



**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**.

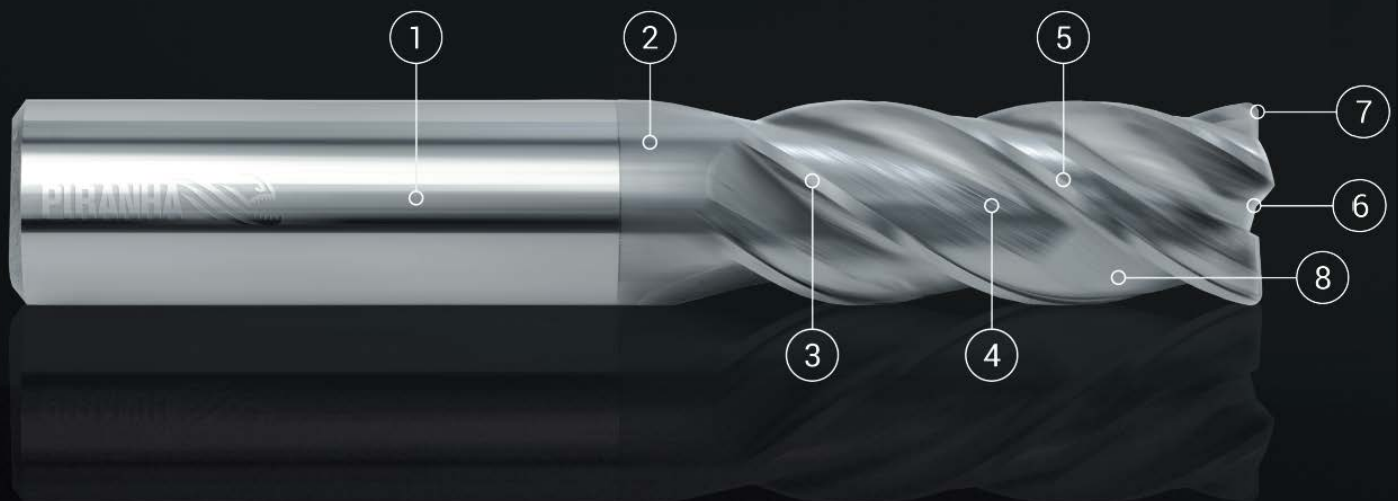
## WHY PIRANHA

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.

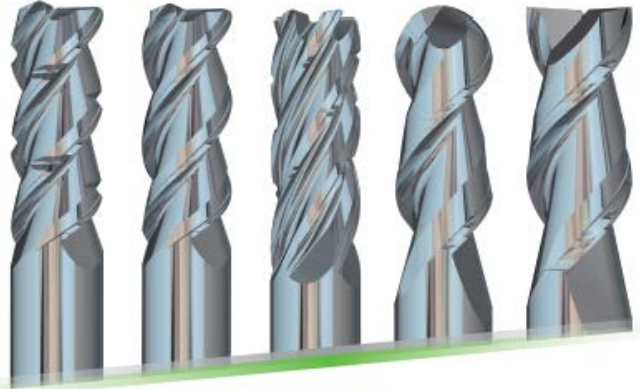
# OUR PRODUCT FAMILY

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.

