COSMOS

wireguides.com

Diamond Polished Wire Guides - Upgrade Wire Quality & Reduce Downtime

# C O N T E N T S

# INTRODUCTION

Diamond Polished Wire Guides lower friction, upgrade wire quality and when applied along the entire production line, substantially reduce machine downtime.

COSMOS diamond polishes wire guides in ultra-hard materials to improve their surface finish. These materials include Alumina, Ruby, Sapphire, Titania, Tungsten Carbide and TZP (Tetragonal Zirconia Polycrystal). Any area that comes into contact with the moving wire is diamond polished, and in addition to lowering friction, the process improves wire quality and reduces machine downtime.

Surface finish is also known as surface roughness. It is a measure of the smoothness of the material's surface and can best be described numerically in terms of microns Ra* as registered from Profilometer readings. In an effort to fill the gap between the DL and the SF surface finish standards previously adopted, we have since January 1, 2005 introduced the P 1 finish. The as-sintered (AS) finish has been removed from our delivery program.

| Suffix | Microns Ra |
|---|---|
| **D L** | 0.1 - 0.2 |
| **P 1** | 0.25 - 0.5 |
| **S F** | 0.525 - 0.75 |

1 micron = $10^{-6}$ meters

Part numbers on the Alumina guides in this catalog consist of 7-10 digits:

| **XX** | **XXX** | **-** | **XX** | **-** | **XX** |
|---|---|---|---|---|---|
| The guide group such as: | Serial No. in the group such as: | | Alumina content such as: | | Surface finish such as: |
| BG | 5 | | 99 | | DL |

For example, part No. BG 5 - 99 -DL stands for Bow Guide Part No. 5 of 99% alumina, diamond lapped to 0.1 - 0.2 microns Ra.

Part numbering for coil winding nozzles is more complex. Please see:

*www.cosmos-na.com/Coil-Winding-Nozzles-Numbering-System.html*

As a matter of fact, a substantial amount of information related to our products is available at website:

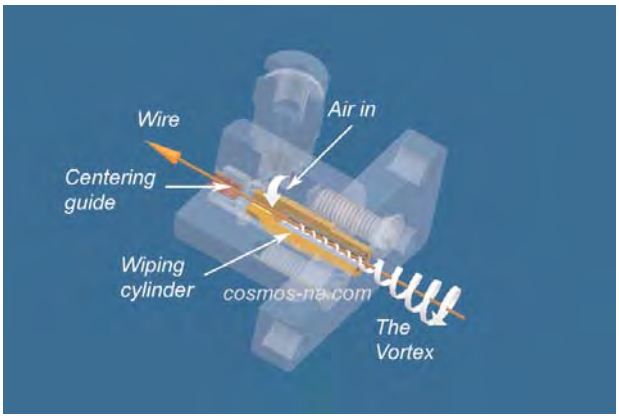
***www.cosmos-na.com***

which is updated on monthly or sometimes even on a weekly basis.

We hope you enjoy this catalog and cordially invite you to give your suggestions as to how may we better serve you. You can reach us at:

***info@cosmos-na.com***

# Optimum Performance of the Air Wipe


The criteria governing the performance of an air wipe are:

1. Choice of the wiping cylinder to fit the wire
2. Centering of the wire
3. Accommodating to the line speed

Please refer to the cut-away view of the air wipe at top right, depicting the **Wiping Cylinder, the Centering Guide and the Vortex.** For details of the **Vortex** please see page 1-2

When forcing in the compressed air, the **gap**, or the clearance between the wire and the **wiping cylinder** should be as narrow as possible without creating turbulence. A narrow gap increases air velocity, saving on compressed air.

With our diamond polished, wear-resistant wiping cylinder made of high alumina or tungsten carbide, there is no need to worry about frictional damage.

**Centering** the wire within the air wipe assures an even coverage of the air surrounding the wire in the wiping cylinder, thereby increasing the efficiency. Supported at the exit end by the **centering guide** and cushioned by the **Vortex**, the wire is virtually floating in the wiping cylinder.

## Exchangeable Wiping Cylinder

This feature allows for the selection of the wiping cylinder that best fits the wire diameter. Since you'll probably be cleaning a range of wire diameters using the same air wipe, we recommend that you adhere to a gap of 0.2 - 0.8 mm.

For example, if you expect to cleanse AWG 18 to 24, of Ø 1.02 - 0.51, you may consider our Vortex Air Wipe AWM 51 - 1.5, which allows a gap of 0.24 to 0.5 mm on each side of the wire.

## Exchangeable Centering Guide

The centering guide is made of diamond polished high alumina, tungsten carbide or ruby/sapphire and is purposely made to be in close bearing with the wire, preferably maintaining a gap between 0.1 - 0.2 mm. In the previous example, you may wish to choose 2 centering guides: Ø 1.2 and Ø 0.8 mm. Centering guides are subject to wear and need occasional replacement.

## Line Speed

It follows therefore that **the Line Speed** is dependent on the wear-resistance and the overall efficiency of the air wipe. A diamond polished, wear-resistant wiping cylinder with a close-fit centering guide, assisted by the Vortex, allows for high line speed.

Raising the air pressure should be reserved as the last measure to accommodate the line speed. Make sure you have the optimum combination of material, surface finish condition and gaps within your air wipe, including **eliminating all air leakage**, before you adjust the air pressure.

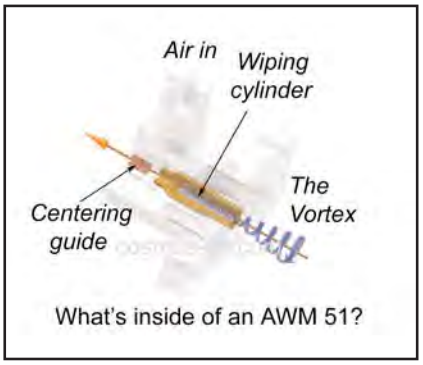
If you would be kind enough to let us know the wire material, the cleaning objective, and the line speed, we'll be glad to recommend the best fitting air wipe. For instance:

The AWM 51 - 2.0 Vortex air wipe which we recommended, shown at top left, effectively cleanses lubricant from a Ø 1.2 mm wire at a line speed of:

***900 meters/minute***

consuming 8.4 liters/minute of air at 2 bars.

# Ruby Vortex Air Wipe AWM 51






The Vortex drives the flag pole rotating at high speed when air is turned on.

RUBY Vortex Air Wipe AWM 51, an advanced version of the Ruby Air Wipe AWM 5, is dedicated for wiping bare, fine gauge wire of:

**Ø 0.05 to Ø 1.70 mm.**

While retaining the merits of its predecessor, specifically its compact size, Ruby Air Wipe AWM 51 offers 4 additional unique features:

1. A Vortex air stream
2. An extended wiping cylinder
3. Exchangeable wiping cylinder
4. Replaceable centering guides

## The Vortex

Ruby Vortex Air wipe AWM 51 converts the potential energy of compressed air to kinetic energy by routing the air via reducing orifice(s). By designing our air wipe with the orifices inclined at compound angles, we convert the potential energy of the air into 2 vectors, one translational and one rotational.

The rotational vector creates a strong, revolving air current which causes the water molecule/debris to turn around and be carried away with the translational vector. It works like a miniature tornado, but with air velocity far exceeding that of a tornado.

Photos at top center and right depict the Vortex at work.

## Exchangeable Wiping Cylinder

As illustrated at top left, the wiping cylinder is made of a diamond polished tungsten carbide. It is 5 times as long, compared with AWM 5 and also exchangeable.

## Replaceable Centering Guide

To minimize friction and to extend the service life, diamond polished ruby/sapphire guides are rendered in tandem to center the wire. It is recommended that you choose a centering guide ID dimension no more than 0.2 mm larger than the wire being wiped. Centering Guides are subject to occasional replacement.

## Multi-Line AWM 51

Ruby Vortex Air Wipe AWM 51 can be installed lined up in a row to cleanse wire emerging from a multi-line drawing installation. The minimum pitch is 20 mm.

## Part Number Description

The main part number is **AWM 51** which stands for air wipe AWM 51 without the centering guide, followed by the wiping cylinder bore diameter in mm. Example: AWM 51 - 1.0 stands for AWM 51 with wiping cylinder bore diameter 1.0 mm. Six (6) bore diameters are available for fine wire wiping:

**Ø 0.5, 0.8, 1.0, 1.3, 1.5, 2.0 mm.**

For centering guides, the part number is:

**AWM 51 CG** - followed by the centering guide bore diameter in 1/10 mm.

Example: AWM 51 CG - 0.3 stands for centering guide for AWM 51 only, with bore diameter 0.3 mm. Eight( 8 ) centering guides of bore Ø 0.2 1.5 mm are available from stock:

**Ø 0.2, 0.3, 0.5, 0.6, 0.8, 1.2, 1.4, 1.8 mm.**

**Please refer to www.cosmos-na.com/Air-Wipe-Modular.html for wire Ø > 1.70 mm**

# Multiwire Drawing Line - Air Wipe Replacements




COSMOS offers replacements for existing air wipes in Niehoff, Samp, and Sictra multi-wire drawing lines, shown above.

## AW 5 for Niehoff

To replace the Alumina flanged eyelets used in Niehoff multiwire drawing lines, COSMOS developed air wipe AW 5 in diamond polished Ruby/Sapphire, which not only offers negligible friction but also a service life 5 times as long.

The ruby is inlaid in a brass shell and nickel plated to impart hardness and lubricity. The shell bears a laser mark of the bore diameter. Listed below are the available ruby bore diameters with the corresponding part number and recommended wire diameter.

| Part No. | for wire Ø mm |
|---|---|
| AW 5 - 0.3 | 0.2 - 0.25 |
| AW 5 - 0.4 | 0.3 - 0.35 |
| AW 5 - 0.5 | 0.4 - 0.45 |
| AW 5 - 0.6 | 0.5 - 0.55 |
| AW 5 - 0.8 | 0.6 - 0.75 |
| AW 5 - 1.4 | 0.8 - 1.30 |

Air wipe AW 5 is available only in pairs, inlaid with either ruby or sapphire wire guides.

## AW 15 for Samp

COSMOS AW 15 for replacing air wipe blocks in Samp multiwire drawing lines is made of 99% Alumina, precision ground, slotted then diamond polished. Listed at right are the available slot widths next to the corresponding part numbers:

| Part No. | of slot width in mm |
|---|---|
| AW 15 - 0.2 | 0.2 |
| AW 15 - 0.3 | 0.3 |
| AW 15 - 0.4 | 0.4 |
| AW 15 - 0.5 | 0.5 |
| AW 15 - 0.6 | 0.6 |
| AW 15 - 0.8 | 0.8 |
| AW 15 - 1.0 | 1.0 |

All AW 15 air wipes will be fabricated after your drawing or representative samples. The width of the slot is laser marked on one side of the air wipe.

## AW 25 for Sictra

COSMOS AW 25 for replacing air wipe in Sictra multiwire drawing lines are fabricated in diamond polished tungsten carbide, inlaid in a brass shell and nickel plated to impart hardness and lubricity. Listed below are the available bore widths next to the corresponding part number.

| Part No. | of bore Ø in mm |
|---|---|
| AW 25 - 0.2 | 0.2 |
| AW 25 - 0.3 | 0.3 |
| AW 25 - 0.4 | 0.4 |
| AW 25 - 0.5 | 0.5 |
| AW 25 - 0.6 | 0.6 |
| AW 25 - 0.7 | 0.7 |
| AW 25 - 0.8 | 0.8 |
| AW 25 - 1.0 | 1.0 |

Air wipe AW 25 will be fabricated after your drawing or representative samples.

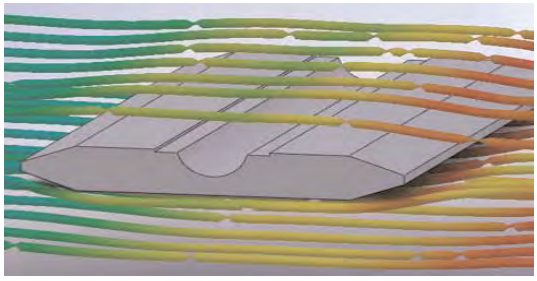
# Together, we deliver Flyer Bows that Perform, at Short Notice and with a Comfortable Price Tag


+


Lian Co., a seasoned manufacturer of Carbon Fiber Flyer Bows, joined forces in the year 2007 with Cosmos, a renowned maker of Diamond Polished Bow Guides, in an effort to deliver Flyer Bows that save you time and money.

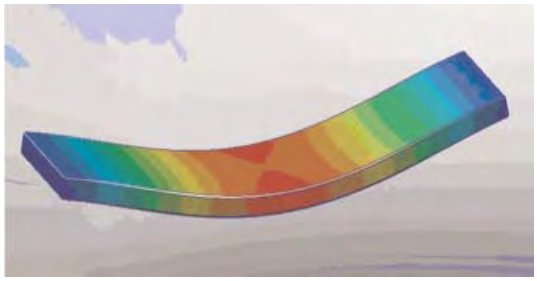
## The Profile

The behavior of a flyer bow, rotating at high speed, is analogous to an airfoil. Consequently, it is only logical that in designing the flyer bow, we analyze its aerodynamic performance as such. The result is an aerodynamically adapted **Profile** without surrendering the dedicated functions. The air flow pattern of one of our flyer bows is depicted below.



## Material Characterization

Routine lab tests, which prognosticate the performance of the flyer bow, are implemented for guidance in adjusting the hardness, stiffness and formulation of the bow material. The picture below shows the result of a beam test:



## The Guidance Components

The merits of Bow Guides are described in pages 3-1, 3-2, 3-3 & 3-4.

