

# PIRANHA

PERFORMANCE REDEFINED™



HIGH PRECISION  
CUTTING TOOLS



## COMMITTED TO QUALITY

At PIRANHA, our mission is to develop and supply cutting tools with a high precision/performance ratio to improve the efficiency of various machining applications. We continuously perform machining performance tests in order to provide the best tools and support needed for the widest variety of processes and materials, and thus offer customized, optimal solutions for all levels of application. PIRANHA pushes the limits for **REDEFINED PERFORMANCE**.

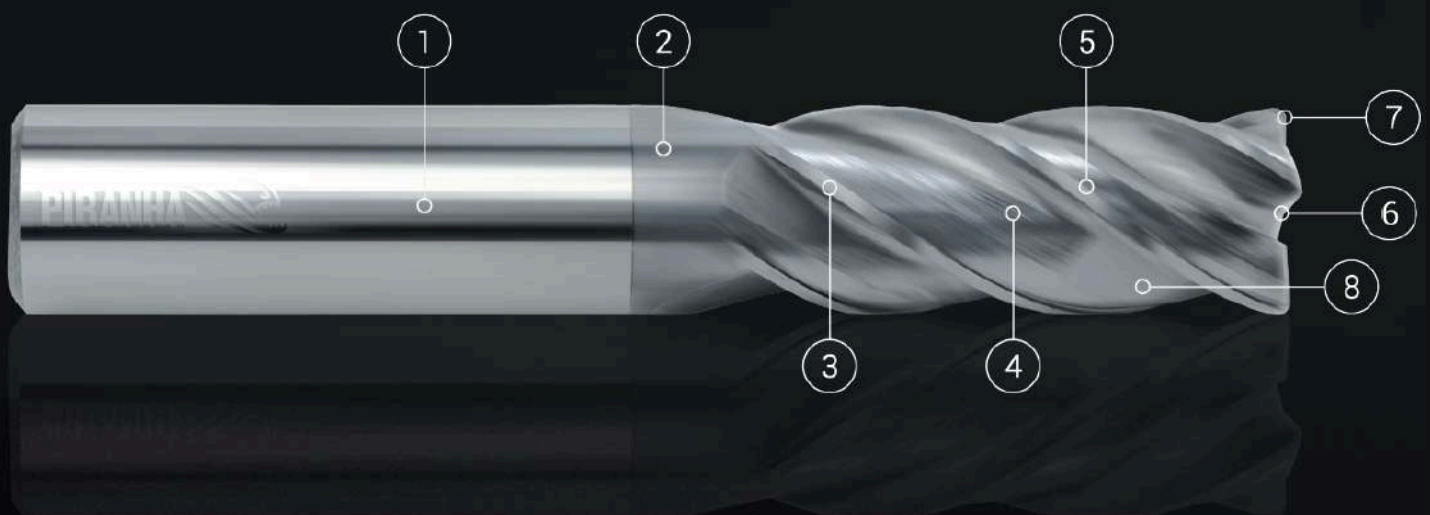
## WHY PIRANHA

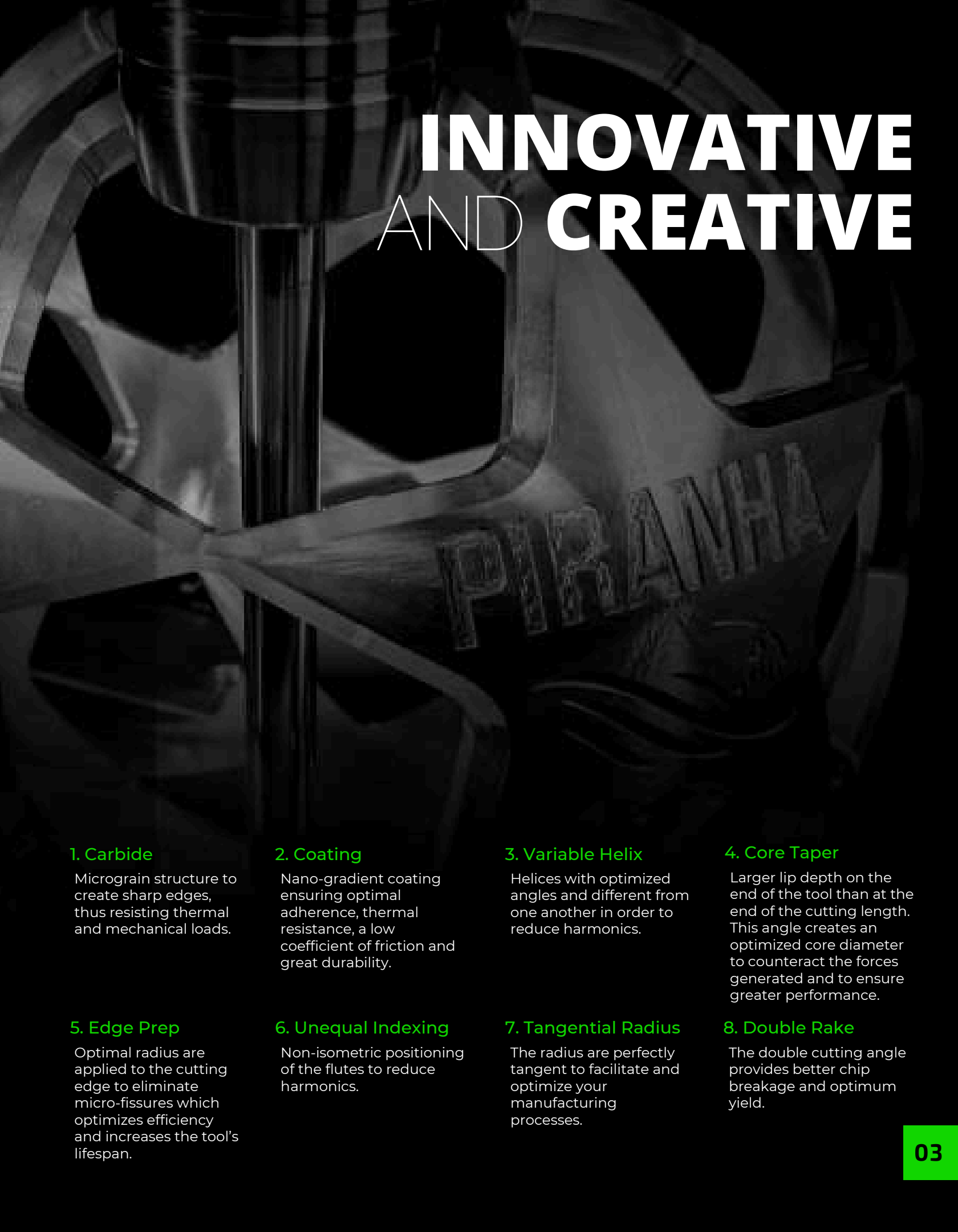
PIRANHA stands out in the market by working in partnership with businesses in order to offer them the most complete, best performing range of products to achieve optimum cost-saving economies of scale per part manufactured. By partnering with renowned distributors that provide high levels of support, PIRANHA ensures that turnkey solutions are provided to each business seeking to improve the efficiency of their machining processes.

## EDGE PREP

Edge prep prepares the edge of the tool for cutting at the main point of contact. This particular area is not always visible to the naked eye, but the difference soon becomes more noticeable through the machining process. Doing edge prep helps reduce stress risers, which are microscopic cavities that appear as a serrated edge under a microscope. During the machining process, those microscopic cavities create an area of stress. Stress buildup can contribute to the tool's breakdown as well as its resulting work. Edge prep can also blunt the tool's cutting edge keeping the tool in compression from the force of the cut.

## ENGINEERED FOR PERFORMANCE





# INNOVATIVE AND CREATIVE

## 1. Carbide

Micrograin structure to create sharp edges, thus resisting thermal and mechanical loads.

## 2. Coating

Nano-gradient coating ensuring optimal adherence, thermal resistance, a low coefficient of friction and great durability.

## 3. Variable Helix

Helices with optimized angles and different from one another in order to reduce harmonics.

## 4. Core Taper

Larger lip depth on the end of the tool than at the end of the cutting length. This angle creates an optimized core diameter to counteract the forces generated and to ensure greater performance.

## 5. Edge Prep

Optimal radius are applied to the cutting edge to eliminate micro-fissures which optimizes efficiency and increases the tool's lifespan.

## 6. Unequal Indexing

Non-isometric positioning of the flutes to reduce harmonics.

## 7. Tangential Radius

The radius are perfectly tangent to facilitate and optimize your manufacturing processes.

## 8. Double Rake

The double cutting angle provides better chip breakage and optimum yield.

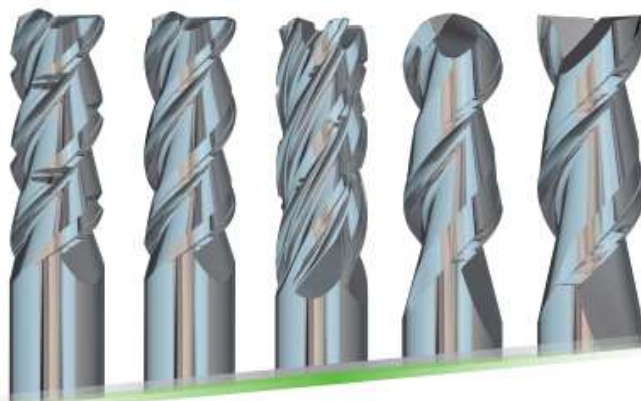
## OUR PRODUCT FAMILY

Our end mills have the best material removal rates on the market, while reducing the forces the tool must endure. The resulting chips are of optimal geometry, clearly scored and perfectly projected. The low noise level provides excellent vibration control. By working in partnership with our advanced materials research centre, PIRANHA has been able to create a line of innovative, high-performance products, thereby optimizing the cost per part produced in its customers' manufacturing processes.

CUSTOMER  
SATISFACTION

1

### ALUMINIUM ALLOYS

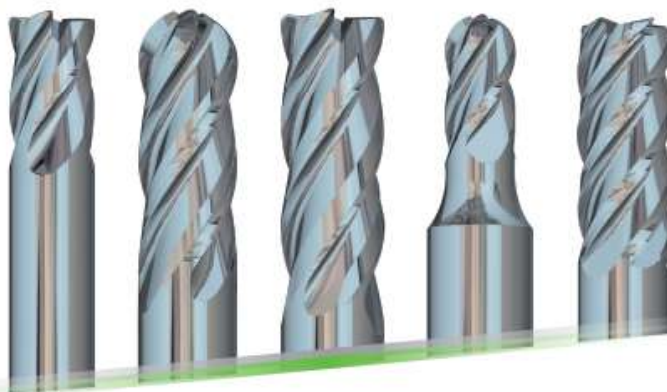


#### FOR HIGH REMOVAL RATE

2 - 3 - 5 flute

2

### FERROUS MEDIUM ALLOYS STEELS

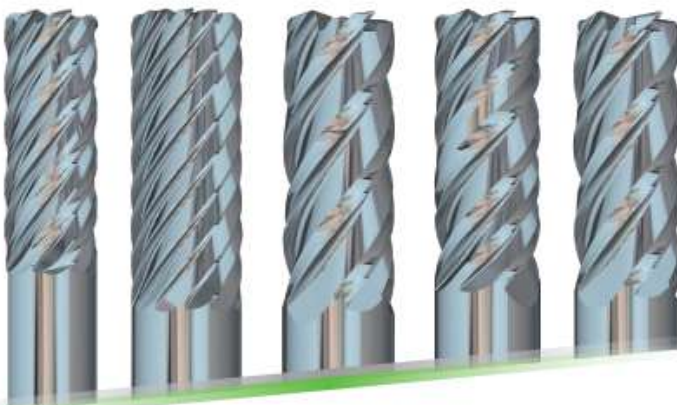


#### OUR STANDARD LINE-UP

4 - 5 flute

3

### EXOTIC SUPERALLOYS



#### HIGH PERFORMANCE MACHINING

5 - 6 - 7 - 9 - 12 flute



## HARDENED STEELS

4

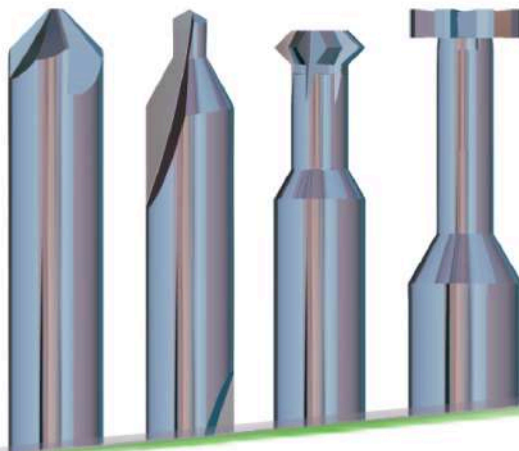


**FOR TOUGHER APPLICATIONS**

**4 - 5 - 6 - 7** flute

## SPECIAL TOOLS

5



**SPECIAL CUTTER**

**SPOT DRILL / COUNTERSINK DRILL /  
DOUBLE ANGLE / KEYSEAT**



# CREATE YOUR CUSTOM TOOLS

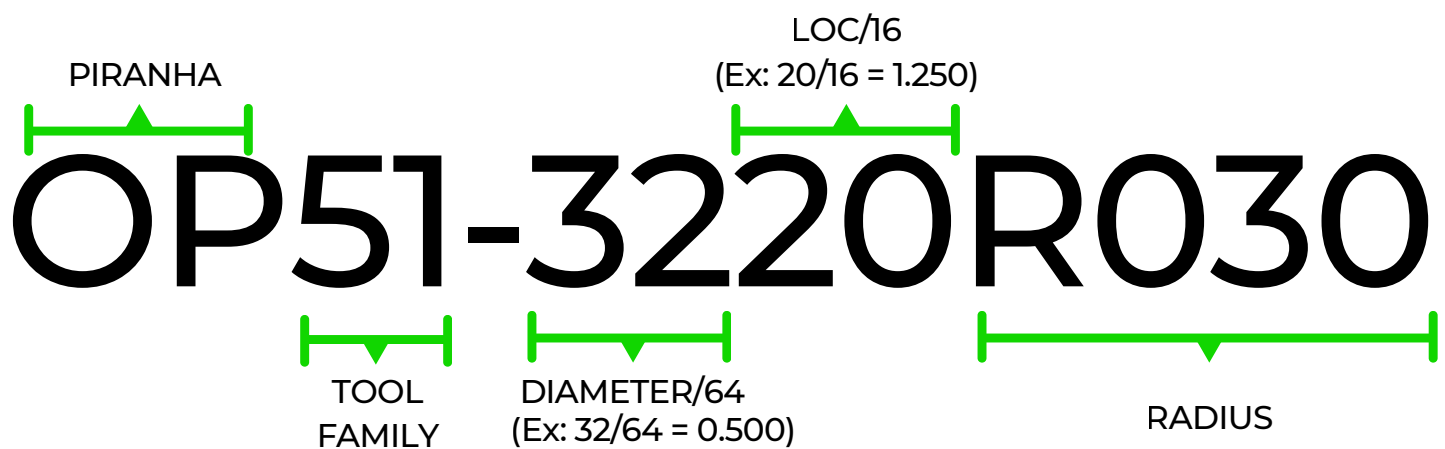
Piranha offers a 24-hour service if needed and we are available to serve you 24/7. Our CNC generated customized tools, production drills, manufactured broaches and sharpened tools combined with our team of courteous and experienced professionals guarantee our performance and your satisfaction.

## NOMENCLATURE PIRANHA PRODUCTS

### EXEMPLE:

Endmill 5 flute Diameter 1/2 LOC 1-1/4 Radius .030

### IMPERIAL MEASUREMENT:



## EASY 3 - STEP PRODUCT CUSTOMIZING PROGRAM

Our team will create a prototype using 2D or 3D tool drawing software and perform a technical trial if necessary. Knowing that your tools and equipment have a direct impact on your manufacturing costs, we offer the possibility of combining multiple cutting tools into one.



# CREATE YOUR CUSTOM TOOLS

## NOMENCLATURE PIRANHA PRODUCTS

### OPTIONS:



OP51-3220R030C

CHIP BREAKER

C



OP51-3220R030W

WELDON

W



OP51-3220R030N225

NECKDOWN

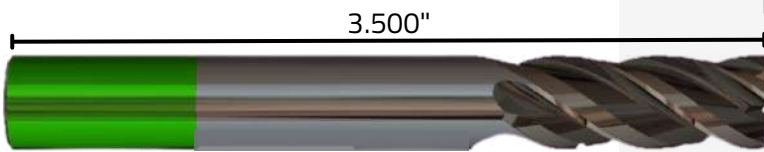
N



OP51-3220R250B

BALL NOSE

B



OP51-3220R030L350

OAL

L

# PVD COATING

TAKE ADVANTAGE OF OUR OWN COATING CENTER

PVD coatings are very useful because of their high hardness, wear and oxidation resistance, thermal stability and lubricity. Gradient deposition nanotechnology provides improved adhesion to substrate and the coating-substrate system's mechanical properties by eliminating the mismatch in material properties at the interface and reducing residual stresses. Gradient deposition nanotechnology reduces coating decohesion due to weak adherence. Nanocomposite gradient super hard coatings have superior performance under abrasive wear, erosive wear and impact wear.

nACRo:

- Nanohardness(Gpa) 39-41
- Coating Thickness (μm) 1-4
- Coefficient of friction (μ) 0.9
- Max service temperature (°C) 1100



nACVlc:

- Nanohardness(Gpa) 25
- Coating Thickness (μm) 1-3
- Coefficient of friction (μ) 0.1
- Max service temperature (°C) 450



nACo:

- Nanohardness(Gpa) 39-41
- Coating Thickness (μm) 1-4
- Coefficient of friction (μ) 0.6
- Max service temperature (°C) 1100



ZrN:

- Nanohardness(Gpa) 21-23
- Coating Thickness (μm) 1-5
- Coefficient of friction (μ) 0.9
- Max service temperature (°C) 550



nACoblue:

- Nanohardness(Gpa) 39-41
- Coating Thickness (μm) 1-4
- Coefficient of friction (μ) 0.6
- Max service temperature (°C) 1100





# PVD COATING

TAKE ADVANTAGE OF OUR OWN COATING CENTER

- TiN:**
- Nanohardness(Gpa) 24-26
  - Coating Thickness ( $\mu\text{m}$ ) 1-10
  - Coefficient of friction ( $\mu$ ) 1
  - Max service temperature ( $^{\circ}\text{C}$ ) 600



- TiAlN:**
- Nanohardness(Gpa) 36-38
  - Coating Thickness ( $\mu\text{m}$ ) 1-5
  - Coefficient of friction ( $\mu$ ) 0.5
  - Max service temperature ( $^{\circ}\text{C}$ ) 900



- TiXT:**
- Nanohardness(Gpa) 36-38
  - Coating Thickness ( $\mu\text{m}$ ) 1-3
  - Coefficient of friction ( $\mu$ ) 0.3
  - Max service temperature ( $^{\circ}\text{C}$ ) 450



- nACRopink:**
- Nanohardness(Gpa) 39-41
  - Coating Thickness ( $\mu\text{m}$ ) 1-4
  - Coefficient of friction ( $\mu$ ) 0.9
  - Max service temperature ( $^{\circ}\text{C}$ ) 1100



This pink coating was developed to help raise awareness for breast cancer. This coating is applied to tools only during the month of October. Also, 10% of sales is given to your local foundation.



# SURPASSING EXPECTATIONS



## STOCK INVENTORY

*Your tools and the custom-design products will be available in inventory. Free storage at your exclusive regional distributor.*

*Substantial saving on unused inventory.*

## DISTRIBUTOR LOCATOR

*Use the powerful search tool on our website to locate your regional distributor anywhere in the United States, Mexico and Canada.*

## FOLLOW US

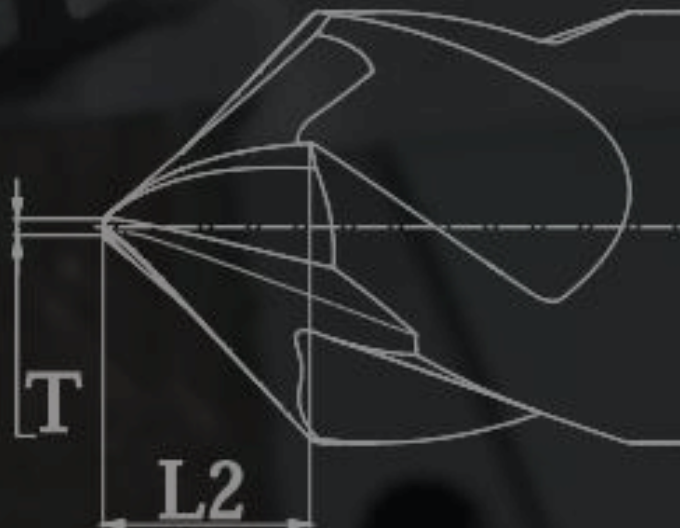
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- 241** KEYSEAT CUTTERS
- 244** SINGLE FLUTE

# OP2 ENDMILLS

Best used for Aluminum and soft alloys like brass and copper.

## SPECIAL FEATURES

|                       |                                                                                                                                                                                                                                                         |
|-----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>1 CENTER FLUTE</b> | Makes it easier for the tool to drill into the material when starting to machine.                                                                                                                                                                       |
| <b>WAVED FLUTE</b>    | Reduce harmonics and cutting friction. The slower helix at the end of the tool helps to stabilize it when it starts to cut. When the tool is completely engaged, the waved helix design helps with the chip evacuation helping with the best reduction. |
| <b>POLISHED</b>       | Prevent chips from sticking inside the tool, enhancing material removal rate and machining speeds.                                                                                                                                                      |
| <b>DLC COATING</b>    | Higher wear resistance when used in abrasive material such as silicon aluminium alloys.                                                                                                                                                                 |
| <b>MARGIN</b>         | 0.002" width to reduce vibration when machining walls and corners.                                                                                                                                                                                      |
| <b>WIPER FLAT</b>     | Small flat spot on top of tool to enhance surface finish of the machined part.                                                                                                                                                                          |

Available upon request

|                    |                                                                                    |
|--------------------|------------------------------------------------------------------------------------|
| <b>ZRN COATING</b> | Prevent edge build up on the endmill that is typical in soft and sticky materials. |
|--------------------|------------------------------------------------------------------------------------|



## 2 FLUTE - REGULAR - POLISHED



OP21

REGULAR INCH

| DIAMETER | LOC   | OAL | RAD    | ITEM#         | DIAMETER | LOC   | OAL | RAD    | ITEM#         |
|----------|-------|-----|--------|---------------|----------|-------|-----|--------|---------------|
| 3/16     | 9/16  | 3   | Square | OP21-1209R000 | 1/2      | 1 1/4 | 3   | R.030  | OP21-3220R030 |
| 3/16     | 9/16  | 3   | R.015  | OP21-1209R015 | 1/2      | 1 1/4 | 3   | R.060  | OP21-3220R060 |
| 3/16     | 9/16  | 3   | R.030  | OP21-1209R030 | 1/2      | 1 1/4 | 3   | R.090  | OP21-3220R090 |
| 3/16     | 9/16  | 3   | R.060  | OP21-1209R060 | 1/2      | 1 1/4 | 3   | R.125  | OP21-3220R125 |
| 1/4      | 3/4   | 3   | Square | OP21-1612R000 | 1/2      | 1 1/4 | 3   | R.190  | OP21-3220R190 |
| 1/4      | 3/4   | 3   | R.015  | OP21-1612R015 | 5/8      | 1 5/8 | 4   | Square | OP21-4026R000 |
| 1/4      | 3/4   | 3   | R.030  | OP21-1612R030 | 5/8      | 1 5/8 | 4   | R.015  | OP21-4026R015 |
| 1/4      | 3/4   | 3   | R.060  | OP21-1612R060 | 5/8      | 1 5/8 | 4   | R.030  | OP21-4026R030 |
| 1/4      | 3/4   | 3   | R.090  | OP21-1612R090 | 5/8      | 1 5/8 | 4   | R.060  | OP21-4026R060 |
| 5/16     | 13/16 | 3   | Square | OP21-2013R000 | 5/8      | 1 5/8 | 4   | R.090  | OP21-4026R090 |
| 5/16     | 13/16 | 3   | R.015  | OP21-2013R015 | 5/8      | 1 5/8 | 4   | R.125  | OP21-4026R125 |
| 5/16     | 13/16 | 3   | R.030  | OP21-2013R030 | 5/8      | 1 5/8 | 4   | R.190  | OP21-4026R190 |
| 5/16     | 13/16 | 3   | R.060  | OP21-2013R060 | 5/8      | 1 5/8 | 4   | R.250  | OP21-4026R250 |
| 5/16     | 13/16 | 3   | R.090  | OP21-2013R090 | 3/4      | 1 5/8 | 4   | Square | OP21-4826R000 |
| 5/16     | 13/16 | 3   | R.125  | OP21-2013R125 | 3/4      | 1 5/8 | 4   | R.015  | OP21-4826R015 |
| 3/8      | 1     | 3   | Square | OP21-2416R000 | 3/4      | 1 5/8 | 4   | R.030  | OP21-4826R030 |
| 3/8      | 1     | 3   | R.015  | OP21-2416R015 | 3/4      | 1 5/8 | 4   | R.060  | OP21-4826R060 |
| 3/8      | 1     | 3   | R.030  | OP21-2416R030 | 3/4      | 1 5/8 | 4   | R.090  | OP21-4826R090 |
| 3/8      | 1     | 3   | R.060  | OP21-2416R060 | 3/4      | 1 5/8 | 4   | R.125  | OP21-4826R125 |
| 3/8      | 1     | 3   | R.090  | OP21-2416R090 | 3/4      | 1 5/8 | 4   | R.190  | OP21-4826R190 |
| 3/8      | 1     | 3   | R.125  | OP21-2416R125 | 3/4      | 1 5/8 | 4   | R.250  | OP21-4826R250 |
| 7/16     | 1     | 3   | Square | OP21-2816R000 | 1        | 1 3/4 | 5   | Square | OP21-6428R000 |
| 7/16     | 1     | 3   | R.015  | OP21-2816R015 | 1        | 1 3/4 | 5   | R.015  | OP21-6428R015 |
| 7/16     | 1     | 3   | R.030  | OP21-2816R030 | 1        | 1 3/4 | 5   | R.030  | OP21-6428R030 |
| 7/16     | 1     | 3   | R.060  | OP21-2816R060 | 1        | 1 3/4 | 5   | R.060  | OP21-6428R060 |
| 7/16     | 1     | 3   | R.090  | OP21-2816R090 | 1        | 1 3/4 | 5   | R.090  | OP21-6428R090 |
| 7/16     | 1     | 3   | R.125  | OP21-2816R125 | 1        | 1 3/4 | 5   | R.125  | OP21-6428R125 |
| 7/16     | 1     | 3   | R.190  | OP21-2816R190 | 1        | 1 3/4 | 5   | R.190  | OP21-6428R190 |
| 1/2      | 1 1/4 | 3   | Square | OP21-3220R000 | 1        | 1 3/4 | 5   | R.250  | OP21-6428R250 |
| 1/2      | 1 1/4 | 3   | R.015  | OP21-3220R015 |          |       |     |        |               |

## 2 FLUTE - REGULAR - POLISHED



OP21M  
REGULAR METRIC

| DIAMETER | LOC | OAL | RAD    | ITEM#           | DIAMETER | LOC | OAL | RAD    | ITEM#           |
|----------|-----|-----|--------|-----------------|----------|-----|-----|--------|-----------------|
| 5        | 14  | 75  | Square | OP21M-05014R0.0 | 12       | 32  | 75  | R1.0   | OP21M-12032R1.0 |
| 5        | 14  | 75  | R0.5   | OP21M-05014R0.5 | 12       | 32  | 75  | R1.5   | OP21M-12032R1.5 |
| 5        | 14  | 75  | R1.0   | OP21M-05014R1.0 | 12       | 32  | 75  | R2.0   | OP21M-12032R2.0 |
| 5        | 14  | 75  | R1.5   | OP21M-05014R1.5 | 12       | 32  | 75  | R3.0   | OP21M-12032R3.0 |
| 6        | 20  | 75  | Square | OP21M-06020R0.0 | 12       | 32  | 75  | R4.5   | OP21M-12032R4.5 |
| 6        | 20  | 75  | R0.5   | OP21M-06020R0.5 | 16       | 41  | 100 | Square | OP21M-16041R0.0 |
| 6        | 20  | 75  | R1.0   | OP21M-06020R1.0 | 16       | 41  | 100 | R0.5   | OP21M-16041R0.5 |
| 6        | 20  | 75  | R1.5   | OP21M-06020R1.5 | 16       | 41  | 100 | R1.0   | OP21M-16041R1.0 |
| 6        | 20  | 75  | R2.0   | OP21M-06020R2.0 | 16       | 41  | 100 | R1.5   | OP21M-16041R1.5 |
| 8        | 21  | 75  | Square | OP21M-08021R0.0 | 16       | 41  | 100 | R2.0   | OP21M-16041R2.0 |
| 8        | 21  | 75  | R0.5   | OP21M-08021R0.5 | 16       | 41  | 100 | R3.0   | OP21M-16041R3.0 |
| 8        | 21  | 75  | R1.0   | OP21M-08021R1.0 | 16       | 41  | 100 | R4.5   | OP21M-16041R4.5 |
| 8        | 21  | 75  | R1.5   | OP21M-08021R1.5 | 16       | 41  | 100 | R6.0   | OP21M-16041R6.0 |
| 8        | 21  | 75  | R2.0   | OP21M-08021R2.0 | 20       | 41  | 100 | Square | OP21M-20041R0.0 |
| 8        | 21  | 75  | R3.0   | OP21M-08021R3.0 | 20       | 41  | 100 | R0.5   | OP21M-20041R0.5 |
| 10       | 25  | 75  | Square | OP21M-10025R0.0 | 20       | 41  | 100 | R1.0   | OP21M-20041R1.0 |
| 10       | 25  | 75  | R0.5   | OP21M-10025R0.5 | 20       | 41  | 100 | R1.5   | OP21M-20041R1.5 |
| 10       | 25  | 75  | R1.0   | OP21M-10025R1.0 | 20       | 41  | 100 | R2.0   | OP21M-20041R2.0 |
| 10       | 25  | 75  | R1.5   | OP21M-10025R1.5 | 20       | 41  | 100 | R3.0   | OP21M-20041R3.0 |
| 10       | 25  | 75  | R2.0   | OP21M-10025R2.0 | 20       | 41  | 100 | R4.5   | OP21M-20041R4.5 |
| 10       | 25  | 75  | R3.0   | OP21M-10025R3.0 | 20       | 41  | 100 | R6.0   | OP21M-20041R6.0 |
| 11       | 25  | 75  | Square | OP21M-11025R0.0 | 25       | 45  | 125 | Square | OP21M-25045R0.0 |
| 11       | 25  | 75  | R0.5   | OP21M-11025R0.5 | 25       | 45  | 125 | R0.5   | OP21M-25045R0.5 |
| 11       | 25  | 75  | R1.0   | OP21M-11025R1.0 | 25       | 45  | 125 | R1.0   | OP21M-25045R1.0 |
| 11       | 25  | 75  | R1.5   | OP21M-11025R1.5 | 25       | 45  | 125 | R1.5   | OP21M-25045R1.5 |
| 11       | 25  | 75  | R2.0   | OP21M-11025R2.0 | 25       | 45  | 125 | R2.0   | OP21M-25045R2.0 |
| 11       | 25  | 75  | R3.0   | OP21M-11025R3.0 | 25       | 45  | 125 | R3.0   | OP21M-25045R3.0 |
| 11       | 25  | 75  | R4.5   | OP21M-11025R4.5 | 25       | 45  | 125 | R4.5   | OP21M-25045R4.5 |
| 12       | 32  | 75  | Square | OP21M-12032R0.0 | 25       | 45  | 125 | R6.0   | OP21M-25045R6.0 |
| 12       | 32  | 75  | R0.5   | OP21M-12032R0.5 |          |     |     |        |                 |



## 2 FLUTE - REGULAR - BALL NOSE - POLISHED



OP21B

BALL INCH

| DIAMETER | LOC   | OAL | ITEM#          |
|----------|-------|-----|----------------|
| 3/16     | 9/16  | 3   | OP21-1209R090B |
| 1/4      | 3/4   | 3   | OP21-1612R125B |
| 5/16     | 13/16 | 3   | OP21-2013R155B |
| 3/8      | 1     | 3   | OP21-2416R190B |
| 7/16     | 1     | 3   | OP21-2816R220B |
| 1/2      | 1 1/4 | 3   | OP21-3220R250B |
| 5/8      | 1 5/8 | 4   | OP21-4026R310B |
| 3/4      | 1 5/8 | 4   | OP21-4826R375B |
| 1        | 1 3/4 | 5   | OP21-6428R500B |

OP21MB

BALL METRIC

| DIAMETER | LOC | OAL | ITEM#             |
|----------|-----|-----|-------------------|
| 5        | 14  | 75  | OP21M-05014R2.5B  |
| 6        | 20  | 75  | OP21M-06020R3.0B  |
| 8        | 21  | 75  | OP21M-08021R4.0B  |
| 10       | 25  | 75  | OP21M-10025R5.0B  |
| 11       | 25  | 75  | OP21M-11025R5.5B  |
| 12       | 32  | 75  | OP21M-12032R6.0B  |
| 16       | 41  | 100 | OP21M-16041R8.0B  |
| 20       | 41  | 100 | OP21M-20041R10.0B |
| 25       | 45  | 125 | OP21M-25045R12.5B |

## 2 FLUTE - REGULAR - CHIP BREAKER - POLISHED



OP21C

CHIP BREAKER INCH

| DIAMETER | LOC   | OAL | RAD    | ITEM#          |
|----------|-------|-----|--------|----------------|
| 3/16     | 9/16  | 3   | Square | OP21-1209R000C |
| 3/16     | 9/16  | 3   | R.015  | OP21-1209R015C |
| 3/16     | 9/16  | 3   | R.030  | OP21-1209R030C |
| 3/16     | 9/16  | 3   | R.060  | OP21-1209R060C |
| 1/4      | 3/4   | 3   | Square | OP21-1612R000C |
| 1/4      | 3/4   | 3   | R.015  | OP21-1612R015C |
| 1/4      | 3/4   | 3   | R.030  | OP21-1612R030C |
| 1/4      | 3/4   | 3   | R.060  | OP21-1612R060C |
| 1/4      | 3/4   | 3   | R.090  | OP21-1612R090C |
| 5/16     | 13/16 | 3   | Square | OP21-2013R000C |
| 5/16     | 13/16 | 3   | R.015  | OP21-2013R015C |
| 5/16     | 13/16 | 3   | R.030  | OP21-2013R030C |
| 5/16     | 13/16 | 3   | R.060  | OP21-2013R060C |
| 5/16     | 13/16 | 3   | R.090  | OP21-2013R090C |
| 5/16     | 13/16 | 3   | R.125  | OP21-2013R125C |
| 3/8      | 1     | 3   | Square | OP21-2416R000C |
| 3/8      | 1     | 3   | R.015  | OP21-2416R015C |
| 3/8      | 1     | 3   | R.030  | OP21-2416R030C |
| 3/8      | 1     | 3   | R.060  | OP21-2416R060C |
| 3/8      | 1     | 3   | R.090  | OP21-2416R090C |
| 3/8      | 1     | 3   | R.125  | OP21-2416R125C |
| 7/16     | 1     | 3   | Square | OP21-2816R000C |
| 7/16     | 1     | 3   | R.015  | OP21-2816R015C |
| 7/16     | 1     | 3   | R.030  | OP21-2816R030C |
| 7/16     | 1     | 3   | R.060  | OP21-2816R060C |
| 7/16     | 1     | 3   | R.090  | OP21-2816R090C |
| 7/16     | 1     | 3   | R.125  | OP21-2816R125C |
| 7/16     | 1     | 3   | R.190  | OP21-2816R190C |
| 1/2      | 1 1/4 | 3   | Square | OP21-3220R000C |
| 1/2      | 1 1/4 | 3   | R.015  | OP21-3220R015C |

| DIAMETER | LOC   | OAL | RAD    | ITEM#          |
|----------|-------|-----|--------|----------------|
| 1/2      | 1 1/4 | 3   | R.030  | OP21-3220R030C |
| 1/2      | 1 1/4 | 3   | R.060  | OP21-3220R060C |
| 1/2      | 1 1/4 | 3   | R.090  | OP21-3220R090C |
| 1/2      | 1 1/4 | 3   | R.125  | OP21-3220R125C |
| 1/2      | 1 1/4 | 3   | R.190  | OP21-3220R190C |
| 5/8      | 1 5/8 | 4   | Square | OP21-4026R000C |
| 5/8      | 1 5/8 | 4   | R.015  | OP21-4026R015C |
| 5/8      | 1 5/8 | 4   | R.030  | OP21-4026R030C |
| 5/8      | 1 5/8 | 4   | R.060  | OP21-4026R060C |
| 5/8      | 1 5/8 | 4   | R.090  | OP21-4026R090C |
| 5/8      | 1 5/8 | 4   | R.125  | OP21-4026R125C |
| 5/8      | 1 5/8 | 4   | R.190  | OP21-4026R190C |
| 5/8      | 1 5/8 | 4   | R.250  | OP21-4026R250C |
| 3/4      | 1 5/8 | 4   | Square | OP21-4826R000C |
| 3/4      | 1 5/8 | 4   | R.015  | OP21-4826R015C |
| 3/4      | 1 5/8 | 4   | R.030  | OP21-4826R030C |
| 3/4      | 1 5/8 | 4   | R.060  | OP21-4826R060C |
| 3/4      | 1 5/8 | 4   | R.090  | OP21-4826R090C |
| 3/4      | 1 5/8 | 4   | R.125  | OP21-4826R125C |
| 3/4      | 1 5/8 | 4   | R.190  | OP21-4826R190C |
| 3/4      | 1 5/8 | 4   | R.250  | OP21-4826R250C |
| 1        | 1 3/4 | 5   | Square | OP21-6428R000C |
| 1        | 1 3/4 | 5   | R.015  | OP21-6428R015C |
| 1        | 1 3/4 | 5   | R.030  | OP21-6428R030C |
| 1        | 1 3/4 | 5   | R.060  | OP21-6428R060C |
| 1        | 1 3/4 | 5   | R.090  | OP21-6428R090C |
| 1        | 1 3/4 | 5   | R.125  | OP21-6428R125C |
| 1        | 1 3/4 | 5   | R.190  | OP21-6428R190C |
| 1        | 1 3/4 | 5   | R.250  | OP21-6428R250C |

## 2 FLUTE - REGULAR - CHIP BREAKER - POLISHED



OP21MC

CHIP BREAKER METRIC

| DIAMETER | LOC | OAL | RAD    | ITEM#            |
|----------|-----|-----|--------|------------------|
| 5        | 14  | 75  | Square | OP21M-05014R0.0C |
| 5        | 14  | 75  | R0.5   | OP21M-05014R0.5C |
| 5        | 14  | 75  | R1.0   | OP21M-05014R1.0C |
| 5        | 14  | 75  | R1.5   | OP21M-05014R1.5C |
| 6        | 20  | 75  | Square | OP21M-06020R0.0C |
| 6        | 20  | 75  | R0.5   | OP21M-06020R0.5C |
| 6        | 20  | 75  | R1.0   | OP21M-06020R1.0C |
| 6        | 20  | 75  | R1.5   | OP21M-06020R1.5C |
| 6        | 20  | 75  | R2.0   | OP21M-06020R2.0C |
| 8        | 21  | 75  | Square | OP21M-08021R0.0C |
| 8        | 21  | 75  | R0.5   | OP21M-08021R0.5C |
| 8        | 21  | 75  | R1.0   | OP21M-08021R1.0C |
| 8        | 21  | 75  | R1.5   | OP21M-08021R1.5C |
| 8        | 21  | 75  | R2.0   | OP21M-08021R2.0C |
| 8        | 21  | 75  | R3.0   | OP21M-08021R3.0C |
| 10       | 25  | 75  | Square | OP21M-10025R0.0C |
| 10       | 25  | 75  | R0.5   | OP21M-10025R0.5C |
| 10       | 25  | 75  | R1.0   | OP21M-10025R1.0C |
| 10       | 25  | 75  | R1.5   | OP21M-10025R1.5C |
| 10       | 25  | 75  | R2.0   | OP21M-10025R2.0C |
| 10       | 25  | 75  | R3.0   | OP21M-10025R3.0C |
| 11       | 25  | 75  | Square | OP21M-11025R0.0C |
| 11       | 25  | 75  | R0.5   | OP21M-11025R0.5C |
| 11       | 25  | 75  | R1.0   | OP21M-11025R1.0C |
| 11       | 25  | 75  | R1.5   | OP21M-11025R1.5C |
| 11       | 25  | 75  | R2.0   | OP21M-11025R2.0C |
| 11       | 25  | 75  | R3.0   | OP21M-11025R3.0C |
| 11       | 25  | 75  | R4.5   | OP21M-11025R4.5C |
| 12       | 32  | 75  | Square | OP21M-12032R0.0C |
| 12       | 32  | 75  | R0.5   | OP21M-12032R0.5C |

| DIAMETER | LOC | OAL | RAD    | ITEM#            |
|----------|-----|-----|--------|------------------|
| 12       | 32  | 75  | R1.0   | OP21M-12032R1.0C |
| 12       | 32  | 75  | R1.5   | OP21M-12032R1.5C |
| 12       | 32  | 75  | R2.0   | OP21M-12032R2.0C |
| 12       | 32  | 75  | R3.0   | OP21M-12032R3.0C |
| 12       | 32  | 75  | R4.5   | OP21M-12032R4.5C |
| 16       | 41  | 100 | Square | OP21M-16041R0.0C |
| 16       | 41  | 100 | R0.5   | OP21M-16041R0.5C |
| 16       | 41  | 100 | R1.0   | OP21M-16041R1.0C |
| 16       | 41  | 100 | R1.5   | OP21M-16041R1.5C |
| 16       | 41  | 100 | R2.0   | OP21M-16041R2.0C |
| 16       | 41  | 100 | R3.0   | OP21M-16041R3.0C |
| 16       | 41  | 100 | R4.5   | OP21M-16041R4.5C |
| 16       | 41  | 100 | R6.0   | OP21M-16041R6.0C |
| 20       | 41  | 100 | Square | OP21M-20041R0.0C |
| 20       | 41  | 100 | R0.5   | OP21M-20041R0.5C |
| 20       | 41  | 100 | R1.0   | OP21M-20041R1.0C |
| 20       | 41  | 100 | R1.5   | OP21M-20041R1.5C |
| 20       | 41  | 100 | R2.0   | OP21M-20041R2.0C |
| 20       | 41  | 100 | R3.0   | OP21M-20041R3.0C |
| 20       | 41  | 100 | R4.5   | OP21M-20041R4.5C |
| 20       | 41  | 100 | R6.0   | OP21M-20041R6.0C |
| 25       | 45  | 125 | Square | OP21M-25045R0.0C |
| 25       | 45  | 125 | R0.5   | OP21M-25045R0.5C |
| 25       | 45  | 125 | R1.0   | OP21M-25045R1.0C |
| 25       | 45  | 125 | R1.5   | OP21M-25045R1.5C |
| 25       | 45  | 125 | R2.0   | OP21M-25045R2.0C |
| 25       | 45  | 125 | R3.0   | OP21M-25045R3.0C |
| 25       | 45  | 125 | R4.5   | OP21M-25045R4.5C |
| 25       | 45  | 125 | R6.0   | OP21M-25045R6.0C |



## 2 FLUTE - LONG - POLISHED



OP22

LONG INCH

| DIAMETER | LOC   | OAL | RAD    | ITEM#         |
|----------|-------|-----|--------|---------------|
| 1/4      | 1 1/8 | 3   | Square | OP22-1618R000 |
| 1/4      | 1 1/8 | 3   | R.015  | OP22-1618R015 |
| 1/4      | 1 1/8 | 3   | R.030  | OP22-1618R030 |
| 1/4      | 1 1/8 | 3   | R.060  | OP22-1618R060 |
| 1/4      | 1 1/8 | 3   | R.090  | OP22-1618R090 |
| 5/16     | 1 1/8 | 3   | Square | OP22-2018R000 |
| 5/16     | 1 1/8 | 3   | R.015  | OP22-2018R015 |
| 5/16     | 1 1/8 | 3   | R.030  | OP22-2018R030 |
| 5/16     | 1 1/8 | 3   | R.060  | OP22-2018R060 |
| 5/16     | 1 1/8 | 3   | R.090  | OP22-2018R090 |
| 5/16     | 1 1/8 | 3   | R.125  | OP22-2018R125 |
| 3/8      | 1 1/4 | 3   | Square | OP22-2420R000 |
| 3/8      | 1 1/4 | 3   | R.015  | OP22-2420R015 |
| 3/8      | 1 1/4 | 3   | R.030  | OP22-2420R030 |
| 3/8      | 1 1/4 | 3   | R.060  | OP22-2420R060 |
| 3/8      | 1 1/4 | 3   | R.090  | OP22-2420R090 |
| 3/8      | 1 1/4 | 3   | R.125  | OP22-2420R125 |
| 7/16     | 2     | 4   | Square | OP22-2832R000 |
| 7/16     | 2     | 4   | R.015  | OP22-2832R015 |
| 7/16     | 2     | 4   | R.030  | OP22-2832R030 |
| 7/16     | 2     | 4   | R.060  | OP22-2832R060 |
| 7/16     | 2     | 4   | R.090  | OP22-2832R090 |
| 7/16     | 2     | 4   | R.125  | OP22-2832R125 |
| 7/16     | 2     | 4   | R.190  | OP22-2832R190 |
| 1/2      | 2     | 4   | Square | OP22-3232R000 |
| 1/2      | 2     | 4   | R.015  | OP22-3232R015 |
| 1/2      | 2     | 4   | R.030  | OP22-3232R030 |
| 1/2      | 2     | 4   | R.060  | OP22-3232R060 |
| 1/2      | 2     | 4   | R.090  | OP22-3232R090 |
| 1/2      | 2     | 4   | R.125  | OP22-3232R125 |

| DIAMETER | LOC   | OAL | RAD    | ITEM#         |
|----------|-------|-----|--------|---------------|
| 1/2      | 2     | 4   | R.190  | OP22-3232R190 |
| 5/8      | 2 1/4 | 5   | Square | OP22-4036R000 |
| 5/8      | 2 1/4 | 5   | R.015  | OP22-4036R015 |
| 5/8      | 2 1/4 | 5   | R.030  | OP22-4036R030 |
| 5/8      | 2 1/4 | 5   | R.060  | OP22-4036R060 |
| 5/8      | 2 1/4 | 5   | R.090  | OP22-4036R090 |
| 5/8      | 2 1/4 | 5   | R.125  | OP22-4036R125 |
| 5/8      | 2 1/4 | 5   | R.190  | OP22-4036R190 |
| 5/8      | 2 1/4 | 5   | R.250  | OP22-4036R250 |
| 3/4      | 2 5/8 | 5   | Square | OP22-4842R000 |
| 3/4      | 2 5/8 | 5   | R.015  | OP22-4842R015 |
| 3/4      | 2 5/8 | 5   | R.030  | OP22-4842R030 |
| 3/4      | 2 5/8 | 5   | R.060  | OP22-4842R060 |
| 3/4      | 2 5/8 | 5   | R.090  | OP22-4842R090 |
| 3/4      | 2 5/8 | 5   | R.125  | OP22-4842R125 |
| 3/4      | 2 5/8 | 5   | R.190  | OP22-4842R190 |
| 3/4      | 2 5/8 | 5   | R.250  | OP22-4842R250 |
| 1        | 3     | 6   | Square | OP22-6448R000 |
| 1        | 3     | 6   | R.015  | OP22-6448R015 |
| 1        | 3     | 6   | R.030  | OP22-6448R030 |
| 1        | 3     | 6   | R.060  | OP22-6448R060 |
| 1        | 3     | 6   | R.090  | OP22-6448R090 |
| 1        | 3     | 6   | R.125  | OP22-6448R125 |
| 1        | 3     | 6   | R.190  | OP22-6448R190 |
| 1        | 3     | 6   | R.250  | OP22-6448R250 |



## 2 FLUTE - LONG - POLISHED



OP22M

LONG METRIC

| DIAMETER | LOC | OAL | RAD    | ITEM#           |
|----------|-----|-----|--------|-----------------|
| 6        | 29  | 75  | Square | OP22M-06029R0.0 |
| 6        | 29  | 75  | R0.5   | OP22M-06029R0.5 |
| 6        | 29  | 75  | R1.0   | OP22M-06029R1.0 |
| 6        | 29  | 75  | R1.5   | OP22M-06029R1.5 |
| 6        | 29  | 75  | R2.0   | OP22M-06029R2.0 |
| 8        | 29  | 75  | Square | OP22M-08029R0.0 |
| 8        | 29  | 75  | R0.5   | OP22M-08029R0.5 |
| 8        | 29  | 75  | R1.0   | OP22M-08029R1.0 |
| 8        | 29  | 75  | R1.5   | OP22M-08029R1.5 |
| 8        | 29  | 75  | R2.0   | OP22M-08029R2.0 |
| 8        | 29  | 75  | R3.0   | OP22M-08029R3.0 |
| 10       | 32  | 75  | Square | OP22M-10032R0.0 |
| 10       | 32  | 75  | R0.5   | OP22M-10032R0.5 |
| 10       | 32  | 75  | R1.0   | OP22M-10032R1.0 |
| 10       | 32  | 75  | R1.5   | OP22M-10032R1.5 |
| 10       | 32  | 75  | R2.0   | OP22M-10032R2.0 |
| 10       | 32  | 75  | R3.0   | OP22M-10032R3.0 |
| 11       | 50  | 100 | Square | OP22M-11050R0.0 |
| 11       | 50  | 100 | R0.5   | OP22M-11050R0.5 |
| 11       | 50  | 100 | R1.0   | OP22M-11050R1.0 |
| 11       | 50  | 100 | R1.5   | OP22M-11050R1.5 |
| 11       | 50  | 100 | R2.0   | OP22M-11050R2.0 |
| 11       | 50  | 100 | R3.0   | OP22M-11050R3.0 |
| 11       | 50  | 100 | R4.5   | OP22M-11050R4.5 |
| 12       | 50  | 100 | Square | OP22M-12050R0.0 |
| 12       | 50  | 100 | R0.5   | OP22M-12050R0.5 |
| 12       | 50  | 100 | R1.0   | OP22M-12050R1.0 |
| 12       | 50  | 100 | R1.5   | OP22M-12050R1.5 |
| 12       | 50  | 100 | R2.0   | OP22M-12050R2.0 |
| 12       | 50  | 100 | R3.0   | OP22M-12050R3.0 |

| DIAMETER | LOC | OAL | RAD    | ITEM#           |
|----------|-----|-----|--------|-----------------|
| 12       | 50  | 100 | R4.5   | OP22M-12050R4.5 |
| 16       | 57  | 125 | Square | OP22M-16057R0.0 |
| 16       | 57  | 125 | R0.5   | OP22M-16057R0.5 |
| 16       | 57  | 125 | R1.0   | OP22M-16057R1.0 |
| 16       | 57  | 125 | R1.5   | OP22M-16057R1.5 |
| 16       | 57  | 125 | R2.0   | OP22M-16057R2.0 |
| 16       | 57  | 125 | R3.0   | OP22M-16057R3.0 |
| 16       | 57  | 125 | R4.5   | OP22M-16057R4.5 |
| 16       | 57  | 125 | R6.0   | OP22M-16057R6.0 |
| 20       | 67  | 125 | Square | OP22M-20067R0.0 |
| 20       | 67  | 125 | R0.5   | OP22M-20067R0.5 |
| 20       | 67  | 125 | R1.0   | OP22M-20067R1.0 |
| 20       | 67  | 125 | R1.5   | OP22M-20067R1.5 |
| 20       | 67  | 125 | R2.0   | OP22M-20067R2.0 |
| 20       | 67  | 125 | R3.0   | OP22M-20067R3.0 |
| 20       | 67  | 125 | R4.5   | OP22M-20067R4.5 |
| 20       | 67  | 125 | R6.0   | OP22M-20067R6.0 |
| 25       | 76  | 150 | Square | OP22M-25076R0.0 |
| 25       | 76  | 150 | R0.5   | OP22M-25076R0.5 |
| 25       | 76  | 150 | R1.0   | OP22M-25076R1.0 |
| 25       | 76  | 150 | R1.5   | OP22M-25076R1.5 |
| 25       | 76  | 150 | R2.0   | OP22M-25076R2.0 |
| 25       | 76  | 150 | R3.0   | OP22M-25076R3.0 |
| 25       | 76  | 150 | R4.5   | OP22M-25076R4.5 |
| 25       | 76  | 150 | R6.0   | OP22M-25076R6.0 |

## 2 FLUTE - LONG - BALL NOSE - POLISHED



OP22B

LONG BALL INCH

| DIAMETER | LOC   | OAL | ITEM#          |
|----------|-------|-----|----------------|
| 1/4      | 1 1/8 | 3   | OP22-1618R125B |
| 5/16     | 1 1/8 | 3   | OP22-2018R155B |
| 3/8      | 1 1/4 | 3   | OP22-2420R190B |
| 7/16     | 2     | 4   | OP22-2832R220B |
| 1/2      | 2     | 4   | OP22-3232R250B |
| 5/8      | 2 1/4 | 5   | OP22-4036R310B |
| 3/4      | 2 5/8 | 5   | OP22-4842R375B |
| 1        | 3     | 6   | OP22-6448R500B |

OP22MB

LONG BALL METRIC

| DIAMETER | LOC | OAL | ITEM#             |
|----------|-----|-----|-------------------|
| 6        | 29  | 75  | OP22M-06029R3.0B  |
| 8        | 29  | 75  | OP22M-08029R4.0B  |
| 10       | 32  | 75  | OP22M-10032R5.0B  |
| 11       | 50  | 100 | OP22M-11050R5.5B  |
| 12       | 50  | 100 | OP22M-12050R6.0B  |
| 16       | 57  | 125 | OP22M-16057R8.0B  |
| 20       | 67  | 125 | OP22M-20067R10.0B |
| 25       | 76  | 150 | OP22M-25076R12.5B |

## 2 FLUTE - LONG - CHIP BREAKER - POLISHED



OP22C

LONG CHIP BREAKER INCH

| DIAMETER | LOC   | OAL | RAD    | ITEM#          |
|----------|-------|-----|--------|----------------|
| 1/4      | 1 1/8 | 3   | Square | OP22-1618R000C |
| 1/4      | 1 1/8 | 3   | R.015  | OP22-1618R015C |
| 1/4      | 1 1/8 | 3   | R.030  | OP22-1618R030C |
| 1/4      | 1 1/8 | 3   | R.060  | OP22-1618R060C |
| 1/4      | 1 1/8 | 3   | R.090  | OP22-1618R090C |
| 5/16     | 1 1/8 | 3   | Square | OP22-2018R000C |
| 5/16     | 1 1/8 | 3   | R.015  | OP22-2018R015C |
| 5/16     | 1 1/8 | 3   | R.030  | OP22-2018R030C |
| 5/16     | 1 1/8 | 3   | R.060  | OP22-2018R060C |
| 5/16     | 1 1/8 | 3   | R.090  | OP22-2018R090C |
| 5/16     | 1 1/8 | 3   | R.125  | OP22-2018R125C |
| 3/8      | 1 1/4 | 3   | Square | OP22-2420R000C |
| 3/8      | 1 1/4 | 3   | R.015  | OP22-2420R015C |
| 3/8      | 1 1/4 | 3   | R.030  | OP22-2420R030C |
| 3/8      | 1 1/4 | 3   | R.060  | OP22-2420R060C |
| 3/8      | 1 1/4 | 3   | R.090  | OP22-2420R090C |
| 3/8      | 1 1/4 | 3   | R.125  | OP22-2420R125C |
| 7/16     | 2     | 4   | Square | OP22-2832R000C |
| 7/16     | 2     | 4   | R.015  | OP22-2832R015C |
| 7/16     | 2     | 4   | R.030  | OP22-2832R030C |
| 7/16     | 2     | 4   | R.060  | OP22-2832R060C |
| 7/16     | 2     | 4   | R.090  | OP22-2832R090C |
| 7/16     | 2     | 4   | R.125  | OP22-2832R125C |
| 7/16     | 2     | 4   | R.190  | OP22-2832R190C |
| 1/2      | 2     | 4   | Square | OP22-3232R000C |
| 1/2      | 2     | 4   | R.015  | OP22-3232R015C |
| 1/2      | 2     | 4   | R.030  | OP22-3232R030C |
| 1/2      | 2     | 4   | R.060  | OP22-3232R060C |
| 1/2      | 2     | 4   | R.090  | OP22-3232R090C |
| 1/2      | 2     | 4   | R.125  | OP22-3232R125C |

| DIAMETER | LOC   | OAL | RAD    | ITEM#          |
|----------|-------|-----|--------|----------------|
| 1/2      | 2     | 4   | R.190  | OP22-3232R190C |
| 5/8      | 2 1/4 | 5   | Square | OP22-4036R000C |
| 5/8      | 2 1/4 | 5   | R.015  | OP22-4036R015C |
| 5/8      | 2 1/4 | 5   | R.030  | OP22-4036R030C |
| 5/8      | 2 1/4 | 5   | R.060  | OP22-4036R060C |
| 5/8      | 2 1/4 | 5   | R.090  | OP22-4036R090C |
| 5/8      | 2 1/4 | 5   | R.125  | OP22-4036R125C |
| 5/8      | 2 1/4 | 5   | R.190  | OP22-4036R190C |
| 5/8      | 2 1/4 | 5   | R.250  | OP22-4036R250C |
| 3/4      | 2 5/8 | 5   | Square | OP22-4842R000C |
| 3/4      | 2 5/8 | 5   | R.015  | OP22-4842R015C |
| 3/4      | 2 5/8 | 5   | R.030  | OP22-4842R030C |
| 3/4      | 2 5/8 | 5   | R.060  | OP22-4842R060C |
| 3/4      | 2 5/8 | 5   | R.090  | OP22-4842R090C |
| 3/4      | 2 5/8 | 5   | R.125  | OP22-4842R125C |
| 3/4      | 2 5/8 | 5   | R.190  | OP22-4842R190C |
| 3/4      | 2 5/8 | 5   | R.250  | OP22-4842R250C |
| 1        | 3     | 6   | Square | OP22-6448R000C |
| 1        | 3     | 6   | R.015  | OP22-6448R015C |
| 1        | 3     | 6   | R.030  | OP22-6448R030C |
| 1        | 3     | 6   | R.060  | OP22-6448R060C |
| 1        | 3     | 6   | R.090  | OP22-6448R090C |
| 1        | 3     | 6   | R.125  | OP22-6448R125C |
| 1        | 3     | 6   | R.190  | OP22-6448R190C |
| 1        | 3     | 6   | R.250  | OP22-6448R250C |



## 2 FLUTE - LONG - CHIP BREAKER - POLISHED



OP22MC

### LONG CHIP BREAKER METRIC

| DIAMETER | LOC | OAL | RAD    | ITEM#            |
|----------|-----|-----|--------|------------------|
| 6        | 29  | 75  | Square | OP22M-06029R0.0C |
| 6        | 29  | 75  | R0.5   | OP22M-06029R0.5C |
| 6        | 29  | 75  | R1.0   | OP22M-06029R1.0C |
| 6        | 29  | 75  | R1.5   | OP22M-06029R1.5C |
| 6        | 29  | 75  | R2.0   | OP22M-06029R2.0C |
| 8        | 29  | 75  | Square | OP22M-08029R0.0C |
| 8        | 29  | 75  | R0.5   | OP22M-08029R0.5C |
| 8        | 29  | 75  | R1.0   | OP22M-08029R1.0C |
| 8        | 29  | 75  | R1.5   | OP22M-08029R1.5C |
| 8        | 29  | 75  | R2.0   | OP22M-08029R2.0C |
| 8        | 29  | 75  | R3.0   | OP22M-08029R3.0C |
| 10       | 32  | 75  | Square | OP22M-10032R0.0C |
| 10       | 32  | 75  | R0.5   | OP22M-10032R0.5C |
| 10       | 32  | 75  | R1.0   | OP22M-10032R1.0C |
| 10       | 32  | 75  | R1.5   | OP22M-10032R1.5C |
| 10       | 32  | 75  | R2.0   | OP22M-10032R2.0C |
| 10       | 32  | 75  | R3.0   | OP22M-10032R3.0C |
| 11       | 50  | 100 | Square | OP22M-11050R0.0C |
| 11       | 50  | 100 | R0.5   | OP22M-11050R0.5C |
| 11       | 50  | 100 | R1.0   | OP22M-11050R1.0C |
| 11       | 50  | 100 | R1.5   | OP22M-11050R1.5C |
| 11       | 50  | 100 | R2.0   | OP22M-11050R2.0C |
| 11       | 50  | 100 | R3.0   | OP22M-11050R3.0C |
| 11       | 50  | 100 | R4.5   | OP22M-11050R4.5C |
| 12       | 50  | 100 | Square | OP22M-12050R0.0C |
| 12       | 50  | 100 | R0.5   | OP22M-12050R0.5C |
| 12       | 50  | 100 | R1.0   | OP22M-12050R1.0C |
| 12       | 50  | 100 | R1.5   | OP22M-12050R1.5C |
| 12       | 50  | 100 | R2.0   | OP22M-12050R2.0C |
| 12       | 50  | 100 | R3.0   | OP22M-12050R3.0C |

| DIAMETER | LOC | OAL | RAD    | ITEM#            |
|----------|-----|-----|--------|------------------|
| 12       | 50  | 100 | R4.5   | OP22M-12050R4.5C |
| 16       | 57  | 125 | Square | OP22M-16057R0.0C |
| 16       | 57  | 125 | R0.5   | OP22M-16057R0.5C |
| 16       | 57  | 125 | R1.0   | OP22M-16057R1.0C |
| 16       | 57  | 125 | R1.5   | OP22M-16057R1.5C |
| 16       | 57  | 125 | R2.0   | OP22M-16057R2.0C |
| 16       | 57  | 125 | R3.0   | OP22M-16057R3.0C |
| 16       | 57  | 125 | R4.5   | OP22M-16057R4.5C |
| 16       | 57  | 125 | R6.0   | OP22M-16057R6.0C |
| 20       | 67  | 125 | Square | OP22M-20067R0.0C |
| 20       | 67  | 125 | R0.5   | OP22M-20067R0.5C |
| 20       | 67  | 125 | R1.0   | OP22M-20067R1.0C |
| 20       | 67  | 125 | R1.5   | OP22M-20067R1.5C |
| 20       | 67  | 125 | R2.0   | OP22M-20067R2.0C |
| 20       | 67  | 125 | R3.0   | OP22M-20067R3.0C |
| 20       | 67  | 125 | R4.5   | OP22M-20067R4.5C |
| 20       | 67  | 125 | R6.0   | OP22M-20067R6.0C |
| 25       | 76  | 150 | Square | OP22M-25076R0.0C |
| 25       | 76  | 150 | R0.5   | OP22M-25076R0.5C |
| 25       | 76  | 150 | R1.0   | OP22M-25076R1.0C |
| 25       | 76  | 150 | R1.5   | OP22M-25076R1.5C |
| 25       | 76  | 150 | R2.0   | OP22M-25076R2.0C |
| 25       | 76  | 150 | R3.0   | OP22M-25076R3.0C |
| 25       | 76  | 150 | R4.5   | OP22M-25076R4.5C |
| 25       | 76  | 150 | R6.0   | OP22M-25076R6.0C |



## 2 FLUTE - LONG REACH - POLISHED



OP23

LONG REACH INCH

| DIAMETER | LOC  | REACH | OAL | RAD    | ITEM#              |
|----------|------|-------|-----|--------|--------------------|
| 1/4      | 3/8  | 1 1/4 | 4   | Square | OP23-1606R000N125  |
| 1/4      | 3/8  | 1 1/4 | 4   | R.015  | OP23-1606R015N125  |
| 5/16     | 7/16 | 1 1/4 | 4   | Square | OP23-2007R000N125  |
| 5/16     | 7/16 | 1 1/4 | 4   | R.015  | OP23-2007R015N125  |
| 3/8      | 1/2  | 1 7/8 | 4   | Square | OP23-2408R000N1875 |
| 3/8      | 1/2  | 1 7/8 | 4   | R.015  | OP23-2408R015N1875 |
| 7/16     | 5/8  | 2 1/4 | 4   | Square | OP23-2810R000N225  |
| 7/16     | 5/8  | 2 1/4 | 4   | R.030  | OP23-2810R030N225  |
| 1/2      | 5/8  | 2 1/4 | 4   | Square | OP23-3210R000N225  |
| 1/2      | 5/8  | 2 1/4 | 4   | R.030  | OP23-3210R030N225  |
| 5/8      | 3/4  | 2 1/4 | 4   | Square | OP23-4012R000N225  |
| 5/8      | 3/4  | 3 1/4 | 5   | Square | OP23-4012R000N325  |
| 5/8      | 3/4  | 2 1/4 | 4   | R.030  | OP23-4012R030N225  |
| 5/8      | 3/4  | 3 1/4 | 5   | R.030  | OP23-4012R030N325  |
| 3/4      | 3/4  | 2 1/4 | 4   | Square | OP23-4812R000N225  |
| 3/4      | 3/4  | 3 1/4 | 5   | Square | OP23-4812R000N325  |
| 3/4      | 3/4  | 2 1/4 | 4   | R.030  | OP23-4812R030N225  |
| 3/4      | 3/4  | 3 1/4 | 5   | R.030  | OP23-4812R030N325  |

## 2 FLUTE - LONG REACH - POLISHED



OP23M

LONG REACH METRIC

| DIAMETER | LOC | REACH | OAL | RAD    | ITEM#              |
|----------|-----|-------|-----|--------|--------------------|
| 6        | 10  | 32    | 100 | Square | OP23M-06010R0.0N32 |
| 6        | 10  | 32    | 100 | R0.5   | OP23M-06010R0.5N32 |
| 8        | 11  | 40    | 100 | Square | OP23M-08011R0.0N40 |
| 8        | 11  | 40    | 100 | R0.5   | OP23M-08011R0.5N40 |
| 10       | 12  | 48    | 100 | Square | OP23M-10012R0.0N48 |
| 10       | 12  | 48    | 100 | R0.5   | OP23M-10012R0.5N48 |
| 11       | 16  | 57    | 100 | Square | OP23M-11016R0.0N57 |
| 11       | 16  | 57    | 100 | R0.5   | OP23M-11016R0.5N57 |
| 12       | 16  | 57    | 100 | Square | OP23M-12016R0.0N57 |
| 12       | 16  | 57    | 100 | R1.0   | OP23M-12016R1.0N57 |
| 16       | 20  | 57    | 100 | Square | OP23M-16020R0.0N57 |
| 16       | 20  | 83    | 150 | Square | OP23M-16020R0.0N83 |
| 16       | 20  | 57    | 100 | R1.0   | OP23M-16020R1.0N57 |
| 16       | 20  | 83    | 150 | R1.0   | OP23M-16020R1.0N83 |
| 20       | 25  | 57    | 100 | Square | OP23M-20025R0.0N57 |
| 20       | 25  | 83    | 150 | Square | OP23M-20025R0.0N83 |
| 20       | 25  | 57    | 100 | R1.0   | OP23M-20025R1.0N57 |
| 20       | 25  | 83    | 150 | R1.0   | OP23M-20025R1.0N83 |

## 2 FLUTE - LONG REACH - BALL NOSE - POLISHED



OP23B

BALL LONG REACH INCH

| DIAMETER | LOC  | REACH | OAL | ITEM#               |
|----------|------|-------|-----|---------------------|
| 1/4      | 3/8  | 1 1/4 | 4   | OP23-1606R125N125B  |
| 5/16     | 7/16 | 1 1/4 | 4   | OP23-2007R155N125B  |
| 3/8      | 1/2  | 1 7/8 | 4   | OP23-2408R190N1875B |
| 7/16     | 5/8  | 2 1/4 | 4   | OP23-2810R220N225B  |
| 1/2      | 5/8  | 2 1/4 | 4   | OP23-3210R250N225B  |
| 5/8      | 3/4  | 2 1/4 | 4   | OP23-4012R310N225B  |
| 5/8      | 3/4  | 3 1/4 | 5   | OP23-4012R310N325B  |
| 3/4      | 3/4  | 2 1/4 | 4   | OP23-4812R375N225B  |
| 3/4      | 3/4  | 3 1/4 | 5   | OP23-4812R375N325B  |

OP23MB

BALL LONG REACH METRIC

| DIAMETER | LOC | REACH | OAL | ITEM#                |
|----------|-----|-------|-----|----------------------|
| 6        | 10  | 32    | 100 | OP23M-06010R3.0N32B  |
| 8        | 11  | 40    | 100 | OP23M-08011R4.0N40B  |
| 10       | 12  | 48    | 100 | OP23M-10012R5.0N48B  |
| 11       | 16  | 57    | 100 | OP23M-11016R5.5N57B  |
| 12       | 16  | 57    | 100 | OP23M-12016R6.0N57B  |
| 16       | 20  | 57    | 100 | OP23M-16020R8.0N57B  |
| 16       | 20  | 83    | 150 | OP23M-16020R8.0N83B  |
| 20       | 25  | 57    | 100 | OP23M-20025R10.0N57B |
| 20       | 25  | 83    | 150 | OP23M-20025R10.0N83B |

## 2 FLUTE - LONG REACH - CHIP BREAKER - POLISHED



OP23C

CHIP BREAKER LONG REACH INCH

| DIAMETER | LOC  | REACH | OAL | RAD    | ITEM#               |
|----------|------|-------|-----|--------|---------------------|
| 1/4      | 3/8  | 1 1/4 | 4   | Square | OP23-1606R000CN125  |
| 1/4      | 3/8  | 1 1/4 | 4   | R.015  | OP23-1606R015CN125  |
| 5/16     | 7/16 | 1 1/4 | 4   | Square | OP23-2007R000CN125  |
| 5/16     | 7/16 | 1 1/4 | 4   | R.015  | OP23-2007R015CN125  |
| 3/8      | 1/2  | 1 7/8 | 4   | Square | OP23-2408R000CN1875 |
| 3/8      | 1/2  | 1 7/8 | 4   | R.015  | OP23-2408R015CN1875 |
| 7/16     | 5/8  | 2 1/4 | 4   | Square | OP23-2810R000CN225  |
| 7/16     | 5/8  | 2 1/4 | 4   | R.030  | OP23-2810R030CN225  |
| 1/2      | 5/8  | 2 1/4 | 4   | Square | OP23-3210R000CN225  |
| 1/2      | 5/8  | 2 1/4 | 4   | R.030  | OP23-3210R030CN225  |
| 5/8      | 3/4  | 2 1/4 | 4   | Square | OP23-4012R000CN225  |
| 5/8      | 3/4  | 3 1/4 | 5   | Square | OP23-4012R000CN325  |
| 5/8      | 3/4  | 2 1/4 | 4   | R.030  | OP23-4012R030CN225  |
| 5/8      | 3/4  | 3 1/4 | 5   | R.030  | OP23-4012R030CN325  |
| 3/4      | 3/4  | 2 1/4 | 4   | Square | OP23-4812R000CN225  |
| 3/4      | 3/4  | 3 1/4 | 5   | Square | OP23-4812R000CN325  |
| 3/4      | 3/4  | 2 1/4 | 4   | R.030  | OP23-4812R030CN225  |
| 3/4      | 3/4  | 3 1/4 | 5   | R.030  | OP23-4812R030CN325  |



## 2 FLUTE - LONG REACH - CHIP BREAKER - POLISHED



OP23MC

CHIP BREAKER LONG REACH METRIC

| DIAMETER | LOC | REACH | OAL | RAD    | ITEM#               |
|----------|-----|-------|-----|--------|---------------------|
| 6        | 10  | 32    | 100 | Square | OP23M-06010R0.0CN32 |
| 6        | 10  | 32    | 100 | R0.5   | OP23M-06010R0.5CN32 |
| 8        | 11  | 40    | 100 | Square | OP23M-08011R0.0CN40 |
| 8        | 11  | 40    | 100 | R0.5   | OP23M-08011R0.5CN40 |
| 10       | 12  | 48    | 100 | Square | OP23M-10012R0.0CN48 |
| 10       | 12  | 48    | 100 | R0.5   | OP23M-10012R0.5CN48 |
| 11       | 16  | 57    | 100 | Square | OP23M-11016R0.0CN57 |
| 11       | 16  | 57    | 100 | R0.5   | OP23M-11016R0.5CN57 |
| 12       | 16  | 57    | 100 | Square | OP23M-12016R0.0CN57 |
| 12       | 16  | 57    | 100 | R1.0   | OP23M-12016R1.0CN57 |
| 16       | 20  | 57    | 100 | Square | OP23M-16020R0.0CN57 |
| 16       | 20  | 83    | 150 | Square | OP23M-16020R0.0CN83 |
| 16       | 20  | 57    | 100 | R1.0   | OP23M-16020R1.0CN57 |
| 16       | 20  | 83    | 150 | R1.0   | OP23M-16020R1.0CN83 |
| 20       | 25  | 57    | 100 | Square | OP23M-20025R0.0CN57 |
| 20       | 25  | 83    | 150 | Square | OP23M-20025R0.0CN83 |
| 20       | 25  | 57    | 100 | R1.0   | OP23M-20025R1.0CN57 |
| 20       | 25  | 83    | 150 | R1.0   | OP23M-20025R1.0CN83 |

## 2 FLUTE - REGULAR - DLC



OP25

REGULAR INCH DLC

| DIAMETER | LOC   | OAL | RAD    | ITEM#         |
|----------|-------|-----|--------|---------------|
| 3/16     | 9/16  | 3   | Square | OP25-1209R000 |
| 3/16     | 9/16  | 3   | R.015  | OP25-1209R015 |
| 3/16     | 9/16  | 3   | R.030  | OP25-1209R030 |
| 3/16     | 9/16  | 3   | R.060  | OP25-1209R060 |
| 1/4      | 3/4   | 3   | Square | OP25-1612R000 |
| 1/4      | 3/4   | 3   | R.015  | OP25-1612R015 |
| 1/4      | 3/4   | 3   | R.030  | OP25-1612R030 |
| 1/4      | 3/4   | 3   | R.060  | OP25-1612R060 |
| 1/4      | 3/4   | 3   | R.090  | OP25-1612R090 |
| 5/16     | 13/16 | 3   | Square | OP25-2013R000 |
| 5/16     | 13/16 | 3   | R.015  | OP25-2013R015 |
| 5/16     | 13/16 | 3   | R.030  | OP25-2013R030 |
| 5/16     | 13/16 | 3   | R.060  | OP25-2013R060 |
| 5/16     | 13/16 | 3   | R.090  | OP25-2013R090 |
| 5/16     | 13/16 | 3   | R.125  | OP25-2013R125 |
| 3/8      | 1     | 3   | Square | OP25-2416R000 |
| 3/8      | 1     | 3   | R.015  | OP25-2416R015 |
| 3/8      | 1     | 3   | R.030  | OP25-2416R030 |
| 3/8      | 1     | 3   | R.060  | OP25-2416R060 |
| 3/8      | 1     | 3   | R.090  | OP25-2416R090 |
| 3/8      | 1     | 3   | R.125  | OP25-2416R125 |
| 7/16     | 1     | 3   | Square | OP25-2816R000 |
| 7/16     | 1     | 3   | R.015  | OP25-2816R015 |
| 7/16     | 1     | 3   | R.030  | OP25-2816R030 |
| 7/16     | 1     | 3   | R.060  | OP25-2816R060 |
| 7/16     | 1     | 3   | R.090  | OP25-2816R090 |
| 7/16     | 1     | 3   | R.125  | OP25-2816R125 |
| 7/16     | 1     | 3   | R.190  | OP25-2816R190 |
| 1/2      | 1 1/4 | 3   | Square | OP25-3220R000 |
| 1/2      | 1 1/4 | 3   | R.015  | OP25-3220R015 |

| DIAMETER | LOC   | OAL | RAD    | ITEM#         |
|----------|-------|-----|--------|---------------|
| 1/2      | 1 1/4 | 3   | R.030  | OP25-3220R030 |
| 1/2      | 1 1/4 | 3   | R.060  | OP25-3220R060 |
| 1/2      | 1 1/4 | 3   | R.090  | OP25-3220R090 |
| 1/2      | 1 1/4 | 3   | R.125  | OP25-3220R125 |
| 1/2      | 1 1/4 | 3   | R.190  | OP25-3220R190 |
| 5/8      | 1 5/8 | 4   | Square | OP25-4026R000 |
| 5/8      | 1 5/8 | 4   | R.015  | OP25-4026R015 |
| 5/8      | 1 5/8 | 4   | R.030  | OP25-4026R030 |
| 5/8      | 1 5/8 | 4   | R.060  | OP25-4026R060 |
| 5/8      | 1 5/8 | 4   | R.090  | OP25-4026R090 |
| 5/8      | 1 5/8 | 4   | R.125  | OP25-4026R125 |
| 5/8      | 1 5/8 | 4   | R.190  | OP25-4026R190 |
| 5/8      | 1 5/8 | 4   | R.250  | OP25-4026R250 |
| 3/4      | 1 5/8 | 4   | Square | OP25-4826R000 |
| 3/4      | 1 5/8 | 4   | R.015  | OP25-4826R015 |
| 3/4      | 1 5/8 | 4   | R.030  | OP25-4826R030 |
| 3/4      | 1 5/8 | 4   | R.060  | OP25-4826R060 |
| 3/4      | 1 5/8 | 4   | R.090  | OP25-4826R090 |
| 3/4      | 1 5/8 | 4   | R.125  | OP25-4826R125 |
| 3/4      | 1 5/8 | 4   | R.190  | OP25-4826R190 |
| 3/4      | 1 5/8 | 4   | R.250  | OP25-4826R250 |
| 1        | 1 3/4 | 5   | Square | OP25-6428R000 |
| 1        | 1 3/4 | 5   | R.015  | OP25-6428R015 |
| 1        | 1 3/4 | 5   | R.030  | OP25-6428R030 |
| 1        | 1 3/4 | 5   | R.060  | OP25-6428R060 |
| 1        | 1 3/4 | 5   | R.090  | OP25-6428R090 |
| 1        | 1 3/4 | 5   | R.125  | OP25-6428R125 |
| 1        | 1 3/4 | 5   | R.190  | OP25-6428R190 |
| 1        | 1 3/4 | 5   | R.250  | OP25-6428R250 |

## 2 FLUTE - REGULAR - DLC



OP25M

REGULAR METRIC DLC

| DIAMETER | LOC | OAL | RAD    | ITEM#           | DIAMETER | LOC | OAL | RAD    | ITEM#           |
|----------|-----|-----|--------|-----------------|----------|-----|-----|--------|-----------------|
| 5        | 14  | 75  | Square | OP25M-05014R0.0 | 12       | 32  | 75  | R1.0   | OP25M-12032R1.0 |
| 5        | 14  | 75  | R0.5   | OP25M-05014R0.5 | 12       | 32  | 75  | R1.5   | OP25M-12032R1.5 |
| 5        | 14  | 75  | R1.0   | OP25M-05014R1.0 | 12       | 32  | 75  | R2.0   | OP25M-12032R2.0 |
| 5        | 14  | 75  | R1.5   | OP25M-05014R1.5 | 12       | 32  | 75  | R3.0   | OP25M-12032R3.0 |
| 6        | 20  | 75  | Square | OP25M-06020R0.0 | 12       | 32  | 75  | R4.5   | OP25M-12032R4.5 |
| 6        | 20  | 75  | R0.5   | OP25M-06020R0.5 | 16       | 41  | 100 | Square | OP25M-16041R0.0 |
| 6        | 20  | 75  | R1.0   | OP25M-06020R1.0 | 16       | 41  | 100 | R0.5   | OP25M-16041R0.5 |
| 6        | 20  | 75  | R1.5   | OP25M-06020R1.5 | 16       | 41  | 100 | R1.0   | OP25M-16041R1.0 |
| 6        | 20  | 75  | R2.0   | OP25M-06020R2.0 | 16       | 41  | 100 | R1.5   | OP25M-16041R1.5 |
| 8        | 21  | 75  | Square | OP25M-08021R0.0 | 16       | 41  | 100 | R2.0   | OP25M-16041R2.0 |
| 8        | 21  | 75  | R0.5   | OP25M-08021R0.5 | 16       | 41  | 100 | R3.0   | OP25M-16041R3.0 |
| 8        | 21  | 75  | R1.0   | OP25M-08021R1.0 | 16       | 41  | 100 | R4.5   | OP25M-16041R4.5 |
| 8        | 21  | 75  | R1.5   | OP25M-08021R1.5 | 16       | 41  | 100 | R6.0   | OP25M-16041R6.0 |
| 8        | 21  | 75  | R2.0   | OP25M-08021R2.0 | 20       | 41  | 100 | Square | OP25M-20041R0.0 |
| 8        | 21  | 75  | R3.0   | OP25M-08021R3.0 | 20       | 41  | 100 | R0.5   | OP25M-20041R0.5 |
| 10       | 25  | 75  | Square | OP25M-10025R0.0 | 20       | 41  | 100 | R1.0   | OP25M-20041R1.0 |
| 10       | 25  | 75  | R0.5   | OP25M-10025R0.5 | 20       | 41  | 100 | R1.5   | OP25M-20041R1.5 |
| 10       | 25  | 75  | R1.0   | OP25M-10025R1.0 | 20       | 41  | 100 | R2.0   | OP25M-20041R2.0 |
| 10       | 25  | 75  | R1.5   | OP25M-10025R1.5 | 20       | 41  | 100 | R3.0   | OP25M-20041R3.0 |
| 10       | 25  | 75  | R2.0   | OP25M-10025R2.0 | 20       | 41  | 100 | R4.5   | OP25M-20041R4.5 |
| 10       | 25  | 75  | R3.0   | OP25M-10025R3.0 | 20       | 41  | 100 | R6.0   | OP25M-20041R6.0 |
| 11       | 25  | 75  | Square | OP25M-11025R0.0 | 25       | 45  | 125 | Square | OP25M-25045R0.0 |
| 11       | 25  | 75  | R0.5   | OP25M-11025R0.5 | 25       | 45  | 125 | R0.5   | OP25M-25045R0.5 |
| 11       | 25  | 75  | R1.0   | OP25M-11025R1.0 | 25       | 45  | 125 | R1.0   | OP25M-25045R1.0 |
| 11       | 25  | 75  | R1.5   | OP25M-11025R1.5 | 25       | 45  | 125 | R1.5   | OP25M-25045R1.5 |
| 11       | 25  | 75  | R2.0   | OP25M-11025R2.0 | 25       | 45  | 125 | R2.0   | OP25M-25045R2.0 |
| 11       | 25  | 75  | R3.0   | OP25M-11025R3.0 | 25       | 45  | 125 | R3.0   | OP25M-25045R3.0 |
| 11       | 25  | 75  | R4.5   | OP25M-11025R4.5 | 25       | 45  | 125 | R4.5   | OP25M-25045R4.5 |
| 12       | 32  | 75  | Square | OP25M-12032R0.0 | 25       | 45  | 125 | R6.0   | OP25M-25045R6.0 |
| 12       | 32  | 75  | R0.5   | OP25M-12032R0.5 |          |     |     |        |                 |

## 2 FLUTE - REGULAR - BALL NOSE - DLC



OP25B  
REGULAR BALL INCH

| DIAMETER | LOC   | OAL | ITEM#          |
|----------|-------|-----|----------------|
| 3/16     | 9/16  | 3   | OP25-1209R090B |
| 1/4      | 3/4   | 3   | OP25-1612R125B |
| 5/16     | 13/16 | 3   | OP25-2013R155B |
| 3/8      | 1     | 3   | OP25-2416R190B |
| 7/16     | 1     | 3   | OP25-2816R220B |
| 1/2      | 1 1/4 | 3   | OP25-3220R250B |
| 5/8      | 1 5/8 | 4   | OP25-4026R310B |
| 3/4      | 1 5/8 | 4   | OP25-4826R375B |
| 1        | 1 3/4 | 5   | OP25-6428R500B |

OP25MB  
REGULAR BALL METRIC

| DIAMETER | LOC | OAL | ITEM#             |
|----------|-----|-----|-------------------|
| 5        | 14  | 75  | OP25M-05014R2.5B  |
| 6        | 20  | 75  | OP25M-06020R3.0B  |
| 8        | 21  | 75  | OP25M-08021R4.0B  |
| 10       | 25  | 75  | OP25M-10025R5.0B  |
| 11       | 25  | 75  | OP25M-11025R5.5B  |
| 12       | 32  | 75  | OP25M-12032R6.0B  |
| 16       | 41  | 100 | OP25M-16041R8.0B  |
| 20       | 41  | 100 | OP25M-20041R10.0B |
| 25       | 45  | 125 | OP25M-25045R12.5B |



## 2 FLUTE - REGULAR - CHIP BREAKER - DLC



OP25C  
CHIP BREAKER INCH

| DIAMETER | LOC   | OAL | RAD    | ITEM#          |
|----------|-------|-----|--------|----------------|
| 3/16     | 9/16  | 3   | Square | OP25-1209R000C |
| 3/16     | 9/16  | 3   | R.015  | OP25-1209R015C |
| 3/16     | 9/16  | 3   | R.030  | OP25-1209R030C |
| 3/16     | 9/16  | 3   | R.060  | OP25-1209R060C |
| 1/4      | 3/4   | 3   | Square | OP25-1612R000C |
| 1/4      | 3/4   | 3   | R.015  | OP25-1612R015C |
| 1/4      | 3/4   | 3   | R.030  | OP25-1612R030C |
| 1/4      | 3/4   | 3   | R.060  | OP25-1612R060C |
| 1/4      | 3/4   | 3   | R.090  | OP25-1612R090C |
| 5/16     | 13/16 | 3   | Square | OP25-2013R000C |
| 5/16     | 13/16 | 3   | R.015  | OP25-2013R015C |
| 5/16     | 13/16 | 3   | R.030  | OP25-2013R030C |
| 5/16     | 13/16 | 3   | R.060  | OP25-2013R060C |
| 5/16     | 13/16 | 3   | R.090  | OP25-2013R090C |
| 5/16     | 13/16 | 3   | R.125  | OP25-2013R125C |
| 3/8      | 1     | 3   | Square | OP25-2416R000C |
| 3/8      | 1     | 3   | R.015  | OP25-2416R015C |
| 3/8      | 1     | 3   | R.030  | OP25-2416R030C |
| 3/8      | 1     | 3   | R.060  | OP25-2416R060C |
| 3/8      | 1     | 3   | R.090  | OP25-2416R090C |
| 3/8      | 1     | 3   | R.125  | OP25-2416R125C |
| 7/16     | 1     | 3   | Square | OP25-2816R000C |
| 7/16     | 1     | 3   | R.015  | OP25-2816R015C |
| 7/16     | 1     | 3   | R.030  | OP25-2816R030C |
| 7/16     | 1     | 3   | R.060  | OP25-2816R060C |
| 7/16     | 1     | 3   | R.090  | OP25-2816R090C |
| 7/16     | 1     | 3   | R.125  | OP25-2816R125C |
| 7/16     | 1     | 3   | R.190  | OP25-2816R190C |
| 1/2      | 1 1/4 | 3   | Square | OP25-3220R000C |
| 1/2      | 1 1/4 | 3   | R.015  | OP25-3220R015C |

| DIAMETER | LOC   | OAL | RAD    | ITEM#          |
|----------|-------|-----|--------|----------------|
| 1/2      | 1 1/4 | 3   | R.030  | OP25-3220R030C |
| 1/2      | 1 1/4 | 3   | R.060  | OP25-3220R060C |
| 1/2      | 1 1/4 | 3   | R.090  | OP25-3220R090C |
| 1/2      | 1 1/4 | 3   | R.125  | OP25-3220R125C |
| 1/2      | 1 1/4 | 3   | R.190  | OP25-3220R190C |
| 5/8      | 1 5/8 | 4   | Square | OP25-4026R000C |
| 5/8      | 1 5/8 | 4   | R.015  | OP25-4026R015C |
| 5/8      | 1 5/8 | 4   | R.030  | OP25-4026R030C |
| 5/8      | 1 5/8 | 4   | R.060  | OP25-4026R060C |
| 5/8      | 1 5/8 | 4   | R.090  | OP25-4026R090C |
| 5/8      | 1 5/8 | 4   | R.125  | OP25-4026R125C |
| 5/8      | 1 5/8 | 4   | R.190  | OP25-4026R190C |
| 5/8      | 1 5/8 | 4   | R.250  | OP25-4026R250C |
| 3/4      | 1 5/8 | 4   | Square | OP25-4826R000C |
| 3/4      | 1 5/8 | 4   | R.015  | OP25-4826R015C |
| 3/4      | 1 5/8 | 4   | R.030  | OP25-4826R030C |
| 3/4      | 1 5/8 | 4   | R.060  | OP25-4826R060C |
| 3/4      | 1 5/8 | 4   | R.090  | OP25-4826R090C |
| 3/4      | 1 5/8 | 4   | R.125  | OP25-4826R125C |
| 3/4      | 1 5/8 | 4   | R.190  | OP25-4826R190C |
| 3/4      | 1 5/8 | 4   | R.250  | OP25-4826R250C |
| 1        | 1 3/4 | 5   | Square | OP25-6428R000C |
| 1        | 1 3/4 | 5   | R.015  | OP25-6428R015C |
| 1        | 1 3/4 | 5   | R.030  | OP25-6428R030C |
| 1        | 1 3/4 | 5   | R.060  | OP25-6428R060C |
| 1        | 1 3/4 | 5   | R.090  | OP25-6428R090C |
| 1        | 1 3/4 | 5   | R.125  | OP25-6428R125C |
| 1        | 1 3/4 | 5   | R.190  | OP25-6428R190C |
| 1        | 1 3/4 | 5   | R.250  | OP25-6428R250C |

## 2 FLUTE - REGULAR - CHIP BREAKER - DLC



OP25MC

CHIP BREAKER METRIC

| DIAMETER | LOC | OAL | RAD    | ITEM#            |
|----------|-----|-----|--------|------------------|
| 5        | 14  | 75  | Square | OP25M-05014R0.0C |
| 5        | 14  | 75  | R0.5   | OP25M-05014R0.5C |
| 5        | 14  | 75  | R1.0   | OP25M-05014R1.0C |
| 5        | 14  | 75  | R1.5   | OP25M-05014R1.5C |
| 6        | 20  | 75  | Square | OP25M-06020R0.0C |
| 6        | 20  | 75  | R0.5   | OP25M-06020R0.5C |
| 6        | 20  | 75  | R1.0   | OP25M-06020R1.0C |
| 6        | 20  | 75  | R1.5   | OP25M-06020R1.5C |
| 6        | 20  | 75  | R2.0   | OP25M-06020R2.0C |
| 8        | 21  | 75  | Square | OP25M-08021R0.0C |
| 8        | 21  | 75  | R0.5   | OP25M-08021R0.5C |
| 8        | 21  | 75  | R1.0   | OP25M-08021R1.0C |
| 8        | 21  | 75  | R1.5   | OP25M-08021R1.5C |
| 8        | 21  | 75  | R2.0   | OP25M-08021R2.0C |
| 8        | 21  | 75  | R3.0   | OP25M-08021R3.0C |
| 10       | 25  | 75  | Square | OP25M-10025R0.0C |
| 10       | 25  | 75  | R0.5   | OP25M-10025R0.5C |
| 10       | 25  | 75  | R1.0   | OP25M-10025R1.0C |
| 10       | 25  | 75  | R1.5   | OP25M-10025R1.5C |
| 10       | 25  | 75  | R2.0   | OP25M-10025R2.0C |
| 10       | 25  | 75  | R3.0   | OP25M-10025R3.0C |
| 11       | 25  | 75  | Square | OP25M-11025R0.0C |
| 11       | 25  | 75  | R0.5   | OP25M-11025R0.5C |
| 11       | 25  | 75  | R1.0   | OP25M-11025R1.0C |
| 11       | 25  | 75  | R1.5   | OP25M-11025R1.5C |
| 11       | 25  | 75  | R2.0   | OP25M-11025R2.0C |
| 11       | 25  | 75  | R3.0   | OP25M-11025R3.0C |
| 11       | 25  | 75  | R4.5   | OP25M-11025R4.5C |
| 12       | 32  | 75  | Square | OP25M-12032R0.0C |
| 12       | 32  | 75  | R0.5   | OP25M-12032R0.5C |

| DIAMETER | LOC | OAL | RAD    | ITEM#            |
|----------|-----|-----|--------|------------------|
| 12       | 32  | 75  | R1.0   | OP25M-12032R1.0C |
| 12       | 32  | 75  | R1.5   | OP25M-12032R1.5C |
| 12       | 32  | 75  | R2.0   | OP25M-12032R2.0C |
| 12       | 32  | 75  | R3.0   | OP25M-12032R3.0C |
| 12       | 32  | 75  | R4.5   | OP25M-12032R4.5C |
| 16       | 41  | 100 | Square | OP25M-16041R0.0C |
| 16       | 41  | 100 | R0.5   | OP25M-16041R0.5C |
| 16       | 41  | 100 | R1.0   | OP25M-16041R1.0C |
| 16       | 41  | 100 | R1.5   | OP25M-16041R1.5C |
| 16       | 41  | 100 | R2.0   | OP25M-16041R2.0C |
| 16       | 41  | 100 | R3.0   | OP25M-16041R3.0C |
| 16       | 41  | 100 | R4.5   | OP25M-16041R4.5C |
| 16       | 41  | 100 | R6.0   | OP25M-16041R6.0C |
| 20       | 41  | 100 | Square | OP25M-20041R0.0C |
| 20       | 41  | 100 | R0.5   | OP25M-20041R0.5C |
| 20       | 41  | 100 | R1.0   | OP25M-20041R1.0C |
| 20       | 41  | 100 | R1.5   | OP25M-20041R1.5C |
| 20       | 41  | 100 | R2.0   | OP25M-20041R2.0C |
| 20       | 41  | 100 | R3.0   | OP25M-20041R3.0C |
| 20       | 41  | 100 | R4.5   | OP25M-20041R4.5C |
| 20       | 41  | 100 | R6.0   | OP25M-20041R6.0C |
| 25       | 45  | 125 | Square | OP25M-25045R0.0C |
| 25       | 45  | 125 | R0.5   | OP25M-25045R0.5C |
| 25       | 45  | 125 | R1.0   | OP25M-25045R1.0C |
| 25       | 45  | 125 | R1.5   | OP25M-25045R1.5C |
| 25       | 45  | 125 | R2.0   | OP25M-25045R2.0C |
| 25       | 45  | 125 | R3.0   | OP25M-25045R3.0C |
| 25       | 45  | 125 | R4.5   | OP25M-25045R4.5C |
| 25       | 45  | 125 | R6.0   | OP25M-25045R6.0C |

