 18.0 | 150 | 75 | 181.37 | 173.48 | 165.60 | 157.71 |
| 41320 | 54820 | 42320 | .7500 | 3/4" | 19.050 | 3/4" | 6" | 2" | 192.17 | 183.81 | 175.46 | 167.10 |
| 41330 | 54830 | 42330 | .7500 | 3/4" | 19.050 | 3/4" | 6" | 3" | 192.17 | 183.81 | 175.46 | 167.10 |
| 92350 | 93350 | 94350 | .7874 | | 20.000 | 20.0 | 150 | 50 | 202.43 | 193.63 | 184.83 | 176.03 |
| 92360 | 93360 | 94360 | .7874 | | 20.000 | 20.0 | 150 | 75 | 202.43 | 193.63 | 184.83 | 176.03 |
| 92370 | 93370 | 94370 | .9843 | | 25.000 | 25.0 | 150 | 50 | 311.94 | 298.38 | 284.81 | 271.25 |
| - | 93380 | 94380 | .9843 | | 25.000 | 25.0 | 150 | 75 | 311.94 | 298.38 | 284.81 | 271.25 |
| 41340 | 54840 | 42340 | 1.000 | 1" | 25.400 | 1" | 6" | 2" | 326.69 | 312.49 | 298.28 | 284.08 |
| 41350 | 54850 | 42350 | 1.000 | 1" | 25.400 | 1" | 6" | 3" | 326.69 | 312.49 | 298.28 | 284.08 |
| - | - | 42360 | 1.000 | 1" | 25.400 | 1" | 6" | 4" | 343.87 | 328.92 | 313.97 | 299.02 |
| - | - | 42390 | 1.250 | 1-1/4" | 31.750 | 1-1/4" | 6" | 3" | 693.11 | 662.97 | 632.84 | 602.70 |



# Series 620MC, 623MC, 630MC

| TOLERANCES | |
|---|---|
| $d_1$ | +.000" –.002" (+.000 –.050mm) |
| $d_2$ | h6 |

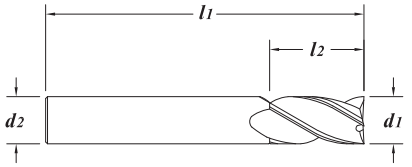



## Extra Length

### TiCN Coating

Solid submicron grain carbide end mill - center cutting
Extended reach
Improved abrasion resistance and lubricity
Can be modified with a neck within 48 hours
Extremely versatile
Bright Finish - page 238
TiALN Coating - page 241
Standard length - page 221







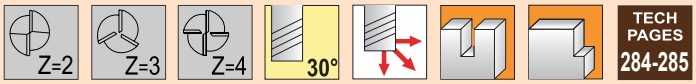

| (620MC) 2 Flute EDP# | (623MC) 3 Flute EDP# | (630MC) 4 Flute EDP# | $d_1$ † Diameter Decimal | $d_1$ † Diameter | $d_1$ † Diameter Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 41014 | 54514 | 42014 | .1250 | 1/8" | 3.175 | 1/8" | 2" | 5/8" | 15.66 | 14.98 | 14.30 | 13.62 |
| 41024 | 54524 | 42024 | .1250 | 1/8" | 3.175 | 1/8" | 3" | 3/4" | 23.40 | 22.39 | 21.37 | 20.35 |
| 41034 | 54534 | 42034 | .1250 | 1/8" | 3.175 | 1/8" | 3" | 1" | 23.40 | 22.39 | 21.37 | 20.35 |
| 41044 | 54544 | 42044 | .1875 | 3/16" | 4.763 | 3/16" | 3" | 1" | 25.98 | 24.85 | 23.72 | 22.59 |
| 41054 | 54554 | 42054 | .1875 | 3/16" | 4.763 | 3/16" | 3" | 1-1/8" | 25.98 | 24.85 | 23.72 | 22.59 |
| 41064 | 54564 | 42064 | .1875 | 3/16" | 4.763 | 3/16" | 4" | 1" | 28.87 | 27.61 | 26.36 | 25.10 |
| 41074 | 54574 | 42074 | .2500 | 1/4" | 6.350 | 1/4" | 3" | 1" | 31.06 | 29.71 | 28.36 | 27.01 |
| 41084 | 54584 | 42084 | .2500 | 1/4" | 6.350 | 1/4" | 4" | 1" | 32.90 | 31.47 | 30.04 | 28.61 |
| 41094 | 54594 | 42094 | .2500 | 1/4" | 6.350 | 1/4" | 4" | 1-1/2" | 32.90 | 31.47 | 30.04 | 28.61 |
| 41104 | 54604 | 42104 | .2500 | 1/4" | 6.350 | 1/4" | 6" | 1-1/2" | 46.47 | 44.45 | 42.43 | 40.41 |
| 41114 | 54614 | 42114 | .3125 | 5/16" | 7.938 | 5/16" | 3" | 1" | 38.81 | 37.13 | 35.44 | 33.75 |
| 41124 | 54624 | 42124 | .3125 | 5/16" | 7.938 | 5/16" | 4" | 1" | 44.11 | 42.20 | 40.28 | 38.36 |
| 41134 | 54634 | 42134 | .3125 | 5/16" | 7.938 | 5/16" | 4" | 1-5/8" | 44.11 | 42.20 | 40.28 | 38.36 |
| 41144 | 54644 | 42144 | .3125 | 5/16" | 7.938 | 5/16" | 6" | 1-1/2" | 64.37 | 61.57 | 58.77 | 55.97 |
| 41154 | 54654 | 42154 | .3750 | 3/8" | 9.525 | 3/8" | 3" | 1" | 42.85 | 40.99 | 39.12 | 37.26 |
| 41164 | 54664 | 42164 | .3750 | 3/8" | 9.525 | 3/8" | 4" | 1" | 48.01 | 45.93 | 43.84 | 41.75 |
| 41174 | 54674 | 42174 | .3750 | 3/8" | 9.525 | 3/8" | 4" | 2" | 48.01 | 45.93 | 43.84 | 41.75 |
| 41184 | 54684 | 42184 | .3750 | 3/8" | 9.525 | 3/8" | 6" | 1-1/2" | 69.07 | 66.07 | 63.06 | 60.06 |
| 41194 | 54694 | 42194 | .3750 | 3/8" | 9.523 | 3/8" | 6" | 3" | 69.07 | 66.07 | 63.06 | 60.06 |
| 41204 | 54704 | 42204 | .4375 | 7/16" | 11.113 | 7/16" | 4" | 1" | 64.68 | 61.86 | 59.05 | 56.24 |
| 41214 | 54714 | 42214 | .4375 | 7/16" | 11.113 | 7/16" | 4" | 2" | 64.68 | 61.86 | 59.05 | 56.24 |
| 41224 | 54724 | 42224 | .4375 | 7/16" | 11.113 | 7/16" | 6" | 1-1/2" | 86.83 | 83.05 | 79.28 | 75.50 |
| - | 54734 | 42234 | .4375 | 7/16" | 11.113 | 7/16" | 6" | 3" | 86.83 | 83.05 | 79.28 | 75.50 |
| 41244 | 54744 | 42244 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 1" | 68.17 | 65.21 | 62.24 | 59.28 |
| 41254 | 54754 | 42254 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 2" | 68.17 | 65.21 | 62.24 | 59.28 |
| 41264 | 54764 | 42264 | .5000 | 1/2" | 12.700 | 1/2" | 6" | 1-1/2" | 98.30 | 94.03 | 89.75 | 85.48 |
| 41274 | 54774 | 42274 | .5000 | 1/2" | 12.700 | 1/2" | 6" | 3" | 98.30 | 94.03 | 89.75 | 85.48 |
| 41284 | 54784 | 42284 | .5625 | 9/16" | 14.288 | 9/16" | 6" | 2" | 127.97 | 122.41 | 116.84 | 111.28 |
| 41294 | - | 42294 | .5625 | 9/16" | 14.288 | 9/16" | 6" | 3" | 127.97 | 122.41 | 116.84 | 111.28 |
| 41304 | 54804 | 42304 | .6250 | 5/8" | 15.875 | 5/8" | 6" | 2" | 137.49 | 131.52 | 125.54 | 119.56 |
| 41314 | 54814 | 42314 | .6250 | 5/8" | 15.875 | 5/8" | 6" | 3" | 137.49 | 131.52 | 125.54 | 119.56 |
| 41324 | 54824 | 42324 | .7500 | 3/4" | 19.050 | 3/4" | 6" | 2" | 211.43 | 202.24 | 193.04 | 183.85 |
| 41334 | 54834 | 42334 | .7500 | 3/4" | 19.050 | 3/4" | 6" | 3" | 211.43 | 202.24 | 193.04 | 183.85 |
| 41344 | 54844 | 42344 | 1.000 | 1" | 25.400 | 1" | 6" | 2" | 353.97 | 338.58 | 323.19 | 307.80 |
| 41354 | 54854 | 42354 | 1.000 | 1" | 25.400 | 1" | 6" | 3" | 353.97 | 338.58 | 323.19 | 307.80 |
| - | - | 42364 | 1.000 | 1" | 25.400 | 1" | 6" | 4" | 371.14 | 355.00 | 338.87 | 322.73 |
| - | - | 42394 | 1.250 | 1-1/4" | 31.750 | 1-1/4" | 6" | 3" | 730.89 | 699.12 | 667.34 | 635.56 |



† *Metric equivalents are for reference only*

| TOLERANCES | |
|---|---|
| $d_1$ | +.000" –.002" (+.000 –.050mm) |
| $d_2$ | h6 |

# Series 620MA, 623MA, 630MA, 640MA, 643MA, 650MA




TECH PAGES 284-285

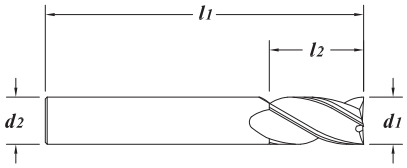
.1181" - .3150"
(3.000mm - 8.000mm)

## Extra Length

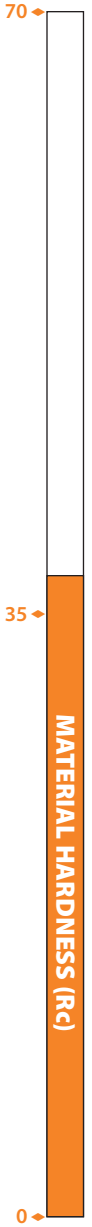
### TiALN Coating

Solid submicron grain carbide end mill - center cutting
Extended reach
Dry or semi-dry machining
Can be modified with a neck within 48 hours
Extremely versatile
Bright Finish - page 238
TiCN Coating - page 240
Stub Length - page 211
Standard length - page 222






| (620MA/640MA) 2 Flute EDP# | (623MA/643MA) 3 Flute EDP# | (630MA/650MA) 4 Flute EDP# | $d_1$ † Diameter Decimal | | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 92017 | 93017 | 94017 | .1181 | | 3.000 | 3.0 | 50 | 16 | 14.85 | 14.20 | 13.56 | 12.91 |
| 92027 | 93027 | 94027 | .1181 | | 3.000 | 3.0 | 75 | 20 | 24.29 | 23.23 | 22.18 | 21.12 |
| 92037 | 93037 | 94037 | .1181 | | 3.000 | 3.0 | 75 | 25 | 24.29 | 23.23 | 22.18 | 21.12 |
| 41017 | 54517 | 42017 | .1250 | 1/8" | 3.175 | 1/8" | 2" | 5/8" | 16.01 | 15.31 | 14.62 | 13.92 |
| 41027 | 54527 | 42027 | .1250 | 1/8" | 3.175 | 1/8" | 3" | 3/4" | 23.82 | 22.78 | 21.75 | 20.71 |
| 41037 | 54537 | 42037 | .1250 | 1/8" | 3.175 | 1/8" | 3" | 1" | 23.82 | 22.78 | 21.75 | 20.71 |
| 92047 | 93047 | 94047 | .1575 | | 4.000 | 4.0 | 50 | 16 | 16.05 | 15.36 | 14.66 | 13.96 |
| 92057 | 93057 | 94057 | .1575 | | 4.000 | 4.0 | 75 | 20 | 26.28 | 25.14 | 23.99 | 22.85 |
| 92067 | 93067 | 94067 | .1575 | | 4.000 | 4.0 | 75 | 25 | 26.28 | 25.14 | 23.99 | 22.85 |
| 41047 | 54547 | 42047 | .1875 | 3/16" | 4.763 | 3/16" | 3" | 1" | 26.84 | 25.67 | 24.51 | 23.34 |
| 41057 | 54557 | 42057 | .1875 | 3/16" | 4.763 | 3/16" | 3" | 1-1/8" | 26.84 | 25.67 | 24.51 | 23.34 |
| 41067 | 54567 | 42067 | .1875 | 3/16" | 4.763 | 3/16" | 4" | 1" | 29.90 | 28.60 | 27.30 | 26.00 |
| 92087 | 93087 | 94087 | .1969 | | 5.000 | 5.0 | 75 | 20 | 29.37 | 28.09 | 26.82 | 25.54 |
| 92097 | 93097 | 94097 | .1969 | | 5.000 | 5.0 | 75 | 25 | 29.37 | 28.09 | 26.82 | 25.54 |
| 92107 | 93107 | 94107 | .2362 | | 6.000 | 6.0 | 75 | 25 | 33.15 | 31.71 | 30.27 | 28.83 |
| 92117 | 93117 | 94117 | .2362 | | 6.000 | 6.0 | 100 | 25 | 35.65 | 34.10 | 32.55 | 31.00 |
| 92127 | 93127 | 94127 | .2362 | | 6.000 | 6.0 | 100 | 32 | 35.65 | 34.10 | 32.55 | 31.00 |
| 92137 | 93137 | 94137 | .2362 | | 6.000 | 6.0 | 150 | 38 | 48.61 | 46.50 | 44.38 | 42.27 |
| 41077 | 54577 | 42077 | .2500 | 1/4" | 6.350 | 1/4" | 3" | 1" | 31.79 | 30.40 | 29.02 | 27.64 |
| 41087 | 54587 | 42087 | .2500 | 1/4" | 6.350 | 1/4" | 4" | 1" | 34.19 | 32.70 | 31.22 | 29.73 |
| 41097 | 54597 | 42097 | .2500 | 1/4" | 6.350 | 1/4" | 4" | 1-1/2" | 34.19 | 32.70 | 31.22 | 29.73 |
| 41107 | 54607 | 42107 | .2500 | 1/4" | 6.350 | 1/4" | 6" | 1-1/2" | 46.63 | 44.61 | 42.58 | 40.55 |
| 41117 | 54617 | 42117 | .3125 | 5/16" | 7.938 | 5/16" | 3" | 1" | 40.69 | 38.92 | 37.15 | 35.38 |
| 41127 | 54627 | 42127 | .3125 | 5/16" | 7.938 | 5/16" | 4" | 1" | 46.68 | 44.65 | 42.62 | 40.59 |
| 41137 | 54637 | 42137 | .3125 | 5/16" | 7.938 | 5/16" | 4" | 1-5/8" | 46.68 | 44.65 | 42.62 | 40.59 |
| 41147 | 54647 | 42147 | .3125 | 5/16" | 7.938 | 5/16" | 6" | 1-1/2" | 68.05 | 65.09 | 62.13 | 59.17 |
| 92147 | 93147 | 94147 | .3150 | | 8.000 | 8.0 | 75 | 25 | 42.38 | 40.54 | 38.69 | 36.85 |
| 92157 | 93157 | 94157 | .3150 | | 8.000 | 8.0 | 100 | 25 | 48.58 | 46.46 | 44.35 | 42.24 |
| 92167 | 93167 | 94167 | .3150 | | 8.000 | 8.0 | 100 | 41 | 48.58 | 46.46 | 44.35 | 42.24 |
| 92177 | 93177 | 94177 | .3150 | | 8.000 | 8.0 | 150 | 50 | 69.41 | 66.40 | 63.38 | 60.36 |




*continued* →

# Series 620MA, 623MA, 630MA, 640MA, 643MA, 650MA *(continued)*

.3750" - 1.250"
(9.525mm - 31.750mm)

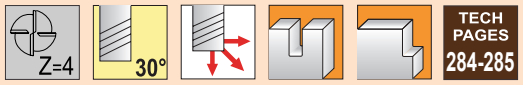
| (620MA/640MA) 2 Flute EDP# | (623MA/643MA) 3 Flute EDP# | (630MA/650MA) 4 Flute EDP# | $d_1$ † Diameter Decimal | | $d_1$ † Diameter Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 41157 | 54657 | 42157 | .3750 | 3/8" | 9.525 | 3/8" | 3" | 1" | 44.75 | 42.80 | 40.86 | 38.91 |
| 41167 | 54667 | 42167 | .3750 | 3/8" | 9.525 | 3/8" | 4" | 1" | 50.55 | 48.36 | 46.16 | 43.96 |
| 41177 | 54677 | 42177 | .3750 | 3/8" | 9.525 | 3/8" | 4" | 2" | 50.55 | 48.36 | 46.16 | 43.96 |
| 41187 | 54687 | 42187 | .3750 | 3/8" | 9.525 | 3/8" | 6" | 1-1/2" | 72.73 | 69.56 | 66.40 | 63.24 |
| 41197 | 54697 | 42197 | .3750 | 3/8" | 9.525 | 3/8" | 6" | 3" | 72.73 | 69.56 | 66.40 | 63.24 |
| 92187 | 93187 | 94187 | .3937 | | 10.000 | 10.0 | 75 | 25 | 48.98 | 46.85 | 44.72 | 42.59 |
| 92197 | 93197 | 94197 | .3937 | | 10.000 | 10.0 | 100 | 25 | 63.19 | 60.45 | 57.70 | 54.95 |
| 92207 | 93207 | 94207 | .3937 | | 10.000 | 10.0 | 100 | 50 | 63.19 | 60.45 | 57.70 | 54.95 |
| 92217 | 93217 | 94217 | .3937 | | 10.000 | 10.0 | 150 | 38 | 84.24 | 80.58 | 76.91 | 73.25 |
| 92227 | 93227 | 94227 | .3937 | | 10.000 | 10.0 | 150 | 75 | 84.24 | 80.58 | 76.91 | 73.25 |
| 41207 | 54707 | 42207 | .4375 | 7/16" | 11.113 | 7/16" | 4" | 1" | 67.26 | 64.34 | 61.41 | 58.49 |
| 41217 | 54717 | 42217 | .4375 | 7/16" | 11.113 | 7/16" | 4" | 2" | 67.26 | 64.34 | 61.41 | 58.49 |
| 41227 | 54727 | 42227 | .4375 | 7/16" | 11.113 | 7/16" | 6" | 1-1/2" | 90.37 | 86.44 | 82.51 | 78.58 |
| 41237 | 54737 | 42237 | .4375 | 7/16" | 11.113 | 7/16" | 6" | 3" | 90.37 | 86.44 | 82.51 | 78.58 |
| 92237 | 93237 | 94237 | .4724 | | 12.000 | 12.0 | 100 | 25 | 74.29 | 71.06 | 67.83 | 64.60 |
| 92247 | 93247 | 94247 | .4724 | | 12.000 | 12.0 | 100 | 50 | 74.29 | 71.06 | 67.83 | 64.60 |
| 92257 | 93257 | 94257 | .4724 | | 12.000 | 12.0 | 150 | 50 | 101.83 | 97.41 | 92.98 | 88.55 |
| 92267 | 93267 | 94267 | .4724 | | 12.000 | 12.0 | 150 | 75 | 101.83 | 97.41 | 92.98 | 88.55 |
| 41247 | 54747 | 42247 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 1" | 70.77 | 67.69 | 64.62 | 61.54 |
| 41257 | 54757 | 42257 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 2" | 70.77 | 67.69 | 64.62 | 61.54 |
| 41267 | 54767 | 42267 | .5000 | 1/2" | 12.700 | 1/2" | 6" | 1-1/2" | 101.83 | 97.41 | 92.98 | 88.55 |
| 41277 | 54777 | 42277 | .5000 | 1/2" | 12.700 | 1/2" | 6" | 3" | 101.83 | 97.41 | 92.98 | 88.55 |
| 92277 | 93277 | 94277 | .5512 | | 14.000 | 14.0 | 100 | 25 | 98.88 | 94.58 | 90.28 | 85.98 |
| 92287 | 93287 | 94287 | .5512 | | 14.000 | 14.0 | 100 | 50 | 98.88 | 94.58 | 90.28 | 85.98 |
| - | 93297 | 94297 | .5512 | | 14.000 | 14.0 | 150 | 50 | 131.39 | 125.68 | 119.96 | 114.25 |
| 92307 | 93307 | 94307 | .5512 | | 14.000 | 14.0 | 150 | 75 | 131.39 | 125.68 | 119.96 | 114.25 |
| 41287 | 54787 | 42287 | .5625 | 9/16" | 14.288 | 9/16" | 6" | 2" | 131.39 | 125.68 | 119.96 | 114.25 |
| - | 54797 | 42297 | .5625 | 9/16" | 14.288 | 9/16" | 6" | 3" | 131.39 | 125.68 | 119.96 | 114.25 |
| 41307 | 54807 | 42307 | .6250 | 5/8" | 15.875 | 5/8" | 6" | 2" | 140.93 | 134.81 | 128.68 | 122.55 |
| 41317 | 54817 | 42317 | .6250 | 5/8" | 15.875 | 5/8" | 6" | 3" | 140.93 | 134.81 | 128.68 | 122.55 |
| 92317 | 93317 | 94317 | .6299 | | 16.000 | 16.0 | 150 | 50 | 140.93 | 134.81 | 128.68 | 122.55 |
| 92327 | 93327 | 94327 | .6299 | | 16.000 | 16.0 | 150 | 75 | 140.93 | 134.81 | 128.68 | 122.55 |
| - | - | 94337 | .7087 | | 18.000 | 18.0 | 150 | 50 | 204.87 | 195.97 | 187.06 | 178.15 |
| - | 93347 | 94347 | .7087 | | 18.000 | 18.0 | 150 | 75 | 204.87 | 195.97 | 187.06 | 178.15 |
| 41327 | 54827 | 42327 | .7500 | 3/4" | 19.050 | 3/4" | 6" | 2" | 215.67 | 206.29 | 196.92 | 187.54 |
| 41337 | 54837 | 42337 | .7500 | 3/4" | 19.050 | 3/4" | 6" | 3" | 215.67 | 206.29 | 196.92 | 187.54 |
| 92357 | 93357 | 94357 | .7874 | | 20.000 | 20.0 | 150 | 50 | 232.97 | 222.84 | 212.71 | 202.58 |
| 92367 | 93367 | 94367 | .7874 | | 20.000 | 20.0 | 150 | 75 | 232.97 | 222.84 | 212.71 | 202.58 |
| - | 93377 | 94377 | .9843 | | 25.000 | 25.0 | 150 | 50 | 342.46 | 327.57 | 312.68 | 297.79 |
| 92387 | 93387 | 94387 | .9843 | | 25.000 | 25.0 | 150 | 75 | 342.46 | 327.57 | 312.68 | 297.79 |
| 41347 | 54847 | 42347 | 1.000 | 1" | 25.400 | 1" | 6" | 2" | 357.20 | 341.67 | 326.14 | 310.61 |
| 41357 | 54857 | 42357 | 1.000 | 1" | 25.400 | 1" | 6" | 3" | 357.20 | 341.67 | 326.14 | 310.61 |
| - | - | 42367 | 1.000 | 1" | 25.400 | 1" | 6" | 4" | 374.39 | 358.12 | 341.84 | 325.56 |
| - | - | 42397 | 1.250 | 1-1/4" | 31.750 | 1-1/4" | 6" | 3" | 732.22 | 700.38 | 668.55 | 636.71 |

MATERIAL HARDNESS (Rc)
70
35
0



† *Metric equivalents are for reference only*

| TOLERANCES | |
|---|---|
| $d_1$ | +.000" –.002" (+.000 –.050mm) |
| $d_2$ | h6 |
| $r$ | +.001" –.001" (+.025 –.025mm) |




TECH PAGES 284-285

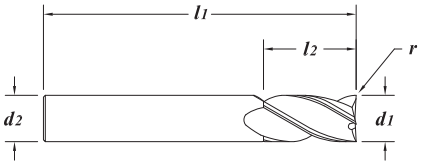
## Series 630R

.1250" - .3125"
(3.175mm - 7.938mm)

## Extra Length - Corner Radius

Solid submicron grain carbide end mill - center cutting
Extended reach
For stronger corners and part radius
Can be modified with a neck within 48 hours
Extremely versatile
TiALN Coating - page 246
Stub length - page 212
Standard length - page 224






| EDP# | $d_1$ † Diameter Decimal | Diameter | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | $r$ Corner Radius | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 20100 | .1250 | 1/8" | 3.175 | 1/8" | 3" | 1" | .010" | 24.15 | 23.10 | 22.05 | 21.00 |
| 20110 | .1250 | 1/8" | 3.175 | 1/8" | 3" | 1" | .015" | 24.15 | 23.10 | 22.05 | 21.00 |
| 20120 | .1250 | 1/8" | 3.175 | 1/8" | 3" | 1" | .020" | 24.15 | 23.10 | 22.05 | 21.00 |
| 20130 | .1250 | 1/8" | 3.175 | 1/8" | 3" | 1" | .030" | 24.15 | 23.10 | 22.05 | 21.00 |
| 20140 | .1250 | 1/8" | 3.175 | 1/8" | 3" | 1" | .045" | 24.15 | 23.10 | 22.05 | 21.00 |
| 20150 | .1875 | 3/16" | 4.763 | 3/16" | 3" | 1" | .010" | 26.63 | 25.48 | 24.32 | 23.16 |
| 20160 | .1875 | 3/16" | 4.763 | 3/16" | 3" | 1" | .015" | 26.63 | 25.48 | 24.32 | 23.16 |
| 20170 | .1875 | 3/16" | 4.763 | 3/16" | 3" | 1" | .020" | 26.63 | 25.48 | 24.32 | 23.16 |
| 20180 | .1875 | 3/16" | 4.763 | 3/16" | 3" | 1" | .030" | 26.63 | 25.48 | 24.32 | 23.16 |
| 20190 | .1875 | 3/16" | 4.763 | 3/16" | 3" | 1" | .045" | 26.63 | 25.48 | 24.32 | 23.16 |
| 20200 | .1875 | 3/16" | 4.763 | 3/16" | 3" | 1" | .060" | 26.63 | 25.48 | 24.32 | 23.16 |
| 20210 | .1875 | 3/16" | 4.763 | 3/16" | 4" | 1" | .010" | 28.67 | 27.42 | 26.18 | 24.93 |
| 20220 | .1875 | 3/16" | 4.763 | 3/16" | 4" | 1" | .015" | 28.67 | 27.42 | 26.18 | 24.93 |
| 20230 | .1875 | 3/16" | 4.763 | 3/16" | 4" | 1" | .020" | 28.67 | 27.42 | 26.18 | 24.93 |
| 20240 | .1875 | 3/16" | 4.763 | 3/16" | 4" | 1" | .030" | 28.67 | 27.42 | 26.18 | 24.93 |
| 20250 | .1875 | 3/16" | 4.763 | 3/16" | 4" | 1" | .045" | 28.67 | 27.42 | 26.18 | 24.93 |
| 20260 | .1875 | 3/16" | 4.763 | 3/16" | 4" | 1" | .060" | 28.67 | 27.42 | 26.18 | 24.93 |
| 20270 | .2500 | 1/4" | 6.350 | 1/4" | 3" | 1" | .010" | 30.83 | 29.49 | 28.15 | 26.81 |
| 20280 | .2500 | 1/4" | 6.350 | 1/4" | 3" | 1" | .020" | 30.83 | 29.49 | 28.15 | 26.81 |
| 20290 | .2500 | 1/4" | 6.350 | 1/4" | 3" | 1" | .030" | 30.83 | 29.49 | 28.15 | 26.81 |
| 20300 | .2500 | 1/4" | 6.350 | 1/4" | 3" | 1" | .045" | 30.83 | 29.49 | 28.15 | 26.81 |
| 20310 | .2500 | 1/4" | 6.350 | 1/4" | 3" | 1" | .060" | 30.83 | 29.49 | 28.15 | 26.81 |
| 20320 | .2500 | 1/4" | 6.350 | 1/4" | 4" | 1" | .010" | 32.43 | 31.02 | 29.61 | 28.20 |
| 20330 | .2500 | 1/4" | 6.350 | 1/4" | 4" | 1" | .020" | 32.43 | 31.02 | 29.61 | 28.20 |
| 20340 | .2500 | 1/4" | 6.350 | 1/4" | 4" | 1" | .030" | 32.43 | 31.02 | 29.61 | 28.20 |
| 20350 | .2500 | 1/4" | 6.350 | 1/4" | 4" | 1" | .045" | 32.43 | 31.02 | 29.61 | 28.20 |
| 20360 | .2500 | 1/4" | 6.350 | 1/4" | 4" | 1" | .060" | 32.43 | 31.02 | 29.61 | 28.20 |
| 20370 | .2500 | 1/4" | 6.350 | 1/4" | 6" | 1-1/2" | .010" | 42.17 | 40.34 | 38.50 | 36.67 |
| 20380 | .2500 | 1/4" | 6.350 | 1/4" | 6" | 1-1/2" | .020" | 42.17 | 40.34 | 38.50 | 36.67 |
| 20390 | .2500 | 1/4" | 6.350 | 1/4" | 6" | 1-1/2" | .030" | 42.17 | 40.34 | 38.50 | 36.67 |
| 20400 | .2500 | 1/4" | 6.350 | 1/4" | 6" | 1-1/2" | .045" | 42.17 | 40.34 | 38.50 | 36.67 |
| 20410 | .2500 | 1/4" | 6.350 | 1/4" | 6" | 1-1/2" | .060" | 42.17 | 40.34 | 38.50 | 36.67 |
| 20420 | .3125 | 5/16" | 7.938 | 5/16" | 4" | 1-5/8" | .010" | 42.49 | 40.65 | 38.80 | 36.95 |
| 20430 | .3125 | 5/16" | 7.938 | 5/16" | 4" | 1-5/8" | .020" | 42.49 | 40.65 | 38.80 | 36.95 |
| 20440 | .3125 | 5/16" | 7.938 | 5/16" | 4" | 1-5/8" | .030" | 42.49 | 40.65 | 38.80 | 36.95 |
| 20450 | .3125 | 5/16" | 7.938 | 5/16" | 4" | 1-5/8" | .045" | 42.49 | 40.65 | 38.80 | 36.95 |
| 20460 | .3125 | 5/16" | 7.938 | 5/16" | 4" | 1-5/8" | .060" | 42.49 | 40.65 | 38.80 | 36.95 |
| 20470 | .3125 | 5/16" | 7.938 | 5/16" | 4" | 1-5/8" | .090" | 42.49 | 40.65 | 38.80 | 36.95 |
| 20480 | .3125 | 5/16" | 7.938 | 5/16" | 4" | 1-5/8" | .125" | 42.49 | 40.65 | 38.80 | 36.95 |




continued →

## Series 630R *(continued)*

.3750" - .6250"
(9.525mm - 15.875mm)

| EDP# | $d_1$ † Diameter Decimal | Diameter | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | $r$ Corner Radius | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 20490 | .3750 | 3/8" | 9.525 | 3/8" | 4" | 1" | .010" | 47.01 | 44.97 | 42.92 | 40.88 |
| 20500 | .3750 | 3/8" | 9.525 | 3/8" | 4" | 1" | .020" | 47.01 | 44.97 | 42.92 | 40.88 |
| 20510 | .3750 | 3/8" | 9.525 | 3/8" | 4" | 1" | .030" | 47.01 | 44.97 | 42.92 | 40.88 |
| 20520 | .3750 | 3/8" | 9.525 | 3/8" | 4" | 1" | .045" | 47.01 | 44.97 | 42.92 | 40.88 |
| 20530 | .3750 | 3/8" | 9.525 | 3/8" | 4" | 1" | .060" | 47.01 | 44.97 | 42.92 | 40.88 |
| 20540 | .3750 | 3/8" | 9.525 | 3/8" | 4" | 1" | .090" | 47.01 | 44.97 | 42.92 | 40.88 |
| 20550 | .3750 | 3/8" | 9.525 | 3/8" | 4" | 1" | .125" | 47.01 | 44.97 | 42.92 | 40.88 |
| 20560 | .3750 | 3/8" | 9.525 | 3/8" | 4" | 2" | .010" | 47.01 | 44.97 | 42.92 | 40.88 |
| 20570 | .3750 | 3/8" | 9.525 | 3/8" | 4" | 2" | .020" | 47.01 | 44.97 | 42.92 | 40.88 |
| 20580 | .3750 | 3/8" | 9.525 | 3/8" | 4" | 2" | .030" | 47.01 | 44.97 | 42.92 | 40.88 |
| 20590 | .3750 | 3/8" | 9.525 | 3/8" | 4" | 2" | .045" | 47.01 | 44.97 | 42.92 | 40.88 |
| 20600 | .3750 | 3/8" | 9.525 | 3/8" | 4" | 2" | .060" | 47.01 | 44.97 | 42.92 | 40.88 |
| 20610 | .3750 | 3/8" | 9.525 | 3/8" | 4" | 2" | .090" | 47.01 | 44.97 | 42.92 | 40.88 |
| 20620 | .3750 | 3/8" | 9.525 | 3/8" | 4" | 2" | .125" | 47.01 | 44.97 | 42.92 | 40.88 |
| 20630 | .3750 | 3/8" | 9.525 | 3/8" | 6" | 1-1/2" | .010" | 64.57 | 61.77 | 58.96 | 56.15 |
| 20640 | .3750 | 3/8" | 9.525 | 3/8" | 6" | 1-1/2" | .020" | 64.57 | 61.77 | 58.96 | 56.15 |
| 20650 | .3750 | 3/8" | 9.525 | 3/8" | 6" | 1-1/2" | .030" | 64.57 | 61.77 | 58.96 | 56.15 |
| 20660 | .3750 | 3/8" | 9.525 | 3/8" | 6" | 1-1/2" | .045" | 64.57 | 61.77 | 58.96 | 56.15 |
| 20670 | .3750 | 3/8" | 9.525 | 3/8" | 6" | 1-1/2" | .060" | 64.57 | 61.77 | 58.96 | 56.15 |
| 20680 | .3750 | 3/8" | 9.525 | 3/8" | 6" | 1-1/2" | .090" | 64.57 | 61.77 | 58.96 | 56.15 |
| 20690 | .3750 | 3/8" | 9.525 | 3/8" | 6" | 1-1/2" | .125" | 64.57 | 61.77 | 58.96 | 56.15 |
| 20700 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 1" | .015" | 66.11 | 63.24 | 60.36 | 57.49 |
| 20710 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 1" | .020" | 66.11 | 63.24 | 60.36 | 57.49 |
| 20720 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 1" | .030" | 66.11 | 63.24 | 60.36 | 57.49 |
| 20730 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 1" | .045" | 66.11 | 63.24 | 60.36 | 57.49 |
| 20740 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 1" | .060" | 66.11 | 63.24 | 60.36 | 57.49 |
| 20750 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 1" | .090" | 66.11 | 63.24 | 60.36 | 57.49 |
| 20760 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 1" | .125" | 66.11 | 63.24 | 60.36 | 57.49 |
| 20770 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 2" | .015" | 66.11 | 63.24 | 60.36 | 57.49 |
| 20780 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 2" | .020" | 66.11 | 63.24 | 60.36 | 57.49 |
| 20790 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 2" | .030" | 66.11 | 63.24 | 60.36 | 57.49 |
| 20800 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 2" | .045" | 66.11 | 63.24 | 60.36 | 57.49 |
| 20810 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 2" | .060" | 66.11 | 63.24 | 60.36 | 57.49 |
| 20820 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 2" | .090" | 66.11 | 63.24 | 60.36 | 57.49 |
| 20830 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 2" | .125" | 66.11 | 63.24 | 60.36 | 57.49 |
| 20840 | .5000 | 1/2" | 12.700 | 1/2" | 6" | 1-1/2" | .015" | 93.64 | 89.57 | 85.50 | 81.43 |
| 20850 | .5000 | 1/2" | 12.700 | 1/2" | 6" | 1-1/2" | .020" | 93.64 | 89.57 | 85.50 | 81.43 |
| 20860 | .5000 | 1/2" | 12.700 | 1/2" | 6" | 1-1/2" | .030" | 93.64 | 89.57 | 85.50 | 81.43 |
| 20870 | .5000 | 1/2" | 12.700 | 1/2" | 6" | 1-1/2" | .045" | 93.64 | 89.57 | 85.50 | 81.43 |
| 20880 | .5000 | 1/2" | 12.700 | 1/2" | 6" | 1-1/2" | .060" | 93.64 | 89.57 | 85.50 | 81.43 |
| 20890 | .5000 | 1/2" | 12.700 | 1/2" | 6" | 1-1/2" | .090" | 93.64 | 89.57 | 85.50 | 81.43 |
| 20900 | .5000 | 1/2" | 12.700 | 1/2" | 6" | 1-1/2" | .125" | 93.64 | 89.57 | 85.50 | 81.43 |
| 20910 | .6250 | 5/8" | 15.875 | 5/8" | 6" | 2" | .010" | 137.70 | 131.71 | 125.73 | 119.74 |
| 20920 | .6250 | 5/8" | 15.875 | 5/8" | 6" | 2" | .015" | 137.70 | 131.71 | 125.73 | 119.74 |
| 20930 | .6250 | 5/8" | 15.875 | 5/8" | 6" | 2" | .020" | 137.70 | 131.71 | 125.73 | 119.74 |
| 20940 | .6250 | 5/8" | 15.875 | 5/8" | 6" | 2" | .030" | 137.70 | 131.71 | 125.73 | 119.74 |
| 20950 | .6250 | 5/8" | 15.875 | 5/8" | 6" | 2" | .045" | 137.70 | 131.71 | 125.73 | 119.74 |
| 20960 | .6250 | 5/8" | 15.875 | 5/8" | 6" | 2" | .060" | 137.70 | 131.71 | 125.73 | 119.74 |
| 20970 | .6250 | 5/8" | 15.875 | 5/8" | 6" | 2" | .090" | 137.70 | 131.71 | 125.73 | 119.74 |
| 20980 | .6250 | 5/8" | 15.875 | 5/8" | 6" | 2" | .125" | 137.70 | 131.71 | 125.73 | 119.74 |

MATERIAL HARDNESS (Rc)
70
35
0



† *Metric equivalents are for reference only*

| EDP# | $d_1$ † Diameter Decimal | Diameter | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | $r$ Corner Radius | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 20990 | .7500 | 3/4" | 19.050 | 3/4" | 6" | 3" | .015" | 225.98 | 216.15 | 206.33 | 196.50 |
| 21000 | .7500 | 3/4" | 19.050 | 3/4" | 6" | 3" | .020" | 225.98 | 216.15 | 206.33 | 196.50 |
| 21010 | .7500 | 3/4" | 19.050 | 3/4" | 6" | 3" | .030" | 225.98 | 216.15 | 206.33 | 196.50 |
| 21020 | .7500 | 3/4" | 19.050 | 3/4" | 6" | 3" | .045" | 225.98 | 216.15 | 206.33 | 196.50 |
| 21030 | .7500 | 3/4" | 19.050 | 3/4" | 6" | 3" | .060" | 225.98 | 216.15 | 206.33 | 196.50 |
| 21040 | .7500 | 3/4" | 19.050 | 3/4" | 6" | 3" | .090" | 225.98 | 216.15 | 206.33 | 196.50 |
| 21050 | .7500 | 3/4" | 19.050 | 3/4" | 6" | 3" | .125" | 225.98 | 216.15 | 206.33 | 196.50 |
| 21140 | .7500 | 3/4" | 19.050 | 3/4" | 6" | 3" | .250" | 225.98 | 216.15 | 206.33 | 196.50 |
| 21060 | 1.000 | 1" | 25.400 | 1" | 6" | 3" | .015" | 384.26 | 367.55 | 350.85 | 334.14 |
| 21070 | 1.000 | 1" | 25.400 | 1" | 6" | 3" | .020" | 384.26 | 367.55 | 350.85 | 334.14 |
| 21080 | 1.000 | 1" | 25.400 | 1" | 6" | 3" | .030" | 384.26 | 367.55 | 350.85 | 334.14 |
| 21090 | 1.000 | 1" | 25.400 | 1" | 6" | 3" | .045" | 384.26 | 367.55 | 350.85 | 334.14 |
| 21100 | 1.000 | 1" | 25.400 | 1" | 6" | 3" | .060" | 384.26 | 367.55 | 350.85 | 334.14 |
| 21110 | 1.000 | 1" | 25.400 | 1" | 6" | 3" | .090" | 384.26 | 367.55 | 350.85 | 334.14 |
| 21120 | 1.000 | 1" | 25.400 | 1" | 6" | 3" | .125" | 384.26 | 367.55 | 350.85 | 334.14 |
| 21130 | 1.000 | 1" | 25.400 | 1" | 6" | 3" | .250" | 384.26 | 367.55 | 350.85 | 334.14 |





# Series 630RA

.1250" - .3125"
(3.175mm - 7.938mm)

Z=4 | 30° | TECH PAGES 284-285

**TOLERANCES**

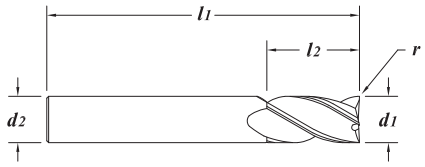
| | |
|---|---|
| $d_1$ | +.000" –.002" (+.000 –.050mm) |
| $d_2$ | h6 |
| $r$ | +.001" –.001" (+.025 –.025mm) |

## Extra Length - Corner Radius

### TiALN Coating

Solid submicron grain carbide end mill - center cutting
Extended reach
For stronger corners and part radius
Dry or semi-dry machining
Can be modified with a neck within 48 hours
Extremely versatile
Bright Finish - page 243
Stub length - page 214
Standard length - page 227






MATERIAL HARDNESS (Rc) 70 35 0

| EDP# | $d_1$ † Diameter Decimal | Diameter | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | $r$ Corner Radius | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 20107 | .1250 | 1/8" | 3.175 | 1/8" | 3" | 1" | .010" | 27.44 | 26.25 | 25.05 | 23.86 |
| 20117 | .1250 | 1/8" | 3.175 | 1/8" | 3" | 1" | .015" | 27.44 | 26.25 | 25.05 | 23.86 |
| 20127 | .1250 | 1/8" | 3.175 | 1/8" | 3" | 1" | .020" | 27.44 | 26.25 | 25.05 | 23.86 |
| 20137 | .1250 | 1/8" | 3.175 | 1/8" | 3" | 1" | .030" | 27.44 | 26.25 | 25.05 | 23.86 |
| 20147 | .1250 | 1/8" | 3.175 | 1/8" | 3" | 1" | .045" | 27.44 | 26.25 | 25.05 | 23.86 |
| 20157 | .1875 | 3/16" | 4.763 | 3/16" | 3" | 1" | .010" | 30.82 | 29.48 | 28.14 | 26.80 |
| 20167 | .1875 | 3/16" | 4.763 | 3/16" | 3" | 1" | .015" | 30.82 | 29.48 | 28.14 | 26.80 |
| 20177 | .1875 | 3/16" | 4.763 | 3/16" | 3" | 1" | .020" | 30.82 | 29.48 | 28.14 | 26.80 |
| 20187 | .1875 | 3/16" | 4.763 | 3/16" | 3" | 1" | .030" | 30.82 | 29.48 | 28.14 | 26.80 |
| 20197 | .1875 | 3/16" | 4.763 | 3/16" | 3" | 1" | .045" | 30.82 | 29.48 | 28.14 | 26.80 |
| 20207 | .1875 | 3/16" | 4.763 | 3/16" | 3" | 1" | .060" | 30.82 | 29.48 | 28.14 | 26.80 |
| 20217 | .1875 | 3/16" | 4.763 | 3/16" | 4" | 1" | .010" | 33.55 | 32.09 | 30.63 | 29.17 |
| 20227 | .1875 | 3/16" | 4.763 | 3/16" | 4" | 1" | .015" | 33.55 | 32.09 | 30.63 | 29.17 |
| 20237 | .1875 | 3/16" | 4.763 | 3/16" | 4" | 1" | .020" | 33.55 | 32.09 | 30.63 | 29.17 |
| 20247 | .1875 | 3/16" | 4.763 | 3/16" | 4" | 1" | .030" | 33.55 | 32.09 | 30.63 | 29.17 |
| 20257 | .1875 | 3/16" | 4.763 | 3/16" | 4" | 1" | .045" | 33.55 | 32.09 | 30.63 | 29.17 |
| 20267 | .1875 | 3/16" | 4.763 | 3/16" | 4" | 1" | .060" | 33.55 | 32.09 | 30.63 | 29.17 |
| 20277 | .2500 | 1/4" | 6.350 | 1/4" | 3" | 1" | .010" | 36.40 | 34.82 | 33.23 | 31.65 |
| 20287 | .2500 | 1/4" | 6.350 | 1/4" | 3" | 1" | .020" | 36.40 | 34.82 | 33.23 | 31.65 |
| 20297 | .2500 | 1/4" | 6.350 | 1/4" | 3" | 1" | .030" | 36.40 | 34.82 | 33.23 | 31.65 |
| 20307 | .2500 | 1/4" | 6.350 | 1/4" | 3" | 1" | .045" | 36.40 | 34.82 | 33.23 | 31.65 |
| 20317 | .2500 | 1/4" | 6.350 | 1/4" | 3" | 1" | .060" | 36.40 | 34.82 | 33.23 | 31.65 |
| 20327 | .2500 | 1/4" | 6.350 | 1/4" | 4" | 1" | .010" | 38.96 | 37.27 | 35.57 | 33.88 |
| 20337 | .2500 | 1/4" | 6.350 | 1/4" | 4" | 1" | .020" | 38.96 | 37.27 | 35.57 | 33.88 |
| 20347 | .2500 | 1/4" | 6.350 | 1/4" | 4" | 1" | .030" | 38.96 | 37.27 | 35.57 | 33.88 |
| 20357 | .2500 | 1/4" | 6.350 | 1/4" | 4" | 1" | .045" | 38.96 | 37.27 | 35.57 | 33.88 |
| 20367 | .2500 | 1/4" | 6.350 | 1/4" | 4" | 1" | .060" | 38.96 | 37.27 | 35.57 | 33.88 |
| 20377 | .2500 | 1/4" | 6.350 | 1/4" | 6" | 1-1/2" | .010" | 51.35 | 49.12 | 46.88 | 44.65 |
| 20387 | .2500 | 1/4" | 6.350 | 1/4" | 6" | 1-1/2" | .020" | 51.35 | 49.12 | 46.88 | 44.65 |
| 20397 | .2500 | 1/4" | 6.350 | 1/4" | 6" | 1-1/2" | .030" | 51.35 | 49.12 | 46.88 | 44.65 |
| 20407 | .2500 | 1/4" | 6.350 | 1/4" | 6" | 1-1/2" | .045" | 51.35 | 49.12 | 46.88 | 44.65 |
| 20417 | .2500 | 1/4" | 6.350 | 1/4" | 6" | 1-1/2" | .060" | 51.35 | 49.12 | 46.88 | 44.65 |
| 20427 | .3125 | 5/16" | 7.938 | 5/16" | 4" | 1-5/8" | .010" | 53.06 | 50.75 | 48.45 | 46.14 |
| 20437 | .3125 | 5/16" | 7.938 | 5/16" | 4" | 1-5/8" | .020" | 53.06 | 50.75 | 48.45 | 46.14 |
| 20447 | .3125 | 5/16" | 7.938 | 5/16" | 4" | 1-5/8" | .030" | 53.06 | 50.75 | 48.45 | 46.14 |
| 20457 | .3125 | 5/16" | 7.938 | 5/16" | 4" | 1-5/8" | .045" | 53.06 | 50.75 | 48.45 | 46.14 |
| 20467 | .3125 | 5/16" | 7.938 | 5/16" | 4" | 1-5/8" | .060" | 53.06 | 50.75 | 48.45 | 46.14 |
| 20477 | .3125 | 5/16" | 7.938 | 5/16" | 4" | 1-5/8" | .090" | 53.06 | 50.75 | 48.45 | 46.14 |
| 20487 | .3125 | 5/16" | 7.938 | 5/16" | 4" | 1-5/8" | .125" | 53.06 | 50.75 | 48.45 | 46.14 |



† *Metric equivalents are for reference only*

| EDP# | $d_1$ † Diameter Decimal | Diameter | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | $r$ Corner Radius | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 20497 | .3750 | 3/8" | 9.525 | 3/8" | 4" | 1" | .010" | 57.58 | 55.08 | 52.57 | 50.07 |
| 20507 | .3750 | 3/8" | 9.525 | 3/8" | 4" | 1" | .020" | 57.58 | 55.08 | 52.57 | 50.07 |
| 20517 | .3750 | 3/8" | 9.525 | 3/8" | 4" | 1" | .030" | 57.58 | 55.08 | 52.57 | 50.07 |
| 20527 | .3750 | 3/8" | 9.525 | 3/8" | 4" | 1" | .045" | 57.58 | 55.08 | 52.57 | 50.07 |
| 20537 | .3750 | 3/8" | 9.525 | 3/8" | 4" | 1" | .060" | 57.58 | 55.08 | 52.57 | 50.07 |
| 20547 | .3750 | 3/8" | 9.525 | 3/8" | 4" | 1" | .090" | 57.58 | 55.08 | 52.57 | 50.07 |
| 20557 | .3750 | 3/8" | 9.525 | 3/8" | 4" | 1" | .125" | 57.58 | 55.08 | 52.57 | 50.07 |
| 20567 | .3750 | 3/8" | 9.525 | 3/8" | 4" | 2" | .010" | 57.58 | 55.08 | 52.57 | 50.07 |
| 20577 | .3750 | 3/8" | 9.525 | 3/8" | 4" | 2" | .020" | 57.58 | 55.08 | 52.57 | 50.07 |
| 20587 | .3750 | 3/8" | 9.525 | 3/8" | 4" | 2" | .030" | 57.58 | 55.08 | 52.57 | 50.07 |
| 20597 | .3750 | 3/8" | 9.525 | 3/8" | 4" | 2" | .045" | 57.58 | 55.08 | 52.57 | 50.07 |
| 20607 | .3750 | 3/8" | 9.525 | 3/8" | 4" | 2" | .060" | 57.58 | 55.08 | 52.57 | 50.07 |
| 20617 | .3750 | 3/8" | 9.525 | 3/8" | 4" | 2" | .090" | 57.58 | 55.08 | 52.57 | 50.07 |
| 20627 | .3750 | 3/8" | 9.525 | 3/8" | 4" | 2" | .125" | 57.58 | 55.08 | 52.57 | 50.07 |
| 20637 | .3750 | 3/8" | 9.525 | 3/8" | 6" | 1-1/2" | .010" | 79.72 | 76.25 | 72.79 | 69.32 |
| 20647 | .3750 | 3/8" | 9.525 | 3/8" | 6" | 1-1/2" | .020" | 79.72 | 76.25 | 72.79 | 69.32 |
| 20657 | .3750 | 3/8" | 9.525 | 3/8" | 6" | 1-1/2" | .030" | 79.72 | 76.25 | 72.79 | 69.32 |
| 20667 | .3750 | 3/8" | 9.525 | 3/8" | 6" | 1-1/2" | .045" | 79.72 | 76.25 | 72.79 | 69.32 |
| 20677 | .3750 | 3/8" | 9.525 | 3/8" | 6" | 1-1/2" | .060" | 79.72 | 76.25 | 72.79 | 69.32 |
| 20687 | .3750 | 3/8" | 9.525 | 3/8" | 6" | 1-1/2" | .090" | 79.72 | 76.25 | 72.79 | 69.32 |
| 20697 | .3750 | 3/8" | 9.525 | 3/8" | 6" | 1-1/2" | .125" | 79.72 | 76.25 | 72.79 | 69.32 |
| 21157 | .4375 | 7/16" | 11.113 | 7/16" | 4" | 1" | .010" | 77.00 | 73.66 | 70.31 | 66.96 |
| 21167 | .4375 | 7/16" | 11.113 | 7/16" | 4" | 1" | .015" | 77.00 | 73.66 | 70.31 | 66.96 |
| 21177 | .4375 | 7/16" | 11.113 | 7/16" | 4" | 1" | .020" | 77.00 | 73.66 | 70.31 | 66.96 |
| 21187 | .4375 | 7/16" | 11.113 | 7/16" | 4" | 1" | .030" | 77.00 | 73.66 | 70.31 | 66.96 |
| 21227 | .4375 | 7/16" | 11.113 | 7/16" | 4" | 1" | .125" | 77.00 | 73.66 | 70.31 | 66.96 |
| 20707 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 1" | .015" | 78.37 | 74.97 | 71.56 | 68.15 |
| 20717 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 1" | .020" | 78.37 | 74.97 | 71.56 | 68.15 |
| 20727 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 1" | .030" | 78.37 | 74.97 | 71.56 | 68.15 |
| 20737 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 1" | .045" | 78.37 | 74.97 | 71.56 | 68.15 |
| 20747 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 1" | .060" | 78.37 | 74.97 | 71.56 | 68.15 |
| 20757 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 1" | .090" | 78.37 | 74.97 | 71.56 | 68.15 |
| 20767 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 1" | .125" | 78.37 | 74.97 | 71.56 | 68.15 |
| 20777 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 2" | .015" | 78.37 | 74.97 | 71.56 | 68.15 |
| 20787 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 2" | .020" | 78.37 | 74.97 | 71.56 | 68.15 |
| 20797 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 2" | .030" | 78.37 | 74.97 | 71.56 | 68.15 |
| 20807 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 2" | .045" | 78.37 | 74.97 | 71.56 | 68.15 |
| 20817 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 2" | .060" | 78.37 | 74.97 | 71.56 | 68.15 |
| 20827 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 2" | .090" | 78.37 | 74.97 | 71.56 | 68.15 |
| 20837 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 2" | .125" | 78.37 | 74.97 | 71.56 | 68.15 |
| 20847 | .5000 | 1/2" | 12.700 | 1/2" | 6" | 1-1/2" | .015" | 110.84 | 106.02 | 101.20 | 96.38 |
| 20857 | .5000 | 1/2" | 12.700 | 1/2" | 6" | 1-1/2" | .020" | 110.84 | 106.02 | 101.20 | 96.38 |
| 20867 | .5000 | 1/2" | 12.700 | 1/2" | 6" | 1-1/2" | .030" | 110.84 | 106.02 | 101.20 | 96.38 |
| 20877 | .5000 | 1/2" | 12.700 | 1/2" | 6" | 1-1/2" | .045" | 110.84 | 106.02 | 101.20 | 96.38 |
| 20887 | .5000 | 1/2" | 12.700 | 1/2" | 6" | 1-1/2" | .060" | 110.84 | 106.02 | 101.20 | 96.38 |
| 20897 | .5000 | 1/2" | 12.700 | 1/2" | 6" | 1-1/2" | .090" | 110.84 | 106.02 | 101.20 | 96.38 |
| 20907 | .5000 | 1/2" | 12.700 | 1/2" | 6" | 1-1/2" | .125" | 110.84 | 106.02 | 101.20 | 96.38 |
| 20917 | .6250 | 5/8" | 15.875 | 5/8" | 6" | 2" | .010" | 157.99 | 151.12 | 144.25 | 137.38 |
| 20927 | .6250 | 5/8" | 15.875 | 5/8" | 6" | 2" | .015" | 157.99 | 151.12 | 144.25 | 137.38 |
| 20937 | .6250 | 5/8" | 15.875 | 5/8" | 6" | 2" | .020" | 157.99 | 151.12 | 144.25 | 137.38 |
| 20947 | .6250 | 5/8" | 15.875 | 5/8" | 6" | 2" | .030" | 157.99 | 151.12 | 144.25 | 137.38 |
| 20957 | .6250 | 5/8" | 15.875 | 5/8" | 6" | 2" | .045" | 157.99 | 151.12 | 144.25 | 137.38 |
| 20967 | .6250 | 5/8" | 15.875 | 5/8" | 6" | 2" | .060" | 157.99 | 151.12 | 144.25 | 137.38 |
| 20977 | .6250 | 5/8" | 15.875 | 5/8" | 6" | 2" | .090" | 157.99 | 151.12 | 144.25 | 137.38 |
| 20987 | .6250 | 5/8" | 15.875 | 5/8" | 6" | 2" | .125" | 157.99 | 151.12 | 144.25 | 137.38 |



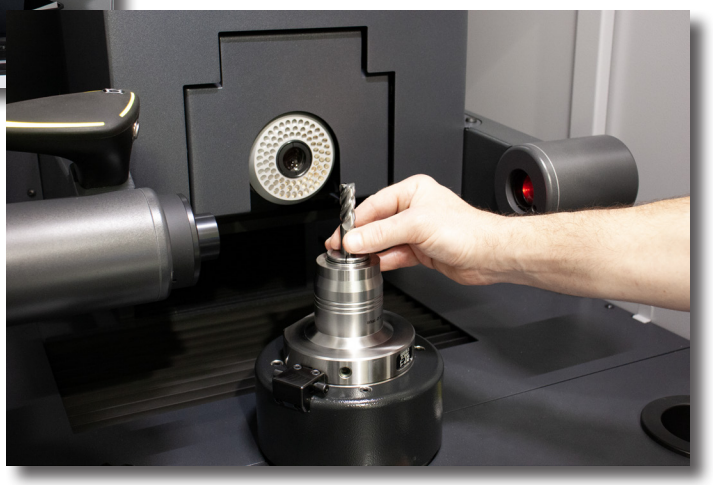
*continued* →

## Series 630RA *(continued)*

.7500" - 1.000"
(19.050mm - 25.400mm)

| EDP# | $d_1$ † Diameter Decimal | Diameter | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | $r$ Corner Radius | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 20997 | .7500 | 3/4" | 19.050 | 3/4" | 6" | 3" | .015" | 249.47 | 238.62 | 227.78 | 216.93 |
| 21007 | .7500 | 3/4" | 19.050 | 3/4" | 6" | 3" | .020" | 249.47 | 238.62 | 227.78 | 216.93 |
| 21017 | .7500 | 3/4" | 19.050 | 3/4" | 6" | 3" | .030" | 249.47 | 238.62 | 227.78 | 216.93 |
| 21027 | .7500 | 3/4" | 19.050 | 3/4" | 6" | 3" | .045" | 249.47 | 238.62 | 227.78 | 216.93 |
| 21037 | .7500 | 3/4" | 19.050 | 3/4" | 6" | 3" | .060" | 249.47 | 238.62 | 227.78 | 216.93 |
| 21047 | .7500 | 3/4" | 19.050 | 3/4" | 6" | 3" | .090" | 249.47 | 238.62 | 227.78 | 216.93 |
| 21057 | .7500 | 3/4" | 19.050 | 3/4" | 6" | 3" | .125" | 249.47 | 238.62 | 227.78 | 216.93 |
| 21147 | .7500 | 3/4" | 19.050 | 3/4" | 6" | 3" | .250" | 249.47 | 238.62 | 227.78 | 216.93 |
| 21067 | 1.000 | 1" | 25.400 | 1" | 6" | 3" | .015" | 414.81 | 396.77 | 378.74 | 360.70 |
| 21077 | 1.000 | 1" | 25.400 | 1" | 6" | 3" | .020" | 414.81 | 396.77 | 378.74 | 360.70 |
| 21087 | 1.000 | 1" | 25.400 | 1" | 6" | 3" | .030" | 414.81 | 396.77 | 378.74 | 360.70 |
| 21097 | 1.000 | 1" | 25.400 | 1" | 6" | 3" | .045" | 414.81 | 396.77 | 378.74 | 360.70 |
| 21107 | 1.000 | 1" | 25.400 | 1" | 6" | 3" | .060" | 414.81 | 396.77 | 378.74 | 360.70 |
| 21117 | 1.000 | 1" | 25.400 | 1" | 6" | 3" | .090" | 414.81 | 396.77 | 378.74 | 360.70 |
| 21127 | 1.000 | 1" | 25.400 | 1" | 6" | 3" | .125" | 414.81 | 396.77 | 378.74 | 360.70 |
| 21137 | 1.000 | 1" | 25.400 | 1" | 6" | 3" | .250" | 414.81 | 396.77 | 378.74 | 360.70 |