The Wear Strips: Wear strips, bearing the full centripetal force of the traversing wire or cable, need to be made of the best wear-resistant material available. Ferrous strips are chosen in consideration of its exceptional toughness, wear-resistance and moderate cost. We offer:

- Plain carbon steel, hardened
- Stainless steel
- Carbon steel, anti-abrasion treated

## Stocked Molds Expedite Delivery

Due to the great variety in configuration and dimensions, Flyer Bows are made to order. We endeavor to shorten the lead-time by keeping in stock the molds needed to fabricate the most frequently demanded flyer bows to fit spool diameter 300 mm to 1,600 mm: A list of the stocked molds follows:

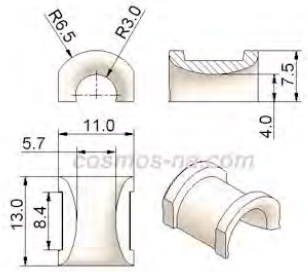
| | |
|---|---|
| BEMA | KINREI |
| CABALLE | LESMO |
| CEECO | NIEHOFF |
| CORTINOVIS | NORTHAMPTON |
| DIGEP | PAN-PIONEER |
| EN-SHANG | POURTIER |
| GAUDER | SAMP |
| GCR | SETIC |
| HAMANA | WATSON |

In addition, we offer custom-made molds at moderate cost based upon your dimensional drawing.

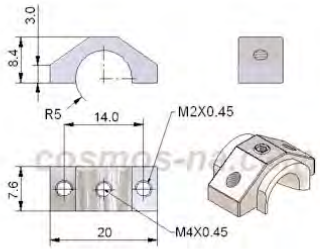
COSMOS offers bow guides made of Alumina, Tungsten Carbide, TZP ( Tetragonal Zirconia Polycrystal ) for flyer bow stranding. They feature:

1. Diamond polished surface areas that come in contact with the wire
2. Precision flatness grinding of the mounting surface
3. Robust construction

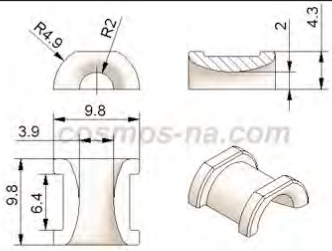
Caps for mounting the bow guides onto the flyer bow are also available.




Part No. BG 2 - TZP Material: TZP
Use: Kinrei PV5D Wt. 2 g

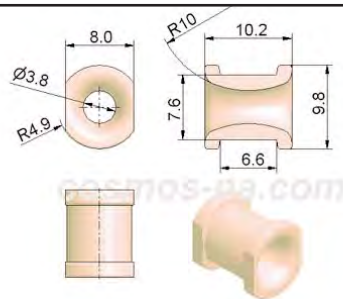



Part No. BG 2 - Cap Material: 6061T6
Weight of the cap only: 2 g

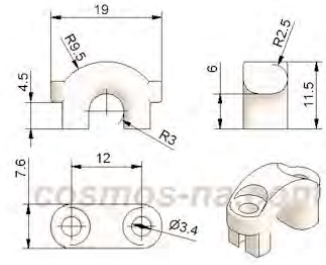



Part No. BG 6 Material: 99% $Al_2O_3$
Use: Kinrei 300, 400, 560 Wt. 0.75 g

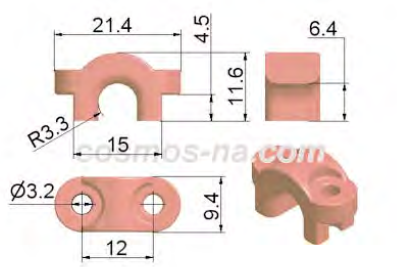

Part No. BG 6 - Cap Material: Nylon
Weight of the cap only: 0.5 g



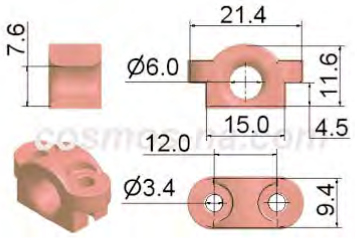

Part No. BG 35 Material: 99% $Al_2O_3$
Use: Kinrei 300, 400, 560 Wt. 1.5 g




Part No. BG 5 Material: 95% or 99% $Al_2O_3$
Use: Samp 560, 630, 760, 800 Wt. 2.75 g

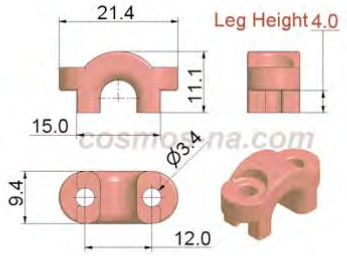



Part No. BG 9 Material: 90% or 99% $Al_2O_3$
Use: Replaces BG 5 for longer service. Wt. 3.7 g

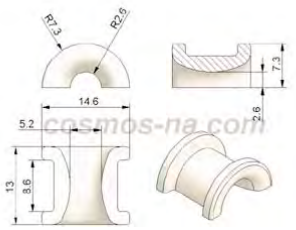



Part No. BG 19 Material: 90% $Al_2O_3$
Use: Samp 560, 630, 760, 800 Wt. 4.0 g


Part No. BG 29 Material: 99% $Al_2O_3$
Use: This is BG 9 with leg height 2.7 Wt. 4.3 g

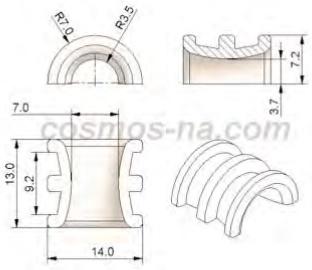



Part No. BG 49 Material: 90% $Al_2O_3$
Use: This is BG 9 with leg height 4.0 Wt. 4.1 g



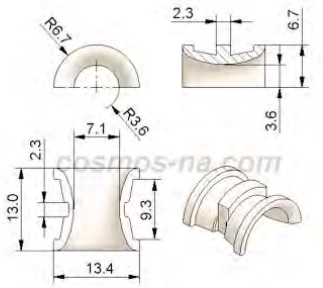

Part No. BG 8 Material: 99% $Al_2O_3$
Use: Kinrei 630, 760 Wt. 1.0 g


Part No. BG 8 - Cap Material: Nylon
Weight of the cap only: 0.8 g



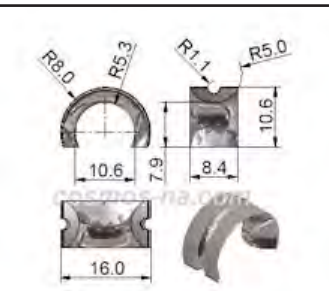

Part No. BG 10 - 2 Material: 99% $Al_2O_3$
Use: Niehoff D630 Wt. 1.5 g


Part No. BG 10 - Cap Material: Nylon
Weight of the cap only: 1.1 g

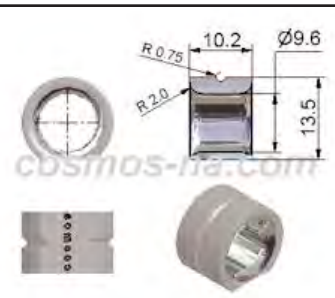



Part No. BG 10 - 4 Material: 99% $Al_2 O_3$
Use: Niehoff D631 Wt. 1.5 g

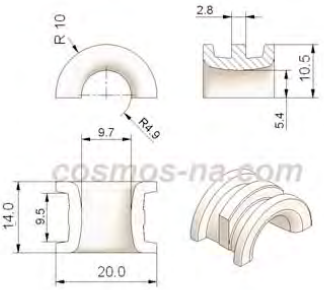

Part No. BG 10 - 4 - Cap Material: Nylon
Weight of the cap only: 1.0 g




Part No. BG 16 - TC Material: Tungsten Carbide
Use: Hamana 560, 630 Wt. 9 g

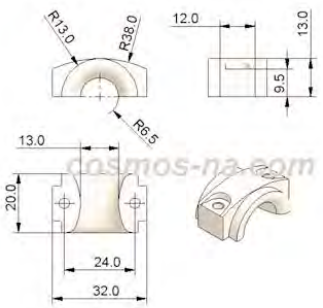



Part No. BG 52 - TC Material: Tungsten Carbide
Use: Hamana 560, 630 Wt. 11 g

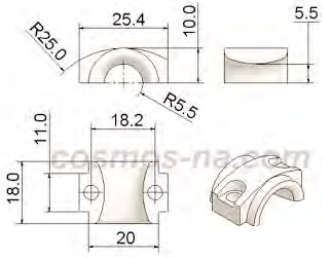



Part No. BG 18 Materal: 99% $Al_2 O_3$
Use: Niehoff D801 Wt. 3.9 g

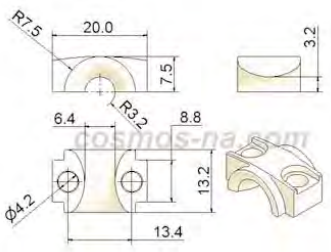

Part No. BG 18 - Cap Material: Nylon
Weight of the cap only: 1.6 g



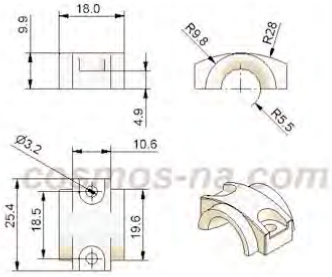

Part No. BG 21 Material: 99% $Al_2 O_3$
Use: Lesmo DTO800, 1000 Wt. 17 g



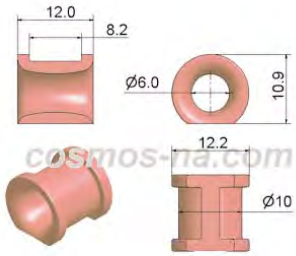

Part No. BG 22 Material: 99% $Al_2 O_3$
Use: Lesmo DTO630, 760, 800 Wt. 8 g



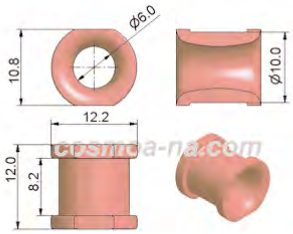

Part No. BG 23 Material: 99% $Al_2O_3$ Wt. 4 g
Use: Hamana 560, 630, Lesmo DTO630



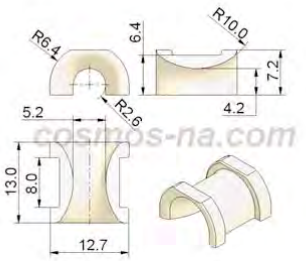

Part No. BG 24 Material: 99% $Al_2O_3$ Wt. 7 g
Use: Lesmo DTO630, 760, 800, Northampton 800



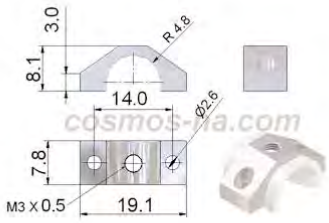

Part No. BG 27 Material: 90% $Al_2O_3$
Use: Kinrei 630, 760 Wt. 2.6 g



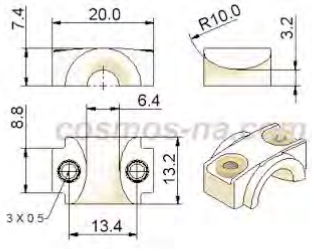

Part No. BG 30 Material: 90% $Al_2O_3$
Use: Kinrei 630, 760 Wt. 2.5 g



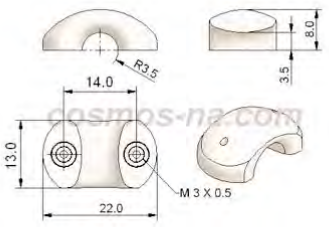

Part No. BG 40 - TZP Material: TZP
Use: Hamana HES800 Wt. 2.5 g




Part No. BG 40 - Cap Material: 6061 T 6
Weight of the cap only: 2 g




Part No. BG 48 Material: 99% $Al_2O_3$ Wt. 5.1 g
Use: Hamana 560, 630, Lesmo DTO630




Part No. BG 50 Material: 99% $Al_2O_3$
Use: Niehoff D561 Wt. 4.25 g

# *We offer the most complete assortment of*

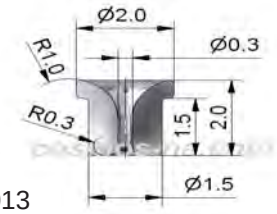
# *Flanged Eyelets*

The more popular flanged eyelets made of Alumina, Tungsten Carbide are shown in cut-away dimensional view, arranged in ascending order of the bore diameter, with the part number and weight depicted at the lower left corner of the image. The digits following the hyphen (-) in the part No. indicate the percentage of the Alumina content, while the ones starting with the prefix **TE** stand for Tungsten Carbide Eyelets.

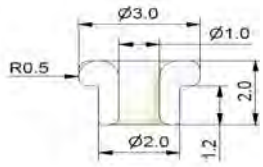
Comprehensive dimensional lists of all flanged eyelets by COSMOS, arranged in ascending order of the bore diameter, the hub diameter and the total length can be viewed at:

http://www.cosmos-na.com/Eyelet%20List%20D%20_%201.html

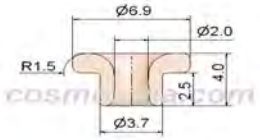
All units in mm.