## 2 FLUTE - LONG - DLC



OP26  
LONG INCH

| DIAMETER | LOC   | OAL | RAD    | ITEM#         |
|----------|-------|-----|--------|---------------|
| 1/4      | 1 1/8 | 3   | Square | OP26-1618R000 |
| 1/4      | 1 1/8 | 3   | R.015  | OP26-1618R015 |
| 1/4      | 1 1/8 | 3   | R.030  | OP26-1618R030 |
| 1/4      | 1 1/8 | 3   | R.060  | OP26-1618R060 |
| 1/4      | 1 1/8 | 3   | R.090  | OP26-1618R090 |
| 5/16     | 1 1/8 | 3   | Square | OP26-2018R000 |
| 5/16     | 1 1/8 | 3   | R.015  | OP26-2018R015 |
| 5/16     | 1 1/8 | 3   | R.030  | OP26-2018R030 |
| 5/16     | 1 1/8 | 3   | R.060  | OP26-2018R060 |
| 5/16     | 1 1/8 | 3   | R.090  | OP26-2018R090 |
| 5/16     | 1 1/8 | 3   | R.125  | OP26-2018R125 |
| 3/8      | 1 1/4 | 3   | Square | OP26-2420R000 |
| 3/8      | 1 1/4 | 3   | R.015  | OP26-2420R015 |
| 3/8      | 1 1/4 | 3   | R.030  | OP26-2420R030 |
| 3/8      | 1 1/4 | 3   | R.060  | OP26-2420R060 |
| 3/8      | 1 1/4 | 3   | R.090  | OP26-2420R090 |
| 3/8      | 1 1/4 | 3   | R.125  | OP26-2420R125 |
| 7/16     | 2     | 4   | Square | OP26-2832R000 |
| 7/16     | 2     | 4   | R.015  | OP26-2832R015 |
| 7/16     | 2     | 4   | R.030  | OP26-2832R030 |
| 7/16     | 2     | 4   | R.060  | OP26-2832R060 |
| 7/16     | 2     | 4   | R.090  | OP26-2832R090 |
| 7/16     | 2     | 4   | R.125  | OP26-2832R125 |
| 7/16     | 2     | 4   | R.190  | OP26-2832R190 |
| 1/2      | 2     | 4   | Square | OP26-3232R000 |
| 1/2      | 2     | 4   | R.015  | OP26-3232R015 |
| 1/2      | 2     | 4   | R.030  | OP26-3232R030 |
| 1/2      | 2     | 4   | R.060  | OP26-3232R060 |
| 1/2      | 2     | 4   | R.090  | OP26-3232R090 |
| 1/2      | 2     | 4   | R.125  | OP26-3232R125 |

| DIAMETER | LOC   | OAL | RAD    | ITEM#         |
|----------|-------|-----|--------|---------------|
| 1/2      | 2     | 4   | R.190  | OP26-3232R190 |
| 5/8      | 2 1/4 | 5   | Square | OP26-4036R000 |
| 5/8      | 2 1/4 | 5   | R.015  | OP26-4036R015 |
| 5/8      | 2 1/4 | 5   | R.030  | OP26-4036R030 |
| 5/8      | 2 1/4 | 5   | R.060  | OP26-4036R060 |
| 5/8      | 2 1/4 | 5   | R.090  | OP26-4036R090 |
| 5/8      | 2 1/4 | 5   | R.125  | OP26-4036R125 |
| 5/8      | 2 1/4 | 5   | R.190  | OP26-4036R190 |
| 5/8      | 2 1/4 | 5   | R.250  | OP26-4036R250 |
| 3/4      | 2 5/8 | 5   | Square | OP26-4842R000 |
| 3/4      | 2 5/8 | 5   | R.015  | OP26-4842R015 |
| 3/4      | 2 5/8 | 5   | R.030  | OP26-4842R030 |
| 3/4      | 2 5/8 | 5   | R.060  | OP26-4842R060 |
| 3/4      | 2 5/8 | 5   | R.090  | OP26-4842R090 |
| 3/4      | 2 5/8 | 5   | R.125  | OP26-4842R125 |
| 3/4      | 2 5/8 | 5   | R.190  | OP26-4842R190 |
| 3/4      | 2 5/8 | 5   | R.250  | OP26-4842R250 |
| 1        | 3     | 6   | Square | OP26-6448R000 |
| 1        | 3     | 6   | R.015  | OP26-6448R015 |
| 1        | 3     | 6   | R.030  | OP26-6448R030 |
| 1        | 3     | 6   | R.060  | OP26-6448R060 |
| 1        | 3     | 6   | R.090  | OP26-6448R090 |
| 1        | 3     | 6   | R.125  | OP26-6448R125 |
| 1        | 3     | 6   | R.190  | OP26-6448R190 |
| 1        | 3     | 6   | R.250  | OP26-6448R250 |



## 2 FLUTE - LONG - DLC



OP26M

LONG METRIC

| DIAMETER | LOC | OAL | RAD    | ITEM#           |
|----------|-----|-----|--------|-----------------|
| 6        | 29  | 75  | Square | OP26M-06029R0.0 |
| 6        | 29  | 75  | R0.5   | OP26M-06029R0.5 |
| 6        | 29  | 75  | R1.0   | OP26M-06029R1.0 |
| 6        | 29  | 75  | R1.5   | OP26M-06029R1.5 |
| 6        | 29  | 75  | R2.0   | OP26M-06029R2.0 |
| 8        | 29  | 75  | Square | OP26M-08029R0.0 |
| 8        | 29  | 75  | R0.5   | OP26M-08029R0.5 |
| 8        | 29  | 75  | R1.0   | OP26M-08029R1.0 |
| 8        | 29  | 75  | R1.5   | OP26M-08029R1.5 |
| 8        | 29  | 75  | R2.0   | OP26M-08029R2.0 |
| 8        | 29  | 75  | R3.0   | OP26M-08029R3.0 |
| 10       | 32  | 75  | Square | OP26M-10032R0.0 |
| 10       | 32  | 75  | R0.5   | OP26M-10032R0.5 |
| 10       | 32  | 75  | R1.0   | OP26M-10032R1.0 |
| 10       | 32  | 75  | R1.5   | OP26M-10032R1.5 |
| 10       | 32  | 75  | R2.0   | OP26M-10032R2.0 |
| 10       | 32  | 75  | R3.0   | OP26M-10032R3.0 |
| 11       | 50  | 100 | Square | OP26M-11050R0.0 |
| 11       | 50  | 100 | R0.5   | OP26M-11050R0.5 |
| 11       | 50  | 100 | R1.0   | OP26M-11050R1.0 |
| 11       | 50  | 100 | R1.5   | OP26M-11050R1.5 |
| 11       | 50  | 100 | R2.0   | OP26M-11050R2.0 |
| 11       | 50  | 100 | R3.0   | OP26M-11050R3.0 |
| 11       | 50  | 100 | R4.5   | OP26M-11050R4.5 |
| 12       | 50  | 100 | Square | OP26M-12050R0.0 |
| 12       | 50  | 100 | R0.5   | OP26M-12050R0.5 |
| 12       | 50  | 100 | R1.0   | OP26M-12050R1.0 |
| 12       | 50  | 100 | R1.5   | OP26M-12050R1.5 |
| 12       | 50  | 100 | R2.0   | OP26M-12050R2.0 |
| 12       | 50  | 100 | R3.0   | OP26M-12050R3.0 |

| DIAMETER | LOC | OAL | RAD    | ITEM#           |
|----------|-----|-----|--------|-----------------|
| 12       | 50  | 100 | R4.5   | OP26M-12050R4.5 |
| 16       | 57  | 125 | Square | OP26M-16057R0.0 |
| 16       | 57  | 125 | R0.5   | OP26M-16057R0.5 |
| 16       | 57  | 125 | R1.0   | OP26M-16057R1.0 |
| 16       | 57  | 125 | R1.5   | OP26M-16057R1.5 |
| 16       | 57  | 125 | R2.0   | OP26M-16057R2.0 |
| 16       | 57  | 125 | R3.0   | OP26M-16057R3.0 |
| 16       | 57  | 125 | R4.5   | OP26M-16057R4.5 |
| 16       | 57  | 125 | R6.0   | OP26M-16057R6.0 |
| 20       | 67  | 125 | Square | OP26M-20067R0.0 |
| 20       | 67  | 125 | R0.5   | OP26M-20067R0.5 |
| 20       | 67  | 125 | R1.0   | OP26M-20067R1.0 |
| 20       | 67  | 125 | R1.5   | OP26M-20067R1.5 |
| 20       | 67  | 125 | R2.0   | OP26M-20067R2.0 |
| 20       | 67  | 125 | R3.0   | OP26M-20067R3.0 |
| 20       | 67  | 125 | R4.5   | OP26M-20067R4.5 |
| 20       | 67  | 125 | R6.0   | OP26M-20067R6.0 |
| 25       | 76  | 150 | Square | OP26M-25076R0.0 |
| 25       | 76  | 150 | R0.5   | OP26M-25076R0.5 |
| 25       | 76  | 150 | R1.0   | OP26M-25076R1.0 |
| 25       | 76  | 150 | R1.5   | OP26M-25076R1.5 |
| 25       | 76  | 150 | R2.0   | OP26M-25076R2.0 |
| 25       | 76  | 150 | R3.0   | OP26M-25076R3.0 |
| 25       | 76  | 150 | R4.5   | OP26M-25076R4.5 |
| 25       | 76  | 150 | R6.0   | OP26M-25076R6.0 |



## 2 FLUTE - LONG - BALL NOSE - DLC



OP26B  
LONG BALL INCH

| DIAMETER | LOC   | OAL | ITEM#          |
|----------|-------|-----|----------------|
| 1/4      | 1 1/8 | 3   | OP26-1618R125B |
| 5/16     | 1 1/8 | 3   | OP26-2018R155B |
| 3/8      | 1 1/4 | 3   | OP26-2420R190B |
| 7/16     | 2     | 4   | OP26-2832R220B |
| 1/2      | 2     | 4   | OP26-3232R250B |
| 5/8      | 2 1/4 | 5   | OP26-4036R310B |
| 3/4      | 2 5/8 | 5   | OP26-4842R375B |
| 1        | 3     | 6   | OP26-6448R500B |

OP26MB  
LONG BALL METRIC

| DIAMETER | LOC | OAL | ITEM#             |
|----------|-----|-----|-------------------|
| 6        | 29  | 75  | OP26M-06029R3.0B  |
| 8        | 29  | 75  | OP26M-08029R4.0B  |
| 10       | 32  | 75  | OP26M-10032R5.0B  |
| 11       | 50  | 100 | OP26M-11050R5.5B  |
| 12       | 50  | 100 | OP26M-12050R6.0B  |
| 16       | 57  | 125 | OP26M-16057R8.0B  |
| 20       | 67  | 125 | OP26M-20067R10.0B |
| 25       | 76  | 150 | OP26M-25076R12.5B |

## 2 FLUTE - LONG - CHIP BREAKER- DLC



OP26C  
CHIP BREAKER INCH

| DIAMETER | LOC   | OAL | RAD    | ITEM#          |
|----------|-------|-----|--------|----------------|
| 1/4      | 1 1/8 | 3   | Square | OP26-1618R000C |
| 1/4      | 1 1/8 | 3   | R.015  | OP26-1618R015C |
| 1/4      | 1 1/8 | 3   | R.030  | OP26-1618R030C |
| 1/4      | 1 1/8 | 3   | R.060  | OP26-1618R060C |
| 1/4      | 1 1/8 | 3   | R.090  | OP26-1618R090C |
| 5/16     | 1 1/8 | 3   | Square | OP26-2018R000C |
| 5/16     | 1 1/8 | 3   | R.015  | OP26-2018R015C |
| 5/16     | 1 1/8 | 3   | R.030  | OP26-2018R030C |
| 5/16     | 1 1/8 | 3   | R.060  | OP26-2018R060C |
| 5/16     | 1 1/8 | 3   | R.090  | OP26-2018R090C |
| 5/16     | 1 1/8 | 3   | R.125  | OP26-2018R125C |
| 3/8      | 1 1/4 | 3   | Square | OP26-2420R000C |
| 3/8      | 1 1/4 | 3   | R.015  | OP26-2420R015C |
| 3/8      | 1 1/4 | 3   | R.030  | OP26-2420R030C |
| 3/8      | 1 1/4 | 3   | R.060  | OP26-2420R060C |
| 3/8      | 1 1/4 | 3   | R.090  | OP26-2420R090C |
| 3/8      | 1 1/4 | 3   | R.125  | OP26-2420R125C |
| 7/16     | 2     | 4   | Square | OP26-2832R000C |
| 7/16     | 2     | 4   | R.015  | OP26-2832R015C |
| 7/16     | 2     | 4   | R.030  | OP26-2832R030C |
| 7/16     | 2     | 4   | R.060  | OP26-2832R060C |
| 7/16     | 2     | 4   | R.090  | OP26-2832R090C |
| 7/16     | 2     | 4   | R.125  | OP26-2832R125C |
| 7/16     | 2     | 4   | R.190  | OP26-2832R190C |
| 1/2      | 2     | 4   | Square | OP26-3232R000C |
| 1/2      | 2     | 4   | R.015  | OP26-3232R015C |
| 1/2      | 2     | 4   | R.030  | OP26-3232R030C |
| 1/2      | 2     | 4   | R.060  | OP26-3232R060C |
| 1/2      | 2     | 4   | R.090  | OP26-3232R090C |
| 1/2      | 2     | 4   | R.125  | OP26-3232R125C |

| DIAMETER | LOC   | OAL | RAD    | ITEM#          |
|----------|-------|-----|--------|----------------|
| 1/2      | 2     | 4   | R.190  | OP26-3232R190C |
| 5/8      | 2 1/4 | 5   | Square | OP26-4036R000C |
| 5/8      | 2 1/4 | 5   | R.015  | OP26-4036R015C |
| 5/8      | 2 1/4 | 5   | R.030  | OP26-4036R030C |
| 5/8      | 2 1/4 | 5   | R.060  | OP26-4036R060C |
| 5/8      | 2 1/4 | 5   | R.090  | OP26-4036R090C |
| 5/8      | 2 1/4 | 5   | R.125  | OP26-4036R125C |
| 5/8      | 2 1/4 | 5   | R.190  | OP26-4036R190C |
| 5/8      | 2 1/4 | 5   | R.250  | OP26-4036R250C |
| 3/4      | 2 5/8 | 5   | Square | OP26-4842R000C |
| 3/4      | 2 5/8 | 5   | R.015  | OP26-4842R015C |
| 3/4      | 2 5/8 | 5   | R.030  | OP26-4842R030C |
| 3/4      | 2 5/8 | 5   | R.060  | OP26-4842R060C |
| 3/4      | 2 5/8 | 5   | R.090  | OP26-4842R090C |
| 3/4      | 2 5/8 | 5   | R.125  | OP26-4842R125C |
| 3/4      | 2 5/8 | 5   | R.190  | OP26-4842R190C |
| 3/4      | 2 5/8 | 5   | R.250  | OP26-4842R250C |
| 1        | 3     | 6   | Square | OP26-6448R000C |
| 1        | 3     | 6   | R.015  | OP26-6448R015C |
| 1        | 3     | 6   | R.030  | OP26-6448R030C |
| 1        | 3     | 6   | R.060  | OP26-6448R060C |
| 1        | 3     | 6   | R.090  | OP26-6448R090C |
| 1        | 3     | 6   | R.125  | OP26-6448R125C |
| 1        | 3     | 6   | R.190  | OP26-6448R190C |
| 1        | 3     | 6   | R.250  | OP26-6448R250C |

## 2 FLUTE - LONG - CHIP BREAKER- DLC



OP26MC

CHIP BREAKER METRIC

| DIAMETER | LOC | OAL | RAD    | ITEM#            |
|----------|-----|-----|--------|------------------|
| 6        | 29  | 75  | Square | OP26M-06029R0.0C |
| 6        | 29  | 75  | R0.5   | OP26M-06029R0.5C |
| 6        | 29  | 75  | R1.0   | OP26M-06029R1.0C |
| 6        | 29  | 75  | R1.5   | OP26M-06029R1.5C |
| 6        | 29  | 75  | R2.0   | OP26M-06029R2.0C |
| 8        | 29  | 75  | Square | OP26M-08029R0.0C |
| 8        | 29  | 75  | R0.5   | OP26M-08029R0.5C |
| 8        | 29  | 75  | R1.0   | OP26M-08029R1.0C |
| 8        | 29  | 75  | R1.5   | OP26M-08029R1.5C |
| 8        | 29  | 75  | R2.0   | OP26M-08029R2.0C |
| 8        | 29  | 75  | R3.0   | OP26M-08029R3.0C |
| 10       | 32  | 75  | Square | OP26M-10032R0.0C |
| 10       | 32  | 75  | R0.5   | OP26M-10032R0.5C |
| 10       | 32  | 75  | R1.0   | OP26M-10032R1.0C |
| 10       | 32  | 75  | R1.5   | OP26M-10032R1.5C |
| 10       | 32  | 75  | R2.0   | OP26M-10032R2.0C |
| 10       | 32  | 75  | R3.0   | OP26M-10032R3.0C |
| 11       | 50  | 100 | Square | OP26M-11050R0.0C |
| 11       | 50  | 100 | R0.5   | OP26M-11050R0.5C |
| 11       | 50  | 100 | R1.0   | OP26M-11050R1.0C |
| 11       | 50  | 100 | R1.5   | OP26M-11050R1.5C |
| 11       | 50  | 100 | R2.0   | OP26M-11050R2.0C |
| 11       | 50  | 100 | R3.0   | OP26M-11050R3.0C |
| 11       | 50  | 100 | R4.5   | OP26M-11050R4.5C |
| 12       | 50  | 100 | Square | OP26M-12050R0.0C |
| 12       | 50  | 100 | R0.5   | OP26M-12050R0.5C |
| 12       | 50  | 100 | R1.0   | OP26M-12050R1.0C |
| 12       | 50  | 100 | R1.5   | OP26M-12050R1.5C |
| 12       | 50  | 100 | R2.0   | OP26M-12050R2.0C |
| 12       | 50  | 100 | R3.0   | OP26M-12050R3.0C |

| DIAMETER | LOC | OAL | RAD    | ITEM#            |
|----------|-----|-----|--------|------------------|
| 12       | 50  | 100 | R4.5   | OP26M-12050R4.5C |
| 16       | 57  | 125 | Square | OP26M-16057R0.0C |
| 16       | 57  | 125 | R0.5   | OP26M-16057R0.5C |
| 16       | 57  | 125 | R1.0   | OP26M-16057R1.0C |
| 16       | 57  | 125 | R1.5   | OP26M-16057R1.5C |
| 16       | 57  | 125 | R2.0   | OP26M-16057R2.0C |
| 16       | 57  | 125 | R3.0   | OP26M-16057R3.0C |
| 16       | 57  | 125 | R4.5   | OP26M-16057R4.5C |
| 16       | 57  | 125 | R6.0   | OP26M-16057R6.0C |
| 20       | 67  | 125 | Square | OP26M-20067R0.0C |
| 20       | 67  | 125 | R0.5   | OP26M-20067R0.5C |
| 20       | 67  | 125 | R1.0   | OP26M-20067R1.0C |
| 20       | 67  | 125 | R1.5   | OP26M-20067R1.5C |
| 20       | 67  | 125 | R2.0   | OP26M-20067R2.0C |
| 20       | 67  | 125 | R3.0   | OP26M-20067R3.0C |
| 20       | 67  | 125 | R4.5   | OP26M-20067R4.5C |
| 20       | 67  | 125 | R6.0   | OP26M-20067R6.0C |
| 25       | 76  | 150 | Square | OP26M-25076R0.0C |
| 25       | 76  | 150 | R0.5   | OP26M-25076R0.5C |
| 25       | 76  | 150 | R1.0   | OP26M-25076R1.0C |
| 25       | 76  | 150 | R1.5   | OP26M-25076R1.5C |
| 25       | 76  | 150 | R2.0   | OP26M-25076R2.0C |
| 25       | 76  | 150 | R3.0   | OP26M-25076R3.0C |
| 25       | 76  | 150 | R4.5   | OP26M-25076R4.5C |
| 25       | 76  | 150 | R6.0   | OP26M-25076R6.0C |

# OP3 ENDMILLS

Best used for Aluminum and soft alloys like brass and copper.

## SPECIAL FEATURES

### WAVED FLUTE

Reduce harmonics and cutting friction. The slower helix at the end of the tool helps to stabilize it when it starts to cut. When the tool is completely engaged, the waved helix design helps with the chip evacuation helping with the best reduction.

### POLISHED

Prevent chips from sticking inside the tool, enhancing material removal rate and machining speeds.

### DLC COATING

Higher wear resistance when used in abrasive material such as silicon aluminium alloys.

### MARGIN

0.002" width to reduce vibration when machining walls and corners.

### WIPER FLAT

Small flat spot on top of tool to enhance surface finish of the machined part.

### CORE TAPER

Makes the tool more rigid, resisting higher shearing force when fully engaged in the material.

Available upon request

### ZRN COATING

Prevent edge build up on the endmill that is typical in soft and sticky materials.





## 3 FLUTE - REGULAR - POLISHED



OP31

REGULAR INCH

| DIAMETER | LOC   | OAL | RAD    | ITEM#         |
|----------|-------|-----|--------|---------------|
| 3/16     | 9/16  | 3   | Square | OP31-1209R000 |
| 3/16     | 9/16  | 3   | R.015  | OP31-1209R015 |
| 3/16     | 9/16  | 3   | R.030  | OP31-1209R030 |
| 3/16     | 9/16  | 3   | R.060  | OP31-1209R060 |
| 1/4      | 3/4   | 3   | Square | OP31-1612R000 |
| 1/4      | 3/4   | 3   | R.015  | OP31-1612R015 |
| 1/4      | 3/4   | 3   | R.030  | OP31-1612R030 |
| 1/4      | 3/4   | 3   | R.060  | OP31-1612R060 |
| 1/4      | 3/4   | 3   | R.090  | OP31-1612R090 |
| 5/16     | 13/16 | 3   | Square | OP31-2013R000 |
| 5/16     | 13/16 | 3   | R.015  | OP31-2013R015 |
| 5/16     | 13/16 | 3   | R.030  | OP31-2013R030 |
| 5/16     | 13/16 | 3   | R.060  | OP31-2013R060 |
| 5/16     | 13/16 | 3   | R.090  | OP31-2013R090 |
| 5/16     | 13/16 | 3   | R.125  | OP31-2013R125 |
| 3/8      | 1     | 3   | Square | OP31-2416R000 |
| 3/8      | 1     | 3   | R.015  | OP31-2416R015 |
| 3/8      | 1     | 3   | R.030  | OP31-2416R030 |
| 3/8      | 1     | 3   | R.060  | OP31-2416R060 |
| 3/8      | 1     | 3   | R.090  | OP31-2416R090 |
| 3/8      | 1     | 3   | R.125  | OP31-2416R125 |
| 7/16     | 1     | 3   | Square | OP31-2816R000 |
| 7/16     | 1     | 3   | R.015  | OP31-2816R015 |
| 7/16     | 1     | 3   | R.030  | OP31-2816R030 |
| 7/16     | 1     | 3   | R.060  | OP31-2816R060 |
| 7/16     | 1     | 3   | R.090  | OP31-2816R090 |
| 7/16     | 1     | 3   | R.125  | OP31-2816R125 |
| 7/16     | 1     | 3   | R.190  | OP31-2816R190 |
| 1/2      | 1 1/4 | 3   | Square | OP31-3220R000 |
| 1/2      | 1 1/4 | 3   | R.015  | OP31-3220R015 |

| DIAMETER | LOC   | OAL | RAD    | ITEM#         |
|----------|-------|-----|--------|---------------|
| 1/2      | 1 1/4 | 3   | R.030  | OP31-3220R030 |
| 1/2      | 1 1/4 | 3   | R.060  | OP31-3220R060 |
| 1/2      | 1 1/4 | 3   | R.090  | OP31-3220R090 |
| 1/2      | 1 1/4 | 3   | R.125  | OP31-3220R125 |
| 1/2      | 1 1/4 | 3   | R.190  | OP31-3220R190 |
| 5/8      | 1 5/8 | 4   | Square | OP31-4026R000 |
| 5/8      | 1 5/8 | 4   | R.015  | OP31-4026R015 |
| 5/8      | 1 5/8 | 4   | R.030  | OP31-4026R030 |
| 5/8      | 1 5/8 | 4   | R.060  | OP31-4026R060 |
| 5/8      | 1 5/8 | 4   | R.090  | OP31-4026R090 |
| 5/8      | 1 5/8 | 4   | R.125  | OP31-4026R125 |
| 5/8      | 1 5/8 | 4   | R.190  | OP31-4026R190 |
| 5/8      | 1 5/8 | 4   | R.250  | OP31-4026R250 |
| 3/4      | 1 5/8 | 4   | Square | OP31-4826R000 |
| 3/4      | 1 5/8 | 4   | R.015  | OP31-4826R015 |
| 3/4      | 1 5/8 | 4   | R.030  | OP31-4826R030 |
| 3/4      | 1 5/8 | 4   | R.060  | OP31-4826R060 |
| 3/4      | 1 5/8 | 4   | R.090  | OP31-4826R090 |
| 3/4      | 1 5/8 | 4   | R.125  | OP31-4826R125 |
| 3/4      | 1 5/8 | 4   | R.190  | OP31-4826R190 |
| 3/4      | 1 5/8 | 4   | R.250  | OP31-4826R250 |
| 1        | 1 3/4 | 5   | Square | OP31-6428R000 |
| 1        | 1 3/4 | 5   | R.015  | OP31-6428R015 |
| 1        | 1 3/4 | 5   | R.030  | OP31-6428R030 |
| 1        | 1 3/4 | 5   | R.060  | OP31-6428R060 |
| 1        | 1 3/4 | 5   | R.090  | OP31-6428R090 |
| 1        | 1 3/4 | 5   | R.125  | OP31-6428R125 |
| 1        | 1 3/4 | 5   | R.190  | OP31-6428R190 |
| 1        | 1 3/4 | 5   | R.250  | OP31-6428R250 |

## 3 FLUTE - REGULAR - POLISHED



OP31M

REGULAR METRIC

| DIAMETER | LOC | OAL | RAD    | ITEM#           | DIAMETER | LOC | OAL | RAD    | ITEM#           |
|----------|-----|-----|--------|-----------------|----------|-----|-----|--------|-----------------|
| 5        | 14  | 75  | Square | OP31M-05014R0.0 | 12       | 32  | 75  | R1.0   | OP31M-12032R1.0 |
| 5        | 14  | 75  | R0.5   | OP31M-05014R0.5 | 12       | 32  | 75  | R1.5   | OP31M-12032R1.5 |
| 5        | 14  | 75  | R1.0   | OP31M-05014R1.0 | 12       | 32  | 75  | R2.0   | OP31M-12032R2.0 |
| 5        | 14  | 75  | R1.5   | OP31M-05014R1.5 | 12       | 32  | 75  | R3.0   | OP31M-12032R3.0 |
| 6        | 20  | 75  | Square | OP31M-06020R0.0 | 12       | 32  | 75  | R4.5   | OP31M-12032R4.5 |
| 6        | 20  | 75  | R0.5   | OP31M-06020R0.5 | 16       | 41  | 100 | Square | OP31M-16041R0.0 |
| 6        | 20  | 75  | R1.0   | OP31M-06020R1.0 | 16       | 41  | 100 | R0.5   | OP31M-16041R0.5 |
| 6        | 20  | 75  | R1.5   | OP31M-06020R1.5 | 16       | 41  | 100 | R1.0   | OP31M-16041R1.0 |
| 6        | 20  | 75  | R2.0   | OP31M-06020R2.0 | 16       | 41  | 100 | R1.5   | OP31M-16041R1.5 |
| 8        | 21  | 75  | Square | OP31M-08021R0.0 | 16       | 41  | 100 | R2.0   | OP31M-16041R2.0 |
| 8        | 21  | 75  | R0.5   | OP31M-08021R0.5 | 16       | 41  | 100 | R3.0   | OP31M-16041R3.0 |
| 8        | 21  | 75  | R1.0   | OP31M-08021R1.0 | 16       | 41  | 100 | R4.5   | OP31M-16041R4.5 |
| 8        | 21  | 75  | R1.5   | OP31M-08021R1.5 | 16       | 41  | 100 | R6.0   | OP31M-16041R6.0 |
| 8        | 21  | 75  | R2.0   | OP31M-08021R2.0 | 20       | 41  | 100 | Square | OP31M-20041R0.0 |
| 8        | 21  | 75  | R3.0   | OP31M-08021R3.0 | 20       | 41  | 100 | R0.5   | OP31M-20041R0.5 |
| 10       | 25  | 75  | Square | OP31M-10025R0.0 | 20       | 41  | 100 | R1.0   | OP31M-20041R1.0 |
| 10       | 25  | 75  | R0.5   | OP31M-10025R0.5 | 20       | 41  | 100 | R1.5   | OP31M-20041R1.5 |
| 10       | 25  | 75  | R1.0   | OP31M-10025R1.0 | 20       | 41  | 100 | R2.0   | OP31M-20041R2.0 |
| 10       | 25  | 75  | R1.5   | OP31M-10025R1.5 | 20       | 41  | 100 | R3.0   | OP31M-20041R3.0 |
| 10       | 25  | 75  | R2.0   | OP31M-10025R2.0 | 20       | 41  | 100 | R4.5   | OP31M-20041R4.5 |
| 10       | 25  | 75  | R3.0   | OP31M-10025R3.0 | 20       | 41  | 100 | R6.0   | OP31M-20041R6.0 |
| 11       | 25  | 75  | Square | OP31M-11025R0.0 | 25       | 45  | 125 | Square | OP31M-25045R0.0 |
| 11       | 25  | 75  | R0.5   | OP31M-11025R0.5 | 25       | 45  | 125 | R0.5   | OP31M-25045R0.5 |
| 11       | 25  | 75  | R1.0   | OP31M-11025R1.0 | 25       | 45  | 125 | R1.0   | OP31M-25045R1.0 |
| 11       | 25  | 75  | R1.5   | OP31M-11025R1.5 | 25       | 45  | 125 | R1.5   | OP31M-25045R1.5 |
| 11       | 25  | 75  | R2.0   | OP31M-11025R2.0 | 25       | 45  | 125 | R2.0   | OP31M-25045R2.0 |
| 11       | 25  | 75  | R3.0   | OP31M-11025R3.0 | 25       | 45  | 125 | R3.0   | OP31M-25045R3.0 |
| 11       | 25  | 75  | R4.5   | OP31M-11025R4.5 | 25       | 45  | 125 | R4.5   | OP31M-25045R4.5 |
| 12       | 32  | 75  | Square | OP31M-12032R0.0 | 25       | 45  | 125 | R6.0   | OP31M-25045R6.0 |
| 12       | 32  | 75  | R0.5   | OP31M-12032R0.5 |          |     |     |        |                 |

## 3 FLUTE - REGULAR - BALL NOSE - POLISHED



OP31B

BALL INCH

| DIAMETER | LOC   | OAL | ITEM#          |
|----------|-------|-----|----------------|
| 3/16     | 9/16  | 3   | OP31-1209R090B |
| 1/4      | 3/4   | 3   | OP31-1612R125B |
| 5/16     | 13/16 | 3   | OP31-2013R155B |
| 3/8      | 1     | 3   | OP31-2416R190B |
| 7/16     | 1     | 3   | OP31-2816R220B |
| 1/2      | 1 1/4 | 3   | OP31-3220R250B |
| 5/8      | 1 5/8 | 4   | OP31-4026R310B |
| 3/4      | 1 5/8 | 4   | OP31-4826R375B |
| 1        | 1 3/4 | 5   | OP31-6428R500B |

OP31MB

BALL METRIC

| DIAMETER | LOC | OAL | ITEM#             |
|----------|-----|-----|-------------------|
| 5        | 14  | 75  | OP31M-05014R2.5B  |
| 6        | 20  | 75  | OP31M-06020R3.0B  |
| 8        | 21  | 75  | OP31M-08021R4.0B  |
| 10       | 25  | 75  | OP31M-10025R5.0B  |
| 11       | 25  | 75  | OP31M-11025R5.5B  |
| 12       | 32  | 75  | OP31M-12032R6.0B  |
| 16       | 41  | 100 | OP31M-16041R8.0B  |
| 20       | 41  | 100 | OP31M-20041R10.0B |
| 25       | 45  | 125 | OP31M-25045R12.5B |



## 3 FLUTE - REGULAR - CHIP BREAKER - POLISHED



OP31C

CHIP BREAKER INCH

| DIAMETER | LOC   | OAL | RAD    | ITEM#          |
|----------|-------|-----|--------|----------------|
| 3/16     | 9/16  | 3   | Square | OP31-1209R000C |
| 3/16     | 9/16  | 3   | R.015  | OP31-1209R015C |
| 3/16     | 9/16  | 3   | R.030  | OP31-1209R030C |
| 3/16     | 9/16  | 3   | R.060  | OP31-1209R060C |
| 1/4      | 3/4   | 3   | Square | OP31-1612R000C |
| 1/4      | 3/4   | 3   | R.015  | OP31-1612R015C |
| 1/4      | 3/4   | 3   | R.030  | OP31-1612R030C |
| 1/4      | 3/4   | 3   | R.060  | OP31-1612R060C |
| 1/4      | 3/4   | 3   | R.090  | OP31-1612R090C |
| 5/16     | 13/16 | 3   | Square | OP31-2013R000C |
| 5/16     | 13/16 | 3   | R.015  | OP31-2013R015C |
| 5/16     | 13/16 | 3   | R.030  | OP31-2013R030C |
| 5/16     | 13/16 | 3   | R.060  | OP31-2013R060C |
| 5/16     | 13/16 | 3   | R.090  | OP31-2013R090C |
| 5/16     | 13/16 | 3   | R.125  | OP31-2013R125C |
| 3/8      | 1     | 3   | Square | OP31-2416R000C |
| 3/8      | 1     | 3   | R.015  | OP31-2416R015C |
| 3/8      | 1     | 3   | R.030  | OP31-2416R030C |
| 3/8      | 1     | 3   | R.060  | OP31-2416R060C |
| 3/8      | 1     | 3   | R.090  | OP31-2416R090C |
| 3/8      | 1     | 3   | R.125  | OP31-2416R125C |
| 7/16     | 1     | 3   | Square | OP31-2816R000C |
| 7/16     | 1     | 3   | R.015  | OP31-2816R015C |
| 7/16     | 1     | 3   | R.030  | OP31-2816R030C |
| 7/16     | 1     | 3   | R.060  | OP31-2816R060C |
| 7/16     | 1     | 3   | R.090  | OP31-2816R090C |
| 7/16     | 1     | 3   | R.125  | OP31-2816R125C |
| 7/16     | 1     | 3   | R.190  | OP31-2816R190C |
| 1/2      | 1 1/4 | 3   | Square | OP31-3220R000C |
| 1/2      | 1 1/4 | 3   | R.015  | OP31-3220R015C |

| DIAMETER | LOC   | OAL | RAD    | ITEM#          |
|----------|-------|-----|--------|----------------|
| 1/2      | 1 1/4 | 3   | R.030  | OP31-3220R030C |
| 1/2      | 1 1/4 | 3   | R.060  | OP31-3220R060C |
| 1/2      | 1 1/4 | 3   | R.090  | OP31-3220R090C |
| 1/2      | 1 1/4 | 3   | R.125  | OP31-3220R125C |
| 1/2      | 1 1/4 | 3   | R.190  | OP31-3220R190C |
| 5/8      | 1 5/8 | 4   | Square | OP31-4026R000C |
| 5/8      | 1 5/8 | 4   | R.015  | OP31-4026R015C |
| 5/8      | 1 5/8 | 4   | R.030  | OP31-4026R030C |
| 5/8      | 1 5/8 | 4   | R.060  | OP31-4026R060C |
| 5/8      | 1 5/8 | 4   | R.090  | OP31-4026R090C |
| 5/8      | 1 5/8 | 4   | R.125  | OP31-4026R125C |
| 5/8      | 1 5/8 | 4   | R.190  | OP31-4026R190C |
| 5/8      | 1 5/8 | 4   | R.250  | OP31-4026R250C |
| 3/4      | 1 5/8 | 4   | Square | OP31-4826R000C |
| 3/4      | 1 5/8 | 4   | R.015  | OP31-4826R015C |
| 3/4      | 1 5/8 | 4   | R.030  | OP31-4826R030C |
| 3/4      | 1 5/8 | 4   | R.060  | OP31-4826R060C |
| 3/4      | 1 5/8 | 4   | R.090  | OP31-4826R090C |
| 3/4      | 1 5/8 | 4   | R.125  | OP31-4826R125C |
| 3/4      | 1 5/8 | 4   | R.190  | OP31-4826R190C |
| 3/4      | 1 5/8 | 4   | R.250  | OP31-4826R250C |
| 1        | 1 3/4 | 5   | Square | OP31-6428R000C |
| 1        | 1 3/4 | 5   | R.015  | OP31-6428R015C |
| 1        | 1 3/4 | 5   | R.030  | OP31-6428R030C |
| 1        | 1 3/4 | 5   | R.060  | OP31-6428R060C |
| 1        | 1 3/4 | 5   | R.090  | OP31-6428R090C |
| 1        | 1 3/4 | 5   | R.125  | OP31-6428R125C |
| 1        | 1 3/4 | 5   | R.190  | OP31-6428R190C |
| 1        | 1 3/4 | 5   | R.250  | OP31-6428R250C |



## 3 FLUTE - REGULAR - CHIP BREAKER - POLISHED



OP31MC

CHIP BREAKER METRIC

| DIAMETER | LOC | OAL | RAD    | ITEM#            |
|----------|-----|-----|--------|------------------|
| 5        | 14  | 75  | Square | OP31M-05014R0.0C |
| 5        | 14  | 75  | R0.5   | OP31M-05014R0.5C |
| 5        | 14  | 75  | R1.0   | OP31M-05014R1.0C |
| 5        | 14  | 75  | R1.5   | OP31M-05014R1.5C |
| 6        | 20  | 75  | Square | OP31M-06020R0.0C |
| 6        | 20  | 75  | R0.5   | OP31M-06020R0.5C |
| 6        | 20  | 75  | R1.0   | OP31M-06020R1.0C |
| 6        | 20  | 75  | R1.5   | OP31M-06020R1.5C |
| 6        | 20  | 75  | R2.0   | OP31M-06020R2.0C |
| 8        | 21  | 75  | Square | OP31M-08021R0.0C |
| 8        | 21  | 75  | R0.5   | OP31M-08021R0.5C |
| 8        | 21  | 75  | R1.0   | OP31M-08021R1.0C |
| 8        | 21  | 75  | R1.5   | OP31M-08021R1.5C |
| 8        | 21  | 75  | R2.0   | OP31M-08021R2.0C |
| 8        | 21  | 75  | R3.0   | OP31M-08021R3.0C |
| 10       | 25  | 75  | Square | OP31M-10025R0.0C |
| 10       | 25  | 75  | R0.5   | OP31M-10025R0.5C |
| 10       | 25  | 75  | R1.0   | OP31M-10025R1.0C |
| 10       | 25  | 75  | R1.5   | OP31M-10025R1.5C |
| 10       | 25  | 75  | R2.0   | OP31M-10025R2.0C |
| 10       | 25  | 75  | R3.0   | OP31M-10025R3.0C |
| 11       | 25  | 75  | Square | OP31M-11025R0.0C |
| 11       | 25  | 75  | R0.5   | OP31M-11025R0.5C |
| 11       | 25  | 75  | R1.0   | OP31M-11025R1.0C |
| 11       | 25  | 75  | R1.5   | OP31M-11025R1.5C |
| 11       | 25  | 75  | R2.0   | OP31M-11025R2.0C |
| 11       | 25  | 75  | R3.0   | OP31M-11025R3.0C |
| 11       | 25  | 75  | R4.5   | OP31M-11025R4.5C |
| 12       | 32  | 75  | Square | OP31M-12032R0.0C |
| 12       | 32  | 75  | R0.5   | OP31M-12032R0.5C |

| DIAMETER | LOC | OAL | RAD    | ITEM#            |
|----------|-----|-----|--------|------------------|
| 12       | 32  | 75  | R1.0   | OP31M-12032R1.0C |
| 12       | 32  | 75  | R1.5   | OP31M-12032R1.5C |
| 12       | 32  | 75  | R2.0   | OP31M-12032R2.0C |
| 12       | 32  | 75  | R3.0   | OP31M-12032R3.0C |
| 12       | 32  | 75  | R4.5   | OP31M-12032R4.5C |
| 16       | 41  | 100 | Square | OP31M-16041R0.0C |
| 16       | 41  | 100 | R0.5   | OP31M-16041R0.5C |
| 16       | 41  | 100 | R1.0   | OP31M-16041R1.0C |
| 16       | 41  | 100 | R1.5   | OP31M-16041R1.5C |
| 16       | 41  | 100 | R2.0   | OP31M-16041R2.0C |
| 16       | 41  | 100 | R3.0   | OP31M-16041R3.0C |
| 16       | 41  | 100 | R4.5   | OP31M-16041R4.5C |
| 16       | 41  | 100 | R6.0   | OP31M-16041R6.0C |
| 20       | 41  | 100 | Square | OP31M-20041R0.0C |
| 20       | 41  | 100 | R0.5   | OP31M-20041R0.5C |
| 20       | 41  | 100 | R1.0   | OP31M-20041R1.0C |
| 20       | 41  | 100 | R1.5   | OP31M-20041R1.5C |
| 20       | 41  | 100 | R2.0   | OP31M-20041R2.0C |
| 20       | 41  | 100 | R3.0   | OP31M-20041R3.0C |
| 20       | 41  | 100 | R4.5   | OP31M-20041R4.5C |
| 20       | 41  | 100 | R6.0   | OP31M-20041R6.0C |
| 25       | 45  | 125 | Square | OP31M-25045R0.0C |
| 25       | 45  | 125 | R0.5   | OP31M-25045R0.5C |
| 25       | 45  | 125 | R1.0   | OP31M-25045R1.0C |
| 25       | 45  | 125 | R1.5   | OP31M-25045R1.5C |
| 25       | 45  | 125 | R2.0   | OP31M-25045R2.0C |
| 25       | 45  | 125 | R3.0   | OP31M-25045R3.0C |
| 25       | 45  | 125 | R4.5   | OP31M-25045R4.5C |
| 25       | 45  | 125 | R6.0   | OP31M-25045R6.0C |

## 3 FLUTE - LONG - POLISHED



OP32

LONG INCH

| DIAMETER | LOC   | OAL | RAD    | ITEM#         |
|----------|-------|-----|--------|---------------|
| 1/4      | 1 1/8 | 3   | Square | OP32-1618R000 |
| 1/4      | 1 1/8 | 3   | R.015  | OP32-1618R015 |
| 1/4      | 1 1/8 | 3   | R.030  | OP32-1618R030 |
| 1/4      | 1 1/8 | 3   | R.060  | OP32-1618R060 |
| 1/4      | 1 1/8 | 3   | R.090  | OP32-1618R090 |
| 5/16     | 1 1/8 | 3   | Square | OP32-2018R000 |
| 5/16     | 1 1/8 | 3   | R.015  | OP32-2018R015 |
| 5/16     | 1 1/8 | 3   | R.030  | OP32-2018R030 |
| 5/16     | 1 1/8 | 3   | R.060  | OP32-2018R060 |
| 5/16     | 1 1/8 | 3   | R.090  | OP32-2018R090 |
| 5/16     | 1 1/8 | 3   | R.125  | OP32-2018R125 |
| 3/8      | 1 1/4 | 3   | Square | OP32-2420R000 |
| 3/8      | 1 1/4 | 3   | R.015  | OP32-2420R015 |
| 3/8      | 1 1/4 | 3   | R.030  | OP32-2420R030 |
| 3/8      | 1 1/4 | 3   | R.060  | OP32-2420R060 |
| 3/8      | 1 1/4 | 3   | R.090  | OP32-2420R090 |
| 3/8      | 1 1/4 | 3   | R.125  | OP32-2420R125 |
| 7/16     | 2     | 4   | Square | OP32-2832R000 |
| 7/16     | 2     | 4   | R.015  | OP32-2832R015 |
| 7/16     | 2     | 4   | R.030  | OP32-2832R030 |
| 7/16     | 2     | 4   | R.060  | OP32-2832R060 |
| 7/16     | 2     | 4   | R.090  | OP32-2832R090 |
| 7/16     | 2     | 4   | R.125  | OP32-2832R125 |
| 7/16     | 2     | 4   | R.190  | OP32-2832R190 |
| 1/2      | 2     | 4   | Square | OP32-3232R000 |
| 1/2      | 2     | 4   | R.015  | OP32-3232R015 |
| 1/2      | 2     | 4   | R.030  | OP32-3232R030 |
| 1/2      | 2     | 4   | R.060  | OP32-3232R060 |
| 1/2      | 2     | 4   | R.090  | OP32-3232R090 |
| 1/2      | 2     | 4   | R.125  | OP32-3232R125 |

| DIAMETER | LOC   | OAL | RAD    | ITEM#         |
|----------|-------|-----|--------|---------------|
| 1/2      | 2     | 4   | R.190  | OP32-3232R190 |
| 5/8      | 2 1/4 | 5   | Square | OP32-4036R000 |
| 5/8      | 2 1/4 | 5   | R.015  | OP32-4036R015 |
| 5/8      | 2 1/4 | 5   | R.030  | OP32-4036R030 |
| 5/8      | 2 1/4 | 5   | R.060  | OP32-4036R060 |
| 5/8      | 2 1/4 | 5   | R.090  | OP32-4036R090 |
| 5/8      | 2 1/4 | 5   | R.125  | OP32-4036R125 |
| 5/8      | 2 1/4 | 5   | R.190  | OP32-4036R190 |
| 5/8      | 2 1/4 | 5   | R.250  | OP32-4036R250 |
| 3/4      | 2 5/8 | 5   | Square | OP32-4842R000 |
| 3/4      | 2 5/8 | 5   | R.015  | OP32-4842R015 |
| 3/4      | 2 5/8 | 5   | R.030  | OP32-4842R030 |
| 3/4      | 2 5/8 | 5   | R.060  | OP32-4842R060 |
| 3/4      | 2 5/8 | 5   | R.090  | OP32-4842R090 |
| 3/4      | 2 5/8 | 5   | R.125  | OP32-4842R125 |
| 3/4      | 2 5/8 | 5   | R.190  | OP32-4842R190 |
| 3/4      | 2 5/8 | 5   | R.250  | OP32-4842R250 |
| 1        | 3     | 6   | Square | OP32-6448R000 |
| 1        | 3     | 6   | R.015  | OP32-6448R015 |
| 1        | 3     | 6   | R.030  | OP32-6448R030 |
| 1        | 3     | 6   | R.060  | OP32-6448R060 |
| 1        | 3     | 6   | R.090  | OP32-6448R090 |
| 1        | 3     | 6   | R.125  | OP32-6448R125 |
| 1        | 3     | 6   | R.190  | OP32-6448R190 |
| 1        | 3     | 6   | R.250  | OP32-6448R250 |

## 3 FLUTE - LONG - POLISHED



OP32M

LONG METRIC

| DIAMETER | LOC | OAL | RAD    | ITEM#           |
|----------|-----|-----|--------|-----------------|
| 6        | 29  | 75  | Square | OP32M-06029R0.0 |
| 6        | 29  | 75  | R0.5   | OP32M-06029R0.5 |
| 6        | 29  | 75  | R1.0   | OP32M-06029R1.0 |
| 6        | 29  | 75  | R1.5   | OP32M-06029R1.5 |
| 6        | 29  | 75  | R2.0   | OP32M-06029R2.0 |
| 8        | 29  | 75  | Square | OP32M-08029R0.0 |
| 8        | 29  | 75  | R0.5   | OP32M-08029R0.5 |
| 8        | 29  | 75  | R1.0   | OP32M-08029R1.0 |
| 8        | 29  | 75  | R1.5   | OP32M-08029R1.5 |
| 8        | 29  | 75  | R2.0   | OP32M-08029R2.0 |
| 8        | 29  | 75  | R3.0   | OP32M-08029R3.0 |
| 10       | 32  | 75  | Square | OP32M-10032R0.0 |
| 10       | 32  | 75  | R0.5   | OP32M-10032R0.5 |
| 10       | 32  | 75  | R1.0   | OP32M-10032R1.0 |
| 10       | 32  | 75  | R1.5   | OP32M-10032R1.5 |
| 10       | 32  | 75  | R2.0   | OP32M-10032R2.0 |
| 10       | 32  | 75  | R3.0   | OP32M-10032R3.0 |
| 11       | 50  | 100 | Square | OP32M-11050R0.0 |
| 11       | 50  | 100 | R0.5   | OP32M-11050R0.5 |
| 11       | 50  | 100 | R1.0   | OP32M-11050R1.0 |
| 11       | 50  | 100 | R1.5   | OP32M-11050R1.5 |
| 11       | 50  | 100 | R2.0   | OP32M-11050R2.0 |
| 11       | 50  | 100 | R3.0   | OP32M-11050R3.0 |
| 11       | 50  | 100 | R4.5   | OP32M-11050R4.5 |
| 12       | 50  | 100 | Square | OP32M-12050R0.0 |
| 12       | 50  | 100 | R0.5   | OP32M-12050R0.5 |
| 12       | 50  | 100 | R1.0   | OP32M-12050R1.0 |
| 12       | 50  | 100 | R1.5   | OP32M-12050R1.5 |
| 12       | 50  | 100 | R2.0   | OP32M-12050R2.0 |
| 12       | 50  | 100 | R3.0   | OP32M-12050R3.0 |

| DIAMETER | LOC | OAL | RAD    | ITEM#           |
|----------|-----|-----|--------|-----------------|
| 12       | 50  | 100 | R4.5   | OP32M-12050R4.5 |
| 16       | 57  | 125 | Square | OP32M-16057R0.0 |
| 16       | 57  | 125 | R0.5   | OP32M-16057R0.5 |
| 16       | 57  | 125 | R1.0   | OP32M-16057R1.0 |
| 16       | 57  | 125 | R1.5   | OP32M-16057R1.5 |
| 16       | 57  | 125 | R2.0   | OP32M-16057R2.0 |
| 16       | 57  | 125 | R3.0   | OP32M-16057R3.0 |
| 16       | 57  | 125 | R4.5   | OP32M-16057R4.5 |
| 16       | 57  | 125 | R6.0   | OP32M-16057R6.0 |
| 20       | 67  | 125 | Square | OP32M-20067R0.0 |
| 20       | 67  | 125 | R0.5   | OP32M-20067R0.5 |
| 20       | 67  | 125 | R1.0   | OP32M-20067R1.0 |
| 20       | 67  | 125 | R1.5   | OP32M-20067R1.5 |
| 20       | 67  | 125 | R2.0   | OP32M-20067R2.0 |
| 20       | 67  | 125 | R3.0   | OP32M-20067R3.0 |
| 20       | 67  | 125 | R4.5   | OP32M-20067R4.5 |
| 20       | 67  | 125 | R6.0   | OP32M-20067R6.0 |
| 25       | 76  | 150 | Square | OP32M-25076R0.0 |
| 25       | 76  | 150 | R0.5   | OP32M-25076R0.5 |
| 25       | 76  | 150 | R1.0   | OP32M-25076R1.0 |
| 25       | 76  | 150 | R1.5   | OP32M-25076R1.5 |
| 25       | 76  | 150 | R2.0   | OP32M-25076R2.0 |
| 25       | 76  | 150 | R3.0   | OP32M-25076R3.0 |
| 25       | 76  | 150 | R4.5   | OP32M-25076R4.5 |
| 25       | 76  | 150 | R6.0   | OP32M-25076R6.0 |



## 3 FLUTE - LONG - BALL NOSE - POLISHED



OP32B

LONG BALL INCH

| DIAMETER | LOC   | OAL | ITEM#          |
|----------|-------|-----|----------------|
| 1/4      | 1 1/8 | 3   | OP32-1618R125B |
| 5/16     | 1 1/8 | 3   | OP32-2018R155B |
| 3/8      | 1 1/4 | 3   | OP32-2420R190B |
| 7/16     | 2     | 4   | OP32-2832R220B |
| 1/2      | 2     | 4   | OP32-3232R250B |
| 5/8      | 2 1/4 | 5   | OP32-4036R310B |
| 3/4      | 2 5/8 | 5   | OP32-4842R375B |
| 1        | 3     | 6   | OP32-6448R500B |

OP32MB

LONG BALL METRIC

| DIAMETER | LOC | OAL | ITEM#             |
|----------|-----|-----|-------------------|
| 6        | 29  | 75  | OP32M-06029R3.0B  |
| 8        | 29  | 75  | OP32M-08029R4.0B  |
| 10       | 32  | 75  | OP32M-10032R5.0B  |
| 11       | 50  | 100 | OP32M-11050R5.5B  |
| 12       | 50  | 100 | OP32M-12050R6.0B  |
| 16       | 57  | 125 | OP32M-16057R8.0B  |
| 20       | 67  | 125 | OP32M-20067R10.0B |
| 25       | 76  | 150 | OP32M-25076R12.5B |



## 3 FLUTE - LONG - CHIP BREAKER - POLISHED



OP32C

LONG CHIP BREAKER INCH

| DIAMETER | LOC   | OAL | RAD    | ITEM#          |
|----------|-------|-----|--------|----------------|
| 1/4      | 1 1/8 | 3   | Square | OP32-1618R000C |
| 1/4      | 1 1/8 | 3   | R.015  | OP32-1618R015C |
| 1/4      | 1 1/8 | 3   | R.030  | OP32-1618R030C |
| 1/4      | 1 1/8 | 3   | R.060  | OP32-1618R060C |
| 1/4      | 1 1/8 | 3   | R.090  | OP32-1618R090C |
| 5/16     | 1 1/8 | 3   | Square | OP32-2018R000C |
| 5/16     | 1 1/8 | 3   | R.015  | OP32-2018R015C |
| 5/16     | 1 1/8 | 3   | R.030  | OP32-2018R030C |
| 5/16     | 1 1/8 | 3   | R.060  | OP32-2018R060C |
| 5/16     | 1 1/8 | 3   | R.090  | OP32-2018R090C |
| 5/16     | 1 1/8 | 3   | R.125  | OP32-2018R125C |
| 3/8      | 1 1/4 | 3   | Square | OP32-2420R000C |
| 3/8      | 1 1/4 | 3   | R.015  | OP32-2420R015C |
| 3/8      | 1 1/4 | 3   | R.030  | OP32-2420R030C |
| 3/8      | 1 1/4 | 3   | R.060  | OP32-2420R060C |
| 3/8      | 1 1/4 | 3   | R.090  | OP32-2420R090C |
| 3/8      | 1 1/4 | 3   | R.125  | OP32-2420R125C |
| 7/16     | 2     | 4   | Square | OP32-2832R000C |
| 7/16     | 2     | 4   | R.015  | OP32-2832R015C |
| 7/16     | 2     | 4   | R.030  | OP32-2832R030C |
| 7/16     | 2     | 4   | R.060  | OP32-2832R060C |
| 7/16     | 2     | 4   | R.090  | OP32-2832R090C |
| 7/16     | 2     | 4   | R.125  | OP32-2832R125C |
| 7/16     | 2     | 4   | R.190  | OP32-2832R190C |
| 1/2      | 2     | 4   | Square | OP32-3232R000C |
| 1/2      | 2     | 4   | R.015  | OP32-3232R015C |
| 1/2      | 2     | 4   | R.030  | OP32-3232R030C |
| 1/2      | 2     | 4   | R.060  | OP32-3232R060C |
| 1/2      | 2     | 4   | R.090  | OP32-3232R090C |
| 1/2      | 2     | 4   | R.125  | OP32-3232R125C |

| DIAMETER | LOC   | OAL | RAD    | ITEM#          |
|----------|-------|-----|--------|----------------|
| 1/2      | 2     | 4   | R.190  | OP32-3232R190C |
| 5/8      | 2 1/4 | 5   | Square | OP32-4036R000C |
| 5/8      | 2 1/4 | 5   | R.015  | OP32-4036R015C |
| 5/8      | 2 1/4 | 5   | R.030  | OP32-4036R030C |
| 5/8      | 2 1/4 | 5   | R.060  | OP32-4036R060C |
| 5/8      | 2 1/4 | 5   | R.090  | OP32-4036R090C |
| 5/8      | 2 1/4 | 5   | R.125  | OP32-4036R125C |
| 5/8      | 2 1/4 | 5   | R.190  | OP32-4036R190C |
| 5/8      | 2 1/4 | 5   | R.250  | OP32-4036R250C |
| 3/4      | 2 5/8 | 5   | Square | OP32-4842R000C |
| 3/4      | 2 5/8 | 5   | R.015  | OP32-4842R015C |
| 3/4      | 2 5/8 | 5   | R.030  | OP32-4842R030C |
| 3/4      | 2 5/8 | 5   | R.060  | OP32-4842R060C |
| 3/4      | 2 5/8 | 5   | R.090  | OP32-4842R090C |
| 3/4      | 2 5/8 | 5   | R.125  | OP32-4842R125C |
| 3/4      | 2 5/8 | 5   | R.190  | OP32-4842R190C |
| 3/4      | 2 5/8 | 5   | R.250  | OP32-4842R250C |
| 1        | 3     | 6   | Square | OP32-6448R000C |
| 1        | 3     | 6   | R.015  | OP32-6448R015C |
| 1        | 3     | 6   | R.030  | OP32-6448R030C |
| 1        | 3     | 6   | R.060  | OP32-6448R060C |
| 1        | 3     | 6   | R.090  | OP32-6448R090C |
| 1        | 3     | 6   | R.125  | OP32-6448R125C |
| 1        | 3     | 6   | R.190  | OP32-6448R190C |
| 1        | 3     | 6   | R.250  | OP32-6448R250C |

## 3 FLUTE - LONG - CHIP BREAKER - POLISHED



OP32MC

LONG CHIP BREAKER METRIC

| DIAMETER | LOC | OAL | RAD    | ITEM#            |
|----------|-----|-----|--------|------------------|
| 6        | 29  | 75  | Square | OP32M-06029R0.0C |
| 6        | 29  | 75  | R0.5   | OP32M-06029R0.5C |
| 6        | 29  | 75  | R1.0   | OP32M-06029R1.0C |
| 6        | 29  | 75  | R1.5   | OP32M-06029R1.5C |
| 6        | 29  | 75  | R2.0   | OP32M-06029R2.0C |
| 8        | 29  | 75  | Square | OP32M-08029R0.0C |
| 8        | 29  | 75  | R0.5   | OP32M-08029R0.5C |
| 8        | 29  | 75  | R1.0   | OP32M-08029R1.0C |
| 8        | 29  | 75  | R1.5   | OP32M-08029R1.5C |
| 8        | 29  | 75  | R2.0   | OP32M-08029R2.0C |
| 8        | 29  | 75  | R3.0   | OP32M-08029R3.0C |
| 10       | 32  | 75  | Square | OP32M-10032R0.0C |
| 10       | 32  | 75  | R0.5   | OP32M-10032R0.5C |
| 10       | 32  | 75  | R1.0   | OP32M-10032R1.0C |
| 10       | 32  | 75  | R1.5   | OP32M-10032R1.5C |
| 10       | 32  | 75  | R2.0   | OP32M-10032R2.0C |
| 10       | 32  | 75  | R3.0   | OP32M-10032R3.0C |
| 11       | 50  | 100 | Square | OP32M-11050R0.0C |
| 11       | 50  | 100 | R0.5   | OP32M-11050R0.5C |
| 11       | 50  | 100 | R1.0   | OP32M-11050R1.0C |
| 11       | 50  | 100 | R1.5   | OP32M-11050R1.5C |
| 11       | 50  | 100 | R2.0   | OP32M-11050R2.0C |
| 11       | 50  | 100 | R3.0   | OP32M-11050R3.0C |
| 11       | 50  | 100 | R4.5   | OP32M-11050R4.5C |
| 12       | 50  | 100 | Square | OP32M-12050R0.0C |
| 12       | 50  | 100 | R0.5   | OP32M-12050R0.5C |
| 12       | 50  | 100 | R1.0   | OP32M-12050R1.0C |
| 12       | 50  | 100 | R1.5   | OP32M-12050R1.5C |
| 12       | 50  | 100 | R2.0   | OP32M-12050R2.0C |
| 12       | 50  | 100 | R3.0   | OP32M-12050R3.0C |

| DIAMETER | LOC | OAL | RAD    | ITEM#            |
|----------|-----|-----|--------|------------------|
| 12       | 50  | 100 | R4.5   | OP32M-12050R4.5C |
| 16       | 57  | 125 | Square | OP32M-16057R0.0C |
| 16       | 57  | 125 | R0.5   | OP32M-16057R0.5C |
| 16       | 57  | 125 | R1.0   | OP32M-16057R1.0C |
| 16       | 57  | 125 | R1.5   | OP32M-16057R1.5C |
| 16       | 57  | 125 | R2.0   | OP32M-16057R2.0C |
| 16       | 57  | 125 | R3.0   | OP32M-16057R3.0C |
| 16       | 57  | 125 | R4.5   | OP32M-16057R4.5C |
| 16       | 57  | 125 | R6.0   | OP32M-16057R6.0C |
| 20       | 67  | 125 | Square | OP32M-20067R0.0C |
| 20       | 67  | 125 | R0.5   | OP32M-20067R0.5C |
| 20       | 67  | 125 | R1.0   | OP32M-20067R1.0C |
| 20       | 67  | 125 | R1.5   | OP32M-20067R1.5C |
| 20       | 67  | 125 | R2.0   | OP32M-20067R2.0C |
| 20       | 67  | 125 | R3.0   | OP32M-20067R3.0C |
| 20       | 67  | 125 | R4.5   | OP32M-20067R4.5C |
| 20       | 67  | 125 | R6.0   | OP32M-20067R6.0C |
| 25       | 76  | 150 | Square | OP32M-25076R0.0C |
| 25       | 76  | 150 | R0.5   | OP32M-25076R0.5C |
| 25       | 76  | 150 | R1.0   | OP32M-25076R1.0C |
| 25       | 76  | 150 | R1.5   | OP32M-25076R1.5C |
| 25       | 76  | 150 | R2.0   | OP32M-25076R2.0C |
| 25       | 76  | 150 | R3.0   | OP32M-25076R3.0C |
| 25       | 76  | 150 | R4.5   | OP32M-25076R4.5C |
| 25       | 76  | 150 | R6.0   | OP32M-25076R6.0C |

## 3 FLUTE - LONG REACH - POLISHED



OP33  
LONG REACH INCH

| DIAMETER | LOC  | REACH | OAL | RAD    | ITEM#              |
|----------|------|-------|-----|--------|--------------------|
| 1/4      | 3/8  | 1 1/4 | 4   | Square | OP33-1606R000N125  |
| 1/4      | 3/8  | 1 1/4 | 4   | R.015  | OP33-1606R015N125  |
| 5/16     | 7/16 | 1 1/4 | 4   | Square | OP33-2007R000N125  |
| 5/16     | 7/16 | 1 1/4 | 4   | R.015  | OP33-2007R015N125  |
| 3/8      | 1/2  | 1 7/8 | 4   | Square | OP33-2408R000N1875 |
| 3/8      | 1/2  | 1 7/8 | 4   | R.015  | OP33-2408R015N1875 |
| 7/16     | 5/8  | 2 1/4 | 4   | Square | OP33-2810R000N225  |
| 7/16     | 5/8  | 2 1/4 | 4   | R.030  | OP33-2810R030N225  |
| 1/2      | 5/8  | 2 1/4 | 4   | Square | OP33-3210R000N225  |
| 1/2      | 5/8  | 2 1/4 | 4   | R.030  | OP33-3210R030N225  |
| 5/8      | 3/4  | 2 1/4 | 4   | Square | OP33-4012R000N225  |
| 5/8      | 3/4  | 3 1/4 | 5   | Square | OP33-4012R000N325  |
| 5/8      | 3/4  | 2 1/4 | 4   | R.030  | OP33-4012R030N225  |
| 5/8      | 3/4  | 3 1/4 | 5   | R.030  | OP33-4012R030N325  |
| 3/4      | 3/4  | 2 1/4 | 4   | Square | OP33-4812R000N225  |
| 3/4      | 3/4  | 3 1/4 | 5   | Square | OP33-4812R000N325  |
| 3/4      | 3/4  | 2 1/4 | 4   | R.030  | OP33-4812R030N225  |
| 3/4      | 3/4  | 3 1/4 | 5   | R.030  | OP33-4812R030N325  |

## 3 FLUTE - LONG REACH - POLISHED



OP33M  
LONG REACH METRIC

| DIAMETER | LOC | REACH | OAL | RAD    | ITEM#              |
|----------|-----|-------|-----|--------|--------------------|
| 6        | 10  | 32    | 100 | Square | OP33M-06010R0.0N32 |
| 6        | 10  | 32    | 100 | R0.5   | OP33M-06010R0.5N32 |
| 8        | 11  | 40    | 100 | Square | OP33M-08011R0.0N40 |
| 8        | 11  | 40    | 100 | R0.5   | OP33M-08011R0.5N40 |
| 10       | 12  | 48    | 100 | Square | OP33M-10012R0.0N48 |
| 10       | 12  | 48    | 100 | R0.5   | OP33M-10012R0.5N48 |
| 11       | 16  | 57    | 100 | Square | OP33M-11016R0.0N57 |
| 11       | 16  | 57    | 100 | R0.5   | OP33M-11016R0.5N57 |
| 12       | 16  | 57    | 100 | Square | OP33M-12016R0.0N57 |
| 12       | 16  | 57    | 100 | R1.0   | OP33M-12016R1.0N57 |
| 16       | 20  | 57    | 100 | Square | OP33M-16020R0.0N57 |
| 16       | 20  | 83    | 150 | Square | OP33M-16020R0.0N83 |
| 16       | 20  | 57    | 100 | R1.0   | OP33M-16020R1.0N57 |
| 16       | 20  | 83    | 150 | R1.0   | OP33M-16020R1.0N83 |
| 20       | 25  | 57    | 100 | Square | OP33M-20025R0.0N57 |
| 20       | 25  | 83    | 150 | Square | OP33M-20025R0.0N83 |
| 20       | 25  | 57    | 100 | R1.0   | OP33M-20025R1.0N57 |
| 20       | 25  | 83    | 150 | R1.0   | OP33M-20025R1.0N83 |



## 3 FLUTE - LONG REACH - BALL NOSE - POLISHED



OP33B

BALL LONG REACH INCH

| DIAMETER | LOC  | REACH | OAL | ITEM#               |
|----------|------|-------|-----|---------------------|
| 1/4      | 3/8  | 1 1/4 | 4   | OP33-1606R125N125B  |
| 5/16     | 7/16 | 1 1/4 | 4   | OP33-2007R155N125B  |
| 3/8      | 1/2  | 1 7/8 | 4   | OP33-2408R190N1875B |
| 7/16     | 5/8  | 2 1/4 | 4   | OP33-2810R220N225B  |
| 1/2      | 5/8  | 2 1/4 | 4   | OP33-3210R250N225B  |
| 5/8      | 3/4  | 2 1/4 | 4   | OP33-4012R310N225B  |
| 5/8      | 3/4  | 3 1/4 | 5   | OP33-4012R310N325B  |
| 3/4      | 3/4  | 2 1/4 | 4   | OP33-4812R375N225B  |
| 3/4      | 3/4  | 3 1/4 | 5   | OP33-4812R375N325B  |

OP33MB

BALL LONG REACH METRIC

| DIAMETER | LOC | REACH | OAL | ITEM#                |
|----------|-----|-------|-----|----------------------|
| 6        | 10  | 32    | 100 | OP33M-06010R3.0N32B  |
| 8        | 11  | 40    | 100 | OP33M-08011R4.0N40B  |
| 10       | 12  | 48    | 100 | OP33M-10012R5.0N48B  |
| 11       | 16  | 57    | 100 | OP33M-11016R5.5N57B  |
| 12       | 16  | 57    | 100 | OP33M-12016R6.0N57B  |
| 16       | 20  | 57    | 100 | OP33M-16020R8.0N57B  |
| 16       | 20  | 83    | 150 | OP33M-16020R8.0N83B  |
| 20       | 25  | 57    | 100 | OP33M-20025R10.0N57B |
| 20       | 25  | 83    | 150 | OP33M-20025R10.0N83B |

## 3 FLUTE - LONG REACH - CHIP BREAKER - POLISHED



OP33C

CHIP BREAKER LONG REACH INCH

| DIAMETER | LOC  | REACH | OAL | RAD    | ITEM#               |
|----------|------|-------|-----|--------|---------------------|
| 1/4      | 3/8  | 1 1/4 | 4   | Square | OP33-1606R000CN125  |
| 1/4      | 3/8  | 1 1/4 | 4   | R.015  | OP33-1606R015CN125  |
| 5/16     | 7/16 | 1 1/4 | 4   | Square | OP33-2007R000CN125  |
| 5/16     | 7/16 | 1 1/4 | 4   | R.015  | OP33-2007R015CN125  |
| 3/8      | 1/2  | 1 7/8 | 4   | Square | OP33-2408R000CN1875 |
| 3/8      | 1/2  | 1 7/8 | 4   | R.015  | OP33-2408R015CN1875 |
| 7/16     | 5/8  | 2 1/4 | 4   | Square | OP33-2810R000CN225  |
| 7/16     | 5/8  | 2 1/4 | 4   | R.030  | OP33-2810R030CN225  |
| 1/2      | 5/8  | 2 1/4 | 4   | Square | OP33-3210R000CN225  |
| 1/2      | 5/8  | 2 1/4 | 4   | R.030  | OP33-3210R030CN225  |
| 5/8      | 3/4  | 2 1/4 | 4   | Square | OP33-4012R000CN225  |
| 5/8      | 3/4  | 3 1/4 | 5   | Square | OP33-4012R000CN325  |
| 5/8      | 3/4  | 2 1/4 | 4   | R.030  | OP33-4012R030CN225  |
| 5/8      | 3/4  | 3 1/4 | 5   | R.030  | OP33-4012R030CN325  |
| 3/4      | 3/4  | 2 1/4 | 4   | Square | OP33-4812R000CN225  |
| 3/4      | 3/4  | 3 1/4 | 5   | Square | OP33-4812R000CN325  |
| 3/4      | 3/4  | 2 1/4 | 4   | R.030  | OP33-4812R030CN225  |
| 3/4      | 3/4  | 3 1/4 | 5   | R.030  | OP33-4812R030CN325  |

## 3 FLUTE - LONG REACH - CHIP BREAKER - POLISHED



OP33MC

CHIP BREAKER LONG REACH METRIC

| DIAMETER | LOC | REACH | OAL | RAD    | ITEM#               |
|----------|-----|-------|-----|--------|---------------------|
| 6        | 10  | 32    | 100 | Square | OP33M-06010R0.0CN32 |
| 6        | 10  | 32    | 100 | R0.5   | OP33M-06010R0.5CN32 |
| 8        | 11  | 40    | 100 | Square | OP33M-08011R0.0CN40 |
| 8        | 11  | 40    | 100 | R0.5   | OP33M-08011R0.5CN40 |
| 10       | 12  | 48    | 100 | Square | OP33M-10012R0.0CN48 |
| 10       | 12  | 48    | 100 | R0.5   | OP33M-10012R0.5CN48 |
| 11       | 16  | 57    | 100 | Square | OP33M-11016R0.0CN57 |
| 11       | 16  | 57    | 100 | R0.5   | OP33M-11016R0.5CN57 |
| 12       | 16  | 57    | 100 | Square | OP33M-12016R0.0CN57 |
| 12       | 16  | 57    | 100 | R1.0   | OP33M-12016R1.0CN57 |
| 16       | 20  | 57    | 100 | Square | OP33M-16020R0.0CN57 |
| 16       | 20  | 83    | 150 | Square | OP33M-16020R0.0CN83 |
| 16       | 20  | 57    | 100 | R1.0   | OP33M-16020R1.0CN57 |
| 16       | 20  | 83    | 150 | R1.0   | OP33M-16020R1.0CN83 |
| 20       | 25  | 57    | 100 | Square | OP33M-20025R0.0CN57 |
| 20       | 25  | 83    | 150 | Square | OP33M-20025R0.0CN83 |
| 20       | 25  | 57    | 100 | R1.0   | OP33M-20025R1.0CN57 |
| 20       | 25  | 83    | 150 | R1.0   | OP33M-20025R1.0CN83 |

## 3 FLUTE - REGULAR - DLC



OP35  
REGULAR INCH DLC

| DIAMETER | LOC   | OAL | RAD    | ITEM#         |
|----------|-------|-----|--------|---------------|
| 3/16     | 9/16  | 3   | Square | OP35-1209R000 |
| 3/16     | 9/16  | 3   | R.015  | OP35-1209R015 |
| 3/16     | 9/16  | 3   | R.030  | OP35-1209R030 |
| 3/16     | 9/16  | 3   | R.060  | OP35-1209R060 |
| 1/4      | 3/4   | 3   | Square | OP35-1612R000 |
| 1/4      | 3/4   | 3   | R.015  | OP35-1612R015 |
| 1/4      | 3/4   | 3   | R.030  | OP35-1612R030 |
| 1/4      | 3/4   | 3   | R.060  | OP35-1612R060 |
| 1/4      | 3/4   | 3   | R.090  | OP35-1612R090 |
| 5/16     | 13/16 | 3   | Square | OP35-2013R000 |
| 5/16     | 13/16 | 3   | R.015  | OP35-2013R015 |
| 5/16     | 13/16 | 3   | R.030  | OP35-2013R030 |
| 5/16     | 13/16 | 3   | R.060  | OP35-2013R060 |
| 5/16     | 13/16 | 3   | R.090  | OP35-2013R090 |
| 5/16     | 13/16 | 3   | R.125  | OP35-2013R125 |
| 3/8      | 1     | 3   | Square | OP35-2416R000 |
| 3/8      | 1     | 3   | R.015  | OP35-2416R015 |
| 3/8      | 1     | 3   | R.030  | OP35-2416R030 |
| 3/8      | 1     | 3   | R.060  | OP35-2416R060 |
| 3/8      | 1     | 3   | R.090  | OP35-2416R090 |
| 3/8      | 1     | 3   | R.125  | OP35-2416R125 |
| 7/16     | 1     | 3   | Square | OP35-2816R000 |
| 7/16     | 1     | 3   | R.015  | OP35-2816R015 |
| 7/16     | 1     | 3   | R.030  | OP35-2816R030 |
| 7/16     | 1     | 3   | R.060  | OP35-2816R060 |
| 7/16     | 1     | 3   | R.090  | OP35-2816R090 |
| 7/16     | 1     | 3   | R.125  | OP35-2816R125 |
| 7/16     | 1     | 3   | R.190  | OP35-2816R190 |
| 1/2      | 1 1/4 | 3   | Square | OP35-3220R000 |
| 1/2      | 1 1/4 | 3   | R.015  | OP35-3220R015 |

| DIAMETER | LOC   | OAL | RAD    | ITEM#         |
|----------|-------|-----|--------|---------------|
| 1/2      | 1 1/4 | 3   | R.030  | OP35-3220R030 |
| 1/2      | 1 1/4 | 3   | R.060  | OP35-3220R060 |
| 1/2      | 1 1/4 | 3   | R.090  | OP35-3220R090 |
| 1/2      | 1 1/4 | 3   | R.125  | OP35-3220R125 |
| 1/2      | 1 1/4 | 3   | R.190  | OP35-3220R190 |
| 5/8      | 1 5/8 | 4   | Square | OP35-4026R000 |
| 5/8      | 1 5/8 | 4   | R.015  | OP35-4026R015 |
| 5/8      | 1 5/8 | 4   | R.030  | OP35-4026R030 |
| 5/8      | 1 5/8 | 4   | R.060  | OP35-4026R060 |
| 5/8      | 1 5/8 | 4   | R.090  | OP35-4026R090 |
| 5/8      | 1 5/8 | 4   | R.125  | OP35-4026R125 |
| 5/8      | 1 5/8 | 4   | R.190  | OP35-4026R190 |
| 5/8      | 1 5/8 | 4   | R.250  | OP35-4026R250 |
| 3/4      | 1 5/8 | 4   | Square | OP35-4826R000 |
| 3/4      | 1 5/8 | 4   | R.015  | OP35-4826R015 |
| 3/4      | 1 5/8 | 4   | R.030  | OP35-4826R030 |
| 3/4      | 1 5/8 | 4   | R.060  | OP35-4826R060 |
| 3/4      | 1 5/8 | 4   | R.090  | OP35-4826R090 |
| 3/4      | 1 5/8 | 4   | R.125  | OP35-4826R125 |
| 3/4      | 1 5/8 | 4   | R.190  | OP35-4826R190 |
| 3/4      | 1 5/8 | 4   | R.250  | OP35-4826R250 |
| 1        | 1 3/4 | 5   | Square | OP35-6428R000 |
| 1        | 1 3/4 | 5   | R.015  | OP35-6428R015 |
| 1        | 1 3/4 | 5   | R.030  | OP35-6428R030 |
| 1        | 1 3/4 | 5   | R.060  | OP35-6428R060 |
| 1        | 1 3/4 | 5   | R.090  | OP35-6428R090 |
| 1        | 1 3/4 | 5   | R.125  | OP35-6428R125 |
| 1        | 1 3/4 | 5   | R.190  | OP35-6428R190 |
| 1        | 1 3/4 | 5   | R.250  | OP35-6428R250 |



## 3 FLUTE - REGULAR - DLC



OP35M

REGULAR METRIC DLC

| DIAMETER | LOC | OAL | RAD    | ITEM#           |
|----------|-----|-----|--------|-----------------|
| 5        | 14  | 75  | Square | OP35M-05014R0.0 |
| 5        | 14  | 75  | R0.5   | OP35M-05014R0.5 |
| 5        | 14  | 75  | R1.0   | OP35M-05014R1.0 |
| 5        | 14  | 75  | R1.5   | OP35M-05014R1.5 |
| 6        | 20  | 75  | Square | OP35M-06020R0.0 |
| 6        | 20  | 75  | R0.5   | OP35M-06020R0.5 |
| 6        | 20  | 75  | R1.0   | OP35M-06020R1.0 |
| 6        | 20  | 75  | R1.5   | OP35M-06020R1.5 |
| 6        | 20  | 75  | R2.0   | OP35M-06020R2.0 |
| 8        | 21  | 75  | Square | OP35M-08021R0.0 |
| 8        | 21  | 75  | R0.5   | OP35M-08021R0.5 |
| 8        | 21  | 75  | R1.0   | OP35M-08021R1.0 |
| 8        | 21  | 75  | R1.5   | OP35M-08021R1.5 |
| 8        | 21  | 75  | R2.0   | OP35M-08021R2.0 |
| 8        | 21  | 75  | R3.0   | OP35M-08021R3.0 |
| 10       | 25  | 75  | Square | OP35M-10025R0.0 |
| 10       | 25  | 75  | R0.5   | OP35M-10025R0.5 |
| 10       | 25  | 75  | R1.0   | OP35M-10025R1.0 |
| 10       | 25  | 75  | R1.5   | OP35M-10025R1.5 |
| 10       | 25  | 75  | R2.0   | OP35M-10025R2.0 |
| 10       | 25  | 75  | R3.0   | OP35M-10025R3.0 |
| 11       | 25  | 75  | Square | OP35M-11025R0.0 |
| 11       | 25  | 75  | R0.5   | OP35M-11025R0.5 |
| 11       | 25  | 75  | R1.0   | OP35M-11025R1.0 |
| 11       | 25  | 75  | R1.5   | OP35M-11025R1.5 |
| 11       | 25  | 75  | R2.0   | OP35M-11025R2.0 |
| 11       | 25  | 75  | R3.0   | OP35M-11025R3.0 |
| 11       | 25  | 75  | R4.5   | OP35M-11025R4.5 |
| 12       | 32  | 75  | Square | OP35M-12032R0.0 |
| 12       | 32  | 75  | R0.5   | OP35M-12032R0.5 |

| DIAMETER | LOC | OAL | RAD    | ITEM#           |
|----------|-----|-----|--------|-----------------|
| 12       | 32  | 75  | R1.0   | OP35M-12032R1.0 |
| 12       | 32  | 75  | R1.5   | OP35M-12032R1.5 |
| 12       | 32  | 75  | R2.0   | OP35M-12032R2.0 |
| 12       | 32  | 75  | R3.0   | OP35M-12032R3.0 |
| 12       | 32  | 75  | R4.5   | OP35M-12032R4.5 |
| 16       | 41  | 100 | Square | OP35M-16041R0.0 |
| 16       | 41  | 100 | R0.5   | OP35M-16041R0.5 |
| 16       | 41  | 100 | R1.0   | OP35M-16041R1.0 |
| 16       | 41  | 100 | R1.5   | OP35M-16041R1.5 |
| 16       | 41  | 100 | R2.0   | OP35M-16041R2.0 |
| 16       | 41  | 100 | R3.0   | OP35M-16041R3.0 |
| 16       | 41  | 100 | R4.5   | OP35M-16041R4.5 |
| 16       | 41  | 100 | R6.0   | OP35M-16041R6.0 |
| 20       | 41  | 100 | Square | OP35M-20041R0.0 |
| 20       | 41  | 100 | R0.5   | OP35M-20041R0.5 |
| 20       | 41  | 100 | R1.0   | OP35M-20041R1.0 |
| 20       | 41  | 100 | R1.5   | OP35M-20041R1.5 |
| 20       | 41  | 100 | R2.0   | OP35M-20041R2.0 |
| 20       | 41  | 100 | R3.0   | OP35M-20041R3.0 |
| 20       | 41  | 100 | R4.5   | OP35M-20041R4.5 |
| 20       | 41  | 100 | R6.0   | OP35M-20041R6.0 |
| 25       | 45  | 125 | Square | OP35M-25045R0.0 |
| 25       | 45  | 125 | R0.5   | OP35M-25045R0.5 |
| 25       | 45  | 125 | R1.0   | OP35M-25045R1.0 |
| 25       | 45  | 125 | R1.5   | OP35M-25045R1.5 |
| 25       | 45  | 125 | R2.0   | OP35M-25045R2.0 |
| 25       | 45  | 125 | R3.0   | OP35M-25045R3.0 |
| 25       | 45  | 125 | R4.5   | OP35M-25045R4.5 |
| 25       | 45  | 125 | R6.0   | OP35M-25045R6.0 |

## 3 FLUTE - REGULAR - BALL NOSE - DLC



OP35B

REGULAR BALL INCH DLC

| DIAMETER | LOC   | OAL | ITEM#          |
|----------|-------|-----|----------------|
| 3/16     | 9/16  | 3   | OP35-1209R090B |
| 1/4      | 3/4   | 3   | OP35-1612R125B |
| 5/16     | 13/16 | 3   | OP35-2013R155B |
| 3/8      | 1     | 3   | OP35-2416R190B |
| 7/16     | 1     | 3   | OP35-2816R220B |
| 1/2      | 1 1/4 | 3   | OP35-3220R250B |
| 5/8      | 1 5/8 | 4   | OP35-4026R310B |
| 3/4      | 1 5/8 | 4   | OP35-4826R375B |
| 1        | 1 3/4 | 5   | OP35-6428R500B |

OP35MB

REGULAR BALL METRIC DLC

| DIAMETER | LOC | OAL | ITEM#             |
|----------|-----|-----|-------------------|
| 5        | 14  | 75  | OP35M-05014R2.5B  |
| 6        | 20  | 75  | OP35M-06020R3.0B  |
| 8        | 21  | 75  | OP35M-08021R4.0B  |
| 10       | 25  | 75  | OP35M-10025R5.0B  |
| 11       | 25  | 75  | OP35M-11025R5.5B  |
| 12       | 32  | 75  | OP35M-12032R6.0B  |
| 16       | 41  | 100 | OP35M-16041R8.0B  |
| 20       | 41  | 100 | OP35M-20041R10.0B |
| 25       | 45  | 125 | OP35M-25045R12.5B |

## 3 FLUTE - REGULAR - CHIP BREAKER - DLC



OP35C  
CHIP BREAKER INCH

| DIAMETER | LOC   | OAL | RAD    | ITEM#          |
|----------|-------|-----|--------|----------------|
| 3/16     | 9/16  | 3   | Square | OP35-1209R000C |
| 3/16     | 9/16  | 3   | R.015  | OP35-1209R015C |
| 3/16     | 9/16  | 3   | R.030  | OP35-1209R030C |
| 3/16     | 9/16  | 3   | R.060  | OP35-1209R060C |
| 1/4      | 3/4   | 3   | Square | OP35-1612R000C |
| 1/4      | 3/4   | 3   | R.015  | OP35-1612R015C |
| 1/4      | 3/4   | 3   | R.030  | OP35-1612R030C |
| 1/4      | 3/4   | 3   | R.060  | OP35-1612R060C |
| 1/4      | 3/4   | 3   | R.090  | OP35-1612R090C |
| 5/16     | 13/16 | 3   | Square | OP35-2013R000C |
| 5/16     | 13/16 | 3   | R.015  | OP35-2013R015C |
| 5/16     | 13/16 | 3   | R.030  | OP35-2013R030C |
| 5/16     | 13/16 | 3   | R.060  | OP35-2013R060C |
| 5/16     | 13/16 | 3   | R.090  | OP35-2013R090C |
| 5/16     | 13/16 | 3   | R.125  | OP35-2013R125C |
| 3/8      | 1     | 3   | Square | OP35-2416R000C |
| 3/8      | 1     | 3   | R.015  | OP35-2416R015C |
| 3/8      | 1     | 3   | R.030  | OP35-2416R030C |
| 3/8      | 1     | 3   | R.060  | OP35-2416R060C |
| 3/8      | 1     | 3   | R.090  | OP35-2416R090C |
| 3/8      | 1     | 3   | R.125  | OP35-2416R125C |
| 7/16     | 1     | 3   | Square | OP35-2816R000C |
| 7/16     | 1     | 3   | R.015  | OP35-2816R015C |
| 7/16     | 1     | 3   | R.030  | OP35-2816R030C |
| 7/16     | 1     | 3   | R.060  | OP35-2816R060C |
| 7/16     | 1     | 3   | R.090  | OP35-2816R090C |
| 7/16     | 1     | 3   | R.125  | OP35-2816R125C |
| 7/16     | 1     | 3   | R.190  | OP35-2816R190C |
| 1/2      | 1 1/4 | 3   | Square | OP35-3220R000C |
| 1/2      | 1 1/4 | 3   | R.015  | OP35-3220R015C |

| DIAMETER | LOC   | OAL | RAD    | ITEM#          |
|----------|-------|-----|--------|----------------|
| 1/2      | 1 1/4 | 3   | R.030  | OP35-3220R030C |
| 1/2      | 1 1/4 | 3   | R.060  | OP35-3220R060C |
| 1/2      | 1 1/4 | 3   | R.090  | OP35-3220R090C |
| 1/2      | 1 1/4 | 3   | R.125  | OP35-3220R125C |
| 1/2      | 1 1/4 | 3   | R.190  | OP35-3220R190C |
| 5/8      | 1 5/8 | 4   | Square | OP35-4026R000C |
| 5/8      | 1 5/8 | 4   | R.015  | OP35-4026R015C |
| 5/8      | 1 5/8 | 4   | R.030  | OP35-4026R030C |
| 5/8      | 1 5/8 | 4   | R.060  | OP35-4026R060C |
| 5/8      | 1 5/8 | 4   | R.090  | OP35-4026R090C |
| 5/8      | 1 5/8 | 4   | R.125  | OP35-4026R125C |
| 5/8      | 1 5/8 | 4   | R.190  | OP35-4026R190C |
| 5/8      | 1 5/8 | 4   | R.250  | OP35-4026R250C |
| 3/4      | 1 5/8 | 4   | Square | OP35-4826R000C |
| 3/4      | 1 5/8 | 4   | R.015  | OP35-4826R015C |
| 3/4      | 1 5/8 | 4   | R.030  | OP35-4826R030C |
| 3/4      | 1 5/8 | 4   | R.060  | OP35-4826R060C |
| 3/4      | 1 5/8 | 4   | R.090  | OP35-4826R090C |
| 3/4      | 1 5/8 | 4   | R.125  | OP35-4826R125C |
| 3/4      | 1 5/8 | 4   | R.190  | OP35-4826R190C |
| 3/4      | 1 5/8 | 4   | R.250  | OP35-4826R250C |
| 1        | 1 3/4 | 5   | Square | OP35-6428R000C |
| 1        | 1 3/4 | 5   | R.015  | OP35-6428R015C |
| 1        | 1 3/4 | 5   | R.030  | OP35-6428R030C |
| 1        | 1 3/4 | 5   | R.060  | OP35-6428R060C |
| 1        | 1 3/4 | 5   | R.090  | OP35-6428R090C |
| 1        | 1 3/4 | 5   | R.125  | OP35-6428R125C |
| 1        | 1 3/4 | 5   | R.190  | OP35-6428R190C |
| 1        | 1 3/4 | 5   | R.250  | OP35-6428R250C |



## 3 FLUTE - REGULAR - CHIP BREAKER - DLC



OP35MC

CHIP BREAKER METRIC

| DIAMETER | LOC | OAL | RAD    | ITEM#            |
|----------|-----|-----|--------|------------------|
| 5        | 14  | 75  | Square | OP35M-05014R0.0C |
| 5        | 14  | 75  | R0.5   | OP35M-05014R0.5C |
| 5        | 14  | 75  | R1.0   | OP35M-05014R1.0C |
| 5        | 14  | 75  | R1.5   | OP35M-05014R1.5C |
| 6        | 20  | 75  | Square | OP35M-06020R0.0C |
| 6        | 20  | 75  | R0.5   | OP35M-06020R0.5C |
| 6        | 20  | 75  | R1.0   | OP35M-06020R1.0C |
| 6        | 20  | 75  | R1.5   | OP35M-06020R1.5C |
| 6        | 20  | 75  | R2.0   | OP35M-06020R2.0C |
| 8        | 21  | 75  | Square | OP35M-08021R0.0C |
| 8        | 21  | 75  | R0.5   | OP35M-08021R0.5C |
| 8        | 21  | 75  | R1.0   | OP35M-08021R1.0C |
| 8        | 21  | 75  | R1.5   | OP35M-08021R1.5C |
| 8        | 21  | 75  | R2.0   | OP35M-08021R2.0C |
| 8        | 21  | 75  | R3.0   | OP35M-08021R3.0C |
| 10       | 25  | 75  | Square | OP35M-10025R0.0C |
| 10       | 25  | 75  | R0.5   | OP35M-10025R0.5C |
| 10       | 25  | 75  | R1.0   | OP35M-10025R1.0C |
| 10       | 25  | 75  | R1.5   | OP35M-10025R1.5C |
| 10       | 25  | 75  | R2.0   | OP35M-10025R2.0C |
| 10       | 25  | 75  | R3.0   | OP35M-10025R3.0C |
| 11       | 25  | 75  | Square | OP35M-11025R0.0C |
| 11       | 25  | 75  | R0.5   | OP35M-11025R0.5C |
| 11       | 25  | 75  | R1.0   | OP35M-11025R1.0C |
| 11       | 25  | 75  | R1.5   | OP35M-11025R1.5C |
| 11       | 25  | 75  | R2.0   | OP35M-11025R2.0C |
| 11       | 25  | 75  | R3.0   | OP35M-11025R3.0C |
| 11       | 25  | 75  | R4.5   | OP35M-11025R4.5C |
| 12       | 32  | 75  | Square | OP35M-12032R0.0C |
| 12       | 32  | 75  | R0.5   | OP35M-12032R0.5C |

| DIAMETER | LOC | OAL | RAD    | ITEM#            |
|----------|-----|-----|--------|------------------|
| 12       | 32  | 75  | R1.0   | OP35M-12032R1.0C |
| 12       | 32  | 75  | R1.5   | OP35M-12032R1.5C |
| 12       | 32  | 75  | R2.0   | OP35M-12032R2.0C |
| 12       | 32  | 75  | R3.0   | OP35M-12032R3.0C |
| 12       | 32  | 75  | R4.5   | OP35M-12032R4.5C |
| 16       | 41  | 100 | Square | OP35M-16041R0.0C |
| 16       | 41  | 100 | R0.5   | OP35M-16041R0.5C |
| 16       | 41  | 100 | R1.0   | OP35M-16041R1.0C |
| 16       | 41  | 100 | R1.5   | OP35M-16041R1.5C |
| 16       | 41  | 100 | R2.0   | OP35M-16041R2.0C |
| 16       | 41  | 100 | R3.0   | OP35M-16041R3.0C |
| 16       | 41  | 100 | R4.5   | OP35M-16041R4.5C |
| 16       | 41  | 100 | R6.0   | OP35M-16041R6.0C |
| 20       | 41  | 100 | Square | OP35M-20041R0.0C |
| 20       | 41  | 100 | R0.5   | OP35M-20041R0.5C |
| 20       | 41  | 100 | R1.0   | OP35M-20041R1.0C |
| 20       | 41  | 100 | R1.5   | OP35M-20041R1.5C |
| 20       | 41  | 100 | R2.0   | OP35M-20041R2.0C |
| 20       | 41  | 100 | R3.0   | OP35M-20041R3.0C |
| 20       | 41  | 100 | R4.5   | OP35M-20041R4.5C |
| 20       | 41  | 100 | R6.0   | OP35M-20041R6.0C |
| 25       | 45  | 125 | Square | OP35M-25045R0.0C |
| 25       | 45  | 125 | R0.5   | OP35M-25045R0.5C |
| 25       | 45  | 125 | R1.0   | OP35M-25045R1.0C |
| 25       | 45  | 125 | R1.5   | OP35M-25045R1.5C |
| 25       | 45  | 125 | R2.0   | OP35M-25045R2.0C |
| 25       | 45  | 125 | R3.0   | OP35M-25045R3.0C |
| 25       | 45  | 125 | R4.5   | OP35M-25045R4.5C |
| 25       | 45  | 125 | R6.0   | OP35M-25045R6.0C |



## 3 FLUTE - LONG - DLC



OP36  
LONG INCH DLC

| DIAMETER | LOC   | OAL | RAD    | ITEM#         |
|----------|-------|-----|--------|---------------|
| 1/4      | 1 1/8 | 3   | Square | OP36-1618R000 |
| 1/4      | 1 1/8 | 3   | R.015  | OP36-1618R015 |
| 1/4      | 1 1/8 | 3   | R.030  | OP36-1618R030 |
| 1/4      | 1 1/8 | 3   | R.060  | OP36-1618R060 |
| 1/4      | 1 1/8 | 3   | R.090  | OP36-1618R090 |
| 5/16     | 1 1/8 | 3   | Square | OP36-2018R000 |
| 5/16     | 1 1/8 | 3   | R.015  | OP36-2018R015 |
| 5/16     | 1 1/8 | 3   | R.030  | OP36-2018R030 |
| 5/16     | 1 1/8 | 3   | R.060  | OP36-2018R060 |
| 5/16     | 1 1/8 | 3   | R.090  | OP36-2018R090 |
| 5/16     | 1 1/8 | 3   | R.125  | OP36-2018R125 |
| 3/8      | 1 1/4 | 3   | Square | OP36-2420R000 |
| 3/8      | 1 1/4 | 3   | R.015  | OP36-2420R015 |
| 3/8      | 1 1/4 | 3   | R.030  | OP36-2420R030 |
| 3/8      | 1 1/4 | 3   | R.060  | OP36-2420R060 |
| 3/8      | 1 1/4 | 3   | R.090  | OP36-2420R090 |
| 3/8      | 1 1/4 | 3   | R.125  | OP36-2420R125 |
| 7/16     | 2     | 4   | Square | OP36-2832R000 |
| 7/16     | 2     | 4   | R.015  | OP36-2832R015 |
| 7/16     | 2     | 4   | R.030  | OP36-2832R030 |
| 7/16     | 2     | 4   | R.060  | OP36-2832R060 |
| 7/16     | 2     | 4   | R.090  | OP36-2832R090 |
| 7/16     | 2     | 4   | R.125  | OP36-2832R125 |
| 7/16     | 2     | 4   | R.190  | OP36-2832R190 |
| 1/2      | 2     | 4   | Square | OP36-3232R000 |
| 1/2      | 2     | 4   | R.015  | OP36-3232R015 |
| 1/2      | 2     | 4   | R.030  | OP36-3232R030 |
| 1/2      | 2     | 4   | R.060  | OP36-3232R060 |
| 1/2      | 2     | 4   | R.090  | OP36-3232R090 |
| 1/2      | 2     | 4   | R.125  | OP36-3232R125 |

| DIAMETER | LOC   | OAL | RAD    | ITEM#         |
|----------|-------|-----|--------|---------------|
| 1/2      | 2     | 4   | R.190  | OP36-3232R190 |
| 5/8      | 2 1/4 | 5   | Square | OP36-4036R000 |
| 5/8      | 2 1/4 | 5   | R.015  | OP36-4036R015 |
| 5/8      | 2 1/4 | 5   | R.030  | OP36-4036R030 |
| 5/8      | 2 1/4 | 5   | R.060  | OP36-4036R060 |
| 5/8      | 2 1/4 | 5   | R.090  | OP36-4036R090 |
| 5/8      | 2 1/4 | 5   | R.125  | OP36-4036R125 |
| 5/8      | 2 1/4 | 5   | R.190  | OP36-4036R190 |
| 5/8      | 2 1/4 | 5   | R.250  | OP36-4036R250 |
| 3/4      | 2 5/8 | 5   | Square | OP36-4842R000 |
| 3/4      | 2 5/8 | 5   | R.015  | OP36-4842R015 |
| 3/4      | 2 5/8 | 5   | R.030  | OP36-4842R030 |
| 3/4      | 2 5/8 | 5   | R.060  | OP36-4842R060 |
| 3/4      | 2 5/8 | 5   | R.090  | OP36-4842R090 |
| 3/4      | 2 5/8 | 5   | R.125  | OP36-4842R125 |
| 3/4      | 2 5/8 | 5   | R.190  | OP36-4842R190 |
| 3/4      | 2 5/8 | 5   | R.250  | OP36-4842R250 |
| 1        | 3     | 6   | Square | OP36-6448R000 |
| 1        | 3     | 6   | R.015  | OP36-6448R015 |
| 1        | 3     | 6   | R.030  | OP36-6448R030 |
| 1        | 3     | 6   | R.060  | OP36-6448R060 |
| 1        | 3     | 6   | R.090  | OP36-6448R090 |
| 1        | 3     | 6   | R.125  | OP36-6448R125 |
| 1        | 3     | 6   | R.190  | OP36-6448R190 |
| 1        | 3     | 6   | R.250  | OP36-6448R250 |