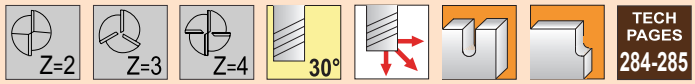
MATERIAL HARDNESS (Rc)
70
35
0



† *Metric equivalents are for reference only*

| TOLERANCES | |
|---|---|
| $d_1$ | +.000" –.002" (+.000 –.050mm) |
| $d_2$ | h6 |
| *ball radius* | +.000" –.001" (+.000 –.025mm) |

# Series 720M, 723M, 730M, 740M, 743M, 750M



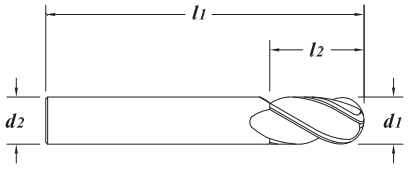

TECH PAGES 284-285

.1181" - .3150"
(3.000mm - 8.000mm)

## Extra Length - Ball End

Solid submicron grain carbide end mill - center cutting
Extended reach
Can be modified with a neck within 48 hours
Extremely versatile
TiCN Coating - page 251
TiALN Coating - page 252
Stub Length - page 216
Standard length - page 230






| (720M/740M) 2 Flute EDP# | (723M/743M) 3 Flute EDP# | (730M/750M) 4 Flute EDP# | $d_1$ † Diameter Decimal | $d_1$ † Diameter | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 97010 | 98010 | 99010 | .1181 | | 3.000 | 3.0 | 50 | 16 | 15.43 | 14.76 | 14.09 | 13.42 |
| 97020 | 98020 | 99020 | .1181 | | 3.000 | 3.0 | 75 | 20 | 25.42 | 24.31 | 23.21 | 22.10 |
| 97030 | 98030 | 99030 | .1181 | | 3.000 | 3.0 | 75 | 25 | 25.42 | 24.31 | 23.21 | 22.10 |
| 43010 | 55510 | 44010 | .1250 | 1/8" | 3.175 | 1/8" | 2" | 5/8" | 15.65 | 14.97 | 14.29 | 13.61 |
| 43020 | 55520 | 44020 | .1250 | 1/8" | 3.175 | 1/8" | 3" | 3/4" | 24.15 | 23.10 | 22.05 | 21.00 |
| 43030 | 55530 | 44030 | .1250 | 1/8" | 3.175 | 1/8" | 3" | 1" | 24.15 | 23.10 | 22.05 | 21.00 |
| 97040 | 98040 | 99040 | .1575 | | 4.000 | 4.0 | 50 | 16 | 16.09 | 15.39 | 14.69 | 13.99 |
| 97050 | 98050 | 99050 | .1575 | | 4.000 | 4.0 | 75 | 20 | 25.96 | 24.83 | 23.70 | 22.57 |
| 97060 | 98060 | 99060 | .1575 | | 4.000 | 4.0 | 75 | 25 | 25.96 | 24.83 | 23.70 | 22.57 |
| 43040 | 55540 | 44040 | .1875 | 3/16" | 4.763 | 3/16" | 3" | 1" | 26.63 | 25.48 | 24.32 | 23.16 |
| 43050 | 55550 | 44050 | .1875 | 3/16" | 4.763 | 3/16" | 3" | 1-1/8" | 26.63 | 25.48 | 24.32 | 23.16 |
| 43060 | 55560 | 44060 | .1875 | 3/16" | 4.763 | 3/16" | 4" | 1" | 28.67 | 27.42 | 26.18 | 24.93 |
| 97080 | 98080 | 99080 | .1969 | | 5.000 | 5.0 | 75 | 20 | 28.04 | 26.82 | 25.60 | 24.38 |
| 97090 | 98090 | 99090 | .1969 | | 5.000 | 5.0 | 75 | 25 | 28.04 | 26.82 | 25.60 | 24.38 |
| 97100 | 98100 | 99100 | .2362 | | 6.000 | 6.0 | 75 | 25 | 32.45 | 31.04 | 29.63 | 28.22 |
| 97110 | 98110 | 99110 | .2362 | | 6.000 | 6.0 | 100 | 25 | 34.16 | 32.67 | 31.19 | 29.70 |
| 97120 | 98120 | 99120 | .2362 | | 6.000 | 6.0 | 100 | 32 | 34.16 | 32.67 | 31.19 | 29.70 |
| 97130 | 98130 | 99130 | .2362 | | 6.000 | 6.0 | 150 | 38 | 44.39 | 42.46 | 40.53 | 38.60 |
| 43070 | 55570 | 44070 | .2500 | 1/4" | 6.350 | 1/4" | 3" | 1" | 30.83 | 29.49 | 28.15 | 26.81 |
| 43080 | 55580 | 44080 | .2500 | 1/4" | 6.350 | 1/4" | 4" | 1" | 32.43 | 31.02 | 29.61 | 28.20 |
| 43090 | 55590 | 44090 | .2500 | 1/4" | 6.350 | 1/4" | 4" | 1-1/2" | 32.43 | 31.02 | 29.61 | 28.20 |
| 43100 | 55600 | 44100 | .2500 | 1/4" | 6.350 | 1/4" | 6" | 1-1/2" | 42.17 | 40.34 | 38.50 | 36.67 |
| 43110 | 55610 | 44110 | .3125 | 5/16" | 7.938 | 5/16" | 3" | 1" | 38.09 | 36.43 | 34.78 | 33.12 |
| 43120 | 55620 | 44120 | .3125 | 5/16" | 7.938 | 5/16" | 4" | 1" | 42.49 | 40.65 | 38.80 | 36.95 |
| 43130 | 55630 | 44130 | .3125 | 5/16" | 7.938 | 5/16" | 4" | 1-5/8" | 42.49 | 40.65 | 38.80 | 36.95 |
| 43140 | 55640 | 44140 | .3125 | 5/16" | 7.938 | 5/16" | 6" | 1-1/2" | 63.05 | 60.31 | 57.57 | 54.83 |
| 97140 | 98140 | 99140 | .3150 | | 8.000 | 8.0 | 75 | 25 | 40.09 | 38.35 | 36.60 | 34.86 |
| 97150 | 98150 | 99150 | .3150 | | 8.000 | 8.0 | 100 | 25 | 44.75 | 42.80 | 40.86 | 38.91 |
| 97160 | 98160 | 99160 | .3150 | | 8.000 | 8.0 | 100 | 41 | 44.75 | 42.80 | 40.86 | 38.91 |
| 97170 | 98170 | 99170 | .3150 | | 8.000 | 8.0 | 150 | 50 | 64.70 | 61.89 | 59.07 | 56.26 |



*continued* →

# Series 720M, 723M, 730M, 740M, 743M, 750M *(continued)*

.3750" - 1.000"
(9.525mm - 25.400mm)

| (720M/740M) 2 Flute EDP# | (723M/743M) 3 Flute EDP# | (730M/750M) 4 Flute EDP# | $d_1$ † Diameter Decimal | $d_1$ † Diameter | $d_1$ † Diameter Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 43150 | 55650 | 44150 | .3750 | 3/8" | 9.525 | 3/8" | 3" | 1" | 42.85 | 40.99 | 39.12 | 37.26 |
| 43160 | 55660 | 44160 | .3750 | 3/8" | 9.525 | 3/8" | 4" | 1" | 47.01 | 44.97 | 42.92 | 40.88 |
| 43170 | 55670 | 44170 | .3750 | 3/8" | 9.525 | 3/8" | 4" | 2" | 47.01 | 44.97 | 42.92 | 40.88 |
| 43180 | 55680 | 44180 | .3750 | 3/8" | 9.525 | 3/8" | 6" | 1-1/2" | 65.26 | 62.43 | 59.59 | 56.75 |
| 43190 | 55690 | 44190 | .3750 | 3/8" | 9.525 | 3/8" | 6" | 3" | 65.26 | 62.43 | 59.59 | 56.75 |
| 97180 | 98180 | 99180 | .3937 | | 10.000 | 10.0 | 75 | 25 | 46.30 | 44.29 | 42.27 | 40.26 |
| 97190 | 98190 | 99190 | .3937 | | 10.000 | 10.0 | 100 | 25 | 60.69 | 58.05 | 55.41 | 52.77 |
| 97200 | 98200 | 99200 | .3937 | | 10.000 | 10.0 | 100 | 50 | 60.69 | 58.05 | 55.41 | 52.77 |
| 97210 | 98210 | 99210 | .3937 | | 10.000 | 10.0 | 150 | 38 | 78.06 | 74.67 | 71.27 | 67.88 |
| 97220 | 98220 | 99220 | .3937 | | 10.000 | 10.0 | 150 | 75 | 78.06 | 74.67 | 71.27 | 67.88 |
| 43200 | 55700 | 44200 | .4375 | 7/16" | 11.113 | 7/16" | 4" | 1" | 64.72 | 61.91 | 59.09 | 56.28 |
| 43210 | 55710 | 44210 | .4375 | 7/16" | 11.113 | 7/16" | 4" | 2" | 64.72 | 61.91 | 59.09 | 56.28 |
| 43220 | - | 44220 | .4375 | 7/16" | 11.113 | 7/16" | 6" | 1-1/2" | 84.13 | 80.48 | 76.82 | 73.16 |
| 43230 | - | 44230 | .4375 | 7/16" | 11.113 | 7/16" | 6" | 3" | 84.13 | 80.48 | 76.82 | 73.16 |
| 97230 | 98230 | 99230 | .4724 | | 12.000 | 12.0 | 100 | 25 | 69.67 | 66.64 | 63.61 | 60.58 |
| 97240 | 98240 | 99240 | .4724 | | 12.000 | 12.0 | 100 | 50 | 69.67 | 66.64 | 63.61 | 60.58 |
| 97250 | 98250 | 99250 | .4724 | | 12.000 | 12.0 | 150 | 50 | 93.62 | 89.55 | 85.48 | 81.41 |
| 97260 | 98260 | 99260 | .4724 | | 12.000 | 12.0 | 150 | 75 | 93.62 | 89.55 | 85.48 | 81.41 |
| 43240 | 55740 | 44240 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 1" | 66.11 | 63.24 | 60.36 | 57.49 |
| 43250 | 55750 | 44250 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 2" | 66.11 | 63.24 | 60.36 | 57.49 |
| 43260 | 55760 | 44260 | .5000 | 1/2" | 12.700 | 1/2" | 6" | 1-1/2" | 93.64 | 89.57 | 85.50 | 81.43 |
| 43270 | 55770 | 44270 | .5000 | 1/2" | 12.700 | 1/2" | 6" | 3" | 93.64 | 89.57 | 85.50 | 81.43 |
| 97270 | 98270 | - | .5512 | | 14.000 | 14.0 | 100 | 25 | 96.27 | 92.08 | 87.90 | 83.71 |
| 97280 | - | - | .5512 | | 14.000 | 14.0 | 100 | 50 | 96.27 | 92.08 | 87.90 | 83.71 |
| 97290 | - | 99290 | .5512 | | 14.000 | 14.0 | 150 | 50 | 130.67 | 124.99 | 119.31 | 113.63 |
| 97300 | 98300 | - | .5512 | | 14.000 | 14.0 | 150 | 75 | 130.67 | 124.99 | 119.31 | 113.63 |
| 43280 | 55780 | 44280 | .5625 | 9/16" | 14.288 | 9/16" | 6" | 2" | 130.66 | 124.98 | 119.30 | 113.62 |
| - | 55790 | 44290 | .5625 | 9/16" | 14.288 | 9/16" | 6" | 3" | 130.66 | 124.98 | 119.30 | 113.62 |
| 43300 | 55800 | 44300 | .6250 | 5/8" | 15.875 | 5/8" | 6" | 2" | 137.70 | 131.71 | 125.73 | 119.74 |
| 43310 | 55810 | 44310 | .6250 | 5/8" | 15.875 | 5/8" | 6" | 3" | 137.70 | 131.71 | 125.73 | 119.74 |
| 97310 | 98310 | 99310 | .6299 | | 16.000 | 16.0 | 150 | 50 | 137.68 | 131.69 | 125.71 | 119.72 |
| 97320 | 98320 | 99320 | .6299 | | 16.000 | 16.0 | 150 | 75 | 137.68 | 131.69 | 125.71 | 119.72 |
| 97340 | 98340 | 99340 | .7087 | | 18.000 | 18.0 | 150 | 75 | 211.80 | 202.59 | 193.38 | 184.17 |
| 43320 | 55820 | 44320 | .7500 | 3/4" | 19.050 | 3/4" | 6" | 2" | 225.98 | 216.15 | 206.33 | 196.50 |
| 43330 | 55830 | 44330 | .7500 | 3/4" | 19.050 | 3/4" | 6" | 3" | 225.98 | 216.15 | 206.33 | 196.50 |
| 97350 | 98350 | 99350 | .7874 | | 20.000 | 20.0 | 150 | 50 | 232.88 | 222.75 | 212.63 | 202.50 |
| 97360 | 98360 | 99360 | .7874 | | 20.000 | 20.0 | 150 | 75 | 232.88 | 222.75 | 212.63 | 202.50 |
| - | 98370 | - | .9843 | | 25.000 | 25.0 | 150 | 50 | 369.52 | 353.45 | 337.39 | 321.32 |
| 97380 | 98380 | - | .9843 | | 25.000 | 25.0 | 150 | 75 | 369.52 | 353.45 | 337.39 | 321.32 |
| 43340 | 55840 | 44340 | 1.000 | 1" | 25.400 | 1" | 6" | 2" | 384.26 | 367.55 | 350.85 | 334.14 |
| 43350 | 55850 | 44350 | 1.000 | 1" | 25.400 | 1" | 6" | 3" | 384.26 | 367.55 | 350.85 | 334.14 |

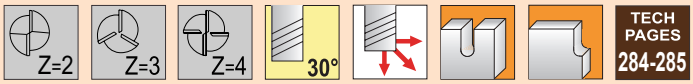
MATERIAL HARDNESS (Rc)
70
35
0



† *Metric equivalents are for reference only*

| TOLERANCES | |
|---|---|
| $d_1$ | +.000" –.002" (+.000 –.050mm) |
| $d_2$ | h6 |
| *ball radius* | +.000" –.001" (+.000 –.025mm) |





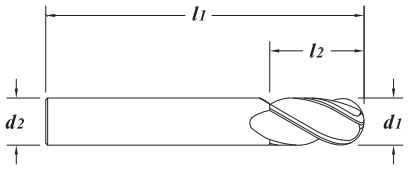

TECH PAGES 284-285

## Extra Length - Ball End

### TiCN Coating

Solid submicron grain carbide end mill - center cutting
Extended reach
Improved abrasion resistance and lubricity
Can be modified with a neck within 48 hours
Extremely versatile
Bright Finish - page 249
TiALN Coating - page 252
Standard length - page 233

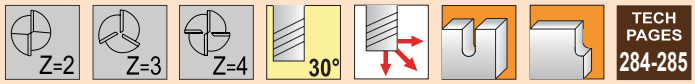





| (720MC) 2 Flute EDP# | (723MC) 3 Flute EDP# | (730MC) 4 Flute EDP# | $d_1$ † Diameter Decimal | $d_1$ † Diameter | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 43014 | 55514 | 44014 | .1250 | 1/8" | 3.175 | 1/8" | 2" | 5/8" | 18.01 | 17.23 | 16.44 | 15.66 |
| 43024 | 55524 | 44024 | .1250 | 1/8" | 3.175 | 1/8" | 3" | 3/4" | 27.05 | 25.87 | 24.70 | 23.52 |
| 43034 | 55534 | 44034 | .1250 | 1/8" | 3.175 | 1/8" | 3" | 1" | 27.05 | 25.87 | 24.70 | 23.52 |
| 43044 | 55544 | 44044 | .1875 | 3/16" | 4.763 | 3/16" | 3" | 1" | 29.95 | 28.64 | 27.34 | 26.04 |
| 43054 | 55554 | 44054 | .1875 | 3/16" | 4.763 | 3/16" | 3" | 1-1/8" | 29.95 | 28.64 | 27.34 | 26.04 |
| 43064 | 55564 | 44064 | .1875 | 3/16" | 4.763 | 3/16" | 4" | 1" | 32.53 | 31.12 | 29.70 | 28.29 |
| 43074 | 55574 | 44074 | .2500 | 1/4" | 6.350 | 1/4" | 3" | 1" | 35.65 | 34.10 | 32.55 | 31.00 |
| 43084 | 55584 | 44084 | .2500 | 1/4" | 6.350 | 1/4" | 4" | 1" | 37.65 | 36.01 | 34.38 | 32.74 |
| 43094 | 55594 | 44094 | .2500 | 1/4" | 6.350 | 1/4" | 4" | 1-1/2" | 37.65 | 36.01 | 34.38 | 32.74 |
| 43104 | 55604 | 44104 | .2500 | 1/4" | 6.350 | 1/4" | 6" | 1-1/2" | 51.16 | 48.94 | 46.71 | 44.49 |
| 43114 | 55614 | 44114 | .3125 | 5/16" | 7.938 | 5/16" | 3" | 1" | 44.55 | 42.61 | 40.68 | 38.74 |
| 43124 | 55624 | 44124 | .3125 | 5/16" | 7.938 | 5/16" | 4" | 1" | 50.52 | 48.32 | 46.13 | 43.93 |
| 43134 | - | 44134 | .3125 | 5/16" | 7.938 | 5/16" | 4" | 1-5/8" | 50.52 | 48.32 | 46.13 | 43.93 |
| 43144 | 55644 | 44144 | .3125 | 5/16" | 7.938 | 5/16" | 6" | 1-1/2" | 73.85 | 70.64 | 67.43 | 64.22 |
| 43154 | 55654 | 44154 | .3750 | 3/8" | 9.525 | 3/8" | 3" | 1" | 49.29 | 47.15 | 45.00 | 42.86 |
| 43164 | 55664 | 44164 | .3750 | 3/8" | 9.525 | 3/8" | 4" | 1" | 55.04 | 52.65 | 50.25 | 47.86 |
| 43174 | 55674 | 44174 | .3750 | 3/8" | 9.525 | 3/8" | 4" | 2" | 55.04 | 52.65 | 50.25 | 47.86 |
| 43184 | 55684 | 44184 | .3750 | 3/8" | 9.525 | 3/8" | 6" | 1-1/2" | 76.07 | 72.77 | 69.46 | 66.15 |
| - | 55694 | 44194 | .3750 | 3/8" | 9.525 | 3/8" | 6" | 3" | 76.07 | 72.77 | 69.46 | 66.15 |
| - | - | 44204 | .4375 | 7/16" | 11.113 | 7/16" | 4" | 1" | 74.39 | 71.16 | 67.92 | 64.69 |
| - | - | 44214 | .4375 | 7/16" | 11.113 | 7/16" | 4" | 2" | 74.39 | 71.16 | 67.92 | 64.69 |
| 43224 | 55724 | 44224 | .4375 | 7/16" | 11.113 | 7/16" | 6" | 1-1/2" | 97.80 | 93.54 | 89.29 | 85.04 |
| - | - | 44234 | .4375 | 7/16" | 11.113 | 7/16" | 6" | 3" | 97.80 | 93.54 | 89.29 | 85.04 |
| 43244 | 55744 | 44244 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 1" | 75.77 | 72.48 | 69.18 | 65.89 |
| 43254 | 55754 | 44254 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 2" | 75.77 | 72.48 | 69.18 | 65.89 |
| 43264 | 55764 | 44264 | .5000 | 1/2" | 12.700 | 1/2" | 6" | 1-1/2" | 107.32 | 102.65 | 97.99 | 93.32 |
| 43274 | 55774 | 44274 | .5000 | 1/2" | 12.700 | 1/2" | 6" | 3" | 107.32 | 102.65 | 97.99 | 93.32 |
| - | - | 44284 | .5625 | 9/16" | 14.288 | 9/16" | 6" | 2" | 147.57 | 141.15 | 134.74 | 128.32 |
| - | - | 44294 | .5625 | 9/16" | 14.288 | 9/16" | 6" | 3" | 147.57 | 141.15 | 134.74 | 128.32 |
| 43304 | 55804 | 44304 | .6250 | 5/8" | 15.875 | 5/8" | 6" | 2" | 154.56 | 147.84 | 141.12 | 134.40 |
| - | - | 44314 | .6250 | 5/8" | 15.875 | 5/8" | 6" | 3" | 154.56 | 147.84 | 141.12 | 134.40 |
| 43324 | 55824 | 44324 | .7500 | 3/4" | 19.050 | 3/4" | 6" | 2" | 245.24 | 234.58 | 223.91 | 213.25 |
| 43334 | 55834 | 44334 | .7500 | 3/4" | 19.050 | 3/4" | 6" | 3" | 245.24 | 234.58 | 223.91 | 213.25 |
| - | 55844 | 44344 | 1.000 | 1" | 25.400 | 1" | 6" | 2" | 411.55 | 393.66 | 375.76 | 357.87 |
| 43354 | 55854 | 44354 | 1.000 | 1" | 25.400 | 1" | 6" | 3" | 411.55 | 393.66 | 375.76 | 357.87 |

# Series 720MA, 723MA, 730MA, 740MA, 743MA, 750MA

.1181" - .3150"
(3.000mm - 8.000mm)




TECH PAGES 284-285

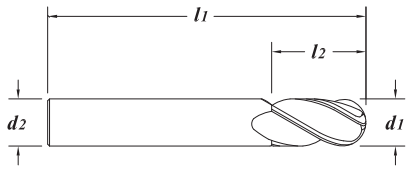
| TOLERANCES | |
|---|---|
| $d_1$ | +.000" –.002" (+.000 –.050mm) |
| $d_2$ | h6 |
| ball radius | +.000" –.001" (+.000 –.025mm) |

## Extra Length - Ball End

### TiALN Coating

Solid submicron grain carbide end mill - center cutting
Extended reach
Dry or semi-dry machining
Can be modified with a neck within 48 hours
Extremely versatile
Bright Finish - page 249
TiCN Coating - page 251
Stub Length - page 217
Standard length - page 234






MATERIAL HARDNESS (Rc)
70
35
0

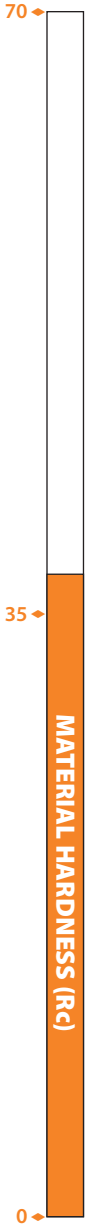
| (720MA/740MA) 2 Flute EDP# | (723MA/743MA) 3 Flute EDP# | (730MA/750MA) 4 Flute EDP# | $d_1$ † Diameter Decimal | $d_1$ † Diameter | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 97017 | 98017 | 99017 | .1181 | | 3.000 | 3.0 | 50 | 16 | 17.58 | 16.82 | 16.05 | 15.29 |
| 97027 | 98027 | 99027 | .1181 | | 3.000 | 3.0 | 75 | 20 | 28.11 | 26.88 | 25.66 | 24.44 |
| 97037 | 98037 | 99037 | .1181 | | 3.000 | 3.0 | 75 | 25 | 28.11 | 26.88 | 25.66 | 24.44 |
| 43017 | 55517 | 44017 | .1250 | 1/8" | 3.175 | 1/8" | 2" | 5/8" | 18.32 | 17.52 | 16.73 | 15.93 |
| 43027 | 55527 | 44027 | .1250 | 1/8" | 3.175 | 1/8" | 3" | 3/4" | 27.44 | 26.25 | 25.05 | 23.86 |
| 43037 | 55537 | 44037 | .1250 | 1/8" | 3.175 | 1/8" | 3" | 1" | 27.44 | 26.25 | 25.05 | 23.86 |
| 97047 | 98047 | 99047 | .1575 | | 4.000 | 4.0 | 50 | 16 | 18.78 | 17.96 | 17.15 | 16.33 |
| 97057 | 98057 | 99057 | .1575 | | 4.000 | 4.0 | 75 | 20 | 30.15 | 28.84 | 27.53 | 26.22 |
| 97067 | 98067 | 99067 | .1575 | | 4.000 | 4.0 | 75 | 25 | 30.15 | 28.84 | 27.53 | 26.22 |
| 43047 | 55547 | 44047 | .1875 | 3/16" | 4.763 | 3/16" | 3" | 1" | 30.82 | 29.48 | 28.14 | 26.80 |
| 43057 | 55557 | 44057 | .1875 | 3/16" | 4.763 | 3/16" | 3" | 1-1/8" | 30.82 | 29.48 | 28.14 | 26.80 |
| 43067 | 55567 | 44067 | .1875 | 3/16" | 4.763 | 3/16" | 4" | 1" | 33.55 | 32.09 | 30.63 | 29.17 |
| 97087 | 98087 | 99087 | .1969 | | 5.000 | 5.0 | 75 | 20 | 33.58 | 32.12 | 30.66 | 29.20 |
| 97097 | 98097 | 99097 | .1969 | | 5.000 | 5.0 | 75 | 25 | 33.58 | 32.12 | 30.66 | 29.20 |
| 97107 | 98107 | 99107 | .2362 | | 6.000 | 6.0 | 75 | 25 | 38.00 | 36.34 | 34.69 | 33.04 |
| 97117 | 98117 | 99117 | .2362 | | 6.000 | 6.0 | 100 | 25 | 40.65 | 38.89 | 37.12 | 35.35 |
| 97127 | 98127 | 99127 | .2362 | | 6.000 | 6.0 | 100 | 32 | 40.65 | 38.89 | 37.12 | 35.35 |
| 97137 | 98137 | 99137 | .2362 | | 6.000 | 6.0 | 150 | 38 | 53.56 | 51.23 | 48.90 | 46.57 |
| 43077 | 55577 | 44077 | .2500 | 1/4" | 6.350 | 1/4" | 3" | 1" | 36.40 | 34.82 | 33.23 | 31.65 |
| 43087 | 55587 | 44087 | .2500 | 1/4" | 6.350 | 1/4" | 4" | 1" | 38.96 | 37.27 | 35.57 | 33.88 |
| 43097 | 55597 | 44097 | .2500 | 1/4" | 6.350 | 1/4" | 4" | 1-1/2" | 38.96 | 37.27 | 35.57 | 33.88 |
| 43107 | 55607 | 44107 | .2500 | 1/4" | 6.350 | 1/4" | 6" | 1-1/2" | 51.35 | 49.12 | 46.88 | 44.65 |
| 43117 | - | 44117 | .3125 | 5/16" | 7.938 | 5/16" | 3" | 1" | 46.41 | 44.40 | 42.38 | 40.36 |
| 43127 | 55627 | 44127 | .3125 | 5/16" | 7.938 | 5/16" | 4" | 1" | 53.06 | 50.75 | 48.45 | 46.14 |
| 43137 | 55637 | 44137 | .3125 | 5/16" | 7.938 | 5/16" | 4" | 1-5/8" | 53.06 | 50.75 | 48.45 | 46.14 |
| 43147 | 55647 | 44147 | .3125 | 5/16" | 7.938 | 5/16" | 6" | 1-1/2" | 77.50 | 74.13 | 70.76 | 67.39 |
| 97147 | 98147 | 99147 | .3150 | | 8.000 | 8.0 | 75 | 25 | 48.39 | 46.29 | 44.18 | 42.08 |
| 97157 | 98157 | 99157 | .3150 | | 8.000 | 8.0 | 100 | 25 | 55.28 | 52.88 | 50.47 | 48.07 |
| 97167 | 98167 | 99167 | .3150 | | 8.000 | 8.0 | 100 | 41 | 55.28 | 52.88 | 50.47 | 48.07 |
| 97177 | 98177 | 99177 | .3150 | | 8.000 | 8.0 | 150 | 50 | 79.15 | 75.71 | 72.27 | 68.83 |



† *Metric equivalents are for reference only*

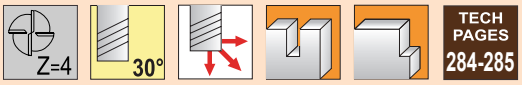
.3750" - 1.000"
(9.525mm - 25.400mm)

| (720MA/740MA) 2 Flute EDP# | (723MA/743MA) 3 Flute EDP# | (730MA/750MA) 4 Flute EDP# | $d_1$ † Diameter Decimal | $d_1$ † Diameter | $d_1$ † Diameter Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 43157 | 55657 | 44157 | .3750 | 3/8" | 9.525 | 3/8" | 3" | 1" | 51.16 | 48.94 | 46.71 | 44.49 |
| 43167 | 55667 | 44167 | .3750 | 3/8" | 9.525 | 3/8" | 4" | 1" | 57.58 | 55.08 | 52.57 | 50.07 |
| 43177 | 55677 | 44177 | .3750 | 3/8" | 9.525 | 3/8" | 4" | 2" | 57.58 | 55.08 | 52.57 | 50.07 |
| 43187 | 55687 | 44187 | .3750 | 3/8" | 9.525 | 3/8" | 6" | 1-1/2" | 79.72 | 76.25 | 72.79 | 69.32 |
| 43197 | 55697 | 44197 | .3750 | 3/8" | 9.525 | 3/8" | 6" | 3" | 79.72 | 76.25 | 72.79 | 69.32 |
| 97187 | 98187 | 99187 | .3937 | | 10.000 | 10.0 | 75 | 25 | 55.78 | 53.35 | 50.93 | 48.50 |
| 97197 | 98197 | 99197 | .3937 | | 10.000 | 10.0 | 100 | 25 | 72.90 | 69.73 | 66.56 | 63.39 |
| 97207 | 98207 | 99207 | .3937 | | 10.000 | 10.0 | 100 | 50 | 72.90 | 69.73 | 66.56 | 63.39 |
| 97217 | 98217 | 99217 | .3937 | | 10.000 | 10.0 | 150 | 38 | 95.24 | 91.10 | 86.96 | 82.82 |
| 97227 | 98227 | 99227 | .3937 | | 10.000 | 10.0 | 150 | 75 | 95.24 | 91.10 | 86.96 | 82.82 |
| 43207 | - | 44207 | .4375 | 7/16" | 11.113 | 7/16" | 4" | 1" | 77.00 | 73.66 | 70.31 | 66.96 |
| - | 55717 | 44217 | .4375 | 7/16" | 11.113 | 7/16" | 4" | 2" | 77.00 | 73.66 | 70.31 | 66.96 |
| 43227 | - | 44227 | .4375 | 7/16" | 11.113 | 7/16" | 6" | 1-1/2" | 101.35 | 96.94 | 92.54 | 88.13 |
| 43237 | 55737 | 44237 | .4375 | 7/16" | 11.113 | 7/16" | 6" | 3" | 101.35 | 96.94 | 92.54 | 88.13 |
| 97237 | - | 99237 | .4724 | | 12.000 | 12.0 | 100 | 25 | 81.89 | 78.33 | 74.77 | 71.21 |
| 97247 | 98247 | 99247 | .4724 | | 12.000 | 12.0 | 100 | 50 | 81.89 | 78.33 | 74.77 | 71.21 |
| 97257 | 98257 | 99257 | .4724 | | 12.000 | 12.0 | 150 | 50 | 110.84 | 106.02 | 101.20 | 96.38 |
| 97267 | 98267 | 99267 | .4724 | | 12.000 | 12.0 | 150 | 75 | 110.84 | 106.02 | 101.20 | 96.38 |
| 43247 | 55747 | 44247 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 1" | 78.37 | 74.97 | 71.56 | 68.15 |
| 43257 | 55757 | 44257 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 2" | 78.37 | 74.97 | 71.56 | 68.15 |
| 43267 | 55767 | 44267 | .5000 | 1/2" | 12.700 | 1/2" | 6" | 1-1/2" | 110.84 | 106.02 | 101.20 | 96.38 |
| 43277 | 55777 | 44277 | .5000 | 1/2" | 12.700 | 1/2" | 6" | 3" | 110.84 | 106.02 | 101.20 | 96.38 |
| 97277 | - | 99277 | .5512 | | 14.000 | 14.0 | 100 | 25 | 109.96 | 105.18 | 100.40 | 95.62 |
| - | - | 99287 | .5512 | | 14.000 | 14.0 | 100 | 50 | 109.96 | 105.18 | 100.40 | 95.62 |
| 97297 | - | 99297 | .5512 | | 14.000 | 14.0 | 150 | 50 | 150.97 | 144.41 | 137.84 | 131.28 |
| - | - | 99307 | .5512 | | 14.000 | 14.0 | 150 | 75 | 150.97 | 144.41 | 137.84 | 131.28 |
| 43287 | - | 44287 | .5625 | 9/16" | 14.288 | 9/16" | 6" | 2" | 150.97 | 144.41 | 137.84 | 131.28 |
| 43297 | - | 44297 | .5625 | 9/16" | 14.288 | 9/16" | 6" | 3" | 150.97 | 144.41 | 137.84 | 131.28 |
| 43307 | 55807 | 44307 | .6250 | 5/8" | 15.875 | 5/8" | 6" | 2" | 157.99 | 151.12 | 144.25 | 137.38 |
| 43317 | 55817 | 44317 | .6250 | 5/8" | 15.875 | 5/8" | 6" | 3" | 157.99 | 151.12 | 144.25 | 137.38 |
| 97317 | 98317 | 99317 | .6299 | | 16.000 | 16.0 | 150 | 50 | 157.99 | 151.12 | 144.25 | 137.38 |
| 97327 | 98327 | 99327 | .6299 | | 16.000 | 16.0 | 150 | 75 | 157.99 | 151.12 | 144.25 | 137.38 |
| - | 98337 | 99337 | .7087 | | 18.000 | 18.0 | 150 | 50 | 235.32 | 225.09 | 214.86 | 204.63 |
| - | - | 99347 | .7087 | | 18.000 | 18.0 | 150 | 75 | 235.32 | 225.09 | 214.86 | 204.63 |
| 43327 | 55827 | 44327 | .7500 | 3/4" | 19.050 | 3/4" | 6" | 2" | 249.47 | 238.62 | 227.78 | 216.93 |
| 43337 | 55837 | 44337 | .7500 | 3/4" | 19.050 | 3/4" | 6" | 3" | 249.47 | 238.62 | 227.78 | 216.93 |
| 97357 | 98357 | 99357 | .7874 | | 20.000 | 20.0 | 150 | 50 | 263.43 | 251.98 | 240.52 | 229.07 |
| 97367 | 98367 | 99367 | .7874 | | 20.000 | 20.0 | 150 | 75 | 263.43 | 251.98 | 240.52 | 229.07 |
| - | - | 99377 | .9843 | | 25.000 | 25.0 | 150 | 50 | 400.04 | 382.65 | 365.25 | 347.86 |
| - | - | 99387 | .9843 | | 25.000 | 25.0 | 150 | 75 | 400.04 | 382.65 | 365.25 | 347.86 |
| - | 55847 | 44347 | 1.000 | 1" | 25.400 | 1" | 6" | 2" | 414.81 | 396.77 | 378.74 | 360.70 |
| 43357 | 55857 | 44357 | 1.000 | 1" | 25.400 | 1" | 6" | 3" | 414.81 | 396.77 | 378.74 | 360.70 |



# Series 435M, 435MA

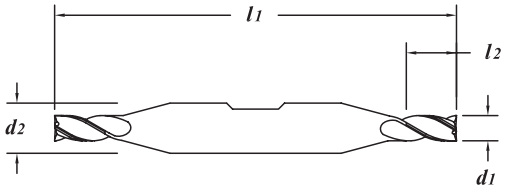
| TOLERANCES | |
|---|---|
| $d_1$ | +.000" –.002" (+.000 –.050mm) |
| $d_2$ | -.0001" -.0005" (-.0025 - .0127mm) |




## Standard Length - Double End - 3/8" Shank

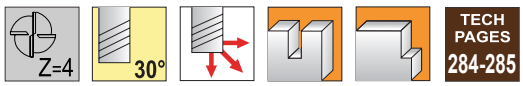


Solid submicron grain carbide end mill - center cutting
Common 3/8" diameter shank with weldon flat
For strength and adaptability when converting from high speed steel




| (435M) EDP# | $d_1$ † Diameter Decimal | Diameter | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|
| 34010 | .1250 | 1/8" | 3.175 | 3/8" | 3" | 3/8" | 39.46 | 37.74 | 36.03 | 34.31 |
| 34020 | .1562 | 5/32" | 3.967 | 3/8" | 3" | 7/16" | 39.46 | 37.74 | 36.03 | 34.31 |
| 34030 | .1875 | 3/16" | 4.763 | 3/8" | 3" | 1/2" | 39.46 | 37.74 | 36.03 | 34.31 |
| 34050 | .2500 | 1/4" | 6.350 | 3/8" | 3" | 5/8" | 39.46 | 37.74 | 36.03 | 34.31 |
| 34060 | .2812 | 9/32" | 7.142 | 3/8" | 4" | 11/16" | 45.34 | 43.37 | 41.40 | 39.43 |
| 34070 | .3125 | 5/16" | 7.938 | 3/8" | 4" | 3/4" | 45.34 | 43.37 | 41.40 | 39.43 |
| 34090 | .3750 | 3/8" | 9.525 | 3/8" | 4" | 3/4" | 45.34 | 43.37 | 41.40 | 39.43 |

MATERIAL HARDNESS (Rc)
70
35
0

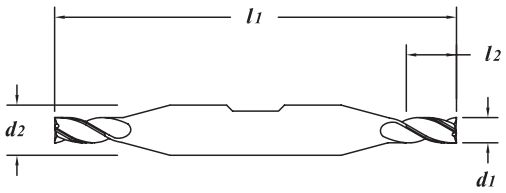



## Standard Length - Double End - 3/8" Shank



**TiALN Coated**

Solid submicron grain carbide end mill - center cutting
Common 3/8" diameter shank with weldon flat
For strength and adaptability when converting from high speed steel
Dry or semi-dry machining



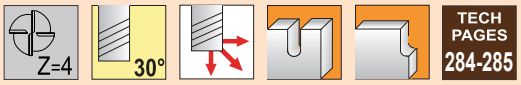

| (435MA) EDP# | $d_1$ † Diameter Decimal | Diameter | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|
| 34017 | .1250 | 1/8" | 3.175 | 3/8" | 3" | 3/8" | 51.93 | 49.68 | 47.42 | 45.16 |
| 34027 | .1562 | 5/32" | 3.967 | 3/8" | 3" | 7/16" | 51.93 | 49.68 | 47.42 | 45.16 |
| 34037 | .1875 | 3/16" | 4.763 | 3/8" | 3" | 1/2" | 51.93 | 49.68 | 47.42 | 45.16 |
| 34047 | .2188 | 7/32" | 5.558 | 3/8" | 3" | 9/16" | 51.93 | 49.68 | 47.42 | 45.16 |
| 34057 | .2500 | 1/4" | 6.350 | 3/8" | 3" | 5/8" | 51.93 | 49.68 | 47.42 | 45.16 |
| 34067 | .2812 | 9/32" | 7.142 | 3/8" | 4" | 11/16" | 61.17 | 58.51 | 55.85 | 53.19 |
| 34077 | .3125 | 5/16" | 7.938 | 3/8" | 4" | 3/4" | 61.17 | 58.51 | 55.85 | 53.19 |
| 34097 | .3750 | 3/8" | 9.525 | 3/8" | 4" | 3/4" | 61.17 | 58.51 | 55.85 | 53.19 |



† *Metric equivalents are for reference only*

**TOLERANCES**

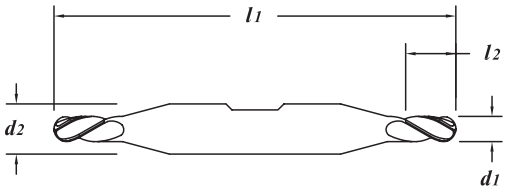
| | |
|---|---|
| $d_1$ | +.000" –.002" (+.000 –.050mm) |
| $d_2$ | -.0001" -.0005" (-.0025 - .0127mm) |
| *ball radius* | +.000" –.001" (+.000 –.025mm) |



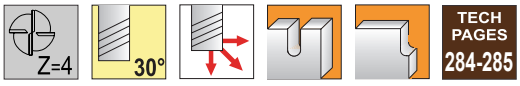

## Standard Length - Double End - 3/8" Shank - Ball End



Solid submicron grain carbide end mill - center cutting
Common 3/8" diameter shank with weldon flat
For strength and adaptability when converting from high speed steel




| (535M) EDP# | $d_1$ † Diameter Decimal | Diameter | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|
| 36010 | .1250 | 1/8" | 3.175 | 3/8" | 3" | 3/8" | 46.41 | 44.40 | 42.38 | 40.36 |
| 36030 | .1875 | 3/16" | 4.763 | 3/8" | 3" | 1/2" | 46.41 | 44.40 | 42.38 | 40.36 |

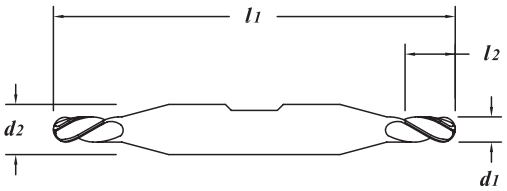



## Standard Length - Double End - 3/8" Shank - Ball End



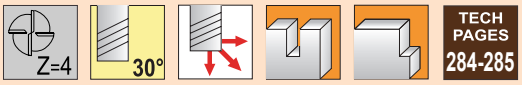
**TiALN Coated**

Solid submicron grain carbide end mill - center cutting
Common 3/8" diameter shank with weldon flat
For strength and adaptability when converting from high speed steel
Dry or semi-dry machining




| (535MA) EDP# | $d_1$ † Diameter Decimal | Diameter | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|
| 36017 | .1250 | 1/8" | 3.175 | 3/8" | 3" | 3/8" | 58.88 | 56.32 | 53.76 | 51.20 |
| 36027 | .1562 | 5/32" | 3.967 | 3/8" | 3" | 7/16" | 58.88 | 56.32 | 53.76 | 51.20 |
| 36037 | .1875 | 3/16" | 4.763 | 3/8" | 3" | 1/2" | 58.88 | 56.32 | 53.76 | 51.20 |
| 36057 | .2500 | 1/4" | 6.350 | 3/8" | 3" | 5/8" | 58.88 | 56.32 | 53.76 | 51.20 |
| 36077 | .3125 | 5/16" | 7.938 | 3/8" | 4" | 3/4" | 69.15 | 66.14 | 63.14 | 60.13 |

# Series 430M




| TOLERANCES | |
|---|---|
| $d_1$ | +.000" –.002" (+.000 –.050mm) |
| $d_2$ | h6 |

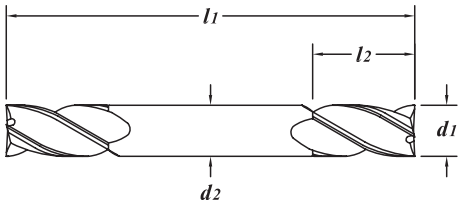
## Standard Length - Double End

Solid submicron grain carbide end mill - center cutting

Extremely versatile

TiALN Coating - page 257






70

35

0

MATERIAL HARDNESS (Rc)

| EDP# | $d_1$ † Diameter Decimal | Diameter | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|
| 30030 | .0625 | 1/16" | 1.588 | 1/8" | 2" | 3/16" | 23.89 | 22.85 | 21.81 | 20.77 |
| 30040 | .0938 | 3/32" | 2.383 | 1/8" | 2" | 1/4" | 23.89 | 22.85 | 21.81 | 20.77 |
| 30050 | .1250 | 1/8" | 3.175 | 1/8" | 2" | 3/8" | 17.26 | 16.51 | 15.76 | 15.01 |
| 30060 | .1562 | 5/32" | 3.967 | 3/16" | 2-1/2" | 7/16" | 24.66 | 23.58 | 22.51 | 21.44 |
| 30070 | .1875 | 3/16" | 4.763 | 3/16" | 2-1/2" | 1/2" | 20.63 | 19.73 | 18.84 | 17.94 |
| 30090 | .2500 | 1/4" | 6.350 | 1/4" | 2-1/2" | 5/8" | 25.02 | 23.94 | 22.85 | 21.76 |
| 30100 | .3125 | 5/16" | 7.938 | 5/16" | 3-1/2" | 3/4" | 32.66 | 31.24 | 29.82 | 28.40 |
| 30110 | .3750 | 3/8" | 9.525 | 3/8" | 3-1/2" | 3/4" | 42.18 | 40.35 | 38.51 | 36.68 |
| 30130 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 1" | 67.36 | 64.43 | 61.50 | 58.57 |

† *Metric equivalents are for reference only*

| TOLERANCES | |
|---|---|
| $d_1$ | +.000" –.002" (+.000 –.050mm) |
| $d_2$ | h6 |

Z=4 | 30° | TECH PAGES 284-285

## Standard Length - Double End

### TiALN Coating

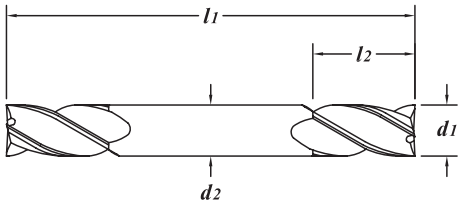
Solid submicron grain carbide end mill - center cutting

Dry or semi-dry machining

Extremely versatile

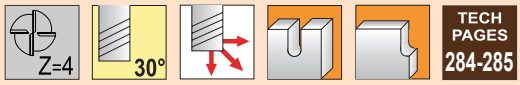
Bright Finish - page 256






| (430MA/450MA) EDP# | $d_1$ † Diameter Decimal | Diameter | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|
| 30017 | .0312 | 1/32" | 0.792 | 1/8" | 2" | 3/32" | 27.92 | 26.71 | 25.49 | 24.28 |
| 30027 | .0469 | 3/64" | 1.191 | 1/8" | 2" | 1/8" | 27.92 | 26.71 | 25.49 | 24.28 |
| 30037 | .0625 | 1/16" | 1.588 | 1/8" | 2" | 3/16" | 27.92 | 26.71 | 25.49 | 24.28 |
| 30047 | .0938 | 3/32" | 2.383 | 1/8" | 2" | 1/4" | 27.92 | 26.71 | 25.49 | 24.28 |
| 30057 | .1250 | 1/8" | 3.175 | 1/8" | 2" | 3/8" | 21.30 | 20.37 | 19.45 | 18.52 |
| 30067 | .1562 | 5/32" | 3.967 | 3/16" | 2-1/2" | 7/16" | 30.94 | 29.59 | 28.25 | 26.90 |
| 30077 | .1875 | 3/16" | 4.763 | 3/16" | 2-1/2" | 1/2" | 26.93 | 25.76 | 24.59 | 23.42 |
| 30087 | .2188 | 7/32" | 5.558 | 1/4" | 2-1/2" | 9/16" | 35.80 | 34.24 | 32.69 | 31.13 |
| 30607 | .2362 | | 6.000 | 6.0 | 65 | 16 | 34.65 | 33.14 | 31.64 | 30.13 |
| 30097 | .2500 | 1/4" | 6.350 | 1/4" | 2-1/2" | 5/8" | 33.37 | 31.92 | 30.47 | 29.02 |
| 30107 | .3125 | 5/16" | 7.938 | 5/16" | 3-1/2" | 3/4" | 48.50 | 46.39 | 44.28 | 42.17 |
| 30117 | .3750 | 3/8" | 9.525 | 3/8" | 3-1/2" | 3/4" | 58.04 | 55.52 | 52.99 | 50.47 |
| 30127 | .4375 | 7/16" | 11.113 | 7/16" | 4" | 7/8" | 78.30 | 74.90 | 71.49 | 68.09 |
| 30137 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 1" | 85.71 | 81.98 | 78.26 | 74.53 |

# Series 530M




| TOLERANCES | |
|---|---|
| $d_1$ | +.000" –.002" (+.000 –.050mm) |
| $d_2$ | h6 |
| ball radius | +.000" –.001" (+.000 –.025mm) |

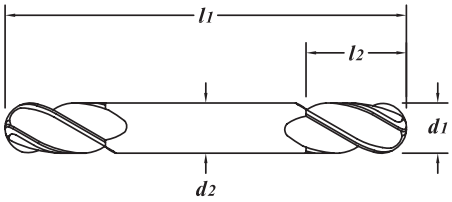
## Standard Length - Double End - Ball End

Solid submicron grain carbide end mill - center cutting

Extremely versatile

TiALN Coating - page 259






70
35
0

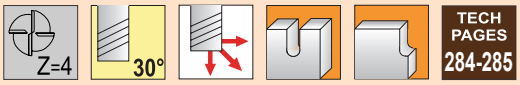
MATERIAL HARDNESS (Rc)

| EDP# | $d_1$ † Diameter Decimal | Diameter | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|
| 32050 | .1250 | 1/8" | 3.175 | 1/8" | 2" | 3/8" | 19.83 | 18.96 | 18.10 | 17.24 |
| 32070 | .1875 | 3/16" | 4.763 | 3/16" | 2-1/2" | 1/2" | 24.29 | 23.23 | 22.18 | 21.12 |
| 32090 | .2500 | 1/4" | 6.350 | 1/4" | 2-1/2" | 5/8" | 28.82 | 27.57 | 26.31 | 25.06 |
| 32110 | .3750 | 3/8" | 9.525 | 3/8" | 3-1/2" | 3/4" | 48.54 | 46.43 | 44.32 | 42.21 |
| 32130 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 1" | 77.46 | 74.10 | 70.73 | 67.36 |



† *Metric equivalents are for reference only*

| TOLERANCES | |
|---|---|
| $d_1$ | +.000" –.002" (+.000 –.050mm) |
| $d_2$ | h6 |
| *ball radius* | +.000" –.001" (+.000 –.025mm) |




TECH PAGES 284-285

## Standard Length - Double End - Ball End

### TiALN Coating

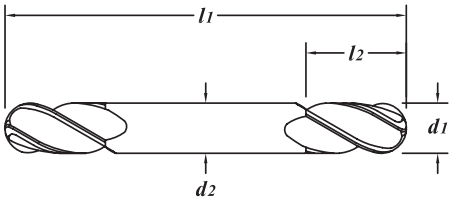
Solid submicron grain carbide end mill - center cutting

Dry or semi-dry machining

Extremely versatile

Bright Finish - page 258

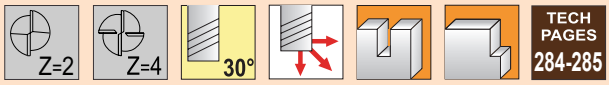





| EDP# | $d_1$ † Diameter Decimal | Diameter | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|
| 32017 | .0312 | 1/32" | 0.792 | 1/8" | 2" | 3/32" | 31.52 | 30.15 | 28.78 | 27.41 |
| 32027 | .0469 | 3/64" | 1.191 | 1/8" | 2" | 1/8" | 31.52 | 30.15 | 28.78 | 27.41 |
| 32037 | .0625 | 1/16" | 1.588 | 1/8" | 2" | 3/16" | 31.52 | 30.15 | 28.78 | 27.41 |
| 32047 | .0938 | 3/32" | 2.383 | 1/8" | 2" | 1/4" | 31.52 | 30.15 | 28.78 | 27.41 |
| 32057 | .1250 | 1/8" | 3.175 | 1/8" | 2" | 3/8" | 23.87 | 22.84 | 21.80 | 20.76 |
| 32067 | .1562 | 5/32" | 3.967 | 3/16" | 2-1/2" | 7/16" | 34.65 | 33.14 | 31.64 | 30.13 |
| 32077 | .1875 | 3/16" | 4.763 | 3/16" | 2-1/2" | 1/2" | 30.58 | 29.25 | 27.92 | 26.59 |
| 32097 | .2500 | 1/4" | 6.350 | 1/4" | 2-1/2" | 5/8" | 37.16 | 35.54 | 33.93 | 32.31 |
| 32117 | .3750 | 3/8" | 9.525 | 3/8" | 3-1/2" | 3/4" | 64.38 | 61.58 | 58.78 | 55.98 |
| 32137 | .5000 | 1/2" | 12.700 | 1/2" | 4" | 1" | 95.82 | 91.65 | 87.49 | 83.32 |

# Series 280M, 290M, 380M, 390M

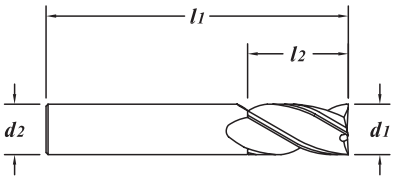
| TOLERANCES | |
|---|---|
| $d_1$ | +.001" –.000" (+.025 –.000mm) |
| $d_2$ | h6 |




## Standard Length - N/C Tolerance - Square End

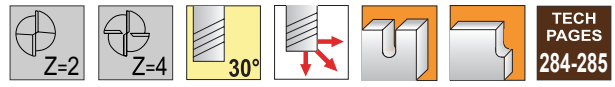


Solid submicron grain carbide end mill - center cutting
Excellent for keyways
Tight tolerance for precision machining
For use when matching tools are necessary




70

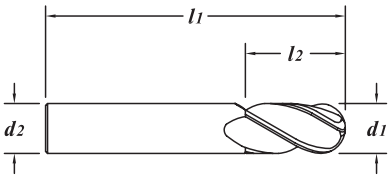
| (280M) 2 Flute EDP# | (290M) 4 Flute EDP# | $d_1$ † Diameter Decimal | Diameter | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 25010 | 26010 | .0625 | 1/16" | 1.588 | 1/8" | 1-1/2" | 1/4" | 14.74 | 14.10 | 13.46 | 12.82 |
| 25020 | 26020 | .0938 | 3/32" | 2.383 | 1/8" | 1-1/2" | 5/16" | 13.97 | 13.37 | 12.76 | 12.15 |
| 25030 | 26030 | .1250 | 1/8" | 3.175 | 1/8" | 1-1/2" | 1/2" | 13.56 | 12.97 | 12.38 | 11.79 |
| 25040 | 26040 | .1875 | 3/16" | 4.763 | 3/16" | 2" | 9/16" | 18.03 | 17.25 | 16.46 | 15.68 |
| 25050 | * 26050 | .2500 | 1/4" | 6.350 | 1/4" | 2-1/2" | 3/4" | 20.73 | 19.83 | 18.93 | 18.03 |
| * 25070 | * 26070 | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 7/8" | 38.10 | 36.44 | 34.79 | 33.13 |
| * 25090 | * 26090 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1" | 61.03 | 58.38 | 55.72 | 53.07 |
| - | * 26100 | .6250 | 5/8" | 15.875 | 5/8" | 3-1/2" | 1-1/4" | 108.64 | 103.92 | 99.19 | 94.47 |






## Standard Length - N/C Tolerance - Ball End

Solid submicron grain carbide end mill - center cutting
Excellent for keyways
Tight tolerance for precision machining
For use when matching tools are necessary
Ball radius tolerance +.0005" –.0000" (+.0127mm –.0000mm)




35

| (380M) 2 Flute EDP# | (390M) 4 Flute EDP# | $d_1$ † Diameter Decimal | Diameter | Metric | $d_2$ Shank Diameter | $l_1$ Overall Length | $l_2$ Flute Length | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 27010 | 28010 | .0625 | 1/16" | 1.588 | 1/8" | 1-1/2" | 1/4" | 16.97 | 16.24 | 15.50 | 14.76 |
| 27030 | 28030 | .1250 | 1/8" | 3.175 | 1/8" | 1-1/2" | 1/2" | 15.59 | 14.92 | 14.24 | 13.56 |
| - | 28040 | .1875 | 3/16" | 4.763 | 3/16" | 2" | 9/16" | 20.73 | 19.83 | 18.93 | 18.03 |
| 27050 | 28050 | .2500 | 1/4" | 6.350 | 1/4" | 2-1/2" | 3/4" | 23.87 | 22.84 | 21.80 | 20.76 |
| - | 28060 | .3125 | 5/16" | 7.938 | 5/16" | 2-1/2" | 7/8" | 34.12 | 32.64 | 31.15 | 29.67 |
| * 27070 | * 28070 | .3750 | 3/8" | 9.525 | 3/8" | 2-1/2" | 7/8" | 43.84 | 41.93 | 40.03 | 38.12 |
| - | * 28090 | .5000 | 1/2" | 12.700 | 1/2" | 3" | 1" | 70.21 | 67.16 | 64.10 | 61.05 |
| - | * 28100 | .6250 | 5/8" | 15.875 | 5/8" | 3-1/2" | 1-1/4" | 124.98 | 119.55 | 114.11 | 108.68 |

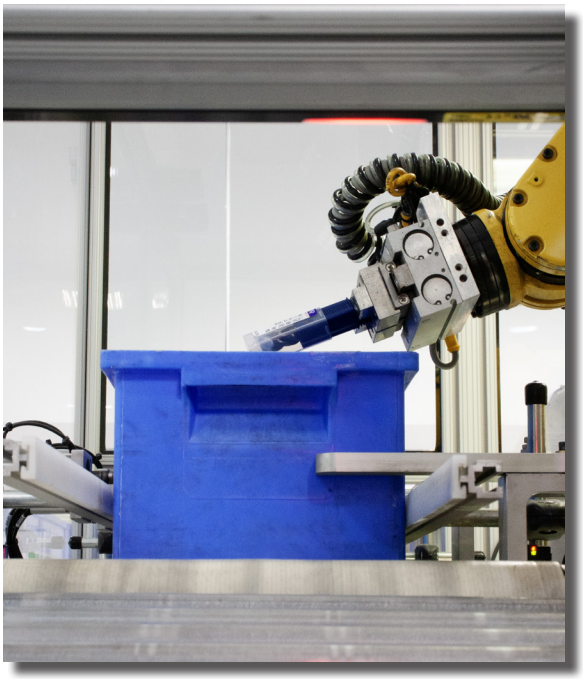
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MATERIAL HARDNESS (Rc)