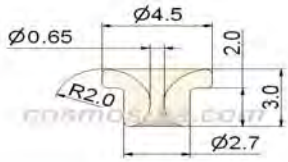

TE 013
0.057 g



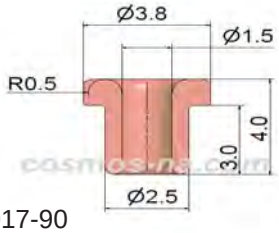

E 181-99
0.03 g



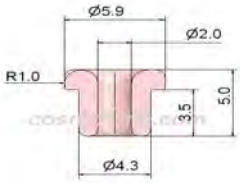

E 004-99
0.25 g



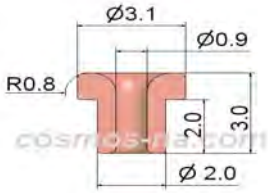

E 177-99
0.09 g



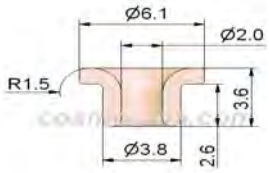

E 017-90
0.05 g



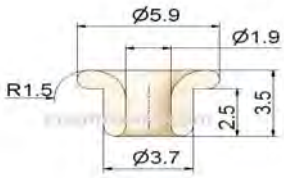

E 016-95
0.25 g



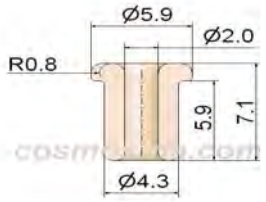

E 069-90
0.04 g



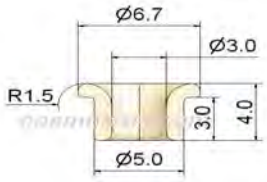

E 140-99
0.15 g



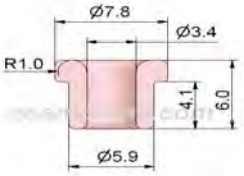

E 026-99
0.15 g



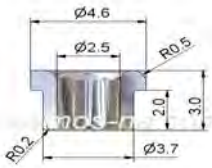

E 018-99
0.35 g



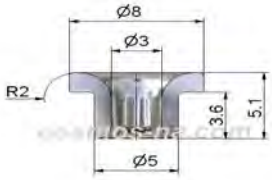

E 027-99
0.2 g



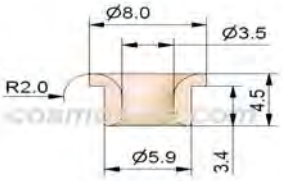

E 005-95
0.55 g



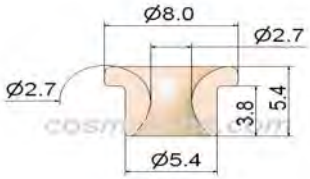

TE 339
0.28 g



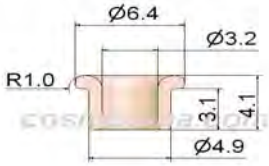

TE 003
1.3 g



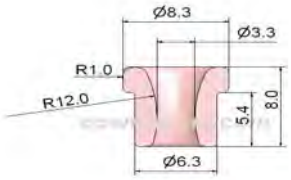

E 192-99
0.35 g



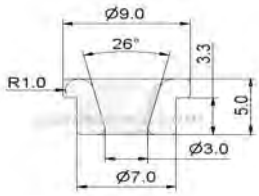

E 019-99
0.45 g



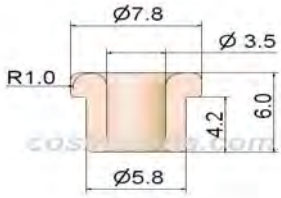

E 139-99
0.2 g



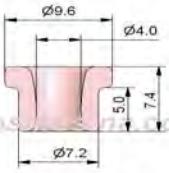

E 122-95
0.77 g



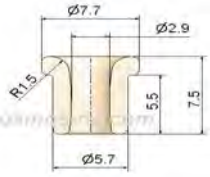

E 009-99
0.6 g




E 012-99
0.5 g

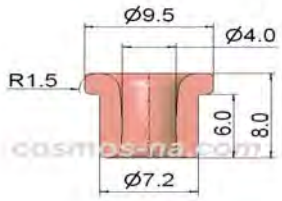



E 006-95
1.05 g

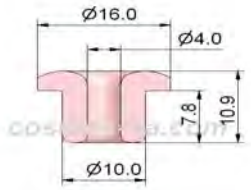



E 014-99
0.7 g

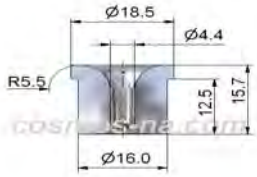

E 500-99
16 g




E 007-90
1.0 g

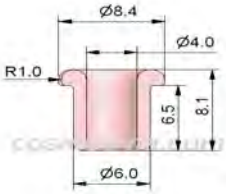



E 038-95
3.65 g

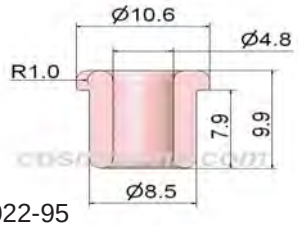



TE 356
45 g

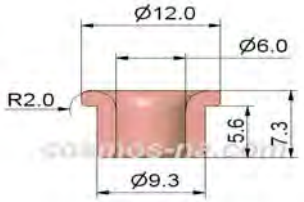

TE 005
4.5 g



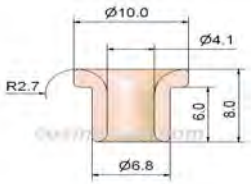

E 021-95
0.6 g



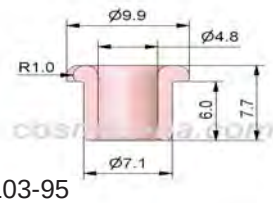

E 022-95
1.6 g



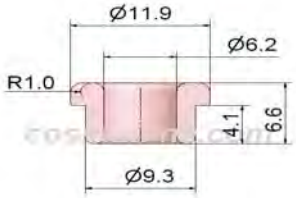

E 107-90
1.2 g



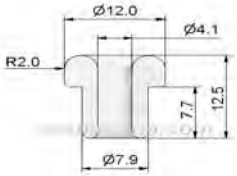

E 173-99
0.95 g



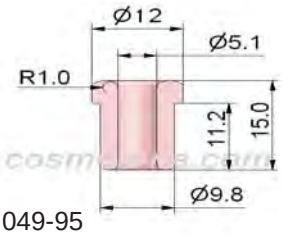

E 103-95
0.8 g



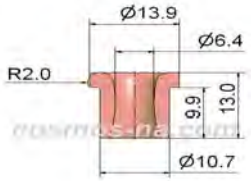

E 023-95
1.25 g




E 255-96
3.0 g




E 049-95
3.6 g




E 037-95
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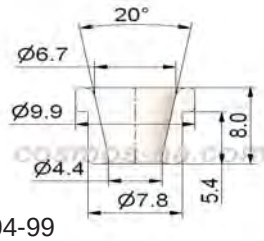
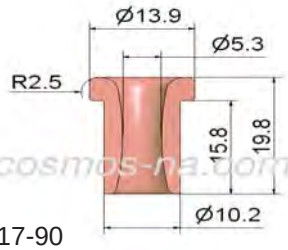
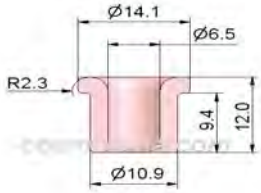


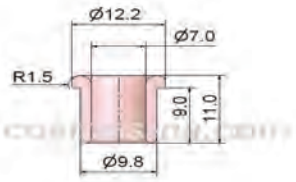

E 104-99
1.0 g



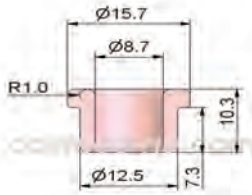

E 117-90
5.25 g



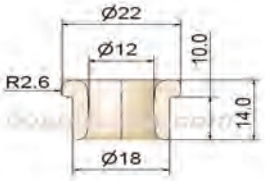

E 108-95
3.0 g



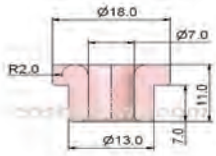

E 111-95
2.0 g



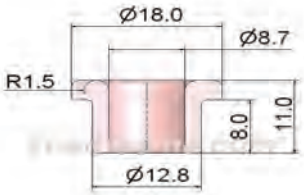

E 059-95
3.0 g



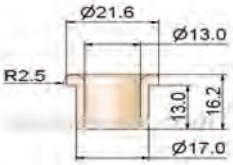

E 054-99
8.7 g



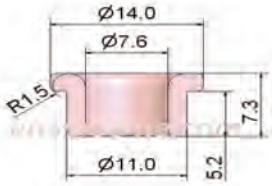

E 381-95
48 g



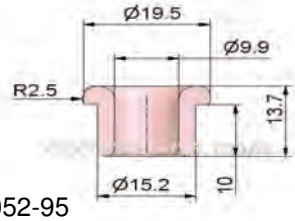

E 146-95
3.8 g



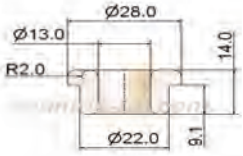

E 384-99
7.2 g



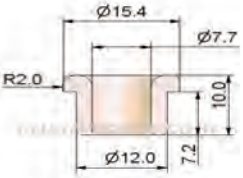

E 271-95
4.9 g



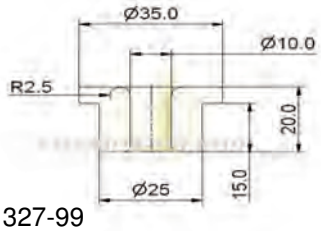

E 052-95
6.6 g



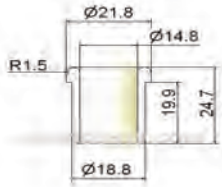

E 041-99
16.5 g



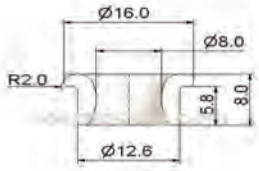

E 036-99
3.1 g



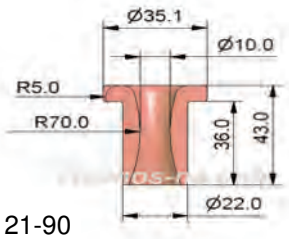

E 327-99
39 g



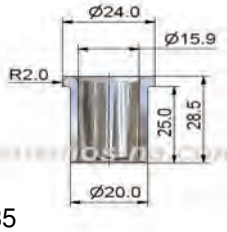

E 266-99
10.5 g




E 331-99
2.65 g

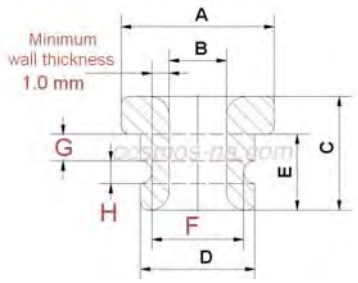


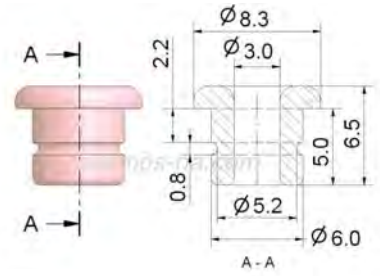

E 121-90
51 g



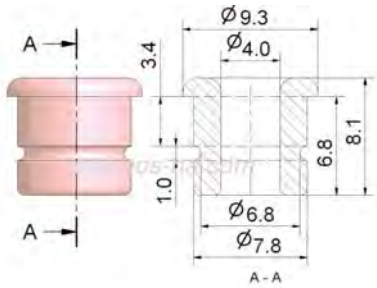

TE 035
51 g

All flanged eyelets by COSMOS can be grooved at a moderate surcharge upon the request of the customer by indicating the dimensions **F, G, H** illustrated at right. For structural rigidity, it is recommended that the wall thickness at the groove should not fall below 1.0 mm after grooving. Some of the frequently grooved eyelets are illustrated.

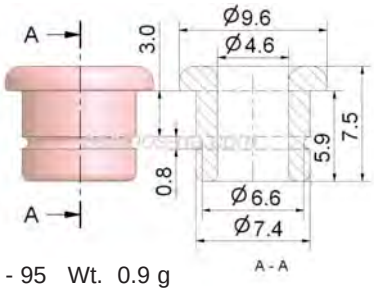


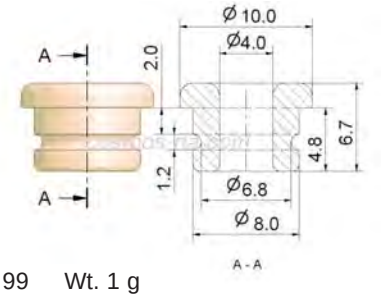

E 028 - 95 Wt. 0.8 g



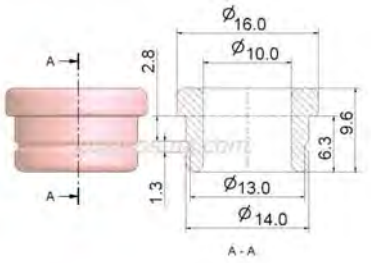

E 029 - 95 Wt. 1.1 g



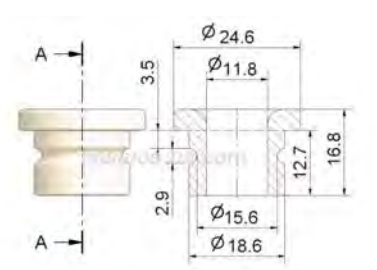

E 030 - 95 Wt. 0.9 g



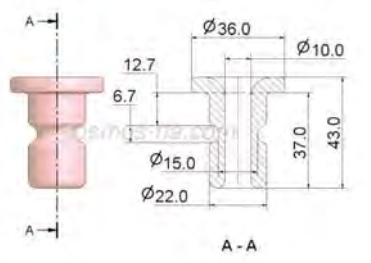

E 031 - 99 Wt. 1 g



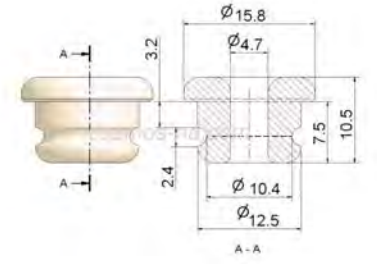

E 032 - 95 Wt. 2.5 g




E 048 - 90 Wt. 12 g

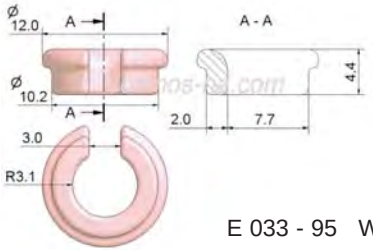



E 161 - 95 Wt. 45 g

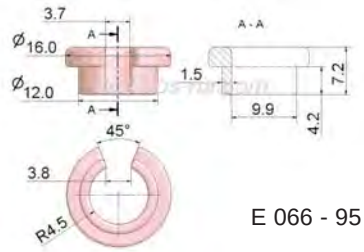



E 158 - 99 Wt. 4.3 g

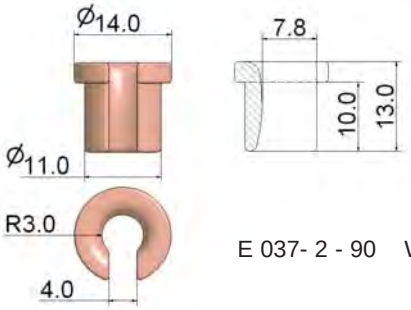
Slotted eyelets not only facilitate string up, but also can be improvised to catch lumps on the wire, such as zinc coating. Unlike grooving, slotting existing flanged eyelets is not a cost-effective process. Creating a new mold is the preferred option.