## 3 FLUTE - LONG - DLC



OP36M  
LONG METRIC DLC

| DIAMETER | LOC | OAL | RAD    | ITEM#           |
|----------|-----|-----|--------|-----------------|
| 6        | 29  | 75  | Square | OP36M-06029R0.0 |
| 6        | 29  | 75  | R0.5   | OP36M-06029R0.5 |
| 6        | 29  | 75  | R1.0   | OP36M-06029R1.0 |
| 6        | 29  | 75  | R1.5   | OP36M-06029R1.5 |
| 6        | 29  | 75  | R2.0   | OP36M-06029R2.0 |
| 8        | 29  | 75  | Square | OP36M-08029R0.0 |
| 8        | 29  | 75  | R0.5   | OP36M-08029R0.5 |
| 8        | 29  | 75  | R1.0   | OP36M-08029R1.0 |
| 8        | 29  | 75  | R1.5   | OP36M-08029R1.5 |
| 8        | 29  | 75  | R2.0   | OP36M-08029R2.0 |
| 8        | 29  | 75  | R3.0   | OP36M-08029R3.0 |
| 10       | 32  | 75  | Square | OP36M-10032R0.0 |
| 10       | 32  | 75  | R0.5   | OP36M-10032R0.5 |
| 10       | 32  | 75  | R1.0   | OP36M-10032R1.0 |
| 10       | 32  | 75  | R1.5   | OP36M-10032R1.5 |
| 10       | 32  | 75  | R2.0   | OP36M-10032R2.0 |
| 10       | 32  | 75  | R3.0   | OP36M-10032R3.0 |
| 11       | 50  | 100 | Square | OP36M-11050R0.0 |
| 11       | 50  | 100 | R0.5   | OP36M-11050R0.5 |
| 11       | 50  | 100 | R1.0   | OP36M-11050R1.0 |
| 11       | 50  | 100 | R1.5   | OP36M-11050R1.5 |
| 11       | 50  | 100 | R2.0   | OP36M-11050R2.0 |
| 11       | 50  | 100 | R3.0   | OP36M-11050R3.0 |
| 11       | 50  | 100 | R4.5   | OP36M-11050R4.5 |
| 12       | 50  | 100 | Square | OP36M-12050R0.0 |
| 12       | 50  | 100 | R0.5   | OP36M-12050R0.5 |
| 12       | 50  | 100 | R1.0   | OP36M-12050R1.0 |
| 12       | 50  | 100 | R1.5   | OP36M-12050R1.5 |
| 12       | 50  | 100 | R2.0   | OP36M-12050R2.0 |
| 12       | 50  | 100 | R3.0   | OP36M-12050R3.0 |

| DIAMETER | LOC | OAL | RAD    | ITEM#           |
|----------|-----|-----|--------|-----------------|
| 12       | 50  | 100 | R4.5   | OP36M-12050R4.5 |
| 16       | 57  | 125 | Square | OP36M-16057R0.0 |
| 16       | 57  | 125 | R0.5   | OP36M-16057R0.5 |
| 16       | 57  | 125 | R1.0   | OP36M-16057R1.0 |
| 16       | 57  | 125 | R1.5   | OP36M-16057R1.5 |
| 16       | 57  | 125 | R2.0   | OP36M-16057R2.0 |
| 16       | 57  | 125 | R3.0   | OP36M-16057R3.0 |
| 16       | 57  | 125 | R4.5   | OP36M-16057R4.5 |
| 16       | 57  | 125 | R6.0   | OP36M-16057R6.0 |
| 20       | 67  | 125 | Square | OP36M-20067R0.0 |
| 20       | 67  | 125 | R0.5   | OP36M-20067R0.5 |
| 20       | 67  | 125 | R1.0   | OP36M-20067R1.0 |
| 20       | 67  | 125 | R1.5   | OP36M-20067R1.5 |
| 20       | 67  | 125 | R2.0   | OP36M-20067R2.0 |
| 20       | 67  | 125 | R3.0   | OP36M-20067R3.0 |
| 20       | 67  | 125 | R4.5   | OP36M-20067R4.5 |
| 20       | 67  | 125 | R6.0   | OP36M-20067R6.0 |
| 25       | 76  | 150 | Square | OP36M-25076R0.0 |
| 25       | 76  | 150 | R0.5   | OP36M-25076R0.5 |
| 25       | 76  | 150 | R1.0   | OP36M-25076R1.0 |
| 25       | 76  | 150 | R1.5   | OP36M-25076R1.5 |
| 25       | 76  | 150 | R2.0   | OP36M-25076R2.0 |
| 25       | 76  | 150 | R3.0   | OP36M-25076R3.0 |
| 25       | 76  | 150 | R4.5   | OP36M-25076R4.5 |
| 25       | 76  | 150 | R6.0   | OP36M-25076R6.0 |

## 3 FLUTE - LONG - BALL NOSE - DLC



OP36B  
LONG BALL INCH

| DIAMETER | LOC   | OAL | ITEM#          |
|----------|-------|-----|----------------|
| 1/4      | 1 1/8 | 3   | OP36-1618R125B |
| 5/16     | 1 1/8 | 3   | OP36-2018R155B |
| 3/8      | 1 1/4 | 3   | OP36-2420R190B |
| 7/16     | 2     | 4   | OP36-2832R220B |
| 1/2      | 2     | 4   | OP36-3232R250B |
| 5/8      | 2 1/4 | 5   | OP36-4036R310B |
| 3/4      | 2 5/8 | 5   | OP36-4842R375B |
| 1        | 3     | 6   | OP36-6448R500B |

OP36MB  
LONG BALL METRIC

| DIAMETER | LOC | OAL | ITEM#             |
|----------|-----|-----|-------------------|
| 6        | 29  | 75  | OP36M-06029R3.0B  |
| 8        | 29  | 75  | OP36M-08029R4.0B  |
| 10       | 32  | 75  | OP36M-10032R5.0B  |
| 11       | 50  | 100 | OP36M-11050R5.5B  |
| 12       | 50  | 100 | OP36M-12050R6.0B  |
| 16       | 57  | 125 | OP36M-16057R8.0B  |
| 20       | 67  | 125 | OP36M-20067R10.0B |
| 25       | 76  | 150 | OP36M-25076R12.5B |



## 3 FLUTE - LONG - CHIP BREAKER - DLC



OP36C

LONG CHIP BREAKER INCH

| DIAMETER | LOC   | OAL | RAD    | ITEM#          |
|----------|-------|-----|--------|----------------|
| 1/4      | 1 1/8 | 3   | Square | OP36-1618R000C |
| 1/4      | 1 1/8 | 3   | R.015  | OP36-1618R015C |
| 1/4      | 1 1/8 | 3   | R.030  | OP36-1618R030C |
| 1/4      | 1 1/8 | 3   | R.060  | OP36-1618R060C |
| 1/4      | 1 1/8 | 3   | R.090  | OP36-1618R090C |
| 5/16     | 1 1/8 | 3   | Square | OP36-2018R000C |
| 5/16     | 1 1/8 | 3   | R.015  | OP36-2018R015C |
| 5/16     | 1 1/8 | 3   | R.030  | OP36-2018R030C |
| 5/16     | 1 1/8 | 3   | R.060  | OP36-2018R060C |
| 5/16     | 1 1/8 | 3   | R.090  | OP36-2018R090C |
| 5/16     | 1 1/8 | 3   | R.125  | OP36-2018R125C |
| 3/8      | 1 1/4 | 3   | Square | OP36-2420R000C |
| 3/8      | 1 1/4 | 3   | R.015  | OP36-2420R015C |
| 3/8      | 1 1/4 | 3   | R.030  | OP36-2420R030C |
| 3/8      | 1 1/4 | 3   | R.060  | OP36-2420R060C |
| 3/8      | 1 1/4 | 3   | R.090  | OP36-2420R090C |
| 3/8      | 1 1/4 | 3   | R.125  | OP36-2420R125C |
| 7/16     | 2     | 4   | Square | OP36-2832R000C |
| 7/16     | 2     | 4   | R.015  | OP36-2832R015C |
| 7/16     | 2     | 4   | R.030  | OP36-2832R030C |
| 7/16     | 2     | 4   | R.060  | OP36-2832R060C |
| 7/16     | 2     | 4   | R.090  | OP36-2832R090C |
| 7/16     | 2     | 4   | R.125  | OP36-2832R125C |
| 7/16     | 2     | 4   | R.190  | OP36-2832R190C |
| 1/2      | 2     | 4   | Square | OP36-3232R000C |
| 1/2      | 2     | 4   | R.015  | OP36-3232R015C |
| 1/2      | 2     | 4   | R.030  | OP36-3232R030C |
| 1/2      | 2     | 4   | R.060  | OP36-3232R060C |
| 1/2      | 2     | 4   | R.090  | OP36-3232R090C |
| 1/2      | 2     | 4   | R.125  | OP36-3232R125C |

| DIAMETER | LOC   | OAL | RAD    | ITEM#          |
|----------|-------|-----|--------|----------------|
| 1/2      | 2     | 4   | R.190  | OP36-3232R190C |
| 5/8      | 2 1/4 | 5   | Square | OP36-4036R000C |
| 5/8      | 2 1/4 | 5   | R.015  | OP36-4036R015C |
| 5/8      | 2 1/4 | 5   | R.030  | OP36-4036R030C |
| 5/8      | 2 1/4 | 5   | R.060  | OP36-4036R060C |
| 5/8      | 2 1/4 | 5   | R.090  | OP36-4036R090C |
| 5/8      | 2 1/4 | 5   | R.125  | OP36-4036R125C |
| 5/8      | 2 1/4 | 5   | R.190  | OP36-4036R190C |
| 5/8      | 2 1/4 | 5   | R.250  | OP36-4036R250C |
| 3/4      | 2 5/8 | 5   | Square | OP36-4842R000C |
| 3/4      | 2 5/8 | 5   | R.015  | OP36-4842R015C |
| 3/4      | 2 5/8 | 5   | R.030  | OP36-4842R030C |
| 3/4      | 2 5/8 | 5   | R.060  | OP36-4842R060C |
| 3/4      | 2 5/8 | 5   | R.090  | OP36-4842R090C |
| 3/4      | 2 5/8 | 5   | R.125  | OP36-4842R125C |
| 3/4      | 2 5/8 | 5   | R.190  | OP36-4842R190C |
| 3/4      | 2 5/8 | 5   | R.250  | OP36-4842R250C |
| 1        | 3     | 6   | Square | OP36-6448R000C |
| 1        | 3     | 6   | R.015  | OP36-6448R015C |
| 1        | 3     | 6   | R.030  | OP36-6448R030C |
| 1        | 3     | 6   | R.060  | OP36-6448R060C |
| 1        | 3     | 6   | R.090  | OP36-6448R090C |
| 1        | 3     | 6   | R.125  | OP36-6448R125C |
| 1        | 3     | 6   | R.190  | OP36-6448R190C |
| 1        | 3     | 6   | R.250  | OP36-6448R250C |



## 3 FLUTE - LONG - CHIP BREAKER - DLC



OP36MC

LONG CHIP BREAKER METRIC

| DIAMETER | LOC | OAL | RAD    | ITEM#            |
|----------|-----|-----|--------|------------------|
| 6        | 29  | 75  | Square | OP36M-06029R0.0C |
| 6        | 29  | 75  | R0.5   | OP36M-06029R0.5C |
| 6        | 29  | 75  | R1.0   | OP36M-06029R1.0C |
| 6        | 29  | 75  | R1.5   | OP36M-06029R1.5C |
| 6        | 29  | 75  | R2.0   | OP36M-06029R2.0C |
| 8        | 29  | 75  | Square | OP36M-08029R0.0C |
| 8        | 29  | 75  | R0.5   | OP36M-08029R0.5C |
| 8        | 29  | 75  | R1.0   | OP36M-08029R1.0C |
| 8        | 29  | 75  | R1.5   | OP36M-08029R1.5C |
| 8        | 29  | 75  | R2.0   | OP36M-08029R2.0C |
| 8        | 29  | 75  | R3.0   | OP36M-08029R3.0C |
| 10       | 32  | 75  | Square | OP36M-10032R0.0C |
| 10       | 32  | 75  | R0.5   | OP36M-10032R0.5C |
| 10       | 32  | 75  | R1.0   | OP36M-10032R1.0C |
| 10       | 32  | 75  | R1.5   | OP36M-10032R1.5C |
| 10       | 32  | 75  | R2.0   | OP36M-10032R2.0C |
| 10       | 32  | 75  | R3.0   | OP36M-10032R3.0C |
| 11       | 50  | 100 | Square | OP36M-11050R0.0C |
| 11       | 50  | 100 | R0.5   | OP36M-11050R0.5C |
| 11       | 50  | 100 | R1.0   | OP36M-11050R1.0C |
| 11       | 50  | 100 | R1.5   | OP36M-11050R1.5C |
| 11       | 50  | 100 | R2.0   | OP36M-11050R2.0C |
| 11       | 50  | 100 | R3.0   | OP36M-11050R3.0C |
| 11       | 50  | 100 | R4.5   | OP36M-11050R4.5C |
| 12       | 50  | 100 | Square | OP36M-12050R0.0C |
| 12       | 50  | 100 | R0.5   | OP36M-12050R0.5C |
| 12       | 50  | 100 | R1.0   | OP36M-12050R1.0C |
| 12       | 50  | 100 | R1.5   | OP36M-12050R1.5C |
| 12       | 50  | 100 | R2.0   | OP36M-12050R2.0C |
| 12       | 50  | 100 | R3.0   | OP36M-12050R3.0C |

| DIAMETER | LOC | OAL | RAD    | ITEM#            |
|----------|-----|-----|--------|------------------|
| 12       | 50  | 100 | R4.5   | OP36M-12050R4.5C |
| 16       | 57  | 125 | Square | OP36M-16057R0.0C |
| 16       | 57  | 125 | R0.5   | OP36M-16057R0.5C |
| 16       | 57  | 125 | R1.0   | OP36M-16057R1.0C |
| 16       | 57  | 125 | R1.5   | OP36M-16057R1.5C |
| 16       | 57  | 125 | R2.0   | OP36M-16057R2.0C |
| 16       | 57  | 125 | R3.0   | OP36M-16057R3.0C |
| 16       | 57  | 125 | R4.5   | OP36M-16057R4.5C |
| 16       | 57  | 125 | R6.0   | OP36M-16057R6.0C |
| 20       | 67  | 125 | Square | OP36M-20067R0.0C |
| 20       | 67  | 125 | R0.5   | OP36M-20067R0.5C |
| 20       | 67  | 125 | R1.0   | OP36M-20067R1.0C |
| 20       | 67  | 125 | R1.5   | OP36M-20067R1.5C |
| 20       | 67  | 125 | R2.0   | OP36M-20067R2.0C |
| 20       | 67  | 125 | R3.0   | OP36M-20067R3.0C |
| 20       | 67  | 125 | R4.5   | OP36M-20067R4.5C |
| 20       | 67  | 125 | R6.0   | OP36M-20067R6.0C |
| 25       | 76  | 150 | Square | OP36M-25076R0.0C |
| 25       | 76  | 150 | R0.5   | OP36M-25076R0.5C |
| 25       | 76  | 150 | R1.0   | OP36M-25076R1.0C |
| 25       | 76  | 150 | R1.5   | OP36M-25076R1.5C |
| 25       | 76  | 150 | R2.0   | OP36M-25076R2.0C |
| 25       | 76  | 150 | R3.0   | OP36M-25076R3.0C |
| 25       | 76  | 150 | R4.5   | OP36M-25076R4.5C |
| 25       | 76  | 150 | R6.0   | OP36M-25076R6.0C |

# OPSN 3 FLUTE CENTER CUTTING

Best used for Aluminum and soft alloys like brass and copper

## SPECIAL FEATURES

### DOUBLE RAKE

Double rake improved chip evacuation for high machining.

### 3 FLUTE CENTER CUTTING

Allows the tool to do plunging and ramping while machining.

### UNEQUAL INDEXING

Eliminates tool vibrations around tool circumference by spreading cutting forces unevenly for a more stable cutting.

### WIPER FLAT

Small flat spot on top of tool to enhance surface finish of the machined part.

### EDGE PREP

Make the cutting edge of the tool more uniform, which help the tool to machine better and faster.

### POLISHED

Prevent chips from sticking inside the tool, enhancing material removal rate and machining speeds.



## 3 FLUTE - CENTER CUTTING - POLISHED



OPSN  
REGULAR INCH

| DIAMETER | LOC     | OAL     | RAD  | ITEM#         |
|----------|---------|---------|------|---------------|
| 1/8      | 1/2     | 2       | R000 | OPSN-0808R000 |
| 1/8      | 1/2     | 2       | R015 | OPSN-0808R015 |
| 1/8      | 3/4     | 2 - 1/2 | R000 | OPSN-0812R000 |
| 1/8      | 3/4     | 2 - 1/2 | R015 | OPSN-0812R015 |
| 3/16     | 5/8     | 3       | R000 | OPSN-1210R000 |
| 3/16     | 5/8     | 3       | R015 | OPSN-1210R015 |
| 3/16     | 5/8     | 3       | R030 | OPSN-1210R030 |
| 3/16     | 5/8     | 3       | R060 | OPSN-1210R060 |
| 3/16     | 3/4     | 3       | R000 | OPSN-1212R000 |
| 3/16     | 3/4     | 3       | R015 | OPSN-1212R015 |
| 3/16     | 3/4     | 3       | R030 | OPSN-1212R030 |
| 3/16     | 3/4     | 3       | R060 | OPSN-1212R060 |
| 1/4      | 3/4     | 3       | R000 | OPSN-1612R000 |
| 1/4      | 3/4     | 3       | R015 | OPSN-1612R015 |
| 1/4      | 3/4     | 3       | R030 | OPSN-1612R030 |
| 1/4      | 3/4     | 3       | R060 | OPSN-1612R060 |
| 1/4      | 3/4     | 3       | R090 | OPSN-1612R090 |
| 1/4      | 1 - 1/4 | 3       | R000 | OPSN-1620R000 |
| 1/4      | 1 - 1/4 | 3       | R015 | OPSN-1620R015 |
| 1/4      | 1 - 1/4 | 3       | R030 | OPSN-1620R030 |
| 1/4      | 1 - 1/4 | 3       | R060 | OPSN-1620R060 |
| 1/4      | 1 - 1/4 | 3       | R090 | OPSN-1620R090 |
| 5/16     | 13/16   | 3       | R000 | OPSN-2013R000 |
| 5/16     | 13/16   | 3       | R015 | OPSN-2013R015 |
| 5/16     | 13/16   | 3       | R030 | OPSN-2013R030 |
| 5/16     | 13/16   | 3       | R060 | OPSN-2013R060 |
| 5/16     | 13/16   | 3       | R090 | OPSN-2013R090 |
| 5/16     | 13/16   | 3       | R125 | OPSN-2013R125 |
| 5/16     | 1 - 3/8 | 3       | R000 | OPSN-2022R000 |
| 5/16     | 1 - 3/8 | 3       | R015 | OPSN-2022R015 |
| 5/16     | 1 - 3/8 | 3       | R030 | OPSN-2022R030 |
| 5/16     | 1 - 3/8 | 3       | R060 | OPSN-2022R060 |
| 5/16     | 1 - 3/8 | 3       | R090 | OPSN-2022R090 |
| 5/16     | 1 - 3/8 | 3       | R125 | OPSN-2022R125 |
| 3/8      | 1       | 3       | R000 | OPSN-2416R000 |
| 3/8      | 1       | 3       | R015 | OPSN-2416R015 |

| DIAMETER | LOC     | OAL | RAD  | ITEM#         |
|----------|---------|-----|------|---------------|
| 3/8      | 1       | 3   | R030 | OPSN-2416R030 |
| 3/8      | 1       | 3   | R060 | OPSN-2416R060 |
| 3/8      | 1       | 3   | R090 | OPSN-2416R090 |
| 3/8      | 1       | 3   | R125 | OPSN-2416R125 |
| 3/8      | 1 - 1/2 | 4   | R000 | OPSN-2424R000 |
| 3/8      | 1 - 1/2 | 4   | R015 | OPSN-2424R015 |
| 3/8      | 1 - 1/2 | 4   | R030 | OPSN-2424R030 |
| 3/8      | 1 - 1/2 | 4   | R060 | OPSN-2424R060 |
| 3/8      | 1 - 1/2 | 4   | R090 | OPSN-2424R090 |
| 3/8      | 1 - 1/2 | 4   | R125 | OPSN-2424R125 |
| 1/2      | 1 - 1/4 | 3   | R000 | OPSN-3220R000 |
| 1/2      | 1 - 1/4 | 3   | R015 | OPSN-3220R015 |
| 1/2      | 1 - 1/4 | 3   | R030 | OPSN-3220R030 |
| 1/2      | 1 - 1/4 | 3   | R060 | OPSN-3220R060 |
| 1/2      | 1 - 1/4 | 3   | R090 | OPSN-3220R090 |
| 1/2      | 1 - 1/4 | 3   | R125 | OPSN-3220R125 |
| 1/2      | 1 - 1/4 | 3   | R190 | OPSN-3220R190 |
| 1/2      | 2       | 4   | R000 | OPSN-3232R000 |
| 1/2      | 2       | 4   | R015 | OPSN-3232R015 |
| 1/2      | 2       | 4   | R030 | OPSN-3232R030 |
| 1/2      | 2       | 4   | R060 | OPSN-3232R060 |
| 1/2      | 2       | 4   | R090 | OPSN-3232R090 |
| 1/2      | 2       | 4   | R125 | OPSN-3232R125 |
| 1/2      | 2       | 4   | R190 | OPSN-3232R190 |
| 5/8      | 1 - 5/8 | 4   | R000 | OPSN-4026R000 |
| 5/8      | 1 - 5/8 | 4   | R015 | OPSN-4026R015 |
| 5/8      | 1 - 5/8 | 4   | R030 | OPSN-4026R030 |
| 5/8      | 1 - 5/8 | 4   | R060 | OPSN-4026R060 |
| 5/8      | 1 - 5/8 | 4   | R090 | OPSN-4026R090 |
| 5/8      | 1 - 5/8 | 4   | R125 | OPSN-4026R125 |
| 5/8      | 1 - 5/8 | 4   | R190 | OPSN-4026R190 |
| 5/8      | 1 - 5/8 | 4   | R250 | OPSN-4026R250 |
| 5/8      | 2 - 3/8 | 5   | R000 | OPSN-4038R000 |
| 5/8      | 2 - 3/8 | 5   | R015 | OPSN-4038R015 |
| 5/8      | 2 - 3/8 | 5   | R030 | OPSN-4038R030 |
| 5/8      | 2 - 3/8 | 5   | R060 | OPSN-4038R060 |

## 3 FLUTE - CENTER CUTTING - POLISHED



OPSN  
REGULAR INCH

| DIAMETER | LOC       | OAL | RAD  | ITEM#         |
|----------|-----------|-----|------|---------------|
| 5 / 8    | 2 - 3 / 8 | 5   | R090 | OPSN-4038R090 |
| 5 / 8    | 2 - 3 / 8 | 5   | R125 | OPSN-4038R125 |
| 5 / 8    | 2 - 3 / 8 | 5   | R190 | OPSN-4038R190 |
| 5 / 8    | 2 - 3 / 8 | 5   | R250 | OPSN-4038R250 |
| 3 / 4    | 1 - 3 / 4 | 4   | R000 | OPSN-4828R000 |
| 3 / 4    | 1 - 3 / 4 | 4   | R015 | OPSN-4828R015 |
| 3 / 4    | 1 - 3 / 4 | 4   | R030 | OPSN-4828R030 |
| 3 / 4    | 1 - 3 / 4 | 4   | R060 | OPSN-4828R060 |
| 3 / 4    | 1 - 3 / 4 | 4   | R090 | OPSN-4828R090 |
| 3 / 4    | 1 - 3 / 4 | 4   | R125 | OPSN-4828R125 |
| 3 / 4    | 1 - 3 / 4 | 4   | R190 | OPSN-4828R190 |
| 3 / 4    | 1 - 3 / 4 | 4   | R250 | OPSN-4828R250 |
| 3 / 4    | 2 - 1 / 2 | 5   | R000 | OPSN-4840R000 |
| 3 / 4    | 2 - 1 / 2 | 5   | R015 | OPSN-4840R015 |
| 3 / 4    | 2 - 1 / 2 | 5   | R030 | OPSN-4840R030 |
| 3 / 4    | 2 - 1 / 2 | 5   | R060 | OPSN-4840R060 |
| 3 / 4    | 2 - 1 / 2 | 5   | R090 | OPSN-4840R090 |
| 3 / 4    | 2 - 1 / 2 | 5   | R125 | OPSN-4840R125 |
| 3 / 4    | 2 - 1 / 2 | 5   | R190 | OPSN-4840R190 |
| 3 / 4    | 2 - 1 / 2 | 5   | R250 | OPSN-4840R250 |
| 1        | 1 - 3 / 4 | 4   | R000 | OPSN-6428R000 |
| 1        | 1 - 3 / 4 | 4   | R015 | OPSN-6428R015 |
| 1        | 1 - 3 / 4 | 4   | R030 | OPSN-6428R030 |
| 1        | 1 - 3 / 4 | 4   | R060 | OPSN-6428R060 |
| 1        | 1 - 3 / 4 | 4   | R090 | OPSN-6428R090 |
| 1        | 1 - 3 / 4 | 4   | R125 | OPSN-6428R125 |
| 1        | 1 - 3 / 4 | 4   | R190 | OPSN-6428R190 |
| 1        | 1 - 3 / 4 | 4   | R250 | OPSN-6428R250 |
| 1        | 2 - 1 / 4 | 5   | R000 | OPSN-6436R000 |
| 1        | 2 - 1 / 4 | 5   | R015 | OPSN-6436R015 |
| 1        | 2 - 1 / 4 | 5   | R030 | OPSN-6436R030 |
| 1        | 2 - 1 / 4 | 5   | R060 | OPSN-6436R060 |
| 1        | 2 - 1 / 4 | 5   | R090 | OPSN-6436R090 |
| 1        | 2 - 1 / 4 | 5   | R125 | OPSN-6436R125 |
| 1        | 2 - 1 / 4 | 5   | R190 | OPSN-6436R190 |
| 1        | 2 - 1 / 4 | 5   | R250 | OPSN-6436R250 |



## 3 FLUTE - CENTER CUTTING - POLISHED



OPSNM  
REGULAR METRIC

| DIAMETER | LOC | OAL | RAD   | ITEM#            |
|----------|-----|-----|-------|------------------|
| 3        | 12  | 50  | R0.0  | OPSNM-03012R0.0  |
| 3        | 12  | 50  | R0.5  | OPSNM-03012R0.5  |
| 5        | 16  | 75  | R0.0  | OPSNM-05016R0.0  |
| 5        | 16  | 75  | R0.5  | OPSNM-05016R0.5  |
| 5        | 16  | 75  | R1.0  | OPSNM-05016R1.0  |
| 5        | 16  | 75  | R1.5  | OPSNM-05016R1.5  |
| 6        | 19  | 75  | R0.0  | OPSNM-06019R0.0  |
| 6        | 19  | 75  | R0.5  | OPSNM-06019R0.5  |
| 6        | 19  | 75  | R1.0  | OPSNM-06019R1.0  |
| 6        | 19  | 75  | R1.5  | OPSNM-06019R1.5  |
| 6        | 19  | 75  | R2.0  | OPSNM-06019R2.0  |
| 8        | 20  | 75  | R0.0  | OPSNM-08020R0.0  |
| 8        | 20  | 75  | R0.5  | OPSNM-08020R0.5  |
| 8        | 20  | 75  | R1.0  | OPSNM-08020R1.0  |
| 8        | 20  | 75  | R1.5  | OPSNM-08020R1.5  |
| 8        | 20  | 75  | R2.0  | OPSNM-08020R2.0  |
| 8        | 20  | 75  | R3.0  | OPSNM-08020R3.0  |
| 10       | 25  | 75  | R0.0  | OPSNM-10022R0.0  |
| 10       | 25  | 75  | R0.5  | OPSNM-10022R0.5  |
| 10       | 25  | 75  | R1.0  | OPSNM-10022R1.0  |
| 10       | 25  | 75  | R1.5  | OPSNM-10022R1.5  |
| 10       | 25  | 75  | R2.0  | OPSNM-10022R2.0  |
| 10       | 25  | 75  | R3.0  | OPSNM-10022R3.0  |
| 10       | 38  | 100 | R0.0  | OPSNM-10038R0.0  |
| 10       | 38  | 100 | R0.10 | OPSNM-10038R0.10 |
| 10       | 38  | 100 | R0.15 | OPSNM-10038R0.15 |
| 10       | 38  | 100 | R0.20 | OPSNM-10038R0.20 |
| 10       | 38  | 100 | R0.25 | OPSNM-10038R0.25 |
| 10       | 38  | 100 | R0.30 | OPSNM-10038R0.30 |
| 10       | 38  | 100 | R0.35 | OPSNM-10038R0.35 |
| 10       | 38  | 100 | R0.40 | OPSNM-10038R0.40 |
| 10       | 38  | 100 | R0.45 | OPSNM-10038R0.45 |
| 10       | 38  | 100 | R0.5  | OPSNM-10038R0.5  |
| 10       | 38  | 100 | R0.50 | OPSNM-10038R0.50 |
| 10       | 38  | 100 | R0.55 | OPSNM-10038R0.55 |
| 10       | 38  | 100 | R0.60 | OPSNM-10038R0.60 |

| DIAMETER | LOC | OAL | RAD   | ITEM#            |
|----------|-----|-----|-------|------------------|
| 10       | 38  | 100 | R0.65 | OPSNM-10038R0.65 |
| 10       | 38  | 100 | R0.70 | OPSNM-10038R0.70 |
| 10       | 38  | 100 | R0.75 | OPSNM-10038R0.75 |
| 10       | 38  | 100 | R1.0  | OPSNM-10038R1.0  |
| 10       | 38  | 100 | R1.10 | OPSNM-10038R1.10 |
| 10       | 38  | 100 | R1.15 | OPSNM-10038R1.15 |
| 10       | 38  | 100 | R1.20 | OPSNM-10038R1.20 |
| 10       | 38  | 100 | R1.25 | OPSNM-10038R1.25 |
| 10       | 38  | 100 | R1.30 | OPSNM-10038R1.30 |
| 10       | 38  | 100 | R1.35 | OPSNM-10038R1.35 |
| 10       | 38  | 100 | R1.40 | OPSNM-10038R1.40 |
| 10       | 38  | 100 | R1.45 | OPSNM-10038R1.45 |
| 10       | 38  | 100 | R1.5  | OPSNM-10038R1.5  |
| 10       | 38  | 100 | R1.50 | OPSNM-10038R1.50 |
| 10       | 38  | 100 | R1.55 | OPSNM-10038R1.55 |
| 10       | 38  | 100 | R1.60 | OPSNM-10038R1.60 |
| 10       | 38  | 100 | R1.65 | OPSNM-10038R1.65 |
| 10       | 38  | 100 | R1.70 | OPSNM-10038R1.70 |
| 10       | 38  | 100 | R1.75 | OPSNM-10038R1.75 |
| 10       | 38  | 100 | R2.0  | OPSNM-10038R2.0  |
| 10       | 38  | 100 | R2.1  | OPSNM-10038R2.1  |
| 10       | 38  | 100 | R2.2  | OPSNM-10038R2.2  |
| 10       | 38  | 100 | R2.3  | OPSNM-10038R2.3  |
| 10       | 38  | 100 | R2.4  | OPSNM-10038R2.4  |
| 10       | 38  | 100 | R2.5  | OPSNM-10038R2.5  |
| 10       | 38  | 100 | R2.6  | OPSNM-10038R2.6  |
| 10       | 38  | 100 | R2.7  | OPSNM-10038R2.7  |
| 10       | 38  | 100 | R3.0  | OPSNM-10038R3.0  |
| 10       | 38  | 100 | R3.1  | OPSNM-10038R3.1  |
| 10       | 38  | 100 | R3.2  | OPSNM-10038R3.2  |
| 10       | 38  | 100 | R3.3  | OPSNM-10038R3.3  |
| 10       | 38  | 100 | R3.4  | OPSNM-10038R3.4  |
| 10       | 38  | 100 | R3.5  | OPSNM-10038R3.5  |
| 10       | 38  | 100 | R3.6  | OPSNM-10038R3.6  |
| 12       | 32  | 75  | R0.0  | OPSNM-12025R0.0  |
| 12       | 32  | 75  | R0.5  | OPSNM-12025R0.5  |

## 3 FLUTE - CENTER CUTTING - CHIP BREAKER - POLISHED



OPSNC  
REGULAR INCH

| DIAMETER | LOC       | OAL | RAD  | ITEM#          |
|----------|-----------|-----|------|----------------|
| 5 / 16   | 13 / 16   | 3   | R000 | OPSN-2013R000C |
| 5 / 16   | 13 / 16   | 3   | R030 | OPSN-2013R030C |
| 5 / 16   | 13 / 16   | 3   | R060 | OPSN-2013R060C |
| 5 / 16   | 1 - 3 / 8 | 3   | R000 | OPSN-2022R000C |
| 5 / 16   | 1 - 3 / 8 | 3   | R030 | OPSN-2022R030C |
| 5 / 16   | 1 - 3 / 8 | 3   | R060 | OPSN-2022R060C |
| 3 / 8    | 1         | 3   | R000 | OPSN-2416R000C |
| 3 / 8    | 1         | 3   | R030 | OPSN-2416R030C |
| 3 / 8    | 1         | 3   | R060 | OPSN-2416R060C |
| 3 / 8    | 1 - 1 / 2 | 4   | R000 | OPSN-2424R000C |
| 3 / 8    | 1 - 1 / 2 | 4   | R030 | OPSN-2424R030C |
| 3 / 8    | 1 - 1 / 2 | 4   | R060 | OPSN-2424R060C |
| 1 / 2    | 1 - 1 / 4 | 3   | R000 | OPSN-3220R000C |
| 1 / 2    | 1 - 1 / 4 | 3   | R030 | OPSN-3220R030C |
| 1 / 2    | 1 - 1 / 4 | 3   | R060 | OPSN-3220R060C |
| 1 / 2    | 2         | 4   | R000 | OPSN-3232R000C |
| 1 / 2    | 2         | 4   | R030 | OPSN-3232R030C |
| 1 / 2    | 2         | 4   | R060 | OPSN-3232R060C |
| 5 / 8    | 1 - 5 / 8 | 4   | R000 | OPSN-4026R000C |
| 5 / 8    | 1 - 5 / 8 | 4   | R030 | OPSN-4026R030C |
| 5 / 8    | 1 - 5 / 8 | 4   | R060 | OPSN-4026R060C |
| 5 / 8    | 2 - 3 / 8 | 5   | R000 | OPSN-4038R000C |
| 5 / 8    | 2 - 3 / 8 | 5   | R030 | OPSN-4038R030C |
| 5 / 8    | 2 - 3 / 8 | 5   | R060 | OPSN-4038R060C |
| 3 / 4    | 1 - 3 / 4 | 4   | R000 | OPSN-4828R000C |
| 3 / 4    | 1 - 3 / 4 | 4   | R030 | OPSN-4828R030C |
| 3 / 4    | 1 - 3 / 4 | 4   | R060 | OPSN-4828R060C |
| 3 / 4    | 2 - 1 / 2 | 5   | R000 | OPSN-4840R000C |
| 3 / 4    | 2 - 1 / 2 | 5   | R030 | OPSN-4840R030C |
| 3 / 4    | 2 - 1 / 2 | 5   | R060 | OPSN-4840R060C |
| 1        | 1 - 3 / 4 | 4   | R000 | OPSN-6428R000C |
| 1        | 1 - 3 / 4 | 4   | R030 | OPSN-6428R030C |
| 1        | 1 - 3 / 4 | 4   | R060 | OPSN-6428R060C |
| 1        | 2 - 1 / 4 | 5   | R000 | OPSN-6436R000C |
| 1        | 2 - 1 / 4 | 5   | R030 | OPSN-6436R030C |
| 1        | 2 - 1 / 4 | 5   | R060 | OPSN-6436R060C |

## 3 FLUTE - CENTERCUTTING - CHIP BREAKER - POLISHED



OPSNMC  
REGULAR METRIC

| DIAMETER | LOC | OAL | RAD  | ITEM#            |
|----------|-----|-----|------|------------------|
| 10       | 38  | 100 | R0.0 | OPSNM-10038R0.0C |
| 10       | 38  | 100 | R0.1 | OPSNM-10038R0.1C |
| 10       | 38  | 100 | R0.2 | OPSNM-10038R0.2C |
| 10       | 38  | 100 | R0.3 | OPSNM-10038R0.3C |
| 10       | 38  | 100 | R0.4 | OPSNM-10038R0.4C |
| 10       | 38  | 100 | R0.5 | OPSNM-10038R0.5C |
| 10       | 38  | 100 | R0.6 | OPSNM-10038R0.6C |
| 10       | 25  | 75  | R0.0 | OPSNM-10022R0.0C |
| 10       | 25  | 75  | R1.0 | OPSNM-10022R1.0C |
| 10       | 25  | 75  | R1.5 | OPSNM-10022R1.5C |
| 12       | 32  | 75  | R0.0 | OPSNM-12025R0.0C |
| 12       | 32  | 75  | R1.0 | OPSNM-12025R1.0C |
| 12       | 32  | 75  | R1.5 | OPSNM-12025R1.5C |
| 16       | 40  | 100 | R0.0 | OPSNM-16032R0.0C |
| 16       | 40  | 100 | R1.0 | OPSNM-16032R1.0C |
| 16       | 40  | 100 | R1.5 | OPSNM-16032R1.5C |
| 20       | 45  | 100 | R0.0 | OPSNM-20038R0.0C |
| 20       | 45  | 100 | R1.0 | OPSNM-20038R1.0C |
| 20       | 45  | 100 | R1.5 | OPSNM-20038R1.5C |
| 25       | 45  | 100 | R0.0 | OPSNM-25038R0.0C |
| 25       | 45  | 100 | R1.0 | OPSNM-25038R1.0C |
| 25       | 45  | 100 | R1.5 | OPSNM-25038R1.5C |
| 8        | 20  | 75  | R0.0 | OPSNM-08020R0.0C |
| 8        | 20  | 75  | R1.0 | OPSNM-08020R1.0C |
| 8        | 20  | 75  | R1.5 | OPSNM-08020R1.5C |

**3 FLUTE - CENTER CUTTING - LONG REACH - POLISHED**



OPSN  
LONG REACH INCH

| DIAMETER | REACH     | LOC   | OAL | RAD  | ITEM#              |
|----------|-----------|-------|-----|------|--------------------|
| 1 / 4    | 1 - 1 / 4 | 3 / 8 | 4   | R000 | OPSN-1606R000N125  |
| 1 / 4    | 1 - 1 / 4 | 3 / 8 | 4   | R020 | OPSN-1606R020N125  |
| 3 / 8    | 1 - 7 / 8 | 1 / 2 | 4   | R000 | OPSN-2408R000N1875 |
| 3 / 8    | 1 - 7 / 8 | 1 / 2 | 4   | R020 | OPSN-2408R020N1875 |
| 1 / 2    | 2 - 1 / 4 | 5 / 8 | 4   | R000 | OPSN-3210R000N225  |
| 1 / 2    | 2 - 1 / 4 | 5 / 8 | 4   | R030 | OPSN-3210R030N225  |
| 5 / 8    | 2 - 1 / 4 | 3 / 4 | 4   | R000 | OPSN-4012R000N225  |
| 5 / 8    | 3 - 1 / 4 | 3 / 4 | 5   | R000 | OPSN-4012R000N325  |
| 5 / 8    | 2 - 1 / 4 | 3 / 4 | 4   | R040 | OPSN-4012R040N225  |
| 5 / 8    | 3 - 1 / 4 | 3 / 4 | 5   | R040 | OPSN-4012R040N325  |
| 3 / 4    | 2 - 1 / 4 | 1     | 4   | R000 | OPSN-4816R000N225  |
| 3 / 4    | 3 - 1 / 4 | 1     | 6   | R000 | OPSN-4816R000N325  |
| 3 / 4    | 2 - 1 / 4 | 1     | 4   | R040 | OPSN-4816R040N225  |
| 3 / 4    | 3 - 1 / 4 | 1     | 6   | R040 | OPSN-4816R040N325  |



## 3 FLUTE - CENTER CUTTING - LONG REACH - POLISHED



OPSNMC  
LONG REACH METRIC

| DIAMETER | REACH | LOC | OAL | RAD  | ITEM#              |
|----------|-------|-----|-----|------|--------------------|
| 6        | 32    | 9   | 100 | R0.0 | OPSNM-06009R0.0N32 |
| 6        | 32    | 9   | 100 | R0.5 | OPSNM-06009R0.5N32 |
| 10       | 48    | 12  | 100 | R0.0 | OPSNM-10012R0.0N48 |
| 10       | 48    | 12  | 100 | R0.5 | OPSNM-10012R0.5N48 |
| 12       | 57    | 16  | 100 | R0.0 | OPSNM-12016R0.0N57 |
| 12       | 57    | 16  | 100 | R1.0 | OPSNM-12016R1.0N57 |
| 16       | 57    | 19  | 100 | R0.0 | OPSNM-16019R0.0N57 |
| 16       | 83    | 19  | 125 | R0.0 | OPSNM-16019R0.0N83 |
| 16       | 57    | 19  | 100 | R1.5 | OPSNM-16019R1.5N57 |
| 16       | 83    | 19  | 125 | R1.5 | OPSNM-16019R1.5N83 |
| 20       | 57    | 25  | 100 | R0.0 | OPSNM-20025R0.0N57 |
| 20       | 83    | 25  | 150 | R0.0 | OPSNM-20025R0.0N83 |
| 20       | 57    | 25  | 100 | R1.5 | OPSNM-20025R1.5N57 |
| 20       | 83    | 25  | 150 | R1.5 | OPSNM-20025R1.5N83 |

**3 FLUTE - CENTER CUTTING - LONG REACH - CHIP BREAKER - POLISHED**



OPSNC  
LONG REACH CHIP BREAKER INCH

| DIAMETER | REACH     | LOC   | OAL | RAD  | ITEM#               |
|----------|-----------|-------|-----|------|---------------------|
| 3 / 8    | 1 - 7 / 8 | 1 / 2 | 4   | R000 | OPSN-2408R000CN1875 |
| 3 / 8    | 1 - 7 / 8 | 1 / 2 | 4   | R020 | OPSN-2408R020CN1875 |
| 1 / 2    | 2 - 1 / 4 | 5 / 8 | 4   | R000 | OPSN-3210R000CN225  |
| 1 / 2    | 2 - 1 / 4 | 5 / 8 | 4   | R030 | OPSN-3210R030CN225  |
| 5 / 8    | 2 - 1 / 4 | 3 / 4 | 4   | R000 | OPSN-4012R000CN225  |
| 5 / 8    | 3 - 1 / 4 | 3 / 4 | 5   | R000 | OPSN-4012R000CN325  |
| 3 / 4    | 2 - 1 / 4 | 1     | 4   | R000 | OPSN-4816R000CN225  |
| 3 / 4    | 3 - 1 / 4 | 1     | 6   | R000 | OPSN-4816R000CN325  |

**3 FLUTE - CENTER CUTTING - LONG REACH - CHIP BREAKER - POLISHED**



OPSNMC  
LONG REACH CHIP BREAKER METRIC

| DIAMETER | REACH | LOC | OAL | RAD  | ITEM#               |
|----------|-------|-----|-----|------|---------------------|
| 10       | 48    | 12  | 100 | R0.0 | OPSNM-10012R0.0CN48 |
| 10       | 48    | 12  | 100 | R1.0 | OPSNM-10012R1.0CN48 |
| 12       | 57    | 16  | 100 | R0.0 | OPSNM-12016R0.0CN57 |
| 12       | 57    | 16  | 100 | R1.5 | OPSNM-12016R1.5CN57 |
| 16       | 57    | 19  | 100 | R0.0 | OPSNM-16019R0.0CN57 |
| 16       | 83    | 19  | 125 | R0.0 | OPSNM-16019R0.0CN83 |
| 20       | 57    | 25  | 100 | R0.0 | OPSNM-20025R0.0CN57 |
| 20       | 83    | 25  | 150 | R0.0 | OPSNM-20025R0.0CN83 |

# OP4 ENDMILLS

Best used for Steel, Stainless and Exotics material

## SPECIAL FEATURES

### UNEQUAL INDEXING

Eliminates tool vibrations around tool circumference by spreading cutting forces unevenly for a more stable cutting.

### VARIABLE HELIX

Breaks up harmonic vibrations (chatter) along the length and improves surface finish and tool life.

### CORE TAPER

Makes the tool more rigid, resisting higher shearing force when fully engaged in the material.

### TANGENTIAL RADIUS

Allows a smooth blending radius on the machined part, improving the manufacturing times by avoiding the finishing process.

### nACRo PVD COATING

Offers a higher cutting edge resistance to wear and higher heat tolerance.





## 4 FLUTE - STUB



### OP40 STUB INCH

| DIAMETER | LOC  | OAL | RAD    | ITEM#         |
|----------|------|-----|--------|---------------|
| 1/8      | 1/4  | 2   | Square | OP40-0804R000 |
| 1/8      | 1/4  | 2   | R.015  | OP40-0804R015 |
| 1/8      | 1/4  | 2   | R.030  | OP40-0804R030 |
| 3/16     | 3/8  | 3   | Square | OP40-1206R000 |
| 3/16     | 3/8  | 3   | R.015  | OP40-1206R015 |
| 3/16     | 3/8  | 3   | R.030  | OP40-1206R030 |
| 3/16     | 3/8  | 3   | R.060  | OP40-1206R060 |
| 1/4      | 3/8  | 3   | Square | OP40-1606R000 |
| 1/4      | 3/8  | 3   | R.015  | OP40-1606R015 |
| 1/4      | 3/8  | 3   | R.030  | OP40-1606R030 |
| 1/4      | 3/8  | 3   | R.060  | OP40-1606R060 |
| 1/4      | 3/8  | 3   | R.090  | OP40-1606R090 |
| 5/16     | 7/16 | 3   | Square | OP40-2007R000 |
| 5/16     | 7/16 | 3   | R.015  | OP40-2007R015 |
| 5/16     | 7/16 | 3   | R.030  | OP40-2007R030 |
| 5/16     | 7/16 | 3   | R.060  | OP40-2007R060 |
| 5/16     | 7/16 | 3   | R.090  | OP40-2007R090 |
| 5/16     | 7/16 | 3   | R.125  | OP40-2007R125 |
| 3/8      | 1/2  | 3   | Square | OP40-2408R000 |
| 3/8      | 1/2  | 3   | R.015  | OP40-2408R015 |
| 3/8      | 1/2  | 3   | R.030  | OP40-2408R030 |
| 3/8      | 1/2  | 3   | R.060  | OP40-2408R060 |
| 3/8      | 1/2  | 3   | R.090  | OP40-2408R090 |
| 3/8      | 1/2  | 3   | R.125  | OP40-2408R125 |
| 7/16     | 5/8  | 3   | Square | OP40-2810R000 |
| 7/16     | 5/8  | 3   | R.015  | OP40-2810R015 |
| 7/16     | 5/8  | 3   | R.030  | OP40-2810R030 |
| 7/16     | 5/8  | 3   | R.060  | OP40-2810R060 |
| 7/16     | 5/8  | 3   | R.090  | OP40-2810R090 |
| 7/16     | 5/8  | 3   | R.125  | OP40-2810R125 |

| DIAMETER | LOC | OAL | RAD    | ITEM#         |
|----------|-----|-----|--------|---------------|
| 7/16     | 5/8 | 3   | R.190  | OP40-2810R190 |
| 1/2      | 5/8 | 3   | Square | OP40-3210R000 |
| 1/2      | 5/8 | 3   | R.015  | OP40-3210R015 |
| 1/2      | 5/8 | 3   | R.030  | OP40-3210R030 |
| 1/2      | 5/8 | 3   | R.060  | OP40-3210R060 |
| 1/2      | 5/8 | 3   | R.090  | OP40-3210R090 |
| 1/2      | 5/8 | 3   | R.125  | OP40-3210R125 |
| 1/2      | 5/8 | 3   | R.190  | OP40-3210R190 |
| 5/8      | 3/4 | 4   | Square | OP40-4012R000 |
| 5/8      | 3/4 | 4   | R.015  | OP40-4012R015 |
| 5/8      | 3/4 | 4   | R.030  | OP40-4012R030 |
| 5/8      | 3/4 | 4   | R.060  | OP40-4012R060 |
| 5/8      | 3/4 | 4   | R.090  | OP40-4012R090 |
| 5/8      | 3/4 | 4   | R.125  | OP40-4012R125 |
| 5/8      | 3/4 | 4   | R.190  | OP40-4012R190 |
| 5/8      | 3/4 | 4   | R.250  | OP40-4012R250 |
| 3/4      | 3/4 | 4   | Square | OP40-4812R000 |
| 3/4      | 3/4 | 4   | R.015  | OP40-4812R015 |
| 3/4      | 3/4 | 4   | R.030  | OP40-4812R030 |
| 3/4      | 3/4 | 4   | R.060  | OP40-4812R060 |
| 3/4      | 3/4 | 4   | R.090  | OP40-4812R090 |
| 3/4      | 3/4 | 4   | R.125  | OP40-4812R125 |
| 3/4      | 3/4 | 4   | R.190  | OP40-4812R190 |
| 3/4      | 3/4 | 4   | R.250  | OP40-4812R250 |

## 4 FLUTE - STUB



OP40M

STUB METRIC

| DIAMETER | LOC | OAL | RAD    | ITEM#           |
|----------|-----|-----|--------|-----------------|
| 3        | 06  | 50  | Square | OP40M-03006R0.0 |
| 3        | 06  | 50  | R0.5   | OP40M-03006R0.5 |
| 3        | 06  | 50  | R1.0   | OP40M-03006R1.0 |
| 5        | 10  | 75  | Square | OP40M-05010R0.0 |
| 5        | 10  | 75  | R0.5   | OP40M-05010R0.5 |
| 5        | 10  | 75  | R1.0   | OP40M-05010R1.0 |
| 5        | 10  | 75  | R1.5   | OP40M-05010R1.5 |
| 6        | 10  | 75  | Square | OP40M-06010R0.0 |
| 6        | 10  | 75  | R0.5   | OP40M-06010R0.5 |
| 6        | 10  | 75  | R1.0   | OP40M-06010R1.0 |
| 6        | 10  | 75  | R1.5   | OP40M-06010R1.5 |
| 6        | 10  | 75  | R2.0   | OP40M-06010R2.0 |
| 8        | 11  | 75  | Square | OP40M-08011R0.0 |
| 8        | 11  | 75  | R0.5   | OP40M-08011R0.5 |
| 8        | 11  | 75  | R1.0   | OP40M-08011R1.0 |
| 8        | 11  | 75  | R1.5   | OP40M-08011R1.5 |
| 8        | 11  | 75  | R2.0   | OP40M-08011R2.0 |
| 8        | 11  | 75  | R3.0   | OP40M-08011R3.0 |
| 10       | 12  | 75  | Square | OP40M-10012R0.0 |
| 10       | 12  | 75  | R0.5   | OP40M-10012R0.5 |
| 10       | 12  | 75  | R1.0   | OP40M-10012R1.0 |
| 10       | 12  | 75  | R1.5   | OP40M-10012R1.5 |
| 10       | 12  | 75  | R2.0   | OP40M-10012R2.0 |
| 10       | 12  | 75  | R3.0   | OP40M-10012R3.0 |
| 11       | 16  | 75  | Square | OP40M-11016R0.0 |
| 11       | 16  | 75  | R0.5   | OP40M-11016R0.5 |
| 11       | 16  | 75  | R1.0   | OP40M-11016R1.0 |
| 11       | 16  | 75  | R1.5   | OP40M-11016R1.5 |
| 11       | 16  | 75  | R2.0   | OP40M-11016R2.0 |
| 11       | 16  | 75  | R3.0   | OP40M-11016R3.0 |

| DIAMETER | LOC | OAL | RAD    | ITEM#           |
|----------|-----|-----|--------|-----------------|
| 11       | 16  | 75  | R4.5   | OP40M-11016R4.5 |
| 12       | 16  | 75  | Square | OP40M-12016R0.0 |
| 12       | 16  | 75  | R0.5   | OP40M-12016R0.5 |
| 12       | 16  | 75  | R1.0   | OP40M-12016R1.0 |
| 12       | 16  | 75  | R1.5   | OP40M-12016R1.5 |
| 12       | 16  | 75  | R2.0   | OP40M-12016R2.0 |
| 12       | 16  | 75  | R3.0   | OP40M-12016R3.0 |
| 12       | 16  | 75  | R4.5   | OP40M-12016R4.5 |
| 16       | 20  | 100 | Square | OP40M-16020R0.0 |
| 16       | 20  | 100 | R0.5   | OP40M-16020R0.5 |
| 16       | 20  | 100 | R1.0   | OP40M-16020R1.0 |
| 16       | 20  | 100 | R1.5   | OP40M-16020R1.5 |
| 16       | 20  | 100 | R2.0   | OP40M-16020R2.0 |
| 16       | 20  | 100 | R3.0   | OP40M-16020R3.0 |
| 16       | 20  | 100 | R4.5   | OP40M-16020R4.5 |
| 16       | 20  | 100 | R6.0   | OP40M-16020R6.0 |
| 20       | 25  | 100 | Square | OP40M-20025R0.0 |
| 20       | 25  | 100 | R0.5   | OP40M-20025R0.5 |
| 20       | 25  | 100 | R1.0   | OP40M-20025R1.0 |
| 20       | 25  | 100 | R1.5   | OP40M-20025R1.5 |
| 20       | 25  | 100 | R2.0   | OP40M-20025R2.0 |
| 20       | 25  | 100 | R3.0   | OP40M-20025R3.0 |
| 20       | 25  | 100 | R4.5   | OP40M-20025R4.5 |
| 20       | 25  | 100 | R6.0   | OP40M-20025R6.0 |

## 4 FLUTE - STUB - BALL NOSE



OP40B

STUB BALL INCH

| DIAMETER | LOC  | OAL | ITEM#          |
|----------|------|-----|----------------|
| 1/8      | 1/4  | 2   | OP40-0804R060B |
| 3/16     | 3/8  | 3   | OP40-1206R090B |
| 1/4      | 3/8  | 3   | OP40-1606R125B |
| 5/16     | 7/16 | 3   | OP40-2007R155B |
| 3/8      | 1/2  | 3   | OP40-2408R190B |
| 7/16     | 5/8  | 3   | OP40-2810R220B |
| 1/2      | 5/8  | 3   | OP40-3210R250B |
| 5/8      | 3/4  | 4   | OP40-4012R310B |
| 3/4      | 3/4  | 4   | OP40-4812R375B |

OP40MB

STUB BALL METRIC

| DIAMETER | LOC | OAL | ITEM#             |
|----------|-----|-----|-------------------|
| 3        | 6   | 50  | OP40M-03006R1.5B  |
| 5        | 10  | 75  | OP40M-05010R2.5B  |
| 6        | 10  | 75  | OP40M-06010R3.0B  |
| 8        | 11  | 75  | OP40M-08011R4.0B  |
| 10       | 12  | 75  | OP40M-10012R5.0B  |
| 11       | 16  | 75  | OP40M-11016R5.5B  |
| 12       | 16  | 75  | OP40M-12016R6.0B  |
| 16       | 20  | 100 | OP40M-16020R8.0B  |
| 20       | 25  | 100 | OP40M-20025R10.0B |

## 4 FLUTE - STUB - CHIP BREAKER



OP40C

STUB CHIP BREAKER INCH

| DIAMETER | LOC  | OAL | RAD    | ITEM#          |
|----------|------|-----|--------|----------------|
| 1/8      | 1/4  | 2   | Square | OP40-0804R000C |
| 1/8      | 1/4  | 2   | R.015  | OP40-0804R015C |
| 1/8      | 1/4  | 2   | R.030  | OP40-0804R030C |
| 3/16     | 3/8  | 3   | Square | OP40-1206R000C |
| 3/16     | 3/8  | 3   | R.015  | OP40-1206R015C |
| 3/16     | 3/8  | 3   | R.030  | OP40-1206R030C |
| 3/16     | 3/8  | 3   | R.060  | OP40-1206R060C |
| 1/4      | 3/8  | 3   | Square | OP40-1606R000C |
| 1/4      | 3/8  | 3   | R.015  | OP40-1606R015C |
| 1/4      | 3/8  | 3   | R.030  | OP40-1606R030C |
| 1/4      | 3/8  | 3   | R.060  | OP40-1606R060C |
| 1/4      | 3/8  | 3   | R.090  | OP40-1606R090C |
| 5/16     | 7/16 | 3   | Square | OP40-2007R000C |
| 5/16     | 7/16 | 3   | R.015  | OP40-2007R015C |
| 5/16     | 7/16 | 3   | R.030  | OP40-2007R030C |
| 5/16     | 7/16 | 3   | R.060  | OP40-2007R060C |
| 5/16     | 7/16 | 3   | R.090  | OP40-2007R090C |
| 5/16     | 7/16 | 3   | R.125  | OP40-2007R125C |
| 3/8      | 1/2  | 3   | Square | OP40-2408R000C |
| 3/8      | 1/2  | 3   | R.015  | OP40-2408R015C |
| 3/8      | 1/2  | 3   | R.030  | OP40-2408R030C |
| 3/8      | 1/2  | 3   | R.060  | OP40-2408R060C |
| 3/8      | 1/2  | 3   | R.090  | OP40-2408R090C |
| 3/8      | 1/2  | 3   | R.125  | OP40-2408R125C |
| 7/16     | 5/8  | 3   | Square | OP40-2810R000C |
| 7/16     | 5/8  | 3   | R.015  | OP40-2810R015C |
| 7/16     | 5/8  | 3   | R.030  | OP40-2810R030C |
| 7/16     | 5/8  | 3   | R.060  | OP40-2810R060C |
| 7/16     | 5/8  | 3   | R.090  | OP40-2810R090C |
| 7/16     | 5/8  | 3   | R.125  | OP40-2810R125C |

| DIAMETER | LOC | OAL | RAD    | ITEM#          |
|----------|-----|-----|--------|----------------|
| 7/16     | 5/8 | 3   | R.190  | OP40-2810R190C |
| 1/2      | 5/8 | 3   | Square | OP40-3210R000C |
| 1/2      | 5/8 | 3   | R.015  | OP40-3210R015C |
| 1/2      | 5/8 | 3   | R.030  | OP40-3210R030C |
| 1/2      | 5/8 | 3   | R.060  | OP40-3210R060C |
| 1/2      | 5/8 | 3   | R.090  | OP40-3210R090C |
| 1/2      | 5/8 | 3   | R.125  | OP40-3210R125C |
| 1/2      | 5/8 | 3   | R.190  | OP40-3210R190C |
| 5/8      | 3/4 | 4   | Square | OP40-4012R000C |
| 5/8      | 3/4 | 4   | R.015  | OP40-4012R015C |
| 5/8      | 3/4 | 4   | R.030  | OP40-4012R030C |
| 5/8      | 3/4 | 4   | R.060  | OP40-4012R060C |
| 5/8      | 3/4 | 4   | R.090  | OP40-4012R090C |
| 5/8      | 3/4 | 4   | R.125  | OP40-4012R125C |
| 5/8      | 3/4 | 4   | R.190  | OP40-4012R190C |
| 5/8      | 3/4 | 4   | R.250  | OP40-4012R250C |
| 3/4      | 3/4 | 4   | Square | OP40-4812R000C |
| 3/4      | 3/4 | 4   | R.015  | OP40-4812R015C |
| 3/4      | 3/4 | 4   | R.030  | OP40-4812R030C |
| 3/4      | 3/4 | 4   | R.060  | OP40-4812R060C |
| 3/4      | 3/4 | 4   | R.090  | OP40-4812R090C |
| 3/4      | 3/4 | 4   | R.125  | OP40-4812R125C |
| 3/4      | 3/4 | 4   | R.190  | OP40-4812R190C |
| 3/4      | 3/4 | 4   | R.250  | OP40-4812R250C |



## 4 FLUTE - STUB - CHIP BREAKER



OP40MC

STUB CHIP BREAKER METRIC

| DIAMETER | LOC | OAL | RAD    | ITEM#            |
|----------|-----|-----|--------|------------------|
| 3        | 06  | 50  | Square | OP40M-03006R0.0C |
| 3        | 06  | 50  | R0.5   | OP40M-03006R0.5C |
| 3        | 06  | 50  | R1.0   | OP40M-03006R1.0C |
| 5        | 10  | 75  | Square | OP40M-05010R0.0C |
| 5        | 10  | 75  | R0.5   | OP40M-05010R0.5C |
| 5        | 10  | 75  | R1.0   | OP40M-05010R1.0C |
| 5        | 10  | 75  | R1.5   | OP40M-05010R1.5C |
| 6        | 10  | 75  | Square | OP40M-06010R0.0C |
| 6        | 10  | 75  | R0.5   | OP40M-06010R0.5C |
| 6        | 10  | 75  | R1.0   | OP40M-06010R1.0C |
| 6        | 10  | 75  | R1.5   | OP40M-06010R1.5C |
| 6        | 10  | 75  | R2.0   | OP40M-06010R2.0C |
| 8        | 11  | 75  | Square | OP40M-08011R0.0C |
| 8        | 11  | 75  | R0.5   | OP40M-08011R0.5C |
| 8        | 11  | 75  | R1.0   | OP40M-08011R1.0C |
| 8        | 11  | 75  | R1.5   | OP40M-08011R1.5C |
| 8        | 11  | 75  | R2.0   | OP40M-08011R2.0C |
| 8        | 11  | 75  | R3.0   | OP40M-08011R3.0C |
| 10       | 12  | 75  | Square | OP40M-10012R0.0C |
| 10       | 12  | 75  | R0.5   | OP40M-10012R0.5C |
| 10       | 12  | 75  | R1.0   | OP40M-10012R1.0C |
| 10       | 12  | 75  | R1.5   | OP40M-10012R1.5C |
| 10       | 12  | 75  | R2.0   | OP40M-10012R2.0C |
| 10       | 12  | 75  | R3.0   | OP40M-10012R3.0C |
| 11       | 16  | 75  | Square | OP40M-11016R0.0C |
| 11       | 16  | 75  | R0.5   | OP40M-11016R0.5C |
| 11       | 16  | 75  | R1.0   | OP40M-11016R1.0C |
| 11       | 16  | 75  | R1.5   | OP40M-11016R1.5C |
| 11       | 16  | 75  | R2.0   | OP40M-11016R2.0C |
| 11       | 16  | 75  | R3.0   | OP40M-11016R3.0C |

| DIAMETER | LOC | OAL | RAD    | ITEM#            |
|----------|-----|-----|--------|------------------|
| 11       | 16  | 75  | R4.5   | OP40M-11016R4.5C |
| 12       | 16  | 75  | Square | OP40M-12016R0.0C |
| 12       | 16  | 75  | R0.5   | OP40M-12016R0.5C |
| 12       | 16  | 75  | R1.0   | OP40M-12016R1.0C |
| 12       | 16  | 75  | R1.5   | OP40M-12016R1.5C |
| 12       | 16  | 75  | R2.0   | OP40M-12016R2.0C |
| 12       | 16  | 75  | R3.0   | OP40M-12016R3.0C |
| 12       | 16  | 75  | R4.5   | OP40M-12016R4.5C |
| 16       | 20  | 100 | Square | OP40M-16020R0.0C |
| 16       | 20  | 100 | R0.5   | OP40M-16020R0.5C |
| 16       | 20  | 100 | R1.0   | OP40M-16020R1.0C |
| 16       | 20  | 100 | R1.5   | OP40M-16020R1.5C |
| 16       | 20  | 100 | R2.0   | OP40M-16020R2.0C |
| 16       | 20  | 100 | R3.0   | OP40M-16020R3.0C |
| 16       | 20  | 100 | R4.5   | OP40M-16020R4.5C |
| 16       | 20  | 100 | R6.0   | OP40M-16020R6.0C |
| 20       | 25  | 100 | Square | OP40M-20025R0.0C |
| 20       | 25  | 100 | R0.5   | OP40M-20025R0.5C |
| 20       | 25  | 100 | R1.0   | OP40M-20025R1.0C |
| 20       | 25  | 100 | R1.5   | OP40M-20025R1.5C |
| 20       | 25  | 100 | R2.0   | OP40M-20025R2.0C |
| 20       | 25  | 100 | R3.0   | OP40M-20025R3.0C |
| 20       | 25  | 100 | R4.5   | OP40M-20025R4.5C |
| 20       | 25  | 100 | R6.0   | OP40M-20025R6.0C |

## 4 FLUTE - REGULAR



OP41

REGULAR INCH

| DIAMETER | LOC   | OAL | RAD    | ITEM#         |
|----------|-------|-----|--------|---------------|
| 3/16     | 9/16  | 3   | Square | OP41-1209R000 |
| 3/16     | 9/16  | 3   | R.015  | OP41-1209R015 |
| 3/16     | 9/16  | 3   | R.030  | OP41-1209R030 |
| 3/16     | 9/16  | 3   | R.060  | OP41-1209R060 |
| 1/4      | 3/4   | 3   | Square | OP41-1612R000 |
| 1/4      | 3/4   | 3   | R.015  | OP41-1612R015 |
| 1/4      | 3/4   | 3   | R.030  | OP41-1612R030 |
| 1/4      | 3/4   | 3   | R.060  | OP41-1612R060 |
| 1/4      | 3/4   | 3   | R.090  | OP41-1612R090 |
| 5/16     | 13/16 | 3   | Square | OP41-2013R000 |
| 5/16     | 13/16 | 3   | R.015  | OP41-2013R015 |
| 5/16     | 13/16 | 3   | R.030  | OP41-2013R030 |
| 5/16     | 13/16 | 3   | R.060  | OP41-2013R060 |
| 5/16     | 13/16 | 3   | R.090  | OP41-2013R090 |
| 5/16     | 13/16 | 3   | R.125  | OP41-2013R125 |
| 3/8      | 1     | 3   | Square | OP41-2416R000 |
| 3/8      | 1     | 3   | R.015  | OP41-2416R015 |
| 3/8      | 1     | 3   | R.030  | OP41-2416R030 |
| 3/8      | 1     | 3   | R.060  | OP41-2416R060 |
| 3/8      | 1     | 3   | R.090  | OP41-2416R090 |
| 3/8      | 1     | 3   | R.125  | OP41-2416R125 |
| 7/16     | 1     | 3   | Square | OP41-2816R000 |
| 7/16     | 1     | 3   | R.015  | OP41-2816R015 |
| 7/16     | 1     | 3   | R.030  | OP41-2816R030 |
| 7/16     | 1     | 3   | R.060  | OP41-2816R060 |
| 7/16     | 1     | 3   | R.090  | OP41-2816R090 |
| 7/16     | 1     | 3   | R.125  | OP41-2816R125 |
| 7/16     | 1     | 3   | R.190  | OP41-2816R190 |
| 1/2      | 1 1/4 | 3   | Square | OP41-3220R000 |
| 1/2      | 1 1/4 | 3   | R.015  | OP41-3220R015 |

| DIAMETER | LOC   | OAL | RAD    | ITEM#         |
|----------|-------|-----|--------|---------------|
| 1/2      | 1 1/4 | 3   | R.030  | OP41-3220R030 |
| 1/2      | 1 1/4 | 3   | R.060  | OP41-3220R060 |
| 1/2      | 1 1/4 | 3   | R.090  | OP41-3220R090 |
| 1/2      | 1 1/4 | 3   | R.125  | OP41-3220R125 |
| 1/2      | 1 1/4 | 3   | R.190  | OP41-3220R190 |
| 5/8      | 1 5/8 | 4   | Square | OP41-4026R000 |
| 5/8      | 1 5/8 | 4   | R.015  | OP41-4026R015 |
| 5/8      | 1 5/8 | 4   | R.030  | OP41-4026R030 |
| 5/8      | 1 5/8 | 4   | R.060  | OP41-4026R060 |
| 5/8      | 1 5/8 | 4   | R.090  | OP41-4026R090 |
| 5/8      | 1 5/8 | 4   | R.125  | OP41-4026R125 |
| 5/8      | 1 5/8 | 4   | R.190  | OP41-4026R190 |
| 5/8      | 1 5/8 | 4   | R.250  | OP41-4026R250 |
| 3/4      | 1 5/8 | 4   | Square | OP41-4826R000 |
| 3/4      | 1 5/8 | 4   | R.015  | OP41-4826R015 |
| 3/4      | 1 5/8 | 4   | R.030  | OP41-4826R030 |
| 3/4      | 1 5/8 | 4   | R.060  | OP41-4826R060 |
| 3/4      | 1 5/8 | 4   | R.090  | OP41-4826R090 |
| 3/4      | 1 5/8 | 4   | R.125  | OP41-4826R125 |
| 3/4      | 1 5/8 | 4   | R.190  | OP41-4826R190 |
| 3/4      | 1 5/8 | 4   | R.250  | OP41-4826R250 |
| 1        | 1 3/4 | 5   | Square | OP41-6428R000 |
| 1        | 1 3/4 | 5   | R.015  | OP41-6428R015 |
| 1        | 1 3/4 | 5   | R.030  | OP41-6428R030 |
| 1        | 1 3/4 | 5   | R.060  | OP41-6428R060 |
| 1        | 1 3/4 | 5   | R.090  | OP41-6428R090 |
| 1        | 1 3/4 | 5   | R.125  | OP41-6428R125 |
| 1        | 1 3/4 | 5   | R.190  | OP41-6428R190 |
| 1        | 1 3/4 | 5   | R.250  | OP41-6428R250 |

## 4 FLUTE - REGULAR



### OP41M REGULAR METRIC

| DIAMETER | LOC | OAL | RAD    | ITEM#           |
|----------|-----|-----|--------|-----------------|
| 5        | 14  | 75  | Square | OP41M-05014R0.0 |
| 5        | 14  | 75  | R0.5   | OP41M-05014R0.5 |
| 5        | 14  | 75  | R1.0   | OP41M-05014R1.0 |
| 5        | 14  | 75  | R1.5   | OP41M-05014R1.5 |
| 6        | 20  | 75  | Square | OP41M-06020R0.0 |
| 6        | 20  | 75  | R0.5   | OP41M-06020R0.5 |
| 6        | 20  | 75  | R1.0   | OP41M-06020R1.0 |
| 6        | 20  | 75  | R1.5   | OP41M-06020R1.5 |
| 6        | 20  | 75  | R2.0   | OP41M-06020R2.0 |
| 8        | 21  | 75  | Square | OP41M-08021R0.0 |
| 8        | 21  | 75  | R0.5   | OP41M-08021R0.5 |
| 8        | 21  | 75  | R1.0   | OP41M-08021R1.0 |
| 8        | 21  | 75  | R1.5   | OP41M-08021R1.5 |
| 8        | 21  | 75  | R2.0   | OP41M-08021R2.0 |
| 8        | 21  | 75  | R3.0   | OP41M-08021R3.0 |
| 10       | 25  | 75  | Square | OP41M-10025R0.0 |
| 10       | 25  | 75  | R0.5   | OP41M-10025R0.5 |
| 10       | 25  | 75  | R1.0   | OP41M-10025R1.0 |
| 10       | 25  | 75  | R1.5   | OP41M-10025R1.5 |
| 10       | 25  | 75  | R2.0   | OP41M-10025R2.0 |
| 10       | 25  | 75  | R3.0   | OP41M-10025R3.0 |
| 11       | 25  | 75  | Square | OP41M-11025R0.0 |
| 11       | 25  | 75  | R0.5   | OP41M-11025R0.5 |
| 11       | 25  | 75  | R1.0   | OP41M-11025R1.0 |
| 11       | 25  | 75  | R1.5   | OP41M-11025R1.5 |
| 11       | 25  | 75  | R2.0   | OP41M-11025R2.0 |
| 11       | 25  | 75  | R3.0   | OP41M-11025R3.0 |
| 11       | 25  | 75  | R4.5   | OP41M-11025R4.5 |
| 12       | 32  | 75  | Square | OP41M-12032R0.0 |
| 12       | 32  | 75  | R0.5   | OP41M-12032R0.5 |

| DIAMETER | LOC | OAL | RAD    | ITEM#           |
|----------|-----|-----|--------|-----------------|
| 12       | 32  | 75  | R1.0   | OP41M-12032R1.0 |
| 12       | 32  | 75  | R1.5   | OP41M-12032R1.5 |
| 12       | 32  | 75  | R2.0   | OP41M-12032R2.0 |
| 12       | 32  | 75  | R3.0   | OP41M-12032R3.0 |
| 12       | 32  | 75  | R4.5   | OP41M-12032R4.5 |
| 16       | 41  | 100 | Square | OP41M-16041R0.0 |
| 16       | 41  | 100 | R0.5   | OP41M-16041R0.5 |
| 16       | 41  | 100 | R1.0   | OP41M-16041R1.0 |
| 16       | 41  | 100 | R1.5   | OP41M-16041R1.5 |
| 16       | 41  | 100 | R2.0   | OP41M-16041R2.0 |
| 16       | 41  | 100 | R3.0   | OP41M-16041R3.0 |
| 16       | 41  | 100 | R4.5   | OP41M-16041R4.5 |
| 16       | 41  | 100 | R6.0   | OP41M-16041R6.0 |
| 20       | 41  | 100 | Square | OP41M-20041R0.0 |
| 20       | 41  | 100 | R0.5   | OP41M-20041R0.5 |
| 20       | 41  | 100 | R1.0   | OP41M-20041R1.0 |
| 20       | 41  | 100 | R1.5   | OP41M-20041R1.5 |
| 20       | 41  | 100 | R2.0   | OP41M-20041R2.0 |
| 20       | 41  | 100 | R3.0   | OP41M-20041R3.0 |
| 20       | 41  | 100 | R4.5   | OP41M-20041R4.5 |
| 20       | 41  | 100 | R6.0   | OP41M-20041R6.0 |
| 25       | 45  | 125 | Square | OP41M-25045R0.0 |
| 25       | 45  | 125 | R0.5   | OP41M-25045R0.5 |
| 25       | 45  | 125 | R1.0   | OP41M-25045R1.0 |
| 25       | 45  | 125 | R1.5   | OP41M-25045R1.5 |
| 25       | 45  | 125 | R2.0   | OP41M-25045R2.0 |
| 25       | 45  | 125 | R3.0   | OP41M-25045R3.0 |
| 25       | 45  | 125 | R4.5   | OP41M-25045R4.5 |
| 25       | 45  | 125 | R6.0   | OP41M-25045R6.0 |



## 4 FLUTE - REGULAR - BALL NOSE



OP41B

REGULAR BALL INCH

| DIAMETER | LOC   | OAL | ITEM#          |
|----------|-------|-----|----------------|
| 3/16     | 9/16  | 3   | OP41-1209R090B |
| 1/4      | 3/4   | 3   | OP41-1612R125B |
| 5/16     | 13/16 | 3   | OP41-2013R155B |
| 3/8      | 1     | 3   | OP41-2416R190B |
| 7/16     | 1     | 3   | OP41-2816R220B |
| 1/2      | 1 1/4 | 3   | OP41-3220R250B |
| 5/8      | 1 5/8 | 4   | OP41-4026R310B |
| 3/4      | 1 5/8 | 4   | OP41-4826R375B |
| 1        | 1 3/4 | 5   | OP41-6428R500B |

OP41MB

REGULAR BALL METRIC

| DIAMETER | LOC | OAL | ITEM#             |
|----------|-----|-----|-------------------|
| 5        | 14  | 75  | OP41M-05014R2.5B  |
| 6        | 20  | 75  | OP41M-06020R3.0B  |
| 8        | 21  | 75  | OP41M-08021R4.0B  |
| 10       | 25  | 75  | OP41M-10025R5.0B  |
| 11       | 25  | 75  | OP41M-11025R5.5B  |
| 12       | 32  | 75  | OP41M-12032R6.0B  |
| 16       | 41  | 100 | OP41M-16041R8.0B  |
| 20       | 41  | 100 | OP41M-20041R10.0B |
| 25       | 45  | 125 | OP41M-25045R12.5B |



## 4 FLUTE - REGULAR - CHIP BREAKER



OP41C

CHIP BREAKER INCH

| DIAMETER | LOC   | OAL | RAD    | ITEM#          |
|----------|-------|-----|--------|----------------|
| 3/16     | 9/16  | 3   | Square | OP41-1209R000C |
| 3/16     | 9/16  | 3   | R.015  | OP41-1209R015C |
| 3/16     | 9/16  | 3   | R.030  | OP41-1209R030C |
| 3/16     | 9/16  | 3   | R.060  | OP41-1209R060C |
| 1/4      | 3/4   | 3   | Square | OP41-1612R000C |
| 1/4      | 3/4   | 3   | R.015  | OP41-1612R015C |
| 1/4      | 3/4   | 3   | R.030  | OP41-1612R030C |
| 1/4      | 3/4   | 3   | R.060  | OP41-1612R060C |
| 1/4      | 3/4   | 3   | R.090  | OP41-1612R090C |
| 5/16     | 13/16 | 3   | Square | OP41-2013R000C |
| 5/16     | 13/16 | 3   | R.015  | OP41-2013R015C |
| 5/16     | 13/16 | 3   | R.030  | OP41-2013R030C |
| 5/16     | 13/16 | 3   | R.060  | OP41-2013R060C |
| 5/16     | 13/16 | 3   | R.090  | OP41-2013R090C |
| 5/16     | 13/16 | 3   | R.125  | OP41-2013R125C |
| 3/8      | 1     | 3   | Square | OP41-2416R000C |
| 3/8      | 1     | 3   | R.015  | OP41-2416R015C |
| 3/8      | 1     | 3   | R.030  | OP41-2416R030C |
| 3/8      | 1     | 3   | R.060  | OP41-2416R060C |
| 3/8      | 1     | 3   | R.090  | OP41-2416R090C |
| 3/8      | 1     | 3   | R.125  | OP41-2416R125C |
| 7/16     | 1     | 3   | Square | OP41-2816R000C |
| 7/16     | 1     | 3   | R.015  | OP41-2816R015C |
| 7/16     | 1     | 3   | R.030  | OP41-2816R030C |
| 7/16     | 1     | 3   | R.060  | OP41-2816R060C |
| 7/16     | 1     | 3   | R.090  | OP41-2816R090C |
| 7/16     | 1     | 3   | R.125  | OP41-2816R125C |
| 7/16     | 1     | 3   | R.190  | OP41-2816R190C |
| 1/2      | 1 1/4 | 3   | Square | OP41-3220R000C |
| 1/2      | 1 1/4 | 3   | R.015  | OP41-3220R015C |

| DIAMETER | LOC   | OAL | RAD    | ITEM#          |
|----------|-------|-----|--------|----------------|
| 1/2      | 1 1/4 | 3   | R.030  | OP41-3220R030C |
| 1/2      | 1 1/4 | 3   | R.060  | OP41-3220R060C |
| 1/2      | 1 1/4 | 3   | R.090  | OP41-3220R090C |
| 1/2      | 1 1/4 | 3   | R.125  | OP41-3220R125C |
| 1/2      | 1 1/4 | 3   | R.190  | OP41-3220R190C |
| 5/8      | 1 5/8 | 4   | Square | OP41-4026R000C |
| 5/8      | 1 5/8 | 4   | R.015  | OP41-4026R015C |
| 5/8      | 1 5/8 | 4   | R.030  | OP41-4026R030C |
| 5/8      | 1 5/8 | 4   | R.060  | OP41-4026R060C |
| 5/8      | 1 5/8 | 4   | R.090  | OP41-4026R090C |
| 5/8      | 1 5/8 | 4   | R.125  | OP41-4026R125C |
| 5/8      | 1 5/8 | 4   | R.190  | OP41-4026R190C |
| 5/8      | 1 5/8 | 4   | R.250  | OP41-4026R250C |
| 3/4      | 1 5/8 | 4   | Square | OP41-4826R000C |
| 3/4      | 1 5/8 | 4   | R.015  | OP41-4826R015C |
| 3/4      | 1 5/8 | 4   | R.030  | OP41-4826R030C |
| 3/4      | 1 5/8 | 4   | R.060  | OP41-4826R060C |
| 3/4      | 1 5/8 | 4   | R.090  | OP41-4826R090C |
| 3/4      | 1 5/8 | 4   | R.125  | OP41-4826R125C |
| 3/4      | 1 5/8 | 4   | R.190  | OP41-4826R190C |
| 3/4      | 1 5/8 | 4   | R.250  | OP41-4826R250C |
| 1        | 1 3/4 | 5   | Square | OP41-6428R000C |
| 1        | 1 3/4 | 5   | R.015  | OP41-6428R015C |
| 1        | 1 3/4 | 5   | R.030  | OP41-6428R030C |
| 1        | 1 3/4 | 5   | R.060  | OP41-6428R060C |
| 1        | 1 3/4 | 5   | R.090  | OP41-6428R090C |
| 1        | 1 3/4 | 5   | R.125  | OP41-6428R125C |
| 1        | 1 3/4 | 5   | R.190  | OP41-6428R190C |
| 1        | 1 3/4 | 5   | R.250  | OP41-6428R250C |

## 4 FLUTE - REGULAR - CHIP BREAKER



OP41MC

CHIP BREAKER METRIC

| DIAMETER | LOC | OAL | RAD    | ITEM#            |
|----------|-----|-----|--------|------------------|
| 5        | 14  | 75  | Square | OP41M-05014R0.0C |
| 5        | 14  | 75  | R0.5   | OP41M-05014R0.5C |
| 5        | 14  | 75  | R1.0   | OP41M-05014R1.0C |
| 5        | 14  | 75  | R1.5   | OP41M-05014R1.5C |
| 6        | 20  | 75  | Square | OP41M-06020R0.0C |
| 6        | 20  | 75  | R0.5   | OP41M-06020R0.5C |
| 6        | 20  | 75  | R1.0   | OP41M-06020R1.0C |
| 6        | 20  | 75  | R1.5   | OP41M-06020R1.5C |
| 6        | 20  | 75  | R2.0   | OP41M-06020R2.0C |
| 8        | 21  | 75  | Square | OP41M-08021R0.0C |
| 8        | 21  | 75  | R0.5   | OP41M-08021R0.5C |
| 8        | 21  | 75  | R1.0   | OP41M-08021R1.0C |
| 8        | 21  | 75  | R1.5   | OP41M-08021R1.5C |
| 8        | 21  | 75  | R2.0   | OP41M-08021R2.0C |
| 8        | 21  | 75  | R3.0   | OP41M-08021R3.0C |
| 10       | 25  | 75  | Square | OP41M-10025R0.0C |
| 10       | 25  | 75  | R0.5   | OP41M-10025R0.5C |
| 10       | 25  | 75  | R1.0   | OP41M-10025R1.0C |
| 10       | 25  | 75  | R1.5   | OP41M-10025R1.5C |
| 10       | 25  | 75  | R2.0   | OP41M-10025R2.0C |
| 10       | 25  | 75  | R3.0   | OP41M-10025R3.0C |
| 11       | 25  | 75  | Square | OP41M-11025R0.0C |
| 11       | 25  | 75  | R0.5   | OP41M-11025R0.5C |
| 11       | 25  | 75  | R1.0   | OP41M-11025R1.0C |
| 11       | 25  | 75  | R1.5   | OP41M-11025R1.5C |
| 11       | 25  | 75  | R2.0   | OP41M-11025R2.0C |
| 11       | 25  | 75  | R3.0   | OP41M-11025R3.0C |
| 11       | 25  | 75  | R4.5   | OP41M-11025R4.5C |
| 12       | 32  | 75  | Square | OP41M-12032R0.0C |
| 12       | 32  | 75  | R0.5   | OP41M-12032R0.5C |

| DIAMETER | LOC | OAL | RAD    | ITEM#            |
|----------|-----|-----|--------|------------------|
| 12       | 32  | 75  | R1.0   | OP41M-12032R1.0C |
| 12       | 32  | 75  | R1.5   | OP41M-12032R1.5C |
| 12       | 32  | 75  | R2.0   | OP41M-12032R2.0C |
| 12       | 32  | 75  | R3.0   | OP41M-12032R3.0C |
| 12       | 32  | 75  | R4.5   | OP41M-12032R4.5C |
| 16       | 41  | 100 | Square | OP41M-16041R0.0C |
| 16       | 41  | 100 | R0.5   | OP41M-16041R0.5C |
| 16       | 41  | 100 | R1.0   | OP41M-16041R1.0C |
| 16       | 41  | 100 | R1.5   | OP41M-16041R1.5C |
| 16       | 41  | 100 | R2.0   | OP41M-16041R2.0C |
| 16       | 41  | 100 | R3.0   | OP41M-16041R3.0C |
| 16       | 41  | 100 | R4.5   | OP41M-16041R4.5C |
| 16       | 41  | 100 | R6.0   | OP41M-16041R6.0C |
| 20       | 41  | 100 | Square | OP41M-20041R0.0C |
| 20       | 41  | 100 | R0.5   | OP41M-20041R0.5C |
| 20       | 41  | 100 | R1.0   | OP41M-20041R1.0C |
| 20       | 41  | 100 | R1.5   | OP41M-20041R1.5C |
| 20       | 41  | 100 | R2.0   | OP41M-20041R2.0C |
| 20       | 41  | 100 | R3.0   | OP41M-20041R3.0C |
| 20       | 41  | 100 | R4.5   | OP41M-20041R4.5C |
| 20       | 41  | 100 | R6.0   | OP41M-20041R6.0C |
| 25       | 45  | 125 | Square | OP41M-25045R0.0C |
| 25       | 45  | 125 | R0.5   | OP41M-25045R0.5C |
| 25       | 45  | 125 | R1.0   | OP41M-25045R1.0C |
| 25       | 45  | 125 | R1.5   | OP41M-25045R1.5C |
| 25       | 45  | 125 | R2.0   | OP41M-25045R2.0C |
| 25       | 45  | 125 | R3.0   | OP41M-25045R3.0C |
| 25       | 45  | 125 | R4.5   | OP41M-25045R4.5C |
| 25       | 45  | 125 | R6.0   | OP41M-25045R6.0C |

## 4 FLUTE - LONG



OP42

LONG INCH

| DIAMETER | LOC   | OAL | RAD    | ITEM#         |
|----------|-------|-----|--------|---------------|
| 1/4      | 1 1/8 | 3   | Square | OP42-1618R000 |
| 1/4      | 1 1/8 | 3   | R.015  | OP42-1618R015 |
| 1/4      | 1 1/8 | 3   | R.030  | OP42-1618R030 |
| 1/4      | 1 1/8 | 3   | R.060  | OP42-1618R060 |
| 1/4      | 1 1/8 | 3   | R.090  | OP42-1618R090 |
| 5/16     | 1 1/8 | 3   | Square | OP42-2018R000 |
| 5/16     | 1 1/8 | 3   | R.015  | OP42-2018R015 |
| 5/16     | 1 1/8 | 3   | R.030  | OP42-2018R030 |
| 5/16     | 1 1/8 | 3   | R.060  | OP42-2018R060 |
| 5/16     | 1 1/8 | 3   | R.090  | OP42-2018R090 |
| 5/16     | 1 1/8 | 3   | R.125  | OP42-2018R125 |
| 3/8      | 1 1/4 | 3   | Square | OP42-2420R000 |
| 3/8      | 1 1/4 | 3   | R.015  | OP42-2420R015 |
| 3/8      | 1 1/4 | 3   | R.030  | OP42-2420R030 |
| 3/8      | 1 1/4 | 3   | R.060  | OP42-2420R060 |
| 3/8      | 1 1/4 | 3   | R.090  | OP42-2420R090 |
| 3/8      | 1 1/4 | 3   | R.125  | OP42-2420R125 |
| 7/16     | 2     | 4   | Square | OP42-2832R000 |
| 7/16     | 2     | 4   | R.015  | OP42-2832R015 |
| 7/16     | 2     | 4   | R.030  | OP42-2832R030 |
| 7/16     | 2     | 4   | R.060  | OP42-2832R060 |
| 7/16     | 2     | 4   | R.090  | OP42-2832R090 |
| 7/16     | 2     | 4   | R.125  | OP42-2832R125 |
| 7/16     | 2     | 4   | R.190  | OP42-2832R190 |
| 1/2      | 2     | 4   | Square | OP42-3232R000 |
| 1/2      | 2     | 4   | R.015  | OP42-3232R015 |
| 1/2      | 2     | 4   | R.030  | OP42-3232R030 |
| 1/2      | 2     | 4   | R.060  | OP42-3232R060 |
| 1/2      | 2     | 4   | R.090  | OP42-3232R090 |
| 1/2      | 2     | 4   | R.125  | OP42-3232R125 |

| DIAMETER | LOC   | OAL | RAD    | ITEM#         |
|----------|-------|-----|--------|---------------|
| 1/2      | 2     | 4   | R.190  | OP42-3232R190 |
| 5/8      | 2 1/4 | 5   | Square | OP42-4036R000 |
| 5/8      | 2 1/4 | 5   | R.015  | OP42-4036R015 |
| 5/8      | 2 1/4 | 5   | R.030  | OP42-4036R030 |
| 5/8      | 2 1/4 | 5   | R.060  | OP42-4036R060 |
| 5/8      | 2 1/4 | 5   | R.090  | OP42-4036R090 |
| 5/8      | 2 1/4 | 5   | R.125  | OP42-4036R125 |
| 5/8      | 2 1/4 | 5   | R.190  | OP42-4036R190 |
| 5/8      | 2 1/4 | 5   | R.250  | OP42-4036R250 |
| 3/4      | 2 5/8 | 5   | Square | OP42-4842R000 |
| 3/4      | 2 5/8 | 5   | R.015  | OP42-4842R015 |
| 3/4      | 2 5/8 | 5   | R.030  | OP42-4842R030 |
| 3/4      | 2 5/8 | 5   | R.060  | OP42-4842R060 |
| 3/4      | 2 5/8 | 5   | R.090  | OP42-4842R090 |
| 3/4      | 2 5/8 | 5   | R.125  | OP42-4842R125 |
| 3/4      | 2 5/8 | 5   | R.190  | OP42-4842R190 |
| 3/4      | 2 5/8 | 5   | R.250  | OP42-4842R250 |
| 1        | 3     | 6   | Square | OP42-6448R000 |
| 1        | 3     | 6   | R.015  | OP42-6448R015 |
| 1        | 3     | 6   | R.030  | OP42-6448R030 |
| 1        | 3     | 6   | R.060  | OP42-6448R060 |
| 1        | 3     | 6   | R.090  | OP42-6448R090 |
| 1        | 3     | 6   | R.125  | OP42-6448R125 |
| 1        | 3     | 6   | R.190  | OP42-6448R190 |
| 1        | 3     | 6   | R.250  | OP42-6448R250 |



## 4 FLUTE - LONG



OP42M

LONG METRIC

| DIAMETER | LOC | OAL | RAD    | ITEM#           |
|----------|-----|-----|--------|-----------------|
| 6        | 29  | 75  | Square | OP42M-06029R0.0 |
| 6        | 29  | 75  | R0.5   | OP42M-06029R0.5 |
| 6        | 29  | 75  | R1.0   | OP42M-06029R1.0 |
| 6        | 29  | 75  | R1.5   | OP42M-06029R1.5 |
| 6        | 29  | 75  | R2.0   | OP42M-06029R2.0 |
| 8        | 29  | 75  | Square | OP42M-08029R0.0 |
| 8        | 29  | 75  | R0.5   | OP42M-08029R0.5 |
| 8        | 29  | 75  | R1.0   | OP42M-08029R1.0 |
| 8        | 29  | 75  | R1.5   | OP42M-08029R1.5 |
| 8        | 29  | 75  | R2.0   | OP42M-08029R2.0 |
| 8        | 29  | 75  | R3.0   | OP42M-08029R3.0 |
| 10       | 32  | 75  | Square | OP42M-10032R0.0 |
| 10       | 32  | 75  | R0.5   | OP42M-10032R0.5 |
| 10       | 32  | 75  | R1.0   | OP42M-10032R1.0 |
| 10       | 32  | 75  | R1.5   | OP42M-10032R1.5 |
| 10       | 32  | 75  | R2.0   | OP42M-10032R2.0 |
| 10       | 32  | 75  | R3.0   | OP42M-10032R3.0 |
| 11       | 50  | 100 | Square | OP42M-11050R0.0 |
| 11       | 50  | 100 | R0.5   | OP42M-11050R0.5 |
| 11       | 50  | 100 | R1.0   | OP42M-11050R1.0 |
| 11       | 50  | 100 | R1.5   | OP42M-11050R1.5 |
| 11       | 50  | 100 | R2.0   | OP42M-11050R2.0 |
| 11       | 50  | 100 | R3.0   | OP42M-11050R3.0 |
| 11       | 50  | 100 | R4.5   | OP42M-11050R4.5 |
| 12       | 50  | 100 | Square | OP42M-12050R0.0 |
| 12       | 50  | 100 | R0.5   | OP42M-12050R0.5 |
| 12       | 50  | 100 | R1.0   | OP42M-12050R1.0 |
| 12       | 50  | 100 | R1.5   | OP42M-12050R1.5 |
| 12       | 50  | 100 | R2.0   | OP42M-12050R2.0 |
| 12       | 50  | 100 | R3.0   | OP42M-12050R3.0 |

| DIAMETER | LOC | OAL | RAD    | ITEM#           |
|----------|-----|-----|--------|-----------------|
| 12       | 50  | 100 | R4.5   | OP42M-12050R4.5 |
| 16       | 57  | 125 | Square | OP42M-16057R0.0 |
| 16       | 57  | 125 | R0.5   | OP42M-16057R0.5 |
| 16       | 57  | 125 | R1.0   | OP42M-16057R1.0 |
| 16       | 57  | 125 | R1.5   | OP42M-16057R1.5 |
| 16       | 57  | 125 | R2.0   | OP42M-16057R2.0 |
| 16       | 57  | 125 | R3.0   | OP42M-16057R3.0 |
| 16       | 57  | 125 | R4.5   | OP42M-16057R4.5 |
| 16       | 57  | 125 | R6.0   | OP42M-16057R6.0 |
| 20       | 67  | 125 | Square | OP42M-20067R0.0 |
| 20       | 67  | 125 | R0.5   | OP42M-20067R0.5 |
| 20       | 67  | 125 | R1.0   | OP42M-20067R1.0 |
| 20       | 67  | 125 | R1.5   | OP42M-20067R1.5 |
| 20       | 67  | 125 | R2.0   | OP42M-20067R2.0 |
| 20       | 67  | 125 | R3.0   | OP42M-20067R3.0 |
| 20       | 67  | 125 | R4.5   | OP42M-20067R4.5 |
| 20       | 67  | 125 | R6.0   | OP42M-20067R6.0 |
| 25       | 76  | 150 | Square | OP42M-25076R0.0 |
| 25       | 76  | 150 | R0.5   | OP42M-25076R0.5 |
| 25       | 76  | 150 | R1.0   | OP42M-25076R1.0 |
| 25       | 76  | 150 | R1.5   | OP42M-25076R1.5 |
| 25       | 76  | 150 | R2.0   | OP42M-25076R2.0 |
| 25       | 76  | 150 | R3.0   | OP42M-25076R3.0 |
| 25       | 76  | 150 | R4.5   | OP42M-25076R4.5 |
| 25       | 76  | 150 | R6.0   | OP42M-25076R6.0 |