* - Tools with weldon flats

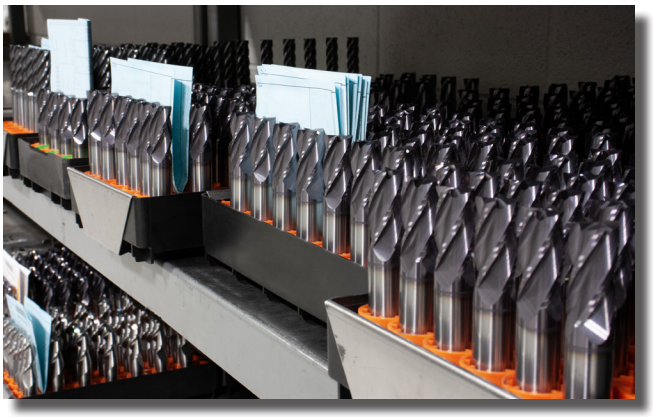


† *Metric equivalents are for reference only*





*Tool Packaging*





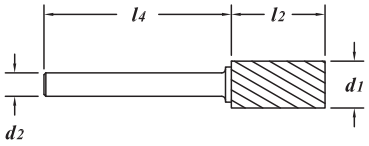


# **SA** (1/4" Steel Shank)

## Carbide Rotary Files - Cylindrical Shape

Submicron Grain Carbide
A - Aluminum Cut
D - Double Cut
* - Solid Carbide






| EDP# | TOOL # | d1 † Diameter Decimal | d1 † Diameter | d1 † Diameter Metric | d2 Shank Diameter | l2 Flute Length | l4 Shank Length | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 60010 | * SA-14 | .1875 | 3/16" | 4.763 | 1/4" | 5/8" | 1-3/8" | 9.94 | 9.50 | 9.07 | 8.64 |
| 60012 | * SA-14D | .1875 | 3/16" | 4.763 | 1/4" | 5/8" | 1-3/8" | 9.94 | 9.50 | 9.07 | 8.64 |
| 60020 | * SA-1 | .2500 | 1/4" | 6.350 | 1/4" | 5/8" | 1-3/8" | 8.84 | 8.46 | 8.07 | 7.69 |
| 60021 | * SA-1A | .2500 | 1/4" | 6.350 | 1/4" | 5/8" | 1-3/8" | 11.10 | 10.62 | 10.13 | 9.65 |
| 60022 | * SA-1D | .2500 | 1/4" | 6.350 | 1/4" | 5/8" | 1-3/8" | 8.84 | 8.46 | 8.07 | 7.69 |
| 60030 | SA-2 | .3125 | 5/16" | 7.938 | 1/4" | 3/4" | 1-3/4" | 12.35 | 11.81 | 11.28 | 10.74 |
| 60032 | SA-2D | .3125 | 5/16" | 7.938 | 1/4" | 3/4" | 1-3/4" | 12.35 | 11.81 | 11.28 | 10.74 |
| 60040 | SA-3 | .3750 | 3/8" | 9.525 | 1/4" | 3/4" | 1-3/4" | 13.32 | 12.74 | 12.16 | 11.58 |
| 60041 | SA-3A | .3750 | 3/8" | 9.525 | 1/4" | 3/4" | 1-3/4" | 17.92 | 17.14 | 16.36 | 15.58 |
| 60042 | SA-3D | .3750 | 3/8" | 9.525 | 1/4" | 3/4" | 1-3/4" | 13.32 | 12.74 | 12.16 | 11.58 |
| 60050 | SA-4 | .4375 | 7/16" | 11.113 | 1/4" | 1" | 1-3/4" | 18.38 | 17.58 | 16.78 | 15.98 |
| 60052 | SA-4D | .4375 | 7/16" | 11.113 | 1/4" | 1" | 1-3/4" | 18.38 | 17.58 | 16.78 | 15.98 |
| 60060 | SA-5 | .5000 | 1/2" | 12.700 | 1/4" | 1" | 1-3/4" | 19.62 | 18.77 | 17.91 | 17.06 |
| 60061 | SA-5A | .5000 | 1/2" | 12.700 | 1/4" | 1" | 1-3/4" | 25.42 | 24.31 | 23.21 | 22.10 |
| 60062 | SA-5D | .5000 | 1/2" | 12.700 | 1/4" | 1" | 1-3/4" | 19.62 | 18.77 | 17.91 | 17.06 |
| 60070 | SA-6 | .6250 | 5/8" | 15.875 | 1/4" | 1" | 1-3/4" | 23.76 | 22.73 | 21.69 | 20.66 |
| 60071 | SA-6A | .6250 | 5/8" | 15.875 | 1/4" | 1" | 1-3/4" | 39.82 | 38.09 | 36.36 | 34.63 |
| 60072 | SA-6D | .6250 | 5/8" | 15.875 | 1/4" | 1" | 1-3/4" | 23.76 | 22.73 | 21.69 | 20.66 |
| 60080 | SA-7 | .7500 | 3/4" | 19.050 | 1/4" | 1" | 1-3/4" | 37.62 | 35.98 | 34.35 | 32.71 |
| 60081 | SA-7A | .7500 | 3/4" | 19.050 | 1/4" | 1" | 1-3/4" | 45.13 | 43.16 | 41.20 | 39.24 |
| 60082 | SA-7D | .7500 | 3/4" | 19.050 | 1/4" | 1" | 1-3/4" | 37.62 | 35.98 | 34.35 | 32.71 |
| 60090 | SA-9 | 1.000 | 1" | 25.400 | 1/4" | 1" | 1-3/4" | 51.31 | 49.08 | 46.85 | 44.62 |
| 60091 | SA-9A | 1.000 | 1" | 25.400 | 1/4" | 1" | 1-3/4" | 61.54 | 58.86 | 56.19 | 53.51 |
| 60092 | SA-9D | 1.000 | 1" | 25.400 | 1/4" | 1" | 1-3/4" | 51.31 | 49.08 | 46.85 | 44.62 |

## Basic Rotary File Cut Styles Available



Standard Cut | Chipbreaker Cut | Double Cut (D) | Diamond Cut (add 20%) | Aluminum Cut (A) | End Cut (add 10%)

*Double Cut and Aluminum Cut rotary files are in stock where indicated by (D) and (A) in the catalog tables.*

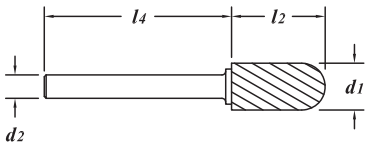


† *Metric equivalents are for reference only*

## Carbide Rotary Files - Cylindrical-Radius Shape

Submicron Grain Carbide
A - Aluminum Cut
D - Double Cut
* - Solid Carbide





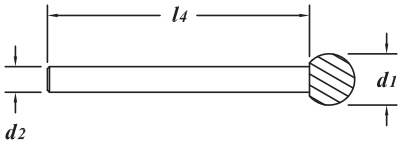

| EDP# | TOOL # | $d_1$ † Diameter Decimal | Diameter | Metric | $d_2$ Shank Diameter | $l_2$ Flute Length | $l_4$ Shank Length | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 61010 | * SC-14 | .1875 | 3/16" | 4.763 | 1/4" | 5/8" | 1-3/8" | 11.25 | 10.76 | 10.27 | 9.78 |
| 61012 | * SC-14D | .1875 | 3/16" | 4.763 | 1/4" | 5/8" | 1-3/8" | 11.25 | 10.76 | 10.27 | 9.78 |
| 61020 | * SC-1 | .2500 | 1/4" | 6.350 | 1/4" | 5/8" | 1-3/8" | 10.58 | 10.12 | 9.66 | 9.20 |
| 61021 | * SC-1A | .2500 | 1/4" | 6.350 | 1/4" | 5/8" | 1-3/8" | 13.97 | 13.37 | 12.76 | 12.15 |
| 61022 | * SC-1D | .2500 | 1/4" | 6.350 | 1/4" | 5/8" | 1-3/8" | 10.58 | 10.12 | 9.66 | 9.20 |
| 61030 | SC-2 | .3125 | 5/16" | 7.938 | 1/4" | 3/4" | 1-3/4" | 12.35 | 11.81 | 11.28 | 10.74 |
| 61032 | SC-2D | .3125 | 5/16" | 7.938 | 1/4" | 3/4" | 1-3/4" | 12.35 | 11.81 | 11.28 | 10.74 |
| 61040 | SC-3 | .3750 | 3/8" | 9.525 | 1/4" | 3/4" | 1-3/4" | 14.42 | 13.79 | 13.17 | 12.54 |
| 61041 | SC-3A | .3750 | 3/8" | 9.525 | 1/4" | 3/4" | 1-3/4" | 25.00 | 23.91 | 22.83 | 21.74 |
| 61042 | SC-3D | .3750 | 3/8" | 9.525 | 1/4" | 3/4" | 1-3/4" | 14.42 | 13.79 | 13.17 | 12.54 |
| 61050 | SC-4 | .4375 | 7/16" | 11.113 | 1/4" | 1" | 1-3/4" | 20.86 | 19.95 | 19.05 | 18.14 |
| 61052 | SC-4D | .4375 | 7/16" | 11.113 | 1/4" | 1" | 1-3/4" | 20.86 | 19.95 | 19.05 | 18.14 |
| 61060 | SC-5 | .5000 | 1/2" | 12.700 | 1/4" | 1" | 1-3/4" | 21.62 | 20.68 | 19.74 | 18.80 |
| 61061 | SC-5A | .5000 | 1/2" | 12.700 | 1/4" | 1" | 1-3/4" | 32.87 | 31.44 | 30.01 | 28.58 |
| 61062 | SC-5D | .5000 | 1/2" | 12.700 | 1/4" | 1" | 1-3/4" | 21.62 | 20.68 | 19.74 | 18.80 |
| 61070 | SC-6 | .6250 | 5/8" | 15.875 | 1/4" | 1" | 1-3/4" | 28.88 | 27.62 | 26.37 | 25.11 |
| 61071 | SC-6A | .6250 | 5/8" | 15.875 | 1/4" | 1" | 1-3/4" | 45.02 | 43.07 | 41.11 | 39.15 |
| 61072 | SC-6D | .6250 | 5/8" | 15.875 | 1/4" | 1" | 1-3/4" | 28.88 | 27.62 | 26.37 | 25.11 |
| 61080 | SC-7 | .7500 | 3/4" | 19.050 | 1/4" | 1" | 1-3/4" | 42.49 | 40.65 | 38.80 | 36.95 |
| 61081 | SC-7A | .7500 | 3/4" | 19.050 | 1/4" | 1" | 1-3/4" | 62.50 | 59.79 | 57.07 | 54.35 |
| 61082 | SC-7D | .7500 | 3/4" | 19.050 | 1/4" | 1" | 1-3/4" | 42.49 | 40.65 | 38.80 | 36.95 |

# **SD** (1/4" Steel Shank)

## Carbide Rotary Files - Ball Shape

Submicron Grain Carbide
A - Aluminum Cut
D - Double Cut
* - Solid Carbide






| EDP# | TOOL # | d1 † Diameter Decimal | d1 † Diameter | Metric | d2 Shank Diameter | l2 Flute Length | l4 Shank Length | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 62010 | * SD-14 | .1875 | 3/16" | 4.763 | 1/4" | - | 2" | 11.25 | 10.76 | 10.27 | 9.78 |
| 62012 | * SD-14D | .1875 | 3/16" | 4.763 | 1/4" | - | 2" | 11.25 | 10.76 | 10.27 | 9.78 |
| 62020 | * SD-1 | .2500 | 1/4" | 6.350 | 1/4" | - | 2" | 11.25 | 10.76 | 10.27 | 9.78 |
| 62021 | * SD-1A | .2500 | 1/4" | 6.350 | 1/4" | - | 2" | 17.83 | 17.05 | 16.28 | 15.50 |
| 62022 | * SD-1D | .2500 | 1/4" | 6.350 | 1/4" | - | 2" | 11.25 | 10.76 | 10.27 | 9.78 |
| 62030 | SD-2 | .3125 | 5/16" | 7.938 | 1/4" | - | 1-3/4" | 10.58 | 10.12 | 9.66 | 9.20 |
| 62032 | SD-2D | .3125 | 5/16" | 7.938 | 1/4" | - | 1-3/4" | 10.58 | 10.12 | 9.66 | 9.20 |
| 62040 | SD-3 | .3750 | 3/8" | 9.525 | 1/4" | - | 1-3/4" | 11.48 | 10.98 | 10.48 | 9.98 |
| 62041 | SD-3A | .3750 | 3/8" | 9.525 | 1/4" | - | 1-3/4" | 18.57 | 17.77 | 16.96 | 16.15 |
| 62042 | SD-3D | .3750 | 3/8" | 9.525 | 1/4" | - | 1-3/4" | 11.48 | 10.98 | 10.48 | 9.98 |
| 62050 | SD-4 | .4375 | 7/16" | 11.113 | 1/4" | - | 1-3/4" | 16.68 | 15.95 | 15.23 | 14.50 |
| 62052 | SD-4D | .4375 | 7/16" | 11.113 | 1/4" | - | 1-3/4" | 16.68 | 15.95 | 15.23 | 14.50 |
| 62060 | SD-5 | .5000 | 1/2" | 12.700 | 1/4" | - | 1-3/4" | 17.22 | 16.47 | 15.72 | 14.97 |
| 62061 | SD-5A | .5000 | 1/2" | 12.700 | 1/4" | - | 1-3/4" | 23.01 | 22.01 | 21.01 | 20.01 |
| 62062 | SD-5D | .5000 | 1/2" | 12.700 | 1/4" | - | 1-3/4" | 17.22 | 16.47 | 15.72 | 14.97 |
| 62070 | SD-6 | .6250 | 5/8" | 15.875 | 1/4" | - | 1-3/4" | 19.24 | 18.40 | 17.57 | 16.73 |
| 62071 | SD-6A | .6250 | 5/8" | 15.875 | 1/4" | - | 1-3/4" | 39.82 | 38.09 | 36.36 | 34.63 |
| 62072 | SD-6D | .6250 | 5/8" | 15.875 | 1/4" | - | 1-3/4" | 19.24 | 18.40 | 17.57 | 16.73 |
| 62080 | SD-7 | .7500 | 3/4" | 19.050 | 1/4" | - | 1-3/4" | 27.40 | 26.21 | 25.02 | 23.83 |
| 62082 | SD-7D | .7500 | 3/4" | 19.050 | 1/4" | - | 1-3/4" | 27.40 | 26.21 | 25.02 | 23.83 |
| 62090 | SD-9 | 1.000 | 1" | 25.400 | 1/4" | - | 1-3/4" | 50.82 | 48.61 | 46.40 | 44.19 |
| 62092 | SD-9D | 1.000 | 1" | 25.400 | 1/4" | - | 1-3/4" | 50.82 | 48.61 | 46.40 | 44.19 |

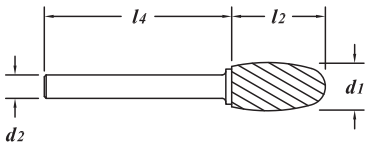


† *Metric equivalents are for reference only*

## Carbide Rotary Files - Egg Shape

Submicron Grain Carbide
A - Aluminum Cut
D - Double Cut
* - Solid Carbide



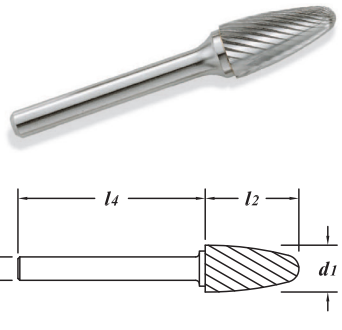



| EDP# | TOOL # | $d_1$ † Diameter Decimal | $d_1$ † Diameter | $d_1$ † Diameter Metric | $d_2$ Shank Diameter | $l_2$ Flute Length | $l_4$ Shank Length | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 63010 | * SE-1 | .2500 | 1/4" | 6.350 | 1/4" | 3/8" | 2" | 11.56 | 11.06 | 10.55 | 10.05 |
| 63012 | * SE-1D | .2500 | 1/4" | 6.350 | 1/4" | 3/8" | 2" | 11.56 | 11.06 | 10.55 | 10.05 |
| 63020 | SE-3 | .3750 | 3/8" | 9.525 | 1/4" | 5/8" | 1-3/4" | 16.05 | 15.36 | 14.66 | 13.96 |
| 63021 | SE-3A | .3750 | 3/8" | 9.525 | 1/4" | 5/8" | 1-3/4" | 23.26 | 22.25 | 21.24 | 20.23 |
| 63022 | SE-3D | .3750 | 3/8" | 9.525 | 1/4" | 5/8" | 1-3/4" | 16.05 | 15.36 | 14.66 | 13.96 |
| 63030 | SE-5 | .5000 | 1/2" | 12.700 | 1/4" | 7/8" | 1-3/4" | 20.54 | 19.65 | 18.75 | 17.86 |
| 63031 | SE-5A | .5000 | 1/2" | 12.700 | 1/4" | 7/8" | 1-3/4" | 33.40 | 31.94 | 30.49 | 29.04 |
| 63032 | SE-5D | .5000 | 1/2" | 12.700 | 1/4" | 7/8" | 1-3/4" | 20.54 | 19.65 | 18.75 | 17.86 |
| 63040 | SE-6 | .6250 | 5/8" | 15.875 | 1/4" | 1" | 1-3/4" | 30.16 | 28.85 | 27.54 | 26.23 |
| 63041 | SE-6A | .6250 | 5/8" | 15.875 | 1/4" | 1" | 1-3/4" | 49.55 | 47.40 | 45.24 | 43.09 |
| 63042 | SE-6D | .6250 | 5/8" | 15.875 | 1/4" | 1" | 1-3/4" | 30.16 | 28.85 | 27.54 | 26.23 |
| 63050 | SE-7 | .7500 | 3/4" | 19.050 | 1/4" | 1" | 1-3/4" | 41.57 | 39.77 | 37.96 | 36.15 |
| 63052 | SE-7D | .7500 | 3/4" | 19.050 | 1/4" | 1" | 1-3/4" | 41.57 | 39.77 | 37.96 | 36.15 |

# **SF** (1/4" Steel Shank)

## Carbide Rotary Files - Tree-Radius Shape

Submicron Grain Carbide
A - Aluminum Cut
D - Double Cut
* - Solid Carbide




| EDP# | TOOL # | $d_1$ † Diameter Decimal | Diameter | Metric | $d_2$ Shank Diameter | $l_2$ Flute Length | $l_4$ Shank Length | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 64010 | * SF-1 | .2500 | 1/4" | 6.350 | 1/4" | 5/8" | 2" | 11.56 | 11.06 | 10.55 | 10.05 |
| 64011 | * SF-1A | .2500 | 1/4" | 6.350 | 1/4" | 5/8" | 2" | 17.83 | 17.05 | 16.28 | 15.50 |
| 64012 | * SF-1D | .2500 | 1/4" | 6.350 | 1/4" | 5/8" | 2" | 11.56 | 11.06 | 10.55 | 10.05 |
| 64020 | SF-3 | .3750 | 3/8" | 9.525 | 1/4" | 3/4" | 1-3/4" | 13.93 | 13.32 | 12.72 | 12.11 |
| 64021 | SF-3A | .3750 | 3/8" | 9.525 | 1/4" | 3/4" | 1-3/4" | 22.46 | 21.48 | 20.51 | 19.53 |
| 64022 | SF-3D | .3750 | 3/8" | 9.525 | 1/4" | 3/4" | 1-3/4" | 13.93 | 13.32 | 12.72 | 12.11 |
| 64030 | SF-5 | .5000 | 1/2" | 12.700 | 1/4" | 1" | 1-3/4" | 20.86 | 19.95 | 19.05 | 18.14 |
| 64031 | SF-5A | .5000 | 1/2" | 12.700 | 1/4" | 1" | 1-3/4" | 31.79 | 30.40 | 29.02 | 27.64 |
| 64032 | SF-5D | .5000 | 1/2" | 12.700 | 1/4" | 1" | 1-3/4" | 20.86 | 19.95 | 19.05 | 18.14 |
| 64040 | SF-6 | .6250 | 5/8" | 15.875 | 1/4" | 1" | 1-3/4" | 28.88 | 27.62 | 26.37 | 25.11 |
| 64041 | SF-6A | .6250 | 5/8" | 15.875 | 1/4" | 1" | 1-3/4" | 44.19 | 42.27 | 40.35 | 38.43 |
| 64042 | SF-6D | .6250 | 5/8" | 15.875 | 1/4" | 1" | 1-3/4" | 28.88 | 27.62 | 26.37 | 25.11 |
| 64050 | SF-14 | .7500 | 3/4" | 19.050 | 1/4" | 1-1/4" | 1-3/4" | 44.48 | 42.55 | 40.61 | 38.68 |
| 64052 | SF-14D | .7500 | 3/4" | 19.050 | 1/4" | 1-1/4" | 1-3/4" | 44.48 | 42.55 | 40.61 | 38.68 |

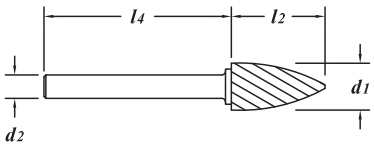


† *Metric equivalents are for reference only*

## Carbide Rotary Files - Tree-Pointed Shape

Submicron Grain Carbide
D - Double Cut
* - Solid Carbide






| EDP# | TOOL # | $d_1$ † Diameter Decimal | Diameter | Metric | $d_2$ Shank Diameter | $l_2$ Flute Length | $l_4$ Shank Length | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 65010 | * SG-1 | .2500 | 1/4" | 6.350 | 1/4" | 5/8" | 2" | 11.56 | 11.06 | 10.55 | 10.05 |
| 65012 | * SG-1D | .2500 | 1/4" | 6.350 | 1/4" | 5/8" | 2" | 11.56 | 11.06 | 10.55 | 10.05 |
| 65020 | SG-3 | .3750 | 3/8" | 9.525 | 1/4" | 3/4" | 1-3/4" | 14.86 | 14.21 | 13.57 | 12.92 |
| 65022 | SG-3D | .3750 | 3/8" | 9.525 | 1/4" | 3/4" | 1-3/4" | 14.86 | 14.21 | 13.57 | 12.92 |
| 65030 | SG-13 | .5000 | 1/2" | 12.700 | 1/4" | 3/4" | 1-3/4" | 19.90 | 19.03 | 18.17 | 17.30 |
| 65032 | SG-13D | .5000 | 1/2" | 12.700 | 1/4" | 3/4" | 1-3/4" | 19.90 | 19.03 | 18.17 | 17.30 |
| 65040 | SG-5 | .5000 | 1/2" | 12.700 | 1/4" | 1" | 1-3/4" | 20.57 | 19.68 | 18.78 | 17.89 |
| 65042 | SG-5D | .5000 | 1/2" | 12.700 | 1/4" | 1" | 1-3/4" | 20.57 | 19.68 | 18.78 | 17.89 |
| 65050 | SG-6 | .6250 | 5/8" | 15.875 | 1/4" | 1" | 1-3/4" | 28.88 | 27.62 | 26.37 | 25.11 |
| 65052 | SG-6D | .6250 | 5/8" | 15.875 | 1/4" | 1" | 1-3/4" | 28.88 | 27.62 | 26.37 | 25.11 |
| 65060 | SG-7 | .7500 | 3/4" | 19.050 | 1/4" | 1" | 1-3/4" | 38.19 | 36.53 | 34.87 | 33.21 |
| 65062 | SG-7D | .7500 | 3/4" | 19.050 | 1/4" | 1" | 1-3/4" | 38.19 | 36.53 | 34.87 | 33.21 |

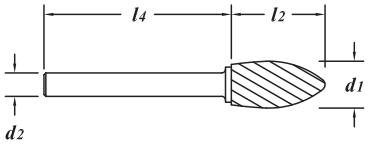
# **SH** (1/4" Steel Shank)

## Carbide Rotary Files - Flame Shape

Submicron Grain Carbide

D - Double Cut






| EDP# | TOOL # | $d_1$ † Diameter Decimal | $d_1$ † Diameter | Metric | $d_2$ Shank Diameter | $l_2$ Flute Length | $l_4$ Shank Length | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 66010 | SH-2 | .3125 | 5/16" | 7.938 | 1/4" | 3/4" | 1-3/4" | 14.12 | 13.51 | 12.89 | 12.28 |
| 66012 | SH-2D | .3125 | 5/16" | 7.938 | 1/4" | 3/4" | 1-3/4" | 14.12 | 13.51 | 12.89 | 12.28 |
| 66020 | SH-5 | .5000 | 1/2" | 12.700 | 1/4" | 1-1/4" | 1-3/4" | 28.88 | 27.62 | 26.37 | 25.11 |
| 66022 | SH-5D | .5000 | 1/2" | 12.700 | 1/4" | 1-1/4" | 1-3/4" | 28.88 | 27.62 | 26.37 | 25.11 |
| 66030 | SH-6 | .6250 | 5/8" | 15.875 | 1/4" | 1-7/16" | 1-3/4" | 37.86 | 36.21 | 34.57 | 32.92 |
| 66032 | SH-6D | .6250 | 5/8" | 15.875 | 1/4" | 1-7/16" | 1-3/4" | 37.86 | 36.21 | 34.57 | 32.92 |
| 66040 | SH-7 | .7500 | 3/4" | 19.050 | 1/4" | 1-5/8" | 1-3/4" | 46.52 | 44.50 | 42.47 | 40.45 |
| 66042 | SH-7D | .7500 | 3/4" | 19.050 | 1/4" | 1-5/8" | 1-3/4" | 46.52 | 44.50 | 42.47 | 40.45 |



† *Metric equivalents are for reference only*

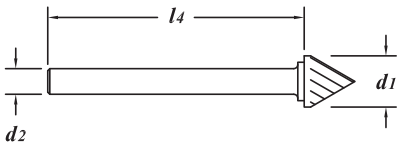
## Carbide Rotary Files - Taper Shape *(60° Included Angle)*

Submicron Grain Carbide

D - Double Cut

** - Solid Carbide/Double End






| EDP# | TOOL # | $d_1$ † Diameter Decimal | $d_1$ † Diameter | Metric | $d_2$ Shank Diameter | $l_4$ Shank Length | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|
| 67010 | **SJ-1 | .2500 | 1/4" | 6.350 | 1/4" | 1-11/16" | 14.54 | 13.90 | 13.27 | 12.64 |
| 67012 | **SJ-1D | .2500 | 1/4" | 6.350 | 1/4" | 1-11/16" | 14.54 | 13.90 | 13.27 | 12.64 |
| 67020 | SJ-3 | .3750 | 3/8" | 9.525 | 1/4" | 1-3/4" | 12.20 | 11.67 | 11.14 | 10.61 |
| 67022 | SJ-3D | .3750 | 3/8" | 9.525 | 1/4" | 1-3/4" | 12.20 | 11.67 | 11.14 | 10.61 |
| 67030 | SJ-5 | .5000 | 1/2" | 12.700 | 1/4" | 1-3/4" | 15.04 | 14.39 | 13.73 | 13.08 |
| 67032 | SJ-5D | .5000 | 1/2" | 12.700 | 1/4" | 1-3/4" | 15.04 | 14.39 | 13.73 | 13.08 |
| 67040 | SJ-6 | .6250 | 5/8" | 15.875 | 1/4" | 1-3/4" | 20.04 | 19.17 | 18.30 | 17.43 |
| 67042 | SJ-6D | .6250 | 5/8" | 15.875 | 1/4" | 1-3/4" | 20.04 | 19.17 | 18.30 | 17.43 |
| 67050 | SJ-7 | .7500 | 3/4" | 19.050 | 1/4" | 1-3/4" | 26.30 | 25.16 | 24.01 | 22.87 |
| 67052 | SJ-7D | .7500 | 3/4" | 19.050 | 1/4" | 1-3/4" | 26.30 | 25.16 | 24.01 | 22.87 |

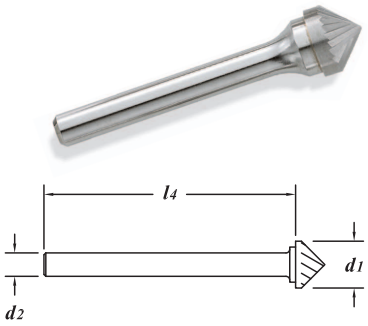
# **SK** (1/4" Steel Shank)

## Carbide Rotary Files - Taper Shape *(90° Included Angle)*

Submicron Grain Carbide

D - Double Cut

** - Solid Carbide/Double End



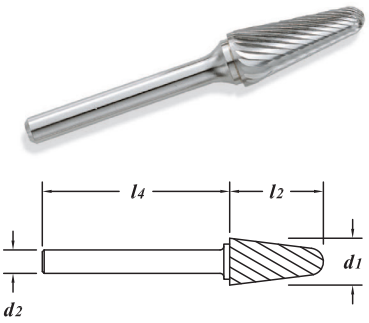

| EDP# | TOOL # | $d_1$ † Diameter Decimal | $d_1$ † Diameter | $d_1$ † Diameter Metric | $d_2$ Shank Diameter | $l_4$ Shank Length | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|
| 68010 | **SK-1 | .2500 | 1/4" | 6.350 | 1/4" | 1-11/16" | 14.54 | 13.90 | 13.27 | 12.64 |
| 68012 | **SK-1D | .2500 | 1/4" | 6.350 | 1/4" | 1-11/16" | 14.54 | 13.90 | 13.27 | 12.64 |
| 68020 | SK-3 | .3750 | 3/8" | 9.525 | 1/4" | 1-3/4" | 12.20 | 11.67 | 11.14 | 10.61 |
| 68022 | SK-3D | .3750 | 3/8" | 9.525 | 1/4" | 1-3/4" | 12.20 | 11.67 | 11.14 | 10.61 |
| 68030 | SK-5 | .5000 | 1/2" | 12.700 | 1/4" | 1-3/4" | 15.04 | 14.39 | 13.73 | 13.08 |
| 68032 | SK-5D | .5000 | 1/2" | 12.700 | 1/4" | 1-3/4" | 15.04 | 14.39 | 13.73 | 13.08 |
| 68040 | SK-6 | .6250 | 5/8" | 15.875 | 1/4" | 1-3/4" | 20.04 | 19.17 | 18.30 | 17.43 |
| 68042 | SK-6D | .6250 | 5/8" | 15.875 | 1/4" | 1-3/4" | 20.04 | 19.17 | 18.30 | 17.43 |
| 68050 | SK-7 | .7500 | 3/4" | 19.050 | 1/4" | 1-3/4" | 26.30 | 25.16 | 24.01 | 22.87 |
| 68052 | SK-7D | .7500 | 3/4" | 19.050 | 1/4" | 1-3/4" | 26.30 | 25.16 | 24.01 | 22.87 |
| 68070 | SK-9 | 1.000 | 1" | 25.400 | 1/4" | 1-3/4" | 42.18 | 40.35 | 38.51 | 36.68 |
| 68072 | SK-9D | 1.000 | 1" | 25.400 | 1/4" | 1-3/4" | 42.18 | 40.35 | 38.51 | 36.68 |



† *Metric equivalents are for reference only*

## Carbide Rotary Files - Cone-Radius Shape *(14° Included Angle)*

Submicron Grain Carbide
A - Aluminum Cut
D - Double Cut
* - Solid Carbide

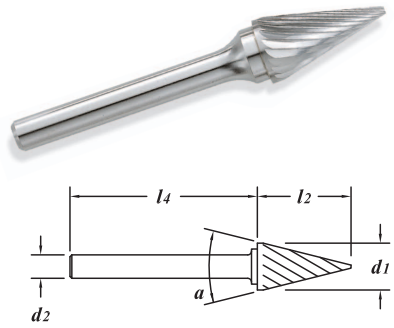



| EDP# | TOOL # | $d_1$ † Diameter Decimal | Diameter | Metric | $d_2$ Shank Diameter | $l_2$ Flute Length | $l_4$ Shank Length | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 69010 | * SL-1 | .2500 | 1/4" | 6.350 | 1/4" | 5/8" | 2" | 11.56 | 11.06 | 10.55 | 10.05 |
| 69012 | * SL-1D | .2500 | 1/4" | 6.350 | 1/4" | 5/8" | 2" | 11.56 | 11.06 | 10.55 | 10.05 |
| 69020 | SL-2 | .3125 | 5/16" | 7.938 | 1/4" | 7/8" | 1-3/4" | 13.80 | 13.20 | 12.60 | 12.00 |
| 69022 | SL-2D | .3125 | 5/16" | 7.938 | 1/4" | 7/8" | 1-3/4" | 13.80 | 13.20 | 12.60 | 12.00 |
| 69030 | SL-3 | .3750 | 3/8" | 9.525 | 1/4" | 1-1/16" | 1-3/4" | 16.36 | 15.65 | 14.94 | 14.23 |
| 69031 | SL-3A | .3750 | 3/8" | 9.525 | 1/4" | 1-1/16" | 1-3/4" | 27.27 | 26.08 | 24.90 | 23.71 |
| 69032 | SL-3D | .3750 | 3/8" | 9.525 | 1/4" | 1-1/16" | 1-3/4" | 16.36 | 15.65 | 14.94 | 14.23 |
| 69040 | SL-4 | .5000 | 1/2" | 12.700 | 1/4" | 1-1/8" | 1-3/4" | 19.90 | 19.03 | 18.17 | 17.30 |
| 69041 | SL-4A | .5000 | 1/2" | 12.700 | 1/4" | 1-1/8" | 1-3/4" | 33.79 | 32.32 | 30.85 | 29.38 |
| 69042 | SL-4D | .5000 | 1/2" | 12.700 | 1/4" | 1-1/8" | 1-3/4" | 19.90 | 19.03 | 18.17 | 17.30 |
| 69050 | SL-5 | .6250 | 5/8" | 15.875 | 1/4" | 1-3/16" | 1-3/4" | 39.15 | 37.44 | 35.74 | 34.04 |
| 69051 | SL-5A | .6250 | 5/8" | 15.875 | 1/4" | 1-3/16" | 1-3/4" | 53.30 | 50.99 | 48.67 | 46.35 |
| 69052 | SL-5D | .6250 | 5/8" | 15.875 | 1/4" | 1-3/16" | 1-3/4" | 39.15 | 37.44 | 35.74 | 34.04 |
| 69060 | SL-7 | .7500 | 3/4" | 19.050 | 1/4" | 1-1/2" | 1-3/4" | 51.67 | 49.42 | 47.18 | 44.93 |
| 69062 | SL-7D | .7500 | 3/4" | 19.050 | 1/4" | 1-1/2" | 1-3/4" | 51.67 | 49.42 | 47.18 | 44.93 |

# **SM** (1/4" Steel Shank)

## Carbide Rotary Files - Cone Flat Shape *(no radius)*

Submicron Grain Carbide
D - Double Cut
* - Solid Carbide




| EDP# | TOOL # | *d1* † Diameter Decimal | Diameter | Metric | *d2* Shank Diameter | *a* Included Angle | *l2* Flute Length | *l4* Shank Length | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 70010 | * SM-1 | .2500 | 1/4" | 6.350 | 1/4" | 22° | 1/2" | 2" | 11.56 | 11.06 | 10.55 | 10.05 |
| 70012 | * SM-1D | .2500 | 1/4" | 6.350 | 1/4" | 22° | 1/2" | 2" | 11.56 | 11.06 | 10.55 | 10.05 |
| 70020 | SM-4 | .3750 | 3/8" | 9.525 | 1/4" | 28° | 5/8" | 1-3/4" | 16.36 | 15.65 | 14.94 | 14.23 |
| 70022 | SM-4D | .3750 | 3/8" | 9.525 | 1/4" | 28° | 5/8" | 1-3/4" | 16.36 | 15.65 | 14.94 | 14.23 |
| 70030 | SM-5 | .5000 | 1/2" | 12.700 | 1/4" | 28° | 7/8" | 1-3/4" | 20.54 | 19.65 | 18.75 | 17.86 |
| 70032 | SM-5D | .5000 | 1/2" | 12.700 | 1/4" | 28° | 7/8" | 1-3/4" | 20.54 | 19.65 | 18.75 | 17.86 |
| 70040 | SM-6 | .6250 | 5/8" | 15.875 | 1/4" | 31° | 1" | 1-3/4" | 27.28 | 26.09 | 24.91 | 23.72 |
| 70042 | SM-6D | .6250 | 5/8" | 15.875 | 1/4" | 31° | 1" | 1-3/4" | 27.28 | 26.09 | 24.91 | 23.72 |

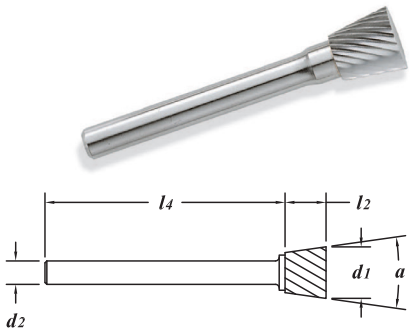





† *Metric equivalents are for reference only*

## Carbide Rotary Files - Inverted Cone Shape

Submicron Grain Carbide
D - Double Cut
* - Solid Carbide




| EDP# | TOOL # | $d_1$ † Diameter Decimal | Diameter | Metric | $d_2$ Shank Diameter | $a$ Included Angle | $l_2$ Flute Length | $l_4$ Shank Length | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 71010 | * SN-1 | .2500 | 1/4" | 6.350 | 1/4" | 10° | 5/16" | 2" | 11.56 | 11.06 | 10.55 | 10.05 |
| 71012 | * SN-1D | .2500 | 1/4" | 6.350 | 1/4" | 10° | 5/16" | 2" | 11.56 | 11.06 | 10.55 | 10.05 |
| 71020 | SN-2 | .3750 | 3/8" | 9.525 | 1/4" | 13° | 3/8" | 1-3/4" | 14.42 | 13.79 | 13.17 | 12.54 |
| 71022 | SN-2D | .3750 | 3/8" | 9.525 | 1/4" | 13° | 3/8" | 1-3/4" | 14.42 | 13.79 | 13.17 | 12.54 |
| 71030 | SN-3 | .5000 | 1/2" | 12.700 | 1/4" | 16° | 1/2" | 1-3/4" | 19.90 | 19.03 | 18.17 | 17.30 |
| 71032 | SN-3D | .5000 | 1/2" | 12.700 | 1/4" | 16° | 1/2" | 1-3/4" | 19.90 | 19.03 | 18.17 | 17.30 |



# 3/16" Diameter (3/16" Shank)

## Solid Carbide Rotary Files

Submicron Grain Carbide

D - Double Cut



SA-81

SC-81

SD-81

SE-81

SF-81

SG-81



SJ-81

SK-81

SL-81

SM-81

SN-81

| EDP# | TOOL # | $d_1$ † Diameter Decimal | Diameter | Metric | $l_1$ Overall Length | $a$ Included Angle | $l_2$ Flute Length | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 72010 | SA-81 | .1875 | 3/16" | 4.763 | 2" | - | 5/8" | 12.64 | 12.09 | 11.54 | 10.99 |
| 72012 | SA-81D | .1875 | 3/16" | 4.763 | 2" | - | 5/8" | 12.64 | 12.09 | 11.54 | 10.99 |
| 72020 | SC-81 | .1875 | 3/16" | 4.763 | 2" | - | 5/8" | 12.64 | 12.09 | 11.54 | 10.99 |
| 72030 | SD-81 | .1875 | 3/16" | 4.763 | 2" | - | - | 12.64 | 12.09 | 11.54 | 10.99 |
| 72032 | SD-81D | .1875 | 3/16" | 4.763 | 2" | - | - | 12.64 | 12.09 | 11.54 | 10.99 |
| 72040 | SE-81 | .1875 | 3/16" | 4.763 | 2" | - | 9/32" | 12.64 | 12.09 | 11.54 | 10.99 |
| 72042 | SE-81D | .1875 | 3/16" | 4.763 | 2" | - | 9/32" | 12.64 | 12.09 | 11.54 | 10.99 |
| 72050 | SF-81 | .1875 | 3/16" | 4.763 | 2" | - | 1/2" | 12.64 | 12.09 | 11.54 | 10.99 |
| 72052 | SF-81D | .1875 | 3/16" | 4.763 | 2" | - | 1/2" | 12.64 | 12.09 | 11.54 | 10.99 |
| 72060 | SG-81 | .1875 | 3/16" | 4.763 | 2" | - | 1/2" | 12.64 | 12.09 | 11.54 | 10.99 |
| 72062 | SG-81D | .1875 | 3/16" | 4.763 | 2" | - | 1/2" | 12.64 | 12.09 | 11.54 | 10.99 |
| 72070 | SJ-81 | .1875 | 3/16" | 4.763 | 2" | 60° | - | 12.64 | 12.09 | 11.54 | 10.99 |
| 72072 | SJ-81D | .1875 | 3/16" | 4.763 | 2" | 60° | - | 12.64 | 12.09 | 11.54 | 10.99 |
| 72080 | SK-81 | .1875 | 3/16" | 4.763 | 2" | 90° | - | 12.64 | 12.09 | 11.54 | 10.99 |
| 72082 | SK-81D | .1875 | 3/16" | 4.763 | 2" | 90° | - | 12.64 | 12.09 | 11.54 | 10.99 |
| 72090 | SL-81 | .1875 | 3/16" | 4.763 | 2" | 14° | 1/2" | 12.64 | 12.09 | 11.54 | 10.99 |
| 72092 | SL-81D | .1875 | 3/16" | 4.763 | 2" | 14° | 1/2" | 12.64 | 12.09 | 11.54 | 10.99 |
| 72100 | SM-81 | .1875 | 3/16" | 4.763 | 2" | 12° | 5/8" | 12.64 | 12.09 | 11.54 | 10.99 |
| 72110 | SN-81 | .1875 | 3/16" | 4.763 | 2" | 10° | 1/4" | 12.64 | 12.09 | 11.54 | 10.99 |
| 72112 | SN-81D | .1875 | 3/16" | 4.763 | 2" | 10° | 1/4" | 12.64 | 12.09 | 11.54 | 10.99 |



† *Metric equivalents are for reference only*

## Carbide Rotary Files

Submicron Grain Carbide

D - Double Cut≤



SA-51

SB-51

SC-51

SD-51

SE-51

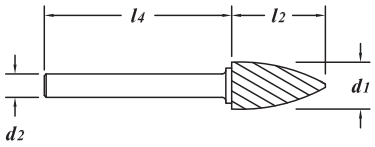


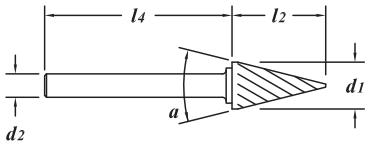
SF-51

SG-51

SM-51

SN-51




| EDP# | TOOL # | $d_1$ † Diameter Decimal | $d_1$ † Diameter | Metric | $d_2$ Shank Diameter | $a$ Included Angle | $l_2$ Flute Length | $l_4$ Shank Length | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 73010 | SA-51 | .2500 | 1/4" | 6.350 | 1/8" | - | 1/2" | 1-1/2" | 12.06 | 11.54 | 11.01 | 10.49 |
| 73012 | SA-51D | .2500 | 1/4" | 6.350 | 1/8" | - | 1/2" | 1-1/2" | 12.06 | 11.54 | 11.01 | 10.49 |
| 73020 | SB-51 | .2500 | 1/4" | 6.350 | 1/8" | - | 3/16" | 1-1/2" | 12.06 | 11.54 | 11.01 | 10.49 |
| 73022 | SB-51D | .2500 | 1/4" | 6.350 | 1/8" | - | 3/16" | 1-1/2" | 12.06 | 11.54 | 11.01 | 10.49 |
| 73030 | SC-51 | .2500 | 1/4" | 6.350 | 1/8" | - | 1/2" | 1-1/2" | 12.06 | 11.54 | 11.01 | 10.49 |
| 73032 | SC-51D | .2500 | 1/4" | 6.350 | 1/8" | - | 1/2" | 1-1/2" | 12.06 | 11.54 | 11.01 | 10.49 |
| 73040 | SD-51 | .2500 | 1/4" | 6.350 | 1/8" | - | - | 1-1/2" | 12.06 | 11.54 | 11.01 | 10.49 |
| 73042 | SD-51D | .2500 | 1/4" | 6.350 | 1/8" | - | - | 1-1/2" | 12.06 | 11.54 | 11.01 | 10.49 |
| 73050 | SE-51 | .2500 | 1/4" | 6.350 | 1/8" | - | 3/8" | 1-1/2" | 12.06 | 11.54 | 11.01 | 10.49 |
| 73052 | SE-51D | .2500 | 1/4" | 6.350 | 1/8" | - | 3/8" | 1-1/2" | 12.06 | 11.54 | 11.01 | 10.49 |
| 73060 | SF-51 | .2500 | 1/4" | 6.350 | 1/8" | - | 1/2" | 1-1/2" | 12.06 | 11.54 | 11.01 | 10.49 |
| 73062 | SF-51D | .2500 | 1/4" | 6.350 | 1/8" | - | 1/2" | 1-1/2" | 12.06 | 11.54 | 11.01 | 10.49 |
| 73070 | SG-51 | .2500 | 1/4" | 6.350 | 1/8" | - | 1/2" | 1-1/2" | 12.06 | 11.54 | 11.01 | 10.49 |
| 73072 | SG-51D | .2500 | 1/4" | 6.350 | 1/8" | - | 1/2" | 1-1/2" | 12.06 | 11.54 | 11.01 | 10.49 |
| 73080 | SM-51 | .2500 | 1/4" | 6.350 | 1/8" | 22° | 1/2" | 1-1/2" | 12.06 | 11.54 | 11.01 | 10.49 |
| 73082 | SM-51D | .2500 | 1/4" | 6.350 | 1/8" | 22° | 1/2" | 1-1/2" | 12.06 | 11.54 | 11.01 | 10.49 |
| 73090 | SN-51 | .2500 | 1/4" | 6.350 | 1/8" | 10° | 1/4" | 1-1/2" | 12.06 | 11.54 | 11.01 | 10.49 |
| 73092 | SN-51D | .2500 | 1/4" | 6.350 | 1/8" | 10° | 1/4" | 1-1/2" | 12.06 | 11.54 | 11.01 | 10.49 |

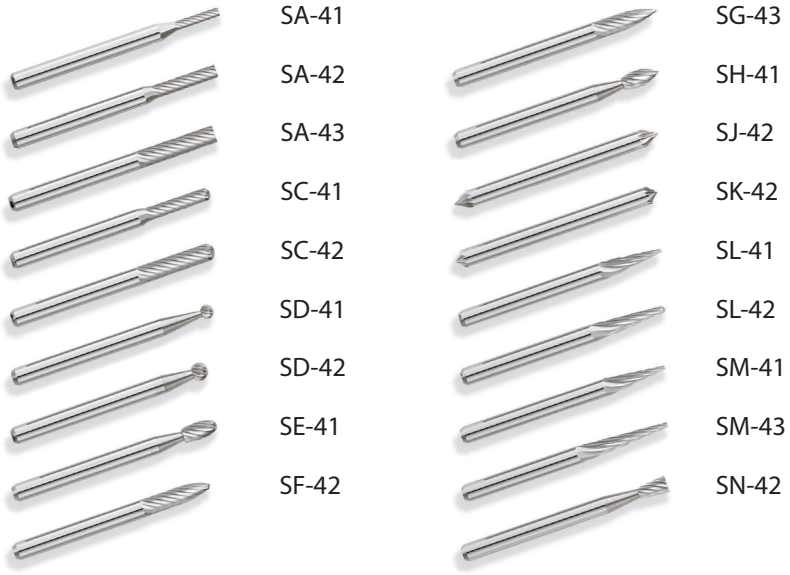
*CAD drawings representative for dimension placement*

# 1/8" Diameter (1/8" Shank)

## Solid Carbide Rotary Files

Submicron Grain Carbide

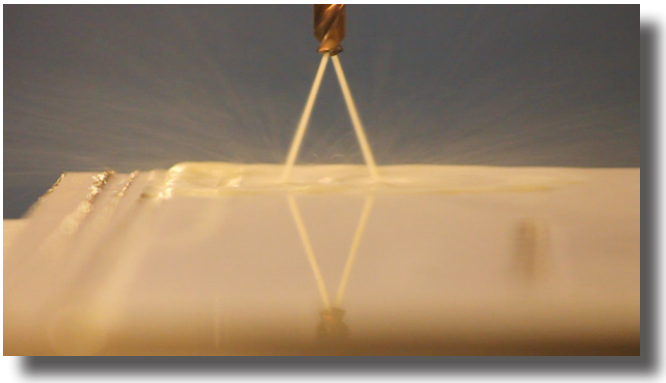
D - Double Cut

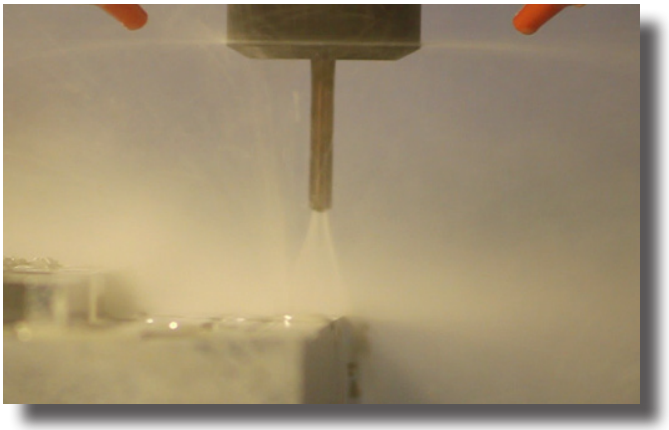


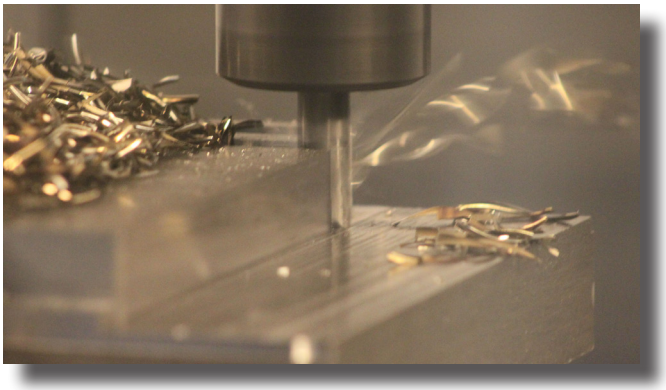

| EDP# | TOOL # | $d_1$ † Diameter Decimal | Diameter | Metric | $l_1$ Overall Length | $a$ Included Angle | $l_2$ Flute Length | 1-11 | 12-24 | 25-49 | 50-100 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 74010 | SA-41 | .0625 | 1/16" | 1.588 | 1-1/2" | - | 1/4" | 7.14 | 6.83 | 6.52 | 6.21 |
| 74012 | SA-41D | .0625 | 1/16" | 1.588 | 1-1/2" | - | 1/4" | 7.14 | 6.83 | 6.52 | 6.21 |
| 74020 | SA-42 | .0938 | 3/32" | 2.383 | 1-1/2" | - | 7/16" | 7.14 | 6.83 | 6.52 | 6.21 |
| 74022 | SA-42D | .0938 | 3/32" | 2.383 | 1-1/2" | - | 7/16" | 7.14 | 6.83 | 6.52 | 6.21 |
| 74030 | SA-43 | .1250 | 1/8" | 3.175 | 1-1/2" | - | 9/16" | 7.14 | 6.83 | 6.52 | 6.21 |
| 74032 | SA-43D | .1250 | 1/8" | 3.175 | 1-1/2" | - | 9/16" | 7.14 | 6.83 | 6.52 | 6.21 |
| 74040 | SC-41 | .0938 | 3/32" | 2.383 | 1-1/2" | - | 7/16" | 7.14 | 6.83 | 6.52 | 6.21 |
| 74042 | SC-41D | .0938 | 3/32" | 2.383 | 1-1/2" | - | 7/16" | 7.14 | 6.83 | 6.52 | 6.21 |
| 74050 | SC-42 | .1250 | 1/8" | 3.175 | 1-1/2" | - | 9/16" | 7.14 | 6.83 | 6.52 | 6.21 |
| 74052 | SC-42D | .1250 | 1/8" | 3.175 | 1-1/2" | - | 9/16" | 7.14 | 6.83 | 6.52 | 6.21 |
| 74060 | SD-41 | .0938 | 3/32" | 2.383 | 1-1/2" | - | - | 7.14 | 6.83 | 6.52 | 6.21 |
| 74062 | SD-41D | .0938 | 3/32" | 2.383 | 1-1/2" | - | - | 7.14 | 6.83 | 6.52 | 6.21 |
| 74070 | SD-42 | .1250 | 1/8" | 3.175 | 1-1/2" | - | - | 7.14 | 6.83 | 6.52 | 6.21 |
| 74072 | SD-42D | .1250 | 1/8" | 3.175 | 1-1/2" | - | - | 7.14 | 6.83 | 6.52 | 6.21 |
| 74080 | SE-41 | .1250 | 1/8" | 3.175 | 1-1/2" | - | 7/32" | 7.14 | 6.83 | 6.52 | 6.21 |
| 74082 | SE-41D | .1250 | 1/8" | 3.175 | 1-1/2" | - | 7/32" | 7.14 | 6.83 | 6.52 | 6.21 |
| 74090 | SF-42 | .1250 | 1/8" | 3.175 | 1-1/2" | - | 1/2" | 7.14 | 6.83 | 6.52 | 6.21 |
| 74092 | SF-42D | .1250 | 1/8" | 3.175 | 1-1/2" | - | 1/2" | 7.14 | 6.83 | 6.52 | 6.21 |
| 74100 | SG-43 | .1250 | 1/8" | 3.175 | 1-1/2" | - | 3/8" | 7.14 | 6.83 | 6.52 | 6.21 |
| 74102 | SG-43D | .1250 | 1/8" | 3.175 | 1-1/2" | - | 3/8" | 7.14 | 6.83 | 6.52 | 6.21 |
| 74110 | SH-41 | .1250 | 1/8" | 3.175 | 1-1/2" | - | 1/4" | 7.14 | 6.83 | 6.52 | 6.21 |
| 74112 | SH-41D | .1250 | 1/8" | 3.175 | 1-1/2" | - | 1/4" | 7.14 | 6.83 | 6.52 | 6.21 |
| 74120 | SJ-42 | .1250 | 1/8" | 3.175 | 1-1/2" | 60° | - | 7.14 | 6.83 | 6.52 | 6.21 |
| 74122 | SJ-42D | .1250 | 1/8" | 3.175 | 1-1/2" | 60° | - | 7.14 | 6.83 | 6.52 | 6.21 |
| 74130 | SK-42 | .1250 | 1/8" | 3.175 | 1-1/2" | 90° | - | 7.14 | 6.83 | 6.52 | 6.21 |
| 74132 | SK-42D | .1250 | 1/8" | 3.175 | 1-1/2" | 90° | - | 7.14 | 6.83 | 6.52 | 6.21 |
| 74140 | SL-41 | .1250 | 1/8" | 3.175 | 1-1/2" | 8° | 3/8" | 7.14 | 6.83 | 6.52 | 6.21 |
| 74142 | SL-41D | .1250 | 1/8" | 3.175 | 1-1/2" | 8° | 3/8" | 7.14 | 6.83 | 6.52 | 6.21 |
| 74150 | SL-42 | .1250 | 1/8" | 3.175 | 1-1/2" | 8° | 1/2" | 7.14 | 6.83 | 6.52 | 6.21 |
| 74152 | SL-42D | .1250 | 1/8" | 3.175 | 1-1/2" | 8° | 1/2" | 7.14 | 6.83 | 6.52 | 6.21 |
| 74160 | SM-41 | .1250 | 1/8" | 3.175 | 1-1/2" | 12° | 3/8" | 7.14 | 6.83 | 6.52 | 6.21 |
| 74162 | SM-41D | .1250 | 1/8" | 3.175 | 1-1/2" | 12° | 3/8" | 7.14 | 6.83 | 6.52 | 6.21 |
| 74170 | SM-43 | .1250 | 1/8" | 3.175 | 1-1/2" | 7° | 5/8" | 7.14 | 6.83 | 6.52 | 6.21 |
| 74172 | SM-43D | .1250 | 1/8" | 3.175 | 1-1/2" | 7° | 5/8" | 7.14 | 6.83 | 6.52 | 6.21 |
| 74180 | SN-42 | .1250 | 1/8" | 3.175 | 1-1/2" | 10° | 3/16" | 7.14 | 6.83 | 6.52 | 6.21 |
| 74182 | SN-42D | .1250 | 1/8" | 3.175 | 1-1/2" | 10° | 3/16" | 7.14 | 6.83 | 6.52 | 6.21 |



† *Metric equivalents are for reference only*








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# Troubleshooting for Drills

| PROBLEM | SUGGESTIONS |
|---|---|
| Chipping on point | Reduce feed rate |
| | Check part rigidity |
| | Constant feed rate |
| | Verify speeds and feeds |
| | Minimum drill overhang |
| | Reduce number of peck cycles |
| Chipping on O.D. | Reduce feed rate |
| | Confirm concentricity of drill in holder |
| | Check coolant flow and location |
| | Check part rigidity |
| Breakage | Reduce feed rate |
| | Check your program - is 'R' clearing the part |
| | Check coolant flow and location |
| | Check part rigiditiy |
| Heavy wear on corners | Increase feed rate |
| | Check coolant flow and location |
| | Confirm concentricity of drill in holder |
| | Check part rigidity |
| Long, stringy chips | Increase feed rate |
| | Increase hone relief |
| | Constant feed rate |
| | Increase number of peck cycles |
| Excessive noise | Check drill |
| | Check part rigidity |
| | Check for proper speeds and feeds |
| Tool life | Lower speeds and feeds |
| | Check coolant flow and location |
| | Confirm concentricity of drill in holder |
| | Confirm coolant concentration |
| Hole too small | Increase feed rate |
| | Confirm coolant concentration |
| | Confirm drill diameter |
| Hole too large | Reduce feed rate |
| | Slow feed rate to start hole |
| | Increase RPMs |
| | Spot hole |
| Chip welding | Increase RPMs by 20% |
| | Confirm coolant concentration |
| | Check coolant flow and location |
| Chip packing | Add a peck cycle to clear chips |
| | Increase RPMs |
| | Reduce feed rate |
| | Check coolant flow and location |

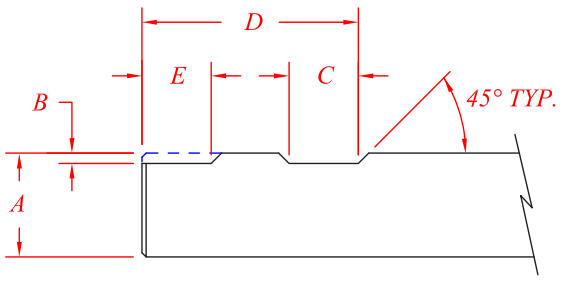
| PROBLEM | SUGGESTIONS |
|---|---|
| Chipping | Check part rigidity |
| | Verify speeds and feeds |
| | Confirm concentricity of end mill in holder |
| | Decrease ramp angle or slow down approach |
| | Check coolant flow and location |
| Breakage | Decrease feed rate |
| | Decrease axial depth |
| | Use shorter tool or stub holder |
| | Resharpen earlier |
| Chattering | Too light of a cut |
| | Leave more stock for finish pass |
| | Decrease axial depth |
| | Adjust speeds and feeds |
| Part finish | Confirm concentricity of end mill in holder |
| | Decrease feed rate |
| | Use different style of end mill |
| | Check coolant flow and location |
| | Check part rigidity |
| Burr | Change end mill sooner / too much wear |
| | Verify speeds and feeds |
| | Increase spindle speed |
| | Decrease feed rate |
| | Use different style of end mill |
| Excessive noise | Check part rigidity |
| | Verify speeds and feeds |
| | Too light of a cut |
| | Confirm concentricity of end mill in holder |
| Tool life | Work material harder than expected |
| | Verify speeds and feeds |
| | Recutting chips |
| | Too light of a cut |
| | Use different style of end mill |
| Wear | Speed too fast |
| | Too light of a feed |
| | Confirm concentricity of end mill in holder |
| | Verify speeds and feeds |
| Chip welding | Verify speeds and feeds |
| | Check coolant flow and location |
| | Use different style of end mill |
| Chip packing | Check coolant flow and location |
| | Decrease axial depth |
| | Adjust speeds and feeds |
| | Use different style of end mill |
| Wall not straight | Decrease feed rate |
| | Decrease axial depth |
| | Use shorter tool or stub holder |
| | Use different style of end mill |

# Troubleshooting for Reamers

| PROBLEM | SUGGESTIONS |
|---|---|
| Hole diameter too large | Check part rigidity |
| | Verify speeds and feeds |
| | Confirm concentricity of reamer in holder |
| | Confirm diameter of reamer |
| | Check coolant flow and location |
| Hole diameter too small | Leave more stock before reaming |
| | Reamer worn |
| | Check coolant flow and concentration |
| | Resharpen earlier |
| Hole not straight | Hole was not drilled properly |
| | Leave more stock before reaming |
| | Confirm concentricity of reamer in holder |
| | Check part rigidity |
| Part finish | Reamer worn |
| | Verify speeds and feeds |
| | Confirm concentricity of reamer in holder |
| | Check coolant flow and location |
| | Check part rigidity |
| Tool life | Work material harder than expected |
| | Verify speeds and feeds |
| | Not evacuating chips properly |
| | Too light of a cut |
| Wear | Speed too fast |
| | Too light of a feed |
| | Confirm concentricity of reamer in holder |
| | Check coolant flow, location, and concentration |
| Not evacuating | Verify speeds and feeds |
| | Check coolant flow, location, and concentration |
| | Reamer worn |

# Weldon Flat Specs

| STANDARD WELDON SHANK DIMENSIONS | | | | | |
|---|---|---|---|---|---|
| Diameter (A) | | B | C | D | E |
| 3/8" | .3750" | .050" - .065" | .280" - .282" | .921" | - |
| 7/16" | .4375" | .050" - .065" | .312" - .314" | .991" | - |
| 1/2" | .5000" | .060" - .075" | .330" - .332" | 1.055" | - |
| 9/16" | .5625" | .065" - .080" | .400" - .402" | 1.154" | - |
| 5/8" | .6250" | .065" - .080" | .400" - .402" | 1.154" | - |
| 3/4" | .7500" | .075" - .090" | .455" - .457" | 1.242" | - |
| 7/8" | .8750" | .065" - .080" | .455" - .457" | 1.242" | .500" |
| 1" | 1.0000" | .075" - .090" | .515" - .517" | 1.398" | .500" |
| 1-1/4" | 1.2500" | .094" - .109" | .515" - .517" | 1.398" | .500" |



$$SFM = \frac{\pi \times Diameter \times RPM}{12}$$

$$CPT = \frac{IPM}{RPM \times Number\ of\ Teeth}$$

$$RPM = \frac{SFM \times 3.82}{Diameter}$$

$$IPM = RPM \times Number\ of\ Teeth \times CPT$$

**Chip Thinning Calculation:**

$$\frac{.50\left(\frac{Diameter}{Radial\ Stepover}\right)}{\sqrt{\left(\frac{Diameter}{Radial\ Stepover}\right)-1}} \times CPT_{\text{(Actual)}} = CPT_{\text{(Programmed)}}$$

Example below:

$$\frac{.50\left(\frac{0.50}{.015}\right)}{\sqrt{\left(\frac{0.50}{.015}\right)-1}} = \frac{16.667}{5.6} = 2.93 \times .0015 = .0045$$

(Chip Thinning reference charts on pages 306-307)

*For additional help:*
*Check out our web site, the MC-20 machinist calculator or, if you have a smartphone, search for the feedrate calculator from the App Store.*

| **h6 TOLERANCE FOR SHRINK FIT HOLDERS** *(as taken from the Machinery's Handbook)* | | |
|---|---|---|
| SHANK DIAMETER | | TOLERANCE |
| Decimal | Nominal | |
| ≤ .1181" | ≤ 3mm | -.00000" / -.00024" |
| > .1181" - .2362" | > 3mm - 6mm | -.00000" / -.00032" |
| > .2362" - .3937" | > 6mm - 10mm | -.00000" / -.00035" |
| > .3937" - .7087" | > 10mm - 18mm | -.00000" / -.00043" |
| > .7087" - 1.1811" | > 18mm - 30mm | -.00000" / -.00050" |
| > 1.1811" | > 30mm | -.00000" / -.00050" |

# Definitions of Tool Coatings on GARR TOOL Standard Products



***TiN***
**(Titanium Nitride)**

A general purpose coating, BALINIT® A has low heat resistance and good lubricity.