**SATISFACTION**  
**CUSTOMER**

1

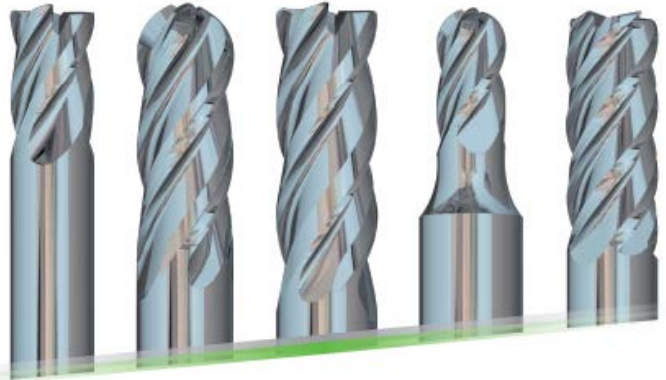
## ALUMINIUM ALLOYS



**FOR HIGH REMOVAL RATE**  
**2 - 3 - 5 flute**

2

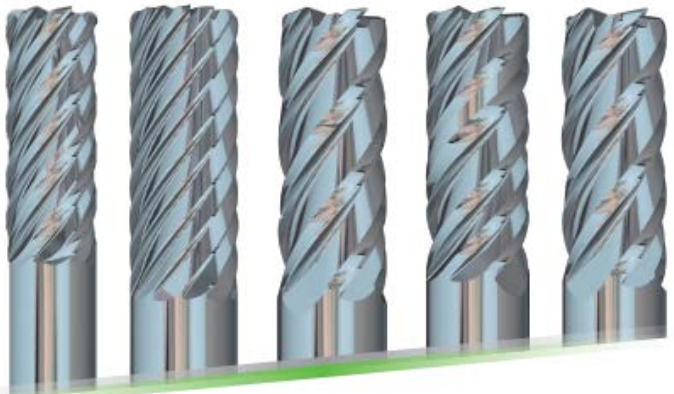
## FERROUS MEDIUM ALLOYS STEELS



**OUR STANDARD LINE-UP**  
**4 - 5 flute**

3

## EXOTIC ALLOYS



**HIGH PERFORMANCE MACHINING**  
**5 - 6 - 7 - 9 - 12 flute**

# PIRANHA



HARDENED STEELS

4

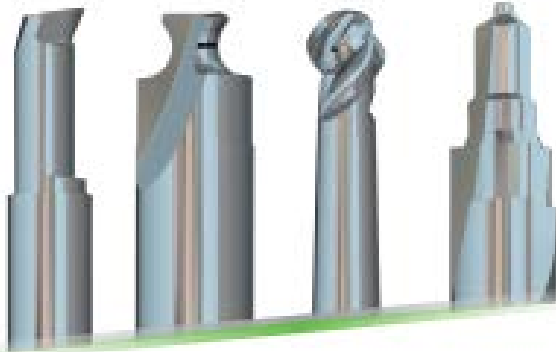


**FOR TOUGHER APPLICATIONS**

4 - 5 - 6 - 7 flute

CUSTOM TOOL

5



**SPECIAL CUTTER**

FORM TOOL / T-SLOT / BORING BAR / STEP DRILL





## CREATE YOUR CUSTOM TOOLS

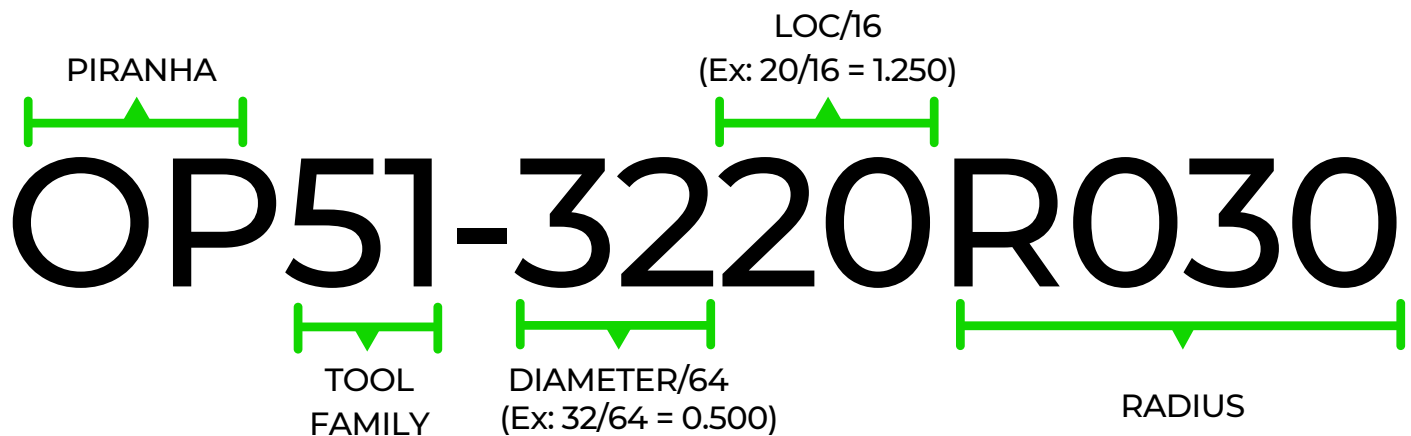
Piranha offers a 24-hour service if needed and we are available to serve you 24/7. Our CNC generated customized tools, production drills, manufactured broaches and sharpened tools combined with our team of courteous and experienced professionals guarantee our performance and your satisfaction.

### 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

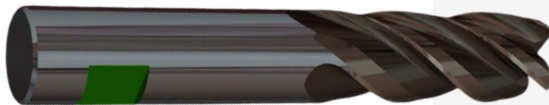
#### OPTIONS:



CHIP BREAKER

OP51-3220R030C

C



WELDON

OP51-3220R030W

W



NECKDOWN

OP51-3220R030N100

N



BALL NOSE

OP51-3220R250B

B



OAL

OP51-3220R030L50

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 ( $\mu\text{m}$ ) 1-4  
-Coefficient of friction ( $\mu$ ) 0.9  
-Max service temperature ( $^{\circ}\text{C}$ ) 1100



nACVlc:  
-Nanohardness(Gpa) 25  
-Coating Thickness ( $\mu\text{m}$ ) 1-3  
-Coefficient of friction ( $\mu$ ) 0.1  
-Max service temperature ( $^{\circ}\text{C}$ ) 450



nACo:  
-Nanohardness(Gpa) 39-41  
-Coating Thickness ( $\mu\text{m}$ ) 1-4  
-Coefficient of friction ( $\mu$ ) 0.6  
-Max service temperature ( $^{\circ}\text{C}$ ) 1100



ZrN:  
-Nanohardness(Gpa) 21-23  
-Coating Thickness ( $\mu\text{m}$ ) 1-5  
-Coefficient of friction ( $\mu$ ) 0.9  
-Max service temperature ( $^{\circ}\text{C}$ ) 550



nACoblue:  
-Nanohardness(Gpa) 39-41  
-Coating Thickness ( $\mu\text{m}$ ) 1-4  
-Coefficient of friction ( $\mu$ ) 0.6  
-Max service temperature ( $^{\circ}\text{C}$ ) 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



- AlTiN:**
- Nanohardness(Gpa) 36-38
  - Coating Thickness ( $\mu\text{m}$ ) 1-5
  - Coefficient of friction ( $\mu$ ) 0.6
  - Max service temperature ( $^{\circ}\text{C}$ ) 900



- TiCN:**
- 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.

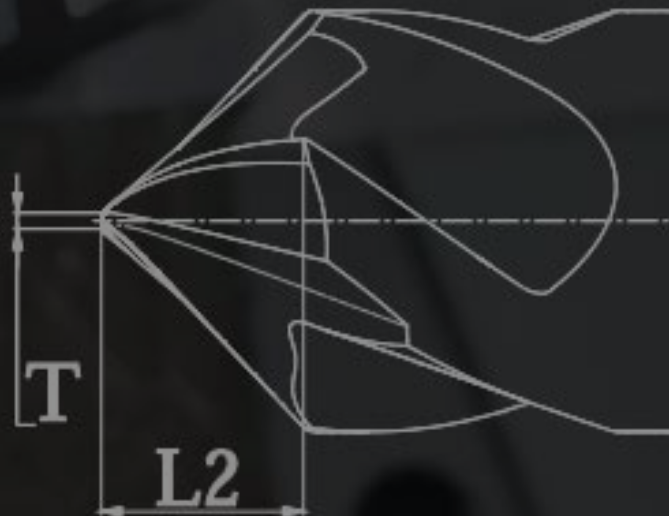
## FOLLOW US

Follow us on social media for all our news and the official announcement of our website launch.