## 4 FLUTE - LONG - BALL NOSE



OP42B

LONG BALL INCH

| DIAMETER | LOC   | OAL | ITEM#          |
|----------|-------|-----|----------------|
| 1/4      | 1 1/8 | 3   | OP42-1618R125B |
| 5/16     | 1 1/8 | 3   | OP42-2018R155B |
| 3/8      | 1 1/4 | 3   | OP42-2420R190B |
| 7/16     | 2     | 4   | OP42-2832R220B |
| 1/2      | 2     | 4   | OP42-3232R250B |
| 5/8      | 2 1/4 | 5   | OP42-4036R310B |
| 3/4      | 2 5/8 | 5   | OP42-4842R375B |
| 1        | 3     | 6   | OP42-6448R500B |

OP42MB

LONG BALL METRIC

| DIAMETER | LOC | OAL | ITEM#             |
|----------|-----|-----|-------------------|
| 6        | 29  | 75  | OP42M-06029R3.0B  |
| 8        | 29  | 75  | OP42M-08029R4.0B  |
| 10       | 32  | 75  | OP42M-10032R5.0B  |
| 11       | 50  | 100 | OP42M-11050R5.5B  |
| 12       | 50  | 100 | OP42M-12050R6.0B  |
| 16       | 57  | 125 | OP42M-16057R8.0B  |
| 20       | 67  | 125 | OP42M-20067R10.0B |
| 25       | 76  | 150 | OP42M-25076R12.5B |

## 4 FLUTE - LONG - CHIP BREAKER



OP42C

LONG CHIP BREAKER INCH

| DIAMETER | LOC   | OAL | RAD    | ITEM#          |
|----------|-------|-----|--------|----------------|
| 1/4      | 1 1/8 | 3   | Square | OP42-1618R000C |
| 1/4      | 1 1/8 | 3   | R.015  | OP42-1618R015C |
| 1/4      | 1 1/8 | 3   | R.030  | OP42-1618R030C |
| 1/4      | 1 1/8 | 3   | R.060  | OP42-1618R060C |
| 1/4      | 1 1/8 | 3   | R.090  | OP42-1618R090C |
| 5/16     | 1 1/8 | 3   | Square | OP42-2018R000C |
| 5/16     | 1 1/8 | 3   | R.015  | OP42-2018R015C |
| 5/16     | 1 1/8 | 3   | R.030  | OP42-2018R030C |
| 5/16     | 1 1/8 | 3   | R.060  | OP42-2018R060C |
| 5/16     | 1 1/8 | 3   | R.090  | OP42-2018R090C |
| 5/16     | 1 1/8 | 3   | R.125  | OP42-2018R125C |
| 3/8      | 1 1/4 | 3   | Square | OP42-2420R000C |
| 3/8      | 1 1/4 | 3   | R.015  | OP42-2420R015C |
| 3/8      | 1 1/4 | 3   | R.030  | OP42-2420R030C |
| 3/8      | 1 1/4 | 3   | R.060  | OP42-2420R060C |
| 3/8      | 1 1/4 | 3   | R.090  | OP42-2420R090C |
| 3/8      | 1 1/4 | 3   | R.125  | OP42-2420R125C |
| 7/16     | 2     | 4   | Square | OP42-2832R000C |
| 7/16     | 2     | 4   | R.015  | OP42-2832R015C |
| 7/16     | 2     | 4   | R.030  | OP42-2832R030C |
| 7/16     | 2     | 4   | R.060  | OP42-2832R060C |
| 7/16     | 2     | 4   | R.090  | OP42-2832R090C |
| 7/16     | 2     | 4   | R.125  | OP42-2832R125C |
| 7/16     | 2     | 4   | R.190  | OP42-2832R190C |
| 1/2      | 2     | 4   | Square | OP42-3232R000C |
| 1/2      | 2     | 4   | R.015  | OP42-3232R015C |
| 1/2      | 2     | 4   | R.030  | OP42-3232R030C |
| 1/2      | 2     | 4   | R.060  | OP42-3232R060C |
| 1/2      | 2     | 4   | R.090  | OP42-3232R090C |
| 1/2      | 2     | 4   | R.125  | OP42-3232R125C |

| DIAMETER | LOC   | OAL | RAD    | ITEM#          |
|----------|-------|-----|--------|----------------|
| 1/2      | 2     | 4   | R.190  | OP42-3232R190C |
| 5/8      | 2 1/4 | 5   | Square | OP42-4036R000C |
| 5/8      | 2 1/4 | 5   | R.015  | OP42-4036R015C |
| 5/8      | 2 1/4 | 5   | R.030  | OP42-4036R030C |
| 5/8      | 2 1/4 | 5   | R.060  | OP42-4036R060C |
| 5/8      | 2 1/4 | 5   | R.090  | OP42-4036R090C |
| 5/8      | 2 1/4 | 5   | R.125  | OP42-4036R125C |
| 5/8      | 2 1/4 | 5   | R.190  | OP42-4036R190C |
| 5/8      | 2 1/4 | 5   | R.250  | OP42-4036R250C |
| 3/4      | 2 5/8 | 5   | Square | OP42-4842R000C |
| 3/4      | 2 5/8 | 5   | R.015  | OP42-4842R015C |
| 3/4      | 2 5/8 | 5   | R.030  | OP42-4842R030C |
| 3/4      | 2 5/8 | 5   | R.060  | OP42-4842R060C |
| 3/4      | 2 5/8 | 5   | R.090  | OP42-4842R090C |
| 3/4      | 2 5/8 | 5   | R.125  | OP42-4842R125C |
| 3/4      | 2 5/8 | 5   | R.190  | OP42-4842R190C |
| 3/4      | 2 5/8 | 5   | R.250  | OP42-4842R250C |
| 1        | 3     | 6   | Square | OP42-6448R000C |
| 1        | 3     | 6   | R.015  | OP42-6448R015C |
| 1        | 3     | 6   | R.030  | OP42-6448R030C |
| 1        | 3     | 6   | R.060  | OP42-6448R060C |
| 1        | 3     | 6   | R.090  | OP42-6448R090C |
| 1        | 3     | 6   | R.125  | OP42-6448R125C |
| 1        | 3     | 6   | R.190  | OP42-6448R190C |
| 1        | 3     | 6   | R.250  | OP42-6448R250C |

## 4 FLUTE - LONG - CHIP BREAKER



OP42MC

LONG CHIP BREAKER METRIC

| DIAMETER | LOC | OAL | RAD    | ITEM#            |
|----------|-----|-----|--------|------------------|
| 6        | 29  | 75  | Square | OP42M-06029R0.0C |
| 6        | 29  | 75  | R0.5   | OP42M-06029R0.5C |
| 6        | 29  | 75  | R1.0   | OP42M-06029R1.0C |
| 6        | 29  | 75  | R1.5   | OP42M-06029R1.5C |
| 6        | 29  | 75  | R2.0   | OP42M-06029R2.0C |
| 8        | 29  | 75  | Square | OP42M-08029R0.0C |
| 8        | 29  | 75  | R0.5   | OP42M-08029R0.5C |
| 8        | 29  | 75  | R1.0   | OP42M-08029R1.0C |
| 8        | 29  | 75  | R1.5   | OP42M-08029R1.5C |
| 8        | 29  | 75  | R2.0   | OP42M-08029R2.0C |
| 8        | 29  | 75  | R3.0   | OP42M-08029R3.0C |
| 10       | 32  | 75  | Square | OP42M-10032R0.0C |
| 10       | 32  | 75  | R0.5   | OP42M-10032R0.5C |
| 10       | 32  | 75  | R1.0   | OP42M-10032R1.0C |
| 10       | 32  | 75  | R1.5   | OP42M-10032R1.5C |
| 10       | 32  | 75  | R2.0   | OP42M-10032R2.0C |
| 10       | 32  | 75  | R3.0   | OP42M-10032R3.0C |
| 11       | 50  | 100 | Square | OP42M-11050R0.0C |
| 11       | 50  | 100 | R0.5   | OP42M-11050R0.5C |
| 11       | 50  | 100 | R1.0   | OP42M-11050R1.0C |
| 11       | 50  | 100 | R1.5   | OP42M-11050R1.5C |
| 11       | 50  | 100 | R2.0   | OP42M-11050R2.0C |
| 11       | 50  | 100 | R3.0   | OP42M-11050R3.0C |
| 11       | 50  | 100 | R4.5   | OP42M-11050R4.5C |
| 12       | 50  | 100 | Square | OP42M-12050R0.0C |
| 12       | 50  | 100 | R0.5   | OP42M-12050R0.5C |
| 12       | 50  | 100 | R1.0   | OP42M-12050R1.0C |
| 12       | 50  | 100 | R1.5   | OP42M-12050R1.5C |
| 12       | 50  | 100 | R2.0   | OP42M-12050R2.0C |
| 12       | 50  | 100 | R3.0   | OP42M-12050R3.0C |

| DIAMETER | LOC | OAL | RAD    | ITEM#            |
|----------|-----|-----|--------|------------------|
| 12       | 50  | 100 | R4.5   | OP42M-12050R4.5C |
| 16       | 57  | 125 | Square | OP42M-16057R0.0C |
| 16       | 57  | 125 | R0.5   | OP42M-16057R0.5C |
| 16       | 57  | 125 | R1.0   | OP42M-16057R1.0C |
| 16       | 57  | 125 | R1.5   | OP42M-16057R1.5C |
| 16       | 57  | 125 | R2.0   | OP42M-16057R2.0C |
| 16       | 57  | 125 | R3.0   | OP42M-16057R3.0C |
| 16       | 57  | 125 | R4.5   | OP42M-16057R4.5C |
| 16       | 57  | 125 | R6.0   | OP42M-16057R6.0C |
| 20       | 67  | 125 | Square | OP42M-20067R0.0C |
| 20       | 67  | 125 | R0.5   | OP42M-20067R0.5C |
| 20       | 67  | 125 | R1.0   | OP42M-20067R1.0C |
| 20       | 67  | 125 | R1.5   | OP42M-20067R1.5C |
| 20       | 67  | 125 | R2.0   | OP42M-20067R2.0C |
| 20       | 67  | 125 | R3.0   | OP42M-20067R3.0C |
| 20       | 67  | 125 | R4.5   | OP42M-20067R4.5C |
| 20       | 67  | 125 | R6.0   | OP42M-20067R6.0C |
| 25       | 76  | 150 | Square | OP42M-25076R0.0C |
| 25       | 76  | 150 | R0.5   | OP42M-25076R0.5C |
| 25       | 76  | 150 | R1.0   | OP42M-25076R1.0C |
| 25       | 76  | 150 | R1.5   | OP42M-25076R1.5C |
| 25       | 76  | 150 | R2.0   | OP42M-25076R2.0C |
| 25       | 76  | 150 | R3.0   | OP42M-25076R3.0C |
| 25       | 76  | 150 | R4.5   | OP42M-25076R4.5C |
| 25       | 76  | 150 | R6.0   | OP42M-25076R6.0C |

## 4 FLUTE - LONG REACH



OP43

LONG REACH INCH

| DIAMETER | LOC  | REACH | OAL | RAD    | ITEM#              |
|----------|------|-------|-----|--------|--------------------|
| 1/4      | 3/8  | 1 1/4 | 4   | Square | OP43-1606R000N125  |
| 1/4      | 3/8  | 1 1/4 | 4   | R.015  | OP43-1606R015N125  |
| 5/16     | 7/16 | 1 1/4 | 4   | Square | OP43-2007R000N125  |
| 5/16     | 7/16 | 1 1/4 | 4   | R.015  | OP43-2007R015N125  |
| 3/8      | 1/2  | 1 7/8 | 4   | Square | OP43-2408R000N1875 |
| 3/8      | 1/2  | 1 7/8 | 4   | R.015  | OP43-2408R015N1875 |
| 7/16     | 5/8  | 2 1/4 | 4   | Square | OP43-2810R000N225  |
| 7/16     | 5/8  | 2 1/4 | 4   | R.030  | OP43-2810R030N225  |
| 1/2      | 5/8  | 2 1/4 | 4   | Square | OP43-3210R000N225  |
| 1/2      | 5/8  | 2 1/4 | 4   | R.030  | OP43-3210R030N225  |
| 5/8      | 3/4  | 2 1/4 | 4   | Square | OP43-4012R000N225  |
| 5/8      | 3/4  | 3 1/4 | 5   | Square | OP43-4012R000N325  |
| 5/8      | 3/4  | 2 1/4 | 4   | R.030  | OP43-4012R030N225  |
| 5/8      | 3/4  | 3 1/4 | 5   | R.030  | OP43-4012R030N325  |
| 3/4      | 3/4  | 2 1/4 | 4   | Square | OP43-4812R000N225  |
| 3/4      | 3/4  | 3 1/4 | 5   | Square | OP43-4812R000N325  |
| 3/4      | 3/4  | 2 1/4 | 4   | R.030  | OP43-4812R030N225  |
| 3/4      | 3/4  | 3 1/4 | 5   | R.030  | OP43-4812R030N325  |



## 4 FLUTE - LONG REACH



OP43M

LONG REACH METRIC

| DIAMETER | LOC | REACH | OAL | RAD    | ITEM#              |
|----------|-----|-------|-----|--------|--------------------|
| 6        | 10  | 32    | 100 | Square | OP43M-06010R0.0N32 |
| 6        | 10  | 32    | 100 | R0.5   | OP43M-06010R0.5N32 |
| 8        | 11  | 40    | 100 | Square | OP43M-08011R0.0N40 |
| 8        | 11  | 40    | 100 | R0.5   | OP43M-08011R0.5N40 |
| 10       | 12  | 48    | 100 | Square | OP43M-10012R0.0N48 |
| 10       | 12  | 48    | 100 | R0.5   | OP43M-10012R0.5N48 |
| 11       | 16  | 57    | 100 | Square | OP43M-11016R0.0N57 |
| 11       | 16  | 57    | 100 | R0.5   | OP43M-11016R0.5N57 |
| 12       | 16  | 57    | 100 | Square | OP43M-12016R0.0N57 |
| 12       | 16  | 57    | 100 | R1.0   | OP43M-12016R1.0N57 |
| 16       | 20  | 57    | 100 | Square | OP43M-16020R0.0N57 |
| 16       | 20  | 83    | 150 | Square | OP43M-16020R0.0N83 |
| 16       | 20  | 57    | 100 | R1.0   | OP43M-16020R1.0N57 |
| 16       | 20  | 83    | 150 | R1.0   | OP43M-16020R1.0N83 |
| 20       | 25  | 57    | 100 | Square | OP43M-20025R0.0N57 |
| 20       | 25  | 83    | 150 | Square | OP43M-20025R0.0N83 |
| 20       | 25  | 57    | 100 | R1.0   | OP43M-20025R1.0N57 |
| 20       | 25  | 83    | 150 | R1.0   | OP43M-20025R1.0N83 |

## 4 FLUTE - LONG REACH - BALL NOSE



OP43B

BALL LONG REACH INCH

| DIAMETER | LOC  | REACH | OAL | ITEM#               |
|----------|------|-------|-----|---------------------|
| 1/4      | 3/8  | 1 1/4 | 4   | OP43-1606R125N125B  |
| 5/16     | 7/16 | 1 1/4 | 4   | OP43-2007R155N125B  |
| 3/8      | 1/2  | 1 7/8 | 4   | OP43-2408R190N1875B |
| 7/16     | 5/8  | 2 1/4 | 4   | OP43-2810R220N225B  |
| 1/2      | 5/8  | 2 1/4 | 4   | OP43-3210R250N225B  |
| 5/8      | 3/4  | 2 1/4 | 4   | OP43-4012R310N225B  |
| 5/8      | 3/4  | 3 1/4 | 5   | OP43-4012R310N325B  |
| 3/4      | 3/4  | 2 1/4 | 4   | OP43-4812R375N225B  |
| 3/4      | 3/4  | 3 1/4 | 5   | OP43-4812R375N325B  |

OP43MB

BALL LONG REACH METRIC

| DIAMETER | LOC | REACH | OAL | ITEM#                |
|----------|-----|-------|-----|----------------------|
| 6        | 10  | 32    | 100 | OP43M-06010R3.0N32B  |
| 8        | 11  | 40    | 100 | OP43M-08011R4.0N40B  |
| 10       | 12  | 48    | 100 | OP43M-10012R5.0N48B  |
| 11       | 16  | 57    | 100 | OP43M-11016R5.5N57B  |
| 12       | 16  | 57    | 100 | OP43M-12016R6.0N57B  |
| 16       | 20  | 57    | 100 | OP43M-16020R8.0N57B  |
| 16       | 20  | 83    | 150 | OP43M-16020R8.0N83B  |
| 20       | 25  | 57    | 100 | OP43M-20025R10.0N57B |
| 20       | 25  | 83    | 150 | OP43M-20025R10.0N83B |

## 4 FLUTE - LONG REACH - CHIP BREAKER



OP43C

CHIP BREAKER LONG REACH INCH

| DIAMETER | LOC  | REACH | OAL | RAD    | ITEM#               |
|----------|------|-------|-----|--------|---------------------|
| 1/4      | 3/8  | 1 1/4 | 4   | Square | OP43-1606R000CN125  |
| 1/4      | 3/8  | 1 1/4 | 4   | R.015  | OP43-1606R015CN125  |
| 5/16     | 7/16 | 1 1/4 | 4   | Square | OP43-2007R000CN125  |
| 5/16     | 7/16 | 1 1/4 | 4   | R.015  | OP43-2007R015CN125  |
| 3/8      | 1/2  | 1 7/8 | 4   | Square | OP43-2408R000CN1875 |
| 3/8      | 1/2  | 1 7/8 | 4   | R.015  | OP43-2408R015CN1875 |
| 7/16     | 5/8  | 2 1/4 | 4   | Square | OP43-2810R000CN225  |
| 7/16     | 5/8  | 2 1/4 | 4   | R.030  | OP43-2810R030CN225  |
| 1/2      | 5/8  | 2 1/4 | 4   | Square | OP43-3210R000CN225  |
| 1/2      | 5/8  | 2 1/4 | 4   | R.030  | OP43-3210R030CN225  |
| 5/8      | 3/4  | 2 1/4 | 4   | Square | OP43-4012R000CN225  |
| 5/8      | 3/4  | 3 1/4 | 5   | Square | OP43-4012R000CN325  |
| 5/8      | 3/4  | 2 1/4 | 4   | R.030  | OP43-4012R030CN225  |
| 5/8      | 3/4  | 3 1/4 | 5   | R.030  | OP43-4012R030CN325  |
| 3/4      | 3/4  | 2 1/4 | 4   | Square | OP43-4812R000CN225  |
| 3/4      | 3/4  | 3 1/4 | 5   | Square | OP43-4812R000CN325  |
| 3/4      | 3/4  | 2 1/4 | 4   | R.030  | OP43-4812R030CN225  |
| 3/4      | 3/4  | 3 1/4 | 5   | R.030  | OP43-4812R030CN325  |

## 4 FLUTE - LONG REACH - CHIP BREAKER



OP43MC

CHIP BREAKER LONG REACH METRIC

| DIAMETER | LOC | REACH | OAL | RAD    | ITEM#               |
|----------|-----|-------|-----|--------|---------------------|
| 6        | 10  | 32    | 100 | Square | OP43M-06010R0.0CN32 |
| 6        | 10  | 32    | 100 | R0.5   | OP43M-06010R0.5CN32 |
| 8        | 11  | 40    | 100 | Square | OP43M-08011R0.0CN40 |
| 8        | 11  | 40    | 100 | R0.5   | OP43M-08011R0.5CN40 |
| 10       | 12  | 48    | 100 | Square | OP43M-10012R0.0CN48 |
| 10       | 12  | 48    | 100 | R0.5   | OP43M-10012R0.5CN48 |
| 11       | 16  | 57    | 100 | Square | OP43M-11016R0.0CN57 |
| 11       | 16  | 57    | 100 | R0.5   | OP43M-11016R0.5CN57 |
| 12       | 16  | 57    | 100 | Square | OP43M-12016R0.0CN57 |
| 12       | 16  | 57    | 100 | R1.0   | OP43M-12016R1.0CN57 |
| 16       | 20  | 57    | 100 | Square | OP43M-16020R0.0CN57 |
| 16       | 20  | 83    | 150 | Square | OP43M-16020R0.0CN83 |
| 16       | 20  | 57    | 100 | R1.0   | OP43M-16020R1.0CN57 |
| 16       | 20  | 83    | 150 | R1.0   | OP43M-16020R1.0CN83 |
| 20       | 25  | 57    | 100 | Square | OP43M-20025R0.0CN57 |
| 20       | 25  | 83    | 150 | Square | OP43M-20025R0.0CN83 |
| 20       | 25  | 57    | 100 | R1.0   | OP43M-20025R1.0CN57 |
| 20       | 25  | 83    | 150 | R1.0   | OP43M-20025R1.0CN83 |



# OP45 4 FLUTE DOUBLE FLUTING

Best used Steel, Stainless and HTSA (Heat-resistant superalloys)

## SPECIAL FEATURES

|                          |                                                                                                                            |
|--------------------------|----------------------------------------------------------------------------------------------------------------------------|
| <b>UNEQUAL INDEXING</b>  | Eliminates tool vibrations around tool circumference by spreading cutting forces unevenly for a more stable cutting.       |
| <b>VARIABLE HELIX</b>    | Breaks up harmonic vibrations (chatter) along the length and improves surface finish and tool life.                        |
| <b>nACRo PVD COATING</b> | Offers a higher cutting edge resistance to wear and higher heat tolerance.                                                 |
| <b>TANGENTIAL RADIUS</b> | Allows a smooth blending radius on the machined part, improving the manufacturing times by avoiding the finishing process. |
| <b>DOUBLE FLUTING</b>    | Improves chip evacuation with a deeper front flute, while the rest of the reinforced body provides greater rigidity.       |
| <b>CORE TAPER</b>        | Makes the tool more rigid, resisting higher shearing force when fully engaged in the material.                             |



These tools are suitable for very hard materials and for those with low machinability, including exotic alloys.

## 4 FLUTE - DOUBLE FLUTING



OP45

DOUBLE FLUTING INCH

| DIAMETER | LOC   | OAL | RAD    | ITEM#         |
|----------|-------|-----|--------|---------------|
| 3/16     | 9/16  | 3   | Square | OP45-1209R000 |
| 3/16     | 9/16  | 3   | R.015  | OP45-1209R015 |
| 3/16     | 9/16  | 3   | R.030  | OP45-1209R030 |
| 3/16     | 9/16  | 3   | R.060  | OP45-1209R060 |
| 1/4      | 3/4   | 3   | Square | OP45-1612R000 |
| 1/4      | 3/4   | 3   | R.015  | OP45-1612R015 |
| 1/4      | 3/4   | 3   | R.030  | OP45-1612R030 |
| 1/4      | 3/4   | 3   | R.060  | OP45-1612R060 |
| 1/4      | 3/4   | 3   | R.090  | OP45-1612R090 |
| 5/16     | 13/16 | 3   | Square | OP45-2013R000 |
| 5/16     | 13/16 | 3   | R.015  | OP45-2013R015 |
| 5/16     | 13/16 | 3   | R.030  | OP45-2013R030 |
| 5/16     | 13/16 | 3   | R.060  | OP45-2013R060 |
| 5/16     | 13/16 | 3   | R.090  | OP45-2013R090 |
| 5/16     | 13/16 | 3   | R.125  | OP45-2013R125 |
| 3/8      | 1     | 3   | Square | OP45-2416R000 |
| 3/8      | 1     | 3   | R.015  | OP45-2416R015 |
| 3/8      | 1     | 3   | R.030  | OP45-2416R030 |
| 3/8      | 1     | 3   | R.060  | OP45-2416R060 |
| 3/8      | 1     | 3   | R.090  | OP45-2416R090 |
| 3/8      | 1     | 3   | R.125  | OP45-2416R125 |
| 7/16     | 1     | 3   | Square | OP45-2816R000 |
| 7/16     | 1     | 3   | R.015  | OP45-2816R015 |
| 7/16     | 1     | 3   | R.030  | OP45-2816R030 |
| 7/16     | 1     | 3   | R.060  | OP45-2816R060 |
| 7/16     | 1     | 3   | R.090  | OP45-2816R090 |
| 7/16     | 1     | 3   | R.125  | OP45-2816R125 |
| 7/16     | 1     | 3   | R.190  | OP45-2816R190 |
| 1/2      | 1 1/4 | 3   | Square | OP45-3220R000 |
| 1/2      | 1 1/4 | 3   | R.015  | OP45-3220R015 |

| DIAMETER | LOC   | OAL | RAD    | ITEM#         |
|----------|-------|-----|--------|---------------|
| 1/2      | 1 1/4 | 3   | R.030  | OP45-3220R030 |
| 1/2      | 1 1/4 | 3   | R.060  | OP45-3220R060 |
| 1/2      | 1 1/4 | 3   | R.090  | OP45-3220R090 |
| 1/2      | 1 1/4 | 3   | R.125  | OP45-3220R125 |
| 1/2      | 1 1/4 | 3   | R.190  | OP45-3220R190 |
| 5/8      | 1 5/8 | 4   | Square | OP45-4026R000 |
| 5/8      | 1 5/8 | 4   | R.015  | OP45-4026R015 |
| 5/8      | 1 5/8 | 4   | R.030  | OP45-4026R030 |
| 5/8      | 1 5/8 | 4   | R.060  | OP45-4026R060 |
| 5/8      | 1 5/8 | 4   | R.090  | OP45-4026R090 |
| 5/8      | 1 5/8 | 4   | R.125  | OP45-4026R125 |
| 5/8      | 1 5/8 | 4   | R.190  | OP45-4026R190 |
| 5/8      | 1 5/8 | 4   | R.250  | OP45-4026R250 |
| 3/4      | 1 5/8 | 4   | Square | OP45-4826R000 |
| 3/4      | 1 5/8 | 4   | R.015  | OP45-4826R015 |
| 3/4      | 1 5/8 | 4   | R.030  | OP45-4826R030 |
| 3/4      | 1 5/8 | 4   | R.060  | OP45-4826R060 |
| 3/4      | 1 5/8 | 4   | R.090  | OP45-4826R090 |
| 3/4      | 1 5/8 | 4   | R.125  | OP45-4826R125 |
| 3/4      | 1 5/8 | 4   | R.190  | OP45-4826R190 |
| 3/4      | 1 5/8 | 4   | R.250  | OP45-4826R250 |
| 1        | 1 3/4 | 5   | Square | OP45-6428R000 |
| 1        | 1 3/4 | 5   | R.015  | OP45-6428R015 |
| 1        | 1 3/4 | 5   | R.030  | OP45-6428R030 |
| 1        | 1 3/4 | 5   | R.060  | OP45-6428R060 |
| 1        | 1 3/4 | 5   | R.090  | OP45-6428R090 |
| 1        | 1 3/4 | 5   | R.125  | OP45-6428R125 |
| 1        | 1 3/4 | 5   | R.190  | OP45-6428R190 |
| 1        | 1 3/4 | 5   | R.250  | OP45-6428R250 |

## 4 FLUTE - DOUBLE FLUTING



OP45M

DOUBLE FLUTING METRIC

| DIAMETER | LOC | OAL | RAD    | ITEM#           |
|----------|-----|-----|--------|-----------------|
| 5        | 14  | 75  | Square | OP45M-05014R0.0 |
| 5        | 14  | 75  | R0.5   | OP45M-05014R0.5 |
| 5        | 14  | 75  | R1.0   | OP45M-05014R1.0 |
| 5        | 14  | 75  | R1.5   | OP45M-05014R1.5 |
| 6        | 20  | 75  | Square | OP45M-06020R0.0 |
| 6        | 20  | 75  | R0.5   | OP45M-06020R0.5 |
| 6        | 20  | 75  | R1.0   | OP45M-06020R1.0 |
| 6        | 20  | 75  | R1.5   | OP45M-06020R1.5 |
| 6        | 20  | 75  | R2.0   | OP45M-06020R2.0 |
| 8        | 21  | 75  | Square | OP45M-08021R0.0 |
| 8        | 21  | 75  | R0.5   | OP45M-08021R0.5 |
| 8        | 21  | 75  | R1.0   | OP45M-08021R1.0 |
| 8        | 21  | 75  | R1.5   | OP45M-08021R1.5 |
| 8        | 21  | 75  | R2.0   | OP45M-08021R2.0 |
| 8        | 21  | 75  | R3.0   | OP45M-08021R3.0 |
| 10       | 25  | 75  | Square | OP45M-10025R0.0 |
| 10       | 25  | 75  | R0.5   | OP45M-10025R0.5 |
| 10       | 25  | 75  | R1.0   | OP45M-10025R1.0 |
| 10       | 25  | 75  | R1.5   | OP45M-10025R1.5 |
| 10       | 25  | 75  | R2.0   | OP45M-10025R2.0 |
| 10       | 25  | 75  | R3.0   | OP45M-10025R3.0 |
| 11       | 25  | 75  | Square | OP45M-11025R0.0 |
| 11       | 25  | 75  | R0.5   | OP45M-11025R0.5 |
| 11       | 25  | 75  | R1.0   | OP45M-11025R1.0 |
| 11       | 25  | 75  | R1.5   | OP45M-11025R1.5 |
| 11       | 25  | 75  | R2.0   | OP45M-11025R2.0 |
| 11       | 25  | 75  | R3.0   | OP45M-11025R3.0 |
| 11       | 25  | 75  | R4.5   | OP45M-11025R4.5 |
| 12       | 32  | 75  | Square | OP45M-12032R0.0 |
| 12       | 32  | 75  | R0.5   | OP45M-12032R0.5 |

| DIAMETER | LOC | OAL | RAD    | ITEM#           |
|----------|-----|-----|--------|-----------------|
| 12       | 32  | 75  | R1.0   | OP45M-12032R1.0 |
| 12       | 32  | 75  | R1.5   | OP45M-12032R1.5 |
| 12       | 32  | 75  | R2.0   | OP45M-12032R2.0 |
| 12       | 32  | 75  | R3.0   | OP45M-12032R3.0 |
| 12       | 32  | 75  | R4.5   | OP45M-12032R4.5 |
| 16       | 41  | 100 | Square | OP45M-16041R0.0 |
| 16       | 41  | 100 | R0.5   | OP45M-16041R0.5 |
| 16       | 41  | 100 | R1.0   | OP45M-16041R1.0 |
| 16       | 41  | 100 | R1.5   | OP45M-16041R1.5 |
| 16       | 41  | 100 | R2.0   | OP45M-16041R2.0 |
| 16       | 41  | 100 | R3.0   | OP45M-16041R3.0 |
| 16       | 41  | 100 | R4.5   | OP45M-16041R4.5 |
| 16       | 41  | 100 | R6.0   | OP45M-16041R6.0 |
| 20       | 41  | 100 | Square | OP45M-20041R0.0 |
| 20       | 41  | 100 | R0.5   | OP45M-20041R0.5 |
| 20       | 41  | 100 | R1.0   | OP45M-20041R1.0 |
| 20       | 41  | 100 | R1.5   | OP45M-20041R1.5 |
| 20       | 41  | 100 | R2.0   | OP45M-20041R2.0 |
| 20       | 41  | 100 | R3.0   | OP45M-20041R3.0 |
| 20       | 41  | 100 | R4.5   | OP45M-20041R4.5 |
| 20       | 41  | 100 | R6.0   | OP45M-20041R6.0 |
| 25       | 45  | 125 | Square | OP45M-25045R0.0 |
| 25       | 45  | 125 | R0.5   | OP45M-25045R0.5 |
| 25       | 45  | 125 | R1.0   | OP45M-25045R1.0 |
| 25       | 45  | 125 | R1.5   | OP45M-25045R1.5 |
| 25       | 45  | 125 | R2.0   | OP45M-25045R2.0 |
| 25       | 45  | 125 | R3.0   | OP45M-25045R3.0 |
| 25       | 45  | 125 | R4.5   | OP45M-25045R4.5 |
| 25       | 45  | 125 | R6.0   | OP45M-25045R6.0 |



## 4 FLUTE - DOUBLE FLUTING- CHIP BREAKER



OP45C

DOUBLE FLUTING CHIP BREAKER INCH

| DIAMETER | LOC   | OAL | RAD    | ITEM#          |
|----------|-------|-----|--------|----------------|
| 3/16     | 9/16  | 3   | Square | OP45-1209R000C |
| 3/16     | 9/16  | 3   | R.015  | OP45-1209R015C |
| 3/16     | 9/16  | 3   | R.030  | OP45-1209R030C |
| 3/16     | 9/16  | 3   | R.060  | OP45-1209R060C |
| 1/4      | 3/4   | 3   | Square | OP45-1612R000C |
| 1/4      | 3/4   | 3   | R.015  | OP45-1612R015C |
| 1/4      | 3/4   | 3   | R.030  | OP45-1612R030C |
| 1/4      | 3/4   | 3   | R.060  | OP45-1612R060C |
| 1/4      | 3/4   | 3   | R.090  | OP45-1612R090C |
| 5/16     | 13/16 | 3   | Square | OP45-2013R000C |
| 5/16     | 13/16 | 3   | R.015  | OP45-2013R015C |
| 5/16     | 13/16 | 3   | R.030  | OP45-2013R030C |
| 5/16     | 13/16 | 3   | R.060  | OP45-2013R060C |
| 5/16     | 13/16 | 3   | R.090  | OP45-2013R090C |
| 5/16     | 13/16 | 3   | R.125  | OP45-2013R125C |
| 3/8      | 1     | 3   | Square | OP45-2416R000C |
| 3/8      | 1     | 3   | R.015  | OP45-2416R015C |
| 3/8      | 1     | 3   | R.030  | OP45-2416R030C |
| 3/8      | 1     | 3   | R.060  | OP45-2416R060C |
| 3/8      | 1     | 3   | R.090  | OP45-2416R090C |
| 3/8      | 1     | 3   | R.125  | OP45-2416R125C |
| 7/16     | 1     | 3   | Square | OP45-2816R000C |
| 7/16     | 1     | 3   | R.015  | OP45-2816R015C |
| 7/16     | 1     | 3   | R.030  | OP45-2816R030C |
| 7/16     | 1     | 3   | R.060  | OP45-2816R060C |
| 7/16     | 1     | 3   | R.090  | OP45-2816R090C |
| 7/16     | 1     | 3   | R.125  | OP45-2816R125C |
| 7/16     | 1     | 3   | R.190  | OP45-2816R190C |
| 1/2      | 1 1/4 | 3   | Square | OP45-3220R000C |
| 1/2      | 1 1/4 | 3   | R.015  | OP45-3220R015C |

| DIAMETER | LOC   | OAL | RAD    | ITEM#          |
|----------|-------|-----|--------|----------------|
| 1/2      | 1 1/4 | 3   | R.030  | OP45-3220R030C |
| 1/2      | 1 1/4 | 3   | R.060  | OP45-3220R060C |
| 1/2      | 1 1/4 | 3   | R.090  | OP45-3220R090C |
| 1/2      | 1 1/4 | 3   | R.125  | OP45-3220R125C |
| 1/2      | 1 1/4 | 3   | R.190  | OP45-3220R190C |
| 5/8      | 1 5/8 | 4   | Square | OP45-4026R000C |
| 5/8      | 1 5/8 | 4   | R.015  | OP45-4026R015C |
| 5/8      | 1 5/8 | 4   | R.030  | OP45-4026R030C |
| 5/8      | 1 5/8 | 4   | R.060  | OP45-4026R060C |
| 5/8      | 1 5/8 | 4   | R.090  | OP45-4026R090C |
| 5/8      | 1 5/8 | 4   | R.125  | OP45-4026R125C |
| 5/8      | 1 5/8 | 4   | R.190  | OP45-4026R190C |
| 5/8      | 1 5/8 | 4   | R.250  | OP45-4026R250C |
| 3/4      | 1 5/8 | 4   | Square | OP45-4826R000C |
| 3/4      | 1 5/8 | 4   | R.015  | OP45-4826R015C |
| 3/4      | 1 5/8 | 4   | R.030  | OP45-4826R030C |
| 3/4      | 1 5/8 | 4   | R.060  | OP45-4826R060C |
| 3/4      | 1 5/8 | 4   | R.090  | OP45-4826R090C |
| 3/4      | 1 5/8 | 4   | R.125  | OP45-4826R125C |
| 3/4      | 1 5/8 | 4   | R.190  | OP45-4826R190C |
| 3/4      | 1 5/8 | 4   | R.250  | OP45-4826R250C |
| 1        | 1 3/4 | 5   | Square | OP45-6428R000C |
| 1        | 1 3/4 | 5   | R.015  | OP45-6428R015C |
| 1        | 1 3/4 | 5   | R.030  | OP45-6428R030C |
| 1        | 1 3/4 | 5   | R.060  | OP45-6428R060C |
| 1        | 1 3/4 | 5   | R.090  | OP45-6428R090C |
| 1        | 1 3/4 | 5   | R.125  | OP45-6428R125C |
| 1        | 1 3/4 | 5   | R.190  | OP45-6428R190C |
| 1        | 1 3/4 | 5   | R.250  | OP45-6428R250C |



## 4 FLUTE - DOUBLE FLUTING - CHIP BREAKER



OP45MC

DOUBLE FLUTING CHIP BREAKER METRIC

| DIAMETER | LOC | OAL | RAD    | ITEM#            |
|----------|-----|-----|--------|------------------|
| 5        | 14  | 75  | Square | OP45M-05014R0.0C |
| 5        | 14  | 75  | R0.5   | OP45M-05014R0.5C |
| 5        | 14  | 75  | R1.0   | OP45M-05014R1.0C |
| 5        | 14  | 75  | R1.5   | OP45M-05014R1.5C |
| 6        | 20  | 75  | Square | OP45M-06020R0.0C |
| 6        | 20  | 75  | R0.5   | OP45M-06020R0.5C |
| 6        | 20  | 75  | R1.0   | OP45M-06020R1.0C |
| 6        | 20  | 75  | R1.5   | OP45M-06020R1.5C |
| 6        | 20  | 75  | R2.0   | OP45M-06020R2.0C |
| 8        | 21  | 75  | Square | OP45M-08021R0.0C |
| 8        | 21  | 75  | R0.5   | OP45M-08021R0.5C |
| 8        | 21  | 75  | R1.0   | OP45M-08021R1.0C |
| 8        | 21  | 75  | R1.5   | OP45M-08021R1.5C |
| 8        | 21  | 75  | R2.0   | OP45M-08021R2.0C |
| 8        | 21  | 75  | R3.0   | OP45M-08021R3.0C |
| 10       | 25  | 75  | Square | OP45M-10025R0.0C |
| 10       | 25  | 75  | R0.5   | OP45M-10025R0.5C |
| 10       | 25  | 75  | R1.0   | OP45M-10025R1.0C |
| 10       | 25  | 75  | R1.5   | OP45M-10025R1.5C |
| 10       | 25  | 75  | R2.0   | OP45M-10025R2.0C |
| 10       | 25  | 75  | R3.0   | OP45M-10025R3.0C |
| 11       | 25  | 75  | Square | OP45M-11025R0.0C |
| 11       | 25  | 75  | R0.5   | OP45M-11025R0.5C |
| 11       | 25  | 75  | R1.0   | OP45M-11025R1.0C |
| 11       | 25  | 75  | R1.5   | OP45M-11025R1.5C |
| 11       | 25  | 75  | R2.0   | OP45M-11025R2.0C |
| 11       | 25  | 75  | R3.0   | OP45M-11025R3.0C |
| 11       | 25  | 75  | R4.5   | OP45M-11025R4.5C |
| 12       | 32  | 75  | Square | OP45M-12032R0.0C |
| 12       | 32  | 75  | R0.5   | OP45M-12032R0.5C |

| DIAMETER | LOC | OAL | RAD    | ITEM#            |
|----------|-----|-----|--------|------------------|
| 12       | 32  | 75  | R1.0   | OP45M-12032R1.0C |
| 12       | 32  | 75  | R1.5   | OP45M-12032R1.5C |
| 12       | 32  | 75  | R2.0   | OP45M-12032R2.0C |
| 12       | 32  | 75  | R3.0   | OP45M-12032R3.0C |
| 12       | 32  | 75  | R4.5   | OP45M-12032R4.5C |
| 16       | 41  | 100 | Square | OP45M-16041R0.0C |
| 16       | 41  | 100 | R0.5   | OP45M-16041R0.5C |
| 16       | 41  | 100 | R1.0   | OP45M-16041R1.0C |
| 16       | 41  | 100 | R1.5   | OP45M-16041R1.5C |
| 16       | 41  | 100 | R2.0   | OP45M-16041R2.0C |
| 16       | 41  | 100 | R3.0   | OP45M-16041R3.0C |
| 16       | 41  | 100 | R4.5   | OP45M-16041R4.5C |
| 16       | 41  | 100 | R6.0   | OP45M-16041R6.0C |
| 20       | 41  | 100 | Square | OP45M-20041R0.0C |
| 20       | 41  | 100 | R0.5   | OP45M-20041R0.5C |
| 20       | 41  | 100 | R1.0   | OP45M-20041R1.0C |
| 20       | 41  | 100 | R1.5   | OP45M-20041R1.5C |
| 20       | 41  | 100 | R2.0   | OP45M-20041R2.0C |
| 20       | 41  | 100 | R3.0   | OP45M-20041R3.0C |
| 20       | 41  | 100 | R4.5   | OP45M-20041R4.5C |
| 20       | 41  | 100 | R6.0   | OP45M-20041R6.0C |
| 25       | 45  | 125 | Square | OP45M-25045R0.0C |
| 25       | 45  | 125 | R0.5   | OP45M-25045R0.5C |
| 25       | 45  | 125 | R1.0   | OP45M-25045R1.0C |
| 25       | 45  | 125 | R1.5   | OP45M-25045R1.5C |
| 25       | 45  | 125 | R2.0   | OP45M-25045R2.0C |
| 25       | 45  | 125 | R3.0   | OP45M-25045R3.0C |
| 25       | 45  | 125 | R4.5   | OP45M-25045R4.5C |
| 25       | 45  | 125 | R6.0   | OP45M-25045R6.0C |

# OP48 ENDMILLS

Best used for Hardensteel

## SPECIAL FEATURES

### RADIUS GASH

Strengthens the radius of the tool.

### CARBIDE GRADE

Dedicated carbide grade for die and mold machining.

### LINE FORM

Very precise line form.

### SMOOTHING RADIUS

Help distribute cutting forces evenly to prevent damage to the end mill and extend its life.

### RIGID CENTER

Rigid center fluting for Hardensteel.

Dedicated carbide grade for die and mold machining, very precise line form, rigid center fluting for Hardensteel.



## 4 FLUTE - STUB - BALL NOSE - HIGH PERFORMANCE



OP48  
STUB INCH

| DIA  | LOC  | OAL | ITEM#          |
|------|------|-----|----------------|
| 1/8  | 1/4  | 2   | OP48-0804R060B |
| 3/16 | 3/8  | 3   | OP48-1206R090B |
| 1/4  | 3/8  | 3   | OP48-1606R125B |
| 5/16 | 7/16 | 3   | OP48-2007R155B |
| 3/8  | 1/2  | 3   | OP48-2408R190B |
| 7/16 | 5/8  | 3   | OP48-2810R220B |
| 1/2  | 5/8  | 3   | OP48-3210R250B |
| 5/8  | 3/4  | 4   | OP48-4012R310B |
| 3/4  | 3/4  | 4   | OP48-4812R375B |

OP48M  
STUB METRIC

| DIA | LOC | OAL | ITEM#             |
|-----|-----|-----|-------------------|
| 3   | 6   | 50  | OP48M-03006R1.5B  |
| 5   | 10  | 75  | OP48M-05010R2.5B  |
| 6   | 10  | 75  | OP48M-06010R3.0B  |
| 8   | 11  | 75  | OP48M-08011R4.0B  |
| 10  | 12  | 75  | OP48M-10012R5.0B  |
| 11  | 16  | 75  | OP48M-11016R5.5B  |
| 12  | 16  | 75  | OP48M-12016R6.0B  |
| 16  | 20  | 100 | OP48M-16020R8.0B  |
| 20  | 25  | 100 | OP48M-20025R10.0B |

## 4 FLUTE - STUB - OVERSIZED SHANK



OP49

OVERSIZED SHANK INCH

| DIAMETER | SHANK | LOC  | OAL | RAD    | ITEM#         |
|----------|-------|------|-----|--------|---------------|
| 3/16     | 1/4   | 3/8  | 3   | Square | OP49-1206R000 |
| 3/16     | 1/4   | 3/8  | 3   | R.015  | OP49-1206R015 |
| 3/16     | 1/4   | 3/8  | 3   | R.030  | OP49-1206R030 |
| 3/16     | 1/4   | 3/8  | 3   | R.060  | OP49-1206R060 |
| 1/4      | 3/8   | 3/8  | 3   | Square | OP49-1606R000 |
| 1/4      | 3/8   | 3/8  | 3   | R.015  | OP49-1606R015 |
| 1/4      | 3/8   | 3/8  | 3   | R.030  | OP49-1606R030 |
| 1/4      | 3/8   | 3/8  | 3   | R.060  | OP49-1606R060 |
| 1/4      | 3/8   | 3/8  | 3   | R.090  | OP49-1606R090 |
| 5/16     | 3/8   | 7/16 | 3   | Square | OP49-2007R000 |
| 5/16     | 3/8   | 7/16 | 3   | R.015  | OP49-2007R015 |
| 5/16     | 3/8   | 7/16 | 3   | R.030  | OP49-2007R030 |
| 5/16     | 3/8   | 7/16 | 3   | R.060  | OP49-2007R060 |
| 5/16     | 3/8   | 7/16 | 3   | R.090  | OP49-2007R090 |
| 5/16     | 3/8   | 7/16 | 3   | R.125  | OP49-2007R125 |
| 3/8      | 1/2   | 1/2  | 3   | Square | OP49-2408R000 |
| 3/8      | 1/2   | 1/2  | 3   | R.015  | OP49-2408R015 |
| 3/8      | 1/2   | 1/2  | 3   | R.030  | OP49-2408R030 |
| 3/8      | 1/2   | 1/2  | 3   | R.060  | OP49-2408R060 |
| 3/8      | 1/2   | 1/2  | 3   | R.090  | OP49-2408R090 |
| 3/8      | 1/2   | 1/2  | 3   | R.125  | OP49-2408R125 |



## 4 FLUTE - STUB - OVERSIZED SHANK



OP49M

OVERSIZED SHANK METRIC

| DIAMETER | SHANK | LOC | OAL | RAD    | ITEM#           |
|----------|-------|-----|-----|--------|-----------------|
| 5        | 6     | 10  | 75  | Square | OP49M-05010R0.0 |
| 5        | 6     | 10  | 75  | R0.5   | OP49M-05010R0.5 |
| 5        | 6     | 10  | 75  | R1.0   | OP49M-05010R1.0 |
| 5        | 6     | 10  | 75  | R1.5   | OP49M-05010R1.5 |
| 6        | 10    | 10  | 75  | Square | OP49M-06010R0.0 |
| 6        | 10    | 10  | 75  | R0.5   | OP49M-06010R0.5 |
| 6        | 10    | 10  | 75  | R1.0   | OP49M-06010R1.0 |
| 6        | 10    | 10  | 75  | R1.5   | OP49M-06010R1.5 |
| 6        | 10    | 10  | 75  | R2.0   | OP49M-06010R2.0 |
| 8        | 10    | 11  | 75  | Square | OP49M-08011R0.0 |
| 8        | 10    | 11  | 75  | R0.5   | OP49M-08011R0.5 |
| 8        | 10    | 11  | 75  | R1.0   | OP49M-08011R1.0 |
| 8        | 10    | 11  | 75  | R1.5   | OP49M-08011R1.5 |
| 8        | 10    | 11  | 75  | R2.0   | OP49M-08011R2.0 |
| 8        | 10    | 11  | 75  | R3.0   | OP49M-08011R3.0 |
| 10       | 12    | 12  | 75  | Square | OP49M-10012R0.0 |
| 10       | 12    | 12  | 75  | R0.5   | OP49M-10012R0.5 |
| 10       | 12    | 12  | 75  | R1.0   | OP49M-10012R1.0 |
| 10       | 12    | 12  | 75  | R1.5   | OP49M-10012R1.5 |
| 10       | 12    | 12  | 75  | R2.0   | OP49M-10012R2.0 |
| 10       | 12    | 12  | 75  | R3.0   | OP49M-10012R3.0 |

## 4 FLUTE - STUB - OVERSIZED SHANK - BALL NOSE



OP49B

OVERSIZED SHANK BALL INCH

| DIAMETER | SHANK | LOC | OAL | ITEM#          |
|----------|-------|-----|-----|----------------|
| 3/16     | 1/4   | 3/8 | 3   | OP49-1206R090B |
| 1/4      | 3/8   | 3/8 | 3   | OP49-1606R125B |
| 3/8      | 1/2   | 1/2 | 3   | OP49-2408R190B |

OP49MB

OVERSIZED SHANK BALL METRIC

| DIAMETER | SHANK | LOC | OAL | ITEM#            |
|----------|-------|-----|-----|------------------|
| 5        | 6     | 10  | 75  | OP49M-05010R2.5B |
| 6        | 10    | 10  | 75  | OP49M-06010R3.0B |
| 10       | 12    | 12  | 75  | OP49M-10012R5.0B |

## 4 FLUTE - STUB - OVERSIZED SHANK - CHIP BREAKER



OP49C

OVERSIZED SHANK CHIP BREAKER INCH

| DIAMETER | SHANK | LOC  | OAL | RAD    | ITEM#          |
|----------|-------|------|-----|--------|----------------|
| 3/16     | 1/4   | 3/8  | 3   | Square | OP49-1206R000C |
| 3/16     | 1/4   | 3/8  | 3   | R.015  | OP49-1206R015C |
| 3/16     | 1/4   | 3/8  | 3   | R.030  | OP49-1206R030C |
| 3/16     | 1/4   | 3/8  | 3   | R.060  | OP49-1206R060C |
| 1/4      | 3/8   | 3/8  | 3   | Square | OP49-1606R000C |
| 1/4      | 3/8   | 3/8  | 3   | R.015  | OP49-1606R015C |
| 1/4      | 3/8   | 3/8  | 3   | R.030  | OP49-1606R030C |
| 1/4      | 3/8   | 3/8  | 3   | R.060  | OP49-1606R060C |
| 1/4      | 3/8   | 3/8  | 3   | R.090  | OP49-1606R090C |
| 5/16     | 3/8   | 7/16 | 3   | Square | OP49-2007R000C |
| 5/16     | 3/8   | 7/16 | 3   | R.015  | OP49-2007R015C |
| 5/16     | 3/8   | 7/16 | 3   | R.030  | OP49-2007R030C |
| 5/16     | 3/8   | 7/16 | 3   | R.060  | OP49-2007R060C |
| 5/16     | 3/8   | 7/16 | 3   | R.090  | OP49-2007R090C |
| 5/16     | 3/8   | 7/16 | 3   | R.125  | OP49-2007R125C |
| 3/8      | 1/2   | 1/2  | 3   | Square | OP49-2408R000C |
| 3/8      | 1/2   | 1/2  | 3   | R.015  | OP49-2408R015C |
| 3/8      | 1/2   | 1/2  | 3   | R.030  | OP49-2408R030C |
| 3/8      | 1/2   | 1/2  | 3   | R.060  | OP49-2408R060C |
| 3/8      | 1/2   | 1/2  | 3   | R.090  | OP49-2408R090C |
| 3/8      | 1/2   | 1/2  | 3   | R.125  | OP49-2408R125C |

## 4 FLUTE - STUB - OVERSIZED SHANK - CHIP BREAKER



OP49MC

OVERSIZED SHANK CHIP BREAKER METRIC

| DIAMETER | SHANK | LOC | OAL | RAD    | ITEM#            |
|----------|-------|-----|-----|--------|------------------|
| 5        | 6     | 10  | 75  | Square | OP49M-05010R0.0C |
| 5        | 6     | 10  | 75  | R0.5   | OP49M-05010R0.5C |
| 5        | 6     | 10  | 75  | R1.0   | OP49M-05010R1.0C |
| 5        | 6     | 10  | 75  | R1.5   | OP49M-05010R1.5C |
| 6        | 10    | 10  | 75  | Square | OP49M-06010R0.0C |
| 6        | 10    | 10  | 75  | R0.5   | OP49M-06010R0.5C |
| 6        | 10    | 10  | 75  | R1.0   | OP49M-06010R1.0C |
| 6        | 10    | 10  | 75  | R1.5   | OP49M-06010R1.5C |
| 6        | 10    | 10  | 75  | R2.0   | OP49M-06010R2.0C |
| 8        | 10    | 11  | 75  | Square | OP49M-08011R0.0C |
| 8        | 10    | 11  | 75  | R0.5   | OP49M-08011R0.5C |
| 8        | 10    | 11  | 75  | R1.0   | OP49M-08011R1.0C |
| 8        | 10    | 11  | 75  | R1.5   | OP49M-08011R1.5C |
| 8        | 10    | 11  | 75  | R2.0   | OP49M-08011R2.0C |
| 8        | 10    | 11  | 75  | R3.0   | OP49M-08011R3.0C |
| 10       | 12    | 12  | 75  | Square | OP49M-10012R0.0C |
| 10       | 12    | 12  | 75  | R0.5   | OP49M-10012R0.5C |
| 10       | 12    | 12  | 75  | R1.0   | OP49M-10012R1.0C |
| 10       | 12    | 12  | 75  | R1.5   | OP49M-10012R1.5C |
| 10       | 12    | 12  | 75  | R2.0   | OP49M-10012R2.0C |
| 10       | 12    | 12  | 75  | R3.0   | OP49M-10012R3.0C |



# OPX4 HIGH PERFORMANCE

Best used for HTSA (Heat-resistant superalloys)

## SPECIAL FEATURES

### UNEQUAL INDEXING

Eliminates tool vibrations around tool circumference by spreading cutting forces unevenly for a more stable cutting.

### VARIABLE HELIX

Breaks up harmonic vibrations (chatter) along the length and improves surface finish and tool life.

### nACRo PVD COATING

Offers a higher cutting edge resistance to wear and higher heat tolerance.

### EDGE PREP

Make the cutting edge of the tool more uniform, which help the tool to machine better and faster.

### CORE TAPER

Make the tool more rigid, resisting higher shearing force when fully engaged in the material.

### TANGENTIAL RADIUS

Allows a smooth blending radius on the machined part, improving the manufacturing times by avoiding the finishing process.



## 4 FLUTE - EDGE PREP FOR EXOTIC ALLOYS



OPX4  
REGULAR INCH

| DIAMETER | LOC       | OAL | RAD  | ITEM#         |
|----------|-----------|-----|------|---------------|
| 1 / 8    | 1 / 4     | 2   | R000 | OPX4-0804R000 |
| 1 / 8    | 1 / 4     | 2   | R015 | OPX4-0804R015 |
| 1 / 8    | 1 / 4     | 2   | R030 | OPX4-0804R030 |
| 1 / 8    | 1 / 2     | 2   | R000 | OPX4-0808R000 |
| 1 / 8    | 1 / 2     | 2   | R015 | OPX4-0808R015 |
| 1 / 8    | 1 / 2     | 2   | R030 | OPX4-0808R030 |
| 3 / 16   | 3 / 8     | 3   | R000 | OPX4-1206R000 |
| 3 / 16   | 3 / 8     | 3   | R015 | OPX4-1206R015 |
| 3 / 16   | 3 / 8     | 3   | R030 | OPX4-1206R030 |
| 3 / 16   | 3 / 8     | 3   | R060 | OPX4-1206R060 |
| 3 / 16   | 9 / 16    | 3   | R000 | OPX4-1209R000 |
| 3 / 16   | 9 / 16    | 3   | R015 | OPX4-1209R015 |
| 3 / 16   | 9 / 16    | 3   | R030 | OPX4-1209R030 |
| 3 / 16   | 9 / 16    | 3   | R060 | OPX4-1209R060 |
| 1 / 4    | 3 / 8     | 3   | R000 | OPX4-1606R000 |
| 1 / 4    | 3 / 8     | 3   | R015 | OPX4-1606R015 |
| 1 / 4    | 3 / 8     | 3   | R030 | OPX4-1606R030 |
| 1 / 4    | 3 / 8     | 3   | R060 | OPX4-1606R060 |
| 1 / 4    | 3 / 8     | 3   | R090 | OPX4-1606R090 |
| 1 / 4    | 3 / 4     | 3   | R000 | OPX4-1612R000 |
| 1 / 4    | 3 / 4     | 3   | R015 | OPX4-1612R015 |
| 1 / 4    | 3 / 4     | 3   | R030 | OPX4-1612R030 |
| 1 / 4    | 3 / 4     | 3   | R060 | OPX4-1612R060 |
| 1 / 4    | 3 / 4     | 3   | R090 | OPX4-1612R090 |
| 1 / 4    | 1 - 1 / 8 | 3   | R000 | OPX4-1618R000 |
| 1 / 4    | 1 - 1 / 8 | 3   | R015 | OPX4-1618R015 |
| 1 / 4    | 1 - 1 / 8 | 3   | R030 | OPX4-1618R030 |
| 1 / 4    | 1 - 1 / 8 | 3   | R060 | OPX4-1618R060 |
| 1 / 4    | 1 - 1 / 8 | 3   | R090 | OPX4-1618R090 |
| 5 / 16   | 7 / 16    | 3   | R000 | OPX4-2007R000 |
| 5 / 16   | 7 / 16    | 3   | R015 | OPX4-2007R015 |
| 5 / 16   | 7 / 16    | 3   | R030 | OPX4-2007R030 |
| 5 / 16   | 7 / 16    | 3   | R060 | OPX4-2007R060 |
| 5 / 16   | 7 / 16    | 3   | R090 | OPX4-2007R090 |
| 5 / 16   | 7 / 16    | 3   | R125 | OPX4-2007R125 |

| DIAMETER | LOC       | OAL | RAD  | ITEM#         |
|----------|-----------|-----|------|---------------|
| 5 / 16   | 13 / 16   | 3   | R000 | OPX4-2013R000 |
| 5 / 16   | 13 / 16   | 3   | R015 | OPX4-2013R015 |
| 5 / 16   | 13 / 16   | 3   | R030 | OPX4-2013R030 |
| 5 / 16   | 13 / 16   | 3   | R060 | OPX4-2013R060 |
| 5 / 16   | 13 / 16   | 3   | R090 | OPX4-2013R090 |
| 5 / 16   | 13 / 16   | 3   | R125 | OPX4-2013R125 |
| 5 / 16   | 1 - 1 / 8 | 3   | R000 | OPX4-2018R000 |
| 5 / 16   | 1 - 1 / 8 | 3   | R015 | OPX4-2018R015 |
| 5 / 16   | 1 - 1 / 8 | 3   | R030 | OPX4-2018R030 |
| 5 / 16   | 1 - 1 / 8 | 3   | R060 | OPX4-2018R060 |
| 5 / 16   | 1 - 1 / 8 | 3   | R090 | OPX4-2018R090 |
| 5 / 16   | 1 - 1 / 8 | 3   | R125 | OPX4-2018R125 |
| 3 / 8    | 1 / 2     | 3   | R000 | OPX4-2408R000 |
| 3 / 8    | 1 / 2     | 3   | R015 | OPX4-2408R015 |
| 3 / 8    | 1 / 2     | 3   | R030 | OPX4-2408R030 |
| 3 / 8    | 1 / 2     | 3   | R060 | OPX4-2408R060 |
| 3 / 8    | 1 / 2     | 3   | R090 | OPX4-2408R090 |
| 3 / 8    | 1 / 2     | 3   | R125 | OPX4-2408R125 |
| 3 / 8    | 1         | 3   | R000 | OPX4-2416R000 |
| 3 / 8    | 1         | 3   | R015 | OPX4-2416R015 |
| 3 / 8    | 1         | 3   | R030 | OPX4-2416R030 |
| 3 / 8    | 1         | 3   | R060 | OPX4-2416R060 |
| 3 / 8    | 1         | 3   | R090 | OPX4-2416R090 |
| 3 / 8    | 1         | 3   | R125 | OPX4-2416R125 |
| 3 / 8    | 1 - 1 / 4 | 3   | R000 | OPX4-2420R000 |
| 3 / 8    | 1 - 1 / 4 | 3   | R015 | OPX4-2420R015 |
| 3 / 8    | 1 - 1 / 4 | 3   | R030 | OPX4-2420R030 |
| 3 / 8    | 1 - 1 / 4 | 3   | R060 | OPX4-2420R060 |
| 3 / 8    | 1 - 1 / 4 | 3   | R090 | OPX4-2420R090 |
| 3 / 8    | 1 - 1 / 4 | 3   | R125 | OPX4-2420R125 |
| 7 / 16   | 5 / 8     | 3   | R000 | OPX4-2810R000 |
| 7 / 16   | 5 / 8     | 3   | R015 | OPX4-2810R015 |
| 7 / 16   | 5 / 8     | 3   | R030 | OPX4-2810R030 |
| 7 / 16   | 5 / 8     | 3   | R060 | OPX4-2810R060 |
| 7 / 16   | 5 / 8     | 3   | R090 | OPX4-2810R090 |

## 4 FLUTE - EDGE PREP FOR EXOTIC ALLOYS



OPX4  
REGULAR INCH

| DIAMETER | LOC       | OAL | RAD  | ITEM#         |
|----------|-----------|-----|------|---------------|
| 7 / 16   | 5 / 8     | 3   | R125 | OPX4-2810R125 |
| 7 / 16   | 5 / 8     | 3   | R190 | OPX4-2810R190 |
| 7 / 16   | 1         | 3   | R000 | OPX4-2816R000 |
| 7 / 16   | 1         | 3   | R015 | OPX4-2816R015 |
| 7 / 16   | 1         | 3   | R030 | OPX4-2816R030 |
| 7 / 16   | 1         | 3   | R060 | OPX4-2816R060 |
| 7 / 16   | 1         | 3   | R090 | OPX4-2816R090 |
| 7 / 16   | 1         | 3   | R125 | OPX4-2816R125 |
| 7 / 16   | 1         | 3   | R190 | OPX4-2816R190 |
| 7 / 16   | 2         | 4   | R000 | OPX4-2832R000 |
| 7 / 16   | 2         | 4   | R015 | OPX4-2832R015 |
| 7 / 16   | 2         | 4   | R030 | OPX4-2832R030 |
| 7 / 16   | 2         | 4   | R060 | OPX4-2832R060 |
| 7 / 16   | 2         | 4   | R090 | OPX4-2832R090 |
| 7 / 16   | 2         | 4   | R125 | OPX4-2832R125 |
| 7 / 16   | 2         | 4   | R190 | OPX4-2832R190 |
| 1 / 2    | 5 / 8     | 3   | R000 | OPX4-3210R000 |
| 1 / 2    | 5 / 8     | 3   | R015 | OPX4-3210R015 |
| 1 / 2    | 5 / 8     | 3   | R030 | OPX4-3210R030 |
| 1 / 2    | 5 / 8     | 3   | R060 | OPX4-3210R060 |
| 1 / 2    | 5 / 8     | 3   | R090 | OPX4-3210R090 |
| 1 / 2    | 5 / 8     | 3   | R125 | OPX4-3210R125 |
| 1 / 2    | 5 / 8     | 3   | R190 | OPX4-3210R190 |
| 1 / 2    | 1 - 1 / 4 | 3   | R000 | OPX4-3220R000 |
| 1 / 2    | 1 - 1 / 4 | 3   | R015 | OPX4-3220R015 |
| 1 / 2    | 1 - 1 / 4 | 3   | R030 | OPX4-3220R030 |
| 1 / 2    | 1 - 1 / 4 | 3   | R060 | OPX4-3220R060 |
| 1 / 2    | 1 - 1 / 4 | 3   | R090 | OPX4-3220R090 |
| 1 / 2    | 1 - 1 / 4 | 3   | R125 | OPX4-3220R125 |
| 1 / 2    | 1 - 1 / 4 | 3   | R190 | OPX4-3220R190 |
| 1 / 2    | 2         | 4   | R000 | OPX4-3232R000 |
| 1 / 2    | 2         | 4   | R015 | OPX4-3232R015 |
| 1 / 2    | 2         | 4   | R030 | OPX4-3232R030 |
| 1 / 2    | 2         | 4   | R060 | OPX4-3232R060 |
| 1 / 2    | 2         | 4   | R090 | OPX4-3232R090 |
| 1 / 2    | 2         | 4   | R125 | OPX4-3232R125 |
| 1 / 2    | 2         | 4   | R190 | OPX4-3232R190 |

| DIAMETER | LOC       | OAL | RAD  | ITEM#         |
|----------|-----------|-----|------|---------------|
| 5 / 8    | 3 / 4     | 4   | R000 | OPX4-4012R000 |
| 5 / 8    | 3 / 4     | 4   | R015 | OPX4-4012R015 |
| 5 / 8    | 3 / 4     | 4   | R030 | OPX4-4012R030 |
| 5 / 8    | 3 / 4     | 4   | R060 | OPX4-4012R060 |
| 5 / 8    | 3 / 4     | 4   | R090 | OPX4-4012R090 |
| 5 / 8    | 3 / 4     | 4   | R125 | OPX4-4012R125 |
| 5 / 8    | 3 / 4     | 4   | R190 | OPX4-4012R190 |
| 5 / 8    | 3 / 4     | 4   | R250 | OPX4-4012R250 |
| 5 / 8    | 1 - 5 / 8 | 4   | R000 | OPX4-4026R000 |
| 5 / 8    | 1 - 5 / 8 | 4   | R015 | OPX4-4026R015 |
| 5 / 8    | 1 - 5 / 8 | 4   | R030 | OPX4-4026R030 |
| 5 / 8    | 1 - 5 / 8 | 4   | R060 | OPX4-4026R060 |
| 5 / 8    | 1 - 5 / 8 | 4   | R090 | OPX4-4026R090 |
| 5 / 8    | 1 - 5 / 8 | 4   | R125 | OPX4-4026R125 |
| 5 / 8    | 1 - 5 / 8 | 4   | R190 | OPX4-4026R190 |
| 5 / 8    | 1 - 5 / 8 | 4   | R250 | OPX4-4026R250 |
| 5 / 8    | 2 - 1 / 4 | 5   | R000 | OPX4-4036R000 |
| 5 / 8    | 2 - 1 / 4 | 5   | R015 | OPX4-4036R015 |
| 5 / 8    | 2 - 1 / 4 | 5   | R030 | OPX4-4036R030 |
| 5 / 8    | 2 - 1 / 4 | 5   | R060 | OPX4-4036R060 |
| 5 / 8    | 2 - 1 / 4 | 5   | R090 | OPX4-4036R090 |
| 5 / 8    | 2 - 1 / 4 | 5   | R125 | OPX4-4036R125 |
| 5 / 8    | 2 - 1 / 4 | 5   | R190 | OPX4-4036R190 |
| 5 / 8    | 2 - 1 / 4 | 5   | R250 | OPX4-4036R250 |
| 3 / 4    | 1         | 4   | R000 | OPX4-4816R000 |
| 3 / 4    | 1         | 4   | R015 | OPX4-4816R015 |
| 3 / 4    | 1         | 4   | R030 | OPX4-4816R030 |
| 3 / 4    | 1         | 4   | R060 | OPX4-4816R060 |
| 3 / 4    | 1         | 4   | R090 | OPX4-4816R090 |
| 3 / 4    | 1         | 4   | R125 | OPX4-4816R125 |
| 3 / 4    | 1         | 4   | R190 | OPX4-4816R190 |
| 3 / 4    | 1         | 4   | R250 | OPX4-4816R250 |
| 3 / 4    | 1 - 5 / 8 | 4   | R000 | OPX4-4826R000 |
| 3 / 4    | 1 - 5 / 8 | 4   | R015 | OPX4-4826R015 |
| 3 / 4    | 1 - 5 / 8 | 4   | R030 | OPX4-4826R030 |

## 4 FLUTE - EDGE PREP FOR EXOTIC ALLOYS



OPX4  
REGULAR INCH

| DIAMETER | LOC       | OAL | RAD  | ITEM#         |
|----------|-----------|-----|------|---------------|
| 3 / 4    | 1 - 5 / 8 | 4   | R060 | OPX4-4826R060 |
| 3 / 4    | 1 - 5 / 8 | 4   | R090 | OPX4-4826R090 |
| 3 / 4    | 1 - 5 / 8 | 4   | R125 | OPX4-4826R125 |
| 3 / 4    | 1 - 5 / 8 | 4   | R190 | OPX4-4826R190 |
| 3 / 4    | 1 - 5 / 8 | 4   | R250 | OPX4-4826R250 |
| 3 / 4    | 2 - 1 / 4 | 5   | R000 | OPX4-4836R000 |
| 3 / 4    | 2 - 1 / 4 | 5   | R015 | OPX4-4836R015 |
| 3 / 4    | 2 - 1 / 4 | 5   | R030 | OPX4-4836R030 |
| 3 / 4    | 2 - 1 / 4 | 5   | R060 | OPX4-4836R060 |
| 3 / 4    | 2 - 1 / 4 | 5   | R090 | OPX4-4836R090 |
| 3 / 4    | 2 - 1 / 4 | 5   | R125 | OPX4-4836R125 |
| 3 / 4    | 2 - 1 / 4 | 5   | R190 | OPX4-4836R190 |
| 3 / 4    | 2 - 1 / 4 | 5   | R250 | OPX4-4836R250 |
| 1        | 2 - 1 / 4 | 5   | R000 | OPX4-6436R000 |
| 1        | 2 - 1 / 4 | 5   | R015 | OPX4-6436R015 |
| 1        | 2 - 1 / 4 | 5   | R030 | OPX4-6436R030 |
| 1        | 2 - 1 / 4 | 5   | R060 | OPX4-6436R060 |
| 1        | 2 - 1 / 4 | 5   | R090 | OPX4-6436R090 |
| 1        | 2 - 1 / 4 | 5   | R125 | OPX4-6436R125 |
| 1        | 2 - 1 / 4 | 5   | R190 | OPX4-6436R190 |
| 1        | 2 - 1 / 4 | 5   | R250 | OPX4-6436R250 |
| 1        | 3 - 1 / 4 | 6   | R000 | OPX4-6452R000 |
| 1        | 3 - 1 / 4 | 6   | R015 | OPX4-6452R015 |
| 1        | 3 - 1 / 4 | 6   | R030 | OPX4-6452R030 |
| 1        | 3 - 1 / 4 | 6   | R060 | OPX4-6452R060 |
| 1        | 3 - 1 / 4 | 6   | R090 | OPX4-6452R090 |
| 1        | 3 - 1 / 4 | 6   | R125 | OPX4-6452R125 |
| 1        | 3 - 1 / 4 | 6   | R190 | OPX4-6452R190 |
| 1        | 3 - 1 / 4 | 6   | R250 | OPX4-6452R250 |



## 4 FLUTE - EDGE PREP FOR EXOTIC ALLOYS



OPX4M  
REGULAR METRIC

| DIAMETER | LOC | OAL | RAD  | ITEM#           |
|----------|-----|-----|------|-----------------|
| 3        | 6   | 50  | R0.0 | OPX4M-03006R0.0 |
| 3        | 6   | 50  | R0.5 | OPX4M-03006R0.5 |
| 3        | 6   | 50  | R1.0 | OPX4M-03006R1.0 |
| 3        | 12  | 50  | R0.0 | OPX4M-03012R0.0 |
| 3        | 12  | 50  | R0.5 | OPX4M-03012R0.5 |
| 3        | 12  | 50  | R1.0 | OPX4M-03012R1.0 |
| 5        | 10  | 75  | R0.0 | OPX4M-05010R0.0 |
| 5        | 10  | 75  | R0.5 | OPX4M-05010R0.5 |
| 5        | 10  | 75  | R1.0 | OPX4M-05010R1.0 |
| 5        | 10  | 75  | R1.5 | OPX4M-05010R1.5 |
| 5        | 14  | 75  | R0.0 | OPX4M-05014R0.0 |
| 5        | 14  | 75  | R0.5 | OPX4M-05014R0.5 |
| 5        | 14  | 75  | R1.0 | OPX4M-05014R1.0 |
| 5        | 14  | 75  | R1.5 | OPX4M-05014R1.5 |
| 6        | 10  | 75  | R0.0 | OPX4M-06010R0.0 |
| 6        | 10  | 75  | R0.5 | OPX4M-06010R0.5 |
| 6        | 10  | 75  | R1.0 | OPX4M-06010R1.0 |
| 6        | 10  | 75  | R1.5 | OPX4M-06010R1.5 |
| 6        | 10  | 75  | R2.0 | OPX4M-06010R2.0 |
| 6        | 20  | 75  | R0.0 | OPX4M-06020R0.0 |
| 6        | 20  | 75  | R0.5 | OPX4M-06020R0.5 |
| 6        | 20  | 75  | R1.0 | OPX4M-06020R1.0 |
| 6        | 20  | 75  | R1.5 | OPX4M-06020R1.5 |
| 6        | 20  | 75  | R2.0 | OPX4M-06020R2.0 |
| 6        | 29  | 75  | R0.0 | OPX4M-06029R0.0 |
| 6        | 29  | 75  | R0.5 | OPX4M-06029R0.5 |
| 6        | 29  | 75  | R1.0 | OPX4M-06029R1.0 |
| 6        | 29  | 75  | R1.5 | OPX4M-06029R1.5 |
| 6        | 29  | 75  | R2.0 | OPX4M-06029R2.0 |
| 8        | 11  | 75  | R0.0 | OPX4M-08011R0.0 |
| 8        | 11  | 75  | R0.5 | OPX4M-08011R0.5 |
| 8        | 11  | 75  | R1.0 | OPX4M-08011R1.0 |
| 8        | 11  | 75  | R1.5 | OPX4M-08011R1.5 |
| 8        | 11  | 75  | R2.0 | OPX4M-08011R2.0 |
| 8        | 11  | 75  | R3.0 | OPX4M-08011R3.0 |

| DIAMETER | LOC | OAL | RAD  | ITEM#           |
|----------|-----|-----|------|-----------------|
| 8        | 21  | 75  | R0.0 | OPX4M-08021R0.0 |
| 8        | 21  | 75  | R0.5 | OPX4M-08021R0.5 |
| 8        | 21  | 75  | R1.0 | OPX4M-08021R1.0 |
| 8        | 21  | 75  | R1.5 | OPX4M-08021R1.5 |
| 8        | 21  | 75  | R2.0 | OPX4M-08021R2.0 |
| 8        | 21  | 75  | R3.0 | OPX4M-08021R3.0 |
| 8        | 29  | 75  | R0.0 | OPX4M-08029R0.0 |
| 8        | 29  | 75  | R0.5 | OPX4M-08029R0.5 |
| 8        | 29  | 75  | R1.0 | OPX4M-08029R1.0 |
| 8        | 29  | 75  | R1.5 | OPX4M-08029R1.5 |
| 8        | 29  | 75  | R2.0 | OPX4M-08029R2.0 |
| 8        | 29  | 75  | R3.0 | OPX4M-08029R3.0 |
| 10       | 12  | 75  | R0.0 | OPX4M-10012R0.0 |
| 10       | 12  | 75  | R0.5 | OPX4M-10012R0.5 |
| 10       | 12  | 75  | R1.0 | OPX4M-10012R1.0 |
| 10       | 12  | 75  | R1.5 | OPX4M-10012R1.5 |
| 10       | 12  | 75  | R2.0 | OPX4M-10012R2.0 |
| 10       | 12  | 75  | R3.0 | OPX4M-10012R3.0 |
| 10       | 25  | 75  | R0.0 | OPX4M-10025R0.0 |
| 10       | 25  | 75  | R0.5 | OPX4M-10025R0.5 |
| 10       | 25  | 75  | R1.0 | OPX4M-10025R1.0 |
| 10       | 25  | 75  | R1.5 | OPX4M-10025R1.5 |
| 10       | 25  | 75  | R2.0 | OPX4M-10025R2.0 |
| 10       | 25  | 75  | R3.0 | OPX4M-10025R3.0 |
| 10       | 32  | 75  | R0.0 | OPX4M-10032R0.0 |
| 10       | 32  | 75  | R0.5 | OPX4M-10032R0.5 |
| 10       | 32  | 75  | R1.0 | OPX4M-10032R1.0 |
| 10       | 32  | 75  | R1.5 | OPX4M-10032R1.5 |
| 10       | 32  | 75  | R2.0 | OPX4M-10032R2.0 |
| 10       | 32  | 75  | R3.0 | OPX4M-10032R3.0 |
| 11       | 16  | 75  | R0.0 | OPX4M-11016R0.0 |
| 11       | 16  | 75  | R0.5 | OPX4M-11016R0.5 |
| 11       | 16  | 75  | R1.0 | OPX4M-11016R1.0 |
| 11       | 16  | 75  | R1.5 | OPX4M-11016R1.5 |
| 11       | 16  | 75  | R2.0 | OPX4M-11016R2.0 |

## 4 FLUTE - EDGE PREP FOR EXOTIC ALLOYS



OPX4M  
REGULAR METRIC

| DIAMETER | LOC | OAL | RAD  | ITEM#           |
|----------|-----|-----|------|-----------------|
| 11       | 16  | 75  | R3.0 | OPX4M-11016R3.0 |
| 11       | 16  | 75  | R4.5 | OPX4M-11016R4.5 |
| 11       | 25  | 75  | R0.0 | OPX4M-11025R0.0 |
| 11       | 25  | 75  | R0.5 | OPX4M-11025R0.5 |
| 11       | 25  | 75  | R1.0 | OPX4M-11025R1.0 |
| 11       | 25  | 75  | R1.5 | OPX4M-11025R1.5 |
| 11       | 25  | 75  | R2.0 | OPX4M-11025R2.0 |
| 11       | 25  | 75  | R3.0 | OPX4M-11025R3.0 |
| 11       | 25  | 75  | R4.5 | OPX4M-11025R4.5 |
| 11       | 50  | 100 | R0.0 | OPX4M-11050R0.0 |
| 11       | 50  | 100 | R0.5 | OPX4M-11050R0.5 |
| 11       | 50  | 100 | R1.0 | OPX4M-11050R1.0 |
| 11       | 50  | 100 | R1.5 | OPX4M-11050R1.5 |
| 11       | 50  | 100 | R2.0 | OPX4M-11050R2.0 |
| 11       | 50  | 100 | R3.0 | OPX4M-11050R3.0 |
| 11       | 50  | 100 | R4.5 | OPX4M-11050R4.5 |
| 12       | 16  | 75  | R0.0 | OPX4M-12016R0.0 |
| 12       | 16  | 75  | R0.5 | OPX4M-12016R0.5 |
| 12       | 16  | 75  | R1.0 | OPX4M-12016R1.0 |
| 12       | 16  | 75  | R1.5 | OPX4M-12016R1.5 |
| 12       | 16  | 75  | R2.0 | OPX4M-12016R2.0 |
| 12       | 16  | 75  | R3.0 | OPX4M-12016R3.0 |
| 12       | 16  | 75  | R4.5 | OPX4M-12016R4.5 |
| 12       | 32  | 75  | R0.0 | OPX4M-12032R0.0 |
| 12       | 32  | 75  | R0.5 | OPX4M-12032R0.5 |
| 12       | 32  | 75  | R1.0 | OPX4M-12032R1.0 |
| 12       | 32  | 75  | R1.5 | OPX4M-12032R1.5 |
| 12       | 32  | 75  | R2.0 | OPX4M-12032R2.0 |
| 12       | 32  | 75  | R3.0 | OPX4M-12032R3.0 |
| 12       | 32  | 75  | R4.5 | OPX4M-12032R4.5 |
| 12       | 50  | 100 | R0.0 | OPX4M-12050R0.0 |
| 12       | 50  | 100 | R0.5 | OPX4M-12050R0.5 |
| 12       | 50  | 100 | R1.0 | OPX4M-12050R1.0 |
| 12       | 50  | 100 | R1.5 | OPX4M-12050R1.5 |
| 12       | 50  | 100 | R2.0 | OPX4M-12050R2.0 |
| 12       | 50  | 100 | R3.0 | OPX4M-12050R3.0 |
| 12       | 50  | 100 | R4.5 | OPX4M-12050R4.5 |

| DIAMETER | LOC | OAL | RAD  | ITEM#           |
|----------|-----|-----|------|-----------------|
| 16       | 20  | 100 | R0.0 | OPX4M-16020R0.0 |
| 16       | 20  | 100 | R0.5 | OPX4M-16020R0.5 |
| 16       | 20  | 100 | R1.0 | OPX4M-16020R1.0 |
| 16       | 20  | 100 | R1.5 | OPX4M-16020R1.5 |
| 16       | 20  | 100 | R2.0 | OPX4M-16020R2.0 |
| 16       | 20  | 100 | R3.0 | OPX4M-16020R3.0 |
| 16       | 20  | 100 | R4.5 | OPX4M-16020R4.5 |
| 16       | 20  | 100 | R6.0 | OPX4M-16020R6.0 |
| 16       | 41  | 100 | R0.0 | OPX4M-16041R0.0 |
| 16       | 41  | 100 | R0.5 | OPX4M-16041R0.5 |
| 16       | 41  | 100 | R1.0 | OPX4M-16041R1.0 |
| 16       | 41  | 100 | R1.5 | OPX4M-16041R1.5 |
| 16       | 41  | 100 | R2.0 | OPX4M-16041R2.0 |
| 16       | 41  | 100 | R3.0 | OPX4M-16041R3.0 |
| 16       | 41  | 100 | R4.5 | OPX4M-16041R4.5 |
| 16       | 41  | 100 | R6.0 | OPX4M-16041R6.0 |
| 16       | 57  | 125 | R0.0 | OPX4M-16057R0.0 |
| 16       | 57  | 125 | R0.5 | OPX4M-16057R0.5 |
| 16       | 57  | 125 | R1.0 | OPX4M-16057R1.0 |
| 16       | 57  | 125 | R1.5 | OPX4M-16057R1.5 |
| 16       | 57  | 125 | R2.0 | OPX4M-16057R2.0 |
| 16       | 57  | 125 | R3.0 | OPX4M-16057R3.0 |
| 16       | 57  | 125 | R4.5 | OPX4M-16057R4.5 |
| 16       | 57  | 125 | R6.0 | OPX4M-16057R6.0 |
| 20       | 25  | 100 | R0.0 | OPX4M-20025R0.0 |
| 20       | 25  | 100 | R0.5 | OPX4M-20025R0.5 |
| 20       | 25  | 100 | R1.0 | OPX4M-20025R1.0 |
| 20       | 25  | 100 | R1.5 | OPX4M-20025R1.5 |
| 20       | 25  | 100 | R2.0 | OPX4M-20025R2.0 |
| 20       | 25  | 100 | R3.0 | OPX4M-20025R3.0 |
| 20       | 25  | 100 | R4.5 | OPX4M-20025R4.5 |
| 20       | 25  | 100 | R6.0 | OPX4M-20025R6.0 |
| 20       | 41  | 100 | R0.0 | OPX4M-20041R0.0 |
| 20       | 41  | 100 | R0.5 | OPX4M-20041R0.5 |
| 20       | 41  | 100 | R1.0 | OPX4M-20041R1.0 |

## 4 FLUTE - EDGE PREP FOR EXOTIC ALLOYS



OPX4M  
REGULAR METRIC

| DIAMETER | LOC | OAL | RAD  | ITEM#           |
|----------|-----|-----|------|-----------------|
| 20       | 41  | 100 | R1.5 | OPX4M-20041R1.5 |
| 20       | 41  | 100 | R2.0 | OPX4M-20041R2.0 |
| 20       | 41  | 100 | R3.0 | OPX4M-20041R3.0 |
| 20       | 41  | 100 | R4.5 | OPX4M-20041R4.5 |
| 20       | 41  | 100 | R6.0 | OPX4M-20041R6.0 |
| 20       | 57  | 125 | R0.0 | OPX4M-20057R0.0 |
| 20       | 57  | 125 | R0.5 | OPX4M-20057R0.5 |
| 20       | 57  | 125 | R1.0 | OPX4M-20057R1.0 |
| 20       | 57  | 125 | R1.5 | OPX4M-20057R1.5 |
| 20       | 57  | 125 | R2.0 | OPX4M-20057R2.0 |
| 20       | 57  | 125 | R3.0 | OPX4M-20057R3.0 |
| 20       | 57  | 125 | R4.5 | OPX4M-20057R4.5 |
| 20       | 57  | 125 | R6.0 | OPX4M-20057R6.0 |
| 25       | 57  | 125 | R0.0 | OPX4M-25057R0.0 |
| 25       | 57  | 125 | R0.5 | OPX4M-25057R0.5 |
| 25       | 57  | 125 | R1.0 | OPX4M-25057R1.0 |
| 25       | 57  | 125 | R1.5 | OPX4M-25057R1.5 |
| 25       | 57  | 125 | R2.0 | OPX4M-25057R2.0 |
| 25       | 57  | 125 | R3.0 | OPX4M-25057R3.0 |
| 25       | 57  | 125 | R4.5 | OPX4M-25057R4.5 |
| 25       | 57  | 125 | R6.0 | OPX4M-25057R6.0 |
| 25       | 83  | 150 | R0.0 | OPX4M-25083R0.0 |
| 25       | 83  | 150 | R0.5 | OPX4M-25083R0.5 |
| 25       | 83  | 150 | R1.0 | OPX4M-25083R1.0 |
| 25       | 83  | 150 | R1.5 | OPX4M-25083R1.5 |
| 25       | 83  | 150 | R2.0 | OPX4M-25083R2.0 |
| 25       | 83  | 150 | R3.0 | OPX4M-25083R3.0 |
| 25       | 83  | 150 | R4.5 | OPX4M-25083R4.5 |
| 25       | 83  | 150 | R6.0 | OPX4M-25083R6.0 |

## 4 FLUTE - EDGE PREP FOR EXOTIC ALLOYS - BALL NOSE



OPX4B

BALL NOSE INCH

| DIAMETER | LOC       | OAL | RAD  | ITEM#          |
|----------|-----------|-----|------|----------------|
| 1 / 8    | 1 / 4     | 2   | R062 | OPX4-0804R062B |
| 1 / 8    | 1 / 2     | 2   | R062 | OPX4-0808R062B |
| 3 / 16   | 3 / 8     | 3   | R090 | OPX4-1206R090B |
| 3 / 16   | 9 / 16    | 3   | R090 | OPX4-1209R090B |
| 1 / 4    | 3 / 8     | 3   | R125 | OPX4-1606R125B |
| 1 / 4    | 3 / 4     | 3   | R125 | OPX4-1612R125B |
| 1 / 4    | 1 - 1 / 8 | 3   | R125 | OPX4-1618R125B |
| 5 / 16   | 7 / 16    | 3   | R155 | OPX4-2007R155B |
| 5 / 16   | 13 / 16   | 3   | R155 | OPX4-2013R155B |
| 5 / 16   | 1 - 1 / 8 | 3   | R155 | OPX4-2018R155B |
| 3 / 8    | 1 / 2     | 3   | R190 | OPX4-2408R190B |
| 3 / 8    | 1         | 3   | R190 | OPX4-2416R190B |
| 3 / 8    | 1 - 1 / 4 | 3   | R190 | OPX4-2420R190B |
| 7 / 16   | 5 / 8     | 3   | R220 | OPX4-2810R220B |
| 7 / 16   | 1         | 3   | R220 | OPX4-2816R220B |
| 7 / 16   | 2         | 4   | R220 | OPX4-2832R220B |
| 1 / 2    | 5 / 8     | 3   | R250 | OPX4-3210R250B |
| 1 / 2    | 1 - 1 / 4 | 3   | R250 | OPX4-3220R250B |
| 1 / 2    | 2         | 4   | R250 | OPX4-3232R250B |
| 5 / 8    | 3 / 4     | 4   | R310 | OPX4-4012R310B |
| 5 / 8    | 1 - 5 / 8 | 4   | R310 | OPX4-4026R310B |
| 5 / 8    | 2 - 1 / 4 | 5   | R310 | OPX4-4036R310B |
| 3 / 4    | 1         | 4   | R375 | OPX4-4816R375B |
| 3 / 4    | 1 - 5 / 8 | 4   | R375 | OPX4-4826R375B |
| 3 / 4    | 2 - 1 / 4 | 5   | R375 | OPX4-4836R375B |
| 1        | 2 - 1 / 4 | 5   | R500 | OPX4-6436R500B |
| 1        | 3 - 1 / 4 | 6   | R500 | OPX4-6452R500B |



## 4 FLUTE - EDGE PREP FOR EXOTIC ALLOYS - BALL NOSE



OPX4MB

BALL NOSE METRIC

| DIAMETER | LOC | OAL | RAD   | ITEM#             |
|----------|-----|-----|-------|-------------------|
| 3        | 6   | 50  | R1.5  | OPX4M-03006R1.5B  |
| 3        | 12  | 50  | R1.5  | OPX4M-03012R1.5B  |
| 5        | 10  | 75  | R2.5  | OPX4M-05010R2.5B  |
| 5        | 14  | 75  | R2.5  | OPX4M-05014R2.5B  |
| 6        | 10  | 75  | R3.0  | OPX4M-06010R3.0B  |
| 6        | 20  | 75  | R3.0  | OPX4M-06020R3.0B  |
| 6        | 29  | 75  | R3.0  | OPX4M-06029R3.0B  |
| 8        | 11  | 75  | R4.0  | OPX4M-08011R4.0B  |
| 8        | 21  | 75  | R4.0  | OPX4M-08021R4.0B  |
| 8        | 29  | 75  | R4.0  | OPX4M-08029R4.0B  |
| 10       | 12  | 75  | R5.0  | OPX4M-10012R5.0B  |
| 10       | 25  | 75  | R5.0  | OPX4M-10025R5.0B  |
| 10       | 32  | 75  | R5.0  | OPX4M-10032R5.0B  |
| 11       | 16  | 75  | R5.5  | OPX4M-11016R5.5B  |
| 11       | 25  | 75  | R5.5  | OPX4M-11025R5.5B  |
| 11       | 50  | 100 | R5.5  | OPX4M-11050R5.5B  |
| 12       | 16  | 75  | R6.0  | OPX4M-12016R6.0B  |
| 12       | 32  | 75  | R6.0  | OPX4M-12032R6.0B  |
| 12       | 50  | 100 | R6.0  | OPX4M-12050R6.0B  |
| 16       | 20  | 100 | R8.0  | OPX4M-16020R8.0B  |
| 16       | 41  | 100 | R8.0  | OPX4M-16041R8.0B  |
| 16       | 57  | 125 | R8.0  | OPX4M-16057R8.0B  |
| 20       | 25  | 100 | R10.0 | OPX4M-20025R10.0B |
| 20       | 41  | 100 | R10.0 | OPX4M-20041R10.0B |
| 20       | 57  | 125 | R10.0 | OPX4M-20057R10.0B |
| 25       | 57  | 125 | R12.5 | OPX4M-25057R12.5B |
| 25       | 83  | 150 | R12.5 | OPX4M-25083R12.5B |

## 4 FLUTE - EDGE PREP FOR EXOTIC ALLOYS - CHIP BREAKER



OPX4C

REGULAR CHIP BREAKER INCH

| DIAMETER | LOC       | OAL | RAD  | ITEM#          |
|----------|-----------|-----|------|----------------|
| 1 / 4    | 3 / 4     | 3   | R015 | OPX4-1612R015C |
| 1 / 4    | 3 / 4     | 3   | R030 | OPX4-1612R030C |
| 1 / 4    | 3 / 4     | 3   | R060 | OPX4-1612R060C |
| 1 / 4    | 3 / 4     | 3   | R090 | OPX4-1612R090C |
| 1 / 4    | 3 / 4     | 3   | R125 | OPX4-1612R125C |
| 1 / 4    | 1 - 1 / 8 | 3   | R015 | OPX4-1618R015C |
| 1 / 4    | 1 - 1 / 8 | 3   | R030 | OPX4-1618R030C |
| 1 / 4    | 1 - 1 / 8 | 3   | R060 | OPX4-1618R060C |
| 1 / 4    | 1 - 1 / 8 | 3   | R090 | OPX4-1618R090C |
| 5 / 16   | 7 / 16    | 3   | R030 | OPX4-2007R030C |
| 5 / 16   | 7 / 16    | 3   | R060 | OPX4-2007R060C |
| 5 / 16   | 13 / 16   | 3   | R015 | OPX4-2013R015C |
| 5 / 16   | 13 / 16   | 3   | R030 | OPX4-2013R030C |
| 5 / 16   | 13 / 16   | 3   | R060 | OPX4-2013R060C |
| 5 / 16   | 13 / 16   | 3   | R090 | OPX4-2013R090C |
| 5 / 16   | 13 / 16   | 3   | R125 | OPX4-2013R125C |
| 5 / 16   | 1 - 1 / 8 | 3   | R015 | OPX4-2018R015C |
| 5 / 16   | 1 - 1 / 8 | 3   | R030 | OPX4-2018R030C |
| 5 / 16   | 1 - 1 / 8 | 3   | R060 | OPX4-2018R060C |
| 5 / 16   | 1 - 1 / 8 | 3   | R090 | OPX4-2018R090C |
| 5 / 16   | 1 - 1 / 8 | 3   | R125 | OPX4-2018R125C |
| 3 / 8    | 1 / 2     | 3   | R030 | OPX4-2408R030C |
| 3 / 8    | 1 / 2     | 3   | R060 | OPX4-2408R060C |
| 3 / 8    | 1         | 3   | R015 | OPX4-2416R015C |
| 3 / 8    | 1         | 3   | R030 | OPX4-2416R030C |
| 3 / 8    | 1         | 3   | R060 | OPX4-2416R060C |
| 3 / 8    | 1         | 3   | R090 | OPX4-2416R090C |
| 3 / 8    | 1         | 3   | R125 | OPX4-2416R125C |
| 3 / 8    | 1 - 1 / 4 | 3   | R015 | OPX4-2420R015C |
| 3 / 8    | 1 - 1 / 4 | 3   | R030 | OPX4-2420R030C |
| 3 / 8    | 1 - 1 / 4 | 3   | R060 | OPX4-2420R060C |
| 3 / 8    | 1 - 1 / 4 | 3   | R090 | OPX4-2420R090C |
| 3 / 8    | 1 - 1 / 4 | 3   | R125 | OPX4-2420R125C |
| 7 / 16   | 5 / 8     | 3   | R030 | OPX4-2810R030C |
| 7 / 16   | 5 / 8     | 3   | R060 | OPX4-2810R060C |

| DIAMETER | LOC       | OAL | RAD  | ITEM#          |
|----------|-----------|-----|------|----------------|
| 7 / 16   | 1         | 3   | R015 | OPX4-2816R015C |
| 7 / 16   | 1         | 3   | R030 | OPX4-2816R030C |
| 7 / 16   | 1         | 3   | R060 | OPX4-2816R060C |
| 7 / 16   | 1         | 3   | R090 | OPX4-2816R090C |
| 7 / 16   | 1         | 3   | R125 | OPX4-2816R125C |
| 7 / 16   | 1         | 3   | R190 | OPX4-2816R190C |
| 7 / 16   | 2         | 4   | R015 | OPX4-2832R015C |
| 7 / 16   | 2         | 4   | R030 | OPX4-2832R030C |
| 7 / 16   | 2         | 4   | R060 | OPX4-2832R060C |
| 7 / 16   | 2         | 4   | R090 | OPX4-2832R090C |
| 7 / 16   | 2         | 4   | R125 | OPX4-2832R125C |
| 7 / 16   | 2         | 4   | R190 | OPX4-2832R190C |
| 1 / 2    | 5 / 8     | 3   | R030 | OPX4-3210R030C |
| 1 / 2    | 5 / 8     | 3   | R060 | OPX4-3210R060C |
| 1 / 2    | 1 - 1 / 4 | 3   | R015 | OPX4-3220R015C |
| 1 / 2    | 1 - 1 / 4 | 3   | R030 | OPX4-3220R030C |
| 1 / 2    | 1 - 1 / 4 | 3   | R060 | OPX4-3220R060C |
| 1 / 2    | 1 - 1 / 4 | 3   | R090 | OPX4-3220R090C |
| 1 / 2    | 1 - 1 / 4 | 3   | R125 | OPX4-3220R125C |
| 1 / 2    | 1 - 1 / 4 | 3   | R190 | OPX4-3220R190C |
| 1 / 2    | 2         | 4   | R015 | OPX4-3232R015C |
| 1 / 2    | 2         | 4   | R030 | OPX4-3232R030C |
| 1 / 2    | 2         | 4   | R060 | OPX4-3232R060C |
| 1 / 2    | 2         | 4   | R090 | OPX4-3232R090C |
| 1 / 2    | 2         | 4   | R125 | OPX4-3232R125C |
| 1 / 2    | 2         | 4   | R190 | OPX4-3232R190C |
| 5 / 8    | 3 / 4     | 4   | R030 | OPX4-4012R030C |
| 5 / 8    | 3 / 4     | 4   | R060 | OPX4-4012R060C |
| 5 / 8    | 1 - 5 / 8 | 4   | R015 | OPX4-4026R015C |
| 5 / 8    | 1 - 5 / 8 | 4   | R030 | OPX4-4026R030C |
| 5 / 8    | 1 - 5 / 8 | 4   | R060 | OPX4-4026R060C |
| 5 / 8    | 1 - 5 / 8 | 4   | R090 | OPX4-4026R090C |
| 5 / 8    | 1 - 5 / 8 | 4   | R125 | OPX4-4026R125C |
| 5 / 8    | 1 - 5 / 8 | 4   | R190 | OPX4-4026R190C |
| 5 / 8    | 1 - 5 / 8 | 4   | R250 | OPX4-4026R250C |