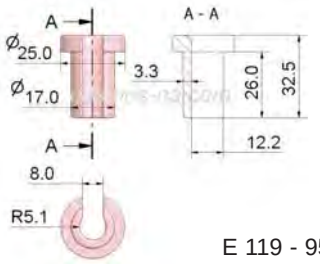

E 033 - 95 Wt. 0.85 g



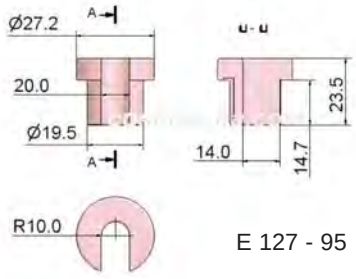

E 066 - 95 Wt. 2 g



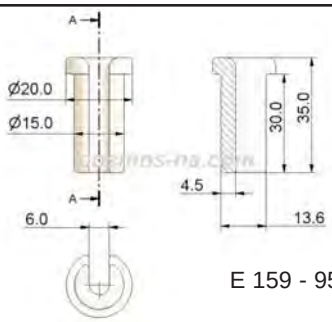

E 037- 2 - 90 Wt. 3 g



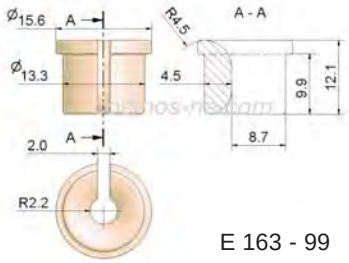

E 119 - 95 Wt. 15 g



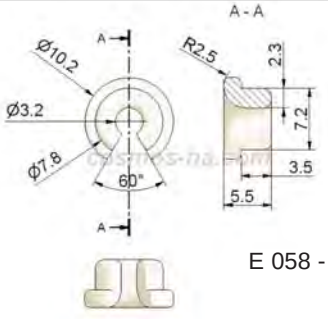

E 127 - 95 Wt. 16 g



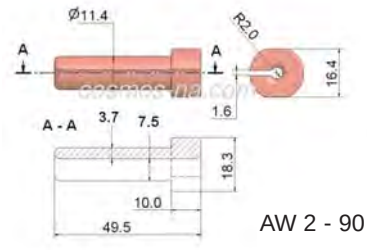

E 159 - 95 Wt. 15 g




E 163 - 99 Wt. 5.5 g




E 058 - 99 Wt. 0.97 g



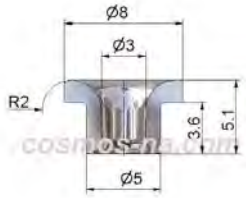

AW 2 - 90 Wt. 20 g

# Tungsten Carbide is suitable for Ferrous Wire

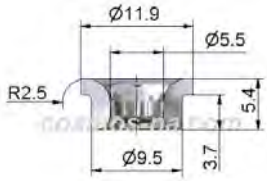
Tungsten carbide wire guide features: **Excellent hardness; Unmatched toughness; Super- finish.** The unique combination of hardness and toughness makes tungsten carbide guide one of the most wear-resistant. It is capable of being diamond polished to a mirror finish as smooth as 0.025 – 0.05 micron or 1 – 2 micro inches Ra for processing ferrous wire or highly abrasive wire.

Wire guides made of Tungsten Carbide are not fragile in dynamic applications; however, at a unit weight 3-4 times that of Alumina, it may create objection. The issue can be addressed by reducing the overall dimensions and the wall thickness. We offer to create molds for tungsten carbide wire guides in the form of bow guide, eyelet guide or ring guide. The more popular tungsten carbide guides are shown below:


TE 013 0.057 g




TE 003 1.3 g



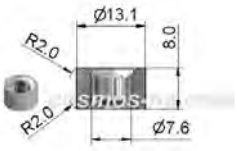

TE 005 4.5 g


BG 51-TC 8.5 g


BG 52-TC 11 g


BG 60-TC 8.1 g


TR 034 0.1 g



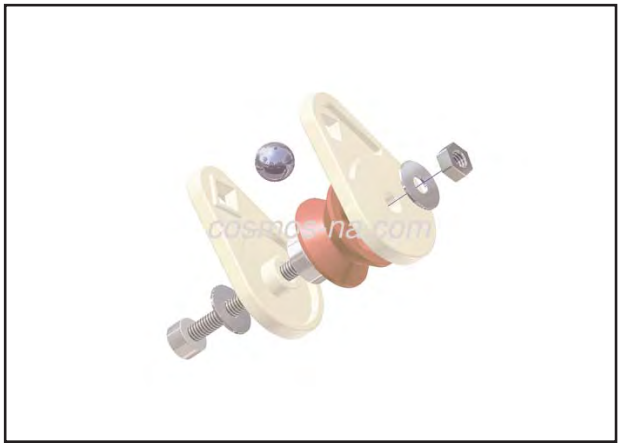

TR 002 8.5 g


TR 347 55 g

# Caged Pulleys stop Wire Jumping + Easy Threading

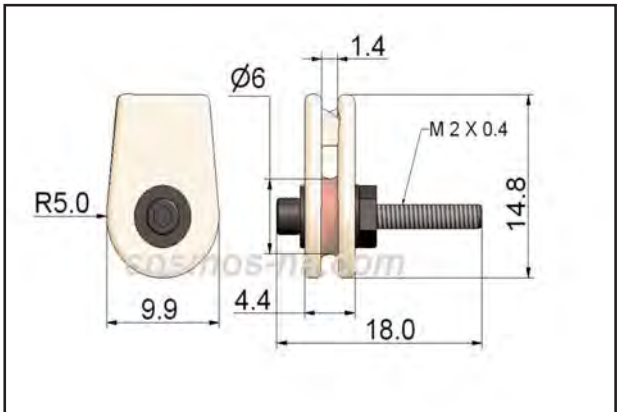
Caged pulleys are recommended when the wire turns at an acute angle or when wire jumping is an issue. Wires guided by a caged pulley runs on a surface that is revolving rather than stationary and at the same time it's confined between 2 side plates with protruding ears or a floating ball, which further restrains the wire movement in the vertical and lateral direction.

To assure optimum protection to the wire, it is desirable to have not only the pulley, but also the side plates diamond polished, as the wire does occasionally come into contact with the side plates due to misalignment, as shown in the photo below. Diamond polished side plates address this issue.

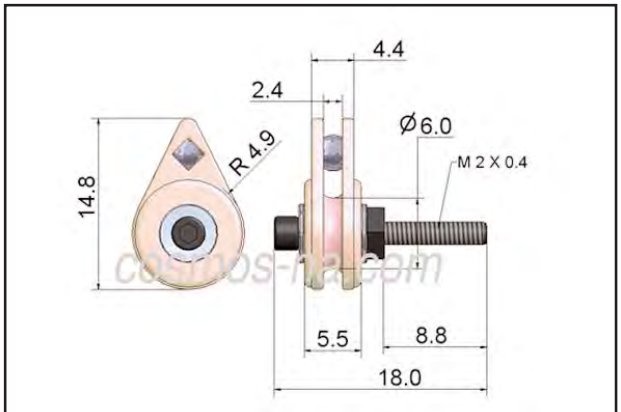



Where weight is a crucial consideration, such as, in precision coil winding or fine wire processing, we offer:

**NT 067 at 1.8 g, shown below.**

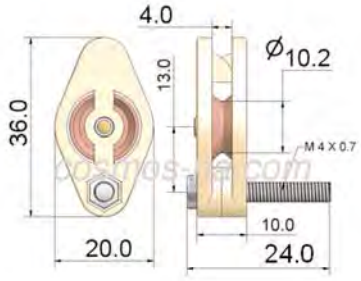



| | | | |
|---|---|---|---|
| Part No. NT 058 | | Material: | 99 % $Al_2O_3$ |
| Bearing No. 520 ZZ | | Wt. | 2.0 g |

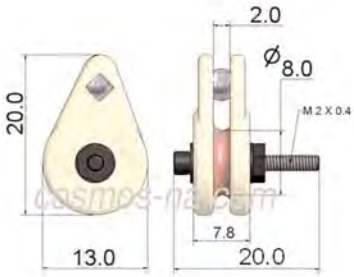



| | | | |
|---|---|---|---|
| Part No. NT 067 | | Material: | 99 % $Al_2O_3$ |
| Bearing No. 520 ZZ | | Wt. | 1.8 g |

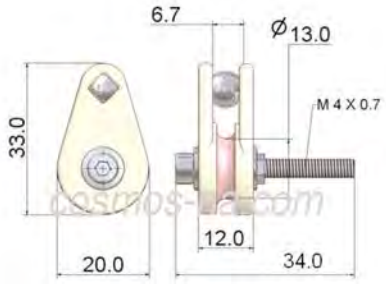

Part No. NT 001 Material: 95% $Al_2O_3$
Bearing No. 692 ZZ Wt. 4.7 g



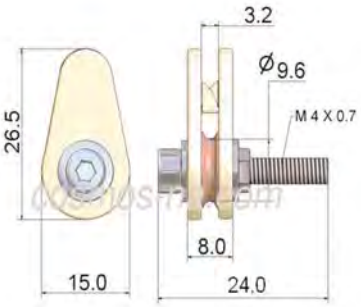

Part No. NT 003 Material: 95% $Al_2O_3$
Bearing No. 683 ZZ Wt. 14 g



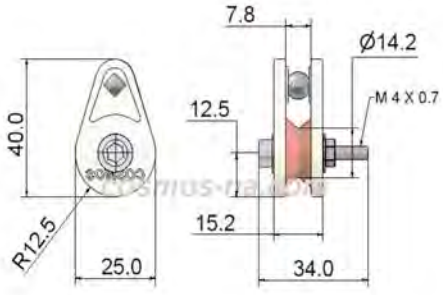

Part No. NT 001 B Material: 95% $Al_2O_3$
Bearing No. 692 ZZ Wt. 4.9 g




Part No. NT 062 Material: 99% $Al_2O_3$
Bearing No. 694 ZZ Wt. 19 g



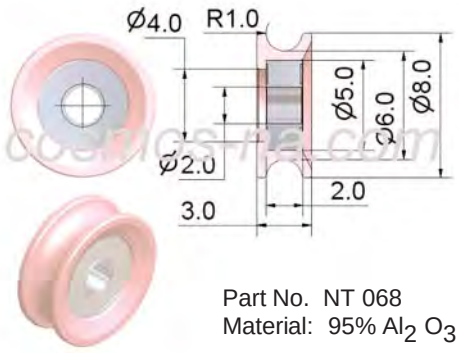

Part No. NT 002 Material: 99% $Al_2O_3$
Bearing No. 840 ZZ Wt. 9.2 g



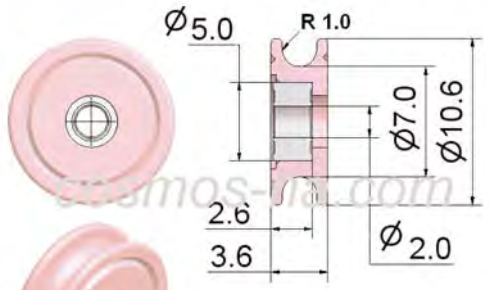

Part No. NT 064 Material: 90% $Al_2O_3$
Bearing No. 694 ZZ Wt. 27 g

COSMOS offers miniature pulleys of groove diameter under **20 mm** for precision coil winding and fine wire processing.

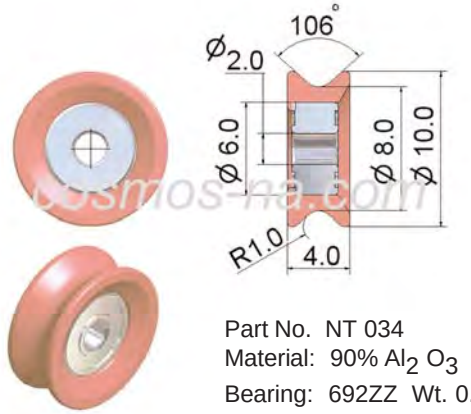
Miniature, double-sealed ball bearings plus the low mass of the pulley reduce the rotational torque. Where light weight and precise tension control are crucial issues, these are the pulleys of choice.