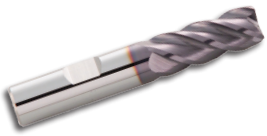
***TiCN***
**(Titanium Carbonitride)**

With good abrasion resistance, BALINIT® B is recommended for aluminum, brass and bronze applications. It has low heat resistance and good lubricity.



***TiAlN***
**(Titanium Aluminum Nitride)**

BALINIT® FUTURA is a multi-layer coating with good thermal stability for increased speeds and feeds. It is designed for semi-dry to dry cutting of most steels, high-nickel alloys, stainless steel and cast iron and has excellent heat resistance, good lubricity. It is useful in materials that are 40Rc and under.



***AlTiN***
**(Aluminum Titanium Nitride)**

BALINIT® LATUMA is a single-layer coating whose hardness, oxidation resistance and thermal stability were optimized for material hardness above 38Rc as well as high-speed machining of materials that are difficult to work (titanium alloys, Inconel).



***ALUMASTAR®***
**(Titanium Diboride)**

A thin film coating with a low affinity for aluminum, ALUMASTAR® is ideal for machining aluminum alloys. The resistance to adhesion of aluminum allows higher speeds or feeds. Its coating thickness is intentionally kept lower in order to maintain a sharp edge.



***CRYSTALLINE DIAMOND***
**(CVD)**

Improved productivity in composites. Excellent choice for cutting graphite and fiberglass. Can be added to a special for milling or drilling applications.



***AlCrN***
**(Aluminum Chromium Nitride)**

Aluminum Chromium-based coatings have excellent wear resistance, thermal shock stability, and hot hardness. BALINIT® ALNOVA is well suited for Titanium, Inconel, and carbon fiber.



***DURANA***
**(AlTiN-based with TiSiXN)**

With a combination of AlTiN-based and TiSiXN layers, BALINIT® DURANA has a high degree of ductility and superior abrasive wear resistance even at extreme service temperatures, resulting in vastly improved performance during demanding machining operations and longer tool service life.



***ALTINOS***
**(AlTiN-based)**

This premium AlTiN-based coating, BALIQ® ALTINOS is highly wear-resistant, even at high operating temperatures, making it particularly beneficial even up to HRC 56. With its perfectly smooth surface, this coating offers significant performance advantages such as optimum chip removal and reduced built-up edge formation.



***ALCRONOS***
**(AlCrN-based)**

BALIQ® ALCRONOS, an AlCrN-based coating is considerably less prone to built-up edge formation. Its revolutionary smooth coating, with excellent adhesion to the substrate, ensures outstanding surfaces and high production quality, especially in ductile alloys like 300 series stainless and steels up to HRC 50.

# SFM (M/Min.) / RPM Conversion Charts

| | DIAMETER | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | .0625" | .0938" | .1250" | .1562" | .1875" | .2188" | .2500" | .3125" | .3750" | .4375" | .5000" | .6250" | .7500" | .8750" | 1.000" |
| | 1/16" | 3/32" | 1/8" | 5/32" | 3/16" | 7/32" | 1/4" | 5/16" | 3/8" | 7/16" | 1/2" | 5/8" | 3/4" | 7/8" | 1" |
| **SFM** | **RPM** | | | | | | | | | | | | | | |
| **50** | 3050 | 2040 | 1530 | 1220 | 1020 | 875 | 765 | 610 | 510 | 440 | 380 | 310 | 250 | 220 | 190 |
| **75** | 4580 | 3060 | 2290 | 1830 | 1530 | 1310 | 1150 | 920 | 760 | 570 | 570 | 460 | 380 | 330 | 285 |
| **100** | 6100 | 4080 | 3050 | 2450 | 2040 | 1750 | 1530 | 1220 | 1020 | 760 | 760 | 610 | 510 | 440 | 385 |
| **125** | 7630 | 5100 | 3820 | 3050 | 2550 | 2180 | 1920 | 1530 | 1270 | 950 | 950 | 770 | 630 | 550 | 475 |
| **150** | 9150 | 6120 | 4570 | 3670 | 3060 | 2620 | 2290 | 1830 | 1530 | 1140 | 1140 | 920 | 760 | 660 | 575 |
| **175** | 10,680 | 7140 | 5350 | 4270 | 3570 | 3060 | 2680 | 2140 | 1780 | 1330 | 1330 | 1080 | 880 | 770 | 665 |
| **200** | 12,200 | 8150 | 6100 | 4900 | 4070 | 3500 | 3100 | 2450 | 2000 | 1500 | 1500 | 1200 | 1000 | 875 | 750 |
| **300** | 18,500 | 12,200 | 9200 | 7300 | 6100 | 5250 | 4600 | 3700 | 3100 | 2300 | 2300 | 1800 | 1500 | 1300 | 1100 |
| **400** | 24,500 | 16,300 | 12,200 | 9800 | 8150 | 7000 | 6100 | 4900 | 4100 | 3050 | 3050 | 2450 | 2050 | 1750 | 1525 |
| **500** | 30,500 | 20,400 | 15,300 | 12,200 | 10,200 | 8700 | 7600 | 6100 | 5100 | 3800 | 3800 | 3100 | 2500 | 2200 | 1900 |
| **750** | 45,800 | 36,700 | 22,900 | 18,300 | 15,300 | 13,100 | 11,500 | 9200 | 7600 | 5700 | 5700 | 4600 | 3800 | 3770 | 2850 |
| **1000** | - | 40,800 | 30,600 | 24,500 | 20,400 | 17,500 | 15,300 | 12,200 | 10,200 | 7650 | 7650 | 6100 | 5100 | 4400 | 3800 |
| **1500** | - | - | 40,800 | 36,700 | 30,600 | 26,200 | 22,900 | 18,300 | 15,300 | 11,300 | 11,300 | 9200 | 7600 | 6500 | 5700 |
| **2000** | - | - | - | 49,000 | 40,800 | 35,000 | 30,600 | 24,400 | 20,400 | 15,300 | 15,300 | 12,200 | 10,200 | 8700 | 7600 |
| **3000** | - | - | - | - | - | 52,500 | 45,900 | 36,600 | 30,600 | 22,900 | 22,900 | 18,300 | 15,300 | 13,100 | 11,400 |
| **4000** | - | - | - | - | - | - | - | 48,800 | 40,800 | 30,600 | 30,600 | 24,400 | 20,400 | 17,500 | 15,200 |
| **5000** | - | - | - | - | - | - | - | - | 51,000 | 38,200 | 38,200 | 30,600 | 25,500 | 21,800 | 19,000 |

| | DIAMETER | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | .0394" | .0787" | .1181" | .1575" | .1969" | .2362" | .3150" | .3937" | .4724" | .5512" | .6299" | .7087" | .7874" | .8661" | .9843" |
| | 1.0mm | 2.0mm | 3.0mm | 4.0mm | 5.0mm | 6.0mm | 8.0mm | 10.0mm | 12.0mm | 14.0mm | 16.0mm | 18.0mm | 20.0mm | 22.0mm | 25.0mm |
| **M/Min.** | **RPM** | | | | | | | | | | | | | | |
| **15** | 4800 | 2400 | 1600 | 1200 | 960 | 800 | 600 | 480 | 400 | 340 | 300 | 265 | 240 | 220 | 190 |
| **22** | 7000 | 3500 | 2300 | 1750 | 1400 | 1170 | 875 | 700 | 585 | 500 | 440 | 390 | 350 | 320 | 280 |
| **30** | 10,000 | 4800 | 3200 | 2400 | 1900 | 1590 | 1200 | 955 | 800 | 685 | 600 | 530 | 480 | 440 | 380 |
| **38** | 12,100 | 6000 | 4000 | 3025 | 2420 | 2020 | 1515 | 1210 | 1000 | 870 | 760 | 670 | 600 | 550 | 485 |
| **45** | 14,300 | 7200 | 4800 | 3600 | 2870 | 2390 | 1790 | 1430 | 1200 | 1020 | 900 | 800 | 710 | 650 | 575 |
| **53** | 16,880 | 8440 | 5630 | 4220 | 3375 | 2815 | 2110 | 1690 | 1400 | 1200 | 1055 | 940 | 845 | 770 | 675 |
| **60** | 19,110 | 9550 | 6370 | 4780 | 3825 | 3185 | 2390 | 1910 | 1590 | 1365 | 1200 | 1060 | 955 | 870 | 765 |
| **90** | 28,770 | 14,350 | 9550 | 7165 | 5735 | 4780 | 3585 | 2870 | 2390 | 2050 | 1790 | 1590 | 1430 | 1300 | 1150 |
| **120** | 38,220 | 19,100 | 12,750 | 9550 | 7645 | 6370 | 4780 | 3820 | 3185 | 2730 | 2490 | 2120 | 1910 | 1740 | 1530 |
| **150** | 47,770 | 23,885 | 15,925 | 11,950 | 9550 | 7965 | 5970 | 4780 | 3980 | 3410 | 2990 | 2650 | 2390 | 2170 | 1900 |
| **230** | - | 36,625 | 24,400 | 18,315 | 14,650 | 12,210 | 9150 | 7325 | 6100 | 5230 | 4580 | 4070 | 3660 | 3330 | 2930 |
| **300** | - | 47,770 | 31,850 | 23,885 | 19,110 | 15,925 | 11,950 | 9550 | 7960 | 6825 | 5970 | 5300 | 4780 | 4340 | 3820 |
| **450** | - | - | 47,770 | 35,830 | 28,660 | 23,885 | 17,915 | 14,330 | 11,950 | 10,240 | 8960 | 7960 | 7170 | 6510 | 5730 |
| **600** | - | - | - | 47,770 | 38,220 | 31,850 | 23,885 | 19,100 | 15,920 | 13,650 | 12,000 | 10,600 | 9550 | 8685 | 7600 |
| **900** | - | - | - | - | - | 47,770 | 35,830 | 28,660 | 23,885 | 20,475 | 17,900 | 15,900 | 14,330 | 13,030 | 11,500 |
| **1200** | - | - | - | - | - | - | 47,770 | 38,210 | 31,850 | 27,300 | 23,885 | 21,230 | 19,100 | 17,370 | 15,300 |
| **1500** | - | - | - | - | - | - | - | 47,770 | 39,810 | 34,210 | 29,860 | 26,540 | 23,885 | 21,710 | 19,100 |

# GARR TOOL General Purpose Milling Guide

| | ISO Material | HRC | SFM (Vc) | CHIPLOAD PER TOOTH (Fz) 1/16" | 1/8" | 3/16" | 1/4" | 5/16" | 3/8" | 1/2" | 5/8" | 3/4" | 1" |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S | **COBALT BASE ALLOYS** | | | | | | | | | | | | |
| | Haynes 25/188, Stellite 21, Cobalt Chrome | < 40<br>> 40 | 60 - 90<br>50 - 80 | .0004" - .0008"<br>.0003" - .0006" | .0004" - .0008"<br>.0003" - .0006" | .0004" - .0008"<br>.0003" - .0006" | .0005" - .0010"<br>.0003" - .0008" | .0008" - .0015"<br>.0005" - .0010" | .0010" - .0018"<br>.0008" - .0015" | .0015" - .0030"<br>.0010" - .0015" | .0020" - .0030"<br>.0015" - .0025" | .0025" - .0035"<br>.0015" - .0020" | .0025" - .0035"<br>.0015" - .0020" |
| | **NICKEL BASE ALLOYS** | | | | | | | | | | | | |
| | Inconel-625/718, Waspaloy, Invar, Rene, Hastelloy, Monel | < 40<br>> 40 | 55 - 90<br>45 - 80 | .0004" - .0008"<br>.0003" - .0006" | .0004" - .0008"<br>.0003" - .0006" | .0004" - .0008"<br>.0003" - .0006" | .0005" - .0010"<br>.0003" - .0008" | .0008" - .0015"<br>.0005" - .0010" | .0010" - .0018"<br>.0008" - .0015" | .0015" - .0030"<br>.0010" - .0015" | .0020" - .0030"<br>.0015" - .0025" | .0025" - .0035"<br>.0015" - .0020" | .0025" - .0035"<br>.0015" - .0020" |
| | **IRON BASE ALLOYS** | | | | | | | | | | | | |
| | A286, Discaloy, Haynes 556, Carpenter 22, Greek Ascolloy | < 40<br>> 40 | 55 - 90<br>50 - 80 | .0004" - .0008"<br>.0003" - .0006" | .0004" - .0008"<br>.0003" - .0006" | .0004" - .0008"<br>.0003" - .0006" | .0005" - .0010"<br>.0003" - .0008" | .0008" - .0015"<br>.0005" - .0010" | .0010" - .0018"<br>.0008" - .0015" | .0015" - .0030"<br>.0010" - .0015" | .0020" - .0030"<br>.0015" - .0025" | .0025" - .0035"<br>.0015" - .0020" | .0025" - .0035"<br>.0015" - .0020" |
| | **TITANIUM ALLOYS** | | | | | | | | | | | | |
| | Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-2SN-4Zr-2Mo-Si | | 100 - 150 | .0003" - .0008" | .0003" - .0008" | .0005" - .0012" | .0005" - .0012" | .0008" - .0015" | .0010" - .0015" | .0013" - .0020" | .0018" - .0025" | .0020" - .0030" | .0025" - .0035" |
| | 5553 / Beta Titanium | | 90 - 120 | .0003" - .0008" | .0003" - .0008" | .0004" - .0010" | .0004" - .0010" | .0005" - .0012" | .0008" - .0014" | .0010" - .0016" | .0010" - .0020" | .0015" - .0025" | .0015" - .0025" |
| M | **STAINLESS STEELS** | | | | | | | | | | | | |
| | 13/8, 15/5, 17-4, pH Types | < 40<br>> 40 | 100 - 150<br>80 - 100 | .0002" - .0005"<br>.0002" - .0004" | .0003" - .0006"<br>.0002" - .0004" | .0003" - .0007"<br>.0002" - .0006" | .0006" - .0009"<br>.0003" - .0007" | .0008" - .0012"<br>.0004" - .0008" | .0013" - .0018"<br>.0007" - .0012" | .0010" - .0020"<br>.0008" - .0015" | .0012" - .0025"<br>.0010" - .0016" | .0012" - .0020"<br>.0013" - .0017" | .0020" - .0028"<br>.0015" - .0020" |
| | 300 Series, 304L, Nitronic 50, Duplex, Super-Austenitic | < 40<br>> 40 | 100 - 150<br>80 - 100 | .0003" - .0006"<br>.0002" - .0004" | .0003" - .0007"<br>.0002" - .0005" | .0005" - .0010"<br>.0004" - .0007" | .0008" - .0015"<br>.0005" - .0010" | .0009" - .0013"<br>.0005" - .0010" | .0010" - .0018"<br>.0007" - .0010" | .0015" - .0020"<br>.0009" - .0015" | .0018" - .0022"<br>.0012" - .0018" | .0018" - .0035"<br>.0015" - .0025" | .0023" - .0036"<br>.0020" - .0030" |
| | 400 Series - 403, 405, 420, 455 | < 40<br>> 40 | 150 - 200<br>100 - 150 | .0005" - .0008"<br>.0003" - .0007" | .0007" - .0010"<br>.0004" - .0008" | .0009" - .0015"<br>.0006" - .0010" | .0009" - .0014"<br>.0007" - .0011" | .0011" - .0015"<br>.0008" - .0012" | .0013" - .0018"<br>.0009" - .0015" | .0015" - .0025"<br>.0012" - .0020" | .0020" - .0035"<br>.0018" - .0030" | .0022" - .0040"<br>.0020" - .0035" | .0030" - .0046"<br>.0024" - .0042" |
| P | **HIGH STRENGTH TOOL STEELS** | | | | | | | | | | | | |
| | A2, D2, P20, H13, S7, O1 | < 40<br>> 40 | 150 - 200<br>100 - 150 | .0003" - .0008"<br>.0003" - .0005" | .0003" - .0008"<br>.0003" - .0005" | .0005" - .0010"<br>.0003" - .0008" | .0010" - .0015"<br>.0005" - .0010" | .0012" - .0020"<br>.0005" - .0010" | .0012" - .0020"<br>.0005" - .0010" | .0014" - .0024"<br>.0010" - .0015" | .0018" - .0026"<br>.0012" - .0018" | .0020" - .0028"<br>.0014" - .0020" | .0022" - .0030"<br>.0015" - .0022" |
| | **MEDIUM ALLOY TOOL STEELS** | | | | | | | | | | | | |
| | 4140, 4340, 52100, 6150, 8620 | < 40<br>> 40 | 150 - 200<br>100 - 150 | .0003" - .0008"<br>.0003" - .0005" | .0003" - .0008"<br>.0003" - .0005" | .0005" - .0010"<br>.0003" - .0008" | .0010" - .0015"<br>.0005" - .0010" | .0012" - .0020"<br>.0005" - .0010" | .0012" - .0020"<br>.0005" - .0010" | .0014" - .0024"<br>.0010" - .0015" | .0018" - .0026"<br>.0012" - .0018" | .0020" - .0028"<br>.0014" - .0020" | .0022" - .0030"<br>.0015" - .0022" |
| | **CARBON STEELS** | | | | | | | | | | | | |
| | 1000's - 1018, 1020, 12L14 | < 40 | 150 - 200 | .0003" - .0008" | .0003" - .0008" | .0005" - .0010" | .0010" - .0015" | .0012" - .0020" | .0012" - .0020" | .0014" - .0024" | .0018" - .0026" | .0020" - .0028" | .0022" - .0030" |
| K | **CAST MATERIAL** | | | | | | | | | | | | |
| | Ductile Iron | | 175 - 225 | .0005" - .0008" | .0008" - .0012" | .0010" - .0015" | .0015" - .0025" | .0015" - .0025" | .0020" - .0030" | .0025" - .0035" | .0035" - .0045" | .0035" - .0045" | .0045" - .0055" |
| | Gray Iron | | 175 - 225 | .0005" - .0008" | .0008" - .0012" | .0010" - .0015" | .0015" - .0025" | .0015" - .0025" | .0020" - .0030" | .0025" - .0035" | .0035" - .0045" | .0035" - .0045" | .0045" - .0055" |
| N | **NON-FERROUS** | | | | | | | | | | | | |
| | Aluminum | | 300 - 500 | .0003" - .0005" | .0006" - .0010" | .0008" - .0014" | .0012" - .0020" | .0014" - .0028" | .0020" - .0030" | .0035" - .0048" | .0050" - .0060" | .0058" - .0070" | .0068" - .0090" |
| | Magnesium | | 300 - 500 | .0003" - .0005" | .0006" - .0010" | .0008" - .0014" | .0012" - .0020" | .0014" - .0028" | .0020" - .0030" | .0035" - .0048" | .0050" - .0060" | .0058" - .0070" | .0068" - .0090" |
| | Copper | | 250 - 450 | .0003" - .0005" | .0006" - .0010" | .0008" - .0014" | .0012" - .0020" | .0014" - .0028" | .0020" - .0030" | .0035" - .0048" | .0050" - .0060" | .0058" - .0070" | .0068" - .0090" |
| | Brass, Bronze | | 200 - 400 | .0003" - .0005" | .0006" - .0010" | .0008" - .0014" | .0012" - .0020" | .0014" - .0028" | .0020" - .0030" | .0035" - .0048" | .0050" - .0060" | .0058" - .0070" | .0068" - .0090" |
| O | **COMPOSITE (non-ISO)** | | | | | | | | | | | | |
| | Fiberglass, Plastics, G10 | | 200 - 400 | .0003" - .0005" | .0006" - .0010" | .0008" - .0014" | .0012" - .0020" | .0014" - .0028" | .0020" - .0030" | .0035" - .0048" | .0050" - .0060" | .0058" - .0070" | .0068" - .0090" |
| | Graphite | | (See Graphite Chart - page 313) | | | | | | | | | | |

When plunging into a solid, drop feed by approximately 50%. 20% of diameter for basic engagement parameters.

**NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.**

# GARR TOOL General Purpose Milling Guide

| | ISO Material | HRC | M/Min. (Vc) | CHIPLOAD PER TOOTH (Fz) 1.5mm | 3.0mm | 5.0mm | 6.0mm | 8.0mm | 10.0mm | 12.0mm | 16.0mm | 20.0mm | 25.0mm |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S | **COBALT BASE ALLOYS** | | | | | | | | | | | | |
| | Haynes 25/188, Stellite 21, Cobalt Chrome | < 40<br>> 40 | 24 - 35<br>20 - 31 | .010 - .020<br>.008 - .015 | .010 - .020<br>.008 - .015 | .010 - .020<br>.008 - .015 | .013 - .025<br>.008 - .020 | .020 - .038<br>.013 - .025 | .025 - .046<br>.020 - .038 | .038 - .076<br>.025 - .038 | .051 - .076<br>.038 - .064 | .064 - .089<br>.038 - .051 | .064 - .089<br>.038 - .051 |
| | **NICKEL BASE ALLOYS** | | | | | | | | | | | | |
| | Inconel-625/718, Waspaloy, Invar, Rene, Hastelloy, Monel | < 40<br>> 40 | 22 - 35<br>18 - 31 | .010 - .020<br>.008 - .015 | .010 - .020<br>.008 - .015 | .010 - .020<br>.008 - .015 | .013 - .025<br>.008 - .020 | .020 - .038<br>.013 - .025 | .025 - .046<br>.020 - .038 | .038 - .076<br>.025 - .038 | .051 - .076<br>.038 - .064 | .064 - .089<br>.038 - .051 | .064 - .089<br>.038 - .051 |
| | **IRON BASE ALLOYS** | | | | | | | | | | | | |
| | A286, Discaloy, Haynes 556, Carpenter 22, Greek Ascolloy | < 40<br>> 40 | 22 - 35<br>20 - 31 | .010 - .020<br>.008 - .015 | .010 - .020<br>.008 - .015 | .010 - .020<br>.008 - .015 | .013 - .025<br>.008 - .020 | .020 - .038<br>.013 - .025 | .025 - .046<br>.020 - .038 | .038 - .076<br>.025 - .038 | .051 - .076<br>.038 - .064 | .064 - .089<br>.038 - .051 | .064 - .089<br>.038 - .051 |
| | **TITANIUM ALLOYS** | | | | | | | | | | | | |
| | Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-2SN-4Zr-2Mo-Si | | 39 - 59 | .008 - .020 | .008 - .020 | .013 - .030 | .013 - .030 | .020 - .038 | .025 - .038 | .033 - .051 | .046 - .064 | .051 - .076 | .064 - .089 |
| | 5553 / Beta Titanium | | 35 - 47 | .008 - .020 | .008 - .020 | .010 -.025 | .010 - .025 | .013 - .030 | .020 - .036 | .025 - .041 | .025 - .051 | .038 - .064 | .038 - .064 |
| M | **STAINLESS STEELS** | | | | | | | | | | | | |
| | 13/8, 15/5, 17-4, pH Types | < 40<br>> 40 | 39 - 59<br>31 - 39 | .005 - .013<br>.005 - .010 | .008 - .015<br>.005 - .010 | .008 - .018<br>.005 - .015 | .015 - .023<br>.008 - .018 | .020 - .030<br>.010 - .020 | .033 - .046<br>.018 - .030 | .025 - .051<br>.020 - .038 | .030 - .064<br>.025 - .041 | .030 - .051<br>.033 - .043 | .051 - .071<br>.038 - .051 |
| | 300 Series, 304L, Nitronic 50, Duplex, Super-Austenitic | < 40<br>> 40 | 39 - 59<br>31 - 39 | .008 - .015<br>.005 - .010 | .008 - .018<br>.005 - .013 | .013 - .025<br>.010 - .018 | .020 - .038<br>.013 - .025 | .023 - .033<br>.013 - .025 | .025 - .046<br>.018 - .025 | .038 - .051<br>.023 - .038 | .046 - .056<br>.030 - .046 | .046 - .089<br>.038 - .064 | .058 - .091<br>.051 - .076 |
| | 400 Series - 403, 405, 420, 455 | < 40<br>> 40 | 59 - 79<br>39 - 59 | .013 - .020<br>.008 - .018 | .018 - .025<br>.010 - .020 | .023 - .038<br>.015 - .025 | .023 - .036<br>.018 - .028 | .028 - .038<br>.020 - .030 | .033 - .046<br>.023 - .038 | .038 - .064<br>.030 - .051 | .051 - .089<br>.046 - .076 | .056 - .102<br>.051 - .089 | .076 - .117<br>.061 - .107 |
| P | **HIGH STRENGTH TOOL STEELS** | | | | | | | | | | | | |
| | A2, D2, P20, H13, S7, O1 | < 40<br>> 40 | 59 - 79<br>39 - 59 | .008 - .020<br>.008 - .013 | .008 - .020<br>.008 - .013 | .013 - .025<br>.008 - .020 | .025 - .038<br>.013 - .025 | .030 - .051<br>.013 - .025 | .030 - .051<br>.013 - .025 | .036 - .061<br>.025 - .038 | .046 - .066<br>.030 - .046 | .051 - .071<br>.036 - .051 | .056 - .076<br>.038 - .056 |
| | **MEDIUM ALLOY TOOL STEELS** | | | | | | | | | | | | |
| | 4140, 4340, 52100, 6150, 8620 | < 40<br>> 40 | 59 - 79<br>39 - 59 | .008 - .020<br>.008 - .013 | .008 - .020<br>.008 - .013 | .013 - .025<br>.008 - .020 | .025 - .038<br>.013 - .025 | .030 - .051<br>.013 - .025 | .030 - .051<br>.013 - .025 | .036 - .061<br>.025 - .038 | .046 - .066<br>.030 - .046 | .051 - .071<br>.036 - .051 | .056 - .076<br>.038 - .056 |
| | **CARBON STEELS** | | | | | | | | | | | | |
| | 1000's - 1018, 1020, 12L14 | < 40 | 59 - 79 | .008 - .020 | .008 - .020 | .013 - .025 | .025 - .038 | .030 - .051 | .030 - .051 | .036 - .061 | .046 - .066 | .051 - .071 | .056 - .076 |
| K | **CAST MATERIAL** | | | | | | | | | | | | |
| | Ductile Iron | | 69 - 89 | .013 - .020 | .020 - .031 | .025 - .038 | .038 - .064 | .038 - .064 | .051 - .076 | .064 - .089 | .089 - .114 | .089 - .114 | .114 - .140 |
| | Gray Iron | | 69 - 89 | .013 - .020 | .020 - .031 | .025 - .038 | .038 - .064 | .038 - .064 | .051 - .076 | .064 - .089 | .089 - .114 | .089 - .114 | .114 - .140 |
| N | **NON-FERROUS** | | | | | | | | | | | | |
| | Aluminum | | 118 - 197 | .008 - .013 | .015 - .025 | .020 - .036 | .030 - .051 | .036 - .071 | .051 - .076 | .089 - .122 | .127 - .152 | .147 - .178 | .173 - .229 |
| | Magnesium | | 118 - 197 | .008 - .013 | .015 - .025 | .020 - .036 | .030 - .051 | .036 - .071 | .051 - .076 | .089 - .122 | .127 - .152 | .147 - .178 | .173 - .229 |
| | Copper | | 98 - 177 | .008 - .013 | .015 - .025 | .020 - .036 | .030 - .051 | .036 - .071 | .051 - .076 | .089 - .122 | .127 - .152 | .147 - .178 | .173 - .229 |
| | Brass, Bronze | | 79 - 157 | .008 - .013 | .015 - .025 | .020 - .036 | .030 - .051 | .036 - .071 | .051 - .076 | .089 - .122 | .127 - .152 | .147 - .178 | .173 - .229 |
| O | **COMPOSITE (non-ISO)** | | | | | | | | | | | | |
| | Fiberglass, Plastics, G10 | | 79 - 157 | .008 - .013 | .015 - .025 | .020 - .036 | .030 - .051 | .036 - .071 | .051 - .076 | .089 - .122 | .127 - .152 | .147 - .178 | .173 - .229 |
| | Graphite | (See Graphite Chart - page 313) | | | | | | | | | | | |

When plunging into a solid, drop feed by approximately 50%. 20% of diameter for basic engagement parameters.

**NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.**

# GARR TOOL High Performance Milling Guide for 246MA, 253MA, 255MA, 263MA

| | ISO Material | HRC | SFM (Vc) | CHIPLOAD PER TOOTH (Fz) 1/8″ | 3/16″ | 1/4″ | 5/16″ | 3/8″ | 1/2″ | 5/8″ | 3/4″ | 1″ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S | **COBALT BASE ALLOYS** | | | | | | | | | | | |
| | Haynes 25/188, Stellite 21, Cobalt Chrome | < 40<br>> 40 | 70 - 110<br>50 - 90 | .0008″ - .0020″<br>.0005″ - .0015″ | .0004″ - .0010″<br>.0004″ - .0007″ | .0007″ - .0012″<br>.0005″ - .0011″ | .0010″ - .0018″<br>.0008″ - .0014″ | .0010″ - .0020″<br>.0010″ - .0017″ | .0018″ - .0028″<br>.0015″ - .0025″ | .0023″ - .0031″<br>.0021″ - .0028″ | .0027″ - .0034″<br>.0024″ - .0030″ | .0029″ - .0036″<br>.0025″ - .0031″ |
| | **NICKEL BASE ALLOYS** | | | | | | | | | | | |
| | Inconel-625/718, Waspaloy, Invar, Rene, Hastelloy, Monel | < 40<br>> 40 | 65 - 110<br>55 - 90 | .0005″ - .0009″<br>.0003″ - .0008″ | .0005″ - .0009″<br>.0004″ - .0007″ | .0007″ - .0013″<br>.0007″ - .0012″ | .0010″ - .0017″<br>.0009″ - .0015″ | .0010″ - .0020″<br>.0010″ - .0018″ | .0020″ - .0028″<br>.0015″ - .0025″ | .0025″ - .0032″<br>.0022″ - .0030″ | .0029″ - .0036″<br>.0026″ - .0033″ | .0030″ - .0038″<br>.0029″ - .0035″ |
| | **IRON BASE ALLOYS** | | | | | | | | | | | |
| | A286, Discaloy, Haynes 556, Carpenter 22, Greek Ascolloy | < 40<br>> 40 | 65 - 110<br>55 - 90 | .0005″ - .0010″<br>.0003″ - .0008″ | .0008″ - .0010″<br>.0004″ - .0008″ | .0006″ - .0012″<br>.0005″ - .0010″ | .0007″ - .0015″<br>.0006″ - .0013″ | .0011″ - .0016″<br>.0008″ - .0014″ | .0018″ - .0026″<br>.0013″ - .0023″ | .0025″ - .0030″<br>.0022″ - .0028″ | .0026″ - .0034″<br>.0025″ - .0031″ | .0032″ - .0038″<br>.0030″ - .0035″ |
| | **TITANIUM ALLOYS** | | | | | | | | | | | |
| | Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si | | 125 - 175 | .0005″ - .0010″ | .0005″ - .0012″ | .0008″ - .0015″ | .0010″ - .0022″ | .0018″ - .0027″ | .0023″ - .0032″ | .0025″ - .0033″ | .0027″ - .0035″ | .0028″ - .0037″ |
| | 5553 / Beta Titanium | | 100 - 150 | .0004″ - .0010″ | .0004″ - .0010″ | .0006″ - .0014″ | .0008″ - .0017″ | .0015″ - .0025″ | .0022″ - .0028″ | .0024″ - .0030″ | .0026″ - .0032″ | .0028″ - .0035″ |
| M | **STAINLESS STEELS** | | | | | | | | | | | |
| | 13/8, 15/5, 17-4, PH Types | < 40<br>> 40 | 175 - 225<br>135 - 175 | .0005″ - .0007″<br>.0002″ - .0004″ | .0004″ - .0008″<br>.0002″ - .0006″ | .0007″ - .0010″<br>.0003″ - .0007″ | .0008″ - .0012″<br>.0004″ - .0008″ | .0013″ - .0018″<br>.0007″ - .0012″ | .0010″ - .0020″<br>.0008″ - .0015″ | .0012″ - .0025″<br>.0010″ - .0016″ | .0012″ - .0020″<br>.0013″ - .0017″ | .0020″ - .0028″<br>.0015″ - .0020″ |
| | 300 Series, 304L, Nitronic 50, Duplex, Super-Austenitic | < 40<br>> 40 | 200 - 225<br>155 - 200 | .0003″ - .0007″<br>.0002″ - .0005″ | .0005″ - .0010″<br>.0004″ - .0007″ | .0008″ - .0015″<br>.0005″ - .0010″ | .0009″ - .0013″<br>.0005″ - .0010″ | .0010″ - .0018″<br>.0007″ - .0010″ | .0015″ - .0020″<br>.0009″ - .0015″ | .0018″ - .0022″<br>.0012″ - .0018″ | .0018″ - .0035″<br>.0015″ - .0025″ | .0023″ - .0036″<br>.0020″ - .0030″ |
| | 400 Series - 403, 405, 420, 455 | < 40<br>> 40 | 200 - 225<br>150 - 200 | .0007″ - .0010″<br>.0004″ - .0008″ | .0009″ - .0015″<br>.0006″ - .0010″ | .0009″ - .0014″<br>.0007″ - .0011″ | .0011″ - .0015″<br>.0008″ - .0012″ | .0013″ - .0018″<br>.0009″ - .0015″ | .0015″ - .0025″<br>.0012″ - .0020″ | .0020″ - .0035″<br>.0018″ - .0030″ | .0022″ - .0040″<br>.0020″ - .0035″ | .0030″ - .0046″<br>.0024″ - .0042″ |
| P | **HIGH STRENGTH TOOL STEELS** | | | | | | | | | | | |
| | A2, D2, P20, H13, S2, O1 | < 40<br>> 40 | 225 - 325<br>150 - 225 | .0005″ - .0008″<br>.0003″ - .0005″ | .0008″ - .0015″<br>.0005″ - .0010″ | .0015″ - .0020″<br>.0008″ - .0012″ | .0015″ - .0023″<br>.0010″ - .0015″ | .0015″ - .0025″<br>.0010″ - .0018″ | .0020″ - .0030″<br>.0015″ - .0020″ | .0020″ - .0030″<br>.0015″ - .0020″ | .0025″ - .0035″<br>.0018″ - .0025″ | .0030″ - .0040″<br>.0020″ - .0030″ |
| | **MEDIUM ALLOY TOOL STEELS** | | | | | | | | | | | |
| | 4140, 4340, 52100, 6150, 8620 | < 40<br>> 40 | 225 - 325<br>150 - 225 | .0005″ - .0008″<br>.0003″ - .0005″ | .0008″ - .0015″<br>.0005″ - .0010″ | .0015″ - .0020″<br>.0008″ - .0012″ | .0015″ - .0023″<br>.0010″ - .0015″ | .0015″ - .0025″<br>.0010″ - .0018″ | .0020″ - .0030″<br>.0015″ - .0020″ | .0020″ - .0030″<br>.0015″ - .0020″ | .0025″ - .0035″<br>.0018″ - .0025″ | .0030″ - .0040″<br>.0020″ - .0030″ |
| | **CARBON STEELS** | | | | | | | | | | | |
| | 1000's - 1018, 1020, 12L14 | < 40 | 225 - 325 | .0005″ - .0008″ | .0008″ - .0015″ | .0015″ - .0020″ | .0015″ - .0023″ | .0015″ - .0025″ | .0020″ - .0030″ | .0020″ - .0030″ | .0025″ - .0035″ | .0030″ - .0040″ |
| K | **CAST MATERIAL** | | | | | | | | | | | |
| | Ductile Iron | | 225 - 325 | .0010″ - .0015″ | .0015″ - .0020″ | .0020″ - .0030″ | .0025″ - .0035″ | .0025″ - .0035″ | .0030″ - .0045″ | .0040″ - .0050″ | .0040″ - .0050″ | .0050″ - .0060″ |
| | Gray Iron | | 300 - 400 | .0015″ - .0025″ | .0020″ - .0030″ | .0025″ - .0035″ | .0030″ - .0040″ | .0030″ - .0040″ | .0040″ - .0050″ | .0050″ - .0060″ | .0060″ - .0070″ | .0060″ - .0070″ |
| N | **NON-FERROUS** | | | | | | | | | | | |
| | Aluminum | | 300 - 500 | .0006" - .0010" | .0008" - .0014" | .0012" - .0020" | .0014" - .0028" | .0020" - .0030" | .0035" - .0048" | .0050" - .0060" | .0058" - .0070" | .0068" - .0090" |
| | Magnesium | | 300 - 500 | .0006" - .0010" | .0008" - .0014" | .0012" - .0020" | .0014" - .0028" | .0020" - .0030" | .0035" - .0048" | .0050" - .0060" | .0058" - .0070" | .0068" - .0090" |
| | Copper | | 250 - 450 | .0006" - .0010" | .0008" - .0014" | .0012" - .0020" | .0014" - .0028" | .0020" - .0030" | .0035" - .0048" | .0050" - .0060" | .0058" - .0070" | .0068" - .0090" |
| | Brass, Bronze | | 200 - 400 | .0006" - .0010" | .0008" - .0014" | .0012" - .0020" | .0014" - .0028" | .0020" - .0030" | .0035" - .0048" | .0050" - .0060" | .0058" - .0070" | .0068" - .0090" |
| O | **COMPOSITE (non-ISO)** | | | | | | | | | | | |
| | Fiberglass, Plastics, G10 | | 200 - 400 | .0006" - .0010" | .0008" - .0014" | .0012" - .0020" | .0014" - .0028" | .0020" - .0030" | .0035" - .0048" | .0050" - .0060" | .0058" - .0070" | .0068" - .0090" |
| | Graphite | (See Graphite Chart - page 313) | | | | | | | | | | |

Beryllium added to any material adds hardness and some nickel content. If tool displays chatter, increase feed (IPM) up to 30% and reduce speed (RPM) by 10%.
More detailed information is available on succeeding pages regarding the following materials: Aluminum, High Rockwell Steels, Graphite, and VRX end mills

**NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.**

# GARR TOOL High Performance Milling Guide for 846MA, 853MA, 855MA, 863MA

| ISO Material | | HRC | M/Min. (Vc) | CHIPLOAD PER TOOTH (Fz) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 3.0mm | 5.0mm | 6.0mm | 8.0mm | 10.0mm | 12.0mm | 16.0mm | 20.0mm | 25.0mm |
| S | **COBALT BASE ALLOYS** | | | | | | | | | | | |
| | Haynes 25/188, Stellite 21, Cobalt Chrome | < 40<br>> 40 | 28 - 43<br>20 - 35 | .020 - .051<br>.013 - .038 | .010 - .025<br>.010 - .018 | .018 - .030<br>.013 - .028 | .025 - .046<br>.020 - .036 | .025 - .051<br>.025 - .043 | .046 - .071<br>.038 - .064 | .058 - .079<br>.053 - .071 | .069 - .086<br>.061 - .076 | .074 - .091<br>.064 - .079 |
| | **NICKEL BASE ALLOYS** | | | | | | | | | | | |
| | Inconel-625/718, Waspaloy, Invar, Rene, Hastelloy, Monel | < 40<br>> 40 | 26 - 43<br>22 - 35 | .013 - .023<br>.008 - .020 | .013 - .023<br>.010 - .018 | .018 - .033<br>.018 - .030 | .025 - .041<br>.023 - .038 | .025 - .051<br>.025 - .046 | .051 - .071<br>.038 - .064 | .064 - .081<br>.056 - .076 | .074 - .091<br>.066 - .084 | .076 - .097<br>.074 - .089 |
| | **IRON BASE ALLOYS** | | | | | | | | | | | |
| | A286, Discaloy, Haynes 556, Carpenter 22, Greek Ascolloy | < 40<br>> 40 | 26 - 43<br>22 - 35 | .013 - .025<br>.008 - .020 | .020 - .025<br>.010 - .020 | .015 - .030<br>.013 - .025 | .018 - .038<br>.015 - .033 | .028 - .041<br>.020 - .036 | .046 - .066<br>.033 - .058 | .064 - .076<br>.056 - .071 | .066 - .086<br>.064 - .079 | .081 - .097<br>.076 - .089 |
| | **TITANIUM ALLOYS** | | | | | | | | | | | |
| | Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si | | 49 - 69 | .013 - .025 | .013 - .030 | .020 - .038 | .025 - .056 | .046 - .069 | .058 - .081 | .064 - .084 | .069 - .089 | .071 - .094 |
| | 5553 / Beta Titanium | | 39 - 59 | .010 - .025 | .010 - .025 | .015 - .036 | .020 - .041 | .038 - .064 | .056 - .071 | .061 - .076 | .066 - .081 | .071 - .089 |
| M | **STAINLESS STEELS** | | | | | | | | | | | |
| | 13/8, 15/5, 17-4, PH Types | < 40<br>> 40 | 69 - 89<br>53 - 69 | .013 - .018<br>.005 - .010 | .010 - .020<br>.005 - .015 | .018 - .025<br>.007 - .018 | .020 - .030<br>.010 - .020 | .033 - .046<br>.018 - .030 | .025 - .051<br>.020 - .038 | .030 - .064<br>.025 - .041 | .030 - .051<br>.033 - .043 | .051 - .071<br>.038 - .051 |
| | 300 Series, 304L, Nitronic 50, Duplex, Super-Austenitic | < 40<br>> 40 | 79 - 89<br>61 - 79 | .008 - .018<br>.005 - .013 | .013 - .025<br>.010 - .018 | .020 - .038<br>.013 - .025 | .023 - .033<br>.013 - .025 | .025 - .046<br>.018 - .025 | .038 - .051<br>.023 - .038 | .046 - .056<br>.030 - .046 | .046 - .089<br>.038 - .064 | .058 - .091<br>.051 - .076 |
| | 400 Series - 403, 405, 420, 455 | < 40<br>> 40 | 79 - 89<br>59 - 79 | .018 - .025<br>.010 - .020 | .023 - .038<br>.015 - .025 | .023 - .036<br>.018 - .028 | .028 - .038<br>.020 - .030 | .033 - .046<br>.023 - .038 | .038 - .064<br>.030 - .051 | .051 - .089<br>.046 - .076 | .056 - .102<br>.051 - .089 | .076 - .117<br>.061 - .107 |
| P | **HIGH STRENGTH TOOL STEELS** | | | | | | | | | | | |
| | A2, D2, P20, H13, S2, O1 | < 40<br>> 40 | 89 - 128<br>59 - 89 | .013 - .020<br>.008 - .013 | .020 - .038<br>.013 - .025 | .038 - .051<br>.020 - .030 | .038 - .058<br>.025 - .038 | .038 - .064<br>.025 - .046 | .051 - .076<br>.038 - .051 | .051 - .076<br>.038 - .051 | .064 - .089<br>.046 - .064 | .076 - .102<br>.051 - .076 |
| | **MEDIUM ALLOY TOOL STEELS** | | | | | | | | | | | |
| | 4140, 4340, 52100, 6150, 8620 | < 40<br>> 40 | 89 - 128<br>59 - 89 | .013 - .020<br>.008 - .013 | .020 - .038<br>.013 - .025 | .038 - .051<br>.020 - .030 | .038 - .058<br>.025 - .038 | .038 - .064<br>.025 - .046 | .051 - .076<br>.038 - .051 | .051 - .076<br>.038 - .051 | .064 - .089<br>.046 - .064 | .076 - .102<br>.051 - .076 |
| | **CARBON STEELS** | | | | | | | | | | | |
| | 1000's - 1018, 1020, 12L14 | < 40 | 89 - 128 | .013 - .020 | .020 - .038 | .038 - .051 | .038 - .058 | .038 - .064 | .051 - .076 | .051 - .076 | .064 - .089 | .076 - .102 |
| K | **CAST MATERIAL** | | | | | | | | | | | |
| | Ductile Iron | | 89 - 128 | .025 - .038 | .038 - .051 | .051 - .076 | .064 - .089 | .064 - .089 | .076 - .114 | .102 - .127 | .102 - .127 | .127 - .152 |
| | Gray Iron | | 118 - 157 | .038 - .064 | .051 - .076 | .064 - .089 | .076 - .102 | .076 - .102 | .102 - .127 | .127 - .152 | .152 - .178 | .152 - .178 |
| N | **NON-FERROUS** | | | | | | | | | | | |
| | Aluminum | | 118 - 197 | .015 - .025 | .020 - .036 | .030 - .051 | .036 - .071 | .051 - .076 | .089 - .122 | .127 - .152 | .147 - .178 | .173 - .229 |
| | Magnesium | | 118 - 197 | .015 - .025 | .020 - .036 | .030 - .051 | .036 - .071 | .051 - .076 | .089 - .122 | .127 - .152 | .147 - .178 | .173 - .229 |
| | Copper | | 98 - 177 | .015 - .025 | .020 - .036 | .030 - .051 | .036 - .071 | .051 - .076 | .089 - .122 | .127 - .152 | .147 - .178 | .173 - .229 |
| | Brass, Bronze | | 79 - 157 | .015 - .025 | .020 - .036 | .030 - .051 | .036 - .071 | .051 - .076 | .089 - .122 | .127 - .152 | .147 - .178 | .173 - .229 |
| O | **COMPOSITE (non-ISO)** | | | | | | | | | | | |
| | Fiberglass, Plastics, G10 | | 79 - 157 | .015 - .025 | .020 - .036 | .030 - .051 | .036 - .071 | .051 - .076 | .089 - .122 | .127 - .152 | .147 - .178 | .173 - .229 |
| | Graphite | (See Graphite Chart - page 313) | | | | | | | | | | |

Beryllium added to any material adds hardness and some nickel content. If tool displays chatter, increase feed (IPM) up to 30% and reduce speed (RPM) by 10%.
More detailed information is available on succeeding pages regarding the following materials: Aluminum, High Rockwell Steels, Graphite, and VRX end mills

**NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.**

# GARR TOOL Milling Guide for Aluminum (Machining Centers with Low-Range HP/Torque)

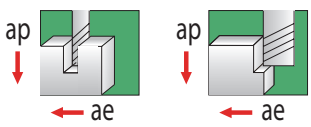
## Series 242M/842M/A3 End Mills

**NOTES:** Spindle interface must be scrutinized when using 5/8" diameter and larger end mills

| | SLOTTING | | PROFILING |
|---|---|---|---|
| | Axial = .5xD | Axial = 1xD | Axial ≤ 1xD<br>Radial ≤ .5xD |
| | SFM = 400 - 600 | SFM = 300 - 450 | SFM = 500 - 650 |
| Diameter | CPT (Fz) = .5% - 1.5% of diameter | CPT (Fz) = .5% - 1% of diameter | CPT (Fz) = 1% - 2% of diameter |
| 1/8" | .0006" - .0018" | .0006" - .0012" | .0012" - .0024" |
| 3/16" | .0009" - .0028" | .0009" - .0018" | .0018" - .0036" |
| 1/4" | .0013" - .0038" | .0013" - .0025" | .0025" - .0050" |
| 5/16" | .0016" - .0047" | .0016" - .0031" | .0031" - .0062" |
| 3/8" | .0019" - .0056" | .0019" - .0037" | .0037" - .0074" |
| 1/2" | .0025" - .0075" | .0025" - .0050" | .0050" - .0100" |
| 5/8" | .0031" - .0094" | .0031" - .0062" | .0062" - .0120" |
| 3/4" | .0038" - .0110" | .0038" - .0075" | .0075" - .0150" |
| 1" | .0050" - .0150" | .0050" - .0100" | .0100" - .0200" |

| | SLOTTING | | PROFILING |
|---|---|---|---|
| | Axial = .5xD | Axial = 1xD | Axial ≤ 1xD<br>Radial ≤ 0.5xD |
| | M/Min. = 125 - 180 | M/Min. = 90 - 140 | M/Min. = 150 - 200 |
| Diameter | CPT (Fz) = .5% - 1.5% of diameter | CPT (Fz) = .5% - 1% of diameter | CPT (Fz) = 1% - 2% of diameter |
| 3.0mm | .015 - .045 | .015 - .030 | .030 - .060 |
| 4.0mm | .020 - .060 | .020 - .040 | .040 - .080 |
| 6.0mm | .030 - .090 | .030 - .060 | .060 - .120 |
| 8.0mm | .040 - .120 | .040 - .080 | .080 - .160 |
| 10.0mm | .050 - .150 | .050 - .100 | .100 - .200 |
| 12.0mm | .060 - .180 | .060 - .120 | .120 - .240 |
| 16.0mm | .080 - .240 | .080 - .160 | .160 - .320 |
| 20.0mm | .100 - .300 | .100 - .200 | .200 - .400 |
| 25.0mm | .125 - .375 | .125 - .250 | .250 - .500 |

| | Slotting<br>Pocket Milling | Profiling<br>Side Milling |
|---|---|---|
| Axial (ap) | up to 1xD | up to 1xD |
| Radial (ae) | 1xD | up to 50% of Dia. |




**NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.**

# GARR TOOL Milling Guide for Aluminum (Machining Centers with Mid-Range HP/Torque)

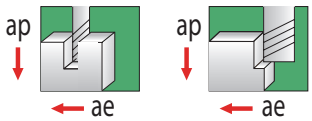
## Series 142M/143M/A3 End Mills

**NOTES:** In cases for tools with slower SFM (M/Min.), reference Series 242M/842M
Spindle interface must be scrutinized when using 5/8" diameter and larger end mills

| | SLOTTING | | PROFILING |
|---|---|---|---|
| | Axial = .5xD | Axial = 1xD | Axial ≤ 1xD<br>Radial ≤ .5xD |
| | SFM = 1500 - 2000 | SFM = 750 - 1500 | SFM = 1500 - 2000 |
| Diameter | CPT (Fz) = 1.5% - 2.5% of diameter | CPT (Fz) = 1% - 2% of diameter | CPT (Fz) = 1.5% - 2.5% of diameter |
| 1/8" | .0019" - .0031" | .0013" - .0025" | .0019" - .0031" |
| 3/16" | .0028" - .0047" | .0018" - .0037" | .0028" - .0047" |
| 1/4" | .0037" - .0062" | .0025" - .0050" | .0037" - .0062" |
| 5/16" | .0052" - .0078" | .0031" - .0062" | .0052" - .0078" |
| 3/8" | .0055" - .0094" | .0037" - .0074" | .0055" - .0094" |
| 1/2" | .0075" - .0125" | .0050" - .0100" | .0075" - .0125" |
| 5/8" | .0093" - .0156" | .0062" - .0125" | .0093" - .0156" |
| 3/4" | .0112" - .0188" | .0075" - .0150" | .0112" - .0188" |
| 1" | .0150" - .0250" | .0100" - .0200" | .0150" - .0250" |

| | SLOTTING | | PROFILING |
|---|---|---|---|
| | Axial = .5xD | Axial = 1xD | Axial ≤ 1xD<br>Radial ≤ 0.5xD |
| | M/Min. = 450 - 760 | M/Min. = 225 - 450 | M/Min. = 450 - 760 |
| Diameter | CPT (Fz) = 1.5% - 2.5% of diameter | CPT (Fz) = 1% - 2% of diameter | CPT (Fz) = 1.5% - 2.5% of diameter |
| 3.0mm | .045 - .075 | .030 - .060 | .045 - .075 |
| 4.0mm | .060 - .100 | .040 - .080 | .060 - .100 |
| 6.0mm | .090 - .150 | .060 - .120 | .090 - .150 |
| 8.0mm | .120 - .200 | .080 - .160 | .120 - .200 |
| 10.0mm | .150 - .250 | .100 - .200 | .150 - .250 |
| 12.0mm | .180 - .300 | .120 - .240 | .180 - .300 |
| 16.0mm | .240 - .400 | .160 - .320 | .240 - .400 |
| 20.0mm | .300 - .500 | .200 - .400 | .300 - .500 |
| 25.0mm | .375 - .625 | .250 - .500 | .375 - .625 |

| | Slotting<br>Pocket Milling | Profiling<br>Side Milling |
|---|---|---|
| Axial (ap) | up to 1xD | up to 1xD |
| Radial (ae) | 1xD | up to 50% of Dia. |




**NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.**

# GARR TOOL Milling Guide for Aluminum (Machining Centers with High-Range HP/Torque)

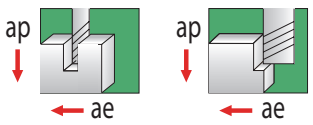
## Series A3 End Mills

**NOTES:** Contact your OEM for your machine's optimal running parameters
CPT parameters shown are for 2xD LOC tooling and 2.5xD Reach Lengths
Spindle interface must be scrutinized when using 5/8" diameter and larger end mills
Preferred tool holders: Rego Fix powRgrip or Shrink Fit

| | SLOTTING | | PROFILING | FINISHING |
|---|---|---|---|---|
| | Axial = .5xD | Axial = 1xD | Axial = 2xD<br>Radial = 30%-40%xD | Axial = Max LOC<br>Radial = 2.5%xD |
| | SFM = Maximum RPM | SFM = Maximum RPM | SFM = Maximum RPM | SFM = up to 80% Max RPM |
| Diameter | CPT (Fz) = 1.5% - 3% of diameter | CPT (Fz) = 1% - 2% of diameter | CPT (Fz) = 2% - 3% of diameter | CPT (Fz) = 1% of diameter |
| 3/16" | .0028" - .0056" | .0018" - .0037" | .0037" - .0056" | .0018" |
| 1/4" | .0037" - .0074" | .0025" - .0050" | .0050" - .0075" | .0025" |
| 5/16" | .0052" - .0104" | .0031" - .0062" | .0062" - .0094" | .0031" |
| 3/8" | .0055" - .0110" | .0037" - .0074" | .0075" - .0112" | .0037" |
| 1/2" | .0075" - .0150" | .0050" - .0100" | .0100" - .0150" | .0050" |
| 5/8" | .0093" - .0186" | .0062" - .0125" | .0125" - .0187" | .0062" |
| 3/4" | .0112" - .0224" | .0075" - .0150" | .0150" - .0225" | .0075" |
| 1" | .0150" - .0300" | .0100" - .0200" | .0200" - .0300" | .0100" |

| | SLOTTING | | PROFILING | FINISHING |
|---|---|---|---|---|
| | Axial = .5xD | Axial = 1xD | Axial = 2xD<br>Radial = 30%-40%xD | Axial = Max LOC<br>Radial = 2.5%xD |
| | M/Min. = Maximum RPM | M/Min. = Maximum RPM | M/Min. = Maximum RPM | M/Min. = up to 80% Max RPM |
| Diameter | CPT (Fz) = 1.5% - 3% of diameter | CPT (Fz) = 1% - 2% of diameter | CPT (Fz) = 2% - 3% of diameter | CPT (Fz) = 1% of diameter |
| 4.0mm | .060 - .120 | .040 - .080 | .080 - .120 | .040 |
| 6.0mm | .090 - .180 | .060 - .120 | .120 - .180 | .060 |
| 8.0mm | .120 - .240 | .080 - .160 | .160 - .240 | .080 |
| 10.0mm | .150 - .300 | .100 - .200 | .200 - .300 | .100 |
| 12.0mm | .180 - .360 | .120 - .240 | .240 - .360 | .120 |
| 16.0mm | .240 - .480 | .160 - .320 | .320 - .480 | .160 |
| 20.0mm | .300 - .600 | .200 - .400 | .400 - .600 | .200 |
| 25.0mm | .375 - .750 | .250 - .500 | .500 - .750 | .250 |

| | Slotting<br>Pocket Milling | Profiling<br>Side Milling |
|---|---|---|
| Axial (ap) | up to 1xD | up to 2xD |
| Radial (ae) | 1xD | up to 50% of Dia. |