## 4 FLUTE - EDGE PREP FOR EXOTIC ALLOYS - CHIP BREAKER



OPX4C

REGULAR CHIP BREAKER INCH

| DIAMETER | LOC       | OAL | RAD  | ITEM#          |
|----------|-----------|-----|------|----------------|
| 5 / 8    | 2 - 1 / 4 | 5   | R015 | OPX4-4036R015C |
| 5 / 8    | 2 - 1 / 4 | 5   | R030 | OPX4-4036R030C |
| 5 / 8    | 2 - 1 / 4 | 5   | R060 | OPX4-4036R060C |
| 5 / 8    | 2 - 1 / 4 | 5   | R090 | OPX4-4036R090C |
| 5 / 8    | 2 - 1 / 4 | 5   | R125 | OPX4-4036R125C |
| 5 / 8    | 2 - 1 / 4 | 5   | R190 | OPX4-4036R190C |
| 5 / 8    | 2 - 1 / 4 | 5   | R250 | OPX4-4036R250C |
| 3 / 4    | 1         | 4   | R030 | OPX4-4816R030C |
| 3 / 4    | 1         | 4   | R060 | OPX4-4816R060C |
| 3 / 4    | 1 - 5 / 8 | 4   | R015 | OPX4-4826R015C |
| 3 / 4    | 1 - 5 / 8 | 4   | R030 | OPX4-4826R030C |
| 3 / 4    | 1 - 5 / 8 | 4   | R060 | OPX4-4826R060C |
| 3 / 4    | 1 - 5 / 8 | 4   | R090 | OPX4-4826R090C |
| 3 / 4    | 1 - 5 / 8 | 4   | R125 | OPX4-4826R125C |
| 3 / 4    | 1 - 5 / 8 | 4   | R190 | OPX4-4826R190C |
| 3 / 4    | 1 - 5 / 8 | 4   | R250 | OPX4-4826R250C |
| 3 / 4    | 2 - 1 / 4 | 5   | R015 | OPX4-4836R015C |
| 3 / 4    | 2 - 1 / 4 | 5   | R030 | OPX4-4836R030C |
| 3 / 4    | 2 - 1 / 4 | 5   | R060 | OPX4-4836R060C |
| 3 / 4    | 2 - 1 / 4 | 5   | R090 | OPX4-4836R090C |
| 3 / 4    | 2 - 1 / 4 | 5   | R125 | OPX4-4836R125C |
| 3 / 4    | 2 - 1 / 4 | 5   | R190 | OPX4-4836R190C |
| 3 / 4    | 2 - 1 / 4 | 5   | R250 | OPX4-4836R250C |
| 1        | 2 - 1 / 4 | 5   | R015 | OPX4-6436R015C |
| 1        | 2 - 1 / 4 | 5   | R030 | OPX4-6436R030C |
| 1        | 2 - 1 / 4 | 5   | R060 | OPX4-6436R060C |
| 1        | 2 - 1 / 4 | 5   | R090 | OPX4-6436R090C |
| 1        | 2 - 1 / 4 | 5   | R125 | OPX4-6436R125C |
| 1        | 2 - 1 / 4 | 5   | R190 | OPX4-6436R190C |
| 1        | 2 - 1 / 4 | 5   | R250 | OPX4-6436R250C |
| 1        | 3 - 1 / 4 | 6   | R015 | OPX4-6452R015C |
| 1        | 3 - 1 / 4 | 6   | R030 | OPX4-6452R030C |
| 1        | 3 - 1 / 4 | 6   | R060 | OPX4-6452R060C |
| 1        | 3 - 1 / 4 | 6   | R090 | OPX4-6452R090C |
| 1        | 3 - 1 / 4 | 6   | R125 | OPX4-6452R125C |
| 1        | 3 - 1 / 4 | 6   | R190 | OPX4-6452R190C |
| 1        | 3 - 1 / 4 | 6   | R250 | OPX4-6452R250C |

## 4 FLUTE - EDGE PREP FOR EXOTIC ALLOYS - CHIP BREAKER



OPX4MC

REGULAR CHIP BREAKER METRIC

| DIAMETER | LOC | OAL | RAD  | ITEM#            |
|----------|-----|-----|------|------------------|
| 8        | 21  | 75  | R1.0 | OP41M-08021R1.0C |
| 8        | 21  | 75  | R1.5 | OP41M-08021R1.5C |
| 10       | 25  | 75  | R1.0 | OP41M-10025R1.0C |
| 10       | 25  | 75  | R1.5 | OP41M-10025R1.5C |
| 11       | 25  | 75  | R1.0 | OP41M-11025R1.0C |
| 11       | 25  | 75  | R1.5 | OP41M-11025R1.5C |
| 12       | 32  | 75  | R1.0 | OP41M-12032R1.0C |
| 12       | 32  | 75  | R1.5 | OP41M-12032R1.5C |
| 16       | 41  | 100 | R1.0 | OP41M-16041R1.0C |
| 16       | 41  | 100 | R1.5 | OP41M-16041R1.5C |
| 20       | 41  | 100 | R1.0 | OP41M-20041R1.0C |
| 20       | 41  | 100 | R1.5 | OP41M-20041R1.5C |
| 25       | 57  | 125 | R1.0 | OP41M-25057R1.0C |
| 25       | 57  | 125 | R1.5 | OP41M-25057R1.5C |
| 8        | 29  | 75  | R1.0 | OP42M-08029R1.0C |
| 8        | 29  | 75  | R1.5 | OP42M-08029R1.5C |
| 10       | 32  | 75  | R1.0 | OP42M-10032R1.0C |
| 10       | 32  | 75  | R1.5 | OP42M-10032R1.5C |
| 11       | 50  | 100 | R1.0 | OP42M-11050R1.0C |
| 11       | 50  | 100 | R1.5 | OP42M-11050R1.5C |
| 12       | 50  | 100 | R1.0 | OP42M-12050R1.0C |
| 12       | 50  | 100 | R1.5 | OP42M-12050R1.5C |
| 16       | 57  | 125 | R1.0 | OP42M-16057R1.0C |
| 16       | 57  | 125 | R1.5 | OP42M-16057R1.5C |
| 20       | 57  | 125 | R1.0 | OP42M-20057R1.0C |
| 20       | 57  | 125 | R1.5 | OP42M-20057R1.5C |
| 25       | 83  | 150 | R1.0 | OP42M-25083R1.0C |
| 25       | 83  | 150 | R1.5 | OP42M-25083R1.5C |
| 8        | 11  | 75  | R1.0 | OPX4M-08011R1.0C |
| 8        | 11  | 75  | R1.5 | OPX4M-08011R1.5C |
| 8        | 21  | 75  | R1.0 | OPX4M-08021R1.0C |
| 8        | 21  | 75  | R1.5 | OPX4M-08021R1.5C |
| 8        | 29  | 75  | R1.0 | OPX4M-08029R1.0C |
| 8        | 29  | 75  | R1.5 | OPX4M-08029R1.5C |
| 10       | 12  | 75  | R1.0 | OPX4M-10012R1.0C |

| DIAMETER | LOC | OAL | RAD  | ITEM#            |
|----------|-----|-----|------|------------------|
| 10       | 12  | 75  | R1.5 | OPX4M-10012R1.5C |
| 10       | 25  | 75  | R1.0 | OPX4M-10025R1.0C |
| 10       | 25  | 75  | R1.5 | OPX4M-10025R1.5C |
| 10       | 32  | 75  | R1.0 | OPX4M-10032R1.0C |
| 10       | 32  | 75  | R1.5 | OPX4M-10032R1.5C |
| 11       | 16  | 75  | R1.0 | OPX4M-11016R1.0C |
| 11       | 16  | 75  | R1.5 | OPX4M-11016R1.5C |
| 11       | 25  | 75  | R1.0 | OPX4M-11025R1.0C |
| 11       | 25  | 75  | R1.5 | OPX4M-11025R1.5C |
| 11       | 50  | 100 | R1.0 | OPX4M-11050R1.0C |
| 11       | 50  | 100 | R1.5 | OPX4M-11050R1.5C |
| 12       | 16  | 75  | R1.0 | OPX4M-12016R1.0C |
| 12       | 16  | 75  | R1.5 | OPX4M-12016R1.5C |
| 12       | 32  | 75  | R1.0 | OPX4M-12032R1.0C |
| 12       | 32  | 75  | R1.5 | OPX4M-12032R1.5C |
| 12       | 50  | 100 | R1.0 | OPX4M-12050R1.0C |
| 12       | 50  | 100 | R1.5 | OPX4M-12050R1.5C |
| 16       | 20  | 100 | R1.0 | OPX4M-16020R1.0C |
| 16       | 20  | 100 | R1.5 | OPX4M-16020R1.5C |
| 16       | 41  | 100 | R1.0 | OPX4M-16041R1.0C |
| 16       | 41  | 100 | R1.5 | OPX4M-16041R1.5C |
| 16       | 57  | 125 | R1.0 | OPX4M-16057R1.0C |
| 16       | 57  | 125 | R1.5 | OPX4M-16057R1.5C |
| 20       | 25  | 100 | R1.0 | OPX4M-20025R1.0C |
| 20       | 25  | 100 | R1.5 | OPX4M-20025R1.5C |
| 20       | 41  | 100 | R1.0 | OPX4M-20041R1.0C |
| 20       | 41  | 100 | R1.5 | OPX4M-20041R1.5C |
| 20       | 57  | 125 | R1.0 | OPX4M-20057R1.0C |
| 20       | 57  | 125 | R1.5 | OPX4M-20057R1.5C |
| 25       | 57  | 125 | R1.0 | OPX4M-25057R1.0C |
| 25       | 57  | 125 | R1.5 | OPX4M-25057R1.5C |
| 25       | 83  | 150 | R1.0 | OPX4M-25083R1.0C |
| 25       | 83  | 150 | R1.5 | OPX4M-25083R1.5C |



## 4 FLUTE - EDGE PREP FOR EXOTIC ALLOYS - LONG REACH



OPX4

LONG REACH INCH

| DIAMETER | REACH     | LOC       | OAL       | RAD  | ITEM#              |
|----------|-----------|-----------|-----------|------|--------------------|
| 1 / 4    | 1 - 1 / 4 | 3 / 8     | 4         | R000 | OPX4-1606R000N125  |
| 1 / 4    | 1 - 1 / 4 | 3 / 8     | 4         | R020 | OPX4-1606R020N125  |
| 3 / 8    | 1 - 7 / 8 | 1 / 2     | 4         | R000 | OPX4-2408R000N1875 |
| 3 / 8    | 1 - 7 / 8 | 1 / 2     | 4         | R020 | OPX4-2408R020N1875 |
| 1 / 2    | 2 - 1 / 4 | 5 / 8     | 4         | R000 | OPX4-3210R000N225  |
| 1 / 2    | 2 - 1 / 4 | 5 / 8     | 4         | R030 | OPX4-3210R030N225  |
| 5 / 8    | 2 - 1 / 4 | 3 / 4     | 4         | R000 | OPX4-4012R000N225  |
| 5 / 8    | 3 - 1 / 4 | 3 / 4     | 5         | R000 | OPX4-4012R000N325  |
| 5 / 8    | 2 - 1 / 4 | 3 / 4     | 4         | R040 | OPX4-4012R040N225  |
| 5 / 8    | 3 - 1 / 4 | 3 / 4     | 5         | R040 | OPX4-4012R040N325  |
| 3 / 4    | 2 - 1 / 4 | 1         | 4         | R000 | OPX4-4816R000N225  |
| 3 / 4    | 3 - 1 / 4 | 1         | 6         | R000 | OPX4-4816R000N325  |
| 3 / 4    | 2 - 1 / 4 | 1         | 4         | R040 | OPX4-4816R040N225  |
| 3 / 4    | 3 - 1 / 4 | 1         | 6         | R040 | OPX4-4816R040N325  |
| 1        | 2 - 1 / 4 | 1 - 1 / 8 | 4 - 1 / 2 | R000 | OPX4-6418R000N225  |
| 1        | 3 - 1 / 4 | 1 - 1 / 8 | 6         | R000 | OPX4-6418R000N325  |
| 1        | 4 - 1 / 4 | 1 - 1 / 8 | 7         | R000 | OPX4-6418R000N425  |
| 1        | 2 - 1 / 4 | 1 - 1 / 8 | 4 - 1 / 2 | R040 | OPX4-6418R040N225  |
| 1        | 3 - 1 / 4 | 1 - 1 / 8 | 6         | R040 | OPX4-6418R040N325  |
| 1        | 4 - 1 / 4 | 1 - 1 / 8 | 7         | R040 | OPX4-6418R040N425  |

## 4 FLUTE - EDGE PREP FOR EXOTIC ALLOYS - LONG REACH



OPX4M  
LONG REACH METRIC

| DIAMETER | LOC | REACH | OAL | RAD    | ITEM#              |
|----------|-----|-------|-----|--------|--------------------|
| 6        | 10  | 32    | 100 | Square | OPX4M-06010R0.0N32 |
| 6        | 10  | 32    | 100 | R0.5   | OPX4M-06010R0.5N32 |
| 8        | 11  | 40    | 100 | Square | OPX4M-08011R0.0N40 |
| 8        | 11  | 40    | 100 | R0.5   | OPX4M-08011R0.5N40 |
| 10       | 12  | 48    | 100 | Square | OPX4M-10012R0.0N48 |
| 10       | 12  | 48    | 100 | R0.5   | OPX4M-10012R0.5N48 |
| 11       | 16  | 57    | 100 | Square | OPX4M-11016R0.0N57 |
| 11       | 16  | 57    | 100 | R0.5   | OPX4M-11016R0.5N57 |
| 12       | 16  | 57    | 100 | Square | OPX4M-12016R0.0N57 |
| 12       | 16  | 57    | 100 | R1.0   | OPX4M-12016R1.0N57 |
| 16       | 20  | 57    | 100 | Square | OPX4M-16020R0.0N57 |
| 16       | 20  | 83    | 150 | Square | OPX4M-16020R0.0N83 |
| 16       | 20  | 57    | 100 | R1.0   | OPX4M-16020R1.0N57 |
| 16       | 20  | 83    | 150 | R1.0   | OPX4M-16020R1.0N83 |
| 20       | 25  | 57    | 100 | Square | OPX4M-20025R0.0N57 |
| 20       | 25  | 83    | 150 | Square | OPX4M-20025R0.0N83 |
| 20       | 25  | 57    | 100 | R1.0   | OPX4M-20025R1.0N57 |
| 20       | 25  | 83    | 150 | R1.0   | OPX4M-20025R1.0N83 |

## 4 FLUTE - EDGE PREP FOR EXOTIC ALLOYS - LONG REACH - BALL NOSE



OPX4B

LONG REACH BALL NOSE INCH

| DIAMETER | REACH     | LOC       | OAL       | RAD  | ITEM#               |
|----------|-----------|-----------|-----------|------|---------------------|
| 1 / 4    | 1 - 1 / 4 | 3 / 8     | 4         | R125 | OPX4-1606R125BN125  |
| 3 / 8    | 1 - 7 / 8 | 1 / 2     | 4         | R190 | OPX4-2408R190BN1875 |
| 1 / 2    | 2 - 1 / 4 | 5 / 8     | 4         | R250 | OPX4-3210R250BN225  |
| 5 / 8    | 2 - 1 / 4 | 3 / 4     | 4         | R310 | OPX4-4012R310BN225  |
| 5 / 8    | 3 - 1 / 4 | 3 / 4     | 5         | R310 | OPX4-4012R310BN325  |
| 3 / 4    | 2 - 1 / 4 | 1         | 4         | R375 | OPX4-4816R375BN225  |
| 3 / 4    | 3 - 1 / 4 | 1         | 6         | R375 | OPX4-4816R375BN325  |
| 1        | 2 - 1 / 4 | 1 - 1 / 8 | 4 - 1 / 2 | R500 | OPX4-6418R500BN225  |
| 1        | 3 - 1 / 4 | 1 - 1 / 8 | 6         | R500 | OPX4-6418R500BN325  |
| 1        | 4 - 1 / 4 | 1 - 1 / 8 | 7         | R500 | OPX4-6418R500BN425  |

## 4 FLUTE - EDGE PREP FOR EXOTIC ALLOYS - LONG REACH - BALL NOSE



OPX4MB

LONG REACH BALL NOSE METRIC

| DIAMETER | LOC | REACH | OAL | ITEM#                |
|----------|-----|-------|-----|----------------------|
| 6        | 10  | 32    | 100 | OPX4M-06010R3.0N32B  |
| 8        | 11  | 40    | 100 | OPX4M-08011R4.0N40B  |
| 10       | 12  | 48    | 100 | OPX4M-10012R5.0N48B  |
| 11       | 16  | 57    | 100 | OPX4M-11016R5.5N57B  |
| 12       | 16  | 57    | 100 | OPX4M-12016R6.0N57B  |
| 16       | 20  | 57    | 100 | OPX4M-16020R8.0N57B  |
| 16       | 20  | 83    | 150 | OPX4M-16020R8.0N83B  |
| 20       | 25  | 57    | 100 | OPX4M-20025R10.0N57B |
| 20       | 25  | 83    | 150 | OPX4M-20025R10.0N83B |



**4 FLUTE - EDGE PREP FOR EXOTIC ALLOYS - LONG REACH - CHIP BREAKER**



OPX4C  
LONG REACH CHIP BREAKER INCH

| DIAMETER | REACH     | LOC   | OAL | RAD  | ITEM#               |
|----------|-----------|-------|-----|------|---------------------|
| 3 / 8    | 1 - 7 / 8 | 1 / 2 | 4   | R020 | OPX4-2408R020CN1875 |
| 1 / 2    | 2 - 1 / 4 | 5 / 8 | 4   | R030 | OPX4-3210R030CN225  |

## 4 FLUTE - EDGE PREP FOR EXOTIC ALLOYS - LONG REACH - CHIP BREAKER



OPX4MC

LONG REACH CHIP BREAKER METRIC

| DIAMETER | LOC | REACH | OAL | RAD    | ITEM#               |
|----------|-----|-------|-----|--------|---------------------|
| 6        | 10  | 32    | 100 | Square | OPX4M-06010R0.0CN32 |
| 6        | 10  | 32    | 100 | R0.5   | OPX4M-06010R0.5CN32 |
| 8        | 11  | 40    | 100 | Square | OPX4M-08011R0.0CN40 |
| 8        | 11  | 40    | 100 | R0.5   | OPX4M-08011R0.5CN40 |
| 10       | 12  | 48    | 100 | Square | OPX4M-10012R0.0CN48 |
| 10       | 12  | 48    | 100 | R0.5   | OPX4M-10012R0.5CN48 |
| 11       | 16  | 57    | 100 | Square | OPX4M-11016R0.0CN57 |
| 11       | 16  | 57    | 100 | R0.5   | OPX4M-11016R0.5CN57 |
| 12       | 16  | 57    | 100 | Square | OPX4M-12016R0.0CN57 |
| 12       | 16  | 57    | 100 | R1.0   | OPX4M-12016R1.0CN57 |
| 16       | 20  | 57    | 100 | Square | OPX4M-16020R0.0CN57 |
| 16       | 20  | 83    | 150 | Square | OPX4M-16020R0.0CN83 |
| 16       | 20  | 57    | 100 | R1.0   | OPX4M-16020R1.0CN57 |
| 16       | 20  | 83    | 150 | R1.0   | OPX4M-16020R1.0CN83 |
| 20       | 25  | 57    | 100 | Square | OPX4M-20025R0.0CN57 |
| 20       | 25  | 83    | 150 | Square | OPX4M-20025R0.0CN83 |
| 20       | 25  | 57    | 100 | R1.0   | OPX4M-20025R1.0CN57 |
| 20       | 25  | 83    | 150 | R1.0   | OPX4M-20025R1.0CN83 |

## 4 FLUTE - EDGE PREP FOR EXOTIC ALLOYS - OVERSIZED SHANK



OPX4K  
OVERSIZED SHANK INCH

| DIAMETER | SHANK | LOC   | OAL       | RAD  | ITEM#          |
|----------|-------|-------|-----------|------|----------------|
| 3 / 16   | 1 / 4 | 3 / 8 | 2         | R000 | OPX4-1206R000K |
| 3 / 16   | 1 / 4 | 3 / 8 | 2         | R015 | OPX4-1206R015K |
| 3 / 16   | 1 / 4 | 3 / 8 | 2         | R030 | OPX4-1206R030K |
| 3 / 16   | 1 / 4 | 3 / 8 | 2         | R060 | OPX4-1206R060K |
| 1 / 4    | 3 / 8 | 3 / 8 | 2 - 1 / 2 | R000 | OPX4-1606R000K |
| 1 / 4    | 3 / 8 | 3 / 8 | 2 - 1 / 2 | R015 | OPX4-1606R015K |
| 1 / 4    | 3 / 8 | 3 / 8 | 2 - 1 / 2 | R030 | OPX4-1606R030K |
| 1 / 4    | 3 / 8 | 3 / 8 | 2 - 1 / 2 | R060 | OPX4-1606R060K |
| 1 / 4    | 3 / 8 | 3 / 8 | 2 - 1 / 2 | R090 | OPX4-1606R090K |
| 3 / 8    | 1 / 2 | 1 / 2 | 3         | R000 | OPX4-2408R000K |
| 3 / 8    | 1 / 2 | 1 / 2 | 3         | R015 | OPX4-2408R015K |
| 3 / 8    | 1 / 2 | 1 / 2 | 3         | R030 | OPX4-2408R030K |
| 3 / 8    | 1 / 2 | 1 / 2 | 3         | R060 | OPX4-2408R060K |
| 3 / 8    | 1 / 2 | 1 / 2 | 3         | R090 | OPX4-2408R090K |
| 3 / 8    | 1 / 2 | 1 / 2 | 3         | R125 | OPX4-2408R125K |

## 4 FLUTE - EDGE PREP FOR EXOTIC ALLOYS - OVERSIZED SHANK



OPX4MK

OVERSIZED SHANK METRIC

| DIAMETER | SHANK | LOC | OAL | RAD    | ITEM#            |
|----------|-------|-----|-----|--------|------------------|
| 5        | 6     | 10  | 75  | Square | OPX4M-05010R0.0K |
| 5        | 6     | 10  | 75  | R0.5   | OPX4M-05010R0.5K |
| 5        | 6     | 10  | 75  | R1.0   | OPX4M-05010R1.0K |
| 5        | 6     | 10  | 75  | R1.5   | OPX4M-05010R1.5K |
| 6        | 10    | 10  | 75  | Square | OPX4M-06010R0.0K |
| 6        | 10    | 10  | 75  | R0.5   | OPX4M-06010R0.5K |
| 6        | 10    | 10  | 75  | R1.0   | OPX4M-06010R1.0K |
| 6        | 10    | 10  | 75  | R1.5   | OPX4M-06010R1.5K |
| 6        | 10    | 10  | 75  | R2.0   | OPX4M-06010R2.0K |
| 8        | 10    | 11  | 75  | Square | OPX4M-08011R0.0K |
| 8        | 10    | 11  | 75  | R0.5   | OPX4M-08011R0.5K |
| 8        | 10    | 11  | 75  | R1.0   | OPX4M-08011R1.0K |
| 8        | 10    | 11  | 75  | R1.5   | OPX4M-08011R1.5K |
| 8        | 10    | 11  | 75  | R2.0   | OPX4M-08011R2.0K |
| 8        | 10    | 11  | 75  | R3.0   | OPX4M-08011R3.0K |
| 10       | 12    | 12  | 75  | Square | OPX4M-10012R0.0K |
| 10       | 12    | 12  | 75  | R0.5   | OPX4M-10012R0.5K |
| 10       | 12    | 12  | 75  | R1.0   | OPX4M-10012R1.0K |
| 10       | 12    | 12  | 75  | R1.5   | OPX4M-10012R1.5K |
| 10       | 12    | 12  | 75  | R2.0   | OPX4M-10012R2.0K |
| 10       | 12    | 12  | 75  | R3.0   | OPX4M-10012R3.0K |



**4 FLUTE - EDGE PREP FOR EXOTIC ALLOYS - OVERSIZED SHANK - BALL NOSE**



OPX4BK

OVERSIZED SHANK BALL NOSE INCH

| DIAMETER | SHANK | LOC   | OAL       | RAD  | ITEM#           |
|----------|-------|-------|-----------|------|-----------------|
| 3 / 16   | 1 / 4 | 3 / 8 | 2         | R090 | OPX4-1206R090BK |
| 1 / 4    | 3 / 8 | 3 / 8 | 2 - 1 / 2 | R125 | OPX4-1606R125BK |
| 3 / 8    | 1 / 2 | 1 / 2 | 3         | R190 | OPX4-2408R190BK |

**4 FLUTE - EDGE PREP FOR EXOTIC ALLOYS - OVERSIZED SHANK - BALL NOSE**



OPX4MBK

OVERSIZED SHANK BALL NOSE METRIC

| DIAMETER | SHANK | LOC | OAL | ITEM#             |
|----------|-------|-----|-----|-------------------|
| 5        | 6     | 10  | 75  | OPX4M-05010R2.5BK |
| 6        | 10    | 10  | 75  | OPX4M-06010R3.0BK |
| 10       | 12    | 12  | 75  | OPX4M-10012R5.0BK |

**4 FLUTE - EDGE PREP FOR EXOTIC ALLOYS - OVERSIZED SHANK - CHIP BREAKER**



OPX4CK

OVERSIZED SHANK CHIP BREAKER INCH

| DIAMETER | SHANK | LOC   | OAL | RAD  | ITEM#           |
|----------|-------|-------|-----|------|-----------------|
| 3 / 8    | 1 / 2 | 1 / 2 | 3   | R030 | OPX4-2408R030CK |
| 3 / 8    | 1 / 2 | 1 / 2 | 3   | R060 | OPX4-2408R060CK |

## 4 FLUTE - EDGE PREP FOR EXOTIC ALLOYS - OVERSIZED SHANK - CHIP BREAKER



OPX4MCK

OVERSIZED SHANK CHIP BREAKER METRIC

| DIAMETER | SHANK | LOC | OAL | RAD    | ITEM#             |
|----------|-------|-----|-----|--------|-------------------|
| 5        | 6     | 10  | 75  | Square | OPX4M-05010R0.0CK |
| 5        | 6     | 10  | 75  | R0.5   | OPX4M-05010R0.5CK |
| 5        | 6     | 10  | 75  | R1.0   | OPX4M-05010R1.0CK |
| 5        | 6     | 10  | 75  | R1.5   | OPX4M-05010R1.5CK |
| 6        | 10    | 10  | 75  | Square | OPX4M-06010R0.0CK |
| 6        | 10    | 10  | 75  | R0.5   | OPX4M-06010R0.5CK |
| 6        | 10    | 10  | 75  | R1.0   | OPX4M-06010R1.0CK |
| 6        | 10    | 10  | 75  | R1.5   | OPX4M-06010R1.5CK |
| 6        | 10    | 10  | 75  | R2.0   | OPX4M-06010R2.0CK |
| 8        | 10    | 11  | 75  | Square | OPX4M-08011R0.0CK |
| 8        | 10    | 11  | 75  | R0.5   | OPX4M-08011R0.5CK |
| 8        | 10    | 11  | 75  | R1.0   | OPX4M-08011R1.0CK |
| 8        | 10    | 11  | 75  | R1.5   | OPX4M-08011R1.5CK |
| 8        | 10    | 11  | 75  | R2.0   | OPX4M-08011R2.0CK |
| 8        | 10    | 11  | 75  | R3.0   | OPX4M-08011R3.0CK |
| 10       | 12    | 12  | 75  | Square | OPX4M-10012R0.0CK |
| 10       | 12    | 12  | 75  | R0.5   | OPX4M-10012R0.5CK |
| 10       | 12    | 12  | 75  | R1.0   | OPX4M-10012R1.0CK |
| 10       | 12    | 12  | 75  | R1.5   | OPX4M-10012R1.5CK |
| 10       | 12    | 12  | 75  | R2.0   | OPX4M-10012R2.0CK |
| 10       | 12    | 12  | 75  | R3.0   | OPX4M-10012R3.0CK |



# OPRI 4 FLUTE ROUGHING

Best used for steel, Stainless and Exotics material

## SPECIAL FEATURES

|                                |                                                                                                    |
|--------------------------------|----------------------------------------------------------------------------------------------------|
| <b>KNUCKLE ROUGHER</b>         | Knuckle geometry for smooth machining and high roughing capacity.                                  |
| <b>TiAlN PVD COATING</b>       | High hardness provides excellent wear resistance and extends tool life                             |
| <b>INTERNAL COOLANT SUPPLY</b> | Coolant through available                                                                          |
| <b>FLAT WELDON</b>             | Available with Standard NAS flat Weldon                                                            |
| <b>CENTER CUTTING</b>          | Center cutting for plunging and ramping operations                                                 |
| <b>EDGE PREP</b>               | Makes the cutting edge of the tool more uniform, which help the tool to machine better and faster. |



Engineered for aggressive roughing with maximum removal and minimum wear.

## 4 FLUTE - NECKDOWN ROUGHING



OPRIN  
INCH

| DIAMETER | LOC | OAL   | REACH | CHAMFER | ITEM#              |
|----------|-----|-------|-------|---------|--------------------|
| 1/4      | 3/8 | 2-1/2 | 1-1/8 | 45      | OPRI-1606C045N1125 |
| 1/4      | 3/8 | 3     | 1-3/8 | 45      | OPRI-1606C045N1375 |
| 3/8      | 1/2 | 2-1/2 | 1-1/8 | 45      | OPRI-2408C045N1125 |
| 1/2      | 5/8 | 3-1/4 | 1-3/8 | 45      | OPRI-3210C045N1375 |
| 1/2      | 3/4 | 4     | 2-1/4 | 45      | OPRI-3212C045N225  |

## 4 FLUTE - ROUGHING



OPRI  
INCH

| DIAMETER | LOC   | OAL | CHAMFER | ITEM#         |
|----------|-------|-----|---------|---------------|
| 1/4      | 3/8   | 3   | 45      | OPRI-1606C045 |
| 1/4      | 1/2   | 3   | 45      | OPRI-1608C045 |
| 1/4      | 3/4   | 3   | 45      | OPRI-1612C045 |
| 1/4      | 1     | 3   | 45      | OPRI-1616C045 |
| 3/8      | 1/2   | 3   | 45      | OPRI-2408C045 |
| 3/8      | 3/4   | 3   | 45      | OPRI-2412C045 |
| 3/8      | 1     | 3   | 45      | OPRI-2416C045 |
| 3/8      | 1 1/4 | 3   | 45      | OPRI-2420C045 |
| 1/2      | 5/8   | 3   | 45      | OPRI-3210C045 |
| 1/2      | 1     | 3   | 45      | OPRI-3216C045 |
| 1/2      | 1 1/4 | 3   | 45      | OPRI-3220C045 |
| 1/2      | 1 5/8 | 4   | 45      | OPRI-3226C045 |
| 5/8      | 3/4   | 4   | 45      | OPRI-4012C045 |
| 5/8      | 1 5/8 | 4   | 45      | OPRI-4026C045 |
| 3/4      | 1     | 4   | 45      | OPRI-4816C045 |

# OP5 ENDMILLS

Best used for Steel, Stainless and Exotic materials

## SPECIAL FEATURES

### **VARIABLE HELIX**

Breaks up harmonic vibrations (chatter) along the length and improves surface finish and tool life.

### **TANGENTIAL RADIUS**

Allows a smooth blending radius on the machined part, improving the manufacturing times by avoiding the finishing process.

### **nACRo PVD COATING**

Offers a higher cutting edge resistance to wear and higher heat tolerance.





## 5 FLUTE - STUB



OP50

STUB INCH

| DIAMETER | LOC  | OAL | RAD    | ITEM#         |
|----------|------|-----|--------|---------------|
| 1/8      | 1/4  | 2   | Square | OP50-0804R000 |
| 1/8      | 1/4  | 2   | R.015  | OP50-0804R015 |
| 1/8      | 1/4  | 2   | R.030  | OP50-0804R030 |
| 3/16     | 3/8  | 3   | Square | OP50-1206R000 |
| 3/16     | 3/8  | 3   | R.015  | OP50-1206R015 |
| 3/16     | 3/8  | 3   | R.030  | OP50-1206R030 |
| 3/16     | 3/8  | 3   | R.060  | OP50-1206R060 |
| 1/4      | 3/8  | 3   | Square | OP50-1606R000 |
| 1/4      | 3/8  | 3   | R.015  | OP50-1606R015 |
| 1/4      | 3/8  | 3   | R.030  | OP50-1606R030 |
| 1/4      | 3/8  | 3   | R.060  | OP50-1606R060 |
| 1/4      | 3/8  | 3   | R.090  | OP50-1606R090 |
| 5/16     | 7/16 | 3   | Square | OP50-2007R000 |
| 5/16     | 7/16 | 3   | R.015  | OP50-2007R015 |
| 5/16     | 7/16 | 3   | R.030  | OP50-2007R030 |
| 5/16     | 7/16 | 3   | R.060  | OP50-2007R060 |
| 5/16     | 7/16 | 3   | R.090  | OP50-2007R090 |
| 5/16     | 7/16 | 3   | R.125  | OP50-2007R125 |
| 3/8      | 1/2  | 3   | Square | OP50-2408R000 |
| 3/8      | 1/2  | 3   | R.015  | OP50-2408R015 |
| 3/8      | 1/2  | 3   | R.030  | OP50-2408R030 |
| 3/8      | 1/2  | 3   | R.060  | OP50-2408R060 |
| 3/8      | 1/2  | 3   | R.090  | OP50-2408R090 |
| 3/8      | 1/2  | 3   | R.125  | OP50-2408R125 |
| 7/16     | 5/8  | 3   | Square | OP50-2810R000 |
| 7/16     | 5/8  | 3   | R.015  | OP50-2810R015 |
| 7/16     | 5/8  | 3   | R.030  | OP50-2810R030 |
| 7/16     | 5/8  | 3   | R.060  | OP50-2810R060 |
| 7/16     | 5/8  | 3   | R.090  | OP50-2810R090 |
| 7/16     | 5/8  | 3   | R.125  | OP50-2810R125 |

| DIAMETER | LOC | OAL | RAD    | ITEM#         |
|----------|-----|-----|--------|---------------|
| 7/16     | 5/8 | 3   | R.190  | OP50-2810R190 |
| 1/2      | 5/8 | 3   | Square | OP50-3210R000 |
| 1/2      | 5/8 | 3   | R.015  | OP50-3210R015 |
| 1/2      | 5/8 | 3   | R.030  | OP50-3210R030 |
| 1/2      | 5/8 | 3   | R.060  | OP50-3210R060 |
| 1/2      | 5/8 | 3   | R.090  | OP50-3210R090 |
| 1/2      | 5/8 | 3   | R.125  | OP50-3210R125 |
| 1/2      | 5/8 | 3   | R.190  | OP50-3210R190 |
| 5/8      | 3/4 | 4   | Square | OP50-4012R000 |
| 5/8      | 3/4 | 4   | R.015  | OP50-4012R015 |
| 5/8      | 3/4 | 4   | R.030  | OP50-4012R030 |
| 5/8      | 3/4 | 4   | R.060  | OP50-4012R060 |
| 5/8      | 3/4 | 4   | R.090  | OP50-4012R090 |
| 5/8      | 3/4 | 4   | R.125  | OP50-4012R125 |
| 5/8      | 3/4 | 4   | R.190  | OP50-4012R190 |
| 5/8      | 3/4 | 4   | R.250  | OP50-4012R250 |
| 3/4      | 3/4 | 4   | Square | OP50-4812R000 |
| 3/4      | 3/4 | 4   | R.015  | OP50-4812R015 |
| 3/4      | 3/4 | 4   | R.030  | OP50-4812R030 |
| 3/4      | 3/4 | 4   | R.060  | OP50-4812R060 |
| 3/4      | 3/4 | 4   | R.090  | OP50-4812R090 |
| 3/4      | 3/4 | 4   | R.125  | OP50-4812R125 |
| 3/4      | 3/4 | 4   | R.190  | OP50-4812R190 |
| 3/4      | 3/4 | 4   | R.250  | OP50-4812R250 |

## 5 FLUTE - STUB



OP50M

STUB METRIC

| DIAMETER | LOC | OAL | RAD    | ITEM#           |
|----------|-----|-----|--------|-----------------|
| 3        | 06  | 50  | Square | OP50M-03006R0.0 |
| 3        | 06  | 50  | R0.5   | OP50M-03006R0.5 |
| 3        | 06  | 50  | R1.0   | OP50M-03006R1.0 |
| 5        | 10  | 75  | Square | OP50M-05010R0.0 |
| 5        | 10  | 75  | R0.5   | OP50M-05010R0.5 |
| 5        | 10  | 75  | R1.0   | OP50M-05010R1.0 |
| 5        | 10  | 75  | R1.5   | OP50M-05010R1.5 |
| 6        | 10  | 75  | Square | OP50M-06010R0.0 |
| 6        | 10  | 75  | R0.5   | OP50M-06010R0.5 |
| 6        | 10  | 75  | R1.0   | OP50M-06010R1.0 |
| 6        | 10  | 75  | R1.5   | OP50M-06010R1.5 |
| 6        | 10  | 75  | R2.0   | OP50M-06010R2.0 |
| 8        | 11  | 75  | Square | OP50M-08011R0.0 |
| 8        | 11  | 75  | R0.5   | OP50M-08011R0.5 |
| 8        | 11  | 75  | R1.0   | OP50M-08011R1.0 |
| 8        | 11  | 75  | R1.5   | OP50M-08011R1.5 |
| 8        | 11  | 75  | R2.0   | OP50M-08011R2.0 |
| 8        | 11  | 75  | R3.0   | OP50M-08011R3.0 |
| 10       | 12  | 75  | Square | OP50M-10012R0.0 |
| 10       | 12  | 75  | R0.5   | OP50M-10012R0.5 |
| 10       | 12  | 75  | R1.0   | OP50M-10012R1.0 |
| 10       | 12  | 75  | R1.5   | OP50M-10012R1.5 |
| 10       | 12  | 75  | R2.0   | OP50M-10012R2.0 |
| 10       | 12  | 75  | R3.0   | OP50M-10012R3.0 |
| 11       | 16  | 75  | Square | OP50M-11016R0.0 |
| 11       | 16  | 75  | R0.5   | OP50M-11016R0.5 |
| 11       | 16  | 75  | R1.0   | OP50M-11016R1.0 |
| 11       | 16  | 75  | R1.5   | OP50M-11016R1.5 |
| 11       | 16  | 75  | R2.0   | OP50M-11016R2.0 |
| 11       | 16  | 75  | R3.0   | OP50M-11016R3.0 |

| DIAMETER | LOC | OAL | RAD    | ITEM#           |
|----------|-----|-----|--------|-----------------|
| 11       | 16  | 75  | R4.5   | OP50M-11016R4.5 |
| 12       | 16  | 75  | Square | OP50M-12016R0.0 |
| 12       | 16  | 75  | R0.5   | OP50M-12016R0.5 |
| 12       | 16  | 75  | R1.0   | OP50M-12016R1.0 |
| 12       | 16  | 75  | R1.5   | OP50M-12016R1.5 |
| 12       | 16  | 75  | R2.0   | OP50M-12016R2.0 |
| 12       | 16  | 75  | R3.0   | OP50M-12016R3.0 |
| 12       | 16  | 75  | R4.5   | OP50M-12016R4.5 |
| 16       | 20  | 100 | Square | OP50M-16020R0.0 |
| 16       | 20  | 100 | R0.5   | OP50M-16020R0.5 |
| 16       | 20  | 100 | R1.0   | OP50M-16020R1.0 |
| 16       | 20  | 100 | R1.5   | OP50M-16020R1.5 |
| 16       | 20  | 100 | R2.0   | OP50M-16020R2.0 |
| 16       | 20  | 100 | R3.0   | OP50M-16020R3.0 |
| 16       | 20  | 100 | R4.5   | OP50M-16020R4.5 |
| 16       | 20  | 100 | R6.0   | OP50M-16020R6.0 |
| 20       | 25  | 100 | Square | OP50M-20025R0.0 |
| 20       | 25  | 100 | R0.5   | OP50M-20025R0.5 |
| 20       | 25  | 100 | R1.0   | OP50M-20025R1.0 |
| 20       | 25  | 100 | R1.5   | OP50M-20025R1.5 |
| 20       | 25  | 100 | R2.0   | OP50M-20025R2.0 |
| 20       | 25  | 100 | R3.0   | OP50M-20025R3.0 |
| 20       | 25  | 100 | R4.5   | OP50M-20025R4.5 |
| 20       | 25  | 100 | R6.0   | OP50M-20025R6.0 |

## 5 FLUTE - STUB - CHIP BREAKER



OP50C

CHIP BREAKER INCH

| DIAMETER | LOC  | OAL | RAD    | ITEM#          |
|----------|------|-----|--------|----------------|
| 1/8      | 1/4  | 2   | Square | OP50-0804R000C |
| 1/8      | 1/4  | 2   | R.015  | OP50-0804R015C |
| 1/8      | 1/4  | 2   | R.030  | OP50-0804R030C |
| 3/16     | 3/8  | 3   | Square | OP50-1206R000C |
| 3/16     | 3/8  | 3   | R.015  | OP50-1206R015C |
| 3/16     | 3/8  | 3   | R.030  | OP50-1206R030C |
| 3/16     | 3/8  | 3   | R.060  | OP50-1206R060C |
| 1/4      | 3/8  | 3   | Square | OP50-1606R000C |
| 1/4      | 3/8  | 3   | R.015  | OP50-1606R015C |
| 1/4      | 3/8  | 3   | R.030  | OP50-1606R030C |
| 1/4      | 3/8  | 3   | R.060  | OP50-1606R060C |
| 1/4      | 3/8  | 3   | R.090  | OP50-1606R090C |
| 5/16     | 7/16 | 3   | Square | OP50-2007R000C |
| 5/16     | 7/16 | 3   | R.015  | OP50-2007R015C |
| 5/16     | 7/16 | 3   | R.030  | OP50-2007R030C |
| 5/16     | 7/16 | 3   | R.060  | OP50-2007R060C |
| 5/16     | 7/16 | 3   | R.090  | OP50-2007R090C |
| 5/16     | 7/16 | 3   | R.125  | OP50-2007R125C |
| 3/8      | 1/2  | 3   | Square | OP50-2408R000C |
| 3/8      | 1/2  | 3   | R.015  | OP50-2408R015C |
| 3/8      | 1/2  | 3   | R.030  | OP50-2408R030C |
| 3/8      | 1/2  | 3   | R.060  | OP50-2408R060C |
| 3/8      | 1/2  | 3   | R.090  | OP50-2408R090C |
| 3/8      | 1/2  | 3   | R.125  | OP50-2408R125C |
| 7/16     | 5/8  | 3   | Square | OP50-2810R000C |
| 7/16     | 5/8  | 3   | R.015  | OP50-2810R015C |
| 7/16     | 5/8  | 3   | R.030  | OP50-2810R030C |
| 7/16     | 5/8  | 3   | R.060  | OP50-2810R060C |
| 7/16     | 5/8  | 3   | R.090  | OP50-2810R090C |
| 7/16     | 5/8  | 3   | R.125  | OP50-2810R125C |

| DIAMETER | LOC | OAL | RAD    | ITEM#          |
|----------|-----|-----|--------|----------------|
| 7/16     | 5/8 | 3   | R.190  | OP50-2810R190C |
| 1/2      | 5/8 | 3   | Square | OP50-3210R000C |
| 1/2      | 5/8 | 3   | R.015  | OP50-3210R015C |
| 1/2      | 5/8 | 3   | R.030  | OP50-3210R030C |
| 1/2      | 5/8 | 3   | R.060  | OP50-3210R060C |
| 1/2      | 5/8 | 3   | R.090  | OP50-3210R090C |
| 1/2      | 5/8 | 3   | R.125  | OP50-3210R125C |
| 1/2      | 5/8 | 3   | R.190  | OP50-3210R190C |
| 5/8      | 3/4 | 4   | Square | OP50-4012R000C |
| 5/8      | 3/4 | 4   | R.015  | OP50-4012R015C |
| 5/8      | 3/4 | 4   | R.030  | OP50-4012R030C |
| 5/8      | 3/4 | 4   | R.060  | OP50-4012R060C |
| 5/8      | 3/4 | 4   | R.090  | OP50-4012R090C |
| 5/8      | 3/4 | 4   | R.125  | OP50-4012R125C |
| 5/8      | 3/4 | 4   | R.190  | OP50-4012R190C |
| 5/8      | 3/4 | 4   | R.250  | OP50-4012R250C |
| 3/4      | 3/4 | 4   | Square | OP50-4812R000C |
| 3/4      | 3/4 | 4   | R.015  | OP50-4812R015C |
| 3/4      | 3/4 | 4   | R.030  | OP50-4812R030C |
| 3/4      | 3/4 | 4   | R.060  | OP50-4812R060C |
| 3/4      | 3/4 | 4   | R.090  | OP50-4812R090C |
| 3/4      | 3/4 | 4   | R.125  | OP50-4812R125C |
| 3/4      | 3/4 | 4   | R.190  | OP50-4812R190C |
| 3/4      | 3/4 | 4   | R.250  | OP50-4812R250C |



## 5 FLUTE - STUB - CHIP BREAKER



OP50MC

CHIP BREAKER METRIC

| DIAMETER | LOC | OAL | RAD    | ITEM#            |
|----------|-----|-----|--------|------------------|
| 3        | 06  | 50  | Square | OP50M-03006R0.0C |
| 3        | 06  | 50  | R0.5   | OP50M-03006R0.5C |
| 3        | 06  | 50  | R1.0   | OP50M-03006R1.0C |
| 5        | 10  | 75  | Square | OP50M-05010R0.0C |
| 5        | 10  | 75  | R0.5   | OP50M-05010R0.5C |
| 5        | 10  | 75  | R1.0   | OP50M-05010R1.0C |
| 5        | 10  | 75  | R1.5   | OP50M-05010R1.5C |
| 6        | 10  | 75  | Square | OP50M-06010R0.0C |
| 6        | 10  | 75  | R0.5   | OP50M-06010R0.5C |
| 6        | 10  | 75  | R1.0   | OP50M-06010R1.0C |
| 6        | 10  | 75  | R1.5   | OP50M-06010R1.5C |
| 6        | 10  | 75  | R2.0   | OP50M-06010R2.0C |
| 8        | 11  | 75  | Square | OP50M-08011R0.0C |
| 8        | 11  | 75  | R0.5   | OP50M-08011R0.5C |
| 8        | 11  | 75  | R1.0   | OP50M-08011R1.0C |
| 8        | 11  | 75  | R1.5   | OP50M-08011R1.5C |
| 8        | 11  | 75  | R2.0   | OP50M-08011R2.0C |
| 8        | 11  | 75  | R3.0   | OP50M-08011R3.0C |
| 10       | 12  | 75  | Square | OP50M-10012R0.0C |
| 10       | 12  | 75  | R0.5   | OP50M-10012R0.5C |
| 10       | 12  | 75  | R1.0   | OP50M-10012R1.0C |
| 10       | 12  | 75  | R1.5   | OP50M-10012R1.5C |
| 10       | 12  | 75  | R2.0   | OP50M-10012R2.0C |
| 10       | 12  | 75  | R3.0   | OP50M-10012R3.0C |
| 11       | 16  | 75  | Square | OP50M-11016R0.0C |
| 11       | 16  | 75  | R0.5   | OP50M-11016R0.5C |
| 11       | 16  | 75  | R1.0   | OP50M-11016R1.0C |
| 11       | 16  | 75  | R1.5   | OP50M-11016R1.5C |
| 11       | 16  | 75  | R2.0   | OP50M-11016R2.0C |
| 11       | 16  | 75  | R3.0   | OP50M-11016R3.0C |

| DIAMETER | LOC | OAL | RAD    | ITEM#            |
|----------|-----|-----|--------|------------------|
| 11       | 16  | 75  | R4.5   | OP50M-11016R4.5C |
| 12       | 16  | 75  | Square | OP50M-12016R0.0C |
| 12       | 16  | 75  | R0.5   | OP50M-12016R0.5C |
| 12       | 16  | 75  | R1.0   | OP50M-12016R1.0C |
| 12       | 16  | 75  | R1.5   | OP50M-12016R1.5C |
| 12       | 16  | 75  | R2.0   | OP50M-12016R2.0C |
| 12       | 16  | 75  | R3.0   | OP50M-12016R3.0C |
| 12       | 16  | 75  | R4.5   | OP50M-12016R4.5C |
| 16       | 20  | 100 | Square | OP50M-16020R0.0C |
| 16       | 20  | 100 | R0.5   | OP50M-16020R0.5C |
| 16       | 20  | 100 | R1.0   | OP50M-16020R1.0C |
| 16       | 20  | 100 | R1.5   | OP50M-16020R1.5C |
| 16       | 20  | 100 | R2.0   | OP50M-16020R2.0C |
| 16       | 20  | 100 | R3.0   | OP50M-16020R3.0C |
| 16       | 20  | 100 | R4.5   | OP50M-16020R4.5C |
| 16       | 20  | 100 | R6.0   | OP50M-16020R6.0C |
| 20       | 25  | 100 | Square | OP50M-20025R0.0C |
| 20       | 25  | 100 | R0.5   | OP50M-20025R0.5C |
| 20       | 25  | 100 | R1.0   | OP50M-20025R1.0C |
| 20       | 25  | 100 | R1.5   | OP50M-20025R1.5C |
| 20       | 25  | 100 | R2.0   | OP50M-20025R2.0C |
| 20       | 25  | 100 | R3.0   | OP50M-20025R3.0C |
| 20       | 25  | 100 | R4.5   | OP50M-20025R4.5C |
| 20       | 25  | 100 | R6.0   | OP50M-20025R6.0C |



## 5 FLUTE - REGULAR



OP51  
REGULAR INCH

| DIAMETER | LOC   | OAL | RAD    | ITEM#         |
|----------|-------|-----|--------|---------------|
| 3/16     | 9/16  | 3   | Square | OP51-1209R000 |
| 3/16     | 9/16  | 3   | R.015  | OP51-1209R015 |
| 3/16     | 9/16  | 3   | R.030  | OP51-1209R030 |
| 3/16     | 9/16  | 3   | R.060  | OP51-1209R060 |
| 1/4      | 3/4   | 3   | Square | OP51-1612R000 |
| 1/4      | 3/4   | 3   | R.015  | OP51-1612R015 |
| 1/4      | 3/4   | 3   | R.030  | OP51-1612R030 |
| 1/4      | 3/4   | 3   | R.060  | OP51-1612R060 |
| 1/4      | 3/4   | 3   | R.090  | OP51-1612R090 |
| 5/16     | 13/16 | 3   | Square | OP51-2013R000 |
| 5/16     | 13/16 | 3   | R.015  | OP51-2013R015 |
| 5/16     | 13/16 | 3   | R.030  | OP51-2013R030 |
| 5/16     | 13/16 | 3   | R.060  | OP51-2013R060 |
| 5/16     | 13/16 | 3   | R.090  | OP51-2013R090 |
| 5/16     | 13/16 | 3   | R.125  | OP51-2013R125 |
| 3/8      | 1     | 3   | Square | OP51-2416R000 |
| 3/8      | 1     | 3   | R.015  | OP51-2416R015 |
| 3/8      | 1     | 3   | R.030  | OP51-2416R030 |
| 3/8      | 1     | 3   | R.060  | OP51-2416R060 |
| 3/8      | 1     | 3   | R.090  | OP51-2416R090 |
| 3/8      | 1     | 3   | R.125  | OP51-2416R125 |
| 7/16     | 1     | 3   | Square | OP51-2816R000 |
| 7/16     | 1     | 3   | R.015  | OP51-2816R015 |
| 7/16     | 1     | 3   | R.030  | OP51-2816R030 |
| 7/16     | 1     | 3   | R.060  | OP51-2816R060 |
| 7/16     | 1     | 3   | R.090  | OP51-2816R090 |
| 7/16     | 1     | 3   | R.125  | OP51-2816R125 |
| 7/16     | 1     | 3   | R.190  | OP51-2816R190 |
| 1/2      | 1 1/4 | 3   | Square | OP51-3220R000 |
| 1/2      | 1 1/4 | 3   | R.015  | OP51-3220R015 |

| DIAMETER | LOC   | OAL | RAD    | ITEM#         |
|----------|-------|-----|--------|---------------|
| 1/2      | 1 1/4 | 3   | R.030  | OP51-3220R030 |
| 1/2      | 1 1/4 | 3   | R.060  | OP51-3220R060 |
| 1/2      | 1 1/4 | 3   | R.090  | OP51-3220R090 |
| 1/2      | 1 1/4 | 3   | R.125  | OP51-3220R125 |
| 1/2      | 1 1/4 | 3   | R.190  | OP51-3220R190 |
| 5/8      | 1 5/8 | 4   | Square | OP51-4026R000 |
| 5/8      | 1 5/8 | 4   | R.015  | OP51-4026R015 |
| 5/8      | 1 5/8 | 4   | R.030  | OP51-4026R030 |
| 5/8      | 1 5/8 | 4   | R.060  | OP51-4026R060 |
| 5/8      | 1 5/8 | 4   | R.090  | OP51-4026R090 |
| 5/8      | 1 5/8 | 4   | R.125  | OP51-4026R125 |
| 5/8      | 1 5/8 | 4   | R.190  | OP51-4026R190 |
| 5/8      | 1 5/8 | 4   | R.250  | OP51-4026R250 |
| 3/4      | 1 5/8 | 4   | Square | OP51-4826R000 |
| 3/4      | 1 5/8 | 4   | R.015  | OP51-4826R015 |
| 3/4      | 1 5/8 | 4   | R.030  | OP51-4826R030 |
| 3/4      | 1 5/8 | 4   | R.060  | OP51-4826R060 |
| 3/4      | 1 5/8 | 4   | R.090  | OP51-4826R090 |
| 3/4      | 1 5/8 | 4   | R.125  | OP51-4826R125 |
| 3/4      | 1 5/8 | 4   | R.190  | OP51-4826R190 |
| 3/4      | 1 5/8 | 4   | R.250  | OP51-4826R250 |
| 1        | 1 3/4 | 5   | Square | OP51-6428R000 |
| 1        | 1 3/4 | 5   | R.015  | OP51-6428R015 |
| 1        | 1 3/4 | 5   | R.030  | OP51-6428R030 |
| 1        | 1 3/4 | 5   | R.060  | OP51-6428R060 |
| 1        | 1 3/4 | 5   | R.090  | OP51-6428R090 |
| 1        | 1 3/4 | 5   | R.125  | OP51-6428R125 |
| 1        | 1 3/4 | 5   | R.190  | OP51-6428R190 |
| 1        | 1 3/4 | 5   | R.250  | OP51-6428R250 |

## 5 FLUTE - REGULAR



OP51M  
REGULAR METRIC

| DIAMETER | LOC | OAL | RAD    | ITEM#           |
|----------|-----|-----|--------|-----------------|
| 5        | 14  | 75  | Square | OP51M-05014R0.0 |
| 5        | 14  | 75  | R0.5   | OP51M-05014R0.5 |
| 5        | 14  | 75  | R1.0   | OP51M-05014R1.0 |
| 5        | 14  | 75  | R1.5   | OP51M-05014R1.5 |
| 6        | 20  | 75  | Square | OP51M-06020R0.0 |
| 6        | 20  | 75  | R0.5   | OP51M-06020R0.5 |
| 6        | 20  | 75  | R1.0   | OP51M-06020R1.0 |
| 6        | 20  | 75  | R1.5   | OP51M-06020R1.5 |
| 6        | 20  | 75  | R2.0   | OP51M-06020R2.0 |
| 8        | 21  | 75  | Square | OP51M-08021R0.0 |
| 8        | 21  | 75  | R0.5   | OP51M-08021R0.5 |
| 8        | 21  | 75  | R1.0   | OP51M-08021R1.0 |
| 8        | 21  | 75  | R1.5   | OP51M-08021R1.5 |
| 8        | 21  | 75  | R2.0   | OP51M-08021R2.0 |
| 8        | 21  | 75  | R3.0   | OP51M-08021R3.0 |
| 10       | 25  | 75  | Square | OP51M-10025R0.0 |
| 10       | 25  | 75  | R0.5   | OP51M-10025R0.5 |
| 10       | 25  | 75  | R1.0   | OP51M-10025R1.0 |
| 10       | 25  | 75  | R1.5   | OP51M-10025R1.5 |
| 10       | 25  | 75  | R2.0   | OP51M-10025R2.0 |
| 10       | 25  | 75  | R3.0   | OP51M-10025R3.0 |
| 11       | 25  | 75  | Square | OP51M-11025R0.0 |
| 11       | 25  | 75  | R0.5   | OP51M-11025R0.5 |
| 11       | 25  | 75  | R1.0   | OP51M-11025R1.0 |
| 11       | 25  | 75  | R1.5   | OP51M-11025R1.5 |
| 11       | 25  | 75  | R2.0   | OP51M-11025R2.0 |
| 11       | 25  | 75  | R3.0   | OP51M-11025R3.0 |
| 11       | 25  | 75  | R4.5   | OP51M-11025R4.5 |
| 12       | 32  | 75  | Square | OP51M-12032R0.0 |
| 12       | 32  | 75  | R0.5   | OP51M-12032R0.5 |

| DIAMETER | LOC | OAL | RAD    | ITEM#           |
|----------|-----|-----|--------|-----------------|
| 12       | 32  | 75  | R1.0   | OP51M-12032R1.0 |
| 12       | 32  | 75  | R1.5   | OP51M-12032R1.5 |
| 12       | 32  | 75  | R2.0   | OP51M-12032R2.0 |
| 12       | 32  | 75  | R3.0   | OP51M-12032R3.0 |
| 12       | 32  | 75  | R4.5   | OP51M-12032R4.5 |
| 16       | 41  | 100 | Square | OP51M-16041R0.0 |
| 16       | 41  | 100 | R0.5   | OP51M-16041R0.5 |
| 16       | 41  | 100 | R1.0   | OP51M-16041R1.0 |
| 16       | 41  | 100 | R1.5   | OP51M-16041R1.5 |
| 16       | 41  | 100 | R2.0   | OP51M-16041R2.0 |
| 16       | 41  | 100 | R3.0   | OP51M-16041R3.0 |
| 16       | 41  | 100 | R4.5   | OP51M-16041R4.5 |
| 16       | 41  | 100 | R6.0   | OP51M-16041R6.0 |
| 20       | 41  | 100 | Square | OP51M-20041R0.0 |
| 20       | 41  | 100 | R0.5   | OP51M-20041R0.5 |
| 20       | 41  | 100 | R1.0   | OP51M-20041R1.0 |
| 20       | 41  | 100 | R1.5   | OP51M-20041R1.5 |
| 20       | 41  | 100 | R2.0   | OP51M-20041R2.0 |
| 20       | 41  | 100 | R3.0   | OP51M-20041R3.0 |
| 20       | 41  | 100 | R4.5   | OP51M-20041R4.5 |
| 20       | 41  | 100 | R6.0   | OP51M-20041R6.0 |
| 25       | 45  | 125 | Square | OP51M-25045R0.0 |
| 25       | 45  | 125 | R0.5   | OP51M-25045R0.5 |
| 25       | 45  | 125 | R1.0   | OP51M-25045R1.0 |
| 25       | 45  | 125 | R1.5   | OP51M-25045R1.5 |
| 25       | 45  | 125 | R2.0   | OP51M-25045R2.0 |
| 25       | 45  | 125 | R3.0   | OP51M-25045R3.0 |
| 25       | 45  | 125 | R4.5   | OP51M-25045R4.5 |
| 25       | 45  | 125 | R6.0   | OP51M-25045R6.0 |

## 5 FLUTE - REGULAR - CHIP BREAKER



OP51C

CHIP BREAKER INCH

| DIAMETER | LOC   | OAL | RAD    | ITEM#          |
|----------|-------|-----|--------|----------------|
| 3/16     | 9/16  | 3   | Square | OP51-1209R000C |
| 3/16     | 9/16  | 3   | R.015  | OP51-1209R015C |
| 3/16     | 9/16  | 3   | R.030  | OP51-1209R030C |
| 3/16     | 9/16  | 3   | R.060  | OP51-1209R060C |
| 1/4      | 3/4   | 3   | Square | OP51-1612R000C |
| 1/4      | 3/4   | 3   | R.015  | OP51-1612R015C |
| 1/4      | 3/4   | 3   | R.030  | OP51-1612R030C |
| 1/4      | 3/4   | 3   | R.060  | OP51-1612R060C |
| 1/4      | 3/4   | 3   | R.090  | OP51-1612R090C |
| 5/16     | 13/16 | 3   | Square | OP51-2013R000C |
| 5/16     | 13/16 | 3   | R.015  | OP51-2013R015C |
| 5/16     | 13/16 | 3   | R.030  | OP51-2013R030C |
| 5/16     | 13/16 | 3   | R.060  | OP51-2013R060C |
| 5/16     | 13/16 | 3   | R.090  | OP51-2013R090C |
| 5/16     | 13/16 | 3   | R.125  | OP51-2013R125C |
| 3/8      | 1     | 3   | Square | OP51-2416R000C |
| 3/8      | 1     | 3   | R.015  | OP51-2416R015C |
| 3/8      | 1     | 3   | R.030  | OP51-2416R030C |
| 3/8      | 1     | 3   | R.060  | OP51-2416R060C |
| 3/8      | 1     | 3   | R.090  | OP51-2416R090C |
| 3/8      | 1     | 3   | R.125  | OP51-2416R125C |
| 7/16     | 1     | 3   | Square | OP51-2816R000C |
| 7/16     | 1     | 3   | R.015  | OP51-2816R015C |
| 7/16     | 1     | 3   | R.030  | OP51-2816R030C |
| 7/16     | 1     | 3   | R.060  | OP51-2816R060C |
| 7/16     | 1     | 3   | R.090  | OP51-2816R090C |
| 7/16     | 1     | 3   | R.125  | OP51-2816R125C |
| 7/16     | 1     | 3   | R.190  | OP51-2816R190C |
| 1/2      | 1 1/4 | 3   | Square | OP51-3220R000C |
| 1/2      | 1 1/4 | 3   | R.015  | OP51-3220R015C |

| DIAMETER | LOC   | OAL | RAD    | ITEM#          |
|----------|-------|-----|--------|----------------|
| 1/2      | 1 1/4 | 3   | R.030  | OP51-3220R030C |
| 1/2      | 1 1/4 | 3   | R.060  | OP51-3220R060C |
| 1/2      | 1 1/4 | 3   | R.090  | OP51-3220R090C |
| 1/2      | 1 1/4 | 3   | R.125  | OP51-3220R125C |
| 1/2      | 1 1/4 | 3   | R.190  | OP51-3220R190C |
| 5/8      | 1 5/8 | 4   | Square | OP51-4026R000C |
| 5/8      | 1 5/8 | 4   | R.015  | OP51-4026R015C |
| 5/8      | 1 5/8 | 4   | R.030  | OP51-4026R030C |
| 5/8      | 1 5/8 | 4   | R.060  | OP51-4026R060C |
| 5/8      | 1 5/8 | 4   | R.090  | OP51-4026R090C |
| 5/8      | 1 5/8 | 4   | R.125  | OP51-4026R125C |
| 5/8      | 1 5/8 | 4   | R.190  | OP51-4026R190C |
| 5/8      | 1 5/8 | 4   | R.250  | OP51-4026R250C |
| 3/4      | 1 5/8 | 4   | Square | OP51-4826R000C |
| 3/4      | 1 5/8 | 4   | R.015  | OP51-4826R015C |
| 3/4      | 1 5/8 | 4   | R.030  | OP51-4826R030C |
| 3/4      | 1 5/8 | 4   | R.060  | OP51-4826R060C |
| 3/4      | 1 5/8 | 4   | R.090  | OP51-4826R090C |
| 3/4      | 1 5/8 | 4   | R.125  | OP51-4826R125C |
| 3/4      | 1 5/8 | 4   | R.190  | OP51-4826R190C |
| 3/4      | 1 5/8 | 4   | R.250  | OP51-4826R250C |
| 1        | 1 3/4 | 5   | Square | OP51-6428R000C |
| 1        | 1 3/4 | 5   | R.015  | OP51-6428R015C |
| 1        | 1 3/4 | 5   | R.030  | OP51-6428R030C |
| 1        | 1 3/4 | 5   | R.060  | OP51-6428R060C |
| 1        | 1 3/4 | 5   | R.090  | OP51-6428R090C |
| 1        | 1 3/4 | 5   | R.125  | OP51-6428R125C |
| 1        | 1 3/4 | 5   | R.190  | OP51-6428R190C |
| 1        | 1 3/4 | 5   | R.250  | OP51-6428R250C |



## 5 FLUTE - REGULAR - CHIP BREAKER



OP51MC

CHIP BREAKER METRIC

| DIAMETER | LOC | OAL | RAD    | ITEM#            |
|----------|-----|-----|--------|------------------|
| 5        | 14  | 75  | Square | OP51M-05014R0.0C |
| 5        | 14  | 75  | R0.5   | OP51M-05014R0.5C |
| 5        | 14  | 75  | R1.0   | OP51M-05014R1.0C |
| 5        | 14  | 75  | R1.5   | OP51M-05014R1.5C |
| 6        | 20  | 75  | Square | OP51M-06020R0.0C |
| 6        | 20  | 75  | R0.5   | OP51M-06020R0.5C |
| 6        | 20  | 75  | R1.0   | OP51M-06020R1.0C |
| 6        | 20  | 75  | R1.5   | OP51M-06020R1.5C |
| 6        | 20  | 75  | R2.0   | OP51M-06020R2.0C |
| 8        | 21  | 75  | Square | OP51M-08021R0.0C |
| 8        | 21  | 75  | R0.5   | OP51M-08021R0.5C |
| 8        | 21  | 75  | R1.0   | OP51M-08021R1.0C |
| 8        | 21  | 75  | R1.5   | OP51M-08021R1.5C |
| 8        | 21  | 75  | R2.0   | OP51M-08021R2.0C |
| 8        | 21  | 75  | R3.0   | OP51M-08021R3.0C |
| 10       | 25  | 75  | Square | OP51M-10025R0.0C |
| 10       | 25  | 75  | R0.5   | OP51M-10025R0.5C |
| 10       | 25  | 75  | R1.0   | OP51M-10025R1.0C |
| 10       | 25  | 75  | R1.5   | OP51M-10025R1.5C |
| 10       | 25  | 75  | R2.0   | OP51M-10025R2.0C |
| 10       | 25  | 75  | R3.0   | OP51M-10025R3.0C |
| 11       | 25  | 75  | Square | OP51M-11025R0.0C |
| 11       | 25  | 75  | R0.5   | OP51M-11025R0.5C |
| 11       | 25  | 75  | R1.0   | OP51M-11025R1.0C |
| 11       | 25  | 75  | R1.5   | OP51M-11025R1.5C |
| 11       | 25  | 75  | R2.0   | OP51M-11025R2.0C |
| 11       | 25  | 75  | R3.0   | OP51M-11025R3.0C |
| 11       | 25  | 75  | R4.5   | OP51M-11025R4.5C |
| 12       | 32  | 75  | Square | OP51M-12032R0.0C |
| 12       | 32  | 75  | R0.5   | OP51M-12032R0.5C |

| DIAMETER | LOC | OAL | RAD    | ITEM#            |
|----------|-----|-----|--------|------------------|
| 12       | 32  | 75  | R1.0   | OP51M-12032R1.0C |
| 12       | 32  | 75  | R1.5   | OP51M-12032R1.5C |
| 12       | 32  | 75  | R2.0   | OP51M-12032R2.0C |
| 12       | 32  | 75  | R3.0   | OP51M-12032R3.0C |
| 12       | 32  | 75  | R4.5   | OP51M-12032R4.5C |
| 16       | 41  | 100 | Square | OP51M-16041R0.0C |
| 16       | 41  | 100 | R0.5   | OP51M-16041R0.5C |
| 16       | 41  | 100 | R1.0   | OP51M-16041R1.0C |
| 16       | 41  | 100 | R1.5   | OP51M-16041R1.5C |
| 16       | 41  | 100 | R2.0   | OP51M-16041R2.0C |
| 16       | 41  | 100 | R3.0   | OP51M-16041R3.0C |
| 16       | 41  | 100 | R4.5   | OP51M-16041R4.5C |
| 16       | 41  | 100 | R6.0   | OP51M-16041R6.0C |
| 20       | 41  | 100 | Square | OP51M-20041R0.0C |
| 20       | 41  | 100 | R0.5   | OP51M-20041R0.5C |
| 20       | 41  | 100 | R1.0   | OP51M-20041R1.0C |
| 20       | 41  | 100 | R1.5   | OP51M-20041R1.5C |
| 20       | 41  | 100 | R2.0   | OP51M-20041R2.0C |
| 20       | 41  | 100 | R3.0   | OP51M-20041R3.0C |
| 20       | 41  | 100 | R4.5   | OP51M-20041R4.5C |
| 20       | 41  | 100 | R6.0   | OP51M-20041R6.0C |
| 25       | 45  | 125 | Square | OP51M-25045R0.0C |
| 25       | 45  | 125 | R0.5   | OP51M-25045R0.5C |
| 25       | 45  | 125 | R1.0   | OP51M-25045R1.0C |
| 25       | 45  | 125 | R1.5   | OP51M-25045R1.5C |
| 25       | 45  | 125 | R2.0   | OP51M-25045R2.0C |
| 25       | 45  | 125 | R3.0   | OP51M-25045R3.0C |
| 25       | 45  | 125 | R4.5   | OP51M-25045R4.5C |
| 25       | 45  | 125 | R6.0   | OP51M-25045R6.0C |



## 5 FLUTE - LONG



OP52

LONG INCH

| DIAMETER | LOC   | OAL | RAD    | ITEM#         |
|----------|-------|-----|--------|---------------|
| 1/4      | 1 1/8 | 3   | Square | OP52-1618R000 |
| 1/4      | 1 1/8 | 3   | R.015  | OP52-1618R015 |
| 1/4      | 1 1/8 | 3   | R.030  | OP52-1618R030 |
| 1/4      | 1 1/8 | 3   | R.060  | OP52-1618R060 |
| 1/4      | 1 1/8 | 3   | R.090  | OP52-1618R090 |
| 5/16     | 1 1/8 | 3   | Square | OP52-2018R000 |
| 5/16     | 1 1/8 | 3   | R.015  | OP52-2018R015 |
| 5/16     | 1 1/8 | 3   | R.030  | OP52-2018R030 |
| 5/16     | 1 1/8 | 3   | R.060  | OP52-2018R060 |
| 5/16     | 1 1/8 | 3   | R.090  | OP52-2018R090 |
| 5/16     | 1 1/8 | 3   | R.125  | OP52-2018R125 |
| 3/8      | 1 1/4 | 3   | Square | OP52-2420R000 |
| 3/8      | 1 1/4 | 3   | R.015  | OP52-2420R015 |
| 3/8      | 1 1/4 | 3   | R.030  | OP52-2420R030 |
| 3/8      | 1 1/4 | 3   | R.060  | OP52-2420R060 |
| 3/8      | 1 1/4 | 3   | R.090  | OP52-2420R090 |
| 3/8      | 1 1/4 | 3   | R.125  | OP52-2420R125 |
| 7/16     | 2     | 4   | Square | OP52-2832R000 |
| 7/16     | 2     | 4   | R.015  | OP52-2832R015 |
| 7/16     | 2     | 4   | R.030  | OP52-2832R030 |
| 7/16     | 2     | 4   | R.060  | OP52-2832R060 |
| 7/16     | 2     | 4   | R.090  | OP52-2832R090 |
| 7/16     | 2     | 4   | R.125  | OP52-2832R125 |
| 7/16     | 2     | 4   | R.190  | OP52-2832R190 |
| 1/2      | 2     | 4   | Square | OP52-3232R000 |
| 1/2      | 2     | 4   | R.015  | OP52-3232R015 |
| 1/2      | 2     | 4   | R.030  | OP52-3232R030 |
| 1/2      | 2     | 4   | R.060  | OP52-3232R060 |
| 1/2      | 2     | 4   | R.090  | OP52-3232R090 |
| 1/2      | 2     | 4   | R.125  | OP52-3232R125 |

| DIAMETER | LOC   | OAL | RAD    | ITEM#         |
|----------|-------|-----|--------|---------------|
| 1/2      | 2     | 4   | R.190  | OP52-3232R190 |
| 5/8      | 2 1/4 | 5   | Square | OP52-4036R000 |
| 5/8      | 2 1/4 | 5   | R.015  | OP52-4036R015 |
| 5/8      | 2 1/4 | 5   | R.030  | OP52-4036R030 |
| 5/8      | 2 1/4 | 5   | R.060  | OP52-4036R060 |
| 5/8      | 2 1/4 | 5   | R.090  | OP52-4036R090 |
| 5/8      | 2 1/4 | 5   | R.125  | OP52-4036R125 |
| 5/8      | 2 1/4 | 5   | R.190  | OP52-4036R190 |
| 5/8      | 2 1/4 | 5   | R.250  | OP52-4036R250 |
| 3/4      | 2 5/8 | 5   | Square | OP52-4842R000 |
| 3/4      | 2 5/8 | 5   | R.015  | OP52-4842R015 |
| 3/4      | 2 5/8 | 5   | R.030  | OP52-4842R030 |
| 3/4      | 2 5/8 | 5   | R.060  | OP52-4842R060 |
| 3/4      | 2 5/8 | 5   | R.090  | OP52-4842R090 |
| 3/4      | 2 5/8 | 5   | R.125  | OP52-4842R125 |
| 3/4      | 2 5/8 | 5   | R.190  | OP52-4842R190 |
| 3/4      | 2 5/8 | 5   | R.250  | OP52-4842R250 |
| 1        | 3     | 6   | Square | OP52-6448R000 |
| 1        | 3     | 6   | R.015  | OP52-6448R015 |
| 1        | 3     | 6   | R.030  | OP52-6448R030 |
| 1        | 3     | 6   | R.060  | OP52-6448R060 |
| 1        | 3     | 6   | R.090  | OP52-6448R090 |
| 1        | 3     | 6   | R.125  | OP52-6448R125 |
| 1        | 3     | 6   | R.190  | OP52-6448R190 |
| 1        | 3     | 6   | R.250  | OP52-6448R250 |

## 5 FLUTE - LONG



OP52M

LONG METRIC

| DIAMETER | LOC | OAL | RAD    | ITEM#           |
|----------|-----|-----|--------|-----------------|
| 6        | 29  | 75  | Square | OP52M-06029R0.0 |
| 6        | 29  | 75  | R0.5   | OP52M-06029R0.5 |
| 6        | 29  | 75  | R1.0   | OP52M-06029R1.0 |
| 6        | 29  | 75  | R1.5   | OP52M-06029R1.5 |
| 6        | 29  | 75  | R2.0   | OP52M-06029R2.0 |
| 8        | 29  | 75  | Square | OP52M-08029R0.0 |
| 8        | 29  | 75  | R0.5   | OP52M-08029R0.5 |
| 8        | 29  | 75  | R1.0   | OP52M-08029R1.0 |
| 8        | 29  | 75  | R1.5   | OP52M-08029R1.5 |
| 8        | 29  | 75  | R2.0   | OP52M-08029R2.0 |
| 8        | 29  | 75  | R3.0   | OP52M-08029R3.0 |
| 10       | 32  | 75  | Square | OP52M-10032R0.0 |
| 10       | 32  | 75  | R0.5   | OP52M-10032R0.5 |
| 10       | 32  | 75  | R1.0   | OP52M-10032R1.0 |
| 10       | 32  | 75  | R1.5   | OP52M-10032R1.5 |
| 10       | 32  | 75  | R2.0   | OP52M-10032R2.0 |
| 10       | 32  | 75  | R3.0   | OP52M-10032R3.0 |
| 11       | 50  | 100 | Square | OP52M-11050R0.0 |
| 11       | 50  | 100 | R0.5   | OP52M-11050R0.5 |
| 11       | 50  | 100 | R1.0   | OP52M-11050R1.0 |
| 11       | 50  | 100 | R1.5   | OP52M-11050R1.5 |
| 11       | 50  | 100 | R2.0   | OP52M-11050R2.0 |
| 11       | 50  | 100 | R3.0   | OP52M-11050R3.0 |
| 11       | 50  | 100 | R4.5   | OP52M-11050R4.5 |
| 12       | 50  | 100 | Square | OP52M-12050R0.0 |
| 12       | 50  | 100 | R0.5   | OP52M-12050R0.5 |
| 12       | 50  | 100 | R1.0   | OP52M-12050R1.0 |
| 12       | 50  | 100 | R1.5   | OP52M-12050R1.5 |
| 12       | 50  | 100 | R2.0   | OP52M-12050R2.0 |
| 12       | 50  | 100 | R3.0   | OP52M-12050R3.0 |

| DIAMETER | LOC | OAL | RAD    | ITEM#           |
|----------|-----|-----|--------|-----------------|
| 12       | 50  | 100 | R4.5   | OP52M-12050R4.5 |
| 16       | 57  | 125 | Square | OP52M-16057R0.0 |
| 16       | 57  | 125 | R0.5   | OP52M-16057R0.5 |
| 16       | 57  | 125 | R1.0   | OP52M-16057R1.0 |
| 16       | 57  | 125 | R1.5   | OP52M-16057R1.5 |
| 16       | 57  | 125 | R2.0   | OP52M-16057R2.0 |
| 16       | 57  | 125 | R3.0   | OP52M-16057R3.0 |
| 16       | 57  | 125 | R4.5   | OP52M-16057R4.5 |
| 16       | 57  | 125 | R6.0   | OP52M-16057R6.0 |
| 20       | 67  | 125 | Square | OP52M-20067R0.0 |
| 20       | 67  | 125 | R0.5   | OP52M-20067R0.5 |
| 20       | 67  | 125 | R1.0   | OP52M-20067R1.0 |
| 20       | 67  | 125 | R1.5   | OP52M-20067R1.5 |
| 20       | 67  | 125 | R2.0   | OP52M-20067R2.0 |
| 20       | 67  | 125 | R3.0   | OP52M-20067R3.0 |
| 20       | 67  | 125 | R4.5   | OP52M-20067R4.5 |
| 20       | 67  | 125 | R6.0   | OP52M-20067R6.0 |
| 25       | 76  | 150 | Square | OP52M-25076R0.0 |
| 25       | 76  | 150 | R0.5   | OP52M-25076R0.5 |
| 25       | 76  | 150 | R1.0   | OP52M-25076R1.0 |
| 25       | 76  | 150 | R1.5   | OP52M-25076R1.5 |
| 25       | 76  | 150 | R2.0   | OP52M-25076R2.0 |
| 25       | 76  | 150 | R3.0   | OP52M-25076R3.0 |
| 25       | 76  | 150 | R4.5   | OP52M-25076R4.5 |
| 25       | 76  | 150 | R6.0   | OP52M-25076R6.0 |

## 5 FLUTE - LONG - CHIP BREAKER



OP52C

LONG CHIP BREAKER INCH

| DIAMETER | LOC   | OAL | RAD    | ITEM#          |
|----------|-------|-----|--------|----------------|
| 1/4      | 1 1/8 | 3   | Square | OP52-1618R000C |
| 1/4      | 1 1/8 | 3   | R.015  | OP52-1618R015C |
| 1/4      | 1 1/8 | 3   | R.030  | OP52-1618R030C |
| 1/4      | 1 1/8 | 3   | R.060  | OP52-1618R060C |
| 1/4      | 1 1/8 | 3   | R.090  | OP52-1618R090C |
| 5/16     | 1 1/8 | 3   | Square | OP52-2018R000C |
| 5/16     | 1 1/8 | 3   | R.015  | OP52-2018R015C |
| 5/16     | 1 1/8 | 3   | R.030  | OP52-2018R030C |
| 5/16     | 1 1/8 | 3   | R.060  | OP52-2018R060C |
| 5/16     | 1 1/8 | 3   | R.090  | OP52-2018R090C |
| 5/16     | 1 1/8 | 3   | R.125  | OP52-2018R125C |
| 3/8      | 1 1/4 | 3   | Square | OP52-2420R000C |
| 3/8      | 1 1/4 | 3   | R.015  | OP52-2420R015C |
| 3/8      | 1 1/4 | 3   | R.030  | OP52-2420R030C |
| 3/8      | 1 1/4 | 3   | R.060  | OP52-2420R060C |
| 3/8      | 1 1/4 | 3   | R.090  | OP52-2420R090C |
| 3/8      | 1 1/4 | 3   | R.125  | OP52-2420R125C |
| 7/16     | 2     | 4   | Square | OP52-2832R000C |
| 7/16     | 2     | 4   | R.015  | OP52-2832R015C |
| 7/16     | 2     | 4   | R.030  | OP52-2832R030C |
| 7/16     | 2     | 4   | R.060  | OP52-2832R060C |
| 7/16     | 2     | 4   | R.090  | OP52-2832R090C |
| 7/16     | 2     | 4   | R.125  | OP52-2832R125C |
| 7/16     | 2     | 4   | R.190  | OP52-2832R190C |
| 1/2      | 2     | 4   | Square | OP52-3232R000C |
| 1/2      | 2     | 4   | R.015  | OP52-3232R015C |
| 1/2      | 2     | 4   | R.030  | OP52-3232R030C |
| 1/2      | 2     | 4   | R.060  | OP52-3232R060C |
| 1/2      | 2     | 4   | R.090  | OP52-3232R090C |
| 1/2      | 2     | 4   | R.125  | OP52-3232R125C |

| DIAMETER | LOC   | OAL | RAD    | ITEM#          |
|----------|-------|-----|--------|----------------|
| 1/2      | 2     | 4   | R.190  | OP52-3232R190C |
| 5/8      | 2 1/4 | 5   | Square | OP52-4036R000C |
| 5/8      | 2 1/4 | 5   | R.015  | OP52-4036R015C |
| 5/8      | 2 1/4 | 5   | R.030  | OP52-4036R030C |
| 5/8      | 2 1/4 | 5   | R.060  | OP52-4036R060C |
| 5/8      | 2 1/4 | 5   | R.090  | OP52-4036R090C |
| 5/8      | 2 1/4 | 5   | R.125  | OP52-4036R125C |
| 5/8      | 2 1/4 | 5   | R.190  | OP52-4036R190C |
| 5/8      | 2 1/4 | 5   | R.250  | OP52-4036R250C |
| 3/4      | 2 5/8 | 5   | Square | OP52-4842R000C |
| 3/4      | 2 5/8 | 5   | R.015  | OP52-4842R015C |
| 3/4      | 2 5/8 | 5   | R.030  | OP52-4842R030C |
| 3/4      | 2 5/8 | 5   | R.060  | OP52-4842R060C |
| 3/4      | 2 5/8 | 5   | R.090  | OP52-4842R090C |
| 3/4      | 2 5/8 | 5   | R.125  | OP52-4842R125C |
| 3/4      | 2 5/8 | 5   | R.190  | OP52-4842R190C |
| 3/4      | 2 5/8 | 5   | R.250  | OP52-4842R250C |
| 1        | 3     | 6   | Square | OP52-6448R000C |
| 1        | 3     | 6   | R.015  | OP52-6448R015C |
| 1        | 3     | 6   | R.030  | OP52-6448R030C |
| 1        | 3     | 6   | R.060  | OP52-6448R060C |
| 1        | 3     | 6   | R.090  | OP52-6448R090C |
| 1        | 3     | 6   | R.125  | OP52-6448R125C |
| 1        | 3     | 6   | R.190  | OP52-6448R190C |
| 1        | 3     | 6   | R.250  | OP52-6448R250C |



## 5 FLUTE - LONG - CHIP BREAKER



OP52MC

LONG CHIP BREAKER METRIC

| DIAMETER | LOC | OAL | RAD    | ITEM#            |
|----------|-----|-----|--------|------------------|
| 6        | 29  | 75  | Square | OP52M-06029R0.0C |
| 6        | 29  | 75  | R0.5   | OP52M-06029R0.5C |
| 6        | 29  | 75  | R1.0   | OP52M-06029R1.0C |
| 6        | 29  | 75  | R1.5   | OP52M-06029R1.5C |
| 6        | 29  | 75  | R2.0   | OP52M-06029R2.0C |
| 8        | 29  | 75  | Square | OP52M-08029R0.0C |
| 8        | 29  | 75  | R0.5   | OP52M-08029R0.5C |
| 8        | 29  | 75  | R1.0   | OP52M-08029R1.0C |
| 8        | 29  | 75  | R1.5   | OP52M-08029R1.5C |
| 8        | 29  | 75  | R2.0   | OP52M-08029R2.0C |
| 8        | 29  | 75  | R3.0   | OP52M-08029R3.0C |
| 10       | 32  | 75  | Square | OP52M-10032R0.0C |
| 10       | 32  | 75  | R0.5   | OP52M-10032R0.5C |
| 10       | 32  | 75  | R1.0   | OP52M-10032R1.0C |
| 10       | 32  | 75  | R1.5   | OP52M-10032R1.5C |
| 10       | 32  | 75  | R2.0   | OP52M-10032R2.0C |
| 10       | 32  | 75  | R3.0   | OP52M-10032R3.0C |
| 11       | 50  | 100 | Square | OP52M-11050R0.0C |
| 11       | 50  | 100 | R0.5   | OP52M-11050R0.5C |
| 11       | 50  | 100 | R1.0   | OP52M-11050R1.0C |
| 11       | 50  | 100 | R1.5   | OP52M-11050R1.5C |
| 11       | 50  | 100 | R2.0   | OP52M-11050R2.0C |
| 11       | 50  | 100 | R3.0   | OP52M-11050R3.0C |
| 11       | 50  | 100 | R4.5   | OP52M-11050R4.5C |
| 12       | 50  | 100 | Square | OP52M-12050R0.0C |
| 12       | 50  | 100 | R0.5   | OP52M-12050R0.5C |
| 12       | 50  | 100 | R1.0   | OP52M-12050R1.0C |
| 12       | 50  | 100 | R1.5   | OP52M-12050R1.5C |
| 12       | 50  | 100 | R2.0   | OP52M-12050R2.0C |
| 12       | 50  | 100 | R3.0   | OP52M-12050R3.0C |

| DIAMETER | LOC | OAL | RAD    | ITEM#            |
|----------|-----|-----|--------|------------------|
| 12       | 50  | 100 | R4.5   | OP52M-12050R4.5C |
| 16       | 57  | 125 | Square | OP52M-16057R0.0C |
| 16       | 57  | 125 | R0.5   | OP52M-16057R0.5C |
| 16       | 57  | 125 | R1.0   | OP52M-16057R1.0C |
| 16       | 57  | 125 | R1.5   | OP52M-16057R1.5C |
| 16       | 57  | 125 | R2.0   | OP52M-16057R2.0C |
| 16       | 57  | 125 | R3.0   | OP52M-16057R3.0C |
| 16       | 57  | 125 | R4.5   | OP52M-16057R4.5C |
| 16       | 57  | 125 | R6.0   | OP52M-16057R6.0C |
| 20       | 67  | 125 | Square | OP52M-20067R0.0C |
| 20       | 67  | 125 | R0.5   | OP52M-20067R0.5C |
| 20       | 67  | 125 | R1.0   | OP52M-20067R1.0C |
| 20       | 67  | 125 | R1.5   | OP52M-20067R1.5C |
| 20       | 67  | 125 | R2.0   | OP52M-20067R2.0C |
| 20       | 67  | 125 | R3.0   | OP52M-20067R3.0C |
| 20       | 67  | 125 | R4.5   | OP52M-20067R4.5C |
| 20       | 67  | 125 | R6.0   | OP52M-20067R6.0C |
| 25       | 76  | 150 | Square | OP52M-25076R0.0C |
| 25       | 76  | 150 | R0.5   | OP52M-25076R0.5C |
| 25       | 76  | 150 | R1.0   | OP52M-25076R1.0C |
| 25       | 76  | 150 | R1.5   | OP52M-25076R1.5C |
| 25       | 76  | 150 | R2.0   | OP52M-25076R2.0C |
| 25       | 76  | 150 | R3.0   | OP52M-25076R3.0C |
| 25       | 76  | 150 | R4.5   | OP52M-25076R4.5C |
| 25       | 76  | 150 | R6.0   | OP52M-25076R6.0C |



## 5 FLUTE - STUB - OVERSIZED SHANK



OP59

OVERSIZED SHANK INCH

| DIAMETER | SHANK | LOC  | OAL | RAD    | ITEM#         |
|----------|-------|------|-----|--------|---------------|
| 3/16     | 1/4   | 3/8  | 3   | Square | OP59-1206R000 |
| 3/16     | 1/4   | 3/8  | 3   | R.015  | OP59-1206R015 |
| 3/16     | 1/4   | 3/8  | 3   | R.030  | OP59-1206R030 |
| 3/16     | 1/4   | 3/8  | 3   | R.060  | OP59-1206R060 |
| 1/4      | 3/8   | 3/8  | 3   | Square | OP59-1606R000 |
| 1/4      | 3/8   | 3/8  | 3   | R.015  | OP59-1606R015 |
| 1/4      | 3/8   | 3/8  | 3   | R.030  | OP59-1606R030 |
| 1/4      | 3/8   | 3/8  | 3   | R.060  | OP59-1606R060 |
| 1/4      | 3/8   | 3/8  | 3   | R.090  | OP59-1606R090 |
| 5/16     | 3/8   | 7/16 | 3   | Square | OP59-2007R000 |
| 5/16     | 3/8   | 7/16 | 3   | R.015  | OP59-2007R015 |
| 5/16     | 3/8   | 7/16 | 3   | R.030  | OP59-2007R030 |
| 5/16     | 3/8   | 7/16 | 3   | R.060  | OP59-2007R060 |
| 5/16     | 3/8   | 7/16 | 3   | R.090  | OP59-2007R090 |
| 5/16     | 3/8   | 7/16 | 3   | R.125  | OP59-2007R125 |
| 3/8      | 1/2   | 1/2  | 3   | Square | OP59-2408R000 |
| 3/8      | 1/2   | 1/2  | 3   | R.015  | OP59-2408R015 |
| 3/8      | 1/2   | 1/2  | 3   | R.030  | OP59-2408R030 |
| 3/8      | 1/2   | 1/2  | 3   | R.060  | OP59-2408R060 |
| 3/8      | 1/2   | 1/2  | 3   | R.090  | OP59-2408R090 |
| 3/8      | 1/2   | 1/2  | 3   | R.125  | OP59-2408R125 |

## 5 FLUTE - STUB - OVERSIZED SHANK



OP59M

OVERSIZED SHANK METRIC

| DIAMETER | SHANK | LOC | OAL | RAD    | ITEM#           |
|----------|-------|-----|-----|--------|-----------------|
| 5        | 6     | 10  | 75  | Square | OP59M-05010R0.0 |
| 5        | 6     | 10  | 75  | R0.5   | OP59M-05010R0.5 |
| 5        | 6     | 10  | 75  | R1.0   | OP59M-05010R1.0 |
| 5        | 6     | 10  | 75  | R1.5   | OP59M-05010R1.5 |
| 6        | 10    | 10  | 75  | Square | OP59M-06010R0.0 |
| 6        | 10    | 10  | 75  | R0.5   | OP59M-06010R0.5 |
| 6        | 10    | 10  | 75  | R1.0   | OP59M-06010R1.0 |
| 6        | 10    | 10  | 75  | R1.5   | OP59M-06010R1.5 |
| 6        | 10    | 10  | 75  | R2.0   | OP59M-06010R2.0 |
| 8        | 10    | 11  | 75  | Square | OP59M-08011R0.0 |
| 8        | 10    | 11  | 75  | R0.5   | OP59M-08011R0.5 |
| 8        | 10    | 11  | 75  | R1.0   | OP59M-08011R1.0 |
| 8        | 10    | 11  | 75  | R1.5   | OP59M-08011R1.5 |
| 8        | 10    | 11  | 75  | R2.0   | OP59M-08011R2.0 |
| 8        | 10    | 11  | 75  | R3.0   | OP59M-08011R3.0 |
| 10       | 12    | 12  | 75  | Square | OP59M-10012R0.0 |
| 10       | 12    | 12  | 75  | R0.5   | OP59M-10012R0.5 |
| 10       | 12    | 12  | 75  | R1.0   | OP59M-10012R1.0 |
| 10       | 12    | 12  | 75  | R1.5   | OP59M-10012R1.5 |
| 10       | 12    | 12  | 75  | R2.0   | OP59M-10012R2.0 |
| 10       | 12    | 12  | 75  | R3.0   | OP59M-10012R3.0 |

## 5 FLUTE - STUB - OVERSIZED SHANK - CHIP BREAKER



OP59C

OVERSIZED SHANK CHIP BREAKER INCH

| DIAMETER | SHANK | LOC  | OAL | RAD    | ITEM#          |
|----------|-------|------|-----|--------|----------------|
| 3/16     | 1/4   | 3/8  | 3   | Square | OP59-1206R000C |
| 3/16     | 1/4   | 3/8  | 3   | R.015  | OP59-1206R015C |
| 3/16     | 1/4   | 3/8  | 3   | R.030  | OP59-1206R030C |
| 3/16     | 1/4   | 3/8  | 3   | R.060  | OP59-1206R060C |
| 1/4      | 3/8   | 3/8  | 3   | Square | OP59-1606R000C |
| 1/4      | 3/8   | 3/8  | 3   | R.015  | OP59-1606R015C |
| 1/4      | 3/8   | 3/8  | 3   | R.030  | OP59-1606R030C |
| 1/4      | 3/8   | 3/8  | 3   | R.060  | OP59-1606R060C |
| 1/4      | 3/8   | 3/8  | 3   | R.090  | OP59-1606R090C |
| 5/16     | 3/8   | 7/16 | 3   | Square | OP59-2007R000C |
| 5/16     | 3/8   | 7/16 | 3   | R.015  | OP59-2007R015C |
| 5/16     | 3/8   | 7/16 | 3   | R.030  | OP59-2007R030C |
| 5/16     | 3/8   | 7/16 | 3   | R.060  | OP59-2007R060C |
| 5/16     | 3/8   | 7/16 | 3   | R.090  | OP59-2007R090C |
| 5/16     | 3/8   | 7/16 | 3   | R.125  | OP59-2007R125C |
| 3/8      | 1/2   | 1/2  | 3   | Square | OP59-2408R000C |
| 3/8      | 1/2   | 1/2  | 3   | R.015  | OP59-2408R015C |
| 3/8      | 1/2   | 1/2  | 3   | R.030  | OP59-2408R030C |
| 3/8      | 1/2   | 1/2  | 3   | R.060  | OP59-2408R060C |
| 3/8      | 1/2   | 1/2  | 3   | R.090  | OP59-2408R090C |
| 3/8      | 1/2   | 1/2  | 3   | R.125  | OP59-2408R125C |

