

HANNIBAL

Carbide Tool, Inc



**CARBIDE TIPPED
& SOLID CARBIDE
CUTTING TOOLS**

2026 Tool Selector Guide & Pricing

WHY HANNIBAL IS ACKNOWLEDGED WORLD CLASS...

THE HANNIBAL WORLD CLASS DIFFERENCE: END USER BENEFITS:

QUALITY — CONSISTENT QUALITY

- Mature quality system – Ford Q101 certified in 1989 and many other major end users' certifications
- Continuous product & quality improvement
- Emphasis on defect prevention & variation reduction
- Tighter tolerances mean better products

- Longer tool life means less down time
- Lower tool cost per part machined

SERVICE — EXCEPTIONAL SERVICE

- Over 97% of line item orders filled – huge finished tool inventory
- Over 97% of orders shipped same date received – drop shipments
- Over 96% of special order tools shipped on promised date
- Special order tool quotes usually same day, always by next day

- Reduces end user's tool inventory cost
- Enables successful "Just in Time" programs
- Reduces tool procurement lead times
- Eliminates end user's production delays

VALUE — SUPERIOR VALUE

- Competitively priced
- Dramatically outperforms high speed steel tools
- Technically advanced tool geometries, carbide grades & titanium coatings outperform all competitors
- Material specific tools for more demanding applications
- Tool selection & application support available on the phone or in the field – just call us

- Dramatically reduces tool cost per operation
- Improves end user's competitive position
- Better performing tools

RESPONSIVENESS — MARKET DRIVEN RESPONSIVENESS

- End user demands generated our standard tool offering of over 20,000 stocked line items
- Solution focused technical & engineering staff
- Tool design creativity based on extensive field experience
- No minimum order size

- Multi-operation tools eliminate operations
- Comprehensive tooling solutions
- Ease of doing business
- Personalized service

LEADERSHIP — RESPONSIBLE LEADERSHIP

- Extensive & deep management commitment
- Long term planning emphasized
- Highest standards of integrity in all of our relationships – customers, suppliers, and employees
- 1999 Recipient of American Eagle Award – Employee Category

- Constantly improving tool supplier
- Availability of latest tool technology
- Understands end user's specific tooling requirements

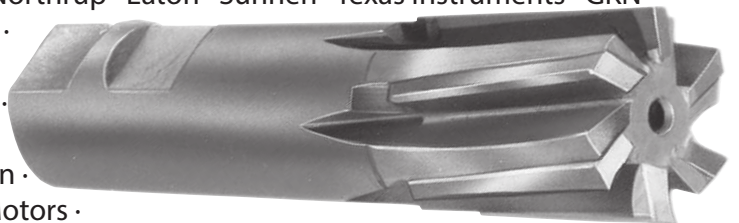
STABILITY — FOR TODAY & TOMORROW

- Strong, financially sound – no debt
- One family ownership with three generations of solid commitment to the cutting tool industry
- Stable, loyal employee team at all levels – tool makers, technical/engineering, customer service, and management
- Extremely small employee turnover

- Dependable long term supplier partner
- Continuity of individual relationships

HANNIBAL'S WORLD CLASS END USERS

John Deere · Boeing · Sikorsky · Caterpillar · Cummins Engine · General Electric · Vought Aircraft · Navistar · Cloyes · Bell Helicopter · Kennedy Valve · Grumman · Northrup · Eaton · Sunnen · Texas Instruments · GKN · Detroit Diesel · Pratt & Whitney · Lockheed · Homelite · Ford · Mack · Sundstrand · Delco · Briggs & Stratton · Cooper · Colt · Mercury Marine · Delta · Borg Warner · Harrison Radiator · Gardners · NACCO · Otis Elevator · Golden's Foundry · APEX · Remington · Parker · Spartan · Stratoflight · Bosch · Dexter · Allied · Alcoa · General Motors · Sturm Ruger · General · Rockwell · Copeland · Harley Davidson · Cleveland Pneumatic · Saginaw Steering · Smith & Wesson · Hamilton Standard · Vermeer · Jacobs · AAR · IngersollChrysler · Alcoa · Dana · ACME ·





WORLD CLASS CONTENTS

GENERAL INFORMATION

SELECTED DISTRIBUTION

To ensure exceptional service & technical application support, Hannibal only sells through selected distributors, your communications link with us. If you require direct technical assistance, contact our Engineering and Technical Service Team.

Phone: 800-451-9436

E-mail: sales@hannibalcarbide.com

STOCK STATUS

Because of our exceptionally broad product listing of over 20,000 line items, our distributors seldom stock our tools unless they have a consistent demand for particular tools requiring same day delivery. HANNIBAL maintains a 99% line item order fill rate. We have a huge inventory of finished tools ready to meet your needs.

ORDERING

The only description required to order a standard tool is the EDP number. However, as a cross-check, orders should include a brief description of the tool.

APPLICATIONS ENGINEERING

HANNIBAL prides itself on the ability to solve end user tooling problems. We will suggest solutions including tool designs that have been used successfully to solve similar problems. Our proven applications engineering capability is reflected in the fact that some of the largest machine tool builders select HANNIBAL to design and produce the original cutting tools used in producing engines and transmissions.

QUALITY TOOLS

20% of HANNIBAL'S sales are special order tools made to end user's specifications and prints for the very demanding automotive, diesel engine, aircraft engine, aerospace, and construction equipment industries. To meet these stringent requirements, our engineers and tool makers work daily with exacting tolerances and procedures.

TOLERANCES AND SPECIFICATIONS

All our tools are manufactured to one or more of the following specifications:

USCTI - United States Cutting Tool Institute

NAS - National Aerospace Standards

ASME/ANSI - American National Standards Institute, and affiliate of American Society of Mechanical Engineers

TOOL PERFORMANCE

While price is always a consideration, the real measure of the tool's value is its in-plant performance. HANNIBAL'S tool performance is proven wherever accurate records are kept, such as the aerospace and automotive industries. Here our tools earn "excellent" ratings... and that is why we are one of the fastest growing tool companies in the world.

PEOPLE

HANNIBAL'S engineers, technicians, tool makers, and sales & support staff are continually focused on the goal of producing the world's best carbide tipped tools. Our experienced tool makers sincerely want to do their very best every day making every effort to manufacture tools that will meet your exacting needs.

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TOOL SELECTION USING CHIP CLASSIFICATIONS

1 FIND THE MATERIAL BEING MACHINED

2 CONFIRM CHIP FORM – BASED ON DRILL CHIP

| | |
|--------------------------------|--|
| ALUMINUM ALLOY - CAST | 308.0, 356.0, 360.0, 380.0, 390.0, 514.0 |
| ALUMINUM ALLOY - WROUGHT | 3003, 4032, 5052, 6061, 7075 |
| COPPER ALLOY - TOUGH | 110, 170, 172, 175, 280, 425, 610, 655 |
| LEAD ALLOY | ALLOYS 7, 8, 13, 15, 15b-95b |
| NON-METAL AND PLASTIC..... | Bakelite, Nylon, Polystyrene, PVC |
| ZINC - DIE CAST ALLOY | AC41A, AG40A, AMS4803, ZDC NO. 7 |

LONG STRINGY CHIPS
(WROUGHT ALUMINUM, COPPER, AND PLASTIC)

MEDIUM LENGTH CURLED CHIPS
(ALL OTHER MATERIALS)

- CHIP EVACUATION IS KEY WHEN DRILLING OR REAMING THESE MATERIALS

| | |
|--------------------------------------|------------------------------|
| ALUMINUM BRONZE..... | 614, 952-958 |
| BRASS - LEADED AND FREE CUTTING..... | 340, 342, 353, 360, 370, 485 |
| BRASS - YELLOW, RED, NAVAL | 268, 270, 464-467 |
| COMMERCIAL BRONZE (LEADED) | 314 |
| MAGNESIUM ALLOY | AM60A, AZ21A, AZ91B-C, K1A |
| NICKEL SILVER | 745-770, 973-978 |

SHORT CHIPS

- THESE MATERIALS CREATE NO MAJOR DRILLING OR REAMING PROBLEMS

| | |
|--|--|
| DUCTILE CAST IRON - AUSTENITIC | D-2, D-2B, D-2C, D-2M, D-3, D-3A, D-4, D-5 |
| FERRITIC | 60-40-18, 65-45-12, D4018, D4512 |
| FERRITIC-PEARLITIC | 80-55-06, D5506 |
| PEARLITIC-MARTENSITIC | 100-70-03, D7003 |
| MARTENSITIC..... | 120-90-02, DQ&T |
| GRAY CAST IRON | 20, 25, 30, 35, 40, 45, 50, 55 |
| MALLEABLE CAST IRON - FERRITIC OR PEARLITIC..... | 32510, 35018, 45008, M3210, M4504 |

DISCONTINUOUS CURLED CHIPS

- THESE MATERIALS ARE VERY ABRASIVE WHICH CAN CAUSE RAPID WEAR OF THE TOOL MARGINS AND CUTTING EDGES

| | |
|--|----------------------|
| LOW AND MEDIUM CARBON STEEL - WROUGHT..... | 1005-1029, 1030-1050 |
| LOW CARBON STEEL - CAST | 1010, 1020 |
| MEDIUM CARBON STEEL - CAST | 1030, 1040, 1050 |

LONG CONTINUOUS CHIPS

- HEAT TREATMENT MAY IMPROVE THE MACHINABILITY OF SOME OF THESE MATERIALS
- CARBIDE TIPPED DRILLS ARE NOT GENERALLY RECOMMENDED FOR PLAIN CARBON STEEL

| | |
|--|--------------------------------------|
| LOW AND MEDIUM CARBON ALLOY STEEL | 4320, 4340, 4620, 5015, 8620, 9310 |
| LOW AND MEDIUM CARBON ALLOY STEEL - FREE MACH..... | 4140, 4142Se, 4145Te, 4150, 86L20 |
| MEDIUM AND HIGH CARBON ALLOY STEEL - LEADED | 41L30, 41L40, 41L50 |
| STAINLESS STEEL - 300 SERIES (FREE MACH.) | 303, 303MA, 303Pb, 303 PLUS X, 303Se |
| STAINLESS STEEL - 400 SERIES..... | 409, 410, 420, 430, 436 |
| STAINLESS STEEL - 400 SERIES (FREE MACH.)..... | 416, 416Se, 420F, 430F, 440F |

THICK CURLED CHIPS

- HEAT TREATMENT MAY IMPROVE THE MACHINABILITY OF SOME OF THESE MATERIALS
- COOLANT FED DRILLS ARE GENERALLY RECOMMENDED FOR THESE MATERIALS

| | |
|------------------------------------|--------------------------------------|
| ARMOR PLATE..... | HY-80, HY-100, HY-180, MIL-5-12560 |
| HIGH CARBON ALLOY STEEL | 50100, 51100, 52100 |
| HIGH STRENGTH STEEL - WROUGHT..... | 300M, 4330V, 98BV40, HP 9-4-20 |
| MARAGING STEEL..... | GRADES 200, 250, 300, 350, HY 230 |
| NITRIDING STEEL | Nitralloy 125, 135, 135 Mod., 230 |
| TOOL STEEL..... | SERIES A2, D2, H13, M50, P20, S7, W1 |

SHORT WIRY CURLED CHIPS

- CHIP DISCOLORATION IS COMMON WITH THESE MATERIALS
- THESE STEELS ARE DIFFICULT TO MACHINE DUE TO THE HIGH CARBON AND ALLOY CONTENT
- COOLANT FED DRILLS ARE GENERALLY RECOMMENDED FOR THESE MATERIALS

| | |
|-----------------------------------|---|
| IRON BASE ALLOY..... | A-286, Discaloy, Incoloy 800-802 |
| NICKEL BASE ALLOY..... | Hastelloy C, Inconel 600, 625, 718, 825 |
| STAINLESS STEEL - 300 SERIES..... | 302, 304, 309, 314, 316, 330, 347, 385 |
| STAINLESS STEEL - PH SERIES..... | 15-5PH, 16-6PH, 17-4PH, AM-350 |
| TITANIUM ALLOY..... | Ti-6Al-4V, Ti-10v-2Fe-3Al, 98.9, 99.5 |

LONG WIRY CHIPS

- CHIP DISCOLORATION IS COMMON WITH THESE MATERIALS
- THIS GROUP MAY WORK HARDEN IF NOT MACHINED WITH CORRECT FEED RATES

3 LOCATE CHIP CLASS



NON-FERROUS LONG CHIPS
CHIP CLASS **20**



NON-FERROUS SHORT CHIPS
CHIP CLASS **40**



CAST IRONS
CHIP CLASS **60**




LOW STRENGTH STEELS
CHIP CLASS **80**



MEDIUM STRENGTH STEELS
CHIP CLASS **100**



HIGH STRENGTH STEELS
CHIP CLASS **120**



HIGH TEMPERATURE ALLOYS
CHIP CLASS **140**

4 SELECT FROM RECOMMENDATIONS IN TOOL SELECTOR BOX

| CHIP CLASS | MATERIAL MACHINED | TOOL TYPE |
|------------|---------------------------|-----------|
| 20 | NON-FERROUS - LONG CHIPS | |
| 40 | NON-FERROUS - SHORT CHIPS | |
| 60 | CAST IRONS | |
| 80 | LOW STRENGTH STEELS | |
| 100 | MEDIUM STRENGTH STEELS | |
| 120 | HIGH STRENGTH STEELS | |
| 140 | HIGH TEMPERATURE ALLOYS | |

HANNIBAL'S RECOMMENDED TOOL TYPE(S) APPEAR IN TOOL SELECTOR BOX FOR EACH CATALOG ITEM

“/” = PREFERRED TYPE NOTED FIRST (e.g., “459/458”)
“or” = NO PREFERENCE (e.g., “620 or 622”)



MILLING STAINLESS STEELS CHIP CLASSIFICATIONS

| MATERIAL MACHINED | CHIP CLASS |
|---|------------|
| FREE MACHINING 300 SERIES | 60 |
| FERRITIC 400 SERIES MARTENSITIC 400 SERIES | 100 |
| AUSTENITIC 200 OR 300 SERIES PH SERIES | 140 |

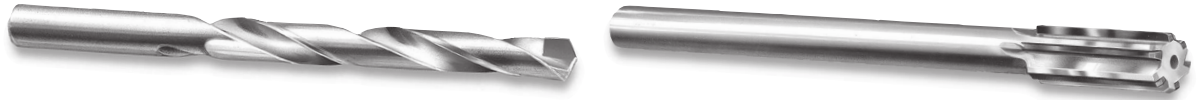
HANNIBAL'S CHIP CLASSIFICATIONS ARE BASED ON EACH MATERIAL'S MOST COMMON CONDITION. SPECIAL HEAT TREATMENTS OR PROCESSING MAY CHANGE THE MATERIAL'S MACHINING CHARACTERISTICS. THIS HANNIBAL GUIDE IS A SUGGESTED STARTING POINT FOR TOOL SELECTION.



FEEDS & SPEEDS — DRILLING OR REAMING GENERAL PURPOSE OR COOLANT FED

GENERAL PURPOSE

COOLANT FED



TECHNICAL

| CHIP CLASS | MATERIAL BEING MACHINED | MATERIAL EXAMPLES | BRINELL HARDNESS | CHIP DESCRIPTION |
|------------|---|---|------------------|-------------------------------------|
| 20 | ALUMINUM ALLOY CAST AND WROUGHT | 308.0, 356.0, 360.0, 380.0, 383.0, 390.0, 2024, 3003, 4032, 5052, 6061, 7075 | 30-150 (500 kg) | DISCONTINUOUS FLAKY OR LONG STRINGY |
| | COPPER ALLOY TOUGH | 101, 110, 115, 120, 130, 142, 155, 170, 172, 175, 195, 425, 610, 630, 655, 725, 805, 826, 910 | 40-200 (500 kg) | LONG CONTINUOUS |
| | LEAD ALLOY | Alloys 7, 8, 13, 15 1Sb, 4Sb, 6Sb, 8Sb, 9Sb | 10-20 (500 kg) | DISCONTINUOUS TIGHTLY CURLED |
| | PLASTIC | ABS, Acrylic, Allyl, Bakelite, Epoxy, Furan, Nylon, Polyethylene, Polystyrene, PVC | – | CONTINUOUS |
| | ZINC ALLOY | AC41A, AG40A, AMS4803, ILZRO 12, ZDC NO. 7, GRADES 903, 925 | 80-100 | LONG TIGHTLY CURLED |
| 40 | ALUMINUM BRONZE | 614, 952-958 | 40-175 | SHORT LOOSELY CURLED |
| | COPPER ALLOY/BRASS/BRONZE FREE MACHINING | 268, 270, 314, 332, 335, 340, 342, 353, 356, 360, 370, 464-467, 485, 838, 945 | 10-100 Rb | FLAT SMALL |
| | MAGNESIUM ALLOY | AM60A, AZ21A, AZ91B-C, HM31A, K1A, ZE41A, ZK40A | 50-90 (500 kg) | FLAT SMALL |
| | NICKEL SILVER | 745, 752, 754, 757, 700, 973-978 | 10-100 Rb | LOOSELY CURLED |
| 60 | CAST IRON-DUCTILE AUSTENITIC (NI-RESIST) | TYPES D-2, D-2B, D-2C, D-2M, D-3, D-3A, D-4, D-5, D-5B | 120-275 | DISCONTINUOUS TIGHTLY CURLED |
| | CAST IRON-DUCTILE FERRITIC & FERRITIC-PEARLITIC | GRADES 60-40-18, 65-45-12, 80-55-06, D4018, D4512, D5506 | 140-270 | DISCONTINUOUS TIGHTLY CURLED |
| | CAST IRON-DUCTILE MARTENSITIC & PEARLITIC-MARTENSITIC | GRADES 100-70-03, 120-90-02, D7003, DQ&T | 270-400 | DISCONTINUOUS TIGHTLY CURLED |
| | CAST IRON-GRAY FERRITIC & FERRITIC-PEARLITIC | CLASSES 20, 25, 30, 35, 40 GRADES G1800, G2500, G3000 | 120-220 | DISCONTINUOUS |
| | CAST IRON-GRAY PEARLITIC | CLASSES 45, 50, 55, 60 GRADES G3500, G4000 | 220-320 | DISCONTINUOUS |
| | CAST IRON-MALLEABLE FERRITIC & PEARLITIC | CLASSES 32510, 35018, 40010, 45008 GRADES M3210, M4504, M5003 | 110-240 | DISCONTINUOUS |
| | CAST IRON-MALLEABLE TEMPERED MARTENSITE | GRADES 60004, 70003, 80002 GRADES M5003, M8501 | 200-320 | DISCONTINUOUS |
| 80 | STEEL-LOW & MEDIUM STRENGTH FREE MACHINING | 1108-1119, 1132-1151, 10L17, 10L18, 10L50, 11L44, 12L13, 12L14, 12L15 | 100-250 | DISCONTINUOUS LOOSELY CURLED |
| | STEEL-LOW & MEDIUM STRENGTH WROUGHT | 1005-1029, 1030-1050, 1513, 1518, 1524, 1552 | 100-375 | CONTINUOUS STRINGY |
| 100 | ALLOY STEEL-LOW & MEDIUM STRENGTH FREE MACHINING | 41L30, 41L40, 41L50, 86L20, 4142Se, 4145Te | 100-275 | DISCONTINUOUS TIGHTLY CURLED |
| | ALLOY STEEL-LOW & MEDIUM STRENGTH | 1330, 1345, 1515, 4012, 4130, 4140, 4150, 4320, 4340, 4620, 5130, 8620, 8630, 8645, 9310 | 85-375 | LOOSELY CURLED |
| | STAINLESS STEEL 400 SERIES | 409, 410, 414, 420, 430, 436, 442, 446 | 135-325 | DISCONTINUOUS TIGHTLY CURLED |
| | STAINLESS STEEL FREE MACHINING | 203 EZ, 303, 303MA, 303Pb, 303 PLUS X, 303Se, 416, 416Se, 420F, 430F, 440F | 135-275 | SHORT TIGHTLY CURLED |
| 120 | ALLOY STEEL-HIGH STRENGTH, MARAGING STEEL, NITRIDING STEEL, TOOL STEEL | 50100, 51100, 52100, GRADES 200-350, Nitralloy, SERIES A2, D2, H13, M50, P20, S7, WI | 175-400 | CONTINUOUS WIRY |
| 140 | HIGH TEMP ALLOY NICKEL & IRON | A-286; Hastelloy C; Inconel 600, 625, 718, 825; Monel 400; Nimonic 75, 80; Rene 41; Waspaloy | 140-300 | CONTINUOUS WIRY |
| | STAINLESS STEEL 300 SERIES | 301, 302, 304, 309, 314, 316, 321, 330, 347, 385, Nitronic 32, 33, 40, 50, 60 | 135-375 | WIRY LOOSELY CURLED |
| | STAINLESS STEEL PH SERIES | 13-8 Mo, 15-5PH, 16-6PH, 17-4PH, 17-7PH, AM-350, AM-355 | 150-440 | WIRY LOOSELY CURLED |
| | TITANIUM ALLOY | 98.9, 99.0, 99.2, 99.5, Ti-6Al-4V, Ti-6Al-6V2Sn, Ti-8Mn, Ti-10v-2Fe-3Al | 110-380 | CONTINUOUS WIRY |

| TOOL APPLIC. | | CUTTING SPEED (SFM) STARTING RANGE* | | FEED RATE (INCHES PER REVOLUTION) | | | | | | | | | | | | | | | | | |
|--------------|--------------------|--|--------------|-----------------------------------|--------------|---------------|--------------|---------------|--------------|---------------|--------------|---------------|--------------|---------------|--------------|---------------|--------------|---------------|--------------|---------------|--------------|
| | | | | HOLE DIAMETER IN INCHES | | | | | | | | | | | | | | | | | |
| | | | | 1/8 | | 1/4 | | 3/8 | | 1/2 | | 5/8 | | 3/4 | | 1 | | 1 1/4 | | 1 1/2 | |
| | | | | GEN. PUR-POSE | COOL-ANT FED | GEN. PUR-POSE | COOL-ANT FED | GEN. PUR-POSE | COOL-ANT FED | GEN. PUR-POSE | COOL-ANT FED | GEN. PUR-POSE | COOL-ANT FED | GEN. PUR-POSE | COOL-ANT FED | GEN. PUR-POSE | COOL-ANT FED | GEN. PUR-POSE | COOL-ANT FED | GEN. PUR-POSE | COOL-ANT FED |
| DRILL REAM | 250-350 150-250 | 375-550 200-300 | .003 .004 | - - | .005 .006 | .004 .008 | .007 .008 | .005 .010 | .008 .011 | .006 .013 | .010 .012 | .006 .015 | .011 .013 | .007 .017 | .014 .016 | .009 .021 | .017 .019 | - .022 | .019 .020 | - .024 | |
| DRILL REAM | 125-190 50-90 | 225-300 70-105 | .002 .005 | - - | .005 .006 | .004 .008 | .007 .008 | .005 .010 | .008 .010 | .006 .013 | .009 .011 | .007 .014 | .010 .012 | .008 .016 | .012 .014 | .010 .018 | .014 .016 | - .019 | .016 .017 | - .020 | |
| DRILL REAM | 350-450 150-250 | 400-500 200-300 | .003 .002 | - - | .005 .006 | .004 .008 | .006 .008 | .006 .010 | .007 .012 | .007 .016 | .008 .014 | .008 .017 | .009 .015 | .009 .018 | .013 .018 | .013 .022 | .015 .021 | - .024 | .017 .022 | - .026 | |
| DRILL REAM | 175-450 90-250 | - 125-300 | .002 .004 | - - | .004 .005 | - .006 | .005 .007 | - .008 | .005 .008 | - .009 | .006 .010 | - .012 | .008 .014 | - .016 | .009 .014 | - .016 | .010 .016 | - .018 | .012 .018 | - .020 | |
| DRILL REAM | 300-400 140-210 | 400-500 170-240 | .003 .005 | - - | .005 .007 | .004 .009 | .007 .008 | .005 .011 | .009 .010 | .006 .013 | .011 .011 | .008 .014 | .012 .012 | .009 .016 | .014 .015 | .010 .020 | .016 .018 | - .022 | .018 .020 | - .025 | |
| DRILL REAM | 125-190 50-90 | 200-300 70-105 | .002 .004 | - - | .005 .006 | .004 .008 | .007 .010 | .005 .013 | .008 .012 | .006 .015 | .009 .014 | .007 .016 | .010 .016 | .008 .018 | .012 .018 | .010 .021 | .014 .020 | - .024 | .016 .022 | - .028 | |
| DRILL REAM | 225-400 100-250 | 300-450 125-300 | .003 .005 | - - | .005 .008 | .004 .010 | .007 .011 | .005 .014 | .008 .015 | .006 .020 | .009 .017 | .007 .022 | .010 .018 | .008 .024 | .012 .020 | .010 .026 | .014 .022 | - .028 | .016 .025 | - .032 | |
| DRILL REAM | 300-400 130-190 | 450-550 150-250 | .003 .005 | - - | .005 .010 | .005 .012 | .006 .012 | .006 .015 | .007 .015 | .007 .018 | .008 .016 | .008 .019 | .009 .017 | .009 .020 | .013 .020 | .013 .024 | .015 .022 | - .026 | .016 .025 | - .028 | |
| DRILL REAM | 125-190 50-90 | 225-300 70-190 | .002 .004 | - - | .005 .006 | .004 .007 | .007 .008 | .005 .010 | .008 .010 | .006 .012 | .009 .011 | .007 .013 | .010 .012 | .008 .014 | .012 .014 | .010 .017 | .014 .015 | - .018 | .016 .016 | - .018 | |
| DRILL REAM | - 45-70 | - 65-100 | - .004 | - - | - .006 | - .008 | - .007 | - .009 | - .008 | - .011 | - .010 | - .014 | - .013 | - .016 | - .015 | - .018 | - .020 | - .018 | - .020 | - .020 | - .025 |
| DRILL REAM | 150-225 50-90 | 200-250 70-105 | .002 .004 | - - | .004 .005 | .004 .007 | .006 .008 | .005 .010 | .008 .010 | .006 .012 | .010 .012 | .007 .015 | .012 .014 | .008 .017 | .014 .017 | .010 .022 | .016 .020 | - .024 | .018 .023 | - .027 | |
| DRILL REAM | - 35-60 | 200-250 50-85 | - .004 | - - | - .006 | .004 .008 | - .007 | .005 .009 | - .008 | .006 .011 | - .009 | .007 .011 | - .010 | .008 .013 | - .012 | .010 .014 | - .014 | - .017 | - .016 | - .019 | |
| DRILL REAM | 175-300 65-135 | 250-400 95-190 | .002 .005 | - - | .005 .008 | .004 .010 | .007 .010 | .006 .013 | .009 .011 | .008 .014 | .011 .013 | .010 .017 | .014 .016 | .012 .020 | .017 .020 | .015 .024 | .018 .022 | .018 .028 | .019 .025 | .030 | |
| DRILL REAM | 130-225 45-70 | 225-325 55-100 | .002 .004 | - - | .004 .006 | .004 .008 | .006 .008 | .006 .010 | .007 .009 | .008 .012 | .009 .010 | .010 .014 | .012 .015 | .013 .018 | .015 .018 | .016 .020 | .016 .018 | - .020 | .018 .020 | - .026 | |
| DRILL REAM | 125-190 60-120 | 200-250 70-105 | .002 .004 | - - | .005 .006 | .004 .007 | .008 .010 | .006 .012 | .009 .011 | .008 .014 | .010 .012 | .008 .014 | .011 .013 | .008 .014 | .012 .014 | .010 .017 | .014 .016 | - .020 | .016 .018 | - .022 | |
| DRILL REAM | 100-150 45-70 | 200-250 65-100 | .002 .004 | - - | .004 .006 | .004 .008 | .006 .008 | .005 .010 | .007 .010 | .006 .012 | .008 .012 | .007 .014 | .010 .013 | .008 .015 | .012 .015 | .010 .020 | .014 .018 | - .023 | .016 .025 | - .030 | |
| DRILL REAM | 125-175 70-100 | 150-250 100-150 | .003 .005 | - - | .004 .008 | .005 .012 | .008 .010 | .006 .014 | .010 .012 | .008 .016 | .012 .014 | .009 .018 | .014 .015 | .010 .020 | .017 .020 | .012 .025 | .018 .025 | - .030 | .019 .030 | - .035 | |
| DRILL REAM | - 30-85 | - 40-110 | - .004 | - - | - .008 | - .009 | - .009 | - .011 | - .011 | - .013 | - .013 | - .015 | - .015 | - .017 | - .018 | - .022 | - .020 | - .024 | - .022 | - .026 | |
| DRILL REAM | - 65-100 | 100-220 90-135 | - .005 | - - | - .008 | .005 .010 | - .010 | .006 .012 | - .015 | .007 .018 | - .017 | .008 .020 | - .018 | .010 .022 | - .022 | .012 .025 | - .025 | - .027 | - .027 | - .030 | |
| DRILL REAM | - 40-85 | 100-150 65-100 | - .005 | - - | - .010 | .005 .012 | - .012 | .006 .015 | - .015 | .007 .018 | - .018 | .008 .022 | - .020 | .010 .024 | - .025 | .012 .028 | - .027 | - .030 | - .030 | - .033 | |
| DRILL REAM | - 40-90 | 110-150 50-100 | - .003 | - - | - .005 | .004 .007 | - .006 | .005 .007 | - .007 | .006 .008 | - .008 | .007 .009 | - .008 | .008 .009 | - .010 | .010 .012 | - .011 | - .014 | - .012 | - .015 | |
| DRILL REAM | 100-150 65-100 | 125-190 90-135 | .002 .004 | - - | .004 .006 | .004 .008 | .005 .007 | .005 .009 | .006 .008 | .006 .010 | .007 .009 | .007 .011 | .008 .009 | .007 .012 | .010 .010 | .008 .013 | .012 .011 | - .013 | .014 .012 | - .014 | |
| DRILL REAM | - 35-70 | 100-150 50-100 | - .004 | - - | - .006 | .004 .007 | - .007 | .006 .008 | - .008 | .007 .009 | - .009 | .008 .011 | - .010 | .010 .012 | - .011 | .012 .014 | - .012 | .015 .015 | - .013 | - .016 | |
| DRILL REAM | - 15-85 | - 20-115 | - .003 | - - | - .005 | - .006 | - .005 | - .007 | - .005 | - .007 | - .006 | - .008 | - .007 | - .008 | - .008 | - .010 | - .010 | - .012 | - .012 | - .015 | |
| DRILL REAM | - 40-75 | - 60-90 | - .003 | - - | - .004 | - .006 | - .005 | - .007 | - .006 | - .008 | - .006 | - .008 | - .007 | - .009 | - .008 | - .010 | - .009 | - .011 | - .010 | - .012 | |
| DRILL REAM | - 35-70 | - 50-90 | - .003 | - - | - .004 | - .006 | - .004 | - .006 | - .005 | - .007 | - .006 | - .008 | - .007 | - .009 | - .008 | - .010 | - .009 | - .012 | - .010 | - .014 | |
| DRILL REAM | - 30-45 | - 40-60 | - .004 | - - | - .006 | - .008 | - .008 | - .010 | - .010 | - .013 | - .011 | - .014 | - .011 | - .014 | - .012 | - .016 | - .013 | - .016 | - .014 | - .018 | |

*Use low end of speed range for high end of hardness range.



ENGINEERED COATINGS FOR CARBIDE TIPPED TOOLS



TECHNICAL

BENEFITS OF USING COATED TOOLS

- HIGHER FEEDS AND SPEEDS
- INCREASED TOOL LIFE
- TOLERANCES HELD LONGER
- IMPROVED WORKPIECE FINISHES

IMPORTANT STEPS IN TOOL COATING SELECTION

1. Use the HANNIBAL Tool Coating Selector Guide to select the *recommended coating* for the machining operation being performed on your specific material.
2. Review the selected coating's detailed description on page 11 to confirm that it meets your specific conditions & requirements.
3. Without a trial production run, you cannot be certain that a specific coating will be the very best for your particular application.
 - Do not order a large quantity of coated standard tools but rather order several with different coatings & review the trial production run results. Then order the full quantity with the most effective coating.
 - When ordering coated special tools, request several tools with different coatings & review the trial production run results before selecting the most effective coating for the balance of the special tool order.
4. The many variables involved in selecting the very best coating for your specific application can only be resolved by trial production run & analysis. Improved coated tool performance will offset your initial time & effort.

PRE-CONDITIONS FOR SUCCESSFUL USE OF COATED TOOLS

- Good operator/manufacturing engineering skills to maximize coating benefits.
- Adequate horsepower and rigidity for maximum feeds and speeds.
- Resharpener policy to only sharpen a tool's cutting edges, thereby preserving the flute face coating.

RESHARPENING METHODS FOR PRESERVING THE FLUTE FACE COATING

- Drills: Grind lips only
- Reamers: Grind relief on chamfers only
- Counterbores: Grind relief on cutting edges only
- End Mills: Grind relief on OD and/or end teeth only
- Milling Cutters: Grind relief on OD and/or side teeth only

SPECIFIC QUALIFIED COATING COMPANIES

PVD Coating Service companies have significant equipment & processing differences that can dramatically influence the coating's effectiveness for different types of tools. HANNIBAL has selected several technically focused coating companies that collectively can meet our customers' exacting needs for all coatings & tool types.

| COATING SELECTOR GUIDE | | | | | | | |
|------------------------|-------------------------|----------|------------|---------------|-------|---------|-------|
| CHIP CLASS | MATERIAL MACHINED | DRILLING | REAMING | COUNTERBORING | | MILLING | |
| | | WET | WET | WET | DRY | WET | DRY |
| 20 | NON-FERROUS LONG CHIPS | ZrN | TiCN/ZrN | ZrN | ZrN | ZrN | ZrN |
| 40 | NON-FERROUS SHORT CHIPS | ZrN | TiCN/ZrN | ZrN | ZrN | ZrN | ZrN |
| 60 | CAST IRONS | AlTiN | TiCN/AlTiN | AlTiN | AlTiN | AlTiN | AlTiN |
| 80 | LOW STRENGTH STEELS | AlTiN | AlTiN | AlTiN | AlTiN | AlTiN | AlTiN |
| 100 | MEDIUM STRENGTH STEELS | AlTiN | AlTiN | AlTiN | AlTiN | AlTiN | AlTiN |
| 120 | HIGH STRENGTH STEELS | AlTiN | AlTiN | AlTiN | AlTiN | AlTiN | AlTiN |
| 140 | HIGH TEMPERATURE ALLOYS | AlTiN | AlTiN | AlTiN | * | AlTiN | * |

* Chip class 140 materials should not be machined dry

WHY COATED TOOLS IMPROVE PRODUCTIVITY

1. Thermal Insulation – Heat at the cutting edge is a primary reason why tools break down. Coatings bond a thermally insulating barrier to the tool to reject heat from the tool surface back into the chip, thus protecting the tool substrate and making it last longer. Some coatings, such as TiAlN and AlTiN under certain conditions, actually produce a hard layer of aluminum oxide (an excellent insulator) during the cut.
2. Mechanical Strength – Abrasion from the chip flow combined with microscopic roughness of the tool surface tends to wear the substrate and dull the cutting edge during normal operations. The high hardness, lower friction coefficient, and reduced surface roughness of coatings allow the chip to flow off the surface of the tool. This reduces built up edge and wear so tool life is increased.
3. Chemical Resistance – Heat, pressure, coolant, and workpiece material all add to the chemically reactive forces present at the cutting edge. When reactive elements are brought together under these conditions, the uncoated tool will degrade. Coatings protect the tool substrate from exposure to these reactive forces thus stabilizing the cutting edge even under the harshest conditions.

| COATING COMPARISONS | | | | |
|---------------------------------------|---------------|---------------|----------------|----------------|
| | TiN | TiCN | ZrN | AlTiN |
| Hardness (Vickers) | 2200 | 3000 | 2500 | 3600 |
| Relative Toughness (1=Toughest) | 3 | 2 | 2 | 4 |
| Max Service Temperature | 525°C (975°F) | 400°C (750°F) | 600°C (1110°F) | 750°C (1380°F) |
| Friction Coefficient | .50 | .40 | .50 | .60 |
| Thickness | 2-4 microns | 2-4 microns | 2-4 microns | 2-4 microns |
| Surface Roughness (R _a µm) | .20 | .17 | .20 | .30 |



PVD COATINGS TiN - TiCN - ZrN - AlTiN

FOR IMPROVED PERFORMANCE OF WET MACHINING

PHYSICAL VAPOR DEPOSITION (PVD)

HANNIBAL utilizes the Physical Vapor Deposition (PVD) process exclusively. PVD has a much lower process temperature than Chemical Vapor Deposition (CVD), thus preserving the strength and hardness of the alloy steel body and allowing for more aggressive machining without tool failure. The fine finish of PVD also results in a smoother, sharper cutting edge which stabilizes the cutting process, reduces edge build up, and improves surface finish on the workpiece.

TiN

Titanium Nitride coating with its familiar gold color remains a popular general purpose coating. The excellent wear resistance, thermal stability, and low coefficient of friction reduces built up edge, improving thermal transfer of heat away from the tool.

- Hardness (Vickers): 2200
- Max Service Temp: 525°C (975°F)
- Friction Coefficient: .50
- Thickness: 2-4 microns
- Surface Roughness (R_a um): .20

Applications: A good general purpose coating for drilling, reaming, counterboring and milling of Chip Class 20 thru 140 materials. Drilling and reaming should be restricted to shallow holes (<2.5x tool diameter) and to applications where coolant reaction must be minimized.

TiCN

Titanium Carbonitride, blue grey in color, has a hard, smooth finish which offers improved wear and built up edge resistance. Performs well on applications where low to moderate temperatures are generated at the cutting edge.

- Hardness (Vickers): 3000
- Max Service Temp: 400°C (750°F)
- Friction Coefficient: .40
- Thickness: 2-4 microns
- Surface Roughness (R_a um): .17

Applications: Excellent for machining materials which generate low cutting edge temperatures. Because of the relatively low service temperature of TiCN, coolant must be applied correctly to control the temperature at the cutting edge. Failure to do so can lead to premature wear of the coated surface.

ZrN

Zirconium Nitride, light gold in color, is excellent when machining non-ferrous and plastic materials. Offers a higher service temperature than TiCN.

- Hardness (Vickers): 2500
- Max Service Temp: 600°C (1110°F)
- Friction Coefficient: .50
- Thickness: 2-4 microns
- Surface Roughness (R_a um): .20

Applications: Very reliable coating when moderate temperatures are generated at the cutting edge. Generally most effective in Chip Class 20 thru 40 materials.

AlTiN

Aluminum Titanium Nitride, black in color, is excellent in abrasive and high temperature applications (>800°C). AlTiN creates a hard aluminum oxide layer during the cutting process. It is now the choice coating for Chip Classes 60 thru 140, in all applications.

- Hardness (Vickers): 3600
- Max Service Temp: 750°C (1380°F)
- Friction Coefficient: .60
- Thickness: 2-4 microns
- Surface Roughness (R_a um): .30

Applications: Preferred coating for tough and abrasive materials. Recommended for use when milling, drilling, reaming or counterboring titanium alloys, high temperature alloys, and other abrasive and difficult to machine materials.



REAMER GUIDE

BASIC TECHNICAL INFORMATION FOR REAMERS

HANNIBAL PRE-REAM DRILL SIZE CHART

REAMERS

| REAMER DIAMETER FRACTION - DECIMAL (NOMINAL) | HOLE SIZE TO LEAVE 2% | DRILL SIZE TO LEAVE 2% | HOLE SIZE TO LEAVE 3% | DRILL SIZE TO LEAVE 3% |
|--|-----------------------------|------------------------------|-----------------------------|------------------------------|
| 1/8 - .1250 | .1225 | 31 | .1213 | 3.0mm |
| 9/64 - .1406 | .1378 | 29 | .1364 | 3.4mm |
| 5/32 - .1562 | .1532 | 24 | .1516 | 25 |
| 11/64 - .1719 | .1685 | 19 | .1667 | 4.2mm |
| 3/16 - .1875 | .1838 | 14 | .1819 | 15 |
| 13/64 - .2031 | .1990 | 5.0mm | .1970 | 9 |
| 7/32 - .2188 | .2144 | 5.4mm | .2122 | 4 |
| 15/64 - .2344 | .2297 | 1 | .2274 | 5.7mm |
| 1/4 - .2500 | .2450 | C | .2425 | 6.1mm |
| 17/64 - .2656 | .2600 | 6.5mm | .2576 | F |
| 9/32 - .2812 | .2756 | I | .2728 | 6.9mm |
| 19/64 - .2969 | .2910 | 7.3mm | .2880 | 7.25mm |
| 5/16 - .3125 | .3063 | 7.75mm | .3031 | N |
| 21/64 - .3281 | .3215 | 8.1mm | .3183 | O |
| 11/32 - .3438 | .3370 | 8.5mm | .3335 | 8.4mm |
| 23/64 - .3594 | .3522 | S | .3486 | 8.8mm |
| 3/8 - .3750 | .3675 | 9.25mm | .3638 | 23/64 |
| 25/64 - .3906 | .3828 | 9.6mm | .3789 | V |
| 13/32 - .4062 | .3982 | 10.0mm | .3941 | 25/64 |
| 27/64 - .4219 | .4135 | 10.4mm | .4092 | 13/32 |
| 7/16 - .4375 | .4288 | 10.8mm | .4244 | 27/64 |
| 29/64 - .4531 | .4440 | 11.2mm | .4395 | 7/16 |
| 15/32 - .4688 | .4594 | 11.6mm | .4547 | 29/64 |
| 31/64 - .4844 | .4747 | 12.0mm | .4699 | 15/32 |
| 1/2 - .5000 | .4900 | 31/64 | .4850 | 12.2mm |
| 33/64 - .5156 | .5053 | 1/2 | .5000 | 12.6mm |
| 17/32 - .5312 | .5206 | 33/64 | .5153 | 13.0mm |
| 35/64 - .5469 | .5360 | 17/32 | .5305 | 13.4mm |
| 9/16 - .5625 | .5513 | 35/64 | .5456 | 13.8mm |
| 37/64 - .5781 | .5665 | 9/16 | .5608 | 14.2mm |
| 19/32 - .5938 | .5820 | 37/64 | .5760 | 14.5mm |
| 39/64 - .6094 | .5972 | 19/32 | .5911 | 14.9mm |
| 5/8 - .6250 | .6125 | 39/64 | .6063 | 15.3mm |
| 41/64 - .6406 | .6278 | 5/8 | .6214 | 15.7mm |
| 21/32 - .6562 | .6431 | 41/64 | .6365 | 16.1mm |
| 43/64 - .6719 | .6585 | 21/32 | .6517 | 16.5mm |
| 11/16 - .6875 | .6738 | 17.0mm | .6669 | 16.8mm |
| 45/64 - .7031 | .6890 | 11/16 | .6820 | 17.2mm |
| 23/32 - .7188 | .7044 | 45/64 | .6972 | 17.6mm |
| 47/64 - .7344 | .7197 | 18.2mm | .7124 | 18.0mm |
| 3/4 - .7500 | .7350 | 18.5mm | .7275 | 18.3mm |
| 49/64 - .7656 | .7502 | 18.9mm | .7426 | 18.8mm |
| 25/32 - .7812 | .7656 | 19.3mm | .7578 | 3/4 |
| 51/64 - .7969 | .7810 | 19.7mm | .7730 | 49/64 |
| 13/16 - .8125 | .7963 | 20.1mm | .7881 | 25/32 |
| 53/64 - .8281 | .8115 | 20.5mm | .8034 | 51/64 |
| 27/32 - .8438 | .8270 | 20.8mm | .8185 | 13/16 |
| 55/64 - .8594 | .8422 | 21.25mm | .8336 | 53/64 |
| 7/8 - .8750 | .8575 | 21.6mm | .8488 | 27/32 |
| 57/64 - .8906 | .8728 | 22.0mm | .8639 | 55/64 |
| 29/32 - .9062 | .8881 | 22.5mm | .8790 | 7/8 |
| 59/64 - .9219 | .9035 | 22.8mm | .8942 | 57/64 |
| 15/16 - .9375 | .9188 | 23.25mm | .9094 | 29/32 |
| 61/64 - .9531 | .9340 | 23.5mm | .9245 | 59/64 |
| 31/32 - .9688 | .9494 | 24.0mm | .9397 | 15/16 |
| 63/64 - .9844 | .9647 | 24.4mm | .9549 | 61/64 |
| 1 - 1.0000 | .9800 | 24.75mm | .9700 | 31/32 |

This chart allows for drill oversize based on study done by the United States Cutting Tool Institute



REAMER GUIDE

BASIC TECHNICAL INFORMATION FOR REAMERS



HANNIBAL CARBIDE would like to inform you of some basic technical knowledge regarding reamers. Following these guidelines will reduce overall set-up time, while increasing productivity. Selecting the right tool, proper stock removal and correct speeds and feeds are all important and covered here in the HANNIBAL Reamer Guide. Ream it right the first time with HANNIBAL.

.....from the Hannibal Technical Team

FLUTE STYLES

Straight:

Best suited for non-chip forming materials, i.e. cast iron, bronze and free cutting brass. Preferred hole condition would be a thru hole.

Right Hand Spiral:

Designed to pull the chip out of the hole in a blind hole application. Due to aggressive flute geometry, a right hand spiral may cut slightly oversized. Effective in bridging interruptions, such as keyways, cross-holes, etc. Excellent in highly ductile materials.

Left Hand Spiral:

Excellent in thru holes, as the flutes tend to push the chips out ahead of the reamer. Effective in bridging interruptions, such as keyways, cross-holes, etc. Good for reaming hard materials. Should provide the very best size and finish.

Expansion Reamers:

Designed for high production runs in abrasive materials, when size or finish can be rapidly lost. Expand the diameter by turning the screw clockwise. The tool is now ready to be reground back to its original diameter and resharpened. This process should produce like new tool performance.

COOLANT OPTIONS

Center Fed Coolant (axial):

Center fed coolant design is used for blind hole reaming. Combine center fed coolant with right hand spiral for maximum chip clearing ability in highly ductile material.

Flute Fed Coolant (radial):

Flute fed coolant design is used for thru hole reaming. Effective in a cavity large enough for chip clearance. Flute fed coolant will flush the chips ahead of the reamer, providing the best hole size and finish.



REAMER GUIDE

BASIC TECHNICAL INFORMATION FOR REAMERS



While developing optimum conditions will require some investment in time, it will be beneficial by reducing cycle times and getting the best possible tool life. There are several elements to evaluate in this section. These elements are key to maximizing tool efficiency.

OPTIMUM OPERATING CONDITIONS

Stock Removal:

2%-3% of the reamer diameter will normally be appropriate stock removal when reaming.

Example: a .500" diameter tool would remove .010"-.015" of stock.

Example: a 1.0" diameter tool would remove .020"-.030" of stock.

These examples cover finish reaming.

When your application calls for a rough ream, stock removal can be up to 5%

See "Pre-Ream Drill Size Chart" on page 10.

Runout (TIR) Concerns:

One of the most overlooked areas in reaming.

It is critical to the function of the tool to be running concentric with the machine spindle.

Some of the most important areas to consider include:

Tool Holders - precision collets and hydraulic chucks are widely used for straight shank tools. When using hydraulic chucks be sure shank diameter tolerance is acceptable. If using taper shank reamers make sure holders are free from dirt, grit and burrs that could cause the shank to not seat properly.

Tool Overhang - Use the shortest tool possible. Runout multiplies rapidly as the distance from the spindle increases.

Rigid Fixturing - Make sure the part piece is secure. Movement of the piece may cause tool breakage, oversized holes, poor finish and would shorten tool life.

Checking TIR - Check the reamer diameter with a dial indicator (at the circular margin). Ideally a reamer should run within .001" TIR.

Coolant feeding reamers:

Coolant induced thru the reamer should be utilized when possible.

Benefits include better finishes, superior tool life and the ability to increase speeds and feeds.

Speeds and Feeds:

Reaming is a finishing operation and the correct combination of speed and feed is critical to tool life. Proper speeds & feeds must be run to achieve size, straightness and finish. See pages 8 and 9 for starting speed and feed information and further guidelines.

Tool Geometry and Carbide Grade:

Geometry may be altered to obtain optimum performance and extend tool life.

Material specific carbide grades are beneficial in reaming material of a specific hardness & condition. Hannibal offers stocked material specific reamers in most all styles.



REAMER GUIDE

BASIC TECHNICAL INFORMATION FOR REAMERS



DEVELOPING OPTIMUM SPEED AND FEEDS

- Most reamer manufacturers will provide you with a starting point for speeds and feeds. It is very important to remember when optimizing your cycle that increasing feed will give you quicker cycles than running higher SFM at lower feed rates.
- With the surface feet per minute (SFM) at the manufacturers low range, begin trying to increase the feed rate. Increase in small increments, .001 - .0015 per revolution. Continue to increase the feed until an undesirable condition develops. This could be an unacceptable finish, a bell, tapered, or egg shaped hole, or poor size. At this point return to the previous feed rate. You are now at or close to the optimum feed rate.
- Increase the speed in increments of 10-20 SFM. Like the feed, increase until undesirable conditions appear, then return to the previous SFM. You should now be at or near the optimum speed and feed. It may also be necessary to fine-tune these numbers after a few runs to achieve the very best tool life.
- As you seek the optimum speed and feed for your application, look and listen for signs or sounds that could save you time. Listen for the reamer squealing upon entry—this means speed or feed is too high or alignment is poor. Examine the chip for size and color. Examine the finish for signs of chatter.

AVOIDING PROBLEMS – Common Problem Areas to Avoid.

- **Improper Tool** - make sure you are using the correct flute style and tool type.
- **Stock Removal** - HANNIBAL recommends 2-3% of the reamer diameter as a starting point for stock removal. 2% for steels and tough alloys, 3% for non-ferrous materials and cast irons. Solid carbide & carbide tipped reamers must have adequate stock to remove or they will rub in the hole and generate excessive heat, which leads to premature tool wear.
- **Improper Speeds & Feeds** - The right combination of speeds and feeds is critical to tool life and consistent size and finish. Getting the correct starting points is a key element. Reaming is a finishing operation and proper speeds and feeds must be run to achieve size, straightness and finish.
- **Poor Fixturing** - If the fixturing cannot hold the piece securely and in line with the spindle, then producing a good finish will be very difficult. A reamed hole is only going to be as good as the machine and fixturing used to machine and hold the part.
- **Excessing Runout (spindle or tool holder)** - Runout leads to poor finishes, oversized, tapered, and bellmouth holes, as well as poor tool life. Floating holders or bushings can sometimes be used to compensate for runout, but the best solution is to fix the problem.
- **Improper Coolant** - Make sure the coolant you are using is recommended for reaming your particular materials. Many coolants will prove effective for reaming if the concentration level is maintained with specifications. Take the time to check the levels on a regular basis.
- **Improper Sharpening or Geometry** - If a new tool works fine, but fails to perform after resharpening, the problem is obvious. However, depending on the hardness and condition of the material you are reaming, the tool geometry may need to be altered to get optimum performance and tool life. Geometries most often changed are the circular margins, radial rake, and the primary chamfer clearance.
- **Material Changes (hardness and/or condition)** - Castings lead the way in inconsistency. Hard spots, free carbides, and scale can all lead to inconsistent results when reaming. A heat treatment that varies just a few points from part to part can cause problems.



REAMER SELECTION GUIDE BASED ON HOLE CONDITION



CARBIDE LENGTH

- Use flute long carbide for hole depths exceeding maximum shallow depth (shown in table to right)

| Hole Diameter | Max. Shallow Hole Depth |
|----------------------|-------------------------|
| .1875" thru .3125" | .500" |
| .3126" thru .7188" | .625" |
| .7189" thru 1.0625" | .750" |
| 1.0626" thru 1.5000" | .875" |

FLUTE STYLES

- Straight Flutes - Good in a wide variety of applications
- Right Spiral Flutes - Tend to bridge interruptions such as keyways, slots or intersecting holes; Good chip clearing ability for ductile materials and blind holes
- Left Spiral Flutes - Also tend to bridge interruptions; Good for cast irons, heat treated steels and other hard materials
Do **not** use in blind holes
- Expansion Reamers - Economical for abrasive materials

REAMERS

| MATERIAL CHIP CLASS | FLUTE STYLE | THRU HOLE | | | | BLIND HOLE | | | |
|--|--|------------------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| | | SHALLOW | | DEEP | | SHALLOW | | DEEP | |
| | | STR. SHANK | TPR. SHANK | STR. SHANK | TPR. SHANK | STR. SHANK | TPR. SHANK | STR. SHANK | TPR. SHANK |
| 20 ALUMINUM ALLOY COPPER ALLOY (TOUGH) LEAD ALLOY NON-METAL & PLASTIC ZINC ALLOY | GENERAL PURPOSE TYPES | | | | | | | | |
| | SPIRAL | 420 - pg. 54 | 422 - pg. 56 | 440 - pg. 28 | - | 410 - pg. 54 | 412 - pg. 56 | - | - |
| | STRAIGHT | 400 - pg. 32 | 402 - pg. 40 | 450 - pg. 42 | 452 - pg. 48 | 400 - pg. 32 | 402 - pg. 40 | 450 - pg. 42 | 452 - pg. 48 |
| | EXPANSION | 465 - pg. 50 | 467 - pg. 52 | 465 - pg. 50 | 467 - pg. 52 | 465 - pg. 50 | 467 - pg. 52 | 465 - pg. 50 | 467 - pg. 52 |
| | MATERIAL SPECIFIC TYPES | | | | | | | | |
| | SPIRAL | 433 - pg. 70 | - | 482 - pg. 71 | - | 432 - pg. 68 | - | 442 - pg. 69 | - |
| | STRAIGHT | 407 - pg. 62 | 472 - pg. 66 | 457 - pg. 64 | - | 407 - pg. 62 | 472 - pg. 66 | 457 - pg. 64 | - |
| | EXPANSION | 464 - pg. 67 | - | 464 - pg. 67 | - | 464 - pg. 67 | - | 464 - pg. 67 | - |
| | COOLANT FED TYPES | | | | | | | | |
| | SPIRAL | 427 - pg. 80 | - | 427 - pg. 80 | - | 411 - pg. 78 | - | 411 - pg. 78 | - |
| | STRAIGHT | 416 - pg. 76 | - | 416 - pg. 76 | - | 414 - pg. 74 | - | 414 - pg. 74 | - |
| | 40 ALUMINUM BRONZE BRASS BRONZE MAGNESIUM ALLOY NICKEL SILVER | GENERAL PURPOSE TYPES | | | | | | | |
| SPIRAL | | 420 - pg. 54 | 422 - pg. 56 | 440 - pg. 28 | - | 410 - pg. 54 | 412 - pg. 56 | - | - |
| STRAIGHT | | 400 - pg. 32 | 402 - pg. 40 | 450 - pg. 42 | 452 - pg. 48 | 400 - pg. 32 | 402 - pg. 40 | 450 - pg. 42 | 452 - pg. 48 |
| EXPANSION | | 465 - pg. 50 | 467 - pg. 52 | 465 - pg. 50 | 467 - pg. 52 | 465 - pg. 50 | 467 - pg. 52 | 465 - pg. 50 | 467 - pg. 52 |
| MATERIAL SPECIFIC TYPES | | | | | | | | | |
| SPIRAL | | 433 - pg. 70 | - | 482 - pg. 71 | - | 432 - pg. 68 | - | 442 - pg. 69 | - |
| STRAIGHT | | 407 - pg. 62 | 472 - pg. 66 | 457 - pg. 64 | - | 407 - pg. 62 | 472 - pg. 66 | 457 - pg. 64 | - |
| EXPANSION | | 464 - pg. 67 | - | 464 - pg. 67 | - | 464 - pg. 67 | - | 464 - pg. 67 | - |
| COOLANT FED TYPES | | | | | | | | | |
| SPIRAL | | 427 - pg. 80 | - | 427 - pg. 80 | - | 411 - pg. 78 | - | 411 - pg. 78 | - |
| STRAIGHT | | 416 - pg. 76 | - | 416 - pg. 76 | - | 414 - pg. 74 | - | 414 - pg. 74 | - |
| 60 DUCTILE CAST IRON GRAY CAST IRON MALLEABLE CAST IRON NODULAR CAST IRON | | GENERAL PURPOSE TYPES | | | | | | | |
| | SPIRAL | 420 - pg. 54 | 422 - pg. 56 | 440 - pg. 28 | - | 410 - pg. 54 | 412 - pg. 56 | - | - |
| | STRAIGHT | 400 - pg. 32 | 402 - pg. 40 | 450 - pg. 42 | 452 - pg. 48 | 400 - pg. 32 | 402 - pg. 40 | 450 - pg. 42 | 452 - pg. 48 |
| | EXPANSION | 465 - pg. 50 | 467 - pg. 52 | 465 - pg. 50 | 467 - pg. 52 | 465 - pg. 50 | 467 - pg. 52 | 465 - pg. 50 | 467 - pg. 52 |
| | MATERIAL SPECIFIC TYPES | | | | | | | | |
| | SPIRAL | 437 - pg. 70 | - | 483 - pg. 71 | - | 436 - pg. 68 | - | 443 - pg. 69 | - |
| | STRAIGHT | 408 - pg. 62 | 473 - pg. 66 | 458 - pg. 64 | - | 408 - pg. 62 | 473 - pg. 66 | 458 - pg. 64 | - |
| | EXPANSION | 466 - pg. 67 | - | 466 - pg. 67 | - | 466 - pg. 67 | - | 466 - pg. 67 | - |
| | COOLANT FED TYPES | | | | | | | | |
| | SPIRAL | 428 - pg. 80 | - | 428 - pg. 80 | - | 413 - pg. 78 | - | 413 - pg. 78 | - |
| | STRAIGHT | 426 - pg. 76 | - | 426 - pg. 76 | - | 424 - pg. 74 | - | 424 - pg. 74 | - |
| | 80 - 100 - 120 LOW STRENGTH STEEL MEDIUM STRENGTH STEEL HIGH STRENGTH STEEL TOOL STEEL | GENERAL PURPOSE TYPES | | | | | | | |
| SPIRAL | | 420 - pg. 54 | 422 - pg. 56 | 440 - pg. 28 | - | 410 - pg. 54 | 412 - pg. 56 | - | - |
| STRAIGHT | | 400 - pg. 32 | 402 - pg. 40 | 450 - pg. 42 | 452 - pg. 48 | 400 - pg. 32 | 402 - pg. 40 | 450 - pg. 42 | 452 - pg. 48 |
| EXPANSION | | 465 - pg. 50 | 467 - pg. 52 | 465 - pg. 50 | 467 - pg. 52 | 465 - pg. 50 | 467 - pg. 52 | 465 - pg. 50 | 467 - pg. 52 |
| MATERIAL SPECIFIC TYPES | | | | | | | | | |
| SPIRAL | | 439 - pg. 70 | - | 484 - pg. 71 | - | 438 - pg. 68 | - | 444 - pg. 69 | - |
| STRAIGHT | | 409 - pg. 62 | 474 - pg. 66 | 459 - pg. 64 | - | 409 - pg. 62 | 474 - pg. 66 | 459 - pg. 64 | - |
| STRAIGHT | | 480 - pg. 60 | - | 480 - pg. 60 | - | 480 - pg. 60 | - | 480 - pg. 60 | - |
| EXPANSION | | 468 - pg. 67 | - | 468 - pg. 67 | - | 468 - pg. 67 | - | 468 - pg. 67 | - |
| COOLANT FED TYPES | | | | | | | | | |
| SPIRAL | | 429 - pg. 80 | - | 429 - pg. 80 | - | 415 - pg. 78 | - | 415 - pg. 78 | - |
| STRAIGHT | | 435 - pg. 76 | - | 435 - pg. 76 | - | 434 - pg. 74 | - | 434 - pg. 74 | - |
| 140 IRON BASE ALLOY NICKEL BASE ALLOY 300 SERIES STAINLESS 400 SERIES STAINLESS PH SERIES STAINLESS TITANIUM ALLOY | GENERAL PURPOSE TYPES | | | | | | | | |
| | SPIRAL | 420 - pg. 54 | 422 - pg. 56 | 440 - pg. 28 | - | 410 - pg. 54 | 412 - pg. 56 | - | - |
| | STRAIGHT | 400 - pg. 32 | 402 - pg. 40 | 450 - pg. 42 | 452 - pg. 48 | 400 - pg. 32 | 402 - pg. 40 | 450 - pg. 42 | 452 - pg. 48 |
| | EXPANSION | 465 - pg. 50 | 467 - pg. 52 | 465 - pg. 50 | 467 - pg. 52 | 465 - pg. 50 | 467 - pg. 52 | 465 - pg. 50 | 467 - pg. 52 |
| | MATERIAL SPECIFIC TYPES | | | | | | | | |
| | SPIRAL | 439 - pg. 70 | - | 484 - pg. 71 | - | 438 - pg. 68 | - | 444 - pg. 69 | - |
| | STRAIGHT | 409 - pg. 62 | 474 - pg. 66 | 459 - pg. 64 | - | 409 - pg. 62 | 474 - pg. 66 | 459 - pg. 64 | - |
| | EXPANSION | 468 - pg. 67 | - | 468 - pg. 67 | - | 468 - pg. 67 | - | 468 - pg. 67 | - |
| | COOLANT FED TYPES | | | | | | | | |
| | SPIRAL | 429 - pg. 80 | - | 429 - pg. 80 | - | 415 - pg. 78 | - | 415 - pg. 78 | - |
| | STRAIGHT | 435 - pg. 76 | - | 435 - pg. 76 | - | 434 - pg. 74 | - | 434 - pg. 74 | - |



CARBIDE TIPPED REAMERS TECHNICAL INFORMATION

REAMER BASICS

- The reamer is used to finish machine a previously formed hole to an exact diameter with a smooth finish. It should **not** be used to significantly enlarge a hole (max. 5% – depending on material and hardness).
- Carbide tipped reamers are especially appropriate for close tolerance reaming. Because carbide is very highly resistant to wear, the reamer will produce accurate hole size and a smooth finish far longer than high speed steel or cobalt.
- The reamer is an end cutting tool, cutting only on the chamfer's edge at the outside diameter of the preformed hole.

The standard 45° chamfer angle provides effective cutting action for most materials.

Reamer Types:

- General Purpose** – Superior performance over high speed steel and cobalt; good in a wide variety of materials
- Material Specific** – Excellent in large production runs due to material specific carbide & tool geometry
- Coolant Fed** – Exceptional performance and tool life using material specific reamer technology and coolant fed capabilities; maximizes feeds & speeds

TECHNICAL REAMING GUIDE INFORMATION PAGES 11-15

Contact us for a PDF copy of "HANNIBAL'S Guide to Cost Effective Reaming." It includes:

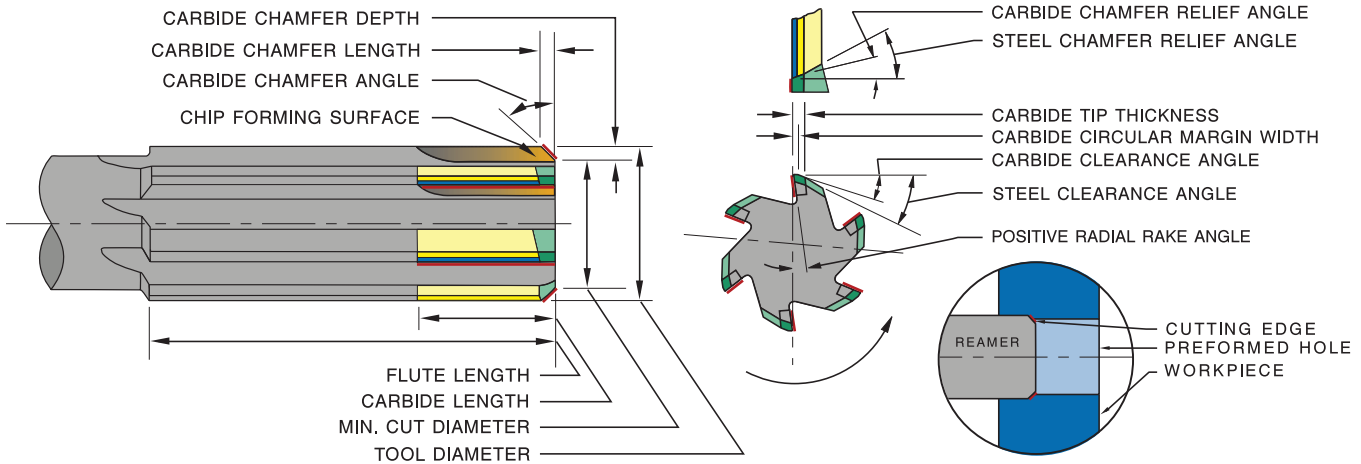
Reamer Expedite Fees: Order must be received by 2:00 PM CST

Does not apply to types 401, 403, 431, 441, 490, and EL Reamers

18 pieces max per diameter

Does NOT require air shipment of the product

| Reamer Diameter | Service | Fee |
|-----------------|---------|-------|
| Up to 1.0000" | 24 Hour | 75.00 |
| Up to 1.0000" | 48 Hour | 50.00 |
| Over 1.0000" | 48 Hour | 75.00 |
| Over 1.0000" | 72 Hour | 50.00 |



REAMER SPECIFICATIONS

- Geometry and carbide grade appropriate for material being machined
- Carbide tips brazed to tough hardened alloy steel body, except expansion reamers which are not hardened
- Polished flutes for easy chip flow
- ASME/ANSI B94.2; NAS 897; USCTI
- Precision ground cutting edges
- "Taper Shank No." refers to American Standard taper series (formerly Morse taper series) per ASME/ANSI B5.10
- Material specific reamer shanks are ground to next smallest shank diameter listed in NAS 897 if tool diameter is within .005" of shank diameter
- Expansion reamers can be expanded for regrinding as follows:

| Tool Diameter | Guaranteed Minimum Expansion |
|-----------------|------------------------------|
| 5/16" - 15/32" | .006" |
| 1/2" - 31/32" | .010" |
| 1" - 1 1/2" | .013" |
| 1 1/4" - 2 1/2" | .015" |

REAMER TOLERANCES

Tool diameter tolerance:

General purpose & Coolant fed

Thru 1 1/2" tool diameter: plus .0003", minus .0000"

Over 1 1/2" tool diameter: plus .0004", minus .0000"

Material specific (excluding coolant fed)

Thru 1/2" tool diameter: plus .0002", minus .0000"

Over 1/2" tool diameter thru 3/4": plus .0003", minus .0000"

Over 3/4" tool diameter: plus .0004", minus .0000"

Closer tool diameter tolerance pricing per tool:

| Standard Tolerance | Modified to Closer Tolerance | | |
|--------------------|------------------------------|--------|--------|
| | .0003" | .0002" | .0001" |
| .0004" | \$1 | \$3 | \$5 |
| .0003" | - | \$1 | \$3 |
| .0002" | - | - | \$3 |

Shank diameter tolerance:

General purpose

minus .0005", minus .0015"

Material specific (NAS) & Coolant fed

Thru 2 3/32" tool diameter: plus .0000", minus .0010"

Over 2 3/32" tool diameter: plus .0000", minus .0015"

REAMERS INDEX AND COMPARISON CHART

REAMERS

| DESCRIPTION | HANNIBAL | | | CJT | CLEVELAND | FULLERTON | IMCO | MORSE | MAFORD |
|---|------------|-------------|-------------------|------|-----------|-----------|--------|-------|--------|
| | FRAC. PAGE | METRIC PAGE | TOOL TYPE | | | | | | |
| EXTENDED LENGTH REAMERS | | | | | | | | | |
| Straight Flutes – Flute Long Carbide | 21 | – | 457EL/458EL/459EL | – | – | – | – | – | – |
| Right Spiral Flutes – Flute Long Carbide | 23 | – | 442EL/443EL/444EL | – | – | – | – | – | – |
| Left Spiral Flutes – Flute Long Carbide | 25 | – | 482EL/483EL/484EL | – | – | – | – | – | – |
| EXTENDED LENGTH REAMERS - COOLANT FED | | | | | | | | | |
| Straight Flutes – Flute Long Carbide | 22 | – | 416EL/426EL/435EL | – | – | – | – | – | – |
| Right Spiral Flutes – Flute Long Carbide | 24 | – | 411EL/413EL/415EL | – | – | – | – | – | – |
| Left Spiral Flutes – Flute Long Carbide | 26 | – | 427EL/428EL/429EL | – | – | – | – | – | – |
| COOLANT FED REAMERS | | | | | | | | | |
| Straight Flutes – Center Fed | 74 | 75 | 414/424/434 | 452 | – | – | – | – | – |
| Straight Flutes – Flute Fed | 76 | 77 | 416/426/435 | 452A | – | – | – | – | – |
| Right Spiral Flutes – Center Fed | 78 | – | 411/413/415 | 453 | – | – | – | – | – |
| Right Spiral Flutes – Flute Fed | 79 | – | 417/418/419 | 453A | – | – | – | – | – |
| Left Spiral Flutes – Flute Fed | 80 | – | 427/428/429 | – | – | – | – | – | – |
| Metcut Type – Right Spiral Flutes | 81 | – | 490 | – | – | – | – | – | – |
| GENERAL PURPOSE CHUCKING REAMERS | | | | | | | | | |
| Stub Length – Straight Flutes | 28 | 29 | 430 | – | – | 50SM | 8200 | 5670 | – |
| Stub Length – Left Spiral Flutes | 28 | 29 | 440 | – | 4701 | 50SML | 8250 | 5669 | – |
| Jobbers Drill Length – Straight Flutes | 30 | – | 401 | – | – | – | – | – | – |
| Dowell Pin Sizes/Over & Under Sizes | 31 | – | 477/479 | – | – | – | – | – | – |
| Straight Flutes – Straight Shank | 32 | 38 | 400 | 450 | 4703 | 50SS | 8000 | 5655 | – |
| Dowell Pin Sizes/Over & Under Sizes | 33 | – | 476/478 | 450 | – | – | 8003/2 | – | – |
| Wire & Letter Sizes | 31 | – | 400 | – | – | – | – | – | – |
| Stocked .0005" Increments | 34 | – | 400 | – | – | – | – | – | – |
| Straight Flutes – Taper Shank | 40 | 41 | 402 | – | – | 50TS | 8010 | 5656 | – |
| Straight Flute Long Carbide – Straight Shank | 42 | 43 | 450 | 480 | – | 50SF | 8100 | 5659 | – |
| Stocked .0005" Increments | 45 | – | 450 | – | – | – | – | – | – |
| Straight Flute Long Carbide – Taper Shank | 48 | 49 | 452 | – | – | – | 8110 | 5660 | – |
| Expansion Type – Straight Shank | 50 | 51 | 465 | 490 | – | 50ES | 8500 | 5733 | – |
| Expansion Type – Taper Shank | 52 | 53 | 467 | 495 | – | 50ET | 8510 | 5734 | – |
| Right Spiral Flutes – Straight Shank | 54 | 55 | 410 | 470 | – | 50SR | 8020 | 5653 | – |
| Right Spiral Flutes – Taper Shank | 56 | – | 412 | – | – | – | 8040 | – | – |
| Left Spiral Flutes – Straight Shank | 54 | 55 | 420 | – | – | 50SL | 8030 | 5651 | – |
| Left Spiral Flutes – Taper Shank | 56 | – | 422 | – | – | – | 8050 | – | – |
| Jobbers – Taper Shank | 27 | – | 403 | – | – | – | – | – | – |
| h6 SHANK REAMERS | | | | | | | | | |
| Straight Flutes - Center Fed | 17 | 17 | 414H6/424H6/434H6 | – | – | – | – | – | – |
| Straight Flutes - Flute Fed | 18 | 18 | 416H6/426H6/435H6 | – | – | – | – | – | – |
| Right Spiral Flutes - Center Fed | 19 | 19 | 411H6/413H6/415H6 | – | – | – | – | – | – |
| Left Spiral Flutes - Flute Fed | 20 | 20 | 427H6/428H6/429H6 | – | – | – | – | – | – |
| MATERIAL SPECIFIC CHUCKING REAMERS | | | | | | | | | |
| Stub Length – Straight Flutes | 72 | – | 470/471/475 | – | – | – | – | – | – |
| Straight Flutes & Shank – For Steels | 60 | 59 | 480 | – | – | – | – | – | – |
| Dowell Pin Sizes/Over & Under Sizes | 61 | – | 486/488 | – | – | – | – | – | – |
| Straight Flutes – Straight Shank | 62 | 63 | 407/408/409 | – | 4703 | – | – | – | – |
| Straight Flutes – Taper Shank | 66 | – | 472/473/474 | – | 4715 | – | – | – | – |
| Straight Flute Long Carbide – Straight Shank | 64 | 65 | 457/458/459 | – | – | – | – | – | – |
| Expansion Type – Straight Shank | 67 | – | 464/466/468 | – | 704 | – | – | – | – |
| Right Spiral Flutes – Straight Shank | 68 | – | 432/436/438 | – | 4711 | – | – | – | – |
| Right Spiral Flt Long Carbide – Straight Shank | 69 | – | 442/443/444 | – | – | – | – | – | – |
| Left Spiral Flutes – Straight Shank | 70 | – | 433/437/439 | – | 4709 | – | – | – | – |
| Left Spiral Flute Long Carbide – Straight Shank | 71 | – | 482/483/484 | – | – | – | – | – | – |
| PIPE TAP REAMERS | | | | | | | | | |
| Straight Shank | 27 | – | 446 | – | – | – | – | – | – |
| Taper Shank | 27 | – | 447 | – | – | – | – | – | – |
| SEMI-FINISHED REAMERS | | | | | | | | | |
| SHELL REAMERS | | | | | | | | | |
| Straight Flutes | 57 | – | 431 | – | – | – | – | 5625 | – |
| Left Spiral Flutes | 58 | – | 441 | – | – | – | – | – | – |
| Arbors – Straight Shank | 58 | – | 481 | – | – | – | – | 505 | – |
| Arbors – Taper Shank | 58 | – | 481 | – | – | – | – | 506 | – |
| SOLID CARBIDE REAMERS | | | | | | | | | |
| Straight Flutes (General Purpose) | 89 | 89 | 804 | – | 1730 | 1400 | 9000 | 5661 | 272 |
| Wire & Letter Sizes | 89 | – | 804 | – | – | 1400 | 9000 | – | 272 |
| Stocked .0005" Increments | 90 | – | 804 | – | – | – | – | – | 272 |
| Straight Flutes (Material Specific) | 88 | – | 802/803 | – | 1730 | 1410 | – | – | 272 |
| Right Spiral Flutes (Material Specific) | 88 | – | 812/813 | – | 1711 | 1410R | – | – | – |
| Left Spiral Flutes (Material Specific) | 88 | – | 822/823 | – | – | 1410L | – | – | 272L |
| SOLID CARBIDE COOLANT FED REAMERS | | | | | | | | | |
| Straight Flutes (Material Specific) | 86 | – | 806/807 | – | – | – | – | – | – |
| Right Spiral Flutes (Material Specific) | 87 | – | 816/817 | – | – | – | – | – | – |
| Left Spiral Flutes (Material Specific) | 87 | – | 828/829 | – | – | – | – | – | – |
| SOLID CARBIDE HEAD REAMERS | | | | | | | | | |
| Straight Flutes – Steel Shank | 94 | – | 800/801 | – | – | 1450 | 9500 | – | – |
| Right Spiral Flutes – Steel Shank | 95 | – | 810/811 | – | – | 1450R | – | – | – |
| Left Spiral Flutes – Steel Shank | 95 | – | 820/821 | – | – | 1450L | – | – | – |
| STEP REAMERS | | | | | | | | | |
| Straight Flute Long Carbide | 82 | – | 457/458/459 Step | – | – | – | – | – | – |
| Right Spiral Flute Long Carbide | 83 | – | 442/443/444 Step | – | – | – | – | – | – |
| Left Spiral Flute Long Carbide | 84 | – | 482/483/484 Step | – | – | – | – | – | – |



PRECISION h6 SHANK REAMERS CARBIDE TIPPED



TYPES 414h6, 424h6, 434h6 FRACTIONAL & METRIC

CENTER FED FOR BLIND HOLES STRAIGHT FLUTES & SHANK



USE:

- Center coolant outlet for reaming blind holes as chips are flushed **back** towards the shank
- Improves hole finish and permits higher feeds & speeds with longer tool life
- Use Tool Selector on page 74 to determine appropriate type

TYPE 414h6 - FOR NON-FERROUS MATERIALS
TYPE 424h6 - FOR CAST IRONS & MULTI-PURPOSE
TYPE 434h6 - FOR STEELS & HIGH TEMP ALLOYS

• Center coolant outlet • Polished flutes • Flute long carbide

| TOOL DIAMETER RANGE | TYPE 414h6 NON FERROUS EDP NO. | TYPE 424h6 CAST IRON EDP NO. | TYPE 434h6 STEEL/ HI-TEMP EDP NO. | DIMENSIONS | | | | FINISHED TO MODIFIED TOOL DIAMETER | | | | | |
|---------------------|--------------------------------|------------------------------|-----------------------------------|------------------|-------------|--------|----------|--|----------|----------|----------|----------|----------|
| | | | | MAX. SHANK DIAM. | NO. OF FLTS | LENGTH | | PRICE EACH - BASED ON QUANTITY ORDERED | | | | | |
| | | | | | | FLT | OVER-ALL | 1 | 2 | 3 | 4 | 5-7 | 8-14* |
| 0.3471 - 0.3780 | 41412h6 | 42412h6 | 43412h6 | .3125 | 4 | 1 3/4 | 5 | \$281.60 | \$251.20 | \$241.10 | \$236.25 | \$230.95 | \$227.00 |
| 0.3781 - 0.4090 | 41413h6 | 42413h6 | 43413h6 | .3125 | 4 | 1 3/4 | 5 | 282.20 | 252.00 | 241.90 | 237.00 | 231.85 | 227.60 |
| 0.4091 - 0.4410 | 41414h6 | 42414h6 | 43414h6 | .3750 | 6 | 1 3/4 | 5 | 284.60 | 254.20 | 244.00 | 239.30 | 233.90 | 229.95 |
| 0.4411 - 0.4720 | 41415h6 | 42415h6 | 43415h6 | .3750 | 6 | 1 3/4 | 5 | 286.50 | 256.20 | 246.00 | 241.15 | 235.90 | 231.90 |
| 0.4721 - 0.5030 | 41416h6 | 42416h6 | 43416h6 | .4375 | 6 | 2 | 6 | 289.10 | 258.75 | 248.60 | 243.85 | 238.60 | 234.50 |
| 0.5031 - 0.5340 | 41417h6 | 42417h6 | 43417h6 | .4375 | 6 | 2 | 6 | 294.05 | 263.75 | 253.65 | 248.90 | 243.75 | 239.60 |
| 0.5341 - 0.5660 | 41418h6 | 42418h6 | 43418h6 | .4375 | 6 | 2 | 6 | 297.55 | 267.25 | 257.05 | 252.25 | 247.10 | 242.95 |
| 0.5661 - 0.5970 | 41419h6 | 42419h6 | 43419h6 | .4375 | 6 | 2 | 6 | 302.45 | 272.05 | 261.85 | 257.15 | 252.00 | 247.90 |
| 0.5971 - 0.6280 | 41420h6 | 42420h6 | 43420h6 | .5625 | 6 | 2 1/4 | 6 | 307.00 | 276.70 | 266.60 | 261.70 | 256.55 | 252.45 |
| 0.6281 - 0.6590 | 41421h6 | 42421h6 | 43421h6 | .5625 | 6 | 2 1/4 | 6 | 333.35 | 303.10 | 292.85 | 288.20 | 282.95 | 278.85 |
| 0.6591 - 0.6910 | 41422h6 | 42422h6 | 43422h6 | .5625 | 6 | 2 1/4 | 6 | 338.95 | 308.70 | 298.55 | 293.75 | 288.35 | 284.35 |
| 0.6911 - 0.7220 | 41423h6 | 42423h6 | 43423h6 | .5625 | 6 | 2 1/4 | 6 | 350.90 | 320.75 | 310.55 | 305.65 | 300.50 | 296.35 |
| 0.7221 - 0.7530 | 41424h6 | 42424h6 | 43424h6 | .6250 | 6 | 2 1/2 | 6 | 350.90 | 320.75 | 310.55 | 305.65 | 300.50 | 296.35 |
| 0.7531 - 0.7840 | 41425h6 | 42425h6 | 43425h6 | .6250 | 6 | 2 1/2 | 6 | 359.55 | 329.30 | 319.10 | 314.25 | 309.10 | 304.95 |
| 0.7841 - 0.8160 | 41426h6 | 42426h6 | 43426h6 | .6250 | 6 | 2 1/2 | 6 | 359.55 | 329.30 | 319.10 | 314.25 | 309.10 | 304.95 |
| 0.8161 - 0.8470 | 41427h6 | 42427h6 | 43427h6 | .6250 | 6 | 2 1/2 | 6 | 369.80 | 339.40 | 329.40 | 324.45 | 319.20 | 315.05 |
| 0.8471 - 0.8780 | 41428h6 | 42428h6 | 43428h6 | .7500 | 6 | 2 3/8 | 6 | 381.70 | 351.40 | 341.25 | 336.45 | 331.25 | 327.15 |
| 0.8781 - 0.9090 | 41429h6 | 42429h6 | 43429h6 | .7500 | 6 | 2 3/8 | 6 | 417.20 | 386.95 | 376.80 | 371.95 | 366.75 | 362.65 |
| 0.9091 - 0.9410 | 41430h6 | 42430h6 | 43430h6 | .7500 | 8 | 2 3/8 | 6 | 417.20 | 386.95 | 376.80 | 371.95 | 366.75 | 362.65 |
| 0.9411 - 0.9720 | 41431h6 | 42431h6 | 43431h6 | .7500 | 8 | 2 3/8 | 6 | 418.55 | 388.20 | 378.15 | 373.30 | 368.05 | 363.90 |
| 0.9721 - 1.0030 | 41432h6 | 42432h6 | 43432h6 | .8750 | 8 | 2 3/4 | 6 | 418.55 | 388.20 | 378.15 | 373.30 | 368.05 | 363.90 |

REAMERS



CENTER FED FOR BLIND HOLES STRAIGHT FLUTES & SHANK

MODIFICATIONS

- End chamfer other than 45°
- End cutting or corner radius
- Increased/Decreased back taper
- Closer tool diameter tolerance (.0001")
- Cutting diameter reduced for step or pilot (Some modifications may affect the TIR)

TYPE 414h6 - FOR NON-FERROUS MATERIALS - METRIC
TYPE 424h6 - FOR CAST IRONS & MULTI-PURPOSE - METRIC
TYPE 434h6 - FOR STEELS & HIGH TEMP ALLOYS - METRIC

• Center coolant outlet • Polished flutes • Flute long carbide

| TOOL DIAMETER RANGE | TYPE 414h6 NON FERROUS EDP NO. | TYPE 424h6 CAST IRON EDP NO. | TYPE 434h6 STEEL/ HI-TEMP EDP NO. | DIMENSIONS | | | | FINISHED TO MODIFIED TOOL DIAMETER | | | | | |
|---------------------|--------------------------------|------------------------------|-----------------------------------|-----------------------|-------------|----------|---------------|--|----------|----------|----------|----------|----------|
| | | | | MAX. SHANK DIAM. (mm) | NO. OF FLTS | LENGTH | | PRICE EACH - BASED ON QUANTITY ORDERED | | | | | |
| | | | | | | FLT (mm) | OVER-ALL (mm) | 1 | 2 | 3 | 4 | 5-7 | 8-14* |
| 8.815 - 9.601 | 414095h6 | 424095h6 | 434095h6 | 8 | 4 | 45 | 127 | \$286.65 | \$256.40 | \$246.20 | \$241.25 | \$236.25 | \$232.00 |
| 9.602 - 10.389 | 414100h6 | 424100h6 | 434100h6 | 8 | 4 | 45 | 127 | 287.40 | 257.15 | 247.10 | 242.10 | 237.00 | 232.70 |
| 10.390 - 11.201 | 414110h6 | 424110h6 | 434110h6 | 10 | 6 | 45 | 127 | 289.50 | 259.45 | 249.30 | 244.40 | 239.30 | 235.05 |
| 11.202 - 12.000 | 414120h6 | 424120h6 | 434120h6 | 10 | 6 | 45 | 127 | 291.55 | 261.45 | 251.20 | 246.20 | 241.15 | 237.00 |
| 12.001 - 12.875 | 414125h6 | 424125h6 | 434125h6 | 10 | 6 | 51 | 153 | 294.05 | 264.10 | 253.70 | 248.90 | 243.85 | 239.60 |
| 12.876 - 13.565 | 414135h6 | 424135h6 | 434135h6 | 12 | 6 | 51 | 153 | 299.20 | 269.15 | 258.85 | 254.05 | 248.90 | 244.60 |
| 13.566 - 14.376 | 414140h6 | 424140h6 | 434140h6 | 12 | 6 | 51 | 153 | 302.55 | 272.35 | 262.25 | 257.20 | 252.25 | 248.00 |
| 14.377 - 15.164 | 414150h6 | 424150h6 | 434150h6 | 12 | 6 | 51 | 153 | 307.55 | 277.25 | 267.25 | 262.25 | 257.15 | 252.90 |
| 15.165 - 16.100 | 414160h6 | 424160h6 | 434160h6 | 14 | 6 | 57 | 153 | 312.10 | 282.00 | 271.80 | 266.75 | 261.70 | 257.50 |
| 16.101 - 16.740 | 414165h6 | 424165h6 | 434165h6 | 14 | 6 | 57 | 153 | 338.45 | 308.20 | 298.05 | 293.20 | 288.20 | 283.95 |
| 16.741 - 17.551 | 414175h6 | 424175h6 | 434175h6 | 14 | 6 | 57 | 153 | 344.00 | 313.95 | 303.80 | 298.75 | 293.75 | 289.45 |
| 17.552 - 18.340 | 414180h6 | 424180h6 | 434180h6 | 14 | 6 | 57 | 153 | 356.00 | 325.95 | 315.70 | 310.85 | 305.65 | 301.45 |
| 18.341 - 19.250 | 414190h6 | 424190h6 | 434190h6 | 16 | 6 | 64 | 153 | 356.00 | 325.95 | 315.70 | 310.85 | 305.65 | 301.45 |
| 19.251 - 20.126 | 414200h6 | 424200h6 | 434200h6 | 16 | 6 | 64 | 153 | 359.00 | 328.50 | 318.45 | 313.55 | 308.35 | 304.20 |
| 20.127 - 21.127 | 414210h6 | 424210h6 | 434210h6 | 16 | 6 | 64 | 153 | 369.05 | 338.75 | 328.60 | 323.75 | 318.55 | 314.45 |
| 21.128 - 22.127 | 414220h6 | 424220h6 | 434220h6 | 20 | 6 | 64 | 153 | 369.05 | 338.75 | 328.60 | 323.75 | 318.55 | 314.45 |
| 22.128 - 23.127 | 414230h6 | 424230h6 | 434230h6 | 20 | 6 | 67 | 153 | 416.35 | 386.00 | 375.95 | 371.00 | 365.90 | 361.75 |
| 23.128 - 24.127 | 414240h6 | 424240h6 | 434240h6 | 20 | 8 | 67 | 153 | 417.75 | 387.40 | 377.30 | 372.40 | 367.25 | 363.10 |
| 24.128 - 25.127 | 414250h6 | 424250h6 | 434250h6 | 20 | 8 | 70 | 153 | 417.75 | 387.40 | 377.30 | 372.40 | 367.25 | 363.10 |

*Quantities of 15 or more - Contact Hannibal Specials Dept.



PRECISION h6 SHANK REAMERS CARBIDE TIPPED



TYPES 416h6, 426h6, 435h6 FRACTIONAL & METRIC

FLUTE FED FOR THRU HOLES STRAIGHT FLUTES & SHANK



USE:

- Flute coolant outlets for reaming thru holes as chips are flushed **forward** through the hole being reamed
- Improves hole finish and permits higher feeds & speeds with longer tool life
- Use Tool Selector on page 76 to determine appropriate type

- TYPE 416h6 - FOR NON-FERROUS MATERIALS**
- TYPE 426h6 - FOR CAST IRONS & MULTI-PURPOSE**
- TYPE 435h6 - FOR STEELS & HIGH TEMP ALLOYS**
- Coolant outlets in each flute • Polished flutes • Flute long carbide

| TOOL DIAMETER RANGE | TYPE 416h6 NON FERROUS EDP NO. | TYPE 426h6 CAST IRON EDP NO. | TYPE 435h6 STEEL/ HI-TEMP EDP NO. | DIMENSIONS | | | | FINISHED TO MODIFIED TOOL DIAMETER | | | | | |
|---------------------|--------------------------------|------------------------------|-----------------------------------|------------------|-------------|--------|----------|--|----------|----------|----------|----------|----------|
| | | | | MAX. SHANK DIAM. | NO. OF FLTS | LENGTH | | PRICE EACH - BASED ON QUANTITY ORDERED | | | | | |
| | | | | | | FLT | OVER-ALL | 1 | 2 | 3 | 4 | 5-7 | 8-14* |
| 0.3471-0.3780 | 41612h6 | 42612h6 | 43512h6 | .3125 | 4 | 1 3/4 | 5 | \$283.50 | \$253.25 | \$243.10 | \$238.25 | \$233.15 | \$228.90 |
| 0.3781-0.4090 | 41613h6 | 42613h6 | 43513h6 | .3125 | 4 | 1 3/4 | 5 | 289.10 | 258.75 | 248.60 | 243.85 | 238.60 | 234.50 |
| 0.4091-0.4410 | 41614h6 | 42614h6 | 43514h6 | .3750 | 6 | 1 3/4 | 5 | 294.50 | 264.35 | 254.20 | 249.35 | 244.20 | 240.10 |
| 0.4411-0.4720 | 41615h6 | 42615h6 | 43515h6 | .3750 | 6 | 1 3/4 | 5 | 294.50 | 264.35 | 254.20 | 249.35 | 244.20 | 240.10 |
| 0.4721-0.5030 | 41616h6 | 42616h6 | 43516h6 | .4375 | 6 | 2 | 6 | 294.50 | 264.35 | 254.20 | 249.35 | 244.20 | 240.10 |
| 0.5031-0.5340 | 41617h6 | 42617h6 | 43517h6 | .4375 | 6 | 2 | 6 | 308.10 | 277.85 | 267.75 | 262.95 | 257.70 | 253.60 |
| 0.5341-0.5660 | 41618h6 | 42618h6 | 43518h6 | .4375 | 6 | 2 | 6 | 311.60 | 281.40 | 271.10 | 266.30 | 261.10 | 257.05 |
| 0.5661-0.5970 | 41619h6 | 42619h6 | 43519h6 | .4375 | 6 | 2 | 6 | 314.00 | 283.60 | 273.50 | 268.55 | 263.35 | 259.45 |
| 0.5971-0.6280 | 41620h6 | 42620h6 | 43520h6 | .5625 | 6 | 2 1/4 | 6 | 314.00 | 283.60 | 273.50 | 268.55 | 263.35 | 259.45 |
| 0.6281-0.6590 | 41621h6 | 42621h6 | 43521h6 | .5625 | 6 | 2 1/4 | 6 | 341.50 | 311.20 | 300.85 | 296.20 | 290.95 | 286.85 |
| 0.6591-0.6910 | 41622h6 | 42622h6 | 43522h6 | .5625 | 6 | 2 1/4 | 6 | 341.50 | 311.20 | 300.85 | 296.20 | 290.95 | 286.85 |
| 0.6911-0.7220 | 41623h6 | 42623h6 | 43523h6 | .5625 | 6 | 2 1/4 | 6 | 360.75 | 330.35 | 320.25 | 315.50 | 310.15 | 306.15 |
| 0.7221-0.7530 | 41624h6 | 42624h6 | 43524h6 | .6250 | 6 | 2 1/2 | 6 | 360.75 | 330.35 | 320.25 | 315.50 | 310.15 | 306.15 |
| 0.7531-0.7840 | 41625h6 | 42625h6 | 43525h6 | .6250 | 6 | 2 1/2 | 6 | 362.00 | 331.55 | 321.55 | 316.60 | 311.40 | 307.35 |
| 0.7841-0.8160 | 41626h6 | 42626h6 | 43526h6 | .6250 | 6 | 2 1/2 | 6 | 362.00 | 331.55 | 321.55 | 316.60 | 311.40 | 307.35 |
| 0.8161-0.8470 | 41627h6 | 42627h6 | 43527h6 | .6250 | 6 | 2 1/2 | 6 | 370.95 | 340.70 | 330.55 | 325.75 | 320.50 | 316.35 |
| 0.8471-0.8780 | 41628h6 | 42628h6 | 43528h6 | .7500 | 6 | 2 5/8 | 6 | 383.00 | 352.60 | 342.50 | 337.65 | 332.50 | 328.40 |
| 0.8781-0.9090 | 41629h6 | 42629h6 | 43529h6 | .7500 | 6 | 2 5/8 | 6 | 422.70 | 392.40 | 382.20 | 377.40 | 372.20 | 368.05 |
| 0.9091-0.9410 | 41630h6 | 42630h6 | 43530h6 | .7500 | 8 | 2 5/8 | 6 | 431.00 | 400.60 | 390.55 | 385.70 | 380.45 | 376.40 |
| 0.9411-0.9720 | 41631h6 | 42631h6 | 43531h6 | .7500 | 8 | 2 5/8 | 6 | 431.00 | 400.60 | 390.55 | 385.70 | 380.45 | 376.40 |
| 0.9721-1.0030 | 41632h6 | 42632h6 | 43532h6 | .8750 | 8 | 2 3/4 | 6 | 431.00 | 400.60 | 390.55 | 385.70 | 380.45 | 376.40 |

REAMERS

FLUTE FED FOR THRU HOLES STRAIGHT FLUTES & SHANK

MODIFICATIONS

- End chamfer other than 45°
- End cutting or corner radius
- Increased/Decreased back taper
- Closer tool diameter tolerance (.0001")
- Cutting diameter reduced for step or pilot (Some modifications may affect the TIR)

- TYPE 416h6 - FOR NON-FERROUS MATERIALS - METRIC**
- TYPE 426h6 - FOR CAST IRONS & MULTI-PURPOSE - METRIC**
- TYPE 435h6 - FOR STEELS & HIGH TEMP ALLOYS - METRIC**
- Coolant outlets in each flute • Polished flutes • Flute long carbide

| TOOL DIAMETER RANGE | TYPE 416h6 NON FERROUS EDP NO. | TYPE 426h6 CAST IRON EDP NO. | TYPE 435h6 STEEL/ HI-TEMP EDP NO. | DIMENSIONS | | | | FINISHED TO MODIFIED TOOL DIAMETER | | | | | |
|---------------------|--------------------------------|------------------------------|-----------------------------------|-----------------------|-------------|----------|---------------|--|----------|----------|----------|----------|----------|
| | | | | MAX. SHANK DIAM. (mm) | NO. OF FLTS | LENGTH | | PRICE EACH - BASED ON QUANTITY ORDERED | | | | | |
| | | | | | | FLT (mm) | OVER-ALL (mm) | 1 | 2 | 3 | 4 | 5-7 | 8-14* |
| 8.815-9.601 | 416095h6 | 426095h6 | 435095h6 | 8 | 4 | 45 | 127 | \$288.55 | \$258.40 | \$248.20 | \$243.25 | \$238.25 | \$233.90 |
| 9.602-10.389 | 416100h6 | 426100h6 | 435100h6 | 8 | 4 | 45 | 127 | 294.05 | 264.10 | 253.70 | 248.90 | 243.85 | 239.60 |
| 10.390-11.201 | 416110h6 | 426110h6 | 435110h6 | 10 | 6 | 45 | 127 | 299.65 | 269.55 | 259.45 | 254.35 | 249.35 | 245.15 |
| 11.202-12.000 | 416120h6 | 426120h6 | 435120h6 | 10 | 6 | 45 | 127 | 299.65 | 269.55 | 259.45 | 254.35 | 249.35 | 245.15 |
| 12.001-12.875 | 416125h6 | 426125h6 | 435125h6 | 10 | 6 | 51 | 153 | 299.65 | 269.55 | 259.45 | 254.35 | 249.35 | 245.15 |
| 12.876-13.565 | 416135h6 | 426135h6 | 435135h6 | 12 | 6 | 51 | 153 | 313.10 | 283.00 | 272.80 | 268.00 | 262.95 | 258.60 |
| 13.566-14.376 | 416140h6 | 426140h6 | 435140h6 | 12 | 6 | 51 | 153 | 316.60 | 286.50 | 276.45 | 271.45 | 266.30 | 262.20 |
| 14.377-15.164 | 416150h6 | 426150h6 | 435150h6 | 12 | 6 | 51 | 153 | 319.10 | 288.85 | 278.70 | 273.70 | 268.55 | 264.50 |
| 15.165-16.100 | 416160h6 | 426160h6 | 435160h6 | 14 | 6 | 57 | 153 | 319.10 | 288.85 | 278.70 | 273.70 | 268.55 | 264.50 |
| 16.101-16.740 | 416165h6 | 426165h6 | 435165h6 | 14 | 6 | 57 | 153 | 346.70 | 316.30 | 306.15 | 301.30 | 296.20 | 291.95 |
| 16.741-17.551 | 416175h6 | 426175h6 | 435175h6 | 14 | 6 | 57 | 153 | 346.70 | 316.30 | 306.15 | 301.30 | 296.20 | 291.95 |
| 17.552-18.340 | 416180h6 | 426180h6 | 435180h6 | 14 | 6 | 57 | 153 | 365.80 | 335.55 | 325.30 | 320.50 | 315.50 | 311.25 |
| 18.341-19.250 | 416190h6 | 426190h6 | 435190h6 | 16 | 6 | 64 | 153 | 365.80 | 335.55 | 325.30 | 320.50 | 315.50 | 311.25 |
| 19.251-20.126 | 416200h6 | 426200h6 | 435200h6 | 16 | 6 | 64 | 153 | 361.35 | 331.05 | 320.90 | 316.15 | 310.95 | 306.70 |
| 20.127-21.127 | 416210h6 | 426210h6 | 435210h6 | 16 | 6 | 64 | 153 | 370.35 | 339.95 | 329.80 | 325.05 | 319.80 | 315.70 |
| 21.128-22.127 | 416220h6 | 426220h6 | 435220h6 | 20 | 6 | 64 | 153 | 370.35 | 339.95 | 329.80 | 325.05 | 319.80 | 315.70 |
| 22.128-23.127 | 416230h6 | 426230h6 | 435230h6 | 20 | 6 | 67 | 153 | 421.95 | 391.65 | 381.45 | 376.70 | 371.50 | 367.25 |
| 23.128-24.127 | 416240h6 | 426240h6 | 435240h6 | 20 | 8 | 67 | 153 | 430.25 | 400.00 | 389.80 | 385.00 | 379.75 | 375.65 |
| 24.128-25.127 | 416250h6 | 426250h6 | 435250h6 | 20 | 8 | 70 | 153 | 430.25 | 400.00 | 389.80 | 385.00 | 379.75 | 375.65 |

*Quantities of 15 or more - Contact Hannibal Specials Dept.



PRECISION h6 SHANK REAMERS CARBIDE TIPPED TYPES 411h6, 413h6, 415h6 FRACTIONAL & METRIC



CENTER FED FOR BLIND HOLES RIGHT SPIRAL FLUTES

TYPE 411h6 - FOR NON-FERROUS MATERIALS
TYPE 413h6 - FOR CAST IRONS & MULTI-PURPOSE
TYPE 415h6 - FOR STEELS & HIGH TEMP ALLOYS

• Center coolant outlet • Polished flutes • Flute long carbide

USE:

- Center coolant outlet for reaming blind holes as chips are flushed **back** towards the shank
- Improves hole finish and permits higher feeds & speeds with longer tool life
- Use Tool Selector on page 78 to determine appropriate type

| TOOL DIAMETER RANGE | TYPE 411h6 NON FERROUS EDP NO. | TYPE 413h6 CAST IRON EDP NO. | TYPE 415h6 STEEL/ HI-TEMP EDP NO. | DIMENSIONS | | | | FINISHED TO MODIFIED TOOL DIAMETER | | | | | |
|---------------------|--------------------------------|------------------------------|-----------------------------------|------------------|-------------|--------|----------|--|----------|----------|----------|----------|----------|
| | | | | MAX. SHANK DIAM. | NO. OF FLTS | LENGTH | | PRICE EACH - BASED ON QUANTITY ORDERED | | | | | |
| | | | | | | FLT | OVER-ALL | 1 | 2 | 3 | 4 | 5-7 | 8-14* |
| 0.3471 - 0.3780 | 41112h6 | 41312h6 | 41512h6 | .3125 | 4 | 1 3/4 | 5 | \$287.05 | \$256.90 | \$246.70 | \$241.90 | \$236.70 | \$232.50 |
| 0.3781 - 0.4090 | 41113h6 | 41313h6 | 41513h6 | .3125 | 4 | 1 3/4 | 5 | 287.75 | 257.40 | 247.35 | 242.50 | 237.25 | 233.25 |
| 0.4091 - 0.4410 | 41114h6 | 41314h6 | 41514h6 | .3750 | 6 | 1 3/4 | 5 | 290.20 | 259.75 | 249.65 | 244.80 | 239.65 | 235.55 |
| 0.4411 - 0.4720 | 41115h6 | 41315h6 | 41515h6 | .3750 | 6 | 1 3/4 | 5 | 292.25 | 261.85 | 251.80 | 247.00 | 241.80 | 237.65 |
| 0.4721 - 0.5030 | 41116h6 | 41316h6 | 41516h6 | .4375 | 6 | 2 | 6 | 301.40 | 271.00 | 260.90 | 256.00 | 250.80 | 246.70 |
| 0.5031 - 0.5340 | 41117h6 | 41317h6 | 41517h6 | .4375 | 6 | 2 | 6 | 310.15 | 279.90 | 269.65 | 264.85 | 259.60 | 255.50 |
| 0.5341 - 0.5660 | 41118h6 | 41318h6 | 41518h6 | .4375 | 6 | 2 | 6 | 310.15 | 279.90 | 269.65 | 264.85 | 259.60 | 255.50 |
| 0.5661 - 0.5970 | 41119h6 | 41319h6 | 41519h6 | .4375 | 6 | 2 | 6 | 320.05 | 289.65 | 279.55 | 274.70 | 269.50 | 265.35 |
| 0.5971 - 0.6280 | 41120h6 | 41320h6 | 41520h6 | .5625 | 6 | 2 1/4 | 6 | 320.05 | 289.65 | 279.55 | 274.70 | 269.50 | 265.35 |
| 0.6281 - 0.6590 | 41121h6 | 41321h6 | 41521h6 | .5625 | 6 | 2 1/4 | 6 | 353.75 | 323.45 | 313.30 | 308.45 | 303.20 | 299.10 |
| 0.6591 - 0.6910 | 41122h6 | 41322h6 | 41522h6 | .5625 | 6 | 2 1/4 | 6 | 353.75 | 323.45 | 313.30 | 308.45 | 303.20 | 299.10 |
| 0.6911 - 0.7220 | 41123h6 | 41323h6 | 41523h6 | .5625 | 6 | 2 1/4 | 6 | 366.45 | 336.05 | 325.95 | 321.05 | 315.90 | 311.75 |
| 0.7221 - 0.7530 | 41124h6 | 41324h6 | 41524h6 | .6250 | 6 | 2 1/2 | 6 | 347.50 | 317.15 | 307.00 | 302.20 | 297.00 | 292.85 |
| 0.7531 - 0.7840 | 41125h6 | 41325h6 | 41525h6 | .6250 | 6 | 2 1/2 | 6 | 390.15 | 359.80 | 349.70 | 344.90 | 339.65 | 335.55 |
| 0.7841 - 0.8160 | 41126h6 | 41326h6 | 41526h6 | .6250 | 6 | 2 1/2 | 6 | 394.35 | 364.00 | 353.85 | 349.05 | 343.80 | 339.70 |
| 0.8161 - 0.8470 | 41127h6 | 41327h6 | 41527h6 | .6250 | 6 | 2 1/2 | 6 | 400.55 | 370.25 | 360.05 | 355.25 | 350.05 | 345.95 |
| 0.8471 - 0.8780 | 41128h6 | 41328h6 | 41528h6 | .7500 | 6 | 2 3/8 | 6 | 419.15 | 388.90 | 378.70 | 373.95 | 368.70 | 364.55 |
| 0.8781 - 0.9090 | 41129h6 | 41329h6 | 41529h6 | .7500 | 6 | 2 3/8 | 6 | 440.50 | 410.20 | 400.05 | 395.25 | 390.05 | 385.80 |
| 0.9091 - 0.9410 | 41130h6 | 41330h6 | 41530h6 | .7500 | 8 | 2 3/8 | 6 | 458.60 | 428.20 | 418.05 | 413.30 | 408.05 | 404.00 |
| 0.9411 - 0.9720 | 41131h6 | 41331h6 | 41531h6 | .7500 | 8 | 2 3/8 | 6 | 459.80 | 429.45 | 419.30 | 414.50 | 409.25 | 405.20 |
| 0.9721 - 1.0030 | 41132h6 | 41332h6 | 41532h6 | .8750 | 8 | 2 3/4 | 6 | 460.50 | 430.05 | 419.95 | 415.15 | 409.90 | 405.80 |

REAMERS



CENTER FED FOR BLIND HOLES RIGHT SPIRAL FLUTES STRAIGHT SHANK

TYPE 411h6 - FOR NON-FERROUS MATERIALS - METRIC
TYPE 413h6 - FOR CAST IRONS & MULTI-PURPOSE - METRIC
TYPE 415h6 - FOR STEELS & HIGH TEMP ALLOYS - METRIC

• Center coolant outlet • Polished flutes • Flute long carbide

MODIFICATIONS

- End chamfer other than 45°
- End cutting or corner radius
- Increased/Decreased back taper
- Closer tool diameter tolerance (.0001")
- Cutting diameter reduced for step or pilot (Some modifications may affect the TIR)



| TOOL DIAMETER RANGE | TYPE 411h6 NON FERROUS EDP NO. | TYPE 413h6 CAST IRON EDP NO. | TYPE 415h6 STEEL/ HI-TEMP EDP NO. | DIMENSIONS | | | | FINISHED TO MODIFIED TOOL DIAMETER | | | | | |
|---------------------|--------------------------------|------------------------------|-----------------------------------|-----------------------|-------------|----------|---------------|--|----------|----------|----------|----------|----------|
| | | | | MAX. SHANK DIAM. (mm) | NO. OF FLTS | LENGTH | | PRICE EACH - BASED ON QUANTITY ORDERED | | | | | |
| | | | | | | FLT (mm) | OVER-ALL (mm) | 1 | 2 | 3 | 4 | 5-7 | 8-14* |
| 8.815 - 9.601 | 411095h6 | 413095h6 | 415095h6 | 8 | 4 | 45 | 127 | \$287.05 | \$256.90 | \$246.70 | \$241.90 | \$236.70 | \$232.50 |
| 9.602 - 10.389 | 411100h6 | 413100h6 | 415100h6 | 8 | 4 | 45 | 127 | 287.75 | 257.40 | 247.35 | 242.50 | 237.25 | 233.25 |
| 10.390 - 11.201 | 411110h6 | 413110h6 | 415110h6 | 10 | 6 | 45 | 127 | 290.20 | 259.75 | 249.65 | 244.80 | 239.65 | 235.55 |
| 11.202 - 12.000 | 411120h6 | 413120h6 | 415120h6 | 10 | 6 | 45 | 127 | 301.40 | 271.00 | 260.90 | 256.00 | 250.80 | 246.70 |
| 12.001 - 12.875 | 411125h6 | 413125h6 | 415125h6 | 10 | 6 | 51 | 153 | 310.15 | 279.90 | 269.65 | 264.85 | 259.60 | 255.50 |
| 12.876 - 13.565 | 411135h6 | 413135h6 | 415135h6 | 12 | 6 | 51 | 153 | 310.15 | 279.90 | 269.65 | 264.85 | 259.60 | 255.50 |
| 13.566 - 14.376 | 411140h6 | 413140h6 | 415140h6 | 12 | 6 | 51 | 153 | 310.15 | 279.90 | 269.65 | 264.85 | 259.60 | 255.50 |
| 14.377 - 15.164 | 411150h6 | 413150h6 | 415150h6 | 12 | 6 | 51 | 153 | 320.05 | 289.65 | 279.55 | 274.70 | 269.50 | 265.35 |
| 15.165 - 16.100 | 411160h6 | 413160h6 | 415160h6 | 14 | 6 | 57 | 153 | 353.75 | 323.45 | 313.30 | 308.45 | 303.20 | 299.10 |
| 16.101 - 16.740 | 411165h6 | 413165h6 | 415165h6 | 14 | 6 | 57 | 153 | 353.75 | 323.45 | 313.30 | 308.45 | 303.20 | 299.10 |
| 16.741 - 17.551 | 411175h6 | 413175h6 | 415175h6 | 14 | 6 | 57 | 153 | 353.75 | 323.45 | 313.30 | 308.45 | 303.20 | 299.10 |
| 17.552 - 18.340 | 411180h6 | 413180h6 | 415180h6 | 14 | 6 | 57 | 153 | 366.45 | 336.05 | 325.95 | 321.05 | 315.90 | 311.75 |
| 18.341 - 19.250 | 411190h6 | 413190h6 | 415190h6 | 16 | 6 | 64 | 153 | 390.15 | 359.80 | 349.70 | 344.90 | 339.65 | 335.55 |
| 19.251 - 20.126 | 411200h6 | 413200h6 | 415200h6 | 16 | 6 | 64 | 153 | 394.35 | 364.00 | 353.85 | 349.05 | 343.80 | 339.70 |
| 20.127 - 21.127 | 411210h6 | 413210h6 | 415210h6 | 16 | 6 | 64 | 153 | 400.55 | 370.25 | 360.05 | 355.25 | 350.05 | 345.95 |
| 21.128 - 22.127 | 411220h6 | 413220h6 | 415220h6 | 20 | 6 | 64 | 153 | 419.15 | 388.90 | 378.70 | 373.95 | 368.70 | 364.55 |
| 22.128 - 23.127 | 411230h6 | 413230h6 | 415230h6 | 20 | 6 | 67 | 153 | 458.60 | 428.20 | 418.05 | 413.30 | 408.05 | 404.00 |
| 23.128 - 24.127 | 411240h6 | 413240h6 | 415240h6 | 20 | 8 | 67 | 153 | 459.80 | 429.45 | 419.30 | 414.50 | 409.25 | 405.20 |
| 24.128 - 25.127 | 411250h6 | 413250h6 | 415250h6 | 20 | 8 | 70 | 153 | 460.50 | 430.05 | 419.95 | 415.15 | 409.90 | 405.80 |

*Quantities of 15 or more - Contact Hannibal Specials Dept.



PRECISION h6 SHANK REAMERS CARBIDE TIPPED



TYPES 427h6, 428h6, 429h6 FRACTIONAL & METRIC

FLUTE FED FOR THRU HOLES LEFT SPIRAL FLUTES

USE:

- Flute coolant outlets for reaming thru holes as chips are flushed **forward** through the hole being reamed
- Improves hole finish and permits higher feeds & speeds with longer tool life
- Use Tool Selector on page 80 to determine appropriate type

- TYPE 427h6 - FOR NON-FERROUS MATERIALS**
- TYPE 428h6 - FOR CAST IRONS & MULTI-PURPOSE**
- TYPE 429h6 - FOR STEELS & HIGH TEMP ALLOYS**
- Coolant outlets in each flute • Polished flutes • Flute long carbide

| TOOL DIAMETER RANGE | TYPE 427h6 NON FERROUS EDP NO. | TYPE 428h6 CAST IRON EDP NO. | TYPE 429h6 STEEL/ HI-TEMP EDP NO. | DIMENSIONS | | | | FINISHED TO MODIFIED TOOL DIAMETER | | | | | |
|---------------------|--------------------------------|------------------------------|-----------------------------------|------------------|-------------|--------|----------|--|----------|----------|----------|----------|----------|
| | | | | MAX. SHANK DIAM. | NO. OF FLTS | LENGTH | | PRICE EACH - BASED ON QUANTITY ORDERED | | | | | |
| | | | | | | FLT | OVER-ALL | 1 | 2 | 3 | 4 | 5-7 | 8-14* |
| 0.3471-0.3780 | 42712h6 | 42812h6 | 42912h6 | .3125 | 4 | 1 3/4 | 5 | \$341.70 | \$311.30 | \$301.30 | \$296.35 | \$291.15 | \$286.95 |
| 0.3781-0.4090 | 42713h6 | 42813h6 | 42913h6 | .3125 | 4 | 1 3/4 | 5 | 342.80 | 312.55 | 302.40 | 297.55 | 292.35 | 288.20 |
| 0.4091-0.4410 | 42714h6 | 42814h6 | 42914h6 | .3750 | 6 | 1 3/4 | 5 | 345.40 | 315.00 | 304.95 | 300.10 | 294.90 | 290.80 |
| 0.4411-0.4720 | 42715h6 | 42815h6 | 42915h6 | .3750 | 6 | 1 3/4 | 5 | 348.05 | 317.60 | 307.55 | 302.60 | 297.40 | 293.30 |
| 0.4721-0.5030 | 42716h6 | 42816h6 | 42916h6 | .4375 | 6 | 2 | 6 | 351.65 | 321.25 | 311.20 | 306.25 | 301.05 | 297.00 |
| 0.5031-0.5340 | 42717h6 | 42817h6 | 42917h6 | .4375 | 6 | 2 | 6 | 357.75 | 327.30 | 317.30 | 312.40 | 307.20 | 303.10 |
| 0.5341-0.5660 | 42718h6 | 42818h6 | 42918h6 | .4375 | 6 | 2 | 6 | 362.05 | 331.80 | 321.60 | 316.80 | 311.45 | 307.50 |
| 0.5661-0.5970 | 42719h6 | 42819h6 | 42919h6 | .4375 | 6 | 2 | 6 | 368.30 | 338.05 | 327.90 | 323.15 | 317.80 | 313.70 |
| 0.5971-0.6280 | 42720h6 | 42820h6 | 42920h6 | .5625 | 6 | 2 1/4 | 6 | 374.05 | 343.65 | 333.55 | 328.70 | 323.55 | 319.40 |
| 0.6281-0.6590 | 42721h6 | 42821h6 | 42921h6 | .5625 | 6 | 2 1/4 | 6 | 407.65 | 377.30 | 367.20 | 362.40 | 357.15 | 353.10 |
| 0.6591-0.6910 | 42722h6 | 42822h6 | 42922h6 | .5625 | 6 | 2 1/4 | 6 | 414.85 | 384.45 | 374.25 | 369.50 | 364.35 | 360.15 |
| 0.6911-0.7220 | 42723h6 | 42823h6 | 42923h6 | .5625 | 6 | 2 1/4 | 6 | 422.30 | 391.90 | 381.85 | 376.95 | 371.75 | 367.75 |
| 0.7221-0.7530 | 42724h6 | 42824h6 | 42924h6 | .6250 | 6 | 2 1/2 | 6 | 430.00 | 399.70 | 389.55 | 384.60 | 379.45 | 375.35 |
| 0.7531-0.7840 | 42725h6 | 42825h6 | 42925h6 | .6250 | 6 | 2 1/2 | 6 | 436.25 | 405.95 | 395.85 | 391.00 | 385.75 | 381.65 |
| 0.7841-0.8160 | 42726h6 | 42826h6 | 42926h6 | .6250 | 6 | 2 1/2 | 6 | 440.85 | 410.50 | 400.40 | 395.55 | 390.40 | 386.30 |
| 0.8161-0.8470 | 42727h6 | 42827h6 | 42927h6 | .6250 | 6 | 2 1/2 | 6 | 447.75 | 417.40 | 407.35 | 402.50 | 397.20 | 393.15 |
| 0.8471-0.8780 | 42728h6 | 42828h6 | 42928h6 | .7500 | 6 | 2 5/8 | 6 | 469.05 | 438.70 | 428.55 | 423.70 | 418.50 | 414.35 |
| 0.8781-0.9090 | 42729h6 | 42829h6 | 42929h6 | .7500 | 6 | 2 5/8 | 6 | 493.15 | 462.75 | 452.60 | 447.85 | 442.55 | 438.50 |
| 0.9091-0.9410 | 42730h6 | 42830h6 | 42930h6 | .7500 | 8 | 2 5/8 | 6 | 514.10 | 483.90 | 473.65 | 468.75 | 463.55 | 459.50 |
| 0.9411-0.9720 | 42731h6 | 42831h6 | 42931h6 | .7500 | 8 | 2 5/8 | 6 | 515.20 | 485.00 | 474.75 | 469.95 | 464.75 | 460.60 |
| 0.9721-1.0030 | 42732h6 | 42832h6 | 42932h6 | .8750 | 8 | 2 3/4 | 6 | 515.85 | 485.45 | 475.35 | 470.50 | 465.40 | 461.20 |

REAMERS

FLUTE FED FOR THRU HOLES LEFT SPIRAL FLUTES STRAIGHT SHANK

- TYPE 427h6 - FOR NON-FERROUS MATERIALS - METRIC**
- TYPE 428h6 - FOR CAST IRONS & MULTI-PURPOSE - METRIC**
- TYPE 429h6 - FOR STEELS & HIGH TEMP ALLOYS - METRIC**
- Coolant outlets in each flute • Polished flutes • Flute long carbide

MODIFICATIONS

- End chamfer other than 45°
- End cutting or corner radius
- Increased/Decreased back taper
- Closer tool diameter tolerance (.0001")
- Cutting diameter reduced for step or pilot (Some modifications may affect the TIR)



| TOOL DIAMETER RANGE | TYPE 427h6 NON FERROUS EDP NO. | TYPE 428h6 CAST IRON EDP NO. | TYPE 429h6 STEEL/ HI-TEMP EDP NO. | DIMENSIONS | | | | FINISHED TO MODIFIED TOOL DIAMETER | | | | | |
|---------------------|--------------------------------|------------------------------|-----------------------------------|-----------------------|-------------|----------|---------------|--|----------|----------|----------|----------|----------|
| | | | | MAX. SHANK DIAM. (mm) | NO. OF FLTS | LENGTH | | PRICE EACH - BASED ON QUANTITY ORDERED | | | | | |
| | | | | | | FLT (mm) | OVER-ALL (mm) | 1 | 2 | 3 | 4 | 5-7 | 8-14* |
| 8.815-9.601 | 427095h6 | 428095h6 | 429095h6 | 8 | 4 | 45 | 127 | \$341.70 | \$311.30 | \$301.30 | \$296.35 | \$291.15 | \$286.95 |
| 9.602-10.389 | 427100h6 | 428100h6 | 429100h6 | 8 | 4 | 45 | 127 | 342.80 | 312.55 | 302.40 | 297.55 | 292.35 | 288.20 |
| 10.390-11.201 | 427110h6 | 428110h6 | 429110h6 | 10 | 6 | 45 | 127 | 345.40 | 315.00 | 304.95 | 300.10 | 294.90 | 290.80 |
| 11.202-12.000 | 427120h6 | 428120h6 | 429120h6 | 10 | 6 | 45 | 127 | 351.65 | 321.25 | 311.20 | 306.25 | 301.05 | 297.00 |
| 12.001-12.875 | 427125h6 | 428125h6 | 429125h6 | 10 | 6 | 51 | 153 | 357.75 | 327.30 | 317.30 | 312.40 | 307.20 | 303.10 |
| 12.876-13.565 | 427135h6 | 428135h6 | 429135h6 | 12 | 6 | 51 | 153 | 362.05 | 331.80 | 321.60 | 316.80 | 311.45 | 307.50 |
| 13.566-14.376 | 427140h6 | 428140h6 | 429140h6 | 12 | 6 | 51 | 153 | 362.05 | 331.80 | 321.60 | 316.80 | 311.45 | 307.50 |
| 14.377-15.164 | 427150h6 | 428150h6 | 429150h6 | 12 | 6 | 51 | 153 | 368.30 | 338.05 | 327.90 | 323.15 | 317.80 | 313.70 |
| 15.165-16.100 | 427160h6 | 428160h6 | 429160h6 | 14 | 6 | 57 | 153 | 407.65 | 377.30 | 367.20 | 362.40 | 357.15 | 353.10 |
| 16.101-16.740 | 427165h6 | 428165h6 | 429165h6 | 14 | 6 | 57 | 153 | 414.85 | 384.45 | 374.25 | 369.50 | 364.35 | 360.15 |
| 16.741-17.551 | 427175h6 | 428175h6 | 429175h6 | 14 | 6 | 57 | 153 | 414.85 | 384.45 | 374.25 | 369.50 | 364.35 | 360.15 |
| 17.552-18.340 | 427180h6 | 428180h6 | 429180h6 | 14 | 6 | 57 | 153 | 422.30 | 391.90 | 381.85 | 376.95 | 371.75 | 367.75 |
| 18.341-19.250 | 427190h6 | 428190h6 | 429190h6 | 16 | 6 | 64 | 153 | 436.25 | 405.95 | 395.85 | 391.00 | 385.75 | 381.65 |
| 19.251-20.126 | 427200h6 | 428200h6 | 429200h6 | 16 | 6 | 64 | 153 | 440.85 | 410.50 | 400.40 | 395.55 | 390.40 | 386.30 |
| 20.127-21.127 | 427210h6 | 428210h6 | 429210h6 | 16 | 6 | 64 | 153 | 447.75 | 417.40 | 407.35 | 402.50 | 397.20 | 393.15 |
| 21.128-22.127 | 427220h6 | 428220h6 | 429220h6 | 20 | 6 | 64 | 153 | 469.05 | 438.70 | 428.55 | 423.70 | 418.50 | 414.35 |
| 22.128-23.127 | 427230h6 | 428230h6 | 429230h6 | 20 | 6 | 67 | 153 | 514.10 | 483.90 | 473.65 | 468.75 | 463.55 | 459.50 |
| 23.128-24.127 | 427240h6 | 428240h6 | 429240h6 | 20 | 8 | 67 | 153 | 515.20 | 485.00 | 474.75 | 469.95 | 464.75 | 460.60 |
| 24.128-25.127 | 427250h6 | 428250h6 | 429250h6 | 20 | 8 | 70 | 153 | 515.85 | 485.45 | 475.35 | 470.50 | 465.40 | 461.20 |

*Quantities of 15 or more - Contact Hannibal Specials Dept.



EXTENDED LENGTH REAMERS CARBIDE TIPPED TYPES 457EL, 458EL, 459EL

MATERIAL SPECIFIC

STRAIGHT FLUTE LONG CARBIDE

- TYPE 457EL - FOR NON-FERROUS MATERIALS**
- TYPE 458EL - FOR CAST IRONS & NAS MULTI-PURPOSE**
- TYPE 459EL - FOR STEELS & HIGH TEMP ALLOYS**

- Extended length versions of types 457, 458, and 459 found on page 64
- All extended length reamers provided with controlled shank
- Must specify overall length when ordering (centers supplied only at maximum overall length)



| TOOL SELECTOR | CHIP CLASS | MATERIAL MACHINED | TOOL TYPE |
|---------------|------------|---------------------------|-----------|
| | 20 | NON-FERROUS - LONG CHIPS | 457EL |
| | 40 | NON-FERROUS - SHORT CHIPS | 457EL |
| | 60 | CAST IRONS | 458EL |
| | 80 | LOW STRENGTH STEELS | 459EL |
| | 100 | MEDIUM STRENGTH STEELS | 459EL |
| | 120 | HIGH STRENGTH STEELS | 459EL |
| | 140 | HIGH TEMPERATURE ALLOYS | 459EL |

MODIFICATIONS (Prompt delivery)

- Modified tool diameter - priced below
- Closer tool diameter tolerance - pg. 15
- Cutting diam. reduced for step or pilot
- End chamfer other than 45°
- End cutting or corner radius
- Increased/decreased circular margin
- Increased/decreased tool diam. back taper
- Shortened shank or reduced shank diameter
- Flat(s) or tang on shank
- Coatings available:

TITANIUM NITRIDE - TiN

TITANIUM CARBONITRIDE - TiCN

ZIRCONIUM NITRIDE - ZrN

AL TITANIUM NITRIDE - AlTiN

REAMERS

| TOOL DIAMETER RANGE | TYPE 457EL NON FERROUS EDP NO. | TYPE 458EL CAST IRON EDP NO. | TYPE 459EL STEEL/ HI-TEMP EDP NO. | DIMENSIONS | | | | FINISHED TO MODIFIED TOOL DIAMETER | | | | | |
|---------------------|--------------------------------|------------------------------|-----------------------------------|------------------|-------------|--------|-----------------|--|----------|----------|----------|----------|----------|
| | | | | MAX. SHANK DIAM. | NO. OF FLTS | LENGTH | | PRICE EACH - BASED ON QUANTITY ORDERED | | | | | |
| | | | | | | FLT | OVERALL RANGE | 1 | 2 | 3 | 4 | 5-7 | 8-14** |
| * 0.1121-0.1280 | 45704EL | 45804EL | 45904EL | .1099 | 4 | 1 1/2 | 2 3/32 - 6 | \$465.10 | \$407.35 | \$387.95 | \$378.80 | \$369.00 | \$361.10 |
| * 0.1281-0.1435 | 457045EL | 458045EL | 459045EL | .1255 | 4 | 1 1/2 | 2 17/32 - 6 1/2 | 466.75 | 409.05 | 389.75 | 380.40 | 370.35 | 362.70 |
| * 0.1436-0.1590 | 45705EL | 45805EL | 45905EL | .1411 | 4 | 1 1/2 | 2 17/32 - 7 | 474.55 | 416.70 | 397.35 | 388.05 | 378.25 | 370.30 |
| * 0.1591-0.1750 | 457055EL | 458055EL | 459055EL | .1567 | 4 | 1 1/2 | 2 25/32 - 8 | 483.50 | 425.55 | 406.35 | 397.10 | 387.15 | 379.40 |
| * 0.1751-0.1910 | 45706EL | 45806EL | 45906EL | .1724 | 4 | 1 1/2 | 4 17/32 - 9 | 496.30 | 438.50 | 419.00 | 410.05 | 399.90 | 392.20 |
| * 0.1911-0.2210 | 45707EL | 45807EL | 45907EL | .1880 | 4 | 1 1/2 | 5 1/32 - 10 | 512.85 | 455.40 | 435.95 | 426.80 | 416.75 | 409.05 |
| * 0.2211-0.2530 | 45708EL | 45808EL | 45908EL | .2193 | 4 | 1 1/2 | 6 1/32 - 12 | 546.20 | 488.35 | 469.10 | 459.90 | 450.00 | 442.25 |
| * 0.2531-0.2840 | 45709EL | 45809EL | 45909EL | .2505 | 4 | 1 1/2 | 6 1/32 - 12 | 574.65 | 516.85 | 497.65 | 488.20 | 478.50 | 470.45 |
| 0.2841-0.3150 | 45710EL | 45810EL | 45910EL | .2792 | 4 | 1 1/2 | 6 1/32 - 12 | 285.15 | 244.75 | 231.25 | 224.75 | 217.85 | 212.45 |
| 0.3151-0.3470 | 45711EL | 45811EL | 45911EL | .2792 | 4 | 1 1/2 | 6 1/32 - 12 | 285.15 | 244.75 | 231.25 | 224.75 | 217.85 | 212.45 |
| 0.3471-0.3780 | 45712EL | 45812EL | 45912EL | .3105 | 4 | 1 3/4 | 7 1/32 - 14 | 294.45 | 254.15 | 240.65 | 234.05 | 227.15 | 221.70 |
| 0.3781-0.4090 | 45713EL | 45813EL | 45913EL | .3105 | 4 | 1 3/4 | 7 1/32 - 14 | 294.45 | 254.15 | 240.65 | 234.05 | 227.15 | 221.70 |
| 0.4091-0.4410 | 45714EL | 45814EL | 45914EL | .3730 | 6 | 1 3/4 | 7 1/32 - 14 | 303.85 | 263.35 | 249.95 | 243.35 | 236.50 | 231.05 |
| 0.4411-0.4720 | 45715EL | 45815EL | 45915EL | .3730 | 6 | 1 3/4 | 7 1/32 - 14 | 303.85 | 263.35 | 249.95 | 243.35 | 236.50 | 231.05 |
| 0.4721-0.5030 | 45716EL | 45816EL | 45916EL | .4355 | 6 | 2 | 8 1/32 - 16 | 310.15 | 269.65 | 256.20 | 249.70 | 242.85 | 237.35 |
| 0.5031-0.5340 | 45717EL | 45817EL | 45917EL | .4355 | 6 | 2 | 8 1/32 - 16 | 310.15 | 269.65 | 256.20 | 249.70 | 242.85 | 237.35 |
| 0.5341-0.5660 | 45718EL | 45818EL | 45918EL | .4355 | 6 | 2 | 8 1/32 - 16 | 315.90 | 275.45 | 261.90 | 255.50 | 248.55 | 243.15 |
| 0.5661-0.5970 | 45719EL | 45819EL | 45919EL | .4355 | 6 | 2 | 8 1/32 - 16 | 315.90 | 275.45 | 261.90 | 255.50 | 248.55 | 243.15 |
| 0.5971-0.6280 | 45720EL | 45820EL | 45920EL | .5615 | 6 | 2 1/4 | 9 1/32 - 18 | 322.55 | 282.15 | 268.55 | 262.20 | 255.30 | 249.80 |
| 0.6281-0.6590 | 45721EL | 45821EL | 45921EL | .5615 | 6 | 2 1/4 | 9 1/32 - 18 | 322.55 | 282.15 | 268.55 | 262.20 | 255.30 | 249.80 |
| 0.6591-0.6910 | 45722EL | 45822EL | 45922EL | .5615 | 6 | 2 1/4 | 9 1/32 - 18 | 323.50 | 283.05 | 269.50 | 263.05 | 256.20 | 250.70 |
| 0.6911-0.7220 | 45723EL | 45823EL | 45923EL | .5615 | 6 | 2 1/4 | 9 1/32 - 18 | 323.50 | 283.05 | 269.50 | 263.05 | 256.20 | 250.70 |
| 0.7221-0.7530 | 45724EL | 45824EL | 45924EL | .6245 | 6 | 2 1/2 | 9 17/32 - 18 | 347.20 | 306.75 | 293.20 | 286.85 | 280.00 | 274.45 |
| 0.7531-0.7840 | 45725EL | 45825EL | 45925EL | .6245 | 6 | 2 1/2 | 9 17/32 - 18 | 421.35 | 382.85 | 369.90 | 363.85 | 357.25 | 352.10 |
| 0.7841-0.8160 | 45726EL | 45826EL | 45926EL | .6245 | 6 | 2 1/2 | 9 17/32 - 18 | 434.75 | 396.25 | 383.35 | 377.30 | 370.70 | 365.45 |
| 0.8161-0.8470 | 45727EL | 45827EL | 45927EL | .6245 | 6 | 2 1/2 | 9 17/32 - 18 | 439.80 | 401.30 | 388.35 | 382.25 | 375.70 | 370.55 |
| 0.8471-0.8780 | 45728EL | 45828EL | 45928EL | .7495 | 6 | 2 5/8 | 10 1/32 - 18 | 449.15 | 410.50 | 397.65 | 391.65 | 385.00 | 379.75 |
| 0.8781-0.9090 | 45729EL | 45829EL | 45929EL | .7495 | 6 | 2 5/8 | 10 1/32 - 18 | 468.00 | 429.45 | 416.60 | 410.45 | 403.90 | 398.70 |
| 0.9091-0.9410 | 45730EL | 45830EL | 45930EL | .7495 | 8 | 2 5/8 | 10 1/32 - 18 | 472.75 | 434.10 | 421.25 | 415.15 | 408.55 | 403.45 |
| 0.9411-0.9720 | 45731EL | 45831EL | 45931EL | .7495 | 8 | 2 5/8 | 10 1/32 - 18 | 477.20 | 438.70 | 425.80 | 419.70 | 413.10 | 407.90 |
| 0.9721-1.0030 | 45732EL | 45832EL | 45932EL | .8745 | 8 | 2 3/4 | 10 17/32 - 18 | 488.30 | 449.85 | 436.90 | 430.85 | 424.15 | 419.00 |

*Solid Carbide

**Quantities of 15 or more — Contact Hannibal Specials Dept.



EXTENDED LENGTH REAMERS CARBIDE TIPPED TYPES 416EL, 426EL, 435EL



FLUTE FED FOR THRU HOLES STRAIGHT FLUTES

TYPE 416EL - FOR NON-FERROUS MATERIALS

TYPE 426EL - FOR CAST IRONS

TYPE 435EL - FOR STEELS & HIGH TEMP ALLOYS

- Coolant outlets in each flute
- Extended length versions of types 416, 426, and 435 found on page 76
- All extended length reamers provided with controlled shank
- Must specify overall length when ordering (centers supplied only at maximum overall length)

| TOOL SELECTOR | CHIP CLASS | MATERIAL MACHINED | TOOL TYPE |
|---------------|---------------------------|--------------------------|-----------|
| | 20 | NON-FERROUS - LONG CHIPS | 416EL |
| 40 | NON-FERROUS - SHORT CHIPS | 416EL | |
| 60 | CAST IRONS | 426EL | |
| 80 | LOW STRENGTH STEELS | 435EL | |
| 100 | MEDIUM STRENGTH STEELS | 435EL | |
| 120 | HIGH STRENGTH STEELS | 435EL | |
| 140 | HIGH TEMPERATURE ALLOYS | 435EL | |

MODIFICATIONS (Prompt delivery)

- Modified tool diameter - priced below
- Metric tool diameter
- Closer tool diameter tolerance - pg. 15
- Cutting diam. reduced for step or pilot
- End chamfer other than 45°
- End cutting or corner radius
- Increased/decreased circular margin
- Increased/decreased tool diam. back taper
- Shortened shank or reduced shank diameter
- Flat(s) or tang on shank
- Coatings available:

TITANIUM NITRIDE - TiN

TITANIUM CARBONITRIDE - TiCN

ZIRCONIUM NITRIDE - ZrN

AL TITANIUM NITRIDE - AlTiN



| TOOL DIAMETER RANGE | TYPE 416EL NON FERROUS EDP NO. | TYPE 426EL CAST IRON EDP NO. | TYPE 435EL STEEL/ HI-TEMP EDP NO. | DIMENSIONS | | | | FINISHED TO MODIFIED TOOL DIAMETER | | | | | |
|---------------------|--------------------------------|------------------------------|-----------------------------------|------------------|-------------|--------|---------------|--|----------|----------|----------|----------|----------|
| | | | | MAX. SHANK DIAM. | NO. OF FLTS | LENGTH | | PRICE EACH - BASED ON QUANTITY ORDERED | | | | | |
| | | | | | | FLT | OVERALL RANGE | 1 | 2 | 3 | 4 | 5-7 | 8-14** |
| * 0.1751-0.1910 | 41606EL | 42606EL | 43506EL | .1724 | 4 | 1 1/2 | 4 17/32 - 9 | \$593.75 | \$535.95 | \$516.60 | \$507.45 | \$497.65 | \$489.65 |
| * 0.1911-0.2210 | 41607EL | 42607EL | 43507EL | .1880 | 4 | 1 1/2 | 5 1/2 - 10 | 616.60 | 558.75 | 539.30 | 530.25 | 520.40 | 512.60 |
| * 0.2211-0.2530 | 41608EL | 42608EL | 43508EL | .2193 | 4 | 1 1/2 | 6 1/2 - 12 | 685.05 | 627.35 | 607.90 | 598.65 | 588.65 | 581.00 |
| * 0.2531-0.2840 | 41609EL | 42609EL | 43509EL | .2505 | 4 | 1 1/2 | 6 1/2 - 12 | 718.35 | 660.45 | 641.15 | 631.90 | 621.90 | 614.10 |
| 0.2841-0.3150 | 41610EL | 42610EL | 43510EL | .2792 | 4 | 1 1/2 | 6 1/2 - 12 | 371.50 | 331.05 | 317.50 | 311.05 | 304.05 | 298.65 |
| 0.3151-0.3470 | 41611EL | 42611EL | 43511EL | .2792 | 4 | 1 1/2 | 6 1/2 - 12 | 371.50 | 331.05 | 317.50 | 311.05 | 304.05 | 298.65 |
| 0.3471-0.3780 | 41612EL | 42612EL | 43512EL | .3105 | 4 | 1 3/4 | 7 1/2 - 14 | 378.70 | 338.30 | 324.90 | 318.45 | 311.40 | 306.05 |
| 0.3781-0.4090 | 41613EL | 42613EL | 43513EL | .3105 | 4 | 1 3/4 | 7 1/2 - 14 | 378.70 | 338.30 | 324.90 | 318.45 | 311.40 | 306.05 |
| 0.4091-0.4410 | 41614EL | 42614EL | 43514EL | .3730 | 6 | 1 3/4 | 7 1/2 - 14 | 380.35 | 339.90 | 326.35 | 319.95 | 312.95 | 307.60 |
| 0.4411-0.4720 | 41615EL | 42615EL | 43515EL | .3730 | 6 | 1 3/4 | 7 1/2 - 14 | 380.35 | 339.90 | 326.35 | 319.95 | 312.95 | 307.60 |
| 0.4721-0.5030 | 41616EL | 42616EL | 43516EL | .4355 | 6 | 2 | 8 1/2 - 16 | 413.75 | 373.30 | 359.80 | 353.30 | 346.40 | 340.95 |
| 0.5031-0.5340 | 41617EL | 42617EL | 43517EL | .4355 | 6 | 2 | 8 1/2 - 16 | 413.75 | 373.30 | 359.80 | 353.30 | 346.40 | 340.95 |
| 0.5341-0.5660 | 41618EL | 42618EL | 43518EL | .4355 | 6 | 2 | 8 1/2 - 16 | 416.65 | 376.25 | 362.70 | 356.25 | 349.35 | 343.80 |
| 0.5661-0.5970 | 41619EL | 42619EL | 43519EL | .4355 | 6 | 2 | 8 1/2 - 16 | 416.65 | 376.25 | 362.70 | 356.25 | 349.35 | 343.80 |
| 0.5971-0.6280 | 41620EL | 42620EL | 43520EL | .5615 | 6 | 2 1/4 | 9 1/2 - 18 | 424.85 | 384.45 | 370.90 | 364.45 | 357.55 | 352.10 |
| 0.6281-0.6590 | 41621EL | 42621EL | 43521EL | .5615 | 6 | 2 1/4 | 9 1/2 - 18 | 424.85 | 384.45 | 370.90 | 364.45 | 357.55 | 352.10 |
| 0.6591-0.6910 | 41622EL | 42622EL | 43522EL | .5615 | 6 | 2 1/4 | 9 1/2 - 18 | 429.45 | 389.05 | 375.55 | 369.05 | 362.10 | 356.70 |
| 0.6911-0.7220 | 41623EL | 42623EL | 43523EL | .5615 | 6 | 2 1/4 | 9 1/2 - 18 | 429.45 | 389.05 | 375.55 | 369.05 | 362.10 | 356.70 |
| 0.7221-0.7530 | 41624EL | 42624EL | 43524EL | .6245 | 6 | 2 1/2 | 9 17/32 - 18 | 447.15 | 406.70 | 393.20 | 386.65 | 379.75 | 374.25 |
| 0.7531-0.7840 | 41625EL | 42625EL | 43525EL | .6245 | 6 | 2 1/2 | 9 17/32 - 18 | 509.65 | 471.05 | 458.20 | 452.05 | 445.55 | 440.30 |
| 0.7841-0.8160 | 41626EL | 42626EL | 43526EL | .6245 | 6 | 2 1/2 | 9 17/32 - 18 | 527.90 | 489.40 | 476.55 | 470.35 | 463.75 | 458.60 |
| 0.8161-0.8470 | 41627EL | 42627EL | 43527EL | .6245 | 6 | 2 1/2 | 9 17/32 - 18 | 532.85 | 494.35 | 481.40 | 475.30 | 468.65 | 463.45 |
| 0.8471-0.8780 | 41628EL | 42628EL | 43528EL | .7495 | 6 | 2 5/8 | 10 1/2 - 18 | 536.10 | 497.60 | 484.75 | 478.60 | 472.05 | 466.85 |
| 0.8781-0.9090 | 41629EL | 42629EL | 43529EL | .7495 | 6 | 2 5/8 | 10 1/2 - 18 | 556.95 | 518.55 | 505.55 | 499.45 | 492.85 | 487.70 |
| 0.9091-0.9410 | 41630EL | 42630EL | 43530EL | .7495 | 8 | 2 5/8 | 10 1/2 - 18 | 566.50 | 528.00 | 515.15 | 509.00 | 502.45 | 497.25 |
| 0.9411-0.9720 | 41631EL | 42631EL | 43531EL | .7495 | 8 | 2 5/8 | 10 1/2 - 18 | 569.65 | 531.20 | 518.25 | 512.15 | 505.50 | 500.30 |
| 0.9721-1.0030 | 41632EL | 42632EL | 43532EL | .8745 | 8 | 2 3/4 | 10 17/32 - 18 | 586.00 | 547.50 | 534.70 | 528.50 | 521.90 | 516.70 |

*Solid Carbide

**Quantities of 15 or more — Contact Hannibal Specials Dept.



EXTENDED LENGTH REAMERS CARBIDE TIPPED TYPES 442EL, 443EL, 444EL

MATERIAL SPECIFIC

**RIGHT SPIRAL FLUTES
FLUTE LONG CARBIDE**

- TYPE 442EL - FOR NON-FERROUS MATERIALS**
- TYPE 443EL - FOR CAST IRONS & NAS MULTI-PURPOSE**
- TYPE 444EL - FOR STEELS & HIGH TEMP ALLOYS**

- Extended length versions of types 442, 443, and 444 found on page 69
- All extended length reamers provided with controlled shank
- Must specify overall length when ordering (centers supplied only at maximum overall length)

| TOOL SELECTOR | CHIP CLASS | MATERIAL MACHINED | TOOL TYPE |
|---------------|-------------------------|---------------------------|-----------|
| | 20 | NON-FERROUS - LONG CHIPS | 442EL |
| | 40 | NON-FERROUS - SHORT CHIPS | 442EL |
| | 60 | CAST IRONS | 443EL |
| | 80 | LOW STRENGTH STEELS | 444EL |
| | 100 | MEDIUM STRENGTH STEELS | 444EL |
| | 120 | HIGH STRENGTH STEELS | 444EL |
| 140 | HIGH TEMPERATURE ALLOYS | 444EL | |

MODIFICATIONS (Prompt delivery)

- Modified tool diameter - priced below
- Metric tool diameter
- Closer tool diameter tolerance - pg. 15
- Cutting diam. reduced for step or pilot
- End chamfer other than 45°
- End cutting or corner radius
- Increased/decreased circular margin
- Increased/decreased tool diam. back taper
- Shortened shank or reduced shank diameter
- Flat(s) or tang on shank
- Coatings available:

TITANIUM NITRIDE – TiN

TITANIUM CARBONITRIDE – TiCN

ZIRCONIUM NITRIDE – ZrN

AL TITANIUM NITRIDE – AlTiN



REAMERS

| TOOL DIAMETER RANGE | TYPE 442EL NON FERROUS EDP NO. | TYPE 443EL CAST IRON EDP NO. | TYPE 444EL STEEL/ HI-TEMP EDP NO. | DIMENSIONS | | | | FINISHED TO MODIFIED TOOL DIAMETER PRICE EACH - BASED ON QUANTITY ORDERED | | | | | |
|---------------------|--------------------------------|------------------------------|-----------------------------------|------------------|-------------|--------|---------------|---|----------|----------|----------|----------|----------|
| | | | | MAX. SHANK DIAM. | NO. OF FLTS | LENGTH | | 1 | 2 | 3 | 4 | 5-7 | 8-14** |
| | | | | | | FLT | OVERALL RANGE | | | | | | |
| * 0.2211 - 0.2530 | 44208EL | 44308EL | 44408EL | .2193 | 4 | 1 1/2 | 6 1/32 - 12 | \$655.30 | \$586.00 | \$562.90 | \$551.90 | \$540.05 | \$530.55 |
| * 0.2531 - 0.2840 | 44209EL | 44309EL | 44409EL | .2505 | 4 | 1 1/2 | 6 1/32 - 12 | 689.60 | 620.10 | 597.00 | 585.95 | 574.05 | 564.80 |
| 0.2841 - 0.3150 | 44210EL | 44310EL | 44410EL | .2792 | 4 | 1 1/2 | 6 1/32 - 12 | 342.25 | 293.75 | 277.60 | 269.75 | 261.50 | 254.90 |
| 0.3151 - 0.3470 | 44211EL | 44311EL | 44411EL | .2792 | 4 | 1 1/2 | 6 1/32 - 12 | 342.25 | 293.75 | 277.60 | 269.75 | 261.50 | 254.90 |
| 0.3471 - 0.3780 | 44212EL | 44312EL | 44412EL | .3105 | 4 | 1 3/4 | 7 1/32 - 14 | 353.40 | 304.95 | 288.70 | 280.85 | 272.65 | 266.10 |
| 0.3781 - 0.4090 | 44213EL | 44313EL | 44413EL | .3105 | 4 | 1 3/4 | 7 1/32 - 14 | 353.40 | 304.95 | 288.70 | 280.85 | 272.65 | 266.10 |
| 0.4091 - 0.4410 | 44214EL | 44314EL | 44414EL | .3730 | 6 | 1 3/4 | 7 1/32 - 14 | 364.60 | 316.20 | 299.90 | 292.10 | 283.75 | 277.25 |
| 0.4411 - 0.4720 | 44215EL | 44315EL | 44415EL | .3730 | 6 | 1 3/4 | 7 1/32 - 14 | 364.60 | 316.20 | 299.90 | 292.10 | 283.75 | 277.25 |
| 0.4721 - 0.5030 | 44216EL | 44316EL | 44416EL | .4355 | 6 | 2 | 8 1/32 - 16 | 372.20 | 323.65 | 307.50 | 299.65 | 291.40 | 284.80 |
| 0.5031 - 0.5340 | 44217EL | 44317EL | 44417EL | .4355 | 6 | 2 | 8 1/32 - 16 | 372.20 | 323.65 | 307.50 | 299.65 | 291.40 | 284.80 |
| 0.5341 - 0.5660 | 44218EL | 44318EL | 44418EL | .4355 | 6 | 2 | 8 1/32 - 16 | 379.15 | 330.55 | 314.30 | 306.60 | 298.35 | 291.70 |
| 0.5661 - 0.5970 | 44219EL | 44319EL | 44419EL | .4355 | 6 | 2 | 8 1/32 - 16 | 379.15 | 330.55 | 314.30 | 306.60 | 298.35 | 291.70 |
| 0.5971 - 0.6280 | 44220EL | 44320EL | 44420EL | .5615 | 6 | 2 1/4 | 9 1/32 - 18 | 387.15 | 338.55 | 322.30 | 314.70 | 306.25 | 299.85 |
| 0.6281 - 0.6590 | 44221EL | 44321EL | 44421EL | .5615 | 6 | 2 1/4 | 9 1/32 - 18 | 387.15 | 338.55 | 322.30 | 314.70 | 306.25 | 299.85 |
| 0.6591 - 0.6910 | 44222EL | 44322EL | 44422EL | .5615 | 6 | 2 1/4 | 9 1/32 - 18 | 388.05 | 339.65 | 323.45 | 315.75 | 307.50 | 300.85 |
| 0.6911 - 0.7220 | 44223EL | 44323EL | 44423EL | .5615 | 6 | 2 1/4 | 9 1/32 - 18 | 388.05 | 339.65 | 323.45 | 315.75 | 307.50 | 300.85 |
| 0.7221 - 0.7530 | 44224EL | 44324EL | 44424EL | .6245 | 6 | 2 1/2 | 9 17/32 - 18 | 416.70 | 368.20 | 351.95 | 344.20 | 335.90 | 329.45 |
| 0.7531 - 0.7840 | 44225EL | 44325EL | 44425EL | .6245 | 6 | 2 1/2 | 9 17/32 - 18 | 480.40 | 434.10 | 418.60 | 411.45 | 403.50 | 397.20 |
| 0.7841 - 0.8160 | 44226EL | 44326EL | 44426EL | .6245 | 6 | 2 1/2 | 9 17/32 - 18 | 494.15 | 448.00 | 432.50 | 425.20 | 417.30 | 411.05 |
| 0.8161 - 0.8470 | 44227EL | 44327EL | 44427EL | .6245 | 6 | 2 1/2 | 9 17/32 - 18 | 499.10 | 453.00 | 437.45 | 430.15 | 422.30 | 416.05 |
| 0.8471 - 0.8780 | 44228EL | 44328EL | 44428EL | .7495 | 6 | 2 5/8 | 10 1/32 - 18 | 501.05 | 454.80 | 439.50 | 432.15 | 424.15 | 417.90 |
| 0.8781 - 0.9090 | 44229EL | 44329EL | 44429EL | .7495 | 6 | 2 5/8 | 10 1/32 - 18 | 517.85 | 471.65 | 456.10 | 448.90 | 440.95 | 434.70 |
| 0.9091 - 0.9410 | 44230EL | 44330EL | 44430EL | .7495 | 8 | 2 5/8 | 10 1/32 - 18 | 535.20 | 489.15 | 473.60 | 466.25 | 458.35 | 452.15 |
| 0.9411 - 0.9720 | 44231EL | 44331EL | 44431EL | .7495 | 8 | 2 5/8 | 10 1/32 - 18 | 538.40 | 492.20 | 476.70 | 469.50 | 461.55 | 455.35 |
| 0.9721 - 1.0030 | 44232EL | 44332EL | 44432EL | .8745 | 8 | 2 3/4 | 10 17/32 - 18 | 558.05 | 511.90 | 496.40 | 489.20 | 481.25 | 474.95 |

*Solid Carbide

**Quantities of 15 or more — Contact Hannibal Specials Dept.



EXTENDED LENGTH REAMERS CARBIDE TIPPED TYPES 411EL, 413EL, & 415EL



CENTER FED FOR BLIND HOLES RIGHT SPIRAL FLUTES

TYPE 411EL - FOR NON-FERROUS MATERIALS

TYPE 413EL - FOR CAST IRONS

TYPE 415EL - FOR STEELS & HIGH TEMP ALLOYS

- Coolant hole through the center
- Extended length versions of types 411, 413, and 415 found on page 78
- All extended length reamers provided with controlled shank
- Must specify overall length when ordering (centers supplied only at maximum overall length)

| TOOL SELECTOR | CHIP CLASS | MATERIAL MACHINED | TOOL TYPE |
|---------------|---------------------------|--------------------------|-----------|
| | 20 | NON-FERROUS - LONG CHIPS | 411EL |
| 40 | NON-FERROUS - SHORT CHIPS | 411EL | |
| 60 | CAST IRONS | 413EL | |
| 80 | LOW STRENGTH STEELS | 415EL | |
| 100 | MEDIUM STRENGTH STEELS | 415EL | |
| 120 | HIGH STRENGTH STEELS | 415EL | |
| 140 | HIGH TEMPERATURE ALLOYS | 415EL | |

MODIFICATIONS (Prompt delivery)

- Modified tool diameter - priced below
- Closer tool diameter tolerance - pg. 15
- Cutting diam. reduced for step or pilot
- End chamfer other than 45°
- End cutting or corner radius
- Increased/decreased circular margin
- Increased/decreased tool diam. back taper
- Shortened shank or reduced shank diameter
- Flat(s) or tang on shank
- Coatings available:

TITANIUM NITRIDE - TiN

TITANIUM CARBONITRIDE - TiCN

ZIRCONIUM NITRIDE - ZrN

AL TITANIUM NITRIDE - AlTiN



| TOOL DIAMETER RANGE | TYPE 411EL NON FERROUS EDP NO. | TYPE 413EL CAST IRON EDP NO. | TYPE 415EL STEEL/ HI-TEMP EDP NO. | DIMENSIONS | | | | FINISHED TO MODIFIED TOOL DIAMETER | | | | | |
|---------------------|--------------------------------|------------------------------|-----------------------------------|------------------|-------------|--------|---------------|--|----------|----------|----------|----------|----------|
| | | | | MAX. SHANK DIAM. | NO. OF FLTS | LENGTH | | PRICE EACH - BASED ON QUANTITY ORDERED | | | | | |
| | | | | | | FLT | OVERALL RANGE | 1 | 2 | 3 | 4 | 5-7 | 8-14** |
| * 0.2211-0.2530 | 41108EL | 41308EL | 41508EL | .2193 | 4 | 1 1/2 | 6 1/2 - 12 | \$821.95 | \$752.60 | \$729.60 | \$718.50 | \$706.40 | \$697.25 |
| * 0.2531-0.2840 | 41109EL | 41309EL | 41509EL | .2505 | 4 | 1 1/2 | 6 1/2 - 12 | 861.85 | 792.60 | 769.20 | 758.25 | 746.30 | 736.95 |
| 0.2841-0.3150 | 41110EL | 41310EL | 41510EL | .2792 | 4 | 1 1/2 | 6 1/2 - 12 | 445.65 | 397.10 | 380.95 | 373.25 | 364.80 | 358.40 |
| 0.3151-0.3470 | 41111EL | 41311EL | 41511EL | .2792 | 4 | 1 1/2 | 6 1/2 - 12 | 445.65 | 397.10 | 380.95 | 373.25 | 364.80 | 358.40 |
| 0.3471-0.3780 | 41112EL | 41312EL | 41512EL | .3105 | 4 | 1 3/4 | 7 1/2 - 14 | 454.55 | 405.95 | 389.65 | 382.00 | 373.80 | 367.20 |
| 0.3781-0.4090 | 41113EL | 41313EL | 41513EL | .3105 | 4 | 1 3/4 | 7 1/2 - 14 | 454.55 | 405.95 | 389.65 | 382.00 | 373.80 | 367.20 |
| 0.4091-0.4410 | 41114EL | 41314EL | 41514EL | .3730 | 6 | 1 3/4 | 7 1/2 - 14 | 456.35 | 407.90 | 391.70 | 383.90 | 375.60 | 369.05 |
| 0.4411-0.4720 | 41115EL | 41315EL | 41515EL | .3730 | 6 | 1 3/4 | 7 1/2 - 14 | 456.35 | 407.90 | 391.70 | 383.90 | 375.60 | 369.05 |
| 0.4721-0.5030 | 41116EL | 41316EL | 41516EL | .4355 | 6 | 2 | 8 1/2 - 16 | 496.45 | 448.00 | 431.65 | 424.00 | 415.65 | 409.20 |
| 0.5031-0.5340 | 41117EL | 41317EL | 41517EL | .4355 | 6 | 2 | 8 1/2 - 16 | 496.45 | 448.00 | 431.65 | 424.00 | 415.65 | 409.20 |
| 0.5341-0.5660 | 41118EL | 41318EL | 41518EL | .4355 | 6 | 2 | 8 1/2 - 16 | 500.00 | 451.35 | 435.25 | 427.50 | 419.15 | 412.60 |
| 0.5661-0.5970 | 41119EL | 41319EL | 41519EL | .4355 | 6 | 2 | 8 1/2 - 16 | 500.00 | 451.35 | 435.25 | 427.50 | 419.15 | 412.60 |
| 0.5971-0.6280 | 41120EL | 41320EL | 41520EL | .5615 | 6 | 2 1/4 | 9 1/2 - 18 | 509.90 | 461.30 | 445.05 | 437.40 | 429.15 | 422.50 |
| 0.6281-0.6590 | 41121EL | 41321EL | 41521EL | .5615 | 6 | 2 1/4 | 9 1/2 - 18 | 509.90 | 461.30 | 445.05 | 437.40 | 429.15 | 422.50 |
| 0.6591-0.6910 | 41122EL | 41322EL | 41522EL | .5615 | 6 | 2 1/4 | 9 1/2 - 18 | 515.35 | 466.90 | 450.70 | 443.00 | 434.60 | 428.10 |
| 0.6911-0.7220 | 41123EL | 41323EL | 41523EL | .5615 | 6 | 2 1/4 | 9 1/2 - 18 | 515.35 | 466.90 | 450.70 | 443.00 | 434.60 | 428.10 |
| 0.7221-0.7530 | 41124EL | 41324EL | 41524EL | .6245 | 6 | 2 1/2 | 9 17/32 - 18 | 536.55 | 488.05 | 471.80 | 464.15 | 455.80 | 449.35 |
| 0.7531-0.7840 | 41125EL | 41325EL | 41525EL | .6245 | 6 | 2 1/2 | 9 17/32 - 18 | 541.70 | 495.50 | 480.10 | 472.75 | 464.75 | 458.60 |
| 0.7841-0.8160 | 41126EL | 41326EL | 41526EL | .6245 | 6 | 2 1/2 | 9 17/32 - 18 | 559.45 | 513.15 | 497.85 | 490.45 | 482.50 | 476.30 |
| 0.8161-0.8470 | 41127EL | 41327EL | 41527EL | .6245 | 6 | 2 1/2 | 9 17/32 - 18 | 564.45 | 518.25 | 502.80 | 495.45 | 487.55 | 481.35 |
| 0.8471-0.8780 | 41128EL | 41328EL | 41528EL | .7495 | 6 | 2 5/8 | 10 1/2 - 18 | 566.30 | 520.10 | 504.75 | 497.35 | 489.35 | 483.20 |
| 0.8781-0.9090 | 41129EL | 41329EL | 41529EL | .7495 | 6 | 2 5/8 | 10 1/2 - 18 | 586.60 | 540.35 | 524.95 | 517.50 | 509.65 | 503.50 |
| 0.9091-0.9410 | 41130EL | 41330EL | 41530EL | .7495 | 8 | 2 5/8 | 10 1/2 - 18 | 604.50 | 558.30 | 542.80 | 535.45 | 527.55 | 521.35 |
| 0.9411-0.9720 | 41131EL | 41331EL | 41531EL | .7495 | 8 | 2 5/8 | 10 1/2 - 18 | 607.65 | 561.50 | 546.10 | 538.65 | 530.75 | 524.60 |
| 0.9721-1.0030 | 41132EL | 41332EL | 41532EL | .8745 | 8 | 2 3/4 | 10 17/32 - 18 | 631.65 | 585.45 | 569.95 | 562.55 | 554.65 | 548.55 |

*Solid Carbide

**Quantities of 15 or more — Contact Hannibal Specials Dept.



EXTENDED LENGTH REAMERS CARBIDE TIPPED TYPES 482EL, 483EL, 484EL



LEFT SPIRAL FLUTES FLUTE LONG CARBIDE

TYPE 482EL - FOR NON-FERROUS MATERIALS

TYPE 483EL - FOR CAST IRONS & NAS MULTI-PURPOSE

TYPE 484EL - FOR STEELS & HIGH TEMP ALLOYS

- Extended length versions of types 482, 483, and 484 found on page 71
- All extended length reamers provided with controlled shank
- Must specify overall length when ordering (centers supplied only at maximum overall length)

| TOOL SELECTOR | CHIP CLASS | MATERIAL MACHINED | TOOL TYPE |
|---------------|------------|---------------------------|-----------|
| | 20 | NON-FERROUS - LONG CHIPS | 482EL |
| | 40 | NON-FERROUS - SHORT CHIPS | 482EL |
| | 60 | CAST IRONS | 483EL |
| | 80 | LOW STRENGTH STEELS | 484EL |
| | 100 | MEDIUM STRENGTH STEELS | 484EL |
| | 120 | HIGH STRENGTH STEELS | 484EL |
| | 140 | HIGH TEMPERATURE ALLOYS | 484EL |



MODIFICATIONS (Prompt delivery)

- Modified tool diameter - priced below
- Metric tool diameter
- Closer tool diameter tolerance - pg. 15
- Cutting diam. reduced for step or pilot
- End chamfer other than 45°
- End cutting or corner radius
- Increased/decreased circular margin
- Increased/decreased tool diam. back taper
- Shortened shank or reduced shank diameter
- Flat(s) or tang on shank
- Coatings available:

TITANIUM NITRIDE – TiN

TITANIUM CARBONITRIDE – TiCN

ZIRCONIUM NITRIDE – ZrN

AL TITANIUM NITRIDE – AlTiN

REAMERS

| TOOL DIAMETER RANGE | TYPE 482EL NON FERROUS EDP NO. | TYPE 483EL CAST IRON EDP NO. | TYPE 484EL STEEL/ HI-TEMP EDP NO. | DIMENSIONS | | | | FINISHED TO MODIFIED TOOL DIAMETER PRICE EACH - BASED ON QUANTITY ORDERED | | | | | |
|---------------------|--------------------------------|------------------------------|-----------------------------------|------------------|-------------|--------|---------------|---|----------|----------|----------|----------|----------|
| | | | | MAX. SHANK DIAM. | NO. OF FLTS | LENGTH | | 1 | 2 | 3 | 4 | 5-7 | 8-14** |
| | | | | | | FLT | OVERALL RANGE | | | | | | |
| * 0.2211 - 0.2530 | 48208EL | 48308EL | 48408EL | .2193 | 4 | 1 1/2 | 6 1/32 - 12 | \$655.30 | \$586.00 | \$562.90 | \$551.90 | \$540.05 | \$530.55 |
| * 0.2531 - 0.2840 | 48209EL | 48309EL | 48409EL | .2505 | 4 | 1 1/2 | 6 1/32 - 12 | 689.60 | 620.10 | 597.00 | 585.95 | 574.05 | 564.80 |
| 0.2841 - 0.3150 | 48210EL | 48310EL | 48410EL | .2792 | 4 | 1 1/2 | 6 1/32 - 12 | 342.25 | 293.75 | 277.60 | 269.75 | 261.50 | 254.90 |
| 0.3151 - 0.3470 | 48211EL | 48311EL | 48411EL | .2792 | 4 | 1 1/2 | 6 1/32 - 12 | 342.25 | 293.75 | 277.60 | 269.75 | 261.50 | 254.90 |
| 0.3471 - 0.3780 | 48212EL | 48312EL | 48412EL | .3105 | 4 | 1 3/4 | 7 1/32 - 14 | 353.40 | 304.95 | 288.70 | 280.85 | 272.65 | 266.10 |
| 0.3781 - 0.4090 | 48213EL | 48313EL | 48413EL | .3105 | 4 | 1 3/4 | 7 1/32 - 14 | 353.40 | 304.95 | 288.70 | 280.85 | 272.65 | 266.10 |
| 0.4091 - 0.4410 | 48214EL | 48314EL | 48414EL | .3730 | 6 | 1 3/4 | 7 1/32 - 14 | 364.60 | 316.20 | 299.90 | 292.10 | 283.75 | 277.25 |
| 0.4411 - 0.4720 | 48215EL | 48315EL | 48415EL | .3730 | 6 | 1 3/4 | 7 1/32 - 14 | 364.60 | 316.20 | 299.90 | 292.10 | 283.75 | 277.25 |
| 0.4721 - 0.5030 | 48216EL | 48316EL | 48416EL | .4355 | 6 | 2 | 8 1/32 - 16 | 372.20 | 323.65 | 307.50 | 299.65 | 291.40 | 284.80 |
| 0.5031 - 0.5340 | 48217EL | 48317EL | 48417EL | .4355 | 6 | 2 | 8 1/32 - 16 | 372.20 | 323.65 | 307.50 | 299.65 | 291.40 | 284.80 |
| 0.5341 - 0.5660 | 48218EL | 48318EL | 48418EL | .4355 | 6 | 2 | 8 1/32 - 16 | 379.15 | 330.55 | 314.30 | 306.60 | 298.35 | 291.70 |
| 0.5661 - 0.5970 | 48219EL | 48319EL | 48419EL | .4355 | 6 | 2 | 8 1/32 - 16 | 379.15 | 330.55 | 314.30 | 306.60 | 298.35 | 291.70 |
| 0.5971 - 0.6280 | 48220EL | 48320EL | 48420EL | .5615 | 6 | 2 1/4 | 9 1/32 - 18 | 387.15 | 338.55 | 322.30 | 314.70 | 306.25 | 299.85 |
| 0.6281 - 0.6590 | 48221EL | 48321EL | 48421EL | .5615 | 6 | 2 1/4 | 9 1/32 - 18 | 387.15 | 338.55 | 322.30 | 314.70 | 306.25 | 299.85 |
| 0.6591 - 0.6910 | 48222EL | 48322EL | 48422EL | .5615 | 6 | 2 1/4 | 9 1/32 - 18 | 388.05 | 339.65 | 323.45 | 315.75 | 307.50 | 300.85 |
| 0.6911 - 0.7220 | 48223EL | 48323EL | 48423EL | .5615 | 6 | 2 1/4 | 9 1/32 - 18 | 388.05 | 339.65 | 323.45 | 315.75 | 307.50 | 300.85 |
| 0.7221 - 0.7530 | 48224EL | 48324EL | 48424EL | .6245 | 6 | 2 1/2 | 9 17/32 - 18 | 416.70 | 368.20 | 351.95 | 344.20 | 335.90 | 329.45 |
| 0.7531 - 0.7840 | 48225EL | 48325EL | 48425EL | .6245 | 6 | 2 1/2 | 9 17/32 - 18 | 480.40 | 434.10 | 418.60 | 411.45 | 403.50 | 397.20 |
| 0.7841 - 0.8160 | 48226EL | 48326EL | 48426EL | .6245 | 6 | 2 1/2 | 9 17/32 - 18 | 494.15 | 448.00 | 432.50 | 425.20 | 417.30 | 411.05 |
| 0.8161 - 0.8470 | 48227EL | 48327EL | 48427EL | .6245 | 6 | 2 1/2 | 9 17/32 - 18 | 499.10 | 453.00 | 437.45 | 430.15 | 422.30 | 416.05 |
| 0.8471 - 0.8780 | 48228EL | 48328EL | 48428EL | .7495 | 6 | 2 5/8 | 10 1/32 - 18 | 501.05 | 454.80 | 439.50 | 432.15 | 424.15 | 417.90 |
| 0.8781 - 0.9090 | 48229EL | 48329EL | 48429EL | .7495 | 6 | 2 5/8 | 10 1/32 - 18 | 517.85 | 471.65 | 456.10 | 448.90 | 440.95 | 434.70 |
| 0.9091 - 0.9410 | 48230EL | 48330EL | 48430EL | .7495 | 8 | 2 5/8 | 10 1/32 - 18 | 535.20 | 489.15 | 473.60 | 466.25 | 458.35 | 452.15 |
| 0.9411 - 0.9720 | 48231EL | 48331EL | 48431EL | .7495 | 8 | 2 5/8 | 10 1/32 - 18 | 538.40 | 492.20 | 476.70 | 469.50 | 461.55 | 455.35 |
| 0.9721 - 1.0030 | 48232EL | 48332EL | 48432EL | .8745 | 8 | 2 3/4 | 10 17/32 - 18 | 558.05 | 511.90 | 496.40 | 489.20 | 481.25 | 474.95 |

*Solid Carbide

**Quantities of 15 or more — Contact Hannibal Specials Dept.



EXTENDED LENGTH REAMERS CARBIDE TIPPED TYPES 427EL, 428EL, 429EL



FLUTE FED FOR THRU HOLES LEFT SPIRAL FLUTES

TYPE 427EL - FOR NON-FERROUS MATERIALS

TYPE 428EL - FOR CAST IRONS

TYPE 429EL - FOR STEELS & HIGH TEMP ALLOYS

- Extended length versions of types 427, 428, and 429 found on page 80
- Coolant outlets in each flute
- All extended length reamers provided with controlled shank
- Must specify overall length when ordering (centers supplied only at maximum overall length)

| TOOL SELECTOR | CHIP CLASS | MATERIAL MACHINED | TOOL TYPE |
|---------------|-------------------------|---------------------------|-----------|
| | 20 | NON-FERROUS - LONG CHIPS | 427EL |
| | 40 | NON-FERROUS - SHORT CHIPS | 427EL |
| | 60 | CAST IRONS | 428EL |
| | 80 | LOW STRENGTH STEELS | 429EL |
| | 100 | MEDIUM STRENGTH STEELS | 429EL |
| | 120 | HIGH STRENGTH STEELS | 429EL |
| 140 | HIGH TEMPERATURE ALLOYS | 429EL | |

MODIFICATIONS (Prompt delivery)

- Modified tool diameter - priced below
- Metric tool diameter
- Closer tool diameter tolerance - pg. 15
- Cutting diam. reduced for step or pilot
- End chamfer other than 45°
- End cutting or corner radius
- Increased/decreased circular margin
- Increased/decreased tool diam. back taper
- Shortened shank or reduced shank diameter
- Flat(s) or tang on shank
- Coatings available:

TITANIUM NITRIDE - TiN

TITANIUM CARBONITRIDE - TiCN

ZIRCONIUM NITRIDE - ZrN

AL TITANIUM NITRIDE - AlTiN



| TOOL DIAMETER RANGE | TYPE 427EL NON FERROUS EDP NO. | TYPE 428EL CAST IRON EDP NO. | TYPE 429EL STEEL/ HI-TEMP EDP NO. | DIMENSIONS | | | | FINISHED TO MODIFIED TOOL DIAMETER PRICE EACH - BASED ON QUANTITY ORDERED | | | | | |
|---------------------|--------------------------------|------------------------------|-----------------------------------|------------------|-------------|--------|---------------|---|----------|----------|----------|----------|----------|
| | | | | MAX. SHANK DIAM. | NO. OF FLTS | LENGTH | | 1 | 2 | 3 | 4 | 5-7 | 8-14** |
| | | | | | | FLT | OVERALL RANGE | | | | | | |
| * 0.2211-0.2530 | 42708EL | 42808EL | 42908EL | .2193 | 4 | 1 1/2 | 6 1/2 -12 | \$821.95 | \$752.60 | \$729.60 | \$718.50 | \$706.40 | \$697.25 |
| * 0.2531-0.2840 | 42709EL | 42809EL | 42909EL | .2505 | 4 | 1 1/2 | 6 1/2 -12 | 861.85 | 792.60 | 769.20 | 758.25 | 746.30 | 736.95 |
| 0.2841-0.3150 | 42710EL | 42810EL | 42910EL | .2792 | 4 | 1 1/2 | 6 1/2 -12 | 445.65 | 397.10 | 380.95 | 373.25 | 364.80 | 358.40 |
| 0.3151-0.3470 | 42711EL | 42811EL | 42911EL | .2792 | 4 | 1 1/2 | 6 1/2 -12 | 445.65 | 397.10 | 380.95 | 373.25 | 364.80 | 358.40 |
| 0.3471-0.3780 | 42712EL | 42812EL | 42912EL | .3105 | 4 | 1 3/4 | 7 1/2 -14 | 454.55 | 405.95 | 389.65 | 382.00 | 373.80 | 367.20 |
| 0.3781-0.4090 | 42713EL | 42813EL | 42913EL | .3105 | 4 | 1 3/4 | 7 1/2 -14 | 454.55 | 405.95 | 389.65 | 382.00 | 373.80 | 367.20 |
| 0.4091-0.4410 | 42714EL | 42814EL | 42914EL | .3730 | 6 | 1 3/4 | 7 1/2 -14 | 456.35 | 407.90 | 391.70 | 383.90 | 375.60 | 369.05 |
| 0.4411-0.4720 | 42715EL | 42815EL | 42915EL | .3730 | 6 | 1 3/4 | 7 1/2 -14 | 456.35 | 407.90 | 391.70 | 383.90 | 375.60 | 369.05 |
| 0.4721-0.5030 | 42716EL | 42816EL | 42916EL | .4355 | 6 | 2 | 8 1/2 -16 | 496.45 | 448.00 | 431.65 | 424.00 | 415.65 | 409.20 |
| 0.5031-0.5340 | 42717EL | 42817EL | 42917EL | .4355 | 6 | 2 | 8 1/2 -16 | 496.45 | 448.00 | 431.65 | 424.00 | 415.65 | 409.20 |
| 0.5341-0.5660 | 42718EL | 42818EL | 42918EL | .4355 | 6 | 2 | 8 1/2 -16 | 500.00 | 451.35 | 435.25 | 427.50 | 419.15 | 412.60 |
| 0.5661-0.5970 | 42719EL | 42819EL | 42919EL | .4355 | 6 | 2 | 8 1/2 -16 | 500.00 | 451.35 | 435.25 | 427.50 | 419.15 | 412.60 |
| 0.5971-0.6280 | 42720EL | 42820EL | 42920EL | .5615 | 6 | 2 1/4 | 9 1/2 -18 | 509.90 | 461.30 | 445.05 | 437.40 | 429.15 | 422.50 |
| 0.6281-0.6590 | 42721EL | 42821EL | 42921EL | .5615 | 6 | 2 1/4 | 9 1/2 -18 | 509.90 | 461.30 | 445.05 | 437.40 | 429.15 | 422.50 |
| 0.6591-0.6910 | 42722EL | 42822EL | 42922EL | .5615 | 6 | 2 1/4 | 9 1/2 -18 | 515.35 | 466.90 | 450.70 | 443.00 | 434.60 | 428.10 |
| 0.6911-0.7220 | 42723EL | 42823EL | 42923EL | .5615 | 6 | 2 1/4 | 9 1/2 -18 | 515.35 | 466.90 | 450.70 | 443.00 | 434.60 | 428.10 |
| 0.7221-0.7530 | 42724EL | 42824EL | 42924EL | .6245 | 6 | 2 1/2 | 9 17/32 -18 | 536.55 | 488.05 | 471.80 | 464.15 | 455.80 | 449.35 |
| 0.7531-0.7840 | 42725EL | 42825EL | 42925EL | .6245 | 6 | 2 1/2 | 9 17/32 -18 | 566.50 | 520.30 | 504.95 | 497.50 | 489.50 | 483.40 |
| 0.7841-0.8160 | 42726EL | 42826EL | 42926EL | .6245 | 6 | 2 1/2 | 9 17/32 -18 | 585.55 | 539.40 | 523.95 | 516.55 | 508.65 | 502.50 |
| 0.8161-0.8470 | 42727EL | 42827EL | 42927EL | .6245 | 6 | 2 1/2 | 9 17/32 -18 | 590.55 | 544.45 | 528.95 | 521.55 | 513.65 | 507.55 |
| 0.8471-0.8780 | 42728EL | 42828EL | 42928EL | .7495 | 6 | 2 5/8 | 10 1/2 -18 | 592.30 | 546.15 | 530.75 | 523.35 | 515.35 | 509.25 |
| 0.8781-0.9090 | 42729EL | 42829EL | 42929EL | .7495 | 6 | 2 5/8 | 10 1/2 -18 | 614.25 | 568.15 | 552.65 | 545.25 | 537.30 | 531.20 |
| 0.9091-0.9410 | 42730EL | 42830EL | 42930EL | .7495 | 8 | 2 5/8 | 10 1/2 -18 | 632.25 | 586.05 | 570.65 | 563.20 | 555.35 | 549.20 |
| 0.9411-0.9720 | 42731EL | 42831EL | 42931EL | .7495 | 8 | 2 5/8 | 10 1/2 -18 | 635.35 | 589.15 | 573.75 | 566.35 | 558.45 | 552.25 |
| 0.9721-1.0030 | 42732EL | 42832EL | 42932EL | .8745 | 8 | 2 3/4 | 10 17/32 -18 | 660.85 | 614.70 | 599.25 | 591.80 | 583.90 | 577.80 |

*Solid Carbide

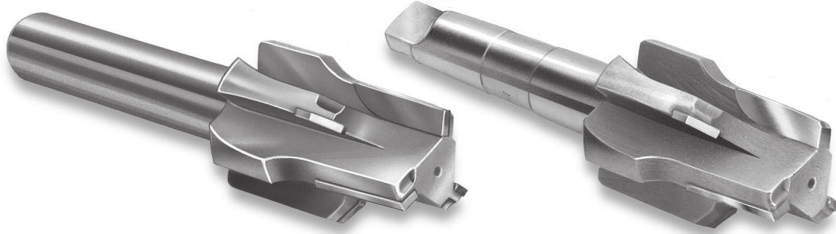
**Quantities of 15 or more — Contact Hannibal Specials Dept.



PIPE TAP REAMERS CARBIDE TIPPED TYPES 446 & 447 FRACTIONAL



STRAIGHT OR TAPER SHANK



TYPE 446 - STRAIGHT SHANK

TYPE 447 - TAPER SHANK

BOTH TYPES:

- Three flutes on pipe tap sizes through 1/2-14
- Six alternate cutting flutes on pipe tap sizes 3/4-14 and larger (three with pipe taper and three with chamfer angle)

USE:

- Cuts on taper and chamfer diameters - far better than high speed steel tools

| TOOL SELECTOR | CHIP CLASS | MATERIAL MACHINED | TOOL TYPE |
|---------------|------------|---------------------------|------------|
| | 20 | NON-FERROUS - LONG CHIPS | 446 or 447 |
| | 40 | NON-FERROUS - SHORT CHIPS | 446 or 447 |
| | 60 | CAST IRONS | 446 or 447 |
| | 80 | LOW STRENGTH STEELS | 446 or 447 |
| | 100 | MEDIUM STRENGTH STEELS | 446 or 447 |
| | 120 | HIGH STRENGTH STEELS | 446 or 447 |
| | 140 | HIGH TEMPERATURE ALLOYS | 446 or 447 |

MODIFICATIONS (Prompt delivery)

- Coatings available:

TITANIUM NITRIDE - TiN

TITANIUM CARBONITRIDE - TiCN

ZIRCONIUM NITRIDE - ZrN

AL TITANIUM NITRIDE - AlTiN

REAMERS

| PIPE TAP SIZE | TOOL DIAM. | DIMENSIONS | | | STRAIGHT SHANK - TYPE 446 | | | | | TAPER SHANK - TYPE 447 | | | |
|----------------|------------|-------------------|-------------------|---------------------|---------------------------|--------------|----------------|------------------|----------|------------------------|----------------|------------------|----------|
| | | LARGE DIAM. TAPER | SMALL DIAM. TAPER | REAMER TAPER LENGTH | SHANK DIAM. | SHANK LENGTH | OVERALL LENGTH | TYPE 446 EDP NO. | PRICE | TAPER SHANK NO. | OVERALL LENGTH | TYPE 447 EDP NO. | PRICE |
| 1/8 - 27 | 5/8 | .347 | .318 | 15/32 | 1/2 | 1 1/2 | 2 19/32 | 44601 | \$190.25 | 2 | 4 11/32 | 44701 | \$212.60 |
| 1/4 - 18 | 3/4 | .450 | .409 | 21/32 | 1/2 | 1 1/2 | 2 29/32 | 44602 | 196.40 | 2 | 4 21/32 | 44702 | 219.70 |
| 3/8 - 18 | 7/8 | .586 | .543 | 11/16 | 1/2 | 2 | 3 7/16 | 44603 | 225.20 | 2 | 4 11/16 | 44703 | 251.60 |
| 1/2 - 14 | 1 | .725 | .670 | 7/8 | 1/2 | 2 | 3 7/8 | 44604 | 239.20 | 2 | 5 1/8 | 44704 | 268.00 |
| 3/4 - 14 | 1 1/4 | .937 | .882 | 7/8 | 1 | 2 1/2 | 4 5/8 | 44606 | 323.10 | 3 | 6 1/8 | 44706 | 361.30 |
| 1 - 11 1/2 | 1 1/2 | 1.173 | 1.107 | 1 1/16 | 1 | 2 1/2 | 5 1/16 | 44608 | 375.65 | 3 | 6 3/16 | 44708 | 420.60 |
| 1 1/2 - 11 1/2 | 1 1/2 | 1.173 | 1.107 | 1 1/16 | - | - | - | - | - | 4 | 7 9/16 | 44709 | 431.55 |
| 1 3/4 - 11 1/2 | 1 7/8 | 1.518 | 1.448 | 1 1/8 | 1 1/2 | 3 | 5 5/8 | 44610 | 448.55 | 3 | 6 3/8 | 44710 | 501.00 |
| 1 1/4 - 11 1/2 | 1 7/8 | 1.518 | 1.448 | 1 1/8 | - | - | - | - | - | 4 | 7 5/8 | 44711 | 537.80 |
| 1 1/2 - 11 1/2 | 2 1/8 | 1.757 | 1.687 | 1 1/8 | 1 1/2 | 3 | 5 7/8 | 44612 | 617.35 | 3 | 6 7/8 | 44712 | 692.05 |
| 1 1/2 - 11 1/2 | 2 1/8 | 1.757 | 1.687 | 1 1/8 | - | - | - | - | - | 4 | 7 7/8 | 44713 | 710.95 |
| 2 - 11 1/2 | 2 5/8 | 2.230 | 2.154 | 1 7/32 | 1 1/2 | 3 | 6 7/32 | 44616 | 699.45 | 3 | 7 3/32 | 44716 | 783.25 |
| 2 - 11 1/2 | 2 5/8 | 2.230 | 2.154 | 1 7/32 | - | - | - | - | - | 4 | 8 7/32 | 44717 | 804.30 |
| 2 1/2 - 8 | 3 1/8 | 2.670 | 2.561 | 1 3/4 | 1 1/2 | 3 | 6 3/4 | 44620 | 940.70 | 3 | 7 3/4 | 44720 | 1053.40 |
| 2 1/2 - 8 | 3 1/8 | 2.670 | 2.561 | 1 3/4 | - | - | - | - | - | 4 | 8 3/4 | 44721 | 1081.75 |
| 3 - 8 | 3 3/4 | 3.296 | 3.180 | 1 7/8 | 1 1/2 | 3 | 6 7/8 | 44624 | 970.15 | 3 | 7 7/8 | 44724 | 1086.60 |



JOBBER'S REAMERS - CARBIDE TIPPED TYPE 403 FRACTIONAL



TYPE 403 - DISCONTINUED WHILE SUPPLIES LAST

- Straight polished flutes and taper shank
- Detailed specifications on page 15



| TOOL DIAMETER | | TYPE 403 EDP NO. | PRICE | DIMENSIONS | | | | | FINISHED TO MODIFIED TOOL DIAMETER | | | | | | |
|---------------|---------|------------------|----------|-----------------|-------------|--------|----------|----------|------------------------------------|--|----------|----------|----------|----------|----------|
| FRAC. | DECIMAL | | | TAPER SHANK NO. | NO. OF FLTS | LENGTH | | | MODIFIED DIAMETER RANGE | PRICE EACH - BASED ON QUANTITY ORDERED | | | | | |
| | | | | | | FLUTE | CAR-BIDE | OVER-ALL | | 1 | 2 | 3 | 4 | 5-7 | 8-14* |
| 3/8 | .3750 | 40312 | \$178.70 | 1 | 4 | 2 1/2 | 5/8 | 5 13/16 | 0.3471 - 0.3780 | \$223.95 | \$201.15 | \$193.70 | \$190.05 | \$186.20 | \$183.20 |
| 7/16 | .4375 | 40314 | 187.05 | 1 | 4 | 2 3/4 | 5/8 | 6 1/8 | 0.4091 - 0.4410 | 232.30 | 209.70 | 202.05 | 198.50 | 194.70 | 191.50 |
| 1/2 | .5000 | 40316 | 195.60 | 1 | 6 | 3 | 5/8 | 6 7/16 | 0.4721 - 0.5030 | 240.85 | 218.20 | 210.50 | 207.05 | 203.05 | 200.00 |
| - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 11/16 | .6875 | 40322 | 223.75 | 2 | 6 | 3 7/8 | 3/4 | 8 | 0.6591 - 0.6910 | 269.00 | 246.20 | 238.65 | 235.05 | 231.10 | 228.20 |
| 3/4 | .7500 | 40324 | 232.80 | 2 | 6 | 4 3/16 | 3/4 | 8 3/8 | 0.7221 - 0.7530 | 278.00 | 255.45 | 247.85 | 244.20 | 240.35 | 237.25 |
| 13/16 | .8125 | 40326 | 241.65 | 2 | 6 | 4 9/16 | 3/4 | 8 13/16 | 0.7841 - 0.8160 | 286.80 | 264.15 | 256.65 | 253.05 | 249.15 | 246.10 |
| 7/8 | .8750 | 40328 | 260.30 | 2 | 6 | 4 7/8 | 3/4 | 9 3/16 | 0.8471 - 0.8780 | 307.15 | 283.60 | 275.70 | 272.00 | 268.00 | 264.70 |
| 15/16 | .9375 | 40330 | 273.80 | 3 | 8 | 5 1/8 | 3/4 | 10 | 0.9091 - 0.9410 | 311.90 | 297.20 | 289.25 | 285.45 | 281.50 | 278.25 |
| 1 | 1.0000 | 40332 | 279.45 | 3 | 8 | 5 7/16 | 3/4 | 10 3/8 | 0.9721 - 1.0030 | 326.25 | 302.80 | 295.05 | 291.15 | 287.00 | 284.00 |

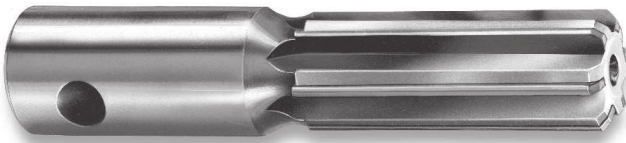
*Quantities of 15 or more - price of fractional size in same size range.