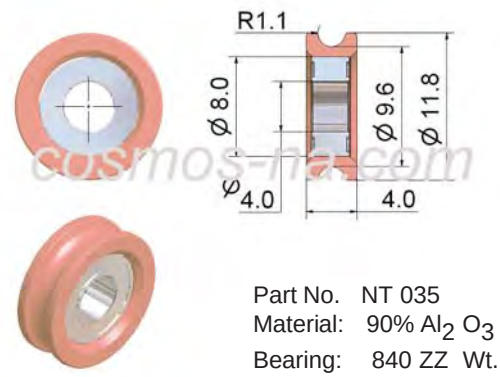

Part No. NT 068
Material: 95% $Al_2O_3$
Bearing: 520ZZ Wt. 0.45 g



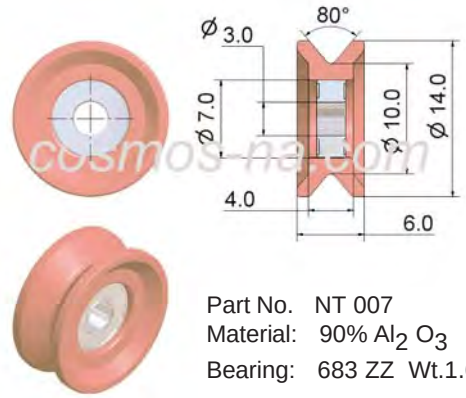

Part No. NT 006
Material: 95% $Al_2O_3$
Bearing: 520 ZZ Wt. 0.8 g




Part No. NT 034
Material: 90% $Al_2O_3$
Bearing: 692ZZ Wt. 0.9 g

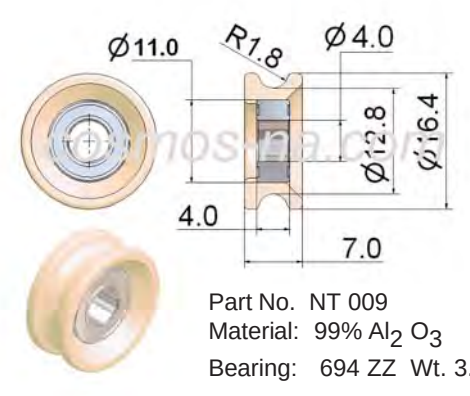



Part No. NT 035
Material: 90% $Al_2O_3$
Bearing: 840 ZZ Wt. 1 g




Part No. NT 007
Material: 90% $Al_2O_3$
Bearing: 683 ZZ Wt.1.6 g


Part No. NT 072
Material: 99 % $Al_2O_3$
Bearing: 105 ZZ Wt. 4 g



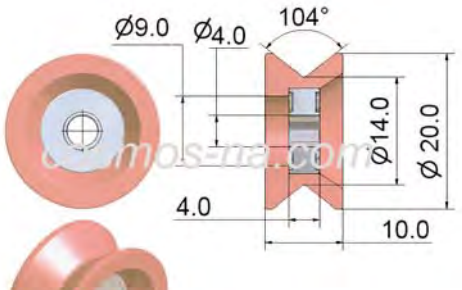

Part No. NT 009
Material: 99% $Al_2O_3$
Bearing: 694 ZZ Wt. 3.9 g

**Solid alumina pulleys** can be fitted with a:

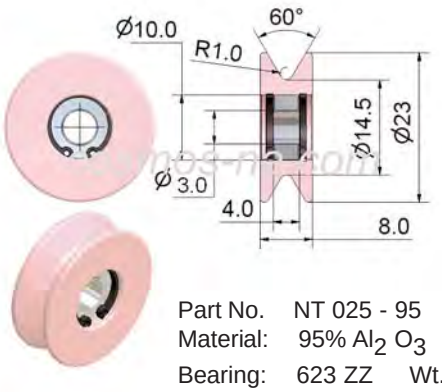
1) Metric Metallic Ball Bearing
2) Imperial Metallic Ball Bearing
3) Metric Ceramic Ball Bearing
4) Metric Plastic Ball Bearing

For imperial ball bearings, please designate the shaft diameter in inches. Applications of the ceramic and plastic ball bearings are covered in a separate page.

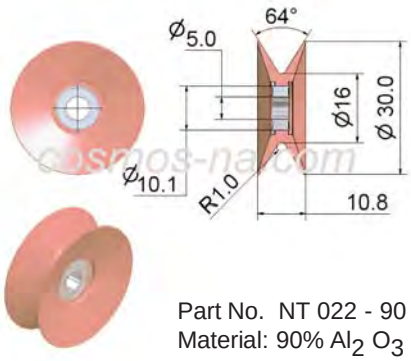

Part No. NT 024 - 90
Material: 90% $Al_2O_3$
Bearing: 6200 ZZ Wt. 80 g



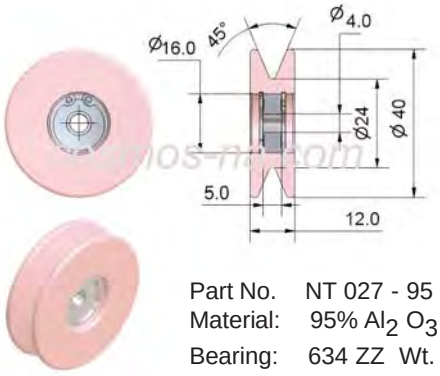

Part No. NT 021 - 90
Material: 90% $Al_2O_3$
Bearing: 694 ZZ Wt. 7 g



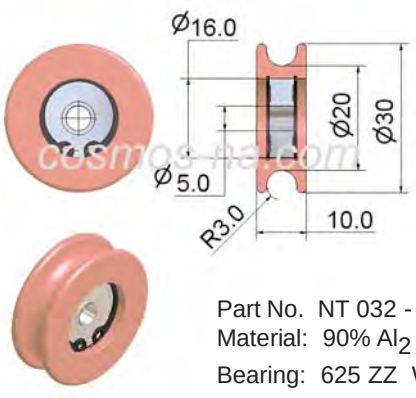

Part No. NT 025 - 95
Material: 95% $Al_2O_3$
Bearing: 623 ZZ Wt. 8 g



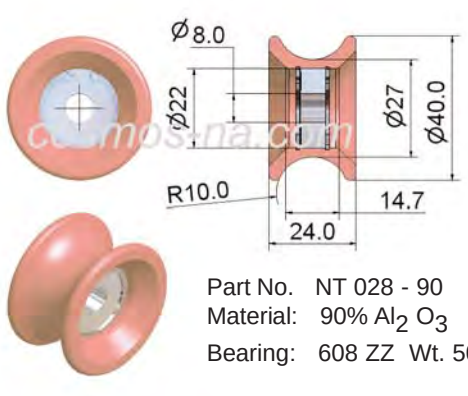

Part No. NT 022 - 90
Material: 90% $Al_2O_3$
Bearing: MF105ZZ Wt.12 g



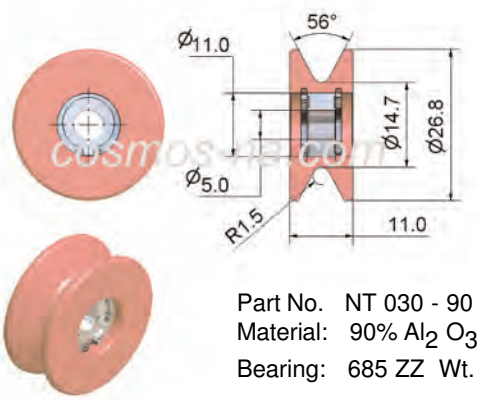

Part No. NT 027 - 95
Material: 95% $Al_2O_3$
Bearing: 634 ZZ Wt. 27 g



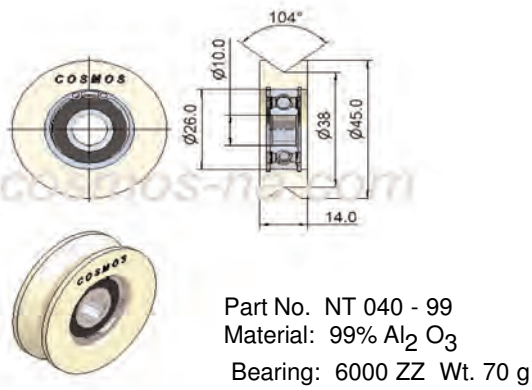

Part No. NT 032 - 90 R
Material: 90% $Al_2O_3$
Bearing: 625 ZZ Wt. 16 g



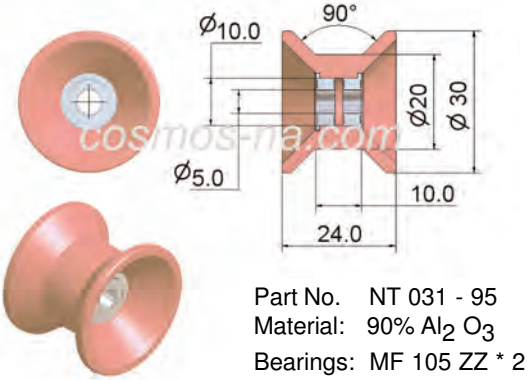

Part No. NT 028 - 90
Material: 90% $Al_2O_3$
Bearing: 608 ZZ Wt. 50 g



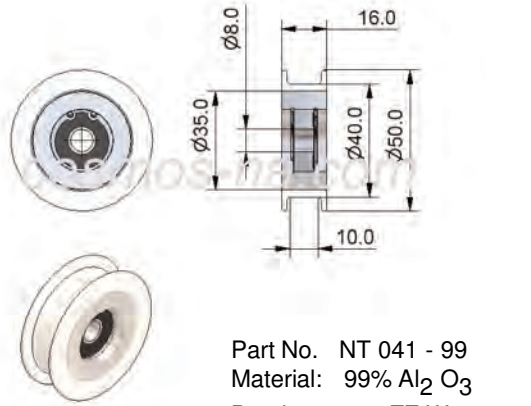

Part No. NT 030 - 90
Material: 90% $Al_2O_3$
Bearing: 685 ZZ Wt. 14 g



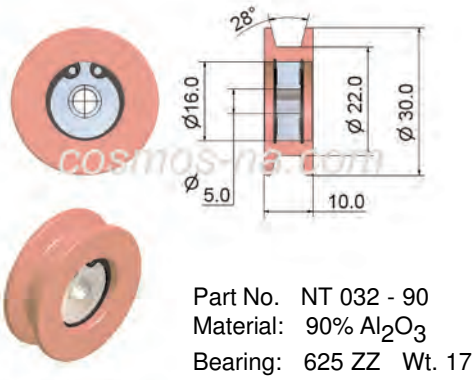

Part No. NT 040 - 99
Material: 99% $Al_2O_3$
Bearing: 6000 ZZ Wt. 70 g



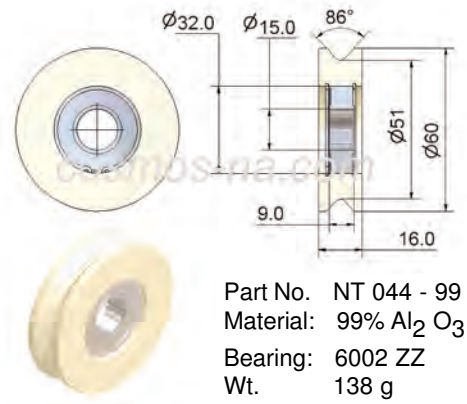

Part No. NT 031 - 95
Material: 90% $Al_2O_3$
Bearings: MF 105 ZZ * 2
Wt. 16 g



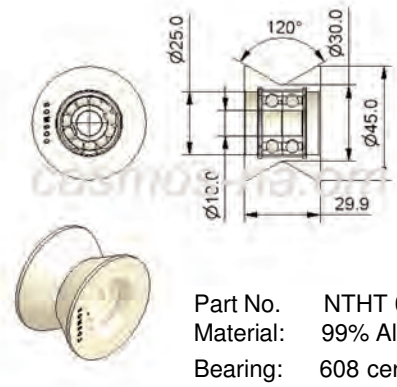

Part No. NT 041 - 99
Material: 99% $Al_2O_3$
Bearing: 608 ZZ Wt. 62 g



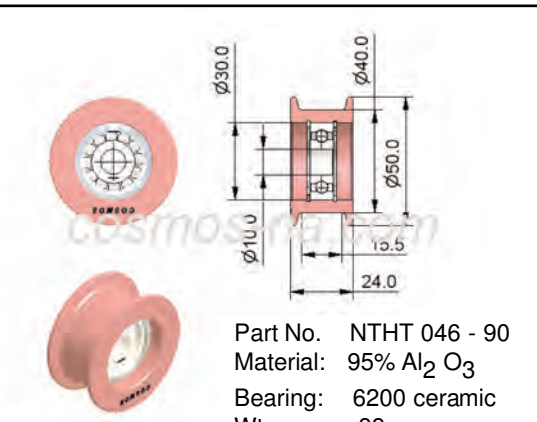

Part No. NT 032 - 90
Material: 90% $Al_2O_3$
Bearing: 625 ZZ Wt. 17 g




Part No. NT 044 - 99
Material: 99% $Al_2O_3$
Bearing: 6002 ZZ
Wt. 138 g




Part No. NTHT 039 - 99
Material: 99% $Al_2O_3$
Bearing: 608 ceramic
Wt. 109 g

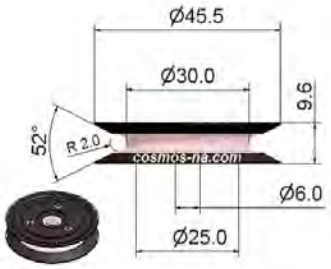



Part No. NTHT 046 - 90
Material: 95% $Al_2O_3$
Bearing: 6200 ceramic
Wt. 88 g

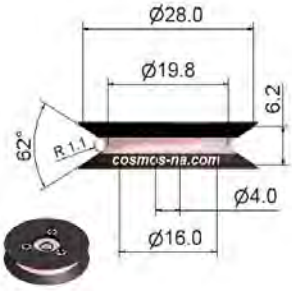
Flanged pulleys offer the following benefits:

1. Light weight, low starting torque
2. Superior surface finish
3. Interchangeability of flanges

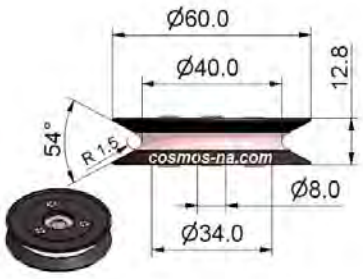
They are used extensively in pay off, spread plate and in adjusting wire velocity to the take-up reel. Some of the more popular flanged pulleys in R-groove are illustrated. Flat-groove pulleys are available upon request.