## 5 FLUTE - STUB - OVERSIZED SHANK - CHIP BREAKER



OP59MC

OVERSIZED SHANK CHIP BREAKER METRIC

| DIAMETER | SHANK | LOC | OAL | RAD    | ITEM#            |
|----------|-------|-----|-----|--------|------------------|
| 5        | 6     | 10  | 75  | Square | OP59M-05010R0.0C |
| 5        | 6     | 10  | 75  | R0.5   | OP59M-05010R0.5C |
| 5        | 6     | 10  | 75  | R1.0   | OP59M-05010R1.0C |
| 5        | 6     | 10  | 75  | R1.5   | OP59M-05010R1.5C |
| 6        | 10    | 10  | 75  | Square | OP59M-06010R0.0C |
| 6        | 10    | 10  | 75  | R0.5   | OP59M-06010R0.5C |
| 6        | 10    | 10  | 75  | R1.0   | OP59M-06010R1.0C |
| 6        | 10    | 10  | 75  | R1.5   | OP59M-06010R1.5C |
| 6        | 10    | 10  | 75  | R2.0   | OP59M-06010R2.0C |
| 8        | 10    | 11  | 75  | Square | OP59M-08011R0.0C |
| 8        | 10    | 11  | 75  | R0.5   | OP59M-08011R0.5C |
| 8        | 10    | 11  | 75  | R1.0   | OP59M-08011R1.0C |
| 8        | 10    | 11  | 75  | R1.5   | OP59M-08011R1.5C |
| 8        | 10    | 11  | 75  | R2.0   | OP59M-08011R2.0C |
| 8        | 10    | 11  | 75  | R3.0   | OP59M-08011R3.0C |
| 10       | 12    | 12  | 75  | Square | OP59M-10012R0.0C |
| 10       | 12    | 12  | 75  | R0.5   | OP59M-10012R0.5C |
| 10       | 12    | 12  | 75  | R1.0   | OP59M-10012R1.0C |
| 10       | 12    | 12  | 75  | R1.5   | OP59M-10012R1.5C |
| 10       | 12    | 12  | 75  | R2.0   | OP59M-10012R2.0C |
| 10       | 12    | 12  | 75  | R3.0   | OP59M-10012R3.0C |



# OPX5 HIGH PERFORMANCE

Best used for Stainless and HTSA (Heat-resistant superalloys)

## SPECIAL FEATURES

|                          |                                                                                                                            |
|--------------------------|----------------------------------------------------------------------------------------------------------------------------|
| <b>DUB</b>               | Strengthens the radius of the tool.                                                                                        |
| <b>VARIABLE HELIX</b>    | Breaks up harmonic vibrations (chatter) along the length and improves surface finish and tool life.                        |
| <b>nACRo PVD COATING</b> | Offers a higher cutting edge resistance to wear and higher heat tolerance.                                                 |
| <b>EDGE PREP</b>         | Makes the cutting edge of the tool more uniform, which help the tool to machine better and faster.                         |
| <b>TANGENTIAL RADIUS</b> | Allows a smooth blending radius on the machined part, improving the manufacturing times by avoiding the finishing process. |



## 5 FLUTE - EDGE PREP FOR EXOTIC ALLOYS

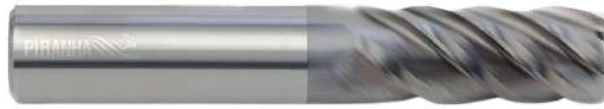


OPX5

STUB - REGULAR - LONG INCH

| DIAMETER | LOC   | OAL | RAD    | ITEM#         | DIAMETER | LOC   | OAL | RAD    | ITEM#         |
|----------|-------|-----|--------|---------------|----------|-------|-----|--------|---------------|
| 1/8      | 1/4   | 2   | Square | OPX5-0804R000 | 5/16     | 7/16  | 3   | R.090  | OPX5-2007R090 |
| 1/8      | 1/4   | 2   | R.015  | OPX5-0804R015 | 5/16     | 7/16  | 3   | R.125  | OPX5-2007R125 |
| 1/8      | 1/4   | 2   | R.030  | OPX5-0804R030 | 5/16     | 13/16 | 3   | Square | OPX5-2013R000 |
| 3/16     | 3/8   | 3   | Square | OPX5-1206R000 | 5/16     | 13/16 | 3   | R.015  | OPX5-2013R015 |
| 3/16     | 3/8   | 3   | R.015  | OPX5-1206R015 | 5/16     | 13/16 | 3   | R.030  | OPX5-2013R030 |
| 3/16     | 3/8   | 3   | R.030  | OPX5-1206R030 | 5/16     | 13/16 | 3   | R.060  | OPX5-2013R060 |
| 3/16     | 3/8   | 3   | R.060  | OPX5-1206R060 | 5/16     | 13/16 | 3   | R.090  | OPX5-2013R090 |
| 3/16     | 9/16  | 3   | Square | OPX5-1209R000 | 5/16     | 13/16 | 3   | R.125  | OPX5-2013R125 |
| 3/16     | 9/16  | 3   | R.015  | OPX5-1209R015 | 5/16     | 1 1/8 | 3   | Square | OPX5-2018R000 |
| 3/16     | 9/16  | 3   | R.030  | OPX5-1209R030 | 5/16     | 1 1/8 | 3   | R.015  | OPX5-2018R015 |
| 3/16     | 9/16  | 3   | R.060  | OPX5-1209R060 | 5/16     | 1 1/8 | 3   | R.030  | OPX5-2018R030 |
| 1/4      | 3/8   | 3   | Square | OPX5-1606R000 | 5/16     | 1 1/8 | 3   | R.060  | OPX5-2018R060 |
| 1/4      | 3/8   | 3   | R.015  | OPX5-1606R015 | 5/16     | 1 1/8 | 3   | R.090  | OPX5-2018R090 |
| 1/4      | 3/8   | 3   | R.030  | OPX5-1606R030 | 5/16     | 1 1/8 | 3   | R.125  | OPX5-2018R125 |
| 1/4      | 3/8   | 3   | R.060  | OPX5-1606R060 | 3/8      | 1/2   | 3   | Square | OPX5-2408R000 |
| 1/4      | 3/8   | 3   | R.090  | OPX5-1606R090 | 3/8      | 1/2   | 3   | R.015  | OPX5-2408R015 |
| 1/4      | 3/4   | 3   | Square | OPX5-1612R000 | 3/8      | 1/2   | 3   | R.030  | OPX5-2408R030 |
| 1/4      | 3/4   | 3   | R.015  | OPX5-1612R015 | 3/8      | 1/2   | 3   | R.060  | OPX5-2408R060 |
| 1/4      | 3/4   | 3   | R.030  | OPX5-1612R030 | 3/8      | 1/2   | 3   | R.090  | OPX5-2408R090 |
| 1/4      | 3/4   | 3   | R.060  | OPX5-1612R060 | 3/8      | 1/2   | 3   | R.125  | OPX5-2408R125 |
| 1/4      | 3/4   | 3   | R.090  | OPX5-1612R090 | 3/8      | 1     | 3   | Square | OPX5-2416R000 |
| 1/4      | 1 1/8 | 3   | Square | OPX5-1618R000 | 3/8      | 1     | 3   | R.015  | OPX5-2416R015 |
| 1/4      | 1 1/8 | 3   | R.015  | OPX5-1618R015 | 3/8      | 1     | 3   | R.030  | OPX5-2416R030 |
| 1/4      | 1 1/8 | 3   | R.030  | OPX5-1618R030 | 3/8      | 1     | 3   | R.060  | OPX5-2416R060 |
| 1/4      | 1 1/8 | 3   | R.060  | OPX5-1618R060 | 3/8      | 1     | 3   | R.090  | OPX5-2416R090 |
| 1/4      | 1 1/8 | 3   | R.090  | OPX5-1618R090 | 3/8      | 1     | 3   | R.125  | OPX5-2416R125 |
| 5/16     | 7/16  | 3   | Square | OPX5-2007R000 | 3/8      | 1 1/4 | 3   | Square | OPX5-2420R000 |
| 5/16     | 7/16  | 3   | R.015  | OPX5-2007R015 | 3/8      | 1 1/4 | 3   | R.015  | OPX5-2420R015 |
| 5/16     | 7/16  | 3   | R.030  | OPX5-2007R030 | 3/8      | 1 1/4 | 3   | R.030  | OPX5-2420R030 |
| 5/16     | 7/16  | 3   | R.060  | OPX5-2007R060 | 3/8      | 1 1/4 | 3   | R.060  | OPX5-2420R060 |

## 5 FLUTE - EDGE PREP FOR EXOTIC ALLOYS

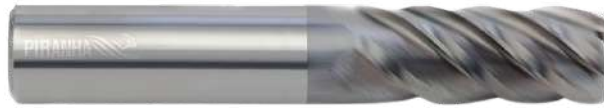


OPX5  
STUB - REGULAR - LONG INCH

| DIAMETER | LOC   | OAL | RAD    | ITEM#         |
|----------|-------|-----|--------|---------------|
| 3/8      | 1 1/4 | 3   | R.090  | OPX5-2420R090 |
| 3/8      | 1 1/4 | 3   | R.125  | OPX5-2420R125 |
| 7/16     | 5/8   | 3   | Square | OPX5-2810R000 |
| 7/16     | 5/8   | 3   | R.015  | OPX5-2810R015 |
| 7/16     | 5/8   | 3   | R.030  | OPX5-2810R030 |
| 7/16     | 5/8   | 3   | R.060  | OPX5-2810R060 |
| 7/16     | 5/8   | 3   | R.090  | OPX5-2810R090 |
| 7/16     | 5/8   | 3   | R.125  | OPX5-2810R125 |
| 7/16     | 5/8   | 3   | R.190  | OPX5-2810R190 |
| 7/16     | 1     | 3   | Square | OPX5-2816R000 |
| 7/16     | 1     | 3   | R.015  | OPX5-2816R015 |
| 7/16     | 1     | 3   | R.030  | OPX5-2816R030 |
| 7/16     | 1     | 3   | R.060  | OPX5-2816R060 |
| 7/16     | 1     | 3   | R.090  | OPX5-2816R090 |
| 7/16     | 1     | 3   | R.125  | OPX5-2816R125 |
| 7/16     | 1     | 3   | R.190  | OPX5-2816R190 |
| 7/16     | 2     | 4   | Square | OPX5-2832R000 |
| 7/16     | 2     | 4   | R.015  | OPX5-2832R015 |
| 7/16     | 2     | 4   | R.030  | OPX5-2832R030 |
| 7/16     | 2     | 4   | R.060  | OPX5-2832R060 |
| 7/16     | 2     | 4   | R.090  | OPX5-2832R090 |
| 7/16     | 2     | 4   | R.125  | OPX5-2832R125 |
| 7/16     | 2     | 4   | R.190  | OPX5-2832R190 |
| 1/2      | 5/8   | 3   | Square | OPX5-3210R000 |
| 1/2      | 5/8   | 3   | R.015  | OPX5-3210R015 |
| 1/2      | 5/8   | 3   | R.030  | OPX5-3210R030 |
| 1/2      | 5/8   | 3   | R.060  | OPX5-3210R060 |
| 1/2      | 5/8   | 3   | R.090  | OPX5-3210R090 |
| 1/2      | 5/8   | 3   | R.125  | OPX5-3210R125 |
| 1/2      | 5/8   | 3   | R.190  | OPX5-3210R190 |

| DIAMETER | LOC   | OAL | RAD    | ITEM#         |
|----------|-------|-----|--------|---------------|
| 1/2      | 1 1/4 | 3   | Square | OPX5-3220R000 |
| 1/2      | 1 1/4 | 3   | R.015  | OPX5-3220R015 |
| 1/2      | 1 1/4 | 3   | R.030  | OPX5-3220R030 |
| 1/2      | 1 1/4 | 3   | R.060  | OPX5-3220R060 |
| 1/2      | 1 1/4 | 3   | R.090  | OPX5-3220R090 |
| 1/2      | 1 1/4 | 3   | R.125  | OPX5-3220R125 |
| 1/2      | 1 1/4 | 3   | R.190  | OPX5-3220R190 |
| 1/2      | 2     | 4   | Square | OPX5-3232R000 |
| 1/2      | 2     | 4   | R.015  | OPX5-3232R015 |
| 1/2      | 2     | 4   | R.030  | OPX5-3232R030 |
| 1/2      | 2     | 4   | R.060  | OPX5-3232R060 |
| 1/2      | 2     | 4   | R.090  | OPX5-3232R090 |
| 1/2      | 2     | 4   | R.125  | OPX5-3232R125 |
| 1/2      | 2     | 4   | R.190  | OPX5-3232R190 |
| 5/8      | 3/4   | 4   | Square | OPX5-4012R000 |
| 5/8      | 3/4   | 4   | R.015  | OPX5-4012R015 |
| 5/8      | 3/4   | 4   | R.030  | OPX5-4012R030 |
| 5/8      | 3/4   | 4   | R.060  | OPX5-4012R060 |
| 5/8      | 3/4   | 4   | R.090  | OPX5-4012R090 |
| 5/8      | 3/4   | 4   | R.125  | OPX5-4012R125 |
| 5/8      | 3/4   | 4   | R.190  | OPX5-4012R190 |
| 5/8      | 3/4   | 4   | R.250  | OPX5-4012R250 |
| 5/8      | 1 5/8 | 4   | Square | OPX5-4026R000 |
| 5/8      | 1 5/8 | 4   | R.015  | OPX5-4026R015 |
| 5/8      | 1 5/8 | 4   | R.030  | OPX5-4026R030 |
| 5/8      | 1 5/8 | 4   | R.060  | OPX5-4026R060 |
| 5/8      | 1 5/8 | 4   | R.090  | OPX5-4026R090 |
| 5/8      | 1 5/8 | 4   | R.125  | OPX5-4026R125 |
| 5/8      | 1 5/8 | 4   | R.190  | OPX5-4026R190 |
| 5/8      | 1 5/8 | 4   | R.250  | OPX5-4026R250 |

## 5 FLUTE - EDGE PREP FOR EXOTIC ALLOYS



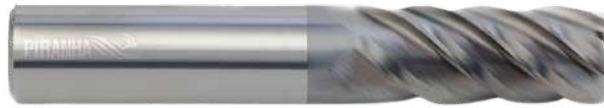
OPX5  
REGULAR INCH

| DIAMETER | LOC   | OAL | RAD    | ITEM#         |
|----------|-------|-----|--------|---------------|
| 5/8      | 2 1/4 | 5   | Square | OPX5-4036R000 |
| 5/8      | 2 1/4 | 5   | R.015  | OPX5-4036R015 |
| 5/8      | 2 1/4 | 5   | R.030  | OPX5-4036R030 |
| 5/8      | 2 1/4 | 5   | R.060  | OPX5-4036R060 |
| 5/8      | 2 1/4 | 5   | R.090  | OPX5-4036R090 |
| 5/8      | 2 1/4 | 5   | R.125  | OPX5-4036R125 |
| 5/8      | 2 1/4 | 5   | R.190  | OPX5-4036R190 |
| 5/8      | 2 1/4 | 5   | R.250  | OPX5-4036R250 |
| 3/4      | 3/4   | 4   | Square | OPX5-4812R000 |
| 3/4      | 3/4   | 4   | R.015  | OPX5-4812R015 |
| 3/4      | 3/4   | 4   | R.030  | OPX5-4812R030 |
| 3/4      | 3/4   | 4   | R.060  | OPX5-4812R060 |
| 3/4      | 3/4   | 4   | R.090  | OPX5-4812R090 |
| 3/4      | 3/4   | 4   | R.125  | OPX5-4812R125 |
| 3/4      | 3/4   | 4   | R.190  | OPX5-4812R190 |
| 3/4      | 3/4   | 4   | R.250  | OPX5-4812R250 |
| 3/4      | 1 5/8 | 4   | Square | OPX5-4826R000 |
| 3/4      | 1 5/8 | 4   | R.015  | OPX5-4826R015 |
| 3/4      | 1 5/8 | 4   | R.030  | OPX5-4826R030 |
| 3/4      | 1 5/8 | 4   | R.060  | OPX5-4826R060 |
| 3/4      | 1 5/8 | 4   | R.090  | OPX5-4826R090 |
| 3/4      | 1 5/8 | 4   | R.125  | OPX5-4826R125 |
| 3/4      | 1 5/8 | 4   | R.190  | OPX5-4826R190 |
| 3/4      | 1 5/8 | 4   | R.250  | OPX5-4826R250 |
| 3/4      | 2 5/8 | 5   | Square | OPX5-4842R000 |
| 3/4      | 2 5/8 | 5   | R.015  | OPX5-4842R015 |
| 3/4      | 2 5/8 | 5   | R.030  | OPX5-4842R030 |
| 3/4      | 2 5/8 | 5   | R.060  | OPX5-4842R060 |
| 3/4      | 2 5/8 | 5   | R.090  | OPX5-4842R090 |
| 3/4      | 2 5/8 | 5   | R.125  | OPX5-4842R125 |

| DIAMETER | LOC   | OAL | RAD    | ITEM#         |
|----------|-------|-----|--------|---------------|
| 3/4      | 2 5/8 | 5   | R.190  | OPX5-4842R190 |
| 3/4      | 2 5/8 | 5   | R.250  | OPX5-4842R250 |
| 1        | 1 3/4 | 5   | Square | OPX5-6428R000 |
| 1        | 1 3/4 | 5   | R.015  | OPX5-6428R015 |
| 1        | 1 3/4 | 5   | R.030  | OPX5-6428R030 |
| 1        | 1 3/4 | 5   | R.060  | OPX5-6428R060 |
| 1        | 1 3/4 | 5   | R.090  | OPX5-6428R090 |
| 1        | 1 3/4 | 5   | R.125  | OPX5-6428R125 |
| 1        | 1 3/4 | 5   | R.190  | OPX5-6428R190 |
| 1        | 1 3/4 | 5   | R.250  | OPX5-6428R250 |
| 1        | 3     | 6   | Square | OPX5-6448R000 |
| 1        | 3     | 6   | R.015  | OPX5-6448R015 |
| 1        | 3     | 6   | R.030  | OPX5-6448R030 |
| 1        | 3     | 6   | R.060  | OPX5-6448R060 |
| 1        | 3     | 6   | R.090  | OPX5-6448R090 |
| 1        | 3     | 6   | R.125  | OPX5-6448R125 |
| 1        | 3     | 6   | R.190  | OPX5-6448R190 |
| 1        | 3     | 6   | R.250  | OPX5-6448R250 |



## 5 FLUTE - EDGE PREP FOR EXOTIC ALLOYS



OPX5M

STUB - REGULAR - LONG METRIC

| DIAMETER | LOC | OAL | RAD    | ITEM#           |
|----------|-----|-----|--------|-----------------|
| 3        | 06  | 50  | Square | OPX5M-03006R0.0 |
| 3        | 06  | 50  | R0.5   | OPX5M-03006R0.5 |
| 3        | 06  | 50  | R1.0   | OPX5M-03006R1.0 |
| 5        | 10  | 75  | Square | OPX5M-05010R0.0 |
| 5        | 10  | 75  | R0.5   | OPX5M-05010R0.5 |
| 5        | 10  | 75  | R1.0   | OPX5M-05010R1.0 |
| 5        | 10  | 75  | R1.5   | OPX5M-05010R1.5 |
| 5        | 14  | 75  | Square | OPX5M-05014R0.0 |
| 5        | 14  | 75  | R0.5   | OPX5M-05014R0.5 |
| 5        | 14  | 75  | R1.0   | OPX5M-05014R1.0 |
| 5        | 14  | 75  | R1.5   | OPX5M-05014R1.5 |
| 6        | 10  | 75  | Square | OPX5M-06010R0.0 |
| 6        | 10  | 75  | R0.5   | OPX5M-06010R0.5 |
| 6        | 10  | 75  | R1.0   | OPX5M-06010R1.0 |
| 6        | 10  | 75  | R1.5   | OPX5M-06010R1.5 |
| 6        | 10  | 75  | R2.0   | OPX5M-06010R2.0 |
| 6        | 20  | 75  | Square | OPX5M-06020R0.0 |
| 6        | 20  | 75  | R0.5   | OPX5M-06020R0.5 |
| 6        | 20  | 75  | R1.0   | OPX5M-06020R1.0 |
| 6        | 20  | 75  | R1.5   | OPX5M-06020R1.5 |
| 6        | 20  | 75  | R2.0   | OPX5M-06020R2.0 |
| 6        | 29  | 75  | Square | OPX5M-06029R0.0 |
| 6        | 29  | 75  | R0.5   | OPX5M-06029R0.5 |
| 6        | 29  | 75  | R1.0   | OPX5M-06029R1.0 |
| 6        | 29  | 75  | R1.5   | OPX5M-06029R1.5 |
| 6        | 29  | 75  | R2.0   | OPX5M-06029R2.0 |
| 8        | 11  | 75  | Square | OPX5M-08011R0.0 |
| 8        | 11  | 75  | R0.5   | OPX5M-08011R0.5 |
| 8        | 11  | 75  | R1.0   | OPX5M-08011R1.0 |
| 8        | 11  | 75  | R1.5   | OPX5M-08011R1.5 |

| DIAMETER | LOC | OAL | RAD    | ITEM#           |
|----------|-----|-----|--------|-----------------|
| 8        | 11  | 75  | R2.0   | OPX5M-08011R2.0 |
| 8        | 11  | 75  | R3.0   | OPX5M-08011R3.0 |
| 8        | 21  | 75  | Square | OPX5M-08021R0.0 |
| 8        | 21  | 75  | R0.5   | OPX5M-08021R0.5 |
| 8        | 21  | 75  | R1.0   | OPX5M-08021R1.0 |
| 8        | 21  | 75  | R1.5   | OPX5M-08021R1.5 |
| 8        | 21  | 75  | R2.0   | OPX5M-08021R2.0 |
| 8        | 21  | 75  | R3.0   | OPX5M-08021R3.0 |
| 8        | 29  | 75  | Square | OPX5M-08029R0.0 |
| 8        | 29  | 75  | R0.5   | OPX5M-08029R0.5 |
| 8        | 29  | 75  | R1.0   | OPX5M-08029R1.0 |
| 8        | 29  | 75  | R1.5   | OPX5M-08029R1.5 |
| 8        | 29  | 75  | R2.0   | OPX5M-08029R2.0 |
| 8        | 29  | 75  | R3.0   | OPX5M-08029R3.0 |
| 10       | 12  | 75  | Square | OPX5M-10012R0.0 |
| 10       | 12  | 75  | R0.5   | OPX5M-10012R0.5 |
| 10       | 12  | 75  | R1.0   | OPX5M-10012R1.0 |
| 10       | 12  | 75  | R1.5   | OPX5M-10012R1.5 |
| 10       | 12  | 75  | R2.0   | OPX5M-10012R2.0 |
| 10       | 12  | 75  | R3.0   | OPX5M-10012R3.0 |
| 10       | 25  | 75  | Square | OPX5M-10025R0.0 |
| 10       | 25  | 75  | R0.5   | OPX5M-10025R0.5 |
| 10       | 25  | 75  | R1.0   | OPX5M-10025R1.0 |
| 10       | 25  | 75  | R1.5   | OPX5M-10025R1.5 |
| 10       | 25  | 75  | R2.0   | OPX5M-10025R2.0 |
| 10       | 25  | 75  | R3.0   | OPX5M-10025R3.0 |
| 10       | 32  | 75  | Square | OPX5M-10032R0.0 |
| 10       | 32  | 75  | R0.5   | OPX5M-10032R0.5 |
| 10       | 32  | 75  | R1.0   | OPX5M-10032R1.0 |
| 10       | 32  | 75  | R1.5   | OPX5M-10032R1.5 |

## 5 FLUTE - EDGE PREP FOR EXOTIC ALLOYS



OPX5M

STUB - REGULAR - LONG METRIC

| DIAMETER | LOC | OAL | RAD    | ITEM#           |
|----------|-----|-----|--------|-----------------|
| 10       | 32  | 75  | R2.0   | OPX5M-10032R2.0 |
| 10       | 32  | 75  | R3.0   | OPX5M-10032R3.0 |
| 11       | 16  | 75  | Square | OPX5M-11016R0.0 |
| 11       | 16  | 75  | R0.5   | OPX5M-11016R0.5 |
| 11       | 16  | 75  | R1.0   | OPX5M-11016R1.0 |
| 11       | 16  | 75  | R1.5   | OPX5M-11016R1.5 |
| 11       | 16  | 75  | R2.0   | OPX5M-11016R2.0 |
| 11       | 16  | 75  | R3.0   | OPX5M-11016R3.0 |
| 11       | 16  | 75  | R4.5   | OPX5M-11016R4.5 |
| 11       | 25  | 75  | Square | OPX5M-11025R0.0 |
| 11       | 25  | 75  | R0.5   | OPX5M-11025R0.5 |
| 11       | 25  | 75  | R1.0   | OPX5M-11025R1.0 |
| 11       | 25  | 75  | R1.5   | OPX5M-11025R1.5 |
| 11       | 25  | 75  | R2.0   | OPX5M-11025R2.0 |
| 11       | 25  | 75  | R3.0   | OPX5M-11025R3.0 |
| 11       | 25  | 75  | R4.5   | OPX5M-11025R4.5 |
| 11       | 50  | 100 | Square | OPX5M-11050R0.0 |
| 11       | 50  | 100 | R0.5   | OPX5M-11050R0.5 |
| 11       | 50  | 100 | R1.0   | OPX5M-11050R1.0 |
| 11       | 50  | 100 | R1.5   | OPX5M-11050R1.5 |
| 11       | 50  | 100 | R2.0   | OPX5M-11050R2.0 |
| 11       | 50  | 100 | R3.0   | OPX5M-11050R3.0 |
| 11       | 50  | 100 | R4.5   | OPX5M-11050R4.5 |
| 12       | 16  | 75  | Square | OPX5M-12016R0.0 |
| 12       | 16  | 75  | R0.5   | OPX5M-12016R0.5 |
| 12       | 16  | 75  | R1.0   | OPX5M-12016R1.0 |
| 12       | 16  | 75  | R1.5   | OPX5M-12016R1.5 |
| 12       | 16  | 75  | R2.0   | OPX5M-12016R2.0 |
| 12       | 16  | 75  | R3.0   | OPX5M-12016R3.0 |
| 12       | 16  | 75  | R4.5   | OPX5M-12016R4.5 |

| DIAMETER | LOC | OAL | RAD    | ITEM#           |
|----------|-----|-----|--------|-----------------|
| 12       | 32  | 75  | Square | OPX5M-12032R0.0 |
| 12       | 32  | 75  | R0.5   | OPX5M-12032R0.5 |
| 12       | 32  | 75  | R1.0   | OPX5M-12032R1.0 |
| 12       | 32  | 75  | R1.5   | OPX5M-12032R1.5 |
| 12       | 32  | 75  | R2.0   | OPX5M-12032R2.0 |
| 12       | 32  | 75  | R3.0   | OPX5M-12032R3.0 |
| 12       | 32  | 75  | R4.5   | OPX5M-12032R4.5 |
| 12       | 50  | 100 | Square | OPX5M-12050R0.0 |
| 12       | 50  | 100 | R0.5   | OPX5M-12050R0.5 |
| 12       | 50  | 100 | R1.0   | OPX5M-12050R1.0 |
| 12       | 50  | 100 | R1.5   | OPX5M-12050R1.5 |
| 12       | 50  | 100 | R2.0   | OPX5M-12050R2.0 |
| 12       | 50  | 100 | R3.0   | OPX5M-12050R3.0 |
| 12       | 50  | 100 | R4.5   | OPX5M-12050R4.5 |
| 16       | 20  | 100 | Square | OPX5M-16020R0.0 |
| 16       | 20  | 100 | R0.5   | OPX5M-16020R0.5 |
| 16       | 20  | 100 | R1.0   | OPX5M-16020R1.0 |
| 16       | 20  | 100 | R1.5   | OPX5M-16020R1.5 |
| 16       | 20  | 100 | R2.0   | OPX5M-16020R2.0 |
| 16       | 20  | 100 | R3.0   | OPX5M-16020R3.0 |
| 16       | 20  | 100 | R4.5   | OPX5M-16020R4.5 |
| 16       | 20  | 100 | R6.0   | OPX5M-16020R6.0 |
| 16       | 41  | 100 | Square | OPX5M-16041R0.0 |
| 16       | 41  | 100 | R0.5   | OPX5M-16041R0.5 |
| 16       | 41  | 100 | R1.0   | OPX5M-16041R1.0 |
| 16       | 41  | 100 | R1.5   | OPX5M-16041R1.5 |
| 16       | 41  | 100 | R2.0   | OPX5M-16041R2.0 |
| 16       | 41  | 100 | R3.0   | OPX5M-16041R3.0 |
| 16       | 41  | 100 | R4.5   | OPX5M-16041R4.5 |
| 16       | 41  | 100 | R6.0   | OPX5M-16041R6.0 |

## 5 FLUTE - EDGE PREP FOR EXOTIC ALLOYS



OPX5M

STUB - REGULAR - LONG METRIC

| DIAMETER | LOC | OAL | RAD    | ITEM#           |
|----------|-----|-----|--------|-----------------|
| 16       | 57  | 125 | Square | OPX5M-16057R0.0 |
| 16       | 57  | 125 | R0.5   | OPX5M-16057R0.5 |
| 16       | 57  | 125 | R1.0   | OPX5M-16057R1.0 |
| 16       | 57  | 125 | R1.5   | OPX5M-16057R1.5 |
| 16       | 57  | 125 | R2.0   | OPX5M-16057R2.0 |
| 16       | 57  | 125 | R3.0   | OPX5M-16057R3.0 |
| 16       | 57  | 125 | R4.5   | OPX5M-16057R4.5 |
| 16       | 57  | 125 | R6.0   | OPX5M-16057R6.0 |
| 20       | 25  | 100 | Square | OPX5M-20025R0.0 |
| 20       | 25  | 100 | R0.5   | OPX5M-20025R0.5 |
| 20       | 25  | 100 | R1.0   | OPX5M-20025R1.0 |
| 20       | 25  | 100 | R1.5   | OPX5M-20025R1.5 |
| 20       | 25  | 100 | R2.0   | OPX5M-20025R2.0 |
| 20       | 25  | 100 | R3.0   | OPX5M-20025R3.0 |
| 20       | 25  | 100 | R4.5   | OPX5M-20025R4.5 |
| 20       | 25  | 100 | R6.0   | OPX5M-20025R6.0 |
| 20       | 41  | 100 | Square | OPX5M-20041R0.0 |
| 20       | 41  | 100 | R0.5   | OPX5M-20041R0.5 |
| 20       | 41  | 100 | R1.0   | OPX5M-20041R1.0 |
| 20       | 41  | 100 | R1.5   | OPX5M-20041R1.5 |
| 20       | 41  | 100 | R2.0   | OPX5M-20041R2.0 |
| 20       | 41  | 100 | R3.0   | OPX5M-20041R3.0 |
| 20       | 41  | 100 | R4.5   | OPX5M-20041R4.5 |
| 20       | 41  | 100 | R6.0   | OPX5M-20041R6.0 |
| 20       | 67  | 125 | Square | OPX5M-20067R0.0 |
| 20       | 67  | 125 | R0.5   | OPX5M-20067R0.5 |
| 20       | 67  | 125 | R1.0   | OPX5M-20067R1.0 |
| 20       | 67  | 125 | R1.5   | OPX5M-20067R1.5 |
| 20       | 67  | 125 | R2.0   | OPX5M-20067R2.0 |
| 20       | 67  | 125 | R3.0   | OPX5M-20067R3.0 |

| DIAMETER | LOC | OAL | RAD    | ITEM#           |
|----------|-----|-----|--------|-----------------|
| 20       | 67  | 125 | R4.5   | OPX5M-20067R4.5 |
| 20       | 67  | 125 | R6.0   | OPX5M-20067R6.0 |
| 25       | 45  | 125 | Square | OPX5M-25045R0.0 |
| 25       | 45  | 125 | R0.5   | OPX5M-25045R0.5 |
| 25       | 45  | 125 | R1.0   | OPX5M-25045R1.0 |
| 25       | 45  | 125 | R1.5   | OPX5M-25045R1.5 |
| 25       | 45  | 125 | R2.0   | OPX5M-25045R2.0 |
| 25       | 45  | 125 | R3.0   | OPX5M-25045R3.0 |
| 25       | 45  | 125 | R4.5   | OPX5M-25045R4.5 |
| 25       | 45  | 125 | R6.0   | OPX5M-25045R6.0 |
| 25       | 76  | 150 | Square | OPX5M-25076R0.0 |
| 25       | 76  | 150 | R0.5   | OPX5M-25076R0.5 |
| 25       | 76  | 150 | R1.0   | OPX5M-25076R1.0 |
| 25       | 76  | 150 | R1.5   | OPX5M-25076R1.5 |
| 25       | 76  | 150 | R2.0   | OPX5M-25076R2.0 |
| 25       | 76  | 150 | R3.0   | OPX5M-25076R3.0 |
| 25       | 76  | 150 | R4.5   | OPX5M-25076R4.5 |
| 25       | 76  | 150 | R6.0   | OPX5M-25076R6.0 |

## 5 FLUTE - EDGE PREP - CHIP BREAKER FOR EXOTIC ALLOYS



OPX5C

STUB - REGULAR - LONG - CHIP BREAKER INCH

| DIAMETER | LOC   | OAL | RAD    | ITEM#          |
|----------|-------|-----|--------|----------------|
| 1/8      | 1/4   | 2   | Square | OPX5-0804R000C |
| 1/8      | 1/4   | 2   | R.015  | OPX5-0804R015C |
| 1/8      | 1/4   | 2   | R.030  | OPX5-0804R030C |
| 3/16     | 3/8   | 3   | Square | OPX5-1206R000C |
| 3/16     | 3/8   | 3   | R.015  | OPX5-1206R015C |
| 3/16     | 3/8   | 3   | R.030  | OPX5-1206R030C |
| 3/16     | 3/8   | 3   | R.060  | OPX5-1206R060C |
| 3/16     | 9/16  | 3   | Square | OPX5-1209R000C |
| 3/16     | 9/16  | 3   | R.015  | OPX5-1209R015C |
| 3/16     | 9/16  | 3   | R.030  | OPX5-1209R030C |
| 3/16     | 9/16  | 3   | R.060  | OPX5-1209R060C |
| 1/4      | 3/8   | 3   | Square | OPX5-1606R000C |
| 1/4      | 3/8   | 3   | R.015  | OPX5-1606R015C |
| 1/4      | 3/8   | 3   | R.030  | OPX5-1606R030C |
| 1/4      | 3/8   | 3   | R.060  | OPX5-1606R060C |
| 1/4      | 3/8   | 3   | R.090  | OPX5-1606R090C |
| 1/4      | 3/4   | 3   | Square | OPX5-1612R000C |
| 1/4      | 3/4   | 3   | R.015  | OPX5-1612R015C |
| 1/4      | 3/4   | 3   | R.030  | OPX5-1612R030C |
| 1/4      | 3/4   | 3   | R.060  | OPX5-1612R060C |
| 1/4      | 3/4   | 3   | R.090  | OPX5-1612R090C |
| 1/4      | 1 1/8 | 3   | Square | OPX5-1618R000C |
| 1/4      | 1 1/8 | 3   | R.015  | OPX5-1618R015C |
| 1/4      | 1 1/8 | 3   | R.030  | OPX5-1618R030C |
| 1/4      | 1 1/8 | 3   | R.060  | OPX5-1618R060C |
| 1/4      | 1 1/8 | 3   | R.090  | OPX5-1618R090C |
| 5/16     | 7/16  | 3   | Square | OPX5-2007R000C |
| 5/16     | 7/16  | 3   | R.015  | OPX5-2007R015C |
| 5/16     | 7/16  | 3   | R.030  | OPX5-2007R030C |
| 5/16     | 7/16  | 3   | R.060  | OPX5-2007R060C |

| DIAMETER | LOC   | OAL | RAD    | ITEM#          |
|----------|-------|-----|--------|----------------|
| 5/16     | 7/16  | 3   | R.090  | OPX5-2007R090C |
| 5/16     | 7/16  | 3   | R.125  | OPX5-2007R125C |
| 5/16     | 13/16 | 3   | Square | OPX5-2013R000C |
| 5/16     | 13/16 | 3   | R.015  | OPX5-2013R015C |
| 5/16     | 13/16 | 3   | R.030  | OPX5-2013R030C |
| 5/16     | 13/16 | 3   | R.060  | OPX5-2013R060C |
| 5/16     | 13/16 | 3   | R.090  | OPX5-2013R090C |
| 5/16     | 13/16 | 3   | R.125  | OPX5-2013R125C |
| 5/16     | 1 1/8 | 3   | Square | OPX5-2018R000C |
| 5/16     | 1 1/8 | 3   | R.015  | OPX5-2018R015C |
| 5/16     | 1 1/8 | 3   | R.030  | OPX5-2018R030C |
| 5/16     | 1 1/8 | 3   | R.060  | OPX5-2018R060C |
| 5/16     | 1 1/8 | 3   | R.090  | OPX5-2018R090C |
| 5/16     | 1 1/8 | 3   | R.125  | OPX5-2018R125C |
| 3/8      | 1/2   | 3   | Square | OPX5-2408R000C |
| 3/8      | 1/2   | 3   | R.015  | OPX5-2408R015C |
| 3/8      | 1/2   | 3   | R.030  | OPX5-2408R030C |
| 3/8      | 1/2   | 3   | R.060  | OPX5-2408R060C |
| 3/8      | 1/2   | 3   | R.090  | OPX5-2408R090C |
| 3/8      | 1/2   | 3   | R.125  | OPX5-2408R125C |
| 3/8      | 1     | 3   | Square | OPX5-2416R000C |
| 3/8      | 1     | 3   | R.015  | OPX5-2416R015C |
| 3/8      | 1     | 3   | R.030  | OPX5-2416R030C |
| 3/8      | 1     | 3   | R.060  | OPX5-2416R060C |
| 3/8      | 1     | 3   | R.090  | OPX5-2416R090C |
| 3/8      | 1     | 3   | R.125  | OPX5-2416R125C |
| 3/8      | 1 1/4 | 3   | Square | OPX5-2420R000C |
| 3/8      | 1 1/4 | 3   | R.015  | OPX5-2420R015C |
| 3/8      | 1 1/4 | 3   | R.030  | OPX5-2420R030C |
| 3/8      | 1 1/4 | 3   | R.060  | OPX5-2420R060C |



## 5 FLUTE - EDGE PREP - CHIP BREAKER FOR EXOTIC ALLOYS



OPX5C

STUB - REGULAR - LONG - CHIP BREAKER INCH

| DIAMETER | LOC   | OAL | RAD    | ITEM#          |
|----------|-------|-----|--------|----------------|
| 3/8      | 1 1/4 | 3   | R.090  | OPX5-2420R090C |
| 3/8      | 1 1/4 | 3   | R.125  | OPX5-2420R125C |
| 7/16     | 5/8   | 3   | Square | OPX5-2810R000C |
| 7/16     | 5/8   | 3   | R.015  | OPX5-2810R015C |
| 7/16     | 5/8   | 3   | R.030  | OPX5-2810R030C |
| 7/16     | 5/8   | 3   | R.060  | OPX5-2810R060C |
| 7/16     | 5/8   | 3   | R.090  | OPX5-2810R090C |
| 7/16     | 5/8   | 3   | R.125  | OPX5-2810R125C |
| 7/16     | 5/8   | 3   | R.190  | OPX5-2810R190C |
| 7/16     | 1     | 3   | Square | OPX5-2816R000C |
| 7/16     | 1     | 3   | R.015  | OPX5-2816R015C |
| 7/16     | 1     | 3   | R.030  | OPX5-2816R030C |
| 7/16     | 1     | 3   | R.060  | OPX5-2816R060C |
| 7/16     | 1     | 3   | R.090  | OPX5-2816R090C |
| 7/16     | 1     | 3   | R.125  | OPX5-2816R125C |
| 7/16     | 1     | 3   | R.190  | OPX5-2816R190C |
| 7/16     | 2     | 4   | Square | OPX5-2832R000C |
| 7/16     | 2     | 4   | R.015  | OPX5-2832R015C |
| 7/16     | 2     | 4   | R.030  | OPX5-2832R030C |
| 7/16     | 2     | 4   | R.060  | OPX5-2832R060C |
| 7/16     | 2     | 4   | R.090  | OPX5-2832R090C |
| 7/16     | 2     | 4   | R.125  | OPX5-2832R125C |
| 7/16     | 2     | 4   | R.190  | OPX5-2832R190C |
| 1/2      | 5/8   | 3   | Square | OPX5-3210R000C |
| 1/2      | 5/8   | 3   | R.015  | OPX5-3210R015C |
| 1/2      | 5/8   | 3   | R.030  | OPX5-3210R030C |
| 1/2      | 5/8   | 3   | R.060  | OPX5-3210R060C |
| 1/2      | 5/8   | 3   | R.090  | OPX5-3210R090C |
| 1/2      | 5/8   | 3   | R.125  | OPX5-3210R125C |
| 1/2      | 5/8   | 3   | R.190  | OPX5-3210R190C |

| DIAMETER | LOC   | OAL | RAD    | ITEM#          |
|----------|-------|-----|--------|----------------|
| 1/2      | 1 1/4 | 3   | Square | OPX5-3220R000C |
| 1/2      | 1 1/4 | 3   | R.015  | OPX5-3220R015C |
| 1/2      | 1 1/4 | 3   | R.030  | OPX5-3220R030C |
| 1/2      | 1 1/4 | 3   | R.060  | OPX5-3220R060C |
| 1/2      | 1 1/4 | 3   | R.090  | OPX5-3220R090C |
| 1/2      | 1 1/4 | 3   | R.125  | OPX5-3220R125C |
| 1/2      | 1 1/4 | 3   | R.190  | OPX5-3220R190C |
| 1/2      | 2     | 4   | Square | OPX5-3232R000C |
| 1/2      | 2     | 4   | R.015  | OPX5-3232R015C |
| 1/2      | 2     | 4   | R.030  | OPX5-3232R030C |
| 1/2      | 2     | 4   | R.060  | OPX5-3232R060C |
| 1/2      | 2     | 4   | R.090  | OPX5-3232R090C |
| 1/2      | 2     | 4   | R.125  | OPX5-3232R125C |
| 1/2      | 2     | 4   | R.190  | OPX5-3232R190C |
| 5/8      | 3/4   | 4   | Square | OPX5-4012R000C |
| 5/8      | 3/4   | 4   | R.015  | OPX5-4012R015C |
| 5/8      | 3/4   | 4   | R.030  | OPX5-4012R030C |
| 5/8      | 3/4   | 4   | R.060  | OPX5-4012R060C |
| 5/8      | 3/4   | 4   | R.090  | OPX5-4012R090C |
| 5/8      | 3/4   | 4   | R.125  | OPX5-4012R125C |
| 5/8      | 3/4   | 4   | R.190  | OPX5-4012R190C |
| 5/8      | 3/4   | 4   | R.250  | OPX5-4012R250C |
| 5/8      | 1 5/8 | 4   | Square | OPX5-4026R000C |
| 5/8      | 1 5/8 | 4   | R.015  | OPX5-4026R015C |
| 5/8      | 1 5/8 | 4   | R.030  | OPX5-4026R030C |
| 5/8      | 1 5/8 | 4   | R.060  | OPX5-4026R060C |
| 5/8      | 1 5/8 | 4   | R.090  | OPX5-4026R090C |
| 5/8      | 1 5/8 | 4   | R.125  | OPX5-4026R125C |
| 5/8      | 1 5/8 | 4   | R.190  | OPX5-4026R190C |
| 5/8      | 1 5/8 | 4   | R.250  | OPX5-4026R250C |

## 5 FLUTE - EDGE PREP - CHIP BREAKER FOR EXOTIC ALLOYS



OPX5C

STUB - REGULAR - LONG - CHIP BREAKER INCH

| DIAMETER | LOC   | OAL | RAD    | ITEM#          |
|----------|-------|-----|--------|----------------|
| 3/8      | 1 1/4 | 3   | R.090  | OPX5-2420R090C |
| 3/8      | 1 1/4 | 3   | R.125  | OPX5-2420R125C |
| 7/16     | 5/8   | 3   | Square | OPX5-2810R000C |
| 7/16     | 5/8   | 3   | R.015  | OPX5-2810R015C |
| 7/16     | 5/8   | 3   | R.030  | OPX5-2810R030C |
| 7/16     | 5/8   | 3   | R.060  | OPX5-2810R060C |
| 7/16     | 5/8   | 3   | R.090  | OPX5-2810R090C |
| 7/16     | 5/8   | 3   | R.125  | OPX5-2810R125C |
| 7/16     | 5/8   | 3   | R.190  | OPX5-2810R190C |
| 7/16     | 1     | 3   | Square | OPX5-2816R000C |
| 7/16     | 1     | 3   | R.015  | OPX5-2816R015C |
| 7/16     | 1     | 3   | R.030  | OPX5-2816R030C |
| 7/16     | 1     | 3   | R.060  | OPX5-2816R060C |
| 7/16     | 1     | 3   | R.090  | OPX5-2816R090C |
| 7/16     | 1     | 3   | R.125  | OPX5-2816R125C |
| 7/16     | 1     | 3   | R.190  | OPX5-2816R190C |
| 7/16     | 2     | 4   | Square | OPX5-2832R000C |
| 7/16     | 2     | 4   | R.015  | OPX5-2832R015C |
| 7/16     | 2     | 4   | R.030  | OPX5-2832R030C |
| 7/16     | 2     | 4   | R.060  | OPX5-2832R060C |
| 7/16     | 2     | 4   | R.090  | OPX5-2832R090C |
| 7/16     | 2     | 4   | R.125  | OPX5-2832R125C |
| 7/16     | 2     | 4   | R.190  | OPX5-2832R190C |
| 1/2      | 5/8   | 3   | Square | OPX5-3210R000C |
| 1/2      | 5/8   | 3   | R.015  | OPX5-3210R015C |
| 1/2      | 5/8   | 3   | R.030  | OPX5-3210R030C |
| 1/2      | 5/8   | 3   | R.060  | OPX5-3210R060C |
| 1/2      | 5/8   | 3   | R.090  | OPX5-3210R090C |
| 1/2      | 5/8   | 3   | R.125  | OPX5-3210R125C |
| 1/2      | 5/8   | 3   | R.190  | OPX5-3210R190C |

| DIAMETER | LOC   | OAL | RAD    | ITEM#          |
|----------|-------|-----|--------|----------------|
| 1/2      | 1 1/4 | 3   | Square | OPX5-3220R000C |
| 1/2      | 1 1/4 | 3   | R.015  | OPX5-3220R015C |
| 1/2      | 1 1/4 | 3   | R.030  | OPX5-3220R030C |
| 1/2      | 1 1/4 | 3   | R.060  | OPX5-3220R060C |
| 1/2      | 1 1/4 | 3   | R.090  | OPX5-3220R090C |
| 1/2      | 1 1/4 | 3   | R.125  | OPX5-3220R125C |
| 1/2      | 1 1/4 | 3   | R.190  | OPX5-3220R190C |
| 1/2      | 2     | 4   | Square | OPX5-3232R000C |
| 1/2      | 2     | 4   | R.015  | OPX5-3232R015C |
| 1/2      | 2     | 4   | R.030  | OPX5-3232R030C |
| 1/2      | 2     | 4   | R.060  | OPX5-3232R060C |
| 1/2      | 2     | 4   | R.090  | OPX5-3232R090C |
| 1/2      | 2     | 4   | R.125  | OPX5-3232R125C |
| 1/2      | 2     | 4   | R.190  | OPX5-3232R190C |
| 5/8      | 3/4   | 4   | Square | OPX5-4012R000C |
| 5/8      | 3/4   | 4   | R.015  | OPX5-4012R015C |
| 5/8      | 3/4   | 4   | R.030  | OPX5-4012R030C |
| 5/8      | 3/4   | 4   | R.060  | OPX5-4012R060C |
| 5/8      | 3/4   | 4   | R.090  | OPX5-4012R090C |
| 5/8      | 3/4   | 4   | R.125  | OPX5-4012R125C |
| 5/8      | 3/4   | 4   | R.190  | OPX5-4012R190C |
| 5/8      | 3/4   | 4   | R.250  | OPX5-4012R250C |
| 5/8      | 1 5/8 | 4   | Square | OPX5-4026R000C |
| 5/8      | 1 5/8 | 4   | R.015  | OPX5-4026R015C |
| 5/8      | 1 5/8 | 4   | R.030  | OPX5-4026R030C |
| 5/8      | 1 5/8 | 4   | R.060  | OPX5-4026R060C |
| 5/8      | 1 5/8 | 4   | R.090  | OPX5-4026R090C |
| 5/8      | 1 5/8 | 4   | R.125  | OPX5-4026R125C |
| 5/8      | 1 5/8 | 4   | R.190  | OPX5-4026R190C |
| 5/8      | 1 5/8 | 4   | R.250  | OPX5-4026R250C |

## 5 FLUTE - EDGE PREP - CHIP BREAKER FOR EXOTIC ALLOYS



OPX5C

STUB - REGULAR - LONG - CHIP BREAKER INCH

| DIAMETER | LOC   | OAL | RAD    | ITEM#          |
|----------|-------|-----|--------|----------------|
| 5/8      | 2 1/4 | 5   | Square | OPX5-4036R000C |
| 5/8      | 2 1/4 | 5   | R.015  | OPX5-4036R015C |
| 5/8      | 2 1/4 | 5   | R.030  | OPX5-4036R030C |
| 5/8      | 2 1/4 | 5   | R.060  | OPX5-4036R060C |
| 5/8      | 2 1/4 | 5   | R.090  | OPX5-4036R090C |
| 5/8      | 2 1/4 | 5   | R.125  | OPX5-4036R125C |
| 5/8      | 2 1/4 | 5   | R.190  | OPX5-4036R190C |
| 5/8      | 2 1/4 | 5   | R.250  | OPX5-4036R250C |
| 3/4      | 3/4   | 4   | Square | OPX5-4812R000C |
| 3/4      | 3/4   | 4   | R.015  | OPX5-4812R015C |
| 3/4      | 3/4   | 4   | R.030  | OPX5-4812R030C |
| 3/4      | 3/4   | 4   | R.060  | OPX5-4812R060C |
| 3/4      | 3/4   | 4   | R.090  | OPX5-4812R090C |
| 3/4      | 3/4   | 4   | R.125  | OPX5-4812R125C |
| 3/4      | 3/4   | 4   | R.190  | OPX5-4812R190C |
| 3/4      | 3/4   | 4   | R.250  | OPX5-4812R250C |
| 3/4      | 1 5/8 | 4   | Square | OPX5-4826R000C |
| 3/4      | 1 5/8 | 4   | R.015  | OPX5-4826R015C |
| 3/4      | 1 5/8 | 4   | R.030  | OPX5-4826R030C |
| 3/4      | 1 5/8 | 4   | R.060  | OPX5-4826R060C |
| 3/4      | 1 5/8 | 4   | R.090  | OPX5-4826R090C |
| 3/4      | 1 5/8 | 4   | R.125  | OPX5-4826R125C |
| 3/4      | 1 5/8 | 4   | R.190  | OPX5-4826R190C |
| 3/4      | 1 5/8 | 4   | R.250  | OPX5-4826R250C |
| 3/4      | 2 5/8 | 5   | Square | OPX5-4842R000C |
| 3/4      | 2 5/8 | 5   | R.015  | OPX5-4842R015C |
| 3/4      | 2 5/8 | 5   | R.030  | OPX5-4842R030C |
| 3/4      | 2 5/8 | 5   | R.060  | OPX5-4842R060C |
| 3/4      | 2 5/8 | 5   | R.090  | OPX5-4842R090C |
| 3/4      | 2 5/8 | 5   | R.125  | OPX5-4842R125C |

| DIAMETER | LOC   | OAL | RAD    | ITEM#          |
|----------|-------|-----|--------|----------------|
| 3/4      | 2 5/8 | 5   | R.190  | OPX5-4842R190C |
| 3/4      | 2 5/8 | 5   | R.250  | OPX5-4842R250C |
| 1        | 1 3/4 | 5   | Square | OPX5-6428R000C |
| 1        | 1 3/4 | 5   | R.015  | OPX5-6428R015C |
| 1        | 1 3/4 | 5   | R.030  | OPX5-6428R030C |
| 1        | 1 3/4 | 5   | R.060  | OPX5-6428R060C |
| 1        | 1 3/4 | 5   | R.090  | OPX5-6428R090C |
| 1        | 1 3/4 | 5   | R.125  | OPX5-6428R125C |
| 1        | 1 3/4 | 5   | R.190  | OPX5-6428R190C |
| 1        | 1 3/4 | 5   | R.250  | OPX5-6428R250C |
| 1        | 3     | 6   | Square | OPX5-6448R000C |
| 1        | 3     | 6   | R.015  | OPX5-6448R015C |
| 1        | 3     | 6   | R.030  | OPX5-6448R030C |
| 1        | 3     | 6   | R.060  | OPX5-6448R060C |
| 1        | 3     | 6   | R.090  | OPX5-6448R090C |
| 1        | 3     | 6   | R.125  | OPX5-6448R125C |
| 1        | 3     | 6   | R.190  | OPX5-6448R190C |
| 1        | 3     | 6   | R.250  | OPX5-6448R250C |

## 5 FLUTE - EDGE PREP - CHIP BREAKER FOR EXOTIC ALLOYS



OPX5MC

STUB - REGULAR - LONG - CHIP BREAKER METRIC

| DIAMETER | LOC | OAL | RAD    | ITEM#            |
|----------|-----|-----|--------|------------------|
| 3        | 06  | 50  | Square | OPX5M-03006R0.0C |
| 3        | 06  | 50  | R0.5   | OPX5M-03006R0.5C |
| 3        | 06  | 50  | R1.0   | OPX5M-03006R1.0C |
| 5        | 10  | 75  | Square | OPX5M-05010R0.0C |
| 5        | 10  | 75  | R0.5   | OPX5M-05010R0.5C |
| 5        | 10  | 75  | R1.0   | OPX5M-05010R1.0C |
| 5        | 10  | 75  | R1.5   | OPX5M-05010R1.5C |
| 5        | 14  | 75  | Square | OPX5M-05014R0.0C |
| 5        | 14  | 75  | R0.5   | OPX5M-05014R0.5C |
| 5        | 14  | 75  | R1.0   | OPX5M-05014R1.0C |
| 5        | 14  | 75  | R1.5   | OPX5M-05014R1.5C |
| 6        | 10  | 75  | Square | OPX5M-06010R0.0C |
| 6        | 10  | 75  | R0.5   | OPX5M-06010R0.5C |
| 6        | 10  | 75  | R1.0   | OPX5M-06010R1.0C |
| 6        | 10  | 75  | R1.5   | OPX5M-06010R1.5C |
| 6        | 10  | 75  | R2.0   | OPX5M-06010R2.0C |
| 6        | 20  | 75  | Square | OPX5M-06020R0.0C |
| 6        | 20  | 75  | R0.5   | OPX5M-06020R0.5C |
| 6        | 20  | 75  | R1.0   | OPX5M-06020R1.0C |
| 6        | 20  | 75  | R1.5   | OPX5M-06020R1.5C |
| 6        | 20  | 75  | R2.0   | OPX5M-06020R2.0C |
| 6        | 29  | 75  | Square | OPX5M-06029R0.0C |
| 6        | 29  | 75  | R0.5   | OPX5M-06029R0.5C |
| 6        | 29  | 75  | R1.0   | OPX5M-06029R1.0C |
| 6        | 29  | 75  | R1.5   | OPX5M-06029R1.5C |
| 6        | 29  | 75  | R2.0   | OPX5M-06029R2.0C |
| 8        | 11  | 75  | Square | OPX5M-08011R0.0C |
| 8        | 11  | 75  | R0.5   | OPX5M-08011R0.5C |
| 8        | 11  | 75  | R1.0   | OPX5M-08011R1.0C |
| 8        | 11  | 75  | R1.5   | OPX5M-08011R1.5C |

| DIAMETER | LOC | OAL | RAD    | ITEM#            |
|----------|-----|-----|--------|------------------|
| 8        | 11  | 75  | R2.0   | OPX5M-08011R2.0C |
| 8        | 11  | 75  | R3.0   | OPX5M-08011R3.0C |
| 8        | 21  | 75  | Square | OPX5M-08021R0.0C |
| 8        | 21  | 75  | R0.5   | OPX5M-08021R0.5C |
| 8        | 21  | 75  | R1.0   | OPX5M-08021R1.0C |
| 8        | 21  | 75  | R1.5   | OPX5M-08021R1.5C |
| 8        | 21  | 75  | R2.0   | OPX5M-08021R2.0C |
| 8        | 21  | 75  | R3.0   | OPX5M-08021R3.0C |
| 8        | 29  | 75  | Square | OPX5M-08029R0.0C |
| 8        | 29  | 75  | R0.5   | OPX5M-08029R0.5C |
| 8        | 29  | 75  | R1.0   | OPX5M-08029R1.0C |
| 8        | 29  | 75  | R1.5   | OPX5M-08029R1.5C |
| 8        | 29  | 75  | R2.0   | OPX5M-08029R2.0C |
| 8        | 29  | 75  | R3.0   | OPX5M-08029R3.0C |
| 10       | 12  | 75  | Square | OPX5M-10012R0.0C |
| 10       | 12  | 75  | R0.5   | OPX5M-10012R0.5C |
| 10       | 12  | 75  | R1.0   | OPX5M-10012R1.0C |
| 10       | 12  | 75  | R1.5   | OPX5M-10012R1.5C |
| 10       | 12  | 75  | R2.0   | OPX5M-10012R2.0C |
| 10       | 12  | 75  | R3.0   | OPX5M-10012R3.0C |
| 10       | 25  | 75  | Square | OPX5M-10025R0.0C |
| 10       | 25  | 75  | R0.5   | OPX5M-10025R0.5C |
| 10       | 25  | 75  | R1.0   | OPX5M-10025R1.0C |
| 10       | 25  | 75  | R1.5   | OPX5M-10025R1.5C |
| 10       | 25  | 75  | R2.0   | OPX5M-10025R2.0C |
| 10       | 25  | 75  | R3.0   | OPX5M-10025R3.0C |
| 10       | 32  | 75  | Square | OPX5M-10032R0.0C |
| 10       | 32  | 75  | R0.5   | OPX5M-10032R0.5C |
| 10       | 32  | 75  | R1.0   | OPX5M-10032R1.0C |
| 10       | 32  | 75  | R1.5   | OPX5M-10032R1.5C |



## 5 FLUTE - EDGE PREP - CHIP BREAKER FOR EXOTIC ALLOYS



OPX5MC

STUB - REGULAR - LONG - CHIP BREAKER METRIC

| DIAMETER | LOC | OAL | RAD    | ITEM#            |
|----------|-----|-----|--------|------------------|
| 10       | 32  | 75  | R2.0   | OPX5M-10032R2.0C |
| 10       | 32  | 75  | R3.0   | OPX5M-10032R3.0C |
| 11       | 16  | 75  | Square | OPX5M-11016R0.0C |
| 11       | 16  | 75  | R0.5   | OPX5M-11016R0.5C |
| 11       | 16  | 75  | R1.0   | OPX5M-11016R1.0C |
| 11       | 16  | 75  | R1.5   | OPX5M-11016R1.5C |
| 11       | 16  | 75  | R2.0   | OPX5M-11016R2.0C |
| 11       | 16  | 75  | R3.0   | OPX5M-11016R3.0C |
| 11       | 16  | 75  | R4.5   | OPX5M-11016R4.5C |
| 11       | 25  | 75  | Square | OPX5M-11025R0.0C |
| 11       | 25  | 75  | R0.5   | OPX5M-11025R0.5C |
| 11       | 25  | 75  | R1.0   | OPX5M-11025R1.0C |
| 11       | 25  | 75  | R1.5   | OPX5M-11025R1.5C |
| 11       | 25  | 75  | R2.0   | OPX5M-11025R2.0C |
| 11       | 25  | 75  | R3.0   | OPX5M-11025R3.0C |
| 11       | 25  | 75  | R4.5   | OPX5M-11025R4.5C |
| 11       | 50  | 100 | Square | OPX5M-11050R0.0C |
| 11       | 50  | 100 | R0.5   | OPX5M-11050R0.5C |
| 11       | 50  | 100 | R1.0   | OPX5M-11050R1.0C |
| 11       | 50  | 100 | R1.5   | OPX5M-11050R1.5C |
| 11       | 50  | 100 | R2.0   | OPX5M-11050R2.0C |
| 11       | 50  | 100 | R3.0   | OPX5M-11050R3.0C |
| 11       | 50  | 100 | R4.5   | OPX5M-11050R4.5C |
| 12       | 16  | 75  | Square | OPX5M-12016R0.0C |
| 12       | 16  | 75  | R0.5   | OPX5M-12016R0.5C |
| 12       | 16  | 75  | R1.0   | OPX5M-12016R1.0C |
| 12       | 16  | 75  | R1.5   | OPX5M-12016R1.5C |
| 12       | 16  | 75  | R2.0   | OPX5M-12016R2.0C |
| 12       | 16  | 75  | R3.0   | OPX5M-12016R3.0C |
| 12       | 16  | 75  | R4.5   | OPX5M-12016R4.5C |

| DIAMETER | LOC | OAL | RAD    | ITEM#            |
|----------|-----|-----|--------|------------------|
| 12       | 32  | 75  | Square | OPX5M-12032R0.0C |
| 12       | 32  | 75  | R0.5   | OPX5M-12032R0.5C |
| 12       | 32  | 75  | R1.0   | OPX5M-12032R1.0C |
| 12       | 32  | 75  | R1.5   | OPX5M-12032R1.5C |
| 12       | 32  | 75  | R2.0   | OPX5M-12032R2.0C |
| 12       | 32  | 75  | R3.0   | OPX5M-12032R3.0C |
| 12       | 32  | 75  | R4.5   | OPX5M-12032R4.5C |
| 12       | 50  | 100 | Square | OPX5M-12050R0.0C |
| 12       | 50  | 100 | R0.5   | OPX5M-12050R0.5C |
| 12       | 50  | 100 | R1.0   | OPX5M-12050R1.0C |
| 12       | 50  | 100 | R1.5   | OPX5M-12050R1.5C |
| 12       | 50  | 100 | R2.0   | OPX5M-12050R2.0C |
| 12       | 50  | 100 | R3.0   | OPX5M-12050R3.0C |
| 12       | 50  | 100 | R4.5   | OPX5M-12050R4.5C |
| 16       | 20  | 100 | Square | OPX5M-16020R0.0C |
| 16       | 20  | 100 | R0.5   | OPX5M-16020R0.5C |
| 16       | 20  | 100 | R1.0   | OPX5M-16020R1.0C |
| 16       | 20  | 100 | R1.5   | OPX5M-16020R1.5C |
| 16       | 20  | 100 | R2.0   | OPX5M-16020R2.0C |
| 16       | 20  | 100 | R3.0   | OPX5M-16020R3.0C |
| 16       | 20  | 100 | R4.5   | OPX5M-16020R4.5C |
| 16       | 20  | 100 | R6.0   | OPX5M-16020R6.0C |
| 16       | 41  | 100 | Square | OPX5M-16041R0.0C |
| 16       | 41  | 100 | R0.5   | OPX5M-16041R0.5C |
| 16       | 41  | 100 | R1.0   | OPX5M-16041R1.0C |
| 16       | 41  | 100 | R1.5   | OPX5M-16041R1.5C |
| 16       | 41  | 100 | R2.0   | OPX5M-16041R2.0C |
| 16       | 41  | 100 | R3.0   | OPX5M-16041R3.0C |
| 16       | 41  | 100 | R4.5   | OPX5M-16041R4.5C |
| 16       | 41  | 100 | R6.0   | OPX5M-16041R6.0C |

## 5 FLUTE - EDGE PREP - CHIP BREAKER FOR EXOTIC ALLOYS



OPX5MC

STUB - REGULAR - LONG - CHIP BREAKER METRIC

| DIAMETER | LOC | OAL | RAD    | ITEM#            |
|----------|-----|-----|--------|------------------|
| 16       | 57  | 125 | Square | OPX5M-16057R0.0C |
| 16       | 57  | 125 | R0.5   | OPX5M-16057R0.5C |
| 16       | 57  | 125 | R1.0   | OPX5M-16057R1.0C |
| 16       | 57  | 125 | R1.5   | OPX5M-16057R1.5C |
| 16       | 57  | 125 | R2.0   | OPX5M-16057R2.0C |
| 16       | 57  | 125 | R3.0   | OPX5M-16057R3.0C |
| 16       | 57  | 125 | R4.5   | OPX5M-16057R4.5C |
| 16       | 57  | 125 | R6.0   | OPX5M-16057R6.0C |
| 20       | 25  | 100 | Square | OPX5M-20025R0.0C |
| 20       | 25  | 100 | R0.5   | OPX5M-20025R0.5C |
| 20       | 25  | 100 | R1.0   | OPX5M-20025R1.0C |
| 20       | 25  | 100 | R1.5   | OPX5M-20025R1.5C |
| 20       | 25  | 100 | R2.0   | OPX5M-20025R2.0C |
| 20       | 25  | 100 | R3.0   | OPX5M-20025R3.0C |
| 20       | 25  | 100 | R4.5   | OPX5M-20025R4.5C |
| 20       | 25  | 100 | R6.0   | OPX5M-20025R6.0C |
| 20       | 41  | 100 | Square | OPX5M-20041R0.0C |
| 20       | 41  | 100 | R0.5   | OPX5M-20041R0.5C |
| 20       | 41  | 100 | R1.0   | OPX5M-20041R1.0C |
| 20       | 41  | 100 | R1.5   | OPX5M-20041R1.5C |
| 20       | 41  | 100 | R2.0   | OPX5M-20041R2.0C |
| 20       | 41  | 100 | R3.0   | OPX5M-20041R3.0C |
| 20       | 41  | 100 | R4.5   | OPX5M-20041R4.5C |
| 20       | 41  | 100 | R6.0   | OPX5M-20041R6.0C |
| 20       | 67  | 125 | Square | OPX5M-20067R0.0C |
| 20       | 67  | 125 | R0.5   | OPX5M-20067R0.5C |
| 20       | 67  | 125 | R1.0   | OPX5M-20067R1.0C |
| 20       | 67  | 125 | R1.5   | OPX5M-20067R1.5C |
| 20       | 67  | 125 | R2.0   | OPX5M-20067R2.0C |
| 20       | 67  | 125 | R3.0   | OPX5M-20067R3.0C |

| DIAMETER | LOC | OAL | RAD    | ITEM#            |
|----------|-----|-----|--------|------------------|
| 20       | 67  | 125 | R4.5   | OPX5M-20067R4.5C |
| 20       | 67  | 125 | R6.0   | OPX5M-20067R6.0C |
| 25       | 45  | 125 | Square | OPX5M-25045R0.0C |
| 25       | 45  | 125 | R0.5   | OPX5M-25045R0.5C |
| 25       | 45  | 125 | R1.0   | OPX5M-25045R1.0C |
| 25       | 45  | 125 | R1.5   | OPX5M-25045R1.5C |
| 25       | 45  | 125 | R2.0   | OPX5M-25045R2.0C |
| 25       | 45  | 125 | R3.0   | OPX5M-25045R3.0C |
| 25       | 45  | 125 | R4.5   | OPX5M-25045R4.5C |
| 25       | 45  | 125 | R6.0   | OPX5M-25045R6.0C |
| 25       | 76  | 150 | Square | OPX5M-25076R0.0C |
| 25       | 76  | 150 | R0.5   | OPX5M-25076R0.5C |
| 25       | 76  | 150 | R1.0   | OPX5M-25076R1.0C |
| 25       | 76  | 150 | R1.5   | OPX5M-25076R1.5C |
| 25       | 76  | 150 | R2.0   | OPX5M-25076R2.0C |
| 25       | 76  | 150 | R3.0   | OPX5M-25076R3.0C |
| 25       | 76  | 150 | R4.5   | OPX5M-25076R4.5C |
| 25       | 76  | 150 | R6.0   | OPX5M-25076R6.0C |

# OPXA ENDMILLS

Best used for Alluminum alloy

## SPECIAL FEATURES

### UNEQUAL INDEXING

Eliminates tool vibrations around tool circumference by spreading cutting forces unevenly for a more stable cutting.

### DOUBLE FLUTING

The double fluting helps with the chip evacuation on the full length of cut, when machining at high speed.

### DOUBLE GASHING

Allows the tool to do ramping while machining.

### MARGIN

0.002" width to reduce vibration when machining walls and corners.

### WIPER FLAT

Small flat spot on top of tool to enhance surface finish of the machined part.

### CHIP BREAKER

Unique Chipbreaker design to help reduce the load on the tool when machining.

### POLISHED

Prevent chips from sticking inside the tool, enhancing material removal rate and machining speeds.

### ECCENTRIC RELIEF

A continuous convex relief grind to provides a stronger cutting edge by maintaining more material behind the cutting edge



## 5 FLUTE - DOUBLE RAKE - CHIP BREAKER



OPXA

STUB - REGULAR - LONG - CHIP BREAKER INCH

| DIAMETER | LOC   | OAL | RAD    | ITEM#          |
|----------|-------|-----|--------|----------------|
| 1/2      | 5/8   | 3   | Square | OPXA-3210R000C |
| 1/2      | 5/8   | 3   | R.015  | OPXA-3210R015C |
| 1/2      | 5/8   | 3   | R.030  | OPXA-3210R030C |
| 1/2      | 5/8   | 3   | R.060  | OPXA-3210R060C |
| 1/2      | 1 1/4 | 3   | Square | OPXA-3220R000C |
| 1/2      | 1 1/4 | 3   | R.015  | OPXA-3220R015C |
| 1/2      | 1 1/4 | 3   | R.030  | OPXA-3220R030C |
| 1/2      | 1 1/4 | 3   | R.060  | OPXA-3220R060C |
| 1/2      | 2     | 4   | Square | OPXA-3232R000C |
| 1/2      | 2     | 4   | R.015  | OPXA-3232R015C |
| 1/2      | 2     | 4   | R.030  | OPXA-3232R030C |
| 1/2      | 2     | 4   | R.060  | OPXA-3232R060C |
| 5/8      | 3/4   | 4   | Square | OPXA-4012R000C |
| 5/8      | 3/4   | 4   | R.015  | OPXA-4012R015C |
| 5/8      | 3/4   | 4   | R.030  | OPXA-4012R030C |
| 5/8      | 3/4   | 4   | R.060  | OPXA-4012R060C |
| 5/8      | 1 5/8 | 5   | Square | OPXA-4026R000C |
| 5/8      | 1 5/8 | 5   | R.015  | OPXA-4026R015C |
| 5/8      | 1 5/8 | 5   | R.030  | OPXA-4026R030C |
| 5/8      | 1 5/8 | 5   | R.060  | OPXA-4026R060C |
| 5/8      | 2 1/4 | 5   | Square | OPXA-4036R000C |
| 5/8      | 2 1/4 | 5   | R.015  | OPXA-4036R015C |
| 5/8      | 2 1/4 | 5   | R.030  | OPXA-4036R030C |
| 5/8      | 2 1/4 | 5   | R.060  | OPXA-4036R060C |
| 3/4      | 3/4   | 4   | Square | OPXA-4812R000C |
| 3/4      | 3/4   | 4   | R.015  | OPXA-4812R015C |
| 3/4      | 3/4   | 4   | R.030  | OPXA-4812R030C |
| 3/4      | 3/4   | 4   | R.060  | OPXA-4812R060C |
| 3/4      | 1 5/8 | 4   | Square | OPXA-4826R000C |
| 3/4      | 1 5/8 | 4   | R.015  | OPXA-4826R015C |

| DIAMETER | LOC   | OAL | RAD    | ITEM#          |
|----------|-------|-----|--------|----------------|
| 3/4      | 1 5/8 | 4   | R.030  | OPXA-4826R030C |
| 3/4      | 1 5/8 | 4   | R.060  | OPXA-4826R060C |
| 3/4      | 2 5/8 | 5   | Square | OPXA-4842R000C |
| 3/4      | 2 5/8 | 5   | R.015  | OPXA-4842R015C |
| 3/4      | 2 5/8 | 5   | R.030  | OPXA-4842R030C |
| 3/4      | 2 5/8 | 5   | R.060  | OPXA-4842R060C |
| 1        | 1 3/4 | 5   | Square | OPXA-6428R000C |
| 1        | 1 3/4 | 5   | R.015  | OPXA-6428R015C |
| 1        | 1 3/4 | 5   | R.030  | OPXA-6428R030C |
| 1        | 1 3/4 | 5   | R.060  | OPXA-6428R060C |
| 1        | 3     | 5   | Square | OPXA-6448R000C |
| 1        | 3     | 5   | R.015  | OPXA-6448R015C |
| 1        | 3     | 5   | R.030  | OPXA-6448R030C |
| 1        | 3     | 5   | R.060  | OPXA-6448R060C |



## 5 FLUTE - DOUBLE RAKE - CHIP BREAKER



OPXAMC

STUB - REGULAR - LONG - CHIP BREAKER METRIC

| DIAMETER | LOC | OAL | RAD    | ITEM#            |
|----------|-----|-----|--------|------------------|
| 12       | 16  | 75  | Square | OPXAM-12016R0.0C |
| 12       | 16  | 75  | R0.5   | OPXAM-12016R0.5C |
| 12       | 16  | 75  | R1.0   | OPXAM-12016R1.0C |
| 12       | 16  | 75  | R2.0   | OPXAM-12016R2.0C |
| 12       | 32  | 75  | Square | OPXAM-12032R0.0C |
| 12       | 32  | 75  | R0.5   | OPXAM-12032R0.5C |
| 12       | 32  | 75  | R1.0   | OPXAM-12032R1.0C |
| 12       | 32  | 75  | R2.0   | OPXAM-12032R2.0C |
| 12       | 50  | 100 | Square | OPXAM-12050R0.0C |
| 12       | 50  | 100 | R0.5   | OPXAM-12050R0.5C |
| 12       | 50  | 100 | R1.0   | OPXAM-12050R1.0C |
| 12       | 50  | 100 | R2.0   | OPXAM-12050R2.0C |
| 16       | 20  | 100 | Square | OPXAM-16020R0.0C |
| 16       | 20  | 100 | R0.5   | OPXAM-16020R0.5C |
| 16       | 20  | 100 | R1.0   | OPXAM-16020R1.0C |
| 16       | 20  | 100 | R2.0   | OPXAM-16020R2.0C |
| 16       | 41  | 125 | Square | OPXAM-16041R0.0C |
| 16       | 41  | 125 | R0.5   | OPXAM-16041R0.5C |
| 16       | 41  | 125 | R1.0   | OPXAM-16041R1.0C |
| 16       | 41  | 125 | R2.0   | OPXAM-16041R2.0C |
| 16       | 57  | 125 | Square | OPXAM-16057R0.0C |
| 16       | 57  | 125 | R0.5   | OPXAM-16057R0.5C |
| 16       | 57  | 125 | R1.0   | OPXAM-16057R1.0C |
| 16       | 57  | 125 | R2.0   | OPXAM-16057R2.0C |
| 20       | 25  | 100 | Square | OPXAM-20025R0.0C |
| 20       | 25  | 100 | R0.5   | OPXAM-20025R0.5C |
| 20       | 25  | 100 | R1.0   | OPXAM-20025R1.0C |
| 20       | 25  | 100 | R2.0   | OPXAM-20025R2.0C |
| 20       | 41  | 125 | Square | OPXAM-20041R0.0C |
| 20       | 41  | 125 | R0.5   | OPXAM-20041R0.5C |

| DIAMETER | LOC | OAL | RAD    | ITEM#            |
|----------|-----|-----|--------|------------------|
| 20       | 41  | 125 | R1.0   | OPXAM-20041R1.0C |
| 20       | 41  | 125 | R2.0   | OPXAM-20041R2.0C |
| 20       | 67  | 125 | Square | OPXAM-20067R0.0C |
| 20       | 67  | 125 | R0.5   | OPXAM-20067R0.5C |
| 20       | 67  | 125 | R1.0   | OPXAM-20067R1.0C |
| 20       | 67  | 125 | R2.0   | OPXAM-20067R2.0C |
| 25       | 45  | 125 | Square | OPXAM-25045R0.0C |
| 25       | 45  | 125 | R0.5   | OPXAM-25045R0.5C |
| 25       | 45  | 125 | R1.0   | OPXAM-25045R1.0C |
| 25       | 45  | 125 | R2.0   | OPXAM-25045R2.0C |
| 25       | 76  | 150 | Square | OPXAM-25076R0.0C |
| 25       | 76  | 150 | R0.5   | OPXAM-25076R0.5C |
| 25       | 76  | 150 | R1.0   | OPXAM-25076R1.0C |
| 25       | 76  | 150 | R2.0   | OPXAM-25076R2.0C |

# OP6 ENDMILLS

Best used for Steel, Stainless and Exotics materials

## SPECIAL FEATURES

### UNEQUAL INDEXING

Eliminates tool vibrations around tool circumference by spreading cutting forces unevenly for a more stable cutting.

### VARIABLE HELIX

Breaks up harmonic vibrations (chatter) along the length and improves surface finish and tool life.

### TANGENTIAL RADIUS

Allows a smooth blending radius on the machined part, improving the manufacturing times by avoiding the finishing process.

### nACRo PVD COATING

Offers a higher cutting edge resistance to wear and higher heat tolerance.

### DOUBLE RAKE

Enables material to be fiercely attacked at a high material removal rate thanks to its two distinct rakes, which enable chip breakage and prevent jamming the flutes. These tools can therefore be used on very hard materials and/or on those with very low machinability rating such as exotic material.



## 6 FLUTE - STUB



OP60

STUB INCH

| DIAMETER | LOC  | OAL | RAD    | ITEM#         |
|----------|------|-----|--------|---------------|
| 1/4      | 3/8  | 3   | Square | OP60-1606R000 |
| 1/4      | 3/8  | 3   | R.015  | OP60-1606R015 |
| 1/4      | 3/8  | 3   | R.030  | OP60-1606R030 |
| 1/4      | 3/8  | 3   | R.060  | OP60-1606R060 |
| 1/4      | 3/8  | 3   | R.090  | OP60-1606R090 |
| 5/16     | 7/16 | 3   | Square | OP60-2007R000 |
| 5/16     | 7/16 | 3   | R.015  | OP60-2007R015 |
| 5/16     | 7/16 | 3   | R.030  | OP60-2007R030 |
| 5/16     | 7/16 | 3   | R.060  | OP60-2007R060 |
| 5/16     | 7/16 | 3   | R.090  | OP60-2007R090 |
| 5/16     | 7/16 | 3   | R.125  | OP60-2007R125 |
| 3/8      | 1/2  | 3   | Square | OP60-2408R000 |
| 3/8      | 1/2  | 3   | R.015  | OP60-2408R015 |
| 3/8      | 1/2  | 3   | R.030  | OP60-2408R030 |
| 3/8      | 1/2  | 3   | R.060  | OP60-2408R060 |
| 3/8      | 1/2  | 3   | R.090  | OP60-2408R090 |
| 3/8      | 1/2  | 3   | R.125  | OP60-2408R125 |
| 7/16     | 5/8  | 3   | Square | OP60-2810R000 |
| 7/16     | 5/8  | 3   | R.015  | OP60-2810R015 |
| 7/16     | 5/8  | 3   | R.030  | OP60-2810R030 |
| 7/16     | 5/8  | 3   | R.060  | OP60-2810R060 |
| 7/16     | 5/8  | 3   | R.090  | OP60-2810R090 |
| 7/16     | 5/8  | 3   | R.125  | OP60-2810R125 |
| 7/16     | 5/8  | 3   | R.190  | OP60-2810R190 |
| 1/2      | 5/8  | 3   | Square | OP60-3210R000 |
| 1/2      | 5/8  | 3   | R.015  | OP60-3210R015 |
| 1/2      | 5/8  | 3   | R.030  | OP60-3210R030 |
| 1/2      | 5/8  | 3   | R.060  | OP60-3210R060 |
| 1/2      | 5/8  | 3   | R.090  | OP60-3210R090 |
| 1/2      | 5/8  | 3   | R.125  | OP60-3210R125 |

| DIAMETER | LOC | OAL | RAD    | ITEM#         |
|----------|-----|-----|--------|---------------|
| 1/2      | 5/8 | 3   | R.190  | OP60-3210R190 |
| 5/8      | 3/4 | 4   | Square | OP60-4012R000 |
| 5/8      | 3/4 | 4   | R.015  | OP60-4012R015 |
| 5/8      | 3/4 | 4   | R.030  | OP60-4012R030 |
| 5/8      | 3/4 | 4   | R.060  | OP60-4012R060 |
| 5/8      | 3/4 | 4   | R.090  | OP60-4012R090 |
| 5/8      | 3/4 | 4   | R.125  | OP60-4012R125 |
| 5/8      | 3/4 | 4   | R.190  | OP60-4012R190 |
| 5/8      | 3/4 | 4   | R.250  | OP60-4012R250 |
| 3/4      | 3/4 | 4   | Square | OP60-4812R000 |
| 3/4      | 3/4 | 4   | R.015  | OP60-4812R015 |
| 3/4      | 3/4 | 4   | R.030  | OP60-4812R030 |
| 3/4      | 3/4 | 4   | R.060  | OP60-4812R060 |
| 3/4      | 3/4 | 4   | R.090  | OP60-4812R090 |
| 3/4      | 3/4 | 4   | R.125  | OP60-4812R125 |
| 3/4      | 3/4 | 4   | R.190  | OP60-4812R190 |
| 3/4      | 3/4 | 4   | R.250  | OP60-4812R250 |

## 6 FLUTE - STUB



OP60M

STUB METRIC

| DIAMETER | LOC | OAL | RAD    | ITEM#           |
|----------|-----|-----|--------|-----------------|
| 6        | 10  | 75  | Square | OP60M-06010R0.0 |
| 6        | 10  | 75  | R0.5   | OP60M-06010R0.5 |
| 6        | 10  | 75  | R1.0   | OP60M-06010R1.0 |
| 6        | 10  | 75  | R1.5   | OP60M-06010R1.5 |
| 6        | 10  | 75  | R2.0   | OP60M-06010R2.0 |
| 8        | 11  | 75  | Square | OP60M-08011R0.0 |
| 8        | 11  | 75  | R0.5   | OP60M-08011R0.5 |
| 8        | 11  | 75  | R1.0   | OP60M-08011R1.0 |
| 8        | 11  | 75  | R1.5   | OP60M-08011R1.5 |
| 8        | 11  | 75  | R2.0   | OP60M-08011R2.0 |
| 8        | 11  | 75  | R3.0   | OP60M-08011R3.0 |
| 10       | 12  | 75  | Square | OP60M-10012R0.0 |
| 10       | 12  | 75  | R0.5   | OP60M-10012R0.5 |
| 10       | 12  | 75  | R1.0   | OP60M-10012R1.0 |
| 10       | 12  | 75  | R1.5   | OP60M-10012R1.5 |
| 10       | 12  | 75  | R2.0   | OP60M-10012R2.0 |
| 10       | 12  | 75  | R3.0   | OP60M-10012R3.0 |
| 11       | 16  | 75  | Square | OP60M-11016R0.0 |
| 11       | 16  | 75  | R0.5   | OP60M-11016R0.5 |
| 11       | 16  | 75  | R1.0   | OP60M-11016R1.0 |
| 11       | 16  | 75  | R1.5   | OP60M-11016R1.5 |
| 11       | 16  | 75  | R2.0   | OP60M-11016R2.0 |
| 11       | 16  | 75  | R3.0   | OP60M-11016R3.0 |
| 11       | 16  | 75  | R4.5   | OP60M-11016R4.5 |
| 12       | 16  | 75  | Square | OP60M-12016R0.0 |
| 12       | 16  | 75  | R0.5   | OP60M-12016R0.5 |
| 12       | 16  | 75  | R1.0   | OP60M-12016R1.0 |
| 12       | 16  | 75  | R1.5   | OP60M-12016R1.5 |
| 12       | 16  | 75  | R2.0   | OP60M-12016R2.0 |
| 12       | 16  | 75  | R3.0   | OP60M-12016R3.0 |

| DIAMETER | LOC | OAL | RAD    | ITEM#           |
|----------|-----|-----|--------|-----------------|
| 12       | 16  | 75  | R4.5   | OP60M-12016R4.5 |
| 16       | 20  | 100 | Square | OP60M-16020R0.0 |
| 16       | 20  | 100 | R0.5   | OP60M-16020R0.5 |
| 16       | 20  | 100 | R1.0   | OP60M-16020R1.0 |
| 16       | 20  | 100 | R1.5   | OP60M-16020R1.5 |
| 16       | 20  | 100 | R2.0   | OP60M-16020R2.0 |
| 16       | 20  | 100 | R3.0   | OP60M-16020R3.0 |
| 16       | 20  | 100 | R4.5   | OP60M-16020R4.5 |
| 16       | 20  | 100 | R6.0   | OP60M-16020R6.0 |
| 20       | 25  | 100 | Square | OP60M-20025R0.0 |
| 20       | 25  | 100 | R0.5   | OP60M-20025R0.5 |
| 20       | 25  | 100 | R1.0   | OP60M-20025R1.0 |
| 20       | 25  | 100 | R1.5   | OP60M-20025R1.5 |
| 20       | 25  | 100 | R2.0   | OP60M-20025R2.0 |
| 20       | 25  | 100 | R3.0   | OP60M-20025R3.0 |
| 20       | 25  | 100 | R4.5   | OP60M-20025R4.5 |
| 20       | 25  | 100 | R6.0   | OP60M-20025R6.0 |



## 6 FLUTE - STUB - BALL NOSE



OP60B

STUB BALL INCH

| DIAMETER | LOC  | OAL | ITEM#          |
|----------|------|-----|----------------|
| 1/4      | 3/8  | 3   | OP60-1606R125B |
| 5/16     | 7/16 | 3   | OP60-2007R155B |
| 3/8      | 1/2  | 3   | OP60-2408R190B |
| 7/16     | 5/8  | 3   | OP60-2810R220B |
| 1/2      | 5/8  | 3   | OP60-3210R250B |
| 5/8      | 3/4  | 4   | OP60-4012R310B |
| 3/4      | 3/4  | 4   | OP60-4812R375B |

OP60MB

STUB BALL METRIC

| DIAMETER | LOC | OAL | ITEM#             |
|----------|-----|-----|-------------------|
| 6        | 10  | 75  | OP60M-06010R3.0B  |
| 8        | 11  | 75  | OP60M-08011R4.0B  |
| 10       | 12  | 75  | OP60M-10012R5.0B  |
| 11       | 16  | 75  | OP60M-11016R5.5B  |
| 12       | 16  | 75  | OP60M-12016R6.0B  |
| 16       | 20  | 100 | OP60M-16020R8.0B  |
| 20       | 25  | 100 | OP60M-20025R10.0B |

## 6 FLUTE - STUB - CHIP BREAKER



OP60C

STUB CHIP BREAKER INCH

| DIAMETER | LOC  | OAL | RAD    | ITEM#          |
|----------|------|-----|--------|----------------|
| 1/4      | 3/8  | 3   | Square | OP60-1606R000C |
| 1/4      | 3/8  | 3   | R.015  | OP60-1606R015C |
| 1/4      | 3/8  | 3   | R.030  | OP60-1606R030C |
| 1/4      | 3/8  | 3   | R.060  | OP60-1606R060C |
| 1/4      | 3/8  | 3   | R.090  | OP60-1606R090C |
| 5/16     | 7/16 | 3   | Square | OP60-2007R000C |
| 5/16     | 7/16 | 3   | R.015  | OP60-2007R015C |
| 5/16     | 7/16 | 3   | R.030  | OP60-2007R030C |
| 5/16     | 7/16 | 3   | R.060  | OP60-2007R060C |
| 5/16     | 7/16 | 3   | R.090  | OP60-2007R090C |
| 5/16     | 7/16 | 3   | R.125  | OP60-2007R125C |
| 3/8      | 1/2  | 3   | Square | OP60-2408R000C |
| 3/8      | 1/2  | 3   | R.015  | OP60-2408R015C |
| 3/8      | 1/2  | 3   | R.030  | OP60-2408R030C |
| 3/8      | 1/2  | 3   | R.060  | OP60-2408R060C |
| 3/8      | 1/2  | 3   | R.090  | OP60-2408R090C |
| 3/8      | 1/2  | 3   | R.125  | OP60-2408R125C |
| 7/16     | 5/8  | 3   | Square | OP60-2810R000C |
| 7/16     | 5/8  | 3   | R.015  | OP60-2810R015C |
| 7/16     | 5/8  | 3   | R.030  | OP60-2810R030C |
| 7/16     | 5/8  | 3   | R.060  | OP60-2810R060C |
| 7/16     | 5/8  | 3   | R.090  | OP60-2810R090C |
| 7/16     | 5/8  | 3   | R.125  | OP60-2810R125C |
| 7/16     | 5/8  | 3   | R.190  | OP60-2810R190C |
| 1/2      | 5/8  | 3   | Square | OP60-3210R000C |
| 1/2      | 5/8  | 3   | R.015  | OP60-3210R015C |
| 1/2      | 5/8  | 3   | R.030  | OP60-3210R030C |
| 1/2      | 5/8  | 3   | R.060  | OP60-3210R060C |
| 1/2      | 5/8  | 3   | R.090  | OP60-3210R090C |
| 1/2      | 5/8  | 3   | R.125  | OP60-3210R125C |

| DIAMETER | LOC | OAL | RAD    | ITEM#          |
|----------|-----|-----|--------|----------------|
| 1/2      | 5/8 | 3   | R.190  | OP60-3210R190C |
| 5/8      | 3/4 | 4   | Square | OP60-4012R000C |
| 5/8      | 3/4 | 4   | R.015  | OP60-4012R015C |
| 5/8      | 3/4 | 4   | R.030  | OP60-4012R030C |
| 5/8      | 3/4 | 4   | R.060  | OP60-4012R060C |
| 5/8      | 3/4 | 4   | R.090  | OP60-4012R090C |
| 5/8      | 3/4 | 4   | R.125  | OP60-4012R125C |
| 5/8      | 3/4 | 4   | R.190  | OP60-4012R190C |
| 5/8      | 3/4 | 4   | R.250  | OP60-4012R250C |
| 3/4      | 3/4 | 4   | Square | OP60-4812R000C |
| 3/4      | 3/4 | 4   | R.015  | OP60-4812R015C |
| 3/4      | 3/4 | 4   | R.030  | OP60-4812R030C |
| 3/4      | 3/4 | 4   | R.060  | OP60-4812R060C |
| 3/4      | 3/4 | 4   | R.090  | OP60-4812R090C |
| 3/4      | 3/4 | 4   | R.125  | OP60-4812R125C |
| 3/4      | 3/4 | 4   | R.190  | OP60-4812R190C |
| 3/4      | 3/4 | 4   | R.250  | OP60-4812R250C |

## 6 FLUTE - STUB - CHIP BREAKER



OP60MC

### STUB CHIP BREAKER METRIC

| DIAMETER | LOC | OAL | RAD    | ITEM#            |
|----------|-----|-----|--------|------------------|
| 6        | 10  | 75  | Square | OP60M-06010R0.0C |
| 6        | 10  | 75  | R0.5   | OP60M-06010R0.5C |
| 6        | 10  | 75  | R1.0   | OP60M-06010R1.0C |
| 6        | 10  | 75  | R1.5   | OP60M-06010R1.5C |
| 6        | 10  | 75  | R2.0   | OP60M-06010R2.0C |
| 8        | 11  | 75  | Square | OP60M-08011R0.0C |
| 8        | 11  | 75  | R0.5   | OP60M-08011R0.5C |
| 8        | 11  | 75  | R1.0   | OP60M-08011R1.0C |
| 8        | 11  | 75  | R1.5   | OP60M-08011R1.5C |
| 8        | 11  | 75  | R2.0   | OP60M-08011R2.0C |
| 8        | 11  | 75  | R3.0   | OP60M-08011R3.0C |
| 10       | 12  | 75  | Square | OP60M-10012R0.0C |
| 10       | 12  | 75  | R0.5   | OP60M-10012R0.5C |
| 10       | 12  | 75  | R1.0   | OP60M-10012R1.0C |
| 10       | 12  | 75  | R1.5   | OP60M-10012R1.5C |
| 10       | 12  | 75  | R2.0   | OP60M-10012R2.0C |
| 10       | 12  | 75  | R3.0   | OP60M-10012R3.0C |
| 11       | 16  | 75  | Square | OP60M-11016R0.0C |
| 11       | 16  | 75  | R0.5   | OP60M-11016R0.5C |
| 11       | 16  | 75  | R1.0   | OP60M-11016R1.0C |
| 11       | 16  | 75  | R1.5   | OP60M-11016R1.5C |
| 11       | 16  | 75  | R2.0   | OP60M-11016R2.0C |
| 11       | 16  | 75  | R3.0   | OP60M-11016R3.0C |
| 11       | 16  | 75  | R4.5   | OP60M-11016R4.5C |
| 12       | 16  | 75  | Square | OP60M-12016R0.0C |
| 12       | 16  | 75  | R0.5   | OP60M-12016R0.5C |
| 12       | 16  | 75  | R1.0   | OP60M-12016R1.0C |
| 12       | 16  | 75  | R1.5   | OP60M-12016R1.5C |
| 12       | 16  | 75  | R2.0   | OP60M-12016R2.0C |
| 12       | 16  | 75  | R3.0   | OP60M-12016R3.0C |

| DIAMETER | LOC | OAL | RAD    | ITEM#            |
|----------|-----|-----|--------|------------------|
| 12       | 16  | 75  | R4.5   | OP60M-12016R4.5C |
| 16       | 20  | 100 | Square | OP60M-16020R0.0C |
| 16       | 20  | 100 | R0.5   | OP60M-16020R0.5C |
| 16       | 20  | 100 | R1.0   | OP60M-16020R1.0C |
| 16       | 20  | 100 | R1.5   | OP60M-16020R1.5C |
| 16       | 20  | 100 | R2.0   | OP60M-16020R2.0C |
| 16       | 20  | 100 | R3.0   | OP60M-16020R3.0C |
| 16       | 20  | 100 | R4.5   | OP60M-16020R4.5C |
| 16       | 20  | 100 | R6.0   | OP60M-16020R6.0C |
| 20       | 25  | 100 | Square | OP60M-20025R0.0C |
| 20       | 25  | 100 | R0.5   | OP60M-20025R0.5C |
| 20       | 25  | 100 | R1.0   | OP60M-20025R1.0C |
| 20       | 25  | 100 | R1.5   | OP60M-20025R1.5C |
| 20       | 25  | 100 | R2.0   | OP60M-20025R2.0C |
| 20       | 25  | 100 | R3.0   | OP60M-20025R3.0C |
| 20       | 25  | 100 | R4.5   | OP60M-20025R4.5C |
| 20       | 25  | 100 | R6.0   | OP60M-20025R6.0C |