CNC STUB REAMERS CARBIDE TIPPED TYPES 430 & 440 FRACTIONAL



STRAIGHT OR LEFT SPIRAL FLUTES FLUTE LONG CARBIDE STRAIGHT SHANK



TYPE 430 - STRAIGHT FLUTES



**TYPE 440 - LEFT SPIRAL FLUTES
BOTH TYPES:**

- Polished flutes; flute long carbide on .2841" tool diameter and larger
- Straight shank fits into standard holders
- Pin cross hole permits use in pin drive floating holders
- Left spiral flutes should not be used on blind holes
- Detailed specifications on page 15

NOTE: For semi-finished reamers, see page 39.

| TOOL SELECTOR | CHIP CLASS | MATERIAL MACHINED | TOOL TYPE |
|---------------|---------------------------|--------------------------|-----------|
| | 20 | NON-FERROUS - LONG CHIPS | 430/440 |
| 40 | NON-FERROUS - SHORT CHIPS | 430/440 | |
| 60 | CAST IRONS | 430/440 | |
| 80 | LOW STRENGTH STEELS | 440/430 | |
| 100 | MEDIUM STRENGTH STEELS | 440/430 | |
| 120 | HIGH STRENGTH STEELS | 440/430 | |
| 140 | HIGH TEMPERATURE ALLOYS | 440/430 | |

For material specific CNC stub with straight flutes, see page 72

MODIFICATIONS (Prompt delivery)

- Modified tool diameter - priced below
- Modified metric tool diameter - priced on pg. 29
- Closer tool diameter tolerance - pg. 15
- Cutting diameter reduced for step or pilot
- End chamfer other than 45°
- End cutting or corner radius
- Increased/decreased circular margin
- Increased/decreased tool diam. back taper
- Reduced shank diameter
- Flat(s) on shank
- Coatings available:
See page 30

| TOOL DIAMETER | | TYPE 430 STRAIGHT EDP NO. | TYPE 440 LEFT EDP NO. | BOTH TYPES PRICE | DIMENSIONS | | | | | FINISHED TO MODIFIED TOOL DIAMETER | | | | | | | |
|---------------|---------|---------------------------------|-----------------------------|------------------------|----------------|---------------------|---------|----------|-------|------------------------------------|-------------------------------|--|---------|---------|---------|---------|---------|
| FRACTIONAL | DECIMAL | | | | SHANK DIAM. | NO. OF FLUTES | LENGTH | | | PIN HOLE DIAM. | MODIFIED DIAMETER RANGE | PRICE EACH - BASED ON QUANTITY ORDERED | | | | | |
| | | | | | | FLUTE | CARBIDE | OVER-ALL | | | | 1 | 2 | 3 | 4 | 5-7 | 8-14* |
| 3/16 | .1875 | 43006 | 44006 | \$61.50 | 1/4 | 4 | 1 | 1/2 | 2 1/4 | 3/32 | 0.1770-0.2040 | \$106.55 | \$84.00 | \$76.40 | \$72.85 | \$68.95 | \$65.85 |
| 7/32 | .2188 | 43007 | 44007 | 61.50 | 1/4 | 4 | 1 | 1/2 | 2 1/4 | 3/32 | 0.2041-0.2210 | 106.55 | 84.00 | 76.40 | 72.85 | 68.95 | 65.85 |
| 15/64 | .2344 | 4302344 | 4402344 | 61.50 | 1/4 | 4 | 1 | 1/2 | 2 1/4 | 3/32 | 0.2211-0.2380 | 106.55 | 84.00 | 76.40 | 72.85 | 68.95 | 65.85 |
| 1/4 | .2500 | 43008 | 44008 | 61.50 | 1/4 | 4 | 1 | 1/2 | 2 1/4 | 3/32 | 0.2381-0.2530 | 106.55 | 84.00 | 76.40 | 72.85 | 68.95 | 65.85 |
| 9/32 | .2812 | 43009 | 44009 | 61.50 | 3/8 | 4 | 1 | 1/2 | 2 1/4 | 1/8 | 0.2531-0.2840 | 106.55 | 84.00 | 76.40 | 72.85 | 68.95 | 65.85 |
| 5/16 | .3125 | 43010 | 44010 | 71.50 | 3/8 | 4 | 1 | 1 | 2 1/4 | 1/8 | 0.2841-0.3150 | 116.55 | 93.90 | 86.45 | 82.85 | 78.90 | 75.90 |
| 11/32 | .3438 | 43011 | 44011 | 72.00 | 3/8 | 4 | 1 1/4 | 1 1/4 | 2 1/2 | 1/8 | 0.3151-0.3470 | 117.20 | 94.65 | 87.05 | 83.55 | 79.55 | 76.55 |
| 3/8 | .3750 | 43012 | 44012 | 78.20 | 3/8 | 4 | 1 1/4 | 1 1/4 | 2 1/2 | 1/8 | 0.3471-0.3780 | 123.35 | 100.75 | 93.20 | 89.45 | 85.65 | 82.55 |
| 13/32 | .4062 | 43013 | 44013 | 79.30 | 1/2 | 4 | 1 1/4 | 1 1/4 | 2 1/2 | 3/16 | 0.3781-0.4090 | 124.50 | 101.75 | 94.30 | 90.65 | 86.70 | 83.75 |
| 7/16 | .4375 | 43014 | 44014 | 93.85 | 1/2 | 4 | 1 1/4 | 1 1/4 | 2 1/2 | 3/16 | 0.4091-0.4410 | 139.05 | 116.45 | 108.80 | 105.25 | 101.40 | 98.40 |
| 15/32 | .4688 | 43015 | 44015 | 93.85 | 1/2 | 4 | 1 1/4 | 1 1/4 | 2 1/2 | 3/16 | 0.4411-0.4720 | 139.05 | 116.45 | 108.80 | 105.25 | 101.40 | 98.40 |
| 1/2 | .5000 | 43016 | 44016 | 102.75 | 1/2 | 4 | 1 1/4 | 1 1/4 | 2 1/2 | 3/16 | 0.4721-0.5030 | 149.20 | 125.90 | 118.15 | 114.50 | 110.40 | 107.35 |
| 17/32 | .5312 | 43017 | 44017 | 102.75 | 5/8 | 6 | 1 1/2 | 1 1/2 | 3 | 1/4 | 0.5031-0.5340 | 149.20 | 125.90 | 118.15 | 114.50 | 110.40 | 107.35 |
| 9/16 | .5625 | 43018 | 44018 | 108.35 | 5/8 | 6 | 1 1/2 | 1 1/2 | 3 | 1/4 | 0.5341-0.5660 | 154.55 | 131.40 | 123.50 | 119.90 | 115.90 | 112.70 |
| 19/32 | .5938 | 43019 | 44019 | 108.35 | 5/8 | 6 | 1 1/2 | 1 1/2 | 3 | 1/4 | 0.5661-0.5970 | 154.55 | 131.40 | 123.50 | 119.90 | 115.90 | 112.70 |
| 5/8 | .6250 | 43020 | 44020 | 111.15 | 5/8 | 6 | 1 1/2 | 1 1/2 | 3 | 1/4 | 0.5971-0.6280 | 157.55 | 134.35 | 126.55 | 122.75 | 118.80 | 115.75 |
| 21/32 | .6562 | 43021 | 44021 | 111.15 | 5/8 | 6 | 1 1/2 | 1 1/2 | 3 | 1/4 | 0.6281-0.6590 | 157.55 | 134.35 | 126.55 | 122.75 | 118.80 | 115.75 |
| 11/16 | .6875 | 43022 | 44022 | 116.35 | 5/8 | 6 | 1 1/2 | 1 1/2 | 3 | 1/4 | 0.6591-0.6910 | 162.65 | 139.50 | 131.75 | 127.95 | 124.00 | 120.90 |
| 23/32 | .7188 | 43023 | 44023 | 116.35 | 3/4 | 6 | 1 1/2 | 1 1/2 | 3 | 5/16 | 0.6911-0.7220 | 162.65 | 139.50 | 131.75 | 127.95 | 124.00 | 120.90 |
| 3/4 | .7500 | 43024 | 44024 | 119.40 | 3/4 | 6 | 1 1/2 | 1 1/2 | 3 | 5/16 | 0.7221-0.7530 | 165.55 | 142.45 | 134.65 | 130.90 | 126.95 | 123.90 |
| 25/32 | .7812 | 43025 | 44025 | 119.40 | 3/4 | 6 | 1 1/2 | 1 1/2 | 3 | 5/16 | 0.7531-0.7840 | 165.55 | 142.45 | 134.65 | 130.90 | 126.95 | 123.90 |
| 13/16 | .8125 | 43026 | 44026 | 129.55 | 3/4 | 6 | 1 1/2 | 1 1/2 | 3 | 5/16 | 0.7841-0.8160 | 175.90 | 152.80 | 144.90 | 141.25 | 137.25 | 134.25 |
| 27/32 | .8438 | 43027 | 44027 | 129.55 | 3/4 | 6 | 1 1/2 | 1 1/2 | 3 | 5/16 | 0.8161-0.8470 | 175.90 | 152.80 | 144.90 | 141.25 | 137.25 | 134.25 |
| 7/8 | .8750 | 43028 | 44028 | 141.65 | 3/4 | 6 | 1 1/2 | 1 1/2 | 3 | 5/16 | 0.8471-0.8780 | 189.75 | 165.50 | 157.45 | 153.65 | 149.50 | 146.30 |
| 29/32 | .9062 | 43029 | 44029 | 141.65 | 3/4 | 6 | 1 1/2 | 1 1/2 | 3 | 5/16 | 0.8781-0.9090 | 189.75 | 165.50 | 157.45 | 153.65 | 149.50 | 146.30 |
| 15/16 | .9375 | 43030 | 44030 | 155.95 | 3/4 | 6 | 1 1/2 | 1 1/2 | 3 | 5/16 | 0.9091-0.9410 | 204.00 | 180.00 | 171.90 | 168.05 | 164.00 | 160.70 |
| 31/32 | .9688 | 43031 | 44031 | 155.95 | 3/4 | 8 | 1 1/2 | 1 1/2 | 3 | 5/16 | 0.9411-0.9720 | 204.00 | 180.00 | 171.90 | 168.05 | 164.00 | 160.70 |
| 1 | 1.0000 | 43032 | 44032 | 163.55 | 3/4 | 8 | 1 1/2 | 1 1/2 | 3 | 5/16 | 0.9721-1.0030 | 211.70 | 187.70 | 179.55 | 175.75 | 171.55 | 168.35 |
| 1 1/16 | 1.0625 | 43034 | 44034 | 163.55 | 3/4 | 8 | 1 1/2 | 1 1/2 | 3 | 5/16 | 1.0031-1.0660 | 211.70 | 187.70 | 179.55 | 175.75 | 171.55 | 168.35 |
| 1 1/8 | 1.1250 | 43036 | 44036 | 191.50 | 3/4 | 8 | 1 1/2 | 1 1/2 | 3 | 5/16 | 1.0661-1.1280 | 239.65 | 215.40 | 207.40 | 203.65 | 199.45 | 196.15 |
| 1 3/16 | 1.1875 | 43038 | 44038 | 199.60 | 3/4 | 8 | 1 1/2 | 1 1/2 | 3 | 5/16 | 1.1281-1.1905 | 247.85 | 223.70 | 215.55 | 211.70 | 207.65 | 204.35 |
| 1 1/4 | 1.2500 | 43040 | 44040 | 233.85 | 3/4 | 8 | 1 1/2 | 1 1/2 | 3 | 5/16 | 1.1906-1.2530 | 282.05 | 257.95 | 249.95 | 246.00 | 241.95 | 238.65 |
| 1 5/16 | 1.3125 | 43042 | 44042 | 233.85 | 3/4 | 8 | 1 1/2 | 1 1/2 | 3 | 5/16 | 1.2531-1.3155 | 282.05 | 257.95 | 249.95 | 246.00 | 241.95 | 238.65 |
| 1 3/8 | 1.3750 | 43044 | 44044 | 237.25 | 3/4 | 8 | 1 1/2 | 1 1/2 | 3 | 5/16 | 1.3156-1.3780 | 285.35 | 261.20 | 253.35 | 249.35 | 245.40 | 242.10 |
| 1 7/16 | 1.4375 | 43046 | 44046 | 276.55 | 3/4 | 8 | 1 1/2 | 1 1/2 | 3 | 5/16 | 1.3781-1.4405 | 324.80 | 300.60 | 292.60 | 288.70 | 284.60 | 281.40 |
| 1 1/2 | 1.5000 | 43048 | 44048 | 332.10 | 3/4 | 8 | 1 1/2 | 1 1/2 | 3 | 5/16 | 1.4406-1.5030 | 380.25 | 356.25 | 348.15 | 344.30 | 340.05 | 336.80 |

*Quantities of 15 or more - price of fractional size in same size range.



CNC STUB REAMERS CARBIDE TIPPED TYPES 430 & 440 METRIC



STRAIGHT OR LEFT SPIRAL FLUTES FLUTE LONG CARBIDE STRAIGHT SHANK



NOTE: Tool diameter in millimeters (mm); all other dimensions in inches. Also, modifications available (see list on page 28).

| TOOL DIAMETER | | TYPE 430 STRAIGHT METRIC EDP NO. | TYPE 440 LEFT METRIC EDP NO. | BOTH TYPES METRIC PRICE | DIMENSIONS | | | | FINISHED TO MODIFIED TOOL DIAMETER | | | | | | | | |
|---------------|--------|----------------------------------|------------------------------|-------------------------|-------------|-------------|--------|-------|------------------------------------|------------------------------|--|---------|---------|---------|---------|---------|---------|
| mm | INCH | | | | SHANK DIAM. | NO. OF FLTS | LENGTH | | PIN HOLE DIAM. | MODIFIED DIAMETER RANGE (mm) | PRICE EACH - BASED ON QUANTITY ORDERED | | | | | | |
| | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| 4.5 | .1772 | 430045 | 440045 | \$76.40 | 1/4 | 4 | *1 | 2 1/4 | 3/32 | 4.494-5.182 | \$110.30 | \$87.80 | \$80.30 | \$76.60 | \$72.85 | \$69.65 | \$65.35 |
| 5.0 | .1969 | 430050 | 440050 | 76.40 | 1/4 | 4 | *1 | 2 1/4 | 3/32 | - | - | - | - | - | - | - | - |
| 5.5 | .2165 | 430055 | 440055 | 76.40 | 1/4 | 4 | *1 | 2 1/4 | 3/32 | 5.183-5.613 | 110.30 | 87.80 | 80.30 | 76.60 | 72.85 | 69.65 | 65.35 |
| 6.0 | .2362 | 430060 | 440060 | 76.40 | 1/4 | 4 | *1 | 2 1/4 | 3/32 | 5.614-6.045 | 110.30 | 87.80 | 80.30 | 76.60 | 72.85 | 69.65 | 65.35 |
| - | - | 430063 | 440063 | - | 1/4 | 4 | *1 | 2 1/4 | 3/32 | 6.046-6.426 | 110.30 | 87.80 | 80.30 | 76.60 | 72.85 | 69.65 | 65.35 |
| 6.5 | .2559 | 430065 | 440065 | 76.40 | 3/8 | 4 | *1 | 2 1/4 | 1/8 | 6.427-7.214 | 110.30 | 87.80 | 80.30 | 76.60 | 72.85 | 69.65 | 65.35 |
| 7.0 | .2756 | 430070 | 440070 | 76.40 | 3/8 | 4 | *1 | 2 1/4 | 1/8 | - | - | - | - | - | - | - | - |
| 7.5 | .2953 | 430075 | 440075 | 86.45 | 3/8 | 4 | 1 | 2 1/4 | 1/8 | 7.215-8.001 | 120.40 | 97.85 | 90.25 | 86.55 | 82.85 | 79.60 | 75.30 |
| 8.0 | .3150 | 430080 | 440080 | 86.45 | 3/8 | 4 | 1 | 2 1/4 | 1/8 | - | - | - | - | - | - | - | - |
| 8.5 | .3346 | 430085 | 440085 | 87.05 | 3/8 | 4 | 1 1/4 | 2 1/2 | 1/8 | 8.002-8.814 | 121.05 | 98.55 | 90.90 | 87.20 | 83.55 | 80.30 | 75.95 |
| 9.0 | .3543 | 430090 | 440090 | 93.20 | 3/8 | 4 | 1 1/4 | 2 1/2 | 1/8 | 8.815-9.601 | 127.05 | 104.70 | 97.00 | 93.35 | 89.45 | 86.45 | 82.05 |
| 9.5 | .3740 | 430095 | 440095 | 93.20 | 3/8 | 4 | 1 1/4 | 2 1/2 | 1/8 | - | - | - | - | - | - | - | - |
| 10.0 | .3937 | 430100 | 440100 | 94.30 | 1/2 | 4 | 1 1/4 | 2 1/2 | 3/16 | 9.602-10.389 | 128.30 | 105.70 | 98.05 | 94.55 | 90.65 | 87.50 | 83.05 |
| 10.5 | .4134 | 430105 | 440105 | 108.80 | 1/2 | 4 | 1 1/4 | 2 1/2 | 3/16 | 10.390-11.201 | 142.95 | 120.25 | 112.60 | 109.05 | 105.25 | 102.15 | 97.75 |
| 11.0 | .4331 | 430110 | 440110 | 108.80 | 1/2 | 4 | 1 1/4 | 2 1/2 | 3/16 | - | - | - | - | - | - | - | - |
| 11.5 | .4528 | 430115 | 440115 | 108.80 | 1/2 | 4 | 1 1/4 | 2 1/2 | 3/16 | 11.202-11.989 | 142.95 | 120.25 | 112.60 | 109.05 | 105.25 | 102.15 | 97.75 |
| 12.0 | .4724 | 430120 | 440120 | 118.15 | 1/2 | 4 | 1 1/4 | 2 1/2 | 3/16 | 11.990-12.776 | 152.95 | 129.75 | 122.10 | 118.30 | 114.50 | 111.15 | 106.75 |
| 12.5 | .4921 | 430125 | 440125 | 118.15 | 1/2 | 4 | 1 1/4 | 2 1/2 | 3/16 | - | - | - | - | - | - | - | - |
| 13.0 | .5118 | 430130 | 440130 | 118.15 | 5/8 | 6 | 1 1/2 | 3 | 1/4 | 12.777-13.564 | 152.95 | 129.75 | 122.10 | 118.30 | 114.50 | 111.15 | 106.75 |
| 13.5 | .5315 | 430135 | 440135 | 118.15 | 5/8 | 6 | 1 1/2 | 3 | 1/4 | - | - | - | - | - | - | - | - |
| 14.0 | .5512 | 430140 | 440140 | 123.50 | 5/8 | 6 | 1 1/2 | 3 | 1/4 | 13.565-14.376 | 158.50 | 135.40 | 127.60 | 123.90 | 119.90 | 116.60 | 112.25 |
| 14.5 | .5709 | 430145 | 440145 | 123.50 | 5/8 | 6 | 1 1/2 | 3 | 1/4 | 14.377-15.164 | 158.50 | 135.40 | 127.60 | 123.90 | 119.90 | 116.60 | 112.25 |
| 15.0 | .5906 | 430150 | 440150 | 123.50 | 5/8 | 6 | 1 1/2 | 3 | 1/4 | - | - | - | - | - | - | - | - |
| 15.5 | .6102 | 430155 | 440155 | 126.55 | 5/8 | 6 | 1 1/2 | 3 | 1/4 | 15.165-15.951 | 161.45 | 138.35 | 130.60 | 126.70 | 122.75 | 119.70 | 115.20 |
| 16.0 | .6299 | 430160 | 440160 | 126.55 | 5/8 | 6 | 1 1/2 | 3 | 1/4 | 15.952-16.739 | 161.45 | 138.35 | 130.60 | 126.70 | 122.75 | 119.70 | 115.20 |
| 16.5 | .6496 | 430165 | 440165 | 126.55 | 5/8 | 6 | 1 1/2 | 3 | 1/4 | - | - | - | - | - | - | - | - |
| 17.0 | .6693 | 430170 | 440170 | 131.75 | 5/8 | 6 | 1 1/2 | 3 | 1/4 | 16.740-17.551 | 166.55 | 143.40 | 135.65 | 131.90 | 127.95 | 124.80 | 120.25 |
| 17.5 | .6890 | 430175 | 440175 | 131.75 | 5/8 | 6 | 1 1/2 | 3 | 1/4 | - | - | - | - | - | - | - | - |
| 18.0 | .7087 | 430180 | 440180 | 131.75 | 3/4 | 6 | 1 1/2 | 3 | 5/16 | 17.552-18.339 | 166.55 | 143.40 | 135.65 | 131.90 | 127.95 | 124.80 | 120.25 |
| 18.5 | .7283 | 430185 | 440185 | 134.65 | 3/4 | 6 | 1 1/2 | 3 | 5/16 | 18.340-19.126 | 169.50 | 146.30 | 138.65 | 134.80 | 130.90 | 127.70 | 123.30 |
| 19.0 | .7480 | 430190 | 440190 | 134.65 | 3/4 | 6 | 1 1/2 | 3 | 5/16 | - | - | - | - | - | - | - | - |
| 19.5 | .7677 | 430195 | 440195 | 134.65 | 3/4 | 6 | 1 1/2 | 3 | 5/16 | 19.127-19.914 | 169.50 | 146.30 | 138.65 | 134.80 | 130.90 | 127.70 | 123.30 |
| 20.0 | .7874 | 430200 | 440200 | 144.90 | 3/4 | 6 | 1 1/2 | 3 | 5/16 | 19.915-20.726 | 179.90 | 156.75 | 149.05 | 145.20 | 141.25 | 138.10 | 133.60 |
| 20.5 | .8071 | 430205 | 440205 | 144.90 | 3/4 | 6 | 1 1/2 | 3 | 5/16 | - | - | - | - | - | - | - | - |
| 21.0 | .8268 | 430210 | 440210 | 144.90 | 3/4 | 6 | 1 1/2 | 3 | 5/16 | 20.727-21.514 | 179.90 | 156.75 | 149.05 | 145.20 | 141.25 | 138.10 | 133.60 |
| 21.5 | .8465 | 430215 | 440215 | 144.90 | 3/4 | 6 | 1 1/2 | 3 | 5/16 | - | - | - | - | - | - | - | - |
| 22.0 | .8661 | 430220 | 440220 | 151.80 | 3/4 | 6 | 1 1/2 | 3 | 5/16 | 21.515-22.301 | 186.75 | 163.55 | 155.70 | 152.05 | 148.05 | 144.85 | 140.45 |
| 22.5 | .8858 | 430225 | 440225 | 157.45 | 3/4 | 6 | 1 1/2 | 3 | 5/16 | 22.302-23.089 | 193.70 | 169.70 | 161.70 | 157.65 | 153.65 | 150.45 | 145.75 |
| 23.0 | .9055 | 430230 | 440230 | 157.45 | 3/4 | 6 | 1 1/2 | 3 | 5/16 | - | - | - | - | - | - | - | - |
| 23.5 | .9252 | 430235 | 440235 | 171.90 | 3/4 | 6 | 1 1/2 | 3 | 5/16 | 23.090-23.901 | 208.10 | 184.05 | 176.00 | 172.15 | 168.05 | 164.70 | 160.15 |
| 24.0 | .9449 | 430240 | 440240 | 171.90 | 3/4 | 8 | 1 1/2 | 3 | 5/16 | 23.902-24.689 | 208.10 | 184.05 | 176.00 | 172.15 | 168.05 | 164.70 | 160.15 |
| 24.5 | .9646 | 430245 | 440245 | 171.90 | 3/4 | 8 | 1 1/2 | 3 | 5/16 | - | - | - | - | - | - | - | - |
| 25.0 | .9843 | 430250 | 440250 | 179.55 | 3/4 | 8 | 1 1/2 | 3 | 5/16 | 24.690-25.476 | 215.90 | 191.70 | 183.80 | 179.85 | 175.75 | 172.40 | 167.80 |
| 25.5 | 1.0039 | 430255 | 440255 | 179.55 | 3/4 | 8 | 1 1/2 | 3 | 5/16 | 25.477-27.076 | 215.90 | 191.70 | 183.80 | 179.85 | 175.75 | 172.40 | 167.80 |
| 26.0 | 1.0236 | 430260 | 440260 | 179.55 | 3/4 | 8 | 1 1/2 | 3 | 5/16 | - | - | - | - | - | - | - | - |
| 27.0 | 1.0630 | 430270 | 440270 | 179.55 | 3/4 | 8 | 1 1/2 | 3 | 5/16 | - | - | - | - | - | - | - | - |
| 28.0 | 1.1024 | 430280 | 440280 | 207.40 | 3/4 | 8 | 1 1/2 | 3 | 5/16 | 27.077-28.651 | 243.75 | 219.65 | 211.50 | 207.65 | 203.65 | 200.30 | 195.70 |
| 29.0 | 1.1417 | 430290 | 440290 | 215.55 | 3/4 | 8 | 1 1/2 | 3 | 5/16 | 28.652-30.239 | 243.75 | 219.65 | 211.50 | 207.65 | 203.65 | 200.30 | 195.70 |
| 30.0 | 1.1811 | 430300 | 440300 | 215.55 | 3/4 | 8 | 1 1/2 | 3 | 5/16 | - | - | - | - | - | - | - | - |
| 31.0 | 1.2205 | 430310 | 440310 | 249.95 | 3/4 | 8 | 1 1/2 | 3 | 5/16 | 30.240-31.826 | 286.10 | 262.00 | 254.10 | 250.05 | 246.00 | 242.65 | 238.05 |
| 32.0 | 1.2598 | 430320 | 440320 | 249.95 | 3/4 | 8 | 1 1/2 | 3 | 5/16 | 31.827-33.414 | 286.10 | 262.00 | 254.10 | 250.05 | 246.00 | 242.65 | 238.05 |
| 33.0 | 1.2992 | 430330 | 440330 | 249.95 | 3/4 | 8 | 1 1/2 | 3 | 5/16 | - | - | - | - | - | - | - | - |
| 34.0 | 1.3386 | 430340 | 440340 | 253.35 | 3/4 | 8 | 1 1/2 | 3 | 5/16 | 33.415-35.001 | 289.45 | 265.35 | 257.30 | 253.45 | 249.35 | 246.00 | 241.40 |
| 35.0 | 1.3780 | 430350 | 440350 | 253.35 | 3/4 | 8 | 1 1/2 | 3 | 5/16 | - | - | - | - | - | - | - | - |
| 36.0 | 1.4173 | 430360 | 440360 | 292.60 | 3/4 | 8 | 1 1/2 | 3 | 5/16 | 35.002-36.589 | 328.70 | 304.75 | 296.65 | 292.70 | 288.70 | 285.30 | 280.70 |
| 37.0 | 1.4567 | 430370 | 440370 | 348.15 | 3/4 | 8 | 1 1/2 | 3 | 5/16 | 36.590-38.176 | 384.40 | 360.40 | 352.25 | 348.35 | 344.30 | 340.85 | 336.25 |
| 38.0 | 1.4961 | 430380 | 440380 | 348.15 | 3/4 | 8 | 1 1/2 | 3 | 5/16 | - | - | - | - | - | - | - | - |

*1/2" carbide length

REAMERS



JOBBERS DRILL LENGTH REAMERS CARBIDE TIPPED TYPE 401 FRACTIONAL



**STRAIGHT FLUTES
STRAIGHT SHANK**



| TOOL SELECTOR | CHIP CLASS | MATERIAL MACHINED | TOOL TYPE |
|---------------|------------|---------------------------|-----------|
| | 20 | NON-FERROUS - LONG CHIPS | 401 |
| | 40 | NON-FERROUS - SHORT CHIPS | 401 |
| | 60 | CAST IRONS | 401 |
| | 80 | LOW STRENGTH STEELS | 401 |
| | 100 | MEDIUM STRENGTH STEELS | 401 |
| | 120 | HIGH STRENGTH STEELS | 401 |
| | 140 | HIGH TEMPERATURE ALLOYS | 401 |

TYPE 401

- Straight polished flutes and straight shank
- Short length for extra rigidity
- Detailed specifications on pg. 15

USE:

- Production length reamers are similar in length to jobbers length drills. This reduces costly setup time, while increasing the rigidity of the reamer compared to the standard length chucking reamer. For shallow holes only (see page 14).

MODIFICATIONS (Prompt delivery)

- Modified tool diameter - priced below
- Metric tool diameter
- Closer tool diameter tolerance - pg. 15
- Cutting diameter reduced for step or pilot
- End chamfer other than 45°
- End cutting or corner radius
- Increased/decreased circular margin
- Increased/decreased tool diam. back taper
- Shortened shank or reduced shank diameter

- Flat(s) or tang on shank
- Coatings available:

TITANIUM NITRIDE - TiN

TITANIUM CARBONITRIDE - TiCN

ZIRCONIUM NITRIDE - ZrN

AL TITANIUM NITRIDE - AlTiN

| TOOL DIAMETER | | TYPE 401 EDP NO. | PRICE | DIMENSIONS | | | | | FINISHED TO MODIFIED TOOL DIAMETER | | | | | | |
|---------------|---------|------------------|---------|-------------|-------------|----------|-----|-------|------------------------------------|--|---------|---------|---------|---------|---------|
| FRACTIONAL | DECIMAL | | | SHANK DIAM. | NO. OF FLTS | LENGTH | | | MODIFIED DIAMETER RANGE | PRICE EACH - BASED ON QUANTITY ORDERED | | | | | |
| | | FLT | CARBIDE | | | OVER-ALL | 1 | 2 | | 3 | 4 | 5-7 | 8-14* | | |
| 5/32 | .1562 | 40105 | \$75.70 | .151 | 4 | 1 | 1/2 | 3 1/8 | 0.1560-0.1769 | \$120.95 | \$98.40 | \$90.70 | \$87.15 | \$83.25 | \$80.25 |
| 11/64 | .1719 | 4011719 | 75.70 | .151 | 4 | 1 | 1/2 | 3 1/4 | - | - | - | - | - | - | - |
| 3/16 | .1875 | 40106 | 73.20 | 11/64 | 4 | 1 1/8 | 1/2 | 3 1/2 | 0.1770-0.2040 | 117.20 | 95.20 | 87.80 | 84.25 | 80.60 | 77.65 |
| 13/64 | .2031 | 4012031 | 73.75 | 11/64 | 4 | 1 1/8 | 1/2 | 3 5/8 | - | - | - | - | - | - | - |
| 7/32 | .2188 | 40107 | 73.20 | 13/64 | 4 | 1 1/4 | 1/2 | 3 3/4 | 0.2041-0.2210 | 117.20 | 95.20 | 87.80 | 84.25 | 80.60 | 77.65 |
| 15/64 | .2344 | 4012344 | 73.75 | 7/32 | 4 | 1 1/2 | 1/2 | 3 7/8 | 0.2211-0.2380 | 117.75 | 95.85 | 88.20 | 84.80 | 81.10 | 78.00 |
| 1/4 | .2500 | 40108 | 73.20 | 15/64 | 4 | 1 1/2 | 1/2 | 4 | 0.2381-0.2530 | 117.20 | 95.20 | 87.80 | 84.25 | 80.60 | 77.65 |
| 17/64 | .2656 | 4012656 | 74.70 | 15/64 | 4 | 1 1/2 | 1/2 | 4 1/8 | - | - | - | - | - | - | - |
| 9/32 | .2812 | 40109 | 74.25 | 15/64 | 4 | 1 1/2 | 1/2 | 4 1/4 | 0.2531-0.2840 | 118.20 | 96.20 | 88.85 | 85.30 | 81.50 | 78.55 |
| 19/64 | .2969 | 4012969 | 74.70 | 9/32 | 4 | 1 1/2 | 1/2 | 4 3/8 | - | - | - | - | - | - | - |
| 5/16 | .3125 | 40110 | 74.25 | 9/32 | 4 | 1 1/2 | 1/2 | 4 1/2 | 0.2841-0.3150 | 118.20 | 96.20 | 88.85 | 85.30 | 81.50 | 78.55 |
| 21/64 | .3281 | 4013281 | 76.90 | 9/32 | 4 | 1 1/2 | 5/8 | 4 5/8 | - | - | - | - | - | - | - |
| 11/32 | .3438 | 40111 | 76.10 | 9/32 | 4 | 1 1/2 | 5/8 | 4 3/4 | 0.3151-0.3470 | 119.95 | 98.00 | 90.65 | 87.15 | 83.35 | 80.35 |
| 23/64 | .3594 | 4013594 | 76.90 | 5/16 | 4 | 1 3/4 | 5/8 | 4 7/8 | - | - | - | - | - | - | - |
| 3/8 | .3750 | 40112 | 69.90 | 5/16 | 4 | 1 3/4 | 5/8 | 5 | 0.3471-0.3780 | 110.15 | 89.95 | 83.05 | 79.90 | 76.55 | 73.75 |
| 25/64 | .3906 | 4013906 | 79.85 | 5/16 | 4 | 1 3/4 | 5/8 | 5 1/8 | - | - | - | - | - | - | - |
| 13/32 | .4062 | 40113 | 78.50 | 5/16 | 4 | 1 3/4 | 5/8 | 5 1/4 | 0.3781-0.4090 | 122.55 | 100.45 | 93.10 | 89.70 | 85.75 | 82.85 |
| 27/64 | .4219 | 4014219 | 79.85 | 3/8 | 4 | 1 3/4 | 5/8 | 5 3/8 | - | - | - | - | - | - | - |
| 7/16 | .4375 | 40114 | 81.95 | 3/8 | 4 | 1 3/4 | 5/8 | 5 1/2 | 0.4091-0.4410 | 125.90 | 103.90 | 96.50 | 92.95 | 89.20 | 86.30 |
| 29/64 | .4531 | 4014531 | 85.15 | 3/8 | 4 | 1 3/4 | 5/8 | 5 5/8 | - | - | - | - | - | - | - |
| 15/32 | .4688 | 40115 | 85.65 | 3/8 | 4 | 1 3/4 | 5/8 | 5 3/4 | 0.4411-0.4720 | 129.55 | 107.60 | 100.20 | 96.70 | 92.90 | 89.95 |
| 31/64 | .4844 | 4014844 | 90.70 | 7/16 | 6 | 2 | 5/8 | 5 7/8 | - | - | - | - | - | - | - |
| 1/2 | .5000 | 40116 | 96.15 | 7/16 | 6 | 2 | 5/8 | 6 | 0.4721-0.5030 | 144.55 | 120.25 | 112.25 | 108.40 | 104.15 | 100.85 |
| 33/64 | .5156 | 4015156 | 102.15 | 7/16 | 6 | 2 | 5/8 | 6 5/8 | - | - | - | - | - | - | - |
| 17/32 | .5312 | 40117 | 102.15 | 7/16 | 6 | 2 | 5/8 | 6 5/8 | 0.5031-0.5340 | 150.55 | 126.25 | 118.20 | 114.35 | 110.20 | 107.00 |
| 35/64 | .5469 | 4015469 | 102.15 | 7/16 | 6 | 2 | 5/8 | 6 5/8 | - | - | - | - | - | - | - |
| 9/16 | .5625 | 40118 | 102.15 | 7/16 | 6 | 2 | 5/8 | 6 5/8 | 0.5341-0.5660 | 150.55 | 126.25 | 118.20 | 114.35 | 110.20 | 107.00 |
| 37/64 | .5781 | 4015781 | 104.95 | 7/16 | 6 | 2 | 5/8 | 6 5/8 | - | - | - | - | - | - | - |
| 19/32 | .5938 | 40119 | 104.95 | 7/16 | 6 | 2 | 5/8 | 7 1/8 | 0.5661-0.5970 | 153.50 | 129.25 | 121.15 | 117.20 | 113.00 | 109.90 |
| 39/64 | .6094 | 4016094 | 104.95 | 9/16 | 6 | 2 1/4 | 5/8 | 7 1/8 | - | - | - | - | - | - | - |
| 5/8 | .6250 | 40120 | 104.95 | 9/16 | 6 | 2 1/4 | 5/8 | 7 1/8 | 0.5971-0.6280 | 153.50 | 129.25 | 121.15 | 117.20 | 113.00 | 109.90 |
| 41/64 | .6406 | 4016406 | 106.30 | 9/16 | 6 | 2 1/4 | 5/8 | 7 1/8 | - | - | - | - | - | - | - |
| 21/32 | .6562 | 40121 | 106.30 | 9/16 | 6 | 2 1/4 | 5/8 | 7 1/8 | 0.6281-0.6590 | 154.70 | 130.60 | 122.40 | 118.50 | 114.35 | 111.05 |
| 43/64 | .6719 | 4016719 | 106.30 | 9/16 | 6 | 2 1/4 | 5/8 | 7 5/8 | - | - | - | - | - | - | - |
| 11/16 | .6875 | 40122 | 106.30 | 9/16 | 6 | 2 1/4 | 5/8 | 7 5/8 | 0.6591-0.6910 | 154.70 | 130.60 | 122.40 | 118.50 | 114.35 | 111.05 |
| 45/64 | .7031 | 4017031 | 110.00 | 9/16 | 6 | 2 1/4 | 5/8 | 7 5/8 | - | - | - | - | - | - | - |
| 23/32 | .7188 | 40123 | 110.00 | 9/16 | 6 | 2 1/4 | 5/8 | 7 5/8 | 0.6911-0.7220 | 158.35 | 134.25 | 126.10 | 122.15 | 118.05 | 114.70 |
| 47/64 | .7344 | 4017344 | 110.00 | 5/8 | 6 | 2 1/2 | 3/4 | 7 5/8 | - | - | - | - | - | - | - |
| 3/4 | .7500 | 40124 | 110.00 | 5/8 | 6 | 2 1/2 | 3/4 | 8 | 0.7221-0.7530 | 158.35 | 134.25 | 126.10 | 122.15 | 118.05 | 114.70 |

*Quantities of 15 or more - price of fractional size in same size range.



JOBBER'S DRILL LENGTH REAMERS CARBIDE TIPPED TYPES 477 & 479 FRACTIONAL



OVER & UNDER SIZE REAMERS CARBIDE TIPPED

TYPE 479 - STRAIGHT FLUTES & SHANK

- Tool diameter tolerance: plus .0002", minus .0000"
- Same specifications and available modifications as Type 401 (pg. 30)

USE:

- These precision ground carbide tipped reamers are very effective for finishing accurate holes in most materials. For shallow holes only (see page 14)

| DECIMAL TOOL DIAMETER | TYPE 479 EDP NO. | PRICE | DIMENSIONS | | | | |
|-----------------------|------------------|---------|-------------|---------------|--------|----------|----------|
| | | | SHANK DIAM. | NO. OF FLUTES | LENGTH | | |
| | | | | | FLUTE | CAR-BIDE | OVER-ALL |
| .1865 | 47918 | \$73.75 | 1/64 | 4 | 1 1/8 | 1/2 | 3 1/2 |
| .1885 | 47919 | 73.75 | 1/64 | 4 | 1 1/8 | 1/2 | 3 1/2 |
| .2490 | 47924 | 73.75 | 1/64 | 4 | 1 1/2 | 1/2 | 4 |
| .2510 | 47925 | 73.75 | 1/64 | 4 | 1 1/2 | 1/2 | 4 |
| .3115 | 47931 | 74.70 | 3/32 | 4 | 1 1/2 | 1/2 | 4 1/2 |
| .3135 | 47932 | 74.70 | 3/32 | 4 | 1 1/2 | 1/2 | 4 1/2 |
| .3740 | 47937 | 76.90 | 5/16 | 4 | 1 3/4 | 5/8 | 5 |
| .3760 | 47938 | 76.90 | 5/16 | 4 | 1 3/4 | 5/8 | 5 |
| .4365 | 47943 | 85.15 | 3/8 | 4 | 1 3/4 | 5/8 | 5 1/2 |
| .4385 | 47944 | 85.15 | 3/8 | 4 | 1 3/4 | 5/8 | 5 1/2 |
| .4990 | 47949 | 90.70 | 7/16 | 6 | 2 | 5/8 | 6 |
| .5010 | 47950 | 90.70 | 7/16 | 6 | 2 | 5/8 | 6 |

DOWEL PIN SIZE REAMERS CARBIDE TIPPED

TYPE 477 - STRAIGHT FLUTES & SHANK

- Special plus .0000", minus .0002" tool diameter tolerance
- Same specifications & available modifications as Type 401 (pg. 30)

USE:

- These precision ground reamers should be used in pairs, .0005" and .0020" under the dowel pin diameter. The .0020" smaller holes assure a tighter dowel pin fit, so all the pins will remain on the same side upon disassembly. Especially useful in plastic or die cast molds and machines when assembled sections are subject to shearing stress, yet require occasional disassembly.

| DECIMAL TOOL DIAMETER | TYPE 477 EDP NO. | PRICE | DIMENSIONS | | | | |
|-----------------------|------------------|---------|-------------|---------------|--------|----------|----------|
| | | | SHANK DIAM. | NO. OF FLUTES | LENGTH | | |
| | | | | | FLUTE | CAR-BIDE | OVER-ALL |
| .1855 | 47717 | \$73.75 | 1/64 | 4 | 1 1/8 | 1/2 | 3 1/2 |
| .1870 | 47718 | 73.75 | 1/64 | 4 | 1 1/8 | 1/2 | 3 1/2 |
| .2480 | 47723 | 73.75 | 1/64 | 4 | 1 1/2 | 1/2 | 4 |
| .2495 | 47724 | 73.75 | 1/64 | 4 | 1 1/2 | 1/2 | 4 |
| .3105 | 47730 | 74.70 | 3/32 | 4 | 1 1/2 | 1/2 | 4 1/2 |
| .3120 | 47731 | 74.70 | 3/32 | 4 | 1 1/2 | 1/2 | 4 1/2 |
| .3730 | 47736 | 76.90 | 5/16 | 4 | 1 3/4 | 5/8 | 5 |
| .3745 | 47737 | 76.90 | 5/16 | 4 | 1 3/4 | 5/8 | 5 |
| .4355 | 47742 | 85.15 | 3/8 | 4 | 1 3/4 | 5/8 | 5 1/2 |
| .4370 | 47743 | 85.15 | 3/8 | 4 | 1 3/4 | 5/8 | 5 1/2 |
| .4980 | 47748 | 90.70 | 7/16 | 6 | 2 | 5/8 | 6 |
| .4995 | 47749 | 90.70 | 7/16 | 6 | 2 | 5/8 | 6 |

REAMERS



REGULAR LENGTH CHUCKING REAMERS CARBIDE TIPPED TYPE 400 WIRE & LETTER SIZES



STRAIGHT FLUTES & SHANK

For shallow holes only (see page 14)
(See specifications & available modifications on page 30)

| TOOL DIAMETER | | TYPE 400 EDP NO. | PRICE | DIMENSIONS | | | | |
|---------------|----------------|------------------|---------|-------------|-------------|----------|-----|-------|
| WIRE/ LETTER | DECIMAL EQUIV. | | | SHANK DIAM. | NO. OF FLTS | LENGTH | | |
| | | | | FLT | CAR-BIDE | OVER-ALL | | |
| 22 | .1570 | 4001570 | \$66.35 | .151 | 4 | 1 | 1/2 | 4 |
| 21 | .1590 | 4001590 | 66.35 | .151 | 4 | 1 | 1/2 | 4 |
| 20 | .1610 | 4001610 | 66.35 | .151 | 4 | 1 | 1/2 | 4 |
| 19 | .1660 | 4001660 | 66.35 | .151 | 4 | 1 | 1/2 | 4 |
| 18 | .1695 | 4001695 | 66.35 | .151 | 4 | 1 | 1/2 | 4 |
| 17 | .1730 | 4001730 | 66.35 | .151 | 4 | 1 | 1/2 | 4 |
| 16 | .1770 | 4001770 | 61.80 | 1/64 | 4 | 1 1/8 | 1/2 | 4 1/2 |
| 15 | .1800 | 4001800 | 61.80 | 1/64 | 4 | 1 1/8 | 1/2 | 4 1/2 |
| 14 | .1820 | 4001820 | 61.80 | 1/64 | 4 | 1 1/8 | 1/2 | 4 1/2 |
| 13 | .1850 | 400047 | 61.80 | 1/64 | 4 | 1 1/8 | 1/2 | 4 1/2 |
| 12 | .1890 | 400048 | 61.80 | 1/64 | 4 | 1 1/8 | 1/2 | 4 1/2 |
| 11 | .1910 | 4001910 | 61.80 | 1/64 | 4 | 1 1/8 | 1/2 | 4 1/2 |
| 10 | .1935 | 4001935 | 61.80 | 1/64 | 4 | 1 1/8 | 1/2 | 4 1/2 |
| 9 | .1960 | 4001960 | 61.80 | 1/64 | 4 | 1 1/8 | 1/2 | 4 1/2 |
| 8 | .1990 | 4001990 | 61.80 | 1/64 | 4 | 1 1/8 | 1/2 | 4 1/2 |
| 7 | .2010 | 4002010 | 61.80 | 1/64 | 4 | 1 1/8 | 1/2 | 4 1/2 |
| 6 | .2040 | 4002040 | 61.80 | 1/64 | 4 | 1 1/8 | 1/2 | 4 1/2 |
| 5 | .2055 | 4002055 | 61.80 | 13/64 | 4 | 1 1/4 | 1/2 | 5 |
| 4 | .2090 | 4002090 | 61.80 | 13/64 | 4 | 1 1/4 | 1/2 | 5 |
| 3 | .2130 | 4002130 | 61.80 | 13/64 | 4 | 1 1/4 | 1/2 | 5 |
| 2 | .2210 | 4002210 | 61.80 | 13/64 | 4 | 1 1/4 | 1/2 | 5 |
| 1 | .2280 | 4002280 | 64.60 | 7/32 | 4 | 1 1/2 | 1/2 | 6 |
| A | .2340 | 4002340 | 64.60 | 7/32 | 4 | 1 1/2 | 1/2 | 6 |
| B | .2380 | 4002380 | 64.60 | 7/32 | 4 | 1 1/2 | 1/2 | 6 |

| TOOL DIAMETER | | TYPE 400 EDP NO. | PRICE | DIMENSIONS | | | | |
|---------------|----------------|------------------|---------|-------------|-------------|----------|-----|---|
| LETTER | DECIMAL EQUIV. | | | SHANK DIAM. | NO. OF FLTS | LENGTH | | |
| | | | | FLT | CAR-BIDE | OVER-ALL | | |
| C | .2420 | 4002420 | \$61.80 | 1/64 | 4 | 1 1/2 | 1/2 | 6 |
| D | .2460 | 4002460 | 61.80 | 1/64 | 4 | 1 1/2 | 1/2 | 6 |
| E | .2500 | 40008 | 47.10 | 1/64 | 4 | 1 1/2 | 1/2 | 6 |
| F | .2570 | 4002570 | 62.75 | 1/64 | 4 | 1 1/2 | 1/2 | 6 |
| G | .2610 | 4002610 | 62.75 | 1/64 | 4 | 1 1/2 | 1/2 | 6 |
| H | .2660 | 4002660 | 62.75 | 1/64 | 4 | 1 1/2 | 1/2 | 6 |
| I | .2720 | 4002720 | 62.75 | 1/64 | 4 | 1 1/2 | 1/2 | 6 |
| J | .2770 | 4002770 | 62.75 | 1/64 | 4 | 1 1/2 | 1/2 | 6 |
| K | .2810 | 4002810 | 62.75 | 1/64 | 4 | 1 1/2 | 1/2 | 6 |
| L | .2900 | 4002900 | 62.75 | 3/32 | 4 | 1 1/2 | 1/2 | 6 |
| M | .2950 | 4002950 | 62.75 | 3/32 | 4 | 1 1/2 | 1/2 | 6 |
| N | .3020 | 4003020 | 62.75 | 3/32 | 4 | 1 1/2 | 1/2 | 6 |
| O | .3160 | 4003160 | 64.35 | 3/32 | 4 | 1 1/2 | 1/2 | 6 |
| P | .3230 | 4003230 | 64.35 | 3/32 | 4 | 1 1/2 | 1/2 | 6 |
| Q | .3320 | 4003320 | 64.35 | 3/32 | 4 | 1 1/2 | 1/2 | 6 |
| R | .3390 | 4003390 | 64.35 | 3/32 | 4 | 1 1/2 | 1/2 | 6 |
| S | .3480 | 4003480 | 64.35 | 5/16 | 4 | 1 3/4 | 5/8 | 7 |
| T | .3580 | 4003580 | 64.35 | 5/16 | 4 | 1 3/4 | 5/8 | 7 |
| U | .3680 | 4003680 | 64.35 | 5/16 | 4 | 1 3/4 | 5/8 | 7 |
| V | .3770 | 4003770 | 64.35 | 5/16 | 4 | 1 3/4 | 5/8 | 7 |
| W | .3860 | 4003860 | 66.80 | 5/16 | 4 | 1 3/4 | 5/8 | 7 |
| X | .3970 | 4003970 | 66.80 | 5/16 | 4 | 1 3/4 | 5/8 | 7 |
| Y | .4040 | 4004040 | 66.80 | 5/16 | 4 | 1 3/4 | 5/8 | 7 |
| Z | .4130 | 4004130 | 70.25 | 3/8 | 4 | 1 3/4 | 5/8 | 7 |



CHUCKING REAMERS CARBIDE TIPPED TYPE 400 FRACTIONAL



**STRAIGHT FLUTES
STRAIGHT SHANK**



| TOOL SELECTOR | CHIP CLASS | MATERIAL MACHINED | TOOL TYPE |
|---------------|---------------------------|--------------------------|-----------------------|
| | 20 | NON-FERROUS - LONG CHIPS | 400/407 ^{MS} |
| 40 | NON-FERROUS - SHORT CHIPS | 400/407 ^{MS} | |
| 60 | CAST IRONS | 400/408 ^{MS} | |
| 80 | LOW STRENGTH STEELS | 400/409 ^{MS} | |
| 100 | MEDIUM STRENGTH STEELS | 400/409 ^{MS} | |
| 120 | HIGH STRENGTH STEELS | 400/409 ^{MS} | |
| 140 | HIGH TEMPERATURE ALLOYS | 409 ^{MS} | |

^{MS}See pages 62 & 63 for material specific reamers

TYPE 400

- Straight polished flutes and straight shank
- Detailed specifications on page 15

USE:

- For all general reaming of steels, cast irons, non-ferrous materials, plastics, and non-metals

MODIFICATIONS (Prompt delivery)

- Modified tool diameter - priced below
- Modified metric tool diameter - priced on pg. 38
- Closer tool diameter tolerance - pg. 15
- Cutting diameter reduced for step or pilot
- End chamfer other than 45°
- End cutting or corner radius

- Increased/decreased circular margin
- Increased/decreased tool diam. back taper
- Shortened shank or reduced shank diameter
- Flat(s) or tang on shank
- Coatings available:
See page 27

NOTE: For stocked tool diameters in .0005 increments, see pgs. 34-37. For semi-finished reamers, see pg. 39. For smaller tool diameters, see solid carbide reamers on pgs. 44, 89-91. For shallow holes only (see page 14).

| TOOL DIAMETER | | TYPE 400 EDP NO. | PRICE | DIMENSIONS | | | | | FINISHED TO MODIFIED TOOL DIAMETER | | | | | | |
|---------------|---------|------------------|---------|-------------|-------------|--------|-----|-------|------------------------------------|--|---------|---------|---------|---------|---------|
| FRACTIONAL | DECIMAL | | | SHANK DIAM. | NO. OF FLTS | LENGTH | | | MODIFIED DIAMETER RANGE | PRICE EACH - BASED ON QUANTITY ORDERED | | | | | |
| | | 1 | 2 | | | 3 | 4 | 5-7 | | 8-14* | | | | | |
| 5/32 | .1562 | 40005 | \$51.30 | .151 | 4 | 1 | 1/2 | 4 | 0.1560-0.1769 | \$97.00 | \$73.80 | \$66.35 | \$62.70 | \$58.80 | \$55.75 |
| 11/64 | .1719 | 4001719 | 51.30 | .151 | 4 | 1 | 1/2 | 4 | - | - | - | - | - | - | - |
| 3/16 | .1875 | 40006 | 47.10 | 11/64 | 4 | 1 1/8 | 1/2 | 4 1/2 | 0.1770-0.2040 | 91.05 | 69.00 | 61.80 | 58.10 | 54.40 | 51.40 |
| 3/16 | .1875 | 40086 | 49.80 | 11/64 | 4 | 1 1/4 | 1/2 | 5 | 0.1770-0.2040 | 93.85 | 71.80 | 64.60 | 60.90 | 57.15 | 54.20 |
| 13/64 | .2031 | 4002031 | 49.80 | 11/64 | 4 | 1 1/8 | 1/2 | 4 1/2 | - | - | - | - | - | - | - |
| 7/32 | .2188 | 40007 | 47.10 | 13/64 | 4 | 1 1/4 | 1/2 | 5 | 0.2041-0.2210 | 91.05 | 69.00 | 61.80 | 58.10 | 54.40 | 51.40 |
| 15/64 | .2344 | 4002344 | 49.80 | 7/32 | 4 | 1 1/2 | 1/2 | 6 | 0.2211-0.2380 | 93.85 | 71.80 | 64.60 | 60.90 | 57.15 | 54.20 |
| 1/4 | .2500 | 40008 | 47.10 | 15/64 | 4 | 1 1/2 | 1/2 | 6 | 0.2381-0.2530 | 91.05 | 69.00 | 61.80 | 58.10 | 54.40 | 51.40 |
| 17/64 | .2656 | 4002656 | 50.95 | 15/64 | 4 | 1 1/2 | 1/2 | 6 | - | - | - | - | - | - | - |
| 9/32 | .2812 | 40009 | 48.15 | 15/64 | 4 | 1 1/2 | 1/2 | 6 | 0.2531-0.2840 | 92.10 | 70.10 | 62.75 | 59.20 | 55.35 | 52.40 |
| 19/64 | .2969 | 4002969 | 50.95 | 9/32 | 4 | 1 1/2 | 1/2 | 6 | - | - | - | - | - | - | - |
| 5/16 | .3125 | 40010 | 48.15 | 9/32 | 4 | 1 1/2 | 1/2 | 6 | 0.2841-0.3150 | 92.10 | 70.10 | 62.75 | 59.20 | 55.35 | 52.40 |
| 21/64 | .3281 | 4003281 | 52.90 | 9/32 | 4 | 1 1/2 | 5/8 | 6 | - | - | - | - | - | - | - |
| 11/32 | .3438 | 40011 | 49.75 | 9/32 | 4 | 1 1/2 | 5/8 | 6 | 0.3151-0.3470 | 93.80 | 71.70 | 64.35 | 60.85 | 57.10 | 54.10 |
| 23/64 | .3594 | 4003594 | 52.90 | 5/16 | 4 | 1 3/4 | 5/8 | 7 | - | - | - | - | - | - | - |
| 3/8 | .3750 | 40012 | 49.75 | 5/16 | 4 | 1 3/4 | 5/8 | 7 | 0.3471-0.3780 | 93.80 | 71.70 | 64.35 | 60.85 | 57.10 | 54.10 |
| 25/64 | .3906 | 4003906 | 55.55 | 5/16 | 4 | 1 3/4 | 5/8 | 7 | - | - | - | - | - | - | - |
| 13/32 | .4062 | 40013 | 52.30 | 5/16 | 4 | 1 3/4 | 5/8 | 7 | 0.3781-0.4090 | 96.20 | 74.20 | 66.80 | 63.30 | 59.45 | 56.60 |
| 17/64 | .4219 | 4004219 | 59.15 | 3/8 | 4 | 1 3/4 | 5/8 | 7 | - | - | - | - | - | - | - |
| 7/16 | .4375 | 40014 | 55.85 | 3/8 | 4 | 1 3/4 | 5/8 | 7 | 0.4091-0.4410 | 99.75 | 77.75 | 70.25 | 66.80 | 62.95 | 60.10 |
| 29/64 | .4531 | 4004531 | 60.05 | 3/8 | 4 | 1 3/4 | 5/8 | 7 | - | - | - | - | - | - | - |
| 15/32 | .4688 | 40015 | 56.60 | 3/8 | 4 | 1 3/4 | 5/8 | 7 | 0.4411-0.4720 | 100.60 | 78.50 | 71.10 | 67.55 | 63.85 | 60.85 |
| 31/64 | .4844 | 4004844 | 64.90 | 7/16 | 6 | 2 | 5/8 | 8 | - | - | - | - | - | - | - |
| 1/2 | .5000 | 40016 | 67.30 | 7/16 | 6 | 2 | 5/8 | 8 | 0.4721-0.5030 | 115.75 | 91.55 | 83.35 | 79.55 | 75.30 | 72.00 |
| 33/64 | .5156 | 4005156 | 73.20 | 7/16 | 6 | 2 | 5/8 | 8 | - | - | - | - | - | - | - |
| 17/32 | .5312 | 40017 | 73.20 | 7/16 | 6 | 2 | 5/8 | 8 | 0.5031-0.5340 | 121.75 | 97.50 | 89.35 | 85.45 | 81.25 | 78.00 |
| 35/64 | .5469 | 4005469 | 73.20 | 7/16 | 6 | 2 | 5/8 | 8 | - | - | - | - | - | - | - |
| 9/16 | .5625 | 40018 | 73.20 | 7/16 | 6 | 2 | 5/8 | 8 | 0.5341-0.5660 | 121.75 | 97.50 | 89.35 | 85.45 | 81.25 | 78.00 |
| 37/64 | .5781 | 4005781 | 76.20 | 7/16 | 6 | 2 | 5/8 | 8 | - | - | - | - | - | - | - |
| 19/32 | .5938 | 40019 | 76.20 | 7/16 | 6 | 2 | 5/8 | 8 | 0.5661-0.5970 | 124.70 | 100.35 | 92.25 | 88.50 | 84.20 | 81.10 |
| 39/64 | .6094 | 4006094 | 76.20 | 9/16 | 6 | 2 1/4 | 5/8 | 9 | - | - | - | - | - | - | - |
| 5/8 | .6250 | 40020 | 76.20 | 9/16 | 6 | 2 1/4 | 5/8 | 9 | 0.5971-0.6280 | 124.70 | 100.35 | 92.25 | 88.50 | 84.20 | 81.10 |
| 41/64 | .6406 | 4006406 | 77.60 | 9/16 | 6 | 2 1/4 | 5/8 | 9 | - | - | - | - | - | - | - |
| 21/32 | .6562 | 40021 | 77.60 | 9/16 | 6 | 2 1/4 | 5/8 | 9 | 0.6281-0.6590 | 125.90 | 101.55 | 93.55 | 89.75 | 85.50 | 82.30 |
| 43/64 | .6719 | 4006719 | 77.60 | 9/16 | 6 | 2 1/4 | 5/8 | 9 | - | - | - | - | - | - | - |
| 11/16 | .6875 | 40022 | 77.60 | 9/16 | 6 | 2 1/4 | 5/8 | 9 | 0.6591-0.6910 | 125.90 | 101.55 | 93.55 | 89.75 | 85.50 | 82.30 |
| 45/64 | .7031 | 4007031 | 81.20 | 9/16 | 6 | 2 1/4 | 5/8 | 9 | - | - | - | - | - | - | - |
| 23/32 | .7188 | 40023 | 81.20 | 9/16 | 6 | 2 1/4 | 5/8 | 9 | 0.6911-0.7220 | 129.55 | 105.45 | 97.25 | 93.40 | 89.20 | 85.95 |
| 47/64 | .7344 | 4007344 | 81.20 | 5/8 | 6 | 2 1/2 | 3/4 | 9 1/2 | - | - | - | - | - | - | - |
| 3/4 | .7500 | 40024 | 81.20 | 5/8 | 6 | 2 1/2 | 3/4 | 9 1/2 | 0.7221-0.7530 | 129.55 | 105.45 | 97.25 | 93.40 | 89.20 | 85.95 |

CONTINUED ON NEXT PAGE

*Quantities of 15 or more - price of fractional size in same size range.

| TOOL DIAMETER | | TYPE 400 EDP NO. | PRICE | DIMENSIONS | | | | | FINISHED TO MODIFIED TOOL DIAMETER | | | | | | |
|---------------|---------|------------------|----------|-------------|-------------|----------|-----|--------|------------------------------------|--|----------|---------|---------|---------|---------|
| FRACTIONAL | DECIMAL | | | SHANK DIAM. | NO. OF FLTS | LENGTH | | | MODIFIED DIAMETER RANGE | PRICE EACH - BASED ON QUANTITY ORDERED | | | | | |
| | | FLT | CAR-BIDE | | | OVER-ALL | 1 | 2 | | 3 | 4 | 5-7 | 8-14* | | |
| .49/64 | .7656 | 4007656 | \$83.80 | 5/8 | 6 | 2 1/2 | 3/4 | 9 1/2 | - | - | - | - | - | - | - |
| .29/32 | .7812 | 40025 | 83.80 | 5/8 | 6 | 2 1/2 | 3/4 | 9 1/2 | 0.7531-0.7840 | \$132.20 | \$107.95 | \$99.90 | \$96.10 | \$91.85 | \$88.60 |
| .51/64 | .7969 | 4007969 | 83.80 | 5/8 | 6 | 2 1/2 | 3/4 | 9 1/2 | - | - | - | - | - | - | - |
| .13/16 | .8125 | 40026 | 83.80 | 5/8 | 6 | 2 1/2 | 3/4 | 9 1/2 | 0.7841-0.8160 | 132.20 | 107.95 | 99.90 | 96.10 | 91.85 | 88.60 |
| .53/64 | .8281 | 4008281 | 87.20 | 5/8 | 6 | 2 1/2 | 3/4 | 9 1/2 | - | - | - | - | - | - | - |
| .27/32 | .8438 | 40027 | 87.20 | 5/8 | 6 | 2 1/2 | 3/4 | 9 1/2 | 0.8161-0.8470 | 135.65 | 111.35 | 103.30 | 99.35 | 95.20 | 91.95 |
| .55/64 | .8594 | 4008594 | 87.20 | 3/4 | 6 | 2 5/8 | 3/4 | 10 | - | - | - | - | - | - | - |
| .7/8 | .8750 | 40028 | 90.50 | 3/4 | 6 | 2 5/8 | 3/4 | 10 | 0.8471-0.8780 | 140.65 | 115.60 | 107.20 | 103.20 | 98.75 | 95.35 |
| .57/64 | .8906 | 4008906 | 105.45 | 3/4 | 6 | 2 5/8 | 3/4 | 10 | - | - | - | - | - | - | - |
| .29/32 | .9062 | 40029 | 105.45 | 3/4 | 6 | 2 5/8 | 3/4 | 10 | 0.8781-0.9090 | 155.65 | 130.40 | 122.10 | 118.10 | 113.70 | 110.30 |
| .59/64 | .9219 | 4009219 | 105.45 | 3/4 | 8 | 2 5/8 | 3/4 | 10 | - | - | - | - | - | - | - |
| .15/16 | .9375 | 40030 | 105.45 | 3/4 | 8 | 2 5/8 | 3/4 | 10 | 0.9091-0.9410 | 155.65 | 130.40 | 122.10 | 118.10 | 113.70 | 110.30 |
| .61/64 | .9531 | 4009531 | 110.45 | 3/4 | 8 | 2 5/8 | 3/4 | 10 | - | - | - | - | - | - | - |
| .31/32 | .9688 | 40031 | 110.45 | 3/4 | 8 | 2 5/8 | 3/4 | 10 | 0.9411-0.9720 | 160.80 | 135.55 | 127.30 | 123.25 | 118.80 | 115.40 |
| .63/64 | .9844 | 4009844 | 110.45 | 7/8 | 8 | 2 3/4 | 3/4 | 10 1/2 | - | - | - | - | - | - | - |
| 1 | 1.0000 | 40032 | 110.45 | 7/8 | 8 | 2 3/4 | 3/4 | 10 1/2 | 0.9721-1.0030 | 160.80 | 135.55 | 127.30 | 123.25 | 118.80 | 115.40 |
| 1 1/16 | 1.0625 | 40034 | 114.25 | 7/8 | 8 | 2 3/4 | 3/4 | 10 1/2 | 1.0031-1.0660 | 162.50 | 138.35 | 130.20 | 126.45 | 122.25 | 118.95 |
| 1 1/8 | 1.1250 | 40036 | 123.45 | 7/8 | 8 | 2 7/8 | 7/8 | 11 | 1.0661-1.1280 | 171.70 | 147.60 | 139.60 | 135.75 | 131.45 | 128.30 |
| 1 3/16 | 1.1875 | 40038 | 129.90 | 1 | 8 | 2 7/8 | 7/8 | 11 | 1.1281-1.1905 | 178.00 | 153.90 | 145.80 | 141.90 | 137.90 | 134.50 |
| 1 1/4 | 1.2500 | 40040 | 137.25 | 1 | 8 | 3 | 7/8 | 11 1/2 | 1.1906-1.2530 | 185.50 | 161.45 | 153.25 | 149.45 | 145.30 | 141.95 |
| 1 5/16 | 1.3125 | 40042 | 144.45 | 1 | 8 | 3 | 7/8 | 11 1/2 | 1.2531-1.3155 | 192.60 | 168.45 | 160.30 | 156.60 | 152.35 | 149.20 |
| 1 3/8 | 1.3750 | 40044 | 153.25 | 1 | 8 | 3 1/4 | 7/8 | 12 | 1.3156-1.3780 | 201.30 | 177.35 | 169.30 | 165.40 | 161.35 | 158.10 |
| 1 7/16 | 1.4375 | 40046 | 170.75 | 1 1/4 | 8 | 3 1/4 | 7/8 | 12 | 1.3781-1.4405 | 219.00 | 194.90 | 186.80 | 182.95 | 178.80 | 175.60 |
| 1 1/2 | 1.5000 | 40048 | 180.55 | 1 1/4 | 8 | 3 1/2 | 7/8 | 12 1/2 | 1.4406-1.5030 | 228.70 | 204.60 | 196.45 | 192.70 | 188.55 | 185.25 |
| 1 9/16 | 1.5625 | 40050 | 268.15 | 1 1/4 | 8 | 3 1/2 | 7/8 | 12 1/2 | 1.5031-1.5660 | 316.30 | 292.20 | 284.15 | 280.25 | 276.20 | 272.85 |
| 1 5/8 | 1.6250 | 40052 | 277.35 | 1 1/4 | 8 | 3 3/4 | 7/8 | 13 | 1.5661-1.6280 | 325.40 | 301.40 | 293.30 | 289.45 | 285.30 | 282.05 |
| 1 11/16 | 1.6875 | 40054 | 311.90 | 1 1/4 | 8 | 3 3/4 | 7/8 | 13 | 1.6281-1.6910 | 360.15 | 336.05 | 327.95 | 324.15 | 320.05 | 316.80 |
| 1 3/4 | 1.7500 | 40056 | 311.90 | 1 1/4 | 10 | 4 | 7/8 | 13 1/2 | 1.6911-1.7530 | 360.15 | 336.05 | 327.95 | 324.15 | 320.05 | 316.80 |
| 1 13/16 | 1.8125 | 40058 | 311.90 | 1 1/2 | 10 | 4 | 7/8 | 13 1/2 | 1.7531-1.8160 | 360.15 | 336.05 | 327.95 | 324.15 | 320.05 | 316.80 |
| 1 7/8 | 1.8750 | 40060 | 326.90 | 1 1/2 | 10 | 4 1/4 | 7/8 | 14 | 1.8161-1.8780 | 375.00 | 350.90 | 342.75 | 338.95 | 334.80 | 331.45 |
| 1 15/16 | 1.9375 | 40062 | 326.90 | 1 1/2 | 10 | 4 1/4 | 7/8 | 14 | 1.8781-1.9410 | 375.00 | 350.90 | 342.75 | 338.95 | 334.80 | 331.45 |
| 2 | 2.0000 | 40064 | 326.90 | 1 1/2 | 12 | 4 1/4 | 7/8 | 14 | 1.9411-2.0030 | 375.00 | 350.90 | 342.75 | 338.95 | 334.80 | 331.45 |

*Quantities of 15 or more - price of fractional size in same size range.

OVER & UNDER SIZE REAMERS CARBIDE TIPPED



TYPE 478 - STRAIGHT FLUTES & SHANK

- Tool diameter tolerance: plus .0002", minus .0000"
- Same specifications and available modifications as Type 400 (pg. 32)

USE:

- These precision ground carbide tipped reamers are very effective for finishing accurate holes in most materials

| DECIMAL TOOL DIAMETER | TYPE 478 EDP NO. | PRICE | DIMENSIONS | | | | |
|-----------------------|------------------|----------|-------------|---------------|--------|-----|--------|
| | | | SHANK DIAM. | NO. OF FLUTES | LENGTH | | |
| FLUTE | CAR-BIDE | OVER-ALL | | | | | |
| .1865 | 47818 | \$59.25 | 1/64 | 4 | 1 1/8 | 1/2 | 4 1/2 |
| .1885 | 47819 | 59.25 | 1/64 | 4 | 1 1/8 | 1/2 | 4 1/2 |
| .2490 | 47824 | 59.25 | 1/64 | 4 | 1 1/2 | 1/2 | 6 |
| .2510 | 47825 | 59.25 | 1/64 | 4 | 1 1/2 | 1/2 | 6 |
| .3115 | 47831 | 60.55 | 3/32 | 4 | 1 1/2 | 1/2 | 6 |
| .3135 | 47832 | 60.55 | 3/32 | 4 | 1 1/2 | 1/2 | 6 |
| .3740 | 47837 | 62.80 | 5/16 | 4 | 1 3/4 | 5/8 | 7 |
| .3760 | 47838 | 62.80 | 5/16 | 4 | 1 3/4 | 5/8 | 7 |
| .4365 | 47843 | 70.20 | 3/8 | 4 | 1 3/4 | 5/8 | 7 |
| .4385 | 47844 | 70.20 | 3/8 | 4 | 1 3/4 | 5/8 | 7 |
| .4990 | 47849 | 76.90 | 7/16 | 6 | 2 | 5/8 | 8 |
| .5010 | 47850 | 76.90 | 7/16 | 6 | 2 | 5/8 | 8 |
| .6240 | 47862 | 92.25 | 9/16 | 6 | 2 1/4 | 5/8 | 9 |
| .6260 | 47863 | 92.25 | 9/16 | 6 | 2 1/4 | 5/8 | 9 |
| .7490 | 47874 | 97.25 | 5/8 | 6 | 2 1/2 | 3/4 | 9 1/2 |
| .7510 | 47875 | 97.25 | 5/8 | 6 | 2 1/2 | 3/4 | 9 1/2 |
| .8740 | 47886 | 103.30 | 3/4 | 6 | 2 5/8 | 3/4 | 10 |
| .8760 | 47887 | 107.20 | 3/4 | 6 | 2 5/8 | 3/4 | 10 |
| .9990 | 47898 | 127.35 | 7/8 | 8 | 2 3/4 | 3/4 | 10 1/2 |
| 1.0010 | 47899 | 122.05 | 7/8 | 8 | 2 3/4 | 3/4 | 10 1/2 |

DOWEL PIN SIZE REAMERS CARBIDE TIPPED



TYPE 476 - STRAIGHT FLUTES & SHANK

- Special plus .0000", minus .0002" tool diameter tolerance
- Same specifications and available modifications as Type 400 (pg. 32)

USE:

- These precision ground reamers should be used in pairs, .0005" and .0020" under the dowel pin diameter. The .0020" smaller holes assure a tighter dowel pin fit, so all the pins will remain on the same side upon disassembly. Especially useful in plastic or die cast molds and machines when assembled sections are subject to shearing stress, yet require occasional disassembly.

| DECIMAL TOOL DIAMETER | TYPE 476 EDP NO. | PRICE | DIMENSIONS | | | | |
|-----------------------|------------------|----------|---------------------------------|---------------|--------|-----|-------|
| | | | SHANK DIAM. | NO. OF FLUTES | LENGTH | | |
| FLUTE | CAR-BIDE | OVER-ALL | | | | | |
| .1855 | 47617 | \$59.25 | 1/64 | 4 | 1 1/8 | 1/2 | 4 1/2 |
| .1870 | 47618 | 59.25 | 1/64 | 4 | 1 1/8 | 1/2 | 4 1/2 |
| .2480 | 47623 | 59.25 | 15/64 | 4 | 1 1/2 | 1/2 | 6 |
| .2495 | 47624 | 59.25 | 15/64 | 4 | 1 1/2 | 1/2 | 6 |
| .3105 | 47630 | 60.55 | 3/32 | 4 | 1 1/2 | 1/2 | 6 |
| .3120 | 47631 | 60.55 | 3/32 | 4 | 1 1/2 | 1/2 | 6 |
| .3730 | 47636 | 62.80 | 5/16 | 4 | 1 3/4 | 5/8 | 7 |
| .3745 | 47637 | 62.80 | 5/16 | 4 | 1 3/4 | 5/8 | 7 |
| .4355 | 47642 | 70.20 | 3/8 | 4 | 1 3/4 | 5/8 | 7 |
| .4370 | 47643 | 70.20 | 3/8 | 4 | 1 3/4 | 5/8 | 7 |
| .4980 | 47648 | 76.90 | 7/16 | 6 | 2 | 5/8 | 8 |
| .4995 | 47649 | 76.90 | 7/16 | 6 | 2 | 5/8 | 8 |
| | 47600 | \$739.20 | - CASED SET OF ABOVE 12 REAMERS | | | | |



CHUCKING REAMERS CARBIDE TIPPED TYPE 400 .0005 INCREMENTS



STOCKED DECIMAL TOOL DIAMETERS (.1560 TO .3055) STRAIGHT FLUTES & SHANK

For shallow holes only (see page 14)

NOTE: Dimension details and available modifications listed on page 32.

| TOOL DIAM. | EDP NO. | PRICE | TOOL DIAM. | EDP NO. | PRICE | TOOL DIAM. | EDP NO. | PRICE | TOOL DIAM. | EDP NO. | PRICE | TOOL DIAM. | EDP NO. | PRICE |
|------------|---------|---------|------------|---------|---------|------------|---------|---------|------------|---------|---------|------------|---------|---------|
| .1560 | 4001560 | \$66.35 | .1860 | 4001860 | \$61.80 | .2160 | 4002160 | \$61.80 | .2460 | 4002460 | \$61.80 | .2760 | 4002760 | \$62.75 |
| .1565 | 4001565 | 66.35 | .1865 | 47818 | 59.25 | .2165 | 400055 | 61.80 | .2465 | 4002465 | 61.80 | .2765 | 4002765 | 62.75 |
| .1570 | 4001570 | 66.35 | .1870 | 4001870 | 61.80 | .2170 | 4002170 | 61.80 | .2470 | 4002470 | 61.80 | .2770 | 4002770 | 62.75 |
| .1575 | 400040 | 66.35 | .1875 | 40006 | 47.10 | .2175 | 4002175 | 61.80 | .2475 | 4002475 | 61.80 | .2775 | 4002775 | 62.75 |
| .1580 | 4001580 | 66.35 | .1880 | 4001880 | 61.80 | .2180 | 4002180 | 61.80 | .2480 | 400063 | 61.80 | .2780 | 4002780 | 62.75 |
| .1585 | 4001585 | 66.35 | .1885 | 47819 | 59.25 | .2185 | 4002185 | 61.80 | .2485 | 4002485 | 61.80 | .2785 | 4002785 | 62.75 |
| .1590 | 4001590 | 66.35 | .1890 | 400048 | 61.80 | .2190 | 4002190 | 61.80 | .2490 | 47824 | 59.25 | .2790 | 4002790 | 62.75 |
| .1595 | 4001595 | 66.35 | .1895 | 4001895 | 61.80 | .2195 | 4002195 | 61.80 | .2495 | 4002495 | 61.80 | .2795 | 400071 | 62.75 |
| .1600 | 4001600 | 66.35 | .1900 | 4001900 | 61.80 | .2200 | 4002200 | 61.80 | .2500 | 40008 | 47.10 | .2800 | 4002800 | 62.75 |
| .1605 | 4001605 | 66.35 | .1905 | 4001905 | 61.80 | .2205 | 400056 | 61.80 | .2505 | 4002505 | 61.80 | .2805 | 4002805 | 62.75 |
| .1610 | 4001610 | 66.35 | .1910 | 4001910 | 61.80 | .2210 | 4002210 | 61.80 | .2510 | 47825 | 59.25 | .2810 | 4002810 | 62.75 |
| .1615 | 4001615 | 66.35 | .1915 | 4001915 | 61.80 | .2215 | 4002215 | 64.60 | .2515 | 4002515 | 61.80 | .2815 | 4002815 | 62.75 |
| .1620 | 4001620 | 66.35 | .1920 | 4001920 | 61.80 | .2220 | 4002220 | 64.60 | .2520 | 400064 | 61.80 | .2820 | 4002820 | 62.75 |
| .1625 | 4001625 | 66.35 | .1925 | 4001925 | 61.80 | .2225 | 4002225 | 64.60 | .2525 | 4002525 | 61.80 | .2825 | 4002825 | 62.75 |
| .1630 | 4001630 | 66.35 | .1930 | 4001930 | 61.80 | .2230 | 4002230 | 64.60 | .2530 | 4002530 | 61.80 | .2830 | 4002830 | 62.75 |
| .1635 | 4001635 | 66.35 | .1935 | 4001935 | 61.80 | .2235 | 4002235 | 64.60 | .2535 | 4002535 | 62.75 | .2835 | 400072 | 62.75 |
| .1640 | 4001640 | 66.35 | .1940 | 4001940 | 61.80 | .2240 | 4002240 | 64.60 | .2540 | 4002540 | 62.75 | .2840 | 4002840 | 62.75 |
| .1645 | 4001645 | 66.35 | .1945 | 4001945 | 61.80 | .2245 | 4002245 | 64.60 | .2545 | 4002545 | 62.75 | .2845 | 4002845 | 62.75 |
| .1650 | 4001650 | 66.35 | .1950 | 4001950 | 61.80 | .2250 | 4002250 | 64.60 | .2550 | 4002550 | 62.75 | .2850 | 4002850 | 62.75 |
| .1655 | 4001655 | 66.35 | .1955 | 4001955 | 61.80 | .2255 | 4002255 | 64.60 | .2555 | 4002555 | 62.75 | .2855 | 4002855 | 62.75 |
| .1660 | 4001660 | 66.35 | .1960 | 4001960 | 61.80 | .2260 | 4002260 | 64.60 | .2560 | 4002560 | 62.75 | .2860 | 4002860 | 62.75 |
| .1665 | 4001665 | 66.35 | .1965 | 4001965 | 61.80 | .2265 | 4002265 | 64.60 | .2565 | 4002565 | 62.75 | .2865 | 4002865 | 62.75 |
| .1670 | 4001670 | 66.35 | .1970 | 4001970 | 61.80 | .2270 | 4002270 | 64.60 | .2570 | 4002570 | 62.75 | .2870 | 4002870 | 62.75 |
| .1675 | 4001675 | 66.35 | .1975 | 4001975 | 61.80 | .2275 | 4002275 | 64.60 | .2575 | 4002575 | 62.75 | .2875 | 4002875 | 62.75 |
| .1680 | 4001680 | 66.35 | .1980 | 4001980 | 61.80 | .2280 | 4002280 | 64.60 | .2580 | 4002580 | 62.75 | .2880 | 4002880 | 62.75 |
| .1685 | 4001685 | 66.35 | .1985 | 4001985 | 61.80 | .2285 | 4002285 | 64.60 | .2585 | 4002585 | 62.75 | .2885 | 4002885 | 62.75 |
| .1690 | 4001690 | 66.35 | .1990 | 4001990 | 61.80 | .2290 | 4002290 | 64.60 | .2590 | 4002590 | 62.75 | .2890 | 4002890 | 62.75 |
| .1695 | 4001695 | 66.35 | .1995 | 4001995 | 61.80 | .2295 | 4002295 | 64.60 | .2595 | 4002595 | 62.75 | .2895 | 4002895 | 62.75 |
| .1700 | 4001700 | 66.35 | .2000 | 4002000 | 61.80 | .2300 | 4002300 | 64.60 | .2600 | 4002600 | 62.75 | .2900 | 4002900 | 62.75 |
| .1705 | 4001705 | 66.35 | .2005 | 4002005 | 61.80 | .2305 | 4002305 | 64.60 | .2605 | 4002605 | 62.75 | .2905 | 4002905 | 62.75 |
| .1710 | 4001710 | 66.35 | .2010 | 4002010 | 61.80 | .2310 | 4002310 | 64.60 | .2610 | 4002610 | 62.75 | .2910 | 4002910 | 62.75 |
| .1715 | 4001715 | 66.35 | .2015 | 4002015 | 61.80 | .2315 | 4002315 | 64.60 | .2615 | 4002615 | 62.75 | .2915 | 4002915 | 62.75 |
| .1720 | 4001720 | 66.35 | .2020 | 4002020 | 61.80 | .2320 | 4002320 | 64.60 | .2620 | 4002620 | 62.75 | .2920 | 4002920 | 62.75 |
| .1725 | 4001725 | 66.35 | .2025 | 4002025 | 61.80 | .2325 | 4002325 | 64.60 | .2625 | 4002625 | 62.75 | .2925 | 4002925 | 62.75 |
| .1730 | 4001730 | 66.35 | .2030 | 4002030 | 61.80 | .2330 | 4002330 | 64.60 | .2630 | 4002630 | 62.75 | .2930 | 4002930 | 62.75 |
| .1735 | 4001735 | 66.35 | .2035 | 4002035 | 61.80 | .2335 | 4002335 | 64.60 | .2635 | 4002635 | 62.75 | .2935 | 4002935 | 62.75 |
| .1740 | 4001740 | 66.35 | .2040 | 4002040 | 61.80 | .2340 | 4002340 | 64.60 | .2640 | 4002640 | 62.75 | .2940 | 4002940 | 62.75 |
| .1745 | 4001745 | 66.35 | .2045 | 4002045 | 61.80 | .2345 | 4002345 | 64.60 | .2645 | 4002645 | 62.75 | .2945 | 4002945 | 62.75 |
| .1750 | 4001750 | 66.35 | .2050 | 4002050 | 61.80 | .2350 | 4002350 | 64.60 | .2650 | 4002650 | 62.75 | .2950 | 4002950 | 62.75 |
| .1755 | 4001755 | 66.35 | .2055 | 4002055 | 61.80 | .2355 | 4002355 | 64.60 | .2655 | 4002655 | 62.75 | .2955 | 4002955 | 62.75 |
| .1760 | 4001760 | 66.35 | .2060 | 4002060 | 61.80 | .2360 | 4002360 | 64.60 | .2660 | 4002660 | 62.75 | .2960 | 4002960 | 62.75 |
| .1765 | 4001765 | 66.35 | .2065 | 4002065 | 61.80 | .2365 | 4002365 | 64.60 | .2665 | 4002665 | 62.75 | .2965 | 4002965 | 62.75 |
| .1770 | 4001770 | 61.80 | .2070 | 4002070 | 61.80 | .2370 | 4002370 | 64.60 | .2670 | 4002670 | 62.75 | .2970 | 4002970 | 62.75 |
| .1775 | 4001775 | 61.80 | .2075 | 4002075 | 61.80 | .2375 | 4002375 | 64.60 | .2675 | 4002675 | 62.75 | .2975 | 4002975 | 62.75 |
| .1780 | 4001780 | 61.80 | .2080 | 4002080 | 61.80 | .2380 | 4002380 | 64.60 | .2680 | 4002680 | 62.75 | .2980 | 4002980 | 62.75 |
| .1785 | 4001785 | 61.80 | .2085 | 4002085 | 61.80 | .2385 | 4002385 | 61.80 | .2685 | 4002685 | 62.75 | .2985 | 4002985 | 62.75 |
| .1790 | 4001790 | 61.80 | .2090 | 4002090 | 61.80 | .2390 | 4002390 | 61.80 | .2690 | 4002690 | 62.75 | .2990 | 4002990 | 62.75 |
| .1795 | 4001795 | 61.80 | .2095 | 4002095 | 61.80 | .2395 | 4002395 | 61.80 | .2695 | 4002695 | 62.75 | .2995 | 4002995 | 62.75 |
| .1800 | 4001800 | 61.80 | .2100 | 4002100 | 61.80 | .2400 | 4002400 | 61.80 | .2700 | 4002700 | 62.75 | .3000 | 4003000 | 62.75 |
| .1805 | 4001805 | 61.80 | .2105 | 4002105 | 61.80 | .2405 | 4002405 | 61.80 | .2705 | 4002705 | 62.75 | .3005 | 4003005 | 62.75 |
| .1810 | 4001810 | 61.80 | .2110 | 4002110 | 61.80 | .2410 | 4002410 | 61.80 | .2710 | 4002710 | 62.75 | .3010 | 4003010 | 62.75 |
| .1815 | 4001815 | 61.80 | .2115 | 4002115 | 61.80 | .2415 | 4002415 | 61.80 | .2715 | 4002715 | 62.75 | .3015 | 4003015 | 62.75 |
| .1820 | 4001820 | 61.80 | .2120 | 4002120 | 61.80 | .2420 | 4002420 | 61.80 | .2720 | 4002720 | 62.75 | .3020 | 4003020 | 62.75 |
| .1825 | 4001825 | 61.80 | .2125 | 4002125 | 61.80 | .2425 | 4002425 | 61.80 | .2725 | 4002725 | 62.75 | .3025 | 4003025 | 62.75 |
| .1830 | 4001830 | 61.80 | .2130 | 4002130 | 61.80 | .2430 | 4002430 | 61.80 | .2730 | 4002730 | 62.75 | .3030 | 4003030 | 62.75 |
| .1835 | 4001835 | 61.80 | .2135 | 4002135 | 61.80 | .2435 | 4002435 | 61.80 | .2735 | 4002735 | 62.75 | .3035 | 4003035 | 62.75 |
| .1840 | 4001840 | 61.80 | .2140 | 4002140 | 61.80 | .2440 | 4002440 | 61.80 | .2740 | 4002740 | 62.75 | .3040 | 4003040 | 62.75 |
| .1845 | 4001845 | 61.80 | .2145 | 4002145 | 61.80 | .2445 | 4002445 | 61.80 | .2745 | 4002745 | 62.75 | .3045 | 4003045 | 62.75 |
| .1850 | 400047 | 61.80 | .2150 | 4002150 | 61.80 | .2450 | 4002450 | 61.80 | .2750 | 4002750 | 62.75 | .3050 | 4003050 | 62.75 |
| .1855 | 4001855 | 61.80 | .2155 | 4002155 | 61.80 | .2455 | 4002455 | 61.80 | .2755 | 4002755 | 62.75 | .3055 | 4003055 | 62.75 |

REAMERS



CHUCKING REAMERS CARBIDE TIPPED TYPE 400 .0005 INCREMENTS



STOCKED DECIMAL TOOL DIAMETERS (.3060 TO .4555) STRAIGHT FLUTES & SHANK

For shallow holes only (see page 14)

NOTE: Dimension details and available modifications listed on page 32.

| TOOL DIAM. | EDP NO. | PRICE | TOOL DIAM. | EDP NO. | PRICE | TOOL DIAM. | EDP NO. | PRICE | TOOL DIAM. | EDP NO. | PRICE | TOOL DIAM. | EDP NO. | PRICE |
|------------|---------|---------|------------|---------|---------|------------|---------|---------|------------|---------|---------|------------|---------|---------|
| .3060 | 4003060 | \$62.75 | .3360 | 4003360 | \$64.35 | .3660 | 4003660 | \$64.35 | .3960 | 4003960 | \$66.80 | .4260 | 4004260 | \$70.25 |
| .3065 | 4003065 | 62.75 | .3365 | 4003365 | 64.35 | .3665 | 4003665 | 64.35 | .3965 | 4003965 | 66.80 | .4265 | 4004265 | 70.25 |
| .3070 | 4003070 | 62.75 | .3370 | 4003370 | 64.35 | .3670 | 4003670 | 64.35 | .3970 | 4003970 | 66.80 | .4270 | 4004270 | 70.25 |
| .3075 | 4003075 | 62.75 | .3375 | 4003375 | 64.35 | .3675 | 4003675 | 64.35 | .3975 | 4003975 | 66.80 | .4275 | 4004275 | 70.25 |
| .3080 | 4003080 | 62.75 | .3380 | 4003380 | 64.35 | .3680 | 4003680 | 64.35 | .3980 | 4003980 | 66.80 | .4280 | 4004280 | 70.25 |
| .3085 | 4003085 | 62.75 | .3385 | 4003385 | 64.35 | .3685 | 4003685 | 64.35 | .3985 | 4003985 | 66.80 | .4285 | 4004285 | 70.25 |
| .3090 | 4003090 | 62.75 | .3390 | 4003390 | 64.35 | .3690 | 4003690 | 64.35 | .3990 | 4003990 | 66.80 | .4290 | 4004290 | 70.25 |
| .3095 | 4003095 | 62.75 | .3395 | 4003395 | 64.35 | .3695 | 4003695 | 64.35 | .3995 | 4003995 | 66.80 | .4295 | 4004295 | 70.25 |
| .3100 | 4003100 | 62.75 | .3400 | 4003400 | 64.35 | .3700 | 4003700 | 64.35 | .4000 | 4004000 | 66.80 | .4300 | 4004300 | 70.25 |
| .3105 | 4003105 | 62.75 | .3405 | 4003405 | 64.35 | .3705 | 4003705 | 64.35 | .4005 | 4004005 | 66.80 | .4305 | 4004305 | 70.25 |
| .3110 | 400079 | 62.75 | .3410 | 4003410 | 64.35 | .3710 | 4003710 | 64.35 | .4010 | 4004010 | 66.80 | .4310 | 4004310 | 70.25 |
| .3115 | 47831 | 60.55 | .3415 | 4003415 | 64.35 | .3715 | 4003715 | 64.35 | .4015 | 4004015 | 66.80 | .4315 | 4004315 | 70.25 |
| .3120 | 4003120 | 62.75 | .3420 | 4003420 | 64.35 | .3720 | 4003720 | 64.35 | .4020 | 4004020 | 66.80 | .4320 | 4004320 | 70.25 |
| .3125 | 40010 | 48.15 | .3425 | 400087 | 64.35 | .3725 | 4003725 | 64.35 | .4025 | 4004025 | 66.80 | .4325 | 4004325 | 70.25 |
| .3130 | 4003130 | 62.75 | .3430 | 4003430 | 64.35 | .3730 | 4003730 | 64.35 | .4030 | 4004030 | 66.80 | .4330 | 4004330 | 70.25 |
| .3135 | 47832 | 60.55 | .3435 | 4003435 | 64.35 | .3735 | 4003735 | 64.35 | .4035 | 4004035 | 66.80 | .4335 | 4004335 | 70.25 |
| .3140 | 4003140 | 62.75 | .3440 | 4003440 | 64.35 | .3740 | 47837 | 62.80 | .4040 | 4004040 | 66.80 | .4340 | 4004340 | 70.25 |
| .3145 | 4003145 | 62.75 | .3445 | 4003445 | 64.35 | .3745 | 4003745 | 64.35 | .4045 | 4004045 | 66.80 | .4345 | 4004345 | 70.25 |
| .3150 | 400080 | 62.75 | .3450 | 4003450 | 64.35 | .3750 | 40012 | 49.75 | .4050 | 4004050 | 66.80 | .4350 | 4004350 | 70.25 |
| .3155 | 4003155 | 64.35 | .3455 | 4003455 | 64.35 | .3755 | 4003755 | 64.35 | .4055 | 400103 | 66.80 | .4355 | 4004355 | 70.25 |
| .3160 | 4003160 | 64.35 | .3460 | 4003460 | 64.35 | .3760 | 47838 | 62.80 | .4060 | 4004060 | 66.80 | .4360 | 4004360 | 70.25 |
| .3165 | 4003165 | 64.35 | .3465 | 400088 | 64.35 | .3765 | 4003765 | 64.35 | .4065 | 4004065 | 66.80 | .4365 | 47843 | 70.20 |
| .3170 | 4003170 | 64.35 | .3470 | 4003470 | 64.35 | .3770 | 4003770 | 64.35 | .4070 | 4004070 | 66.80 | .4370 | 400111 | 70.25 |
| .3175 | 4003175 | 64.35 | .3475 | 4003475 | 64.35 | .3775 | 4003775 | 64.35 | .4075 | 4004075 | 66.80 | .4375 | 40014 | 55.85 |
| .3180 | 4003180 | 64.35 | .3480 | 4003480 | 64.35 | .3780 | 400096 | 64.35 | .4080 | 4004080 | 66.80 | .4380 | 4004380 | 70.25 |
| .3185 | 4003185 | 64.35 | .3485 | 4003485 | 64.35 | .3785 | 4003785 | 66.80 | .4085 | 4004085 | 66.80 | .4385 | 47844 | 70.20 |
| .3190 | 4003190 | 64.35 | .3490 | 4003490 | 64.35 | .3790 | 4003790 | 66.80 | .4090 | 4004090 | 66.80 | .4390 | 4004390 | 70.25 |
| .3195 | 4003195 | 64.35 | .3495 | 4003495 | 64.35 | .3795 | 4003795 | 66.80 | .4095 | 4004095 | 70.25 | .4395 | 4004395 | 70.25 |
| .3200 | 4003200 | 64.35 | .3500 | 4003500 | 64.35 | .3800 | 4003800 | 66.80 | .4100 | 4004100 | 70.25 | .4400 | 4004400 | 70.25 |
| .3205 | 4003205 | 64.35 | .3505 | 4003505 | 64.35 | .3805 | 4003805 | 66.80 | .4105 | 4004105 | 70.25 | .4405 | 4004405 | 70.25 |
| .3210 | 4003210 | 64.35 | .3510 | 4003510 | 64.35 | .3810 | 4003810 | 66.80 | .4110 | 4004110 | 70.25 | .4410 | 4004410 | 70.25 |
| .3215 | 4003215 | 64.35 | .3515 | 4003515 | 64.35 | .3815 | 4003815 | 66.80 | .4115 | 4004115 | 70.25 | .4415 | 4004415 | 71.10 |
| .3220 | 4003220 | 64.35 | .3520 | 4003520 | 64.35 | .3820 | 4003820 | 66.80 | .4120 | 4004120 | 70.25 | .4420 | 4004420 | 71.10 |
| .3225 | 4003225 | 64.35 | .3525 | 4003525 | 64.35 | .3825 | 4003825 | 66.80 | .4125 | 4004125 | 70.25 | .4425 | 4004425 | 71.10 |
| .3230 | 4003230 | 64.35 | .3530 | 4003530 | 64.35 | .3830 | 4003830 | 66.80 | .4130 | 4004130 | 70.25 | .4430 | 4004430 | 71.10 |
| .3235 | 4003235 | 64.35 | .3535 | 4003535 | 64.35 | .3835 | 4003835 | 66.80 | .4135 | 4004135 | 70.25 | .4435 | 4004435 | 71.10 |
| .3240 | 4003240 | 64.35 | .3540 | 4003540 | 64.35 | .3840 | 4003840 | 66.80 | .4140 | 4004140 | 70.25 | .4440 | 4004440 | 71.10 |
| .3245 | 4003245 | 64.35 | .3545 | 4003545 | 64.35 | .3845 | 4003845 | 66.80 | .4145 | 4004145 | 70.25 | .4445 | 4004445 | 71.10 |
| .3250 | 4003250 | 64.35 | .3550 | 4003550 | 64.35 | .3850 | 4003850 | 66.80 | .4150 | 4004150 | 70.25 | .4450 | 4004450 | 71.10 |
| .3255 | 4003255 | 64.35 | .3555 | 4003555 | 64.35 | .3855 | 4003855 | 66.80 | .4155 | 4004155 | 70.25 | .4455 | 4004455 | 71.10 |
| .3260 | 4003260 | 64.35 | .3560 | 4003560 | 64.35 | .3860 | 4003860 | 66.80 | .4160 | 4004160 | 70.25 | .4460 | 4004460 | 71.10 |
| .3265 | 4003265 | 64.35 | .3565 | 4003565 | 64.35 | .3865 | 4003865 | 66.80 | .4165 | 4004165 | 70.25 | .4465 | 4004465 | 71.10 |
| .3270 | 4003270 | 64.35 | .3570 | 4003570 | 64.35 | .3870 | 4003870 | 66.80 | .4170 | 4004170 | 70.25 | .4470 | 4004470 | 71.10 |
| .3275 | 4003275 | 64.35 | .3575 | 4003575 | 64.35 | .3875 | 4003875 | 66.80 | .4175 | 4004175 | 70.25 | .4475 | 4004475 | 71.10 |
| .3280 | 4003280 | 64.35 | .3580 | 4003580 | 64.35 | .3880 | 4003880 | 66.80 | .4180 | 4004180 | 70.25 | .4480 | 4004480 | 71.10 |
| .3285 | 4003285 | 64.35 | .3585 | 4003585 | 64.35 | .3885 | 4003885 | 66.80 | .4185 | 4004185 | 70.25 | .4485 | 4004485 | 71.10 |
| .3290 | 4003290 | 64.35 | .3590 | 4003590 | 64.35 | .3890 | 4003890 | 66.80 | .4190 | 4004190 | 70.25 | .4490 | 4004490 | 71.10 |
| .3295 | 4003295 | 64.35 | .3595 | 4003595 | 64.35 | .3895 | 4003895 | 66.80 | .4195 | 4004195 | 70.25 | .4495 | 4004495 | 71.10 |
| .3300 | 4003300 | 64.35 | .3600 | 4003600 | 64.35 | .3900 | 4003900 | 66.80 | .4200 | 4004200 | 70.25 | .4500 | 4004500 | 71.10 |
| .3305 | 4003305 | 64.35 | .3605 | 4003605 | 64.35 | .3905 | 4003905 | 66.80 | .4205 | 4004205 | 70.25 | .4505 | 4004505 | 71.10 |
| .3310 | 4003310 | 64.35 | .3610 | 4003610 | 64.35 | .3910 | 4003910 | 66.80 | .4210 | 4004210 | 70.25 | .4510 | 4004510 | 71.10 |
| .3315 | 4003315 | 64.35 | .3615 | 4003615 | 64.35 | .3915 | 4003915 | 66.80 | .4215 | 4004215 | 70.25 | .4515 | 4004515 | 71.10 |
| .3320 | 4003320 | 64.35 | .3620 | 4003620 | 64.35 | .3920 | 4003920 | 66.80 | .4220 | 4004220 | 70.25 | .4520 | 4004520 | 71.10 |
| .3325 | 4003325 | 64.35 | .3625 | 4003625 | 64.35 | .3925 | 4003925 | 66.80 | .4225 | 4004225 | 70.25 | .4525 | 4004525 | 71.10 |
| .3330 | 4003330 | 64.35 | .3630 | 4003630 | 64.35 | .3930 | 4003930 | 66.80 | .4230 | 4004230 | 70.25 | .4530 | 4004530 | 71.10 |
| .3335 | 4003335 | 64.35 | .3635 | 4003635 | 64.35 | .3935 | 4003935 | 66.80 | .4235 | 4004235 | 70.25 | .4535 | 4004535 | 71.10 |
| .3340 | 4003340 | 64.35 | .3640 | 4003640 | 64.35 | .3940 | 4003940 | 66.80 | .4240 | 4004240 | 70.25 | .4540 | 4004540 | 71.10 |
| .3345 | 4003345 | 64.35 | .3645 | 4003645 | 64.35 | .3945 | 4003945 | 66.80 | .4245 | 4004245 | 70.25 | .4545 | 4004545 | 71.10 |
| .3350 | 4003350 | 64.35 | .3650 | 4003650 | 64.35 | .3950 | 4003950 | 66.80 | .4250 | 4004250 | 70.25 | .4550 | 4004550 | 71.10 |
| .3355 | 4003355 | 64.35 | .3655 | 4003655 | 64.35 | .3955 | 4003955 | 66.80 | .4255 | 4004255 | 70.25 | .4555 | 4004555 | 71.10 |

REAMERS



CHUCKING REAMERS CARBIDE TIPPED TYPE 400 .0005 INCREMENTS



STOCKED DECIMAL TOOL DIAMETERS (.4560 TO .6055) STRAIGHT FLUTES & SHANK

For shallow holes only (see page 14)

NOTE: Dimension details and available modifications listed on page 32.

| TOOL DIAM. | EDP NO. | PRICE | TOOL DIAM. | EDP NO. | PRICE | TOOL DIAM. | EDP NO. | PRICE | TOOL DIAM. | EDP NO. | PRICE | TOOL DIAM. | EDP NO. | PRICE |
|------------|---------|---------|------------|---------|---------|------------|---------|---------|------------|---------|---------|------------|---------|---------|
| .4560 | 4004560 | \$71.10 | .4860 | 4004860 | \$83.35 | .5160 | 4005160 | \$89.35 | .5460 | 4005460 | \$89.35 | .5760 | 4005760 | \$92.25 |
| .4565 | 4004565 | 71.10 | .4865 | 4004865 | 83.35 | .5165 | 4005165 | 89.35 | .5465 | 4005465 | 89.35 | .5765 | 4005765 | 92.25 |
| .4570 | 4004570 | 71.10 | .4870 | 4004870 | 83.35 | .5170 | 4005170 | 89.35 | .5470 | 4005470 | 89.35 | .5770 | 4005770 | 92.25 |
| .4575 | 4004575 | 71.10 | .4875 | 4004875 | 83.35 | .5175 | 4005175 | 89.35 | .5475 | 4005475 | 89.35 | .5775 | 4005775 | 92.25 |
| .4580 | 4004580 | 71.10 | .4880 | 4004880 | 83.35 | .5180 | 4005180 | 89.35 | .5480 | 4005480 | 89.35 | .5780 | 4005780 | 92.25 |
| .4585 | 4004585 | 71.10 | .4885 | 4004885 | 83.35 | .5185 | 4005185 | 89.35 | .5485 | 4005485 | 89.35 | .5785 | 4005785 | 92.25 |
| .4590 | 4004590 | 71.10 | .4890 | 4004890 | 83.35 | .5190 | 4005190 | 89.35 | .5490 | 4005490 | 89.35 | .5790 | 4005790 | 92.25 |
| .4595 | 4004595 | 71.10 | .4895 | 4004895 | 83.35 | .5195 | 4005195 | 89.35 | .5495 | 4005495 | 89.35 | .5795 | 4005795 | 92.25 |
| .4600 | 4004600 | 71.10 | .4900 | 4004900 | 83.35 | .5200 | 4005200 | 89.35 | .5500 | 4005500 | 89.35 | .5800 | 4005800 | 92.25 |
| .4605 | 4004605 | 71.10 | .4905 | 4004905 | 83.35 | .5205 | 4005205 | 89.35 | .5505 | 4005505 | 89.35 | .5805 | 4005805 | 92.25 |
| .4610 | 4004610 | 71.10 | .4910 | 4004910 | 83.35 | .5210 | 4005210 | 89.35 | .5510 | 4005510 | 89.35 | .5810 | 4005810 | 92.25 |
| .4615 | 4004615 | 71.10 | .4915 | 4004915 | 83.35 | .5215 | 4005215 | 89.35 | .5515 | 4005515 | 89.35 | .5815 | 4005815 | 92.25 |
| .4620 | 4004620 | 71.10 | .4920 | 4004920 | 83.35 | .5220 | 4005220 | 89.35 | .5520 | 4005520 | 89.35 | .5820 | 4005820 | 92.25 |
| .4625 | 4004625 | 71.10 | .4925 | 4004925 | 83.35 | .5225 | 4005225 | 89.35 | .5525 | 4005525 | 89.35 | .5825 | 4005825 | 92.25 |
| .4630 | 4004630 | 71.10 | .4930 | 4004930 | 83.35 | .5230 | 4005230 | 89.35 | .5530 | 4005530 | 89.35 | .5830 | 4005830 | 92.25 |
| .4635 | 4004635 | 71.10 | .4935 | 4004935 | 83.35 | .5235 | 4005235 | 89.35 | .5535 | 4005535 | 89.35 | .5835 | 4005835 | 92.25 |
| .4640 | 4004640 | 71.10 | .4940 | 4004940 | 83.35 | .5240 | 4005240 | 89.35 | .5540 | 4005540 | 89.35 | .5840 | 4005840 | 92.25 |
| .4645 | 4004645 | 71.10 | .4945 | 4004945 | 83.35 | .5245 | 4005245 | 89.35 | .5545 | 4005545 | 89.35 | .5845 | 4005845 | 92.25 |
| .4650 | 4004650 | 71.10 | .4950 | 4004950 | 83.35 | .5250 | 4005250 | 89.35 | .5550 | 4005550 | 89.35 | .5850 | 4005850 | 92.25 |
| .4655 | 4004655 | 71.10 | .4955 | 4004955 | 83.35 | .5255 | 4005255 | 89.35 | .5555 | 4005555 | 89.35 | .5855 | 4005855 | 92.25 |
| .4660 | 4004660 | 71.10 | .4960 | 4004960 | 83.35 | .5260 | 4005260 | 89.35 | .5560 | 4005560 | 89.35 | .5860 | 4005860 | 92.25 |
| .4665 | 4004665 | 71.10 | .4965 | 4004965 | 83.35 | .5265 | 4005265 | 89.35 | .5565 | 4005565 | 89.35 | .5865 | 4005865 | 92.25 |
| .4670 | 4004670 | 71.10 | .4970 | 4004970 | 83.35 | .5270 | 4005270 | 89.35 | .5570 | 4005570 | 89.35 | .5870 | 4005870 | 92.25 |
| .4675 | 4004675 | 71.10 | .4975 | 4004975 | 83.35 | .5275 | 4005275 | 89.35 | .5575 | 4005575 | 89.35 | .5875 | 4005875 | 92.25 |
| .4680 | 4004680 | 71.10 | .4980 | 4004980 | 83.35 | .5280 | 4005280 | 89.35 | .5580 | 4005580 | 89.35 | .5880 | 4005880 | 92.25 |
| .4685 | 400119 | 71.10 | .4985 | 4004985 | 83.35 | .5285 | 4005285 | 89.35 | .5585 | 4005585 | 89.35 | .5885 | 4005885 | 92.25 |
| .4690 | 4004690 | 71.10 | .4990 | 47849 | 76.90 | .5290 | 4005290 | 89.35 | .5590 | 4005590 | 89.35 | .5890 | 4005890 | 92.25 |
| .4695 | 4004695 | 71.10 | .4995 | 4004995 | 83.35 | .5295 | 4005295 | 89.35 | .5595 | 4005595 | 89.35 | .5895 | 4005895 | 92.25 |
| .4700 | 4004700 | 71.10 | .5000 | 40016 | 67.30 | .5300 | 4005300 | 89.35 | .5600 | 4005600 | 89.35 | .5900 | 4005900 | 92.25 |
| .4705 | 4004705 | 71.10 | .5005 | 4005005 | 83.35 | .5305 | 4005305 | 89.35 | .5605 | 4005605 | 89.35 | .5905 | 4005905 | 92.25 |
| .4710 | 4004710 | 71.10 | .5010 | 47850 | 76.90 | .5310 | 4005310 | 89.35 | .5610 | 4005610 | 89.35 | .5910 | 4005910 | 92.25 |
| .4715 | 4004715 | 71.10 | .5015 | 4005015 | 83.35 | .5315 | 400135 | 89.35 | .5615 | 4005615 | 89.35 | .5915 | 4005915 | 92.25 |
| .4720 | 4004720 | 71.10 | .5020 | 4005020 | 83.35 | .5320 | 4005320 | 89.35 | .5620 | 4005620 | 89.35 | .5920 | 4005920 | 92.25 |
| .4725 | 4004725 | 83.35 | .5025 | 4005025 | 83.35 | .5325 | 4005325 | 89.35 | .5625 | 40018 | 73.20 | .5925 | 4005925 | 92.25 |
| .4730 | 4004730 | 83.35 | .5030 | 4005030 | 83.35 | .5330 | 4005330 | 89.35 | .5630 | 400143 | 89.35 | .5930 | 4005930 | 92.25 |
| .4735 | 4004735 | 83.35 | .5035 | 4005035 | 89.35 | .5335 | 4005335 | 89.35 | .5635 | 4005635 | 89.35 | .5935 | 4005935 | 92.25 |
| .4740 | 4004740 | 83.35 | .5040 | 4005040 | 89.35 | .5340 | 4005340 | 89.35 | .5640 | 4005640 | 89.35 | .5940 | 4005940 | 92.25 |
| .4745 | 4004745 | 83.35 | .5045 | 4005045 | 89.35 | .5345 | 4005345 | 89.35 | .5645 | 4005645 | 89.35 | .5945 | 400151 | 92.25 |
| .4750 | 4004750 | 83.35 | .5050 | 4005050 | 89.35 | .5350 | 4005350 | 89.35 | .5650 | 4005650 | 89.35 | .5950 | 4005950 | 92.25 |
| .4755 | 4004755 | 83.35 | .5055 | 4005055 | 89.35 | .5355 | 4005355 | 89.35 | .5655 | 4005655 | 89.35 | .5955 | 4005955 | 92.25 |
| .4760 | 4004760 | 83.35 | .5060 | 4005060 | 89.35 | .5360 | 4005360 | 89.35 | .5660 | 4005660 | 89.35 | .5960 | 4005960 | 92.25 |
| .4765 | 4004765 | 83.35 | .5065 | 4005065 | 89.35 | .5365 | 4005365 | 89.35 | .5665 | 4005665 | 92.25 | .5965 | 4005965 | 92.25 |
| .4770 | 4004770 | 83.35 | .5070 | 4005070 | 89.35 | .5370 | 4005370 | 89.35 | .5670 | 4005670 | 92.25 | .5970 | 4005970 | 92.25 |
| .4775 | 4004775 | 83.35 | .5075 | 4005075 | 89.35 | .5375 | 4005375 | 89.35 | .5675 | 4005675 | 92.25 | .5975 | 4005975 | 92.25 |
| .4780 | 4004780 | 83.35 | .5080 | 4005080 | 89.35 | .5380 | 4005380 | 89.35 | .5680 | 4005680 | 92.25 | .5980 | 4005980 | 92.25 |
| .4785 | 4004785 | 83.35 | .5085 | 4005085 | 89.35 | .5385 | 4005385 | 89.35 | .5685 | 4005685 | 92.25 | .5985 | 4005985 | 92.25 |
| .4790 | 4004790 | 83.35 | .5090 | 4005090 | 89.35 | .5390 | 4005390 | 89.35 | .5690 | 4005690 | 92.25 | .5990 | 4005990 | 92.25 |
| .4795 | 4004795 | 83.35 | .5095 | 4005095 | 89.35 | .5395 | 4005395 | 89.35 | .5695 | 4005695 | 92.25 | .5995 | 4005995 | 92.25 |
| .4800 | 4004800 | 83.35 | .5100 | 4005100 | 89.35 | .5400 | 4005400 | 89.35 | .5700 | 4005700 | 92.25 | .6000 | 4006000 | 92.25 |
| .4805 | 4004805 | 83.35 | .5105 | 4005105 | 89.35 | .5405 | 4005405 | 89.35 | .5705 | 4005705 | 92.25 | .6005 | 4006005 | 92.25 |
| .4810 | 4004810 | 83.35 | .5110 | 4005110 | 89.35 | .5410 | 4005410 | 89.35 | .5710 | 4005710 | 92.25 | .6010 | 4006010 | 92.25 |
| .4815 | 4004815 | 83.35 | .5115 | 4005115 | 89.35 | .5415 | 4005415 | 89.35 | .5715 | 4005715 | 92.25 | .6015 | 4006015 | 92.25 |
| .4820 | 4004820 | 83.35 | .5120 | 4005120 | 89.35 | .5420 | 4005420 | 89.35 | .5720 | 4005720 | 92.25 | .6020 | 4006020 | 92.25 |
| .4825 | 4004825 | 83.35 | .5125 | 4005125 | 89.35 | .5425 | 4005425 | 89.35 | .5725 | 4005725 | 92.25 | .6025 | 4006025 | 92.25 |
| .4830 | 4004830 | 83.35 | .5130 | 4005130 | 89.35 | .5430 | 4005430 | 89.35 | .5730 | 4005730 | 92.25 | .6030 | 4006030 | 92.25 |
| .4835 | 4004835 | 83.35 | .5135 | 4005135 | 89.35 | .5435 | 4005435 | 89.35 | .5735 | 4005735 | 92.25 | .6035 | 4006035 | 92.25 |
| .4840 | 4004840 | 83.35 | .5140 | 4005140 | 89.35 | .5440 | 4005440 | 89.35 | .5740 | 4005740 | 92.25 | .6040 | 4006040 | 92.25 |
| .4845 | 4004845 | 83.35 | .5145 | 4005145 | 89.35 | .5445 | 4005445 | 89.35 | .5745 | 4005745 | 92.25 | .6045 | 4006045 | 92.25 |
| .4850 | 4004850 | 83.35 | .5150 | 4005150 | 89.35 | .5450 | 4005450 | 89.35 | .5750 | 4005750 | 92.25 | .6050 | 4006050 | 92.25 |
| .4855 | 4004855 | 83.35 | .5155 | 4005155 | 89.35 | .5455 | 4005455 | 89.35 | .5755 | 4005755 | 92.25 | .6055 | 4006055 | 92.25 |

REAMERS



CHUCKING REAMERS CARBIDE TIPPED TYPE 400 .0005 INCREMENTS



STOCKED DECIMAL TOOL DIAMETERS (.6060 TO .7555) STRAIGHT FLUTES & SHANK

For shallow holes only (see page 14)

NOTE: Dimension details and available modifications listed on page 32.

| TOOL DIAM. | EDP NO. | PRICE | TOOL DIAM. | EDP NO. | PRICE | TOOL DIAM. | EDP NO. | PRICE | TOOL DIAM. | EDP NO. | PRICE | TOOL DIAM. | EDP NO. | PRICE |
|------------|---------|---------|------------|---------|---------|------------|---------|---------|------------|---------|---------|------------|---------|---------|
| .6060 | 4006060 | \$92.25 | .6360 | 4006360 | \$93.55 | .6660 | 4006660 | \$93.55 | .6960 | 4006960 | \$97.25 | .7260 | 4007260 | \$97.25 |
| .6065 | 4006065 | 92.25 | .6365 | 4006365 | 93.55 | .6665 | 4006665 | 93.55 | .6965 | 4006965 | 97.25 | .7265 | 4007265 | 97.25 |
| .6070 | 4006070 | 92.25 | .6370 | 4006370 | 93.55 | .6670 | 4006670 | 93.55 | .6970 | 4006970 | 97.25 | .7270 | 4007270 | 97.25 |
| .6075 | 4006075 | 92.25 | .6375 | 4006375 | 93.55 | .6675 | 4006675 | 93.55 | .6975 | 4006975 | 97.25 | .7275 | 4007275 | 97.25 |
| .6080 | 4006080 | 92.25 | .6380 | 4006380 | 93.55 | .6680 | 4006680 | 93.55 | .6980 | 4006980 | 97.25 | .7280 | 4007280 | 97.25 |
| .6085 | 4006085 | 92.25 | .6385 | 4006385 | 93.55 | .6685 | 4006685 | 93.55 | .6985 | 4006985 | 97.25 | .7285 | 4007285 | 97.25 |
| .6090 | 4006090 | 92.25 | .6390 | 4006390 | 93.55 | .6690 | 4006690 | 93.55 | .6990 | 4006990 | 97.25 | .7290 | 4007290 | 97.25 |
| .6095 | 4006095 | 92.25 | .6395 | 4006395 | 93.55 | .6695 | 4006695 | 93.55 | .6995 | 4006995 | 97.25 | .7295 | 4007295 | 97.25 |
| .6100 | 4006100 | 92.25 | .6400 | 4006400 | 93.55 | .6700 | 4006700 | 93.55 | .7000 | 4007000 | 97.25 | .7300 | 4007300 | 97.25 |
| .6105 | 4006105 | 92.25 | .6405 | 4006405 | 93.55 | .6705 | 4006705 | 93.55 | .7005 | 4007005 | 97.25 | .7305 | 4007305 | 97.25 |
| .6110 | 4006110 | 92.25 | .6410 | 4006410 | 93.55 | .6710 | 4006710 | 93.55 | .7010 | 4007010 | 97.25 | .7310 | 4007310 | 97.25 |
| .6115 | 4006115 | 92.25 | .6415 | 4006415 | 93.55 | .6715 | 4006715 | 93.55 | .7015 | 4007015 | 97.25 | .7315 | 4007315 | 97.25 |
| .6120 | 4006120 | 92.25 | .6420 | 4006420 | 93.55 | .6720 | 4006720 | 93.55 | .7020 | 4007020 | 97.25 | .7320 | 4007320 | 97.25 |
| .6125 | 4006125 | 92.25 | .6425 | 4006425 | 93.55 | .6725 | 4006725 | 93.55 | .7025 | 4007025 | 97.25 | .7325 | 4007325 | 97.25 |
| .6130 | 4006130 | 92.25 | .6430 | 4006430 | 93.55 | .6730 | 4006730 | 93.55 | .7030 | 4007030 | 97.25 | .7330 | 4007330 | 97.25 |
| .6135 | 4006135 | 92.25 | .6435 | 4006435 | 93.55 | .6735 | 4006735 | 93.55 | .7035 | 4007035 | 97.25 | .7335 | 4007335 | 97.25 |
| .6140 | 4006140 | 92.25 | .6440 | 4006440 | 93.55 | .6740 | 4006740 | 93.55 | .7040 | 4007040 | 97.25 | .7340 | 4007340 | 97.25 |
| .6145 | 4006145 | 92.25 | .6445 | 4006445 | 93.55 | .6745 | 4006745 | 93.55 | .7045 | 4007045 | 97.25 | .7345 | 4007345 | 97.25 |
| .6150 | 4006150 | 92.25 | .6450 | 4006450 | 93.55 | .6750 | 4006750 | 93.55 | .7050 | 4007050 | 97.25 | .7350 | 4007350 | 97.25 |
| .6155 | 4006155 | 92.25 | .6455 | 4006455 | 93.55 | .6755 | 4006755 | 93.55 | .7055 | 4007055 | 97.25 | .7355 | 4007355 | 97.25 |
| .6160 | 4006160 | 92.25 | .6460 | 4006460 | 93.55 | .6760 | 4006760 | 93.55 | .7060 | 4007060 | 97.25 | .7360 | 4007360 | 97.25 |
| .6165 | 4006165 | 92.25 | .6465 | 4006465 | 93.55 | .6765 | 4006765 | 93.55 | .7065 | 4007065 | 97.25 | .7365 | 4007365 | 97.25 |
| .6170 | 4006170 | 92.25 | .6470 | 4006470 | 93.55 | .6770 | 4006770 | 93.55 | .7070 | 4007070 | 97.25 | .7370 | 4007370 | 97.25 |
| .6175 | 4006175 | 92.25 | .6475 | 4006475 | 93.55 | .6775 | 4006775 | 93.55 | .7075 | 4007075 | 97.25 | .7375 | 4007375 | 97.25 |
| .6180 | 4006180 | 92.25 | .6480 | 4006480 | 93.55 | .6780 | 4006780 | 93.55 | .7080 | 4007080 | 97.25 | .7380 | 4007380 | 97.25 |
| .6185 | 4006185 | 92.25 | .6485 | 4006485 | 93.55 | .6785 | 4006785 | 93.55 | .7085 | 4007085 | 97.25 | .7385 | 4007385 | 97.25 |
| .6190 | 4006190 | 92.25 | .6490 | 4006490 | 93.55 | .6790 | 4006790 | 93.55 | .7090 | 4007090 | 97.25 | .7390 | 4007390 | 97.25 |
| .6195 | 4006195 | 92.25 | .6495 | 4006495 | 93.55 | .6795 | 4006795 | 93.55 | .7095 | 4007095 | 97.25 | .7395 | 4007395 | 97.25 |
| .6200 | 4006200 | 92.25 | .6500 | 4006500 | 93.55 | .6800 | 4006800 | 93.55 | .7100 | 4007100 | 97.25 | .7400 | 4007400 | 97.25 |
| .6205 | 4006205 | 92.25 | .6505 | 4006505 | 93.55 | .6805 | 4006805 | 93.55 | .7105 | 4007105 | 97.25 | .7405 | 4007405 | 97.25 |
| .6210 | 4006210 | 92.25 | .6510 | 4006510 | 93.55 | .6810 | 4006810 | 93.55 | .7110 | 4007110 | 97.25 | .7410 | 4007410 | 97.25 |
| .6215 | 4006215 | 92.25 | .6515 | 4006515 | 93.55 | .6815 | 4006815 | 93.55 | .7115 | 4007115 | 97.25 | .7415 | 4007415 | 97.25 |
| .6220 | 400158 | 92.25 | .6520 | 4006520 | 93.55 | .6820 | 4006820 | 93.55 | .7120 | 4007120 | 97.25 | .7420 | 4007420 | 97.25 |
| .6225 | 4006225 | 92.25 | .6525 | 4006525 | 93.55 | .6825 | 4006825 | 93.55 | .7125 | 4007125 | 97.25 | .7425 | 4007425 | 97.25 |
| .6230 | 4006230 | 92.25 | .6530 | 4006530 | 93.55 | .6830 | 4006830 | 93.55 | .7130 | 4007130 | 97.25 | .7430 | 4007430 | 97.25 |
| .6235 | 4006235 | 92.25 | .6535 | 400166 | 93.55 | .6835 | 4006835 | 93.55 | .7135 | 4007135 | 97.25 | .7435 | 4007435 | 97.25 |
| .6240 | 47862 | 92.25 | .6540 | 4006540 | 93.55 | .6840 | 4006840 | 93.55 | .7140 | 4007140 | 97.25 | .7440 | 4007440 | 97.25 |
| .6245 | 4006245 | 92.25 | .6545 | 4006545 | 93.55 | .6845 | 4006845 | 93.55 | .7145 | 4007145 | 97.25 | .7445 | 4007445 | 97.25 |
| .6250 | 40020 | 76.20 | .6550 | 4006550 | 93.55 | .6850 | 400174 | 93.55 | .7150 | 4007150 | 97.25 | .7450 | 4007450 | 97.25 |
| .6255 | 4006255 | 92.25 | .6555 | 4006555 | 93.55 | .6855 | 4006855 | 93.55 | .7155 | 4007155 | 97.25 | .7455 | 4007455 | 97.25 |
| .6260 | 47863 | 92.25 | .6560 | 4006560 | 93.55 | .6860 | 4006860 | 93.55 | .7160 | 4007160 | 97.25 | .7460 | 4007460 | 97.25 |
| .6265 | 4006265 | 92.25 | .6565 | 4006565 | 93.55 | .6865 | 4006865 | 93.55 | .7165 | 400182 | 97.25 | .7465 | 4007465 | 97.25 |
| .6270 | 4006270 | 92.25 | .6570 | 4006570 | 93.55 | .6870 | 4006870 | 93.55 | .7170 | 4007170 | 97.25 | .7470 | 4007470 | 97.25 |
| .6275 | 4006275 | 92.25 | .6575 | 400167 | 93.55 | .6875 | 40022 | 77.60 | .7175 | 4007175 | 97.25 | .7475 | 4007475 | 97.25 |
| .6280 | 4006280 | 92.25 | .6580 | 4006580 | 93.55 | .6880 | 4006880 | 93.55 | .7180 | 4007180 | 97.25 | .7480 | 400190 | 97.25 |
| .6285 | 4006285 | 93.55 | .6585 | 4006585 | 93.55 | .6885 | 4006885 | 93.55 | .7185 | 4007185 | 97.25 | .7485 | 4007485 | 97.25 |
| .6290 | 4006290 | 93.55 | .6590 | 4006590 | 93.55 | .6890 | 400175 | 93.55 | .7190 | 4007190 | 97.25 | .7490 | 47874 | 97.25 |
| .6295 | 4006295 | 93.55 | .6595 | 4006595 | 93.55 | .6895 | 4006895 | 93.55 | .7195 | 4007195 | 97.25 | .7495 | 4007495 | 97.25 |
| .6300 | 4006300 | 93.55 | .6600 | 4006600 | 93.55 | .6900 | 4006900 | 93.55 | .7200 | 4007200 | 97.25 | .7500 | 40024 | 81.20 |
| .6305 | 4006305 | 93.55 | .6605 | 4006605 | 93.55 | .6905 | 4006905 | 93.55 | .7205 | 400183 | 97.25 | .7505 | 4007505 | 97.25 |
| .6310 | 4006310 | 93.55 | .6610 | 4006610 | 93.55 | .6910 | 4006910 | 93.55 | .7210 | 4007210 | 97.25 | .7510 | 47875 | 97.25 |
| .6315 | 4006315 | 93.55 | .6615 | 4006615 | 93.55 | .6915 | 4006915 | 97.25 | .7215 | 4007215 | 97.25 | .7515 | 4007515 | 97.25 |
| .6320 | 4006320 | 93.55 | .6620 | 4006620 | 93.55 | .6920 | 4006920 | 97.25 | .7220 | 4007220 | 97.25 | .7520 | 400191 | 97.25 |
| .6325 | 4006325 | 93.55 | .6625 | 4006625 | 93.55 | .6925 | 4006925 | 97.25 | .7225 | 4007225 | 97.25 | .7525 | 4007525 | 97.25 |
| .6330 | 4006330 | 93.55 | .6630 | 4006630 | 93.55 | .6930 | 4006930 | 97.25 | .7230 | 4007230 | 97.25 | .7530 | 4007530 | 97.25 |
| .6335 | 4006335 | 93.55 | .6635 | 4006635 | 93.55 | .6935 | 4006935 | 97.25 | .7235 | 4007235 | 97.25 | .7535 | 4007535 | 99.90 |
| .6340 | 4006340 | 93.55 | .6640 | 4006640 | 93.55 | .6940 | 4006940 | 97.25 | .7240 | 4007240 | 97.25 | .7540 | 4007540 | 99.90 |
| .6345 | 4006345 | 93.55 | .6645 | 4006645 | 93.55 | .6945 | 4006945 | 97.25 | .7245 | 4007245 | 97.25 | .7545 | 4007545 | 99.90 |
| .6350 | 4006350 | 93.55 | .6650 | 4006650 | 93.55 | .6950 | 4006950 | 97.25 | .7250 | 4007250 | 97.25 | .7550 | 4007550 | 99.90 |
| .6355 | 4006355 | 93.55 | .6655 | 4006655 | 93.55 | .6955 | 4006955 | 97.25 | .7255 | 4007255 | 97.25 | .7555 | 4007555 | 99.90 |

REAMERS



CHUCKING REAMERS CARBIDE TIPPED TYPE 400 METRIC



STRAIGHT FLUTES & SHANK



For shallow holes only (see page 14)

NOTE: Tool diameter in millimeters (mm); all other dimensions in inches. Also, modifications available (see list on page 32).

| TOOL DIAMETER | | TYPE 400 METRIC EDP NO. | METRIC PRICE | DIMENSIONS | | | | | FINISHED TO MODIFIED TOOL DIAMETER | | | | | | | |
|---------------|--------|-------------------------|--------------|-------------|-------------|--------|----------|----------|------------------------------------|--|---------|---------|---------|---------|---------|---------|
| mm | INCH | | | SHANK DIAM. | NO. OF FLTS | LENGTH | | | MODIFIED DIAMETER RANGE (mm) | PRICE EACH - BASED ON QUANTITY ORDERED | | | | | | |
| | | | | | | FLT | CAR-BIDE | OVER-ALL | | 1 | 2 | 3 | 4 | 5-7 | 8-14 | OVER 14 |
| 4.0 | .1575 | 400040 | \$66.35 | .151 | 4 | 1 | ½ | 4 | 3.962-4.493 | \$100.25 | \$77.75 | \$70.15 | \$66.40 | \$62.70 | \$59.40 | \$55.20 |
| 4.5 | .1772 | 400045 | 61.80 | 1¼ | 4 | 1 ½ | ½ | 4 ½ | 4.494-5.182 | 94.75 | 72.85 | 65.55 | 61.90 | 58.10 | 55.15 | 50.90 |
| 5.0 | .1969 | 400050 | 61.80 | 1¼ | 4 | 1 ½ | ½ | 4 ½ | - | - | - | - | - | - | - | - |
| 5.5 | .2165 | 400055 | 61.80 | 1¾ | 4 | 1 ¼ | ½ | 5 | 5.183-5.613 | 94.75 | 72.85 | 65.55 | 61.90 | 58.10 | 55.15 | 50.90 |
| 6.0 | .2362 | 400060 | 64.60 | 7/32 | 4 | 1 ½ | ½ | 6 | 5.614-6.045 | 97.60 | 75.65 | 68.20 | 64.70 | 60.90 | 57.85 | 53.65 |
| 6.3 | .2480 | 400063 | 61.80 | 15/64 | 4 | 1 ½ | ½ | 6 | 6.046-6.426 | 94.75 | 72.85 | 65.55 | 61.90 | 58.10 | 55.15 | 50.90 |
| 6.5 | .2559 | 400065 | 62.75 | 15/64 | 4 | 1 ½ | ½ | 6 | 6.427-7.214 | 95.90 | 73.80 | 66.50 | 62.85 | 59.20 | 56.05 | 51.85 |
| 7.0 | .2756 | 400070 | 62.75 | 15/64 | 4 | 1 ½ | ½ | 6 | - | - | - | - | - | - | - | - |
| 7.5 | .2953 | 400075 | 62.75 | 9/32 | 4 | 1 ½ | ½ | 6 | 7.215-8.001 | 95.90 | 73.80 | 66.50 | 62.85 | 59.20 | 56.05 | 51.85 |
| 8.0 | .3150 | 400080 | 62.75 | 9/32 | 4 | 1 ½ | ½ | 6 | - | - | - | - | - | - | - | - |
| 8.5 | .3346 | 400085 | 64.35 | 9/32 | 4 | 1 ½ | 5/8 | 6 | 8.002-8.814 | 97.55 | 75.55 | 68.15 | 64.60 | 60.85 | 57.80 | 53.55 |
| 9.0 | .3543 | 400090 | 64.35 | 5/16 | 4 | 1 ¾ | 5/8 | 7 | 8.815-9.601 | 97.55 | 75.55 | 68.15 | 64.60 | 60.85 | 57.80 | 53.55 |
| 9.5 | .3740 | 400095 | 64.35 | 5/16 | 4 | 1 ¾ | 5/8 | 7 | - | - | - | - | - | - | - | - |
| 10.0 | .3937 | 400100 | 66.80 | 5/16 | 4 | 1 ¾ | 5/8 | 7 | 9.602-10.389 | 99.90 | 77.90 | 70.65 | 67.00 | 63.30 | 60.30 | 56.00 |
| 10.5 | .4134 | 400105 | 70.25 | 3/8 | 4 | 1 ¾ | 5/8 | 7 | 10.390-11.201 | 103.40 | 81.45 | 74.15 | 70.45 | 66.80 | 63.80 | 59.45 |
| 11.0 | .4331 | 400110 | 70.25 | 3/8 | 4 | 1 ¾ | 5/8 | 7 | - | - | - | - | - | - | - | - |
| 11.5 | .4528 | 400115 | 71.10 | 3/8 | 4 | 1 ¾ | 5/8 | 7 | 11.202-11.989 | 104.20 | 82.30 | 74.90 | 71.40 | 67.55 | 64.60 | 60.40 |
| 12.0 | .4724 | 400120 | 83.35 | 7/16 | 6 | 2 | 5/8 | 8 | 11.990-12.776 | 119.80 | 95.55 | 87.50 | 83.65 | 79.55 | 76.15 | 71.50 |
| 12.5 | .4921 | 400125 | 83.35 | 7/16 | 6 | 2 | 5/8 | 8 | - | - | - | - | - | - | - | - |
| 13.0 | .5118 | 400130 | 89.35 | 7/16 | 6 | 2 | 5/8 | 8 | 12.777-13.564 | 125.70 | 101.50 | 93.45 | 89.45 | 85.45 | 82.05 | 77.45 |
| 13.5 | .5315 | 400135 | 89.35 | 7/16 | 6 | 2 | 5/8 | 8 | - | - | - | - | - | - | - | - |
| 14.0 | .5512 | 400140 | 89.35 | 7/16 | 6 | 2 | 5/8 | 8 | 13.565-14.376 | 125.70 | 101.50 | 93.45 | 89.45 | 85.45 | 82.05 | 77.45 |
| 14.5 | .5709 | 400145 | 92.25 | 7/16 | 6 | 2 | 5/8 | 8 | 14.377-15.164 | 128.70 | 104.50 | 96.35 | 92.45 | 88.50 | 85.10 | 80.35 |
| 15.0 | .5906 | 400150 | 92.25 | 7/16 | 6 | 2 | 5/8 | 8 | - | - | - | - | - | - | - | - |
| 15.5 | .6102 | 400155 | 92.25 | 9/16 | 6 | 2 ¼ | 5/8 | 9 | 15.165-15.951 | 128.70 | 104.50 | 96.35 | 92.45 | 88.50 | 85.10 | 80.35 |
| 16.0 | .6299 | 400160 | 93.55 | 9/16 | 6 | 2 ¼ | 5/8 | 9 | 15.952-16.739 | 130.10 | 105.85 | 97.65 | 93.70 | 89.75 | 86.35 | 81.60 |
| 16.5 | .6496 | 400165 | 93.55 | 9/16 | 6 | 2 ¼ | 5/8 | 9 | - | - | - | - | - | - | - | - |
| 17.0 | .6693 | 400170 | 93.55 | 9/16 | 6 | 2 ¼ | 5/8 | 9 | 16.740-17.551 | 130.10 | 105.85 | 97.65 | 93.70 | 89.75 | 86.35 | 81.60 |
| 17.5 | .6890 | 400175 | 93.55 | 9/16 | 6 | 2 ¼ | 5/8 | 9 | - | - | - | - | - | - | - | - |
| 18.0 | .7087 | 400180 | 97.25 | 9/16 | 6 | 2 ¼ | 5/8 | 9 | 17.552-18.339 | 133.65 | 109.50 | 101.40 | 97.50 | 93.40 | 90.00 | 85.30 |
| 18.5 | .7283 | 400185 | 97.25 | 5/8 | 6 | 2 ½ | ¾ | 9 ½ | 18.340-19.126 | 133.65 | 109.50 | 101.40 | 97.50 | 93.40 | 90.00 | 85.30 |
| 19.0 | .7480 | 400190 | 97.25 | 5/8 | 6 | 2 ½ | ¾ | 9 ½ | - | - | - | - | - | - | - | - |
| 19.5 | .7677 | 400195 | 99.90 | 5/8 | 6 | 2 ½ | ¾ | 9 ½ | 19.127-19.914 | 136.25 | 112.25 | 104.10 | 100.05 | 96.10 | 92.65 | 88.05 |
| 20.0 | .7874 | 400200 | 99.90 | 5/8 | 6 | 2 ½ | ¾ | 9 ½ | 19.915-20.726 | 136.25 | 112.25 | 104.10 | 100.05 | 96.10 | 92.65 | 88.05 |
| 20.5 | .8071 | 400205 | 99.90 | 5/8 | 6 | 2 ½ | ¾ | 9 ½ | - | - | - | - | - | - | - | - |
| 21.0 | .8268 | 400210 | 103.30 | 5/8 | 6 | 2 ½ | ¾ | 9 ½ | 20.727-21.514 | 139.70 | 115.40 | 107.40 | 103.40 | 99.35 | 96.10 | 91.45 |
| 21.5 | .8465 | 400215 | 103.30 | 5/8 | 6 | 2 ½ | ¾ | 9 ½ | - | - | - | - | - | - | - | - |
| 22.0 | .8661 | 400220 | 103.30 | 3/4 | 6 | 2 5/8 | ¾ | 10 | 21.515-22.301 | 139.70 | 115.40 | 107.40 | 103.40 | 99.35 | 96.10 | 91.45 |
| 22.5 | .8858 | 400225 | 122.10 | 3/4 | 6 | 2 5/8 | ¾ | 10 | 22.302-23.089 | 159.85 | 134.75 | 126.35 | 122.25 | 118.10 | 114.60 | 109.70 |
| 23.0 | .9055 | 400230 | 122.10 | 3/4 | 6 | 2 5/8 | ¾ | 10 | - | - | - | - | - | - | - | - |
| 23.5 | .9252 | 400235 | 122.10 | 3/4 | 8 | 2 5/8 | ¾ | 10 | 23.090-23.901 | 159.85 | 134.75 | 126.35 | 122.25 | 118.10 | 114.60 | 109.70 |
| 24.0 | .9449 | 400240 | 127.30 | 3/4 | 8 | 2 5/8 | ¾ | 10 | 23.902-24.689 | 165.00 | 139.85 | 131.45 | 127.40 | 123.25 | 119.75 | 114.85 |
| 24.5 | .9646 | 400245 | 127.30 | 3/4 | 8 | 2 5/8 | ¾ | 10 | - | - | - | - | - | - | - | - |
| 25.0 | .9843 | 400250 | 127.30 | 7/8 | 8 | 2 ¾ | ¾ | 10 ½ | 24.690-25.476 | 165.00 | 139.85 | 131.45 | 127.40 | 123.25 | 119.75 | 114.85 |
| 25.5 | 1.0039 | 400255 | 130.20 | 7/8 | 8 | 2 ¾ | ¾ | 10 ½ | 25.477-27.076 | 166.55 | 142.45 | 134.40 | 130.40 | 126.45 | 123.20 | 118.35 |
| 26.0 | 1.0236 | 400260 | 130.20 | 7/8 | 8 | 2 ¾ | ¾ | 10 ½ | - | - | - | - | - | - | - | - |
| 27.0 | 1.0630 | 400270 | 130.20 | 7/8 | 8 | 2 ¾ | ¾ | 10 ½ | - | - | - | - | - | - | - | - |
| 28.0 | 1.1024 | 400280 | 139.60 | 7/8 | 8 | 2 7/8 | 7/8 | 11 | 27.077-28.651 | 175.75 | 151.70 | 143.60 | 139.70 | 135.75 | 132.35 | 127.70 |
| 29.0 | 1.1417 | 400290 | 145.80 | 1 | 8 | 2 7/8 | 7/8 | 11 | 28.652-30.239 | 182.00 | 158.10 | 149.85 | 146.00 | 141.90 | 138.65 | 133.95 |
| 30.0 | 1.1811 | 400300 | 145.80 | 1 | 8 | 2 7/8 | 7/8 | 11 | - | - | - | - | - | - | - | - |
| 31.0 | 1.2205 | 400310 | 153.25 | 1 | 8 | 3 | 7/8 | 11 ½ | 30.240-31.826 | 189.50 | 165.45 | 157.40 | 153.50 | 149.45 | 146.15 | 141.60 |
| 32.0 | 1.2598 | 400320 | 160.30 | 1 | 8 | 3 | 7/8 | 11 ½ | 31.827-33.414 | 196.65 | 172.70 | 164.50 | 160.65 | 156.60 | 153.15 | 148.50 |
| 33.0 | 1.2992 | 400330 | 160.30 | 1 | 8 | 3 | 7/8 | 11 ½ | - | - | - | - | - | - | - | - |
| 34.0 | 1.3386 | 400340 | 169.30 | 1 | 8 | 3 ¼ | 7/8 | 12 | 33.415-35.001 | 205.40 | 181.50 | 173.30 | 169.45 | 165.40 | 162.00 | 157.40 |
| 35.0 | 1.3780 | 400350 | 169.30 | 1 | 8 | 3 ¼ | 7/8 | 12 | - | - | - | - | - | - | - | - |
| 36.0 | 1.4173 | 400360 | 186.80 | 1 ¼ | 8 | 3 ¼ | 7/8 | 12 | 35.002-36.589 | 223.05 | 198.95 | 190.90 | 186.90 | 182.95 | 179.55 | 175.00 |
| 37.0 | 1.4567 | 400370 | 196.45 | 1 ¼ | 8 | 3 ½ | 7/8 | 12 ½ | 36.590-38.176 | 232.80 | 208.70 | 200.60 | 196.70 | 192.70 | 189.35 | 184.75 |

Modified tool diameters are available up to 50mm - contact us for price.

REAMERS



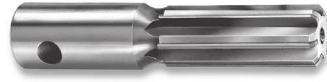
SEMI-FINISHED REAMERS CARBIDE TIPPED TYPES 400, 402, 410, 430, 440, 450, 465



FINISH GRINDING OPERATIONS REQUIRED BEFORE USE



TYPE 400



TYPE 430



TYPE 440



TYPE 402



TYPE 450



TYPE 410



TYPE 465

REAMERS

NOTE:

- Before semi-finished reamers can be used, the tool diameter must be finish ground & relieved and the reamer end must be faced & chamfered
- Semi-finished reamers are purchased by regrind shops, distributors, or users with regrind capabilities
- For detailed description of each specific type, see page indicated in table below

| SEMI-FINISHED TOOL DIAMETER RANGE | TYPE 400 PAGE 46 | | TYPE 402 PAGE 54 | | TYPE 410 PAGE 68 | | TYPE 430 PAGE 42 | TYPE 440 PAGE 42 | TYPE 430 OR 440 PRICE | TYPE 450 PAGE 56 | | TYPE 465 PAGE 64 | |
|---|---------------------|---------|---------------------|---------|---------------------|---------|---------------------|---------------------|--------------------------------|---------------------|---------|---------------------|---------|
| | EDP NO. | PRICE | EDP NO. | PRICE | EDP NO. | PRICE | EDP NO. | EDP NO. | | EDP NO. | PRICE | EDP NO. | PRICE |
| 0.1770-0.2040 | 40006SF | \$40.10 | - | - | 41006SF | \$56.45 | 43006SF | 44006SF | \$52.30 | 45006SF | \$47.95 | - | - |
| 0.2041-0.2210 | 40007SF | 40.10 | - | - | 41007SF | 56.45 | 43007SF | 44007SF | 52.30 | 45007SF | 47.95 | - | - |
| 0.2211-0.2380 | 4002344SF | 42.30 | - | - | 4102344SF | 56.45 | 4302344SF | 4402344SF | 52.30 | 4502344SF | 47.95 | - | - |
| 0.2381-0.2530 | 40008SF | 40.10 | 40208SF | \$46.25 | 41008SF | 56.45 | 43008SF | 44008SF | 52.30 | 45008SF | 47.95 | - | - |
| 0.2531-0.2840 | 40009SF | 40.85 | 40209SF | 47.00 | 41009SF | 56.60 | 43009SF | 44009SF | 52.30 | 45009SF | 49.05 | - | - |
| 0.2841-0.3150 | 40010SF | 40.85 | 40210SF | 47.00 | 41010SF | 56.60 | 43010SF | 44010SF | 60.65 | 45010SF | 49.05 | 46510SF | \$74.00 |
| 0.3151-0.3470 | 40011SF | 42.25 | 40211SF | 48.65 | 41011SF | 62.20 | 43011SF | 44011SF | 61.30 | 45011SF | 50.75 | 46511SF | 74.00 |
| 0.3471-0.3780 | 40012SF | 38.75 | 40212SF | 44.80 | 41012SF | 62.80 | 43012SF | 44012SF | 66.40 | 45012SF | 50.75 | 46512SF | 69.25 |
| 0.3781-0.4090 | 40013SF | 44.35 | 40213SF | 51.05 | 41013SF | 65.65 | 43013SF | 44013SF | 67.30 | 45013SF | 53.20 | 46513SF | 73.40 |
| 0.4091-0.4410 | 40014SF | 47.25 | 40214SF | 54.40 | 41014SF | 68.20 | 43014SF | 44014SF | 79.85 | 45014SF | 57.65 | 46514SF | 73.40 |
| 0.4411-0.4720 | 40015SF | 48.15 | 40215SF | 55.95 | 41015SF | 72.50 | 43015SF | 44015SF | 79.85 | 45015SF | 62.20 | 46515SF | 77.85 |
| 0.4721-0.5030 | 40016SF | 57.30 | 40216SF | 65.80 | 41016SF | 75.25 | 43016SF | 44016SF | 87.25 | 45016SF | 66.75 | 46516SF | 77.85 |
| 0.5031-0.5340 | 40017SF | 62.20 | 40217SF | 71.10 | 41017SF | 77.60 | 43017SF | 44017SF | 87.25 | 45017SF | 68.45 | 46517SF | 79.85 |
| 0.5341-0.5660 | 40018SF | 62.20 | 40218SF | 71.10 | 41018SF | 77.60 | 43018SF | 44018SF | 92.10 | 45018SF | 68.45 | 46518SF | 79.85 |
| 0.5661-0.5970 | 40019SF | 64.75 | 40219SF | 74.40 | 41019SF | 79.85 | 43019SF | 44019SF | 92.10 | 45019SF | 71.30 | 46519SF | 83.35 |
| 0.5971-0.6280 | 40020SF | 64.75 | 40220SF | 74.40 | 41020SF | 79.85 | 43020SF | 44020SF | 94.55 | 45020SF | 71.30 | 46520SF | 83.35 |
| 0.6281-0.6590 | 40021SF | 65.85 | 40221SF | 75.85 | 41021SF | 82.05 | 43021SF | 44021SF | 94.55 | 45021SF | 72.50 | 46521SF | 91.15 |
| 0.6591-0.6910 | 40022SF | 65.85 | 40222SF | 75.85 | 41022SF | 87.45 | 43022SF | 44022SF | 98.90 | 45022SF | 72.50 | 46522SF | 91.15 |
| 0.6911-0.7220 | 40023SF | 68.95 | 40223SF | 79.30 | 41023SF | 88.65 | 43023SF | 44023SF | 98.90 | 45023SF | 75.85 | 46523SF | 94.65 |
| 0.7221-0.7530 | 40024SF | 68.95 | 40224SF | 79.30 | 41024SF | 90.05 | 43024SF | 44024SF | 101.40 | 45024SF | 75.85 | 46524SF | 94.65 |
| 0.7531-0.7840 | 40025SF | 71.40 | 40225SF | 81.65 | 41025SF | 92.30 | 43025SF | 44025SF | 101.40 | 45025SF | 78.35 | 46525SF | 102.05 |
| 0.7841-0.8160 | 40026SF | 71.40 | 40226SF | 81.65 | 41026SF | 92.30 | 43026SF | 44026SF | 110.15 | 45026SF | 78.35 | 46526SF | 102.05 |
| 0.8161-0.8470 | 40027SF | 74.20 | 40227SF | 85.25 | 41027SF | 97.35 | 43027SF | 44027SF | 110.15 | 45027SF | 81.50 | 46527SF | 105.90 |
| 0.8471-0.8780 | 40028SF | 76.90 | 40228SF | 88.50 | 41028SF | 101.05 | 43028SF | 44028SF | 120.40 | 45028SF | 84.70 | 46528SF | 109.95 |
| 0.8781-0.9090 | 40029SF | 89.85 | 40229SF | 103.75 | 41029SF | 117.75 | 43029SF | 44029SF | 120.40 | 45029SF | 98.55 | 46529SF | 117.00 |
| 0.9091-0.9410 | 40030SF | 89.85 | 40230SF | 103.75 | 41030SF | 117.75 | 43030SF | 44030SF | 132.50 | 45030SF | 98.55 | 46530SF | 117.00 |
| 0.9411-0.9720 | 40031SF | 94.00 | 40231SF | 107.95 | 41031SF | 123.40 | 43031SF | 44031SF | 132.50 | 45031SF | 103.30 | 46531SF | 121.50 |
| 0.9721-1.0030 | 40032SF | 94.00 | 40232SF | 107.95 | 41032SF | 123.40 | 43032SF | 44032SF | 139.10 | 45032SF | 103.30 | 46532SF | 121.50 |
| 1.0031-1.0660 | 40034SF | 97.05 | 40234SF | 148.50 | 41034SF | 132.45 | 43034SF | 44034SF | 139.10 | 45034SF | 106.95 | 46534SF | 133.25 |
| 1.0661-1.1280 | 40036SF | 105.05 | 40236SF | 158.15 | 41036SF | 136.55 | 43036SF | 44036SF | 162.75 | 45036SF | 115.60 | 46536SF | 133.25 |
| 1.1281-1.1905 | 40038SF | 110.30 | 40238SF | 167.65 | 41038SF | 143.40 | 43038SF | 44038SF | 169.70 | 45038SF | 120.90 | 46538SF | 145.35 |
| 1.1906-1.2530 | 40040SF | 116.60 | 40240SF | 186.20 | 41040SF | 151.95 | 43040SF | 44040SF | 198.90 | 45040SF | 141.20 | 46540SF | 145.35 |
| 1.2531-1.3155 | 40042SF | 122.70 | 40242SF | 200.90 | 41042SF | 167.90 | 43042SF | 44042SF | 198.90 | 45042SF | 141.20 | 46542SF | 161.25 |
| 1.3156-1.3780 | 40044SF | 130.20 | 40244SF | 208.85 | 41044SF | 184.10 | 43044SF | 44044SF | 201.65 | 45044SF | 143.25 | 46544SF | 168.75 |
| 1.3781-1.4405 | 40046SF | 145.20 | 40246SF | 213.30 | 41046SF | 195.00 | 43046SF | 44046SF | 235.10 | 45046SF | 158.25 | 46546SF | 199.30 |
| 1.4406-1.5030 | 40048SF | 153.50 | 40248SF | 223.80 | 41048SF | 206.00 | 43048SF | 44048SF | 282.35 | 45048SF | 190.05 | 46548SF | 205.25 |



CHUCKING REAMERS CARBIDE TIPPED TYPE 402 FRACTIONAL



STRAIGHT FLUTES TAPER SHANK



TYPE 402

- Straight polished flutes and taper shank
- Detailed specifications on page 15

USE:

- For general reaming of steels, cast irons, non-ferrous materials, plastics and non-metals

MODIFICATIONS (Prompt delivery)

- Modified tool diameter - priced below
- Modified metric tool diameter - priced on pg. 41
- Closer tool diameter tolerance - pg. 15
- Cutting diam. reduced for step or pilot
- End chamfer other than 45°
- End cutting or corner radius
- Increased/decreased circular margin

| TOOL SELECTOR | CHIP CLASS | MATERIAL MACHINED | TOOL TYPE |
|---------------|---------------------------|--------------------------|-----------------------|
| | 20 | NON-FERROUS - LONG CHIPS | 402/472 ^{MS} |
| 40 | NON-FERROUS - SHORT CHIPS | 402/472 ^{MS} | |
| 60 | CAST IRONS | 402/473 ^{MS} | |
| 80 | LOW STRENGTH STEELS | 402/474 ^{MS} | |
| 100 | MEDIUM STRENGTH STEELS | 402/474 ^{MS} | |
| 120 | HIGH STRENGTH STEELS | 402/474 ^{MS} | |
| 140 | HIGH TEMPERATURE ALLOYS | 474 ^{MS} | |

^{MS}See page 66 for material specific reamers

- Increased/decreased tool diam. back taper
- Shank whistle notch for set screw
- Smaller taper shank
- Coatings available:

TITANIUM NITRIDE - TiN

TITANIUM CARBONITRIDE - TiCN

ZIRCONIUM NITRIDE - ZrN

AL TITANIUM NITRIDE - AlTiN

NOTE: For semi-finished reamers, see page 39. For shallow holes only (see page 14)

| TOOL DIAMETER | | TYPE 402 EDP NO. | PRICE | DIMENSIONS | | | | | FINISHED TO MODIFIED TOOL DIAMETER | | | | | | |
|---------------|---------|------------------|---------|-----------------|-------------|---------|----------|--------|------------------------------------|--|---------|---------|---------|---------|---------|
| FRACTIONAL | DECIMAL | | | TAPER SHANK NO. | NO. OF FLTS | LENGTH | | | MODIFIED DIAMETER RANGE | PRICE EACH - BASED ON QUANTITY ORDERED | | | | | |
| | | | | | FLUTE | CARBIDE | OVER-ALL | | | 1 | 2 | 3 | 4 | 5-7 | 8-14* |
| 1/4 | .2500 | 40208 | \$54.25 | 1 | 4 | 1 1/2 | 1/2 | 6 | 0.2381-0.2530 | \$98.15 | \$76.20 | \$68.90 | \$65.35 | \$61.75 | \$58.70 |
| 9/32 | .2812 | 40209 | 55.30 | 1 | 4 | 1 1/2 | 1/2 | 6 | 0.2531-0.2840 | 99.25 | 77.20 | 69.95 | 66.35 | 62.70 | 59.55 |
| 5/16 | .3125 | 40210 | 55.30 | 1 | 4 | 1 1/2 | 1/2 | 6 | 0.2841-0.3150 | 99.25 | 77.20 | 69.95 | 66.35 | 62.70 | 59.55 |
| 11/32 | .3438 | 40211 | 57.40 | 1 | 4 | 1 1/2 | 5/8 | 6 | 0.3151-0.3470 | 101.35 | 79.30 | 71.85 | 68.35 | 64.70 | 61.80 |
| 3/8 | .3750 | 40212 | 52.60 | 1 | 4 | 1 3/4 | 5/8 | 7 | 0.3471-0.3780 | 92.95 | 72.75 | 65.90 | 62.80 | 59.30 | 56.60 |
| 13/32 | .4062 | 40213 | 60.15 | 1 | 4 | 1 3/4 | 5/8 | 7 | 0.3781-0.4090 | 104.15 | 82.05 | 74.70 | 71.30 | 67.45 | 64.50 |
| 7/16 | .4375 | 40214 | 64.05 | 1 | 4 | 1 3/4 | 5/8 | 7 | 0.4091-0.4410 | 107.95 | 85.95 | 78.55 | 75.10 | 71.40 | 68.25 |
| 15/32 | .4688 | 40215 | 65.70 | 1 | 4 | 1 3/4 | 5/8 | 7 | 0.4411-0.4720 | 109.70 | 87.70 | 80.30 | 76.80 | 73.05 | 70.10 |
| 1/2 | .5000 | 40216 | 77.45 | 1 | 6 | 2 | 5/8 | 8 | 0.4721-0.5030 | 125.80 | 101.50 | 93.45 | 89.70 | 85.45 | 82.25 |
| 17/32 | .5312 | 40217 | 83.65 | 1 | 6 | 2 | 5/8 | 8 | 0.5031-0.5340 | 132.05 | 107.70 | 99.60 | 95.85 | 91.60 | 88.20 |
| 9/16 | .5625 | 40218 | 83.65 | 1 | 6 | 2 | 5/8 | 8 | 0.5341-0.5660 | 132.05 | 107.70 | 99.60 | 95.85 | 91.60 | 88.20 |
| 19/32 | .5938 | 40219 | 87.65 | 1 | 6 | 2 | 5/8 | 8 | 0.5661-0.5970 | 136.05 | 111.75 | 103.65 | 99.80 | 95.55 | 92.40 |
| 5/8 | .6250 | 40220 | 87.65 | 2 | 6 | 2 1/4 | 5/8 | 9 | 0.5971-0.6280 | 136.05 | 111.75 | 103.65 | 99.80 | 95.55 | 92.40 |
| 21/32 | .6562 | 40221 | 89.20 | 2 | 6 | 2 1/4 | 5/8 | 9 | 0.6281-0.6590 | 137.55 | 113.35 | 105.25 | 101.40 | 97.25 | 93.90 |
| 11/16 | .6875 | 40222 | 89.20 | 2 | 6 | 2 1/4 | 5/8 | 9 | 0.6591-0.6910 | 137.55 | 113.35 | 105.25 | 101.40 | 97.25 | 93.90 |
| 23/32 | .7188 | 40223 | 93.25 | 2 | 6 | 2 1/4 | 5/8 | 9 | 0.6911-0.7220 | 141.70 | 117.35 | 109.25 | 105.50 | 101.35 | 98.00 |
| 3/4 | .7500 | 40224 | 93.25 | 2 | 6 | 2 1/2 | 3/4 | 9 1/2 | 0.7221-0.7530 | 141.70 | 117.35 | 109.25 | 105.50 | 101.35 | 98.00 |
| 25/32 | .7812 | 40225 | 96.15 | 2 | 6 | 2 1/2 | 3/4 | 9 1/2 | 0.7531-0.7840 | 144.55 | 120.25 | 112.25 | 108.40 | 104.15 | 100.85 |
| 13/16 | .8125 | 40226 | 96.15 | 2 | 6 | 2 1/2 | 3/4 | 9 1/2 | 0.7841-0.8160 | 144.55 | 120.25 | 112.25 | 108.40 | 104.15 | 100.85 |
| 27/32 | .8438 | 40227 | 100.30 | 2 | 6 | 2 1/2 | 3/4 | 9 1/2 | 0.8161-0.8470 | 148.65 | 124.35 | 116.35 | 112.45 | 108.40 | 104.95 |
| 7/8 | .8750 | 40228 | 104.15 | 2 | 6 | 2 5/8 | 3/4 | 10 | 0.8471-0.8780 | 154.25 | 129.20 | 120.70 | 116.60 | 112.40 | 108.95 |
| 29/32 | .9062 | 40229 | 122.10 | 2 | 6 | 2 5/8 | 3/4 | 10 | 0.8781-0.9090 | 172.25 | 147.05 | 138.70 | 134.65 | 130.35 | 126.95 |
| 15/16 | .9375 | 40230 | 122.10 | 3 | 8 | 2 5/8 | 3/4 | 10 | 0.9091-0.9410 | 172.25 | 147.05 | 138.70 | 134.65 | 130.35 | 126.95 |
| 31/32 | .9688 | 40231 | 127.30 | 3 | 8 | 2 5/8 | 3/4 | 10 | 0.9411-0.9720 | 177.40 | 152.20 | 143.70 | 139.80 | 135.50 | 132.10 |
| 1 | 1.0000 | 40232 | 127.30 | 3 | 8 | 2 3/4 | 3/4 | 10 1/2 | 0.9721-1.0030 | 177.40 | 152.20 | 143.70 | 139.80 | 135.50 | 132.10 |
| 1 1/16 | 1.0625 | 40234 | 174.65 | 3 | 8 | 2 3/4 | 3/4 | 10 1/2 | 1.0031-1.0660 | 222.90 | 198.80 | 190.75 | 186.85 | 182.65 | 179.40 |
| 1 1/8 | 1.1250 | 40236 | 186.15 | 3 | 8 | 2 7/8 | 7/8 | 11 | 1.0661-1.1280 | 234.30 | 210.00 | 202.05 | 198.15 | 194.15 | 190.85 |
| 1 3/16 | 1.1875 | 40238 | 197.15 | 3 | 8 | 2 7/8 | 7/8 | 11 | 1.1281-1.1905 | 245.40 | 221.10 | 213.15 | 209.15 | 205.05 | 201.85 |
| 1 1/4 | 1.2500 | 40240 | 219.05 | 4 | 8 | 3 | 7/8 | 11 1/2 | 1.1906-1.2530 | 267.25 | 243.10 | 235.05 | 231.10 | 227.05 | 223.75 |
| 1 9/16 | 1.3125 | 40242 | 236.25 | 4 | 8 | 3 | 7/8 | 11 1/2 | 1.2531-1.3155 | 284.30 | 260.25 | 252.10 | 248.30 | 244.15 | 240.90 |
| 1 3/8 | 1.3750 | 40244 | 245.70 | 4 | 8 | 3 1/4 | 7/8 | 12 | 1.3156-1.3780 | 293.90 | 269.75 | 261.70 | 257.85 | 253.65 | 250.60 |
| 1 7/16 | 1.4375 | 40246 | 250.80 | 4 | 8 | 3 1/4 | 7/8 | 12 | 1.3781-1.4405 | 299.05 | 274.95 | 266.75 | 263.00 | 258.75 | 255.55 |
| 1 1/2 | 1.5000 | 40248 | 263.30 | 4 | 8 | 3 1/2 | 7/8 | 12 1/2 | 1.4406-1.5030 | 311.45 | 287.50 | 279.35 | 275.50 | 271.30 | 268.05 |
| 1 9/16 | 1.5625 | 40250 | 284.25 | 4 | 8 | 3 1/2 | 7/8 | 12 1/2 | 1.5031-1.5660 | 332.40 | 308.30 | 300.15 | 296.35 | 292.20 | 288.95 |
| 1 5/8 | 1.6250 | 40252 | 294.00 | 4 | 8 | 3 3/4 | 7/8 | 13 | 1.5661-1.6280 | 342.25 | 318.15 | 310.00 | 306.15 | 302.10 | 298.75 |
| 1 11/16 | 1.6875 | 40254 | 330.65 | 4 | 8 | 3 3/4 | 7/8 | 13 | 1.6281-1.6910 | 378.85 | 354.65 | 346.75 | 342.75 | 338.75 | 335.50 |
| 1 3/4 | 1.7500 | 40256 | 330.65 | 4 | 10 | 4 | 7/8 | 13 1/2 | 1.6911-1.7530 | 378.85 | 354.65 | 346.75 | 342.75 | 338.75 | 335.50 |
| 1 13/16 | 1.8125 | 40258 | 330.65 | 4 | 10 | 4 | 7/8 | 13 1/2 | 1.7531-1.8160 | 378.85 | 354.65 | 346.75 | 342.75 | 338.75 | 335.50 |
| 1 7/8 | 1.8750 | 40260 | 346.50 | 4 | 10 | 4 1/4 | 7/8 | 14 | 1.8161-1.8780 | 394.60 | 370.50 | 362.40 | 358.50 | 354.50 | 351.15 |
| 1 15/16 | 1.9375 | 40262 | 346.50 | 4 | 10 | 4 1/4 | 7/8 | 14 | 1.8781-1.9410 | 394.60 | 370.50 | 362.40 | 358.50 | 354.50 | 351.15 |
| 2 | 2.0000 | 40264 | 346.50 | 4 | 12 | 4 1/4 | 7/8 | 14 | 1.9411-2.0030 | 394.60 | 370.50 | 362.40 | 358.50 | 354.50 | 351.15 |

*Quantities of 15 or more - price of fractional size in same size range.



CHUCKING REAMERS CARBIDE TIPPED TYPE 402 METRIC



STRAIGHT FLUTES TAPER SHANK



For shallow holes only (see page 14)

NOTE: Tool diameter in millimeters (mm); all other dimensions in inches. Also, modifications available (see list on page 40).

| TOOL DIAMETER | | TYPE 402 METRIC EDP NO. | METRIC PRICE | DIMENSIONS | | | | | FINISHED TO MODIFIED TOOL DIAMETER | | | | | | | |
|---------------|--------|-------------------------|--------------|-----------------|-------------|--------|----------|----------|------------------------------------|--|---------|---------|---------|---------|---------|---------|
| mm | INCH | | | TAPER SHANK NO. | NO. OF FLTS | LENGTH | | | MODIFIED DIAMETER RANGE (mm) | PRICE EACH - BASED ON QUANTITY ORDERED | | | | | | |
| | | | | | | FLT | CAR-BIDE | OVER-ALL | | 1 | 2 | 3 | 4 | 5-7 | 8-14 | OVER 14 |
| 6.0 | .2362 | 402060 | \$68.90 | 1 | 4 | 1 1/2 | 1/2 | 6 | 6.000-6.426 | \$102.05 | \$80.00 | \$72.70 | \$69.00 | \$65.35 | \$62.20 | \$58.00 |
| 6.5 | .2559 | 402065 | 69.95 | 1 | 4 | 1 1/2 | 1/2 | 6 | 6.427-7.214 | 102.95 | 81.10 | 73.70 | 70.10 | 66.35 | 63.30 | 59.15 |
| 7.0 | .2756 | 402070 | 69.95 | 1 | 4 | 1 1/2 | 1/2 | 6 | - | - | - | - | - | - | - | |
| 7.5 | .2953 | 402075 | 69.95 | 1 | 4 | 1 1/2 | 1/2 | 6 | 7.215-8.001 | 102.95 | 81.10 | 73.70 | 70.10 | 66.35 | 63.30 | 59.15 |
| 8.0 | .3150 | 402080 | 69.95 | 1 | 4 | 1 1/2 | 1/2 | 6 | - | - | - | - | - | - | - | |
| 8.5 | .3346 | 402085 | 71.85 | 1 | 4 | 1 1/2 | 5/8 | 6 | 8.002-8.814 | 104.95 | 83.00 | 75.70 | 72.00 | 68.35 | 65.35 | 61.10 |
| 9.0 | .3543 | 402090 | 65.90 | 1 | 4 | 1 3/4 | 5/8 | 7 | 8.815-9.601 | 96.30 | 76.20 | 69.55 | 66.20 | 62.80 | 60.05 | 56.05 |
| 9.5 | .3740 | 402095 | 65.90 | 1 | 4 | 1 3/4 | 5/8 | 7 | - | - | - | - | - | - | - | |
| 10.0 | .3937 | 402100 | 74.70 | 1 | 4 | 1 3/4 | 5/8 | 7 | 9.602-10.389 | 107.75 | 85.80 | 78.50 | 74.90 | 71.30 | 68.15 | 64.00 |
| 10.5 | .4134 | 402105 | 78.55 | 1 | 4 | 1 3/4 | 5/8 | 7 | 10.390-11.201 | 111.70 | 89.85 | 82.35 | 78.85 | 75.10 | 71.95 | 67.90 |
| 11.0 | .4331 | 402110 | 78.55 | 1 | 4 | 1 3/4 | 5/8 | 7 | - | - | - | - | - | - | - | |
| 11.5 | .4528 | 402115 | 80.30 | 1 | 4 | 1 3/4 | 5/8 | 7 | 11.202-11.989 | 113.35 | 91.55 | 84.05 | 80.55 | 76.80 | 73.75 | 69.60 |
| 12.0 | .4724 | 402120 | 93.45 | 1 | 6 | 2 | 5/8 | 8 | 11.990-12.776 | 129.75 | 105.80 | 97.60 | 93.60 | 89.70 | 86.30 | 81.50 |
| 12.5 | .4921 | 402125 | 93.45 | 1 | 6 | 2 | 5/8 | 8 | - | - | - | - | - | - | - | |
| 13.0 | .5118 | 402130 | 99.60 | 1 | 6 | 2 | 5/8 | 8 | 12.777-13.564 | 136.05 | 111.85 | 103.75 | 99.80 | 95.85 | 92.40 | 87.70 |
| 13.5 | .5315 | 402135 | 99.60 | 1 | 6 | 2 | 5/8 | 8 | - | - | - | - | - | - | - | |
| 14.0 | .5512 | 402140 | 99.60 | 1 | 6 | 2 | 5/8 | 8 | 13.565-14.376 | 136.05 | 111.85 | 103.75 | 99.80 | 95.85 | 92.40 | 87.70 |
| 14.5 | .5709 | 402145 | 103.65 | 1 | 6 | 2 | 5/8 | 8 | 14.377-15.164 | 140.00 | 115.90 | 107.75 | 103.90 | 99.80 | 96.35 | 91.75 |
| 15.0 | .5906 | 402150 | 103.65 | 1 | 6 | 2 | 5/8 | 8 | - | - | - | - | - | - | - | |
| 15.5 | .6102 | 402155 | 103.65 | 2 | 6 | 2 1/4 | 5/8 | 9 | 15.165-15.951 | 140.00 | 115.90 | 107.75 | 103.90 | 99.80 | 96.35 | 91.75 |
| 16.0 | .6299 | 402160 | 105.25 | 2 | 6 | 2 1/4 | 5/8 | 9 | 15.952-16.739 | 141.70 | 117.40 | 109.45 | 105.50 | 101.40 | 98.00 | 93.40 |
| 16.5 | .6496 | 402165 | 105.25 | 2 | 6 | 2 1/4 | 5/8 | 9 | - | - | - | - | - | - | - | |
| 17.0 | .6693 | 402170 | 105.25 | 2 | 6 | 2 1/4 | 5/8 | 9 | 16.740-17.551 | 141.70 | 117.40 | 109.45 | 105.50 | 101.40 | 98.00 | 93.40 |
| 17.5 | .6890 | 402175 | 105.25 | 2 | 6 | 2 1/4 | 5/8 | 9 | - | - | - | - | - | - | - | |
| 18.0 | .7087 | 402180 | 109.25 | 2 | 6 | 2 1/4 | 5/8 | 9 | 17.552-18.339 | 145.75 | 121.50 | 113.55 | 109.50 | 105.50 | 102.10 | 97.50 |
| 18.5 | .7283 | 402185 | 109.25 | 2 | 6 | 2 1/2 | 3/4 | 9 1/2 | 18.340-19.126 | 145.75 | 121.50 | 113.55 | 109.50 | 105.50 | 102.10 | 97.50 |
| 19.0 | .7480 | 402190 | 109.25 | 2 | 6 | 2 1/2 | 3/4 | 9 1/2 | - | - | - | - | - | - | - | |
| 19.5 | .7677 | 402195 | 112.25 | 2 | 6 | 2 1/2 | 3/4 | 9 1/2 | 19.127-19.914 | 148.55 | 124.35 | 116.35 | 112.40 | 108.40 | 104.90 | 100.30 |
| 20.0 | .7874 | 402200 | 112.25 | 2 | 6 | 2 1/2 | 3/4 | 9 1/2 | 19.915-20.726 | 148.55 | 124.35 | 116.35 | 112.40 | 108.40 | 104.90 | 100.30 |
| 20.5 | .8071 | 402205 | 112.25 | 2 | 6 | 2 1/2 | 3/4 | 9 1/2 | - | - | - | - | - | - | - | |
| 21.0 | .8268 | 402210 | 116.35 | 2 | 6 | 2 1/2 | 3/4 | 9 1/2 | 20.727-21.514 | 152.80 | 128.65 | 120.45 | 116.50 | 112.45 | 109.05 | 104.45 |
| 21.5 | .8465 | 402215 | 116.35 | 2 | 6 | 2 1/2 | 3/4 | 9 1/2 | - | - | - | - | - | - | - | |
| 22.0 | .8661 | 402220 | 116.35 | 2 | 6 | 2 5/8 | 3/4 | 10 | 21.515-22.301 | 152.80 | 128.65 | 120.45 | 116.50 | 112.45 | 109.05 | 104.45 |
| 22.5 | .8858 | 402225 | 138.70 | 2 | 6 | 2 5/8 | 3/4 | 10 | 22.302-23.089 | 176.50 | 151.45 | 143.05 | 138.85 | 134.65 | 131.05 | 126.35 |
| 23.0 | .9055 | 402230 | 138.70 | 2 | 6 | 2 5/8 | 3/4 | 10 | - | - | - | - | - | - | - | |
| 23.5 | .9252 | 402235 | 138.70 | 3 | 8 | 2 5/8 | 3/4 | 10 | 23.090-23.901 | 176.50 | 151.45 | 143.05 | 138.85 | 134.65 | 131.05 | 126.35 |
| 24.0 | .9449 | 402240 | 143.70 | 3 | 8 | 2 5/8 | 3/4 | 10 | 23.902-24.689 | 181.70 | 156.65 | 148.05 | 144.00 | 139.80 | 136.25 | 131.45 |
| 24.5 | .9646 | 402245 | 143.70 | 3 | 8 | 2 5/8 | 3/4 | 10 | - | - | - | - | - | - | - | |
| 25.0 | .9843 | 402250 | 143.70 | 3 | 8 | 2 3/4 | 3/4 | 10 1/2 | 24.690-25.476 | 181.70 | 156.65 | 148.05 | 144.00 | 139.80 | 136.25 | 131.45 |
| 25.5 | 1.0039 | 402255 | 190.75 | 3 | 8 | 2 3/4 | 3/4 | 10 1/2 | 25.477-27.076 | 227.00 | 202.85 | 194.90 | 190.90 | 186.85 | 183.50 | 179.00 |
| 26.0 | 1.0236 | 402260 | 190.75 | 3 | 8 | 2 3/4 | 3/4 | 10 1/2 | - | - | - | - | - | - | - | |
| 27.0 | 1.0630 | 402270 | 190.75 | 3 | 8 | 2 3/4 | 3/4 | 10 1/2 | - | - | - | - | - | - | - | |
| 28.0 | 1.1024 | 402280 | 202.05 | 3 | 8 | 2 7/8 | 7/8 | 11 | 27.077-28.651 | 238.25 | 214.20 | 206.15 | 202.25 | 198.15 | 194.90 | 190.20 |
| 29.0 | 1.1417 | 402290 | 213.15 | 3 | 8 | 2 7/8 | 7/8 | 11 | 28.652-30.239 | 249.30 | 225.30 | 217.30 | 213.30 | 209.15 | 205.95 | 201.20 |
| 30.0 | 1.1811 | 402300 | 213.15 | 3 | 8 | 2 7/8 | 7/8 | 11 | - | - | - | - | - | - | - | |
| 31.0 | 1.2205 | 402310 | 235.05 | 4 | 8 | 3 | 7/8 | 11 1/2 | 30.240-31.826 | 271.25 | 247.30 | 239.20 | 235.15 | 231.10 | 227.75 | 223.15 |
| 32.0 | 1.2598 | 402320 | 252.10 | 4 | 8 | 3 | 7/8 | 11 1/2 | 31.827-33.414 | 288.30 | 264.40 | 256.25 | 252.30 | 248.30 | 244.85 | 240.35 |
| 33.0 | 1.2992 | 402330 | 252.10 | 4 | 8 | 3 | 7/8 | 11 1/2 | - | - | - | - | - | - | - | |
| 34.0 | 1.3386 | 402340 | 261.70 | 4 | 8 | 3 1/4 | 7/8 | 12 | 33.415-35.001 | 297.90 | 273.90 | 265.85 | 261.85 | 257.85 | 254.50 | 249.95 |
| 35.0 | 1.3780 | 402350 | 261.70 | 4 | 8 | 3 1/4 | 7/8 | 12 | - | - | - | - | - | - | - | |
| 36.0 | 1.4173 | 402360 | 266.75 | 4 | 8 | 3 1/4 | 7/8 | 12 | 35.002-36.589 | 303.10 | 278.95 | 271.00 | 267.05 | 263.00 | 259.60 | 254.95 |
| 37.0 | 1.4567 | 402370 | 279.35 | 4 | 8 | 3 1/2 | 7/8 | 12 1/2 | 36.590-38.176 | 315.60 | 291.55 | 283.40 | 279.55 | 275.50 | 272.10 | 267.60 |
| 38.0 | 1.4961 | 402380 | 279.35 | 4 | 8 | 3 1/2 | 7/8 | 12 1/2 | - | - | - | - | - | - | - | |
| 39.0 | 1.5354 | 402390 | 300.15 | 4 | 8 | 3 1/2 | 7/8 | 12 1/2 | 38.177-39.776 | 336.45 | 312.40 | 304.30 | 300.40 | 296.35 | 292.90 | 288.30 |
| 40.0 | 1.5748 | 402400 | 310.00 | 4 | 8 | 3 3/4 | 7/8 | 13 | 39.777-41.351 | 346.25 | 322.25 | 314.15 | 310.20 | 306.15 | 302.80 | 298.10 |
| 41.0 | 1.6142 | 402410 | 310.00 | 4 | 8 | 3 3/4 | 7/8 | 13 | - | - | - | - | - | - | - | |

Modified tool diameters are available up to 50mm - contact us for price.



CHUCKING REAMERS CARBIDE TIPPED TYPE 450 FRACTIONAL



STRAIGHT FLUTE LONG CARBIDE STRAIGHT SHANK



TYPE 450

- Straight polished flutes with flute long carbide
- Straight shank
- Detailed specifications on page 15

USE:

- For all general reaming - specifically designed with flute long carbide for deep hole reaming to precision tolerances and for long production runs

MODIFICATIONS (Prompt delivery)

- Modified tool diameter - priced below
- Modified metric tool diameter - priced on pg. 43
- Closer tool diameter tolerance - pg. 15
- Cutting diam. reduced for step or pilot
- End chamfer other than 45°
- End cutting or corner radius
- Increased/decreased circular margin
- Increased/decreased tool diam. back taper

| TOOL SELECTOR | CHIP CLASS | MATERIAL MACHINED | TOOL TYPE |
|---------------|-------------------------|---------------------------|-----------------------|
| | 20 | NON-FERROUS - LONG CHIPS | 450/457 ^{MS} |
| | 40 | NON-FERROUS - SHORT CHIPS | 450/457 ^{MS} |
| | 60 | CAST IRONS | 450/458 ^{MS} |
| | 80 | LOW STRENGTH STEELS | 450/459 ^{MS} |
| | 100 | MEDIUM STRENGTH STEELS | 450/459 ^{MS} |
| | 120 | HIGH STRENGTH STEELS | 450/459 ^{MS} |
| 140 | HIGH TEMPERATURE ALLOYS | 459 ^{MS} | |

^{MS}See pages 64 & 65 for material specific reamers

- Shortened shank or reduced shank diameter
- Flat(s) or tang on shank
- Coatings available:
See page 40

NOTE: For stocked tool diameters in .0005 increments, see pgs. 45-47. For semi-finished reamers, see pg. 39. For smaller tool diameters, see solid carbide reamers on pgs. 44, 89-91.

| TOOL DIAMETER | | TYPE 450 EDP NO. | PRICE | DIMENSIONS | | | FINISHED TO MODIFIED TOOL DIAMETER | | | | | | | | |
|---------------|---------|------------------|---------|-------------|-------------|------------------------|------------------------------------|-------------------------|--|---------|---------|---------|---------|---------|-------|
| FRACTIONAL | DECIMAL | | | SHANK DIAM. | NO. OF FLTS | LENGTH FLUTE & CARBIDE | OVER-ALL | MODIFIED DIAMETER RANGE | PRICE EACH - BASED ON QUANTITY ORDERED | | | | | | |
| | | | | | | | | | | 1 | 2 | 3 | 4 | 5-7 | 8-14* |
| 3/16 | .1875 | 45006 | \$56.35 | 1 1/64 | 4 | 1 1/2 | 6 | 0.1770-0.2040 | \$101.50 | \$78.90 | \$71.50 | \$67.80 | \$63.85 | \$60.75 | |
| 7/32 | .2188 | 45007 | 56.35 | 1 3/64 | 4 | 1 1/2 | 6 | 0.2041-0.2210 | 101.50 | 78.90 | 71.50 | 67.80 | 63.85 | 60.75 | |
| 15/64 | .2344 | 4502344 | 56.35 | 7/32 | 4 | 1 1/2 | 6 | 0.2211-0.2380 | 101.50 | 78.90 | 71.50 | 67.80 | 63.85 | 60.75 | |
| 1/4 | .2500 | 45008 | 56.35 | 15/64 | 4 | 1 1/2 | 6 | 0.2381-0.2530 | 101.50 | 78.90 | 71.50 | 67.80 | 63.85 | 60.75 | |
| 9/32 | .2812 | 45009 | 57.65 | 15/64 | 4 | 1 1/2 | 6 | 0.2531-0.2840 | 102.75 | 80.10 | 72.55 | 68.95 | 65.00 | 62.05 | |
| 5/16 | .3125 | 45010 | 57.65 | 9/32 | 4 | 1 1/2 | 6 | 0.2841-0.3150 | 102.75 | 80.10 | 72.55 | 68.95 | 65.00 | 62.05 | |
| 11/32 | .3438 | 45011 | 59.60 | 9/32 | 4 | 1 1/2 | 6 | 0.3151-0.3470 | 104.85 | 82.30 | 74.55 | 71.05 | 67.20 | 64.10 | |
| 3/8 | .3750 | 45012 | 59.60 | 5/16 | 4 | 1 3/4 | 7 | 0.3471-0.3780 | 104.85 | 82.30 | 74.55 | 71.05 | 67.20 | 64.10 | |
| 13/32 | .4062 | 45013 | 62.70 | 5/16 | 4 | 1 3/4 | 7 | 0.3781-0.4090 | 107.75 | 85.25 | 77.65 | 74.10 | 70.15 | 67.05 | |
| 7/16 | .4375 | 45014 | 67.80 | 3/8 | 4 | 1 3/4 | 7 | 0.4091-0.4410 | 112.95 | 90.25 | 82.65 | 79.15 | 75.25 | 72.20 | |
| 15/32 | .4688 | 45015 | 73.15 | 3/8 | 4 | 1 3/4 | 7 | 0.4411-0.4720 | 118.35 | 95.85 | 88.10 | 84.50 | 80.65 | 77.65 | |
| 1/2 | .5000 | 45016 | 78.35 | 7/16 | 6 | 2 | 8 | 0.4721-0.5030 | 126.80 | 102.55 | 94.55 | 90.60 | 86.50 | 83.05 | |
| 17/32 | .5312 | 45017 | 80.60 | 7/16 | 6 | 2 | 8 | 0.5031-0.5340 | 129.05 | 104.80 | 96.70 | 92.70 | 88.60 | 85.30 | |
| 9/16 | .5625 | 45018 | 80.60 | 7/16 | 6 | 2 | 8 | 0.5341-0.5660 | 129.05 | 104.80 | 96.70 | 92.70 | 88.60 | 85.30 | |
| 19/32 | .5938 | 45019 | 83.75 | 7/16 | 6 | 2 | 8 | 0.5661-0.5970 | 132.15 | 107.80 | 99.80 | 96.05 | 91.75 | 88.55 | |
| 5/8 | .6250 | 45020 | 83.75 | 9/16 | 6 | 2 | 9 | 0.5971-0.6280 | 132.15 | 107.80 | 99.80 | 96.05 | 91.75 | 88.55 | |
| 21/32 | .6562 | 45021 | 85.25 | 9/16 | 6 | 2 | 9 | 0.6281-0.6590 | 133.65 | 109.45 | 101.35 | 97.50 | 93.25 | 90.00 | |
| 11/16 | .6875 | 45022 | 85.25 | 9/16 | 6 | 2 | 9 | 0.6591-0.6910 | 133.65 | 109.45 | 101.35 | 97.50 | 93.25 | 90.00 | |
| 23/32 | .7188 | 45023 | 89.20 | 9/16 | 6 | 2 | 9 | 0.6911-0.7220 | 137.55 | 113.35 | 105.25 | 101.40 | 97.25 | 93.90 | |
| 3/4 | .7500 | 45024 | 89.20 | 5/8 | 6 | 2 | 9 1/2 | 0.7221-0.7530 | 137.55 | 113.35 | 105.25 | 101.40 | 97.25 | 93.90 | |
| 25/32 | .7812 | 45025 | 92.25 | 5/8 | 6 | 2 | 9 1/2 | 0.7531-0.7840 | 140.60 | 116.45 | 108.40 | 104.45 | 100.30 | 97.00 | |
| 13/16 | .8125 | 45026 | 92.25 | 5/8 | 6 | 2 | 9 1/2 | 0.7841-0.8160 | 140.60 | 116.45 | 108.40 | 104.45 | 100.30 | 97.00 | |
| 27/32 | .8438 | 45027 | 96.05 | 5/8 | 6 | 2 | 9 1/2 | 0.8161-0.8470 | 144.40 | 120.00 | 111.90 | 108.10 | 104.00 | 100.65 | |
| 7/8 | .8750 | 45028 | 99.60 | 3/4 | 6 | 2 1/4 | 10 | 0.8471-0.8780 | 149.80 | 124.70 | 116.25 | 112.20 | 107.80 | 104.45 | |
| 29/32 | .9062 | 45029 | 115.90 | 3/4 | 6 | 2 1/4 | 10 | 0.8781-0.9090 | 166.10 | 141.00 | 132.50 | 128.55 | 124.25 | 120.80 | |
| 15/16 | .9375 | 45030 | 115.90 | 3/4 | 8 | 2 1/4 | 10 | 0.9091-0.9410 | 166.10 | 141.00 | 132.50 | 128.55 | 124.25 | 120.80 | |
| 31/32 | .9688 | 45031 | 121.40 | 3/4 | 8 | 2 1/4 | 10 | 0.9411-0.9720 | 171.65 | 146.50 | 138.15 | 134.10 | 129.75 | 126.35 | |
| 1 | 1.0000 | 45032 | 121.40 | 7/8 | 8 | 2 1/4 | 10 1/2 | 0.9721-1.0030 | 171.65 | 146.50 | 138.15 | 134.10 | 129.75 | 126.35 | |
| 1 1/16 | 1.0625 | 45034 | 125.65 | 7/8 | 8 | 2 1/4 | 10 1/2 | 1.0031-1.0660 | 173.85 | 149.65 | 141.65 | 137.70 | 133.65 | 130.35 | |
| 1 1/8 | 1.1250 | 45036 | 136.00 | 7/8 | 8 | 2 1/4 | 11 | 1.0661-1.1280 | 184.05 | 160.10 | 151.95 | 148.05 | 143.90 | 140.60 | |
| 1 3/16 | 1.1875 | 45038 | 142.25 | 1 | 8 | 2 1/4 | 11 | 1.1281-1.1905 | 190.35 | 166.30 | 158.25 | 154.35 | 150.20 | 147.00 | |
| 1 1/4 | 1.2500 | 45040 | 166.10 | 1 | 8 | 2 1/2 | 11 1/2 | 1.1906-1.2530 | 214.20 | 190.15 | 182.00 | 178.15 | 174.00 | 170.75 | |
| 1 5/16 | 1.3125 | 45042 | 166.10 | 1 | 8 | 2 1/2 | 11 1/2 | 1.2531-1.3155 | 214.20 | 190.15 | 182.00 | 178.15 | 174.00 | 170.75 | |
| 1 3/8 | 1.3750 | 45044 | 168.50 | 1 | 8 | 2 1/2 | 12 | 1.3156-1.3780 | 216.65 | 192.60 | 184.45 | 180.60 | 176.50 | 173.15 | |
| 1 7/16 | 1.4375 | 45046 | 186.20 | 1 1/4 | 8 | 2 1/2 | 12 | 1.3781-1.4405 | 234.40 | 210.10 | 202.20 | 198.30 | 194.20 | 190.90 | |
| 1 1/2 | 1.5000 | 45048 | 223.50 | 1 1/4 | 8 | 2 1/2 | 12 1/2 | 1.4406-1.5030 | 271.65 | 247.45 | 239.50 | 235.65 | 231.50 | 228.30 | |
| 1 9/16 | 1.5625 | 45050 | 295.05 | 1 1/4 | 8 | 2 1/2 | 12 1/2 | 1.5031-1.5660 | 343.15 | 319.05 | 311.00 | 307.15 | 303.05 | 299.80 | |
| 1 5/8 | 1.6250 | 45052 | 305.10 | 1 1/4 | 8 | 2 3/4 | 13 | 1.5661-1.6280 | 353.25 | 329.00 | 321.00 | 317.30 | 313.05 | 309.85 | |
| 1 11/16 | 1.6875 | 45054 | 334.90 | 1 1/4 | 8 | 2 3/4 | 13 | 1.6281-1.6910 | 383.15 | 359.10 | 351.05 | 347.10 | 343.00 | 339.85 | |
| 1 3/4 | 1.7500 | 45056 | 334.90 | 1 1/4 | 10 | 3 | 13 1/2 | 1.6911-1.7530 | 383.15 | 359.10 | 351.05 | 347.10 | 343.00 | 339.85 | |
| 1 13/16 | 1.8125 | 45058 | 342.75 | 1 1/2 | 10 | 3 | 13 1/2 | 1.7531-1.8160 | 391.00 | 366.90 | 358.65 | 354.95 | 350.80 | 347.55 | |
| 1 7/8 | 1.8750 | 45060 | 359.45 | 1 1/2 | 10 | 3 1/4 | 14 | 1.8161-1.8780 | 407.55 | 383.45 | 375.50 | 371.60 | 367.35 | 364.20 | |
| 1 15/16 | 1.9375 | 45062 | 381.15 | 1 1/2 | 10 | 3 1/4 | 14 | 1.8781-1.9410 | 429.25 | 405.05 | 397.05 | 393.20 | 389.10 | 385.80 | |
| 2 | 2.0000 | 45064 | 381.15 | 1 1/2 | 12 | 3 1/4 | 14 | 1.9411-2.0030 | 429.25 | 405.05 | 397.05 | 393.20 | 389.10 | 385.80 | |

*Quantities of 15 or more - price of fractional size in same size range.