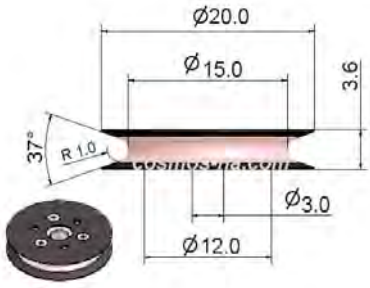

Part No. NT 012 Material: 95% $Al_2O_3$
Bearing 626 ZZ Wt. 23 g




Part No. NT 004 Material: 95% $Al_2O_3$
Bearing 694 ZZ Wt. 6.4 g

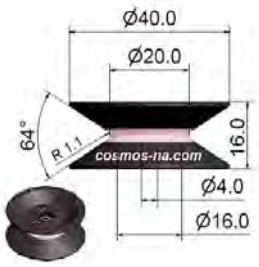



Part No. NT 017 Material: 95% $Al_2O_3$
Bearing 608 ZZ Wt. 42 g

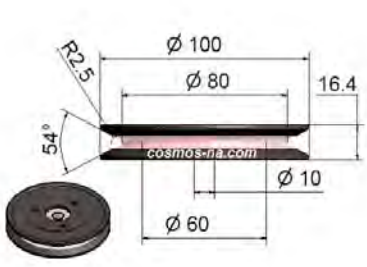



Part No. NT 005 Materal: 95% $Al_2O_3$
Bearing 683 ZZ Wt. 2.2 g


Part No. NT 019 Material: 95% $Al_2O_3$
Bearing 6200 ZZ Wt. 96 g




Part No. NT 010 Material: 95% $Al_2O_3$
Bearing 694 ZZ Wt. 11 g



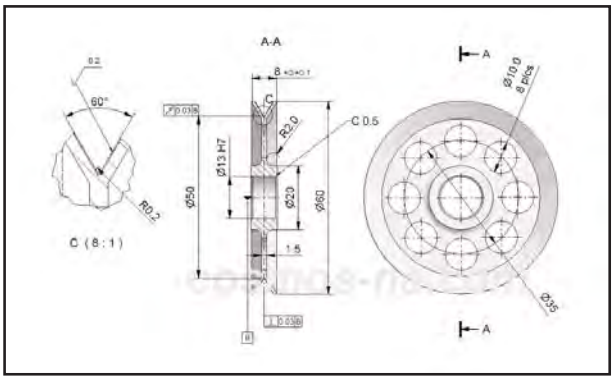

Part No. NT 080 Material: 95% $Al_2O_3$
Bearing 6200 ZZ Wt. 163 g

# Thermally Sprayed Pulleys can be Delivered at Short Notice

Sprayed Pulleys and Capstans are fabricated by machine tools in Aluminum Alloy or Carbon Steel and then Plasma Sprayed with wear-resistant, ultra-hard material, without the need to injection mold the green, removing the wax then sinter the item as in the manufacturing of Alumina pulleys. Therefore they can be delivered at short notice.


The additional benefits are:

1. Low starting torque when made of Aluminum
2. Precise dimensions by machine tool, including good concentricity
3. A broad range of dimensions to choose from



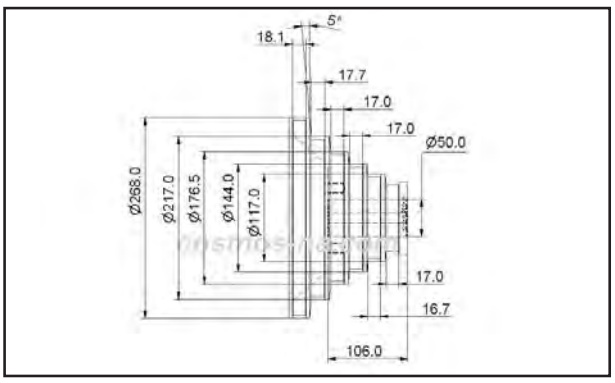

The wear-resistant, ultra-hard materials including their respective HV hardness value which we offer are:

| | |
|---|---|
| Chromium Oxide | 1,000 - 1,800 HV |
| Tungsten Carbide Cobalt | 750 - 1,450 HV |


You can opt to have the pulleys delivered with or without the bearing(s). The bearings, if included, will be:

Metric Metallic Ball Bearing

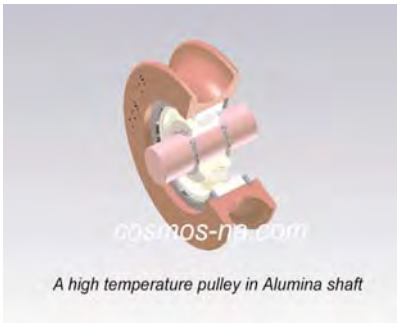
Thermal sprayed pulleys are made to order items, which call for precise dimensional drawings to fabricate the pulley from. In the absence of such a drawing, please consider sending us one used pulley and/or capstan, which will be returned to you after measurements.

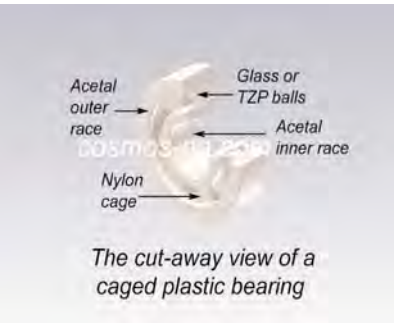



Images at right depict samples and the respective dimensional drawings.

# Harsh Environment Pulleys

The cut-away view of a full ball ceramic bearing


A high temperature pulley in Alumina shaft



The cut-away view of a caged plastic bearing

In the course of manufacturing, wires may go through:

***Elevated temperatures***

***A corrosive bath***

***A melted metallic bath***

For instance, Zinc galvanizing bath at 450$^{o}$ C; the preceding hydrochloric acid pickling bath.

All solid ceramic pulleys withstand high temperature and acid/water erosion, but the conventional grease lubricated metallic ball bearings are not equal to the task. The issue is addressed by switching to a ceramic ball bearing of which the basic components are depicted at top left.

A second choice is the plastic ball bearing depicted at top right for light duty guidance underwater at room temperature.

## Choice of the Shaft

For room temperature applications, the recommended shaft material is 304 Stainless Steel. At elevated temperatures, we offer 2 options:

1. Thermally matched shaft in Alumina
2. Thermally compensated 304 SS shaft with reduced diameter

An Alumina shaft is recommended for operating temperatures beyond 700$^{o}$ C above which the tensile strength of 304 Stainless Steel drops below that of Alumina. In addition, unlike its metallic counterpart, an Alumina shaft does not deform under temperatures below 1,000$^{o}$C.

## Thermally Matched Bonding

Bonding between the pulley and the ceramic bearing is achieved by ceramics to eliminate failure at elevated temperatures. Where metallic retaining rings are applied, the ring groove is ground oversize to compensate for thermal expansion.

## Service Temperature

The service temperature of the solid ceramic pulley, the full ceramic ball bearing and the ceramic bonding all exceed 1,000$^{o}$ C. The governing factor is the material of the shaft as previously elaborated. Service temperature of the plastic ball bearing should not exceed 50$^{o}$ C.

## Pulleys Dedicated for Harsh Environment

**NT 024** **NT 028** **NT 039**

**NT 041** **NT 046**

## Loading and Speed

As a rule of thumb, loading of the full ceramic ball bearing should be limited to 1/2 of that of the corresponding metallic ball bearing at room temperature. For the plastic balling bearings, do not exceed 1/4 of the corresponding capacity.

The no load maximum rotational speeds, without lubrication, are:

| | |
|---|---|
| Full Ceramic Ball Beaming: | 2,000 rpm |
| Plastic Ball Bearing: | 1,000 rpm |

Welding Butts, also known as welding tubes, are disposable wire guides used for hot butt welding bare wires. The material can either be Glass or Ceramics. Glass is 99% Silica, while Ceramics can either be Alumina or Mullite - a composite of Alumina and Silica. We offer welding butts in Glass and Mullite. Each has its merits and drawbacks as shown below:

| Characteristics | Glass | Mullite |
|---|---|---|
| Thermal shock resistance | Good | Good |
| Dielectric Strength | Good | Good |
| Fracture toughness | High | Low |
| Cost | High | Low |
| Transparency | Yes | No |
| I D (hole) tolerence | +/- 0.02 | +/- 0.1 |

The prominent advantages of Glass welding butts are: **Transparency + Tight ID size**

You can see through a glass welding butt to tell whether the two wire ends are properly aligned while welding, which is impossible with Mullite or Alumina. The precise ID size of the glass welding butt further assures a precise alignment for a perfect weld. The reduced number of rejects and the savings gained over time more than compensate for the additional cost you pay for the Glass.

We carry on inventory the following Glass and Mullite Welding Butts in mm dimensions:

**Glass**

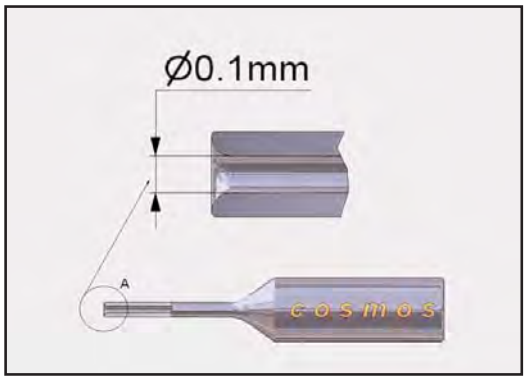
| Part No. | I. D. Min. | I. D. Max. | O. D. | Length |
|---|---|---|---|---|
| WG 22 | 0.74 | 0.78 | 6.1 | 6.2 |
| WG 21 | 0.82 | 0.86 | 6.1 | 6.2 |
| WG 20 | 0.91 | 0.95 | 6.1 | 6.2 |
| WG 18 | 1.12 | 1.16 | 6.1 | 6.2 |
| WG 16 | 1.40 | 1.44 | 6.1 | 6.2 |
| WG 14 | 1.80 | 1.84 | 6.1 | 6.2 |
| WG 12 | 2.25 | 2.29 | 6.1 | 6.2 |
| WG 10 | 2.84 | 2.88 | 6.1 | 6.2 |

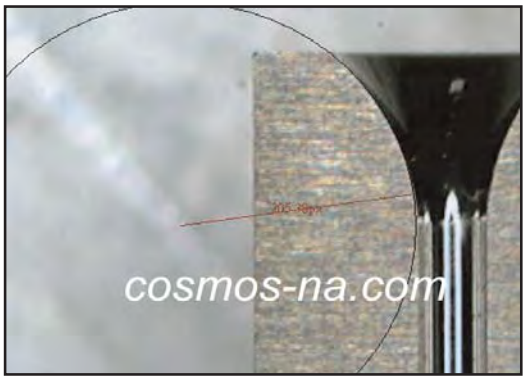
**Mullite**

| Part No. | I. D. Min. | I. D. Max. | O. D. | Length |
|---|---|---|---|---|
| W 22 | 0.74 | 0.94 | 10 | 13 |
| W 21 | 0.82 | 1.02 | 10 | 13 |
| W 20 | 0.91 | 1.11 | 10 | 13 |
| W 18 | 1.12 | 1.32 | 10 | 13 |
| W 16 | 1.40 | 1.60 | 10 | 13 |
| W 14 | 1.80 | 2.00 | 10 | 13 |
| W 12 | 2.25 | 2.45 | 10 | 13 |
| W 10 | 2.84 | 3.04 | 10 | 13 |

When the quantity justifies it, we can custom produce Glass and Mullite welding butts to your specifications. Please contact our sales engineers for details.

# Nozzle - Bore Ø 0.1 mm




NO, that's not a misprint. This is what is demanded of state-of-the-art miniature coil winding, to which we responded with a Solid Tungsten Carbide nozzle with a Diamond Polished Bore of **0.1 mm** plus precise radius. The one shown at top left illustrates a representative sample.

### Precise Radii

In unison with the trend to miniaturize, the tolerance of the bore radii has become even tighter. It is now being monitored by digital image processing, shown at top right, in which a nozzle is bisected to measure the radii dimension - a costly inspection procedure.

Upon request, our nozzle department will accompany each shipment of nozzles with a quality assurance report that registers the radius dimension of each nozzle, based upon which the customer is free to select at random to bisect and inspect. One customer, impressed by the accuracy of the report, asked: **How did you do that without bisecting?**

### Why Tungsten Carbide and not steel?

Isn't a carbon or stainless steel nozzle cheaper and capable of being salvaged when bent?