## 6 FLUTE - REGULAR



OP61

REGULAR INCH

| DIAMETER | LOC   | OAL | RAD    | ITEM#         |
|----------|-------|-----|--------|---------------|
| 1/4      | 3/4   | 3   | Square | OP61-1612R000 |
| 1/4      | 3/4   | 3   | R.015  | OP61-1612R015 |
| 1/4      | 3/4   | 3   | R.030  | OP61-1612R030 |
| 1/4      | 3/4   | 3   | R.060  | OP61-1612R060 |
| 1/4      | 3/4   | 3   | R.090  | OP61-1612R090 |
| 5/16     | 13/16 | 3   | Square | OP61-2013R000 |
| 5/16     | 13/16 | 3   | R.015  | OP61-2013R015 |
| 5/16     | 13/16 | 3   | R.030  | OP61-2013R030 |
| 5/16     | 13/16 | 3   | R.060  | OP61-2013R060 |
| 5/16     | 13/16 | 3   | R.090  | OP61-2013R090 |
| 5/16     | 13/16 | 3   | R.125  | OP61-2013R125 |
| 3/8      | 1     | 3   | Square | OP61-2416R000 |
| 3/8      | 1     | 3   | R.015  | OP61-2416R015 |
| 3/8      | 1     | 3   | R.030  | OP61-2416R030 |
| 3/8      | 1     | 3   | R.060  | OP61-2416R060 |
| 3/8      | 1     | 3   | R.090  | OP61-2416R090 |
| 3/8      | 1     | 3   | R.125  | OP61-2416R125 |
| 7/16     | 1     | 3   | Square | OP61-2816R000 |
| 7/16     | 1     | 3   | R.015  | OP61-2816R015 |
| 7/16     | 1     | 3   | R.030  | OP61-2816R030 |
| 7/16     | 1     | 3   | R.060  | OP61-2816R060 |
| 7/16     | 1     | 3   | R.090  | OP61-2816R090 |
| 7/16     | 1     | 3   | R.125  | OP61-2816R125 |
| 7/16     | 1     | 3   | R.190  | OP61-2816R190 |
| 1/2      | 1 1/4 | 3   | Square | OP61-3220R000 |
| 1/2      | 1 1/4 | 3   | R.015  | OP61-3220R015 |
| 1/2      | 1 1/4 | 3   | R.030  | OP61-3220R030 |
| 1/2      | 1 1/4 | 3   | R.060  | OP61-3220R060 |
| 1/2      | 1 1/4 | 3   | R.090  | OP61-3220R090 |
| 1/2      | 1 1/4 | 3   | R.125  | OP61-3220R125 |

| DIAMETER | LOC   | OAL | RAD    | ITEM#         |
|----------|-------|-----|--------|---------------|
| 1/2      | 1 1/4 | 3   | R.190  | OP61-3220R190 |
| 5/8      | 1 5/8 | 4   | Square | OP61-4026R000 |
| 5/8      | 1 5/8 | 4   | R.015  | OP61-4026R015 |
| 5/8      | 1 5/8 | 4   | R.030  | OP61-4026R030 |
| 5/8      | 1 5/8 | 4   | R.060  | OP61-4026R060 |
| 5/8      | 1 5/8 | 4   | R.090  | OP61-4026R090 |
| 5/8      | 1 5/8 | 4   | R.125  | OP61-4026R125 |
| 5/8      | 1 5/8 | 4   | R.190  | OP61-4026R190 |
| 5/8      | 1 5/8 | 4   | R.250  | OP61-4026R250 |
| 3/4      | 1 5/8 | 4   | Square | OP61-4826R000 |
| 3/4      | 1 5/8 | 4   | R.015  | OP61-4826R015 |
| 3/4      | 1 5/8 | 4   | R.030  | OP61-4826R030 |
| 3/4      | 1 5/8 | 4   | R.060  | OP61-4826R060 |
| 3/4      | 1 5/8 | 4   | R.090  | OP61-4826R090 |
| 3/4      | 1 5/8 | 4   | R.125  | OP61-4826R125 |
| 3/4      | 1 5/8 | 4   | R.190  | OP61-4826R190 |
| 3/4      | 1 5/8 | 4   | R.250  | OP61-4826R250 |
| 1        | 1 3/4 | 5   | Square | OP61-6428R000 |
| 1        | 1 3/4 | 5   | R.015  | OP61-6428R015 |
| 1        | 1 3/4 | 5   | R.030  | OP61-6428R030 |
| 1        | 1 3/4 | 5   | R.060  | OP61-6428R060 |
| 1        | 1 3/4 | 5   | R.090  | OP61-6428R090 |
| 1        | 1 3/4 | 5   | R.125  | OP61-6428R125 |
| 1        | 1 3/4 | 5   | R.190  | OP61-6428R190 |
| 1        | 1 3/4 | 5   | R.250  | OP61-6428R250 |



## 6 FLUTE - REGULAR

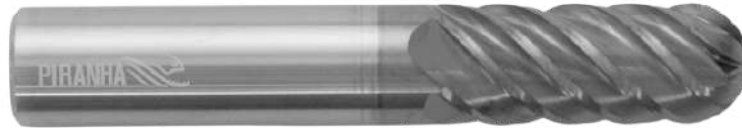


OP61M  
REGULAR METRIC

| DIAMETER | LOC | OAL | RAD    | ITEM#           |
|----------|-----|-----|--------|-----------------|
| 6        | 20  | 75  | Square | OP61M-06020R0.0 |
| 6        | 20  | 75  | R0.5   | OP61M-06020R0.5 |
| 6        | 20  | 75  | R1.0   | OP61M-06020R1.0 |
| 6        | 20  | 75  | R1.5   | OP61M-06020R1.5 |
| 6        | 20  | 75  | R2.0   | OP61M-06020R2.0 |
| 8        | 21  | 75  | Square | OP61M-08021R0.0 |
| 8        | 21  | 75  | R0.5   | OP61M-08021R0.5 |
| 8        | 21  | 75  | R1.0   | OP61M-08021R1.0 |
| 8        | 21  | 75  | R1.5   | OP61M-08021R1.5 |
| 8        | 21  | 75  | R2.0   | OP61M-08021R2.0 |
| 8        | 21  | 75  | R3.0   | OP61M-08021R3.0 |
| 10       | 25  | 75  | Square | OP61M-10025R0.0 |
| 10       | 25  | 75  | R0.5   | OP61M-10025R0.5 |
| 10       | 25  | 75  | R1.0   | OP61M-10025R1.0 |
| 10       | 25  | 75  | R1.5   | OP61M-10025R1.5 |
| 10       | 25  | 75  | R2.0   | OP61M-10025R2.0 |
| 10       | 25  | 75  | R3.0   | OP61M-10025R3.0 |
| 11       | 25  | 75  | Square | OP61M-11025R0.0 |
| 11       | 25  | 75  | R0.5   | OP61M-11025R0.5 |
| 11       | 25  | 75  | R1.0   | OP61M-11025R1.0 |
| 11       | 25  | 75  | R1.5   | OP61M-11025R1.5 |
| 11       | 25  | 75  | R2.0   | OP61M-11025R2.0 |
| 11       | 25  | 75  | R3.0   | OP61M-11025R3.0 |
| 11       | 25  | 75  | R4.5   | OP61M-11025R4.5 |
| 12       | 32  | 75  | Square | OP61M-12032R0.0 |
| 12       | 32  | 75  | R0.5   | OP61M-12032R0.5 |
| 12       | 32  | 75  | R1.0   | OP61M-12032R1.0 |
| 12       | 32  | 75  | R1.5   | OP61M-12032R1.5 |
| 12       | 32  | 75  | R2.0   | OP61M-12032R2.0 |
| 12       | 32  | 75  | R3.0   | OP61M-12032R3.0 |

| DIAMETER | LOC | OAL | RAD    | ITEM#           |
|----------|-----|-----|--------|-----------------|
| 12       | 32  | 75  | R4.5   | OP61M-12032R4.5 |
| 16       | 41  | 100 | Square | OP61M-16041R0.0 |
| 16       | 41  | 100 | R0.5   | OP61M-16041R0.5 |
| 16       | 41  | 100 | R1.0   | OP61M-16041R1.0 |
| 16       | 41  | 100 | R1.5   | OP61M-16041R1.5 |
| 16       | 41  | 100 | R2.0   | OP61M-16041R2.0 |
| 16       | 41  | 100 | R3.0   | OP61M-16041R3.0 |
| 16       | 41  | 100 | R4.5   | OP61M-16041R4.5 |
| 16       | 41  | 100 | R6.0   | OP61M-16041R6.0 |
| 20       | 41  | 100 | Square | OP61M-20041R0.0 |
| 20       | 41  | 100 | R0.5   | OP61M-20041R0.5 |
| 20       | 41  | 100 | R1.0   | OP61M-20041R1.0 |
| 20       | 41  | 100 | R1.5   | OP61M-20041R1.5 |
| 20       | 41  | 100 | R2.0   | OP61M-20041R2.0 |
| 20       | 41  | 100 | R3.0   | OP61M-20041R3.0 |
| 20       | 41  | 100 | R4.5   | OP61M-20041R4.5 |
| 20       | 41  | 100 | R6.0   | OP61M-20041R6.0 |
| 25       | 45  | 125 | Square | OP61M-25045R0.0 |
| 25       | 45  | 125 | R0.5   | OP61M-25045R0.5 |
| 25       | 45  | 125 | R1.0   | OP61M-25045R1.0 |
| 25       | 45  | 125 | R1.5   | OP61M-25045R1.5 |
| 25       | 45  | 125 | R2.0   | OP61M-25045R2.0 |
| 25       | 45  | 125 | R3.0   | OP61M-25045R3.0 |
| 25       | 45  | 125 | R4.5   | OP61M-25045R4.5 |
| 25       | 45  | 125 | R6.0   | OP61M-25045R6.0 |

## 6 FLUTE - REGULAR - BALL NOSE



OP61B

REGULAR BALL INCH

| DIAMETER | LOC   | OAL | ITEM#          |
|----------|-------|-----|----------------|
| 1/4      | 3/4   | 3   | OP61-1612R125B |
| 5/16     | 13/16 | 3   | OP61-2013R155B |
| 3/8      | 1     | 3   | OP61-2416R190B |
| 7/16     | 1     | 3   | OP61-2816R220B |
| 1/2      | 1 1/4 | 3   | OP61-3220R250B |
| 5/8      | 1 5/8 | 4   | OP61-4026R310B |
| 3/4      | 1 5/8 | 4   | OP61-4826R375B |
| 1        | 1 3/4 | 5   | OP61-6428R500B |

OP61MB

REGULAR BALL METRIC

| DIAMETER | LOC | OAL | ITEM#             |
|----------|-----|-----|-------------------|
| 6        | 20  | 75  | OP61M-06020R3.0B  |
| 8        | 21  | 75  | OP61M-08021R4.0B  |
| 10       | 25  | 75  | OP61M-10025R5.0B  |
| 11       | 25  | 75  | OP61M-11025R5.5B  |
| 12       | 32  | 75  | OP61M-12032R6.0B  |
| 16       | 41  | 100 | OP61M-16041R8.0B  |
| 20       | 41  | 100 | OP61M-20041R10.0B |
| 25       | 45  | 125 | OP61M-25045R12.5B |

## 6 FLUTE - REGULAR - CHIP BREAKER



OP61C

CHIP BREAKER INCH

| DIAMETER | LOC   | OAL | RAD    | ITEM#          |
|----------|-------|-----|--------|----------------|
| 1/4      | 3/4   | 3   | Square | OP61-1612R000C |
| 1/4      | 3/4   | 3   | R.015  | OP61-1612R015C |
| 1/4      | 3/4   | 3   | R.030  | OP61-1612R030C |
| 1/4      | 3/4   | 3   | R.060  | OP61-1612R060C |
| 1/4      | 3/4   | 3   | R.090  | OP61-1612R090C |
| 5/16     | 13/16 | 3   | Square | OP61-2013R000C |
| 5/16     | 13/16 | 3   | R.015  | OP61-2013R015C |
| 5/16     | 13/16 | 3   | R.030  | OP61-2013R030C |
| 5/16     | 13/16 | 3   | R.060  | OP61-2013R060C |
| 5/16     | 13/16 | 3   | R.090  | OP61-2013R090C |
| 5/16     | 13/16 | 3   | R.125  | OP61-2013R125C |
| 3/8      | 1     | 3   | Square | OP61-2416R000C |
| 3/8      | 1     | 3   | R.015  | OP61-2416R015C |
| 3/8      | 1     | 3   | R.030  | OP61-2416R030C |
| 3/8      | 1     | 3   | R.060  | OP61-2416R060C |
| 3/8      | 1     | 3   | R.090  | OP61-2416R090C |
| 3/8      | 1     | 3   | R.125  | OP61-2416R125C |
| 7/16     | 1     | 3   | Square | OP61-2816R000C |
| 7/16     | 1     | 3   | R.015  | OP61-2816R015C |
| 7/16     | 1     | 3   | R.030  | OP61-2816R030C |
| 7/16     | 1     | 3   | R.060  | OP61-2816R060C |
| 7/16     | 1     | 3   | R.090  | OP61-2816R090C |
| 7/16     | 1     | 3   | R.125  | OP61-2816R125C |
| 7/16     | 1     | 3   | R.190  | OP61-2816R190C |
| 1/2      | 1 1/4 | 3   | Square | OP61-3220R000C |
| 1/2      | 1 1/4 | 3   | R.015  | OP61-3220R015C |
| 1/2      | 1 1/4 | 3   | R.030  | OP61-3220R030C |
| 1/2      | 1 1/4 | 3   | R.060  | OP61-3220R060C |
| 1/2      | 1 1/4 | 3   | R.090  | OP61-3220R090C |
| 1/2      | 1 1/4 | 3   | R.125  | OP61-3220R125C |

| DIAMETER | LOC   | OAL | RAD    | ITEM#          |
|----------|-------|-----|--------|----------------|
| 1/2      | 1 1/4 | 3   | R.190  | OP61-3220R190C |
| 5/8      | 1 5/8 | 4   | Square | OP61-4026R000C |
| 5/8      | 1 5/8 | 4   | R.015  | OP61-4026R015C |
| 5/8      | 1 5/8 | 4   | R.030  | OP61-4026R030C |
| 5/8      | 1 5/8 | 4   | R.060  | OP61-4026R060C |
| 5/8      | 1 5/8 | 4   | R.090  | OP61-4026R090C |
| 5/8      | 1 5/8 | 4   | R.125  | OP61-4026R125C |
| 5/8      | 1 5/8 | 4   | R.190  | OP61-4026R190C |
| 5/8      | 1 5/8 | 4   | R.250  | OP61-4026R250C |
| 3/4      | 1 5/8 | 4   | Square | OP61-4826R000C |
| 3/4      | 1 5/8 | 4   | R.015  | OP61-4826R015C |
| 3/4      | 1 5/8 | 4   | R.030  | OP61-4826R030C |
| 3/4      | 1 5/8 | 4   | R.060  | OP61-4826R060C |
| 3/4      | 1 5/8 | 4   | R.090  | OP61-4826R090C |
| 3/4      | 1 5/8 | 4   | R.125  | OP61-4826R125C |
| 3/4      | 1 5/8 | 4   | R.190  | OP61-4826R190C |
| 3/4      | 1 5/8 | 4   | R.250  | OP61-4826R250C |
| 1        | 1 3/4 | 5   | Square | OP61-6428R000C |
| 1        | 1 3/4 | 5   | R.015  | OP61-6428R015C |
| 1        | 1 3/4 | 5   | R.030  | OP61-6428R030C |
| 1        | 1 3/4 | 5   | R.060  | OP61-6428R060C |
| 1        | 1 3/4 | 5   | R.090  | OP61-6428R090C |
| 1        | 1 3/4 | 5   | R.125  | OP61-6428R125C |
| 1        | 1 3/4 | 5   | R.190  | OP61-6428R190C |
| 1        | 1 3/4 | 5   | R.250  | OP61-6428R250C |



## 6 FLUTE - REGULAR - CHIP BREAKER



OP61MC

CHIP BREAKER METRIC

| DIAMETER | LOC | OAL | RAD    | ITEM#            |
|----------|-----|-----|--------|------------------|
| 6        | 20  | 75  | Square | OP61M-06020R0.0C |
| 6        | 20  | 75  | R0.5   | OP61M-06020R0.5C |
| 6        | 20  | 75  | R1.0   | OP61M-06020R1.0C |
| 6        | 20  | 75  | R1.5   | OP61M-06020R1.5C |
| 6        | 20  | 75  | R2.0   | OP61M-06020R2.0C |
| 8        | 21  | 75  | Square | OP61M-08021R0.0C |
| 8        | 21  | 75  | R0.5   | OP61M-08021R0.5C |
| 8        | 21  | 75  | R1.0   | OP61M-08021R1.0C |
| 8        | 21  | 75  | R1.5   | OP61M-08021R1.5C |
| 8        | 21  | 75  | R2.0   | OP61M-08021R2.0C |
| 8        | 21  | 75  | R3.0   | OP61M-08021R3.0C |
| 10       | 25  | 75  | Square | OP61M-10025R0.0C |
| 10       | 25  | 75  | R0.5   | OP61M-10025R0.5C |
| 10       | 25  | 75  | R1.0   | OP61M-10025R1.0C |
| 10       | 25  | 75  | R1.5   | OP61M-10025R1.5C |
| 10       | 25  | 75  | R2.0   | OP61M-10025R2.0C |
| 10       | 25  | 75  | R3.0   | OP61M-10025R3.0C |
| 11       | 25  | 75  | Square | OP61M-11025R0.0C |
| 11       | 25  | 75  | R0.5   | OP61M-11025R0.5C |
| 11       | 25  | 75  | R1.0   | OP61M-11025R1.0C |
| 11       | 25  | 75  | R1.5   | OP61M-11025R1.5C |
| 11       | 25  | 75  | R2.0   | OP61M-11025R2.0C |
| 11       | 25  | 75  | R3.0   | OP61M-11025R3.0C |
| 11       | 25  | 75  | R4.5   | OP61M-11025R4.5C |
| 12       | 32  | 75  | Square | OP61M-12032R0.0C |
| 12       | 32  | 75  | R0.5   | OP61M-12032R0.5C |
| 12       | 32  | 75  | R1.0   | OP61M-12032R1.0C |
| 12       | 32  | 75  | R1.5   | OP61M-12032R1.5C |
| 12       | 32  | 75  | R2.0   | OP61M-12032R2.0C |
| 12       | 32  | 75  | R3.0   | OP61M-12032R3.0C |

| DIAMETER | LOC | OAL | RAD    | ITEM#            |
|----------|-----|-----|--------|------------------|
| 12       | 32  | 75  | R4.5   | OP61M-12032R4.5C |
| 16       | 41  | 100 | Square | OP61M-16041R0.0C |
| 16       | 41  | 100 | R0.5   | OP61M-16041R0.5C |
| 16       | 41  | 100 | R1.0   | OP61M-16041R1.0C |
| 16       | 41  | 100 | R1.5   | OP61M-16041R1.5C |
| 16       | 41  | 100 | R2.0   | OP61M-16041R2.0C |
| 16       | 41  | 100 | R3.0   | OP61M-16041R3.0C |
| 16       | 41  | 100 | R4.5   | OP61M-16041R4.5C |
| 16       | 41  | 100 | R6.0   | OP61M-16041R6.0C |
| 20       | 41  | 100 | Square | OP61M-20041R0.0C |
| 20       | 41  | 100 | R0.5   | OP61M-20041R0.5C |
| 20       | 41  | 100 | R1.0   | OP61M-20041R1.0C |
| 20       | 41  | 100 | R1.5   | OP61M-20041R1.5C |
| 20       | 41  | 100 | R2.0   | OP61M-20041R2.0C |
| 20       | 41  | 100 | R3.0   | OP61M-20041R3.0C |
| 20       | 41  | 100 | R4.5   | OP61M-20041R4.5C |
| 20       | 41  | 100 | R6.0   | OP61M-20041R6.0C |
| 25       | 45  | 125 | Square | OP61M-25045R0.0C |
| 25       | 45  | 125 | R0.5   | OP61M-25045R0.5C |
| 25       | 45  | 125 | R1.0   | OP61M-25045R1.0C |
| 25       | 45  | 125 | R1.5   | OP61M-25045R1.5C |
| 25       | 45  | 125 | R2.0   | OP61M-25045R2.0C |
| 25       | 45  | 125 | R3.0   | OP61M-25045R3.0C |
| 25       | 45  | 125 | R4.5   | OP61M-25045R4.5C |
| 25       | 45  | 125 | R6.0   | OP61M-25045R6.0C |



## 6 FLUTE - LONG



OP62  
LONG INCH

| DIAMETER | LOC   | OAL | RAD    | ITEM#         |
|----------|-------|-----|--------|---------------|
| 1/4      | 1 1/8 | 3   | Square | OP62-1618R000 |
| 1/4      | 1 1/8 | 3   | R.015  | OP62-1618R015 |
| 1/4      | 1 1/8 | 3   | R.030  | OP62-1618R030 |
| 1/4      | 1 1/8 | 3   | R.060  | OP62-1618R060 |
| 1/4      | 1 1/8 | 3   | R.090  | OP62-1618R090 |
| 5/16     | 1 1/8 | 3   | Square | OP62-2018R000 |
| 5/16     | 1 1/8 | 3   | R.015  | OP62-2018R015 |
| 5/16     | 1 1/8 | 3   | R.030  | OP62-2018R030 |
| 5/16     | 1 1/8 | 3   | R.060  | OP62-2018R060 |
| 5/16     | 1 1/8 | 3   | R.090  | OP62-2018R090 |
| 5/16     | 1 1/8 | 3   | R.125  | OP62-2018R125 |
| 3/8      | 1 1/4 | 3   | Square | OP62-2420R000 |
| 3/8      | 1 1/4 | 3   | R.015  | OP62-2420R015 |
| 3/8      | 1 1/4 | 3   | R.030  | OP62-2420R030 |
| 3/8      | 1 1/4 | 3   | R.060  | OP62-2420R060 |
| 3/8      | 1 1/4 | 3   | R.090  | OP62-2420R090 |
| 3/8      | 1 1/4 | 3   | R.125  | OP62-2420R125 |
| 7/16     | 2     | 4   | Square | OP62-2832R000 |
| 7/16     | 2     | 4   | R.015  | OP62-2832R015 |
| 7/16     | 2     | 4   | R.030  | OP62-2832R030 |
| 7/16     | 2     | 4   | R.060  | OP62-2832R060 |
| 7/16     | 2     | 4   | R.090  | OP62-2832R090 |
| 7/16     | 2     | 4   | R.125  | OP62-2832R125 |
| 7/16     | 2     | 4   | R.190  | OP62-2832R190 |
| 1/2      | 2     | 4   | Square | OP62-3232R000 |
| 1/2      | 2     | 4   | R.015  | OP62-3232R015 |
| 1/2      | 2     | 4   | R.030  | OP62-3232R030 |
| 1/2      | 2     | 4   | R.060  | OP62-3232R060 |
| 1/2      | 2     | 4   | R.090  | OP62-3232R090 |
| 1/2      | 2     | 4   | R.125  | OP62-3232R125 |

| DIAMETER | LOC   | OAL | RAD    | ITEM#         |
|----------|-------|-----|--------|---------------|
| 1/2      | 2     | 4   | R.190  | OP62-3232R190 |
| 5/8      | 2 1/4 | 5   | Square | OP62-4036R000 |
| 5/8      | 2 1/4 | 5   | R.015  | OP62-4036R015 |
| 5/8      | 2 1/4 | 5   | R.030  | OP62-4036R030 |
| 5/8      | 2 1/4 | 5   | R.060  | OP62-4036R060 |
| 5/8      | 2 1/4 | 5   | R.090  | OP62-4036R090 |
| 5/8      | 2 1/4 | 5   | R.125  | OP62-4036R125 |
| 5/8      | 2 1/4 | 5   | R.190  | OP62-4036R190 |
| 5/8      | 2 1/4 | 5   | R.250  | OP62-4036R250 |
| 3/4      | 2 5/8 | 5   | Square | OP62-4842R000 |
| 3/4      | 2 5/8 | 5   | R.015  | OP62-4842R015 |
| 3/4      | 2 5/8 | 5   | R.030  | OP62-4842R030 |
| 3/4      | 2 5/8 | 5   | R.060  | OP62-4842R060 |
| 3/4      | 2 5/8 | 5   | R.090  | OP62-4842R090 |
| 3/4      | 2 5/8 | 5   | R.125  | OP62-4842R125 |
| 3/4      | 2 5/8 | 5   | R.190  | OP62-4842R190 |
| 3/4      | 2 5/8 | 5   | R.250  | OP62-4842R250 |
| 1        | 3     | 6   | Square | OP62-6448R000 |
| 1        | 3     | 6   | R.015  | OP62-6448R015 |
| 1        | 3     | 6   | R.030  | OP62-6448R030 |
| 1        | 3     | 6   | R.060  | OP62-6448R060 |
| 1        | 3     | 6   | R.090  | OP62-6448R090 |
| 1        | 3     | 6   | R.125  | OP62-6448R125 |
| 1        | 3     | 6   | R.190  | OP62-6448R190 |
| 1        | 3     | 6   | R.250  | OP62-6448R250 |

## 6 FLUTE - LONG

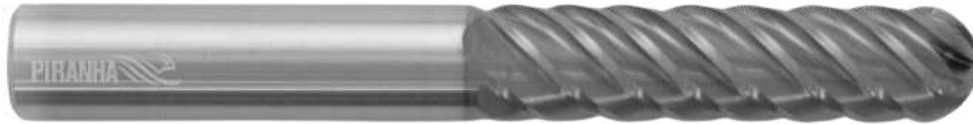


OP62M  
LONG METRIC

| DIAMETER | LOC | OAL | RAD    | ITEM#           |
|----------|-----|-----|--------|-----------------|
| 6        | 29  | 75  | Square | OP62M-06029R0.0 |
| 6        | 29  | 75  | R0.5   | OP62M-06029R0.5 |
| 6        | 29  | 75  | R1.0   | OP62M-06029R1.0 |
| 6        | 29  | 75  | R1.5   | OP62M-06029R1.5 |
| 6        | 29  | 75  | R2.0   | OP62M-06029R2.0 |
| 8        | 29  | 75  | Square | OP62M-08029R0.0 |
| 8        | 29  | 75  | R0.5   | OP62M-08029R0.5 |
| 8        | 29  | 75  | R1.0   | OP62M-08029R1.0 |
| 8        | 29  | 75  | R1.5   | OP62M-08029R1.5 |
| 8        | 29  | 75  | R2.0   | OP62M-08029R2.0 |
| 8        | 29  | 75  | R3.0   | OP62M-08029R3.0 |
| 10       | 32  | 75  | Square | OP62M-10032R0.0 |
| 10       | 32  | 75  | R0.5   | OP62M-10032R0.5 |
| 10       | 32  | 75  | R1.0   | OP62M-10032R1.0 |
| 10       | 32  | 75  | R1.5   | OP62M-10032R1.5 |
| 10       | 32  | 75  | R2.0   | OP62M-10032R2.0 |
| 10       | 32  | 75  | R3.0   | OP62M-10032R3.0 |
| 11       | 50  | 100 | Square | OP62M-11050R0.0 |
| 11       | 50  | 100 | R0.5   | OP62M-11050R0.5 |
| 11       | 50  | 100 | R1.0   | OP62M-11050R1.0 |
| 11       | 50  | 100 | R1.5   | OP62M-11050R1.5 |
| 11       | 50  | 100 | R2.0   | OP62M-11050R2.0 |
| 11       | 50  | 100 | R3.0   | OP62M-11050R3.0 |
| 11       | 50  | 100 | R4.5   | OP62M-11050R4.5 |
| 12       | 50  | 100 | Square | OP62M-12050R0.0 |
| 12       | 50  | 100 | R0.5   | OP62M-12050R0.5 |
| 12       | 50  | 100 | R1.0   | OP62M-12050R1.0 |
| 12       | 50  | 100 | R1.5   | OP62M-12050R1.5 |
| 12       | 50  | 100 | R2.0   | OP62M-12050R2.0 |
| 12       | 50  | 100 | R3.0   | OP62M-12050R3.0 |

| DIAMETER | LOC | OAL | RAD    | ITEM#           |
|----------|-----|-----|--------|-----------------|
| 12       | 50  | 100 | R4.5   | OP62M-12050R4.5 |
| 16       | 57  | 125 | Square | OP62M-16057R0.0 |
| 16       | 57  | 125 | R0.5   | OP62M-16057R0.5 |
| 16       | 57  | 125 | R1.0   | OP62M-16057R1.0 |
| 16       | 57  | 125 | R1.5   | OP62M-16057R1.5 |
| 16       | 57  | 125 | R2.0   | OP62M-16057R2.0 |
| 16       | 57  | 125 | R3.0   | OP62M-16057R3.0 |
| 16       | 57  | 125 | R4.5   | OP62M-16057R4.5 |
| 16       | 57  | 125 | R6.0   | OP62M-16057R6.0 |
| 20       | 67  | 125 | Square | OP62M-20067R0.0 |
| 20       | 67  | 125 | R0.5   | OP62M-20067R0.5 |
| 20       | 67  | 125 | R1.0   | OP62M-20067R1.0 |
| 20       | 67  | 125 | R1.5   | OP62M-20067R1.5 |
| 20       | 67  | 125 | R2.0   | OP62M-20067R2.0 |
| 20       | 67  | 125 | R3.0   | OP62M-20067R3.0 |
| 20       | 67  | 125 | R4.5   | OP62M-20067R4.5 |
| 20       | 67  | 125 | R6.0   | OP62M-20067R6.0 |
| 25       | 76  | 150 | Square | OP62M-25076R0.0 |
| 25       | 76  | 150 | R0.5   | OP62M-25076R0.5 |
| 25       | 76  | 150 | R1.0   | OP62M-25076R1.0 |
| 25       | 76  | 150 | R1.5   | OP62M-25076R1.5 |
| 25       | 76  | 150 | R2.0   | OP62M-25076R2.0 |
| 25       | 76  | 150 | R3.0   | OP62M-25076R3.0 |
| 25       | 76  | 150 | R4.5   | OP62M-25076R4.5 |
| 25       | 76  | 150 | R6.0   | OP62M-25076R6.0 |

## 6 FLUTE - LONG - BALL NOSE



OP62B

LONG BALL INCH

| DIAMETER | LOC   | OAL | ITEM#          |
|----------|-------|-----|----------------|
| 1/4      | 1 1/8 | 3   | OP62-1618R125B |
| 5/16     | 1 1/8 | 3   | OP62-2018R155B |
| 3/8      | 1 1/4 | 3   | OP62-2420R190B |
| 7/16     | 2     | 4   | OP62-2832R220B |
| 1/2      | 2     | 4   | OP62-3232R250B |
| 5/8      | 2 1/4 | 5   | OP62-4036R310B |
| 3/4      | 2 5/8 | 5   | OP62-4842R375B |
| 1        | 3     | 6   | OP62-6448R500B |

OP62MB

LONG BALL METRIC

| DIAMETER | LOC | OAL | ITEM#             |
|----------|-----|-----|-------------------|
| 6        | 29  | 75  | OP62M-06029R3.0B  |
| 8        | 29  | 75  | OP62M-08029R4.0B  |
| 10       | 32  | 75  | OP62M-10032R5.0B  |
| 11       | 50  | 100 | OP62M-11050R5.5B  |
| 12       | 50  | 100 | OP62M-12050R6.0B  |
| 16       | 57  | 125 | OP62M-16057R8.0B  |
| 20       | 67  | 125 | OP62M-20067R10.0B |
| 25       | 76  | 150 | OP62M-25076R12.5B |



## 6 FLUTE - LONG - CHIP BREAKER



OP62C

LONG CHIP BREAKER INCH

| DIAMETER | LOC   | OAL | RAD    | ITEM#          |
|----------|-------|-----|--------|----------------|
| 1/4      | 1 1/8 | 3   | Square | OP62-1618R000C |
| 1/4      | 1 1/8 | 3   | R.015  | OP62-1618R015C |
| 1/4      | 1 1/8 | 3   | R.030  | OP62-1618R030C |
| 1/4      | 1 1/8 | 3   | R.060  | OP62-1618R060C |
| 1/4      | 1 1/8 | 3   | R.090  | OP62-1618R090C |
| 5/16     | 1 1/8 | 3   | Square | OP62-2018R000C |
| 5/16     | 1 1/8 | 3   | R.015  | OP62-2018R015C |
| 5/16     | 1 1/8 | 3   | R.030  | OP62-2018R030C |
| 5/16     | 1 1/8 | 3   | R.060  | OP62-2018R060C |
| 5/16     | 1 1/8 | 3   | R.090  | OP62-2018R090C |
| 5/16     | 1 1/8 | 3   | R.125  | OP62-2018R125C |
| 3/8      | 1 1/4 | 3   | Square | OP62-2420R000C |
| 3/8      | 1 1/4 | 3   | R.015  | OP62-2420R015C |
| 3/8      | 1 1/4 | 3   | R.030  | OP62-2420R030C |
| 3/8      | 1 1/4 | 3   | R.060  | OP62-2420R060C |
| 3/8      | 1 1/4 | 3   | R.090  | OP62-2420R090C |
| 3/8      | 1 1/4 | 3   | R.125  | OP62-2420R125C |
| 7/16     | 2     | 4   | Square | OP62-2832R000C |
| 7/16     | 2     | 4   | R.015  | OP62-2832R015C |
| 7/16     | 2     | 4   | R.030  | OP62-2832R030C |
| 7/16     | 2     | 4   | R.060  | OP62-2832R060C |
| 7/16     | 2     | 4   | R.090  | OP62-2832R090C |
| 7/16     | 2     | 4   | R.125  | OP62-2832R125C |
| 7/16     | 2     | 4   | R.190  | OP62-2832R190C |
| 1/2      | 2     | 4   | Square | OP62-3232R000C |
| 1/2      | 2     | 4   | R.015  | OP62-3232R015C |
| 1/2      | 2     | 4   | R.030  | OP62-3232R030C |
| 1/2      | 2     | 4   | R.060  | OP62-3232R060C |
| 1/2      | 2     | 4   | R.090  | OP62-3232R090C |
| 1/2      | 2     | 4   | R.125  | OP62-3232R125C |

| DIAMETER | LOC   | OAL | RAD    | ITEM#          |
|----------|-------|-----|--------|----------------|
| 1/2      | 2     | 4   | R.190  | OP62-3232R190C |
| 5/8      | 2 1/4 | 5   | Square | OP62-4036R000C |
| 5/8      | 2 1/4 | 5   | R.015  | OP62-4036R015C |
| 5/8      | 2 1/4 | 5   | R.030  | OP62-4036R030C |
| 5/8      | 2 1/4 | 5   | R.060  | OP62-4036R060C |
| 5/8      | 2 1/4 | 5   | R.090  | OP62-4036R090C |
| 5/8      | 2 1/4 | 5   | R.125  | OP62-4036R125C |
| 5/8      | 2 1/4 | 5   | R.190  | OP62-4036R190C |
| 5/8      | 2 1/4 | 5   | R.250  | OP62-4036R250C |
| 3/4      | 2 5/8 | 5   | Square | OP62-4842R000C |
| 3/4      | 2 5/8 | 5   | R.015  | OP62-4842R015C |
| 3/4      | 2 5/8 | 5   | R.030  | OP62-4842R030C |
| 3/4      | 2 5/8 | 5   | R.060  | OP62-4842R060C |
| 3/4      | 2 5/8 | 5   | R.090  | OP62-4842R090C |
| 3/4      | 2 5/8 | 5   | R.125  | OP62-4842R125C |
| 3/4      | 2 5/8 | 5   | R.190  | OP62-4842R190C |
| 3/4      | 2 5/8 | 5   | R.250  | OP62-4842R250C |
| 1        | 3     | 6   | Square | OP62-6448R000C |
| 1        | 3     | 6   | R.015  | OP62-6448R015C |
| 1        | 3     | 6   | R.030  | OP62-6448R030C |
| 1        | 3     | 6   | R.060  | OP62-6448R060C |
| 1        | 3     | 6   | R.090  | OP62-6448R090C |
| 1        | 3     | 6   | R.125  | OP62-6448R125C |
| 1        | 3     | 6   | R.190  | OP62-6448R190C |
| 1        | 3     | 6   | R.250  | OP62-6448R250C |



## 6 FLUTE - LONG - CHIP BREAKER



OP62MC

LONG CHIP BREAKER METRIC

| DIAMETER | LOC | OAL | RAD    | ITEM#            |
|----------|-----|-----|--------|------------------|
| 6        | 29  | 75  | Square | OP62M-06029R0.0C |
| 6        | 29  | 75  | R0.5   | OP62M-06029R0.5C |
| 6        | 29  | 75  | R1.0   | OP62M-06029R1.0C |
| 6        | 29  | 75  | R1.5   | OP62M-06029R1.5C |
| 6        | 29  | 75  | R2.0   | OP62M-06029R2.0C |
| 8        | 29  | 75  | Square | OP62M-08029R0.0C |
| 8        | 29  | 75  | R0.5   | OP62M-08029R0.5C |
| 8        | 29  | 75  | R1.0   | OP62M-08029R1.0C |
| 8        | 29  | 75  | R1.5   | OP62M-08029R1.5C |
| 8        | 29  | 75  | R2.0   | OP62M-08029R2.0C |
| 8        | 29  | 75  | R3.0   | OP62M-08029R3.0C |
| 10       | 32  | 75  | Square | OP62M-10032R0.0C |
| 10       | 32  | 75  | R0.5   | OP62M-10032R0.5C |
| 10       | 32  | 75  | R1.0   | OP62M-10032R1.0C |
| 10       | 32  | 75  | R1.5   | OP62M-10032R1.5C |
| 10       | 32  | 75  | R2.0   | OP62M-10032R2.0C |
| 10       | 32  | 75  | R3.0   | OP62M-10032R3.0C |
| 11       | 50  | 100 | Square | OP62M-11050R0.0C |
| 11       | 50  | 100 | R0.5   | OP62M-11050R0.5C |
| 11       | 50  | 100 | R1.0   | OP62M-11050R1.0C |
| 11       | 50  | 100 | R1.5   | OP62M-11050R1.5C |
| 11       | 50  | 100 | R2.0   | OP62M-11050R2.0C |
| 11       | 50  | 100 | R3.0   | OP62M-11050R3.0C |
| 11       | 50  | 100 | R4.5   | OP62M-11050R4.5C |
| 12       | 50  | 100 | Square | OP62M-12050R0.0C |
| 12       | 50  | 100 | R0.5   | OP62M-12050R0.5C |
| 12       | 50  | 100 | R1.0   | OP62M-12050R1.0C |
| 12       | 50  | 100 | R1.5   | OP62M-12050R1.5C |
| 12       | 50  | 100 | R2.0   | OP62M-12050R2.0C |
| 12       | 50  | 100 | R3.0   | OP62M-12050R3.0C |

| DIAMETER | LOC | OAL | RAD    | ITEM#            |
|----------|-----|-----|--------|------------------|
| 12       | 50  | 100 | R4.5   | OP62M-12050R4.5C |
| 16       | 57  | 125 | Square | OP62M-16057R0.0C |
| 16       | 57  | 125 | R0.5   | OP62M-16057R0.5C |
| 16       | 57  | 125 | R1.0   | OP62M-16057R1.0C |
| 16       | 57  | 125 | R1.5   | OP62M-16057R1.5C |
| 16       | 57  | 125 | R2.0   | OP62M-16057R2.0C |
| 16       | 57  | 125 | R3.0   | OP62M-16057R3.0C |
| 16       | 57  | 125 | R4.5   | OP62M-16057R4.5C |
| 16       | 57  | 125 | R6.0   | OP62M-16057R6.0C |
| 20       | 67  | 125 | Square | OP62M-20067R0.0C |
| 20       | 67  | 125 | R0.5   | OP62M-20067R0.5C |
| 20       | 67  | 125 | R1.0   | OP62M-20067R1.0C |
| 20       | 67  | 125 | R1.5   | OP62M-20067R1.5C |
| 20       | 67  | 125 | R2.0   | OP62M-20067R2.0C |
| 20       | 67  | 125 | R3.0   | OP62M-20067R3.0C |
| 20       | 67  | 125 | R4.5   | OP62M-20067R4.5C |
| 20       | 67  | 125 | R6.0   | OP62M-20067R6.0C |
| 25       | 76  | 150 | Square | OP62M-25076R0.0C |
| 25       | 76  | 150 | R0.5   | OP62M-25076R0.5C |
| 25       | 76  | 150 | R1.0   | OP62M-25076R1.0C |
| 25       | 76  | 150 | R1.5   | OP62M-25076R1.5C |
| 25       | 76  | 150 | R2.0   | OP62M-25076R2.0C |
| 25       | 76  | 150 | R3.0   | OP62M-25076R3.0C |
| 25       | 76  | 150 | R4.5   | OP62M-25076R4.5C |
| 25       | 76  | 150 | R6.0   | OP62M-25076R6.0C |

# OPX6 HIGH PERFORMANCE

Best used for HTSA (Heat-resistant superalloys)

## SPECIAL FEATURES

- |                          |                                                                                                                            |
|--------------------------|----------------------------------------------------------------------------------------------------------------------------|
| <b>UNEQUAL INDEXING</b>  | Eliminates tool vibrations around tool circumference by spreading cutting forces unevenly for a more stable cutting.       |
| <b>VARIABLE HELIX</b>    | Breaks up harmonic vibrations (chatter) along the length and improves surface finish and tool life.                        |
| <b>nACRo PVD COATING</b> | Offers a higher cutting edge resistance to wear and higher heat tolerance.                                                 |
| <b>EDGE PREP</b>         | Makes the cutting edge of the tool more uniform, which help the tool to machine better and faster.                         |
| <b>TANGENTIAL RADIUS</b> | Allows a smooth blending radius on the machined part, improving the manufacturing times by avoiding the finishing process. |



High performance endmill for high removal rate in  
Stainless and Titanium.

## 6 FLUTE - EDGE PREP FOR EXOTIC ALLOYS



OPX6

STUB - REGULAR - LONG INCH

| DIAMETER | LOC       | OAL | RAD  | ITEM#         |
|----------|-----------|-----|------|---------------|
| 3 / 16   | 3 / 8     | 3   | R000 | OPX6-1206R000 |
| 3 / 16   | 3 / 8     | 3   | R015 | OPX6-1206R015 |
| 3 / 16   | 3 / 8     | 3   | R030 | OPX6-1206R030 |
| 3 / 16   | 9 / 16    | 3   | R000 | OPX6-1209R000 |
| 3 / 16   | 9 / 16    | 3   | R015 | OPX6-1209R015 |
| 3 / 16   | 9 / 16    | 3   | R030 | OPX6-1209R030 |
| 1 / 4    | 3 / 8     | 3   | R000 | OPX6-1606R000 |
| 1 / 4    | 3 / 8     | 3   | R015 | OPX6-1606R015 |
| 1 / 4    | 3 / 8     | 3   | R030 | OPX6-1606R030 |
| 1 / 4    | 3 / 8     | 3   | R060 | OPX6-1606R060 |
| 1 / 4    | 3 / 4     | 3   | R000 | OPX6-1612R000 |
| 1 / 4    | 3 / 4     | 3   | R015 | OPX6-1612R015 |
| 1 / 4    | 3 / 4     | 3   | R030 | OPX6-1612R030 |
| 1 / 4    | 3 / 4     | 3   | R060 | OPX6-1612R060 |
| 1 / 4    | 1 - 1 / 8 | 3   | R000 | OPX6-1618R000 |
| 1 / 4    | 1 - 1 / 8 | 3   | R015 | OPX6-1618R015 |
| 1 / 4    | 1 - 1 / 8 | 3   | R030 | OPX6-1618R030 |
| 1 / 4    | 1 - 1 / 8 | 3   | R060 | OPX6-1618R060 |
| 1 / 4    | 1 - 1 / 8 | 3   | R090 | OPX6-1618R090 |
| 5 / 16   | 7 / 16    | 3   | R000 | OPX6-2007R000 |
| 5 / 16   | 7 / 16    | 3   | R015 | OPX6-2007R015 |
| 5 / 16   | 7 / 16    | 3   | R030 | OPX6-2007R030 |
| 5 / 16   | 7 / 16    | 3   | R060 | OPX6-2007R060 |
| 5 / 16   | 7 / 16    | 3   | R090 | OPX6-2007R090 |
| 5 / 16   | 7 / 16    | 3   | R125 | OPX6-2007R125 |
| 5 / 16   | 13 / 16   | 3   | R000 | OPX6-2013R000 |
| 5 / 16   | 13 / 16   | 3   | R015 | OPX6-2013R015 |
| 5 / 16   | 13 / 16   | 3   | R030 | OPX6-2013R030 |
| 5 / 16   | 13 / 16   | 3   | R060 | OPX6-2013R060 |
| 5 / 16   | 13 / 16   | 3   | R090 | OPX6-2013R090 |
| 5 / 16   | 13 / 16   | 3   | R125 | OPX6-2013R125 |
| 5 / 16   | 1 - 1 / 8 | 3   | R000 | OPX6-2018R000 |
| 5 / 16   | 1 - 1 / 8 | 3   | R015 | OPX6-2018R015 |
| 5 / 16   | 1 - 1 / 8 | 3   | R030 | OPX6-2018R030 |
| 5 / 16   | 1 - 1 / 8 | 3   | R060 | OPX6-2018R060 |
| 5 / 16   | 1 - 1 / 8 | 3   | R090 | OPX6-2018R090 |
| 5 / 16   | 1 - 1 / 8 | 3   | R125 | OPX6-2018R125 |
| 3 / 8    | 1 / 2     | 3   | R000 | OPX6-2408R000 |
| 3 / 8    | 1 / 2     | 3   | R015 | OPX6-2408R015 |

| DIAMETER | LOC       | OAL | RAD  | ITEM#         |
|----------|-----------|-----|------|---------------|
| 3 / 8    | 1 / 2     | 3   | R030 | OPX6-2408R030 |
| 3 / 8    | 1 / 2     | 3   | R060 | OPX6-2408R060 |
| 3 / 8    | 1 / 2     | 3   | R090 | OPX6-2408R090 |
| 3 / 8    | 1 / 2     | 3   | R125 | OPX6-2408R125 |
| 3 / 8    | 1         | 3   | R000 | OPX6-2416R000 |
| 3 / 8    | 1         | 3   | R015 | OPX6-2416R015 |
| 3 / 8    | 1         | 3   | R030 | OPX6-2416R030 |
| 3 / 8    | 1         | 3   | R060 | OPX6-2416R060 |
| 3 / 8    | 1         | 3   | R090 | OPX6-2416R090 |
| 3 / 8    | 1         | 3   | R125 | OPX6-2416R125 |
| 3 / 8    | 1 - 1 / 4 | 3   | R000 | OPX6-2420R000 |
| 3 / 8    | 1 - 1 / 4 | 3   | R015 | OPX6-2420R015 |
| 3 / 8    | 1 - 1 / 4 | 3   | R030 | OPX6-2420R030 |
| 3 / 8    | 1 - 1 / 4 | 3   | R060 | OPX6-2420R060 |
| 3 / 8    | 1 - 1 / 4 | 3   | R090 | OPX6-2420R090 |
| 3 / 8    | 1 - 1 / 4 | 3   | R125 | OPX6-2420R125 |
| 7 / 16   | 5 / 8     | 3   | R000 | OPX6-2810R000 |
| 7 / 16   | 5 / 8     | 3   | R015 | OPX6-2810R015 |
| 7 / 16   | 5 / 8     | 3   | R030 | OPX6-2810R030 |
| 7 / 16   | 5 / 8     | 3   | R060 | OPX6-2810R060 |
| 7 / 16   | 5 / 8     | 3   | R090 | OPX6-2810R090 |
| 7 / 16   | 5 / 8     | 3   | R125 | OPX6-2816R125 |
| 7 / 16   | 1         | 3   | R000 | OPX6-2816R000 |
| 7 / 16   | 1         | 3   | R015 | OPX6-2816R015 |
| 7 / 16   | 1         | 3   | R030 | OPX6-2816R030 |
| 7 / 16   | 1         | 3   | R060 | OPX6-2816R060 |
| 7 / 16   | 1         | 3   | R090 | OPX6-2816R090 |
| 7 / 16   | 1         | 3   | R125 | OPX6-2816R125 |
| 7 / 16   | 2         | 4   | R000 | OPX6-2832R000 |
| 7 / 16   | 2         | 4   | R015 | OPX6-2832R015 |
| 7 / 16   | 2         | 4   | R030 | OPX6-2832R030 |
| 7 / 16   | 2         | 4   | R060 | OPX6-2832R060 |
| 7 / 16   | 2         | 4   | R090 | OPX6-2832R090 |
| 7 / 16   | 2         | 4   | R125 | OPX6-2832R125 |
| 1 / 2    | 5 / 8     | 3   | R000 | OPX6-3210R000 |
| 1 / 2    | 5 / 8     | 3   | R015 | OPX6-3210R015 |
| 1 / 2    | 5 / 8     | 3   | R030 | OPX6-3210R030 |
| 1 / 2    | 5 / 8     | 3   | R060 | OPX6-3210R060 |



## 6 FLUTE - EDGE PREP FOR EXOTIC ALLOYS



OPX6

STUB - REGULAR - LONG INCH

| DIAMETER | LOC   | OAL | RAD  | ITEM#         |
|----------|-------|-----|------|---------------|
| 1/2      | 5/8   | 3   | R090 | OPX6-3210R090 |
| 1/2      | 5/8   | 3   | R125 | OPX6-3210R125 |
| 1/2      | 1-1/4 | 3   | R000 | OPX6-3220R000 |
| 1/2      | 1-1/4 | 3   | R015 | OPX6-3220R015 |
| 1/2      | 1-1/4 | 3   | R030 | OPX6-3220R030 |
| 1/2      | 1-1/4 | 3   | R060 | OPX6-3220R060 |
| 1/2      | 1-1/4 | 3   | R090 | OPX6-3220R090 |
| 1/2      | 1-1/4 | 3   | R125 | OPX6-3220R125 |
| 1/2      | 2     | 4   | R000 | OPX6-3232R000 |
| 1/2      | 2     | 4   | R015 | OPX6-3232R015 |
| 1/2      | 2     | 4   | R030 | OPX6-3232R030 |
| 1/2      | 2     | 4   | R060 | OPX6-3232R060 |
| 1/2      | 2     | 4   | R090 | OPX6-3232R090 |
| 1/2      | 2     | 4   | R125 | OPX6-3232R125 |
| 5/8      | 3/4   | 4   | R000 | OPX6-4012R000 |
| 5/8      | 3/4   | 4   | R015 | OPX6-4012R015 |
| 5/8      | 3/4   | 4   | R030 | OPX6-4012R030 |
| 5/8      | 3/4   | 4   | R060 | OPX6-4012R060 |
| 5/8      | 3/4   | 4   | R090 | OPX6-4012R090 |
| 5/8      | 3/4   | 4   | R125 | OPX6-4012R125 |
| 5/8      | 1-5/8 | 4   | R000 | OPX6-4026R000 |
| 5/8      | 1-5/8 | 4   | R015 | OPX6-4026R015 |
| 5/8      | 1-5/8 | 4   | R030 | OPX6-4026R030 |
| 5/8      | 1-5/8 | 4   | R060 | OPX6-4026R060 |
| 5/8      | 1-5/8 | 4   | R090 | OPX6-4026R090 |
| 5/8      | 1-5/8 | 4   | R125 | OPX6-4026R125 |
| 5/8      | 2-1/4 | 5   | R000 | OPX6-4036R000 |
| 5/8      | 2-1/4 | 5   | R015 | OPX6-4036R015 |
| 5/8      | 2-1/4 | 5   | R030 | OPX6-4036R030 |
| 5/8      | 2-1/4 | 5   | R060 | OPX6-4036R060 |
| 5/8      | 2-1/4 | 5   | R090 | OPX6-4036R090 |
| 5/8      | 2-1/4 | 5   | R125 | OPX6-4036R125 |

| DIAMETER | LOC   | OAL | RAD  | ITEM#         |
|----------|-------|-----|------|---------------|
| 3/4      | 1     | 4   | R000 | OPX6-4816R000 |
| 3/4      | 1     | 4   | R015 | OPX6-4816R015 |
| 3/4      | 1     | 4   | R030 | OPX6-4816R030 |
| 3/4      | 1     | 4   | R060 | OPX6-4816R060 |
| 3/4      | 1     | 4   | R090 | OPX6-4816R090 |
| 3/4      | 1     | 4   | R125 | OPX6-4816R125 |
| 3/4      | 1-5/8 | 4   | R000 | OPX6-4826R000 |
| 3/4      | 1-5/8 | 4   | R015 | OPX6-4826R015 |
| 3/4      | 1-5/8 | 4   | R030 | OPX6-4826R030 |
| 3/4      | 1-5/8 | 4   | R060 | OPX6-4826R060 |
| 3/4      | 1-5/8 | 4   | R090 | OPX6-4826R090 |
| 3/4      | 1-5/8 | 4   | R125 | OPX6-4826R125 |
| 3/4      | 2-1/4 | 5   | R000 | OPX6-4836R000 |
| 3/4      | 2-1/4 | 5   | R015 | OPX6-4836R015 |
| 3/4      | 2-1/4 | 5   | R030 | OPX6-4836R030 |
| 3/4      | 2-1/4 | 5   | R060 | OPX6-4836R060 |
| 3/4      | 2-1/4 | 5   | R090 | OPX6-4836R090 |
| 3/4      | 2-1/4 | 5   | R125 | OPX6-4836R125 |
| 1        | 2-1/4 | 5   | R000 | OPX6-6436R000 |
| 1        | 2-1/4 | 5   | R015 | OPX6-6436R015 |
| 1        | 2-1/4 | 5   | R030 | OPX6-6436R030 |
| 1        | 2-1/4 | 5   | R060 | OPX6-6436R060 |
| 1        | 2-1/4 | 5   | R090 | OPX6-6436R090 |
| 1        | 2-1/4 | 5   | R125 | OPX6-6436R125 |
| 1        | 3-1/4 | 6   | R000 | OPX6-6452R000 |
| 1        | 3-1/4 | 6   | R015 | OPX6-6452R015 |
| 1        | 3-1/4 | 6   | R030 | OPX6-6452R030 |
| 1        | 3-1/4 | 6   | R060 | OPX6-6452R060 |
| 1        | 3-1/4 | 6   | R090 | OPX6-6452R090 |
| 1        | 3-1/4 | 6   | R125 | OPX6-6452R125 |



## 6 FLUTE - EDGE PREP FOR EXOTIC ALLOYS



OPX6M

STUB - REGULAR - LONG METRIC

| DIAMETER | LOC | OAL | RAD  | ITEM#           |
|----------|-----|-----|------|-----------------|
| 5        | 10  | 75  | R0.0 | OPX6M-05010R0.0 |
| 5        | 10  | 75  | R0.5 | OPX6M-05010R0.5 |
| 5        | 10  | 75  | R1.0 | OPX6M-05010R1.0 |
| 5        | 10  | 75  | R1.5 | OPX6M-05010R1.5 |
| 5        | 14  | 75  | R0.0 | OPX6M-05014R0.0 |
| 5        | 14  | 75  | R0.5 | OPX6M-05014R0.5 |
| 5        | 14  | 75  | R1.0 | OPX6M-05014R1.0 |
| 5        | 14  | 75  | R1.5 | OPX6M-05014R1.5 |
| 6        | 10  | 75  | R0.0 | OPX6M-06010R0.0 |
| 6        | 10  | 75  | R0.5 | OPX6M-06010R0.5 |
| 6        | 10  | 75  | R1.0 | OPX6M-06010R1.0 |
| 6        | 10  | 75  | R1.5 | OPX6M-06010R1.5 |
| 6        | 10  | 75  | R2.0 | OPX6M-06010R2.0 |
| 6        | 20  | 75  | R0.0 | OPX6M-06020R0.0 |
| 6        | 20  | 75  | R0.5 | OPX6M-06020R0.5 |
| 6        | 20  | 75  | R1.0 | OPX6M-06020R1.0 |
| 6        | 20  | 75  | R1.5 | OPX6M-06020R1.5 |
| 6        | 20  | 75  | R2.0 | OPX6M-06020R2.0 |
| 6        | 29  | 75  | R0.0 | OPX6M-06029R0.0 |
| 6        | 29  | 75  | R0.5 | OPX6M-06029R0.5 |
| 6        | 29  | 75  | R1.0 | OPX6M-06029R1.0 |
| 6        | 29  | 75  | R1.5 | OPX6M-06029R1.5 |
| 6        | 29  | 75  | R2.0 | OPX6M-06029R2.0 |
| 8        | 11  | 75  | R0.0 | OPX6M-08011R0.0 |
| 8        | 11  | 75  | R0.5 | OPX6M-08011R0.5 |
| 8        | 11  | 75  | R1.0 | OPX6M-08011R1.0 |
| 8        | 11  | 75  | R1.5 | OPX6M-08011R1.5 |
| 8        | 11  | 75  | R2.0 | OPX6M-08011R2.0 |
| 8        | 11  | 75  | R3.0 | OPX6M-08011R3.0 |
| 8        | 21  | 75  | R0.0 | OPX6M-08021R0.0 |
| 8        | 21  | 75  | R0.5 | OPX6M-08021R0.5 |
| 8        | 21  | 75  | R1.0 | OPX6M-08021R1.0 |

| DIAMETER | LOC | OAL | RAD  | ITEM#           |
|----------|-----|-----|------|-----------------|
| 8        | 21  | 75  | R1.5 | OPX6M-08021R1.5 |
| 8        | 21  | 75  | R2.0 | OPX6M-08021R2.0 |
| 8        | 21  | 75  | R3.0 | OPX6M-08021R3.0 |
| 8        | 29  | 75  | R0.0 | OPX6M-08029R0.0 |
| 8        | 29  | 75  | R0.5 | OPX6M-08029R0.5 |
| 8        | 29  | 75  | R1.0 | OPX6M-08029R1.0 |
| 8        | 29  | 75  | R1.5 | OPX6M-08029R1.5 |
| 8        | 29  | 75  | R2.0 | OPX6M-08029R2.0 |
| 8        | 29  | 75  | R3.0 | OPX6M-08029R3.0 |
| 10       | 12  | 75  | R0.0 | OPX6M-10012R0.0 |
| 10       | 12  | 75  | R0.5 | OPX6M-10012R0.5 |
| 10       | 12  | 75  | R1.0 | OPX6M-10012R1.0 |
| 10       | 12  | 75  | R1.5 | OPX6M-10012R1.5 |
| 10       | 12  | 75  | R2.0 | OPX6M-10012R2.0 |
| 10       | 12  | 75  | R3.0 | OPX6M-10012R3.0 |
| 10       | 25  | 75  | R0.0 | OPX6M-10025R0.0 |
| 10       | 25  | 75  | R0.5 | OPX6M-10025R0.5 |
| 10       | 25  | 75  | R1.0 | OPX6M-10025R1.0 |
| 10       | 25  | 75  | R1.5 | OPX6M-10025R1.5 |
| 10       | 25  | 75  | R2.0 | OPX6M-10025R2.0 |
| 10       | 25  | 75  | R3.0 | OPX6M-10025R3.0 |
| 10       | 32  | 75  | R0.0 | OPX6M-10032R0.0 |
| 10       | 32  | 75  | R0.5 | OPX6M-10032R0.5 |
| 10       | 32  | 75  | R1.0 | OPX6M-10032R1.0 |
| 10       | 32  | 75  | R1.5 | OPX6M-10032R1.5 |
| 10       | 32  | 75  | R2.0 | OPX6M-10032R2.0 |
| 10       | 32  | 75  | R3.0 | OPX6M-10032R3.0 |
| 11       | 16  | 75  | R0.0 | OPX6M-11016R0.0 |
| 11       | 16  | 75  | R0.5 | OPX6M-11016R0.5 |
| 11       | 16  | 75  | R1.0 | OPX6M-11016R1.0 |
| 11       | 16  | 75  | R1.5 | OPX6M-11016R1.5 |
| 11       | 16  | 75  | R2.0 | OPX6M-11016R2.0 |

## 6 FLUTE - EDGE PREP FOR EXOTIC ALLOYS



OPX6M

STUB - REGULAR - LONG METRIC

| DIAMETER | LOC | OAL | RAD  | ITEM#           |
|----------|-----|-----|------|-----------------|
| 11       | 16  | 75  | R3.0 | OPX6M-11016R3.0 |
| 11       | 25  | 75  | R0.0 | OPX6M-11025R0.0 |
| 11       | 25  | 75  | R0.5 | OPX6M-11025R0.5 |
| 11       | 25  | 75  | R1.0 | OPX6M-11025R1.0 |
| 11       | 25  | 75  | R1.5 | OPX6M-11025R1.5 |
| 11       | 25  | 75  | R2.0 | OPX6M-11025R2.0 |
| 11       | 25  | 75  | R3.0 | OPX6M-11025R3.0 |
| 11       | 50  | 100 | R0.0 | OPX6M-11050R0.0 |
| 11       | 50  | 100 | R0.5 | OPX6M-11050R0.5 |
| 11       | 50  | 100 | R1.0 | OPX6M-11050R1.0 |
| 11       | 50  | 100 | R1.5 | OPX6M-11050R1.5 |
| 11       | 50  | 100 | R2.0 | OPX6M-11050R2.0 |
| 11       | 50  | 100 | R3.0 | OPX6M-11050R3.0 |
| 12       | 16  | 75  | R0.0 | OPX6M-12016R0.0 |
| 12       | 16  | 75  | R0.5 | OPX6M-12016R0.5 |
| 12       | 16  | 75  | R1.0 | OPX6M-12016R1.0 |
| 12       | 16  | 75  | R1.5 | OPX6M-12016R1.5 |
| 12       | 16  | 75  | R2.0 | OPX6M-12016R2.0 |
| 12       | 16  | 75  | R3.0 | OPX6M-12016R3.0 |
| 12       | 32  | 75  | R0.0 | OPX6M-12032R0.0 |
| 12       | 32  | 75  | R0.5 | OPX6M-12032R0.5 |
| 12       | 32  | 75  | R1.0 | OPX6M-12032R1.0 |
| 12       | 32  | 75  | R1.5 | OPX6M-12032R1.5 |
| 12       | 32  | 75  | R2.0 | OPX6M-12032R2.0 |
| 12       | 32  | 75  | R3.0 | OPX6M-12032R3.0 |
| 12       | 50  | 100 | R0.0 | OPX6M-12050R0.0 |
| 12       | 50  | 100 | R0.5 | OPX6M-12050R0.5 |
| 12       | 50  | 100 | R1.0 | OPX6M-12050R1.0 |
| 12       | 50  | 100 | R1.5 | OPX6M-12050R1.5 |
| 12       | 50  | 100 | R2.0 | OPX6M-12050R2.0 |
| 12       | 50  | 100 | R3.0 | OPX6M-12050R3.0 |
| 16       | 20  | 100 | R0.0 | OPX6M-16020R0.0 |

| DIAMETER | LOC | OAL | RAD  | ITEM#           |
|----------|-----|-----|------|-----------------|
| 16       | 20  | 100 | R0.5 | OPX6M-16020R0.5 |
| 16       | 20  | 100 | R1.0 | OPX6M-16020R1.0 |
| 16       | 20  | 100 | R1.5 | OPX6M-16020R1.5 |
| 16       | 20  | 100 | R2.0 | OPX6M-16020R2.0 |
| 16       | 20  | 100 | R3.0 | OPX6M-16020R3.0 |
| 16       | 41  | 100 | R0.0 | OPX6M-16041R0.0 |
| 16       | 41  | 100 | R0.5 | OPX6M-16041R0.5 |
| 16       | 41  | 100 | R1.0 | OPX6M-16041R1.0 |
| 16       | 41  | 100 | R1.5 | OPX6M-16041R1.5 |
| 16       | 41  | 100 | R2.0 | OPX6M-16041R2.0 |
| 16       | 41  | 100 | R3.0 | OPX6M-16041R3.0 |
| 16       | 57  | 125 | R0.0 | OPX6M-16057R0.0 |
| 16       | 57  | 125 | R0.5 | OPX6M-16057R0.5 |
| 16       | 57  | 125 | R1.0 | OPX6M-16057R1.0 |
| 16       | 57  | 125 | R1.5 | OPX6M-16057R1.5 |
| 16       | 57  | 125 | R2.0 | OPX6M-16057R2.0 |
| 16       | 57  | 125 | R3.0 | OPX6M-16057R3.0 |
| 20       | 25  | 100 | R0.0 | OPX6M-20025R0.0 |
| 20       | 25  | 100 | R0.5 | OPX6M-20025R0.5 |
| 20       | 25  | 100 | R1.0 | OPX6M-20025R1.0 |
| 20       | 25  | 100 | R1.5 | OPX6M-20025R1.5 |
| 20       | 25  | 100 | R2.0 | OPX6M-20025R2.0 |
| 20       | 25  | 100 | R3.0 | OPX6M-20025R3.0 |
| 20       | 41  | 100 | R0.0 | OPX6M-20041R0.0 |
| 20       | 41  | 100 | R0.5 | OPX6M-20041R0.5 |
| 20       | 41  | 100 | R1.0 | OPX6M-20041R1.0 |
| 20       | 41  | 100 | R1.5 | OPX6M-20041R1.5 |
| 20       | 41  | 100 | R2.0 | OPX6M-20041R2.0 |
| 20       | 41  | 100 | R3.0 | OPX6M-20041R3.0 |
| 20       | 57  | 125 | R0.0 | OPX6M-20057R0.0 |
| 20       | 57  | 125 | R0.5 | OPX6M-20057R0.5 |
| 20       | 57  | 125 | R1.0 | OPX6M-20057R1.0 |

## 6 FLUTE - EDGE PREP FOR EXOTIC ALLOYS



OPX6M

STUB - REGULAR - LONG METRIC

| DIAMETER | LOC | OAL | RAD  | ITEM#           |
|----------|-----|-----|------|-----------------|
| 20       | 57  | 125 | R1.5 | OPX6M-20057R1.5 |
| 20       | 57  | 125 | R2.0 | OPX6M-20057R2.0 |
| 20       | 57  | 125 | R3.0 | OPX6M-20057R3.0 |
| 25       | 57  | 125 | R0.0 | OPX6M-25057R0.0 |
| 25       | 57  | 125 | R0.5 | OPX6M-25057R0.5 |
| 25       | 57  | 125 | R1.0 | OPX6M-25057R1.0 |
| 25       | 57  | 125 | R1.5 | OPX6M-25057R1.5 |
| 25       | 57  | 125 | R2.0 | OPX6M-25057R2.0 |
| 25       | 57  | 125 | R3.0 | OPX6M-25057R3.0 |
| 25       | 83  | 150 | R0.0 | OPX6M-25083R0.0 |
| 25       | 83  | 150 | R0.5 | OPX6M-25083R0.5 |
| 25       | 83  | 150 | R1.0 | OPX6M-25083R1.0 |
| 25       | 83  | 150 | R1.5 | OPX6M-25083R1.5 |
| 25       | 83  | 150 | R2.0 | OPX6M-25083R2.0 |
| 25       | 83  | 150 | R3.0 | OPX6M-25083R3.0 |

## 6 FLUTE - EDGE PREP FOR EXOTIC ALLOYS - CHIP BREAKER



OPX6C

STUB - REGULAR - LONG - CHIP BREAKER INCH

| DIAMETER | LOC       | OAL | RAD  | ITEM#          |
|----------|-----------|-----|------|----------------|
| 5 / 16   | 7 / 16    | 3   | R030 | OPX6-2007R030C |
| 5 / 16   | 7 / 16    | 3   | R060 | OPX6-2007R060C |
| 5 / 16   | 13 / 16   | 3   | R030 | OPX6-2013R030C |
| 5 / 16   | 13 / 16   | 3   | R060 | OPX6-2013R060C |
| 5 / 16   | 1 - 1 / 8 | 3   | R030 | OPX6-2018R030C |
| 5 / 16   | 1 - 1 / 8 | 3   | R060 | OPX6-2018R060C |
| 3 / 8    | 1 / 2     | 3   | R030 | OPX6-2408R030C |
| 3 / 8    | 1 / 2     | 3   | R060 | OPX6-2408R060C |
| 3 / 8    | 1         | 3   | R030 | OPX6-2416R030C |
| 3 / 8    | 1         | 3   | R060 | OPX6-2416R060C |
| 3 / 8    | 1 - 1 / 4 | 3   | R030 | OPX6-2420R030C |
| 3 / 8    | 1 - 1 / 4 | 3   | R060 | OPX6-2420R060C |
| 7 / 16   | 5 / 8     | 3   | R030 | OPX6-2810R030C |
| 7 / 16   | 5 / 8     | 3   | R060 | OPX6-2810R060C |
| 7 / 16   | 1         | 3   | R030 | OPX6-2816R030C |
| 7 / 16   | 1         | 3   | R060 | OPX6-2816R060C |
| 7 / 16   | 2         | 4   | R030 | OPX6-2832R030C |
| 7 / 16   | 2         | 4   | R060 | OPX6-2832R060C |
| 1 / 2    | 5 / 8     | 3   | R030 | OPX6-3210R030C |
| 1 / 2    | 5 / 8     | 3   | R060 | OPX6-3210R060C |
| 1 / 2    | 1 - 1 / 4 | 3   | R030 | OPX6-3220R030C |
| 1 / 2    | 1 - 1 / 4 | 3   | R060 | OPX6-3220R060C |
| 1 / 2    | 2         | 4   | R030 | OPX6-3232R030C |
| 1 / 2    | 2         | 4   | R060 | OPX6-3232R060C |
| 5 / 8    | 3 / 4     | 4   | R030 | OPX6-4012R030C |
| 5 / 8    | 3 / 4     | 4   | R060 | OPX6-4012R060C |
| 5 / 8    | 1 - 5 / 8 | 4   | R030 | OPX6-4026R030C |
| 5 / 8    | 1 - 5 / 8 | 4   | R060 | OPX6-4026R060C |
| 5 / 8    | 2 - 1 / 4 | 5   | R030 | OPX6-4036R030C |
| 5 / 8    | 2 - 1 / 4 | 5   | R060 | OPX6-4036R060C |
| 3 / 4    | 1         | 4   | R030 | OPX6-4816R030C |
| 3 / 4    | 1         | 4   | R060 | OPX6-4816R060C |
| 3 / 4    | 1 - 5 / 8 | 4   | R030 | OPX6-4826R030C |
| 3 / 4    | 1 - 5 / 8 | 4   | R060 | OPX6-4826R060C |
| 3 / 4    | 2 - 1 / 4 | 5   | R030 | OPX6-4836R030C |
| 3 / 4    | 2 - 1 / 4 | 5   | R060 | OPX6-4836R060C |
| 1        | 2 - 1 / 4 | 5   | R030 | OPX6-6436R030C |
| 1        | 2 - 1 / 4 | 5   | R060 | OPX6-6436R060C |
| 1        | 3 - 1 / 4 | 6   | R030 | OPX6-6452R030C |
| 1        | 3 - 1 / 4 | 6   | R060 | OPX6-6452R060C |



## 6 FLUTE - EDGE PREP FOR EXOTIC ALLOYS - CHIP BREAKER



OPX6MC

STUB - REGULAR - LONG - CHIP BREAKER METRIC

| DIAMETER | LOC | OAL | RAD  | ITEM#            |
|----------|-----|-----|------|------------------|
| 8        | 11  | 75  | R1.0 | OPX6M-08011R1.0C |
| 8        | 11  | 75  | R1.5 | OPX6M-08011R1.5C |
| 8        | 21  | 75  | R1.0 | OPX6M-08021R1.0C |
| 8        | 21  | 75  | R1.5 | OPX6M-08021R1.5C |
| 8        | 29  | 75  | R1.0 | OPX6M-08029R1.0C |
| 8        | 29  | 75  | R1.5 | OPX6M-08029R1.5C |
| 10       | 12  | 75  | R1.0 | OPX6M-10012R1.0C |
| 10       | 12  | 75  | R1.5 | OPX6M-10012R1.5C |
| 10       | 25  | 75  | R1.0 | OPX6M-10025R1.0C |
| 10       | 25  | 75  | R1.5 | OPX6M-10025R1.5C |
| 10       | 32  | 75  | R1.0 | OPX6M-10032R1.0C |
| 10       | 32  | 75  | R1.5 | OPX6M-10032R1.5C |
| 11       | 16  | 75  | R1.0 | OPX6M-11016R1.0C |
| 11       | 16  | 75  | R1.5 | OPX6M-11016R1.5C |
| 11       | 25  | 75  | R1.0 | OPX6M-11025R1.0C |
| 11       | 25  | 75  | R1.5 | OPX6M-11025R1.5C |
| 11       | 50  | 100 | R1.0 | OPX6M-11050R1.0C |
| 11       | 50  | 100 | R1.5 | OPX6M-11050R1.5C |
| 12       | 16  | 75  | R1.0 | OPX6M-12016R1.0C |
| 12       | 16  | 75  | R1.5 | OPX6M-12016R1.5C |
| 12       | 32  | 75  | R1.0 | OPX6M-12032R1.0C |
| 12       | 32  | 75  | R1.5 | OPX6M-12032R1.5C |
| 12       | 50  | 100 | R1.0 | OPX6M-12050R1.0C |
| 12       | 50  | 100 | R1.5 | OPX6M-12050R1.5C |
| 16       | 20  | 100 | R1.0 | OPX6M-16020R1.0C |
| 16       | 20  | 100 | R1.5 | OPX6M-16020R1.5C |
| 16       | 41  | 100 | R1.0 | OPX6M-16041R1.0C |
| 16       | 41  | 100 | R1.5 | OPX6M-16041R1.5C |
| 16       | 57  | 125 | R1.0 | OPX6M-16057R1.0C |
| 16       | 57  | 125 | R1.5 | OPX6M-16057R1.5C |
| 20       | 25  | 100 | R1.0 | OPX6M-20025R1.0C |
| 20       | 25  | 100 | R1.5 | OPX6M-20025R1.5C |
| 20       | 41  | 100 | R1.0 | OPX6M-20041R1.0C |
| 20       | 41  | 100 | R1.5 | OPX6M-20041R1.5C |
| 20       | 57  | 125 | R1.0 | OPX6M-20057R1.0C |
| 20       | 57  | 125 | R1.5 | OPX6M-20057R1.5C |
| 25       | 57  | 125 | R1.0 | OPX6M-25057R1.0C |
| 25       | 57  | 125 | R1.5 | OPX6M-25057R1.5C |
| 25       | 83  | 150 | R1.0 | OPX6M-25083R1.0C |
| 25       | 83  | 150 | R1.5 | OPX6M-25083R1.5C |

# OP65 6 FLUTE DOUBLE FLUTING

Best used Steel, Stainless and HTSA (Heat-resistant superalloys)

## SPECIAL FEATURES

### UNEQUAL INDEXING

Eliminates tool vibrations around tool circumference by spreading cutting forces unevenly for a more stable cutting.

### nACRo PVD COATING

Offers a higher cutting edge resistance to wear and higher heat tolerance.

### TANGENTIAL RADIUS

Allows a smooth blending radius on the machined part, improving the manufacturing times by avoiding the finishing process.

### DOUBLE FLUTING

Improves chip evacuation with a deeper front flute, while the rest of the reinforced body provides greater rigidity.

### CARBIDE GRADE

Super fine carbide grade specially developed for heat resistant super alloy, with exceptional edge strength and wear resistance.



These tools are suitable for very hard materials and for those with low machinability, including exotic alloys.

## 6 FLUTE - DOUBLE FLUTING



OP65

DOUBLE FLUTING INCH

| DIAMETER | LOC   | OAL | RAD    | ITEM#         | DIAMETER | LOC   | OAL | RAD    | ITEM#         |
|----------|-------|-----|--------|---------------|----------|-------|-----|--------|---------------|
| 1/4      | 3/4   | 3   | Square | OP65-1612R000 | 1/2      | 1 1/4 | 3   | R.190  | OP65-3220R190 |
| 1/4      | 3/4   | 3   | R.015  | OP65-1612R015 | 5/8      | 1 5/8 | 4   | Square | OP65-4026R000 |
| 1/4      | 3/4   | 3   | R.030  | OP65-1612R030 | 5/8      | 1 5/8 | 4   | R.015  | OP65-4026R015 |
| 1/4      | 3/4   | 3   | R.060  | OP65-1612R060 | 5/8      | 1 5/8 | 4   | R.030  | OP65-4026R030 |
| 1/4      | 3/4   | 3   | R.090  | OP65-1612R090 | 5/8      | 1 5/8 | 4   | R.060  | OP65-4026R060 |
| 5/16     | 13/16 | 3   | Square | OP65-2013R000 | 5/8      | 1 5/8 | 4   | R.090  | OP65-4026R090 |
| 5/16     | 13/16 | 3   | R.015  | OP65-2013R015 | 5/8      | 1 5/8 | 4   | R.125  | OP65-4026R125 |
| 5/16     | 13/16 | 3   | R.030  | OP65-2013R030 | 5/8      | 1 5/8 | 4   | R.190  | OP65-4026R190 |
| 5/16     | 13/16 | 3   | R.060  | OP65-2013R060 | 5/8      | 1 5/8 | 4   | R.250  | OP65-4026R250 |
| 5/16     | 13/16 | 3   | R.090  | OP65-2013R090 | 3/4      | 1 5/8 | 4   | Square | OP65-4826R000 |
| 5/16     | 13/16 | 3   | R.125  | OP65-2013R125 | 3/4      | 1 5/8 | 4   | R.015  | OP65-4826R015 |
| 3/8      | 1     | 3   | Square | OP65-2416R000 | 3/4      | 1 5/8 | 4   | R.030  | OP65-4826R030 |
| 3/8      | 1     | 3   | R.015  | OP65-2416R015 | 3/4      | 1 5/8 | 4   | R.060  | OP65-4826R060 |
| 3/8      | 1     | 3   | R.030  | OP65-2416R030 | 3/4      | 1 5/8 | 4   | R.090  | OP65-4826R090 |
| 3/8      | 1     | 3   | R.060  | OP65-2416R060 | 3/4      | 1 5/8 | 4   | R.125  | OP65-4826R125 |
| 3/8      | 1     | 3   | R.090  | OP65-2416R090 | 3/4      | 1 5/8 | 4   | R.190  | OP65-4826R190 |
| 3/8      | 1     | 3   | R.125  | OP65-2416R125 | 3/4      | 1 5/8 | 4   | R.250  | OP65-4826R250 |
| 7/16     | 1     | 3   | Square | OP65-2816R000 | 1        | 1 3/4 | 5   | Square | OP65-6428R000 |
| 7/16     | 1     | 3   | R.015  | OP65-2816R015 | 1        | 1 3/4 | 5   | R.015  | OP65-6428R015 |
| 7/16     | 1     | 3   | R.030  | OP65-2816R030 | 1        | 1 3/4 | 5   | R.030  | OP65-6428R030 |
| 7/16     | 1     | 3   | R.060  | OP65-2816R060 | 1        | 1 3/4 | 5   | R.060  | OP65-6428R060 |
| 7/16     | 1     | 3   | R.090  | OP65-2816R090 | 1        | 1 3/4 | 5   | R.090  | OP65-6428R090 |
| 7/16     | 1     | 3   | R.125  | OP65-2816R125 | 1        | 1 3/4 | 5   | R.125  | OP65-6428R125 |
| 7/16     | 1     | 3   | R.190  | OP65-2816R190 | 1        | 1 3/4 | 5   | R.190  | OP65-6428R190 |
| 1/2      | 1 1/4 | 3   | Square | OP65-3220R000 | 1        | 1 3/4 | 5   | R.250  | OP65-6428R250 |
| 1/2      | 1 1/4 | 3   | R.015  | OP65-3220R015 |          |       |     |        |               |
| 1/2      | 1 1/4 | 3   | R.030  | OP65-3220R030 |          |       |     |        |               |
| 1/2      | 1 1/4 | 3   | R.060  | OP65-3220R060 |          |       |     |        |               |
| 1/2      | 1 1/4 | 3   | R.090  | OP65-3220R090 |          |       |     |        |               |
| 1/2      | 1 1/4 | 3   | R.125  | OP65-3220R125 |          |       |     |        |               |

## 6 FLUTE - DOUBLE FLUTING



OP65M

DOUBLE FLUTING METRIC

| DIAMETER | LOC | OAL | RAD    | ITEM#           |
|----------|-----|-----|--------|-----------------|
| 6        | 20  | 75  | Square | OP65M-06020R0.0 |
| 6        | 20  | 75  | R0.5   | OP65M-06020R0.5 |
| 6        | 20  | 75  | R1.0   | OP65M-06020R1.0 |
| 6        | 20  | 75  | R1.5   | OP65M-06020R1.5 |
| 6        | 20  | 75  | R2.0   | OP65M-06020R2.0 |
| 8        | 21  | 75  | Square | OP65M-08021R0.0 |
| 8        | 21  | 75  | R0.5   | OP65M-08021R0.5 |
| 8        | 21  | 75  | R1.0   | OP65M-08021R1.0 |
| 8        | 21  | 75  | R1.5   | OP65M-08021R1.5 |
| 8        | 21  | 75  | R2.0   | OP65M-08021R2.0 |
| 8        | 21  | 75  | R3.0   | OP65M-08021R3.0 |
| 10       | 25  | 75  | Square | OP65M-10025R0.0 |
| 10       | 25  | 75  | R0.5   | OP65M-10025R0.5 |
| 10       | 25  | 75  | R1.0   | OP65M-10025R1.0 |
| 10       | 25  | 75  | R1.5   | OP65M-10025R1.5 |
| 10       | 25  | 75  | R2.0   | OP65M-10025R2.0 |
| 10       | 25  | 75  | R3.0   | OP65M-10025R3.0 |
| 11       | 25  | 75  | Square | OP65M-11025R0.0 |
| 11       | 25  | 75  | R0.5   | OP65M-11025R0.5 |
| 11       | 25  | 75  | R1.0   | OP65M-11025R1.0 |
| 11       | 25  | 75  | R1.5   | OP65M-11025R1.5 |
| 11       | 25  | 75  | R2.0   | OP65M-11025R2.0 |
| 11       | 25  | 75  | R3.0   | OP65M-11025R3.0 |
| 11       | 25  | 75  | R4.5   | OP65M-11025R4.5 |
| 12       | 32  | 75  | Square | OP65M-12032R0.0 |
| 12       | 32  | 75  | R0.5   | OP65M-12032R0.5 |
| 12       | 32  | 75  | R1.0   | OP65M-12032R1.0 |
| 12       | 32  | 75  | R1.5   | OP65M-12032R1.5 |
| 12       | 32  | 75  | R2.0   | OP65M-12032R2.0 |
| 12       | 32  | 75  | R3.0   | OP65M-12032R3.0 |

| DIAMETER | LOC | OAL | RAD    | ITEM#           |
|----------|-----|-----|--------|-----------------|
| 12       | 32  | 75  | R4.5   | OP65M-12032R4.5 |
| 16       | 41  | 100 | Square | OP65M-16041R0.0 |
| 16       | 41  | 100 | R0.5   | OP65M-16041R0.5 |
| 16       | 41  | 100 | R1.0   | OP65M-16041R1.0 |
| 16       | 41  | 100 | R1.5   | OP65M-16041R1.5 |
| 16       | 41  | 100 | R2.0   | OP65M-16041R2.0 |
| 16       | 41  | 100 | R3.0   | OP65M-16041R3.0 |
| 16       | 41  | 100 | R4.5   | OP65M-16041R4.5 |
| 16       | 41  | 100 | R6.0   | OP65M-16041R6.0 |
| 20       | 41  | 100 | Square | OP65M-20041R0.0 |
| 20       | 41  | 100 | R0.5   | OP65M-20041R0.5 |
| 20       | 41  | 100 | R1.0   | OP65M-20041R1.0 |
| 20       | 41  | 100 | R1.5   | OP65M-20041R1.5 |
| 20       | 41  | 100 | R2.0   | OP65M-20041R2.0 |
| 20       | 41  | 100 | R3.0   | OP65M-20041R3.0 |
| 20       | 41  | 100 | R4.5   | OP65M-20041R4.5 |
| 20       | 41  | 100 | R6.0   | OP65M-20041R6.0 |
| 25       | 45  | 125 | Square | OP65M-25045R0.0 |
| 25       | 45  | 125 | R0.5   | OP65M-25045R0.5 |
| 25       | 45  | 125 | R1.0   | OP65M-25045R1.0 |
| 25       | 45  | 125 | R1.5   | OP65M-25045R1.5 |
| 25       | 45  | 125 | R2.0   | OP65M-25045R2.0 |
| 25       | 45  | 125 | R3.0   | OP65M-25045R3.0 |
| 25       | 45  | 125 | R4.5   | OP65M-25045R4.5 |
| 25       | 45  | 125 | R6.0   | OP65M-25045R6.0 |



## 6 FLUTE - DOUBLE FLUTING- CHIP BREAKER



OP65C

DOUBLE FLUTING CHIP BREAKER INCH

| DIAMETER | LOC   | OAL | RAD    | ITEM#          |
|----------|-------|-----|--------|----------------|
| 1/4      | 3/4   | 3   | Square | OP65-1612R000C |
| 1/4      | 3/4   | 3   | R.015  | OP65-1612R015C |
| 1/4      | 3/4   | 3   | R.030  | OP65-1612R030C |
| 1/4      | 3/4   | 3   | R.060  | OP65-1612R060C |
| 1/4      | 3/4   | 3   | R.090  | OP65-1612R090C |
| 5/16     | 13/16 | 3   | Square | OP65-2013R000C |
| 5/16     | 13/16 | 3   | R.015  | OP65-2013R015C |
| 5/16     | 13/16 | 3   | R.030  | OP65-2013R030C |
| 5/16     | 13/16 | 3   | R.060  | OP65-2013R060C |
| 5/16     | 13/16 | 3   | R.090  | OP65-2013R090C |
| 5/16     | 13/16 | 3   | R.125  | OP65-2013R125C |
| 3/8      | 1     | 3   | Square | OP65-2416R000C |
| 3/8      | 1     | 3   | R.015  | OP65-2416R015C |
| 3/8      | 1     | 3   | R.030  | OP65-2416R030C |
| 3/8      | 1     | 3   | R.060  | OP65-2416R060C |
| 3/8      | 1     | 3   | R.090  | OP65-2416R090C |
| 3/8      | 1     | 3   | R.125  | OP65-2416R125C |
| 7/16     | 1     | 3   | Square | OP65-2816R000C |
| 7/16     | 1     | 3   | R.015  | OP65-2816R015C |
| 7/16     | 1     | 3   | R.030  | OP65-2816R030C |
| 7/16     | 1     | 3   | R.060  | OP65-2816R060C |
| 7/16     | 1     | 3   | R.090  | OP65-2816R090C |
| 7/16     | 1     | 3   | R.125  | OP65-2816R125C |
| 7/16     | 1     | 3   | R.190  | OP65-2816R190C |
| 1/2      | 1 1/4 | 3   | Square | OP65-3220R000C |
| 1/2      | 1 1/4 | 3   | R.015  | OP65-3220R015C |
| 1/2      | 1 1/4 | 3   | R.030  | OP65-3220R030C |
| 1/2      | 1 1/4 | 3   | R.060  | OP65-3220R060C |
| 1/2      | 1 1/4 | 3   | R.090  | OP65-3220R090C |
| 1/2      | 1 1/4 | 3   | R.125  | OP65-3220R125C |

| DIAMETER | LOC   | OAL | RAD    | ITEM#          |
|----------|-------|-----|--------|----------------|
| 1/2      | 1 1/4 | 3   | R.190  | OP65-3220R190C |
| 5/8      | 1 5/8 | 4   | Square | OP65-4026R000C |
| 5/8      | 1 5/8 | 4   | R.015  | OP65-4026R015C |
| 5/8      | 1 5/8 | 4   | R.030  | OP65-4026R030C |
| 5/8      | 1 5/8 | 4   | R.060  | OP65-4026R060C |
| 5/8      | 1 5/8 | 4   | R.090  | OP65-4026R090C |
| 5/8      | 1 5/8 | 4   | R.125  | OP65-4026R125C |
| 5/8      | 1 5/8 | 4   | R.190  | OP65-4026R190C |
| 5/8      | 1 5/8 | 4   | R.250  | OP65-4026R250C |
| 3/4      | 1 5/8 | 4   | Square | OP65-4826R000C |
| 3/4      | 1 5/8 | 4   | R.015  | OP65-4826R015C |
| 3/4      | 1 5/8 | 4   | R.030  | OP65-4826R030C |
| 3/4      | 1 5/8 | 4   | R.060  | OP65-4826R060C |
| 3/4      | 1 5/8 | 4   | R.090  | OP65-4826R090C |
| 3/4      | 1 5/8 | 4   | R.125  | OP65-4826R125C |
| 3/4      | 1 5/8 | 4   | R.190  | OP65-4826R190C |
| 3/4      | 1 5/8 | 4   | R.250  | OP65-4826R250C |
| 1        | 1 3/4 | 5   | Square | OP65-6428R000C |
| 1        | 1 3/4 | 5   | R.015  | OP65-6428R015C |
| 1        | 1 3/4 | 5   | R.030  | OP65-6428R030C |
| 1        | 1 3/4 | 5   | R.060  | OP65-6428R060C |
| 1        | 1 3/4 | 5   | R.090  | OP65-6428R090C |
| 1        | 1 3/4 | 5   | R.125  | OP65-6428R125C |
| 1        | 1 3/4 | 5   | R.190  | OP65-6428R190C |
| 1        | 1 3/4 | 5   | R.250  | OP65-6428R250C |

## 6 FLUTE - DOUBLE FLUTING- CHIP BREAKER



OP65MC

DOUBLE FLUTING CHIP BREAKER METRIC

| DIAMETER | LOC | OAL | RAD    | ITEM#            |
|----------|-----|-----|--------|------------------|
| 6        | 20  | 75  | Square | OP65M-06020R0.0C |
| 6        | 20  | 75  | R0.5   | OP65M-06020R0.5C |
| 6        | 20  | 75  | R1.0   | OP65M-06020R1.0C |
| 6        | 20  | 75  | R1.5   | OP65M-06020R1.5C |
| 6        | 20  | 75  | R2.0   | OP65M-06020R2.0C |
| 8        | 21  | 75  | Square | OP65M-08021R0.0C |
| 8        | 21  | 75  | R0.5   | OP65M-08021R0.5C |
| 8        | 21  | 75  | R1.0   | OP65M-08021R1.0C |
| 8        | 21  | 75  | R1.5   | OP65M-08021R1.5C |
| 8        | 21  | 75  | R2.0   | OP65M-08021R2.0C |
| 8        | 21  | 75  | R3.0   | OP65M-08021R3.0C |
| 10       | 25  | 75  | Square | OP65M-10025R0.0C |
| 10       | 25  | 75  | R0.5   | OP65M-10025R0.5C |
| 10       | 25  | 75  | R1.0   | OP65M-10025R1.0C |
| 10       | 25  | 75  | R1.5   | OP65M-10025R1.5C |
| 10       | 25  | 75  | R2.0   | OP65M-10025R2.0C |
| 10       | 25  | 75  | R3.0   | OP65M-10025R3.0C |
| 11       | 25  | 75  | Square | OP65M-11025R0.0C |
| 11       | 25  | 75  | R0.5   | OP65M-11025R0.5C |
| 11       | 25  | 75  | R1.0   | OP65M-11025R1.0C |
| 11       | 25  | 75  | R1.5   | OP65M-11025R1.5C |
| 11       | 25  | 75  | R2.0   | OP65M-11025R2.0C |
| 11       | 25  | 75  | R3.0   | OP65M-11025R3.0C |
| 11       | 25  | 75  | R4.5   | OP65M-11025R4.5C |
| 12       | 32  | 75  | Square | OP65M-12032R0.0C |
| 12       | 32  | 75  | R0.5   | OP65M-12032R0.5C |
| 12       | 32  | 75  | R1.0   | OP65M-12032R1.0C |
| 12       | 32  | 75  | R1.5   | OP65M-12032R1.5C |
| 12       | 32  | 75  | R2.0   | OP65M-12032R2.0C |
| 12       | 32  | 75  | R3.0   | OP65M-12032R3.0C |

| DIAMETER | LOC | OAL | RAD    | ITEM#            |
|----------|-----|-----|--------|------------------|
| 12       | 32  | 75  | R4.5   | OP65M-12032R4.5C |
| 16       | 41  | 100 | Square | OP65M-16041R0.0C |
| 16       | 41  | 100 | R0.5   | OP65M-16041R0.5C |
| 16       | 41  | 100 | R1.0   | OP65M-16041R1.0C |
| 16       | 41  | 100 | R1.5   | OP65M-16041R1.5C |
| 16       | 41  | 100 | R2.0   | OP65M-16041R2.0C |
| 16       | 41  | 100 | R3.0   | OP65M-16041R3.0C |
| 16       | 41  | 100 | R4.5   | OP65M-16041R4.5C |
| 16       | 41  | 100 | R6.0   | OP65M-16041R6.0C |
| 20       | 41  | 100 | Square | OP65M-20041R0.0C |
| 20       | 41  | 100 | R0.5   | OP65M-20041R0.5C |
| 20       | 41  | 100 | R1.0   | OP65M-20041R1.0C |
| 20       | 41  | 100 | R1.5   | OP65M-20041R1.5C |
| 20       | 41  | 100 | R2.0   | OP65M-20041R2.0C |
| 20       | 41  | 100 | R3.0   | OP65M-20041R3.0C |
| 20       | 41  | 100 | R4.5   | OP65M-20041R4.5C |
| 20       | 41  | 100 | R6.0   | OP65M-20041R6.0C |
| 25       | 45  | 125 | Square | OP65M-25045R0.0C |
| 25       | 45  | 125 | R0.5   | OP65M-25045R0.5C |
| 25       | 45  | 125 | R1.0   | OP65M-25045R1.0C |
| 25       | 45  | 125 | R1.5   | OP65M-25045R1.5C |
| 25       | 45  | 125 | R2.0   | OP65M-25045R2.0C |
| 25       | 45  | 125 | R3.0   | OP65M-25045R3.0C |
| 25       | 45  | 125 | R4.5   | OP65M-25045R4.5C |
| 25       | 45  | 125 | R6.0   | OP65M-25045R6.0C |

# OP7 ENDMILLS

Best used for Steel, Hardensteel, Stainless, Exotics materials

## SPECIAL FEATURES

### UNEQUAL INDEXING

Eliminates tool vibrations around tool circumference by spreading cutting forces unevenly for a more stable cutting.

### VARIABLE HELIX

Breaks up harmonic vibrations (chatter) along the length and improves surface finish and tool life.

### TANGENTIAL RADIUS

Allows a smooth blending radius on the machined part, improving the manufacturing times by avoiding the finishing process.

### nACRo PVD COATING

Offers a higher cutting edge resistance to wear and higher heat tolerance.

### CHIP BREAKER

Unique Chipbreaker design to help reduce the load on the tool when machining.