CHUCKING REAMERS CARBIDE TIPPED TYPE 450 METRIC



STRAIGHT FLUTE LONG CARBIDE STRAIGHT SHANK



NOTE: Tool diameter in millimeters (mm); all other dimensions in inches. Also, modifications available (see list on page 42).

| TOOL DIAMETER | | TYPE 450 METRIC EDP NO. | METRIC PRICE | DIMENSIONS | | | | FINISHED TO MODIFIED TOOL DIAMETER | | | | | | | |
|---------------|--------|-------------------------|--------------|-------------|-------------|-----------------|----------|------------------------------------|--|---------|---------|---------|---------|---------|---------|
| mm | INCH | | | SHANK DIAM. | NO. OF FLTS | LENGTH | | MODIFIED DIAMETER RANGE (mm) | PRICE EACH - BASED ON QUANTITY ORDERED | | | | | | |
| | | | | | | FLUTE & CARBIDE | OVER-ALL | | 1 | 2 | 3 | 4 | 5-7 | 8-14 | OVER 14 |
| 4.5 | .1772 | 450045 | \$71.50 | 1/64 | 4 | 1 1/2 | 6 | 4.494-5.182 | \$105.45 | \$82.85 | \$75.25 | \$71.55 | \$67.80 | \$64.60 | \$60.30 |
| 5.0 | .1969 | 450050 | 71.50 | 1/64 | 4 | 1 1/2 | 6 | - | - | - | - | - | - | - | - |
| 5.5 | .2165 | 450055 | 71.50 | 13/64 | 4 | 1 1/2 | 6 | 5.183-5.613 | 105.45 | 82.85 | 75.25 | 71.55 | 67.80 | 64.60 | 60.30 |
| 6.0 | .2362 | 450060 | 71.50 | 7/32 | 4 | 1 1/2 | 6 | 5.614-6.045 | 105.45 | 82.85 | 75.25 | 71.55 | 67.80 | 64.60 | 60.30 |
| 6.3 | .2480 | 450063 | 71.50 | 15/64 | 4 | 1 1/2 | 6 | 6.046-6.426 | 105.45 | 82.85 | 75.25 | 71.55 | 67.80 | 64.60 | 60.30 |
| 6.5 | .2559 | 450065 | 72.55 | 15/64 | 4 | 1 1/2 | 6 | 6.427-7.214 | 106.45 | 84.00 | 76.40 | 72.70 | 68.95 | 65.70 | 61.50 |
| 7.0 | .2756 | 450070 | 72.55 | 15/64 | 4 | 1 1/2 | 6 | - | - | - | - | - | - | - | - |
| 7.5 | .2953 | 450075 | 72.55 | 9/32 | 4 | 1 1/2 | 6 | 7.215-8.001 | 106.45 | 84.00 | 76.40 | 72.70 | 68.95 | 65.70 | 61.50 |
| 8.0 | .3150 | 450080 | 72.55 | 9/32 | 4 | 1 1/2 | 6 | - | - | - | - | - | - | - | - |
| 8.5 | .3346 | 450085 | 74.55 | 9/32 | 4 | 1 1/2 | 6 | 8.002-8.814 | 108.60 | 86.20 | 78.50 | 74.85 | 71.05 | 67.95 | 63.55 |
| 9.0 | .3543 | 450090 | 74.55 | 5/16 | 4 | 1 3/4 | 7 | 8.815-9.601 | 108.60 | 86.20 | 78.50 | 74.85 | 71.05 | 67.95 | 63.55 |
| 9.5 | .3740 | 450095 | 74.55 | 5/16 | 4 | 1 3/4 | 7 | - | - | - | - | - | - | - | - |
| 10.0 | .3937 | 450100 | 77.65 | 5/16 | 4 | 1 3/4 | 7 | 9.602-10.389 | 111.65 | 89.15 | 81.45 | 77.80 | 74.10 | 70.90 | 66.50 |
| 10.5 | .4134 | 450105 | 82.65 | 3/8 | 4 | 1 3/4 | 7 | 10.390-11.201 | 116.80 | 94.05 | 86.55 | 82.90 | 79.15 | 75.95 | 71.60 |
| 11.0 | .4331 | 450110 | 82.65 | 3/8 | 4 | 1 3/4 | 7 | - | - | - | - | - | - | - | - |
| 11.5 | .4528 | 450115 | 88.10 | 3/8 | 4 | 1 3/4 | 7 | 11.202-11.989 | 122.15 | 99.60 | 92.10 | 88.40 | 84.50 | 81.35 | 77.05 |
| 12.0 | .4724 | 450120 | 94.55 | 7/16 | 6 | 2 | 8 | 11.990-12.776 | 130.85 | 106.75 | 98.60 | 94.65 | 90.60 | 87.20 | 82.55 |
| 12.5 | .4921 | 450125 | 94.55 | 7/16 | 6 | 2 | 8 | - | - | - | - | - | - | - | - |
| 13.0 | .5118 | 450130 | 96.70 | 7/16 | 6 | 2 | 8 | 12.777-13.564 | 133.10 | 108.90 | 100.80 | 96.80 | 92.70 | 89.35 | 84.75 |
| 13.5 | .5315 | 450135 | 96.70 | 7/16 | 6 | 2 | 8 | - | - | - | - | - | - | - | - |
| 14.0 | .5512 | 450140 | 96.70 | 7/16 | 6 | 2 | 8 | 13.565-14.376 | 133.10 | 108.90 | 100.80 | 96.80 | 92.70 | 89.35 | 84.75 |
| 14.5 | .5709 | 450145 | 99.80 | 7/16 | 6 | 2 | 8 | 14.377-15.164 | 136.20 | 112.00 | 104.00 | 99.95 | 96.05 | 92.55 | 87.95 |
| 15.0 | .5906 | 450150 | 99.80 | 7/16 | 6 | 2 | 8 | - | - | - | - | - | - | - | - |
| 15.5 | .6102 | 450155 | 99.80 | 9/16 | 6 | 2 | 9 | 15.165-15.951 | 136.20 | 112.00 | 104.00 | 99.95 | 96.05 | 92.55 | 87.95 |
| 16.0 | .6299 | 450160 | 101.35 | 9/16 | 6 | 2 | 9 | 15.952-16.739 | 137.60 | 113.60 | 105.50 | 101.45 | 97.50 | 94.00 | 89.35 |
| 16.5 | .6496 | 450165 | 101.35 | 9/16 | 6 | 2 | 9 | - | - | - | - | - | - | - | - |
| 17.0 | .6693 | 450170 | 101.35 | 9/16 | 6 | 2 | 9 | 16.740-17.551 | 137.60 | 113.60 | 105.50 | 101.45 | 97.50 | 94.00 | 89.35 |
| 17.5 | .6890 | 450175 | 101.35 | 9/16 | 6 | 2 | 9 | - | - | - | - | - | - | - | - |
| 18.0 | .7087 | 450180 | 105.25 | 9/16 | 6 | 2 | 9 | 17.552-18.339 | 141.70 | 117.40 | 109.45 | 105.50 | 101.40 | 98.00 | 93.40 |
| 18.5 | .7283 | 450185 | 105.25 | 5/8 | 6 | 2 | 9 1/2 | 18.340-19.126 | 141.70 | 117.40 | 109.45 | 105.50 | 101.40 | 98.00 | 93.40 |
| 19.0 | .7480 | 450190 | 105.25 | 5/8 | 6 | 2 | 9 1/2 | - | - | - | - | - | - | - | - |
| 19.5 | .7677 | 450195 | 108.40 | 5/8 | 6 | 2 | 9 1/2 | 19.127-19.914 | 144.70 | 120.65 | 112.45 | 108.50 | 104.45 | 101.05 | 96.35 |
| 20.0 | .7874 | 450200 | 108.40 | 5/8 | 6 | 2 | 9 1/2 | 19.915-20.726 | 144.70 | 120.65 | 112.45 | 108.50 | 104.45 | 101.05 | 96.35 |
| 20.5 | .8071 | 450205 | 108.40 | 5/8 | 6 | 2 | 9 1/2 | - | - | - | - | - | - | - | - |
| 21.0 | .8268 | 450210 | 111.90 | 5/8 | 6 | 2 | 9 1/2 | 20.727-21.514 | 148.45 | 124.25 | 116.10 | 112.25 | 108.10 | 104.80 | 100.05 |
| 21.5 | .8465 | 450215 | 111.90 | 5/8 | 6 | 2 | 9 1/2 | - | - | - | - | - | - | - | - |
| 22.0 | .8661 | 450220 | 111.90 | 3/4 | 6 | 2 1/4 | 10 | 21.515-22.301 | 148.45 | 124.25 | 116.10 | 112.25 | 108.10 | 104.80 | 100.05 |
| 22.5 | .8858 | 450225 | 132.50 | 3/4 | 6 | 2 1/4 | 10 | 22.302-23.089 | 170.35 | 145.30 | 136.90 | 132.70 | 128.55 | 124.95 | 120.05 |
| 23.0 | .9055 | 450230 | 132.50 | 3/4 | 6 | 2 1/4 | 10 | - | - | - | - | - | - | - | - |
| 23.5 | .9252 | 450235 | 132.50 | 3/4 | 8 | 2 1/4 | 10 | 23.090-23.901 | 170.35 | 145.30 | 136.90 | 132.70 | 128.55 | 124.95 | 120.05 |
| 24.0 | .9449 | 450240 | 138.15 | 3/4 | 8 | 2 1/4 | 10 | 23.902-24.689 | 175.80 | 150.85 | 142.35 | 138.25 | 134.10 | 130.65 | 125.80 |
| 24.5 | .9646 | 450245 | 138.15 | 3/4 | 8 | 2 1/4 | 10 | - | - | - | - | - | - | - | - |
| 25.0 | .9843 | 450250 | 138.15 | 7/8 | 8 | 2 1/4 | 10 1/2 | 24.690-25.476 | 175.80 | 150.85 | 142.35 | 138.25 | 134.10 | 130.65 | 125.80 |
| 25.5 | 1.0039 | 450255 | 141.65 | 7/8 | 8 | 2 1/4 | 10 1/2 | 25.477-27.076 | 177.85 | 153.85 | 145.75 | 141.80 | 137.70 | 134.40 | 129.75 |
| 26.0 | 1.0236 | 450260 | 141.65 | 7/8 | 8 | 2 1/4 | 10 1/2 | - | - | - | - | - | - | - | - |
| 27.0 | 1.0630 | 450270 | 141.65 | 7/8 | 8 | 2 1/4 | 10 1/2 | - | - | - | - | - | - | - | - |
| 28.0 | 1.1024 | 450280 | 151.95 | 7/8 | 8 | 2 1/4 | 11 | 27.077-28.651 | 188.20 | 164.15 | 156.00 | 152.15 | 148.05 | 144.70 | 140.00 |
| 29.0 | 1.1417 | 450290 | 158.25 | 1 | 8 | 2 1/4 | 11 | 28.652-30.239 | 194.35 | 170.50 | 162.35 | 158.35 | 154.35 | 151.00 | 146.45 |
| 30.0 | 1.1811 | 450300 | 158.25 | 1 | 8 | 2 1/4 | 11 | - | - | - | - | - | - | - | - |
| 31.0 | 1.2205 | 450310 | 182.00 | 1 | 8 | 2 1/2 | 11 1/2 | 30.240-31.826 | 218.30 | 194.25 | 186.20 | 182.35 | 178.15 | 174.70 | 170.20 |
| 32.0 | 1.2598 | 450320 | 182.00 | 1 | 8 | 2 1/2 | 11 1/2 | 31.827-33.414 | 218.30 | 194.25 | 186.20 | 182.35 | 178.15 | 174.70 | 170.20 |
| 33.0 | 1.2992 | 450330 | 182.00 | 1 | 8 | 2 1/2 | 11 1/2 | - | - | - | - | - | - | - | - |
| 34.0 | 1.3386 | 450340 | 184.45 | 1 | 8 | 2 1/2 | 12 | 33.415-35.001 | 220.80 | 196.70 | 188.60 | 184.75 | 180.60 | 177.35 | 172.75 |
| 35.0 | 1.3780 | 450350 | 184.45 | 1 | 8 | 2 1/2 | 12 | - | - | - | - | - | - | - | - |
| 36.0 | 1.4173 | 450360 | 202.20 | 1 1/4 | 8 | 2 1/2 | 12 | 35.002-36.589 | 238.35 | 214.40 | 206.25 | 202.30 | 198.30 | 194.95 | 190.25 |
| 37.0 | 1.4567 | 450370 | 239.50 | 1 1/4 | 8 | 2 1/2 | 12 1/2 | 36.590-38.176 | 275.60 | 251.65 | 243.60 | 239.65 | 235.65 | 232.25 | 227.60 |
| 38.0 | 1.4961 | 450380 | 239.50 | 1 1/4 | 8 | 2 1/2 | 12 1/2 | - | - | - | - | - | - | - | - |

Modified tool diameters are available up to 50mm - contact us for price.



CHUCKING REAMERS SOLID CARBIDE TYPE 804 .0005 INCREMENTS



STOCKED DECIMAL TOOL DIAMETERS (.0280 TO .1765) STRAIGHT FLUTES & SHANK - SHORT SERIES

NOTE: Dimension details on pages 88. Available modifications on page 85. Additional Type 804 sizes on page 89-93.

| TOOL DIAM. | EDP NO. | PRICE | TOOL DIAM. | EDP NO. | PRICE | TOOL DIAM. | EDP NO. | PRICE | TOOL DIAM. | EDP NO. | PRICE | TOOL DIAM. | EDP NO. | PRICE |
|------------|---------|---------|------------|---------|---------|------------|---------|---------|------------|---------|---------|------------|---------|---------|
| .0280 | 8040280 | \$42.55 | .0580 | 8040580 | \$43.75 | .0880 | 8040880 | \$44.10 | .1180 | 8041180 | \$49.85 | .1480 | 8041480 | \$54.85 |
| .0285 | 8040285 | 44.95 | .0585 | 8040585 | 43.75 | .0885 | 8040885 | 44.10 | .1185 | 8041185 | 50.00 | .1485 | 8041485 | 54.85 |
| .0290 | 8040290 | 44.95 | .0590 | 8040590 | 38.20 | .0890 | 8040890 | 42.70 | .1190 | 8041190 | 50.00 | .1490 | 8041490 | 54.85 |
| .0295 | 8040295 | 42.55 | .0595 | 8040595 | 40.25 | .0895 | 8040895 | 45.20 | .1195 | 8041195 | 50.00 | .1495 | 8041495 | 52.10 |
| .0300 | 8040300 | 44.95 | .0600 | 8040600 | 43.55 | .0900 | 8040900 | 45.20 | .1200 | 8041200 | 47.50 | .1500 | 8041500 | 54.85 |
| .0305 | 8040305 | 44.95 | .0605 | 8040605 | 43.55 | .0905 | 8040905 | 45.20 | .1205 | 8041205 | 50.00 | .1505 | 8041505 | 54.85 |
| .0310 | 8040310 | 42.55 | .0610 | 8040610 | 41.25 | .0910 | 8040910 | 45.40 | .1210 | 8041210 | 50.00 | .1510 | 8041510 | 54.85 |
| .0315 | 804008 | 42.55 | .0615 | 8040615 | 43.55 | .0915 | 8040915 | 45.40 | .1215 | 8041215 | 50.00 | .1515 | 8041515 | 54.85 |
| .0320 | 8040320 | 42.55 | .0620 | 8040620 | 43.55 | .0920 | 8040920 | 45.40 | .1220 | 804031 | 47.50 | .1520 | 8041520 | 52.10 |
| .0325 | 8040325 | 44.95 | .0625 | 80404 | 37.90 | .0925 | 8040925 | 42.85 | .1225 | 8041225 | 50.00 | .1525 | 8041525 | 57.20 |
| .0330 | 8040330 | 42.55 | .0630 | 804016 | 41.25 | .0930 | 8040930 | 45.40 | .1230 | 8041230 | 50.00 | .1530 | 8041530 | 57.20 |
| .0335 | 8040335 | 42.55 | .0635 | 8040635 | 41.25 | .0935 | 8040935 | 42.85 | .1235 | 8041235 | 50.00 | .1535 | 804039 | 54.35 |
| .0340 | 8040340 | 43.40 | .0640 | 8040640 | 43.55 | .0940 | 8040940 | 45.40 | .1240 | 8041240 | 50.00 | .1540 | 8041540 | 54.35 |
| .0345 | 8040345 | 43.40 | .0645 | 8040645 | 43.55 | .0945 | 804024 | 42.85 | .1245 | 8041245 | 50.00 | .1545 | 8041545 | 57.20 |
| .0350 | 8040350 | 41.35 | .0650 | 8040650 | 43.75 | .0950 | 8040950 | 45.90 | .1250 | 80408 | 43.75 | .1550 | 8041550 | 57.20 |
| .0355 | 8040355 | 43.40 | .0655 | 8040655 | 43.75 | .0955 | 8040955 | 45.90 | .1255 | 8041255 | 50.00 | .1555 | 8041555 | 54.35 |
| .0360 | 8040360 | 41.35 | .0660 | 8040660 | 43.75 | .0960 | 8040960 | 43.75 | .1260 | 804032 | 47.50 | .1560 | 8041560 | 57.20 |
| .0365 | 8040365 | 43.40 | .0665 | 8040665 | 43.75 | .0965 | 8040965 | 43.75 | .1265 | 8041265 | 50.10 | .1565 | 8041565 | 59.20 |
| .0370 | 8040370 | 41.35 | .0670 | 8040670 | 41.70 | .0970 | 8040970 | 45.90 | .1270 | 8041270 | 50.10 | .1570 | 8041570 | 56.20 |
| .0375 | 8040375 | 43.40 | .0675 | 8040675 | 43.75 | .0975 | 8040975 | 45.90 | .1275 | 8041275 | 50.10 | .1575 | 804040 | 51.35 |
| .0380 | 8040380 | 41.35 | .0680 | 8040680 | 43.75 | .0980 | 8040980 | 43.75 | .1280 | 8041280 | 47.55 | .1580 | 8041580 | 60.50 |
| .0385 | 8040385 | 43.40 | .0685 | 8040685 | 43.75 | .0985 | 8040985 | 46.25 | .1285 | 8041285 | 47.55 | .1585 | 8041585 | 60.50 |
| .0390 | 8040390 | 41.35 | .0690 | 8040690 | 43.75 | .0990 | 8040990 | 46.25 | .1290 | 8041290 | 50.10 | .1590 | 8041590 | 57.65 |
| .0395 | 8040395 | 43.40 | .0695 | 8040695 | 43.75 | .0995 | 8040995 | 44.10 | .1295 | 8041295 | 50.10 | .1595 | 8041595 | 61.50 |
| .0400 | 8040400 | 41.35 | .0700 | 8040700 | 41.70 | .1000 | 8041000 | 46.25 | .1300 | 8041300 | 50.10 | .1600 | 8041600 | 61.50 |
| .0405 | 8040405 | 43.40 | .0705 | 8040705 | 43.75 | .1005 | 8041005 | 46.25 | .1305 | 8041305 | 50.10 | .1605 | 8041605 | 61.50 |
| .0410 | 8040410 | 41.35 | .0710 | 8040710 | 43.75 | .1010 | 8041010 | 46.25 | .1310 | 8041310 | 50.10 | .1610 | 8041610 | 58.35 |
| .0415 | 8040415 | 43.40 | .0715 | 8040715 | 43.75 | .1015 | 8041015 | 44.10 | .1315 | 8041315 | 50.10 | .1615 | 8041615 | 61.50 |
| .0420 | 8040420 | 41.35 | .0720 | 8040720 | 43.75 | .1020 | 8041020 | 46.70 | .1320 | 8041320 | 50.10 | .1620 | 8041620 | 61.50 |
| .0425 | 8040425 | 43.40 | .0725 | 8040725 | 43.75 | .1025 | 8041025 | 46.90 | .1325 | 8041325 | 50.10 | .1625 | 8041625 | 61.50 |
| .0430 | 8040430 | 41.35 | .0730 | 8040730 | 41.70 | .1030 | 8041030 | 46.90 | .1330 | 8041330 | 50.10 | .1630 | 8041630 | 61.50 |
| .0435 | 8040435 | 43.75 | .0735 | 8040735 | 43.75 | .1035 | 8041035 | 46.90 | .1335 | 8041335 | 50.10 | .1635 | 8041635 | 61.65 |
| .0440 | 8040440 | 43.75 | .0740 | 8040740 | 43.75 | .1040 | 8041040 | 46.90 | .1340 | 8041340 | 50.10 | .1640 | 8041640 | 61.50 |
| .0445 | 8040445 | 43.75 | .0745 | 8040745 | 43.75 | .1045 | 8041045 | 46.90 | .1345 | 8041345 | 50.10 | .1645 | 8041645 | 61.50 |
| .0450 | 8040450 | 43.75 | .0750 | 8040750 | 43.75 | .1050 | 8041050 | 46.90 | .1350 | 8041350 | 50.10 | .1650 | 8041650 | 61.50 |
| .0455 | 8040455 | 43.75 | .0755 | 8040755 | 43.75 | .1055 | 8041055 | 46.90 | .1355 | 8041355 | 50.10 | .1655 | 8041655 | 61.50 |
| .0460 | 8040460 | 43.75 | .0760 | 8040760 | 41.70 | .1060 | 8041060 | 46.90 | .1360 | 8041360 | 47.55 | .1660 | 8041660 | 58.70 |
| .0465 | 8040465 | 41.55 | .0765 | 8040765 | 43.75 | .1065 | 8041065 | 44.55 | .1365 | 8041365 | 50.10 | .1665 | 8041665 | 62.20 |
| .0470 | 8040470 | 43.75 | .0770 | 8040770 | 43.75 | .1070 | 8041070 | 47.55 | .1370 | 8041370 | 50.10 | .1670 | 8041670 | 62.20 |
| .0475 | 8040475 | 43.75 | .0775 | 8040775 | 43.75 | .1075 | 8041075 | 47.55 | .1375 | 8041375 | 50.10 | .1675 | 8041675 | 62.20 |
| .0480 | 8040480 | 43.75 | .0780 | 8040780 | 43.75 | .1080 | 8041080 | 47.55 | .1380 | 8041380 | 51.05 | .1680 | 8041680 | 62.20 |
| .0485 | 8040485 | 43.75 | .0785 | 8040785 | 41.75 | .1085 | 8041085 | 48.20 | .1385 | 8041385 | 51.05 | .1685 | 8041685 | 62.20 |
| .0490 | 8040490 | 43.75 | .0790 | 8040790 | 43.95 | .1090 | 8041090 | 48.20 | .1390 | 8041390 | 51.05 | .1690 | 8041690 | 62.20 |
| .0495 | 8040495 | 43.75 | .0795 | 8040795 | 43.95 | .1095 | 8041095 | 48.20 | .1395 | 8041395 | 51.05 | .1695 | 8041695 | 59.25 |
| .0500 | 8040500 | 43.75 | .0800 | 8040800 | 43.95 | .1100 | 8041100 | 45.90 | .1400 | 8041400 | 51.05 | .1700 | 8041700 | 63.55 |
| .0505 | 8040505 | 43.75 | .0805 | 8040805 | 43.95 | .1105 | 8041105 | 48.90 | .1405 | 8041405 | 48.20 | .1705 | 8041705 | 63.55 |
| .0510 | 8040510 | 43.75 | .0810 | 8040810 | 41.75 | .1110 | 8041110 | 46.70 | .1410 | 8041410 | 53.00 | .1710 | 8041710 | 63.55 |
| .0515 | 8040515 | 43.75 | .0815 | 8040815 | 44.10 | .1115 | 8041115 | 49.85 | .1415 | 8041415 | 53.00 | .1715 | 8041715 | 63.55 |
| .0520 | 8040520 | 41.55 | .0820 | 8040820 | 42.05 | .1120 | 8041120 | 49.85 | .1420 | 8041420 | 53.00 | .1720 | 8041720 | 63.55 |
| .0525 | 8040525 | 43.75 | .0825 | 8040825 | 44.10 | .1125 | 8041125 | 49.85 | .1425 | 8041425 | 53.00 | .1725 | 8041725 | 63.55 |
| .0530 | 8040530 | 43.75 | .0830 | 8040830 | 44.10 | .1130 | 8041130 | 47.25 | .1430 | 8041430 | 53.00 | .1730 | 8041730 | 60.50 |
| .0535 | 8040535 | 43.75 | .0835 | 8040835 | 44.10 | .1135 | 8041135 | 49.85 | .1435 | 8041435 | 53.00 | .1735 | 8041735 | 64.50 |
| .0540 | 8040540 | 43.75 | .0840 | 8040840 | 44.10 | .1140 | 8041140 | 49.85 | .1440 | 8041440 | 50.35 | .1740 | 8041740 | 64.50 |
| .0545 | 8040545 | 43.75 | .0845 | 8040845 | 44.10 | .1145 | 8041145 | 49.85 | .1445 | 8041445 | 53.20 | .1745 | 8041745 | 64.50 |
| .0550 | 8040550 | 41.55 | .0850 | 8040850 | 44.10 | .1150 | 8041150 | 49.85 | .1450 | 8041450 | 53.25 | .1750 | 8041750 | 64.50 |
| .0555 | 8040555 | 43.75 | .0855 | 8040855 | 44.10 | .1155 | 8041155 | 49.85 | .1455 | 8041455 | 53.25 | .1755 | 8041755 | 65.05 |
| .0560 | 8040560 | 43.75 | .0860 | 8040860 | 42.05 | .1160 | 8041160 | 47.25 | .1460 | 8041460 | 54.70 | .1760 | 8041760 | 65.05 |
| .0565 | 8040565 | 43.75 | .0865 | 8040865 | 44.10 | .1165 | 8041165 | 49.85 | .1465 | 8041465 | 54.70 | .1765 | 8041765 | 65.05 |
| .0570 | 8040570 | 43.75 | .0870 | 8040870 | 44.10 | .1170 | 8041170 | 49.85 | .1470 | 8041470 | 51.90 | - | - | - |
| .0575 | 8040575 | 43.75 | .0875 | 8040875 | 44.10 | .1175 | 8041175 | 49.85 | .1475 | 8041475 | 54.70 | - | - | - |

REAMERS



CHUCKING REAMERS CARBIDE TIPPED TYPE 450 .0005 INCREMENTS



STOCKED DECIMAL TOOL DIAMETERS (.1770 TO .3265) STRAIGHT FLUTE LONG CARBIDE & STRAIGHT SHANK

NOTE: Dimension details and available modifications listed on page 42.

| TOOL DIAM. | EDP NO. | PRICE | TOOL DIAM. | EDP NO. | PRICE | TOOL DIAM. | EDP NO. | PRICE | TOOL DIAM. | EDP NO. | PRICE | TOOL DIAM. | EDP NO. | PRICE |
|------------|---------|---------|------------|---------|---------|------------|---------|---------|------------|---------|---------|------------|---------|---------|
| .1770 | 4501770 | \$71.50 | .2070 | 4502070 | \$71.50 | .2370 | 4502370 | \$71.50 | .2670 | 4502670 | \$72.55 | .2970 | 4502970 | \$72.55 |
| .1775 | 4501775 | 71.50 | .2075 | 4502075 | 71.50 | .2375 | 4502375 | 71.50 | .2675 | 4502675 | 72.55 | .2975 | 4502975 | 72.55 |
| .1780 | 4501780 | 71.50 | .2080 | 4502080 | 71.50 | .2380 | 4502380 | 71.50 | .2680 | 4502680 | 72.55 | .2980 | 4502980 | 72.55 |
| .1785 | 4501785 | 71.50 | .2085 | 4502085 | 71.50 | .2385 | 4502385 | 71.50 | .2685 | 4502685 | 72.55 | .2985 | 4502985 | 72.55 |
| .1790 | 4501790 | 71.50 | .2090 | 4502090 | 71.50 | .2390 | 4502390 | 71.50 | .2690 | 4502690 | 72.55 | .2990 | 4502990 | 72.55 |
| .1795 | 4501795 | 71.50 | .2095 | 4502095 | 71.50 | .2395 | 4502395 | 71.50 | .2695 | 4502695 | 72.55 | .2995 | 4502995 | 72.55 |
| .1800 | 4501800 | 71.50 | .2100 | 4502100 | 71.50 | .2400 | 4502400 | 71.50 | .2700 | 4502700 | 72.55 | .3000 | 4503000 | 72.55 |
| .1805 | 4501805 | 71.50 | .2105 | 4502105 | 71.50 | .2405 | 4502405 | 71.50 | .2705 | 4502705 | 72.55 | .3005 | 4503005 | 72.55 |
| .1810 | 4501810 | 71.50 | .2110 | 4502110 | 71.50 | .2410 | 4502410 | 71.50 | .2710 | 4502710 | 72.55 | .3010 | 4503010 | 72.55 |
| .1815 | 4501815 | 71.50 | .2115 | 4502115 | 71.50 | .2415 | 4502415 | 71.50 | .2715 | 4502715 | 72.55 | .3015 | 4503015 | 72.55 |
| .1820 | 4501820 | 71.50 | .2120 | 4502120 | 71.50 | .2420 | 4502420 | 71.50 | .2720 | 4502720 | 72.55 | .3020 | 4503020 | 72.55 |
| .1825 | 4501825 | 71.50 | .2125 | 4502125 | 71.50 | .2425 | 4502425 | 71.50 | .2725 | 4502725 | 72.55 | .3025 | 4503025 | 72.55 |
| .1830 | 4501830 | 71.50 | .2130 | 4502130 | 71.50 | .2430 | 4502430 | 71.50 | .2730 | 4502730 | 72.55 | .3030 | 4503030 | 72.55 |
| .1835 | 4501835 | 71.50 | .2135 | 4502135 | 71.50 | .2435 | 4502435 | 71.50 | .2735 | 4502735 | 72.55 | .3035 | 4503035 | 72.55 |
| .1840 | 4501840 | 71.50 | .2140 | 4502140 | 71.50 | .2440 | 4502440 | 71.50 | .2740 | 4502740 | 72.55 | .3040 | 4503040 | 72.55 |
| .1845 | 4501845 | 71.50 | .2145 | 4502145 | 71.50 | .2445 | 4502445 | 71.50 | .2745 | 4502745 | 72.55 | .3045 | 4503045 | 72.55 |
| .1850 | 450047 | 71.50 | .2150 | 4502150 | 71.50 | .2450 | 4502450 | 71.50 | .2750 | 4502750 | 72.55 | .3050 | 4503050 | 72.55 |
| .1855 | 4501855 | 71.50 | .2155 | 4502155 | 71.50 | .2455 | 4502455 | 71.50 | .2755 | 4502755 | 72.55 | .3055 | 4503055 | 72.55 |
| .1860 | 4501860 | 71.50 | .2160 | 4502160 | 71.50 | .2460 | 4502460 | 71.50 | .2760 | 4502760 | 72.55 | .3060 | 4503060 | 72.55 |
| .1865 | 4501865 | 71.50 | .2165 | 450055 | 71.50 | .2465 | 4502465 | 71.50 | .2765 | 4502765 | 72.55 | .3065 | 4503065 | 72.55 |
| .1870 | 4501870 | 71.50 | .2170 | 4502170 | 71.50 | .2470 | 4502470 | 71.50 | .2770 | 4502770 | 72.55 | .3070 | 4503070 | 72.55 |
| .1875 | 450006 | 56.35 | .2175 | 4502175 | 71.50 | .2475 | 4502475 | 71.50 | .2775 | 4502775 | 72.55 | .3075 | 4503075 | 72.55 |
| .1880 | 4501880 | 71.50 | .2180 | 4502180 | 71.50 | .2480 | 450063 | 71.50 | .2780 | 4502780 | 72.55 | .3080 | 4503080 | 72.55 |
| .1885 | 4501885 | 71.50 | .2185 | 4502185 | 71.50 | .2485 | 4502485 | 71.50 | .2785 | 4502785 | 72.55 | .3085 | 4503085 | 72.55 |
| .1890 | 450048 | 71.50 | .2190 | 4502190 | 71.50 | .2490 | 4502490 | 71.50 | .2790 | 4502790 | 72.55 | .3090 | 4503090 | 72.55 |
| .1895 | 4501895 | 71.50 | .2195 | 4502195 | 71.50 | .2495 | 4502495 | 71.50 | .2795 | 450071 | 72.55 | .3095 | 4503095 | 72.55 |
| .1900 | 4501900 | 71.50 | .2200 | 4502200 | 71.50 | .2500 | 450008 | 56.35 | .2800 | 4502800 | 72.55 | .3100 | 4503100 | 72.55 |
| .1905 | 4501905 | 71.50 | .2205 | 450056 | 71.50 | .2505 | 4502505 | 71.50 | .2805 | 4502805 | 72.55 | .3105 | 4503105 | 72.55 |
| .1910 | 4501910 | 71.50 | .2210 | 4502210 | 71.50 | .2510 | 4502510 | 71.50 | .2810 | 4502810 | 72.55 | .3110 | 450079 | 72.55 |
| .1915 | 4501915 | 71.50 | .2215 | 4502215 | 71.50 | .2515 | 4502515 | 71.50 | .2815 | 4502815 | 72.55 | .3115 | 4503115 | 72.55 |
| .1920 | 4501920 | 71.50 | .2220 | 4502220 | 71.50 | .2520 | 450064 | 71.50 | .2820 | 4502820 | 72.55 | .3120 | 4503120 | 72.55 |
| .1925 | 4501925 | 71.50 | .2225 | 4502225 | 71.50 | .2525 | 4502525 | 71.50 | .2825 | 4502825 | 72.55 | .3125 | 45010 | 57.65 |
| .1930 | 4501930 | 71.50 | .2230 | 4502230 | 71.50 | .2530 | 4502530 | 71.50 | .2830 | 4502830 | 72.55 | .3130 | 4503130 | 72.55 |
| .1935 | 4501935 | 71.50 | .2235 | 4502235 | 71.50 | .2535 | 4502535 | 72.55 | .2835 | 450072 | 72.55 | .3135 | 4503135 | 72.55 |
| .1940 | 4501940 | 71.50 | .2240 | 4502240 | 71.50 | .2540 | 4502540 | 72.55 | .2840 | 4502840 | 72.55 | .3140 | 4503140 | 72.55 |
| .1945 | 4501945 | 71.50 | .2245 | 4502245 | 71.50 | .2545 | 4502545 | 72.55 | .2845 | 4502845 | 72.55 | .3145 | 4503145 | 72.55 |
| .1950 | 4501950 | 71.50 | .2250 | 4502250 | 71.50 | .2550 | 4502550 | 72.55 | .2850 | 4502850 | 72.55 | .3150 | 450080 | 72.55 |
| .1955 | 4501955 | 71.50 | .2255 | 4502255 | 71.50 | .2555 | 4502555 | 72.55 | .2855 | 4502855 | 72.55 | .3155 | 4503155 | 74.55 |
| .1960 | 4501960 | 71.50 | .2260 | 4502260 | 71.50 | .2560 | 4502560 | 72.55 | .2860 | 4502860 | 72.55 | .3160 | 4503160 | 74.55 |
| .1965 | 4501965 | 71.50 | .2265 | 4502265 | 71.50 | .2565 | 4502565 | 72.55 | .2865 | 4502865 | 72.55 | .3165 | 4503165 | 74.55 |
| .1970 | 4501970 | 71.50 | .2270 | 4502270 | 71.50 | .2570 | 4502570 | 72.55 | .2870 | 4502870 | 72.55 | .3170 | 4503170 | 74.55 |
| .1975 | 4501975 | 71.50 | .2275 | 4502275 | 71.50 | .2575 | 4502575 | 72.55 | .2875 | 4502875 | 72.55 | .3175 | 4503175 | 74.55 |
| .1980 | 4501980 | 71.50 | .2280 | 4502280 | 71.50 | .2580 | 4502580 | 72.55 | .2880 | 4502880 | 72.55 | .3180 | 4503180 | 74.55 |
| .1985 | 4501985 | 71.50 | .2285 | 4502285 | 71.50 | .2585 | 4502585 | 72.55 | .2885 | 4502885 | 72.55 | .3185 | 4503185 | 74.55 |
| .1990 | 4501990 | 71.50 | .2290 | 4502290 | 71.50 | .2590 | 4502590 | 72.55 | .2890 | 4502890 | 72.55 | .3190 | 4503190 | 74.55 |
| .1995 | 4501995 | 71.50 | .2295 | 4502295 | 71.50 | .2595 | 4502595 | 72.55 | .2895 | 4502895 | 72.55 | .3195 | 4503195 | 74.55 |
| .2000 | 4502000 | 71.50 | .2300 | 4502300 | 71.50 | .2600 | 4502600 | 72.55 | .2900 | 4502900 | 72.55 | .3200 | 4503200 | 74.55 |
| .2005 | 4502005 | 71.50 | .2305 | 4502305 | 71.50 | .2605 | 4502605 | 72.55 | .2905 | 4502905 | 72.55 | .3205 | 4503205 | 74.55 |
| .2010 | 4502010 | 71.50 | .2310 | 4502310 | 71.50 | .2610 | 4502610 | 72.55 | .2910 | 4502910 | 72.55 | .3210 | 4503210 | 74.55 |
| .2015 | 4502015 | 71.50 | .2315 | 4502315 | 71.50 | .2615 | 4502615 | 72.55 | .2915 | 4502915 | 72.55 | .3215 | 4503215 | 74.55 |
| .2020 | 4502020 | 71.50 | .2320 | 4502320 | 71.50 | .2620 | 4502620 | 72.55 | .2920 | 4502920 | 72.55 | .3220 | 4503220 | 74.55 |
| .2025 | 4502025 | 71.50 | .2325 | 4502325 | 71.50 | .2625 | 4502625 | 72.55 | .2925 | 4502925 | 72.55 | .3225 | 4503225 | 74.55 |
| .2030 | 4502030 | 71.50 | .2330 | 4502330 | 71.50 | .2630 | 4502630 | 72.55 | .2930 | 4502930 | 72.55 | .3230 | 4503230 | 74.55 |
| .2035 | 4502035 | 71.50 | .2335 | 4502335 | 71.50 | .2635 | 4502635 | 72.55 | .2935 | 4502935 | 72.55 | .3235 | 4503235 | 74.55 |
| .2040 | 4502040 | 71.50 | .2340 | 4502340 | 71.50 | .2640 | 4502640 | 72.55 | .2940 | 4502940 | 72.55 | .3240 | 4503240 | 74.55 |
| .2045 | 4502045 | 71.50 | .2345 | 4502345 | 71.50 | .2645 | 4502645 | 72.55 | .2945 | 4502945 | 72.55 | .3245 | 4503245 | 74.55 |
| .2050 | 4502050 | 71.50 | .2350 | 4502350 | 71.50 | .2650 | 4502650 | 72.55 | .2950 | 4502950 | 72.55 | .3250 | 4503250 | 74.55 |
| .2055 | 4502055 | 71.50 | .2355 | 4502355 | 71.50 | .2655 | 4502655 | 72.55 | .2955 | 4502955 | 72.55 | .3255 | 4503255 | 74.55 |
| .2060 | 4502060 | 71.50 | .2360 | 4502360 | 71.50 | .2660 | 4502660 | 72.55 | .2960 | 4502960 | 72.55 | .3260 | 4503260 | 74.55 |
| .2065 | 4502065 | 71.50 | .2365 | 4502365 | 71.50 | .2665 | 4502665 | 72.55 | .2965 | 4502965 | 72.55 | .3265 | 4503265 | 74.55 |

REAMERS



CHUCKING REAMERS CARBIDE TIPPED TYPE 450 .0005 INCREMENTS



STOCKED DECIMAL TOOL DIAMETERS (.3270 TO .4765) STRAIGHT FLUTE LONG CARBIDE & STRAIGHT SHANK

NOTE: Dimension details and available modifications listed on page 42.

REAMERS

| TOOL DIAM. | EDP NO. | PRICE | TOOL DIAM. | EDP NO. | PRICE | TOOL DIAM. | EDP NO. | PRICE | TOOL DIAM. | EDP NO. | PRICE | TOOL DIAM. | EDP NO. | PRICE |
|------------|---------|---------|------------|---------|---------|------------|---------|---------|------------|---------|---------|------------|---------|---------|
| .3270 | 4503270 | \$74.55 | .3570 | 4503570 | \$74.55 | .3870 | 4503870 | \$77.65 | .4170 | 4504170 | \$82.65 | .4470 | 4504470 | \$88.20 |
| .3275 | 4503275 | 74.55 | .3575 | 4503575 | 74.55 | .3875 | 4503875 | 77.65 | .4175 | 4504175 | 82.65 | .4475 | 4504475 | 88.20 |
| .3280 | 4503280 | 74.55 | .3580 | 4503580 | 74.55 | .3880 | 4503880 | 77.65 | .4180 | 4504180 | 82.65 | .4480 | 4504480 | 88.20 |
| .3285 | 4503285 | 74.55 | .3585 | 4503585 | 74.55 | .3885 | 4503885 | 77.65 | .4185 | 4504185 | 82.65 | .4485 | 4504485 | 88.20 |
| .3290 | 4503290 | 74.55 | .3590 | 4503590 | 74.55 | .3890 | 4503890 | 77.65 | .4190 | 4504190 | 82.65 | .4490 | 4504490 | 88.20 |
| .3295 | 4503295 | 74.55 | .3595 | 4503595 | 74.55 | .3895 | 4503895 | 77.65 | .4195 | 4504195 | 82.65 | .4495 | 4504495 | 88.20 |
| .3300 | 4503300 | 74.55 | .3600 | 4503600 | 74.55 | .3900 | 4503900 | 77.65 | .4200 | 4504200 | 82.65 | .4500 | 4504500 | 88.20 |
| .3305 | 4503305 | 74.55 | .3605 | 4503605 | 74.55 | .3905 | 4503905 | 77.65 | .4205 | 4504205 | 82.65 | .4505 | 4504505 | 88.20 |
| .3310 | 4503310 | 74.55 | .3610 | 4503610 | 74.55 | .3910 | 4503910 | 77.65 | .4210 | 4504210 | 82.65 | .4510 | 4504510 | 88.20 |
| .3315 | 4503315 | 74.55 | .3615 | 4503615 | 74.55 | .3915 | 4503915 | 77.65 | .4215 | 4504215 | 82.65 | .4515 | 4504515 | 88.20 |
| .3320 | 4503320 | 74.55 | .3620 | 4503620 | 74.55 | .3920 | 4503920 | 77.65 | .4220 | 4504220 | 82.65 | .4520 | 4504520 | 88.20 |
| .3325 | 4503325 | 74.55 | .3625 | 4503625 | 74.55 | .3925 | 4503925 | 77.65 | .4225 | 4504225 | 82.65 | .4525 | 4504525 | 88.20 |
| .3330 | 4503330 | 74.55 | .3630 | 4503630 | 74.55 | .3930 | 4503930 | 77.65 | .4230 | 4504230 | 82.65 | .4530 | 4504530 | 88.20 |
| .3335 | 4503335 | 74.55 | .3635 | 4503635 | 74.55 | .3935 | 4503935 | 77.65 | .4235 | 4504235 | 82.65 | .4535 | 4504535 | 88.20 |
| .3340 | 4503340 | 74.55 | .3640 | 4503640 | 74.55 | .3940 | 4503940 | 77.65 | .4240 | 4504240 | 82.65 | .4540 | 4504540 | 88.20 |
| .3345 | 4503345 | 74.55 | .3645 | 4503645 | 74.55 | .3945 | 4503945 | 77.65 | .4245 | 4504245 | 82.65 | .4545 | 4504545 | 88.20 |
| .3350 | 4503350 | 74.55 | .3650 | 4503650 | 74.55 | .3950 | 4503950 | 77.65 | .4250 | 4504250 | 82.65 | .4550 | 4504550 | 88.20 |
| .3355 | 4503355 | 74.55 | .3655 | 4503655 | 74.55 | .3955 | 4503955 | 77.65 | .4255 | 4504255 | 82.65 | .4555 | 4504555 | 88.20 |
| .3360 | 4503360 | 74.55 | .3660 | 4503660 | 74.55 | .3960 | 4503960 | 77.65 | .4260 | 4504260 | 82.65 | .4560 | 4504560 | 88.20 |
| .3365 | 4503365 | 74.55 | .3665 | 4503665 | 74.55 | .3965 | 4503965 | 77.65 | .4265 | 4504265 | 82.65 | .4565 | 4504565 | 88.20 |
| .3370 | 4503370 | 74.55 | .3670 | 4503670 | 74.55 | .3970 | 4503970 | 77.65 | .4270 | 4504270 | 82.65 | .4570 | 4504570 | 88.20 |
| .3375 | 4503375 | 74.55 | .3675 | 4503675 | 74.55 | .3975 | 4503975 | 77.65 | .4275 | 4504275 | 82.65 | .4575 | 4504575 | 88.20 |
| .3380 | 4503380 | 74.55 | .3680 | 4503680 | 74.55 | .3980 | 4503980 | 77.65 | .4280 | 4504280 | 82.65 | .4580 | 4504580 | 88.20 |
| .3385 | 4503385 | 74.55 | .3685 | 4503685 | 74.55 | .3985 | 4503985 | 77.65 | .4285 | 4504285 | 82.65 | .4585 | 4504585 | 88.20 |
| .3390 | 4503390 | 74.55 | .3690 | 4503690 | 74.55 | .3990 | 4503990 | 77.65 | .4290 | 4504290 | 82.65 | .4590 | 4504590 | 88.20 |
| .3395 | 4503395 | 74.55 | .3695 | 4503695 | 74.55 | .3995 | 4503995 | 77.65 | .4295 | 4504295 | 82.65 | .4595 | 4504595 | 88.20 |
| .3400 | 4503400 | 74.55 | .3700 | 4503700 | 74.55 | .4000 | 4504000 | 77.65 | .4300 | 4504300 | 82.65 | .4600 | 4504600 | 88.20 |
| .3405 | 4503405 | 74.55 | .3705 | 4503705 | 74.55 | .4005 | 4504005 | 77.65 | .4305 | 4504305 | 82.65 | .4605 | 4504605 | 88.20 |
| .3410 | 4503410 | 74.55 | .3710 | 4503710 | 74.55 | .4010 | 4504010 | 77.65 | .4310 | 4504310 | 82.65 | .4610 | 4504610 | 88.20 |
| .3415 | 4503415 | 74.55 | .3715 | 4503715 | 74.55 | .4015 | 4504015 | 77.65 | .4315 | 4504315 | 82.65 | .4615 | 4504615 | 88.20 |
| .3420 | 4503420 | 74.55 | .3720 | 4503720 | 74.55 | .4020 | 4504020 | 77.65 | .4320 | 4504320 | 82.65 | .4620 | 4504620 | 88.20 |
| .3425 | 450087 | 74.55 | .3725 | 4503725 | 74.55 | .4025 | 4504025 | 77.65 | .4325 | 4504325 | 82.65 | .4625 | 4504625 | 88.20 |
| .3430 | 4503430 | 74.55 | .3730 | 4503730 | 74.55 | .4030 | 4504030 | 77.65 | .4330 | 4504330 | 82.65 | .4630 | 4504630 | 88.20 |
| .3435 | 4503435 | 74.55 | .3735 | 4503735 | 74.55 | .4035 | 4504035 | 77.65 | .4335 | 4504335 | 82.65 | .4635 | 4504635 | 88.20 |
| .3440 | 4503440 | 74.55 | .3740 | 450095 | 74.55 | .4040 | 4504040 | 77.65 | .4340 | 4504340 | 82.65 | .4640 | 4504640 | 88.20 |
| .3445 | 4503445 | 74.55 | .3745 | 4503745 | 74.55 | .4045 | 4504045 | 77.65 | .4345 | 4504345 | 82.65 | .4645 | 4504645 | 88.20 |
| .3450 | 4503450 | 74.55 | .3750 | 45012 | 59.60 | .4050 | 4504050 | 77.65 | .4350 | 4504350 | 82.65 | .4650 | 4504650 | 88.20 |
| .3455 | 4503455 | 74.55 | .3755 | 4503755 | 74.55 | .4055 | 450103 | 77.65 | .4355 | 4504355 | 82.65 | .4655 | 4504655 | 88.20 |
| .3460 | 4503460 | 74.55 | .3760 | 4503760 | 74.55 | .4060 | 4504060 | 77.65 | .4360 | 4504360 | 82.65 | .4660 | 4504660 | 88.20 |
| .3465 | 450088 | 74.55 | .3765 | 4503765 | 74.55 | .4065 | 4504065 | 77.65 | .4365 | 4504365 | 82.65 | .4665 | 4504665 | 88.20 |
| .3470 | 4503470 | 74.55 | .3770 | 4503770 | 74.55 | .4070 | 4504070 | 77.65 | .4370 | 450111 | 82.65 | .4670 | 4504670 | 88.20 |
| .3475 | 4503475 | 74.55 | .3775 | 4503775 | 74.55 | .4075 | 4504075 | 77.65 | .4375 | 45014 | 67.80 | .4675 | 4504675 | 88.20 |
| .3480 | 4503480 | 74.55 | .3780 | 450096 | 74.55 | .4080 | 4504080 | 77.65 | .4380 | 4504380 | 82.65 | .4680 | 4504680 | 88.20 |
| .3485 | 4503485 | 74.55 | .3785 | 4503785 | 77.65 | .4085 | 4504085 | 77.65 | .4385 | 4504385 | 82.65 | .4685 | 450119 | 88.20 |
| .3490 | 4503490 | 74.55 | .3790 | 4503790 | 77.65 | .4090 | 4504090 | 77.65 | .4390 | 4504390 | 82.65 | .4690 | 4504690 | 88.20 |
| .3495 | 4503495 | 74.55 | .3795 | 4503795 | 77.65 | .4095 | 4504095 | 82.65 | .4395 | 4504395 | 82.65 | .4695 | 4504695 | 88.20 |
| .3500 | 4503500 | 74.55 | .3800 | 4503800 | 77.65 | .4100 | 4504100 | 82.65 | .4400 | 4504400 | 82.65 | .4700 | 4504700 | 88.20 |
| .3505 | 4503505 | 74.55 | .3805 | 4503805 | 77.65 | .4105 | 4504105 | 82.65 | .4405 | 4504405 | 82.65 | .4705 | 4504705 | 88.20 |
| .3510 | 4503510 | 74.55 | .3810 | 4503810 | 77.65 | .4110 | 4504110 | 82.65 | .4410 | 4504410 | 82.65 | .4710 | 4504710 | 88.20 |
| .3515 | 4503515 | 74.55 | .3815 | 4503815 | 77.65 | .4115 | 4504115 | 82.65 | .4415 | 4504415 | 88.20 | .4715 | 4504715 | 88.20 |
| .3520 | 4503520 | 74.55 | .3820 | 4503820 | 77.65 | .4120 | 4504120 | 82.65 | .4420 | 4504420 | 88.20 | .4720 | 4504720 | 88.20 |
| .3525 | 4503525 | 74.55 | .3825 | 4503825 | 77.65 | .4125 | 4504125 | 82.65 | .4425 | 4504425 | 88.20 | .4725 | 4504725 | 94.60 |
| .3530 | 4503530 | 74.55 | .3830 | 4503830 | 77.65 | .4130 | 4504130 | 82.65 | .4430 | 4504430 | 88.20 | .4730 | 4504730 | 94.60 |
| .3535 | 4503535 | 74.55 | .3835 | 4503835 | 77.65 | .4135 | 4504135 | 82.65 | .4435 | 4504435 | 88.20 | .4735 | 4504735 | 94.60 |
| .3540 | 4503540 | 74.55 | .3840 | 4503840 | 77.65 | .4140 | 4504140 | 82.65 | .4440 | 4504440 | 88.20 | .4740 | 4504740 | 94.60 |
| .3545 | 4503545 | 74.55 | .3845 | 4503845 | 77.65 | .4145 | 4504145 | 82.65 | .4445 | 4504445 | 88.20 | .4745 | 4504745 | 94.60 |
| .3550 | 4503550 | 74.55 | .3850 | 4503850 | 77.65 | .4150 | 4504150 | 82.65 | .4450 | 4504450 | 88.20 | .4750 | 4504750 | 94.60 |
| .3555 | 4503555 | 74.55 | .3855 | 4503855 | 77.65 | .4155 | 4504155 | 82.65 | .4455 | 4504455 | 88.20 | .4755 | 4504755 | 94.60 |
| .3560 | 4503560 | 74.55 | .3860 | 4503860 | 77.65 | .4160 | 4504160 | 82.65 | .4460 | 4504460 | 88.20 | .4760 | 4504760 | 94.60 |
| .3565 | 4503565 | 74.55 | .3865 | 4503865 | 77.65 | .4165 | 4504165 | 82.65 | .4465 | 4504465 | 88.20 | .4765 | 4504765 | 94.60 |



CHUCKING REAMERS CARBIDE TIPPED TYPE 450 .0005 INCREMENTS



STOCKED DECIMAL TOOL DIAMETERS (.4770 TO .6265) STRAIGHT FLUTE LONG CARBIDE & STRAIGHT SHANK

NOTE: Dimension details and available modifications listed on page 42.

| TOOL DIAM. | EDP NO. | PRICE | TOOL DIAM. | EDP NO. | PRICE | TOOL DIAM. | EDP NO. | PRICE | TOOL DIAM. | EDP NO. | PRICE | TOOL DIAM. | EDP NO. | PRICE |
|------------|---------|---------|------------|---------|---------|------------|---------|---------|------------|---------|---------|------------|---------|---------|
| .4770 | 4504770 | \$94.60 | .5070 | 4505070 | \$96.70 | .5370 | 4505370 | \$96.70 | .5670 | 4505670 | \$99.80 | .5970 | 4505970 | \$99.80 |
| .4775 | 4504775 | 94.60 | .5075 | 4505075 | 96.70 | .5375 | 4505375 | 96.70 | .5675 | 4505675 | 99.80 | .5975 | 4505975 | 99.80 |
| .4780 | 4504780 | 94.60 | .5080 | 4505080 | 96.70 | .5380 | 4505380 | 96.70 | .5680 | 4505680 | 99.80 | .5980 | 4505980 | 99.80 |
| .4785 | 4504785 | 94.60 | .5085 | 4505085 | 96.70 | .5385 | 4505385 | 96.70 | .5685 | 4505685 | 99.80 | .5985 | 4505985 | 99.80 |
| .4790 | 4504790 | 94.60 | .5090 | 4505090 | 96.70 | .5390 | 4505390 | 96.70 | .5690 | 4505690 | 99.80 | .5990 | 4505990 | 99.80 |
| .4795 | 4504795 | 94.60 | .5095 | 4505095 | 96.70 | .5395 | 4505395 | 96.70 | .5695 | 4505695 | 99.80 | .5995 | 4505995 | 99.80 |
| .4800 | 4504800 | 94.60 | .5100 | 4505100 | 96.70 | .5400 | 4505400 | 96.70 | .5700 | 4505700 | 99.80 | .6000 | 4506000 | 99.80 |
| .4805 | 4504805 | 94.60 | .5105 | 4505105 | 96.70 | .5405 | 4505405 | 96.70 | .5705 | 4505705 | 99.80 | .6005 | 4506005 | 99.80 |
| .4810 | 4504810 | 94.60 | .5110 | 4505110 | 96.70 | .5410 | 4505410 | 96.70 | .5710 | 4505710 | 99.80 | .6010 | 4506010 | 99.80 |
| .4815 | 4504815 | 94.60 | .5115 | 4505115 | 96.70 | .5415 | 4505415 | 96.70 | .5715 | 4505715 | 99.80 | .6015 | 4506015 | 99.80 |
| .4820 | 4504820 | 94.60 | .5120 | 4505120 | 96.70 | .5420 | 4505420 | 96.70 | .5720 | 4505720 | 99.80 | .6020 | 4506020 | 99.80 |
| .4825 | 4504825 | 94.60 | .5125 | 4505125 | 96.70 | .5425 | 4505425 | 96.70 | .5725 | 4505725 | 99.80 | .6025 | 4506025 | 99.80 |
| .4830 | 4504830 | 94.60 | .5130 | 4505130 | 96.70 | .5430 | 4505430 | 96.70 | .5730 | 4505730 | 99.80 | .6030 | 4506030 | 99.80 |
| .4835 | 4504835 | 94.60 | .5135 | 4505135 | 96.70 | .5435 | 4505435 | 96.70 | .5735 | 4505735 | 99.80 | .6035 | 4506035 | 99.80 |
| .4840 | 4504840 | 94.60 | .5140 | 4505140 | 96.70 | .5440 | 4505440 | 96.70 | .5740 | 4505740 | 99.80 | .6040 | 4506040 | 99.80 |
| .4845 | 4504845 | 94.60 | .5145 | 4505145 | 96.70 | .5445 | 4505445 | 96.70 | .5745 | 4505745 | 99.80 | .6045 | 4506045 | 99.80 |
| .4850 | 4504850 | 94.60 | .5150 | 4505150 | 96.70 | .5450 | 4505450 | 96.70 | .5750 | 4505750 | 99.80 | .6050 | 4506050 | 99.80 |
| .4855 | 4504855 | 94.60 | .5155 | 4505155 | 96.70 | .5455 | 4505455 | 96.70 | .5755 | 4505755 | 99.80 | .6055 | 4506055 | 99.80 |
| .4860 | 4504860 | 94.60 | .5160 | 4505160 | 96.70 | .5460 | 4505460 | 96.70 | .5760 | 4505760 | 99.80 | .6060 | 4506060 | 99.80 |
| .4865 | 4504865 | 94.60 | .5165 | 4505165 | 96.70 | .5465 | 4505465 | 96.70 | .5765 | 4505765 | 99.80 | .6065 | 4506065 | 99.80 |
| .4870 | 4504870 | 94.60 | .5170 | 4505170 | 96.70 | .5470 | 4505470 | 96.70 | .5770 | 4505770 | 99.80 | .6070 | 4506070 | 99.80 |
| .4875 | 4504875 | 94.60 | .5175 | 4505175 | 96.70 | .5475 | 4505475 | 96.70 | .5775 | 4505775 | 99.80 | .6075 | 4506075 | 99.80 |
| .4880 | 4504880 | 94.60 | .5180 | 4505180 | 96.70 | .5480 | 4505480 | 96.70 | .5780 | 4505780 | 99.80 | .6080 | 4506080 | 99.80 |
| .4885 | 4504885 | 94.60 | .5185 | 4505185 | 96.70 | .5485 | 4505485 | 96.70 | .5785 | 4505785 | 99.80 | .6085 | 4506085 | 99.80 |
| .4890 | 4504890 | 94.60 | .5190 | 4505190 | 96.70 | .5490 | 4505490 | 96.70 | .5790 | 4505790 | 99.80 | .6090 | 4506090 | 99.80 |
| .4895 | 4504895 | 94.60 | .5195 | 4505195 | 96.70 | .5495 | 4505495 | 96.70 | .5795 | 4505795 | 99.80 | .6095 | 4506095 | 99.80 |
| .4900 | 4504900 | 94.60 | .5200 | 4505200 | 96.70 | .5500 | 4505500 | 96.70 | .5800 | 4505800 | 99.80 | .6100 | 4506100 | 99.80 |
| .4905 | 4504905 | 94.60 | .5205 | 4505205 | 96.70 | .5505 | 4505505 | 96.70 | .5805 | 4505805 | 99.80 | .6105 | 4506105 | 99.80 |
| .4910 | 4504910 | 94.60 | .5210 | 4505210 | 96.70 | .5510 | 4505510 | 96.70 | .5810 | 4505810 | 99.80 | .6110 | 4506110 | 99.80 |
| .4915 | 4504915 | 94.60 | .5215 | 4505215 | 96.70 | .5515 | 4505515 | 96.70 | .5815 | 4505815 | 99.80 | .6115 | 4506115 | 99.80 |
| .4920 | 4504920 | 94.60 | .5220 | 4505220 | 96.70 | .5520 | 4505520 | 96.70 | .5820 | 4505820 | 99.80 | .6120 | 4506120 | 99.80 |
| .4925 | 4504925 | 94.60 | .5225 | 4505225 | 96.70 | .5525 | 4505525 | 96.70 | .5825 | 4505825 | 99.80 | .6125 | 4506125 | 99.80 |
| .4930 | 4504930 | 94.60 | .5230 | 4505230 | 96.70 | .5530 | 4505530 | 96.70 | .5830 | 4505830 | 99.80 | .6130 | 4506130 | 99.80 |
| .4935 | 4504935 | 94.60 | .5235 | 4505235 | 96.70 | .5535 | 4505535 | 96.70 | .5835 | 4505835 | 99.80 | .6135 | 4506135 | 99.80 |
| .4940 | 4504940 | 94.60 | .5240 | 4505240 | 96.70 | .5540 | 4505540 | 96.70 | .5840 | 4505840 | 99.80 | .6140 | 4506140 | 99.80 |
| .4945 | 4504945 | 94.60 | .5245 | 4505245 | 96.70 | .5545 | 4505545 | 96.70 | .5845 | 4505845 | 99.80 | .6145 | 4506145 | 99.80 |
| .4950 | 4504950 | 94.60 | .5250 | 4505250 | 96.70 | .5550 | 4505550 | 96.70 | .5850 | 4505850 | 99.80 | .6150 | 4506150 | 99.80 |
| .4955 | 4504955 | 94.60 | .5255 | 4505255 | 96.70 | .5555 | 4505555 | 96.70 | .5855 | 4505855 | 99.80 | .6155 | 4506155 | 99.80 |
| .4960 | 4504960 | 94.60 | .5260 | 4505260 | 96.70 | .5560 | 4505560 | 96.70 | .5860 | 4505860 | 99.80 | .6160 | 4506160 | 99.80 |
| .4965 | 4504965 | 94.60 | .5265 | 4505265 | 96.70 | .5565 | 4505565 | 96.70 | .5865 | 4505865 | 99.80 | .6165 | 4506165 | 99.80 |
| .4970 | 4504970 | 94.60 | .5270 | 4505270 | 96.70 | .5570 | 4505570 | 96.70 | .5870 | 4505870 | 99.80 | .6170 | 4506170 | 99.80 |
| .4975 | 4504975 | 94.60 | .5275 | 4505275 | 96.70 | .5575 | 4505575 | 96.70 | .5875 | 4505875 | 99.80 | .6175 | 4506175 | 99.80 |
| .4980 | 4504980 | 94.60 | .5280 | 4505280 | 96.70 | .5580 | 4505580 | 96.70 | .5880 | 4505880 | 99.80 | .6180 | 4506180 | 99.80 |
| .4985 | 4504985 | 94.60 | .5285 | 4505285 | 96.70 | .5585 | 4505585 | 96.70 | .5885 | 4505885 | 99.80 | .6185 | 4506185 | 99.80 |
| .4990 | 4504990 | 94.60 | .5290 | 4505290 | 96.70 | .5590 | 4505590 | 96.70 | .5890 | 4505890 | 99.80 | .6190 | 4506190 | 99.80 |
| .4995 | 4504995 | 94.60 | .5295 | 4505295 | 96.70 | .5595 | 4505595 | 96.70 | .5895 | 4505895 | 99.80 | .6195 | 4506195 | 99.80 |
| .5000 | 45016 | 78.35 | .5300 | 4505300 | 96.70 | .5600 | 4505600 | 96.70 | .5900 | 4505900 | 99.80 | .6200 | 4506200 | 99.80 |
| .5005 | 4505005 | 94.60 | .5305 | 4505305 | 96.70 | .5605 | 4505605 | 96.70 | .5905 | 4505905 | 99.80 | .6205 | 4506205 | 99.80 |
| .5010 | 4505010 | 94.60 | .5310 | 4505310 | 96.70 | .5610 | 4505610 | 96.70 | .5910 | 4505910 | 99.80 | .6210 | 4506210 | 99.80 |
| .5015 | 4505015 | 94.60 | .5315 | 450135 | 96.70 | .5615 | 4505615 | 96.70 | .5915 | 4505915 | 99.80 | .6215 | 4506215 | 99.80 |
| .5020 | 4505020 | 94.60 | .5320 | 4505320 | 96.70 | .5620 | 4505620 | 96.70 | .5920 | 4505920 | 99.80 | .6220 | 450158 | 99.80 |
| .5025 | 4505025 | 94.60 | .5325 | 4505325 | 96.70 | .5625 | 45018 | 80.60 | .5925 | 4505925 | 99.80 | .6225 | 4506225 | 99.80 |
| .5030 | 4505030 | 94.60 | .5330 | 4505330 | 96.70 | .5630 | 450143 | 96.70 | .5930 | 4505930 | 99.80 | .6230 | 4506230 | 99.80 |
| .5035 | 4505035 | 96.70 | .5335 | 4505335 | 96.70 | .5635 | 4505635 | 96.70 | .5935 | 4505935 | 99.80 | .6235 | 4506235 | 99.80 |
| .5040 | 4505040 | 96.70 | .5340 | 4505340 | 96.70 | .5640 | 4505640 | 96.70 | .5940 | 4505940 | 99.80 | .6240 | 4506240 | 99.80 |
| .5045 | 4505045 | 96.70 | .5345 | 4505345 | 96.70 | .5645 | 4505645 | 96.70 | .5945 | 450151 | 99.80 | .6245 | 4506245 | 99.80 |
| .5050 | 4505050 | 96.70 | .5350 | 4505350 | 96.70 | .5650 | 4505650 | 96.70 | .5950 | 4505950 | 99.80 | .6250 | 45020 | 83.75 |
| .5055 | 4505055 | 96.70 | .5355 | 4505355 | 96.70 | .5655 | 4505655 | 96.70 | .5955 | 4505955 | 99.80 | .6255 | 4506255 | 99.80 |
| .5060 | 4505060 | 96.70 | .5360 | 4505360 | 96.70 | .5660 | 4505660 | 96.70 | .5960 | 4505960 | 99.80 | .6260 | 450159 | 99.80 |
| .5065 | 4505065 | 96.70 | .5365 | 4505365 | 96.70 | .5665 | 4505665 | 99.80 | .5965 | 4505965 | 99.80 | .6265 | 4506265 | 99.80 |

REAMERS



CHUCKING REAMERS CARBIDE TIPPED TYPE 452 FRACTIONAL



STRAIGHT FLUTE LONG CARBIDE TAPER SHANK



| TOOL SELECTOR | CHIP CLASS | MATERIAL MACHINED | TOOL TYPE |
|---------------|------------|---------------------------|-----------|
| | 20 | NON-FERROUS - LONG CHIPS | 452 |
| | 40 | NON-FERROUS - SHORT CHIPS | 452 |
| | 60 | CAST IRONS | 452 |
| | 80 | LOW STRENGTH STEELS | 452 |
| | 100 | MEDIUM STRENGTH STEELS | 452 |
| | 120 | HIGH STRENGTH STEELS | 452 |
| | 140 | HIGH TEMPERATURE ALLOYS | 452 |

MODIFICATIONS (Prompt delivery)

- Modified tool diameter - priced below
- Modified metric tool diameter - priced on pg. 49
- Closer tool diameter tolerance - pg. 15
- Cutting diameter reduced for step or pilot
- End chamfer other than 45°
- End cutting or corner radius
- Increased/decreased circular margin
- Increased/decreased tool diam. back taper
- Shank whistle notch for set screw
- Smaller taper shank
- Coatings available:

TITANIUM NITRIDE - TiN

TITANIUM CARBONITRIDE - TiCN

ZIRCONIUM NITRIDE - ZrN

AL TITANIUM NITRIDE - AlTiN

TYPE 452

- Straight polished flutes with flute long carbide
- Taper shank
- Detailed specifications on page 15

USE:

- For all general reaming - specifically designed with flute long carbide for deep hole reaming to precision tolerances and for long production runs

| TOOL DIAMETER | | TYPE 452 EDP NO. | PRICE | DIMENSIONS | | | | MODIFIED DIAMETER RANGE | FINISHED TO MODIFIED TOOL DIAMETER | | | | | |
|---------------|---------|---------------------|---------|-----------------------|-------------------|--------------------|--------------|-------------------------------|--|---------|---------|---------|---------|---------|
| FRACTIONAL | DECIMAL | | | TAPER SHANK NO. | NO. OF FLTS | LENGTH | | | PRICE EACH - BASED ON QUANTITY ORDERED | | | | | |
| | | | | | | FLUTE & CARBIDE | OVER- ALL | | 1 | 2 | 3 | 4 | 5-7 | 8-14* |
| 1/4 | .2500 | 45208 | \$64.90 | 1 | 4 | 1 1/2 | 6 | 0.2381-0.2530 | \$110.10 | \$87.45 | \$79.85 | \$76.20 | \$72.40 | \$69.25 |
| 9/32 | .2812 | 45209 | 65.70 | 1 | 4 | 1 1/2 | 6 | 0.2531-0.2840 | 111.00 | 88.40 | 80.70 | 77.10 | 73.20 | 70.20 |
| 5/16 | .3125 | 45210 | 65.70 | 1 | 4 | 1 1/2 | 6 | 0.2841-0.3150 | 111.00 | 88.40 | 80.70 | 77.10 | 73.20 | 70.20 |
| 11/32 | .3438 | 45211 | 67.25 | 1 | 4 | 1 1/2 | 6 | 0.3151-0.3470 | 112.45 | 89.90 | 82.30 | 78.55 | 74.70 | 71.65 |
| 3/8 | .3750 | 45212 | 68.00 | 1 | 4 | 1 3/4 | 7 | 0.3471-0.3780 | 113.20 | 90.60 | 82.95 | 79.35 | 75.45 | 72.50 |
| 13/32 | .4062 | 45213 | 71.60 | 1 | 4 | 1 3/4 | 7 | 0.3781-0.4090 | 116.85 | 94.05 | 86.55 | 82.95 | 79.15 | 76.10 |
| 7/16 | .4375 | 45214 | 76.25 | 1 | 4 | 1 3/4 | 7 | 0.4091-0.4410 | 121.45 | 98.90 | 91.30 | 87.70 | 83.80 | 80.70 |
| 15/32 | .4688 | 45215 | 77.85 | 1 | 4 | 1 3/4 | 7 | 0.4411-0.4720 | 123.20 | 100.35 | 92.90 | 89.25 | 85.40 | 82.35 |
| 1/2 | .5000 | 45216 | 84.00 | 1 | 6 | 2 | 8 | 0.4721-0.5030 | 132.30 | 108.10 | 99.95 | 96.15 | 91.95 | 88.75 |
| 17/32 | .5312 | 45217 | 91.95 | 1 | 6 | 2 | 8 | 0.5031-0.5340 | 140.45 | 116.10 | 107.95 | 104.15 | 99.95 | 96.70 |
| 9/16 | .5625 | 45218 | 91.95 | 1 | 6 | 2 | 8 | 0.5341-0.5660 | 140.45 | 116.10 | 107.95 | 104.15 | 99.95 | 96.70 |
| 19/32 | .5938 | 45219 | 96.20 | 1 | 6 | 2 | 8 | 0.5661-0.5970 | 144.60 | 120.40 | 112.30 | 108.45 | 104.25 | 101.00 |
| 5/8 | .6250 | 45220 | 96.20 | 2 | 6 | 2 | 9 | 0.5971-0.6280 | 144.60 | 120.40 | 112.30 | 108.45 | 104.25 | 101.00 |
| 21/32 | .6562 | 45221 | 98.00 | 2 | 6 | 2 | 9 | 0.6281-0.6590 | 146.50 | 122.15 | 113.95 | 110.20 | 106.00 | 102.80 |
| 11/16 | .6875 | 45222 | 98.00 | 2 | 6 | 2 | 9 | 0.6591-0.6910 | 146.50 | 122.15 | 113.95 | 110.20 | 106.00 | 102.80 |
| 23/32 | .7188 | 45223 | 99.35 | 2 | 6 | 2 | 9 | 0.6911-0.7220 | 147.90 | 123.50 | 115.35 | 111.60 | 107.40 | 104.15 |
| 3/4 | .7500 | 45224 | 102.55 | 2 | 6 | 2 | 9 1/2 | 0.7221-0.7530 | 151.00 | 126.70 | 118.60 | 114.70 | 110.45 | 107.35 |
| 25/32 | .7812 | 45225 | 103.35 | 2 | 6 | 2 | 9 1/2 | 0.7531-0.7840 | 151.80 | 127.55 | 119.45 | 115.40 | 111.35 | 108.10 |
| 13/16 | .8125 | 45226 | 105.80 | 2 | 6 | 2 | 9 1/2 | 0.7841-0.8160 | 154.05 | 129.75 | 121.80 | 117.95 | 113.75 | 110.40 |
| 27/32 | .8438 | 45227 | 110.30 | 2 | 6 | 2 | 9 1/2 | 0.8161-0.8470 | 158.85 | 134.50 | 126.35 | 122.60 | 118.35 | 115.20 |
| 7/8 | .8750 | 45228 | 114.60 | 2 | 6 | 2 1/4 | 10 | 0.8471-0.8780 | 164.85 | 139.65 | 131.05 | 127.30 | 122.75 | 119.55 |
| 29/32 | .9062 | 45229 | 129.05 | 2 | 6 | 2 1/4 | 10 | 0.8781-0.9090 | 179.20 | 154.05 | 145.75 | 141.70 | 137.25 | 133.95 |
| 15/16 | .9375 | 45230 | 134.25 | 3 | 8 | 2 1/4 | 10 | 0.9091-0.9410 | 184.30 | 159.20 | 150.85 | 146.80 | 142.45 | 139.10 |
| 31/32 | .9688 | 45231 | 139.70 | 3 | 8 | 2 1/4 | 10 | 0.9411-0.9720 | 190.00 | 164.85 | 156.35 | 152.35 | 148.00 | 144.70 |
| 1 | 1.0000 | 45232 | 139.70 | 3 | 8 | 2 1/4 | 10 1/2 | 0.9721-1.0030 | 190.00 | 164.85 | 156.35 | 152.35 | 148.00 | 144.70 |
| 1 1/16 | 1.0625 | 45234 | 191.50 | 3 | 8 | 2 1/4 | 10 1/2 | 1.0031-1.0660 | 239.65 | 215.40 | 207.40 | 203.65 | 199.45 | 196.15 |
| 1 1/8 | 1.1250 | 45236 | 206.25 | 3 | 8 | 2 1/4 | 11 | 1.0661-1.1280 | 254.35 | 230.30 | 222.30 | 218.35 | 214.20 | 210.95 |
| 1 3/16 | 1.1875 | 45238 | 221.65 | 3 | 8 | 2 1/4 | 11 | 1.1281-1.1905 | 269.75 | 245.60 | 237.55 | 233.65 | 229.70 | 226.30 |
| 1 1/4 | 1.2500 | 45240 | 235.55 | 4 | 8 | 2 1/2 | 11 1/2 | 1.1906-1.2530 | 283.60 | 259.50 | 251.50 | 247.50 | 243.35 | 240.20 |
| 1 5/16 | 1.3125 | 45242 | 265.90 | 4 | 8 | 2 1/2 | 11 1/2 | 1.2531-1.3155 | 314.05 | 290.00 | 281.75 | 278.10 | 273.90 | 270.65 |
| 1 3/8 | 1.3750 | 45244 | 303.85 | 4 | 8 | 2 1/2 | 12 | 1.3156-1.3780 | 351.95 | 327.90 | 319.75 | 315.90 | 311.75 | 308.50 |
| 1 7/16 | 1.4375 | 45246 | 317.10 | 4 | 8 | 2 1/2 | 12 | 1.3781-1.4405 | 365.30 | 341.20 | 333.10 | 329.40 | 325.10 | 321.80 |
| 1 1/2 | 1.5000 | 45248 | 330.35 | 4 | 8 | 2 1/2 | 12 1/2 | 1.4406-1.5030 | 378.50 | 354.50 | 346.40 | 342.50 | 338.35 | 335.05 |

*Quantities of 15 or more - price of fractional size in same size range.



CHUCKING REAMERS CARBIDE TIPPED TYPE 452 METRIC



STRAIGHT FLUTE LONG CARBIDE TAPER SHANK



NOTE: Tool diameter in millimeters (mm); all other dimensions in inches. Also, modifications available (see list on page 48).

| TOOL DIAMETER | | TYPE 452 METRIC EDP NO. | METRIC PRICE | DIMENSIONS | | | | FINISHED TO MODIFIED TOOL DIAMETER | | | | | | | | |
|---------------|--------|-------------------------|--------------|-----------------|-------------|-----------------|----------|------------------------------------|--|---------|---------|---------|---------|---------|---------|--|
| mm | INCH | | | TAPER SHANK NO. | NO. OF FLTS | LENGTH | | MODIFIED DIAMETER RANGE (mm) | PRICE EACH - BASED ON QUANTITY ORDERED | | | | | | | |
| | | | | | | FLUTE & CARBIDE | OVER-ALL | | 1 | 2 | 3 | 4 | 5-7 | 8-14 | OVER 14 | |
| 6.0 | .2362 | 452060 | \$79.85 | 1 | 4 | 1 1/2 | 6 | 6.000-6.426 | \$113.85 | \$91.30 | \$83.75 | \$80.00 | \$76.20 | \$73.10 | \$68.75 | |
| 6.5 | .2559 | 452065 | 80.70 | 1 | 4 | 1 1/2 | 6 | 6.427-7.214 | 114.70 | 92.25 | 84.70 | 81.05 | 77.10 | 74.10 | 69.65 | |
| 7.0 | .2756 | 452070 | 80.70 | 1 | 4 | 1 1/2 | 6 | - | - | - | - | - | - | - | - | |
| 7.5 | .2953 | 452075 | 80.70 | 1 | 4 | 1 1/2 | 6 | 7.215-8.001 | 114.70 | 92.25 | 84.70 | 81.05 | 77.10 | 74.10 | 69.65 | |
| 8.0 | .3150 | 452080 | 80.70 | 1 | 4 | 1 1/2 | 6 | - | - | - | - | - | - | - | - | |
| 8.5 | .3346 | 452085 | 82.30 | 1 | 4 | 1 1/2 | 6 | 8.002-8.814 | 116.30 | 93.70 | 86.20 | 82.45 | 78.55 | 75.45 | 71.10 | |
| 9.0 | .3543 | 452090 | 82.95 | 1 | 4 | 1 3/4 | 7 | 8.815-9.601 | 117.00 | 94.55 | 86.80 | 83.05 | 79.35 | 76.20 | 71.80 | |
| 9.5 | .3740 | 452095 | 82.95 | 1 | 4 | 1 3/4 | 7 | - | - | - | - | - | - | - | - | |
| 10.0 | .3937 | 452100 | 86.55 | 1 | 4 | 1 3/4 | 7 | 9.602-10.389 | 120.65 | 98.00 | 90.40 | 86.70 | 82.95 | 79.85 | 75.45 | |
| 10.5 | .4134 | 452105 | 91.30 | 1 | 4 | 1 3/4 | 7 | 10.390-11.201 | 125.20 | 102.75 | 95.20 | 91.55 | 87.70 | 84.50 | 80.25 | |
| 11.0 | .4331 | 452110 | 91.30 | 1 | 4 | 1 3/4 | 7 | - | - | - | - | - | - | - | - | |
| 11.5 | .4528 | 452115 | 92.90 | 1 | 4 | 1 3/4 | 7 | 11.202-11.989 | 126.90 | 104.25 | 96.75 | 93.10 | 89.25 | 86.20 | 81.65 | |
| 12.0 | .4724 | 452120 | 99.95 | 1 | 6 | 2 | 8 | 11.990-12.776 | 136.45 | 112.30 | 104.15 | 100.20 | 96.15 | 92.70 | 88.10 | |
| 12.5 | .4921 | 452125 | 99.95 | 1 | 6 | 2 | 8 | - | - | - | - | - | - | - | - | |
| 13.0 | .5118 | 452130 | 107.95 | 1 | 6 | 2 | 8 | 12.777-13.564 | 144.45 | 120.25 | 112.25 | 108.35 | 104.15 | 100.80 | 96.15 | |
| 13.5 | .5315 | 452135 | 107.95 | 1 | 6 | 2 | 8 | - | - | - | - | - | - | - | - | |
| 14.0 | .5512 | 452140 | 107.95 | 1 | 6 | 2 | 8 | 13.565-14.376 | 144.45 | 120.25 | 112.25 | 108.35 | 104.15 | 100.80 | 96.15 | |
| 14.5 | .5709 | 452145 | 112.30 | 1 | 6 | 2 | 8 | 14.377-15.164 | 148.65 | 124.65 | 116.45 | 112.45 | 108.45 | 104.95 | 100.35 | |
| 15.0 | .5906 | 452150 | 112.30 | 1 | 6 | 2 | 8 | - | - | - | - | - | - | - | - | |
| 15.5 | .6102 | 452155 | 112.30 | 2 | 6 | 2 | 9 | 15.165-15.951 | 148.65 | 124.65 | 116.45 | 112.45 | 108.45 | 104.95 | 100.35 | |
| 16.0 | .6299 | 452160 | 113.95 | 2 | 6 | 2 | 9 | 15.952-16.739 | 150.50 | 126.25 | 118.20 | 114.25 | 110.20 | 106.95 | 102.15 | |
| 16.5 | .6496 | 452165 | 113.95 | 2 | 6 | 2 | 9 | - | - | - | - | - | - | - | - | |
| 17.0 | .6693 | 452170 | 113.95 | 2 | 6 | 2 | 9 | 16.740-17.551 | 150.50 | 126.25 | 118.20 | 114.25 | 110.20 | 106.95 | 102.15 | |
| 17.5 | .6890 | 452175 | 113.95 | 2 | 6 | 2 | 9 | - | - | - | - | - | - | - | - | |
| 18.0 | .7087 | 452180 | 115.35 | 2 | 6 | 2 | 9 | 17.552-18.339 | 151.95 | 127.70 | 119.70 | 115.65 | 111.60 | 108.35 | 103.50 | |
| 18.5 | .7283 | 452185 | 118.60 | 2 | 6 | 2 | 9 1/2 | 18.340-19.126 | 155.10 | 130.85 | 122.70 | 118.75 | 114.70 | 111.35 | 106.75 | |
| 19.0 | .7480 | 452190 | 118.60 | 2 | 6 | 2 | 9 1/2 | - | - | - | - | - | - | - | - | |
| 19.5 | .7677 | 452195 | 119.45 | 2 | 6 | 2 | 9 1/2 | 19.127-19.914 | 155.80 | 131.75 | 123.50 | 119.70 | 115.40 | 112.25 | 107.45 | |
| 20.0 | .7874 | 452200 | 121.80 | 2 | 6 | 2 | 9 1/2 | 19.915-20.726 | 158.25 | 133.95 | 125.90 | 122.00 | 117.95 | 114.55 | 109.95 | |
| 20.5 | .8071 | 452205 | 121.80 | 2 | 6 | 2 | 9 1/2 | - | - | - | - | - | - | - | - | |
| 21.0 | .8268 | 452210 | 126.35 | 2 | 6 | 2 | 9 1/2 | 20.727-21.514 | 162.85 | 138.70 | 130.65 | 126.60 | 122.60 | 119.25 | 114.55 | |
| 21.5 | .8465 | 452215 | 126.35 | 2 | 6 | 2 | 9 1/2 | - | - | - | - | - | - | - | - | |
| 22.0 | .8661 | 452220 | 126.35 | 2 | 6 | 2 1/4 | 10 | 21.515-22.301 | 162.85 | 138.70 | 130.65 | 126.60 | 122.60 | 119.25 | 114.55 | |
| 22.5 | .8858 | 452225 | 145.75 | 2 | 6 | 2 1/4 | 10 | 22.302-23.089 | 183.45 | 158.35 | 149.95 | 145.85 | 141.70 | 138.20 | 133.50 | |
| 23.0 | .9055 | 452230 | 145.75 | 2 | 6 | 2 1/4 | 10 | - | - | - | - | - | - | - | - | |
| 23.5 | .9252 | 452235 | 150.85 | 3 | 8 | 2 1/4 | 10 | 23.090-23.901 | 188.60 | 163.50 | 155.20 | 151.00 | 146.80 | 143.30 | 138.45 | |
| 24.0 | .9449 | 452240 | 156.35 | 3 | 8 | 2 1/4 | 10 | 23.902-24.689 | 194.20 | 169.05 | 160.70 | 156.65 | 152.35 | 148.85 | 144.00 | |
| 24.5 | .9646 | 452245 | 156.35 | 3 | 8 | 2 1/4 | 10 | - | - | - | - | - | - | - | - | |
| 25.0 | .9843 | 452250 | 156.35 | 3 | 8 | 2 1/4 | 10 1/2 | 24.690-25.476 | 194.20 | 169.05 | 160.70 | 156.65 | 152.35 | 148.85 | 144.00 | |
| 25.5 | 1.0039 | 452255 | 207.40 | 3 | 8 | 2 1/4 | 10 1/2 | 25.477-27.076 | 243.75 | 219.65 | 211.50 | 207.65 | 203.65 | 200.30 | 195.70 | |
| 26.0 | 1.0236 | 452260 | 207.40 | 3 | 8 | 2 1/4 | 10 1/2 | - | - | - | - | - | - | - | - | |
| 27.0 | 1.0630 | 452270 | 207.40 | 3 | 8 | 2 1/4 | 10 1/2 | - | - | - | - | - | - | - | - | |
| 28.0 | 1.1024 | 452280 | 222.30 | 3 | 8 | 2 1/4 | 11 | 27.077-28.651 | 258.45 | 234.45 | 226.30 | 222.40 | 218.35 | 215.00 | 210.45 | |
| 29.0 | 1.1417 | 452290 | 237.55 | 3 | 8 | 2 1/4 | 11 | 28.652-30.239 | 273.80 | 249.80 | 241.65 | 237.80 | 233.65 | 230.40 | 225.75 | |
| 30.0 | 1.1811 | 452300 | 237.55 | 3 | 8 | 2 1/4 | 11 | - | - | - | - | - | - | - | - | |
| 31.0 | 1.2205 | 452310 | 251.50 | 4 | 8 | 2 1/2 | 11 1/2 | 30.240-31.826 | 287.65 | 263.70 | 255.55 | 251.65 | 247.50 | 244.20 | 239.65 | |
| 32.0 | 1.2598 | 452320 | 281.75 | 4 | 8 | 2 1/2 | 11 1/2 | 31.827-33.414 | 318.15 | 294.00 | 286.05 | 282.05 | 278.10 | 274.65 | 269.95 | |
| 33.0 | 1.2992 | 452330 | 281.75 | 4 | 8 | 2 1/2 | 11 1/2 | - | - | - | - | - | - | - | - | |
| 34.0 | 1.3386 | 452340 | 319.75 | 4 | 8 | 2 1/2 | 12 | 33.415-35.001 | 356.00 | 332.00 | 323.90 | 320.05 | 315.90 | 312.60 | 307.95 | |
| 35.0 | 1.3780 | 452350 | 319.75 | 4 | 8 | 2 1/2 | 12 | - | - | - | - | - | - | - | - | |
| 36.0 | 1.4173 | 452360 | 333.10 | 4 | 8 | 2 1/2 | 12 | 35.002-36.589 | 369.30 | 345.25 | 337.25 | 333.25 | 329.40 | 325.85 | 321.10 | |
| 37.0 | 1.4567 | 452370 | 346.40 | 4 | 8 | 2 1/2 | 12 1/2 | 36.590-38.176 | 382.65 | 358.50 | 350.45 | 346.70 | 342.50 | 339.25 | 334.65 | |
| 38.0 | 1.4961 | 452380 | 346.40 | 4 | 8 | 2 1/2 | 12 1/2 | - | - | - | - | - | - | - | - | |

REAMERS



CHUCKING REAMERS CARBIDE TIPPED TYPE 465 FRACTIONAL



EXPANSION REAMERS STRAIGHT FLUTE LONG CARBIDE STRAIGHT SHANK



TYPE 465

- Expansion screw permits expansion of tool diameter for regrinding after wear without reinserting carbide
- Straight polished flutes with flute long carbide; Straight shank
- Detailed specifications, including minimum expansion, on page 15

USE:

- Expansion reamers are recommended for reaming abrasive materials. As the diameter wears down, the reamers can be expanded many times by tightening the end expansion screw and regrinding to its original size. Expansion reamers should not be considered as adjustable for use in producing holes of different sizes.

| TOOL SELECTOR | CHIP CLASS | MATERIAL MACHINED | TOOL TYPE |
|---------------|------------|---------------------------|-----------------------|
| | 20 | NON-FERROUS - LONG CHIPS | 465/464 ^{MS} |
| | 40 | NON-FERROUS - SHORT CHIPS | 465/464 ^{MS} |
| | 60 | CAST IRONS | 465/466 ^{MS} |
| | 80 | LOW STRENGTH STEELS | 465/468 ^{MS} |
| | 100 | MEDIUM STRENGTH STEELS | 465/468 ^{MS} |
| | 120 | HIGH STRENGTH STEELS | 465/468 ^{MS} |
| | 140 | HIGH TEMPERATURE ALLOYS | 468 ^{MS} |

^{MS}See page 67 for material specific reamers

MODIFICATIONS (See list on page 54, except expansion reamers can not be coated; modified metric tool diameters priced on page 51)

NOTE: For semi-finished reamers, see page 39.

| TOOL DIAMETER | | TYPE 465 EDP NO. | PRICE | DIMENSIONS | | | | FINISHED TO MODIFIED TOOL DIAMETER | | | | | | |
|---------------|---------|------------------|---------|-------------|-------------|-----------------|----------|------------------------------------|--|----------|----------|---------|---------|---------|
| FRACTIONAL | DECIMAL | | | SHANK DIAM. | NO. OF FLTS | LENGTH | | MODIFIED DIAMETER RANGE | PRICE EACH - BASED ON QUANTITY ORDERED | | | | | |
| | | | | | | FLUTE & CARBIDE | OVER-ALL | | | 1 | 2 | 3 | 4 | 5-7 |
| 5/16 | .3125 | 46510 | \$86.90 | 5/32 | 4 | 1 | 6 | 0.2841-0.3150 | \$132.15 | \$109.50 | \$101.80 | \$98.40 | \$94.55 | \$91.45 |
| 1/32 | .3438 | 46511 | 86.90 | 5/32 | 4 | 1 | 6 | 0.3151-0.3470 | 132.15 | 109.50 | 101.80 | 98.40 | 94.55 | 91.45 |
| 3/8 | .3750 | 46512 | 81.45 | 5/16 | 4 | 1 | 7 | 0.3471-0.3780 | 123.95 | 102.65 | 95.45 | 92.15 | 88.55 | 85.65 |
| 13/32 | .4062 | 46513 | 86.50 | 5/16 | 4 | 1 | 7 | 0.3781-0.4090 | 128.75 | 107.60 | 100.45 | 97.05 | 93.45 | 90.60 |
| 7/16 | .4375 | 46514 | 86.50 | 3/8 | 4 | 1 | 7 | 0.4091-0.4410 | 128.75 | 107.60 | 100.45 | 97.05 | 93.45 | 90.60 |
| 15/32 | .4688 | 46515 | 91.70 | 3/8 | 4 | 1 | 7 | 0.4411-0.4720 | 133.85 | 112.70 | 105.70 | 102.25 | 98.70 | 95.90 |
| 1/2 | .5000 | 46516 | 91.70 | 7/16 | 6 | 1 | 8 | 0.4721-0.5030 | 133.85 | 112.70 | 105.70 | 102.25 | 98.70 | 95.90 |
| 17/32 | .5312 | 46517 | 93.90 | 7/16 | 6 | 1 | 8 | 0.5031-0.5340 | 136.35 | 115.15 | 107.95 | 104.70 | 101.00 | 98.10 |
| 9/16 | .5625 | 46518 | 93.90 | 7/16 | 6 | 1 1/8 | 8 | 0.5341-0.5660 | 136.35 | 115.15 | 107.95 | 104.70 | 101.00 | 98.10 |
| 19/32 | .5938 | 46519 | 98.05 | 7/16 | 6 | 1 1/8 | 8 | 0.5661-0.5970 | 140.45 | 119.25 | 112.20 | 108.75 | 105.05 | 102.20 |
| 5/8 | .6250 | 46520 | 98.05 | 9/16 | 6 | 1 1/4 | 9 | 0.5971-0.6280 | 140.45 | 119.25 | 112.20 | 108.75 | 105.05 | 102.20 |
| 21/32 | .6562 | 46521 | 107.25 | 9/16 | 6 | 1 1/4 | 9 | 0.6281-0.6590 | 149.50 | 128.35 | 121.25 | 117.95 | 114.25 | 111.35 |
| 11/16 | .6875 | 46522 | 107.25 | 9/16 | 6 | 1 1/4 | 9 | 0.6591-0.6910 | 149.50 | 128.35 | 121.25 | 117.95 | 114.25 | 111.35 |
| 23/32 | .7188 | 46523 | 111.15 | 9/16 | 6 | 1 1/4 | 9 | 0.6911-0.7220 | 153.65 | 132.30 | 125.15 | 121.85 | 118.20 | 115.35 |
| 3/4 | .7500 | 46524 | 111.15 | 5/8 | 6 | 1 3/8 | 9 1/2 | 0.7221-0.7530 | 153.65 | 132.30 | 125.15 | 121.85 | 118.20 | 115.35 |
| 25/32 | .7812 | 46525 | 119.85 | 5/8 | 6 | 1 3/8 | 9 1/2 | 0.7531-0.7840 | 162.30 | 141.05 | 133.80 | 130.60 | 126.90 | 124.05 |
| 13/16 | .8125 | 46526 | 119.85 | 5/8 | 6 | 1 3/8 | 9 1/2 | 0.7841-0.8160 | 162.30 | 141.05 | 133.80 | 130.60 | 126.90 | 124.05 |
| 27/32 | .8438 | 46527 | 124.65 | 3/4 | 6 | 1 1/2 | 10 | 0.8161-0.8470 | 166.90 | 145.75 | 138.65 | 135.20 | 131.65 | 128.70 |
| 7/8 | .8750 | 46528 | 129.30 | 3/4 | 6 | 1 1/2 | 10 | 0.8471-0.8780 | 173.10 | 151.20 | 143.70 | 140.40 | 136.55 | 133.60 |
| 29/32 | .9062 | 46529 | 137.60 | 3/4 | 6 | 1 1/2 | 10 | 0.8781-0.9090 | 181.60 | 159.50 | 152.20 | 148.70 | 144.90 | 141.90 |
| 15/16 | .9375 | 46530 | 137.60 | 3/4 | 8 | 1 1/2 | 10 | 0.9091-0.9410 | 181.60 | 159.50 | 152.20 | 148.70 | 144.90 | 141.90 |
| 31/32 | .9688 | 46531 | 143.05 | 3/4 | 8 | 1 1/2 | 10 | 0.9411-0.9720 | 186.85 | 164.90 | 157.45 | 154.00 | 150.20 | 147.20 |
| 1 | 1.0000 | 46532 | 143.05 | 7/8 | 8 | 1 5/8 | 10 1/2 | 0.9721-1.0030 | 186.85 | 164.90 | 157.45 | 154.00 | 150.20 | 147.20 |
| 1 1/32 | 1.0312 | 46533 | 156.70 | 7/8 | 8 | 1 5/8 | 10 1/2 | - | - | - | - | - | - | - |
| 1 1/16 | 1.0625 | 46534 | 156.70 | 7/8 | 8 | 1 5/8 | 10 1/2 | 1.0031-1.0660 | 200.60 | 178.65 | 171.25 | 167.75 | 164.00 | 160.95 |
| 1 3/32 | 1.0938 | 46535 | 156.70 | 7/8 | 8 | 1 3/4 | 11 | - | - | - | - | - | - | - |
| 1 1/8 | 1.1250 | 46536 | 156.70 | 7/8 | 8 | 1 3/4 | 11 | 1.0661-1.1280 | 200.60 | 178.65 | 171.25 | 167.75 | 164.00 | 160.95 |
| 1 3/16 | 1.1875 | 46538 | 171.00 | 1 | 8 | 1 3/4 | 11 | 1.1281-1.1905 | 214.95 | 192.90 | 185.50 | 182.00 | 178.15 | 175.35 |
| 1 1/4 | 1.2500 | 46540 | 171.00 | 1 | 8 | 1 7/8 | 11 1/2 | 1.1906-1.2530 | 214.95 | 192.90 | 185.50 | 182.00 | 178.15 | 175.35 |
| 1 5/16 | 1.3125 | 46542 | 189.50 | 1 | 8 | 1 7/8 | 11 1/2 | 1.2531-1.3155 | 233.55 | 211.50 | 204.20 | 200.60 | 196.85 | 194.00 |
| 1 3/8 | 1.3750 | 46544 | 198.50 | 1 | 8 | 2 | 12 | 1.3156-1.3780 | 242.45 | 220.35 | 213.05 | 209.70 | 205.70 | 202.80 |
| 1 7/16 | 1.4375 | 46546 | 234.55 | 1 1/4 | 8 | 2 | 12 | 1.3781-1.4405 | 281.45 | 257.95 | 250.05 | 246.25 | 242.25 | 239.20 |
| 1 1/2 | 1.5000 | 46548 | 241.40 | 1 1/4 | 8 | 2 1/8 | 12 1/2 | 1.4406-1.5030 | 288.30 | 264.70 | 257.00 | 253.35 | 249.20 | 246.00 |
| 1 9/16 | 1.5625 | 46550 | 317.05 | 1 1/4 | 8 | 2 1/8 | 12 1/2 | 1.5031-1.5660 | 363.85 | 340.55 | 332.50 | 328.70 | 324.80 | 321.60 |
| 1 5/8 | 1.6250 | 46552 | 317.05 | 1 1/4 | 8 | 2 1/4 | 13 | 1.5661-1.6280 | 363.85 | 340.55 | 332.50 | 328.70 | 324.80 | 321.60 |
| 1 11/16 | 1.6875 | 46554 | 351.10 | 1 1/4 | 8 | 2 1/4 | 13 | 1.6281-1.6910 | 398.00 | 374.50 | 366.70 | 362.90 | 359.00 | 355.65 |
| 1 3/4 | 1.7500 | 46556 | 351.10 | 1 1/4 | 10 | 2 3/8 | 13 1/2 | 1.6911-1.7530 | 398.00 | 374.50 | 366.70 | 362.90 | 359.00 | 355.65 |
| 1 13/16 | 1.8125 | 46558 | 415.85 | 1 1/2 | 10 | 2 3/8 | 13 1/2 | 1.7531-1.8160 | 462.60 | 439.10 | 431.30 | 427.50 | 423.55 | 420.35 |
| 1 7/8 | 1.8750 | 46560 | 415.85 | 1 1/2 | 10 | 2 1/2 | 14 | 1.8161-1.8780 | 462.60 | 439.10 | 431.30 | 427.50 | 423.55 | 420.35 |
| 1 15/16 | 1.9375 | 46562 | 454.30 | 1 1/2 | 10 | 2 1/2 | 14 | 1.8781-1.9410 | 501.05 | 477.65 | 469.75 | 465.90 | 462.05 | 458.80 |
| 2 | 2.0000 | 46564 | 454.30 | 1 1/2 | 12 | 2 1/2 | 14 | 1.9411-2.0030 | 501.05 | 477.65 | 469.75 | 465.90 | 462.05 | 458.80 |
| 2 1/8 | 2.1250 | 46568 | 737.80 | 1 1/2 | 12 | 2 3/4 | 14 1/2 | 2.0031-2.1280 | 784.75 | 761.25 | 753.35 | 749.70 | 745.65 | 742.35 |
| 2 1/4 | 2.2500 | 46572 | 792.45 | 1 3/4 | 12 | 2 3/4 | 14 1/2 | 2.1281-2.2530 | 839.15 | 815.80 | 807.90 | 804.15 | 800.15 | 796.95 |
| 2 3/8 | 2.3750 | 46576 | 820.00 | 1 3/4 | 12 | 3 | 15 | 2.2531-2.3780 | 866.95 | 843.50 | 835.55 | 831.75 | 827.80 | 824.60 |
| 2 1/2 | 2.5000 | 46580 | 820.00 | 1 3/4 | 12 | 3 | 15 | 2.3781-2.5030 | 866.95 | 843.50 | 835.55 | 831.75 | 827.80 | 824.60 |

*Quantities of 15 or more - price of fractional size in same size range.

REAMERS



CHUCKING REAMERS CARBIDE TIPPED TYPE 465 METRIC



EXPANSION REAMERS STRAIGHT FLUTE LONG CARBIDE STRAIGHT SHANK



NOTE: Tool diameter in millimeters (mm); all other dimensions in inches. Also, modifications available (see list on page 54, except no coatings).

| TOOL DIAMETER | | TYPE 465 METRIC EDP NO. | METRIC PRICE | DIMENSIONS | | | | FINISHED TO MODIFIED TOOL DIAMETER | | | | | | | | |
|---------------|--------|-------------------------|--------------|-------------|-------------|-----------------|----------|------------------------------------|--|----------|----------|----------|---------|---------|---------|--|
| mm | INCH | | | SHANK DIAM. | NO. OF FLTS | LENGTH | | MODIFIED DIAMETER RANGE (mm) | PRICE EACH - BASED ON QUANTITY ORDERED | | | | | | | |
| | | | | | | FLUTE & CARBIDE | OVER-ALL | | 1 | 2 | 3 | 4 | 5-7 | 8-14 | OVER 14 | |
| 7.5 | .2953 | 465075 | \$101.80 | 5/32 | 4 | 1 | 6 | 7.215 - 8.001 | \$136.00 | \$113.35 | \$105.80 | \$102.15 | \$98.40 | \$95.20 | \$90.80 | |
| 8.0 | .3150 | 465080 | 101.80 | 5/32 | 4 | 1 | 6 | - | - | - | - | - | - | - | - | |
| 8.5 | .3346 | 465085 | 101.80 | 5/32 | 4 | 1 | 6 | 8.002 - 8.814 | 136.00 | 113.35 | 105.80 | 102.15 | 98.40 | 95.20 | 90.80 | |
| 9.0 | .3543 | 465090 | 95.45 | 3/16 | 4 | 1 | 7 | 8.815 - 9.601 | 127.45 | 106.25 | 99.10 | 95.85 | 92.15 | 89.25 | 85.15 | |
| 9.5 | .3740 | 465095 | 95.45 | 5/16 | 4 | 1 | 7 | - | - | - | - | - | - | - | - | |
| 10.0 | .3937 | 465100 | 100.45 | 5/16 | 4 | 1 | 7 | 9.602 - 10.389 | 132.30 | 111.15 | 104.15 | 100.65 | 97.05 | 94.05 | 90.10 | |
| 10.5 | .4134 | 465105 | 100.45 | 3/8 | 4 | 1 | 7 | 10.390 - 11.201 | 132.30 | 111.15 | 104.15 | 100.65 | 97.05 | 94.05 | 90.10 | |
| 11.0 | .4331 | 465110 | 100.45 | 3/8 | 4 | 1 | 7 | - | - | - | - | - | - | - | - | |
| 11.5 | .4528 | 465115 | 105.70 | 3/8 | 4 | 1 | 7 | 11.202 - 11.989 | 137.50 | 116.45 | 109.25 | 105.85 | 102.25 | 99.30 | 95.25 | |
| 12.0 | .4724 | 465120 | 105.70 | 7/16 | 6 | 1 | 8 | 11.990 - 12.776 | 137.50 | 116.45 | 109.25 | 105.85 | 102.25 | 99.30 | 95.25 | |
| 12.5 | .4921 | 465125 | 105.70 | 7/16 | 6 | 1 | 8 | - | - | - | - | - | - | - | - | |
| 13.0 | .5118 | 465130 | 107.95 | 7/16 | 6 | 1 | 8 | 12.777 - 13.564 | 139.90 | 118.75 | 111.65 | 108.25 | 104.70 | 101.65 | 97.60 | |
| 13.5 | .5315 | 465135 | 107.95 | 7/16 | 6 | 1 | 8 | - | - | - | - | - | - | - | - | |
| 14.0 | .5512 | 465140 | 107.95 | 7/16 | 6 | 1 1/8 | 8 | 13.565 - 14.376 | 139.90 | 118.75 | 111.65 | 108.25 | 104.70 | 101.65 | 97.60 | |
| 14.5 | .5709 | 465145 | 112.20 | 7/16 | 6 | 1 1/8 | 8 | 14.377 - 15.164 | 144.00 | 122.75 | 115.75 | 112.30 | 108.75 | 105.80 | 101.65 | |
| 15.0 | .5906 | 465150 | 112.20 | 7/16 | 6 | 1 1/8 | 8 | - | - | - | - | - | - | - | - | |
| 15.5 | .6102 | 465155 | 112.20 | 9/16 | 6 | 1 1/4 | 9 | 15.165 - 15.951 | 144.00 | 122.75 | 115.75 | 112.30 | 108.75 | 105.80 | 101.65 | |
| 16.0 | .6299 | 465160 | 121.25 | 9/16 | 6 | 1 1/4 | 9 | 15.952 - 16.739 | 153.10 | 132.05 | 124.90 | 121.40 | 117.95 | 115.05 | 110.90 | |
| 16.5 | .6496 | 465165 | 121.25 | 9/16 | 6 | 1 1/4 | 9 | - | - | - | - | - | - | - | - | |
| 17.0 | .6693 | 465170 | 121.25 | 9/16 | 6 | 1 1/4 | 9 | 16.740 - 17.551 | 153.10 | 132.05 | 124.90 | 121.40 | 117.95 | 115.05 | 110.90 | |
| 17.5 | .6890 | 465175 | 121.25 | 9/16 | 6 | 1 1/4 | 9 | - | - | - | - | - | - | - | - | |
| 18.0 | .7087 | 465180 | 125.15 | 9/16 | 6 | 1 1/4 | 9 | 17.552 - 18.339 | 157.20 | 136.00 | 128.85 | 125.50 | 121.85 | 118.95 | 114.85 | |
| 18.5 | .7283 | 465185 | 125.15 | 5/8 | 6 | 1 3/8 | 9 1/2 | 18.340 - 19.126 | 157.20 | 136.00 | 128.85 | 125.50 | 121.85 | 118.95 | 114.85 | |
| 19.0 | .7480 | 465190 | 125.15 | 5/8 | 6 | 1 3/8 | 9 1/2 | - | - | - | - | - | - | - | - | |
| 19.5 | .7677 | 465195 | 133.80 | 5/8 | 6 | 1 3/8 | 9 1/2 | 19.127 - 19.914 | 165.85 | 144.70 | 137.50 | 133.95 | 130.60 | 127.60 | 123.45 | |
| 20.0 | .7874 | 465200 | 133.80 | 5/8 | 6 | 1 3/8 | 9 1/2 | 19.915 - 20.726 | 165.85 | 144.70 | 137.50 | 133.95 | 130.60 | 127.60 | 123.45 | |
| 20.5 | .8071 | 465205 | 133.80 | 5/8 | 6 | 1 3/8 | 9 1/2 | - | - | - | - | - | - | - | - | |
| 21.0 | .8268 | 465210 | 138.65 | 5/8 | 6 | 1 3/8 | 9 1/2 | 20.727 - 21.514 | 170.50 | 149.35 | 142.20 | 138.80 | 135.20 | 132.20 | 128.15 | |
| 21.5 | .8465 | 465215 | 138.65 | 5/8 | 6 | 1 3/8 | 9 1/2 | - | - | - | - | - | - | - | - | |
| 22.0 | .8661 | 465220 | 138.65 | 3/4 | 6 | 1 1/2 | 10 | 21.515 - 22.301 | 170.50 | 149.35 | 142.20 | 138.80 | 135.20 | 132.20 | 128.15 | |
| 22.5 | .8858 | 465225 | 152.20 | 3/4 | 6 | 1 1/2 | 10 | 22.302 - 23.089 | 185.25 | 163.35 | 155.95 | 152.35 | 148.70 | 145.70 | 141.35 | |
| 23.0 | .9055 | 465230 | 152.20 | 3/4 | 6 | 1 1/2 | 10 | - | - | - | - | - | - | - | - | |
| 23.5 | .9252 | 465235 | 152.20 | 3/4 | 8 | 1 1/2 | 10 | 23.090 - 23.901 | 185.25 | 163.35 | 155.95 | 152.35 | 148.70 | 145.70 | 141.35 | |
| 24.0 | .9449 | 465240 | 157.45 | 3/4 | 8 | 1 1/2 | 10 | 23.902 - 24.689 | 190.60 | 168.65 | 161.35 | 157.65 | 154.00 | 150.90 | 146.70 | |
| 24.5 | .9646 | 465245 | 157.45 | 3/4 | 8 | 1 1/2 | 10 | - | - | - | - | - | - | - | - | |
| 25.0 | .9843 | 465250 | 157.45 | 7/8 | 8 | 1 5/8 | 10 1/2 | 24.690 - 25.476 | 190.60 | 168.65 | 161.35 | 157.65 | 154.00 | 150.90 | 146.70 | |
| 25.5 | 1.0039 | 465255 | 171.25 | 7/8 | 8 | 1 5/8 | 10 1/2 | 25.477 - 27.076 | 204.35 | 182.45 | 175.00 | 171.35 | 167.75 | 164.70 | 160.40 | |
| 26.0 | 1.0236 | 465260 | 171.25 | 7/8 | 8 | 1 5/8 | 10 1/2 | - | - | - | - | - | - | - | - | |
| 27.0 | 1.0630 | 465270 | 171.25 | 7/8 | 8 | 1 5/8 | 10 1/2 | - | - | - | - | - | - | - | - | |
| 28.0 | 1.1024 | 465280 | 171.25 | 7/8 | 8 | 1 3/4 | 11 | 27.077 - 28.651 | 204.35 | 182.45 | 175.00 | 171.35 | 167.75 | 164.70 | 160.40 | |
| 29.0 | 1.1417 | 465290 | 185.50 | 1 | 8 | 1 3/4 | 11 | 28.652 - 30.239 | 218.60 | 196.65 | 189.35 | 185.60 | 182.00 | 179.05 | 174.65 | |
| 30.0 | 1.1811 | 465300 | 185.50 | 1 | 8 | 1 3/4 | 11 | - | - | - | - | - | - | - | - | |
| 31.0 | 1.2205 | 465310 | 185.50 | 1 | 8 | 1 7/8 | 11 1/2 | 30.240 - 31.826 | 218.60 | 196.65 | 189.35 | 185.60 | 182.00 | 179.05 | 174.65 | |
| 32.0 | 1.2598 | 465320 | 204.20 | 1 | 8 | 1 7/8 | 11 1/2 | 31.827 - 33.414 | 237.20 | 215.20 | 207.95 | 204.35 | 200.60 | 197.60 | 193.45 | |
| 33.0 | 1.2992 | 465330 | 204.20 | 1 | 8 | 1 7/8 | 11 1/2 | - | - | - | - | - | - | - | - | |
| 34.0 | 1.3386 | 465340 | 213.05 | 1 | 8 | 2 | 12 | 33.415 - 35.001 | 246.10 | 224.15 | 216.75 | 213.30 | 209.70 | 206.45 | 202.25 | |
| 35.0 | 1.3780 | 465350 | 213.05 | 1 | 8 | 2 | 12 | - | - | - | - | - | - | - | - | |
| 36.0 | 1.4173 | 465360 | 250.05 | 1 1/4 | 8 | 2 | 12 | 35.002 - 36.589 | 285.30 | 261.90 | 254.15 | 250.25 | 246.25 | 243.10 | 238.60 | |
| 37.0 | 1.4567 | 465370 | 257.00 | 1 1/4 | 8 | 2 1/8 | 12 1/2 | 36.590 - 38.176 | 292.25 | 268.95 | 261.05 | 257.10 | 253.35 | 250.00 | 245.50 | |
| 38.0 | 1.4961 | 465380 | 257.00 | 1 1/4 | 8 | 2 1/8 | 12 1/2 | - | - | - | - | - | - | - | - | |
| 39.0 | 1.5354 | 465390 | 332.50 | 1 1/4 | 8 | 2 1/8 | 12 1/2 | 38.177 - 39.776 | 367.85 | 344.40 | 336.50 | 332.70 | 328.70 | 325.40 | 321.00 | |
| 40.0 | 1.5748 | 465400 | 332.50 | 1 1/4 | 8 | 2 1/4 | 13 | 39.777 - 41.351 | 367.85 | 344.40 | 336.50 | 332.70 | 328.70 | 325.40 | 321.00 | |
| 41.0 | 1.6142 | 465410 | 332.50 | 1 1/4 | 8 | 2 1/4 | 13 | - | - | - | - | - | - | - | - | |
| 42.0 | 1.6535 | 465420 | 366.70 | 1 1/4 | 8 | 2 1/4 | 13 | 41.352 - 42.951 | 401.90 | 378.50 | 370.70 | 366.90 | 362.90 | 359.65 | 355.05 | |
| 43.0 | 1.6929 | 465430 | 366.70 | 1 1/4 | 10 | 2 3/8 | 13 1/2 | 42.952 - 44.526 | 401.90 | 378.50 | 370.70 | 366.90 | 362.90 | 359.65 | 355.05 | |
| 44.0 | 1.7323 | 465440 | 366.70 | 1 1/4 | 10 | 2 3/8 | 13 1/2 | - | - | - | - | - | - | - | - | |

Modified tool diameters are available up to 63mm - contact us for price.

REAMERS



CHUCKING REAMERS CARBIDE TIPPED TYPE 467 FRACTIONAL



EXPANSION REAMERS STRAIGHT FLUTE LONG CARBIDE TAPER SHANK



| TOOL SELECTOR | CHIP CLASS | MATERIAL MACHINED | TOOL TYPE |
|---------------|------------|---------------------------|-----------|
| | 20 | NON-FERROUS - LONG CHIPS | 467 |
| | 40 | NON-FERROUS - SHORT CHIPS | 467 |
| | 60 | CAST IRONS | 467 |
| | 80 | LOW STRENGTH STEELS | 467 |
| | 100 | MEDIUM STRENGTH STEELS | 467 |
| | 120 | HIGH STRENGTH STEELS | 467 |
| | 140 | HIGH TEMPERATURE ALLOYS | 467 |

TYPE 467

• Same as Type 465, except taper shank (see description and "USE" on page 50)

MODIFICATIONS (Prompt delivery)

- Modified tool diameter - priced below
- Modified metric tool diameter - priced on pg. 53
- Closer tool diameter tolerance - pg. 15
- Cutting diameter reduced for step or pilot
- End chamfer other than 45°
- End cutting or corner radius
- Increased/decreased circular margin
- Increased/decreased tool diam. back taper
- Shank whistle notch for set screw
- Smaller taper shank
- Expansion reamers can not be coated

| TOOL DIAMETER | | TYPE 467 EDP NO. | PRICE | DIMENSIONS | | | | FINISHED TO MODIFIED TOOL DIAMETER | | | | | | | |
|---------------|---------|------------------|---------|-----------------|-------------|------------------------|----------|------------------------------------|--|----------|----------|----------|----------|----------|-------|
| FRACTIONAL | DECIMAL | | | TAPER SHANK NO. | NO. OF FLTS | LENGTH FLUTE & CARBIDE | OVER-ALL | MODIFIED DIAMETER RANGE | PRICE EACH - BASED ON QUANTITY ORDERED | | | | | | |
| | | | | | | | | | | 1 | 2 | 3 | 4 | 5-7 | 8-14* |
| 5/16 | .3125 | 46710 | \$97.90 | 1 | 4 | 1 | 6 | 0.2841-0.3150 | \$143.15 | \$120.45 | \$112.95 | \$109.25 | \$105.50 | \$102.35 | |
| 11/32 | .3438 | 46711 | 97.90 | 1 | 4 | 1 | 6 | 0.3151-0.3470 | 143.15 | 120.45 | 112.95 | 109.25 | 105.50 | 102.35 | |
| 3/8 | .3750 | 46712 | 91.80 | 1 | 4 | 1 | 7 | 0.3471-0.3780 | 134.25 | 112.95 | 105.85 | 102.50 | 98.90 | 96.05 | |
| 13/32 | .4062 | 46713 | 94.65 | 1 | 4 | 1 | 7 | 0.3781-0.4090 | 137.00 | 115.75 | 108.60 | 105.25 | 101.55 | 98.75 | |
| 7/16 | .4375 | 46714 | 94.65 | 1 | 4 | 1 | 7 | 0.4091-0.4410 | 137.00 | 115.75 | 108.60 | 105.25 | 101.55 | 98.75 | |
| 15/32 | .4688 | 46715 | 99.25 | 1 | 4 | 1 | 7 | 0.4411-0.4720 | 141.70 | 120.45 | 113.30 | 109.95 | 106.25 | 103.40 | |
| 1/2 | .5000 | 46716 | 99.25 | 1 | 6 | 1 | 8 | 0.4721-0.5030 | 141.70 | 120.45 | 113.30 | 109.95 | 106.25 | 103.40 | |
| 17/32 | .5312 | 46717 | 102.25 | 1 | 6 | 1 | 8 | 0.5031-0.5340 | 144.70 | 123.40 | 116.35 | 112.95 | 109.25 | 106.40 | |
| 9/16 | .5625 | 46718 | 102.25 | 1 | 6 | 1 1/8 | 8 | 0.5341-0.5660 | 144.70 | 123.40 | 116.35 | 112.95 | 109.25 | 106.40 | |
| 19/32 | .5938 | 46719 | 106.40 | 1 | 6 | 1 1/8 | 8 | 0.5661-0.5970 | 148.75 | 127.60 | 120.55 | 117.10 | 113.60 | 110.65 | |
| 5/8 | .6250 | 46720 | 106.40 | 2 | 6 | 1 1/4 | 9 | 0.5971-0.6280 | 148.75 | 127.60 | 120.55 | 117.10 | 113.60 | 110.65 | |
| 21/32 | .6562 | 46721 | 119.80 | 2 | 6 | 1 1/4 | 9 | 0.6281-0.6590 | 162.15 | 140.85 | 133.75 | 130.40 | 126.80 | 124.00 | |
| 11/16 | .6875 | 46722 | 119.80 | 2 | 6 | 1 1/4 | 9 | 0.6591-0.6910 | 162.15 | 140.85 | 133.75 | 130.40 | 126.80 | 124.00 | |
| 23/32 | .7188 | 46723 | 120.00 | 2 | 6 | 1 1/4 | 9 | 0.6911-0.7220 | 162.50 | 141.30 | 134.25 | 130.85 | 127.05 | 124.30 | |
| 3/4 | .7500 | 46724 | 120.00 | 2 | 6 | 1 3/8 | 9 1/2 | 0.7221-0.7530 | 162.50 | 141.30 | 134.25 | 130.85 | 127.05 | 124.30 | |
| 25/32 | .7812 | 46725 | 128.95 | 2 | 6 | 1 3/8 | 9 1/2 | 0.7531-0.7840 | 171.35 | 150.05 | 143.10 | 139.70 | 136.00 | 133.15 | |
| 13/16 | .8125 | 46726 | 128.95 | 2 | 6 | 1 3/8 | 9 1/2 | 0.7841-0.8160 | 171.35 | 150.05 | 143.10 | 139.70 | 136.00 | 133.15 | |
| 27/32 | .8438 | 46727 | 134.40 | 2 | 6 | 1 3/8 | 9 1/2 | 0.8161-0.8470 | 176.75 | 155.50 | 148.45 | 145.00 | 141.35 | 138.45 | |
| 7/8 | .8750 | 46728 | 139.55 | 2 | 6 | 1 1/2 | 10 | 0.8471-0.8780 | 183.35 | 161.45 | 154.00 | 150.55 | 146.70 | 143.65 | |
| 29/32 | .9062 | 46729 | 147.50 | 2 | 6 | 1 1/2 | 10 | 0.8781-0.9090 | 191.45 | 169.45 | 162.00 | 158.50 | 154.70 | 151.80 | |
| 15/16 | .9375 | 46730 | 147.50 | 3 | 8 | 1 1/2 | 10 | 0.9091-0.9410 | 191.45 | 169.45 | 162.00 | 158.50 | 154.70 | 151.80 | |
| 31/32 | .9688 | 46731 | 152.85 | 3 | 8 | 1 1/2 | 10 | 0.9411-0.9720 | 196.70 | 174.65 | 167.25 | 163.80 | 160.15 | 157.00 | |
| 1 | 1.0000 | 46732 | 152.85 | 3 | 8 | 1 5/8 | 10 1/2 | 0.9721-1.0030 | 196.70 | 174.65 | 167.25 | 163.80 | 160.15 | 157.00 | |
| 1 1/32 | 1.0312 | 46733 | 167.15 | 3 | 8 | 1 5/8 | 10 1/2 | - | - | - | - | - | - | - | |
| 1 1/16 | 1.0625 | 46734 | 167.15 | 3 | 8 | 1 5/8 | 10 1/2 | 1.0031-1.0660 | 211.35 | 189.20 | 181.80 | 178.30 | 174.55 | 171.55 | |
| 1 3/32 | 1.0938 | 46735 | 167.15 | 3 | 8 | 1 3/4 | 11 | - | - | - | - | - | - | - | |
| 1 1/8 | 1.1250 | 46736 | 167.15 | 3 | 8 | 1 3/4 | 11 | 1.0661-1.1280 | 211.35 | 189.20 | 181.80 | 178.30 | 174.55 | 171.55 | |
| 1 3/16 | 1.1875 | 46738 | 188.05 | 3 | 8 | 1 3/4 | 11 | 1.1281-1.1905 | 232.00 | 209.95 | 202.65 | 199.15 | 195.40 | 192.40 | |
| 1 1/4 | 1.2500 | 46740 | 190.65 | 4 | 8 | 1 7/8 | 11 1/2 | 1.1906-1.2530 | 234.55 | 212.60 | 205.25 | 201.75 | 197.85 | 194.95 | |
| 1 5/16 | 1.3125 | 46742 | 208.40 | 4 | 8 | 1 7/8 | 11 1/2 | 1.2531-1.3155 | 252.30 | 230.30 | 222.90 | 219.45 | 215.75 | 212.65 | |
| 1 3/8 | 1.3750 | 46744 | 228.30 | 4 | 8 | 2 | 12 | 1.3156-1.3780 | 272.10 | 250.15 | 242.85 | 239.30 | 235.55 | 232.50 | |
| 1 7/16 | 1.4375 | 46746 | 256.25 | 4 | 8 | 2 | 12 | 1.3781-1.4405 | 303.10 | 279.60 | 271.80 | 268.00 | 263.95 | 260.85 | |
| 1 1/2 | 1.5000 | 46748 | 265.30 | 4 | 8 | 2 1/8 | 12 1/2 | 1.4406-1.5030 | 312.25 | 288.70 | 280.75 | 277.15 | 273.05 | 269.85 | |
| 1 9/16 | 1.5625 | 46750 | 364.55 | 4 | 8 | 2 1/8 | 12 1/2 | 1.5031-1.5660 | 411.50 | 387.95 | 380.15 | 376.40 | 372.30 | 369.10 | |
| 1 5/8 | 1.6250 | 46752 | 364.55 | 4 | 8 | 2 1/4 | 13 | 1.5661-1.6280 | 411.50 | 387.95 | 380.15 | 376.40 | 372.30 | 369.10 | |
| 1 11/16 | 1.6875 | 46754 | 403.75 | 4 | 8 | 2 1/4 | 13 | 1.6281-1.6910 | 450.70 | 427.20 | 419.30 | 415.50 | 411.55 | 408.35 | |
| 1 3/4 | 1.7500 | 46756 | 403.75 | 4 | 10 | 2 3/8 | 13 1/2 | 1.6911-1.7530 | 450.70 | 427.20 | 419.30 | 415.50 | 411.55 | 408.35 | |
| 1 13/16 | 1.8125 | 46758 | 478.00 | 4 | 10 | 2 3/8 | 13 1/2 | 1.7531-1.8160 | 524.95 | 501.55 | 493.70 | 489.90 | 485.80 | 482.70 | |
| 1 7/8 | 1.8750 | 46760 | 478.00 | 4 | 10 | 2 1/2 | 14 | 1.8161-1.8780 | 524.95 | 501.55 | 493.70 | 489.90 | 485.80 | 482.70 | |
| 1 15/16 | 1.9375 | 46762 | 522.50 | 4 | 10 | 2 1/2 | 14 | 1.8781-1.9410 | 569.25 | 545.75 | 537.85 | 534.20 | 530.10 | 527.10 | |
| 2 | 2.0000 | 46764 | 522.50 | 4 | 12 | 2 1/2 | 14 | 1.9411-2.0030 | 569.25 | 545.75 | 537.85 | 534.20 | 530.10 | 527.10 | |
| 2 1/8 | 2.1250 | 46768 | 782.15 | 5 | 12 | 2 3/4 | 14 1/2 | 2.0031-2.1280 | 829.00 | 805.60 | 797.65 | 793.95 | 790.00 | 786.70 | |
| 2 1/4 | 2.2500 | 46772 | 839.90 | 5 | 12 | 2 3/4 | 14 1/2 | 2.1281-2.2530 | 886.90 | 863.35 | 855.60 | 851.70 | 847.75 | 844.65 | |
| 2 3/8 | 2.3750 | 46776 | 869.15 | 5 | 12 | 3 | 15 | 2.2531-2.3780 | 915.95 | 892.65 | 884.65 | 881.05 | 876.95 | 873.80 | |
| 2 1/2 | 2.5000 | 46780 | 869.15 | 5 | 12 | 3 | 15 | 2.3781-2.5030 | 915.95 | 892.65 | 884.65 | 881.05 | 876.95 | 873.80 | |

*Quantities of 15 or more - price of fractional size in same size range.

REAMERS



CHUCKING REAMERS CARBIDE TIPPED TYPE 467 METRIC



EXPANSION REAMERS STRAIGHT FLUTE LONG CARBIDE TAPER SHANK



NOTE: Tool diameter in millimeters (mm); all other dimensions in inches. Also, modifications available (see list on page 52).

| TOOL DIAMETER | | TYPE 467 METRIC EDP NO. | METRIC PRICE | DIMENSIONS | | | | FINISHED TO MODIFIED TOOL DIAMETER | | | | | | | |
|---------------|--------|-------------------------|--------------|-----------------|-------------|-----------------|----------|------------------------------------|--|----------|----------|----------|----------|----------|----------|
| mm | INCH | | | TAPER SHANK NO. | NO. OF FLTS | LENGTH | | MODIFIED DIAMETER RANGE (mm) | PRICE EACH - BASED ON QUANTITY ORDERED | | | | | | |
| | | | | | | FLUTE & CARBIDE | OVER-ALL | | 1 | 2 | 3 | 4 | 5-7 | 8-14 | OVER 14 |
| 7.5 | .2953 | 467075 | \$112.95 | 1 | 4 | 1 | 6 | 7.215-8.001 | \$146.95 | \$124.35 | \$116.85 | \$113.10 | \$109.25 | \$106.15 | \$101.75 |
| 8.0 | .3150 | 467080 | 112.95 | 1 | 4 | 1 | 6 | - | - | - | - | - | - | - | - |
| 8.5 | .3346 | 467085 | 112.95 | 1 | 4 | 1 | 6 | 8.002-8.814 | 146.95 | 124.35 | 116.85 | 113.10 | 109.25 | 106.15 | 101.75 |
| 9.0 | .3543 | 467090 | 105.85 | 1 | 4 | 1 | 7 | 8.815-9.601 | 137.70 | 116.55 | 109.50 | 106.00 | 102.50 | 99.55 | 95.35 |
| 9.5 | .3740 | 467095 | 105.85 | 1 | 4 | 1 | 7 | - | - | - | - | - | - | - | - |
| 10.0 | .3937 | 467100 | 108.60 | 1 | 4 | 1 | 7 | 9.602-10.389 | 140.50 | 119.45 | 112.30 | 108.80 | 105.25 | 102.25 | 98.15 |
| 10.5 | .4134 | 467105 | 108.60 | 1 | 4 | 1 | 7 | 10.390-11.201 | 140.50 | 119.45 | 112.30 | 108.80 | 105.25 | 102.25 | 98.15 |
| 11.0 | .4331 | 467110 | 108.60 | 1 | 4 | 1 | 7 | - | - | - | - | - | - | - | - |
| 11.5 | .4528 | 467115 | 113.30 | 1 | 4 | 1 | 7 | 11.202-11.989 | 145.20 | 124.05 | 117.00 | 113.60 | 109.95 | 107.05 | 102.90 |
| 12.0 | .4724 | 467120 | 113.30 | 1 | 6 | 1 | 8 | 11.990-12.776 | 145.20 | 124.05 | 117.00 | 113.60 | 109.95 | 107.05 | 102.90 |
| 12.5 | .4921 | 467125 | 113.30 | 1 | 6 | 1 | 8 | - | - | - | - | - | - | - | - |
| 13.0 | .5118 | 467130 | 116.35 | 1 | 6 | 1 | 8 | 12.777-13.564 | 148.30 | 127.00 | 119.90 | 116.50 | 112.95 | 110.10 | 105.90 |
| 13.5 | .5315 | 467135 | 116.35 | 1 | 6 | 1 | 8 | - | - | - | - | - | - | - | - |
| 14.0 | .5512 | 467140 | 116.35 | 1 | 6 | 1 1/8 | 8 | 13.565-14.376 | 148.30 | 127.00 | 119.90 | 116.50 | 112.95 | 110.10 | 105.90 |
| 14.5 | .5709 | 467145 | 120.55 | 1 | 6 | 1 1/8 | 8 | 14.377-15.164 | 152.35 | 131.15 | 124.15 | 120.70 | 117.10 | 114.10 | 110.15 |
| 15.0 | .5906 | 467150 | 120.55 | 1 | 6 | 1 1/8 | 8 | - | - | - | - | - | - | - | - |
| 15.5 | .6102 | 467155 | 120.55 | 2 | 6 | 1 1/4 | 9 | 15.165-15.951 | 152.35 | 131.15 | 124.15 | 120.70 | 117.10 | 114.10 | 110.15 |
| 16.0 | .6299 | 467160 | 133.75 | 2 | 6 | 1 1/4 | 9 | 15.952-16.739 | 165.75 | 144.55 | 137.40 | 133.85 | 130.40 | 127.55 | 123.40 |
| 16.5 | .6496 | 467165 | 133.75 | 2 | 6 | 1 1/4 | 9 | - | - | - | - | - | - | - | - |
| 17.0 | .6693 | 467170 | 133.75 | 2 | 6 | 1 1/4 | 9 | 16.740-17.551 | 165.75 | 144.55 | 137.40 | 133.85 | 130.40 | 127.55 | 123.40 |
| 17.5 | .6890 | 467175 | 133.75 | 2 | 6 | 1 1/4 | 9 | - | - | - | - | - | - | - | - |
| 18.0 | .7087 | 467180 | 134.25 | 2 | 6 | 1 1/4 | 9 | 17.552-18.339 | 166.10 | 144.90 | 137.90 | 134.40 | 130.85 | 127.85 | 123.85 |
| 18.5 | .7283 | 467185 | 134.25 | 2 | 6 | 1 3/8 | 9 1/2 | 18.340-19.126 | 166.10 | 144.90 | 137.90 | 134.40 | 130.85 | 127.85 | 123.85 |
| 19.0 | .7480 | 467190 | 134.25 | 2 | 6 | 1 3/8 | 9 1/2 | - | - | - | - | - | - | - | - |
| 19.5 | .7677 | 467195 | 143.10 | 2 | 6 | 1 3/8 | 9 1/2 | 19.127-19.914 | 174.95 | 153.85 | 146.70 | 143.25 | 139.70 | 136.70 | 132.60 |
| 20.0 | .7874 | 467200 | 143.10 | 2 | 6 | 1 3/8 | 9 1/2 | 19.915-20.726 | 174.95 | 153.85 | 146.70 | 143.25 | 139.70 | 136.70 | 132.60 |
| 20.5 | .8071 | 467205 | 143.10 | 2 | 6 | 1 3/8 | 9 1/2 | - | - | - | - | - | - | - | - |
| 21.0 | .8268 | 467210 | 148.45 | 2 | 6 | 1 3/8 | 9 1/2 | 20.727-21.514 | 180.25 | 159.15 | 152.10 | 148.55 | 145.00 | 141.95 | 138.10 |
| 21.5 | .8465 | 467215 | 148.45 | 2 | 6 | 1 3/8 | 9 1/2 | - | - | - | - | - | - | - | - |
| 22.0 | .8661 | 467220 | 148.45 | 2 | 6 | 1 1/2 | 10 | 21.515-22.301 | 180.25 | 159.15 | 152.10 | 148.55 | 145.00 | 141.95 | 138.10 |
| 22.5 | .8858 | 467225 | 162.00 | 2 | 6 | 1 1/2 | 10 | 22.302-23.089 | 195.15 | 173.10 | 165.85 | 162.15 | 158.50 | 155.50 | 151.25 |
| 23.0 | .9055 | 467230 | 162.00 | 2 | 6 | 1 1/2 | 10 | - | - | - | - | - | - | - | - |
| 23.5 | .9252 | 467235 | 162.00 | 3 | 8 | 1 1/2 | 10 | 23.090-23.901 | 195.15 | 173.10 | 165.85 | 162.15 | 158.50 | 155.50 | 151.25 |
| 24.0 | .9449 | 467240 | 167.25 | 3 | 8 | 1 1/2 | 10 | 23.902-24.689 | 200.45 | 178.60 | 171.20 | 167.65 | 163.80 | 160.80 | 156.65 |
| 24.5 | .9646 | 467245 | 167.25 | 3 | 8 | 1 1/2 | 10 | - | - | - | - | - | - | - | - |
| 25.0 | .9843 | 467250 | 167.25 | 3 | 8 | 1 5/8 | 10 1/2 | 24.690-25.476 | 200.45 | 178.60 | 171.20 | 167.65 | 163.80 | 160.80 | 156.65 |
| 25.5 | 1.0039 | 467255 | 181.80 | 3 | 8 | 1 5/8 | 10 1/2 | 25.477-27.076 | 214.95 | 192.95 | 185.55 | 182.00 | 178.30 | 175.35 | 171.05 |
| 26.0 | 1.0236 | 467260 | 181.80 | 3 | 8 | 1 5/8 | 10 1/2 | - | - | - | - | - | - | - | - |
| 27.0 | 1.0630 | 467270 | 181.80 | 3 | 8 | 1 5/8 | 10 1/2 | - | - | - | - | - | - | - | - |
| 28.0 | 1.1024 | 467280 | 181.80 | 3 | 8 | 1 3/4 | 11 | 27.077-28.651 | 214.95 | 192.95 | 185.55 | 182.00 | 178.30 | 175.35 | 171.05 |
| 29.0 | 1.1417 | 467290 | 202.65 | 3 | 8 | 1 3/4 | 11 | 28.652-30.239 | 235.70 | 213.80 | 206.40 | 202.80 | 199.15 | 196.05 | 191.75 |
| 30.0 | 1.1811 | 467300 | 202.65 | 3 | 8 | 1 3/4 | 11 | - | - | - | - | - | - | - | - |
| 31.0 | 1.2205 | 467310 | 205.25 | 4 | 8 | 1 7/8 | 11 1/2 | 30.240-31.826 | 238.35 | 216.35 | 209.00 | 205.35 | 201.75 | 198.65 | 194.35 |
| 32.0 | 1.2598 | 467320 | 222.90 | 4 | 8 | 1 7/8 | 11 1/2 | 31.827-33.414 | 255.95 | 234.00 | 226.75 | 223.10 | 219.45 | 216.35 | 212.15 |
| 33.0 | 1.2992 | 467330 | 222.90 | 4 | 8 | 1 7/8 | 11 1/2 | - | - | - | - | - | - | - | - |
| 34.0 | 1.3386 | 467340 | 242.85 | 4 | 8 | 2 | 12 | 33.415-35.001 | 275.85 | 254.05 | 246.60 | 243.05 | 239.30 | 236.25 | 232.00 |
| 35.0 | 1.3780 | 467350 | 242.85 | 4 | 8 | 2 | 12 | - | - | - | - | - | - | - | - |
| 36.0 | 1.4173 | 467360 | 271.80 | 4 | 8 | 2 | 12 | 35.002-36.589 | 307.00 | 283.60 | 275.70 | 271.95 | 268.00 | 264.65 | 260.30 |
| 37.0 | 1.4567 | 467370 | 280.75 | 4 | 8 | 2 1/8 | 12 1/2 | 36.590-38.176 | 316.20 | 292.70 | 284.95 | 281.10 | 277.15 | 273.90 | 269.30 |
| 38.0 | 1.4961 | 467380 | 280.75 | 4 | 8 | 2 1/8 | 12 1/2 | - | - | - | - | - | - | - | - |
| 39.0 | 1.5354 | 467390 | 380.15 | 4 | 8 | 2 1/8 | 12 1/2 | 38.177-39.776 | 415.35 | 391.95 | 384.25 | 380.25 | 376.40 | 373.10 | 368.65 |
| 40.0 | 1.5748 | 467400 | 380.15 | 4 | 8 | 2 1/4 | 13 | 39.777-41.351 | 415.35 | 391.95 | 384.25 | 380.25 | 376.40 | 373.10 | 368.65 |
| 41.0 | 1.6142 | 467410 | 380.15 | 4 | 8 | 2 1/4 | 13 | - | - | - | - | - | - | - | - |
| 42.0 | 1.6535 | 467420 | 419.30 | 4 | 8 | 2 1/4 | 13 | 41.352-42.951 | 454.60 | 431.20 | 423.40 | 419.60 | 415.50 | 412.40 | 407.70 |
| 43.0 | 1.6929 | 467430 | 419.30 | 4 | 10 | 2 3/8 | 13 1/2 | 42.952-44.526 | 454.60 | 431.20 | 423.40 | 419.60 | 415.50 | 412.40 | 407.70 |
| 44.0 | 1.7323 | 467440 | 419.30 | 4 | 10 | 2 3/8 | 13 1/2 | - | - | - | - | - | - | - | - |

Modified tool diameters are available up to 63mm - contact us for price.

REAMERS



CHUCKING REAMERS CARBIDE TIPPED TYPE 410 & 420 FRACTIONAL



SPIRAL FLUTES STRAIGHT SHANK



TYPE 410

- Polished flutes
- Right spiral flutes have greater chip clearing ability for use with ductile materials, highly abrasive materials, or blind holes
- Finishes are much better as spiral flutes tend to bridge interruptions such as keyways, slots, or intersecting holes
- Detailed specifications on page 15



TYPE 420

- Polished flutes
- Used on thru holes for heat treated steels, hard cast irons and other hard materials
- Finishes are much better as spiral flutes tend to bridge interruptions such as keyways, slots, or intersecting holes
- Left spiral flutes should not be used on blind holes For shallow holes only (see page 14)
- Detailed specifications on page 15

| TOOL SELECTOR | CHIP CLASS | MATERIAL MACHINED | TOOL TYPE |
|---------------|---------------------------|--------------------------|-----------------------|
| | 20 | NON-FERROUS - LONG CHIPS | 410/432 ^{MS} |
| 40 | NON-FERROUS - SHORT CHIPS | 410/432 ^{MS} | |
| 60 | CAST IRONS | 410/436 ^{MS} | |
| 80 | LOW STRENGTH STEELS | 410/438 ^{MS} | |
| 100 | MEDIUM STRENGTH STEELS | 410/438 ^{MS} | |
| 120 | HIGH STRENGTH STEELS | 410/438 ^{MS} | |
| 140 | HIGH TEMPERATURE ALLOYS | 438 ^{MS} | |

^{MS}See page 68 for material specific reamers

MODIFICATIONS (Prompt delivery)

- Modified tool diameter - priced below
- Modified metric tool diameter - priced on pg. 55
- Closer tool diameter tolerance - pg. 15
- Cutting diameter reduced for step or pilot
- End chamfer other than 45°
- End cutting or corner radius
- Increased/decreased circular margin
- Increased/decreased tool diam. back taper
- Shortened shank or reduced shank diameter
- Flat(s) or tang on shank
- Coatings available: See page 56

For type 410 semi-finished reamers, see pg. 39.

NOTE: For smaller tool diameters, see solid carbide reamers on pgs. 88 & 95.

| TOOL DIAMETER | | TYPE 410 RIGHT EDP NO. | TYPE 420 LEFT EDP NO. | PRICE | DIMENSIONS | | | | | FINISHED TO MODIFIED TOOL DIAMETER | | | | | | |
|---------------|---------|------------------------|-----------------------|---------|-------------|-------------|---------|----------|--------|------------------------------------|--|---------|---------|---------|---------|---------|
| FRACTIONAL | DECIMAL | | | | SHANK DIAM. | NO. OF FLTS | LENGTH | | | MODIFIED DIAMETER RANGE | PRICE EACH - BASED ON QUANTITY ORDERED | | | | | |
| | | | | | | FLT | CARBIDE | OVER-ALL | | | 1 | 2 | 3 | 4 | 5-7 | 8-14* |
| 3/16 | .1875 | 41006 | 42006 | \$66.35 | 1 1/64 | 4 | 1 1/8 | 1/2 | 4 1/2 | 0.1770-0.2040 | \$109.45 | \$87.80 | \$80.60 | \$77.10 | \$73.40 | \$70.65 |
| 7/32 | .2188 | 41007 | 42007 | 66.35 | 1 3/64 | 4 | 1 1/4 | 1/2 | 5 | 0.2041-0.2210 | 109.45 | 87.80 | 80.60 | 77.10 | 73.40 | 70.65 |
| 15/64 | .2344 | 4102344 | 4202344 | 66.35 | 7/32 | 4 | 1 1/2 | 1/2 | 6 | 0.2211-0.2380 | 109.45 | 87.80 | 80.60 | 77.10 | 73.40 | 70.65 |
| 1/4 | .2500 | 41008 | 42008 | 66.35 | 1 5/64 | 4 | 1 1/2 | 1/2 | 6 | 0.2381-0.2530 | 109.45 | 87.80 | 80.60 | 77.10 | 73.40 | 70.65 |
| 9/32 | .2812 | 41009 | 42009 | 66.60 | 1 5/64 | 4 | 1 1/2 | 1/2 | 6 | 0.2531-0.2840 | 109.55 | 88.00 | 80.70 | 77.30 | 73.65 | 70.75 |
| 5/16 | .3125 | 41010 | 42010 | 66.60 | 9/32 | 4 | 1 1/2 | 1/2 | 6 | 0.2841-0.3150 | 109.55 | 88.00 | 80.70 | 77.30 | 73.65 | 70.75 |
| 11/32 | .3438 | 41011 | 42011 | 73.20 | 9/32 | 4 | 1 1/2 | 5/8 | 6 | 0.3151-0.3470 | 116.30 | 94.65 | 87.45 | 84.05 | 80.35 | 77.55 |
| 3/8 | .3750 | 41012 | 42012 | 73.90 | 5/16 | 4 | 1 3/4 | 5/8 | 7 | 0.3471-0.3780 | 116.95 | 95.35 | 88.10 | 84.80 | 81.15 | 78.20 |
| 13/32 | .4062 | 41013 | 42013 | 77.20 | 5/16 | 4 | 1 3/4 | 5/8 | 7 | 0.3781-0.4090 | 120.35 | 98.75 | 91.55 | 88.05 | 84.30 | 81.45 |
| 7/16 | .4375 | 41014 | 42014 | 80.35 | 3/8 | 4 | 1 3/4 | 5/8 | 7 | 0.4091-0.4410 | 123.35 | 101.80 | 94.60 | 91.15 | 87.45 | 84.55 |
| 15/32 | .4688 | 41015 | 42015 | 85.25 | 3/8 | 4 | 1 3/4 | 5/8 | 7 | 0.4411-0.4720 | 128.35 | 106.75 | 99.60 | 96.10 | 92.45 | 89.40 |
| 1/2 | .5000 | 41016 | 42016 | 88.55 | 7/16 | 6 | 2 | 5/8 | 8 | 0.4721-0.5030 | 132.60 | 110.40 | 103.05 | 99.60 | 95.85 | 92.80 |
| 17/32 | .5312 | 41017 | 42017 | 91.15 | 7/16 | 6 | 2 | 5/8 | 8 | 0.5031-0.5340 | 135.40 | 113.20 | 105.85 | 102.25 | 98.55 | 95.50 |
| 9/16 | .5625 | 41018 | 42018 | 91.15 | 7/16 | 6 | 2 | 5/8 | 8 | 0.5341-0.5660 | 135.40 | 113.20 | 105.85 | 102.25 | 98.55 | 95.50 |
| 19/32 | .5938 | 41019 | 42019 | 93.90 | 7/16 | 6 | 2 | 5/8 | 8 | 0.5661-0.5970 | 138.10 | 115.95 | 108.50 | 104.95 | 101.20 | 98.15 |
| 5/8 | .6250 | 41020 | 42020 | 93.90 | 9/16 | 6 | 2 1/4 | 5/8 | 9 | 0.5971-0.6280 | 138.10 | 115.95 | 108.50 | 104.95 | 101.20 | 98.15 |
| 21/32 | .6562 | 41021 | 42021 | 96.60 | 9/16 | 6 | 2 1/4 | 5/8 | 9 | 0.6281-0.6590 | 140.85 | 118.70 | 111.20 | 107.70 | 103.80 | 101.00 |
| 11/16 | .6875 | 41022 | 42022 | 102.90 | 9/16 | 6 | 2 1/4 | 5/8 | 9 | 0.6591-0.6910 | 147.00 | 124.85 | 117.45 | 113.90 | 110.15 | 107.20 |
| 23/32 | .7188 | 41023 | 42023 | 104.25 | 9/16 | 6 | 2 1/4 | 5/8 | 9 | 0.6911-0.7220 | 148.45 | 126.25 | 118.85 | 115.35 | 111.60 | 108.55 |
| 3/4 | .7500 | 41024 | 42024 | 105.90 | 5/8 | 6 | 2 1/2 | 3/4 | 9 1/2 | 0.7221-0.7530 | 150.05 | 127.95 | 120.55 | 117.00 | 113.20 | 110.20 |
| 25/32 | .7812 | 41025 | 42025 | 108.55 | 5/8 | 6 | 2 1/2 | 3/4 | 9 1/2 | 0.7531-0.7840 | 152.85 | 130.75 | 123.30 | 119.75 | 115.95 | 112.95 |
| 13/16 | .8125 | 41026 | 42026 | 108.55 | 5/8 | 6 | 2 1/2 | 3/4 | 9 1/2 | 0.7841-0.8160 | 152.85 | 130.75 | 123.30 | 119.75 | 115.95 | 112.95 |
| 27/32 | .8438 | 41027 | 42027 | 114.55 | 5/8 | 6 | 2 1/2 | 3/4 | 9 1/2 | 0.8161-0.8470 | 158.85 | 136.60 | 129.25 | 125.70 | 121.85 | 118.85 |
| 7/8 | .8750 | 41028 | 42028 | 118.85 | 3/4 | 6 | 2 5/8 | 3/4 | 10 | 0.8471-0.8780 | 164.75 | 141.80 | 133.95 | 130.40 | 126.45 | 123.35 |
| 29/32 | .9062 | 41029 | 42029 | 138.45 | 3/4 | 6 | 2 5/8 | 3/4 | 10 | 0.8781-0.9090 | 184.30 | 161.40 | 153.75 | 150.00 | 146.05 | 143.05 |
| 15/16 | .9375 | 41030 | 42030 | 138.45 | 3/4 | 8 | 2 5/8 | 3/4 | 10 | 0.9091-0.9410 | 184.30 | 161.40 | 153.75 | 150.00 | 146.05 | 143.05 |
| 31/32 | .9688 | 41031 | 42031 | 145.20 | 3/4 | 8 | 2 5/8 | 3/4 | 10 | 0.9411-0.9720 | 191.15 | 168.10 | 160.55 | 156.75 | 152.80 | 149.80 |
| 1 | 1.0000 | 41032 | 42032 | 145.20 | 7/8 | 8 | 2 3/4 | 3/4 | 10 1/2 | 0.9721-1.0030 | 191.15 | 168.10 | 160.55 | 156.75 | 152.80 | 149.80 |
| 1 1/16 | 1.0625 | 41034 | 42034 | 155.80 | 7/8 | 8 | 2 3/4 | 3/4 | 10 1/2 | 1.0031-1.0660 | 201.70 | 178.70 | 171.05 | 167.25 | 163.35 | 160.30 |
| 1 1/8 | 1.1250 | 41036 | 42036 | 160.65 | 7/8 | 8 | 2 7/8 | 7/8 | 11 | 1.0661-1.1280 | 206.40 | 183.50 | 175.80 | 172.15 | 168.20 | 165.15 |
| 1 3/16 | 1.1875 | 41038 | 42038 | 168.80 | 1 | 8 | 2 7/8 | 7/8 | 11 | 1.1281-1.1905 | 214.60 | 191.60 | 183.95 | 180.25 | 176.40 | 173.25 |
| 1 1/4 | 1.2500 | 41040 | 42040 | 178.65 | 1 | 8 | 3 | 7/8 | 11 1/2 | 1.1906-1.2530 | 224.50 | 201.50 | 193.80 | 190.15 | 186.20 | 183.20 |
| 1 5/16 | 1.3125 | 41042 | 42042 | 197.60 | 1 | 8 | 3 | 7/8 | 11 1/2 | 1.2531-1.3155 | 243.60 | 220.60 | 212.75 | 209.20 | 205.25 | 202.20 |
| 1 3/8 | 1.3750 | 41044 | 42044 | 216.60 | 1 | 8 | 3 1/4 | 7/8 | 12 | 1.3156-1.3780 | 262.40 | 239.50 | 231.80 | 228.20 | 224.15 | 221.10 |
| 1 7/16 | 1.4375 | 41046 | 42046 | 229.40 | 1 1/4 | 8 | 3 1/4 | 7/8 | 12 | 1.3781-1.4405 | 275.30 | 252.30 | 244.60 | 241.05 | 237.05 | 233.90 |
| 1 1/2 | 1.5000 | 41048 | 42048 | 242.40 | 1 1/4 | 8 | 3 1/2 | 7/8 | 12 1/2 | 1.4406-1.5030 | 288.20 | 265.20 | 257.65 | 253.75 | 250.00 | 246.85 |

*Quantities of 15 or more - price of fractional size in same size range.

REAMERS



CHUCKING REAMERS CARBIDE TIPPED TYPE 410 & 420 METRIC



SPIRAL FLUTES STRAIGHT SHANK

For shallow holes only (see page 14)



TYPE 410



TYPE 420

NOTE: Tool diameter in millimeters (mm); all other dimensions in inches. Also, modifications available (see list on page 54).

| TOOL DIAMETER | | TYPE 410 | TYPE 420 | METRIC PRICE | DIMENSIONS | | | | FINISHED TO MODIFIED TOOL DIAMETER | | | | | | | | |
|---------------|--------|----------------------|---------------------|--------------|-------------|-------------|----------|----------|------------------------------------|------------------------------|--|---------|---------|---------|---------|---------|---------|
| mm | INCH | RIGHT METRIC EDP NO. | LEFT METRIC EDP NO. | | SHANK DIAM. | NO. OF FLTS | LENGTH | | | MODIFIED DIAMETER RANGE (mm) | PRICE EACH - BASED ON QUANTITY ORDERED | | | | | | |
| | | | | FLT | | | CAR-BIDE | OVER-ALL | 1 | | 2 | 3 | 4 | 5-7 | 8-14 | OVER 14 | |
| 4.5 | .1772 | 410045 | 420045 | \$80.60 | 11/64 | 4 | 1 1/8 | 1/2 | 4 1/2 | 4.494-5.182 | \$112.95 | \$91.55 | \$84.25 | \$80.70 | \$77.10 | \$74.20 | \$70.15 |
| 5.0 | .1969 | 410050 | 420050 | 80.60 | 11/64 | 4 | 1 1/8 | 1/2 | 4 1/2 | - | - | - | - | - | - | - | |
| 5.5 | .2165 | 410055 | 420055 | 80.60 | 13/64 | 4 | 1 1/4 | 1/2 | 5 | 5.183-5.613 | 112.95 | 91.55 | 84.25 | 80.70 | 77.10 | 74.20 | 70.15 |
| 6.0 | .2362 | 410060 | 420060 | 80.60 | 7/32 | 4 | 1 1/2 | 1/2 | 6 | 5.614-6.045 | 112.95 | 91.55 | 84.25 | 80.70 | 77.10 | 74.20 | 70.15 |
| - | - | 410063 | 420063 | - | 15/64 | 4 | 1 1/2 | 1/2 | 6 | 6.046-6.426 | 112.95 | 91.55 | 84.25 | 80.70 | 77.10 | 74.20 | 70.15 |
| 6.5 | .2559 | 410065 | 420065 | 80.70 | 15/64 | 4 | 1 1/2 | 1/2 | 6 | 6.427-7.214 | 113.10 | 91.70 | 84.50 | 81.05 | 77.30 | 74.35 | 70.25 |
| 7.0 | .2756 | 410070 | 420070 | 80.70 | 15/64 | 4 | 1 1/2 | 1/2 | 6 | - | - | - | - | - | - | - | |
| 7.5 | .2953 | 410075 | 420075 | 80.70 | 9/32 | 4 | 1 1/2 | 1/2 | 6 | 7.215-8.001 | 113.10 | 91.70 | 84.50 | 81.05 | 77.30 | 74.35 | 70.25 |
| 8.0 | .3150 | 410080 | 420080 | 80.70 | 9/32 | 4 | 1 1/2 | 1/2 | 6 | - | - | - | - | - | - | - | |
| 8.5 | .3346 | 410085 | 420085 | 87.45 | 9/32 | 4 | 1 1/2 | 5/8 | 6 | 8.002-8.814 | 119.80 | 98.40 | 91.15 | 87.70 | 84.05 | 81.15 | 76.90 |
| 9.0 | .3543 | 410090 | 420090 | 88.10 | 5/16 | 4 | 1 3/4 | 5/8 | 7 | 8.815-9.601 | 120.55 | 99.05 | 91.80 | 88.20 | 84.80 | 81.65 | 77.65 |
| 9.5 | .3740 | 410095 | 420095 | 88.10 | 5/16 | 4 | 1 3/4 | 5/8 | 7 | - | - | - | - | - | - | - | |
| 10.0 | .3937 | 410100 | 420100 | 91.55 | 3/8 | 4 | 1 3/4 | 5/8 | 7 | 9.602-10.389 | 123.95 | 102.45 | 95.25 | 91.70 | 88.05 | 85.10 | 81.05 |
| 10.5 | .4134 | 410105 | 420105 | 94.60 | 3/8 | 4 | 1 3/4 | 5/8 | 7 | 10.390-11.201 | 126.95 | 105.55 | 98.30 | 94.70 | 91.15 | 88.10 | 84.05 |
| 11.0 | .4331 | 410110 | 420110 | 94.60 | 3/8 | 4 | 1 3/4 | 5/8 | 7 | - | - | - | - | - | - | - | |
| 11.5 | .4528 | 410115 | 420115 | 99.60 | 3/8 | 4 | 1 3/4 | 5/8 | 7 | 11.202-11.989 | 132.00 | 110.40 | 103.30 | 99.70 | 96.10 | 93.10 | 88.95 |
| 12.0 | .4724 | 410120 | 420120 | 103.05 | 7/16 | 6 | 2 | 5/8 | 8 | 11.990-12.776 | 136.25 | 114.35 | 106.95 | 103.30 | 99.60 | 96.50 | 92.25 |
| 12.5 | .4921 | 410125 | 420125 | 103.05 | 7/16 | 6 | 2 | 5/8 | 8 | - | - | - | - | - | - | - | |
| 13.0 | .5118 | 410130 | 420130 | 105.85 | 7/16 | 6 | 2 | 5/8 | 8 | 12.777-13.564 | 139.05 | 117.00 | 109.60 | 106.00 | 102.25 | 99.25 | 95.05 |
| 13.5 | .5315 | 410135 | 420135 | 105.85 | 7/16 | 6 | 2 | 5/8 | 8 | - | - | - | - | - | - | - | |
| 14.0 | .5512 | 410140 | 420140 | 105.85 | 7/16 | 6 | 2 | 5/8 | 8 | 13.565-14.376 | 139.05 | 117.00 | 109.60 | 106.00 | 102.25 | 99.25 | 95.05 |
| 14.5 | .5709 | 410145 | 420145 | 108.50 | 7/16 | 6 | 2 | 5/8 | 8 | 14.377-15.164 | 141.75 | 119.75 | 112.30 | 108.60 | 104.95 | 102.00 | 97.65 |
| 15.0 | .5906 | 410150 | 420150 | 108.50 | 7/16 | 6 | 2 | 5/8 | 8 | - | - | - | - | - | - | - | |
| 15.5 | .6102 | 410155 | 420155 | 108.50 | 9/16 | 6 | 2 1/4 | 5/8 | 9 | 15.165-15.951 | 141.75 | 119.75 | 112.30 | 108.60 | 104.95 | 102.00 | 97.65 |
| 16.0 | .6299 | 410160 | 420160 | 111.20 | 9/16 | 6 | 2 1/4 | 5/8 | 9 | 15.952-16.739 | 144.45 | 122.40 | 115.10 | 111.35 | 107.70 | 104.75 | 100.40 |
| 16.5 | .6496 | 410165 | 420165 | 111.20 | 9/16 | 6 | 2 1/4 | 5/8 | 9 | - | - | - | - | - | - | - | |
| 17.0 | .6693 | 410170 | 420170 | 117.45 | 9/16 | 6 | 2 1/4 | 5/8 | 9 | 16.740-17.551 | 150.65 | 128.65 | 121.25 | 117.65 | 113.90 | 110.90 | 106.55 |
| 17.5 | .6890 | 410175 | 420175 | 117.45 | 9/16 | 6 | 2 1/4 | 5/8 | 9 | - | - | - | - | - | - | - | |
| 18.0 | .7087 | 410180 | 420180 | 118.85 | 9/16 | 6 | 2 1/4 | 5/8 | 9 | 17.552-18.339 | 152.15 | 130.10 | 122.70 | 119.10 | 115.35 | 112.30 | 108.10 |
| 18.5 | .7283 | 410185 | 420185 | 120.55 | 5/8 | 6 | 2 1/2 | 3/4 | 9 1/2 | 18.340-19.126 | 153.75 | 131.80 | 124.30 | 120.65 | 117.00 | 113.90 | 109.70 |
| 19.0 | .7480 | 410190 | 420190 | 120.55 | 5/8 | 6 | 2 1/2 | 3/4 | 9 1/2 | - | - | - | - | - | - | - | |
| 19.5 | .7677 | 410195 | 420195 | 123.30 | 5/8 | 6 | 2 1/2 | 3/4 | 9 1/2 | 19.127-19.914 | 156.60 | 134.45 | 127.00 | 123.40 | 119.75 | 116.60 | 112.45 |
| 20.0 | .7874 | 410200 | 420200 | 123.30 | 5/8 | 6 | 2 1/2 | 3/4 | 9 1/2 | 19.915-20.726 | 156.60 | 134.45 | 127.00 | 123.40 | 119.75 | 116.60 | 112.45 |
| 20.5 | .8071 | 410205 | 420205 | 123.30 | 5/8 | 6 | 2 1/2 | 3/4 | 9 1/2 | - | - | - | - | - | - | - | |
| 21.0 | .8268 | 410210 | 420210 | 129.25 | 5/8 | 6 | 2 1/2 | 3/4 | 9 1/2 | 20.727-21.514 | 162.50 | 140.45 | 133.05 | 129.45 | 125.70 | 122.65 | 118.30 |
| 21.5 | .8465 | 410215 | 420215 | 129.25 | 5/8 | 6 | 2 1/2 | 3/4 | 9 1/2 | - | - | - | - | - | - | - | |
| 22.0 | .8661 | 410220 | 420220 | 129.25 | 3/4 | 6 | 2 5/8 | 3/4 | 10 | 21.515-22.301 | 162.50 | 140.45 | 133.05 | 129.45 | 125.70 | 122.65 | 118.30 |
| 22.5 | .8858 | 410225 | 420225 | 153.75 | 3/4 | 6 | 2 5/8 | 3/4 | 10 | 22.302-23.089 | 188.20 | 165.35 | 157.55 | 153.90 | 150.00 | 146.85 | 142.45 |
| 23.0 | .9055 | 410230 | 420230 | 153.75 | 3/4 | 6 | 2 5/8 | 3/4 | 10 | - | - | - | - | - | - | - | |
| 23.5 | .9252 | 410235 | 420235 | 153.75 | 3/4 | 8 | 2 5/8 | 3/4 | 10 | 23.090-23.901 | 188.20 | 165.35 | 157.55 | 153.90 | 150.00 | 146.85 | 142.45 |
| 24.0 | .9449 | 410240 | 420240 | 160.55 | 3/4 | 8 | 2 5/8 | 3/4 | 10 | 23.902-24.689 | 194.95 | 172.00 | 164.35 | 160.65 | 156.75 | 153.55 | 149.25 |
| 24.5 | .9646 | 410245 | 420245 | 160.55 | 3/4 | 8 | 2 5/8 | 3/4 | 10 | - | - | - | - | - | - | - | |
| 25.0 | .9843 | 410250 | 420250 | 160.55 | 7/8 | 8 | 2 3/4 | 3/4 | 10 1/2 | 24.690-25.476 | 194.95 | 172.00 | 164.35 | 160.65 | 156.75 | 153.55 | 149.25 |
| 25.5 | 1.0039 | 410255 | 420255 | 171.05 | 7/8 | 8 | 2 3/4 | 3/4 | 10 1/2 | 25.477-27.076 | 205.55 | 182.65 | 175.05 | 171.25 | 167.25 | 164.20 | 159.75 |
| 26.0 | 1.0236 | 410260 | 420260 | 171.05 | 7/8 | 8 | 2 3/4 | 3/4 | 10 1/2 | - | - | - | - | - | - | - | |
| 27.0 | 1.0630 | 410270 | 420270 | 171.05 | 7/8 | 8 | 2 3/4 | 3/4 | 10 1/2 | - | - | - | - | - | - | - | |
| 28.0 | 1.1024 | 410280 | 420280 | 175.80 | 7/8 | 8 | 2 7/8 | 7/8 | 11 | 27.077-28.651 | 210.35 | 187.45 | 179.85 | 176.00 | 172.15 | 168.95 | 164.50 |
| 29.0 | 1.1417 | 410290 | 420290 | 183.95 | 1 | 8 | 2 7/8 | 7/8 | 11 | 28.652-30.239 | 218.55 | 195.60 | 187.95 | 184.20 | 180.25 | 177.10 | 172.75 |
| 30.0 | 1.1811 | 410300 | 420300 | 183.95 | 1 | 8 | 2 7/8 | 7/8 | 11 | - | - | - | - | - | - | - | |
| 31.0 | 1.2205 | 410310 | 420310 | 193.80 | 1 | 8 | 3 | 7/8 | 11 1/2 | 30.240-31.826 | 228.30 | 205.40 | 197.75 | 194.00 | 190.15 | 186.90 | 182.60 |
| 32.0 | 1.2598 | 410320 | 420320 | 212.75 | 1 | 8 | 3 | 7/8 | 11 1/2 | 31.827-33.414 | 247.35 | 224.50 | 216.75 | 213.05 | 209.20 | 206.10 | 201.60 |
| 33.0 | 1.2992 | 410330 | 420330 | 212.75 | 1 | 8 | 3 | 7/8 | 11 1/2 | - | - | - | - | - | - | - | |
| 34.0 | 1.3386 | 410340 | 420340 | 231.80 | 1 | 8 | 3 1/4 | 7/8 | 12 | 33.415-35.001 | 266.35 | 243.35 | 235.75 | 232.00 | 228.20 | 224.90 | 220.60 |
| 35.0 | 1.3780 | 410350 | 420350 | 231.80 | 1 | 8 | 3 1/4 | 7/8 | 12 | - | - | - | - | - | - | - | |
| 36.0 | 1.4173 | 410360 | 420360 | 244.60 | 1 1/4 | 8 | 3 1/4 | 7/8 | 12 | 35.002-36.589 | 279.15 | 256.25 | 248.55 | 244.80 | 241.05 | 237.80 | 233.35 |
| 37.0 | 1.4567 | 410370 | 420370 | 257.65 | 1 1/4 | 8 | 3 1/2 | 7/8 | 12 1/2 | 36.590-38.176 | 292.00 | 269.20 | 261.55 | 257.75 | 253.75 | 250.70 | 246.25 |
| 38.0 | 1.4961 | 410380 | 420380 | 257.65 | 1 1/4 | 8 | 3 1/2 | 7/8 | 12 1/2 | - | - | - | - | - | - | - | |

REAMERS



CHUCKING REAMERS CARBIDE TIPPED TYPES 412 & 422 FRACTIONAL



RIGHT OR LEFT SPIRAL FLUTES TAPER SHANK



TYPE 412 – RIGHT SPIRAL FLUTES – TAPER SHANK

- Polished flutes
- Right spiral flutes have greater chip clearing ability for use with ductile materials, highly abrasive materials, or blind holes
- Finishes are much better as spiral flutes tend to bridge interruptions such as keyways, slots, or intersecting holes
- Detailed specifications on page 15



TYPE 422 – LEFT SPIRAL FLUTES – TAPER SHANK

- Polished flutes
- Used on thru holes for heat treated steels, hard cast irons and other hard materials
- Finishes are much better as spiral flutes tend to bridge interruptions such as keyways, slots, or intersecting holes
- Left spiral flutes should not be used on blind holes
- Detailed specifications on page 15

| TOOL SELECTOR | CHIP CLASS | MATERIAL MACHINED | TOOL TYPE |
|---------------|---------------------------|--------------------------|-----------|
| | 20 | NON-FERROUS - LONG CHIPS | 412/422 |
| 40 | NON-FERROUS - SHORT CHIPS | 412/422 | |
| 60 | CAST IRONS | 412/422 | |
| 80 | LOW STRENGTH STEELS | 422/412 | |
| 100 | MEDIUM STRENGTH STEELS | 422/412 | |
| 120 | HIGH STRENGTH STEELS | 422/412 | |
| 140 | HIGH TEMPERATURE ALLOYS | 422/412 | |

MODIFICATIONS (Prompt delivery)

- Modified tool diameter - priced below
- Metric tool diameter
- Closer tool diameter tolerance - pg. 15
- Cutting diameter reduced for step or pilot
- End chamfer other than 45°
- End cutting or corner radius
- Increased/decreased circular margin
- Increased/decreased tool diam. back taper
- Shank whistle notch for set screw
- Smaller taper shank
- Coatings available:

- TITANIUM NITRIDE – TiN
- TITANIUM CARBONITRIDE – TiCN
- ZIRCONIUM NITRIDE – ZrN
- AL TITANIUM NITRIDE – AlTiN

For shallow holes only (see page 14)

| TOOL DIAMETER | | TYPE 412 RIGHT EDP NO. | TYPE 422 LEFT EDP NO. | BOTH TYPES PRICE | DIMENSIONS | | | | | FINISHED TO MODIFIED TOOL DIAMETER | | | | | | |
|---------------|---------|------------------------------|-----------------------------|------------------------|-----------------------|-------------------|--------------|--------------|--------|------------------------------------|--|---------|---------|---------|---------|---------|
| FRACTIONAL | DECIMAL | | | | TAPER SHANK NO. | NO. OF FLTS | LENGTH | | | MODIFIED DIAMETER RANGE | PRICE EACH - BASED ON QUANTITY ORDERED | | | | | |
| | | | | | | FLT | CAR- BIDE | OVER- ALL | | | 1 | 2 | 3 | 4 | 5-7 | 8-14* |
| 1/4 | .2500 | 41208 | 42208 | \$69.60 | 1 | 4 | 1 1/2 | 1/2 | 6 | 0.2381 - 0.2530 | \$111.90 | \$90.65 | \$83.65 | \$80.25 | \$76.60 | \$73.75 |
| 9/32 | .2812 | 41209 | 42209 | 69.60 | 1 | 4 | 1 1/2 | 1/2 | 6 | 0.2531 - 0.2840 | 111.90 | 90.65 | 83.65 | 80.25 | 76.60 | 73.75 |
| 5/16 | .3125 | 41210 | 42210 | 71.10 | 1 | 4 | 1 1/2 | 1/2 | 6 | 0.2841 - 0.3150 | 113.60 | 92.25 | 85.15 | 81.65 | 78.15 | 75.25 |
| 11/32 | .3438 | 41211 | 42211 | 72.40 | 1 | 4 | 1 1/2 | 5/8 | 6 | 0.3151 - 0.3470 | 114.65 | 93.45 | 86.45 | 82.95 | 79.35 | 76.55 |
| 3/8 | .3750 | 41212 | 42212 | 73.35 | 1 | 4 | 1 3/4 | 5/8 | 7 | 0.3471 - 0.3780 | 115.80 | 94.65 | 87.45 | 84.10 | 80.50 | 77.65 |
| 13/32 | .4062 | 41213 | 42213 | 76.90 | 1 | 4 | 1 3/4 | 5/8 | 7 | 0.3781 - 0.4090 | 119.45 | 98.10 | 91.05 | 87.70 | 84.00 | 81.20 |
| 7/16 | .4375 | 41214 | 42214 | 80.30 | 1 | 4 | 1 3/4 | 5/8 | 7 | 0.4091 - 0.4410 | 122.65 | 101.45 | 94.35 | 90.90 | 87.25 | 84.40 |
| 15/32 | .4688 | 41215 | 42215 | 83.55 | 1 | 4 | 1 3/4 | 5/8 | 7 | 0.4411 - 0.4720 | 125.80 | 104.50 | 97.50 | 94.00 | 90.40 | 87.65 |
| 1/2 | .5000 | 41216 | 42216 | 96.15 | 1 | 6 | 2 | 5/8 | 8 | 0.4721 - 0.5030 | 141.25 | 118.60 | 111.05 | 107.45 | 103.65 | 100.60 |
| 17/32 | .5312 | 41217 | 42217 | 98.70 | 1 | 6 | 2 | 5/8 | 8 | 0.5031 - 0.5340 | 143.90 | 121.20 | 113.70 | 110.10 | 106.15 | 103.05 |
| 9/16 | .5625 | 41218 | 42218 | 98.70 | 1 | 6 | 2 | 5/8 | 8 | 0.5341 - 0.5660 | 143.90 | 121.20 | 113.70 | 110.10 | 106.15 | 103.05 |
| 19/32 | .5938 | 41219 | 42219 | 102.55 | 1 | 6 | 2 | 5/8 | 8 | 0.5661 - 0.5970 | 147.75 | 125.00 | 117.50 | 113.90 | 110.10 | 107.05 |
| 5/8 | .6250 | 41220 | 42220 | 102.55 | 2 | 6 | 2 1/4 | 5/8 | 9 | 0.5971 - 0.6280 | 147.75 | 125.00 | 117.50 | 113.90 | 110.10 | 107.05 |
| 11/16 | .6875 | 41222 | 42222 | 112.50 | 2 | 6 | 2 1/4 | 5/8 | 9 | 0.6591 - 0.6910 | 157.70 | 135.00 | 127.55 | 123.95 | 119.95 | 117.00 |
| 3/4 | .7500 | 41224 | 42224 | 119.05 | 2 | 6 | 2 1/2 | 3/4 | 9 1/2 | 0.7221 - 0.7530 | 164.15 | 141.65 | 133.85 | 130.35 | 126.45 | 123.40 |
| 13/16 | .8125 | 41226 | 42226 | 124.00 | 2 | 6 | 2 1/2 | 3/4 | 9 1/2 | 0.7841 - 0.8160 | 169.25 | 146.55 | 138.90 | 135.40 | 131.45 | 128.40 |
| 7/8 | .8750 | 41228 | 42228 | 133.55 | 2 | 6 | 2 5/8 | 3/4 | 10 | 0.8471 - 0.8780 | 180.40 | 156.80 | 149.05 | 145.30 | 141.25 | 138.15 |
| 15/16 | .9375 | 41230 | 42230 | 155.25 | 3 | 8 | 2 5/8 | 3/4 | 10 | 0.9091 - 0.9410 | 202.20 | 178.70 | 170.75 | 167.00 | 162.95 | 159.85 |
| 1 | 1.0000 | 41232 | 42232 | 160.65 | 3 | 8 | 2 3/4 | 3/4 | 10 1/2 | 0.9721 - 1.0030 | 207.45 | 183.95 | 176.15 | 172.40 | 168.40 | 165.25 |

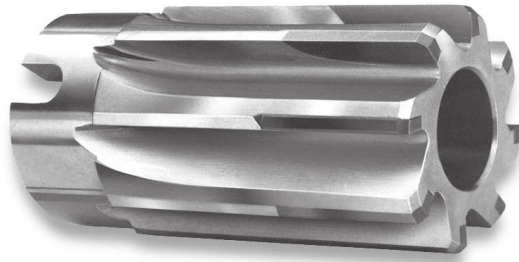
*Quantities of 15 or more - price of fractional size in same size range.



SHELL REAMERS CARBIDE TIPPED TYPE 431 FRACTIONAL



STRAIGHT FLUTES



| TOOL SELECTOR | CHIP CLASS | MATERIAL MACHINED | TOOL TYPE |
|---------------|---------------------------|--------------------------|-----------|
| | 20 | NON-FERROUS - LONG CHIPS | 431/441 |
| 40 | NON-FERROUS - SHORT CHIPS | 431/441 | |
| 60 | CAST IRONS | 431/441 | |
| 80 | LOW STRENGTH STEELS | 441/431 | |
| 100 | MEDIUM STRENGTH STEELS | 441/431 | |
| 120 | HIGH STRENGTH STEELS | 441/431 | |
| 140 | HIGH TEMPERATURE ALLOYS | 441/431 | |

TYPE 431

- Straight polished flutes
- Arbor hole tapered 1/8" per foot with drive slots
- Tool diameter tolerance thru 1": plus .0001", plus .0005"
over 1": plus .0002", plus .0006"

USE:

- For thru or blind holes
- Shell reamers are used with an arbor which is tapered to fit the hole in the reamer. Drive slots in the reamer engage lugs on the arbor to supplement the rotational drive from the tapered arbor. The space between the reamer's drive end and the arbor collar permits easy removal of the shell reamer by prying.

MODIFICATIONS (Prompt delivery)

- Modified tool diameter - priced below
- Metric tool diameter
- Cutting diameter reduced for step or pilot
- End chamfer other than 45°
- End cutting or corner radius
- Increased/decreased circular margin
- Increased/decreased tool diameter back taper

| TOOL DIAMETER | | TYPE 431 EDP NO. | PRICE | DIMENSIONS | | | | | | FINISHED TO MODIFIED TOOL DIAMETER | | | | | | |
|---------------|---------|------------------|----------|-------------------|----------------|-------------|----------|----------|-------|------------------------------------|--|----------|----------|----------|----------|----------|
| FRACTIONAL | DECIMAL | | | HOLE DIAM LG. END | FITS ARBOR NO. | NO. OF FLTS | LENGTH | | | MODIFIED DIAMETER RANGE | PRICE EACH - BASED ON QUANTITY ORDERED | | | | | |
| | | | | | | FLUTE | CAR-BIDE | OVER-ALL | | | 1 | 2 | 3 | 4 | 5-7 | 8-14* |
| 3/4 | .7500 | 43124 | \$224.05 | 3/8 | 4 | 6 | 1 3/4 | 1 | 2 1/4 | 0.7221 - 0.7530 | \$316.95 | \$270.45 | \$254.85 | \$247.40 | \$239.50 | \$233.30 |
| 25/32 | .7812 | 43125 | 228.40 | 3/8 | 4 | 6 | 1 3/4 | 1 | 2 1/4 | 0.7531 - 0.7840 | 321.25 | 274.70 | 259.30 | 251.80 | 243.85 | 237.65 |
| 13/16 | .8125 | 43126 | 228.40 | 1/2 | 5 | 6 | 1 15/16 | 1 | 2 1/2 | 0.7841 - 0.8160 | 321.25 | 274.70 | 259.30 | 251.80 | 243.85 | 237.65 |
| 7/8 | .8750 | 43128 | 255.30 | 1/2 | 5 | 6 | 1 15/16 | 1 | 2 1/2 | 0.8161 - 0.8780 | 351.65 | 303.30 | 287.05 | 279.55 | 271.25 | 264.65 |
| 15/16 | .9375 | 43130 | 255.30 | 1/2 | 5 | 8 | 1 15/16 | 1 | 2 1/2 | 0.8781 - 0.9410 | 351.65 | 303.30 | 287.05 | 279.55 | 271.25 | 264.65 |
| 1 | 1.0000 | 43132 | 259.90 | 1/2 | 5 | 8 | 1 15/16 | 1 | 2 1/2 | 0.9411 - 1.0030 | 356.25 | 307.95 | 291.85 | 284.15 | 275.85 | 269.30 |
| 1 1/16 | 1.0625 | 43134 | 269.05 | 5/8 | 6 | 8 | 2 1/8 | 1 | 2 3/4 | 1.0031 - 1.0660 | 365.30 | 317.05 | 300.75 | 293.20 | 284.95 | 278.35 |
| 1 1/8 | 1.1250 | 43136 | 273.50 | 5/8 | 6 | 8 | 2 1/8 | 1 | 2 3/4 | 1.0661 - 1.1280 | 369.80 | 321.60 | 305.35 | 297.80 | 289.45 | 283.00 |
| 1 3/16 | 1.1875 | 43138 | 278.15 | 5/8 | 6 | 8 | 2 1/8 | 1 1/8 | 2 3/4 | 1.1281 - 1.1905 | 374.25 | 326.20 | 310.00 | 302.40 | 294.00 | 287.60 |
| 1 1/4 | 1.2500 | 43140 | 296.35 | 5/8 | 6 | 8 | 2 1/8 | 1 1/8 | 2 3/4 | 1.1906 - 1.2530 | 392.60 | 344.40 | 328.30 | 320.50 | 312.35 | 305.80 |
| 1 5/16 | 1.3125 | 43142 | 300.75 | 3/4 | 7 | 8 | 2 1/4 | 1 1/8 | 3 | 1.2531 - 1.3155 | 397.10 | 348.90 | 332.75 | 325.10 | 316.95 | 310.30 |
| 1 3/8 | 1.3750 | 43144 | 309.95 | 3/4 | 7 | 8 | 2 1/4 | 1 1/8 | 3 | 1.3156 - 1.3780 | 406.30 | 357.95 | 341.90 | 334.10 | 325.85 | 319.40 |
| 1 7/16 | 1.4375 | 43146 | 319.10 | 3/4 | 7 | 8 | 2 1/4 | 1 1/8 | 3 | 1.3781 - 1.4405 | 415.35 | 367.15 | 351.05 | 343.40 | 334.90 | 328.60 |
| 1 1/2 | 1.5000 | 43148 | 332.75 | 3/4 | 7 | 8 | 2 1/4 | 1 1/8 | 3 | 1.4406 - 1.5030 | 429.15 | 380.85 | 364.65 | 356.95 | 348.70 | 342.25 |
| 1 5/8 | 1.5625 | 43150 | 385.30 | 3/4 | 7 | 10 | 2 1/4 | 1 1/8 | 3 | 1.5031 - 1.5660 | 485.75 | 435.50 | 418.55 | 410.45 | 401.85 | 395.15 |
| 1 3/4 | 1.6250 | 43152 | 404.20 | 3/4 | 7 | 10 | 2 1/4 | 1 1/8 | 3 | 1.5661 - 1.6280 | 504.85 | 454.50 | 437.55 | 429.50 | 420.95 | 414.15 |
| 1 11/16 | 1.6875 | 43154 | 437.60 | 1 | 8 | 10 | 2 3/4 | 1 1/8 | 3 1/2 | 1.6281 - 1.6910 | 538.25 | 487.80 | 470.95 | 462.90 | 454.35 | 447.60 |
| 1 3/4 | 1.7500 | 43156 | 437.60 | 1 | 8 | 10 | 2 3/4 | 1 1/8 | 3 1/2 | 1.6911 - 1.7530 | 538.25 | 487.80 | 470.95 | 462.90 | 454.35 | 447.60 |
| 1 13/16 | 1.8125 | 43158 | 470.85 | 1 | 8 | 10 | 2 3/4 | 1 1/8 | 3 1/2 | 1.7531 - 1.8160 | 571.25 | 521.00 | 504.15 | 496.15 | 487.50 | 480.65 |
| 1 7/8 | 1.8750 | 43160 | 470.85 | 1 | 8 | 10 | 2 3/4 | 1 1/8 | 3 1/2 | 1.8161 - 1.8780 | 571.25 | 521.00 | 504.15 | 496.15 | 487.50 | 480.65 |
| 1 15/16 | 1.9375 | 43162 | 504.25 | 1 | 8 | 10 | 2 3/4 | 1 1/8 | 3 1/2 | 1.8781 - 1.9410 | 604.60 | 554.30 | 537.50 | 529.55 | 520.90 | 514.10 |
| 2 | 2.0000 | 43164 | 504.25 | 1 | 8 | 10 | 2 3/4 | 1 1/8 | 3 1/2 | 1.9411 - 2.0030 | 604.60 | 554.30 | 537.50 | 529.55 | 520.90 | 514.10 |
| 2 1/16 | 2.0625 | 43166 | 542.25 | 1 1/4 | 9 | 12 | 2 7/8 | 1 1/8 | 3 3/4 | 2.0031 - 2.0660 | 642.70 | 592.45 | 575.50 | 567.55 | 558.85 | 552.15 |
| 2 1/8 | 2.1250 | 43168 | 542.25 | 1 1/4 | 9 | 12 | 2 7/8 | 1 1/8 | 3 3/4 | 2.0661 - 2.1280 | 642.70 | 592.45 | 575.50 | 567.55 | 558.85 | 552.15 |
| 2 3/16 | 2.1875 | 43170 | 589.75 | 1 1/4 | 9 | 12 | 2 7/8 | 1 1/8 | 3 3/4 | 2.1281 - 2.1905 | 690.30 | 639.90 | 623.05 | 615.00 | 606.50 | 599.55 |
| 2 1/4 | 2.2500 | 43172 | 589.75 | 1 1/4 | 9 | 12 | 2 7/8 | 1 1/8 | 3 3/4 | 2.1906 - 2.2530 | 690.30 | 639.90 | 623.05 | 615.00 | 606.50 | 599.55 |
| 2 5/16 | 2.3125 | 43174 | 623.05 | 1 1/4 | 9 | 12 | 2 7/8 | 1 1/8 | 3 3/4 | 2.2531 - 2.3155 | 723.65 | 673.20 | 656.40 | 648.30 | 639.75 | 632.90 |
| 2 3/8 | 2.3750 | 43176 | 623.05 | 1 1/4 | 9 | 12 | 2 7/8 | 1 1/8 | 3 3/4 | 2.3156 - 2.3780 | 723.65 | 673.20 | 656.40 | 648.30 | 639.75 | 632.90 |
| 2 7/16 | 2.4375 | 43178 | 656.45 | 1 1/4 | 9 | 12 | 2 7/8 | 1 1/8 | 3 3/4 | 2.3781 - 2.4405 | 756.95 | 706.60 | 689.75 | 681.70 | 673.10 | 666.25 |
| 2 1/2 | 2.5000 | 43180 | 656.45 | 1 1/4 | 9 | 12 | 2 7/8 | 1 1/8 | 3 3/4 | 2.4406 - 2.5030 | 756.95 | 706.60 | 689.75 | 681.70 | 673.10 | 666.25 |
| 2 9/16 | 2.5625 | 43182 | 720.55 | 1 1/2 | 10 | 14 | 3 1/8 | 1 1/8 | 4 | 2.5031 - 2.5660 | 821.05 | 770.70 | 753.85 | 745.80 | 737.20 | 730.40 |
| 2 5/8 | 2.6250 | 43184 | 747.30 | 1 1/2 | 10 | 14 | 3 1/8 | 1 1/8 | 4 | 2.5661 - 2.6280 | 847.75 | 797.30 | 780.65 | 772.45 | 763.95 | 757.10 |
| 2 11/16 | 2.6875 | 43186 | 776.30 | 1 1/2 | 10 | 14 | 3 1/8 | 1 1/8 | 4 | 2.6281 - 2.6910 | 876.75 | 826.50 | 809.60 | 801.65 | 792.95 | 786.15 |
| 2 3/4 | 2.7500 | 43188 | 803.30 | 1 1/2 | 10 | 14 | 3 1/8 | 1 1/8 | 4 | 2.6911 - 2.7530 | 903.80 | 853.40 | 836.55 | 828.60 | 819.95 | 813.10 |
| 2 13/16 | 2.8125 | 43190 | 831.50 | 1 1/2 | 10 | 14 | 3 1/8 | 1 1/8 | 4 | 2.7531 - 2.8160 | 931.95 | 881.70 | 864.85 | 856.80 | 848.20 | 841.45 |
| 2 7/8 | 2.8750 | 43192 | 864.85 | 1 1/2 | 10 | 14 | 3 1/8 | 1 1/8 | 4 | 2.8161 - 2.8780 | 965.20 | 915.05 | 898.05 | 890.15 | 881.50 | 874.70 |
| 2 15/16 | 2.9375 | 43194 | 898.25 | 1 1/2 | 10 | 14 | 3 1/8 | 1 1/8 | 4 | 2.8781 - 2.9410 | 998.70 | 948.30 | 931.45 | 923.60 | 914.95 | 908.10 |
| 3 | 3.0000 | 43196 | 931.55 | 1 1/2 | 10 | 14 | 3 1/8 | 1 1/8 | 4 | 2.9411 - 3.0030 | 1032.00 | 981.70 | 964.85 | 957.00 | 948.25 | 941.50 |

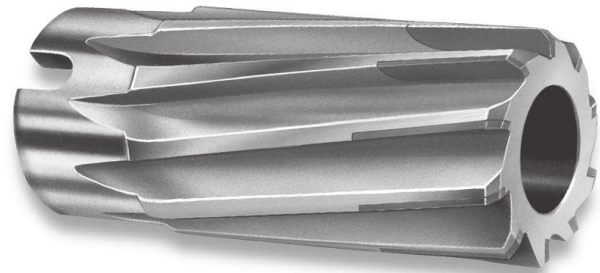
*Quantities of 15 or more - price of fractional size in same size range.



SHELL REAMERS AND ARBORS CARBIDE TIPPED TYPES 441 FRACTIONAL & 481



LEFT SPIRAL FLUTES



TYPE 441

- Left spiral polished flutes
- Arbor hole tapered 1/8" per foot with drive slots
- Tool diameter tolerance thru 1": plus .0001", plus .0005"
over 1": plus .0002", plus .0006"

USE:

- See "USE" on page 57 - but used only on thru holes for heat treated steels, hard cast irons and other hard materials; left spiral flutes should not be used on blind holes
- Finishes are much better as spiral flutes tend to bridge interruptions such as keyways, slots, or intersecting holes.