 [twitter.com/piranhamill](https://twitter.com/piranhamill)

 [linkedin.com/company/piranha-mill/](https://linkedin.com/company/piranha-mill/)

 [facebook.com/piranhamill/](https://facebook.com/piranhamill/)



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# PIRANHA



## 2 FLUTE

- 15 2 FLUTE REGULAR POLISHED
- 17 2 FLUTE REGULAR BALL NOSE POLISHED
- 18 2 FLUTE REGULAR CHIP BREAKER POLISHED
- 20 2 FLUTE LONG POLISHED
- 22 2 FLUTE LONG BALL NOSE POLISHED
- 23 2 FLUTE LONG CHIP BREAKER POLISHED
- 25 2 FLUTE LONG REACH POLISHED
- 27 2 FLUTE LONG REACH BALL NOSE POLISHED
- 28 2 FLUTE LONG REACH CHIP BREAKER POLISHED
- 30 2 FLUTE REGULAR DLC
- 32 2 FLUTE REGULAR BALL NOSE DLC
- 33 2 FLUTE REGULAR CHIP BREAKER DLC
- 35 2 FLUTE LONG DLC
- 37 2 FLUTE LONG BALL NOSE DLC
- 38 2 FLUTE LONG CHIP BREAKER DLC
- 182 2 FLUTE CHAMFERING TOOL

## 3 FLUTE

- 41 3 FLUTE REGULAR POLISHED
- 43 3 FLUTE REGULAR BALL NOSE POLISHED
- 44 3 FLUTE REGULAR CHIP BREAKER POLISHED
- 46 3 FLUTE LONG POLISHED
- 48 3 FLUTE LONG BALL NOSE POLISHED
- 49 3 FLUTE LONG CHIP BREAKER POLISHED
- 51 3 FLUTE LONG REACH POLISHED
- 53 3 FLUTE LONG REACH BALL NOSE POLISHED
- 54 3 FLUTE LONG REACH CHIP BREAKER POLISHED
- 56 3 FLUTE REGULAR DLC
- 58 3 FLUTE REGULAR BALL NOSE DLC
- 59 3 FLUTE REGULAR CHIP BREAKER DLC
- 61 3 FLUTE LONG DLC
- 63 3 FLUTE LONG BALL NOSE DLC
- 64 3 FLUTE LONG CHIP BREAKER DLC
- 183 3 FLUTE CHAMFERING TOOL

**MADE FOR THE USA**

[www.piranhamill.com](http://www.piranhamill.com)



## 4 FLUTE

- 76** 4 FLUTE STUB CHIP BREAKER
- 78** 4 FLUTE REGULAR
- 80** 4 FLUTE REGULAR BALL NOSE
- 81** 4 FLUTE REGULAR CHIP BREAKER
- 83** 4 FLUTE LONG
- 85** 4 FLUTE LONG BALL NOSE
- 86** 4 FLUTE LONG CHIP BREAKER
- 88** 4 FLUTE LONG REACH
- 90** 4 FLUTE LONG REACH BALL NOSE
- 91** 4 FLUTE LONG REACH CHIP BREAKER
- 93** 4 FLUTE DOUBLE RAKE
- 96** 4 FLUTE DOUBLE RAKE CHIP BREAKER
- 99** 4 FLUTE STUB BALL NOSE HIGH PERFORMANCE
- 100** 4 FLUTE STUB WITH OVERSIZED SHANK
- 103** 4 FLUTE STUB WITH OVERSIZED SHANK CHIP BREAKER
- 102** 4 FLUTE STUB WITH OVERSIZED SHANK BALL NOSE
- 73** 4 FLUTE STUB
- 75** 4 FLUTE STUB BALL NOSE
- 70** 4 FLUTE OPXA4
- 184** 4 FLUTE CHAMFERING TOOL

## 5 FLUTE

- 106** 5 FLUTE STUB
- 108** 5 FLUTE STUB CHIP BREAKER
- 110** 5 FLUTE REGULAR
- 112** 5 FLUTE REGULAR CHIP BREAKER
- 114** 5 FLUTE LONG
- 116** 5 FLUTE LONG CHIP BREAKER
- 118** 5 FLUTE STUB WITH OVERSIZED SHANK
- 120** 5 FLUTE STUB WITH OVERSIZED SHANK CHIP BREAKER
- 123** 5 FLUTE REGULAR FOR EXOTIC ALLOYS
- 129** 5 FLUTE REGULAR CHIP BREAKER FOR EXOTIC ALLOYS
- 67** 5 FLUTE DOUBLE RAKE CHIP BREAKER
- 185** 5 FLUTE CHAMFERING TOOL

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# PIRANHA



## 6 FLUTE

- 137** 6 FLUTE STUB
- 139** 6 FLUTE STUB BALL NOSE
- 140** 6 FLUTE STUB CHIP BREAKER
- 142** 6 FLUTE REGULAR
- 144** 6 FLUTE REGULAR BALL NOSE
- 145** 6 FLUTE REGULAR CHIP BREAKER
- 147** 6 FLUTE LONG
- 149** 6 FLUTE LONG BALL NOSE
- 150** 6 FLUTE LONG CHIP BREAKER
- 153** 6 FLUTE DOUBLE RAKE
- 155** 6 FLUTE DOUBLE RAKE CHIP BREAKER
- 158** 6 FLUTE REGULAR CHIP BREAKER FOR INCONEL

## 7 FLUTE

- 161** 7 FLUTE STUB
- 163** 7 FLUTE STUB CHIP BREAKER
- 165** 7 FLUTE REGULAR
- 167** 7 FLUTE REGULAR CHIP BREAKER
- 169** 7 FLUTE LONG
- 171** 7 FLUTE LONG CHIP BREAKER

## 9 FLUTE

- 174** 9 FLUTE STUB
- 176** 9 FLUTE REGULAR

## 12 FLUTE

- 179** 12 FLUTE REGULAR FOR TITANIUM

## SPOT DRILL

- 187** 82° SPOT DRILL
- 188** 90° SPOT DRILL
- 189** 142° SPOT DRILL



## SPECIAL FEATURES

### OP2 ENDMILLS

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

- 1 CENTER FLUTE** Makes it easier for the tool to drill into the material when starting to machine.
- 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.
- ZRN COATING** Prevent edge build up on the endmill that is typical in soft and sticky materials.
- 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.