## 7 FLUTE - STUB



OP70

STUB INCH

| DIAMETER | LOC | OAL | RAD    | ITEM#         |
|----------|-----|-----|--------|---------------|
| 1/4      | 3/8 | 3   | Square | OP70-1606R000 |
| 1/4      | 3/8 | 3   | R.015  | OP70-1606R015 |
| 1/4      | 3/8 | 3   | R.030  | OP70-1606R030 |
| 1/4      | 3/8 | 3   | R.060  | OP70-1606R060 |
| 3/8      | 1/2 | 3   | Square | OP70-2408R000 |
| 3/8      | 1/2 | 3   | R.015  | OP70-2408R015 |
| 3/8      | 1/2 | 3   | R.030  | OP70-2408R030 |
| 3/8      | 1/2 | 3   | R.060  | OP70-2408R060 |
| 1/2      | 5/8 | 3   | Square | OP70-3210R000 |
| 1/2      | 5/8 | 3   | R.015  | OP70-3210R015 |
| 1/2      | 5/8 | 3   | R.030  | OP70-3210R030 |
| 1/2      | 5/8 | 3   | R.060  | OP70-3210R060 |
| 5/8      | 3/4 | 4   | Square | OP70-4012R000 |
| 5/8      | 3/4 | 4   | R.015  | OP70-4012R015 |
| 5/8      | 3/4 | 4   | R.030  | OP70-4012R030 |
| 5/8      | 3/4 | 4   | R.060  | OP70-4012R060 |



## 7 FLUTE - STUB



OP70M

STUB METRIC

| DIAMETER | LOC | OAL | RAD    | ITEM#           |
|----------|-----|-----|--------|-----------------|
| 6        | 10  | 75  | Square | OP70M-06010R0.0 |
| 6        | 10  | 75  | R0.5   | OP70M-06010R0.5 |
| 6        | 10  | 75  | R1.0   | OP70M-06010R1.0 |
| 6        | 10  | 75  | R2.0   | OP70M-06010R2.0 |
| 10       | 12  | 75  | Square | OP70M-10012R0.0 |
| 10       | 12  | 75  | R0.5   | OP70M-10012R0.5 |
| 10       | 12  | 75  | R1.0   | OP70M-10012R1.0 |
| 10       | 12  | 75  | R2.0   | OP70M-10012R2.0 |
| 12       | 16  | 75  | Square | OP70M-12016R0.0 |
| 12       | 16  | 75  | R0.5   | OP70M-12016R0.5 |
| 12       | 16  | 75  | R1.0   | OP70M-12016R1.0 |
| 12       | 16  | 75  | R2.0   | OP70M-12016R2.0 |
| 16       | 20  | 100 | Square | OP70M-16020R0.0 |
| 16       | 20  | 100 | R0.5   | OP70M-16020R0.5 |
| 16       | 20  | 100 | R1.0   | OP70M-16020R1.0 |
| 16       | 20  | 100 | R2.0   | OP70M-16020R2.0 |

## 7 FLUTE - STUB - CHIP BREAKER



OP70C

STUB CHIP BREAKER INCH

| DIAMETER | LOC | OAL | RAD    | ITEM#          |
|----------|-----|-----|--------|----------------|
| 1/4      | 3/8 | 3   | Square | OP70-1606R000C |
| 1/4      | 3/8 | 3   | R.015  | OP70-1606R015C |
| 1/4      | 3/8 | 3   | R.030  | OP70-1606R030C |
| 1/4      | 3/8 | 3   | R.060  | OP70-1606R060C |
| 3/8      | 1/2 | 3   | Square | OP70-2408R000C |
| 3/8      | 1/2 | 3   | R.015  | OP70-2408R015C |
| 3/8      | 1/2 | 3   | R.030  | OP70-2408R030C |
| 3/8      | 1/2 | 3   | R.060  | OP70-2408R060C |
| 1/2      | 5/8 | 3   | Square | OP70-3210R000C |
| 1/2      | 5/8 | 3   | R.015  | OP70-3210R015C |
| 1/2      | 5/8 | 3   | R.030  | OP70-3210R030C |
| 1/2      | 5/8 | 3   | R.060  | OP70-3210R060C |
| 5/8      | 3/4 | 4   | Square | OP70-4012R000C |
| 5/8      | 3/4 | 4   | R.015  | OP70-4012R015C |
| 5/8      | 3/4 | 4   | R.030  | OP70-4012R030C |
| 5/8      | 3/4 | 4   | R.060  | OP70-4012R060C |

## 7 FLUTE - STUB - CHIP BREAKER

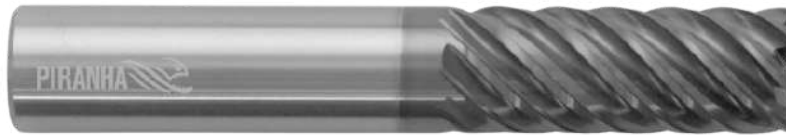


OP70MC

STUB CHIP BREAKER METRIC

| DIAMETER | LOC | OAL | RAD    | ITEM#            |
|----------|-----|-----|--------|------------------|
| 6        | 10  | 75  | Square | OP70M-06010R0.0C |
| 6        | 10  | 75  | R0.5   | OP70M-06010R0.5C |
| 6        | 10  | 75  | R1.0   | OP70M-06010R1.0C |
| 6        | 10  | 75  | R2.0   | OP70M-06010R2.0C |
| 10       | 12  | 75  | Square | OP70M-10012R0.0C |
| 10       | 12  | 75  | R0.5   | OP70M-10012R0.5C |
| 10       | 12  | 75  | R1.0   | OP70M-10012R1.0C |
| 10       | 12  | 75  | R2.0   | OP70M-10012R2.0C |
| 12       | 16  | 75  | Square | OP70M-12016R0.0C |
| 12       | 16  | 75  | R0.5   | OP70M-12016R0.5C |
| 12       | 16  | 75  | R1.0   | OP70M-12016R1.0C |
| 12       | 16  | 75  | R2.0   | OP70M-12016R2.0C |
| 16       | 20  | 100 | Square | OP70M-16020R0.0C |
| 16       | 20  | 100 | R0.5   | OP70M-16020R0.5C |
| 16       | 20  | 100 | R1.0   | OP70M-16020R1.0C |
| 16       | 20  | 100 | R2.0   | OP70M-16020R2.0C |

## 7 FLUTE - REGULAR



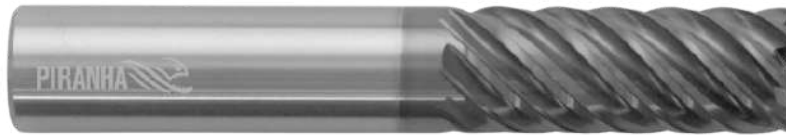
OP71

REGULAR INCH

| DIAMETER | LOC   | OAL | RAD    | ITEM#         |
|----------|-------|-----|--------|---------------|
| 1/4      | 3/4   | 3   | Square | OP71-1612R000 |
| 1/4      | 3/4   | 3   | R.015  | OP71-1612R015 |
| 1/4      | 3/4   | 3   | R.030  | OP71-1612R030 |
| 1/4      | 3/4   | 3   | R.060  | OP71-1612R060 |
| 3/8      | 1     | 3   | Square | OP71-2416R000 |
| 3/8      | 1     | 3   | R.015  | OP71-2416R015 |
| 3/8      | 1     | 3   | R.030  | OP71-2416R030 |
| 3/8      | 1     | 3   | R.060  | OP71-2416R060 |
| 1/2      | 1 1/4 | 3   | Square | OP71-3220R000 |
| 1/2      | 1 1/4 | 3   | R.015  | OP71-3220R015 |
| 1/2      | 1 1/4 | 3   | R.030  | OP71-3220R030 |
| 1/2      | 1 1/4 | 3   | R.060  | OP71-3220R060 |
| 5/8      | 1 5/8 | 4   | Square | OP71-4026R000 |
| 5/8      | 1 5/8 | 4   | R.015  | OP71-4026R015 |
| 5/8      | 1 5/8 | 4   | R.030  | OP71-4026R030 |
| 5/8      | 1 5/8 | 4   | R.060  | OP71-4026R060 |



## 7 FLUTE - REGULAR

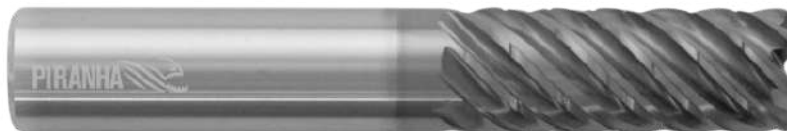


OP71M

REGULAR METRIC

| DIAMETER | LOC | OAL | RAD    | ITEM#           |
|----------|-----|-----|--------|-----------------|
| 6        | 20  | 75  | Square | OP71M-06020R0.0 |
| 6        | 20  | 75  | R0.5   | OP71M-06020R0.5 |
| 6        | 20  | 75  | R1.0   | OP71M-06020R1.0 |
| 6        | 20  | 75  | R2.0   | OP71M-06020R2.0 |
| 10       | 25  | 75  | Square | OP71M-10025R0.0 |
| 10       | 25  | 75  | R0.5   | OP71M-10025R0.5 |
| 10       | 25  | 75  | R1.0   | OP71M-10025R1.0 |
| 10       | 25  | 75  | R2.0   | OP71M-10025R2.0 |
| 12       | 32  | 75  | Square | OP71M-12032R0.0 |
| 12       | 32  | 75  | R0.5   | OP71M-12032R0.5 |
| 12       | 32  | 75  | R1.0   | OP71M-12032R1.0 |
| 12       | 32  | 75  | R2.0   | OP71M-12032R2.0 |
| 16       | 41  | 100 | Square | OP71M-16041R0.0 |
| 16       | 41  | 100 | R0.5   | OP71M-16041R0.5 |
| 16       | 41  | 100 | R1.0   | OP71M-16041R1.0 |
| 16       | 41  | 100 | R2.0   | OP71M-16041R2.0 |

## 7 FLUTE - REGULAR - CHIP BREAKER



OP71C

CHIP BREAKER INCH

| DIAMETER | LOC   | OAL | RAD    | ITEM#          |
|----------|-------|-----|--------|----------------|
| 1/4      | 3/4   | 3   | Square | OP71-1612R000C |
| 1/4      | 3/4   | 3   | R.015  | OP71-1612R015C |
| 1/4      | 3/4   | 3   | R.030  | OP71-1612R030C |
| 1/4      | 3/4   | 3   | R.060  | OP71-1612R060C |
| 3/8      | 1     | 3   | Square | OP71-2416R000C |
| 3/8      | 1     | 3   | R.015  | OP71-2416R015C |
| 3/8      | 1     | 3   | R.030  | OP71-2416R030C |
| 3/8      | 1     | 3   | R.060  | OP71-2416R060C |
| 1/2      | 1 1/4 | 3   | Square | OP71-3220R000C |
| 1/2      | 1 1/4 | 3   | R.015  | OP71-3220R015C |
| 1/2      | 1 1/4 | 3   | R.030  | OP71-3220R030C |
| 1/2      | 1 1/4 | 3   | R.060  | OP71-3220R060C |
| 5/8      | 1 5/8 | 4   | Square | OP71-4026R000C |
| 5/8      | 1 5/8 | 4   | R.015  | OP71-4026R015C |
| 5/8      | 1 5/8 | 4   | R.030  | OP71-4026R030C |
| 5/8      | 1 5/8 | 4   | R.060  | OP71-4026R060C |

## 7 FLUTE - REGULAR - CHIP BREAKER

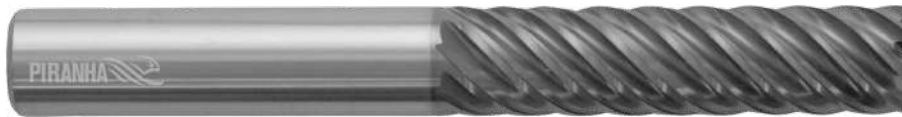


OP71MC

CHIP BREAKER METRIC

| DIAMETER | LOC | OAL | RAD    | ITEM#            |
|----------|-----|-----|--------|------------------|
| 6        | 20  | 75  | Square | OP71M-06020R0.0C |
| 6        | 20  | 75  | R0.5   | OP71M-06020R0.5C |
| 6        | 20  | 75  | R1.0   | OP71M-06020R1.0C |
| 6        | 20  | 75  | R2.0   | OP71M-06020R2.0C |
| 10       | 25  | 75  | Square | OP71M-10025R0.0C |
| 10       | 25  | 75  | R0.5   | OP71M-10025R0.5C |
| 10       | 25  | 75  | R1.0   | OP71M-10025R1.0C |
| 10       | 25  | 75  | R2.0   | OP71M-10025R2.0C |
| 12       | 32  | 75  | Square | OP71M-12032R0.0C |
| 12       | 32  | 75  | R0.5   | OP71M-12032R0.5C |
| 12       | 32  | 75  | R1.0   | OP71M-12032R1.0C |
| 12       | 32  | 75  | R2.0   | OP71M-12032R2.0C |
| 16       | 41  | 100 | Square | OP71M-16041R0.0C |
| 16       | 41  | 100 | R0.5   | OP71M-16041R0.5C |
| 16       | 41  | 100 | R1.0   | OP71M-16041R1.0C |
| 16       | 41  | 100 | R2.0   | OP71M-16041R2.0C |

## 7 FLUTE - LONG



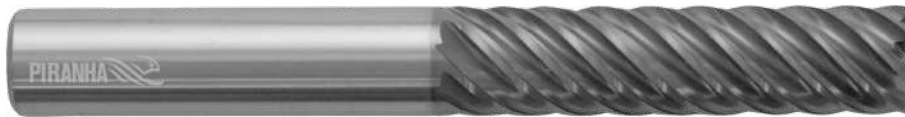
OP72

LONG INCH

| DIAMETER | LOC   | OAL | RAD    | ITEM#         |
|----------|-------|-----|--------|---------------|
| 1/4      | 1 1/8 | 3   | Square | OP72-1618R000 |
| 1/4      | 1 1/8 | 3   | R.015  | OP72-1618R015 |
| 1/4      | 1 1/8 | 3   | R.030  | OP72-1618R030 |
| 1/4      | 1 1/8 | 3   | R.060  | OP72-1618R060 |
| 3/8      | 1 1/4 | 3   | Square | OP72-2420R000 |
| 3/8      | 1 1/4 | 3   | R.015  | OP72-2420R015 |
| 3/8      | 1 1/4 | 3   | R.030  | OP72-2420R030 |
| 3/8      | 1 1/4 | 3   | R.060  | OP72-2420R060 |
| 1/2      | 2     | 4   | Square | OP72-3232R000 |
| 1/2      | 2     | 4   | R.015  | OP72-3232R015 |
| 1/2      | 2     | 4   | R.030  | OP72-3232R030 |
| 1/2      | 2     | 4   | R.060  | OP72-3232R060 |
| 5/8      | 2 1/4 | 5   | Square | OP72-4036R000 |
| 5/8      | 2 1/4 | 5   | R.015  | OP72-4036R015 |
| 5/8      | 2 1/4 | 5   | R.030  | OP72-4036R030 |
| 5/8      | 2 1/4 | 5   | R.060  | OP72-4036R060 |



## 7 FLUTE - LONG



OP72M

LONG METRIC

| DIAMETER | LOC | OAL | RAD    | ITEM#           |
|----------|-----|-----|--------|-----------------|
| 6        | 29  | 75  | Square | OP72M-06029R0.0 |
| 6        | 29  | 75  | R0.5   | OP72M-06029R0.5 |
| 6        | 29  | 75  | R1.0   | OP72M-06029R1.0 |
| 6        | 29  | 75  | R2.0   | OP72M-06029R2.0 |
| 10       | 32  | 75  | Square | OP72M-10032R0.0 |
| 10       | 32  | 75  | R0.5   | OP72M-10032R0.5 |
| 10       | 32  | 75  | R1.0   | OP72M-10032R1.0 |
| 10       | 32  | 75  | R2.0   | OP72M-10032R2.0 |
| 12       | 50  | 100 | Square | OP72M-12050R0.0 |
| 12       | 50  | 100 | R0.5   | OP72M-12050R0.5 |
| 12       | 50  | 100 | R1.0   | OP72M-12050R1.0 |
| 12       | 50  | 100 | R2.0   | OP72M-12050R2.0 |
| 16       | 57  | 125 | Square | OP72M-16057R0.0 |
| 16       | 57  | 125 | R0.5   | OP72M-16057R0.5 |
| 16       | 57  | 125 | R1.0   | OP72M-16057R1.0 |
| 16       | 57  | 125 | R2.0   | OP72M-16057R2.0 |

**7 FLUTE - LONG - CHIP BREAKER**



OP72C

CHIP BREAKER INCH

| DIAMETER | LOC   | OAL | RAD    | ITEM#          |
|----------|-------|-----|--------|----------------|
| 1/4      | 1 1/8 | 3   | Square | OP72-1618R000C |
| 1/4      | 1 1/8 | 3   | R.015  | OP72-1618R015C |
| 1/4      | 1 1/8 | 3   | R.030  | OP72-1618R030C |
| 1/4      | 1 1/8 | 3   | R.060  | OP72-1618R060C |
| 3/8      | 1 1/4 | 3   | Square | OP72-2420R000C |
| 3/8      | 1 1/4 | 3   | R.015  | OP72-2420R015C |
| 3/8      | 1 1/4 | 3   | R.030  | OP72-2420R030C |
| 3/8      | 1 1/4 | 3   | R.060  | OP72-2420R060C |
| 1/2      | 2     | 4   | Square | OP72-3232R000C |
| 1/2      | 2     | 4   | R.015  | OP72-3232R015C |
| 1/2      | 2     | 4   | R.030  | OP72-3232R030C |
| 1/2      | 2     | 4   | R.060  | OP72-3232R060C |
| 5/8      | 2 1/4 | 5   | Square | OP72-4036R000C |
| 5/8      | 2 1/4 | 5   | R.015  | OP72-4036R015C |
| 5/8      | 2 1/4 | 5   | R.030  | OP72-4036R030C |
| 5/8      | 2 1/4 | 5   | R.060  | OP72-4036R060C |

## 7 FLUTE - LONG - CHIP BREAKER



OP72MC

CHIP BREAKER METRIC

| DIAMETER | LOC | OAL | RAD    | ITEM#            |
|----------|-----|-----|--------|------------------|
| 6        | 29  | 75  | Square | OP72M-06029R0.0C |
| 6        | 29  | 75  | R0.5   | OP72M-06029R0.5C |
| 6        | 29  | 75  | R1.0   | OP72M-06029R1.0C |
| 6        | 29  | 75  | R2.0   | OP72M-06029R2.0C |
| 10       | 32  | 75  | Square | OP72M-10032R0.0C |
| 10       | 32  | 75  | R0.5   | OP72M-10032R0.5C |
| 10       | 32  | 75  | R1.0   | OP72M-10032R1.0C |
| 10       | 32  | 75  | R2.0   | OP72M-10032R2.0C |
| 12       | 50  | 100 | Square | OP72M-12050R0.0C |
| 12       | 50  | 100 | R0.5   | OP72M-12050R0.5C |
| 12       | 50  | 100 | R1.0   | OP72M-12050R1.0C |
| 12       | 50  | 100 | R2.0   | OP72M-12050R2.0C |
| 16       | 57  | 125 | Square | OP72M-16057R0.0C |
| 16       | 57  | 125 | R0.5   | OP72M-16057R0.5C |
| 16       | 57  | 125 | R1.0   | OP72M-16057R1.0C |
| 16       | 57  | 125 | R2.0   | OP72M-16057R2.0C |

# OPX7 HIGH PERFORMANCE

Best used for HTSA (Heat-resistant superalloys)

## SPECIAL FEATURES

|                          |                                                                                                                            |
|--------------------------|----------------------------------------------------------------------------------------------------------------------------|
| <b>UNEQUAL INDEXING</b>  | Eliminates tool vibrations around tool circumference by spreading cutting forces unevenly for a more stable cutting.       |
| <b>nACRo PVD COATING</b> | Offers a higher cutting edge resistance to wear and higher heat tolerance.                                                 |
| <b>EDGE PREP</b>         | Makes the cutting edge of the tool more uniform, which help the tool to machine better and faster.                         |
| <b>TANGENTIAL RADIUS</b> | Allows a smooth blending radius on the machined part, improving the manufacturing times by avoiding the finishing process. |
| <b>ECCENTRIC RELIEF</b>  | A continuous convex relief grind to provides a stronger cutting edge by maintaining more material behind the cutting edge. |
| <b>DOUBLE FLUTING</b>    | Improves chip evacuation with a deeper front flute, while the rest of the reinforced body provides greater rigidity.       |





## 7 FLUTE - EDGE PREP FOR EXOTIC ALLOYS



OPX7  
REGULAR - LONG INCH

| DIAMETER | LOC       | OAL | RADIUS | ITEM#         |
|----------|-----------|-----|--------|---------------|
| 1 / 4    | 3 / 4     | 3   | R000   | OPX7-1612R000 |
| 1 / 4    | 3 / 4     | 3   | R030   | OPX7-1612R030 |
| 1 / 4    | 3 / 4     | 3   | R060   | OPX7-1612R060 |
| 3 / 8    | 1         | 3   | R000   | OPX7-2416R000 |
| 3 / 8    | 1         | 3   | R030   | OPX7-2416R030 |
| 3 / 8    | 1         | 3   | R060   | OPX7-2416R060 |
| 3 / 8    | 1 - 5 / 8 | 3   | R000   | OPX7-2426R000 |
| 3 / 8    | 1 - 5 / 8 | 3   | R030   | OPX7-2426R030 |
| 3 / 8    | 1 - 5 / 8 | 3   | R060   | OPX7-2426R060 |
| 1 / 2    | 1 - 1 / 4 | 3   | R000   | OPX7-3220R000 |
| 1 / 2    | 1 - 1 / 4 | 3   | R030   | OPX7-3220R030 |
| 1 / 2    | 1 - 1 / 4 | 3   | R060   | OPX7-3220R060 |
| 1 / 2    | 2 - 1 / 4 | 4   | R000   | OPX7-3236R000 |
| 1 / 2    | 2 - 1 / 4 | 4   | R030   | OPX7-3236R030 |
| 1 / 2    | 2 - 1 / 4 | 4   | R060   | OPX7-3236R060 |
| 5 / 8    | 1 - 5 / 8 | 4   | R000   | OPX7-4026R000 |
| 5 / 8    | 1 - 5 / 8 | 4   | R030   | OPX7-4026R030 |
| 5 / 8    | 1 - 5 / 8 | 4   | R060   | OPX7-4026R060 |
| 5 / 8    | 2 - 1 / 2 | 5   | R000   | OPX7-4040R000 |
| 5 / 8    | 2 - 1 / 2 | 5   | R030   | OPX7-4040R030 |
| 5 / 8    | 2 - 1 / 2 | 5   | R060   | OPX7-4040R060 |

## 7 FLUTE - EDGE PREP FOR EXOTIC ALLOYS



OPX7M  
REGULAR - LONG METRIC

| DIAMETER | LOC | OAL | RADIUS | ITEM#           |
|----------|-----|-----|--------|-----------------|
| 6        | 20  | 75  | R0.0   | OPX7M-06020R0.0 |
| 6        | 20  | 75  | R0.5   | OPX7M-06020R0.5 |
| 6        | 20  | 75  | R1.0   | OPX7M-06020R1.0 |
| 8        | 25  | 75  | R0.0   | OPX7M-08025R0.0 |
| 8        | 25  | 75  | R0.5   | OPX7M-08025R0.5 |
| 8        | 25  | 75  | R1.0   | OPX7M-08025R1.0 |
| 12       | 32  | 75  | R0.0   | OPX7M-12032R0.0 |
| 12       | 32  | 75  | R0.5   | OPX7M-12032R0.5 |
| 12       | 32  | 75  | R1.0   | OPX7M-12032R1.0 |
| 12       | 57  | 100 | R0.5   | OPX7M-12057R0.5 |
| 12       | 57  | 100 | R1.0   | OPX7M-12057R1.0 |
| 16       | 41  | 100 | R0.0   | OPX7M-16041R0.0 |
| 16       | 41  | 100 | R0.5   | OPX7M-16041R0.5 |
| 16       | 41  | 100 | R1.0   | OPX7M-16041R1.0 |
| 16       | 63  | 125 | R0.0   | OPX7M-16063R0.0 |
| 16       | 63  | 125 | R0.5   | OPX7M-16063R0.5 |
| 16       | 63  | 125 | R1.0   | OPX7M-16063R1.0 |

## 7 FLUTE - EDGE PREP FOR EXOTIC ALLOYS - CHIP BREAKER



OPX7C

CHIP BREAKER REGULAR - LONG INCH

| DIAMETER | LOC       | OAL | RADIUS | ITEM#          |
|----------|-----------|-----|--------|----------------|
| 3 / 8    | 1         | 3   | R030   | OPX7-2416R030C |
| 3 / 8    | 1         | 3   | R060   | OPX7-2416R060C |
| 3 / 8    | 1 - 5 / 8 | 3   | R030   | OPX7-2426R030C |
| 3 / 8    | 1 - 5 / 8 | 3   | R060   | OPX7-2426R060C |
| 1 / 2    | 1 - 1 / 4 | 3   | R030   | OPX7-3220R030C |
| 1 / 2    | 1 - 1 / 4 | 3   | R060   | OPX7-3220R060C |
| 1 / 2    | 2 - 1 / 4 | 4   | R030   | OPX7-3236R030C |
| 1 / 2    | 2 - 1 / 4 | 4   | R060   | OPX7-3236R060C |
| 5 / 8    | 1 - 5 / 8 | 4   | R030   | OPX7-4026R030C |
| 5 / 8    | 1 - 5 / 8 | 4   | R060   | OPX7-4026R060C |
| 5 / 8    | 2 - 1 / 2 | 5   | R030   | OPX7-4040R030C |
| 5 / 8    | 2 - 1 / 2 | 5   | R060   | OPX7-4040R060C |

## 7 FLUTE - EDGE PREP FOR EXOTIC ALLOYS - CHIP BREAKER



OPX7MC

CHIP BREAKER REGULAR - LONG METRIC

| DIAMETER | LOC | OAL | RADIUS | ITEM#            |
|----------|-----|-----|--------|------------------|
| 8        | 25  | 75  | R1.0   | OPX7M-08025R1.0C |
| 8        | 25  | 75  | R1.5   | OPX7M-08025R1.5C |
| 12       | 32  | 75  | R1.0   | OPX7M-12032R1.0C |
| 12       | 32  | 75  | R1.5   | OPX7M-12032R1.5C |
| 12       | 57  | 100 | R1.0   | OPX7M-12057R1.0C |
| 12       | 57  | 100 | R1.5   | OPX7M-12057R1.5C |
| 16       | 41  | 100 | R1.0   | OPX7M-16041R1.0C |
| 16       | 41  | 100 | R1.5   | OPX7M-16041R1.5C |
| 16       | 63  | 125 | R1.0   | OPX7M-16063R1.0C |
| 16       | 63  | 125 | R1.5   | OPX7M-16063R1.5C |



# OP9 ENDMILLS

Best used for Stainless and Exotics materials

## SPECIAL FEATURES

### UNEQUAL INDEXING

Eliminates tool vibrations around tool circumference by spreading cutting forces unevenly for a more stable cutting.

### TANGENTIAL RADIUS

Allows a smooth blending radius on the machined part, improving the manufacturing times by avoiding the finishing process.

### nACRo PVD COATING

Offers a higher cutting edge resistance to wear and higher heat tolerance.

For peripheral milling at high feed rate and low depth of cut, exceptional surface finish and long tool life.



## 9 FLUTE STUB



OP90

STUB INCH

| DIAMETER | LOC | OAL | RAD    | ITEM#         |
|----------|-----|-----|--------|---------------|
| 1/4      | 3/8 | 3   | Square | OP90-1606R000 |
| 1/4      | 3/8 | 3   | R.015  | OP90-1606R015 |
| 1/4      | 3/8 | 3   | R.030  | OP90-1606R030 |
| 1/4      | 3/8 | 3   | R.060  | OP90-1606R060 |
| 3/8      | 1/2 | 3   | Square | OP90-2408R000 |
| 3/8      | 1/2 | 3   | R.015  | OP90-2408R015 |
| 3/8      | 1/2 | 3   | R.030  | OP90-2408R030 |
| 3/8      | 1/2 | 3   | R.060  | OP90-2408R060 |
| 1/2      | 5/8 | 3   | Square | OP90-3210R000 |
| 1/2      | 5/8 | 3   | R.015  | OP90-3210R015 |
| 1/2      | 5/8 | 3   | R.030  | OP90-3210R030 |
| 1/2      | 5/8 | 3   | R.060  | OP90-3210R060 |
| 5/8      | 3/4 | 4   | Square | OP90-4012R000 |
| 5/8      | 3/4 | 4   | R.015  | OP90-4012R015 |
| 5/8      | 3/4 | 4   | R.030  | OP90-4012R030 |
| 5/8      | 3/4 | 4   | R.060  | OP90-4012R060 |

## 9 FLUTE STUB

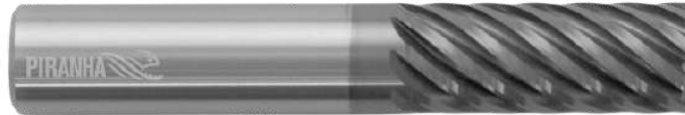


OP90M

STUB METRIC

| DIAMETER | LOC | OAL | RAD    | ITEM#           |
|----------|-----|-----|--------|-----------------|
| 6        | 10  | 75  | Square | OP90M-06010R0.0 |
| 6        | 10  | 75  | R0.5   | OP90M-06010R0.5 |
| 6        | 10  | 75  | R1.0   | OP90M-06010R1.0 |
| 6        | 10  | 75  | R2.0   | OP90M-06010R2.0 |
| 10       | 12  | 75  | Square | OP90M-10012R0.0 |
| 10       | 12  | 75  | R0.5   | OP90M-10012R0.5 |
| 10       | 12  | 75  | R1.0   | OP90M-10012R1.0 |
| 10       | 12  | 75  | R2.0   | OP90M-10012R2.0 |
| 12       | 16  | 75  | Square | OP90M-12016R0.0 |
| 12       | 16  | 75  | R0.5   | OP90M-12016R0.5 |
| 12       | 16  | 75  | R1.0   | OP90M-12016R1.0 |
| 12       | 16  | 75  | R2.0   | OP90M-12016R2.0 |
| 16       | 20  | 100 | Square | OP90M-16020R0.0 |
| 16       | 20  | 100 | R0.5   | OP90M-16020R0.5 |
| 16       | 20  | 100 | R1.0   | OP90M-16020R1.0 |
| 16       | 20  | 100 | R2.0   | OP90M-16020R2.0 |

## 9 FLUTE REGULAR



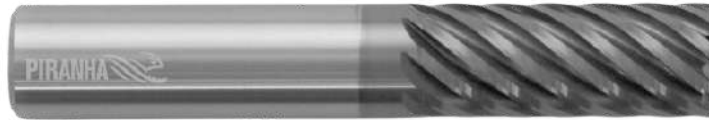
OP91

REGULAR INCH

| DIAMETER | LOC   | OAL | RAD    | ITEM#         |
|----------|-------|-----|--------|---------------|
| 1/4      | 3/4   | 3   | Square | OP91-1612R000 |
| 1/4      | 3/4   | 3   | R.015  | OP91-1612R015 |
| 1/4      | 3/4   | 3   | R.030  | OP91-1612R030 |
| 1/4      | 3/4   | 3   | R.060  | OP91-1612R060 |
| 3/8      | 1     | 3   | Square | OP91-2416R000 |
| 3/8      | 1     | 3   | R.015  | OP91-2416R015 |
| 3/8      | 1     | 3   | R.030  | OP91-2416R030 |
| 3/8      | 1     | 3   | R.060  | OP91-2416R060 |
| 1/2      | 1 1/4 | 3   | Square | OP91-3220R000 |
| 1/2      | 1 1/4 | 3   | R.015  | OP91-3220R015 |
| 1/2      | 1 1/4 | 3   | R.030  | OP91-3220R030 |
| 1/2      | 1 1/4 | 3   | R.060  | OP91-3220R060 |
| 5/8      | 1 5/8 | 4   | Square | OP91-4026R000 |
| 5/8      | 1 5/8 | 4   | R.015  | OP91-4026R015 |
| 5/8      | 1 5/8 | 4   | R.030  | OP91-4026R030 |
| 5/8      | 1 5/8 | 4   | R.060  | OP91-4026R060 |



## 9 FLUTE REGULAR



OP91M  
REGULAR METRIC

| DIAMETER | LOC | OAL | RAD    | ITEM#           |
|----------|-----|-----|--------|-----------------|
| 6        | 20  | 75  | Square | OP91M-06020R0.0 |
| 6        | 20  | 75  | R0.5   | OP91M-06020R0.5 |
| 6        | 20  | 75  | R1.0   | OP91M-06020R1.0 |
| 6        | 20  | 75  | R2.0   | OP91M-06020R2.0 |
| 10       | 25  | 75  | Square | OP91M-10025R0.0 |
| 10       | 25  | 75  | R0.5   | OP91M-10025R0.5 |
| 10       | 25  | 75  | R1.0   | OP91M-10025R1.0 |
| 10       | 25  | 75  | R2.0   | OP91M-10025R2.0 |
| 12       | 32  | 75  | Square | OP91M-12032R0.0 |
| 12       | 32  | 75  | R0.5   | OP91M-12032R0.5 |
| 12       | 32  | 75  | R1.0   | OP91M-12032R1.0 |
| 12       | 32  | 75  | R2.0   | OP91M-12032R2.0 |
| 16       | 41  | 100 | Square | OP91M-16041R0.0 |
| 16       | 41  | 100 | R0.5   | OP91M-16041R0.5 |
| 16       | 41  | 100 | R1.0   | OP91M-16041R1.0 |
| 16       | 41  | 100 | R2.0   | OP91M-16041R2.0 |

# OPXT 12 FLUTE ENDMILLS

Best used for HTSA (Heat-resistant superalloys)

## SPECIAL FEATURES

### UNEQUAL INDEXING

Eliminates tool vibrations around tool circumference by spreading cutting forces unevenly for a more stable cutting.

### TANGENTIAL RADIUS

Enables a smooth blending radius on the machined part, reducing manufacturing time by eliminating the need for a separate finishing process.

### TiXT PVD COATING

Unique coating especially developed for high performance machining in Inconel and Titanium that protect the cutting edge.

### HIGH DENSITY CARBIDE

High density carbide and 12 flute that work quietly in HTSA materials.



High performance endmill for Inconel and Titanium.

## 12 FLUTE FOR EXOTIC ALLOYS



OPXT

STUB - REGULAR INCH

| DIAMETER | LOC   | OAL | RAD    | ITEM#         |
|----------|-------|-----|--------|---------------|
| 1/2      | 5/8   | 3   | Square | OPXT-3210R000 |
| 1/2      | 5/8   | 3   | R.015  | OPXT-3210R015 |
| 1/2      | 5/8   | 3   | R.030  | OPXT-3210R030 |
| 1/2      | 5/8   | 3   | R.060  | OPXT-3210R060 |
| 1/2      | 1 1/4 | 3   | Square | OPXT-3220R000 |
| 1/2      | 1 1/4 | 3   | R.015  | OPXT-3220R015 |
| 1/2      | 1 1/4 | 3   | R.030  | OPXT-3220R030 |
| 1/2      | 1 1/4 | 3   | R.060  | OPXT-3220R060 |
| 5/8      | 3/4   | 4   | Square | OPXT-4012R000 |
| 5/8      | 3/4   | 4   | R.015  | OPXT-4012R015 |
| 5/8      | 3/4   | 4   | R.030  | OPXT-4012R030 |
| 5/8      | 3/4   | 4   | R.060  | OPXT-4012R060 |
| 5/8      | 1 5/8 | 4   | Square | OPXT-4026R000 |
| 5/8      | 1 5/8 | 4   | R.015  | OPXT-4026R015 |
| 5/8      | 1 5/8 | 4   | R.030  | OPXT-4026R030 |
| 5/8      | 1 5/8 | 4   | R.060  | OPXT-4026R060 |
| 3/4      | 3/4   | 4   | Square | OPXT-4812R000 |
| 3/4      | 3/4   | 4   | R.015  | OPXT-4812R015 |
| 3/4      | 3/4   | 4   | R.030  | OPXT-4812R030 |
| 3/4      | 3/4   | 4   | R.060  | OPXT-4812R060 |
| 3/4      | 1 5/8 | 4   | Square | OPXT-4826R000 |
| 3/4      | 1 5/8 | 4   | R.015  | OPXT-4826R015 |
| 3/4      | 1 5/8 | 4   | R.030  | OPXT-4826R030 |
| 3/4      | 1 5/8 | 4   | R.060  | OPXT-4826R060 |

## 12 FLUTE FOR EXOTIC ALLOYS



OPXTM

STUB - REGULAR METRIC

| DIAMETER | LOC | OAL | RAD    | ITEM#           |
|----------|-----|-----|--------|-----------------|
| 12       | 16  | 75  | Square | OPXTM-12016R0.0 |
| 12       | 16  | 75  | R0.5   | OPXTM-12016R0.5 |
| 12       | 16  | 75  | R1.0   | OPXTM-12016R1.0 |
| 12       | 16  | 75  | R2.0   | OPXTM-12016R2.0 |
| 12       | 32  | 75  | Square | OPXTM-12032R0.0 |
| 12       | 32  | 75  | R0.5   | OPXTM-12032R0.5 |
| 12       | 32  | 75  | R1.0   | OPXTM-12032R1.0 |
| 12       | 32  | 75  | R2.0   | OPXTM-12032R2.0 |
| 16       | 20  | 100 | Square | OPXTM-16020R0.0 |
| 16       | 20  | 100 | R0.5   | OPXTM-16020R0.5 |
| 16       | 20  | 100 | R1.0   | OPXTM-16020R1.0 |
| 16       | 20  | 100 | R2.0   | OPXTM-16020R2.0 |
| 16       | 41  | 100 | Square | OPXTM-16041R0.0 |
| 16       | 41  | 100 | R0.5   | OPXTM-16041R0.5 |
| 16       | 41  | 100 | R1.0   | OPXTM-16041R1.0 |
| 16       | 41  | 100 | R2.0   | OPXTM-16041R2.0 |
| 20       | 25  | 100 | Square | OPXTM-20025R0.0 |
| 20       | 25  | 100 | R0.5   | OPXTM-20025R0.5 |
| 20       | 25  | 100 | R1.0   | OPXTM-20025R1.0 |
| 20       | 25  | 100 | R2.0   | OPXTM-20025R2.0 |
| 20       | 41  | 100 | Square | OPXTM-20041R0.0 |
| 20       | 41  | 100 | R0.5   | OPXTM-20041R0.5 |
| 20       | 41  | 100 | R1.0   | OPXTM-20041R1.0 |
| 20       | 41  | 100 | R2.0   | OPXTM-20041R2.0 |



# OPC CHAMFERING TOOL

Best used for all materials

## SPECIAL FEATURES

- |                          |                                                                                                                                                                                                                            |
|--------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>nACRo PVD COATING</b> | Offers a higher cutting-edge resistance to wear and higher heat tolerance.                                                                                                                                                 |
| <b>HELIX FLUTING</b>     | Contrary to the straight flute usually found on chamfering tools, the helix flutes enable the cutting edge to shear off material when cutting, applying less axial load on the tool and providing a better surface finish. |
| <b>2-3-4-5 FLUTE</b>     | Allows use in a wider range of material.                                                                                                                                                                                   |
| <b>60° OR 90° POINT</b>  | Different point angle available for different applications.                                                                                                                                                                |
| <b>BRIGHT FINISH</b>     | Bright finish for gummy metal.                                                                                                                                                                                             |



Perfect for creating smooth, flush seating for screws, they enhance both the strength and appearance of assemblies.

## 2 FLUTE CHAMFERING TOOL



OPC2

CHAMFERING INCH NACRO

| DIAMETER | TIP   | OAL   | ANGLE | ITEM#           |
|----------|-------|-------|-------|-----------------|
| 1/8      | 0.010 | 1 1/2 | 60°   | OPC2-0824A060AP |
| 1/8      | 0.010 | 1 1/2 | 90°   | OPC2-0824A090AP |
| 3/16     | 0.010 | 2     | 60°   | OPC2-1232A060AP |
| 3/16     | 0.010 | 2     | 90°   | OPC2-1232A090AP |
| 1/4      | 0.010 | 2 1/2 | 60°   | OPC2-1640A060AP |
| 1/4      | 0.010 | 2 1/2 | 90°   | OPC2-1640A090AP |
| 3/8      | 0.010 | 2 1/2 | 60°   | OPC2-2440A060AP |
| 3/8      | 0.010 | 2 1/2 | 90°   | OPC2-2440A090AP |
| 1/2      | 0.010 | 3     | 60°   | OPC2-3248A060AP |
| 1/2      | 0.010 | 3     | 90°   | OPC2-3248A090AP |

OPC2

CHAMFERING INCH

| DIAMETER | TIP   | OAL   | ANGLE | ITEM#         |
|----------|-------|-------|-------|---------------|
| 1/8      | 0.010 | 1 1/2 | 60°   | OPC2-0824A060 |
| 1/8      | 0.010 | 1 1/2 | 90°   | OPC2-0824A090 |
| 3/16     | 0.010 | 2     | 60°   | OPC2-1232A060 |
| 3/16     | 0.010 | 2     | 90°   | OPC2-1232A090 |
| 1/4      | 0.010 | 2 1/2 | 60°   | OPC2-1640A060 |
| 1/4      | 0.010 | 2 1/2 | 90°   | OPC2-1640A090 |
| 3/8      | 0.010 | 2 1/2 | 60°   | OPC2-2440A060 |
| 3/8      | 0.010 | 2 1/2 | 90°   | OPC2-2440A090 |
| 1/2      | 0.010 | 3     | 60°   | OPC2-3248A060 |
| 1/2      | 0.010 | 3     | 90°   | OPC2-3248A090 |

## 3 FLUTE CHAMFERING TOOL



OPC3

CHAMFERING INCH NACRO

| DIAMETER | TIP   | OAL   | ANGLE | ITEM#           |
|----------|-------|-------|-------|-----------------|
| 1/8      | 0.010 | 1 1/2 | 60°   | OPC3-0824A060AP |
| 1/8      | 0.010 | 1 1/2 | 90°   | OPC3-0824A090AP |
| 3/16     | 0.010 | 2     | 60°   | OPC3-1232A060AP |
| 3/16     | 0.010 | 2     | 90°   | OPC3-1232A090AP |
| 1/4      | 0.010 | 2 1/2 | 60°   | OPC3-1640A060AP |
| 1/4      | 0.010 | 2 1/2 | 90°   | OPC3-1640A090AP |
| 3/8      | 0.010 | 2 1/2 | 60°   | OPC3-2440A060AP |
| 3/8      | 0.010 | 2 1/2 | 90°   | OPC3-2440A090AP |
| 1/2      | 0.010 | 3     | 60°   | OPC3-3248A060AP |
| 1/2      | 0.010 | 3     | 90°   | OPC3-3248A090AP |

OPC3

CHAMFERING INCH

| DIAMETER | TIP   | OAL   | ANGLE | ITEM#         |
|----------|-------|-------|-------|---------------|
| 1/8      | 0.010 | 1 1/2 | 60°   | OPC3-0824A060 |
| 1/8      | 0.010 | 1 1/2 | 90°   | OPC3-0824A090 |
| 3/16     | 0.010 | 2     | 60°   | OPC3-1232A060 |
| 3/16     | 0.010 | 2     | 90°   | OPC3-1232A090 |
| 1/4      | 0.010 | 2 1/2 | 60°   | OPC3-1232A090 |
| 1/4      | 0.010 | 2 1/2 | 90°   | OPC3-1232A090 |
| 3/8      | 0.010 | 2 1/2 | 60°   | OPC3-1232A090 |
| 3/8      | 0.010 | 2 1/2 | 90°   | OPC3-1232A090 |
| 1/2      | 0.010 | 3     | 60°   | OPC3-1232A090 |
| 1/2      | 0.010 | 3     | 90°   | OPC3-1232A090 |

## 4 FLUTE CHAMFERING TOOL



OPC4

CHAMFERING INCH NACRO

| DIAMETER | TIP   | OAL   | ANGLE | ITEM#           |
|----------|-------|-------|-------|-----------------|
| 1/8      | 0.010 | 1 1/2 | 60°   | OPC4-0824A060AP |
| 1/8      | 0.010 | 1 1/2 | 90°   | OPC4-0824A090AP |
| 3/16     | 0.010 | 2     | 60°   | OPC4-1232A060AP |
| 3/16     | 0.010 | 2     | 90°   | OPC4-1232A090AP |
| 1/4      | 0.010 | 2 1/2 | 60°   | OPC4-1640A060AP |
| 1/4      | 0.010 | 2 1/2 | 90°   | OPC4-1640A090AP |
| 3/8      | 0.010 | 2 1/2 | 60°   | OPC4-2440A060AP |
| 3/8      | 0.010 | 2 1/2 | 90°   | OPC4-2440A090AP |
| 1/2      | 0.010 | 3     | 60°   | OPC4-3248A060AP |
| 1/2      | 0.010 | 3     | 90°   | OPC4-3248A090AP |

OPC4

CHAMFERING INCH

| DIAMETER | TIP   | OAL   | ANGLE | ITEM#         |
|----------|-------|-------|-------|---------------|
| 1/8      | 0.010 | 1 1/2 | 60°   | OPC4-0824A060 |
| 1/8      | 0.010 | 1 1/2 | 90°   | OPC4-0824A090 |
| 3/16     | 0.010 | 2     | 60°   | OPC4-1232A060 |
| 3/16     | 0.010 | 2     | 90°   | OPC4-1232A090 |
| 1/4      | 0.010 | 2 1/2 | 60°   | OPC4-1640A060 |
| 1/4      | 0.010 | 2 1/2 | 90°   | OPC4-1640A090 |
| 3/8      | 0.010 | 2 1/2 | 60°   | OPC4-2440A060 |
| 3/8      | 0.010 | 2 1/2 | 90°   | OPC4-2440A090 |
| 1/2      | 0.010 | 3     | 60°   | OPC4-3248A060 |
| 1/2      | 0.010 | 3     | 90°   | OPC4-3248A090 |



## 5 FLUTE CHAMFERING TOOL



OPC5

CHAMFERING INCH NACRO

| DIAMETER | TIP   | OAL   | ANGLE | ITEM#           |
|----------|-------|-------|-------|-----------------|
| 1/4      | 0.010 | 2 1/2 | 60°   | OPC5-1640A060AP |
| 1/4      | 0.010 | 2 1/2 | 90°   | OPC5-1640A090AP |
| 3/8      | 0.010 | 2 1/2 | 60°   | OPC5-2440A060AP |
| 3/8      | 0.010 | 2 1/2 | 90°   | OPC5-2440A090AP |
| 1/2      | 0.010 | 3     | 60°   | OPC5-3248A060AP |
| 1/2      | 0.010 | 3     | 90°   | OPC5-3248A090AP |

OPC5

CHAMFERING INCH

| DIAMETER | TIP   | OAL   | ANGLE | ITEM#         |
|----------|-------|-------|-------|---------------|
| 1/4      | 0.010 | 2 1/2 | 60°   | OPC5-1640A060 |
| 1/4      | 0.010 | 2 1/2 | 90°   | OPC5-1640A090 |
| 3/8      | 0.010 | 2 1/2 | 60°   | OPC5-2440A060 |
| 3/8      | 0.010 | 2 1/2 | 90°   | OPC5-2440A090 |
| 1/2      | 0.010 | 3     | 60°   | OPC5-3248A060 |
| 1/2      | 0.010 | 3     | 90°   | OPC5-3248A090 |

# SPOT DRILL

Best used for all materials

## SPECIAL FEATURES

- |                         |                                                                           |
|-------------------------|---------------------------------------------------------------------------|
| <b>nACo PVD COATING</b> | Offer a higher cutting edge resistance to wear and higher heat tolerance. |
| <b>82°, 90° OR 142°</b> | Different point angle available for different applications.               |
| <b>BRIGHT FINISH</b>    | Bright finish for gummy material.                                         |



## 82° SPOT DRILL



OPSD082  
INCH

| DIAMETER | LOC | OAL | ANGLE | ITEM#         |
|----------|-----|-----|-------|---------------|
| 1/4      | 3/8 | 3   | 82°   | OPSD-1648A082 |
| 3/8      | 1/2 | 3   | 82°   | OPSD-2448A082 |
| 1/2      | 3/4 | 3   | 82°   | OPSD-3248A082 |

OPSDM082  
METRIC

| DIAMETER | LOC | OAL | ANGLE | ITEM#          |
|----------|-----|-----|-------|----------------|
| 6        | 10  | 75  | 82°   | OPSDM-0675A082 |
| 10       | 12  | 75  | 82°   | OPSDM-1075A082 |
| 12       | 20  | 75  | 82°   | OPSDM-1275A082 |

OPSD082  
NACO INCH

| DIAMETER | LOC | OAL | ANGLE | ITEM#           |
|----------|-----|-----|-------|-----------------|
| 1/4      | 3/8 | 3   | 82°   | OPSD-1648A082AL |
| 3/8      | 1/2 | 3   | 82°   | OPSD-2448A082AL |
| 1/2      | 3/4 | 3   | 82°   | OPSD-3248A082AL |

OPSDM082  
NACO METRIC

| DIAMETER | LOC | OAL | ANGLE | ITEM#            |
|----------|-----|-----|-------|------------------|
| 6        | 10  | 75  | 82°   | OPSDM-0675A082AL |
| 10       | 12  | 75  | 82°   | OPSDM-1075A082AL |
| 12       | 20  | 75  | 82°   | OPSDM-1275A082AL |

## 90° SPOT DRILL



OPSD090

INCH

| DIAMETER | LOC | OAL | ANGLE | ITEM#           |
|----------|-----|-----|-------|-----------------|
| 1/4      | 3/8 | 3   | 90°   | OPSD-1648A090AL |
| 3/8      | 1/2 | 3   | 90°   | OPSD-2448A090AL |
| 1/2      | 3/4 | 3   | 90°   | OPSD-3248A090AL |

OPSDM090

METRIC

| DIAMETER | LOC | OAL | ANGLE | ITEM#          |
|----------|-----|-----|-------|----------------|
| 6        | 10  | 75  | 90°   | OPSDM-0675A090 |
| 10       | 12  | 75  | 90°   | OPSDM-1075A090 |
| 12       | 20  | 75  | 90°   | OPSDM-1275A090 |

OPSD090

NACO INCH

| DIAMETER | LOC | OAL | ANGLE | ITEM#           |
|----------|-----|-----|-------|-----------------|
| 1/4      | 3/8 | 3   | 90°   | OPSD-1648A090AL |
| 3/8      | 1/2 | 3   | 90°   | OPSD-2448A090AL |
| 1/2      | 3/4 | 3   | 90°   | OPSD-3248A090AL |

OPSDM090

NACO METRIC

| DIAMETER | LOC | OAL | ANGLE | ITEM#            |
|----------|-----|-----|-------|------------------|
| 6        | 10  | 75  | 90°   | OPSDM-0675A090AL |
| 10       | 12  | 75  | 90°   | OPSDM-1075A090AL |
| 12       | 20  | 75  | 90°   | OPSDM-1275A090AL |



## 142° SPOT DRILL



OPSD142

INCH

| DIAMETER | LOC | OAL | ANGLE | ITEM#         |
|----------|-----|-----|-------|---------------|
| 1/4      | 3/8 | 3   | 142°  | OPSD-1648A142 |
| 3/8      | 1/2 | 3   | 142°  | OPSD-2448A142 |
| 1/2      | 3/4 | 3   | 142°  | OPSD-3248A142 |

OPSDM142

METRIC

| DIAMETER | LOC | OAL | ANGLE | ITEM#          |
|----------|-----|-----|-------|----------------|
| 6        | 10  | 75  | 142°  | OPSDM-0675A142 |
| 10       | 12  | 75  | 142°  | OPSDM-1075A142 |
| 12       | 20  | 75  | 142°  | OPSDM-1275A142 |

OPSD142

NACO INCH

| DIAMETER | LOC | OAL | ANGLE | ITEM#           |
|----------|-----|-----|-------|-----------------|
| 1/4      | 3/8 | 3   | 142°  | OPSD-1648A142AL |
| 3/8      | 1/2 | 3   | 142°  | OPSD-2448A142AL |
| 1/2      | 3/4 | 3   | 142°  | OPSD-3248A142AL |

OPSDM142

NACO METRIC

| DIAMETER | LOC | OAL | ANGLE | ITEM#            |
|----------|-----|-----|-------|------------------|
| 6        | 10  | 75  | 142°  | OPSDM-0675A142AL |
| 10       | 12  | 75  | 142°  | OPSDM-1075A142AL |
| 12       | 20  | 75  | 142°  | OPSDM-1275A142AL |

# OPAC ANGLE CUTTER

Best used for all materials

## SPECIAL FEATURES

### **nACRo PVD COATING**

Offers a higher cutting edge resistance to wear to wear and higher heat tolerance.

### **FLAT END**

Improves tool life and finish for profiling and chamfering larger features

### **END CUTTING-SHARP**

4 flute center cutting geometry to blend the floor and a chamfered wall in a same pass

### **MULTIPLE ANGLES**

Different point angle available for multiple application.



Give parts a clean, finished look, which is especially important in visible or high-end applications.

## ANGLE CUTTER



OPAC  
INCH

| DIAMETER | ANGLE | TIP  | FLUTE | END CUTTING | ITEM#          |
|----------|-------|------|-------|-------------|----------------|
| 3 / 16   | 15    | .040 | 4     |             | OPAC4-1204A15  |
| 3 / 16   | 30    | .040 | 4     |             | OPAC4-1204A30  |
| 3 / 16   | 45    | .040 | 4     |             | OPAC4-1204A45  |
| 3 / 16   | 45    | .040 | 4     | SHARP       | OPAC4-1204A45S |
| 3 / 16   | 50    | .040 | 4     |             | OPAC4-1204A50  |
| 3 / 16   | 60    | .040 | 4     |             | OPAC4-1204A60  |
| 1 / 4    | 15    | .060 | 4     |             | OPAC4-1606A15  |
| 1 / 4    | 15    | .060 | 4     | SHARP       | OPAC4-1606A15S |
| 1 / 4    | 50    | .060 | 4     | SHARP       | OPAC4-1606A50S |
| 1 / 4    | 30    | .060 | 4     |             | OPAC4-1606A30  |
| 1 / 4    | 30    | .060 | 4     | SHARP       | OPAC4-1606A30S |
| 1 / 4    | 45    | .060 | 4     |             | OPAC4-1606A45  |
| 1 / 4    | 45    | .060 | 4     | SHARP       | OPAC4-1606A45S |
| 1 / 4    | 50    | .060 | 4     |             | OPAC4-1606A50  |
| 1 / 4    | 60    | .060 | 4     |             | OPAC4-1606A60  |
| 1 / 4    | 60    | .060 | 4     | SHARP       | OPAC4-1606A60S |
| 3 / 8    | 15    | .060 | 4     |             | OPAC4-2406A15  |
| 3 / 8    | 15    | .060 | 4     | SHARP       | OPAC4-2406A15S |
| 3 / 8    | 30    | .060 | 4     |             | OPAC4-2406A30  |
| 3 / 8    | 30    | .060 | 4     | SHARP       | OPAC4-2406A30S |
| 3 / 8    | 45    | .060 | 4     |             | OPAC4-2406A45  |
| 3 / 8    | 45    | .060 | 4     | SHARP       | OPAC4-2406A45S |
| 3 / 8    | 50    | .060 | 4     |             | OPAC4-2406A50  |
| 3 / 8    | 60    | .060 | 4     |             | OPAC4-2406A60  |
| 3 / 8    | 60    | .060 | 4     | SHARP       | OPAC4-2406A60S |
| 1 / 2    | 15    | .080 | 4     |             | OPAC4-3208A15  |
| 1 / 2    | 15    | .080 | 4     | SHARP       | OPAC4-3208A15S |
| 1 / 2    | 30    | .080 | 4     |             | OPAC4-3208A30  |
| 1 / 2    | 30    | .080 | 4     | SHARP       | OPAC4-3208A30S |
| 1 / 2    | 45    | .080 | 4     |             | OPAC4-3208A45  |
| 1 / 2    | 45    | .080 | 4     | SHARP       | OPAC4-3208A45S |
| 1 / 2    | 50    | .080 | 4     |             | OPAC4-3208A50  |
| 1 / 2    | 50    | .080 | 4     | SHARP       | OPAC4-3208A50S |
| 1 / 2    | 60    | .080 | 4     |             | OPAC4-3208A60  |
| 1 / 2    | 60    | .080 | 4     | SHARP       | OPAC4-3208A60S |

# OPCD COUNTERSINK DRILL

Best used for all materials

## SPECIAL FEATURES

### nACRo PVD COATING

Offers a higher cutting edge resistance to wear and higher heat tolerance.

### MADE OF SOLID CARBIDE

Superior hardness and wear resistance. Faster cutting speeds and longer tool life, even in high temperatures.

### 118° INCLUDED TIP ANGLE

Allow use in a wider range of materials.

### DOUBLE-ENDED

Perfect for creating smooth, flush seating for screws, they enhance both the strength and appearance of assemblies.

### SIZE #0-1-2-3-4-5-6

Offered in different size for small to larger material diameters.

### BRIGHT FINISH

Bright finish for gummy metal.





## COUNTERSINK DRILL



OPCD

INCH

| SIZE | DRILL DIAMETER | ANGLE | COATING | ITEM#           |
|------|----------------|-------|---------|-----------------|
| 0    | 1 / 32         | 60    |         | OPCD0-0202A60   |
| 0    | 1 / 32         | 60    | nACRo   | OPCD0-0202A60AP |
| 1    | 3 / 64         | 60    |         | OPCD1-0302A60   |
| 1    | 3 / 64         | 60    | nACRo   | OPCD1-0302A60AP |
| 2    | 5 / 64         | 60    |         | OPCD2-0503A60   |
| 2    | 5 / 64         | 60    | nACRo   | OPCD2-0503A60AP |
| 3    | 7 / 64         | 60    |         | OPCD3-0704A60   |
| 3    | 7 / 64         | 60    | nACRo   | OPCD3-0704A60AP |
| 4    | 1 / 8          | 60    |         | OPCD4-0805A60   |
| 4    | 1 / 8          | 60    | nACRo   | OPCD4-0805A60AP |
| 5    | 3 / 16         | 60    |         | OPCD5-1207A60   |
| 5    | 3 / 16         | 60    | nACRo   | OPCD5-1207A60AP |
| 6    | 7 / 32         | 60    |         | OPCD6-1408A60   |
| 6    | 7 / 32         | 60    | nACRo   | OPCD6-1408A60AP |

# OPDA DOUBLE ANGLE CUTTER

Best used for all materials

**nACRo PVD COATING**

Offers a higher cutting edge resistance to wear and higher heat tolerance.

**DEEP GROOVE**

Deep groove and different angle available.

**DOUBLE ANGLE**

Designed to cut two angles in one pass, saving time and ensuring symmetry.

**REACH**

Different neck length for short and long reach

For back chamfering, chamfering, deburring a milling groove.



## DOUBLE ANGLE CUTTER



OPDA  
INCH

| CUTTER DIAMETER | NECK LENGTH | ANGLE | FLUTE | NECK DIAMETER | ITEM#          |
|-----------------|-------------|-------|-------|---------------|----------------|
| 3 / 16          | 5/16        | 90    | 4     | 3/32          | OPDA4-1210A90  |
| 3 / 16          | 5/16        | 90    | 4     | 1/16          | OPDA4-1210A90G |
| 3 / 16          | 1/2         | 90    | 4     | 3/32          | OPDA4-1216A90  |
| 3 / 16          | 3/4         | 90    | 4     | 3/32          | OPDA4-1224A90  |
| 1 / 4           | 5/16        | 90    | 4     | 1/8           | OPDA4-1610A90  |
| 1 / 4           | 5/16        | 90    | 4     | .083          | OPDA4-1610A90G |
| 1 / 4           | 5/8         | 90    | 4     | 1/8           | OPDA4-1620A90  |
| 1 / 4           | 1           | 90    | 4     | 1/8           | OPDA4-1632A90  |
| 1 / 4           | 1-5/16      | 90    | 4     | 1/8           | OPDA4-1642A90  |
| 5 / 16          | 3/8         | 90    | 6     | 3/16          | OPDA6-2012A90  |
| 5 / 16          | 7/8         | 90    | 6     | 3/16          | OPDA6-2028A90  |
| 5 / 16          | 1 - 1/4     | 90    | 6     | 3/16          | OPDA6-2040A90  |
| 3 / 8           | 1/2         | 90    | 6     | 1/4           | OPDA6-2416A90  |
| 3 / 8           | 1/2         | 90    | 6     | 1/8           | OPDA6-2416A90G |
| 3 / 8           | 3/4         | 90    | 6     | 1/4           | OPDA6-2424A90  |
| 3 / 8           | 1 - 1/2     | 90    | 6     | 1/4           | OPDA6-2448A90  |
| 3 / 8           | 2 - 5/16    | 90    | 6     | 1/4           | OPDA6-2474A90  |
| 1 / 2           | 1/2         | 90    | 6     | 5/16          | OPDA6-3216A90  |
| 1 / 2           | 1/2         | 90    | 6     | .167          | OPDA6-3216A90G |
| 1 / 2           | 3/4         | 90    | 6     | 5/16          | OPDA6-3224A90  |
| 1 / 2           | 1           | 90    | 6     | 5/16          | OPDA6-3232A90  |
| 1 / 2           | 1 - 1/2     | 90    | 6     | 5/16          | OPDA6-3248A90  |

# OPKC KEYSEAT CUTTER

Best used for all materials

## SPECIAL FEATURES

**nACRo PVD COATING**

Offer a higher cutting edge resistance to wear and higher heat tolerance.

**SHORT OR LONG NECK**

Available in short and long neck series.

**RADIUS AVAILABLE**

Available with standard typical corner radius.

**MADE OF SOLID CARBIDE**

Superior hardness and wear resistance. Faster cutting speeds and longer tool life, even in high temperatures.

Specifically designed for accurate and consistent keyseat profiles.





## KEYSEAT CUTTER



OPKC  
INCH

| DIAMETER | CUTTER WIDTH | NECK LENGTH | FLUTE | RADIUS | ITEM#              |
|----------|--------------|-------------|-------|--------|--------------------|
| 3 / 16   | 1 / 32       | 9 / 32      | 6     | SQUARE | OPKC6-1202R000N028 |
| 3 / 16   | 1 / 32       | 9 / 16      | 6     | SQUARE | OPKC6-1202R000N056 |
| 3 / 16   | 3 / 64       | 9 / 32      | 6     | SQUARE | OPKC6-1203R000N028 |
| 3 / 16   | 3 / 64       | 9 / 16      | 6     | SQUARE | OPKC6-1203R000N056 |
| 3 / 16   | 1 / 16       | 3 / 16      | 6     | SQUARE | OPKC6-1204R000N019 |
| 3 / 16   | 1 / 16       | 9 / 32      | 6     | SQUARE | OPKC6-1204R000N028 |
| 3 / 16   | 1 / 16       | 9 / 16      | 6     | SQUARE | OPKC6-1204R000N056 |
| 3 / 16   | 3 / 32       | 9 / 32      | 6     | SQUARE | OPKC6-1206R000N028 |
| 3 / 16   | 3 / 32       | 9 / 16      | 6     | SQUARE | OPKC6-1206R000N056 |
| 3 / 16   | 1 / 8        | 9 / 32      | 6     | SQUARE | OPKC6-1208R000N028 |
| 3 / 16   | 1 / 8        | 9 / 16      | 6     | SQUARE | OPKC6-1208R000N056 |
| 1 / 4    | 1 / 32       | 3 / 8       | 6     | SQUARE | OPKC6-1602R000N038 |
| 1 / 4    | 1 / 32       | 3 / 4       | 6     | SQUARE | OPKC6-1602R000N075 |
| 1 / 4    | 3 / 64       | 3 / 8       | 6     | SQUARE | OPKC6-1603R000N038 |
| 1 / 4    | 3 / 64       | 3 / 4       | 6     | SQUARE | OPKC6-1603R000N075 |
| 1 / 4    | 1 / 16       | 1 / 4       | 6     | SQUARE | OPKC6-1604R000N025 |
| 1 / 4    | 1 / 16       | 3 / 8       | 6     | SQUARE | OPKC6-1604R000N038 |
| 1 / 4    | 1 / 16       | 3 / 4       | 6     | SQUARE | OPKC6-1604R000N075 |
| 1 / 4    | 3 / 32       | 3 / 8       | 6     | SQUARE | OPKC6-1606R000N038 |
| 1 / 4    | 3 / 32       | 3 / 4       | 6     | SQUARE | OPKC6-1606R000N075 |
| 1 / 4    | 1 / 8        | 3 / 8       | 6     | SQUARE | OPKC6-1608R000N038 |
| 1 / 4    | 1 / 8        | 3 / 4       | 6     | SQUARE | OPKC6-1608R000N075 |
| 1 / 4    | 1 / 8        | 1           | 6     | SQUARE | OPKC6-1608R000N100 |
| 1 / 4    | 3 / 16       | 3 / 8       | 6     | SQUARE | OPKC6-1612R000N038 |
| 1 / 4    | 3 / 16       | 3 / 4       | 6     | SQUARE | OPKC6-1612R000N075 |
| 5 / 16   | 1 / 32       | 15 / 32     | 6     | SQUARE | OPKC6-2002R000N047 |
| 5 / 16   | 1 / 32       | 1           | 6     | SQUARE | OPKC6-2002R000N100 |
| 5 / 16   | 1 / 16       | 15 / 32     | 6     | SQUARE | OPKC6-2004R000N047 |
| 5 / 16   | 1 / 16       | 1           | 6     | SQUARE | OPKC6-2004R000N100 |
| 5 / 16   | 3 / 32       | 15 / 32     | 6     | SQUARE | OPKC6-2006R000N047 |
| 5 / 16   | 3 / 32       | 1           | 6     | SQUARE | OPKC6-2006R000N100 |
| 5 / 16   | 1 / 8        | 15 / 32     | 6     | SQUARE | OPKC6-2008R000N047 |
| 5 / 16   | 1 / 8        | 1           | 6     | SQUARE | OPKC6-2008R000N100 |

## KEYSEAT CUTTER



OPKC  
INCH

| DIAMETER | CUTTER WIDTH | NECK LENGTH | FLUTE | RADIUS | ITEM#              |
|----------|--------------|-------------|-------|--------|--------------------|
| 5 / 16   | 3 / 16       | 15 / 32     | 6     | SQUARE | OPKC6-2012R000N047 |
| 5 / 16   | 3 / 16       | 1           | 6     | SQUARE | OPKC6-2012R000N100 |
| 3 / 8    | 1 / 32       | 9 / 16      | 8     | SQUARE | OPKC8-2402R000N056 |
| 3 / 8    | 1 / 32       | 1 - 1 / 8   | 8     | SQUARE | OPKC8-2402R000N113 |
| 3 / 8    | 3 / 64       | 9 / 16      | 8     | SQUARE | OPKC8-2403R000N056 |
| 3 / 8    | 3 / 64       | 1 - 1 / 8   | 8     | SQUARE | OPKC8-2403R000N113 |
| 3 / 8    | 1 / 16       | 3 / 8       | 8     | SQUARE | OPKC8-2404R000N038 |
| 3 / 8    | 1 / 16       | 9 / 16      | 8     | SQUARE | OPKC8-2404R000N056 |
| 3 / 8    | 1 / 16       | 1 - 1 / 8   | 8     | SQUARE | OPKC8-2404R000N113 |
| 3 / 8    | 5 / 64       | 9 / 16      | 8     | SQUARE | OPKC8-2405R000N056 |
| 3 / 8    | 5 / 64       | 1 - 1 / 8   | 8     | SQUARE | OPKC8-2405R000N113 |
| 3 / 8    | 3 / 32       | 3 / 8       | 8     | SQUARE | OPKC8-2406R000N038 |
| 3 / 8    | 3 / 32       | 9 / 16      | 8     | SQUARE | OPKC8-2406R000N056 |
| 3 / 8    | 3 / 32       | 1 - 1 / 8   | 8     | SQUARE | OPKC8-2406R000N113 |
| 3 / 8    | 1 / 8        | 3 / 8       | 8     | SQUARE | OPKC8-2408R000N038 |
| 3 / 8    | 1 / 8        | 9 / 16      | 8     | SQUARE | OPKC8-2408R000N056 |
| 3 / 8    | 1 / 8        | 1 - 1 / 8   | 8     | SQUARE | OPKC8-2408R000N113 |
| 3 / 8    | 3 / 16       | 9 / 16      | 8     | SQUARE | OPKC8-2412R000N056 |
| 3 / 8    | 3 / 16       | 1 - 1 / 8   | 8     | SQUARE | OPKC8-2412R000N113 |
| 1 / 2    | 1 / 32       | 3 / 4       | 8     | SQUARE | OPKC8-3202R000N075 |
| 1 / 2    | 1 / 32       | 1 - 1 / 2   | 8     | SQUARE | OPKC8-3202R000N150 |
| 1 / 2    | 1 / 16       | 3 / 4       | 8     | SQUARE | OPKC8-3204R000N075 |
| 1 / 2    | 1 / 16       | 1 - 1 / 2   | 8     | SQUARE | OPKC8-3204R000N150 |
| 1 / 2    | 3 / 32       | 3 / 4       | 8     | SQUARE | OPKC8-3206R000N075 |
| 1 / 2    | 3 / 32       | 1 - 1 / 2   | 8     | SQUARE | OPKC8-3206R000N150 |
| 1 / 2    | 1 / 8        | 1 / 2       | 8     | SQUARE | OPKC8-3208R000N050 |
| 1 / 2    | 1 / 8        | 3 / 4       | 8     | SQUARE | OPKC8-3208R000N075 |
| 1 / 2    | 1 / 8        | 1 - 1 / 2   | 8     | SQUARE | OPKC8-3208R000N150 |
| 1 / 2    | 3 / 16       | 1 / 2       | 8     | SQUARE | OPKC8-3212R000N050 |
| 1 / 2    | 3 / 16       | 3 / 4       | 8     | SQUARE | OPKC8-3212R000N075 |
| 1 / 2    | 3 / 16       | 1 - 1 / 2   | 8     | SQUARE | OPKC8-3212R000N150 |
| 1 / 2    | 1 / 4        | 1 / 2       | 8     | SQUARE | OPKC8-3216R000N050 |
| 1 / 2    | 1 / 4        | 3 / 4       | 8     | SQUARE | OPKC8-3216R000N075 |
| 1 / 2    | 1 / 4        | 1 - 1 / 2   | 8     | SQUARE | OPKC8-3216R000N150 |

# OPSF SINGLE FLUTE

Best used for plastics

## SPECIAL FEATURES

|                                  |                                                                                                      |
|----------------------------------|------------------------------------------------------------------------------------------------------|
| <b>SINGLE SPIRAL UPCUT FLUTE</b> | Engineered for high-speed machining and superior chip evacuation while maintaining excellent finish. |
| <b>STUB AND LONG</b>             | Available in stub or long flute length for more application.                                         |
| <b>POLISHED</b>                  | Prevent chips from sticking inside the tool, enhancing material removal rate and machining speeds.   |
| <b>DISH ANGLE</b>                | 7° dish angle for best ramping and plunge in material if required.                                   |



## SINGLE FLUTE POLISHED



OPSF  
INCH

| DIAMETER | LOC       | OAL     | ITEM#     |
|----------|-----------|---------|-----------|
| 1 / 8    | 3 / 8     | 1 - 1/2 | OPSF-0806 |
| 1 / 8    | 1 / 2     | 2       | OPSF-0808 |
| 3 / 16   | 9 / 16    | 2       | OPSF-1209 |
| 3 / 16   | 1         | 3       | OPSF-1216 |
| 1 / 4    | 1         | 3       | OPSF-1616 |
| 1 / 4    | 1 - 1 / 4 | 3       | OPSF-1620 |
| 3 / 8    | 9 / 16    | 2 - 1/2 | OPSF-2409 |
| 3 / 8    | 1         | 2 - 1/2 | OPSF-2416 |
| 3 / 8    | 1 - 1 / 2 | 4       | OPSF-2424 |



# FEED AND SPEED

## 2 & 3 FLUTE

| MATERIAL TYPE                | HRC | SFM  |      |
|------------------------------|-----|------|------|
|                              |     | MIN  | MAX  |
| <b>ALUMINUM</b>              |     |      |      |
| 2014, 2024, 6061-(T1-T6)     | -   | 1500 | 2500 |
| 7075, DIE CAST, EXTRUDED     | -   |      |      |
| <b>MAGNESIUM</b>             |     |      |      |
|                              | -   | 600  | 900  |
| <b>COPPER, COPPER ALLOYS</b> |     |      |      |
|                              | -   | 800  | 1200 |
| <b>BRASS BRONZE</b>          |     |      |      |
| BRASS, ALUM/BRONZE           | -   | 700  | 1000 |
| LOW SILICON BRONZE           | -   |      |      |
| <b>COMPOSITES</b>            |     |      |      |
| G-10 FIBERGLASS, GRAPHITE    | -   | 150  | 350  |
| GRAPHITE/EPOXY, PLASTICS     | -   |      |      |

### IPT (INCH PER TOOTH)

| MATERIAL TYPE                | 1/8"   | 3/16"  | 1/4"   | 5/16"  | 3/8"  | 7/16"  | 1/2"  | 5/8"  | 3/4"  | 1"    |
|------------------------------|--------|--------|--------|--------|-------|--------|-------|-------|-------|-------|
| <b>ALUMINUM</b>              |        |        |        |        |       |        |       |       |       |       |
| 2014, 2024, 6061-(T1-T6)     | 0,0015 | 0,0025 | 0,0035 | 0,0045 | 0,006 | 0,007  | 0,008 | 0,009 | 0,010 | 0,012 |
| 7075, DIE CAST, EXTRUDED     |        |        |        |        |       |        |       |       |       |       |
| <b>MAGNESIUM</b>             |        |        |        |        |       |        |       |       |       |       |
|                              | 0,001  | 0,0015 | 0,002  | 0,0025 | 0,003 | 0,0035 | 0,004 | 0,005 | 0,006 | 0,008 |
| <b>COPPER, COPPER ALLOYS</b> |        |        |        |        |       |        |       |       |       |       |
|                              | 0,0015 | 0,0025 | 0,0035 | 0,0045 | 0,006 | 0,007  | 0,008 | 0,009 | 0,010 | 0,012 |
| <b>BRASS BRONZE</b>          |        |        |        |        |       |        |       |       |       |       |
| BRASS, ALUM/BRONZE           | 0,0015 | 0,0025 | 0,0035 | 0,0045 | 0,006 | 0,007  | 0,008 | 0,009 | 0,010 | 0,012 |
| LOW SILICON BRONZE           |        |        |        |        |       |        |       |       |       |       |
| <b>COMPOSITES</b>            |        |        |        |        |       |        |       |       |       |       |
| G-10 FIBERGLASS, GRAPHITE    | 0,001  | 0,0015 | 0,002  | 0,0025 | 0,003 | 0,0035 | 0,004 | 0,005 | 0,006 | 0,008 |
| GRAPHITE/EPOXY, PLASTICS     |        |        |        |        |       |        |       |       |       |       |

# FEED AND SPEED

## 4 FLUTE

| MATERIAL TYPE                   | HRC      | SFM |     |
|---------------------------------|----------|-----|-----|
|                                 |          | MIN | MAX |
| NICKEL BASE ALLOYS              |          |     |     |
| INCONEL-625/718, WASPOLLOY      | Under 32 | 75  | 90  |
| RENE, HASTELLOY                 | Over 32  | 80  | 100 |
| TITANIUM ALLOYS                 |          |     |     |
| COMMERCIALLY PURE, 6Al-4V       | -        | 150 | 230 |
| ASTM 1/2/3, 6Al-25N-4Zr-2Mo-Si  |          |     |     |
| STAINLESS STEEL (PRECIPITATION) |          |     |     |
| 12/8, 15/5, 17/4, AM-350/355    | Under 32 | 225 | 350 |
|                                 | Over 32  | 200 | 250 |
| STAINLESS STEEL (AUSTENITIC)    |          |     |     |
| 200 SERIES, 302, 303, 304, 316  | -        | 300 | 350 |
| 304L, 316L                      | Under 32 | 250 | 300 |
|                                 | Over 32  | 200 | 250 |
| STAINLESS STEEL (MARTENSITIC)   |          |     |     |
| 403, 410, 416, 440              | -        | 250 | 300 |
| HIGH STRENGTH TOOL STEELS       |          |     |     |
| 4140, 4340, 6150, 5210, A2      | Under 32 | 500 | 600 |
| D2, P20, H11, H13, S2, S1       | Over 32  | 350 | 450 |
| CARBON STEELS                   |          |     |     |
| 1000's, 1100's, 1300's          | -        | 560 | 595 |
| DUCTILE                         |          |     |     |
| DUCTILE CAST IRONS              | -        | 350 | 400 |
| CAST IRONS                      |          |     |     |
| GRAY CAST IRONS                 | -        | 350 | 500 |

# FEED AND SPEED

4 fLUTE  $a_e$  - 40%

IPT (INCH PER TOOTH)

| MATERIAL TYPE                                               | 1/8"             | 3/16"            | 1/4"             | 5/16"            | 3/8"             | 7/16"            | 1/2"             | 5/8"             | 3/4"             | 1"               |
|-------------------------------------------------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|
| <b>NICKEL BASE ALLOYS</b>                                   |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |
| INCONEL-625/718                                             | 0,0011           | 0,0017           | 0,0023           | 0,0028           | 0,0034           | 0,0039           | 0,0045           | 0,0056           | 0,0068           | 0,0090           |
| <b>TITANIUM ALLOYS</b>                                      |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |
| COMMERCIALLY PURE, 6Al-4V<br>ASTM 1/2/3, 6Al-25N-4Zr-2Mo-Si | 0,0011           | 0,0017           | 0,0023           | 0,0028           | 0,0034           | 0,0039           | 0,0045           | 0,0056           | 0,0068           | 0,0090           |
| <b>STAINLESS STEEL (PRECIPITATION)</b>                      |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |
| 12/8, 15/5, 17/4 PH                                         | 0,0007<br>0,0008 | 0,0010<br>0,0012 | 0,0013<br>0,0016 | 0,0016<br>0,0020 | 0,0020<br>0,0024 | 0,0023<br>0,0028 | 0,0026<br>0,0032 | 0,0033<br>0,0040 | 0,0039<br>0,0048 | 0,0052<br>0,0064 |
| <b>STAINLESS STEEL (AUSTENITIC)</b>                         |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |
| 300 and UP SERIES                                           | 0,0008           | 0,0011           | 0,0015           | 0,0019           | 0,0023           | 0,0026           | 0,003            | 0,0038           | 0,0045           | 0,0060           |
| <b>STAINLESS STEEL (MARTENSITIC)</b>                        |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |
| 400 and UP SERIES                                           | 0,0007<br>0,0008 | 0,0010<br>0,0012 | 0,0013<br>0,0016 | 0,0016<br>0,0020 | 0,0020<br>0,0024 | 0,0023<br>0,0028 | 0,0026<br>0,0032 | 0,0033<br>0,0040 | 0,0039<br>0,0048 | 0,0052<br>0,0064 |
| <b>HIGH STRENGTH TOOL STEELS</b>                            |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |
| 4140, 4340, A2<br>D2, P20, H11, H13, O1, 300M               | 0,0011           | 0,0017           | 0,0023           | 0,0028           | 0,0034           | 0,0039           | 0,0045           | 0,0056           | 0,0068           | 0,0090           |
| <b>CARBON STEELS</b>                                        |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |
| 1045                                                        | 0,0009<br>0,0009 | 0,0013<br>0,0014 | 0,0018<br>0,0019 | 0,0022<br>0,0023 | 0,0026<br>0,0028 | 0,0031<br>0,0032 | 0,0035<br>0,0037 | 0,0044<br>0,0046 | 0,0053<br>0,0056 | 0,0070<br>0,0074 |
| <b>DUCTILE</b>                                              |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |
| DUCTILE CAST IRONS                                          | 0,0011           | 0,0017           | 0,0023           | 0,0028           | 0,0034           | 0,0039           | 0,0045           | 0,0056           | 0,0068           | 0,0090           |
| <b>CAST IRONS</b>                                           |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |
| GRAY CAST IRONS                                             | 0,0011           | 0,0017           | 0,0023           | 0,0028           | 0,0034           | 0,0039           | 0,0045           | 0,0056           | 0,0068           | 0,0090           |

# FEED AND SPEED

4 fLUTE  $a_e$  - 100%

IPT (INCH PER TOOTH)

| MATERIAL TYPE                                               | 1/8"   | 3/16"  | 1/4"   | 5/16"  | 3/8"   | 7/16"  | 1/2"   | 5/8"   | 3/4"   | 1"     |
|-------------------------------------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| <b>NICKEL BASE ALLOYS</b>                                   |        |        |        |        |        |        |        |        |        |        |
| INCONEL-625/718                                             | 0,0008 | 0,0011 | 0,0015 | 0,0019 | 0,0023 | 0,0026 | 0,003  | 0,0038 | 0,0045 | 0,0060 |
| <b>TITANIUM ALLOYS</b>                                      |        |        |        |        |        |        |        |        |        |        |
| COMMERCIALLY PURE, 6Al-4V<br>ASTM 1/2/3, 6Al-25N-4Zr-2Mo-Si | 0,0008 | 0,0011 | 0,0015 | 0,0019 | 0,0023 | 0,0026 | 0,003  | 0,0038 | 0,0045 | 0,0060 |
| <b>STAINLESS STEEL (PRECIPITATION)</b>                      |        |        |        |        |        |        |        |        |        |        |
| 12/8, 15/5, 17/4 PH                                         | 0,0005 | 0,0008 | 0,0010 | 0,0013 | 0,0015 | 0,0018 | 0,002  | 0,0025 | 0,0030 | 0,0040 |
| <b>STAINLESS STEEL (AUSTENITIC)</b>                         |        |        |        |        |        |        |        |        |        |        |
| 300 and UP SERIES                                           | 0,0004 | 0,0006 | 0,0008 | 0,0009 | 0,0011 | 0,0013 | 0,0015 | 0,0019 | 0,0023 | 0,0030 |
| <b>STAINLESS STEEL (MARTENSITIC)</b>                        |        |        |        |        |        |        |        |        |        |        |
| 400 and UP SERIES                                           | 0,0006 | 0,0009 | 0,0013 | 0,0016 | 0,0019 | 0,0022 | 0,0025 | 0,0031 | 0,0038 | 0,0050 |
| <b>HIGH STRENGTH TOOL STEELS</b>                            |        |        |        |        |        |        |        |        |        |        |
| 4140, 4340, A2<br>D2, P20, H11, H13, O1, 300M               | 0,0008 | 0,0011 | 0,0015 | 0,0019 | 0,0023 | 0,0026 | 0,003  | 0,0038 | 0,0045 | 0,0060 |
| <b>CARBON STEELS</b>                                        |        |        |        |        |        |        |        |        |        |        |
| 1045                                                        | 0,0006 | 0,0009 | 0,0013 | 0,0016 | 0,0019 | 0,0022 | 0,0025 | 0,0031 | 0,0038 | 0,0050 |
| <b>DUCTILE</b>                                              |        |        |        |        |        |        |        |        |        |        |
| DUCTILE CAST IRONS                                          | 0,0008 | 0,0011 | 0,0015 | 0,0019 | 0,0023 | 0,0026 | 0,003  | 0,0038 | 0,0045 | 0,0060 |
| <b>CAST IRONS</b>                                           |        |        |        |        |        |        |        |        |        |        |
| GRAY CAST IRONS                                             | 0,0008 | 0,0011 | 0,0015 | 0,0019 | 0,0023 | 0,0026 | 0,003  | 0,0038 | 0,0045 | 0,0060 |



# FEED AND SPEED

## 5 FLUTE

| MATERIAL TYPE                                               | HRC      | SFM |     |
|-------------------------------------------------------------|----------|-----|-----|
|                                                             |          | MIN | MAX |
| <b>NICKEL BASE ALLOYS</b>                                   |          |     |     |
| INCONEL-625/718, WASPOLLOY<br>RENE, HASTELLOY               | -        | 90  | 110 |
| <b>TITANIUM ALLOYS</b>                                      |          |     |     |
| COMMERCIALLY PURE, 6Al-4V<br>ASTM 1/2/3, 6Al-25N-4Zr-2Mo-Si | -        | 230 | 315 |
| <b>STAINLESS STEEL (PRECIPITATION)</b>                      |          |     |     |
| 12/8, 15/5, 17/4, AM-350/355                                | -        | 350 | 425 |
| <b>STAINLESS STEEL (AUSTENITIC)</b>                         |          |     |     |
| 200 SERIES, 302, 303, 304, 316                              | -        | 350 | 425 |
| 304L, 316L                                                  | -        | 350 | 450 |
| <b>STAINLESS STEEL (MARTENSITIC)</b>                        |          |     |     |
| 403, 410, 416, 440                                          | -        | 400 | 500 |
| <b>HIGH STRENGTH TOOL STEELS</b>                            |          |     |     |
| 4140, 4340, 6150, 5210, A2                                  | Under 32 | 500 | 625 |
| D2, P20, H11, H13, S2, S1                                   | Over 32  | 400 | 500 |
| <b>CARBON STEELS</b>                                        |          |     |     |
| 1000's, 1100's, 1300's                                      | -        | 550 | 600 |
| <b>DUCTILE</b>                                              |          |     |     |
| DUCTILE CAST IRONS                                          | -        | 400 | 500 |
| <b>CAST IRONS</b>                                           |          |     |     |
| GRAY CAST IRONS                                             | -        | 500 | 625 |

# FEED AND SPEED

5 FLUTE  $a_e$  - 10%

IPT (INCH PER TOOTH)

| MATERIAL TYPE                                               | 1/8"   | 3/16"  | 1/4"   | 5/16"  | 3/8"   | 7/16"  | 1/2"   | 5/8"   | 3/4"   | 1"     |
|-------------------------------------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| <b>NICKEL BASE ALLOYS</b>                                   |        |        |        |        |        |        |        |        |        |        |
| INCONEL-625/718                                             | 0,0011 | 0,0017 | 0,0023 | 0,0028 | 0,0034 | 0,0039 | 0,0045 | 0,0056 | 0,0068 | 0,0090 |
| <b>TITANIUM ALLOYS</b>                                      |        |        |        |        |        |        |        |        |        |        |
| COMMERCIALLY PURE, 6Al-4V<br>ASTM 1/2/3, 6Al-25N-4Zr-2Mo-Si | 0,0011 | 0,0017 | 0,0023 | 0,0028 | 0,0034 | 0,0039 | 0,0045 | 0,0056 | 0,0068 | 0,0090 |
| <b>STAINLESS STEEL (PRECIPITATION)</b>                      |        |        |        |        |        |        |        |        |        |        |
| 12/8, 15/5, 17/4 PH                                         | 0,0010 | 0,0015 | 0,0020 | 0,0025 | 0,0030 | 0,0035 | 0,004  | 0,0050 | 0,0060 | 0,0080 |
| <b>STAINLESS STEEL (AUSTENITIC)</b>                         |        |        |        |        |        |        |        |        |        |        |
| 300 and UP SERIES                                           | 0,0009 | 0,0013 | 0,0018 | 0,0022 | 0,0026 | 0,0031 | 0,0035 | 0,0044 | 0,0053 | 0,0070 |
| <b>STAINLESS STEEL (MARTENSITIC)</b>                        |        |        |        |        |        |        |        |        |        |        |
| 400 and UP SERIES                                           | 0,0010 | 0,0015 | 0,0020 | 0,0025 | 0,0030 | 0,0035 | 0,004  | 0,0050 | 0,0060 | 0,0080 |
| <b>HIGH STRENGTH TOOL STEELS</b>                            |        |        |        |        |        |        |        |        |        |        |
| 4140, 4340, A2<br>D2, P20, H11, H13, 01, 300M               | 0,0011 | 0,0017 | 0,0023 | 0,0028 | 0,0034 | 0,0039 | 0,0045 | 0,0056 | 0,0068 | 0,0090 |
| <b>CARBON STEELS</b>                                        |        |        |        |        |        |        |        |        |        |        |
| 1045                                                        | 0,0013 | 0,0019 | 0,0025 | 0,0031 | 0,0038 | 0,0044 | 0,005  | 0,0063 | 0,0075 | 0,0100 |
| <b>DUCTILE</b>                                              |        |        |        |        |        |        |        |        |        |        |
| DUCTILE CAST IRONS                                          | 0,0011 | 0,0017 | 0,0023 | 0,0028 | 0,0034 | 0,0039 | 0,0045 | 0,0056 | 0,0068 | 0,0090 |
| <b>CAST IRONS</b>                                           |        |        |        |        |        |        |        |        |        |        |
| GRAY CAST IRONS                                             | 0,0011 | 0,0017 | 0,0023 | 0,0028 | 0,0034 | 0,0039 | 0,0045 | 0,0056 | 0,0068 | 0,0090 |

# FEED AND SPEED

5 FLUTE  $a_e$  - 40%

IPT (INCH PER TOOTH)

| MATERIAL TYPE                                               | 1/8"   | 3/16"  | 1/4"   | 5/16"  | 3/8"   | 7/16"  | 1/2"   | 5/8"   | 3/4"   | 1"     |
|-------------------------------------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| <b>NICKEL BASE ALLOYS</b>                                   |        |        |        |        |        |        |        |        |        |        |
| INCONEL-625/718                                             | 0,0006 | 0,0009 | 0,0013 | 0,0016 | 0,0019 | 0,0022 | 0,0025 | 0,0031 | 0,0038 | 0,0050 |
| <b>TITANIUM ALLOYS</b>                                      |        |        |        |        |        |        |        |        |        |        |
| COMMERCIALLY PURE, 6Al-4V<br>ASTM 1/2/3, 6Al-25N-4Zr-2Mo-Si | 0,0008 | 0,0011 | 0,0015 | 0,0019 | 0,0023 | 0,0026 | 0,003  | 0,0038 | 0,0045 | 0,0060 |
| <b>STAINLESS STEEL (PRECIPITATION)</b>                      |        |        |        |        |        |        |        |        |        |        |
| 12/8, 15/5, 17/4 PH                                         | 0,0006 | 0,0009 | 0,0013 | 0,0016 | 0,0019 | 0,0022 | 0,0025 | 0,0031 | 0,0038 | 0,0050 |
| <b>STAINLESS STEEL (AUSTENITIC)</b>                         |        |        |        |        |        |        |        |        |        |        |
| 300 and UP SERIES                                           | 0,0004 | 0,0006 | 0,0008 | 0,0009 | 0,0011 | 0,0013 | 0,0015 | 0,0019 | 0,0023 | 0,0030 |
| <b>STAINLESS STEEL (MARTENSITIC)</b>                        |        |        |        |        |        |        |        |        |        |        |
| 400 and UP SERIES                                           | 0,0008 | 0,0011 | 0,0015 | 0,0019 | 0,0023 | 0,0026 | 0,003  | 0,0038 | 0,0045 | 0,0060 |
| <b>HIGH STRENGTH TOOL STEELS</b>                            |        |        |        |        |        |        |        |        |        |        |
| 4140, 4340, A2<br>D2, P20, H11, H13, O1, 300M               | 0,0008 | 0,0011 | 0,0015 | 0,0019 | 0,0023 | 0,0026 | 0,003  | 0,0038 | 0,0045 | 0,0060 |
| <b>CARBON STEELS</b>                                        |        |        |        |        |        |        |        |        |        |        |
| 1045                                                        | 0,0008 | 0,0011 | 0,0015 | 0,0019 | 0,0023 | 0,0026 | 0,003  | 0,0038 | 0,0045 | 0,0060 |
| <b>DUCTILE</b>                                              |        |        |        |        |        |        |        |        |        |        |
| DUCTILE CAST IRONS                                          | 0,0008 | 0,0011 | 0,0015 | 0,0019 | 0,0023 | 0,0026 | 0,003  | 0,0038 | 0,0045 | 0,0060 |
| <b>CAST IRONS</b>                                           |        |        |        |        |        |        |        |        |        |        |
| GRAY CAST IRONS                                             | 0,0008 | 0,0011 | 0,0015 | 0,0019 | 0,0023 | 0,0026 | 0,003  | 0,0038 | 0,0045 | 0,0060 |

# FEED AND SPEED

## 6 FLUTE

| MATERIAL TYPE                                             | HRC      | SFM |     |
|-----------------------------------------------------------|----------|-----|-----|
|                                                           |          | MIN | MAX |
| <b>NICKEL BASE ALLOYS</b>                                 |          |     |     |
| INCONEL-625/718, WASTOLLOY<br>RENE, HASTELLOY             | -        | 120 | 135 |
| <b>TITANIUM ALLOYS</b>                                    |          |     |     |
| COMMERCIAL PURE, 6Al-4V<br>ASTM 1/2/3, 6Al-25N-4Zr-2Mo-Si | -        | 230 | 315 |
| <b>STAINLESS STEEL (PRECIPITATION)</b>                    |          |     |     |
| 12/8, 15/5, 17/4, AM-350/355                              | -        | 430 | 525 |
| <b>STAINLESS STEEL (AUSTENITIC)</b>                       |          |     |     |
| 200 SERIES, 302, 303, 304, 316<br>304L, 316L              | -        | 450 | 525 |
| <b>STAINLESS STEEL (MARTENSITIC)</b>                      |          |     |     |
| 403, 410, 416, 440                                        | -        | 500 | 550 |
| <b>HIGH STRENGTH TOOL STEELS</b>                          |          |     |     |
| 4140, 4340, 6150, 5210, A2                                | Under 32 | 750 | 800 |
| D2, P20, H11, H13, S2, S1                                 | Over 32  | 600 | 650 |
| <b>CARBON STEELS</b>                                      |          |     |     |
| 1000's, 1100's, 1300's                                    | -        | 650 | 800 |
| <b>DUCTILE</b>                                            |          |     |     |
| DUCTILE CAST IRONS                                        | -        | 600 | 700 |
| <b>CAST IRONS</b>                                         |          |     |     |
| GRAY CAST IRONS                                           | -        | 750 | 800 |



# FEED AND SPEED

6 FLUTE  $a_e$  5% - 10%

IPT (INCH PER TOOTH)

| MATERIAL TYPE                          | 1/8"             | 3/16"            | 1/4"             | 5/16"            | 3/8"             | 7/16"            | 1/2"             | 5/8"             | 3/4"             | 1"               |
|----------------------------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|
| <b>NICKEL BASE ALLOYS</b>              |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |
| INCONEL-625/718                        | 0,0011           | 0,0017           | 0,0023           | 0,0028           | 0,0034           | 0,0039           | 0,0045           | 0,0056           | 0,0068           | 0,0090           |
| <b>TITANIUM ALLOYS</b>                 |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |
| COMMERCIAL PURE, 6Al-4V                | 0,0011           | 0,0017           | 0,0023           | 0,0028           | 0,0034           | 0,0039           | 0,0045           | 0,0056           | 0,0068           | 0,0090           |
| ASTM 1/2/3, 6Al-25N-4Zr-2Mo-Si         | 0,0013           | 0,0019           | 0,0025           | 0,0031           | 0,0038           | 0,0044           | 0,005            | 0,0063           | 0,0075           | 0,0100           |
| <b>STAINLESS STEEL (PRECIPITATION)</b> |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |
| 12/8, 15/5, 17/4 PH                    | 0,0010           | 0,0015           | 0,0020           | 0,0025           | 0,0030           | 0,0035           | 0,004            | 0,0050           | 0,0060           | 0,0080           |
| <b>STAINLESS STEEL (AUSTENITIC)</b>    |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |
| 300 and UP SERIES                      | 0,0009<br>0,0011 | 0,0013<br>0,0017 | 0,0018<br>0,0023 | 0,0022<br>0,0028 | 0,0026<br>0,0034 | 0,0031<br>0,0039 | 0,0035<br>0,0045 | 0,0044<br>0,0056 | 0,0053<br>0,0068 | 0,0070<br>0,0090 |
| <b>STAINLESS STEEL (MARTENSITIC)</b>   |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |
| 400 and UP SERIES                      | 0,0010           | 0,0015           | 0,0020           | 0,0025           | 0,0030           | 0,0035           | 0,004            | 0,0050           | 0,0060           | 0,0080           |
| <b>HIGH STRENGTH TOOL STEELS</b>       |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |
| 4140, 4340, A2                         | 0,0011           | 0,0017           | 0,0023           | 0,0028           | 0,0034           | 0,0039           | 0,0045           | 0,0056           | 0,0068           | 0,0090           |
| D2, P20, H11, H13, O1, 300M            | 0,0015           | 0,0023           | 0,0030           | 0,0038           | 0,0045           | 0,0053           | 0,006            | 0,0075           | 0,0090           | 0,0120           |
| <b>CARBON STEELS</b>                   |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |
| 1045                                   | 0,0013           | 0,0019           | 0,0025           | 0,0031           | 0,0038           | 0,0044           | 0,005            | 0,0063           | 0,0075           | 0,0100           |
| <b>DUCTILE</b>                         |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |
| DUCTILE CAST IRONS                     | 0,0013           | 0,0019           | 0,0025           | 0,0031           | 0,0038           | 0,0044           | 0,005            | 0,0063           | 0,0075           | 0,0100           |
| <b>CAST IRONS</b>                      |                  |                  |                  |                  |                  |                  |                  |                  |                  |                  |
| GRAY CAST IRONS                        | 0,0013           | 0,0019           | 0,0025           | 0,0031           | 0,0038           | 0,0044           | 0,005            | 0,0063           | 0,0075           | 0,0100           |

# FAMILY OF MATERIALS

## STAINLESS STEEL



Use in everyday life, in kitchen, medical, chemical, food industry. This essential material is good at corrosion resistance and is gathered in 4 categories:

- Austenitic - include the 304 and 316 grades.
- Ferritic - known for their magnetic properties. Include 400 grade.
- Martensitic - high hardness and strength, achieved through heat treatment.
- Precipitation Hardening - specific heat treatment process used to enhance strength and hardness.

Machining notes: Work-hardens easily, needs sharp tools.

## STEEL AND CAST IRON



These 2 groups are the most commonly use material, for transportation, structure, engine, landing gear, and are the least expensive of these 6 categories. Machinability of these 2 materials is good at the bottom of the Rockwell scale and get more difficult as Rockwell increase. Grey cast iron (GCI) and malleable cast iron (MCI) are easy to machine.

Machining notes: Medium hardness, chip control important.

# FAMILY OF MATERIALS

## HARDENED STEEL



Alloy steel and cast iron heat-treated to 45-65 HRC. Maintainability is very low and depends mainly on the hardness because these materials will generate heat during machining.

Machining notes: Moderate to high feeds to keep cutting edge in contact and avoid rubbing.

## EXOTIC MATERIALS AND TITANIUM ALLOYS



HRSA refers to Heat-Resistant SuperAlloys and include high-alloyed iron, nickel, cobalt and titanium-based materials and are difficult to cut. These materials are very expensive and dedicated to jet-engine parts, Aerospace, Defense, and Medical. Includes Inconel 625, 718, Titanium Ti6Al4V, Waspalloy, Rene41.

Machining notes: Low speeds, rigid setup.

## ALUMINUM & NON-FERROUS



Aluminum is very Light and soft, can be found in every home, car and plane, can be challenging to machine due to its softness and tendency to stick at the cutting tool if feed is not optimized and flood coolant is not used. This family includes copper, bronze, brass and plastic/composite materials.

Machining notes: High speeds, sharp edges, avoid built-up edge.

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