TOOL SELECTOR BOX (See page 57)
MODIFICATIONS (See list on page 57)

| TOOL DIAMETER | | TYPE 441 EDP NO. | PRICE | DIMENSIONS | | | | | | FINISHED TO MODIFIED TOOL DIAMETER | | | | | | |
|---------------|---------|------------------|----------|--------------------|----------------|-------------|----------|----------|-------|------------------------------------|--|----------|----------|----------|----------|----------|
| FRACTIONAL | DECIMAL | | | HOLE DIAM. LG. END | FITS ARBOR NO. | NO. OF FLTS | LENGTH | | | MODIFIED DIAMETER RANGE | PRICE EACH - BASED ON QUANTITY ORDERED | | | | | |
| | | | | | | FLUTE | CAR-BIDE | OVER-ALL | | | 1 | 2 | 3 | 4 | 5-7 | 8-14* |
| 3/4 | .7500 | 44124 | \$291.20 | 3/8 | 4 | 6 | 1 3/4 | 1 | 2 1/4 | 0.7221-0.7530 | \$384.00 | \$337.60 | \$322.00 | \$314.65 | \$306.65 | \$300.35 |
| 25/32 | .7812 | 44125 | 296.90 | 3/8 | 4 | 6 | 1 3/4 | 1 | 2 1/4 | 0.7531-0.7840 | 389.60 | 343.25 | 327.55 | 320.20 | 312.25 | 306.05 |
| 13/16 | .8125 | 44126 | 296.90 | 1/2 | 5 | 6 | 1 15/16 | 1 | 2 1/2 | 0.7841-0.8160 | 389.60 | 343.25 | 327.55 | 320.20 | 312.25 | 306.05 |
| 7/8 | .8750 | 44128 | 331.95 | 1/2 | 5 | 6 | 1 15/16 | 1 | 2 1/2 | 0.8161-0.8780 | 428.15 | 380.00 | 363.75 | 356.10 | 347.85 | 341.30 |
| 15/16 | .9375 | 44130 | 331.95 | 1/2 | 5 | 8 | 1 15/16 | 1 | 2 1/2 | 0.8781-0.9410 | 428.15 | 380.00 | 363.75 | 356.10 | 347.85 | 341.30 |
| 1 | 1.0000 | 44132 | 337.80 | 1/2 | 5 | 8 | 1 15/16 | 1 | 2 1/2 | 0.9411-1.0030 | 434.05 | 385.80 | 369.65 | 362.05 | 353.75 | 347.20 |
| 1 1/16 | 1.0625 | 44134 | 348.35 | 5/8 | 6 | 8 | 2 1/8 | 1 | 2 3/4 | 1.0031-1.0660 | 444.60 | 396.45 | 380.20 | 372.55 | 364.25 | 357.80 |
| 1 1/8 | 1.1250 | 44136 | 355.60 | 5/8 | 6 | 8 | 2 1/8 | 1 | 2 3/4 | 1.0661-1.1280 | 451.85 | 403.60 | 387.50 | 379.85 | 371.60 | 365.00 |
| 1 3/16 | 1.1875 | 44138 | 361.50 | 5/8 | 6 | 8 | 2 1/8 | 1 1/8 | 2 3/4 | 1.1281-1.1905 | 457.95 | 409.50 | 393.30 | 385.75 | 377.50 | 370.90 |
| 1 1/4 | 1.2500 | 44140 | 385.15 | 5/8 | 6 | 8 | 2 1/8 | 1 1/8 | 2 3/4 | 1.1906-1.2530 | 481.40 | 433.25 | 417.05 | 409.35 | 401.20 | 394.60 |
| 1 5/16 | 1.3125 | 44142 | 391.20 | 3/4 | 7 | 8 | 2 1/4 | 1 1/8 | 3 | 1.2531-1.3155 | 487.50 | 439.10 | 423.05 | 415.35 | 407.10 | 400.55 |
| 1 3/8 | 1.3750 | 44144 | 402.95 | 3/4 | 7 | 8 | 2 1/4 | 1 1/8 | 3 | 1.3156-1.3780 | 499.30 | 451.05 | 434.90 | 427.20 | 418.90 | 412.45 |
| 1 7/16 | 1.4375 | 44146 | 414.85 | 3/4 | 7 | 8 | 2 1/4 | 1 1/8 | 3 | 1.3781-1.4405 | 511.15 | 462.85 | 446.75 | 439.00 | 430.75 | 424.10 |
| 1 1/2 | 1.5000 | 44148 | 432.60 | 3/4 | 7 | 8 | 2 1/4 | 1 1/8 | 3 | 1.4406-1.5030 | 528.95 | 480.60 | 464.50 | 456.90 | 448.50 | 442.10 |
| 1 5/8 | 1.5625 | 44150 | 500.90 | 3/4 | 7 | 10 | 2 1/4 | 1 1/8 | 3 | 1.5031-1.5660 | 601.45 | 551.10 | 534.20 | 526.20 | 517.65 | 510.70 |
| 1 5/8 | 1.6250 | 44152 | 525.55 | 3/4 | 7 | 10 | 2 1/4 | 1 1/8 | 3 | 1.5661-1.6280 | 626.05 | 575.80 | 558.85 | 550.80 | 542.25 | 535.30 |
| 1 11/16 | 1.6875 | 44154 | 568.70 | 1 | 8 | 10 | 2 3/4 | 1 1/8 | 3 1/2 | 1.6281-1.6910 | 669.35 | 618.95 | 602.10 | 594.20 | 585.50 | 578.70 |
| 1 3/4 | 1.7500 | 44156 | 568.70 | 1 | 8 | 10 | 2 3/4 | 1 1/8 | 3 1/2 | 1.6911-1.7530 | 669.35 | 618.95 | 602.10 | 594.20 | 585.50 | 578.70 |
| 1 13/16 | 1.8125 | 44158 | 611.80 | 1 | 8 | 10 | 2 3/4 | 1 1/8 | 3 1/2 | 1.7531-1.8160 | 712.20 | 661.75 | 644.95 | 637.00 | 628.35 | 621.50 |
| 1 7/8 | 1.8750 | 44160 | 611.80 | 1 | 8 | 10 | 2 3/4 | 1 1/8 | 3 1/2 | 1.8161-1.8780 | 712.20 | 661.75 | 644.95 | 637.00 | 628.35 | 621.50 |
| 1 15/16 | 1.9375 | 44162 | 655.50 | 1 | 8 | 10 | 2 3/4 | 1 1/8 | 3 1/2 | 1.8781-1.9410 | 756.00 | 705.55 | 688.80 | 680.70 | 672.05 | 665.25 |
| 2 | 2.0000 | 44164 | 655.50 | 1 | 8 | 10 | 2 3/4 | 1 1/8 | 3 1/2 | 1.9411-2.0030 | 756.00 | 705.55 | 688.80 | 680.70 | 672.05 | 665.25 |
| 2 1/16 | 2.0625 | 44166 | 704.85 | 1 1/4 | 9 | 12 | 2 7/8 | 1 1/8 | 3 3/4 | 2.0031-2.0660 | 805.35 | 755.05 | 738.10 | 730.10 | 721.60 | 714.75 |
| 2 1/8 | 2.1250 | 44168 | 704.85 | 1 1/4 | 9 | 12 | 2 7/8 | 1 1/8 | 3 3/4 | 2.0661-2.1280 | 805.35 | 755.05 | 738.10 | 730.10 | 721.60 | 714.75 |
| 2 3/16 | 2.1875 | 44170 | 766.75 | 1 1/4 | 9 | 12 | 2 7/8 | 1 1/8 | 3 3/4 | 2.1281-2.1905 | 867.15 | 816.75 | 799.95 | 792.00 | 783.30 | 776.55 |
| 2 1/4 | 2.2500 | 44172 | 766.75 | 1 1/4 | 9 | 12 | 2 7/8 | 1 1/8 | 3 3/4 | 2.1906-2.2530 | 867.15 | 816.75 | 799.95 | 792.00 | 783.30 | 776.55 |
| 2 5/16 | 2.3125 | 44174 | 810.10 | 1 1/4 | 9 | 12 | 2 7/8 | 1 1/8 | 3 3/4 | 2.2531-2.3155 | 910.60 | 860.25 | 843.35 | 835.40 | 826.65 | 819.95 |
| 2 3/8 | 2.3750 | 44176 | 810.10 | 1 1/4 | 9 | 12 | 2 7/8 | 1 1/8 | 3 3/4 | 2.3156-2.3780 | 910.60 | 860.25 | 843.35 | 835.40 | 826.65 | 819.95 |
| 2 7/16 | 2.4375 | 44178 | 853.30 | 1 1/4 | 9 | 12 | 2 7/8 | 1 1/8 | 3 3/4 | 2.3781-2.4405 | 953.75 | 903.45 | 886.70 | 878.50 | 869.90 | 863.10 |
| 2 1/2 | 2.5000 | 44180 | 853.30 | 1 1/4 | 9 | 12 | 2 7/8 | 1 1/8 | 3 3/4 | 2.4406-2.5030 | 953.75 | 903.45 | 886.70 | 878.50 | 869.90 | 863.10 |
| 2 5/8 | 2.5625 | 44182 | 936.70 | 1 1/2 | 10 | 14 | 3 1/8 | 1 1/8 | 4 | 2.5031-2.5660 | 1037.20 | 986.85 | 969.95 | 962.10 | 953.40 | 946.65 |
| 2 3/4 | 2.6250 | 44184 | 971.45 | 1 1/2 | 10 | 14 | 3 1/8 | 1 1/8 | 4 | 2.5661-2.6280 | 1072.00 | 1021.65 | 1004.90 | 996.85 | 988.25 | 981.40 |

*Quantities of 15 or more - price of fractional size in same size range.

| ARBOR NO. | FITS REAMER TOOL DIAM. | OVER-ALL LENGTH | STRAIGHT SHANK | | | TAPER SHANK | | |
|-----------|------------------------|-----------------|----------------|------------------|----------|-----------------|------------------|----------|
| | | | SHANK DIAM. | TYPE 481 EDP NO. | PRICE | TAPER SHANK NO. | TYPE 481 EDP NO. | PRICE |
| 4 | 0.7221-0.7840 | 9 | .500 | 48104 | \$142.25 | 2 | 48114 | \$169.65 |
| 5 | 0.7841-1.0030 | 9 1/2 | .625 | 48105 | 158.70 | 2 | 48115 | 202.50 |
| 6 | 1.0031-1.2530 | 10 | .750 | 48106 | 175.20 | 3 | 48116 | 218.90 |
| 7 | 1.2531-1.6280 | 11 | .875 | 48107 | 191.55 | 3 | 48117 | 240.90 |
| 8 | 1.6281-2.0030 | 12 | 1.125 | 48108 | 213.45 | 4 | 48118 | 268.30 |
| 9 | 2.0031-2.5030 | 13 | 1.375 | 48109 | 257.20 | 4 | 48119 | 301.05 |
| 10 | 2.5031-3.0030 | 14 | 1.625 | 48110 | 334.50 | 5 | 48120 | 381.95 |

SHELL REAMER ARBORS TYPE 481

STRAIGHT SHANK



TAPER SHANK



Both types hardened and ground

REAMERS



CHUCKING REAMERS - FOR STEELS CARBIDE TIPPED TYPE 480 METRIC

MATERIAL SPECIFIC

STRAIGHT FLUTE LONG CARBIDE STRAIGHT SHANK



NOTE: Tool diameter in millimeters (mm); all other dimensions in inches. Also, modifications available (see list on page 60).

| TOOL DIAMETER | | TYPE 480 STEEL METRIC EDP NO. | METRIC PRICE | DIMENSIONS | | | | FINISHED TO MODIFIED TOOL DIAMETER | | | | | | | |
|---------------|--------|-------------------------------|--------------|------------------|-------------|-----------------|----------|------------------------------------|--|---------|---------|---------|---------|---------|---------|
| mm | INCH | | | MAX. SHANK DIAM. | NO. OF FLTS | LENGTH | | MODIFIED DIAMETER RANGE (mm) | PRICE EACH - BASED ON QUANTITY ORDERED | | | | | | |
| | | | | | | FLUTE & CARBIDE | OVER-ALL | | 1 | 2 | 3 | 4 | 5-7 | 8-14 | OVER 14 |
| 4.5 | .1772 | 480045 | \$82.55 | .1704 | 4 | 1 1/8 | 4 1/2 | 4.494 - 4.696 | \$116.55 | \$94.00 | \$86.50 | \$82.85 | \$79.00 | \$75.90 | \$71.55 |
| 5.0 | .1969 | 480050 | 82.55 | .1805 | 4 | 1 1/8 | 4 1/2 | 4.697 - 5.182 | 116.55 | 94.00 | 86.50 | 82.85 | 79.00 | 75.90 | 71.55 |
| 5.5 | .2165 | 480055 | 82.55 | .2075 | 4 | 1 1/4 | 5 | 5.183 - 5.613 | 116.55 | 94.00 | 86.50 | 82.85 | 79.00 | 75.90 | 71.55 |
| 6.0 | .2362 | 480060 | 82.55 | .2265 | 4 | 1 1/2 | 6 | 5.614 - 6.045 | 116.55 | 94.00 | 86.50 | 82.85 | 79.00 | 75.90 | 71.55 |
| - | - | 480063 | - | .2405 | 4 | 1 1/2 | 6 | 6.046 - 6.426 | 116.55 | 94.00 | 86.50 | 82.85 | 79.00 | 75.90 | 71.55 |
| 6.5 | .2559 | 480065 | 84.05 | .2485 | 4 | 1 1/2 | 6 | 6.427 - 7.214 | 118.10 | 95.45 | 87.95 | 84.20 | 80.55 | 77.30 | 73.05 |
| 7.0 | .2756 | 480070 | 84.05 | .2485 | 4 | 1 1/2 | 6 | - | - | - | - | - | - | - | - |
| 7.5 | .2953 | 480075 | 84.05 | .2792 | 4 | 1 1/2 | 6 | 7.215 - 8.001 | 118.10 | 95.45 | 87.95 | 84.20 | 80.55 | 77.30 | 73.05 |
| 8.0 | .3150 | 480080 | 84.05 | .2792 | 4 | 1 1/2 | 6 | - | - | - | - | - | - | - | - |
| 8.5 | .3346 | 480085 | 86.55 | .2792 | 4 | 1 1/2 | 6 | 8.002 - 8.814 | 120.65 | 98.00 | 90.40 | 86.70 | 82.95 | 79.85 | 75.45 |
| 9.0 | .3543 | 480090 | 86.55 | .3105 | 4 | 1 3/4 | 7 | 8.815 - 9.601 | 120.65 | 98.00 | 90.40 | 86.70 | 82.95 | 79.85 | 75.45 |
| 9.5 | .3740 | 480095 | 86.55 | .3105 | 4 | 1 3/4 | 7 | - | - | - | - | - | - | - | - |
| 10.0 | .3937 | 480100 | 90.10 | .3105 | 4 | 1 3/4 | 7 | 9.602 - 10.389 | 124.05 | 101.50 | 93.90 | 90.25 | 86.50 | 83.35 | 79.00 |
| 10.5 | .4134 | 480105 | 102.05 | .3730 | 6 | 1 3/4 | 7 | 10.390 - 11.201 | 136.05 | 113.55 | 105.90 | 102.20 | 98.45 | 95.25 | 90.90 |
| 11.0 | .4331 | 480110 | 102.05 | .3730 | 6 | 1 3/4 | 7 | - | - | - | - | - | - | - | - |
| 11.5 | .4528 | 480115 | 102.90 | .3730 | 6 | 1 3/4 | 7 | 11.202 - 11.989 | 136.95 | 114.25 | 106.75 | 103.00 | 99.25 | 96.15 | 91.75 |
| 12.0 | .4724 | 480120 | 110.20 | .4355 | 6 | 2 | 8 | 11.990 - 12.776 | 146.60 | 122.50 | 114.35 | 110.30 | 106.30 | 102.95 | 98.40 |
| 12.5 | .4921 | 480125 | 110.20 | .4355 | 6 | 2 | 8 | - | - | - | - | - | - | - | - |
| 13.0 | .5118 | 480130 | 112.80 | .4355 | 6 | 2 | 8 | 12.777 - 13.564 | 149.35 | 125.10 | 117.00 | 113.00 | 108.95 | 105.60 | 101.00 |
| 13.5 | .5315 | 480135 | 112.80 | .4355 | 6 | 2 | 8 | - | - | - | - | - | - | - | - |
| 14.0 | .5512 | 480140 | 112.80 | .4355 | 6 | 2 | 8 | 13.565 - 14.376 | 149.35 | 125.10 | 117.00 | 113.00 | 108.95 | 105.60 | 101.00 |
| 14.5 | .5709 | 480145 | 116.50 | .4355 | 6 | 2 | 8 | 14.377 - 15.164 | 152.90 | 128.75 | 120.70 | 116.80 | 112.60 | 109.25 | 104.70 |
| 15.0 | .5906 | 480150 | 116.50 | .4355 | 6 | 2 | 8 | - | - | - | - | - | - | - | - |
| 15.5 | .6102 | 480155 | 116.50 | .5615 | 6 | 2 1/4 | 9 | 15.165 - 15.951 | 152.90 | 128.75 | 120.70 | 116.80 | 112.60 | 109.25 | 104.70 |
| 16.0 | .6299 | 480160 | 118.35 | .5615 | 6 | 2 1/4 | 9 | 15.952 - 16.739 | 154.90 | 130.75 | 122.60 | 118.60 | 114.55 | 111.15 | 106.45 |
| 16.5 | .6496 | 480165 | 118.35 | .5615 | 6 | 2 1/4 | 9 | - | - | - | - | - | - | - | - |
| 17.0 | .6693 | 480170 | 118.35 | .5615 | 6 | 2 1/4 | 9 | 16.740 - 17.551 | 154.90 | 130.75 | 122.60 | 118.60 | 114.55 | 111.15 | 106.45 |
| 17.5 | .6890 | 480175 | 118.35 | .5615 | 6 | 2 1/4 | 9 | - | - | - | - | - | - | - | - |
| 18.0 | .7087 | 480180 | 123.20 | .5615 | 6 | 2 1/2 | 9 | 17.552 - 18.339 | 159.45 | 135.25 | 127.30 | 123.30 | 119.25 | 115.80 | 111.15 |
| 18.5 | .7283 | 480185 | 123.20 | .6245 | 6 | 2 1/2 | 9 1/2 | 18.340 - 19.126 | 159.45 | 135.25 | 127.30 | 123.30 | 119.25 | 115.80 | 111.15 |
| 19.0 | .7480 | 480190 | 123.20 | .6245 | 6 | 2 1/2 | 9 1/2 | - | - | - | - | - | - | - | - |
| 19.5 | .7677 | 480195 | 126.70 | .6245 | 6 | 2 1/2 | 9 1/2 | 19.127 - 19.914 | 163.20 | 139.00 | 130.85 | 126.90 | 122.75 | 119.50 | 114.85 |
| 20.0 | .7874 | 480200 | 126.70 | .6245 | 6 | 2 1/2 | 9 1/2 | 19.915 - 20.726 | 163.20 | 139.00 | 130.85 | 126.90 | 122.75 | 119.50 | 114.85 |
| 20.5 | .8071 | 480205 | 126.70 | .6245 | 6 | 2 1/2 | 9 1/2 | - | - | - | - | - | - | - | - |
| 21.0 | .8268 | 480210 | 131.05 | .6245 | 6 | 2 1/2 | 9 1/2 | 20.727 - 21.514 | 167.70 | 143.40 | 135.25 | 131.35 | 127.35 | 123.95 | 119.40 |
| 21.5 | .8465 | 480215 | 131.05 | .6245 | 6 | 2 1/2 | 9 1/2 | - | - | - | - | - | - | - | - |
| 22.0 | .8661 | 480220 | 131.05 | .7495 | 6 | 2 5/8 | 10 | 21.515 - 22.301 | 167.70 | 143.40 | 135.25 | 131.35 | 127.35 | 123.95 | 119.40 |
| 22.5 | .8858 | 480225 | 155.70 | .7495 | 6 | 2 5/8 | 10 | 22.302 - 23.089 | 193.55 | 168.45 | 160.15 | 155.95 | 151.70 | 148.30 | 143.35 |
| 23.0 | .9055 | 480230 | 155.70 | .7495 | 6 | 2 5/8 | 10 | - | - | - | - | - | - | - | - |
| 23.5 | .9252 | 480235 | 155.70 | .7495 | 8 | 2 5/8 | 10 | 23.090 - 23.901 | 193.55 | 168.45 | 160.15 | 155.95 | 151.70 | 148.30 | 143.35 |
| 24.0 | .9449 | 480240 | 162.40 | .7495 | 8 | 2 5/8 | 10 | 23.902 - 24.689 | 200.30 | 175.20 | 166.80 | 162.65 | 158.35 | 154.95 | 150.00 |
| 24.5 | .9646 | 480245 | 162.40 | .7495 | 8 | 2 5/8 | 10 | - | - | - | - | - | - | - | - |
| 25.0 | .9843 | 480250 | 162.40 | .8745 | 8 | 2 3/4 | 10 1/2 | 24.690 - 25.476 | 200.30 | 175.20 | 166.80 | 162.65 | 158.35 | 154.95 | 150.00 |
| 25.5 | 1.0039 | 480255 | 166.75 | .8745 | 8 | 2 3/4 | 10 1/2 | 25.477 - 27.076 | 202.85 | 179.00 | 170.75 | 166.90 | 162.85 | 159.45 | 154.90 |
| 26.0 | 1.0236 | 480260 | 166.75 | .8745 | 8 | 2 3/4 | 10 1/2 | - | - | - | - | - | - | - | - |
| 27.0 | 1.0630 | 480270 | 166.75 | .8745 | 8 | 2 3/4 | 10 1/2 | - | - | - | - | - | - | - | - |
| 28.0 | 1.1024 | 480280 | 179.15 | .8745 | 8 | 2 7/8 | 11 | 27.077 - 28.651 | 215.35 | 191.45 | 183.30 | 179.30 | 175.35 | 171.95 | 167.25 |
| 29.0 | 1.1417 | 480290 | 194.80 | .9995 | 8 | 2 7/8 | 11 | 28.652 - 30.239 | 230.95 | 207.00 | 198.90 | 194.95 | 190.90 | 187.55 | 182.95 |
| 30.0 | 1.1811 | 480300 | 194.80 | .9995 | 8 | 2 7/8 | 11 | - | - | - | - | - | - | - | - |
| 31.0 | 1.2205 | 480310 | 215.15 | .9995 | 8 | 3 | 11 1/2 | 30.240 - 31.826 | 251.50 | 227.45 | 219.40 | 215.35 | 211.40 | 208.00 | 203.50 |
| 32.0 | 1.2598 | 480320 | 215.15 | .9995 | 8 | 3 | 11 1/2 | 31.827 - 33.414 | 251.50 | 227.45 | 219.40 | 215.35 | 211.40 | 208.00 | 203.50 |
| 33.0 | 1.2992 | 480330 | 215.15 | .9995 | 8 | 3 | 11 1/2 | - | - | - | - | - | - | - | - |
| 34.0 | 1.3386 | 480340 | 218.20 | .9995 | 8 | 3 1/4 | 12 | 33.415 - 35.001 | 254.35 | 230.40 | 222.35 | 218.35 | 214.40 | 210.95 | 206.35 |
| 35.0 | 1.3780 | 480350 | 218.20 | .9995 | 8 | 3 1/4 | 12 | - | - | - | - | - | - | - | - |
| 36.0 | 1.4173 | 480360 | 239.40 | .9995 | 8 | 3 1/4 | 12 | 35.002 - 36.589 | 275.55 | 251.60 | 243.35 | 239.60 | 235.55 | 232.20 | 227.55 |
| 37.0 | 1.4567 | 480370 | 284.25 | 1.2495 | 8 | 3 1/2 | 12 1/2 | 36.590 - 38.176 | 320.45 | 296.40 | 288.30 | 284.35 | 280.30 | 277.10 | 272.50 |
| 38.0 | 1.4961 | 480380 | 284.25 | 1.2495 | 8 | 3 1/2 | 12 1/2 | - | - | - | - | - | - | - | - |

REAMERS



CHUCKING REAMERS - FOR STEELS CARBIDE TIPPED TYPE 480 FRACTIONAL

MATERIAL SPECIFIC

STRAIGHT FLUTE LONG CARBIDE STRAIGHT SHANK

TYPE 480 - FOR REAMING STEELS, TOUGH STEEL ALLOYS, & CAST STEELS

- Polished straight flutes with steel cutting grade flute long carbide
- Special steel cutting tool geometry:
 - Positive radial rake (behind center)
 - Narrow circular lands
 - Minimum back taper
- Detailed specifications on page 15
- See page 64 for other material specific reamers

| TOOL SELECTOR | CHIP CLASS | MATERIAL MACHINED | TOOL TYPE |
|---------------|-------------------------|---------------------------|--------------------------------------|
| | 20 | NON-FERROUS - LONG CHIPS | 457 ^{MS} |
| | 40 | NON-FERROUS - SHORT CHIPS | 457 ^{MS} /458 ^{MS} |
| | 60 | CAST IRONS | 458 ^{MS} |
| | 80 | LOW STRENGTH STEELS | 480 |
| | 100 | MEDIUM STRENGTH STEELS | 480 |
| | 120 | HIGH STRENGTH STEELS | 480 |
| 140 | HIGH TEMPERATURE ALLOYS | 459 ^{MS} | |

MODIFICATIONS (Prompt delivery)

- Closer tool diameter tolerance - pg. 15
- Cutting diameter reduced for step or pilot
- End chamfer other than 45°
- End cutting or corner radius
- Increased/decreased circular margin
- Increased/decreased tool diameter back taper
- Shortened shank or reduced shank diameter
- Flat(s) or tang on shank
- Coatings available:

TITANIUM NITRIDE - TiN

TITANIUM CARBONITRIDE - TiCN

ZIRCONIUM NITRIDE - ZrN

AL TITANIUM NITRIDE - AlTiN



USE:

- This carbide tipped reamer design is based on our extensive development and design experience in manufacturing special reamers for reaming steel.
- Traditional steel reaming problems have been reduced by the following HANNIBAL features:
 1. Holds size longer because steel cutting grade carbide is utilized.
 2. Improved surface finish due to this reamer's reduced circular land minimizing possible material buildup that would reduce surface quality.
 3. Straighter holes due to longer flute length and reduced back taper.
 4. Flute long carbide allows for more regrinds.

NOTE: For smaller tool diameters, see solid carbide reamers on pages 44, 89-91.

| TOOL DIAMETER | | TYPE 480 STEEL EDP NO. | PRICE | DIMENSIONS | | | | FINISHED TO MODIFIED TOOL DIAMETER | | | | | | |
|---------------|---------|------------------------|---------|------------------|-------------|-----------------|----------|------------------------------------|--|---------|---------|---------|---------|---------|
| FRACTIONAL | DECIMAL | | | MAX. SHANK DIAM. | NO. OF FLTS | LENGTH | | MODIFIED DIAMETER RANGE | PRICE EACH - BASED ON QUANTITY ORDERED | | | | | |
| | | | | | | FLUTE & CARBIDE | OVER-ALL | | | 1 | 2 | 3 | 4 | 5-7 |
| 3/16 | .1875 | 48006 | \$67.55 | .1805 | 4 | 1 1/8 | 4 1/2 | 0.1770 - 0.2040 | \$112.80 | \$90.15 | \$82.55 | \$79.00 | \$75.15 | \$72.00 |
| 13/64 | .2031 | 4802031 | 67.55 | .1805 | 4 | 1 1/8 | 4 1/2 | - | - | - | - | - | - | - |
| 7/32 | .2188 | 48007 | 67.55 | .2075 | 4 | 1 1/4 | 5 | 0.2041 - 0.2210 | 112.80 | 90.15 | 82.55 | 79.00 | 75.15 | 72.00 |
| 15/64 | .2344 | 4802344 | 67.55 | .2265 | 4 | 1 1/2 | 6 | 0.2211 - 0.2380 | 112.80 | 90.15 | 82.55 | 79.00 | 75.15 | 72.00 |
| 1/4 | .2500 | 48008 | 67.55 | .2405 | 4 | 1 1/2 | 6 | 0.2381 - 0.2530 | 112.80 | 90.15 | 82.55 | 79.00 | 75.15 | 72.00 |
| 17/64 | .2656 | 4802656 | 69.05 | .2485 | 4 | 1 1/2 | 6 | - | - | - | - | - | - | - |
| 9/32 | .2812 | 48009 | 69.05 | .2485 | 4 | 1 1/2 | 6 | 0.2531 - 0.2840 | 114.25 | 91.70 | 84.05 | 80.55 | 76.60 | 73.65 |
| 19/64 | .2969 | 4802969 | 69.05 | .2792 | 4 | 1 1/2 | 6 | - | - | - | - | - | - | - |
| 5/16 | .3125 | 48010 | 69.05 | .2792 | 4 | 1 1/2 | 6 | 0.2841 - 0.3150 | 114.25 | 91.70 | 84.05 | 80.55 | 76.60 | 73.65 |
| 21/64 | .3281 | 4803281 | 71.60 | .2792 | 4 | 1 1/2 | 6 | - | - | - | - | - | - | - |
| 11/32 | .3438 | 48011 | 71.60 | .2792 | 4 | 1 1/2 | 6 | 0.3151 - 0.3470 | 116.85 | 94.05 | 86.55 | 82.95 | 79.15 | 76.10 |
| 23/64 | .3594 | 4803594 | 71.60 | .3105 | 4 | 1 3/4 | 7 | - | - | - | - | - | - | - |
| 3/8 | .3750 | 48012 | 71.60 | .3105 | 4 | 1 3/4 | 7 | 0.3471 - 0.3780 | 116.85 | 94.05 | 86.55 | 82.95 | 79.15 | 76.10 |
| 25/64 | .3906 | 4803906 | 75.15 | .3105 | 4 | 1 3/4 | 7 | - | - | - | - | - | - | - |
| 13/32 | .4062 | 48013 | 75.15 | .3105 | 4 | 1 3/4 | 7 | 0.3781 - 0.4090 | 120.25 | 97.65 | 90.10 | 86.50 | 82.55 | 79.55 |
| 27/64 | .4219 | 4804219 | 87.05 | .3730 | 6 | 1 3/4 | 7 | - | - | - | - | - | - | - |
| 7/16 | .4375 | 48014 | 87.05 | .3730 | 6 | 1 3/4 | 7 | 0.4091 - 0.4410 | 132.20 | 109.55 | 102.05 | 98.45 | 94.60 | 91.55 |
| 29/64 | .4531 | 4804531 | 87.80 | .3730 | 6 | 1 3/4 | 7 | - | - | - | - | - | - | - |
| 15/32 | .4688 | 48015 | 87.80 | .3730 | 6 | 1 3/4 | 7 | 0.4411 - 0.4720 | 133.10 | 110.30 | 102.90 | 99.25 | 95.30 | 92.30 |
| 31/64 | .4844 | 4804844 | 94.05 | .4355 | 6 | 2 | 8 | - | - | - | - | - | - | - |
| 1/2 | .5000 | 48016 | 94.05 | .4355 | 6 | 2 | 8 | 0.4721 - 0.5030 | 142.55 | 118.30 | 110.20 | 106.30 | 102.15 | 98.95 |
| 33/64 | .5156 | 4805156 | 96.80 | .4355 | 6 | 2 | 8 | - | - | - | - | - | - | - |
| 17/32 | .5312 | 48017 | 96.80 | .4355 | 6 | 2 | 8 | 0.5031 - 0.5340 | 145.20 | 120.95 | 112.80 | 108.95 | 104.85 | 101.50 |
| 35/64 | .5469 | 4805469 | 96.80 | .4355 | 6 | 2 | 8 | - | - | - | - | - | - | - |
| 9/16 | .5625 | 48018 | 96.80 | .4355 | 6 | 2 | 8 | 0.5341 - 0.5660 | 145.20 | 120.95 | 112.80 | 108.95 | 104.85 | 101.50 |
| 37/64 | .5781 | 4805781 | 100.45 | .4355 | 6 | 2 | 8 | - | - | - | - | - | - | - |
| 19/32 | .5938 | 48019 | 100.45 | .4355 | 6 | 2 | 8 | 0.5661 - 0.5970 | 148.85 | 124.70 | 116.50 | 112.60 | 108.50 | 105.25 |
| 39/64 | .6094 | 4806094 | 100.45 | .5615 | 6 | 2 1/4 | 9 | - | - | - | - | - | - | - |

CONTINUED ON NEXT PAGE

*Quantities of 15 or more - price of fractional size in same size range.

| TOOL DIAMETER | | TYPE 480 STEEL EDP NO. | PRICE | DIMENSIONS | | | | FINISHED TO MODIFIED TOOL DIAMETER | | | | | | |
|---------------|---------|------------------------|----------|------------------|-------------|-----------------|----------|------------------------------------|--|----------|----------|----------|----------|----------|
| FRACTIONAL | DECIMAL | | | MAX. SHANK DIAM. | NO. OF FLTS | LENGTH | | MODIFIED DIAMETER RANGE | PRICE EACH - BASED ON QUANTITY ORDERED | | | | | |
| | | | | | | FLUTE & CARBIDE | OVER-ALL | | 1 | 2 | 3 | 4 | 5-7 | 8-14* |
| 5/8 | .6250 | 48020 | \$100.45 | .5615 | 6 | 2 1/4 | 9 | 0.5971 - 0.6280 | \$148.85 | \$124.70 | \$116.50 | \$112.60 | \$108.50 | \$105.25 |
| 41/64 | .6406 | 4806406 | 102.35 | .5615 | 6 | 2 1/4 | 9 | - | - | - | - | - | - | |
| 21/32 | .6562 | 48021 | 102.35 | .5615 | 6 | 2 1/4 | 9 | 0.6281 - 0.6590 | 150.85 | 126.55 | 118.35 | 114.55 | 110.30 | 107.15 |
| 43/64 | .6719 | 4806719 | 102.35 | .5615 | 6 | 2 1/4 | 9 | - | - | - | - | - | - | |
| 11/16 | .6875 | 48022 | 102.35 | .5615 | 6 | 2 1/4 | 9 | 0.6591 - 0.6910 | 150.85 | 126.55 | 118.35 | 114.55 | 110.30 | 107.15 |
| 45/64 | .7031 | 4807031 | 107.05 | .5615 | 6 | 2 1/4 | 9 | - | - | - | - | - | - | |
| 23/32 | .7188 | 48023 | 107.05 | .5615 | 6 | 2 1/4 | 9 | 0.6911 - 0.7220 | 155.45 | 131.05 | 123.20 | 119.25 | 115.10 | 111.75 |
| 47/64 | .7344 | 4807344 | 107.05 | .6245 | 6 | 2 1/2 | 9 1/2 | - | - | - | - | - | - | |
| 3/4 | .7500 | 48024 | 107.05 | .6245 | 6 | 2 1/2 | 9 1/2 | 0.7221 - 0.7530 | 155.45 | 131.05 | 123.20 | 119.25 | 115.10 | 111.75 |
| 49/64 | .7656 | 4807656 | 110.80 | .6245 | 6 | 2 1/2 | 9 1/2 | - | - | - | - | - | - | |
| 25/32 | .7812 | 48025 | 110.80 | .6245 | 6 | 2 1/2 | 9 1/2 | 0.7531 - 0.7840 | 159.05 | 134.80 | 126.70 | 122.75 | 118.70 | 115.35 |
| 51/64 | .7969 | 4807969 | 110.80 | .6245 | 6 | 2 1/2 | 9 1/2 | - | - | - | - | - | - | |
| 13/16 | .8125 | 48026 | 110.80 | .6245 | 6 | 2 1/2 | 9 1/2 | 0.7841 - 0.8160 | 159.05 | 134.80 | 126.70 | 122.75 | 118.70 | 115.35 |
| 53/64 | .8281 | 4808281 | 115.20 | .6245 | 6 | 2 1/2 | 9 1/2 | - | - | - | - | - | - | |
| 27/32 | .8438 | 48027 | 115.20 | .6245 | 6 | 2 1/2 | 9 1/2 | 0.8161 - 0.8470 | 163.50 | 139.15 | 131.05 | 127.35 | 123.25 | 119.85 |
| 55/64 | .8594 | 4808594 | 115.20 | .7495 | 6 | 2 3/8 | 10 | - | - | - | - | - | - | |
| 7/8 | .8750 | 48028 | 119.55 | .7495 | 6 | 2 3/8 | 10 | 0.8471 - 0.8780 | 169.65 | 144.55 | 136.10 | 132.10 | 127.75 | 124.35 |
| 57/64 | .8906 | 4808906 | 139.10 | .7495 | 6 | 2 3/8 | 10 | - | - | - | - | - | - | |
| 29/32 | .9062 | 48029 | 139.10 | .7495 | 6 | 2 3/8 | 10 | 0.8781 - 0.9090 | 189.40 | 164.25 | 155.70 | 151.70 | 147.40 | 144.00 |
| 59/64 | .9219 | 4809219 | 139.10 | .7495 | 8 | 2 3/8 | 10 | - | - | - | - | - | - | |
| 15/16 | .9375 | 48030 | 139.10 | .7495 | 8 | 2 3/8 | 10 | 0.9091 - 0.9410 | 189.40 | 164.25 | 155.70 | 151.70 | 147.40 | 144.00 |
| 61/64 | .9531 | 4809531 | 145.80 | .7495 | 8 | 2 3/8 | 10 | - | - | - | - | - | - | |
| 31/32 | .9688 | 48031 | 145.80 | .7495 | 8 | 2 3/8 | 10 | 0.9411 - 0.9720 | 196.05 | 170.95 | 162.40 | 158.35 | 154.05 | 150.65 |
| 63/64 | .9844 | 4809844 | 145.80 | .8745 | 8 | 2 3/4 | 10 1/2 | - | - | - | - | - | - | |
| 1 | 1.0000 | 48032 | 145.80 | .8745 | 8 | 2 3/4 | 10 1/2 | 0.9721 - 1.0030 | 196.05 | 170.95 | 162.40 | 158.35 | 154.05 | 150.65 |
| 1 1/16 | 1.0625 | 48034 | 150.75 | .8745 | 8 | 2 3/4 | 10 1/2 | 1.0031 - 1.0660 | 198.90 | 174.65 | 166.75 | 162.85 | 158.70 | 155.50 |
| 1 1/8 | 1.1250 | 48036 | 163.30 | .8745 | 8 | 2 7/8 | 11 | 1.0661 - 1.1280 | 211.40 | 187.25 | 179.15 | 175.35 | 171.25 | 167.90 |
| 1 3/16 | 1.1875 | 48038 | 178.80 | .9995 | 8 | 2 7/8 | 11 | 1.1281 - 1.1905 | 227.00 | 202.80 | 194.80 | 190.90 | 186.80 | 183.50 |
| 1 1/4 | 1.2500 | 48040 | 199.30 | .9995 | 8 | 3 | 11 1/2 | 1.1906 - 1.2530 | 247.40 | 223.25 | 215.15 | 211.40 | 207.25 | 203.95 |
| 1 5/16 | 1.3125 | 48042 | 199.30 | .9995 | 8 | 3 | 11 1/2 | 1.2531 - 1.3155 | 247.40 | 223.25 | 215.15 | 211.40 | 207.25 | 203.95 |
| 1 3/8 | 1.3750 | 48044 | 202.25 | .9995 | 8 | 3 1/4 | 12 | 1.3156 - 1.3780 | 250.30 | 226.25 | 218.20 | 214.40 | 210.10 | 207.00 |
| 1 7/16 | 1.4375 | 48046 | 223.45 | .9995 | 8 | 3 1/4 | 12 | 1.3781 - 1.4405 | 271.50 | 247.40 | 239.40 | 235.55 | 231.30 | 228.25 |
| 1 1/2 | 1.5000 | 48048 | 268.30 | 1.2495 | 8 | 3 1/2 | 12 1/2 | 1.4406 - 1.5030 | 316.40 | 292.25 | 284.25 | 280.30 | 276.30 | 273.00 |

*Quantities of 15 or more - price of fractional size in same size range.

OVER & UNDER SIZE REAMERS CARBIDE TIPPED - FOR STEELS



TYPE 488 - STRAIGHT FLUTES & SHANK

- Tool diameter tolerance: plus .0002", minus .0000"
- Same specifications & available modifications as Type 480 (page 60)

USE:

- These precision ground carbide tipped reamers are very convenient for finishing accurate holes in steels, tough steel alloys and cast steels

| DECIMAL TOOL DIAMETER | TYPE 488 STEEL EDP NO. | PRICE | DIMENSIONS | | | |
|-----------------------|------------------------|---|------------------|---------------|-----------------|----------|
| | | | MAX. SHANK DIAM. | NO. OF FLUTES | LENGTH | |
| | | | | | FLUTE & CARBIDE | OVER-ALL |
| .1865 | 48818 | \$84.50 | .1805 | 4 | 1 1/8 | 4 1/2 |
| .1885 | 48819 | 84.50 | .1805 | 4 | 1 1/8 | 4 1/2 |
| .2490 | 48824 | 84.50 | .2405 | 4 | 1 1/2 | 6 |
| .2510 | 48825 | 84.50 | .2405 | 4 | 1 1/2 | 6 |
| .3115 | 48831 | 86.00 | .2792 | 4 | 1 1/2 | 6 |
| .3135 | 48832 | 86.00 | .2792 | 4 | 1 1/2 | 6 |
| .3740 | 48837 | 88.55 | .3105 | 4 | 1 3/4 | 7 |
| .3760 | 48838 | 88.55 | .3105 | 4 | 1 3/4 | 7 |
| .4365 | 48843 | 104.00 | .3730 | 6 | 1 3/4 | 7 |
| .4385 | 48844 | 104.00 | .3730 | 6 | 1 3/4 | 7 |
| .4990 | 48849 | 112.30 | .4355 | 6 | 2 | 8 |
| .5010 | 48850 | 112.30 | .4355 | 6 | 2 | 8 |
| | 48800 | \$1063.80 - CASED SET OF ABOVE 12 REAMERS | | | | |

DOWEL PIN SIZE REAMERS CARBIDE TIPPED - FOR STEELS



TYPE 486 - STRAIGHT FLUTES & SHANK

- Special plus .0000", minus .0002" tool diameter tolerance
- Same specifications & available modifications as Type 480 (page 60)

USE:

- These precision ground reamers should be used in pairs, .0005" and .0020" under the dowel pin diameter. The .0020" smaller holes assure a tighter dowel pin fit, so all the pins will remain on the same side upon disassembly. Especially useful in plastic or die cast molds and machines when assembled sections are subject to shearing stress, yet require occasional disassembly.

| DECIMAL TOOL DIAMETER | TYPE 486 STEEL EDP NO. | PRICE | DIMENSIONS | | | |
|-----------------------|------------------------|---|------------------|---------------|-----------------|----------|
| | | | MAX. SHANK DIAM. | NO. OF FLUTES | LENGTH | |
| | | | | | FLUTE & CARBIDE | OVER-ALL |
| .1855 | 48617 | \$84.50 | .1805 | 4 | 1 1/8 | 4 1/2 |
| .1870 | 48618 | 84.50 | .1805 | 4 | 1 1/8 | 4 1/2 |
| .2480 | 48623 | 84.50 | .2405 | 4 | 1 1/2 | 6 |
| .2495 | 48624 | 84.50 | .2405 | 4 | 1 1/2 | 6 |
| .3105 | 48630 | 86.00 | .2792 | 4 | 1 1/2 | 6 |
| .3120 | 48631 | 86.00 | .2792 | 4 | 1 1/2 | 6 |
| .3730 | 48636 | 88.55 | .3105 | 4 | 1 3/4 | 7 |
| .3745 | 48637 | 88.55 | .3105 | 4 | 1 3/4 | 7 |
| .4355 | 48642 | 104.00 | .3730 | 6 | 1 3/4 | 7 |
| .4370 | 48643 | 104.00 | .3730 | 6 | 1 3/4 | 7 |
| .4980 | 48648 | 112.30 | .4355 | 6 | 2 | 8 |
| .4995 | 48649 | 112.30 | .4355 | 6 | 2 | 8 |
| | 48600 | \$1063.80 - CASED SET OF ABOVE 12 REAMERS | | | | |



MATERIAL SPECIFIC REAMERS CARBIDE TIPPED TYPES 407, 408, 409 FRACTIONAL



STRAIGHT FLUTES STRAIGHT SHANK



| TOOL SELECTOR | CHIP CLASS | MATERIAL MACHINED | TOOL TYPE |
|---------------|---------------------------|--------------------------|-----------|
| | 20 | NON-FERROUS - LONG CHIPS | 407 |
| 40 | NON-FERROUS - SHORT CHIPS | 407/408 | |
| 60 | CAST IRONS | 408 | |
| 80 | LOW STRENGTH STEELS | 409/408 | |
| 100 | MEDIUM STRENGTH STEELS | 409 | |
| 120 | HIGH STRENGTH STEELS | 409 | |
| 140 | HIGH TEMPERATURE ALLOYS | 409 | |

NATIONAL AEROSPACE STANDARDS - NAS 897

TYPE 407 - FOR NON-FERROUS MATERIALS

TYPE 408 - FOR CAST IRONS & NAS MULTI-PURPOSE

TYPE 409 - FOR STEELS & HIGH TEMP ALLOYS

- Type "C" with short carbide tip
- Straight polished flutes and straight shank
- Tool geometry and carbide grade appropriate for material being machined
- Detailed specifications on page 15

MODIFICATIONS (Prompt delivery)

- Closer tool diameter tolerance - pg. 15
- Cutting diameter reduced for step or pilot
- End chamfer other than 45°
- End cutting or corner radius
- Increased/decreased circular margin
- Increased/decreased tool diameter back taper
- Shortened shank or reduced shank diameter
- Flat(s) or tang on shank
- Coatings available: See page 69

For shallow holes only (see page 14)

NOTE: For smaller tool diameters, see solid carbide reamers on pages 44, & 89-91.

| TOOL DIAMETER | | TYPE 407 NON-FERROUS EDP NO. | TYPE 408 NAS/ CAST IRON EDP NO. | TYPE 409 STEEL/ HI-TEMP EDP NO. | ALL TYPES PRICE | DIMENSIONS | | | | | FINISHED TO MODIFIED TOOL DIAMETER | | | | | | |
|---------------|---------|------------------------------------|--|--|-----------------------|-----------------------|-------------------|--------------|-----|--------|------------------------------------|--|---------|---------|---------|---------|---------|
| FRACTIONAL | DECIMAL | | | | | MAX SHANK DIAM. | NO. OF FLTS | LENGTH | | | MODIFIED DIAMETER RANGE | PRICE EACH - BASED ON QUANTITY ORDERED | | | | | |
| | | | | | | FLT | CAR- BIDE | OVER- ALL | | 1 | | 2 | 3 | 4 | 5-7 | 8-14* | |
| 5/32 | .1562 | 40705 | 40805 | 40905 | \$61.75 | .1510 | 4 | 1 | 1/2 | 4 | 0.1560-0.1769 | \$106.95 | \$84.10 | \$76.60 | \$73.05 | \$69.05 | \$66.05 |
| 3/16 | .1875 | 40706 | 40806 | 40906 | 56.60 | .1805 | 4 | 1 1/8 | 1/2 | 4 1/2 | 0.1770-0.2040 | 100.60 | 78.50 | 71.10 | 67.55 | 63.85 | 60.85 |
| 7/32 | .2188 | 40707 | 40807 | 40907 | 56.60 | .2075 | 4 | 1 1/4 | 1/2 | 5 | 0.2041-0.2210 | 100.60 | 78.50 | 71.10 | 67.55 | 63.85 | 60.85 |
| 15/64 | .2344 | 4072344 | 4082344 | 4092344 | 60.05 | .2265 | 4 | 1 1/2 | 1/2 | 6 | 0.2211-0.2380 | 104.00 | 81.95 | 74.50 | 71.05 | 67.25 | 64.30 |
| 1/4 | .2500 | 40708 | 40808 | 40908 | 56.95 | .2405 | 4 | 1 1/2 | 1/2 | 6 | 0.2381-0.2530 | 100.85 | 78.90 | 71.55 | 68.00 | 64.15 | 61.25 |
| 9/32 | .2812 | 40709 | 40809 | 40909 | 58.00 | .2485 | 4 | 1 1/2 | 1/2 | 6 | 0.2531-0.2840 | 102.10 | 80.00 | 72.70 | 69.05 | 65.35 | 62.25 |
| 5/16 | .3125 | 40710 | 40810 | 40910 | 58.00 | .2792 | 4 | 1 1/2 | 1/2 | 6 | 0.2841-0.3150 | 102.10 | 80.00 | 72.70 | 69.05 | 65.35 | 62.25 |
| 3/8 | .3750 | 40711 | 40811 | 40911 | 60.30 | .2792 | 4 | 1 1/2 | 5/8 | 6 | 0.3151-0.3470 | 104.20 | 82.25 | 74.85 | 71.40 | 67.50 | 64.60 |
| 11/32 | .3438 | 40791 | 40891 | 40991 | 66.20 | .2792 | 6 | 1 1/2 | 5/8 | 6 | 0.3151-0.3470 | 110.15 | 88.10 | 80.70 | 77.20 | 73.40 | 70.45 |
| 3/8 | .3750 | 40712 | 40812 | 40912 | 55.30 | .3105 | 4 | 1 3/4 | 5/8 | 7 | 0.3471-0.3780 | 95.55 | 75.40 | 68.70 | 65.50 | 62.00 | 59.25 |
| 3/8 | .3750 | 40792 | 40892 | 40992 | 60.65 | .3105 | 6 | 1 3/4 | 5/8 | 7 | 0.3471-0.3780 | 101.05 | 80.80 | 74.15 | 70.90 | 67.40 | 64.70 |
| 13/32 | .4062 | 40713 | 40813 | 40913 | 63.15 | .3105 | 4 | 1 3/4 | 5/8 | 7 | 0.3781-0.4090 | 107.15 | 85.10 | 77.75 | 74.20 | 70.30 | 67.45 |
| 13/32 | .4062 | 40793 | 40893 | 40993 | 67.30 | .3105 | 6 | 1 3/4 | 5/8 | 7 | 0.3781-0.4090 | 111.30 | 89.25 | 81.95 | 78.35 | 74.55 | 71.65 |
| 7/16 | .4375 | 40714 | 40814 | 40914 | 67.30 | .3730 | 6 | 1 3/4 | 5/8 | 7 | 0.4091-0.4410 | 111.30 | 89.25 | 81.95 | 78.35 | 74.55 | 71.65 |
| 15/32 | .4688 | 40715 | 40815 | 40915 | 68.25 | .3730 | 6 | 1 3/4 | 5/8 | 7 | 0.4411-0.4720 | 112.30 | 90.25 | 82.90 | 79.35 | 75.65 | 72.70 |
| 1/2 | .5000 | 40716 | 40816 | 40916 | 80.70 | .4355 | 6 | 2 | 5/8 | 8 | 0.4721-0.5030 | 129.25 | 104.90 | 96.80 | 92.95 | 88.80 | 85.50 |
| 17/32 | .5312 | 40717 | 40817 | 40917 | 87.95 | .4355 | 6 | 2 | 5/8 | 8 | 0.5031-0.5340 | 136.25 | 112.00 | 104.00 | 100.05 | 96.05 | 92.65 |
| 9/16 | .5625 | 40718 | 40818 | 40918 | 87.95 | .4355 | 6 | 2 | 5/8 | 8 | 0.5341-0.5660 | 136.25 | 112.00 | 104.00 | 100.05 | 96.05 | 92.65 |
| 19/32 | .5938 | 40719 | 40819 | 40919 | 91.55 | .4355 | 6 | 2 | 5/8 | 8 | 0.5661-0.5970 | 139.90 | 115.65 | 107.45 | 103.65 | 99.55 | 96.20 |
| 5/8 | .6250 | 40720 | 40820 | 40920 | 91.55 | .5615 | 6 | 2 1/4 | 5/8 | 9 | 0.5971-0.6280 | 139.90 | 115.65 | 107.45 | 103.65 | 99.55 | 96.20 |
| 21/32 | .6562 | 40721 | 40821 | 40921 | 93.10 | .5615 | 6 | 2 1/4 | 5/8 | 9 | 0.6281-0.6590 | 141.60 | 117.20 | 109.05 | 105.25 | 101.05 | 97.85 |
| 11/16 | .6875 | 40722 | 40822 | 40922 | 93.10 | .5615 | 6 | 2 1/4 | 5/8 | 9 | 0.6591-0.6910 | 141.60 | 117.20 | 109.05 | 105.25 | 101.05 | 97.85 |
| 23/32 | .7188 | 40723 | 40823 | 40923 | 97.50 | .5615 | 6 | 2 1/4 | 5/8 | 9 | 0.6911-0.7220 | 145.85 | 121.50 | 113.55 | 109.55 | 105.50 | 102.15 |
| 3/4 | .7500 | 40724 | 40824 | 40924 | 97.50 | .6245 | 6 | 2 1/2 | 3/4 | 9 1/2 | 0.7221-0.7530 | 145.85 | 121.50 | 113.55 | 109.55 | 105.50 | 102.15 |
| 25/32 | .7812 | 40725 | 40825 | 40925 | 100.60 | .6245 | 6 | 2 1/2 | 3/4 | 9 1/2 | 0.7531-0.7840 | 149.05 | 124.80 | 116.60 | 112.70 | 108.55 | 105.45 |
| 13/16 | .8125 | 40726 | 40826 | 40926 | 100.60 | .6245 | 6 | 2 1/2 | 3/4 | 9 1/2 | 0.7841-0.8160 | 149.05 | 124.80 | 116.60 | 112.70 | 108.55 | 105.45 |
| 27/32 | .8438 | 40727 | 40827 | 40927 | 104.70 | .6245 | 6 | 2 1/2 | 3/4 | 9 1/2 | 0.8161-0.8470 | 152.95 | 128.75 | 120.70 | 116.85 | 112.60 | 109.45 |
| 7/8 | .8750 | 40728 | 40828 | 40928 | 108.55 | .7495 | 6 | 2 5/8 | 3/4 | 10 | 0.8471-0.8780 | 158.85 | 133.65 | 125.15 | 121.25 | 117.00 | 113.60 |
| 29/32 | .9062 | 40729 | 40829 | 40929 | 126.45 | .7495 | 6 | 2 5/8 | 3/4 | 10 | 0.8781-0.9090 | 176.70 | 151.50 | 143.15 | 139.10 | 134.75 | 131.35 |
| 15/16 | .9375 | 40730 | 40830 | 40930 | 126.45 | .7495 | 8 | 2 5/8 | 3/4 | 10 | 0.9091-0.9410 | 176.70 | 151.50 | 143.15 | 139.10 | 134.75 | 131.35 |
| 31/32 | .9688 | 40731 | 40831 | 40931 | 132.45 | .7495 | 8 | 2 5/8 | 3/4 | 10 | 0.9411-0.9720 | 182.65 | 157.45 | 149.15 | 145.00 | 140.65 | 137.25 |
| 1 | 1.0000 | 40732 | 40832 | 40932 | 132.45 | .8745 | 8 | 2 3/4 | 3/4 | 10 1/2 | 0.9721-1.0030 | 182.65 | 157.45 | 149.15 | 145.00 | 140.65 | 137.25 |
| 1 1/16 | 1.0625 | 40734 | 40834 | 40934 | 137.15 | .8745 | 8 | 2 3/4 | 3/4 | 10 1/2 | 1.0031-1.0660 | 185.25 | 161.25 | 153.10 | 149.25 | 145.05 | 141.85 |
| 1 1/8 | 1.1250 | 40736 | 40836 | 40936 | 148.30 | .8745 | 8 | 2 7/8 | 7/8 | 11 | 1.0661-1.1280 | 196.40 | 172.25 | 164.25 | 160.30 | 156.20 | 152.95 |
| 1 3/16 | 1.1875 | 40738 | 40838 | 40938 | 155.80 | .9995 | 8 | 2 7/8 | 7/8 | 11 | 1.1281-1.1905 | 203.95 | 179.90 | 171.80 | 167.90 | 163.80 | 160.65 |
| 1 1/4 | 1.2500 | 40740 | 40840 | 40940 | 164.70 | .9995 | 8 | 3 | 7/8 | 11 1/2 | 1.1906-1.2530 | 212.85 | 188.80 | 180.60 | 176.80 | 172.75 | 169.45 |
| 1 5/16 | 1.3125 | 40742 | 40842 | 40942 | 173.30 | .9995 | 8 | 3 | 7/8 | 11 1/2 | 1.2531-1.3155 | 221.50 | 197.50 | 189.35 | 185.50 | 181.30 | 178.05 |
| 1 3/8 | 1.3750 | 40744 | 40844 | 40944 | 183.90 | .9995 | 8 | 3 1/4 | 7/8 | 12 | 1.3156-1.3780 | 232.15 | 207.95 | 199.80 | 196.05 | 191.75 | 188.60 |
| 1 7/16 | 1.4375 | 40746 | 40846 | 40946 | 204.95 | .9995 | 8 | 3 1/4 | 7/8 | 12 | 1.3781-1.4405 | 253.25 | 228.95 | 220.95 | 217.20 | 212.90 | 209.80 |
| 1 1/2 | 1.5000 | 40748 | 40848 | 40948 | 216.65 | 1.2495 | 8 | 3 1/2 | 7/8 | 12 1/2 | 1.4406-1.5030 | 264.85 | 240.75 | 232.60 | 228.85 | 224.65 | 221.40 |

*Quantities of 15 or more - price of fractional size in same size range.



MATERIAL SPECIFIC REAMERS CARBIDE TIPPED TYPES 407, 408, 409 METRIC



STRAIGHT FLUTES STRAIGHT SHANK

For shallow holes only (see page 14)



NOTE: Tool diameter in millimeters (mm); all other dimensions in inches. Also, modifications available (see list on page 62).

| TOOL DIAMETER | | TYPE 407 NON FERROUS | TYPE 408 NAS/ CAST IRON | TYPE 409 STEEL/ HI-TEMP | ALL TYPES METRIC PRICE | DIMENSIONS | | | | | FINISHED TO MODIFIED TOOL DIAMETER | | | | | | | |
|---------------|--------|----------------------------|-------------------------------|-------------------------------|---------------------------------|------------------------|-------------------|--------|--------------|--------------|------------------------------------|--|---------|---------|---------|---------|---------|---------|
| mm | INCH | METRIC EDP NO. | METRIC EDP NO. | METRIC EDP NO. | | MAX. SHANK DIAM. | NO. OF FLTS | LENGTH | | | MODIFIED DIAMETER RANGE (mm) | PRICE EACH - BASED ON QUANTITY ORDERED | | | | | | |
| | | | | | | | | FLT | CAR- BIDE | OVER- ALL | | 1 | 2 | 3 | 4 | 5-7 | 8-14 | OVER 14 |
| 4.0 | .1575 | 407040 | 408040 | 409040 | \$76.60 | .1510 | 4 | 1 | 1/2 | 4 | 3.962-4.493 | \$110.65 | \$88.05 | \$80.55 | \$76.80 | \$73.05 | \$69.95 | \$65.55 |
| 4.5 | .1772 | 407045 | 408045 | 409045 | 71.10 | .1704 | 4 | 1 1/8 | 1/2 | 4 1/2 | 4.494-4.696 | 104.20 | 82.30 | 74.90 | 71.40 | 67.55 | 64.60 | 60.40 |
| 5.0 | .1969 | 407050 | 408050 | 409050 | 71.10 | .1805 | 4 | 1 1/8 | 1/2 | 4 1/2 | 4.697-5.182 | 104.20 | 82.30 | 74.90 | 71.40 | 67.55 | 64.60 | 60.40 |
| 5.5 | .2165 | 407055 | 408055 | 409055 | 71.10 | .2075 | 4 | 1 1/4 | 1/2 | 5 | 5.183-5.613 | 104.20 | 82.30 | 74.90 | 71.40 | 67.55 | 64.60 | 60.40 |
| 6.0 | .2362 | 407060 | 408060 | 409060 | 74.50 | .2265 | 4 | 1 1/2 | 1/2 | 6 | 5.614-6.045 | 107.65 | 85.70 | 78.30 | 74.70 | 71.05 | 68.00 | 63.80 |
| - | - | 407063 | 408063 | 409063 | - | .2405 | 4 | 1 1/2 | 1/2 | 6 | 6.046-6.426 | 104.70 | 82.65 | 75.25 | 71.65 | 68.00 | 64.95 | 60.65 |
| 6.5 | .2559 | 407065 | 408065 | 409065 | 72.70 | .2485 | 4 | 1 1/2 | 1/2 | 6 | 6.427-7.214 | 105.80 | 83.80 | 76.40 | 72.85 | 69.05 | 66.05 | 61.90 |
| 7.0 | .2756 | 407070 | 408070 | 409070 | 72.70 | .2485 | 4 | 1 1/2 | 1/2 | 6 | - | - | - | - | - | - | - | |
| 7.5 | .2953 | 407075 | 408075 | 409075 | 72.70 | .2792 | 4 | 1 1/2 | 1/2 | 6 | 7.215-8.001 | 105.80 | 83.80 | 76.40 | 72.85 | 69.05 | 66.05 | 61.90 |
| 7.5 | .2953 | 407078 | 408078 | 409078 | 78.35 | .2792 | 6 | 1 1/2 | 1/2 | 6 | 7.215-8.001 | 111.60 | 89.70 | 82.25 | 78.55 | 74.90 | 71.80 | 67.55 |
| 8.0 | .3150 | 407080 | 408080 | 409080 | 72.70 | .2792 | 4 | 1 1/2 | 1/2 | 6 | - | - | - | - | - | - | - | |
| 8.0 | .3150 | 407083 | 408083 | 409083 | 78.35 | .2792 | 6 | 1 1/2 | 1/2 | 6 | - | - | - | - | - | - | - | |
| 8.5 | .3346 | 407085 | 408085 | 409085 | 74.85 | .2792 | 4 | 1 1/2 | 5/8 | 6 | 8.002-8.814 | 107.80 | 85.95 | 78.55 | 75.05 | 71.40 | 68.20 | 64.05 |
| 8.5 | .3346 | 407088 | 408088 | 409088 | 80.70 | .2792 | 6 | 1 1/2 | 5/8 | 6 | 8.002-8.814 | 113.85 | 91.85 | 84.50 | 81.05 | 77.20 | 74.20 | 70.05 |
| 9.0 | .3543 | 407090 | 408090 | 409090 | 68.70 | .3105 | 4 | 1 3/4 | 5/8 | 7 | 8.815-9.601 | 99.00 | 78.90 | 72.00 | 68.80 | 65.50 | 62.70 | 58.80 |
| 9.0 | .3543 | 407093 | 408093 | 409093 | 74.15 | .3105 | 6 | 1 3/4 | 5/8 | 7 | 8.815-9.601 | 104.45 | 84.25 | 77.60 | 74.25 | 70.90 | 68.05 | 64.15 |
| 9.5 | .3740 | 407095 | 408095 | 409095 | 68.70 | .3105 | 4 | 1 3/4 | 5/8 | 7 | - | - | - | - | - | - | - | |
| 9.5 | .3740 | 407098 | 408098 | 409098 | 74.15 | .3105 | 6 | 1 3/4 | 5/8 | 7 | - | - | - | - | - | - | - | |
| 10.0 | .3937 | 407100 | 408100 | 409100 | 77.75 | .3105 | 4 | 1 3/4 | 5/8 | 7 | 9.602-10.389 | 110.85 | 88.85 | 81.45 | 77.85 | 74.20 | 71.10 | 66.95 |
| 10.0 | .3937 | 407103 | 408103 | 409103 | 81.95 | .3105 | 6 | 1 3/4 | 5/8 | 7 | 9.602-10.389 | 115.10 | 93.10 | 85.70 | 82.05 | 78.35 | 75.30 | 71.10 |
| 10.5 | .4134 | 407105 | 408105 | 409105 | 81.95 | .3730 | 6 | 1 3/4 | 5/8 | 7 | 10.390-11.201 | 115.10 | 93.10 | 85.70 | 82.05 | 78.35 | 75.30 | 71.10 |
| 11.0 | .4331 | 407110 | 408110 | 409110 | 81.95 | .3730 | 6 | 1 3/4 | 5/8 | 7 | - | - | - | - | - | - | - | |
| 11.5 | .4528 | 407115 | 408115 | 409115 | 82.90 | .3730 | 6 | 1 3/4 | 5/8 | 7 | 11.202-11.989 | 115.95 | 94.00 | 86.65 | 83.00 | 79.35 | 76.25 | 72.00 |
| 12.0 | .4724 | 407120 | 408120 | 409120 | 96.80 | .4355 | 6 | 2 | 5/8 | 8 | 11.990-12.776 | 133.25 | 109.05 | 101.00 | 97.00 | 92.95 | 89.70 | 85.05 |
| 12.5 | .4921 | 407125 | 408125 | 409125 | 96.80 | .4355 | 6 | 2 | 5/8 | 8 | - | - | - | - | - | - | - | |
| 13.0 | .5118 | 407130 | 408130 | 409130 | 104.00 | .4355 | 6 | 2 | 5/8 | 8 | 12.777-13.564 | 140.45 | 116.30 | 108.10 | 104.15 | 100.05 | 96.70 | 92.10 |
| 13.5 | .5315 | 407135 | 408135 | 409135 | 104.00 | .4355 | 6 | 2 | 5/8 | 8 | - | - | - | - | - | - | - | |
| 14.0 | .5512 | 407140 | 408140 | 409140 | 104.00 | .4355 | 6 | 2 | 5/8 | 8 | 13.565-14.376 | 140.45 | 116.30 | 108.10 | 104.15 | 100.05 | 96.70 | 92.10 |
| 14.5 | .5709 | 407145 | 408145 | 409145 | 107.45 | .4355 | 6 | 2 | 5/8 | 8 | 14.377-15.164 | 144.00 | 119.80 | 111.70 | 107.70 | 103.65 | 100.30 | 95.55 |
| 15.0 | .5906 | 407150 | 408150 | 409150 | 107.45 | .4355 | 6 | 2 | 5/8 | 8 | - | - | - | - | - | - | - | |
| 15.5 | .6102 | 407155 | 408155 | 409155 | 107.45 | .5615 | 6 | 2 1/4 | 5/8 | 9 | 15.165-15.951 | 144.00 | 119.80 | 111.70 | 107.70 | 103.65 | 100.30 | 95.55 |
| 16.0 | .6299 | 407160 | 408160 | 409160 | 109.05 | .5615 | 6 | 2 1/4 | 5/8 | 9 | 15.952-16.739 | 145.65 | 121.35 | 113.30 | 109.25 | 105.25 | 101.80 | 97.25 |
| 16.5 | .6496 | 407165 | 408165 | 409165 | 109.05 | .5615 | 6 | 2 1/4 | 5/8 | 9 | - | - | - | - | - | - | - | |
| 17.0 | .6693 | 407170 | 408170 | 409170 | 109.05 | .5615 | 6 | 2 1/4 | 5/8 | 9 | 16.740-17.551 | 145.65 | 121.35 | 113.30 | 109.25 | 105.25 | 101.80 | 97.25 |
| 17.5 | .6890 | 407175 | 408175 | 409175 | 109.05 | .5615 | 6 | 2 1/4 | 5/8 | 9 | - | - | - | - | - | - | - | |
| 18.0 | .7087 | 407180 | 408180 | 409180 | 113.55 | .5615 | 6 | 2 1/4 | 5/8 | 9 | 17.552-18.339 | 149.85 | 125.70 | 117.70 | 113.70 | 109.55 | 106.25 | 101.50 |
| 19.0 | .7480 | 407190 | 408190 | 409190 | 113.55 | .6245 | 6 | 2 1/2 | 3/4 | 9 1/2 | 18.340-19.126 | 149.85 | 125.70 | 117.70 | 113.70 | 109.55 | 106.25 | 101.50 |
| 19.5 | .7677 | 407195 | 408195 | 409195 | 116.60 | .6245 | 6 | 2 1/2 | 3/4 | 9 1/2 | 19.127-19.914 | 152.95 | 128.85 | 120.80 | 116.85 | 112.70 | 109.45 | 104.80 |
| 20.0 | .7874 | 407200 | 408200 | 409200 | 116.60 | .6245 | 6 | 2 1/2 | 3/4 | 9 1/2 | 19.915-20.726 | 152.95 | 128.85 | 120.80 | 116.85 | 112.70 | 109.45 | 104.80 |
| 21.0 | .8268 | 407210 | 408210 | 409210 | 120.70 | .6245 | 6 | 2 1/2 | 3/4 | 9 1/2 | 20.727-21.514 | 157.00 | 133.00 | 124.85 | 120.90 | 116.85 | 113.55 | 108.80 |
| 22.0 | .8661 | 407220 | 408220 | 409220 | 120.70 | .7495 | 6 | 2 5/8 | 3/4 | 10 | 21.515-22.301 | 157.00 | 133.00 | 124.85 | 120.90 | 116.85 | 113.55 | 108.80 |
| 23.0 | .9055 | 407230 | 408230 | 409230 | 143.15 | .7495 | 6 | 2 5/8 | 3/4 | 10 | 22.302-23.089 | 180.85 | 155.80 | 147.40 | 143.30 | 139.10 | 135.55 | 130.85 |
| 23.5 | .9252 | 407235 | 408235 | 409235 | 143.15 | .7495 | 8 | 2 5/8 | 3/4 | 10 | 23.090-23.901 | 180.85 | 155.80 | 147.40 | 143.30 | 139.10 | 135.55 | 130.85 |
| 24.0 | .9449 | 407240 | 408240 | 409240 | 149.15 | .7495 | 8 | 2 5/8 | 3/4 | 10 | 23.902-24.689 | 186.85 | 161.80 | 153.45 | 149.30 | 145.00 | 141.65 | 136.75 |
| 25.0 | .9843 | 407250 | 408250 | 409250 | 149.15 | .8745 | 8 | 2 3/4 | 3/4 | 10 1/2 | 24.690-25.476 | 186.85 | 161.80 | 153.45 | 149.30 | 145.00 | 141.65 | 136.75 |
| 26.0 | 1.0236 | 407260 | 408260 | 409260 | 153.10 | .8745 | 8 | 2 3/4 | 3/4 | 10 1/2 | 25.477-27.076 | 189.35 | 165.35 | 157.30 | 153.25 | 149.25 | 145.85 | 141.25 |
| 27.0 | 1.0630 | 407270 | 408270 | 409270 | 153.10 | .8745 | 8 | 2 3/4 | 3/4 | 10 1/2 | - | - | - | - | - | - | - | |
| 28.0 | 1.1024 | 407280 | 408280 | 409280 | 164.25 | .8745 | 8 | 2 7/8 | 7/8 | 11 | 27.077-28.651 | 200.40 | 176.45 | 168.35 | 164.35 | 160.30 | 156.95 | 152.35 |
| 29.0 | 1.1417 | 407290 | 408290 | 409290 | 171.80 | .9995 | 8 | 2 7/8 | 7/8 | 11 | 28.652-30.239 | 208.00 | 183.95 | 175.85 | 171.95 | 167.90 | 164.60 | 160.10 |
| 30.0 | 1.1811 | 407300 | 408300 | 409300 | 171.80 | .9995 | 8 | 2 7/8 | 7/8 | 11 | - | - | - | - | - | - | - | |
| 31.0 | 1.2205 | 407310 | 408310 | 409310 | 180.60 | .9995 | 8 | 3 | 7/8 | 11 1/2 | 30.240-31.826 | 216.75 | 192.90 | 184.90 | 180.85 | 176.80 | 173.40 | 168.80 |
| 32.0 | 1.2598 | 407320 | 408320 | 409320 | 189.35 | .9995 | 8 | 3 | 7/8 | 11 1/2 | 31.827-33.414 | 225.55 | 201.50 | 193.50 | 189.50 | 185.50 | 182.10 | 177.45 |
| 33.0 | 1.2992 | 407330 | 408330 | 409330 | 189.35 | .9995 | 8 | 3 | 7/8 | 11 1/2 | - | - | - | - | - | - | - | |
| 34.0 | 1.3386 | 407340 | 408340 | 409340 | 199.80 | .9995 | 8 | 3 1/4 | 7/8 | 12 | 33.415-35.001 | 236.10 | 212.10 | 203.95 | 200.15 | 196.05 | 192.70 | 188.00 |
| 35.0 | 1.3780 | 407350 | 408350 | 409350 | 199.80 | .9995 | 8 | 3 1/4 | 7/8 | 12 | - | - | - | - | - | - | - | |
| 36.0 | 1.4173 | 407360 | 408360 | 409360 | 220.95 | .9995 | 8 | 3 1/4 | 7/8 | 12 | 35.002-36.589 | 257.10 | 233.15 | 225.15 | 221.10 | 217.20 | 213.80 | 209.10 |
| 37.0 | 1.4567 | 407370 | 408370 | 409370 | 232.60 | 1.2495 | 8 | 3 1/2 | 7/8 | 12 1/2 | 36.590-38.176 | 269.00 | 244.80 | 236.85 | 232.90 | 228.85 | 225.50 | 220.85 |

REAMERS



MATERIAL SPECIFIC REAMERS CARBIDE TIPPED TYPES 457, 458, 459 FRACTIONAL



STRAIGHT FLUTE LONG CARBIDE STRAIGHT SHANK



NATIONAL AEROSPACE STANDARDS - NAS 897

TYPE 457 - FOR NON-FERROUS MATERIALS

TYPE 458 - FOR CAST IRONS & NAS MULTI-PURPOSE

TYPE 459 - FOR STEELS & HIGH TEMP ALLOYS

- Type "C" with flute long carbide
- Straight polished flutes and straight shank
- Longer flutes than Type 450 on .5971" tool diameter and larger for straight deep holes
- Tool geometry and carbide grade appropriate for material being machined
- Detailed specifications on page 15

NOTE: For step reamers, see page 82.
For smaller tool diameters, see solid carbide reamers on pages 44, 89-91.

| TOOL SELECTOR | CHIP CLASS | MATERIAL MACHINED | TOOL TYPE |
|---------------|-------------------------|---------------------------|-----------|
| | 20 | NON-FERROUS - LONG CHIPS | 457 |
| | 40 | NON-FERROUS - SHORT CHIPS | 457/458 |
| | 60 | CAST IRONS | 458 |
| | 80 | LOW STRENGTH STEELS | 459/458 |
| | 100 | MEDIUM STRENGTH STEELS | 459 |
| | 120 | HIGH STRENGTH STEELS | 459 |
| 140 | HIGH TEMPERATURE ALLOYS | 459 | |

MODIFICATIONS (See list on page 62;
modified metric tool diameters priced on page 65)

| TOOL DIAMETER | | TYPE 457 NON-FERROUS EDP NO. | TYPE 458 NAS/ CAST IRON EDP NO. | TYPE 459 STEEL/ HI-TEMP EDP NO. | ALL TYPES PRICE | DIMENSIONS | | | | FINISHED TO MODIFIED TOOL DIAMETER | | | | | | |
|---------------|---------|------------------------------------|--|--|-----------------------|------------------|---------------|--------|--------|------------------------------------|--|---------|---------|---------|---------|---------|
| FRACTIONAL | DECIMAL | | | | | MAX. SHANK DIAM. | NO. OF FLUTES | LENGTH | | MODIFIED DIAMETER RANGE | PRICE EACH - BASED ON QUANTITY ORDERED | | | | | |
| | | | | | | FLUTE & CARBIDE | OVER-ALL | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| 3/16 | .1875 | 45706 | 45806 | 45906 | \$67.55 | .1805 | 4 | 1 1/8 | 4 1/2 | 0.1770-0.2040 | \$112.80 | \$90.15 | \$82.55 | \$79.00 | \$75.15 | \$72.00 |
| 7/32 | .2188 | 45707 | 45807 | 45907 | 67.55 | .2075 | 4 | 1 1/4 | 5 | 0.2041-0.2210 | 112.80 | 90.15 | 82.55 | 79.00 | 75.15 | 72.00 |
| 15/64 | .2344 | 4572344 | 4582344 | 4592344 | 67.55 | .2265 | 4 | 1 1/2 | 6 | 0.2211-0.2380 | 112.80 | 90.15 | 82.55 | 79.00 | 75.15 | 72.00 |
| 1/4 | .2500 | 45708 | 45808 | 45908 | 67.55 | .2405 | 4 | 1 1/2 | 6 | 0.2381-0.2530 | 112.80 | 90.15 | 82.55 | 79.00 | 75.15 | 72.00 |
| 9/32 | .2812 | 45709 | 45809 | 45909 | 69.05 | .2485 | 4 | 1 1/2 | 6 | 0.2531-0.2840 | 114.25 | 91.70 | 84.05 | 80.55 | 76.60 | 73.65 |
| 5/16 | .3125 | 45710 | 45810 | 45910 | 69.05 | .2792 | 4 | 1 1/2 | 6 | 0.2841-0.3150 | 114.25 | 91.70 | 84.05 | 80.55 | 76.60 | 73.65 |
| 11/32 | .3438 | 45711 | 45811 | 45911 | 71.60 | .2792 | 4 | 1 1/2 | 6 | 0.3151-0.3470 | 116.85 | 94.05 | 86.55 | 82.95 | 79.15 | 76.10 |
| 3/8 | .3750 | 45712 | 45812 | 45912 | 71.60 | .3105 | 4 | 1 3/4 | 7 | 0.3471-0.3780 | 116.85 | 94.05 | 86.55 | 82.95 | 79.15 | 76.10 |
| 13/32 | .4062 | 45713 | 45813 | 45913 | 75.15 | .3105 | 4 | 1 3/4 | 7 | 0.3781-0.4090 | 120.25 | 97.65 | 90.10 | 86.50 | 82.55 | 79.55 |
| 7/16 | .4375 | 45714 | 45814 | 45914 | 81.30 | .3730 | 6 | 1 3/4 | 7 | 0.4091-0.4410 | 126.45 | 103.90 | 96.25 | 92.65 | 88.80 | 85.70 |
| 15/32 | .4688 | 45715 | 45815 | 45915 | 87.80 | .3730 | 6 | 1 3/4 | 7 | 0.4411-0.4720 | 133.10 | 110.30 | 102.90 | 99.25 | 95.30 | 92.30 |
| 1/2 | .5000 | 45716 | 45816 | 45916 | 94.05 | .4355 | 6 | 2 | 8 | 0.4721-0.5030 | 142.55 | 118.30 | 110.20 | 106.30 | 102.15 | 98.95 |
| 17/32 | .5312 | 45717 | 45817 | 45917 | 96.80 | .4355 | 6 | 2 | 8 | 0.5031-0.5340 | 145.20 | 120.95 | 112.80 | 108.95 | 104.85 | 101.50 |
| 9/16 | .5625 | 45718 | 45818 | 45918 | 96.80 | .4355 | 6 | 2 | 8 | 0.5341-0.5660 | 145.20 | 120.95 | 112.80 | 108.95 | 104.85 | 101.50 |
| 19/32 | .5938 | 45719 | 45819 | 45919 | 100.45 | .4355 | 6 | 2 | 8 | 0.5661-0.5970 | 148.85 | 124.70 | 116.50 | 112.60 | 108.50 | 105.25 |
| 5/8 | .6250 | 45720 | 45820 | 45920 | 100.45 | .5615 | 6 | 2 1/4 | 9 | 0.5971-0.6280 | 148.85 | 124.70 | 116.50 | 112.60 | 108.50 | 105.25 |
| 21/32 | .6562 | 45721 | 45821 | 45921 | 102.35 | .5615 | 6 | 2 1/4 | 9 | 0.6281-0.6590 | 150.85 | 126.55 | 118.35 | 114.55 | 110.30 | 107.15 |
| 11/16 | .6875 | 45722 | 45822 | 45922 | 102.35 | .5615 | 6 | 2 1/4 | 9 | 0.6591-0.6910 | 150.85 | 126.55 | 118.35 | 114.55 | 110.30 | 107.15 |
| 23/32 | .7188 | 45723 | 45823 | 45923 | 107.05 | .5615 | 6 | 2 1/4 | 9 | 0.6911-0.7220 | 155.45 | 131.05 | 123.20 | 119.25 | 115.10 | 111.75 |
| 3/4 | .7500 | 45724 | 45824 | 45924 | 107.05 | .6245 | 6 | 2 1/2 | 9 1/2 | 0.7221-0.7530 | 155.45 | 131.05 | 123.20 | 119.25 | 115.10 | 111.75 |
| 25/32 | .7812 | 45725 | 45825 | 45925 | 110.80 | .6245 | 6 | 2 1/2 | 9 1/2 | 0.7531-0.7840 | 159.05 | 134.80 | 126.70 | 122.75 | 118.70 | 115.35 |
| 13/16 | .8125 | 45726 | 45826 | 45926 | 110.80 | .6245 | 6 | 2 1/2 | 9 1/2 | 0.7841-0.8160 | 159.05 | 134.80 | 126.70 | 122.75 | 118.70 | 115.35 |
| 27/32 | .8438 | 45727 | 45827 | 45927 | 115.20 | .6245 | 6 | 2 1/2 | 9 1/2 | 0.8161-0.8470 | 163.50 | 139.15 | 131.05 | 127.35 | 123.25 | 119.85 |
| 7/8 | .8750 | 45728 | 45828 | 45928 | 119.55 | .7495 | 6 | 2 3/8 | 10 | 0.8471-0.8780 | 169.65 | 144.55 | 136.10 | 132.10 | 127.75 | 124.35 |
| 29/32 | .9062 | 45729 | 45829 | 45929 | 139.10 | .7495 | 6 | 2 3/8 | 10 | 0.8781-0.9090 | 189.40 | 164.25 | 155.70 | 151.70 | 147.40 | 144.00 |
| 15/16 | .9375 | 45730 | 45830 | 45930 | 139.10 | .7495 | 8 | 2 3/8 | 10 | 0.9091-0.9410 | 189.40 | 164.25 | 155.70 | 151.70 | 147.40 | 144.00 |
| 31/32 | .9688 | 45731 | 45831 | 45931 | 145.80 | .7495 | 8 | 2 3/8 | 10 | 0.9411-0.9720 | 196.05 | 170.95 | 162.40 | 158.35 | 154.05 | 150.65 |
| 1 | 1.0000 | 45732 | 45832 | 45932 | 145.80 | .8745 | 8 | 2 3/4 | 10 1/2 | 0.9721-1.0030 | 196.05 | 170.95 | 162.40 | 158.35 | 154.05 | 150.65 |
| 1 1/16 | 1.0625 | 45734 | 45834 | 45934 | 150.75 | .8745 | 8 | 2 3/4 | 10 1/2 | 1.0031-1.0660 | 198.90 | 174.65 | 166.75 | 162.85 | 158.70 | 155.50 |
| 1 1/8 | 1.1250 | 45736 | 45836 | 45936 | 163.30 | .8745 | 8 | 2 7/8 | 11 | 1.0661-1.1280 | 211.40 | 187.25 | 179.15 | 175.35 | 171.25 | 167.90 |
| 1 3/16 | 1.1875 | 45738 | 45838 | 45938 | 170.65 | .9995 | 8 | 2 7/8 | 11 | 1.1281-1.1905 | 218.85 | 194.80 | 186.70 | 182.85 | 178.70 | 175.40 |
| 1 1/4 | 1.2500 | 45740 | 45840 | 45940 | 184.45 | .9995 | 8 | 3 | 11 1/2 | 1.1906-1.2530 | 232.60 | 208.60 | 200.40 | 196.65 | 192.45 | 189.20 |
| 1 5/16 | 1.3125 | 45742 | 45842 | 45942 | 189.55 | .9995 | 8 | 3 | 11 1/2 | 1.2531-1.3155 | 237.80 | 213.70 | 205.55 | 201.75 | 197.60 | 194.30 |
| 1 3/8 | 1.3750 | 45744 | 45844 | 45944 | 202.25 | .9995 | 8 | 3 1/4 | 12 | 1.3156-1.3780 | 250.30 | 226.25 | 218.20 | 214.40 | 210.10 | 207.00 |
| 1 7/16 | 1.4375 | 45746 | 45846 | 45946 | 219.00 | .9995 | 8 | 3 1/4 | 12 | 1.3781-1.4405 | 267.15 | 243.05 | 234.95 | 231.05 | 227.00 | 223.70 |
| 1 1/2 | 1.5000 | 45748 | 45848 | 45948 | 225.35 | 1.2495 | 8 | 3 1/2 | 12 1/2 | 1.4406-1.5030 | 273.50 | 249.35 | 241.30 | 237.45 | 233.40 | 230.10 |
| 1 9/16 | 1.5625 | 45750 | 45850 | 45950 | 353.95 | 1.2495 | 8 | 3 1/2 | 12 1/2 | 1.5031-1.5660 | 402.20 | 378.15 | 370.05 | 366.10 | 362.00 | 358.65 |
| 1 5/8 | 1.6250 | 45752 | 45852 | 45952 | 366.05 | 1.2495 | 8 | 3 1/2 | 13 | 1.5661-1.6280 | 414.35 | 390.25 | 382.15 | 378.30 | 374.10 | 370.90 |
| 1 11/16 | 1.6875 | 45754 | 45854 | 45954 | 401.95 | 1.2495 | 8 | 3 1/2 | 13 | 1.6281-1.6910 | 450.20 | 426.15 | 418.00 | 414.20 | 410.00 | 406.75 |
| 1 3/4 | 1.7500 | 45756 | 45856 | 45956 | 401.95 | 1.2495 | 10 | 3 1/2 | 13 1/2 | 1.6911-1.7530 | 450.20 | 426.15 | 418.00 | 414.20 | 410.00 | 406.75 |
| 1 13/16 | 1.8125 | 45758 | 45858 | 45958 | 411.40 | 1.4995 | 10 | 3 1/2 | 13 1/2 | 1.7531-1.8160 | 459.55 | 435.50 | 427.40 | 423.55 | 419.30 | 416.15 |
| 1 7/8 | 1.8750 | 45760 | 45860 | 45960 | 431.45 | 1.4995 | 10 | 3 1/2 | 14 | 1.8161-1.8780 | 479.65 | 455.50 | 447.35 | 443.65 | 439.50 | 436.20 |
| 1 15/16 | 1.9375 | 45762 | 45862 | 45962 | 457.35 | 1.4995 | 10 | 3 1/2 | 14 | 1.8781-1.9410 | 505.55 | 481.40 | 473.35 | 469.55 | 465.40 | 462.15 |
| 2 | 2.0000 | 45764 | 45864 | 45964 | 456.65 | 1.4995 | 12 | 3 1/2 | 14 | 1.9411-2.0030 | 504.95 | 480.75 | 472.80 | 468.90 | 464.75 | 461.50 |
| 2 1/8 | 2.1250 | 45768 | 45868 | 45968 | 848.50 | 1.4995 | 12 | 3 1/2 | 14 1/2 | 2.0031-2.1280 | 896.75 | 872.60 | 864.50 | 860.80 | 856.50 | 853.30 |
| 2 1/4 | 2.2500 | 45772 | 45872 | 45972 | 911.30 | 1.7495 | 12 | 3 1/2 | 14 1/2 | 2.1281-2.2530 | 959.55 | 935.40 | 927.40 | 923.60 | 919.35 | 916.20 |
| 2 3/8 | 2.3750 | 45776 | 45876 | 45976 | 943.00 | 1.7495 | 12 | 3 1/2 | 15 | 2.2531-2.3780 | 991.20 | 967.05 | 958.95 | 955.20 | 951.00 | 947.80 |
| 2 1/2 | 2.5000 | 45780 | 45880 | 45980 | 943.00 | 1.7495 | 12 | 3 1/2 | 15 | 2.3781-2.5030 | 991.20 | 967.05 | 958.95 | 955.20 | 951.00 | 947.80 |

*Quantities of 15 or more - price of fractional size in same size range.

REAMERS



MATERIAL SPECIFIC REAMERS

CARBIDE TIPPED TYPES 457, 458, 459 METRIC



STRAIGHT FLUTE LONG CARBIDE STRAIGHT SHANK



NOTE: Tool diameter in millimeters (mm); all other dimensions in inches. Also, modifications available (see list on page 62).

| TOOL DIAMETER | | TYPE 457 NON FERROUS METRIC EDP NO. | TYPE 458 NAS/ CAST IRON METRIC EDP NO. | TYPE 459 STEEL/ HI-TEMP METRIC EDP NO. | ALL TYPES METRIC PRICE | DIMENSIONS | | | | FINISHED TO MODIFIED TOOL DIAMETER | | | | | | | |
|---------------|--------|---|--|--|---------------------------------|------------------------|-------------------|---------------|--------------|------------------------------------|--|---------|---------|---------|---------|---------|---------|
| mm | INCH | | | | | MAX. SHANK DIAM. | NO. OF FLTS | LENGTH | | MODIFIED DIAMETER RANGE (mm) | PRICE EACH - BASED ON QUANTITY ORDERED | | | | | | |
| | | | | | | | | FLT & CARB | OVER- ALL | | 1 | 2 | 3 | 4 | 5-7 | 8-14 | OVER 14 |
| 4.5 | .1772 | 457045 | 458045 | 459045 | \$82.55 | .1704 | 4 | 1 1/8 | 4 1/2 | 4.494-4.696 | \$116.55 | \$94.00 | \$86.50 | \$82.85 | \$79.00 | \$75.90 | \$71.55 |
| 5.0 | .1969 | 457050 | 458050 | 459050 | 82.55 | .1805 | 4 | 1 1/8 | 4 1/2 | 4.697-5.182 | 116.55 | 94.00 | 86.50 | 82.85 | 79.00 | 75.90 | 71.55 |
| 5.5 | .2165 | 457055 | 458055 | 459055 | 82.55 | .2075 | 4 | 1 1/4 | 5 | 5.183-5.613 | 116.55 | 94.00 | 86.50 | 82.85 | 79.00 | 75.90 | 71.55 |
| 6.0 | .2362 | 457060 | 458060 | 459060 | 82.55 | .2265 | 4 | 1 1/2 | 6 | 5.614-6.045 | 116.55 | 94.00 | 86.50 | 82.85 | 79.00 | 75.90 | 71.55 |
| - | - | 457063 | 458063 | 459063 | - | .2405 | 4 | 1 1/2 | 6 | 6.046-6.426 | 116.55 | 94.00 | 86.50 | 82.85 | 79.00 | 75.90 | 71.55 |
| 6.5 | .2559 | 457065 | 458065 | 459065 | 84.05 | .2485 | 4 | 1 1/2 | 6 | 6.427-7.214 | 118.10 | 95.45 | 87.95 | 84.20 | 80.55 | 77.30 | 73.05 |
| 7.0 | .2756 | 457070 | 458070 | 459070 | 84.05 | .2485 | 4 | 1 1/2 | 6 | - | - | - | - | - | - | - | - |
| 7.5 | .2953 | 457075 | 458075 | 459075 | 84.05 | .2792 | 4 | 1 1/2 | 6 | 7.215-8.001 | 118.10 | 95.45 | 87.95 | 84.20 | 80.55 | 77.30 | 73.05 |
| 8.0 | .3150 | 457080 | 458080 | 459080 | 84.05 | .2792 | 4 | 1 1/2 | 6 | - | - | - | - | - | - | - | - |
| 8.5 | .3346 | 457085 | 458085 | 459085 | 86.55 | .2792 | 4 | 1 1/2 | 6 | 8.002-8.814 | 120.65 | 98.00 | 90.40 | 86.70 | 82.95 | 79.85 | 75.45 |
| 9.0 | .3543 | 457090 | 458090 | 459090 | 86.55 | .3105 | 4 | 1 3/4 | 7 | 8.815-9.601 | 120.65 | 98.00 | 90.40 | 86.70 | 82.95 | 79.85 | 75.45 |
| 9.5 | .3740 | 457095 | 458095 | 459095 | 86.55 | .3105 | 4 | 1 3/4 | 7 | - | - | - | - | - | - | - | - |
| 10.0 | .3937 | 457100 | 458100 | 459100 | 90.10 | .3105 | 4 | 1 3/4 | 7 | 9.602-10.389 | 124.05 | 101.50 | 93.90 | 90.25 | 86.50 | 83.35 | 79.00 |
| 10.5 | .4134 | 457105 | 458105 | 459105 | 96.25 | .3730 | 6 | 1 3/4 | 7 | 10.390-11.201 | 130.25 | 107.70 | 100.20 | 96.35 | 92.65 | 89.45 | 85.25 |
| 11.0 | .4331 | 457110 | 458110 | 459110 | 96.25 | .3730 | 6 | 1 3/4 | 7 | - | - | - | - | - | - | - | - |
| 11.5 | .4528 | 457115 | 458115 | 459115 | 102.90 | .3730 | 6 | 1 3/4 | 7 | 11.202-11.989 | 136.95 | 114.25 | 106.75 | 103.00 | 99.25 | 96.15 | 91.75 |
| 12.0 | .4724 | 457120 | 458120 | 459120 | 110.20 | .4355 | 6 | 2 | 8 | 11.990-12.776 | 146.60 | 122.50 | 114.35 | 110.30 | 106.30 | 102.95 | 98.40 |
| 12.5 | .4921 | 457125 | 458125 | 459125 | 110.20 | .4355 | 6 | 2 | 8 | - | - | - | - | - | - | - | - |
| 13.0 | .5118 | 457130 | 458130 | 459130 | 112.80 | .4355 | 6 | 2 | 8 | 12.777-13.564 | 149.35 | 125.10 | 117.00 | 113.00 | 108.95 | 105.60 | 101.00 |
| 13.5 | .5315 | 457135 | 458135 | 459135 | 112.80 | .4355 | 6 | 2 | 8 | - | - | - | - | - | - | - | - |
| 14.0 | .5512 | 457140 | 458140 | 459140 | 112.80 | .4355 | 6 | 2 | 8 | 13.565-14.376 | 149.35 | 125.10 | 117.00 | 113.00 | 108.95 | 105.60 | 101.00 |
| 14.5 | .5709 | 457145 | 458145 | 459145 | 116.50 | .4355 | 6 | 2 | 8 | 14.377-15.164 | 152.90 | 128.75 | 120.70 | 116.80 | 112.60 | 109.25 | 104.70 |
| 15.0 | .5906 | 457150 | 458150 | 459150 | 116.50 | .4355 | 6 | 2 | 8 | - | - | - | - | - | - | - | - |
| 15.5 | .6102 | 457155 | 458155 | 459155 | 116.50 | .5615 | 6 | 2 1/4 | 9 | 15.165-15.951 | 152.90 | 128.75 | 120.70 | 116.80 | 112.60 | 109.25 | 104.70 |
| 16.0 | .6299 | 457160 | 458160 | 459160 | 118.35 | .5615 | 6 | 2 1/4 | 9 | 15.952-16.739 | 154.90 | 130.75 | 122.60 | 118.60 | 114.55 | 111.15 | 106.45 |
| 16.5 | .6496 | 457165 | 458165 | 459165 | 118.35 | .5615 | 6 | 2 1/4 | 9 | - | - | - | - | - | - | - | - |
| 17.0 | .6693 | 457170 | 458170 | 459170 | 118.35 | .5615 | 6 | 2 1/4 | 9 | 16.740-17.551 | 154.90 | 130.75 | 122.60 | 118.60 | 114.55 | 111.15 | 106.45 |
| 17.5 | .6890 | 457175 | 458175 | 459175 | 118.35 | .5615 | 6 | 2 1/4 | 9 | - | - | - | - | - | - | - | - |
| 18.0 | .7087 | 457180 | 458180 | 459180 | 123.20 | .6245 | 6 | 2 1/2 | 9 1/2 | 17.552-18.339 | 159.45 | 135.25 | 127.30 | 123.30 | 119.25 | 115.80 | 111.15 |
| 18.5 | .7283 | 457185 | 458185 | 459185 | 123.20 | .6245 | 6 | 2 1/2 | 9 1/2 | 18.340-19.126 | 159.45 | 135.25 | 127.30 | 123.30 | 119.25 | 115.80 | 111.15 |
| 19.0 | .7480 | 457190 | 458190 | 459190 | 123.20 | .6245 | 6 | 2 1/2 | 9 1/2 | - | - | - | - | - | - | - | - |
| 19.5 | .7677 | 457195 | 458195 | 459195 | 126.70 | .6245 | 6 | 2 1/2 | 9 1/2 | 19.127-19.914 | 163.20 | 139.00 | 130.85 | 126.90 | 122.75 | 119.50 | 114.85 |
| 20.0 | .7874 | 457200 | 458200 | 459200 | 126.70 | .6245 | 6 | 2 1/2 | 9 1/2 | 19.915-20.726 | 163.20 | 139.00 | 130.85 | 126.90 | 122.75 | 119.50 | 114.85 |
| 20.5 | .8071 | 457205 | 458205 | 459205 | 126.70 | .6245 | 6 | 2 1/2 | 9 1/2 | - | - | - | - | - | - | - | - |
| 21.0 | .8268 | 457210 | 458210 | 459210 | 131.05 | .6245 | 6 | 2 1/2 | 9 1/2 | 20.727-21.514 | 167.70 | 143.40 | 135.25 | 131.35 | 127.35 | 123.95 | 119.40 |
| 21.5 | .8465 | 457215 | 458215 | 459215 | 131.05 | .6245 | 6 | 2 1/2 | 9 1/2 | - | - | - | - | - | - | - | - |
| 22.0 | .8661 | 457220 | 458220 | 459220 | 131.05 | .7495 | 6 | 2 5/8 | 10 | 21.515-22.301 | 167.70 | 143.40 | 135.25 | 131.35 | 127.35 | 123.95 | 119.40 |
| 22.5 | .8858 | 457225 | 458225 | 459225 | 155.70 | .7495 | 6 | 2 5/8 | 10 | 22.302-23.089 | 193.55 | 168.45 | 160.15 | 155.95 | 151.70 | 148.30 | 143.35 |
| 23.0 | .9055 | 457230 | 458230 | 459230 | 155.70 | .7495 | 6 | 2 5/8 | 10 | - | - | - | - | - | - | - | - |
| 23.5 | .9252 | 457235 | 458235 | 459235 | 155.70 | .7495 | 8 | 2 5/8 | 10 | 23.090-23.901 | 193.55 | 168.45 | 160.15 | 155.95 | 151.70 | 148.30 | 143.35 |
| 24.0 | .9449 | 457240 | 458240 | 459240 | 162.40 | .7495 | 8 | 2 5/8 | 10 | 23.902-24.689 | 200.30 | 175.20 | 166.80 | 162.65 | 158.35 | 154.95 | 150.00 |
| 24.5 | .9646 | 457245 | 458245 | 459245 | 162.40 | .7495 | 8 | 2 5/8 | 10 | - | - | - | - | - | - | - | - |
| 25.0 | .9843 | 457250 | 458250 | 459250 | 162.40 | .8745 | 8 | 2 3/4 | 10 1/2 | 24.690-25.476 | 200.30 | 175.20 | 166.80 | 162.65 | 158.35 | 154.95 | 150.00 |
| 25.5 | 1.0039 | 457255 | 458255 | 459255 | 166.75 | .8745 | 8 | 2 3/4 | 10 1/2 | 25.477-27.076 | 202.85 | 179.00 | 170.75 | 166.90 | 162.85 | 159.45 | 154.90 |
| 26.0 | 1.0236 | 457260 | 458260 | 459260 | 166.75 | .8745 | 8 | 2 3/4 | 10 1/2 | - | - | - | - | - | - | - | - |
| 27.0 | 1.0630 | 457270 | 458270 | 459270 | 166.75 | .8745 | 8 | 2 3/4 | 10 1/2 | - | - | - | - | - | - | - | - |
| 28.0 | 1.1024 | 457280 | 458280 | 459280 | 179.15 | .8745 | 8 | 2 7/8 | 11 | 27.077-28.651 | 215.35 | 191.45 | 183.30 | 179.30 | 175.35 | 171.95 | 167.25 |
| 29.0 | 1.1417 | 457290 | 458290 | 459290 | 186.70 | .9995 | 8 | 2 7/8 | 11 | 28.652-30.239 | 222.90 | 198.90 | 190.85 | 186.85 | 182.85 | 179.40 | 174.70 |
| 30.0 | 1.1811 | 457300 | 458300 | 459300 | 186.70 | .9995 | 8 | 2 7/8 | 11 | - | - | - | - | - | - | - | - |
| 31.0 | 1.2205 | 457310 | 458310 | 459310 | 200.40 | .9995 | 8 | 3 | 11 1/2 | 30.240-31.826 | 236.75 | 212.65 | 204.60 | 200.60 | 196.65 | 193.15 | 188.60 |
| 32.0 | 1.2598 | 457320 | 458320 | 459320 | 205.55 | .9995 | 8 | 3 | 11 1/2 | 31.827-33.414 | 241.80 | 217.75 | 209.80 | 205.75 | 201.75 | 198.35 | 193.70 |
| 33.0 | 1.2992 | 457330 | 458330 | 459330 | 205.55 | .9995 | 8 | 3 | 11 1/2 | - | - | - | - | - | - | - | - |
| 34.0 | 1.3386 | 457340 | 458340 | 459340 | 218.20 | .9995 | 8 | 3 1/4 | 12 | 33.415-35.001 | 254.35 | 230.40 | 222.35 | 218.35 | 214.40 | 210.95 | 206.35 |
| 35.0 | 1.3780 | 457350 | 458350 | 459350 | 218.20 | .9995 | 8 | 3 1/4 | 12 | - | - | - | - | - | - | - | - |
| 36.0 | 1.4173 | 457360 | 458360 | 459360 | 234.95 | .9995 | 8 | 3 1/4 | 12 | 35.002-36.589 | 271.10 | 247.15 | 239.00 | 235.10 | 231.05 | 227.65 | 223.10 |
| 37.0 | 1.4567 | 457370 | 458370 | 459370 | 241.30 | 1.2495 | 8 | 3 1/2 | 12 1/2 | 36.590-38.176 | 277.60 | 253.50 | 245.50 | 241.45 | 237.45 | 234.05 | 229.55 |
| 38.0 | 1.4961 | 457380 | 458380 | 459380 | 241.30 | 1.2495 | 8 | 3 1/2 | 12 1/2 | - | - | - | - | - | - | - | - |

REAMERS



MATERIAL SPECIFIC REAMERS CARBIDE TIPPED TYPES 472, 473, 474 FRACTIONAL



STRAIGHT FLUTES TAPER SHANK



| TOOL SELECTOR | CHIP CLASS | MATERIAL MACHINED | TOOL TYPE |
|---------------|---------------------------|--------------------------|-----------|
| | 20 | NON-FERROUS - LONG CHIPS | 472 |
| 40 | NON-FERROUS - SHORT CHIPS | 472/473 | |
| 60 | CAST IRONS | 473 | |
| 80 | LOW STRENGTH STEELS | 474/473 | |
| 100 | MEDIUM STRENGTH STEELS | 474 | |
| 120 | HIGH STRENGTH STEELS | 474 | |
| 140 | HIGH TEMPERATURE ALLOYS | 474 | |

MODIFICATIONS (See list on page 69)

NATIONAL AEROSPACE STANDARDS - NAS 897

- TYPE 472 - FOR NON-FERROUS MATERIALS
- TYPE 473 - FOR CAST IRONS & NAS MULTI-PURPOSE
- TYPE 474 - FOR STEELS & HIGH TEMP ALLOYS

- Type "C" with short carbide tip
- Straight polished flutes and taper shank
- Tool geometry and carbide grade appropriate for material being machined
- Detailed specifications on page 15

For shallow holes only (see page 14)

| TOOL DIAMETER | | TYPE 472 NON-FERROUS EDP NO. | TYPE 473 NAS/ CAST IRON EDP NO. | TYPE 474 STEEL/ HI-TEMP EDP NO. | ALL TYPES PRICE | DIMENSIONS | | | | | FINISHED TO MODIFIED TOOL DIAMETER | | | | | | |
|---------------|---------|------------------------------------|--|--|-----------------------|-----------------------|-------------------|--------------|--------------|--------|------------------------------------|--|---------|---------|---------|---------|---------|
| FRACTIONAL | DECIMAL | | | | | TAPER SHANK NO. | NO. OF FLTS | LENGTH | | | MODIFIED DIAMETER RANGE | PRICE EACH - BASED ON QUANTITY ORDERED | | | | | |
| | | | | | | | FLT | CAR- BIDE | OVER- ALL | | | 1 | 2 | 3 | 4 | 5-7 | 8-14* |
| 1/4 | .2500 | 47208 | 47308 | 47408 | \$65.20 | 1 | 4 | 1 1/2 | 1/2 | 6 | 0.2381-0.2530 | \$109.10 | \$87.15 | \$79.75 | \$76.20 | \$72.55 | \$69.60 |
| 9/32 | .2812 | 47209 | 47309 | 47409 | 66.30 | 1 | 4 | 1 1/2 | 1/2 | 6 | 0.2531-0.2840 | 110.20 | 88.15 | 80.80 | 77.30 | 73.65 | 70.65 |
| 5/16 | .3125 | 47210 | 47310 | 47410 | 66.30 | 1 | 4 | 1 1/2 | 1/2 | 6 | 0.2841-0.3150 | 110.20 | 88.15 | 80.80 | 77.30 | 73.65 | 70.65 |
| 11/32 | .3438 | 47211 | 47311 | 47411 | 68.25 | 1 | 4 | 1 1/2 | 5/8 | 6 | 0.3151-0.3470 | 112.30 | 90.25 | 82.90 | 79.35 | 75.65 | 72.70 |
| 3/8 | .3750 | 47212 | 47312 | 47412 | 63.15 | 1 | 4 | 1 3/4 | 5/8 | 7 | 0.3471-0.3780 | 103.40 | 83.25 | 76.55 | 73.20 | 69.90 | 67.05 |
| 13/32 | .4062 | 47213 | 47313 | 47413 | 72.20 | 1 | 4 | 1 3/4 | 5/8 | 7 | 0.3781-0.4090 | 116.10 | 94.05 | 86.70 | 83.25 | 79.55 | 76.60 |
| 7/16 | .4375 | 47214 | 47314 | 47414 | 76.85 | 1 | 6 | 1 3/4 | 5/8 | 7 | 0.4091-0.4410 | 120.90 | 98.90 | 91.55 | 87.95 | 84.10 | 81.20 |
| 15/32 | .4688 | 47215 | 47315 | 47415 | 78.95 | 1 | 6 | 1 3/4 | 5/8 | 7 | 0.4411-0.4720 | 122.85 | 100.85 | 93.55 | 90.00 | 86.30 | 83.25 |
| 1/2 | .5000 | 47216 | 47316 | 47416 | 90.40 | 1 | 6 | 2 | 5/8 | 8 | 0.4721-0.5030 | 138.80 | 114.55 | 106.40 | 102.55 | 98.45 | 95.15 |
| 17/32 | .5312 | 47217 | 47317 | 47417 | 96.10 | 1 | 6 | 2 | 5/8 | 8 | 0.5031-0.5340 | 144.45 | 120.05 | 112.00 | 108.35 | 104.10 | 100.80 |
| 9/16 | .5625 | 47218 | 47318 | 47418 | 96.10 | 1 | 6 | 2 | 5/8 | 8 | 0.5341-0.5660 | 144.45 | 120.05 | 112.00 | 108.35 | 104.10 | 100.80 |
| 19/32 | .5938 | 47219 | 47319 | 47419 | 102.15 | 1 | 6 | 2 | 5/8 | 8 | 0.5661-0.5970 | 150.55 | 126.25 | 118.20 | 114.35 | 110.20 | 107.00 |
| 5/8 | .6250 | 47220 | 47320 | 47420 | 102.15 | 2 | 6 | 2 1/4 | 5/8 | 9 | 0.5971-0.6280 | 150.55 | 126.25 | 118.20 | 114.35 | 110.20 | 107.00 |
| 21/32 | .6562 | 47221 | 47321 | 47421 | 103.90 | 2 | 6 | 2 1/4 | 5/8 | 9 | 0.6281-0.6590 | 152.25 | 128.00 | 119.85 | 115.95 | 111.85 | 108.55 |
| 11/16 | .6875 | 47222 | 47322 | 47422 | 103.90 | 2 | 6 | 2 1/4 | 5/8 | 9 | 0.6591-0.6910 | 152.25 | 128.00 | 119.85 | 115.95 | 111.85 | 108.55 |
| 23/32 | .7188 | 47223 | 47323 | 47423 | 107.95 | 2 | 6 | 2 1/4 | 5/8 | 9 | 0.6911-0.7220 | 156.50 | 132.15 | 124.05 | 120.05 | 115.95 | 112.70 |
| 3/4 | .7500 | 47224 | 47324 | 47424 | 107.95 | 2 | 6 | 2 1/2 | 3/4 | 9 1/2 | 0.7221-0.7530 | 156.50 | 132.15 | 124.05 | 120.05 | 115.95 | 112.70 |
| 25/32 | .7812 | 47225 | 47325 | 47425 | 110.45 | 2 | 6 | 2 1/2 | 3/4 | 9 1/2 | 0.7531-0.7840 | 159.00 | 134.75 | 126.60 | 122.70 | 118.60 | 115.30 |
| 13/16 | .8125 | 47226 | 47326 | 47426 | 110.45 | 2 | 6 | 2 1/2 | 3/4 | 9 1/2 | 0.7841-0.8160 | 159.00 | 134.75 | 126.60 | 122.70 | 118.60 | 115.30 |
| 27/32 | .8438 | 47227 | 47327 | 47427 | 115.90 | 2 | 6 | 2 1/2 | 3/4 | 9 1/2 | 0.8161-0.8470 | 164.35 | 140.00 | 132.05 | 128.10 | 123.95 | 120.70 |
| 7/8 | .8750 | 47228 | 47328 | 47428 | 120.35 | 2 | 6 | 2 5/8 | 3/4 | 10 | 0.8471-0.8780 | 170.55 | 145.35 | 137.00 | 132.95 | 128.60 | 125.15 |
| 29/32 | .9062 | 47229 | 47329 | 47429 | 146.45 | 2 | 6 | 2 5/8 | 3/4 | 10 | 0.8781-0.9090 | 196.65 | 171.50 | 162.95 | 159.05 | 154.65 | 151.40 |
| 15/16 | .9375 | 47230 | 47330 | 47430 | 146.45 | 3 | 8 | 2 5/8 | 3/4 | 10 | 0.9091-0.9410 | 196.65 | 171.50 | 162.95 | 159.05 | 154.65 | 151.40 |
| 31/32 | .9688 | 47231 | 47331 | 47431 | 150.65 | 3 | 8 | 2 5/8 | 3/4 | 10 | 0.9411-0.9720 | 201.00 | 175.75 | 167.25 | 163.35 | 159.05 | 155.65 |
| 1 | 1.0000 | 47232 | 47332 | 47432 | 150.65 | 3 | 8 | 2 3/4 | 3/4 | 10 1/2 | 0.9721-1.0030 | 201.00 | 175.75 | 167.25 | 163.35 | 159.05 | 155.65 |
| 1 1/16 | 1.0625 | 47234 | 47334 | 47434 | 186.15 | 3 | 8 | 2 3/4 | 3/4 | 10 1/2 | 1.0031-1.0660 | 234.30 | 210.00 | 202.05 | 198.15 | 194.15 | 190.85 |
| 1 1/8 | 1.1250 | 47236 | 47336 | 47436 | 197.60 | 3 | 8 | 2 7/8 | 7/8 | 11 | 1.0661-1.1280 | 245.70 | 221.65 | 213.45 | 209.80 | 205.55 | 202.30 |
| 1 3/16 | 1.1875 | 47238 | 47338 | 47438 | 216.00 | 3 | 8 | 2 7/8 | 7/8 | 11 | 1.1281-1.1905 | 264.15 | 240.00 | 231.90 | 228.25 | 224.00 | 220.80 |
| 1 1/4 | 1.2500 | 47240 | 47340 | 47440 | 234.55 | 4 | 8 | 3 | 7/8 | 11 1/2 | 1.1906-1.2530 | 282.85 | 258.60 | 250.65 | 246.70 | 242.60 | 239.40 |
| 1 5/16 | 1.3125 | 47242 | 47342 | 47442 | 247.85 | 4 | 8 | 3 | 7/8 | 11 1/2 | 1.2531-1.3155 | 296.00 | 271.85 | 263.75 | 259.90 | 255.80 | 252.50 |
| 1 3/8 | 1.3750 | 47244 | 47344 | 47444 | 261.05 | 4 | 8 | 3 1/4 | 7/8 | 12 | 1.3156-1.3780 | 309.15 | 285.05 | 276.95 | 273.05 | 269.05 | 265.75 |
| 1 7/16 | 1.4375 | 47246 | 47346 | 47446 | 275.90 | 4 | 8 | 3 1/4 | 7/8 | 12 | 1.3781-1.4405 | 324.15 | 300.00 | 291.95 | 288.15 | 284.00 | 280.70 |
| 1 1/2 | 1.5000 | 47248 | 47348 | 47448 | 290.80 | 4 | 8 | 3 1/2 | 7/8 | 12 1/2 | 1.4406-1.5030 | 338.85 | 314.80 | 306.65 | 302.80 | 298.70 | 295.45 |
| 1 9/16 | 1.5625 | 47250 | 47350 | 47450 | 341.00 | 4 | 8 | 3 1/2 | 7/8 | 12 1/2 | 1.5031-1.5660 | 389.20 | 365.00 | 356.95 | 353.20 | 349.05 | 345.80 |
| 1 5/8 | 1.6250 | 47252 | 47352 | 47452 | 352.95 | 4 | 8 | 3 3/4 | 7/8 | 13 | 1.5661-1.6280 | 401.05 | 376.85 | 368.85 | 364.85 | 360.80 | 357.65 |
| 1 11/16 | 1.6875 | 47254 | 47354 | 47454 | 396.90 | 4 | 8 | 3 3/4 | 7/8 | 13 | 1.6281-1.6910 | 445.00 | 420.95 | 412.75 | 409.00 | 404.90 | 401.55 |
| 1 3/4 | 1.7500 | 47256 | 47356 | 47456 | 396.90 | 4 | 10 | 4 | 7/8 | 13 1/2 | 1.6911-1.7530 | 445.00 | 420.95 | 412.75 | 409.00 | 404.90 | 401.55 |
| 1 13/16 | 1.8125 | 47258 | 47358 | 47458 | 396.90 | 4 | 10 | 4 | 7/8 | 13 1/2 | 1.7531-1.8160 | 445.00 | 420.95 | 412.75 | 409.00 | 404.90 | 401.55 |
| 1 7/8 | 1.8750 | 47260 | 47360 | 47460 | 415.85 | 4 | 10 | 4 1/4 | 7/8 | 14 | 1.8161-1.8780 | 464.00 | 439.80 | 431.65 | 427.95 | 423.75 | 420.50 |
| 1 15/16 | 1.9375 | 47262 | 47362 | 47462 | 415.85 | 4 | 10 | 4 1/4 | 7/8 | 14 | 1.8781-1.9410 | 464.00 | 439.80 | 431.65 | 427.95 | 423.75 | 420.50 |
| 2 | 2.0000 | 47264 | 47364 | 47464 | 415.85 | 4 | 12 | 4 1/4 | 7/8 | 14 | 1.9411-2.0030 | 464.00 | 439.80 | 431.65 | 427.95 | 423.75 | 420.50 |

*Quantities of 15 or more - price of fractional size in same size range.

REAMERS



MATERIAL SPECIFIC REAMERS CARBIDE TIPPED TYPES 464, 466, 468 FRACTIONAL



EXPANSION REAMERS STRAIGHT FLUTE LONG CARBIDE STRAIGHT SHANK



NATIONAL AEROSPACE STANDARDS - NAS 897
TYPE 464 - FOR NON-FERROUS MATERIALS
TYPE 466 - FOR CAST IRONS & NAS MULTI-PURPOSE
TYPE 468 - FOR STEELS & HIGH TEMP ALLOYS

- Type "C" with flute long carbide
- Straight polished flutes and straight shank
- Expansion screw permits expansion of tool diameter for regrinding after wear without reinserting carbide
- Tool geometry and carbide grade appropriate for material being machined
- Detailed specifications, including minimum expansion, on page 15

| TOOL SELECTOR | CHIP CLASS | MATERIAL MACHINED | TOOL TYPE |
|---------------|---------------------------|--------------------------|-----------|
| | 20 | NON-FERROUS - LONG CHIPS | |
| 40 | NON-FERROUS - SHORT CHIPS | | 464/466 |
| 60 | CAST IRONS | | 466 |
| 80 | LOW STRENGTH STEELS | | 468/466 |
| 100 | MEDIUM STRENGTH STEELS | | 468 |
| 120 | HIGH STRENGTH STEELS | | 468 |
| 140 | HIGH TEMPERATURE ALLOYS | | 468 |

MODIFICATIONS (See list on page 69, except expansion reamers can not be coated)

USE:

- Expansion reamers are recommended for reaming abrasive materials. As the diameter wears down, the reamers can be expanded many times by tightening the end expansion screw and regrinding to its original size. Expansion reamers should not be considered as adjustable for use in producing holes of different sizes.

REAMERS

| TOOL DIAMETER | | TYPE 464 NON-FERROUS EDP NO. | TYPE 466 NAS/ CAST IRON EDP NO. | TYPE 468 STEEL/ HI-TEMP EDP NO. | ALL TYPES PRICE | DIMENSIONS | | | | FINISHED TO MODIFIED TOOL DIAMETER | | | | | | |
|---------------|---------|------------------------------------|--|--|-----------------------|------------------|-------------|-----------------|----------|------------------------------------|--|----------|----------|----------|----------|----------|
| FRACTIONAL | DECIMAL | | | | | MAX. SHANK DIAM. | NO. OF FLTS | LENGTH | | MODIFIED DIAMETER RANGE | PRICE EACH - BASED ON QUANTITY ORDERED | | | | | |
| | | | | | | | | FLUTE & CARBIDE | OVER-ALL | | | 1 | 2 | 3 | 4 | 5-7 |
| 5/16 | .3125 | 46410 | 46610 | 46810 | \$104.25 | .2792 | 4 | 1 | 6 | 0.2841-0.3150 | \$149.45 | \$126.90 | \$119.40 | \$115.65 | \$111.75 | \$108.75 |
| 1/32 | .3438 | 46411 | 46611 | 46811 | 104.25 | .2792 | 4 | 1 | 6 | 0.3151-0.3470 | 149.45 | 126.90 | 119.40 | 115.65 | 111.75 | 108.75 |
| 3/8 | .3750 | 46412 | 46612 | 46812 | 98.55 | .3105 | 4 | 1 | 7 | 0.3471-0.3780 | 140.75 | 119.70 | 112.50 | 109.10 | 105.55 | 102.65 |
| 13/32 | .4062 | 46413 | 46613 | 46813 | 103.75 | .3105 | 4 | 1 | 7 | 0.3781-0.4090 | 146.05 | 124.90 | 117.80 | 114.50 | 110.85 | 107.80 |
| 7/16 | .4375 | 46414 | 46614 | 46814 | 103.75 | .3730 | 6 | 1 | 7 | 0.4091-0.4410 | 146.05 | 124.90 | 117.80 | 114.50 | 110.85 | 107.80 |
| 15/32 | .4688 | 46415 | 46615 | 46815 | 109.95 | .3730 | 6 | 1 | 7 | 0.4411-0.4720 | 152.25 | 131.00 | 124.00 | 120.65 | 117.00 | 114.00 |
| 1/2 | .5000 | 46416 | 46616 | 46816 | 109.95 | .4355 | 6 | 1 | 8 | 0.4721-0.5030 | 152.25 | 131.00 | 124.00 | 120.65 | 117.00 | 114.00 |
| 17/32 | .5312 | 46417 | 46617 | 46817 | 112.70 | .4355 | 6 | 1 | 8 | 0.5031-0.5340 | 155.25 | 133.80 | 126.80 | 123.40 | 119.80 | 117.00 |
| 9/16 | .5625 | 46418 | 46618 | 46818 | 112.70 | .4355 | 6 | 1 1/8 | 8 | 0.5341-0.5660 | 155.25 | 133.80 | 126.80 | 123.40 | 119.80 | 117.00 |
| 19/32 | .5938 | 46419 | 46619 | 46819 | 117.70 | .4355 | 6 | 1 1/8 | 8 | 0.5661-0.5970 | 159.90 | 138.80 | 131.75 | 128.30 | 124.70 | 121.80 |
| 5/8 | .6250 | 46420 | 46620 | 46820 | 117.70 | .5615 | 6 | 1 1/4 | 9 | 0.5971-0.6280 | 159.90 | 138.80 | 131.75 | 128.30 | 124.70 | 121.80 |
| 21/32 | .6562 | 46421 | 46621 | 46821 | 128.65 | .5615 | 6 | 1 1/4 | 9 | 0.6281-0.6590 | 171.00 | 149.75 | 142.60 | 139.15 | 135.65 | 132.90 |
| 11/16 | .6875 | 46422 | 46622 | 46822 | 128.65 | .5615 | 6 | 1 1/4 | 9 | 0.6591-0.6910 | 171.00 | 149.75 | 142.60 | 139.15 | 135.65 | 132.90 |
| 23/32 | .7188 | 46423 | 46623 | 46823 | 133.55 | .5615 | 6 | 1 1/4 | 9 | 0.6911-0.7220 | 175.85 | 154.55 | 147.50 | 144.20 | 140.50 | 137.55 |
| 3/4 | .7500 | 46424 | 46624 | 46824 | 133.55 | .6245 | 6 | 1 3/8 | 9 1/2 | 0.7221-0.7530 | 175.85 | 154.55 | 147.50 | 144.20 | 140.50 | 137.55 |
| 25/32 | .7812 | 46425 | 46625 | 46825 | 143.90 | .6245 | 6 | 1 3/8 | 9 1/2 | 0.7531-0.7840 | 186.25 | 165.00 | 157.95 | 154.50 | 150.90 | 148.00 |
| 13/16 | .8125 | 46426 | 46626 | 46826 | 143.90 | .6245 | 6 | 1 3/8 | 9 1/2 | 0.7841-0.8160 | 186.25 | 165.00 | 157.95 | 154.50 | 150.90 | 148.00 |
| 27/32 | .8438 | 46427 | 46627 | 46827 | 149.45 | .6245 | 6 | 1 3/8 | 9 1/2 | 0.8161-0.8470 | 191.95 | 170.60 | 163.50 | 160.15 | 156.60 | 153.75 |
| 7/8 | .8750 | 46428 | 46628 | 46828 | 155.20 | .7495 | 6 | 1 1/2 | 10 | 0.8471-0.8780 | 199.15 | 177.10 | 169.65 | 166.20 | 162.40 | 159.45 |
| 29/32 | .9062 | 46429 | 46629 | 46829 | 165.15 | .7495 | 6 | 1 1/2 | 10 | 0.8781-0.9090 | 209.05 | 187.05 | 179.70 | 176.25 | 172.40 | 169.45 |
| 15/16 | .9375 | 46430 | 46630 | 46830 | 165.15 | .7495 | 8 | 1 1/2 | 10 | 0.9091-0.9410 | 209.05 | 187.05 | 179.70 | 176.25 | 172.40 | 169.45 |
| 31/32 | .9688 | 46431 | 46631 | 46831 | 171.50 | .7495 | 8 | 1 1/2 | 10 | 0.9411-0.9720 | 215.40 | 193.50 | 186.15 | 182.60 | 178.80 | 175.80 |
| 1 | 1.0000 | 46432 | 46632 | 46832 | 171.50 | .8745 | 8 | 1 5/8 | 10 1/2 | 0.9721-1.0030 | 215.40 | 193.50 | 186.15 | 182.60 | 178.80 | 175.80 |
| 1 1/32 | 1.0312 | 46433 | 46633 | 46833 | 188.00 | .8745 | 8 | 1 5/8 | 10 1/2 | - | - | - | - | - | - | - |
| 1 1/16 | 1.0625 | 46434 | 46634 | 46834 | 188.00 | .8745 | 8 | 1 5/8 | 10 1/2 | 1.0031-1.0660 | 231.90 | 209.90 | 202.60 | 199.05 | 195.20 | 192.35 |
| 1 3/32 | 1.0938 | 46435 | 46635 | 46835 | 188.00 | .8745 | 8 | 1 3/4 | 11 | - | - | - | - | - | - | - |
| 1 1/8 | 1.1250 | 46436 | 46636 | 46836 | 188.00 | .8745 | 8 | 1 3/4 | 11 | 1.0661-1.1280 | 231.90 | 209.90 | 202.60 | 199.05 | 195.20 | 192.35 |
| 1 3/16 | 1.1875 | 46438 | 46638 | 46838 | 205.25 | .9995 | 8 | 1 3/4 | 11 | 1.1281-1.1905 | 249.20 | 227.10 | 219.70 | 216.25 | 212.45 | 209.70 |
| 1 1/4 | 1.2500 | 46440 | 46640 | 46840 | 205.25 | .9995 | 8 | 1 7/8 | 11 1/2 | 1.1906-1.2530 | 249.20 | 227.10 | 219.70 | 216.25 | 212.45 | 209.70 |
| 1 5/16 | 1.3125 | 46442 | 46642 | 46842 | 226.60 | .9995 | 8 | 1 7/8 | 11 1/2 | 1.2531-1.3155 | 270.55 | 248.50 | 241.15 | 237.70 | 233.85 | 230.90 |
| 1 3/8 | 1.3750 | 46444 | 46644 | 46844 | 238.10 | .9995 | 8 | 2 | 12 | 1.3156-1.3780 | 282.20 | 260.25 | 252.80 | 249.30 | 245.55 | 242.50 |
| 1 7/16 | 1.4375 | 46446 | 46646 | 46846 | 280.65 | .9995 | 8 | 2 | 12 | 1.3781-1.4405 | 327.55 | 304.05 | 296.25 | 292.55 | 288.35 | 285.20 |
| 1 1/2 | 1.5000 | 46448 | 46648 | 46848 | 288.55 | 1.2495 | 8 | 2 1/8 | 12 1/2 | 1.4406-1.5030 | 335.55 | 311.90 | 304.10 | 300.40 | 296.35 | 293.20 |
| 1 9/16 | 1.5625 | 46450 | 46650 | 46850 | 379.15 | 1.2495 | 8 | 2 1/8 | 12 1/2 | 1.5031-1.5660 | 426.00 | 402.65 | 394.70 | 390.90 | 386.95 | 383.70 |
| 1 5/8 | 1.6250 | 46452 | 46652 | 46852 | 379.15 | 1.2495 | 8 | 2 1/4 | 13 | 1.5661-1.6280 | 426.00 | 402.65 | 394.70 | 390.90 | 386.95 | 383.70 |
| 1 11/16 | 1.6875 | 46454 | 46654 | 46854 | 419.80 | 1.2495 | 8 | 2 1/4 | 13 | 1.6281-1.6910 | 466.80 | 443.30 | 435.50 | 431.60 | 427.55 | 424.55 |
| 1 3/4 | 1.7500 | 46456 | 46656 | 46856 | 419.80 | 1.2495 | 10 | 2 3/8 | 13 1/2 | 1.6911-1.7530 | 466.80 | 443.30 | 435.50 | 431.60 | 427.55 | 424.55 |
| 1 13/16 | 1.8125 | 46458 | 46658 | 46858 | 497.15 | 1.4995 | 10 | 2 3/8 | 13 1/2 | 1.7531-1.8160 | 544.00 | 520.45 | 512.75 | 509.00 | 504.95 | 501.75 |
| 1 7/8 | 1.8750 | 46460 | 46660 | 46860 | 497.15 | 1.4995 | 10 | 2 1/2 | 14 | 1.8161-1.8780 | 544.00 | 520.45 | 512.75 | 509.00 | 504.95 | 501.75 |
| 1 15/16 | 1.9375 | 46462 | 46662 | 46862 | 543.30 | 1.4995 | 10 | 2 1/2 | 14 | 1.8781-1.9410 | 590.05 | 566.60 | 558.70 | 555.00 | 550.95 | 547.85 |
| 2 | 2.0000 | 46464 | 46664 | 46864 | 543.30 | 1.4995 | 12 | 2 1/2 | 14 | 1.9411-2.0030 | 590.05 | 566.60 | 558.70 | 555.00 | 550.95 | 547.85 |

*Quantities of 15 or more - price of fractional size in same size range.



MATERIAL SPECIFIC REAMERS CARBIDE TIPPED TYPES 432, 436, 438 FRACTIONAL



**RIGHT SPIRAL FLUTES
STRAIGHT SHANK**



| TOOL SELECTOR | CHIP CLASS | MATERIAL MACHINED | TOOL TYPE |
|---------------|------------|---------------------------|-----------|
| | 20 | NON-FERROUS - LONG CHIPS | 432 |
| | 40 | NON-FERROUS - SHORT CHIPS | 432/436 |
| | 60 | CAST IRONS | 436 |
| | 80 | LOW STRENGTH STEELS | 438/436 |
| | 100 | MEDIUM STRENGTH STEELS | 438 |
| | 120 | HIGH STRENGTH STEELS | 438 |
| | 140 | HIGH TEMPERATURE ALLOYS | 438 |

MODIFICATIONS (Prompt delivery)

- Modified tool diameter - priced below
- Metric tool diameter
- Closer tool diameter tolerance - pg. 15
- Cutting diameter reduced for step or pilot
- End chamfer other than 45°
- End cutting or corner radius
- Increased/decreased circular margin
- Increased/decreased tool diameter back taper
- Shortened shank or reduced shank diameter
- Flat(s) or tang on shank
- Coatings available:
See page 69

**NATIONAL AEROSPACE STANDARDS - NAS 897
TYPE 432 - FOR NON-FERROUS MATERIALS
TYPE 436 - FOR CAST IRONS & NAS MULTI-PURPOSE
TYPE 438 - FOR STEELS & HIGH TEMP ALLOYS**

- Type "C" with short carbide tip
- Right spiral polished flutes and straight shank
- Tool geometry and carbide grade appropriate for material being machined
- Detailed specifications on page 15

NOTE: For smaller tool diameters, see solid carbide reamers on pages 88-95.

For shallow holes only (see page 14)

| TOOL DIAMETER | | TYPE 432 NON-FERROUS EDP NO. | TYPE 436 NAS/ CAST IRON EDP NO. | TYPE 438 STEEL/ HI-TEMP EDP NO. | ALL TYPES PRICE | DIMENSIONS | | | | | FINISHED TO MODIFIED TOOL DIAMETER | | | | | | |
|---------------|---------|------------------------------------|--|--|-----------------------|-----------------|-------------|--------|----------|----------|------------------------------------|--|---------|---------|---------|---------|---------|
| FRACTIONAL | DECIMAL | | | | | MAX SHANK DIAM. | NO. OF FLTS | LENGTH | | | MODIFIED DIAMETER RANGE | PRICE EACH - BASED ON QUANTITY ORDERED | | | | | |
| | | | | | | | | FLT | CAR-BIDE | OVER-ALL | | | 1 | 2 | 3 | 4 | 5-7 |
| 3/16 | .1875 | 43206 | 43606 | 43806 | \$71.55 | .1805 | 4 | 1 1/8 | 1/2 | 4 1/2 | 0.1770-0.2040 | \$113.90 | \$92.70 | \$85.50 | \$82.25 | \$78.50 | \$75.70 |
| 7/32 | .2188 | 43207 | 43607 | 43807 | 71.55 | .2075 | 4 | 1 1/4 | 1/2 | 5 | 0.2041-0.2210 | 113.90 | 92.70 | 85.50 | 82.25 | 78.50 | 75.70 |
| 15/64 | .2344 | 4322344 | 4362344 | 4382344 | 71.55 | .2265 | 4 | 1 1/2 | 1/2 | 6 | 0.2211-0.2380 | 113.90 | 92.70 | 85.50 | 82.25 | 78.50 | 75.70 |
| 1/4 | .2500 | 43208 | 43608 | 43808 | 71.55 | .2405 | 4 | 1 1/2 | 1/2 | 6 | 0.2381-0.2530 | 113.90 | 92.70 | 85.50 | 82.25 | 78.50 | 75.70 |
| 9/32 | .2812 | 43209 | 43609 | 43809 | 71.65 | .2485 | 4 | 1 1/2 | 1/2 | 6 | 0.2531-0.2840 | 114.00 | 92.90 | 85.75 | 82.45 | 78.80 | 75.90 |
| 5/16 | .3125 | 43210 | 43610 | 43810 | 71.65 | .2792 | 4 | 1 1/2 | 1/2 | 6 | 0.2841-0.3150 | 114.00 | 92.90 | 85.75 | 82.45 | 78.80 | 75.90 |
| 11/32 | .3438 | 43211 | 43611 | 43811 | 79.00 | .2792 | 4 | 1 1/2 | 5/8 | 6 | 0.3151-0.3470 | 121.35 | 100.20 | 93.10 | 89.75 | 86.00 | 83.05 |
| 3/8 | .3750 | 43212 | 43612 | 43812 | 79.70 | .3105 | 4 | 1 3/4 | 5/8 | 7 | 0.3471-0.3780 | 122.05 | 100.80 | 93.70 | 90.35 | 86.65 | 83.80 |
| 13/32 | .4062 | 43213 | 43613 | 43813 | 83.25 | .3105 | 4 | 1 3/4 | 5/8 | 7 | 0.3781-0.4090 | 125.60 | 104.30 | 97.30 | 93.85 | 90.25 | 87.40 |
| 7/16 | .4375 | 43214 | 43614 | 43814 | 86.50 | .3730 | 6 | 1 3/4 | 5/8 | 7 | 0.4091-0.4410 | 128.75 | 107.60 | 100.45 | 97.05 | 93.45 | 90.60 |
| 15/32 | .4688 | 43215 | 43615 | 43815 | 91.95 | .3730 | 6 | 1 3/4 | 5/8 | 7 | 0.4411-0.4720 | 134.40 | 113.10 | 106.00 | 102.65 | 99.00 | 96.20 |
| 1/2 | .5000 | 43216 | 43616 | 43816 | 99.05 | .4355 | 6 | 2 | 5/8 | 8 | 0.4721-0.5030 | 144.25 | 121.50 | 113.95 | 110.30 | 106.45 | 103.40 |
| 17/32 | .5312 | 43217 | 43617 | 43817 | 102.05 | .4355 | 6 | 2 | 5/8 | 8 | 0.5031-0.5340 | 147.15 | 124.65 | 117.00 | 113.35 | 109.50 | 106.40 |
| 9/16 | .5625 | 43218 | 43618 | 43818 | 102.05 | .4355 | 6 | 2 | 5/8 | 8 | 0.5341-0.5660 | 147.15 | 124.65 | 117.00 | 113.35 | 109.50 | 106.40 |
| 19/32 | .5938 | 43219 | 43619 | 43819 | 105.15 | .4355 | 6 | 2 | 5/8 | 8 | 0.5661-0.5970 | 150.35 | 127.70 | 120.00 | 116.50 | 112.55 | 109.55 |
| 5/8 | .6250 | 43220 | 43620 | 43820 | 105.15 | .5615 | 6 | 2 1/4 | 5/8 | 9 | 0.5971-0.6280 | 150.35 | 127.70 | 120.00 | 116.50 | 112.55 | 109.55 |
| 21/32 | .6562 | 43221 | 43621 | 43821 | 108.40 | .5615 | 6 | 2 1/4 | 5/8 | 9 | 0.6281-0.6590 | 153.50 | 130.85 | 123.30 | 119.70 | 115.75 | 112.60 |
| 11/16 | .6875 | 43222 | 43622 | 43822 | 115.20 | .5615 | 6 | 2 1/4 | 5/8 | 9 | 0.6591-0.6910 | 160.30 | 137.60 | 130.15 | 126.45 | 122.60 | 119.55 |
| 23/32 | .7188 | 43223 | 43623 | 43823 | 116.95 | .5615 | 6 | 2 1/4 | 5/8 | 9 | 0.6911-0.7220 | 162.00 | 139.50 | 131.90 | 128.30 | 124.35 | 121.35 |
| 3/4 | .7500 | 43224 | 43624 | 43824 | 118.55 | .6245 | 6 | 2 1/2 | 3/4 | 9 1/2 | 0.7221-0.7530 | 163.75 | 141.10 | 133.55 | 130.05 | 126.10 | 122.95 |
| 25/32 | .7812 | 43225 | 43625 | 43825 | 121.80 | .6245 | 6 | 2 1/2 | 3/4 | 9 1/2 | 0.7531-0.7840 | 166.95 | 144.30 | 136.75 | 133.15 | 129.30 | 126.20 |
| 13/16 | .8125 | 43226 | 43626 | 43826 | 121.80 | .6245 | 6 | 2 1/2 | 3/4 | 9 1/2 | 0.7841-0.8160 | 166.95 | 144.30 | 136.75 | 133.15 | 129.30 | 126.20 |
| 27/32 | .8438 | 43227 | 43627 | 43827 | 128.30 | .6245 | 6 | 2 1/2 | 3/4 | 9 1/2 | 0.8161-0.8470 | 173.30 | 150.85 | 143.25 | 139.65 | 135.75 | 132.60 |
| 7/8 | .8750 | 43228 | 43628 | 43828 | 133.10 | .7495 | 6 | 2 5/8 | 3/4 | 10 | 0.8471-0.8780 | 180.00 | 156.60 | 148.65 | 144.85 | 140.85 | 137.60 |
| 29/32 | .9062 | 43229 | 43629 | 43829 | 155.10 | .7495 | 6 | 2 5/8 | 3/4 | 10 | 0.8781-0.9090 | 201.90 | 178.40 | 170.55 | 166.90 | 162.85 | 159.70 |
| 15/16 | .9375 | 43230 | 43630 | 43830 | 155.10 | .7495 | 8 | 2 5/8 | 3/4 | 10 | 0.9091-0.9410 | 201.90 | 178.40 | 170.55 | 166.90 | 162.85 | 159.70 |
| 31/32 | .9688 | 43231 | 43631 | 43831 | 162.65 | .7495 | 8 | 2 5/8 | 3/4 | 10 | 0.9411-0.9720 | 209.65 | 186.10 | 178.10 | 174.45 | 170.35 | 167.10 |
| 1 | 1.0000 | 43232 | 43632 | 43832 | 162.65 | .8745 | 8 | 2 3/4 | 3/4 | 10 1/2 | 0.9721-1.0030 | 209.65 | 186.10 | 178.10 | 174.45 | 170.35 | 167.10 |
| 1 1/16 | 1.0625 | 43234 | 43634 | 43834 | 174.50 | .8745 | 8 | 2 3/4 | 3/4 | 10 1/2 | 1.0031-1.0660 | 221.40 | 197.85 | 190.05 | 186.30 | 182.35 | 179.10 |
| 1 1/8 | 1.1250 | 43236 | 43636 | 43836 | 179.90 | .8745 | 8 | 2 7/8 | 7/8 | 11 | 1.0661-1.1280 | 226.90 | 203.30 | 195.45 | 191.60 | 187.70 | 184.45 |
| 1 3/16 | 1.1875 | 43238 | 43638 | 43838 | 189.00 | .9995 | 8 | 2 7/8 | 7/8 | 11 | 1.1281-1.1905 | 235.85 | 212.40 | 204.55 | 200.90 | 196.70 | 193.55 |
| 1 1/4 | 1.2500 | 43240 | 43640 | 43840 | 200.15 | .9995 | 8 | 3 | 7/8 | 11 1/2 | 1.1906-1.2530 | 247.10 | 223.55 | 215.75 | 211.85 | 207.90 | 204.70 |
| 1 5/16 | 1.3125 | 43242 | 43642 | 43842 | 221.40 | .9995 | 8 | 3 | 7/8 | 11 1/2 | 1.2531-1.3155 | 268.30 | 244.75 | 237.00 | 233.25 | 229.20 | 226.05 |
| 1 3/8 | 1.3750 | 43244 | 43644 | 43844 | 242.45 | .9995 | 8 | 3 1/4 | 7/8 | 12 | 1.3156-1.3780 | 289.40 | 265.90 | 258.05 | 254.25 | 250.25 | 247.15 |
| 1 7/16 | 1.4375 | 43246 | 43646 | 43846 | 257.00 | .9995 | 8 | 3 1/4 | 7/8 | 12 | 1.3781-1.4405 | 303.85 | 280.30 | 272.55 | 268.80 | 264.65 | 261.55 |
| 1 1/2 | 1.5000 | 43248 | 43648 | 43848 | 271.45 | 1.2495 | 8 | 3 1/2 | 7/8 | 12 1/2 | 1.4406-1.5030 | 318.30 | 294.85 | 286.90 | 283.20 | 279.15 | 275.95 |

*Quantities of 15 or more - price of fractional size in same size range.



MATERIAL SPECIFIC REAMERS

CARBIDE TIPPED TYPES 442, 443, 444 FRACTIONAL



**RIGHT SPIRAL FLUTES
FLUTE LONG CARBIDE
STRAIGHT SHANK**



NATIONAL AEROSPACE STANDARDS - NAS 897
TYPE 442 - FOR NON-FERROUS MATERIALS
TYPE 443 - FOR CAST IRONS & NAS MULTI-PURPOSE
TYPE 444 - FOR STEELS & HIGH TEMP ALLOYS

- Type "C" with flute long carbide
- Right spiral polished flutes and straight shank
- Tool geometry and carbide grade appropriate for material being machined
- Detailed specifications on page 15

| TOOL SELECTOR | CHIP CLASS | MATERIAL MACHINED | TOOL TYPE |
|---------------|------------|---------------------------|-----------|
| | 20 | NON-FERROUS - LONG CHIPS | 442 |
| | 40 | NON-FERROUS - SHORT CHIPS | 442/443 |
| | 60 | CAST IRONS | 443 |
| | 80 | LOW STRENGTH STEELS | 444/443 |
| | 100 | MEDIUM STRENGTH STEELS | 444 |
| | 120 | HIGH STRENGTH STEELS | 444 |
| | 140 | HIGH TEMPERATURE ALLOYS | 444 |

MODIFICATIONS (Prompt delivery)

- Modified tool diameter - priced below
- Metric tool diameter
- Closer tool diameter tolerance - pg. 15
- Cutting diameter reduced for step or pilot
- End chamfer other than 45°
- End cutting or corner radius
- Increased/decreased circular margin
- Increased/decreased tool diameter back taper
- Shortened shank or reduced shank diameter
- Flat(s) or tang on shank
- Coatings available:

TITANIUM NITRIDE - TiN

TITANIUM CARBONITRIDE - TiCN

ZIRCONIUM NITRIDE - ZrN

AL TITANIUM NITRIDE - AlTiN

NOTE: For step reamers, see page 83. For smaller tool diameters, see solid carbide reamers on pages 88 & 95.

| TOOL DIAMETER | | TYPE 442 NON-FERROUS EDP NO. | TYPE 443 NAS/ CAST IRON EDP NO. | TYPE 444 STEEL/ HI-TEMP EDP NO. | ALL TYPES PRICE | DIMENSIONS | | | | FINISHED TO MODIFIED TOOL DIAMETER | | | | | | |
|---------------|---------|------------------------------------|--|--|-----------------------|------------------|---------------|---------------------------|----------|------------------------------------|--|----------|----------|---------|---------|---------|
| FRACTIONAL | DECIMAL | | | | | MAX. SHANK DIAM. | NO. OF FLUTES | LENGTH FLUTE & CARBIDE | OVER-ALL | MODIFIED DIAMETER RANGE | PRICE EACH - BASED ON QUANTITY ORDERED | | | | | |
| | | | | | | | | | | | 1 | 2 | 3 | 4 | 5-7 | 8-14* |
| 5/16 | .3125 | 44210 | 44310 | 44410 | \$86.00 | .2792 | 4 | 1 1/2 | 6 | 0.2841 - 0.3150 | \$128.35 | \$107.20 | \$100.05 | \$96.70 | \$93.10 | \$90.15 |
| 1/32 | .3438 | 44211 | 44311 | 44411 | 94.75 | .2792 | 4 | 1 1/2 | 6 | 0.3151 - 0.3470 | 137.15 | 115.90 | 108.80 | 105.50 | 101.75 | 98.95 |
| 3/8 | .3750 | 44212 | 44312 | 44412 | 95.55 | .3105 | 4 | 1 3/4 | 7 | 0.3471 - 0.3780 | 138.10 | 116.80 | 109.60 | 106.25 | 102.65 | 99.80 |
| 13/32 | .4062 | 44213 | 44313 | 44413 | 99.90 | .3105 | 4 | 1 3/4 | 7 | 0.3781 - 0.4090 | 142.20 | 121.05 | 113.90 | 110.45 | 107.00 | 104.10 |
| 7/16 | .4375 | 44214 | 44314 | 44414 | 103.75 | .3730 | 6 | 1 3/4 | 7 | 0.4091 - 0.4410 | 146.05 | 124.90 | 117.80 | 114.50 | 110.85 | 107.80 |
| 15/32 | .4688 | 44215 | 44315 | 44415 | 110.30 | .3730 | 6 | 1 3/4 | 7 | 0.4411 - 0.4720 | 152.75 | 131.45 | 124.35 | 121.05 | 117.35 | 114.55 |
| 1/2 | .5000 | 44216 | 44316 | 44416 | 119.05 | .4355 | 6 | 2 | 8 | 0.4721 - 0.5030 | 164.15 | 141.65 | 133.85 | 130.35 | 126.45 | 123.40 |
| 17/32 | .5312 | 44217 | 44317 | 44417 | 122.50 | .4355 | 6 | 2 | 8 | 0.5031 - 0.5340 | 167.70 | 144.90 | 137.30 | 133.75 | 130.05 | 126.90 |
| 9/16 | .5625 | 44218 | 44318 | 44418 | 122.50 | .4355 | 6 | 2 | 8 | 0.5341 - 0.5660 | 167.70 | 144.90 | 137.30 | 133.75 | 130.05 | 126.90 |
| 19/32 | .5938 | 44219 | 44319 | 44419 | 126.10 | .4355 | 6 | 2 | 8 | 0.5661 - 0.5970 | 171.25 | 148.55 | 141.05 | 137.30 | 133.55 | 130.40 |
| 5/8 | .6250 | 44220 | 44320 | 44420 | 126.10 | .5615 | 6 | 2 1/4 | 9 | 0.5971 - 0.6280 | 171.25 | 148.55 | 141.05 | 137.30 | 133.55 | 130.40 |
| 21/32 | .6562 | 44221 | 44321 | 44421 | 130.10 | .5615 | 6 | 2 1/4 | 9 | 0.6281 - 0.6590 | 175.20 | 152.50 | 144.90 | 141.35 | 137.50 | 134.45 |
| 11/16 | .6875 | 44222 | 44322 | 44422 | 138.10 | .5615 | 6 | 2 1/4 | 9 | 0.6591 - 0.6910 | 183.25 | 160.65 | 152.95 | 149.40 | 145.65 | 142.50 |
| 23/32 | .7188 | 44223 | 44323 | 44423 | 140.15 | .5615 | 6 | 2 1/4 | 9 | 0.6911 - 0.7220 | 185.40 | 162.65 | 155.20 | 151.50 | 147.70 | 144.60 |
| 3/4 | .7500 | 44224 | 44324 | 44424 | 142.25 | .6245 | 6 | 2 1/2 | 9 1/2 | 0.7221 - 0.7530 | 187.40 | 164.85 | 157.25 | 153.75 | 149.80 | 146.80 |
| 25/32 | .7812 | 44225 | 44325 | 44425 | 146.05 | .6245 | 6 | 2 1/2 | 9 1/2 | 0.7531 - 0.7840 | 191.30 | 168.65 | 160.95 | 157.35 | 153.55 | 150.50 |
| 13/16 | .8125 | 44226 | 44326 | 44426 | 146.05 | .6245 | 6 | 2 1/2 | 9 1/2 | 0.7841 - 0.8160 | 191.30 | 168.65 | 160.95 | 157.35 | 153.55 | 150.50 |
| 27/32 | .8438 | 44227 | 44327 | 44427 | 153.95 | .6245 | 6 | 2 1/2 | 9 1/2 | 0.8161 - 0.8470 | 199.15 | 176.45 | 168.85 | 165.35 | 161.45 | 158.35 |
| 7/8 | .8750 | 44228 | 44328 | 44428 | 159.75 | .7495 | 6 | 2 5/8 | 10 | 0.8471 - 0.8780 | 206.65 | 183.20 | 175.30 | 171.55 | 167.65 | 164.35 |
| 29/32 | .9062 | 44229 | 44329 | 44429 | 186.15 | .7495 | 6 | 2 5/8 | 10 | 0.8781 - 0.9090 | 233.05 | 209.65 | 201.65 | 197.85 | 194.00 | 190.75 |
| 15/16 | .9375 | 44230 | 44330 | 44430 | 186.15 | .7495 | 8 | 2 5/8 | 10 | 0.9091 - 0.9410 | 233.05 | 209.65 | 201.65 | 197.85 | 194.00 | 190.75 |
| 31/32 | .9688 | 44231 | 44331 | 44431 | 195.15 | .7495 | 8 | 2 5/8 | 10 | 0.9411 - 0.9720 | 242.15 | 218.60 | 210.75 | 207.05 | 202.95 | 199.80 |
| 1 | 1.0000 | 44232 | 44332 | 44432 | 195.15 | .8745 | 8 | 2 3/4 | 10 1/2 | 0.9721 - 1.0030 | 242.15 | 218.60 | 210.75 | 207.05 | 202.95 | 199.80 |
| 1 1/16 | 1.0625 | 44234 | 44334 | 44434 | 229.40 | .8745 | 8 | 2 3/4 | 10 1/2 | 1.0031 - 1.0660 | 276.45 | 252.80 | 244.90 | 241.25 | 237.20 | 234.00 |
| 1 1/8 | 1.1250 | 44236 | 44336 | 44436 | 236.50 | .8745 | 8 | 2 7/8 | 11 | 1.0661 - 1.1280 | 283.40 | 259.90 | 252.00 | 248.35 | 244.40 | 241.15 |
| 1 3/16 | 1.1875 | 44238 | 44338 | 44438 | 248.55 | .9995 | 8 | 2 7/8 | 11 | 1.1281 - 1.1905 | 295.55 | 272.00 | 264.30 | 260.40 | 256.40 | 253.35 |
| 1 1/4 | 1.2500 | 44240 | 44340 | 44440 | 263.05 | .9995 | 8 | 3 | 11 1/2 | 1.1906 - 1.2530 | 310.00 | 286.55 | 278.70 | 274.95 | 270.80 | 267.75 |
| 1 5/16 | 1.3125 | 44242 | 44342 | 44442 | 291.10 | .9995 | 8 | 3 | 11 1/2 | 1.2531 - 1.3155 | 338.05 | 314.60 | 306.65 | 303.00 | 298.90 | 295.65 |
| 1 3/8 | 1.3750 | 44244 | 44344 | 44444 | 318.95 | .9995 | 8 | 3 1/4 | 12 | 1.3156 - 1.3780 | 365.80 | 342.30 | 334.60 | 330.65 | 326.70 | 323.55 |
| 1 7/16 | 1.4375 | 44246 | 44346 | 44446 | 337.95 | .9995 | 8 | 3 1/4 | 12 | 1.3781 - 1.4405 | 384.65 | 361.25 | 353.40 | 349.75 | 345.75 | 342.50 |
| 1 1/2 | 1.5000 | 44248 | 44348 | 44448 | 356.95 | 1.2495 | 8 | 3 1/2 | 12 1/2 | 1.4406 - 1.5030 | 403.85 | 380.35 | 372.40 | 368.85 | 364.65 | 361.60 |

*Quantities of 15 or more - price of fractional size in same size range.



MATERIAL SPECIFIC REAMERS CARBIDE TIPPED TYPES 433, 437, 439 FRACTIONAL



LEFT SPIRAL FLUTES STRAIGHT SHANK



| TOOL SELECTOR | CHIP CLASS | MATERIAL MACHINED | TOOL TYPE |
|---------------|---------------------------|--------------------------|-----------|
| | 20 | NON-FERROUS - LONG CHIPS | 433 |
| 40 | NON-FERROUS - SHORT CHIPS | 433/437 | |
| 60 | CAST IRONS | 437 | |
| 80 | LOW STRENGTH STEELS | 439/437 | |
| 100 | MEDIUM STRENGTH STEELS | 439 | |
| 120 | HIGH STRENGTH STEELS | 439 | |
| 140 | HIGH TEMPERATURE ALLOYS | 439 | |

MODIFICATIONS (Prompt delivery)

- Modified tool diameter - priced below
- Metric tool diameter
- Closer tool diameter tolerance - pg. 15
- Cutting diameter reduced for step or pilot
- End chamfer other than 45°
- End cutting or corner radius
- Increased/decreased circular margin
- Increased/decreased tool diameter back taper
- Shortened shank or reduced shank diameter
- Flat(s) or tang on shank
- Coatings available:
See page 71

NATIONAL AEROSPACE STANDARDS - NAS 897
TYPE 433 - FOR NON-FERROUS MATERIALS
TYPE 437 - FOR CAST IRONS & NAS MULTI-PURPOSE
TYPE 439 - FOR STEELS & HIGH TEMP ALLOYS

- Type "C" with short carbide tip
- Left spiral polished flutes and straight shank
- Tool geometry and carbide grade appropriate for material being machined
- Left spiral flutes should not be used on blind holes
- Detailed specifications on page 15

NOTE: For smaller tool diameters, see solid carbide reamers on pages 88 & 95.

For shallow holes only (see page 14)

| TOOL DIAMETER | | TYPE 433 NON-FERROUS EDP NO. | TYPE 437 NAS/ CAST IRON EDP NO. | TYPE 439 STEEL/ HI-TEMP EDP NO. | ALL TYPES PRICE | DIMENSIONS | | | | | FINISHED TO MODIFIED TOOL DIAMETER | | | | | | |
|---------------|---------|------------------------------------|--|--|-----------------------|------------------|-------------|----------|----------|--------|------------------------------------|--|---------|---------|---------|---------|---------|
| FRACTIONAL | DECIMAL | | | | | MAX. SHANK DIAM. | NO. OF FLTS | LENGTH | | | MODIFIED DIAMETER RANGE | PRICE EACH - BASED ON QUANTITY ORDERED | | | | | |
| | | | | | | | FLT | CAR-BIDE | OVER-ALL | | | 1 | 2 | 3 | 4 | 5-7 | 8-14* |
| 3/16 | .1875 | 43306 | 43706 | 43906 | \$76.25 | .1805 | 4 | 1 1/8 | 1/2 | 4 1/2 | 0.1770-0.2040 | \$121.45 | \$98.90 | \$91.30 | \$87.70 | \$83.80 | \$80.70 |
| 7/32 | .2188 | 43307 | 43707 | 43907 | 76.25 | .2075 | 4 | 1 1/4 | 1/2 | 5 | 0.2041-0.2210 | 121.45 | 98.90 | 91.30 | 87.70 | 83.80 | 80.70 |
| 15/64 | .2344 | 4332344 | 4372344 | 4392344 | 76.25 | .2265 | 4 | 1 1/2 | 1/2 | 6 | 0.2211-0.2380 | 121.45 | 98.90 | 91.30 | 87.70 | 83.80 | 80.70 |
| 1/4 | .2500 | 43308 | 43708 | 43908 | 76.25 | .2405 | 4 | 1 1/2 | 1/2 | 6 | 0.2381-0.2530 | 121.45 | 98.90 | 91.30 | 87.70 | 83.80 | 80.70 |
| 9/32 | .2812 | 43309 | 43709 | 43909 | 76.55 | .2485 | 4 | 1 1/2 | 1/2 | 6 | 0.2531-0.2840 | 121.75 | 99.05 | 91.55 | 87.80 | 84.00 | 81.05 |
| 5/16 | .3125 | 43310 | 43710 | 43910 | 76.55 | .2792 | 4 | 1 1/2 | 1/2 | 6 | 0.2841-0.3150 | 121.75 | 99.05 | 91.55 | 87.80 | 84.00 | 81.05 |
| 11/32 | .3438 | 43311 | 43711 | 43911 | 84.20 | .2792 | 4 | 1 1/2 | 5/8 | 6 | 0.3151-0.3470 | 129.45 | 106.95 | 99.25 | 95.55 | 91.75 | 88.75 |
| 3/8 | .3750 | 43312 | 43712 | 43912 | 85.05 | .3105 | 4 | 1 3/4 | 5/8 | 7 | 0.3471-0.3780 | 130.20 | 107.60 | 99.95 | 96.30 | 92.45 | 89.35 |
| 13/32 | .4062 | 43313 | 43713 | 43913 | 88.80 | .3105 | 4 | 1 3/4 | 5/8 | 7 | 0.3781-0.4090 | 133.85 | 111.35 | 103.75 | 100.20 | 96.25 | 93.25 |
| 7/16 | .4375 | 43314 | 43714 | 43914 | 92.25 | .3730 | 6 | 1 3/4 | 5/8 | 7 | 0.4091-0.4410 | 137.30 | 114.70 | 107.20 | 103.65 | 99.65 | 96.70 |
| 15/32 | .4688 | 43315 | 43715 | 43915 | 98.05 | .3730 | 6 | 1 3/4 | 5/8 | 7 | 0.4411-0.4720 | 143.30 | 120.70 | 113.10 | 109.50 | 105.60 | 102.55 |
| 1/2 | .5000 | 43316 | 43716 | 43916 | 101.65 | .4355 | 6 | 2 | 5/8 | 8 | 0.4721-0.5030 | 148.05 | 124.85 | 117.05 | 113.35 | 109.45 | 106.25 |
| 17/32 | .5312 | 43317 | 43717 | 43917 | 104.80 | .4355 | 6 | 2 | 5/8 | 8 | 0.5031-0.5340 | 151.10 | 127.85 | 120.00 | 116.45 | 112.45 | 109.25 |
| 9/16 | .5625 | 43318 | 43718 | 43918 | 104.80 | .4355 | 6 | 2 | 5/8 | 8 | 0.5341-0.5660 | 151.10 | 127.85 | 120.00 | 116.45 | 112.45 | 109.25 |
| 19/32 | .5938 | 43319 | 43719 | 43919 | 107.95 | .4355 | 6 | 2 | 5/8 | 8 | 0.5661-0.5970 | 154.35 | 131.00 | 123.35 | 119.70 | 115.65 | 112.50 |
| 5/8 | .6250 | 43320 | 43720 | 43920 | 107.95 | .5615 | 6 | 2 1/4 | 5/8 | 9 | 0.5971-0.6280 | 154.35 | 131.00 | 123.35 | 119.70 | 115.65 | 112.50 |
| 21/32 | .6562 | 43321 | 43721 | 43921 | 111.15 | .5615 | 6 | 2 1/4 | 5/8 | 9 | 0.6281-0.6590 | 157.55 | 134.35 | 126.55 | 122.75 | 118.80 | 115.75 |
| 11/16 | .6875 | 43322 | 43722 | 43922 | 118.20 | .5615 | 6 | 2 1/4 | 5/8 | 9 | 0.6591-0.6910 | 164.60 | 141.35 | 133.60 | 129.75 | 125.90 | 122.70 |
| 23/32 | .7188 | 43323 | 43723 | 43923 | 119.95 | .5615 | 6 | 2 1/4 | 5/8 | 9 | 0.6911-0.7220 | 166.40 | 143.15 | 135.40 | 131.75 | 127.70 | 124.65 |
| 3/4 | .7500 | 43324 | 43724 | 43924 | 121.75 | .6245 | 6 | 2 1/2 | 3/4 | 9 1/2 | 0.7221-0.7530 | 168.10 | 144.85 | 137.15 | 133.50 | 129.45 | 126.25 |
| 25/32 | .7812 | 43325 | 43725 | 43925 | 125.00 | .6245 | 6 | 2 1/2 | 3/4 | 9 1/2 | 0.7531-0.7840 | 171.50 | 148.15 | 140.45 | 136.70 | 132.75 | 129.55 |
| 13/16 | .8125 | 43326 | 43726 | 43926 | 125.00 | .6245 | 6 | 2 1/2 | 3/4 | 9 1/2 | 0.7841-0.8160 | 171.50 | 148.15 | 140.45 | 136.70 | 132.75 | 129.55 |
| 27/32 | .8438 | 43327 | 43727 | 43927 | 131.75 | .6245 | 6 | 2 1/2 | 3/4 | 9 1/2 | 0.8161-0.8470 | 178.10 | 154.90 | 147.00 | 143.35 | 139.30 | 136.20 |
| 7/8 | .8750 | 43328 | 43728 | 43928 | 136.70 | .7495 | 6 | 2 5/8 | 3/4 | 10 | 0.8471-0.8780 | 184.90 | 160.70 | 152.50 | 148.75 | 144.60 | 141.30 |
| 29/32 | .9062 | 43329 | 43729 | 43929 | 159.20 | .7495 | 6 | 2 5/8 | 3/4 | 10 | 0.8781-0.9090 | 207.30 | 183.25 | 175.20 | 171.30 | 167.10 | 164.00 |
| 15/16 | .9375 | 43330 | 43730 | 43930 | 159.20 | .7495 | 8 | 2 5/8 | 3/4 | 10 | 0.9091-0.9410 | 207.30 | 183.25 | 175.20 | 171.30 | 167.10 | 164.00 |
| 31/32 | .9688 | 43331 | 43731 | 43931 | 166.95 | .7495 | 8 | 2 5/8 | 3/4 | 10 | 0.9411-0.9720 | 215.10 | 191.00 | 182.95 | 179.10 | 175.00 | 171.70 |
| 1 | 1.0000 | 43332 | 43732 | 43932 | 166.95 | .8745 | 8 | 2 3/4 | 3/4 | 10 1/2 | 0.9721-1.0030 | 215.10 | 191.00 | 182.95 | 179.10 | 175.00 | 171.70 |
| 1 1/16 | 1.0625 | 43334 | 43734 | 43934 | 179.15 | .8745 | 8 | 2 3/4 | 3/4 | 10 1/2 | 1.0031-1.0660 | 227.20 | 203.30 | 195.05 | 191.30 | 187.15 | 183.90 |
| 1 1/8 | 1.1250 | 43336 | 43736 | 43936 | 184.75 | .8745 | 8 | 2 7/8 | 7/8 | 11 | 1.0661-1.1280 | 232.90 | 208.70 | 200.60 | 196.75 | 192.70 | 189.45 |
| 1 3/16 | 1.1875 | 43338 | 43738 | 43938 | 194.15 | .9995 | 8 | 2 7/8 | 7/8 | 11 | 1.1281-1.1905 | 242.20 | 218.10 | 209.95 | 206.15 | 202.05 | 198.80 |
| 1 1/4 | 1.2500 | 43340 | 43740 | 43940 | 205.40 | .9995 | 8 | 3 | 7/8 | 11 1/2 | 1.1906-1.2530 | 253.55 | 229.55 | 221.40 | 217.60 | 213.40 | 210.10 |
| 1 5/16 | 1.3125 | 43342 | 43742 | 43942 | 227.20 | .9995 | 8 | 3 | 7/8 | 11 1/2 | 1.2531-1.3155 | 275.50 | 251.45 | 243.25 | 239.50 | 235.20 | 232.15 |
| 1 3/8 | 1.3750 | 43344 | 43744 | 43944 | 249.00 | .9995 | 8 | 3 1/4 | 7/8 | 12 | 1.3156-1.3780 | 297.20 | 273.00 | 264.90 | 261.10 | 257.00 | 253.65 |
| 1 7/16 | 1.4375 | 43346 | 43746 | 43946 | 263.90 | .9995 | 8 | 3 1/4 | 7/8 | 12 | 1.3781-1.4405 | 311.90 | 287.80 | 279.90 | 275.90 | 271.85 | 268.55 |
| 1 1/2 | 1.5000 | 43348 | 43748 | 43948 | 278.80 | 1.2495 | 8 | 3 1/2 | 7/8 | 12 1/2 | 1.4406-1.5030 | 326.90 | 302.70 | 294.65 | 290.90 | 286.75 | 283.40 |

*Quantities of 15 or more - price of fractional size in same size range.



MATERIAL SPECIFIC REAMERS CARBIDE TIPPED TYPES 482, 483, 484 FRACTIONAL



**LEFT SPIRAL FLUTES
FLUTE LONG CARBIDE
STRAIGHT SHANK**



**NATIONAL AEROSPACE STANDARDS - NAS 897
TYPE 482 - FOR NON-FERROUS MATERIALS
TYPE 483 - FOR CAST IRONS & NAS MULTI-PURPOSE
TYPE 484 - FOR STEELS & HIGH TEMP ALLOYS**

- Type "C" with flute long carbide
- Left spiral polished flutes and straight shank
- Tool geometry and carbide grade appropriate for material being machined
- Left spiral flutes should not be used on blind holes
- Detailed specifications on page 15

| TOOL SELECTOR | CHIP CLASS | MATERIAL MACHINED | TOOL TYPE |
|---------------|------------|---------------------------|-----------|
| | 20 | NON-FERROUS - LONG CHIPS | 482 |
| | 40 | NON-FERROUS - SHORT CHIPS | 482/483 |
| | 60 | CAST IRONS | 483 |
| | 80 | LOW STRENGTH STEELS | 484/483 |
| | 100 | MEDIUM STRENGTH STEELS | 484 |
| | 120 | HIGH STRENGTH STEELS | 484 |
| | 140 | HIGH TEMPERATURE ALLOYS | 484 |

MODIFICATIONS (Prompt delivery)

- Modified tool diameter - priced below
- Metric tool diameter
- Closer tool diameter tolerance - pg. 15
- Cutting diameter reduced for step or pilot
- End chamfer other than 45°
- End cutting or corner radius
- Increased/decreased circular margin
- Increased/decreased tool diameter back taper
- Shortened shank or reduced shank diameter
- Flat(s) or tang on shank
- Coatings available:

TITANIUM NITRIDE - TiN

TITANIUM CARBONITRIDE - TiCN

ZIRCONIUM NITRIDE - ZrN

AL TITANIUM NITRIDE - AlTiN

NOTE: For step reamers, see page 84. For smaller tool diameter, see solid carbide reamers on pages 88 & 95.

| TOOL DIAMETER | | TYPE 482 NON-FERROUS EDP NO. | TYPE 483 NAS/ CAST IRON EDP NO. | TYPE 484 STEEL/ HI-TEMP EDP NO. | ALL TYPES PRICE | DIMENSIONS | | | | FINISHED TO MODIFIED TOOL DIAMETER | | | | | | |
|---------------|---------|------------------------------------|--|--|-----------------------|------------------|-------------|-----------------|----------|------------------------------------|--|----------|----------|----------|---------|---------|
| FRACTIONAL | DECIMAL | | | | | MAX. SHANK DIAM. | NO. OF FLTS | LENGTH | | MODIFIED DIAMETER RANGE | PRICE EACH - BASED ON QUANTITY ORDERED | | | | | |
| | | | | | | | | FLUTE & CARBIDE | OVER-ALL | | | 1 | 2 | 3 | 4 | 5-7 |
| 5/16 | .3125 | 48210 | 48310 | 48410 | \$91.75 | .2792 | 4 | 1 1/2 | 6 | 0.2841-0.3150 | \$137.00 | \$114.25 | \$106.75 | \$103.05 | \$99.25 | \$96.20 |
| 1/32 | .3438 | 48211 | 48311 | 48411 | 101.05 | .2792 | 4 | 1 1/2 | 6 | 0.3151-0.3470 | 146.25 | 123.55 | 116.05 | 112.45 | 108.55 | 105.55 |
| 3/8 | .3750 | 48212 | 48312 | 48412 | 102.05 | .3105 | 4 | 1 3/4 | 7 | 0.3471-0.3780 | 147.15 | 124.65 | 117.00 | 113.35 | 109.50 | 106.40 |
| 13/32 | .4062 | 48213 | 48313 | 48413 | 106.45 | .3105 | 4 | 1 3/4 | 7 | 0.3781-0.4090 | 151.70 | 129.20 | 121.45 | 117.95 | 113.95 | 111.00 |
| 7/16 | .4375 | 48214 | 48314 | 48414 | 110.80 | .3730 | 6 | 1 3/4 | 7 | 0.4091-0.4410 | 155.80 | 133.25 | 125.65 | 122.10 | 118.15 | 115.20 |
| 15/32 | .4688 | 48215 | 48315 | 48415 | 117.75 | .3730 | 6 | 1 3/4 | 7 | 0.4411-0.4720 | 162.95 | 140.25 | 132.60 | 129.20 | 125.15 | 122.15 |
| 1/2 | .5000 | 48216 | 48316 | 48416 | 122.15 | .4355 | 6 | 2 | 8 | 0.4721-0.5030 | 168.65 | 145.35 | 137.55 | 133.80 | 129.75 | 126.70 |
| 17/32 | .5312 | 48217 | 48317 | 48417 | 125.70 | .4355 | 6 | 2 | 8 | 0.5031-0.5340 | 172.15 | 148.75 | 141.10 | 137.30 | 133.50 | 130.25 |
| 9/16 | .5625 | 48218 | 48318 | 48418 | 125.70 | .4355 | 6 | 2 | 8 | 0.5341-0.5660 | 172.15 | 148.75 | 141.10 | 137.30 | 133.50 | 130.25 |
| 19/32 | .5938 | 48219 | 48319 | 48419 | 129.45 | .4355 | 6 | 2 | 8 | 0.5661-0.5970 | 175.80 | 152.50 | 144.75 | 141.10 | 137.15 | 133.85 |
| 5/8 | .6250 | 48220 | 48320 | 48420 | 129.45 | .5615 | 6 | 2 1/4 | 9 | 0.5971-0.6280 | 175.80 | 152.50 | 144.75 | 141.10 | 137.15 | 133.85 |
| 21/32 | .6562 | 48221 | 48321 | 48421 | 133.55 | .5615 | 6 | 2 1/4 | 9 | 0.6281-0.6590 | 179.90 | 156.70 | 148.75 | 145.20 | 141.20 | 138.10 |
| 11/16 | .6875 | 48222 | 48322 | 48422 | 141.75 | .5615 | 6 | 2 1/4 | 9 | 0.6591-0.6910 | 188.05 | 164.90 | 157.00 | 153.50 | 149.40 | 146.25 |
| 23/32 | .7188 | 48223 | 48323 | 48423 | 144.00 | .5615 | 6 | 2 1/4 | 9 | 0.6911-0.7220 | 190.25 | 167.00 | 159.30 | 155.55 | 151.55 | 148.50 |
| 3/4 | .7500 | 48224 | 48324 | 48424 | 146.05 | .6245 | 6 | 2 1/2 | 9 1/2 | 0.7221-0.7530 | 192.45 | 169.30 | 161.45 | 157.70 | 153.85 | 150.65 |
| 25/32 | .7812 | 48225 | 48325 | 48425 | 149.95 | .6245 | 6 | 2 1/2 | 9 1/2 | 0.7531-0.7840 | 196.40 | 173.10 | 165.35 | 161.75 | 157.65 | 154.50 |
| 13/16 | .8125 | 48226 | 48326 | 48426 | 149.95 | .6245 | 6 | 2 1/2 | 9 1/2 | 0.7841-0.8160 | 196.40 | 173.10 | 165.35 | 161.75 | 157.65 | 154.50 |
| 27/32 | .8438 | 48227 | 48327 | 48427 | 158.10 | .6245 | 6 | 2 1/2 | 9 1/2 | 0.8161-0.8470 | 204.45 | 181.15 | 173.30 | 169.65 | 165.75 | 162.60 |
| 7/8 | .8750 | 48228 | 48328 | 48428 | 164.10 | .7495 | 6 | 2 5/8 | 10 | 0.8471-0.8780 | 212.15 | 188.00 | 180.00 | 176.15 | 171.95 | 168.75 |
| 29/32 | .9062 | 48229 | 48329 | 48429 | 191.15 | .7495 | 6 | 2 5/8 | 10 | 0.8781-0.9090 | 239.25 | 215.10 | 207.05 | 203.30 | 199.05 | 195.85 |
| 15/16 | .9375 | 48230 | 48330 | 48430 | 191.15 | .7495 | 8 | 2 5/8 | 10 | 0.9091-0.9410 | 239.25 | 215.10 | 207.05 | 203.30 | 199.05 | 195.85 |
| 31/32 | .9688 | 48231 | 48331 | 48431 | 200.40 | .7495 | 8 | 2 5/8 | 10 | 0.9411-0.9720 | 248.55 | 224.50 | 216.50 | 212.60 | 208.45 | 205.25 |
| 1 | 1.0000 | 48232 | 48332 | 48432 | 200.40 | .8745 | 8 | 2 3/4 | 10 1/2 | 0.9721-1.0030 | 248.55 | 224.50 | 216.50 | 212.60 | 208.45 | 205.25 |
| 1 1/16 | 1.0625 | 48234 | 48334 | 48434 | 235.65 | .8745 | 8 | 2 3/4 | 10 1/2 | 1.0031-1.0660 | 283.70 | 259.60 | 251.60 | 247.60 | 243.60 | 240.35 |
| 1 1/8 | 1.1250 | 48236 | 48336 | 48436 | 242.95 | .8745 | 8 | 2 7/8 | 11 | 1.0661-1.1280 | 291.05 | 266.95 | 258.75 | 254.95 | 250.80 | 247.50 |
| 1 3/16 | 1.1875 | 48238 | 48338 | 48438 | 255.30 | .9995 | 8 | 2 7/8 | 11 | 1.1281-1.1905 | 303.35 | 279.35 | 271.25 | 267.35 | 263.20 | 259.95 |
| 1 1/4 | 1.2500 | 48240 | 48340 | 48440 | 270.30 | .9995 | 8 | 3 | 11 1/2 | 1.1906-1.2530 | 318.30 | 294.25 | 286.10 | 282.25 | 278.15 | 274.95 |
| 1 5/16 | 1.3125 | 48242 | 48342 | 48442 | 298.90 | .9995 | 8 | 3 | 11 1/2 | 1.2531-1.3155 | 347.05 | 322.85 | 314.85 | 311.05 | 306.85 | 303.70 |
| 1 3/8 | 1.3750 | 48244 | 48344 | 48444 | 327.50 | .9995 | 8 | 3 1/4 | 12 | 1.3156-1.3780 | 375.60 | 351.60 | 343.45 | 339.50 | 335.50 | 332.10 |
| 1 7/16 | 1.4375 | 48246 | 48346 | 48446 | 346.95 | .9995 | 8 | 3 1/4 | 12 | 1.3781-1.4405 | 395.15 | 370.90 | 362.90 | 359.10 | 354.95 | 351.70 |
| 1 1/2 | 1.5000 | 48248 | 48348 | 48448 | 366.50 | 1.2495 | 8 | 3 1/2 | 12 1/2 | 1.4406-1.5030 | 414.60 | 390.55 | 382.60 | 378.55 | 374.50 | 371.35 |

*Quantities of 15 or more - price of fractional size in same size range.



MATERIAL SPECIFIC REAMERS CARBIDE TIPPED TYPES 470, 471, 475 FRACTIONAL



CNC STUB STRAIGHT FLUTE LONG CARBIDE STRAIGHT SHANK



| TOOL SELECTOR | CHIP CLASS | MATERIAL MACHINED | TOOL TYPE |
|---------------|------------|---------------------------|-----------|
| | 20 | NON-FERROUS - LONG CHIPS | 470 |
| | 40 | NON-FERROUS - SHORT CHIPS | 470/471 |
| | 60 | CAST IRONS | 471 |
| | 80 | LOW STRENGTH STEELS | 475/471 |
| | 100 | MEDIUM STRENGTH STEELS | 475 |
| | 120 | HIGH STRENGTH STEELS | 475 |
| | 140 | HIGH TEMPERATURE ALLOYS | 475 |

MODIFICATIONS (Prompt delivery)

- Modified tool diameter - priced below
- Metric tool diameter
- Closer tool diameter tolerance - pg. 15
- Cutting diameter reduced for step or pilot
- End chamfer other than 45°
- End cutting or corner radius
- Increased/decreased circular margin
- Increased/decreased tool diam. back taper
- Reduced shank diameter
- Flat(s) on shank
- Coatings available:
See page 71

TYPE 470 - FOR NON-FERROUS MATERIALS
TYPE 471 - FOR CAST IRONS & NAS MULTI-PURPOSE
TYPE 475 - FOR STEELS & HIGH TEMP ALLOYS

- Straight polished flutes
- Flute long carbide on .2841" tool diameter and larger
- Straight shank fits into standard holders
- Pin cross hole permits use in pin drive floating holders
- Tool geometry and carbide grade appropriate for material being machined
- Detailed specifications on page 15

| TOOL DIAMETER | | TYPE 470 NON-FERROUS EDP NO. | TYPE 471 NAS/ CAST IRON EDP NO. | TYPE 475 STEEL/ HI-TEMP EDP NO. | ALL TYPES PRICES | DIMENSIONS | | | | | FINISHED TO MODIFIED TOOL DIAMETER | | | | | | | |
|---------------|---------|------------------------------------|--|--|------------------------|----------------|-------------------|--------|-------|-------|------------------------------------|-------------------------------|--|---------|---------|---------|---------|---------|
| FRACTIONAL | DECIMAL | | | | | SHANK DIAM. | NO. OF FLTS | LENGTH | | | PIN HOLE DIAM. | MODIFIED DIAMETER RANGE | PRICE EACH - BASED ON QUANTITY ORDERED | | | | | |
| | | FLT | CAR- BIDE | OVER- ALL | 1 | | | 2 | 3 | 4 | | | 5-7 | 8-14* | | | | |
| 3/16 | .1875 | 47006 | 47106 | 47506 | \$73.75 | 1/4 | 4 | 1 | 1/2 | 2 1/4 | 3/32 | 0.1770-0.2040 | \$118.80 | \$96.25 | \$88.75 | \$85.15 | \$81.20 | \$78.20 |
| 7/32 | .2188 | 47007 | 47107 | 47507 | 73.75 | 1/4 | 4 | 1 | 1/2 | 2 1/4 | 3/32 | 0.2041-0.2210 | 118.80 | 96.25 | 88.75 | 85.15 | 81.20 | 78.20 |
| 15/64 | .2344 | 4702344 | 4712344 | 4752344 | 73.75 | 1/4 | 4 | 1 | 1/2 | 2 1/4 | 3/32 | 0.2211-0.2380 | 118.80 | 96.25 | 88.75 | 85.15 | 81.20 | 78.20 |
| 1/4 | .2500 | 47008 | 47108 | 47508 | 73.75 | 1/4 | 4 | 1 | 1/2 | 2 1/4 | 3/32 | 0.2381-0.2530 | 118.80 | 96.25 | 88.75 | 85.15 | 81.20 | 78.20 |
| 9/32 | .2812 | 47009 | 47109 | 47509 | 73.75 | 3/8 | 4 | 1 | 1/2 | 2 1/4 | 1/8 | 0.2531-0.2840 | 118.80 | 96.25 | 88.75 | 85.15 | 81.20 | 78.20 |
| 5/16 | .3125 | 47010 | 47110 | 47510 | 85.70 | 3/8 | 4 | 1 | 1 | 2 1/4 | 1/8 | 0.2841-0.3150 | 130.90 | 108.40 | 100.75 | 97.05 | 93.25 | 90.15 |
| 11/32 | .3438 | 47011 | 47111 | 47511 | 86.50 | 3/8 | 4 | 1 1/4 | 1 1/4 | 2 1/2 | 1/8 | 0.3151-0.3470 | 131.75 | 109.05 | 101.45 | 97.85 | 93.90 | 90.90 |
| 3/8 | .3750 | 47012 | 47112 | 47512 | 93.80 | 3/8 | 4 | 1 1/4 | 1 1/4 | 2 1/2 | 1/8 | 0.3471-0.3780 | 138.90 | 116.35 | 108.75 | 105.15 | 101.35 | 98.15 |
| 13/32 | .4062 | 47013 | 47113 | 47513 | 95.20 | 1/2 | 4 | 1 1/4 | 1 1/4 | 2 1/2 | 3/16 | 0.3781-0.4090 | 140.40 | 117.75 | 110.15 | 106.45 | 102.65 | 99.60 |
| 7/16 | .4375 | 47014 | 47114 | 47514 | 112.55 | 1/2 | 4 | 1 1/4 | 1 1/4 | 2 1/2 | 3/16 | 0.4091-0.4410 | 157.90 | 135.20 | 127.60 | 124.00 | 120.00 | 117.05 |
| 15/32 | .4688 | 47015 | 47115 | 47515 | 112.55 | 1/2 | 4 | 1 1/4 | 1 1/4 | 2 1/2 | 3/16 | 0.4411-0.4720 | 157.90 | 135.20 | 127.60 | 124.00 | 120.00 | 117.05 |
| 1/2 | .5000 | 47016 | 47116 | 47516 | 128.65 | 1/2 | 4 | 1 1/4 | 1 1/4 | 2 1/2 | 3/16 | 0.4721-0.5030 | 177.10 | 152.80 | 144.60 | 140.65 | 136.60 | 133.35 |
| 17/32 | .5312 | 47017 | 47117 | 47517 | 128.65 | 5/8 | 6 | 1 1/2 | 1 1/2 | 3 | 1/4 | 0.5031-0.5340 | 177.10 | 152.80 | 144.60 | 140.65 | 136.60 | 133.35 |
| 9/16 | .5625 | 47018 | 47118 | 47518 | 135.55 | 5/8 | 6 | 1 1/2 | 1 1/2 | 3 | 1/4 | 0.5341-0.5660 | 183.95 | 159.70 | 151.50 | 147.70 | 143.50 | 140.25 |
| 19/32 | .5938 | 47019 | 47119 | 47519 | 135.55 | 5/8 | 6 | 1 1/2 | 1 1/2 | 3 | 1/4 | 0.5661-0.5970 | 183.95 | 159.70 | 151.50 | 147.70 | 143.50 | 140.25 |
| 5/8 | .6250 | 47020 | 47120 | 47520 | 139.10 | 5/8 | 6 | 1 1/2 | 1 1/2 | 3 | 1/4 | 0.5971-0.6280 | 187.55 | 163.35 | 155.35 | 151.40 | 147.15 | 144.00 |
| 21/32 | .6562 | 47021 | 47121 | 47521 | 139.10 | 5/8 | 6 | 1 1/2 | 1 1/2 | 3 | 1/4 | 0.6281-0.6590 | 187.55 | 163.35 | 155.35 | 151.40 | 147.15 | 144.00 |
| 11/16 | .6875 | 47022 | 47122 | 47522 | 145.75 | 5/8 | 6 | 1 1/2 | 1 1/2 | 3 | 1/4 | 0.6591-0.6910 | 194.15 | 169.90 | 161.80 | 157.95 | 153.85 | 150.50 |
| 23/32 | .7188 | 47023 | 47123 | 47523 | 145.75 | 3/4 | 6 | 1 1/2 | 1 1/2 | 3 | 5/16 | 0.6911-0.7220 | 194.15 | 169.90 | 161.80 | 157.95 | 153.85 | 150.50 |
| 3/4 | .7500 | 47024 | 47124 | 47524 | 149.40 | 3/4 | 6 | 1 1/2 | 1 1/2 | 3 | 5/16 | 0.7221-0.7530 | 197.80 | 173.65 | 165.40 | 161.55 | 157.35 | 154.05 |
| 25/32 | .7812 | 47025 | 47125 | 47525 | 149.40 | 3/4 | 6 | 1 1/2 | 1 1/2 | 3 | 5/16 | 0.7531-0.7840 | 197.80 | 173.65 | 165.40 | 161.55 | 157.35 | 154.05 |
| 13/16 | .8125 | 47026 | 47126 | 47526 | 162.30 | 3/4 | 6 | 1 1/2 | 1 1/2 | 3 | 5/16 | 0.7841-0.8160 | 210.70 | 186.50 | 178.30 | 174.45 | 170.25 | 166.95 |
| 27/32 | .8438 | 47027 | 47127 | 47527 | 162.30 | 3/4 | 6 | 1 1/2 | 1 1/2 | 3 | 5/16 | 0.8161-0.8470 | 210.70 | 186.50 | 178.30 | 174.45 | 170.25 | 166.95 |
| 7/8 | .8750 | 47028 | 47128 | 47528 | 177.35 | 3/4 | 6 | 1 1/2 | 1 1/2 | 3 | 5/16 | 0.8471-0.8780 | 227.55 | 202.40 | 194.10 | 190.00 | 185.55 | 182.35 |
| 29/32 | .9062 | 47029 | 47129 | 47529 | 177.35 | 3/4 | 6 | 1 1/2 | 1 1/2 | 3 | 5/16 | 0.8781-0.9090 | 227.55 | 202.40 | 194.10 | 190.00 | 185.55 | 182.35 |
| 15/16 | .9375 | 47030 | 47130 | 47530 | 195.20 | 3/4 | 6 | 1 1/2 | 1 1/2 | 3 | 5/16 | 0.9091-0.9410 | 245.55 | 220.30 | 212.05 | 207.95 | 203.65 | 200.30 |
| 31/32 | .9688 | 47031 | 47131 | 47531 | 195.20 | 3/4 | 8 | 1 1/2 | 1 1/2 | 3 | 5/16 | 0.9411-0.9720 | 245.55 | 220.30 | 212.05 | 207.95 | 203.65 | 200.30 |
| 1 | 1.0000 | 47032 | 47132 | 47532 | 204.95 | 3/4 | 8 | 1 1/2 | 1 1/2 | 3 | 5/16 | 0.9721-1.0030 | 255.20 | 230.05 | 221.50 | 217.60 | 213.30 | 209.90 |
| 1 1/16 | 1.0625 | 47034 | 47134 | 47534 | 196.40 | 3/4 | 8 | 1 1/2 | 1 1/2 | 3 | 5/16 | 1.0031-1.0660 | 244.60 | 220.35 | 212.40 | 208.60 | 204.35 | 201.10 |
| 1 1/8 | 1.1250 | 47036 | 47136 | 47536 | 229.80 | 3/4 | 8 | 1 1/2 | 1 1/2 | 3 | 5/16 | 1.0661-1.1280 | 277.95 | 253.75 | 245.70 | 241.95 | 237.80 | 234.50 |
| 1 3/16 | 1.1875 | 47038 | 47138 | 47538 | 239.65 | 3/4 | 8 | 1 1/2 | 1 1/2 | 3 | 5/16 | 1.1281-1.1905 | 287.70 | 263.70 | 255.55 | 251.80 | 247.50 | 244.40 |
| 1 1/4 | 1.2500 | 47040 | 47140 | 47540 | 280.75 | 3/4 | 8 | 1 1/2 | 1 1/2 | 3 | 5/16 | 1.1906-1.2530 | 328.90 | 304.80 | 296.80 | 292.85 | 288.80 | 285.45 |
| 1 5/16 | 1.3125 | 47042 | 47142 | 47542 | 280.75 | 3/4 | 8 | 1 1/2 | 1 1/2 | 3 | 5/16 | 1.2531-1.3155 | 328.90 | 304.80 | 296.80 | 292.85 | 288.80 | 285.45 |
| 1 3/8 | 1.3750 | 47044 | 47144 | 47544 | 284.70 | 3/4 | 8 | 1 1/2 | 1 1/2 | 3 | 5/16 | 1.3156-1.3780 | 332.75 | 308.70 | 300.60 | 296.80 | 292.65 | 289.40 |
| 1 7/16 | 1.4375 | 47046 | 47146 | 47546 | 331.95 | 3/4 | 8 | 1 1/2 | 1 1/2 | 3 | 5/16 | 1.3781-1.4405 | 380.05 | 355.95 | 347.85 | 344.00 | 339.90 | 336.55 |
| 1 1/2 | 1.5000 | 47048 | 47148 | 47548 | 398.65 | 3/4 | 8 | 1 1/2 | 1 1/2 | 3 | 5/16 | 1.4406-1.5030 | 446.85 | 422.70 | 414.55 | 410.85 | 406.65 | 403.45 |

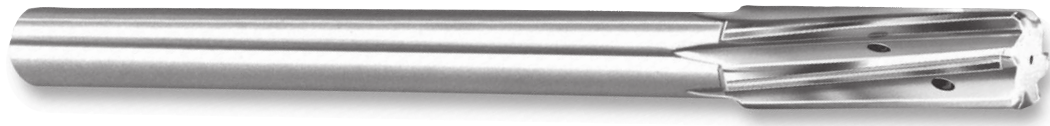
*Quantities of 15 or more - price of fractional size in same size range.