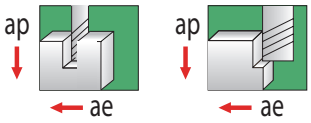

**NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.**

# GARR TOOL Milling Guide for ARC Series 3-Flute Rougher

| ISO Material | | SFM (Vc) | CHIPLOAD PER TOOTH (Fz) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | 3/16" | 1/4" | 5/16" | 3/8" | 1/2" | 5/8" | 3/4" | 1" |
| S | **TITANIUM ALLOYS** | | | | | | | | | |
| | Titanium: 6AL4V, CP | 150 - 250 | .0005" - .0008" | .0007" - .0010" | .0008" - .0013" | .0012" - .0018" | .0015" - .0023" | .0018" - .0028" | .0020" - .0035" | .0025" - .0045" |
| N | **NON-FERROUS** | | | | | | | | | |
| | Aluminum | 700 - 1000 | .0010" - .0020" | .0015" - .0025" | .0020" - .0030" | .0025" - .0035" | .0030" - .0040" | .0040" - .0050" | .0050" - .0060" | .0060" - .0070 |
| | Copper, Brass, Bronze | 300 - 500 | .0008" - .0013" | .0012" - .0018" | .0015" - .0023" | .0018" - .0028" | .0020" - .0035" | .0025" - .0045" | .0030" - .0050" | .0040" - .0060" |

| ISO Material | | M/Min. (Vc) | CHIPLOAD PER TOOTH (Fz) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | 4.0mm | 6.0mm | 8.0mm | 10.0mm | 12.0mm | 16.0mm | 20.0mm | 25.0mm |
| S | **TITANIUM ALLOYS** | | | | | | | | | |
| | Titanium: 6AL4V, CP | 40 - 80 | .010 - .020 | .015 - .025 | .020 - .035 | .025 - .050 | .035 - .055 | .045 - .075 | .050 - .090 | .060 - .115 |
| N | **NON-FERROUS** | | | | | | | | | |
| | Aluminum | 200 - 350 | .025 - .050 | .040 - .065 | .050 - .075 | .060 - .090 | .075 - .100 | .100 - .125 | .125 - .150 | .150 - .180 |
| | Copper, Brass, Bronze | 80 - 150 | .020 - .035 | .025 - .050 | .035 - .055 | .045 - .075 | .050 - .090 | .060 - .115 | .075 - .125 | .100 - .150 |

| | Slotting | Profiling |
|---|---|---|
| Axial (ap) | 1xD | 2xD |
| Radial (ae) | 1xD | 0.5xD |



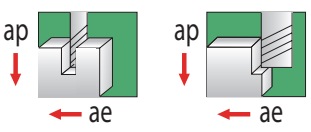

*ARC SERIES TOOLS ARE NOT DESIGNED FOR OVER 28Rc MATERIALS*

**NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.**

# GARR TOOL Milling Guide for VHM Series 4-Flute Rougher

| ISO Material | | SFM (Vc) | CHIPLOAD PER TOOTH (Fz) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | 3/16" | 1/4" | 5/16" | 3/8" | 1/2" | 5/8" | 3/4" | 1" |
| S | **NICKEL BASE ALLOYS** | | | | | | | | | |
| | High Temperature Alloys: Inconel 625/718, A286 | 100 - 175 | .0007" - .0010" | .0008" - .0010" | .0010" - .0015" | .0010" - .0015" | .0010" - .0015" | .0012" - .0020" | .0015" - .0025" | .0015" - .0025" |
| | **TITANIUM ALLOYS** | | | | | | | | | |
| | Titanium: 6AL4V, CP | 150 - 200 | .0008" - .0010" | .0010" - .0015" | .0010" - .0020" | .0015" - .0020" | .0020" - .0030" | .0025" - .0030" | .0030" - .0035" | .0030" - .0040" |
| M | **STAINLESS STEELS** | | | | | | | | | |
| | Stainless Steel: 303 | 290 - 375 | .0008" - .0010" | .0010" - .0015" | .0013" - .0020" | .0015" - .0020" | .0020" - .0030" | .0025" - .0035" | .0030" - .0040" | .0035" - .0045" |
| | Stainless Steel: 304, 316, 400 Series, Kovar, Invar | 250 - 300 | .0006" - .0010" | .0008" - .0015" | .0010" - .0020" | .0012" - .0020" | .0015" - .0020" | .0020" - .0025" | .0025" - .0030" | .0025" - .0035" |
| | Stainless Steel: 304L, 316L, 8620, 17/4, 15/5, 13/8, PH Mat'l | 200 - 250 | .0006" - .0008" | .0007" - .0010" | .0008" - .0010" | .0010" - .0015" | .0010" - .0020" | .0015" - .0025" | .0020" - .0030" | .0020" - .0030" |
| P | **HIGH STRENGTH TOOL STEELS** | | | | | | | | | |
| | High Strength Tool Steel: 4130, 4140, A2, D2, P20, H13 | 250 - 400 | .0006" - .0008" | .0007" - .0010" | .0008" - .0010" | .0010" - .0015" | .0010" - .0020" | .0015" - .0025" | .0020" - .0030" | .0020" - .0030" |
| | **CARBON STEELS** | | | | | | | | | |
| | Carbon Steels: 1000 Series | 275 - 425 | .0006" - .0008" | .0008" - .0012" | .0010" - .0015" | .0010" - .0020" | .0015" - .0025" | .0020" - .0025" | .0020" - .0030" | .0025" - .0035" |
| K | **CAST MATERIAL** | | | | | | | | | |
| | Cast Iron | 400 - 500 | .0010" - .0020" | .0010" - .0020" | .0015" - .0020" | .0015" - .0025" | .0020" - .0035" | .0025" - .0035" | .0030" - .0040" | .0040" - .0050" |

| | Slotting | Profiling |
|---|---|---|
| Axial (ap) | 0.5xD | 2xD |
| Radial (ae) | 1xD | 0.2xD |

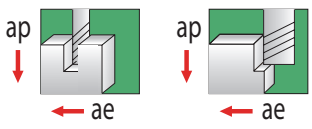



**NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.**

# GARR TOOL Milling Guide for VHM Series 4-Flute Rougher

| | ISO Material | M/Min. (Vc) | CHIPLOAD PER TOOTH (Fz) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | 4.0mm | 5.0mm | 6.0mm | 8.0mm | 10.0mm | 12.0mm | 16.0mm | 20.0mm | 25.0mm |
| S | **NICKEL BASE ALLOYS** | | | | | | | | | | |
| | High Temperature Alloys: Inconel 625/718, A286 | 30 - 55 | .008 - .015 | .018 - .025 | .020 - .025 | .025 - .038 | .025 - .038 | .025 - .038 | .030 - .050 | .038 - .063 | .038 - .063 |
| | **TITANIUM ALLOYS** | | | | | | | | | | |
| | Titanium: 6AL4V, CP | 45 - 60 | .010 - .020 | .020 - .025 | .025 - .038 | .025 - .050 | .038 - .050 | .050 - .076 | .063 - .076 | .076 - .089 | .076 - .102 |
| M | **STAINLESS STEELS** | | | | | | | | | | |
| | Stainless Steel: 303 | 90 - 115 | .010 - .020 | .020 - .025 | .025 - .038 | .033 - .050 | .038 - .050 | .050 - .076 | .063 - .089 | .076 - .102 | .089 - .114 |
| | Stainless Steel: 304, 316, 400 Series, Kovar, Invar | 75 - 90 | .008 - .015 | .015 - .025 | .020 - .038 | .025 - .050 | .030 - .050 | .038 - .050 | .050 - .063 | .063 - .076 | .063 - .089 |
| | Stainless Steel: 304L, 316L, 8620, 17/4, 15/5, 13/8, PH Mat'l | 60 - 75 | .008 - .015 | .015 - .020 | .018 - .025 | .020 - .025 | .025 - .038 | .025 - .050 | .038 - .063 | .050 - .076 | .050 - .076 |
| P | **HIGH STRENGTH TOOL STEELS** | | | | | | | | | | |
| | High Strength Tool Steel: 4130, 4140, A2, D2, P20, H13 | 75 - 125 | .006 - .015 | .015 - .020 | .018 - .025 | .020 - .025 | .025 - .038 | .025 - .050 | .038 - .063 | .050 - .076 | .050 - .076 |
| | **CARBON STEELS** | | | | | | | | | | |
| | Carbon Steels: 1000 Series | 85 - 130 | .008 - .015 | .015 - .020 | .020 - .030 | .025 - .038 | .025 - .050 | .038 - .063 | .050 - .063 | .050 - .076 | .063 - .089 |
| K | **CAST MATERIAL** | | | | | | | | | | |
| | Cast Iron | 125 - 150 | .013 - .025 | .025 - .050 | .025 - .050 | .038 - .050 | .038 - .063 | .050 - .089 | .063 - .089 | .076 - .102 | .102 - .127 |

| | Slotting | Profiling |
|---|---|---|
| Axial (ap) | 0.5xD | 2xD |
| Radial (ae) | 1xD | 0.2xD |




**NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.**

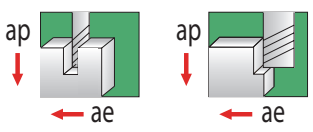
# GARR TOOL High Performance Milling Guide for VRX

**NOTE - DATA DOES NOT REFLECT CHIP THINNING.**

**SPINDLE INTERFACE MUST BE SCRUTINIZED WHEN USING 5/8" DIAMETER AND LARGER END MILLS**

| | ISO Material | HRC | SFM (Vc) | CHIPLOAD PER TOOTH (Fz) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 1/16" | 1/8" | 3/16" | 1/4" | 5/16" | 3/8" | 1/2" | 5/8" | 3/4" | 1" |
| S | **COBALT BASE ALLOYS** | | | | | | | | | | | | |
| | Haynes 25/188, Stellite 21, Cobalt Chrome | < 40<br>> 40 | 75 - 150<br>60 - 125 | .0003" - .0006"<br>.0003" - .0005" | .0004" - .0007"<br>.0003" - .0006" | .0005" - .0008"<br>.0004" - .0007" | .0007" - .0012"<br>.0006" - .0010" | .0008" - .0015"<br>.0007" - .0013" | .0010" - .0019"<br>.0009" - .0017" | .0014" - .0024"<br>.0012" - .0020" | .0016" - .0030"<br>.0014" - .0026" | .0020" - .0038"<br>.0018" - .0034" | .0028" - .0048"<br>.0024" - .0040" |
| | **NICKEL BASE ALLOYS** | | | | | | | | | | | | |
| | Inconel-625/718, Waspaloy, Invar, Rene, Hastelloy, Monel | < 40<br>> 40 | 75 - 150<br>60 - 125 | .0003" - .0006"<br>.0003" - .0005" | .0004" - .0007"<br>.0003" - .0006" | .0005" - .0008"<br>.0004" - .0007" | .0007" - .0012"<br>.0006" - .0010" | .0008" - .0015"<br>.0007" - .0013" | .0010" - .0019"<br>.0009" - .0017" | .0014" - .0024"<br>.0012" - .0020" | .0016" - .0030"<br>.0014" - .0026" | .0020" - .0038"<br>.0018" - .0034" | .0028" - .0048"<br>.0024" - .0040" |
| | **IRON BASE ALLOYS** | | | | | | | | | | | | |
| | A286, Discaloy, Haynes 556, Carpenter 22, Greek Ascolloy | < 40<br>> 40 | 75 - 150<br>60 - 125 | .0003" - .0006"<br>.0003" - .0005" | .0004" - .0007"<br>.0003" - .0006" | .0005" - .0008"<br>.0004" - .0007" | .0007" - .0012"<br>.0006" - .0010" | .0008" - .0015"<br>.0007" - .0013" | .0010" - .0019"<br>.0009" - .0017" | .0014" - .0024"<br>.0012" - .0020" | .0016" - .0030"<br>.0014" - .0026" | .0020" - .0038"<br>.0018" - .0034" | .0028" - .0048"<br>.0024" - .0040" |
| | **TITANIUM ALLOYS** | | | | | | | | | | | | |
| | Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-2SN-4Zr-2Mo-Si | | 175 - 300 | .0003" - .0006" | .0004" - .0007" | .0005" - .0008" | .0007" - .0014" | .0008" - .0017" | .0010" - .0021" | .0014" - .0028" | .0016" - .0034" | .0020" - .0042" | .0028" - .0056" |
| | 5553 / Beta Titanium | | 125 - 225 | .0003" - .0006" | .0003" - .0007" | .0004" - .0008" | .0007" - .0012" | .0008" - .0015" | .0010" - .0019" | .0014" - .0024" | .0016" - .0030" | .0020" - .0038" | .0028" - .0048" |
| M | **STAINLESS STEELS** | | | | | | | | | | | | |
| | 13/8, 15/5, 17-4, pH Types | < 40<br>> 40 | 175 - 300<br>150 - 225 | .0003" - .0006"<br>.0003" - .0005" | .0004" - .0007"<br>.0003" - .0006" | .0005" - .0008"<br>.0004" - .0007" | .0007" - .0012"<br>.0006" - .0010" | .0008" - .0015"<br>.0007" - .0013" | .0010" - .0019"<br>.0009" - .0017" | .0014" - .0024"<br>.0012" - .0020" | .0016" - .0030"<br>.0014" - .0026" | .0020" - .0038"<br>.0018" - .0034" | .0028" - .0048"<br>.0022" - .0040" |
| | 300 Series, 304L, Nitronic 50, Duplex, Super-Austenitic | < 40<br>> 40 | 200 - 325<br>175 - 250 | .0003" - .0006"<br>.0003" - .0005" | .0004" - .0007"<br>.0003" - .0006" | .0005" - .0008"<br>.0004" - .0007" | .0007" - .0012"<br>.0006" - .0011" | .0008" - .0015"<br>.0007" - .0014" | .0010" - .0019"<br>.0009" - .0018" | .0014" - .0024"<br>.0012" - .0022" | .0016" - .0030"<br>.0014" - .0028" | .0020" - .0038"<br>.0018" - .0036" | .0028" - .0048"<br>.0024" - .0044" |
| | 400 Series - 403, 405, 420, 455 | < 40<br>> 40 | 225 - 350<br>175 - 250 | .0003" - .0006"<br>.0003" - .0005" | .0004" - .0007"<br>.0003" - .0006" | .0005" - .0008"<br>.0004" - .0007" | .0007" - .0013"<br>.0006" - .0011" | .0008" - .0016"<br>.0007" - .0014" | .0010" - .0020"<br>.0009" - .0018" | .0014" - .0026"<br>.0012" - .0022" | .0016" - .0032"<br>.0014" - .0028" | .0024" - .0043"<br>.0018" - .0036" | .0028" - .0052"<br>.0024" - .0044" |
| P | **HIGH STRENGTH TOOL STEELS** | | | | | | | | | | | | |
| | A2, D2, P20, H13, S7, O1 | < 40<br>> 40 | 175 - 300<br>125 - 275 | .0004" - .0007"<br>.0003" - .0005" | .0005" - .0008"<br>.0003" - .0005" | .0006" - .0010"<br>.0005" - .0008" | .0008" - .0013"<br>.0007" - .0010" | .0009" - .0016"<br>.0008" - .0013" | .0011" - .0020"<br>.0010" - .0017" | .0016" - .0026"<br>.0014" - .0020" | .0018" - .0032"<br>.0016" - .0026" | .0022" - .0040"<br>.0020" - .0034" | .0032" - .0052"<br>.0028" - .0040" |
| | **MEDIUM ALLOY TOOL STEELS** | | | | | | | | | | | | |
| | 4140, 4340, 52100, 6150, 8620 | < 40<br>> 40 | 250 - 400<br>225 - 300 | .0004" - .0007"<br>.0003" - .0005" | .0005" - .0008"<br>.0003" - .0005" | .0006" - .0010"<br>.0005" - .0008" | .0008" - .0014"<br>.0007" - .0011" | .0009" - .0017"<br>.0008" - .0014" | .0011" - .0021"<br>.0010" - .0018" | .0016" - .0026"<br>.0014" - .0022" | .0018" - .0034"<br>.0016" - .0028" | .0022" - .0042"<br>.0020" - .0036" | .0032" - .0056"<br>.0028" - .0044" |
| | **CARBON STEELS** | | | | | | | | | | | | |
| | 1000's - 1018, 1020, 12L14 | < 40 | 300 - 425 | .0004" - .0007" | .0005" - .0008" | .0006" - .0010" | .0008" - .0015" | .0009" - .0018" | .0011" - .0022" | .0016" - .0030" | .0018" - .0036" | .0022" - .0044" | .0032" - .0060" |
| K | **CAST MATERIAL** | | | | | | | | | | | | |
| | Ductile Iron | | 300 - 425 | .0004" - .0007" | .0005" - .0008" | .0006" - .0010" | .0009" - .0016" | .0010" - .0019" | .0012" - .0023" | .0018" - .0032" | .0020" - .0038" | .0024" - .0046" | .0036" - .0064" |
| | Gray Iron | | 325 - 475 | .0005" - .0008" | .0007" - .0010" | .0007" - .0012" | .0010" - .0017" | .0011" - .0020" | .0013" - .0024" | .0020" - .0034" | .0022" - .0040" | .0026" - .0048" | .0040" - .0068" |

| | Slotting Pocket Milling | Profiling Side Milling |
|---|---|---|
| Axial (ap) | up to 1.5xD | up to 2xD |
| Radial (ae) | 1xD | 5% - 15% of Dia. |



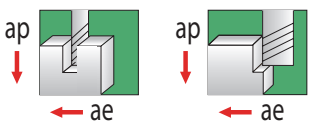

**NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.**

**NOTE - DATA DOES NOT REFLECT CHIP THINNING.**

**SPINDLE INTERFACE MUST BE SCRUTINIZED WHEN USING 16mm DIAMETER AND LARGER END MILLS**

| | ISO Material | HRC | M/Min. (Vc) | CHIPLOAD PER TOOTH (Fz) 1.5mm | 3.0mm | 5.0mm | 6.0mm | 8.0mm | 10.0mm | 12.0mm | 16.0mm | 20.0mm | 25.0mm |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S | **COBALT BASE ALLOYS** | | | | | | | | | | | | |
| | Haynes 25/188, Stellite 21, Cobalt Chrome | < 40<br>> 40 | 25 - 45<br>20 - 40 | .008 - .015<br>.008 - .012 | .010 - .018<br>.008 - .015 | .013 - .020<br>.010 - .018 | .018 - .030<br>.015 - .025 | .020 - .038<br>.018 - .033 | .025 - .048<br>.023 - .043 | .036 - .061<br>.030 - .051 | .041 - .076<br>.036 - .066 | .051 - .097<br>.046 - .086 | .071 - .122<br>.061 - .102 |
| | **NICKEL BASE ALLOYS** | | | | | | | | | | | | |
| | Inconel-625/718, Waspaloy, Invar, Rene, Hastelloy, Monel | < 40<br>> 40 | 25 - 45<br>20 - 40 | .008 - .015<br>.008 - .012 | .010 - .018<br>.008 - .015 | .013 - .020<br>.010 - .018 | .018 - .030<br>.015 - .025 | .020 - .038<br>.018 - .033 | .025 - .048<br>.023 - .043 | .036 - .061<br>.030 - .051 | .041 - .076<br>.036 - .066 | .051 - .097<br>.046 - .086 | .071 - .122<br>.061 - .102 |
| | **IRON BASE ALLOYS** | | | | | | | | | | | | |
| | A286, Discaloy, Haynes 556, Carpenter 22, Greek Ascolloy | < 40<br>> 40 | 25 - 45<br>20 - 40 | .008 - .015<br>.008 - .012 | .010 - .018<br>.008 - .015 | .013 - .020<br>.010 - .018 | .018 - .030<br>.015 - .025 | .020 - .038<br>.018 - .033 | .025 - .048<br>.023 - .043 | .036 - .061<br>.030 - .051 | .041 - .076<br>.036 - .066 | .051 - .097<br>.046 - .086 | .071 - .122<br>.061 - .102 |
| | **TITANIUM ALLOYS** | | | | | | | | | | | | |
| | Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-2SN-4Zr-2Mo-Si | | 55 - 90 | .008 - .015 | .010 - .018 | .013 - .020 | .018 - .036 | .020 - .043 | .025 - .053 | .036 - .071 | .041 - .086 | .051 - .107 | .071 - .142 |
| | 5553 / Beta Titanium | | 40 - 70 | .008 - .015 | .008 - .018 | .010 - .020 | .018 - .030 | .020 - .038 | .025 - .048 | .036 - .061 | .041 - .076 | .051 - .097 | .071 - .122 |
| M | **STAINLESS STEELS** | | | | | | | | | | | | |
| | 13/8, 15/5, 17-4, pH Types | < 40<br>> 40 | 55 - 90<br>45 - 70 | .008 - .015<br>.008 - .013 | .010 - .018<br>.008 - .015 | .013 - .020<br>.010 - .018 | .018 - .030<br>.015 - .025 | .020 - .038<br>.018 - .033 | .025 - .048<br>.023 - .043 | .036 - .061<br>.030 - .051 | .041 - .076<br>.036 - .066 | .051 - .097<br>.046 - .086 | .071 - .122<br>.056 - .102 |
| | 300 Series, 304L, Nitronic 50, Duplex, Super-Austenitic | < 40<br>> 40 | 60 - 100<br>55 - 75 | .008 - .015<br>.008 - .013 | .010 - .018<br>.008 - .015 | .013 - .020<br>.010 - .018 | .018 - .030<br>.015 - .028 | .020 - .038<br>.018 - .036 | .025 - .048<br>.023 - .046 | .036 - .061<br>.030 - .056 | .041 - .076<br>.036 - .071 | .051 - .097<br>.046 - .091 | .071 - .122<br>.061 - .112 |
| | 400 Series - 403, 405, 420, 455 | < 40<br>> 40 | 70 - 110<br>55 - 75 | .008 - .015<br>.008 - .013 | .010 - .018<br>.008 - .015 | .013 - .020<br>.010 - .018 | .018 - .033<br>.015 - .028 | .020 - .041<br>.018 - .036 | .025 - .051<br>.023 - .046 | .036 - .066<br>.030 - .056 | .041 - .081<br>.036 - .071 | .061 - .109<br>.046 - .091 | .071 - .132<br>.061 - .112 |
| P | **HIGH STRENGTH TOOL STEELS** | | | | | | | | | | | | |
| | A2, D2, P20, H13, S7, O1 | < 40<br>> 40 | 55 - 90<br>40 - 85 | .010 - .018<br>.008 - .013 | .013 - .020<br>.008 - .013 | .015 - .025<br>.013 - .020 | .020 - .033<br>.018 - .025 | .023 - .041<br>.020 - .033 | .028 - .051<br>.025 - .043 | .041 - .066<br>.036 - .051 | .046 - .081<br>.041 - .066 | .056 - .102<br>.051 - .086 | .081 - .132<br>.071 - .102 |
| | **MEDIUM ALLOY TOOL STEELS** | | | | | | | | | | | | |
| | 4140, 4340, 52100, 6150, 8620 | < 40<br>> 40 | 75 - 120<br>70 - 90 | .010 - .018<br>.008 - .013 | .013 - .020<br>.008 - .013 | .015 - .025<br>.013 - .020 | .020 - .036<br>.018 - .028 | .023 - .043<br>.020 - .036 | .028 - .053<br>.025 - .046 | .041 - .071<br>.036 - .056 | .046 - .086<br>.041 - .071 | .056 - .107<br>.051 - .091 | .081 - .142<br>.071 - .112 |
| | **CARBON STEELS** | | | | | | | | | | | | |
| | 1000's - 1018, 1020, 12L14 | < 40 | 90 - 130 | .010 - .018 | .013 - .020 | .015 - .025 | .020 - .038 | .023 - .046 | .028 - .056 | .041 - .076 | .046 - .091 | .056 - .112 | .081 - .152 |
| K | **CAST MATERIAL** | | | | | | | | | | | | |
| | Ductile Iron | | 90 - 130 | .010 - .018 | .013 - .020 | .015 - .025 | .023 - .041 | .025 - .048 | .030 - .058 | .046 - .081 | .051 - .097 | .061 - .117 | .091 - .163 |
| | Gray Iron | | 100 - 145 | .013 - .020 | .018 - .025 | .018 - .030 | .025 - .043 | .028 - .051 | .033 - .061 | .051 - .086 | .056 - .102 | .066 - .122 | .102 - .173 |

| | Slotting Pocket Milling | Profiling Side Milling |
|---|---|---|
| Axial (ap) | up to 1.5xD | up to 2xD |
| Radial (ae) | 1xD | 5% - 15% of Dia. |




**NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.**

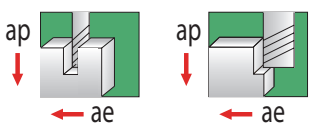
# GARR TOOL High Performance Milling Guide for V4

**NOTE - DATA DOES NOT REFLECT CHIP THINNING.**

**SPINDLE INTERFACE MUST BE SCRUTINIZED WHEN USING 5/8" DIAMETER AND LARGER END MILLS**

| | ISO Material | HRC | SFM (Vc) | CHIPLOAD PER TOOTH (Fz) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 1/4" | 5/16" | 3/8" | 1/2" | 5/8" | 3/4" | 1" |
| S | **COBALT BASE ALLOYS** | | | | | | | | | |
| | Haynes 25/188, Stellite 21, Cobalt Chrome | < 40<br>> 40 | 90 - 185<br>75 - 150 | .0008" - .0015"<br>.0006" - .0013" | .0009" - .0018"<br>.0007" - .0016" | .0011" - .0022"<br>.0009" - .0020" | .0016" - .0030"<br>.0012" - .0026" | .0018" - .0036"<br>.0014" - .0032" | .0022" - .0044"<br>.0018" - .0040" | .0032" - .0060"<br>.0024" - .0052" |
| | **NICKEL BASE ALLOYS** | | | | | | | | | |
| | Inconel-625/718, Waspaloy, Invar, Rene, Hastelloy, Monel | < 40<br>> 40 | 90 - 185<br>75 - 150 | .0008" - .0015"<br>.0006" - .0013" | .0009" - .0018"<br>.0007" - .0016" | .0011" - .0022"<br>.0009" - .0020" | .0016" - .0030"<br>.0012" - .0026" | .0018" - .0036"<br>.0014" - .0032" | .0022" - .0044"<br>.0018" - .0040" | .0032" - .0060"<br>.0024" - .0052" |
| | **IRON BASE ALLOYS** | | | | | | | | | |
| | A286, Discaloy, Haynes 556, Carpenter 22, Greek Ascolloy | < 40<br>> 40 | 90 - 185<br>75 - 150 | .0008" - .0015"<br>.0006" - .0013" | .0009" - .0018"<br>.0007" - .0016" | .0011" - .0022"<br>.0009" - .0020" | .0016" - .0030"<br>.0012" - .0026" | .0018" - .0036"<br>.0014" - .0032" | .0022" - .0044"<br>.0018" - .0040" | .0032" - .0060"<br>.0024" - .0052" |
| | **TITANIUM ALLOYS** | | | | | | | | | |
| | Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-2SN-4Zr-2Mo-Si | | 200 - 375 | .0009" - .0017" | .0010" - .0020" | .0012" - .0024" | .0018" - .0034" | .0020" - .0040" | .0024" - .0048" | .0036" - .0068" |
| | 5553 / Beta Titanium | | 150 - 280 | .0009" - .0015" | .0010" - .0018" | .0012" - .0022" | .0018" - .0030" | .0020" - .0036" | .0024" - .0044" | .0032" - .0060" |
| M | **STAINLESS STEELS** | | | | | | | | | |
| | 13/8, 15/5, 17-4, pH Types | < 40<br>> 40 | 225 - 375<br>175 - 275 | .0008" - .0015"<br>.0006" - .0013" | .0009" - .0018"<br>.0007" - .0016" | .0011" - .0022"<br>.0009" - .0020" | .0016" - .0030"<br>.0012" - .0026" | .0018" - .0036"<br>.0014" - .0032" | .0022" - .0044"<br>.0018" - .0040" | .0032" - .0060"<br>.0024" - .0052" |
| | 300 Series, 304L, Nitronic 50, Duplex, Super-Austenitic | < 40<br>> 40 | 250 - 400<br>175 - 275 | .0008" - .0016"<br>.0006" - .0013" | .0009" - .0018"<br>.0007" - .0016" | .0011" - .0022"<br>.0009" - .0020" | .0016" - .0030"<br>.0012" - .0026" | .0018" - .0036"<br>.0014" - .0032" | .0022" - .0044"<br>.0018" - .0040" | .0032" - .0060"<br>.0024" - .0052" |
| | 400 Series - 403, 405, 420, 455 | < 40<br>> 40 | 225 - 425<br>175 - 325 | .0008" - .0016"<br>.0006" - .0014" | .0009" - .0019"<br>.0007" - .0017" | .0011" - .0023"<br>.0009" - .0021" | .0016" - .0032"<br>.0012" - .0028" | .0018" - .0038"<br>.0014" - .0034" | .0022" - .0046"<br>.0018" - .0042" | .0032" - .0064"<br>.0024" - .0056" |
| P | **HIGH STRENGTH TOOL STEELS** | | | | | | | | | |
| | A2, D2, P20, H13, S7, O1 | < 40<br>> 40 | 225 - 400<br>150 - 325 | .0008" - .0016"<br>.0006" - .0013" | .0011" - .0019"<br>.0010" - .0016" | .0013" - .0023"<br>.0012" - .0020" | .0016" - .0032"<br>.0012" - .0026" | .0022" - .0038"<br>.0020" - .0032" | .0026" - .0056"<br>.0024" - .0040" | .0040" - .0064"<br>.0036" - .0052" |
| | **MEDIUM ALLOY TOOL STEELS** | | | | | | | | | |
| | 4140, 4340, 52100, 6150, 8620 | < 40<br>> 40 | 350 - 500<br>250 - 375 | .0008" - .0017"<br>.0006" - .0014" | .0011" - .0020"<br>.0010" - .0017" | .0013" - .0024"<br>.0012" - .0020" | .0016" - .0034"<br>.0012" - .0028" | .0022" - .0040"<br>.0020" - .0034" | .0026" - .0048"<br>.0024" - .0040" | .0040" - .0068"<br>.0036" - .0056" |
| | **CARBON STEELS** | | | | | | | | | |
| | 1000's - 1018, 1020, 12L14 | < 40 | 375 - 600 | .0010" - .0018" | .0011" - .0021" | .0013" - .0025" | .0020" - .0036" | .0022" - .0042" | .0026" - .0050" | .0040" - .0072" |
| K | **CAST MATERIAL** | | | | | | | | | |
| | Ductile Iron | | 350 - 525 | .0010" - .0018" | .0013" - .0022" | .0015" - .0026" | .0020" - .0036" | .0026" - .0044" | .0030" - .0052" | .0040" - .0072" |
| | Gray Iron | | 450 - 590 | .0011" - .0020" | .0014" - .0023" | .0016" - .0027" | .0022" - .0040" | .0028" - .0046" | .0032" - .0054" | .0044" - .0080" |

| | Slotting Pocket Milling | Profiling Side Milling |
|---|---|---|
| Axial (ap) | up to 1.5xD | up to 2xD |
| Radial (ae) | 1xD | 5% - 15% of Dia. |



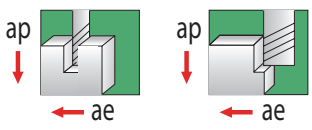

**NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.**

**NOTE - DATA DOES NOT REFLECT CHIP THINNING.**

**SPINDLE INTERFACE MUST BE SCRUTINIZED WHEN USING 16mm DIAMETER AND LARGER END MILLS**

| | ISO Material | HRC | M/Min. (Vc) | CHIPLOAD PER TOOTH (Fz) 6.0mm | 8.0mm | 10.0mm | 12.0mm | 16.0mm | 20.0mm | 25.0mm |
|---|---|---|---|---|---|---|---|---|---|---|
| S | **COBALT BASE ALLOYS** | | | | | | | | | |
| | Haynes 25/188, Stellite 21, Cobalt Chrome | < 40<br>> 40 | 27 - 57<br>25 - 45 | .020 - .038<br>.015 - .033 | .023 - .046<br>.018 - .041 | .028 - .056<br>.023 - .051 | .041 - .076<br>.030 - .066 | .046 - .091<br>.036 - .081 | .056 - .112<br>.046 - .102 | .081 - .152<br>.061 - .132 |
| | **NICKEL BASE ALLOYS** | | | | | | | | | |
| | Inconel-625/718, Waspaloy, Invar, Rene, Hastelloy, Monel | < 40<br>> 40 | 27 - 57<br>25 - 45 | .020 - .038<br>.015 - .033 | .023 - .046<br>.018 - .041 | .028 - .056<br>.023 - .051 | .041 - .076<br>.030 - .066 | .046 - .091<br>.036 - .081 | .056 - .112<br>.046 - .102 | .081 - .152<br>.061 - .132 |
| | **IRON BASE ALLOYS** | | | | | | | | | |
| | A286, Discaloy, Haynes 556, Carpenter 22, Greek Ascolloy | < 40<br>> 40 | 27 - 57<br>25 - 45 | .020 - .038<br>.015 - .033 | .023 - .046<br>.018 - .041 | .028 - .056<br>.023 - .051 | .041 - .076<br>.030 - .066 | .046 - .091<br>.036 - .081 | .056 - .112<br>.046 - .102 | .081 - .152<br>.061 - .132 |
| | **TITANIUM ALLOYS** | | | | | | | | | |
| | Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-2SN-4Zr-2Mo-Si | | 60 - 115 | .023 - .043 | .025 - .051 | .030 - .061 | .046 - .086 | .051 - .102 | .061 - .122 | .091 - .173 |
| | 5553 / Beta Titanium | | 45 - 85 | .023 - .038 | .025 - .046 | .030 - .056 | .046 - .076 | .051 - .091 | .061 - .112 | .081 - .152 |
| M | **STAINLESS STEELS** | | | | | | | | | |
| | 13/8, 15/5, 17-4, pH Types | < 40<br>> 40 | 70 - 115<br>55 - 85 | .020 - .038<br>.015 - .033 | .023 - .046<br>.018 - .041 | .028 - .056<br>.023 - .051 | .041 - .076<br>.030 - .066 | .046 - .091<br>.036 - .081 | .056 - .112<br>.046 - .102 | .081 - .152<br>.061 - .132 |
| | 300 Series, 304L, Nitronic 50, Duplex, Super-Austenitic | < 40<br>> 40 | 75 - 120<br>55 - 85 | .020 - .038<br>.015 - .033 | .023 - .046<br>.018 - .041 | .028 - .056<br>.023 - .051 | .041 - .076<br>.030 - .066 | .046 - .091<br>.036 - .081 | .056 - .112<br>.046 - .102 | .081 - .152<br>.061 - .132 |
| | 400 Series - 403, 405, 420, 455 | < 40<br>> 40 | 70 - 130<br>55 - 100 | .020 - .041<br>.015 - .036 | .023 - .048<br>.018 - .043 | .028 - .058<br>.023 - .053 | .041 - .081<br>.030 - .071 | .046 - .097<br>.036 - .086 | .056 - .117<br>.046 - .107 | .081 - .163<br>.061 - .142 |
| P | **HIGH STRENGTH TOOL STEELS** | | | | | | | | | |
| | A2, D2, P20, H13, S7, O1 | < 40<br>> 40 | 70 - 120<br>45 - 100 | .020 - .041<br>.015 - .033 | .028 - .048<br>.025 - .041 | .033 - .058<br>.030 - .051 | .041 - .081<br>.030 - .066 | .056 - .097<br>.051 - .081 | .066 - .142<br>.061 - .102 | .102 - .163<br>.091 - .132 |
| | **MEDIUM ALLOY TOOL STEELS** | | | | | | | | | |
| | 4140, 4340, 52100, 6150, 8620 | < 40<br>> 40 | 110 - 150<br>75 - 115 | .020 - .043<br>.015 - .036 | .028 - .051<br>.025 - .043 | .033 - .061<br>.030 - .051 | .041 - .086<br>.030 - .071 | .056 - .102<br>.051 - .086 | .066 - .122<br>.061 - .102 | .102 - .173<br>.091 - .142 |
| | **CARBON STEELS** | | | | | | | | | |
| | 1000's - 1018, 1020, 12L14 | < 40 | 115 - 180 | .025 - .046 | .028 - .053 | .033 - .064 | .051 - .091 | .056 - .107 | .066 - .127 | .102 - .183 |
| K | **CAST MATERIAL** | | | | | | | | | |
| | Ductile Iron | | 110 - 160 | .025 - .046 | .033 - .056 | .038 - .066 | .051 - .091 | .066 - .112 | .076 - .132 | .102 - .183 |
| | Gray Iron | | 135 - 180 | .028 - .051 | .036 - .058 | .041 - .069 | .056 - .102 | .071 - .117 | .081 - .137 | .112 - .203 |

| | Slotting Pocket Milling | Profiling Side Milling |
|---|---|---|
| Axial (ap) | up to 1.5xD | up to 2xD |
| Radial (ae) | 1xD | 5% - 15% of Dia. |




**NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.**

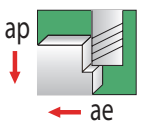
# GARR TOOL High Performance Milling Guide for V5, V5C
## (HIGH EFFICIENCY MILLING)

**NOTE - DATA DOES NOT REFLECT CHIP THINNING.**

**SPINDLE INTERFACE MUST BE SCRUTINIZED WHEN USING 5/8" DIAMETER AND LARGER END MILLS**

| | ISO Material | HRC | SFM (Vc) | CHIPLOAD PER TOOTH (Fz) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 1/4" | 5/16" | 3/8" | 1/2" | 5/8" | 3/4" | 1" |
| S | **COBALT BASE ALLOYS** | | | | | | | | | |
| | Haynes 25/188, Stellite 21, Cobalt Chrome | < 40<br>> 40 | 105 - 220<br>90 - 180 | .0009" - .0016"<br>.0007" - .0014" | .0010" - .0019"<br>.0008" - .0017" | .0012" - .0023"<br>.0010" - .0021" | .0018" - .0032"<br>.0014" - .0028" | .0020" - .0038"<br>.0016" - .0034" | .0024" - .0046"<br>.0020" - .0042" | .0036" - .0064"<br>.0028" - .0056" |
| | **NICKEL BASE ALLOYS** | | | | | | | | | |
| | Inconel-625/718, Waspaloy, Invar, Rene, Hastelloy, Monel | < 40<br>> 40 | 105 - 220<br>90 - 180 | .0009" - .0016"<br>.0007" - .0014" | .0010" - .0019"<br>.0008" - .0017" | .0012" - .0023"<br>.0010" - .0021" | .0018" - .0032"<br>.0014" - .0028" | .0020" - .0038"<br>.0016" - .0034" | .0024" - .0046"<br>.0020" - .0042" | .0036" - .0064"<br>.0028" - .0056" |
| | **IRON BASE ALLOYS** | | | | | | | | | |
| | A286, Discaloy, Haynes 556, Carpenter 22, Greek Ascolloy | < 40<br>> 40 | 105 - 220<br>90 - 180 | .0009" - .0016"<br>.0007" - .0014" | .0010" - .0019"<br>.0008" - .0017" | .0012" - .0023"<br>.0010" - .0021" | .0018" - .0032"<br>.0014" - .0028" | .0020" - .0038"<br>.0016" - .0034" | .0024" - .0046"<br>.0020" - .0042" | .0036" - .0064"<br>.0028" - .0056" |
| | **TITANIUM ALLOYS** | | | | | | | | | |
| | Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-2SN-4Zr-2Mo-Si | | 240 - 450 | .0010" - .0018" | .0011" - .0021" | .0013" - .0025" | .0020" - .0036" | .0022" - .0042" | .0026" - .0050" | .0040" - .0072" |
| | 5553 / Beta Titanium | | 180 - 340 | .0010" - .0016" | .0011" - .0019" | .0013" - .0023" | .0020" - .0032" | .0022" - .0038" | .0026" - .0046" | .0040" - .0064" |
| M | **STAINLESS STEELS** | | | | | | | | | |
| | 13/8, 15/5, 17-4, pH Types | < 40<br>> 40 | 300 - 450<br>210 - 330 | .0009" - .0016"<br>.0007" - .0014" | .0010" - .0019"<br>.0008" - .0017" | .0012" - .0023"<br>.0010" - .0021" | .0018" - .0032"<br>.0014" - .0028" | .0020" - .0038"<br>.0016" - .0034" | .0024" - .0046"<br>.0020" - .0042" | .0036" - .0064"<br>.0028" - .0056" |
| | 300 Series, 304L, Nitronic 50, Duplex, Super-Austenitic | < 40<br>> 40 | 300 - 480<br>210 - 330 | .0009" - .0016"<br>.0007" - .0014" | .0010" - .0019"<br>.0008" - .0017" | .0012" - .0023"<br>.0010" - .0021" | .0018" - .0032"<br>.0014" - .0028" | .0020" - .0038"<br>.0016" - .0034" | .0024" - .0046"<br>.0020" - .0042" | .0036" - .0064"<br>.0028" - .0056" |
| | 400 Series - 403, 405, 420, 455 | < 40<br>> 40 | 270 - 510<br>210 - 390 | .0009" - .0017"<br>.0007" - .0015" | .0010" - .0020"<br>.0008" - .0018" | .0012" - .0024"<br>.0010" - .0022" | .0018" - .0034"<br>.0014" - .0030" | .0020" - .0040"<br>.0016" - .0036" | .0024" - .0048"<br>.0020" - .0044" | .0036" - .0068"<br>.0028" - .0060" |
| P | **HIGH STRENGTH TOOL STEELS** | | | | | | | | | |
| | A2, D2, P20, H13, S7, O1 | < 40<br>> 40 | 270 - 480<br>180 - 390 | .0009" - .0017"<br>.0007" - .0014" | .0010" - .0020"<br>.0008" - .0017" | .0012" - .0024"<br>.0010" - .0021" | .0018" - .0034"<br>.0014" - .0028" | .0020" - .0040"<br>.0016" - .0034" | .0024" - .0048"<br>.0020" - .0042" | .0036" - .0068"<br>.0028" - .0056" |
| | **MEDIUM ALLOY TOOL STEELS** | | | | | | | | | |
| | 4140, 4340, 52100, 6150, 8620 | < 40<br>> 40 | 420 - 600<br>300 - 450 | .0009" - .0018"<br>.0007" - .0015" | .0010" - .0021"<br>.0008" - .0018" | .0012" - .0025"<br>.0010" - .0022" | .0018" - .0036"<br>.0014" - .0030" | .0020" - .0042"<br>.0016" - .0036" | .0024" - .0050"<br>.0020" - .0044" | .0036" - .0072"<br>.0028" - .0060" |
| | **CARBON STEELS** | | | | | | | | | |
| | 1000's - 1018, 1020, 12L14 | < 40 | 450 - 720 | .0011" - .0019" | .0012" - .0022" | .0014" - .0026" | .0022" - .0038" | .0024" - .0044" | .0028" - .0052" | .0044" - .0076" |
| K | **CAST MATERIAL** | | | | | | | | | |
| | Ductile Iron | | 420 - 630 | .0011" - .0019" | .0012" - .0022" | .0014" - .0026" | .0022" - .0038" | .0024" - .0044" | .0028" - .0052" | .0044" - .0076" |
| | Gray Iron | | 540 - 710 | .0012" - .0021" | .0013" - .0024" | .0015" - .0028" | .0024" - .0042" | .0026" - .0048" | .0030" - .0056" | .0048" - .0084" |

| | Profile/Trochoidal Milling |
|---|---|
| Axial (ap) | up to 2xD |
| Radial (ae) | 5% - 15% of Dia. |




**NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.**

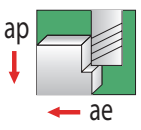
# GARR TOOL High Performance Milling Guide for V5, V5C
## (HIGH EFFICIENCY MILLING)

**NOTE - DATA DOES NOT REFLECT CHIP THINNING.**

**SPINDLE INTERFACE MUST BE SCRUTINIZED WHEN USING 16mm DIAMETER AND LARGER END MILLS**

| | ISO Material | HRC | M/Min. (Vc) | CHIPLOAD PER TOOTH (Fz) 6.0mm | 8.0mm | 10.0mm | 12.0mm | 16.0mm | 20.0mm | 25.0mm |
|---|---|---|---|---|---|---|---|---|---|---|
| S | **COBALT BASE ALLOYS** | | | | | | | | | |
| | Haynes 25/188, Stellite 21, Cobalt Chrome | < 40<br>> 40 | 30 - 70<br>27 - 55 | .023 - .041<br>.018 - .036 | .025 - .048<br>.020 - .043 | .030 - .058<br>.025 - .053 | .046 - .081<br>.036 - .071 | .051 - .097<br>.041 - .086 | .061 - .117<br>.051 - .107 | .091 - .163<br>.071 - .142 |
| | **NICKEL BASE ALLOYS** | | | | | | | | | |
| | Inconel-625/718, Waspaloy, Invar, Rene, Hastelloy, Monel | < 40<br>> 40 | 30 - 70<br>27 - 55 | .023 - .041<br>.018 - .036 | .025 - .048<br>.020 - .043 | .030 - .058<br>.025 - .053 | .046 - .081<br>.036 - .071 | .051 - .097<br>.041 - .086 | .061 - .117<br>.051 - .107 | .091 - .163<br>.071 - .142 |
| | **IRON BASE ALLOYS** | | | | | | | | | |
| | A286, Discaloy, Haynes 556, Carpenter 22, Greek Ascolloy | < 40<br>> 40 | 30 - 70<br>27 - 55 | .023 - .041<br>.018 - .036 | .025 - .048<br>.020 - .043 | .030 - .058<br>.025 - .053 | .046 - .081<br>.036 - .071 | .051 - .097<br>.041 - .086 | .061 - .117<br>.051 - .107 | .091 - .163<br>.071 - .142 |
| | **TITANIUM ALLOYS** | | | | | | | | | |
| | Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-2SN-4Zr-2Mo-Si | | 75 - 135 | .025 - .046 | .028 - .053 | .033 - .064 | .051 - .091 | .056 - .107 | .066 - .127 | .102 - .183 |
| | 5553 / Beta Titanium | | 55 - 105 | .025 - .041 | .028 - .048 | .033 - .058 | .051 - .081 | .056 - .097 | .066 - .117 | .102 - .163 |
| M | **STAINLESS STEELS** | | | | | | | | | |
| | 13/8, 15/5, 17-4, pH Types | < 40<br>> 40 | 90 - 135<br>65 - 100 | .023 - .041<br>.018 - .036 | .025 - .048<br>.020 - .043 | .030 - .058<br>.025 - .053 | .046 - .081<br>.036 - .071 | .051 - .097<br>.041 - .086 | .061 - .117<br>.051 - .107 | .091 - .163<br>.071 - .142 |
| | 300 Series, 304L, Nitronic 50, Duplex, Super-Austenitic | < 40<br>> 40 | 90 - 145<br>65 - 100 | .023 - .041<br>.018 - .036 | .025 - .048<br>.020 - .043 | .030 - .058<br>.025 - .053 | .046 - .081<br>.036 - .071 | .051 - .097<br>.041 - .086 | .061 - .117<br>.051 - .107 | .091 - .163<br>.071 - .142 |
| | 400 Series - 403, 405, 420, 455 | < 40<br>> 40 | 85 - 155<br>65 - 120 | .023 - .043<br>.018 - .038 | .025 - .051<br>.020 - .046 | .030 - .061<br>.025 - .056 | .046 - .086<br>.036 - .076 | .051 - .102<br>.041 - .091 | .061 - .122<br>.051 - .112 | .091 - .173<br>.071 - .152 |
| P | **HIGH STRENGTH TOOL STEELS** | | | | | | | | | |
| | A2, D2, P20, H13, S7, O1 | < 40<br>> 40 | 85 - 145<br>55 - 120 | .023 - .043<br>.018 - .036 | .025 - .051<br>.020 - .043 | .030 - .061<br>.025 - .053 | .046 - .086<br>.036 - .071 | .051 - .102<br>.041 - .086 | .061 - .122<br>.051 - .107 | .091 - .173<br>.071 - .142 |
| | **MEDIUM ALLOY TOOL STEELS** | | | | | | | | | |
| | 4140, 4340, 52100, 6150, 8620 | < 40<br>> 40 | 130 - 180<br>90 - 135 | .023 - .046<br>.018 - .038 | .025 - .053<br>.020 - .046 | .030 - .064<br>.025 - .056 | .046 - .091<br>.036 - .076 | .051 - .107<br>.041 - .091 | .061 - .127<br>.051 - .112 | .091 - .183<br>.071 - .152 |
| | **CARBON STEELS** | | | | | | | | | |
| | 1000's - 1018, 1020, 12L14 | < 40 | 135 - 220 | .028 - .048 | .030 - .056 | .036 - .066 | .056 - .097 | .061 - .112 | .071 - .132 | .112 - .193 |
| K | **CAST MATERIAL** | | | | | | | | | |
| | Ductile Iron | | 130 - 190 | .028 - .048 | .030 - .056 | .036 - .066 | .056 - .097 | .061 - .112 | .071 - .132 | .112 - .193 |
| | Gray Iron | | 170 - 215 | .030 - .053 | .033 - .061 | .038 - .071 | .061 - .107 | .066 - .122 | .076 - .142 | .122 - .213 |

| | Profile/Trochoidal Milling |
|---|---|
| Axial (ap) | up to 2xD |
| Radial (ae) | 5% - 15% of Dia. |




**NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.**

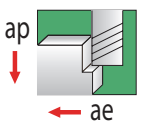
# GARR TOOL High Performance Milling Guide for VRX-6
## (HIGH EFFICIENCY MILLING)

**NOTE - DATA DOES NOT REFLECT CHIP THINNING.**

**SPINDLE INTERFACE MUST BE SCRUTINIZED WHEN USING 5/8" DIAMETER AND LARGER END MILLS**

| ISO Material | | HRC | SFM (Vc) | CHIPLOAD PER TOOTH (Fz) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | 1/4" | 3/8" | 1/2" | 5/8" | 3/4" | 1" |
| S | **COBALT BASE ALLOYS** | | | | | | | | |
| | Haynes 25/188, Stellite 21, Cobalt Chrome | < 40<br>> 40 | 115 - 230<br>95 - 190 | .0006" - .0012"<br>.0004" - .0010" | .0006" - .0014"<br>.0005" - .0013" | .0011" - .0023"<br>.0008" - .0020" | .0011" - .0023"<br>.0009" - .0021" | .0012" - .0028"<br>.0010" - .0026" | .0022" - .0046"<br>.0016" - .0040" |
| | **NICKEL BASE ALLOYS** | | | | | | | | |
| | Inconel-625/718, Waspaloy, Invar, Rene, Hastelloy, Monel | < 40<br>> 40 | 115 - 230<br>95 - 190 | .0006" - .0013"<br>.0003" - .0007" | .0008" - .0016"<br>.0007" - .0015" | .0012" - .0024"<br>.0008" - .0020" | .0012" - .0025"<br>.0011" - .0022" | .0016" - .0032"<br>.0014" - .0030" | .0024" - .0048"<br>.0016" - .0040" |
| | **IRON BASE ALLOYS** | | | | | | | | |
| | A286, Discaloy, Haynes 556, Carpenter 22, Greek Ascolloy | < 40<br>> 40 | 115 - 230<br>95 - 190 | .0006" - .0012"<br>.0003" - .0007" | .0008" - .0014"<br>.0005" - .0013" | .0011" - .0023"<br>.0007" - .0019" | .0012" - .0024"<br>.0010" - .0022" | .0016" - .0028"<br>.0010" - .0026" | .0022" - .0046"<br>.0014" - .0038" |
| | **TITANIUM ALLOYS** | | | | | | | | |
| | Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si | | 250 - 470 | .0010" - .0015" | .0015" - .0025" | .0020" - .0030" | .0025" - .0035" | .0030" - .0050" | .0040" - .0060" |
| | 5553 / Beta Titanium | | 185 - 350 | .0008" - .0014" | .0012" - .0022" | .0016" - .0028" | .0023" - .0034" | .0024" - .0044" | .0032" - .0056" |
| M | **STAINLESS STEELS** | | | | | | | | |
| | 13/8, 15/5, 17-4, pH Types | < 40<br>> 40 | 280 - 470<br>215 - 345 | .0008" - .0015"<br>.0006" - .0013" | .0010" - .0017"<br>.0009" - .0016" | .0016" - .0030"<br>.0012" - .0026" | .0018" - .0031"<br>.0013" - .0028" | .0020" - .0034"<br>.0018" - .0032" | .0032" - .0060"<br>.0024" - .0052" |
| | 300 Series, 304L, Nitronic 50, Duplex, Super-Austenitic | < 40<br>> 40 | 310 - 500<br>215 - 345 | .0008" - .0015"<br>.0006" - .0013" | .0010" - .0017"<br>.0008" - .0015" | .0016" - .0030"<br>.0012" - .0026" | .0017" - .0028"<br>.0014" - .0024" | .0020" - .0034"<br>.0016" - .0030" | .0032" - .0060"<br>.0022" - .0038" |
| | 400 Series - 403, 405, 420, 455 | < 40<br>> 40 | 280 - 530<br>215 - 405 | .0008" - .0016"<br>.0006" - .0014" | .0010" - .0018"<br>.0009" - .0017" | .0016" - .0032"<br>.0012" - .0028" | .0020" - .0035"<br>.0013" - .0030" | .0020" - .0036"<br>.0018" - .0034" | .0032" - .0064"<br>.0024" - .0056" |
| P | **HIGH STRENGTH TOOL STEELS** | | | | | | | | |
| | A2, D2, P20, H13, S7, O1 | < 40<br>> 40 | 280 - 500<br>185 - 410 | .0008" - .0015"<br>.0006" - .0013" | .0013" - .0023"<br>.0012" - .0020" | .0018" - .0029"<br>.0014" - .0022" | .0024" - .0034"<br>.0020" - .0028" | .0034" - .0044"<br>.0024" - .0032" | .0036" - .0048"<br>.0030" - .0040" |
| | **MEDIUM ALLOY TOOL STEELS** | | | | | | | | |
| | 4140, 4340, 52100, 6150, 8620 | < 40<br>> 40 | 435 - 625<br>310 - 470 | .0010" - .0016"<br>.0007" - .0012" | .0013" - .0024"<br>.0012" - .0020" | .0018" - .0029"<br>.0014" - .0022" | .0024" - .0034"<br>.0020" - .0028" | .0034" - .0044"<br>.0024" - .0032" | .0036" - .0048"<br>.0030" - .0040" |
| | **CARBON STEELS** | | | | | | | | |
| | 1000's - 1018, 1020, 12L14 | < 40 | 465 - 750 | .0010" - .0017" | .0013" - .0025" | .0018" - .0029" | .0024" - .0034" | .0034" - .0044" | .0036" - .0048" |
| K | **CAST MATERIAL** | | | | | | | | |
| | Ductile Iron | | 435 - 660 | .0012" - .0019" | .0015" - .0026" | .0024" - .0038" | .0026" - .0050" | .0030" - .0052" | .0048" - .0076" |
| | Gray Iron | | 560 - 740 | .0013" - .0021" | .0016" - .0027" | .0026" - .0042" | .0028" - .0052" | .0032" - .0064" | .0052" - .0084" |

| | Profile/Trochoidal Milling |
|---|---|
| Axial (ap) | up to 2xD |
| Radial (ae) | 5% - 15% of Dia. |




**NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.**

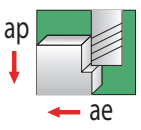
# GARR TOOL High Performance Milling Guide for VRX-6
## (HIGH EFFICIENCY MILLING)