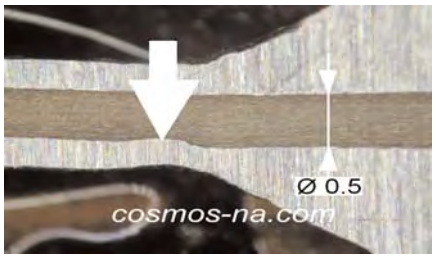
**Answer:** The choice of the nozzle material is a matter of manufacturing philosophy. Many nozzle makers claim that steel nozzle can also be mirror finished: plus, they do not break on impact and can always be salvaged for reuse.

The facts are:

1. You need to examine the bore surface under a microscope to see the true picture

2. A salvaged steel nozzle creates insulation layer damages, which leads to catastrophic consequences

The photo-microscopic image below may be of reference value. This is a stainless steel nozzle, bent and salvaged.



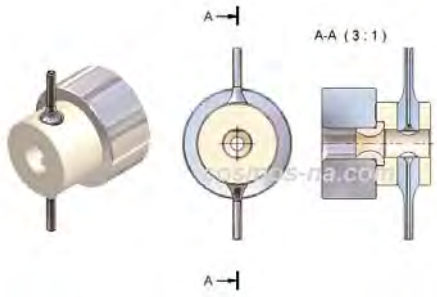

Upon cut-away and examination under a microscope, a bulge is revealed at the point where the nozzle was bent. Wire insulation is impaired by the bulge and may go undetected, only to manifest itself years after the coil has been put into service, resulting in millions of recalls and replacements.

The bore surface in the photo reveals the inherent nature of all hard-drawn ferrous tubes, where steel grains line up in the direction of drawing, creating a rough texture that is difficult to level.

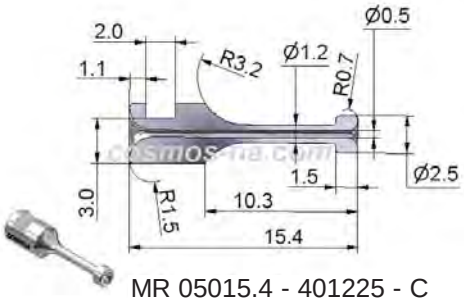
**Tungsten Carbide or Steel, the choice is yours.**

Used extensively in motor coil winding, the configuration of the Flyer Nozzles are usually custom made against drawings or samples. Six (6) representative drawings are illustrated.

Flyer nozzles are usually arranged in pairs when winding motor coils. One such fixture is shown at right.