REAMERS



COOLANT FED REAMERS SUPERIOR HOLE FINISH, FEEDS & SPEEDS & TOOL LIFE

ADVANTAGES & APPLICATION RECOMMENDATIONS



SUPERIOR SURFACE FINISHES

- Tool's ability to flush chips away from the cutting edge prevents recutting of chips
- Coolant's constant presence at the cutting edge reduces heat in both the reamer and workpiece
- Extremely fine ground finish of the reamer's chamfer reduces buildup of material on the cutting edges

HIGHER FEEDS AND SPEEDS

- Maximum utilization of the coolant's lubricating properties
- Material specific geometries ensure optimum feed and speed capability

MAXIMUM TOOL LIFE

- Use of premium carbide grades based on material specific application

BLIND HOLE APPLICATIONS

- Select tool with center coolant outlet to flush chips out of the hole
- Available in straight and right spiral flutes (pgs. 74, 75, 78, 86, & 87)

THRU HOLE APPLICATIONS

- Select tool with flute coolant outlets which enable the coolant to flush the chips ahead of the tool
- Available in straight, right spiral, and left spiral flutes (pgs. 76, 77, 79, 86, & 87)

REAMING A HOLE WITH INTERRUPTIONS

- Select the proper spiral based on hole condition (blind or thru)
- Spiral flutes will help bridge the interruption (i.e., crosshole, keyway, etc.)
- Do not use straight flute reamer



STEP REAMERS CUTTING OR NON-CUTTING PILOT



LOW COST & PROMPT DELIVERY



HANNIBAL SERVICES MARKET DEMAND FOR MATERIAL SPECIFIC STEP AND PILOT REAMERS

- 9 types available in straight, right spiral, and left spiral flute designs (pgs. 82-84)
- Reduce tooling cost and costly setup time by reaming multi-diameter holes in one operation
- Eliminate problems caused by heavy stock removal – use a step reamer to remove excess material with minor diameter, while setting up the finish diameter to remove adequate stock to obtain size and best finish
- When alignment is critical, rely on a piloted reamer; the pilot is non-cutting and acts as a guide to ensure alignment of multi-diameter holes

STEP REAMER MODIFICATIONS

- Modified tool diameter
- Metric tool diameter
- Closer tool diameter tolerance
- End chamfer other than 45°
- End cutting or corner radius
- Increased/decreased circular margin
- Increased/decreased tool diameter back taper
- Shortened shank or reduced shank diameter
- Flat(s) or tang on shank
- Coatings available:

TITANIUM NITRIDE – TiN

TITANIUM CARBONITRIDE – TiCN

ZIRCONIUM NITRIDE – ZrN

AL TITANIUM NITRIDE – AlTiN

STEP REAMER SPECIFICATIONS

- Geometry and carbide grade appropriate for material being machined
- Carbide tips brazed to tough hardened alloy steel body
- Polished flutes for easy chip flow
- Reamer shanks are ground to next smallest shank diameter listed in NAS 897 if tool diameter is within .005" of shank diameter

STEP REAMER TOLERANCES

- Tool diameter tolerance:
 - Major cutting diameter: plus .0003", minus .0000"
 - Minor cutting diameter: plus .0003", minus .0000"
 - If non-cutting pilot: plus .000", minus .001"
- Shank diameter tolerance thru ²³/₃₂" tool diameter: plus .0000", minus .0010"
- over ²³/₃₂" tool diameter: plus .0000", minus .0015"
- Step or pilot length tolerance: plus .005", minus .005"



COOLANT FED REAMERS CARBIDE TIPPED TYPES 414, 424, 434 FRACTIONAL



CENTER FED FOR BLIND HOLES STRAIGHT FLUTES & SHANK

- TYPE 414 - FOR NON-FERROUS MATERIALS**
- TYPE 424 - FOR CAST IRONS**
- TYPE 434 - FOR STEELS & HIGH TEMP ALLOYS**

- Center coolant outlet
- Polished flutes; flute long carbide on .2841" tool diameter and larger
- Tool geometry and carbide grade appropriate for material being machined
- Detailed specifications on page 15

USE:

- Center coolant outlet for reaming blind holes as chips are flushed *back* towards the shank
- Improves hole finish and permits higher feeds & speeds with longer tool life

| TOOL SELECTOR | CHIP CLASS | MATERIAL MACHINED | TOOL TYPE |
|---------------|-------------------------|---------------------------|-----------|
| | 20 | NON-FERROUS - LONG CHIPS | 414 |
| | 40 | NON-FERROUS - SHORT CHIPS | 414/424 |
| | 60 | CAST IRONS | 424 |
| | 80 | LOW STRENGTH STEELS | 434/424 |
| | 100 | MEDIUM STRENGTH STEELS | 434 |
| | 120 | HIGH STRENGTH STEELS | 434 |
| 140 | HIGH TEMPERATURE ALLOYS | 434 | |

MODIFICATIONS (See list on page 78)



| TOOL DIAMETER | | TYPE 414 NON-FERROUS EDP NO. | TYPE 424 CAST IRON EDP NO. | TYPE 434 STEEL/ HI-TEMP EDP NO. | ALL TYPES PRICE | DIMENSIONS | | | | FINISHED TO MODIFIED TOOL DIAMETER | | | | | | | |
|---------------|---------|------------------------------------|----------------------------------|--|-----------------------|------------------|-------------|---------|----------|------------------------------------|-------------------------|--|----------|----------|----------|----------|----------|
| FRACTIONAL | DECIMAL | | | | | MAX. SHANK DIAM. | NO. OF FLTS | LENGTH | | | MODIFIED DIAMETER RANGE | PRICE EACH - BASED ON QUANTITY ORDERED | | | | | |
| | | | | | | | FLT | CARBIDE | OVER-ALL | | | | | | | | |
| | | | | | | | | | | 1 | 2 | 3 | 4 | 5-7 | 8-14* | | |
| 3/16 | .1875 | 41406 | 42406 | 43406 | \$154.95 | .1805 | 4 | 1 1/4 | 1/2 | 5 | 0.1770 - 0.2040 | \$203.40 | \$179.10 | \$170.95 | \$167.10 | \$162.95 | \$159.70 |
| 13/64 | .2031 | 4142031 | 4242031 | 4342031 | 154.95 | .1805 | 4 | 1 1/4 | 1/2 | 5 | - | - | - | - | - | - | - |
| 7/32 | .2188 | 41407 | 42407 | 43407 | 154.95 | .2075 | 4 | 1 1/4 | 1/2 | 5 | 0.2041 - 0.2210 | 203.40 | 179.10 | 170.95 | 167.10 | 162.95 | 159.70 |
| 15/64 | .2344 | 4142344 | 4242344 | 4342344 | 154.95 | .2265 | 4 | 1 1/2 | 1/2 | 6 | 0.2211 - 0.2380 | 203.40 | 179.10 | 170.95 | 167.10 | 162.95 | 159.70 |
| 1/4 | .2500 | 41408 | 42408 | 43408 | 154.95 | .2405 | 4 | 1 1/2 | 1/2 | 6 | 0.2381 - 0.2530 | 203.40 | 179.10 | 170.95 | 167.10 | 162.95 | 159.70 |
| 17/64 | .2656 | 4142656 | 4242656 | 4342656 | 164.40 | .2485 | 4 | 1 1/2 | 1/2 | 6 | - | - | - | - | - | - | - |
| 9/32 | .2812 | 41409 | 42409 | 43409 | 164.40 | .2485 | 4 | 1 1/2 | 1/2 | 6 | 0.2531 - 0.2840 | 212.85 | 188.60 | 180.45 | 176.55 | 172.40 | 169.25 |
| 19/64 | .2969 | 4142969 | 4242969 | 4342969 | 173.70 | .2792 | 4 | 1 1/2 | 1 1/2 | 6 | - | - | - | - | - | - | - |
| 5/16 | .3125 | 41410 | 42410 | 43410 | 173.70 | .2792 | 4 | 1 1/2 | 1 1/2 | 6 | 0.2841 - 0.3150 | 222.20 | 197.80 | 189.70 | 185.65 | 181.70 | 178.40 |
| 21/64 | .3281 | 4143281 | 4243281 | 4343281 | 175.05 | .2792 | 4 | 1 1/2 | 1 1/2 | 6 | - | - | - | - | - | - | - |
| 11/32 | .3438 | 41411 | 42411 | 43411 | 175.05 | .2792 | 4 | 1 1/2 | 1 1/2 | 6 | 0.3151 - 0.3470 | 223.45 | 199.15 | 191.15 | 187.15 | 183.10 | 179.85 |
| 23/64 | .3594 | 4143594 | 4243594 | 4343594 | 176.80 | .3105 | 4 | 1 3/4 | 1 3/4 | 7 | - | - | - | - | - | - | - |
| 3/8 | .3750 | 41412 | 42412 | 43412 | 176.80 | .3105 | 4 | 1 3/4 | 1 3/4 | 7 | 0.3471 - 0.3780 | 225.30 | 201.00 | 192.90 | 188.95 | 184.80 | 181.60 |
| 25/64 | .3906 | 4143906 | 4243906 | 4343906 | 177.40 | .3105 | 4 | 1 3/4 | 1 3/4 | 7 | - | - | - | - | - | - | - |
| 13/32 | .4062 | 41413 | 42413 | 43413 | 177.40 | .3105 | 4 | 1 3/4 | 1 3/4 | 7 | 0.3781 - 0.4090 | 225.75 | 201.65 | 193.50 | 189.55 | 185.45 | 182.05 |
| 27/64 | .4219 | 4144219 | 4244219 | 4344219 | 179.15 | .3730 | 6 | 1 3/4 | 1 3/4 | 7 | - | - | - | - | - | - | - |
| 7/16 | .4375 | 41414 | 42414 | 43414 | 179.15 | .3730 | 6 | 1 3/4 | 1 3/4 | 7 | 0.4091 - 0.4410 | 227.60 | 203.40 | 195.15 | 191.40 | 187.15 | 183.95 |
| 29/64 | .4531 | 4144531 | 4244531 | 4344531 | 180.70 | .3730 | 6 | 1 3/4 | 1 3/4 | 7 | - | - | - | - | - | - | - |
| 15/32 | .4688 | 41415 | 42415 | 43415 | 180.70 | .3730 | 6 | 1 3/4 | 1 3/4 | 7 | 0.4411 - 0.4720 | 229.20 | 204.95 | 196.75 | 192.95 | 188.70 | 185.50 |
| 31/64 | .4844 | 4144844 | 4244844 | 4344844 | 182.75 | .4355 | 6 | 2 | 2 | 8 | - | - | - | - | - | - | - |
| 1/2 | .5000 | 41416 | 42416 | 43416 | 182.75 | .4355 | 6 | 2 | 2 | 8 | 0.4721 - 0.5030 | 231.25 | 207.05 | 198.95 | 195.00 | 190.90 | 187.55 |
| 33/64 | .5156 | 4145156 | 4245156 | 4345156 | 186.90 | .4355 | 6 | 2 | 2 | 8 | - | - | - | - | - | - | - |
| 17/32 | .5312 | 41417 | 42417 | 43417 | 186.90 | .4355 | 6 | 2 | 2 | 8 | 0.5031 - 0.5340 | 235.20 | 211.05 | 202.95 | 199.05 | 194.95 | 191.55 |
| 9/16 | .5625 | 41418 | 42418 | 43418 | 189.55 | .4355 | 6 | 2 | 2 | 8 | 0.5341 - 0.5660 | 238.00 | 213.70 | 205.60 | 201.80 | 197.60 | 194.30 |
| 19/32 | .5938 | 41419 | 42419 | 43419 | 193.55 | .4355 | 6 | 2 | 2 | 8 | 0.5661 - 0.5970 | 241.95 | 217.65 | 209.65 | 205.75 | 201.65 | 198.30 |
| 5/8 | .6250 | 41420 | 42420 | 43420 | 197.20 | .5615 | 6 | 2 1/4 | 2 1/4 | 9 | 0.5971 - 0.6280 | 245.60 | 221.30 | 213.30 | 209.25 | 205.25 | 201.90 |
| 21/32 | .6562 | 41421 | 42421 | 43421 | 218.30 | .5615 | 6 | 2 1/4 | 2 1/4 | 9 | 0.6281 - 0.6590 | 266.70 | 242.45 | 234.30 | 230.55 | 226.30 | 223.05 |
| 11/16 | .6875 | 41422 | 42422 | 43422 | 222.70 | .5615 | 6 | 2 1/4 | 2 1/4 | 9 | 0.6591 - 0.6910 | 271.10 | 247.00 | 238.70 | 235.00 | 230.75 | 227.50 |
| 23/32 | .7188 | 41423 | 42423 | 43423 | 232.30 | .5615 | 6 | 2 1/2 | 2 1/2 | 9 | 0.6911 - 0.7220 | 280.70 | 256.55 | 248.45 | 244.55 | 240.40 | 237.05 |
| 3/4 | .7500 | 41424 | 42424 | 43424 | 232.30 | .6245 | 6 | 2 1/2 | 2 1/2 | 9 1/2 | 0.7221 - 0.7530 | 280.70 | 256.55 | 248.45 | 244.55 | 240.40 | 237.05 |
| 25/32 | .7812 | 41425 | 42425 | 43425 | 239.25 | .6245 | 6 | 2 1/2 | 2 1/2 | 9 1/2 | 0.7531 - 0.7840 | 287.60 | 263.30 | 255.30 | 251.45 | 247.20 | 243.90 |
| 13/16 | .8125 | 41426 | 42426 | 43426 | 239.25 | .6245 | 6 | 2 1/2 | 2 1/2 | 9 1/2 | 0.7841 - 0.8160 | 287.60 | 263.30 | 255.30 | 251.45 | 247.20 | 243.90 |
| 27/32 | .8438 | 41427 | 42427 | 43427 | 247.40 | .6245 | 6 | 2 1/2 | 2 1/2 | 9 1/2 | 0.8161 - 0.8470 | 295.75 | 271.65 | 263.35 | 259.55 | 255.45 | 252.05 |
| 7/8 | .8750 | 41428 | 42428 | 43428 | 256.80 | .7495 | 6 | 2 5/8 | 2 5/8 | 10 | 0.8471 - 0.8780 | 307.00 | 281.75 | 273.35 | 269.30 | 265.10 | 261.65 |
| 29/32 | .9062 | 41429 | 42429 | 43429 | 285.10 | .7495 | 6 | 2 5/8 | 2 5/8 | 10 | 0.8781 - 0.9090 | 335.35 | 310.15 | 301.65 | 297.80 | 293.35 | 290.05 |
| 15/16 | .9375 | 41430 | 42430 | 43430 | 285.10 | .7495 | 8 | 2 5/8 | 2 5/8 | 10 | 0.9091 - 0.9410 | 335.35 | 310.15 | 301.65 | 297.80 | 293.35 | 290.05 |
| 31/32 | .9688 | 41431 | 42431 | 43431 | 286.20 | .7495 | 8 | 2 5/8 | 2 5/8 | 10 | 0.9411 - 0.9720 | 336.45 | 311.30 | 303.00 | 298.90 | 294.45 | 291.15 |
| 1 | 1.0000 | 41432 | 42432 | 43432 | 286.20 | .8745 | 8 | 2 3/4 | 2 3/4 | 10 1/2 | 0.9721 - 1.0030 | 336.45 | 311.30 | 303.00 | 298.90 | 294.45 | 291.15 |
| 1 1/16 | 1.0625 | 41434 | 42434 | 43434 | 294.35 | .8745 | 8 | 2 3/4 | 2 3/4 | 10 1/2 | 1.0031 - 1.0660 | 344.60 | 319.40 | 311.00 | 307.00 | 302.55 | 299.25 |
| 1 1/8 | 1.1250 | 41436 | 42436 | 43436 | 304.55 | .8745 | 8 | 2 3/4 | 2 3/4 | 11 | 1.0661 - 1.1280 | 354.80 | 329.65 | 321.05 | 317.10 | 312.80 | 309.40 |
| 1 3/16 | 1.1875 | 41438 | 42438 | 43438 | 326.20 | .9995 | 8 | 2 7/8 | 2 7/8 | 11 | 1.1281 - 1.1905 | 376.45 | 351.20 | 342.75 | 338.85 | 334.60 | 331.20 |
| 1 1/4 | 1.2500 | 41440 | 42440 | 43440 | 330.40 | .9995 | 8 | 3 | 3 | 11 1/2 | 1.1906 - 1.2530 | 380.80 | 355.55 | 347.10 | 343.15 | 338.85 | 335.50 |
| 1 5/16 | 1.3125 | 41442 | 42442 | 43442 | 339.95 | .9995 | 8 | 3 | 3 | 11 1/2 | 1.2531 - 1.3155 | 390.25 | 365.00 | 356.60 | 352.50 | 348.25 | 344.90 |
| 1 3/8 | 1.3750 | 41444 | 42444 | 43444 | 353.75 | .9995 | 8 | 3 1/4 | 3 1/4 | 12 | 1.3156 - 1.3780 | 404.00 | 378.70 | 370.40 | 366.40 | 362.05 | 358.55 |
| 1 7/16 | 1.4375 | 41446 | 42446 | 43446 | 364.70 | .9995 | 8 | 3 1/4 | 3 1/4 | 12 | 1.3781 - 1.4405 | 415.10 | 389.80 | 381.50 | 377.50 | 373.10 | 369.80 |
| 1 1/2 | 1.5000 | 41448 | 42448 | 43448 | 376.95 | 1.2495 | 8 | 3 1/2 | 3 1/2 | 12 1/2 | 1.4406 - 1.5030 | 427.25 | 402.10 | 393.70 | 389.65 | 385.35 | 381.95 |

*Quantities of 15 or more - price of fractional size in same size range.

| TOOL DIAMETER | | TYPE 414 NON-FERROUS EDP NO. | TYPE 424 CAST IRON EDP NO. | TYPE 434 STEEL/ HI-TEMP EDP NO. | ALL TYPES PRICE | DIMENSIONS | | | | | FINISHED TO MODIFIED TOOL DIAMETER | | | | | | |
|---------------|--------|------------------------------|----------------------------|---------------------------------|-----------------|------------------|-------------|--------|-------|--------|------------------------------------|--|----------|----------|----------|----------|----------|
| FRAC. | DEC. | | | | | MAX. SHANK DIAM. | NO. OF FLTS | LENGTH | | | MODIFIED DIAMETER RANGE | PRICE EACH - BASED ON QUANTITY ORDERED | | | | | |
| | | FLT | CAR-BIDE | OVER-ALL | 1 | | | 2 | 3 | 4 | | 5-7 | 8-14* | | | | |
| 1 1/16 | 1.5625 | 41450 | 42450 | 43450 | \$401.35 | 1.2495 | 8 | 3 1/2 | 3 1/2 | 12 1/2 | 1.5031 - 1.5660 | \$449.30 | \$425.30 | \$417.30 | \$413.45 | \$409.25 | \$406.20 |
| 1 1/8 | 1.6250 | 41452 | 42452 | 43452 | 439.50 | 1.2495 | 8 | 3 1/2 | 3 1/2 | 13 | 1.5661 - 1.6280 | 487.20 | 463.35 | 455.35 | 451.40 | 447.30 | 444.20 |
| 1 1/4 | 1.6875 | 41454 | 42454 | 43454 | 448.70 | 1.2495 | 8 | 3 1/2 | 3 1/2 | 13 | 1.6281 - 1.6910 | 496.65 | 472.75 | 464.70 | 460.80 | 456.65 | 453.50 |
| 1 3/8 | 1.7500 | 41456 | 42456 | 43456 | 491.45 | 1.2495 | 10 | 3 1/2 | 3 1/2 | 13 1/2 | 1.6911 - 1.7530 | 539.35 | 515.35 | 507.30 | 503.55 | 499.35 | 496.20 |
| 1 1/2 | 1.8125 | 41458 | 42458 | 43458 | 511.45 | 1.4995 | 10 | 3 1/2 | 3 1/2 | 13 1/2 | 1.7531 - 1.8160 | 559.45 | 535.45 | 527.45 | 523.55 | 519.40 | 516.35 |
| 1 5/8 | 1.8750 | 41460 | 42460 | 43460 | 540.00 | 1.4995 | 10 | 3 1/2 | 3 1/2 | 14 | 1.8161 - 1.8780 | 587.90 | 563.85 | 555.95 | 552.10 | 547.95 | 544.70 |
| 1 3/4 | 1.9375 | 41462 | 42462 | 43462 | 572.50 | 1.4995 | 10 | 3 1/2 | 3 1/2 | 14 | 1.8781 - 1.9410 | 620.35 | 596.45 | 588.40 | 584.60 | 580.45 | 577.25 |
| 2 | 2.0000 | 41464 | 42464 | 43464 | 594.50 | 1.4995 | 12 | 3 1/2 | 3 1/2 | 14 | 1.9411 - 2.0030 | 642.45 | 618.55 | 610.45 | 606.65 | 602.45 | 599.30 |



COOLANT FED REAMERS

CARBIDE TIPPED TYPES 414, 424, 434 METRIC



CENTER FED FOR BLIND HOLES
STRAIGHT FLUTES & SHANK



REAMERS

NOTE: Tool diameter in millimeters (mm); all other dimensions in inches. Also, modifications available (see list on page 78).

| TOOL DIAMETER | | TYPE 414 NON-FERROUS EDP NO. | TYPE 424 CAST IRON METRIC EDP NO. | TYPE 434 STEEL/ HI-TEMP METRIC EDP NO. | ALL TYPES METRIC PRICE | DIMENSIONS | | | | FINISHED TO MODIFIED TOOL DIAMETER | | | | | | | |
|---------------|--------|------------------------------|-----------------------------------|--|------------------------|------------------|-------------|--------|--------|------------------------------------|--|----------|----------|----------|----------|----------|----------|
| mm | INCH | | | | | MAX. SHANK DIAM. | NO. OF FLTS | LENGTH | | MODIFIED DIAMETER RANGE (mm) | PRICE EACH - BASED ON QUANTITY ORDERED | | | | | | |
| | | FLT & CARB | OVER-ALL | 1 | 2 | | | 3 | 4 | | 5-7 | 8-14 | OVER 14 | | | | |
| 4.5 | .1772 | 414045 | 424045 | 434045 | \$170.95 | .1704 | 4 | *1 1/4 | 5 | 4.494-4.696 | \$207.40 | \$183.25 | \$175.10 | \$171.25 | \$167.10 | \$163.75 | \$159.05 |
| 5.0 | .1969 | 414050 | 424050 | 434050 | 170.95 | .1805 | 4 | *1 1/4 | 5 | 4.697-5.182 | 207.40 | 183.25 | 175.10 | 171.25 | 167.10 | 163.75 | 159.05 |
| 5.5 | .2165 | 414055 | 424055 | 434055 | 170.95 | .2075 | 4 | *1 1/4 | 5 | 5.183-5.613 | 207.40 | 183.25 | 175.10 | 171.25 | 167.10 | 163.75 | 159.05 |
| 6.0 | .2362 | 414060 | 424060 | 434060 | 170.95 | .2265 | 4 | *1 1/2 | 6 | 5.614-6.045 | 207.40 | 183.25 | 175.10 | 171.25 | 167.10 | 163.75 | 159.05 |
| - | - | 414063 | 424063 | 434063 | - | .2405 | 4 | *1 1/2 | 6 | 6.046-6.426 | 207.40 | 183.25 | 175.10 | 171.25 | 167.10 | 163.75 | 159.05 |
| 6.5 | .2559 | 414065 | 424065 | 434065 | 180.45 | .2485 | 4 | *1 1/2 | 6 | 6.427-7.214 | 216.85 | 192.70 | 184.60 | 180.60 | 176.55 | 173.15 | 168.65 |
| 7.0 | .2756 | 414070 | 424070 | 434070 | 180.45 | .2485 | 4 | *1 1/2 | 6 | - | - | - | - | - | - | - | - |
| 7.5 | .2953 | 414075 | 424075 | 434075 | 189.70 | .2792 | 4 | 1 1/2 | 6 | 7.215-8.001 | 226.10 | 201.90 | 193.90 | 189.95 | 185.65 | 182.55 | 177.70 |
| 8.0 | .3150 | 414080 | 424080 | 434080 | 189.70 | .2792 | 4 | 1 1/2 | 6 | - | - | - | - | - | - | - | - |
| 8.5 | .3346 | 414085 | 424085 | 434085 | 191.15 | .2792 | 4 | 1 1/2 | 6 | 8.002-8.814 | 227.50 | 203.40 | 195.15 | 191.30 | 187.15 | 183.85 | 179.15 |
| 9.0 | .3543 | 414090 | 424090 | 434090 | 192.90 | .3105 | 4 | 1 3/4 | 7 | 8.815-9.601 | 229.25 | 205.15 | 196.95 | 193.00 | 188.95 | 185.55 | 181.05 |
| 9.5 | .3740 | 414095 | 424095 | 434095 | 192.90 | .3105 | 4 | 1 3/4 | 7 | - | - | - | - | - | - | - | - |
| 10.0 | .3937 | 414100 | 424100 | 434100 | 193.50 | .3105 | 4 | 1 3/4 | 7 | 9.602-10.389 | 229.85 | 205.75 | 197.60 | 193.65 | 189.55 | 186.20 | 181.60 |
| 10.5 | .4134 | 414105 | 424105 | 434105 | 195.15 | .3730 | 6 | 1 3/4 | 7 | 10.390-11.201 | 231.60 | 207.45 | 199.40 | 195.45 | 191.40 | 188.00 | 183.30 |
| 11.0 | .4331 | 414110 | 424110 | 434110 | 195.15 | .3730 | 6 | 1 3/4 | 7 | - | - | - | - | - | - | - | - |
| 11.5 | .4528 | 414115 | 424115 | 434115 | 196.75 | .3730 | 6 | 1 3/4 | 7 | 11.202-11.989 | 233.30 | 209.05 | 201.00 | 196.95 | 192.95 | 189.55 | 185.05 |
| 12.0 | .4724 | 414120 | 424120 | 434120 | 198.95 | .4355 | 6 | 2 | 8 | 11.990-12.776 | 235.20 | 211.30 | 203.00 | 199.05 | 195.00 | 191.55 | 186.95 |
| 12.5 | .4921 | 414125 | 424125 | 434125 | 198.95 | .4355 | 6 | 2 | 8 | - | - | - | - | - | - | - | - |
| 13.0 | .5118 | 414130 | 424130 | 434130 | 202.95 | .4355 | 6 | 2 | 8 | 12.777-13.564 | 239.40 | 215.20 | 207.10 | 203.05 | 199.05 | 195.70 | 191.15 |
| 13.5 | .5315 | 414135 | 424135 | 434135 | 202.95 | .4355 | 6 | 2 | 8 | - | - | - | - | - | - | - | - |
| 14.0 | .5512 | 414140 | 424140 | 434140 | 205.60 | .4355 | 6 | 2 | 8 | 13.565-14.376 | 242.10 | 217.85 | 209.85 | 205.90 | 201.80 | 198.35 | 193.70 |
| 14.5 | .5709 | 414145 | 424145 | 434145 | 209.65 | .4355 | 6 | 2 | 8 | 14.377-15.164 | 246.00 | 221.80 | 213.70 | 209.85 | 205.75 | 202.40 | 197.65 |
| 15.5 | .6102 | 414155 | 424155 | 434155 | 213.30 | .5615 | 6 | 2 1/4 | 9 | 15.165-15.951 | 249.65 | 225.55 | 217.40 | 213.40 | 209.25 | 206.00 | 201.25 |
| 16.0 | .6299 | 414160 | 424160 | 434160 | 234.30 | .5615 | 6 | 2 1/4 | 9 | 15.952-16.739 | 270.75 | 246.60 | 238.50 | 234.55 | 230.55 | 227.10 | 222.40 |
| 17.0 | .6693 | 414170 | 424170 | 434170 | 238.70 | .5615 | 6 | 2 1/4 | 9 | 16.740-17.551 | 275.25 | 251.05 | 243.05 | 239.00 | 235.00 | 231.55 | 226.95 |
| 18.0 | .7087 | 414180 | 424180 | 434180 | 248.45 | .5615 | 6 | 2 1/4 | 9 | 17.552-18.339 | 284.80 | 260.75 | 252.50 | 248.55 | 244.55 | 241.10 | 236.50 |
| 18.5 | .7283 | 414185 | 424185 | 434185 | 248.45 | .6245 | 6 | 2 1/2 | 9 1/2 | 18.340-19.126 | 284.80 | 260.75 | 252.50 | 248.55 | 244.55 | 241.10 | 236.50 |
| 19.5 | .7677 | 414195 | 424195 | 434195 | 255.30 | .6245 | 6 | 2 1/2 | 9 1/2 | 19.127-19.914 | 291.65 | 267.55 | 259.45 | 255.45 | 251.45 | 248.00 | 243.30 |
| 20.0 | .7874 | 414200 | 424200 | 434200 | 255.30 | .6245 | 6 | 2 1/2 | 9 1/2 | 19.915-20.726 | 291.65 | 267.55 | 259.45 | 255.45 | 251.45 | 248.00 | 243.30 |
| 21.0 | .8268 | 414210 | 424210 | 434210 | 263.35 | .6245 | 6 | 2 1/2 | 9 1/2 | 20.727-21.514 | 299.90 | 275.70 | 267.65 | 263.70 | 259.55 | 256.25 | 251.60 |
| 22.0 | .8661 | 414220 | 424220 | 434220 | 263.35 | .7495 | 6 | 2 5/8 | 10 | 21.515-22.301 | 299.90 | 275.70 | 267.65 | 263.70 | 259.55 | 256.25 | 251.60 |
| 22.5 | .8858 | 414225 | 424225 | 434225 | 301.65 | .7495 | 6 | 2 5/8 | 10 | 22.302-23.089 | 339.50 | 314.45 | 306.05 | 301.90 | 297.80 | 294.30 | 289.40 |
| 23.5 | .9252 | 414235 | 424235 | 434235 | 301.65 | .7495 | 8 | 2 5/8 | 10 | 23.090-23.901 | 339.50 | 314.45 | 306.05 | 301.90 | 297.80 | 294.30 | 289.40 |
| 24.0 | .9449 | 414240 | 424240 | 434240 | 303.00 | .7495 | 8 | 2 5/8 | 10 | 23.902-24.689 | 340.70 | 315.60 | 307.20 | 303.10 | 298.90 | 295.40 | 290.50 |
| 25.0 | .9843 | 414250 | 424250 | 434250 | 303.00 | .8745 | 8 | 2 3/4 | 10 1/2 | 24.690-25.476 | 340.70 | 315.60 | 307.20 | 303.10 | 298.90 | 295.40 | 290.50 |
| 25.5 | 1.0039 | 414255 | 424255 | 434255 | 311.00 | .8745 | 8 | 2 3/4 | 10 1/2 | 25.477-27.076 | 348.75 | 323.70 | 315.35 | 311.20 | 307.00 | 303.55 | 298.65 |
| 28.0 | 1.1024 | 414280 | 424280 | 434280 | 321.05 | .8745 | 8 | 2 7/8 | 11 | 27.077-28.651 | 359.05 | 333.85 | 325.40 | 321.35 | 317.10 | 313.65 | 308.80 |
| 29.0 | 1.1417 | 414290 | 424290 | 434290 | 342.75 | .9995 | 8 | 2 7/8 | 11 | 28.652-30.239 | 380.75 | 355.55 | 347.10 | 343.00 | 338.85 | 335.35 | 330.40 |
| 31.0 | 1.2205 | 414310 | 424310 | 434310 | 347.10 | .9995 | 8 | 3 | 11 1/2 | 30.240-31.826 | 384.95 | 359.85 | 351.55 | 347.35 | 343.15 | 339.65 | 334.80 |
| 32.0 | 1.2598 | 414320 | 424320 | 434320 | 356.60 | .9995 | 8 | 3 | 11 1/2 | 31.827-33.414 | 394.40 | 369.30 | 360.95 | 356.85 | 352.50 | 349.10 | 344.25 |
| 34.0 | 1.3386 | 414340 | 424340 | 434340 | 370.40 | .9995 | 8 | 3 1/4 | 12 | 33.415-35.001 | 408.15 | 383.05 | 374.70 | 370.55 | 366.40 | 362.85 | 358.00 |
| 36.0 | 1.4173 | 414360 | 424360 | 434360 | 381.50 | .9995 | 8 | 3 1/4 | 12 | 35.002-36.589 | 419.20 | 394.10 | 385.75 | 381.65 | 377.50 | 374.00 | 369.10 |
| 37.0 | 1.4567 | 414370 | 424370 | 434370 | 393.70 | 1.2495 | 8 | 3 1/2 | 12 1/2 | 36.590-38.176 | 431.50 | 406.40 | 398.00 | 393.95 | 389.65 | 386.25 | 381.30 |

*1/2" carbide length



COOLANT FED REAMERS CARBIDE TIPPED TYPES 416, 426, 435 FRACTIONAL



FLUTE FED FOR THRU HOLES STRAIGHT FLUTES & SHANK

| TOOL SELECTOR | CHIP CLASS | MATERIAL MACHINED | TOOL TYPE |
|---------------|-------------------------|---------------------------|-----------|
| | 20 | NON-FERROUS - LONG CHIPS | 416 |
| | 40 | NON-FERROUS - SHORT CHIPS | 416/426 |
| | 60 | CAST IRONS | 426 |
| | 80 | LOW STRENGTH STEELS | 435/426 |
| | 100 | MEDIUM STRENGTH STEELS | 435 |
| | 120 | HIGH STRENGTH STEELS | 435 |
| 140 | HIGH TEMPERATURE ALLOYS | 435 | |

TYPE 416 - FOR NON-FERROUS MATERIALS

TYPE 426 - FOR CAST IRONS

TYPE 435 - FOR STEELS & HIGH TEMP ALLOYS

- Coolant outlets in *each* flute
- Polished flutes; flute long carbide on .2841" tool diameter and larger
- Tool geometry and carbide grade appropriate for material being machined
- Detailed specifications on page 15

USE:

- Flute coolant outlets for reaming thru holes as chips are flushed *forward* through the hole being reamed
- Improves hole finish and permits higher feeds & speeds with longer tool life



MODIFICATIONS (See list on page 78)

| TOOL DIAMETER | | TYPE 416 NON-FERROUS EDP NO. | TYPE 426 CAST IRON EDP NO. | TYPE 435 STEEL/ HI-TEMP EDP NO. | ALL TYPES PRICE | DIMENSIONS | | | | FINISHED TO MODIFIED TOOL DIAMETER | | | | | | | |
|---------------|---------|------------------------------------|-------------------------------------|--|-----------------------|------------------------|-------------------|--------------|-------|------------------------------------|-------------------------------|--|----------|----------|----------|----------|----------|
| FRACTIONAL | DECIMAL | | | | | MAX. SHANK DIAM. | NO. OF FLTS | LENGTH | | | MODIFIED DIAMETER RANGE | PRICE EACH - BASED ON QUANTITY ORDERED | | | | | |
| | | | | | | FLT | CAR- BIDE | OVER- ALL | | 1 | | 2 | 3 | 4 | 5-7 | 8-14* | |
| 3/16 | .1875 | 41606 | 42606 | 43506 | \$160.80 | .1805 | 4 | 1 1/4 | 1/2 | 5 | 0.1770 - 0.2040 | \$209.15 | \$185.05 | \$176.80 | \$172.95 | \$168.80 | \$165.45 |
| 13/64 | .2031 | 4162031 | 4262031 | 4352031 | 160.80 | .1805 | 4 | 1 1/4 | 1/2 | 5 | - | - | - | - | - | - | |
| 7/32 | .2188 | 41607 | 42607 | 43507 | 160.80 | .2075 | 4 | 1 1/4 | 1/2 | 5 | 0.2041 - 0.2210 | 209.15 | 185.05 | 176.80 | 172.95 | 168.80 | 165.45 |
| 15/64 | .2344 | 4162344 | 4262344 | 4352344 | 160.80 | .2265 | 4 | 1 1/2 | 1/2 | 6 | 0.2211 - 0.2380 | 209.15 | 185.05 | 176.80 | 172.95 | 168.80 | 165.45 |
| 1/4 | .2500 | 41608 | 42608 | 43508 | 160.80 | .2405 | 4 | 1 1/2 | 1/2 | 6 | 0.2381 - 0.2530 | 209.15 | 185.05 | 176.80 | 172.95 | 168.80 | 165.45 |
| 17/64 | .2656 | 4162656 | 4262656 | 4352656 | 164.40 | .2485 | 4 | 1 1/2 | 1/2 | 6 | - | - | - | - | - | - | |
| 9/32 | .2812 | 41609 | 42609 | 43509 | 164.40 | .2485 | 4 | 1 1/2 | 1/2 | 6 | 0.2531 - 0.2840 | 212.85 | 188.60 | 180.45 | 176.55 | 172.40 | 169.25 |
| 19/64 | .2969 | 4162969 | 4262969 | 4352969 | 178.40 | .2792 | 4 | 1 1/2 | 1 1/2 | 6 | - | - | - | - | - | - | |
| 5/16 | .3125 | 41610 | 42610 | 43510 | 178.40 | .2792 | 4 | 1 1/2 | 1 1/2 | 6 | 0.2841 - 0.3150 | 226.90 | 202.50 | 194.35 | 190.60 | 186.50 | 183.20 |
| 21/64 | .3281 | 4163281 | 4263281 | 4353281 | 178.40 | .2792 | 4 | 1 1/2 | 1 1/2 | 6 | - | - | - | - | - | - | |
| 11/32 | .3438 | 41611 | 42611 | 43511 | 178.40 | .2792 | 4 | 1 1/2 | 1 1/2 | 6 | 0.3151 - 0.3470 | 226.90 | 202.50 | 194.35 | 190.60 | 186.50 | 183.20 |
| 23/64 | .3594 | 4163594 | 4263594 | 4353594 | 178.40 | .3105 | 4 | 1 3/4 | 1 3/4 | 7 | - | - | - | - | - | - | |
| 3/8 | .3750 | 41612 | 42612 | 43512 | 178.40 | .3105 | 4 | 1 3/4 | 1 3/4 | 7 | 0.3471 - 0.3780 | 226.90 | 202.50 | 194.35 | 190.60 | 186.50 | 183.20 |
| 25/64 | .3906 | 4163906 | 4263906 | 4353906 | 182.75 | .3105 | 4 | 1 3/4 | 1 3/4 | 7 | - | - | - | - | - | - | |
| 13/32 | .4062 | 41613 | 42613 | 43513 | 182.75 | .3105 | 4 | 1 3/4 | 1 3/4 | 7 | 0.3781 - 0.4090 | 231.25 | 207.05 | 198.95 | 195.00 | 190.90 | 187.55 |
| 27/64 | .4219 | 4164219 | 4264219 | 4354219 | 182.75 | .3730 | 6 | 1 3/4 | 1 3/4 | 7 | - | - | - | - | - | - | |
| 7/16 | .4375 | 41614 | 42614 | 43514 | 182.75 | .3730 | 6 | 1 3/4 | 1 3/4 | 7 | 0.4091 - 0.4410 | 235.70 | 211.45 | 203.40 | 199.45 | 195.40 | 192.05 |
| 29/64 | .4531 | 4164531 | 4264531 | 4354531 | 187.25 | .3730 | 6 | 1 3/4 | 1 3/4 | 7 | - | - | - | - | - | - | |
| 15/32 | .4688 | 41615 | 42615 | 43515 | 187.25 | .3730 | 6 | 1 3/4 | 1 3/4 | 7 | 0.4411 - 0.4720 | 235.70 | 211.45 | 203.40 | 199.45 | 195.40 | 192.05 |
| 31/64 | .4844 | 4164844 | 4264844 | 4354844 | 187.25 | .4355 | 6 | 2 | 2 | 8 | - | - | - | - | - | - | |
| 1/2 | .5000 | 41616 | 42616 | 43516 | 187.25 | .4355 | 6 | 2 | 2 | 8 | 0.4721 - 0.5030 | 235.70 | 211.45 | 203.40 | 199.45 | 195.40 | 192.05 |
| 33/64 | .5156 | 4165156 | 4265156 | 4355156 | 198.10 | .4355 | 6 | 2 | 2 | 8 | - | - | - | - | - | - | |
| 17/32 | .5312 | 41617 | 42617 | 43517 | 198.10 | .4355 | 6 | 2 | 2 | 8 | 0.5031 - 0.5340 | 246.45 | 222.30 | 214.20 | 210.35 | 206.10 | 202.85 |
| 9/16 | .5625 | 41618 | 42618 | 43518 | 200.95 | .4355 | 6 | 2 | 2 | 8 | 0.5341 - 0.5660 | 249.30 | 225.15 | 216.85 | 213.05 | 208.85 | 205.60 |
| 19/32 | .5938 | 41619 | 42619 | 43519 | 202.70 | .4355 | 6 | 2 | 2 | 8 | 0.5661 - 0.5970 | 251.10 | 226.95 | 218.80 | 214.90 | 210.75 | 207.45 |
| 5/8 | .6250 | 41620 | 42620 | 43520 | 202.70 | .5615 | 6 | 2 1/4 | 2 1/4 | 9 | 0.5971 - 0.6280 | 251.10 | 226.95 | 218.80 | 214.90 | 210.75 | 207.45 |
| 21/32 | .6562 | 41621 | 42621 | 43521 | 224.70 | .5615 | 6 | 2 1/4 | 2 1/4 | 9 | 0.6281 - 0.6590 | 273.25 | 248.90 | 240.75 | 236.95 | 232.70 | 229.55 |
| 11/16 | .6875 | 41622 | 42622 | 43522 | 224.70 | .5615 | 6 | 2 1/4 | 2 1/4 | 9 | 0.6591 - 0.6910 | 273.25 | 248.90 | 240.75 | 236.95 | 232.70 | 229.55 |
| 23/32 | .7188 | 41623 | 42623 | 43523 | 240.15 | .5615 | 6 | 2 1/2 | 2 1/2 | 9 | 0.6911 - 0.7220 | 288.55 | 264.35 | 256.25 | 252.35 | 248.15 | 244.85 |
| 3/4 | .7500 | 41624 | 42624 | 43524 | 240.15 | .6245 | 6 | 2 1/2 | 2 1/2 | 9 1/2 | 0.7221 - 0.7530 | 288.55 | 264.35 | 256.25 | 252.35 | 248.15 | 244.85 |
| 25/32 | .7812 | 41625 | 42625 | 43525 | 240.15 | .6245 | 6 | 2 1/2 | 2 1/2 | 9 1/2 | 0.7531 - 0.7840 | 288.55 | 264.35 | 256.25 | 252.35 | 248.15 | 244.85 |
| 13/16 | .8125 | 41626 | 42626 | 43526 | 240.15 | .6245 | 6 | 2 1/2 | 2 1/2 | 9 1/2 | 0.7841 - 0.8160 | 288.55 | 264.35 | 256.25 | 252.35 | 248.15 | 244.85 |
| 27/32 | .8438 | 41627 | 42627 | 43527 | 247.40 | .6245 | 6 | 2 1/2 | 2 1/2 | 9 1/2 | 0.8161 - 0.8470 | 295.75 | 271.65 | 263.35 | 259.55 | 255.45 | 252.05 |
| 7/8 | .8750 | 41628 | 42628 | 43528 | 256.80 | .7495 | 6 | 2 3/8 | 2 3/8 | 10 | 0.8471 - 0.8780 | 307.00 | 281.75 | 273.35 | 269.30 | 265.10 | 261.65 |
| 29/32 | .9062 | 41629 | 42629 | 43529 | 288.25 | .7495 | 6 | 2 3/8 | 2 3/8 | 10 | 0.8781 - 0.9090 | 338.45 | 313.35 | 304.95 | 300.85 | 296.45 | 293.20 |
| 15/16 | .9375 | 41630 | 42630 | 43530 | 295.05 | .7495 | 8 | 2 3/8 | 2 3/8 | 10 | 0.9091 - 0.9410 | 345.15 | 320.05 | 311.60 | 307.60 | 303.20 | 299.90 |
| 31/32 | .9688 | 41631 | 42631 | 43531 | 295.05 | .7495 | 8 | 2 3/8 | 2 3/8 | 10 | 0.9411 - 0.9720 | 345.15 | 320.05 | 311.60 | 307.60 | 303.20 | 299.90 |
| 1 | 1.0000 | 41632 | 42632 | 43532 | 295.05 | .8745 | 8 | 2 3/4 | 2 3/4 | 10 1/2 | 0.9721 - 1.0030 | 345.15 | 320.05 | 311.60 | 307.60 | 303.20 | 299.90 |
| 1 1/16 | 1.0625 | 41634 | 42634 | 43534 | 311.90 | .8745 | 8 | 2 3/4 | 2 3/4 | 10 1/2 | 1.0031 - 1.0660 | 362.15 | 337.15 | 328.65 | 324.60 | 320.30 | 317.00 |
| 1 1/8 | 1.1250 | 41636 | 42636 | 43536 | 313.30 | .8745 | 8 | 2 3/4 | 2 3/4 | 11 | 1.0661 - 1.1280 | 363.55 | 338.30 | 329.80 | 325.85 | 321.60 | 318.15 |
| 1 1/16 | 1.1875 | 41638 | 42638 | 43538 | 326.20 | .9995 | 8 | 2 7/8 | 2 7/8 | 11 | 1.1281 - 1.1905 | 376.45 | 351.20 | 342.75 | 338.85 | 334.60 | 331.20 |
| 1 1/4 | 1.2500 | 41640 | 42640 | 43540 | 330.40 | .9995 | 8 | 3 | 3 | 11 1/2 | 1.1906 - 1.2530 | 380.80 | 355.55 | 347.10 | 343.15 | 338.85 | 335.50 |
| 1 5/16 | 1.3125 | 41642 | 42642 | 43542 | 339.95 | .9995 | 8 | 3 | 3 | 11 1/2 | 1.2531 - 1.3155 | 390.25 | 365.00 | 356.60 | 352.50 | 348.25 | 344.90 |
| 1 3/8 | 1.3750 | 41644 | 42644 | 43544 | 353.75 | .9995 | 8 | 3 1/4 | 3 1/4 | 12 | 1.3156 - 1.3780 | 404.00 | 378.70 | 370.40 | 366.40 | 362.05 | 358.55 |
| 1 7/16 | 1.4375 | 41646 | 42646 | 43546 | 364.70 | .9995 | 8 | 3 1/4 | 3 1/4 | 12 | 1.3781 - 1.4405 | 415.10 | 389.80 | 381.50 | 377.50 | 373.10 | 369.80 |
| 1 1/2 | 1.5000 | 41648 | 42648 | 43548 | 376.95 | 1.2495 | 8 | 3 1/2 | 3 1/2 | 12 1/2 | 1.4406 - 1.5030 | 427.25 | 402.10 | 393.70 | 389.65 | 385.35 | 381.95 |

*Quantities of 15 or more - price of fractional size in same size range.

| TOOL DIAMETER | | TYPE 416 NON-FERROUS EDP NO. | TYPE 426 CAST IRON EDP NO. | TYPE 435 STEEL/ HI-TEMP EDP NO. | ALL TYPES PRICE | DIMENSIONS | | | | | FINISHED TO MODIFIED TOOL DIAMETER | | | | | | |
|---------------|--------|------------------------------|----------------------------|---------------------------------|-----------------|------------------|----|-------------|--------|--------|------------------------------------|-------------------------|--|----------|----------|----------|----------|
| FRAC. | DEC. | | | | | MAX. SHANK DIAM. | | NO. OF FLTS | LENGTH | | | MODIFIED DIAMETER RANGE | PRICE EACH - BASED ON QUANTITY ORDERED | | | | |
| | | FLT | CARBIDE | OVER-ALL | 1 | 2 | 3 | | 4 | 5-7 | 8-14* | | | | | | |
| 1 1/16 | 1.5625 | 41650 | 42650 | 43550 | \$423.80 | 1.2495 | 8 | 3 1/2 | 3 1/2 | 12 1/2 | 1.5031 - 1.5660 | \$471.75 | \$447.75 | \$439.70 | \$435.95 | \$431.70 | \$428.60 |
| 1 5/8 | 1.6250 | 41652 | 42652 | 43552 | 466.00 | 1.2495 | 8 | 3 1/2 | 3 1/2 | 13 | 1.5661 - 1.6280 | 513.90 | 490.00 | 481.85 | 478.10 | 473.90 | 470.80 |
| 1 11/16 | 1.6875 | 41654 | 42654 | 43554 | 474.10 | 1.2495 | 8 | 3 1/2 | 3 1/2 | 13 | 1.6281 - 1.6910 | 522.00 | 498.05 | 490.00 | 486.20 | 481.95 | 478.90 |
| 1 3/4 | 1.7500 | 41656 | 42656 | 43556 | 518.10 | 1.2495 | 10 | 3 1/2 | 3 1/2 | 13 1/2 | 1.6911 - 1.7530 | 566.00 | 542.00 | 533.90 | 530.20 | 526.10 | 522.80 |
| 1 13/16 | 1.8125 | 41658 | 42658 | 43558 | 539.50 | 1.4995 | 10 | 3 1/2 | 3 1/2 | 13 1/2 | 1.7531 - 1.8160 | 587.35 | 563.45 | 555.35 | 551.50 | 547.40 | 544.25 |
| 1 7/8 | 1.8750 | 41660 | 42660 | 43560 | 568.00 | 1.4995 | 10 | 3 1/2 | 3 1/2 | 14 | 1.8161 - 1.8780 | 615.95 | 591.90 | 583.90 | 580.15 | 575.90 | 572.75 |
| 1 15/16 | 1.9375 | 41662 | 42662 | 43562 | 604.30 | 1.4995 | 10 | 3 1/2 | 3 1/2 | 14 | 1.8781 - 1.9410 | 652.15 | 628.25 | 620.10 | 616.30 | 612.15 | 609.05 |
| 2 | 2.0000 | 41664 | 42664 | 43564 | 626.20 | 1.4995 | 12 | 3 1/2 | 3 1/2 | 14 | 1.9411 - 2.0030 | 674.10 | 650.15 | 642.10 | 638.35 | 634.05 | 631.00 |



COOLANT FED REAMERS

CARBIDE TIPPED TYPES 416, 426, 435 METRIC



FLUTE FED FOR THRU HOLES
STRAIGHT FLUTES & SHANK



REAMERS

NOTE: Tool diameter in millimeters (mm); all other dimensions in inches. Also, modifications available (see list on page 78).

| TOOL DIAMETER | | TYPE 416 NON-FERROUS METRIC EDP NO. | TYPE 426 CAST IRON METRIC EDP NO. | TYPE 435 STEEL/ HI-TEMP METRIC EDP NO. | ALL TYPES METRIC PRICE | DIMENSIONS | | | | | FINISHED TO MODIFIED TOOL DIAMETER | | | | | | |
|---------------|--------|-------------------------------------|-----------------------------------|--|------------------------|------------------|---|-------------|--------|---------------|------------------------------------|------------------------------|--|----------|----------|----------|----------|
| mm | INCH | | | | | MAX. SHANK DIAM. | | NO. OF FLTS | LENGTH | | | MODIFIED DIAMETER RANGE (mm) | PRICE EACH - BASED ON QUANTITY ORDERED | | | | |
| | | FLT | CARB. | OVER-ALL | 1 | 2 | 3 | | 4 | 5-7 | 8-14 | | OVER 14 | | | | |
| 4.5 | .1772 | 416045 | 426045 | 435045 | \$176.80 | .1704 | 4 | *1 1/4 | 5 | 4.494-4.696 | \$213.30 | \$189.10 | \$181.05 | \$177.10 | \$172.95 | \$169.55 | \$164.90 |
| 5.0 | .1969 | 416050 | 426050 | 435050 | 176.80 | .1805 | 4 | *1 1/4 | 5 | 4.697-5.182 | 213.30 | 189.10 | 181.05 | 177.10 | 172.95 | 169.55 | 164.90 |
| 5.5 | .2165 | 416055 | 426055 | 435055 | 176.80 | .2075 | 4 | *1 1/4 | 5 | 5.183-5.613 | 213.30 | 189.10 | 181.05 | 177.10 | 172.95 | 169.55 | 164.90 |
| 6.0 | .2362 | 416060 | 426060 | 435060 | 176.80 | .2265 | 4 | *1 1/2 | 6 | 5.614-6.045 | 213.30 | 189.10 | 181.05 | 177.10 | 172.95 | 169.55 | 164.90 |
| - | - | 416063 | 426063 | 435063 | - | .2405 | 4 | *1 1/2 | 6 | 6.046-6.426 | 213.30 | 189.10 | 181.05 | 177.10 | 172.95 | 169.55 | 164.90 |
| 6.5 | .2559 | 416065 | 426065 | 435065 | 180.45 | .2485 | 4 | *1 1/2 | 6 | 6.427-7.214 | 216.85 | 192.70 | 184.60 | 180.60 | 176.55 | 173.15 | 168.65 |
| 7.0 | .2756 | 416070 | 426070 | 435070 | 180.45 | .2485 | 4 | *1 1/2 | 6 | - | - | - | - | - | - | - | - |
| 7.5 | .2953 | 416075 | 426075 | 435075 | 194.35 | .2792 | 4 | 1 1/2 | 6 | 7.215-8.001 | 230.85 | 206.70 | 198.60 | 194.70 | 190.60 | 187.15 | 182.60 |
| 8.0 | .3150 | 416080 | 426080 | 435080 | 194.35 | .2792 | 4 | 1 1/2 | 6 | - | - | - | - | - | - | - | - |
| 8.5 | .3346 | 416085 | 426085 | 435085 | 194.35 | .2792 | 4 | 1 1/2 | 6 | 8.002-8.814 | 230.85 | 206.70 | 198.60 | 194.70 | 190.60 | 187.15 | 182.60 |
| 9.0 | .3543 | 416090 | 426090 | 435090 | 194.35 | .3105 | 4 | 1 3/4 | 7 | 8.815-9.601 | 230.85 | 206.70 | 198.60 | 194.70 | 190.60 | 187.15 | 182.60 |
| 9.5 | .3740 | 416095 | 426095 | 435095 | 194.35 | .3105 | 4 | 1 3/4 | 7 | - | - | - | - | - | - | - | - |
| 10.0 | .3937 | 416100 | 426100 | 435100 | 198.95 | .3105 | 4 | 1 3/4 | 7 | 9.602-10.389 | 235.20 | 211.30 | 203.00 | 199.05 | 195.00 | 191.55 | 186.95 |
| 10.5 | .4134 | 416105 | 426105 | 435105 | 203.40 | .3730 | 6 | 1 3/4 | 7 | 10.390-11.201 | 239.70 | 215.75 | 207.45 | 203.55 | 199.45 | 196.10 | 191.45 |
| 11.0 | .4331 | 416110 | 426110 | 435110 | 203.40 | .3730 | 6 | 1 3/4 | 7 | - | - | - | - | - | - | - | - |
| 11.5 | .4528 | 416115 | 426115 | 435115 | 203.40 | .3730 | 6 | 1 3/4 | 7 | 11.202-11.989 | 239.70 | 215.75 | 207.45 | 203.55 | 199.45 | 196.10 | 191.45 |
| 12.0 | .4724 | 416120 | 426120 | 435120 | 203.40 | .4355 | 6 | 2 | 8 | 11.990-12.776 | 239.70 | 215.75 | 207.45 | 203.55 | 199.45 | 196.10 | 191.45 |
| 12.5 | .4921 | 416125 | 426125 | 435125 | 203.40 | .4355 | 6 | 2 | 8 | - | - | - | - | - | - | - | - |
| 13.0 | .5118 | 416130 | 426130 | 435130 | 214.20 | .4355 | 6 | 2 | 8 | 12.777-13.564 | 250.60 | 226.35 | 218.30 | 214.40 | 210.35 | 206.90 | 202.30 |
| 13.5 | .5315 | 416135 | 426135 | 435135 | 214.20 | .4355 | 6 | 2 | 8 | - | - | - | - | - | - | - | - |
| 14.0 | .5512 | 416140 | 426140 | 435140 | 216.85 | .4355 | 6 | 2 | 8 | 13.565-14.376 | 253.40 | 229.20 | 221.10 | 217.20 | 213.05 | 209.80 | 205.05 |
| 14.5 | .5709 | 416145 | 426145 | 435145 | 218.80 | .4355 | 6 | 2 | 8 | 14.377-15.164 | 255.30 | 231.05 | 222.90 | 218.90 | 214.90 | 211.50 | 206.90 |
| 15.5 | .6102 | 416155 | 426155 | 435155 | 218.80 | .5615 | 6 | 2 1/4 | 9 | 15.165-15.951 | 255.30 | 231.05 | 222.90 | 218.90 | 214.90 | 211.50 | 206.90 |
| 16.0 | .6299 | 416160 | 426160 | 435160 | 240.75 | .5615 | 6 | 2 1/4 | 9 | 15.952-16.739 | 277.20 | 253.05 | 244.85 | 241.00 | 236.95 | 233.55 | 228.85 |
| 17.0 | .6693 | 416170 | 426170 | 435170 | 240.75 | .5615 | 6 | 2 1/4 | 9 | 16.740-17.551 | 277.20 | 253.05 | 244.85 | 241.00 | 236.95 | 233.55 | 228.85 |
| 18.0 | .7087 | 416180 | 426180 | 435180 | 256.25 | .6245 | 6 | 2 1/2 | 9 1/2 | 17.552-18.339 | 292.65 | 268.40 | 260.35 | 256.40 | 252.35 | 249.00 | 244.45 |
| 18.5 | .7283 | 416185 | 426185 | 435185 | 256.25 | .6245 | 6 | 2 1/2 | 9 1/2 | 18.340-19.126 | 292.65 | 268.40 | 260.35 | 256.40 | 252.35 | 249.00 | 244.45 |
| 19.5 | .7677 | 416195 | 426195 | 435195 | 256.25 | .6245 | 6 | 2 1/2 | 9 1/2 | 19.127-19.914 | 292.65 | 268.40 | 260.35 | 256.40 | 252.35 | 249.00 | 244.45 |
| 20.0 | .7874 | 416200 | 426200 | 435200 | 256.25 | .6245 | 6 | 2 1/2 | 9 1/2 | 19.915-20.726 | 292.65 | 268.40 | 260.35 | 256.40 | 252.35 | 249.00 | 244.45 |
| 21.0 | .8268 | 416210 | 426210 | 435210 | 263.35 | .6245 | 6 | 2 1/2 | 9 1/2 | 20.727-21.514 | 299.90 | 275.70 | 267.65 | 263.70 | 259.55 | 256.25 | 251.60 |
| 22.0 | .8661 | 416220 | 426220 | 435220 | 263.35 | .7495 | 6 | 2 5/8 | 10 | 21.515-22.301 | 299.90 | 275.70 | 267.65 | 263.70 | 259.55 | 256.25 | 251.60 |
| 22.5 | .8858 | 416225 | 426225 | 435225 | 304.95 | .7495 | 6 | 2 5/8 | 10 | 22.302-23.089 | 342.70 | 317.60 | 309.25 | 305.10 | 300.85 | 297.35 | 292.65 |
| 23.5 | .9252 | 416235 | 426235 | 435235 | 311.60 | .7495 | 8 | 2 5/8 | 10 | 23.090-23.901 | 349.40 | 324.35 | 315.90 | 311.75 | 307.60 | 304.05 | 299.25 |
| 24.0 | .9449 | 416240 | 426240 | 435240 | 311.60 | .7495 | 8 | 2 5/8 | 10 | 23.902-24.689 | 349.40 | 324.35 | 315.90 | 311.75 | 307.60 | 304.05 | 299.25 |
| 25.0 | .9843 | 416250 | 426250 | 435250 | 311.60 | .8745 | 8 | 2 3/4 | 10 1/2 | 24.690-25.476 | 349.40 | 324.35 | 315.90 | 311.75 | 307.60 | 304.05 | 299.25 |
| 25.5 | 1.0039 | 416255 | 426255 | 435255 | 328.65 | .8745 | 8 | 2 3/4 | 10 1/2 | 25.477-27.076 | 366.45 | 341.40 | 333.05 | 328.75 | 324.60 | 321.05 | 316.30 |
| 28.0 | 1.1024 | 416280 | 426280 | 435280 | 329.85 | .8745 | 8 | 2 7/8 | 11 | 27.077-28.651 | 367.75 | 342.65 | 334.20 | 330.15 | 325.85 | 322.40 | 317.55 |
| 29.0 | 1.1417 | 416290 | 426290 | 435290 | 342.75 | .9995 | 8 | 2 7/8 | 11 | 28.652-30.239 | 380.75 | 355.55 | 347.10 | 343.00 | 338.85 | 335.35 | 330.40 |
| 31.0 | 1.2205 | 416310 | 426310 | 435310 | 347.10 | .9995 | 8 | 3 | 11 1/2 | 30.240-31.826 | 384.95 | 359.85 | 351.55 | 347.35 | 343.15 | 339.65 | 334.80 |
| 32.0 | 1.2598 | 416320 | 426320 | 435320 | 356.60 | .9995 | 8 | 3 | 11 1/2 | 31.827-33.414 | 394.40 | 369.30 | 360.95 | 356.85 | 352.50 | 349.10 | 344.25 |
| 34.0 | 1.3386 | 416340 | 426340 | 435340 | 370.40 | .9995 | 8 | 3 1/4 | 12 | 33.415-35.001 | 408.15 | 383.05 | 374.70 | 370.55 | 366.40 | 362.85 | 358.00 |
| 36.0 | 1.4173 | 416360 | 426360 | 435360 | 381.50 | .9995 | 8 | 3 1/4 | 12 | 35.002-36.589 | 419.20 | 394.10 | 385.75 | 381.65 | 377.50 | 374.00 | 369.10 |
| 37.0 | 1.4567 | 416370 | 426370 | 435370 | 393.70 | 1.2495 | 8 | 3 1/2 | 12 1/2 | 36.590-38.176 | 431.50 | 406.40 | 398.00 | 393.95 | 389.65 | 386.25 | 381.30 |

*1/2" carbide length



COOLANT FED REAMERS CARBIDE TIPPED TYPES 411 413, 415 FRACTIONAL



**CENTER FED FOR BLIND HOLES
RIGHT SPIRAL FLUTES
STRAIGHT SHANK**



| TOOL SELECTOR | CHIP CLASS | MATERIAL MACHINED | TOOL TYPE |
|---------------|------------|---------------------------|-----------|
| | 20 | NON-FERROUS - LONG CHIPS | 411 |
| | 40 | NON-FERROUS - SHORT CHIPS | 411/413 |
| | 60 | CAST IRONS | 413 |
| | 80 | LOW STRENGTH STEELS | 415/413 |
| | 100 | MEDIUM STRENGTH STEELS | 415 |
| | 120 | HIGH STRENGTH STEELS | 415 |
| | 140 | HIGH TEMPERATURE ALLOYS | 415 |

MODIFICATIONS (Prompt delivery)

- Modified tool diameter - priced below
- Metric tool diameter
- Closer tool diameter tolerance - pg. 15
- Cutting diameter reduced for step or pilot
- End chamfer other than 45°
- End cutting or corner radius
- Increased/decreased circular margin
- Increased/decreased tool diameter back taper
- Shortened shank or reduced shank diameter
- Flat(s) or tang on shank
- Coatings available:

TITANIUM NITRIDE - TiN

TITANIUM CARBONITRIDE - TiCN

ZIRCONIUM NITRIDE - ZrN

AL TITANIUM NITRIDE - AlTiN

**TYPE 411 - FOR NON-FERROUS MATERIALS
TYPE 413 - FOR CAST IRONS
TYPE 415 - FOR STEELS & HIGH TEMP ALLOYS**

- Center coolant outlet
- Polished flutes; flute long carbide on .2841" tool diameter and larger
- Tool geometry and carbide grade appropriate for material being machined
- Detailed specifications on page 15

USE:

- Center coolant outlet for reaming blind holes as chips are flushed *back* towards the shank
- Improves hole finish and permits higher feeds & speeds with longer tool life

| TOOL DIAMETER | | TYPE 411 NON-FERROUS EDP NO. | TYPE 413 CAST IRON EDP NO. | TYPE 415 STEEL/ HI-TEMP EDP NO. | ALL TYPES PRICE | DIMENSIONS | | | | | FINISHED TO MODIFIED TOOL DIAMETER | | | | | | |
|---------------|--------|------------------------------------|----------------------------------|--|-----------------------|------------------|-------------|--------|----------|----------|------------------------------------|--|----------|----------|----------|----------|----------|
| FRAC. | DEC. | | | | | MAX. SHANK DIAM. | NO. OF FLTS | LENGTH | | | MODIFIED DIAMETER RANGE | PRICE EACH - BASED ON QUANTITY ORDERED | | | | | |
| | | | | | | | | FLT | CAR-BIDE | OVER-ALL | | 1 | 2 | 3 | 4 | 5-7 | 8-14* |
| 1/4 | .2500 | 41108 | 41308 | 41508 | \$159.15 | .2405 | 4 | 1 1/2 | 1/2 | 6 | 0.2381-0.2530 | \$204.25 | \$181.70 | \$174.10 | \$170.50 | \$166.55 | \$163.50 |
| 9/32 | .2812 | 41109 | 41309 | 41509 | 162.75 | .2485 | 4 | 1 1/2 | 1/2 | 6 | 0.2531-0.2840 | 206.35 | 184.55 | 177.25 | 173.80 | 170.10 | 167.00 |
| 5/16 | .3125 | 41110 | 41310 | 41510 | 178.40 | .2792 | 4 | 1 1/2 | 1 1/2 | 6 | 0.2841-0.3150 | 223.55 | 200.95 | 193.30 | 189.70 | 185.65 | 182.70 |
| 11/32 | .3438 | 41111 | 41311 | 41511 | 179.70 | .2792 | 4 | 1 1/2 | 1 1/2 | 6 | 0.3151-0.3470 | 224.85 | 202.30 | 194.80 | 191.15 | 187.15 | 184.10 |
| 3/8 | .3750 | 41112 | 41312 | 41512 | 181.60 | .3105 | 4 | 1 3/4 | 1 3/4 | 7 | 0.3471-0.3780 | 226.75 | 204.00 | 196.50 | 192.95 | 189.10 | 186.10 |
| 13/32 | .4062 | 41113 | 41313 | 41513 | 182.05 | .3105 | 4 | 1 3/4 | 1 3/4 | 7 | 0.3781-0.4090 | 227.20 | 204.70 | 197.15 | 193.50 | 189.55 | 186.55 |
| 7/16 | .4375 | 41114 | 41314 | 41514 | 183.95 | .3730 | 6 | 1 3/4 | 1 3/4 | 7 | 0.4091-0.4410 | 229.20 | 206.45 | 198.95 | 195.40 | 191.45 | 188.50 |
| 15/32 | .4688 | 41115 | 41315 | 41515 | 185.55 | .3730 | 6 | 1 3/4 | 1 3/4 | 7 | 0.4411-0.4720 | 230.85 | 208.10 | 200.60 | 196.95 | 193.05 | 190.05 |
| 1/2 | .5000 | 41116 | 41316 | 41516 | 192.85 | .4355 | 6 | 2 | 2 | 8 | 0.4721-0.5030 | 239.25 | 215.95 | 208.10 | 204.45 | 200.45 | 197.45 |
| 17/32 | .5312 | 41117 | 41317 | 41517 | 199.80 | .4355 | 6 | 2 | 2 | 8 | 0.5031-0.5340 | 246.15 | 222.90 | 215.10 | 211.45 | 207.45 | 204.35 |
| 9/16 | .5625 | 41118 | 41318 | 41518 | 199.80 | .4355 | 6 | 2 | 2 | 8 | 0.5341-0.5660 | 246.15 | 222.90 | 215.10 | 211.45 | 207.45 | 204.35 |
| 19/32 | .5938 | 41119 | 41319 | 41519 | 207.70 | .4355 | 6 | 2 | 2 | 8 | 0.5661-0.5970 | 254.20 | 230.90 | 223.10 | 219.50 | 215.40 | 212.30 |
| 5/8 | .6250 | 41120 | 41320 | 41520 | 207.70 | .5615 | 6 | 2 1/4 | 2 1/4 | 9 | 0.5971-0.6280 | 254.20 | 230.90 | 223.10 | 219.50 | 215.40 | 212.30 |
| 21/32 | .6562 | 41121 | 41321 | 41521 | 234.75 | .5615 | 6 | 2 1/4 | 2 1/4 | 9 | 0.6281-0.6590 | 281.10 | 257.95 | 250.05 | 246.30 | 242.40 | 239.30 |
| 11/16 | .6875 | 41122 | 41322 | 41522 | 234.75 | .5615 | 6 | 2 1/4 | 2 1/4 | 9 | 0.6591-0.6910 | 281.10 | 257.95 | 250.05 | 246.30 | 242.40 | 239.30 |
| 23/32 | .7188 | 41123 | 41323 | 41523 | 244.85 | .5615 | 6 | 2 1/4 | 2 1/4 | 9 | 0.6911-0.7220 | 291.40 | 268.10 | 260.35 | 256.70 | 252.60 | 249.40 |
| 3/4 | .7500 | 41124 | 41324 | 41524 | 230.05 | .6245 | 6 | 2 1/2 | 2 1/2 | 9 1/2 | 0.7221-0.7530 | 273.70 | 251.80 | 244.55 | 241.00 | 237.25 | 234.30 |
| 25/32 | .7812 | 41125 | 41325 | 41525 | 263.95 | .6245 | 6 | 2 1/2 | 2 1/2 | 9 1/2 | 0.7531-0.7840 | 310.30 | 287.00 | 279.35 | 275.55 | 271.65 | 268.40 |
| 13/16 | .8125 | 41126 | 41326 | 41526 | 267.15 | .6245 | 6 | 2 1/2 | 2 1/2 | 9 1/2 | 0.7841-0.8160 | 313.55 | 290.30 | 282.55 | 278.85 | 274.95 | 271.85 |
| 27/32 | .8438 | 41127 | 41327 | 41527 | 272.10 | .6245 | 6 | 2 1/2 | 2 1/2 | 9 1/2 | 0.8161-0.8470 | 318.70 | 295.40 | 287.60 | 283.80 | 279.95 | 276.75 |
| 7/8 | .8750 | 41128 | 41328 | 41528 | 286.85 | .7495 | 6 | 2 3/8 | 2 3/8 | 10 | 0.8471-0.8780 | 334.90 | 311.00 | 302.80 | 299.05 | 294.85 | 291.65 |
| 29/32 | .9062 | 41129 | 41329 | 41529 | 303.90 | .7495 | 6 | 2 3/8 | 2 3/8 | 10 | 0.8781-0.9090 | 352.05 | 327.95 | 319.90 | 316.15 | 311.85 | 308.70 |
| 15/16 | .9375 | 41130 | 41330 | 41530 | 318.50 | .7495 | 8 | 2 3/8 | 2 3/8 | 10 | 0.9091-0.9410 | 366.70 | 342.50 | 334.60 | 330.60 | 326.40 | 323.20 |
| 31/32 | .9688 | 41131 | 41331 | 41531 | 319.40 | .7495 | 8 | 2 3/8 | 2 3/8 | 10 | 0.9411-0.9720 | 367.45 | 343.45 | 335.35 | 331.40 | 327.30 | 324.15 |
| 1 | 1.0000 | 41132 | 41332 | 41532 | 319.90 | .8745 | 8 | 2 3/4 | 2 3/4 | 10 1/2 | 0.9721-1.0030 | 368.05 | 343.90 | 335.85 | 332.00 | 327.90 | 324.60 |
| 1 1/16 | 1.0625 | 41134 | 41334 | 41534 | 328.75 | .8745 | 8 | 2 3/4 | 2 3/4 | 10 1/2 | 1.0031-1.0660 | 376.90 | 352.95 | 344.75 | 340.85 | 336.75 | 333.55 |
| 1 1/8 | 1.1250 | 41136 | 41336 | 41536 | 340.15 | .8745 | 8 | 2 7/8 | 2 7/8 | 11 | 1.0661-1.1280 | 388.45 | 364.25 | 356.25 | 352.35 | 348.25 | 345.05 |
| 1 1/16 | 1.1875 | 41138 | 41338 | 41538 | 364.45 | .9995 | 8 | 2 7/8 | 2 7/8 | 11 | 1.1281-1.1905 | 412.60 | 388.60 | 380.40 | 376.70 | 372.35 | 369.10 |
| 1 1/4 | 1.2500 | 41140 | 41340 | 41540 | 369.10 | .9995 | 8 | 3 | 3 | 11 1/2 | 1.1906-1.2530 | 417.30 | 393.20 | 385.15 | 381.30 | 377.15 | 374.00 |
| 1 5/16 | 1.3125 | 41142 | 41342 | 41542 | 379.85 | .9995 | 8 | 3 | 3 | 11 1/2 | 1.2531-1.3155 | 428.00 | 403.85 | 395.75 | 391.90 | 387.85 | 384.50 |
| 1 3/8 | 1.3750 | 41144 | 41344 | 41544 | 395.30 | .9995 | 8 | 3 1/4 | 3 1/4 | 12 | 1.3156-1.3780 | 443.50 | 419.30 | 411.15 | 407.45 | 403.25 | 400.00 |
| 1 7/16 | 1.4375 | 41146 | 41346 | 41546 | 407.55 | .9995 | 8 | 3 1/4 | 3 1/4 | 12 | 1.3781-1.4405 | 455.75 | 431.60 | 423.55 | 419.70 | 415.50 | 412.40 |
| 1 1/2 | 1.5000 | 41148 | 41348 | 41548 | 421.35 | 1.2495 | 8 | 3 1/2 | 3 1/2 | 12 1/2 | 1.4406-1.5030 | 469.50 | 445.50 | 437.35 | 433.40 | 429.35 | 426.15 |

*Quantities of 15 or more - price of fractional size in same size range.

REAMERS



COOLANT FED REAMERS CARBIDE TIPPED TYPES 417, 418, 419 FRACTIONAL



**FLUTE FED FOR THRU HOLES
RIGHT SPIRAL FLUTES
STRAIGHT SHANK**



| TOOL SELECTOR | CHIP CLASS | MATERIAL MACHINED | TOOL TYPE |
|---------------|------------|---------------------------|-----------|
| | 20 | NON-FERROUS - LONG CHIPS | 417 |
| | 40 | NON-FERROUS - SHORT CHIPS | 417/418 |
| | 60 | CAST IRONS | 418 |
| | 80 | LOW STRENGTH STEELS | 419/418 |
| | 100 | MEDIUM STRENGTH STEELS | 419 |
| | 120 | HIGH STRENGTH STEELS | 419 |
| | 140 | HIGH TEMPERATURE ALLOYS | 419 |

**TYPE 417 - FOR NON-FERROUS MATERIALS
TYPE 418 - FOR CAST IRONS
TYPE 419 - FOR STEELS & HIGH TEMP ALLOYS**

- Coolant outlets in *each* flute
- Polished flutes; flute long carbide on .2841" tool diameter and larger
- Tool geometry and carbide grade appropriate for material being machined
- Detailed specifications on page 15

USE:

- Flute coolant outlets for reaming thru holes as chips are flushed *forward* through the hole being reamed
- Improves hole finish and permits higher feeds & speeds with longer tool life

MODIFICATIONS (Prompt delivery)

- Modified tool diameter - priced below
- Metric tool diameter
- Closer tool diameter tolerance - pg. 15
- Cutting diameter reduced for step or pilot
- End chamfer other than 45°
- End cutting or corner radius
- Increased/decreased circular margin
- Increased/decreased tool diameter back taper
- Shortened shank or reduced shank diameter
- Flat(s) or tang on shank
- Coatings available:

TITANIUM NITRIDE - TiN

TITANIUM CARBONITRIDE - TiCN

ZIRCONIUM NITRIDE - ZrN

AL TITANIUM NITRIDE - AlTiN

| TOOL DIAMETER | | TYPE 417 NON-FERROUS EDP NO. | TYPE 418 CAST IRON EDP NO. | TYPE 419 STEEL/ HI-TEMP EDP NO. | ALL TYPES PRICE | DIMENSIONS | | | | | FINISHED TO MODIFIED TOOL DIAMETER | | | | | | |
|---------------|--------|------------------------------------|----------------------------------|--|-----------------------|------------------------|-------------------|--------|--------------|--------------|------------------------------------|--|----------|----------|----------|----------|----------|
| FRAC. | DEC. | | | | | MAX. SHANK DIAM. | NO. OF FLTS | LENGTH | | | MODIFIED DIAMETER RANGE | PRICE EACH - BASED ON QUANTITY ORDERED | | | | | |
| | | | | | | | | FLT | CAR- BIDE | OVER- ALL | | 1 | 2 | 3 | 4 | 5-7 | 8-14* |
| 1/4 | .2500 | 41708 | 41808 | 41908 | \$170.50 | .2405 | 4 | 1 1/2 | 1/2 | 6 | 0.2381-0.2530 | \$218.85 | \$194.70 | \$186.55 | \$182.65 | \$178.60 | \$175.20 |
| 9/32 | .2812 | 41709 | 41809 | 41909 | 180.85 | .2485 | 4 | 1 1/2 | 1/2 | 6 | 0.2531-0.2840 | 229.25 | 205.05 | 196.85 | 193.00 | 188.90 | 185.55 |
| 5/16 | .3125 | 41710 | 41810 | 41910 | 191.15 | .2792 | 4 | 1 1/2 | 1 1/2 | 6 | 0.2841-0.3150 | 239.50 | 215.20 | 207.10 | 203.35 | 199.05 | 195.85 |
| 11/32 | .3438 | 41711 | 41811 | 41911 | 192.60 | .2792 | 4 | 1 1/2 | 1 1/2 | 6 | 0.3151-0.3470 | 241.00 | 216.70 | 208.60 | 204.75 | 200.50 | 197.45 |
| 3/8 | .3750 | 41712 | 41812 | 41912 | 194.40 | .3105 | 4 | 1 3/4 | 1 3/4 | 7 | 0.3471-0.3780 | 243.05 | 218.65 | 210.50 | 206.70 | 202.50 | 199.30 |
| 13/32 | .4062 | 41713 | 41813 | 41913 | 195.05 | .3105 | 4 | 1 3/4 | 1 3/4 | 7 | 0.3781-0.4090 | 243.45 | 219.25 | 211.30 | 207.30 | 203.05 | 199.85 |
| 7/16 | .4375 | 41714 | 41814 | 41914 | 197.15 | .3730 | 6 | 1 3/4 | 1 3/4 | 7 | 0.4091-0.4410 | 245.55 | 221.25 | 213.20 | 209.20 | 205.15 | 201.85 |
| 15/32 | .4688 | 41715 | 41815 | 41915 | 198.95 | .3730 | 6 | 1 3/4 | 1 3/4 | 7 | 0.4411-0.4720 | 247.35 | 223.05 | 214.90 | 211.05 | 206.90 | 203.65 |
| 1/2 | .5000 | 41716 | 41816 | 41916 | 201.10 | .4355 | 6 | 2 | 2 | 8 | 0.4721-0.5030 | 249.50 | 225.35 | 217.30 | 213.35 | 209.15 | 205.95 |
| 17/32 | .5312 | 41717 | 41817 | 41917 | 208.55 | .4355 | 6 | 2 | 2 | 8 | 0.5031-0.5340 | 256.95 | 232.60 | 224.55 | 220.80 | 216.50 | 213.30 |
| 9/16 | .5625 | 41718 | 41818 | 41918 | 208.55 | .4355 | 6 | 2 | 2 | 8 | 0.5341-0.5660 | 256.95 | 232.60 | 224.55 | 220.80 | 216.50 | 213.30 |
| 19/32 | .5938 | 41719 | 41819 | 41919 | 216.75 | .4355 | 6 | 2 | 2 | 8 | 0.5661-0.5970 | 265.20 | 241.00 | 232.80 | 229.00 | 224.75 | 221.50 |
| 5/8 | .6250 | 41720 | 41820 | 41920 | 216.75 | .5615 | 6 | 2 1/4 | 2 1/4 | 9 | 0.5971-0.6280 | 265.20 | 241.00 | 232.80 | 229.00 | 224.75 | 221.50 |
| 21/32 | .6562 | 41721 | 41821 | 41921 | 244.85 | .5615 | 6 | 2 1/4 | 2 1/4 | 9 | 0.6281-0.6590 | 293.30 | 269.15 | 261.00 | 257.05 | 252.90 | 249.65 |
| 11/16 | .6875 | 41722 | 41822 | 41922 | 244.85 | .5615 | 6 | 2 1/4 | 2 1/4 | 9 | 0.6591-0.6910 | 293.30 | 269.15 | 261.00 | 257.05 | 252.90 | 249.65 |
| 23/32 | .7188 | 41723 | 41823 | 41923 | 255.55 | .5615 | 6 | 2 1/4 | 2 1/4 | 9 | 0.6911-0.7220 | 303.95 | 279.65 | 271.80 | 267.80 | 263.70 | 260.35 |
| 3/4 | .7500 | 41724 | 41824 | 41924 | 255.55 | .6245 | 6 | 2 1/2 | 2 1/2 | 9 1/2 | 0.7221-0.7530 | 303.95 | 279.65 | 271.80 | 267.80 | 263.70 | 260.35 |
| 25/32 | .7812 | 41725 | 41825 | 41925 | 275.40 | .6245 | 6 | 2 1/2 | 2 1/2 | 9 1/2 | 0.7531-0.7840 | 323.75 | 299.50 | 291.45 | 287.60 | 283.40 | 280.20 |
| 13/16 | .8125 | 41726 | 41826 | 41926 | 278.80 | .6245 | 6 | 2 1/2 | 2 1/2 | 9 1/2 | 0.7841-0.8160 | 327.20 | 303.00 | 294.85 | 291.05 | 286.80 | 283.50 |
| 27/32 | .8438 | 41727 | 41827 | 41927 | 284.05 | .6245 | 6 | 2 1/2 | 2 1/2 | 9 1/2 | 0.8161-0.8470 | 332.50 | 308.20 | 300.05 | 296.20 | 292.00 | 288.80 |
| 7/8 | .8750 | 41728 | 41828 | 41928 | 299.30 | .7495 | 6 | 2 5/8 | 2 5/8 | 10 | 0.8471-0.8780 | 349.65 | 324.45 | 316.05 | 311.90 | 307.65 | 304.20 |
| 29/32 | .9062 | 41729 | 41829 | 41929 | 317.10 | .7495 | 6 | 2 5/8 | 2 5/8 | 10 | 0.8781-0.9090 | 367.30 | 342.25 | 333.80 | 329.75 | 325.40 | 322.10 |
| 15/16 | .9375 | 41730 | 41830 | 41930 | 332.40 | .7495 | 8 | 2 5/8 | 2 5/8 | 10 | 0.9091-0.9410 | 382.65 | 357.40 | 348.90 | 345.05 | 340.70 | 337.30 |
| 31/32 | .9688 | 41731 | 41831 | 41931 | 333.25 | .7495 | 8 | 2 5/8 | 2 5/8 | 10 | 0.9411-0.9720 | 383.50 | 358.40 | 349.85 | 345.85 | 341.55 | 338.20 |
| 1 | 1.0000 | 41732 | 41832 | 41932 | 333.80 | .8745 | 8 | 2 3/4 | 2 3/4 | 10 1/2 | 0.9721-1.0030 | 384.15 | 359.00 | 350.40 | 346.40 | 342.15 | 338.75 |
| 1 1/16 | 1.0625 | 41734 | 41834 | 41934 | 384.95 | .8745 | 8 | 2 3/4 | 2 3/4 | 10 1/2 | 1.0031-1.0660 | 435.15 | 410.00 | 401.55 | 397.55 | 393.25 | 389.80 |
| 1 1/8 | 1.1250 | 41736 | 41836 | 41936 | 386.60 | .8745 | 8 | 2 7/8 | 2 7/8 | 11 | 1.0661-1.1280 | 436.85 | 411.60 | 403.25 | 399.20 | 394.95 | 391.50 |
| 1 3/16 | 1.1875 | 41738 | 41838 | 41938 | 402.65 | .9995 | 8 | 2 7/8 | 2 7/8 | 11 | 1.1281-1.1905 | 452.65 | 427.50 | 419.15 | 415.15 | 410.90 | 407.45 |
| 1 1/4 | 1.2500 | 41740 | 41840 | 41940 | 407.85 | .9995 | 8 | 3 | 3 | 11 1/2 | 1.1906-1.2530 | 458.10 | 432.90 | 424.55 | 420.50 | 416.15 | 412.75 |
| 1 5/16 | 1.3125 | 41742 | 41842 | 41942 | 419.65 | .9995 | 8 | 3 | 3 | 11 1/2 | 1.2531-1.3155 | 469.85 | 444.70 | 436.15 | 432.20 | 427.95 | 424.55 |
| 1 3/8 | 1.3750 | 41744 | 41844 | 41944 | 436.40 | .9995 | 8 | 3 1/4 | 3 1/4 | 12 | 1.3156-1.3780 | 486.85 | 461.65 | 453.10 | 449.20 | 444.90 | 441.45 |
| 1 7/16 | 1.4375 | 41746 | 41846 | 41946 | 450.10 | .9995 | 8 | 3 1/4 | 3 1/4 | 12 | 1.3781-1.4405 | 500.45 | 475.25 | 466.85 | 462.85 | 458.60 | 455.15 |
| 1 1/2 | 1.5000 | 41748 | 41848 | 41948 | 465.30 | 1.2495 | 8 | 3 1/2 | 3 1/2 | 12 1/2 | 1.4406-1.5030 | 515.45 | 490.45 | 481.90 | 477.90 | 473.60 | 470.20 |

*Quantities of 15 or more - price of fractional size in same size range.



COOLANT FED REAMERS CARBIDE TIPPED TYPES 427, 428, 429 FRACTIONAL



**FLUTE FED FOR THRU HOLES
LEFT SPIRAL FLUTES
STRAIGHT SHANK**



| TOOL SELECTOR | CHIP CLASS | MATERIAL MACHINED | TOOL TYPE |
|---------------|-------------------------|---------------------------|-----------|
| | 20 | NON-FERROUS - LONG CHIPS | 427 |
| | 40 | NON-FERROUS - SHORT CHIPS | 427/428 |
| | 60 | CAST IRONS | 428 |
| | 80 | LOW STRENGTH STEELS | 429/428 |
| | 100 | MEDIUM STRENGTH STEELS | 429 |
| | 120 | HIGH STRENGTH STEELS | 429 |
| 140 | HIGH TEMPERATURE ALLOYS | 429 | |

MODIFICATIONS (Prompt delivery)

- Modified tool diameter - priced below
- Metric tool diameter
- Closer tool diameter tolerance - pg. 15
- Cutting diameter reduced for step or pilot
- End chamfer other than 45°
- End cutting or corner radius
- Increased/decreased circular margin
- Increased/decreased tool diameter back taper
- Shortened shank or reduced shank diameter
- Flat(s) or tang on shank
- Coatings available:

TITANIUM NITRIDE - TiN

TITANIUM CARBONITRIDE - TiCN

ZIRCONIUM NITRIDE - ZrN

AL TITANIUM NITRIDE - AlTiN

TYPE 427 - FOR NON-FERROUS MATERIALS

TYPE 428 - FOR CAST IRONS

TYPE 429 - FOR STEELS & HIGH TEMP ALLOYS

- Coolant outlets in *each* flute
- Polished flutes; flute long carbide on .2841" tool diameter and larger
- Left spiral flutes should not be used on blind holes
- Tool geometry and carbide grade appropriate for material being machined
- Detailed specifications on page 15

USE:

- Flute coolant outlets for reaming thru holes as chips are flushed *forward* through the hole being reamed
- Improves hole finish and permits higher feeds & speeds with longer tool life

| TOOL DIAMETER | | TYPE 427 NON-FERROUS EDP NO. | TYPE 428 CAST IRON EDP NO. | TYPE 429 STEEL/ HI-TEMP EDP NO. | ALL TYPES PRICE | DIMENSIONS | | | | | FINISHED TO MODIFIED TOOL DIAMETER | | | | | | |
|---------------|---------|------------------------------------|----------------------------------|--|-----------------------|------------------|-------------|------------|---------|----------|------------------------------------|--|----------|----------|----------|----------|----------|
| FRACTIONAL | DECIMAL | | | | | MAX. SHANK DIAM. | NO. OF FLTS | LENGTH FLT | CARBIDE | OVER-ALL | MODIFIED DIAMETER RANGE | PRICE EACH - BASED ON QUANTITY ORDERED | | | | | |
| | | | | | | 1 | 2 | 3 | 4 | 5-7 | 8-14* | | | | | | |
| 1/4 | .2500 | 42708 | 42808 | 42908 | \$197.15 | .2405 | 4 | 1 1/2 | 1/2 | 6 | 0.2381 - 0.2530 | \$245.55 | \$221.25 | \$213.20 | \$209.20 | \$205.15 | \$201.85 |
| 9/32 | .2812 | 42709 | 42809 | 42909 | 209.05 | .2485 | 4 | 1 1/2 | 1/2 | 6 | 0.2531 - 0.2840 | 257.40 | 233.30 | 225.20 | 221.25 | 217.20 | 213.85 |
| 5/16 | .3125 | 42710 | 42810 | 42910 | 220.90 | .2792 | 4 | 1 1/2 | 1 1/2 | 6 | 0.2841 - 0.3150 | 269.25 | 244.90 | 236.95 | 233.05 | 228.85 | 225.60 |
| 11/32 | .3438 | 42711 | 42811 | 42911 | 222.60 | .2792 | 4 | 1 1/2 | 1 1/2 | 6 | 0.3151 - 0.3470 | 270.85 | 246.65 | 238.60 | 234.75 | 230.60 | 227.20 |
| 3/8 | .3750 | 42712 | 42812 | 42912 | 224.75 | .3105 | 4 | 1 3/4 | 1 3/4 | 7 | 0.3471 - 0.3780 | 273.30 | 249.00 | 240.90 | 237.00 | 232.80 | 229.70 |
| 13/32 | .4062 | 42713 | 42813 | 42913 | 225.70 | .3105 | 4 | 1 3/4 | 1 3/4 | 7 | 0.3781 - 0.4090 | 274.15 | 249.95 | 241.80 | 237.95 | 233.65 | 230.55 |
| 7/16 | .4375 | 42714 | 42814 | 42914 | 227.80 | .3730 | 6 | 1 3/4 | 1 3/4 | 7 | 0.4091 - 0.4410 | 276.30 | 252.00 | 243.90 | 240.10 | 235.95 | 232.60 |
| 15/32 | .4688 | 42715 | 42815 | 42915 | 229.85 | .3730 | 6 | 1 3/4 | 1 3/4 | 7 | 0.4411 - 0.4720 | 278.20 | 254.10 | 245.95 | 242.10 | 237.95 | 234.60 |
| 1/2 | .5000 | 42716 | 42816 | 42916 | 232.80 | .4355 | 6 | 2 | 2 | 8 | 0.4721 - 0.5030 | 281.35 | 257.00 | 248.90 | 244.90 | 240.90 | 237.65 |
| 17/32 | .5312 | 42717 | 42817 | 42917 | 237.70 | .4355 | 6 | 2 | 2 | 8 | 0.5031 - 0.5340 | 286.10 | 261.80 | 253.70 | 249.95 | 245.70 | 242.45 |
| 9/16 | .5625 | 42718 | 42818 | 42918 | 241.10 | .4355 | 6 | 2 | 2 | 8 | 0.5341 - 0.5660 | 289.55 | 265.30 | 257.15 | 253.40 | 249.15 | 245.95 |
| 19/32 | .5938 | 42719 | 42819 | 42919 | 246.15 | .4355 | 6 | 2 | 2 | 8 | 0.5661 - 0.5970 | 294.50 | 270.40 | 262.25 | 258.40 | 254.25 | 250.95 |
| 5/8 | .6250 | 42720 | 42820 | 42920 | 250.75 | .5615 | 6 | 2 1/4 | 2 1/4 | 9 | 0.5971 - 0.6280 | 299.15 | 274.95 | 266.75 | 262.95 | 258.75 | 255.50 |
| 21/32 | .6562 | 42721 | 42821 | 42921 | 277.70 | .5615 | 6 | 2 1/4 | 2 1/4 | 9 | 0.6281 - 0.6590 | 326.15 | 301.85 | 293.75 | 289.90 | 285.75 | 282.40 |
| 11/16 | .6875 | 42722 | 42822 | 42922 | 283.30 | .5615 | 6 | 2 1/4 | 2 1/4 | 9 | 0.6591 - 0.6910 | 331.80 | 307.55 | 299.30 | 295.55 | 291.40 | 288.15 |
| 23/32 | .7188 | 42723 | 42823 | 42923 | 289.40 | .5615 | 6 | 2 1/4 | 2 1/4 | 9 | 0.6911 - 0.7220 | 337.75 | 313.50 | 305.35 | 301.50 | 297.35 | 294.05 |
| 3/4 | .7500 | 42724 | 42824 | 42924 | 295.55 | .6245 | 6 | 2 1/2 | 2 1/2 | 9 1/2 | 0.7221 - 0.7530 | 343.90 | 319.75 | 311.45 | 307.75 | 303.55 | 300.30 |
| 25/32 | .7812 | 42725 | 42825 | 42925 | 300.60 | .6245 | 6 | 2 1/2 | 2 1/2 | 9 1/2 | 0.7531 - 0.7840 | 348.90 | 324.80 | 316.50 | 312.75 | 308.50 | 305.30 |
| 13/16 | .8125 | 42726 | 42826 | 42926 | 304.20 | .6245 | 6 | 2 1/2 | 2 1/2 | 9 1/2 | 0.7841 - 0.8160 | 352.50 | 328.40 | 320.25 | 316.35 | 312.25 | 308.90 |
| 27/32 | .8438 | 42727 | 42827 | 42927 | 309.70 | .6245 | 6 | 2 1/2 | 2 1/2 | 9 1/2 | 0.8161 - 0.8470 | 358.30 | 334.00 | 325.80 | 321.95 | 317.75 | 314.60 |
| 7/8 | .8750 | 42728 | 42828 | 42928 | 326.60 | .7495 | 6 | 2 5/8 | 2 5/8 | 10 | 0.8471 - 0.8780 | 376.85 | 351.70 | 343.25 | 339.25 | 334.85 | 331.40 |
| 29/32 | .9062 | 42729 | 42829 | 42929 | 345.80 | .7495 | 6 | 2 5/8 | 2 5/8 | 10 | 0.8781 - 0.9090 | 396.05 | 370.80 | 362.45 | 358.45 | 354.20 | 350.80 |
| 15/16 | .9375 | 42730 | 42830 | 42930 | 362.70 | .7495 | 8 | 2 5/8 | 2 5/8 | 10 | 0.9091 - 0.9410 | 412.85 | 387.80 | 379.30 | 375.30 | 370.90 | 367.60 |
| 31/32 | .9688 | 42731 | 42831 | 42931 | 363.65 | .7495 | 8 | 2 5/8 | 2 5/8 | 10 | 0.9411 - 0.9720 | 413.80 | 388.70 | 380.20 | 376.20 | 371.85 | 368.50 |
| 1 | 1.0000 | 42732 | 42832 | 42932 | 364.15 | .8745 | 8 | 2 3/4 | 2 3/4 | 10 1/2 | 0.9721 - 1.0030 | 414.35 | 389.20 | 380.80 | 376.75 | 372.35 | 368.95 |
| 1 1/16 | 1.0625 | 42734 | 42834 | 42934 | 384.95 | .8745 | 8 | 2 3/4 | 2 3/4 | 10 1/2 | 1.0031 - 1.0660 | 435.15 | 410.00 | 401.55 | 397.55 | 393.25 | 389.80 |
| 1 1/8 | 1.1250 | 42736 | 42836 | 42936 | 386.60 | .8745 | 8 | 2 7/8 | 2 7/8 | 11 | 1.0661 - 1.1280 | 436.85 | 411.60 | 403.25 | 399.20 | 394.95 | 391.50 |
| 1 1/16 | 1.1875 | 42738 | 42838 | 42938 | 402.65 | .9995 | 8 | 2 7/8 | 2 7/8 | 11 | 1.1281 - 1.1905 | 452.65 | 427.50 | 419.15 | 415.15 | 410.90 | 407.45 |
| 1 1/4 | 1.2500 | 42740 | 42840 | 42940 | 407.85 | .9995 | 8 | 3 | 3 | 11 1/2 | 1.1906 - 1.2530 | 458.10 | 432.90 | 424.55 | 420.50 | 416.15 | 412.75 |
| 1 5/16 | 1.3125 | 42742 | 42842 | 42942 | 419.65 | .9995 | 8 | 3 | 3 | 11 1/2 | 1.2531 - 1.3155 | 469.85 | 444.70 | 436.15 | 432.20 | 427.95 | 424.55 |
| 1 3/8 | 1.3750 | 42744 | 42844 | 42944 | 436.40 | .9995 | 8 | 3 1/4 | 3 1/4 | 12 | 1.3156 - 1.3780 | 486.85 | 461.65 | 453.10 | 449.20 | 444.90 | 441.45 |
| 1 7/16 | 1.4375 | 42746 | 42846 | 42946 | 450.10 | .9995 | 8 | 3 1/4 | 3 1/4 | 12 | 1.3781 - 1.4405 | 500.45 | 475.25 | 466.85 | 462.85 | 458.60 | 455.15 |
| 1 1/2 | 1.5000 | 42748 | 42848 | 42948 | 465.30 | 1.2495 | 8 | 3 1/2 | 3 1/2 | 12 1/2 | 1.4406 - 1.5030 | 515.45 | 490.45 | 481.90 | 477.90 | 473.60 | 470.20 |

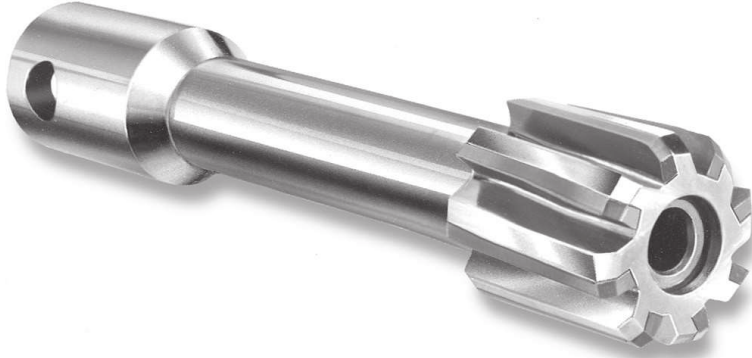
*Quantities of 15 or more - price of fractional size in same size range.



COOLANT FED REAMERS CARBIDE TIPPED TYPE 490 FRACTIONAL



**SIMILAR TO BARBER-COLMAN
AND METCUT OFC REAMER**



| TOOL SELECTOR | CHIP CLASS | MATERIAL MACHINED | TOOL TYPE |
|---------------|------------|---------------------------|-----------|
| | 20 | NON-FERROUS - LONG CHIPS | 490 |
| | 40 | NON-FERROUS - SHORT CHIPS | 490 |
| | 60 | CAST IRONS | 490 |
| | 80 | LOW STRENGTH STEELS | 490 |
| | 100 | MEDIUM STRENGTH STEELS | 490 |
| | 120 | HIGH STRENGTH STEELS | 490 |
| | 140 | HIGH TEMPERATURE ALLOYS | 490 |

MODIFICATIONS (Prompt delivery)

- Modified tool diameter - priced below
- Metric tool diameter
- Cutting diameter reduced for step or pilot
- End chamfer other than 45° included
- End cutting or corner radius
- Increased circular margin
- Increased/decreased tool diameter back taper
- Coatings available:

TITANIUM NITRIDE - TiN

TITANIUM CARBONITRIDE - TiCN

ZIRCONIUM NITRIDE - ZrN

AL TITANIUM NITRIDE - AlTiN

TYPE 490

- Center coolant outlet
- Flute long carbide
- Right spiral polished flutes: 2° to 5°
- Positive face rake angles (behind center)
- Tool diameter tolerance: plus .0003", minus .0000"
- Pin cross hole
- Radial edged for cutting smooth, accurate holes while maximizing tool life

| TOOL DIAMETER | | TYPE 490 EDP NO. | PRICE | DIMENSIONS | | | | | FINISHED TO MODIFIED TOOL DIAMETER | | | | | | | |
|---------------|--------|---------------------|----------|----------------|-----------------|-------------------|--------------------|--------------|------------------------------------|--|----------|----------|----------|----------|----------|--|
| FRAC. | DEC. | | | SHANK DIAM. | SHANK LENGTH | NO. OF FLTS | LENGTH | | MODIFIED DIAMETER RANGE | PRICE EACH - BASED ON QUANTITY ORDERED | | | | | | |
| | | | | | | | FLUTE & CARBIDE | OVER- ALL | | 1 | 2 | 3 | 4 | 5-7 | 8-14* | |
| 3/8 | .3750 | 49012 | \$150.55 | 3/8 | 3/4 | 6 | 1/2 | 2 1/2 | 0.3181 - 0.3800 | \$243.30 | \$196.75 | \$181.30 | \$173.90 | \$165.90 | \$159.65 | |
| 13/32 | .4062 | 49013 | 152.80 | 3/8 | 3/4 | 6 | 1/2 | 2 5/8 | 0.3801 - 0.4090 | 245.55 | 199.05 | 183.45 | 176.00 | 168.10 | 161.90 | |
| 7/16 | .4375 | 49014 | 152.80 | 3/8 | 3/4 | 6 | 1/2 | 2 5/8 | 0.4091 - 0.4410 | 245.55 | 199.05 | 183.45 | 176.00 | 168.10 | 161.90 | |
| 15/32 | .4688 | 49015 | 156.90 | 5/8 | 1 | 6 | 5/8 | 3 1/2 | 0.4411 - 0.4720 | 249.70 | 203.30 | 187.80 | 180.25 | 172.25 | 166.05 | |
| 1/2 | .5000 | 49016 | 156.90 | 5/8 | 1 | 6 | 5/8 | 3 1/2 | 0.4721 - 0.5050 | 249.70 | 203.30 | 187.80 | 180.25 | 172.25 | 166.05 | |
| 9/16 | .5625 | 49018 | 171.55 | 5/8 | 1 | 6 | 3/4 | 3 3/4 | 0.5051 - 0.5660 | 264.35 | 217.75 | 202.30 | 194.90 | 186.90 | 180.60 | |
| 5/8 | .6250 | 49020 | 171.55 | 5/8 | 1 | 6 | 3/4 | 3 3/4 | 0.5661 - 0.6300 | 264.35 | 217.75 | 202.30 | 194.90 | 186.90 | 180.60 | |
| 11/16 | .6875 | 49022 | 190.25 | 5/8 | 1 | 6 | 3/4 | 4 1/4 | 0.6301 - 0.6910 | 283.10 | 236.65 | 221.10 | 213.60 | 205.70 | 199.40 | |
| 3/4 | .7500 | 49024 | 190.25 | 5/8 | 1 | 6 | 3/4 | 4 1/4 | 0.6911 - 0.7550 | 283.10 | 236.65 | 221.10 | 213.60 | 205.70 | 199.40 | |
| 13/16 | .8125 | 49026 | 200.70 | 5/8 | 1 | 6 | 7/8 | 4 3/4 | 0.7551 - 0.8160 | 293.55 | 247.15 | 231.50 | 224.05 | 216.10 | 209.90 | |
| 7/8 | .8750 | 49028 | 208.30 | 5/8 | 1 | 6 | 7/8 | 4 3/4 | 0.8161 - 0.8800 | 304.70 | 256.40 | 240.20 | 232.50 | 224.35 | 217.75 | |
| 15/16 | .9375 | 49030 | 249.65 | 1 | 1 1/2 | 8 | 1 | 5 1/2 | 0.8801 - 0.9410 | 345.95 | 297.80 | 281.60 | 273.90 | 265.65 | 259.15 | |
| 1 | 1.0000 | 49032 | 249.65 | 1 | 1 1/2 | 8 | 1 | 5 1/2 | 0.9411 - 1.0050 | 345.95 | 297.80 | 281.60 | 273.90 | 265.65 | 259.15 | |
| 1 1/16 | 1.0625 | 49034 | 276.30 | 1 | 1 1/2 | 8 | 1 1/4 | 6 | 1.0051 - 1.0660 | 376.75 | 326.35 | 309.60 | 301.50 | 292.85 | 286.10 | |
| 1 1/8 | 1.1250 | 49036 | 276.30 | 1 | 1 1/2 | 8 | 1 1/4 | 6 | 1.0661 - 1.1300 | 376.75 | 326.35 | 309.60 | 301.50 | 292.85 | 286.10 | |
| 1 3/16 | 1.1875 | 49038 | 283.10 | 1 | 1 1/2 | 8 | 1 1/4 | 6 | 1.1301 - 1.1900 | 383.65 | 333.25 | 316.40 | 308.35 | 299.85 | 292.90 | |
| 1 1/4 | 1.2500 | 49040 | 283.10 | 1 | 1 1/2 | 8 | 1 1/4 | 6 | 1.1901 - 1.2550 | 383.65 | 333.25 | 316.40 | 308.35 | 299.85 | 292.90 | |
| 1 5/16 | 1.3125 | 49042 | 303.60 | 1 | 1 1/2 | 8 | 1 1/4 | 6 | 1.2551 - 1.3155 | 404.10 | 353.75 | 336.80 | 328.75 | 320.20 | 313.45 | |
| 1 3/8 | 1.3750 | 49044 | 303.60 | 1 | 1 1/2 | 8 | 1 1/4 | 6 | 1.3156 - 1.3800 | 404.10 | 353.75 | 336.80 | 328.75 | 320.20 | 313.45 | |
| 1 7/16 | 1.4375 | 49046 | 323.90 | 1 | 1 1/2 | 8 | 1 1/4 | 6 | 1.3801 - 1.4405 | 424.50 | 374.05 | 357.15 | 349.20 | 340.65 | 333.80 | |
| 1 1/2 | 1.5000 | 49048 | 323.90 | 1 | 1 1/2 | 8 | 1 1/4 | 6 | 1.4406 - 1.5050 | 424.50 | 374.05 | 357.15 | 349.20 | 340.65 | 333.80 | |
| 1 9/16 | 1.5625 | 49050 | 339.70 | 1 | 1 1/2 | 10 | 1 1/4 | 6 | 1.5051 - 1.5660 | 440.25 | 389.80 | 373.05 | 365.00 | 356.35 | 349.65 | |
| 1 5/8 | 1.6250 | 49052 | 339.70 | 1 | 1 1/2 | 10 | 1 1/4 | 6 | 1.5661 - 1.6300 | 440.25 | 389.80 | 373.05 | 365.00 | 356.35 | 349.65 | |
| 1 11/16 | 1.6875 | 49054 | 360.15 | 1 | 1 1/2 | 10 | 1 1/4 | 6 | 1.6301 - 1.6910 | 460.65 | 410.30 | 393.50 | 385.50 | 376.85 | 370.05 | |
| 1 3/4 | 1.7500 | 49056 | 360.15 | 1 | 1 1/2 | 10 | 1 1/4 | 6 | 1.6911 - 1.7550 | 460.65 | 410.30 | 393.50 | 385.50 | 376.85 | 370.05 | |
| 1 13/16 | 1.8125 | 49058 | 378.25 | 1 | 1 1/2 | 10 | 1 1/4 | 6 | 1.7551 - 1.8160 | 478.85 | 428.40 | 411.55 | 403.55 | 394.95 | 388.05 | |
| 1 7/8 | 1.8750 | 49060 | 378.25 | 1 | 1 1/2 | 10 | 1 1/4 | 6 | 1.8161 - 1.8800 | 478.85 | 428.40 | 411.55 | 403.55 | 394.95 | 388.05 | |
| 1 15/16 | 1.9375 | 49062 | 396.45 | 1 | 1 1/2 | 10 | 1 1/4 | 6 | 1.8801 - 1.9410 | 496.75 | 446.45 | 429.60 | 421.65 | 412.90 | 406.30 | |
| 2 | 2.0000 | 49064 | 396.45 | 1 | 1 1/2 | 10 | 1 1/4 | 6 | 1.9411 - 2.0150 | 496.75 | 446.45 | 429.60 | 421.65 | 412.90 | 406.30 | |

*Quantities of 15 or more - price of fractional size in same size range.

MATERIAL SPECIFIC STEP REAMERS CARBIDE TIPPED TYPES 457ST, 458ST, 459ST

STRAIGHT FLUTES FLUTE LONG CARBIDE CUTTING OR NON-CUTTING PILOT

TYPE 457ST - FOR NON-FERROUS MATERIALS

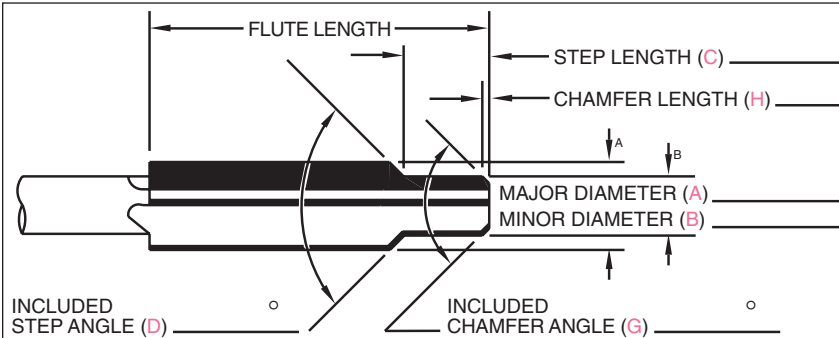
TYPE 458ST - FOR CAST IRONS

TYPE 459ST - FOR STEELS & HIGH TEMP ALLOYS

- Polished flutes; straight flute long carbide and straight shank
- Tool geometry & carbide grade appropriate for material being machined
- Detailed specifications and available modifications on page 73

| TOOL SELECTOR | CHIP CLASS | MATERIAL MACHINED | TOOL TYPE |
|---------------|-------------------------|---------------------------|-------------|
| | 20 | NON-FERROUS - LONG CHIPS | 457ST |
| | 40 | NON-FERROUS - SHORT CHIPS | 457ST/458ST |
| | 60 | CAST IRONS | 458ST |
| | 80 | LOW STRENGTH STEELS | 459ST/458ST |
| | 100 | MEDIUM STRENGTH STEELS | 459ST |
| | 120 | HIGH STRENGTH STEELS | 459ST |
| 140 | HIGH TEMPERATURE ALLOYS | 459ST | |

NOTE: See pgs. 64 & 65 for non-step reamers (457/458/459)



ORDERING INSTRUCTIONS:

Specify dimensions according to the letters (A, B, C, D, G & H) indicated on line drawing. Also, indicate if pilot is cutting or non-cutting and describe material being machined.

NOTE: Recommended stock removal is 3% per cutting diameter. Maximum between major and minor diameter (cutting or non-cutting pilot) should not exceed 6%. Both major and minor cutting diameter must be within cutting diameter range listed. Non-cutting pilot diameter can be smaller than cutting diameter range as indicated in the "non-cutting pilot minimum diameter" column.

| MAJOR & MINOR CUTTING DIAMETER RANGE | DIMENSIONS | | | | | TYPE 457ST NON-FERROUS EDP NO. | TYPE 458ST CAST IRON EDP NO. | TYPE 459ST STEEL/ HI-TEMP EDP NO. | FINISHED TO MODIFIED TOOL DIAMETER | | | | | | |
|--------------------------------------|--------------------------|------------------|-------------|---------------|----------|--------------------------------|------------------------------|-----------------------------------|--|----------|----------|----------|----------|----------|---------|
| | NON-CUT PILOT MIN. DIAM. | MAX. SHANK DIAM. | NO. OF FLTS | LENGTH | | | | | PRICE EACH - BASED ON QUANTITY ORDERED | | | | | | |
| | | | | FLUTE & CARB. | OVER-ALL | | | | 1 | 2 | 3 | 4 | 5-7 | 8-14 | OVER 14 |
| 0.1770-0.2040 | .1660 | .1805 | 4 | 1 1/8 | 4 1/2 | 45706ST | 45806ST | 45906ST | \$181.70 | \$136.35 | \$121.20 | \$113.95 | \$106.25 | \$100.20 | \$91.30 |
| 0.2041-0.2210 | .1920 | .2075 | 4 | 1 1/4 | 5 | 45707ST | 45807ST | 45907ST | 181.70 | 136.35 | 121.20 | 113.95 | 106.25 | 100.20 | 91.30 |
| 0.2211-0.2380 | .2080 | .2265 | 4 | 1 1/2 | 6 | 4572344ST | 4582344ST | 4592344ST | 181.70 | 136.35 | 121.20 | 113.95 | 106.25 | 100.20 | 91.30 |
| 0.2381-0.2530 | .2240 | .2405 | 4 | 1 1/2 | 6 | 45708ST | 45808ST | 45908ST | 181.70 | 136.35 | 121.20 | 113.95 | 106.25 | 100.20 | 91.30 |
| 0.2531-0.2840 | .2380 | .2485 | 4 | 1 1/2 | 6 | 45709ST | 45809ST | 45909ST | 183.80 | 138.40 | 123.30 | 116.05 | 108.40 | 102.20 | 93.35 |
| 0.2841-0.3150 | .2670 | .2792 | 4 | 1 1/2 | 6 | 45710ST | 45810ST | 45910ST | 183.80 | 138.40 | 123.30 | 116.05 | 108.40 | 102.20 | 93.35 |
| 0.3151-0.3470 | .2960 | .2792 | 4 | 1 1/2 | 6 | 45711ST | 45811ST | 45911ST | 186.95 | 141.75 | 126.55 | 119.45 | 111.65 | 105.55 | 96.70 |
| 0.3471-0.3780 | .3260 | .3105 | 4 | 1 3/4 | 7 | 45712ST | 45812ST | 45912ST | 186.95 | 141.75 | 126.55 | 119.45 | 111.65 | 105.55 | 96.70 |
| 0.3781-0.4090 | .3550 | .3105 | 4 | 1 3/4 | 7 | 45713ST | 45813ST | 45913ST | 191.70 | 146.55 | 131.40 | 124.15 | 116.45 | 110.25 | 101.45 |
| 0.4091-0.4410 | .3850 | .3730 | 6 | 1 3/4 | 7 | 45714ST | 45814ST | 45914ST | 200.20 | 154.90 | 139.70 | 132.45 | 124.80 | 118.60 | 109.90 |
| 0.4411-0.4720 | .4150 | .3730 | 6 | 1 3/4 | 7 | 45715ST | 45815ST | 45915ST | 208.85 | 163.60 | 148.50 | 141.25 | 133.55 | 127.40 | 118.55 |
| 0.4721-0.5030 | .4440 | .4355 | 6 | 2 | 8 | 45716ST | 45816ST | 45916ST | 223.80 | 175.30 | 159.05 | 151.40 | 143.10 | 136.55 | 127.00 |
| 0.5031-0.5340 | .4730 | .4355 | 6 | 2 | 8 | 45717ST | 45817ST | 45917ST | 227.50 | 179.05 | 162.75 | 155.10 | 146.70 | 140.15 | 130.75 |
| 0.5341-0.5660 | .5020 | .4355 | 6 | 2 | 8 | 45718ST | 45818ST | 45918ST | 227.50 | 179.05 | 162.75 | 155.10 | 146.70 | 140.15 | 130.75 |
| 0.5661-0.5970 | .5320 | .4355 | 6 | 2 | 8 | 45719ST | 45819ST | 45919ST | 232.50 | 184.05 | 167.80 | 160.10 | 151.80 | 145.20 | 135.75 |
| 0.5971-0.6280 | .5610 | .5615 | 6 | 2 1/4 | 9 | 45720ST | 45820ST | 45920ST | 232.50 | 184.05 | 167.80 | 160.10 | 151.80 | 145.20 | 135.75 |
| 0.6281-0.6590 | .5900 | .5615 | 6 | 2 1/4 | 9 | 45721ST | 45821ST | 45921ST | 235.05 | 186.55 | 170.25 | 162.50 | 154.25 | 147.70 | 138.25 |
| 0.6591-0.6910 | .6200 | .5615 | 6 | 2 1/4 | 9 | 45722ST | 45822ST | 45922ST | 235.05 | 186.55 | 170.25 | 162.50 | 154.25 | 147.70 | 138.25 |
| 0.6911-0.7220 | .6500 | .5615 | 6 | 2 1/4 | 9 | 45723ST | 45823ST | 45923ST | 241.15 | 192.70 | 176.50 | 168.80 | 160.55 | 153.95 | 144.45 |
| 0.7221-0.7530 | .6790 | .6245 | 6 | 2 1/2 | 9 1/2 | 45724ST | 45824ST | 45924ST | 241.15 | 192.70 | 176.50 | 168.80 | 160.55 | 153.95 | 144.45 |
| 0.7531-0.7840 | .7080 | .6245 | 6 | 2 1/2 | 9 1/2 | 45725ST | 45825ST | 45925ST | 246.15 | 197.65 | 181.55 | 173.80 | 165.40 | 158.95 | 149.40 |
| 0.7841-0.8160 | .7370 | .6245 | 6 | 2 1/2 | 9 1/2 | 45726ST | 45826ST | 45926ST | 246.15 | 197.65 | 181.55 | 173.80 | 165.40 | 158.95 | 149.40 |
| 0.8161-0.8470 | .7670 | .6245 | 6 | 2 1/2 | 9 1/2 | 45727ST | 45827ST | 45927ST | 252.05 | 203.65 | 187.40 | 179.70 | 171.35 | 164.85 | 155.40 |
| 0.8471-0.8780 | .7970 | .7495 | 6 | 2 3/8 | 10 | 45728ST | 45828ST | 45928ST | 261.65 | 211.35 | 194.40 | 186.50 | 177.85 | 171.05 | 161.25 |
| 0.8781-0.9090 | .8260 | .7495 | 6 | 2 3/8 | 10 | 45729ST | 45829ST | 45929ST | 288.25 | 237.95 | 221.05 | 213.15 | 204.45 | 197.65 | 187.85 |
| 0.9091-0.9410 | .8550 | .7495 | 8 | 2 3/8 | 10 | 45730ST | 45830ST | 45930ST | 288.25 | 237.95 | 221.05 | 213.15 | 204.45 | 197.65 | 187.85 |
| 0.9411-0.9720 | .8850 | .7495 | 8 | 2 3/8 | 10 | 45731ST | 45831ST | 45931ST | 297.25 | 246.85 | 230.05 | 222.00 | 213.35 | 206.50 | 196.70 |
| 0.9721-1.0030 | .9140 | .8745 | 8 | 2 3/4 | 10 1/2 | 45732ST | 45832ST | 45932ST | 297.25 | 246.85 | 230.05 | 222.00 | 213.35 | 206.50 | 196.70 |
| 1.0031-1.0660 | .9430 | .8745 | 8 | 2 3/4 | 10 1/2 | 45734ST | 45834ST | 45934ST | 299.80 | 251.50 | 235.20 | 227.60 | 219.40 | 212.85 | 203.50 |
| 1.0661-1.1280 | 1.0020 | .8745 | 8 | 2 3/4 | 11 | 45736ST | 45836ST | 45936ST | 316.50 | 268.35 | 252.25 | 244.60 | 236.30 | 229.80 | 220.30 |
| 1.1281-1.1905 | 1.0610 | .9995 | 8 | 2 3/4 | 11 | 45738ST | 45838ST | 45938ST | 326.70 | 278.35 | 262.25 | 254.60 | 246.25 | 239.75 | 230.40 |
| 1.1906-1.2530 | 1.1200 | .9995 | 8 | 3 | 11 1/2 | 45740ST | 45840ST | 45940ST | 345.35 | 297.20 | 280.85 | 273.30 | 265.10 | 258.55 | 249.15 |
| 1.2531-1.3155 | 1.1780 | .9995 | 8 | 3 | 11 1/2 | 45742ST | 45842ST | 45942ST | 352.25 | 303.95 | 287.80 | 280.20 | 271.95 | 265.35 | 255.95 |
| 1.3156-1.3780 | 1.2370 | .9995 | 8 | 3 1/4 | 12 | 45744ST | 45844ST | 45944ST | 369.30 | 321.00 | 304.95 | 297.25 | 288.95 | 282.40 | 273.00 |
| 1.3781-1.4405 | 1.2960 | .9995 | 8 | 3 1/4 | 12 | 45746ST | 45846ST | 45946ST | 391.80 | 343.50 | 327.30 | 319.65 | 311.35 | 304.95 | 295.45 |
| 1.4406-1.5030 | 1.3550 | 1.2495 | 8 | 3 1/2 | 12 1/2 | 45748ST | 45848ST | 45948ST | 400.50 | 352.25 | 336.15 | 328.45 | 320.20 | 313.65 | 304.20 |



MATERIAL SPECIFIC STEP REAMERS CARBIDE TIPPED TYPES 442ST, 443ST, 444ST



**RIGHT SPIRAL FLUTES
FLUTE LONG CARBIDE
CUTTING OR NON-CUTTING PILOT**

TYPE 442ST - FOR NON-FERROUS MATERIALS

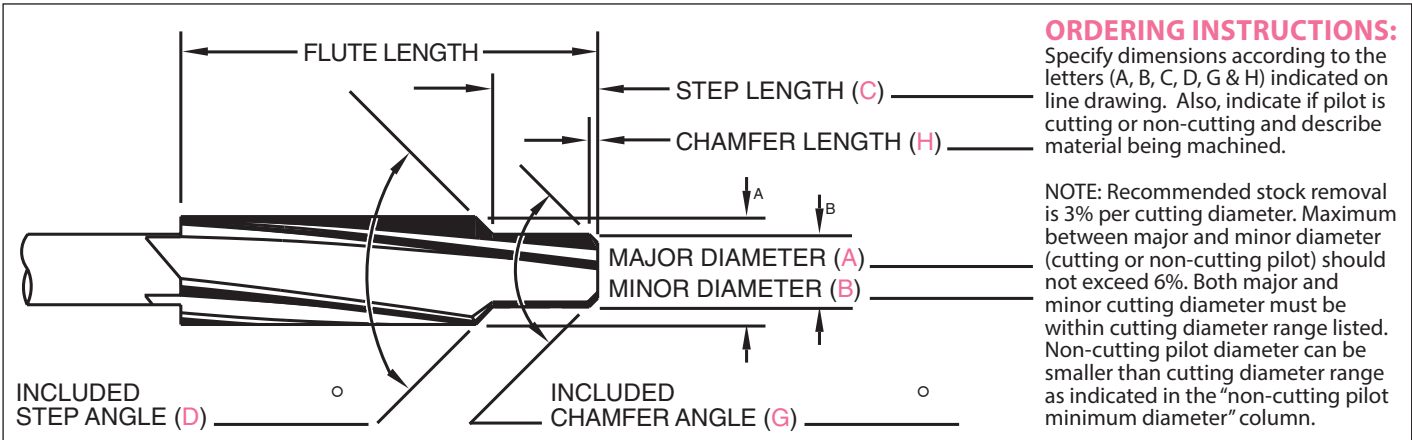
TYPE 443ST - FOR CAST IRONS

TYPE 444ST - FOR STEELS & HIGH TEMP ALLOYS

- Polished flutes; right spiral flute long carbide and straight shank
- Tool geometry & carbide grade appropriate for material being machined
- Detailed specifications and available modifications on page 73

| TOOL SELECTOR | CHIP CLASS | MATERIAL MACHINED | TOOL TYPE |
|---------------|------------|---------------------------|-------------|
| | 20 | NON-FERROUS - LONG CHIPS | 442ST |
| | 40 | NON-FERROUS - SHORT CHIPS | 442ST/443ST |
| | 60 | CAST IRONS | 443ST |
| | 80 | LOW STRENGTH STEELS | 444ST/443ST |
| | 100 | MEDIUM STRENGTH STEELS | 444ST |
| | 120 | HIGH STRENGTH STEELS | 444ST |
| | 140 | HIGH TEMPERATURE ALLOYS | 444ST |

NOTE: See page 69 for non-step reamers (442/443/444)



| MAJOR & MINOR CUTTING DIAMETER RANGE | DIMENSIONS | | | | | TYPE 442ST NON-FERROUS EDP NO. | TYPE 443ST CAST IRON EDP NO. | TYPE 444ST STEEL/ HI-TEMP EDP NO. | FINISHED TO MODIFIED TOOL DIAMETER | | | | | | |
|--------------------------------------|--------------------------|------------------|-------------|-------------|----------|--------------------------------|------------------------------|-----------------------------------|--|----------|----------|----------|----------|----------|----------|
| | NON-CUT PILOT MIN. DIAM. | MAX. SHANK DIAM. | NO. OF FLTS | LENGTH | | | | | PRICE EACH - BASED ON QUANTITY ORDERED | | | | | | |
| | | | | FLT & CARB. | OVER-ALL | | | | 1 | 2 | 3 | 4 | 5-7 | 8-14 | OVER 14 |
| 0.2841 - 0.3150 | .2670 | .2792 | 4 | 1 1/2 | 6 | 44210ST | 44310ST | 44410ST | \$200.95 | \$158.35 | \$144.25 | \$137.40 | \$130.20 | \$124.50 | \$116.10 |
| 0.3151 - 0.3470 | .2960 | .2792 | 4 | 1 1/2 | 6 | 44211ST | 44311ST | 44411ST | 212.70 | 170.20 | 155.95 | 149.30 | 141.90 | 136.25 | 127.95 |
| 0.3471 - 0.3780 | .3260 | .3105 | 4 | 1 3/4 | 7 | 44212ST | 44312ST | 44412ST | 213.85 | 171.50 | 157.25 | 150.50 | 143.25 | 137.40 | 129.25 |
| 0.3781 - 0.4090 | .3550 | .3105 | 4 | 1 3/4 | 7 | 44213ST | 44313ST | 44413ST | 219.60 | 177.15 | 162.95 | 156.15 | 148.85 | 143.25 | 134.85 |
| 0.4091 - 0.4410 | .3850 | .3730 | 6 | 1 3/4 | 7 | 44214ST | 44314ST | 44414ST | 224.75 | 182.45 | 168.10 | 161.40 | 154.05 | 148.45 | 140.00 |
| 0.4411 - 0.4720 | .4150 | .3730 | 6 | 1 3/4 | 7 | 44215ST | 44315ST | 44415ST | 233.65 | 191.30 | 177.10 | 170.25 | 163.10 | 157.30 | 149.05 |
| 0.4721 - 0.5030 | .4440 | .4355 | 6 | 2 | 8 | 44216ST | 44316ST | 44416ST | 250.95 | 205.70 | 190.50 | 183.30 | 175.65 | 169.45 | 160.65 |
| 0.5031 - 0.5340 | .4730 | .4355 | 6 | 2 | 8 | 44217ST | 44317ST | 44417ST | 255.65 | 210.40 | 195.20 | 188.00 | 180.25 | 174.20 | 165.35 |
| 0.5341 - 0.5660 | .5020 | .4355 | 6 | 2 | 8 | 44218ST | 44318ST | 44418ST | 255.65 | 210.40 | 195.20 | 188.00 | 180.25 | 174.20 | 165.35 |
| 0.5661 - 0.5970 | .5320 | .4355 | 6 | 2 | 8 | 44219ST | 44319ST | 44419ST | 260.45 | 215.30 | 200.20 | 192.95 | 185.20 | 179.10 | 170.20 |
| 0.5971 - 0.6280 | .5610 | .5615 | 6 | 2 1/4 | 9 | 44220ST | 44320ST | 44420ST | 260.45 | 215.30 | 200.20 | 192.95 | 185.20 | 179.10 | 170.20 |
| 0.6281 - 0.6590 | .5900 | .5615 | 6 | 2 1/4 | 9 | 44221ST | 44321ST | 44421ST | 265.85 | 220.80 | 205.40 | 198.30 | 190.50 | 184.45 | 175.65 |
| 0.6591 - 0.6910 | .6200 | .5615 | 6 | 2 1/4 | 9 | 44222ST | 44322ST | 44422ST | 276.85 | 231.55 | 216.35 | 209.15 | 201.50 | 195.40 | 186.50 |
| 0.6911 - 0.7220 | .6500 | .5615 | 6 | 2 1/4 | 9 | 44223ST | 44323ST | 44423ST | 279.60 | 234.40 | 219.25 | 212.05 | 204.25 | 198.15 | 189.40 |
| 0.7221 - 0.7530 | .6790 | .6245 | 6 | 2 1/2 | 9 1/2 | 44224ST | 44324ST | 44424ST | 282.40 | 237.20 | 222.00 | 214.85 | 207.10 | 201.00 | 192.05 |
| 0.7531 - 0.7840 | .7080 | .6245 | 6 | 2 1/2 | 9 1/2 | 44225ST | 44325ST | 44425ST | 287.55 | 242.25 | 227.10 | 220.00 | 212.15 | 206.10 | 197.20 |
| 0.7841 - 0.8160 | .7370 | .6245 | 6 | 2 1/2 | 9 1/2 | 44226ST | 44326ST | 44426ST | 287.55 | 242.25 | 227.10 | 220.00 | 212.15 | 206.10 | 197.20 |
| 0.8161 - 0.8470 | .7670 | .6245 | 6 | 2 1/2 | 9 1/2 | 44227ST | 44327ST | 44427ST | 298.30 | 253.05 | 237.90 | 230.65 | 222.80 | 216.75 | 207.90 |
| 0.8471 - 0.8780 | .7970 | .7495 | 6 | 2 5/8 | 10 | 44228ST | 44328ST | 44428ST | 309.50 | 262.60 | 246.80 | 239.40 | 231.25 | 224.95 | 215.80 |
| 0.8781 - 0.9090 | .8260 | .7495 | 6 | 2 5/8 | 10 | 44229ST | 44329ST | 44429ST | 345.05 | 297.95 | 282.25 | 274.80 | 266.75 | 260.40 | 251.10 |
| 0.9091 - 0.9410 | .8550 | .7495 | 8 | 2 5/8 | 10 | 44230ST | 44330ST | 44430ST | 345.05 | 297.95 | 282.25 | 274.80 | 266.75 | 260.40 | 251.10 |
| 0.9411 - 0.9720 | .8850 | .7495 | 8 | 2 5/8 | 10 | 44231ST | 44331ST | 44431ST | 357.30 | 310.30 | 294.65 | 287.00 | 279.05 | 272.75 | 263.60 |
| 0.9721 - 1.0030 | .9140 | .8745 | 8 | 2 3/4 | 10 1/2 | 44232ST | 44332ST | 44432ST | 357.30 | 310.30 | 294.65 | 287.00 | 279.05 | 272.75 | 263.60 |
| 1.0031 - 1.0660 | .9430 | .8745 | 8 | 2 3/4 | 10 1/2 | 44234ST | 44334ST | 44434ST | 403.50 | 356.50 | 340.75 | 333.25 | 325.20 | 318.95 | 309.70 |
| 1.0661 - 1.1280 | 1.0020 | .8745 | 8 | 2 7/8 | 11 | 44236ST | 44336ST | 44436ST | 413.10 | 366.05 | 350.35 | 342.90 | 334.80 | 328.50 | 319.25 |
| 1.1281 - 1.1905 | 1.0610 | .9995 | 8 | 2 7/8 | 11 | 44238ST | 44338ST | 44438ST | 429.45 | 382.60 | 366.75 | 359.30 | 351.20 | 345.00 | 335.75 |
| 1.1906 - 1.2530 | 1.1200 | .9995 | 8 | 3 | 11 1/2 | 44240ST | 44340ST | 44440ST | 448.75 | 401.85 | 386.15 | 378.55 | 370.60 | 364.25 | 355.00 |
| 1.2531 - 1.3155 | 1.1780 | .9995 | 8 | 3 | 11 1/2 | 44242ST | 44342ST | 44442ST | 486.85 | 439.80 | 424.05 | 416.65 | 408.50 | 402.20 | 393.05 |
| 1.3156 - 1.3780 | 1.2370 | .9995 | 8 | 3 1/4 | 12 | 44244ST | 44344ST | 44444ST | 524.25 | 477.25 | 461.65 | 454.10 | 446.00 | 439.70 | 430.65 |
| 1.3781 - 1.4405 | 1.2960 | .9995 | 8 | 3 1/4 | 12 | 44246ST | 44346ST | 44446ST | 549.85 | 502.80 | 487.15 | 479.65 | 471.65 | 465.30 | 456.10 |
| 1.4406 - 1.5030 | 1.3550 | 1.2495 | 8 | 3 1/2 | 12 1/2 | 44248ST | 44348ST | 44448ST | 575.70 | 528.80 | 513.00 | 505.55 | 497.50 | 491.25 | 481.90 |

REAMERS



MATERIAL SPECIFIC STEP REAMERS CARBIDE TIPPED TYPES 482ST, 483ST, 484ST



LEFT SPIRAL FLUTES FLUTE LONG CARBIDE CUTTING OR NON-CUTTING PILOT

TYPE 482ST - FOR NON-FERROUS MATERIALS

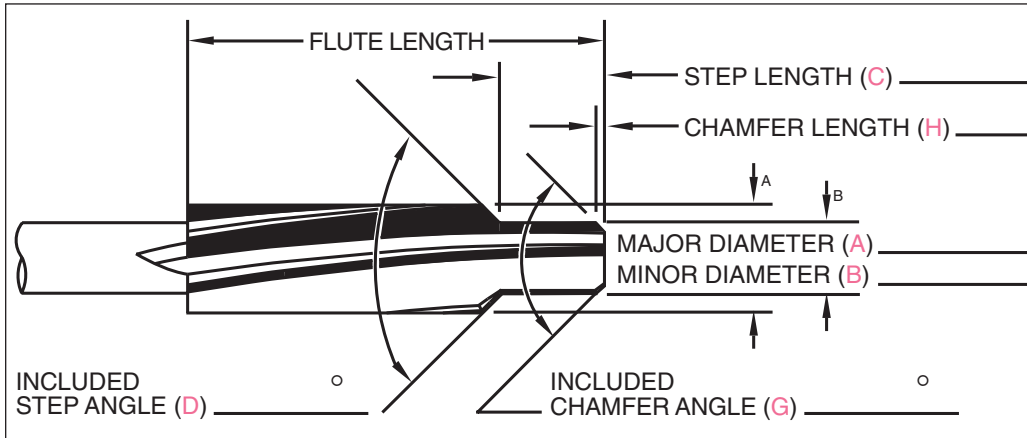
TYPE 483ST - FOR CAST IRONS

TYPE 484ST - FOR STEELS & HIGH TEMP ALLOYS

- Polished flutes; left spiral flute long carbide and straight shank
- Left spiral flutes should not be used on blind holes
- Tool geometry & carbide grade appropriate for material being machined
- Detailed specifications and available modifications on page 73

| TOOL SELECTOR | CHIP CLASS | MATERIAL MACHINED | TOOL TYPE |
|---------------|-------------------------|---------------------------|-------------|
| | 20 | NON-FERROUS - LONG CHIPS | 482ST |
| | 40 | NON-FERROUS - SHORT CHIPS | 482ST/483ST |
| | 60 | CAST IRONS | 483ST |
| | 80 | LOW STRENGTH STEELS | 484ST/483ST |
| | 100 | MEDIUM STRENGTH STEELS | 484ST |
| | 120 | HIGH STRENGTH STEELS | 484ST |
| 140 | HIGH TEMPERATURE ALLOYS | 484ST | |

NOTE: See page 71 for non-step reamers (482/483/484)



ORDERING INSTRUCTIONS:
Specify dimensions according to the letters (A, B, C, D, G & H) indicated on line drawing. Also, indicate if pilot is cutting or non-cutting and describe material being machined.

NOTE: Recommended stock removal is 3% per cutting diameter. Maximum between major and minor diameter (cutting or non-cutting pilot) should not exceed 6%. Both major and minor cutting diameter must be within cutting diameter range listed. Non-cutting pilot diameter can be smaller than cutting diameter range as indicated in the "non-cutting pilot minimum diameter" column.

| MAJOR & MINOR CUTTING DIAMETER RANGE | DIMENSIONS | | | | | TYPE 482ST NON-FERROUS EDP NO. | TYPE 483ST CAST IRON EDP NO. | TYPE 484ST STEEL/ HI-TEMP EDP NO. | FINISHED TO MODIFIED TOOL DIAMETER | | | | | | |
|--------------------------------------|--------------------------|------------------|-------------|-------------|----------|--------------------------------|------------------------------|-----------------------------------|--|----------|----------|----------|----------|----------|----------|
| | NON-CUT PILOT MIN. DIAM. | MAX. SHANK DIAM. | NO. OF FLTS | LENGTH | | | | | PRICE EACH - BASED ON QUANTITY ORDERED | | | | | | |
| | | | | FLT & CARB. | OVER-ALL | | | | 1 | 2 | 3 | 4 | 5-7 | 8-14 | OVER 14 |
| 0.2841 - 0.3150 | .2670 | .2792 | 4 | 1 1/2 | 6 | 48210ST | 48310ST | 48410ST | \$214.25 | \$169.00 | \$153.90 | \$146.60 | \$138.85 | \$132.75 | \$123.95 |
| 0.3151 - 0.3470 | .2960 | .2792 | 4 | 1 1/2 | 6 | 48211ST | 48311ST | 48411ST | 226.95 | 181.60 | 166.40 | 159.20 | 151.45 | 145.35 | 136.45 |
| 0.3471 - 0.3780 | .3260 | .3105 | 4 | 1 3/4 | 7 | 48212ST | 48312ST | 48412ST | 228.20 | 182.75 | 167.75 | 160.55 | 152.75 | 146.60 | 137.70 |
| 0.3781 - 0.4090 | .3550 | .3105 | 4 | 1 3/4 | 7 | 48213ST | 48313ST | 48413ST | 234.20 | 188.90 | 173.85 | 166.55 | 158.85 | 152.75 | 143.90 |
| 0.4091 - 0.4410 | .3850 | .3730 | 6 | 1 3/4 | 7 | 48214ST | 48314ST | 48414ST | 239.70 | 194.40 | 179.30 | 172.20 | 164.35 | 158.30 | 149.40 |
| 0.4411 - 0.4720 | .4150 | .3730 | 6 | 1 3/4 | 7 | 48215ST | 48315ST | 48415ST | 249.30 | 203.95 | 188.80 | 181.70 | 173.90 | 167.80 | 158.95 |
| 0.4721 - 0.5030 | .4440 | .4355 | 6 | 2 | 8 | 48216ST | 48316ST | 48416ST | 257.70 | 211.30 | 195.60 | 188.25 | 180.25 | 174.00 | 164.90 |
| 0.5031 - 0.5340 | .4730 | .4355 | 6 | 2 | 8 | 48217ST | 48317ST | 48417ST | 262.55 | 216.05 | 200.45 | 193.00 | 185.20 | 178.85 | 169.65 |
| 0.5341 - 0.5660 | .5020 | .4355 | 6 | 2 | 8 | 48218ST | 48318ST | 48418ST | 262.55 | 216.05 | 200.45 | 193.00 | 185.20 | 178.85 | 169.65 |
| 0.5661 - 0.5970 | .5320 | .4355 | 6 | 2 | 8 | 48219ST | 48319ST | 48419ST | 267.60 | 221.10 | 205.40 | 198.10 | 190.15 | 183.90 | 174.65 |
| 0.5971 - 0.6280 | .5610 | .5615 | 6 | 2 1/4 | 9 | 48220ST | 48320ST | 48420ST | 267.60 | 221.10 | 205.40 | 198.10 | 190.15 | 183.90 | 174.65 |
| 0.6281 - 0.6590 | .5900 | .5615 | 6 | 2 1/4 | 9 | 48221ST | 48321ST | 48421ST | 273.05 | 226.50 | 211.05 | 203.65 | 195.60 | 189.40 | 180.25 |
| 0.6591 - 0.6910 | .6200 | .5615 | 6 | 2 1/4 | 9 | 48222ST | 48322ST | 48422ST | 284.25 | 237.80 | 222.25 | 214.85 | 206.80 | 200.50 | 191.45 |
| 0.6911 - 0.7220 | .6500 | .5615 | 6 | 2 1/4 | 9 | 48223ST | 48323ST | 48423ST | 287.05 | 240.75 | 225.20 | 217.65 | 209.85 | 203.55 | 194.30 |
| 0.7221 - 0.7530 | .6790 | .6245 | 6 | 2 1/2 | 9 1/2 | 48224ST | 48324ST | 48424ST | 290.05 | 243.45 | 227.90 | 220.60 | 212.65 | 206.35 | 197.25 |
| 0.7531 - 0.7840 | .7080 | .6245 | 6 | 2 1/2 | 9 1/2 | 48225ST | 48325ST | 48425ST | 295.30 | 248.80 | 233.30 | 225.75 | 217.75 | 211.50 | 202.45 |
| 0.7841 - 0.8160 | .7370 | .6245 | 6 | 2 1/2 | 9 1/2 | 48226ST | 48326ST | 48426ST | 295.30 | 248.80 | 233.30 | 225.75 | 217.75 | 211.50 | 202.45 |
| 0.8161 - 0.8470 | .7670 | .6245 | 6 | 2 1/2 | 9 1/2 | 48227ST | 48327ST | 48427ST | 306.20 | 259.75 | 244.20 | 236.75 | 228.85 | 222.60 | 213.45 |
| 0.8471 - 0.8780 | .7970 | .7495 | 6 | 2 5/8 | 10 | 48228ST | 48328ST | 48428ST | 317.75 | 269.55 | 253.45 | 245.70 | 237.45 | 230.95 | 221.50 |
| 0.8781 - 0.9090 | .8260 | .7495 | 6 | 2 5/8 | 10 | 48229ST | 48329ST | 48429ST | 354.30 | 306.00 | 289.90 | 282.20 | 273.90 | 267.35 | 257.95 |
| 0.9091 - 0.9410 | .8550 | .7495 | 8 | 2 5/8 | 10 | 48230ST | 48330ST | 48430ST | 354.30 | 306.00 | 289.90 | 282.20 | 273.90 | 267.35 | 257.95 |
| 0.9411 - 0.9720 | .8850 | .7495 | 8 | 2 5/8 | 10 | 48231ST | 48331ST | 48431ST | 366.95 | 318.75 | 302.50 | 294.85 | 286.65 | 280.10 | 270.65 |
| 0.9721 - 1.0030 | .9140 | .8745 | 8 | 2 3/4 | 10 1/2 | 48232ST | 48332ST | 48432ST | 366.95 | 318.75 | 302.50 | 294.85 | 286.65 | 280.10 | 270.65 |
| 1.0031 - 1.0660 | .9430 | .8745 | 8 | 2 3/4 | 10 1/2 | 48234ST | 48334ST | 48434ST | 414.25 | 366.05 | 349.85 | 342.25 | 334.00 | 327.50 | 317.90 |
| 1.0661 - 1.1280 | 1.0020 | .8745 | 8 | 2 7/8 | 11 | 48236ST | 48336ST | 48436ST | 424.05 | 375.95 | 359.75 | 352.05 | 343.80 | 337.30 | 327.90 |
| 1.1281 - 1.1905 | 1.0610 | .9995 | 8 | 2 7/8 | 11 | 48238ST | 48338ST | 48438ST | 440.95 | 392.65 | 376.70 | 368.90 | 360.65 | 354.25 | 344.65 |
| 1.1906 - 1.2530 | 1.1200 | .9995 | 8 | 3 | 11 1/2 | 48240ST | 48340ST | 48440ST | 460.80 | 412.60 | 396.50 | 388.80 | 380.50 | 374.05 | 364.55 |
| 1.2531 - 1.3155 | 1.1780 | .9995 | 8 | 3 | 11 1/2 | 48242ST | 48342ST | 48442ST | 499.85 | 451.65 | 435.50 | 427.80 | 419.60 | 412.90 | 403.55 |
| 1.3156 - 1.3780 | 1.2370 | .9995 | 8 | 3 1/4 | 12 | 48244ST | 48344ST | 48444ST | 538.35 | 490.20 | 473.90 | 466.25 | 458.05 | 451.40 | 442.10 |
| 1.3781 - 1.4405 | 1.2960 | .9995 | 8 | 3 1/4 | 12 | 48246ST | 48346ST | 48446ST | 564.60 | 516.45 | 500.20 | 492.50 | 484.30 | 477.80 | 468.40 |
| 1.4406 - 1.5030 | 1.3550 | 1.2495 | 8 | 3 1/2 | 12 1/2 | 48248ST | 48348ST | 48448ST | 591.20 | 542.80 | 526.60 | 519.05 | 510.70 | 504.25 | 494.90 |



SOLID CARBIDE REAMERS



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- TYPE 816** - RIGHT SPIRAL FLUTES FOR CAST IRONS & STEELS
- TYPE 807** - STRAIGHT FLUTES FOR NON-FERROUS MATERIALS
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- TYPE 800** - STRAIGHT FLUTES FOR CAST IRONS & STEELS
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- TYPE 820** - LEFT SPIRAL FLUTES FOR CAST IRONS & STEELS
- TYPE 801** - STRAIGHT FLUTES FOR NON-FERROUS MATERIALS
- TYPE 811** - RIGHT SPIRAL FLUTES FOR NON-FERROUS MATERIALS
- TYPE 821** - LEFT SPIRAL FLUTES FOR NON-FERROUS MATERIALS

REAMERS



SOLID CARBIDE REAMERS TECHNICAL INFORMATION

REAMER BASICS

- The reamer is used to finish machine a previously formed hole to an exact diameter with a smooth finish. It should **not** be used to significantly enlarge a hole (max. 5% – depending on material and hardness).
- Carbide reamers are especially appropriate for close tolerance reaming. Because carbide is very highly resistant to wear, the reamer will produce accurate hole size and a smooth finish far longer than high speed steel or cobalt.
- The reamer is an end cutting tool, cutting only on the chamfer's edge at the outside diameter of the preformed hole.

The standard 45° chamfer angle provides effective cutting action for most materials.

• Reamer Types:

- General Purpose** – Superior performance over high speed steel and cobalt; good in a wide variety of materials
- Material Specific** – Excellent in large production runs due to material specific tool geometry
- Coolant Fed** – Exceptional performance and tool life using material specific reamer technology and coolant fed capabilities; maximizes feeds & speeds

TECHNICAL REAMING GUIDE INFORMATION PAGES 10-15

Contact us for a PDF copy of "HANNIBAL'S Guide to Cost Effective Reaming." It includes:

Reamer Expedite Fees: Order must be received by 2:00 PM CST
18 pieces max per diameter
Does NOT require air shipment of the product

| Reamer Diameter | Service | Fee |
|-----------------|---------|-------|
| Up to 1.0000" | 24 Hour | 75.00 |
| Up to 1.0000" | 48 Hour | 50.00 |
| Over 1.0000" | 48 Hour | 75.00 |
| Over 1.0000" | 72 Hour | 50.00 |

MODIFICATIONS (Prompt delivery)

- Modified tool diameter - priced below
- Metric tool diameter
- Closer tool diameter tolerance
- Cutting diameter reduced for step or pilot
- End chamfer other than 45°
- End cutting or corner radius
- Increased/decreased circular margin
- Increased/decreased tool diameter back taper
- Shortened shank or reduced shank diameter
- Flat(s) or tang on shank

• Coatings available:

TITANIUM NITRIDE – TiN

TITANIUM CARBONITRIDE – TiCN

ZIRCONIUM NITRIDE – ZrN

AL TITANIUM NITRIDE – AlTiN

- Solid carbide head and straight shank
- Tool diameter tolerance - thru .2500": plus .0002", minus .0000"
over .2500": plus .0003", minus .0000"
- Shank diameter tolerance: plus .0000", minus .0010"



COOLANT FED MATERIAL SPECIFIC REAMERS

SOLID CARBIDE TYPES 806, 807, 808, & 809



SHORT SERIES CENTER AND FLUTE FED COOLANT STRAIGHT FLUTES



Center Fed Coolant Holes



Flute Fed Coolant Holes

| TOOL SELECTOR | CHIP CLASS | MATERIAL MACHINED | TOOL TYPE |
|---------------|-------------------------|---------------------------|-----------|
| | 20 | NON-FERROUS - LONG CHIPS | 807/809 |
| | 40 | NON-FERROUS - SHORT CHIPS | 807/809 |
| | 60 | CAST IRONS | 806/808 |
| | 80 | LOW STRENGTH STEELS | 806/808 |
| | 100 | MEDIUM STRENGTH STEELS | 806/808 |
| | 120 | HIGH STRENGTH STEELS | 806/808 |
| 140 | HIGH TEMPERATURE ALLOYS | 806/808 | |

MODIFICATIONS (Prompt delivery)

- Modified tool diameter - priced below
- Metric tool diameter
- Closer tool diameter tolerance - pg. 15
- Cutting diameter reduced for step or pilot
- End chamfer other than 45°
- End cutting or corner radius
- Increased/decreased circular margin
- Increased/decreased tool diameter back taper
- Shortened shank or reduced shank diameter
- Flat(s) or tang on shank
- Coatings available: See page 85

TYPE 806 - STRAIGHT FLUTES - FOR CAST IRONS & STEELS TYPE 807 - STRAIGHT FLUTES - FOR NON-FERROUS MATERIALS

- Solid carbide head and straight shank
- Tool diameter tolerance - thru .2500": plus .0002", minus .0000"
over .2500": plus .0003", minus .0000"
- Shank diameter tolerance: plus .0000", minus .0010"
- Tool geometry appropriate for material being machined

CENTER FED COOLANT

| TOOL DIAMETER RANGE | DIMENSIONS | | | | STRAIGHT - CENTER FED | | FINISHED TO MODIFIED TOOL DIAMETER | | | | | | |
|---------------------|------------------|---------------|--------|----------|-----------------------|--------------------------|--|----------|----------|----------|----------|----------|----------|
| | MAX. SHANK DIAM. | NO. OF FLUTES | LENGTH | | TYPE 807 NON-FERROUS | TYPE 806 CAST IRON/STEEL | PRICE EACH - BASED ON QUANTITY ORDERED | | | | | | |
| | | | FLT | OVER-ALL | | | 1 | 2 | 3 | 4 | 5-7 | 8-14 | OVER 14 |
| .1121-.1280 | .1099 | 4 | 5/8 | 2 1/4 | 80708 | 80608 | \$241.45 | \$209.20 | \$198.25 | \$193.20 | \$187.45 | \$183.25 | \$176.80 |
| .1281-.1435 | .1255 | 4 | 3/4 | 2 1/2 | 80709 | 80609 | 243.15 | 210.65 | 200.15 | 194.85 | 189.35 | 184.90 | 178.55 |
| .1436-.1590 | .1411 | 4 | 3/4 | 2 1/2 | 80710 | 80610 | 244.10 | 211.80 | 201.05 | 195.90 | 190.20 | 185.90 | 179.60 |
| .1591-.1750 | .1567 | 4 | 7/8 | 2 3/4 | 80711 | 80611 | 246.40 | 214.30 | 203.50 | 198.20 | 192.60 | 188.35 | 182.05 |
| .1751-.1910 | .1724 | 4 | 7/8 | 2 3/4 | 80712 | 80612 | 256.45 | 223.95 | 213.35 | 208.05 | 202.55 | 198.15 | 191.90 |
| .1911-.2210 | .1880 | 6 | 1 | 3 | 80714 | 80614 | 260.25 | 227.85 | 217.05 | 211.80 | 206.35 | 201.90 | 195.75 |
| .2211-.2530 | .2193 | 6 | 1 | 3 | 80716 | 80616 | 264.85 | 232.50 | 221.80 | 216.50 | 210.70 | 206.65 | 200.20 |
| .2531-.2840 | .2505 | 6 | 1 1/8 | 3 1/4 | 80718 | 80618 | 272.35 | 240.05 | 229.35 | 223.95 | 218.45 | 214.15 | 207.65 |
| .2841-.3150 | .2817 | 6 | 1 1/8 | 3 1/4 | 80720 | 80620 | 278.65 | 246.25 | 235.50 | 230.35 | 224.80 | 220.50 | 214.15 |
| .3151-.3470 | .3130 | 6 | 1 1/4 | 3 1/2 | 80722 | 80622 | 286.45 | 253.95 | 243.25 | 237.80 | 232.50 | 228.10 | 221.80 |
| .3471-.3780 | .3443 | 6 | 1 1/4 | 3 1/2 | 80724 | 80624 | 295.10 | 262.60 | 251.95 | 246.80 | 241.15 | 236.75 | 230.50 |
| .3781-.4090 | .3755 | 6 | 1 3/8 | 3 3/4 | 80726 | 80626 | 308.65 | 276.30 | 265.70 | 260.40 | 254.85 | 250.55 | 244.10 |

TYPE 808 - STRAIGHT FLUTES - FOR CAST IRONS & STEELS TYPE 809 - STRAIGHT FLUTES - FOR NON-FERROUS MATERIALS

FLUTE FED COOLANT

| TOOL DIAMETER RANGE | DIMENSIONS | | | | STRAIGHT - FLUTE FED | | FINISHED TO MODIFIED TOOL DIAMETER | | | | | | |
|---------------------|------------------|---------------|--------|----------|----------------------|--------------------------|--|----------|----------|----------|----------|----------|----------|
| | MAX. SHANK DIAM. | NO. OF FLUTES | LENGTH | | TYPE 809 NON-FERROUS | TYPE 808 CAST IRON/STEEL | PRICE EACH - BASED ON QUANTITY ORDERED | | | | | | |
| | | | FLT | OVER-ALL | | | 1 | 2 | 3 | 4 | 5-7 | 8-14 | OVER 14 |
| .1121-.1280 | .1099 | 4 | 5/8 | 2 1/4 | 80908 | 80808 | \$341.65 | \$309.30 | \$298.50 | \$293.35 | \$287.65 | \$283.50 | \$277.15 |
| .1281-.1435 | .1255 | 4 | 3/4 | 2 1/2 | 80909 | 80809 | 324.55 | 292.15 | 281.50 | 276.05 | 270.70 | 266.25 | 259.90 |
| .1436-.1590 | .1411 | 4 | 3/4 | 2 1/2 | 80910 | 80810 | 345.00 | 312.60 | 302.00 | 296.65 | 291.15 | 286.70 | 280.35 |
| .1591-.1750 | .1567 | 4 | 7/8 | 2 3/4 | 80911 | 80811 | 347.90 | 315.60 | 304.90 | 299.80 | 294.15 | 289.70 | 283.50 |
| .1751-.1910 | .1724 | 4 | 7/8 | 2 3/4 | 80912 | 80812 | 350.15 | 317.80 | 306.95 | 301.85 | 296.15 | 291.85 | 285.55 |
| .1911-.2210 | .1880 | 6 | 1 | 3 | 80914 | 80814 | 420.80 | 388.40 | 377.60 | 372.35 | 366.85 | 362.65 | 356.15 |
| .2211-.2530 | .2193 | 6 | 1 | 3 | 80916 | 80816 | 426.00 | 393.45 | 382.95 | 377.50 | 372.00 | 367.65 | 361.30 |
| .2531-.2840 | .2505 | 6 | 1 1/8 | 3 1/4 | 80918 | 80818 | 435.10 | 402.60 | 392.05 | 386.75 | 381.25 | 376.75 | 370.35 |
| .2841-.3150 | .2817 | 6 | 1 1/8 | 3 1/4 | 80920 | 80820 | 442.25 | 410.05 | 399.25 | 393.95 | 388.40 | 383.90 | 377.60 |
| .3151-.3470 | .3130 | 6 | 1 1/4 | 3 1/2 | 80922 | 80822 | 470.40 | 438.10 | 427.45 | 422.00 | 416.55 | 412.20 | 405.75 |
| .3471-.3780 | .3443 | 6 | 1 1/4 | 3 1/2 | 80924 | 80824 | 480.50 | 448.00 | 437.45 | 432.00 | 426.55 | 422.05 | 415.85 |
| .3781-.4090 | .3755 | 6 | 1 3/8 | 3 3/4 | 80926 | 80826 | 496.90 | 464.55 | 453.75 | 448.50 | 442.95 | 438.60 | 432.30 |

REAMERS



COOLANT FED MATERIAL SPECIFIC REAMERS

SOLID CARBIDE TYPES 816, 817, 828, & 829



SHORT SERIES CENTER AND FLUTE FED COOLANT RIGHT OR LEFT SPIRAL FLUTES



Right Spiral Flutes for Blind Holes



Left Spiral Flutes for Through Holes

| TOOL SELECTOR | CHIP CLASS | MATERIAL MACHINED | TOOL TYPE |
|---------------|---------------------------|--------------------------|-----------|
| | 20 | NON-FERROUS - LONG CHIPS | 817/829 |
| 40 | NON-FERROUS - SHORT CHIPS | 817/829 | |
| 60 | CAST IRONS | 816/828 | |
| 80 | LOW STRENGTH STEELS | 816/828 | |
| 100 | MEDIUM STRENGTH STEELS | 816/828 | |
| 120 | HIGH STRENGTH STEELS | 816/828 | |
| 140 | HIGH TEMPERATURE ALLOYS | 816/828 | |

MODIFICATIONS (Prompt delivery)

- Modified tool diameter - priced below
- Metric tool diameter
- Closer tool diameter tolerance - pg. 15
- Cutting diameter reduced for step or pilot
- End chamfer other than 45°
- End cutting or corner radius
- Increased/decreased circular margin
- Increased/decreased tool diameter back taper
- Shortened shank or reduced shank diameter
- Flat(s) or tang on shank
- Coatings available: See page 85

REAMERS

TYPE 816 - RIGHT SPIRAL FLUTES - FOR CAST IRONS & STEELS TYPE 817 - RIGHT SPIRAL FLUTES - FOR NON-FERROUS MATERIALS CENTER FED COOLANT

| TOOL DIAMETER RANGE | DIMENSIONS | | | | RIGHT - CENTER FED | | FINISHED TO MODIFIED TOOL DIAMETER | | | | | | |
|---------------------|------------------|---------------|--------|----------|----------------------|--------------------------|--|----------|----------|----------|----------|----------|----------|
| | MAX. SHANK DIAM. | NO. OF FLUTES | LENGTH | | TYPE 817 NON-FERROUS | TYPE 816 CAST IRON/STEEL | PRICE EACH - BASED ON QUANTITY ORDERED | | | | | | |
| | | | FLT | OVER-ALL | | | 1 | 2 | 3 | 4 | 5-7 | 8-14 | OVER 14 |
| .1121 - .1280 | .1099 | 4 | 5/8 | 2 1/4 | 81708 | 81608 | \$247.70 | \$215.05 | \$204.50 | \$199.15 | \$193.60 | \$189.35 | \$182.75 |
| .1281 - .1435 | .1255 | 4 | 3/4 | 2 1/2 | 81709 | 81609 | 249.20 | 216.95 | 206.15 | 200.90 | 195.10 | 191.05 | 184.70 |
| .1436 - .1590 | .1411 | 4 | 3/4 | 2 1/2 | 81710 | 81610 | 250.25 | 217.85 | 207.35 | 201.90 | 196.25 | 192.05 | 185.60 |
| .1591 - .1750 | .1567 | 4 | 7/8 | 2 3/4 | 81711 | 81611 | 252.70 | 220.30 | 209.65 | 204.35 | 198.75 | 194.35 | 187.95 |
| .1751 - .1910 | .1724 | 4 | 7/8 | 2 3/4 | 81712 | 81612 | 262.50 | 230.10 | 219.30 | 214.15 | 208.50 | 204.20 | 198.00 |
| .1911 - .2210 | .1880 | 6 | 1 | 3 | 81714 | 81614 | 266.20 | 233.80 | 223.10 | 217.70 | 212.30 | 207.85 | 201.50 |
| .2211 - .2530 | .2193 | 6 | 1 | 3 | 81716 | 81616 | 270.85 | 238.45 | 227.75 | 222.20 | 216.95 | 212.50 | 206.15 |
| .2531 - .2840 | .2505 | 6 | 1 1/8 | 3 1/4 | 81718 | 81618 | 278.20 | 246.05 | 235.30 | 230.00 | 224.30 | 219.95 | 213.65 |
| .2841 - .3150 | .2817 | 6 | 1 1/8 | 3 1/4 | 81720 | 81620 | 284.55 | 252.25 | 241.55 | 236.40 | 230.65 | 226.25 | 219.95 |
| .3151 - .3470 | .3130 | 6 | 1 1/4 | 3 1/2 | 81722 | 81622 | 292.35 | 260.20 | 249.25 | 244.05 | 238.60 | 234.25 | 227.85 |
| .3471 - .3780 | .3443 | 6 | 1 1/4 | 3 1/2 | 81724 | 81624 | 302.95 | 270.35 | 259.70 | 254.55 | 248.90 | 244.55 | 238.40 |
| .3781 - .4090 | .3755 | 6 | 1 3/8 | 3 3/4 | 81726 | 81626 | 316.65 | 284.45 | 273.55 | 268.35 | 262.70 | 258.45 | 252.20 |

TYPE 828 - LEFT SPIRAL FLUTES - FOR CAST IRONS & STEELS TYPE 829 - LEFT SPIRAL FLUTES - FOR NON-FERROUS MATERIALS FLUTE FED COOLANT

| TOOL DIAMETER RANGE | DIMENSIONS | | | | LEFT - FLUTE FED | | FINISHED TO MODIFIED TOOL DIAMETER | | | | | | |
|---------------------|------------------|---------------|--------|----------|----------------------|--------------------------|--|----------|----------|----------|----------|----------|----------|
| | MAX. SHANK DIAM. | NO. OF FLUTES | LENGTH | | TYPE 829 NON-FERROUS | TYPE 828 CAST IRON/STEEL | PRICE EACH - BASED ON QUANTITY ORDERED | | | | | | |
| | | | FLT | OVER-ALL | | | 1 | 2 | 3 | 4 | 5-7 | 8-14 | OVER 14 |
| .1121 - .1280 | .1099 | 4 | 5/8 | 2 1/4 | 82908 | 82808 | \$390.80 | \$358.45 | \$347.80 | \$342.55 | \$336.85 | \$332.50 | \$326.20 |
| .1281 - .1435 | .1255 | 4 | 3/4 | 2 1/2 | 82909 | 82809 | 392.95 | 360.55 | 349.85 | 344.75 | 339.00 | 334.60 | 328.35 |
| .1436 - .1590 | .1411 | 4 | 3/4 | 2 1/2 | 82910 | 82810 | 394.10 | 361.70 | 351.15 | 345.70 | 340.20 | 335.85 | 329.45 |
| .1591 - .1750 | .1567 | 4 | 7/8 | 2 3/4 | 82911 | 82811 | 396.90 | 364.50 | 353.70 | 348.55 | 342.90 | 338.70 | 332.35 |
| .1751 - .1910 | .1724 | 4 | 7/8 | 2 3/4 | 82912 | 82812 | 398.70 | 366.35 | 355.80 | 350.30 | 344.90 | 340.50 | 334.20 |
| .1911 - .2210 | .1880 | 6 | 1 | 3 | 82914 | 82814 | 515.60 | 483.35 | 472.55 | 467.20 | 461.55 | 457.45 | 451.10 |
| .2211 - .2530 | .2193 | 6 | 1 | 3 | 82916 | 82816 | 515.15 | 482.85 | 472.10 | 466.95 | 461.25 | 456.80 | 450.65 |
| .2531 - .2840 | .2505 | 6 | 1 1/8 | 3 1/4 | 82918 | 82818 | 524.15 | 491.90 | 481.00 | 475.85 | 470.20 | 465.95 | 459.65 |
| .2841 - .3150 | .2817 | 6 | 1 1/8 | 3 1/4 | 82920 | 82820 | 531.55 | 499.20 | 488.50 | 483.35 | 477.75 | 473.25 | 467.05 |
| .3151 - .3470 | .3130 | 6 | 1 1/4 | 3 1/2 | 82922 | 82822 | 559.55 | 527.30 | 516.45 | 511.20 | 505.65 | 501.35 | 494.90 |
| .3471 - .3780 | .3443 | 6 | 1 1/4 | 3 1/2 | 82924 | 82824 | 569.65 | 537.45 | 526.65 | 521.30 | 515.80 | 511.50 | 505.20 |
| .3781 - .4090 | .3755 | 6 | 1 3/8 | 3 3/4 | 82926 | 82826 | 586.50 | 553.90 | 543.35 | 537.95 | 532.55 | 528.10 | 521.90 |



MATERIAL SPECIFIC REAMERS

SOLID CARBIDE TYPES 802, 803, 812, 813, 822, 823



SHORT SERIES STRAIGHT, RIGHT SPIRAL, OR LEFT SPIRAL FLUTES STRAIGHT SHANK



| TOOL SELECTOR | CHIP CLASS | MATERIAL MACHINED | TOOL TYPE |
|---------------|---------------------------|--------------------------|-------------|
| | 20 | NON-FERROUS - LONG CHIPS | 803/813/823 |
| 40 | NON-FERROUS - SHORT CHIPS | 803/813/823 | |
| 60 | CAST IRONS | 802/812/822 | |
| 80 | LOW STRENGTH STEELS | 802/812/822 | |
| 100 | MEDIUM STRENGTH STEELS | 802/812/822 | |
| 120 | HIGH STRENGTH STEELS | 802/812/822 | |
| 140 | HIGH TEMPERATURE ALLOYS | 802/812/822 | |

TYPE 803 - STRAIGHT FLUTES - FOR NON-FERROUS MATERIALS
TYPE 802 - STRAIGHT FLUTES - FOR CAST IRONS & STEELS

- Solid carbide head and straight shank
- Tool diameter tolerance thru .2500": plus .0002", minus .0000"
 over .2500": plus .0003", minus .0000"
- Shank diameter tolerance: plus .0000", minus .0010"
- Tool geometry appropriate for material being machined

MODIFICATIONS (See list on page 85)

REAMERS

| TOOL DIAMETER RANGE | DIMENSIONS | | | | EDP NO. - STRAIGHT | | FINISHED TO MODIFIED TOOL DIAMETER | | | | | | |
|---------------------|------------------|---------------|--------|----------|----------------------|--------------------------|--|---------|---------|---------|---------|---------|---------|
| | MAX. SHANK DIAM. | NO. OF FLUTES | LENGTH | | TYPE 803 NON-FERROUS | TYPE 802 CAST IRON/STEEL | PRICE EACH - BASED ON QUANTITY ORDERED | | | | | | |
| | | | FLT | OVER-ALL | | | 1 | 2 | 3 | 4 | 5-7 | 8-14 | OVER 14 |
| *0.0591 - 0.0660 | .0580 | 4 | 3/8 | 1 1/2 | - | 80204 | \$127.20 | \$79.20 | \$63.15 | \$55.65 | \$47.35 | \$40.85 | \$31.45 |
| *0.0661 - 0.0740 | .0650 | 4 | 1/2 | 1 3/4 | - | 80245 | 127.65 | 79.50 | 63.55 | 55.90 | 47.70 | 41.25 | 31.90 |
| *0.0741 - 0.0810 | .0730 | 4 | 1/2 | 1 3/4 | - | 80205 | 127.85 | 79.70 | 63.65 | 56.20 | 47.85 | 41.55 | 31.95 |
| *0.0811 - 0.0890 | .0800 | 4 | 1/2 | 2 | - | 80255 | 128.50 | 80.65 | 64.55 | 57.00 | 48.85 | 42.35 | 32.90 |
| *0.0891 - 0.0970 | .0880 | 4 | 1/2 | 2 | - | 80206 | 129.40 | 81.30 | 65.35 | 57.70 | 49.60 | 42.85 | 33.70 |
| *0.0971 - 0.1120 | .0943 | 4 | 5/8 | 2 1/4 | 80307 | 80207 | 129.90 | 81.70 | 65.80 | 58.15 | 50.00 | 43.55 | 34.10 |
| 0.1121 - 0.1280 | .1099 | 4 | 5/8 | 2 1/4 | 80308 | 80208 | 132.20 | 84.10 | 68.00 | 60.50 | 52.10 | 45.70 | 36.40 |
| 0.1281 - 0.1435 | .1255 | 4 | 3/4 | 2 1/2 | 80309 | 80209 | 133.05 | 85.10 | 68.95 | 61.50 | 53.20 | 46.75 | 37.30 |
| 0.1436 - 0.1590 | .1411 | 4 | 3/4 | 2 1/2 | 80310 | 80210 | 135.35 | 87.25 | 71.20 | 63.65 | 55.55 | 48.90 | 39.55 |
| 0.1591 - 0.1750 | .1567 | 4 | 7/8 | 2 3/4 | 80311 | 80211 | 140.50 | 92.40 | 76.30 | 68.80 | 60.55 | 54.15 | 44.60 |
| 0.1751 - 0.1910 | .1724 | 4 | 7/8 | 2 3/4 | 80312 | 80212 | 143.85 | 95.75 | 79.70 | 72.20 | 63.80 | 57.55 | 48.05 |
| 0.1911 - 0.2210 | .1880 | 6 | 1 | 3 | 80314 | 80214 | 149.80 | 101.75 | 85.75 | 78.15 | 70.05 | 63.50 | 54.15 |
| 0.2211 - 0.2530 | .2193 | 6 | 1 | 3 | 80316 | 80216 | 159.95 | 111.95 | 95.90 | 88.45 | 80.15 | 73.65 | 64.35 |
| 0.2531 - 0.2840 | .2505 | 6 | 1 1/8 | 3 1/4 | 80318 | 80218 | 171.90 | 123.75 | 107.75 | 100.15 | 91.95 | 85.50 | 76.15 |
| 0.2841 - 0.3150 | .2817 | 6 | 1 1/8 | 3 1/4 | 80320 | 80220 | 184.95 | 136.90 | 120.70 | 113.35 | 105.10 | 98.60 | 89.25 |
| 0.3151 - 0.3470 | .3130 | 6 | 1 1/4 | 3 1/2 | 80322 | 80222 | 204.35 | 156.35 | 140.35 | 132.80 | 124.60 | 117.85 | 108.75 |
| 0.3471 - 0.3780 | .3443 | 6 | 1 1/4 | 3 1/2 | 80324 | 80224 | 206.80 | 158.95 | 143.00 | 135.35 | 127.15 | 120.55 | 111.20 |
| 0.3781 - 0.4090 | .3755 | 6 | 1 3/8 | 3 3/4 | 80326 | 80226 | 224.00 | 175.95 | 159.95 | 152.20 | 144.05 | 137.65 | 128.20 |
| 0.4091 - 0.4410 | .4067 | 6 | 1 3/8 | 3 3/4 | 80328 | 80228 | 225.95 | 177.90 | 161.90 | 154.30 | 146.05 | 139.55 | 130.15 |
| 0.4411 - 0.4720 | .4380 | 6 | 1 1/2 | 4 | 80330 | 80230 | 239.65 | 191.70 | 175.55 | 168.00 | 159.80 | 153.35 | 143.95 |
| 0.4721 - 0.5150 | .4693 | 6 | 1 1/2 | 4 | 80332 | 80232 | 253.05 | 205.00 | 188.85 | 181.40 | 173.15 | 166.75 | 157.30 |

TYPE 813 - RIGHT SPIRAL FLUTES - FOR NON-FERROUS MATERIALS
TYPE 812 - RIGHT SPIRAL FLUTES - FOR CAST IRONS & STEELS
TYPE 823 - LEFT SPIRAL FLUTES - FOR NON-FERROUS MATERIALS
TYPE 822 - LEFT SPIRAL FLUTES - FOR CAST IRONS & STEELS



- See description under Type 802-803 above
- Left spiral flutes should not be used on blind holes

| TOOL DIAMETER RANGE | DIMENSIONS | | | | EDP NO. - R SPIRAL | | EDP NO. - L SPIRAL | | FINISHED TO MODIFIED TOOL DIAMETER | | | | | | |
|---------------------|------------------|-------------|--------|----------|----------------------|--------------------------|----------------------|--------------------------|--|---------|---------|---------|---------|---------|---------|
| | MAX. SHANK DIAM. | NO. OF FLTS | LENGTH | | TYPE 813 NON-FERROUS | TYPE 812 CAST IRON/STEEL | TYPE 823 NON-FERROUS | TYPE 822 CAST IRON/STEEL | PRICE EACH - BASED ON QUANTITY ORDERED | | | | | | |
| | | | FLT | OVER-ALL | | | | | 1 | 2 | 3 | 4 | 5-7 | 8-14 | OVER 14 |
| *0.0971 - 0.1120 | .0943 | 4 | 5/8 | 2 1/4 | 81307 | 81207 | 82307 | 82207 | \$134.80 | \$86.30 | \$70.05 | \$62.40 | \$54.00 | \$47.35 | \$37.80 |
| 0.1121 - 0.1280 | .1099 | 4 | 5/8 | 2 1/4 | 81308 | 81208 | 82308 | 82208 | 137.35 | 88.75 | 72.50 | 64.90 | 56.40 | 49.90 | 40.45 |
| 0.1281 - 0.1435 | .1255 | 4 | 3/4 | 2 1/2 | 81309 | 81209 | 82309 | 82209 | 145.35 | 94.50 | 77.45 | 69.30 | 60.65 | 53.75 | 43.60 |
| 0.1436 - 0.1590 | .1411 | 4 | 3/4 | 2 1/2 | 81310 | 81210 | 82310 | 82210 | 148.10 | 97.10 | 80.00 | 72.00 | 63.30 | 56.25 | 46.50 |
| 0.1591 - 0.1750 | .1567 | 4 | 7/8 | 2 3/4 | 81311 | 81211 | 82311 | 82211 | 154.10 | 103.10 | 85.95 | 77.85 | 69.20 | 62.20 | 52.20 |
| 0.1751 - 0.1910 | .1724 | 4 | 7/8 | 2 3/4 | 81312 | 81212 | 82312 | 82212 | 157.85 | 107.05 | 89.80 | 81.70 | 73.00 | 66.05 | 56.15 |
| 0.1911 - 0.2210 | .1880 | 6 | 1 | 3 | 81314 | 81214 | 82314 | 82214 | 172.75 | 119.35 | 101.45 | 92.95 | 83.80 | 76.50 | 66.05 |
| 0.2211 - 0.2530 | .2193 | 6 | 1 | 3 | 81316 | 81216 | 82316 | 82216 | 185.40 | 131.70 | 113.85 | 105.55 | 96.30 | 89.25 | 78.85 |
| 0.2531 - 0.2840 | .2505 | 6 | 1 1/8 | 3 1/4 | 81318 | 81218 | 82318 | 82218 | 199.90 | 146.45 | 128.55 | 120.25 | 110.90 | 103.90 | 93.40 |
| 0.2841 - 0.3150 | .2817 | 6 | 1 1/8 | 3 1/4 | 81320 | 81220 | 82320 | 82220 | 215.65 | 162.30 | 144.35 | 135.90 | 126.85 | 119.55 | 109.05 |
| 0.3151 - 0.3470 | .3130 | 6 | 1 1/4 | 3 1/2 | 81322 | 81222 | 82322 | 82222 | 239.50 | 186.20 | 168.15 | 159.80 | 150.60 | 143.20 | 132.85 |
| 0.3471 - 0.3780 | .3443 | 6 | 1 1/4 | 3 1/2 | 81324 | 81224 | 82324 | 82224 | 242.80 | 189.35 | 171.45 | 162.90 | 153.85 | 146.60 | 136.15 |
| 0.3781 - 0.4090 | .3755 | 6 | 1 3/8 | 3 3/4 | 81326 | 81226 | 82326 | 82226 | 249.45 | 196.00 | 178.05 | 169.60 | 160.45 | 153.20 | 142.85 |
| 0.4091 - 0.4410 | .4067 | 6 | 1 3/8 | 3 3/4 | 81328 | 81228 | 82328 | 82228 | 251.60 | 198.00 | 180.10 | 171.75 | 162.50 | 155.30 | 144.95 |
| 0.4411 - 0.4720 | .4380 | 6 | 1 1/2 | 4 | 81330 | 81230 | 82330 | 82230 | 266.85 | 213.35 | 195.55 | 187.20 | 177.95 | 170.75 | 160.25 |
| 0.4721 - 0.5150 | .4693 | 6 | 1 1/2 | 4 | 81332 | 81232 | 82332 | 82232 | 281.65 | 228.15 | 210.35 | 202.00 | 192.70 | 185.45 | 175.05 |

*Designed with male centers



CHUCKING REAMERS SOLID CARBIDE TYPE 804 .0005 INCREMENTS



SHORT SERIES STRAIGHT FLUTES STRAIGHT SHANK



| TOOL SELECTOR | CHIP CLASS | MATERIAL MACHINED | TOOL TYPE |
|---------------|---------------------------|--------------------------|-----------|
| | 20 | NON-FERROUS - LONG CHIPS | 804 |
| 40 | NON-FERROUS - SHORT CHIPS | 804 | |
| 60 | CAST IRONS | 804 | |
| 80 | LOW STRENGTH STEELS | 804 | |
| 100 | MEDIUM STRENGTH STEELS | 804 | |
| 120 | HIGH STRENGTH STEELS | 804 | |
| 140 | HIGH TEMPERATURE ALLOYS | 804 | |

TYPE 804 - STRAIGHT FLUTES

- Solid carbide head and straight shank
- Tool diameter tolerance thru .2500": plus .0002"/minus .0000"
over .2500": plus .0003"/minus .0000"
- Shank diameter tolerance: plus .0000"/minus .0010"
- Tool geometry appropriate for material being machined

MODIFICATIONS (See list on page 85)

| TOOL DIAM. | EDP NO. | PRICE | TOOL DIAM. | EDP NO. | PRICE | TOOL DIAM. | EDP NO. | PRICE | TOOL DIAM. | EDP NO. | PRICE | TOOL DIAM. | EDP NO. | PRICE |
|------------|---------|---------|------------|---------|---------|------------|---------|---------|------------|---------|---------|------------|---------|---------|
| .0280 | 8040280 | \$42.55 | .0520 | 8040520 | \$41.55 | .0760 | 8040760 | \$41.70 | .1000 | 8041000 | \$46.25 | .1240 | 8041240 | \$50.00 |
| .0285 | 8040285 | 44.95 | .0525 | 8040525 | 43.75 | .0765 | 8040765 | 43.75 | .1005 | 8041005 | 46.25 | .1245 | 8041245 | 50.00 |
| .0290 | 8040290 | 44.95 | .0530 | 8040530 | 43.75 | .0770 | 8040770 | 43.75 | .1010 | 8041010 | 46.25 | .1250 | 80408 | 43.75 |
| .0295 | 8040295 | 42.55 | .0535 | 8040535 | 43.75 | .0775 | 8040775 | 43.75 | .1015 | 8041015 | 44.10 | .1255 | 8041255 | 50.00 |
| .0300 | 8040300 | 44.95 | .0540 | 8040540 | 43.75 | .0780 | 8040780 | 43.75 | .1020 | 8041020 | 46.70 | .1260 | 804032 | 47.50 |
| .0305 | 8040305 | 44.95 | .0545 | 8040545 | 43.75 | .0785 | 8040785 | 41.75 | .1025 | 8041025 | 46.90 | .1265 | 8041265 | 50.10 |
| .0310 | 8040310 | 42.55 | .0550 | 8040550 | 41.55 | .0790 | 8040790 | 43.95 | .1030 | 8041030 | 46.90 | .1270 | 8041270 | 50.10 |
| .0315 | 804008 | 42.55 | .0555 | 8040555 | 43.75 | .0795 | 8040795 | 43.95 | .1035 | 8041035 | 46.90 | .1275 | 8041275 | 50.10 |
| .0320 | 8040320 | 42.55 | .0560 | 8040560 | 43.75 | .0800 | 8040800 | 43.95 | .1040 | 8041040 | 46.90 | .1280 | 8041280 | 47.55 |
| .0325 | 8040325 | 44.95 | .0565 | 8040565 | 43.75 | .0805 | 8040805 | 43.95 | .1045 | 8041045 | 46.90 | .1285 | 8041285 | 47.55 |
| .0330 | 8040330 | 42.55 | .0570 | 8040570 | 43.75 | .0810 | 8040810 | 41.75 | .1050 | 8041050 | 46.90 | .1290 | 8041290 | 50.10 |
| .0335 | 8040335 | 42.55 | .0575 | 8040575 | 43.75 | .0815 | 8040815 | 44.10 | .1055 | 8041055 | 46.90 | .1295 | 8041295 | 50.10 |
| .0340 | 8040340 | 43.40 | .0580 | 8040580 | 43.75 | .0820 | 8040820 | 42.05 | .1060 | 8041060 | 46.90 | .1300 | 8041300 | 50.10 |
| .0345 | 8040345 | 43.40 | .0585 | 8040585 | 43.75 | .0825 | 8040825 | 44.10 | .1065 | 8041065 | 44.55 | .1305 | 8041305 | 50.10 |
| .0350 | 8040350 | 41.35 | .0590 | 8040590 | 38.20 | .0830 | 8040830 | 44.10 | .1070 | 8041070 | 47.55 | .1310 | 8041310 | 50.10 |
| .0355 | 8040355 | 43.40 | .0595 | 8040595 | 40.25 | .0835 | 8040835 | 44.10 | .1075 | 8041075 | 47.55 | .1315 | 8041315 | 50.10 |
| .0360 | 8040360 | 41.35 | .0600 | 8040600 | 43.55 | .0840 | 8040840 | 44.10 | .1080 | 8041080 | 47.55 | .1320 | 8041320 | 50.10 |
| .0365 | 8040365 | 43.40 | .0605 | 8040605 | 43.55 | .0845 | 8040845 | 44.10 | .1085 | 8041085 | 48.20 | .1325 | 8041325 | 50.10 |
| .0370 | 8040370 | 41.35 | .0610 | 8040610 | 41.25 | .0850 | 8040850 | 44.10 | .1090 | 8041090 | 48.20 | .1330 | 8041330 | 50.10 |
| .0375 | 8040375 | 43.40 | .0615 | 8040615 | 43.55 | .0855 | 8040855 | 44.10 | .1095 | 8041095 | 48.20 | .1335 | 8041335 | 50.10 |
| .0380 | 8040380 | 41.35 | .0620 | 8040620 | 43.55 | .0860 | 8040860 | 42.05 | .1100 | 8041100 | 45.90 | .1340 | 8041340 | 50.10 |
| .0385 | 8040385 | 43.40 | .0625 | 80404 | 37.90 | .0865 | 8040865 | 44.10 | .1105 | 8041105 | 48.90 | .1345 | 8041345 | 50.10 |
| .0390 | 8040390 | 41.35 | .0630 | 804016 | 41.25 | .0870 | 8040870 | 44.10 | .1110 | 8041110 | 46.70 | .1350 | 8041350 | 50.10 |
| .0395 | 8040395 | 43.40 | .0635 | 8040635 | 41.25 | .0875 | 8040875 | 44.10 | .1115 | 8041115 | 49.85 | .1355 | 8041355 | 50.10 |
| .0400 | 8040400 | 41.35 | .0640 | 8040640 | 43.55 | .0880 | 8040880 | 44.10 | .1120 | 8041120 | 49.85 | .1360 | 8041360 | 47.55 |
| .0405 | 8040405 | 43.40 | .0645 | 8040645 | 43.55 | .0885 | 8040885 | 44.10 | .1125 | 8041125 | 49.85 | .1365 | 8041365 | 50.10 |
| .0410 | 8040410 | 41.35 | .0650 | 8040650 | 43.75 | .0890 | 8040890 | 42.70 | .1130 | 8041130 | 47.25 | .1370 | 8041370 | 50.10 |
| .0415 | 8040415 | 43.40 | .0655 | 8040655 | 43.75 | .0895 | 8040895 | 45.20 | .1135 | 8041135 | 49.85 | .1375 | 8041375 | 50.10 |
| .0420 | 8040420 | 41.35 | .0660 | 8040660 | 43.75 | .0900 | 8040900 | 45.20 | .1140 | 8041140 | 49.85 | .1380 | 8041380 | 51.05 |
| .0425 | 8040425 | 43.40 | .0665 | 8040665 | 43.75 | .0905 | 8040905 | 45.20 | .1145 | 8041145 | 49.85 | .1385 | 8041385 | 51.05 |
| .0430 | 8040430 | 41.35 | .0670 | 8040670 | 41.70 | .0910 | 8040910 | 45.40 | .1150 | 8041150 | 49.85 | .1390 | 8041390 | 51.05 |
| .0435 | 8040435 | 43.75 | .0675 | 8040675 | 43.75 | .0915 | 8040915 | 45.40 | .1155 | 8041155 | 49.85 | .1395 | 8041395 | 51.05 |
| .0440 | 8040440 | 43.75 | .0680 | 8040680 | 43.75 | .0920 | 8040920 | 45.40 | .1160 | 8041160 | 47.25 | .1400 | 8041400 | 51.05 |
| .0445 | 8040445 | 43.75 | .0685 | 8040685 | 43.75 | .0925 | 8040925 | 42.85 | .1165 | 8041165 | 49.85 | .1405 | 8041405 | 48.20 |
| .0450 | 8040450 | 43.75 | .0690 | 8040690 | 43.75 | .0930 | 8040930 | 45.40 | .1170 | 8041170 | 49.85 | .1410 | 8041410 | 53.00 |
| .0455 | 8040455 | 43.75 | .0695 | 8040695 | 43.75 | .0935 | 8040935 | 42.85 | .1175 | 8041175 | 49.85 | .1415 | 8041415 | 53.00 |
| .0460 | 8040460 | 43.75 | .0700 | 8040700 | 41.70 | .0940 | 8040940 | 45.40 | .1180 | 8041180 | 49.85 | .1420 | 8041420 | 53.00 |
| .0465 | 8040465 | 41.55 | .0705 | 8040705 | 43.75 | .0945 | 804024 | 42.85 | .1185 | 8041185 | 50.00 | .1425 | 8041425 | 53.00 |
| .0470 | 8040470 | 43.75 | .0710 | 8040710 | 43.75 | .0950 | 8040950 | 45.90 | .1190 | 8041190 | 50.00 | .1430 | 8041430 | 53.00 |
| .0475 | 8040475 | 43.75 | .0715 | 8040715 | 43.75 | .0955 | 8040955 | 45.90 | .1195 | 8041195 | 50.00 | .1435 | 8041435 | 53.00 |
| .0480 | 8040480 | 43.75 | .0720 | 8040720 | 43.75 | .0960 | 8040960 | 43.75 | .1200 | 8041200 | 47.50 | .1440 | 8041440 | 50.35 |
| .0485 | 8040485 | 43.75 | .0725 | 8040725 | 43.75 | .0965 | 8040965 | 43.75 | .1205 | 8041205 | 50.00 | .1445 | 8041445 | 53.20 |
| .0490 | 8040490 | 43.75 | .0730 | 8040730 | 41.70 | .0970 | 8040970 | 45.90 | .1210 | 8041210 | 50.00 | .1450 | 8041450 | 53.20 |
| .0495 | 8040495 | 43.75 | .0735 | 8040735 | 43.75 | .0975 | 8040975 | 45.90 | .1215 | 8041215 | 50.00 | .1455 | 8041455 | 53.20 |
| .0500 | 8040500 | 43.75 | .0740 | 8040740 | 43.75 | .0980 | 8040980 | 43.75 | .1220 | 804031 | 47.50 | .1460 | 8041460 | 54.70 |
| .0505 | 8040505 | 43.75 | .0745 | 8040745 | 43.75 | .0985 | 8040985 | 46.25 | .1225 | 8041225 | 50.00 | .1465 | 8041465 | 54.70 |
| .0510 | 8040510 | 43.75 | .0750 | 8040750 | 43.75 | .0990 | 8040990 | 46.25 | .1230 | 8041230 | 50.00 | .1470 | 8041470 | 51.90 |
| .0515 | 8040515 | 43.75 | .0755 | 8040755 | 43.75 | .0995 | 8040995 | 44.10 | .1235 | 8041235 | 50.00 | .1475 | 8041475 | 54.70 |



CHUCKING REAMERS SOLID CARBIDE TYPE 804 .0005 INCREMENTS



SHORT SERIES STRAIGHT FLUTES STRAIGHT SHANK



| TOOL SELECTOR | CHIP CLASS | MATERIAL MACHINED | TOOL TYPE |
|---------------|------------|---------------------------|-----------|
| | 20 | NON-FERROUS - LONG CHIPS | 804 |
| | 40 | NON-FERROUS - SHORT CHIPS | 804 |
| | 60 | CAST IRONS | 804 |
| | 80 | LOW STRENGTH STEELS | 804 |
| | 100 | MEDIUM STRENGTH STEELS | 804 |
| | 120 | HIGH STRENGTH STEELS | 804 |
| | 140 | HIGH TEMPERATURE ALLOYS | 804 |

TYPE 804 - STRAIGHT FLUTES

- Solid carbide head and straight shank
- Tool diameter tolerance thru .2500": plus .0002"/minus .0000"
over .2500": plus.0003"/minus .0000"
- Shank diameter tolerance: plus .0000"/minus .0010"
- Tool geometry appropriate for material being machined

MODIFICATIONS (See list on page 85)

| TOOL DIAM. | EDP NO. | PRICE | TOOL DIAM. | EDP NO. | PRICE | TOOL DIAM. | EDP NO. | PRICE | TOOL DIAM. | EDP NO. | PRICE | TOOL DIAM. | EDP NO. | PRICE |
|------------|---------|---------|------------|---------|---------|------------|---------|---------|------------|---------|---------|------------|---------|---------|
| .1480 | 8041480 | \$54.85 | .1720 | 8041720 | \$63.55 | .1960 | 8041960 | \$70.65 | .2200 | 8042200 | \$86.10 | .2440 | 8042440 | \$91.90 |
| .1485 | 8041485 | 54.85 | .1725 | 8041725 | 63.55 | .1965 | 8041965 | 74.00 | .2205 | 804056 | 81.65 | .2445 | 8042445 | 91.90 |
| .1490 | 8041490 | 54.85 | .1730 | 8041730 | 60.50 | .1970 | 8041970 | 74.85 | .2210 | 8042210 | 81.65 | .2450 | 8042450 | 91.90 |
| .1495 | 8041495 | 52.10 | .1735 | 8041735 | 64.50 | .1975 | 8041975 | 74.85 | .2215 | 8042215 | 89.50 | .2455 | 8042455 | 91.90 |
| .1500 | 8041500 | 54.85 | .1740 | 8041740 | 64.50 | .1980 | 8041980 | 74.85 | .2220 | 8042220 | 89.50 | .2460 | 8042460 | 87.50 |
| .1505 | 8041505 | 54.85 | .1745 | 8041745 | 64.50 | .1985 | 8041985 | 74.85 | .2225 | 8042225 | 89.50 | .2465 | 8042465 | 91.90 |
| .1510 | 8041510 | 54.85 | .1750 | 8041750 | 64.50 | .1990 | 8041990 | 71.00 | .2230 | 8042230 | 89.50 | .2470 | 8042470 | 91.90 |
| .1515 | 8041515 | 54.85 | .1755 | 8041755 | 65.05 | .1995 | 8041995 | 77.00 | .2235 | 8042235 | 89.50 | .2475 | 8042475 | 91.90 |
| .1520 | 8041520 | 52.10 | .1760 | 8041760 | 65.05 | .2000 | 8042000 | 77.00 | .2240 | 8042240 | 89.50 | .2480 | 804063 | 87.50 |
| .1525 | 8041525 | 57.20 | .1765 | 8041765 | 65.05 | .2005 | 8042005 | 77.00 | .2245 | 8042245 | 89.50 | .2485 | 8042485 | 91.90 |
| .1530 | 8041530 | 57.20 | .1770 | 8041770 | 61.90 | .2010 | 8042010 | 73.30 | .2250 | 8042250 | 89.50 | .2490 | 8042490 | 91.90 |
| .1535 | 804039 | 54.35 | .1775 | 8041775 | 65.35 | .2015 | 8042015 | 77.00 | .2255 | 8042255 | 89.50 | .2495 | 8042495 | 91.90 |
| .1540 | 8041540 | 54.35 | .1780 | 8041780 | 65.35 | .2020 | 8042020 | 77.00 | .2260 | 8042260 | 89.50 | .2500 | 80416 | 79.50 |
| .1545 | 8041545 | 57.20 | .1785 | 8041785 | 65.35 | .2025 | 8042025 | 77.00 | .2265 | 8042265 | 90.45 | .2505 | 8042505 | 91.90 |
| .1550 | 8041550 | 57.20 | .1790 | 8041790 | 65.35 | .2030 | 8042030 | 77.00 | .2270 | 8042270 | 90.45 | .2510 | 8042510 | 91.90 |
| .1555 | 8041555 | 54.35 | .1795 | 8041795 | 65.35 | .2035 | 8042035 | 77.00 | .2275 | 8042275 | 90.45 | .2515 | 8042515 | 91.90 |
| .1560 | 8041560 | 57.20 | .1800 | 8041800 | 62.20 | .2040 | 8042040 | 73.30 | .2280 | 8042280 | 85.80 | .2520 | 804064 | 96.40 |
| .1565 | 8041565 | 59.20 | .1805 | 8041805 | 65.80 | .2045 | 8042045 | 77.00 | .2285 | 8042285 | 90.45 | .2525 | 8042525 | 96.40 |
| .1570 | 8041570 | 56.20 | .1810 | 8041810 | 65.85 | .2050 | 8042050 | 77.00 | .2290 | 8042290 | 90.45 | .2530 | 8042530 | 91.90 |
| .1575 | 804040 | 51.35 | .1815 | 8041815 | 66.30 | .2055 | 8042055 | 73.30 | .2295 | 8042295 | 90.45 | .2535 | 8042535 | 101.45 |
| .1580 | 8041580 | 60.50 | .1820 | 8041820 | 63.15 | .2060 | 8042060 | 77.00 | .2300 | 8042300 | 90.45 | .2540 | 8042540 | 101.45 |
| .1585 | 8041585 | 60.50 | .1825 | 8041825 | 66.65 | .2065 | 8042065 | 77.00 | .2305 | 8042305 | 90.45 | .2545 | 8042545 | 101.45 |
| .1590 | 8041590 | 57.65 | .1830 | 8041830 | 66.65 | .2070 | 8042070 | 77.00 | .2310 | 8042310 | 90.45 | .2550 | 8042550 | 101.45 |
| .1595 | 8041595 | 61.50 | .1835 | 8041835 | 66.80 | .2075 | 8042075 | 77.00 | .2315 | 8042315 | 90.45 | .2555 | 8042555 | 101.45 |
| .1600 | 8041600 | 61.50 | .1840 | 8041840 | 66.80 | .2080 | 8042080 | 77.00 | .2320 | 8042320 | 90.45 | .2560 | 8042560 | 101.45 |
| .1605 | 8041605 | 61.50 | .1845 | 8041845 | 66.80 | .2085 | 8042085 | 77.00 | .2325 | 8042325 | 90.45 | .2565 | 8042565 | 101.45 |
| .1610 | 8041610 | 58.35 | .1850 | 804047 | 63.55 | .2090 | 8042090 | 77.00 | .2330 | 8042330 | 90.45 | .2570 | 8042570 | 96.30 |
| .1615 | 8041615 | 61.50 | .1855 | 8041855 | 70.30 | .2095 | 8042095 | 77.00 | .2335 | 8042335 | 90.45 | .2575 | 8042575 | 101.45 |
| .1620 | 8041620 | 61.50 | .1860 | 8041860 | 70.30 | .2100 | 8042100 | 77.00 | .2340 | 8042340 | 85.80 | .2580 | 8042580 | 101.45 |
| .1625 | 8041625 | 61.50 | .1865 | 8041865 | 70.30 | .2105 | 8042105 | 77.00 | .2345 | 8042345 | 90.45 | .2585 | 8042585 | 101.45 |
| .1630 | 8041630 | 61.50 | .1870 | 8041870 | 66.90 | .2110 | 8042110 | 77.00 | .2350 | 8042350 | 90.45 | .2590 | 8042590 | 101.45 |
| .1635 | 8041635 | 61.65 | .1875 | 80412 | 60.90 | .2115 | 8042115 | 77.00 | .2355 | 8042355 | 90.45 | .2595 | 8042595 | 101.45 |
| .1640 | 8041640 | 61.50 | .1880 | 8041880 | 70.50 | .2120 | 8042120 | 77.00 | .2360 | 8042360 | 90.45 | .2600 | 8042600 | 101.45 |
| .1645 | 8041645 | 61.50 | .1885 | 8041885 | 70.50 | .2125 | 8042125 | 77.00 | .2365 | 8042365 | 91.90 | .2605 | 8042605 | 101.45 |
| .1650 | 8041650 | 61.50 | .1890 | 804048 | 66.90 | .2130 | 8042130 | 73.30 | .2370 | 8042370 | 91.90 | .2610 | 8042610 | 96.30 |
| .1655 | 8041655 | 61.50 | .1895 | 8041895 | 71.20 | .2135 | 8042135 | 77.00 | .2375 | 8042375 | 91.90 | .2615 | 8042615 | 101.45 |
| .1660 | 8041660 | 58.70 | .1900 | 8041900 | 71.20 | .2140 | 8042140 | 77.00 | .2380 | 8042380 | 87.50 | .2620 | 8042620 | 101.45 |
| .1665 | 8041665 | 62.20 | .1905 | 8041905 | 71.20 | .2145 | 8042145 | 77.00 | .2385 | 8042385 | 91.90 | .2625 | 8042625 | 101.45 |
| .1670 | 8041670 | 62.20 | .1910 | 8041910 | 67.80 | .2150 | 8042150 | 77.00 | .2390 | 8042390 | 91.90 | .2630 | 8042630 | 101.45 |
| .1675 | 8041675 | 62.20 | .1915 | 8041915 | 71.35 | .2155 | 8042155 | 77.00 | .2395 | 8042395 | 91.90 | .2635 | 8042635 | 101.45 |
| .1680 | 8041680 | 62.20 | .1920 | 8041920 | 71.35 | .2160 | 8042160 | 77.00 | .2400 | 8042400 | 91.90 | .2640 | 8042640 | 101.45 |
| .1685 | 8041685 | 62.20 | .1925 | 8041925 | 71.35 | .2165 | 804055 | 66.90 | .2405 | 8042405 | 91.90 | .2645 | 8042645 | 101.45 |
| .1690 | 8041690 | 62.20 | .1930 | 8041930 | 72.15 | .2170 | 8042170 | 77.00 | .2410 | 8042410 | 91.90 | .2650 | 8042650 | 101.45 |
| .1695 | 8041695 | 59.25 | .1935 | 8041935 | 68.20 | .2175 | 8042175 | 77.00 | .2415 | 8042415 | 91.90 | .2655 | 8042655 | 101.45 |
| .1700 | 8041700 | 63.55 | .1940 | 8041940 | 72.15 | .2180 | 8042180 | 77.00 | .2420 | 8042420 | 87.50 | .2660 | 8042660 | 96.30 |
| .1705 | 8041705 | 63.55 | .1945 | 8041945 | 72.15 | .2185 | 8042185 | 73.30 | .2425 | 8042425 | 91.90 | .2665 | 8042665 | 101.45 |
| .1710 | 8041710 | 63.55 | .1950 | 8041950 | 74.00 | .2190 | 8042190 | 86.10 | .2430 | 8042430 | 91.90 | .2670 | 8042670 | 101.45 |
| .1715 | 8041715 | 63.55 | .1955 | 8041955 | 74.00 | .2195 | 8042195 | 86.10 | .2435 | 8042435 | 91.90 | .2675 | 8042675 | 101.45 |