## 2 FLUTE - REGULAR - POLISHED



OP21

REGULAR INCH

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

DIAMETER	LOC	OAL	RAD	ITEM#
1/2	1 1/4	3	R.030	OP21-3220R030
1/2	1 1/4	3	R.060	OP21-3220R060
1/2	1 1/4	3	R.090	OP21-3220R090
1/2	1 1/4	3	R.125	OP21-3220R125
1/2	1 1/4	3	R.190	OP21-3220R190
5/8	1 5/8	4	Square	OP21-4026R000
5/8	1 5/8	4	R.015	OP21-4026R015
5/8	1 5/8	4	R.030	OP21-4026R030
5/8	1 5/8	4	R.060	OP21-4026R060
5/8	1 5/8	4	R.090	OP21-4026R090
5/8	1 5/8	4	R.125	OP21-4026R125
5/8	1 5/8	4	R.190	OP21-4026R190
5/8	1 5/8	4	R.250	OP21-4026R250
3/4	1 5/8	4	Square	OP21-4826R000
3/4	1 5/8	4	R.015	OP21-4826R015
3/4	1 5/8	4	R.030	OP21-4826R030
3/4	1 5/8	4	R.060	OP21-4826R060
3/4	1 5/8	4	R.090	OP21-4826R090
3/4	1 5/8	4	R.125	OP21-4826R125
3/4	1 5/8	4	R.190	OP21-4826R190
3/4	1 5/8	4	R.250	OP21-4826R250
1	1 3/4	5	Square	OP21-6428R000
1	1 3/4	5	R.015	OP21-6428R015
1	1 3/4	5	R.030	OP21-6428R030
1	1 3/4	5	R.060	OP21-6428R060
1	1 3/4	5	R.090	OP21-6428R090
1	1 3/4	5	R.125	OP21-6428R125
1	1 3/4	5	R.190	OP21-6428R190
1	1 3/4	5	R.250	OP21-6428R250

## 2 FLUTE - REGULAR - POLISHED



OP21  
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

OP21B

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



OP21C

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



OP22

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

OP22B

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



OP22C

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



OP23

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

OP23B

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



OP23C

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

Also available in Zirconium: OP28 ZRN





## 2 FLUTE - REGULAR - DLC



OP25

REGULAR METRIC DLC

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

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



## 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

OP25B  
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

Also available in Zirconium: OP28 ZRN







## 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



Also available in Zirconium: OP28C ZRN



## 2 FLUTE - REGULAR - CHIP BREAKER - DLC



OP25C

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  
REGULAR 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



Also available in Zirconium: OP28 ZRN



## 2 FLUTE - LONG - DLC



OP26

REGULAR 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

OP26B  
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



Also available in Zirconium: OP28B ZRN



## 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

Also available in Zirconium: OP28 ZRN





## 2 FLUTE - LONG - CHIP BREAKER- DLC



OP26C

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.

### 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.

### ZRN COATING

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

### 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.







## 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



OP31

REGULAR METRIC

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

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



## 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

OP31B

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



OP31C

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



OP32

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

OP32B

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



OP32C

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



OP33  
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

OP33B

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



OP33C

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

Also available in Zirconium: OP38 ZRN







## 3 FLUTE - REGULAR - DLC



OP35

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

OP35B

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

Also available in Zirconium: OP38 ZRN





## 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



Also available in Zirconium: OP38C ZRN



## 3 FLUTE - REGULAR - CHIP BREAKER - DLC



OP35C

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



Also available in Zirconium: OP38 ZRN



## 3 FLUTE - LONG - DLC



OP36  
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

OP36B  
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



Also available in Zirconium: OP38B ZRN



## 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

Also available in Zirconium: OP28 ZRN







## 3 FLUTE - LONG - CHIP BREAKER - DLC



OP36C

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

## OPXA ENDMILLS

Best used for Alluminum alloy

### **UNEQUAL INDEXING**

Eliminate tool chatter , reducing vibration and increasing tool life.

### **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**

Constant and continuous drop provides stronger cutting edges.





## 5 FLUTE DOUBLE RAKE CHIP BREAKER



OPXA

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



OPXA

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



## OPXA4 ENDMILLS

Best used for Alluminum alloy

### **UNEQUAL INDEXING**

Eliminate tool chatter , reducing vibration and increasing tool life.

### **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**

Constant and continuous drop provides stronger cutting edges.





## 4 FLUTE DOUBLE RAKE CHIP BREAKER



OPXA4

CHIP BREAKER INCH

DIAMETER	LOC	OAL	RAD	ITEM#
3/8	1/2	3	Square	OPXA4-2408R000C
3/8	1/2	3	R.015	OPXA4-2408R015C
3/8	1/2	3	R.030	OPXA4-2408R030C
3/8	1/2	3	R.060	OPXA4-2408R060C
3/8	1	3	Square	OPXA4-2416R000C
3/8	1	3	R.015	OPXA4-2416R015C
3/8	1	3	R.030	OPXA4-2416R030C
3/8	1	3	R.060	OPXA4-2416R060C
3/8	1 1/4	3	Square	OPXA4-2420R000C
3/8	1 1/4	3	R.015	OPXA4-2420R015C
3/8	1 1/4	3	R.030	OPXA4-2420R030C
3/8	1 1/4	3	R.060	OPXA4-2420R060C
1/2	5/8	3	Square	OPXA4-3210R000C
1/2	5/8	3	R.015	OPXA4-3210R015C
1/2	5/8	3	R.030	OPXA4-3210R030C
1/2	5/8	3	R.060	OPXA4-3210R060C
1/2	1 1/4	3	Square	OPXA4-3220R000C
1/2	1 1/4	3	R.015	OPXA4-3220R015C
1/2	1 1/4	3	R.030	OPXA4-3220R030C
1/2	1 1/4	3	R.060	OPXA4-3220R060C
1/2	2	4	Square	OPXA4-3232R000C
1/2	2	4	R.015	OPXA4-3232R015C
1/2	2	4	R.030	OPXA4-3232R030C
1/2	2	4	R.060	OPXA4-3232R060C



## 4 FLUTE DOUBLE RAKE CHIP BREAKER



OPXA4

CHIP BREAKER METRIC

DIAMETER	LOC	OAL	RAD	ITEM#
10	12	75	Square	OPXA4M-10012R0.0C
10	12	75	R0.5	OPXA4M-10012R0.5C
10	12	75	R1.0	OPXA4M-10012R1.0C
10	12	75	R2.0	OPXA4M-10012R2.0C
10	25	75	Square	OPXA4M-10025R0.0C
10	25	75	R0.5	OPXA4M-10025R0.5C
10	25	75	R1.0	OPXA4M-10025R1.0C
10	25	75	R2.0	OPXA4M-10025R2.0C
10	32	75	Square	OPXA4M-10032R0.0C
10	32	75	R0.5	OPXA4M-10032R0.5C
10	32	75	R1.0	OPXA4M-10032R1.0C
10	32	75	R2.0	OPXA4M-10032R2.0C
12	16	75	Square	OPXA4M-12016R0.0C
12	16	75	R0.5	OPXA4M-12016R0.5C
12	16	75	R1.0	OPXA4M-12016R1.0C
12	16	75	R2.0	OPXA4M-12016R2.0C
12	32	75	Square	OPXA4M-12032R0.0C
12	32	75	R0.5	OPXA4M-12032R0.5C
12	32	75	R1.0	OPXA4M-12032R1.0C
12	32	75	R2.0	OPXA4M-12032R2.0C
12	50	100	Square	OPXA4M-12050R0.0C
12	50	100	R0.5	OPXA4M-12050R0.5C
12	50	100	R1.0	OPXA4M-12050R1.0C
12	50	100	R2.0	OPXA4M-12050R2.0C



## OP4 ENDMILLS

Best used for Steel, Stainless and Exotics material

### UNEQUAL INDEXING

Eliminate tool chatter, reducing vibration and increasing tool life.