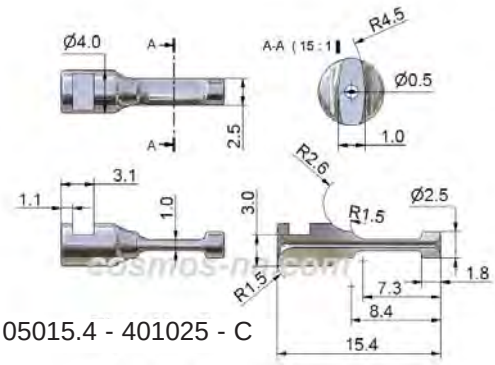



A 2 - Flyer Winding Fixture



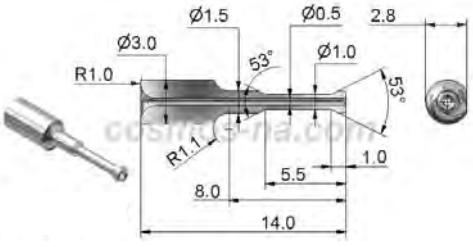

MR 05015.4 - 401225 - C


EE 05027 - 601020



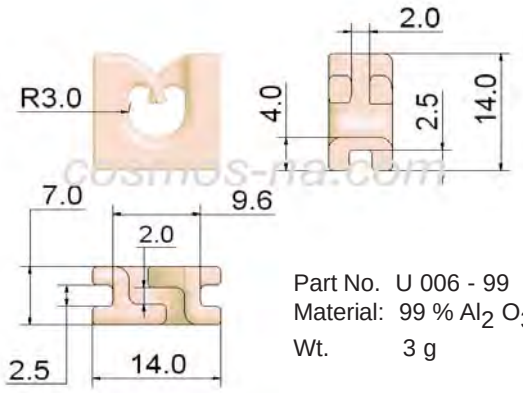

E 05015.4 - 401025 - C


E 05013.2 - 301010

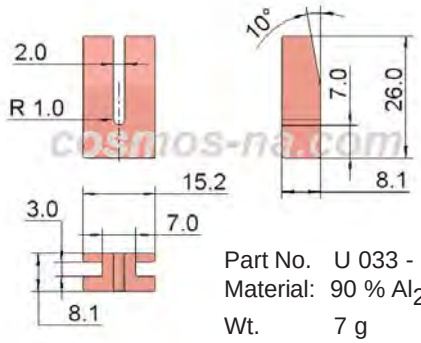



MR 05014 - 30151015 - F

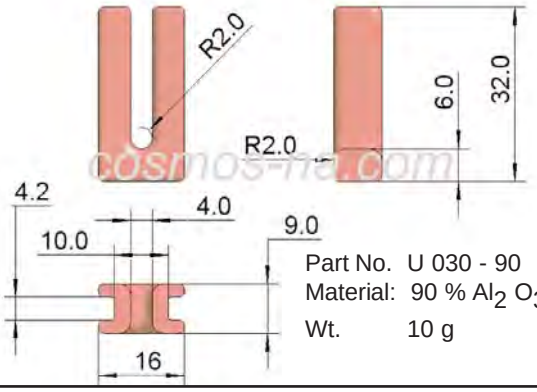

E 20023 - 743636



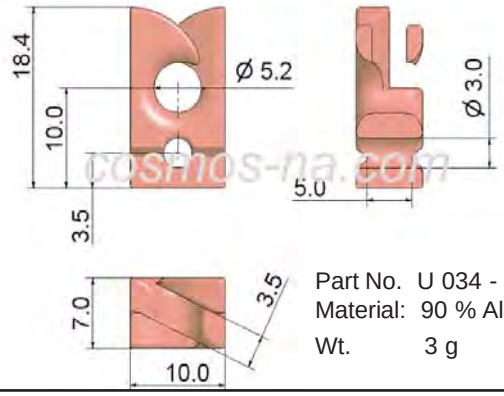

Part No. U 006 - 99
Material: 99 % $Al_2O_3$
Wt. 3 g



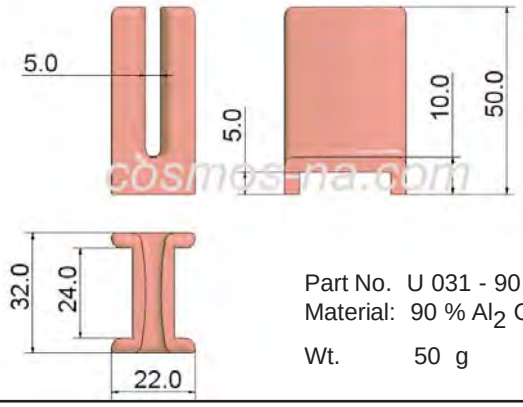

Part No. U 033 - 90
Material: 90 % $Al_2O_3$
Wt. 7 g



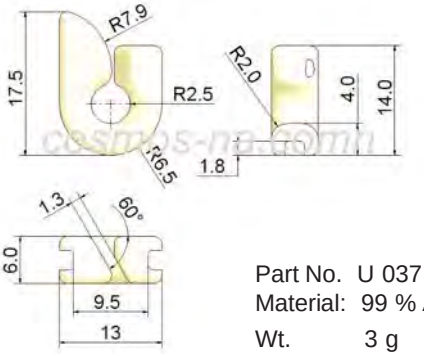

Part No. U 030 - 90
Material: 90 % $Al_2O_3$
Wt. 10 g



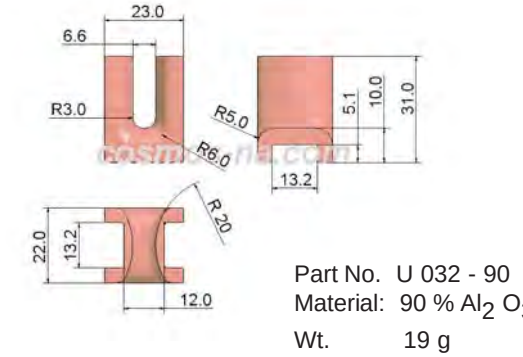

Part No. U 034 - 90
Material: 90 % $Al_2O_3$
Wt. 3 g



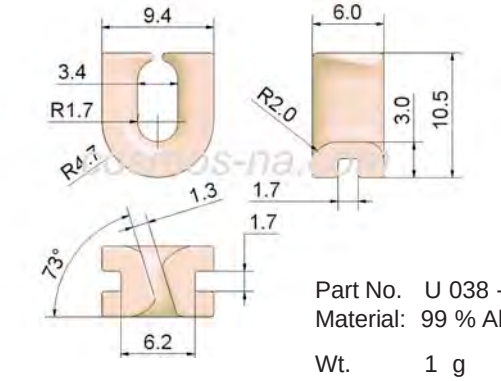

Part No. U 031 - 90
Material: 90 % $Al_2O_3$
Wt. 50 g



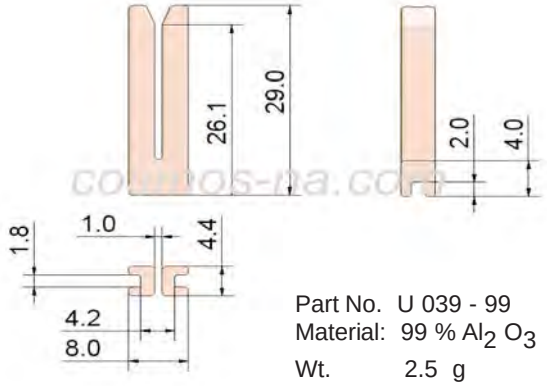

Part No. U 037 - 99
Material: 99 % $Al_2O_3$
Wt. 3 g



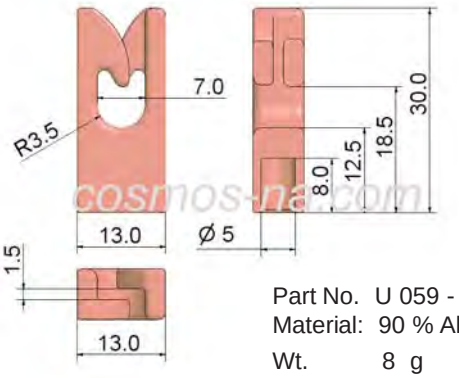

Part No. U 032 - 90
Material: 90 % $Al_2O_3$
Wt. 19 g



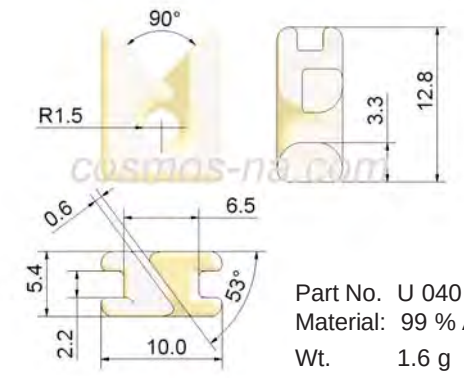

Part No. U 038 - 99
Material: 99 % $Al_2O_3$
Wt. 1 g



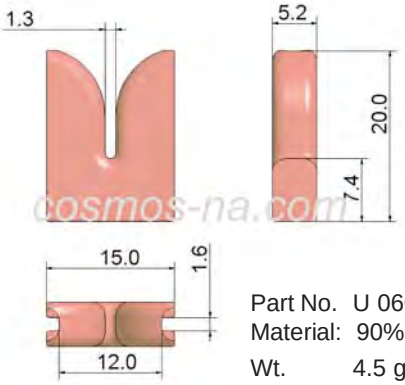

Part No. U 039 - 99
Material: 99 % $Al_2O_3$
Wt. 2.5 g



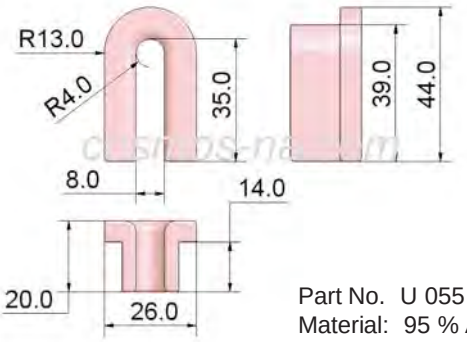

Part No. U 059 - 90
Material: 90 % $Al_2O_3$
Wt. 8 g



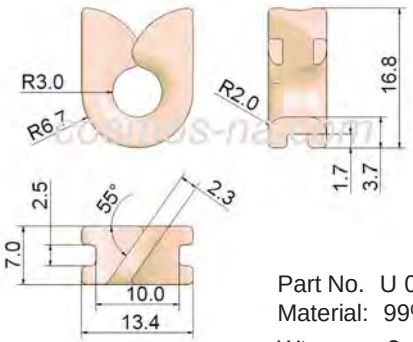

Part No. U 040 - 99
Material: 99 % $Al_2O_3$
Wt. 1.6 g



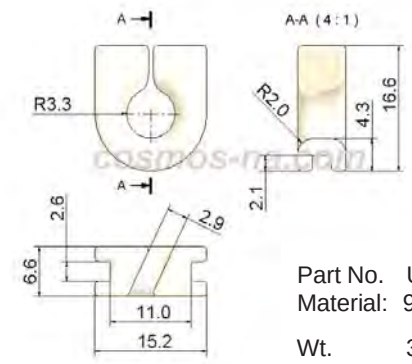

Part No. U 060 - 90
Material: 90% $Al_2O_3$
Wt. 4.5 g



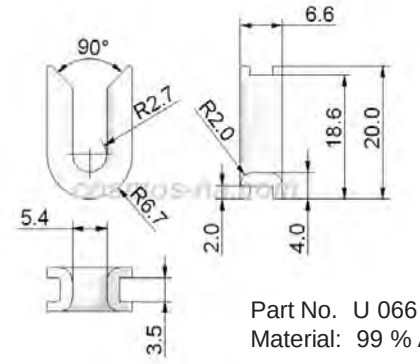

Part No. U 055 - 95
Material: 95 % $Al_2O_3$
Wt. 30g



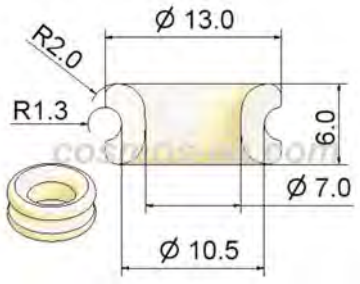

Part No. U 061 - 99
Material: 99% $Al_2O_3$
Wt: 3 g



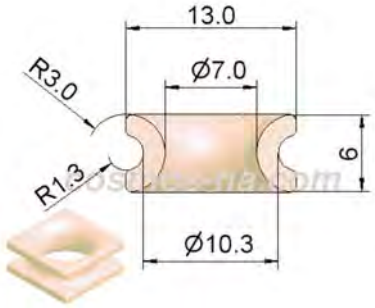

Part No. U 057 - 99
Material: 99% $Al_2O_3$
Wt. 3 g



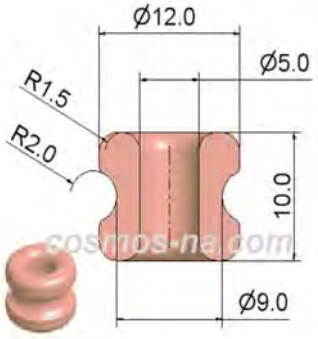

Part No. U 066 - 99
Material: 99 % $Al_2O_3$
Wt. 2.4 g



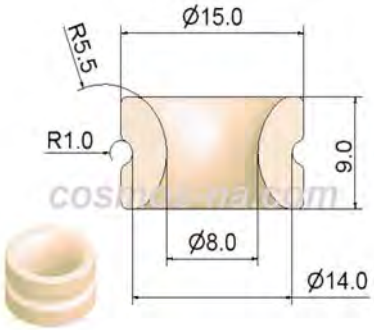

Part No. E 050 - 99 Wt. 2 g
Material: 99 % $Al_2 O_3$




Part No. E 051 - 99 Wt. 2 g
Material: 99 % $Al_2 O_3$

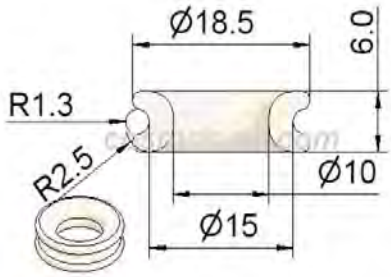



Part No. E 055 - 90 Wt. 2.8 g
Material: 90 % $Al_2 O_3$

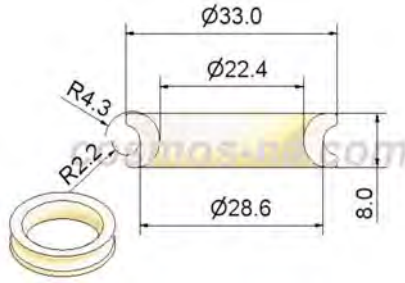



Part No. E 175 - 99 Wt. 5 g
Material: 99 % $Al_2 O_3$

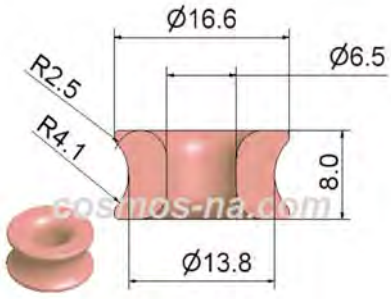

Part No. E 246 - 95 Wt. 0.4 g
Material: 95 % $Al_2 O_3$




Part No. E 253 - 92 Wt. 3 g
Material: 92 % $Al_2 O_3$




Part No. E 150 - 99 Wt. 8.5 g
Material: 99 % $Al_2 O_3$



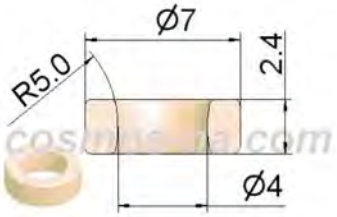

Part No. E 214 - 90 Wt. 6 g
Material: 90 % $Al_2 O_3$

## *Rings without groove*

A groove can be added to rings originally without a groove, depending upon the height and wall thickness. Please contact our sales engineers for details.


Part No. E 247 Wt. 0.13 g
Material: 95 % $Al_2O_3$

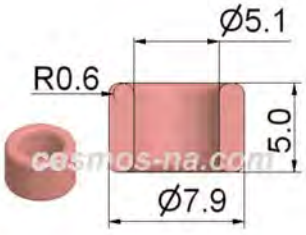

Part No. TR 034 Wt. 0.15 g
Material: Tungsten carbide



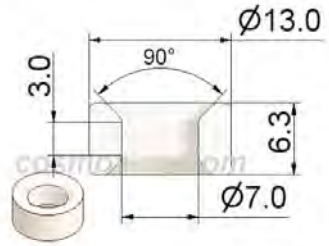

Part No. E 207 Wt. 0.2 g
Material: 99 % $Al_2O_3$


Part No. E 112 Wt. 3 g
Material: 90 % $Al_2O_3$

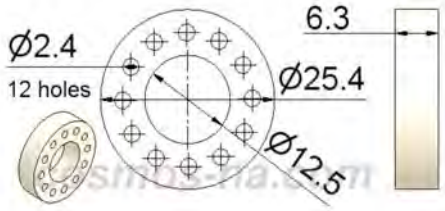

Part No. TR 001 Wt. 0.25 g
Material: Tungsten carbide



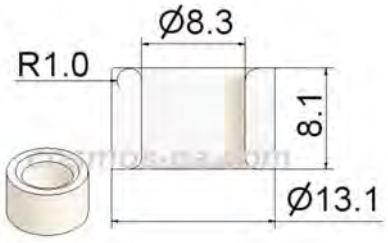

Part No. E 392 Wt. 0.5 g
Material: 90 % $Al_2O_3$




Part No. E 154 Wt. 2.5 g
Material: 99 % $Al_2O_3$




Part No. E 502 Wt. 8 g
Material: 99 % $Al_2O_3$

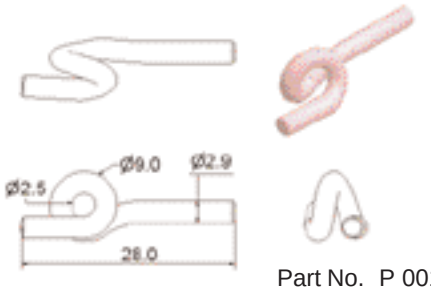



Part No. E 396 Wt. 2.45 g
Material: 99 % $Al_2O_3$

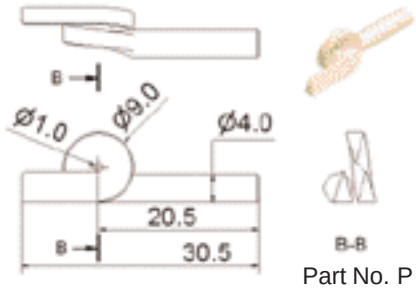

Part No. E 148 Wt. 16 g
Material: 95 % $Al_2O_3$

# *Pigtails, diamond polished within the loop, replace caged pulleys where wire alignment is an issue.*

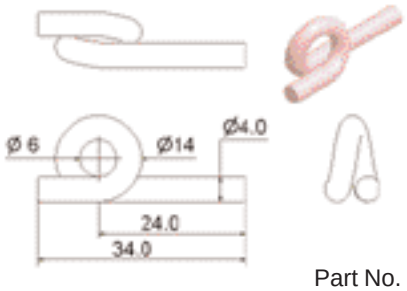
Pigtails can replace caged pulleys where wire alignment is an issue. Since the wire in this case is rubbing against the guide surface, it is highly desirable that the loop, or the surface in contact with the wire, be thoroughly mirror finished, shown left. Pigtails turn either to the left or to the right. This is indicated in the Part No. by the suffix " L " or " R "

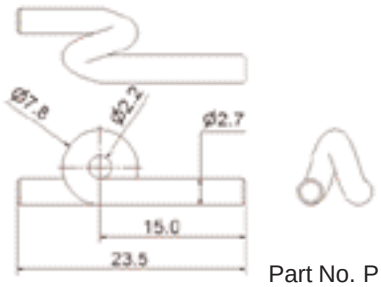

Part No. P 001 - L
Material: 95% $Al_2O_3$
Wt: 1.3 g



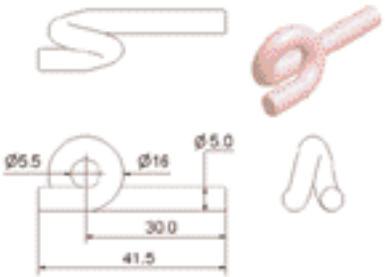

Part No. P 010 - L
Material: 99% $Al_2O_3$
Wt. 1.0 g



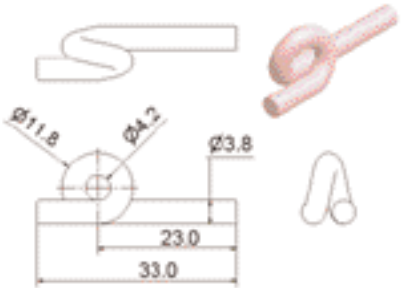

Part No. P 003 - L
Material: 95% $Al_2O_3$
Wt. 2.9 g




Part No. P 021 - R
Material: 95% $Al_2O_3$
Wt. 0.8 g



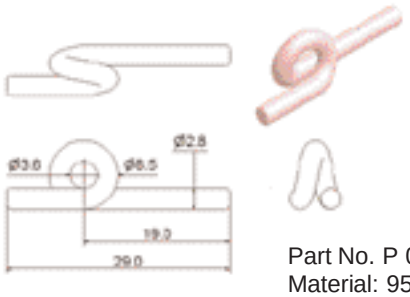

Part No. P 004 - L
Material: 95% $Al_2O_3$
Wt. 5.1 g



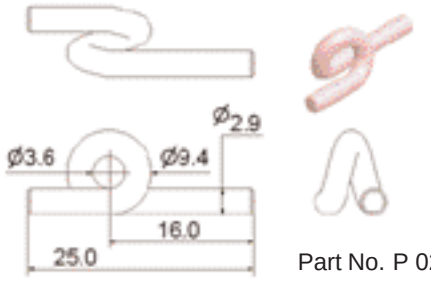

Part No. P 023 - L
Material: 95% $Al_2O_3$
Wt. 2.5 g

## *Pigtails can be delivered epoxy - bond to stainless steel holder in metric or inch threads*

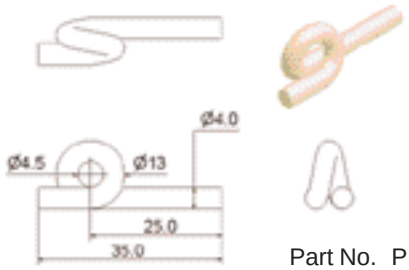
P 003 - L + SH 002



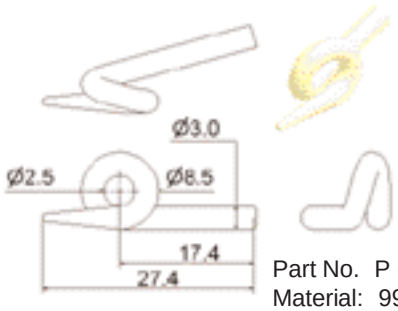

Part No. P 026 - L
Material: 95% $Al_2 O_3$
Wt. 1 g



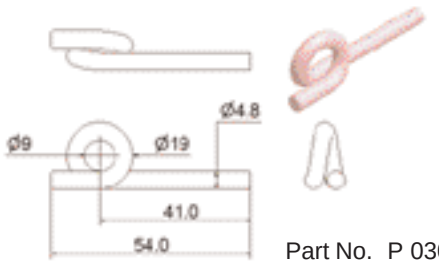

Part No. P 024 - L
Material: 95 % $Al_2 O_3$
Wt. 1 g



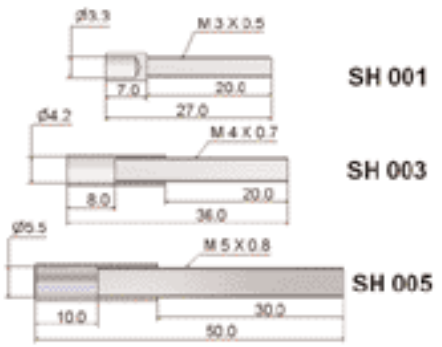

Part No. P 027 - L
Material: 99% $Al_2 O_3$
Wt. 3 g



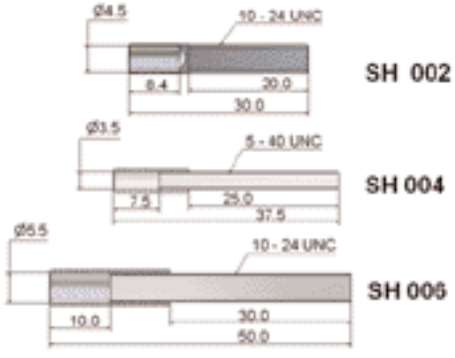

Part No. P 025 - L
Material: 99% $Al_2 O_3$
Wt. 1 g




Part No. P 030 - L
Material: 95% $Al_2 O_3$
Wt. 6.5 g




SH 001
SH 003
SH 005




SH 002
SH 004
SH 006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