REAMERS



CHUCKING REAMERS SOLID CARBIDE TYPE 804 .0005 INCREMENTS



SHORT SERIES STRAIGHT FLUTES STRAIGHT SHANK



| TOOL SELECTOR | CHIP CLASS | MATERIAL MACHINED | TOOL TYPE |
|---------------|---------------------------|--------------------------|-----------|
| | 20 | NON-FERROUS - LONG CHIPS | 804 |
| 40 | NON-FERROUS - SHORT CHIPS | 804 | |
| 60 | CAST IRONS | 804 | |
| 80 | LOW STRENGTH STEELS | 804 | |
| 100 | MEDIUM STRENGTH STEELS | 804 | |
| 120 | HIGH STRENGTH STEELS | 804 | |
| 140 | HIGH TEMPERATURE ALLOYS | 804 | |

TYPE 804 - STRAIGHT FLUTES

- Solid carbide head and straight shank
- Tool diameter tolerance thru .2500": plus .0002"/minus .0000"
over .2500": plus .0003"/minus .0000"
- Shank diameter tolerance: plus .0000"/minus .0010"
- Tool geometry appropriate for material being machined

MODIFICATIONS (See list on page 85)

| TOOL DIAM. | EDP NO. | PRICE | TOOL DIAM. | EDP NO. | PRICE | TOOL DIAM. | EDP NO. | PRICE | TOOL DIAM. | EDP NO. | PRICE | TOOL DIAM. | EDP NO. | PRICE |
|------------|---------|----------|------------|---------|----------|------------|---------|----------|------------|---------|----------|------------|---------|----------|
| .2680 | 8042680 | \$101.45 | .2920 | 8042920 | \$118.90 | .3160 | 8043160 | \$123.70 | .3400 | 8043400 | \$150.85 | .3640 | 8043640 | \$154.65 |
| .2685 | 8042685 | 101.45 | .2925 | 8042925 | 118.90 | .3165 | 8043165 | 131.65 | .3405 | 8043405 | 150.85 | .3645 | 8043645 | 154.65 |
| .2690 | 8042690 | 101.45 | .2930 | 8042930 | 118.90 | .3170 | 8043170 | 131.65 | .3410 | 8043410 | 150.85 | .3650 | 8043650 | 154.65 |
| .2695 | 8042695 | 101.45 | .2935 | 8042935 | 118.90 | .3175 | 8043175 | 131.65 | .3415 | 8043415 | 150.85 | .3655 | 8043655 | 154.65 |
| .2700 | 8042700 | 101.45 | .2940 | 8042940 | 118.90 | .3180 | 8043180 | 131.65 | .3420 | 8043420 | 150.85 | .3660 | 8043660 | 154.65 |
| .2705 | 8042705 | 101.45 | .2945 | 8042945 | 118.90 | .3185 | 8043185 | 131.65 | .3425 | 804087 | 150.50 | .3665 | 8043665 | 154.65 |
| .2710 | 8042710 | 101.45 | .2950 | 8042950 | 113.05 | .3190 | 8043190 | 131.65 | .3430 | 8043430 | 150.85 | .3670 | 8043670 | 154.65 |
| .2715 | 8042715 | 101.45 | .2955 | 8042955 | 118.90 | .3195 | 8043195 | 131.65 | .3435 | 8043435 | 150.85 | .3675 | 8043675 | 154.65 |
| .2720 | 8042720 | 96.30 | .2960 | 8042960 | 118.90 | .3200 | 8043200 | 131.65 | .3440 | 8043440 | 151.20 | .3680 | 8043680 | 147.10 |
| .2725 | 8042725 | 101.45 | .2965 | 8042965 | 118.90 | .3205 | 8043205 | 131.65 | .3445 | 8043445 | 151.20 | .3685 | 8043685 | 156.25 |
| .2730 | 8042730 | 101.45 | .2970 | 8042970 | 123.70 | .3210 | 8043210 | 131.65 | .3450 | 8043450 | 151.20 | .3690 | 8043690 | 156.50 |
| .2735 | 8042735 | 101.45 | .2975 | 8042975 | 123.70 | .3215 | 8043215 | 131.65 | .3455 | 8043455 | 151.20 | .3695 | 8043695 | 156.25 |
| .2740 | 8042740 | 101.45 | .2980 | 8042980 | 123.70 | .3220 | 8043220 | 131.65 | .3460 | 8043460 | 151.20 | .3700 | 8043700 | 156.25 |
| .2745 | 8042745 | 101.45 | .2985 | 8042985 | 123.70 | .3225 | 8043225 | 131.65 | .3465 | 804088 | 151.20 | .3705 | 8043705 | 156.25 |
| .2750 | 8042750 | 101.45 | .2990 | 8042990 | 123.70 | .3230 | 8043230 | 125.20 | .3470 | 8043470 | 151.20 | .3710 | 8043710 | 156.25 |
| .2755 | 8042755 | 101.45 | .2995 | 8042995 | 123.70 | .3235 | 8043235 | 131.65 | .3475 | 8043475 | 151.20 | .3715 | 8043715 | 156.25 |
| .2760 | 8042760 | 101.45 | .3000 | 8043000 | 123.70 | .3240 | 8043240 | 150.85 | .3480 | 8043480 | 143.95 | .3720 | 8043720 | 156.25 |
| .2765 | 8042765 | 101.45 | .3005 | 8043005 | 123.70 | .3245 | 8043245 | 150.85 | .3485 | 8043485 | 151.20 | .3725 | 8043725 | 156.25 |
| .2770 | 8042770 | 96.30 | .3010 | 8043010 | 123.70 | .3250 | 8043250 | 150.85 | .3490 | 8043490 | 151.20 | .3730 | 8043730 | 156.25 |
| .2775 | 8042775 | 101.45 | .3015 | 8043015 | 123.70 | .3255 | 8043255 | 150.85 | .3495 | 8043495 | 151.20 | .3735 | 8043735 | 156.25 |
| .2780 | 8042780 | 109.80 | .3020 | 8043020 | 117.75 | .3260 | 8043260 | 150.85 | .3500 | 8043500 | 151.20 | .3740 | 804095 | 147.95 |
| .2785 | 8042785 | 109.80 | .3025 | 8043025 | 123.70 | .3265 | 8043265 | 150.85 | .3505 | 8043505 | 151.20 | .3745 | 8043745 | 156.25 |
| .2790 | 8042790 | 109.80 | .3030 | 8043030 | 123.70 | .3270 | 8043270 | 150.85 | .3510 | 8043510 | 151.20 | .3750 | 80424 | 135.40 |
| .2795 | 804071 | 109.70 | .3035 | 8043035 | 123.70 | .3275 | 8043275 | 150.85 | .3515 | 8043515 | 151.20 | .3755 | 8043755 | 185.20 |
| .2800 | 8042800 | 109.80 | .3040 | 8043040 | 123.70 | .3280 | 8043280 | 150.85 | .3520 | 8043520 | 151.20 | .3760 | 8043760 | 185.35 |
| .2805 | 8042805 | 109.80 | .3045 | 8043045 | 123.70 | .3285 | 8043285 | 150.85 | .3525 | 8043525 | 151.20 | .3765 | 8043765 | 185.20 |
| .2810 | 8042810 | 104.40 | .3050 | 8043050 | 123.70 | .3290 | 8043290 | 150.85 | .3530 | 8043530 | 151.20 | .3770 | 8043770 | 175.75 |
| .2815 | 8042815 | 109.80 | .3055 | 8043055 | 123.70 | .3295 | 8043295 | 150.85 | .3535 | 8043535 | 151.20 | .3775 | 8043775 | 185.20 |
| .2820 | 8042820 | 118.90 | .3060 | 8043060 | 123.70 | .3300 | 8043300 | 150.85 | .3540 | 8043540 | 151.20 | .3780 | 804096 | 184.70 |
| .2825 | 8042825 | 118.90 | .3065 | 8043065 | 123.70 | .3305 | 8043305 | 150.85 | .3545 | 8043545 | 151.20 | .3785 | 8043785 | 185.20 |
| .2830 | 8042830 | 118.90 | .3070 | 8043070 | 123.70 | .3310 | 8043310 | 145.65 | .3550 | 8043550 | 151.85 | .3790 | 8043790 | 185.20 |
| .2835 | 804072 | 118.55 | .3075 | 8043075 | 123.70 | .3315 | 8043315 | 150.85 | .3555 | 8043555 | 151.85 | .3795 | 8043795 | 185.20 |
| .2840 | 8042840 | 118.90 | .3080 | 8043080 | 123.70 | .3320 | 8043320 | 143.20 | .3560 | 8043560 | 151.85 | .3800 | 8043800 | 185.20 |
| .2845 | 8042845 | 118.90 | .3085 | 8043085 | 123.70 | .3325 | 8043325 | 150.85 | .3565 | 8043565 | 151.85 | .3805 | 8043805 | 185.20 |
| .2850 | 8042850 | 118.90 | .3090 | 8043090 | 123.70 | .3330 | 8043330 | 150.85 | .3570 | 8043570 | 151.85 | .3810 | 8043810 | 185.20 |
| .2855 | 8042855 | 118.90 | .3095 | 8043095 | 123.70 | .3335 | 8043335 | 150.85 | .3575 | 8043575 | 151.85 | .3815 | 8043815 | 185.20 |
| .2860 | 8042860 | 118.90 | .3100 | 8043100 | 123.70 | .3340 | 8043340 | 150.85 | .3580 | 8043580 | 144.55 | .3820 | 8043820 | 185.20 |
| .2865 | 8042865 | 118.90 | .3105 | 8043105 | 123.70 | .3345 | 8043345 | 150.85 | .3585 | 8043585 | 151.85 | .3825 | 8043825 | 185.20 |
| .2870 | 8042870 | 118.90 | .3110 | 804079 | 123.70 | .3350 | 8043350 | 150.85 | .3590 | 8043590 | 153.10 | .3830 | 8043830 | 185.20 |
| .2875 | 8042875 | 118.90 | .3115 | 8043115 | 123.70 | .3355 | 8043355 | 150.85 | .3595 | 8043595 | 154.65 | .3835 | 8043835 | 185.20 |
| .2880 | 8042880 | 118.90 | .3120 | 8043120 | 123.70 | .3360 | 8043360 | 150.85 | .3600 | 8043600 | 154.65 | .3840 | 8043840 | 185.20 |
| .2885 | 8042885 | 118.90 | .3125 | 80420 | 107.70 | .3365 | 8043365 | 150.85 | .3605 | 8043605 | 154.65 | .3845 | 8043845 | 185.20 |
| .2890 | 8042890 | 118.90 | .3130 | 8043130 | 123.70 | .3370 | 8043370 | 150.85 | .3610 | 8043610 | 154.65 | .3850 | 8043850 | 185.20 |
| .2895 | 8042895 | 118.90 | .3135 | 8043135 | 123.70 | .3375 | 8043375 | 150.85 | .3615 | 8043615 | 154.65 | .3855 | 8043855 | 185.20 |
| .2900 | 8042900 | 113.05 | .3140 | 8043140 | 123.70 | .3380 | 8043380 | 150.85 | .3620 | 8043620 | 154.65 | .3860 | 8043860 | 176.25 |
| .2905 | 8042905 | 118.90 | .3145 | 8043145 | 123.70 | .3385 | 8043385 | 150.85 | .3625 | 8043625 | 154.65 | .3865 | 8043865 | 194.60 |
| .2910 | 8042910 | 118.90 | .3150 | 804080 | 107.70 | .3390 | 8043390 | 143.20 | .3630 | 8043630 | 154.65 | .3870 | 8043870 | 194.60 |
| .2915 | 8042915 | 118.90 | .3155 | 8043155 | 123.70 | .3395 | 8043395 | 150.85 | .3635 | 8043635 | 154.65 | .3875 | 8043875 | 194.60 |



CHUCKING REAMERS SOLID CARBIDE TYPE 804 .0005 INCREMENTS



SHORT SERIES STRAIGHT FLUTES STRAIGHT SHANK



TYPE 804 - STRAIGHT FLUTES

- Solid carbide head and straight shank
- Tool diameter tolerance thru .2500": plus .0002"/minus .0000"
over .2500": plus.0003"/minus .0000"
- Shank diameter tolerance: plus .0000"/minus .0010"
- Tool geometry appropriate for material being machined

| TOOL SELECTOR | CHIP CLASS | MATERIAL MACHINED | TOOL TYPE |
|---------------|------------|---------------------------|-----------|
| | 20 | NON-FERROUS - LONG CHIPS | 804 |
| | 40 | NON-FERROUS - SHORT CHIPS | 804 |
| | 60 | CAST IRONS | 804 |
| | 80 | LOW STRENGTH STEELS | 804 |
| | 100 | MEDIUM STRENGTH STEELS | 804 |
| | 120 | HIGH STRENGTH STEELS | 804 |
| | 140 | HIGH TEMPERATURE ALLOYS | 804 |

MODIFICATIONS (See list on page 85)

| TOOL DIAM. | EDP NO. | PRICE | TOOL DIAM. | EDP NO. | PRICE | TOOL DIAM. | EDP NO. | PRICE | TOOL DIAM. | EDP NO. | PRICE | TOOL DIAM. | EDP NO. | PRICE |
|------------|---------|----------|------------|---------|----------|------------|---------|----------|------------|---------|----------|------------|---------|----------|
| .3880 | 8043880 | \$194.60 | .4135 | 8044135 | \$199.85 | .4390 | 8044390 | \$218.85 | .4645 | 8044645 | \$218.85 | .4900 | 8044900 | \$238.10 |
| .3885 | 8043885 | 194.60 | .4140 | 8044140 | 199.85 | .4395 | 8044395 | 218.85 | .4650 | 8044650 | 218.85 | .4905 | 8044905 | 238.10 |
| .3890 | 8043890 | 194.60 | .4145 | 8044145 | 199.85 | .4400 | 8044400 | 218.85 | .4655 | 8044655 | 218.85 | .4910 | 8044910 | 238.10 |
| .3895 | 8043895 | 194.60 | .4150 | 8044150 | 199.85 | .4405 | 8044405 | 218.85 | .4660 | 8044660 | 218.85 | .4915 | 8044915 | 238.10 |
| .3900 | 8043900 | 194.60 | .4155 | 8044155 | 199.85 | .4410 | 8044410 | 218.85 | .4665 | 8044665 | 218.85 | .4920 | 8044920 | 238.10 |
| .3905 | 8043905 | 194.60 | .4160 | 8044160 | 199.85 | .4415 | 8044415 | 218.85 | .4670 | 8044670 | 218.85 | .4925 | 8044925 | 238.10 |
| .3910 | 8043910 | 194.60 | .4165 | 8044165 | 199.85 | .4420 | 8044420 | 218.85 | .4675 | 8044675 | 218.85 | .4930 | 8044930 | 238.10 |
| .3915 | 8043915 | 194.60 | .4170 | 8044170 | 199.85 | .4425 | 8044425 | 218.85 | .4680 | 8044680 | 218.85 | .4935 | 8044935 | 238.10 |
| .3920 | 8043920 | 194.60 | .4175 | 8044175 | 199.85 | .4430 | 8044430 | 218.85 | .4685 | 804119 | 218.85 | .4940 | 8044940 | 238.10 |
| .3925 | 8043925 | 194.60 | .4180 | 8044180 | 199.85 | .4435 | 8044435 | 218.85 | .4690 | 8044690 | 218.85 | .4945 | 8044945 | 238.10 |
| .3930 | 8043930 | 194.60 | .4185 | 8044185 | 199.85 | .4440 | 8044440 | 218.85 | .4695 | 8044695 | 218.85 | .4950 | 8044950 | 238.10 |
| .3935 | 8043935 | 194.60 | .4190 | 8044190 | 199.85 | .4445 | 8044445 | 218.85 | .4700 | 8044700 | 218.85 | .4955 | 8044955 | 238.10 |
| .3940 | 8043940 | 194.60 | .4195 | 8044195 | 199.85 | .4450 | 8044450 | 218.85 | .4705 | 8044705 | 218.85 | .4960 | 8044960 | 238.10 |
| .3945 | 8043945 | 194.60 | .4200 | 8044200 | 199.85 | .4455 | 8044455 | 218.85 | .4710 | 8044710 | 218.85 | .4965 | 8044965 | 238.10 |
| .3950 | 8043950 | 194.60 | .4205 | 8044205 | 199.85 | .4460 | 8044460 | 218.85 | .4715 | 8044715 | 218.85 | .4970 | 8044970 | 238.10 |
| .3955 | 8043955 | 194.60 | .4210 | 8044210 | 199.85 | .4465 | 8044465 | 218.85 | .4720 | 8044720 | 218.85 | .4975 | 8044975 | 238.10 |
| .3960 | 8043960 | 194.60 | .4215 | 8044215 | 199.85 | .4470 | 8044470 | 218.85 | .4725 | 8044725 | 238.10 | .4980 | 8044980 | 238.10 |
| .3965 | 8043965 | 194.60 | .4220 | 8044220 | 199.85 | .4475 | 8044475 | 218.85 | .4730 | 8044730 | 238.10 | .4985 | 8044985 | 238.10 |
| .3970 | 8043970 | 185.35 | .4225 | 8044225 | 199.85 | .4480 | 8044480 | 218.85 | .4735 | 8044735 | 238.10 | .4990 | 8044990 | 238.10 |
| .3975 | 8043975 | 194.60 | .4230 | 8044230 | 199.85 | .4485 | 8044485 | 218.85 | .4740 | 8044740 | 238.10 | .4995 | 8044995 | 225.15 |
| .3980 | 8043980 | 194.60 | .4235 | 8044235 | 199.85 | .4490 | 8044490 | 218.85 | .4745 | 8044745 | 238.10 | .5000 | 80432 | 225.15 |
| .3985 | 8043985 | 194.60 | .4240 | 8044240 | 199.85 | .4495 | 8044495 | 218.85 | .4750 | 8044750 | 238.10 | .5005 | 8045005 | 282.65 |
| .3990 | 8043990 | 194.60 | .4245 | 8044245 | 199.85 | .4500 | 8044500 | 218.85 | .4755 | 8044755 | 238.10 | .5010 | 8045010 | 282.65 |
| .3995 | 8043995 | 194.60 | .4250 | 8044250 | 199.85 | .4505 | 8044505 | 218.85 | .4760 | 8044760 | 238.10 | .5015 | 8045015 | 282.65 |
| .4000 | 8044000 | 194.60 | .4255 | 8044255 | 199.85 | .4510 | 8044510 | 218.85 | .4765 | 8044765 | 238.10 | .5020 | 8045020 | 282.65 |
| .4005 | 8044005 | 194.60 | .4260 | 8044260 | 199.85 | .4515 | 8044515 | 218.85 | .4770 | 8044770 | 238.10 | .5025 | 8045025 | 282.65 |
| .4010 | 8044010 | 194.60 | .4265 | 8044265 | 199.85 | .4520 | 8044520 | 218.85 | .4775 | 8044775 | 238.10 | .5030 | 8045030 | 282.65 |
| .4015 | 8044015 | 194.60 | .4270 | 8044270 | 199.85 | .4525 | 8044525 | 218.85 | .4780 | 8044780 | 238.10 | .5035 | 8045035 | 282.65 |
| .4020 | 8044020 | 194.60 | .4275 | 8044275 | 199.85 | .4530 | 8044530 | 218.85 | .4785 | 8044785 | 238.10 | .5040 | 8045040 | 282.65 |
| .4025 | 8044025 | 194.60 | .4280 | 8044280 | 199.85 | .4535 | 8044535 | 218.85 | .4790 | 8044790 | 238.10 | .5045 | 8045045 | 282.65 |
| .4030 | 8044030 | 194.60 | .4285 | 8044285 | 199.85 | .4540 | 8044540 | 218.85 | .4795 | 8044795 | 238.10 | .5050 | 8045050 | 282.65 |
| .4035 | 8044035 | 194.60 | .4290 | 8044290 | 199.85 | .4545 | 8044545 | 218.85 | .4800 | 8044800 | 238.10 | .5055 | 8045055 | 282.65 |
| .4040 | 8044040 | 185.35 | .4295 | 8044295 | 199.85 | .4550 | 8044550 | 218.85 | .4805 | 8044805 | 238.10 | .5060 | 8045060 | 282.65 |
| .4045 | 8044045 | 194.60 | .4300 | 8044300 | 199.85 | .4555 | 8044555 | 218.85 | .4810 | 8044810 | 238.10 | .5065 | 8045065 | 282.65 |
| .4050 | 8044050 | 194.60 | .4305 | 8044305 | 199.85 | .4560 | 8044560 | 218.85 | .4815 | 8044815 | 238.10 | .5070 | 8045070 | 282.65 |
| .4055 | 804103 | 194.60 | .4310 | 8044310 | 199.85 | .4565 | 8044565 | 218.85 | .4820 | 8044820 | 238.10 | .5075 | 8045075 | 282.65 |
| .4060 | 8044060 | 194.60 | .4315 | 8044315 | 199.85 | .4570 | 8044570 | 218.85 | .4825 | 8044825 | 238.10 | .5080 | 8045080 | 282.65 |
| .4065 | 8044065 | 194.60 | .4320 | 8044320 | 199.85 | .4575 | 8044575 | 218.85 | .4830 | 8044830 | 238.10 | .5085 | 8045085 | 282.65 |
| .4070 | 8044070 | 194.60 | .4325 | 8044325 | 199.85 | .4580 | 8044580 | 218.85 | .4835 | 8044835 | 238.10 | .5090 | 8045090 | 282.65 |
| .4075 | 8044075 | 194.60 | .4330 | 8044330 | 199.85 | .4585 | 8044585 | 218.85 | .4840 | 8044840 | 238.10 | .5095 | 8045095 | 282.65 |
| .4080 | 8044080 | 194.60 | .4335 | 8044335 | 199.85 | .4590 | 8044590 | 218.85 | .4845 | 8044845 | 238.10 | .5100 | 8045100 | 282.65 |
| .4085 | 8044085 | 194.60 | .4340 | 8044340 | 199.85 | .4595 | 8044595 | 218.85 | .4850 | 8044850 | 238.10 | .5105 | 8045105 | 282.65 |
| .4090 | 8044090 | 194.60 | .4345 | 8044345 | 199.85 | .4600 | 8044600 | 218.85 | .4855 | 8044855 | 238.10 | .5110 | 8045110 | 282.65 |
| .4095 | 8044095 | 194.60 | .4350 | 8044350 | 199.85 | .4605 | 8044605 | 218.85 | .4860 | 8044860 | 238.10 | .5115 | 8045115 | 282.65 |
| .4100 | 8044100 | 194.60 | .4355 | 8044355 | 199.85 | .4610 | 8044610 | 218.85 | .4865 | 8044865 | 238.10 | .5120 | 8045120 | 282.65 |
| .4105 | 8044105 | 194.60 | .4360 | 8044360 | 199.85 | .4615 | 8044615 | 218.85 | .4870 | 8044870 | 238.10 | .5125 | 8045125 | 282.65 |
| .4110 | 8044110 | 194.60 | .4365 | 8044365 | 199.85 | .4620 | 8044620 | 218.85 | .4875 | 8044875 | 238.10 | .5130 | 8045130 | 282.65 |
| .4115 | 8044115 | 194.60 | .4370 | 804111 | 199.85 | .4625 | 8044625 | 218.85 | .4880 | 8044880 | 238.10 | .5135 | 8045135 | 282.65 |
| .4120 | 8044120 | 194.60 | .4375 | 80428 | 190.20 | .4630 | 8044630 | 218.85 | .4885 | 8044885 | 238.10 | .5140 | 8045140 | 282.65 |
| .4125 | 8044125 | 194.60 | .4380 | 8044380 | 218.85 | .4635 | 8044635 | 218.85 | .4890 | 8044890 | 238.10 | .5145 | 8045145 | 282.65 |
| .4130 | 8044130 | 185.35 | .4385 | 8044385 | 218.85 | .4640 | 8044640 | 218.85 | .4895 | 8044895 | 238.10 | .5150 | 8045150 | 282.65 |

REAMERS



MATERIAL SPECIFIC REAMERS SOLID CARBIDE HEAD TYPES 800 & 801 FRACTIONAL

MATERIAL SPECIFIC

STRAIGHT FLUTES STRAIGHT STEEL SHANK

TYPE 801 - STRAIGHT FLUTES - FOR NON-FERROUS MATERIALS
TYPE 800 - STRAIGHT FLUTES - FOR CAST IRONS & STEELS

- Solid carbide head
- Straight steel shank on .1911" tool diameter and larger (smaller sizes have a straight solid carbide shank)
- Tolerances are listed on page 85
- Tool geometry appropriate for material being machined
- Diameters 7/64" and below furnished with male centers



| TOOL SELECTOR | CHIP CLASS | MATERIAL MACHINED | TOOL TYPE |
|---------------|------------|---------------------------|-------------|
| | 20 | NON-FERROUS - LONG CHIPS | 801/821/811 |
| | 40 | NON-FERROUS - SHORT CHIPS | 801/821/811 |
| | 60 | CAST IRONS | 800/820/810 |
| | 80 | LOW STRENGTH STEELS | 800/820/810 |
| | 100 | MEDIUM STRENGTH STEELS | 800/820/810 |
| | 120 | HIGH STRENGTH STEELS | 800/820/810 |
| | 140 | HIGH TEMPERATURE ALLOYS | 800/820/810 |

MODIFICATIONS (See list on page 85)

NOTE: See NOTE on page 95

| TOOL DIAMETER | | TYPE 801 NON-FERROUS EDP NO. | TYPE 800 CAST IRON/STEEL EDP NO. | BOTH TYPES PRICE | DIMENSIONS | | | | FINISHED TO MODIFIED TOOL DIAMETER | | | | | | |
|---------------|---------|------------------------------|----------------------------------|------------------|------------------|-------------|----------|-------|------------------------------------|--|---------|---------|---------|---------|---------|
| FRACTIONAL | DECIMAL | | | | MAX. SHANK DIAM. | NO. OF FLTS | LENGTH | | MODIFIED DIAMETER RANGE | PRICE EACH - BASED ON QUANTITY ORDERED | | | | | |
| | | | | | | FLUTE | OVER-ALL | | | 1 | 2 | 3 | 4 | 5-7 | 8-14** |
| * - | - | - | 80099 | - | .0800 | 4 | 3/4 | 3 | 0.0811 - 0.0890 | \$131.40 | \$97.10 | \$85.25 | \$80.00 | \$73.95 | \$69.50 |
| * 3/32 | .0938 | - | 80006 | \$62.75 | .0880 | 4 | 3/4 | 3 | 0.0891 - 0.0970 | 131.40 | 97.10 | 85.25 | 80.00 | 73.95 | 69.50 |
| * 7/64 | .1094 | - | 80007 | 62.75 | .0943 | 4 | 7/8 | 3 1/2 | 0.0971 - 0.1120 | 131.40 | 97.10 | 85.25 | 80.00 | 73.95 | 69.50 |
| * 1/8 | .1250 | 80108 | 80008 | 62.75 | .1099 | 4 | 7/8 | 3 1/2 | 0.1121 - 0.1280 | 131.40 | 97.10 | 85.25 | 80.00 | 73.95 | 69.50 |
| * 9/64 | .1406 | 80109 | 80009 | 71.75 | .1255 | 4 | 7/8 | 3 1/2 | 0.1281 - 0.1435 | 140.40 | 106.00 | 94.40 | 88.95 | 83.10 | 78.40 |
| * 5/32 | .1562 | 80110 | 80010 | 73.80 | .1411 | 4 | 1 | 4 | 0.1436 - 0.1590 | 142.40 | 108.05 | 96.40 | 91.05 | 85.05 | 80.70 |
| * 11/64 | .1719 | 80111 | 80011 | 83.20 | .1567 | 4 | 1 | 4 | 0.1591 - 0.1750 | 151.60 | 117.50 | 106.00 | 100.45 | 94.55 | 90.00 |
| * 3/16 | .1875 | 80112 | 80012 | 85.00 | .1724 | 4 | 1 1/8 | 4 1/2 | 0.1751 - 0.1910 | 153.60 | 119.25 | 107.55 | 102.25 | 96.30 | 91.90 |
| 13/64 | .2031 | 80113 | 80013 | 90.50 | .1880 | 6 | 1 1/4 | 5 | 0.1911 - 0.2210 | 159.10 | 124.90 | 113.40 | 107.75 | 101.95 | 97.45 |
| 7/32 | .2188 | 80114 | 80014 | 90.50 | .1880 | 6 | 1 1/4 | 5 | - | - | - | - | - | - | - |
| 15/64 | .2344 | 80115 | 80015 | 96.30 | .2193 | 6 | 1 1/2 | 6 | - | - | - | - | - | - | - |
| 1/4 | .2500 | 80116 | 80016 | 96.30 | .2193 | 6 | 1 1/2 | 6 | 0.2211 - 0.2530 | 164.95 | 130.50 | 119.10 | 113.70 | 107.55 | 103.10 |
| 17/64 | .2656 | 80117 | 80017 | 103.55 | .2505 | 6 | 1 1/2 | 6 | - | - | - | - | - | - | - |
| 9/32 | .2812 | 80118 | 80018 | 103.55 | .2505 | 6 | 1 1/2 | 6 | 0.2531 - 0.2840 | 172.05 | 137.90 | 126.30 | 120.90 | 115.05 | 110.40 |
| 19/64 | .2969 | 80119 | 80019 | 107.75 | .2817 | 6 | 1 5/8 | 6 | - | - | - | - | - | - | - |
| 5/16 | .3125 | 80120 | 80020 | 107.75 | .2817 | 6 | 1 5/8 | 6 | 0.2841 - 0.3150 | 176.30 | 142.05 | 130.50 | 125.10 | 119.25 | 114.50 |
| 21/64 | .3281 | 80121 | 80021 | 115.45 | .3130 | 6 | 1 5/8 | 6 | - | - | - | - | - | - | - |
| 11/32 | .3438 | 80122 | 80022 | 115.45 | .3130 | 6 | 1 5/8 | 6 | 0.3151 - 0.3470 | 183.90 | 149.55 | 137.95 | 132.45 | 126.70 | 122.20 |
| 23/64 | .3594 | 80123 | 80023 | 124.10 | .3443 | 6 | 1 3/4 | 7 | - | - | - | - | - | - | - |
| 3/8 | .3750 | 80124 | 80024 | 124.10 | .3443 | 6 | 1 3/4 | 7 | 0.3471 - 0.3780 | 192.50 | 158.20 | 146.70 | 141.40 | 135.45 | 130.90 |
| 25/64 | .3906 | 80125 | 80025 | 141.75 | .3755 | 6 | 1 3/4 | 7 | - | - | - | - | - | - | - |
| 13/32 | .4062 | 80126 | 80026 | 141.75 | .3755 | 6 | 1 3/4 | 7 | 0.3781 - 0.4090 | 210.30 | 175.95 | 164.60 | 159.05 | 153.10 | 148.50 |
| 27/64 | .4219 | 80127 | 80027 | 150.70 | .4067 | 6 | 1 3/4 | 7 | - | - | - | - | - | - | - |
| 7/16 | .4375 | 80128 | 80028 | 150.70 | .4067 | 6 | 1 3/4 | 7 | 0.4091 - 0.4410 | 219.05 | 184.60 | 173.30 | 167.95 | 161.95 | 157.20 |
| 29/64 | .4531 | 80129 | 80029 | 159.70 | .4380 | 6 | 1 3/4 | 8 | - | - | - | - | - | - | - |
| 15/32 | .4688 | 80130 | 80030 | 159.70 | .4380 | 6 | 1 3/4 | 8 | 0.4411 - 0.4720 | 228.25 | 193.80 | 182.40 | 177.00 | 171.10 | 166.40 |
| 31/64 | .4844 | 80131 | 80031 | 171.40 | .4693 | 6 | 1 3/4 | 8 | - | - | - | - | - | - | - |
| 1/2 | .5000 | 80132 | 80032 | 171.40 | .4693 | 6 | 1 3/4 | 8 | 0.4721 - 0.5030 | 240.05 | 205.60 | 194.00 | 188.60 | 182.70 | 178.20 |
| 33/64 | .5156 | 80133 | 80033 | 221.10 | .5005 | 6 | 1 7/8 | 9 | - | - | - | - | - | - | - |
| 17/32 | .5312 | 80134 | 80034 | 221.10 | .5005 | 6 | 1 7/8 | 9 | 0.5031 - 0.5340 | 289.55 | 255.25 | 243.90 | 238.40 | 232.45 | 227.75 |
| 35/64 | .5469 | 80135 | 80035 | 261.00 | .5005 | 6 | 1 7/8 | 9 | - | - | - | - | - | - | - |
| 9/16 | .5625 | 80136 | 80036 | 256.25 | .5005 | 6 | 1 7/8 | 9 | 0.5341 - 0.5660 | 323.55 | 289.60 | 278.40 | 273.10 | 267.30 | 262.90 |
| 37/64 | .5781 | 80137 | 80037 | 290.75 | .5630 | 6 | 1 7/8 | 9 | - | - | - | - | - | - | - |
| 19/32 | .5938 | 80138 | 80038 | 290.75 | .5630 | 6 | 1 7/8 | 9 | 0.5661 - 0.5970 | 358.10 | 324.40 | 313.05 | 307.60 | 301.95 | 297.40 |
| 39/64 | .6094 | 80139 | 80039 | 294.05 | .5630 | 6 | 1 7/8 | 9 | - | - | - | - | - | - | - |
| 5/8 | .6250 | 80140 | 80040 | 294.05 | .5630 | 6 | 1 7/8 | 9 | 0.5971 - 0.6280 | 361.25 | 327.45 | 316.50 | 311.00 | 305.30 | 300.60 |
| 21/32 | .6562 | 80142 | 80042 | 425.40 | .6255 | 6 | 2 | 9 1/2 | 0.6281 - 0.6590 | 489.40 | 457.40 | 446.60 | 441.50 | 436.60 | 431.60 |
| 11/16 | .6875 | 80144 | 80044 | 425.40 | .6255 | 6 | 2 | 9 1/2 | 0.6591 - 0.6910 | 489.40 | 457.40 | 446.60 | 441.50 | 436.60 | 431.60 |
| 23/32 | .7188 | 80146 | 80046 | 478.75 | .6880 | 6 | 2 | 9 1/2 | 0.6911 - 0.7220 | 542.70 | 510.50 | 499.95 | 494.75 | 490.00 | 484.95 |
| 3/4 | .7500 | 80148 | 80048 | 478.75 | .6880 | 6 | 2 | 9 1/2 | 0.7221 - 0.7530 | 542.70 | 510.50 | 499.95 | 494.75 | 490.00 | 484.95 |
| 25/32 | .7812 | 80150 | 80050 | 531.45 | .7505 | 8 | 2 | 10 | 0.7531 - 0.7840 | 595.40 | 563.25 | 552.60 | 547.50 | 542.55 | 537.50 |
| 13/16 | .8125 | 80152 | 80052 | 579.80 | .7817 | 8 | 2 | 10 | 0.7841 - 0.8160 | 643.80 | 611.60 | 601.05 | 595.95 | 591.05 | 586.05 |
| 27/32 | .8438 | 80154 | 80054 | 611.50 | .8130 | 8 | 2 | 10 | 0.8161 - 0.8470 | 675.45 | 643.40 | 632.70 | 627.60 | 622.60 | 617.70 |
| 7/8 | .8750 | 80156 | 80056 | 598.60 | .8440 | 8 | 2 | 10 | 0.8471 - 0.8780 | 662.60 | 630.50 | 619.90 | 614.75 | 609.80 | 604.80 |
| 29/32 | .9062 | 80158 | 80058 | 700.50 | .8755 | 8 | 2 | 10 | 0.8781 - 0.9090 | 764.50 | 732.30 | 721.75 | 716.60 | 711.70 | 706.75 |
| 15/16 | .9375 | 80160 | 80060 | 736.40 | .9067 | 8 | 2 | 10 | 0.9091 - 0.9410 | 800.25 | 768.25 | 757.50 | 752.40 | 747.50 | 742.50 |
| 31/32 | .9688 | 80162 | 80062 | 771.30 | .9380 | 8 | 2 | 10 | 0.9411 - 0.9720 | 835.25 | 803.20 | 792.50 | 787.45 | 782.50 | 777.45 |
| 1 | 1.0000 | 80164 | 80064 | 800.30 | .9693 | 8 | 2 | 10 | 0.9721 - 1.0030 | 864.40 | 832.25 | 821.55 | 816.45 | 811.60 | 806.60 |

*Solid carbide head and shank (.0811" - .1910" tool diameters)

**Quantities of 15 or more - price of fractional size in same size range.



MATERIAL SPECIFIC REAMERS

SOLID CARBIDE HEAD TYPES 810, 811, 820, 821 FRACTIONAL



RIGHT OR LEFT SPIRAL FLUTES
STRAIGHT STEEL SHANK



- TYPE 811 - RIGHT SPIRAL FLUTES - FOR NON-FERROUS MATERIALS**
- TYPE 810 - RIGHT SPIRAL FLUTES - FOR CAST IRONS & STEELS**
- TYPE 821 - LEFT SPIRAL FLUTES - FOR NON-FERROUS MATERIALS**
- TYPE 820 - LEFT SPIRAL FLUTES - FOR CAST IRONS & STEELS**

MODIFICATIONS (See list on page 85)

Use the tool selector on page 94 to determine which tool is appropriate for the material you are reaming.

- Solid carbide head
- Straight steel shank on .1911" tool diameter and larger (smaller sizes have a straight solid carbide shank)
- Tool diameter tolerance thru .2500": plus .0002", minus .0000"
over .2500": plus .0003", minus .0000"
- Shank diameter tolerance: plus .0000", minus .0010"
- Left spiral flutes should not be used on blind holes
- Tool geometry appropriate for material being machined

NO COATINGS

NOTE: For best results in reaming tough steel alloys and cast steels, we recommend Type 480 Carbide Tipped Reamer (page 60) or Type 459 Carbide Tipped Reamer (page 64). They utilize special steel cutting grade carbides with excellent cutting and wear characteristics.

REAMERS

| TOOL DIAMETER | | EDP NO. - R SPIRAL | | EDP NO. - L SPIRAL | | ALL TYPES PRICE | DIMENSIONS | | | | FINISHED TO MODIFIED TOOL DIAMETER | | | | | | |
|---------------|--------|----------------------|--------------------------|----------------------|--------------------------|-----------------|------------------|-------------|--------|----------|------------------------------------|--|---------|---------|---------|---------|---------|
| FRAC. | DEC. | TYPE 811 NON-FERROUS | TYPE 810 CAST IRON/STEEL | TYPE 821 NON-FERROUS | TYPE 820 CAST IRON/STEEL | | MAX. SHANK DIAM. | NO. OF FLTS | LENGTH | | MODIFIED DIAMETER RANGE | PRICE EACH - BASED ON QUANTITY ORDERED | | | | | |
| | | | | | | | | | FLT | OVER-ALL | | 1 | 2 | 3 | 4 | 5-7 | 8-14** |
| * 1/8 | .1250 | 81108 | 81008 | 82108 | 82008 | \$64.05 | .1099 | 4 | 7/8 | 3 1/2 | 0.1121-0.1280 | \$121.55 | \$92.90 | \$83.00 | \$78.50 | \$73.50 | \$69.75 |
| * 9/64 | .1406 | 81109 | 81009 | 82109 | 82009 | 73.10 | .1255 | 4 | 7/8 | 3 1/2 | 0.1281-0.1435 | 130.60 | 101.90 | 92.20 | 87.70 | 82.80 | 78.90 |
| * 5/32 | .1562 | 81110 | 81010 | 82110 | 82010 | 75.60 | .1411 | 4 | 1 | 4 | 0.1436-0.1590 | 133.00 | 104.10 | 94.45 | 89.95 | 84.90 | 81.05 |
| * 11/64 | .1719 | 81111 | 81011 | 82111 | 82011 | 93.45 | .1567 | 4 | 1 | 4 | 0.1591-0.1750 | 156.90 | 125.20 | 114.45 | 109.50 | 104.10 | 100.00 |
| * 3/16 | .1875 | 81112 | 81012 | 82112 | 82012 | 95.50 | .1724 | 4 | 1 1/8 | 4 1/2 | 0.1751-0.1910 | 158.60 | 127.10 | 116.40 | 111.45 | 106.05 | 101.70 |
| 13/64 | .2031 | 81113 | 81013 | 82113 | 82013 | 101.70 | .1880 | 6 | 1 1/4 | 5 | - | - | - | - | - | - | - |
| 7/32 | .2188 | 81114 | 81014 | 82114 | 82014 | 110.40 | .1880 | 6 | 1 1/4 | 5 | 0.1911-0.2210 | 178.95 | 144.60 | 133.20 | 127.80 | 121.60 | 117.10 |
| 15/64 | .2344 | 81115 | 81015 | 82115 | 82015 | 117.60 | .2193 | 6 | 1 1/2 | 6 | - | - | - | - | - | - | - |
| 1/4 | .2500 | 81116 | 81016 | 82116 | 82016 | 117.60 | .2193 | 6 | 1 1/2 | 6 | 0.2211-0.2530 | 186.10 | 151.60 | 140.40 | 134.70 | 128.75 | 124.20 |
| 17/64 | .2656 | 81117 | 81017 | 82117 | 82017 | 126.30 | .2505 | 6 | 1 1/2 | 6 | - | - | - | - | - | - | - |
| 9/32 | .2812 | 81118 | 81018 | 82118 | 82018 | 126.30 | .2505 | 6 | 1 1/2 | 6 | 0.2531-0.2840 | 194.90 | 160.60 | 148.95 | 143.55 | 137.60 | 133.20 |
| 19/64 | .2969 | 81119 | 81019 | 82119 | 82019 | 131.70 | .2817 | 6 | 1 5/8 | 6 | - | - | - | - | - | - | - |
| 5/16 | .3125 | 81120 | 81020 | 82120 | 82020 | 131.70 | .2817 | 6 | 1 5/8 | 6 | 0.2841-0.3150 | 200.10 | 165.80 | 154.40 | 148.80 | 142.90 | 138.30 |
| 21/64 | .3281 | 81121 | 81021 | 82121 | 82021 | 140.55 | .3130 | 6 | 1 5/8 | 6 | - | - | - | - | - | - | - |
| 11/32 | .3438 | 81122 | 81022 | 82122 | 82022 | 140.55 | .3130 | 6 | 1 5/8 | 6 | 0.3151-0.3470 | 209.00 | 174.90 | 163.20 | 157.75 | 151.80 | 147.40 |
| 23/64 | .3594 | 81123 | 81023 | 82123 | 82023 | 151.45 | .3443 | 6 | 1 3/4 | 7 | - | - | - | - | - | - | - |
| 3/8 | .3750 | 81124 | 81024 | 82124 | 82024 | 151.45 | .3443 | 6 | 1 3/4 | 7 | 0.3471-0.3780 | 219.70 | 185.30 | 174.00 | 168.70 | 162.70 | 157.90 |
| 25/64 | .3906 | 81125 | 81025 | 82125 | 82025 | 173.00 | .3755 | 6 | 1 3/4 | 7 | - | - | - | - | - | - | - |
| 13/32 | .4062 | 81126 | 81026 | 82126 | 82026 | 173.00 | .3755 | 6 | 1 3/4 | 7 | 0.3781-0.4090 | 241.45 | 207.00 | 195.60 | 190.05 | 184.40 | 179.55 |
| 27/64 | .4219 | 81127 | 81027 | 82127 | 82027 | 183.50 | .4067 | 6 | 1 3/4 | 7 | - | - | - | - | - | - | - |
| 7/16 | .4375 | 81128 | 81028 | 82128 | 82028 | 183.50 | .4067 | 6 | 1 3/4 | 7 | 0.4091-0.4410 | 252.00 | 217.55 | 206.25 | 200.75 | 194.90 | 190.20 |
| 29/64 | .4531 | 81129 | 81029 | 82129 | 82029 | 194.75 | .4380 | 6 | 1 3/4 | 8 | - | - | - | - | - | - | - |
| 15/32 | .4688 | 81130 | 81030 | 82130 | 82030 | 194.75 | .4380 | 6 | 1 3/4 | 8 | 0.4411-0.4720 | 263.20 | 228.90 | 217.45 | 211.95 | 206.20 | 201.45 |
| 31/64 | .4844 | 81131 | 81031 | 82131 | 82031 | 208.90 | .4693 | 6 | 1 3/4 | 8 | - | - | - | - | - | - | - |
| 1/2 | .5000 | 81132 | 81032 | 82132 | 82032 | 208.90 | .4693 | 6 | 1 3/4 | 8 | 0.4721-0.5030 | 277.45 | 243.10 | 231.70 | 226.10 | 220.45 | 215.70 |
| 33/64 | .5156 | 81133 | 81033 | 82133 | 82033 | 248.30 | .5005 | 6 | 1 7/8 | 9 | - | - | - | - | - | - | - |
| 17/32 | .5312 | 81134 | 81034 | 82134 | 82034 | 243.75 | .5005 | 6 | 1 7/8 | 9 | 0.5031-0.5340 | 305.95 | 274.75 | 264.30 | 259.40 | 254.10 | 250.05 |
| 35/64 | .5469 | 81135 | 81035 | 82135 | 82035 | 287.95 | .5005 | 6 | 1 7/8 | 9 | - | - | - | - | - | - | - |
| 9/16 | .5625 | 81136 | 81036 | 82136 | 82036 | 287.95 | .5005 | 6 | 1 7/8 | 9 | 0.5341-0.5660 | 350.10 | 318.90 | 308.50 | 303.50 | 298.10 | 293.95 |
| 37/64 | .5781 | 81137 | 81037 | 82137 | 82037 | 326.70 | .5630 | 6 | 1 7/8 | 9 | - | - | - | - | - | - | - |
| 19/32 | .5938 | 81138 | 81038 | 82138 | 82038 | 326.70 | .5630 | 6 | 1 7/8 | 9 | 0.5661-0.5970 | 388.60 | 357.70 | 347.30 | 342.30 | 337.00 | 332.90 |
| 39/64 | .6094 | 81139 | 81039 | 82139 | 82039 | 330.45 | .5630 | 6 | 1 7/8 | 9 | - | - | - | - | - | - | - |
| 5/8 | .6250 | 81140 | 81040 | 82140 | 82040 | 330.45 | .5630 | 6 | 1 7/8 | 9 | 0.5971-0.6280 | 392.60 | 361.55 | 351.00 | 346.10 | 340.80 | 336.50 |
| 21/32 | .6562 | 81142 | 81042 | 82142 | 82042 | 478.50 | .6255 | 6 | 2 | 9 1/2 | 0.6281-0.6590 | 550.50 | 514.40 | 502.40 | 496.50 | 491.10 | 485.40 |
| 11/16 | .6875 | 81144 | 81044 | 82144 | 82044 | 478.50 | .6255 | 6 | 2 | 9 1/2 | 0.6591-0.6910 | 550.50 | 514.40 | 502.40 | 496.50 | 491.10 | 485.40 |
| 23/32 | .7188 | 81146 | 81046 | 82146 | 82046 | 538.40 | .6880 | 6 | 2 | 9 1/2 | 0.6911-0.7220 | 610.45 | 574.05 | 562.10 | 556.50 | 550.90 | 545.20 |
| 3/4 | .7500 | 81148 | 81048 | 82148 | 82048 | 538.40 | .6880 | 6 | 2 | 9 1/2 | 0.7221-0.7530 | 610.45 | 574.05 | 562.10 | 556.50 | 550.90 | 545.20 |
| 25/32 | .7812 | 81150 | 81050 | 82150 | 82050 | 597.60 | .7505 | 8 | 2 | 10 | 0.7531-0.7840 | 669.50 | 633.45 | 621.40 | 615.60 | 610.00 | 604.50 |
| 13/16 | .8125 | 81152 | 81052 | 82152 | 82052 | 652.00 | .7817 | 8 | 2 | 10 | 0.7841-0.8160 | 724.00 | 687.80 | 675.90 | 670.05 | 664.50 | 658.90 |
| 27/32 | .8438 | 81154 | 81054 | 82154 | 82054 | 687.50 | .8130 | 8 | 2 | 10 | 0.8161-0.8470 | 759.50 | 723.50 | 711.45 | 705.75 | 700.20 | 694.50 |
| 7/8 | .8750 | 81156 | 81056 | 82156 | 82056 | 673.20 | .8440 | 8 | 2 | 10 | 0.8471-0.8780 | 745.20 | 709.10 | 697.05 | 691.25 | 685.80 | 680.20 |
| 29/32 | .9062 | 81158 | 81058 | 82158 | 82058 | 787.80 | .8755 | 8 | 2 | 10 | 0.8781-0.9090 | 859.75 | 823.75 | 811.55 | 805.80 | 800.25 | 794.70 |
| 15/16 | .9375 | 81160 | 81060 | 82160 | 82060 | 828.00 | .9067 | 8 | 2 | 10 | 0.9091-0.9410 | 899.95 | 863.90 | 851.90 | 846.05 | 840.50 | 835.00 |
| 31/32 | .9688 | 81162 | 81062 | 82162 | 82062 | 867.30 | .9380 | 8 | 2 | 10 | 0.9411-0.9720 | 939.25 | 903.10 | 891.25 | 885.40 | 879.90 | 874.40 |
| 1 | 1.0000 | 81164 | 81064 | 82164 | 82064 | 900.00 | .9693 | 8 | 2 | 10 | 0.9721-1.0030 | 972.00 | 935.90 | 924.00 | 918.30 | 912.60 | 907.10 |

*Solid carbide head and shank (.1121" - .1910" tool diameters)

**Quantities of 15 or more - price of fractional size in same size range.



DRILLS INDEX AND COMPARISON CHART



| DESCRIPTION | HANNIBAL | | | CJT | CLEVELAND | FULLERTON | CHICAGO/LATROBE | IMCO | MORSE | NYTD | PTD/DORMER |
|--------------------------------------|------------|-------------|-----------|-----|-----------|-----------|-----------------|------|-------|------|------------|
| | FRAC. PAGE | METRIC PAGE | TOOL TYPE | | | | | | | | |
| AIRCRAFT EXTENSION DRILLS | | | | | | | | | | | |
| 6" Length, 135° Split Point | 99 | - | 610 | - | - | - | - | - | - | - | - |
| 12" Length, 135° Split Point | 99 | - | 611 | 129 | - | - | - | - | - | - | - |
| CORE DRILLS | | | | | | | | | | | |
| Straight Shank | 101 | 141 | 620 | - | - | - | - | - | 5456 | - | - |
| Taper Shank | 101 | 141 | 622 | 410 | - | - | CD | - | 5454 | - | - |
| Straight Shank - For Steels | 103 | 143 | 621 | - | - | - | - | - | - | - | - |
| Taper Shank - For Steels | 103 | 143 | 623 | - | - | - | - | - | - | - | - |
| JOBBERS LENGTH DRILLS | | | | | | | | | | | |
| 118° Standard Point | 98 | 123 | 600 | 120 | 2727 | 40CT | CTD | DT20 | 5330 | 4011 | D444 |
| 135° Split Point | | | | | | | | | | | |
| REDUCED SHANK DIAMETER DRILLS | | | | | | | | | | | |
| Silver & Deming, 118° Standard Point | 100 | - | 616 | 163 | - | - | - | - | - | - | - |

DRILL BASICS

- Drills are end cutting tools used to produce holes when rapid removal of material is desired
- Use shortest drill available for accurate hole location and minimum runout for maximum tool life
- Non-coolant fed drills (conventional twist drills) are generally effective in holes up to 3 tool diameters deep. Peck cycles should be used for deeper holes to achieve better chip evacuation

DRILL SELECTION GUIDE

TWIST DRILLS - NON-COOLANT

- Excellent up to 3 tool diameters deep
- Use shortest length available
- Excellent in non-ferrous materials and cast irons
- Generally not recommended for drilling steels

CORE DRILLS

- Used to enlarge cored, punched, drilled, or preformed holes
- Capable of removing up to 30% of tool diameter
- Produces near-reamed surface finish
- Often eliminates need for final reaming or boring operation

DRILL SPECIFICATIONS

- Carbide tip brazed to hardened tool steel body
- Smooth flutes for effective chip flow
- Precision ground to ensure concentricity of tip & body
- Dimension & element tolerances conform to following standard, unless otherwise specified on selected styles:
ASME/ANSIB94.11M * ISO * NAS 907 * USCTI
- Jobber length drills 1/2" diameter and smaller are manufactured with an overall length tolerance of plus 1/4", minus 1/8"

DRILL TOLERANCES

| Tool Diameter | Diameter | | Included Angle | | Lip Height T.I.V. |
|---------------------|----------|--------|----------------|-------|-------------------|
| | Plus | Minus | Plus | Minus | |
| Thru 1/8" | .0000" | .0005" | 5° | 5° | .0020" |
| Over 1/8" thru 1/4" | .0000" | .0007" | 5° | 5° | .0030" |
| Over 1/4" thru 1/2" | .0000" | .0010" | 5° | 5° | .0040" |
| Over 1/2" thru 1" | .0000" | .0012" | 3° | 3° | .0050" |
| Over 1" thru 1 1/4" | .0000" | .0015" | 3° | 3° | .0060" |

DRILL PROBLEM SOLVING GUIDE - CARBIDE TIPPED

AVOID PROBLEMS BY CAREFUL ORIGINAL SET-UP

- MACHINE CONDITION Tool holder in good condition and secure part holding fixture.
- TOOL CONDITION Use cutting tool recommended for material being machined. Avoid excessive tool overhang.
- FEEDS & SPEEDS Start with feeds and speeds recommended for material being machined (see page 6 & 7).
- COOLANT Coolant flow must be adequate to avoid intermittent quenching and to flush chips promptly, avoid the recutting of hardened chips.

| DRILLING PROBLEMS | POSSIBLE CAUSES | POSSIBLE SOLUTIONS |
|--------------------------|---|--|
| 1. CHIPPED CUTTING EDGE | Excessive feed Excessive lip relief Vibration Thermal cracking carbide | Reduce feed Reduce lip relief to provide smaller chisel angle Frequently a worn drill bushing - Replace Maintain adequate coolant flow at all times |
| 2. SHORT TOOL LIFE | Drill dwelling Only one lip cutting | Maintain adequate feed at all times Regrind with equal lip heights and chisel in center |
| 3. DRILL WALKS OR DRIFTS | Unequal lip heights Worn drill bushing | Regrind with equal lip heights and chisel in center Replace drill bushing |
| 4. OVERSIZED HOLES | Unequal lip heights Excessive lip relief Worn drill bushing | Regrind with equal lip heights and chisel in center Reduce lip relief to provide smaller chisel angle Replace drill bushing |
| 5. ROUGH FINISH | Dull cutting edge Inadequate coolant | Regrind with fine grit diamond wheel Review type of coolant and maintain adequate flow |



FULL CENTERS & HALF CENTERS CARBIDE TIPPED TYPES 592, 593, 594, 595, 596, 597

MORSE - BROWN & SHARPE - JARNO TAPERS



FULL CENTERS:

- TYPE 595 - MORSE TAPER
- TYPE 596 - BROWN & SHARPE TAPER
- TYPE 597 - JARNO TAPER

- Carbide tip brazed to hardened alloy steel body
- Center precision ground to 60° included angle
- Center tip concentric to precision ground taper

USE (ALL TYPES):

- Carbide tipped center holds point angle and overall concentricity so parts can be held securely and accurately for precision turning and grinding
- When operating at high speed, carbide tipped center will not wear as rapidly, avoiding burning or scoring of workpiece's center hole

HALF CENTERS:

- TYPE 592 - MORSE TAPER
- TYPE 593 - BROWN & SHARPE TAPER
- TYPE 594 - JARNO TAPER

- Same construction as full centers
- Half center provides clearance for the grinding wheel or turning tool when machining a small diameter near the end of the part

| MORSE TAPER SHANK | OVERALL LENGTH | TYPE 595 - FULL CENTER - MORSE TAPER | | | | TYPE 592 - HALF CENTER - MORSE TAPER | | | | | |
|-------------------|----------------|--------------------------------------|----------|---------|---------|--------------------------------------|----------|-----------------|---------------------|---------|---------|
| | | CARBIDE | | EDP NO. | PRICE | CARBIDE | | UNDERCUT LENGTH | HEIGHT ABOVE CENTER | EDP NO. | PRICE |
| | | LENGTH | DIAMETER | | | LENGTH | DIAMETER | | | | |
| 1 | 3 5/16 | 7/16 | 1/4 | 59501 | \$49.65 | 7/16 | 1/4 | 1 | 9/64 | 59201 | \$91.50 |
| 2 | 4 3/16 | 9/16 | 3/16 | 59502 | 59.15 | 9/16 | 3/16 | 1 3/8 | 1 1/64 | 59202 | 113.30 |
| 3 | 5 1/4 | 7/8 | 1/2 | 59503 | 108.40 | 1 1/16 | 3/8 | 1 1 1/16 | 13/64 | 59203 | 171.20 |
| 4 | 6 3/4 | 7/8 | 1/2 | 59504 | 164.80 | 7/8 | 1/2 | 2 1/4 | 1 1/64 | 59204 | 250.30 |
| 5 | 8 1/2 | 1 1/16 | 5/8 | 59505 | 269.65 | 1 1/16 | 5/8 | 2 3/4 | 2 1/64 | 59205 | 418.40 |

| BROWN & SHARPE TAPER SHANK | OVERALL LENGTH | TYPE 596 - FULL CENTER - B & S TAPER | | | | TYPE 593 - HALF CENTER - B & S TAPER | | | | | |
|----------------------------|----------------|--------------------------------------|----------|---------|---------|--------------------------------------|----------|-----------------|---------------------|---------|----------|
| | | CARBIDE | | EDP NO. | PRICE | CARBIDE | | UNDERCUT LENGTH | HEIGHT ABOVE CENTER | EDP NO. | PRICE |
| | | LENGTH | DIAMETER | | | LENGTH | DIAMETER | | | | |
| 7 | 4 1/2 | 9/16 | 5/16 | 59607 | \$75.85 | 9/16 | 5/16 | 1 1/8 | 1 1/64 | 59307 | \$128.45 |
| 8 | 5 1 1/32 | 1 1/16 | 3/8 | 59608 | 106.40 | 9/16 | 5/16 | 1 5/16 | 1 1/64 | 59308 | 168.65 |
| 9 | 6 | 7/8 | 1/2 | 59609 | 134.95 | 1 1/16 | 3/8 | 1 1/2 | 13/64 | 59309 | 200.90 |
| 10 | 8 1 1/32 | 7/8 | 1/2 | 59610 | 192.85 | 7/8 | 1/2 | 2 1/4 | 1 1/64 | 59310 | 281.35 |
| 11 | 10 1/8 | 1 1/16 | 5/8 | 59611 | 256.20 | 1 1/16 | 5/8 | 2 1/2 | 3/8 | 59311 | 386.45 |

| JARNO TAPER SHANK | OVERALL LENGTH | TYPE 597 - FULL CENTER - JARNO TAPER | | | | TYPE 594 - HALF CENTER - JARNO TAPER | | | | | |
|-------------------|----------------|--------------------------------------|----------|---------|---------|--------------------------------------|----------|-----------------|---------------------|---------|---------|
| | | CARBIDE | | EDP NO. | PRICE | CARBIDE | | UNDERCUT LENGTH | HEIGHT ABOVE CENTER | EDP NO. | PRICE |
| | | LENGTH | DIAMETER | | | LENGTH | DIAMETER | | | | |
| 4 | 3 | 7/16 | 1/4 | 59704 | \$54.25 | 7/16 | 1/4 | 2 5/32 | 9/64 | 59404 | \$99.80 |
| 5 | 3 3/8 | 7/16 | 1/4 | 59705 | 60.00 | 7/16 | 1/4 | 1 5/16 | 9/64 | 59405 | 110.55 |
| 6 | 4 1/2 | 9/16 | 5/16 | 59706 | 74.10 | 9/16 | 5/16 | 1 1/8 | 1 1/64 | 59406 | 123.20 |
| 7 | 5 1/4 | 1 1/16 | 3/8 | 59707 | 96.00 | 1 1/16 | 3/8 | 1 3/16 | 13/64 | 59407 | 161.40 |
| 8 | 6 | 7/8 | 1/2 | 59708 | 124.10 | 7/8 | 1/2 | 1 3/8 | 1 1/64 | 59408 | 199.45 |
| 9 | 6 3/4 | 7/8 | 1/2 | 59709 | 134.70 | 7/8 | 1/2 | 1 5/8 | 1 1/64 | 59409 | 224.70 |
| 10 | 7 1/2 | 7/8 | 1/2 | 59710 | 171.20 | 7/8 | 1/2 | 2 | 1 1/64 | 59410 | 266.00 |
| 11 | 8 1/4 | 7/8 | 1/2 | 59711 | 192.65 | 7/8 | 1/2 | 2 | 1 1/64 | 59411 | 294.40 |
| 12 | 9 | 1 1/16 | 5/8 | 59712 | 213.10 | 1 1/16 | 5/8 | 2 1/4 | 2 1/64 | 59412 | 331.70 |



JOBBER'S LENGTH DRILLS CARBIDE TIPPED TYPES 600 & 601 FRACTIONAL



118° STANDARD OR 135° SPLIT POINT

TYPE 600 – 118° STANDARD POINT

- Jobbers length - 118° standard point
- Detailed specifications on page 96

TYPE 601 – 135° SPLIT POINT

- Same as Type 600 above, except with 135° split point designed for drilling tough abrasive or high tensile materials

USE:

- The most popular carbide tipped drill - will perform satisfactorily under a variety of conditions

| TOOL SELECTOR | CHIP CLASS | MATERIAL MACHINED | TOOL TYPE |
|---------------|-------------------------|---------------------------|-----------|
| | 20 | NON-FERROUS - LONG CHIPS | 600 |
| | 40 | NON-FERROUS - SHORT CHIPS | 600/601 |
| | 60 | CAST IRONS | 601/600 |
| | 80 | LOW STRENGTH STEELS | CALL US |
| | 100 | MEDIUM STRENGTH STEELS | CALL US |
| | 120 | HIGH STRENGTH STEELS | CALL US |
| 140 | HIGH TEMPERATURE ALLOYS | CALL US | |

MODIFICATIONS (Prompt delivery)

- Coatings available:

TITANIUM NITRIDE – TiN

TITANIUM CARBONITRIDE – TiCN

ZIRCONIUM NITRIDE – ZrN

AL TITANIUM NITRIDE – AlTiN



| TOOL DIAMETER | | | LENGTH | | TYPE 600 118° POINT | | TYPE 601 135° POINT | |
|---------------|-----------|-------|--------|-------|------------------------|---------|------------------------|-------|
| FRACTIONAL | WIRE/LTR. | DEC. | FLUTE | OAL | EDP NO. | PRICE | EDP NO. | PRICE |
| | *40 | .0980 | 1 | 2 | 60240 | \$26.25 | - | - |
| | *39 | .0995 | 1 1/4 | 2 1/4 | 60239 | 26.25 | - | - |
| | *38 | .1015 | 1 1/4 | 2 1/4 | 60238 | 26.25 | - | - |
| | *37 | .1040 | 1 1/4 | 2 1/4 | 60237 | 26.25 | - | - |
| *7/64 | *36 | .1065 | 1 1/4 | 2 1/4 | 60236 | 26.25 | - | - |
| | | .1094 | 1 1/4 | 2 1/4 | 60007 | 26.25 | - | - |
| | *35 | .1100 | 1 1/4 | 2 1/4 | 60235 | 26.25 | - | - |
| | *34 | .1110 | 1 1/4 | 2 1/4 | 60234 | 26.25 | - | - |
| 1/8 | *33 | .1130 | 1 1/4 | 2 1/4 | 60233 | 26.25 | - | - |
| | 32 | .1160 | 1 5/8 | 2 3/4 | 60232 | 21.20 | - | - |
| | 31 | .1200 | 1 5/8 | 2 3/4 | 60231 | 19.20 | - | - |
| 3/64 | | .1250 | 1 5/8 | 2 3/4 | 60008 | 19.65 | 60108 | 22.90 |
| | 30 | .1285 | 1 5/8 | 2 3/4 | 60230 | 20.00 | 60330 | 23.30 |
| | 29 | .1360 | 1 3/4 | 2 7/8 | 60229 | 20.75 | 60329 | 23.95 |
| | 28 | .1405 | 1 3/4 | 2 7/8 | 60228 | 20.90 | 60328 | 24.40 |
| 1/4 | | .1406 | 1 3/4 | 2 7/8 | 60009 | 21.20 | 60109 | 24.75 |
| | 27 | .1440 | 1 7/8 | 3 | 60227 | 21.50 | 60327 | 24.90 |
| | 26 | .1470 | 1 7/8 | 3 | 60226 | 19.90 | 60326 | 23.30 |
| | 25 | .1495 | 1 7/8 | 3 | 60225 | 19.90 | 60325 | 23.30 |
| 5/32 | 24 | .1520 | 2 | 3 1/8 | 60224 | 21.50 | 60324 | 24.90 |
| | 23 | .1540 | 2 | 3 1/8 | 60223 | 20.90 | 60323 | 24.40 |
| | | .1562 | 2 | 3 1/8 | 60010 | 20.80 | 60110 | 24.40 |
| | 22 | .1570 | 2 | 3 1/8 | 60222 | 23.00 | 60322 | 27.00 |
| 3/8 | 21 | .1590 | 2 1/8 | 3 1/4 | 60221 | 22.15 | 60321 | 25.80 |
| | 20 | .1610 | 2 1/8 | 3 1/4 | 60220 | 22.70 | 60320 | 26.25 |
| | 19 | .1660 | 2 1/8 | 3 1/4 | 60219 | 22.70 | 60319 | 26.25 |
| | 18 | .1695 | 2 1/8 | 3 1/4 | 60218 | 22.70 | 60318 | 26.25 |
| 11/64 | | .1719 | 2 1/8 | 3 1/4 | 60011 | 22.70 | 60111 | 26.25 |
| | 17 | .1730 | 2 3/16 | 3 3/8 | 60217 | 22.70 | 60317 | 26.25 |
| | 16 | .1770 | 2 3/16 | 3 3/8 | 60216 | 22.15 | 60316 | 25.80 |
| | 15 | .1800 | 2 3/16 | 3 3/8 | 60215 | 23.00 | 60315 | 27.00 |
| 1/2 | 14 | .1820 | 2 3/16 | 3 3/8 | 60214 | 22.15 | 60314 | 25.80 |
| | 13 | .1850 | 2 3/16 | 3 1/2 | 60213 | 24.40 | 60313 | 25.80 |
| | | .1875 | 2 3/16 | 3 1/2 | 60012 | 22.15 | 60112 | 25.80 |
| | 12 | .1890 | 2 3/16 | 3 1/2 | 60212 | 25.55 | 60312 | 27.00 |
| 5/8 | 11 | .1910 | 2 3/16 | 3 1/2 | 60211 | 23.55 | 60311 | 27.20 |
| | 10 | .1935 | 2 3/16 | 3 5/8 | 60210 | 23.00 | 60310 | 27.00 |

| TOOL DIAMETER | | | LENGTH | | TYPE 600 118° POINT | | TYPE 601 135° POINT | | |
|---------------|-------|-------|---------|---------|------------------------|--------|------------------------|--------|--------|
| FRACTIONAL | LTR. | DEC. | FLUTE | OAL | EDP NO. | PRICE | EDP NO. | PRICE | |
| 13/64 | 9 | .1960 | 2 7/16 | 3 5/8 | 60209 | 23.55 | 60309 | 27.20 | |
| | 8 | .1990 | 2 7/16 | 3 5/8 | 60208 | 23.55 | 60308 | 27.20 | |
| | 7 | .2010 | 2 7/16 | 3 5/8 | 60207 | 23.55 | 60307 | 27.20 | |
| 1/4 | | .2031 | 2 7/16 | 3 5/8 | 60013 | 24.35 | 60113 | 28.00 | |
| | 6 | .2040 | 2 1/2 | 3 3/4 | 60206 | 24.10 | 60306 | 27.95 | |
| | 5 | .2055 | 2 1/2 | 3 3/4 | 60205 | 24.35 | 60305 | 27.20 | |
| | 4 | .2090 | 2 1/2 | 3 3/4 | 60204 | 24.10 | 60304 | 27.95 | |
| 7/32 | 3 | .2130 | 2 1/2 | 3 3/4 | 60203 | 24.35 | 60303 | 27.20 | |
| | 2 | .2188 | 2 1/2 | 3 3/4 | 60014 | 24.35 | 60114 | 28.00 | |
| | 1 | | .2210 | 2 5/8 | 3 7/8 | 60202 | 25.35 | 60302 | 29.30 |
| | | | .2280 | 2 5/8 | 3 7/8 | 60201 | 24.85 | 60301 | 28.85 |
| 15/64 | | .2344 | 2 5/8 | 3 7/8 | 60015 | 26.10 | 60115 | 30.40 | |
| | 1/4 | E | .2500 | 2 3/4 | 4 | 60016 | 26.10 | 60116 | 30.40 |
| 9/32 | 17/64 | .2656 | 2 7/8 | 4 1/4 | 60017 | 29.10 | 60117 | 33.30 | |
| | 15/32 | .2812 | 2 15/16 | 4 1/4 | 60018 | 30.90 | 60118 | 35.65 | |
| | 19/64 | | .2969 | 3 1/16 | 4 3/8 | 60019 | 34.15 | 60119 | 39.50 |
| | | 5/16 | .3125 | 3 3/16 | 4 1/2 | 60020 | 33.40 | 60120 | 38.70 |
| 11/32 | 21/64 | .3281 | 3 3/16 | 4 5/8 | 60021 | 35.40 | 60121 | 41.10 | |
| | 13/32 | | .3438 | 3 7/16 | 4 3/4 | 60022 | 35.40 | 60122 | 41.10 |
| | | | .3594 | 3 1/2 | 4 7/8 | 60023 | 37.70 | 60123 | 43.80 |
| | 3/8 | .3750 | 3 5/8 | 5 | 60024 | 37.70 | 60124 | 43.80 | |
| 25/64 | 25/64 | .3906 | 3 3/4 | 5 1/8 | 60025 | 40.95 | 60125 | 47.70 | |
| | 13/32 | | .4062 | 3 7/8 | 5 1/4 | 60026 | 40.95 | 60126 | 47.70 |
| | | | .4219 | 3 15/16 | 5 3/8 | 60027 | 44.55 | 60127 | 51.75 |
| | 7/16 | .4375 | 4 1/16 | 5 1/2 | 60028 | 44.55 | 60128 | 51.75 | |
| 31/64 | 29/64 | .4531 | 4 3/16 | 5 5/8 | 60029 | 51.30 | 60129 | 59.35 | |
| | 15/32 | .4688 | 4 5/16 | 5 3/4 | 60030 | 50.05 | 60130 | 58.00 | |
| | 31/64 | | .4844 | 4 3/8 | 5 7/8 | 60031 | 56.10 | 60131 | 64.95 |
| | | 1/2 | .5000 | 4 1/2 | 6 | 60032 | 61.55 | 60132 | 64.95 |
| 17/32 | 17/32 | .5312 | 4 13/16 | 6 5/8 | 60034 | 80.20 | 60134 | 93.20 | |
| | 9/16 | | .5625 | 4 13/16 | 6 5/8 | 60036 | 80.95 | 60136 | 94.00 |
| | | | .5938 | 5 3/16 | 7 1/8 | 60038 | 86.85 | 60138 | 100.95 |
| | 5/8 | .6250 | 5 3/16 | 7 1/8 | 60040 | 98.50 | 60140 | 114.20 | |
| 21/32 | 21/32 | .6562 | 5 3/16 | 7 1/8 | 60042 | 100.20 | 60142 | 116.20 | |
| | 11/16 | | .6875 | 5 5/8 | 7 5/8 | 60044 | 102.10 | 60144 | 118.45 |
| | | | .7188 | 5 5/8 | 7 5/8 | 60046 | 120.55 | 60146 | 133.90 |
| | 3/4 | .7500 | 5 13/16 | 8 | 60048 | 122.95 | 60148 | 136.75 | |

*Solid carbide



AIRCRAFT EXTENSION DRILLS CARBIDE TIPPED TYPES 610 & 611 FRACTIONAL



135° SPLIT POINT



TYPE 610 – AIRCRAFT EXTENSION DRILLS – 6" OVERALL LENGTH

- 135° split point per NAS 907 specifications
- Detailed specifications on page 96



TYPE 611 – AIRCRAFT EXTENSION DRILLS – 12" OVERALL LENGTH

- Same as Type 610 above, except 12" long

USE (BOTH TYPES):

- For drilling holes not accessible with shorter drills
- Feeds should be light to medium
- Not recommended for deep hole applications

| TOOL SELECTOR | CHIP CLASS | MATERIAL MACHINED | TOOL TYPE |
|---------------|------------|---------------------------|------------|
| | 20 | NON-FERROUS - LONG CHIPS | 610 or 611 |
| | 40 | NON-FERROUS - SHORT CHIPS | 610 or 611 |
| | 60 | CAST IRONS | 610 or 611 |
| | 80 | LOW STRENGTH STEELS | CALL US |
| | 100 | MEDIUM STRENGTH STEELS | CALL US |
| | 120 | HIGH STRENGTH STEELS | CALL US |
| | 140 | HIGH TEMPERATURE ALLOYS | CALL US |

MODIFICATIONS (Prompt delivery)

- Coatings available:

| |
|------------------------------|
| TITANIUM NITRIDE - TiN |
| TITANIUM CARBONITRIDE - TiCN |
| ZIRCONIUM NITRIDE - ZrN |
| AL TITANIUM NITRIDE - AlTiN |

| TOOL DIAMETER | | | FLUTE LENGTH | TYPE 610 - 6" | | TYPE 611 - 12" | |
|---------------|-------------|----------------|--------------|---------------|-------|----------------|---------|
| FRAC. | WIRE/LETTER | DECIMAL EQUIV. | | EDP NO. | PRICE | EDP NO. | PRICE |
| 1/8 | 30 | .1250 | 1 5/8 | 61008 | 25.80 | 61108 | \$30.40 |
| | | .1285 | 1 3/8 | 61230 | 35.10 | 61330 | 41.25 |
| | | .1360 | 1 3/4 | 61229 | 36.20 | 61329 | 42.65 |
| | | .1405 | 1 3/4 | 61228 | 36.80 | 61328 | 43.40 |
| 9/64 | 27 | .1406 | 1 3/4 | 61009 | 28.00 | 61109 | 32.90 |
| | | .1440 | 1 7/8 | 61227 | 37.70 | 61327 | 44.20 |
| | | .1470 | 1 7/8 | 61226 | 36.80 | 61326 | 43.40 |
| | | .1495 | 1 7/8 | 61225 | 36.80 | 61325 | 43.40 |
| 5/32 | 24 | .1520 | 2 | 61224 | 37.70 | 61324 | 44.20 |
| | | .1540 | 2 | 61223 | 36.80 | 61323 | 43.40 |
| | | .1562 | 2 | 61010 | 27.40 | 61110 | 32.35 |
| | | .1570 | 2 | 61222 | 40.20 | 61322 | 47.35 |
| 3/16 | 21 | .1590 | 2 1/8 | 61221 | 39.00 | 61321 | 46.00 |
| | | .1610 | 2 1/8 | 61220 | 40.05 | 61320 | 47.00 |
| | | .1660 | 2 1/8 | 61219 | 40.05 | 61319 | 47.00 |
| | | .1695 | 2 1/8 | 61218 | 40.05 | 61318 | 47.00 |
| 1/16 | 17 | .1719 | 2 1/8 | 61011 | 30.05 | 61111 | 35.20 |
| | | .1730 | 2 3/16 | 61217 | 40.05 | 61317 | 47.00 |
| | | .1770 | 2 3/16 | 61216 | 39.00 | 61316 | 46.00 |
| | | .1800 | 2 3/16 | 61215 | 40.20 | 61315 | 47.35 |
| 3/16 | 14 | .1820 | 2 3/16 | 61214 | 39.00 | 61314 | 46.00 |
| | | .1850 | 2 3/16 | 61213 | 39.00 | 61313 | 46.00 |
| | | .1875 | 2 5/16 | 61012 | 29.20 | 61112 | 34.50 |
| | | .1890 | 2 3/16 | 61212 | 40.70 | 61312 | 47.80 |
| 1/2 | 11 | .1910 | 2 3/16 | 61211 | 41.10 | 61311 | 48.55 |
| | | .1935 | 2 7/16 | 61210 | 40.70 | 61310 | 47.80 |
| | | .1960 | 2 7/16 | 61209 | 41.10 | 61309 | 48.55 |
| | | .1990 | 2 7/16 | 61208 | 41.10 | 61308 | 48.55 |

| TOOL DIAMETER | | | FLUTE LENGTH | TYPE 610 - 6" | | TYPE 611 - 12" | |
|---------------|--------|----------------|--------------|---------------|-------|----------------|-------|
| FRAC. | LETTER | DECIMAL EQUIV. | | EDP NO. | PRICE | EDP NO. | PRICE |
| 13/64 | 7 | .2010 | 2 7/16 | 61207 | 41.10 | 61307 | 48.55 |
| | | .2031 | 2 7/16 | 61013 | 32.05 | 61113 | 37.70 |
| | | .2040 | 2 1/2 | 61206 | 42.30 | 61306 | 49.85 |
| | | .2055 | 2 1/2 | 61205 | 41.10 | 61305 | 48.55 |
| 7/32 | 4 | .2090 | 2 1/2 | 61204 | 38.70 | 61304 | 45.55 |
| | | .2130 | 2 1/2 | 61203 | 41.10 | 61303 | 48.55 |
| | | .2188 | 2 1/2 | 61014 | 32.05 | 61114 | 37.70 |
| | | .2210 | 2 5/8 | 61202 | 40.50 | 61302 | 47.65 |
| 15/64 | 1 | .2280 | 2 5/8 | 61201 | 40.05 | 61301 | 47.00 |
| | | .2344 | 2 5/8 | 61015 | 34.50 | 61115 | 40.55 |
| | | .2500 | 2 3/4 | 61016 | 34.50 | 61116 | 40.55 |
| | | .2656 | 2 7/8 | 61017 | 36.80 | 61117 | 43.40 |
| 9/32 | E | .2812 | 2 15/16 | 61018 | 36.80 | 61118 | 43.40 |
| | | .2969 | 3 1/16 | 61019 | 40.05 | 61119 | 47.00 |
| | | .3125 | 3 3/16 | 61020 | 40.05 | 61120 | 47.00 |
| | | .3281 | 3 5/16 | 61021 | 42.50 | 61121 | 50.05 |
| 11/32 | - | .3438 | 3 7/16 | 61022 | 42.50 | 61122 | 50.05 |
| | | .3594 | 3 1/2 | 61023 | 45.35 | 61123 | 53.15 |
| | | .3750 | 3 5/8 | 61024 | 45.35 | 61124 | 53.15 |
| | | .3906 | 3 3/4 | 61025 | 46.50 | 61125 | 54.80 |
| 13/32 | - | .4062 | 3 7/8 | 61026 | 45.90 | 61126 | 53.95 |
| | | .4219 | 3 15/16 | 61027 | 50.40 | 61127 | 59.40 |
| | | .4375 | 4 1/16 | 61028 | 50.40 | 61128 | 59.40 |
| | | .4531 | 4 3/16 | 61029 | 57.95 | 61129 | 68.25 |
| 15/32 | - | .4688 | 4 9/16 | 61030 | 56.80 | 61130 | 66.80 |
| | | .4844 | 4 3/8 | 61031 | 63.75 | 61131 | 75.00 |
| | | .5000 | 4 1/2 | 61032 | 63.75 | 61132 | 75.00 |
| | | - | - | - | - | - | - |



SILVER & DEMING DRILLS CARBIDE TIPPED TYPES 616 FRACTIONAL



118° STANDARD

| TOOL SELECTOR | CHIP CLASS | MATERIAL MACHINED | TOOL TYPE |
|---------------|------------|---------------------------|-----------|
| | 20 | NON-FERROUS - LONG CHIPS | 616 |
| | 40 | NON-FERROUS - SHORT CHIPS | 616 |
| | 60 | CAST IRONS | 616 |
| | 80 | LOW STRENGTH STEELS | CALL US |
| | 100 | MEDIUM STRENGTH STEELS | CALL US |
| | 120 | HIGH STRENGTH STEELS | CALL US |
| | 140 | HIGH TEMPERATURE ALLOYS | CALL US |

MODIFICATIONS (Prompt delivery)

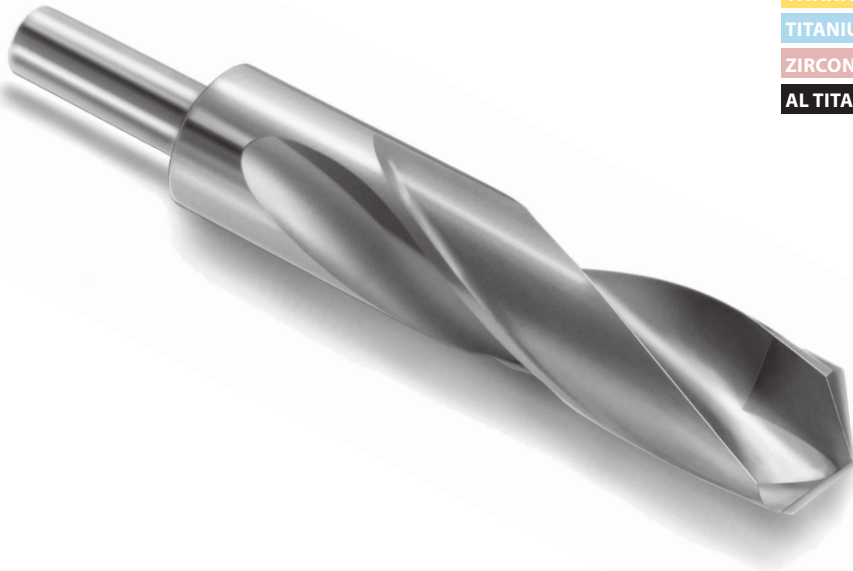
- Modified point and/or angle
- Flat(s) on shank
- Coatings available:

TITANIUM NITRIDE - TiN

TITANIUM CARBONITRIDE - TiCN

ZIRCONIUM NITRIDE - ZrN

AL TITANIUM NITRIDE - AlTiN



TYPE 616 - 118° STANDARD POINT

- Shank : 1/2" diameter, 2 1/4" long
- 118° point - 6" overall length
- Heavy duty quality construction
- Detailed specifications on page 96
- Allows larger tool diameter drilling using a 1/2" drill chuck

| TOOL DIAMETER | | LENGTH | | TYPE 616 - 118° PT. | |
|---------------|---------|--------|----------|---------------------|---------|
| FRAC. | DECIMAL | FLUTE | OVER-ALL | EDP NO. | PRICE |
| 1/2 | .5000 | 3 1/8 | 6 | 61632 | \$77.50 |
| 17/32 | .5312 | 3 1/8 | 6 | 61634 | 113.35 |
| 9/16 | .5625 | 3 1/8 | 6 | 61636 | 117.50 |
| 19/32 | .5938 | 3 1/8 | 6 | 61638 | 122.20 |
| 5/8 | .6250 | 3 1/8 | 6 | 61640 | 135.85 |
| 21/32 | .6562 | 3 1/8 | 6 | 61642 | 147.25 |
| 11/16 | .6875 | 3 1/8 | 6 | 61644 | 152.95 |
| 23/32 | .7188 | 3 1/8 | 6 | 61646 | 158.70 |
| 3/4 | .7500 | 3 1/8 | 6 | 61648 | 166.30 |
| 25/32 | .7812 | 3 1/8 | 6 | 61650 | 183.30 |
| 13/16 | .8125 | 3 1/8 | 6 | 61652 | 183.80 |
| 27/32 | .8438 | 3 1/8 | 6 | 61654 | 183.80 |
| 7/8 | .8750 | 3 1/8 | 6 | 61656 | 191.25 |

| TOOL DIAMETER | | LENGTH | | TYPE 616 - 118° PT. | |
|---------------|---------|--------|----------|---------------------|----------|
| FRAC. | DECIMAL | FLUTE | OVER-ALL | EDP NO. | PRICE |
| 29/32 | .9062 | 3 1/8 | 6 | 61658 | \$195.80 |
| 15/16 | .9375 | 3 1/8 | 6 | 61660 | 197.80 |
| 31/32 | .9688 | 3 1/8 | 6 | 61662 | 204.45 |
| 1 | 1.0000 | 3 1/8 | 6 | 61664 | 208.85 |
| 1 1/32 | 1.0312 | 3 1/8 | 6 | 61666 | 201.55 |
| 1 1/16 | 1.0625 | 3 1/8 | 6 | 61668 | 218.65 |
| 1 3/32 | 1.0938 | 3 1/8 | 6 | 61670 | 223.80 |
| 1 1/8 | 1.1250 | 3 1/8 | 6 | 61672 | 228.25 |
| 1 5/32 | 1.1562 | 3 1/8 | 6 | 61674 | 277.00 |
| 1 3/16 | 1.1875 | 3 1/8 | 6 | 61676 | 282.00 |
| 1 7/32 | 1.2188 | 3 1/8 | 6 | 61678 | 296.05 |
| 1 1/4 | 1.2500 | 3 1/8 | 6 | 61680 | 270.35 |



CORE DRILLS CARBIDE TIPPED TYPES 620 & 622 FRACTIONAL



FOUR RIGHT SPIRAL FLUTES STRAIGHT OR TAPER SHANK



TYPE 620 – STRAIGHT SHANK

- Four large right spiral polished flutes permit higher feeds and speeds
- Carbide tips brazed to hardened tool steel body
- 118° included chamfer angle
- Rigid design provides maximum support for the carbide tips
- Tool diameter tolerance: plus .000", minus .001"

TYPE 622 – TAPER SHANK

- Same as Type 620 above, except with taper shank

| TOOL SELECTOR | CHIP CLASS | MATERIAL MACHINED | TOOL TYPE |
|---------------|---------------------------|--|------------|
| | 20 | NON-FERROUS - LONG CHIPS | 620 or 622 |
| 40 | NON-FERROUS - SHORT CHIPS | 620 or 622 | |
| 60 | CAST IRONS | 620 or 622 | |
| 80 | LOW STRENGTH STEELS | 621 ^{MS} or 623 ^{MS} | |
| 100 | MEDIUM STRENGTH STEELS | 621 ^{MS} or 623 ^{MS} | |
| 120 | HIGH STRENGTH STEELS | 621 ^{MS} or 623 ^{MS} | |
| 140 | HIGH TEMPERATURE ALLOYS | 620 or 622 | |

^{MS}Types 621 & 623 on page 103

MODIFICATIONS (See list on page 102)

USE:

- Designed for economically enlarging cored, punched, drilled, or preformed holes - can remove up to 30% of the tool diameter
- The balanced cutting action of the core drill removes considerably more material than a reamer, often eliminating the need for a final reaming or boring operation

| TOOL DIAMETER | | DIMENSIONS | | | | TYPE 620 | | TYPE 622 | | BOTH TYPES PRICE | FINISHED TO MODIFIED TOOL DIAMETER | | | | | | |
|---------------|---------|----------------|---------|-------|----------|-------------|---------|-----------------|---------|------------------|------------------------------------|--|----------|----------|----------|----------|----------|
| FRACTIONAL | DECIMAL | MIN. CUT DIAM. | LENGTH | | | SHANK DIAM. | EDP NO. | TAPER SHANK NO. | EDP NO. | | MODIFIED DIAMETER RANGE | PRICE EACH - BASED ON QUANTITY ORDERED | | | | | |
| | | | CARBIDE | FLT | OVER-ALL | | | | | | 1 | 2 | 3 | 4 | 5-7 | 8-14** | |
| * 3/8 | .3750 | .262 | 5/8 | 3 1/2 | 6 3/4 | 3/8 | 62012 | 1 | 62212 | \$124.85 | 0.3471 - 0.3780 | \$170.45 | \$147.50 | \$139.90 | \$136.25 | \$132.30 | \$129.35 |
| * 13/32 | .4062 | .284 | 5/8 | 3 5/8 | 7 | 13/32 | 62013 | 1 | 62213 | 124.85 | 0.3781 - 0.4090 | 170.45 | 147.50 | 139.90 | 136.25 | 132.30 | 129.35 |
| * 7/16 | .4375 | .306 | 3/4 | 3 7/8 | 7 1/4 | 7/16 | 62014 | 1 | 62214 | 124.85 | 0.4091 - 0.4410 | 170.45 | 147.50 | 139.90 | 136.25 | 132.30 | 129.35 |
| * 15/32 | .4688 | .328 | 3/4 | 4 1/8 | 7 1/2 | 15/32 | 62015 | 1 | 62215 | 124.85 | 0.4411 - 0.4720 | 170.45 | 147.50 | 139.90 | 136.25 | 132.30 | 129.35 |
| 1/2 | .5000 | .350 | 3/4 | 4 3/8 | 8 1/4 | 1/2 | 62016 | 2 | 62216 | 124.85 | 0.4721 - 0.5030 | 170.45 | 147.50 | 139.90 | 136.25 | 132.30 | 129.35 |
| 17/32 | .5312 | .372 | 3/4 | 4 3/8 | 8 1/4 | 17/32 | 62017 | 2 | 62217 | 125.30 | 0.5031 - 0.5340 | 171.05 | 148.15 | 140.45 | 136.90 | 132.95 | 129.75 |
| 9/16 | .5625 | .394 | 3/4 | 4 3/8 | 8 1/4 | 9/16 | 62018 | 2 | 62218 | 125.30 | 0.5341 - 0.5660 | 171.05 | 148.15 | 140.45 | 136.90 | 132.95 | 129.75 |
| 19/32 | .5938 | .416 | 3/4 | 4 3/8 | 8 1/4 | 19/32 | 62019 | 2 | 62219 | 131.60 | 0.5661 - 0.5970 | 177.25 | 154.35 | 146.80 | 143.10 | 139.15 | 136.15 |
| 5/8 | .6250 | .438 | 3/4 | 4 3/8 | 8 1/4 | 5/8 | 62020 | 2 | 62220 | 131.60 | 0.5971 - 0.6280 | 177.25 | 154.35 | 146.80 | 143.10 | 139.15 | 136.15 |
| 21/32 | .6562 | .459 | 3/4 | 4 3/8 | 8 1/4 | 21/32 | 62021 | 2 | 62221 | 133.10 | 0.6281 - 0.6590 | 178.80 | 155.95 | 148.35 | 144.60 | 140.85 | 137.70 |
| 11/16 | .6875 | .481 | 7/8 | 4 3/8 | 8 1/4 | 11/16 | 62022 | 2 | 62222 | 134.35 | 0.6591 - 0.6910 | 180.00 | 157.20 | 149.40 | 145.80 | 141.90 | 138.80 |
| 23/32 | .7188 | .503 | 7/8 | 4 3/8 | 8 1/4 | 23/32 | 62023 | 2 | 62223 | 134.35 | 0.6911 - 0.7220 | 180.00 | 157.20 | 149.40 | 145.80 | 141.90 | 138.80 |
| 3/4 | .7500 | .525 | 7/8 | 4 3/8 | 8 1/4 | 3/4 | 62024 | 2 | 62224 | 134.35 | 0.7221 - 0.7530 | 180.00 | 157.20 | 149.40 | 145.80 | 141.90 | 138.80 |
| 25/32 | .7812 | .547 | 7/8 | 4 3/8 | 8 1/4 | 25/32 | 62025 | 2 | 62225 | 137.25 | 0.7531 - 0.7840 | 182.85 | 160.10 | 152.40 | 148.75 | 144.90 | 141.80 |
| 13/16 | .8125 | .569 | 7/8 | 4 7/8 | 9 1/2 | 13/16 | 62026 | 3 | 62226 | 141.10 | 0.7841 - 0.8160 | 186.80 | 164.00 | 156.20 | 152.70 | 148.60 | 145.70 |
| 27/32 | .8438 | .591 | 7/8 | 4 7/8 | 9 1/2 | 27/32 | 62027 | 3 | 62227 | 148.60 | 0.8161 - 0.8470 | 194.30 | 171.50 | 163.80 | 160.15 | 156.20 | 153.15 |
| 7/8 | .8750 | .612 | 7/8 | 4 7/8 | 9 1/2 | 7/8 | 62028 | 3 | 62228 | 148.60 | 0.8471 - 0.8780 | 194.30 | 171.50 | 163.80 | 160.15 | 156.20 | 153.15 |
| 29/32 | .9062 | .634 | 7/8 | 4 7/8 | 9 1/2 | 29/32 | 62029 | 3 | 62229 | 149.50 | 0.8781 - 0.9090 | 195.20 | 172.40 | 164.70 | 161.05 | 157.25 | 154.05 |
| 15/16 | .9375 | .656 | 7/8 | 4 7/8 | 9 1/2 | 15/16 | 62030 | 3 | 62230 | 149.50 | 0.9091 - 0.9410 | 195.20 | 172.40 | 164.70 | 161.05 | 157.25 | 154.05 |
| 31/32 | .9688 | .678 | 7/8 | 4 7/8 | 9 1/2 | 31/32 | 62031 | 3 | 62231 | 155.20 | 0.9411 - 0.9720 | 200.70 | 177.85 | 170.25 | 166.70 | 162.65 | 159.65 |
| 1 | 1.0000 | .700 | 7/8 | 4 7/8 | 9 1/2 | 1 | 62032 | 3 | 62232 | 158.05 | 0.9721 - 1.0030 | 203.70 | 180.85 | 173.05 | 169.50 | 165.55 | 162.50 |
| 1 1/32 | 1.0312 | .722 | 7/8 | 4 7/8 | 9 1/2 | 1 1/32 | 62033 | 3 | 62233 | 159.40 | 1.0031 - 1.0340 | 204.95 | 182.00 | 174.50 | 170.75 | 166.95 | 163.80 |
| 1 1/16 | 1.0625 | .744 | 7/8 | 4 7/8 | 9 1/2 | 1 1/16 | 62034 | 3 | 62234 | 161.55 | 1.0341 - 1.0660 | 207.25 | 184.30 | 176.70 | 173.00 | 169.05 | 166.05 |
| 1 1/32 | 1.0938 | .766 | 1 | 4 7/8 | 10 1/2 | 1 1/32 | 62035 | 4 | 62235 | 188.20 | 1.0661 - 1.0970 | 233.75 | 210.95 | 203.30 | 199.65 | 195.75 | 192.65 |
| 1 1/8 | 1.1250 | .787 | 1 | 4 7/8 | 10 1/2 | 1 1/8 | 62036 | 4 | 62236 | 188.20 | 1.0971 - 1.1280 | 233.75 | 210.95 | 203.30 | 199.65 | 195.75 | 192.65 |
| 1 5/32 | 1.1562 | .809 | 1 | 4 7/8 | 10 1/2 | 1 5/32 | 62037 | 4 | 62237 | 205.40 | 1.1281 - 1.1590 | 251.05 | 228.25 | 220.60 | 216.95 | 213.05 | 209.90 |
| 1 3/16 | 1.1875 | .831 | 1 | 4 7/8 | 10 1/2 | 1 3/16 | 62038 | 4 | 62238 | 211.40 | 1.1591 - 1.1905 | 257.00 | 234.30 | 226.45 | 222.90 | 219.00 | 215.95 |
| 1 7/32 | 1.2188 | .853 | 1 | 4 7/8 | 10 1/2 | 1 7/32 | 62039 | 4 | 62239 | 212.15 | 1.1906 - 1.2220 | 257.80 | 234.95 | 227.40 | 223.65 | 219.65 | 216.65 |
| 1 1/4 | 1.2500 | .875 | 1 | 4 7/8 | 10 1/2 | 1 1/4 | 62040 | 4 | 62240 | 213.05 | 1.2221 - 1.2530 | 258.70 | 235.80 | 228.20 | 224.50 | 220.60 | 217.45 |
| 1 9/32 | 1.2812 | .897 | 1 | 4 7/8 | 10 1/2 | 1 9/32 | 62041 | 4 | 62241 | 228.25 | 1.2531 - 1.2840 | 273.90 | 250.95 | 243.35 | 239.65 | 235.80 | 232.65 |
| 1 5/16 | 1.3125 | .919 | 1 | 4 7/8 | 10 1/2 | 1 5/16 | 62042 | 4 | 62242 | 234.55 | 1.2841 - 1.3150 | 280.25 | 257.40 | 249.65 | 246.10 | 242.15 | 239.00 |
| 1 11/32 | 1.3438 | .940 | 1 | 4 7/8 | 10 1/2 | 1 11/32 | 62043 | 4 | 62243 | 239.50 | 1.3151 - 1.3470 | 285.15 | 262.30 | 254.60 | 250.95 | 247.15 | 243.90 |
| 1 3/8 | 1.3750 | .962 | 1 | 4 7/8 | 10 1/2 | 1 3/8 | 62044 | 4 | 62244 | 245.35 | 1.3471 - 1.3780 | 290.95 | 268.10 | 260.40 | 256.80 | 252.90 | 249.70 |
| 1 13/32 | 1.4062 | .984 | 1 | 4 7/8 | 10 1/2 | 1 13/32 | 62045 | 4 | 62245 | 250.85 | 1.3781 - 1.4090 | 296.55 | 273.75 | 266.00 | 262.35 | 258.45 | 255.40 |
| 1 7/16 | 1.4375 | 1.006 | 1 | 4 7/8 | 10 1/2 | 1 7/16 | 62046 | 4 | 62246 | 258.20 | 1.4091 - 1.4410 | 303.90 | 281.10 | 273.35 | 269.75 | 265.85 | 262.80 |
| 1 15/32 | 1.4688 | 1.025 | 1 | 4 7/8 | 10 1/2 | 1 15/32 | 62047 | 4 | 62247 | 265.90 | 1.4411 - 1.4720 | 311.45 | 288.70 | 281.10 | 277.40 | 273.40 | 270.45 |
| 1 1/2 | 1.5000 | 1.050 | 1 | 4 7/8 | 10 1/2 | 1 1/2 | 62048 | 4 | 62248 | 271.70 | 1.4721 - 1.5030 | 317.30 | 294.35 | 286.80 | 283.10 | 279.15 | 276.20 |

*3 flutes

**Quantities of 15 or more - price of fractional size in same size range.



CORE DRILLS CARBIDE TIPPED TYPES 620 & 622 METRIC



FOUR RIGHT SPIRAL FLUTES STRAIGHT OR TAPER SHANK



MODIFICATIONS (Prompt delivery)

- Modified tool diameter - priced on pg. 101
- Modified metric tool diameter - priced below
- Closer tool diameter tolerance
- End chamfer other than 118° included angle
- End cutting or corner radius
- Shortened shank or reduced shank diameter (for Type 620)
- Flat(s) or tang on shank (for Type 620)
- Shank whistle notch for set screw (for Type 622)
- Smaller taper shank (for Type 622)
- Coatings available:

TITANIUM NITRIDE - TiN

TITANIUM CARBONITRIDE - TiCN

ZIRCONIUM NITRIDE - ZrN

AL TITANIUM NITRIDE - AlTiN

NOTE: Tool diameter in millimeters (mm): all other dimensions in inches.

| TOOL DIAMETER | | DIMENSIONS | | | | TYPE 620 | | TYPE 622 | | BOTH TYPES METRIC PRICE | FINISHED TO MODIFIED TOOL DIAMETER | | | | | | | |
|---------------|--------|----------------|---------|------------|----------|-------------|----------------|-----------------|----------------|-------------------------|------------------------------------|--|----------|----------|----------|----------|----------|----------|
| mm | INCH | MIN. CUT DIAM. | CARBIDE | LENGTH FLT | OVER-ALL | SHANK DIAM. | METRIC EDP NO. | TAPER SHANK NO. | METRIC EDP NO. | | MODIFIED DIAMETER RANGE (mm) | PRICE EACH - BASED ON QUANTITY ORDERED | | | | | | |
| | | | | | | | | | | | 1 | 2 | 3 | 4 | 5-7 | 8-14 | OVER 14 | |
| * 9.0 | .3543 | .262 | 5/8 | 3 1/2 | 6 3/4 | 3/8 | 620090 | 1 | 622090 | \$139.90 | 8.815 - 9.601 | \$174.25 | \$151.50 | \$143.70 | \$140.00 | \$136.25 | \$133.05 | \$128.65 |
| *10.0 | .3937 | .284 | 5/8 | 3 5/8 | 7 | 13/32 | 620100 | 1 | 622100 | 139.90 | 9.602 - 10.389 | 174.25 | 151.50 | 143.70 | 140.00 | 136.25 | 133.05 | 128.65 |
| *11.0 | .4331 | .306 | 3/4 | 3 7/8 | 7 1/4 | 7/16 | 620110 | 1 | 622110 | 139.90 | 10.390 - 11.201 | 174.25 | 151.50 | 143.70 | 140.00 | 136.25 | 133.05 | 128.65 |
| * | - | .328 | 3/4 | 4 1/8 | 7 1/2 | 15/32 | 620119 | 1 | 622119 | - | 11.202 - 11.989 | 174.25 | 151.50 | 143.70 | 140.00 | 136.25 | 133.05 | 128.65 |
| 12.0 | .4724 | .350 | 3/4 | 4 3/8 | 8 1/4 | 1/2 | 620120 | 2 | 622120 | 139.90 | 11.990 - 12.776 | 174.25 | 151.50 | 143.70 | 140.00 | 136.25 | 133.05 | 128.65 |
| 13.0 | .5118 | .372 | 3/4 | 4 3/8 | 8 1/4 | 17/32 | 620130 | 2 | 622130 | 140.45 | 12.777 - 13.564 | 174.70 | 152.10 | 144.40 | 140.75 | 136.90 | 133.70 | 129.35 |
| 14.0 | .5512 | .394 | 3/4 | 4 3/8 | 8 1/4 | 9/16 | 620140 | 2 | 622140 | 140.45 | 13.565 - 14.376 | 174.70 | 152.10 | 144.40 | 140.75 | 136.90 | 133.70 | 129.35 |
| 15.0 | .5906 | .416 | 3/4 | 4 3/8 | 8 1/4 | 19/32 | 620150 | 2 | 622150 | 146.80 | 14.377 - 15.164 | 181.10 | 158.30 | 150.65 | 146.95 | 143.10 | 139.90 | 135.50 |
| - | - | .438 | 3/4 | 4 3/8 | 8 1/4 | 5/8 | 620159 | 2 | 622159 | - | 15.165 - 15.951 | 181.10 | 158.30 | 150.65 | 146.95 | 143.10 | 139.90 | 135.50 |
| 16.0 | .6299 | .459 | 3/4 | 4 3/8 | 8 1/4 | 21/32 | 620160 | 2 | 622160 | 148.35 | 15.952 - 16.739 | 182.70 | 159.85 | 152.20 | 148.50 | 144.60 | 141.35 | 137.15 |
| 17.0 | .6693 | .481 | 7/8 | 4 3/8 | 8 1/4 | 11/16 | 620170 | 2 | 622170 | 149.40 | 16.740 - 17.551 | 183.85 | 160.95 | 153.25 | 149.50 | 145.80 | 142.55 | 138.20 |
| 18.0 | .7087 | .503 | 7/8 | 4 3/8 | 8 1/4 | 23/32 | 620180 | 2 | 622180 | 149.40 | 17.552 - 18.339 | 183.85 | 160.95 | 153.25 | 149.50 | 145.80 | 142.55 | 138.20 |
| 19.0 | .7480 | .525 | 7/8 | 4 3/8 | 8 1/4 | 3/4 | 620190 | 2 | 622190 | 149.40 | 18.340 - 19.126 | 183.85 | 160.95 | 153.25 | 149.50 | 145.80 | 142.55 | 138.20 |
| - | - | .547 | 7/8 | 4 3/8 | 8 1/4 | 25/32 | 620199 | 2 | 622199 | - | 19.127 - 19.914 | 186.80 | 164.10 | 156.50 | 152.70 | 148.75 | 145.70 | 141.20 |
| 20.0 | .7874 | .569 | 7/8 | 4 7/8 | 9 1/2 | 13/16 | 620200 | 3 | 622200 | 156.20 | 19.915 - 20.726 | 190.60 | 167.85 | 160.15 | 156.55 | 152.70 | 149.40 | 145.05 |
| 21.0 | .8268 | .591 | 7/8 | 4 7/8 | 9 1/2 | 27/32 | 620210 | 3 | 622210 | 163.80 | 20.727 - 21.514 | 198.20 | 175.35 | 167.75 | 164.10 | 160.15 | 157.00 | 152.70 |
| 22.0 | .8661 | .612 | 7/8 | 4 7/8 | 9 1/2 | 7/8 | 620220 | 3 | 622220 | 163.80 | 21.515 - 22.301 | 198.20 | 175.35 | 167.75 | 164.10 | 160.15 | 157.00 | 152.70 |
| 23.0 | .9055 | .634 | 7/8 | 4 7/8 | 9 1/2 | 29/32 | 620230 | 3 | 622230 | 164.70 | 22.302 - 23.089 | 199.05 | 176.35 | 168.75 | 164.85 | 161.05 | 158.00 | 153.55 |
| - | - | .656 | 7/8 | 4 7/8 | 9 1/2 | 15/16 | 620239 | 3 | 622239 | - | 23.090 - 23.901 | 199.05 | 176.35 | 168.75 | 164.85 | 161.05 | 158.00 | 153.55 |
| 24.0 | .9449 | .678 | 7/8 | 4 7/8 | 9 1/2 | 31/32 | 620240 | 3 | 622240 | 170.25 | 23.902 - 24.689 | 204.60 | 181.80 | 174.20 | 170.45 | 166.70 | 163.35 | 159.00 |
| 25.0 | .9843 | .700 | 7/8 | 4 7/8 | 9 1/2 | 1 | 620250 | 3 | 622250 | 173.05 | 24.690 - 25.476 | 207.50 | 184.75 | 177.10 | 173.30 | 169.50 | 166.35 | 161.95 |
| 26.0 | 1.0236 | .722 | 7/8 | 4 7/8 | 9 1/2 | 1 1/32 | 620260 | 3 | 622260 | 174.50 | 25.477 - 26.264 | 208.75 | 186.05 | 178.40 | 174.60 | 170.75 | 167.70 | 163.20 |
| 27.0 | 1.0630 | .744 | 7/8 | 4 7/8 | 9 1/2 | 1 1/16 | 620270 | 3 | 622270 | 176.70 | 26.265 - 27.076 | 211.15 | 188.25 | 180.55 | 176.90 | 173.00 | 169.90 | 165.50 |
| - | - | .766 | 1 | 4 7/8 | 10 1/2 | 1 1/32 | 620279 | 4 | 622279 | - | 27.077 - 27.864 | 237.65 | 214.85 | 207.25 | 203.40 | 199.65 | 196.45 | 192.15 |
| 28.0 | 1.1024 | .787 | 1 | 4 7/8 | 10 1/2 | 1 1/8 | 620280 | 4 | 622280 | 203.30 | 27.865 - 28.651 | 237.65 | 214.85 | 207.25 | 203.40 | 199.65 | 196.45 | 192.15 |
| 29.0 | 1.1417 | .809 | 1 | 4 7/8 | 10 1/2 | 1 5/32 | 620290 | 4 | 622290 | 220.60 | 28.652 - 29.439 | 254.90 | 232.20 | 224.50 | 220.80 | 216.95 | 213.70 | 209.25 |
| 30.0 | 1.1811 | .831 | 1 | 4 7/8 | 10 1/2 | 1 3/16 | 620300 | 4 | 622300 | 226.45 | 29.440 - 30.239 | 260.90 | 238.05 | 230.55 | 226.60 | 222.90 | 219.65 | 215.35 |
| 31.0 | 1.2205 | .853 | 1 | 4 7/8 | 10 1/2 | 1 7/32 | 620310 | 4 | 622310 | 227.40 | 30.240 - 31.039 | 261.65 | 238.80 | 231.25 | 227.50 | 223.65 | 220.35 | 216.05 |
| - | - | .875 | 1 | 4 7/8 | 10 1/2 | 1 1/4 | 620319 | 4 | 622319 | - | 31.040 - 31.826 | 262.40 | 239.65 | 232.15 | 228.35 | 224.50 | 221.30 | 216.95 |
| 32.0 | 1.2598 | .897 | 1 | 4 7/8 | 10 1/2 | 1 9/32 | 620320 | 4 | 622320 | 243.35 | 31.827 - 32.614 | 277.80 | 254.90 | 247.30 | 243.60 | 239.65 | 236.50 | 232.20 |
| 33.0 | 1.2992 | .919 | 1 | 4 7/8 | 10 1/2 | 1 5/16 | 620330 | 4 | 622330 | 249.65 | 32.615 - 33.401 | 284.00 | 261.15 | 253.55 | 249.80 | 246.10 | 242.95 | 238.55 |
| 34.0 | 1.3386 | .940 | 1 | 4 7/8 | 10 1/2 | 1 11/32 | 620340 | 4 | 622340 | 254.60 | 33.402 - 34.214 | 289.10 | 266.30 | 258.60 | 254.85 | 250.95 | 247.85 | 243.45 |
| 35.0 | 1.3780 | .962 | 1 | 4 7/8 | 10 1/2 | 1 3/8 | 620350 | 4 | 622350 | 260.40 | 34.215 - 35.001 | 294.90 | 272.00 | 264.40 | 260.60 | 256.80 | 253.55 | 249.30 |
| - | - | .984 | 1 | 4 7/8 | 10 1/2 | 1 13/32 | 620359 | 4 | 622359 | - | 35.002 - 35.789 | 300.35 | 277.70 | 269.85 | 266.30 | 262.35 | 259.25 | 254.85 |
| 36.0 | 1.4173 | 1.006 | 1 | 4 7/8 | 10 1/2 | 1 7/16 | 620360 | 4 | 622360 | 273.35 | 35.790 - 36.601 | 307.75 | 284.95 | 277.35 | 273.50 | 269.75 | 266.60 | 262.25 |
| 37.0 | 1.4567 | 1.025 | 1 | 4 7/8 | 10 1/2 | 1 15/32 | 620370 | 4 | 622370 | 281.10 | 36.602 - 37.389 | 315.40 | 292.65 | 284.95 | 281.30 | 277.40 | 274.20 | 269.80 |
| 38.0 | 1.4961 | 1.050 | 1 | 4 7/8 | 10 1/2 | 1 1/2 | 620380 | 4 | 622380 | 286.80 | 37.390 - 38.176 | 321.05 | 298.35 | 290.70 | 286.90 | 283.10 | 279.95 | 275.50 |

*3 flutes

DRILLS



CORE DRILLS - FOR STEELS

CARBIDE TIPPED TYPES 621 & 623 FRACTIONAL



FOUR RIGHT SPIRAL FLUTES STRAIGHT OR TAPER SHANK



| TOOL SELECTOR | CHIP CLASS | MATERIAL MACHINED | TOOL TYPE |
|---------------|---------------------------|--------------------------|--------------|
| | 20 | NON-FERROUS - LONG CHIPS | 620* or 622* |
| 40 | NON-FERROUS - SHORT CHIPS | 620* or 622* | |
| 60 | CAST IRONS | 620* or 622* | |
| 80 | LOW STRENGTH STEELS | 621 or 623 | |
| 100 | MEDIUM STRENGTH STEELS | 621 or 623 | |
| 120 | HIGH STRENGTH STEELS | 621 or 623 | |
| 140 | HIGH TEMPERATURE ALLOYS | 620* or 622* | |

*Types 620 & 622 on page 101

TYPE 621 - STRAIGHT SHANK FOR MACHINING STEELS

- Special carbide grade & tool geometry permit the heavy chip loads and speeds required for machining steel
- Not to be used for machining non-ferrous materials, cast irons, or high temp alloys
- Four large right spiral polished flutes permit higher feeds and speeds
- Carbide tips brazed to hardened tool steel body
- 118° included chamfer angle
- Rigid design provides maximum support for the carbide tips
- Tool diameter tolerance: plus .000", minus .001"

TYPE 623 - TAPER SHANK FOR MACHINING STEELS

- Same as Type 621 above, except with taper shank

MODIFICATIONS (See list on page 104)

USE:

- Designed for economically enlarging cored, punched, drilled, or preformed holes - can remove up to 30% of the tool diameter
- The balanced cutting action of the core drill removes considerably more material than a reamer, often eliminating the need for a final reaming or boring operation

| TOOL DIAMETER | | DIMENSIONS | | | | TYPE 621 | | TYPE 623 | | BOTH TYPES PRICE | FINISHED TO MODIFIED TOOL DIAMETER | | | | | | |
|---------------|--------|----------------|---------|-------|----------|-------------|---------------|-----------------|---------------|------------------|------------------------------------|--|----------|----------|----------|----------|----------|
| FRAC. | DEC. | MIN. CUT DIAM. | LENGTH | | | SHANK DIAM. | STEEL EDP NO. | TAPER SHANK NO. | STEEL EDP NO. | | MODIFIED DIAMETER RANGE | PRICE EACH - BASED ON QUANTITY ORDERED | | | | | |
| | | | CARBIDE | FLT | OVER-ALL | | | | | | | | | | 1 | 2 | 3 |
| * 3/8 | .3750 | .262 | 5/8 | 3 1/2 | 6 3/4 | 3/8 | 62112 | 1 | 62312 | \$137.40 | 0.3471 - 0.3780 | \$183.10 | \$160.15 | \$152.50 | \$148.85 | \$145.00 | \$141.90 |
| * 13/32 | .4062 | .284 | 5/8 | 3 5/8 | 7 | 13/32 | 62113 | 1 | 62313 | 137.40 | 0.3781 - 0.4090 | 183.10 | 160.15 | 152.50 | 148.85 | 145.00 | 141.90 |
| * 7/16 | .4375 | .306 | 3/4 | 3 7/8 | 7 1/4 | 7/16 | 62114 | 1 | 62314 | 137.40 | 0.4091 - 0.4410 | 183.10 | 160.15 | 152.50 | 148.85 | 145.00 | 141.90 |
| * 15/32 | .4688 | .328 | 3/4 | 4 1/8 | 7 1/2 | 15/32 | 62115 | 1 | 62315 | 137.40 | 0.4411 - 0.4720 | 183.10 | 160.15 | 152.50 | 148.85 | 145.00 | 141.90 |
| 1/2 | .5000 | .350 | 3/4 | 4 3/8 | 8 1/4 | 1/2 | 62116 | 2 | 62316 | 137.40 | 0.4721 - 0.5030 | 183.10 | 160.15 | 152.50 | 148.85 | 145.00 | 141.90 |
| 17/32 | .5312 | .372 | 3/4 | 4 3/8 | 8 1/4 | 17/32 | 62117 | 2 | 62317 | 137.90 | 0.5031 - 0.5340 | 183.45 | 160.70 | 152.95 | 149.35 | 145.40 | 142.40 |
| 9/16 | .5625 | .394 | 3/4 | 4 3/8 | 8 1/4 | 9/16 | 62118 | 2 | 62318 | 137.90 | 0.5341 - 0.5660 | 183.45 | 160.70 | 152.95 | 149.35 | 145.40 | 142.40 |
| 19/32 | .5938 | .416 | 3/4 | 4 3/8 | 8 1/4 | 19/32 | 62119 | 2 | 62319 | 144.90 | 0.5661 - 0.5970 | 190.50 | 167.70 | 159.90 | 156.50 | 152.40 | 149.35 |
| 5/8 | .6250 | .438 | 3/4 | 4 3/8 | 8 1/4 | 5/8 | 62120 | 2 | 62320 | 144.90 | 0.5971 - 0.6280 | 190.50 | 167.70 | 159.90 | 156.50 | 152.40 | 149.35 |
| 21/32 | .6562 | .459 | 3/4 | 4 3/8 | 8 1/4 | 21/32 | 62121 | 2 | 62321 | 146.55 | 0.6281 - 0.6590 | 192.15 | 169.20 | 161.55 | 158.00 | 154.00 | 150.90 |
| 11/16 | .6875 | .481 | 7/8 | 4 3/8 | 8 1/4 | 11/16 | 62122 | 2 | 62322 | 147.80 | 0.6591 - 0.6910 | 193.45 | 170.50 | 162.90 | 159.20 | 155.40 | 152.20 |
| 23/32 | .7188 | .503 | 7/8 | 4 3/8 | 8 1/4 | 23/32 | 62123 | 2 | 62323 | 147.80 | 0.6911 - 0.7220 | 193.45 | 170.50 | 162.90 | 159.20 | 155.40 | 152.20 |
| 3/4 | .7500 | .525 | 7/8 | 4 3/8 | 8 1/4 | 3/4 | 62124 | 2 | 62324 | 147.80 | 0.7221 - 0.7530 | 193.45 | 170.50 | 162.90 | 159.20 | 155.40 | 152.20 |
| 25/32 | .7812 | .547 | 7/8 | 4 3/8 | 8 1/4 | 25/32 | 62125 | 2 | 62325 | 150.90 | 0.7531 - 0.7840 | 196.50 | 173.80 | 166.05 | 162.40 | 158.40 | 155.45 |
| 13/16 | .8125 | .569 | 7/8 | 4 7/8 | 9 1/2 | 13/16 | 62126 | 3 | 62326 | 155.25 | 0.7841 - 0.8160 | 200.90 | 178.05 | 170.35 | 166.80 | 162.85 | 159.70 |
| 27/32 | .8438 | .591 | 7/8 | 4 7/8 | 9 1/2 | 27/32 | 62127 | 3 | 62327 | 163.55 | 0.8161 - 0.8470 | 209.15 | 186.30 | 178.65 | 175.05 | 171.20 | 168.05 |
| 7/8 | .8750 | .612 | 7/8 | 4 7/8 | 9 1/2 | 7/8 | 62128 | 3 | 62328 | 163.55 | 0.8471 - 0.8780 | 209.15 | 186.30 | 178.65 | 175.05 | 171.20 | 168.05 |
| 29/32 | .9062 | .634 | 7/8 | 4 7/8 | 9 1/2 | 29/32 | 62129 | 3 | 62329 | 164.50 | 0.8781 - 0.9090 | 210.15 | 187.40 | 179.70 | 176.00 | 172.20 | 169.00 |
| 15/16 | .9375 | .656 | 7/8 | 4 7/8 | 9 1/2 | 15/16 | 62130 | 3 | 62330 | 164.50 | 0.9091 - 0.9410 | 210.15 | 187.40 | 179.70 | 176.00 | 172.20 | 169.00 |
| 31/32 | .9688 | .678 | 7/8 | 4 7/8 | 9 1/2 | 31/32 | 62131 | 3 | 62331 | 170.55 | 0.9411 - 0.9720 | 216.15 | 193.45 | 185.65 | 182.00 | 178.25 | 175.15 |
| 1 | 1.0000 | .700 | 7/8 | 4 7/8 | 9 1/2 | 1 | 62132 | 3 | 62332 | 173.90 | 0.9721 - 1.0030 | 219.50 | 196.70 | 189.00 | 185.40 | 181.55 | 178.40 |
| 1 1/32 | 1.0312 | .722 | 7/8 | 4 7/8 | 9 1/2 | 1 1/32 | 62133 | 3 | 62333 | 175.20 | 1.0031 - 1.0340 | 220.85 | 197.90 | 190.25 | 186.75 | 182.75 | 179.70 |
| 1 1/16 | 1.0625 | .744 | 7/8 | 4 7/8 | 9 1/2 | 1 1/16 | 62134 | 3 | 62334 | 177.60 | 1.0341 - 1.0660 | 223.25 | 200.40 | 192.70 | 189.05 | 185.25 | 182.00 |
| 1 1/32 | 1.0938 | .766 | 1 | 4 7/8 | 10 1/2 | 1 1/32 | 62135 | 4 | 62335 | 207.00 | 1.0661 - 1.0970 | 252.50 | 229.75 | 222.00 | 218.50 | 214.50 | 211.40 |
| 1 1/8 | 1.1250 | .787 | 1 | 4 7/8 | 10 1/2 | 1 1/8 | 62136 | 4 | 62336 | 216.25 | 1.0971 - 1.1280 | 262.00 | 239.20 | 231.50 | 227.75 | 223.95 | 220.85 |
| 1 5/32 | 1.1562 | .809 | 1 | 4 7/8 | 10 1/2 | 1 5/32 | 62137 | 4 | 62337 | 226.05 | 1.1281 - 1.1590 | 271.70 | 248.80 | 241.10 | 237.45 | 233.50 | 230.55 |
| 1 3/16 | 1.1875 | .831 | 1 | 4 7/8 | 10 1/2 | 1 3/16 | 62138 | 4 | 62338 | 232.50 | 1.1591 - 1.1905 | 278.15 | 255.40 | 247.70 | 244.00 | 240.20 | 237.10 |
| 1 7/32 | 1.2188 | .853 | 1 | 4 7/8 | 10 1/2 | 1 7/32 | 62139 | 4 | 62339 | 233.40 | 1.1906 - 1.2220 | 279.05 | 256.25 | 248.55 | 244.85 | 241.05 | 237.95 |
| 1 1/4 | 1.2500 | .875 | 1 | 4 7/8 | 10 1/2 | 1 1/4 | 62140 | 4 | 62340 | 234.35 | 1.2221 - 1.2530 | 279.95 | 257.00 | 249.40 | 245.85 | 241.90 | 238.75 |
| 1 9/32 | 1.2812 | .897 | 1 | 4 7/8 | 10 1/2 | 1 9/32 | 62141 | 4 | 62341 | 250.95 | 1.2531 - 1.2840 | 296.60 | 273.80 | 266.05 | 262.40 | 258.60 | 255.45 |
| 1 5/16 | 1.3125 | .919 | 1 | 4 7/8 | 10 1/2 | 1 5/16 | 62142 | 4 | 62342 | 257.95 | 1.2841 - 1.3150 | 303.60 | 280.75 | 273.15 | 269.50 | 265.60 | 262.40 |
| 1 11/32 | 1.3438 | .940 | 1 | 4 7/8 | 10 1/2 | 1 11/32 | 62143 | 4 | 62343 | 263.45 | 1.3151 - 1.3470 | 309.15 | 286.30 | 278.70 | 275.05 | 271.00 | 268.05 |
| 1 3/8 | 1.3750 | .962 | 1 | 4 7/8 | 10 1/2 | 1 3/8 | 62144 | 4 | 62344 | 269.80 | 1.3471 - 1.3780 | 315.45 | 292.65 | 284.95 | 281.35 | 277.40 | 274.25 |
| 1 13/32 | 1.4062 | .984 | 1 | 4 7/8 | 10 1/2 | 1 13/32 | 62145 | 4 | 62345 | 276.20 | 1.3781 - 1.4090 | 321.70 | 298.90 | 291.20 | 287.60 | 283.70 | 280.60 |
| 1 7/16 | 1.4375 | 1.006 | 1 | 4 7/8 | 10 1/2 | 1 7/16 | 62146 | 4 | 62346 | 284.15 | 1.4091 - 1.4410 | 329.80 | 306.80 | 299.20 | 295.60 | 291.75 | 288.55 |
| 1 15/32 | 1.4688 | 1.025 | 1 | 4 7/8 | 10 1/2 | 1 15/32 | 62147 | 4 | 62347 | 292.60 | 1.4411 - 1.4720 | 338.25 | 315.35 | 307.65 | 304.05 | 300.05 | 297.00 |
| 1 1/2 | 1.5000 | 1.050 | 1 | 4 7/8 | 10 1/2 | 1 1/2 | 62148 | 4 | 62348 | 298.70 | 1.4721 - 1.5030 | 344.40 | 321.55 | 313.95 | 310.25 | 306.50 | 303.30 |

*3 flutes

**Quantities of 15 or more - price of fractional size in same size range.



CORE DRILLS - FOR STEELS

CARBIDE TIPPED TYPES 621 & 623 METRIC

MATERIAL SPECIFIC

FOUR RIGHT SPIRAL FLUTES STRAIGHT OR TAPER SHANK

MODIFICATIONS (Prompt delivery)

- Modified tool diameter - priced on pg. 103
- Modified metric tool diameter - priced below
- Closer tool diameter tolerance
- End chamfer other than 118° included angle
- End cutting or corner radius
- Shortened shank or reduced shank diameter (for Type 621)
- Flat(s) or tang on shank (for Type 621)
- Shank whistle notch for set screw (for Type 623)
- Smaller taper shank (for Type 623)
- Coatings available:

TITANIUM NITRIDE - TiN

TITANIUM CARBONITRIDE - TiCN

ZIRCONIUM NITRIDE - ZrN

AL TITANIUM NITRIDE - AlTiN



NOTE: Tool diameter in millimeters (mm); all other dimensions in inches.

| TOOL DIAMETER | | DIMENSIONS | | | | TYPE 621 | | TYPE 623 | | BOTH TYPES METRIC PRICE | FINISHED TO MODIFIED TOOL DIAMETER | | | | | | | |
|---------------|--------|----------------|----------|-------|----------|-------------|----------------------|-----------------|----------------------|-------------------------|------------------------------------|--|----------|----------|----------|----------|----------|----------|
| mm | INCH | MIN. CUT DIAM. | CAR-BIDE | FLUTE | OVER-ALL | SHANK DIAM. | STEEL METRIC EDP NO. | TAPER SHANK NO. | STEEL METRIC EDP NO. | | MODIFIED DIAMETER RANGE (mm) | PRICE EACH - BASED ON QUANTITY ORDERED | | | | | | |
| | | | | | | | | | | | 1 | 2 | 3 | 4 | 5-7 | 8-14 | OVER 14 | |
| 9.0 | .3543 | .262 | 5/8 | 3 1/2 | 6 3/4 | 3/8 | 621090 | 1 | 623090 | \$152.50 | 8.815-9.601 | \$186.85 | \$164.15 | \$156.55 | \$152.75 | \$148.85 | \$145.75 | \$141.25 |
| 10.0 | .3937 | .284 | 5/8 | 3 3/8 | 7 | 13/32 | 621100 | 1 | 623100 | 152.50 | 9.602-10.389 | 186.85 | 164.15 | 156.55 | 152.75 | 148.85 | 145.75 | 141.25 |
| 11.0 | .4331 | .306 | 3/4 | 3 7/8 | 7 1/4 | 7/16 | 621110 | 1 | 623110 | 152.50 | 10.390-11.201 | 186.85 | 164.15 | 156.55 | 152.75 | 148.85 | 145.75 | 141.25 |
| - | - | .328 | 3/4 | 4 1/8 | 7 1/2 | 15/32 | 621119 | 1 | 623119 | - | 11.202-11.989 | 186.85 | 164.15 | 156.55 | 152.75 | 148.85 | 145.75 | 141.25 |
| 12.0 | .4724 | .350 | 3/4 | 4 3/8 | 8 1/4 | 1/2 | 621120 | 2 | 623120 | 152.50 | 11.990-12.776 | 186.85 | 164.15 | 156.55 | 152.75 | 148.85 | 145.75 | 141.25 |
| 13.0 | .5118 | .372 | 3/4 | 4 3/8 | 8 1/4 | 17/32 | 621130 | 2 | 623130 | 152.95 | 12.777-13.564 | 187.40 | 164.50 | 156.80 | 153.15 | 149.35 | 146.05 | 141.80 |
| 14.0 | .5512 | .394 | 3/4 | 4 3/8 | 8 1/4 | 9/16 | 621140 | 2 | 623140 | 152.95 | 13.565-14.376 | 187.40 | 164.50 | 156.80 | 153.15 | 149.35 | 146.05 | 141.80 |
| 15.0 | .5906 | .416 | 3/4 | 4 3/8 | 8 1/4 | 19/32 | 621150 | 2 | 623150 | 159.90 | 14.377-15.164 | 194.30 | 171.55 | 164.00 | 160.15 | 156.50 | 153.15 | 148.75 |
| - | - | .438 | 3/4 | 4 3/8 | 8 1/4 | 5/8 | 621159 | 2 | 623159 | - | 15.165-15.951 | 194.30 | 171.55 | 164.00 | 160.15 | 156.50 | 153.15 | 148.75 |
| 16.0 | .6299 | .459 | 3/4 | 4 3/8 | 8 1/4 | 21/32 | 621160 | 2 | 623160 | 161.55 | 15.952-16.739 | 195.90 | 173.05 | 165.50 | 161.75 | 158.00 | 154.70 | 150.35 |
| 17.0 | .6693 | .481 | 7/8 | 4 3/8 | 8 1/4 | 11/16 | 621170 | 2 | 623170 | 162.90 | 16.740-17.551 | 197.25 | 174.50 | 166.90 | 163.10 | 159.20 | 156.00 | 151.70 |
| 18.0 | .7087 | .503 | 7/8 | 4 3/8 | 8 1/4 | 23/32 | 621180 | 2 | 623180 | 162.90 | 17.552-18.339 | 197.25 | 174.50 | 166.90 | 163.10 | 159.20 | 156.00 | 151.70 |
| 19.0 | .7480 | .525 | 7/8 | 4 3/8 | 8 1/4 | 3/4 | 621190 | 2 | 623190 | 162.90 | 18.340-19.126 | 197.25 | 174.50 | 166.90 | 163.10 | 159.20 | 156.00 | 151.70 |
| - | - | .547 | 7/8 | 4 3/8 | 8 1/4 | 25/32 | 621199 | 2 | 623199 | - | 19.127-19.914 | 200.40 | 177.60 | 170.10 | 166.20 | 162.40 | 159.20 | 154.90 |
| 20.0 | .7874 | .569 | 7/8 | 4 7/8 | 9 1/2 | 13/16 | 621200 | 3 | 623200 | 170.35 | 19.915-20.726 | 204.65 | 181.90 | 174.25 | 170.50 | 166.80 | 163.55 | 159.05 |
| 21.0 | .8268 | .591 | 7/8 | 4 7/8 | 9 1/2 | 27/32 | 621210 | 3 | 623210 | 178.65 | 20.727-21.514 | 213.05 | 190.20 | 182.60 | 178.80 | 175.05 | 171.80 | 167.55 |
| 22.0 | .8661 | .612 | 7/8 | 4 7/8 | 9 1/2 | 7/8 | 621220 | 3 | 623220 | 178.65 | 21.515-22.301 | 213.05 | 190.20 | 182.60 | 178.80 | 175.05 | 171.80 | 167.55 |
| 23.0 | .9055 | .634 | 7/8 | 4 7/8 | 9 1/2 | 29/32 | 621230 | 3 | 623230 | 179.70 | 22.302-23.089 | 214.05 | 191.35 | 183.50 | 179.90 | 176.00 | 172.90 | 168.45 |
| - | - | .656 | 7/8 | 4 7/8 | 9 1/2 | 15/16 | 621239 | 3 | 623239 | - | 23.090-23.901 | 214.05 | 191.35 | 183.50 | 179.90 | 176.00 | 172.90 | 168.45 |
| 24.0 | .9449 | .678 | 7/8 | 4 7/8 | 9 1/2 | 31/32 | 621240 | 3 | 623240 | 185.65 | 23.902-24.689 | 220.15 | 197.35 | 189.75 | 185.95 | 182.00 | 178.85 | 174.55 |
| 25.0 | .9843 | .700 | 7/8 | 4 7/8 | 9 1/2 | 1 | 621250 | 3 | 623250 | 189.00 | 24.690-25.476 | 223.40 | 200.50 | 192.95 | 189.10 | 185.40 | 182.05 | 177.70 |
| 26.0 | 1.0236 | .722 | 7/8 | 4 7/8 | 9 1/2 | 1 1/32 | 621260 | 3 | 623260 | 190.25 | 25.477-26.264 | 224.75 | 201.85 | 194.20 | 190.50 | 186.75 | 183.45 | 179.15 |
| 27.0 | 1.0630 | .744 | 7/8 | 4 7/8 | 9 1/2 | 1 1/16 | 621270 | 3 | 623270 | 192.70 | 26.265-27.076 | 227.15 | 204.35 | 196.70 | 192.95 | 189.05 | 185.95 | 181.60 |
| - | - | .766 | 1 | 4 7/8 | 10 1/2 | 1 3/32 | 621279 | 4 | 623279 | - | 27.077-27.864 | 256.45 | 233.60 | 226.05 | 222.25 | 218.50 | 215.15 | 210.85 |
| 28.0 | 1.1024 | .787 | 1 | 4 7/8 | 10 1/2 | 1 1/8 | 621280 | 4 | 623280 | 231.50 | 27.865-28.651 | 265.85 | 243.10 | 235.35 | 231.75 | 227.75 | 224.75 | 220.25 |
| 29.0 | 1.1417 | .809 | 1 | 4 7/8 | 10 1/2 | 1 5/32 | 621290 | 4 | 623290 | 241.10 | 28.652-29.439 | 275.45 | 252.75 | 244.95 | 241.30 | 237.45 | 234.35 | 229.90 |
| 30.0 | 1.1811 | .831 | 1 | 4 7/8 | 10 1/2 | 1 3/16 | 621300 | 4 | 623300 | 247.70 | 29.440-30.239 | 282.15 | 259.30 | 251.75 | 247.90 | 244.00 | 240.85 | 236.50 |
| 31.0 | 1.2205 | .853 | 1 | 4 7/8 | 10 1/2 | 1 7/32 | 621310 | 4 | 623310 | 248.55 | 30.240-31.039 | 282.90 | 260.25 | 252.45 | 248.80 | 244.85 | 241.85 | 237.35 |
| - | - | .875 | 1 | 4 7/8 | 10 1/2 | 1 1/4 | 621319 | 4 | 623319 | - | 31.040-31.826 | 283.75 | 261.00 | 253.40 | 249.60 | 245.85 | 242.50 | 238.10 |
| 32.0 | 1.2598 | .897 | 1 | 4 7/8 | 10 1/2 | 1 9/32 | 621320 | 4 | 623320 | 266.05 | 31.827-32.614 | 300.60 | 277.80 | 269.95 | 266.35 | 262.40 | 259.30 | 254.90 |
| 33.0 | 1.2992 | .919 | 1 | 4 7/8 | 10 1/2 | 1 5/16 | 621330 | 4 | 623330 | 273.10 | 32.615-33.401 | 307.50 | 284.70 | 277.00 | 273.30 | 269.50 | 266.35 | 261.85 |
| 34.0 | 1.3386 | .940 | 1 | 4 7/8 | 10 1/2 | 1 11/32 | 621340 | 4 | 623340 | 278.70 | 33.402-34.214 | 312.90 | 290.25 | 282.55 | 278.85 | 275.05 | 271.85 | 267.40 |
| 35.0 | 1.3780 | .962 | 1 | 4 7/8 | 10 1/2 | 1 3/8 | 621350 | 4 | 623350 | 284.95 | 34.215-35.001 | 319.40 | 296.55 | 288.95 | 285.15 | 281.35 | 278.10 | 273.80 |
| - | - | .984 | 1 | 4 7/8 | 10 1/2 | 1 13/32 | 621359 | 4 | 623359 | - | 35.002-35.789 | 325.55 | 302.75 | 295.15 | 291.40 | 287.60 | 284.35 | 280.00 |
| 36.0 | 1.4173 | 1.006 | 1 | 4 7/8 | 10 1/2 | 1 7/16 | 621360 | 4 | 623360 | 299.20 | 35.790-36.601 | 333.65 | 310.85 | 303.15 | 299.45 | 295.60 | 292.55 | 288.10 |
| 37.0 | 1.4567 | 1.025 | 1 | 4 7/8 | 10 1/2 | 1 15/32 | 621370 | 4 | 623370 | 307.65 | 36.602-37.389 | 341.95 | 319.25 | 311.45 | 307.90 | 304.05 | 300.85 | 296.45 |
| 38.0 | 1.4961 | 1.050 | 1 | 4 7/8 | 10 1/2 | 1 1/2 | 621380 | 4 | 623380 | 313.95 | 37.390-38.176 | 348.20 | 325.40 | 317.80 | 314.05 | 310.25 | 307.15 | 302.60 |

*3 flutes

DRILLS

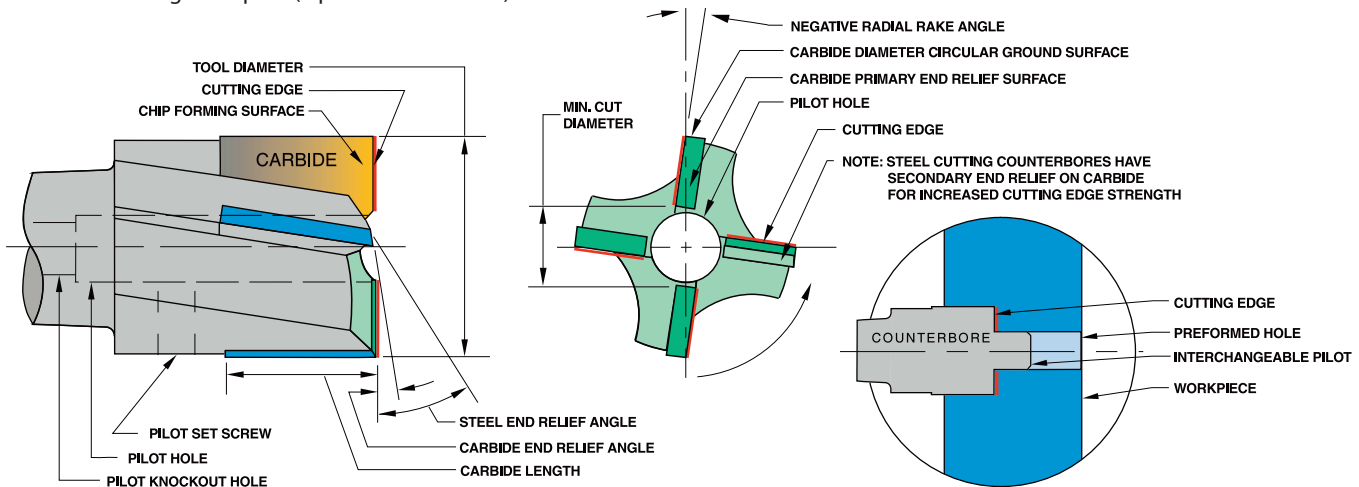


CARBIDE TIPPED COUNTERBORES INDEX AND TECHNICAL INFORMATION

MOST TYPES FOR INTERCHANGEABLE PILOTS

| DESCRIPTION | HANNIBAL | | | CLEVELAND | ECLIPSE | METCUT | MORSE | WHITNEY |
|---|--|----------------------------|--|----------------------------|----------------------------------|----------------------------------|----------------------------|----------------------------|
| | FRAC. PAGE | METRIC PAGE | TOOL TYPE | | | | | |
| AIRCRAFT COUNTERBORES 3 Flutes (similar to Craig 850 series) | 107 | - | 522 | - | - | - | - | - |
| STRAIGHT SHANK COUNTERBORES 4 Flutes 3 - 4 Flutes 3 - 4 Flutes - For Steels | 108 108 112 | 109 109 113 | 512 514 510 | - 779 - | - - - | - - - | - 5779 - | - - - |
| TAPER SHANK COUNTERBORES 4 Flutes 3 - 4 Flutes 3 - 4 Flutes - For Steels | 110 110 112 | 111 111 113 | 518 516 511 | - - - | - - - | - - - | - 5780 - | - - - |
| STUB LENGTH COUNTERBORES Pin Drive - For Non-Ferrous & Cast Irons Pin Drive - For Steels Stub Taper - For Non-Ferrous & Cast Irons Stub Taper - For Steels Radial Drive - For Non-Ferrous & Cast Irons Radial Drive - For Steels | 115 115 114 114 116 116 | - - - - - - | 573 574 575 576 577 578 | - - - - - - | 412 - 427 - 402 - | 200 - 210 - 220 - | - - - - - - | - - - - - - |
| *CAPSCREW COUNTERBORES Straight Shank - For Non-Ferrous & Cast Iron Straight Shank - For Steels | 117 117 | 117 117 | 513 515 | - - | - - | - - | - - | - - |
| PILOTS Short Shank | 118 | - | 500 | Yes | - | 410 | 776 | Yes |

*Non-interchangeable pilot (1 piece construction)



COUNTERBORE BASICS

- The counterbore is used to enlarge a preformed hole when a flat bottom is required or to spotface when a machine finish is required
- The counterbore is an end cutting tool which may utilize a pilot to align the enlarged hole being machined with the preformed hole
- The three flute counterbore tends to reduce chatter & improve finish
- Coatings are especially effective (see "Coating Selector" on page 8)

COUNTERBORE SPECIFICATIONS & TOLERANCES

- Geometry and carbide grade appropriate for material being machined
- Carbide tips brazed to tough hardened alloy steel body, except aircraft counterbores which are not hardened
- Precision ground cutting edges
- USCTI
- "Taper Shank No." refers to American Standard taper series (formerly Morse taper series) per ASME/ANSI B5.10
- Tool diameter tolerance: plus .001", minus .000"
- Shank diameter tolerance: plus .0000", minus .0005"
- Steel cutting counterbores have secondary end relief on carbide for increased cutting edge strength



FEEDS & SPEEDS - COUNTERBORES CARBIDE TIPPED

Speeds & feeds are starting recommendations only. Factors such as machine, fixture and tooling rigidity, horsepower available, coolant application and others will affect the performance significantly. Please read machine operators instructions and use all safety shields and glasses before performing these operations. Use this chart for carbide tipped counterbores.



$$\text{RPM} = \text{SFPM} * 3.82 / \text{CUTTER DIAMETER}$$

| CHIP CLASS | MATERIAL | COUNTERBORING | | FEED RATE (INCHES PER REVOLUTION) FINISHED HOLE DIAMETER IN INCHES | | | | | |
|------------|--|---------------|----------|---|------|------|------|------|------|
| | | BRINELL | SFPM | ¼ | ½ | ¾ | 1 | 1 ½ | 2 |
| 20 | ALUMINUM ALLOY - WROUGHT | 30-150 | 750-900 | .006 | .006 | .007 | .007 | .009 | .010 |
| | MAGNESIUM ALLOY | 50-90 | 875-1000 | .006 | .006 | .007 | .007 | .009 | .010 |
| | LEAD | 10-20 | 875-1000 | .006 | .006 | .007 | .007 | .009 | .010 |
| | NON-METAL AND PLASTIC | - | 700-1200 | .006 | .006 | .007 | .007 | .009 | .010 |
| | ZINC ALLOY - DIE CAST | 80-100 | 700-850 | .005 | .005 | .006 | .006 | .007 | .009 |
| 40 | ALUMINUM BRONZE | 40-175 | 700-850 | .006 | .006 | .007 | .007 | .009 | .010 |
| | BRASS ALLOY - LEADED AND FREE CUTTING | 10-100Rb | 850-1000 | .006 | .006 | .007 | .007 | .009 | .010 |
| | CHROMIUM - NICKEL | 10-100Rb | 75-85 | .003 | .003 | .003 | .003 | .004 | .005 |
| | COPPER ALLOY - TOUGH | 40-200* | 275-350 | .005 | .005 | .006 | .006 | .007 | .009 |
| 60 | DUCTILE CAST IRON - AUSTENITIC | 120-275 | 85-110 | .002 | .002 | .002 | .002 | .003 | .004 |
| | DUCTILE CAST IRON - FERRITIC | 140-270 | 200-250 | .006 | .006 | .007 | .007 | .009 | .010 |
| | DUCTILE CAST IRON - MARTENSITIC | 270-400 | 75-95 | .002 | .002 | .002 | .002 | .003 | .004 |
| | GRAY - PEARLITIC | 220-320 | 125-200 | .004 | .004 | .004 | .005 | .006 | .007 |
| | GRAY - FERRITIC | 110-240 | 200-250 | .004 | .004 | .004 | .005 | .006 | .007 |
| | MALLEABLE CAST IRON - MARTENSITIC | 200-320 | 60-85 | .004 | .004 | .004 | .005 | .006 | .007 |
| 80 | LOW AND MEDIUM CARBON STEEL - FREE MACHINING | 100-250 | 200-250 | .006 | .006 | .007 | .007 | .009 | .010 |
| | LOW AND MEDIUM CARBON STEEL - WROUGHT | 100-375 | 150-200 | .006 | .006 | .007 | .007 | .009 | .010 |
| 100 | LOW AND MEDIUM CARBON ALLOY STEEL - FREE MACHINING | 100-275 | 145-185 | .004 | .004 | .004 | .005 | .006 | .007 |
| | LOW AND MEDIUM CARBON ALLOY STEEL | 85-375 | 130-165 | .004 | .004 | .004 | .005 | .006 | .007 |
| | STAINLESS STEEL - 400 SERIES | 135-325 | 150-200 | .003 | .003 | .003 | .003 | .004 | .005 |
| | STAINLESS STEEL - 400 SERIES FREE MACHINING | 135-275 | 155-205 | .003 | .003 | .003 | .003 | .004 | .005 |
| 120 | HIGH STRENGTH STEEL - WROUGHT & TOOL STEEL | 175-400 | 90-135 | .002 | .002 | .002 | .002 | .003 | .003 |
| 140 | HIGH TEMP ALLOYS NICKEL & IRON BASE ALLOY | 140-300 | 40-65 | .002 | .002 | .002 | .002 | .003 | .003 |
| | STAINLESS STEEL - 300 SERIES | 135-375 | 150-300 | .003 | .003 | .003 | .003 | .004 | .005 |
| | STAINLESS STEEL - PH SERIES | 150-440 | 115-175 | .003 | .003 | .003 | .003 | .004 | .005 |
| | TITANIUM ALLOY | 110-380 | 125-175 | .002 | .002 | .002 | .002 | .003 | .003 |

C/BORES



AIRCRAFT COUNTERBORES CARBIDE TIPPED TYPE 522 FRACTIONAL



INTERCHANGEABLE PILOT TYPE STRAIGHT SHANK



TYPE 522 – STRAIGHT SHANK

- 3 flutes
- Furnished with 1/64" corner radius
- Carbide tips brazed to tough alloy steel body
- Tool diameter tolerance: plus .001", minus .000"
- Shank diameter tolerance: plus .0000", minus .001"
- Detailed specifications on page 105

USE:

- For counterboring and spotfacing non-ferrous materials, composites, and non-metals used in airframe manufacturing

| TOOL SELECTOR | CHIP CLASS | MATERIAL MACHINED | TOOL TYPE |
|---------------|------------|---------------------------|-----------|
| | 20 | NON-FERROUS - LONG CHIPS | 522 |
| | 40 | NON-FERROUS - SHORT CHIPS | 522 |
| | 60 | CAST IRONS | 522 |
| | 80 | LOW STRENGTH STEELS | 522 |
| | 100 | MEDIUM STRENGTH STEELS | 522 |
| | 120 | HIGH STRENGTH STEELS | 522 |
| | 140 | HIGH TEMPERATURE ALLOYS | 522 |

MODIFICATIONS (Prompt delivery)

- Modified tool diameter - priced below
- Metric tool diameter
- Cutting diameter reduced for step
- Corner chamfer or corner radius
- 4 coatings available (listed on page 114)

| TOOL DIAMETER | | DIMENSIONS | | | | TYPE 522 EDP NO. | PRICE | FINISHED TO MODIFIED TOOL DIAMETER | | | | | | |
|---------------|---------|---------------|------------------|-------------------|----------------|------------------|---------|------------------------------------|--|---------|---------|---------|---------|---------|
| FRACTION | DECIMAL | MIN CUT DIAM. | PILOT HOLE DIAM. | SMALL SHANK DIAM. | OVERALL LENGTH | | | MODIFIED DIAMETER RANGE | PRICE EACH - BASED ON QUANTITY ORDERED | | | | | |
| | | | | | | | | 1 | 2 | 3 | 4 | 5-7 | 8-14* | |
| 1/4 | .2500 | .1250 | .0938 | 1/4 | 2 3/8 | 52208 | \$73.70 | 0.2381-0.2530 | \$125.30 | \$99.65 | \$90.90 | \$86.80 | \$82.45 | \$78.85 |
| 5/32 | .2812 | .1250 | .0938 | 1/4 | 2 3/8 | 52209 | 73.80 | 0.2531-0.2840 | 125.45 | 99.70 | 91.05 | 86.90 | 82.50 | 78.95 |
| 3/16 | .3125 | .1250 | .0938 | 1/4 | 2 3/8 | 52210 | 75.70 | 0.2841-0.3150 | 127.40 | 101.45 | 92.85 | 88.60 | 84.30 | 80.80 |
| 1/32 | .3438 | .1250 | .0938 | 1/4 | 2 3/8 | 52211 | 77.20 | 0.3151-0.3470 | 128.90 | 102.95 | 94.45 | 90.15 | 85.85 | 82.35 |
| 3/8 | .3750 | .1250 | .0938 | 1/4 | 2 3/8 | 52212 | 77.45 | 0.3471-0.3780 | 129.05 | 103.20 | 94.70 | 90.40 | 85.95 | 82.50 |
| 13/32 | .4062 | .1560 | .1250 | 1/4 | 2 3/4 | 52213 | 88.05 | 0.3781-0.4090 | 139.55 | 113.95 | 105.15 | 101.05 | 96.65 | 93.20 |
| 7/16 | .4375 | .1560 | .1250 | 1/4 | 2 3/4 | 52214 | 94.90 | 0.4091-0.4410 | 146.50 | 120.65 | 112.20 | 107.80 | 103.60 | 99.95 |
| 15/32 | .4688 | .1560 | .1250 | 1/4 | 2 3/4 | 52215 | 96.50 | 0.4411-0.4720 | 148.10 | 122.25 | 113.70 | 109.55 | 105.10 | 101.55 |
| 1/2 | .5000 | .1560 | .1250 | 1/4 | 2 3/4 | 52216 | 97.65 | 0.4721-0.5030 | 149.35 | 123.50 | 114.85 | 110.60 | 106.25 | 102.70 |
| 17/32 | .5312 | .1560 | .1250 | 1/4 | 2 3/4 | 52217 | 98.20 | 0.5031-0.5340 | 149.80 | 123.95 | 115.35 | 111.10 | 106.70 | 103.20 |
| 9/16 | .5625 | .1560 | .1250 | 1/4 | 2 3/4 | 52218 | 98.60 | 0.5341-0.5660 | 150.20 | 124.45 | 115.80 | 111.55 | 107.25 | 103.65 |
| 19/32 | .5938 | .1560 | .1250 | 1/4 | 2 3/4 | 52219 | 99.10 | 0.5661-0.5970 | 150.85 | 125.00 | 116.50 | 112.20 | 107.75 | 104.20 |
| 5/8 | .6250 | .1560 | .1250 | 1/4 | 2 3/4 | 52220 | 100.25 | 0.5971-0.6280 | 151.80 | 126.15 | 117.45 | 113.30 | 108.90 | 105.25 |
| 21/32 | .6562 | .2190 | .1875 | 1/4 | 2 3/4 | 52221 | 111.35 | 0.6281-0.6590 | 162.95 | 137.15 | 128.65 | 124.45 | 120.00 | 116.55 |
| 11/16 | .6875 | .2190 | .1875 | 1/4 | 2 3/4 | 52222 | 117.00 | 0.6591-0.6910 | 168.60 | 142.85 | 134.20 | 130.00 | 125.50 | 122.05 |
| 23/32 | .7188 | .2190 | .1875 | 1/4 | 2 3/4 | 52223 | 120.95 | 0.6911-0.7220 | 172.40 | 146.80 | 138.10 | 133.95 | 129.50 | 126.10 |
| 3/4 | .7500 | .2190 | .1875 | 1/4 | 2 3/4 | 52224 | 122.50 | 0.7221-0.7530 | 174.00 | 148.30 | 139.55 | 135.45 | 131.05 | 127.55 |
| 25/32 | .7812 | .2190 | .1875 | 1/4 | 2 3/4 | 52225 | 122.90 | 0.7531-0.7840 | 174.60 | 148.75 | 140.20 | 135.85 | 131.55 | 128.00 |
| 13/16 | .8125 | .2190 | .1875 | 1/4 | 2 3/4 | 52226 | 124.00 | 0.7841-0.8160 | 175.80 | 149.85 | 141.25 | 137.00 | 132.70 | 129.10 |
| 27/32 | .8438 | .2190 | .1875 | 1/4 | 2 3/4 | 52227 | 124.95 | 0.8161-0.8470 | 176.55 | 150.55 | 142.00 | 137.80 | 133.50 | 130.00 |
| 7/8 | .8750 | .2190 | .1875 | 1/4 | 2 3/4 | 52228 | 126.15 | 0.8471-0.8780 | 177.65 | 151.80 | 143.35 | 139.05 | 134.65 | 131.15 |
| 29/32 | .9062 | .2190 | .1875 | 1/4 | 2 3/4 | 52229 | 126.90 | 0.8781-0.9090 | 178.60 | 152.80 | 144.25 | 139.95 | 135.55 | 132.05 |
| 15/16 | .9375 | .2190 | .1875 | 1/4 | 2 3/4 | 52230 | 128.10 | 0.9091-0.9410 | 179.80 | 154.00 | 145.40 | 141.15 | 136.90 | 133.15 |
| 31/32 | .9688 | .2190 | .1875 | 1/4 | 2 3/4 | 52231 | 129.05 | 0.9411-0.9720 | 180.60 | 154.80 | 146.35 | 141.95 | 137.65 | 134.10 |
| 1 | 1.0000 | .2190 | .1875 | 1/4 | 2 3/4 | 52232 | 129.45 | 0.9721-1.0030 | 181.10 | 155.25 | 146.55 | 142.40 | 137.95 | 134.45 |
| 1 1/16 | 1.0625 | .2190 | .1875 | 3/8 | 2 3/4 | 52234 | 165.25 | 1.0031-1.0660 | 216.75 | 190.90 | 182.50 | 178.10 | 173.70 | 170.20 |
| 1 1/8 | 1.1250 | .2190 | .1875 | 3/8 | 2 3/4 | 52236 | 176.25 | 1.0661-1.1280 | 227.80 | 202.05 | 193.55 | 189.25 | 184.85 | 181.30 |
| 1 3/16 | 1.1875 | .2190 | .1875 | 3/8 | 2 3/4 | 52238 | 178.55 | 1.1281-1.1905 | 230.10 | 204.35 | 195.75 | 191.50 | 187.15 | 183.60 |
| 1 1/4 | 1.2500 | .2810 | .2500 | 3/8 | 2 3/4 | 52240 | 181.80 | 1.1906-1.2530 | 233.60 | 207.65 | 198.95 | 194.80 | 190.60 | 186.95 |
| 1 5/16 | 1.3125 | .2810 | .2500 | 3/8 | 2 3/4 | 52242 | 185.20 | 1.2531-1.3155 | 236.75 | 210.95 | 202.45 | 198.20 | 193.70 | 190.20 |
| 1 3/8 | 1.3750 | .2810 | .2500 | 3/8 | 2 3/4 | 52244 | 187.30 | 1.3156-1.3780 | 239.05 | 213.35 | 204.65 | 200.35 | 196.05 | 192.40 |
| 1 7/16 | 1.4375 | .2810 | .2500 | 3/8 | 2 3/4 | 52246 | 189.55 | 1.3781-1.4405 | 241.30 | 215.40 | 206.90 | 202.60 | 198.25 | 194.70 |
| 1 1/2 | 1.5000 | .2810 | .2500 | 3/8 | 2 3/4 | 52248 | 199.60 | 1.4406-1.5030 | 253.05 | 226.35 | 217.40 | 213.05 | 208.45 | 204.85 |
| 1 9/16 | 1.5625 | .3430 | .3125 | 1/2 | 3 1/16 | 52250 | 222.00 | 1.5031-1.5660 | 275.50 | 248.85 | 239.90 | 235.55 | 231.05 | 227.45 |
| 1 5/8 | 1.6250 | .3430 | .3125 | 1/2 | 3 1/16 | 52252 | 224.90 | 1.5661-1.6280 | 278.50 | 251.75 | 242.95 | 238.50 | 233.90 | 230.15 |
| 1 11/16 | 1.6875 | .3430 | .3125 | 1/2 | 3 1/16 | 52254 | 227.85 | 1.6281-1.6910 | 281.45 | 254.75 | 245.85 | 241.45 | 236.95 | 233.25 |
| 1 3/4 | 1.7500 | .3430 | .3125 | 1/2 | 3 1/16 | 52256 | 231.45 | 1.6911-1.7530 | 284.95 | 258.10 | 249.20 | 244.80 | 240.35 | 236.70 |
| 1 13/16 | 1.8125 | .3430 | .3125 | 1/2 | 3 1/16 | 52258 | 234.20 | 1.7531-1.8160 | 287.20 | 260.50 | 251.60 | 247.20 | 242.55 | 238.95 |
| 1 7/8 | 1.8750 | .3430 | .3125 | 1/2 | 3 1/16 | 52260 | 235.85 | 1.8161-1.8780 | 289.45 | 262.65 | 253.65 | 249.40 | 244.80 | 241.10 |
| 1 15/16 | 1.9375 | .3430 | .3125 | 1/2 | 3 1/16 | 52262 | 260.30 | 1.8781-1.9410 | 313.85 | 287.00 | 278.10 | 273.70 | 269.15 | 265.55 |
| 2 | 2.0000 | .3430 | .3125 | 1/2 | 3 1/16 | 52264 | 323.85 | 1.9411-2.0030 | 377.60 | 350.85 | 341.90 | 337.50 | 332.90 | 329.15 |

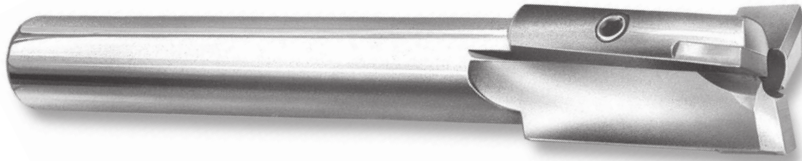
*Quantities of 15 or more - price of fractional size in same size range.



COUNTERBORES CARBIDE TIPPED TYPES 512 & 514 FRACTIONAL



INTERCHANGEABLE PILOT TYPE STRAIGHT SHANK



| TOOL SELECTOR | CHIP CLASS | MATERIAL MACHINED | TOOL TYPE |
|---------------|-------------------------|---------------------------|-------------------|
| | 20 | NON-FERROUS - LONG CHIPS | 512 or 514 |
| | 40 | NON-FERROUS - SHORT CHIPS | 512 or 514 |
| | 60 | CAST IRONS | 512 or 514 |
| | 80 | LOW STRENGTH STEELS | 510 ^{MS} |
| | 100 | MEDIUM STRENGTH STEELS | 510 ^{MS} |
| | 120 | HIGH STRENGTH STEELS | 510 ^{MS} |
| 140 | HIGH TEMPERATURE ALLOYS | 512 or 514 | |

^{MS}See page 112 for Type 510

MODIFICATIONS (Prompt delivery)

- Modified tool diameter - priced below
- Modified metric tool diameter - priced on pg. 109
- Cutting diameter reduced for step
- Corner chamfer or corner radius
- Shortened shank or reduced shank diameter
- Flat(s) or tang on shank
- 4 coatings available (listed on page 114)

TYPE 512 - FOUR FLUTES - STRAIGHT SHANK TYPE 514 - THREE/FOUR FLUTES - STRAIGHT SHANK

- Right spiral flutes
- Carbide tips brazed to tough hardened alloy steel body
- Tool diameter tolerance: plus .001", minus .000"
- Shank diameter tolerance: plus .0000", minus .0005"
- Detailed specifications on page 105

| TOOL DIAMETER | | DIMENSIONS | | | | TYPE 512 | | TYPE 514 | | BOTH TYPES PRICE | FINISHED TO MODIFIED TOOL DIAMETER | | | | | | |
|---------------|---------|---------------|------------------|-------------|-----------------|-------------|---------|-------------|---------|------------------|------------------------------------|--|----------|----------|----------|---------|---------|
| FRACTIONAL | DECIMAL | MIN CUT DIAM. | PILOT HOLE DIAM. | SHANK DIAM. | OVER-ALL LENGTH | NO. OF FLTS | EDP NO. | NO. OF FLTS | EDP NO. | | MODIFIED DIAMETER RANGE | PRICE EACH - BASED ON QUANTITY ORDERED | | | | | |
| | | | | | | | | | | | 1 | 2 | 3 | 4 | 5-7 | 8-14* | |
| 1/4 | .2500 | .1140 | .0938 | 15/64 | 3 13/16 | - | - | 3 | 51408 | \$91.40 | 0.2381-0.2530 | \$142.95 | \$117.20 | \$108.60 | \$104.30 | \$99.90 | \$96.35 |
| 5/32 | .2812 | .1140 | .0938 | 17/64 | 3 13/16 | - | - | 3 | 51409 | 111.70 | 0.2531-0.2840 | 163.15 | 137.55 | 128.90 | 124.65 | 120.35 | 116.75 |
| 3/16 | .3125 | .1140 | .0938 | 19/64 | 3 13/16 | - | - | 3 | 51410 | 95.30 | 0.2841-0.3150 | 143.65 | 119.55 | 111.55 | 107.45 | 103.40 | 100.05 |
| 1/32 | .3438 | .1140 | .0938 | 5/16 | 3 13/16 | - | - | 3 | 51411 | 120.65 | 0.3151-0.3470 | 169.00 | 144.75 | 136.70 | 132.75 | 128.65 | 125.20 |
| 3/8 | .3750 | .1820 | .1562 | 5/16 | 4 1/16 | - | - | 3 | 51412 | 101.05 | 0.3471-0.3780 | 145.75 | 123.40 | 115.95 | 112.30 | 108.50 | 105.50 |
| 17/32 | .4062 | .1820 | .1562 | 3/8 | 4 1/16 | - | - | 3 | 51413 | 113.95 | 0.3781-0.4090 | 158.60 | 136.35 | 128.85 | 125.15 | 121.40 | 118.35 |
| 7/16 | .4375 | .1820 | .1562 | 3/8 | 4 1/16 | - | - | 3 | 51414 | 103.70 | 0.4091-0.4410 | 148.35 | 126.00 | 118.55 | 115.05 | 111.10 | 108.10 |
| 15/32 | .4688 | .2280 | .1875 | 7/16 | 4 3/16 | - | - | 3 | 51415 | 126.60 | 0.4411-0.4720 | 171.25 | 148.85 | 141.60 | 137.90 | 133.95 | 130.95 |
| 1/2 | .5000 | .2280 | .1875 | 7/16 | 4 3/16 | 4 | 51216 | 3 | 51416 | 115.15 | 0.4721-0.5030 | 159.70 | 137.30 | 130.05 | 126.25 | 122.55 | 119.50 |
| 17/32 | .5312 | .2280 | .1875 | 1/2 | 4 3/16 | 4 | 51217 | 3 | 51417 | 130.25 | 0.5031-0.5340 | 174.95 | 152.70 | 145.20 | 141.60 | 137.70 | 134.65 |
| 9/16 | .5625 | .2280 | .1875 | 1/2 | 4 3/16 | 4 | 51218 | 3 | 51418 | 118.50 | 0.5341-0.5660 | 163.15 | 140.75 | 133.35 | 129.60 | 125.90 | 122.75 |
| 19/32 | .5938 | .2280 | .1875 | 1/2 | 5 1/8 | 4 | 51219 | 3 | 51419 | 131.65 | 0.5661-0.5970 | 176.25 | 153.95 | 146.55 | 142.85 | 139.00 | 136.00 |
| 5/8 | .6250 | .2280 | .1875 | 1/2 | 5 1/8 | 4 | 51220 | 3 | 51420 | 119.70 | 0.5971-0.6280 | 164.25 | 141.85 | 134.45 | 130.85 | 127.00 | 124.00 |
| 21/32 | .6562 | .2280 | .1875 | 1/2 | 5 1/8 | 4 | 51221 | 3 | 51421 | 139.30 | 0.6281-0.6590 | 183.90 | 161.70 | 154.20 | 150.50 | 146.80 | 143.65 |
| 11/16 | .6875 | .2280 | .1875 | 1/2 | 5 1/8 | 4 | 51222 | 3 | 51422 | 126.70 | 0.6591-0.6910 | 171.35 | 149.05 | 141.65 | 137.95 | 134.25 | 131.00 |
| 23/32 | .7188 | .2900 | .2500 | 1/2 | 5 3/8 | 4 | 51223 | 3 | 51423 | 142.60 | 0.6911-0.7220 | 187.15 | 164.90 | 157.45 | 153.90 | 150.00 | 147.00 |
| 3/4 | .7500 | .2900 | .2500 | 1/2 | 5 3/8 | 4 | 51224 | 3 | 51424 | 129.55 | 0.7221-0.7530 | 174.25 | 151.95 | 144.45 | 140.75 | 137.05 | 133.85 |
| 25/32 | .7812 | .2900 | .2500 | 5/8 | 5 3/8 | 4 | 51225 | 3 | 51425 | 145.70 | 0.7531-0.7840 | 190.20 | 167.85 | 160.55 | 156.80 | 152.95 | 149.95 |
| 13/16 | .8125 | .2900 | .2500 | 5/8 | 5 3/8 | 4 | 51226 | 3 | 51426 | 132.30 | 0.7841-0.8160 | 176.90 | 154.55 | 147.15 | 143.40 | 139.80 | 136.70 |
| 27/32 | .8438 | .2900 | .2500 | 3/4 | 5 3/8 | 4 | 51227 | 3 | 51427 | 154.25 | 0.8161-0.8470 | 198.90 | 176.50 | 169.20 | 165.45 | 161.75 | 158.60 |
| 7/8 | .8750 | .2900 | .2500 | 3/4 | 5 3/8 | 4 | 51228 | 3 | 51428 | 140.25 | 0.8471-0.8780 | 184.90 | 162.60 | 155.20 | 151.45 | 147.70 | 144.60 |
| 29/32 | .9062 | .2900 | .2500 | 3/4 | 6 1/8 | 4 | 51229 | 3 | 51429 | 157.35 | 0.8781-0.9090 | 202.05 | 179.70 | 172.25 | 168.65 | 164.85 | 161.80 |
| 15/16 | .9375 | .2900 | .2500 | 3/4 | 6 1/8 | 4 | 51230 | 3 | 51430 | 143.15 | 0.9091-0.9410 | 187.85 | 165.45 | 158.05 | 154.35 | 150.55 | 147.50 |
| 31/32 | .9688 | .3530 | .3125 | 3/4 | 6 3/8 | 4 | 51231 | 3 | 51431 | 161.95 | 0.9411-0.9720 | 206.50 | 184.20 | 176.80 | 173.10 | 169.40 | 166.35 |
| 1 | 1.0000 | .3530 | .3125 | 3/4 | 6 3/8 | 4 | 51232 | 3 | 51432 | 147.20 | 0.9721-1.0030 | 191.95 | 169.50 | 162.05 | 158.40 | 154.65 | 151.55 |
| 1 1/16 | 1.0625 | .3530 | .3125 | 3/4 | 6 3/8 | 4 | 51233 | 3 | 51433 | 148.75 | 1.0031-1.0660 | 193.50 | 171.05 | 163.60 | 160.10 | 156.20 | 153.15 |
| 1 1/8 | 1.1250 | .3530 | .3125 | 1 | 6 3/8 | 4 | 51236 | 3 | 51436 | 152.70 | 1.0661-1.1280 | 197.20 | 174.95 | 167.60 | 163.75 | 160.10 | 156.95 |
| 1 1/16 | 1.1875 | .3530 | .3125 | 1 | 6 3/8 | 4 | 51238 | 3 | 51438 | 159.40 | 1.1281-1.1905 | 203.95 | 181.75 | 174.30 | 170.60 | 166.80 | 163.75 |
| 1 1/4 | 1.2500 | .4260 | .3750 | 1 | 6 3/8 | - | - | 4 | 51440 | 177.50 | 1.1906-1.2530 | 225.85 | 201.75 | 193.65 | 189.70 | 185.50 | 182.35 |
| 1 5/16 | 1.3125 | .4260 | .3750 | 1 | 6 3/8 | - | - | 4 | 51442 | 191.55 | 1.2531-1.3155 | 240.10 | 215.90 | 207.70 | 203.80 | 199.65 | 196.40 |
| 1 3/8 | 1.3750 | .4260 | .3750 | 1 | 6 3/8 | - | - | 4 | 51444 | 201.65 | 1.3156-1.3780 | 249.95 | 225.70 | 217.60 | 213.60 | 209.65 | 206.25 |
| 1 7/16 | 1.4375 | .4260 | .3750 | 1 1/4 | 7 7/8 | - | - | 4 | 51446 | 220.95 | 1.3781-1.4405 | 273.50 | 247.20 | 238.45 | 234.05 | 229.75 | 226.05 |
| 1 1/2 | 1.5000 | .4260 | .3750 | 1 1/4 | 7 7/8 | - | - | 4 | 51448 | 255.45 | 1.4406-1.5030 | 310.00 | 282.60 | 273.60 | 269.20 | 264.55 | 260.75 |
| 1 9/16 | 1.5625 | .4890 | .4375 | 1 1/4 | 8 1/8 | - | - | 4 | 51450 | 262.95 | 1.5031-1.5660 | 317.60 | 290.25 | 281.10 | 276.60 | 272.05 | 268.35 |
| 1 5/8 | 1.6250 | .4890 | .4375 | 1 1/4 | 8 1/8 | - | - | 4 | 51452 | 268.45 | 1.5661-1.6280 | 323.10 | 295.75 | 286.80 | 282.25 | 277.65 | 273.90 |
| 1 11/16 | 1.6875 | .4890 | .4375 | 1 1/4 | 8 1/8 | - | - | 4 | 51454 | 321.25 | 1.6281-1.6910 | 380.05 | 350.65 | 340.80 | 335.90 | 331.00 | 326.90 |
| 1 3/4 | 1.7500 | .4890 | .4375 | 1 1/4 | 8 1/8 | - | - | 4 | 51456 | 321.25 | 1.6911-1.7530 | 380.05 | 350.65 | 340.80 | 335.90 | 331.00 | 326.90 |
| 1 13/16 | 1.8125 | .4890 | .4375 | 1 1/2 | 8 1/8 | - | - | 4 | 51458 | 380.25 | 1.7531-1.8160 | 439.15 | 409.75 | 399.95 | 395.15 | 390.00 | 386.05 |
| 1 7/8 | 1.8750 | .4890 | .4375 | 1 1/2 | 8 1/8 | - | - | 4 | 51460 | 380.25 | 1.8161-1.8780 | 439.15 | 409.75 | 399.95 | 395.15 | 390.00 | 386.05 |
| 1 15/16 | 1.9375 | .4890 | .4375 | 1 1/2 | 8 1/8 | - | - | 4 | 51462 | 415.55 | 1.8781-1.9410 | 474.55 | 445.10 | 435.25 | 430.30 | 425.40 | 421.35 |
| 2 | 2.0000 | .5510 | .5000 | 1 1/2 | 8 3/8 | - | - | 4 | 51464 | 415.55 | 1.9411-2.0030 | 474.55 | 445.10 | 435.25 | 430.30 | 425.40 | 421.35 |

*Quantities of 15 or more - price of fractional size in same size range.



COUNTERBORES CARBIDE TIPPED TYPES 512 & 514 METRIC



INTERCHANGEABLE PILOT TYPE STRAIGHT SHANK



NOTE: Tool diameter in millimeters (mm); all other dimensions in inches. Also, modifications available (see list on page 108).

| TOOL DIAMETER | | DIMENSIONS | | | | TYPE 512 | | TYPE 514 | | BOTH TYPES METRIC PRICE | FINISHED TO MODIFIED TOOL DIAMETER | | | | | | | |
|---------------|--------|---------------|------------------|-------------|-----------------|-------------|----------------|-------------|----------------|-------------------------|------------------------------------|--|----------|----------|----------|----------|----------|---------|
| | | MIN CUT DIAM. | PILOT HOLE DIAM. | SHANK DIAM. | OVER-ALL LENGTH | NO. OF FLTS | METRIC EDP NO. | NO. OF FLTS | METRIC EDP NO. | | MODIFIED DIAMETER RANGE (mm) | PRICE EACH - BASED ON QUANTITY ORDERED | | | | | | |
| mm | INCH | | | | | | | | | | 1 | 2 | 3 | 4 | 5-7 | 8-14 | OVER 14 | |
| 6.0 | .2362 | .1140 | .0938 | 15/64 | 3 13/16 | - | - | 3 | 514060 | \$108.60 | 6.000-6.426 | \$147.05 | \$121.25 | \$112.70 | \$108.60 | \$104.25 | \$100.80 | \$95.65 |
| 6.5 | .2559 | .1140 | .0938 | 17/64 | 3 13/16 | - | - | 3 | 514065 | 128.90 | 6.427-7.214 | 167.35 | 141.65 | 133.05 | 128.90 | 124.60 | 121.10 | 115.95 |
| 7.0 | .2756 | .1140 | .0938 | 17/64 | 3 13/16 | - | - | 3 | 514070 | 128.90 | - | - | - | - | - | - | - | |
| 7.5 | .2953 | .1140 | .0938 | 19/64 | 3 13/16 | - | - | 3 | 514075 | 111.55 | 7.215-8.001 | 147.60 | 123.40 | 115.30 | 111.55 | 107.40 | 104.15 | 99.30 |
| 8.0 | .3150 | .1140 | .0938 | 19/64 | 3 13/16 | - | - | 3 | 514080 | 111.55 | - | - | - | - | - | - | - | |
| 8.5 | .3346 | .1140 | .0938 | 3/16 | 3 13/16 | - | - | 3 | 514085 | 136.70 | 8.002-8.814 | 172.90 | 148.65 | 140.55 | 136.70 | 132.60 | 129.30 | 124.65 |
| 9.0 | .3543 | .1820 | .1562 | 5/16 | 4 1/16 | - | - | 3 | 514090 | 115.95 | 8.815-9.601 | 149.30 | 126.95 | 119.55 | 115.95 | 112.25 | 109.10 | 104.80 |
| 9.5 | .3740 | .1820 | .1562 | 3/16 | 4 1/16 | - | - | 3 | 514095 | 115.95 | - | - | - | - | - | - | - | |
| 10.0 | .3937 | .1820 | .1562 | 3/8 | 4 1/16 | - | - | 3 | 514100 | 128.85 | 9.602-10.389 | 162.15 | 139.90 | 132.45 | 128.85 | 125.10 | 122.10 | 117.75 |
| 10.5 | .4134 | .1820 | .1562 | 3/8 | 4 1/16 | - | - | 3 | 514105 | 118.55 | 10.390-11.201 | 151.95 | 129.55 | 122.15 | 118.55 | 114.85 | 111.75 | 107.40 |
| 11.0 | .4331 | .1820 | .1562 | 3/8 | 4 1/16 | - | - | 3 | 514110 | 118.55 | - | - | - | - | - | - | - | |
| 11.5 | .4528 | .2280 | .1875 | 7/16 | 4 5/16 | - | - | 3 | 514115 | 141.60 | 11.202-11.989 | 174.70 | 152.50 | 145.10 | 141.60 | 137.70 | 134.65 | 130.25 |
| 12.0 | .4724 | .2280 | .1875 | 7/16 | 4 5/16 | 4 | 512120 | 3 | 514120 | 130.05 | 11.990-12.776 | 163.30 | 141.05 | 133.60 | 130.05 | 126.20 | 123.20 | 118.70 |
| 12.5 | .4921 | .2280 | .1875 | 7/16 | 4 5/16 | 4 | 512125 | 3 | 514125 | 130.05 | - | - | - | - | - | - | - | |
| 13.0 | .5118 | .2280 | .1875 | 1/2 | 4 5/16 | 4 | 512130 | 3 | 514130 | 145.20 | 12.777-13.564 | 178.45 | 156.15 | 148.70 | 145.20 | 141.35 | 138.35 | 133.85 |
| 13.5 | .5315 | .2280 | .1875 | 1/2 | 4 5/16 | 4 | 512135 | 3 | 514135 | 145.20 | - | - | - | - | - | - | - | |
| 14.0 | .5512 | .2280 | .1875 | 1/2 | 4 5/16 | 4 | 512140 | 3 | 514140 | 133.35 | 13.565-14.376 | 166.70 | 144.40 | 137.00 | 133.35 | 129.55 | 126.55 | 122.15 |
| 14.5 | .5709 | .2280 | .1875 | 1/2 | 5 1/8 | 4 | 512145 | 3 | 514145 | 146.55 | 14.377-15.164 | 179.85 | 157.45 | 150.00 | 146.55 | 142.75 | 139.70 | 135.25 |
| 15.0 | .5906 | .2280 | .1875 | 1/2 | 5 1/8 | 4 | 512150 | 3 | 514150 | 146.55 | - | - | - | - | - | - | - | |
| 15.5 | .6102 | .2280 | .1875 | 1/2 | 5 1/8 | 4 | 512155 | 3 | 514155 | 134.45 | 15.165-15.951 | 167.80 | 145.65 | 138.15 | 134.45 | 130.80 | 127.70 | 123.35 |
| 16.0 | .6299 | .2280 | .1875 | 1/2 | 5 1/8 | 4 | 512160 | 3 | 514160 | 154.20 | 15.952-16.739 | 187.45 | 165.15 | 157.70 | 154.20 | 150.45 | 147.35 | 143.05 |
| 16.5 | .6496 | .2280 | .1875 | 1/2 | 5 1/8 | 4 | 512165 | 3 | 514165 | 154.20 | - | - | - | - | - | - | - | |
| 17.0 | .6693 | .2280 | .1875 | 1/2 | 5 1/8 | 4 | 512170 | 3 | 514170 | 141.65 | 16.740-17.551 | 174.95 | 152.70 | 145.20 | 141.65 | 137.90 | 134.75 | 130.35 |
| 17.5 | .6890 | .2280 | .1875 | 1/2 | 5 1/8 | 4 | 512175 | 3 | 514175 | 141.65 | - | - | - | - | - | - | - | |
| 18.0 | .7087 | .2900 | .2500 | 1/2 | 5 3/8 | 4 | 512180 | 3 | 514180 | 157.45 | 17.552-18.339 | 190.85 | 168.50 | 161.05 | 157.45 | 153.75 | 150.65 | 146.25 |
| 18.5 | .7283 | .2900 | .2500 | 1/2 | 5 3/8 | 4 | 512185 | 3 | 514185 | 144.45 | 18.340-19.126 | 177.70 | 155.50 | 148.05 | 144.45 | 140.65 | 137.55 | 133.25 |
| 19.0 | .7480 | .2900 | .2500 | 1/2 | 5 3/8 | 4 | 512190 | 3 | 514190 | 144.45 | - | - | - | - | - | - | - | |
| 19.5 | .7677 | .2900 | .2500 | 5/8 | 5 3/8 | 4 | 512195 | 3 | 514195 | 160.55 | 19.127-19.914 | 193.75 | 171.55 | 164.10 | 160.55 | 156.75 | 153.65 | 149.30 |
| 20.0 | .7874 | .2900 | .2500 | 5/8 | 5 3/8 | 4 | 512200 | 3 | 514200 | 147.15 | 19.915-20.726 | 180.45 | 158.25 | 150.75 | 147.15 | 143.35 | 140.40 | 136.00 |
| 20.5 | .8071 | .2900 | .2500 | 5/8 | 5 3/8 | 4 | 512205 | 3 | 514205 | 147.15 | - | - | - | - | - | - | - | |
| 21.0 | .8268 | .2900 | .2500 | 3/4 | 5 3/8 | 4 | 512210 | 3 | 514210 | 169.20 | 20.727-21.514 | 202.45 | 180.20 | 172.85 | 169.20 | 165.35 | 162.30 | 157.95 |
| 21.5 | .8465 | .2900 | .2500 | 3/4 | 5 3/8 | 4 | 512215 | 3 | 514215 | 169.20 | - | - | - | - | - | - | - | |
| 22.0 | .8661 | .2900 | .2500 | 3/4 | 5 3/8 | 4 | 512220 | 3 | 514220 | 155.20 | 21.515-22.301 | 188.50 | 166.20 | 158.70 | 155.20 | 151.40 | 148.35 | 144.00 |
| 22.5 | .8858 | .2900 | .2500 | 3/4 | 6 1/8 | 4 | 512225 | 3 | 514225 | 172.25 | 22.302-23.089 | 205.60 | 183.30 | 175.85 | 172.25 | 168.50 | 165.45 | 161.05 |
| 23.0 | .9055 | .2900 | .2500 | 3/4 | 6 1/8 | 4 | 512230 | 3 | 514230 | 172.25 | - | - | - | - | - | - | - | |
| 23.5 | .9252 | .2900 | .2500 | 3/4 | 6 1/8 | 4 | 512235 | 3 | 514235 | 158.05 | 23.090-23.901 | 191.35 | 169.05 | 161.70 | 158.05 | 154.25 | 151.20 | 146.85 |
| 24.0 | .9449 | .3530 | .3125 | 3/4 | 6 3/8 | 4 | 512240 | 3 | 514240 | 176.80 | 23.902-24.689 | 210.10 | 187.90 | 180.40 | 176.80 | 173.05 | 170.10 | 165.55 |
| 24.5 | .9646 | .3530 | .3125 | 3/4 | 6 3/8 | 4 | 512245 | 3 | 514245 | 176.80 | - | - | - | - | - | - | - | |
| 25.0 | .9843 | .3530 | .3125 | 3/4 | 6 3/8 | 4 | 512250 | 3 | 514250 | 162.05 | 24.690-25.476 | 195.45 | 173.10 | 165.75 | 162.05 | 158.35 | 155.40 | 151.00 |
| 25.5 | 1.0039 | .3530 | .3125 | 3/4 | 6 3/8 | 4 | 512255 | 3 | 514255 | 163.60 | 25.477-27.076 | 196.95 | 174.65 | 167.25 | 163.60 | 159.90 | 156.90 | 152.50 |
| 26.0 | 1.0236 | .3530 | .3125 | 3/4 | 6 3/8 | 4 | 512260 | 3 | 514260 | 163.60 | - | - | - | - | - | - | - | |
| 27.0 | 1.0630 | .3530 | .3125 | 3/4 | 6 3/8 | 4 | 512270 | 3 | 514270 | 163.60 | - | - | - | - | - | - | - | |
| 28.0 | 1.1024 | .3530 | .3125 | 1 | 6 3/8 | 4 | 512280 | 3 | 514280 | 167.60 | 27.077-28.651 | 200.90 | 178.45 | 171.00 | 167.60 | 163.60 | 160.65 | 156.20 |
| 29.0 | 1.1417 | .3530 | .3125 | 1 | 6 3/8 | 4 | 512290 | 3 | 514290 | 174.30 | 28.652 30.239 | 207.50 | 185.35 | 177.85 | 174.30 | 170.55 | 167.60 | 163.15 |
| 30.0 | 1.1811 | .3530 | .3125 | 1 | 6 3/8 | 4 | 512300 | 3 | 514300 | 174.30 | - | - | - | - | - | - | - | |
| 31.0 | 1.2205 | .4260 | .3750 | 1 | 6 3/8 | - | - | 4 | 514310 | 193.65 | 30.240-31.826 | 229.80 | 205.60 | 197.55 | 193.65 | 189.55 | 186.20 | 181.55 |
| 32.0 | 1.2598 | .4260 | .3750 | 1 | 6 3/8 | - | - | 4 | 514320 | 207.70 | 31.827-33.414 | 243.90 | 219.65 | 211.65 | 207.70 | 203.70 | 200.40 | 195.60 |
| 33.0 | 1.2992 | .4260 | .3750 | 1 | 6 3/8 | - | - | 4 | 514330 | 207.70 | - | - | - | - | - | - | - | |
| 34.0 | 1.3386 | .4260 | .3750 | 1 | 6 3/8 | - | - | 4 | 514340 | 217.60 | 33.415-35.001 | 253.70 | 229.70 | 221.45 | 217.60 | 213.50 | 210.15 | 205.40 |
| 35.0 | 1.3780 | .4260 | .3750 | 1 | 6 3/8 | - | - | 4 | 514350 | 217.60 | - | - | - | - | - | - | - | |
| 36.0 | 1.4173 | .4260 | .3750 | 1 1/4 | 7 7/8 | - | - | 4 | 514360 | 238.45 | 35.002-36.589 | 277.70 | 251.50 | 242.60 | 238.45 | 233.90 | 230.40 | 225.30 |
| 37.0 | 1.4567 | .4260 | .3750 | 1 1/4 | 7 7/8 | - | - | 4 | 514370 | 263.70 | 36.590-38.176 | 303.00 | 276.70 | 268.00 | 263.70 | 259.30 | 255.65 | 250.55 |
| 38.0 | 1.4961 | .4260 | .3750 | 1 1/4 | 7 7/8 | - | - | 4 | 514380 | 263.70 | - | - | - | - | - | - | - | |

Modified tool diameters are available up to 50mm-contact us for price.