### VARIABLE HELIX

Increasing tool life and increasing cutting time.

### 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

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

### DOUBLE RAKE

The double cutting angle provides better chip breakage and optimum yield







## 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



OP40

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

OP40B

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



OP40C

### 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



OP41  
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

OP41B

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



OP41C

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



OP42

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

OP42B

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



OP42C

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



OP43

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

OP43B

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



OP43C

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



## 4 FLUTE - DOUBLE RAKE



OP45

DOUBLE RAKE 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 RAKE



OP45

DOUBLE RAKE 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 RAKE - CHIP BREAKER



OP45C

DOUBLE RAKE 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 RAKE - CHIP BREAKER



OP45C

DOUBLE RAKE 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

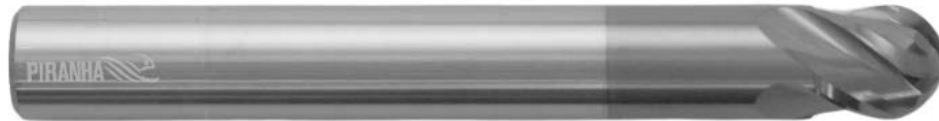
<b>DUB</b>	Stengthens the radius of the tool.
<b>CARBIDE GRADE</b>	Dedicated carbide grade for die and mold machining.
<b>LINE FORM</b>	Very precise line form.
<b>SMOTERING RADIUS</b>	Help distribute cutting forces evenly to prevent damage to the end mill and extend its life.
<b>RIGID CENTER</b>	Rigid 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

OP48  
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 WITH 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 WITH OVERSIZED SHANK



OP49

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 WITH 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

OP49B

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 WITH 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 WITH OVERSIZED SHANK - CHIP BREAKER



OP49C

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



## OP5 ENDMILLS

Best used for Steel, Stainless and Exotic materials

### VARIABLE HELIX

Eliminate tool chatter, reducing vibration and increasing tool life.

### TANGENTIAL RADIUS

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

### NACRO

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



OP50

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



OP50C

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



OP51  
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



OP51C

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



OP52

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



OP52C

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 WITH 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 WITH OVERSIZED SHANK



OP59

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 WITH OVERSIZED SHANK - CHIP BREAKER



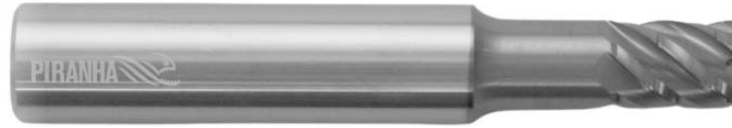
OP59C

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 WITH OVERSIZED SHANK - CHIP BREAKER



OP59C

### 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 ENDMILLS

It is used for Stainless, Titanium alloy and Exotic materials

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

### DUB

Strengthens the radius of the tool.

### VARIABLE HELIX

Eliminate tool chatter, reducing vibration and increasing tool life.

### EDGE PREP

Makes the cutting edge of the tool more uniform, which helps the tool to machine better and faster.

### HEEL

Helps to clear the back of the cutting edge, allowing the chips to be ejected faster and more efficiently.





## 5 FLUTE REGULAR FOR EXOTIC ALLOYS



OPX5

REGULAR INCH

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

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



## 5 FLUTE REGULAR FOR EXOTIC ALLOYS



OPX5

REGULAR 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 REGULAR 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 REGULAR FOR EXOTIC ALLOYS



OPX5

REGULAR 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 REGULAR FOR EXOTIC ALLOYS



OPX5  
REGULAR 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 REGULAR FOR EXOTIC ALLOYS



OPX5

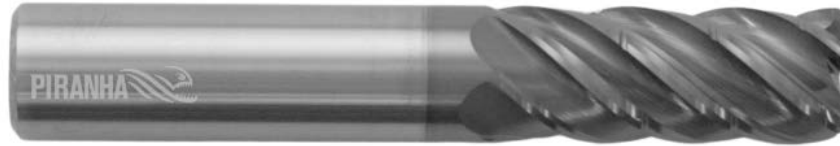
REGULAR METRIC

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 REGULAR CHIP BREAKER FOR EXOTIC ALLOYS



OPX5C

CHIP BREAKER INCH

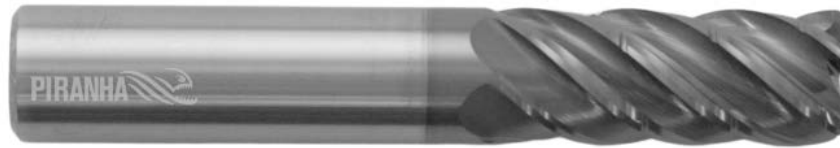
DIAMETER	LOC	OAL	RAD	ITEM#
1/8	1/4	2	Square	OPX5-0804R000C
1/8	1/4	2	R.015	OPX5-0804R015C
1/8	1/4	2	R.030	OPX5-0804R030C
3/16	3/8	3	Square	OPX5-1206R000C
3/16	3/8	3	R.015	OPX5-1206R015C
3/16	3/8	3	R.030	OPX5-1206R030C
3/16	3/8	3	R.060	OPX5-1206R060C
3/16	9/16	3	Square	OPX5-1209R000C
3/16	9/16	3	R.015	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 REGULAR CHIP BREAKER FOR EXOTIC ALLOYS