**NOTE - DATA DOES NOT REFLECT CHIP THINNING.**

**SPINDLE INTERFACE MUST BE SCRUTINIZED WHEN USING 16mm DIAMETER AND LARGER END MILLS**

| ISO Material | | HRC | M/Min. (Vc) | CHIPLOAD PER TOOTH (Fz) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 6.0mm | 8.0mm | 10.0mm | 12.0mm | 16.0mm | 20.0mm | 25.0mm |
| S | **COBALT BASE ALLOYS** | | | | | | | | | |
| | Haynes 25/188, Stellite 21, Cobalt Chrome | < 40<br>> 40 | 35 - 70<br>30 - 57 | .015 - .030<br>.010 - .025 | .015 - .033<br>.010 - .030 | .015 - .036<br>.013 - .033 | .028 - .058<br>.020 - .051 | .028 - .058<br>.023 - .053 | .030 - .071<br>.025 - .066 | .056 - .117<br>.041 - .102 |
| | **NICKEL BASE ALLOYS** | | | | | | | | | |
| | Inconel-625/718, Waspaloy, Invar, Rene, Hastelloy, Monel | < 40<br>> 40 | 35 - 70<br>30 - 57 | .015 - .033<br>.008 - .018 | .020 - .035<br>.013 - .028 | .020 - .041<br>.018 - .038 | .030 - .061<br>.020 - .051 | .030 - .064<br>.028 - .056 | .041 - .081<br>.036 - .076 | .061 - .122<br>.041 - .102 |
| | **IRON BASE ALLOYS** | | | | | | | | | |
| | A286, Discaloy, Haynes 556, Carpenter 22, Greek Ascolloy | < 40<br>> 40 | 35 - 70<br>30 - 57 | .015 - .030<br>.008 - .018 | .020 - .033<br>.010 - .025 | .020 - .036<br>.013 - .033 | .028 - .058<br>.018 - .048 | .030 - .061<br>.025 - .056 | .041 - .071<br>.025 - .066 | .056 - .117<br>.036 - .097 |
| | **TITANIUM ALLOYS** | | | | | | | | | |
| | Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-2SN-4Zr-2Mo-Si | | 75 - 140 | .025 - .038 | .030 - .050 | .038 - .064 | .051 - .076 | .064 - .089 | .076 - .127 | .102 - .152 |
| | 5553 / Beta Titanium | | 57 - 110 | .020 - .036 | .025 - .046 | .030 - .056 | .041 - .071 | .058 - .086 | .061 - .112 | .081 - .142 |
| M | **STAINLESS STEELS** | | | | | | | | | |
| | 13/8, 15/5, 17-4, pH Types | < 40<br>> 40 | 85 - 140<br>65 - 105 | .020 - .038<br>.015 - .033 | .023 - .040<br>.020 - .038 | .025 - .043<br>.023 - .041 | .041 - .076<br>.030 - .066 | .046 - .079<br>.033 - .071 | .051 - .086<br>.046 - .081 | .081 - .152<br>.061 - .132 |
| | 300 Series, 304L, Nitronic 50, Duplex, Super-Austenitic | < 40<br>> 40 | 95 - 150<br>65 - 105 | .020 - .038<br>.015 - .033 | .023 - .040<br>.018 - .035 | .025 - .043<br>.020 - .038 | .041 - .076<br>.030 - .066 | .043 - .071<br>.036 - .061 | .051 - .086<br>.041 - .076 | .081 - .152<br>.056 - .097 |
| | 400 Series - 403, 405, 420, 455 | < 40<br>> 40 | 85 - 160<br>65 - 125 | .020 - .041<br>.015 - .036 | .023 - .043<br>.020 - .040 | .025 - .046<br>.023 - .043 | .041 - .081<br>.030 - .071 | .051 - .089<br>.033 - .076 | .051 - .091<br>.046 - .086 | .081 - .163<br>.061 - .142 |
| P | **HIGH STRENGTH TOOL STEELS** | | | | | | | | | |
| | A2, D2, P20, H13, S7, O1 | < 40<br>> 40 | 85 - 150<br>57 - 125 | .020 - .038<br>.015 - .033 | .025 - .048<br>.022 - .042 | .033 - .058<br>.030 - .051 | .046 - .061<br>.041 - .056 | .061 - .086<br>.051 - .071 | .086 - .112<br>.061 - .081 | .091 - .122<br>.076 - .102 |
| | **MEDIUM ALLOY TOOL STEELS** | | | | | | | | | |
| | 4140, 4340, 52100, 6150, 8620 | < 40<br>> 40 | 130 - 190<br>95 - 140 | .025 - .041<br>.018 - .030 | .029 - .051<br>.025 - .041 | .033 - .061<br>.030 - .051 | .046 - .061<br>.041 - .056 | .061 - .086<br>.051 - .071 | .086 - .112<br>.061 - .081 | .091 - .122<br>.076 - .102 |
| | **CARBON STEELS** | | | | | | | | | |
| | 1000's - 1018, 1020, 12L14 | < 40 | 140 - 230 | .025 - .043 | .029 - .053 | .033 - .064 | .046 - .061 | .061 - .086 | .086 - .112 | .091 - .122 |
| K | **CAST MATERIAL** | | | | | | | | | |
| | Ductile Iron | | 130 - 200 | .030 - .048 | .034 - .056 | .038 - .066 | .061 - .097 | .066 - .127 | .076 - .132 | .122 - .193 |
| | Gray Iron | | 170 - 225 | .033 - .053 | .037 - .061 | .041 - .069 | .066 - .107 | .071 - .132 | .081 - .163 | .132 - .213 |

| | Profile/Trochoidal Milling |
|---|---|
| Axial (ap) | up to 2xD |
| Radial (ae) | 5% - 15% of Dia. |




**NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.**

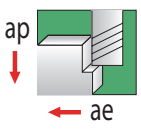
# GARR TOOL High Performance Milling Guide for VX-7, VX-7C
## (HIGH EFFICIENCY MILLING)

**NOTE - DATA DOES NOT REFLECT CHIP THINNING.**

**SPINDLE INTERFACE MUST BE SCRUTINIZED WHEN USING 5/8" DIAMETER AND LARGER END MILLS**

| ISO Material | | HRC | SFM (Vc) | CHIPLOAD PER TOOTH (Fz) | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | 3/8" | 1/2" | 5/8" | 3/4" | 1" |
| S | **COBALT BASE ALLOYS** | | | | | | | |
| | Haynes 25/188, Stellite 21, Cobalt Chrome | < 40<br>> 40 | 120 - 240<br>100 - 195 | .0013" - .0026"<br>.0010" - .0024" | .0019" - .0036"<br>.0014" - .0031" | .0021" - .0043"<br>.0017" - .0038" | .0026" - .0052"<br>.0020" - .0048" | .0038" - .0072"<br>.0028" - .0062" |
| | **NICKEL BASE ALLOYS** | | | | | | | |
| | Inconel-625/718, Waspaloy, Invar, Rene, Hastelloy, Monel | < 40<br>> 40 | 120 - 240<br>100 - 195 | .0013" - .0026"<br>.0010" - .0024" | .0019" - .0036"<br>.0014" - .0031" | .0021" - .0043"<br>.0017" - .0038" | .0026" - .0052"<br>.0020" - .0048" | .0038" - .0072"<br>.0028" - .0062" |
| | **IRON BASE ALLOYS** | | | | | | | |
| | A286, Discaloy, Haynes 556, Carpenter 22, Greek Ascolloy | < 40<br>> 40 | 120 - 240<br>100 - 195 | .0013" - .0026"<br>.0010" - .0024" | .0019" - .0036"<br>.0014" - .0031" | .0021" - .0043"<br>.0017" - .0038" | .0026" - .0052"<br>.0020" - .0048" | .0038" - .0072"<br>.0028" - .0062" |
| | **TITANIUM ALLOYS** | | | | | | | |
| | Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-2SN-4Zr-2Mo-Si | | 260 - 490 | .0014" - .0028" | .0021" - .0040" | .0026" - .0048" | .0028" - .0056" | .0042" - .0080" |
| | 5553 / Beta Titanium | | 195 - 365 | .0014" - .0026" | .0021" - .0036" | .0026" - .0043" | .0028" - .0052" | .0042" - .0072" |
| M | **STAINLESS STEELS** | | | | | | | |
| | 13/8, 15/5, 17-4, pH Types | < 40<br>> 40 | 290 - 490<br>225 - 360 | .0013" - .0026"<br>.0010" - .0024" | .0019" - .0036"<br>.0014" - .0031" | .0022" - .0043"<br>.0017" - .0039" | .0026" - .0052"<br>.0020" - .0048" | .0038" - .0072"<br>.0028" - .0062" |
| | 300 Series, 304L, Nitronic 50, Duplex, Super-Austenitic | < 40<br>> 40 | 325 - 520<br>225 - 360 | .0013" - .0026"<br>.0010" - .0024" | .0019" - .0036"<br>.0014" - .0031" | .0022" - .0043"<br>.0017" - .0039" | .0026" - .0052"<br>.0020" - .0048" | .0038" - .0072"<br>.0028" - .0062" |
| | 400 Series - 403, 405, 420, 455 | < 40<br>> 40 | 290 - 555<br>225 - 425 | .0013" - .0028"<br>.0010" - .0025" | .0019" - .0038"<br>.0014" - .0034" | .0022" - .0046"<br>.0017" - .0041" | .0026" - .0056"<br>.0020" - .0050" | .0038" - .0076"<br>.0028" - .0068" |
| P | **HIGH STRENGTH TOOL STEELS** | | | | | | | |
| | A2, D2, P20, H13, S7, O1 | < 40<br>> 40 | 290 - 520<br>195 - 425 | .0016" - .0028"<br>.0014" - .0024" | .0024" - .0038"<br>.0022" - .0031" | .0026" - .0046"<br>.0024" - .0038" | .0032" - .0056"<br>.0028" - .0048" | .0048" - .0076"<br>.0044" - .0062" |
| | **MEDIUM ALLOY TOOL STEELS** | | | | | | | |
| | 4140, 4340, 52100, 6150, 8620 | < 40<br>> 40 | 455 - 650<br>325 - 490 | .0016" - .0029"<br>.0014" - .0024" | .0024" - .0040"<br>.0022" - .0033" | .0026" - .0048"<br>.0024" - .0040" | .0032" - .0058"<br>.0028" - .0048" | .0048" - .0080"<br>.0044" - .0066" |
| | **CARBON STEELS** | | | | | | | |
| | 1000's - 1018, 1020, 12L14 | < 40 | 490 - 780 | .0016" - .0030" | .0024" - .0043" | .0026" - .0050" | .0032" - .0060" | .0048" - .0086" |
| K | **CAST MATERIAL** | | | | | | | |
| | Ductile Iron | | 455 - 685 | .0018" - .0031" | .0029" - .0046" | .0031" - .0053" | .0036" - .0062" | .0058" - .0092" |
| | Gray Iron | | 585 - 770 | .0019" - .0032" | .0031" - .0048" | .0034" - .0055" | .0038" - .0064" | .0062" - .0096" |

| | Profile/Trochoidal Milling |
|---|---|
| Axial (ap) | up to 2xD |
| Radial (ae) | 5% - 15% of Dia. |




**NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.**

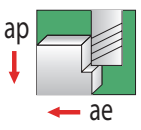
# GARR TOOL High Performance Milling Guide for VX-7, VX-7C
## (HIGH EFFICIENCY MILLING)

**NOTE - DATA DOES NOT REFLECT CHIP THINNING.**

**SPINDLE INTERFACE MUST BE SCRUTINIZED WHEN USING 16mm DIAMETER AND LARGER END MILLS**

| | ISO Material | HRC | M/Min. (Vc) | CHIPLOAD PER TOOTH (Fz) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | 8.0mm | 10.0mm | 12.0mm | 16.0mm | 20.0mm | 25.0mm |
| S | **COBALT BASE ALLOYS** | | | | | | | | |
| | Haynes 25/188, Stellite 21, Cobalt Chrome | < 40<br>> 40 | 35 - 75<br>30 - 60 | .024 - .046<br>.018 - .040 | .033 - .066<br>.025 - .061 | .048 - .091<br>.036 - .079 | .053 - .109<br>.043 - .097 | .066 - .132<br>.051 - .122 | .097 - .183<br>.071 - .157 |
| | **NICKEL BASE ALLOYS** | | | | | | | | |
| | Inconel-625/718, Waspaloy, Invar, Rene, Hastelloy, Monel | < 40<br>> 40 | 35 - 75<br>30 - 60 | .024 - .046<br>.018 - .040 | .033 - .066<br>.025 - .061 | .048 - .091<br>.036 - .079 | .053 - .109<br>.043 - .097 | .066 - .132<br>.051 - .122 | .097 - .183<br>.071 - .157 |
| | **IRON BASE ALLOYS** | | | | | | | | |
| | A286, Discaloy, Haynes 556, Carpenter 22, Greek Ascolloy | < 40<br>> 40 | 35 - 75<br>30 - 60 | .024 - .046<br>.018 - .040 | .033 - .066<br>.025 - .061 | .048 - .091<br>.036 - .079 | .053 - .109<br>.043 - .097 | .066 - .132<br>.051 - .122 | .097 - .183<br>.071 - .157 |
| | **TITANIUM ALLOYS** | | | | | | | | |
| | Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-2SN-4Zr-2Mo-Si | | 80 - 150 | .026 - .051 | .036 - .071 | .053 - .102 | .066 - .122 | .071 - .142 | .107 - .203 |
| | 5553 / Beta Titanium | | 60 - 110 | .026 - .046 | .036 - .066 | .053 - .091 | .066 - .109 | .071 - .132 | .107 - .183 |
| M | **STAINLESS STEELS** | | | | | | | | |
| | 13/8, 15/5, 17-4, pH Types | < 40<br>> 40 | 90 - 150<br>70 - 110 | .024 - .046<br>.018 - .040 | .033 - .066<br>.025 - .061 | .048 - .091<br>.036 - .079 | .056 - .109<br>.043 - .099 | .066 - .132<br>.051 - .122 | .097 - .183<br>.071 - .157 |
| | 300 Series, 304L, Nitronic 50, Duplex, Super-Austenitic | < 40<br>> 40 | 100 - 160<br>70 - 110 | .024 - .052<br>.018 - .040 | .033 - .066<br>.025 - .061 | .048 - .091<br>.036 - .079 | .056 - .109<br>.043 - .099 | .066 - .132<br>.051 - .122 | .097 - .183<br>.071 - .157 |
| | 400 Series - 403, 405, 420, 455 | < 40<br>> 40 | 90 - 170<br>70 - 130 | .024 - .051<br>.018 - .043 | .033 - .071<br>.025 - .064 | .048 - .097<br>.036 - .086 | .056 - .117<br>.043 - .104 | .066 - .142<br>.051 - .127 | .097 - .193<br>.071 - .173 |
| P | **HIGH STRENGTH TOOL STEELS** | | | | | | | | |
| | A2, D2, P20, H13, S7, O1 | < 40<br>> 40 | 90 - 160<br>60 - 130 | .032 - .051<br>.026 - .040 | .041 - .071<br>.036 - .061 | .061 - .097<br>.056 - .079 | .066 - .117<br>.061 - .097 | .081 - .142<br>.071 - .122 | .122 - .193<br>.112 - .157 |
| | **MEDIUM ALLOY TOOL STEELS** | | | | | | | | |
| | 4140, 4340, 52100, 6150, 8620 | < 40<br>> 40 | 140 - 200<br>100 - 150 | .032 - .053<br>.026 - .040 | .041 - .074<br>.036 - .061 | .061 - .102<br>.056 - .084 | .066 - .122<br>.061 - .102 | .081 - .147<br>.071 - .122 | .122 - .203<br>.112 - .168 |
| | **CARBON STEELS** | | | | | | | | |
| | 1000's - 1018, 1020, 12L14 | < 40 | 150 - 240 | .032 - .053 | .041 - .076 | .061 - .109 | .066 - .127 | .081 - .152 | .122 - .218 |
| K | **CAST MATERIAL** | | | | | | | | |
| | Ductile Iron | | 140 - 210 | .035 - .057 | .046 - .079 | .074 - .117 | .079 - .135 | .091 - .157 | .147 - .234 |
| | Gray Iron | | 180 - 235 | .036 - .060 | .048 - .081 | .079 - .122 | .086 - .140 | .097 - .163 | .157 - .244 |

| | Profile/Trochoidal Milling |
|---|---|
| Axial (ap) | up to 2xD |
| Radial (ae) | 5% - 15% of Dia. |

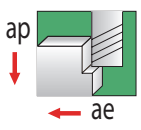



**NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.**

# GARR TOOL Milling Guide for TMS / TMR
## (HIGH EFFICIENCY MILLING)

**NOTE - CHIP THINNING CALCULATION ALREADY APPLIED**
**CHIPLOAD PER TOOTH (Fz) AT 2% RADIAL ENGAGEMENT (USING PROGRAMMED CALCULATION - SEE PAGE 306)**
**SPINDLE INTERFACE MUST BE SCRUTINIZED WHEN USING 5/8" DIAMETER AND LARGER END MILLS**

| ISO Material | | SFM (Vc) | CHIPLOAD PER TOOTH (Fz) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | 1/4" | 5/16" | 3/8" | 1/2" | 5/8" | 3/4" | 1" |
| S | **TITANIUM ALLOYS** | | | | | | | | |
| | 6Al-4V | 250 - 400 | .0020" - .0042" | .0030" - .0052" | .0035" - .0065" | .0043" - .0078" | .0052" - .0095" | .0065" - .0115" | .0080" - .0143" |
| | 5553 | 150 - 250 | .0015" - .0028" | .0018" - .0035" | .0025" - .0043" | .0030" - .0055" | .0035" - .0065" | .0042" - .0080" | .0052" - .0095" |
| M | **STAINLESS STEELS** | | | | | | | | |
| | Free Machining (303) | 300 - 400 | .0020" - .0042" | .0027" - .0052" | .0035" - .0065" | .0043" - .0078" | .0052" - .0095" | .0065" - .0115" | .0080" - .0143" |
| | Austenitic (304 / 304L) | 225 - 350 | .0017" - .0035" | .0025" - .0043" | .0030" - .0052" | .0035" - .0065" | .0043" - .0078" | .0052" - .0095" | .0065" - .0115" |
| | Martensitic (17-4 / 416) | 200 - 250 | .0015" - .0028" | .0018" - .0035" | .0025" - .0043" | .0030" - .0055" | .0035" - .0065" | .0042" - .0080" | .0052" - .0095" |
| P | **MEDIUM ALLOY TOOL STEELS** | | | | | | | | |
| | 8620 | 250 - 400 | .0017" - .0035" | .0025" - .0043" | .0030" - .0052" | .0035" - .0065" | .0043" - .0078" | .0052" - .0095" | .0065" - .0115" |
| | 4140, D2, S7 | 250 - 350 | .0015" - .0028" | .0018" - .0035" | .0025" - .0043" | .0030" - .0055" | .0035" - .0065" | .0042" - .0080" | .0052" - .0095" |
| | **CARBON STEELS** | | | | | | | | |
| | 1000 Series, A36, 12L14 | 300 - 500 | .0020" - .0042" | .0027" - .0052" | .0035" - .0065" | .0043" - .0078" | .0052" - .0095" | .0065" - .0115" | .0080" - .0143" |
| | **CAST STEELS** | | | | | | | | |
| | Steel | 250 - 350 | .0020" - .0042" | .0027" - .0052" | .0035" - .0065" | .0043" - .0078" | .0052" - .0095" | .0065" - .0115" | .0080" - .0143" |
| K | **CAST MATERIAL** | | | | | | | | |
| | Ductile Iron | 250 - 350 | .0020" - .0042" | .0027" - .0052" | .0035" - .0065" | .0043" - .0078" | .0052" - .0095" | .0065" - .0115" | .0080" - .0143" |
| | Gray Iron | 250 - 350 | .0020" - .0042" | .0027" - .0052" | .0035" - .0065" | .0043" - .0078" | .0052" - .0095" | .0065" - .0115" | .0080" - .0143" |
| N | **NON-FERROUS** | | | | | | | | |
| | Aluminum (6061-T6) | 300 - 500 | .0020" - .0042" | .0027" - .0052" | .0035" - .0065" | .0043" - .0078" | .0052" - .0095" | .0065" - .0115" | .0080" - .0143" |
| | Copper, Brass | 175 - 350 | .0017" - .0042" | .0025" - .0052" | .0030" - .0065" | .0035" - .0078" | .0043" - .0095" | .0052" - .0115" | .0065" - .0143" |



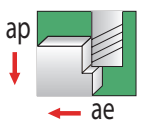

ap = full flute length
ae = 2%

**NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.**

# GARR TOOL Milling Guide for TMS / TMR
## (HIGH EFFICIENCY MILLING)

**NOTE - CHIP THINNING CALCULATION ALREADY APPLIED**
**CHIPLOAD PER TOOTH (Fz) AT 2% RADIAL ENGAGEMENT (USING PROGRAMMED CALCULATION - SEE PAGE 307)**
**SPINDLE INTERFACE MUST BE SCRUTINIZED WHEN USING 16mm DIAMETER AND LARGER END MILLS**

| ISO Material | | M/Min. (Vc) | CHIPLOAD PER TOOTH (Fz) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | 6.0mm | 8.0mm | 10.0mm | 12.0mm | 16.0mm | 20.0mm | 25.0mm |
| S | **TITANIUM ALLOYS** | | | | | | | | |
| | 6Al-4V | 98 - 157 | .051 - .107 | .076 - .132 | .089 - .165 | .109 - .198 | .132 - .241 | .165 - .292 | .132 - .363 |
| | 5553 | 59 - 98 | .038 - .071 | .046 - .089 | .064 - .109 | .076 - .140 | .089 - .165 | .107 - .203 | .132 - .241 |
| M | **STAINLESS STEELS** | | | | | | | | |
| | Free Machining (303) | 118 - 157 | .051 - .107 | .069 - 132 | .089 - .165 | .109 - .198 | .132 - .241 | .165 - .292 | .132 - .363 |
| | Austenitic (304 / 304L) | 89 - 138 | .043 - .089 | .064 - .109 | .076 - .132 | .089 - .165 | .109 - .198 | .132 - .241 | .165 - .292 |
| | Martensitic (17-4 / 416) | 79 - 98 | .038 - .071 | .046 - .089 | .064 - .109 | .076 - .140 | .089 - .165 | .107 - .203 | .132 - .241 |
| P | **MEDIUM ALLOY TOOL STEELS** | | | | | | | | |
| | 8620 | 98 - 157 | .043 - .089 | .064 - .109 | .076 - .132 | .089 - .165 | .109 - .198 | .132 - .241 | .165 - .292 |
| | 4140, D2, S7 | 98 - 138 | .038 - .071 | .046 - .089 | .064 - .109 | .076 - .140 | .089 - .165 | .107 - .203 | .132 - .241 |
| | **CARBON STEELS** | | | | | | | | |
| | 1000 Series, A36, 12L14 | 118 - 197 | .051 - .107 | .069 - .132 | .089 - .165 | .109 - .198 | .132 - .241 | .165 - .292 | .203 - .363 |
| | **CAST STEELS** | | | | | | | | |
| | Steel | 98 - 138 | .051 - .107 | .069 - .132 | .089 - .165 | .109 - .198 | .132 - .241 | .165 - .292 | .203 - .363 |
| K | **CAST MATERIAL** | | | | | | | | |
| | Ductile Iron | 98 - 138 | .051 - .107 | .069 - .132 | .089 - .165 | .109 - .198 | .132 - .241 | .165 - .292 | .203 - .363 |
| | Gray Iron | 98 - 138 | .051 - .107 | .069 - .132 | .089 - .165 | .109 - .198 | .132 - .241 | .165 - .292 | .203 - .363 |
| N | **NON-FERROUS** | | | | | | | | |
| | Aluminum (6061-T6) | 90 - 150 | .050 - .105 | .075 - .130 | .090 - .165 | .105 - .200 | .130 - .240 | .165 - .292 | .203 - .363 |
| | Copper, Brass | 60 - 110 | .043 - .105 | .064 - .130 | .076 - .165 | .089 - .200 | .109 - .240 | .132 - .292 | .165 - .363 |

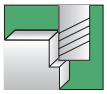



ap = full flute length
ae = 2%

**NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.**

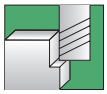
# Chip Thinning Calculations for TMS / TMR End Mills

ae = 3%



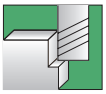

| 3% Radial Engagement (.03 x d) | |
|---|---|
| Actual (CPT) | Programmed (CPT) |
| .0002" | .0005" |
| .0003" | .0010" |
| .0005" | .0015" |
| .0007" | .0020" |
| .0009" | .0025" |
| .0010" | .0030" |
| .0012" | .0035" |
| .0014" | .0040" |
| .0015" | .0045" |
| .0017" | .0050" |
| .0019" | .0055" |
| .0020" | .0060" |
| .0022" | .0065" |
| .0024" | .0070" |
| .0026" | .0075" |
| .0027" | .0080" |
| .0029" | .0085" |
| .0031" | .0090" |
| .0032" | .0095" |
| .0034" | .0100" |
| .0036" | .0105" |
| .0037" | .0110" |
| .0039" | .0115" |
| .0041" | .0120" |
| .0043" | .0125" |
| .0044" | .0130" |
| .0046" | .0135" |
| .0048" | .0140" |
| .0049" | .0145" |
| .0051" | .0150" |
| .0053" | .0155" |
| .0054" | .0160" |
| .0056" | .0165" |
| .0058" | .0170" |
| .0060" | .0175" |
| .0061" | .0180" |
| .0063" | .0185" |
| .0065" | .0190" |
| .0066" | .0195" |
| .0068" | .0200" |

ae = 2%




| 2% Radial Engagement (.02 x d) | |
|---|---|
| Actual (CPT) | Programmed (CPT) |
| .0001" | .0005" |
| .0003" | .0010" |
| .0004" | .0015" |
| .0006" | .0020" |
| .0007" | .0025" |
| .0008" | .0030" |
| .0010" | .0035" |
| .0011" | .0040" |
| .0013" | .0045" |
| .0014" | .0050" |
| .0015" | .0055" |
| .0017" | .0060" |
| .0018" | .0065" |
| .0020" | .0070" |
| .0021" | .0075" |
| .0022" | .0080" |
| .0024" | .0085" |
| .0025" | .0090" |
| .0027" | .0095" |
| .0028" | .0100" |
| .0029" | .0105" |
| .0031" | .0110" |
| .0032" | .0115" |
| .0034" | .0120" |
| .0035" | .0125" |
| .0036" | .0130" |
| .0038" | .0135" |
| .0039" | .0140" |
| .0041" | .0145" |
| .0042" | .0150" |
| .0043" | .0155" |
| .0045" | .0160" |
| .0046" | .0165" |
| .0048" | .0170" |
| .0049" | .0175" |
| .0050" | .0180" |
| .0052" | .0185" |
| .0053" | .0190" |
| .0055" | .0195" |
| .0056" | .0200" |

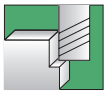
ae = 1%




| 1% Radial Engagement (.01 x d) | |
|---|---|
| Actual (CPT) | Programmed (CPT) |
| .0001" | .0005" |
| .0002" | .0010" |
| .0003" | .0015" |
| .0004" | .0020" |
| .0005" | .0025" |
| .0006" | .0030" |
| .0007" | .0035" |
| .0008" | .0040" |
| .0009" | .0045" |
| .0010" | .0050" |
| .0011" | .0055" |
| .0012" | .0060" |
| .0013" | .0065" |
| .0014" | .0070" |
| .0015" | .0075" |
| .0016" | .0080" |
| .0017" | .0085" |
| .0018" | .0090" |
| .0019" | .0095" |
| .0020" | .0100" |
| .0021" | .0105" |
| .0022" | .0110" |
| .0023" | .0115" |
| .0024" | .0120" |
| .0025" | .0125" |
| .0026" | .0130" |
| .0027" | .0135" |
| .0028" | .0140" |
| .0029" | .0145" |
| .0030" | .0150" |
| .0031" | .0155" |
| .0032" | .0160" |
| .0033" | .0165" |
| .0034" | .0170" |
| .0035" | .0175" |
| .0036" | .0180" |
| .0037" | .0185" |
| .0038" | .0190" |
| .0039" | .0195" |
| .0040" | .0200" |

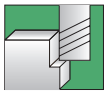
# Chip Thinning Calculations for TMS / TMR End Mills

ae = 3%



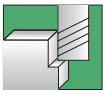

| 3% Radial Engagement (.03 x d) | |
|---|---|
| Actual (CPT) | Programmed (CPT) |
| .0043mm | .0127mm |
| .0086mm | .0254mm |
| .0130mm | .0381mm |
| .0173mm | .0508mm |
| .0216mm | .0635mm |
| .0259mm | .0762mm |
| .0302mm | .0889mm |
| .0345mm | .1016mm |
| .0389mm | .1143mm |
| .0432mm | .1270mm |
| .0475mm | .1397mm |
| .0518mm | .1524mm |
| .0561mm | .1651mm |
| .0605mm | .1778mm |
| .0648mm | .1905mm |
| .0691mm | .2032mm |
| .0734mm | .2159mm |
| .0777mm | .2286mm |
| .0820mm | .2413mm |
| .0864mm | .2540mm |
| .0907mm | .2667mm |
| .0950mm | .2794mm |
| .0993mm | .2921mm |
| .1036mm | .3048mm |
| .1080mm | .3175mm |
| .1123mm | .3302mm |
| .1166mm | .3429mm |
| .1209mm | .3556mm |
| .1252mm | .3683mm |
| .1295mm | .3810mm |
| .1339mm | .3937mm |
| .1382mm | .4064mm |
| .1425mm | .4191mm |
| .1468mm | .4318mm |
| .1511mm | .4445mm |
| .1554mm | .4572mm |
| .1598mm | .4699mm |
| .1641mm | .4826mm |
| .1684mm | .4953mm |
| .1727mm | .5080mm |

ae = 2%




| 2% Radial Engagement (.02 x d) | |
|---|---|
| Actual (CPT) | Programmed (CPT) |
| .0036mm | .0127mm |
| .0071mm | .0254mm |
| .0107mm | .0381mm |
| .0142mm | .0508mm |
| .0178mm | .0635mm |
| .0213mm | .0762mm |
| .0249mm | .0889mm |
| .0284mm | .1016mm |
| .0320mm | .1143mm |
| .0356mm | .1270mm |
| .0391mm | .1397mm |
| .0427mm | .1524mm |
| .0462mm | .1651mm |
| .0498mm | .1778mm |
| .0533mm | .1905mm |
| .0569mm | .2032mm |
| .0605mm | .2159mm |
| .0640mm | .2286mm |
| .0676mm | .2413mm |
| .0711mm | .2540mm |
| .0747mm | .2667mm |
| .0782mm | .2794mm |
| .0818mm | .2921mm |
| .0853mm | .3048mm |
| .0889mm | .3175mm |
| .0925mm | .3302mm |
| .0960mm | .3429mm |
| .0996mm | .3556mm |
| .1031mm | .3683mm |
| .1067mm | .3810mm |
| .1102mm | .3937mm |
| .1138mm | .4064mm |
| .1173mm | .4191mm |
| .1209mm | .4318mm |
| .1245mm | .4445mm |
| .1280mm | .4572mm |
| .1316mm | .4699mm |
| .1351mm | .4826mm |
| .1387mm | .4953mm |
| .1422mm | .5080mm |

ae = 1%




| 1% Radial Engagement (.01 x d) | |
|---|---|
| Actual (CPT) | Programmed (CPT) |
| .0025mm | .0127mm |
| .0051mm | .0254mm |
| .0076mm | .0381mm |
| .0102mm | .0508mm |
| .0127mm | .0635mm |
| .0152mm | .0762mm |
| .0178mm | .0889mm |
| .0203mm | .1016mm |
| .0229mm | .1143mm |
| .0254mm | .1270mm |
| .0279mm | .1397mm |
| .0305mm | .1524mm |
| .0330mm | .1651mm |
| .0356mm | .1778mm |
| .0381mm | .1905mm |
| .0406mm | .2032mm |
| .0432mm | .2159mm |
| .0457mm | .2286mm |
| .0483mm | .2413mm |
| .0508mm | .2540mm |
| .0533mm | .2667mm |
| .0559mm | .2794mm |
| .0584mm | .2921mm |
| .0610mm | .3048mm |
| .0635mm | .3175mm |
| .0660mm | .3302mm |
| .0686mm | .3429mm |
| .0711mm | .3556mm |
| .0737mm | .3683mm |
| .0762mm | .3810mm |
| .0787mm | .3937mm |
| .0813mm | .4064mm |
| .0838mm | .4191mm |
| .0864mm | .4318mm |
| .0889mm | .4445mm |
| .0914mm | .4572mm |
| .0940mm | .4699mm |
| .0965mm | .4826mm |
| .0991mm | .4953mm |
| .1016mm | .5080mm |

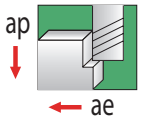
# GARR TOOL Milling Guide for High Rc Finishers in Hardened Steel

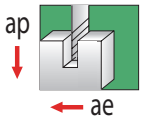
**(Reference Series: 545MA, 545BA, 545RA, VRX)**

| | 38 - 45 HRC | | 45 - 50 HRC | | 50 - 55 HRC | | 55 - 60 HRC | | 60 - 65 HRC | | 65 - 70 HRC | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | SFM = 450 | | SFM = 250 | | SFM = 175 | | SFM = 125 | | SFM = 75 | | SFM = 60 | |
| DIAMETER | RPM | CPT (Fz) | RPM | CPT (Fz) | RPM | CPT (Fz) | RPM | CPT (Fz) | RPM | CPT (Fz) | RPM | CPT (Fz) |
| 1/8" | 13750 | .0009" | 7650 | .0008" | 5350 | .0006" | 3820 | .0005" | 2300 | .0004" | 1850 | .0003" |
| 3/16" | 9200 | .0012" | 5100 | .0010" | 3570 | .0008" | 2550 | .0007" | 1530 | .0006" | 1225 | .0004" |
| 1/4" | 6900 | .0015" | 3850 | .0012" | 2675 | .0010" | 1910 | .0008" | 1150 | .0007" | 925 | .0006" |
| 3/8" | 4600 | .0018" | 2550 | .0015" | 1800 | .0012" | 1275 | .0010" | 765 | .0009" | 615 | .0008" |
| 1/2" | 3450 | .0022" | 1950 | .0018" | 1350 | .0014" | 955 | .0012" | 575 | .0012" | 460 | .0010" |
| 5/8" | 2750 | .0027" | 1550 | .0022" | 1100 | .0020" | 765 | .0018" | 460 | .0015" | 370 | .0013" |
| 3/4" | 2300 | .0030" | 1275 | .0027" | 900 | .0025" | 640 | .0022" | 390 | .0017" | 310 | .0017" |
| 1" | 1720 | .0033" | 960 | .0030" | 675 | .0027" | 480 | .0025" | 290 | .0023" | 230 | .0019" |

| | Profiling / Side Milling |
|---|---|
| Axial (ap) | 1xD |
| Radial (ae) | 5% of Dia. |

| | Slotting / Pocket Milling |
|---|---|
| Axial (ap) | 5% of Dia. |
| Radial (ae) | 1xD |




## *High Speed Machining*

| | 38 - 45 HRC | | 45 - 50 HRC | | 50 - 55 HRC | | 55 - 60 HRC | | 60 - 65 HRC | | 65 - 70 HRC | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | SFM = 1200 | | SFM = 1000 | | SFM = 800 | | SFM = 600 | | SFM = 450 | | SFM = 375 | |
| DIAMETER | RPM | CPT (Fz) | RPM | CPT (Fz) | RPM | CPT (Fz) | RPM | CPT (Fz) | RPM | CPT (Fz) | RPM | CPT (Fz) |
| 1/8" | 36670 | .0006" | 30600 | .0005" | 24500 | .0004" | 18340 | .0004" | 13750 | .0003" | 11460 | .0002" |
| 3/16" | 24450 | .0009" | 20400 | .0008" | 16300 | .0006" | 12230 | .0005" | 9200 | .0004" | 7650 | .0003" |
| 1/4" | 18340 | .0012" | 15300 | .0010" | 12230 | .0008" | 9200 | .0007" | 6900 | .0005" | 5750 | .0004" |
| 3/8" | 12225 | .0015" | 10200 | .0012" | 8150 | .0010" | 6100 | .0008" | 4600 | .0007" | 3850 | .0006" |
| 1/2" | 9170 | .0018" | 7650 | .0015" | 6100 | .0012" | 4600 | .0010" | 3450 | .0009" | 2870 | .0008" |
| 5/8" | 7335 | .0022" | 6100 | .0018" | 4900 | .0014" | 3700 | .0012" | 2750 | .0011" | 2300 | .0010" |
| 3/4" | 6115 | .0027" | 5100 | .0022" | 4100 | .0020" | 3100 | .0018" | 2300 | .0014" | 1900 | .0013" |
| 1" | 4585 | .0030" | 3820 | .0027" | 3100 | .0025" | 2300 | .0022" | 1720 | .0019" | 1450 | .0017" |

| | Profiling / Side Milling |
|---|---|
| Axial (ap) | 1xD |
| Radial (ae) | 2% of Dia. |

| | Slotting / Pocket Milling |
|---|---|
| Axial (ap) | 2% of Dia. |
| Radial (ae) | 1xD |

***D = Tool Diameter***

***Example: 2% of Dia., when D = 1/2" (.02 x .500") = .010" per pass***

**Preferable method is to run tools with air blast to keep chips away from the cutting edge.**
**If air is not available, either coolant spray or dry machining is acceptable.**

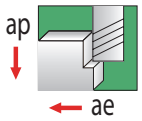
**NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.**

# GARR TOOL Milling Guide for High Rc Finishers in Hardened Steel

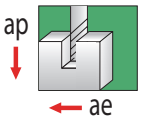
**(Reference Series: 545MA, 545BA, 545RA, VRX)**

| | 38 - 45 HRC | | 45 - 50 HRC | | 50 - 55 HRC | | 55 - 60 HRC | | 60 - 65 HRC | | 65 - 70 HRC | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | M/Min. = 135 | | M/Min. = 75 | | M/Min. = 50 | | M/Min. = 40 | | M/Min. = 25 | | M/Min. = 20 | |
| DIAMETER | RPM | CPT (Fz) | RPM | CPT (Fz) | RPM | CPT (Fz) | RPM | CPT (Fz) | RPM | CPT (Fz) | RPM | CPT (Fz) |
| 3.0mm | 14500 | .025 | 8100 | .020 | 5650 | .015 | 4050 | .010 | 2400 | .008 | 1950 | .007 |
| 4.0mm | 10900 | .030 | 6100 | .025 | 4200 | .020 | 3000 | .015 | 1800 | .010 | 1450 | .008 |
| 6.0mm | 7300 | .035 | 4050 | .030 | 2800 | .025 | 2000 | .020 | 1200 | .015 | 970 | .010 |
| 8.0mm | 5450 | .040 | 3000 | .035 | 2100 | .030 | 1500 | .025 | 900 | .020 | 725 | .015 |
| 12.0mm | 3650 | .055 | 2000 | .045 | 1400 | .035 | 1000 | .030 | 600 | .025 | 480 | .020 |
| 16.0mm | 2700 | .065 | 1500 | .055 | 1050 | .050 | 750 | .045 | 450 | .030 | 360 | .025 |
| 18.0mm | 2400 | .075 | 1350 | .065 | 950 | .060 | 675 | .055 | 400 | .045 | 320 | .030 |
| 20.0mm | 2150 | .078 | 1200 | .070 | 850 | .065 | 600 | .058 | 360 | .050 | 290 | .040 |
| 25.0mm | 1750 | .080 | 1000 | .075 | 700 | .070 | 500 | .060 | 300 | .055 | 250 | .045 |

| | Profiling / Side Milling |
|---|---|
| Axial (ap) | 1xD |
| Radial (ae) | 5% of Dia. |




| | Slotting / Pocket Milling |
|---|---|
| Axial (ap) | 5% of Dia. |
| Radial (ae) | 1xD |




## *High Speed Machining*

| | 38 - 45 HRC | | 45 - 50 HRC | | 50 - 55 HRC | | 55 - 60 HRC | | 60 - 65 HRC | | 65 - 70 HRC | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | M/Min. = 365 | | M/Min. = 305 | | M/Min. = 240 | | M/Min. = 180 | | M/Min. = 135 | | M/Min. = 115 | |
| DIAMETER | RPM | CPT (Fz) | RPM | CPT (Fz) | RPM | CPT (Fz) | RPM | CPT (Fz) | RPM | CPT (Fz) | RPM | CPT (Fz) |
| 3.0mm | 38800 | .020 | 32300 | .015 | 25800 | .008 | 19400 | .008 | 14500 | .007 | 12100 | .005 |
| 4.0mm | 29100 | .025 | 24200 | .020 | 19400 | .015 | 14500 | .010 | 10900 | .008 | 9100 | .007 |
| 6.0mm | 19400 | .030 | 16100 | .025 | 12900 | .020 | 9700 | .015 | 7300 | .010 | 6050 | .008 |
| 8.0mm | 14500 | .035 | 12100 | .030 | 9700 | .025 | 7250 | .020 | 5450 | .015 | 4500 | .010 |
| 12.0mm | 9700 | .045 | 8075 | .035 | 6450 | .030 | 4850 | .025 | 3650 | .020 | 3000 | .015 |
| 16.0mm | 7250 | .055 | 6050 | .045 | 4850 | .035 | 3600 | .030 | 2700 | .025 | 2300 | .020 |
| 18.0mm | 6450 | .065 | 5400 | .055 | 4300 | .050 | 3200 | .045 | 2400 | .030 | 2000 | .025 |
| 20.0mm | 5800 | .070 | 4850 | .060 | 3850 | .055 | 2900 | .050 | 2150 | .040 | 1800 | .028 |
| 25.0mm | 4650 | .075 | 3870 | .065 | 3100 | .060 | 2300 | .055 | 1750 | .045 | 1450 | .030 |

| | Profiling / Side Milling |
|---|---|
| Axial (ap) | 1xD |
| Radial (ae) | 2% of Dia. |

| | Slotting / Pocket Milling |
|---|---|
| Axial (ap) | 2% of Dia. |
| Radial (ae) | 1xD |

***D = Tool Diameter***

***Example: 2% of Dia., when D = 12mm (.02 x 12mm) = .24mm per pass***

**Preferable method is to run tools with air blast to keep chips away from the cutting edge.**
**If air is not available, either coolant spray or dry machining is acceptable.**

**NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.**

# GARR TOOL Milling Guide for Die Mold Cutters

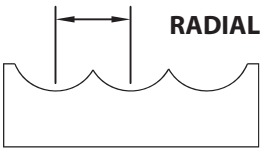
## *Roughing*

**(Reference series: 350MX)**

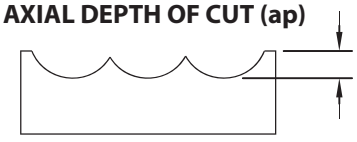
| | RPM | | CHIPLOAD PER TOOTH (Fz) | |
|---|---|---|---|---|
| DIAMETER | 40 - 50 HRC | 50 - 60 HRC | 40 - 50 HRC | 50 - 60 HRC |
| 1/32" | 20,000 - 40,000 | 20,000 - 40,000 | .0005" - .0007" | .0004" - .0005" |
| 1/16" | 20,000 - 40,000 | 20,000 - 40,000 | .0010" - .0015" | .0008" - .0010" |
| 3/32" | 20,000 - 32,000 | 20,000 - 30,000 | .0015" - .0020" | .0010" - .0015" |
| 1/8" | 18,000 - 24,000 | 15,000 - 20,000 | .0020" - .0025" | .0015" - .0020" |
| 3/16" | 12,000 - 16,000 | 10,000 - 14,000 | .0030" - .0040" | .0020" - .0030" |
| 1/4" | 9,000 - 12,000 | 7,500 - 10,000 | .0040" - .0050" | .0025" - .0040" |
| 5/16" | 7,000 - 10,000 | 6,000 - 8,500 | .0050" - .0065" | .0035" - .0050" |
| 3/8" | 6,000 - 8,000 | 5,000 - 7,000 | .0060" - .0075" | .0045" - .0060" |
| 1/2" | 4,500 - 6,000 | 4,000 - 5,500 | .0080" - .0100" | .0055" - .0080" |
| 5/8" | 3,500 - 5,000 | 3,000 - 4,500 | .0090" - .0110" | .0065" - .0090" |
| 3/4" | 3,000 - 4,000 | 2,500 - 3,500 | .0100" - .0120" | .0075" - .0100" |
| 1" | 2,300 - 3,000 | 2,000 - 2,500 | .0110" - .0130" | .0085" - .0110" |

## *Semi-Finishing and Finishing*

| | RPM | | CHIPLOAD PER TOOTH (Fz) | |
|---|---|---|---|---|
| DIAMETER | 40 - 50 HRC | 50 - 60 HRC | 40 - 50 HRC | 50 - 60 HRC |
| 1/32" | 20,000 - 40,000 | 20,000 - 40,000 | .0004" - .0005" | .0003" - .0004" |
| 1/16" | 20,000 - 40,000 | 20,000 - 40,000 | .0008" - .0010" | .0005" - .0008" |
| 3/32" | 20,000 - 40,000 | 20,000 - 40,000 | .0010" - .0015" | .0008" - .0012" |
| 1/8" | 20,000 - 40,000 | 20,000 - 36,000 | .0015" - .0020" | .0010" - .0015" |
| 3/16" | 20,000 - 32,000 | 20,000 - 25,000 | .0020" - .0030" | .0015" - .0020" |
| 1/4" | 18,000 - 25,000 | 15,000 - 18,000 | .0025" - .0040" | .0020" - .0030" |
| 5/16" | 14,000 - 19,000 | 12,000 - 14,000 | .0035" - .0050" | .0025" - .0040" |
| 3/8" | 12,000 - 16,000 | 10,000 - 12,000 | .0045" - .0060" | .0030" - .0045" |
| 1/2" | 9,000 - 12,000 | 7,500 - 9,000 | .0055" - .0080" | .0040" - .0060" |
| 5/8" | 6,500 - 9,000 | 5,000 - 7,000 | .0065" - .0090" | .0050" - .0070" |
| 3/4" | 5,500 - 7,500 | 4,000 - 6,000 | .0075" - .0100" | .0060" - .0080" |
| 1" | 4,000 - 6,000 | 3,500 - 5,500 | .0085" - .0110" | .0070" - .0090" |



**RADIAL STEP OVER (ae)**



**AXIAL DEPTH OF CUT (ap)**

| Roughing | |
|---|---|
| Axial (ap) | 15% - 25% of Dia. |
| Radial (ae) | 20% - 30% of Dia. |

| Semi-Finishing | |
|---|---|
| Axial (ap) | 5% - 8% of Dia. |
| Radial (ae) | 2% - 5% of Dia. |

| Finishing | |
|---|---|
| Axial (ap) | 1% - 3% of Dia. |
| Radial (ae) | .5% - 1% of Dia. |

High pressure air is recommended for clearing chips away from the cut.

**NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.**

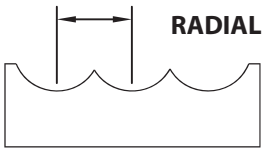
# Roughing

**(Reference series: 950MX)**

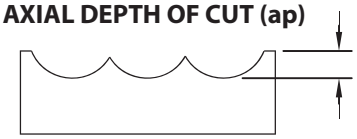
| | RPM | | CHIPLOAD PER TOOTH (Fz) | |
|---|---|---|---|---|
| DIAMETER | 40 - 50 HRC | 50 - 60 HRC | 40 - 50 HRC | 50 - 60 HRC |
| 1.0mm | 20,000 - 40,000 | 20,000 - 40,000 | .013 - .018 | .010 - .013 |
| 1.5mm | 20,000 - 40,000 | 20,000 - 40,000 | .025 - .038 | .020 - .025 |
| 2.0mm | 20,000 - 32,000 | 20,000 - 30,000 | .038 - .050 | .025 - .038 |
| 3.0mm | 18,000 - 24,000 | 15,000 - 20,000 | .050 - .065 | .038 - .050 |
| 4.0mm | 12,000 - 16,000 | 10,000 - 14,000 | .075 - .100 | .050 - .075 |
| 6.0mm | 9,000 - 12,000 | 7,500 - 10,000 | .100 - .125 | .065 - .100 |
| 8.0mm | 7,000 - 10,000 | 6,000 - 8,500 | .125 - .165 | .088 - .125 |
| 10.0mm | 6,000 - 8,000 | 5,000 - 7,000 | .150 - .190 | .110 - .150 |
| 12.0mm | 4,500 - 6,000 | 4,000 - 5,500 | .200 - .250 | .140 - .200 |
| 16.0mm | 3,500 - 5,000 | 3,000 - 4,500 | .225 - .275 | .165 - .225 |
| 20.0mm | 3,000 - 4,000 | 2,500 - 3,500 | .250 - .300 | .190 - .250 |
| 25.0mm | 2,300 - 3,000 | 2,000 - 2,500 | .275 - .325 | .215 - .275 |

# Semi-Finishing and Finishing

| | RPM | | CHIPLOAD PER TOOTH (Fz) | |
|---|---|---|---|---|
| DIAMETER | 40 - 50 HRC | 50 - 60 HRC | 40 - 50 HRC | 50 - 60 HRC |
| 1.0mm | 20,000 - 40,000 | 20,000 - 40,000 | .010 - .013 | .008 - .010 |
| 1.5mm | 20,000 - 40,000 | 20,000 - 40,000 | .020 - .025 | .013 - .020 |
| 2.0mm | 20,000 - 40,000 | 20,000 - 40,000 | .025 - .038 | .020 - .030 |
| 3.0mm | 20,000 - 40,000 | 20,000 - 36,000 | .038 - .050 | .025 - .038 |
| 4.0mm | 20,000 - 32,000 | 20,000 - 25,000 | .050 - .075 | .038 - .050 |
| 6.0mm | 18,000 - 25,000 | 15,000 - 18,000 | .065 - .100 | .050 - .075 |
| 8.0mm | 14,000 - 19,000 | 12,000 - 14,000 | .088 - .125 | .065 - .100 |
| 10.0mm | 12,000 - 16,000 | 10,000 - 12,000 | .110 - .150 | .075 - .110 |
| 12.0mm | 9,000 - 12,000 | 7,500 - 9,000 | .140 - .200 | .100 - .150 |
| 16.0mm | 6,500 - 9,000 | 5,000 - 7,000 | .165 - .225 | .125 - .175 |
| 20.0mm | 5,500 - 7,500 | 4,000 - 6,000 | .190 - .250 | .150 - .200 |
| 25.0mm | 4,000 - 6,000 | 3,500 - 5,500 | .215 - .275 | .175 - .225 |



**RADIAL STEP OVER (ae)**



**AXIAL DEPTH OF CUT (ap)**

| Roughing | |
|---|---|
| Axial (ap) | 15% - 25% of Dia. |
| Radial (ae) | 20% - 30% of Dia. |

| Semi-Finishing | |
|---|---|
| Axial (ap) | 5% - 8% of Dia. |
| Radial (ae) | 2% - 5% of Dia. |

| Finishing | |
|---|---|
| Axial (ap) | 1% - 3% of Dia. |
| Radial (ae) | .5% - 1% of Dia. |

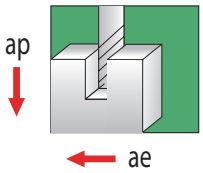
High pressure air is recommended for clearing chips away from the cut.

**NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.**

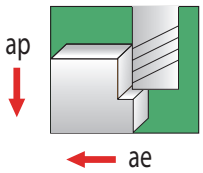
# GARR TOOL Milling Guide for H-45 High Feed End Mills

| | UP TO 40 HRC | | | 40 - 45 HRC | | | 45 - 55 HRC | | | 55 - 60 HRC | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DIAMETER | SPEED RPM | FEED IN/MIN | FEED MM/MIN | SPEED RPM | FEED IN/MIN | FEED MM/MIN | SPEED RPM | FEED IN/MIN | FEED MM/MIN | SPEED RPM | FEED IN/MIN | FEED MM/MIN |
| 3.0mm | 16000 | - | 3100 | 13000 | - | 2032 | 11300 | - | 1778 | 9700 | - | 889 |
| 1/8" | 15200 | 120 | - | 12000 | 80 | - | 10700 | 70 | - | 9200 | 35 | - |
| 4.0mm | 12100 | - | 3700 | 9700 | - | 2540 | 8500 | - | 2159 | 7300 | - | 1016 |
| 3/16" | 10200 | 160 | - | 8200 | 110 | - | 7100 | 90 | - | 6100 | 45 | - |
| 5.0mm | 9700 | - | 4000 | 7700 | - | 2667 | 6800 | - | 2286 | 5800 | - | 1143 |
| 6.0mm | 8100 | - | 4600 | 6500 | - | 3048 | 5700 | - | 2540 | 4900 | - | 1270 |
| 1/4" | 7650 | 180 | - | 6100 | 120 | - | 5400 | 100 | - | 4600 | 50 | - |
| 5/16" | 6100 | 195 | - | 4900 | 130 | - | 4300 | 110 | - | 3700 | 55 | - |
| 8.0mm | 6050 | - | 4950 | 4850 | - | 3302 | 4300 | - | 2794 | 3650 | - | 1397 |
| 3/8" | 5100 | 200 | - | 4100 | 135 | - | 3600 | 115 | - | 3100 | 60 | - |
| 10.0mm | 4850 | - | 5100 | 3900 | - | 3429 | 3400 | - | 2921 | 2900 | - | 1524 |
| 12.0mm | 4050 | - | 6400 | 3200 | - | 4064 | 2800 | - | 3429 | 2400 | - | 1651 |
| 1/2" | 3800 | 240 | - | 3100 | 160 | - | 2700 | 135 | - | 2300 | 65 | - |

| | Slotting Pocket Milling |
|---|---|
| Axial (ap) | 0.3 x Radius |
| Radial (ae) | 1 x D |




| | Profiling Side Milling |
|---|---|
| Axial (ap) | 1 x D |
| Radial (ae) | 0.3 x Radius |




***D = Tool Diameter***

***Example: Axial = 0.3 x radius, when D = 1/2" with .060" corner radius (.3 x .060") = .018" per pass***

**NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.**

# GARR TOOL Milling Guide for Diamond Coated End Mills in Graphite

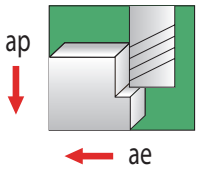


| DIAMETER | RPM | CHIPLOAD PER TOOTH (Fz) |
|---|---|---|
| 1/32" - 1/16" | 15,000 - 35,000 | .0005" - .0010" |
| 1/16" - 1/8" | 8,000 - 31,000 | .0008" - .0015" |
| 1/8" - 3/16" | 8,000 - 31,000 | .0010" - .0020" |
| 3/16" - 1/4" | 8,000 - 25,000 | .0010" - .0020" |
| 1/4" - 5/16" | 6,000 - 23,000 | .0020" - .0040" |
| 5/16" - 3/8" | 6,000 - 20,000 | .0020" - .0040" |
| 3/8" - 1/2" | 6,000 - 20,000 | .0030" - .0050" |
| 1/2" - 5/8" | 4,500 - 15,000 | .0050" - .0060" |
| 5/8" - 3/4" | 4,500 - 12,000 | .0060" - .0070" |
| 3/4" - 1" | 4,500 - 12,000 | .0070" - .0080" |

| DIAMETER | RPM | CHIPLOAD PER TOOTH (Fz) |
|---|---|---|
| 1.0 - 3.0mm | 15,000 - 35,000 | .015 - .030 |
| 3.0 - 6.0mm | 8,000 - 31,000 | .030 - .050 |
| 6.0 - 10.0mm | 6,000 - 31,000 | .050 - .100 |
| 10.0 - 12.0mm | 6,000 - 25,000 | .080 - .130 |
| 16.0 - 20.0mm | 4,500 - 15,000 | .130 - .150 |
| 20.0 - 25.0mm | 4,500 - 12,000 | .150 - .200 |

**Generally, tools will run at maximum RPM in relation to the corresponding parameters below:**

| | Slotting | Profiling |
|---|---|---|
| Axial (ap) | 5% of Dia. | 1xD |
| Radial (ae) | 1xD | 10% of Dia. |




**These recommendations are suggested for use primarily in graphite cutting applications. Rigid work holding, machine stability and part integrity are critical!**

**NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.**

# GARR TOOL Reaming Guide

| ISO Material | | HRC | SFM (Vc) | CHIPLOAD PER TOOTH (Fz) | | | |
|---|---|---|---|---|---|---|---|
| | | | | .0590" - .1250" | .1251" - .2500" | .2501" - .3750" | .3751" - .5020" |
| S | **COBALT BASE ALLOYS** | | | | | | |
| | Haynes 25/188, Stellite 21, Cobalt Chrome | < 40<br>> 40 | 80 - 120<br>60 - 80 | .0003" - .0008" | .0005" - .0010" | .0008" - .0012" | .0010" - .0015" |
| | **NICKEL BASE ALLOYS** | | | | | | |
| | Inconel-625/718, Waspaloy, Invar, Rene, Hastelloy, Monel | < 40<br>> 40 | 100 - 125<br>80 - 110 | .0003" - .0008" | .0005" - .0010" | .0008" - .0012" | .0010" - .0015" |
| | **IRON BASE ALLOYS** | | | | | | |
| | A286, Discaloy, Haynes 556, Carpenter 22, Greek Ascolloy | < 40<br>> 40 | 150 - 175<br>120 - 150 | .0004" - .0009" | .0006" - .0012" | .0009" - .0013" | .0010" - .0017" |
| | **TITANIUM ALLOYS** | | | | | | |
| | Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si | | 120 - 150 | .0004" - .0009" | .0006" - .0012" | .0009" - .0013" | .0010" - .0017" |
| | 5553 / Beta Titanium | | 90 - 110 | .0004" - .0007" | .0006" - .0010" | .0009" - .0011" | .0010" - .0015" |
| M | **STAINLESS STEELS** | | | | | | |
| | 13/8, 15/5, 17-4, pH Types | < 40<br>> 40 | 100 - 125<br>80 - 110 | .0004" - .0009" | .0006" - .0012" | .0009" - .0013" | .0010" - .0017" |
| | 300 Series, 304L, Nitronic 50, Duplex, Super-Austenitic | < 40<br>> 40 | 100 - 125<br>80 - 110 | .0004" - .0009" | .0006" - .0012" | .0009" - .0013" | .0010" - .0017" |
| | 400 Series - 403, 405, 420, 455 | < 40<br>> 40 | 100 - 125<br>80 - 110 | .0004" - .0009" | .0006" - .0012" | .0009" - .0013" | .0010" - .0017" |
| P | **HIGH STRENGTH TOOL STEELS** | | | | | | |
| | A2, D2, P20, H13, S7, O1 | < 40<br>> 40 | 100 - 125<br>80 - 110 | .0003" - .0008" | .0005" - .0010" | .0008" - .0012" | .0010" - .0015" |
| | **MEDIUM ALLOY TOOL STEELS** | | | | | | |
| | 4140, 4340, 52100, 6150, 8620 | < 40<br>> 40 | 100 - 125<br>80 - 110 | .0004" - .0009" | .0006" - .0012" | .0009" - .0013" | .0010" - .0017" |
| | **CARBON STEELS** | | | | | | |
| | 1000's - 1018, 1020, 12L14 | < 40 | 100 - 125 | .0004" - .0009" | .0006" - .0012" | .0009" - .0013" | .0010" - .0017" |
| K | **CAST MATERIAL** | | | | | | |
| | Ductile Iron | | 150 - 225 | .0005" - .0010" | .0007" - .0012" | .0010" - .0015" | .0010" - .0018" |
| | Gray Iron | | 125 - 200 | .0005" - .0010" | .0007" - .0012" | .0010" - .0015" | .0010" - .0018" |
| N | **NON-FERROUS** | | | | | | |
| | Aluminum (6061, 7075) | | 225 | .0005" - .0010" | .0007" - .0012" | .0010" - .0015" | .0010" - .0018" |
| | Magnesium | | 225 | .0005" - .0010" | .0007" - .0012" | .0010" - .0015" | .0010" - .0018" |
| | Copper | | 225 | .0005" - .0010" | .0007" - .0012" | .0010" - .0015" | .0010" - .0018" |
| | Brass, Bronze | | 125 - 200 | .0005" - .0010" | .0007" - .0012" | .0010" - .0015" | .0010" - .0018" |
| O | **COMPOSITE (non-ISO)** | | | | | | |
| | Glass Epoxy, Fiberglass, Plastics, Graphite, G10 | | 150 | .0003" - .0008" | .0005" - .0010" | .0008" - .0012" | .0010" - .0015" |

**NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.**

| ISO Material | | HRC | M/Min. (Vc) | CHIPLOAD PER TOOTH (Fz) | | | |
|---|---|---|---|---|---|---|---|
| | | | | 1.50 - 3.00mm | 3.01 - 6.00mm | 6.01 - 9.00mm | 9.01 - 13.00mm |
| S | **COBALT BASE ALLOYS** | | | | | | |
| | Haynes 25/188, Stellite 21, Cobalt Chrome | < 40<br>> 40 | 25 - 40<br>15 - 25 | .008 - .020 | .013 - .025 | .020 - .030 | .025 - .040 |
| | **NICKEL BASE ALLOYS** | | | | | | |
| | Inconel-625/718, Waspaloy, Invar, Rene, Hastelloy, Monel | < 40<br>> 40 | 30 - 40<br>25 - 35 | .008 - .020 | .013 - .025 | .020 - .030 | .025 - .040 |
| | **IRON BASE ALLOYS** | | | | | | |
| | A286, Discaloy, Haynes 556, Carpenter 22, Greek Ascolloy | < 40<br>> 40 | 45 - 50<br>35 - 45 | .010 - .023 | .015 - .030 | .023 - .035 | .025 - .045 |
| | **TITANIUM ALLOYS** | | | | | | |
| | Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si | | 40 - 45 | .010 - .023 | .015 - .030 | .023 - .035 | .025 - .045 |
| | 5553 / Beta Titanium | | 30 - 35 | .010 - .020 | .015 - .025 | .023 - .030 | .025 - .040 |
| M | **STAINLESS STEELS** | | | | | | |
| | 13/8, 15/5, 17-4, pH Types | < 40<br>> 40 | 30 - 40<br>25 - 35 | .010 - .023 | .015 - .030 | .023 - .035 | .025 - .045 |
| | 300 Series, 304L, Nitronic 50, Duplex, Super-Austenitic | < 40<br>> 40 | 30 - 40<br>25 - 35 | .010 - .023 | .015 - .030 | .023 - .035 | .025 - .045 |
| | 400 Series - 403, 405, 420, 455 | < 40<br>> 40 | 30 - 40<br>25 - 35 | .010 - .023 | .015 - .030 | .023 - .035 | .025 - .045 |
| P | **HIGH STRENGTH TOOL STEELS** | | | | | | |
| | A2, D2, P20, H13, S7, O1 | < 40<br>> 40 | 30 - 40<br>25 - 35 | .008 - .020 | .013 - .025 | .020 - .030 | .025 - .040 |
| | **MEDIUM ALLOY TOOL STEELS** | | | | | | |
| | 4140, 4340, 52100, 6150, 8620 | < 40<br>> 40 | 30 - 40<br>25 - 35 | .010 - .023 | .015 - .030 | .023 - .035 | .025 - .045 |
| | **CARBON STEELS** | | | | | | |
| | 1000's - 1018, 1020, 12L14 | < 40 | 30 - 40 | .010 - .023 | .015 - .030 | .023 - .035 | .025 - .045 |
| K | **CAST MATERIAL** | | | | | | |
| | Ductile Iron | | 45 - 70 | .013 - .025 | .018 - .025 | .025 - .040 | .025 - .050 |
| | Gray Iron | | 35 - 70 | .013 - .025 | .018 - .025 | .025 - .040 | .025 - .050 |
| N | **NON-FERROUS** | | | | | | |
| | Aluminum (6061, 7075) | | 70 | .013 - .025 | .018 - .025 | .025 - .040 | .025 - .050 |
| | Magnesium | | 70 | .013 - .025 | .018 - .025 | .025 - .040 | .025 - .050 |
| | Copper | | 70 | .013 - .025 | .018 - .025 | .025 - .040 | .025 - .050 |
| | Brass, Bronze | | 40 - 60 | .013 - .025 | .018 - .025 | .025 - .040 | .025 - .050 |
| O | **COMPOSITE (non-ISO)** | | | | | | |
| | Glass Epoxy, Fiberglass, Plastics, Graphite, G10 | | 40 - 45 | .008 - .020 | .013 - .025 | .020 - .030 | .025 - .040 |

**NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.**

# GARR TOOL Milling Guide for Drill Mills

## * Chamfering *

| ISO Material | | HRC | SFM (Vc) | CHIPLOAD PER TOOTH (Fz) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 154M, 154MA 152M, 152MA | 1/8" | 3/16" | 1/4" | 5/16" | 3/8" | 1/2" | 5/8" | 3/4" |
| S | **COBALT BASE ALLOYS** | | | | | | | | | | |
| | Haynes 25/188, Stellite 21, Cobalt Chrome | < 40<br>> 40 | 60 - 90<br>50 - 80 | .0004" - .0008"<br>.0003" - .0006" | .0004" - .0008"<br>.0003" - .0006" | .0005" - .0010"<br>.0003" - .0008" | .0008" - .0015"<br>.0005" - .0010" | .0010" - .0018"<br>.0008" - .0015" | .0015" - .0030"<br>.0010" - .0015" | .0020" - .0030"<br>.0015" - .0025" | .0025" - .0035"<br>.0015" - .0020" |
| | **NICKEL BASE ALLOYS** | | | | | | | | | | |
| | Inconel-625/718, Waspaloy, Invar, Rene, Hastelloy, Monel | < 40<br>> 40 | 55 - 90<br>45 - 80 | .0004" - .0008"<br>.0003" - .0006" | .0004" - .0008"<br>.0003" - .0006" | .0005" - .0010"<br>.0003" - .0008" | .0008" - .0015"<br>.0005" - .0010" | .0010" - .0018"<br>.0008" - .0015" | .0015" - .0030"<br>.0010" - .0015" | .0020" - .0030"<br>.0015" - .0025" | .0025" - .0035"<br>.0015" - .0020" |
| | **IRON BASE ALLOYS** | | | | | | | | | | |
| | A286, Discaloy, Haynes 556, Carpenter 22, Greek Ascolloy | < 40<br>> 40 | 55 - 90<br>50 - 80 | .0004" - .0008"<br>.0003" - .0006" | .0004" - .0008"<br>.0003" - .0006" | .0005" - .0010"<br>.0003" - .0008" | .0008" - .0015"<br>.0005" - .0010" | .0010" - .0018"<br>.0008" - .0015" | .0015" - .0030"<br>.0010" - .0015" | .0020" - .0030"<br>.0015" - .0025" | .0025" - .0035"<br>.0015" - .0020" |
| | **TITANIUM ALLOYS** | | | | | | | | | | |
| | Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si | | 100 - 150 | .0003" - .0008" | .0005" - .0012" | .0005" - .0012" | .0008" - .0015" | .0010" - .0015" | .0013" - .0020" | .0018" - .0025" | .0025" - .0035" |
| | 5553 / Beta Titanium | | 90 - 120 | .0003" - .0008" | .0004" - .0010" | .0004" - .0010" | .0005" - .0012" | .0008" - .0014" | .0010" - .0016" | .0010" - .0020" | .0015" - .0025" |
| M | **STAINLESS STEELS** | | | | | | | | | | |
| | 13/8, 15/5, 17-4, pH Types | < 40<br>> 40 | 100 - 150<br>80 - 100 | .0003" - .0006"<br>.0002" - .0004" | .0003" - .0007"<br>.0002" - .0006" | .0006" - .0009"<br>.0003" - .0007" | .0008" - .0012"<br>.0004" - .0008" | .0013" - .0018"<br>.0007" - .0012" | .0010" - .0020"<br>.0008" - .0015" | .0012" - .0025"<br>.0010" - .0016" | .0012" - .0020"<br>.0013" - .0017" |
| | 300 Series, 304L, Nitronic 50, Duplex, Super-Austenitic | < 40<br>> 40 | 150 - 225<br>125 - 220 | .0002" - .0006"<br>.0003" - .0005" | .0005" - .0008"<br>.0003" - .0007" | .0008" - .0015"<br>.0005" - .0010" | .0010" - .0018"<br>.0008" - .0012" | .0010" - .0018"<br>.0009" - .0015" | .0015" - .0025"<br>.0013" - .0018" | .0018" - .0028"<br>.0013" - .0018" | .0022" - .0032"<br>.0017" - .0025" |
| | 400 Series - 403, 405, 420, 455 | < 40<br>> 40 | 150 - 200<br>100 - 150 | .0007" - .0010"<br>.0004" - .0008" | .0009" - .0015"<br>.0006" - .0010" | .0009" - .0014"<br>.0007" - .0011" | .0011" - .0015"<br>.0008" - .0012" | .0013" - .0018"<br>.0009" - .0015" | .0015" - .0025"<br>.0012" - .0020" | .0020" - .0035"<br>.0018" - .0030" | .0030" - .0046"<br>.0024" - .0042" |
| P | **HIGH STRENGTH TOOL STEELS** | | | | | | | | | | |
| | A2, D2, P20, H13, S7, O1 | < 40<br>> 40 | 150 - 200<br>100 - 150 | .0003" - .0008"<br>.0003" - .0005" | .0005" - .0010"<br>.0003" - .0008" | .0010" - .0015"<br>.0005" - .0010" | .0012" - .0020"<br>.0005" - .0010" | .0012" - .0020"<br>.0005" - .0010" | .0014" - .0024"<br>.0010" - .0015" | .0018" - .0026"<br>.0012" - .0018" | .0020" - .0028"<br>.0015" - .0022" |
| | **MEDIUM ALLOY TOOL STEELS** | | | | | | | | | | |
| | 4140, 4340, 52100, 6150, 8620 | < 40<br>> 40 | 150 - 200<br>100 - 150 | .0003" - .0008"<br>.0003" - .0005" | .0005" - .0010"<br>.0003" - .0008" | .0010" - .0015"<br>.0005" - .0010" | .0012" - .0020"<br>.0005" - .0010" | .0012" - .0020"<br>.0005" - .0010" | .0014" - .0024"<br>.0010" - .0015" | .0018" - .0026"<br>.0012" - .0018" | .0020" - .0028"<br>.0015" - .0022" |
| | **CARBON STEELS** | | | | | | | | | | |
| | 1000's - 1018, 1020, 12L14 | < 40 | 150 - 200 | .0003" - .0008" | .0005" - .0010" | .0010" - .0015" | .0012" - .0020" | .0012" - .0020" | .0014" - .0024" | .0018" - .0026" | .0020" - .0028" |
| K | **CAST MATERIAL** | | | | | | | | | | |
| | Ductile Iron | | 175 - 225 | .0008" - .0012" | .0010" - .0015" | .0015" - .0025" | .0015" - .0025" | .0020" - .0030" | .0025" - .0035" | .0035" - .0045" | .0035" - .0045" |
| | Gray Iron | | 175 - 225 | .0008" - .0012" | .0010" - .0015" | .0015" - .0025" | .0015" - .0025" | .0020" - .0030" | .0025" - .0035" | .0035" - .0045" | .0035" - .0045" |
| N | **NON-FERROUS** | | | | | | | | | | |
| | Aluminum (6061, 7075) | | 300 - 500 | .0006" - .0010" | .0008" - .0014" | .0012" - .0020" | .0014" - .0028" | .0020" - .0030" | .0035" - .0048" | .0050" - .0060" | .0058" - .0070" |
| | Magnesium | | 300 - 500 | .0006" - .0010" | .0008" - .0014" | .0012" - .0020" | .0014" - .0028" | .0020" - .0030" | .0035" - .0048" | .0050" - .0060" | .0058" - .0070" |
| | Copper | | 250 - 450 | .0006" - .0010" | .0008" - .0014" | .0012" - .0020" | .0014" - .0028" | .0020" - .0030" | .0035" - .0048" | .0050" - .0060" | .0058" - .0070" |
| | Brass, Bronze | | 200 - 400 | .0006" - .0010" | .0008" - .0014" | .0012" - .0020" | .0014" - .0028" | .0020" - .0030" | .0035" - .0048" | .0050" - .0060" | .0058" - .0070" |
| O | **COMPOSITE (non-ISO)** | | | | | | | | | | |
| | Glass Epoxy, Fiberglass, Plastics | | 200 - 400 | .0006" - .0010" | .0008" - .0014" | .0012" - .0020" | .0014" - .0028" | .0020" - .0030" | .0035" - .0048" | .0050" - .0060" | .0058" - .0070" |

**NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.**

# * Chamfering *

| | ISO Material | HRC | M/Min. (Vc) | CHIPLOAD PER TOOTH (Fz) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 154M, 154MA 152M, 152MA | 3.0mm | 4.0mm | 5.0mm | 6.0mm | 8.0mm | 10.0mm | 12.0mm | 16.00mm | 20.0mm |
| S | **COBALT BASE ALLOYS** | | | | | | | | | | | |
| | Haynes 25/188, Stellite 21, Cobalt Chrome | < 40<br>> 40 | 24 - 35<br>20 - 31 | .010 - .020<br>.008 - .015 | .010 - .020<br>.008 - .015 | .010 - .020<br>.008 - .015 | .013 - .025<br>.008 - .020 | .020 - .038<br>.013 - .025 | .025 - .046<br>.020 - .038 | .038 - .076<br>.025 - .038 | .051 - .076<br>.038 - .064 | .064 - .089<br>.038 - .051 |
| | **NICKEL BASE ALLOYS** | | | | | | | | | | | |
| | Inconel-625/718, Waspaloy, Invar, Rene, Hastelloy, Monel | < 40<br>> 40 | 22 - 35<br>18 - 31 | .010 - .020<br>.008 - .015 | .010 - .020<br>.008 - .015 | .010 - .020<br>.008 - .015 | .013 - .025<br>.008 - .020 | .020 - .038<br>.013 - .025 | .025 - .046<br>.020 - .038 | .038 - .076<br>.025 - .038 | .051 - .076<br>.038 - .064 | .064 - .089<br>.038 - .051 |
| | **IRON BASE ALLOYS** | | | | | | | | | | | |
| | A286, Discaloy, Haynes 556, Carpenter 22, Greek Ascolloy | < 40<br>> 40 | 22 - 35<br>20 - 31 | .010 - .020<br>.008 - .015 | .010 - .020<br>.008 - .015 | .010 - .020<br>.008 - .015 | .013 - .025<br>.008 - .020 | .020 - .038<br>.013 - .025 | .025 - .046<br>.020 - .038 | .038 - .076<br>.025 - .038 | .051 - .076<br>.038 - .064 | .064 - .089<br>.038 - .051 |
| | **TITANIUM ALLOYS** | | | | | | | | | | | |
| | Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si | | 20 - 31 | .008 - .020 | .008 - .020 | .013 - .030 | .013 - .030 | .020 - .038 | .025 - .038 | .033 - .051 | .046 - .064 | .051 - .076 |
| | 5553 / Beta Titanium | | 35 - 47 | .008 - .020 | .008 - .020 | .010 - .025 | .010 - .025 | .013 - .030 | .020 - .036 | .025 - .041 | .025 - .051 | .038 - .064 |
| M | **STAINLESS STEELS** | | | | | | | | | | | |
| | 13/8, 15/5, 17-4, pH Types | < 40<br>> 40 | 39 - 59<br>31 - 39 | .008 - .015<br>.005 - .010 | .008 - .015<br>.005 - .010 | .008 - .018<br>.005 - .015 | .015 - .023<br>.008 - .018 | .020 - .030<br>.010 - .020 | .033 - .046<br>.018 - .030 | .025 - .051<br>.020 - .038 | .030 - .064<br>.025 - .041 | .030 - .051<br>.033 - .043 |
| | 300 Series, 304L, Nitronic 50, Duplex, Super-Austenitic | < 40<br>> 40 | 59 - 89<br>49 - 87 | .005 - .015<br>.008 - .013 | .005 - .015<br>.008 - .013 | .013 - .020<br>.008 - .018 | .020 - .038<br>.013 - .025 | .038 - .046<br>.020 - .030 | .025 - .046<br>.018 - .030 | .038 - .064<br>.033 - .046 | .046 - .071<br>.038 - .058 | .056 - .081<br>.043 - .064 |
| | 400 Series - 403, 405, 420, 455 | < 40<br>> 40 | 59 - 79<br>39 - 59 | .018 - .025<br>.010 - .020 | .018 - .025<br>.010 - .020 | .023 - .038<br>.015 - .025 | .023 - .036<br>.018 - .028 | .028 - .038<br>.020 - .030 | .033 - .046<br>.023 - .038 | .038 - .064<br>.030 - .051 | .051 - .089<br>.046 - .076 | .056 - .102<br>.051 - .089 |
| P | **HIGH STRENGTH TOOL STEELS** | | | | | | | | | | | |
| | A2, D2, P20, H13, S7, O1 | < 40<br>> 40 | 59 - 79<br>39 - 59 | .008 - .020<br>.008 - .013 | .008 - .020<br>.008 - .013 | .013 - .025<br>.008 - .020 | .025 - .038<br>.013 - .025 | .030 - .051<br>.013 - .025 | .030 - .051<br>.013 - .025 | .036 - .061<br>.025 - .038 | .046 - .066<br>.030 - .046 | .051 - .071<br>.036 - .051 |
| | **MEDIUM ALLOY TOOL STEELS** | | | | | | | | | | | |
| | 4140, 4340, 52100, 6150, 8620 | < 40<br>> 40 | 59 - 79<br>39 - 59 | .008 - .020<br>.008 - .013 | .008 - .020<br>.008 - .013 | .013 - .025<br>.008 - .020 | .025 - .038<br>.013 - .025 | .030 - .051<br>.013 - .025 | .030 - .051<br>.013 - .025 | .036 - .061<br>.025 - .038 | .046 - .066<br>.030 - .046 | .051 - .071<br>.036 - .051 |
| | **CARBON STEELS** | | | | | | | | | | | |
| | 1000's - 1018, 1020, 12L14 | < 40 | 59 - 79 | .008 - .020 | .008 - .020 | .013 - .025 | .025 - .038 | .030 - .051 | .030 - .051 | .036 - .061 | .046 - .066 | .051 - .071 |
| K | **CAST MATERIAL** | | | | | | | | | | | |
| | Ductile Iron | | 69 - 89 | .020 - .031 | .023 - .035 | .025 - .038 | .038 - .064 | .038 - .064 | .051 - .076 | .064 - .089 | .089 - .114 | .089 - .114 |
| | Gray Iron | | 69 - 89 | .020 - .031 | .023 - .035 | .025 - .038 | .038 - .064 | .038 - .064 | .051 - .076 | .064 - .089 | .089 - .114 | .089 - .114 |
| N | **NON-FERROUS** | | | | | | | | | | | |
| | Aluminum (6061, 7075) | | 118 - 197 | .015 - .025 | .015 - .025 | .020 - .036 | .030 - .051 | .036 - .071 | .051 - .076 | .089 - .122 | .127 - .152 | .147 - .178 |
| | Magnesium | | 118 - 197 | .015 - .025 | .015 - .025 | .020 - .036 | .030 - .051 | .036 - .071 | .051 - .076 | .089 - .122 | .127 - .152 | .147 - .178 |
| | Copper | | 98 - 177 | .015 - .025 | .015 - .025 | .020 - .036 | .030 - .051 | .036 - .071 | .051 - .076 | .089 - .122 | .127 - .152 | .147 - .178 |
| | Brass, Bronze | | 98 - 157 | .015 - .025 | .015 - .025 | .020 - .036 | .030 - .051 | .036 - .071 | .051 - .076 | .089 - .122 | .127 - .152 | .147 - .178 |
| O | **COMPOSITE (non-ISO)** | | | | | | | | | | | |
| | Glass Epoxy, Fiberglass, Plastics | | 79 - 157 | .015 - .025 | .015 - .025 | .020 - .036 | .030 - .051 | .036 - .071 | .051 - .076 | .089 - .122 | .127 - .152 | .147 - .178 |

**NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.**

# GARR TOOL Drilling Guide for Drill Mills

## * Through Hole *

| | ISO Material | HRC | SFM (Vc) | CHIPLOAD PER TOOTH (Fz) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 152DA | 1/8" | 3/16" | 1/4" | 5/16" | 3/8" | 1/2" | 5/8" | 3/4" |
| S | **COBALT BASE ALLOYS** | | | | | | | | | | |
| | Haynes 25/188, Stellite 21, Cobalt Chrome | < 40<br>> 40 | 60 - 90<br>50 - 80 | .0004" - .0008"<br>.0003" - .0006" | .0004" - .0008"<br>.0003" - .0006" | .0005" - .0010"<br>.0003" - .0008" | .0008" - .0015"<br>.0005" - .0010" | .0010" - .0018"<br>.0008" - .0015" | .0015" - .0030"<br>.0010" - .0015" | .0020" - .0030"<br>.0015" - .0025" | .0025" - .0035"<br>.0015" - .0020" |
| | **NICKEL BASE ALLOYS** | | | | | | | | | | |
| | Inconel-625/718, Waspaloy, Invar, Rene, Hastelloy, Monel | < 40<br>> 40 | 55 - 90<br>45 - 80 | .0004" - .0008"<br>.0003" - .0006" | .0004" - .0008"<br>.0003" - .0006" | .0005" - .0010"<br>.0003" - .0008" | .0008" - .0015"<br>.0005" - .0010" | .0010" - .0018"<br>.0008" - .0015" | .0015" - .0030"<br>.0010" - .0015" | .0020" - .0030"<br>.0015" - .0025" | .0025" - .0035"<br>.0015" - .0020" |
| | **IRON BASE ALLOYS** | | | | | | | | | | |
| | A286, Discaloy, Haynes 556, Carpenter 22, Greek Ascolloy | < 40<br>> 40 | 55 - 90<br>50 - 80 | .0004" - .0008"<br>.0003" - .0006" | .0004" - .0008"<br>.0003" - .0006" | .0005" - .0010"<br>.0003" - .0008" | .0008" - .0015"<br>.0005" - .0010" | .0010" - .0018"<br>.0008" - .0015" | .0015" - .0030"<br>.0010" - .0015" | .0020" - .0030"<br>.0015" - .0025" | .0025" - .0035"<br>.0015" - .0020" |
| | **TITANIUM ALLOYS** | | | | | | | | | | |
| | Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si | | 100 - 150 | .0003" - .0008" | .0005" - .0012" | .0005" - .0012" | .0008" - .0015" | .0010" - .0015" | .0013" - .0020" | .0018" - .0025" | .0025" - .0035" |
| | 5553 / Beta Titanium | | 90 - 120 | .0003" - .0008" | .0004" - .0010" | .0004" - .0010" | .0005" - .0012" | .0008" - .0014" | .0010" - .0016" | .0010" - .0020" | .0015" - .0025" |
| M | **STAINLESS STEELS** | | | | | | | | | | |
| | 13/8, 15/5, 17-4, pH Types | < 40<br>> 40 | 100 - 150<br>80 - 100 | .0003" - .0006"<br>.0002" - .0004" | .0003" - .0007"<br>.0002" - .0006" | .0006" - .0009"<br>.0003" - .0007" | .0008" - .0012"<br>.0004" - .0008" | .0013" - .0018"<br>.0007" - .0012" | .0010" - .0020"<br>.0008" - .0015" | .0012" - .0025"<br>.0010" - .0016" | .0012" - .0020"<br>.0013" - .0017" |
| | 300 Series, 304L, Nitronic 50, Duplex, Super-Austenitic | < 40<br>> 40 | 150 - 225<br>125 - 220 | .0002" - .0006"<br>.0003" - .0005" | .0005" - .0008"<br>.0003" - .0007" | .0008" - .0015"<br>.0005" - .0010" | .0010" - .0018"<br>.0008" - .0012" | .0010" - .0018"<br>.0009" - .0015" | .0015" - .0025"<br>.0013" - .0018" | .0018" - .0028"<br>.0013" - .0018" | .0022" - .0032"<br>.0017" - .0025" |
| | 400 Series - 403, 405, 420, 455 | < 40<br>> 40 | 150 - 200<br>100 - 150 | .0007" - .0010"<br>.0004" - .0008" | .0009" - .0015"<br>.0006" - .0010" | .0009" - .0014"<br>.0007" - .0011" | .0011" - .0015"<br>.0008" - .0012" | .0013" - .0018"<br>.0009" - .0015" | .0015" - .0025"<br>.0012" - .0020" | .0020" - .0035"<br>.0018" - .0030" | .0030" - .0046"<br>.0024" - .0042" |
| P | **HIGH STRENGTH TOOL STEELS** | | | | | | | | | | |
| | A2, D2, P20, H13, S7, O1 | < 40<br>> 40 | 150 - 200<br>100 - 150 | .0003" - .0008"<br>.0003" - .0005" | .0005" - .0010"<br>.0003" - .0008" | .0010" - .0015"<br>.0005" - .0010" | .0012" - .0020"<br>.0005" - .0010" | .0012" - .0020"<br>.0005" - .0010" | .0014" - .0024"<br>.0010" - .0015" | .0018" - .0026"<br>.0012" - .0018" | .0020" - .0028"<br>.0015" - .0022" |
| | **MEDIUM ALLOY TOOL STEELS** | | | | | | | | | | |
| | 4140, 4340, 52100, 6150, 8620 | < 40<br>> 40 | 150 - 200<br>100 - 150 | .0003" - .0008"<br>.0003" - .0005" | .0005" - .0010"<br>.0003" - .0008" | .0010" - .0015"<br>.0005" - .0010" | .0012" - .0020"<br>.0005" - .0010" | .0012" - .0020"<br>.0005" - .0010" | .0014" - .0024"<br>.0010" - .0015" | .0018" - .0026"<br>.0012" - .0018" | .0020" - .0028"<br>.0015" - .0022" |
| | **CARBON STEELS** | | | | | | | | | | |
| | 1000's - 1018, 1020, 12L14 | < 40 | 150 - 200 | .0003" - .0008" | .0005" - .0010" | .0010" - .0015" | .0012" - .0020" | .0012" - .0020" | .0014" - .0024" | .0018" - .0026" | .0020" - .0028" |
| K | **CAST MATERIAL** | | | | | | | | | | |
| | Ductile Iron | | 175 - 225 | .0008" - .0012" | .0010" - .0015" | .0015" - .0025" | .0015" - .0025" | .0020" - .0030" | .0025" - .0035" | .0035" - .0045" | .0035" - .0045" |
| | Gray Iron | | 175 - 225 | .0008" - .0012" | .0010" - .0015" | .0015" - .0025" | .0015" - .0025" | .0020" - .0030" | .0025" - .0035" | .0035" - .0045" | .0035" - .0045" |
| N | **NON-FERROUS** | | | | | | | | | | |
| | Aluminum (6061, 7075) | | 300 - 500 | .0006" - .0010" | .0008" - .0014" | .0012" - .0020" | .0014" - .0028" | .0020" - .0030" | .0035" - .0048" | .0050" - .0060" | .0058" - .0070" |
| | Magnesium | | 300 - 500 | .0006" - .0010" | .0008" - .0014" | .0012" - .0020" | .0014" - .0028" | .0020" - .0030" | .0035" - .0048" | .0050" - .0060" | .0058" - .0070" |
| | Copper | | 250 - 450 | .0006" - .0010" | .0008" - .0014" | .0012" - .0020" | .0014" - .0028" | .0020" - .0030" | .0035" - .0048" | .0050" - .0060" | .0058" - .0070" |
| | Brass, Bronze | | 200 - 400 | .0006" - .0010" | .0008" - .0014" | .0012" - .0020" | .0014" - .0028" | .0020" - .0030" | .0035" - .0048" | .0050" - .0060" | .0058" - .0070" |
| O | **COMPOSITE (non-ISO)** | | | | | | | | | | |
| | Glass Epoxy, Fiberglass, Plastics | | 200 - 400 | .0006" - .0010" | .0008" - .0014" | .0012" - .0020" | .0014" - .0028" | .0020" - .0030" | .0035" - .0048" | .0050" - .0060" | .0058" - .0070" |

**NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.**

# * Through Hole *

| | ISO Material | HRC | M/Min. (Vc) | CHIPLOAD PER TOOTH (Fz) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 152DA | 3.0mm | 4.0mm | 5.0mm | 6.0mm | 8.0mm | 10.0mm | 12.0mm | 16.00mm | 20.0mm |
| S | **COBALT BASE ALLOYS** | | | | | | | | | | | |
| | Haynes 25/188, Stellite 21, Cobalt Chrome | < 40<br>> 40 | 24 - 35<br>20 - 31 | .010 - .020<br>.008 - .015 | .010 - .020<br>.008 - .015 | .010 - .020<br>.008 - .015 | .013 - .025<br>.008 - .020 | .020 - .038<br>.013 - .025 | .025 - .046<br>.020 - .038 | .038 - .076<br>.025 - .038 | .051 - .076<br>.038 - .064 | .064 - .089<br>.038 - .051 |
| | **NICKEL BASE ALLOYS** | | | | | | | | | | | |
| | Inconel-625/718, Waspaloy, Invar, Rene, Hastelloy, Monel | < 40<br>> 40 | 22 - 35<br>18 - 31 | .010 - .020<br>.008 - .015 | .010 - .020<br>.008 - .015 | .010 - .020<br>.008 - .015 | .013 - .025<br>.008 - .020 | .020 - .038<br>.013 - .025 | .025 - .046<br>.020 - .038 | .038 - .076<br>.025 - .038 | .051 - .076<br>.038 - .064 | .064 - .089<br>.038 - .051 |
| | **IRON BASE ALLOYS** | | | | | | | | | | | |
| | A286, Discaloy, Haynes 556, Carpenter 22, Greek Ascolloy | < 40<br>> 40 | 22 - 35<br>20 - 31 | .010 - .020<br>.008 - .015 | .010 - .020<br>.008 - .015 | .010 - .020<br>.008 - .015 | .013 - .025<br>.008 - .020 | .020 - .038<br>.013 - .025 | .025 - .046<br>.020 - .038 | .038 - .076<br>.025 - .038 | .051 - .076<br>.038 - .064 | .064 - .089<br>.038 - .051 |
| | **TITANIUM ALLOYS** | | | | | | | | | | | |
| | Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si | | 20 - 31 | .008 - .020 | .008 - .020 | .013 - .030 | .013 - .030 | .020 - .038 | .025 - .038 | .033 - .051 | .046 - .064 | .051 - .076 |
| | 5553 / Beta Titanium | | 35 - 47 | .008 - .020 | .008 - .020 | .010 - .025 | .010 - .025 | .013 - .030 | .020 - .036 | .025 - .041 | .025 - .051 | .038 - .064 |
| M | **STAINLESS STEELS** | | | | | | | | | | | |
| | 13/8, 15/5, 17-4, pH Types | < 40<br>> 40 | 39 - 59<br>31 - 39 | .008 - .015<br>.005 - .010 | .008 - .015<br>.005 - .010 | .008 - .018<br>.005 - .015 | .015 - .023<br>.008 - .018 | .020 - .030<br>.010 - .020 | .033 - .046<br>.018 - .030 | .025 - .051<br>.020 - .038 | .030 - .064<br>.025 - .041 | .030 - .051<br>.033 - .043 |
| | 300 Series, 304L, Nitronic 50, Duplex, Super-Austenitic | < 40<br>> 40 | 59 - 89<br>49 - 87 | .005 - .015<br>.008 - .013 | .005 - .015<br>.008 - .013 | .013 - .020<br>.008 - .018 | .020 - .038<br>.013 - .025 | .038 - .046<br>.020 - .030 | .025 - .046<br>.018 - .030 | .038 - .064<br>.033 - .046 | .046 - .071<br>.038 - .058 | .056 - .081<br>.043 - .064 |
| | 400 Series - 403, 405, 420, 455 | < 40<br>> 40 | 59 - 79<br>39 - 59 | .018 - .025<br>.010 - .020 | .018 - .025<br>.010 - .020 | .023 - .038<br>.015 - .025 | .023 - .036<br>.018 - .028 | .028 - .038<br>.020 - .030 | .033 - .046<br>.023 - .038 | .038 - .064<br>.030 - .051 | .051 - .089<br>.046 - .076 | .056 - .102<br>.051 - .089 |
| P | **HIGH STRENGTH TOOL STEELS** | | | | | | | | | | | |
| | A2, D2, P20, H13, S7, O1 | < 40<br>> 40 | 59 - 79<br>39 - 59 | .008 - .020<br>.008 - .013 | .008 - .020<br>.008 - .013 | .013 - .025<br>.008 - .020 | .025 - .038<br>.013 - .025 | .030 - .051<br>.013 - .025 | .030 - .051<br>.013 - .025 | .036 - .061<br>.025 - .038 | .046 - .066<br>.030 - .046 | .051 - .071<br>.036 - .051 |
| | **MEDIUM ALLOY TOOL STEELS** | | | | | | | | | | | |
| | 4140, 4340, 52100, 6150, 8620 | < 40<br>> 40 | 59 - 79<br>39 - 59 | .008 - .020<br>.008 - .013 | .008 - .020<br>.008 - .013 | .013 - .025<br>.008 - .020 | .025 - .038<br>.013 - .025 | .030 - .051<br>.013 - .025 | .030 - .051<br>.013 - .025 | .036 - .061<br>.025 - .038 | .046 - .066<br>.030 - .046 | .051 - .071<br>.036 - .051 |
| | **CARBON STEELS** | | | | | | | | | | | |
| | 1000's - 1018, 1020, 12L14 | < 40 | 59 - 79 | .008 - .020 | .008 - .020 | .013 - .025 | .025 - .038 | .030 - .051 | .030 - .051 | .036 - .061 | .046 - .066 | .051 - .071 |
| K | **CAST MATERIAL** | | | | | | | | | | | |
| | Ductile Iron | | 69 - 89 | .020 - .031 | .023 - .035 | .025 - .038 | .038 - .064 | .038 - .064 | .051 - .076 | .064 - .089 | .089 - .114 | .089 - .114 |
| | Gray Iron | | 69 - 89 | .020 - .031 | .023 - .035 | .025 - .038 | .038 - .064 | .038 - .064 | .051 - .076 | .064 - .089 | .089 - .114 | .089 - .114 |
| N | **NON-FERROUS** | | | | | | | | | | | |
| | Aluminum (6061, 7075) | | 118 - 197 | .015 - .025 | .015 - .025 | .020 - .036 | .030 - .051 | .036 - .071 | .051 - .076 | .089 - .122 | .127 - .152 | .147 - .178 |
| | Magnesium | | 118 - 197 | .015 - .025 | .015 - .025 | .020 - .036 | .030 - .051 | .036 - .071 | .051 - .076 | .089 - .122 | .127 - .152 | .147 - .178 |
| | Copper | | 98 - 177 | .015 - .025 | .015 - .025 | .020 - .036 | .030 - .051 | .036 - .071 | .051 - .076 | .089 - .122 | .127 - .152 | .147 - .178 |
| | Brass, Bronze | | 98 - 157 | .015 - .025 | .015 - .025 | .020 - .036 | .030 - .051 | .036 - .071 | .051 - .076 | .089 - .122 | .127 - .152 | .147 - .178 |
| O | **COMPOSITE (non-ISO)** | | | | | | | | | | | |
| | Glass Epoxy, Fiberglass, Plastics | | 79 - 157 | .015 - .025 | .015 - .025 | .020 - .036 | .030 - .051 | .036 - .071 | .051 - .076 | .089 - .122 | .127 - .152 | .147 - .178 |

**NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.**

# GARR TOOL General Purpose Drilling Guide (Bright Finish)

| ISO Material | | HRC | SFM (by Series) | | | |
|---|---|---|---|---|---|---|
| | | | 1100 | 1200, 1205, 1520 | 1500, 1510 | 1600 |
| S | **COBALT BASE ALLOYS** | | | | | |
| | Haynes 25/188, Stellite 21, Cobalt Chrome | < 40<br>> 40 | -<br>- | 45 - 70<br>35 - 60 | 45 - 70<br>35 - 60 | 30 - 55<br>20 - 45 |
| | **NICKEL BASE ALLOYS** | | | | | |
| | Inconel-625/718, Waspaloy, Invar, Rene, Hastelloy, Monel | < 40<br>> 40 | -<br>- | 45 - 70<br>35 - 60 | 45 - 70<br>35 - 60 | 30 - 55<br>20 - 45 |
| | **IRON BASE ALLOYS** | | | | | |
| | A286, Discaloy, Haynes 556, Carpenter 22, Greek Ascolloy | < 40<br>> 40 | -<br>- | 45 - 70<br>35 - 60 | 45 - 70<br>35 - 60 | 30 - 55<br>20 - 45 |
| | **TITANIUM ALLOYS** | | | | | |
| | Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si | | - | 60 - 90 | 60 - 90 | 45 - 75 |
| | 5553 / Beta Titanium | | - | 45 - 65 | 45 - 65 | 30 - 50 |
| M | **STAINLESS STEELS** | | | | | |
| | 13/8, 15/5, 17-4, pH Types | < 40<br>> 40 | -<br>- | 50 - 80<br>35 - 60 | 50 - 80<br>35 - 60 | 35 - 65<br>20 - 45 |
| | 300 Series, 304L, Nitronic 50, Duplex, Super-Austenitic | < 40<br>> 40 | -<br>- | 45 - 75<br>35 - 55 | 45 - 75<br>35 - 55 | 30 - 60<br>20 - 40 |
| | 400 Series - 403, 405, 420, 455 | < 40<br>> 40 | -<br>- | 60 - 90<br>40 - 65 | 60 - 90<br>40 - 65 | 45 - 75<br>25 - 50 |
| P | **HIGH STRENGTH TOOL STEELS** | | | | | |
| | A2, D2, P20, H13, S7, O1 | < 40<br>> 40 | -<br>- | 80 - 130<br>60 - 110 | 80 - 130<br>60 - 110 | 65 - 110<br>45 - 90 |
| | Thompson Shaft, Armor Plate (Class 1) | > 50 | - | - | 45 - 80 | 30 - 60 |
| | **MEDIUM ALLOY TOOL STEELS** | | | | | |
| | 4140, 4340, 52100, 6150, 8620 | < 40<br>> 40 | -<br>- | 100 - 140<br>70 - 120 | 100 - 140<br>70 - 120 | 65 - 120<br>55 - 100 |
| | **CARBON STEELS** | | | | | |
| | 1000's - 1018, 1020, 12L14 | < 40 | - | 120 - 170 | 120 - 170 | 105 - 150 |
| K | **CAST MATERIAL** | | | | | |
| | Ductile Iron | | 70 - 140 | 120 - 170 | 120 - 170 | 105 - 150 |
| | Gray Iron | | 70 - 165 | 120 - 190 | 120 - 190 | 105 - 170 |
| N | **NON-FERROUS** | | | | | |
| | Aluminum (6061, 7075) | | - | 200 - 300 | - | 160 - 250 |
| | Magnesium | | - | 120 - 215 | - | 80 - 165 |
| | Copper | | - | 100 - 165 | - | 60 - 125 |
| | Brass, Bronze | | - | 120 - 215 | - | 80 - 165 |
| O | **COMPOSITE (non-ISO)** | | | | | |
| | Glass Epoxy, Fiberglass, Plastics, Graphite, G10 | | 140 | 100 - 230 | 105 - 230 | - |

**NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.**

# GARR TOOL General Purpose Drilling Guide (Bright Finish)

| ISO Material | | HRC | CHIPLOAD PER TOOTH (Fz) | | | | |
|---|---|---|---|---|---|---|---|
| | | | 1/16" - 1/8" | 1/8" - 1/4" | 1/4" - 3/8" | 3/8" - 1/2" | 1/2" - 5/8" |
| S | **COBALT BASE ALLOYS** | | | | | | |
| | Haynes 25/188, Stellite 21, Cobalt Chrome | < 40<br>> 40 | .0003" - .0008"<br>.0002" - .0006" | .0006" - .0011"<br>.0004" - .0009" | .0010" - .0017"<br>.0008" - .0015" | .0014" - .0024"<br>.0012" - .0022" | .0019" - .0032"<br>.0017" - .0030" |
| | **NICKEL BASE ALLOYS** | | | | | | |
| | Inconel-625/718, Waspaloy, Invar, Rene, Hastelloy, Monel | < 40<br>> 40 | .0003" - .0008"<br>.0002" - .0006" | .0006" - .0011"<br>.0004" - .0009" | .0010" - .0017"<br>.0008" - .0015" | .0014" - .0024"<br>.0012" - .0022" | .0019" - .0032"<br>.0017" - .0030" |
| | **IRON BASE ALLOYS** | | | | | | |
| | A286, Discaloy, Haynes 556, Carpenter 22, Greek Ascolloy | < 40<br>> 40 | .0003" - .0008"<br>.0002" - .0006" | .0006" - .0011"<br>.0004" - .0009" | .0010" - .0017"<br>.0008" - .0015" | .0014" - .0024"<br>.0012" - .0022" | .0019" - .0032"<br>.0017" - .0030" |
| | **TITANIUM ALLOYS** | | | | | | |
| | Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si | | .0004" - .0009" | .0008" - .0014" | .0012" - .0020" | .0016" - .0027" | .0021" - .0033" |
| | 5553 / Beta Titanium | | .0003" - .0007" | .0006" - .0011" | .0010" - .0017" | .0014" - .0024" | .0019" - .0030" |
| M | **STAINLESS STEELS** | | | | | | |
| | 13/8, 15/5, 17-4, pH Types | < 40<br>> 40 | .0004" - .0009"<br>.0003" - .0007" | .0007" - .0013"<br>.0006" - .0011" | .0011" - .0019"<br>.0010" - .0017" | .0015" - .0026"<br>.0014" - .0024" | .0020" - .0032"<br>.0019" - .0030" |
| | 300 Series, 304L, Nitronic 50, Duplex, Super-Austenitic | < 40<br>> 40 | .0004" - .0009"<br>.0003" - .0007" | .0007" - .0013"<br>.0006" - .0011" | .0011" - .0019"<br>.0010" - .0017" | .0015" - .0026"<br>.0014" - .0024" | .0020" - .0032"<br>.0019" - .0030" |
| | 400 Series - 403, 405, 420, 455 | < 40<br>> 40 | .0004" - .0009"<br>.0003" - .0007" | .0007" - .0013"<br>.0006" - .0011" | .0011" - .0019"<br>.0010" - .0017" | .0015" - .0026"<br>.0014" - .0024" | .0020" - .0032"<br>.0019" - .0030" |
| P | **HIGH STRENGTH TOOL STEELS** | | | | | | |
| | A2, D2, P20, H13, S7, O1 | < 40<br>> 40 | .0004" - .0009"<br>.0003" - .0007" | .0007" - .0013"<br>.0006" - .0011" | .0011" - .0019"<br>.0010" - .0017" | .0015" - .0026"<br>.0014" - .0024" | .0020" - .0032"<br>.0019" - .0030" |
| | Thompson Shaft, Armor Plate (Class 1) | > 50 | .0002" - .0006" | .0005" - .0009" | .0009" - .0015" | .0013" - .0022" | .0018" - .0028" |
| | **MEDIUM ALLOY TOOL STEELS** | | | | | | |
| | 4140, 4340, 52100, 6150, 8620 | < 40<br>> 40 | .0004" - .0009"<br>.0003" - .0007" | .0007" - .0013"<br>.0006" - .0011" | .0011" - .0019"<br>.0010" - .0017" | .0015" - .0026"<br>.0014" - .0024" | .0020" - .0032"<br>.0019" - .0030" |
| | **CARBON STEELS** | | | | | | |
| | 1000's - 1018, 1020, 12L14 | < 40 | .0005" - .0010" | .0008" - .0014" | .0012" - .0020" | .0016" - .0027" | .0021" - .0033" |
| K | **CAST MATERIAL** | | | | | | |
| | Ductile Iron | | .0005" - .0010" | .0008" - .0014" | .0012" - .0020" | .0016" - .0027" | .0021" - .0033" |
| | Gray Iron | | .0005" - .0010" | .0008" - .0014" | .0012" - .0020" | .0016" - .0027" | .0021" - .0033" |
| N | **NON-FERROUS** | | | | | | |
| | Aluminum (6061, 7075) | | .0006" - .0011" | .0009" - .0015" | .0013" - .0021" | .0017" - .0028" | .0022" - .0034" |
| | Magnesium | | .0005" - .0010" | .0009" - .0014" | .0013" - .0020" | .0017" - .0027" | .0022" - .0033" |
| | Copper | | .0004" - .0008" | .0008" - .0012" | .0012" - .0018" | .0016" - .0025" | .0021" - .0031" |
| | Brass, Bronze | | .0005" - .0009" | .0009" - .0013" | .0013" - .0019" | .0017" - .0026" | .0022" - .0032" |
| O | **COMPOSITE (non-ISO)** | | | | | | |
| | Glass Epoxy, Fiberglass, Plastics, Graphite, G10 | | .0003" - .0008" | .0007" - .0012" | .0011" - .0018" | .0015" - .0025" | .0020" - .0031" |

**NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.**

# GARR TOOL General Purpose Drilling Guide (Bright Finish)

| ISO Material | | HRC | M/Min. (by Series) | | | |
|---|---|---|---|---|---|---|
| | | | 1100 | 1200, 1205, 1520 | 1500, 1510 | 1600 |
| S | **COBALT BASE ALLOYS** | | | | | |
| | Haynes 25/188, Stellite 21, Cobalt Chrome | < 40<br>> 40 | -<br>- | 14 - 21<br>10 - 18 | 14 - 21<br>10 - 18 | 10 - 17<br>6 - 14 |
| | **NICKEL BASE ALLOYS** | | | | | |
| | Inconel-625/718, Waspaloy, Invar, Rene, Hastelloy, Monel | < 40<br>> 40 | -<br>- | 14 - 21<br>10 - 18 | 14 - 21<br>10 - 18 | 10 - 17<br>6 - 14 |
| | **IRON BASE ALLOYS** | | | | | |
| | A286, Discaloy, Haynes 556, Carpenter 22, Greek Ascolloy | < 40<br>> 40 | -<br>- | 14 - 21<br>10 - 18 | 14 - 21<br>10 - 18 | 10 - 17<br>6 - 14 |
| | **TITANIUM ALLOYS** | | | | | |
| | Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si | | - | 18 - 27 | 18 - 27 | 14 - 23 |
| | 5553 / Beta Titanium | | - | 14 - 20 | 14 - 20 | 10 - 15 |
| M | **STAINLESS STEELS** | | | | | |
| | 13/8, 15/5, 17-4, pH Types | < 40<br>> 40 | - | 15 - 25<br>10 - 18 | 15 - 25<br>10 - 18 | 10 - 20<br>6 - 14 |
| | 300 Series, 304L, Nitronic 50, Duplex, Super-Austenitic | < 40<br>> 40 | - | 14 - 23<br>10 - 17 | 14 - 23<br>10 - 17 | 10 - 18<br>6 - 12 |
| | 400 Series - 403, 405, 420, 455 | < 40<br>> 40 | - | 18 - 27<br>12 - 20 | 18 - 27<br>12 - 20 | 14 - 23<br>8 - 15 |
| P | **HIGH STRENGTH TOOL STEELS** | | | | | |
| | A2, D2, P20, H13, S7, O1 | < 40<br>> 40 | -<br>- | 25 - 40<br>18 - 34 | 25 - 40<br>18 - 34 | 20 - 34<br>14 - 27 |
| | Thompson Shaft, Armor Plate (Class 1) | > 50 | - | - | 14 - 25 | 10 - 20 |
| | **MEDIUM ALLOY TOOL STEELS** | | | | | |
| | 4140, 4340, 52100, 6150, 8620 | < 40<br>> 40 | - | 30 - 43<br>21 - 37 | 30 - 43<br>21 - 37 | 20 - 37<br>17 - 30 |
| | **CARBON STEELS** | | | | | |
| | 1000's - 1018, 1020, 12L14 | < 40 | - | 37 - 52 | 37 - 52 | 32 - 45 |
| K | **CAST MATERIAL** | | | | | |
| | Ductile Iron | | 21 - 43 | 37 - 52 | 37 - 52 | 32 - 45 |
| | Gray Iron | | 21 - 50 | 37 - 58 | 37 - 58 | 32 - 52 |
| N | **NON-FERROUS** | | | | | |
| | Aluminum (6061, 7075) | | - | 60 - 90 | - | 50 - 75 |
| | Magnesium | | - | 37 - 65 | - | 25 - 50 |
| | Copper | | - | 30 - 50 | - | 18 - 38 |
| | Brass, Bronze | | - | 37 - 65 | - | 25 - 50 |
| O | **COMPOSITE (non-ISO)** | | | | | |
| | Glass Epoxy, Fiberglass, Plastics, Graphite, G10 | | 43 | 30 - 70 | 32 - 70 | - |

**NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.**

# GARR TOOL General Purpose Drilling Guide (Bright Finish)

| ISO Material | | HRC | CHIPLOAD PER TOOTH (Fz) | | | | |
|---|---|---|---|---|---|---|---|
| | | | 2.0 - 3.0mm | 3.0 - 6.0mm | 6.0 - 10.0mm | 10.0 - 13.0mm | 13.0 - 16.0mm |
| S | **COBALT BASE ALLOYS** | | | | | | |
| | Haynes 25/188, Stellite 21, Cobalt Chrome | < 40<br>> 40 | .008 - .020<br>.005 - .015 | .015 - .028<br>.010 - .023 | .025 - .043<br>.020 - .038 | .036 - .061<br>.030 - .056 | .048 - .081<br>.043 - .076 |
| | **NICKEL BASE ALLOYS** | | | | | | |
| | Inconel-625/718, Waspaloy, Invar, Rene, Hastelloy, Monel | < 40<br>> 40 | .008 - .020<br>.005 - .015 | .015 - .028<br>.010 - .023 | .025 - .043<br>.020 - .038 | .036 - .061<br>.030 - .056 | .048 - .081<br>.043 - .076 |
| | **IRON BASE ALLOYS** | | | | | | |
| | A286, Discaloy, Haynes 556, Carpenter 22, Greek Ascolloy | < 40<br>> 40 | .008 - .020<br>.005 - .015 | .015 - .028<br>.010 - .023 | .025 - .043<br>.020 - .038 | .036 - .061<br>.030 - .056 | .048 - .081<br>.043 - .076 |
| | **TITANIUM ALLOYS** | | | | | | |
| | Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si | | .010 - .023 | .020 - .036 | .030 - .051 | .041 - .069 | .053 - .084 |
| | 5553 / Beta Titanium | | .008 - .018 | .015 - .028 | .025 - .043 | .036 - .061 | .048 - .076 |
| M | **STAINLESS STEELS** | | | | | | |
| | 13/8, 15/5, 17-4, pH Types | < 40<br>> 40 | .010 - .023<br>.008 - .018 | .018 - .033<br>.015 - .028 | .028 - .048<br>.025 - .043 | .038 - .066<br>.036 - .061 | .051 - .081<br>.048 - .076 |
| | 300 Series, 304L, Nitronic 50, Duplex, Super-Austenitic | < 40<br>> 40 | .010 - .023<br>.008 - .018 | .018 - .033<br>.015 - .028 | .028 - .048<br>.025 - .043 | .038 - .066<br>.036 - .061 | .051 - .081<br>.048 - .076 |
| | 400 Series - 403, 405, 420, 455 | < 40<br>> 40 | .010 - .023<br>.008 - .018 | .018 - .033<br>.015 - .028 | .028 - .048<br>.025 - .043 | .038 - .066<br>.036 - .061 | .051 - .081<br>.048 - .076 |
| P | **HIGH STRENGTH TOOL STEELS** | | | | | | |
| | A2, D2, P20, H13, S7, O1 | < 40<br>> 40 | .010 - .023<br>.008 - .018 | .018 - .033<br>.015 - .028 | .028 - .048<br>.025 - .043 | .038 - .066<br>.036 - .061 | .051 - .081<br>.048 - .076 |
| | Thompson Shaft, Armor Plate (Class 1) | > 50 | .005 - .015 | .013 - .023 | .023 - .038 | .033 - .056 | .046 - .071 |
| | **MEDIUM ALLOY TOOL STEELS** | | | | | | |
| | 4140, 4340, 52100, 6150, 8620 | < 40<br>> 40 | .010 - .023<br>.008 - .018 | .018 - .033<br>.015 - .028 | .028 - .048<br>.025 - .043 | .038 - .066<br>.036 - .061 | .051 - .081<br>.048 - .076 |
| | **CARBON STEELS** | | | | | | |
| | 1000's - 1018, 1020, 12L14 | < 40 | .013 - .025 | .020 - .036 | .030 - .051 | .041 - .069 | .053 - .084 |
| K | **CAST MATERIAL** | | | | | | |
| | Ductile Iron | | .013 - .025 | .020 - .036 | .030 - .051 | .041 - .069 | .053 - .084 |
| | Gray Iron | | .013 - .025 | .020 - .036 | .030 - .051 | .041 - .069 | .053 - .084 |
| N | **NON-FERROUS** | | | | | | |
| | Aluminum (6061, 7075) | | .015 - .028 | .023 - .038 | .033 - .053 | .043 - .071 | .056 - .086 |
| | Magnesium | | .013 - .025 | .023 - .036 | .033 - .051 | .043 - .069 | .056 - .084 |
| | Copper | | .010 - .020 | .020 - .030 | .030 - .046 | .041 - .064 | .053 - .079 |
| | Brass, Bronze | | .013 - .023 | .023 - .033 | .033 - .048 | .043 - .066 | .056 - .081 |
| O | **COMPOSITE (non-ISO)** | | | | | | |
| | Glass Epoxy, Fiberglass, Plastics, Graphite, G10 | | .008 - .020 | .018 - .030 | .028 - .046 | .038 - .064 | .051 - .079 |

**NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.**

# GARR TOOL General Purpose Drilling Guide (Durana Coated)

| ISO Material | | HRC | SFM (by Series) | | | |
|---|---|---|---|---|---|---|
| | | | 1100H, 1120H | 1200H, 1205H, 1520H | 1500H, 1510H | 1800H |
| S | **COBALT BASE ALLOYS** | | | | | |
| | Haynes 25/188, Stellite 21, Cobalt Chrome | < 40<br>> 40 | -<br>- | 55 - 75<br>45 - 65 | 55 - 75<br>45 - 65 | -<br>- |
| | **NICKEL BASE ALLOYS** | | | | | |
| | Inconel-625/718, Waspaloy, Invar, Rene, Hastelloy, Monel | < 40<br>> 40 | -<br>- | 55 - 80<br>45 - 70 | 55 - 80<br>45 - 70 | -<br>- |
| | **IRON BASE ALLOYS** | | | | | |
| | A286, Discaloy, Haynes 556, Carpenter 22, Greek Ascolloy | < 40<br>> 40 | -<br>- | 55 - 80<br>45 - 70 | 55 - 80<br>45 - 70 | -<br>- |
| | **TITANIUM ALLOYS** | | | | | |
| | Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si | | - | 70 - 100 | 70 - 100 | - |
| | 5553 / Beta Titanium | | - | 55 - 75 | 55 - 75 | - |
| M | **STAINLESS STEELS** | | | | | |
| | 13/8, 15/5, 17-4, pH Types | < 40<br>> 40 | -<br>- | 60 - 90<br>45 - 70 | 60 - 90<br>45 - 70 | -<br>- |
| | 300 Series, 304L, Nitronic 50, Duplex, Super-Austenitic | < 40<br>> 40 | -<br>- | 55 - 85<br>45 - 65 | 55 - 85<br>45 - 65 | -<br>- |
| | 400 Series - 403, 405, 420, 455 | < 40<br>> 40 | -<br>- | 70 - 100<br>50 - 75 | 70 - 100<br>50 - 75 | -<br>- |
| P | **HIGH STRENGTH TOOL STEELS** | | | | | |
| | A2, D2, P20, H13, S7, O1 | < 40<br>> 40 | -<br>- | 90 - 140<br>70 - 120 | 90 - 140<br>70 - 120 | -<br>- |
| | Thompson Shaft, Armor Plate (Class 1) | > 50 | - | - | 55 - 90 | - |
| | **MEDIUM ALLOY TOOL STEELS** | | | | | |
| | 4140, 4340, 52100, 6150, 8620 | < 40<br>> 40 | -<br>- | 110 - 150<br>80 - 130 | 110 - 150<br>80 - 130 | -<br>- |
| | **CARBON STEELS** | | | | | |
| | 1000's - 1018, 1020, 12L14 | < 40 | - | 130 - 180 | 130 - 180 | - |
| K | **CAST MATERIAL** | | | | | |
| | Ductile Iron | | 80 - 150 | 130 - 180 | 130 - 180 | - |
| | Gray Iron | | 80 - 175 | 130 - 200 | 130 - 200 | - |
| N | **NON-FERROUS** | | | | | |
| | Aluminum (6061, 7075) | | - | 200 - 300 | - | 200 - 300 |
| | Magnesium | | - | 130 - 225 | - | 130 - 225 |
| | Copper | | - | 110 - 175 | - | 110 - 175 |
| | Brass, Bronze | | - | 130 - 225 | - | 130 - 225 |
| O | **COMPOSITE (non-ISO)** | | | | | |
| | Glass Epoxy, Fiberglass, Plastics, Graphite, G10 | | 160 | 125 - 250 | 125 - 250 | - |

**NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.**

# GARR TOOL General Purpose Drilling Guide (Durana Coated)

| ISO Material | | HRC | CHIPLOAD PER TOOTH (Fz) | | | | |
|---|---|---|---|---|---|---|---|
| | | | 1/16" - 1/8" | 1/8" - 1/4" | 1/4" - 3/8" | 3/8" - 1/2" | 1/2" - 5/8" |
| S | **COBALT BASE ALLOYS** | | | | | | |
| | Haynes 25/188, Stellite 21, Cobalt Chrome | < 40<br>> 40 | .0003" - .0008"<br>.0002" - .0006" | .0006" - .0011"<br>.0004" - .0009" | .0010" - .0017"<br>.0008" - .0015" | .0014" - .0024"<br>.0012" - .0022" | .0019" - .0032"<br>.0017" - .0030" |
| | **NICKEL BASE ALLOYS** | | | | | | |
| | Inconel-625/718, Waspaloy, Invar, Rene, Hastelloy, Monel | < 40<br>> 40 | .0003" - .0008"<br>.0002" - .0006" | .0006" - .0011"<br>.0004" - .0009" | .0010" - .0017"<br>.0008" - .0015" | .0014" - .0024"<br>.0012" - .0022" | .0019" - .0032"<br>.0017" - .0030" |
| | **IRON BASE ALLOYS** | | | | | | |
| | A286, Discaloy, Haynes 556, Carpenter 22, Greek Ascolloy | < 40<br>> 40 | .0003" - .0008"<br>.0002" - .0006" | .0006" - .0011"<br>.0004" - .0009" | .0010" - .0017"<br>.0008" - .0015" | .0014" - .0024"<br>.0012" - .0022" | .0019" - .0032"<br>.0017" - .0030" |
| | **TITANIUM ALLOYS** | | | | | | |
| | Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si | | .0004" - .0009" | .0008" - .0014" | .0012" - .0020" | .0016" - .0027" | .0021" - .0033" |
| | 5553 / Beta Titanium | | .0003" - .0007" | .0006" - .0011" | .0010" - .0017" | .0014" - .0024" | .0019" - .0030" |
| M | **STAINLESS STEELS** | | | | | | |
| | 13/8, 15/5, 17-4, pH Types | < 40<br>> 40 | .0004" - .0009"<br>.0003" - .0007" | .0007" - .0013"<br>.0006" - .0011" | .0011" - .0019"<br>.0010" - .0017" | .0015" - .0026"<br>.0014" - .0024" | .0020" - .0032"<br>.0019" - .0030" |
| | 300 Series, 304L, Nitronic 50, Duplex, Super-Austenitic | < 40<br>> 40 | .0004" - .0009"<br>.0003" - .0007" | .0007" - .0013"<br>.0006" - .0011" | .0011" - .0019"<br>.0010" - .0017" | .0015" - .0026"<br>.0014" - .0024" | .0020" - .0032"<br>.0019" - .0030" |
| | 400 Series - 403, 405, 420, 455 | < 40<br>> 40 | .0004" - .0009"<br>.0003" - .0007" | .0007" - .0013"<br>.0006" - .0011" | .0011" - .0019"<br>.0010" - .0017" | .0015" - .0026"<br>.0014" - .0024" | .0020" - .0032"<br>.0019" - .0030" |
| P | **HIGH STRENGTH TOOL STEELS** | | | | | | |
| | A2, D2, P20, H13, S7, O1 | < 40<br>> 40 | .0004" - .0009"<br>.0003" - .0007" | .0007" - .0013"<br>.0006" - .0011" | .0011" - .0019"<br>.0010" - .0017" | .0015" - .0026"<br>.0014" - .0024" | .0020" - .0032"<br>.0019" - .0030" |
| | Thompson Shaft, Armor Plate (Class 1) | > 50 | .0002" - .0006" | .0005" - .0009" | .0009" - .0015" | .0013" - .0022" | .0018" - .0028" |
| | **MEDIUM ALLOY TOOL STEELS** | | | | | | |
| | 4140, 4340, 52100, 6150, 8620 | < 40<br>> 40 | .0004" - .0009"<br>.0003" - .0007" | .0007" - .0013"<br>.0006" - .0011" | .0011" - .0019"<br>.0010" - .0017" | .0015" - .0026"<br>.0014" - .0024" | .0020" - .0032"<br>.0019" - .0030" |
| | **CARBON STEELS** | | | | | | |
| | 1000's - 1018, 1020, 12L14 | < 40 | .0005" - .0010" | .0008" - .0014" | .0012" - .0020" | .0016" - .0027" | .0021" - .0033" |
| K | **CAST MATERIAL** | | | | | | |
| | Ductile Iron | | .0005" - .0010" | .0008" - .0014" | .0012" - .0020" | .0016" - .0027" | .0021" - .0033" |
| | Gray Iron | | .0005" - .0010" | .0008" - .0014" | .0012" - .0020" | .0016" - .0027" | .0021" - .0033" |
| N | **NON-FERROUS** | | | | | | |
| | Aluminum (6061, 7075) | | .0006" - .0011" | .0009" - .0015" | .0013" - .0021" | .0017" - .0028" | .0022" - .0034" |
| | Magnesium | | .0005" - .0010" | .0009" - .0014" | .0013" - .0020" | .0017" - .0027" | .0022" - .0033" |
| | Copper | | .0004" - .0008" | .0008" - .0012" | .0012" - .0018" | .0016" - .0025" | .0021" - .0031" |
| | Brass, Bronze | | .0005" - .0009" | .0009" - .0013" | .0013" - .0019" | .0017" - .0026" | .0022" - .0032" |
| O | **COMPOSITE (non-ISO)** | | | | | | |
| | Glass Epoxy, Fiberglass, Plastics, Graphite, G10 | | .0003" - .0008" | .0007" - .0012" | .0011" - .0018" | .0015" - .0025" | .0020" - .0031" |

**NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.**

# GARR TOOL General Purpose Drilling Guide (Durana Coated)

| | ISO Material | HRC | M/Min. (by Series) | | | |
|---|---|---|---|---|---|---|
| | | | 1100H, 1120H | 1200H, 1205H, 1520H | 1500H, 1510H | 1800H |
| S | **COBALT BASE ALLOYS** | | | | | |
| | Haynes 25/188, Stellite 21, Cobalt Chrome | < 40<br>> 40 | -<br>- | 17 - 23<br>13 - 20 | 17 - 23<br>13 - 20 | -<br>- |
| | **NICKEL BASE ALLOYS** | | | | | |
| | Inconel-625/718, Waspaloy, Invar, Rene, Hastelloy, Monel | < 40<br>> 40 | -<br>- | 17 - 25<br>13 - 21 | 17 - 25<br>13 - 21 | -<br>- |
| | **IRON BASE ALLOYS** | | | | | |
| | A286, Discaloy, Haynes 556, Carpenter 22, Greek Ascolloy | < 40<br>> 40 | -<br>- | 17 - 25<br>13 - 21 | 17 - 25<br>13 - 21 | -<br>- |
| | **TITANIUM ALLOYS** | | | | | |
| | Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si | | - | 21 - 30 | 21 - 30 | - |
| | 5553 / Beta Titanium | | - | 17 - 23 | 17 - 23 | - |
| M | **STAINLESS STEELS** | | | | | |
| | 13/8, 15/5, 17-4, pH Types | < 40<br>> 40 | -<br>- | 18 - 27<br>13 - 21 | 18 - 27<br>13 - 21 | -<br>- |
| | 300 Series, 304L, Nitronic 50, Duplex, Super-Austenitic | < 40<br>> 40 | -<br>- | 17 - 26<br>13 - 20 | 17 - 26<br>13 - 20 | -<br>- |
| | 400 Series - 403, 405, 420, 455 | < 40<br>> 40 | -<br>- | 21 - 30<br>15 - 23 | 21 - 30<br>15 - 23 | -<br>- |
| P | **HIGH STRENGTH TOOL STEELS** | | | | | |
| | A2, D2, P20, H13, S7, O1 | < 40<br>> 40 | -<br>- | 27 - 43<br>21 - 37 | 27 - 43<br>21 - 37 | -<br>- |
| | Thompson Shaft, Armor Plate (Class 1) | > 50 | - | - | 17 - 27 | - |
| | **MEDIUM ALLOY TOOL STEELS** | | | | | |
| | 4140, 4340, 52100, 6150, 8620 | < 40<br>> 40 | -<br>- | 34 - 45<br>25 - 40 | 34 - 45<br>25 - 40 | -<br>- |
| | **CARBON STEELS** | | | | | |
| | 1000's - 1018, 1020, 12L14 | < 40 | - | 40 - 55 | 40 - 55 | - |
| K | **CAST MATERIAL** | | | | | |
| | Ductile Iron | | 25 - 45 | 40 - 55 | 40 - 55 | - |
| | Gray Iron | | 25 - 53 | 40 - 60 | 40 - 60 | - |
| N | **NON-FERROUS** | | | | | |
| | Aluminum (6061, 7075) | | - | 60 - 90 | - | 60 - 90 |
| | Magnesium | | - | 40 - 68 | - | 40 - 68 |
| | Copper | | - | 34 - 53 | - | 34 - 53 |
| | Brass, Bronze | | - | 40 - 68 | - | 40 - 68 |
| O | **COMPOSITE (non-ISO)** | | | | | |
| | Glass Epoxy, Fiberglass, Plastics, Graphite, G10 | | 50 | 38 - 75 | - | - |

**NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.**

# GARR TOOL General Purpose Drilling Guide (Durana Coated)

| ISO Material | | HRC | CHIPLOAD PER TOOTH (Fz) | | | | |
|---|---|---|---|---|---|---|---|
| | | | 2.0 - 3.0mm | 3.0 - 6.0mm | 6.0 - 10.0mm | 10.0 - 13.0mm | 13.0 - 16.0mm |
| S | **COBALT BASE ALLOYS** | | | | | | |
| | Haynes 25/188, Stellite 21, Cobalt Chrome | < 40<br>> 40 | .008 - .020<br>.005 - .015 | .015 - .028<br>.010 - .023 | .025 - .043<br>.020 - .038 | .036 - .061<br>.030 - .056 | .048 - .081<br>.043 - .076 |
| | **NICKEL BASE ALLOYS** | | | | | | |
| | Inconel-625/718, Waspaloy, Invar, Rene, Hastelloy, Monel | < 40<br>> 40 | .008 - .020<br>.005 - .015 | .015 - .028<br>.010 - .023 | .025 - .043<br>.020 - .038 | .036 - .061<br>.030 - .056 | .048 - .081<br>.043 - .076 |
| | **IRON BASE ALLOYS** | | | | | | |
| | A286, Discaloy, Haynes 556, Carpenter 22, Greek Ascolloy | < 40<br>> 40 | .008 - .020<br>.005 - .015 | .015 - .028<br>.010 - .023 | .025 - .043<br>.020 - .038 | .036 - .061<br>.030 - .056 | .048 - .081<br>.043 - .076 |
| | **TITANIUM ALLOYS** | | | | | | |
| | Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si | | .010 - .023 | .020 - .036 | .030 - .051 | .041 - .069 | .053 - .084 |
| | 5553 / Beta Titanium | | .008 - .018 | .015 - .028 | .025 - .043 | .036 - .061 | .048 - .076 |
| M | **STAINLESS STEELS** | | | | | | |
| | 13/8, 15/5, 17-4, pH Types | < 40<br>> 40 | .010 - .023<br>.008 - .018 | .018 - .033<br>.015 - .028 | .028 - .048<br>.025 - .043 | .038 - .066<br>.036 - .061 | .051 - .081<br>.048 - .076 |
| | 300 Series, 304L, Nitronic 50, Duplex, Super-Austenitic | < 40<br>> 40 | .010 - .023<br>.008 - .018 | .018 - .033<br>.015 - .028 | .028 - .048<br>.025 - .043 | .038 - .066<br>.036 - .061 | .051 - .081<br>.048 - .076 |
| | 400 Series - 403, 405, 420, 455 | < 40<br>> 40 | .010 - .023<br>.008 - .018 | .018 - .033<br>.015 - .028 | .028 - .048<br>.025 - .043 | .038 - .066<br>.036 - .061 | .051 - .081<br>.048 - .076 |
| P | **HIGH STRENGTH TOOL STEELS** | | | | | | |
| | A2, D2, P20, H13, S7, O1 | < 40<br>> 40 | .010 - .023<br>.008 - .018 | .018 - .033<br>.015 - .028 | .028 - .048<br>.025 - .043 | .038 - .066<br>.036 - .061 | .051 - .081<br>.048 - .076 |
| | Thompson Shaft, Armor Plate (Class 1) | > 50 | .005 - .015 | .013 - .023 | .023 - .038 | .033 - .056 | .046 - .071 |
| | **MEDIUM ALLOY TOOL STEELS** | | | | | | |
| | 4140, 4340, 52100, 6150, 8620 | < 40<br>> 40 | .010 - .023<br>.008 - .018 | .018 - .033<br>.015 - .028 | .028 - .048<br>.025 - .043 | .038 - .066<br>.036 - .061 | .051 - .081<br>.048 - .076 |
| | **CARBON STEELS** | | | | | | |
| | 1000's - 1018, 1020, 12L14 | < 40 | .013 - .025 | .020 - .036 | .030 - .051 | .041 - .069 | .053 - .084 |
| K | **CAST MATERIAL** | | | | | | |
| | Ductile Iron | | .013 - .025 | .020 - .036 | .030 - .051 | .041 - .069 | .053 - .084 |
| | Gray Iron | | .013 - .025 | .020 - .036 | .030 - .051 | .041 - .069 | .053 - .084 |
| N | **NON-FERROUS** | | | | | | |
| | Aluminum (6061, 7075) | | .015 - .028 | .023 - .038 | .033 - .053 | .043 - .071 | .056 - .086 |
| | Magnesium | | .013 - .025 | .023 - .036 | .033 - .051 | .043 - .069 | .056 - .084 |
| | Copper | | .010 - .020 | .020 - .030 | .030 - .046 | .041 - .064 | .053 - .079 |
| | Brass, Bronze | | .013 - .023 | .023 - .033 | .033 - .048 | .043 - .066 | .056 - .081 |
| O | **COMPOSITE (non-ISO)** | | | | | | |
| | Glass Epoxy, Fiberglass, Plastics, Graphite, G10 | | .008 - .020 | .018 - .030 | .028 - .046 | .038 - .064 | .051 - .079 |

**NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.**

# GARR TOOL High Performance Drilling Guide for Mini Drills

## (Series 1550H,1250H,1850H)

| ISO Material | | HRC | SFM (Vc) | CHIPLOAD PER TOOTH (Fz) | | |
|---|---|---|---|---|---|---|
| | | | | .0312" - .0390" | .0394" - .0787" | .0791" - .1250" |
| S | **COBALT BASE ALLOYS** | | | | | |
| | Haynes 25/188, Stellite 21, Cobalt Chrome | < 40<br>> 40 | 70 - 100<br>50 - 85 | .0002" - .0004"<br>.0002" - .0004" | .0004" - .0007"<br>.0003" - .0006" | .0006" - .0010"<br>.0005" - .0009" |
| | **NICKEL BASE ALLOYS** | | | | | |
| | Inconel-625/718, Waspaloy, Invar, Rene, Hastelloy, Monel | < 40<br>> 40 | 70 - 100<br>50 - 85 | .0002" - .0004"<br>.0002" - .0004" | .0004" - .0007"<br>.0003" - .0006" | .0006" - .0010"<br>.0005" - .0009" |
| | **IRON BASE ALLOYS** | | | | | |
| | A286, Discaloy, Haynes 556, Carpenter 22, Greek Ascolloy | < 40<br>> 40 | 70 - 100<br>50 - 85 | .0002" - .0004"<br>.0002" - .0004" | .0004" - .0007"<br>.0003" - .0006" | .0006" - .0010"<br>.0005" - .0009" |
| | **TITANIUM ALLOYS** | | | | | |
| | Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si | | 90 - 130 | .0003" - .0006" | .0004" - .0008" | .0006" - .0012" |
| | 5553 / Beta Titanium | | 75 - 115 | .0002" - .0004" | .0003" - .0006" | .0005" - .0010" |
| M | **STAINLESS STEELS** | | | | | |
| | 13/8, 15/5, 17-4, pH Types | < 40<br>> 40 | 95 - 135<br>80 - 125 | .0002" - .0004"<br>.0002" - .0004" | .0004" - .0007"<br>.0003" - .0006" | .0006" - .0010"<br>.0005" - .0009" |
| | 300 Series, 304L, Nitronic 50, Duplex, Super-Austenitic | < 40<br>> 40 | 90 - 125<br>80 - 115 | .0002" - .0004"<br>.0002" - .0004" | .0004" - .0007"<br>.0003" - .0006" | .0006" - .0010"<br>.0005" - .0009" |
| | 400 Series - 403, 405, 420, 455 | < 40<br>> 40 | 100 - 150<br>80 - 125 | .0002" - .0004"<br>.0002" - .0004" | .0004" - .0007"<br>.0003" - .0006" | .0006" - .0010"<br>.0005" - .0009" |
| P | **HIGH STRENGTH TOOL STEELS** | | | | | |
| | A2, D2, P20, H13, S7, O1 | < 40<br>> 40 | 100 - 175<br>60 - 80 | .0003" - .0006"<br>.0002" - .0004" | .0004" - .0008"<br>.0003" - .0006" | .0006" - .0012"<br>.0005" - .0010" |
| | **MEDIUM ALLOY TOOL STEELS** | | | | | |
| | 4140, 4340, 52100, 6150, 8620 | < 40<br>> 40 | 125 - 175<br>80 - 125 | .0004" - .0008"<br>.0003" - .0005" | .0006" - .0012"<br>.0004" - .0008" | .0008" - .0015"<br>.0006" - .0012" |
| | **CARBON STEELS** | | | | | |
| | 1000's - 1018, 1020, 12L14 | < 40 | 125 - 175 | .0004" - .0008" | .0006" - .0012" | .0008" - .0015" |
| K | **CAST MATERIAL** | | | | | |
| | Ductile Iron | | 100 - 200 | .0004" - .0008" | .0006" - .0012" | .0008" - .0015" |
| | Gray Iron | | 80 - 175 | .0004" - .0008" | .0006" - .0012" | .0008" - .0015" |
| N | **NON-FERROUS** | | | | | |
| | Aluminum 2014, 2024, 6061-(T1-T6), 7075, Extruded | | 125 - 300 | .0004" - .0008" | .0006" - .0012" | .0008" - .0015" |
| | Magnesium | | 125 - 250 | .0004" - .0008" | .0006" - .0012" | .0008" - .0015" |
| | Copper | | 125 - 250 | .0004" - .0008" | .0006" - .0012" | .0008" - .0015" |
| | Brass | | 100 - 250 | .0003" - .0008" | .0004" - .0012" | .0006" - .0015" |
| | Bronze | | 80 - 250 | .0003" - .0008" | .0004" - .0012" | .0006" - .0015" |

**NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.**

# GARR TOOL High Performance Drilling Guide for Mini Drills

## (Series 1550H,1250H,1850H)

| ISO Material | | HRC | M/Min. (Vc) | CHIPLOAD PER TOOTH (Fz) | | |
|---|---|---|---|---|---|---|
| | | | | 0.79 - 0.99mm | 1.00 - 2.00mm | 2.01 - 3.17mm |
| S | **COBALT BASE ALLOYS** | | | | | |
| | Haynes 25/188, Stellite 21, Cobalt Chrome | < 40<br>> 40 | 20 - 30<br>15 - 25 | .005 - .010<br>.005 - .010 | .010 - .018<br>.008 - .015 | .015 - .025<br>.013 - .023 |
| | **NICKEL BASE ALLOYS** | | | | | |
| | Inconel-625/718, Waspaloy, Invar, Rene, Hastelloy, Monel | < 40<br>> 40 | 20 - 30<br>15 - 25 | .008 - .013<br>.005 - .010 | .010 - .018<br>.008 - .015 | .015 - .025<br>.013 - .023 |
| | **IRON BASE ALLOYS** | | | | | |
| | A286, Discaloy, Haynes 556, Carpenter 22, Greek Ascolloy | < 40<br>> 40 | 20 - 30<br>15 - 25 | .005 - .013<br>.005 - .010 | .010 - .020<br>.008 - .018 | .013 - .025<br>.010 - .023 |
| | **TITANIUM ALLOYS** | | | | | |
| | Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si | | 25 - 40 | .008 - .015 | .010 - .020 | .015 - .030 |
| | 5553 / Beta Titanium | | 20 - 35 | .005 - .010 | .008 - .015 | .013 - .025 |
| M | **STAINLESS STEELS** | | | | | |
| | 13/8, 15/5, 17-4, pH Types | < 40<br>> 40 | 30 - 40<br>25 - 40 | .005 - .010<br>.005 - .010 | .010 - .018<br>.008 - .015 | .015 - .025<br>.013 - .023 |
| | 300 Series, 304L, Nitronic 50, Duplex, Super-Austenitic | < 40<br>> 40 | 25 - 40<br>25 - 35 | .005 - .010<br>.005 - .010 | .010 - .018<br>.008 - .015 | .015 - .025<br>.013 - .023 |
| | 400 Series - 403, 405, 420, 455 | < 40<br>> 40 | 30 - 45<br>25 - 40 | .005 - .010<br>.005 - .010 | .010 - .018<br>.008 - .015 | .015 - .025<br>.013 - .023 |
| P | **HIGH STRENGTH TOOL STEELS** | | | | | |
| | A2, D2, P20, H13, S7, O1 | < 40<br>> 40 | 30 - 50<br>20 - 25 | .008 - .015<br>.005 - .010 | .010 - .020<br>.008 - .015 | .015 - .030<br>.013 - .025 |
| | **MEDIUM ALLOY TOOL STEELS** | | | | | |
| | 4140, 4340, 52100, 6150, 8620 | < 40<br>> 40 | 40 - 50<br>25 - 40 | .010 - .020<br>.008 - .013 | .015 - .030<br>.010 - .020 | .020 - .038<br>.015 - .030 |
| | **CARBON STEELS** | | | | | |
| | 1000's - 1018, 1020, 12L14 | < 40 | 40 - 50 | .010 - .020 | .015 - .030 | .020 - .038 |
| K | **CAST MATERIAL** | | | | | |
| | Ductile Iron | | 30 - 60 | .010 - .020 | .015 - .030 | .020 - .038 |
| | Gray Iron | | 25 - 50 | .010 - .020 | .015 - .030 | .020 - .038 |
| N | **NON-FERROUS** | | | | | |
| | Aluminum 2014, 2024, 6061-(T1-T6), 7075, Extruded | | 40 - 90 | .010 - .020 | .015 - .030 | .020 - .038 |
| | Magnesium | | 40 - 75 | .010 - .020 | .015 - .030 | .020 - .038 |
| | Copper | | 40 - 75 | .010 - .020 | .015 - .030 | .020 - .038 |
| | Brass | | 30 - 75 | .008 - .020 | .010 - .030 | .015 - .038 |
| | Bronze | | 25 - 75 | .008 - .020 | .010 - .030 | .015 - .038 |

**NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.**

# GARR TOOL HTD 12 High Performance Drilling Guide

| | ISO Material | HRC | SFM (Vc) | CHIPLOAD PER TOOTH (Fz) 1/8" - 1/4" | 1/4" - 3/8" | 3/8" - 1/2" |
|---|---|---|---|---|---|---|
| S | **COBALT BASE ALLOYS** | | | | | |
| | Haynes 25/188, Stellite 21, Cobalt Chrome | < 40<br>> 40 | 110<br>70 | .0006" - .0016"<br>.0004" - .0012" | .0016" - .0022"<br>.0012" - .0018" | .0022" - .0035"<br>.0018" - .0031" |
| | **NICKEL BASE ALLOYS** | | | | | |
| | Inconel-625/718, Waspaloy, Invar, Rene, Hastelloy, Monel | < 40<br>> 40 | 120<br>80 | .0006" - .0016"<br>.0004" - .0012" | .0016" - .0022"<br>.0012" - .0018" | .0022" - .0035"<br>.0018" - .0031" |
| | **IRON BASE ALLOYS** | | | | | |
| | A286, Discaloy, Haynes 556, Carpenter 22, Greek Ascolloy | < 40<br>> 40 | 120<br>80 | .0006" - .0016"<br>.0004" - .0012" | .0016" - .0022"<br>.0012" - .0018" | .0022" - .0035"<br>.0018" - .0031" |
| | **TITANIUM ALLOYS** | | | | | |
| | Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-2SN-4Zr-2Mo-Si | | 170 | .0006" - .0026" | .0026" - .0040" | .0040" - .0055" |
| | 5553 / Beta Titanium | | 120 | .0005" - .0023" | .0023" - .0034" | .0034" - .0047" |
| M | **STAINLESS STEELS** | | | | | |
| | 13/8, 15/5, 17-4, pH Types | < 40<br>> 40 | 150<br>105 | .0006" - .0018"<br>.0005" - .0013" | .0018" - .0035"<br>.0013" - .0030" | .0035" - .0049"<br>.0030" - .0043" |
| | 300 Series, 304L, Nitronic 50, Duplex, Super-Austenitic | < 40<br>> 40 | 150<br>105 | .0006" - .0018"<br>.0005" - .0013" | .0018" - .0035"<br>.0013" - .0030" | .0035" - .0049"<br>.0030" - .0043" |
| | 400 Series - 403, 405, 420, 455 | < 40<br>> 40 | 160<br>105 | .0006" - .0018"<br>.0005" - .0013" | .0018" - .0035"<br>.0013" - .0030" | .0035" - .0049"<br>.0030" - .0043" |
| P | **HIGH STRENGTH TOOL STEELS** | | | | | |
| | A2, D2, P20, H13, S7, O1 | < 40<br>> 40 | 170<br>105 | .0008" - .0026"<br>.0006" - .0020" | .0026" - .0038"<br>.0020" - .0032" | .0038" - .0050"<br>.0032" - .0043" |
| | **MEDIUM ALLOY TOOL STEELS** | | | | | |
| | 4140, 4340, 52100, 6150, 8620 | < 40<br>> 40 | 260<br>110 | .0008" - .0026"<br>.0006" - .0020" | .0026" - .0038"<br>.0020" - .0032" | .0038" - .0050"<br>.0032" - .0043" |
| | **CARBON STEELS** | | | | | |
| | 1000's - 1018, 1020, 12L14 | < 40 | 320 | .0008" - .0029" | .0030" - .0045" | .0045" - .0060" |
| K | **CAST MATERIAL** | | | | | |
| | Ductile Iron | | 340 | .0008" - .0029" | .0029" - .0045" | .0045" - .0060" |
| | Gray Iron | | 350 | .0008" - .0029" | .0029" - .0045" | .0045" - .0060" |
| N | **NON-FERROUS** | | | | | |
| | Aluminum 2014, 2024, 6061-(T1-T6), 7075 | | 400 | .0016" - .0030" | .0030" - .0046" | .0046" - .0062" |
| | Aluminum Die Cast | | 375 | .0014" - .0027" | .0027" - .0040" | .0040" - .0054" |
| | Magnesium | | 275 | .0014" - .0026" | .0026" - .0037" | .0037" - .0049" |
| | Copper | | 250 | .0013" - .0024" | .0024" - .0031" | .0031" - .0044" |
| | Brass | | 360 | .0016" - .0030" | .0030" - .0044" | .0044" - .0060" |
| | Bronze | | 260 | .0013" - .0024" | .0024" - .0031" | .0031" - .0044" |

**NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.**

# GARR TOOL HTD 12 High Performance Drilling Guide

| | ISO Material | HRC | M/Min. (Vc) | CHIPLOAD PER TOOTH (Fz) 3.0 - 6.0mm | 6.0 - 10.0mm | 10.0 - 13.0mm |
|---|---|---|---|---|---|---|
| S | **COBALT BASE ALLOYS** | | | | | |
| | Haynes 25/188, Stellite 21, Cobalt Chrome | < 40<br>> 40 | 33<br>21 | .015 - .041<br>.010 - .030 | .041 - .056<br>.030 - .046 | .056 - .089<br>.046 - .079 |
| | **NICKEL BASE ALLOYS** | | | | | |
| | Inconel-625/718, Waspaloy, Invar, Rene, Hastelloy, Monel | < 40<br>> 40 | 36<br>24 | .015 - .041<br>.010 - .030 | .041 - .056<br>.030 - .046 | .056 - .089<br>.046 - .079 |
| | **IRON BASE ALLOYS** | | | | | |
| | A286, Discaloy, Haynes 556, Carpenter 22, Greek Ascolloy | < 40<br>> 40 | 36<br>24 | .015 - .041<br>.010 - .030 | .041 - .056<br>.030 - .046 | .056 - .089<br>.046 - .079 |
| | **TITANIUM ALLOYS** | | | | | |
| | Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si | | 52 | .015 - .066 | .066 - .102 | .102 - .140 |
| | 5553 / Beta Titanium | | 36 | .013 - .058 | .058 - .086 | .086 - .119 |
| M | **STAINLESS STEELS** | | | | | |
| | 13/8, 15/5, 17-4, pH Types | < 40<br>> 40 | 45<br>32 | .015 - .046<br>.013 - .033 | .046 - .089<br>.033 - .076 | .089 - .124<br>.076 - .109 |
| | 300 Series, 304L, Nitronic 50, Duplex, Super-Austenitic | < 40<br>> 40 | 45<br>32 | .015 - .046<br>.013 - .033 | .046 - .089<br>.033 - .076 | .089 - .124<br>.076 - .109 |
| | 400 Series - 403, 405, 420, 455 | < 40<br>> 40 | 48<br>32 | .015 - .046<br>.013 - .033 | .046 - .089<br>.033 - .076 | .089 - .124<br>.076 - .109 |
| P | **HIGH STRENGTH TOOL STEELS** | | | | | |
| | A2, D2, P20, H13, S7, O1 | < 40<br>> 40 | 52<br>32 | .020 - .066<br>.015 - .051 | .066 - .097<br>.051 - .081 | .097 - .127<br>.081 - .109 |
| | **MEDIUM ALLOY TOOL STEELS** | | | | | |
| | 4140, 4340, 52100, 6150, 8620 | < 40<br>> 40 | 79<br>33 | .020 - .066<br>.015 - .051 | .066 - .097<br>.051 - .081 | .097 - .127<br>.081 - .109 |
| | **CARBON STEELS** | | | | | |
| | 1000's - 1018, 1020, 12L14 | < 40 | 97 | .020 - .074 | .074 - .114 | .114 - .152 |
| K | **CAST MATERIAL** | | | | | |
| | Ductile Iron | | 103 | .020 - .074 | .074 - .114 | .114 - .152 |
| | Gray Iron | | 106 | .020 - .074 | .074 - .114 | .114 - .152 |
| N | **NON-FERROUS** | | | | | |
| | Aluminum 2014, 2024, 6061-(T1-T6), 7075 | | 122 | .041 - .076 | .076 - .117 | .117 - .157 |
| | Aluminum Die Cast | | 114 | .036 - .069 | .069 - .102 | .102 - .137 |
| | Magnesium | | 83 | .036 - .066 | .066 - .094 | .094 - .124 |
| | Copper | | 76 | .033 - .061 | .061 - .079 | .079 - .112 |
| | Brass | | 109 | .041 - .076 | .076 - .112 | .112 - .152 |
| | Bronze | | 79 | .033 - .061 | .061 - .079 | .079 - .112 |

**NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.**

# GARR TOOL High Performance Drilling Guide

| ISO Material | | HRC | SFM (Vc) | | CHIPLOAD PER TOOTH (Fz) | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | NON-COOLANT | COOLANT FED | 1/8" - 1/4" | 1/4" - 3/8" | 3/8" - 1/2" | 1/2" - 5/8" | 5/8" - 3/4" |
| S | **COBALT BASE ALLOYS** | | | | | | | | |
| | Haynes 25/188, Stellite 21, Cobalt Chrome | < 40<br>> 40 | 80<br>60 | 100<br>75 | .0008" - .0015"<br>.0005" - .0012" | .0012" - .0020"<br>.0009" - .0017" | .0017" - .0026"<br>.0014" - .0023" | .0022" - .0032"<br>.0019" - .0029" | .0027" - .0038"<br>.0024" - .0035" |
| | **NICKEL BASE ALLOYS** | | | | | | | | |
| | Inconel-625/718, Waspaloy, Invar, Rene, Hastelloy, Monel | < 40<br>> 40 | 90<br>70 | 110<br>75 | .0008" - .0015"<br>.0005" - .0012" | .0012" - .0020"<br>.0009" - .0017" | .0017" - .0026"<br>.0014" - .0023" | .0022" - .0032"<br>.0019" - .0029" | .0027" - .0038"<br>.0024" - .0035" |
| | **IRON BASE ALLOYS** | | | | | | | | |
| | A286, Discaloy, Haynes 556, Carpenter 22, Greek Ascolloy | < 40<br>> 40 | 90<br>60 | 115<br>75 | .0008" - .0015"<br>.0005" - .0012" | .0012" - .0020"<br>.0009" - .0017" | .0017" - .0026"<br>.0014" - .0023" | .0022" - .0032"<br>.0019" - .0029" | .0027" - .0038"<br>.0024" - .0035" |
| | **TITANIUM ALLOYS** | | | | | | | | |
| | Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si | | 110 | 135 | .0010" - .0018" | .0015" - .0023" | .0020" - .0029" | .0025" - .0035" | .0030" - .0041" |
| | 5553 / Beta Titanium | | 70 | 100 | .0008" - .0015" | .0012" - .0020" | .0017" - .0026" | .0022" - .0032" | .0027" - .0038" |
| M | **STAINLESS STEELS** | | | | | | | | |
| | 13/8, 15/5, 17-4, pH Types | < 40<br>> 40 | 100<br>80 | 120<br>90 | .0010" - .0017"<br>.0007" - .0015" | .0014" - .0022"<br>.0011" - .0020" | .0019" - .0028"<br>.0016" - .0026" | .0024" - .0034"<br>.0021" - .0032" | .0029" - .0040"<br>.0026" - .0038" |
| | 300 Series, 304L, Nitronic 50, Duplex, Super-Austenitic | < 40<br>> 40 | 90<br>70 | 110<br>80 | .0010" - .0017"<br>.0007" - .0015" | .0014" - .0022"<br>.0011" - .0020" | .0019" - .0028"<br>.0016" - .0026" | .0024" - .0034"<br>.0021" - .0032" | .0029" - .0040"<br>.0026" - .0038" |
| | 400 Series - 403, 405, 420, 455 | < 40<br>> 40 | 110<br>80 | 130<br>105 | .0010" - .0017"<br>.0007" - .0015" | .0014" - .0022"<br>.0011" - .0020" | .0019" - .0028"<br>.0016" - .0026" | .0024" - .0034"<br>.0021" - .0032" | .0029" - .0040"<br>.0026" - .0038" |
| P | **HIGH STRENGTH TOOL STEELS** | | | | | | | | |
| | A2, D2, P20, H13, S7, O1 | < 40<br>> 40 | 160<br>130 | 200<br>150 | .0011" - .0020"<br>.0007" - .0014" | .0015" - .0025"<br>.0011" - .0019" | .0020" - .0031"<br>.0016" - .0025" | .0025" - .0037"<br>.0021" - .0031" | .0030" - .0043"<br>.0026" - .0037" |
| | **MEDIUM ALLOY TOOL STEELS** | | | | | | | | |
| | 4140, 4340, 52100, 6150, 8620 | < 40<br>> 40 | 175<br>145 | 215<br>170 | .0011" - .0020"<br>.0007" - .0014" | .0015" - .0025"<br>.0011" - .0019" | .0020" - .0031"<br>.0016" - .0025" | .0025" - .0037"<br>.0021" - .0031" | .0030" - .0043"<br>.0026" - .0037" |
| | **CARBON STEELS** | | | | | | | | |
| | 1000's - 1018, 1020, 12L14 | < 40 | 225 | 275 | .0014" - .0023" | .0018" - .0027" | .0023" - .0033" | .0028" - .0039" | .0033" - .0045" |
| K | **CAST MATERIAL** | | | | | | | | |
| | Ductile Iron | | 250 | 350 | .0015" - .0023" | .0019" - .0028" | .0024" - .0034" | .0029" - .0040" | .0034" - .0046" |
| | Gray Iron | | 275 | 375 | .0016" - .0024" | .0020" - .0029" | .0025" - .0035" | .0030" - .0041" | .0035" - .0047" |
| N | **NON-FERROUS** | | | | | | | | |
| | Aluminum 2014, 2024, 6061-(T1-T6), 7075 | | 350 | 425 | .0023" - .0033" | .0027" - .0038" | .0033" - .0044" | .0038" - .0050" | .0043" - .0056" |
| | Aluminum Die Cast | | 300 | 375 | .0018" - .0028" | .0022" - .0033" | .0027" - .0039" | .0032" - .0045" | .0037" - .0051" |
| | Magnesium | | 275 | 350 | .0020" - .0030" | .0024" - .0035" | .0029" - .0041" | .0034" - .0047" | .0039" - .0053" |
| | Copper | | 200 | 300 | .0017" - .0025" | .0021" - .0030" | .0026" - .0036" | .0031" - .0042" | .0036" - .0048" |
| | Brass | | 250 | 350 | .0020" - .0032" | .0024" - .0037" | .0029" - .0043" | .0034" - .0049" | .0039" - .0055" |
| | Bronze | | 200 | 275 | .0018" - .0025" | .0022" - .0030" | .0027" - .0036" | .0032" - .0042" | .0037" - .0048" |

**NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.**

# GARR TOOL High Performance Drilling Guide

| | ISO Material | HRC | M/Min. (Vc) | | CHIPLOAD PER TOOTH (Fz) | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | NON-COOLANT | COOLANT FED | 3.0 - 6.0mm | 6.0 - 10.0mm | 10.0 - 13.0mm | 13.0 - 16.0mm | 16.0 - 20.0mm |
| S | **COBALT BASE ALLOYS** | | | | | | | | |
| | Haynes 25/188, Stellite 21, Cobalt Chrome | < 40<br>> 40 | 25<br>20 | 30<br>25 | .020 - .038<br>.013 - .030 | .030 - .051<br>.023 - .043 | .043 - .066<br>.036 - .058 | .056 - .081<br>.048 - .074 | .069 - .097<br>.061 - .089 |
| | **NICKEL BASE ALLOYS** | | | | | | | | |
| | Inconel-625/718, Waspaloy, Invar, Rene, Hastelloy, Monel | < 40<br>> 40 | 25<br>20 | 35<br>25 | .020 - .038<br>.013 - .030 | .030 - .051<br>.023 - .043 | .043 - .066<br>.036 - .058 | .056 - .081<br>.048 - .074 | .069 - .097<br>.061 - .089 |
| | **IRON BASE ALLOYS** | | | | | | | | |
| | A286, Discaloy, Haynes 556, Carpenter 22, Greek Ascolloy | < 40<br>> 40 | 25<br>20 | 35<br>25 | .020 - .038<br>.013 - .030 | .030 - .051<br>.023 - .043 | .043 - .066<br>.036 - .058 | .056 - .081<br>.048 - .074 | .069 - .097<br>.061 - .089 |
| | **TITANIUM ALLOYS** | | | | | | | | |
| | Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si | | 35 | 40 | .025 - .046 | .038 - .058 | .051 - .074 | .064 - .089 | .076 - .104 |
| | 5553 / Beta Titanium | | 20 | 30 | .020 - .038 | .030 - .051 | .043 - .066 | .056 - .081 | .069 - .097 |
| M | **STAINLESS STEELS** | | | | | | | | |
| | 13/8, 15/5, 17-4, pH Types | < 40<br>> 40 | 30<br>25 | 35<br>25 | .025 - .043<br>.018 - .038 | .036 - .056<br>.028 - .051 | .048 - .071<br>.041 - .066 | .061 - .086<br>.053 - .081 | .074 - .102<br>.066 - .097 |
| | 300 Series, 304L, Nitronic 50, Duplex, Super-Austenitic | < 40<br>> 40 | 25<br>20 | 35<br>25 | .025 - .043<br>.018 - .038 | .036 - .056<br>.028 - .051 | .048 - .071<br>.041 - .066 | .061 - .086<br>.053 - .081 | .074 - .102<br>.066 - .097 |
| | 400 Series - 403, 405, 420, 455 | < 40<br>> 40 | 35<br>25 | 40<br>30 | .025 - .043<br>.018 - .038 | .036 - .056<br>.028 - .051 | .048 - .071<br>.041 - .066 | .061 - .086<br>.053 - .081 | .074 - .102<br>.066 - .097 |
| P | **HIGH STRENGTH TOOL STEELS** | | | | | | | | |
| | A2, D2, P20, H13, S7, O1 | < 40<br>> 40 | 50<br>40 | 60<br>45 | .028 - .051<br>.018 - .036 | .038 - .064<br>.028 - .048 | .051 - .079<br>.041 - .064 | .064 - .094<br>.053 - .079 | .076 - .109<br>.066 - .094 |
| | **MEDIUM ALLOY TOOL STEELS** | | | | | | | | |
| | 4140, 4340, 52100, 6150, 8620 | < 40<br>> 40 | 55<br>45 | 65<br>50 | .028 - .051<br>.018 - .036 | .038 - .064<br>.028 - .048 | .051 - .079<br>.041 - .064 | .064 - .094<br>.053 - .079 | .076 - .109<br>.066 - .094 |
| | **CARBON STEELS** | | | | | | | | |
| | 1000's - 1018, 1020, 12L14 | < 40 | 70 | 85 | .036 - .058 | .048 - .069 | .058 - .064 | .071 - .099 | .084 - .114 |
| K | **CAST MATERIAL** | | | | | | | | |
| | Ductile Iron | | 75 | 105 | .038 - .058 | .048 - .071 | .061 - .086 | .074 - .102 | .086 - .117 |
| | Gray Iron | | 85 | 115 | .041 - .061 | .051 - .074 | .064 - .089 | .076 - .104 | .089 - .119 |
| N | **NON-FERROUS** | | | | | | | | |
| | Aluminum 2014, 2024, 6061-(T1-T6), 7075 | | 105 | 130 | .058 - .084 | .069 - .097 | .084 - .112 | .097 - .127 | .109 - .142 |
| | Aluminum Die Cast | | 90 | 115 | .046 - .071 | .056 - .084 | .069 - .099 | .081 - .114 | .094 - .130 |
| | Magnesium | | 85 | 105 | .051 - .076 | .061 - .089 | .074 - .104 | .086 - .119 | .099 - .135 |
| | Copper | | 60 | 90 | .043 - .064 | .053 - .076 | .066 - .091 | .079 - .107 | .091 - .122 |
| | Brass | | 75 | 105 | .051 - .081 | .061 - .094 | .074 - .109 | .086 - .124 | .099 - .140 |
| | Bronze | | 60 | 85 | .048 - .064 | .056 - .076 | .069 - .091 | .081 - .107 | .094 - .122 |

**NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.**

# GARR TOOL Drilling Guide for Aluminum Series 3-Flute Drills

| | | | | CHIPLOAD PER TOOTH (Fz) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| ISO Material | | Type | SFM (Vc) | 3/16" | 1/4" | 5/16" | 3/8" | 1/2" | 5/8" |
| N | NON-FERROUS | | | | | | | | |
| | Aluminum Alloy | 6061 | 450 - 650 | .0020" - .0040" | .0025" - .0050" | .0035" - .0060" | .0045" - .0070" | .0055" - .0080" | .0065" - .0100" |
| | Cast Aluminum | 380 | 300 - 500 | .0015" - .0030" | .0020" - .0040" | .0030" - .0050" | .0030" - .0060" | .0035" - .0070" | .0040" - .0080" |
| | Magnesium | | 250 - 500 | .0015" - .0030" | .0020" - .0040" | .0030" - .0050" | .0030" - .0060" | .0035" - .0070" | .0040" - .0080" |
| | Copper & Brass | | 250 - 400 | .0010" - .0025" | .0020" - .0030" | .0020" - .0030" | .0020" - .0040" | .0030" - .0050" | .0030" - .0060" |
| | Titanium | 6Al-4V | 100 - 300 | .0010" - .0020" | .0020" - .0030" | .0020" - .0030" | .0020" - .0040" | .0030" - .0050" | .0030" - .0060" |

| | | | | CHIPLOAD PER TOOTH (Fz) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| ISO Material | | Type | M/Min. (Vc) | 4.0mm | 6.0mm | 8.0mm | 10.0mm | 12.0mm | 16.0mm |
| N | NON-FERROUS | | | | | | | | |
| | Aluminum Alloy | 6061 | 140 - 200 | .050 - .100 | .065 - .125 | .090 - .150 | .115 - .175 | .150 - .200 | .165 - .250 |
| | Cast Aluminum | 380 | 90 - 150 | .038 - .075 | .050 - .100 | .075 - .125 | .075 - .150 | .090 - .175 | .100 - .200 |
| | Magnesium | | 75 - 150 | .038 - .075 | .050 - .100 | .075 - .125 | .075 - .150 | .090 - .175 | .100 - .200 |
| | Copper, Brass | | 75 - 120 | .025 - .060 | .050 - .075 | .050 - .075 | .050 - .100 | .075 - .125 | .075 - .150 |
| | Titanium | 6Al-4V | 30 - 90 | .025 - .050 | .050 - .075 | .050 - .075 | .050 - .100 | .075 - .125 | .075 - .150 |



**NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.**

| OPERATING PARAMETERS | | |
|---|---|---|
| TOOL DIAMETER | Vc | |
| | 1500 SFM | 3000 SFM |
| | RPM (n) | |
| 1/16" | 45,000 | 90,000 |
| 1/8" | 45,000 | 90,000 |
| 3/16" | 30,000 | 60,000 |
| 1/4" | 23,000 | 45,000 |
| 3/8" | 15,000 | 30,000 |
| 1/2" | 11,000 | 22,000 |
| 3/4" | 7,500 | 15,000 |
| 1" | 5,500 | 10,000 |

## Speeds and Feeds

Carbide burrs typically operate between 1500 and 3000 SFM. Solid carbide burrs that are 1/8" diameter or less can typically be run at speeds up to 75,000 RPM (n). Burrs ranging in size from 3/16" to 3/8" diameter can utilize a 30,000 RPM (n) grinder. Burrs ranging in size from 1/4" to 1/2" diameter can utilize a 22,000 RPM (n) grinder. These are general speed recommendations that may need to be adjusted for optimal performance.

## Safety Information

Always wear the appropriate personal protective equipment, such as safety glasses and protective clothing, when using solid carbide or HSS cutting tools. Machines should be fully guarded. Technical data provided should be considered advisory only as variations may be necessary depending on the particular application.

| BURR TROUBLESHOOTING OPTIONS | |
|---|---|
| PROBLEM | POSSIBLE SOLUTIONS |
| Broken Braze | Excessive Force<br>Heat from rubbing shank<br>Dull tool |
| Chatter | Improper location in collet<br>Bad grinder bearings<br>Bent shank<br>Unstable control of process<br>Lack of rigid setup |
| Plugged Flutes | Use coarser burr<br>Working in soft material<br>Use an anti-stick agent<br>Faster RPM<br>Slower RPM<br>Lighter cuts |
| Excessive Vibration | Improper location in collet<br>Bad grinder bearings<br>Bent shank<br>Unstable control of process<br>Faster RPM<br>Slower RPM<br>Faster feed<br>Slower feed<br>Lack of rigid setup |
| Poor Finish | Improper location in collet<br>Bad grinder bearings<br>Bent shank<br>Unstable control of process<br>Faster RPM<br>Slower RPM<br>Switch to finer cut<br>Don't use double cut<br>Faster feed<br>Lack of rigid setup |
| Poor Tool Life | Heat from rubbing shank<br>Improper location in collet<br>Bad grinder bearings<br>Bent shank<br>Unstable control of process<br>Faster RPM<br>Slower RPM<br>Don't use double cut<br>Faster feed<br>Slower feed<br>Cutting abrasive material<br>Lack of rigid setup |

# Hardness Conversion Chart

| ROCKWELL HARDNESS (HRb) | ROCKWELL HARDNESS (HRc) | BRINELL HARDNESS (HB) | VICKERS HARDNESS (HV) | TENSILE STRENGTH ($N/mm^2$) | PSI ($1000\ lb/in^2$) |
|---|---|---|---|---|---|
| 67 | - | 116 | 122 | 401 | 58 |
| 70 | - | 121 | 127 | 432 | 63 |
| 73 | - | 126 | 132 | 448 | 65 |
| 75 | - | 131 | 137 | 455 | 66 |
| 77 | - | 137 | 143 | 463 | 67 |
| 80 | - | 143 | 150 | 479 | 69 |
| 82 | - | 149 | 156 | 494 | 72 |
| 84 | - | 156 | 163 | 525 | 76 |
| 86 | - | 163 | 171 | 540 | 78 |
| 89 | - | 170 | 178 | 556 | 81 |
| 91 | - | 179 | 188 | 602 | 88 |
| 93 | - | 187 | 196 | 632 | 92 |
| 96 | - | 197 | 212 | 664 | 97 |
| 97 | - | 207 | 218 | 695 | 101 |
| 98 | - | 212 | 222 | 710 | 103 |
| - | 20 | 217 | 228 | 741 | 107 |
| - | 21 | 223 | 234 | 756 | 110 |
| - | 22 | 229 | 241 | 772 | 112 |
| - | 23 | 235 | 247 | 787 | 114 |
| - | 24 | 241 | 255 | 818 | 118 |
| - | 25 | 248 | 261 | 849 | 123 |
| - | 27 | 255 | 269 | 865 | 125 |
| - | 28 | 262 | 275 | 895 | 130 |
| - | 29 | 269 | 284 | 911 | 132 |
| - | 30 | 277 | 292 | 942 | 136 |
| - | 31 | 285 | 300 | 973 | 141 |
| - | 32 | 293 | 308 | 988 | 143 |
| - | 33 | 302 | 318 | 1019 | 147 |
| - | 34 | 311 | 327 | 1050 | 152 |
| - | 35 | 321 | 337 | 1096 | 159 |
| - | 37 | 331 | 349 | 1127 | 163 |
| - | 38 | 341 | 359 | 1158 | 168 |
| - | 39 | 352 | 370 | 1189 | 172 |
| - | 40 | 363 | 381 | 1235 | 179 |
| - | 41 | 375 | 395 | 1266 | 183 |
| - | 42 | 388 | 408 | 1312 | 190 |
| - | 44 | 401 | 422 | 1359 | 197 |
| - | 45 | 415 | 437 | 1420 | 206 |
| - | 46 | 429 | 452 | 1467 | 212 |
| - | 48 | 444 | 470 | 1513 | 219 |
| - | 50 | 461 | 497 | 1559 | 226 |
| - | 51 | 477 | 517 | 1621 | 235 |
| - | 52 | 495 | 532 | 1668 | 241 |
| - | 54 | 543 | 572 | 1729 | 250 |
| - | 56 | 514 | 609 | 1807 | 262 |
| - | 57 | 555 | 630 | 1884 | 273 |
| - | 59 | 578 | 670 | 1961 | 284 |
| - | 60 | 601 | 698 | 2039 | 295 |
| - | 61 | - | 720 | - | - |
| - | 62 | - | 746 | - | - |
| - | 63 | - | 772 | - | - |
| - | 64 | - | 800 | - | - |
| - | 65 | - | 832 | - | - |
| - | 66 | - | 865 | - | - |
| - | 67 | - | 900 | - | - |
| - | 68 | - | 940 | - | - |

***Conversions from each scale are approximate***

# Decimal Equivalent Chart



| Diameter | Decimal Equiv. |
|---|---|
| #80 | .0135 |
| 0.35mm | .0138 |
| #79 | .0145 |
| 1/64" | .0156 |
| 0.40mm | .0158 |
| #78 | .0160 |
| 0.45mm | .0177 |
| #77 | .0180 |
| 0.50mm | .0197 |
| #76 | .0200 |
| #75 | .0210 |
| 0.55mm | .0217 |
| #74 | .0225 |
| 0.60mm | .0236 |
| #73 | .0240 |
| #72 | .0250 |
| 0.65mm | .0256 |
| #71 | .0260 |
| 0.70mm | .0276 |
| #70 | .0280 |
| #69 | .0292 |
| 0.75mm | .0295 |
| #68 | .0310 |
| 1/32" | .0312 |
| 0.80mm | .0315 |
| #67 | .0320 |
| #66 | .0330 |
| 0.85mm | .0335 |
| #65 | .0350 |
| 0.90mm | .0354 |
| #64 | .0360 |
| #63 | .0370 |
| 0.95mm | .0374 |
| #62 | .0380 |
| #61 | .0390 |
| 1.00mm | .0394 |
| #60 | .0400 |
| #59 | .0410 |
| 1.05mm | .0413 |
| #58 | .0420 |
| #57 | .0430 |
| 1.10mm | .0433 |
| 1.15mm | .0453 |
| #56 | .0465 |
| 3/64" | .0469 |
| 1.20mm | .0472 |
| 1.25mm | .0492 |
| 1.30mm | .0512 |
| #55 | .0520 |
| 1.35mm | .0531 |
| #54 | .0550 |
| 1.40mm | .0551 |
| 1.45mm | .0571 |
| 1.50mm | .0591 |
| #53 | .0595 |
| 1.55mm | .0610 |
| 1/16" | .0625 |
| 1.60mm | .0630 |
| #52 | .0635 |
| 1.65mm | .0650 |
| 1.70mm | .0669 |
| #51 | .0670 |
| 1.75mm | .0689 |
| #50 | .0700 |
| 1.80mm | .0709 |
| 1.85mm | .0728 |

| Diameter | Decimal Equiv. |
|---|---|
| #49 | .0730 |
| 1.90mm | .0748 |
| #48 | .0760 |
| 1.95mm | .0768 |
| 5/64" | .0781 |
| #47 | .0785 |
| 2.00mm | .0787 |
| 2.05mm | .0807 |
| #46 | .0810 |
| #45 | .0820 |
| 2.10mm | .0827 |
| 2.15mm | .0846 |
| #44 | .0860 |
| 2.20mm | .0866 |
| 2.25mm | .0886 |
| #43 | .0890 |
| 2.30mm | .0906 |
| 2.35mm | .0925 |
| #42 | .0935 |
| 3/32" | .0938 |
| 2.40mm | .0945 |
| #41 | .0960 |
| 2.45mm | .0965 |
| #40 | .0980 |
| 2.50mm | .0984 |
| #39 | .0995 |
| #38 | .1015 |
| 2.60mm | .1024 |
| #37 | .1040 |
| 2.70mm | .1063 |
| #36 | .1065 |
| 2.75mm | .1083 |
| 7/64" | .1094 |
| #35 | .1100 |
| 2.80mm | .1102 |
| #34 | .1110 |
| #33 | .1130 |
| 2.90mm | .1142 |
| #32 | .1160 |
| 3.00mm | .1181 |
| #31 | .1200 |
| 3.10mm | .1220 |
| 1/8" | .1250 |
| 3.20mm | .1260 |
| 3.25mm | .1280 |
| #30 | .1285 |
| 3.30mm | .1299 |
| 3.40mm | .1339 |
| #29 | .1360 |
| 3.50mm | .1378 |
| #28 | .1405 |
| 9/64" | .1406 |
| 3.60mm | .1417 |
| #27 | .1440 |
| 3.70mm | .1457 |
| #26 | .1470 |
| 3.75mm | .1476 |
| #25 | .1495 |
| 3.80mm | .1496 |
| #24 | .1520 |
| 3.90mm | .1535 |
| #23 | .1540 |
| 5/32" | .1562 |
| #22 | .1570 |
| 4.00mm | .1575 |
| #21 | .1590 |
| #20 | .1610 |

| Diameter | Decimal Equiv. |
|---|---|
| 4.10mm | .1614 |
| 4.20mm | .1654 |
| #19 | .1660 |
| 4.25mm | .1673 |
| 4.30mm | .1693 |
| #18 | .1695 |
| 11/64" | .1719 |
| #17 | .1730 |
| 4.40mm | .1732 |
| #16 | .1770 |
| 4.50mm | .1772 |
| #15 | .1800 |
| 4.60mm | .1811 |
| #14 | .1820 |
| #13 | .1850 |
| 4.70mm | .1850 |
| 4.75mm | .1870 |
| 3/16" | .1875 |
| 4.80mm | .1890 |
| #12 | .1890 |
| #11 | .1910 |
| 4.90mm | .1929 |
| #10 | .1935 |
| #9 | .1960 |
| 5.00mm | .1969 |
| #8 | .1990 |
| 5.10mm | .2008 |
| #7 | .2010 |
| 13/64" | .2031 |
| #6 | .2040 |
| 5.20mm | .2047 |
| #5 | .2055 |
| 5.25mm | .2067 |
| 5.30mm | .2087 |
| #4 | .2090 |
| 5.40mm | .2126 |
| #3 | .2130 |
| 5.50mm | .2165 |
| 7/32" | .2188 |
| 5.60mm | .2205 |
| #2 | .2210 |
| 5.70mm | .2244 |
| 5.75mm | .2264 |
| #1 | .2280 |
| 5.80mm | .2283 |
| 5.90mm | .2323 |
| A | .2340 |
| 15/64" | .2344 |
| 6.00mm | .2362 |
| B | .2380 |
| 6.10mm | .2402 |
| C | .2420 |
| 6.20mm | .2441 |
| D | .2460 |
| 6.25mm | .2461 |
| 6.30mm | .2480 |
| 1/4" | .2500 |
| E | .2500 |
| 6.40mm | .2520 |
| 6.50mm | .2559 |
| F | .2570 |
| 6.60mm | .2598 |
| G | .2610 |
| 6.70mm | .2638 |
| 17/64" | .2656 |
| 6.75mm | .2657 |
| H | .2660 |

| Diameter | Decimal Equiv. |
|---|---|
| 6.80mm | .2677 |
| 6.90mm | .2717 |
| I | .2720 |
| 7.00mm | .2756 |
| J | .2770 |
| 7.10mm | .2795 |
| K | .2810 |
| 9/32" | .2812 |
| 7.20mm | .2835 |
| 7.25mm | .2854 |
| 7.30mm | .2874 |
| L | .2900 |
| 7.40mm | .2913 |
| M | .2950 |
| 7.50mm | .2953 |
| 19/64" | .2969 |
| 7.60mm | .2992 |
| N | .3020 |
| 7.70mm | .3031 |
| 7.75mm | .3051 |
| 7.80mm | .3071 |
| 7.90mm | .3110 |
| 5/16" | .3125 |
| 8.00mm | .3150 |
| O | .3160 |
| 8.10mm | .3189 |
| 8.20mm | .3228 |
| P | .3230 |
| 8.25mm | .3248 |
| 8.30mm | .3268 |
| 21/64" | .3281 |
| 8.40mm | .3307 |
| Q | .3320 |
| 8.50mm | .3346 |
| 8.60mm | .3386 |
| R | .3390 |
| 8.70mm | .3425 |
| 11/32" | .3438 |
| 8.75mm | .3445 |
| 8.80mm | .3465 |
| S | .3480 |
| 8.90mm | .3504 |
| 9.00mm | .3543 |
| T | .3580 |
| 9.10mm | .3583 |
| 23/64" | .3594 |
| 9.20mm | .3622 |
| 9.25mm | .3642 |
| 9.30mm | .3661 |
| U | .3680 |
| 9.40mm | .3701 |
| 9.50mm | .3740 |
| 3/8" | .3750 |
| V | .3770 |
| 9.60mm | .3780 |
| 9.70mm | .3819 |
| 9.75mm | .3839 |
| 9.80mm | .3858 |
| W | .3860 |
| 9.90mm | .3898 |
| 25/64" | .3906 |
| 10.00mm | .3937 |
| X | .3970 |
| Y | .4040 |
| 13/32" | .4062 |
| Z | .4130 |
| 10.50mm | .4134 |

| Diameter | Decimal Equiv. |
|---|---|
| 27/64" | .4219 |
| 11.00mm | .4331 |
| 7/16" | .4375 |
| 11.50mm | .4528 |
| 29/64" | .4531 |
| 15/32" | .4688 |
| 12.00mm | .4724 |
| 31/64" | .4844 |
| 12.50mm | .4921 |
| 1/2" | .5000 |
| 13.00mm | .5118 |
| 33/64" | .5156 |
| 17/32" | .5312 |
| 13.50mm | .5315 |
| 35/64" | .5469 |
| 14.00mm | .5512 |
| 9/16" | .5625 |
| 14.50mm | .5709 |
| 37/64" | .5781 |
| 15.00mm | .5906 |
| 19/32" | .5938 |
| 39/64" | .6094 |
| 15.50mm | .6102 |
| 5/8" | .6250 |
| 16.00mm | .6299 |
| 41/64" | .6406 |
| 16.50mm | .6496 |
| 21/32" | .6562 |
| 17.00mm | .6693 |
| 43/64" | .6719 |
| 11/16" | .6875 |
| 17.50mm | .6890 |
| 45/64" | .7031 |
| 18.00mm | .7087 |
| 23/32" | .7188 |
| 18.50mm | .7283 |
| 47/64" | .7344 |
| 19.00mm | .7480 |
| 3/4" | .7500 |
| 49/64" | .7656 |
| 19.50mm | .7677 |
| 25/32" | .7812 |
| 20.00mm | .7874 |
| 51/64" | .7969 |
| 20.50mm | .8071 |
| 13/16" | .8125 |
| 21.00mm | .8268 |
| 53/64" | .8281 |
| 27/32" | .8438 |
| 21.50mm | .8465 |
| 55/64" | .8594 |
| 22.00mm | .8661 |
| 7/8" | .8750 |
| 22.50mm | .8858 |
| 57/64" | .8906 |
| 23.00mm | .9055 |
| 29/32" | .9062 |
| 59/64" | .9219 |
| 23.50mm | .9252 |
| 15/16" | .9375 |
| 24.00mm | .9449 |
| 61/64" | .9531 |
| 24.50mm | .9646 |
| 31/32" | .9688 |
| 25.00mm | .9843 |
| 63/64" | .9844 |
| 1" | 1.0000 |


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COOLANT

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