C'BORES



COUNTERBORES CARBIDE TIPPED TYPES 516 & 518 FRACTIONAL



INTERCHANGEABLE PILOT TYPE TAPER SHANK



| TOOL SELECTOR | CHIP CLASS | MATERIAL MACHINED | TOOL TYPE |
|---------------|-------------------------|---------------------------|-------------------|
| | 20 | NON-FERROUS - LONG CHIPS | 516 or 518 |
| | 40 | NON-FERROUS - SHORT CHIPS | 516 or 518 |
| | 60 | CAST IRONS | 516 or 518 |
| | 80 | LOW STRENGTH STEELS | 511 ^{MS} |
| | 100 | MEDIUM STRENGTH STEELS | 511 ^{MS} |
| | 120 | HIGH STRENGTH STEELS | 511 ^{MS} |
| 140 | HIGH TEMPERATURE ALLOYS | 516 or 518 | |

^{MS}See page 112 for Type 511

MODIFICATIONS (Prompt delivery)

- Modified tool diameter - priced below
- Modified metric tool diameter - priced on pg. 111
- Cutting diameter reduced for step
- Corner chamfer or corner radius
- Shank whistle notch for set screw
- Smaller taper shank
- 4 coatings available (listed on page 114)

TYPE 518 – FOUR FLUTES – TAPER SHANK TYPE 516 – THREE/FOUR FLUTES – TAPER SHANK

- Right spiral flutes
- Carbide tips brazed to tough hardened alloy steel body
- Tool diameter tolerance: plus .001", minus .000"
- Detailed specifications on page 105

| TOOL DIAMETER | | DIMENSIONS | | | | TYPE 518 | | TYPE 516 | | BOTH TYPES PRICE | FINISHED TO MODIFIED TOOL DIAMETER | | | | | | |
|---------------|--------|---------------|------------------|-----------------|-----------------|-------------|---------|-------------|---------|------------------|------------------------------------|--|----------|----------|----------|----------|----------|
| FRAC. | DEC. | MIN CUT DIAM. | PILOT HOLE DIAM. | TAPER SHANK NO. | OVER-ALL LENGTH | NO. OF FLTS | EDP NO. | NO. OF FLTS | EDP NO. | | MODIFIED DIAMETER RANGE | PRICE EACH - BASED ON QUANTITY ORDERED | | | | | |
| | | | | | | | | | | | 1 | 2 | 3 | 4 | 5-7 | 8-14* | |
| 1/4 | .2500 | .1140 | .0938 | 1 | 3 13/16 | - | - | 3 | 51608 | \$110.85 | 0.2381-0.2530 | \$164.35 | \$137.65 | \$128.70 | \$124.30 | \$119.80 | \$116.10 |
| 5/32 | .2812 | .1140 | .0938 | 1 | 3 13/16 | - | - | 3 | 51609 | 133.50 | 0.2531-0.2840 | 186.80 | 160.00 | 151.10 | 146.80 | 142.40 | 138.50 |
| 3/16 | .3125 | .1140 | .0938 | 1 | 3 13/16 | - | - | 3 | 51610 | 113.95 | 0.2841-0.3150 | 164.15 | 139.00 | 130.75 | 126.60 | 122.25 | 118.85 |
| 11/32 | .3438 | .1140 | .0938 | 1 | 3 13/16 | - | - | 3 | 51611 | 140.45 | 0.3151-0.3470 | 190.65 | 165.45 | 157.00 | 152.95 | 148.70 | 145.30 |
| 3/8 | .3750 | .1820 | .1562 | 1 | 4 1/16 | - | - | 3 | 51612 | 117.65 | 0.3471-0.3780 | 163.80 | 140.75 | 133.00 | 129.25 | 125.40 | 122.20 |
| 13/32 | .4062 | .1820 | .1562 | 1 | 4 1/16 | - | - | 3 | 51613 | 132.90 | 0.3781-0.4090 | 179.15 | 156.00 | 148.35 | 144.45 | 140.60 | 137.40 |
| 7/16 | .4375 | .1820 | .1562 | 1 | 4 1/16 | - | - | 3 | 51614 | 120.80 | 0.4091-0.4410 | 167.00 | 143.95 | 136.15 | 132.45 | 128.55 | 125.40 |
| 15/32 | .4688 | .2280 | .1875 | 1 | 4 5/16 | - | - | 3 | 51615 | 146.70 | 0.4411-0.4720 | 192.95 | 169.80 | 162.05 | 158.30 | 154.45 | 151.25 |
| 1/2 | .5000 | .2280 | .1875 | 1 | 4 5/16 | 4 | 51816 | 3 | 51616 | 133.35 | 0.4721-0.5030 | 179.75 | 156.55 | 148.70 | 145.10 | 141.05 | 137.90 |
| 17/32 | .5312 | .2280 | .1875 | 1 | 4 5/16 | 4 | 51817 | 3 | 51617 | 149.35 | 0.5031-0.5340 | 195.60 | 172.45 | 164.75 | 160.95 | 157.00 | 153.90 |
| 9/16 | .5625 | .2280 | .1875 | 1 | 4 5/16 | 4 | 51818 | 3 | 51618 | 135.85 | 0.5341-0.5660 | 182.10 | 158.95 | 151.35 | 147.40 | 143.60 | 140.45 |
| 19/32 | .5938 | .2280 | .1875 | 2 | 5 1/8 | 4 | 51819 | 3 | 51619 | 153.45 | 0.5661-0.5970 | 199.80 | 176.60 | 168.95 | 165.05 | 161.25 | 158.00 |
| 5/8 | .6250 | .2280 | .1875 | 2 | 5 1/8 | 4 | 51820 | 3 | 51620 | 139.50 | 0.5971-0.6280 | 185.65 | 162.65 | 154.90 | 151.20 | 147.10 | 144.00 |
| 21/32 | .6562 | .2280 | .1875 | 2 | 5 1/8 | 4 | 51821 | 3 | 51621 | 162.00 | 0.6281-0.6590 | 208.30 | 185.20 | 177.40 | 173.70 | 169.70 | 166.55 |
| 11/16 | .6875 | .2280 | .1875 | 2 | 5 1/8 | 4 | 51822 | 3 | 51622 | 147.10 | 0.6591-0.6910 | 193.55 | 170.25 | 162.65 | 158.80 | 154.90 | 151.70 |
| 23/32 | .7188 | .2900 | .2500 | 2 | 5 3/8 | 4 | 51823 | 3 | 51623 | 164.70 | 0.6911-0.7220 | 210.95 | 187.85 | 180.15 | 176.40 | 172.40 | 169.30 |
| 3/4 | .7500 | .2900 | .2500 | 2 | 5 3/8 | 4 | 51824 | 3 | 51624 | 149.75 | 0.7221-0.7530 | 195.90 | 172.85 | 165.05 | 161.35 | 157.35 | 154.05 |
| 25/32 | .7812 | .2900 | .2500 | 2 | 5 3/8 | 4 | 51825 | 3 | 51625 | 167.55 | 0.7531-0.7840 | 213.70 | 190.65 | 182.80 | 179.05 | 175.15 | 172.00 |
| 13/16 | .8125 | .2900 | .2500 | 2 | 5 3/8 | 4 | 51826 | 3 | 51626 | 152.25 | 0.7841-0.8160 | 198.50 | 175.40 | 167.75 | 163.80 | 160.00 | 156.80 |
| 27/32 | .8438 | .2900 | .2500 | 2 | 5 3/8 | 4 | 51827 | 3 | 51627 | 176.00 | 0.8161-0.8470 | 222.40 | 199.30 | 191.55 | 187.80 | 183.90 | 180.70 |
| 7/8 | .8750 | .2900 | .2500 | 2 | 5 3/8 | 4 | 51828 | 3 | 51628 | 160.10 | 0.8471-0.8780 | 206.35 | 183.20 | 175.60 | 171.65 | 167.80 | 164.60 |
| 29/32 | .9062 | .2900 | .2500 | 3 | 6 1/8 | 4 | 51829 | 3 | 51629 | 180.90 | 0.8781-0.9090 | 227.10 | 203.95 | 196.40 | 192.40 | 188.60 | 185.45 |
| 15/16 | .9375 | .2900 | .2500 | 3 | 6 1/8 | 4 | 51830 | 3 | 51630 | 164.40 | 0.9091-0.9410 | 210.70 | 187.55 | 179.85 | 175.95 | 172.25 | 169.00 |
| 31/32 | .9688 | .3530 | .3125 | 3 | 6 3/8 | 4 | 51831 | 3 | 51631 | 185.10 | 0.9411-0.9720 | 231.30 | 208.25 | 200.50 | 196.70 | 192.70 | 189.50 |
| 1 | 1.0000 | .3530 | .3125 | 3 | 6 3/8 | 4 | 51832 | 3 | 51632 | 174.60 | 0.9721-1.0030 | 222.65 | 198.65 | 190.65 | 186.75 | 182.55 | 179.30 |
| 1 1/16 | 1.0625 | .3530 | .3125 | 3 | 6 3/8 | 4 | 51834 | 3 | 51634 | 176.90 | 1.0031-1.0660 | 224.80 | 200.90 | 192.90 | 188.95 | 184.80 | 181.55 |
| 1 1/8 | 1.1250 | .3530 | .3125 | 3 | 6 3/8 | 4 | 51836 | 3 | 51636 | 182.50 | 1.0661-1.1280 | 230.55 | 206.65 | 198.40 | 194.55 | 190.50 | 187.20 |
| 1 3/16 | 1.1875 | .3530 | .3125 | 3 | 6 3/8 | 4 | 51838 | 3 | 51638 | 188.65 | 1.1281-1.1905 | 236.85 | 212.75 | 204.65 | 200.80 | 196.70 | 193.45 |
| 1 1/4 | 1.2500 | .4260 | .3750 | 3 | 6 5/8 | - | - | 4 | 51640 | 209.80 | 1.1906-1.2530 | 261.80 | 235.80 | 227.10 | 222.90 | 218.50 | 214.85 |
| 1 5/16 | 1.3125 | .4260 | .3750 | 3 | 6 5/8 | - | - | 4 | 51642 | 224.80 | 1.2531-1.3155 | 277.10 | 250.80 | 242.25 | 237.90 | 233.60 | 229.95 |
| 1 3/8 | 1.3750 | .4260 | .3750 | 3 | 6 5/8 | - | - | 4 | 51644 | 235.65 | 1.3156-1.3780 | 287.65 | 261.65 | 252.95 | 248.60 | 244.40 | 240.70 |
| 1 7/16 | 1.4375 | .4260 | .3750 | 4 | 7 7/8 | - | - | 4 | 51646 | 262.15 | 1.3781-1.4405 | 318.75 | 290.45 | 280.85 | 276.25 | 271.50 | 267.60 |
| 1 1/2 | 1.5000 | .4260 | .3750 | 4 | 7 7/8 | - | - | 4 | 51648 | 290.55 | 1.4406-1.5030 | 347.20 | 318.95 | 309.50 | 304.80 | 300.10 | 296.20 |
| 1 9/16 | 1.5625 | .4890 | .4375 | 4 | 8 1/8 | - | - | 4 | 51650 | 312.20 | 1.5031-1.5660 | 371.55 | 341.95 | 332.10 | 327.15 | 322.20 | 318.15 |
| 1 5/8 | 1.6250 | .4890 | .4375 | 4 | 8 1/8 | - | - | 4 | 51652 | 317.80 | 1.5661-1.6280 | 377.05 | 347.55 | 337.65 | 332.70 | 327.70 | 323.75 |
| 1 11/16 | 1.6875 | .4890 | .4375 | 4 | 8 1/8 | - | - | 4 | 51654 | 380.25 | 1.6281-1.6910 | 444.35 | 412.40 | 401.75 | 396.45 | 390.95 | 386.60 |
| 1 3/4 | 1.7500 | .4890 | .4375 | 4 | 8 1/8 | - | - | 4 | 51656 | 380.25 | 1.6911-1.7530 | 444.35 | 412.40 | 401.75 | 396.45 | 390.95 | 386.60 |
| 1 13/16 | 1.8125 | .4890 | .4375 | 4 | 8 1/8 | - | - | 4 | 51658 | 450.10 | 1.7531-1.8160 | 514.10 | 482.15 | 471.45 | 466.15 | 460.70 | 456.25 |
| 1 7/8 | 1.8750 | .4890 | .4375 | 4 | 8 1/8 | - | - | 4 | 51660 | 450.10 | 1.8161-1.8780 | 514.10 | 482.15 | 471.45 | 466.15 | 460.70 | 456.25 |
| 1 15/16 | 1.9375 | .4890 | .4375 | 4 | 8 1/8 | - | - | 4 | 51662 | 491.75 | 1.8781-1.9410 | 555.90 | 523.85 | 513.05 | 507.85 | 502.50 | 498.05 |
| 2 | 2.0000 | .5510 | .5000 | 4 | 8 3/8 | - | - | 4 | 51664 | 491.75 | 1.9411-2.0030 | 555.90 | 523.85 | 513.05 | 507.85 | 502.50 | 498.05 |

*Quantities of 15 or more - price of fractional size in same size range.



COUNTERBORES CARBIDE TIPPED TYPES 516 & 518 METRIC



INTERCHANGEABLE PILOT TYPE TAPER SHANK



NOTE: Tool diameter in millimeters (mm); all other dimensions in inches. Also, modifications available (see list on page 110).

| TOOL DIAMETER | | DIMENSIONS | | | | TYPE 518 | | TYPE 516 | | BOTH TYPES METRIC PRICE | FINISHED TO MODIFIED TOOL DIAMETER | | | | | | | |
|---------------|--------|---------------|------------------|-----------------|-----------------|-------------|----------------|-------------|----------------|-------------------------|------------------------------------|--|----------|----------|----------|----------|----------|----------|
| | | MIN CUT DIAM. | PILOT HOLE DIAM. | TAPER SHANK NO. | OVER-ALL LENGTH | NO. OF FLTS | METRIC EDP NO. | NO. OF FLTS | METRIC EDP NO. | | MODIFIED DIAMETER RANGE (mm) | PRICE EACH - BASED ON QUANTITY ORDERED | | | | | | |
| mm | INCH | | | | | | | | | | 1 | 2 | 3 | 4 | 5-7 | 8-14 | OVER 14 | |
| 6.0 | .2362 | .1140 | .0938 | 1 | 3 1/16 | - | - | 3 | 516060 | \$128.70 | 6.000-6.426 | \$168.65 | \$141.85 | \$133.00 | \$128.70 | \$124.25 | \$120.50 | \$115.30 |
| 6.5 | .2559 | .1140 | .0938 | 1 | 3 1/16 | - | - | 3 | 516065 | 151.10 | 6.427-7.214 | 191.00 | 164.35 | 155.40 | 151.10 | 146.70 | 143.05 | 137.75 |
| 7.0 | .2756 | .1140 | .0938 | 1 | 3 1/16 | - | - | 3 | 516070 | 151.10 | - | - | - | - | - | - | - | |
| 7.5 | .2953 | .1140 | .0938 | 1 | 3 1/16 | - | - | 3 | 516075 | 130.75 | 7.215-8.001 | 168.20 | 143.10 | 134.65 | 130.75 | 126.45 | 122.90 | 118.05 |
| 8.0 | .3150 | .1140 | .0938 | 1 | 3 1/16 | - | - | 3 | 516080 | 130.75 | - | - | - | - | - | - | - | |
| 8.5 | .3346 | .1140 | .0938 | 1 | 3 1/16 | - | - | 3 | 516085 | 157.00 | 8.002-8.814 | 194.65 | 169.50 | 161.25 | 157.00 | 152.90 | 149.45 | 144.45 |
| 9.0 | .3543 | .1820 | .1562 | 1 | 4 1/16 | - | - | 3 | 516090 | 133.00 | 8.815-9.601 | 167.65 | 144.45 | 136.75 | 133.00 | 129.10 | 125.90 | 121.40 |
| 9.5 | .3740 | .1820 | .1562 | 1 | 4 1/16 | - | - | 3 | 516095 | 133.00 | - | - | - | - | - | - | - | |
| 10.0 | .3937 | .1820 | .1562 | 1 | 4 1/16 | - | - | 3 | 516100 | 148.35 | 9.602-10.389 | 182.80 | 159.75 | 152.10 | 148.35 | 144.30 | 141.10 | 136.70 |
| 10.5 | .4134 | .1820 | .1562 | 1 | 4 1/16 | - | - | 3 | 516105 | 136.15 | 10.390-11.201 | 170.80 | 147.65 | 139.95 | 136.15 | 132.30 | 129.10 | 124.50 |
| 11.0 | .4331 | .1820 | .1562 | 1 | 4 1/16 | - | - | 3 | 516110 | 136.15 | - | - | - | - | - | - | - | |
| 11.5 | .4528 | .2280 | .1875 | 1 | 4 1/16 | - | - | 3 | 516115 | 162.05 | 11.202-11.989 | 196.70 | 173.60 | 165.85 | 162.05 | 158.25 | 154.95 | 150.35 |
| 12.0 | .4724 | .2280 | .1875 | 1 | 4 3/16 | 4 | 518120 | 3 | 516120 | 148.70 | 11.990-12.776 | 183.45 | 160.20 | 152.50 | 148.70 | 145.05 | 141.75 | 137.20 |
| 12.5 | .4921 | .2280 | .1875 | 1 | 4 3/16 | 4 | 518125 | 3 | 516125 | 148.70 | - | - | - | - | - | - | - | |
| 13.0 | .5118 | .2280 | .1875 | 1 | 4 3/16 | 4 | 518130 | 3 | 516130 | 164.75 | 12.777-13.564 | 199.40 | 176.35 | 168.45 | 164.75 | 160.90 | 157.70 | 153.15 |
| 13.5 | .5315 | .2280 | .1875 | 1 | 4 3/16 | 4 | 518135 | 3 | 516135 | 164.75 | - | - | - | - | - | - | - | |
| 14.0 | .5512 | .2280 | .1875 | 1 | 4 3/16 | 4 | 518140 | 3 | 516140 | 151.35 | 13.565-14.376 | 185.95 | 162.75 | 154.95 | 151.35 | 147.20 | 144.10 | 139.60 |
| 14.5 | .5709 | .2280 | .1875 | 2 | 5 1/8 | 4 | 518145 | 3 | 516145 | 168.95 | 14.377-15.164 | 203.55 | 180.25 | 172.50 | 168.95 | 165.00 | 161.75 | 157.25 |
| 15.0 | .5906 | .2280 | .1875 | 2 | 5 1/8 | 4 | 518150 | 3 | 516150 | 168.95 | - | - | - | - | - | - | - | |
| 15.5 | .6102 | .2280 | .1875 | 2 | 5 1/8 | 4 | 518155 | 3 | 516155 | 154.90 | 15.165-15.951 | 189.45 | 166.35 | 158.60 | 154.90 | 151.05 | 147.90 | 143.30 |
| 16.0 | .6299 | .2280 | .1875 | 2 | 5 1/8 | 4 | 518160 | 3 | 516160 | 177.40 | 15.952-16.739 | 212.05 | 188.80 | 181.10 | 177.40 | 173.60 | 170.25 | 165.85 |
| 16.5 | .6496 | .2280 | .1875 | 2 | 5 1/8 | 4 | 518165 | 3 | 516165 | 177.40 | - | - | - | - | - | - | - | |
| 17.0 | .6693 | .2280 | .1875 | 2 | 5 1/8 | 4 | 518170 | 3 | 516170 | 162.65 | 16.740-17.551 | 197.15 | 174.00 | 166.35 | 162.65 | 158.70 | 155.50 | 151.05 |
| 17.5 | .6890 | .2280 | .1875 | 2 | 5 1/8 | 4 | 518175 | 3 | 516175 | 162.65 | - | - | - | - | - | - | - | |
| 18.0 | .7087 | .2900 | .2500 | 2 | 5 3/8 | 4 | 518180 | 3 | 516180 | 180.15 | 17.552-18.339 | 214.65 | 191.55 | 183.90 | 180.15 | 176.35 | 173.00 | 168.45 |
| 18.5 | .7283 | .2900 | .2500 | 2 | 5 3/8 | 4 | 518185 | 3 | 516185 | 165.05 | 18.340-19.126 | 199.65 | 176.50 | 168.75 | 165.05 | 161.25 | 158.00 | 153.45 |
| 19.0 | .7480 | .2900 | .2500 | 2 | 5 3/8 | 4 | 518190 | 3 | 516190 | 165.05 | - | - | - | - | - | - | - | |
| 19.5 | .7677 | .2900 | .2500 | 2 | 5 3/8 | 4 | 518195 | 3 | 516195 | 182.80 | 19.127-19.914 | 217.45 | 194.25 | 186.70 | 182.80 | 179.00 | 175.80 | 171.25 |
| 20.0 | .7874 | .2900 | .2500 | 2 | 5 3/8 | 4 | 518200 | 3 | 516200 | 167.75 | 19.915-20.726 | 202.30 | 179.15 | 171.35 | 167.75 | 163.75 | 160.65 | 156.10 |
| 20.5 | .8071 | .2900 | .2500 | 2 | 5 3/8 | 4 | 518205 | 3 | 516205 | 167.75 | - | - | - | - | - | - | - | |
| 21.0 | .8268 | .2900 | .2500 | 2 | 5 3/8 | 4 | 518210 | 3 | 516210 | 191.55 | 20.727-21.514 | 226.25 | 203.00 | 195.30 | 191.55 | 187.70 | 184.50 | 179.90 |
| 21.5 | .8465 | .2900 | .2500 | 2 | 5 3/8 | 4 | 518215 | 3 | 516215 | 191.55 | - | - | - | - | - | - | - | |
| 22.0 | .8661 | .2900 | .2500 | 2 | 5 3/8 | 4 | 518220 | 3 | 516220 | 175.60 | 21.515-22.301 | 210.00 | 186.95 | 179.30 | 175.60 | 171.55 | 168.40 | 163.80 |
| 22.5 | .8858 | .2900 | .2500 | 3 | 6 1/8 | 4 | 518225 | 3 | 516225 | 196.40 | 22.302-23.089 | 230.90 | 207.80 | 200.00 | 196.40 | 192.35 | 189.20 | 184.60 |
| 23.0 | .9055 | .2900 | .2500 | 3 | 6 1/8 | 4 | 518230 | 3 | 516230 | 196.40 | - | - | - | - | - | - | - | |
| 23.5 | .9252 | .2900 | .2500 | 3 | 6 1/8 | 4 | 518235 | 3 | 516235 | 179.85 | 23.090-23.901 | 214.45 | 191.30 | 183.60 | 179.85 | 175.90 | 172.85 | 168.25 |
| 24.0 | .9449 | .3530 | .3125 | 3 | 6 3/8 | 4 | 518240 | 3 | 516240 | 200.50 | 23.902-24.689 | 235.10 | 211.90 | 204.15 | 200.50 | 196.65 | 193.45 | 188.80 |
| 24.5 | .9646 | .3530 | .3125 | 3 | 6 3/8 | 4 | 518245 | 3 | 516245 | 200.50 | - | - | - | - | - | - | - | |
| 25.0 | .9843 | .3530 | .3125 | 3 | 6 3/8 | 4 | 518250 | 3 | 516250 | 183.75 | 24.690-25.476 | 218.25 | 195.15 | 187.40 | 183.75 | 179.80 | 176.60 | 172.20 |
| 25.5 | 1.0039 | .3530 | .3125 | 3 | 6 3/8 | 4 | 518255 | 3 | 516255 | 192.90 | 25.477-27.076 | 228.80 | 204.65 | 196.70 | 192.90 | 188.80 | 185.50 | 180.80 |
| 26.0 | 1.0236 | .3530 | .3125 | 3 | 6 3/8 | 4 | 518260 | 3 | 516260 | 192.90 | - | - | - | - | - | - | - | |
| 27.0 | 1.0630 | .3530 | .3125 | 3 | 6 3/8 | 4 | 518270 | 3 | 516270 | 192.90 | - | - | - | - | - | - | - | |
| 28.0 | 1.1024 | .3530 | .3125 | 3 | 6 3/8 | 4 | 518280 | 3 | 516280 | 198.40 | 27.077-28.651 | 234.40 | 210.40 | 202.40 | 198.40 | 194.40 | 191.25 | 186.40 |
| 29.0 | 1.1417 | .3530 | .3125 | 3 | 6 3/8 | 4 | 518290 | 3 | 516290 | 204.65 | 28.652-30.239 | 240.65 | 216.65 | 208.60 | 204.65 | 200.70 | 197.45 | 192.70 |
| 30.0 | 1.1811 | .3530 | .3125 | 3 | 6 3/8 | 4 | 518300 | 3 | 516300 | 204.65 | - | - | - | - | - | - | - | |
| 31.0 | 1.2205 | .4260 | .3750 | 3 | 6 5/8 | - | - | 4 | 516310 | 227.10 | 30.240-31.826 | 266.05 | 240.00 | 231.30 | 227.10 | 222.80 | 219.25 | 214.00 |
| 32.0 | 1.2598 | .4260 | .3750 | 3 | 6 5/8 | - | - | 4 | 516320 | 242.25 | 31.827-33.414 | 281.30 | 255.15 | 246.45 | 242.25 | 237.85 | 234.35 | 229.15 |
| 33.0 | 1.2992 | .4260 | .3750 | 3 | 6 5/8 | - | - | 4 | 516330 | 242.25 | - | - | - | - | - | - | - | |
| 34.0 | 1.3386 | .4260 | .3750 | 3 | 6 5/8 | - | - | 4 | 516340 | 252.95 | 33.415-35.001 | 292.00 | 265.85 | 257.10 | 252.95 | 248.55 | 245.10 | 239.80 |
| 35.0 | 1.3780 | .4260 | .3750 | 3 | 6 5/8 | - | - | 4 | 516350 | 252.95 | - | - | - | - | - | - | - | |
| 36.0 | 1.4173 | .4260 | .3750 | 4 | 7 7/8 | - | - | 4 | 516360 | 280.85 | 35.002-36.589 | 323.25 | 294.95 | 285.50 | 280.85 | 276.20 | 272.45 | 266.70 |
| 37.0 | 1.4567 | .4260 | .3750 | 4 | 7 7/8 | - | - | 4 | 516370 | 309.50 | 36.590-38.176 | 351.75 | 323.50 | 314.00 | 309.50 | 304.75 | 300.80 | 295.30 |
| 38.0 | 1.4961 | .4260 | .3750 | 4 | 7 7/8 | - | - | 4 | 516380 | 309.50 | - | - | - | - | - | - | - | |

Modified tool diameters are available up to 50mm-contact us for price.

C'BORES



COUNTERBORES - FOR STEELS CARBIDE TIPPED TYPES 510 & 511 FRACTIONAL

MATERIAL SPECIFIC

INTERCHANGEABLE PILOT TYPE STRAIGHT OR TAPER SHANK



TYPE 510 - STRAIGHT SHANK FOR MACHINING STEELS



**TYPE 511 - TAPER SHANK FOR MACHINING STEELS
BOTH TYPES:**

- Right spiral flutes
- Carbide tips brazed to tough hardened alloy steel body
- Tool diameter tolerance: plus .001", minus .000"
- Shank diameter tolerance: plus .0000", minus .0005" (Type 510)
- Detailed specifications on page 105

| TOOL SELECTOR | CHIP CLASS | MATERIAL MACHINED | TOOL TYPE |
|---------------|-------------------------|--|--|
| | 20 | NON-FERROUS - LONG CHIPS | 514 ^{GP} or 516 ^{GP} |
| | 40 | NON-FERROUS - SHORT CHIPS | 514 ^{GP} or 516 ^{GP} |
| | 60 | CAST IRONS | 514 ^{GP} or 516 ^{GP} |
| | 80 | LOW STRENGTH STEELS | 510 or 511 |
| | 100 | MEDIUM STRENGTH STEELS | 510 or 511 |
| | 120 | HIGH STRENGTH STEELS | 510 or 511 |
| 140 | HIGH TEMPERATURE ALLOYS | 514 ^{GP} or 516 ^{GP} | |

^{GP}See page 108 for Type 514, page 110 for Type 516

MODIFICATIONS (For Type 510, see list on page 108. For Type 511, see list on page 110)

USE:

- Special steel cutting grade of carbide and appropriate tool geometry permit the machining of steels, tough steel alloys, and cast steels

| TOOL DIAMETER | | DIMENSIONS | | | | TYPE 510 | | TYPE 511 | | BOTH TYPES PRICE | FINISHED TO MODIFIED TOOL DIAMETER | | | | | | |
|---------------|---------|---------------|------------------|-----------------|-------------|-------------|---------------|-----------------|---------------|------------------|------------------------------------|--|----------|----------|----------|----------|----------|
| | | MIN CUT DIAM. | PILOT HOLE DIAM. | OVER-ALL LENGTH | NO. OF FLTS | SHANK DIAM. | STEEL EDP NO. | TAPER SHANK NO. | STEEL EDP NO. | | MODIFIED DIAMETER RANGE | PRICE EACH - BASED ON QUANTITY ORDERED | | | | | |
| FRACTIONAL | DECIMAL | | | | | | | | | | 1 | 2 | 3 | 4 | 5-7 | 8-14* | |
| 1/4 | .2500 | .1140 | .0938 | 3 13/16 | 3 | 15/64 | 51008 | 1 | 51108 | \$110.85 | 0.2381-0.2530 | \$164.35 | \$137.65 | \$128.70 | \$124.30 | \$119.80 | \$116.10 |
| 9/32 | .2812 | .1140 | .0938 | 3 13/16 | 3 | 17/64 | 51009 | 1 | 51109 | 133.50 | 0.2531-0.2840 | 186.80 | 160.00 | 151.10 | 146.80 | 142.40 | 138.50 |
| 5/16 | .3125 | .1140 | .0938 | 3 13/16 | 3 | 19/64 | 51010 | 1 | 51110 | 113.95 | 0.2841-0.3150 | 164.15 | 139.00 | 130.75 | 126.60 | 122.25 | 118.85 |
| 11/32 | .3438 | .1140 | .0938 | 3 13/16 | 3 | 5/16 | 51011 | 1 | 51111 | 140.45 | 0.3151-0.3470 | 190.65 | 165.45 | 157.00 | 152.95 | 148.70 | 145.30 |
| 3/8 | .3750 | .1820 | .1562 | 4 1/16 | 3 | 5/16 | 51012 | 1 | 51112 | 117.65 | 0.3471-0.3780 | 163.80 | 140.75 | 133.00 | 129.25 | 125.40 | 122.20 |
| 13/32 | .4062 | .1820 | .1562 | 4 1/16 | 3 | 3/8 | 51013 | 1 | 51113 | 132.90 | 0.3781-0.4090 | 179.15 | 156.00 | 148.35 | 144.45 | 140.60 | 137.40 |
| 7/16 | .4375 | .1820 | .1562 | 4 1/16 | 3 | 3/8 | 51014 | 1 | 51114 | 120.80 | 0.4091-0.4410 | 167.00 | 143.95 | 136.15 | 132.45 | 128.55 | 125.40 |
| 15/32 | .4688 | .2280 | .1875 | 4 5/16 | 3 | 7/16 | 51015 | 1 | 51115 | 146.70 | 0.4411-0.4720 | 192.95 | 169.80 | 162.05 | 158.30 | 154.45 | 151.25 |
| 1/2 | .5000 | .2280 | .1875 | 4 5/16 | 3 | 7/16 | 51016 | 1 | 51116 | 133.35 | 0.4721-0.5030 | 179.75 | 156.55 | 148.70 | 145.10 | 141.05 | 137.90 |
| 17/32 | .5312 | .2280 | .1875 | 4 5/16 | 3 | 1/2 | 51017 | 1 | 51117 | 144.00 | 0.5031-0.5340 | 188.55 | 166.30 | 158.85 | 155.20 | 151.40 | 148.35 |
| 9/16 | .5625 | .2280 | .1875 | 4 5/16 | 3 | 1/2 | 51018 | 1 | 51118 | 130.90 | 0.5341-0.5660 | 175.60 | 153.15 | 145.80 | 141.95 | 138.35 | 135.25 |
| 19/32 | .5938 | .2280 | .1875 | 5 1/8 | 3 | 1/2 | 51019 | 2 | 51119 | 147.90 | 0.5661-0.5970 | 192.45 | 170.20 | 162.75 | 159.05 | 155.40 | 152.20 |
| 5/8 | .6250 | .2280 | .1875 | 5 1/8 | 3 | 1/2 | 51020 | 2 | 51120 | 134.40 | 0.5971-0.6280 | 179.05 | 156.75 | 149.30 | 145.70 | 141.80 | 138.80 |
| 21/32 | .6562 | .2280 | .1875 | 5 1/8 | 3 | 1/2 | 51021 | 2 | 51121 | 156.10 | 0.6281-0.6590 | 200.70 | 178.40 | 170.95 | 167.25 | 163.50 | 160.55 |
| 11/16 | .6875 | .2280 | .1875 | 5 1/8 | 3 | 1/2 | 51022 | 2 | 51122 | 141.80 | 0.6591-0.6910 | 186.50 | 164.15 | 156.75 | 152.95 | 149.30 | 146.15 |
| 23/32 | .7188 | .2900 | .2500 | 5 3/8 | 3 | 1/2 | 51023 | 2 | 51123 | 158.70 | 0.6911-0.7220 | 203.35 | 181.05 | 173.65 | 169.95 | 166.20 | 163.15 |
| 3/4 | .7500 | .2900 | .2500 | 5 3/8 | 3 | 1/2 | 51024 | 2 | 51124 | 144.25 | 0.7221-0.7530 | 188.80 | 166.45 | 159.05 | 155.45 | 151.55 | 148.55 |
| 25/32 | .7812 | .2900 | .2500 | 5 3/8 | 3 | 5/8 | 51025 | 2 | 51125 | 161.40 | 0.7531-0.7840 | 205.95 | 183.75 | 176.25 | 172.45 | 168.80 | 165.75 |
| 13/16 | .8125 | .2900 | .2500 | 5 3/8 | 3 | 5/8 | 51026 | 2 | 51126 | 146.80 | 0.7841-0.8160 | 191.35 | 169.05 | 161.70 | 157.95 | 154.20 | 151.10 |
| 27/32 | .8438 | .2900 | .2500 | 5 3/8 | 3 | 3/4 | 51027 | 2 | 51127 | 169.65 | 0.8161-0.8470 | 214.40 | 192.05 | 184.60 | 180.90 | 177.25 | 174.10 |
| 7/8 | .8750 | .2900 | .2500 | 5 3/8 | 3 | 3/4 | 51028 | 2 | 51128 | 154.25 | 0.8471-0.8780 | 198.90 | 176.50 | 169.20 | 165.45 | 161.75 | 158.60 |
| 29/32 | .9062 | .2900 | .2500 | 6 1/8 | 3 | 3/4 | 51029 | 3 | 51129 | 174.30 | 0.8781-0.9090 | 218.85 | 196.55 | 189.20 | 185.45 | 181.75 | 178.70 |
| 15/16 | .9375 | .2900 | .2500 | 6 1/8 | 3 | 3/4 | 51030 | 3 | 51130 | 158.40 | 0.9091-0.9410 | 203.00 | 180.70 | 173.25 | 169.55 | 165.90 | 162.85 |
| 31/32 | .9688 | .3530 | .3125 | 6 3/8 | 3 | 3/4 | 51031 | 3 | 51131 | 178.30 | 0.9411-0.9720 | 222.90 | 200.60 | 193.15 | 189.50 | 185.60 | 182.65 |
| 1 | 1.0000 | .3530 | .3125 | 6 3/8 | 3 | 3/4 | 51032 | 3 | 51132 | 168.25 | 0.9721-1.0030 | 214.60 | 191.45 | 183.75 | 179.90 | 175.85 | 172.85 |
| 1 1/16 | 1.0625 | .3530 | .3125 | 6 3/8 | 3 | 3/4 | 51034 | 3 | 51134 | 170.50 | 1.0031-1.0660 | 216.65 | 193.55 | 185.80 | 182.00 | 178.10 | 175.00 |
| 1 1/8 | 1.1250 | .3530 | .3125 | 6 3/8 | 3 | 1 | 51036 | 3 | 51136 | 175.80 | 1.0661-1.1280 | 222.20 | 199.05 | 191.30 | 187.45 | 183.50 | 180.40 |
| 1 3/16 | 1.1875 | .3530 | .3125 | 6 3/8 | 3 | 1 | 51038 | 3 | 51138 | 181.80 | 1.1281-1.1905 | 228.25 | 205.05 | 197.25 | 193.50 | 189.50 | 186.40 |
| 1 1/4 | 1.2500 | .4260 | .3750 | 6 5/8 | 4 | 1 | 51040 | 3 | 51140 | 202.20 | 1.1906-1.2530 | 252.30 | 227.15 | 218.85 | 214.80 | 210.50 | 207.05 |
| 1 5/16 | 1.3125 | .4260 | .3750 | 6 5/8 | 4 | 1 | 51042 | 3 | 51142 | 216.65 | 1.2531-1.3155 | 266.95 | 241.80 | 233.50 | 229.25 | 225.15 | 221.65 |
| 1 3/8 | 1.3750 | .4260 | .3750 | 6 5/8 | 4 | 1 | 51044 | 3 | 51144 | 227.05 | 1.3156-1.3780 | 277.20 | 252.10 | 243.80 | 239.65 | 235.35 | 231.90 |
| 1 7/16 | 1.4375 | .4260 | .3750 | 7 7/8 | 4 | 1 1/4 | 51046 | 4 | 51146 | 252.50 | 1.3781-1.4405 | 307.20 | 279.95 | 270.70 | 266.30 | 261.65 | 257.85 |
| 1 1/2 | 1.5000 | .4260 | .3750 | 7 7/8 | 4 | 1 1/4 | 51048 | 4 | 51148 | 290.55 | 1.4406-1.5030 | 347.20 | 318.95 | 309.50 | 304.80 | 300.10 | 296.20 |
| 1 9/16 | 1.5625 | .4890 | .4375 | 8 1/8 | 4 | 1 1/4 | 51050 | 4 | 51150 | 312.20 | 1.5031-1.5660 | 371.55 | 341.95 | 332.10 | 327.15 | 322.20 | 318.15 |
| 1 5/8 | 1.6250 | .4890 | .4375 | 8 1/8 | 4 | 1 1/4 | 51052 | 4 | 51152 | 317.80 | 1.5661-1.6280 | 377.05 | 347.55 | 337.65 | 332.70 | 327.70 | 323.75 |
| 1 11/16 | 1.6875 | .4890 | .4375 | 8 1/8 | 4 | 1 1/4 | 51054 | 4 | 51154 | 380.25 | 1.6281-1.6910 | 444.35 | 412.40 | 401.75 | 396.45 | 390.95 | 386.60 |
| 1 3/4 | 1.7500 | .4890 | .4375 | 8 1/8 | 4 | 1 1/4 | 51056 | 4 | 51156 | 380.25 | 1.6911-1.7530 | 444.35 | 412.40 | 401.75 | 396.45 | 390.95 | 386.60 |
| 1 13/16 | 1.8125 | .4890 | .4375 | 8 1/8 | 4 | 1 1/2 | 51058 | 4 | 51158 | 450.10 | 1.7531-1.8160 | 514.10 | 482.15 | 471.45 | 466.15 | 460.70 | 456.25 |
| 1 7/8 | 1.8750 | .4890 | .4375 | 8 1/8 | 4 | 1 1/2 | 51060 | 4 | 51160 | 450.10 | 1.8161-1.8780 | 514.10 | 482.15 | 471.45 | 466.15 | 460.70 | 456.25 |
| 1 15/16 | 1.9375 | .4890 | .4375 | 8 1/8 | 4 | 1 1/2 | 51062 | 4 | 51162 | 491.75 | 1.8781-1.9410 | 555.90 | 523.85 | 513.05 | 507.85 | 502.50 | 498.05 |
| 2 | 2.0000 | .5510 | .5000 | 8 3/8 | 4 | 1 1/2 | 51064 | 4 | 51164 | 491.75 | 1.9411-2.0030 | 555.90 | 523.85 | 513.05 | 507.85 | 502.50 | 498.05 |

*Quantities of 15 or more - price of fractional size in same size range.



COUNTERBORES - FOR STEELS

CARBIDE TIPPED TYPES 510 & 511 METRIC

MATERIAL SPECIFIC

INTERCHANGEABLE PILOT TYPE STRAIGHT OR TAPER SHANK



NOTE: Tool diameter in millimeters (mm); all other dimensions in inches. Modifications available (Type 510 see page 108, type 511 see page 110).

| TOOL DIAMETER | | DIMENSIONS | | | | TYPE 510 | | TYPE 511 | | BOTH TYPES METRIC PRICE | FINISHED TO MODIFIED TOOL DIAMETER | | | | | | | |
|---------------|--------|---------------|------------------|-----------------|-------------|-------------|----------------------|-----------------|----------------------|-------------------------|------------------------------------|--|----------|----------|----------|----------|----------|----------|
| | | MIN CUT DIAM. | PILOT HOLE DIAM. | OVER-ALL LENGTH | NO. OF FLTS | SHANK DIAM. | STEEL METRIC EDP NO. | TAPER SHANK NO. | STEEL METRIC EDP NO. | | MODIFIED DIAMETER RANGE (mm) | PRICE EACH - BASED ON QUANTITY ORDERED | | | | | | |
| mm | INCH | | | | | | | | | | 1 | 2 | 3 | 4 | 5-7 | 8-14 | OVER 14 | |
| 6.0 | .2362 | .1140 | .0938 | 3 1/16 | 3 | 15/64 | 510060 | 1 | 511060 | \$128.70 | 6.000-6.426 | \$168.65 | \$141.85 | \$133.00 | \$128.70 | \$124.25 | \$120.50 | \$115.30 |
| 6.5 | .2559 | .1140 | .0938 | 3 1/16 | 3 | 17/64 | 510065 | 1 | 511065 | 151.10 | 6.427-7.214 | 191.00 | 164.35 | 155.40 | 151.10 | 146.70 | 143.05 | 137.75 |
| 7.0 | .2756 | .1140 | .0938 | 3 1/16 | 3 | 17/64 | 510070 | 1 | 511070 | 151.10 | - | - | - | - | - | - | - | |
| 7.5 | .2953 | .1140 | .0938 | 3 1/16 | 3 | 19/64 | 510075 | 1 | 511075 | 130.75 | 7.215-8.001 | 168.20 | 143.10 | 134.65 | 130.75 | 126.45 | 122.90 | 118.05 |
| 8.0 | .3150 | .1140 | .0938 | 3 1/16 | 3 | 19/64 | 510080 | 1 | 511080 | 130.75 | - | - | - | - | - | - | - | |
| 8.5 | .3346 | .1140 | .0938 | 3 1/16 | 3 | 5/16 | 510085 | 1 | 511085 | 157.00 | 8.002-8.814 | 194.65 | 169.50 | 161.25 | 157.00 | 152.90 | 149.45 | 144.45 |
| 9.0 | .3543 | .1820 | .1562 | 4 1/16 | 3 | 5/16 | 510090 | 1 | 511090 | 133.00 | 8.815-9.601 | 167.65 | 144.45 | 136.75 | 133.00 | 129.10 | 125.90 | 121.40 |
| 9.5 | .3740 | .1820 | .1562 | 4 1/16 | 3 | 5/16 | 510095 | 1 | 511095 | 133.00 | - | - | - | - | - | - | - | |
| 10.0 | .3937 | .1820 | .1562 | 4 1/16 | 3 | 3/8 | 510100 | 1 | 511100 | 148.35 | 9.602-10.389 | 182.80 | 159.75 | 152.10 | 148.35 | 144.30 | 141.10 | 136.70 |
| 10.5 | .4134 | .1820 | .1562 | 4 1/16 | 3 | 3/8 | 510105 | 1 | 511105 | 136.15 | 10.390-11.201 | 170.80 | 147.65 | 139.95 | 136.15 | 132.30 | 129.10 | 124.50 |
| 11.0 | .4331 | .1820 | .1562 | 4 1/16 | 3 | 3/8 | 510110 | 1 | 511110 | 136.15 | - | - | - | - | - | - | - | |
| 11.5 | .4528 | .2280 | .1875 | 4 5/16 | 3 | 7/16 | 510115 | 1 | 511115 | 162.05 | 11.202-11.989 | 196.70 | 173.60 | 165.85 | 162.05 | 158.25 | 154.95 | 150.35 |
| 12.0 | .4724 | .2280 | .1875 | 4 5/16 | 3 | 7/16 | 510120 | 1 | 511120 | 148.70 | 11.990-12.776 | 183.45 | 160.20 | 152.50 | 148.70 | 145.05 | 141.75 | 137.20 |
| 12.5 | .4921 | .2280 | .1875 | 4 5/16 | 3 | 7/16 | 510125 | 1 | 511125 | 148.70 | - | - | - | - | - | - | - | |
| 13.0 | .5118 | .2280 | .1875 | 4 5/16 | 3 | 1/2 | 510130 | 1 | 511130 | 158.85 | 12.777-13.564 | 192.15 | 169.90 | 162.35 | 158.85 | 155.10 | 152.05 | 147.60 |
| 13.5 | .5315 | .2280 | .1875 | 4 5/16 | 3 | 1/2 | 510135 | 1 | 511135 | 158.85 | - | - | - | - | - | - | - | |
| 14.0 | .5512 | .2280 | .1875 | 4 5/16 | 3 | 1/2 | 510140 | 1 | 511140 | 145.80 | 13.565-14.376 | 179.10 | 156.80 | 149.35 | 145.80 | 141.90 | 138.90 | 134.50 |
| 14.5 | .5709 | .2280 | .1875 | 5 1/8 | 3 | 1/2 | 510145 | 2 | 511145 | 162.75 | 14.377-15.164 | 196.10 | 173.80 | 166.35 | 162.75 | 159.00 | 155.85 | 151.50 |
| 15.0 | .5906 | .2280 | .1875 | 5 1/8 | 3 | 1/2 | 510150 | 2 | 511150 | 162.75 | - | - | - | - | - | - | - | |
| 15.5 | .6102 | .2280 | .1875 | 5 1/8 | 3 | 1/2 | 510155 | 2 | 511155 | 149.30 | 15.165-15.951 | 182.60 | 160.30 | 152.85 | 149.30 | 145.65 | 142.50 | 138.15 |
| 16.0 | .6299 | .2280 | .1875 | 5 1/8 | 3 | 1/2 | 510160 | 2 | 511160 | 149.30 | 15.952-16.739 | 182.60 | 160.30 | 152.85 | 149.30 | 145.65 | 142.50 | 138.15 |
| 16.5 | .6496 | .2280 | .1875 | 5 1/8 | 3 | 1/2 | 510165 | 2 | 511165 | 170.95 | - | - | - | - | - | - | - | |
| 17.0 | .6693 | .2280 | .1875 | 5 1/8 | 3 | 1/2 | 510170 | 2 | 511170 | 156.75 | 16.740-17.551 | 190.00 | 167.75 | 160.30 | 156.75 | 152.90 | 149.85 | 145.65 |
| 17.5 | .6890 | .2280 | .1875 | 5 1/8 | 3 | 1/2 | 510175 | 2 | 511175 | 156.75 | - | - | - | - | - | - | - | |
| 18.0 | .7087 | .2900 | .2500 | 5 3/8 | 3 | 1/2 | 510180 | 2 | 511180 | 173.65 | 17.552-18.339 | 206.90 | 184.60 | 177.25 | 173.65 | 169.90 | 166.75 | 162.35 |
| 18.5 | .7283 | .2900 | .2500 | 5 3/8 | 3 | 1/2 | 510185 | 2 | 511185 | 159.05 | 18.340-19.126 | 192.40 | 170.15 | 162.65 | 159.05 | 155.40 | 152.20 | 147.90 |
| 19.0 | .7480 | .2900 | .2500 | 5 3/8 | 3 | 1/2 | 510190 | 2 | 511190 | 159.05 | - | - | - | - | - | - | - | |
| 19.5 | .7677 | .2900 | .2500 | 5 3/8 | 3 | 3/8 | 510195 | 2 | 511195 | 176.25 | 19.127-19.914 | 209.65 | 187.15 | 179.85 | 176.25 | 172.40 | 169.40 | 165.00 |
| 20.0 | .7874 | .2900 | .2500 | 5 3/8 | 3 | 3/8 | 510200 | 2 | 511200 | 161.70 | 19.915-20.726 | 194.95 | 172.70 | 165.15 | 161.70 | 157.90 | 154.70 | 150.45 |
| 20.5 | .8071 | .2900 | .2500 | 5 3/8 | 3 | 3/8 | 510205 | 2 | 511205 | 161.70 | - | - | - | - | - | - | - | |
| 21.0 | .8268 | .2900 | .2500 | 5 3/8 | 3 | 3/4 | 510210 | 2 | 511210 | 184.60 | 20.727-21.514 | 217.95 | 195.60 | 188.20 | 184.60 | 180.85 | 177.70 | 173.30 |
| 21.5 | .8465 | .2900 | .2500 | 5 3/8 | 3 | 3/4 | 510215 | 2 | 511215 | 184.60 | - | - | - | - | - | - | - | |
| 22.0 | .8661 | .2900 | .2500 | 5 3/8 | 3 | 3/4 | 510220 | 2 | 511220 | 169.20 | 21.515-22.301 | 202.45 | 180.20 | 172.85 | 169.20 | 165.35 | 162.30 | 157.95 |
| 22.5 | .8858 | .2900 | .2500 | 6 1/8 | 3 | 3/4 | 510225 | 3 | 511225 | 189.20 | 22.302-23.089 | 222.55 | 200.20 | 192.70 | 189.20 | 185.40 | 182.45 | 177.95 |
| 23.0 | .9055 | .2900 | .2500 | 6 1/8 | 3 | 3/4 | 510230 | 3 | 511230 | 189.20 | - | - | - | - | - | - | - | |
| 23.5 | .9252 | .2900 | .2500 | 6 1/8 | 3 | 3/4 | 510235 | 3 | 511235 | 173.25 | 23.090-23.901 | 206.65 | 184.25 | 176.90 | 173.25 | 169.50 | 166.45 | 162.05 |
| 24.0 | .9449 | .3530 | .3125 | 6 3/8 | 3 | 3/4 | 510240 | 3 | 511240 | 193.15 | 23.902-24.689 | 226.45 | 204.20 | 196.70 | 193.15 | 189.45 | 186.40 | 181.95 |
| 24.5 | .9646 | .3530 | .3125 | 6 3/8 | 3 | 3/4 | 510245 | 3 | 511245 | 193.15 | - | - | - | - | - | - | - | |
| 25.0 | .9843 | .3530 | .3125 | 6 3/8 | 3 | 3/4 | 510250 | 3 | 511250 | 176.95 | 24.690-25.476 | 210.35 | 188.00 | 180.55 | 176.95 | 173.15 | 170.20 | 165.85 |
| 25.5 | 1.0039 | .3530 | .3125 | 6 3/8 | 3 | 3/4 | 510255 | 3 | 511255 | 185.80 | 25.477-27.076 | 220.35 | 197.25 | 189.50 | 185.80 | 181.95 | 178.80 | 174.20 |
| 26.0 | 1.0236 | .3530 | .3125 | 6 3/8 | 3 | 3/4 | 510260 | 3 | 511260 | 185.80 | - | - | - | - | - | - | - | |
| 27.0 | 1.0630 | .3530 | .3125 | 6 3/8 | 3 | 3/4 | 510270 | 3 | 511270 | 185.80 | - | - | - | - | - | - | - | |
| 28.0 | 1.1024 | .3530 | .3125 | 6 3/8 | 3 | 1 | 510280 | 3 | 511280 | 191.30 | 27.077-28.651 | 225.85 | 202.70 | 195.00 | 191.30 | 187.40 | 184.20 | 179.70 |
| 29.0 | 1.1417 | .3530 | .3125 | 6 3/8 | 3 | 1 | 510290 | 3 | 511290 | 197.25 | 28.652-30.239 | 231.85 | 208.70 | 201.05 | 197.25 | 193.45 | 190.20 | 185.60 |
| 30.0 | 1.1811 | .3530 | .3125 | 6 3/8 | 3 | 1 | 510300 | 3 | 511300 | 197.25 | - | - | - | - | - | - | - | |
| 31.0 | 1.2205 | .4260 | .3750 | 6 5/8 | 4 | 1 | 510310 | 3 | 511310 | 218.85 | 30.240-31.826 | 256.40 | 231.25 | 222.90 | 218.85 | 214.65 | 211.30 | 206.25 |
| 32.0 | 1.2598 | .4260 | .3750 | 6 5/8 | 4 | 1 | 510320 | 3 | 511320 | 233.50 | 31.827-33.414 | 271.00 | 245.90 | 237.45 | 233.50 | 229.20 | 225.75 | 220.85 |
| 33.0 | 1.2992 | .4260 | .3750 | 6 5/8 | 4 | 1 | 510330 | 3 | 511330 | 233.50 | - | - | - | - | - | - | - | |
| 34.0 | 1.3386 | .4260 | .3750 | 6 5/8 | 4 | 1 | 510340 | 3 | 511340 | 243.80 | 33.415-35.001 | 281.40 | 256.20 | 247.85 | 243.80 | 239.60 | 236.10 | 231.10 |
| 35.0 | 1.3780 | .4260 | .3750 | 6 5/8 | 4 | 1 | 510350 | 3 | 511350 | 243.80 | - | - | - | - | - | - | - | |
| 36.0 | 1.4173 | .4260 | .3750 | 7 7/8 | 4 | 1 1/4 | 510360 | 4 | 511360 | 270.70 | 35.002-36.589 | 311.45 | 284.25 | 275.15 | 270.70 | 266.10 | 262.40 | 257.00 |
| 37.0 | 1.4567 | .4260 | .3750 | 7 7/8 | 4 | 1 1/4 | 510370 | 4 | 511370 | 298.30 | 36.590-38.176 | 339.00 | 311.70 | 302.55 | 298.30 | 293.70 | 289.90 | 284.60 |
| 38.0 | 1.4961 | .4260 | .3750 | 7 7/8 | 4 | 1 1/4 | 510380 | 4 | 511380 | 298.30 | - | - | - | - | - | - | - | |

Modified tool diameters are available up to 50mm-contact us for price.

C'BORES



COUNTERBORES CARBIDE TIPPED TYPES 575 & 576 FRACTIONAL

MATERIAL SPECIFIC

STUB TAPER SHANK - TWO TYPES: FOR NON-FERROUS & CAST IRONS OR FOR STEELS



| TOOL SELECTOR | CHIP CLASS | MATERIAL MACHINED | TOOL TYPE |
|---------------|-------------------------|---------------------------|-----------|
| | 20 | NON-FERROUS - LONG CHIPS | 575 |
| | 40 | NON-FERROUS - SHORT CHIPS | 575 |
| | 60 | CAST IRONS | 575 |
| | 80 | LOW STRENGTH STEELS | 576 |
| | 100 | MEDIUM STRENGTH STEELS | 576 |
| | 120 | HIGH STRENGTH STEELS | 576 |
| 140 | HIGH TEMPERATURE ALLOYS | 575 | |

MODIFICATIONS (Prompt delivery)

- Modified tool diameter - priced below
- Metric tool diameter
- Cutting diameter reduced for step
- Corner chamfer or corner radius
- Coatings available:

TITANIUM NITRIDE - TiN

TITANIUM CARBONITRIDE - TiCN

ZIRCONIUM NITRIDE - ZrN

AL TITANIUM NITRIDE - AlTiN

STUB TAPER SHANK: TYPE 575 - FOR NON-FERROUS MATERIALS AND CAST IRONS TYPE 576 - FOR STEELS

- 10° right spiral flutes
- Body length = 1/4" through 1.9410" tool diameter; 1/2" above 1.9410" tool diameter
- Tool diameter tolerance: plus .001", minus .000"
- Both types will accept only short shank pilots (see page 118)
- Stub taper dimensions conform to ASME/ANSI B5.10 specifications
- Tool geometry and carbide grade appropriate for material being machined

| TOOL DIAMETER | | DIMENSIONS | | | | | | TYPE 575 N-F/CI EDP NO. | TYPE 576 STEEL EDP NO. | BOTH TYPES PRICE | FINISHED TO MODIFIED TOOL DIAMETER | | | | | | |
|---------------|---------|----------------|------------------|----------------|---------|----------|-------------|-------------------------|------------------------|------------------|------------------------------------|--|----------|----------|----------|----------|----------|
| FRACTIONAL | DECIMAL | MIN. CUT DIAM. | PILOT HOLE DIAM. | STUB TAPER NO. | LENGTH | | NO. OF FLTS | | | | MODIFIED DIAMETER RANGE | PRICE EACH - BASED ON QUANTITY ORDERED | | | | | |
| | | | | | CARBIDE | OVER-ALL | | | | | 1 | 2 | 3 | 4 | 5-7 | 8-14* | |
| 1/2 | .5000 | .2188 | .1875 | 1 | 3/4 | 2 9/16 | 3 | 57516 | 57616 | \$235.50 | 0.4721-0.5030 | \$325.15 | \$280.45 | \$265.35 | \$258.00 | \$250.45 | \$244.30 |
| 9/16 | .5625 | .2188 | .1875 | 1 | 3/4 | 2 9/16 | 3 | 57518 | 57618 | 235.50 | 0.5341-0.5660 | 325.15 | 280.45 | 265.35 | 258.00 | 250.45 | 244.30 |
| 5/8 | .6250 | .2188 | .1875 | 1 | 3/4 | 2 9/16 | 3 | 57520 | 57620 | 235.50 | 0.5971-0.6280 | 325.15 | 280.45 | 265.35 | 258.00 | 250.45 | 244.30 |
| 11/16 | .6875 | .2188 | .1875 | 1 | 3/4 | 2 9/16 | 3 | 57522 | 57622 | 235.50 | 0.6591-0.6910 | 325.15 | 280.45 | 265.35 | 258.00 | 250.45 | 244.30 |
| 3/4 | .7500 | .2969 | .2500 | 2 | 3/4 | 2 7/8 | 4 | 57524 | 57624 | 220.65 | 0.7221-0.7530 | 310.30 | 265.65 | 250.60 | 243.25 | 235.75 | 229.50 |
| 13/16 | .8125 | .2969 | .2500 | 2 | 3/4 | 2 7/8 | 4 | 57526 | 57626 | 220.65 | 0.7841-0.8160 | 310.30 | 265.65 | 250.60 | 243.25 | 235.75 | 229.50 |
| 7/8 | .8750 | .2969 | .2500 | 2 | 3/4 | 2 7/8 | 4 | 57528 | 57628 | 220.65 | 0.8471-0.8780 | 310.30 | 265.65 | 250.60 | 243.25 | 235.75 | 229.50 |
| 15/16 | .9375 | .2969 | .2500 | 2 | 3/4 | 2 7/8 | 4 | 57530 | 57630 | 212.80 | 0.9091-0.9410 | 302.55 | 257.70 | 242.75 | 235.40 | 227.85 | 221.70 |
| 1 | 1.0000 | .3594 | .3125 | 2 | 3/4 | 2 7/8 | 4 | 57532 | 57632 | 212.80 | 0.9721-1.0030 | 302.55 | 257.70 | 242.75 | 235.40 | 227.85 | 221.70 |
| 1 1/16 | 1.0625 | .3594 | .3125 | 2 | 3/4 | 2 7/8 | 4 | 57534 | 57634 | 212.80 | 1.0031-1.0660 | 302.55 | 257.70 | 242.75 | 235.40 | 227.85 | 221.70 |
| 1 1/8 | 1.1250 | .3594 | .3125 | 2 | 3/4 | 2 7/8 | 4 | 57536 | 57636 | 212.80 | 1.0661-1.1280 | 302.55 | 257.70 | 242.75 | 235.40 | 227.85 | 221.70 |
| 1 3/16 | 1.1875 | .3594 | .3125 | 2 | 3/4 | 2 7/8 | 4 | 57538 | 57638 | 220.65 | 1.1281-1.1905 | 310.30 | 265.65 | 250.60 | 243.25 | 235.75 | 229.50 |
| 1 1/4 | 1.2500 | .3594 | .3125 | 2 | 3/4 | 2 7/8 | 4 | 57540 | 57640 | 220.65 | 1.1906-1.2530 | 310.30 | 265.65 | 250.60 | 243.25 | 235.75 | 229.50 |
| 1 5/16 | 1.3125 | .3594 | .3125 | 2 | 3/4 | 2 7/8 | 4 | 57542 | 57642 | 224.20 | 1.2531-1.3155 | 313.90 | 269.10 | 254.10 | 246.60 | 239.25 | 233.00 |
| 1 3/8 | 1.3750 | .3594 | .3125 | 2 | 3/4 | 2 7/8 | 4 | 57544 | 57644 | 247.10 | 1.3156-1.3780 | 336.70 | 292.05 | 277.00 | 269.60 | 262.15 | 255.95 |
| 1 7/16 | 1.4375 | .3594 | .3125 | 2 | 1/2 | 2 7/8 | 4 | 57546 | 57646 | 269.90 | 1.3781-1.4405 | 359.55 | 314.75 | 299.75 | 292.30 | 284.80 | 278.45 |
| 1 1/2 | 1.5000 | .3594 | .3125 | 2 | 1/2 | 2 7/8 | 4 | 57548 | 57648 | 292.45 | 1.4406-1.5030 | 382.25 | 337.35 | 322.50 | 315.05 | 307.60 | 301.30 |
| 1 5/8 | 1.5625 | .4844 | .4375 | 3 | 1/2 | 3 3/16 | 6 | 57550 | 57650 | 311.45 | 1.5031-1.5660 | 401.20 | 356.30 | 341.40 | 334.15 | 326.55 | 320.40 |
| 1 3/4 | 1.6250 | .4844 | .4375 | 3 | 1/2 | 3 3/16 | 6 | 57552 | 57652 | 349.65 | 1.5661-1.6280 | 439.15 | 394.40 | 379.45 | 372.05 | 364.40 | 358.30 |
| 1 15/16 | 1.6875 | .4844 | .4375 | 3 | 1/2 | 3 3/16 | 6 | 57554 | 57654 | 379.75 | 1.6281-1.6910 | 469.45 | 424.65 | 409.70 | 402.35 | 394.85 | 388.60 |
| 1 3/4 | 1.7500 | .4844 | .4375 | 3 | 1/2 | 3 3/16 | 6 | 57556 | 57656 | 410.20 | 1.6911-1.7530 | 499.80 | 455.10 | 440.15 | 432.75 | 425.15 | 419.05 |
| 1 13/16 | 1.8125 | .4844 | .4375 | 3 | 1/2 | 3 3/16 | 6 | 57558 | 57658 | 433.15 | 1.7531-1.8160 | 522.85 | 478.10 | 462.95 | 455.70 | 448.20 | 442.00 |
| 1 7/8 | 1.8750 | .4844 | .4375 | 3 | 1/2 | 3 3/16 | 6 | 57560 | 57660 | 455.80 | 1.8161-1.8780 | 545.45 | 500.60 | 485.65 | 478.20 | 470.65 | 464.45 |
| 1 15/16 | 1.9375 | .4844 | .4375 | 3 | 1/2 | 3 3/16 | 6 | 57562 | 57662 | 478.80 | 1.8781-1.9410 | 568.45 | 523.55 | 508.70 | 501.25 | 493.80 | 487.45 |
| 2 | 2.0000 | .5625 | .5000 | 4 | 1/2 | 3 3/4 | 6 | 57564 | 57664 | 501.30 | 1.9411-2.0030 | 590.90 | 546.30 | 531.25 | 523.90 | 516.40 | 510.10 |
| 2 1/8 | 2.1250 | .5625 | .5000 | 4 | 1/2 | 3 3/4 | 6 | 57568 | 57668 | 516.55 | 2.0661-2.1280 | 606.25 | 561.40 | 546.40 | 539.05 | 531.60 | 525.35 |
| 2 1/4 | 2.2500 | .5625 | .5000 | 4 | 1/2 | 3 3/4 | 6 | 57572 | 57672 | 531.55 | 2.1906-2.2530 | 621.15 | 576.40 | 561.35 | 554.00 | 546.40 | 540.25 |
| 2 3/8 | 2.3750 | .5625 | .5000 | 4 | 1/2 | 3 3/4 | 6 | 57576 | 57676 | 571.60 | 2.3156-2.3780 | 664.50 | 618.00 | 602.60 | 594.90 | 587.15 | 580.75 |
| 2 1/2 | 2.5000 | .5625 | .5000 | 4 | 1/2 | 3 3/4 | 6 | 57580 | 57680 | 591.45 | 2.4406-2.5030 | 684.60 | 638.05 | 622.55 | 614.90 | 607.10 | 600.60 |
| 2 3/4 | 2.7500 | .5625 | .5000 | 4 | 1/2 | 3 3/4 | 6 | 57588 | 57688 | 622.90 | 2.6911-2.7530 | 715.90 | 669.35 | 653.80 | 646.20 | 638.45 | 632.00 |
| 3 | 3.0000 | .5625 | .5000 | 4 | 1/2 | 3 3/4 | 6 | 57596 | 57696 | 654.35 | 2.9411-3.0030 | 747.25 | 700.90 | 685.30 | 677.60 | 669.80 | 663.45 |

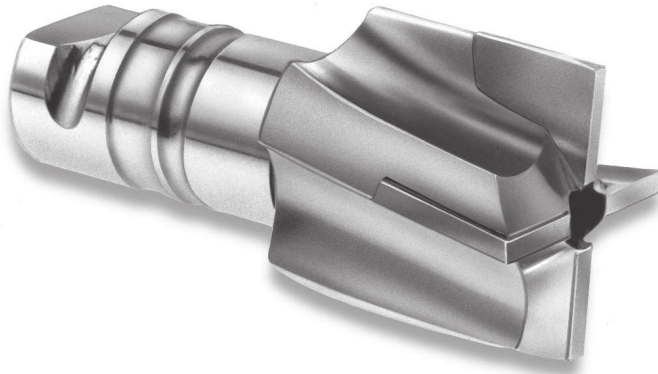
*Quantities of 15 or more - price of fractional size in same size range.



COUNTERBORES CARBIDE TIPPED TYPES 573 & 574 FRACTIONAL



**PIN DRIVE - TWO TYPES:
FOR NON-FERROUS & CAST IRONS OR
FOR STEELS**



| TOOL SELECTOR | CHIP CLASS | MATERIAL MACHINED | TOOL TYPE |
|---------------|------------|---------------------------|-----------|
| | 20 | NON-FERROUS - LONG CHIPS | 573 |
| | 40 | NON-FERROUS - SHORT CHIPS | 573 |
| | 60 | CAST IRONS | 573 |
| | 80 | LOW STRENGTH STEELS | 574 |
| | 100 | MEDIUM STRENGTH STEELS | 574 |
| | 120 | HIGH STRENGTH STEELS | 574 |
| | 140 | HIGH TEMPERATURE ALLOYS | 573 |

MODIFICATIONS (Prompt delivery)

- Modified tool diameter - priced below
- Metric tool diameter
- Cutting diameter reduced for step
- Coatings available:

| |
|------------------------------|
| TITANIUM NITRIDE - TiN |
| TITANIUM CARBONITRIDE - TiCN |
| ZIRCONIUM NITRIDE - ZrN |
| AL TITANIUM NITRIDE - AlTiN |

**PIN DRIVE:
TYPE 573 - FOR NON-FERROUS MATERIALS AND CAST IRONS
TYPE 574 - FOR STEELS**

- 10° right spiral flutes
- Body length = 1 3/8"
- Tool diameter tolerance: plus .001", minus .000"
- Counterbore's set screw design accepts short shank pilots (see page 118)
- Tool geometry and carbide grade appropriate for material being machined

USE:

- Pin drive shank may also be used in straight shank holder or collet

| TOOL DIAMETER | | DIMENSIONS | | | | | | | TYPE 573 N-F/CI EDP NO. | TYPE 574 STEEL EDP NO. | BOTH TYPES PRICE | FINISHED TO MODIFIED TOOL DIAMETER | | | | | | |
|---------------|---------|----------------|------------------|---------------|-------------|---------|----------|-------------|-------------------------|------------------------|------------------|------------------------------------|--|----------|----------|----------|----------|----------|
| FRACTIONAL | DECIMAL | MIN. CUT DIAM. | PILOT HOLE DIAM. | PIN DRIVE NO. | SHANK DIAM. | LENGTH | | NO. OF FLTS | | | | MODIFIED DIAMETER RANGE | PRICE EACH - BASED ON QUANTITY ORDERED | | | | | |
| | | | | | | CARBIDE | OVER-ALL | | | | | 1 | 2 | 3 | 4 | 5-7 | 8-14* | |
| 1/2 | .5000 | .2188 | .1875 | 1 | 3/16 | 3/4 | 2 7/8 | 3 | 57316 | 57416 | \$202.60 | 0.4721-.05030 | \$300.10 | \$251.35 | \$234.95 | \$227.00 | \$218.80 | \$212.00 |
| 5/16 | .5625 | .2188 | .1875 | 1 | 3/16 | 3/4 | 2 7/8 | 3 | 57318 | 57418 | 202.60 | 0.5341-.05660 | 300.10 | 251.35 | 234.95 | 227.00 | 218.80 | 212.00 |
| 3/8 | .6250 | .2188 | .1875 | 1 | 3/16 | 3/4 | 2 7/8 | 3 | 57320 | 57420 | 202.60 | 0.5971-.06280 | 300.10 | 251.35 | 234.95 | 227.00 | 218.80 | 212.00 |
| 1/4 | .6875 | .2969 | .2500 | 1 | 3/16 | 3/4 | 2 7/8 | 3 | 57322 | 57422 | 190.30 | 0.6591-.06910 | 287.80 | 239.05 | 222.85 | 214.90 | 206.70 | 199.85 |
| 3/4 | .7500 | .2969 | .2500 | 1 | 3/16 | 3/4 | 2 7/8 | 3 | 57324 | 57424 | 190.30 | 0.7221-.07530 | 287.80 | 239.05 | 222.85 | 214.90 | 206.70 | 199.85 |
| 13/16 | .8125 | .2969 | .2500 | 1 | 3/16 | 3/4 | 2 7/8 | 4 | 57326 | 57426 | 190.30 | 0.7841-.08160 | 287.80 | 239.05 | 222.85 | 214.90 | 206.70 | 199.85 |
| 7/8 | .8750 | .2969 | .2500 | 1 | 3/16 | 3/4 | 2 7/8 | 4 | 57328 | 57428 | 190.30 | 0.8471-.08780 | 287.80 | 239.05 | 222.85 | 214.90 | 206.70 | 199.85 |
| 15/16 | .9375 | .2969 | .2500 | 1 | 3/16 | 3/4 | 2 7/8 | 4 | 57330 | 57430 | 194.60 | 0.9091-.09410 | 292.15 | 243.45 | 227.15 | 219.20 | 210.90 | 204.15 |
| 1 | 1.0000 | .2969 | .2500 | 1 | 3/16 | 3/4 | 2 7/8 | 4 | 57332 | 57432 | 198.25 | 0.9721-.10030 | 295.70 | 247.05 | 230.60 | 222.60 | 214.45 | 207.70 |
| 1 1/16 | 1.0625 | .2969 | .2500 | 1 | 3/16 | 3/4 | 2 7/8 | 4 | 57334 | 57434 | 219.20 | 1.0031-.10660 | 316.55 | 267.95 | 251.70 | 243.65 | 235.40 | 228.70 |
| 1 1/8 | 1.1250 | .3594 | .3125 | 2 | 7/8 | 3/4 | 3 | 4 | 57335 | 57435 | 231.60 | 1.0031-.10660 | 329.00 | 280.25 | 263.95 | 255.95 | 247.75 | 241.05 |
| 1 1/4 | 1.1250 | .2969 | .2500 | 1 | 3/16 | 3/4 | 2 7/8 | 4 | 57336 | 57436 | 219.20 | 1.0661-.11280 | 316.55 | 267.95 | 251.70 | 243.65 | 235.40 | 228.70 |
| 1 1/8 | 1.1250 | .3594 | .3125 | 2 | 7/8 | 3/4 | 3 | 4 | 57337 | 57437 | 231.60 | 1.0661-.11280 | 329.00 | 280.25 | 263.95 | 255.95 | 247.75 | 241.05 |
| 1 3/16 | 1.1875 | .3594 | .3125 | 2 | 7/8 | 3/4 | 3 | 4 | 57338 | 57438 | 240.00 | 1.1281-.11905 | 337.60 | 288.85 | 272.55 | 264.45 | 256.35 | 249.65 |
| 1 1/4 | 1.2500 | .3594 | .3125 | 2 | 7/8 | 3/4 | 3 | 4 | 57340 | 57440 | 240.00 | 1.1906-.12530 | 337.60 | 288.85 | 272.55 | 264.45 | 256.35 | 249.65 |
| 1 5/16 | 1.3125 | .3594 | .3125 | 2 | 7/8 | 3/4 | 3 | 4 | 57342 | 57442 | 243.80 | 1.2531-.13155 | 341.35 | 292.65 | 276.25 | 268.20 | 260.10 | 253.40 |
| 1 3/8 | 1.3750 | .3594 | .3125 | 2 | 7/8 | 3/4 | 3 | 4 | 57344 | 57444 | 243.80 | 1.3156-.13780 | 341.35 | 292.65 | 276.25 | 268.20 | 260.10 | 253.40 |
| 1 7/16 | 1.4375 | .3594 | .3125 | 2 | 7/8 | 1/2 | 3 | 4 | 57346 | 57446 | 256.10 | 1.3781-.14405 | 353.50 | 304.90 | 288.55 | 280.55 | 272.35 | 265.60 |
| 1 1/2 | 1.5000 | .3594 | .3125 | 2 | 7/8 | 1/2 | 3 | 4 | 57348 | 57448 | 268.75 | 1.4406-.15030 | 366.05 | 317.45 | 301.20 | 293.15 | 284.90 | 278.20 |
| 1 5/8 | 1.5625 | .3594 | .3125 | 2 | 7/8 | 1/2 | 3 | 4 | 57350 | 57450 | 288.95 | 1.5031-.15660 | 386.45 | 337.70 | 321.50 | 313.35 | 305.30 | 298.50 |
| 1 3/4 | 1.6250 | .3594 | .3125 | 2 | 7/8 | 1/2 | 3 | 4 | 57352 | 57452 | 301.50 | 1.5661-.16280 | 399.00 | 350.35 | 334.10 | 326.05 | 317.95 | 311.15 |
| 1 11/16 | 1.6875 | .3594 | .3125 | 2 | 7/8 | 1/2 | 3 | 4 | 57354 | 57454 | 313.85 | 1.6281-.16910 | 411.45 | 362.60 | 346.40 | 338.35 | 330.20 | 323.45 |
| 1 3/4 | 1.7500 | .3594 | .3125 | 2 | 7/8 | 1/2 | 3 | 4 | 57356 | 57456 | 330.60 | 1.6911-.17530 | 427.95 | 379.25 | 363.05 | 354.95 | 346.90 | 340.15 |
| 1 3/4 | 1.7500 | .4844 | .4375 | 3 | 1 1/4 | 1/2 | 3 1/16 | 6 | 57357 | 57457 | 376.25 | 1.6911-.17530 | 473.85 | 425.10 | 408.75 | 400.70 | 392.65 | 385.90 |
| 1 7/8 | 1.8750 | .4844 | .4375 | 3 | 1 1/4 | 1/2 | 3 1/16 | 6 | 57360 | 57460 | 376.25 | 1.8161-.18780 | 473.85 | 425.10 | 408.75 | 400.70 | 392.65 | 385.90 |
| 2 | 2.0000 | .4844 | .4375 | 3 | 1 1/4 | 1/2 | 3 1/16 | 6 | 57364 | 57464 | 425.90 | 1.9411-.20030 | 523.30 | 474.70 | 458.35 | 450.45 | 442.10 | 435.35 |
| 2 1/8 | 2.1250 | .4844 | .4375 | 3 | 1 1/4 | 1/2 | 3 1/16 | 6 | 57368 | 57468 | 437.80 | 2.0661-.21280 | 535.15 | 486.50 | 470.20 | 462.15 | 454.05 | 447.30 |
| 2 1/4 | 2.2500 | .4844 | .4375 | 3 | 1 1/4 | 1/2 | 3 1/16 | 6 | 57372 | 57472 | 454.40 | 2.1906-.22530 | 552.00 | 503.15 | 486.85 | 478.85 | 470.75 | 463.95 |
| 2 3/8 | 2.3750 | .4844 | .4375 | 3 | 1 1/4 | 1/2 | 3 1/16 | 6 | 57376 | 57476 | 509.85 | 2.3156-.23780 | 611.10 | 560.40 | 543.65 | 535.25 | 526.80 | 519.80 |
| 2 1/2 | 2.5000 | .5625 | .5000 | 3 | 1 1/4 | 1/2 | 3 1/16 | 6 | 57380 | 57480 | 548.25 | 2.4406-.25030 | 649.60 | 599.00 | 581.95 | 573.75 | 565.30 | 558.30 |
| 2 3/4 | 2.7500 | .5625 | .5000 | 3 | 1 1/4 | 1/2 | 3 1/16 | 6 | 57388 | 57488 | 608.70 | 2.6911-.27530 | 709.90 | 659.30 | 642.35 | 634.00 | 625.55 | 618.60 |
| 3 | 3.0000 | .5625 | .5000 | 3 | 1 1/4 | 1/2 | 3 1/16 | 6 | 57396 | 57496 | 643.05 | 2.9411-.30030 | 744.35 | 693.75 | 676.85 | 668.50 | 660.10 | 653.05 |

*Quantities of 15 or more - price of fractional size in same size range.

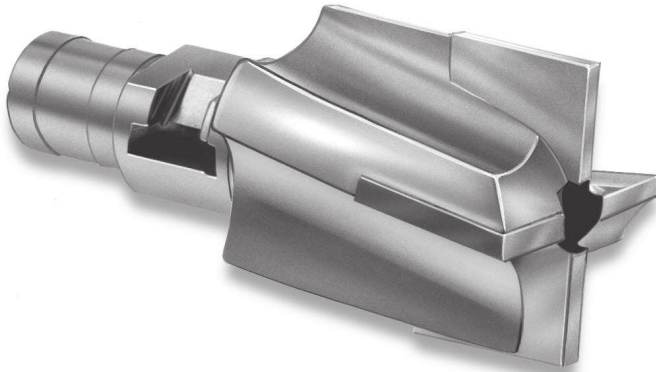
C'BORES



COUNTERBORES CARBIDE TIPPED TYPES 577 & 578 FRACTIONAL



**RADIAL DRIVE - TWO TYPES:
FOR NON-FERROUS & CAST IRONS OR
FOR STEELS**



| TOOL SELECTOR | CHIP CLASS | MATERIAL MACHINED | TOOL TYPE |
|---------------|------------|---------------------------|-----------|
| | 20 | NON-FERROUS - LONG CHIPS | 577 |
| | 40 | NON-FERROUS - SHORT CHIPS | 577 |
| | 60 | CAST IRONS | 577 |
| | 80 | LOW STRENGTH STEELS | 578 |
| | 100 | MEDIUM STRENGTH STEELS | 578 |
| | 120 | HIGH STRENGTH STEELS | 578 |
| | 140 | HIGH TEMPERATURE ALLOYS | 577 |

MODIFICATIONS (Prompt delivery)

- Modified tool diameter - priced below
- Metric tool diameter
- Cutting diameter reduced for step
- Corner chamfer or corner radius
- Coatings available:

TITANIUM NITRIDE - TiN

TITANIUM CARBONITRIDE - TiCN

ZIRCONIUM NITRIDE - ZrN

AL TITANIUM NITRIDE - AlTiN

**RADIAL DRIVE:
TYPE 577 - FOR NON-FERROUS MATERIALS AND CAST IRONS
TYPE 578 - FOR STEELS**

- 10° right spiral flutes
- Body length = 1 1/2"
- Tool diameter tolerance: plus .001", minus .000"
- Counterbore's set screw design accepts short shank pilots (see page 118)
- Tool geometry and carbide grade appropriate for material being machined

C'BORES

| TOOL DIAMETER | | DIMENSIONS | | | | | | | TYPE 577 N-F/CI EDP NO. | TYPE 578 STEEL EDP NO. | BOTH TYPES PRICE | FINISHED TO MODIFIED TOOL DIAMETER | | | | | | |
|---------------|---------|----------------|------------------|-------------------|-------------------|---------|----------|-------------|-------------------------|------------------------|------------------|------------------------------------|--|----------|----------|----------|----------|----------|
| FRACTIONAL | DECIMAL | MIN. CUT DIAM. | PILOT HOLE DIAM. | RADIAL DRIVE SIZE | LARGE SHANK DIAM. | CARBIDE | OVER-ALL | NO. OF FLTS | | | | MODIFIED DIAMETER RANGE | PRICE EACH - BASED ON QUANTITY ORDERED | | | | | |
| | | | | | | | | | | | 1 | 2 | 3 | 4 | 5-7 | 8-14* | | |
| 1/2 | .5000 | .2188 | .1875 | RB | 5/8 | 3/4 | 2 7/8 | 3 | 57716 | 57816 | \$210.90 | 0.4721-0.5030 | \$308.35 | \$259.80 | \$243.45 | \$235.40 | \$227.25 | \$220.55 |
| 9/16 | .5625 | .2188 | .1875 | RB | 5/8 | 3/4 | 2 7/8 | 3 | 57718 | 57818 | 210.90 | 0.5341-0.5660 | 308.35 | 259.80 | 243.45 | 235.40 | 227.25 | 220.55 |
| 5/8 | .6250 | .2188 | .1875 | RB | 5/8 | 3/4 | 2 7/8 | 3 | 57720 | 57820 | 210.90 | 0.5971-0.6280 | 308.35 | 259.80 | 243.45 | 235.40 | 227.25 | 220.55 |
| 11/16 | .6875 | .2969 | .2500 | RB | 5/8 | 3/4 | 2 7/8 | 3 | 57722 | 57822 | 210.90 | 0.6591-0.6910 | 308.35 | 259.80 | 243.45 | 235.40 | 227.25 | 220.55 |
| 3/4 | .7500 | .2969 | .2500 | RB | 5/8 | 3/4 | 2 7/8 | 4 | 57724 | 57824 | 210.90 | 0.7221-0.7530 | 308.35 | 259.80 | 243.45 | 235.40 | 227.25 | 220.55 |
| 13/16 | .8125 | .2969 | .2500 | RB | 5/8 | 3/4 | 2 7/8 | 4 | 57726 | 57826 | 214.95 | 0.7841-0.8160 | 312.40 | 263.75 | 247.35 | 239.50 | 231.30 | 224.50 |
| 7/8 | .8750 | .2969 | .2500 | RB | 5/8 | 3/4 | 2 7/8 | 4 | 57728 | 57828 | 214.95 | 0.8471-0.8780 | 312.40 | 263.75 | 247.35 | 239.50 | 231.30 | 224.50 |
| 15/16 | .9375 | .2969 | .2500 | RB | 5/8 | 3/4 | 2 7/8 | 4 | 57730 | 57830 | 227.55 | 0.9091-0.9410 | 325.00 | 276.25 | 259.95 | 251.90 | 243.80 | 237.10 |
| 1 | 1.0000 | .2969 | .2500 | RB | 5/8 | 3/4 | 2 7/8 | 4 | 57732 | 57832 | 227.55 | 0.9721-1.0030 | 325.00 | 276.25 | 259.95 | 251.90 | 243.80 | 237.10 |
| 1 | 1.0000 | .3594 | .3125 | RC | 3/4 | 3/4 | 2 7/8 | 4 | 57733 | 57833 | 231.60 | 0.9721-1.0030 | 329.00 | 280.25 | 263.95 | 255.95 | 247.75 | 241.05 |
| 1 1/16 | 1.0625 | .3594 | .3125 | RC | 3/4 | 3/4 | 2 7/8 | 4 | 57734 | 57834 | 231.60 | 1.0031-1.0660 | 329.00 | 280.25 | 263.95 | 255.95 | 247.75 | 241.05 |
| 1 1/8 | 1.1250 | .3594 | .3125 | RC | 3/4 | 3/4 | 2 7/8 | 4 | 57736 | 57836 | 231.60 | 1.0661-1.1280 | 329.00 | 280.25 | 263.95 | 255.95 | 247.75 | 241.05 |
| 1 1/16 | 1.1875 | .3594 | .3125 | RC | 3/4 | 3/4 | 2 7/8 | 4 | 57738 | 57838 | 247.75 | 1.1281-1.1905 | 345.20 | 296.45 | 280.25 | 272.20 | 264.10 | 257.40 |
| 1 1/4 | 1.2500 | .3594 | .3125 | RC | 3/4 | 3/4 | 2 7/8 | 4 | 57740 | 57840 | 247.75 | 1.1906-1.2530 | 345.20 | 296.45 | 280.25 | 272.20 | 264.10 | 257.40 |
| 1 5/16 | 1.3125 | .3594 | .3125 | RC | 3/4 | 3/4 | 2 7/8 | 4 | 57742 | 57842 | 247.75 | 1.2531-1.3155 | 345.20 | 296.45 | 280.25 | 272.20 | 264.10 | 257.40 |
| 1 3/8 | 1.3750 | .3594 | .3125 | RC | 3/4 | 3/4 | 2 7/8 | 4 | 57744 | 57844 | 247.75 | 1.3156-1.3780 | 345.20 | 296.45 | 280.25 | 272.20 | 264.10 | 257.40 |
| 1 3/8 | 1.3750 | .3594 | .3125 | RE | 1 | 3/4 | 3 | 4 | 57745 | 57845 | 268.75 | 1.3151-1.3780 | 366.05 | 317.45 | 301.20 | 293.15 | 284.90 | 278.20 |
| 1 1/2 | 1.5000 | .3594 | .3125 | RE | 1 | 1/2 | 3 | 4 | 57748 | 57848 | 301.50 | 1.4406-1.5030 | 399.00 | 350.35 | 334.10 | 326.05 | 317.95 | 311.15 |
| 1 1/2 | 1.5000 | .4844 | .4375 | RF | 1 1/8 | 1/2 | 3 1/16 | 4 | 57749 | 57849 | 313.85 | 1.4406-1.5030 | 411.45 | 362.60 | 346.40 | 338.35 | 330.20 | 323.45 |
| 1 5/8 | 1.6250 | .3594 | .3125 | RE | 1 | 1/2 | 3 | 4 | 57752 | 57852 | 313.85 | 1.5661-1.6280 | 411.45 | 362.60 | 346.40 | 338.35 | 330.20 | 323.45 |
| 1 5/8 | 1.6250 | .4844 | .4375 | RF | 1 1/8 | 1/2 | 3 1/16 | 4 | 57753 | 57853 | 322.35 | 1.5661-1.6280 | 419.80 | 371.15 | 354.90 | 346.90 | 338.80 | 332.00 |
| 1 3/4 | 1.7500 | .4844 | .4375 | RF | 1 1/8 | 1/2 | 3 1/16 | 6 | 57756 | 57856 | 396.35 | 1.6911-1.7530 | 493.80 | 445.05 | 428.85 | 420.80 | 412.70 | 405.95 |
| 1 7/8 | 1.8750 | .4844 | .4375 | RF | 1 1/8 | 1/2 | 3 1/16 | 6 | 57760 | 57860 | 417.20 | 1.8161-1.8780 | 514.65 | 466.00 | 449.75 | 441.65 | 433.45 | 426.70 |
| 2 | 2.0000 | .4844 | .4375 | RF | 1 1/8 | 1/2 | 3 1/16 | 6 | 57764 | 57864 | 454.40 | 1.9411-2.0030 | 552.00 | 503.15 | 486.85 | 478.85 | 470.75 | 463.95 |
| 2 | 2.0000 | .5625 | .5000 | RJ | 1 3/8 | 1/2 | 3 1/16 | 6 | 57765 | 57865 | 454.40 | 1.9411-2.0030 | 552.00 | 503.15 | 486.85 | 478.85 | 470.75 | 463.95 |
| 2 1/8 | 2.1250 | .5625 | .5000 | RJ | 1 3/8 | 1/2 | 3 1/16 | 6 | 57768 | 57868 | 466.70 | 2.0661-2.1280 | 564.20 | 515.65 | 499.30 | 491.35 | 483.15 | 476.40 |
| 2 1/4 | 2.2500 | .5625 | .5000 | RJ | 1 3/8 | 1/2 | 3 1/16 | 6 | 57772 | 57872 | 487.20 | 2.1906-2.2530 | 584.70 | 536.00 | 519.75 | 511.70 | 503.55 | 496.85 |
| 2 3/8 | 2.3750 | .5625 | .5000 | RJ | 1 3/8 | 1/2 | 3 1/16 | 6 | 57776 | 57876 | 514.25 | 2.3156-2.3780 | 615.45 | 564.85 | 547.95 | 539.80 | 531.10 | 524.00 |
| 2 1/2 | 2.5000 | .5625 | .5000 | RJ | 1 3/8 | 1/2 | 3 1/16 | 6 | 57780 | 57880 | 535.95 | 2.4406-2.5030 | 637.20 | 586.60 | 569.65 | 561.35 | 553.00 | 545.85 |
| 2 5/8 | 2.6250 | .5625 | .5000 | RJ | 1 3/8 | 1/2 | 3 1/16 | 6 | 57784 | 57884 | 548.25 | 2.5661-2.6280 | 649.60 | 599.00 | 581.95 | 573.75 | 565.30 | 558.30 |
| 2 3/4 | 2.7500 | .5625 | .5000 | RS | 1 3/4 | 1/2 | 3 1/8 | 6 | 57788 | 57888 | 557.15 | 2.6911-2.7530 | 658.20 | 607.80 | 590.85 | 582.50 | 574.15 | 567.10 |
| 2 7/8 | 2.8750 | .5625 | .5000 | RS | 1 3/4 | 1/2 | 3 1/8 | 6 | 57792 | 57892 | 587.20 | 2.8161-2.8780 | 688.45 | 637.85 | 620.95 | 612.55 | 604.10 | 597.10 |
| 3 | 3.0000 | .5625 | .5000 | RS | 1 3/4 | 1/2 | 3 1/8 | 6 | 57796 | 57896 | 630.05 | 2.9411-3.0030 | 731.15 | 680.60 | 663.75 | 655.40 | 647.00 | 639.95 |

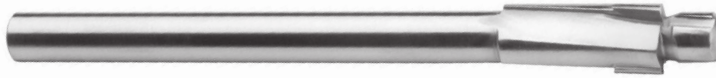
*Quantities of 15 or more - price of fractional size in same size range.



CAPSCREW COUNTERBORES CARBIDE TIPPED TYPES 513 & 515 FRACTIONAL & METRIC



STRAIGHT SHANK FOR NON-FERROUS, CAST IRON AND STEEL



TYPE 513 - STRAIGHT SHANK - FOR NON-FERROUS AND CAST IRONS

TYPE 515 - STRAIGHT SHANK - FOR STEELS

- Right spiral smooth flutes
- Carbide tips brazed to tough hardened alloy steel bodies
- Integral pilot types
- Tools are designed with appropriate carbide grade and tool geometry for material being machined. The pilot is manufactured in nominal screw body diameters as well as 1/64" and 1/32" over size diameters

USE:

- To form a recess for a capscREW head

| TOOL SELECTOR | CHIP CLASS | MATERIAL MACHINED | TOOL TYPE |
|---------------|------------|---------------------------|-----------|
| | 20 | NON-FERROUS - LONG CHIPS | 513 |
| | 40 | NON-FERROUS - SHORT CHIPS | 513 |
| | 60 | CAST IRONS | 513 |
| | 80 | LOW STRENGTH STEELS | 515 |
| | 100 | MEDIUM STRENGTH STEELS | 515 |
| | 120 | HIGH STRENGTH STEELS | 515 |
| | 140 | HIGH TEMPERATURE ALLOYS | 513 |

MODIFICATIONS (Prompt delivery)

- Modified tool diameter
- Corner radius or corner chamfer
- Flat(s) or tang on shank
- Shortened shank or reduced shank diameter
- Coatings available (see pg 116)

| TOOL DIAMETER | | PILOT DIAMETER | PILOT LENGTH | SHANK DIAMETER | OVERALL LENGTH | NO. OF FLUTES | TYPE 513 | | TYPE 515 | |
|---------------|------------|----------------|--------------|----------------|----------------|---------------|---------------------|------------|---------------|------------|
| DECIMAL | SCREW SIZE | | | | | | NON-FERR/CI EDP NO. | PRICE EACH | STEEL EDP NO. | PRICE EACH |
| .3820 | 1/4 | .2500 | .3125 | 5/16 | 5 5/8 | 3 | 5132500 | \$106.25 | 5152500 | \$116.85 |
| .3980 | 1/4 | .2650 | .3125 | 5/16 | 5 5/8 | 3 | 5132650 | 118.05 | 5152650 | 129.90 |
| .4140 | 1/4 | .2810 | .3125 | 5/16 | 5 5/8 | 3 | 5132810 | 118.05 | 5152810 | 129.90 |
| .4750 | 5/16 | .3125 | .3750 | 3/8 | 6 1/8 | 3 | 5133125 | 118.80 | 5153125 | 130.80 |
| .4910 | 5/16 | .3280 | .3750 | 3/8 | 6 1/8 | 3 | 5133280 | 118.80 | 5153280 | 130.80 |
| .5070 | 5/16 | .3430 | .3750 | 3/8 | 6 1/8 | 3 | 5133430 | 118.80 | 5153430 | 130.80 |
| .5720 | 3/8 | .3750 | .5000 | 1/2 | 6 1/2 | 3 | 5133750 | 133.95 | 5153750 | 147.40 |
| .5880 | 3/8 | .3900 | .5000 | 1/2 | 6 1/2 | 3 | 5133900 | 133.95 | 5153900 | 147.40 |
| .6040 | 3/8 | .4060 | .5000 | 1/2 | 6 1/2 | 3 | 5134060 | 133.95 | 5154060 | 147.40 |
| .6630 | 7/16 | .4375 | .5000 | 1/2 | 7 | 3 | 5134375 | 129.45 | 5154375 | 142.40 |
| .6790 | 7/16 | .4530 | .5000 | 1/2 | 7 | 3 | 5134530 | 129.45 | 5154530 | 142.40 |
| .6950 | 7/16 | .4680 | .5000 | 1/2 | 7 | 3 | 5134680 | 129.45 | 5154680 | 142.40 |
| .7570 | 1/2 | .5000 | .5000 | 1/2 | 7 1/2 | 3 | 5135000 | 146.80 | 5155000 | 161.55 |
| .7730 | 1/2 | .5150 | .5000 | 1/2 | 7 1/2 | 3 | 5135150 | 146.80 | 5155150 | 161.55 |
| .7890 | 1/2 | .5310 | .5000 | 1/2 | 7 1/2 | 3 | 5135310 | 146.80 | 5155310 | 161.55 |
| .8510 | 9/16 | .5625 | .5625 | 5/8 | 7 5/8 | 3 | 5135625 | 141.85 | 5155625 | 156.10 |
| .8670 | 9/16 | .5780 | .5625 | 5/8 | 7 5/8 | 3 | 5135780 | 141.85 | 5155780 | 156.10 |
| .8830 | 9/16 | .5930 | .5625 | 5/8 | 7 5/8 | 3 | 5135930 | 141.85 | 5155930 | 156.10 |
| .9450 | 5/8 | .6250 | .6250 | 5/8 | 7 5/8 | 3 | 5136250 | 161.75 | 5156250 | 177.95 |
| .9610 | 5/8 | .6400 | .6250 | 5/8 | 7 5/8 | 3 | 5136400 | 161.75 | 5156400 | 177.95 |
| .9770 | 5/8 | .6560 | .6250 | 5/8 | 7 5/8 | 3 | 5136560 | 161.75 | 5156560 | 177.95 |
| 1.1330 | 3/4 | .7500 | .7500 | 3/4 | 7 3/4 | 3 | 5137500 | 159.45 | 5157500 | 175.35 |
| 1.1490 | 3/4 | .7650 | .7500 | 3/4 | 7 3/4 | 3 | 5137650 | 159.45 | 5157650 | 175.35 |
| 1.1650 | 3/4 | .7810 | .7500 | 3/4 | 7 3/4 | 3 | 5137810 | 159.45 | 5157810 | 175.35 |
| 1.3220 | 7/8 | .8750 | .8750 | 7/8 | 8 1/8 | 4 | 5138750 | 177.25 | 5158750 | 195.05 |
| 1.3380 | 7/8 | .8910 | .8750 | 7/8 | 8 1/8 | 4 | 5138910 | 177.25 | 5158910 | 195.05 |
| 1.3540 | 7/8 | .9060 | .8750 | 7/8 | 8 1/8 | 4 | 5139060 | 177.25 | 5159060 | 195.05 |
| 1.5100 | 1 | 1.0000 | 1.0000 | 1 | 8 1/2 | 4 | 5130000 | 202.95 | 5150000 | 223.25 |
| 1.5260 | 1 | 1.0150 | 1.0000 | 1 | 8 1/2 | 4 | 5130156 | 202.95 | 5150156 | 223.25 |
| 1.5420 | 1 | 1.0310 | 1.0000 | 1 | 8 1/2 | 4 | 5130313 | 202.95 | 5150313 | 223.25 |

TYPE 513 - STRAIGHT SHANK - FOR NON-FERROUS AND CAST IRONS - METRIC

TYPE 515 - STRAIGHT SHANK - FOR STEELS - METRIC

USE:

- Same as above except metric sizes.

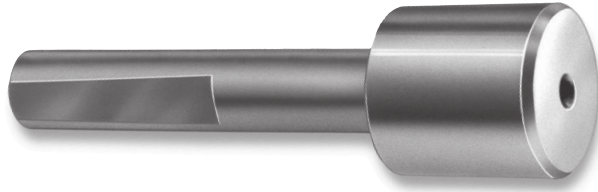
| TOOL DIAMETER | | PILOT DIAMETER mm | PILOT LENGTH | SHANK DIAMETER | OVERALL LENGTH | NO. OF FLUTES | TYPE 513 | | TYPE 515 | |
|---------------|---------------|-------------------|--------------|----------------|----------------|---------------|---------------------|------------|---------------|------------|
| DECIMAL | SCREW SIZE mm | | | | | | NON-FERR/CI EDP NO. | PRICE EACH | STEEL EDP NO. | PRICE EACH |
| .3543 | 5 | 5.5 | 9/32 | 5/16 | 5 5/8 | 3 | 513055 | \$117.70 | 515055 | \$129.45 |
| .4134 | 6 | 6.5 | 5/16 | 5/16 | 5 5/8 | 3 | 513065 | 124.25 | 515065 | 136.70 |
| .5315 | 8 | 8.5 | 3/8 | 1/2 | 6 1/2 | 3 | 513085 | 147.60 | 515085 | 162.30 |
| .6496 | 10 | 10.5 | 1/2 | 1/2 | 7 | 3 | 513105 | 160.55 | 515105 | 176.55 |
| .7283 | 12 | 12.5 | 1/2 | 1/2 | 7 1/2 | 3 | 513125 | 150.60 | 515125 | 165.55 |
| .8465 | 14 | 14.5 | 9/16 | 5/8 | 7 5/8 | 3 | 513145 | 175.65 | 515145 | 193.05 |
| .9646 | 16 | 16.5 | 5/8 | 5/8 | 7 5/8 | 3 | 513165 | 183.45 | 515165 | 201.80 |
| 1.2008 | 20 | 20.5 | 3/4 | 7/8 | 8 | 3 | 513205 | 170.15 | 515205 | 187.15 |

C'BORES



INTERCHANGEABLE COUNTERBORE PILOTS TYPE 500 FRACTIONAL

SHORT SHANK PILOTS



| PILOT HEAD DIAMETER | TOLERANCE |
|-----------------------|--------------------------|
| 1/8" thru 1/4" | minus .001"; minus .002" |
| over 1/4" thru 7/8" | minus .003"; minus .004" |
| over 7/8" thru 1 1/4" | minus .005"; minus .006" |
| over 1 1/4" | minus .006"; minus .007" |

MODIFICATIONS (prompt delivery)

- Modified pilot head diameter - priced below (ground down from finished pilot)
- Corner radius

TYPE 500

- Shank diameter tolerance: plus .0000", minus .0005"
- Shank diameter ordered must be the same as pilot hole diameter in the counterbore to be used
- Pilot head diameter must be larger than the counterbore's minimum cut diameter

| PILOT HEAD DIAMETER | | SHANK DIAMETER | | | | | | | | | ALL TYPES PRICE | FINISHED TO MODIFIED PILOT HEAD DIAMETER | | | | | |
|---------------------|---------|----------------|---------|---------|---------|---------|---------|---------|---------|---------|-----------------|--|---------|---------|---------|---------|---------|
| | | 3/32 | 1/8 | 5/32 | 3/16 | 1/4 | 5/16 | 3/8 | 7/16 | 1/2 | | PRICE EACH - BASED ON QUANTITY ORDERED | | | | | |
| FRACTIONAL | DECIMAL | EDP NO. | EDP NO. | EDP NO. | EDP NO. | EDP NO. | EDP NO. | EDP NO. | EDP NO. | EDP NO. | | 1 | 2 | 3 | 4 | 5-7 | OVER 7 |
| 1/8 | .1250 | 50104 | - | - | - | - | - | - | - | - | \$30.40 | \$120.85 | \$75.65 | \$60.60 | \$53.20 | \$45.50 | \$39.20 |
| 5/32 | .1562 | 50105 | 50205 | - | - | - | - | - | - | - | 24.70 | 115.05 | 69.95 | 54.85 | 47.20 | 39.80 | 33.50 |
| 3/16 | .1875 | 50106 | 50206 | 50306 | - | - | - | - | - | - | 25.20 | 115.50 | 70.40 | 55.35 | 47.85 | 40.20 | 33.95 |
| 7/32 | .2188 | 50107 | 50207 | 50307 | 50407 | - | - | - | - | - | 28.50 | 118.90 | 73.70 | 58.60 | 51.25 | 43.65 | 37.35 |
| 1/4 | .2500 | 50108 | 50208 | 50308 | 50408 | - | - | - | - | - | 28.50 | 118.90 | 73.70 | 58.60 | 51.25 | 43.65 | 37.35 |
| 9/32 | .2812 | 50109 | 50209 | 50309 | 50409 | 50509 | - | - | - | - | 30.40 | 120.85 | 75.65 | 60.60 | 53.20 | 45.50 | 39.20 |
| 5/16 | .3125 | 50110 | 50210 | 50310 | 50410 | 50510 | - | - | - | - | 30.40 | 120.85 | 75.65 | 60.60 | 53.20 | 45.50 | 39.20 |
| 11/32 | .3438 | 50111 | 50211 | 50311 | 50411 | 50511 | 50611 | - | - | - | 30.40 | 120.85 | 75.65 | 60.60 | 53.20 | 45.50 | 39.20 |
| 3/8 | .3750 | - | 50212 | 50312 | 50412 | 50512 | 50612 | - | - | - | 33.50 | 123.95 | 78.80 | 63.65 | 56.10 | 48.60 | 42.45 |
| 13/32 | .4062 | - | 50213 | 50313 | 50413 | 50513 | 50613 | - | - | - | 33.50 | 123.95 | 78.80 | 63.65 | 56.10 | 48.60 | 42.45 |
| 7/16 | .4375 | - | 50214 | 50314 | 50414 | 50514 | 50614 | 50714 | - | - | 34.35 | 124.65 | 79.50 | 64.50 | 56.95 | 49.45 | 43.15 |
| 15/32 | .4688 | - | 50215 | - | 50415 | 50515 | 50615 | - | - | - | 34.35 | 124.65 | 79.50 | 64.50 | 56.95 | 49.45 | 43.15 |
| 1/2 | .5000 | - | 50216 | - | 50416 | 50516 | 50616 | 50716 | 50816 | - | 39.20 | 129.75 | 84.50 | 69.35 | 62.15 | 54.40 | 48.20 |
| 17/32 | .5312 | - | 50217 | - | 50417 | 50517 | 50617 | - | 50817 | - | 45.75 | 136.15 | 91.05 | 76.05 | 68.50 | 60.90 | 54.70 |
| 9/16 | .5625 | - | 50218 | - | 50418 | 50518 | 50618 | 50718 | 50818 | 50918 | 51.35 | 141.85 | 96.65 | 81.50 | 74.25 | 66.60 | 60.35 |
| 19/32 | .5938 | - | 50219 | - | - | 50519 | 50619 | - | 50819 | 50919 | 56.50 | 146.85 | 101.65 | 86.55 | 79.00 | 71.45 | 65.30 |
| 5/8 | .6250 | - | 50220 | - | 50420 | 50520 | 50620 | 50720 | 50820 | 50920 | 56.50 | 146.85 | 101.65 | 86.55 | 79.00 | 71.45 | 65.30 |
| 21/32 | .6562 | - | - | - | 50421 | 50521 | 50621 | - | 50821 | - | 57.80 | 148.20 | 102.95 | 87.85 | 80.55 | 72.95 | 66.65 |
| 11/16 | .6875 | - | - | - | 50422 | 50522 | 50622 | 50722 | 50822 | 50922 | 57.80 | 148.20 | 102.95 | 87.85 | 80.55 | 72.95 | 66.65 |
| 23/32 | .7188 | - | - | - | - | 50523 | 50623 | - | 50823 | 50923 | 65.50 | 155.80 | 110.65 | 95.60 | 88.15 | 80.55 | 74.35 |
| 3/4 | .7500 | - | - | - | 50424 | 50524 | 50624 | 50724 | 50824 | 50924 | 65.50 | 155.80 | 110.65 | 95.60 | 88.15 | 80.55 | 74.35 |
| 25/32 | .7812 | - | - | - | - | 50525 | 50625 | - | 50825 | 50925 | 73.55 | 164.05 | 118.80 | 103.70 | 96.45 | 88.70 | 82.45 |
| 13/16 | .8125 | - | - | - | 50426 | 50526 | 50626 | 50726 | 50826 | 50926 | 73.55 | 164.05 | 118.80 | 103.70 | 96.45 | 88.70 | 82.45 |
| 27/32 | .8438 | - | - | - | - | 50527 | - | - | - | - | 81.40 | 171.80 | 126.65 | 111.60 | 103.95 | 96.50 | 90.25 |
| 7/8 | .8750 | - | - | - | 50428 | 50528 | 50628 | 50728 | 50828 | 50928 | 81.40 | 171.80 | 126.65 | 111.60 | 103.95 | 96.50 | 90.25 |
| 15/16 | .9375 | - | - | - | 50430 | 50530 | 50630 | 50730 | 50830 | 50930 | 85.90 | 176.25 | 131.05 | 116.00 | 108.55 | 100.90 | 94.75 |
| 1 | 1.0000 | - | - | - | 50432 | 50532 | 50632 | 50732 | 50832 | 50932 | 88.85 | 179.20 | 134.05 | 118.90 | 111.60 | 103.90 | 97.75 |
| 1 1/16 | 1.0625 | - | - | - | - | - | 50634 | 50734 | 50834 | 50934 | 92.10 | 182.50 | 137.20 | 122.15 | 114.60 | 107.20 | 100.90 |
| 1 1/8 | 1.1250 | - | - | - | - | - | 50636 | 50736 | 50836 | 50936 | 111.00 | 201.45 | 156.20 | 141.05 | 133.75 | 126.00 | 119.90 |
| 1 3/16 | 1.1875 | - | - | - | - | - | 50638 | 50738 | 50838 | 50938 | 114.45 | 204.70 | 159.50 | 144.50 | 137.10 | 129.45 | 123.25 |
| 1 1/4 | 1.2500 | - | - | - | - | - | 50640 | 50740 | 50840 | 50940 | 120.55 | 211.00 | 165.85 | 150.65 | 143.45 | 135.60 | 129.45 |
| 1 5/16 | 1.3125 | - | - | - | - | - | - | 50742 | 50842 | 50942 | 126.90 | 217.30 | 172.20 | 157.15 | 149.70 | 142.00 | 135.75 |
| 1 3/8 | 1.3750 | - | - | - | - | - | 50644 | 50744 | 50844 | 50944 | 138.55 | 229.20 | 183.95 | 168.90 | 161.35 | 153.80 | 147.60 |
| 1 7/16 | 1.4375 | - | - | - | - | - | - | 50746 | 50846 | 50946 | 140.30 | 230.70 | 185.45 | 170.35 | 163.00 | 155.25 | 149.15 |
| 1 1/2 | 1.5000 | - | - | - | - | - | - | - | 50848 | 50948 | 142.00 | 232.60 | 187.35 | 172.25 | 164.65 | 157.25 | 151.00 |
| 1 9/16 | 1.5625 | - | - | - | - | - | - | - | 50850 | 50950 | 143.70 | 234.40 | 189.20 | 174.10 | 166.55 | 159.00 | 152.75 |
| 1 5/8 | 1.6250 | - | - | - | - | - | - | - | - | 50952 | 145.30 | 235.65 | 190.55 | 175.35 | 167.95 | 160.30 | 154.30 |
| 1 11/16 | 1.6875 | - | - | - | - | - | - | - | - | 50954 | 147.30 | 237.55 | 192.40 | 177.25 | 169.90 | 162.15 | 156.10 |
| 1 3/4 | 1.7500 | - | - | - | - | - | - | - | 50856 | 50956 | 149.50 | 239.80 | 194.60 | 179.55 | 172.20 | 164.45 | 158.30 |
| 1 7/8 | 1.8750 | - | - | - | - | - | - | - | - | 50960 | 180.00 | 270.75 | 225.45 | 210.35 | 202.85 | 195.30 | 189.20 |
| 2 | 2.0000 | - | - | - | - | - | - | - | - | 50964 | 180.00 | 270.75 | 225.45 | 210.35 | 202.85 | 195.30 | 189.20 |

For larger pilot head diameters, contact us for price and availability.



MILLING CUTTERS INDEX AND COMPARISON CHART

| DESCRIPTION | HANNIBAL | | CLEVELAND | GAY-LEE | MORSE | NIAGARA | WHITNEY |
|--|---------------------|-----------------|-----------|---------|-------|---------|-------------|
| | PAGE | TOOL TYPE | | | | | |
| ARBOR HOLE TYPES | | | | | | | |
| SHELL END MILLS | | | | | | | |
| For Non-Ferrous | 134 | 530 | - | - | 5858 | 4920 | - |
| For Cast Irons | 134 | 531 | - | - | 5859 | 4900 | - |
| For Steels | 134 | 532 | - | - | 5860 | 4910 | - |
| SIDE MILLING CUTTERS | | | | | | | |
| Staggered Tooth For General Purpose | 122 | 547 | - | - | - | - | - |
| Straight Tooth For Non-Ferrous | 123 | 540 | - | - | 5861 | 1630 | - |
| Straight Tooth For Cast Irons | 123 | 541 | - | - | 5862 | 1590 | - |
| Straight Tooth For Steels | 123 | 542 | - | - | 5863 | 1550 | - |
| Straight Tooth For High Temp Alloys | 123 | 543 | - | - | 5849 | - | - |
| Single Angle Cutters – For Non-Ferrous & Cast Irons | | | | | | | |
| 45° Right | 134 | 714 | - | - | - | - | - |
| 45° Left | 134 | 716 | - | - | - | - | - |
| 60° Right | 134 | 724 | - | - | - | - | - |
| 60° Left | 134 | 726 | - | - | - | - | - |
| Double Angle Cutters – For Non-Ferrous & Cast Irons | | | | | | | |
| 45° Included | 134 | 750 | - | - | - | - | - |
| 60° Included | 134 | 752 | - | - | - | - | DAA XXX 60 |
| 90° Included | 134 | 754 | - | - | - | - | DAA XXX 90 |
| SLITTING SAWS – COARSE TOOTH | | | | | | | |
| For Non-Ferrous | 124 | 550 | - | CNF | 5846 | 4690 | - |
| For Cast Irons | 124 | 552 | - | CCI | 5847 | 4240 | - |
| For Steels | 124 | 554 | - | CST | 5848 | 4220 | - |
| For High Temp Alloys | 124 | 558 | - | GSS | 5850 | 4260 | - |
| SLITTING SAWS – STANDARD TOOTH | | | | | | | |
| For Non-Ferrous | 125 | 551 | 1361 | GPP | - | - | - |
| For Cast Irons | 125 | 553 | 1361 | GPP | - | - | - |
| For Steels | 125, 126-129 | 556 | 1360 | STL | - | - | - |
| For High Temp Alloys | 125, 130-133 | 559 | - | GSS | - | - | - |
| SHANK TYPES | | | | | | | |
| CHAMFER MILLING CUTTERS | | | | | | | |
| 45° for Non-Ferrous & Cast Irons/Steels | 143 | 730/731 | - | - | - | - | CH XXXX 45C |
| 60° for Non-Ferrous & Cast Irons/Steels | 143 | 732/733 | - | - | - | - | CH XXXX 60C |
| CORNER ROUNDING END MILLS | | | | | | | |
| For Non-Ferrous & Cast Irons/Steels | 142 | 740/741 | - | - | - | - | - |
| COUNTERSINKS | | | | | | | |
| Single Flute (60°/82°/90°/100°) | 135 | 561/581/584/591 | 791 | - | - | - | - |
| Three Flutes (60°/82°/90°/100°) | 135 | 563/583/585/590 | 793 | - | - | - | - |
| DOUBLE ANGLE CUTTERS | | | | | | | |
| 60° for Non-Ferrous & Cast Irons/Steels | 144 | 746/747 | - | - | - | - | DA XXX 60C |
| 90° for Non-Ferrous & Cast Irons/Steels | 144 | 748/749 | - | - | - | - | DA XXX 90C |
| DOVETAIL CUTTERS | | | | | | | |
| 45° for Non-Ferrous & Cast Irons/Steels | 143 | 734/735 | - | - | - | - | C90 XXX 45 |
| 60° for Non-Ferrous & Cast Irons/Steels | 143 | 736/737 | - | - | - | - | C90 XXX 60 |
| KEYSEAT CUTTERS | | | | | | | |
| High Performance Straight Tooth for Aluminum | 137 | 704 | - | - | - | - | - |
| Straight Tooth for Non-Ferrous & Cast Irons | 138 | 700 | - | - | - | CB444 | 120 |
| Staggered Tooth for Non-Ferrous & Cast Irons | 139 | 701 | - | - | - | - | 121 |
| Straight Tooth for Steels | 140 | 702 | - | - | - | - | - |
| Staggered Tooth for Steels | 141 | 703 | - | - | - | - | - |
| RADIUS CUTTERS – For Non-Ferrous/Cast Irons/Steels | | | | | | | |
| | 144 | 718/719 | - | - | - | - | R XXX C |
| T-SLOT CUTTERS – For Non-Ferrous/Cast Irons/Steels | | | | | | | |
| | 142 | 720/721 | - | - | - | - | C XXXX |

CUTTERS

ARBOR DIAMETER: Select the **largest diameter** available to maximize rigidity and minimize deflection. For example, a 1¼" arbor is more than twice as rigid as a 1" arbor.

TOOL DIAMETER: For **slitting saws**, select the smallest diameter which permits the greatest number of teeth to be engaged in the cut at all times.

For **slot and side milling cutters**, select the diameter which permits no more than two teeth to be engaged in the cut at any time.

NUMBER OF TEETH: Select **fewer teeth** for low tensile materials and heavier chip loads. Select **more teeth** for high tensile materials and better finishes.

COATINGS are especially effective (see "Coating Selector" on page 8).

APPROPRIATE carbide grade, carbide finish, number of teeth, flute size, radial rake angle and cutting edge clearance are engineered by HANNIBAL for optimum performance when machining the materials indicated.

TYPES OF MILLING: In **conventional milling**, the direction of cutter rotation is opposite to the direction of workpiece feed. The initial portion of the chip generated is very thin and gradually increases through the cutting cycle. The maximum cutting force is upward at the end of the cutting cycle.

In **climb milling**, the direction of the cutter rotation and the direction of workpiece feed are the same. The initial portion of the chip generated is thick and gradually thins through the cutting cycle, producing a better finish. The maximum cutting force is the initial downward thrust at the beginning of the cutting cycle.

For **deep slotting**, HANNIBAL'S saws are appropriate due to adequate side & body clearance.



FEEDS & SPEEDS - MILLING CUTTERS OR SAWS CARBIDE TIPPED

RPM FORMULA: $\frac{\text{SFM} \times 3.82}{\text{Diameter}}$

IPM FORMULA: $\text{IPT} \times \text{RPM} \times \text{Number of teeth}$



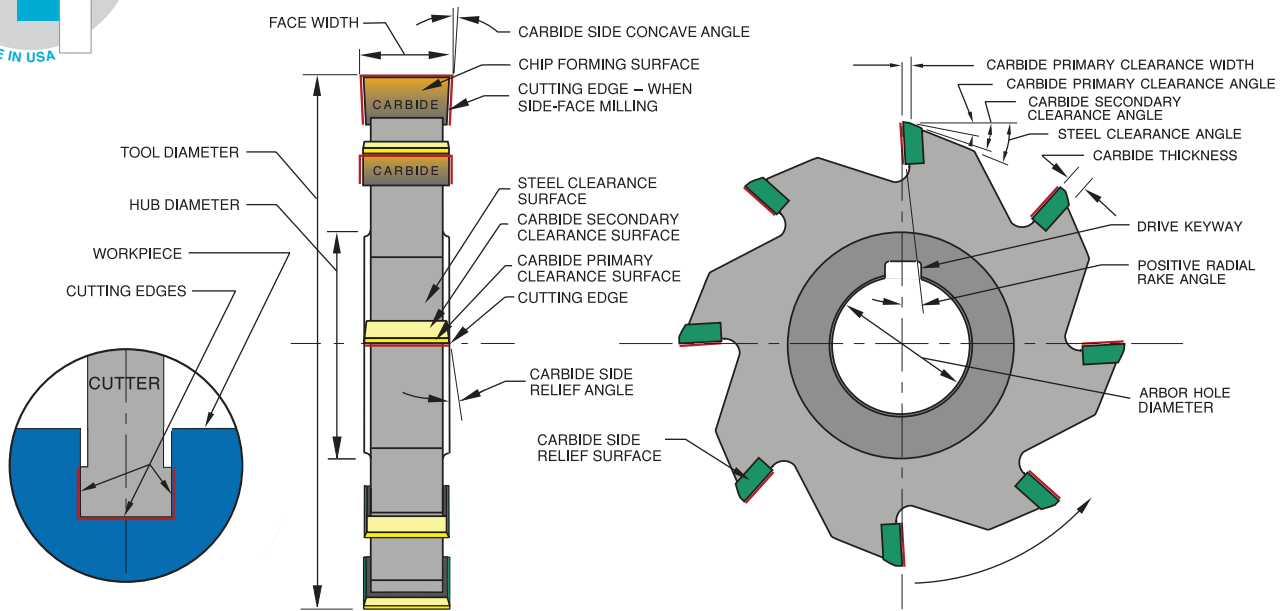
Feeds & speeds are starting recommendations only. Factors including fixturing, available horsepower, depth of cut, and coolant capabilities may significantly affect performance. Use this chart for half and full side mill & face mill cutters.

| CHIP CLASS | MATERIAL BEING MACHINED | MATERIAL EXAMPLES | BRINELL HARDNESS | CHIP DESCRIPTION | SLITTING SAWS AND SIDE MILLING CUTTERS | |
|------------|--|---|----------------------|-------------------------------------|--|------------------|
| | | | | | SURFACE FEET PER MINUTE | INCHES PER TOOTH |
| | | | | | SFPM | IPT |
| 20 | ALUMINUM ALLOY CAST AND WROUGHT | 308.0, 356.0, 360.0, 380.0, 383.0, 390.0, 2024, 3003, 4032, 5052, 6061, 7075 | 30 - 150 (500 kg) | DISCONTINUOUS FLAKY OR LONG STRINGY | 1000 - 2000 | .004-.008 |
| | COPPER ALLOY TOUGH | 101, 110, 115, 120, 130, 142, 155, 170, 172, 175, 195, 425, 610, 630, 655, 725, 805, 826, 910 | 40 - 200 (500 kg) | LONG CONTINUOUS | 200 - 500 | .004-.008 |
| | LEAD ALLOY | Alloys 7, 8, 13, 15 15b, 45b, 65b, 85b, 95b | 10 - 20 (500 kg) | DISCONTINUOUS TIGHTLY CURLED | 300 - 1000 | .004-.008 |
| | PLASTIC | ABS, Acrylic, Allyl, Bakelite, Epoxy, Furan, Nylon, Polyethylene, Polystyrene, PVC | - | CONTINUOUS | 1500 - 3000 | .004-.008 |
| | ZINC ALLOY | AC41 A, AG40A, AMS4803, 11 7RO 12, ZDC NO. 7 GRADES 903, 925 | 80 - 100 | LONG TIGHTLY CURLED | 750 - 1500 | .005-.010 |
| 40 | ALUMINUM BRONZE | 614, 952-958 | 40 - 175 | SHORT LOOSELY CURLED | 200 - 600 | .003-.006 |
| | COPPER ALLOY/BRASS/BRONZE FREE MACHINING | 268, 270, 314, 332, 335, 340, 342, 353, 356, 360, 370, 464-467, 485, 838, 945 | 10 - 100Rb | FLAT SMALL | 400 - 800 | .004-.008 |
| | MAGNESIUM ALLOY | AM60A, AZ21A, AZ91B-C, HM31A, K1A, ZE41A, ZK40A | 50 - 90 (500 kg) | FLAT SMALL | 750 - 1500 | .004-.008 |
| | NICKEL SILVER | 745, 752, 754, 757, 770, 973-978 | 10 - 100Rb | LOOSELY CURLED | 200 - 400 | .003-.006 |
| 60 | CAST IRON - DUCTILE AUSTENITIC (NI-RESIST) | TYPES D-2, D-2B, D-2C, D-2M, D-3, D-3A, D-4, D-5, D-5B | 120 - 275 | DISCONTINUOUS TIGHTLY CURLED | 75 - 150 | .002-.004 |
| | CAST IRON - DUCTILE FERRITIC & FERRITIC - PEARLITIC | GRADES 60-40-18, 65-45-12, 80-55-06, D4018, D4512, D5506 | 140 - 270 | DISCONTINUOUS TIGHTLY CURLED | 250 - 400 | .003-.006 |
| | CAST IRON - DUCTILE MARTENSITIC & PEARLITIC - MARTENSITIC | GRADES 100-70-03, 120-90-02, D7003, DQ&T | 270 - 400 | DISCONTINUOUS TIGHTLY CURLED | 200 - 300 | .003-.006 |
| | CAST IRON - GRAY FERRITIC & FERRITIC - PEARLITIC | CLASSES 20, 25, 30, 35, 40 GRADES G1800, G2500, G3000 | 120 - 220 | DISCONTINUOUS | 250 - 425 | .003-.006 |
| | CAST IRON - GRAY PEARLITIC | CLASSES 45, 50, 55, 60 GRADES G3500, G4000 | 220 - 320 | DISCONTINUOUS | 120 - 300 | .002-.004 |
| | CAST IRON - MALLEABLE FERRITIC & PEARLITIC | GRADES 32510, 35018, 40010, 45008 GRADES M3210, M4504, M5003 | 110 - 240 | DISCONTINUOUS | 200 - 400 | .003-.006 |
| | CAST IRON - MALLEABLE TEMPERED MARTENSITE | GRADES 60004, 70003, 80002 GRADES M5003, M8501 | 200 - 320 | DISCONTINUOUS | 130 - 225 | .002-.004 |
| 80 | STEEL - LOW & MEDIUM STRENGTH FREE MACHINING | 1108-1119, 1132-1151, 10L17, 10L18, 10L50, 11L44, 12L13, 12L14, 12L15 | 100 - 250 | DISCONTINUOUS LOOSELY CURLED | 250 - 500 | .003-.006 |
| | STEEL - LOW & MEDIUM STRENGTH WROUGHT | 1005-1029, 1030-1050, 1513, 1518, 1524, 1552 | 100 - 375 | CONTINUOUS STRINGY | 200 - 400 | .002-.004 |
| 100 | ALLOY STEEL - LOW & MEDIUM STRENGTH FREE MACHINING | 41L30, 41L40, 41L50, 86L20, 4142Se, 4145Te | 100 - 275 | DISCONTINUOUS TIGHTLY CURLED | 200 - 400 | .002-.004 |
| | ALLOY STEEL - LOW & MEDIUM STRENGTH | 1330, 1345, 1515, 4012, 4130, 4140, 4150, 4320, 4340, 4620, 5130, 8620, 8630, 8645, 9310 | 85 - 375 | LOOSELY CURLED | 150 - 300 | .002-.005 |
| | STAINLESS STEEL 400 SERIES | 409, 410, 414, 420, 430, 436, 442, 446 | 135 - 325 | DISCONTINUOUS TIGHTLY CURLED | 200 - 400 | .003-.006 |
| | STAINLESS STEEL FREE MACHINING | 203 EZ, 303, 303MA, 303Pb, 303 PLUS X, 303Se, 416, 416Se, 420F, 430F, 440F | 135 - 275 | SHORT TIGHTLY CURLED | 250 - 500 | .003-.006 |
| 120 | ALLOY STEEL - HIGH STRENGTH, MARAGING STEEL, NITRIDING STEEL, TOOL STEEL | 50100, 51100, 52100, GRADES 200-350, Nitrallloy, SERIES A2, D2, H13, M50, P20, S7, W1 | 175 - 400 | CONTINUOUS WIRY | 75 - 150 | .002-.004 |
| 140 | HIGH TEMP ALLOY NICKEL & IRON | A-286; Hastelloy C; Inconel 600, 625, 718, 825; Monel 400; Nimonic 75, 80; Rene 41; Waspaloy | 140 - 300 | CONTINUOUS WIRY | 50 - 150 | .002-.004 |
| | STAINLESS STEEL 300 SERIES | 301, 302, 304, 309, 314, 316, 321, 330, 347, 385, Nitronic 32, 33, 40, 50, 60 | 135 - 375 | WIRY LOOSELY CURLED | 75 - 150 | .002-.004 |
| | STAINLESS STEEL PH SERIES | 13-8 Mo, 15-5PH, 16-6PH, 17-4PH, 17-7PH, AM-350, AM-335 | 150 - 440 | WIRY LOOSELY CURLED | 75 - 150 | .002-.004 |
| | TITANIUM ALLOY | 98.9, 99.0, 99.2, 99.5, Ti-6Al-4V, Ti-6Al-6V2Sn, Ti-8Mn, Ti-10v-2Fe-3Al | 110 - 380 | CONTINUOUS WIRY | 100 - 200 | .002-.004 |

CUTTERS



CARBIDE TIPPED MILLING CUTTER TECHNICAL INFORMATION



MILLING CUTTER PROBLEM SOLVING GUIDE – CARBIDE TIPPED

AVOID PROBLEMS BY CAREFUL ORIGINAL SET-UP

- MACHINE CONDITION Tool holder in good condition and secure part holding fixture.
 TOOL CONDITION Use cutting tool recommended for material being machined. Avoid excessive tool overhang.
 FEEDS & SPEEDS Start with feeds and speeds recommended for material being machined.
 COOLANT Where used, coolant flow must be adequate to avoid intermittent quenching and to flush chips promptly, avoiding the recutting of hardened chips.

| MILLING PROBLEMS | POSSIBLE CAUSES | POSSIBLE SOLUTIONS |
|-----------------------------------|---|---|
| 1. ROUGH FINISH | Dull cutting edge Wrong feeds & speeds | Resharpener to original tool geometry Increase speed – also try reduced feed |
| 2. EXCESSIVE CUTTING EDGE WEAR | Wrong feeds & speeds Rough cutting edge Insufficient coolant | Increase feed (should always be over .001" per tooth) – especially when machining ductile or free machining materials. Also try reduced speed Lightly hone cutting edge with fine grit diamond hone Increase coolant flow – review type of coolant |
| 3. CHIPPED CUTTING EDGE | Poor chip removal Recutting work hardened chips Vibration Incorrect carbide grade | Use tool with larger flute space – larger diameter or fewer flutes Increase coolant flow Increase rigidity of set-up, especially worn tool holders or arbors Change to tougher carbide grade |
| 4. CHATTER MARKS | Insufficient machine horsepower Vibration | Use tool with fewer flutes as correct feeds & speeds must be maintained Consider climb milling Use larger diameter cutter Resharpener tool with more clearance |
| 5. GLAZED FINISH | Feed too light Dull cutting edge Insufficient clearance | Increase feed Resharpener tool to original geometry Resharpener tool with more clearance |
| 6. POOR TOOL LIFE | Excessive cratering Milling abrasive material Milling surface scale Milling hard material Insufficient chip room Delayed resharpening Thermal cracked carbide | Increase speed or decrease feed Change to harder grade of carbide Decrease speed and increase feed Increase coolant flow Climb milling better than conventional milling Conventional milling better than climb milling Reduce speed – rigidity very important Use larger diameter tool Prompt resharpening to original geometry will increase total tool life Maintain adequate coolant flow at all times Climb milling is cooler than conventional milling |

CUTTERS



SIDE MILLING CUTTERS - STAGGERED TOOTH CARBIDE TIPPED TYPE 547 FRACTIONAL



SUITABLE FOR MOST MATERIALS

TYPE 547 – GENERAL PURPOSE

- Alternating right and left hand axial rake.
- Carbide extends across the entire length of each tooth.
- Tool geometry and carbide grade appropriate for machining most materials including steels, stainless steels, cast irons, composites, aluminums and titaniums.



| TOOL SELECTOR | CHIP CLASS | MATERIAL MACHINED | TOOL TYPE |
|---------------|------------|---------------------------|-----------|
| | 20 | NON-FERROUS - LONG CHIPS | 547 |
| | 40 | NON-FERROUS - SHORT CHIPS | 547 |
| | 60 | CAST IRONS | 547 |
| | 80 | LOW STRENGTH STEELS | 547 |
| | 100 | MEDIUM STRENGTH STEELS | 547 |
| | 120 | HIGH STRENGTH STEELS | 547 |
| | 140 | HIGH TEMPERATURE ALLOYS | 547 |

MODIFICATIONS (Prompt delivery)

- Alternate chamfer every other tooth
- Corner chamfer or corner radius on one side
- Corner chamfer or corner radius on both sides
- Reduced face width
- Closer tool diameter tolerance
- Chip breakers
- Matched tool diameter set(s)
- Reduced hub width
- Additional keyway
- Coatings available:

| |
|------------------------------|
| TITANIUM NITRIDE – TiN |
| TITANIUM CARBONITRIDE – TiCN |
| ZIRCONIUM NITRIDE – ZrN |
| AL TITANIUM NITRIDE – AlTiN |

Tool diameter tolerance: plus $\frac{1}{16}$ ", minus .000"
 Face width tolerance: plus .001", minus .000"
 Arbor hole tolerance: plus .001", minus .000"

| TOOL DIAM. | FACE WIDTH | | TYPE 547 FOR MOST MATERIALS | | | |
|------------|------------|-------|-----------------------------|------------------|----------------------|----------|
| | FRAC. | DEC. | NO. OF TEETH | 1" ARBOR EDP NO. | 1 1/4" ARBOR EDP NO. | PRICE |
| 3 | 3/16 | .1875 | 8 | 54710 | - | \$475.35 |
| | 1/4 | .2500 | 8 | 54712 | - | 486.65 |
| | 5/16 | .3125 | 8 | 54714 | - | 491.00 |
| | 3/8 | .3750 | 8 | 54716 | - | 492.95 |
| | 1/2 | .5000 | 8 | 54718 | - | 508.30 |
| | 5/8 | .6250 | 8 | 54720 | - | 544.15 |
| 4 | 3/16 | .1875 | 10 | 54722 | - | 516.45 |
| | 1/4 | .2500 | 10 | 54724 | - | 522.90 |
| | 5/16 | .3125 | 10 | 54726 | - | 529.20 |
| | 3/8 | .3750 | 10 | 54728 | - | 535.60 |
| | 1/2 | .5000 | 10 | 54730 | - | 543.10 |
| | 5/8 | .6250 | 10 | 54732 | - | 553.25 |
| 6 | 3/4 | .7500 | 10 | 54734 | - | 559.50 |
| | 1/4 | .2500 | 14 | - | 54750 | 671.40 |
| | 5/16 | .3125 | 14 | - | 54752 | 676.50 |
| | 3/8 | .3750 | 14 | - | 54754 | 677.40 |
| | 1/2 | .5000 | 14 | - | 54756 | 686.30 |
| | 5/8 | .6250 | 14 | - | 54758 | 690.20 |
| | 3/4 | .7500 | 14 | - | 54760 | 712.70 |
| 1 | 1.0000 | 14 | - | 54762 | 763.05 | |



SIDE MILLING CUTTERS CARBIDE TIPPED TYPES 540, 541, 542, 543 FRACTIONAL



FOUR TYPES – FOR NON-FERROUS, CAST IRONS, STEELS, OR HIGH TEMPERATURE ALLOYS

TYPE 540 – FOR NON-FERROUS MATERIALS

- Very large flute capacity assures good chip flow and permits high feed rates

TYPE 541 – FOR CAST IRONS

- Large flute capacity but more teeth permits high metal removal at moderate feeds and speeds

TYPE 542 – FOR STEELS

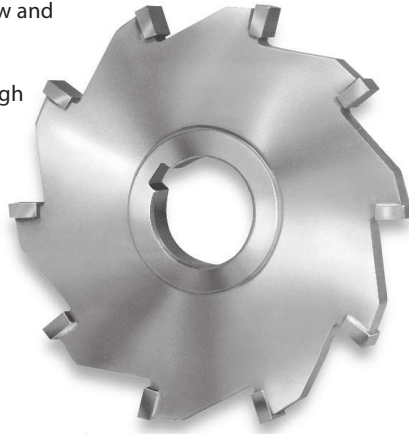
- Steel carbide grade permits longer production runs

TYPE 543 – FOR HIGH TEMP ALLOYS

- Larger number of teeth permits high metal removal at moderate feeds and speeds

ALL TYPES:

- For slotting, straddle milling, and face milling
- Tool diameter tolerance: plus $\frac{1}{16}$ ", minus .000"
- Face width tolerance: plus .001", minus .000"
- Arbor hole tolerance: plus .001", minus .000"
- Tool geometry & carbide grade appropriate for material being machined



| TOOL SELECTOR | CHIP CLASS | MATERIAL MACHINED | TOOL TYPE |
|---------------|------------|---------------------------|-----------|
| | 20 | NON-FERROUS - LONG CHIPS | 540 |
| | 40 | NON-FERROUS - SHORT CHIPS | 540/541 |
| | 60 | CAST IRONS | 541 |
| | 80 | LOW STRENGTH STEELS | 542 |
| | 100 | MEDIUM STRENGTH STEELS | 542 |
| | 120 | HIGH STRENGTH STEELS | 542 |
| | 140 | HIGH TEMPERATURE ALLOYS | 543 |

MODIFICATIONS (Prompt delivery)

- Alternate chamfer every other tooth
- Corner chamfer or corner radius on one side
- Corner chamfer or corner radius on both sides
- Full radius
- Reduced face width
- Closer tool diameter tolerance
- Chip breakers
- Matched tool diameter set(s)
- Reduced hub width
- Additional keyway
- Coatings available:

| |
|------------------------------|
| TITANIUM NITRIDE – TiN |
| TITANIUM CARBONITRIDE – TiCN |
| ZIRCONIUM NITRIDE – ZrN |
| AL TITANIUM NITRIDE – AlTiN |

| TOOL DIAM. | FACE WIDTH | | TYPE 540 FOR NON-FERROUS | | | | TYPE 541 FOR CAST IRONS | | | | TYPE 542 FOR STEELS | | | | TYPE 543 FOR HIGH TEMP ALLOYS | | | |
|------------|------------|---------|--------------------------|------------------|----------------------|----------|-------------------------|------------------|----------------------|----------|---------------------|------------------|----------------------|----------|-------------------------------|------------------|----------------------|----------|
| | FRACTIONAL | DECIMAL | NO. OF TEETH | 1" ARBOR EDP NO. | 1 1/4" ARBOR EDP NO. | PRICE | NO. OF TEETH | 1" ARBOR EDP NO. | 1 1/4" ARBOR EDP NO. | PRICE | NO. OF TEETH | 1" ARBOR EDP NO. | 1 1/4" ARBOR EDP NO. | PRICE | NO. OF TEETH | 1" ARBOR EDP NO. | 1 1/4" ARBOR EDP NO. | PRICE |
| 3 | 1/4 | .2500 | 4 | 54030 | - | \$160.55 | 6 | 54130 | - | \$200.80 | 6 | 54230 | - | \$198.25 | 8 | 54330 | - | \$247.30 |
| | 3/16 | .3125 | 4 | 54031 | - | 168.50 | 6 | 54131 | - | 201.70 | 6 | 54231 | - | 200.95 | 8 | 54331 | - | 259.15 |
| | 3/8 | .3750 | 4 | 54032 | - | 174.65 | 6 | 54132 | - | 205.65 | 6 | 54232 | - | 203.50 | 8 | 54332 | - | 262.60 |
| | 7/16 | .4375 | 4 | 54033 | - | 181.80 | 6 | 54133 | - | 222.40 | 6 | 54233 | - | 226.95 | - | - | - | - |
| | 1/2 | .5000 | 4 | 54034 | - | 190.65 | 6 | 54134 | - | 231.60 | 6 | 54234 | - | 229.95 | 8 | 54334 | - | 293.60 |
| 4 | 1/4 | .2500 | 4 | 54040 | - | 209.20 | 8 | 54140 | - | 259.40 | 8 | 54240 | - | 261.05 | 10 | 54340 | - | 309.25 |
| | 3/16 | .3125 | 4 | 54041 | - | 215.15 | 8 | 54141 | - | 268.10 | 8 | 54241 | - | 277.20 | 10 | 54341 | - | 324.90 |
| | 3/8 | .3750 | 4 | 54042 | 54043 | 220.80 | 8 | 54142 | 54143 | 281.70 | 8 | 54242 | 54243 | 277.20 | 10 | 54342 | 54343 | 332.10 |
| | 7/16 | .4375 | 4 | 54074 | - | 221.80 | 8 | 54174 | - | 287.45 | 8 | 54274 | - | 285.45 | 10 | 54374 | - | 360.65 |
| | 1/2 | .5000 | 4 | 54044 | 54045 | 221.80 | 8 | 54144 | 54145 | 296.90 | 8 | 54244 | 54245 | 295.40 | 10 | 54344 | 54345 | 363.40 |
| | 5/16 | .5625 | 4 | 54094 | - | 241.10 | 8 | 54194 | - | 305.10 | 8 | 54294 | - | 310.00 | - | - | - | - |
| | 3/8 | .6250 | 4 | 54046 | 54047 | 258.75 | 8 | 54146 | 54147 | 330.65 | 8 | 54246 | 54247 | 362.40 | 10 | 54346 | 54347 | 382.65 |
| | 3/4 | .7500 | 4 | 54048 | 54049 | 289.90 | 8 | 54148 | 54149 | 330.65 | 8 | 54248 | 54249 | 366.95 | 10 | 54348 | 54349 | 394.10 |
| 5 | 1/4 | .2500 | 6 | 54050 | - | 292.25 | 10 | 54150 | - | 343.50 | 10 | 54250 | - | 343.65 | - | - | - | - |
| | 3/16 | .3125 | - | - | - | - | 10 | 54151 | - | 343.50 | 10 | 54251 | - | 343.65 | - | - | - | - |
| | 3/8 | .3750 | - | - | - | - | 10 | - | 54153 | 351.75 | 10 | - | 54253 | 360.80 | - | - | - | - |
| | 7/16 | .4375 | 6 | - | 54075 | 304.05 | 10 | - | 54175 | 353.50 | 10 | - | 54275 | 372.40 | - | - | - | - |
| | 1/2 | .5000 | 6 | 54054 | 54055 | 307.65 | 10 | 54154 | 54155 | 375.30 | 10 | 54254 | 54255 | 372.50 | 12 | 54354 | 54355 | 417.40 |
| | 5/16 | .5625 | 6 | - | 54095 | 317.55 | 10 | - | 54195 | 381.70 | 10 | - | 54295 | 388.95 | - | - | - | - |
| | 3/8 | .6250 | 6 | - | 54057 | 334.05 | 10 | - | 54157 | 406.30 | 10 | - | 54257 | 456.50 | 12 | - | 54357 | 455.90 |
| | 3/4 | .7500 | 6 | 54058 | 54059 | 356.10 | 10 | 54158 | 54159 | 460.00 | 10 | 54258 | 54259 | 505.25 | 12 | 54358 | 54359 | 511.25 |
| 1 | 1.0000 | 6 | - | 54015 | 356.70 | 10 | - | 54115 | 500.65 | 10 | - | 54215 | 532.90 | - | - | - | - | |
| 6 | 3/8 | .3750 | 6 | 54062 | - | 313.60 | 12 | - | 54163 | 432.20 | 12 | - | 54263 | 456.60 | - | - | - | - |
| | 1/2 | .5000 | 6 | 54064 | 54065 | 343.50 | 12 | 54164 | 54165 | 458.95 | 12 | 54264 | 54265 | 470.25 | 14 | 54364 | 54365 | 536.95 |
| | 5/8 | .6250 | 6 | - | 54067 | 376.40 | 12 | - | 54167 | 501.60 | 12 | - | 54267 | 511.60 | 14 | - | 54367 | 541.25 |
| | 3/4 | .7500 | 6 | 54068 | 54069 | 432.90 | 12 | 54168 | 54169 | 562.80 | 12 | 54268 | 54269 | 582.75 | 14 | 54368 | 54369 | 584.05 |
| | 1 | 1.0000 | 6 | - | 54016 | 496.20 | 12 | - | 54116 | 568.70 | 12 | - | 54216 | 594.55 | - | - | - | - |
| 8 | 3/4 | .7500 | 8 | 54088 | 54089 | 563.15 | 12 | 54188 | 54189 | 590.65 | 12 | 54288 | 54289 | 612.70 | 14 | 54388 | - | 626.25 |
| | 1 | 1.0000 | 8 | 54080 | 54081 | 611.15 | 12 | 54180 | 54181 | 615.55 | 12 | 54280 | 54281 | 637.75 | - | - | - | - |
| | | | | 1 1/4" ARBOR | 1 1/2" ARBOR | | | 1 1/4" ARBOR | 1 1/2" ARBOR | | | 1 1/4" ARBOR | 1 1/2" ARBOR | | | 1 1/4" ARBOR | 1 1/2" ARBOR | |

CUTTERS



SLITTING SAWS - COARSE TOOTH CARBIDE TIPPED TYPES 550, 552, 554, 558 FRACTIONAL

MATERIAL SPECIFIC

FOUR TYPES – FOR NON-FERROUS, CAST IRONS, STEELS, OR HIGH TEMPERATURE ALLOYS

TYPE 550 – FOR NON-FERROUS MATERIALS

- Very large flute capacity assures good chip flow and permits high feed rates

TYPE 552 – FOR CAST IRONS

- Large flute capacity but more teeth permits high metal removal at moderate feeds and speeds

TYPE 554 – FOR STEELS

- Steel carbide grade permits longer production runs

TYPE 558 – FOR HIGH TEMPERATURE ALLOYS

- Larger number of teeth permits high metal removal at moderate feeds and speeds

ALL TYPES:

- For slitting, slotting, milling, and cut-off operations
- Tool diameter tolerance: plus 1/16", minus .000"
- Face width tolerance: plus .001", minus .000"
- Arbor hole tolerance: plus .001", minus .000"
- Tool geometry and carbide grade appropriate for material being machined

MODIFICATIONS (Prompt delivery)

- Alternate chamfer every other tooth
- Corner chamfer or corner radius on one side
- Corner chamfer or corner radius on both sides
- Full radius
- Reduced face width
- Closer tool diameter tolerance
- Chip breakers
- Matched tool diameter set(s)
- Reduced hub width
- Additional keyway
- Coatings available:

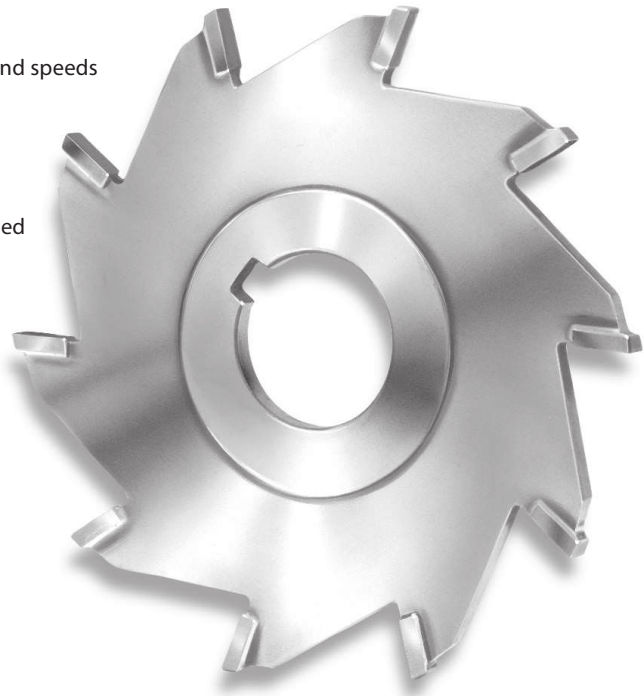
TITANIUM NITRIDE - TiN

TITANIUM CARBONITRIDE - TiCN

ZIRCONIUM NITRIDE - ZrN

AL TITANIUM NITRIDE - AlTiN

| TOOL SELECTOR | CHIP CLASS | MATERIAL MACHINED | TOOL TYPE |
|---------------|-------------------------|---------------------------|-----------------|
| | 20 | NON-FERROUS - LONG CHIPS | 550/551 |
| | 40 | NON-FERROUS - SHORT CHIPS | 550/551/552/553 |
| | 60 | CAST IRONS | 552/553 |
| | 80 | LOW STRENGTH STEELS | 554/556 |
| | 100 | MEDIUM STRENGTH STEELS | 554/556 |
| | 120 | HIGH STRENGTH STEELS | 554/556 |
| 140 | HIGH TEMPERATURE ALLOYS | 558/559 | |



| TOOL DIAM. | FACE WIDTH | | ARBOR HOLE | TYPE 550 FOR NON-FERROUS | | | TYPE 552 FOR CAST IRONS | | | TYPE 554 FOR STEELS | | | TYPE 558 FOR HIGH TEMP ALLOYS | | |
|------------|------------|---------|------------|--------------------------|---------|----------|-------------------------|---------|----------|---------------------|---------|----------|-------------------------------|---------|----------|
| | FRACTIONAL | DECIMAL | | NO. OF TEETH | EDP NO. | PRICE | NO. OF TEETH | EDP NO. | PRICE | NO. OF TEETH | EDP NO. | PRICE | NO. OF TEETH | EDP NO. | PRICE |
| 3 | 3/32 | .0938 | 1 | 6 | 55032 | \$190.35 | 6 | 55232 | \$219.05 | 8 | 55432 | \$217.20 | 8 | 55832 | \$203.50 |
| | 1/8 | .1250 | 1 | 6 | 55034 | 196.05 | 6 | 55234 | 232.00 | 8 | 55434 | 243.10 | 8 | 55834 | 211.30 |
| | 3/16 | .1875 | 1 | 6 | 55036 | 203.85 | 6 | 55236 | 245.40 | 8 | 55436 | 245.40 | 8 | 55836 | 219.45 |
| | 1/4 | .2500 | 1 | 6 | 55037 | 138.65 | 6 | 55237 | 201.15 | 8 | 55437 | 201.15 | 8 | 55837 | 241.45 |
| | 5/16 | .3125 | 1 | 6 | 55031 | 145.65 | 6 | 55231 | 201.15 | 8 | 55431 | 201.15 | 8 | 55831 | 241.45 |
| | 3/8 | .3750 | 1 | 6 | 55038 | 148.50 | 6 | 55238 | 204.45 | 8 | 55438 | 204.45 | 8 | 55838 | 245.40 |
| 4 | 3/32 | .0938 | 1 | 6 | 55042 | 233.65 | 8 | 55242 | 280.85 | 8 | 55442 | 280.85 | 10 | 55842 | 292.80 |
| | 1/8 | .1250 | 1 | 6 | 55044 | 240.65 | 8 | 55244 | 284.65 | 8 | 55444 | 284.65 | 10 | 55844 | 296.45 |
| | 3/16 | .1875 | 1 | 6 | 55046 | 244.20 | 8 | 55246 | 306.70 | 8 | 55446 | 306.70 | 10 | 55846 | 300.60 |
| | 1/4 | .2500 | 1 | 6 | 55047 | 178.15 | 8 | 55247 | 260.45 | 8 | 55447 | 260.45 | 10 | 55847 | 312.75 |
| | 5/16 | .3125 | 1 | 6 | 55041 | 183.20 | 8 | 55241 | 270.55 | 8 | 55441 | 270.55 | 10 | 55841 | 324.50 |
| | 3/8 | .3750 | 1 | 6 | 55048 | 188.00 | 8 | 55248 | 280.35 | 8 | 55448 | 280.35 | 10 | 55848 | 336.45 |
| 5 | 3/8 | .3750 | 1 1/4 | 6 | 55049 | 188.00 | 8 | 55249 | 280.35 | 8 | 55449 | 280.35 | 10 | 55849 | 336.45 |
| | 3/32 | .0938 | 1 | 8 | 55052 | 252.85 | 10 | 55252 | 377.05 | 10 | 55452 | 377.05 | 12 | 55852 | 398.00 |
| | 1/8 | .1250 | 1 | 8 | 55054 | 252.85 | 10 | 55254 | 405.60 | 10 | 55454 | 405.60 | 12 | 55854 | 406.30 |
| 6 | 3/16 | .1875 | 1 | - | - | - | 10 | 55256 | 456.60 | 10 | 55456 | 456.60 | 12 | 55856 | 422.50 |
| | 1/8 | .1250 | 1 1/4 | 8 | 55063 | 344.30 | 12 | 55263 | 495.00 | 12 | 55463 | 495.00 | 14 | 55863 | 475.30 |
| | 3/16 | .1875 | 1 1/4 | 8 | 55065 | 453.75 | 12 | 55265 | 511.30 | 12 | 55465 | 511.30 | 14 | 55865 | 487.55 |
| 8 | 1/4 | .2500 | 1 1/4 | 8 | 55067 | 470.05 | 12 | 55267 | 522.00 | 12 | 55467 | 522.00 | 14 | 55867 | 495.50 |
| | 1/8 | .1250 | 1 1/4 | 10 | 55083 | 440.20 | - | - | - | - | - | - | - | - | - |
| | 3/16 | .1875 | 1 1/4 | - | - | - | 16 | 55285 | 703.65 | 16 | 55485 | 703.65 | - | - | - |
| 8 | 1/4 | .2500 | 1 1/4 | - | - | - | 16 | 55287 | 730.55 | 16 | 55487 | 730.55 | - | - | - |

CUTTERS



SLITTING SAWS - STANDARD TOOTH CARBIDE TIPPED TYPES 551, 553, 556, 559 FRACTIONAL

MATERIAL SPECIFIC

FOUR TYPES – FOR NON-FERROUS, CAST IRONS, STEELS, OR HIGH TEMPERATURE ALLOYS

TYPE 551 – FOR NON-FERROUS MATERIALS

TYPE 553 – FOR CAST IRONS

TYPE 556 – FOR STEELS

TYPE 559 – FOR HIGH TEMPERATURE ALLOYS

- Similar to slitting saws on page 124, except designed with more teeth for better finishes and higher feed rates
- For descriptions and tolerances, see page 124

Use the tool selector on page 124 to determine which tool is appropriate for the material you are cutting.

MODIFICATIONS

(See list on page 124)

| TOOL DIAM. | FACE WIDTH | | TYPE 551 FOR NON-FERROUS | | | | TYPE 553 FOR CAST IRONS | | | | TYPE 556 FOR STEELS | | | | TYPE 559 FOR HIGH TEMP ALLOYS | | | |
|------------|------------|---------|--------------------------|------------------|----------------------|----------|-------------------------|------------------|----------------------|----------|---------------------|------------------|----------------------|----------|-------------------------------|------------------|----------------------|----------|
| | FRACTIONAL | DECIMAL | NO. OF TEETH | 1" ARBOR EDP NO. | 1 1/4" ARBOR EDP NO. | PRICE | NO. OF TEETH | 1" ARBOR EDP NO. | 1 1/4" ARBOR EDP NO. | PRICE | NO. OF TEETH | 1" ARBOR EDP NO. | 1 1/4" ARBOR EDP NO. | PRICE | NO. OF TEETH | 1" ARBOR EDP NO. | 1 1/4" ARBOR EDP NO. | PRICE |
| 3 | 1/16 | .0625 | 12 | 55198 | - | \$299.90 | 12 | 55398 | - | \$299.90 | 16 | 55698 | - | \$358.55 | 12 | 55998 | - | \$337.30 |
| | 3/64 | .0781 | 12 | 55100 | - | 354.65 | 12 | 55300 | - | 354.65 | 16 | 55600 | - | 433.60 | 12 | 55900 | - | 377.85 |
| | 3/32 | .0938 | 12 | 55102 | - | 299.90 | 12 | 55302 | - | 299.90 | 16 | 55602 | - | 358.55 | 12 | 55902 | - | 337.30 |
| | 7/64 | .1094 | 12 | 55104 | - | 298.75 | 12 | 55304 | - | 298.75 | 16 | 55604 | - | 330.95 | 12 | 55904 | - | 322.00 |
| | 1/8 | .1250 | 12 | 55106 | 55107 | 241.10 | 12 | 55306 | 55307 | 241.10 | 16 | 55606 | - | 299.85 | 12 | 55906 | 55907 | 307.55 |
| | 5/32 | .1562 | 12 | 55108 | - | 287.40 | 12 | 55308 | - | 287.40 | 16 | 55608 | - | 314.90 | 12 | 55908 | - | 314.90 |
| | 3/16 | .1875 | 12 | 55109 | - | 257.00 | 12 | 55309 | - | 257.00 | 16 | 55609 | - | 330.15 | 12 | 55909 | - | 322.50 |
| | 7/32 | .2188 | 12 | 55110 | - | 297.30 | 12 | 55310 | - | 297.30 | 16 | 55610 | - | 345.25 | 12 | 55910 | - | 332.70 |
| | 1/4 | .2500 | 12 | 55111 | - | 312.60 | 12 | 55311 | - | 312.60 | 16 | 55611 | - | 360.55 | 12 | 55911 | - | 342.75 |
| | 5/16 | .3125 | 12 | 55112 | - | 342.75 | 12 | 55312 | - | 342.75 | 16 | 55612 | - | 395.25 | 12 | 55912 | - | 375.50 |
| | 3/8 | .3750 | 12 | 55113 | - | 373.00 | 12 | 55313 | - | 373.00 | 16 | 55613 | - | 430.10 | 12 | 55913 | - | 410.75 |
| | 7/16 | .4375 | - | - | - | - | - | - | - | - | 16 | 55614 | - | 477.95 | 12 | 55914 | - | 446.30 |
| 1/2 | .5000 | - | - | - | - | - | - | - | - | 16 | 55615 | - | 531.15 | 12 | 55915 | - | 481.70 | |
| 4 | 1/16 | .0625 | 14 | 55116 | 55117 | 349.20 | 14 | 55316 | - | 349.20 | 20 | 55616 | - | 433.60 | 14 | 55916 | 55917 | 383.65 |
| | 3/64 | .0781 | 14 | 55118 | 55119 | 412.50 | 14 | 55318 | 55319 | 412.50 | 20 | 55618 | 55619 | 474.45 | 14 | 55918 | 55919 | 439.60 |
| | 3/32 | .0938 | 14 | 55120 | 55121 | 349.20 | 14 | 55320 | 55321 | 349.20 | 20 | 55620 | 55621 | 433.60 | 14 | 55920 | 55921 | 383.65 |
| | 7/64 | .1094 | 14 | 55122 | 55123 | 356.60 | 14 | 55322 | 55323 | 356.60 | 20 | 55622 | 55623 | 410.10 | 14 | 55922 | 55923 | 454.80 |
| | 1/8 | .1250 | 14 | 55124 | 55125 | 314.90 | 14 | 55324 | 55325 | 314.90 | 20 | 55624 | 55625 | 383.05 | 14 | 55924 | 55925 | 383.05 |
| | 5/32 | .1562 | 14 | 55126 | 55127 | 357.75 | 14 | 55326 | 55327 | 357.75 | 20 | 55626 | 55627 | 411.55 | 14 | 55926 | 55927 | 393.15 |
| | 3/16 | .1875 | 14 | 55128 | 55129 | 335.30 | 14 | 55328 | 55329 | 335.30 | 20 | 55628 | 55629 | 413.30 | 14 | 55928 | 55929 | 405.65 |
| | 7/32 | .2188 | 14 | 55130 | 55131 | 380.50 | 14 | 55330 | 55331 | 380.50 | 20 | 55630 | 55631 | 437.60 | 14 | 55930 | 55931 | 418.45 |
| | 1/4 | .2500 | 14 | 55132 | 55133 | 387.90 | 14 | 55332 | 55333 | 387.90 | 20 | 55632 | 55633 | 443.30 | 14 | 55932 | 55933 | 428.45 |
| | 5/16 | .3125 | 14 | 55134 | 55135 | 418.45 | 14 | 55334 | 55335 | 418.45 | 20 | 55634 | 55635 | 481.05 | 14 | 55934 | 55935 | 458.70 |
| | 3/8 | .3750 | 14 | 55136 | 55137 | 448.55 | 14 | 55336 | 55337 | 448.55 | 20 | 55636 | 55637 | 515.85 | 14 | 55936 | 55937 | 493.85 |
| | 7/16 | .4375 | - | - | - | - | - | - | - | - | 20 | 55638 | - | 573.10 | 14 | 55938 | - | 529.45 |
| 1/2 | .5000 | - | - | - | - | - | - | - | - | 20 | 55640 | - | 636.95 | 14 | 55940 | - | 564.90 | |
| 5 | 3/64 | .0781 | 16 | 55142 | 55143 | 511.00 | 16 | 55342 | 55343 | 511.00 | 24 | 55642 | 55643 | 587.50 | 16 | 55942 | 55943 | 541.65 |
| | 3/32 | .0938 | 16 | 55144 | 55145 | 421.60 | 16 | 55344 | 55345 | 421.60 | 24 | 55644 | 55645 | 591.65 | 16 | 55944 | 55945 | 464.50 |
| | 7/64 | .1094 | 16 | 55146 | 55147 | 479.95 | 16 | 55346 | 55347 | 479.95 | 24 | 55646 | 55647 | 552.05 | 16 | 55946 | 55947 | 511.00 |
| | 1/8 | .1250 | 16 | 55148 | 55149 | 389.45 | 16 | 55348 | 55349 | 389.45 | 24 | 55648 | 55649 | 478.70 | 16 | 55948 | 55949 | 451.10 |
| | 5/32 | .1562 | 16 | 55150 | 55151 | 425.85 | 16 | 55350 | 55351 | 425.85 | 24 | 55650 | 55651 | 489.65 | 16 | 55950 | 55951 | 466.00 |
| | 3/16 | .1875 | 16 | 55152 | 55153 | 436.15 | 16 | 55352 | 55353 | 436.15 | 24 | 55652 | 55653 | 524.10 | 16 | 55952 | 55953 | 491.40 |
| | 7/32 | .2188 | 16 | 55154 | 55155 | 468.65 | 16 | 55354 | 55355 | 468.65 | 24 | 55654 | 55655 | 539.00 | 16 | 55954 | 55955 | 516.60 |
| | 1/4 | .2500 | 16 | 55156 | 55157 | 488.85 | 16 | 55356 | 55357 | 488.85 | 24 | 55656 | 55657 | 562.25 | 16 | 55956 | 55957 | 541.70 |
| | 5/16 | .3125 | 16 | 55158 | 55159 | 531.55 | 16 | 55358 | 55359 | 531.55 | 24 | 55658 | 55659 | 611.45 | 16 | 55958 | 55959 | 584.55 |
| | 3/8 | .3750 | 16 | 55160 | 55161 | 574.50 | 16 | 55360 | 55361 | 574.50 | 24 | 55660 | 55661 | 660.60 | 16 | 55960 | 55961 | 629.95 |
| | 7/16 | .4375 | - | - | - | - | - | - | - | - | 24 | 55662 | - | 734.10 | 16 | 55962 | - | 665.45 |
| | 1/2 | .5000 | - | - | - | - | - | - | - | - | 24 | 55664 | - | 815.65 | 16 | 55964 | - | 700.90 |
| 6 | 3/64 | .0781 | 18 | 55166 | 55167 | 574.45 | 18 | 55366 | 55367 | 574.45 | 28 | 55666 | 55667 | 660.55 | 18 | 55966 | 55967 | 609.10 |
| | 3/32 | .0938 | 18 | 55168 | 55169 | 511.60 | 18 | 55368 | 55369 | 511.60 | 28 | 55668 | 55669 | 605.15 | 18 | 55968 | 55969 | 560.90 |
| | 7/64 | .1094 | 18 | 55170 | 55171 | 576.40 | 18 | 55370 | 55371 | 576.40 | 28 | 55670 | 55671 | 662.85 | 18 | 55970 | 55971 | 611.15 |
| | 1/8 | .1250 | 18 | 55172 | 55173 | 487.60 | 18 | 55372 | 55373 | 487.60 | 28 | 55672 | 55673 | 634.95 | 18 | 55972 | 55973 | 577.00 |
| | 5/32 | .1562 | 18 | 55174 | 55175 | 551.65 | 18 | 55374 | 55375 | 551.65 | 28 | 55674 | 55675 | 634.65 | 18 | 55974 | 55975 | 602.20 |
| | 3/16 | .1875 | 18 | 55176 | 55177 | 534.20 | 18 | 55376 | 55377 | 534.20 | 28 | 55676 | 55677 | 680.80 | 18 | 55976 | 55977 | 627.35 |
| | 7/32 | .2188 | 18 | 55178 | 55179 | 602.20 | 18 | 55378 | 55379 | 602.20 | 28 | 55678 | 55679 | 692.55 | 18 | 55978 | 55979 | 652.60 |
| | 1/4 | .2500 | 18 | 55180 | 55181 | 627.45 | 18 | 55380 | 55381 | 627.45 | 28 | 55680 | 55681 | 740.25 | 18 | 55980 | 55981 | 687.40 |
| | 5/16 | .3125 | 18 | 55182 | 55183 | 652.75 | 18 | 55382 | 55383 | 652.75 | 28 | 55682 | 55683 | 750.60 | 18 | 55982 | 55983 | 718.15 |
| | 3/8 | .3750 | 18 | 55184 | 55185 | 677.75 | 18 | 55384 | 55385 | 677.75 | 28 | 55684 | 55685 | 779.50 | 18 | 55984 | 55985 | 745.75 |
| | 7/16 | .4375 | - | - | - | - | - | - | - | - | 28 | 55690 | - | 866.00 | 18 | 55990 | - | 781.25 |
| | 1/2 | .5000 | - | - | - | - | - | - | - | - | 28 | 55692 | - | 962.25 | 18 | 55992 | - | 816.75 |
| 8 | 1/8 | .1250 | 24 | - | 55186 | 809.55 | 24 | - | 55386 | 809.55 | 24 | - | 55686 | 855.80 | 24 | - | 55986 | 855.80 |
| | 5/32 | .1562 | 24 | - | 55187 | 819.15 | 24 | - | 55387 | 819.15 | 24 | - | 55687 | 865.50 | 24 | - | 55987 | 865.50 |
| | 3/16 | .1875 | 24 | - | 55188 | 828.80 | 24 | - | 55388 | 828.80 | 24 | - | 55688 | 875.05 | 24 | - | 55988 | 875.05 |
| | 1/4 | .2500 | 24 | - | 55189 | 878.80 | 24 | - | 55389 | 878.80 | 24 | - | 55689 | 925.15 | 24 | - | 55989 | 925.15 |

CUTTERS



3" MILLING CUTTERS & SLITTING SAWS CARBIDE TIPPED TYPE 556



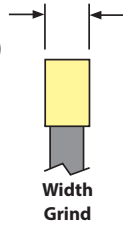
FOR STEEL

Modified width between .0600" and .5312"

TYPE 556

Cutter Notes (All cutters on page)

- 16 Teeth
- C-5 Carbide
- 1° - 3° Positive Radial Rake
- Width Tolerance: +.001"/-.000"
- OD tolerance: +.0313"/-.000"
- 1" Arbor hole +.001"/-.000"
- ANSI standard keyway dimensions
- Add 5% to grind down hub width
- Add 5% to match OD's on cutter sets within .001"
- Not designed to be used on heat treated materials greater than 475 Brinell (50RC)



| TOOL DIAM. | HUB WIDTH | EDP NO. | MODIFIED FACE WIDTH RANGE | FINISHED TO MODIFIED FACE WIDTH | | | | | |
|------------|-----------|---------|---------------------------|--|----------|----------|----------|----------|----------|
| | | | | PRICE EACH - BASED ON QUANTITY ORDERED | | | | | |
| | | | | 1 | 2 | 3 | 4 | 5 | 6 |
| 3 | .0555 | 55698D | 0.0600 - 0.0703 | \$436.90 | \$407.40 | \$401.90 | \$399.20 | \$397.50 | \$358.55 |
| 3 | .0711 | 55600D | 0.0704 - 0.0859 | 511.80 | 482.35 | 476.95 | 474.30 | 472.55 | 433.60 |
| 3 | .0867 | 55602D | 0.0860 - 0.1015 | 436.90 | 407.40 | 401.90 | 399.20 | 397.50 | 358.55 |
| 3 | .1024 | 55604D | 0.1016 - 0.1171 | 409.05 | 379.45 | 374.10 | 371.50 | 369.65 | 330.95 |
| 3 | .1180 | 55606D | 0.1172 - 0.1406 | 378.00 | 348.55 | 343.15 | 340.55 | 338.65 | 299.85 |
| 3 | .1562 | 55608D | 0.1407 - 0.1718 | 393.20 | 363.70 | 358.35 | 355.60 | 353.80 | 314.90 |
| 3 | .1875 | 55609D | 0.1719 - 0.2031 | 408.35 | 378.85 | 373.45 | 370.75 | 368.95 | 330.15 |
| 3 | .2188 | 55610D | 0.2032 - 0.2343 | 423.45 | 394.00 | 388.65 | 385.80 | 384.25 | 345.25 |
| 3 | .2500 | 55611D | 0.2344 - 0.2812 | 438.75 | 409.20 | 403.85 | 401.20 | 399.35 | 360.55 |
| 3 | .3125 | 55612D | 0.2813 - 0.3437 | 473.55 | 443.90 | 438.60 | 435.90 | 434.10 | 395.30 |
| 3 | .3750 | 55613D | 0.3438 - 0.4062 | 508.45 | 478.95 | 473.55 | 470.80 | 469.05 | 430.10 |
| 3 | .4375 | 55614D | 0.4063 - 0.4687 | 556.10 | 526.60 | 521.25 | 518.60 | 516.80 | 477.95 |
| 3 | .5000 | 55615D | 0.4688 - 0.5312 | 609.25 | 579.75 | 574.45 | 571.75 | 569.95 | 531.15 |

Corner Radius or Chamfer on ONE Side

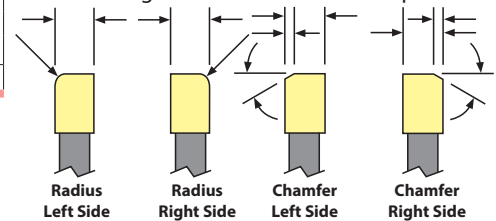
| TOOL DIAM. | HUB WIDTH | EDP NO. | ONE RADIUS OR CHAMFER FINISHED TO MODIFIED FACE WIDTH | | | | | | | |
|------------|-----------|---------|---|--|----------|----------|----------|----------|----------|--|
| | | | MODIFIED FACE WIDTH RANGE | PRICE EACH - BASED ON QUANTITY ORDERED | | | | | | |
| | | | | 1 | 2 | 3 | 4 | 5 | 6 | |
| 3 | .0555 | 55698R1 | 0.0600 - 0.0703 | \$456.60 | \$413.40 | \$407.40 | \$404.20 | \$402.30 | \$401.35 | |
| 3 | .0711 | 55600R1 | 0.0704 - 0.0859 | 531.60 | 488.40 | 482.40 | 479.25 | 477.35 | 476.45 | |
| 3 | .0867 | 55602R1 | 0.0860 - 0.1015 | 456.60 | 413.40 | 407.40 | 404.20 | 402.30 | 401.35 | |
| 3 | .1024 | 55604R1 | 0.1016 - 0.1171 | 428.85 | 385.60 | 379.60 | 376.45 | 374.65 | 373.50 | |
| 3 | .1180 | 55606R1 | 0.1172 - 0.1406 | 397.80 | 354.60 | 348.60 | 345.45 | 343.55 | 342.50 | |
| 3 | .1562 | 55608R1 | 0.1407 - 0.1718 | 412.90 | 369.80 | 363.75 | 360.70 | 358.60 | 357.75 | |
| 3 | .1875 | 55609R1 | 0.1719 - 0.2031 | 428.15 | 384.95 | 379.00 | 375.75 | 373.95 | 372.95 | |
| 3 | .2188 | 55610R1 | 0.2032 - 0.2343 | 443.30 | 400.05 | 394.05 | 390.90 | 389.05 | 388.00 | |
| 3 | .2500 | 55611R1 | 0.2344 - 0.2812 | 458.55 | 415.30 | 409.25 | 406.25 | 404.20 | 403.25 | |
| 3 | .3125 | 55612R1 | 0.2813 - 0.3437 | 493.25 | 450.00 | 443.95 | 440.85 | 439.00 | 438.05 | |
| 3 | .3750 | 55613R1 | 0.3438 - 0.4062 | 528.05 | 485.05 | 479.00 | 475.85 | 473.85 | 472.95 | |
| 3 | .4375 | 55614R1 | 0.4063 - 0.4687 | 575.95 | 532.70 | 526.75 | 523.55 | 521.75 | 520.85 | |
| 3 | .5000 | 55615R1 | 0.4688 - 0.5312 | 629.15 | 585.95 | 579.90 | 576.80 | 574.80 | 574.00 | |

Radius Notes

- Maximum radius on one side is .2656"
- Full radius and maximum radius on both sides is 1/2 the width of the cutter
- A non-tangent radii must be quoted

Chamfer Notes

- Chamfer Angles can range from 0° to 45°
- Chamfer is measured off the OD
- Maximum chamfer is the LESSER of 1/3 the width of the cutter OR .2656" length of angle when measured across the OD
- Chamfer Angle Tolerance: +/- 1/2°
- Chamfers greater than 45° must be quoted

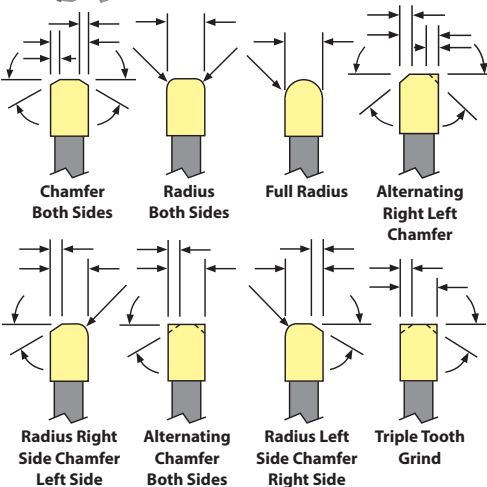


Specify right or left side for radius or chamfer



Corner Radius or Chamfer on BOTH Sides OR a Full Radius

• Price Increases 5% for Alternating Chamfers



| TOOL DIAM. | HUB WIDTH | EDP NO. | MODIFIED FACE WIDTH RANGE | RADI, CHAMFERS, OR COMBO FINISHED TO MODIFIED FACE WIDTH | | | | | |
|------------|-----------|---------|---------------------------|--|----------|----------|----------|----------|----------|
| | | | | PRICE EACH - BASED ON QUANTITY ORDERED | | | | | |
| | | | | 1 | 2 | 3 | 4 | 5 | 6 |
| 3 | .0555 | 55698R2 | 0.0600 - 0.0703 | \$467.45 | \$419.60 | \$412.75 | \$409.25 | \$407.30 | \$406.20 |
| 3 | .0711 | 55600R2 | 0.0704 - 0.0859 | 542.55 | 494.55 | 487.75 | 484.30 | 482.25 | 481.05 |
| 3 | .0867 | 55602R2 | 0.0860 - 0.1015 | 467.45 | 419.60 | 412.75 | 409.25 | 407.30 | 406.20 |
| 3 | .1024 | 55604R2 | 0.1016 - 0.1171 | 439.70 | 391.75 | 384.95 | 381.50 | 379.40 | 378.30 |
| 3 | .1180 | 55606R2 | 0.1172 - 0.1406 | 408.75 | 360.70 | 353.95 | 350.50 | 348.35 | 347.20 |
| 3 | .1562 | 55608R2 | 0.1407 - 0.1718 | 423.80 | 375.75 | 369.10 | 365.75 | 363.55 | 362.45 |
| 3 | .1875 | 55609R2 | 0.1719 - 0.2031 | 439.00 | 391.00 | 384.35 | 380.90 | 378.70 | 377.65 |
| 3 | .2188 | 55610R2 | 0.2032 - 0.2343 | 454.30 | 406.25 | 399.40 | 396.00 | 393.95 | 392.65 |
| 3 | .2500 | 55611R2 | 0.2344 - 0.2812 | 469.45 | 421.35 | 414.60 | 411.15 | 409.05 | 408.00 |
| 3 | .3125 | 55612R2 | 0.2813 - 0.3437 | 504.20 | 456.10 | 449.40 | 445.90 | 443.80 | 442.70 |
| 3 | .3750 | 55613R2 | 0.3438 - 0.4062 | 539.00 | 490.95 | 484.30 | 480.90 | 478.85 | 477.65 |
| 3 | .4375 | 55614R2 | 0.4063 - 0.4687 | 586.85 | 538.85 | 532.15 | 528.70 | 526.55 | 525.45 |
| 3 | .5000 | 55615R2 | 0.4688 - 0.5312 | 640.05 | 591.90 | 585.35 | 581.90 | 579.70 | 578.60 |



4" MILLING CUTTERS & SLITTING SAWS CARBIDE TIPPED TYPE 556

MATERIAL SPECIFIC

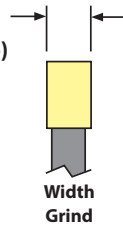
FOR STEEL

Modified width between .0600" and .5312"

TYPE 556

Cutter Notes (All cutters on page)

- 20 Teeth
- C-5 Carbide
- 1° - 3° Positive Radial Rake
- Width Tolerance: +.001"/-.000"
- OD tolerance: +.0313"/-.000"
- 1" Arbor hole +.001"/-.000"
- ANSI standard keyway dimensions
- Add 5% to grind down hub width
- Add 5% to match OD's on cutter sets within .001"
- Not designed to be used on heat treated materials greater than 475 Brinell (50RC)



| TOOL DIAM. | HUB WIDTH | EDP NO. | MODIFIED FACE WIDTH RANGE | FINISHED TO MODIFIED FACE WIDTH | | | | | |
|------------|-----------|---------|---------------------------|--|----------|----------|----------|----------|----------|
| | | | | PRICE EACH - BASED ON QUANTITY ORDERED | | | | | |
| | | | | 1 | 2 | 3 | 4 | 5 | 6 |
| 4 | .0545 | 55616D | 0.0600 - 0.0703 | \$526.00 | \$491.80 | \$485.40 | \$482.05 | \$480.10 | \$433.60 |
| 4 | .0701 | 55618D | 0.0704 - 0.0859 | 566.65 | 532.60 | 526.20 | 522.85 | 520.95 | 474.45 |
| 4 | .0858 | 55620D | 0.0860 - 0.1015 | 526.00 | 491.80 | 485.40 | 482.05 | 480.10 | 433.60 |
| 4 | .1014 | 55622D | 0.1016 - 0.1171 | 502.45 | 468.35 | 461.95 | 458.60 | 456.55 | 410.10 |
| 4 | .1170 | 55624D | 0.1172 - 0.1406 | 475.30 | 441.20 | 434.75 | 431.50 | 429.50 | 383.00 |
| 4 | .1562 | 55626D | 0.1407 - 0.1718 | 503.85 | 469.75 | 463.40 | 460.00 | 458.10 | 411.60 |
| 4 | .1875 | 55628D | 0.1719 - 0.2031 | 505.50 | 471.45 | 465.00 | 461.70 | 459.65 | 413.15 |
| 4 | .2188 | 55630D | 0.2032 - 0.2343 | 529.85 | 495.85 | 489.40 | 486.05 | 484.15 | 437.65 |
| 4 | .2500 | 55632D | 0.2344 - 0.2812 | 535.65 | 501.55 | 495.10 | 491.80 | 489.90 | 443.30 |
| 4 | .3125 | 55634D | 0.2813 - 0.3437 | 573.30 | 539.30 | 532.85 | 529.55 | 527.55 | 481.05 |
| 4 | .3750 | 55636D | 0.3438 - 0.4062 | 608.15 | 574.10 | 567.75 | 564.40 | 562.30 | 515.85 |
| 4 | .4375 | 55638D | 0.4063 - 0.4687 | 665.45 | 631.30 | 625.05 | 621.60 | 619.60 | 573.10 |
| 4 | .5000 | 55640D | 0.4688 - 0.5312 | 729.10 | 695.10 | 688.65 | 685.35 | 683.40 | 636.95 |

Corner Radius or Chamfer on ONE Side

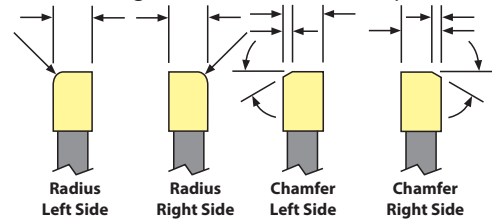
| TOOL DIAM. | HUB WIDTH | EDP NO. | ONE RADIUS OR CHAMFER FINISHED TO MODIFIED FACE WIDTH | | | | | | |
|------------|-----------|---------|---|--|----------|----------|----------|----------|----------|
| | | | MODIFIED FACE WIDTH RANGE | PRICE EACH - BASED ON QUANTITY ORDERED | | | | | |
| | | | | 1 | 2 | 3 | 4 | 5 | 6 |
| 4 | .0545 | 55616R1 | 0.0600 - 0.0703 | \$547.25 | \$498.35 | \$491.40 | \$487.60 | \$485.35 | \$484.15 |
| 4 | .0701 | 55618R1 | 0.0704 - 0.0859 | 588.10 | 539.30 | 532.15 | 528.35 | 526.20 | 524.95 |
| 4 | .0858 | 55620R1 | 0.0860 - 0.1015 | 547.25 | 498.35 | 491.40 | 487.60 | 485.35 | 484.15 |
| 4 | .1014 | 55622R1 | 0.1016 - 0.1171 | 523.65 | 474.85 | 467.85 | 464.10 | 461.85 | 460.65 |
| 4 | .1170 | 55624R1 | 0.1172 - 0.1406 | 496.65 | 447.85 | 440.75 | 437.00 | 434.70 | 433.60 |
| 4 | .1562 | 55626R1 | 0.1407 - 0.1718 | 525.25 | 476.45 | 469.35 | 465.60 | 463.40 | 462.15 |
| 4 | .1875 | 55628R1 | 0.1719 - 0.2031 | 526.80 | 478.00 | 470.95 | 467.15 | 464.95 | 463.75 |
| 4 | .2188 | 55630R1 | 0.2032 - 0.2343 | 551.35 | 502.50 | 495.40 | 491.60 | 489.40 | 488.25 |
| 4 | .2500 | 55632R1 | 0.2344 - 0.2812 | 556.95 | 508.05 | 501.05 | 497.40 | 495.05 | 493.90 |
| 4 | .3125 | 55634R1 | 0.2813 - 0.3437 | 594.60 | 545.95 | 538.70 | 535.00 | 532.85 | 531.55 |
| 4 | .3750 | 55636R1 | 0.3438 - 0.4062 | 629.50 | 580.70 | 573.45 | 569.80 | 567.60 | 566.35 |
| 4 | .4375 | 55638R1 | 0.4063 - 0.4687 | 686.80 | 637.95 | 630.95 | 627.20 | 624.85 | 623.75 |
| 4 | .5000 | 55640R1 | 0.4688 - 0.5312 | 750.45 | 701.75 | 694.55 | 690.85 | 688.60 | 687.40 |

Radius Notes

- Maximum radius on one side is .2656"
- Full radius and maximum radius on both sides is 1/2 the width of the cutter
- A non-tangent radii must be quoted

Chamfer Notes

- Chamfer Angles can range from 0° to 45°
- Chamfer is measured off the OD
- Maximum chamfer is the LESSER of 1/3 the width of the cutter OR .2656" length of angle when measured across the OD
- Chamfer Angle Tolerance: +/- 1/2°
- Chamfers greater than 45° must be quoted

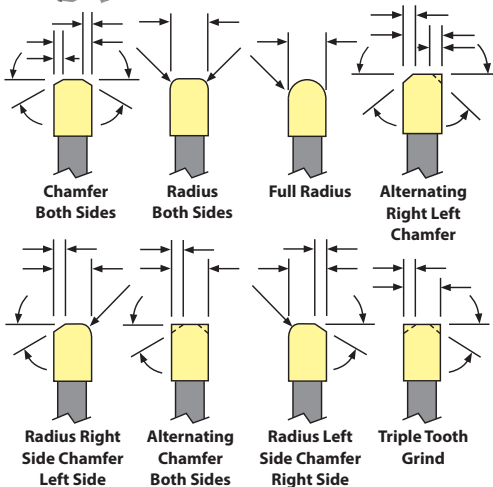


Specify right or left side for radius or chamfer



Corner Radius or Chamfer on BOTH Sides OR a Full Radius

• Price Increases 5% for Alternating Chamfers



| TOOL DIAM. | HUB WIDTH | EDP NO. | MODIFIED FACE WIDTH RANGE | RADI, CHAMFERS, OR COMBO FINISHED TO MODIFIED FACE WIDTH | | | | | |
|------------|-----------|---------|---------------------------|--|----------|----------|----------|----------|----------|
| | | | | PRICE EACH - BASED ON QUANTITY ORDERED | | | | | |
| | | | | 1 | 2 | 3 | 4 | 5 | 6 |
| 4 | .0545 | 55616R2 | 0.0600 - 0.0703 | \$558.85 | \$505.00 | \$497.25 | \$493.15 | \$490.60 | \$489.30 |
| 4 | .0701 | 55618R2 | 0.0704 - 0.0859 | 599.60 | 545.95 | 538.15 | 533.85 | 531.45 | 530.10 |
| 4 | .0858 | 55620R2 | 0.0860 - 0.1015 | 558.85 | 505.00 | 497.25 | 493.15 | 490.60 | 489.30 |
| 4 | .1014 | 55622R2 | 0.1016 - 0.1171 | 535.30 | 481.60 | 473.65 | 469.60 | 467.05 | 465.75 |
| 4 | .1170 | 55624R2 | 0.1172 - 0.1406 | 508.35 | 454.50 | 446.65 | 442.50 | 440.05 | 438.75 |
| 4 | .1562 | 55626R2 | 0.1407 - 0.1718 | 536.90 | 483.05 | 475.25 | 471.05 | 468.60 | 467.30 |
| 4 | .1875 | 55628R2 | 0.1719 - 0.2031 | 538.50 | 484.60 | 476.70 | 472.80 | 470.25 | 468.90 |
| 4 | .2188 | 55630R2 | 0.2032 - 0.2343 | 563.00 | 509.05 | 501.35 | 497.15 | 494.65 | 493.30 |
| 4 | .2500 | 55632R2 | 0.2344 - 0.2812 | 568.50 | 514.75 | 507.00 | 502.80 | 500.30 | 499.05 |
| 4 | .3125 | 55634R2 | 0.2813 - 0.3437 | 606.35 | 552.55 | 544.65 | 540.50 | 538.20 | 536.65 |
| 4 | .3750 | 55636R2 | 0.3438 - 0.4062 | 641.05 | 587.30 | 579.40 | 575.30 | 572.90 | 571.60 |
| 4 | .4375 | 55638R2 | 0.4063 - 0.4687 | 698.45 | 644.55 | 636.65 | 632.65 | 630.25 | 628.85 |
| 4 | .5000 | 55640R2 | 0.4688 - 0.5312 | 762.10 | 708.25 | 700.45 | 696.35 | 693.95 | 692.60 |



5" MILLING CUTTERS & SLITTING SAWS CARBIDE TIPPED TYPE 556

MATERIAL SPECIFIC

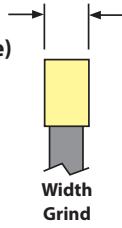
FOR STEEL

Modified width between .0704" and .5312"

TYPE 556

Cutter Notes (All cutters on page)

- 24 Teeth
- C-5 Carbide
- 1° - 3° Positive Radial Rake
- Width Tolerance: +.001"/-.000"
- OD tolerance: +.0313"/-.000"
- 1" Arbor hole +.001"/-.000"
- ANSI standard keyway dimensions
- Add 5% to grind down hub width
- Add 5% to match OD's on cutter sets within .001"
- Not designed to be used on heat treated materials greater than 475 Brinell (50RC)



| TOOL DIAM. | HUB WIDTH | EDP NO. | MODIFIED FACE WIDTH RANGE | FINISHED TO MODIFIED FACE WIDTH | | | | | |
|------------|-----------|---------|---------------------------|--|----------|----------|----------|----------|----------|
| | | | | PRICE EACH - BASED ON QUANTITY ORDERED | | | | | |
| | | | | 1 | 2 | 3 | 4 | 5 | 6 |
| 5 | .0691 | 55642D | 0.0704 - 0.0859 | \$681.80 | \$647.05 | \$640.65 | \$637.15 | \$635.10 | \$587.50 |
| 5 | .0848 | 55644D | 0.0860 - 0.1015 | 686.00 | 651.15 | 644.70 | 641.30 | 639.20 | 591.65 |
| 5 | .1004 | 55646D | 0.1016 - 0.1171 | 646.20 | 611.50 | 605.05 | 601.55 | 599.50 | 552.05 |
| 5 | .1160 | 55648D | 0.1172 - 0.1406 | 573.00 | 538.25 | 531.60 | 528.25 | 526.20 | 478.70 |
| 5 | .1562 | 55650D | 0.1407 - 0.1718 | 584.00 | 549.25 | 542.70 | 539.30 | 537.25 | 489.65 |
| 5 | .1875 | 55652D | 0.1719 - 0.2031 | 618.45 | 583.65 | 577.10 | 573.65 | 571.65 | 524.10 |
| 5 | .2188 | 55654D | 0.2032 - 0.2343 | 633.40 | 598.65 | 591.90 | 588.55 | 586.60 | 539.00 |
| 5 | .2500 | 55656D | 0.2344 - 0.2812 | 656.50 | 621.70 | 615.15 | 611.85 | 609.80 | 562.25 |
| 5 | .3125 | 55658D | 0.2813 - 0.3437 | 705.65 | 670.95 | 664.40 | 661.00 | 658.85 | 611.45 |
| 5 | .3750 | 55660D | 0.3438 - 0.4062 | 755.05 | 720.25 | 713.55 | 710.25 | 708.15 | 660.65 |
| 5 | .4375 | 55662D | 0.4063 - 0.4687 | 828.50 | 793.60 | 787.10 | 783.60 | 781.65 | 734.10 |
| 5 | .5000 | 55664D | 0.4688 - 0.5312 | 910.00 | 875.10 | 868.65 | 865.20 | 863.30 | 815.65 |