OPX5C

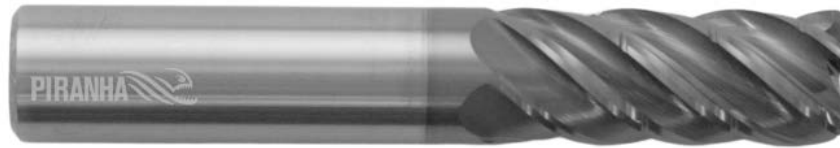
CHIP BREAKER INCH

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 REGULAR CHIP BREAKER FOR EXOTIC ALLOYS



OPX5C

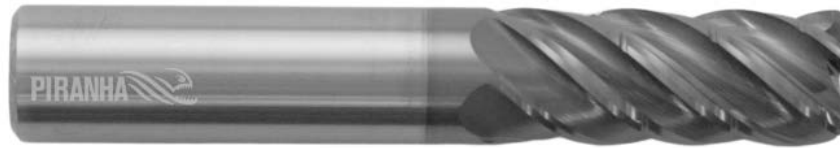
CHIP BREAKER INCH

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 REGULAR CHIP BREAKER FOR EXOTIC ALLOYS



OPX5C

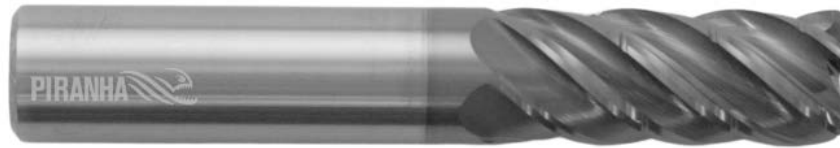
CHIP BREAKER INCH

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 REGULAR CHIP BREAKER FOR EXOTIC ALLOYS



OPX5C

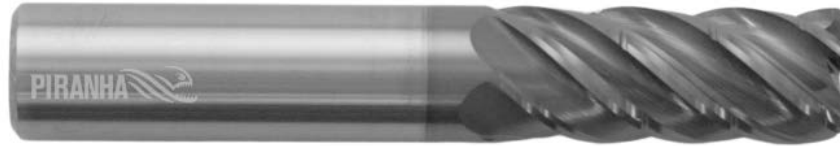
CHIP BREAKER METRIC

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 REGULAR CHIP BREAKER FOR EXOTIC ALLOYS



OPX5C

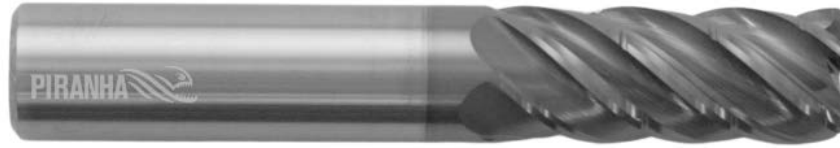
CHIP BREAKER METRIC

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 REGULAR CHIP BREAKER FOR EXOTIC ALLOYS



OPX5C

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



## OP6 ENDMILLS

Best used for Steel, Stainless and Exotics materials

### UNEQUAL INDEXING

Eliminate tool chatter, reducing vibration and increasing tool life.

### VARIABLE HELIX

Increasing tool life and increasing cutting time.

### TANGENTIAL RADIUS

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

### NACRO

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



OP60

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

OP60B

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



OP60C

### 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



OP61

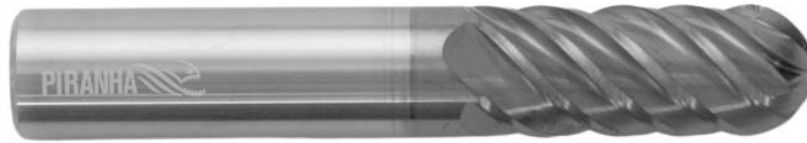
REGULAR METRIC

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

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



OP61C

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

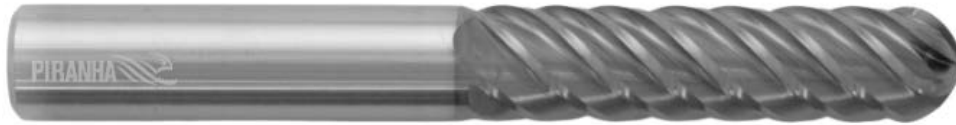


OP62  
LONG METRIC

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

OP62B

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



OP62C

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



## OP65 ENDMILLS

Best used for Steel, Stainless and Exotics materials

### **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.

### **CARBIDE GRADE**

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



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 - DOUBLE RAKE



OP65

DOUBLE RAKE INCH

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

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





## 6 FLUTE - DOUBLE RAKE



OP65

DOUBLE RAKE 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 RAKE - CHIP BREAKER



OP65C

DOUBLE RAKE 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 RAKE - CHIP BREAKER



OP65C

DOUBLE RAKE 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



## OPXi Endmills

Best used for Inconel

- SQUARE CHIP BREAKER** Unique Chipbreaker design to help reduce the load on the tool when machining.
- SPECIAL CARBIDE** High performance carbide grade suited for tougher materials.
- ECCENTRIC RELIEF** Constant and continuous drop provides stronger cutting edge.
- EDGE PREP** Makes the cutting edge of the tool more uniform, which help the tool to machine better, faster.



Outstanding performance in HRSA.



## 6 FLUTE REGULAR CHIP BREAKER FOR INCONEL



OPXi

CHIP BREAKER INCH

DIAMETER	LOC	OAL	RAD	ITEM#
1/4	3/4	3	Square	OPXi-1612R000C
1/4	3/4	3	R.015	OPXi-1612R015C
1/4	3/4	3	R.030	OPXi-1612R030C
5/16	13/16	3	Square	OPXi-2013R000C
5/16	13/16	3	R.015	OPXi-2013R015C
5/16	13/16	3	R.030	OPXi-2013R030C
5/16	13/16	3	R.060	OPXi-2013R060C
3/8	1	3	Square	OPXi-2416R000C
3/8	1	3	R.015	OPXi-2416R015C
3/8	1	3	R.030	OPXi-2416R030C
3/8	1	3	R.060	OPXi-2416R060C
7/16	1	3	Square	OPXi-2816R000C
7/16	1	3	R.015	OPXi-2816R015C
7/16	1	3	R.030	OPXi-2816R030C
7/16	1	3	R.060	OPXi-2816R060C
1/2	1 1/4	3	Square	OPXi-3220R000C
1/2	1 1/4	3	R.015	OPXi-3220R015C
1/2	1 1/4	3	R.030	OPXi-3220R030C
1/2	1 1/4	3	R.060	OPXi-3220R060C
1/2	1 1/4	3	R.090	OPXi-3220R090C
5/8	1 5/8	4	Square	OPXi-4026R000C
5/8	1 5/8	4	R.015	OPXi-4026R015C
5/8	1 5/8	4	R.030	OPXi-4026R030C
5/8	1 5/8	4	R.060	OPXi-4026R060C
5/8	1 5/8	4	R.090	OPXi-4026R090C
3/4	1 5/8	4	Square	OPXi-4826R000C
3/4	1 5/8	4	R.015	OPXi-4826R015C
3/4	1 5/8	4	R.030	OPXi-4826R030C
3/4	1 5/8	4	R.060	OPXi-4826R060C
3/4	1 5/8	4	R.090	OPXi-4826R090C



## 6 FLUTE REGULAR CHIP BREAKER FOR INCONEL



OPXi

CHIP BREAKER METRIC

DIAMETER	LOC	OAL	RAD	ITEM#
6	20	75	Square	OPXiM-06020R0.0C
6	20	75	R0.5	OPXiM-06020R0.5C
6	20	75	R1.0	OPXiM-06020R1.0C
8	21	75	Square	OPXiM-08021R0.0C
8	21	75	R0.5	OPXiM-08021R0.5C
8	21	75	R1.0	OPXiM-08021R1.0C
8	21	75	R1.5	OPXiM-08021R1.5C
10	25	75	Square	OPXiM-10025R0.0C
10	25	75	R0.5	OPXiM-10025R0.5C
10	25	75	R1.0	OPXiM-10025R1.0C
10	25	75	R1.5	OPXiM-10025R1.5C
11	25	75	Square	OPXiM-11025R0.0C
11	25	75	R0.5	OPXiM-11025R0.5C
11	25	75	R1.0	OPXiM-11025R1.0C
11	25	75	R1.5	OPXiM-11025R1.5C
12	32	75	Square	OPXiM-12032R0.0C
12	32	75	R0.5	OPXiM-12032R0.5C
12	32	75	R1.0	OPXiM-12032R1.0C
12	32	75	R1.5	OPXiM-12032R1.5C
12	32	75	R2.0	OPXiM-12032R2.0C
16	41	100	Square	OPXiM-16041R0.0C
16	41	100	R0.5	OPXiM-16041R0.5C
16	41	100	R1.0	OPXiM-16041R1.0C
16	41	100	R1.5	OPXiM-16041R1.5C
16	41	100	R2.0	OPXiM-16041R2.0C
20	41	100	Square	OPXiM-20041R0.0C
20	41	100	R0.5	OPXiM-20041R0.5C
20	41	100	R1.0	OPXiM-20041R1.0C
20	41	100	R1.5	OPXiM-20041R1.5C
20	41	100	R2.0	OPXiM-20041R2.0C



## OP7 ENDMILLS

Best used for Steel, Hardensteel, Stainless, Exotics materials

### UNEQUAL INDEXING

Eliminate tool chatter, reducing vibration and increasing tool life.

### VARIABLE HELIX

Increasing tool life and increasing cutting time.

### TANGENTIAL RADIUS

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

### NACRO

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



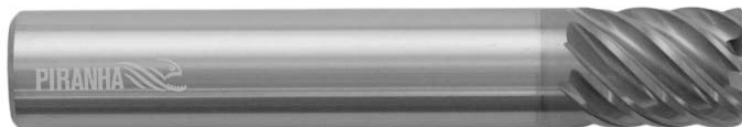
OP70  
STUB INCH

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



OP70

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



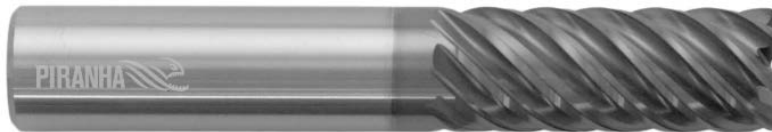
OP70C

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



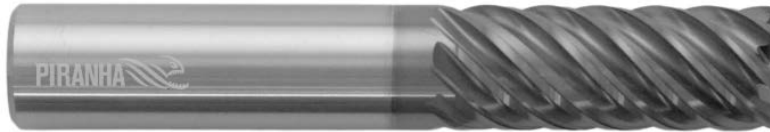
OP71

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

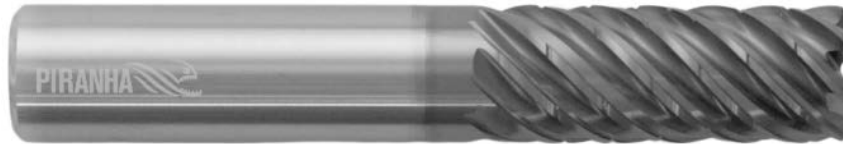


OP71

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



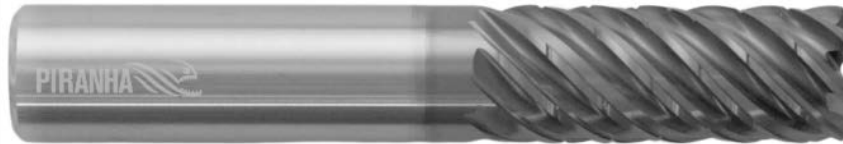
OP71C

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

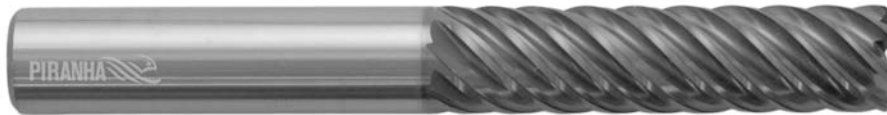


OP71C

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 - CHIP BREAKER



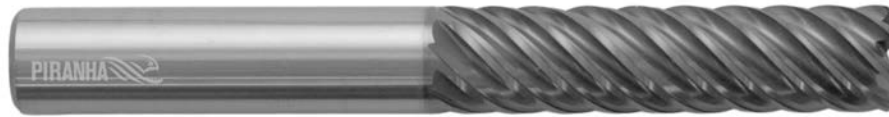
OP72  
LONG INCH

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 - CHIP BREAKER

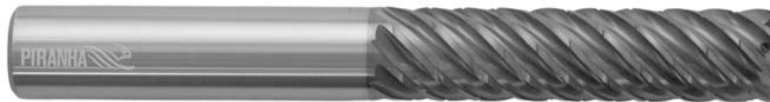


OP72

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



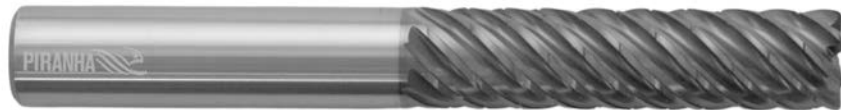
OP72C

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



OP72C

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

# PIRANHA



## OP9 ENDMILLS

Best used for Stainless and Exotics materials

### UNEQUAL INDEXING

Eliminate tool chatter, reducing vibration and increasing tool life.