Corner Radius or Chamfer on ONE Side

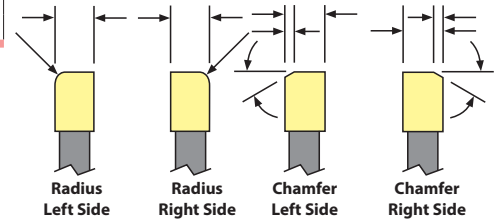
| TOOL DIAM. | HUB WIDTH | EDP NO. | ONE RADIUS OR CHAMFER FINISHED TO MODIFIED FACE WIDTH | | | | | | |
|------------|-----------|---------|---|--|----------|----------|----------|----------|----------|
| | | | MODIFIED FACE WIDTH RANGE | PRICE EACH - BASED ON QUANTITY ORDERED | | | | | |
| | | | | 1 | 2 | 3 | 4 | 5 | 6 |
| 5 | .0691 | 55642R1 | 0.0704 - 0.0859 | \$703.50 | \$653.65 | \$646.45 | \$642.60 | \$640.35 | \$639.15 |
| 5 | .0848 | 55644R1 | 0.0860 - 0.1015 | 707.65 | 657.90 | 650.60 | 646.80 | 644.50 | 643.25 |
| 5 | .1004 | 55646R1 | 0.1016 - 0.1171 | 667.95 | 618.05 | 610.80 | 607.00 | 604.80 | 603.65 |
| 5 | .1160 | 55648R1 | 0.1172 - 0.1406 | 594.55 | 544.75 | 537.50 | 533.75 | 531.45 | 530.25 |
| 5 | .1562 | 55650R1 | 0.1407 - 0.1718 | 605.65 | 555.90 | 548.60 | 544.75 | 542.55 | 541.25 |
| 5 | .1875 | 55652R1 | 0.1719 - 0.2031 | 640.05 | 590.25 | 583.05 | 579.25 | 577.00 | 575.75 |
| 5 | .2188 | 55654R1 | 0.2032 - 0.2343 | 654.95 | 605.20 | 597.85 | 594.20 | 591.80 | 590.65 |
| 5 | .2500 | 55656R1 | 0.2344 - 0.2812 | 678.25 | 628.40 | 621.10 | 617.30 | 615.00 | 613.75 |
| 5 | .3125 | 55658R1 | 0.2813 - 0.3437 | 727.35 | 677.55 | 670.35 | 666.60 | 664.30 | 663.10 |
| 5 | .3750 | 55660R1 | 0.3438 - 0.4062 | 776.75 | 726.80 | 719.45 | 715.70 | 713.40 | 712.30 |
| 5 | .4375 | 55662R1 | 0.4063 - 0.4687 | 850.00 | 800.30 | 792.95 | 789.20 | 787.00 | 785.70 |
| 5 | .5000 | 55664R1 | 0.4688 - 0.5312 | 931.55 | 881.80 | 874.45 | 870.75 | 868.50 | 867.20 |

Radius Notes

- Maximum radius on one side is .2656"
- Full radius and maximum radius on both sides is 1/2 the width of the cutter
- A non-tangent radii must be quoted

Chamfer Notes

- Chamfer Angles can range from 0° to 45°
- Chamfer is measured off the OD
- Maximum chamfer is the LESSER of 1/2 the width of the cutter OR .2656" length of angle when measured across the OD
- Chamfer Angle Tolerance: +/- 1/2°
- Chamfers greater than 45° must be quoted

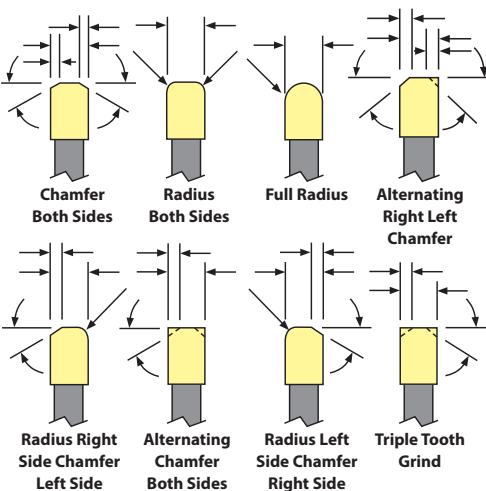


Specify right or left side for radius or chamfer



Corner Radius or Chamfer on BOTH Sides OR a Full Radius

• Price Increases 5% for Alternating Chamfers



| TOOL DIAM. | HUB WIDTH | EDP NO. | RADI, CHAMFERS, OR COMBO FINISHED TO MODIFIED FACE WIDTH | | | | | | |
|------------|-----------|---------|--|--|----------|----------|----------|----------|----------|
| | | | MODIFIED FACE WIDTH RANGE | PRICE EACH - BASED ON QUANTITY ORDERED | | | | | |
| | | | | 1 | 2 | 3 | 4 | 5 | 6 |
| 5 | .0691 | 55642R2 | 0.0704 - 0.0859 | \$726.65 | \$666.85 | \$658.25 | \$653.65 | \$651.00 | \$649.50 |
| 5 | .0848 | 55644R2 | 0.0860 - 0.1015 | 730.85 | 671.05 | 662.35 | 657.70 | 654.95 | 653.60 |
| 5 | .1004 | 55646R2 | 0.1016 - 0.1171 | 691.10 | 631.30 | 622.60 | 618.00 | 615.30 | 613.90 |
| 5 | .1160 | 55648R2 | 0.1172 - 0.1406 | 617.80 | 558.00 | 549.30 | 544.70 | 541.95 | 540.55 |
| 5 | .1562 | 55650R2 | 0.1407 - 0.1718 | 628.85 | 569.15 | 560.35 | 555.75 | 553.05 | 551.60 |
| 5 | .1875 | 55652R2 | 0.1719 - 0.2031 | 663.25 | 603.45 | 594.75 | 590.25 | 587.50 | 586.00 |
| 5 | .2188 | 55654R2 | 0.2032 - 0.2343 | 678.25 | 618.45 | 609.80 | 605.15 | 602.40 | 600.90 |
| 5 | .2500 | 55656R2 | 0.2344 - 0.2812 | 701.35 | 641.55 | 632.85 | 628.35 | 625.55 | 624.10 |
| 5 | .3125 | 55658R2 | 0.2813 - 0.3437 | 750.60 | 690.85 | 682.10 | 677.50 | 674.80 | 673.30 |
| 5 | .3750 | 55660R2 | 0.3438 - 0.4062 | 799.75 | 740.05 | 731.30 | 726.70 | 724.00 | 722.60 |
| 5 | .4375 | 55662R2 | 0.4063 - 0.4687 | 873.20 | 813.60 | 804.75 | 800.15 | 797.40 | 796.00 |
| 5 | .5000 | 55664R2 | 0.4688 - 0.5312 | 954.80 | 895.05 | 886.25 | 881.75 | 879.05 | 877.60 |



6" MILLING CUTTERS & SLITTING SAWS CARBIDE TIPPED TYPE 556

MATERIAL SPECIFIC

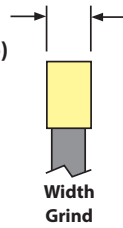
FOR STEEL

Modified width between .0704" and .5312"

TYPE 556

Cutter Notes (All cutters on page)

- 28 Teeth
- C-5 Carbide
- 1° - 3° Positive Radial Rake
- Width Tolerance: +.001"/-.000"
- OD tolerance: +.0313"/-.000"
- 1" Arbor hole +.001"/-.000"
- ANSI standard keyway dimensions
- Add 5% to grind down hub width
- Add 5% to match OD's on cutter sets within .001"
- Not designed to be used on heat treated materials greater than 475 Brinell (50RC)



| TOOL DIAM. | HUB WIDTH | EDP NO. | MODIFIED FACE WIDTH RANGE | FINISHED TO MODIFIED FACE WIDTH | | | | | |
|------------|-----------|---------|---------------------------|--|----------|----------|----------|----------|----------|
| | | | | PRICE EACH - BASED ON QUANTITY ORDERED | | | | | |
| | | | | 1 | 2 | 3 | 4 | 5 | 6 |
| 6 | .0681 | 55666D | 0.0704 - 0.0859 | \$766.30 | \$728.05 | \$720.60 | \$716.80 | \$714.50 | \$660.55 |
| 6 | .0838 | 55668D | 0.0860 - 0.1015 | 710.85 | 672.70 | 665.25 | 661.40 | 659.15 | 605.15 |
| 6 | .0994 | 55670D | 0.1016 - 0.1171 | 768.60 | 730.35 | 722.90 | 719.10 | 716.75 | 662.85 |
| 6 | .1150 | 55672D | 0.1172 - 0.1406 | 740.70 | 702.50 | 695.10 | 691.15 | 688.90 | 634.95 |
| 6 | .1562 | 55674D | 0.1407 - 0.1718 | 740.40 | 702.05 | 694.65 | 690.85 | 688.55 | 634.65 |
| 6 | .1875 | 55676D | 0.1719 - 0.2031 | 786.60 | 748.45 | 741.05 | 737.15 | 734.80 | 680.80 |
| 6 | .2188 | 55678D | 0.2032 - 0.2343 | 798.25 | 760.05 | 752.65 | 748.80 | 746.45 | 692.55 |
| 6 | .2500 | 55680D | 0.2344 - 0.2812 | 846.10 | 807.80 | 800.40 | 796.55 | 794.25 | 740.25 |
| 6 | .3125 | 55682D | 0.2813 - 0.3437 | 856.35 | 818.05 | 810.65 | 806.80 | 804.45 | 750.60 |
| 6 | .3750 | 55684D | 0.3438 - 0.4062 | 885.25 | 846.85 | 839.45 | 835.55 | 833.30 | 779.50 |
| 6 | .4375 | 55690D | 0.4063 - 0.4687 | 971.80 | 933.55 | 926.15 | 922.15 | 919.95 | 866.00 |
| 6 | .5000 | 55692D | 0.4688 - 0.5312 | 1067.95 | 1029.80 | 1022.40 | 1018.40 | 1016.20 | 962.25 |

Corner Radius or Chamfer on ONE Side

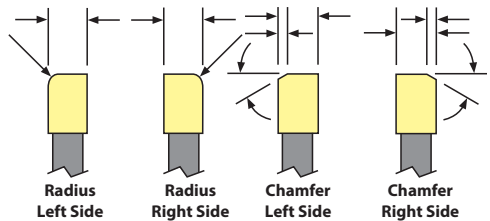
| TOOL DIAM. | HUB WIDTH | EDP NO. | ONE RADIUS OR CHAMFER FINISHED TO MODIFIED FACE WIDTH | | | | | | |
|------------|-----------|---------|---|--|----------|----------|----------|----------|----------|
| | | | MODIFIED FACE WIDTH RANGE | PRICE EACH - BASED ON QUANTITY ORDERED | | | | | |
| | | | | 1 | 2 | 3 | 4 | 5 | 6 |
| 6 | .0681 | 55666R1 | 0.0704 - 0.0859 | \$789.15 | \$735.30 | \$727.15 | \$722.75 | \$720.25 | \$718.85 |
| 6 | .0838 | 55668R1 | 0.0860 - 0.1015 | 733.65 | 679.95 | 671.75 | 667.40 | 664.75 | 663.40 |
| 6 | .0994 | 55670R1 | 0.1016 - 0.1171 | 791.35 | 737.55 | 729.30 | 725.10 | 722.55 | 721.10 |
| 6 | .1150 | 55672R1 | 0.1172 - 0.1406 | 763.45 | 709.70 | 701.50 | 697.20 | 694.60 | 693.20 |
| 6 | .1562 | 55674R1 | 0.1407 - 0.1718 | 763.20 | 709.40 | 701.20 | 696.85 | 694.30 | 692.95 |
| 6 | .1875 | 55676R1 | 0.1719 - 0.2031 | 809.40 | 755.60 | 747.40 | 743.00 | 740.55 | 739.20 |
| 6 | .2188 | 55678R1 | 0.2032 - 0.2343 | 821.15 | 767.30 | 759.05 | 754.85 | 752.25 | 750.85 |
| 6 | .2500 | 55680R1 | 0.2344 - 0.2812 | 868.90 | 815.05 | 806.80 | 802.60 | 800.00 | 798.60 |
| 6 | .3125 | 55682R1 | 0.2813 - 0.3437 | 879.25 | 825.30 | 817.15 | 812.85 | 810.30 | 808.90 |
| 6 | .3750 | 55684R1 | 0.3438 - 0.4062 | 907.90 | 854.10 | 845.90 | 841.65 | 839.05 | 837.60 |
| 6 | .4375 | 55690R1 | 0.4063 - 0.4687 | 994.60 | 940.65 | 932.50 | 928.20 | 925.65 | 924.25 |
| 6 | .5000 | 55692R1 | 0.4688 - 0.5312 | 1090.80 | 1036.90 | 1028.75 | 1024.45 | 1021.80 | 1020.55 |

Radius Notes

- Maximum radius on one side is .2656"
- Full radius and maximum radius on both sides is 1/2 the width of the cutter
- A non-tangent radii must be quoted

Chamfer Notes

- Chamfer Angles can range from 0° to 45°
- Chamfer is measured off the OD
- Maximum chamfer is the LESSER of 1/2 the width of the cutter OR .2656" length of angle when measured across the OD
- Chamfer Angle Tolerance: +/- 1/2°
- Chamfers greater than 45° must be quoted

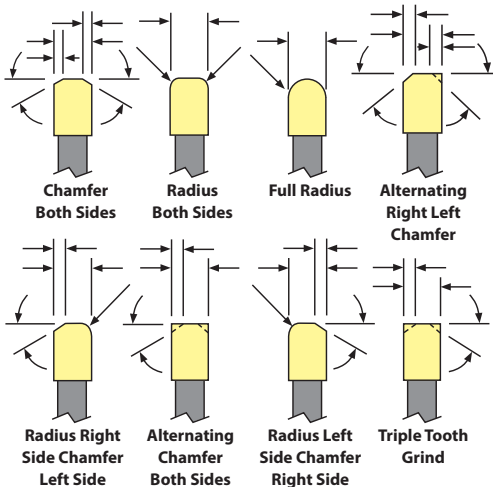


Specify right or left side for radius or chamfer



Corner Radius or Chamfer on BOTH Sides OR a Full Radius

• Price Increases 5% for Alternating Chamfers



| TOOL DIAM. | HUB WIDTH | EDP NO. | RADI, CHAMFERS, OR COMBO FINISHED TO MODIFIED FACE WIDTH | | | | | | |
|------------|-----------|---------|--|--|----------|----------|----------|----------|----------|
| | | | MODIFIED FACE WIDTH RANGE | PRICE EACH - BASED ON QUANTITY ORDERED | | | | | |
| | | | | 1 | 2 | 3 | 4 | 5 | 6 |
| 6 | .0681 | 55666R2 | 0.0704 - 0.0859 | \$813.85 | \$749.70 | \$739.80 | \$734.80 | \$731.75 | \$730.10 |
| 6 | .0838 | 55668R2 | 0.0860 - 0.1015 | 758.45 | 694.25 | 684.45 | 679.35 | 676.25 | 674.70 |
| 6 | .0994 | 55670R2 | 0.1016 - 0.1171 | 816.10 | 751.90 | 742.15 | 736.95 | 734.05 | 732.30 |
| 6 | .1150 | 55672R2 | 0.1172 - 0.1406 | 788.25 | 724.00 | 714.20 | 709.05 | 706.15 | 704.45 |
| 6 | .1562 | 55674R2 | 0.1407 - 0.1718 | 787.90 | 723.75 | 714.00 | 708.80 | 705.80 | 704.15 |
| 6 | .1875 | 55676R2 | 0.1719 - 0.2031 | 834.15 | 770.00 | 760.10 | 755.05 | 752.00 | 750.30 |
| 6 | .2188 | 55678R2 | 0.2032 - 0.2343 | 845.85 | 781.65 | 771.80 | 766.70 | 763.75 | 762.05 |
| 6 | .2500 | 55680R2 | 0.2344 - 0.2812 | 893.50 | 829.35 | 819.65 | 814.45 | 811.45 | 809.75 |
| 6 | .3125 | 55682R2 | 0.2813 - 0.3437 | 903.90 | 839.70 | 829.90 | 824.80 | 821.80 | 820.10 |
| 6 | .3750 | 55684R2 | 0.3438 - 0.4062 | 932.65 | 868.50 | 858.70 | 853.50 | 850.60 | 848.80 |
| 6 | .4375 | 55690R2 | 0.4063 - 0.4687 | 1019.25 | 955.05 | 945.25 | 940.15 | 937.15 | 935.50 |
| 6 | .5000 | 55692R2 | 0.4688 - 0.5312 | 1115.55 | 1051.30 | 1041.50 | 1036.40 | 1033.40 | 1031.70 |



3" MILLING CUTTERS & SLITTING SAWS CARBIDE TIPPED TYPE 559



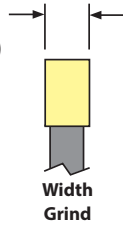
SUITABLE FOR MOST MATERIALS

Modified width between .0600" and .5312"

TYPE 559

Cutter Notes (All cutters on page)

- 12 Teeth
- C-2(m) Carbide
- 5° Positive Radial Rake
- Width Tolerance: +.001"/-.000"
- OD tolerance: +.0313"/-.000"
- 1" Arbor hole +.001"/-.000"
- ANSI standard keyway dimensions
- Add 5% to grind down hub width
- Add 5% to match OD's on cutter sets within .001"
- Not designed to be used on heat treated materials greater than 363 Brinell (39RC)



| TOOL DIAM. | HUB WIDTH | EDP NO. | MODIFIED FACE WIDTH RANGE | FINISHED TO MODIFIED FACE WIDTH | | | | | |
|------------|-----------|---------|---------------------------|--|----------|----------|----------|----------|----------|
| | | | | PRICE EACH - BASED ON QUANTITY ORDERED | | | | | |
| | | | | 1 | 2 | 3 | 4 | 5 | 6 |
| 3 | .0555 | 55998D | 0.0600 - 0.0703 | \$414.70 | \$384.65 | \$379.60 | \$376.85 | \$375.25 | \$337.30 |
| 3 | .0711 | 55900D | 0.0704 - 0.0859 | 455.30 | 425.30 | 420.10 | 417.40 | 415.65 | 377.85 |
| 3 | .0867 | 55902D | 0.0860 - 0.1015 | 414.70 | 384.65 | 379.60 | 376.85 | 375.25 | 337.30 |
| 3 | .1024 | 55904D | 0.1016 - 0.1171 | 399.35 | 369.50 | 364.25 | 361.50 | 359.85 | 322.00 |
| 3 | .1180 | 55906D | 0.1172 - 0.1406 | 384.95 | 354.95 | 349.70 | 346.95 | 345.35 | 307.55 |
| 3 | .1562 | 55908D | 0.1407 - 0.1718 | 392.40 | 362.50 | 357.25 | 354.55 | 352.95 | 314.90 |
| 3 | .1875 | 55909D | 0.1719 - 0.2031 | 399.95 | 369.90 | 364.65 | 362.00 | 360.40 | 322.50 |
| 3 | .2188 | 55910D | 0.2032 - 0.2343 | 410.10 | 380.25 | 375.00 | 372.25 | 370.60 | 332.70 |
| 3 | .2500 | 55911D | 0.2344 - 0.2812 | 420.30 | 390.35 | 385.00 | 382.25 | 380.75 | 342.75 |
| 3 | .3125 | 55912D | 0.2813 - 0.3437 | 452.95 | 423.00 | 417.75 | 415.10 | 413.45 | 375.50 |
| 3 | .3750 | 55913D | 0.3438 - 0.4062 | 488.05 | 458.15 | 452.95 | 450.10 | 448.50 | 410.75 |
| 3 | .4375 | 55914D | 0.4063 - 0.4687 | 523.55 | 493.70 | 488.50 | 485.75 | 484.10 | 446.30 |
| 3 | .5000 | 55915D | 0.4688 - 0.5312 | 559.25 | 529.15 | 523.95 | 521.25 | 519.75 | 481.70 |

Corner Radius or Chamfer on ONE Side

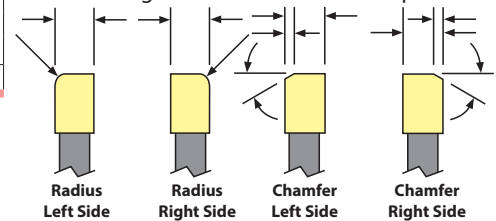
| TOOL DIAM. | HUB WIDTH | EDP NO. | ONE RADIUS OR CHAMFER FINISHED TO MODIFIED FACE WIDTH | | | | | | |
|------------|-----------|---------|---|--|----------|----------|----------|----------|----------|
| | | | MODIFIED FACE WIDTH RANGE | PRICE EACH - BASED ON QUANTITY ORDERED | | | | | |
| | | | | 1 | 2 | 3 | 4 | 5 | 6 |
| 3 | .0555 | 55998R1 | 0.0600 - 0.0703 | \$434.95 | \$390.70 | \$384.65 | \$381.85 | \$380.00 | \$379.10 |
| 3 | .0711 | 55900R1 | 0.0704 - 0.0859 | 475.55 | 431.20 | 425.30 | 422.30 | 420.50 | 419.60 |
| 3 | .0867 | 55902R1 | 0.0860 - 0.1015 | 434.95 | 390.70 | 384.65 | 381.85 | 380.00 | 379.10 |
| 3 | .1024 | 55904R1 | 0.1016 - 0.1171 | 419.70 | 375.35 | 369.50 | 366.50 | 364.60 | 363.65 |
| 3 | .1180 | 55906R1 | 0.1172 - 0.1406 | 405.20 | 360.80 | 354.95 | 351.95 | 350.20 | 349.10 |
| 3 | .1562 | 55908R1 | 0.1407 - 0.1718 | 412.60 | 368.30 | 362.50 | 359.40 | 357.65 | 356.60 |
| 3 | .1875 | 55909R1 | 0.1719 - 0.2031 | 420.25 | 375.75 | 369.90 | 366.95 | 365.25 | 364.20 |
| 3 | .2188 | 55910R1 | 0.2032 - 0.2343 | 430.30 | 386.15 | 380.25 | 377.05 | 375.35 | 374.25 |
| 3 | .2500 | 55911R1 | 0.2344 - 0.2812 | 440.45 | 396.10 | 390.35 | 387.25 | 385.50 | 384.45 |
| 3 | .3125 | 55912R1 | 0.2813 - 0.3437 | 473.15 | 428.90 | 423.00 | 419.95 | 418.25 | 417.10 |
| 3 | .3750 | 55913R1 | 0.3438 - 0.4062 | 508.45 | 464.05 | 458.15 | 455.15 | 453.35 | 452.40 |
| 3 | .4375 | 55914R1 | 0.4063 - 0.4687 | 543.90 | 499.60 | 493.70 | 490.65 | 488.85 | 487.90 |
| 3 | .5000 | 55915R1 | 0.4688 - 0.5312 | 579.40 | 535.05 | 529.15 | 526.25 | 524.30 | 523.40 |

Radius Notes

- Maximum radius on one side is .2656"
- Full radius and maximum radius on both sides is 1/2 the width of the cutter
- A non-tangent radii must be quoted

Chamfer Notes

- Chamfer Angles can range from 0° to 45°
- Chamfer is measured off the OD
- Maximum chamfer is the LESSER of 1/3 the width of the cutter OR .2656" length of angle when measured across the OD
- Chamfer Angle Tolerance: +/- 1/2°
- Chamfers greater than 45° must be quoted

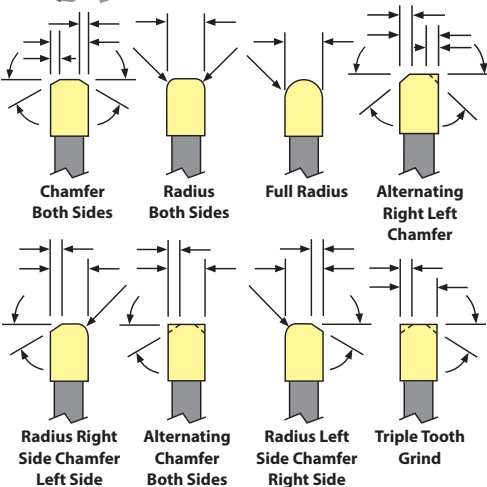


Specify right or left side for radius or chamfer



Corner Radius or Chamfer on BOTH Sides OR a Full Radius

• Price Increases 5% for Alternating Chamfers



| TOOL DIAM. | HUB WIDTH | EDP NO. | RADI, CHAMFERS, OR COMBO FINISHED TO MODIFIED FACE WIDTH | | | | | | |
|------------|-----------|---------|--|--|----------|----------|----------|----------|----------|
| | | | MODIFIED FACE WIDTH RANGE | PRICE EACH - BASED ON QUANTITY ORDERED | | | | | |
| | | | | 1 | 2 | 3 | 4 | 5 | 6 |
| 3 | .0555 | 55998R2 | 0.0600 - 0.0703 | \$445.75 | \$396.65 | \$390.15 | \$386.65 | \$384.60 | \$383.65 |
| 3 | .0711 | 55900R2 | 0.0704 - 0.0859 | 486.40 | 437.10 | 430.70 | 427.25 | 425.15 | 424.05 |
| 3 | .0867 | 55902R2 | 0.0860 - 0.1015 | 445.75 | 396.65 | 390.15 | 386.65 | 384.60 | 383.65 |
| 3 | .1024 | 55904R2 | 0.1016 - 0.1171 | 430.65 | 381.30 | 374.80 | 371.50 | 369.40 | 368.25 |
| 3 | .1180 | 55906R2 | 0.1172 - 0.1406 | 416.05 | 366.80 | 360.25 | 356.90 | 354.85 | 353.80 |
| 3 | .1562 | 55908R2 | 0.1407 - 0.1718 | 423.55 | 374.20 | 367.80 | 364.40 | 362.40 | 361.25 |
| 3 | .1875 | 55909R2 | 0.1719 - 0.2031 | 430.95 | 381.85 | 375.30 | 371.85 | 369.85 | 368.80 |
| 3 | .2188 | 55910R2 | 0.2032 - 0.2343 | 441.35 | 391.95 | 385.55 | 382.15 | 380.05 | 379.10 |
| 3 | .2500 | 55911R2 | 0.2344 - 0.2812 | 451.30 | 402.05 | 395.55 | 392.15 | 390.15 | 389.05 |
| 3 | .3125 | 55912R2 | 0.2813 - 0.3437 | 484.05 | 434.75 | 428.20 | 424.90 | 422.95 | 421.85 |
| 3 | .3750 | 55913R2 | 0.3438 - 0.4062 | 519.30 | 470.05 | 463.45 | 460.05 | 458.05 | 457.00 |
| 3 | .4375 | 55914R2 | 0.4063 - 0.4687 | 554.65 | 505.55 | 499.05 | 495.55 | 493.65 | 492.50 |
| 3 | .5000 | 55915R2 | 0.4688 - 0.5312 | 590.25 | 541.15 | 534.50 | 531.20 | 529.10 | 528.00 |



4" MILLING CUTTERS & SLITTING SAWS CARBIDE TIPPED TYPE 559



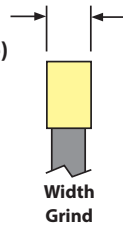
SUITABLE FOR MOST MATERIALS

Modified width between .0600" and .5312"

TYPE 559

Cutter Notes (All cutters on page)

- 14 Teeth
- C-2(m) Carbide
- 5° Positive Radial Rake
- Width Tolerance: +.001"/-.000"
- OD tolerance: +.0313"/-.000"
- 1" Arbor hole +.001"/-.000"
- ANSI standard keyway dimensions
- Add 5% to grind down hub width
- Add 5% to match OD's on cutter sets within .001"
- Not designed to be used on heat treated materials greater than 363 Brinell (39RC)



| TOOL DIAM. | HUB WIDTH | EDP NO. | MODIFIED FACE WIDTH RANGE | FINISHED TO MODIFIED FACE WIDTH | | | | | |
|------------|-----------|---------|---------------------------|--|----------|----------|----------|----------|----------|
| | | | | PRICE EACH - BASED ON QUANTITY ORDERED | | | | | |
| | | | | 1 | 2 | 3 | 4 | 5 | 6 |
| 4 | .0545 | 55916D | 0.0600 - 0.0703 | \$474.80 | \$440.45 | \$434.15 | \$430.95 | \$428.95 | \$383.70 |
| 4 | .0701 | 55918D | 0.0704 - 0.0859 | 530.80 | 496.35 | 490.05 | 486.85 | 485.00 | 439.60 |
| 4 | .0858 | 55920D | 0.0860 - 0.1015 | 474.80 | 440.45 | 434.15 | 430.95 | 428.95 | 383.70 |
| 4 | .1014 | 55922D | 0.1016 - 0.1171 | 546.15 | 511.70 | 505.45 | 502.35 | 500.25 | 454.80 |
| 4 | .1170 | 55924D | 0.1172 - 0.1406 | 474.35 | 439.80 | 433.45 | 430.25 | 428.40 | 383.05 |
| 4 | .1562 | 55926D | 0.1407 - 0.1718 | 484.30 | 449.95 | 443.65 | 440.45 | 438.45 | 393.15 |
| 4 | .1875 | 55928D | 0.1719 - 0.2031 | 496.80 | 462.40 | 456.10 | 453.00 | 451.00 | 405.65 |
| 4 | .2188 | 55930D | 0.2032 - 0.2343 | 509.65 | 475.25 | 468.90 | 465.70 | 463.60 | 418.40 |
| 4 | .2500 | 55932D | 0.2344 - 0.2812 | 519.75 | 485.20 | 478.95 | 475.70 | 473.70 | 428.45 |
| 4 | .3125 | 55934D | 0.2813 - 0.3437 | 549.80 | 515.35 | 509.05 | 505.85 | 503.85 | 458.70 |
| 4 | .3750 | 55936D | 0.3438 - 0.4062 | 585.15 | 550.75 | 544.50 | 541.20 | 539.10 | 493.85 |
| 4 | .4375 | 55938D | 0.4063 - 0.4687 | 620.65 | 586.25 | 579.90 | 576.70 | 574.60 | 529.45 |
| 4 | .5000 | 55940D | 0.4688 - 0.5312 | 656.25 | 621.65 | 615.45 | 612.15 | 610.25 | 564.90 |

Corner Radius or Chamfer on ONE Side

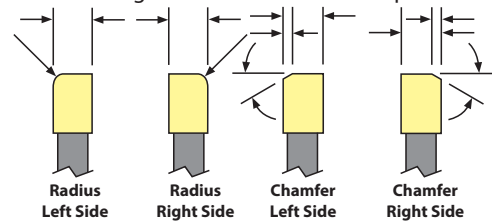
| TOOL DIAM. | HUB WIDTH | EDP NO. | ONE RADIUS OR CHAMFER FINISHED TO MODIFIED FACE WIDTH | | | | | | |
|------------|-----------|---------|---|--|----------|----------|----------|----------|----------|
| | | | MODIFIED FACE WIDTH RANGE | PRICE EACH - BASED ON QUANTITY ORDERED | | | | | |
| | | | | 1 | 2 | 3 | 4 | 5 | 6 |
| 4 | .0545 | 55916R1 | 0.0600 - 0.0703 | \$496.75 | \$446.90 | \$439.95 | \$436.25 | \$434.15 | \$433.00 |
| 4 | .0701 | 55918R1 | 0.0704 - 0.0859 | 552.65 | 502.75 | 495.85 | 492.15 | 490.05 | 488.85 |
| 4 | .0858 | 55920R1 | 0.0860 - 0.1015 | 496.75 | 446.90 | 439.95 | 436.25 | 434.15 | 433.00 |
| 4 | .1014 | 55922R1 | 0.1016 - 0.1171 | 568.15 | 518.15 | 511.20 | 507.65 | 505.45 | 504.25 |
| 4 | .1170 | 55924R1 | 0.1172 - 0.1406 | 496.20 | 446.30 | 439.30 | 435.65 | 433.45 | 432.35 |
| 4 | .1562 | 55926R1 | 0.1407 - 0.1718 | 506.20 | 456.25 | 449.40 | 445.75 | 443.65 | 442.45 |
| 4 | .1875 | 55928R1 | 0.1719 - 0.2031 | 518.80 | 468.90 | 461.95 | 458.25 | 456.10 | 454.85 |
| 4 | .2188 | 55930R1 | 0.2032 - 0.2343 | 531.55 | 481.65 | 474.65 | 471.05 | 468.90 | 467.65 |
| 4 | .2500 | 55932R1 | 0.2344 - 0.2812 | 541.60 | 491.60 | 484.65 | 481.05 | 478.95 | 477.75 |
| 4 | .3125 | 55934R1 | 0.2813 - 0.3437 | 571.75 | 521.75 | 514.85 | 511.25 | 509.05 | 507.80 |
| 4 | .3750 | 55936R1 | 0.3438 - 0.4062 | 606.95 | 557.10 | 550.05 | 546.45 | 544.50 | 543.15 |
| 4 | .4375 | 55938R1 | 0.4063 - 0.4687 | 642.55 | 592.70 | 585.60 | 582.10 | 579.90 | 578.70 |
| 4 | .5000 | 55940R1 | 0.4688 - 0.5312 | 678.10 | 628.25 | 621.30 | 617.65 | 615.45 | 614.30 |

Radius Notes

- Maximum radius on one side is .2656"
- Full radius and maximum radius on both sides is 1/2 the width of the cutter
- A non-tangent radii must be quoted

Chamfer Notes

- Chamfer Angles can range from 0° to 45°
- Chamfer is measured off the OD
- Maximum chamfer is the LESSER of 1/3 the width of the cutter OR .2656" length of angle when measured across the OD
- Chamfer Angle Tolerance: +/- 1/2°
- Chamfers greater than 45° must be quoted

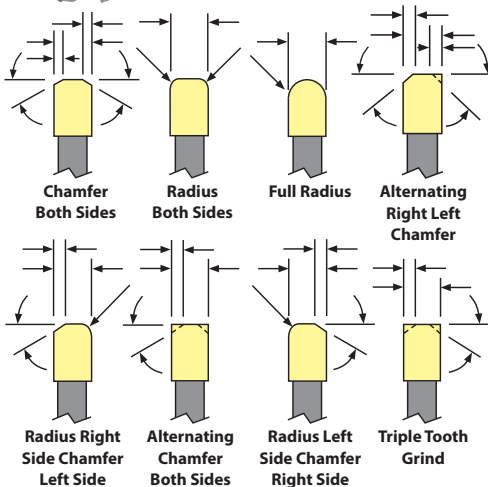


Specify right or left side for radius or chamfer



Corner Radius or Chamfer on BOTH Sides OR a Full Radius

• Price Increases 5% for Alternating Chamfers



| TOOL DIAM. | HUB WIDTH | EDP NO. | MODIFIED FACE WIDTH RANGE | RADI, CHAMFERS, OR COMBO FINISHED TO MODIFIED FACE WIDTH | | | | | |
|------------|-----------|---------|---------------------------|--|----------|----------|----------|----------|----------|
| | | | | PRICE EACH - BASED ON QUANTITY ORDERED | | | | | |
| | | | | 1 | 2 | 3 | 4 | 5 | 6 |
| 4 | .0545 | 55916R2 | 0.0600 - 0.0703 | \$508.45 | \$453.40 | \$445.65 | \$441.70 | \$439.30 | \$438.05 |
| 4 | .0701 | 55918R2 | 0.0704 - 0.0859 | 564.15 | 509.25 | 501.55 | 497.55 | 495.10 | 493.85 |
| 4 | .0858 | 55920R2 | 0.0860 - 0.1015 | 508.45 | 453.40 | 445.65 | 441.70 | 439.30 | 438.05 |
| 4 | .1014 | 55922R2 | 0.1016 - 0.1171 | 579.60 | 524.65 | 516.85 | 513.00 | 510.55 | 509.25 |
| 4 | .1170 | 55924R2 | 0.1172 - 0.1406 | 507.70 | 452.65 | 445.00 | 441.05 | 438.70 | 437.35 |
| 4 | .1562 | 55926R2 | 0.1407 - 0.1718 | 517.85 | 462.85 | 455.10 | 451.15 | 448.60 | 447.35 |
| 4 | .1875 | 55928R2 | 0.1719 - 0.2031 | 530.40 | 475.35 | 467.65 | 463.60 | 461.20 | 460.00 |
| 4 | .2188 | 55930R2 | 0.2032 - 0.2343 | 543.10 | 488.05 | 480.45 | 476.50 | 474.10 | 472.80 |
| 4 | .2500 | 55932R2 | 0.2344 - 0.2812 | 553.05 | 498.10 | 490.45 | 486.40 | 484.05 | 482.70 |
| 4 | .3125 | 55934R2 | 0.2813 - 0.3437 | 583.25 | 528.30 | 520.55 | 516.60 | 514.15 | 512.95 |
| 4 | .3750 | 55936R2 | 0.3438 - 0.4062 | 618.60 | 563.55 | 555.90 | 551.95 | 549.60 | 548.20 |
| 4 | .4375 | 55938R2 | 0.4063 - 0.4687 | 654.10 | 599.15 | 591.45 | 587.40 | 584.95 | 583.85 |
| 4 | .5000 | 55940R2 | 0.4688 - 0.5312 | 689.65 | 634.70 | 626.90 | 622.95 | 620.55 | 619.15 |



5" MILLING CUTTERS & SLITTING SAWS CARBIDE TIPPED TYPE 559



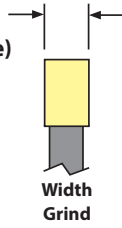
SUITABLE FOR MOST MATERIALS

Modified width between .0704" and .5312"

TYPE 559

Cutter Notes (All cutters on page)

- 16 Teeth
- C-2(m) Carbide
- 5° Positive Radial Rake
- Width Tolerance: +.001"/-.000"
- OD tolerance: +.0313"/-.000"
- 1" Arbor hole +.001"/-.000"
- ANSI standard keyway dimensions
- Add 5% to grind down hub width
- Add 5% to match OD's on cutter sets within .001"
- Not designed to be used on heat treated materials greater than 363 Brinell (39RC)



| TOOL DIAM. | HUB WIDTH | EDP NO. | MODIFIED FACE WIDTH RANGE | FINISHED TO MODIFIED FACE WIDTH | | | | | |
|------------|-----------|---------|---------------------------|--|----------|----------|----------|----------|----------|
| | | | | PRICE EACH - BASED ON QUANTITY ORDERED | | | | | |
| | | | | 1 | 2 | 3 | 4 | 5 | 6 |
| 5 | .0691 | 55942D | 0.0704 - 0.0859 | \$634.95 | \$599.60 | \$593.20 | \$590.00 | \$588.05 | \$541.65 |
| 5 | .0848 | 55944D | 0.0860 - 0.1015 | 557.90 | 522.65 | 516.35 | 513.00 | 511.05 | 464.50 |
| 5 | .1004 | 55946D | 0.1016 - 0.1171 | 604.10 | 569.00 | 562.50 | 559.35 | 557.30 | 511.00 |
| 5 | .1160 | 55948D | 0.1172 - 0.1406 | 544.50 | 509.05 | 502.75 | 499.45 | 497.50 | 451.10 |
| 5 | .1562 | 55950D | 0.1407 - 0.1718 | 559.40 | 524.10 | 517.85 | 514.40 | 512.40 | 466.00 |
| 5 | .1875 | 55952D | 0.1719 - 0.2031 | 584.70 | 549.45 | 543.10 | 539.85 | 537.80 | 491.40 |
| 5 | .2188 | 55954D | 0.2032 - 0.2343 | 609.95 | 574.60 | 568.30 | 564.95 | 563.00 | 516.60 |
| 5 | .2500 | 55956D | 0.2344 - 0.2812 | 635.00 | 599.70 | 593.45 | 590.10 | 588.20 | 541.70 |
| 5 | .3125 | 55958D | 0.2813 - 0.3437 | 677.75 | 642.55 | 636.20 | 632.85 | 630.95 | 584.55 |
| 5 | .3750 | 55960D | 0.3438 - 0.4062 | 723.15 | 687.95 | 681.65 | 678.30 | 676.25 | 629.95 |
| 5 | .4375 | 55962D | 0.4063 - 0.4687 | 758.65 | 723.60 | 717.20 | 713.90 | 711.80 | 665.45 |
| 5 | .5000 | 55964D | 0.4688 - 0.5312 | 794.30 | 759.05 | 752.65 | 749.40 | 747.40 | 700.90 |

Corner Radius or Chamfer on ONE Side

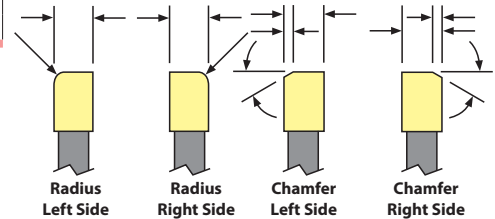
| TOOL DIAM. | HUB WIDTH | EDP NO. | ONE RADIUS OR CHAMFER FINISHED TO MODIFIED FACE WIDTH | | | | | | | |
|------------|-----------|---------|---|--|----------|----------|----------|----------|----------|--|
| | | | MODIFIED FACE WIDTH RANGE | PRICE EACH - BASED ON QUANTITY ORDERED | | | | | | |
| | | | | 1 | 2 | 3 | 4 | 5 | 6 | |
| 5 | .0691 | 55942R1 | 0.0704 - 0.0859 | \$657.05 | \$606.10 | \$599.00 | \$595.25 | \$593.00 | \$591.90 | |
| 5 | .0848 | 55944R1 | 0.0860 - 0.1015 | 580.15 | 529.10 | 522.00 | 518.35 | 516.05 | 514.85 | |
| 5 | .1004 | 55946R1 | 0.1016 - 0.1171 | 626.35 | 575.50 | 568.30 | 564.65 | 562.35 | 561.20 | |
| 5 | .1160 | 55948R1 | 0.1172 - 0.1406 | 566.50 | 515.60 | 508.55 | 504.85 | 502.60 | 501.45 | |
| 5 | .1562 | 55950R1 | 0.1407 - 0.1718 | 581.55 | 530.55 | 523.45 | 519.85 | 517.50 | 516.45 | |
| 5 | .1875 | 55952R1 | 0.1719 - 0.2031 | 606.80 | 555.95 | 548.75 | 545.15 | 542.95 | 541.70 | |
| 5 | .2188 | 55954R1 | 0.2032 - 0.2343 | 632.05 | 581.10 | 574.05 | 570.45 | 568.15 | 566.95 | |
| 5 | .2500 | 55956R1 | 0.2344 - 0.2812 | 657.15 | 606.35 | 599.15 | 595.50 | 593.20 | 592.00 | |
| 5 | .3125 | 55958R1 | 0.2813 - 0.3437 | 700.00 | 648.95 | 641.90 | 638.15 | 636.10 | 634.85 | |
| 5 | .3750 | 55960R1 | 0.3438 - 0.4062 | 745.35 | 694.45 | 687.30 | 683.60 | 681.55 | 680.25 | |
| 5 | .4375 | 55962R1 | 0.4063 - 0.4687 | 780.95 | 730.05 | 722.85 | 719.20 | 716.95 | 715.75 | |
| 5 | .5000 | 55964R1 | 0.4688 - 0.5312 | 816.45 | 765.55 | 758.45 | 754.85 | 752.45 | 751.30 | |

Radius Notes

- Maximum radius on one side is .2656"
- Full radius and maximum radius on both sides is 1/2 the width of the cutter
- A non-tangent radii must be quoted

Chamfer Notes

- Chamfer Angles can range from 0° to 45°
- Chamfer is measured off the OD
- Maximum chamfer is the LESSER of 1/3 the width of the cutter OR .2656" length of angle when measured across the OD
- Chamfer Angle Tolerance: +/- 1/2°
- Chamfers greater than 45° must be quoted

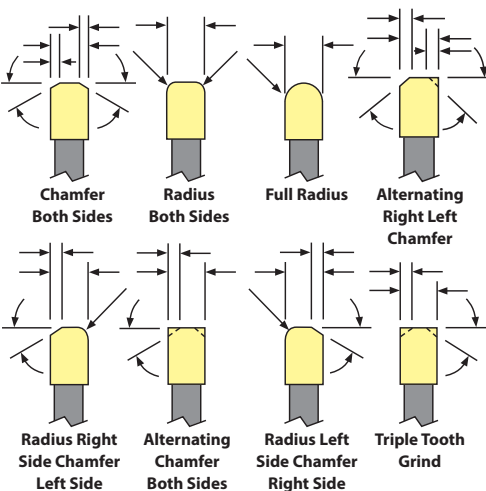


Specify right or left side for radius or chamfer



Corner Radius or Chamfer on BOTH Sides OR a Full Radius

• Price Increases 5% for Alternating Chamfers



| TOOL DIAM. | HUB WIDTH | EDP NO. | RADI, CHAMFERS, OR COMBO FINISHED TO MODIFIED FACE WIDTH | | | | | | | |
|------------|-----------|---------|--|--|----------|----------|----------|----------|----------|--|
| | | | MODIFIED FACE WIDTH RANGE | PRICE EACH - BASED ON QUANTITY ORDERED | | | | | | |
| | | | | 1 | 2 | 3 | 4 | 5 | 6 | |
| 5 | .0691 | 55942R2 | 0.0704 - 0.0859 | \$680.15 | \$619.05 | \$610.45 | \$606.05 | \$603.35 | \$602.00 | |
| 5 | .0848 | 55944R2 | 0.0860 - 0.1015 | 603.20 | 541.95 | 533.50 | 529.05 | 526.35 | 525.00 | |
| 5 | .1004 | 55946R2 | 0.1016 - 0.1171 | 649.45 | 588.30 | 579.75 | 575.30 | 572.75 | 571.25 | |
| 5 | .1160 | 55948R2 | 0.1172 - 0.1406 | 589.65 | 528.50 | 520.00 | 515.45 | 512.95 | 511.45 | |
| 5 | .1562 | 55950R2 | 0.1407 - 0.1718 | 604.60 | 543.45 | 534.95 | 530.55 | 527.90 | 526.35 | |
| 5 | .1875 | 55952R2 | 0.1719 - 0.2031 | 629.95 | 568.85 | 560.20 | 555.90 | 553.20 | 551.85 | |
| 5 | .2188 | 55954R2 | 0.2032 - 0.2343 | 655.05 | 594.15 | 585.50 | 581.10 | 578.50 | 577.05 | |
| 5 | .2500 | 55956R2 | 0.2344 - 0.2812 | 680.25 | 619.10 | 610.50 | 606.20 | 603.65 | 602.20 | |
| 5 | .3125 | 55958R2 | 0.2813 - 0.3437 | 722.95 | 661.95 | 653.45 | 648.90 | 646.20 | 644.85 | |
| 5 | .3750 | 55960R2 | 0.3438 - 0.4062 | 768.55 | 707.30 | 698.90 | 694.35 | 691.70 | 690.40 | |
| 5 | .4375 | 55962R2 | 0.4063 - 0.4687 | 804.10 | 742.85 | 734.25 | 730.00 | 727.30 | 725.90 | |
| 5 | .5000 | 55964R2 | 0.4688 - 0.5312 | 839.55 | 778.45 | 769.95 | 765.55 | 762.80 | 761.35 | |



6" MILLING CUTTERS & SLITTING SAWS CARBIDE TIPPED TYPE 559



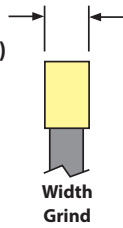
SUITABLE FOR MOST MATERIALS

Modified width between .0704" and .5312"

TYPE 559

Cutter Notes (All cutters on page)

- 18 Teeth
- C-2(m) Carbide
- 5° Positive Radial Rake
- Width Tolerance: +.001"/-.000"
- OD tolerance: +.0313"/-.000"
- 1" Arbor hole +.001"/-.000"
- ANSI standard keyway dimensions
- Add 5% to grind down hub width
- Add 5% to match OD's on cutter sets within .001"
- Not designed to be used on heat treated materials greater than 363 Brinell (39Rc)



| TOOL DIAM. | HUB WIDTH | EDP NO. | MODIFIED FACE WIDTH RANGE | FINISHED TO MODIFIED FACE WIDTH | | | | | |
|------------|-----------|---------|---------------------------|--|----------|----------|----------|----------|----------|
| | | | | PRICE EACH - BASED ON QUANTITY ORDERED | | | | | |
| | | | | 1 | 2 | 3 | 4 | 5 | 6 |
| 6 | .0681 | 55966D | 0.0704 - 0.0859 | \$706.55 | \$669.70 | \$663.10 | \$659.65 | \$657.50 | \$609.10 |
| 6 | .0838 | 55968D | 0.0860 - 0.1015 | 658.30 | 621.50 | 614.85 | 611.45 | 609.25 | 560.90 |
| 6 | .0994 | 55970D | 0.1016 - 0.1171 | 708.65 | 671.90 | 665.10 | 661.65 | 659.65 | 611.15 |
| 6 | .1150 | 55972D | 0.1172 - 0.1406 | 674.25 | 637.55 | 630.95 | 627.45 | 625.35 | 577.00 |
| 6 | .1562 | 55974D | 0.1407 - 0.1718 | 699.45 | 662.85 | 656.20 | 652.65 | 650.60 | 602.20 |
| 6 | .1875 | 55976D | 0.1719 - 0.2031 | 724.80 | 687.95 | 681.45 | 677.75 | 675.65 | 627.35 |
| 6 | .2188 | 55978D | 0.2032 - 0.2343 | 749.95 | 713.15 | 706.55 | 703.05 | 700.90 | 652.60 |
| 6 | .2500 | 55980D | 0.2344 - 0.2812 | 784.80 | 748.10 | 741.30 | 737.85 | 735.90 | 687.40 |
| 6 | .3125 | 55982D | 0.2813 - 0.3437 | 815.55 | 778.75 | 772.15 | 768.65 | 766.60 | 718.15 |
| 6 | .3750 | 55984D | 0.3438 - 0.4062 | 843.20 | 806.30 | 799.75 | 796.25 | 794.15 | 745.70 |
| 6 | .4375 | 55990D | 0.4063 - 0.4687 | 878.65 | 841.85 | 835.25 | 831.70 | 829.65 | 781.25 |
| 6 | .5000 | 55992D | 0.4688 - 0.5312 | 914.15 | 877.40 | 870.75 | 867.30 | 865.20 | 816.75 |

Corner Radius or Chamfer on ONE Side

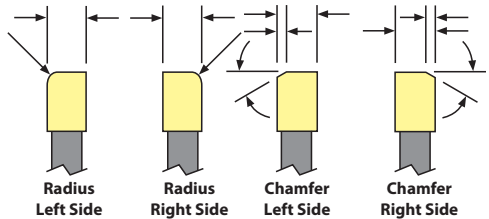
| TOOL DIAM. | HUB WIDTH | EDP NO. | ONE RADIUS OR CHAMFER FINISHED TO MODIFIED FACE WIDTH | | | | | | |
|------------|-----------|---------|---|--|----------|----------|----------|----------|----------|
| | | | MODIFIED FACE WIDTH RANGE | PRICE EACH - BASED ON QUANTITY ORDERED | | | | | |
| | | | | 1 | 2 | 3 | 4 | 5 | 6 |
| 6 | .0681 | 55966R1 | 0.0704 - 0.0859 | \$729.05 | \$676.15 | \$668.70 | \$665.00 | \$662.60 | \$661.40 |
| 6 | .0838 | 55968R1 | 0.0860 - 0.1015 | 680.85 | 627.95 | 620.55 | 616.75 | 614.45 | 613.25 |
| 6 | .0994 | 55970R1 | 0.1016 - 0.1171 | 731.25 | 678.25 | 670.80 | 666.95 | 664.60 | 663.45 |
| 6 | .1150 | 55972R1 | 0.1172 - 0.1406 | 696.95 | 643.95 | 636.50 | 632.70 | 630.45 | 629.20 |
| 6 | .1562 | 55974R1 | 0.1407 - 0.1718 | 722.20 | 669.30 | 661.75 | 658.10 | 655.70 | 654.45 |
| 6 | .1875 | 55976R1 | 0.1719 - 0.2031 | 747.40 | 694.45 | 687.05 | 683.15 | 680.85 | 679.70 |
| 6 | .2188 | 55978R1 | 0.2032 - 0.2343 | 772.60 | 719.70 | 712.35 | 708.30 | 706.15 | 704.90 |
| 6 | .2500 | 55980R1 | 0.2344 - 0.2812 | 807.45 | 754.55 | 747.10 | 743.35 | 740.95 | 739.65 |
| 6 | .3125 | 55982R1 | 0.2813 - 0.3437 | 838.15 | 785.20 | 777.90 | 774.05 | 771.70 | 770.40 |
| 6 | .3750 | 55984R1 | 0.3438 - 0.4062 | 865.70 | 812.85 | 805.45 | 801.55 | 799.30 | 798.10 |
| 6 | .4375 | 55990R1 | 0.4063 - 0.4687 | 901.25 | 848.45 | 841.00 | 837.20 | 834.75 | 833.60 |
| 6 | .5000 | 55992R1 | 0.4688 - 0.5312 | 936.90 | 883.90 | 876.45 | 872.65 | 870.40 | 869.05 |

Radius Notes

- Maximum radius on one side is .2656"
- Full radius and maximum radius on both sides is 1/2 the width of the cutter
- A non-tangent radii must be quoted

Chamfer Notes

- Chamfer Angles can range from 0° to 45°
- Chamfer is measured off the OD
- Maximum chamfer is the LESSER of 1/3 the width of the cutter OR .2656" length of angle when measured across the OD
- Chamfer Angle Tolerance: +/- 1/2°
- Chamfers greater than 45° must be quoted

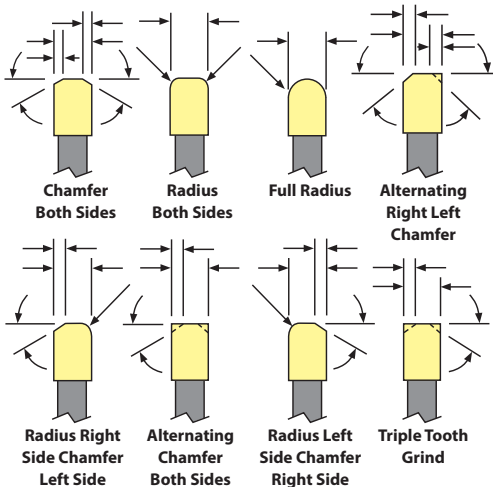


Specify right or left side for radius or chamfer



Corner Radius or Chamfer on BOTH Sides OR a Full Radius

• Price Increases 5% for Alternating Chamfers



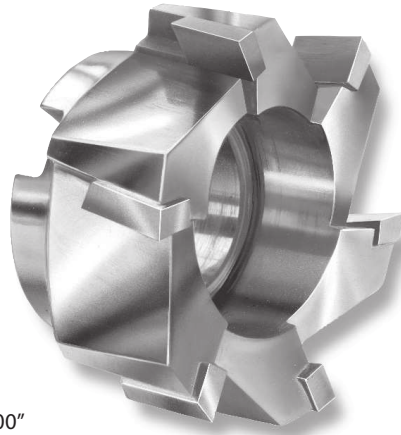
| TOOL DIAM. | HUB WIDTH | EDP NO. | RADI, CHAMFERS, OR COMBO FINISHED TO MODIFIED FACE WIDTH | | | | | | |
|------------|-----------|---------|--|--|----------|----------|----------|----------|----------|
| | | | MODIFIED FACE WIDTH RANGE | PRICE EACH - BASED ON QUANTITY ORDERED | | | | | |
| | | | | 1 | 2 | 3 | 4 | 5 | 6 |
| 6 | .0681 | 55966R2 | 0.0704 - 0.0859 | \$752.25 | \$689.10 | \$680.25 | \$675.65 | \$672.90 | \$671.35 |
| 6 | .0838 | 55968R2 | 0.0860 - 0.1015 | 704.00 | 640.90 | 632.05 | 627.50 | 624.75 | 623.15 |
| 6 | .0994 | 55970R2 | 0.1016 - 0.1171 | 754.40 | 691.15 | 682.30 | 677.75 | 674.95 | 673.55 |
| 6 | .1150 | 55972R2 | 0.1172 - 0.1406 | 720.15 | 657.00 | 648.10 | 643.55 | 640.80 | 639.25 |
| 6 | .1562 | 55974R2 | 0.1407 - 0.1718 | 745.30 | 682.15 | 673.30 | 668.70 | 666.00 | 664.50 |
| 6 | .1875 | 55976R2 | 0.1719 - 0.2031 | 770.40 | 707.30 | 698.50 | 694.00 | 691.25 | 689.75 |
| 6 | .2188 | 55978R2 | 0.2032 - 0.2343 | 795.65 | 732.60 | 723.75 | 719.20 | 716.40 | 714.95 |
| 6 | .2500 | 55980R2 | 0.2344 - 0.2812 | 830.55 | 767.40 | 758.55 | 753.95 | 751.15 | 749.80 |
| 6 | .3125 | 55982R2 | 0.2813 - 0.3437 | 861.20 | 798.20 | 789.35 | 784.80 | 782.00 | 780.50 |
| 6 | .3750 | 55984R2 | 0.3438 - 0.4062 | 888.75 | 825.75 | 816.90 | 812.40 | 809.60 | 808.15 |
| 6 | .4375 | 55990R2 | 0.4063 - 0.4687 | 924.40 | 861.20 | 852.45 | 847.90 | 845.10 | 843.65 |
| 6 | .5000 | 55992R2 | 0.4688 - 0.5312 | 959.95 | 896.80 | 888.00 | 883.50 | 880.75 | 879.25 |



SHELL END MILLS CARBIDE TIPPED TYPES 530, 531, 532 FRACTIONAL

MATERIAL SPECIFIC

THREE TYPES – FOR NON-FERROUS, CAST IRONS, OR STEELS



TYPE 530 – FOR NON-FERROUS

- Right spiral flutes

TYPE 531 – FOR CAST IRONS

- Right spiral flutes

TYPE 532 – FOR STEELS

- Left spiral flutes absorb the impact shock on entering steel

ALL TYPES:

- Large open flutes for easy chip flow
- Tool diameter tolerance: plus $\frac{1}{16}$ " , minus .000"
- Arbor hole tolerance: plus .001" , minus .000"
- Tool geometry & carbide grade appropriate for material being machined

| TOOL SELECTOR | CHIP CLASS | MATERIAL MACHINED | TOOL TYPE |
|---------------|---------------------------|--------------------------|-----------|
| | 20 | NON-FERROUS - LONG CHIPS | |
| 40 | NON-FERROUS - SHORT CHIPS | | 530/531 |
| 60 | CAST IRONS | | 531 |
| 80 | LOW STRENGTH STEELS | | 532 |
| 100 | MEDIUM STRENGTH STEELS | | 532 |
| 120 | HIGH STRENGTH STEELS | | 532 |
| 140 | HIGH TEMPERATURE ALLOYS | | 531 |

MODIFICATIONS (Prompt delivery)

- Corner chamfer or corner radius
- Cutting diameter reduced for step
- Coatings available:

- TITANIUM NITRIDE – TiN
- TITANIUM CARBONITRIDE – TiCN
- ZIRCONIUM NITRIDE – ZrN
- AL TITANIUM NITRIDE – AlTiN

| TOOL DIAM. | DIMENSIONS | | | | | TYPE 530 FOR NON-FERROUS | | | TYPE 531 FOR CAST IRONS | | | TYPE 532 FOR STEELS | | |
|------------|------------|----------|----------|-------------|-------|--------------------------|---------|----------|-------------------------|---------|----------|---------------------|---------|----------|
| | ARBOR HOLE | LENGTH | | DRIVE SLOTS | | NO. OF TEETH | EDP NO. | PRICE | NO. OF TEETH | EDP NO. | PRICE | NO. OF TEETH | EDP NO. | PRICE |
| | | CAR-BIDE | OVER-ALL | WIDTH | DEPTH | | | | | | | | | |
| 1 ¼ | ½ | ½ | 1 | ¼ | 5/32 | 4 | 53024 | \$240.00 | 4 | 53124 | \$240.00 | 4 | 53224 | \$249.65 |
| 1 ½ | ½ | ½ | 1 ½ | ¼ | 5/32 | 4 | 53026 | 249.95 | 4 | 53126 | 249.95 | 4 | 53226 | 259.90 |
| 1 ¾ | ¾ | ½ | 1 ¼ | 5/16 | 3/16 | 4 | 53028 | 311.40 | 4 | 53128 | 311.40 | 4 | 53228 | 323.80 |
| 2 | ¾ | 5/8 | 1 ¾ | 5/16 | 3/16 | 4 | 53032 | 327.00 | 4 | 53132 | 348.00 | 4 | 53232 | 361.85 |
| 2 ¼ | 1 | 5/8 | 1 ½ | 3/8 | 7/32 | 6 | 53036 | 345.45 | 6 | 53136 | 376.75 | 6 | 53236 | 391.80 |
| 2 ½ | 1 | 5/8 | 1 5/8 | 3/8 | 7/32 | 6 | 53040 | 363.75 | 6 | 53140 | 410.60 | 6 | 53240 | 410.60 |
| 2 ¾ | 1 | 5/8 | 1 5/8 | 3/8 | 7/32 | 6 | 53044 | 383.85 | 6 | 53144 | 430.75 | 6 | 53244 | 430.75 |
| 3 | 1 ¼ | ¾ | 1 ¾ | ½ | 9/32 | 6 | 53048 | 420.75 | 6 | 53148 | 468.50 | 6 | 53248 | 468.50 |
| 3 ½ | 1 ¼ | ¾ | 1 7/8 | ½ | 9/32 | 6 | 53056 | 515.10 | 8 | 53156 | 550.95 | 6 | 53256 | 582.45 |
| 4 | 1 ½ | ¾ | 2 ¼ | 5/8 | 3/8 | 6 | 53064 | 647.25 | 8 | 53164 | 681.65 | 6 | 53264 | 723.50 |

CUTTERS



SINGLE ANGLE CUTTERS CARBIDE TIPPED TYPES 714, 716, 724, & 726 FRACTIONAL

FOR NON-FERROUS OR CAST IRONS

TYPE 714

- 45° Angle - Right

TYPE 716

- 45° Angle - Left

TYPE 724

- 60° Angle - Right

TYPE 726

- 60° Angle - Left

Left Hand Shown



ALL TYPES:

- Carbide tips brazed to alloy steel body
- General purpose cutters for cutting non-ferrous materials and cast irons
- Arbor hole tolerance: plus .001" , minus .000"
- Tool geometry & carbide grade appropriate for material being machined

| TOOL SELECTOR | CHIP CLASS | MATERIAL MACHINED | TOOL TYPE |
|---------------|---------------------------|--------------------------|-----------------|
| | 20 | NON-FERROUS - LONG CHIPS | |
| 40 | NON-FERROUS - SHORT CHIPS | | 714/716/724/726 |
| 60 | CAST IRONS | | 714/716/724/726 |
| 80 | LOW STRENGTH STEELS | | CALL US |
| 100 | MEDIUM STRENGTH STEELS | | CALL US |
| 120 | HIGH STRENGTH STEELS | | CALL US |
| 140 | HIGH TEMPERATURE ALLOYS | | CALL US |

MODIFICATIONS (Prompt delivery)

- Flat or Radius on Tip
- Reduced face width
- Closer tool diameter tolerance
- Matched tool diameter set(s)
- Additional keyway
- Coatings available:

- TITANIUM NITRIDE – TiN
- TITANIUM CARBONITRIDE – TiCN
- ZIRCONIUM NITRIDE – ZrN
- AL TITANIUM NITRIDE – AlTiN

| TOOL DIAMETER | WIDTH | ARBOR HOLES | NO. OF TEETH | RIGHT 45° TYPE 714 EDP NO. | LEFT 45° TYPE 716 EDP NO. | RIGHT 60° TYPE 724 EDP NO. | LEFT 60° TYPE 726 EDP NO. | ALL TYPES PRICE |
|---------------|-------|-------------|--------------|----------------------------|---------------------------|----------------------------|---------------------------|-----------------|
| 3 | ½ | 1 | 8 | 71408 | 71608 | 72408 | 72608 | \$501.15 |
| 4 | ½ | 1 ¼ | 10 | 71416 | 71616 | 72416 | 72616 | 620.15 |
| 4 | ¾ | 1 ¼ | 10 | 71424 | 71624 | 72424 | 72624 | 672.75 |



DOUBLE ANGLE CUTTERS CARBIDE TIPPED TYPES 750, 752, & 754 FRACTIONAL

FOR NON-FERROUS OR CAST IRONS

TYPE 750

- 45° Included Angle

TYPE 752

- 60° Included Angle

TYPE 754

- 90° Included Angle

ALL TYPES:

- Carbide tips brazed to alloy steel body
- General purpose cutters for cutting non-ferrous materials and cast irons
- Arbor hole tolerance: plus .001", minus .000"
- Tool geometry & carbide grade appropriate for material being machined



| TOOL SELECTOR | CHIP CLASS | MATERIAL MACHINED | TOOL TYPE |
|---------------|---------------------------|--------------------------|-------------|
| | 20 | NON-FERROUS - LONG CHIPS | 750/752/754 |
| 40 | NON-FERROUS - SHORT CHIPS | 750/752/754 | |
| 60 | CAST IRONS | 750/752/754 | |
| 80 | LOW STRENGTH STEELS | CALL US | |
| 100 | MEDIUM STRENGTH STEELS | CALL US | |
| 120 | HIGH STRENGTH STEELS | CALL US | |
| 140 | HIGH TEMPERATURE ALLOYS | CALL US | |

MODIFICATIONS (Prompt delivery)

- Flat or Radius on Tip
- Reduced face width
- Closer tool diameter tolerance
- Matched tool diameter set(s)
- Additional keyway
- Coatings available:

| |
|------------------------------|
| TITANIUM NITRIDE - TiN |
| TITANIUM CARBONITRIDE - TiCN |
| ZIRCONIUM NITRIDE - ZrN |
| AL TITANIUM NITRIDE - ALTiN |

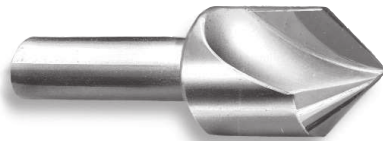
| TOOL DIAMETER | WIDTH | ARBOR HOLES | NO. OF TEETH | 45° TYPE 750 EDP NO. | 60° TYPE 752 EDP NO. | 90° TYPE 754 EDP NO. | ALL TYPES PRICE |
|---------------|-------|-------------|--------------|----------------------|----------------------|----------------------|-----------------|
| 2 3/4 | 1/2 | 1 | 8 | - | 75207 | 75407 | \$421.90 |
| 3 | 1/2 | 1 | 8 | 75008 | 75208 | 75408 | 526.15 |
| 4 | 1/2 | 1 1/4 | 10 | 75016 | 75216 | 75416 | 651.15 |
| 4 | 3/4 | 1 1/4 | 10 | 75024 | 75224 | 75424 | 706.35 |
| 4 | 1 | 1 1/4 | 10 | - | 75232 | 75432 | 826.60 |



SPIRAL FLUTE COUNTERSINKS CARBIDE TIPPED TYPES 561, 563, 581, 583, 584, 585, 590, 591 FRACTIONAL

GENERAL PURPOSE

SINGLE OR THREE FLUTES: 60°, 82°, 90°, 100° ANGLES



TYPE 561 - 60° SINGLE FLUTE

TYPE 581 - 82° SINGLE FLUTE

TYPE 591 - 90° SINGLE FLUTE

TYPE 584 - 100° SINGLE FLUTE

- Right spiral flute minimizes chatter
- Carbide tip brazed to tough hardened alloy steel body
- Not recommended for portable tool use (use "three flutes" type)

TYPE 563 - 60° THREE FLUTES

TYPE 583 - 82° THREE FLUTES

TYPE 590 - 90° THREE FLUTES

TYPE 585 - 100° THREE FLUTES

- Right spiral flutes minimizes chatter
- Carbide tips brazed to tough hardened alloy steel body
- Three flute design tends to center the tool in portable use and results in longer tool life

MODIFICATIONS (Prompt delivery)

- Modified included angle
- Shank drive flat(s)
- Reduced shank diameter
- 4 coatings available (listed on page 134)

| TOOL DIAM. | SHANK DIAM. | MIN. CUT DIAM. | TYPE 561 60° ANGLE EDP NO. | TYPE 581 82° ANGLE EDP NO. | TYPE 591 90° ANGLE EDP NO. | TYPE 584 100° ANGLE EDP NO. | PRICE ALL TYPES |
|------------|-------------|----------------|----------------------------|----------------------------|----------------------------|-----------------------------|-----------------|
| 1/4 | 3/16 | 1/16 | 56108 | 58108 | 59108 | 58408 | \$79.10 |
| 3/8 | 1/4 | 5/64 | 56112 | 58112 | 59112 | 58412 | 79.10 |
| 1/2 | 3/8 | 3/32 | 56116 | 58116 | 59116 | 58416 | 93.95 |
| 3/4 | 1/2 | 1/8 | 56124 | 58124 | 59124 | 58424 | 117.50 |
| 1 | 1/2 | 3/8 | 56132 | 58132 | 59132 | 58432 | 153.45 |
| 1 1/4 | 1/2 | 5/32 | 56140 | 58140 | 59140 | 58440 | 195.30 |
| 1 1/2 | 1/2 | 3/16 | 56148 | 58148 | 59148 | 58448 | 218.95 |

| TOOL DIAM. | SHANK DIAM. | MIN. CUT DIAM. | TYPE 563 60° ANGLE EDP NO. | TYPE 583 82° ANGLE EDP NO. | TYPE 590 90° ANGLE EDP NO. | TYPE 585 100° ANGLE EDP NO. | PRICE ALL TYPES |
|------------|-------------|----------------|----------------------------|----------------------------|----------------------------|-----------------------------|-----------------|
| 1/4 | 3/16 | 5/64 | 56308 | 58308 | 59008 | 58508 | \$87.05 |
| 3/8 | 1/4 | 7/64 | 56312 | 58312 | 59012 | 58512 | 87.05 |
| 1/2 | 3/8 | 9/64 | 56316 | 58316 | 59016 | 58516 | 103.35 |
| 5/8 | 3/8 | 5/32 | 56320 | 58320 | 59020 | 58520 | 108.75 |
| 3/4 | 1/2 | 3/16 | 56324 | 58324 | 59024 | 58524 | 130.75 |
| 7/8 | 1/2 | 1/4 | 56328 | 58328 | 59028 | 58528 | 149.85 |
| 1 | 1/2 | 3/8 | 56332 | 58332 | 59032 | 58532 | 163.45 |
| 1 1/4 | 1/2 | 1/2 | 56340 | 58340 | 59040 | 58540 | 203.30 |
| 1 1/2 | 1/2 | 5/8 | 56348 | 58348 | 59048 | 58548 | 237.10 |

CUTTERS



FEEDS & SPEEDS - KEYSEAT CUTTERS CARBIDE TIPPED

Speeds & feeds are starting recommendations only. Factors such as machine, fixture and tooling rigidity, horsepower available, coolant application and others will affect the performance significantly. Please read machine operators instructions and use all safety shields and glasses before performing these operations. **Use this chart for carbide tipped keyseat cutters types 700, 701, 702, and 703.**

IPM is based on catalog standards only using the mid SFPM and a 0.002 IPT chip load as a starting point. For all other conditions use the following formulas to calculate RPM and IPM from the ranges listed in the material group and brinell hardness section as a starting point.

IPM = Inches Per Minute

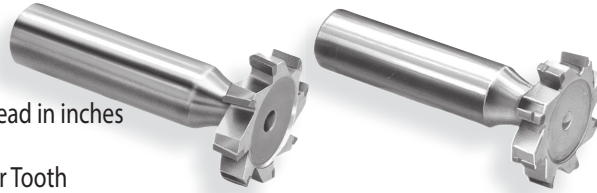
RPM = Rotations Per Minute

SFPM = Surface Feet Per Minute

Cutter Diameter = Diameter of the head in inches

$RPM = (SFPM * 3.82) / \text{Cutter Diameter}$

$IPM = IPT * RPM * \#Teeth$
IPT = Inches Per Tooth



SPEEDS AND FEEDS FOR TYPE 704 ONLY:

Starting point for Aluminum slotting:
1K - 4K SFPM, .002 - .008 IPT. Reduce SFPM and IPT by 25% for widths under .0938.

| CHIP CLASS | MATERIAL | BRINELL | SFPM | IPT | KEYSEAT CUTTER DIAMETER | | | | | | | | | |
|------------|--|----------------|----------|-----------|-------------------------|-----|-----|-----|-----|-------|-------|-------|-------|--|
| | | | | | 1/2 | 5/8 | 3/4 | 7/8 | 1 | 1 1/8 | 1 1/4 | 1 3/8 | 1 1/2 | |
| | | | | | IPM | IPM | IPM | IPM | IPM | IPM | IPM | IPM | IPM | |
| 20 | ALUMINUM ALLOY - WROUGHT | 30-150 (500kg) | 1200+ | .002-.010 | 110 | 88 | 73 | 63 | 73 | 65 | 59 | 53 | 49 | |
| | MAGNESIUM ALLOY | 50-90 | 1000+ | .002-.010 | 92 | 73 | 61 | 52 | 61 | 54 | 49 | 44 | 41 | |
| | NON-METAL AND PLASTIC | - | 1500+ | .002-.006 | 138 | 110 | 92 | 79 | 92 | 81 | 73 | 67 | 61 | |
| | ZINC ALLOY - DIE CAST | 80-100 | 750-1000 | .002-.006 | 80 | 64 | 53 | 46 | 53 | 48 | 43 | 39 | 36 | |
| 40 | ALUMINUM BRONZE | 40-175 | 200-600 | .002-.006 | 37 | 29 | 24 | 21 | 24 | 22 | 20 | 18 | 16 | |
| | BRASS ALLOY - LEADED AND FREE CUTTING | 10-100Rb | 400-550 | .002-.006 | 44 | 35 | 29 | 25 | 29 | 26 | 23 | 21 | 19 | |
| | NICKEL SILVER | 10-100Rb | 200-400 | .002-.006 | 28 | 22 | 18 | 16 | 18 | 16 | 15 | 13 | 12 | |
| | COPPER ALLOY - TOUGH | 40-200 | 200-500 | .002-.006 | 32 | 26 | 21 | 18 | 21 | 19 | 17 | 16 | 14 | |
| 60 | DUCTILE CAST IRON - AUSTENITIC | 120-275 | 75-150 | .002-.004 | 10 | 8 | 7 | 6 | 7 | 6 | 6 | 5 | 5 | |
| | DUCTILE CAST IRON - FERRITIC | 140-270 | 200-400 | .002-.007 | 28 | 22 | 18 | 16 | 18 | 16 | 15 | 13 | 12 | |
| | DUCTILE CAST IRON - MARTENSITIC | 270-440 | 150-350 | .002-.007 | 23 | 18 | 15 | 13 | 15 | 14 | 12 | 11 | 10 | |
| | GRAY - PEARLITIC | 220-320 | 150-300 | .002-.007 | 21 | 17 | 14 | 12 | 14 | 12 | 11 | 10 | 9 | |
| | GRAY - FERRITIC | 110-240 | 220-410 | .002-.006 | 29 | 23 | 19 | 17 | 19 | 17 | 15 | 14 | 13 | |
| | MALLEABLE CAST IRON - MARTENSITIC | 200-320 | 130-300 | .002-.004 | 20 | 16 | 13 | 11 | 13 | 12 | 11 | 10 | 9 | |
| 80 | LOW AND MEDIUM CARBON STEEL - FREE MACHINING | 100-250 | 200-500 | .001-.005 | 32 | 26 | 21 | 18 | 21 | 19 | 17 | 16 | 14 | |
| | LOW AND MEDIUM CARBON STEEL - WROUGHT | 100-375 | 200-400 | .001-.005 | 28 | 22 | 18 | 16 | 18 | 16 | 15 | 13 | 12 | |
| 100 | LOW AND MEDIUM CARBON ALLOY STEEL - FREE MACHINING | 100-275 | 200-400 | .001-.005 | 28 | 22 | 18 | 16 | 18 | 16 | 15 | 13 | 12 | |
| | LOW AND MEDIUM CARBON ALLOY STEEL | 85-375 | 130-330 | .001-.005 | 21 | 17 | 14 | 12 | 14 | 12 | 11 | 10 | 9 | |
| | STAINLESS STEEL - 400 SERIES | 135-325 | 135-375 | .002-.005 | 24 | 19 | 16 | 14 | 16 | 14 | 13 | 12 | 11 | |
| 120 | STAINLESS STEEL - 400 SERIES FREE MACHINING | 135-275 | 250-500 | .002-.005 | 34 | 28 | 23 | 20 | 23 | 20 | 18 | 17 | 15 | |
| | HIGH STRENGTH STEEL - WROUGHT & TOOL STEEL | 175-400 | 75-200 | .001-.004 | 13 | 28 | 23 | 20 | 23 | 20 | 18 | 17 | 15 | |
| 140 | HIGH TEMP ALLOYS NICKEL & IRON BASE ALLOY | 140-300 | 50-150 | .001-.004 | 9 | 7 | 6 | 5 | 6 | 5 | 5 | 4 | 4 | |
| | STAINLESS STEEL - 300 SERIES | 135-375 | 75-175 | .001-.004 | 11 | 9 | 8 | 7 | 8 | 7 | 6 | 6 | 5 | |
| | STAINLESS STEEL - PH SERIES | 150-440 | 75-175 | .001-.004 | 11 | 9 | 8 | 7 | 8 | 7 | 6 | 6 | 5 | |
| | TITANIUM ALLOY | 110-380 | 75-200 | .002-.006 | 13 | 10 | 8 | 7 | 8 | 7 | 7 | 6 | 6 | |

CUTTERS



KEYSEAT CUTTERS

CHIP CLASS 20, 40 - CARBIDE TIPPED TYPE 704 FRACTIONAL



HIGH PERFORMANCE

MODIFICATIONS (Prompt delivery)
• See page 138



See box on page 136 for speeds and feeds

TYPE 704 - HIGH PERFORMANCE - FOR ALUMINUM

- Carbide tips brazed to tough hardened alloy steel body
- Face width tolerance: plus .0005", minus .0005"
- Tool diameter tolerance: plus .015", plus .020"

USE:

- Specifically designed for use in aluminum and non-ferrous materials
- High volume flute capacity for milling, slotting, grooving, snap & O-rings

| *TOOL DIAM. | SHANK DIAM. |
|------------------|-------------|
| Up to 1 1/2" | 1/2" |
| 1 3/4" to 2 1/2" | 3/4" |

| AMERICAN STANDARD NO. | TOOL DIAM. | DIMENSIONS | | | | TYPE 704 EDP NO. | PRICE EACH | MODIFIED FACE WIDTH RANGE |
|-----------------------|------------|------------|------------|---------------|--------------|------------------|------------|---------------------------|
| | | FACE WIDTH | NECK DIAM. | OVER-ALL LEN. | NO. OF TEETH | | | |
| - | 5/8 | 1/16 | .160 | 2 1/16 | 2 | 7042002 | \$110.65 | .0575 - .0787 |
| 305 | 5/8 | 3/32 | .191 | 2 3/32 | 2 | 7040305 | 110.65 | .0788 - .1099 |
| 405 | 5/8 | 1/8 | .223 | 2 1/8 | 2 | 7040405 | 110.65 | .1100 - .1400 |
| 505 | 5/8 | 5/32 | .252 | 2 5/32 | 2 | 7040505 | 110.65 | .1401 - .1713 |
| 605 | 5/8 | 3/16 | .279 | 2 3/16 | 2 | 7040605 | 110.65 | .1714 - .2025 |
| - | 5/8 | 7/32 | .342 | 2 7/32 | 2 | 7042007 | 110.65 | .2026 - .2339 |
| - | 5/8 | 1/4 | .342 | 2 1/4 | 2 | 7042008 | 110.65 | .2340 - .2650 |
| - | 3/4 | 1/16 | .160 | 2 1/16 | 2 | 7042402 | 116.15 | .0575 - .0787 |
| - | 3/4 | 3/32 | .191 | 2 3/32 | 2 | 7042403 | 116.15 | .0788 - .1099 |
| 406 | 3/4 | 1/8 | .217 | 2 1/8 | 2 | 7040406 | 116.15 | .1100 - .1400 |
| 506 | 3/4 | 5/32 | .246 | 2 5/32 | 2 | 7040506 | 116.15 | .1401 - .1713 |
| 606 | 3/4 | 3/16 | .279 | 2 3/16 | 2 | 7040606 | 116.15 | .1714 - .2025 |
| - | 3/4 | 7/32 | .342 | 2 7/32 | 2 | 7042407 | 116.15 | .2026 - .2339 |
| 806 | 3/4 | 1/4 | .342 | 2 1/4 | 2 | 7040806 | 116.15 | .2340 - .2650 |
| - | 7/8 | 1/16 | .160 | 2 1/16 | 2 | 7042802 | 124.50 | .0575 - .0787 |
| - | 7/8 | 3/32 | .191 | 2 3/32 | 2 | 7042803 | 124.50 | .0788 - .1099 |
| - | 7/8 | 1/8 | .217 | 2 1/8 | 2 | 7042804 | 124.50 | .1100 - .1400 |
| 507 | 7/8 | 5/32 | .246 | 2 5/32 | 2 | 7040507 | 124.50 | .1401 - .1713 |
| 607 | 7/8 | 3/16 | .279 | 2 3/16 | 2 | 7040607 | 124.50 | .1714 - .2025 |
| 707 | 7/8 | 7/32 | .312 | 2 7/32 | 2 | 7040707 | 124.50 | .2026 - .2339 |
| 807 | 7/8 | 1/4 | .342 | 2 1/4 | 2 | 7040807 | 124.50 | .2340 - .2650 |
| - | 1 | 3/32 | .191 | 2 3/32 | 2 | 7043203 | 131.40 | .0788 - .1088 |
| - | 1 | 1/8 | .217 | 2 1/8 | 2 | 7043204 | 131.40 | .1089 - .1400 |
| - | 1 | 5/32 | .246 | 2 5/32 | 2 | 7043205 | 131.40 | .1401 - .1713 |
| 608 | 1 | 3/16 | .279 | 2 3/16 | 2 | 7040608 | 131.40 | .1714 - .2025 |
| 708 | 1 | 7/32 | .312 | 2 7/32 | 2 | 7040708 | 131.40 | .2026 - .2339 |
| 808 | 1 | 1/4 | .342 | 2 1/4 | 2 | 7040808 | 131.40 | .2340 - .2650 |
| - | 1 | 9/32 | .401 | 2 9/32 | 2 | 7043209 | 131.40 | .2651 - .2968 |
| 1008 | 1 | 5/16 | .401 | 2 5/16 | 2 | 7041008 | 131.40 | .2969 - .3281 |
| - | 1 | 11/32 | .467 | 2 11/32 | 2 | 7043211 | 131.40 | .3282 - .3593 |
| 1208 | 1 | 3/8 | .467 | 2 3/8 | 2 | 7041208 | 131.40 | .3594 - .3900 |
| - | 1 1/8 | 3/32 | .217 | 2 3/32 | 2 | 7043603 | 131.40 | .0788 - .1088 |
| - | 1 1/8 | 1/8 | .246 | 2 1/8 | 2 | 7043604 | 131.40 | .1089 - .1400 |
| - | 1 1/8 | 5/32 | .279 | 2 5/32 | 2 | 7043605 | 131.40 | .1401 - .1713 |
| 609 | 1 1/8 | 3/16 | .312 | 2 3/16 | 2 | 7040609 | 131.40 | .1714 - .2025 |
| 709 | 1 1/8 | 7/32 | .342 | 2 7/32 | 2 | 7040709 | 131.40 | .2026 - .2339 |
| 809 | 1 1/8 | 1/4 | .374 | 2 1/4 | 2 | 7040809 | 131.40 | .2340 - .2650 |
| - | 1 1/8 | 9/32 | .435 | 2 9/32 | 2 | 7043609 | 131.40 | .2651 - .2968 |
| 1009 | 1 1/8 | 5/16 | .435 | 2 5/16 | 2 | 7041009 | 131.40 | .2969 - .3281 |
| - | 1 1/8 | 11/32 | .467 | 2 11/32 | 2 | 7043611 | 131.40 | .3282 - .3593 |
| - | 1 1/8 | 3/8 | .467 | 2 3/8 | 2 | 7043612 | 131.40 | .3594 - .3900 |
| - | 1 1/4 | 3/32 | .217 | 2 3/32 | 3 | 7044003 | 138.30 | .0788 - .1088 |
| - | 1 1/4 | 1/8 | .246 | 2 1/8 | 3 | 7044004 | 138.30 | .1089 - .1400 |
| - | 1 1/4 | 5/32 | .279 | 2 5/32 | 3 | 7044005 | 138.30 | .1401 - .1713 |
| 610 | 1 1/4 | 3/16 | .312 | 2 3/16 | 3 | 7040610 | 138.30 | .1714 - .2025 |
| 710 | 1 1/4 | 7/32 | .342 | 2 7/32 | 3 | 7040710 | 138.30 | .2026 - .2339 |
| 810 | 1 1/4 | 1/4 | .374 | 2 1/4 | 3 | 7040810 | 138.30 | .2340 - .2650 |
| - | 1 1/4 | 9/32 | .435 | 2 9/32 | 3 | 7044009 | 138.30 | .2651 - .2968 |
| 1010 | 1 1/4 | 5/16 | .435 | 2 5/16 | 3 | 7041010 | 138.30 | .2969 - .3281 |
| - | 1 1/4 | 11/32 | .467 | 2 11/32 | 3 | 7044011 | 138.30 | .3282 - .3593 |
| 1210 | 1 1/4 | 3/8 | .467 | 2 3/8 | 3 | 7041210 | 138.30 | .3594 - .3900 |

| AMERICAN STANDARD NO. | TOOL DIAM. | DIMENSIONS | | | | TYPE 704 EDP NO. | PRICE EACH | MODIFIED FACE WIDTH RANGE |
|-----------------------|------------|------------|------------|---------------|--------------|------------------|------------|---------------------------|
| | | FACE WIDTH | NECK DIAM. | OVER-ALL LEN. | NO. OF TEETH | | | |
| - | 1 3/8 | 3/32 | .312 | 2 3/32 | 3 | 7044403 | \$152.15 | .0788 - .1088 |
| - | 1 3/8 | 1/8 | .342 | 2 1/8 | 3 | 7044404 | 152.15 | .1089 - .1400 |
| - | 1 3/8 | 5/32 | .374 | 2 5/32 | 3 | 7044405 | 152.15 | .1401 - .1713 |
| - | 1 3/8 | 3/16 | .401 | 2 3/16 | 3 | 7044406 | 152.15 | .1714 - .2025 |
| - | 1 3/8 | 7/32 | .401 | 2 7/32 | 3 | 7044407 | 152.15 | .2026 - .2339 |
| 811 | 1 3/8 | 1/4 | .401 | 2 1/4 | 3 | 7040811 | 152.15 | .2340 - .2650 |
| - | 1 3/8 | 9/32 | .467 | 2 9/32 | 3 | 7044409 | 152.15 | .2651 - .2968 |
| 1011 | 1 3/8 | 5/16 | .467 | 2 5/16 | 3 | 7041011 | 152.15 | .2969 - .3281 |
| - | 1 3/8 | 11/32 | .467 | 2 11/32 | 3 | 7044411 | 152.15 | .3282 - .3593 |
| 1211 | 1 3/8 | 3/8 | .467 | 2 3/8 | 3 | 7041211 | 152.15 | .3594 - .3900 |
| - | 1 1/2 | 3/32 | .435 | 2 3/32 | 3 | 7044803 | 172.90 | .0788 - .1088 |
| - | 1 1/2 | 1/8 | .435 | 2 1/8 | 3 | 7044804 | 172.90 | .1089 - .1400 |
| - | 1 1/2 | 5/32 | .435 | 2 5/32 | 3 | 7044805 | 172.90 | .1401 - .1713 |
| - | 1 1/2 | 3/16 | .435 | 2 3/16 | 3 | 7044806 | 172.90 | .1714 - .2025 |
| - | 1 1/2 | 7/32 | .435 | 2 7/32 | 3 | 7044807 | 172.90 | .2026 - .2339 |
| 812 | 1 1/2 | 1/4 | .435 | 2 1/4 | 3 | 7040812 | 172.90 | .2340 - .2650 |
| - | 1 1/2 | 9/32 | .467 | 2 9/32 | 3 | 7044809 | 172.90 | .2651 - .2968 |
| 1012 | 1 1/2 | 5/16 | .467 | 2 5/16 | 3 | 7041012 | 172.90 | .2969 - .3281 |
| - | 1 1/2 | 11/32 | .467 | 2 11/32 | 3 | 7044811 | 172.90 | .3282 - .3593 |
| 1212 | 1 1/2 | 3/8 | .467 | 2 3/8 | 3 | 7041212 | 207.50 | .3594 - .3900 |
| - | 1 1/2 | 13/32 | .467 | 2 13/32 | 3 | 7044813 | 207.50 | .3901 - .4219 |
| - | 1 1/2 | 7/16 | .467 | 2 7/16 | 3 | 7044814 | 207.50 | .4220 - .4531 |
| - | 1 1/2 | 15/32 | .467 | 2 15/32 | 3 | 7044815 | 207.50 | .4532 - .4843 |
| - | 1 1/2 | 1/2 | .467 | 2 1/2 | 3 | 7044816 | 207.50 | .4844 - .5150 |
| - | 1 3/4 | 1/8 | .718 | 3 1/8 | 4 | 7045604 | 190.85 | .1089 - .1400 |
| - | 1 3/4 | 5/32 | .718 | 3 5/32 | 4 | 7045605 | 190.85 | .1401 - .1713 |
| - | 1 3/4 | 3/16 | .718 | 3 3/16 | 4 | 7045606 | 190.85 | .1714 - .2025 |
| - | 1 3/4 | 7/32 | .718 | 3 7/32 | 4 | 7045607 | 190.85 | .2026 - .2339 |
| - | 1 3/4 | 1/4 | .718 | 3 1/4 | 4 | 7045608 | 190.85 | .2340 - .2650 |
| - | 1 3/4 | 9/32 | .718 | 3 9/32 | 4 | 7045609 | 190.85 | .2651 - .2968 |
| - | 1 3/4 | 5/16 | .718 | 3 5/16 | 4 | 7045610 | 190.85 | .2969 - .3281 |
| - | 1 3/4 | 11/32 | .718 | 3 11/32 | 4 | 7045611 | 190.85 | .3282 - .3593 |
| - | 1 3/4 | 3/8 | .718 | 3 3/8 | 4 | 7045612 | 224.10 | .3594 - .3900 |
| - | 1 3/4 | 13/32 | .718 | 3 13/32 | 4 | 7045613 | 224.10 | .3901 - .4219 |
| - | 1 3/4 | 7/16 | .718 | 3 7/16 | 4 | 7045614 | 224.10 | .4220 - .4531 |
| - | 1 3/4 | 15/32 | .718 | 3 15/32 | 4 | 7045615 | 224.10 | .4532 - .4843 |
| - | 1 3/4 | 1/2 | .718 | 3 1/2 | 4 | 7045616 | 224.10 | .4844 - .5150 |
| - | 2 | 1/8 | .718 | 3 1/8 | 4 | 7046404 | 221.30 | .1089 - .1400 |
| - | 2 | 5/32 | .718 | 3 5/32 | 4 | 7046405 | 221.30 | .1401 - .1713 |
| - | 2 | 3/16 | .718 | 3 3/16 | 4 | 7046406 | 221.30 | .1714 - .2025 |
| - | 2 | 7/32 | .718 | 3 7/32 | 4 | 7046407 | 221.30 | .2026 - .2339 |
| - | 2 | 1/4 | .718 | 3 1/4 | 4 | 7046408 | 221.30 | .2340 - .2650 |
| - | 2 | 9/32 | .718 | 3 9/32 | 4 | 7046409 | 221.30 | .2651 - .2968 |
| - | 2 | 5/16 | .718 | 3 5/16 | 4 | 7046410 | 221.30 | .2969 - .3281 |
| - | 2 | 11/32 | .718 | 3 11/32 | 4 | 7046411 | 221.30 | .3282 - .3593 |
| - | 2 | 3/8 | .718 | 3 3/8 | 4 | 7046412 | 255.90 | .3594 - .3900 |
| - | 2 | 13/32 | .718 | 3 13/32 | 4 | 7046413 | 255.90 | .3901 - .4219 |
| - | 2 | 7/16 | .718 | 3 7/16 | 4 | 7046414 | 255.90 | .4220 - .4531 |
| - | 2 | 15/32 | .718 | 3 15/32 | 4 | 7046415 | 255.90 | .4532 - .4843 |
| - | 2 | 1/2 | .718 | 3 1/2 | 4 | 7046416 | 255.90 | .4844 - .5150 |

*Contact Hannibal for price and availability on tool diameters greater than 2"

CUTTERS



KEYSEAT CUTTERS

CHIP CLASS 20, 40, 60, 140 - CARBIDE TIPPED TYPE 700



STRAIGHT TOOTH FOR NON-FERROUS & CAST IRONS

TYPE 700 - FOR NON-FERROUS MATERIALS AND CAST IRONS

- Woodruff type
- Carbide tips brazed to tough hardened alloy steel body
- Straight shank: 1/2" diameter, 2" long
- Tool diameter tolerance: plus .020", plus .015"
- Face width tolerance: plus .0000", minus .0005"
- Chip breakers on all straight tooth cutters 5/32" and greater in face width
- Tool geometry and carbide grade appropriate for material being machined
- Decimal size cutters DO NOT have chip breakers



MODIFICATIONS (Prompt delivery)

- Modified tool diameter
- Metric tool diameter
- Modified face width
- Metric face width
- Reduced neck diameter
- Shank drive flat(s)
- Coatings available:
- Corner chamfer or corner radius on one or both sides
- Shortened shank or reduced shank diameter

TITANIUM NITRIDE - TiN

TITANIUM CARBONITRIDE - TiCN

ZIRCONIUM NITRIDE - ZrN

AL TITANIUM NITRIDE - AlTiN

| AMERICAN STANDARD NO. | TOOL DIAM. | DIMENSIONS | | | | TYPE 700 FOR N-F/CI EDP NO. | PRICE EACH | FINISHED TO MODIFIED FACE WIDTH | | | | | | |
|-----------------------|------------|------------|------------|----------------|--------------|-----------------------------|------------|---------------------------------|--|----------|----------|----------|----------|----------|
| | | FACE WIDTH | NECK DIAM. | OVERALL LENGTH | NO. OF TEETH | | | MODIFIED FACE WIDTH RANGE | PRICE EACH - BASED ON QUANTITY ORDERED | | | | | |
| | | | | | | | | | 1 | 2 | 3 | 4 | 5-7 | 8-14* |
| 204 | 1/2 | 1/16 | .130 | 2 1/16 | 6 | 7000204 | \$115.05 | .0575 - .0787 | \$155.00 | \$137.75 | \$132.05 | \$129.30 | \$126.40 | \$123.95 |
| 304 | 1/2 | 3/32 | .160 | 2 3/32 | 6 | 7000304 | 115.05 | .0788 - .1088 | 155.00 | 137.75 | 132.05 | 129.30 | 126.40 | 123.95 |
| 404 | 1/2 | 1/8 | .191 | 2 1/8 | 6 | 7000404 | 115.05 | .1089 - .1400 | 155.00 | 137.75 | 132.05 | 129.30 | 126.40 | 123.95 |
| 305 | 5/8 | 3/32 | .191 | 2 3/32 | 6 | 7000305 | 119.25 | .0788 - .1088 | 159.30 | 142.10 | 136.30 | 133.45 | 130.60 | 128.25 |
| 405 | 5/8 | 1/8 | .223 | 2 1/8 | 6 | 7000405 | 119.25 | .1089 - .1400 | 159.30 | 142.10 | 136.30 | 133.45 | 130.60 | 128.25 |
| 505 | 5/8 | 5/32 | .252 | 2 5/32 | 6 | 7000505 | 119.25 | .1401 - .1713 | 159.30 | 142.10 | 136.30 | 133.45 | 130.60 | 128.25 |
| 605 | 5/8 | 3/16 | .279 | 2 3/16 | 6 | 7000605 | 119.25 | .1714 - .2025 | 159.30 | 142.10 | 136.30 | 133.45 | 130.60 | 128.25 |
| 406 | 3/4 | 1/8 | .217 | 2 1/8 | 6 | 7000406 | 124.45 | .1100 - .1400 | 164.80 | 147.55 | 141.75 | 139.05 | 136.10 | 133.70 |
| 506 | 3/4 | 5/32 | .246 | 2 5/32 | 6 | 7000506 | 124.45 | .1401 - .1713 | 164.80 | 147.55 | 141.75 | 139.05 | 136.10 | 133.70 |
| 606 | 3/4 | 3/16 | .279 | 2 3/16 | 6 | 7000606 | 124.45 | .1714 - .2025 | 164.80 | 147.55 | 141.75 | 139.05 | 136.10 | 133.70 |
| - | 3/4 | 7/32 | .342 | 2 7/32 | 6 | 7002407 | 141.65 | .2026 - .2339 | 171.25 | 153.35 | 147.30 | 144.50 | 141.45 | 138.95 |
| 806 | 3/4 | 1/4 | .342 | 2 1/4 | 6 | 7000806 | 124.45 | .2340 - .2650 | 164.80 | 147.55 | 141.75 | 139.05 | 136.10 | 133.70 |
| 507 | 7/8 | 5/32 | .246 | 2 5/32 | 6 | 7000507 | 130.30 | .1401 - .1713 | 170.90 | 153.70 | 147.90 | 145.25 | 142.30 | 139.85 |
| 607 | 7/8 | 3/16 | .279 | 2 3/16 | 6 | 7000607 | 130.30 | .1714 - .2025 | 170.90 | 153.70 | 147.90 | 145.25 | 142.30 | 139.85 |
| 707 | 7/8 | 7/32 | .312 | 2 7/32 | 6 | 7000707 | 130.30 | .2026 - .2339 | 170.90 | 153.70 | 147.90 | 145.25 | 142.30 | 139.85 |
| 807 | 7/8 | 1/4 | .342 | 2 1/4 | 6 | 7000807 | 130.30 | .2340 - .2650 | 170.90 | 153.70 | 147.90 | 145.25 | 142.30 | 139.85 |
| 608 | 1 | 3/16 | .279 | 2 3/16 | 8 | 7000608 | 147.10 | .1714 - .2025 | 188.45 | 171.25 | 165.35 | 162.65 | 159.75 | 157.40 |
| 708 | 1 | 7/32 | .312 | 2 7/32 | 8 | 7000708 | 147.10 | .2026 - .2339 | 188.45 | 171.25 | 165.35 | 162.65 | 159.75 | 157.40 |
| 808 | 1 | 1/4 | .342 | 2 1/4 | 8 | 7000808 | 147.10 | .2340 - .2650 | 188.45 | 171.25 | 165.35 | 162.65 | 159.75 | 157.40 |
| - | 1 | 9/32 | .401 | 2 9/32 | 8 | 7003209 | 167.35 | .2651 - .2968 | 195.85 | 177.95 | 171.85 | 169.00 | 166.00 | 163.55 |
| 1008 | 1 | 5/16 | .401 | 2 5/16 | 8 | 7001008 | 147.10 | .2969 - .3281 | 188.45 | 171.25 | 165.35 | 162.65 | 159.75 | 157.40 |
| - | 1 | 11/32 | .467 | 2 11/32 | 8 | 7003211 | 167.35 | .3282 - .3593 | 195.85 | 177.95 | 171.85 | 169.00 | 166.00 | 163.55 |
| 1208 | 1 | 3/8 | .467 | 2 3/8 | 8 | 7001208 | 147.10 | .3594 - .3900 | 188.45 | 171.25 | 165.35 | 162.65 | 159.75 | 157.40 |
| 609 | 1 1/8 | 3/16 | .312 | 2 3/16 | 8 | 7000609 | 154.40 | .1714 - .2025 | 196.15 | 179.00 | 173.20 | 170.45 | 167.50 | 165.15 |
| 709 | 1 1/8 | 7/32 | .342 | 2 7/32 | 8 | 7000709 | 154.40 | .2026 - .2339 | 196.15 | 179.00 | 173.20 | 170.45 | 167.50 | 165.15 |
| 809 | 1 1/8 | 1/4 | .374 | 2 1/4 | 8 | 7000809 | 154.40 | .2340 - .2650 | 196.15 | 179.00 | 173.20 | 170.45 | 167.50 | 165.15 |
| - | 1 1/8 | 9/32 | .435 | 2 9/32 | 8 | 7003609 | 175.80 | .2651 - .2968 | 203.85 | 186.05 | 180.00 | 177.15 | 174.05 | 171.60 |
| 1009 | 1 1/8 | 5/16 | .435 | 2 5/16 | 8 | 7001009 | 154.40 | .2969 - .3281 | 196.15 | 179.00 | 173.20 | 170.45 | 167.50 | 165.15 |
| 610 | 1 1/4 | 3/16 | .312 | 2 3/16 | 8 | 7000610 | 162.10 | .1714 - .2025 | 204.25 | 187.10 | 181.30 | 178.50 | 175.60 | 173.20 |
| 710 | 1 1/4 | 7/32 | .342 | 2 7/32 | 8 | 7000710 | 162.10 | .2026 - .2339 | 204.25 | 187.10 | 181.30 | 178.50 | 175.60 | 173.20 |
| 810 | 1 1/4 | 1/4 | .374 | 2 1/4 | 8 | 7000810 | 162.10 | .2340 - .2650 | 204.25 | 187.10 | 181.30 | 178.50 | 175.60 | 173.20 |
| - | 1 1/4 | 9/32 | .435 | 2 9/32 | 8 | 7004009 | 184.55 | .2651 - .2968 | 212.25 | 194.45 | 188.40 | 185.50 | 182.50 | 180.00 |
| 1010 | 1 1/4 | 5/16 | .435 | 2 5/16 | 8 | 7001010 | 162.10 | .2969 - .3281 | 204.25 | 187.10 | 181.30 | 178.50 | 175.60 | 173.20 |
| - | 1 1/4 | 11/32 | .467 | 2 11/32 | 8 | 7004011 | 184.55 | .3282 - .3593 | 212.25 | 194.45 | 188.40 | 185.50 | 182.50 | 180.00 |
| 1210 | 1 1/4 | 3/8 | .467 | 2 3/8 | 8 | 7001210 | 162.10 | .3594 - .3900 | 204.25 | 187.10 | 181.30 | 178.50 | 175.60 | 173.20 |
| 811 | 1 3/8 | 1/4 | .401 | 2 1/4 | 8 | 7000811 | 170.35 | .2340 - .2650 | 212.80 | 195.65 | 189.85 | 187.10 | 184.10 | 181.80 |
| - | 1 3/8 | 9/32 | .467 | 2 9/32 | 8 | 7004409 | 193.85 | .2651 - .2968 | 221.15 | 203.30 | 197.30 | 194.45 | 191.35 | 188.95 |
| 1011 | 1 3/8 | 5/16 | .467 | 2 5/16 | 8 | 7001011 | 170.35 | .2969 - .3281 | 212.80 | 195.65 | 189.85 | 187.10 | 184.10 | 181.80 |
| - | 1 3/8 | 11/32 | .467 | 2 11/32 | 8 | 7004411 | 193.85 | .3282 - .3593 | 221.15 | 203.30 | 197.30 | 194.45 | 191.35 | 188.95 |
| 1211 | 1 3/8 | 3/8 | .467 | 2 3/8 | 8 | 7001211 | 170.35 | .3594 - .3900 | 212.80 | 195.65 | 189.85 | 187.10 | 184.10 | 181.80 |
| 812 | 1 1/2 | 1/4 | .435 | 2 1/4 | 8 | 7000812 | 178.85 | .2340 - .2650 | 221.70 | 204.55 | 198.80 | 196.05 | 193.05 | 190.75 |
| - | 1 1/2 | 9/32 | .467 | 2 9/32 | 8 | 7004809 | 203.65 | .2651 - .2968 | 230.40 | 212.60 | 206.60 | 203.75 | 200.60 | 198.20 |
| 1012 | 1 1/2 | 5/16 | .467 | 2 5/16 | 8 | 7001012 | 178.85 | .2969 - .3281 | 221.70 | 204.55 | 198.80 | 196.05 | 193.05 | 190.75 |
| - | 1 1/2 | 11/32 | .467 | 2 11/32 | 8 | 7004811 | 203.65 | .3282 - .3593 | 230.40 | 212.60 | 206.60 | 203.75 | 200.60 | 198.20 |
| 1212 | 1 1/2 | 3/8 | .467 | 2 3/8 | 8 | 7001212 | 178.85 | .3594 - .3900 | 221.70 | 204.55 | 198.80 | 196.05 | 193.05 | 190.75 |
| - | 1 1/2 | 13/32 | .467 | 2 13/32 | 8 | 7004813 | 203.65 | .3901 - .4219 | 230.40 | 212.60 | 206.60 | 203.75 | 200.60 | 198.20 |
| - | 1 1/2 | 7/16 | .467 | 2 7/16 | 8 | 7004814 | 203.65 | .4220 - .4531 | 230.40 | 212.60 | 206.60 | 203.75 | 200.60 | 198.20 |
| - | 1 1/2 | 15/32 | .467 | 2 15/32 | 8 | 7004815 | 203.65 | .4532 - .4843 | 230.40 | 212.60 | 206.60 | 203.75 | 200.60 | 198.20 |
| - | 1 1/2 | 1/2 | .467 | 2 1/2 | 8 | 7004816 | 203.65 | .4844 - .5150 | 230.40 | 212.60 | 206.60 | 203.75 | 200.60 | 198.20 |

*Quantities of 15 or more - price of fractional size in same size range

CUTTERS



KEYSEAT CUTTERS

CHIP CLASS 20, 40, 60, 140 - CARBIDE TIPPED TYPE 701

MATERIAL SPECIFIC

STAGGERED TOOTH FOR NON-FERROUS & CAST IRONS

TYPE 701 - FOR NON-FERROUS MATERIALS AND CAST IRONS

- Woodruff type
- Carbide tips brazed to tough hardened alloy steel body
- Straight shank: 1/2" diameter, 2" long
- Tool diameter tolerance: plus .020", plus .015"
- Face width tolerance: plus .0000", minus .0005"
- Alternate right and left axial rake on all staggered tooth cutters
- Tool geometry and carbide grade appropriate for material being machined



MODIFICATIONS (Prompt delivery)

- Modified tool diameter
- Metric tool diameter
- Modified face width
- Metric face width
- Reduced neck diameter
- Shank drive flat(s)
- Coatings available:
- Corner chamfer or corner radius on one or both sides
- Shortened shank or reduced shank diameter

TITANIUM NITRIDE - TiN

TITANIUM CARBONITRIDE - TiCN

ZIRCONIUM NITRIDE - ZrN

AL TITANIUM NITRIDE - AlTiN

| AMERICAN STANDARD NO. | TOOL DIAM. | DIMENSIONS | | | | TYPE 701 FOR N-F/CI EDP NO. | PRICE EACH | FINISHED TO MODIFIED FACE WIDTH | | | | | | |
|-----------------------|------------|------------|------------|----------------|--------------|-----------------------------|------------|---------------------------------|--|----------|----------|----------|----------|----------|
| | | FACE WIDTH | NECK DIAM. | OVERALL LENGTH | NO. OF TEETH | | | MODIFIED FACE WIDTH RANGE | PRICE EACH - BASED ON QUANTITY ORDERED | | | | | |
| | | | | | | | | | 1 | 2 | 3 | 4 | 5-7 | 8-14* |
| 204 | 1/2 | 1/16 | .130 | 2 1/16 | 6 | 7010204 | \$135.40 | .0575 - .0787 | \$176.25 | \$159.05 | \$153.25 | \$150.55 | \$147.55 | \$145.25 |
| 304 | 1/2 | 3/32 | .160 | 2 3/32 | 6 | 7010304 | 135.40 | .0788 - .1088 | 176.25 | 159.05 | 153.25 | 150.55 | 147.55 | 145.25 |
| 404 | 1/2 | 1/8 | .191 | 2 1/8 | 6 | 7010404 | 135.40 | .1089 - .1400 | 176.25 | 159.05 | 153.25 | 150.55 | 147.55 | 145.25 |
| 305 | 5/8 | 3/32 | .191 | 2 3/32 | 6 | 7010305 | 140.25 | .0788 - .1088 | 181.35 | 164.15 | 158.35 | 155.55 | 152.65 | 150.30 |
| 405 | 5/8 | 1/8 | .223 | 2 1/8 | 6 | 7010405 | 140.25 | .1089 - .1400 | 181.35 | 164.15 | 158.35 | 155.55 | 152.65 | 150.30 |
| 505 | 5/8 | 5/32 | .252 | 2 5/32 | 6 | 7010505 | 140.25 | .1401 - .1713 | 181.35 | 164.15 | 158.35 | 155.55 | 152.65 | 150.30 |
| 605 | 5/8 | 3/16 | .279 | 2 3/16 | 6 | 7010605 | 140.25 | .1714 - .2025 | 181.35 | 164.15 | 158.35 | 155.55 | 152.65 | 150.30 |
| 406 | 3/4 | 1/8 | .217 | 2 1/8 | 6 | 7010406 | 146.50 | .1100 - .1400 | 187.95 | 170.75 | 164.95 | 162.10 | 159.25 | 156.95 |
| 506 | 3/4 | 5/32 | .246 | 2 5/32 | 6 | 7010506 | 146.50 | .1401 - .1713 | 187.95 | 170.75 | 164.95 | 162.10 | 159.25 | 156.95 |
| 606 | 3/4 | 3/16 | .279 | 2 3/16 | 6 | 7010606 | 146.50 | .1714 - .2025 | 187.95 | 170.75 | 164.95 | 162.10 | 159.25 | 156.95 |
| - | 3/4 | 7/32 | .342 | 2 7/32 | 6 | 7012407 | 166.80 | .2026 - .2339 | 195.30 | 177.45 | 171.40 | 168.45 | 165.50 | 163.10 |
| 806 | 3/4 | 1/4 | .342 | 2 1/4 | 6 | 7010806 | 146.50 | .2340 - .2650 | 187.95 | 170.75 | 164.95 | 162.10 | 159.25 | 156.95 |
| 507 | 7/8 | 5/32 | .246 | 2 5/32 | 6 | 7010507 | 153.25 | .1401 - .1713 | 194.90 | 177.70 | 171.95 | 169.15 | 166.20 | 163.90 |
| 607 | 7/8 | 3/16 | .279 | 2 3/16 | 6 | 7010607 | 153.25 | .1714 - .2025 | 194.90 | 177.70 | 171.95 | 169.15 | 166.20 | 163.90 |
| 707 | 7/8 | 5/32 | .312 | 2 7/32 | 6 | 7010707 | 153.25 | .2026 - .2339 | 194.90 | 177.70 | 171.95 | 169.15 | 166.20 | 163.90 |
| 807 | 7/8 | 1/4 | .342 | 2 1/4 | 6 | 7010807 | 153.25 | .2340 - .2650 | 194.90 | 177.70 | 171.95 | 169.15 | 166.20 | 163.90 |
| 608 | 1 | 3/16 | .279 | 2 3/16 | 8 | 7010608 | 172.90 | .1714 - .2025 | 215.60 | 198.30 | 192.60 | 189.75 | 186.80 | 184.55 |
| 708 | 1 | 7/32 | .312 | 2 7/32 | 8 | 7010708 | 172.90 | .2026 - .2339 | 215.60 | 198.30 | 192.60 | 189.75 | 186.80 | 184.55 |
| 808 | 1 | 1/4 | .342 | 2 1/4 | 8 | 7010808 | 172.90 | .2340 - .2650 | 215.60 | 198.30 | 192.60 | 189.75 | 186.80 | 184.55 |
| - | 1 | 9/32 | .401 | 2 9/32 | 8 | 7013209 | 196.85 | .2651 - .2968 | 224.05 | 206.05 | 200.15 | 197.20 | 194.15 | 191.80 |
| 1008 | 1 | 5/16 | .401 | 2 5/16 | 8 | 7011008 | 172.90 | .2969 - .3281 | 215.60 | 198.30 | 192.60 | 189.75 | 186.80 | 184.55 |
| - | 1 | 11/32 | .467 | 2 11/32 | 8 | 7013211 | 196.85 | .3282 - .3593 | 224.05 | 206.05 | 200.15 | 197.20 | 194.15 | 191.80 |
| 1208 | 1 | 3/8 | .467 | 2 3/8 | 8 | 7011208 | 172.90 | .3594 - .3900 | 215.60 | 198.30 | 192.60 | 189.75 | 186.80 | 184.55 |
| 609 | 1 1/8 | 3/16 | .312 | 2 3/16 | 8 | 7010609 | 181.55 | .1714 - .2025 | 224.55 | 207.30 | 201.55 | 198.80 | 195.95 | 193.50 |
| 709 | 1 1/8 | 7/32 | .342 | 2 7/32 | 8 | 7010709 | 181.55 | .2026 - .2339 | 224.55 | 207.30 | 201.55 | 198.80 | 195.95 | 193.50 |
| 809 | 1 1/8 | 1/4 | .374 | 2 1/4 | 8 | 7010809 | 181.55 | .2340 - .2650 | 224.55 | 207.30 | 201.55 | 198.80 | 195.95 | 193.50 |
| - | 1 1/8 | 9/32 | .435 | 2 9/32 | 8 | 7013609 | 206.60 | .2651 - .2968 | 233.35 | 215.45 | 209.45 | 206.60 | 203.65 | 201.10 |
| 1009 | 1 1/8 | 5/16 | .435 | 2 5/16 | 8 | 7011009 | 181.55 | .2969 - .3281 | 224.55 | 207.30 | 201.55 | 198.80 | 195.95 | 193.50 |
| 610 | 1 1/4 | 3/16 | .312 | 2 3/16 | 8 | 7010610 | 190.70 | .1714 - .2025 | 234.10 | 216.90 | 211.20 | 208.35 | 205.35 | 203.05 |
| 710 | 1 1/4 | 7/32 | .342 | 2 7/32 | 8 | 7010710 | 190.70 | .2026 - .2339 | 234.10 | 216.90 | 211.20 | 208.35 | 205.35 | 203.05 |
| 810 | 1 1/4 | 1/4 | .374 | 2 1/4 | 8 | 7010810 | 190.70 | .2340 - .2650 | 234.10 | 216.90 | 211.20 | 208.35 | 205.35 | 203.05 |
| - | 1 1/4 | 9/32 | .435 | 2 9/32 | 8 | 7014009 | 217.00 | .2651 - .2968 | 243.25 | 225.40 | 219.45 | 216.50 | 213.40 | 211.00 |
| 1010 | 1 1/4 | 5/16 | .435 | 2 5/16 | 8 | 7011010 | 190.70 | .2969 - .3281 | 234.10 | 216.90 | 211.20 | 208.35 | 205.35 | 203.05 |
| - | 1 1/4 | 11/32 | .467 | 2 11/32 | 8 | 7014011 | 217.00 | .3282 - .3593 | 243.25 | 225.40 | 219.45 | 216.50 | 213.40 | 211.00 |
| 1210 | 1 1/4 | 3/8 | .467 | 2 3/8 | 8 | 7011210 | 190.70 | .3594 - .3900 | 234.10 | 216.90 | 211.20 | 208.35 | 205.35 | 203.05 |
| 811 | 1 3/8 | 1/4 | .401 | 2 1/4 | 8 | 7010811 | 200.30 | .2340 - .2650 | 244.25 | 227.10 | 221.30 | 218.45 | 215.60 | 213.20 |
| - | 1 3/8 | 9/32 | .467 | 2 9/32 | 8 | 7014409 | 228.00 | .2651 - .2968 | 253.80 | 236.00 | 229.95 | 227.00 | 224.05 | 221.55 |
| 1011 | 1 3/8 | 5/16 | .467 | 2 5/16 | 8 | 7011011 | 200.30 | .2969 - .3281 | 244.25 | 227.10 | 221.30 | 218.45 | 215.60 | 213.20 |
| - | 1 3/8 | 11/32 | .467 | 2 11/32 | 8 | 7014411 | 228.00 | .3282 - .3593 | 253.80 | 236.00 | 229.95 | 227.00 | 224.05 | 221.55 |
| 1211 | 1 3/8 | 3/8 | .467 | 2 3/8 | 8 | 7011211 | 200.30 | .3594 - .3900 | 244.25 | 227.10 | 221.30 | 218.45 | 215.60 | 213.20 |
| 812 | 1 1/2 | 1/4 | .435 | 2 1/4 | 8 | 7010812 | 210.40 | .2340 - .2650 | 254.70 | 237.50 | 231.75 | 229.05 | 226.05 | 223.70 |
| - | 1 1/2 | 9/32 | .467 | 2 9/32 | 8 | 7014809 | 239.45 | .2651 - .2968 | 264.70 | 246.80 | 240.85 | 238.00 | 234.90 | 232.45 |
| 1012 | 1 1/2 | 5/16 | .467 | 2 5/16 | 8 | 7011012 | 210.40 | .2969 - .3281 | 254.70 | 237.50 | 231.75 | 229.05 | 226.05 | 223.70 |
| - | 1 1/2 | 11/32 | .467 | 2 11/32 | 8 | 7014811 | 239.45 | .3282 - .3593 | 264.70 | 246.80 | 240.85 | 238.00 | 234.90 | 232.45 |
| 1212 | 1 1/2 | 3/8 | .467 | 2 3/8 | 8 | 7011212 | 210.40 | .3594 - .3900 | 254.70 | 237.50 | 231.75 | 229.05 | 226.05 | 223.70 |
| - | 1 1/2 | 13/32 | .467 | 2 13/32 | 8 | 7014813 | 239.45 | .3901 - .4219 | 264.70 | 246.80 | 240.85 | 238.00 | 234.90 | 232.45 |
| - | 1 1/2 | 7/16 | .467 | 2 7/16 | 8 | 7014814 | 239.45 | .4220 - .4531 | 264.70 | 246.80 | 240.85 | 238.00 | 234.90 | 232.45 |
| - | 1 1/2 | 15/32 | .467 | 2 15/32 | 8 | 7014815 | 239.45 | .4532 - .4843 | 264.70 | 246.80 | 240.85 | 238.00 | 234.90 | 232.45 |
| - | 1 1/2 | 1/2 | .467 | 2 1/2 | 8 | 7014816 | 239.45 | .4844 - .5150 | 264.70 | 246.80 | 240.85 | 238.00 | 234.90 | 232.45 |

*Quantities of 15 or more - price of fractional size in same size range



KEYSEAT CUTTERS

CHIP CLASS 80, 100, 120 - CARBIDE TIPPED TYPE 702



STRAIGHT TOOTH FOR STEEL



TYPE 702 - FOR STEELS

- Woodruff type
- Carbide tips brazed to tough hardened alloy steel body
- Straight shank: 1/2" diameter, 2" long
- Tool diameter tolerance: plus .020", plus .015"
- Face width tolerance: plus .0000", minus .0005"
- Chip breakers on all straight tooth cutters 5/32" and greater in face width
- Tool geometry and carbide grade appropriate for material being machined
- Decimal size cutters DO NOT have chip breakers

MODIFICATIONS (Prompt delivery)

- Modified tool diameter
- Metric tool diameter
- Modified face width
- Metric face width
- Reduced neck diameter
- Shank drive flat(s)
- Coatings available:
- Corner chamfer or corner radius on one or both sides
- Shortened shank or reduced shank diameter

TITANIUM NITRIDE - TiN

TITANIUM CARBONITRIDE - TiCN

ZIRCONIUM NITRIDE - ZrN

AL TITANIUM NITRIDE - AlTiN

| AMERICAN STANDARD NO. | TOOL DIAM. | DIMENSIONS | | | | TYPE 702 FOR STEEL EDP NO. | PRICE EACH | FINISHED TO MODIFIED FACE WIDTH | | | | | | |
|-----------------------|------------|------------|------------|----------------|--------------|----------------------------|------------|---------------------------------|--|----------|----------|----------|----------|----------|
| | | FACE WIDTH | NECK DIAM. | OVERALL LENGTH | NO. OF TEETH | | | MODIFIED FACE WIDTH RANGE | PRICE EACH - BASED ON QUANTITY ORDERED | | | | | |
| | | | | | | | | | 1 | 2 | 3 | 4 | 5-7 | 8-14* |
| 204 | 1/2 | 1/16 | .130 | 2 1/16 | 6 | 7020204 | \$138.15 | .0575 - .0787 | \$182.30 | \$163.55 | \$157.20 | \$154.25 | \$151.00 | \$148.40 |
| 304 | 1/2 | 3/32 | .160 | 2 3/32 | 6 | 7020304 | 138.15 | .0788 - .1088 | 182.30 | 163.55 | 157.20 | 154.25 | 151.00 | 148.40 |
| 404 | 1/2 | 1/8 | .191 | 2 1/8 | 6 | 7020404 | 138.15 | .1089 - .1400 | 182.30 | 163.55 | 157.20 | 154.25 | 151.00 | 148.40 |
| 305 | 5/8 | 3/32 | .191 | 2 3/32 | 6 | 7020305 | 143.15 | .0788 - .1088 | 187.40 | 168.65 | 162.40 | 159.30 | 156.20 | 153.60 |
| 405 | 5/8 | 1/8 | .223 | 2 1/8 | 6 | 7020405 | 143.15 | .1089 - .1400 | 187.40 | 168.65 | 162.40 | 159.30 | 156.20 | 153.60 |
| 505 | 5/8 | 5/32 | .252 | 2 5/32 | 6 | 7020505 | 143.15 | .1401 - .1713 | 187.40 | 168.65 | 162.40 | 159.30 | 156.20 | 153.60 |
| 605 | 5/8 | 3/16 | .279 | 2 3/16 | 6 | 7020605 | 143.15 | .1714 - .2025 | 187.40 | 168.65 | 162.40 | 159.30 | 156.20 | 153.60 |
| 406 | 3/4 | 1/8 | .217 | 2 1/8 | 6 | 7020406 | 149.40 | .1100 - .1400 | 194.10 | 175.30 | 168.95 | 165.90 | 162.70 | 160.15 |
| 506 | 3/4 | 5/32 | .246 | 2 5/32 | 6 | 7020506 | 149.40 | .1401 - .1713 | 194.10 | 175.30 | 168.95 | 165.90 | 162.70 | 160.15 |
| 606 | 3/4 | 3/16 | .279 | 2 3/16 | 6 | 7020606 | 149.40 | .1714 - .2025 | 194.10 | 175.30 | 168.95 | 165.90 | 162.70 | 160.15 |
| - | 3/4 | 7/32 | .342 | 2 7/32 | 6 | 7022407 | 163.60 | .2026 - .2339 | 194.10 | 175.30 | 168.95 | 165.90 | 162.70 | 160.15 |
| 806 | 3/4 | 1/4 | .342 | 2 1/4 | 6 | 7020806 | 149.40 | .2340 - .2650 | 194.10 | 175.30 | 168.95 | 165.90 | 162.70 | 160.15 |
| 507 | 7/8 | 5/32 | .246 | 2 5/32 | 6 | 7020507 | 156.50 | .1401 - .1713 | 201.45 | 182.65 | 176.30 | 173.25 | 170.15 | 167.50 |
| 607 | 7/8 | 3/16 | .279 | 2 3/16 | 6 | 7020607 | 156.50 | .1714 - .2025 | 201.45 | 182.65 | 176.30 | 173.25 | 170.15 | 167.50 |
| 707 | 7/8 | 5/32 | .312 | 2 5/32 | 6 | 7020707 | 156.50 | .2026 - .2339 | 201.45 | 182.65 | 176.30 | 173.25 | 170.15 | 167.50 |
| 807 | 7/8 | 1/4 | .342 | 2 1/4 | 6 | 7020807 | 156.50 | .2340 - .2650 | 201.45 | 182.65 | 176.30 | 173.25 | 170.15 | 167.50 |
| 608 | 1 | 3/16 | .279 | 2 3/16 | 8 | 7020608 | 176.55 | .1714 - .2025 | 222.35 | 203.70 | 197.25 | 194.30 | 191.10 | 188.55 |
| 708 | 1 | 7/32 | .312 | 2 7/32 | 8 | 7020708 | 176.55 | .2026 - .2339 | 222.35 | 203.70 | 197.25 | 194.30 | 191.10 | 188.55 |
| 808 | 1 | 1/4 | .342 | 2 1/4 | 8 | 7020808 | 176.55 | .2340 - .2650 | 222.35 | 203.70 | 197.25 | 194.30 | 191.10 | 188.55 |
| - | 1 | 5/32 | .401 | 2 5/32 | 8 | 7023209 | 193.35 | .2651 - .2968 | 222.35 | 203.70 | 197.25 | 194.30 | 191.10 | 188.55 |
| 1008 | 1 | 5/16 | .401 | 2 5/16 | 8 | 7021008 | 176.55 | .2969 - .3281 | 222.35 | 203.70 | 197.25 | 194.30 | 191.10 | 188.55 |
| - | 1 | 11/32 | .467 | 2 11/32 | 8 | 7023211 | 193.35 | .3282 - .3593 | 222.35 | 203.70 | 197.25 | 194.30 | 191.10 | 188.55 |
| 1208 | 1 | 3/8 | .467 | 2 3/8 | 8 | 7021208 | 176.55 | .3594 - .3900 | 222.35 | 203.70 | 197.25 | 194.30 | 191.10 | 188.55 |
| 609 | 1 1/8 | 3/16 | .312 | 2 3/16 | 8 | 7020609 | 185.40 | .1714 - .2025 | 231.70 | 213.00 | 206.60 | 203.70 | 200.45 | 197.80 |
| 709 | 1 1/8 | 7/32 | .342 | 2 7/32 | 8 | 7020709 | 185.40 | .2026 - .2339 | 231.70 | 213.00 | 206.60 | 203.70 | 200.45 | 197.80 |
| 809 | 1 1/8 | 1/4 | .374 | 2 1/4 | 8 | 7020809 | 185.40 | .2340 - .2650 | 231.70 | 213.00 | 206.60 | 203.70 | 200.45 | 197.80 |
| - | 1 1/8 | 5/32 | .435 | 2 5/32 | 8 | 7023609 | 203.05 | .2651 - .2968 | 231.70 | 213.00 | 206.60 | 203.70 | 200.45 | 197.80 |
| 1009 | 1 1/8 | 5/16 | .435 | 2 5/16 | 8 | 7021009 | 185.40 | .2969 - .3281 | 231.70 | 213.00 | 206.60 | 203.70 | 200.45 | 197.80 |
| 610 | 1 1/4 | 3/16 | .312 | 2 3/16 | 8 | 7020610 | 194.60 | .1714 - .2025 | 241.40 | 222.60 | 216.35 | 213.25 | 210.10 | 207.55 |
| 710 | 1 1/4 | 7/32 | .342 | 2 7/32 | 8 | 7020710 | 194.60 | .2026 - .2339 | 241.40 | 222.60 | 216.35 | 213.25 | 210.10 | 207.55 |
| 810 | 1 1/4 | 1/4 | .374 | 2 1/4 | 8 | 7020810 | 194.60 | .2340 - .2650 | 241.40 | 222.60 | 216.35 | 213.25 | 210.10 | 207.55 |
| - | 1 1/4 | 5/32 | .435 | 2 5/32 | 8 | 7024009 | 213.15 | .2651 - .2968 | 241.40 | 222.60 | 216.35 | 213.25 | 210.10 | 207.55 |
| 1010 | 1 1/4 | 5/16 | .435 | 2 5/16 | 8 | 7021010 | 194.60 | .2969 - .3281 | 241.40 | 222.60 | 216.35 | 213.25 | 210.10 | 207.55 |
| - | 1 1/4 | 11/32 | .467 | 2 11/32 | 8 | 7024011 | 213.15 | .3282 - .3593 | 241.40 | 222.60 | 216.35 | 213.25 | 210.10 | 207.55 |
| 1210 | 1 1/4 | 3/8 | .467 | 2 3/8 | 8 | 7021210 | 194.60 | .3594 - .3900 | 241.40 | 222.60 | 216.35 | 213.25 | 210.10 | 207.55 |
| 811 | 1 3/8 | 1/4 | .401 | 2 1/4 | 8 | 7020811 | 204.45 | .2340 - .2650 | 251.85 | 233.00 | 226.70 | 223.55 | 220.35 | 217.85 |
| - | 1 3/8 | 5/32 | .467 | 2 5/32 | 8 | 7024409 | 223.85 | .2651 - .2968 | 251.85 | 233.00 | 226.70 | 223.55 | 220.35 | 217.85 |
| 1011 | 1 3/8 | 5/16 | .467 | 2 5/16 | 8 | 7021011 | 204.45 | .2969 - .3281 | 251.85 | 233.00 | 226.70 | 223.55 | 220.35 | 217.85 |
| - | 1 3/8 | 11/32 | .467 | 2 11/32 | 8 | 7024411 | 223.85 | .3282 - .3593 | 251.85 | 233.00 | 226.70 | 223.55 | 220.35 | 217.85 |
| 1211 | 1 3/8 | 3/8 | .467 | 2 3/8 | 8 | 7021211 | 204.45 | .3594 - .3900 | 251.85 | 233.00 | 226.70 | 223.55 | 220.35 | 217.85 |
| 812 | 1 1/2 | 1/4 | .435 | 2 1/4 | 8 | 7020812 | 214.65 | .2340 - .2650 | 262.45 | 243.75 | 237.45 | 234.40 | 231.15 | 228.70 |
| - | 1 1/2 | 5/32 | .467 | 2 5/32 | 8 | 7024809 | 235.10 | .2651 - .2968 | 262.45 | 243.75 | 237.45 | 234.40 | 231.15 | 228.70 |
| 1012 | 1 1/2 | 5/16 | .467 | 2 5/16 | 8 | 7021012 | 214.65 | .2969 - .3281 | 262.45 | 243.75 | 237.45 | 234.40 | 231.15 | 228.70 |
| - | 1 1/2 | 11/32 | .467 | 2 11/32 | 8 | 7024811 | 235.10 | .3282 - .3593 | 262.45 | 243.75 | 237.45 | 234.40 | 231.15 | 228.70 |
| 1212 | 1 1/2 | 3/8 | .467 | 2 3/8 | 8 | 7021212 | 214.65 | .3594 - .3900 | 262.45 | 243.75 | 237.45 | 234.40 | 231.15 | 228.70 |
| - | 1 1/2 | 13/32 | .467 | 2 13/32 | 8 | 7024813 | 235.10 | .3901 - .4219 | 262.45 | 243.75 | 237.45 | 234.40 | 231.15 | 228.70 |
| - | 1 1/2 | 7/16 | .467 | 2 7/16 | 8 | 7024814 | 235.10 | .4220 - .4531 | 262.45 | 243.75 | 237.45 | 234.40 | 231.15 | 228.70 |
| - | 1 1/2 | 15/32 | .467 | 2 15/32 | 8 | 7024815 | 235.10 | .4532 - .4843 | 262.45 | 243.75 | 237.45 | 234.40 | 231.15 | 228.70 |
| - | 1 1/2 | 1/2 | .467 | 2 1/2 | 8 | 7024816 | 235.10 | .4844 - .5150 | 262.45 | 243.75 | 237.45 | 234.40 | 231.15 | 228.70 |

*Quantities of 15 or more - price of fractional size in same size range

CUTTERS

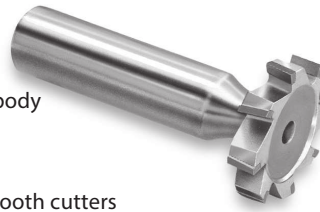


KEYSEAT CUTTERS

CHIP CLASS 80, 100, 120 - CARBIDE TIPPED TYPE 703

MATERIAL SPECIFIC

STAGGERED TOOTH FOR STEEL



TYPE 703 - FOR STEELS

- Woodruff type
- Carbide tips brazed to tough hardened alloy steel body
- Straight shank: 1/2" diameter, 2" long
- Tool diameter tolerance: plus .020", plus .015"
- Face width tolerance: plus .0000", minus .0005"
- Alternate right and left axial rake on all staggered tooth cutters
- Tool geometry and carbide grade appropriate for material being machined

MODIFICATIONS (Prompt delivery)

- Modified tool diameter
- Metric tool diameter
- Modified face width
- Metric face width
- Reduced neck diameter
- Shank drive flat(s)
- Coatings available:
- Corner chamfer or corner radius on one or both sides
- Shortened shank or reduced shank diameter

TITANIUM NITRIDE - TiN

TITANIUM CARBONITRIDE - TiCN

ZIRCONIUM NITRIDE - ZrN

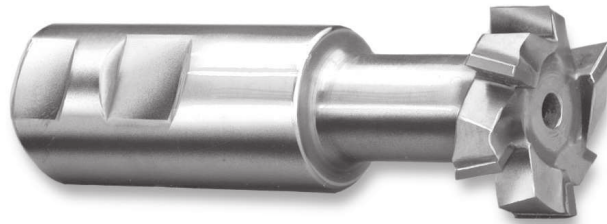
AL TITANIUM NITRIDE - AlTiN

| AMERICAN STANDARD NO. | TOOL DIAM. | DIMENSIONS | | | | TYPE 703 FOR STEEL EDP NO. | PRICE EACH | FINISHED TO MODIFIED FACE WIDTH | | | | | | |
|-----------------------|------------|------------|------------|----------------|--------------|----------------------------|------------|---------------------------------|--|----------|----------|----------|----------|----------|
| | | FACE WIDTH | NECK DIAM. | OVERALL LENGTH | NO. OF TEETH | | | MODIFIED FACE WIDTH RANGE | PRICE EACH - BASED ON QUANTITY ORDERED | | | | | |
| | | | | | | | | | 1 | 2 | 3 | 4 | 5-7 | 8-14* |
| 204 | 1/2 | 1/16 | .130 | 2 1/16 | 6 | 7030204 | \$162.55 | .0575 - .0787 | \$207.80 | \$189.05 | \$182.75 | \$179.65 | \$176.55 | \$174.00 |
| 304 | 1/2 | 3/32 | .160 | 2 3/32 | 6 | 7030304 | 162.55 | .0788 - .1088 | 207.80 | 189.05 | 182.75 | 179.65 | 176.55 | 174.00 |
| 404 | 1/2 | 1/8 | .191 | 2 1/8 | 6 | 7030404 | 162.55 | .1089 - .1400 | 207.80 | 189.05 | 182.75 | 179.65 | 176.55 | 174.00 |
| 305 | 5/8 | 3/32 | .191 | 2 3/32 | 6 | 7030305 | 168.30 | .0788 - .1088 | 213.85 | 195.15 | 188.85 | 185.80 | 182.65 | 180.05 |
| 405 | 5/8 | 1/8 | .223 | 2 1/8 | 6 | 7030405 | 168.30 | .1089 - .1400 | 213.85 | 195.15 | 188.85 | 185.80 | 182.65 | 180.05 |
| 505 | 5/8 | 5/32 | .252 | 2 5/32 | 6 | 7030505 | 168.30 | .1401 - .1713 | 213.85 | 195.15 | 188.85 | 185.80 | 182.65 | 180.05 |
| 605 | 5/8 | 3/16 | .279 | 2 3/16 | 6 | 7030605 | 168.30 | .1714 - .2025 | 213.85 | 195.15 | 188.85 | 185.80 | 182.65 | 180.05 |
| 406 | 3/4 | 1/8 | .217 | 2 1/8 | 6 | 7030406 | 175.90 | .1100 - .1400 | 221.80 | 203.10 | 196.80 | 193.75 | 190.50 | 187.95 |
| 506 | 3/4 | 5/32 | .246 | 2 5/32 | 6 | 7030506 | 175.90 | .1401 - .1713 | 221.80 | 203.10 | 196.80 | 193.75 | 190.50 | 187.95 |
| 606 | 3/4 | 3/16 | .279 | 2 3/16 | 6 | 7030606 | 175.90 | .1714 - .2025 | 221.80 | 203.10 | 196.80 | 193.75 | 190.50 | 187.95 |
| - | 3/4 | 7/32 | .342 | 2 7/32 | 6 | 7032407 | 192.60 | .2026 - .2339 | 221.80 | 203.10 | 196.80 | 193.75 | 190.50 | 187.95 |
| 806 | 3/4 | 1/4 | .342 | 2 1/4 | 6 | 7030806 | 175.90 | .2340 - .2650 | 221.80 | 203.10 | 196.80 | 193.75 | 190.50 | 187.95 |
| 507 | 7/8 | 5/32 | .246 | 2 5/32 | 6 | 7030507 | 184.00 | .1401 - .1713 | 230.25 | 211.50 | 205.15 | 202.00 | 198.85 | 196.45 |
| 607 | 7/8 | 3/16 | .279 | 2 3/16 | 6 | 7030607 | 184.00 | .1714 - .2025 | 230.25 | 211.50 | 205.15 | 202.00 | 198.85 | 196.45 |
| 707 | 7/8 | 7/32 | .312 | 2 7/32 | 6 | 7030707 | 184.00 | .2026 - .2339 | 230.25 | 211.50 | 205.15 | 202.00 | 198.85 | 196.45 |
| 807 | 7/8 | 1/4 | .342 | 2 1/4 | 6 | 7030807 | 184.00 | .2340 - .2650 | 230.25 | 211.50 | 205.15 | 202.00 | 198.85 | 196.45 |
| 608 | 1 | 3/16 | .279 | 2 3/16 | 8 | 7030608 | 207.55 | .1714 - .2025 | 254.90 | 236.20 | 229.85 | 226.85 | 223.65 | 221.10 |
| 708 | 1 | 7/32 | .312 | 2 7/32 | 8 | 7030708 | 207.55 | .2026 - .2339 | 254.90 | 236.20 | 229.85 | 226.85 | 223.65 | 221.10 |
| 808 | 1 | 1/4 | .342 | 2 1/4 | 8 | 7030808 | 207.55 | .2340 - .2650 | 254.90 | 236.20 | 229.85 | 226.85 | 223.65 | 221.10 |
| - | 1 | 9/32 | .401 | 2 9/32 | 8 | 7033209 | 227.40 | .2651 - .2968 | 254.90 | 236.20 | 229.85 | 226.85 | 223.65 | 221.10 |
| 1008 | 1 | 5/16 | .401 | 2 5/16 | 8 | 7031008 | 207.55 | .2969 - .3281 | 254.90 | 236.20 | 229.85 | 226.85 | 223.65 | 221.10 |
| - | 1 | 11/32 | .467 | 2 11/32 | 8 | 7033211 | 227.40 | .3282 - .3593 | 254.90 | 236.20 | 229.85 | 226.85 | 223.65 | 221.10 |
| 1208 | 1 | 3/8 | .467 | 2 3/8 | 8 | 7031208 | 207.55 | .3594 - .3900 | 254.90 | 236.20 | 229.85 | 226.85 | 223.65 | 221.10 |
| 609 | 1 1/8 | 3/16 | .312 | 2 3/16 | 8 | 7030609 | 217.85 | .1714 - .2025 | 265.75 | 246.95 | 240.65 | 237.65 | 234.50 | 231.80 |
| 709 | 1 1/8 | 7/32 | .342 | 2 7/32 | 8 | 7030709 | 217.85 | .2026 - .2339 | 265.75 | 246.95 | 240.65 | 237.65 | 234.50 | 231.80 |
| 809 | 1 1/8 | 1/4 | .374 | 2 1/4 | 8 | 7030809 | 217.85 | .2340 - .2650 | 265.75 | 246.95 | 240.65 | 237.65 | 234.50 | 231.80 |
| - | 1 1/8 | 9/32 | .435 | 2 9/32 | 8 | 7033609 | 238.55 | .2651 - .2968 | 265.75 | 246.95 | 240.65 | 237.65 | 234.50 | 231.80 |
| 1009 | 1 1/8 | 5/16 | .435 | 2 5/16 | 8 | 7031009 | 217.85 | .2969 - .3281 | 265.75 | 246.95 | 240.65 | 237.65 | 234.50 | 231.80 |
| 610 | 1 1/4 | 3/16 | .312 | 2 3/16 | 8 | 7030610 | 228.85 | .1714 - .2025 | 277.20 | 258.45 | 252.15 | 249.15 | 246.05 | 243.40 |
| 710 | 1 1/4 | 7/32 | .342 | 2 7/32 | 8 | 7030710 | 228.85 | .2026 - .2339 | 277.20 | 258.45 | 252.15 | 249.15 | 246.05 | 243.40 |
| 810 | 1 1/4 | 1/4 | .374 | 2 1/4 | 8 | 7030810 | 228.85 | .2340 - .2650 | 277.20 | 258.45 | 252.15 | 249.15 | 246.05 | 243.40 |
| - | 1 1/4 | 9/32 | .435 | 2 9/32 | 8 | 7034009 | 250.70 | .2651 - .2968 | 277.20 | 258.45 | 252.15 | 249.15 | 246.05 | 243.40 |
| 1010 | 1 1/4 | 5/16 | .435 | 2 5/16 | 8 | 7031010 | 228.85 | .2969 - .3281 | 277.20 | 258.45 | 252.15 | 249.15 | 246.05 | 243.40 |
| - | 1 1/4 | 11/32 | .467 | 2 11/32 | 8 | 7034011 | 250.70 | .3282 - .3593 | 277.20 | 258.45 | 252.15 | 249.15 | 246.05 | 243.40 |
| 1210 | 1 1/4 | 3/8 | .467 | 2 3/8 | 8 | 7031210 | 228.85 | .3594 - .3900 | 277.20 | 258.45 | 252.15 | 249.15 | 246.05 | 243.40 |
| 811 | 1 3/8 | 1/4 | .401 | 2 1/4 | 8 | 7030811 | 240.50 | .2340 - .2650 | 289.40 | 270.65 | 264.25 | 261.30 | 258.10 | 255.50 |
| - | 1 3/8 | 9/32 | .467 | 2 9/32 | 8 | 7034409 | 263.30 | .2651 - .2968 | 289.40 | 270.65 | 264.25 | 261.30 | 258.10 | 255.50 |
| 1011 | 1 3/8 | 5/16 | .467 | 2 5/16 | 8 | 7031011 | 240.50 | .2969 - .3281 | 289.40 | 270.65 | 264.25 | 261.30 | 258.10 | 255.50 |
| - | 1 3/8 | 11/32 | .467 | 2 11/32 | 8 | 7034411 | 263.30 | .3282 - .3593 | 289.40 | 270.65 | 264.25 | 261.30 | 258.10 | 255.50 |
| 1211 | 1 3/8 | 3/8 | .467 | 2 3/8 | 8 | 7031211 | 240.50 | .3594 - .3900 | 289.40 | 270.65 | 264.25 | 261.30 | 258.10 | 255.50 |
| 812 | 1 1/2 | 1/4 | .435 | 2 1/4 | 8 | 7030812 | 252.50 | .2340 - .2650 | 302.00 | 283.25 | 276.90 | 273.90 | 270.65 | 268.25 |
| - | 1 1/2 | 9/32 | .467 | 2 9/32 | 8 | 7034809 | 276.50 | .2651 - .2968 | 302.00 | 283.25 | 276.90 | 273.90 | 270.65 | 268.25 |
| 1012 | 1 1/2 | 5/16 | .467 | 2 5/16 | 8 | 7031012 | 252.50 | .2969 - .3281 | 302.00 | 283.25 | 276.90 | 273.90 | 270.65 | 268.25 |
| - | 1 1/2 | 11/32 | .467 | 2 11/32 | 8 | 7034811 | 276.50 | .3282 - .3593 | 302.00 | 283.25 | 276.90 | 273.90 | 270.65 | 268.25 |
| 1212 | 1 1/2 | 3/8 | .467 | 2 3/8 | 8 | 7031212 | 252.50 | .3594 - .3900 | 302.00 | 283.25 | 276.90 | 273.90 | 270.65 | 268.25 |
| - | 1 1/2 | 13/32 | .467 | 2 13/32 | 8 | 7034813 | 276.50 | .3901 - .4219 | 302.00 | 283.25 | 276.90 | 273.90 | 270.65 | 268.25 |
| - | 1 1/2 | 7/16 | .467 | 2 7/16 | 8 | 7034814 | 276.50 | .4220 - .4531 | 302.00 | 283.25 | 276.90 | 273.90 | 270.65 | 268.25 |
| - | 1 1/2 | 15/32 | .467 | 2 15/32 | 8 | 7034815 | 276.50 | .4532 - .4843 | 302.00 | 283.25 | 276.90 | 273.90 | 270.65 | 268.25 |
| - | 1 1/2 | 1/2 | .467 | 2 1/2 | 8 | 7034816 | 276.50 | .4844 - .5150 | 302.00 | 283.25 | 276.90 | 273.90 | 270.65 | 268.25 |

*Quantities of 15 or more - price of fractional size in same size range



T-SLOT CUTTERS CARBIDE TIPPED TYPES 720 & 721 FRACTIONAL



| TOOL SELECTOR | CHIP CLASS | MATERIAL MACHINED | TOOL TYPE |
|---------------|-------------------------|---------------------------|-----------|
| | 20 | NON-FERROUS - LONG CHIPS | 720 |
| | 40 | NON-FERROUS - SHORT CHIPS | 720 |
| | 60 | CAST IRONS | 720 |
| | 80 | LOW STRENGTH STEELS | 721 |
| | 100 | MEDIUM STRENGTH STEELS | 721 |
| | 120 | HIGH STRENGTH STEELS | 721 |
| 140 | HIGH TEMPERATURE ALLOYS | 720 | |

TYPE 720 – FOR NON-FERROUS & CAST IRONS TYPE 721 – FOR STEELS

- Alternate right and left axial rake
- Straight shank with Weldon flats
- Tool diameter tolerance: plus .000", minus .010"
- Tool geometry & carbide grade appropriate for material being machined

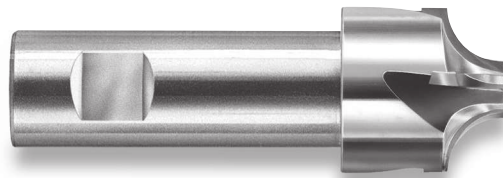
MODIFICATIONS (Prompt delivery)

- Modified tool width
- Metric tool width
- Reduced neck diameter
- Shortened shank or reduced shank diameter
- Additional shank drive flat(s)
- Coolant outlets
- 4 coatings available (see bottom of page)

| BOLT DIAM. | TOOL DIAM. | DIMENSIONS | | | | | | TYPE 720 FOR NON-FERROUS/CAST IRONS | | TYPE 721 FOR STEELS | |
|------------|------------|------------|-------------|------------|----------|---------|--------------|-------------------------------------|----------|---------------------|----------|
| | | TOOL WIDTH | SHANK DIAM. | NECK DIAM. | LENGTH | | NO. OF TEETH | EDP NO. | PRICE | EDP NO. | PRICE |
| | | | | | UNDERCUT | OVERALL | | | | | |
| 1/4 | 9/16 | 15/64 | 1/2 | 17/64 | 35/64 | 2 19/32 | 6 | 72008 | \$169.95 | 72108 | \$183.50 |
| 5/16 | 21/32 | 17/64 | 1/2 | 21/64 | 39/64 | 2 11/16 | 6 | 72010 | 167.85 | 72110 | 181.30 |
| 3/8 | 25/32 | 21/64 | 3/4 | 13/32 | 59/64 | 3 1/4 | 6 | 72012 | 211.30 | 72112 | 228.25 |
| 1/2 | 31/32 | 25/64 | 3/4 | 17/32 | 63/64 | 3 7/16 | 6 | 72016 | 229.75 | 72116 | 248.05 |
| 5/8 | 1 1/4 | 31/64 | 1 | 21/32 | 1 9/64 | 3 15/16 | 6 | 72020 | 304.85 | 72120 | 329.40 |
| 3/4 | 1 15/32 | 5/8 | 1 | 25/32 | 1 1/2 | 4 7/16 | 6 | 72024 | 340.70 | 72124 | 367.90 |
| 1 | 1 27/32 | 53/64 | 1 1/4 | 1 1/32 | 1 43/64 | 4 13/16 | 8 | 72032 | 486.40 | 72132 | 525.40 |
| 1 1/4 | 2 7/32 | 1 3/32 | 1 1/4 | 1 7/32 | 1 31/32 | 5 3/8 | 8 | 72040 | 613.80 | 72140 | 662.95 |
| 1 1/2 | 2 21/32 | 1 11/32 | 1 1/4 | 1 17/32 | 2 1/8 | 5 29/32 | 8 | 72048 | 710.80 | 72148 | 767.70 |



CORNER ROUNDING END MILLS CARBIDE TIPPED TYPES 740 & 741 FRACTIONAL



| TOOL SELECTOR | CHIP CLASS | MATERIAL MACHINED | TOOL TYPE |
|---------------|-------------------------|---------------------------|-----------|
| | 20 | NON-FERROUS - LONG CHIPS | 740 |
| | 40 | NON-FERROUS - SHORT CHIPS | 740 |
| | 60 | CAST IRONS | 740 |
| | 80 | LOW STRENGTH STEELS | 741 |
| | 100 | MEDIUM STRENGTH STEELS | 741 |
| | 120 | HIGH STRENGTH STEELS | 741 |
| 140 | HIGH TEMPERATURE ALLOYS | 740 | |

TYPE 740 – FOR NON-FERROUS & CAST IRONS TYPE 741 – FOR STEELS

- All sizes have 3 flutes.
- Straight shank with Weldon flats
- Tool geometry & carbide grade appropriate for material being machined

USE:

- For milling round corners on square edges

MODIFICATIONS (Prompt delivery)

- Shortened shank or reduced shank diameter
- Additional shank drive flat(s)
- Coatings available:

TITANIUM NITRIDE – TiN

TITANIUM CARBONITRIDE – TiCN

ZIRCONIUM NITRIDE – ZrN

AL TITANIUM NITRIDE – AlTiN

| CIRCLE RADIUS | TOOL DIAMETER | DIMENSIONS | | | | TYPE 740 FOR N-F/CI | | TYPE 741 FOR STEELS | |
|---------------|---------------|-------------|-----------|----------|----------|---------------------|----------|---------------------|----------|
| | | SHANK DIAM. | END DIAM. | LENGTH | | EDP NO. | PRICE | EDP NO. | PRICE |
| | | | | CAR-BIDE | OVER-ALL | | | | |
| 1/16 | 7/16 | 3/8 | 17/64 | 13/32 | 2 3/4 | 74002 | \$155.95 | 74102 | \$168.50 |
| 3/32 | 1/2 | 3/8 | 17/64 | 13/32 | 2 3/4 | 74003 | 155.95 | 74103 | 168.50 |
| 1/8 | 5/8 | 1/2 | 19/64 | 13/32 | 3 | 74004 | 161.45 | 74104 | 174.25 |
| 5/32 | 3/4 | 1/2 | 23/64 | 13/32 | 3 | 74005 | 171.25 | 74105 | 184.90 |
| 3/16 | 7/8 | 3/4 | 13/32 | 13/32 | 3 1/4 | 74006 | 181.15 | 74106 | 195.60 |
| 1/4 | 1 | 3/4 | 13/32 | 15/32 | 3 1/2 | 74008 | 206.45 | 74108 | 222.95 |
| 5/16 | 1 1/8 | 7/8 | 13/32 | 19/32 | 3 1/2 | 74010 | 212.10 | 74110 | 229.05 |
| 3/8 | 1 1/4 | 7/8 | 13/32 | 25/32 | 3 3/4 | 74012 | 220.30 | 74112 | 238.00 |
| 7/16 | 1 3/8 | 1 | 13/32 | 7/8 | 4 | 74014 | 245.40 | 74114 | 265.05 |
| 1/2 | 1 1/2 | 1 | 13/32 | 1 | 4 | 74016 | 273.05 | 74116 | 295.05 |
| 5/8 | 2 | 1 1/4 | 21/32 | 1 7/32 | 4 1/4 | 74020 | 336.05 | 74120 | 363.00 |



DOVETAIL CUTTERS CARBIDE TIPPED TYPES 734, 735, 736, & 737 FRACTIONAL

MATERIAL SPECIFIC



45° DOVETAIL CUTTERS:

TYPE 734 – FOR NON-FERROUS & CAST IRONS

TYPE 735 – FOR STEELS

60° DOVETAIL CUTTERS:

TYPE 736 – FOR NON-FERROUS & CAST IRONS

TYPE 737 – FOR STEELS

- Right hand cut
- Straight shank with Weldon flats
- .015" - .020" corner radius
- Tool diameter tolerance: plus .015", minus .000"
- Tool geometry & carbide grade appropriate for material being machined

| TOOL SELECTOR | CHIP CLASS | MATERIAL MACHINED | TOOL TYPE |
|---------------|---------------------------|--------------------------|------------|
| | 20 | NON-FERROUS - LONG CHIPS | 734 or 736 |
| 40 | NON-FERROUS - SHORT CHIPS | 734 or 736 | |
| 60 | CAST IRONS | 734 or 736 | |
| 80 | LOW STRENGTH STEELS | 735 or 737 | |
| 100 | MEDIUM STRENGTH STEELS | 735 or 737 | |
| 120 | HIGH STRENGTH STEELS | 735 or 737 | |
| 140 | HIGH TEMPERATURE ALLOYS | 734 or 736 | |

MODIFICATIONS (Prompt delivery)

- Reduced neck diameter
- Shortened shank or reduced shank diameter
- Additional shank drive flat(s)
- Coatings available:

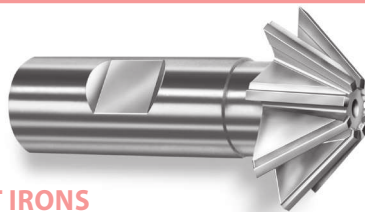
| |
|------------------------------|
| TITANIUM NITRIDE - TiN |
| TITANIUM CARBONITRIDE - TiCN |
| ZIRCONIUM NITRIDE - ZrN |
| AL TITANIUM NITRIDE - AlTiN |

| TOOL DIAM. | DIMENSIONS | | | | 45° ANGLE | | | | | | 60° ANGLE | | | |
|------------|-------------|------------|-----------------|--------------|------------|---------------------|----------|---------------------|----------|------------|---------------------|----------|---------------------|----------|
| | SHANK DIAM. | NECK DIAM. | OVER-ALL LENGTH | NO. OF TEETH | TOOL WIDTH | TYPE 734 FOR N-F/CI | | TYPE 735 FOR STEELS | | TOOL WIDTH | TYPE 736 FOR N-F/CI | | TYPE 737 FOR STEELS | |
| | | | | | | EDP NO. | PRICE | EDP NO. | PRICE | | EDP NO. | PRICE | EDP NO. | PRICE |
| 1/2 | 3/8 | 3/16 | 2 1/8 | 3 | 5/32 | 73416 | \$170.15 | 73516 | \$172.75 | 7/32 | 73616 | \$170.15 | 73716 | \$172.75 |
| 3/4 | 3/8 | 1/4 | 2 1/4 | 3 | 1/4 | 73424 | 183.60 | 73524 | 186.15 | 1/4 | 73624 | 183.60 | 73724 | 186.15 |
| 1 | 1/2 | 3/8 | 2 1/2 | 4 | 5/16 | 73432 | 196.40 | 73532 | 199.25 | 3/8 | 73632 | 196.40 | 73732 | 199.25 |
| 1 1/4 | 5/8 | 1/2 | 2 3/4 | 4 | 3/8 | 73440 | 223.25 | 73540 | 226.45 | 1/2 | 73640 | 223.25 | 73740 | 226.45 |
| 1 1/2 | 3/4 | 1/2 | 3 1/4 | 4 | 1/2 | 73448 | 260.85 | 73548 | 264.60 | 5/8 | 73648 | 260.85 | 73748 | 264.60 |
| 2 | 1 | 3/4 | 4 1/4 | 6 | 5/8 | 73464 | 419.10 | 73564 | 425.10 | 3/4 | 73664 | 419.10 | 73764 | 425.10 |
| 2 1/2 | 1 1/4 | 1 | 4 3/8 | 6 | 3/4 | 73480 | 566.85 | 73580 | 574.75 | 7/8 | 73680 | 566.85 | 73780 | 574.75 |
| 3 | 1 1/4 | 1 | 4 1/2 | 6 | 1 | 73496 | 668.35 | 73596 | 677.95 | 1 1/8 | 73696 | 668.35 | 73796 | 677.95 |



CHAMFER MILLING CUTTERS CARBIDE TIPPED TYPES 730, 731, 732, & 733 FRACTIONAL

MATERIAL SPECIFIC



45° CHAMFER MILLING CUTTERS:

TYPE 730 – FOR NON-FERROUS & CAST IRONS

TYPE 731 – FOR STEELS

60° CHAMFER MILLING CUTTERS:

TYPE 732 – FOR NON-FERROUS & CAST IRONS

TYPE 733 – FOR STEELS

- Right hand cut
- Straight shank with Weldon flats
- Tool diameter tolerance: plus .015", minus .000"
- Tool geometry & carbide grade appropriate for material being machined

| TOOL SELECTOR | CHIP CLASS | MATERIAL MACHINED | TOOL TYPE |
|---------------|---------------------------|--------------------------|------------|
| | 20 | NON-FERROUS - LONG CHIPS | 730 or 732 |
| 40 | NON-FERROUS - SHORT CHIPS | 730 or 732 | |
| 60 | CAST IRONS | 730 or 732 | |
| 80 | LOW STRENGTH STEELS | 731 or 733 | |
| 100 | MEDIUM STRENGTH STEELS | 731 or 733 | |
| 120 | HIGH STRENGTH STEELS | 731 or 733 | |
| 140 | HIGH TEMPERATURE ALLOYS | 730 or 732 | |

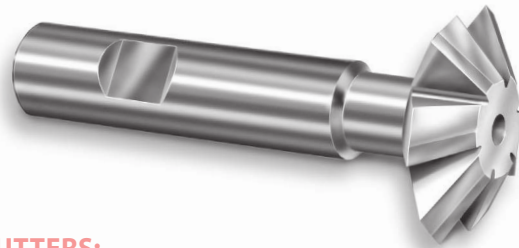
MODIFICATIONS (Prompt delivery)

- Reduced neck diameter
- Shortened shank or reduced shank diameter
- Additional shank drive flat(s)
- 4 coatings available (see top of page)

| TOOL DIAM. | DIMENSIONS | | | 45° ANGLE | | | | | | 60° ANGLE | | | |
|------------|-------------|-----------------|--------------|------------|---------------------|----------|---------------------|----------|------------|---------------------|----------|---------------------|----------|
| | SHANK DIAM. | OVER-ALL LENGTH | NO. OF TEETH | TOOL WIDTH | TYPE 730 FOR N-F/CI | | TYPE 731 FOR STEELS | | TOOL WIDTH | TYPE 732 FOR N-F/CI | | TYPE 733 FOR STEELS | |
| | | | | | EDP NO. | PRICE | EDP NO. | PRICE | | EDP NO. | PRICE | EDP NO. | PRICE |
| 1/2 | 3/8 | 2 1/8 | 4 | 1/8 | 73016 | \$207.90 | 73116 | \$228.60 | 7/32 | 73216 | \$207.90 | 73316 | \$228.60 |
| 3/4 | 3/8 | 2 1/8 | 6 | 3/16 | 73024 | 224.10 | 73124 | 246.45 | 5/16 | 73224 | 224.10 | 73324 | 246.45 |
| 1 | 1/2 | 2 1/2 | 6 | 5/16 | 73032 | 262.95 | 73132 | 289.15 | 7/16 | 73232 | 262.95 | 73332 | 289.15 |
| 1 1/2 | 3/4 | 2 3/4 | 8 | 1/2 | 73048 | 333.20 | 73148 | 366.70 | 5/8 | 73248 | 333.20 | 73348 | 366.70 |



DOUBLE ANGLE CUTTERS CARBIDE TIPPED TYPES 746, 747, 748, & 749 FRACTIONAL



| TOOL SELECTOR | CHIP CLASS | MATERIAL MACHINED | TOOL TYPE |
|---------------|------------|---------------------------|------------|
| | 20 | NON-FERROUS - LONG CHIPS | 746 or 748 |
| | 40 | NON-FERROUS - SHORT CHIPS | 746 or 748 |
| | 60 | CAST IRONS | 746 or 748 |
| | 80 | LOW STRENGTH STEELS | 747 or 749 |
| | 100 | MEDIUM STRENGTH STEELS | 747 or 749 |
| | 120 | HIGH STRENGTH STEELS | 747 or 749 |
| | 140 | HIGH TEMPERATURE ALLOYS | 746 or 748 |

60° DOUBLE ANGLE CUTTERS:

TYPE 746 – FOR NON-FERROUS & CAST IRONS

TYPE 747 – FOR STEELS

90° DOUBLE ANGLE CUTTERS:

TYPE 748 – FOR NON-FERROUS & CAST IRONS

TYPE 749 – FOR STEELS

- Right hand cut
- Straight shank with Weldon flats
- .010" - .020" corner radius
- Tool diameter tolerance: plus .015", minus .000"
- Tool geometry & carbide grade appropriate for material being machined

MODIFICATIONS (Prompt delivery)

- Reduced neck diameter
- Shortened shank or reduced shank diameter
- Additional shank drive flat(s)
- Coatings available:

TITANIUM NITRIDE – TiN

TITANIUM CARBONITRIDE – TiCN

ZIRCONIUM NITRIDE – ZrN

AL TITANIUM NITRIDE – AlTiN

| TOOL DIAMETER | DIMENSIONS | | 60° ANGLE | | | | | | 90° ANGLE | | | | | |
|---------------|-------------|--------------|------------|-----------------|---------------------|----------|---------------------|----------|------------|-----------------|---------------------|----------|---------------------|----------|
| | SHANK DIAM. | NO. OF TEETH | TOOL WIDTH | OVER-ALL LENGTH | TYPE 746 FOR N-F/CI | | TYPE 747 FOR STEELS | | TOOL WIDTH | OVER-ALL LENGTH | TYPE 748 FOR N-F/CI | | TYPE 749 FOR STEELS | |
| | | | | | EDP NO. | PRICE | EDP NO. | PRICE | | | EDP NO. | PRICE | EDP NO. | PRICE |
| 3/4 | 3/8 | 6 | 3/16 | 2 3/8 | 74624 | \$197.35 | 74724 | \$217.15 | 1/4 | 2 3/8 | 74824 | \$197.35 | 74924 | \$217.15 |
| 1 | 1/2 | 6 | 5/16 | 2 27/32 | 74632 | 233.05 | 74732 | 256.45 | 3/8 | 2 29/32 | 74832 | 233.05 | 74932 | 256.45 |
| 1 3/8 | 5/8 | 6 | 7/16 | 3 7/32 | 74644 | 269.95 | 74744 | 297.05 | 1/2 | 3 3/32 | 74844 | 269.95 | 74944 | 297.05 |
| 1 1/2 | 5/8 | 6 | 1/2 | 3 3/8 | 74648 | 283.60 | 74748 | 311.90 | 9/16 | 3 7/16 | 74848 | 283.60 | 74948 | 311.90 |
| 1 7/8 | 3/4 | 6 | 5/8 | 3 25/32 | 74660 | 430.60 | 74760 | 473.70 | 5/8 | 3 25/32 | 74860 | 430.60 | 74960 | 473.70 |
| 2 1/4 | 7/8 | 6 | 3/4 | 4 5/32 | 74672 | 582.85 | 74772 | 641.10 | 3/4 | 4 5/32 | 74872 | 582.85 | 74972 | 641.10 |



RADIUS CUTTERS CARBIDE TIPPED TYPES 718 & 719 FRACTIONAL



| TOOL SELECTOR | CHIP CLASS | MATERIAL MACHINED | TOOL TYPE |
|---------------|------------|---------------------------|-----------|
| | 20 | NON-FERROUS - LONG CHIPS | 718 |
| | 40 | NON-FERROUS - SHORT CHIPS | 718 |
| | 60 | CAST IRONS | 718 |
| | 80 | LOW STRENGTH STEELS | 719 |
| | 100 | MEDIUM STRENGTH STEELS | 719 |
| | 120 | HIGH STRENGTH STEELS | 719 |
| | 140 | HIGH TEMPERATURE ALLOYS | 718 |

RADIUS CUTTERS:

TYPE 718 – FOR NON-FERROUS & CAST IRONS

TYPE 719 – FOR STEELS

- Right hand cut; Convex radius
- Straight shank with Weldon flats
- Tool geometry & carbide grade appropriate for material being machined
- Tool diameter tolerance: plus .005", minus .000"
- Tool radius tolerance thru 1/8" radius: plus .001", minus .001"
- Tool radius tolerance over 1/8" radius: plus .002", minus .002"

MODIFICATIONS (Prompt delivery)

- Reduced neck diameter
- Shortened shank or reduced shank diameter
- Additional shank drive flat(s)
- Coatings available:

TITANIUM NITRIDE – TiN

TITANIUM CARBONITRIDE – TiCN

ZIRCONIUM NITRIDE – ZrN

AL TITANIUM NITRIDE – AlTiN

| TOOL RADIUS | TOOL DIAMETER | DIMENSIONS | | | | TYPE 718 FOR N-F/CI | | TYPE 719 FOR STEELS | |
|-------------|---------------|------------|-------------|-----------------|--------------|---------------------|----------|---------------------|----------|
| | | TOOL WIDTH | SHANK DIAM. | OVER-ALL LENGTH | NO. OF TEETH | EDP NO. | PRICE | EDP NO. | PRICE |
| | | | | | | | | | |
| 1/32 | 3/4 | 1/16 | 1/2 | 3 | 6 | 71801 | \$246.20 | 71901 | \$270.85 |
| 1/16 | 3/4 | 1/8 | 1/2 | 3 | 6 | 71802 | 246.20 | 71902 | 270.85 |
| 3/32 | 7/8 | 3/16 | 1/2 | 3 | 6 | 71803 | 269.20 | 71903 | 296.00 |
| 1/8 | 1 1/4 | 1/4 | 3/4 | 3 1/2 | 6 | 71804 | 292.90 | 71904 | 322.30 |
| 5/32 | 1 5/16 | 5/16 | 3/4 | 3 1/2 | 6 | 71805 | 337.15 | 71905 | 370.80 |
| 3/16 | 1 3/8 | 3/8 | 3/4 | 3 1/2 | 6 | 71806 | 356.75 | 71906 | 392.45 |
| 1/4 | 1 1/2 | 1/2 | 3/4 | 4 | 6 | 71808 | 369.30 | 71908 | 406.30 |



CARBIDE TIPPED END MILLS TECHNICAL INFORMATION

| TOOL SELECTOR | CHIP CLASS | MATERIAL MACHINED | PAGE # |
|---------------|------------|---------------------------|--------|
| | 20 | NON-FERROUS - LONG CHIPS | |
| | 40 | NON-FERROUS - SHORT CHIPS | |
| | 60 | CAST IRONS | |
| | 80 | LOW STRENGTH STEELS | |
| | 100 | MEDIUM STRENGTH STEELS | |
| | 120 | HIGH STRENGTH STEELS | |
| | 140 | HIGH TEMPERATURE ALLOYS | |

END MILL BASICS

END MILLS have cutting edges on both the end and sides, permitting end cutting and peripheral cutting. Center cutting types permit plunge and traverse milling.

CUTTING EDGE: Select **sharp edged** for faster speeds. Select radial edged for longer tool life.

SHANK DIAMETER: Select **largest diameter** available to maximize rigidity and minimize axial deflection and chatter.

NUMBER OF FLUTES: Select **fewer flutes** for milling softer materials at higher feeds and speeds where more chip space is required or when machine horsepower is limited.

Select **more flutes** for milling tougher materials at reduced feeds and speeds or for increased table feeds using the same cutting speeds.

TOOL DIAMETER: Select **largest practical diameter** to maximize rigidity, minimize chatter and improve tool life. If machine spindle speed is limited, the largest practical diameter permits higher cutting speeds

COATINGS are especially effective (see "Coating Selector" on page 8).

FLUTE AXIAL RELATIONSHIP:

Select **straight flutes** for a wide variety of applications.

Select **right spiral flutes** for improved cutting action and easier chip removal.

Select **left spiral flutes** for use in absorbing impact shock when entering steel workpiece – maintains constant hold down pressure and minimizes chatter. Useful in profiling applications where recutting chips causes premature cutter dulling.

Select **high spiral** (15° or more) to **dramatically** improve cutting action, finish, chip removal, and tool life. High spirals distribute impact load more evenly throughout the tool's entire revolution.

END MILL SPECIFICATIONS AND TOLERANCES

- Geometry, carbide grade, O.D. relief and end clearance appropriate for material being machined
- Flute long carbide tips brazed to tough hardened alloy steel body
- Spiral flute carbide tips formed to true helix angles
- Straight shanks have standard Weldon drive flats
- Non-center cutting end mills have the ends cleared to depth of carbide
- Precision ground cutting edges
- USCTI
- Tool diameter tolerance:
Radial edged: plus .002", minus .000"
Sharp edged: plus .005", minus .000"
- Shank diameter tolerance:
minus .0001", minus .0005"

| DESCRIPTION | HANNIBAL | | FULLERTON | PUTNAM | MORSE | NIAGARA |
|---|------------|-----------|-----------|--------|-------|---------|
| | PAGE | TOOL TYPE | | | | |
| CENTER CUTTING END MILLS | | | | | | |
| Straight Flutes | | | | | | |
| For Non-Ferrous & Cast Irons | 146 | 314 | 60SK | SKM | 5935 | 4800 |
| For Steels | 146 | 312 | 60SKS | - | 5936 | 4780 |
| 25° Right Spiral Flutes | | | | | | |
| For Non-Ferrous & Cast Irons | 146 | 318 | 60CS | - | 5966 | - |
| HIGH SPIRAL SHEAR CUTTING END MILLS | | | | | | |
| 15° Right Spiral Flutes | | | | | | |
| For Non-Ferrous & Cast Irons | 147 | 375 | - | HLS | 5962 | 4840 |
| For Steels | 146 | 350 | 60GSS | HES | 5960 | 4820 |
| SLOW SPIRAL END MILLS | | | | | | |
| 6° Right Spiral Flutes | | | | | | |
| For Non-Ferrous & Cast Irons | 147 | 306 | 60RS | RSEM | 5921 | - |
| For Steels | 146 | 308 | 60RSS | - | - | - |
| STRAIGHT FLUTES END MILLS | | | | | | |
| Radial Edged | | | | | | |
| For Non-Ferrous & Cast Irons (2 Flutes) | 147 | 302 | 60TF | TFEM | 5923 | 4700 |
| For Non-Ferrous & Cast Irons (4 or 6 Flts.) | 147 | 304 | 60EM | EM | 5925 | 4750 |



END MILLS CARBIDE TIPPED TYPES 318, 312, 314, 308 & 350 FRACTIONAL

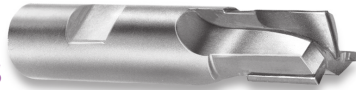


CENTER CUTTING TYPE



25° RIGHT SPIRAL FLUTES TYPE 318 - FOR NON-FERROUS & CAST IRONS

- Larger flute capacity for heavy milling
- Center cutting design for plunge, slot, profile and peripheral milling including splines, keyways, and spotfacing
- Radial edged for longer tool life
- Detailed specifications on page 145



THREE STRAIGHT FLUTES TYPE 312 - FOR STEELS TYPE 314 - FOR NON-FERROUS & CAST IRONS

- Three straight flutes provide generous capacity for chips
- Center cutting design for plunge, slot, profile, and peripheral milling including splines, keyways, and spotfacing
- Radial edged for longer tool life
- Detailed specifications on page 145

| TOOL DIAMETER | | DIMENSIONS | | | | TYPE 318 FOR NON-FERR. | |
|---------------|---------|-------------|---------|---------|---------------|------------------------|----------|
| FRAC. | DECIMAL | SHANK DIAM. | LENGTH | | NO. OF FLUTES | EDP NO. | PRICE |
| | | | CARBIDE | OVERALL | | | |
| 1/2 | .5000 | 1/2 | 1 | 3 | 2 | 31816 | \$216.50 |
| 5/8 | .6250 | 5/8 | 1 1/4 | 3 3/8 | 2 | 31820 | 241.95 |
| 3/4 | .7500 | 3/4 | 1 1/4 | 3 3/8 | 2 | 31824 | 256.40 |
| 7/8 | .8750 | 7/8 | 1 1/2 | 3 3/4 | 2 | 31828 | 282.00 |
| 1 | 1.0000 | 1 | 1 1/2 | 4 | 2 | 31832 | 324.00 |
| 1 1/4 | 1.2500 | 1 1/4 | 1 3/4 | 4 1/4 | 2 | 31840 | 440.45 |
| 1 1/2 | 1.5000 | 1 1/2 | 2 | 4 3/4 | 2 | 31848 | 513.95 |

| TOOL DIAMETER | | DIMENSIONS | | | | TYPE 314 FOR NON-FERR. & C.I. | | TYPE 312 FOR STEELS | |
|---------------|---------|-------------|---------|---------|-------------|-------------------------------|----------|---------------------|----------|
| FRAC. | DECIMAL | SHANK DIAM. | LENGTH | | NO. OF FLTS | EDP NO. | PRICE | EDP NO. | PRICE |
| | | | CARBIDE | OVERALL | | | | | |
| 3/8 | .3750 | 3/8 | 1/2 | 2 1/2 | 3 | 31412 | \$129.45 | 31212 | \$134.50 |
| 7/16 | .4375 | 3/8 | 3/4 | 2 1/2 | 3 | 31414 | 132.35 | 31214 | 137.55 |
| 1/2 | .5000 | 1/2 | 3/4 | 3 | 3 | 31416 | 135.85 | 31216 | 140.95 |
| 9/16 | .5625 | 1/2 | 3/4 | 3 | 3 | 31418 | 141.05 | 31218 | 146.50 |
| 5/8 | .6250 | 5/8 | 3/4 | 3 1/4 | 3 | 31420 | 165.05 | 31220 | 171.30 |
| 3/4 | .7500 | 5/8 | 3/4 | 3 3/8 | 3 | 31424 | 172.75 | 31224 | 179.40 |
| 7/8 | .8750 | 7/8 | 3/4 | 3 3/4 | 3 | 31428 | 201.65 | 31228 | 209.40 |
| 1 | 1.0000 | 7/8 | 3/4 | 3 3/4 | 3 | 31432 | 221.50 | 31232 | 230.05 |
| 1 1/8 | 1.1250 | 1 | 3/4 | 4 | 3 | 31436 | 237.30 | 31236 | 246.25 |
| 1 1/4 | 1.2500 | 1 | 3/4 | 4 | 3 | 31440 | 274.90 | 31240 | 285.60 |
| 1 1/2 | 1.5000 | 1 1/4 | 3/4 | 4 | 3 | 31448 | 326.85 | 31248 | 339.45 |

END MILLS FOR STEELS

TYPE 308 - 6° RIGHT SPIRAL FLUTES FOR STEEL

- Spiral flutes aid in chip removal, permitting heavier feeds and faster speeds

ALL TYPES:

- Radial edged for longer tool life
- Detailed specifications on page 145

| TOOL DIAMETER | | DIMENSIONS | | | TYPE 308 - 6° SPIRAL FLUTES FOR STEELS | | |
|---------------|---------|-------------|---------|---------|--|------------------------|----------|
| FRAC. | DECIMAL | SHANK DIAM. | LENGTH | | NO. OF FLTS | TYPE 308 RIGHT EDP NO. | PRICE |
| | | | CARBIDE | OVERALL | | | |
| 1 | 1.0000 | 7/8 | 1 1/4 | 4 | 6 | 30832 | \$209.85 |
| 1 1/8 | 1.1250 | 1 | 1 1/4 | 4 1/4 | 6 | 30836 | 222.55 |
| 1 1/4 | 1.2500 | 1 | 1 1/4 | 4 1/4 | 6 | 30840 | 269.00 |
| 1 1/2 | 1.5000 | 1 1/4 | 1 1/2 | 4 1/2 | 6 | 30848 | 327.15 |



TYPE 350 - 15° RIGHT SPIRAL FLUTES FOR STEEL

- 15° right spiral flutes for improved chip removal
- Spiral flutes distribute the milling impact load evenly, improving finish and increasing tool life
- Radial edged for longer tool life
- Detailed specifications on page 145

MODIFICATIONS (See list on page 147)



| TOOL DIAMETER | | DIMENSIONS | | | TYPE 350 - 15° RIGHT SPIRAL 4 TO 8 FLUTES FOR STEELS | | |
|---------------|---------|-------------|---------|---------|--|---------|----------|
| FRAC. | DECIMAL | SHANK DIAM. | LENGTH | | NO. OF FLTS | EDP NO. | PRICE |
| | | | CARBIDE | OVERALL | | | |
| 3/4 | .7500 | 5/8 | 1 1/4 | 3 3/8 | 4 | 35025 | \$165.50 |
| 13/16 | .8125 | 5/8 | 1 1/2 | 3 5/8 | 4 | 35026 | 178.60 |
| 7/8 | .8750 | 5/8 | 1 1/2 | 3 5/8 | 4 | 35028 | 189.50 |
| 15/16 | .9375 | 7/8 | 1 1/2 | 3 3/4 | 4 | 35031 | 280.75 |
| 1 | 1.0000 | 1 | 1 1/2 | 4 | 6 | 35033 | 265.85 |
| 1 1/8 | 1.1250 | 1 | 1 3/4 | 4 1/4 | 6 | 35036 | 312.85 |
| 1 1/4 | 1.2500 | 1 | 1 3/4 | 4 1/4 | 6 | 35040 | 358.55 |
| 1 1/2 | 1.5000 | 1 1/4 | 2 | 4 1/2 | 6 | 35048 | 412.60 |
| 1 3/4 | 1.7500 | 1 1/4 | 2 | 4 1/2 | 8 | 35056 | 586.70 |
| 2 | 2.0000 | 1 1/4 | 2 | 4 1/2 | 8 | 35064 | 662.60 |



END MILLS FOR NON-FERROUS & CAST IRONS

CARBIDE TIPPED TYPES 302, 304, 306, & 375 FRACTIONAL

MATERIAL SPECIFIC

BASIC TYPES



MODIFICATIONS (Prompt delivery)

- Modified tool diameter
- Metric tool diameter
- Cutting diameter reduced for step or pilot
- Corner chamfer or corner radius
- Shortened shank or reduced shank diam.
- Additional shank drive flat(s)
- Coolant outlets (except on Type 318)
- Coatings available:

TITANIUM NITRIDE - TiN

TITANIUM CARBONITRIDE - TiCN

ZIRCONIUM NITRIDE - ZrN

AL TITANIUM NITRIDE - AlTiN



RADIAL EDGED WITH TWO STRAIGHT FLUTES

TYPE 302 - FOR NON-FERROUS MATERIALS & CAST IRONS

- Two large flutes for easy chip removal
- Use when machine horsepower is too low for high chip capacity end mills

RADIAL EDGED WITH FOUR OR SIX STRAIGHT FLUTES

TYPE 304 - FOR NON-FERROUS MATERIALS & CAST IRONS

- More flutes for improved finish
- Use when machine horsepower allows for a higher chip capacity end mill

RADIAL EDGED WITH 6° RIGHT SPIRAL FLUTES

TYPE 306 - FOR NON-FERROUS MATERIALS & CAST IRONS

- Spiral flutes aid in chip removal, permitting heavier feeds and faster speeds
- Radial edged for tough aluminum alloys and castings

| TOOL DIAMETER | | DIMENSIONS | | | TYPE 302 2 STRAIGHT FLUTES | | | TYPE 304 4 OR 6 STRAIGHT FLUTES | | | TYPE 306 RADIAL EDGED 6° RIGHT SPIRAL | | |
|---------------|--------|-------------|---------|----------|-------------------------------|---------|---------|------------------------------------|---------|---------|---|---------|---------|
| FRAC. | DEC. | SHANK DIAM. | LENGTH | | NO. OF FLTS | EDP NO. | PRICE | NO. OF FLTS | EDP NO. | PRICE | NO. OF FLTS | EDP NO. | PRICE |
| | | | CARBIDE | OVER-ALL | | | | | | | | | |
| 1/2 | .5000 | 1/2 | 1 | 3 1/4 | 2 | 30216 | \$80.30 | 4 | 30416 | \$81.85 | 2 | 30616 | \$81.90 |
| 3/8 | .6250 | 1/2 | 1 | 3 3/8 | 2 | 30220 | 88.75 | 4 | 30420 | 96.20 | 4 | 30620 | 94.15 |
| 3/4 | .7500 | 5/8 | 1 | 3 5/8 | 2 | 30224 | 99.70 | 4 | 30424 | 99.05 | 4 | 30624 | 107.65 |
| 7/8 | .8750 | 5/8 | 1 1/4 | 4 | 2 | 30228 | 121.25 | 4 | 30428 | 117.00 | 4 | 30628 | 143.90 |
| 1 | 1.0000 | 7/8 | 1 1/4 | 4 | 2 | 30232 | 130.20 | 4 | 30432 | 135.20 | 4 | 30632 | 166.20 |
| 1 1/8 | 1.1250 | 1 | 1 1/4 | 4 1/4 | - | - | - | 4 | 30436 | 153.30 | - | - | - |
| 1 1/4 | 1.2500 | 1 | 1 1/4 | 4 1/4 | 2 | 30240 | 161.15 | 4 | 30440 | 172.40 | 4 | 30640 | 211.90 |
| 1 1/2 | 1.5000 | 1 1/4 | 1 1/2 | 4 1/2 | 2 | 30248 | 199.55 | 4 | 30448 | 222.30 | 4 | 30648 | 262.25 |
| 1 3/4 | 1.7500 | 1 1/4 | 1 1/2 | 4 1/2 | - | - | - | 6 | 30456 | 286.50 | - | - | - |
| 2 | 2.0000 | 1 1/4 | 1 1/2 | 4 1/2 | - | - | - | 6 | 30464 | 330.10 | - | - | - |

RADIAL EDGED WITH 15° RIGHT SPIRAL FLUTES

TYPE 375 - FOR NON-FERROUS MATERIALS & CAST IRONS

- 15° spiral flutes for improved chip removal
- Radial edged for tough aluminum alloys and castings
- Spiral flutes distribute the milling impact load evenly, improving finish and increasing tool life

MODIFICATIONS (See list Above)



| TOOL DIAMETER | | DIMENSIONS | | | TYPE 375 - 15° RIGHT SPIRAL FOR NON-FERROUS & CAST IRON | | |
|---------------|---------|-------------|---------|---------|---|-------------------------------|----------|
| FRAC. | DECIMAL | SHANK DIAM. | LENGTH | | NO. OF FLTS | TYPE 375 RADIAL EDP NO. | PRICE |
| | | | CARBIDE | OVERALL | | | |
| 1/2 | .5000 | 3/8 | 1 | 3 | 2 | 37516 | \$118.55 |
| 1/2 | .5000 | 1/2 | 1 | 3 | 2 | 37517 | 118.55 |
| 5/16 | .5625 | 1/2 | 1 | 3 | 2 | 37518 | 127.45 |
| 5/8 | .6250 | 1/2 | 1 1/4 | 3 1/4 | 2 | 37520 | 137.00 |
| 5/8 | .6250 | 5/8 | 1 1/4 | 3 3/8 | 2 | 37521 | 137.00 |
| 11/16 | .6875 | 1/2 | 1 1/4 | 3 1/4 | 2 | 37522 | 142.85 |
| 11/16 | .6875 | 5/8 | 1 1/4 | 3 3/8 | 2 | 37523 | 142.85 |
| 3/4 | .7500 | 1/2 | 1 1/4 | 3 1/4 | 2 | 37524 | 152.50 |
| 3/4 | .7500 | 5/8 | 1 1/4 | 3 3/8 | 2 | 37525 | 152.50 |
| 13/16 | .8125 | 5/8 | 1 1/2 | 3 5/8 | 2 | 37526 | 164.60 |
| 7/8 | .8750 | 5/8 | 1 1/2 | 3 5/8 | 2 | 37528 | 174.70 |
| 7/8 | .8750 | 7/8 | 1 1/2 | 3 3/4 | 2 | 37529 | 174.70 |
| 15/16 | .9375 | 5/8 | 1 1/2 | 3 3/4 | 3 | 37530 | 258.70 |
| 15/16 | .9375 | 7/8 | 1 1/2 | 3 3/4 | 3 | 37531 | 258.70 |
| 1 | 1.0000 | 7/8 | 1 1/2 | 3 3/4 | 3 | 37532 | 244.85 |
| 1 | 1.0000 | 1 | 1 1/2 | 4 | 3 | 37533 | 244.85 |
| 1 1/8 | 1.1250 | 1 | 1 3/4 | 4 1/4 | 3 | 37536 | 288.35 |
| 1 1/4 | 1.2500 | 1 | 1 3/4 | 4 1/4 | 4 | 37540 | 330.45 |
| 1 3/8 | 1.3750 | 1 | 1 3/4 | 4 1/4 | 4 | 37544 | 385.90 |
| 1 1/2 | 1.5000 | 1 1/4 | 2 | 4 1/2 | 4 | 37548 | 380.25 |
| 1 5/8 | 1.6250 | 1 1/4 | 2 | 4 1/2 | 4 | 37552 | 465.05 |
| 1 3/4 | 1.7500 | 1 1/4 | 2 | 4 1/2 | 4 | 37556 | 495.95 |
| 1 7/8 | 1.8750 | 1 1/4 | 2 | 4 1/2 | 4 | 37560 | 530.45 |
| 2 | 2.0000 | 1 1/4 | 2 | 4 1/2 | 8 | 37564 | 560.30 |

END MILLS



GENERAL INFORMATION

SELECTED DISTRIBUTION

To ensure exceptional service & technical application support, Hannibal only sells through selected distributors, your communications link with us. If you require direct technical assistance, contact our Engineering and Technical Service Team.

Phone: 800-451-9436

E-mail: sales@hannibalcabride.com

STOCK STATUS

Because of our exceptionally broad product listing of over 20,000 line items, our distributors seldom stock our tools unless they have a consistent demand for particular tools requiring same day delivery. HANNIBAL maintains a 99% line item order fill rate. We have a huge inventory of finished tools ready to meet your needs.

SHIPPING

Normal procedure is to ship all distributor orders by UPS, unless requested otherwise. Our lost shipment insurance does not cover shipments sent "freight collect."

ORDERING

The only description required to order a standard tool is the EDP number. However, as a cross-check, orders should include a brief description of the tool.

MODIFICATIONS

Many standard tools ordered include requests for one or more modifications. On each page of this catalog is a list of the modifications most commonly requested. Just phone, fax, or e-mail us for an immediate quote. Modified tools are delivered promptly and are competitively priced.

APPLICATIONS ENGINEERING

HANNIBAL prides itself on the ability to solve end user tooling problems. We will suggest solutions including tool designs that have been used successfully to solve similar problems. Our proven applications engineering capability is reflected in the fact that some of the largest machine tool builders select HANNIBAL to design and produce the original cutting tools used in producing engines and transmissions.

FREE TECHNICAL REAMING GUIDE AVAILABLE

For technical reaming information see pages 11-15 or contact us to request your free hard copy, or PDF version of "HANNIBAL'S Guide to Cost Effective Reaming." It is continuously updated to include the latest reamer technical developments, including:

Reamer Stock Removal Chart • Titanium Coatings • Flute Geometry • Reamer Nomenclature & Definitions • Avoiding Reaming Problems • Runout Concerns • Developing Optimum Feeds & Speeds

QUALITY TOOLS

20% of HANNIBAL'S sales are special order tools made to end user's specifications and prints for the very demanding automotive, diesel engine, aircraft engine, aerospace, and construction equipment industries. To meet these stringent requirements, our engineers and tool makers work daily with exacting tolerances and procedures.

QUALITY APPROVED

Our plants have consistently passed quality system inspections by key engineering, production, and purchasing executives of our major tool users. HANNIBAL was Ford Q101 certified in 1989 and was originally ISO Certified on August 18, 1999. Currently ISO 9001 compliant.

TOLERANCES AND SPECIFICATIONS

All our tools are manufactured to one or more of the following specifications:

USCTI - United States Cutting Tool Institute

NAS - National Aerospace Standards

ISO - International Organization for Standardization

ASME/ANSI - American National Standards Institute, and affiliate of American Society of Mechanical Engineers

TOOL PERFORMANCE

While price is always a consideration, the real measure of the tool's value is its in-plant performance. HANNIBAL'S tool performance is proven wherever accurate records are kept, such as the aerospace and automotive industries. Here our tools earn "excellent" ratings... and that is why we are one of the fastest growing tool companies in the world.

PEOPLE

HANNIBAL'S engineers, technicians, tool makers, and sales & support staff are continually focused on the goal of producing the world's best carbide tipped tools. Our experienced tool makers sincerely want to do their very best every day making every effort to manufacture tools that will meet your exacting needs.

HANNIBAL

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ACKNOWLEDGEMENTS

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HANNIBAL

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