### TANGENTIAL RADIUS

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

### NACRO

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

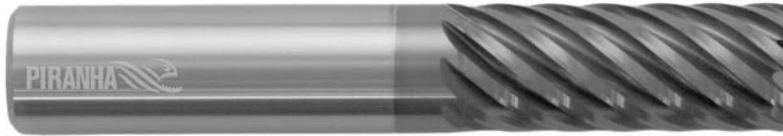


OP90  
STUB METRIC

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



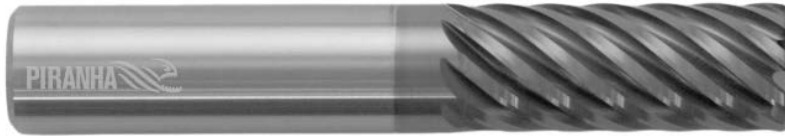
OP91

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



OP91

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 Titanium

### UNEQUAL INDEXING

Eliminate tool chatter, reducing vibration and increasing tool life.

### TANGENTIAL RADIUS

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

### COATING $TiN$ (TICN)

Unique coating especially developed for high performance machining in Titanium.



Developed for finishing operations in Titanium. Will perform in almost all HRSA.

## 12 FLUTE REGULAR FOR TITANIUM



OPXT

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 REGULAR FOR TITANIUM



OPXT

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

### **NACRO**

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

### **HELIX FLUTING**

Contrary to the straight flute usually found on chamfering tools, the helix flute enable the cutting edge to shear off material when cutting, applying less axial load on the tool and providing a better surface finish.

### **2-3-4-5 flute rang**

Allow use in a wider range of material.

### **60° or 90° point**

Different point angle available for different application.

### **BRIGHT FINISH**

Bright finish for gummy metal.





## 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

**nACo**

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

**82°, 90° OR 142°**

Different point angle available for different applications.

**BRIGHT FINISH**

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

OPSD082  
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

OPSD082  
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

OPSD090

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

OPSD090

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

OPSD142

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

OPSD142

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



## 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
<b>NICKEL BASE ALLOYS</b>			
INCONEL-625/718, WASPOLLOY	Under 32	75	90
RENE, HASTELLOY	Over 32	80	100
<b>TITANIUM ALLOYS</b>			
COMMERCIALLY PURE, 6Al-4V	-	150	230
ASTM 1/2/3, 6Al-25N-4Zr-2Mo-Si	-	150	230
<b>STAINLESS STEEL (PRECIPITATION)</b>			
12/8, 15/5, 17/4, AM-350/355	Under 32	225	350
	Over 32	200	250
<b>STAINLESS STEEL (AUSTENITIC)</b>			
200 SERIES, 302, 303, 304, 316	-	300	350
304L, 316L	Under 32	250	300
	Over 32	200	250
<b>STAINLESS STEEL (MARTENSITIC)</b>			
403, 410, 416, 440	-	250	300
<b>HIGH STRENGTH TOOL STEELS</b>			
4140, 4340, 6150, 5210, A2	Under 32	500	600
D2, P20, H11, H13, S2, S1	Over 32	350	450
<b>CARBON STEELS</b>			
1000's, 1100's, 1300's	-	560	595
<b>DUCTILE</b>			
DUCTILE CAST IRONS	-	350	400
<b>CAST IRONS</b>			
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 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 0,0008	0,0010 0,0012	0,0013 0,0016	0,0016 0,0020	0,0020 0,0024	0,0023 0,0028	0,0026 0,0032	0,0033 0,0040	0,0039 0,0048	0,0052 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 0,0008	0,0010 0,0012	0,0013 0,0016	0,0016 0,0020	0,0020 0,0024	0,0023 0,0028	0,0026 0,0032	0,0033 0,0040	0,0039 0,0048	0,0052 0,0064
<b>HIGH STRENGTH TOOL STEELS</b>										
4140, 4340, A2 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 0,0009	0,0013 0,0014	0,0018 0,0019	0,0022 0,0023	0,0026 0,0028	0,0031 0,0032	0,0035 0,0037	0,0044 0,0046	0,0053 0,0056	0,0070 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 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 D2, P20, H11, H13, 01, 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 RENE, HASTELLOY	-	90	110
<b>TITANIUM ALLOYS</b>			
COMMERCIALLY PURE, 6Al-4V 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 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 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 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 D2, P20, H11, H13, 01, 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, WASPOLLOY RENE, HASTELLOY	-	120	135
<b>TITANIUM ALLOYS</b>			
COMMERCIALLY PURE, 6Al-4V 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 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 D2, P20, H11, H13, S2, S1	Under 32 Over 32	750 600	800 650
<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>										
COMMERCIALLY 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 0,0011	0,0013 0,0017	0,0018 0,0023	0,0022 0,0028	0,0026 0,0034	0,0031 0,0039	0,0035 0,0045	0,0044 0,0056	0,0053 0,0068	0,0070 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 industrie, this essential material is gather in 4 categories;

- Ferritic serie 400
- Martensitic 17-4 PH
- Austenitic Serie 200 and 300
- Duplex

### STEEL AND CAST IRON

These 2 material are the most commonly use material in the world, for transportation, structure, engine, landing gear, and are the least expensive of these 5 categories, machinability of these 2 material is good at the bottom of the rockwell scale, and get more difficult as rockwell increase.

### TITANIUM

High tensil strength and toughness, very light, and extraordinary corrosion resistant make this material very attractive to Aerospace , Defense, and Medical.



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## FAMILY OF MATERIALS

### EXOTIC MATERIALS

In this category you will find Nickel base alloy, some Stainless steel, Cobalt, Nitralloy, Wespalloy Inconel, these material are very expensive and decicated to Aerospace , Defense, Nuclear

### ALUMINIUM

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



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